



Your Electrical Solutions

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A Commitment to the Installed Base

Our employees are committed to supporting all Cutler-Hammer and Westinghouse equipment, no matter when it was manufactured or how long it has been in service. Our dedicated Aftermarket Organization provides products, services and expertise through a focused management team, sales engineers and technicians that work to keep customers' equipment operating.

Replacement Components and Renewal Parts

A full line of replacement components and renewal parts is available for the existing installed base of Cutler-Hammer and Westinghouse equipment. These replacement components and renewal parts are **new**, not used or surplus material. The use of original production tooling, assembly fixtures, and original specifications and drawings guarantees compatibility with existing equipment.

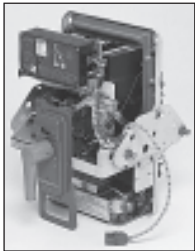
Equipment Modernization and Upgrades

Cutler-Hammer can extend the life of your existing equipment through modernization that can economically upgrade Cutler-Hammer and Westinghouse products, as well as those of other manufacturers. These state-of-the-art upgrades are engineered to provide:

- Solutions for obsolete electrical equipment;
- New technology for aging equipment;
- Retrofit, repair and remanufacturing processes;
- Monitoring, protection and control capabilities to your system;
- Genuine new replacement components and renewal parts.

Products and Services for Life Extension and Equipment Upgrades

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Standardize and Expand Circuit Protection

Digitrip RMS Trip Unit Retrofit Kits are available for Cutler-Hammer, Westinghouse, and other manufacturers of low voltage power breakers. These retrofits will expand circuit protection while increasing breaker and electrical system reliability.



Motor Control Center Bucket Retrofits

Freedom 2100 and ADVANTAGE replacement starter units can be used to increase the capacity of a motor control center without investing in a completely new assembly. Competitive retrofits are also available for other manufacturers' units using the ADVANTAGE MCC Bucket Retrofits.



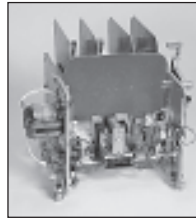
Replacement Vacuum Breakers

DHP-VR vacuum replacement breakers provide a means to cost effectively modernize existing air magnetic medium voltage switchgear while further increasing its effective life.



Switchgear Fluidized Epoxy Bus

Existing switchgear bus can be replaced or returned to our factory, regardless of the original manufacturer for re-insulation, using the custom fluidized epoxy bed process. It is available from 600 volts to 15 kV for switchgear, bus runs, and other equipment.



Medium Voltage Starter Upgrading

Vacuum contactors can be retrofitted or retrofitted into existing medium voltage air magnetic starters, achieving the benefits of vacuum technology without the expense of a completely new assembly.



Power Breaker Replacement

New DS or SPB power breakers are available for replacement, to fill existing cells, or in a cell retrofit package for upgrading existing older low voltage switchgear. These breakers are electrically and mechanically identical to the original vintages of DS and SPB breakers.



Low Voltage High Resistance Pulsing Ground Systems

Type C-HRG provides service continuity by providing a ground path for ground current via resistance that limits current magnitude and includes a means to trace the fault source.



Submetering Retrofitting

The IQ Energy Sentinel submetering device can be easily retrofitted on Series C Breakers, or those of other manufacturers, in existing equipment. When combined with the PowerNet System, the IQ Energy Sentinel can now provide submetering at numerous levels of monitoring and energy management.



Retrofit TVSS System

Protect solid state devices from the damaging effects of transient overvoltages. Retrofit TVSS systems can be installed in low voltage distribution gear or retrofitted into existing switchboards, panelboards, and motor control center units to eliminate the transient surge before it can reach sensitive equipment.



Replacement Molded Case Breakers and Parts

Panelboard and motor control center replacement breakers and parts are physically interchangeable with out-of-production breakers for existing Cutler-Hammer and Westinghouse products.



Excitation Control

Cutler-Hammer offers a complete family of static exciters designed for application on medium to large electric utility and industrial generators and motors.



Installation and Start-Up Services

Installation and start-up services can be provided for Cutler-Hammer equipment, as well as equipment manufactured by other organizations.



DISTRIBUTION SYSTEM

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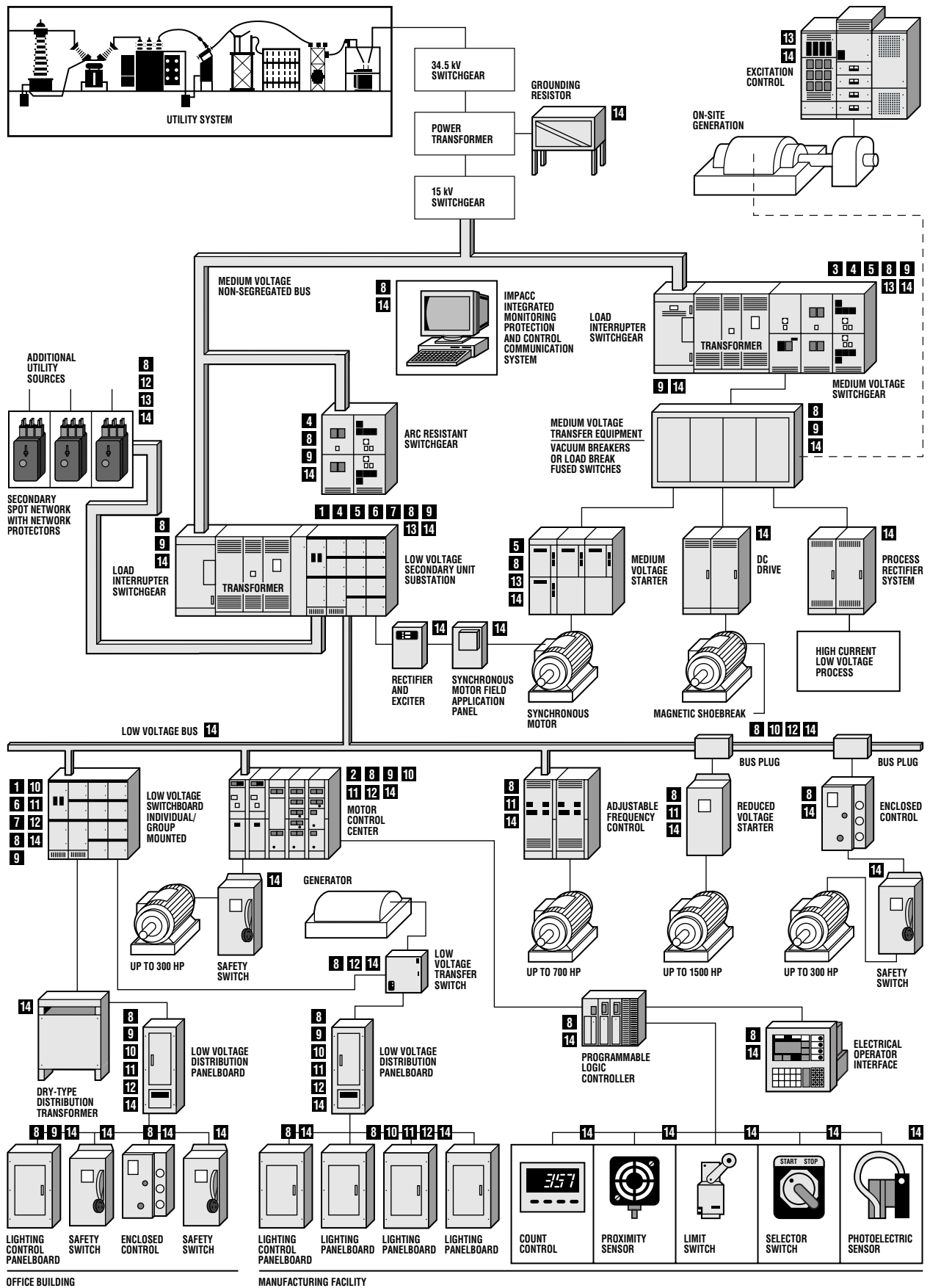




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PRODUCT DESCRIPTION

Molded case circuit breakers are designed to provide circuit protection for low-voltage distribution systems. They are described by NEMA as, "... a device for closing and interrupting a circuit between separable contacts under both normal and abnormal conditions," and furthermore as, "... a breaker assembled as an integral unit in supporting an

enclosed housing of insulating material." The NEC describes them as, "... a device designed to open and close a circuit by non-automatic means, and to open the circuit automatically on a predetermined overload of current, without injury to itself when properly applied within its rating." Circuit breakers protect against overloads in conductors and protects against short

circuits in connected apparatus, such as motors and motor starters. Circuit breakers are designed for use in panelboards, switchboards, motor control centers, control panels, combination starters, individual enclosures, and bus duct plug-in units.

PRODUCT HISTORY

Originally a Westinghouse Product

The need for molded case circuit breakers came about in 1918 when numerous applications for electrical motors resulted in a demand for a device that would ensure safe operation and, at the same time, protect electrical circuits.

During this period, individual motors were used for the first time in industrial plants to operate machine tools and in private homes to operate appliances. Plant electricians were constantly changing fuses blown during motor start-ups because of the lack of properly designed fuses for motor circuit protection. Homes experienced similar problems when electrical circuits were overloaded. Inspectors were concerned about fire hazards because of plug fuses being bridged with pennies and the installation of fuses with too high of an ampere rating.

Inspection authorities became involved and attempted to find a solution to the problem. Meetings with switch manufacturers were initiated in an effort to find a

solution. Switch manufacturers were asked to develop a switching device that would interrupt a circuit under prolonged overload conditions. The device would have to be safe, reliable and tamperproof. It should also be resettable so as to be reusable after an interruption without replacing any parts. This search for better circuit protection resulted in many different but unacceptable approaches to the problem. These early meetings and subsequent efforts prepared the groundwork for the eventual development of the molded case circuit breaker.

After intensive research and development, Westinghouse produced the DE-ION arc extinguisher for use in large oil circuit breakers. Although too large in its initial form to be practical for small circuit breakers, the arc extinguisher was eventually modified into a usable size. The first compact, workable circuit breaker was developed in 1923 when the

modified arc extinguisher was coupled with a thermal tripping mechanism. It was not until four years later, however, that Westinghouse research engineers found the ideal combination of materials and design that permitted circuit breakers to interrupt fault currents of 5000 amperes at 120 volts AC or DC. One year later, Westinghouse placed the first circuit breaker on the market. Its acceptance was instantaneous.

Since that initial introduction in 1927, Westinghouse continued to be at the forefront of circuit breaker technology with an unprecedented series of circuit protective enhancements and introductions as chronicled below. In 1994 the Eaton Corporation, another World Class technology leader, acquired the Westinghouse Distribution and Control Business Unit and integrated it with Cutler-Hammer forming a powerful, new combination, poised to meet the challenges of the next 100 years.

MAJOR PRODUCT INTRODUCTION

	1920	1930	1940	1950	1960	1970	1980	1990	Present
1923 First compact, workable circuit breaker developed by Westinghouse		[Timeline bar from 1923 to Present]							
1927 Westinghouse introduced the first complete circuit breaker line, rated 10-600 amps, 600 volts		[Timeline bar from 1927 to Present]							
1939 Along with ordering information and style numbers, the various maximum current ratings came to be known by frame designations:		[Timeline bar from 1939 to Present]							
		50 Ampere	E Frame						
		100 Ampere	F Frame (Non-interchangeable Trip)						
		100 Ampere	G Frame						
		225 Ampere	K Frame						
		600 Ampere	L Frame						
1970 Motor Circuit Protector ("MCP") introduced – First sensitive, low level protection designed specifically for motor circuits						[Timeline bar from 1970 to Present]			
1973 "SELTRONIC" introduced – First molded case circuit breaker with an electronic trip unit						[Timeline bar from 1973 to Present]			
1979 "Current Limit-R Circuit Breaker" introduced – First true current limiting circuit breaker							[Timeline bar from 1979 to Present]		
1982 "Series C" Family introduced – New World Class standard meeting increasing interrupting requirements without sacrificing compact size							[Timeline bar from 1982 to Present]		
1994 Westinghouse Distribution and Control Business Unit (DCBU) acquired by Eaton, integrated with Cutler-Hammer (The Cutler-Hammer line of molded case circuit breakers was sold when merged with Westinghouse)								[Timeline bar from 1994 to Present]	
1995 "OPTIM" Family introduced – First truly programmable molded case circuit breaker								[Timeline bar from 1995 to Present]	



BREAKER IDENTIFICATION

Nameplate Data

A circuit breaker is identified by data found on the nameplate.

This includes:

- Catalog Number
- Shop Order Number
- Style Number
- Amperage
- Number of Poles
- Voltage Class
- Temperature Rating

In most instances, the Catalog Number, Style Number, or Shop Order Number will supply enough information to identify the circuit breaker. **However, it is always advisable to obtain all data from the nameplate to facilitate identification.**

A **Catalog Number** begins with a series of letters followed by numbers that identify:

- Circuit Breaker Type
- Number of Poles
- Maximum Amperage

Example: Catalog Number F3020 indicates a Type F Circuit Breaker, 3 Poles, 20 Amperes

A **Shop Order Number** begins with one or two numbers followed by a single letter and four additional numbers.

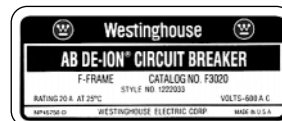
A Shop Order Number is listed in place of a Catalog Number and indicates the circuit breaker was modified at the factory, i.e., addition of a shunt trip, special calibration, etc. **Every Shop Order Number must be researched with the factory to properly identify modifications.** Call your Cutler-Hammer Field Sales Office for this information.

Example: 70E2121

NOTE: Cutler-Hammer does not recommend replacing a circuit breaker identified by a Shop Order Number with a standard "off-the-shelf" circuit breaker without first identifying the modifications. They may be critical to safe and reliable operation.



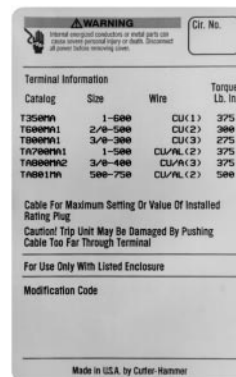
Pre-Series C Breaker with Original Label



Series C Breaker with Original Label



New Label for Typical SELTRONIC MCCB



Accessories

Most circuit breaker accessories are mounted internally and are not visible with a quick inspection. However, since many accessories rely on or supply an external signal, there may be electrical leads exiting the circuit breaker case. Inspect for these leads when obtaining full descriptive information for circuit breaker replacement. Examples of common accessories:

Shunt Trip

Used to remotely trip the circuit breaker using an electrical signal. Typically two wires extend through the case.

Undervoltage Release (UVR)

Trips the circuit breaker when voltage drops below a specified percentage of coil voltage (typically 70%). Typically two wires extend through the case.

Auxiliary Switch

Provides remote indication of the circuit breaker status (open/closed). Typically three wires extend through case in a 1-pole 1A/1B application.

Alarm Lockout Switch

For remote indication of an automatic trip operation. Typically two or three wires extend through the case.



MOLDED CASE CIRCUIT BREAKERS

General Information

FACTORY ORIGINAL CIRCUIT BREAKERS

Why Insist on Only Genuine, New MCCBs Purchased Through Authorized Distributors?

Cutler-Hammer defines “New” product as that which has not yet been installed in an electrical circuit, purchased through authorized channels in factory original condition and packaged in unopened Cutler-Hammer cartons.

- The only way to ensure safe and reliable operation of your system is to use genuine, new, Cutler-Hammer products exclusively. Since Cutler-Hammer does not resell the component parts for mold-

ed case circuit breakers, the only way for third party breaker refurbishers to get parts for the breakers that they are rebuilding is to cannibalize other used breakers or to use counterfeit components. Neither is a very good option for the end user.

- In some cases, unauthorized resellers of molded case circuit breakers have been found to misrepresent used, rebuilt, or surplus products. Only

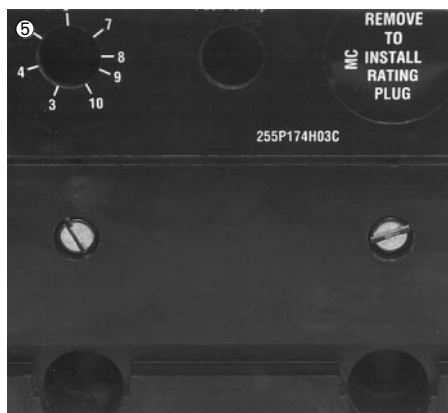
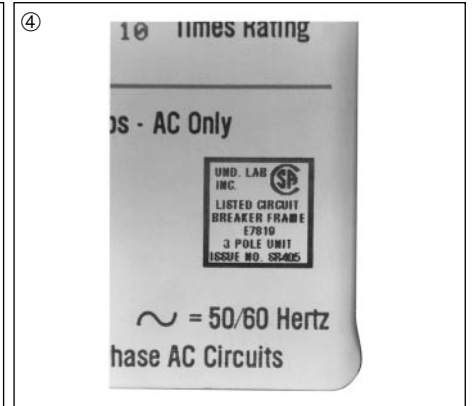
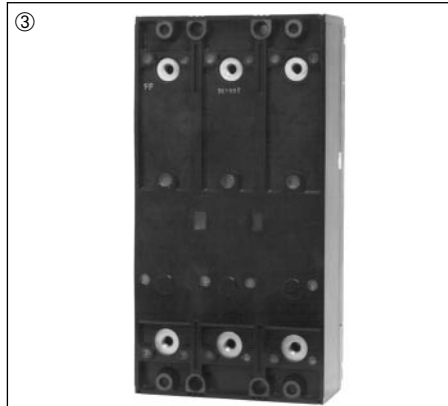
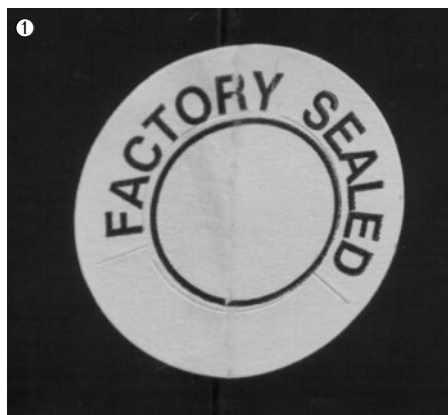
products purchased as “new” through authorized channels are covered under the Cutler-Hammer warranty policy.

- There have been instances where third party refurbishers have rebuilt breakers using the wrong parts, with parts missing or the factory lubrication removed in the cleaning process — any of which may result in devices that may not be depended upon to function properly to protect equipment and personnel.

Identifying Genuine, Factory Original Westinghouse Circuit Breakers Manufactured by Cutler-Hammer

The features on a molded case circuit breaker that identify it as genuine or counterfeit may or may not be readily apparent. In fact, there may be differences not detectable by an external investigation.

- ① A genuine Westinghouse brand molded case circuit breaker manufactured by Cutler-Hammer will have an unbroken seal where the case comes together. This seal was placed at the factory and assures the internal integrity of the breaker. If, for any reason this seal is broken, do not accept the breaker. (Seal does not appear on interchangeable trip breakers.)
- ② There is a manufacturing date code on the back of genuine molded case circuit breakers stamped in silver and white. If this coding is missing, it may mean the breaker has been subjected to tampering. Frequently, this date code is wiped off in an attempt to represent the breaker as new.
- ③ Another way to tell if a breaker has been tampered with is to examine the sealant used to cover the screws on the top rear of the breaker. If the sealant appears sloppy or is missing, it indicates that the unit may have been subjected to tampering.
- ④ A UL label on a genuine Westinghouse breaker is either exactly as shown in the photo or is stamped in white ink onto the frame in older pre-Series C breakers. Anything other than this may indicate fraud.
- ⑤ If front cover screw shows marks from use, someone has attempted to open the breaker. The front covers are either black or gray on genuine Westinghouse molded case circuit breakers.
- ⑥ Westinghouse molded case circuit breakers manufactured by Cutler-Hammer are packed individually and shipped in Cutler-Hammer labeled cartons. Anything other than this is not to be considered new and should be suspect.





REPLACEMENT CAPABILITIES

Series C Molded Case Circuit Breakers

When and Where to Use:

- Generally a first choice wherever physically and electrically practical
- Where communications, energy and power quality monitoring are desired
- As a direct replacement or add-on to already installed Series C product
- Where ampere rating flexibility is desired. (Interchangeable trip units are available.)

Advantages:

- Most current molded case circuit breaker technology
- Higher interrupting capacities in each frame size
- Smaller and lighter for a given frame size than other options
- Generally less expensive than other replacement breaker options
- Readily available throughout range / High levels of stock
- Available from stock
- One year warranty

Current Production Replacement Circuit Breakers

When and Where to Use:

- As a direct, one-for-one replacement of current production pre-Series C product
- Where you know the catalog/style number but not the physical or electrical specifics about the application

Advantages:

- Ease of selection and certainty of replacement
- Guaranteed to be both a physical and electrical duplicate of original
- Still in production
- Newly manufactured
- UL listed
- Available from stock
- One year warranty

Replacement of Out-of-Production Panelboard or Motor Control Center Molded Case Circuit Breakers

When and Where to Use:

- When replacing out-of-production circuit breakers in an existing Panelboard or MCC

Advantages:

- Newly manufactured and tested to the latest applicable standards
- Both physically and electrically interchangeable with the circuit breakers that they are designed to replace
- UL listed
- Available from stock in most frame sizes
- One year warranty

Factory Reconditioned Molded Case Circuit Breakers

When and Where to Use:

- Where Series C and other replacement breaker options are either not available or not workable
- Where it is not feasible to modify or upgrade gear but there is a need to replace or add a circuit breaker

Advantages:

- Though not UL listed, these breakers are reconditioned and tested by Cutler-Hammer at the factory according to the original manufacturing and engineering standards to which the breakers were built
- Available for all styles of out-of-production circuit breakers (E, F, G, J, K, L, M, P)
- Knowledge that these breakers are both safe and reliable
- Labeled "Reconditioned Circuit Breaker, Resold By Cutler-Hammer"

Service for Molded Case Circuit Breakers

When and Where to Use:

- Where circuit breaker has sustained minor physical damage to a handle, lug, etc., that otherwise would be fully functional
- Large frame circuit breaker (600A and above) that has experienced some normal wear, but is in generally good condition, as an economically driven alternative to new

Advantages:

- Prevents loss of circuit breakers due to minor damage
- Reduces overall breaker costs
- Prevents use of potentially unreliable third party refurbishers
- Includes full one year Cutler-Hammer Warranty
- Ensures reliability through dealing with the original manufacturer with a long and well-recognized tradition of product safety, integrity and quality
- Provides a simple and convenient solution



MOLDED CASE CIRCUIT BREAKERS

Digitrip OPTIM System

NEW TECHNOLOGY

Digitrip OPTIM is a new programmable communicating microprocessor-based low-voltage electronic trip unit system for Westinghouse Series C Molded Case Circuit Breakers and low-voltage power breakers. Digitrip OPTIM trip units are available in two styles, Digitrip OPTIM 750 and Digitrip OPTIM 1050, in Series C frames L-, N-, and R-70 through 2500 amperes.

Digitrip OPTIM trip units are fully programmable and can be applied as a stand-alone breaker with a hand-held Digitrip OPTIMizer programmer for configuring the trip unit, displaying information and testing. In addition, OPTIM can be applied as a low-voltage assembly with a panel mounted Breaker Interface Module (BIM) to configure, display and test. Alternatively, OPTIM can be applied as part of a fully integrated IMPACC system.



Stand Alone

The hand-held Digitrip OPTIMizer is used to program individual OPTIM Trip Units.



Sub-Network

The Breaker Interface Module, mounted on the assembly or at a remote location, is used to access, configure, and display information from Digitrip OPTIM Trip Units. Any combination of OPTIM Trip Units and/or Digitrip RMS 810/910 Trip Units and/or IQ Energy Sentinels™ (up to 50 devices) can communicate with the Breaker Interface Module.



Field Bus

With Integrated Monitoring, Protection and Control Communications (IMPACC), the plant operator, facilities engineer, and/or maintenance engineer can monitor and control the entire power distribution system from a central PC.

Typical OPTIM Applications

When more information is required to better manage your production process. In a critical process such as a batch reactor used in the food, chemical, pharmaceutical, and petroleum industries.

Material in the process vessel can be worth more than the equipment required to produce it. This application requires close coordination with the overall electrical distribution system, possible isolation from the main switchboard, higher levels of overload and fault protection, remote breaker status indications, controlled shut-down sequence, monitoring, and data collection.

When early warning information that reduces downtime is required. On a critical production line such as an automatic feeder supplying subassemblies for a finished product used in the automotive industry, or by OEMs and electric product manufacturers. Automated welding and paint lines, for example, require higher levels of overload and fault protection, advanced warning of an impending trip condition, and system diagnostics which reduce the time necessary to get back on line.

When there is a concern with system obsolescence. When upgrading your facility's electrical distribution system, there could be a requirement to replace obsolete main or branch protection devices where space is limited. Feeders for laboratories and computer rooms could require better coordination and protection, while specialized equipment such as engine generators and variable frequency drives could also require upgraded protection.

OPTIM meets these requirements economically because they provide high reliability and increased performance in a compact, dustproof unit that is wall mountable. Rewiring costs are minimized. A Digitrip OPTIM Enclosed Circuit Breaker can be locked in the off position to comply with OSHA lockout/tagout regulations, and meet the NEC 430 requirements for a separate disconnect within sight of motor loads.



NEW TECHNOLOGY, Continued

Programmability Increases Protection and Coordination Capabilities

Several unique protection and coordination features can be electronically programmed to provide:

- **Time-current settings** with more increments that permit the user to optimize system protection and coordination.
- **Improved accuracy** giving more selectivity and closer sensitivity in providing coordination.
- **Improved reliability** provided by displaying time-current setpoints in actual amperes.
- **Programmable short delay and/or instantaneous curve tripping options.**
- **Selectable powered and unpowered thermal memory as well as selectable sure start discriminator protection features.**
- **Increased system security** provided by the addition of programmable password protection.

For improved system coordination, we have added:

- **1st long delay time slope** to the traditional nine Long Time, Short Time, Instantaneous, and Ground Fault (LSIG) curve shaping options.
- **Short delay and ground delay zone selective interlocking** down to a 70 ampere molded case circuit breaker.

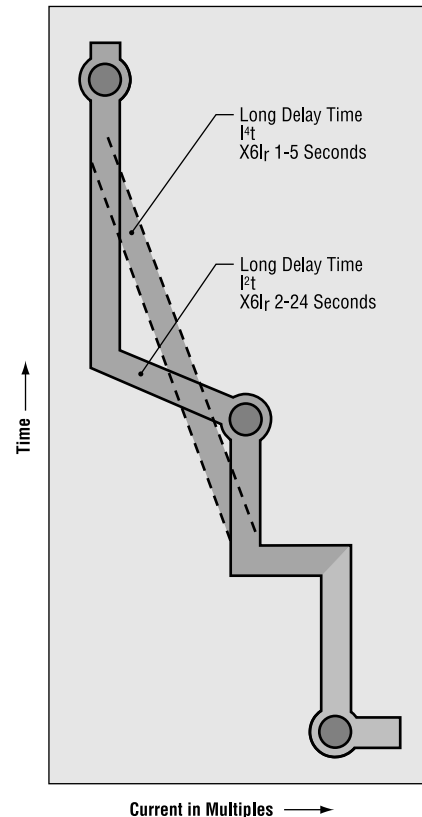


Digitrip OPTIM Trip Units can be programmed with hand-held OPTIMizer (above) that plugs into the front of the trip unit; or with the Breaker Interface Module mounted directly on the enclosure door.

Advance Warning Alerts to Potential Problems

This feature helps keep your system operating and more productive with:

- **Programmable high load phase and neutral alarm**, adjustable between 50% and 100% of I_r Long Delay Pick Up (LDPU) setting, that will signal an impending trip condition.
- **Adjustable ground fault alarm** that will alert the user of a ground fault condition without tripping the breaker.
- **Energy alarming** (such as peak demand exceeded) to reduce energy costs with OPTIM 1050 via IMPACC.
- **Total Harmonic Distortion (THD) alarming** detects changes in power quality with OPTIM 1050 via IMPACC.



System Diagnostics Provide Reduced Downtime

Digitrip OPTIM provides a complete selection of system diagnostic capabilities such as:

- **Four cause-of-trip Light Emitting Diodes (LEDs)** mounted on the front of the trip unit to improve troubleshooting capabilities along with trip event information that is stored in memory after a trip condition.
- **Remote breaker status indicator** provided by auxiliary and alarm switches.
- **The Breaker Interface Module (BIM)** provides trip indication information on the front of the unit itself or via relay contacts to a remote location.

System Monitoring – “If You Can’t Measure It, You Can’t Manage It”

- Digitrip OPTIM has an extensive menu of system monitoring capabilities:
 - Load monitoring (ABCNG).
 - Power factor (OPTIM 1050).
 - Power and energy (OPTIM 1050).
 - Power quality – current harmonics (OPTIM 1050) with accuracy based on full scale sensor rating:
 - $\pm 2\%$ Current.
 - $\pm 4\%$ Power.
 - ± 5 Energy.
- OPTIM trip units are IMPACC compatible and can be included in the unique Cutler-Hammer IMPACC communications system, specially designed for electrical distribution applications.
- All OPTIM programming, configuration, advanced warning, diagnostics, monitoring, and control capabilities can be accessed from a central PC using IMPACC software. Additional software packages can provide energy management as well as waveform capture.

Field Testing to Verify Performance

Trip or no trip testing can be performed on OPTIM Trip Units to verify operation. Testing can be completed by using a Digitrip OPTIMizer, the Breaker Interface Module or IMPACC software. An auxiliary power module can be provided for bench testing.



NEW TECHNOLOGY, Continued

Digitrip OPTIMizer



Hand-Held Programmer

The OPTIMizer plugs into the front of the trip unit and is powered by a nine-volt battery. The Digitrip OPTIMizer hand-held programmer accesses, displays and configures information from OPTIM Trip Units.

An operator can use the OPTIMizer to:

- **Complete Initial System Setup**
 - Select breaker addresses
 - Select system frequency (50/60 Hz)
 - Set system baud rate
 - Set system password

- **Configure the System**
 - Change time-current setpoints
 - Select protection options
 - Select alarm levels
- **Display Information**
 - Breaker information
 - Time-current setpoints
 - Metered values
 - Trip event information
- **Test Trip Unit Performance**
 - Phase and ground
 - Trip/no trip

Breaker Interface Module



Panel Mounted User Interface

The Breaker Interface Module can be mounted directly on the assembly or at a remote location and can be used to access, configure and display information from OPTIM Trip Units.

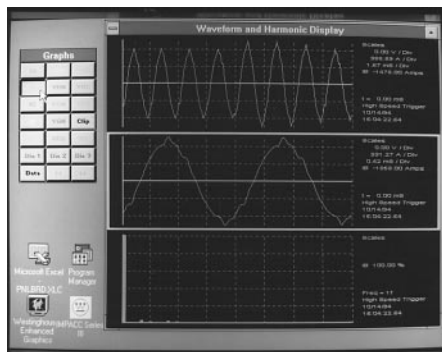
An operator can use the Breaker Interface Module to:

- **Setup Initial System**
 - Select system frequency (50/60 Hz)
 - Set system password
- **Configure the System**
 - Change time-current setpoints
 - Select protection options
 - Select alarm levels
- **Display Information**
 - Breaker information
 - Time-current setpoints
 - Metered values
 - Trip event information
- **Test Trip Unit Performance**
 - Phase and ground
 - Trip/no trip

All Features of the OPTIMizer PLUS...

- **Expanded Energy Monitoring**
 - Set addresses for group energy monitoring
 - Group energy readings
- **Local and Remote Indication**
 - Remote indication/alarming
 - Breaker status LED indication
- **Expanded Communications**
 - Communicates with:
 - OPTIM Trip Units
 - Digitrip RMS 810 and 910 Trip Units
 - IQ Energy Sentinels and Universal IQ Energy Sentinels
 - Up to 50 devices

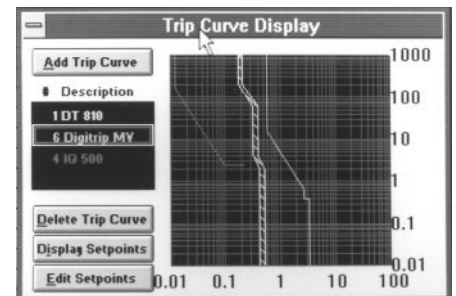
IMPACC Communications



Programming and Other Capabilities from a Personal Computer

All OPTIM programming, configuration, advance warning, diagnostic, monitoring and control capabilities can be accessed from a central personal computer using IMPACC Series III software. Application software packages are available to configure and download setpoints to provide faster, more efficient system management. These include:

- **Coordination software** to display, configure and coordinate time-current protection curves for OPTIM Trip Units and other devices that can be included on an IMPACC System
- **Custom billing software**, a stand-alone application-specific software package, that provides the capability to determine energy usage data by individual departments or tenants in a facility and



then create electric bills based on this data.

- **Waveform and harmonic display software** capable of performing a waveform capture of phase currents A, B and C. In addition, Total Harmonic Distortion (THD) and individual harmonic contents of phase currents A, B, C, neutral, or ground can be displayed.



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MOLDED CASE CIRCUIT BREAKERS

Miniature Circuit Breakers

A

MINIATURE CIRCUIT BREAKER REPLACEMENT GUIDE

Quicklag Plug-in Industrial Circuit Breakers							
Maximum Amperes	150A	125A	100A	100A	30A		
CURRENT DESIGN	These circuit breakers replace the out-of-production circuit breakers listed below.	HQP 	QPHW 	QHPX 	QHPW 		
	Dimensions – Inches Per Single Pole Breaker						
		W 1 H 2 1/16 D 2 3/8	W 1 H 2 1/16 D 2 3/8	W 1 H 2 1/16 D 2 3/8	W 1 H 2 1/16 D 2 3/8	W 1 H 2 1/16 D 2 3/8	
Out-of-Production Westinghouse Circuit Breakers							
These Circuit Breakers Are No Longer Manufactured	HQNPL, HQNPAL, HQNP, HQNPA, QP, QPA, QPAH, QNPL, QNPAL, QNP Type P, PL	QPH	No Previous Circuit Breaker Existed	QHPL QHP			
Recommended QUICKLAG® Circuit Breakers listed above.							
Quicklag Bolt-on Industrial Circuit Breakers							
Maximum Amperes	150A	100A	125A	100A	30A		
CURRENT DESIGN	These circuit breakers replace the out-of-production circuit breakers listed below.	BAB 	GB, GHB 	QBHW 	HBAX 	HBAX 	
	Dimensions – Inches Per Single Pole Breaker						
		W 1 H 2 1/16 D 2 3/8	W 1 H 4 D 2 1/16	W 1 H 2 1/16 D 2 3/8	W 1 H 2 1/16 D 2 3/8	W 1 H 2 1/16 D 2 3/8	
Out-of-Production Westinghouse Circuit Breakers							
These Circuit Breakers Are No Longer Manufactured	HQNB HQNBA QB, BA QNBL QNBAL	BA (277V) Single Pole Only	QBH	No Previous Circuit Breaker Existed	HBA		
Recommended QUICKLAG® Circuit Breakers listed above.							
Quicklag Cable-in/Cable-out Industrial Circuit Breakers							
Maximum Amperes	60	60	100A	100A	100A	30A	
CURRENT DESIGN	These circuit breakers replace the out-of-production circuit breakers listed below.	QCR 	QCF 	QC 	QCHW 	QHCX 	QHCW 
	Dimensions – Inches Per Single Pole Breaker						
		W 1/2 H 3 1/16 D 2 7/16	W 1/2 H 3 1/16 D 2 7/16	W 1 H 3 3/4 D 2 7/16	W 1 H 3 3/4 D 2 7/16	W 1 H 3 3/4 D 2 7/16	W 1 H 3 3/4 D 2 7/16
Out-of-Production Westinghouse Circuit Breakers							
These Circuit Breakers Are No Longer Manufactured	No Previous Circuit Breaker Existed	No Previous Circuit Breaker Existed	HQCL HQCAL HQC, HQCA QCA	QCH	No Previous Circuit Breaker Existed	QHCL QHC	
Recommended QUICKLAG® Circuit Breakers listed above.							

MOLDED CASE CIRCUIT BREAKERS

Miniature Circuit Breakers



QUICKLAG MINIATURE CIRCUIT BREAKERS

QUICKLAG is the largest and most complete family of industrial thermal magnetic miniature circuit breakers. They provide the exclusive features of steel frame calibration and arc chutes in every pole.

QUICKLAG circuit breakers are provided in ranges from 5 to 125 amperes continuous

in one-, two-, and three-pole configurations with interrupting capacities from 10,000 AIC to 65,000 AIC. QUICKLAG circuit breakers have been series rated up to 200,000 AIC in conjunction with larger Westinghouse current limiting circuit breakers.

Each QUICKLAG rating is available for plug-in (Type P), bolt-on (Type B), and cable to cable connections (Type C) for line/load feed applications. They are also available with one of the industry's widest selection of accessories, including shunt trip, and can be custom modified to meet special application requirements.

Circuit Breaker Selection Guide

Circuit Breaker Type	Circuit Breaker Type Code	Cont. Ampere Rating At 40°C	No. Poles	Volts		Federal Spec. W-C-375b	UL Listed Interrupting Ratings RMS Symmetrical Amperes					
				AC	DC		AC Ratings Volts			DC ¹		
							120	120/240	240	24	48	80
HQP HQP HQP	P	5-70 10-125 10-100	1 2 2, 3	120/240 120/240 240	24, 48, 80 24, 48, 80	10a, 11a, 12a 10a, 12a 10b, 11b, 12b	..... ..... .....	10,000 10,000 10,000	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
QPHW QPHW QPHW	P	15-70 15-125 15-100	1 2 2, 3	120/240 120/240 240	24, 48, 80 24, 48, 80	14a 14a 14b	..... ..... .....	22,000 22,000 22,000	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
QHPX QHPX QHPX	P	15-70 15-100 15-100	1 2 3	120/240 120/240 240	24, 48, 80 24, 48, 80 .....	..... ..... .....	..... ..... .....	42,000 42,000 .....	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
QHPW QHPW QHPW	P	15-30 15-30 15-30	1 2 3	120/240 120/240 240	24, 48, 80 24, 48, 80	15a 15a 15b	..... ..... .....	65,000 65,000 65,000	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
QPGF QPGF	P, GF	15-30 15-50	1 2	120 120/240	..... .....	10a, 11a, 12a 10a, 11a, 12a	..... .....	10,000 10,000	..........	..........	..........	..........
QPHGF QPHGF	P, GF	15-30 15-50	1 2	120 120/240	..... .....	10a, 11a, 12a 10a, 11a, 12a	..... .....	22,000 22,000	..........	..........	..........	..........
QPGFEP QPGFEP	P, GFEP	15-30 15-50	1 2	120 120/240	..... .....	..... .....	..... .....	10,000 10,000	..........	..........	..........	..........
QPHGFEP QPHGFEP	P, GFEP	15-30 15-30	1 2	120 120/240	..... .....	..... .....	..... .....	22,000 22,000	..........	..........	..........	..........
BAB BAB BAB	B	5-70 10-125 10-100	1 2 2, 3	120/240 120/240 240	24, 48, 80 24, 48, 80	10a, 11a, 12a 10a, 12a 10b, 11b, 12b	..... ..... .....	10,000 10,000 10,000	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
QBHW QBHW QBHW	B	15-70 15-125 15-100	1 2 2, 3	120/240 120/240 240	24, 48, 80 24, 48, 80	14a 14a 14b	..... ..... .....	22,000 22,000 22,000	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
HBAX HBAX HBAX	B	15-70 15-100 15-100	1 2 3	120/240 120/240 240	24, 48, 80 24, 48, 80 .....	..... ..... .....	..... ..... .....	42,000 42,000 42,000	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
HBAW HBAW HBAW	B	15-30 15-30 15-30	1 2 3	120/240 120/240 240	24, 48, 80 24, 48, 80	15a 15a 15b	..... ..... .....	65,000 65,000 65,000	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
QBGF QBGF	B, GF	15-30 15-50	1 2	120 120/240	..... .....	10a, 11a, 12a 10a, 11a, 12a	..... .....	10,000 10,000	..........	..........	..........	..........
QBHGF QBHGF	B, GF	15-30 15-30	1 2	120 120/240	..... .....	10a, 11a, 12a 10a, 11a, 12a	..... .....	22,000 22,000	..........	..........	..........	..........
QBGFEP QBGFEP	B, GFEP	15-30 15-50	1 2	120 120/240	..... .....	..... .....	..... .....	10,000 10,000	..........	..........	..........	..........
QBHGFEP QBHGFEP	B, GFEP	15-30 15-30	1 2	120 120/240	..... .....	..... .....	..... .....	22,000 22,000	..........	..........	..........	..........
QC QC QC QC	C	5-70 10-100 10-100 15-100	1 2 2, 3 4	120/240 120/240 240 240	24, 48, 80 24, 48, 80	10a, 11a, 12a 10a, 12a 10b, 11b, 12b 10b, 11b, 12b	..... ..... ..... .....	10,000 10,000 10,000	..... ..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
QCF QCF	C	10-60 10-60	1, 2 1, 2	120/240 120/240	..... .....	..... .....	..... .....	10,000 10,000	10,000 10,000	..........	..........	..........
QCHW QCHW QCHW	C	15-70 15-100 15-100	1 2 2, 3	120/240 120/240 240	24, 48, 80 24, 48, 80	14a 14a 14b	..... ..... .....	22,000 22,000 22,000	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
QHCX QHCX QHCX	C	15-70 15-100 15-100	1 2 3	120/240 120/240 240	24, 48, 80 24, 48, 80 .....	..... ..... .....	..... ..... .....	42,000 42,000 42,000	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
QHCW QHCW QHCW	C	15-30 15-30 15-30	1 2 3	120/240 120/240 240	24, 48, 80 24, 48, 80	15a 15a 15b	..... ..... .....	65,000 65,000 65,000	..... ..... .....	5,000 5,000	5,000 5,000	2,000 5,000
QCGF QCGF	C, GF	15-30 15-50	1 2	120 120/240	..... .....	..... .....	..... .....	10,000 10,000	10,000 10,000	..........	..........	..........
QCHGF QCHGF	C, GF	15-30 15-30	1 2	120 120/240	..... .....	..... .....	..... .....	22,000 22,000	..........	..........	..........	..........
QCGFEP QCGFEP	C, GFEP	15-30 15-30	1 2	120 120/240	..... .....	..... .....	..... .....	10,000 10,000	10,000 10,000	..........	..........	..........
QCHGFEP QCHGFEP	C, GFEP	15-30 15-30	1 2	120 120/240	..... .....	..... .....	..... .....	22,000 22,000	..........	..........	..........	..........

Circuit Breaker Type Codes: P Plug-in; B Bolt-on; C Cable-in/Cable-out; GF Ground Fault, 5 ma; GFEP Ground Fault, 30 ma.

¹ 2-pole DC interrupting rating based on 2 poles connected in series.



MOLDED CASE CIRCUIT BREAKERS

Miniature Circuit Breakers

A

CHB CIRCUIT BREAKER

Originally a Cutler-Hammer Product

The CHB breaker continues to be available as a replacement breaker for use in Cutler-Hammer Type PB Panelboards.

When combined with the mounting base, CHB breakers were also used for surface and DIN rail mount cable-in/cable-out applications. (See photo.)

For "new" cable-in/cable-out applications, Cutler-Hammer recommends the use of our most current product offering:

- QUICKLAG Type QC Breakers (1 inch per pole)
- QCR Breakers – Rear Mount (1/2 inch per pole)
- QCF Breakers – Front Mount (1/2 inch per pole)

QCR and QCF Breakers provide a 50% space savings over 1 inch per pole designs of the same rating.

CHB Mounting Bases		
Description		Catalog Number
Low Amp. 15-50A	1-pole	CHB9L1
	2-pole	CHB9L250
	3-pole	CHB9L350
High Amp. 25-50A	1-pole	CHB9H1
	25-125A 2-pole	CHB9H2125
	25-100A 3-pole	CHB9H3100

CHB CIRCUIT BREAKER – CATALOG NUMBERING

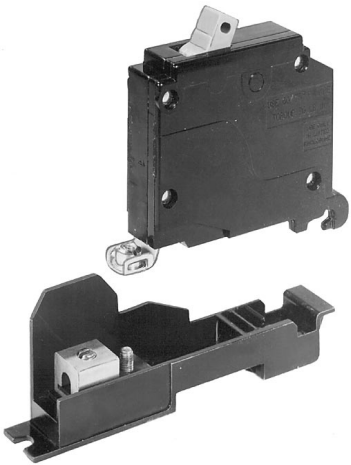
Bolt-On Circuit Breaker ——— **CHB** **3** **100** *****

Poles - 1-, 2- or 3- ———

Ampere Rating ———


Accessories ———

- * **ST** – Shunt trip – requires extra pole space
- SW** – Switched neutral application
- HID** – High intensity discharge lighting applications
- HM** – High magnetic trip
- GF** – Ground fault personnel protection
- EPD** – Ground fault equipment protection
- H2** – 22,000 AIC
- H4** – 42,000 AIC




CHB Breaker Mounting Base


REPLACEMENT CAPABILITIES



1-Pole
QUICKLAG Type QC
Cable-in/Cable-out Breaker
1 inch Per Pole





















1-Pole **2-Pole**
Type QCR
Cable-in/Cable-out Breaker
1/2 inch Per Pole
(Rear-Connected)



1-Pole **2-Pole**
Type QCF
Cable-in/Cable-out Breaker
1/2 inch Per Pole
(Front-Connected)



MOLDED CASE CIRCUIT BREAKER REPLACEMENT GUIDE

Series C Industrial Circuit Breakers																	
Maximum Amperes		100A			100A			225A			100A			100A			
CURRENT DESIGN	Series C Circuit Breakers are Cutler-Hammer's most current offering and, as such, are a logical first choice when upgrading or retrofitting equipment.		GC, GHC			GD			ED, EDH, EDC			EHD			FDB, FD, HFD, FDC		
	All circuit breakers listed in a column are ELECTRICALLY INTERCHANGEABLE .																
			Dimensions – Inches Per 3-pole Breaker														
		W	H	D	W	H	D	W	H	D	W	H	D	W	H	D	
		3	4 ⁷ / ₁₆	2 ¹⁵ / ₁₆	3	4 ⁷ / ₁₆	2 ¹³ / ₁₆	4 ¹ / ₁₆	6	3 ³ / ₁₆	4 ¹ / ₁₆	6	3 ³ / ₁₆	4 ¹ / ₁₆	6	3 ³ / ₁₆	
Replacement Circuit Breakers																	
REPLACEMENT	These new, UL labeled circuit breakers continue to be manufactured and are primarily applied to achieve exact physical and electrical replacement of previously installed Cutler-Hammer/Westinghouse circuit breakers of the same style number and rating.		EB 			NO PREVIOUS CIRCUIT BREAKER EXISTED			CA, CAH, HCA 			EHB 			FB, HFB 		
			W	H	D				W	H	D	W	H	D	W	H	D
		4 ¹ / ₁₆	6	3 ³ / ₁₆				4 ¹ / ₁₆	6 ¹ / ₂	2 ¹ / ₁₆	4 ¹ / ₁₆	6	3 ³ / ₁₆	4 ¹ / ₁₆	6	3 ³ / ₁₆	
Out-of-Production Westinghouse Circuit Breakers																	
OUT OF PRODUCTION	These circuit breakers are no longer manufactured.		E, EA 			QCC 			EH 			FA, HFA 					
	Indicates the last date of manufacture. As an option, any of these circuit breakers can be reconditioned at the original factory by Cutler-Hammer. For details, see page 8 , or contact your local Cutler-Hammer Field Sales Office.		*1974			*1968			*1974			*1974					
			W	H	D	W	H	D	W	H	D	W	H	D			
			4 ¹ / ₁₆	6	3 ³ / ₁₆	4 ¹ / ₂	7	3 ³ / ₁₆	4 ¹ / ₁₆	6 ¹ / ₂	3 ³ / ₁₆	4 ¹ / ₁₆	6 ¹ / ₂	3 ³ / ₁₆			
											F, HF 		G 				
											*1974 W H D 4 ¹ / ₈ 9 ³ / ₁₆ 4 ¹ / ₁₆		*1965 W H D 8 ³ / ₄ 9 ³ / ₁₆ 4 ¹ / ₁₆				
Out-of-Production Cutler-Hammer Circuit Breakers Last Manufactured by Cutler-Hammer in 1994																	
OUT OF PRODUCTION									FS EC, EHC 			FS, FH FC, HFC 					
									W	H	D	W	H	D			
									4 ¹ / ₁₆	6 ¹ / ₁₆	3 ³ / ₁₆	4 ¹ / ₁₆	6 ¹ / ₁₆	3 ³ / ₁₆			
											FL 						
											W	H	D				
											4 ¹ / ₁₆	9 ³ / ₁₆	3 ³ / ₁₆				






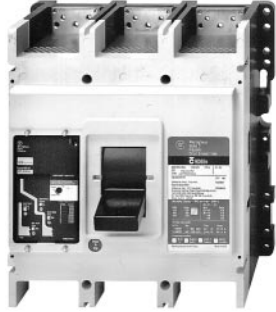
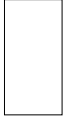

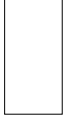

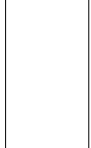



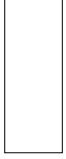
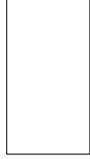


A

MOLDED CASE CIRCUIT BREAKER REPLACEMENT GUIDE																						
Series C Industrial Circuit Breakers																						
CURRENT DESIGN	150A	225A, 250A		400A	400A	400A	600A															
	FDB, FD, HFD, FDC	JD, HJD, JDC 250 Ampere	JDB 250 Ampere	DK ^⓪	KD, HKD, KDC ^⓪	KDB	LD, HLD, LDB															
	Dimensions – Inches Per 3-pole Breaker																					
	W 4 1/8	H 6	D 3 3/8	W 4 1/8	H 10	D 4 1/8	W 4 1/8	H 10	D 4 1/8	W 5 1/2	H 10 1/8	D 4 1/8	W 5 1/2	H 10 1/8	D 4 1/8	W 5 1/2	H 10 1/8	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	
REPLACEMENT	Replacement Circuit Breakers																					
	FB, HFB	KB, HKB		JB	DA ^⓪	LB, HLB ^⓪	LBB ^⓪	LC, HLC														
	W 4 1/8	H 6	D 3 3/8	W 4 1/8	H 10	D 4 1/8	W 5 1/2	H 10 1/8	D 4 1/8	W 5 1/2	H 10 1/8	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	
		KA, HKA ^⓪		JA ^⓪		LA, HLA	LAB	LA, HLA														
		W 5 1/2	H 10 1/8	D 4 1/8	W 5 1/2	H 10 1/8	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8
OUT OF PRODUCTION	Out-of-Production Westinghouse Circuit Breakers																					
	FA, HFA	JK	J	JKL	L, LM, HLM																	
	W 4 1/8	H 6 1/2	D 3 3/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 15 1/2	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 15 1/2	D 4 1/8	W 8 1/4	H 22	D 5 1/2	
	*1974	*1967	*1967	*1967	*1967																	
	*Indicates the last date of manufacture.																					
		K, HK		KL, HKL	SPCB 600A, SCB 600A *1986 Consult Cutler-Hammer																	
		W 8 1/4	H 15 1/2	D 4 1/8	W 8 1/4	H 15 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8	W 8 1/4	H 10 3/4	D 4 1/8
OUT OF PRODUCTION	Out-of-Production Cutler-Hammer Circuit Breakers Last Manufactured by Cutler-Hammer in 1994																					
	FS, FH FC, HFC	JS, JH, JL	JS	KS-D KS	KS-D, KH-D KS, KH	KS-D, KH-D KS, KH	LS(E), LH(E) LS(A), LH(A)															
	W 4 1/8	H 6 1/8	D 3 1/8	W 5 1/2	H 10 1/8	D 3 13/16	W 5 1/2	H 12 29/64	D 3 13/16	W 5 1/2	H 12 29/64	D 3 13/16	W 8 1/4	H 11 17/32	D 3 13/16	W 8 1/4	H 11 17/32	D 3 13/16	W 8 1/4	H 11 17/32	D 3 13/16	

⓪ When upgrading a DA, KA, HKA, JA, LB, HLB, LBB to a Series C k frame in a panelboard application, also order TAD3 spacer kit.



MOLDED CASE CIRCUIT BREAKER REPLACEMENT GUIDE

Series C Industrial Circuit Breakers																
Maximum Amperes		800A			800A			1200A			1600A/2000A/2500A [Ⓢ]					
CURRENT DESIGN	Series C Circuit Breakers are Cutler-Hammer's most current offering and, as such, are a logical first choice when upgrading or retrofitting equipment.	MD, MDS			ND, HND, NDC			ND, HND, NDC			RD					
																
	All circuit breakers listed in a column are ELECTRICALLY INTERCHANGEABLE .															
Dimensions – Inches Per 3-pole Breaker																
		W	H	D	W	H	D	W	H	D	W	H	D			
		8¼	16	4½	8¼	16	5½	8¼	16	5½	15½	16	9¾			
Replacement Circuit Breakers																
REPLACEMENT	These new, UL labeled circuit breakers continue to be manufactured and are primarily applied to achieve exact physical and electrical replacement of previously installed Cutler-Hammer/Westinghouse circuit breakers of the same style number and rating.	MA, HMA and MC			MA, HMA and MC, MCC SELTRONIC			NC, HNC and NB, HNB			PC, PCC			PB		
																
		W	H	D	W	H	D	W	H	D	W	H	D	W	H	D
		8¼	16	4½	8¼	16	4½	8¼	16	5½	12½	22½	9½	12½	22½	9½
Out-of-Production Westinghouse Circuit Breakers																
OUT OF PRODUCTION	These circuit breakers are no longer manufactured.	LM, HLM and M			LM, HLM and M			MA, HMA 1200 Amp			LM, HLM			PA		
	* Indicates the last date of manufacture. As an option, any of these circuit breakers can be reconditioned at the original factory by Cutler-Hammer. For details, see page 8, or contact your local Cutler-Hammer Field Sales Office.															
		W	H	D	W	H	D	W	H	D	W	H	D	W	H	D
		8¼	22	5½	8¼	22	5½	8¼	16	5½	8¼	22	5½	12	22	9½
		*1967			*1967			*1968			*1967			*1968		
		SPCB 1200A, SCB 1200A *1986 Consult Cutler-Hammer			SPCB 1200A, SCB 1200A *1986 Consult Cutler-Hammer			SPCB 2000-3000A, SCB 2000-3000A *1986 Consult Cutler-Hammer			SPCB 2000-3000A, SCB 2000-3000A *1986 Consult Cutler-Hammer			SPCB 2000-3000A, SCB 2000-3000A *1986 Consult Cutler-Hammer		
		W	H	D	W	H	D	W	H	D	W	H	D	W	H	D
		8¼	16	5½	8¼	16	5½	8¼	16	5½	12½	22½	9½	12½	22½	9½
Out-of-Production Cutler-Hammer Circuit Breakers Last Manufactured by Cutler-Hammer in 1994																
OUT OF PRODUCTION		MS, MH			NS, NH			No Equivalent Cutler-Hammer Brand Frame Size Existed			No Equivalent Cutler-Hammer Brand Frame Size Existed					
																
		W	H	D	W	H	D									
		8¼	16	4½	8¼	16	5½									

Ⓢ RD Breaker replaces PC, PCC and PB Breakers for 2000A and 2500A only.



Protection to a Higher Power

For today's sophisticated electrical systems, total protection means much more than just meeting your minimum standards.

Cutler-Hammer has engineered an impressive new generation of Westinghouse circuit breakers, with a range of intelligent features designed to achieve levels of performance beyond conventional protective devices.

Dedicated and general purpose applications range from QUICKLAG miniature circuit breakers to Series C high interrupting capacity molded case circuit breakers, and from thermal magnetic breakers to the latest microprocessor-based Digitrip units featuring true RMS sensing, energy and status monitoring.






Additionally, Cutler-Hammer breakers communicate with the IMPACC monitoring and control system. This family of circuit breakers works overtime to help anticipate, detect and pre-empt electrical problems before they occur. So the next trip may not be necessary.

That is protection to the higher power — from the new Cutler-Hammer.



MOLDED CASE CIRCUIT BREAKER REPLACEMENT GUIDE

Current Limiting Circuit Breaker

Maximum Amperes	100A	250A	400A	100A	225A
	FCL Current Limit-R (Non-Fused)	LCL Current Limit-R (Non-Fused)	LCL Current Limit-R (Non-Fused)	FB Tri-Pac (Fused)	LA Tri-Pac (Fused)
C U R R E N T D E S I G N					
	All circuit breakers listed in a column are ELECTRICALLY INTERCHANGEABLE.				




Dimensions – Inches Per 3-pole Breaker

	W	H	D	W	H	D	W	H	D	W	H	D	W	H	D
	4 $\frac{1}{8}$	8 $\frac{3}{4}$	3 $\frac{3}{8}$	8 $\frac{1}{4}$	16	4 $\frac{1}{16}$	8 $\frac{1}{4}$	16	4 $\frac{1}{16}$	4 $\frac{1}{8}$	8 $\frac{3}{4}$	3 $\frac{1}{2}$	8 $\frac{1}{4}$	16	4 $\frac{3}{4}$

Replacement Circuit Breakers

R E P L A C E M E N T	These new, UL labeled circuit breakers continue to be manufactured and are primarily applied to achieve exact physical and electrical replacement of previously installed Cutler-Hammer/Westinghouse circuit breakers of the same style number and rating.														
---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Out-of-Production Westinghouse Circuit Breakers




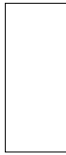



O U T O F P R O D U C T I O N	<p>These circuit breakers are no longer manufactured</p> <p>* Indicates the last date of manufacture. As an option, any of these circuit breakers can be reconditioned at the original factory by Cutler-Hammer. For details, see page 8, or contact your local Cutler-Hammer Field Sales Office.</p>					<p>FA Tri-Pac</p>  <p>*1968 W 4$\frac{1}{8}$</p> <p>H 9$\frac{3}{8}$</p> <p>D 3$\frac{3}{16}$</p>	<p>F Tri-Pac</p>  <p>*1968 W 4$\frac{5}{8}$</p> <p>H 11$\frac{13}{16}$</p> <p>D 3$\frac{13}{16}$</p>	<p>K Tri-Pac</p>  <p>*1968 W 8$\frac{1}{4}$</p> <p>H 19$\frac{5}{8}$</p> <p>D 4$\frac{1}{16}$</p>
---	---	--	--	--	--	---	--	---

Out-of-Production Cutler-Hammer Circuit Breakers

O U T O F P R O D U C T I O N	NO EQUIVALENT CUTLER-HAMMER BRAND FRAME SIZES EXISTED														
---	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--



A

MOLDED CASE CIRCUIT BREAKER REPLACEMENT GUIDE											
Current Limiting Circuit Breaker											
Maximum Amperes		400A			800A			1600A			
CURRENT DESIGN		LA Tri-Pac (Fused) 			NB Tri-Pac (Fused) 			PB Tri-Pac (Fused) 			
		All circuit breakers listed in a column are ELECTRICALLY INTERCHANGEABLE .									
	Dimensions – Inches Per 3-pole Breaker										
		W	H	D	W	H	D	W	H	D	
		8¼	16	4¼	8¼	22	5½	12½	22½	9½	
Replacement Circuit Breakers											
REPLACEMENT	These new, UL labeled circuit breakers continue to be manufactured and are primarily applied to achieve exact physical and electrical replacement of previously installed Cutler-Hammer/Westinghouse circuit breakers of the same style number and rating.										
Out-of-Production Westinghouse Circuit Breakers											
OUT OF PRODUCTION	These circuit breakers are no longer manufactured * Indicates the last date of manufacture. As an option, any of these circuit breakers can be reconditioned at the original factory by Cutler-Hammer. For details, see page 8 , or contact your local Cutler-Hammer Field Sales Office.	KL Tri-Pac 		L Tri-Pac 		MA Tri-Pac 			PA Tri-Pac 		
		*1968 W 8¼ H 19% D 4½		*1968 W 8¼ H 26 ²⁹ / ₃₂ D 5½		*1968 W 8¼ H 22 D 5½			*1968 W 12 H 22 D 9½		
		Out-of-Production Cutler-Hammer Circuit Breakers									
OUT OF PRODUCTION	NO EQUIVALENT CUTLER-HAMMER BRAND FRAME SIZES EXISTED										



REPLACEMENT CAPABILITIES

Type EB 1-, 2-, 3-Poles; 240 Volts AC Max.; Thermal Magnetic and Saf-T-Vue®

(Includes Load Terminals Only)

Continuous Ampere Rating at 40°C	1-Pole, 120 Volts AC, 125 Volts DC ❶		2-Pole, 240 Volts AC, 125/250 Volts DC ❶		3-Pole, 240 Volts AC, 125/250 Volts DC ❶	
	Standard		Standard		Standard	
	Saf-T-Vue® ❷					
Catalog Numbers						
15	EB1015 ❸	EB2015	EB3015	EB3015S	EB3015S	EB3015S
20	EB1020 ❸	EB2020	EB3020	EB3020S	EB3020S	EB3020S
25	EB1025	EB2025	EB3025	EB3025S	EB3025S	EB3025S
30	EB1030	EB2030	EB3030	EB3030S	EB3030S	EB3030S
35	EB1035	EB2035	EB3035	EB3035S	EB3035S	EB3035S
40	EB1040	EB2040	EB3040	EB3040S	EB3040S	EB3040S
45	EB1045	EB2045	EB3045	EB3045S	EB3045S	EB3045S
50	EB1050	EB2050	EB3050	EB3050S	EB3050S	EB3050S
60	EB1060	EB2060	EB3060	EB3060S	EB3060S	EB3060S
70	EB1070	EB2070	EB3070	EB3070S	EB3070S	EB3070S
80	EB1080	EB2080	EB3080	EB3080S	EB3080S	EB3080S
90	EB1090	EB2090	EB3090	EB3090S	EB3090S	EB3090S
100	EB1100	EB2100	EB3100	EB3100S	EB3100S	EB3100S
	Approx. ship. wt. 2 lbs.	Approx. ship. wt. 3 lbs.	Approx. ship. wt. 4½ lbs.			



EB: 120, 240 Volts AC; 125/250 Volts DC

Type EHB 1-, 2-, 3-Poles; 480 Volts AC Max.; Thermal Magnetic and Saf-T-Vue®

(Includes Load Terminals Only)

Continuous Ampere Rating at 40°C	1-Pole, 277 Volts AC, 125 Volts DC ❶		2-Pole, 480 Volts AC, 250 Volts DC ❶		3-Pole, 480 Volts AC	
	Standard		Standard		Standard	
	Saf-T-Vue® ❷					
Catalog Numbers						
15	EHB1015 ❸	EHB2015	EHB3015	EHB3015S	EHB3015S	EHB3015S
20	EHB1020 ❸	EHB2020	EHB3020	EHB3020S	EHB3020S	EHB3020S
25	EHB1025	EHB2025	EHB3025	EHB3025S	EHB3025S	EHB3025S
30	EHB1030	EHB2030	EHB3030	EHB3030S	EHB3030S	EHB3030S
35	EHB1035	EHB2035	EHB3035	EHB3035S	EHB3035S	EHB3035S
40	EHB1040	EHB2040	EHB3040	EHB3040S	EHB3040S	EHB3040S
45	EHB1045	EHB2045	EHB3045	EHB3045S	EHB3045S	EHB3045S
50	EHB1050	EHB2050	EHB3050	EHB3050S	EHB3050S	EHB3050S
60	EHB1060	EHB2060	EHB3060	EHB3060S	EHB3060S	EHB3060S
70	EHB1070	EHB2070	EHB3070	EHB3070S	EHB3070S	EHB3070S
80	EHB1080	EHB2080	EHB3080	EHB3080S	EHB3080S	EHB3080S
90	EHB1090	EHB2090	EHB3090	EHB3090S	EHB3090S	EHB3090S
100	EHB1100	EHB2100	EHB3100	EHB3100S	EHB3100S	EHB3100S
	Approx. ship. wt. 2 lbs.	Approx. ship. wt. 3 lbs.	Approx. ship. wt. 4½ lbs.			



EHB: 277, 480 Volts AC; 250 Volts DC

Type FB, HFB 1-, 2-, 3-, 4-Poles; 600 Volts AC Max.; Thermal Magnetic MARK 75® Saf-T-Vue®

(Includes Load Terminals Only)

Continuous Ampere Rating at 40°C	1-Pole, 277 Volts AC, 125 Volts DC ❶		2-Pole, 600 Volts AC, 250 Volts DC ❶		3-Pole, 600 Volts AC		4-Pole ❷❸, 600 Volts AC	
	MARK 75® ❹		Standard		Standard		Standard	
	Saf-T-Vue® ❷							
Catalog Numbers								
15	HFB1015 ❸	FB2015	HFB2015	FB3015	FB3015S	HFB3015	FB4015	FB4015
20	HFB1020 ❸	FB2020	HFB2020	FB3020	FB3020S	HFB3020	FB4020	FB4020
25	HFB1025	FB2025	HFB2025	FB3025	FB3025S	HFB3025	FB4025	FB4025
30	HFB1030	FB2030	HFB2030	FB3030	FB3030S	HFB3030	FB4030	FB4030
35	HFB1035	FB2035	HFB2035	FB3035	FB3035S	HFB3035	FB4035	FB4035
40	HFB1040	FB2040	HFB2040	FB3040	FB3040S	HFB3040	FB4040	FB4040
45	HFB1045	FB2045	HFB2045	FB3045	FB3045S	HFB3045	FB4045	FB4045
50	HFB1050	FB2050	HFB2050	FB3050	FB3050S	HFB3050	FB4050	FB4050
60	HFB1060	FB2060	HFB2060	FB3060	FB3060S	HFB3060	FB4060	FB4060
70	HFB1070	FB2070	HFB2070	FB3070	FB3070S	HFB3070	FB4070	FB4070
80	HFB1080	FB2080	HFB2080	FB3080	FB3080S	HFB3080	FB4080	FB4080
90	HFB1090	FB2090	HFB2090	FB3090	FB3090S	HFB3090	FB4090	FB4090
100	HFB1100	FB2100	HFB2100	FB3100	FB3100S	HFB3100	FB4100	FB4100
110	.....	.....	.....	FB3110	FB3110S	HFB3110	.....	.....
125	.....	.....	.....	FB3125	FB3125S	HFB3125	.....	.....
150	.....	.....	.....	FB3150	FB3150S	HFB3150	.....	.....



FB, HFB: 600 Volts AC; 250 Volts DC

Accessories and Modifications

Underwriters' Laboratories, Inc. Listed Interrupting Ratings®

Max. Volts	Amperes
EB Breakers	
120 and 240 AC 125/250 DC	10,000 Asym., Sym. 5,000 ❶
EHB, FB Breakers	
240 AC 277 AC (EHB) 480 AC 600 AC (FB) 250 DC	20,000 Asym., 18,000 Sym. 15,000 Asym., 14,000 Sym. 15,000 Asym., 14,000 Sym. 15,000 Asym., 14,000 Sym. 10,000 ❶
MARK 75® Type HFB	
240 AC 277 AC ❸ 480 AC 600 AC 250 DC (2-Pole)	75,000 Asym., 65,000 Sym. 75,000 Asym., 65,000 Sym. 30,000 Asym., 25,000 Sym. 20,000 Asym., 18,000 Sym. 20,000 ❶❷

For CSA, see page 41.

- ❶ DC ratings apply to substantially non-inductive circuits.
- ❷ Not listed with Underwriters' Laboratories, Inc.
- ❸ Switching duty rated for 120 VAC fluorescent light applications only.
- ❹ Switching duty rated for 277 VAC fluorescent light applications only.
- ❺ All four poles have thermal magnetic trip elements. Can be supplied with three protected poles and one unprotected, non-automatic pole if required. Order by description with no price or dimensional differences.

- ❻ 15-30A rated 75,000 AIC.
40-100A rated 30,000A Asym., 25,000A Sym.
- ❼ 2-pole breakers are supplied in 3-pole frames with current carrying parts omitted from center pole.
- ❽ Interrupting capacities shown do not apply to molded case switches.
- ❾ Ratings above 10,000 amperes not UL listed.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

REPLACEMENT CAPABILITIES, *Continued*

Special Breakers[Ⓢ] Type FB, Magnetic Only, Front Adjustable

(Includes Line and Load Terminals)

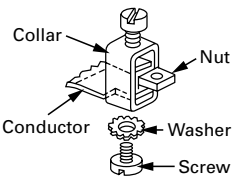
Continuous Ampere Rating	Magnetic Trip Range Amperes	2-Pole ^{Ⓢ②} , 600 Volts AC		3-Pole, 600 Volts AC		
		Standard	MARK 75 [Ⓢ]	Standard	Saf-T-Vue [Ⓢ]	MARK 75 [Ⓢ]
		Catalog/Style Numbers				
3	7 - 22	FB2022MRL	HFB2022ML	FB3022MRL	FB3022SMRL	HFB3022ML
5	15 - 45	FB2045MRL	HFB2045ML	FB3045MRL	FB3045SMRL	HFB3045ML
10	35 - 110	FB2110MRL	HFB2110ML	FB3110MRL	FB3110SMRL	HFB3110ML
25	32 - 80	2610D53G12	4994D96G12	2610D53G30	4998D89G30	4994D96G30
25	66 - 190	FB2190MRL	HFB2190ML	FB3190MRL	FB3190SMRL	HFB3190ML
30	50 - 150	1268C14G05	.....	1268C14G06	.....	.....
30	90 - 270	FB2270MRL	HFB2270ML	FB3270MRL	FB3270SMRL	HFB3270ML
50	66 - 190	1268C14G01	.....	1268C14G02	.....	.....
50	160 - 480	FB2480MRL	HFB2480ML	FB3480MRL	FB3480SMRL	HFB3480ML
70	100 - 270	2610D53G13	4994D96G13	2610D53G31	2610D58G31	4994D96G31
100	150 - 480	1268C14G03	.....	1268C14G04	81E4647	65E4667
100	450 - 1550	FB21550MRL	HFB21550ML	FB31550MRL	FB31550SMRL	HFB31550ML
150	575 - 1800	FB21800MRL	HFB21800ML	FB31800MRL	FB31800SMRL	HFB31800ML

Accessories and Modifications

Terminals

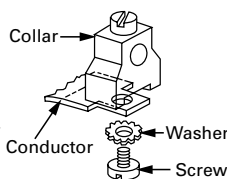
Breakers include load terminals only^{Ⓢ④}. Terminals are Underwriters' Laboratories, Inc. listed as suitable for wire type and size. When used with aluminum conductors, use joint compound. When line terminals are required, order by style number from table at no charge with the breaker.

Max. Amperes	Wire Type	Wire Range	Package of Three Line Terminals [Ⓢ]
			Style Number
Standard Pressure Type Terminals			
20 (EB, EHB)	Al/Cu	#14-#10	624B100G14
100	Al/Cu	#14-1/0	624B100G02
150	Al/Cu	# 4-4/0	624B100G17
Optional Al/Cu Pressure Terminals			
50	Al/Cu	#14-#4	624B100G10
100	Al/Cu	# 4-4/0	624B100G17



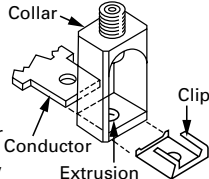
Style 624B100G02

Insert collar enclosing conductor as shown. Locate nut on top of conductor and tighten securely with screw and washer. **Caution:** Collar must surround conductor.



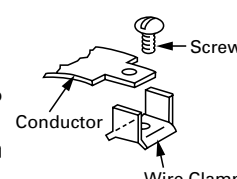
Style 624B100G10

Assemble collar on top of conductor as shown. Tighten securely with screw and washer.



Style 624B100G17

Insert collar enclosing conductor and center on extrusion on collar. Install clip with legs on top of conductor and snap end around bottom of collar.



Style 624B100G14

Assemble wire clamp to bottom of conductor as shown.

Special Calibrations[Ⓢ]

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC, refer to Cutler-Hammer. See Application Data 29-160 for information regarding special conditions. Maximum calibration for 400 Hz is 135 amperes.

50°C Calibration[Ⓢ]

Add suffix "V" to catalog number for complete breaker, listed above, when ordering breakers to be used in 50°C ambients.

Ambient Compensating Breakers[Ⓢ]

To order, add suffix letter "A" to standard thermal magnetic breaker catalog number. Available in all standard ratings of EB, EHB, FB and HFB breakers up to ratings of 100 amperes. Factory adder 20%.

Federal Specification Classifications

EB, EHB, FB and HFB breakers meet requirements of Federal Specification W-C-375b as follows:
 EB: 1-pole, Class 11a; 2-, 3-poles, Classes 10b, 11b, 12b
 EHB: 1-pole, Class 13a; 2-, 3-poles, Class 13b;
 FB: 2-, 3-poles, Class 18a;
 HFB: 1-pole, Class 13a; 2-, 3-poles, Class 22a

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

LFB Current Limiter Attachment[Ⓢ]

The LFB Current Limiter is an attachment that bolts to the load end of a standard FB thermal magnetic or magnetic only breaker, providing 200,000 Amperes Interrupting Capacity (AIC) at up to 600 volts AC. Limiters for thermal magnetic breakers are listed with Underwriters' Laboratories, Inc. Current limiters must be applied as indicated in the table.

Standard LFB terminals are suitable for Cu/Al cable. Ratings thru 70 amperes accept (1) #14-#2, and 100 and 150 amperes accept (1) #1-4/0.[Ⓢ]

Breaker Rating, Amperes	Limiter Catalog Number
For Thermal Magnetic Breakers[Ⓢ]	
15-70	LFB3070R
80-150	LFB3150R
For Magnetic Only Breakers[Ⓢ]	
3	LFB3003MR
5	LFB3005MR
10	LFB3010MR
25	LFB3025MR
30	LFB3030MR
50	LFB3050MR
70	LFB3070MR
100	LFB3100MR
150	LFB3150MR

- Ⓢ 2-pole magnetic only breakers supplied in 3-pole frame with current carrying parts omitted from center pole.
- Ⓢ Magnetic only breakers for DC applications require special calibration. Order by description.
- Ⓢ Magnetic only breakers include both line and load terminals.
- Ⓢ Suffix "L" on catalog number indicates line and load terminals included. If factory installation is required, specify on order.
- Ⓢ Style listed is for package of three terminals.
- Ⓢ Not listed with Underwriters' Laboratories, Inc.
- Ⓢ Cannot be used with plug-in adapters.
- Ⓢ Ratings thru 70 amperes can be supplied with terminals for Cu cable only (#14-#2). Order by description.

MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type JB 90-250 Amperes, 600 Volts AC, 250 Volts DC, 2- and 3 -Poles, Fixed Trip, Thermal Magnetic, Saf-T-Vue®

Continuous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes (Set on High Side, Adjustable to Lower Limits)		Complete Breaker Includes Pressure Type Aluminum Terminals ¹		Breaker Without Terminals	
			Standard	Saf-T-Vue® ²	Standard	Saf-T-Vue® ²
	Low	High	Catalog Numbers			
2-Poles, 600 Volts AC, 250 Volts DC³						
70	350	700	JB2070	JB2070S	JB2070W	JB2070SW
90	450	900	JB2090	JB2090S	JB2090W	JB2090SW
100	500	1000	JB2100	JB2100S	JB2100W	JB2100SW
125	625	1250	JB2125	JB2125S	JB2125W	JB2125SW
150	750	1500	JB2150	JB2150S	JB2150W	JB2150SW
175	875	1750	JB2175	JB2175S	JB2175W	JB2175SW
200	1000	2000	JB2200	JB2200S	JB2200W	JB2200SW
225	1125	2250	JB2225	JB2225S	JB2225W	JB2225SW
250	1250	2500	JB2250	JB2250S	JB2250W	JB2250SW
			Approx. ship. wt. 12 lbs.		Approx. ship. wt. 12 lbs.	
3-Poles, 600 Volts AC Only						
70	350	700	JB3070	JB3070S	JB3070W	JB3070SW
90	450	900	JB3090	JB3090S	JB3090W	JB3090SW
100	500	1000	JB3100	JB3100S	JB3100W	JB3100SW
125	625	1250	JB3125	JB3125S	JB3125W	JB3125SW
150	750	1500	JB3150	JB3150S	JB3150W	JB3150SW
175	875	1750	JB3175	JB3175S	JB3175W	JB3175SW
200	1000	2000	JB3200	JB3200S	JB3200W	JB3200SW
225	1125	2250	JB3225	JB3225S	JB3225W	JB3225SW
250	1250	2500	JB3250	JB3250S	JB3250W	JB3250SW
			Approx. ship. wt. 14 lbs.		Approx. ship. wt. 12 lbs.	



JB: 600 Volts AC; 250 Volts DC

Magnetic Only Breakers, Front Adjustable⁴

Continuous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes (Set on High Side, Adjustable to Lower Limits)		Breaker Only, No Terminals ⁵			
			2-Poles ³		3-Poles	
	Low	High	Standard	Saf-T-Vue®	Standard	Saf-T-Vue®
Catalog Numbers						
250	350	700	JB2700MW	JB2700SMW	JB3700MW	JB3700SMW
250	625	1250	JB21250MW	JB21250SMW	JB31250MW	JB31250SMW
250	750	1500	JB21500MW	JB21500SMW	JB31500MW	JB31500SMW
250	875	1750	JB21750MW	JB21750SMW	JB31750MW	JB31750SMW
250	1125	2250	JB22250MW	JB22250SMW	JB32250MW	JB32250SMW
250	1250	2500	JB22500MW	JB22500SMW	JB32500MW	JB32500SMW

Accessories and Modifications

Special Calibrations⁶

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC, refer to Cutler-Hammer.

50°C Calibration⁶

Add suffix "V" to catalog number for complete breaker when ordering breakers to be used in 50°C ambients. Same price as standard 40°C breakers.

For CSA, see page 41.

Type JB breakers meet requirements of Class 19a circuit breakers as defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings⁶

Max. Volts	Amperes
240 AC	30,000 Asym., 25,000 Sym.
480 AC	25,000 Asym., 22,000 Sym.
600 AC	15,000 Asym., 14,000 Sym.
250 DC	10,000

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Terminals¹

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed right. When used with aluminum conduc-

tors, use joint compound. To order optional copper only terminals, add suffix "C" to complete breaker catalog number.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Standard Al/Cu Pressure Terminals		
250	TA250KB	(1) #4-350 MCM Al/Cu
Optional Pressure Terminals		
250	T250KB	(1) #4-350 MCM Cu

Magnetic Only Breakers

For description, refer to Application Data 29-160.

Additional Accessories and Modifications
Refer to pages 58-68.

¹ Terminals are shipped separately from breaker frame.
² Not listed with Underwriters' Laboratories, Inc.
³ 2-pole breakers are supplied in 3-pole frames with current carrying parts omitted from center pole.
⁴ Select desired terminal from table and order as separate item.
⁵ Ratings above 10,000 amperes not UL listed.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Type KB and MARK 75® Type HKB 90-250 Amperes, 600 Volts AC, 250 Volts DC, 2- and 3-Poles, Interchangeable Trip Thermal Magnetic, Saf-T-Vue®

Continu- ous Ampere Rating at 40°C	Magnetic Trip Setting Amperes ^②		Complete Breaker			Shipped as Frame, Trip Unit and Terminals ^①			
			Includes Pressure Type Aluminum Terminals ^②			Frame Only			Trip Unit Only
	Low	High	Standard	Saf-T-Vue® ^②	MARK 75®	Standard	Saf-T-Vue® ^③	MARK 75®	Standard Saf-T-Vue®, MARK 75®
2-Poles, 600 Volts AC, 250 Volts DC^④									
70	350	700	KB2070	KB2070S	HKB2070	KB2250F	KB2250FS	HKB2250F	HKB2070T
90	450	900	KB2090	KB2090S	HKB2090	KB2250F	KB2250FS	HKB2250F	HKB2090T
100	500	1000	KB2100	KB2100S	HKB2100	KB2250F	KB2250FS	HKB2250F	HKB2100T
125	625	1250	KB2125	KB2125S	HKB2125	KB2250F	KB2250FS	HKB2250F	HKB2125T
150	750	1500	KB2150	KB2150S	HKB2150	KB2250F	KB2250FS	HKB2250F	HKB2150T
175	875	1750	KB2175	KB2175S	HKB2175	KB2250F	KB2250FS	HKB2250F	HKB2175T
200	1000	2000	KB2200	KB2200S	HKB2200	KB2250F	KB2250FS	HKB2250F	HKB2200T
225	1125	2250	KB2225	KB2225S	HKB2225	KB2250F	KB2250FS	HKB2250F	HKB2225T
250	1250	2500	KB2250	KB2250S	HKB2250	KB2250F	KB2250FS	HKB2250F	HKB2250T
			Approx. ship. wt. 12 lbs.			Approx. ship. wt. 9 lbs.			Approx. ship. wt. 2 lbs.
3-Poles, 600 Volts AC Only									
70	350	700	KB3070	KB3070S	HKB3070	KB3250F	KB3250FS	HKB3250F	HKB3070T
90	450	900	KB3090	KB3090S	HKB3090	KB3250F	KB3250FS	HKB3250F	HKB3090T
100	500	1000	KB3100	KB3100S	HKB3100	KB3250F	KB3250FS	HKB3250F	HKB3100T
125	625	1250	KB3125	KB3125S	HKB3125	KB3250F	KB3250FS	HKB3250F	HKB3125T
150	750	1500	KB3150	KB3150S	HKB3150	KB3250F	KB3250FS	HKB3250F	HKB3150T
175	875	1750	KB3175	KB3175S	HKB3175	KB3250F	KB3250FS	HKB3250F	HKB3175T
200	1000	2000	KB3200	KB3200S	HKB3200	KB3250F	KB3250FS	HKB3250F	HKB3200T
225	1125	2250	KB3225	KB3225S	HKB3225	KB3250F	KB3250FS	HKB3250F	HKB3225T
250	1250	2500	KB3250	KB3250S	HKB3250	KB3250F	KB3250FS	HKB3250F	HKB3250T
			Approx. ship. wt. 14 lbs.			Approx. ship. wt. 11 lbs.			Approx. ship. wt. 2 lbs.



KB/Mark 75/HKB: 600 Volts AC; 250 Volts DC

Accessories and Modifications

Magnetic Only, Front Adjustable Breakers^⑤

Continu- ous Ampere Rating	Magnetic Trip Setting Amperes ^⑤		Trip Units Only	
			2-Poles ^⑥	3-Poles
	Low	High	Catalog Numbers	
250	350	700	HKB2700TM	HKB3700TM
250	500	1000	HKB21000TM	HKB31000TM
250	625	1250	HKB21250TM	HKB31250TM
250	750	1500	HKB21500TM	HKB31500TM
250	875	1750	HKB21750TM	HKB31750TM
250	1125	2250	HKB22250TM	HKB32250TM
250	1250	2500	HKB22500TM	HKB32500TM

Special Calibrations^⑦

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC, refer to Cutler-Hammer.

50°C Calibration^⑧

Add suffix "V" to catalog number for complete breaker, listed above, when ordering breakers to be used in 50°C ambients.

For CSA, see page 41.

Type KB breakers meet requirements for Class 19a, as defined by Federal Specification W-C-375b. Type HKB breakers not defined in W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings

Max. Volts	Amperes
Standard Breakers	
240 AC	30,000 Asym., 25,000 Sym.
480 AC	25,000 Asym., 22,000 Sym.
600 AC	15,000 Asym., 14,000 Sym.
250 DC	10,000
MARK 75® Breakers	
240 AC	75,000 Asym., 65,000 Sym.
480 AC	30,000 Asym., 25,000 Sym.
600 AC	20,000 Asym., 18,000 Sym.
250 DC	20,000 ^⑨

Link to Selection Data 29-121

Click here to view [page 8.1](#) of Selection Data 29-121.

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Terminals^⑩

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed below. When used with aluminum conductors, use joint compound. To order optional copper only terminals, add suffix "C" to complete breaker catalog number.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Standard Al/Cu Pressure Terminals		
250	TA250KB	(1) #4-350 MCM Al/Cu
Optional Pressure Terminals		
250	T250KB	(1) #4-350 MCM Cu

Magnetic Only Breakers

For description, refer to Application Data 29-160. To order these breakers, select frame, trip unit and terminals.

Additional Accessories and Modifications

Refer to [pages 58-68](#).

① Terminals shipped separately from breaker frame.

② Not listed with Underwriters' Laboratories, Inc.

③ 2-pole breakers are supplied in 3-pole frames with current carrying parts omitted from center pole.

④ Set on high side, adjustable to lower limit.

⑤ Ratings above 10,000 amperes not UL listed.

MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type JA 70-225 Amperes, 600 Volts AC, 250 Volts DC, 2- and 3-Poles, Fixed Trip, Thermal Magnetic, Saf-T-Vue®

Continuous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes (Set on High Side, Adjustable to Lower Limits)		Complete Breaker Includes Pressure Type Aluminum Terminals ^①		Breaker Without Terminals	
			Standard	Saf-T-Vue®	Standard	Saf-T-Vue®
	Low	High	Catalog Numbers			
2-Poles, 600 Volts AC, 250 Volts DC^②						
70	350	700	JA2070	JA2070S	JA2070W	JA2070SW
90	450	900	JA2090	JA2090S	JA2090W	JA2090SW
100	500	1000	JA2100	JA2100S	JA2100W	JA2100SW
125	625	1250	JA2125	JA2125S	JA2125W	JA2125SW
150	750	1500	JA2150	JA2150S	JA2150W	JA2150SW
175	875	1750	JA2175	JA2175S	JA2175W	JA2175SW
200	1000	2000	JA2200	JA2200S	JA2200W	JA2200SW
225	1125	2250	JA2225	JA2225S	JA2225W	JA2225SW
			Approx. ship. wt. 12 lbs.		Approx. ship. wt. 12 lbs.	
3-Poles, 600 Volts AC Only						
70	350	700	JA3070	JA3070S	JA3070W	JA3070SW
90	450	900	JA3090	JA3090S	JA3090W	JA3090SW
100	500	1000	JA3100	JA3100S	JA3100W	JA3100SW
125	625	1250	JA3125	JA3125S	JA3125W	JA3125SW
150	750	1500	JA3150	JA3150S	JA3150W	JA3150SW
175	875	1750	JA3175	JA3175S	JA3175W	JA3175SW
200	1000	2000	JA3200	JA3200S	JA3200W	JA3200SW
225	1125	2250	JA3225	JA3225S	JA3225W	JA3225SW
			Approx. ship. wt. 14 lbs.		Approx. ship. wt. 12 lbs.	



JA; 600 Volts AC; 250 Volts DC

Special Breakers^③

Continuous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes (Set on High Side, Adjustable to Lower Limits)		2-Poles ^④		3-Poles	
			Standard	Saf-T-Vue®	Standard	Saf-T-Vue®
	Low	High	Catalog Numbers			
Magnetic Only Breakers, Front Adjustable – Without Terminals^⑤						
225	350	700	JA2700MW	JA2700SMW	JA3700MW	JA3700SMW
225	625	1250	JA21250MW	JA21250SMW	JA31250MW	JA31250SMW
225	750	1500	JA21500MW	JA21500SMW	JA31500MW	JA31500SMW
225	875	1750	JA21750MW	JA21750SMW	JA31750MW	JA31750SMW
225	1125	2250	JA22250MW	JA22250SMW	JA32250MW	JA32250SMW
Ambient Compensating Breakers						
70	350	700	JA2070A	.....	JA3070A	.....
100	500	1000	JA2100A	.....	JA3100A	.....
125	625	1250	JA2125A	.....	JA3125A	.....
150	750	1500	JA2150A	.....	JA3150A	.....
175	875	1750	JA2175A	.....	JA3175A	.....
200	1000	2000	JA2200A	.....	JA3200A	.....
225	1125	2250	JA2225A	.....	JA3225A	.....

Accessories and Modifications

Special Calibrations^⑥

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC, refer to Cutler-Hammer.

See Application Data 29-160 for information regarding special conditions.

50°C Calibration^⑦

Add suffix "V" to catalog number for complete breaker when ordering breakers to be used in 50°C ambients.

For CSA, see page 41.

Type JA breakers meet requirements of Class 19a and 20a circuit breakers as defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings

Max. Volts	Amperes
240 AC	30,000 Asym., 25,000 Sym.
480 AC	25,000 Asym., 22,000 Sym.
600 AC	25,000 Asym., 22,000 Sym.
250 DC	10,000

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Terminals^{⑧⑨}

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed right. When used with aluminum conductors, use joint compound. To order

optional copper only terminals, add suffix "C" to complete breaker catalog number.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Standard Al/Cu Pressure Terminals		
70-225	TA225LA1	(1) #6-350 MCM Cu, or (1) #4-350 MCM Al
Optional Copper Pressure Terminals		
70-225	T225LA	(1) #6-350 MCM Cu
70-225 ^⑩	T225LBF	(1) #6-250 MCM Cu

Magnetic Only and Ambient Compensating Breakers

For description, refer to Application Data 29-160. To order, select catalog number from table above.

- ① Terminals are shipped separately from breaker frame.
- ② Not listed with Underwriters' Laboratories, Inc.
- ③ 2-pole breakers are supplied in 3-pole frames with current carrying parts omitted from center pole.
- ④ Select desired terminal from table and order as separate item.
- ⑤ Optional terminal.
- ⑥ If upgrading a JA breaker to a Series C K frame in a panelboard application, order TAD3 spacer kit.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

REPLACEMENT CAPABILITIES, *Continued*

Type KA 70-225 Amperes, 600 Volts AC, 250 Volts DC, 2- and 3-Poles, Interchangeable Trip, Thermal Magnetic, Saf-T-Vue® and MARK 75® Type HKA

Contin- uous Ampere Rating at 40°C	Magnetic Trip Setting Amperes ^①		Complete Breaker			Shipped as Frame, Trip Unit and Terminals			
			Includes Pressure Type Aluminum Terminals ^②			Frame Only			Trip Unit Only
	Low	High	Standard	Saf-T-Vue®	MARK 75®	Standard	Saf-T-Vue®	MARK 75®	Standard MARK 75® or Saf-T-Vue®
Catalog Numbers									
2-Poles, 600 Volts AC, 250 Volts DC^③									
70	350	700	KA2070	KA2070S	HKA2070	KA2225F	KA2225FS	HKA2225F	HKA2070T
90	450	900	KA2090	KA2090S	HKA2090	KA2225F	KA2225FS	HKA2225F	HKA2090T
100	500	1000	KA2100	KA2100S	HKA2100	KA2225F	KA2225FS	HKA2225F	HKA2100T
125	625	1250	KA2125	KA2125S	HKA2125	KA2225F	KA2225FS	HKA2225F	HKA2125T
150	750	1500	KA2150	KA2150S	HKA2150	KA2225F	KA2225FS	HKA2225F	HKA2150T
175	875	1750	KA2175	KA2175S	HKA2175	KA2225F	KA2225FS	HKA2225F	HKA2175T
200	1000	2000	KA2200	KA2200S	HKA2200	KA2225F	KA2225FS	HKA2225F	HKA2200T
225	1125	2250	KA2225	KA2225S	HKA2225	KA2225F	KA2225FS	HKA2225F	HKA2225T
			Approx. ship. wt. 12 lbs.			Approx. ship. wt. 9-½ lbs.			Approx. ship. wt. 2 lbs.
3-Poles, 600 Volts AC Only									
70	350	700	KA3070	KA3070S	HKA3070	KA3225F	KA3225FS	HKA3225F	HKA3070T
90	450	900	KA3090	KA3090S	HKA3090	KA3225F	KA3225FS	HKA3225F	HKA3090T
100	500	1000	KA3100	KA3100S	HKA3100	KA3225F	KA3225FS	HKA3225F	HKA3100T
125	625	1250	KA3125	KA3125S	HKA3125	KA3225F	KA3225FS	HKA3225F	HKA3125T
150	750	1500	KA3150	KA3150S	HKA3150	KA3225F	KA3225FS	HKA3225F	HKA3150T
175	875	1750	KA3175	KA3175S	HKA3175	KA3225F	KA3225FS	HKA3225F	HKA3175T
200	1000	2000	KA3200	KA3200S	HKA3200	KA3225F	KA3225FS	HKA3225F	HKA3200T
225	1125	2250	KA3225	KA3225S	HKA3225	KA3225F	KA3225FS	HKA3225F	HKA3225T
			Approx. ship. wt. 14 lbs.			Approx. ship. wt. 11 lbs.			Approx. ship. wt. 2-½ lbs.



**KA, 600 Volts AC;
250 Volts DC**

Accessories and Modifications

Trip Units Only For Magnetic Only and Ambient Compensating Breakers^④

Contin- uous Ampere Rating	Magnetic Trip Setting, Amperes ^①		2-Poles ^③	3-Poles
	Low	High	Catalog Numbers	
Magnetic Only, Front Adjustable Breakers				
225	350	700	HKA2700TM	HKA3700TM
225	625	1250	HKA21250TM	HKA31250TM
225	750	1500	HKA21500TM	HKA31500TM
225	875	1750	HKA21750TM	HKA31750TM
225	1125	2250	HKA22250TM	HKA32250TM
Ambient Compensating Breakers				
70	350	700	HKA2070TA	HKA3070TA
100	500	1000	HKA2100TA	HKA3100TA
125	625	1250	HKA2125TA	HKA3125TA
150	750	1500	HKA2150TA	HKA3150TA
175	875	1750	HKA2175TA	HKA3175TA
200	1000	2000	HKA2200TA	HKA3200TA
225	1125	2250	HKA2225TA	HKA3225TA

Special Calibration^⑤

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC, refer to Cutler-Hammer. See Application Data 29-160 for information regarding special conditions.

50°C Calibration^⑥

Add suffix "V" to catalog number for complete breaker when ordering breakers to be used in 50°C ambients.

Terminals^{⑦⑧}

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed below. When used with aluminum conductors, use joint compound. To order optional copper only terminals, add suffix "C" to complete breaker catalog number.

Max. Amps	Catalog Numbers	No. of Cables, Wire Range, Type
Standard Al/Cu Pressure Terminals		
225	TA225LA1	(1) #6-350 MCM Cu, or (1) #4-350 MCM Al
Optional Copper Pressure Terminals		
225	T225LA	(1) #6-350 MCM Cu
225 ^⑨	T225LBF	(1) #6-250 MCM Cu

Type KA breakers meet requirements for Class 19a and 20a circuit breakers, and Type HKA meet requirements for Class 23a as defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings

Max. Volts	Amperes
Standard Breakers	
240 VAC	30,000 Asym., 25,000 Sym.
480 VAC	25,000 Asym., 22,000 Sym.
600 VAC	25,000 Asym., 22,000 Sym.
250 VDC	10,000
MARK 75® Breakers	
240 VAC	75,000 Asym., 65,000 Sym.
480 VAC	40,000 Asym., 35,000 Sym.
600 VAC	30,000 Asym., 25,000 Sym.
250 VDC	20,000 ^⑩

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Magnetic Only and Ambient Compensating Breakers

For description, refer to Application Data 29-160. To order these breakers, select frame, trip unit and terminals.

- ① Set on high side, adjustable to lower limit.
- ② Terminals are shipped separately from breaker frame.
- ③ 2-pole breakers are supplied in 3-pole frames with current carrying parts omitted from center pole.
- ④ Not listed with Underwriters' Laboratories, Inc.
- ⑤ Optional terminal.
- ⑥ Ratings above 10,000 amperes not UL listed.
- ⑦ If upgrading a KA, HKA breaker to a Series C K frame in a panelboard application, also order TAD3 spacer kit.

MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type LBB 125-400 Amperes, 600 Volts AC, 250 Volts DC, 2- and 3-Poles, Fixed Trip, Thermal Magnetic, Saf-T-Vue®

Continuous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes ^①		Complete Breaker Includes Pressure Type Aluminum Terminals ^②		Breaker Without Terminals	
			Standard	Saf-T-Vue®	Standard	Saf-T-Vue®
	Low	High	Catalog Numbers			
2-Poles, 600 Volts AC, 250 Volts DC^③						
125	625	1250	LBB2125	LBB2125S	LBB2125W	LBB2125SW
150	750	1500	LBB2150	LBB2150S	LBB2150W	LBB2150SW
175	875	1750	LBB2175	LBB2175S	LBB2175W	LBB2175SW
200	1000	2000	LBB2200	LBB2200S	LBB2200W	LBB2200SW
225	1125	2250	LBB2225	LBB2225S	LBB2225W	LBB2225SW
250	1250	2500	LBB2250	LBB2250S	LBB2250W	LBB2250SW
300	1500	3000	LBB2300	LBB2300S	LBB2300W	LBB2300SW
350	1750	3500	LBB2350	LBB2350S	LBB2350W	LBB2350SW
400	2000	4000	LBB2400	LBB2400S	LBB2400W	LBB2400SW
			Approx. ship. wt. 13 lbs.		Approx. ship. wt. 13 lbs.	
3-Poles, 600 Volts AC Only						
125	625	1250	LBB3125	LBB3125S	LBB3125W	LBB3125SW
150	750	1500	LBB3150	LBB3150S	LBB3150W	LBB3150SW
175	875	1750	LBB3175	LBB3175S	LBB3175W	LBB3175SW
200	1000	2000	LBB3200	LBB3200S	LBB3200W	LBB3200SW
225	1125	2250	LBB3225	LBB3225S	LBB3225W	LBB3225SW
250	1250	2500	LBB3250	LBB3250S	LBB3250W	LBB3250SW
300	1500	3000	LBB3300	LBB3300S	LBB3300W	LBB3300SW
350	1750	3500	LBB3350	LBB3350S	LBB3350W	LBB3350SW
400	2000	4000	LBB3400	LBB3400S	LBB3400W	LBB3400SW
			Approx. ship. wt. 15 lbs.		Approx. ship. wt. 15 lbs.	



LBB, 600 Volts AC; 250 Volts DC

Magnetic Only, Ambient Compensating Breakers^④

Continuous Ampere Rating	Magnetic Trip Setting, Amperes ^①		2-Pole Breakers ^⑤		3-Pole Breakers	
			Standard	Saf-T-Vue®	Standard	Saf-T-Vue®
	Low	High	Catalog Numbers			
Magnetic Only Breakers, Front Adjustable – Without Terminals^⑥						
400	350	700	LBB2700MW	LBB2700SMW	LBB3700MW	LBB3700SMW
400	625	1250	LBB21250MW	LBB21250SMW	LBB31250MW	LBB31250SMW
400	750	1500	LBB21500MW	LBB21500SMW	LBB31500MW	LBB31500SMW
400	875	1750	LBB21750MW	LBB21750SMW	LBB31750MW	LBB31750SMW
400	1125	2250	LBB22250MW	LBB22250SMW	LBB32250MW	LBB32250SMW
400	1500	3000	LBB23000MW	LBB23000SMW	LBB33000MW	LBB33000SMW
400	2000	4000	LBB24000MW	LBB24000SMW	LBB34000MW	LBB34000SMW
Ambient Compensating Breakers – Includes Terminals						
125	625	1250	LBB2125A	LBB2125SA	LBB3125A	LBB3125SA
150	750	1500	LBB2150A	LBB2150SA	LBB3150A	LBB3150SA
175	875	1750	LBB2175A	LBB2175SA	LBB3175A	LBB3175SA
200	1000	2000	LBB2200A	LBB2200SA	LBB3200A	LBB3200SA
225	1125	2250	LBB2225A	LBB2225SA	LBB3225A	LBB3225SA
250	1250	2500	LBB2250A	LBB2250SA	LBB3250A	LBB3250SA
300	1500	3000	LBB2300A	LBB2300SA	LBB3300A	LBB3300SA
350	1750	3500	LBB2350A	LBB2350SA	LBB3350A	LBB3350SA
400	2000	4000	LBB2400A	LBB2400SA	LBB3400A	LBB3400SA

Accessories and Modifications

Terminals^⑦

Two terminals required per pole.

Select from **page 30**.

Magnetic Only and Ambient Compensating Breakers

For description, refer to Application Data 29-160. To order, select catalog number from table above.

For **CSA**, see **page 41**.

Type LBB breakers meet requirements for Class 21a circuit breakers, as defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings

Max. Volts	Amperes
240 VAC	50,000 Asym., 42,000 Sym.
480 VAC	35,000 Asym., 30,000 Sym.
600 VAC	25,000 Asym., 22,000 Sym.
250 VDC	20,000 ^⑧

On all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Special Calibrations^⑨

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC, refer to Cutler-Hammer. See Application Data 29-160 for information regarding special conditions. Maximum calibration for 400 Hz is 300 amperes.

50°C Calibration^⑩

Add suffix "V" to catalog number for complete breaker when ordering breakers to be used in 50°C ambients.

- ① Set on high side, adjustable to lower limits.
- ② Terminals are shipped separately from breaker.
- ③ 2-pole breakers or trips are supplied in 3-pole frames with current carrying parts omitted from center pole.
- ④ Not listed with Underwriters' Laboratories, Inc.
- ⑤ Select desired terminals from **page 30**, and order as separate item.
- ⑥ Ratings above 10,000 amperes not UL listed.
- ⑦ If upgrading an LBB breaker to a Series C K frame in a panelboard application, also order TAD3 spacer kit.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Type LB and MARK 75® Type HLB 70-400 Amperes, 600 Volts AC, 250 Volts DC, 2- and 3-Poles, Interchangeable Trip Thermal Magnetic, Saf-T-Vue® and MARK 75®

Contin- uous Ampere Rating at 40°C	Magnetic Trip Setting Amperes ^①		Complete Breaker Includes Pressure Type Aluminum Terminals ^②			Shipped as Frame, Trip Unit and Terminals ^② Frame Only			Trip Unit Only
	Low	High	Standard	Saf-T-Vue®	MARK 75®	Standard	Saf-T-Vue®	MARK 75®	Standard Saf-T-Vue®, MARK 75®
2-Poles, 600 Volts AC, 250 Volts DC^③									
70	350	700	LB2070	LB2070S	.....	LB2400F	LB2400FS	.....	HLB2070T
90	450	900	LB2090	LB2090S	.....	LB2400F	LB2400FS	.....	HLB2090T
100	500	1000	LB2100	LB2100S	.....	LB2400F	LB2400FS	.....	HLB2100T
125	625	1250	LB2125	LB2125S	HLB2125	LB2400F	LB2400FS	HLB2400F	HLB2125T
150	750	1500	LB2150	LB2150S	HLB2150	LB2400F	LB2400FS	HLB2400F	HLB2150T
175	875	1750	LB2175	LB2175S	HLB2175	LB2400F	LB2400FS	HLB2400F	HLB2175T
200	1000	2000	LB2200	LB2200S	HLB2200	LB2400F	LB2400FS	HLB2400F	HLB2200T
225	1125	2250	LB2225	LB2225S	HLB2225	LB2400F	LB2400FS	HLB2400F	HLB2225T
250	1250	2500	LB2250	LB2250S	HLB2250	LB2400F	LB2400FS	HLB2400F	HLB2250T
300	1500	3000	LB2300	LB2300S	HLB2300	LB2400F	LB2400FS	HLB2400F	HLB2300T
350	1750	3500	LB2350	LB2350S	HLB2350	LB2400F	LB2400FS	HLB2400F	HLB2350T
400	2000	4000	LB2400	LB2400S	HLB2400	LB2400F	LB2400FS	HLB2400F	HLB2400T
			Approx. ship. wt. 13 lbs.			Approx. ship. wt. 10 lbs.			Approx. ship. wt. 2 lbs.
3-Poles, 600 Volts AC Only									
70	350	700	LB3070	LB3070S	.....	LB3400F	LB3400FS	.....	HLB3070T
90	450	900	LB3090	LB3090S	.....	LB3400F	LB3400FS	.....	HLB3090T
100	500	1000	LB3100	LB3100S	.....	LB3400F	LB3400FS	.....	HLB3100T
125	625	1250	LB3125	LB3125S	HLB3125	LB3400F	LB3400FS	HLB3400F	HLB3125T
150	750	1500	LB3150	LB3150S	HLB3150	LB3400F	LB3400FS	HLB3400F	HLB3150T
175	875	1750	LB3175	LB3175S	HLB3175	LB3400F	LB3400FS	HLB3400F	HLB3175T
200	1000	2000	LB3200	LB3200S	HLB3200	LB3400F	LB3400FS	HLB3400F	HLB3200T
225	1125	2250	LB3225	LB3225S	HLB3225	LB3400F	LB3400FS	HLB3400F	HLB3225T
250	1250	2500	LB3250	LB3250S	HLB3250	LB3400F	LB3400FS	HLB3400F	HLB3250T
300	1500	3000	LB3300	LB3300S	HLB3300	LB3400F	LB3400FS	HLB3400F	HLB3300T
350	1750	3500	LB3350	LB3350S	HLB3350	LB3400F	LB3400FS	HLB3400F	HLB3350T
400	2000	4000	LB3400	LB3400S	HLB3400	LB3400F	LB3400FS	HLB3400F	HLB3400T
			Approx. ship. wt. 15 lbs.			Approx. ship. wt. 12 lbs.			Approx. ship wt. 2-½ lbs.



**LB, 600 Volts AC;
250 Volts DC**

Special Breakers^④ Trip Units Only

Contin- uous Ampere Rating	Magnetic Trip Setting, Amperes ^①		Trip Unit Only	
	Low	High	2-Poles ^⑤	3-Poles
Magnetic Only Breakers, Front Adjustable				
400	350	700	HLB2700TM	HLB3700TM
400	625	1250	HLB21250TM	HLB31250TM
400	750	1500	HLB21500TM	HLB31500TM
400	875	1750	HLB21750TM	HLB31750TM
400	1125	2250	HLB22250TM	HLB32250TM
400	1500	3000	HLB23000TM	HLB33000TM
400	2000	4000	HLB24000TM	HLB34000TM
Ambient Compensating Breakers				
70	350	700	HLB2070TA	HLB3070TA
90	450	900	HLB2090TA	HLB3090TA
100	500	1000	HLB2100TA	HLB3100TA
125	625	1250	HLB2125TA	HLB3125TA
150	750	1500	HLB2150TA	HLB3150TA
175	875	1750	HLB2175TA	HLB3175TA
200	1000	2000	HLB2200TA	HLB3200TA
225	1125	2250	HLB2225TA	HLB3225TA
250	1250	2500	HLB2250TA	HLB3250TA
300	1500	3000	HLB2300TA	HLB3300TA
350	1750	3500	HLB2350TA	HLB3350TA
400	2000	4000	HLB2400TA	HLB3400TA

Terminals^⑥
Two terminals required per pole.
Select from chart on page 30.

① Set on high side, adjustable to lower limits.
 ② Terminals are shipped separately from breaker.
 ③ 2-pole breakers or trips are supplied in 3-pole frames with current carrying parts omitted from center pole.
 ④ Not listed with Underwriters' Laboratories, Inc.
 ⑤ If upgrading an LB, HLB breaker to a Series C K frame in a panelboard application, also order TAD3 spacer kit.





MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type LB and MARK 75® Type HLB Accessories and Modifications

Terminals①②

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed below. When used with aluminum cable, use joint compound. To order optional copper only terminals, add suffix "C" to complete breaker catalog number.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Standard Pressure Terminals		
225	TA225LA1	(1) #6-350 MCM Cu, or (1) #4-350 MCM Al
350	TA350DA	(1) 250-500 MCM Al/Cu
400	T400DA2	(2) 3/0-250 MCM Cu only
Optional Copper Pressure Terminals		
225	T225LA	(1) #6-350 MCM Cu
225②	T225LBF	(1) #6-250 MCM Cu
350	T350DA	(1) 250-500 MCM Cu

For CSA, see page 41.

Type LB breakers meet requirements for Class 21a circuit breakers, and Type HLB meet requirements for Class 23a, as defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings

Volt Max.	Amperes
Standard Breakers	
240 AC	50,000 Asym., 42,000 Sym.
480 AC	35,000 Asym., 30,000 Sym.
600 AC	25,000 Asym., 22,000 Sym.
250 DC	20,000③
MARK 75® Breakers	
240 AC	75,000 Asym., 65,000 Sym.
480 AC	40,000 Asym., 35,000 Sym.
600 AC	30,000 Asym., 25,000 Sym.
250 DC	20,000③

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Magnetic Only and Ambient Compensating Breakers④

For description, refer to Application Data 29-160. To order, select trip unit from table at left, frame and terminals.

Special Calibrations⑤

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC circuits, refer to Cutler-Hammer. See Application Data 29-160 for information regarding special conditions. Maximum calibration for 400 Hz is 300 amperes.

50°C Calibration⑥

Add suffix "V" to catalog number for complete breaker or trip unit only, when ordering breakers to be used in 50°C ambients.

① Terminals are shipped separately from breaker.

② Optional terminal.

③ Ratings above 10,000 amperes not UL listed.

④ Not listed with Underwriters' Laboratories, Inc.

⑤ If upgrading an LB, HLB breaker to a Series C K frame in a panelboard application, also order TAD3 spacer kit.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

REPLACEMENT CAPABILITIES, *Continued*

Type DA Breakers 250-400 Amperes, 240 Volts AC, 250 Volts DC, 2- and 3-Poles, Fixed Trip, Thermal Magnetic

Continuous Ampere Rating at 40°C	Breakers With Line Terminals Only		Breakers With Line and Load Terminals	
	Catalog Numbers		Catalog Numbers	
	2-Pole ❶	3-Pole	2-Pole ❶	3-Pole
250	DA2250Y	DA3250Y	DA2250	DA3250
300	DA2300Y	DA3300Y	DA2300	DA3300
350	DA2350Y	DA3350Y	DA2350	DA3350
400	DA2400Y	DA3400Y	DA2400	DA3400
	Approx. ship. wt. 13 lbs.	Approx. ship. wt. 15 lbs.	Approx. ship. wt. 13 lbs.	Approx. ship. wt. 13 lbs.



DA, 240 Volts AC; 250 Volts DC

Accessories and Modifications

Type DA breakers meet requirements of Federal Specification W-C-375b., Class 14b.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings

Max. Volts	Amperes
240 VAC	25,000 Asym., 22,000 Sym.
250 VDC	10,000

On all 3-phase Delta, grounded B phase applications, refer to Cutler-Hammer.

Terminals❸

Terminals are Underwriters' Laboratories, Inc. listed for the wire type and size listed below. When used with aluminum conductors, use joint compound.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Standard Pressure Terminals		
350	TA350DA	(1) 250-500 MCM Al/Cu
400	T400DA2	(2) 3/0-250 MCM Cu only
Optional Terminals (for Copper cable)		
350	T350DA	(1) 250-500 MCM Cu

For CSA, see page 41.

Special Calibrations❹

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC circuits, refer to Cutler-Hammer. See Application Data 29-160 for information regarding special conditions. Maximum 400 Hz calibrations: Type DA, 300 amperes.

50°C Calibration❺

Add suffix "V" to catalog number for complete breaker when ordering breakers to be used in 50°C ambients. Same price as standard 40°C breakers.

❶ 2-pole breakers are supplied in 3-pole frames.

❷ Not UL listed.

❸ If upgrading a DA breaker to a Series C K frame in a panelboard application, also order TAD3 spacer kit.

MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type LAB 125-400 Amperes, 600 Volts AC, 250 Volts DC, 2- and 3-Poles, Fixed Trip, Thermal Magnetic, Saf-T-Vue®

Continuous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes ^①		Complete Breaker Includes Pressure Type Aluminum Terminals ^②		Breaker Without Terminals	
			Standard	Saf-T-Vue®	Standard	Saf-T-Vue®
	Low	High	Catalog Numbers			
2-Poles, 600 Volts AC, 250 Volts DC^③						
125	625	1250	LAB2125	LAB2125S	LAB2125W	LAB2125SW
150	750	1500	LAB2150	LAB2150S	LAB2150W	LAB2150SW
175	875	1750	LAB2175	LAB2175S	LAB2175W	LAB2175SW
200	1000	2000	LAB2200	LAB2200S	LAB2200W	LAB2200SW
225	1125	2250	LAB2225	LAB2225S	LAB2225W	LAB2225SW
250	1250	2500	LAB2250	LAB2250S	LAB2250W	LAB2250SW
300	1500	3000	LAB2300	LAB2300S	LAB2300W	LAB2300SW
350	1750	3500	LAB2350	LAB2350S	LAB2350W	LAB2350SW
400	2000	4000	LAB2400	LAB2400S	LAB2400W	LAB2400SW
			Approx. ship. wt. 22 lbs.		Approx. ship. wt. 22 lbs.	
3-Poles, 600 Volts AC Only						
125	625	1250	LAB3125	LAB3125S	LAB3125W	LAB3125SW
150	750	1500	LAB3150	LAB3150S	LAB3150W	LAB3150SW
175	875	1750	LAB3175	LAB3175S	LAB3175W	LAB3175SW
200	1000	2000	LAB3200	LAB3200S	LAB3200W	LAB3200SW
225	1125	2250	LAB3225	LAB3225S	LAB3225W	LAB3225SW
250	1250	2500	LAB3250	LAB3250S	LAB3250W	LAB3250SW
300	1500	3000	LAB3300	LAB3300S	LAB3300W	LAB3300SW
350	1750	3500	LAB3350	LAB3350S	LAB3350W	LAB3350SW
400	2000	4000	LAB3400	LAB3400S	LAB3400W	LAB3400SW
			Approx. ship. wt. 24-½ lbs.		Approx. ship. wt. 24-½ lbs.	



LAB, 600 Volts AC; 250 Volts DC

Special Breakers^④

Continuous Ampere Rating	Magnetic Trip Setting, Amperes ^①		Breaker Catalog Number			
			2-Poles ^⑤		3-Poles	
	Low	High	Standard	Saf-T-Vue®	Standard	Saf-T-Vue®
Catalog Numbers						
Magnetic Only Breakers, Front Adjustable – Without Terminals^⑥						
400	350	700	LAB2700MW	LAB2700SMW	LAB3700MW	LAB3700SMW
400	625	1250	LAB21250MW	LAB21250SMW	LAB31250MW	LAB31250SMW
400	750	1500	LAB21500MW	LAB21500SMW	LAB31500MW	LAB31500SMW
400	875	1750	LAB21750MW	LAB21750SMW	LAB31750MW	LAB31750SMW
400	1125	2250	LAB22250MW	LAB22250SMW	LAB32250MW	LAB32250SMW
400	1500	3000	LAB23000MW	LAB23000SMW	LAB33000MW	LAB33000SMW
400	2000	4000	LAB24000MW	LAB24000SMW	LAB34000MW	LAB34000SMW
Ambient Compensating Breakers – Includes Terminals						
125	625	1250	LAB2125A	.....	LAB3125A	.....
150	750	1500	LAB2150A	.....	LAB3150A	.....
175	875	1750	LAB2175A	.....	LAB3175A	.....
200	1000	2000	LAB2200A	.....	LAB3200A	.....
225	1125	2250	LAB2225A	.....	LAB3225A	.....
250	1250	2500	LAB2250A	.....	LAB3250A	.....
300	1500	3000	LAB2300A	.....	LAB3300A	.....
350	1750	3500	LAB2350A	.....	LAB3350A	.....
400	2000	4000	LAB2400A	.....	LAB3400A	.....

Accessories and Modifications

Special Calibrations^⑦

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC circuits, refer to Cutler-Hammer. See Application Data 29-160 for information regarding special conditions. Maximum calibration for 400 Hz is 300 amperes.

50°C Calibration^⑧

Add suffix "V" to catalog number for complete breaker when ordering breakers to be used in 50°C ambients.

For CSA, see page 41.

Type LAB breakers meet requirements for Class 21a circuit breakers, as defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings^⑨

Max. Volts	Amperes
240 VAC	50,000 Asym., 42,000 Sym.
480 VAC	35,000 Asym., 30,000 Sym.
600 VAC	25,000 Asym., 22,000 Sym.
250 VDC	20,000 ^⑩

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Sales Office.

Terminals^⑪

Two terminals required per pole.

Select from table on page 35.

Magnetic Only and Ambient Compensating Breakers

For description, refer to Application Data 29-160. To order, select catalog number from "Special Breakers" table above.

Additional Accessories and Modifications

Refer to pages 58-68.

- ① Set on high side, adjustable to lower limits.
- ② Terminals shipped separately from breaker.
- ③ 2-pole breakers or trips are supplied in 3-pole frames with current carrying parts omitted from center pole.
- ④ Not listed with Underwriters' Laboratories, Inc.
- ⑤ Select desired terminals from page 42 and order as separate item.
- ⑥ Interrupting capacities shown do not apply to molded case switches.
- ⑦ Ratings above 10,000 amperes not UL listed.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Type LA and MARK 75® Type HLA 70-400 Amperes, 600 Volts AC, 250 Volts DC, 2- and 3-Poles, Interchangeable Trip

Continu- ous Ampere Rating at 40°C	Magnetic Trip Setting Amperes ^①		Complete Breaker Includes Pressure Type Aluminum Terminals ^②			Shipped as Frame, Trip Unit and Terminals Frame Only			Trip Unit Only
			Standard	Saf-T-Vue®	MARK 75®	Standard	Saf-T-Vue®	MARK 75®	
	Low	High	Catalog Numbers						
400 Ampere Frame Breakers^③									
2-Poles, 600 Volts AC, 250 Volts DC^④									
70 ^⑤	350	700	LA2070	LA2070S	.....	LA2400F	LA2400FS	.....	HLA2070T
90 ^⑤	450	900	LA2090	LA2090S	.....	LA2400F	LA2400FS	.....	HLA2090T
100 ^⑤	500	1000	LA2100	LA2100S	.....	LA2400F	LA2400FS	.....	HLA2100T
125	625	1250	LA2125	LA2125S	HLA2125	LA2400F	LA2400FS	HLA2400F	HLA2125T
150	750	1500	LA2150	LA2150S	HLA2150	LA2400F	LA2400FS	HLA2400F	HLA2150T
175	875	1750	LA2175	LA2175S	HLA2175	LA2400F	LA2400FS	HLA2400F	HLA2175T
200	1000	2000	LA2200	LA2200S	HLA2200	LA2400F	LA2400FS	HLA2400F	HLA2200T
225	1125	2250	LA2225	LA2225S	HLA2225	LA2400F	LA2400FS	HLA2400F	HLA2225T
250	1250	2500	LA2250	LA2250S	HLA2250	LA2400F	LA2400FS	HLA2400F	HLA2250T
300	1500	3000	LA2300	LA2300S	HLA2300	LA2400F	LA2400FS	HLA2400F	HLA2300T
350	1750	3500	LA2350	LA2350S	HLA2350	LA2400F	LA2400FS	HLA2400F	HLA2350T
400	2000	4000	LA2400	LA2400S	HLA2400	LA2400F	LA2400FS	HLA2400F	HLA2400T
Approx. ship. wt. 21- ³ / ₄ lbs.					Approx. ship. wt. 17- ¹ / ₂ lbs.			Approx. ship. wt. 2- ¹ / ₄ lbs.	
3-Poles, 600 Volts AC Only									
70 ^⑤	350	700	LA3070	LA3070S	.....	LA3400F	LA3400FS	.....	HLA3070T
90 ^⑤	450	900	LA3090	LA3090S	.....	LA3400F	LA3400FS	.....	HLA3090T
100 ^⑤	500	1000	LA3100	LA3100S	.....	LA3400F	LA3400FS	.....	HLA3100T
125	625	1250	LA3125	LA3125S	HLA3125	LA3400F	LA3400FS	HLA3400F	HLA3125T
150	750	1500	LA3150	LA3150S	HLA3150	LA3400F	LA3400FS	HLA3400F	HLA3150T
175	875	1750	LA3175	LA3175S	HLA3175	LA3400F	LA3400FS	HLA3400F	HLA3175T
200	1000	2000	LA3200	LA3200S	HLA3200	LA3400F	LA3400FS	HLA3400F	HLA3200T
225	1125	2250	LA3225	LA3225S	HLA3225	LA3400F	LA3400FS	HLA3400F	HLA3225T
250	1250	2500	LA3250	LA3250S	HLA3250	LA3400F	LA3400FS	HLA3400F	HLA3250T
300	1500	3000	LA3300	LA3300S	HLA3300	LA3400F	LA3400FS	HLA3400F	HLA3300T
350	1750	3500	LA3350	LA3350S	HLA3350	LA3400F	LA3400FS	HLA3400F	HLA3350T
400	2000	4000	LA3400	LA3400S	HLA3400	LA3400F	LA3400FS	HLA3400F	HLA3400T
Approx. ship. wt. 24- ¹ / ₂ lbs.					Approx. ship. wt. 19 lbs.			Approx. ship. wt. 3 lbs.	



LA, 600 Volts AC; 250 Volts DC

Special Breakers^⑥ Trip Units Only

Continuous Ampere Rating	Magnetic Trip Setting, Amperes ^①		2-Poles ^④	3-Poles
	Low	High	Catalog Numbers	
Magnetic Only Breakers, Front Adjustable				
400-Ampere Frame Breakers^③				
400	350	700	HLA2700TM	HLA3700TM
400	625	1250	HLA21250TM	HLA31250TM
400	750	1500	HLA21500TM	HLA31500TM
400	875	1750	HLA21750TM	HLA31750TM
400	1125	2250	HLA22250TM	HLA32250TM
400	1500	3000	HLA23000TM	HLA33000TM
400	2000	4000	HLA24000TM	HLA34000TM
Ambient Compensating Breakers				
400-Ampere Frame Breakers Only^⑥				
70 ^⑤	350	700	HLA2070TA	HLA3070TA
90 ^⑤	450	900	HLA2090TA	HLA3090TA
100 ^⑤	500	1000	HLA2100TA	HLA3100TA
125	625	1250	HLA2125TA	HLA3125TA
150	750	1500	HLA2150TA	HLA3150TA
175	875	1750	HLA2175TA	HLA3175TA
200	1000	2000	HLA2200TA	HLA3200TA
225	1125	2250	HLA2225TA	HLA3225TA
250	1250	2500	HLA2250TA	HLA3250TA
300	1500	3000	HLA2300TA	HLA3300TA
350	1750	3500	HLA2350TA	HLA3350TA
400	2000	4000	HLA2400TA	HLA3400TA

Terminals
Two terminals required per pole.
Select from chart on page 35.

- ① Set on high side, adjustable to lower limits.
- ② Terminals shipped separately from breaker.
- ③ Terminals, trip units and accessories are not interchangeable between 400- and 600- ampere frames.
- ④ 2-pole breakers or trips are supplied in 3-pole frames with current carrying parts omitted from center pole.
- ⑤ These ratings have interrupting capacities reduced to 25,000 amperes sym. at 240 volts, 20,000 amperes sym. at 480 volts, and 15,000 amperes sym. at 600 volts.
- ⑥ Not listed with Underwriters' Laboratories, Inc.

MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT AB DE-ION® CIRCUIT BREAKERS

Type LA and MARK 75® Type HLA 600 Ampere Breakers

250-600 Amperes, 600 Volts AC, 250 Volts DC, 2-, 3-Poles, Interchangeable Trip Thermal Magnetic, Saf-T-Vue® and MARK 75® Breakers

Contin- uous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes ^①		Complete Breaker			Shipped as Frame, Trip Unit and Terminals ^②			Trip Unit Only
			Includes Pressure Type Aluminum Terminals ^③			Frame Only			
	Low	High	Standard	Saf-T-Vue®	MARK 75®	Standard	Saf-T-Vue®	MARK 75®	Standard Saf-T-Vue® MARK 75®
600 Ampere Frame Breakers^④									
2-Poles, 600 Volts AC, 250 Volts DC^⑤									
250	1250	2500	2603D50G01	2603D50G13	1256C10G02	LA2600F	LA2600FS	HLA2600F	2603D46G07
300	1500	3000	2603D50G02	2603D50G14	1256C10G03	LA2600F	LA2600FS	HLA2600F	2603D46G08
350	1750	3500	2603D50G03	2603D50G15	1256C10G04	LA2600F	LA2600FS	HLA2600F	2603D46G09
400	2000	4000	2603D50G04	2603D50G16	1256C10G05	LA2600F	LA2600FS	HLA2600F	2603D46G10
500	2500	5000	LA2500	LA2500S	HLA2500	LA2600F	LA2600FS	HLA2600F	HLA2500T
600	3000	6000	LA2600	LA2600S	HLA2600	LA2600F	LA2600FS	HLA2600F	HLA2600T
3-Poles, 600 Volts AC Only									
250	1250	2500	2603D50G07	2603D50G019	1256C10G12	LA3600F	LA3600FS	HLA3600F	2603D46G26
300	1500	3000	2603D50G08	2603D50G020	1256C10G13	LA3600F	LA3600FS	HLA3600F	2603D46G27
350	1750	3500	2603D50G09	2603D50G021	1256C10G14	LA3600F	LA3600FS	HLA3600F	2603D46G28
400	2000	4000	2603D50G10	2603D50G022	1256C10G15	LA3600F	LA3600FS	HLA3600F	2603D46G29
500	2500	5000	LA3500	LA3500S	HLA3500	LA3600F	LA3600FS	HLA3600F	HLA3500T
600	3000	6000	LA3600	LA3600S	HLA3600	LA3600F	LA3600FS	HLA3600F	HLA3600T



LA, 600 Volts AC; 250 Volts DC

Underwriters' Laboratories, Inc. Listed
Interrupting Ratings^⑥

Volts Max. Amperes	
Standard Breakers	
240 VAC	50,000 Asym., 42,000 Sym.
480 VAC	35,000 Asym., 30,000 Sym.
600 VAC	25,000 Asym., 22,000 Sym.
250 VDC	20,000 ^⑦
MARK 75® Breakers	
240 VAC	75,000 Asym., 65,000 Sym.
480 VAC	40,000 Asym., 35,000 Sym.
600 VAC	30,000 Asym., 25,000 Sym.
250 VDC	20,000 ^⑦

Special Breakers^⑧ Trip Units Only

Contin- uous Ampere Rating	Magnetic Trip Setting, Amperes ^①		Catalog/Style Number	
	Low	High	2-Poles ^④	3-Poles
600 Ampere Frame Breakers^④				
Magnetic Only Breakers, Front Adjustable				
600	1125	2250	2603D47G07	2603D47G26
600	1500	3000	2603D47G08	2603D47G27
600	2000	4000	2603D47G10	2603D47G29
600	2500	5000	HLA25000TM	HLA35000TM
600	3000	6000	HLA26000TM	HLA36000TM
Ambient Compensating Breakers				
250	1250	2500	5683D88G07	5683D88G26
300	1500	3000	5683D88G08	5683D88G27
350	1750	3500	5683D88G09	5683D88G28
400	2000	4000	5683D88G10	5683D88G29
500	2500	5000	HLA2500TA	HLA3500TA
600	3000	6000	HLA2600TA	HLA3600TA

Special Calibration^⑨

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC, refer to Cutler-Hammer. See Application Data 29-160 for information regarding special conditions. Maximum 400 Hz calibration: 600 ampere frame, 450 amperes.

50°C Calibration^⑩

Add suffix "V" to catalog number for complete breaker or trip unit only, when ordering breakers to be used in 50°C ambients. Same price as standard 40°C breakers.

For CSA, see page 41.

Type LA breakers meet requirements for Class 21a circuit breakers, and type HLA meet requirements for Class 23a as defined by Federal Specification W-C-375b.

On all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Terminals^⑪

Two terminals are required per pole. Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed below. When used with aluminum cable, use joint compound. To order optional copper only terminals, add suffix "C" to complete breaker catalog number.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Standard Al/Cu Pressure Terminals		
600 ^⑫	TA600LA	(2) 250-500 MCM Al/Cu
Optional Copper Pressure Terminals		
600 ^⑫	T600LA	(2) 250-500 MCM Cu

Magnetic Only and Ambient Compensating Breakers

For description, refer to Application Data 29-160. To order, select frame, trip unit and terminals from tables on **this page**.

Accessories and Modifications

Refer to **pages 58-68**.

- ① Set on high side, adjustable to lower limits.
- ② Terminals shipped separately from breakers.
- ③ Terminals, trip units and accessories are not interchangeable between 400 and 600 ampere frames.
- ④ 2-pole breakers or trips are supplied in 3-pole frames with current carrying parts omitted from center pole.
- ⑤ Not listed with Underwriters' Laboratories, Inc.
- ⑥ Interrupting capacities shown do not apply to molded case switches.
- ⑦ Ratings above 10,000 amperes not UL listed.
- ⑧ For 600 ampere frame breakers only.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Type LA and MARK 75® Type HLA Accessories and Modifications

TerminalsⓀ

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed below. When used with aluminum cable, use joint compound. To order optional copper only terminals, add suffix "C" to complete breaker catalog number.

Max. Amperes	Catalog Number	No. of Cables, Wire Range, Type,
Standard Al/Cu Pressure Terminals		
225Ⓚ	TA225LA1	(1) #6-350 MCM Cu, or (1) #4-350 MCM Al
400Ⓚ	TA400LA1	(1) #4-250 MCM Al/Cu, plus (1) 3/0-600 MCM Al/Cu
Optional Copper Pressure Terminals		
225Ⓚ	T225LA	(1) #6-350 MCM Cu
225ⓀⓀ	T225LBF	(1) #6-250 MCM Cu
400Ⓚ	T401LA	(1) #4-250 MCM Cu, plus (1) 3/0-600 MCM Cu

Listed with Underwriters' Laboratories, Inc. except as noted.

Type LA breakers meet requirements for Class 21a circuit breakers, and Type HLA meet requirements for Class 23a as defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting RatingsⓀ

Volts Max.	Amperes
Standard Breakers	
240 VAC	50,000 Asym., 42,000 Sym.
480 VAC	35,000 Asym., 30,000 Sym.
600 VAC	25,000 Asym., 22,000 Sym.
250 VDC	20,000Ⓚ
MARK 75® Breakers	
240 VAC	75,000 Asym., 65,000 Sym.
480 VAC	40,000 Asym., 35,000 Sym.
600 VAC	30,000 Asym., 25,000 Sym.
250 VDC	20,000Ⓚ

Magnetic Only and Ambient Compensating BreakersⓀ

For description, refer to Application Data 29-160. To order, select trip unit from table on page 34, frame and terminals from table at left.

Special CalibrationsⓀ

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC refer to Cutler-Hammer. See Application Data 29-160 for information regarding special conditions. Maximum 400 Hz calibration: 400 ampere frame, 300 amperes.

50°C CalibrationⓀ

Add suffix "V" to catalog number for complete breaker or trip unit only, when ordering breakers to be used in 50°C ambients.

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Type LAY 250-600 Amperes, 240 Volts AC, 3-Poles, Interchangeable Trip Thermal Magnetic, 600 Ampere Frame

Continuous Ampere Rating at 40°C	Magnetic Trip Setting AmperesⓀ		Complete Breaker	Shipped as Frame, Trip Unit and TerminalsⓀ	
	Low	High	Includes Pressure Type Aluminum TerminalsⓀ	Frame Only	Trip Unit Only
600 Ampere Frame BreakersⓀ 3-Poles, 240 Volts AC Only					
250	1250	2500	LAY3250	LAY3600F	2603D46G26
300	1500	3000	LAY3300	LAY3600F	2603D46G27
350	1750	3500	LAY3350	LAY3600F	2603D46G28
400	2000	4000	LAY3400	LAY3600F	2603D46G29
500	2500	5000	LAY3500	LAY3600F	HLA3500T
600	3000	6000	LAY3600	LAY3600F	HLA3600T



LAY, 240 Volts AC

Accessories and Modifications

Special CalibrationsⓀ

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC, refer to Cutler-Hammer. See Application Data 29-160 for information regarding special conditions. Maximum 400 Hz calibration: 600 ampere frame, 450 amperes.

50°C CalibrationⓀ

Add suffix "V" to catalog number for complete breaker or trip unit only, when ordering breakers to be used in 50°C ambients. Same price as standard 40°C breakers.

For CSA, see page 41.

Type LAY breakers are not defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting RatingsⓀ

Volts Max.	Amperes
240 VAC	115,000 Asym., 100,000 Sym.

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

TerminalsⓀ

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed

below. When used with aluminum cable, use joint compound.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Standard Al/Cu Pressure Terminals		
500Ⓚ	TA602LD	(2) 250-350 MCM Al/Cu
600Ⓚ	TA603LA	(2) 400-500 MCM Al/Cu
600Ⓚ	TA600LA	(2) 250-500 MCM Al/Cu
Optional Copper Pressure Terminals		
600Ⓚ	T600LA	(2) 250-500 MCM Cu

Additional Accessories and Modifications
Refer to pages 58-68.

- Ⓚ Terminals shipped separately from breaker.
- Ⓚ Terminals, trip units and accessories are not interchangeable between 400 and 600 ampere frames.
- Ⓚ 400 ampere frame only.
- Ⓚ Optional terminal.
- Ⓚ Interrupting capacities do not apply to molded case switches.
- Ⓚ Ratings above 10,000 amperes not UL listed.
- Ⓚ Not listed with Underwriters' Laboratories, Inc.
- Ⓚ Set on high side, adjustable to lower limits.
- Ⓚ For 600 ampere frame breakers only.

MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type MA 125-800 Amperes, 600 Volts AC, 250 Volts DC 0, 2- and 3-Poles, Interchangeable Trip

Continuous Ampere Rating at 40°C	Magnetic Trip Setting Amperes ^②		Complete Breaker Includes Pressure Type Copper Terminals ^③			Shipped as Frame, Trip Unit and Terminals ^④ Frame Only			Trip Unit Only Standard Saf-T-Vue®, MARK 75®
			Standard	Saf-T-Vue®	MARK 75®	Standard	Saf-T-Vue®	MARK 75®	
	Low	High	Catalog Numbers						
2-Poles, 600 Volts AC, 250 Volts DC 0④									
125	625	1250	MA2125	MA2125S	HMA2125	MA2800F	MA2800FS	HMA2800F	HMA2125T
150	750	1500	MA2150	MA2150S	HMA2150	MA2800F	MA2800FS	HMA2800F	HMA2150T
175	875	1750	MA2175	MA2175S	HMA2175	MA2800F	MA2800FS	HMA2800F	HMA2175T
200	1000	2000	MA2200	MA2200S	HMA2200	MA2800F	MA2800FS	HMA2800F	HMA2200T
225	1125	2250	MA2225	MA2225S	HMA2225	MA2800F	MA2800FS	HMA2800F	HMA2225T
250	1250	2500	MA2250	MA2250S	HMA2250	MA2800F	MA2800FS	HMA2800F	HMA2250T
300	1500	3000	MA2300	MA2300S	HMA2300	MA2800F	MA2800FS	HMA2800F	HMA2300T
350	1750	3500	MA2350	MA2350S	HMA2350	MA2800F	MA2800FS	HMA2800F	HMA2350T
400	2000	4000	MA2400	MA2400S	HMA2400	MA2800F	MA2800FS	HMA2800F	HMA2400T
500	2500	5000	MA2500	MA2500S	HMA2500	MA2800F	MA2800FS	HMA2800F	HMA2500T
600	3000	6000	MA2600	MA2600S	HMA2600	MA2800F	MA2800FS	HMA2800F	HMA2600T
700	3000	6000	MA2700 ^⑤	MA2700S	HMA2700	MA2800F	MA2800FS	HMA2800F	HMA2700T ^⑤
800	3000	6000	MA2800 ^⑤	MA2800S	HMA2800	MA2800F	MA2800FS	HMA2800F	HMA2800T ^⑤
800	MCS ^⑥	.....	MA2800WK	MA2800WSK	.....	.....	.....	.....	Incl. in Frame
			Approx. ship. wt. 37 lbs.			Approx. ship. wt. 24 lbs.			Approx. ship. wt. 3-1/2 lbs.
3-Poles, 600 Volts AC Only									
125	625	1250	MA3125	MA3125S	HMA3125	MA3800F	MA3800FS	HMA3800F	HMA3125T
150	750	1500	MA3150	MA3150S	HMA3150	MA3800F	MA3800FS	HMA3800F	HMA3150T
175	875	1750	MA3175	MA3175S	HMA3175	MA3800F	MA3800FS	HMA3800F	HMA3175T
200	1000	2000	MA3200	MA3200S	HMA3200	MA3800F	MA3800FS	HMA3800F	HMA3200T
225	1125	2250	MA3225	MA3225S	HMA3225	MA3800F	MA3800FS	HMA3800F	HMA3225T
250	1250	2500	MA3250	MA3250S	HMA3250	MA3800F	MA3800FS	HMA3800F	HMA3250T
300	1500	3000	MA3300	MA3300S	HMA3300	MA3800F	MA3800FS	HMA3800F	HMA3300T
350	1750	3500	MA3350	MA3350S	HMA3350	MA3800F	MA3800FS	HMA3800F	HMA3350T
400	2000	4000	MA3400	MA3400S	HMA3400	MA3800F	MA3800FS	HMA3800F	HMA3400T
500	2500	5000	MA3500	MA3500S	HMA3500	MA3800F	MA3800FS	HMA3800F	HMA3500T
600	3000	6000	MA3600	MA3600S	HMA3600	MA3800F	MA3800FS	HMA3800F	HMA3600T
700	3000	6000	MA3700 ^⑤	MA3700S	HMA3700	MA3800F	MA3800FS	HMA3800F	HMA3700T ^⑤
800	3000	6000	MA3800 ^⑤	MA3800S	HMA3800	MA3800F	MA3800FS	HMA3800F	HMA3800T ^⑤
800	MCS ^⑥	.....	MA3800WK	MA3800WSK	.....	.....	.....	.....	Incl. in Frame
			Approx. ship. wt. 44 lbs.			Approx. ship. wt. 28 lbs.			Approx. ship. wt. 4 lbs.



MA, 600 Volts AC; 250 Volts DC

Magnetic Only Breakers, Front Adj. ⑦

Continuous Ampere Rating	Magnetic Trip Range ^②		Trip Unit Only	
			2-Poles ^④	3-Poles
	Low	High	Catalog Number	
800	625	1250	HMA21250TM	HMA31250TM
800	1000	2000	HMA22000TM	HMA32000TM
800	1500	3000	HMA23000TM	HMA33000TM
800	2000	4000	HMA24000TM	HMA34000TM
800	3000	6000	HMA26000TM	HMA36000TM
800	4000	8000	HMA28000TM	HMA38000TM

Ambient Compensating Breakers ⑦

Continuous Ampere Rating	Magnetic Trip Range ^②		Trip Unit Only	
			2-Poles	3-Poles
	Low	High	Catalog Number	
125	625	1250	HMA2125TA	HMA3125TA
150	750	1500	HMA2150TA	HMA3150TA
175	875	1750	HMA2175TA	HMA3175TA
200	1000	2000	HMA2200TA	HMA3200TA
225	1125	2250	HMA2225TA	HMA3225TA
250	1250	2500	HMA2250TA	HMA3250TA
300	1500	3000	HMA2300TA	HMA3300TA
350	1750	3500	HMA2350TA	HMA3350TA
400	2000	4000	HMA2400TA	HMA3400TA
500	2500	5000	HMA2500TA	HMA3500TA
600	3000	6000	HMA2600TA	HMA3600TA
700	3000	6000	HMA2700TA	HMA3700TA
800	3000	6000	HMA2800TA	HMA3800TA

- ① Above 600 amperes, DC rating applies to magnetic only breakers.
- ② Set on high side, adjustable to lower limits.
- ③ Terminals are shipped separately from breaker.
- ④ 2-pole breakers are supplied in 3-pole frames with current carrying parts omitted from center pole.
- ⑤ 60 Hz AC only.
- ⑥ Interrupting capacities shown do not apply to high magnetic molded case switches.
- ⑦ Not listed with Underwriters' Laboratories, Inc.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Type MA Accessories and Modifications

For CSA, see page 41.

Special Calibrations^❶

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC (50 Hz AC minimum – 60 Hz AC maximum) refer to Cutler-Hammer. See Application Data 29-160 for additional information regarding special conditions.

50°C Calibration^❷

Add suffix "V" to catalog number for complete breaker or trip unit only, when ordering breakers to be used in 50°C ambients.

Type MA breakers meet requirements for Class 21a circuit breakers, and Type HMA meet requirements for Class 23a, as defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings^❷

Max. Volts	Amperes
Standard Breakers	
240 VAC	50,000 Asym., 42,000 Sym.
480 VAC	35,000 Asym., 30,000 Sym.
600 VAC	25,000 Asym., 22,000 Sym.
250 VDC ^❸	20,000 ^❹
MARK 75® Breakers	
240 VAC	75,000 Asym., 65,000 Sym.
480 VAC	40,000 Asym., 35,000 Sym.
600 VAC	30,000 Asym., 25,000 Sym.
250 VDC ^❸	20,000 ^❹

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Terminals^❺

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed below. When used with aluminum conductors, use joint compound.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Standard Al/Cu Pressure Terminals		
600	TA700MA1	(2) #1-500 MCM Al/Cu
800 (Std.)	TA800MA2	(3) 3/0-400 MCM Al/Cu
800 ^❶	TA801MA	(2) 500-750 MCM Al/Cu
Optional Copper Pressure Terminals		
350	T350MA	(1) #1-600 MCM Cu
600	T600MA1	(2) 2/0-500 MCM Cu
800	T800MA1	(3) 3/0-300 MCM Cu

Magnetic Only and Ambient Compensating Breakers

For description, refer to Application Data 29-160. To order a complete breaker, select trip unit plus frame and terminals.

Type MAY 600-800 Amperes, 240 Volts AC, 3-Poles, Interchangeable Trip

Continuous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes ^❺		Complete Breaker	Shipped as Frame, Trip Unit and Terminals ^❺	
	Low	High	Includes Pressure Type Aluminum Terminals ^❻	Frame Only	Trip Unit Only
3-Poles, 240 Volts AC Only					
600	3000	6000	MAY3600	MAY3800F	HMA3600T
700 ^❷	3000	6000	MAY3700	MAY3800F	HMA3700T
800 ^❷	3000	6000	MAY3800	MAY3800F	HMA3800T

Accessories and Modifications

Special Calibrations^❶

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC (50 Hz AC minimum – 60 Hz AC maximum), refer to Cutler-Hammer. See Application Data 29-160 for additional information regarding special conditions.

50°C Calibration^❷

Add suffix "V" to catalog number for complete breaker or trip unit only, when ordering breakers to be used in 50°C ambients.

For CSA, see page 41.

Type MAY breakers are not defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. listed Interrupting Ratings

Volts Max.	Amperes
240 VAC	115,000 Asym., 100,000 Sym.

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Terminals^❺

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed right. When used with aluminum cable, use joint compound.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Standard Al/Cu Pressure Terminals		
600	TA700MA1	(2) #1-500 MCM Al/Cu
800 (Std.)	TA800MA2	(3) 3/0-400 MCM Al/Cu
800	TA801MA	(2) 500-750 MCM Al/Cu
Optional Copper Pressure Terminals		
350	T350MA	(1) #1-600 MCM Cu
600	T600MA1	(2) 2/0-500 MCM Cu
800	T800MA1	(3) 3/0-300 MCM Cu

Additional Accessories and Modifications

Refer to pages 58-68.

- ❶ Not listed with Underwriters' Laboratories, Inc.
- ❷ Interrupting capacities shown do not apply to high magnetic molded case switches.
- ❸ Above 600 amperes, DC rating applies to magnetic only breakers.
- ❹ Ratings above 10,000 amperes not UL listed.
- ❺ Terminals are shipped separately from breaker.
- ❻ Set on high side, adjustable to lower limits.
- ❼ 60 Hz AC only.

MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type NB 700-1200 Amperes, 600 Volts, 60 Hz AC^①, 250 Volts DC^②, 2- and 3-Poles, Interchangeable Trip

Continuous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes ^③		Complete Breaker			Shipped as Frame, Trip Unit and Terminals ^④			
	Low	High	Includes Pressure Type Copper Terminals ^⑤			Frame Only			Trip Unit Only
			Standard	Saf-T-Vue [®]	MARK 75 [®]	Standard	Saf-T-Vue [®]	MARK 75 [®]	Standard Saf-T-Vue [®] , MARK 75 [®]
Catalog Numbers									
2-Poles, 600 Volts AC, 250 Volts DC^②									
700	3000	6000	NB2700	NB2700S	HNB2700	NB21200F	NB21200FS	HNB21200F	HNB2700T
800	3000	6000	NB2800	NB2800S	HNB2800	NB21200F	NB21200FS	HNB21200F	HNB2800T
900	4000	8000	NB2900	NB2900S	HNB2900	NB21200F	NB21200FS	HNB21200F	HNB2900T
1000	4000	8000	NB21000	NB21000S	HNB21000	NB21200F	NB21200FS	HNB21200F	HNB21000T
1200	4000	8000	NB21200	NB21200S	HNB21200	NB21200F	NB21200FS	HNB21200F	HNB21200T
			Approx. ship. wt. 43 lbs.			Approx. ship. wt. 29 lbs.			Approx. ship. wt. 3½ lbs.
3-Poles, 600 Volts AC Only									
700	3000	6000	NB3700	NB3700S	HNB3700	NB31200F	NB31200FS	HNB31200F	HNB3700T
800	3000	6000	NB3800	NB3800S	HNB3800	NB31200F	NB31200FS	HNB31200F	HNB3800T
900	4000	8000	NB3900	NB3900S	HNB3900	NB31200F	NB31200FS	HNB31200F	HNB3900T
1000	4000	8000	NB31000	NB31000S	HNB31000	NB31200F	NB31200FS	HNB31200F	HNB31000T
1200	4000	8000	NB31200	NB31200S	HNB31200	NB31200F	NB31200FS	HNB31200F	HNB31200T
			Approx. ship. wt. 51 lbs.			Approx. ship. wt. 32 lbs.			Approx. ship. wt. 4 lbs.



NB, 600 Volts AC; 250 Volts DC

Accessories and Modifications

Magnetic Only Breakers, Front Adjustable^⑥

Continuous Ampere Rating	Magnetic Trip Range ^⑥		Trip Unit Only	
	Low	High	2-Poles ^⑥	3-Poles
			Catalog Numbers	
1200	3000	6000	HNB26000TM	HNB36000TM
1200	4000	8000	HNB28000TM	HNB38000TM
1200	5000	10000	HNB210000TM	HNB310000TM
1200	6000	12000	HNB212000TM	HNB312000TM

Magnetic Only Breakers^⑦

For description, refer to Application Data 29-160. To order a complete breaker, select trip unit, plus frame and terminals.

Special Calibrations^⑧

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC (50 Hz AC minimum - 60 Hz AC maximum for ratings of 700 amperes and above), refer to Cutler-Hammer. See Application Data 29-160 for additional information regarding special conditions. Maximum 400 Hz calibration for type MA is 475 amperes.

50°C Calibration^⑨

Add suffix "V" to catalog number for complete breaker or trip unit only, when ordering breakers to be used in 50°C ambients.

For CSA, see page 41.

Type NB breakers meet requirements for Class 21a circuit breakers, and Type HNB meet requirements for class 23a, as defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. listed Interrupting Ratings:

Max. Volts	Amperes
Standard Breakers	
240 VAC	50,000 Asym., 42,000 Sym.
480 VAC	35,000 Asym., 30,000 Sym.
600 VAC	25,000 Asym., 22,000 Sym.
250 VDC ^⑩	20,000 ^⑩
MARK 75[®] Breakers	
240 VAC	75,000 Asym., 65,000 Sym.
480 VAC	40,000 Asym., 35,000 Sym.
600 VAC	30,000 Asym., 25,000 Sym.
250 VDC ^⑩	20,000 ^⑩

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Terminals^⑪

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed below. When used with aluminum conductors, use joint compound. To order optional copper terminals, add suffix "C" to complete breaker catalog number.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type,
Standard Al/Cu Pressure Terminals		
1000	TA1000NB1	(3) 3/0-400 MCM Al/Cu
1200	TA1200NB1	(4) 4/0-500 MCM Al/Cu
Optional Copper or Al/Cu Pressure Terminals		
1000	T1000NB1	(3) 3/0-500 MCM Cu
1200	T1200NB1	(4) 3/0-400 MCM Cu
1200	TA1201NB1	(3) 500-750 MCM Al/Cu

Additional Accessories and Modifications
Refer to pages 58-68.

① Higher frequency calibration not available. Minimum of 50 Hz calibration available on special order.

② 250 volt DC rating applied only to magnetic only type breakers.

③ Set on high side, adjustable to lower limits.

④ Terminals shipped separately from breaker.

⑤ 2-pole breakers supplied in 3-pole frames with current carrying parts omitted from center pole.

⑥ Frames, terminals, studs, mounting hardware, dimensions and shipping weights are same as standard thermal magnetic breakers.

⑦ Not listed with Underwriters' Laboratories, Inc.

⑧ Ratings above 10,000 amperes not UL listed.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

REPLACEMENT CAPABILITIES, *Continued*

Type NBY 700-1200 Amperes, 240 Volts, 60 Hz AC^❶, 3-Poles, Interchangeable Trip

Continuous Ampere Rating at 40°C	Magnetic Trip Setting Amperes ^❷		Complete Breaker	Shipped as Frame, Trip Unit and Terminals ^❸	
	Low	High	Includes Pressure Type Aluminum Terminals ^❹	Frame Only	Trip Unit Only
3-Poles, 600 Volts AC Only					
700	3000	6000	NBY3700	NBY31200F	HNB3700T
800	3000	6000	NBY3800	NBY31200F	HNB3800T
900	4000	8000	NBY3900	NBY31200F	HNB3900T
1000	4000	8000	NBY31000	NBY31200F	HNB31000T
1200	4000	8000	NBY31200	NBY31200F	HNB31200T



NBY, 240 Volts AC

Accessories and Modifications

Special Calibrations^❶

Special calibration price additions apply to ampere ratings not listed as standard or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC (50 Hz AC minimum – 60 Hz AC maximum), refer to Cutler-Hammer. See Application Data 29-160 for additional information regarding special conditions.

50°C Calibration^❶

Add suffix "V" to catalog number for complete breaker or trip unit only, when ordering for breakers to be used in 50°C ambients.

For CSA see page 41.

Type NBY breakers are not defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. listed Interrupting Ratings

Volts Max.	Amperes
240 VAC	115,000 Asym., 100,000 Sym.

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Terminals^❸

Two terminals are required per pole.

Terminals are Underwriters' Laboratories, Inc. listed for wire type and range listed below. When used with aluminum conductors, use joint compound.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type,
Standard Al/Cu Pressure Terminals		
1000	TA1000NB1	(3) 3/0-400 MCM Al/Cu
1200	TA1200NB1	(4) 4/0-500 MCM Al/Cu
1200	TA1201NB1	(3) 500-750 MCM Al/Cu
Alternate Copper Pressure Terminals		
1000	T1000NB1	(3) 3/0-500 MCM Cu
1200	T1200NB1	(4) 3/0-400 MCM Cu

Additional Accessories and Modifications
Refer to **pages 58-68.**

❶ Higher frequency calibration not available. Minimum of 50 Hz calibration available on special order.
 ❷ Set on high side, adjustable to lower limits.
 ❸ Terminals shipped separately from breaker.
 ❹ Not listed with Underwriters' Laboratories, Inc.

MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type PB 600-2500 Amperes, 600 Volts, 60 Cycle AC[ⓐ], 250 Volts DC[ⓑ], 2- and 3-Poles, Interchangeable Trip

Continuous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes [ⓐ]		Complete Breaker	Shipped as Frame, Trip Unit and Terminals	
	Low	High	Includes Bus Bar Connectors [ⓐ]	Frame Only	Trip Unit Only
			Catalog Numbers		
2-Poles, 600 Volts AC Only[ⓐ]					
600	1500	5000	PB2600	PB22500F	PB2600T
700	1500	5000	PB2700	PB22500F	PB2700T
800	1500	5000	PB2800	PB22500F	PB2800T
900	1500	5000	PB2900	PB22500F	PB2900T
1000	1500	5000	PB21000	PB22500F	PB21000T
1200	2000	6000	PB21200	PB22500F	PB21200T
1400	2500	7000	PB21400	PB22500F	PB21400T
1600	3000	8000	PB21600	PB22500F	PB21600T
1800	3000	8000	PB21800	PB22500F	PB21800T
2000	3000	8000	PB22000	PB22500F	PB22000T
Approx. ship. wt.			132 lbs.	98 lbs.	18 lbs.
2500	3000	8000	PB22500	PB22500F	PB22500T
Approx. ship. wt.			144 lbs.	98 lbs.	18 lbs.
3-Poles, 600 Volts AC Only					
600	1500	5000	PB3600	PB32500F	PB3600T
700	1500	5000	PB3700	PB32500F	PB3700T
800	1500	5000	PB3800	PB32500F	PB3800T
900	1500	5000	PB3900	PB32500F	PB3900T
1000	1500	5000	PB31000	PB32500F	PB31000T
1200	2000	6000	PB31200	PB32500F	PB31200T
1400	2500	7000	PB31400	PB32500F	PB31400T
1600	3000	8000	PB31600	PB32500F	PB31600T
1800	3000	8000	PB31800	PB32500F	PB31800T
2000	3000	8000	PB32000	PB32500F	PB32000T
Approx. ship. wt.			155 lbs.	108 lbs.	23 lbs.
2500	3000	8000	PB32500	PB32500F	PB32500T
Approx. ship. wt.			173 lbs.	108 lbs.	23 lbs.



Rear Connected PB Breaker;
600 Volts AC, 250 Volts DC

Type PBF Front Connected 600-2000 Amperes, 600 Volts, 60 Cycle AC[ⓐ], 250 Volts DC[ⓑ], 2- and 3-Poles, Interchangeable Trip

Continuous Ampere Rating at 40°C	Magnetic Trip Setting, Amperes (Set on High Side, Adjustable to Lower Limits)		Complete Breaker	Shipped As:	
	Low	High	Includes Bus Bar Connectors [ⓐ]	Frame Only	Trip Unit Only
			Catalog Numbers		
2-Pole, 600 Volts AC[ⓐ]					
600	1500	5000	PBF2600	PBF22000F	PBF2600T
700	1500	5000	PBF2700	PBF22000F	PBF2700T
800	1500	5000	PBF2800	PBF22000F	PBF2800T
900	1500	5000	PBF2900	PBF22000F	PBF2900T
1000	1500	5000	PBF21000	PBF22000F	PBF21000T
1200	2000	6000	PBF21200	PBF22000F	PBF21200T
1400	2500	7000	PBF21400	PBF22000F	PBF21400T
1600	3000	8000	PBF21600	PBF22000F	PBF21600T
1800	3000	8000	PBF21800	PBF22000F	PBF21800T
2000	3000	8000	PBF22000	PBF22000F	PBF22000T
3-Pole, 600 Volts AC					
600	1500	5000	PBF3600	PBF32000F	PBF3600T
700	1500	5000	PBF3700	PBF32000F	PBF3700T
800	1500	5000	PBF3800	PBF32000F	PBF3800T
900	1500	5000	PBF3900	PBF32000F	PBF3900T
1000	1500	5000	PBF31000	PBF32000F	PBF31000T
1200	2000	6000	PBF31200	PBF32000F	PBF31200T
1400	2500	7000	PBF31400	PBF32000F	PBF31400T
1600	3000	8000	PBF31600	PBF32000F	PBF31600T
1800	3000	8000	PBF31800	PBF32000F	PBF31800T
2000	3000	8000	PBF32000	PBF32000F	PBF32000T



PBF Front Connected;
600 Volts AC

- ⓐ Higher frequency calibration not available. Minimum of 50 Hz calibration available on special order.
- ⓑ Available only on magnetic only breakers.
- ⓒ Higher magnetic trip settings are available as special calibration. Refer to magnetic only breakers for specific trip ranges.
- ⓓ Set on high side, adjustable to lower limits.
- ⓔ Shipped separately from breaker.
- ⓕ 2-pole breakers are supplied in 3-pole frames with current carrying parts omitted from center pole.
- ⓖ Included with frame.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Type PB and PBF Accessories and Modifications

Special Breakers^① Magnetic Only, Front Adjustable^② Trip Unit Only

Contin- uous Ampere Rating	Magnetic Trip Range, Amperes ^③		2-Poles ^④	3-Poles
	Low	High		

For Rear Connected Type PB Breakers

Continuous Ampere Rating	Magnetic Trip Range, Amperes	2-Poles	3-Poles	
2000	1500	5000	PB25000TM	PB35000TM
2000	2000	6000	PB26000TM	PB36000TM
2000	2500	7000	PB27000TM	PB37000TM
2000	3000	8000	PB28000TM	PB38000TM
2000	3500	10000	PB210000TM	PB310000TM
2000	4000	12000	PB212000TM	PB312000TM
2500	4000	12000	373D488G08	373D488G09

For Front Connected Type PBF Breakers

Continuous Ampere Rating	Magnetic Trip Range, Amperes	2-Poles	3-Poles	
2000	1500	5000	PBF25000TM	PBF35000TM
2000	2000	6000	PBF26000TM	PBF36000TM
2000	2500	7000	PBF27000TM	PBF37000TM
2000	3000	8000	PBF28000TM	PBF38000TM
2000	3500	10000	PBF210000TM	PBF310000TM
2000	4000	12000	PBF212000TM	PBF312000TM

Magnetic Only Breakers^①
For description, refer to Application Data 29-160. To order a complete breaker, select trip unit, plus frame and connectors.

Type PB breakers meet the requirements for Class 25a circuit breakers as defined by Federal Specification W-C-375b.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings

Max. Volts	Amperes
240 AC	150,000 Asym., 125,000 Sym.
480 AC	115,000 Asym., 100,000 Sym.
600 AC	115,000 Asym., 100,000 Sym.
250 DC ^⑤	75,000 Amperes ^⑥

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Field Sales Office.

Special Calibrations^①
Special calibration price additions apply to ampere ratings not listed as standard, or for ambients other than 40°C or 50°C. For frequencies other than 0-60 Hz AC, refer to Cutler-Hammer. See Application Data 29-160 for information regarding special conditions.

50°C Calibration^{①⑥}
Add suffix "V" to catalog number for complete breaker or trip unit only, when ordering breakers to be used in 50°C ambients.

For CSA, see information below.

Canadian Standards Association (CSA) Listing
Most standard thermal magnetic molded case circuit breakers listed with Underwriters' Laboratories, Inc., and having a UL label are also listed with CSA and may be marked with the CSA monogram.

Bus Bar Connections^⑦



Bus Bar Connections^⑦ "T" Connector (For Cu/Al Bus)
Two required per pole. For rear bus connection of breakers thru 2000 amperes. Accepts up to four bus bolts. May be rotated 90°.

Catalog Number
BA2000PB



"C" Connector (For Cu/Al Bus)
Two required per pole. For rear bus connection of 2500 ampere breakers.

Breaker Amperes	Catalog Number
2500	BA2500PB



Cable Connector
Fits "T" Connector and 2000 ampere front connected breakers. Accepts four 400-600 MCM copper cables.

Catalog Number
505C706G04

① Not listed with Underwriters' Laboratories, Inc.
 ② Frames, connectors, dimensions and shipping weights are same as thermal magnetic breakers.
 ③ Set on high side, adjustable to lower limits.
 ④ 2-pole breakers are supplied in 3-pole frames with current carrying parts omitted from center pole.
 ⑤ Based on NEMA test procedure.
 ⑥ 50°C or higher calibration not available for 2500 ampere trip units.
 ⑦ Shipped separately from breaker.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Types LC, LCC, LCA, LCCA, MARK 75® Types HLC, HLCC, HLCA, HLCCA SELTRONIC™ with Solid-state Trip Units
600 Volts AC, 50/60 Hz

Complete Breaker Requires Frame, Rating Plug and Terminals

Frame Only			
Poles❶	Standard (Long Delay and Short Time)	Short Time Only❷	Long Delay, Short Time and Adjustable Short Delay Time (.06-.22 sec.)
Catalog Numbers			
Breakers for Standard Applications			
Types LC 150 and LCA 150 (75-150 Amperes)			
2	LC2150F	LC2150FM	LCA2150F
3	LC3150F	LC3150FM	LCA3150F
MARK 75® Types HLC 150 and HLCA 150 (75-150 Amperes)			
2	HLC2150F	HLC2150FM	HLCA2150F
3	HLC3150F	HLC3150FM	HLCA3150F
Types LC 300 and LCA 300 (150-300 Amperes)			
2	LC2300F	LC2300FM	LCA2300F
3	LC3300F	LC3300FM	LCA3300F
MARK 75® Types HLC 300 and HLCA 300 (150-300 Amperes)			
2	HLC2300F	HLC2300FM	HLCA2300F
3	HLC3300F	HLC3300FM	HLCA3300F
Types LC 400 and LCA 400 (200-400 Amperes)			
2	LC2400F	LC2400FM	LCA2400F
3	LC3400F	LC3400FM	LCA3400F
MARK 75® Types HLC 400 and HLCA 400 (200-400 Amperes)			
2	HLC2400F	HLC2400FM	HLCA2400F
3	HLC3400F	HLC3400FM	HLCA3400F
Types LC 600 and LCA 600 (300-600 Amperes)			
2	LC2600F	LC2600FM	LCA2600F
3	LC3600F	LC3600FM	LCA3600F
MARK 75® Types HLC 600 and HLCA 600 (300-600 Amperes)			
2	HLC2600F	HLC2600FM	HLCA2600F
3	HLC3600F	HLC3600FM	HLCA3600F
Type LC 600 Molded Case Switch: Refer to Page 55			
Breakers for Applications at 100% Rating			
Types LCC 600 and LCCA 600 (300-600 Amperes)			
3	LCC3600F		LCCA3600F
MARK 75® Types HLCC 600 and HLCCA 600 (300-600 Amperes)			
3	HLCC3600F		HLCCA3600F



LC, 600 Volts AC

❶ 2-pole breakers are supplied in 3-pole frames with current carrying parts omitted from center pole.
❷ UL Inc. recognized component.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

REPLACEMENT CAPABILITIES, *Continued*

Types LCG, LCCG, LCGA, LCCGA, MARK 75® HLCG, HLCCG, HLCGA, HLCCGA SELTRONIC™ with Built-in Ground Fault Protection

Complete Breaker Requires Frame, Rating Plug, and Terminals. Extra Current Transformer Included for Neutral. ①② See Accessories, **page 58** for Remote Ground Fault Trip Indicator.

Frame Only		Ground Fault Characteristics		
Poles③	Standard (Long Delay, Short Time) and Ground Fault Trip	Long Delay, Short Time, Adjustable Short Delay Time and Ground Fault Trip	Pick-up Setting Amperes	Time Setting
	Catalog Number			

Breakers for Standard Application

Types LCG 150 and LCGA 150 (75-150 Amperes)④

3	LCG3150F	LCGA3150F	50-150	3.5-30 Cy
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MARK 75® Types HLCG 150 and HLCGA 150 (75-150 Amperes)④

3	HLCG3150F	HLCGA3150F	50-150	3.5-30 Cy
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Types LCG 300 and LCGA 300 (150-300 Amperes)④

3	LCG3300F	LCGA3300F	60-300	3.5-30 Cy
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MARK 75® Types HLCG 300 and HLCGA 300 (150-300 Amperes)④

3	HLCG3300F	HLCGA3300F	60-300	3.5-30 Cy
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Types LCG 400 and LCGA 400 (200-400 Amperes)④

3	LCG3400F	LCGA3400F	80-400	3.5-30 Cy
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MARK 75® Types HLCG 400 and HLCGA 400 (200-400 Amperes)④

3	HLCG3400F	HLCGA3400F	80-400	3.5-30 Cy
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Types LCG 600 and LCGA 600 (300-600 Amperes)④

3	LCG3600F	LCGA3600F	120-600	3.5-30 Cy
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MARK 75® Types HLCG 600 and HLCGA 600 (300-600 Amperes)④

3	HLCG3600F	HLCGA3600F	120-600	3.5-30 Cy
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Breakers for Application at 100% Rating

Types LCCG 600 and LCCGA 600 (300-600 Amperes)④

3	LCCG3600F	LCCGA3600F	120-600	3.5-30 Cy
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MARK 75® Types HLCCG 600 and HLCCGA 600 (300-600 Amperes)④

3	HLCCG3600F	HLCCGA3600F	120-600	3.5-30 Cy
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- ① Available without extra CT for neutral. Order by description as similar to above except without neutral CT or external CT terminal connections at same price. Note the standard ground fault unit can also be used without the neutral CT.
- ② These breakers use LC terminals. The fourth CT uses MC breaker terminals, **page 46**.
- ③ 2-pole breakers supplied in 3-pole frames with current carrying parts omitted from center pole.
- ④ For applications other than standard residual scheme, see Application Data 29-160.

Type LC Accessories and Modifications

Field Mountable Attachments①②③④

Description	Style Number
Provision to trip flux transfer shunt trip from external source: 32 to 120 Volts DC to 60 Hz⑤	1371D11G22
240 to 600 Volts AC, 50/60 Hz⑥	1371D11G32
Provision to trip flux transfer shunt trip from external source, plus a 1A-1B auxiliary switch: 32 to 120 Volts DC to 60 Hz⑤	1371D11G15
240 to 600 Volts AC, 50/60 Hz⑥	1371D11G25
Provision to trip flux transfer shunt trip from 24 Volts DC source	1371D93G01
1A-1B Auxiliary Switch	1371D11G03

For CSA, see page 41.

Type LC breakers meet requirements for Class 21a circuit breakers, and Type HLC meet requirements for Class 23a as defined by Federal Specification W-C-375b.

- ① Only one attachment may be mounted per breaker.
- ② Refer to Cutler-Hammer for other combinations.
- ③ Molded case switches do not use standard SELTRONIC™ attachments, and should be ordered by description for factory mounting.
- ④ Does not void listing of UL listed breakers.
- ⑤ Rated 48 volts minimum for ground fault applications requiring tripping at 55% of voltage.
- ⑥ Not for use on ground fault applications.
- ⑦ Interrupting capacities shown do not apply to molded case switches.

Underwriters' Laboratories, Inc. Listed Interrupting Ratings⑦

Volts Max.	Amperes
Standard Breakers	
240 VAC	50,000 Asym., 42,000 Sym.
480 VAC	35,000 Asym., 30,000 Sym.
600 VAC	25,000 Asym., 22,000 Sym.
MARK 75® Breakers	
240 VAC	75,000 Asym., 65,000 Sym.
480 VAC	40,000 Asym., 35,000 Sym.
600 VAC	30,000 Asym., 25,000 Sym.

For all 3-phase Delta, grounded B phase applications, contact your local Cutler-Hammer Sales Office.

Additional Accessories and Modifications
Refer to **pages 58-68**.

Terminals (Order Separately) Two terminals are required per pole.

Terminals are UL listed for wire type and range listed below. When used with aluminum cable, use joint compound.

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
150-, 300-, and 400-Ampere Frames Only		
Al/Cu Pressure Terminals		
225	TA225LA1	(1) #6-350 MCM Cu, or (1) #4-350 MCM Al
400	TA400LA1	(1) #4-250 MCM Al/Cu, plus (1) 3/0-600 MCM Al/Cu
Optional Copper Pressure Terminals		
225	T225LA	(1) #6-350 MCM Cu
225	T225LBF	(1) #6-250 MCM Cu
400	T401LA	(1) #4-250 MCM Cu, plus (1) 3/0-600 MCM Cu
600 Ampere Frame Only		
Al/Cu Pressure Terminals		
500	TA602LD	(2) 250-350 MCM Al/Cu
600	TA603LA	(2) 400-500 MCM Al/Cu
600 (Std.)	TA600LA	(2) 250-500 MCM Al/Cu
Optional Copper Pressure Terminals		
600	T600LA	(2) 250-500 MCM Cu



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



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MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

REPLACEMENT CAPABILITIES, *Continued*

Types MC, MCC, MCA, MCCA, MARK 75® Types HMC, HMCC, HMCA, HMCCA SELTRONIC™ with Solid State Trip Units, 600 Volts AC, 50/60 Hz

Complete Breaker Requires Frame, Rating Plug, and Terminals

Frame Only			
Poles ^①	Standard (Long Delay and Short Time)	Short Time Only ^②	Long Delay, Short Time and Adjustable Short Delay Time (.08-.28 seconds)
Catalog Numbers			

Breakers for Standard Application

Types MC and MCA (400 to 800 Amperes)

2	MC2800F	MC2800FM	MCA2800F
3	MC3800F	MC3800FM	MCA3800F

MARK 75® Types HMC and HMCA (400 to 800 Amperes)

2	HMC2800F	HMC2800FM	HMCA2800F
3	HMC3800F	HMC3800FM	HMCA3800F

Type MC800 Molded Case Switch: Refer to Page 55

Breakers for Application at 100% Rating

Types MCC and MCCA (400 to 800 Amperes)

3	MCC3800F	MCCA3800F
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MARK 75® Types HMCC and HMCCA (400 to 800 Amperes)

3	HMCC3800F	HMCCA3800F
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MC, 600 Volts AC

Types MCG, MCGG, MCGA, MCGGA and MARK 75® Types HMCG, HMCCG, HMCGA, HMCCGA SELTRONIC™ with Built-in Ground Fault Protection

Complete Breaker Requires Frame, Rating Plug and Terminals – Extra Current Transformer Included for Neutral. ^{③④} See Page 58 For Optional Indicator Kit.

Frame Only			Ground Fault Characteristics	
Poles	Standard (Long Delay, Short Time and Ground Fault Trip)	Long Delay, Short Time, Adjustable Short Delay Time and Ground Fault Trip	Pick-up Setting Amperes	Time Setting
Catalog Numbers				

Breakers for Standard Applications

Types MCG and MCGA (400 to 800 Amperes)^⑤

3	MCG3800F	MCGA3800F	80-800	3.5-30 Cy
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MARK 75® Types HMCG and HMCGA (400 to 800 Amperes)^⑤

3	HMCG3800F	HMCGA3800F	80-800	3.5-30 Cy
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Breakers for Applications at 100% Rating

Types MCGG and MCGGA (400 to 800 Amperes)^⑤

3	MCGG3800F	MCGGA3800F	80-800	3.5-30 Cy
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MARK 75® Types HMCCG and HMCCGA (400 to 800 Amperes)^⑤

3	HMCCG3800F	HMCCGA3800F	80-800	3.5-30 Cy
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① 2-pole breakers are supplied in 3-pole frames with current-carrying parts omitted from center pole.

② UL Inc. recognized component.

③ Available without extra CT for neutral. Order by description as similar to above except without neutral CT or external CT Terminal connections same price.

Note the standard ground fault unit above can also be used without the neutral CT.

④ Order two of the desired terminals for each pole of the breaker and two for the neutral CT.

⑤ For applications other than standard residual scheme, see Application Data 29-160.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type MC Accessories and Modifications

For CSA, see page 41.

Type MC SELTRONIC™ breakers meet requirements for Class 21a, and MARK 75®. Type HMC meet Class 23a as defined by Federal Spec. W-C-375b.

UL Listed Interrupting Capacity, RMS Symmetrical Amperes^①

Breaker	AC Volts		
	240	480	600
MC, MCG	42000	30000	22000
HMC, HMCG	65000	50000	25000

Field Mountable Attachments^{②③④⑤}

Description	Style Number
Provision to trip flux transfer shunt trip from external source: 32 to 120 Volts DC to 60 Hz ^⑥	1371D72G22
240 to 600 Volts AC, 50/60 Hz ^⑦	1371D72G32
Provision to trip flux transfer shunt trip from external source, plus 1A-1B Auxiliary Switch: 32 to 120 Volts DC to 60 Hz ^⑥	1371D72G15
240 to 600 Volts AC, 50/60 Hz ^⑦	1371D72G25
Provision to trip flux transfer shunt trip from external 24-Volt DC source	1370D85G01
1A-1B Auxiliary Switch	1371D72G03

Terminals

Two Terminals Required per Pole^⑧

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Al/Cu Pressure Terminals		
600	TA700MA1 ^⑨	(2) #1-500 MCM
800 (Std.)	TA800MA2 ^⑨	(3) 3/0-400 MCM
800	TA801MA ^⑨	(2) 500-750 MCM
Optional Copper Pressure Terminals		
600	T600MA1	(2) 2/0-500 MCM
800	T800MA1	(3) 3/0-300 MCM

Rating Plugs

Select from page 53.

Additional Accessories and Modifications

Refer to pages 58-68.

- ① Interrupting capacities shown do not apply to molded case switches.
- ② Does not void listing of UL listed breakers.
- ③ Only one of the attachments may be mounted per breaker.
- ④ For other possible combinations, refer to factory.
- ⑤ Molded case switches do not use standard SELTRONIC™ attachments and should be ordered by description.
- ⑥ Rated 48 volts minimum for ground fault applications requiring tripping at 55% of voltage.
- ⑦ Not for Ground Fault Applications.
- ⑧ Also used on breakers with ground fault and on separately mounted neutral current transformers.
- ⑨ Type Al/Cu pressure terminal.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

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MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type NC, NCA, MARK 75® Type HNC, HNCA SELTRONIC™ with Solid State Trip Units, 600 Volts AC

50/60 Hz Complete Breaker Requires Frame, Rating Plug, and Terminals

Frame Only			
Poles ①	Standard (Long Delay and Short Time)	Short Time Only②	Long Delay, Short Time and Adjustable Short Delay Time (.08-.28 Seconds)
Catalog Numbers			
Types NC and NCA (800 to 1200 Amperes)			
2	NC21200F	NC21200FM	NCA21200F
3	NC31200F	NC31200FM	NCA31200F
Mark 75 Types HNC and HNCA (800 to 1200 Amperes)			
2	HNC21200F	HNC21200FM	HNCA21200F
3	HNC31200F	HNC31200FM	HNCA31200F



NC, 600 Volts AC

Type NC 1200 Molded Case Switch: Refer to Page 55

Type NCG, NCGA, and MARK 75® Type HNCG, HNCGA SELTRONIC™ with Built-in Ground Fault Protection

Complete Breaker Requires Frame, Rating Plug and Terminals – Extra Current Transformer Included for Neutral③ See page 58 for Optional Remote Ground Fault Trip Indicator

Frame Only			Ground Fault Characteristics	
Poles	Standard (Long Delay, Short Time and Ground Fault Trip)	Long Delay, Short Time, Adjustable Short Delay Time, and Ground Fault Trip	Pick-up Setting Amps	Time Setting
Catalog Numbers				
Types NCG and NCGA (800 to 1200 Amperes)④				
3	NCG31200F	NCGA31200F	120-1200	3.5-30 Cy
Mark 75 Types HNCG and HNCGA (800 to 1200 Amperes)⑤				
3	HNCG31200F	HNCGA31200F	120-1200	3.5-30 Cy

Accessories and Modifications

Field Mountable Attachments⑥⑦⑧⑨

Description	Style Number
Provision to trip flux transfer shunt trip from external source: 32 to 120 Volts DC to 60 Hz⑩	1372D39G13
240 to 600 Volts AC, 50/60 Hz⑪	1372D39G23
Provision to trip flux transfer shunt trip from external source, plus a 1A-1B Auxiliary Switch: 32 to 120 Volts DC to 60 Hz⑫	1372D39G16
240 to 600 Volts AC, 50/60 Hz⑬	1372D39G26
Provision to trip flux transfer shunt trip from external 24-volt DC source	1371D94G05
1A-1B Auxiliary Switch	1371D39G03

Additional Accessories and Modifications
Refer to pages 58-68.

For CSA, see page 41.

Rating Plugs
Select from page 53.

Type NC SELTRONIC™ breakers meet requirements for Class 21a, and MARK 75®. Type HNC meet Class 23a as defined by Federal Spec. W-C-375b.

Terminals⑭

Two Terminals Required per Pole

Max. Amps	Catalog Number	No. of Cables, Wire Range, Type
Al/Cu Pressure Terminals		
1000	TA1000NB1⑯	(3) 3/0-400MCM
1200 (Std.)	TA1200NB1⑰	(4) 4/0-500MCM
1200	TA1201NB1⑱	(3) 500-750MCM
Optional Copper Pressure Terminals		
1000	T1000NB1	(3) 3/0-500MCM
1200	T1200NB1	(4) 3/0-400MCM

UL Listed Interrupting Capacity, RMS Symmetrical Amperes⑲

Breaker	AC Volts		
	240	480	600
NC, NCG	42000	30000	22000
HNC, HNCG	65000	50000	25000

- ① 2-pole breakers are supplied in 3-pole frames with current-carrying parts omitted from center pole.
- ② UL Inc. recognized component.
- ③ Available without extra CT for neutral. Order by description as similar to above except without neutral CT or external CT Terminal connections at same price. Note the standard ground fault unit above can also be used without the neutral CT.
- ④ Order two of the desired terminals for each pole of the breaker and two for the neutral CT.
- ⑤ For applications other than standard residual scheme, see Application Data 29-160.
- ⑥ For other possible combinations, refer to factory.
- ⑦ Molded case switches do not use standard SELTRONIC™ attachments and should be ordered by description.
- ⑧ Does not void listing of UL listed breakers.
- ⑨ Only one of the attachments may be mounted per breaker.
- ⑩ Rated 48 volts minimum for ground fault applications requiring tripping at 55% of voltage.
- ⑪ Not for ground fault applications.
- ⑫ Also used on breakers with ground fault and on separately mounted neutral current transformers.
- ⑬ Type Al/Cu pressure terminal.
- ⑭ Interrupting capacities shown do not apply to molded case switches.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

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MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Types PC, PCA, PCC, PCCA 2000, 2500 and 3000 Ampere SELTRONIC™ with Solid State Trip Units, 600 Volts AC, 50/60 Hz

Complete Breaker Requires Frame, Rating Plug and Rear Connectors (connectors are included in 3000 Ampere and all front connected frames.) Suitable for reverse feed applications.

Breakers for Standard Applications				Breakers for Standard Applications at 100% Rating			
Frame Only				Frame Only			
Poles ^❶	Standard (Long Delay and Short Time)	Short Time Only ^❷	Long Delay, Short Time Trip, and Adjustable Short Delay Time (.08-.28 seconds)	Poles ^❶	Standard (Long Delay and Short Time Trip)	Magnetic Only ^❷	Long Delay, Short Time Trip, and Adjustable Short Delay Time (.08-.28 seconds)
Catalog Numbers				Catalog Numbers			
Type PC 2000, 1000 to 2000 Amperes^❸		Type PCA 2000^❹		Type PCC 2000, 1000 to 2000 Amperes^❸			
Rear Connected Breakers		Rear Connected Breakers		Rear Connected Breakers		Rear Connected Breakers	
2 3	PC22000F PC32000F	PC22000FM PC32000FM	PCA22000F PCA32000F	2 3	PCC22000F PCC32000F	PCC22000FM PCC32000FM	PCCA22000F PCCA32000F
Front Connected Breakers		Front Connected Breakers		Front Connected Breakers		Front Connected Breakers	
2 3	PCF22000F PCF32000F	PCF22000FM PCF32000FM	PCFA22000F PCFA32000F	2 3	PCCF22000F PCCF32000F	PCCF22000FM PCCF32000FM	PCCFA22000F PCCFA32000F
Type PC 2500, 1400 to 2500 Amperes^❸		Type PCA 2500^❹		Type PCC 2500, 1400 to 2500 Amperes^❸			
Rear Connected Breakers		Rear Connected Breakers		Rear Connected Breakers		Rear Connected Breakers	
2 3	PC22500F PC32500F	PC22500FM PC32500FM	PCA22500F PCA32500F	2 3	PCC22500F PCC32500F	PCC22500FM PCC32500FM	PCCA22500F PCCA32500F
Front Connected Breakers		Front Connected Breakers		Front Connected Breakers		Front Connected Breakers	
2 3	PCF22500F PCF32500F	PCF22500FM PCF32500FM	PCFA22500F PCFA32500F	2 3	PCCF22500F PCCF32500F	PCCF22500FM PCCF32500FM	PCCFA22500F PCCFA32500F
Type PC 3000, 1600 to 3000 Amperes^❸		Type PCA 3000^❹		Type PCC 3000, 1600 to 3000 Amperes^❸			
2 3	PC23000F PC33000F	PC23000FM PC33000FM	PCA23000F PCA33000F	2 3	PCC23000F PCC33000F	PCC23000FM PCC33000FM	PCCA23000F PCCA33000F

Type PC, PCC Molded Case Switches: Refer to Page 55

Accessories and Modifications

Drawout Mounting Breakers, 3-Pole Only
Breaker frame and complete drawout frame with safety tripping interlock.

Order by description. Secondary contacts supplied as required at no extra charge. Order required rating plug separately.❸ Refer to **page 68**.

Rating Plugs

Select from **page 53**.

Stationary Portion of Drawout Frame Only for Future Breaker Installations, 3-Pole Only. Refer to **page 68**.

Special Type PCC Breakers for SCR Power Supplies

These drawout mounting breakers are designed with a 2 to 4 times magnetic trip adjustment and special time delay trip characteristics to provide maximum protection and coordination with SCR power supplies on offshore drilling rigs. Suitable for application at 100% of rating.

Order by description. Secondary contacts supplied as required. Order standard rating plugs separately.

Availability: PCC2000, PCC2500 Drawout-Mounting breakers

Type PC and PCC meet requirements of Class 25a as defined in Federal Spec. W-C-375b.

For CSA, see **page 41**.

UL listed Interrupting Capacity RMS Symmetrical Amperes (Std. and Grd. Flt. Breakers)❸

Breaker	AC Volts		
	240	480	600
PC, PCC	125,000	100,000	100,000

Additional Accessories and Modifications
Refer to **pages 58-68**.



PC, 600 Volts AC

- ❶ 2-pole breakers are supplied in 3-pole frames with current carrying parts omitted from center pole.
- ❷ UL Inc. recognized component.
- ❸ UL listed for standard applications.
- ❹ These breakers are UL listed for application at 100% of rating per NEC exceptions when used in a properly ventilated and listed enclosure.
- ❺ Includes breakers without adjustable short delay time.
- ❻ Secondary contacts, when required for motor operator or other attachment must be specified and factory mounted on stationary frame when it is ordered separately.
- ❼ When ordering breaker with movable portion only for use with previously installed stationary portion, deduct the list price of stationary portion from list price of complete breaker with drawout frame.
- ❽ Interrupting capacities shown do not apply to molded case switches.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

REPLACEMENT CAPABILITIES, *Continued*

Type PCG, PCGA, PCCG, PCCGA SELTRONIC™ with Built-in Ground Fault Protection
Includes Extra Current Transformer for Neutral❶ (Optional Remote Ground Fault Trip Indicator Kit, page 58)

Breakers for Standard Application

Complete Breaker Requires Frame, Rating Plug and Rear Connectors (except Front Connected Frames and 3000 Ampere Frames Include Connectors)

Frames Only			Ground Fault Characteristics	
Poles	Standard (Long Delay, Short Time and Ground Fault Trip)	Long Delay, Short Time, Ground Fault Trip, and Adjustable Short Delay Time (.08-.28 Seconds)	Pick-up Setting	Time Setting
	Catalog Numbers			
Type PCG 2000❷		Type PCGA 2000❷ 1000 to 2000 Amperes❸		
Rear Connected Breakers				
3	PCG32000F	PCGA32000F	200-1200	3.5-30 Cycles
Front Connected Breakers				
3	PCFG32000F	PCFGA32000F	200-1200	3.5-30 Cycles
Type PCG 2500❷		Type PCGA 2500❷ 1400 to 2500 Amperes❸		
Rear Connected Breakers				
3	PCG32500F	PCGA32500F	240-1200	3.5-30 Cycles
Front Connected Breakers				
3	PCFG32500F	PCFGA32500F	240-1200	3.5-30 Cycles
Type PCG 3000❷		Type PCGA 3000❷ 1600 to 3000 Amperes❸		
3	PCG33000F	PCGA33000F	300-1200	3.5-30 Cycles

Breakers for Application at 100% Rating

Frames Only			Ground Fault Characteristics	
Poles	Standard (Long Delay, Short Time and Ground Fault Trip)	Long Delay, Short Time, Ground Fault Trip, and Adjustable Short Delay Time (.08-.28 Seconds)	Pick-up Setting	Time Setting
	Catalog Numbers			
Type PCCG 2000❹		Type PCCGA 2000❹ 1000 to 2000 Amperes❸		
Rear Connected Breakers				
3	PCCG32000F	PCCGA32000F	200-1200	3.5-30 Cycles
Front Connected Breakers				
3	PCCFG32000F	PCCFGA32000F	200-1200	3.5-30 Cycles
Type PCCG 2500❹		Type PCCGA 2500❹ 1400 to 2500 Amperes❸		
Rear Connected Breakers				
3	PCCG32500F	PCCGA32500F	240-1200	3.5-30 Cycles
Front Connected Breakers				
3	PCCFG32500F	PCCFGA32500F	240-1200	3.5-30 Cycles
Type PCCG 3000❹		Type PCCGA 3000❹ 1600 to 3000 Amperes❸		
3	PCCG33000F	PCCGA33000F	300-1200	3.5-30 Cycles

- ❶ Available without external CT for neutral. Order by description and specify similar to above except no neutral CT or terminal connections for neutral CT at same price. Note the standard ground fault unit listed above can also be used without the neutral CT.
- ❷ UL listed for standard applications.
- ❸ For application other than standard residual schemes, refer to Application Data 29-160.
- ❹ These breakers are UL listed for application at 100% of rating per NEC exceptions when used in a properly ventilated and listed enclosure.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type PC Accessories and Modifications

Field Mountable Attachments^{1,2,3}

Description	Style Number
Provision to trip flux transfer shunt trip from external source: 32 to 120 Volts DC to 60 Hz ⁴	1372D35G22
240 to 600 Volts AC, 50/60 Hz ⁵	1372D35G32
Provision to trip flux transfer shunt trip from external source plus 1A-1B Auxiliary Switch: 32 to 120 Volts DC to 60 Hz ⁴	1372D35G15
240 to 600 Volts AC, 50/60 Hz ⁵	1372D35G25
Provision to trip flux transfer shunt trip from external 24-volt DC source	1371D95G01
1A-1B Auxiliary Switch	1372D35G03

Cell Switches Mounted on Drawout Frames, All Ratings

A maximum of four switches can be provided. Order by description. Each switch provides a NO and NC contact that transfers before reaching the test position when being withdrawn, and after the test position when being racked in.

Approximate Shipping Wts., PC and PCC Breakers (3-Poles)

Rating	Breaker			
	PC, PCC	PCF, PCCF	PCG, PCCG	PCFG, PCCFG
2000	136 lbs.	163 lbs.	160 lbs.	185 lbs.
2500	145 lbs.	175 lbs.	170 lbs.	200 lbs.
3000	220 lbs.	.....	245 lbs.	.....

Rear Bus Connectors

Two required per pole. Fixed mounting breakers.

Breaker Frame ⁶	Connector Style/Cat. No.
PC2000 ⁷ , PCC2000 ⁷	BA2000PB
PC2500 ⁷ , PCC2500 ⁷	BA2500PB
PC3000, PCC3000	Included in Frame

Racking Crank for Drawout Frames

To engage or withdraw the moving portion of the drawout. A standard 1/2 inch hex socket with extension can be used for this purpose.

Style Number

765A767G01

Bus Bar Connections⁸



Bus Bar Connections⁸ "T" Connector (For Cu/Al Bus)

Two required per pole. For rear bus connection of breakers thru 2000 amperes accepts up to four bus bolts. May be rotated 90°.

Catalog Number

BA2000PB



"C" Connector (For Cu/Al Bus)

Two required per pole. For rear bus connection of 2500 ampere breakers.

Breaker Amperes	Catalog Number
2500	BA2500PB



Cable Connector

Fits "T" Connector and 2000 ampere front connected breakers. Accepts four 400-600 MCM copper cables.

Catalog Number

505C706G04

- ¹ For other possible combinations, contact your local Cutler-Hammer Field Sales Office.
- ² Does not void listing of UL listed breakers.
- ³ Only one of these attachments may be mounted per breaker.
- ⁴ Rated 48 volts minimum for ground fault applications.
- ⁵ Not for ground fault applications.
- ⁶ Also apply to equivalent ratings of PCG and PCCG ground fault breakers.
- ⁷ Not required for front connected frames.
- ⁸ Shipped separately from breaker.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Rating Plug Selection Data

Rating Plugs Listed Below Are For Both Standard Breakers and Breakers with Built-in Ground Fault Protection

Rating Plugs Only (For 2- or 3-Pole Frames)				
Continuous Ampere Rating ^❶	Magnetic Trip Setting, Amperes		Fixed Rating Plugs	Adjustable Rating Plugs ^{❷❸}
	Low	High	Catalog Number	
For 150 Ampere Frames: LC, LCA, LCG, LCGA, HLC, HLCA, HLCG, HLCGA				
75	225	750	1LC75	.....
90	270	900	1LC90	.....
100	300	1000	1LC100	A1LC100 ^❹
125	375	1250	1LC125	A1LC125
150	450	1500	1LC150	A1LC150 ^❺
For 300 Ampere Frames: LC, LCA, LCG, LCGA, HLC, HLCA, HLCA, HLCG, HLCGA				
150	450	1500	3LC150	.....
175	525	1750	3LC175	.....
200	600	2000	3LC200	.....
225	675	2250	3LC225	A3LC225
250	750	2500	3LC250	A3LC250
275	825	2750	3LC275	A3LC275
300	900	3000	3LC300	A3LC300 ^❻
For 400 Ampere Frames: LC, LCA, LCG, LCGA, HLC, HLCA, HLCG, HLCGA				
200	600	2000	4LC200	.....
225	675	2250	4LC225	.....
250	750	2500	4LC250	.....
300	900	3000	4LC300	A4LC300
350	1050	3500	4LC350	A4LC350
400	1200	4000	4LC400	A4LC400 ^❻
For 600 Ampere Frames: LC, LCS, LCG, LCGA, HLC, HLCA, HLCG, HLCGA, LCC, LCCA, HLCC, HLCCA, LCCG, LCCGA, HLCCG, HLCCGA				
300	900	3000	6LC300	.....
350	1050	3500	6LC350	.....
400	1200	4000	6LC400	A6LC400 ^❹
450	1350	4500	6LC450	A6LC450
500	1500	5000	6LC500	A6LC500
600	1800	6000	6LC600	A6LC600 ^❻
For 800 Ampere Frames: MC, MCA, MCG, MCGA, HMC, HMCA, HMCG, HMC GA, MCC, MCCA, HMCC, HMCCA, MCCG, MCCGA, HMCCG, HMCCGA				
400	1200	4000	8MC400	.....
500	1500	5000	8MC500	A8MC500 ^❹
600	1800	6000	8MC600	A8MC600
700	2100	7000	8MC700	A8MC700
800	2400	8000	8MC800	A8MC800 ^❹
For 1200 Ampere Frames: NC, NCA, NCG, NCGA, HNC, HNCA, HNCG, HNCGA				
800	1600	6400	12NC800	A12NC800 ^❹
900	1800	7200	12NC900	A12NC900
1000	2000	8000	12NC1000	A12NC1000
1200	2400	9600	12NC1200	A12NC1200 ^❹

Rating Plugs Only (For 2- or 3-Pole Frames)				
Continuous Ampere Rating ^❶	Magnetic Trip Setting, Amperes		Fixed Rating Plugs	Adjustable Rating Plugs ^{❷❸}
	Low	High	Catalog Numbers	
For 2000 Ampere Frames: PC, PCA, PCC, PCCA, PCG, PCGA, PCCG, PCCGA				
1000	2000	8000	20PC1000	.....
1200	2400	9600	20PC1200	.....
1400	2800	11200	20PC1400	.....
1600	3200	12800	20PC1600	A20PC1600
1800	3600	14400	20PC1800	A20PC1800
2000	4000	16000	20PC2000	A20PC2000 ^❻
For 2500 Ampere Frames: PC, PCA, PCC, PCCA, PCG, PCGA, PCCG, PCCGA				
1400	2800	11200	25PC1400	.....
1600	3200	12800	25PC1600	.....
1800	3600	14400	25PC1800	A25PC1800
2000	4000	16000	25PC2000	A25PC2000
2500	5000	20000	25PC2500	A25PC2500 ^❻
For 3000 Ampere Frames: PC, PCA, PCC, PCCA, PCG, PCGA, PCCG, PCCGA				
1600	3200	12800	30PC1600	.....
1800	3600	14400	30PC1800	.....
2000	4000	16000	30PC2000	.....
2500	5000	20000	30PC2500	A30PC2500
3000	6000	24000	30PC3000	A30PC3000 ^❻

NOTE: Refer to your local Cutler-Hammer Field Sales Office for old style (three prong) ground fault rating plugs

❶ Ampere rating when used in magnetic only frames:
 LC-150: 150 Amperes MC-800: 800 Amperes PC-3000: 3000 Amperes
 LC-300: 300 Amperes NC-1200: 1200 Amperes LCL-250: 250 Amperes
 LC-400: 400 Amperes PC-2000: 2000 Amperes LCL-400: 400 Amperes
 LC-600: 600 Amperes PC-2500: 2500 Amperes

❷ Magnetic Trip range of adjustable rating plugs:
 LC, HLC, MC, HMC: 3 to 10 times ampere setting
 NC, HNC, PC, PCC, LCL-400: 2 to 8 times ampere setting
 LCL-250: 3 to 9 times ampere setting

❸ Adjustable 70 to 100% except as noted

❹ Adjustable 75 to 100%

❺ Adjustable 50 to 100%

❻ Adjustable 80 to 100%



MOLDED CASE CIRCUIT BREAKERS

Replacement Molded Case Switches



REPLACEMENT CAPABILITIES

Molded Case Switches

Molded Case Switches are Underwriters' Laboratories, Inc. listed devices and are available only as high magnetic trip type with fixed trip setting.

Molded Case Switches with High Magnetic Trip (Fixed Trip Setting)

Switch Catalog Number ^{①②}	No. of Poles	Max. Volts	Max. Amperes	Switch Catalog Number ^{①②}	No. of Poles	Max. Volts	Max. Amperes
DA2400WK	2	240	400	JB2250WK	2	600	250
DA3400WK	3	240	400	JB2250WSK	2	600	250
EB1100LK	1	120	100	JB3250WK	3	600	250
EB2100LK	2	240	100	JB3250WSK	3	600	250
EB3100LK	3	240	100	KA2225WK	2	600	225
EB3100SLK	3	240	100	KA2225WSK	2	600	225
EHB1100LK	1	277	100	KA3225WK	3	600	225
EHB2100LK	2	480	100	KA3225WSK	3	600	225
EHB3100LK	3	480	100	KB2250WK	2	600	250
EHB3100SLK	3	480	100	KB2250WSK	2	600	250
FB2100LK	2	600	100	KB3250WK	3	600	250
FB2150LK	2	600	150	KB3250WSK	3	600	250
FB3100LK	3	600	100	LB2400WK	2	600	400
FB3150LK	3	600	150	LB2400WSK	2	600	400
FB3150SLK	3	600	150	LB3400WK	3	600	400
FB4100LK	4	277/480	100	LB3400WSK	3	600	400
FB4150LK	4	277/480	150	LBB2400WK	2	600	400
JA2225WK	2	600	225	LBB2400WSK	2	600	400
JA2225WSK	2	600	225	LBB3400WK	3	600	400
JA3225WK	3	600	225	LBB3400WSK	3	600	400
JA3225WSK	3	600	225				

Molded Case Switch Terminal Data

MCS Type	Max. Switch Amperes	Standard Terminals				Optional Terminals			
		Terminal Type or Cat. Number	Wire Type	No. of Wires	Wire Range	Terminal Type or Cat. Number	Wire Type	No. of Wires	Wire Range
DA, LB, LBB	400	T400DA2	Cu only	2	3/0-250 MCM	.....	....	..	.....
EB, EHB, FB	100 150	Pressure Pressure	Cu Cu/Al	1	#14-1/0 #4-4/0	Pressure	Cu/Al	1 ..	#4-4/0
JA, KA	225	TA225LA1	Cu/Al	1	#4-350 MCM	T225LA	Cu	1	#6-350 MCM
JB, KB	250	TA250KB	Cu/Al	1	#4-350 MCM	T250KB	Cu	1	#4-350 MCM

Molded Case Switches with High Magnetic Trip – Trip Setting and Tolerance

Frame	Rating	Trip Setting (Amperes)	Tolerance (%)
EB	100	1000	±20
EHB/FB	100	1200	±20
FB	150	1500	±20
DA/LB/LBB	400	4000	+10 - 0
JA/KA	225	2250	+10 - 0
JB/KB	250	2500	+10 - 0

① Catalog number suffix identification:

- K = Molded Case Switch with High Magnetic Trip (Fixed Trip Setting)
- S = Saf-T-Vue® cover
- L = With Line and Load Terminals
- W = No terminals

② Molded case switch dimensions are the same as the equivalent thermal magnetic breaker. Refer to Dimension Sheet 29-171.



MOLDED CASE CIRCUIT BREAKERS

Replacement Molded Case Switches

A

REPLACEMENT CAPABILITIES, *Continued*

Molded Case Switches

Molded Case Switches with High Magnetic Trip (Fixed Trip Setting)

Switch Catalog Number ^①	No. of Poles	Max. Volts	Max. Amperes	Switch Catalog Number ^①	No. of Poles	Max. Volts	Max. Amperes	Switch Catalog Number ^①	No. of Poles	Max. Volts	Max. Amperes
CA2225WK	2	240	225	MA2800WK	2	600	800	PBF22000K	2	600	2000
CA3225WK	3	240	225	MA2800WSK	2	600	800	PBF32000K	3	600	2000
LA2400WK	2	600	400	MA3800WK	3	600	800	PC22000WK	2 ^②	600	2000
LA2400WSK	2	600	400	MA3800WSK	3	600	800	PC22500WK	2 ^②	600	2500
LA2600WK	2	600	600	MC2800WK ^③	2	600	800	PC23000K	2 ^②	600	3000
LA2600WSK	2	600	600	MC3800WK ^③	3	600	800	PC32000WK	3 ^④	600	2000
LA3400WK	3	600	400	MCC2800WK ^③	2	600	800	PC32500WK	3 ^④	600	2500
LA3400WSK	3	600	400	MCC3800WK ^③	3	600	800	PC33000K	3 ^④	600	3000
LA3600WK	3	600	600	NB21200WK	2	600	1200	PCC22000WK	2 ^②	600	2000
LA3600WSK	3	600	600	NB21200WSK	2	600	1200	PCC22500WK	2 ^②	600	2500
LAB2400WK	2	600	400	NB31200WK	3	600	1200	PCC23000K	2 ^②	600	3000
LAB2400WSK	2	600	400	NB31200WSK	3	600	1200	PCC32000WK	3 ^④	600	2000
LAB3400WK	3	600	400	NC21200WK ^③	2	600	1200	PCC32500WK	3 ^④	600	2500
LAB3400WSK	3	600	400	NC31200WK ^③	3	600	1200	PCC33000K	3 ^④	600	3000
LC2600WK ^③	2	600	600	PB22000WK	2	600	2000	PCF22000K	2 ^②	600	2000
LC3600WK ^③	3	600	600	PB22500WK	2	600	2500	PCF32000K	3 ^④	600	2000
LCC2600WK ^③	2	600	600	PB32000WK	3	600	2000				
LCC3600WK ^③	3	600	600	PB32500WK	3	600	2500				

Molded Case Switch Terminal Data

MCS Type	Max. Switch Amperes	Standard Terminals (Aluminum Body)				Optional Terminals				
		Terminal Type or Cat. Number	Wire Type	No. of Wires	Wire Range	Terminal Type or Cat. Number	Wire Type	No. of Wires	Wire Range	
CA	225	TA225CA2	Cu/Al	1	#1-300 MCM	.....	...	...	.....
LA400, LAB	400	TA400LA1	Cu/Al	1	#4-250 MCM, plus 3/0-600 MCM	T401LA	Cu	1	#4-250 MCM, plus 3/0-600 MCM	
LA600, LC600	600	TA600LA	Cu/Al	2	250/500 MCM	T600LA	Cu	2	250/500 MCM	
MC, MA	800	TA800MA2	Cu/Al	3	3/0-400 MCM	T800MA1	Cu	3	3/0-300 MCM	
NC, NB	1200	TA1200NB1	Cu/Al	4	4/0-500 MCM	T1200NB1	Cu	4	3/0-400 MCM	
NC, NB	1200	.....	.....	..	.....	TA1201NB1	Cu/Al	3	500-750 MCM
PC2000, PCC2000	2000	BA2000PB Rear Bus Connector								
PC2500, PCC2500	2500	BA2500PB Rear Bus Connector								
PC3000, PCC3000	3000	Rear Bus Connector Included in Frame								

Molded Case Switches

Molded Case Switches are Underwriters' Laboratories, Inc. listed devices and are available only as high magnetic trip type with fixed trip setting.

For application information and UL listed withstand ratings, refer to Application Data 29-160.

Molded Case Switches With High Magnetic Trip – Trip Setting and Tolerance

Frame	Rating	Trip Setting (Amperes)	Tolerance (%)
CA	225	2250	+20 -10
LA (400)	400	4000	+10 - 0
LA/LC	600	6000	+10 - 0
MA/MC	800	8000	+10 - 0
NB/NC	1200	12000	+10 - 0
PB/PC	2000-3000	12000	+10 - 0

① Catalog number suffix identification:

- K = Molded Case Switch with High Magnetic Trip (Fixed Trip Setting)
- S = Saf-T-Vue® cover
- W= No terminals

② Molded case switch dimensions are the same as the equivalent thermal magnetic breaker. Refer to Dimension Sheet 29-171.

③ For molded case switch types LC, LCC – use LA attachments; MC and MCC – use MA attachments; NC – use NB attachments.

④ For molded case switch types PC, PCC and PCF, rating plug is included and use SELTRONIC PC attachments.

MOLDED CASE CIRCUIT BREAKERS

Replacement Motor Circuit Protectors



REPLACEMENT CAPABILITIES

The Motor Circuit Protector (MCP) is designed specifically for the protection of motor circuits. It operates on the magnetic principle with a current sensing coil in each of the 3 poles, with the trip-point adjustable from the front. MCPs are the fastest devices available for clearing low level faults and offer circuit breaker features and convenience, resettable, quick make-quick break, dead front, and protection against single phasing.

MCPs are rated to correspond to NEMA starter size

Current Limiter Attach. (Size 0-4 Only)

The EL current limiter is an attachment that bolts to the load end of the MCP to provide increased interrupting capacity. The combination is UL listed as a recognized component for application at up to 200,000 amperes symmetrical at 600 volts AC. It is coordinated with the MCP so that normal short circuits will be cleared automatically by the MCP, opening all 3 poles, and only the rare high fault will cause the limiter to function. Current limiters must be applied as shown in the table below.

Terminals

Terminals are included with both the MCP and Current Limiter. Standard terminals are aluminum alloy, with non-aluminum terminals optional for use with only the MCP. Both standard and optional terminals will accommodate aluminum or copper conductors. When using aluminum conductors, use of joint compound is recommended. Wire ranges are listed below.

MCP or Limiter	Terminals	
	Standard Alum.	Optional Non-Alum.
Size 0, 1, 2	#14-#4	#14-1/0
Size 3	#6-3/0	#14-1/0
Size 4	#4-4/0	#4-4/0
Size 5 (250 Amp.)	#4-350MCM	#4-350MCM
Size 5 (400 Amp.)	.....	(2)-3/0-250MCM
Limiters to 50 Amps.	#14-#2	.....
Limiters to 100 Amps.	#1-4/0	.....
Limiters to 150 Amps.	#1-4/0	.....

Underwriters' Laboratories, Inc. Listed

The MCP is listed with Underwriters' Laboratories as a recognized component and requires additional listing by the control manufacturer in combination with a contactor and overload relay.



Size 0-4 MCP With Current Limiter



Size 5 MCP 532500

Motor Circuit Protectors

Starter Size	Trip Range, Amperes	Continuous Ampere Rating	With Standard Aluminum Alloy Terminals	With Optional Non-Aluminum Terminals ^②
			Catalog Numbers	
0	7- 22	3	MCP0322R	MCP0322CR
0	18- 58	7	MCP0358R	MCP0358CR
0	50- 150	15	MCP03150R	MCP03150CR
1	100- 300	30	MCP13300R	MCP13300CR
2	160- 480	50	MCP23480R	MCP23480CR
3	275- 1000	100	MCP331000R	MCP331000CR
4	450- 1550	150	MCP431550R	MCP431550CR
4	575- 1800	150	MCP431800R	MCP431800CR
5	1250- 2500	250	MCP532500	MCP532500C
5	2000- 4000	400	.....	MCP534000C

Modifications for MCP^④

These modifications must be factory installed.

Description
Auxiliary Switches ^⑤ 1A and 1B, 2As and 2Bs
Shunt Trip ^⑥
Undervoltage Release ^{⑥⑦}
Moisture-Fungus Treatment

Accessories for MCP^⑥

For handle mechanisms refer to pages 66 and 75.

For MCP Size	Use Access. For
0-4	FB
5 (250 Amp.)	KB
5 (400 Amp.)	LB

Current Limiters

Limiter Catalog Numbers	For MCP Catalog Numbers ^②
EL3003R	MCP0322R
EL3007R	MCP0358R
EL3015R	MCP03150R
EL3030R	MCP13300R
EL3050R	MCP23480R
EL3100R	MCP331000R
EL3150R	MCP431550R
EL3150R	MCP431800R

Interrupting Ratings

Maximum application current shall be determined by testing the MCP in combination with a contactor and overload relay. Additional capacity can be obtained by using the current limiter attachment.

Base Mounting Hardware

No charge when ordered with MCP. Order separately when required.

Description	Style Number
Size 0-4	21C6782G18
Size 5 (250 Amperes)	673B125G12
Size 5 (400 Amperes)	21C6782G22

① Except 400 amperes size 5. Non-aluminum terminal suitable for copper only.

② Catalog numbers ending in CR were previously listed ending in RC. This is a catalog number change only, not a material change.

③ Also applicable to MCPs with optional terminals.

④ Not Underwriters' Laboratories.

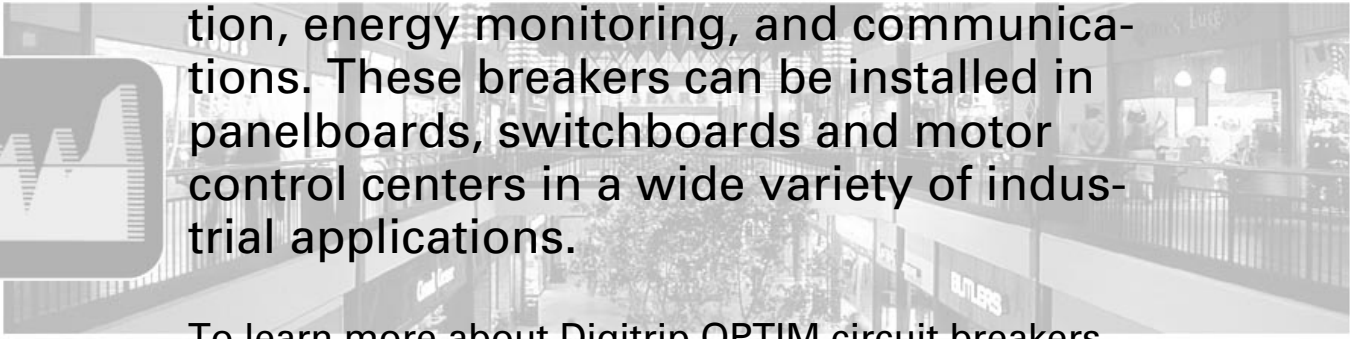
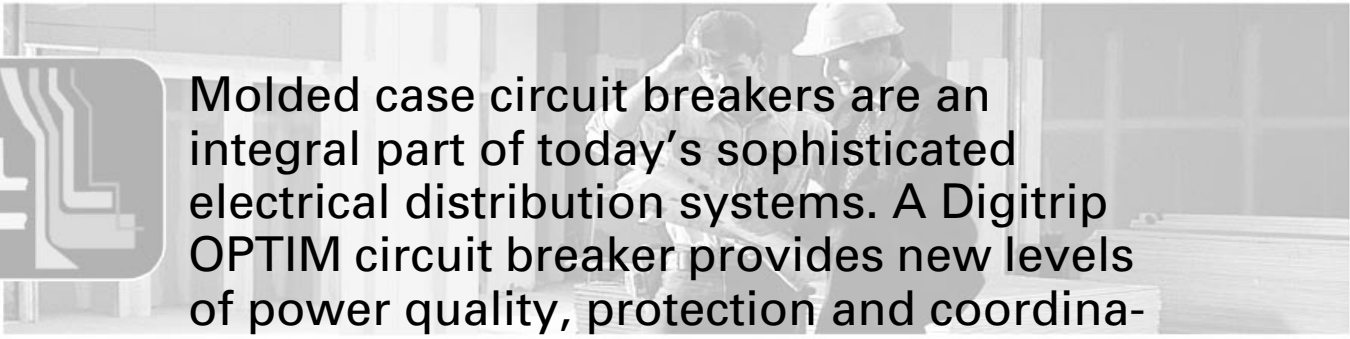
⑤ Mounts only in right pole; only one Modification marked^⑥ can be used in MCP. (Size 0-4)

⑥ On 400 amperes size 5, an external resistor is supplied for voltages above 240 volts AC and 24 volts DC.

⑦ On size 0-4 and 250 amperes size 5, an external resistor is supplied for customer mounting, except for 120 volts AC, 12, 24, 125 volts DC.



Molded case circuit breakers are an integral part of today's sophisticated electrical distribution systems. A Digitrip OPTIM circuit breaker provides new levels of power quality, protection and coordination, energy monitoring, and communications. These breakers can be installed in panelboards, switchboards and motor control centers in a wide variety of industrial applications.



To learn more about Digitrip OPTIM circuit breakers, turn to page 9.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breaker Accessories



SELTRONIC™ AND CURRENT LIMIT-R CIRCUIT BREAKERS

Portable Test Kit

Provides verification of performance of all frame sizes of SELTRONIC™ breakers while devices are still in service under varying load and/or phase unbalance. The tester operates on 120V 50/60 Hz and includes complete instructions and test times for testing the long time, instantaneous operation and optional ground fault operation of the breaker.

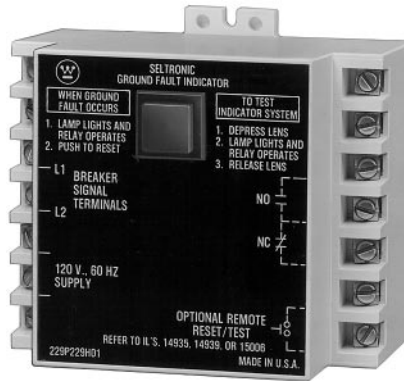
Style Number

STK2



Remote Ground Fault Trip Indicator¹

For use only with SELTRONIC™ Circuit Breakers (LCG, HLCG, MCG, HMCG, NCG, HNCG, PCG and PCCG) with built-in ground fault protection.



The SELTRONIC™ Ground Fault indicator is a remotely mounted device with a combination indicating light/reset/test button that will light when the breaker trips on a Ground Fault. Tripping from overloads or short circuits will not activate the device. A separate 120V, 50/60 Hz power source is required to power the light and internal relay which has 1 N.O. and 1 N.C. contacts for customer connected alarm etc. Designed for panel mounting, it can be face-mounted by ordering the optional mounting bracket below.

Style Number

1259C14G01



Face Mounting Bracket for Ground Fault Indicator

Style Number

1264C67G01

¹ UL listed as a recognized component.



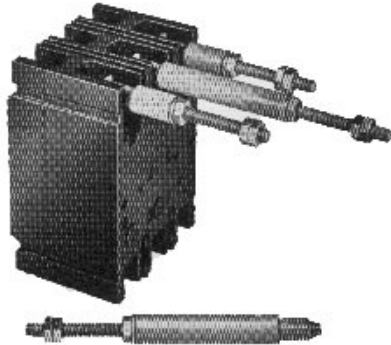
MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breaker Accessories

ACCESSORIES

Rear Connected Studs[ⓐ]

For complete stud assembly, order a stud and appropriate tube based on thickness of customer's mounting panel. A short stud must be assembled adjacent to a long stud to maintain clearances required by Underwriters' Laboratories, Inc.[ⓑ]. Two studs are required per pole. Refer to Dimension Sheet 29-171 for stud sizes and extensions behind breaker.



Low Resolution Photo

For DA, EB, EHB, FB, JA, KA, JB, KB, LB, LBB, HFB, HKA, HKB, HLB Breakers
For insulated panels only; 2 required per pole.

Mounting Panel Thickness, Inches	Stud		Tube [ⓐ]	
	Length	Style Number	Length	Style Number
DA, LB, LBB, HLB Breakers				
3/4 - 1	Short	656D565G03	27/32	313C909H17
	Long	656D565G04	329/32	313C909H20
1/2 - 3/4	Short	656D565G03	13/32	313C909H18
	Long	656D565G04	41/32	313C909H21
1/4 - 1/2	Short	656D565G03	111/32	313C909H19
	Long	656D565G04	49/32	313C909H22

Panelboard Connecting Straps[ⓐ]

For connecting line end of breakers to panelboard bus.



For DA, EB, EHB, FB, JA, KA, JB, KB, LB, LBB, HFB, HKB, and HLB Breakers

Ampere Rating	Connector Type	Style Number
EB, EHB, FB, HFB Breakers Narrow Distribution Panelboards Bus Spacing 2 3/4 in. in Box 5 1/4 in. Deep (600 Volts Max.)		
50	Center	673B142G02
50	Outside	673B142G09
100	Center	673B142G02
100	Outside	673B142G10
150	Center	673B142G04
150	Outside	673B142G03

- ⓑ Not Underwriters' Laboratories, Inc. listed.
- ⓐ 400 ampere LA studs of the same length have sufficient clearance; however, customer connections may make it necessary to use a short stud adjacent to a long stud.
- ⓐ Included at No Charge when ordered with stud.
- ⓐ 150, 250, 300 and 400 ampere frames only.

Mounting Panel Thickness, Inches	Stud		Tube [ⓐ]	
	Length	Style Number	Length	Style Number
EB, EHB, FB, HFB (100 Ampere Max.)				
1	Short	451D874G01	1 1/16	32B9446H20
	Long	451D874G02	3 7/16	32B9446H24
1 1/16 - 1 5/16	Short	451D874G01	1 3/8	32B9446H21
	Long	451D874G02	3 3/4	32B9446H25
3/8 - 5/8	Short	451D874G01	1 11/16	32B9446H22
	Long	451D874G02	4 1/16	32B9446H26
1/4 - 5/16	Short	451D874G01	2	32B9446H23
	Long	451D874G02	4 3/8	32B9446H27
FB, HFB 150 Ampere Breakers				
1	Short	374D883G01	1 1/16	374D883H06
	Long	374D883G02	4 5/16	374D883H10
1 1/16 - 1 5/16	Short	374D883G01	1 3/8	374D883H07
	Long	374D883G02	4 5/8	374D883H11
3/8 - 5/8	Short	374D883G01	1 11/16	374D883H08
	Long	374D883G02	4 15/16	374D883H12
1/4 - 5/16	Short	374D883G01	2	374D883H09
	Long	374D883G02	5 1/4	374D883H13
JA, KA, HKA Breakers				
3/4 - 1	Short	656D565G01	27/32	456D983H05
	Long	656D565G02	329/32	456D983H08
1/2 - 3/4	Short	656D565G01	13/32	456D983H06
	Long	656D565G02	41/32	456D983H09
1/4 - 1/2	Short	656D565G01	111/32	456D983H07
	Long	656D565G02	49/32	456D983H10
JB, KB, HKB Breakers				
3/4 - 1	Short	5010D23G01	27/32	456D983H05
	Long	5010D23G02	33/8	5010D23H05
1/2 - 3/4	Short	5010D23G01	13/32	456D983H06
	Long	5010D23G02	41/8	5010D23H06
1/4 - 1/2	Short	5010D23G01	111/32	456D983H07
	Long	5010D23G02	49/8	5010D23H07

For LAB, LA, MA, HLA, HMA, and HNB Breakers

For insulated panels only; 2 required per pole.

Stud Ampere Rating	Diameter, Inches and Thread	Extension Back of Breaker, Inches	Stud Style Number
LAB, LA, HLA, LC, HLC Breakers			
225 [ⓐ]	1/2-13	37/32	1241 345
225 [ⓐ]	1/2-13	69/32	1241 346
225 [ⓐ]	1/2-13	431/32	1241 392
400 [ⓐ]	3/4-16	515/32	5B7383G15
400 [ⓐ]	3/4-16	731/32	5B7383G16
400 [ⓐ]	3/4-16	1015/32	5B7383G17
600 [ⓐ]	1 - 12	529/32	314C960G07
600 [ⓐ]	1 - 12	813/32	314C960G08
600 [ⓐ]	1 - 12	1029/32	314C960G09
MA, HMA, MC, HMC Breakers			
225	1/2-13	321/32	314C960G01
400	3/4-16	529/32	314C960G04
400	3/4-16	813/32	314C960G05
400	3/4-16	1029/32	314C960G06
600	1 - 12	529/32	314C960G07
600	1 - 12	813/32	314C960G08
600	1 - 12	1029/32	314C960G09
800	1 1/8-12	529/32	314C960G10
800	1 1/8-12	813/32	314C960G11
800	1 1/8-12	1029/32	314C960G12
NB, HNB, NC, HNC Breakers			
800	1 1/8-12	5/2	623B222G01
800	1 1/8-12	8	623B222G02
800	1 1/8-12	10 1/2	623B222G03
1200	1 1/4-12	5 1/2	373B375G04
1200	1 1/4-12	10 1/2	373B375G03

Ampere Rating	Connector Type	Style Number
Power Panelboards (Convertible) Bus Spacing 3 1/2 in.		
50	Center	1253C72G01
50	Outside	1253C72G03
100	Center	1253C73G03
100	Outside	1253C73G06
150	Center	1253C73G01
150	Outside	1253C73G05
3-Pole Mounting Bracket		624B600H01
2-Pole Mounting Bracket		624B600H02
DA, LB, LBB, HLB Breakers Bus Spacing 3 1/2 in.		
400	Center	314C940G04
400	Outside	505C680G01
Mounting Bracket (1 Required)		208B264H01
JA, KA, HKA Breakers Bus Spacing 3 1/2 in.		
225	Center	314C940G03
225	Outside	180C074G01
Mounting Bracket (1 Required)		208B264H01
JB, KB, HKB Breakers Bus Spacing 3 1/2 in.		
250	Center	2600D26G01
250	Outside	2600D26G02
Mounting Bracket (1 Required)		1576707

For CA, LAB, LA, MA, HLA, HMA, and HNB Breakers

Ampere Rating	Connector Type	Style Number
CA Breaker Power Panelboards (Convertible) Bus Spacing 3 1/2 in.		
225	Center	1253C74G01
225	Outside	1253C74G02
3-Pole Mounting Bracket		624B624H01
2-Pole Mounting Bracket		624B624H02
LAB, LA, HLA, LC, HLC 150, 300, 400 Amp Frames Bus Spacing 3 1/2 in.		
400	Center	32B4570G02
400	Outside	314C541G01
Mounting Bracket (2 Required)		208B297H01
LA, HLA, LC, HLC 600 Amp Frames Bus Spacing 3 1/2 in.		
600	Center	624B609G01
600	Outside	506C052G01
Mounting Bracket (2 Required)		208B297H01
MA, HMA, MC, HMC Breakers Bus Spacing 3 1/2 in.		
800	Short	314C996G01
800	Medium	314C996G02
800	Long	314C996G03
Mounting Bracket (4 Required)		315C270H01
NB, HNB, NC, HNC Breakers Bus Spacing 3 1/2 in.		
1200	Short	505C606G04
1200	Medium	505C606G05
1200	Long	505C606G06
Mounting Bracket (4 Required)		315C270H01

- ⓐ This is a special stud which includes six contact nuts for use where bus contact nuts must be used.
- ⓐ 600 ampere frames only.



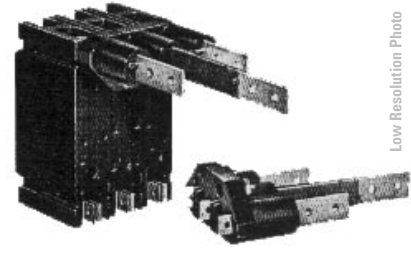
ACCESSORIES, *Continued*

Plug-in Adapter Kits

For rear connected applications such as switchboards. Facilitates ease of installation and front removal of breaker. Includes conductor for mounting on breaker, plug-in mounting blocks with matching conductor, rear studs and mounting hardware. Order two mounting blocks style number when line and load are required; order one mounting block style number when either line or load is required.



Threaded Studs Type



Flat Bus Type

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Flat Bus Type

Description	Style Number
EB, EHB, FB Thermal Magnetic Breakers[Ⓛ] Flat Bus Type	
1 Mounting Block, Line or Load	
2-pole, 100 Ampere	1480D13G05
2-pole, 150 Ampere	1480D13G05
3-pole, 100 Ampere	1480D13G06
3-pole, 150 Ampere	1480D13G06
FB and HFB Magnetic Only, HFB Thermal Magnetic[Ⓛ] Flat Bus Type	
1 Mounting Block, Line or Load	
2-pole, 100 Ampere	1480D13G05
2-pole, 150 Ampere	1480D13G05
3-pole, 100 Ampere	1480D13G06
3-pole, 150 Ampere	1480D13G06
JB, KB, HKB Breakers[Ⓛ] Flat Bus Type	
2 Mounting Blocks, Line and Load	
2-pole	506C144G17
3-pole	506C144G18
1 Mounting Block, Line Only	
2-pole	1260C86G01
3-pole	1260C86G02
1 Mounting Block, Line Only	
2-pole	1260C86G03
3-pole	1260C86G04
LAB, LA, HLA, LC, HLC (150, 250, 300 and 400 Ampere Frame)[Ⓛ] Flat Bus Type	
2 Mounting Blocks, Line and Load	
2-pole	313C644G25
3-pole	313C644G26
1 Mounting Block, Line or Load	
2-pole	450D010G15
3-pole	450D010G16

Description	Style Number
DA, LB, LBB, HLB Breakers[Ⓛ] Flat Bus Type	
2 Mounting Blocks, Line and Load	
2-pole	313C644G45
3-pole	313C644G46
1 Mounting Block, Line or Load	
2-pole	314C932G03
3-pole	314C932G04
MA, HMA, MC, HMC Breakers[Ⓛ] Threaded Studs	
2 Mounting Blocks, Line and Load	
2-pole, 125-600 Ampere	313C644G27
2-pole, 700-800 Ampere	176C544G01 [Ⓜ]
3-pole, 125-600 Ampere	313C644G28
3-pole, 700-800 Ampere	176C544G02 [Ⓜ]
1 Mounting Block, Line or Load	
2-pole, 125-600 Ampere	313C370G03
2-pole, 700-800 Ampere	507C049G01 [Ⓜ]
3-pole, 125-600 Ampere	313C370G04
3-pole, 700-800 Ampere	507C049G02 [Ⓜ]

Threaded Studs Type

Description	Style Number
JA, KA, HKA Breakers[Ⓛ] (Threaded Studs Type)	
2 Mounting Blocks, Line and Load	
2-pole	313C644G29
3-pole	313C644G30
1 Mounting Block, Line or Load	
2-pole	314C932G01
3-pole	314C932G02
LA, HLA, LC, HLC (600 Ampere Frames)[Ⓛ] (Threaded Studs)	
2 Mounting Blocks, Line and Load	
2-pole	313C644G50
3-pole	313C644G51
1 Mounting Block, Line or Load	
2-pole	506C059G03
3-pole	506C059G04
1 Mounting Block, Line or Load Flat Bus Type	
2-pole	1288C19G01
3-pole	1288C19G02
MA, HMA, MC, HMC, NB, HNB, NC, HNC, NB TRI-PAC Breakers[Ⓛ] (Flat Bus Type)	
1 Mounting Block, Line or Load	
MA, HMA, MC, HMC 2-poles	2614D53G05
MA, HMA, MC, HMC 3-poles	2614D53G06
NB, HNB, NC, HNC, NB TRI-PAC, 2-poles	2614D53G03
NB, HNB, NC, HNC, NB TRI-PAC, 3-poles	2614D53G04

Mounting Plates

Predrilled Panels for:	
EB, EHB, FB, HFB	507C047H01
JB, KB	179C207H01
JA, KA	504C823H01
DA, LB, LBB, ALB	178C781H01
LA, LAB, HLA, LC, HLC	504C824H01
MA, HMA, MC, MMC, NB, HNB, NC, HNC	1290C73H01

- [Ⓛ] These plug-in adapter kits are UL listed as recognized components.
[Ⓜ] 700-1200 ampere adapter kit is front removable, bolt-on design — not plug-in type.
[Ⓝ] Not Underwriters' Laboratories, Inc. listed.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breaker Accessories

ACCESSORIES, Continued

Extended Line Terminal Shields



Low Resolution Photo

For shielding line side terminal connections. One shield required per breaker. Order separately when needed. Sold only in lots of 10, including hardware.

Breaker Frame	Style Number
JB, KB, HKB	1266C07G01
MA, HMA, MC, HMC	208B966G01
NB, HNB, NC, HNC	208B966G02
LAB, LA, (Saf-T-Vue®)	314C420G02
JA, KA, LB, LBB (Saf-T-Vue®)	314C420G04
LAB, LA, HLA, LC, HLC	314C420G05
DA	314C420G06
JA, KA, HKA, LB, LBB, HLB (Standard Breaker)	314C420G06
EB, EHB, FB, HFB	625B229G08

Base Mounting Hardware

No charge when ordered with breaker. Order separately when needed.

Description	Style Number
1-pole Breakers	
EB, EHB, HFB	624B375G01
EB, EHB, HFB	624B375G02
2- and 3-pole Breakers	
LAB, LA, HLA, LC, HLC	21C6782G05
MA, NB, HMA, HNB, MC, HMC, NC, HNC	1091716
PB, PC, PCC	624B375G22
DA, JA, KA, HKA, LB, LBB, HLB	21C6782G22
EB, EHB, FB, HFB, MCP	21C6782G18
JB, KB, HKB	673B125G12
CA 2-pole	21C6782G28
CA 3-pole	21C6782G29

Handle Locks



Non-Padlockable

For prevention of unintentional operation of breaker. Fits over breaker handle and may be removed.

Padlockable

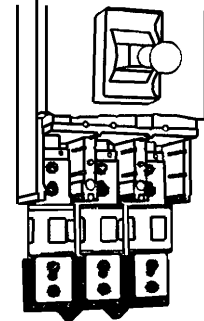
For prevention of unauthorized operation of breaker. Is non-removable once installed on breaker. Meets Underwriters' Laboratories, Inc. and California Code requirements.

Note: All breakers are trip free and will trip with handle locks attached. Cannot be used when handle extension is used.

Breaker Frame	Style Number
Non-Padlockable	
CA, EB, EHB, FB, HFB	1720360
LAB, LA, LC, HLC, MA, NB, HLA, HMA, HNB, MC, HMC, NC, HNC	1720101
GB, GC, GHB, GHC	1294C01H01
DA, JA, KA, HKA, LB, LBB, HLB	29B2721H04
Padlockable	
CA	506C438G01
EB, EHB, FB, HFB	765A754G01
DA, JA, KA, LB, LBB, HKA, HLB	673B796G02
JB, KB, HKB	673B796G01
LAB, LA, HLA, LC, HLC	373B591G02
MA, HMA, MC, HMC	6591C30G02 – OFF
MB, HMA, MC, HMC	6591C30G05 – ON/OFF
NB, HNB, NC, HNC	6591C30G01 – OFF
NB, HNB, NC, HNC	6591C30G04 – ON/OFF
PB, PC	6591C30G03 – OFF

Fuse Mounting Base for PB Breakers

For 2000 amp non-automatic breakers only.



Catalog Number
FMB2000PB

For use with non-automatic, 3-pole circuit breaker. Includes fuse mounting base and hardware to mount standard Class L current limiting fuses, 801 - 2000A (fuses not included).

For complete installation, order:

1. Front connected, non-automatic PB breaker. (Order similar to standard front connected, except omit load conductor extensions)
2. Fuse mounting base.
3. Fuses (from distributor).

Cable Connectors

The fuse mounting base will accept the following terminals for front cable connection (omit "T" connectors from rear connected breakers).

Style Number	Wire Range, Type No. of Cables
672B655G01	3 3/0-400 MCM Cu
180C046G03	4 400-500 MCM Cu

Molded Type Handle Extension

For LAB, LA, HLA Breakers

Style Number
372B399G01

For MA, HMA, MC, HMC Breakers

Style Number
1251C65G01

For NB, HNB, NC, and HNC Breakers

Style Number
1251C65G01

For PB, PC, and PCC Breakers

Style Number
6635C78G02

① Not Underwriters' Laboratories, Inc. listed.
 ② One of style 625B229G08 is one package of 10.
 ③ Individually mounted.
 ④ Group mounted.
 ⑤ Included with frame at no charge.
 ⑥ Interrupters used with fuse mounting base will accept all standard PB accessories. See Dimension Sheet 29-171 for mounting details.



ACCESSORIES, Continued

Modifications

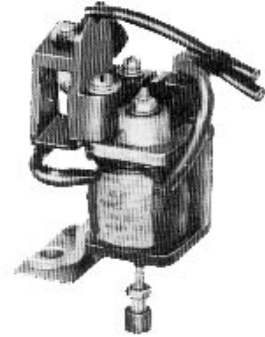
Only two internally mounted modifications — shunt trip, undervoltage release, auxiliary switch, alarm switch — may be mounted in EB through PB. Only one of these modifications may be mounted in FB, HFB magnetic only, 2-pole EB, EHB, FB and SELTRONIC™ breakers. None are available in 1-pole breakers except alarm switch in EB, EHB and HFB. Refer to Cutler-Hammer for possible special combinations of the following modifications not in tabulations.

Shunt Trip

For tripping breaker from a remote point. A solenoid device mounts within breaker case. Breaker trips when coil is energized.

Shunt trips should not be used as circuit interlocks using maintained contact pilot devices.

A cut-off switch breaks the circuit to the momentary rated coil when breaker opens. Available for control voltages up to 250 volts DC or 600 volts AC. Voltage and frequency must be specified. Standard leads extend 18 inches outside the breaker. Longer leads may be specified.



Low Resolution Photo

Shunt Trip for Field Mounting^{①②③}

Voltage/ Hz	Breaker Type						
	EB, EHB, FB, HFB ^④ (Thermal-Magnetic only)	JB, KB, HKB	JA, KA, HKA, DA, LB, LBB, HLB	LA, LAB, HLA	MA, HMA	NB, HNB	PB

Right Hand Mounting

600/50-60 Hz	2609D39G15	2609D42G15	2605D15G15	2606D56G15	2606D57G15	2606D58G15	2606D59G15
480/50-60 Hz	2609D39G16	2609D42G16	2605D15G16	2606D56G16	2606D57G16	2606D58G16	2606D59G16
240/50-60 Hz	2609D39G17	2609D42G17	2605D15G17	2606D56G17	2606D57G17	2606D58G17	2606D59G17
208/50-60 Hz	2609D39G18	2609D42G18	2605D15G18	2606D56G18	2606D57G18	2606D58G18	2606D59G18
120/50-60 Hz	2609D39G19	2609D42G19	2605D15G19	2606D56G19	2606D57G19	2606D58G19	2606D59G19
60/50-60 Hz	2609D39G20	2609D42G20	2605D15G20	2606D56G20	2606D57G20	2606D58G20	2606D59G20
48/50-60 Hz	2609D39G21	2609D42G21	2605D15G21	2606D56G21	2606D57G21	2606D58G21	2606D59G21
24/50-60 Hz	2609D39G22	2609D42G22	2605D15G22	2606D56G22	2606D57G22	2606D58G22	2606D59G22
250 DC	2609D39G23	2609D42G23	2605D15G23	2606D56G23	2606D57G23	2606D58G23	2606D59G23
125 DC	2609D39G24	2609D42G24	2605D15G24	2606D56G24	2606D57G24	2606D58G24	2606D59G24
60 DC	2609D39G25	2609D42G25	2605D15G25	2606D56G25	2606D57G25	2606D58G25	2606D59G25
48 DC	2609D39G26	2609D42G26	2605D15G26	2606D56G26	2606D57G26	2606D58G26	2606D59G26
24 DC	2609D39G27	2609D42G27	2605D15G27	2606D56G27	2606D57G27	2606D58G27	2606D59G27
12 DC	2609D39G28	2609D42G28	2605D15G28	2606D56G28	2606D57G28	2606D58G28	2606D59G28

Left Hand Mounting

600/50-60 Hz	2609D39G01	2609D42G01	2605D15G01	2606D56G01	2606D57G01	2606D58G01	2606D59G01
480/50-60 Hz	2609D39G02	2609D42G02	2605D15G02	2606D56G02	2606D57G02	2606D58G02	2606D59G02
240/50-60 Hz	2609D39G03	2609D42G03	2605D15G03	2606D56G03	2606D57G03	2606D58G03	2606D59G03
208/50-60 Hz	2609D39G04	2609D42G04	2605D15G04	2606D56G04	2606D57G04	2606D58G04	2606D59G04
120/50-60 Hz	2609D39G05	2609D42G05	2605D15G05	2606D56G05	2606D57G05	2606D58G05	2606D59G05
60/50-60 Hz	2609D39G06	2609D42G06	2605D15G06	2606D56G06	2606D57G06	2606D58G06	2606D59G06
48/50-60 Hz	2609D39G07	2609D42G07	2605D15G07	2606D56G07	2606D57G07	2606D58G07	2606D59G07
24/50-60 Hz	2609D39G08	2609D42G08	2605D15G08	2606D56G08	2606D57G08	2606D58G08	2606D59G08
250 DC	2609D39G09	2609D42G09	2605D15G09	2606D56G09	2606D57G09	2606D58G09	2606D59G09
125 DC	2609D39G10	2609D42G10	2605D15G10	2606D56G10	2606D57G10	2606D58G10	2606D59G10
60 DC	2609D39G11	2609D42G11	2605D15G11	2606D56G11	2606D57G11	2606D58G11	2606D59G11
48 DC	2609D39G12	2609D42G12	2605D15G12	2606D56G12	2606D57G12	2606D58G12	2606D59G12
24 DC	2609D39G13	2609D42G13	2605D15G13	2606D56G13	2606D57G13	2606D58G13	2606D59G13
12 DC	2609D39G14	2609D42G14	2605D15G14	2606D56G14	2606D57G14	2606D58G14	2606D59G14

Factory Mounted Shunt Trips^{④⑤}

All of the above shunt trips can be specified for factory mounting at the same price as listed for the kit. These shunt trips have

the leads out the side and are UL listed when factory mounted, unless other non-UL listed modifications are used.

Factory mounted shunt trips only can be supplied for the following breakers:

CA, HCA, CAH, FB magnetic only^{⑥⑦}, HFB magnetic only^{⑥⑦} and non-automatic breakers (molded case switches)^⑧.

① 120 volt AC ratings suitable for 55% pickup for ground fault applications.

② Not field mountable on non-automatic breakers (molded case switches).

③ Field mounting voids breakers' UL listing except on LA, HLA, MA, HMA, NB, HNB, KB, HKB, KA, HKA, LB, HLB and SELTRONIC™ breakers.

④ Available similar to this except "Leads out the load end - (not UL listed)." Order by description.

⑤ Right hand mounting considered standard unless specified otherwise.

⑥ Not UL listed.

⑦ Right hand mounting only.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breaker Accessories

A

ACCESSORIES, *Continued*

Left Hand Mounting Kits For SELTRONIC™ Breakers

Provision to trip flux transfer shunt trip from external 32 to 120 volt (DC to 60 Hz) source. ❶❷

MC, HMC	Style 1371D72G22
NC, HNC	Style 1372D39G13
PC, PCC	Style 1372D35G22
LC, HLC	Style 1371D11G22

Provision to trip flux transfer shunt trip from external 240 to 600 volt AC, 50/60 Hz source. ❸❹

MC, HMC	Style 1371D72G32
NC, HNC	Style 1372D39G23
PC, PCC	Style 1372D35G32
LC, HLC	Style 1371D11G32

Shunt Trip Coil Data

Shunt Trip Voltage Rating	For All Breakers Listed Above and on Previous Page Except CA and SELTRONIC™		SELTRONIC™	
	Coil Inrush		Coil Inrush	
	Amperes	Volt-Amperes	Amperes	Volt-Amperes
600 AC	0.105	63.0	...	...
480 AC	0.085	40.8	...	...
240 AC	1.7	408.0	...	...
208 AC	1.4	291.2	...	...
120 AC	0.88	105.6	15	18
60 AC	9.10	546.0	...	...
48 AC	7.50	360.0	...	...
24 AC	3.95	94.8	...	...
250 DC	2.5	625.0	...	...
125 DC	0.975	121.9	...	...
60 DC	0.525	31.5	...	...
48 DC	1.3	62.4	...	...
24 DC (FB)	6.	144.0	...	...
24 DC (KB)	3.8	91.2	...	...
24 DC (others)	8.	192.	...	...
12 DC	6.	72.	...	...

❶ Rated 48 volts minimum for ground fault applications.
 ❷ Also available factory mounted for 24 volts DC. Order by description.
 ❸ Not for ground fault.

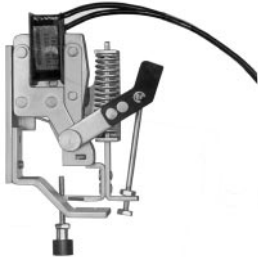
MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breaker Accessories



ACCESSORIES, Continued

Standard Undervoltage Release



For undervoltage protection. A solenoid device mounts within breaker case. Coil must be energized before closing breaker. Trips breaker when voltage drops below 35 to 70% of coil rating. Picks up and seals in at 85% of coil rating. For line voltages up to 250 volts DC or 600 volts AC. Externally mounted resistors are supplied for certain ratings. Standard leads extend 18 inches outside of breaker. Longer leads may be specified.

NOTE: Undervoltage release attachments are not designed for, and should not be used as, circuit interlocks. For further information, consult your local Cutler-Hammer Field Sales Office.

Factory Mounted Undervoltage Releases

All of the above undervoltage releases can be specified for factory mounting at the same price as listed for the kit. These attachments have the leads out the side and are UL listed when factory mounted unless other non-UL listed modifications are used.

Factory mounted undervoltage releases only can be supplied for the following breakers:

SELTRONIC™ Breakers (120V AC 60 Hz only standard), MC, HMC, NC, HNC, PC, PCC, LC, HLC

SELTRONIC™ Breakers with Remote Trip Provisions, MC, HMC, NC, HNC, PC, PCC, LC, HLC

EB, EHB, FB, HFB, JB, KB, HKB magnetic only, and HFB

No UVR available for CA, CAH and HCA

- ① Right hand mounting considered standard unless specified otherwise except JA, KA, DA, HKA, LB, LBB, HLB and SELTRONIC™ available for left hand only, and JB, KB, HKB left hand is standard.
- ② Cannot be used with other attachments except a small 1A-1B auxiliary switch rated 250 volts can be supplied in right hand pole.
- ③ Provided with two leads (total of 4) for use with a remote normally open contact (push-button etc.) to trip the breaker. No external power required.
- ④ Not available on ambient compensating breakers.
- ⑤ Not UL listed.
- ⑥ Right hand mounting only.
- ⑦ Not field mountable on non-automatic breakers. (Molded case switches)
- ⑧ Field mounting voids UL listing of breaker except on LA, HLA, MA, HMA, NB, HNB, PB, KA, HKA, LB, HLB.

Undervoltage Release Attachment Kits for Field Mounting

Attachment Voltage, Hz	Breaker Type				
	JA, KA, DA, HKA, LB, LBB, HLB	LA, LAB, HLA	MA, HMA	NB, HNB	PB
For Right Hand Mounting					
24 60	.....	60A9355G17	.....	.....	.....
48 60	.....	60A9355G08	.....	.....	5674D29G16
120 60	.....	60A9355G01	457D727G01	373D632G01	5674D29G09
208 60	.....	60A9355G02	457D727G19	373D632G19	5674D29G10
240 60	.....	60A9355G03	457D727G02	373D632G02	5674D29G11
480 60	.....	60A9355G05	457D727G03	373D632G03	5674D29G13
600 60	.....	60A9355G06	457D727G04	373D632G04	5674D29G14
12 DC	.....	458D020G01	457D727G09	372D032G01	4976D85G01
24 DC	.....	458D020G02	457D727G10	372D032G02	4976D85G02
48 DC	.....	458D020G03	457D727G11	372D032G03	4976D85G03
60 DC	.....	458D020G04	457D727G21	.....	4976D85G04
125 DC	.....	458D020G07	457D727G12	372D032G04	4976D85G07
250 DC	.....	458D020G08	457D727G13	372D032G05	4976D85G08
For Left Hand Mounting					
48 60	.....	60A9355G16	.....	.....	5674D29G08
120 60	458D070G01	60A9355G09	457D727G05	373D632G05	5674D29G01
208 60	458D070G05	60A9355G10	457D727G20	373D632G20	5674D29G02
240 60	458D070G02	60A9355G11	457D727G06	373D632G06	5674D29G03
480 60	458D070G03	60A9355G13	457D727G07	373D632G07	5674D29G05
600 60	458D070G04	60A9355G14	457D727G08	373D632G08	5674D29G06
12 DC	458D070G09	458D020G11	457D727G14	372D032G06	4976D85G11
24 DC	458D070G10	458D020G12	457D727G15	372D032G07	4976D85G12
48 DC	458D070G11	458D020G13	457D727G16	372D032G08	4976D85G13
60 DC	.....	458D020G14	457D727G22	.....	4976D85G14
125 DC	458D070G12	458D020G17	457D727G17	372D032G09	4976D85G17
250 DC	458D070G13	458D020G18	457D727G18	372D032G10	4976D85G18

Undervoltage Release Coil Data

Voltage Rating Hz	Breaker Type								
	EB, EHB, FB, HFB, JB, KB and HKB			JA, KA, HKA, DA, LB, LBB, HLB			LA, LAB, HLA, PB		
	Coil Amperes	External Series Resistance (Ohms)	Total VA	Coil Amperes	External Series Resistance (Ohms)	Total VA	Coil Amperes	External Series Resistance (Ohms)	Total VA
600 AC	0.020	25,000	12.0	0.012	50,000	7.2	0.029	20,000	17.4
480 AC	0.016	20,000	7.7	0.013	30,000	6.3	0.014	.....	6.8
240 AC	0.021	6,000	5.1	0.013	.....	3.2	0.036	.....	8.7
208 AC	0.019	6,000	4.0	0.018	.....	3.8	0.036	.....	7.5
120 AC	0.023	.....	2.8	0.023	.....	2.8	0.073	.....	8.8
60 AC	0.203	250	12.2	.....	.....	.....	.....	.....	.....
48 AC	0.245	150	11.8	.....	.....	.....	0.152	.....	7.3
24 AC	0.250	50	6.0	.....	.....	.....	.....	.....	.....
250 DC	0.026	5,000	6.5	0.013	16,500	3.3	0.035	5,000	8.8
125 DC	0.026	.....	3.3	0.013	6,500	1.7	0.039	1,500	4.9
60 DC	0.248	200	14.9	0.013	1,500	0.8	0.034	.....	2.1
48 DC	0.260	150	12.5	0.012	600	0.6	0.040	.....	2.0
24 DC	0.141	.....	3.4	0.023	.....	0.6	0.069	.....	1.7
12 DC	0.286	.....	3.5	0.048	.....	0.6	0.136	.....	1.7
Breaker Type									
MA and HMA			NB and HNB			MC, HMC, NC, HNC, PC, PCC, LC, HLC			
600 AC	0.012	50,000	7.2	0.016	35,000	9.6	.....	.....	.....
480 AC	0.013	30,000	6.3	0.013	30,000	6.3	.....	.....	.....
240 AC	0.013	.....	3.2	0.013	.....	3.2	.....	.....	.....
208 AC	0.018	.....	3.8	0.018	.....	3.8	.....	.....	.....
120 AC	0.023	.....	2.8	0.023	.....	2.8	0.5	.....	6
60 AC	.....	.....	.....	.....	.....	.....	.....	.....	.....
48 AC	.....	.....	.....	.....	.....	.....	.....	.....	.....
24 AC	.....	.....	.....	.....	.....	.....	.....	.....	.....
250 DC	0.013	16,500	3.3	0.013	16,500	3.3	.....	.....	.....
125 DC	0.013	6,500	1.7	0.013	6,500	1.7	.....	.....	.....
60 DC	0.013	1,500	0.8	.....	.....	.....	.....	.....	.....
48 DC	0.012	600	0.6	0.012	600	0.6	.....	.....	.....
24 DC	0.023	.....	0.6	0.023	.....	0.6	.....	.....	.....
12 DC	0.048	.....	0.6	0.048	.....	0.6	.....	.....	.....



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breaker Accessories

ACCESSORIES, Continued

Alarm Switch

Availability: EB through PC. For light or alarm indication when breaker trips. Does not function with manual operation. Automatically resets when breaker is related. Standard leads extend 18 inches outside of breaker. Longer leads may be specified. Not field mountable.

Breaker Frame	Normal Pole Mounting	Contact Operation (Specify Type Desired)
DA	Left	Make or Break
EB, EHB, FB, HFB ^{①②}	Mechanism	Make or Break
JA, KA, LB	Left	Make or Break
LBB, HKA, HLB	Left	Make or Break
JB, KB, HKB	Left	Make or Break
LAB, LA, MA, NB, HLA, HMA, HNB, LC, HLC	Left	Make or Break
MC, HMC	Left only ^③	Make or Break
NC, HNC	Left only ^④	Make or Break
PB	Left	Make or Break
PC, PCC	Left ^⑤	Make or Break

Alarm Switch Contact Rating (Non Inductive)

MC, HMC, LA, LAB, HLA, LC, HLC:
10 amperes, 120 volt AC; 5A, 240 volt AC.

EB, EHB, FB, HFB:
5 amperes, 120 volt AC.

All other breakers:
10 amperes, 120-240 volt AC.

Auxiliary Switch^⑥

For auxiliary control circuits. Miniature switches mount within breaker. Commonly used for remote indication of open or closed breaker and electrically interlocking component control circuits. "A" contacts are closed when breaker is closed. "B" contacts are open when breaker is closed. Standard leads extend 18 inches outside of breaker. Longer leads may be specified.



Auxiliary Switch Attachment Kits for Field Mounting^{⑦⑧}

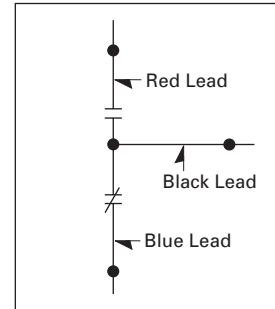
Breaker Type	For Left Hand Mounting		For Right Hand Mounting		Max AC Voltage Rating ^⑨	Max Non-inductive Amperes
	1A-1B	2A-2B	1A-1B	2A-2B		
EB, EHB, FB, HFB ^⑩	4979D06G03	4979D06G09	4979D06G03	4979D06G08	240	5
JA, KA, DA, HKA, LB, LBB, HLB	458D067G03	656D527G01 ^⑪	458D067G08	656D527G09 ^⑪	480	10
JB, KB, HKB	2600D97G03	2609D45G03 ^⑫	2600D97G08	2609D45G08 ^⑫	240	5
JB, KB, HKB	2600D97G03	2609D45G03 ^⑫	2600D97G08	2609D45G08 ^⑫	480	10
LA, LAB, HLA	655D555G12	655D555G13	655D555G05	655D555G06	480	10
MA, HMA	458D013G12	458D013G13	458D013G05	458D013G06	480	10
NB, HNB,	4980D16G12	4980D16G13	4980D16G05	4980D16G06	480	10
PB	2602D32G11	2602D32G12	2602D32G14	2602D32G15	480	10
MC, HMC, MCG, HMCG	1371D72G03	1371D72G06	.....	.....	480	6 (10 @ 240)
NC, HNC, NCG, HNCG	1372D39G03	1372D39G06	.....	.....	480	6 (10 @ 240)
PC, PCC, PCG, PCCG	1372D35G03	1372D35G06	.....	.....	480	6 (10 @ 240)
LC, HLC, LCG, HLCG	1371D11G03	1371D11G06	.....	.....	480	6 (10 @ 240)

Factory Mounted Auxiliary Switches^⑬

All of the above auxiliary switches can be specified for factory mounting at the same price as listed for the kit. These attachments have the leads out the side of the breaker and are UL listed when factory mounted unless other non-UL listed modifications are used (except as noted).

Factory mounted switches only can be supplied for the following breaker:

JB, LBB, LAB, JA, DA, FB magnetic only^{⑭⑮} and HFB magnetic only^{⑭⑮}.



- ① Not UL listed.
- ② Not available for magnetic only, ambient compensating, or breakers with undervoltage release.
- ③ When alarm switch is used in conjunction with auxiliary switch, the auxiliary switch is rated 250 volts vax, 5 amperes max.
- ④ Except when other attachments are used, must be mounted in right pole.
- ⑤ Right hand mounting standard for EB, EHB, FB, HFB, JB, KB, HKB. All others are left hand mounting as standard unless otherwise specified.
- ⑥ Not for use on molded case switches.
- ⑦ All switches are multiples of 1A-1B with a common electrical connection (see diagram above right).
- ⑧ Field mounting voids UL listing of breaker except on LA, HLA, MA, HMA, NB, HNB, KB, HKB, KA, HKA, LB, HLB and SELTRONIC™ breakers.
- ⑨ For DC applications, refer to factory.
- ⑩ Thermal magnetic only.
- ⑪ Right hand mounting only.



ACCESSORIES, *Continued*

Moisture-Fungus-Corrosion Treatment^①

Availability: EB through PC. Treatment can be provided to meet customer's specific atmospheric conditions. Moisture-fungus treating material used meets JAN-T-152; treatment meets MIL-V-173a. Requests and orders should specify government specifications or conditions to be met.

Mechanical Interlocks^② (A-C)

For mechanically interlocking a pair of breakers so that only one may be closed at one time, but both may be open simultaneously.

A. Walking Beam Type^{①②③}



Low Resolution Photo

Availability: EB through PC

Mounts on panel (not included) at rear of breaker. Standard breaker spacing: center to center; LAB, LA, LC, HLC, MA, MC, NB, NC, HLA, HMA, HMC, HNB, HNC 8¹/₂ inch center to center; PB, PC, PCC; 12¹/₄ inch center to center; DA, JA, KA, HKA, LB, LBB, HLB 5³/₄ inch center to center; EB, EHB, FB, JB, KB, HFB, HKB 4³/₈ inch center to center. Order as a set of two special factory drilled breakers and 1 walking beam interlock. Specify breaker type, panel thickness and center to center dimension of breakers.

B. Sliding Bar Type (Field Mount-



Availability: EB through PC

Mounts on panel (not included) fitting over front of breakers. Standard breaker spacing: LAB, LA, LC, HLC, MA, MC, NB, NC, HLA, HMA, HMC, HNB, HNC 8¹/₂ inch center to center; DA, JA, KA, HKA, LB, LBB, HLB 5³/₄ inch center to center; EB, EHB, FB, HFB 4³/₁₆ inch center to center; JB, KB, HKB 4³/₈ inch center to center.

C. Kirk Key Interlock^④



Availability: EB through PC

Permits interlocking of two breakers or one breaker with other devices. Before breaker can be closed, key must be inserted and turned in breaker interlock. Breaker must be opened before key can be removed. It can then be inserted in interlock or other devices to permit their closure. Requests and orders should completely outline interlocking scheme, ultimate user and his address.

Center Studs^①



Availability: 600 ampere Frames (LA) through (NB) 1200 ampere Frames except SELTRONIC™ and current limiting breakers.

Provides connections for dual voltage generators, so that same trip unit can be used for protection at both voltages. At higher voltage, the trip unit carries full load current. At lower voltage, half the current by-passes the trip unit through the center studs. Trip rating cannot exceed 50% of frame rating.

Field Discharge Switch Availability: 400, 600 Ampere Frame (LA).

Breaker is used exclusively to discharge the field of a DC motor or generator, usually through a resistor. When the two outer poles open, the center pole closes.

① Not UL listed.
 ② 2000 ampere maximum for PB breaker.
 ③ Not available on draw-out breakers.
 ④ Not available on motor operated breakers.



MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breaker Accessories

ACCESSORIES, Continued

Motor Operators^①

Motor operators provide complete remote control by means of a pushbutton or similar pilot device^②. Positive switching action is accomplished by use of an operating arm engaging the breaker handle. The unit is energized momentarily to actuate the lever arm moving it to either the "ON" or "OFF" position. The control is broken by an internal cutoff switch. Means for emergency manual operations is provided.

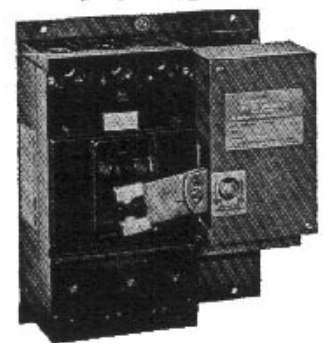
Motor operations are available with motors rated 120 volts AC, 208 volts AC, and 240 volts AC.^③

The 480 volt operators utilize a 120 volt AC motor in conjunction with a 480/240 to 120 volt dual voltage transformer. (On LA and larger operators, the transformer is supplied for separate mounting by the customer.)

NOTE: The motor operator is intended only for infrequent operation in line with Underwriters' Laboratories, Inc. endurance standards for AB molded case breakers. Minimum 1 kVA transformer is required for use with all motor operations.



For EB, EHB, FB and HFB



For DA, JA, KA, JB, LB, LBB, HKA, HKB and HLB Breakers

Low Resolution Photo



For LAB, LA, HLA Breakers



For MA, HMA, NB, HNB Breakers



For PB Breakers

Back Mounting Plates

Type Breaker	120, 208, 240, 480 Volts AC
	Style Number
EB, EHB, FB, HFB	503C707G01
DA, JA, KA, LB	503C981G01
JB, KB, HKB	1250C26G01

Motor Operator Selection

Type Breaker	AC Voltage				DC Voltage	
	120	208	240	480	125	24
	Style Number	Style Number	Style Number	Style Number	Style Number	Style Number
EB, EHB, FB, HFB	656D148G11	656D148G04	656D148G02	656D148G13	.....	.....
DA, JA, KA, HKA	657D819G23	657D819G10	657D819G08	657D819G24	.....	.....
LB, LBB, HLB	657D819G25	657D819G16	657D819G14	657D819G26	.....	.....
JB, KB, HKB	2600D28G07	2600D28G04	2600D28G02	2600D28G08	.....	.....
LAB, LA, HLA, LC, HLC	2607D97G37	2607D97G40	2607D97G38	2607D97G39	2607D97G51	2607D97G42
MA, HMA, MC, HMC	5664D54G75	5664D54G78	5664D54G76	5664D54G77	5664D54G96	5664D54G81
NB, HNB, NC, HNC	1494D60G31	1494D60G32	1494D60G33	1494D60G34	1494D60G35	1494D60G36
PB, PC, PCC	5661D52G01	5661D52G04	5661D52G02	5661D52G03	5661D52G17	.....

Motor Data

Dimensions: Dimension Sheet 29-170

Type Breaker	Motor		Inrush Current, Ampere (Peak)			Continuous Current (RMS)			Operating Time, Open or Close
	Type	HP	120 Volts	208 Volts	240 Volts	120 Volts	208 Volts	240 Volts	
EB, EHB, FB, HFB	Split Phase	1/75	10	4	5	2.3	1.17	1.65	1.5 Seconds
DA, JA, KA, JB, KB, LB, LBB, HKB, HLB	Split Phase	1/50	14	6	7	3.5	1.6	1.75	1.5 Seconds
LAB, LA, HLA	Reversing	....	8	5	4	...	....	....	12 Cycles
MA, HMA, NB, HNB	Reversing	....	11	7	6	...	....	....	12 Cycles
PB	Reversing	....	20	12	11	...	....	....	10 Cycles

① AC voltage rated operators are UL listed as recognized components.

② The pilot device must be maintained contact type for EB, EHB, FB, HFB, DA, JA, KA, JB, KB, HKB and LB mechanisms, momentary contact type for all others.

③ LA and larger available for 125 volts DC.

MOLDED CASE CIRCUIT BREAKERS

Replacement Circuit Breaker Accessories



ACCESSORIES, *Continued*

Drawout Frame^①



These drawout frames are for use with standard 3-pole Cutler-Hammer molded case circuit breakers. They consist of two separate parts: stationary mounting frame and movable carrier frame. Slide rails are drawer-type, and a screw mechanism is used to engage or withdraw the movable carrier frame.

The drawout frames have three positions: connected, test and disconnected. The frames do not include a safety tripping interlock, or secondary contacts. These are optional items and may be ordered at additional cost.

Breakers mounted in the drawout frames can be equipped with standard breaker accessories including shunt trip, undervoltage release, auxiliary switch, alarm switch and motor operator.

Optional Features

Safety Interlock^②

This feature trips the breaker as the movable carrier frame is withdrawn, and must be factory installed. Order as follows.

For LA, MA and NB breakers^③

Order standard stationary mounting frame. Order breaker and movable carrier frame assembled with safety interlock.

Secondary Contacts

These are used to disconnect auxiliary circuits when attachments such as shunt trip or motor operator are used. Available in multiples of four contacts with a maximum of 24 contacts for the LA 600 or 32 contacts for the MA and NB. They must be factory mounted. Order by description as similar to stationary or moving frame and specify number of contacts required.

Selection Data^{②③}

Breaker Type	Stationary Mounting Frame Style Number ^②	Movable Carrier Frame Style Number ^②
LA600, HLA600, LC600, HLC600	2603D84G01	2608D35G06
MA, HMA, MC, HMC	2603D85G01	2608D35G10
NB, HNB, NC, HNC	2603D85G01	2608D34G08
PB, PC, PCC 2000A	2601D18G04	Order by description ^④
PB 2500A, PC, PCC 2500A and 3000A	2601D18G05	Order by description ^④

Ordering Information^②

Standard Installation

Order one stationary mounting frame and one movable carrier frame.

Order breakers without terminals or rear connectors.

Order any attachments desired (shunt trip, undervoltage release, etc.)

Order secondary contacts as required:

- A shunt trip, undervoltage release or alarm switch requires two contacts;
- A 1A-1B auxiliary switch requires three contacts;
- A motor operator requires a maximum of four contacts;
- Others as required.

With Safety Interlock

Order stationary mounting frame and movable carrier frame as directed under Optional Features.

Racking Crank

A special crank to engage or withdraw the moving portion of the drawout. A standard 1/2 inch hex socket with extension can be used for this purpose.

Style Number
765A767G01

Cell Switches Mounted on Draw-out Frames, All Ratings

Up to four switches can be provided. Order by description.

Each switch provides NO and NC contact that transfers before reaching the test position when being withdrawn, and after the test position when being racked in.

^① These units are UL listed.

^② Safety interlock not available on MC, NC, HMC, HNC, LC, HLC.

^③ SELTRONIC™ circuit breakers with built-in ground fault require a special breaker frame with leads out the side in place of standard terminal block. Order by description the breaker frame and carrier as one assembly.

^④ Factory installed only.



MOLDED CASE CIRCUIT BREAKERS

Panelboard Replacement Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Panelboard Replacement Breaker Selection Guide

Panelboard Replacement Breakers are generally for use as replacement for out-of-production panelboard branch circuit breakers where both physical and electrical interchangeability is required. Where possible, consideration should be given to application of either Series C or Original Westinghouse Circuit Breakers.

For additional information, consult the charts on pages 72-73 or contact your local Cutler-Hammer Field Sales Office.

Breaker Type	Amps	Panelboard Replacement Breaker Interrupting Ampere Rating											
		120 Volts AC		240 Volts AC		277 (1-Pole)		480 Volts AC		600 Volts AC		125 (1-Pole)	250 VDC
		Sym.	Asym.	Sym.	Asym.	Sym.	Asym.	Sym.	Asym.	Sym.	Asym.		
RE	15-20					10,000	10,000						
RE	15-100	7,500	7,500	7,500	7,500							5,000	5,000
REA	15-20					10,000	10,000						
REA	15-100	7,500	7,500	7,500	7,500							5,000	5,000
REH	15-100			18,000	20,000	10,000	10,000	14,000	15,000				10,000
RF	15-100			18,000	20,000			14,000	15,000	14,000	15,000		10,000
RFA	15-150			18,000	20,000			14,000	15,000	14,000	15,000		10,000
RHF	15-100			65,000	75,000			25,000	30,000	18,000	20,000		20,000
RHFA	15-150			65,000	75,000			25,000	30,000	18,000	20,000		20,000
RJ	70-225			22,000	25,000			18,000	20,000	14,000	15,000		10,000
LA	70-225			42,000	50,000			30,000	35,000	22,000	25,000		20,000
LA	125-400			42,000	50,000			30,000	35,000	22,000	25,000		20,000
RK	70-225			25,000	30,000			22,000	25,000	22,000	25,000		10,000
RKL	125-400			42,000	50,000			30,000	35,000	22,000	25,000		20,000
RLM	125-800			42,000	50,000			30,000	35,000	22,000	25,000		20,000
RHK	70-225			65,000	75,000			35,000	40,000	25,000	30,000		20,000
RHKL	125-400			65,000	75,000			35,000	40,000	25,000	30,000		20,000
RHLM	125-800			65,000	75,000			35,000	40,000	25,000	30,000		20,000

Replacement Chart

Current Panelboard Circuit Breaker Type	Out-of-Production Circuit Breaker Type	Volts AC (50/60 Hz)		
		240	480	600
REA	EA ^①	•		
RE	E ^①	•		
REH	EH ^①		•	
RFA	FA ^①			•
RHFA	HFA ^①			•
RF	F ^①			•
RHF	HF ^①			•
RJ	J ^②			•
RK	K ^②			•
RHK	HK ^②			•
RKL	KL ^②			•
RHKL	HKL ^②			•
RLM	LM ^②			•
RHLM	HLM ^②			•
LA	JK ^②			•
LA	JKL ^②			•

Replacement of all out-of-production panelboard circuit breakers other than the "JK" and "JKL" types are designated by the easily identifiable addition of an "R" prefix to the out-of-production circuit breaker catalog number that they replace.

An Example:

RF3100 is a newly manufactured, 3-Pole, 100-Ampere Trip Panelboard Replacement Breaker for an out-of-production F3100.

- R** Designates new panelboard replacement breaker
- F** Identifies the out-of-production circuit breaker frame
- 3** Number of poles
- 100** Trip ampere rating

NOTES:

1. Panelboard Replacement Circuit Breakers have non-interchangeable trip units and the same interrupting capacity as the out-of-production circuit breakers they replace.
2. The RE breaker has off-center terminals just like the E breaker it is replacing.
3. For out-of-production breakers, the "B" suffix denotes 277 VAC rating for the Panelboard Replacement Breaker. (EX: RE3020B)

4. Some Panelboard Replacement Breakers do not have the same physical dimensions or mounting holes as the breakers they replace. For example, the types REH, RFA and RHFA are 6 inches in length and the breakers they replace, EH, FA and HFA are 6-1/2 inches in length. Mounting hardware is provided with each breaker to resolve these differences, and must be installed to ensure a proper fit.

5. Panelboard Replacement Breakers can be installed in the following styles of out-of-production Westinghouse panelboards:

ABH	NEB
A2B	NHDP
CDP	NHEB
NAB	NH1B
NA1B	NLAB-AB
NA1B-LX	NLAB-ABH
NDP	

① Last manufacture date – 1974.
 ② Last manufacture date – 1967.



MOLDED CASE CIRCUIT BREAKERS

Panelboard Replacement Circuit Breakers



PANELBOARD "ONLY" REPLACEMENT CIRCUIT BREAKER GUIDE

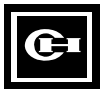
Maximum Amperes	100A	100A	150A	100A
	RE, REA	REH	RFA, RHFA	RF, RHF
Panelboard "Only" Replacement Circuit Breakers C U R R E N T D E S I G N These circuit breakers, when used in a panelboard, are direct replacements for the circuit breakers listed below both electrically and physically.				

Dimensions – Inches Per 3-Pole Breaker

	W	H	D	W	H	D	W	H	D	W	H	D
	4 $\frac{1}{8}$	6	3 $\frac{3}{8}$	4 $\frac{1}{8}$	6 $\frac{1}{2}$	3 $\frac{3}{8}$	4 $\frac{1}{8}$	6 $\frac{1}{2}$	3 $\frac{3}{8}$	4 $\frac{1}{8}$	9 $\frac{3}{8}$	4 $\frac{1}{16}$

Out-of-Production Westinghouse Circuit Breakers

	E, EA	EH	FA, HFA	F, HF
These Circuit Breakers are No Longer Manufactured O U T O F P R O D U C T I O N These circuit breakers, when used in a panelboard, are directly replaced by the circuit breakers listed above. *Indicates last date of manufacture.	 *1974 W H D 4 $\frac{1}{8}$ 6 3 $\frac{3}{8}$	 *1974 W H D 4 $\frac{1}{8}$ 6 $\frac{1}{2}$ 3 $\frac{3}{8}$	 *1974 W H D 4 $\frac{1}{8}$ 6 $\frac{1}{2}$ 3 $\frac{3}{8}$	 *1974 W H D 4 $\frac{1}{8}$ 9 $\frac{3}{8}$ 4 $\frac{1}{16}$



MOLDED CASE CIRCUIT BREAKERS

Panelboard Replacement Circuit Breakers

A





PANELBOARD "ONLY" REPLACEMENT CIRCUIT BREAKER GUIDE

	Maximum Amperes 225A	400A	400A	800A
	RJ	RK, RHK	RKL, RHKL	RLM, RHLM
CURRENT DESIGN				

Dimensions – Inches Per 3-Pole Breaker

W	H	D	W	H	D	W	H	D	W	H	D
8¼	10⅝	4⅞	8¼	15½	4⅞	8¼	16	4⅞	8¼	22	5½

Out-of-Production Westinghouse Circuit Breakers

	J	K, HK	KL, HKL	LM, HLM
OUT OF PRODUCTION				
	W 8¼ H *1967 10⅝ D 4⅞	W 8¼ H *1967 15½ D 4⅞	W 8¼ H *1967 16 D 4⅞	W 8¼ H *1967 22 D 5½
	*Indicates last date of manufacture.			

FURTHER INFORMATION

Literature Number	Description
IL 15558	Mounting Information for the RE, REA Breakers
IL 15559	Mounting Information for the RF, RHF Breakers
IL 15562	Mounting Information for the REH, RFA, RHFA Breakers
IL 15563	Mounting Information for the RJ Breaker
IL 15564	Mounting Information for the RK, RHK Breakers
IL 15565	Mounting Information for the RKL, RHKL Breakers
IL 15566	Mounting Information for the RLM, RHLM Breakers

PRICING INFORMATION

Literature Number	Description
PAD	Price and Availability Digest
VISTA/VISTALINE	Discount Symbol RCB-2

MOLDED CASE CIRCUIT BREAKERS

Panelboard Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type REA 1-, 2-, 3-Poles; 240 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers		
	1-Pole 120 Volts AC	2-Pole 240 Volts AC	3-Pole 240 Volts AC
10	REA1010	.....	.....
15	REA1015	REA2015	REA3015
20	REA1020	REA2020	REA3020
25	REA1025	REA2025	REA3025
30	REA1030	REA2030	REA3030
40	REA1040	REA2040	REA3040
50	REA1050	REA2050	REA3050
60	REA1060	REA2060	REA3060
70	REA1070	REA2070	REA3070
80	REA1080	REA2080	REA3080
90	REA1090	REA2090	REA3090
100	REA1100	REA2100	REA3100



Type REA

Type REH 1-, 2-, 3-Poles; 480 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers		
	1-Pole 277 Volts AC	2-Pole 480 Volts AC	3-Pole 480 Volts AC
10	REH1010	.....	.....
15	REH1015	REH2015	REH3015
20	REH1020	REH2020	REH3020
25	REH1025	REH2025	REH3025
30	REH1030	REH2030	REH3030
40	REH1040	REH2040	REH3040
50	REH1050	REH2050	REH3050
60	REH1060	REH2060	REH3060
70	REH1070	REH2070	REH3070
80	REH1080	REH2080	REH3080
90	REH1090	REH2090	REH3090
100	REH1100	REH2100	REH3100



Type REH

Type RE 1-, 2-, 3-Poles; 240 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers		
	1-Pole 120 Volts AC	2-Pole 240 Volts AC	3-Pole 240 Volts AC
10	RE1010	.....	.....
15	RE1015	RE2015	RE3015
20	RE1020	RE2020	RE3020
25	RE1025	RE2025	RE3025
30	RE1030	RE2030	RE3030
40	RE1040	RE2040	RE3040
50	RE1050	RE2050	RE3050
60	RE1060	RE2060	RE3060
70	RE1070	RE2070	RE3070
80	RE1080	RE2080	RE3080
90	RE1090	RE2090	RE3090
100	RE1100	RE2100	RE3100



Type RE

Accessories and Modifications

All accessories and modifications available for Replacement Breakers Types EB, EHB and FB are also available for Panelboard Replacement Breakers Types RE, REH, RFA, RF, RHF, REA, and RHFA.

For accessories and modifications refer to pages 22-23.

Terminals

Max. Amps	Wire Type	Wire Range	Style Number [Ⓞ]
Standard Pressure Type Terminals			
20 (EB, EHB)	Al/Cu	#14-#10	624B100G14
100	Al/Cu	#14-1/0	624B100G02
150	Al/Cu	# 4-4/0	624B100G17
Optional Al/Cu Pressure Terminals			
50	Al/Cu	#14-#4	624B100G10
100	Al/Cu	# 4-4/0	624B100G17

50°C Calibration[Ⓞ]

Add suffix "V" to catalog number for breakers to be used in 50°C ambients. Same price as standard 40°C breakers.

[Ⓞ] Package of three.

[Ⓞ] Not listed with Underwriters' Laboratories, Inc.



MOLDED CASE CIRCUIT BREAKERS

Panelboard Replacement Circuit Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Type RFA 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600 Volts AC	3-Pole 600 Volts AC
15	RFA2015	RFA3015
20	RFA2020	RFA3020
25	RFA2025	RFA3025
30	RFA2030	RFA3030
35	RFA2035	RFA3035
40	RFA2040	RFA3040
50	RFA2050	RFA3050
60	RFA2060	RFA3060
70	RFA2070	RFA3070
80	RFA2080	RFA3080
90	RFA2090	RFA3090
100	RFA2100	RFA3100
125	RFA2125	RFA3125
150	RFA2150	RFA3150



Type RFA

Type RF 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600 Volts AC	3-Pole 600 Volts AC
15	RF2015	RF3015
20	RF2020	RF3020
25	RF2025	RF3025
30	RF2030	RF3030
35	RF2035	RF3035
40	RF2040	RF3040
50	RF2050	RF3050
60	RF2060	RF3060
70	RF2070	RF3070
80	RF2080	RF3080
90	RF2090	RF3090
100	RF2100	RF3100



Type RF

Type RHFA 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600 Volts AC	3-Pole 600 Volts AC
15	RHFA2015	RHFA3015
20	RHFA2020	RHFA3020
25	RHFA2025	RHFA3025
30	RHFA2030	RHFA3030
35	RHFA2035	RHFA3035
40	RHFA2040	RHFA3040
50	RHFA2050	RHFA3050
60	RHFA2060	RHFA3060
70	RHFA2070	RHFA3070
80	RHFA2080	RHFA3080
90	RHFA2090	RHFA3090
100	RHFA2100	RHFA3100
125	RHFA2125	RHFA3125
150	RHFA2150	RHFA3150



Type RHFA

Type RHF 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600Volts AC	3-Pole 600Volts AC
15	RHF2015	RHF3015
20	RHF2020	REA3020
25	RHF2025	RHF3025
30	RHF2030	RHF3030
40	RHF2040	RHF3040
50	RHF2050	RHF3050
60	RHF2060	RHF3060
70	RHF2070	RHF3070
80	RHF2080	RHF3080
90	RHF2090	RHF3090
100	RHF2100	RHF3100



Type RHF

MOLDED CASE CIRCUIT BREAKERS

Panelboard Replacement Circuit Breakers



REPLACEMENT CAPABILITIES, *Continued*

Type RJ 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600 Volts AC	3-Pole 600 Volts AC
70	RJ2070	RJ3070
90	RJ2090	RJ3090
100	RJ2100	RJ3100
125	RJ2125	RJ3125
150	RJ2150	RJ3150
175	RJ2175	RJ3175
200	RJ2000	RJ3200
225	RJ2225	RJ3225
225 MCS	RJ2225K	RJ3225K



Type RJ

Type RK 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600 Volts AC	3-Pole 600 Volts AC
70	RK2070	RK3070
90	RK2090	RK3090
100	RK2100	RK3100
125	RK2125	RK3125
150	RK2150	RK3150
175	RK2175	RK3175
200	RK2200	RK3200
225	RK2225	RK3225
225 MCS	RK2225K	RK3225K



Type RK

Type RKL 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600 Volts AC	3-Pole 600 Volts AC
125	RKL2125	RKL3125
150	RKL2150	RKL3150
175	RKL2175	RKL3175
200	RKL2200	RKL3200
225	RKL2225	RKL3225
250	RKL2250	RKL3250
300	RKL2300	RKL3300
350	RKL2350	RKL3350
400	RKL2400	RKL3400
400 MCS	RKL2400K	RKL3400K



Type RKL

Type RLM 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600 Volts AC	3-Pole 600 Volts AC
125	RLM2125	RLM3125
150	RLM2150	RLM3150
175	RLM2175	RLM3175
200	RLM2200	RLM3200
225	RLM2225	RLM3225
250	RLM2250	RLM3250
275	RLM2275	RLM3275
300	RLM2300	RLM3300
350	RLM2350	RLM3350
400	RLM2400	RLM3400
500	RLM2500	RLM3500
600	RLM2600	RLM3600
600 MCS	RLM2600K	RLM3600K
700	RLM2700	RLM3700
800	RLM2800	RLM3800



Type RLM



MOLDED CASE CIRCUIT BREAKERS

Panelboard Replacement Circuit Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Type RHK 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600 Volts AC	3-Pole 600 Volts AC
70	RHK2070	RHK3070
90	RHK2090	RHK3090
100	RHK2100	RHK3100
125	RHK2125	RHK3125
150	RHK2150	RHK3150
175	RHK2175	RHK3175
200	RHK2200	RHK3200
225	RHK2225	RHK3225
225 MCS	RHK2225K	RHK3225K



Type RHK

Type RHKL 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600 Volts AC	3-Pole 600 Volts AC
125	RHKL2125	RHKL3125
150	RHKL2150	RHKL3150
175	RHKL2175	RHKL3175
200	RHKL2200	RHKL3200
225	RHKL2225	RHKL3225
250	RHKL2250	RHKL3250
300	RHKL2300	RHKL3300
350	RHKL2350	RHKL3350
400	RHKL2400	RHKL3400
400 MCS	RHKL2400K	RHKL3400K



Type RHKL

Type RHLM 2-, 3-Poles; 600 Volts AC Maximum; Thermal Magnetic

(Includes Terminals on Load Side only)

Continuous Ampere Rating at 40°C	Catalog Numbers	
	2-Pole 600 Volts AC	3-Pole 600 Volts AC
125	RHLM2125	RHLM3125
150	RHLM2150	RHLM3150
175	RHLM2175	RHLM3175
200	RHLM2200	RHLM3200
225	RHLM2225	RHLM3225
250	RHLM2250	RHLM3250
275	RHLM2275	RHLM3275
300	RHLM2300	RHLM3300
325	RHLM2325	RHLM3325
350	RHLM2350	RHLM3350
400	RHLM2400	RHLM3400
450	RHLM2450	RHLM3450
500	RHLM2500	RHLM3500
550	RHLM2550	RHLM3550
600	RHLM2600	RHLM3600
600 MCS	RHLM2600K	RHLM3600K
700	RHLM2700	RHLM3700
800	RHLM2800	RHLM3800



Type RHLM

Accessories and Modifications

All accessories and modifications available for replacement breakers types KA, LA and MA are also available for panelboard replacement breakers types RJ, RK, RKL, RLM, RHK, RHKL, and RHLM.

For additional accessories and modifications refer to **pages 35, 43 and 44**.

Terminals

Panelboard Circuit Breakers	Terminals ^①
RJ	TA225LA1
RK	TA225LA1
RHK	TA225LA1
RKL	TA400LA1
RHKL	TA400LA1
RLM	{ TA700MA1 (for <600A) TA800MA1 (for 700-800A)
RHLM	

50°C Calibration^②

Add suffix "V" to catalog number for breakers to be used in 50°C ambients. Same price as standard 40°C breakers.

Special Breakers^②

Magnetic only (includes load terminals). Available for all ampere ratings for 2- and 3-pole RJ, RK, RKL, RLM, RHK, RHKL, and RHLM.

High magnetic molded case switches (K suffix) are available to replace out-of-production non-automatic breakers (N suffix).

^① Packaged individually.

^② Not listed with Underwriters' Laboratories, Inc.

MOLDED CASE CIRCUIT BREAKERS

Motor Control Center Replacement Circuit Breakers



REPLACEMENT CAPABILITIES

Cutler-Hammer Motor Control Center replacement circuit breakers are newly manufactured and tested to the latest applicable standards at the Cutler-Hammer molded case circuit breaker plant in Beaver, PA. This plant has a long and well-recognized tradition of product safety, integrity and quality.

The Motor Control Center replacement circuit breaker solution eliminates the need to consider alternative approaches. Cutler-Hammer customers are assured that the high standards of product quality and reliability do not have to be sacrificed when replacing Westinghouse out-of-production circuit breakers.

All Motor Control Center replacement circuit breakers are easily identified by the prefix "RMC" added to the out-of-production type circuit breaker catalog number they replace.

Replacement Chart

Current MCC Circuit Breaker Type	Out-of-Production Circuit Breaker Type ¹	Volts AC (50/60 Hz)
		600
RMCF	F	●
RMCF	F	●
RMCF	F	●
RMCF	F	●



Replacement MCC Breaker



Motor Control Center Replacement Breaker Interrupting Amp Ratings^{2,3,4}

Breaker Type	Amperes	@ 240 Volts AC	@480 Volts AC	@ 600 Volts AC	@ 250 Volts AC
RMCF	15-100	18000	14000	14000	10000
RMCF	15-150	18000	14000	14000	10000
RMCF	15-100	65000	25000	18000	20000
RMCF	15-150	65000	25000	18000	20000

Example:

An **RMCF3100** is a newly manufactured, three-pole, 100 ampere trip panelboard replacement circuit breaker. It replaces an out-of-production F circuit breaker.

Example:

- RMC** Designates new Motor Control Center replacement circuit breaker
- F** Identifies the out-of-production circuit breaker frame
- 3** Number of poles
- 100** Trip unit ampere rating

¹ Last manufacture date – 1974.

² Motor Control Center Replacement Breakers do not have the same physical dimensions or mounting holes as the breakers they replace. Types RMCF and RMCF are 6 inches long and the breakers they replace, FA and HFA, are 6½ inches long. Types RMCF and RMCF are 6 inches long and the breakers they replace, F and HF, are 9¾ inches long. A mounting plate is provided with each breaker to resolve these differences, and must be installed to ensure a proper fit.

³ Motor Control Center Replacement Circuit Breakers have non-interchangeable trip units and the same interrupting capacity as the out-of-production circuit breakers they replace.

⁴ RMCF and RMCF 2-pole breakers are supplied in a 3-pole frame with current carrying parts omitted from the center pole.



MOLDED CASE CIRCUIT BREAKERS

Motor Control Center Replacement Circuit Breakers

A

REPLACEMENT CAPABILITIES, *Continued*

Type RMCF A — 15-150 Amperes 2-, 3-Pole; 600 Volts AC Maximum; Thermal Magnetic

Continuous Ampere Rating at 40°C	Catalog Numbers		
	1-Pole	2-Pole	3-Pole
15	—	RMCF A2015	RMCF A3015
20	—	RMCF A2020	RMCF A3020
25	—	RMCF A2025	RMCF A3025
30	—	RMCF A2030	RMCF A3030
35	—	RMCF A2035	RMCF A3035
40	—	RMCF A2040	RMCF A3040
50	—	RMCF A2050	RMCF A3050
60	—	RMCF A2060	RMCF A3060
70	—	RMCF A2070	RMCF A3070
80	—	RMCF A2080	RMCF A3080
90	—	RMCF A2090	RMCF A3090
100	—	RMCF A2100	RMCF A3100
125	—	RMCF A2125	RMCF A3125
150	—	RMCF A2150	RMCF A3150



Type RMCF A

Type RMCF B — 15-100 Amperes 2-, 3-Pole; 600 Volts AC Maximum; Thermal Magnetic

Continuous Ampere Rating at 40°C	Catalog Numbers		
	1-Pole	2-Pole	3-Pole
15	—	RMCF B2015	RMCF B3015
20	—	RMCF B2020	RMCF B3020
25	—	RMCF B2025	RMCF B3025
30	—	RMCF B2030	RMCF B3030
35	—	RMCF B2035	RMCF B3035
40	—	RMCF B2040	RMCF B3040
50	—	RMCF B2050	RMCF B3050
60	—	RMCF B2060	RMCF B3060
70	—	RMCF B2070	RMCF B3070
80	—	RMCF B2080	RMCF B3080
90	—	RMCF B2090	RMCF B3090
100	—	RMCF B2100	RMCF B3100



Type RMCF B

Type RMCF C — 15-150 Amperes 2-, 3-Pole; 600 Volts AC Maximum; Thermal Magnetic

Continuous Ampere Rating at 40°C	Catalog Numbers		
	1-Pole	2-Pole	3-Pole
15	—	RMCF C2015	RMCF C3015
20	—	RMCF C2020	RMCF C3020
25	—	RMCF C2025	RMCF C3025
30	—	RMCF C2030	RMCF C3030
35	—	RMCF C2035	RMCF C3035
40	—	RMCF C2040	RMCF C3040
50	—	RMCF C2050	RMCF C3050
60	—	RMCF C2060	RMCF C3060
70	—	RMCF C2070	RMCF C3070
80	—	RMCF C2080	RMCF C3080
90	—	RMCF C2090	RMCF C3090
100	—	RMCF C2100	RMCF C3100
125	—	RMCF C2125	RMCF C3125
150	—	RMCF C2150	RMCF C3150



Type RMCF C

Type RMCF D — 15-100 Amperes 2-, 3-Pole; 600 Volts AC Maximum; Thermal Magnetic

Continuous Ampere Rating at 40°C	Catalog Numbers		
	1-Pole	2-Pole	3-Pole
15	—	RMCF D2015	RMCF D3015
20	—	RMCF D2020	RMCF D3020
25	—	RMCF D2025	RMCF D3025
30	—	RMCF D2030	RMCF D3030
35	—	RMCF D2035	RMCF D3035
40	—	RMCF D2040	RMCF D3040
50	—	RMCF D2050	RMCF D3050
60	—	RMCF D2060	RMCF D3060
70	—	RMCF D2070	RMCF D3070
80	—	RMCF D2080	RMCF D3080
90	—	RMCF D2090	RMCF D3090
100	—	RMCF D2100	RMCF D3100



Type RMCF D

MOLDED CASE CIRCUIT BREAKERS

Motor Control Center Replacement Circuit Breakers



TECHNOLOGY UPGRADE

Series C Retrofit Kits

Product Description

Series C Retrofit Kits are to be used to upgrade existing Type W and 5 Star Motor Control Center units by changing out the old breakers with new Series C models. These kits can be applied to both starter and feeder units.

Some of the breakers that these kits will upgrade include:

MCP, F, FA, FB, HFB, K, KA, KB, HKB, L, LA, LB, and HLB breakers

Series C Molded Case Circuit Breakers

Frame Type	Interrupting Rating (KAIC)			Trip Rating Amps	Catalog Numbers				
	240V	480V	600V						
HFD	100	65	25	15	HFD3015				
				20	HFD3020				
				25	HFD3025				
				30	HFD3030				
				40	HFD3040				
				50	HFD3050				
				60	HFD3060				
				70	HFD3070				
				80	HFD3080				
				90	HFD3090				
				100	HFD3100				
				125	HFD3125				
				150	HFD3150				
				FDC	200	100	35	15	FDC3015
								20	FDC3020
25	FDC3025								
30	FDC3030								
40	FDC3040								
50	FDC3050								
60	FDC3060								
70	FDC3070								
80	FDC3080								
90	FDC3090								
100	FDC3100								
125	FDC3125								
150	FDC3150								
HJD	100	65	25					175	HJD3175
								200	HJD3200
				225	HJD3225				
				250	HJD3250				
				JDC	200	100	35	175	JDC3175
								200	JDC3200
HKD	100	65	35	225	JDC3225				
				250	JDC3250				
				300	HKD3300				
KDC	200	100	50	350	HKD3350				
				400	HKD3400				
				300	KDC3300				
				350	KDC3350				
				400	KDC3400				

How to Order:

Step 1: Select the correct Series C device from the tables on this page.

Step 2: Create a catalog number based on the MCC type, device selected, modifications, door size, and device panel.

FT H M C P 0 3 0 H 1

MCC Type:
FT = Type W
FS = 5 Star

Device Catalog Number:
Use tables

C

Modifications:
C = Copper lugs for HMCP
L = Lugs for molded case breaker

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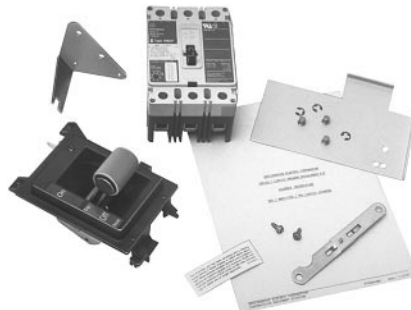
Door Size:
Height of door in inches, 6 inch increments

N

Device Panel:
D = With device panel
N = No device panel

Step 3: Select price from PL8991A page 26.

5 Star Series C Retrofit Kit



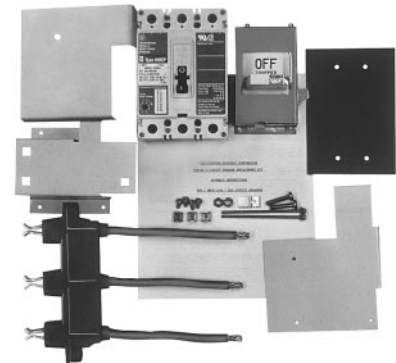
The 5 Star Series C Retrofit Kit Includes:

- Series C device, 65kA (either HMCP or thermal-magnetic breaker)
- Operating handle, including tripped indication and push-to-trip mechanism
- Label stating that the MCC unit has been retrofitted with Series C device suitable for 65kA (similar to UL quality label)
- Templates for desired frame size
- Assembly instructions

Customer Benefits:

- Ease of ordering – one catalog number for all required parts
- Series C Technology – higher AIC Rating
- All new components associated with the breaker including new stab assembly, operating mechanism and door, if required

Type W Series C Retrofit Kit



The Type W Series C Retrofit Kit Includes:

- Series C device, 65kA (either HMCP or thermal-magnetic breaker)
- Operating handle, including tripped indication and push-to-trip mechanism
- Label stating that the MCC unit has been retrofitted with Series C device suitable for 65kA (similar to UL quality label)
- Templates for proper hole placement for desired frame size
- Series C breaker mounting hardware
- New door and hardware
- New stab assembly
- Assembly instructions

Series C Motor Circuit Protectors

Starter Size	Magnetic Trip Range Amperes	Continuous Rating Amperes	Catalog Numbers
0	9- 30	3	HMCP003A0
0	21- 70	7	HMCP007C0
0	45- 150	15	HMCP015E0
0	40- 60	25	HMCP025D0
1	90- 300	30	HMCP030H1
2	80- 120	50	HMCP050G2
2	150- 500	50	HMCP050K2
2	115- 170	70	HMCP070J2
2	210- 700	70	HMCP070M2
3	160- 240	100	HMCP100L3
3	300-1000	100	HMCP100R3
4	450-1500	150	HMCP150T4
4	750-2500	150	HMCP150U4
4, 5	350- 700	250	HMCP250A5
5	450- 900	250	HMCP250C5
5	500-1000	250	HMCP250D5
5	625-1250	250	HMCP250F5
5	750-1500	250	HMCP250G5
5	875-1750	250	HMCP250J5
5	1000-2000	250	HMCP250K5
5	1125-2250	250	HMCP250L5
5	1250-2500	250	HMCP250W5
5	500-1000	400	HMCP400D5
5	625-1250	400	HMCP400F5
5	750-1500	400	HMCP400G5
5	875-1750	400	HMCP400J5
5	1000-2000	400	HMCP400K5
5	1125-2250	400	HMCP400L5
5	1250-2500	400	HMCP400M5
5	1500-3000	400	HMCP400N5
5	1750-3500	400	HMCP400R5
5, 6	2000-4000	400	HMCP400X5



MOLDED CASE CIRCUIT BREAKERS

Motor Control Center Replacement Circuit Breakers

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GENERAL INFORMATION

Accessories and Modifications

All accessories and modifications available for Type FB and HFB molded case circuit breakers are also available for Motor Control Center replacement breakers types RMCFA, RMCHFA, RMCF, and RMCHF.

Terminal

Breakers include both line and load terminals. See Terminal Data for replacement breaker type FB.

50°C Calibration

Add suffix "V" to catalog number for complete breaker, listed above, when ordering listed ampere ratings for breakers to be used in 50°C ambients. Same price as standard 40°C breakers.

Special Breakers

Magnetic only, front adjustable (includes line and load terminals). Available for 15-150 ampere ratings for 2- and 3-pole RMCF, RMCHF, RMCFA and RMCHFA.

Handle Mechanism — Slide Plate Type

The same type of handle mechanism as was originally used in Westinghouse Type W and 11-300 Motor Control Centers continues to be available from Cutler-Hammer today.

The "Slide Plate" handle mechanism was originally used on the Westinghouse 11-300 Motor Control Center manufactured from 1935 to 1965. This handle is still used on replacement units today and is also available as a component.

The MC handle mechanism was used on the Westinghouse Type W and Cutler-Hammer 9800 Motor Control Centers manufactured from 1965 to 1975.

This handle mechanism was also used by many other OEM's such as ITE and Federal Pacific. The MC handle is also still used on replacement units today and is available as a component.

Slide Plate Handle Mechanism Selection Charts

Enclosure Cover Hinged on Right	Vertical Mounting		
	Padlocks in OFF Position	Padlocks in ON or OFF Position	Padlocks in OFF Position
	Style Numbers	Style Numbers	Style Numbers
Circuit Breakers			
KL and HKL Frame			
MA, HMA, MC and HMC Breaker			
LA, HLA, LC and HLC Breaker			
JA, KA, HKA, DA, LB, LBB and HLB Breaker	314C386G01	314C386G08	314C386G04
NB, HNB, NC and HNC Breaker			
JB, KB and HKB Breaker			
LCL Breaker			
EH Breaker 2P with long handle			
EH Breaker 3P with long handle			
F Frame 2P	314C386G02	314C386G09	314C386G05
F and HF Frame 3P			
Type AQB and NQB 100A Frames and Type PF 15-100A Frame			
EH Standard 2P			
EH Std. 3P and FA magnetic only 2 and 3P			
FA 2 and 3P Thermal Magnetic	314C386G03	314C386G10	314C386G06
EB, EHB, FB, HFB MCP HMCP (0-4)	3P 2P		
FCL Breaker			
PB, TRI-PAC® PB, PC, PCC	505C294G03		
Series C Circuit Breakers			
F-Frame Series C	314C386G03	314C386G10	314C386G06
J-Frame Series C	314C386G02	314C386G09	314C386G05
K-Frame Series C			
L-Frame Series C	314C386G18	314C386G08	314C386G04
R-Frame	505C294G03		
Tri-Pac Switches			
225A TRI-PAC Type K			
400A TRI-PAC Type KL	314C386G01	314C386G08	314C386G04
LA TRI-PAC			
NB TRI-PAC			
100A TRI-PAC	314C386G02	314C386G09	314C386G05
FB TRI-PAC	314C386G03	314C386G10	314C386G06
Visi-Flex Switches (Model T)			
60-100A Visi-Flex	314C386G01	314C386G08	314C386G04
30A and Special 60A Visi-Flex	314C386G02	314C386G09	314C386G05
De-ion Switches and Disconnect Switches			
30-60A (long handle) De-ion			
100A (long handle) De-ion	314C386G01	314C386G08	314C386G04
200A Disconnect Switch			
200 DS Switch			
30-60A Disconnect Switch	314C386G02	314C386G09	314C386G05
100A Disconnect Switch			
30, 60, 100A DS Switch	314C386G03	314C386G10	314C386G06
400 and 600A DS Switch	314C386G15		

● Check VISTA for order entry procedures.

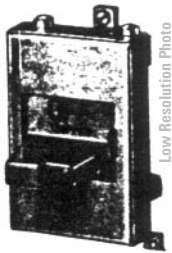
MOLDED CASE CIRCUIT BREAKERS

Motor Control Center Replacement Circuit Breakers



GENERAL INFORMATION

Accessories and Modifications



100 Ampere Mechanism



225 Ampere Mechanism





Type MC handle mechanisms are linear drive, fixed depth mechanisms designed for through-door mounting in standardized or shallow depth enclosures such as motor control centers or enclosed circuit breakers.

Mounting directly to the front of the disconnect, these mechanisms provide positive operation and handle indication. Both disconnect and mechanism mount simultaneously with mounting hardware supplied with the mechanism.

For security, the handle can be padlocked in the OFF position with up to three – 3/8 inch hasp padlocks. Also, the mechanism is interlocked with the enclosure door so that the disconnect must be OFF before the door can be opened. A defeater is provided to bypass this interlock.

Catalog numbers listed include the mechanism, mounting hardware and door interlock clip.

Type MC Handle Mechanism Selection Chart

Selection Data For Handle Mechanisms Only; Circuit Breaker Not Included.			
Handle Mechanism	For Use With	NEMA 1 Enclosure	NEMA 12 Enclosure
		Catalog Numbers	Catalog Numbers
	Series C F Frame HMCP F..... EB, EHB, FB, HFB Breakers, and MCP (size 0-4)..... FB TRI-PAC®..... FCL Breakers.....	SMCU150FD SMCU150FB SMCU100FBP SMCU100FCL	CMCU150FD CMCU150FB CMCU100FBP CMCU100FCL
	30-60-100 Amp DS Switch Fusible, Non-fusible..... 200 Amp DS Switch Fusible, Non-fusible.....	SMCU100DS SMCU200DS	CMCU100DS CMCU200DS
	Series C J Frame HMCP J..... Series C K Frame HMCP K..... DA, JA, KA, HKA, LB, LBB, HLB Breakers, Size 5 MCP (400 Amp.)..... JB, KB, HKB, Size 5 MCP (250 Amp.).....	SMCU250JD SMCU400KD SMCU225KA SMCU250KB	CMCU250JD CMCU400KD CMCU255KA CMCU250KB
	LAB, LA, HLA, LC, HLC Breakers (400 and 600 Amperes Frame)..... LA TRI-PAC..... MA, HMA, MC, HMC Breakers (800 Ampere Frame)..... NB, HNB, NC, HNC Breakers (1200 Ampere Frame)..... LCL225 and 400..... Series C L Frame HMCP L.....	SMCU400LA SMCU400LAP SMCU800MA SMCU1200NB SMCU400LCL SMCU600LD	CMCU400LA CMCU400LAP CMCU800MA CMCU1200NB CMCU400LCL CMCU600LD

FURTHER INFORMATION

Literature Number	Description
IL 15582	Mounting Information for RMCF, RMCHF
IL 15583	Mounting Information for RMCF, RMCHF
RPD 8991	Renewal Parts Data for Motor Control Centers

PRICING INFORMATION

Literature Number	Description
PL 8991A	Price List for Aftermarket Renewal Parts
VISTA/VISTALINE	Discount Symbol RCB-2

- 1 Please check VISTA for order entry procedures.
- 2 Mechanisms are shown mounted on breaker for illustration purposes only. Breakers are not included.
- 3 These mechanisms are recognized under the component program of Underwriters' Laboratories, Inc.



MOLDED CASE CIRCUIT BREAKERS

Motor Control Center Replacement Breakers

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A grayscale photograph of a factory floor. In the foreground, a worker is seated at a workstation, working on a large piece of machinery. In the background, other workers are visible at similar workstations. The factory is filled with various pieces of equipment, including conveyor belts and assembly lines.

For Motor Control Center
Replacement Breakers,
Call 1-800-OLD-UNIT



MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms



PRODUCT DESCRIPTION

MCCB Handle Mechanism Introduction

Cutler-Hammer offers a broad range of handle mechanisms for molded case circuit breakers. Each of these has been designed specifically for safe, dependable operation and ease of installation.

Applications include: enclosed molded case circuit breakers, control panels, motor centers, etc.

Whether replacing a damaged handle mechanism with a like unit, switching from fuses to circuit breakers in order to limit downtime, or upgrading to take advantage of the many benefits associated with applying communicating, programmable molded case circuit breaker technology, Cutler-Hammer has the handle mechanism solution that is right for you.



Vari-Depth Type – Page 84



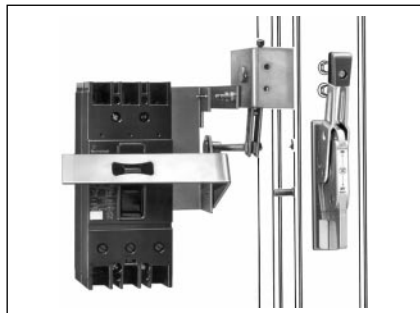
Side Plate Type – Page 85



Type SM Safety Handle – Page 86



Type MC Motor Control – Page 88



Type AMT Vari-Depth – Page 89



MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms

SELECTION AND AVAILABILITY GUIDE

Circuit Breaker and Switch Type	Door Mounted				Flange Mounted			
	Vari-Depth	Series C ^① Rotary	Slide Plate	MC	Series C ^① Flex Shaft	SM	AMT Fixed Width	AMT Vari-Depth
Series C Breakers								
F Frame/F HMCP ^②	●	●	●	●	●	●	●	●
J Frame/J HMCP	●	●	●	●	●	●	●	●
K Frame/K HMCP	●	●	●	●	●	●	●	●
L Frame/L HMCP	●	●	●	●	●	●	●	●
M Frame	●	●	●	●	●	●	N/A	●
N Frame	N/A	●	N/A	N/A	●	N/A	N/A	N/A
R Frame	N/A	N/A	●	N/A	●	N/A	N/A	N/A
Other Industrial Breakers								
GB/GHB/GC/GHC/GD/GMCP	●	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LA/LAB/HLA	●	N/A	●	●	N/A	●	●	●
LC/HLC/LCG	●	N/A	●	●	N/A	●	●	●
MA/HMA	●	N/A	●	●	N/A	●	N/A	●
MC/HMC	●	N/A	●	●	N/A	●	N/A	●
NB/HNB	●	N/A	●	●	N/A	●	N/A	●
NC/HNC	●	N/A	●	●	N/A	●	N/A	●
PB	N/A	N/A	●	N/A	N/A	N/A	N/A	N/A
PC/PCC	N/A	N/A	●	N/A	N/A	N/A	N/A	N/A
FB TRI-PAC	●	N/A	●	●	N/A	●	N/A	●
LA TRI-PAC	●	N/A	●	N/A	N/A	●	N/A	●
NB TRI-PAC	●	N/A	●	N/A	N/A	●	N/A	●
PB TRI-PAC	N/A	N/A	●	N/A	N/A	N/A	N/A	N/A
FCL	●	N/A	N/A	●	N/A	●	N/A	N/A
LCL	●	N/A	N/A	●	N/A	●	N/A	●
EB/EHB/FB/HFB	●	N/A	●	●	N/A	●	●	●
JA/KA/HKA/DA/LB/LBB/HLB	●	N/A	●	●	N/A	●	●	●
JB/KB/HKB	●	N/A	N/A	●	N/A	●	●	●
Disconnect Switches								
De-ion 30, 60, 100	●	N/A	●	N/A	N/A	N/A	N/A	N/A
DS 30, 60, 100, 200	●	N/A	●	●	N/A	●	●	●
DS 400, 600	N/A	N/A	●	N/A	N/A	N/A	N/A	N/A
Visi-Flex Model "T" 30, 60, 100	N/A	N/A	●	N/A	N/A	N/A	N/A	N/A
KEY								
N/A = Not Available								
● = Available								

① For application only with Series C Molded Case Circuit Breakers and HMCPs.
 ② Series C F Frame includes EHD, ED, FDB, FD, HFD and FDC designations.

MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms



VARI-DEPTH TYPE

Westinghouse general purpose vari-depth handle mechanisms are suitable for use with NEMA 1 fabricated enclosures. They are designed for use with breakers or disconnect switches when used in deep enclosures.

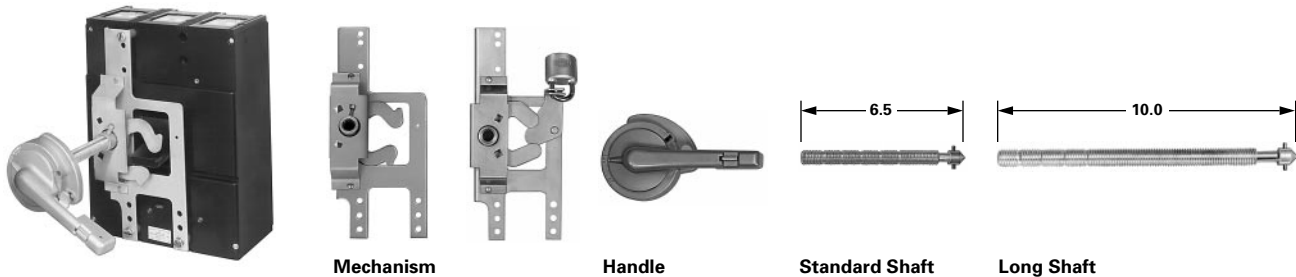
Required for a standard application are a padlockable operating handle, shaft and mechanism. Two variable depth shafts are offered to better cover the wide range of depths of various enclosures... these are

referred to in the table as the standard and the long shaft. The dimensions for panel depth given in the table are from the mounting surface of the breaker or disconnect to the inside of the enclosure cover.

Standard mechanisms do not include an internal lockoff device. Mechanisms with this feature are, however, offered as an optional item. The internal lockoff provides a means of padlocking the breaker or switch in the "off" position while the enclosure door is open.

These mechanisms may also be used in conjunction with NEMA 4, 7 and 9 cast enclosures. When used with these enclosures, the special handle kits shown as accessory items must be ordered in place of the standard handle.

The adapter bushing, a component of the special handle kit, may be ordered separately.



CATALOG NUMBERS

For Complete Applications Order Mechanism, Handle and Shaft	Mechanism ①②		Handle ⑤	Shaft			
	Standard - (No Internal Lockoff)	Special - (With Internal Lockoff)	NEMA 1, 3R, 12 (With Hardware)	Standard		Long	
	Style Number	Style Number	Style Number	Style Number	Panel Depth	Style Number	Panel Depth
Circuit Breakers							
Series C F Frame & HMCP F④ EB, EHB, FB, HFB, MCP CA	373D958G22 373D958G05 458D493G20	373D958G23 373D958G06 458D493G21	504C323G07 504C323G07 504C323G07	47A4446G38 47A4446G36 47A4446G36	5 - 10¼ 5 - 10¼ 4¾ - 9¾	47A4446G37 47A4446G37 47A4446G37	10½ - 14 10½ - 14 9¾ - 13½
Series C J Frame & HMCP J Series C K Frame & HMCP K Series C L Frame & HMCP L JA, KA, HKA, DA, LB, LBB, HLB JB, KB, HKB	5092A62G03 5092A62G01 5092A62G05	5092A62G04 5092A62G02 5092A62G06	504C323G07 504C323G07 504C323G07	47A4446G36 47A4446G36 47A4446G36	5⅞ - 11⅞ 5⅞ - 11⅞ 6⅞ - 11¼	47A4446G37 47A4446G37 47A4446G37	11⅞ - 14⅞ 11⅞ - 14⅞ 11¼ - 15
LA, HLA, LC, HLC TRI-PAC FB FCL	458D493G03 373D958G18 458D493G04 373D958G10 373D958G16	458D493G11 373D958G19 458D493G12 373D958G11 373D958G17	504C323G07 504C323G07 504C323G07 504C323G07 504C323G07	47A4446G36 47A4446G36 47A4446G36 47A4446G36 47A4446G36	5⅞ - 11⅞ 6⅞ - 11¼ 5 - 10¼ 5 - 10¼	47A4446G37 47A4446G37 47A4446G37 47A4446G37 47A4446G37	11⅞ - 14⅞ 11¼ - 15 10¼ - 14 10¼ - 14
MA, HMA, MC, HMC, Series C M Frame (800 Amp max.) NB, HNB, NC, HNC TRI-PAC LA TRI-PAC FB FCL	458D493G05 373D958G07 374D075G02 373D958G12 458D493G22	458D493G13 373D958G08 374D075G01 373D958G13 458D493G23	504C323G07 504C323G07 504C323G07 504C323G07 504C323G07	47A4446G36 47A4446G36 47A4446G36 47A4446G36 47A4446G36	6⅞ - 11⅞ 7⅞ - 13¼ 6⅞ - 11¼ 7⅞ - 13¼ 6⅞ - 11¼	47A4446G37 47A4446G37 47A4446G37 47A4446G37 47A4446G37	11⅞ - 15⅞ 12⅞ - 16⅞ 11¼ - 15 12⅞ - 16⅞ 11⅞ - 15⅞
Disconnect Switches							
30, 60, 100 Amp De-ion⑥ Type DS 30, 60, 100 Amp Type DS 200 Amp 200 Amp De-ion	47A4446G34 4987D14G02 4987D14G01 458D493G04	..... ..... ..... 458D493G12	⑥ 504C323G07 504C323G07 504C323G07	⑥ 47A4446G36 47A4446G36 47A4446G36	5¾ - 11 5⅞ - 10⅞ 6⅞ - 11⅞ 6⅞ - 11¼	47A4446G37 47A4446G37 47A4446G37 47A4446G37	11 - 14¾ 10⅞ - 14⅞ 10⅞ - 14⅞ 11¼ - 15

ACCESSORIES

Special Handles⑦

Meet **NEMA 4 sheet steel requirements**. These handles are similar to standard handles, except they include an internal neoprene gasket. Due to gasketing effect between handle and housing, handle will not indicate a tripped position when used with circuit breakers.

Standard Finish

Style Number

504C323G08

Handle Kits



purchased separately). Kits may be used with standard mechanisms and shafts. Instruction drawing 314C809 applies for assembly.

These kits are for use with **NEMA 4, 7 and 9 cast enclosures**. They include a special operating handle, mounting bolts and an adapter bushing (bushing may be

For NEMA 4, 9 Enclosure

Style Number

314C794G10

For NEMA 7 Enclosure

Style Number

314C794G09

Adapter Bushing Only

Style Number

314C794G04

① Includes hardware

② When used with plug-in adapter kits or rear connected studs, special mounting hardware is required. Refer to Westinghouse.

③ Mechanism style includes handle and a standard shaft. Long shaft may be ordered separately if required.

④ Extra long shaft includes support bracket for Series C F-Frame with no internal lockoff. Order 373D958G24, which includes the mech, shaft, and bracket. Order handle separately. Panel depth 16⅞-24¼.

⑤ UL File No. E56845 Vol. 1 Sect. 4.

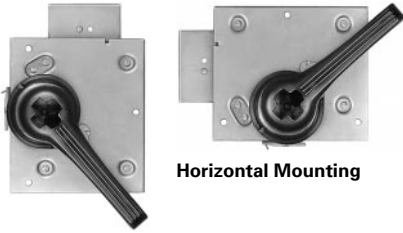


MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms

A

SLIDE PLATE TYPE



Horizontal Mounting

Vertical Mounting

These compact Westinghouse slide plate handle mechanisms are especially designed for use with AB De-ion circuit breakers and disconnect switches when they are mounted in a shallow enclosure. They are suitable for use on NEMA 1 applications.

Because of the mechanisms' simplified installation – three mounting holes – and preassembled construction, these units are commonly used where high volume, standardized enclosures are being fabricated.

The mechanism styles listed on this page are for use on enclosures which have covers hinged on the right side. If these mechanisms are used on enclosures which have covers hinged on the left side, the door interlock will not function.

Outdoor or Hazardous Location Type



This handle mechanism is designed for use with fabricated or cast, NEMA 3, 4 or 5 enclosures. A butterfly cam type mechanism may be used on enclosures with either right or left hand hinged covers or on enclosures with bolted covers. The mechanism has a provision for padlocking. Will accept up to three locks. Assembly of this mechanism is accomplished by welding it to the enclosure door or cover. Refer to IL29C287 for drilling plan. For PB, PC and RD, refer to Drawing 372D690.

ACCESSORIES

Door Interlock Kits

For use with slide plate mechanisms used in larger panels where regular interlock is not adequate.

Style Number	Description	Drilling Plan Reference
28A2656G08	3 point – For mechanisms, style numbers: 314C386G01, 02, 03, 04, 05, 06, 08, 09 and 10	208B624
1532990	2 point – For PB mechanism, style number 505C294G03	372D690

- ① Handle mechanisms cannot be used on Visi-flex switches with 200 ampere fuse kits.
- ② Does not padlock in OFF position. NEMA 3R version available as special. Contact your Cutler-Hammer representative.

CATALOG NUMBERS

Standard Slide Plate Mechanisms

Enclosure Cover Hinged on Right	Vertical Mounting		Horizontal Mounting
	Padlocks in OFF Position	Padlocks in ON or OFF Position	Padlocks in OFF Position
	Style Number	Style Number	Style Number
Circuit Breakers			
KL and HKL Frame	314C386G01	314C386G08	314C386G04
MA, HMA, MC and HMC Breaker			
LA, HLA, LC and HLC Breaker			
JA, KA, HKA, DA, LB, LBB and HLB Breaker			
NB, HNB, NC and HNC Breaker			
JB, KB and HKB Breaker			
LCL Breaker	314C386G02	314C386G09	314C386G05
EH Breaker 2P with long handle			
EH Breaker 3P with long handle			
F Frame 2P			
F and HF Frame 3P			
Type AQB and NQB 100A Frames and Type PF 15-100A Frame			
EH Standard 2P	314C386G03	314C386G10	314C386G06
EH Standard 3P and FA mag only 2 and 3P			
FA 2 and 3P Thermal Mag			
EB, EHB, FB, HFB 3P			
MCP, HMCP (0-4) 2P			
FCL Breaker			
PB, TRI-PAC® PB, PC, PCC, PCF	505C294G03	.....	.....
Series C Circuit Breakers			
F-Frame Series C + HMCP-F	314C386G03	314C386G10	314C386G06
J-Frame Series C + HMCP-J	314C386G02	314C386G09	314C386G05
K-Frame Series C + HMCP-K	314C386G18	314C386G08	314C386G04
L-Frame Series C + HMCP-L			
M-Frame Series C	314C386G01	314C386G08	314C386G04
R-Frame②	505C294G03	.....	.....
TRI-PAC Switches			
225A TRI-PAC Type K	314C386G01	314C386G08	314C386G04
400A TRI-PAC Type KL			
LA TRI-PAC			
NB TRI-PAC			
100A TRI-PAC	314C386G02	314C386G09	314C386G05
FB TRI-PAC	314C386G03	314C386G10	314C386G06
Visi-Flex Switches (Model T)①			
60-100A Visi-Flex	314C386G01	314C386G08	314C386G04
30A and Special 60A Visi-Flex	314C386G02	314C386G09	314C386G05
De-ion Switches and Disconnect Switches			
30-60A (long handle) De-ion			
100A (long handle) De-ion	314C386G01	314C386G08	314C386G04
200A Disconnect Switch			
200 DS Switch			
30-60A Disconnect Switch			
100A Disconnect Switch	314C386G02	314C386G09	314C386G05
30, 60, 100A DS Switch	314C386G03	314C386G10	314C386G06
400 and 600A DS Switch	314C386G15	.....	.....
Mechanisms for Outdoor or Hazardous Locations			
Description	Complete Handle Mechanisms NEMA 3, 4, 5		Drilling Plan Reference
	Padlocks in OFF Position	Padlocks in ON or OFF Position	
	Style Number	Style Number	
Circuit Breakers			
Series C F Frame EB, EHB, FB, HFB	48A3656G03	48A3656G04	48A3656
JA, KA, LA, MA, HKA, HLA, HMA, LB, HLB	452D028G01	.....	452D028
De-ion Switches			
30, 60, 100 Amp	48A3656G03	48A3656G04	48A3656

MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms



TYPE SM SAFETY HANDLE



The Westinghouse Type SM safety handle mechanism is designed to prevent tampering by unauthorized individuals and provides the optimum in personnel safety. When properly applied, these mechanisms conform to NEMA 12 and J.I.C. requirements, and are thus well-suited for use by the automotive and machine tool industries.

Completely preassembled in a rugged cast housing, the Type SM safety handle mechanism includes a predrilled mounting plate for simplified customer installation. Standard handles are 5½ inches long and can be padlocked in "OFF" position with as many as three padlocks. A shorter handle 3⅞ inches long can be supplied on SM100, SM101, or SM150 mechanisms when specified.

All Type SM safety handle mechanisms can be used on any size enclosure. Order handle mechanism from table at right, plus desired door hardware for complete application. Dress nameplate required to meet automotive specifications is available from accessories section.

CATALOG NUMBERS

Handle Mechanism	For Use With:	Catalog Number [●]	
		Right Hand Mounting Enclosure Cover Hinged On Left	Left Hand Mounting Enclosure Cover Hinged On Right
	Series C — F Frame, MCP, HMCP F EB, EHB, FB, HFB Breakers, and Type DS 30, 60, 100 Ampere Non-fusible Switches	SM150R	SM150L
	Type DS 30, 60, 100 Ampere Fusible Switches	SM100SFR	SM100SFL
	FB TRI-PAC®, FB Breaker with Current Limiter, or Type FCL 30, 60, 100 Ampere De-ion Switches	SM101PR SM100R	SM101PL SM100L
	DA, JA, KA, HKA, LB, LBB, HLB Breakers	SM225R	SM225L
	Series C — J Frame, HMCP J	SM250JR	SM250JL
	JB, KB, HKB	SM250R	SM250L
	Series C — K Frame, HMCP K	SM400KR	SM400KL
	LAB, LA, HLA, LC, HLC Breakers (400 and 600 Ampere)	SM400R	SM400L
	Series C — L Frame, HMCP L	SM600R	SM600L
	Series C — M Frame	SM800R	SM800L
	MA, HMA, MC, HMC Breakers	SM800R	SM800L
	TRI-PAC LA Breaker	SM400PR	SM400PL
	TRI-PAC NB	SM800PR	SM800PL
	NB, HNB, NC, HNC Breakers	SM1200R	SM1200L
	Type DS 200 Ampere Non-Fusible Switch Type DS 200 Ampere Fusible Switch	SM200SR SM200SFR	SM200SL SM200SFL
	Type LCL	SM400LCLR	SM400LCLL

Mechanisms for NEMA 4 Applications

Mechanisms with stainless steel parts and special gasketing can be supplied. Order by description. 30% adder.

FURTHER INFORMATION

Literature Number	Description
IL 14439	F Frame, EB, EHB, FB, FCL, HFB, MCP, FB-P, 30-200 De-ion SW
IL 29C274	J&K Frame
IL 29C284	L Frame
IL 13282	JA, KA, JB, KB, LAB, LA, MA, NB, HLA, NB-P, 200A, De-ion SW
IL 13327	DH1L Door Hardware
IL 13326	DH1R Door Hardware
IL 13325	DH2R Door Hardware
IL 13324	DH3L Door Hardware
IL 13322	DH3R Door Hardware
IL 13287	Electrical Interlock

● Must be ordered with door hardware; if not, door-operated defeater kit is required.



MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms





A

TYPE SM SAFETY HANDLE

Door Hardware

Three choices of door hardware and an auxiliary handle are offered to provide the best latching scheme for individual needs. The door hardware is designed with a provision for padlocking, and a coin-proof slot that requires the use of a tool to open the door, for maximum security.

Select desired hardware below. Additional latches can be ordered from accessories section if desired. NEMA 1, 12 only.

Hardware Item	Description
	With sliding latches for smaller panels up to approx. 30 inches high. Catalog Numbers Right Hand: DH1R ❶ Left Hand: DH1L ❷
	With 2-roller latches for intermediate panels up to approx. 40 inches high. Catalog Numbers Right Hand: DH2R ❶ Left Hand: DH2L ❷
	With 3-roller latches for larger panels, approx. 40 inches and higher. Catalog Numbers Right Hand: DH3R ❶ Left Hand: DH3L ❷
	Auxiliary handle for larger panels. Catalog Numbers Right Hand: DH4R ❶ Left Hand: DH4L ❷

Dress Nameplates

Required to meet automotive specifications. Mounts from inside enclosure and covers operating mechanism mounting bolts, making mechanism non-removable when enclosure door is closed.

For SM100, SM150 Mechanisms

Style Number
373D260G05

For SM200, and larger mechanisms

Style Number
373D260G05

Auxiliary Latch Kits

Provide an additional latch for use with applications where two point latching may not be adequate.



Slide Latch



Roller Latch

For Door Hardware Using Sliding Latches Right or Left Hand Mounting.

Style Number
656D669G01

For Door Hardware Using Roller Latches Right Hand Mounting.

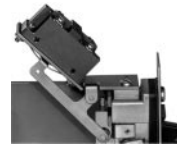
Style Number
370D801G04

Left Hand Mounting.

Style Number
370D802G04

Electrical Interlock Kit

Provides 1 N.C. and 1 N.O. contacts (SPDT switch) for use with auxiliary circuits. Mounts to end of mechanism housing as shown.



Style Number
622B747G01

Door Operated Interlock Defeater Kit

Required when door hardware is not used; operates as door closes. Additional method of securing door such as screw latch, also required (to be supplied by box manufacturer).

Style Number
623B214G02

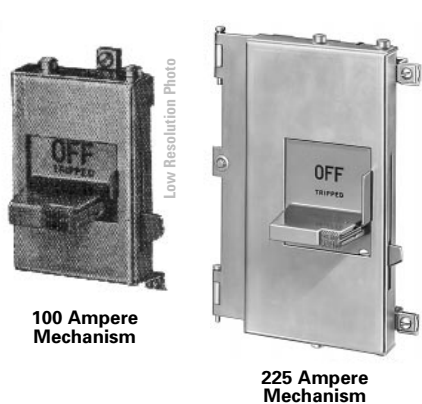
❶ Enclosure cover hinged on left.
❷ Enclosure cover hinged on right.

MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms



TYPE MC MOTOR CONTROL







Type MC handle mechanisms are linear drive, fixed depth mechanisms designed for through-door mounting in standardized or shallow depth enclosures such as motor control centers or enclosed circuit breakers.

Mounting directly to the front of the disconnect, these mechanisms provide positive operation and handle indication. Both disconnect and mechanism mount simultaneously with mounting hardware supplied with the mechanism.

For security, the handle can be padlocked in the OFF position with up to three 3/8 inch hasp padlocks. Also, the mechanism is interlocked with the enclosure door so that the disconnect must be "OFF" before the door can be opened. A defeater is provided to bypass this interlock.

Catalog numbers listed include the mechanism, mounting hardware and door interlock clip.

CATALOG NUMBERS

Selection Data for Handle Mechanism Only; Circuit Breaker Not Included			
Handle Mechanism❶	For Use With:	NEMA 1 Enclosure	NEMA 12 Enclosure
		Catalog Number❷	Catalog Number❷
	Series C F Frame HMCP F EB, EHB, FB, HFB Breakers and MCP (Size 0-4) FB TRI-PAC® FCL Breakers	SMCU150FD SMCU150FD SMCU100FBP SMCU100FCL	CMCU150FD CMCU150FD CMCU100FBP CMCU100FCL
	30-60-100 Ampere DS Switch Fusible, Non-fusible 200 Ampere DS Switch Fusible, Non-fusible	SMCU100DS SMCU200DS	CMCU100DS CMCU200DS
	Series C J Frame HMCP J Series C K Frame HMCP K DA, JA, KA, HKA, LB, LBB, HLB Breakers, Size 5 MCP (400 Ampere) JB, KB, HKB, Size 5 MCP (250 Ampere) Series C L Frame HMCP L Series C M Frame	SMCU250JD SMCU400KD SMCU225KA SMCU250KB SMCU600LD SMCU800MA	CMCU250JD CMCU400KD CMCU225KA CMCU250KB CMCU600LD CMCU800MA
	LAB, LA, HLA, LC, HLC, Breakers (400 and 600 Amperes Frame) LA TRI-PAC MA, HMA, MC, HMC Breakers (800 Ampere Frame) NB, HNB, NC, HNC Breakers (1200 Ampere Frame) LCL225 and 400 Series C L Frame HMCP L	SMCU400LA SMCU400LAP SMCU800MA SMCU1200NB SMCU400LCL SMCU600LD	SMCU400LA SMCU400LAP SMCU800MA SMCU1200NB SMCU400LCL SMCU600LD

FURTHER INFORMATION

Literature Number	Description
IL 14572	F Frame, EB, EHB, FB, MCP, HFB
IL 29C273	J&K Frame
IL 29C283	L Frame
IL 14571	FB-P
IL 14938	JB, KB
IL 14573	30, 60, 100A DS Switch
IL 14574	200A DS Switch

❶ Mechanisms are shown mounted on breaker for illustration purposes only. Breakers are not included.
❷ These mechanisms are recognized under the component program of Underwriters' Laboratories, Inc.



MOLDED CASE CIRCUIT BREAKERS

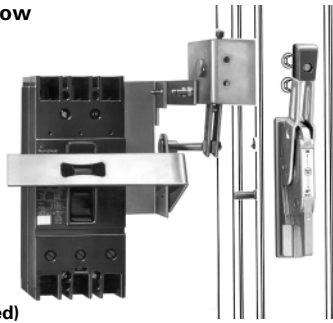
Handle Mechanisms

AMT VARI-DEPTH

Fixed Width Type

Type AMT for Below Handle Mounting

Assembled Type AMT for Below Handle Mounting (Breaker not Included)



Backplate, Yoke Assembly



Rod and Brace Assembly[Ⓞ]



Pivot Mechanism



Operating Handle

CATALOG NUMBERS

Complete Assembly consists of and is shipped as the Component Parts listed below.

Breaker or Switch Type	Complete Catalog Number	Backplate and Yoke Catalog Number	Rod and Brace Catalog Number	Pivot Mechanism Catalog Number	Operating Handle Catalog Number
Below the Handle – Fixed Width – with Short Brace and/or Rod as Listed (For all enclosures including Hoffman A-25 Enclosures)					
Series C F Frame HMCP F [Ⓛ]	AMTFDBSFH	AMTFD-B	AMTR	AMTPM-FH	AMTOP
Series C J Frame HMCP J [Ⓛ]	AMTKDBSFH	AMTKB-B	AMTRB1	AMTPM-FSH	AMTOP
Series C K Frame HMCP K [Ⓛ]	AMTKDBSFH	AMTLB-B	AMTRB1	AMTPM-FSH	AMTOP
Series C L Frame HMCP L [Ⓛ]	AMTLDBSFH	AMTLD-B	AMTRB1	AMTPM-FS	AMTOP
DS-30, 60, 100 Unfused	AMTDSBSFH	AMTDS100-B	AMTR	AMTPM-FH	AMTOP
DS-30, 60, 100 Fused [Ⓞ]	AMTDSFBSFH	AMTDS100F-B	AMTR	AMTPM-FH	AMTOP
DS-30, 60, 100 Fused [Ⓞ]	AMTDSF1BSFH	AMTDS100F1-B	AMTR	AMTPM-FH	AMTOP
DS-200 Unfused	AMTDS2BSFH	AMTDS200-B	AMTRB1	AMTPM-FSH	AMTOP
DS-200 Fused	AMTDS2FBSFH	AMTDS200F-B	AMTRB1	AMTPM-FSH	AMTOP

Below the Handle – Fixed Width – with Short Brace and/or Rod as Listed (Not for use with Hoffman A-25 Enclosures)

Breaker or Switch Type	Complete Catalog Number	Backplate and Yoke Catalog Number	Rod and Brace Catalog Number	Pivot Mechanism Catalog Number	Operating Handle Catalog Number
EB, EHB, FB, HFB, MCP (0-4)	AMTFBBSF	AMTFD-B	AMTR	AMTPM-F	AMTOP
JB, KB, MCP (250 Amp)	AMTKBBSF	AMTKB-B	AMTRB1	AMTPM-FS	AMTOP
JA, KA, HKA, LB, LBB, HLB, DA MCP (400 Amp)	AMTLBBSF	AMTLB-B	AMTRB1	AMTPM-FS	AMTOP
FB TRI-PAC [®] , FCL	AMTFBPBSF	AMTFBP-B	AMTR	AMTPM-F	AMTOP
			Optional Rod and Brace [Ⓞ]		
			AMTRB2 Long Rod and Brace		
			AMTRB3 Extended Rod and Brace		

Standard Door Hardware (Requires Adapter Kit below)

Catalog Number	
DH1R	NOTE: For standard door hardware description, see page 87 .
DH2R	
DH3R	

Door Hardware Adapter Kit (Required on Standard Door Hardware only when used with any AMT Handle Mechanisms)

Catalog Number	
AMTDHA	

Door Hardware Kit for Hoffman A-25 Enclosure (For use with AMT Fixed Width Mechanisms only)

Kit consists of special door hardware and door interlock pin. Available for right hand flange mounting only.

Catalog Number	
HDH-2R [Ⓞ]	
HDH-3R [Ⓞ]	

FURTHER INFORMATION

Literature Number	Description
IL 29C277	AMT Vari-depth Handle Mechanism

- Ⓛ Also for use with equivalent HMCP Frame.
- Ⓞ For switches using 30, 60, 100 amperes 250 volt NEC Class H or R fuses.
- Ⓞ For switches using 30, 60, 100 amperes 600 volt NEC Class H, R or J fuses.
- Ⓞ 2 point latch for use with panels up to approximately 40 inches high.
- Ⓞ 3 point latch for use with panels approximately 40 inches and higher.
- Ⓞ AMTR and AMTRB1 for use with enclosure depth of 6½-14¼ inches. For 12¼-18¼ inch depth use optional AMTRB2. For 18-24 inch depth use optional AMTRB3.
- Ⓞ AMTR is rod only; AMTRI is rod and brace assembly.

MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms



AMT VARI-DEPTH

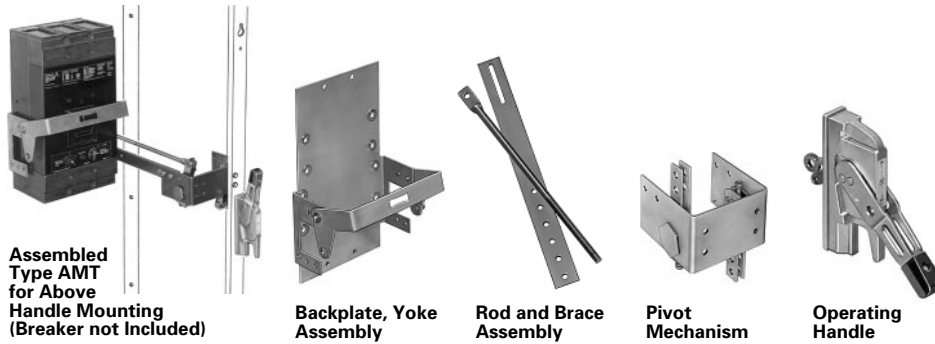
Vari-Width Type

Type AMT For Above Handle Mounting
The Type AMT is an extra heavy duty handle mechanism designed for mounting in flange-type enclosures, and has

provisions for mounting in various depth enclosures and for varying the width relationship between the disconnect device and the external handle.

A door interlock is provided to prevent opening the enclosure door with the disconnect in the ON position or to close the disconnect with the enclosure door open. The external handle can be locked in the OFF position with up to three padlocks. The AMT mechanism is supplied for mounting in right hand flange enclosures but can be easily converted for left hand mounting.

AMT mechanisms are available for above the handle mounting or below the handle mounting. Mechanisms for below the handle mounting are also available as fixed width units. When door hardware is used with AMT handle mechanism a door hardware adapter kit is required.



Assembled Type AMT for Above Handle Mounting (Breaker not Included)

Backplate, Yoke Assembly

Rod and Brace Assembly

Pivot Mechanism

Operating Handle

CATALOG NUMBERS

Complete Assembly consists of and is shipped as the Component Parts listed below.

Breaker or Switch Type	Complete Assembly	Backplate and Yoke Assembly	Operating Rod and Brace Assembly	Flange Mounted Pivot Mechanism Assembly ^{1,2}	External Operating Handle
	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
Above the Handle Mounting with Short Rod and Brace					
Series C F Frame ³ EB, EHB, FB, HFB, MCP (0-4)	AMTFDASV	AMTFB	AMTRB1	AMTPM	AMTOP
Series C J Frame ³	AMTJDASV	AMTJD	AMTRB1	AMTPM	AMTOP
JB, KB, MCP (250 Ampere)	AMTKBASV	AMTKB	AMTRB1	AMTPM	AMTOP
Series C K Frame ³	AMTKDASV	AMTKD	AMTRB1	AMTPM	AMTOP
Series C L Frame ³	AMTLDASV	AMTLD	AMTRB1	AMTPM	AMTOP
JA, KA, HKA, LB, LBB, HLB, DA, MCP (400 Ampere)	AMTLBASV	AMTLB	AMTRB1	AMTPM	AMTOP
LA, HLA, LC, HLC	AMTLAASV	AMTLA	AMTRB1	AMTPM	AMTOP
MA, HMA, MC, HMC, Series C M, Frame, LCL	AMTMAASV	AMTMA	AMTRB1	AMTPM	AMTOP
NB, HNB, NC, HNC	AMTNBASV	AMTNB	AMTRB1	AMTPMNB	AMTOP
FB TRI-PAC ⁴ , FCL	AMTFBASV	AMTFB	AMTRB1	AMTPM	AMTOP
LA TRI-PAC ⁴	AMTLAPASV	AMTLAP	AMTRB1	AMTPM	AMTOP
NB TRI-PAC ⁴	AMTNBPASV	AMTNBP	AMTRB1	AMTPMNB	AMTOP
DS-30, 60, 100 Unfused	AMTDSASV	AMTDS100	AMTRB1	AMTPM	AMTOP
DS-30, 60, 100 Fused ⁵	AMTDSFASV	AMTDS100F	AMTRB1	AMTPM	AMTOP
DS-30, 60, 100 Fused ⁵	AMTDSF1ASV	AMTDS100F1	AMTRB1	AMTPM	AMTOP
DS-200 Unfused	AMTDS2ASV	AMTDS200	AMTRB1	AMTPM	AMTOP
DS-200 Fused	AMTDS2FASV	AMTDS200F	AMTRB1	AMTPM	AMTOP

Above the Handle Mounting with Long Rod and Brace

Series C F Frame ³ EB, EHB, FB, HFB, MCP (0-4)	AMTFDALV	AMTFB	AMTRB2	AMTPM	AMTOP
Series C J Frame ³	AMTJDALV	AMTJD	AMTRB2	AMTPM	AMTOP
JB, KB, MCP (250 Ampere)	AMTKBALV	AMTKB	AMTRB2	AMTPM	AMTOP
Series C K Frame ³	AMTKDALV	AMTKD	AMTRB2	AMTPM	AMTOP
Series C L Frame ³	AMTLDALV	AMTLD	AMTRB2	AMTPM	AMTOP
JA, KA, HKA, LB, LBB, HLB, DA, MCP (400 Ampere)	AMTLBALV	AMTLB	AMTRB2	AMTPM	AMTOP
LA, HLA, LC, HLC	AMTLAALV	AMTLA	AMTRB2	AMTPM	AMTOP
MA, HMA, MC, HMC, Series C M Frame, LCL	AMTMAALV	AMTMA	AMTRB2	AMTPM	AMTOP
NB, HNB, NC, HNC	AMTNBALV	AMTNB	AMTRB2	AMTPMNB	AMTOP
FB TRI-PAC ⁴ , FCL	AMTFBALV	AMTFB	AMTRB2	AMTPM	AMTOP
LA TRI-PAC ⁴	AMTLAPALV	AMTLAP	AMTRB2	AMTPM	AMTOP
NB TRI-PAC ⁴	AMTNBPALV	AMTNBP	AMTRB2	AMTPMNB	AMTOP
DS-30, 60, 100 Unfused	AMTDSALV	AMTDS100	AMTRB2	AMTPM	AMTOP
DS-30, 60, 100 Fused ⁵	AMTDSFALV	AMTDS100F	AMTRB2	AMTPM	AMTOP
DS-30, 60, 100 Fused ⁵	AMTDSF1ALV	AMTDS100F1	AMTRB2	AMTPM	AMTOP
DS-200 Unfused	AMTDS2ALV	AMTDS200	AMTRB2	AMTPM	AMTOP
DS-200 Fused	AMTDS2FALV	AMTDS200F	AMTRB2	AMTPM	AMTOP

FURTHER INFORMATION

Literature Number	Description
IL 14946	AMT Vari-depth Handle Mechanism

¹ Width spacer kit not included.

² Also for use with equivalent HMCP Frame.

³ For switches using 30, 60, 100 amperes 600 volt NEC Class H, R or J fuses.

⁴ For switches using 30, 60, 100 amperes 600 volt NEC Class H or R fuses.

⁵ This spacer kit is for up to 1-inch variation and consists of multiples of thin spacers to be used as required. A maximum of two kits per installation may be used. Due to the possible variation in dimensions, hardware is not supplied. Use standard 1/4-20 bolts.

ACCESSORIES

Spacer Kit to Vary Width (Not for use with fixed mechanisms)
Catalog Number AMTSK1⁶ for up to 1 inch variation.



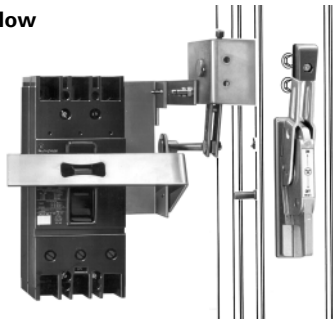
MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms

AMT VARI-DEPTH

Vari-Width Type

Type AMT For Below Handle Mounting



Assembled Type AMT for Below Handle Mounting (Breaker not included)



Backplate, Yoke Assembly



Rod and Brace Assembly



Pivot Mechanism



Operating Handle

CATALOG NUMBERS

Complete Assembly consists of and is shipped as the Component Parts listed below.

Breaker or Switch Type	Complete Assembly	Backplate and Yoke Assembly	Operating Rod and Brace Assembly	Flange Mounted Pivot Mechanism Assembly ①②	External Operating Handle
	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
Below the Handle Mounting with Short Rod and Brace					
Series C F Frame ② EB, EHB, FB, HFB, MCP (0-4)	AMTFDBSV	AMTFD-B	AMTRB1	AMTPM-B	AMTOP
Series C J Frame ②	AMTJDBSV	AMTJD-B	AMTRB1	AMTPM-B	AMTOP
JB, KB, MCP (250 Ampere)	AMTKBSV	AMTKB-B	AMTRB1	AMTPM-B	AMTOP
Series C K Frame ②	AMTKDBSV	AMTKD-B	AMTRB1	AMTPM-B	AMTOP
Series C L Frame ②	AMTLDBSV	AMTLD-B	AMTRB1	AMTPM-B	AMTOP
JA, KA, HKA, LB, LBB, HLB, DA, MCP (400 Ampere)	AMTLBBSV	AMTLB-B	AMTRB1	AMTPM-B	AMTOP
LA, HLA, LC, HLC	AMTLABS	AMTLA-B	AMTRB1	AMTPM-B	AMTOP
MA, HMA, MC, HMC, Series C M Frame, LCL	AMTMABSV	AMTMA-B	AMTRB1	AMTPM-B	AMTOP
NB, HNB, NC, HNC	AMTNBSV	AMTNB-B	AMTRB1	AMTPM-B	AMTOP
FB TRI-PAC®, FCL	AMTFBPBSV	AMTFBP-B	AMTRB1	AMTPM-B	AMTOP
LA TRI-PAC®	AMTLAPBSV	AMTLAP-B	AMTRB1	AMTPM-B	AMTOP
NB TRI-PAC®	AMTNBPBSV	AMTNBP-B	AMTRB1	AMTPM-B	AMTOP
DS-30, 60, 100 Unfused	AMTDSBSV	AMTDS100-B	AMTRB1	AMTPM-B	AMTOP
DS-30, 60, 100 Fused ③	AMTDSFBSV	AMTDS100F-B	AMTRB1	AMTPM-B	AMTOP
DS-30, 60, 100 Fused ④	AMTDSF1BSV	AMTDS100F1-B	AMTRB1	AMTPM-B	AMTOP
DS-200 Unfused	AMTDS2BSV	AMTDS200-B	AMTRB1	AMTPM-B	AMTOP
DS-200 Fused	AMTDS2FBSV	AMTDS200F-B	AMTRB1	AMTPM-B	AMTOP
Below the Handle Mounting with Long Rod and Brace					
Series C F Frame ② EB, EHB, FB, HFB, MCP (0-4)	AMTFDBLV	AMTFD-B	AMTRB2	AMTPM-B	AMTOP
Series C J Frame ②	AMTJDBLV	AMTJD-B	AMTRB2	AMTPM-B	AMTOP
JB, KB, MCP (250 Ampere)	AMTKBBLV	AMTKB-B	AMTRB2	AMTPM-B	AMTOP
Series C K Frame ②	AMTKDBLV	AMTKD-B	AMTRB2	AMTPM-B	AMTOP
Series C L Frame ②	AMTLDBLV	AMTLD-B	AMTRB2	AMTPM-B	AMTOP
JA, KA, HKA, LB, LBB, HLB, DA, MCP (400 Ampere)	AMTLBBLV	AMTLB-B	AMTRB2	AMTPM-B	AMTOP
LA, HLA, LC, HLC	AMTLABLV	AMTLA-B	AMTRB2	AMTPM-B	AMTOP
MA, HMA, MC, HMC, Series C M Frame, LCL	AMTMABLV	AMTMA-B	AMTRB2	AMTPM-B	AMTOP
NB, HNB, NC, HNC	AMTNBBLV	AMTNB-B	AMTRB2	AMTPM-B	AMTOP
FB TRI-PAC®, FCL	AMTFBPBLV	AMTFBP-B	AMTRB2	AMTPM-B	AMTOP
LA TRI-PAC®	AMTLAPBLV	AMTLAP-B	AMTRB2	AMTPM-B	AMTOP
NB TRI-PAC®	AMTNBPBLV	AMTNBP-B	AMTRB2	AMTPM-B	AMTOP
DS-30, 60, 100 Unfused	AMTDSBLV	AMTDS100-B	AMTRB2	AMTPM-B	AMTOP
DS-30, 60, 100 Fused ③	AMTDSFBLV	AMTDS100F-B	AMTRB2	AMTPM-B	AMTOP
DS-30, 60, 100 Fused ④	AMTDSF1BLV	AMTDS100F1-B	AMTRB2	AMTPM-B	AMTOP
DS-200 Unfused	AMTDS2BLV	AMTDS200-B	AMTRB2	AMTPM-B	AMTOP
DS-200 Fused	AMTDS2FBLV	AMTDS200F-B	AMTRB2	AMTPM-B	AMTOP

- ① Width spacer kit not included.
- ② Also for use with equivalent HMCP Frame.
- ③ For switches using 30, 60, 100 amperes 600 volt NEC Class H, R or J fuses.
- ④ For switches using 30, 60, 100 amperes 600 volt NEC Class H or R fuses.
- ⑤ This spacer kit is for up to 1-inch variation and consists of multiples of thin spacers to be used as required. A maximum of two kits per installation may be used. Due to the possible variation in dimensions, hardware is not supplied. (Use standard ¼-20 bolts).

ACCESSORIES

Spacer Kit to Vary Width (Not for use with fixed mechanisms)
 Catalog Number AMTSK1 ⑤ for up to 1-inch variation.

ORDERING INFORMATION

- Order a complete mechanism by catalog number.
- Order spacer kits or door hardware adapter as required.
- Individual component parts may be ordered by Catalog Number.



MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms



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MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms

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MOLDED CASE CIRCUIT BREAKERS

Handle Mechanisms



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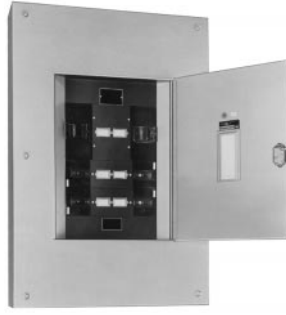


PRODUCT DESCRIPTION

Panelboards and switchboards are enclosed assemblies for lighting and distribution that accept incoming power and consist of a series of circuit breakers and/or fusible switches. These devices protect each circuit by providing overcurrent and short circuit protection.



Cutler-Hammer NFB



Cutler-Hammer MP40



Cutler-Hammer CHB



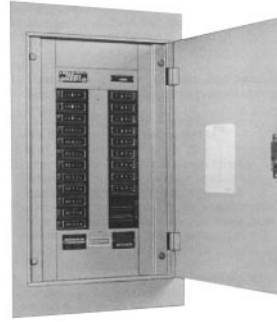
Cutler-Hammer EE



Westinghouse FDP



Westinghouse
Pow-R-Line 3



Westinghouse WEB



Westinghouse CDP

PRODUCT HISTORY

In 1994, Cutler-Hammer acquired the Distribution and Control Business Unit (DCBU) of Westinghouse. This product history tracks the evolution of panelboard and switchboard products for both manufacturers.

In the 1920s, prior to the development of circuit breakers, Westinghouse sold panelboards designed for main and branch circuit fuses. Circuit breakers were first introduced in 1927 and put Westinghouse in the forefront of circuit breaker technology. A few years later the first Westinghouse "NOFUSE" circuit breakers were introduced. "NOFUSE" panelboards were initially available in ratings up to 225 amperes at 250 volts. Panelboards were designed at higher ratings as circuit breaker ratings became available. By 1958, panelboards were available at ratings up to 800 amperes and 600 volts.

The most significant panelboard types were the CDP and FDP panels. For more than 34 years, these two types encompassed most Westinghouse molded case breakers and fusible switches.

In 1962, Cutler-Hammer entered the panelboard and switchboard market with the purchase of Mullenbach. Soon after the Mullenbach acquisition, Cutler-Hammer entered into an agreement with Westinghouse to supply breakers and fusible devices for panelboards and switchboards and Cutler-Hammer also began manufacturing Westinghouse type panelboards under the agreement. This relationship made in the early 1960s provided users of both trade name products access to aftermarket service for add-on branch devices and hardware. Classic Cutler-Hammer panelboards and switchboards were designed and listed for use with Westinghouse breakers.

In 1988, Westinghouse redesigned the panelboard and switchboard line to incorporate the new Series C design breakers. This new design became a true family of products. These new panelboards and switchboards became today's **Pow-R-Line Family** which are manufactured in state-of-the-art facilities strategically located throughout the United States.

Cutler-Hammer's unique Satellite plants support aftermarket services for all current **Pow-R-Line** panelboard and switchboard products. Aftermarket service for out-of-production panelboards and switchboards for both the classic Westinghouse and Cutler-Hammer designs is supported by the Aftermarket Center in Sumter, SC and is staffed with experienced and knowledgeable representatives.

NOTE: Switchboards manufactured by Cutler-Hammer and Westinghouse.



B

PRODUCT HISTORY TIMELINE		1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	Present
100	Westinghouse A2B		█												
	Westinghouse NM/NMM		█												
	Westinghouse NAIB		█	█	█	█	█	█	█						
100	Westinghouse NLAB		█	█	█	█	█	█	█						
100	Westinghouse NAB			█	█	█	█	█							
100	Westinghouse ABH			█	█	█	█	█							
100	Westinghouse NDP					█	█	█	█						
98	Cutler-Hammer CDP							█	█	█					
102	Westinghouse CDP/FDP					█	█	█	█	█	█	█	█	█	█
100	Westinghouse NQB/NQC/NQP							█	█	█	█				
100	Westinghouse NEB/NHEB							█	█	█	█				
101	Westinghouse WCA/WEB/WEHB/WFB/WGB/									█	█	█	█	█	█
98	WGHB									█	█	█	█	█	█
98	Cutler-Hammer CHP/CHB									█	█	█	█	█	█
103	Cutler-Hammer NFB									█	█	█	█	█	█
100	Cutler-Hammer MP40/MP100										█	█	█	█	█
103	Westinghouse B10B/Q10P											█	█	█	█
103	Cutler-Hammer PB												█	█	█
104	Cutler-Hammer PH													█	█
101	Cutler-Hammer EE														█
104	Westinghouse W10B/W10P														█
106	Cutler-Hammer EP														█
105	Westinghouse PRL3														█
	Westinghouse PRL1, PRL2														█
106	Cutler-Hammer PRL1a, 2a														█
107	Cutler-Hammer PRL3a														█
	Westinghouse PRL4B, F														█
105	Cutler-Hammer PRL5P														█
	Westinghouse PRL1, PRL2, PRL3, PRL4B, PRL4F														█



ORIGINAL CUTLER-HAMMER PANELBOARD BREAKER REPLACEMENT CHART

Cutler-Hammer Panelboard Type	Original Branch Circuit Breaker	REPLACEMENT SOLUTIONS		
		New Panelboard Type	New Breaker	Panelboard Replacement Breaker ^②
CHP ^①	CH	PRL1a	CH	—
CHB ^①	CHB	PRL1a	CHB	—
NPLAB ^①	P	PRL1a	—	—
NLAB ^①	QL	PRL1a	—	—
NA1B ^①	E EA	PRL3a PRL3a	—	RE REA
NH1B ^①	EH	PRL3a	—	REH
NDP ^①	E EA	PRL3a PRL3a	—	RE REA
HNDP ^①	EH	PRL3a	—	REH
NFB	EB	PRL3a or PRL4B	EHD	—
	EHB		EHD	—
	EHC		FD	—
	EC		EHD	—
	CA		CA	—
	CC		CC	—
	FB		FD	—
	HFB		FD	—
	FD		FD	—
	FC		FD	—
	FH		HFD	—
	FS		FD	—
	HFC		HFD	—
	CCH		—	—
	CHH		CHH	—
CDP ^③	E	PRL4B	—	RE
	EA		—	REA
	EH		—	REH
	EB		EHD	—
	EHB		EHD	—
	F		—	RF
	FA		—	RFA
	HF		—	RHF
	HFA		—	RHFA
	FB		FDB	—
	HFB		FD	—
	CA		CA	—
	DA		DK	—
	JA		KDB	—
	KA		KD	—
	HKA		HKD	—
	HK		—	RHK
	HKL		—	RHKL
	LA		LD	—
	HLA		LD	—
	LAB		LDB	—
	LM		—	RLM
	HLM		—	RHLM
	MA		MD	—
	HMA		MD	—
	NB		ND	—
	HNB		ND	—
CC	CC	—		
CCH	—	—		
CHH	CHH	—		

HOW TO SELECT REPLACEMENT BREAKERS

Cutler-Hammer offers a complete line of new, UL listed, physically and electrically interchangeable molded case circuit breakers.

To properly select the breaker for your existing panelboard:

1. Identify the panel type and existing branch breaker.
2. Select the appropriate breaker from the direct replacement solution column. As shown, three options are available.

Option 1: Series C breakers are available as direct replacement for installation in Cutler-Hammer panelboards. They are available at your local distributor's and are the most economic solution.

Option 2: Original, but still-in-production breakers, (sometimes referred to as replacement breakers) are available from Cutler-Hammer's national warehouse. These are identical to the existing branch breakers.

Option 3: Panelboard replacement breakers, available for out-of-production molded case breakers, are physically and electrically interchangeable with the existing breaker.

3. For additional information, contact your local Cutler-Hammer Field Sales Office or the Customer Support Center.

① Connectors not available.

② New breakers which are a direct physical and electrical replacement for out-of-production breakers.

③ Not rated for 100% rated breakers.



PANELBOARDS

General Information

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B

ORIGINAL CUTLER-HAMMER PANELBOARD BREAKER REPLACEMENT CHART

Cutler-Hammer Panelboard Type	Original Branch Circuit Breaker	REPLACEMENT SOLUTION	
		New Panelboard Type	New Breaker
MP40	CC	PRL4B	CC
	CCH		—
	CHH		CHH
	EB		EHD
	EHB		EHD
	EC		EHD
	EHC		FD
	FB		FDB
	HFB		FD
	FC		FDB
	HFC		HFD
	FH		HFD
	FS		FD
	JA		KDB
	JB		JB
	JS		HJD
	JH		HJD
	JL		JDC
	KA		KD
	HKA		HKD
	KB		JD
	HKB		JD
	KS		KD
	KH		KD
	DA		DK
LA	LD		
HLA	LD		
HLA	LD		
LAB	LDB		
LB	KD		
LBB	KDB		
HLB	KD		
LC	LD		
LS (A)	LD		
LH (A)	HLD		
MA	MD		
HMA	MD		
MC	MD		
HMC	MD		
MS	MD		
MH	MD		
NB	ND		
HNB	ND		
NC	ND		
HNC	ND		
NS	ND		
NH	ND		
MP100	M50 Fusible Switch	PRL4F	M50 Fusible Switch
PH	CH	PRL3a	CH
	CHB		CHB
	CC		CC
	CCH		CCH
	CHH		CHH
	EB		EHD
	EHB		EHD
	EC		EHD
	EHD		EHD
	FC		FD
	FS		FD
	FH		HFD
	FD		FD
PB❶	CH	PRL1a	CH
	CHB		CHB

PLUG-IN POWER PANELBOARDS AND SWITCHBOARDS

Cutler-Hammer Panelboard Type	Original Branch Circuit Breaker	New Panelboard Type	New Breaker
EE❷	FS	PRL5P	FD
	FH		HFD
	FL		HDC
	JS		JD
	JH		HJD
	JL		JDC
	KS		KD
	KH		HKD
	LS		LD
	LS(A)		LD
	LS(E)		LD
	LH(B)		HLD
	LH(A)		HLD
	LL(E)		LDC
	LS(B)		LD
	LH(E)		HLD
	MS		MD
	NS		ND
	MH		—
	CC		CC
CCH	—		
CHH	CHH		
EP❷	FS	PRL5P	FD
	FH		HFD
	FL		FDC
	JS		JD
	JH		HJD
	JL		JDC
	KS		KD
	KH		HKD
	LS		LD
	LS(A)		LD
	LS(E)		LD
	LH(B)		HLD
	LH(A)		HLD
	LL(E)		LDC
	LS(B)		LD
	LH(E)		HLD
	MS		MD
	NS		ND
	MH		—
	NH		HND
CC	CC		
CCH	—		
CHH	CHH		

❶ Connectors not available.
 ❷ Not rated for 100% rated breakers.



ORIGINAL WESTINGHOUSE PANELBOARD BREAKER REPLACEMENT CHART

Westinghouse Panelboard Type	Existing Branch Circuit Breaker	REPLACEMENT SOLUTIONS		
		New Panelboard Type	New Breaker	Panelboard Replacement Breaker ^❶
Panelboards Manufactured Between 1937 and 1988				
ABH ^❷ A2B ^❷ B10B ^❷ B10B-LX ^❷ B10B-LXX ^❷ B65B ^❷ CDP/HCDP ^❷	E E BA BA BA HBA E, EA, EH F, FA	PRL3a PRL3a PRL1a PRL1aLX PRL1aLX PRL1a PRL4B	— — BAB BAB BAB — — —	RE RE — — — HBAW, HBAX RE, REA, REH RF, RFA
CDP/HCDP ^❷	EB, EHB, EHD, FB, HFB, FDB, FD, HFD, FDC FB-P TRI-PAC JB, KB, HKB, JDB, JD, HJD, JDC CA, CAH, HCA DA, LB, LBB, HLB ^❸ JA, KA, HKA, DK, KD, HKD, KDC LA, LAB, HLA (400A) LA-P TRI-PAC LA, LC, HLA (600A) MA, HMA, MC, HMC LCL NB, HNB, NC, HNC NB-P TRI-PAC	PRL4B	EHD FDB, FD, HFD, FDC FB-P TRI-PAC JDB JD, HJD, JDC ED, EDH, EDC ❹ DK, KD, HKD, KDC LD, HLD LA-P TRI-PAC LD, HLD, LDC MDS LCL ND, HND NB-P TRI-PAC	Contact your local Cutler-Hammer Field Sales Office.
FDP	Fusible Switches	PRL4F		Fusible Switches
H10P ^❷ H10B ^❷ NAB ^❷ NAIB ^❷ NDP ^❷ NEB ^❷ NHDP ^❷ NHEB ^❷ NHIB ^❷	HQP BA E E E, EA, EAH EA EH EH, FA E-277	PRL2a PRL2a PRL3a PRL3a PRL3a PRL3a PRL3a PRL3a PRL2a	HQP BAB	RE RE RE, REA, REH REA REH REH, RFA RE
NLAB ^❷ NLAB-LX ^❷ NLAB-AB ^❷ NLAB-ABH ^❷ NPLAB ^❷ NPLAQ ^❷ NQC ^❷	QC QC QC QC QP QP QC	PRL1a PRL1aLX PRL3a PRL3a PRL1a PRL1a PRL1a	HQP HQP	— — — — — — —

❶ Not Rated for 100% rated breakers.

❷ Connectors not available.

❸ Only breakers of the same frame size can be installed across from each other (i.e. in the same horizontal plane).
For other configurations, call **1-800-556-4569**.

❹ KD breakers can be mounted across from LB breakers if a TAD3 line side adapter is utilized. All hardware works with this configuration.



ORIGINAL WESTINGHOUSE PANELBOARD BREAKER REPLACEMENT CHART

Westinghouse Panelboard Type	Original Branch Circuit Breaker	REPLACEMENT SOLUTIONS		
		New Panelboard Type	New Breaker	Panelboard Replacement Breaker
Panelboards Manufactured Between 1937 and 1988, Continued				
NQB❶ NQP❶ Q10P❶ Q22P❶ Q22B❶ Q65P❶ W10B❶ W10P❶ W22B❶ W22P❶ WCA WEB WEHB WFB WGB❶ WGHB❶	BA QP QP QPH QBH HP BA HQP QBH QPH CA EB EHB FB GB GHB	PRL1a PRL1a PRL1a PRL1a PRL1a PRL2a PRL1a PRL1a PRL1a PRL1a PRL3a PRL3a PRL3a PRL3a PRL2a PRL2a	BAB HQP HQP QPHW QBHW QHPW BAB HQP QBHW QPHW CA EB, EHD EHB, EHD FB, FDB GB GHB	
Panelboards Manufactured After 1988				
PRL1❷	BAB, QBHW HQP, QPHW	PRL1a	BAB, QBHW	
PRL2❷	GB, GHB, GHBS	PRL2a	GB, GHB, GHBS-D	
PRL3❷	BAB, QBH GB, GHB, GHBS EHD, FD, FDB, HFD, FDC ED, EDH, EDC CA, HCA, CAH	PRL3a	BAB, QBHW GB, GHB, GHBS-D EHD, FD, FDB, HFD, FDC ED, EDH, EDC CA, HCA, CAH	
PRL4B❷	EHD, FD, FDB HFD, FDC ED, EDH, EDC CA, CAH, HCA FCL, FB-P, FDB/LFB JD, JDB, HJD, JDC DK, KDB, KD, HKD, KDC LCL LA-P TRI-PAC LC, HLC, LA, HLA LD, HLD, LDC MD, MDS ND, HND, NDC MC, HMC, MA, HMA NC, HNC, NB, HNB NB-P TRI-PAC BAB, QBGF, QBHW, QBHGF, GB, GHB	PRL4B	EHD, FD, FDB HFD, FDC ED, EDH, EDC CA, CAH, HCA FCL, FB-P, FDB/LFB JD, JDB, HJD, JDC DK, KDB, KD, HKD, KDC LCL LA-P TRI-PAC LC, HLC, LA, HLA LD, HLD, LDC MD, MDS ND, HND, NDC MC, HMC, MA, HMA NC, HNC, NB, HNB NB-P TRI-PAC BAB, QBGF, QBHW, QBHGF, GB, GHB	
PRL4F❷	Fusible Switches❸	PRL4F		Fusible Switches

❶ Connectors not available.
 ❷ Current product offering sold under Cutler-Hammer trade name.
 ❸ 400A, 600A, 800A, 1200A FDP connectors are **NOT** compatible with FDPW switches.



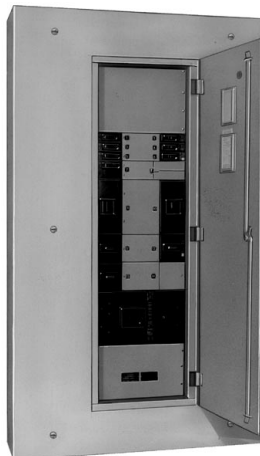
CDP/FDP

Originally a Westinghouse Product

The panel layouts shown on this and the following pages will aid in determining the space available for the addition of molded case circuit breakers and fusible switches into your Cutler-Hammer panelboards.

- Determine the amount of space available in the panelboard for adding circuit breakers.
- 1-3/8 inches of panel height = one X space
- Determine the type of breaker needed for the required amp rating and number of poles.
- Panel layouts shown aids in determining the space available for adding breakers to CDP/HCDP panels or fusible switches for FDP panelboards. First determine the available space for additions. Determine height of new device per layout. Order breaker hardware from RPD 31-480. Complete breaker retrofit kits are available which include breaker, connectors and hardware from the Sumter, SC Aftermarket Center. (1-800-556-4569)

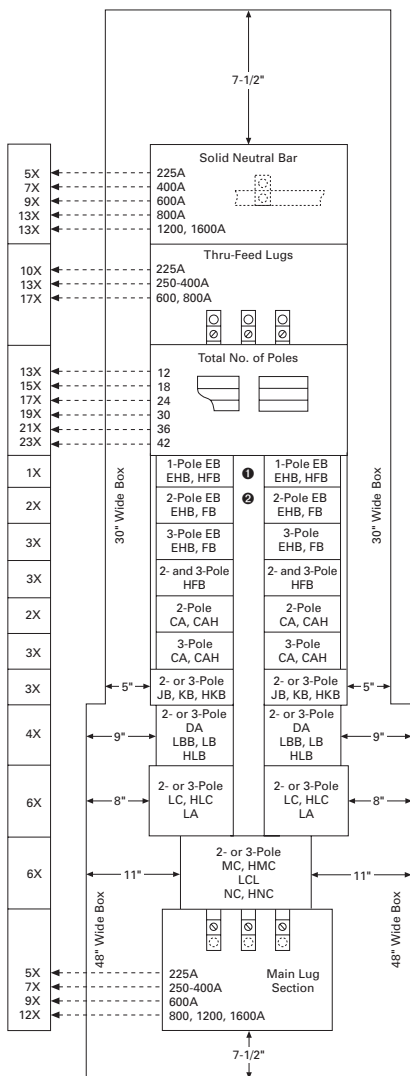
Ratings: 1600A Maximum
Replacement Devices: Breakers and Fusible Switches



Westinghouse CDP

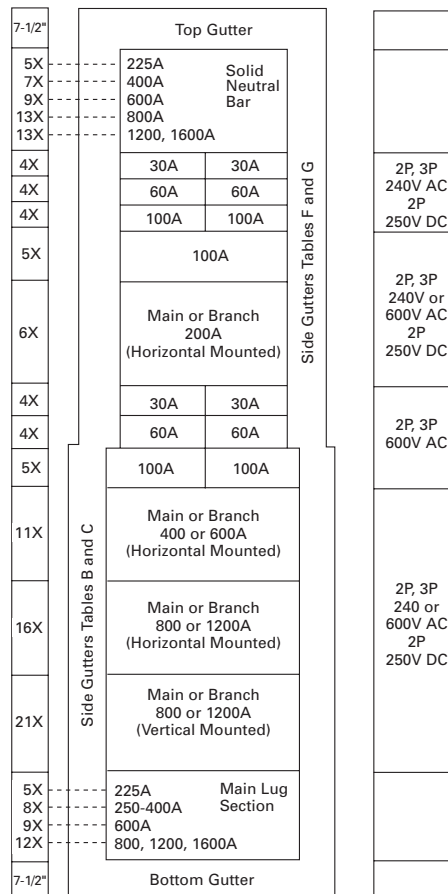


Westinghouse FDP



CDP Panel Layout

One X space = 1-3/8 inches.
Blank fillers are required for unused x spaces.



FDP Panel Layout

- When only one EB, EHB, or HFB single pole breaker is required in conjunction with other frame size breakers, the single pole breaker space required changes from 1X to 2X.
- Must use 3-pole connector kit.



B

PB/PH/PH-L

Originally a Cutler-Hammer Product



15 or 21 inches wide
Cutler-Hammer PB



21 or 26 inches wide
Cutler-Hammer PH

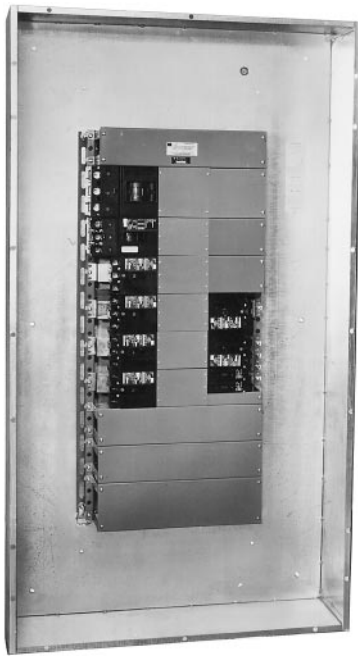


21 inches wide
Cutler-Hammer PH-L

Refer to RPD 31-470 for more information on the PB, PH, and PH-L.

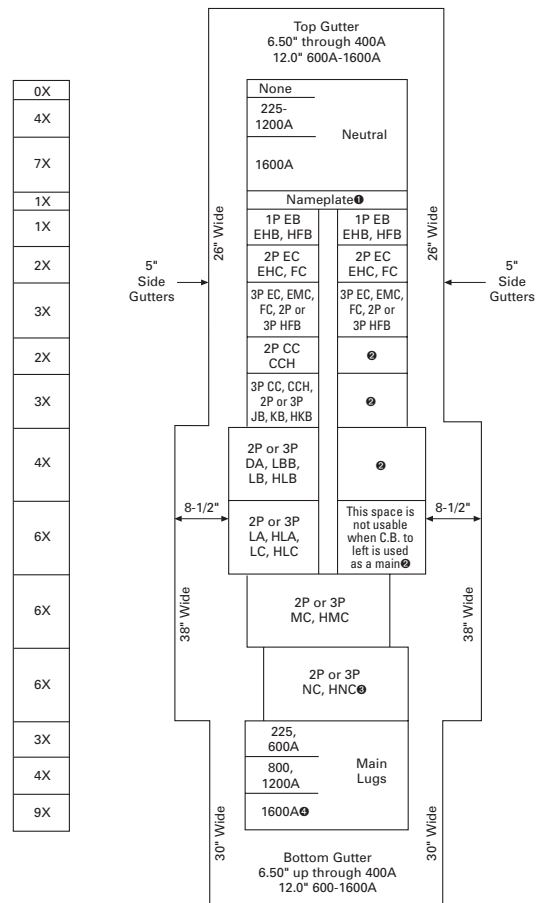
MP40

Originally a Cutler-Hammer Product



Cutler-Hammer MP40

Refer to RPD 31-460 for more information on Cutler-Hammer MP-40 panelboards.



Panel Layout

- ① If the panelboard has a main breaker, no neutral, no split bus, or no sub feed or feed through lugs, add 1X to provide space for a nameplate.
- ② Breakers of the same frame size, regardless of poles, may be mounted opposite of each other.
- ③ Only Type NC and HNC breakers require a 11.38 inch deep box. Standard box depth is 10.50 inches.
- ④ When 1600A Lug Mains are for (4)-600MCM maximum copper cables per phase, the X unit space can be reduced to 4X.

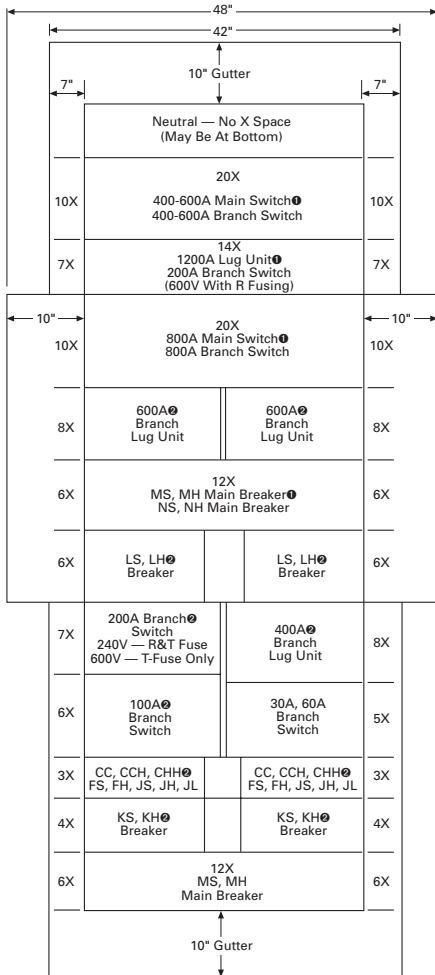


EE

Originally a Cutler-Hammer Product



Cutler-Hammer EE Panelboard



Panel Layout

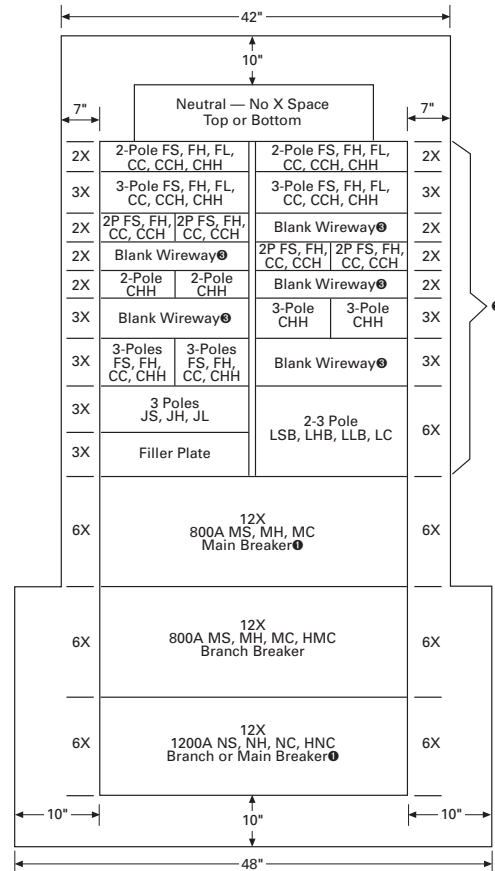
Refer to RPD 31-470 for more information on the Cutler-Hammer EE panelboard.

EP

Originally a Cutler-Hammer Product



Cutler-Hammer EP Panelboard



Panel Layout

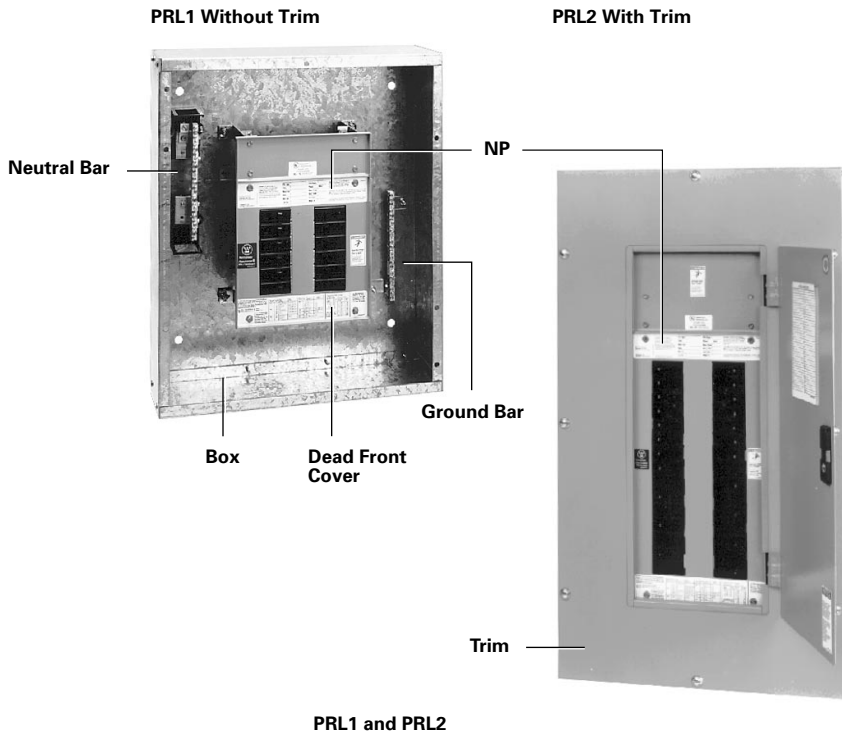
Refer to RPD 31-470 for more information on the Cutler-Hammer EP panelboard.

- ❶ Main device must be mounted at neutral end of double-bus panel.
- ❷ May be used in 30 inch wide single bus interiors.
- ❸ Blank wireway fillers are required opposite any dual breaker unit or adapter.



PRL1 AND PRL2 PANELBOARDS

Originally a Westinghouse Product



PRL1 and PRL2

REPLACEMENT CAPABILITIES

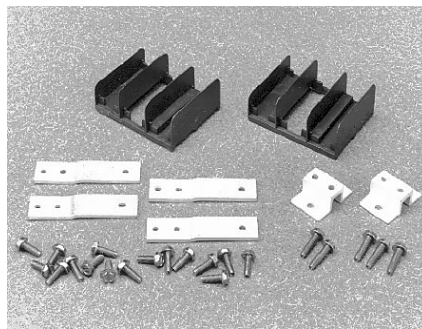
The Aftermarket Center in Sumter, SC offers a wide variety of Cutler-Hammer parts to support its installed base of panelboards and switchboards.

The parts available include:

- Panelboard Connector Kits
- Breaker Mounting Hardware
- Breaker Plug-in Units and Retrofit Kits
- Trims and Covers
- Lugs and Lug Landing Kits
- Neutral and Ground Bars
- Trim Locks
- Back Boxes
- Back Box Endwalls
- Trims
- Neutrals
- Ground Bars
- Isolated Ground Bars
- Branch Deadfront Covers
- Main Breakers
- Branch Breakers
- Branch Breaker Connector Kits

For more information, contact your local Cutler-Hammer Field Sales Office or call the Sumter Aftermarket Center at **1-800-556-4569**.

Connector Kits



Each kit contains two sets of A, B, and C phase connectors, phase isolators, hardware and instructions for mounting up to 12 poles. Silver plated copper connectors are suitable for use with copper or aluminum bus. Maximum amperes connected to any one connector cannot exceed 140A.

Panel Type	Catalog Number
PRL1	KPRL1BAB
PRL2	KPRL2GHB

If a connector strap kit is not available and connectors are required to install a replacement breaker, in most cases, the customer should replace the entire panel. Any breakers, connectors, and parts from the old panel that are in usable condition should be retained for repair of other panels of the same type and vintage.



PRL3

Originally a Westinghouse Product



Westinghouse PRL3

No Neutral	2X 100-600A	
Neutral Section	2X 100, 225A	
	8X 400, 600A	
Sub Chassis		
	Poles 10X-12 } 13X-18 } 15X-24 } 17X-30 } 19X-36 } 21X-42 }	
	} BABⓈ } QBHⓈ } GBⓈ } GHBⓈ	
	} (100A Max.)	
	400 Amp Maximum Bus Rating	
	1-Pole } 2-Pole } 1-Pole } 2-Pole }	1X EHD (100A Max.) 2X } } FDB } FD } HFD } FDC 3X }
2- and 3-Pole	3X CA, CAH, HCA (225A Max.)	
Main Lug Section	2X 100, 225A 7X 400, 600A	
Horizontal Mounting	3X 2P EHD (100A Max.) 3X 2P FDB, FD, HFD, FDC (150A Max.) 4X 3P EHD (100A Max.) 4X 3P FDB, FD, HFD, FDC (150A Max.)	
	4X 2P & 3P CA, CAH, HCA (225A Max.)	
Main Breaker Section	7X EHD (100A Max.) 7X FDB, FD, HFD, FDC (150A Max.) 9X CA, CAH (225A Max.) 9X FCL, FB-P (100A Max.)	
	14X JD, JDB, HJD, JDC (250A Max.) 14X DK, KD, KDB, HKD, KDC (400A Max.) 19X LC, HLC, LA (600A Max.) 22X LCL, LA-P (400A Max.)	

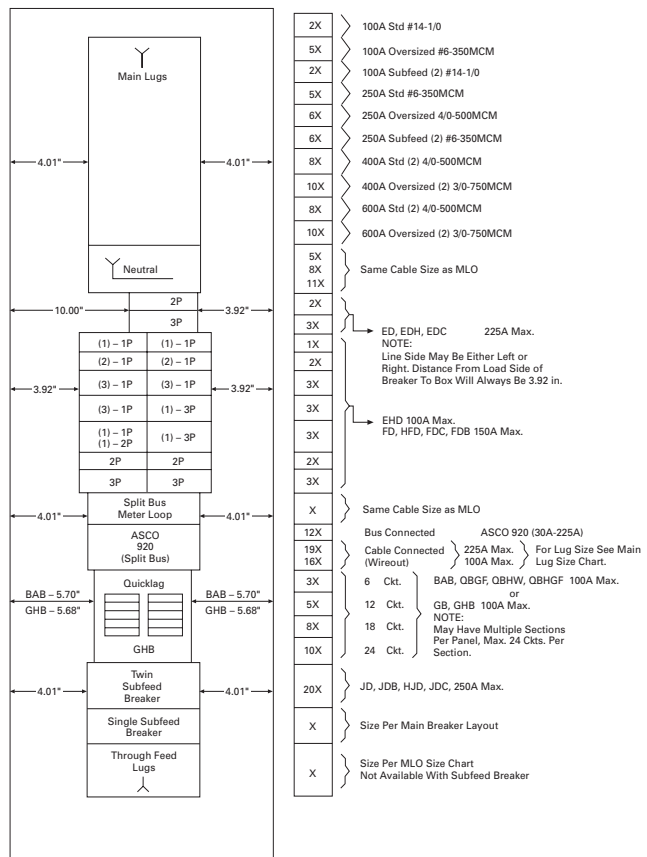
Panel Layout

Refer to RPD 31-490 for more information on the Westinghouse Pow-R-Line 3.

PRL3a



Cutler-Hammer/
Westinghouse PRL3a



Panel Layout

Refer to RPD 31-490 for more information on the Cutler-Hammer/Westinghouse Pow-R-Line 3a.

- ❶ If panel contains only BAB or QBH branch breakers, use a PRL1 panelboard.
- ❷ BAB and QBH breakers with shunt trips require one additional pole space, i.e.; 1-pole is 2-pole size, 2-pole is 3-pole size and 3-pole is 4-pole size.
- ❸ GB, GHB breakers cannot be mixed on same subchassis as BAB, QBH.
- ❹ If panel contains only GB or GHB branch breakers, use a PRL2 panelboard.
- ❺ Not recommended for motor loads. Use JD circuit breaker.

- ❻ Horizontally mounted 15 through 150 ampere main breakers EHD, FDB, FD, HFD, FDC, will be furnished as branch breaker construction. Branch breakers 1, 2 or 3 poles as required, may be located opposite these main breakers.
- ❼ FBP and LAP top mounting only.
- ❽ 100% rated breaker.
- ❾ LCL main breaker requires 6-1/2-inch deep box.



B

PRL4B/PRL4F

Originally a Westinghouse Product

The panel layouts shown on this and the following pages will aid in determining the space available for the addition of molded case circuit breakers and fusible switches into your Cutler-Hammer panelboards.

- Determine the amount of space available in the panelboard for adding circuit breakers.
- 1-3/8 inches of panel height = one X space
- Determine the type of breaker needed for the required ampere rating and number of poles.
- Panel layouts shown aids in determining the space available for adding breakers to PRL4B panels or fusible switches for PRL4F panelboards. First determine the available space for additions. Determine height of new device per layout. Order breaker hardware from RPD 31-490. Complete breaker retrofit kits are available which include breaker, connectors and hardware from the Sumter Aftermarket Center. (1-800-556-4569)

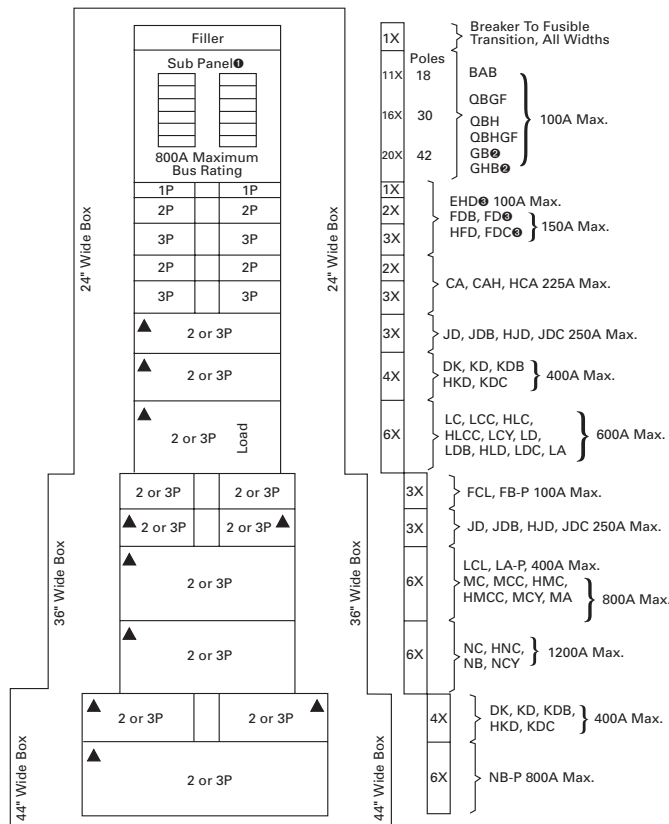
Ratings: 1200A Maximum
Replacement Devices: Breakers and Fusible Switches



Westinghouse PRL4B

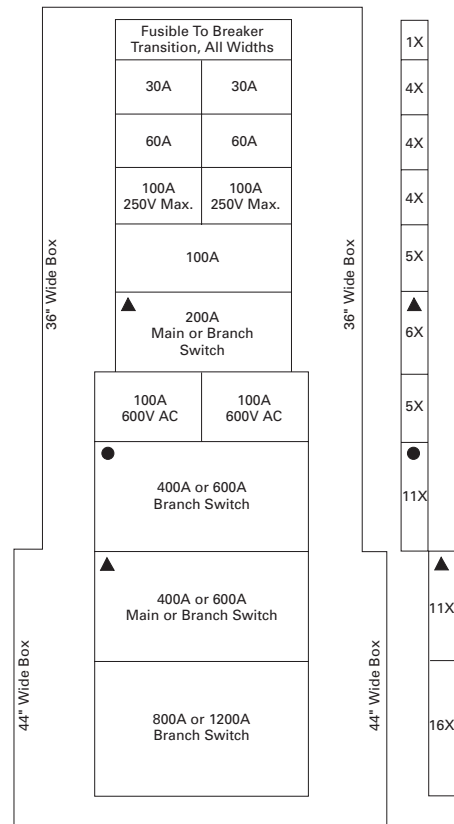


Westinghouse PRL4F



PRL4B Panel Layout

One X space = 1-3/8 inches.
Blank fillers are required for unused x spaces.



PRL4F Panel Layout

① Maximum amperes connected to any one connector cannot exceed 140 amperes.
 ② GB, GHB breakers cannot be mixed on the same subchassis as BAB, QBHW.
 ③ When only one single pole breaker of the group is required on either side of chassis, the single pole breaker space required changes from 1X to 2X.



CLIPPER POWER SYSTEM



Clipper Power System
Transient Voltage Surge Suppressor

Description

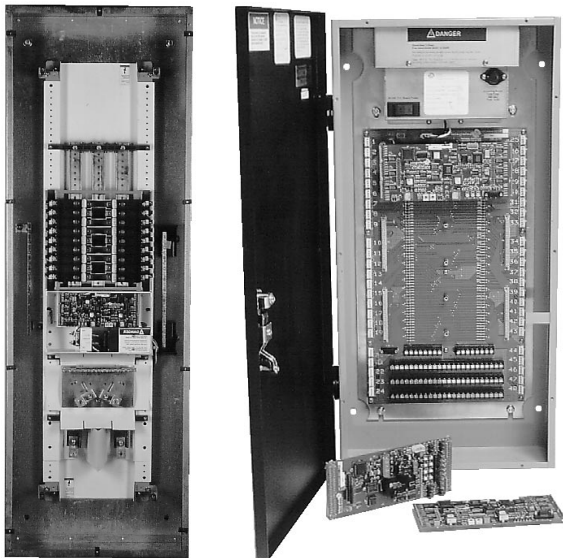
The Clipper Power System is a hybrid Transient Voltage Surge Suppressor (TVSS) used to protect sensitive electronic equipment from the damaging effects of voltage transients and electrical line noise. The Clipper's hybrid design combines both suppression and filtering elements to provide best in class performance. Field installation is required.

Benefits

- Clipper can be externally mounted to existing distribution equipment
- Five models – 90kA, 120kA, 160kA, 250kA and 400kA
- Standard NEMA 12 enclosure, optional NEMA 4
- Surface or flush mounting
- Full range of diagnostic options including the Tri-Monitor™
- Five year warranty

For more information about Clipper Power Systems, contact your local Cutler-Hammer Field Sales Office.

POW-R-COMMAND



Pow-R-Command
Lighting Control

Description

Pow-R-Command is a microprocessor-based lighting control system designed for today's modern facilities. The system may be utilized as a stand alone or networked as a system for the control of lighting and other branch circuits.

System Features Include:

- Day/Date/Time of Day Scheduling
- Holiday Scheduling - up to 30 days/year
- Astronomical Time Scheduling
- Real Time Clock
- Hardware Diagnostics
- Off Warning by Blinking Lights
- Manual Load Override Control
- Brownout and Power Failure Recovery
- Telephone Override of Schedules
- Switch Override of Schedules
- Remote Access to System
- Dimming Systems for Fluorescent Fixtures
- Priority Load Management

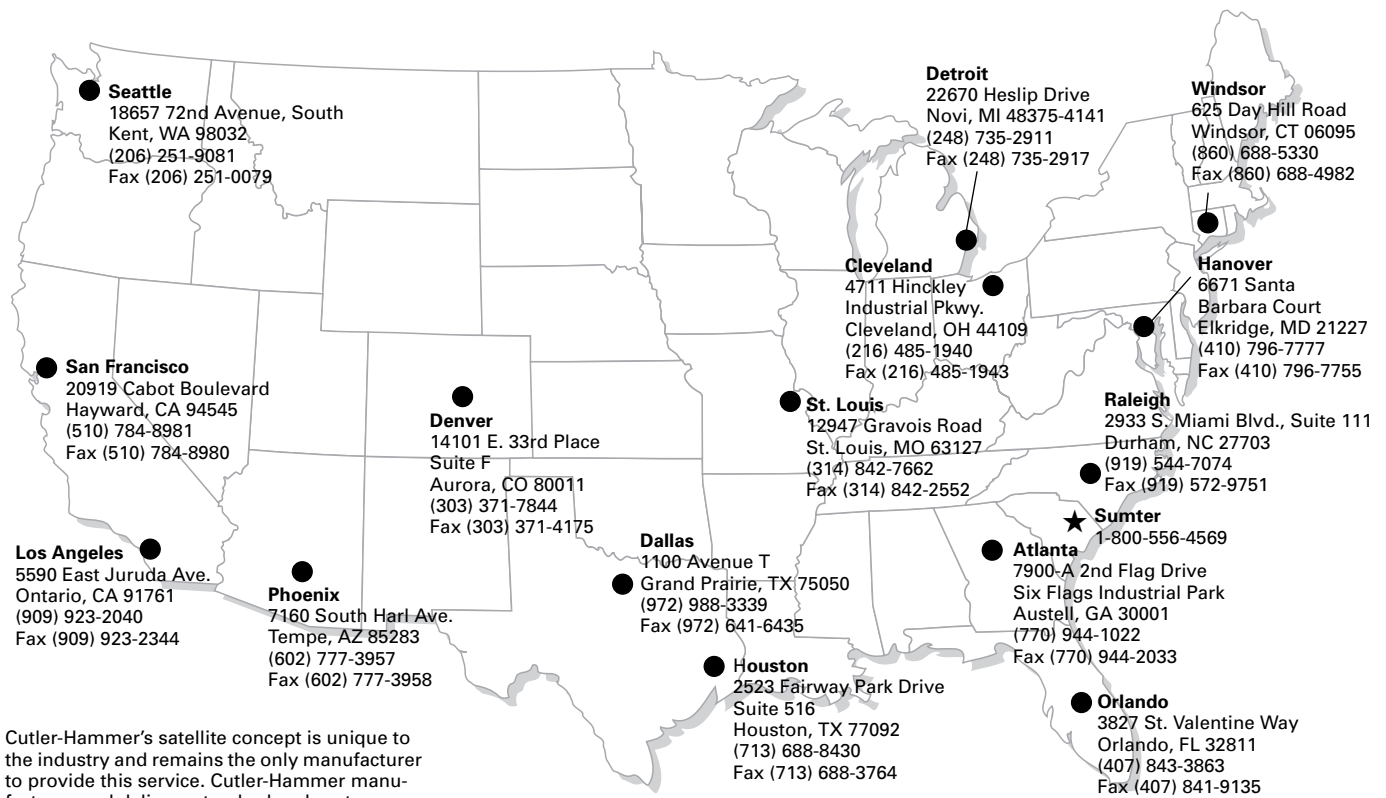
Existing facilities can be retrofitted to include various **Pow-R-Command** scenarios allowing customers varying degrees of control. For more information on upgrading your building to include the energy savings and control of **Pow-R-Command**, contact your local Cutler-Hammer Field Sales Office.



B

PRODUCT SUPPORT SERVICES

Satellite Locations



Cutler-Hammer's satellite concept is unique to the industry and remains the only manufacturer to provide this service. Cutler-Hammer manufactures and delivers standard and custom assembled panelboards and switchboards within days. A phone call is all that is necessary for immediate order entry.

★ Main manufacturing plant

FURTHER INFORMATION

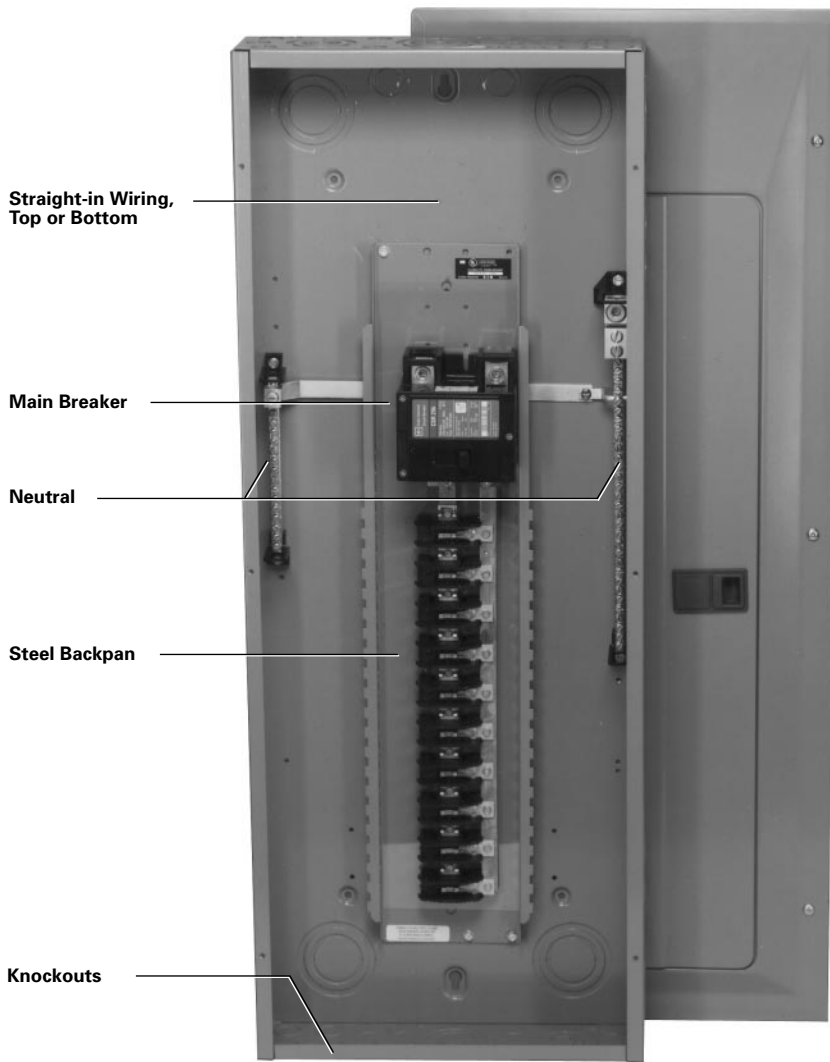
Literature Number	Description
RP.38F.03.T.E	Renewal Parts Data for MP40, MP200
RP.38F.03.T.E	Renewal Parts Data for PB, PH, PH-L, EP, EE
RP.38F.02.T.E	Renewal Parts Data for CDP/HCDP, FDP, PRL1LX, PRL1, PRL2, PRL3
RP.38F.01.T.E	Renewal Parts Data for PRL1A, PRL2A, PRL3A, PRL4B, PRL4F, PRL5P
SA-12033A	Sales Aid for Pow-R-Line 3a
SA-156	Sales Aid for TVSS
SA-155A	Sales Aid for Pow-R-Command
SA-302	Sales Aid for Pow-R-Line 5P
SA-268	Sales Aid for Instant Switchboards

PRICING INFORMATION

Literature Number	Description
PL.38F.03A.P.E	Price List for MP40, MP200
PL.38F.03A.P.E	Price List for PB, PH, PH-L, EP, EE
PL.38F.02A.P.E	Price List for CDP/HCDP, FDP, PRL1LX, PRL1, PRL2, PRL3
PL.38F.01A.P.E	Price List for PRL1A, PRL2A, PRL3A, PRL4B, PRL4F, PRL5P
	Discount Symbol CE9



PRODUCT DESCRIPTION



Main Breaker Loadcenter

Loadcenters are enclosed assemblies used for power distribution and circuit protection in residential, commercial and light industrial applications. The assembly consists of a box, an interior assembly and a trim. The interior assembly consists of a backpan where the bus assembly is mounted. Incoming power is terminated at main lugs or a main circuit breaker. Load circuit protection is provided by molded case circuit breakers which plug onto the bus assembly. Loadcenters are used on services providing no more than 240 VAC, and are available with bus rated from 40 to 600 amperes. Loadcenter covers are available as surface, flush or combination.

PRODUCT HISTORY

CH Family

Cutler-Hammer began manufacturing the CH series of loadcenters and circuit breakers in 1962. Many changes occurred over the years due to code changes, UL Listed requirements and product enhancements. Three major design changes occurred in 1969, 1982 and 1995. The 3/4-inch wide feeder circuit breakers, bolted copper bus, Sandalwood (tan) painted box and industry-leading warranties have been the trademarks of this premium product through the years.

BR Family

With the acquisition of Westinghouse's Distribution and Control Business Unit in 1994, Cutler-Hammer gained the circuit breaker and loadcenter manufacturing and marketing operations of Westinghouse. Prior to 1989, these products were manufactured by Westinghouse's Bryant subsidiary in Bridgeport, CT. The products from this facility bore the Westinghouse and Bryant nameplates. In 1988, Westinghouse purchased Challenger Electric, redesigned the product, and moved all production from Bridgeport to Jackson, MS. As Cutler-Hammer integrated the product lines in 1995, all loadcenter production shifted to the Lincoln, IL facility.

To achieve economies of scale, the product line was completely redesigned and is currently marketed as the Cutler-Hammer type BR 1-inch loadcenter. Though redesigned, it retained many of its unique characteristics. The product features aluminum bus as standard with optional copper bus available on limited styles. The bus is cut and formed to produce the breaker stabs. The current design also maintains the use of the Westinghouse (previously Bryant) breakers familiar to many by the characteristic color-coded handles. The different color handles indicate the various ampacities of the breakers.



C

PRODUCT HISTORY TIMELINE

Originally a Cutler-Hammer Product 3/4-Inch Non-Interchangeable Product Line										
Type	Design Features	1960	1965	1970	1975	1980	1985	1990	1995	Present
Current Vintage (CH)❶	Door latch is tan plastic, twin neutrals									
Vintage-1 (CH1)❶	Metal latch, single neutral									
Vintage-2 (CH2)❶	Cover catalog numbers CH7_S or F (Blank is 1 letter indicating box size i.e. B,C,D,E,G,J,K)									
Originally a Westinghouse Product 1-Inch Interchangeable Product Line										
Type	Design Features	1960	1965	1970	1975	1980	1985	1990	1995	Present
Current Vintage (BR)❶	Catalog numbers start w/"BR" or "3BR"									
Vintage-1 (BR1)❶	Twin neutral, combination trim									
Vintage-2 (BR2)❶	Single neutral, combination trim									
Vintage-3 (BR3)❶	Single neutral, surface or flush trim									

REPLACEMENT CAPABILITES

Part❶	Loadcenter Generations						
	CH	CH1	CH2	BR	BR1	BR2	BR3
Breakers	●	●	●	●	●	●	●
Surge Arrestors	●	●	●	●	●	●	●
Covers	●	●		●	●		
Deadfronts (NEMA 3R)	●	●		●	●		
Door Assemblies (NEMA 3R)	●	●		●	●		
MCB Kits	●	●		●	●		
Neutral Bars	●	●	●	●	●	●	●
Ground Bars	●	●	●	●	●	●	●
Breaker Accessories	●	●	●	●	●	●	●
Labels	●	●	●	●	●	●	●
Lugs	●	●		●	●		
Door Locks	●			●			
Door Latches	●			●			
Paint	●	●	●	●	●	●	●
Closure Plates	●	●	●	●	●	●	●
Hubs	●	●		●	●		
Spare Parts Kit	●			●			

FURTHER INFORMATION

Literature Number	Description
Catalog 25-000	CH Quick Selector Guide
Catalog 30-320	Cutler-Hammer Residential Products (CH)
Catalog 30-325	Cutler-Hammer Residential Products (BR)
LATER	Renewal Parts Data for Standard Products

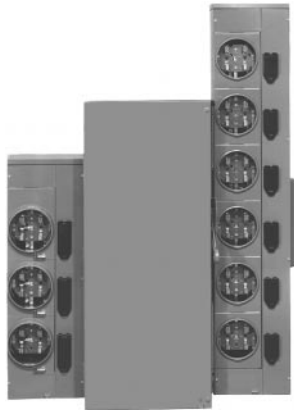
PRICING INFORMATION

PAD	Pricing and Availability Digest
VISTA/VISTALINE	Discount Symbol 22-CD

❶ CH and BR are the current product designations. CH1, CH2, BR1, BR2, and BR3 are used only to identify previous generations of the product described in the replacement capabilities chart above. These are not actual product designations.
 ❷ Catalog number of loadcenter required to obtain correct part.



PRODUCT DESCRIPTION



WCG3 Meter Center

Meter centers are designed for use where an individually metered distribution center is required. Meter centers house meter sockets which measure power consumption at service entrances. Metering is designed for use with multi-family dwelling units, commercial units and light industrial application.

PRODUCT HISTORY

In the beginning, all multiple metering applications were assembled on the job site using wire troughs, individual meter sockets and enclosed circuit breakers.

In the early 1960s, factory assembled meter packs began to be made on a job-by-job basis. Soon after, modular metering was introduced for 1-phase 200 ampere max. ring style applications.

In 1981, a few utilities began to require ringless meter covers and in 1983 the first 3-phase commercial meter modules with lever type bypass were introduced.

The Westinghouse Meter Center designs, type WM and/or WP, and facilities were sold to Thomas and Betts in 1994. Today, wall hung multiple metering is used in virtually all areas of the country for both

residential and commercial applications. Main ratings range from 250 to 2000 ampere and 125, 200 and 320 ampere sockets are available in both 1-phase and 3-phase versions.

PRODUCT HISTORY TIMELINE

Product	1970	1975	1980	1985	1990	1995	Present	
Westinghouse QS, QP		█						
Cutler-Hammer CG2, 4		█						
Cutler-Hammer CG3, 5, 7, 9, 11			█					
Westinghouse WM, WP					█			
Cutler-Hammer/Westinghouse WCG3, 5, 7, 9, 11						█		

REPLACEMENT CAPABILITIES

	CG3	CG5	CG7	CG9	CG11	WCG3	WCG5	WCG7	WCG9	WCG11
Accessories	●	●	●	●	●	●	●	●	●	●
Covers	●	●	●	●	●	●	●	●	●	●
Jaws	●					●	●			
Bus End Caps	●		●	●	●	●		●	●	●
Tenant Breaker Hinged Cover	●	●	●	●	●	●	●	●	●	●
Drip Hoods			●	●	●	●	●	●	●	●
Socket Replacement	●	●	●	●		●	●	●	●	

FURTHER INFORMATION

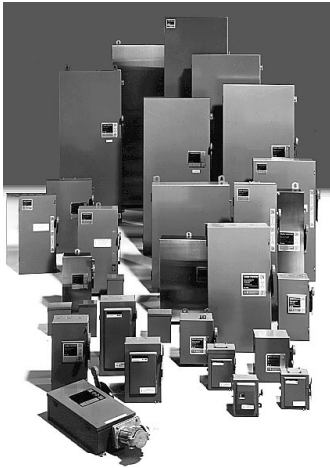
Literature Number	Description
TIP WCG3	Technical Information Publication (Application and Dimensions)
TIP WCG3-M	Technical Information Publication (Application and Dimensions)
TIP WCG5	Technical Information Publication (Application and Dimensions)
TIP WCG7/9	Technical Information Publication (Application and Dimensions)
Template SA-168	Layout Template
LATER	Renewal Parts Data for Standard Products

PRICING INFORMATION

PAD	Pricing and Availability Digest
VISTA/VISTALINE	Discount Symbol 22-CD



PRODUCT DESCRIPTION



Low Resolution Photo

Safety switches have a number of applications from service entrance to branch circuit protection. They are also horsepower rated for use as motor circuit switches. Safety switches offer a wide variety of switching capabilities with General Duty, Heavy Duty and Double Throw Switches.

Family of Safety Switches

PRODUCT HISTORY

Cutler-Hammer began manufacturing safety switches with the 4103 line in 1957. In 1977, the new 4105 line was moved from the New York plant to the manufacturing facility in Lincoln, IL. The last design change came in 1983, where the manufacture of the new K-Series switch was moved to our Cleveland, TN facility. The K-Series design represents our current product offering and is still manufactured

at the Cleveland plant. The Westinghouse safety switch design and facilities were sold to Thomas and Betts in 1994. Prior to this, there were various design and code changes which caused changes in catalog numbering and utilization of the switches. In 1984, a "N" was added to the middle of the catalog numbers to signify the new National Electrical Code (NEC) regulations. During this time period,

Westinghouse's safety switches were manufactured in Beaver, PA. In 1989, the manufacture of the switches was moved to Vidalia, GA. There was then another code change in 1992 which necessitated another change in catalog numbering. The previous "N" in the middle of the catalog number was deleted for the 400 to 1200 ampere units.

PRODUCT HISTORY TIMELINE

Product	1955	1960	1965	1970	1975	1980	1985	1990	1995	Present
Cutler-Hammer 4103	█									
Cutler-Hammer 4105						█				
Cutler-Hammer K-Series							█			
Westinghouse HF365N (Bacalyte Base)							█			
Westinghouse HFN365N							█			
Westinghouse HF365N (Red Base) (400A – 1200A)									█	

REPLACEMENT CAPABILITIES

	K-Series
Operating Handle	●
Ground	●
Neutral	●
Fuse Base	●
Fuse Block	●
Line Shield	●
Operating Mechanism	●
Switching Base	●

FURTHER INFORMATION

Literature Number	Description
B1227	Safety Switch Binder (Trafford)
SA-12147	Rotary Switch Pocket Brochure
Catalog 30-320	Cutler-Hammer Residential Products (CH)
Catalog 30-325	Cutler-Hammer Residential Products (BR)
RPD 30-326	Renewal Parts Data for Standard Products

PRICING INFORMATION

PAD	Pricing and Availability Digest
VISTA/VISTALINE	Discount Symbol 22-CD



PRODUCT DESCRIPTION



Family of Dry-type Distribution Transformers

Dry-type distribution transformers are electrical devices that transfer energy by magnetic induction from one circuit to another. They are typically used to change the voltage in an electric power system from its distribution level to the proper level for practical and safe use.

Typical loads for dry-type distribution transformers include lighting, heating, air conditioning, fans and machine tools. Such loads are found in commercial, institutional, industrial and residential structures.

Different types of dry-type distribution transformers are used for various applications throughout facilities. Therefore, dry-type distribution transformers are classified in distinct product groups as follows: General Purpose-Resin Encapsulated, General Purpose-Ventilated, Energy Efficient, Shielded Isolation, Motor Drive Isolation, Non-Linear, Mini-Power Center, and Buck-Boost.

PRODUCT HISTORY

Originally a Westinghouse Product

The first transformer built in the United States was manufactured by Westinghouse Electric in 1892. It was a 2 kVA dry-type transformer. For over a century, Westinghouse manufactured numerous varieties of transformers for countless applications worldwide.

The Westinghouse design transformer is now available through Cutler-Hammer. Dry-type transformers, the workhorse of modern industry, are the foundation of modern AC power distribution. It is a transformer that solves the problems of maintenance, installation, safety and

efficiency by using air to cool the coils instead of liquids. Many older transformers, which in some cases pre-date the product families listed below, can be updated to the modern designs currently manufactured by Cutler-Hammer.

PRODUCT HISTORY TIMELINE

Type	1955	1960	1965	1970	1975	1980	1985	1990	1995	Present
DS-3	[Timeline bar from 1955 to Present]									
DT-3	[Timeline bar from 1955 to Present]									
MTA	[Timeline bar from 1960 to Present]									
MTC	[Timeline bar from 1960 to Present]									
EP	[Timeline bar from 1965 to Present]									
EPT	[Timeline bar from 1965 to Present]									
MPC	[Timeline bar from 1975 to Present]									
MD	[Timeline bar from 1975 to Present]									
KT	[Timeline bar from 1995 to Present]									

FURTHER INFORMATION

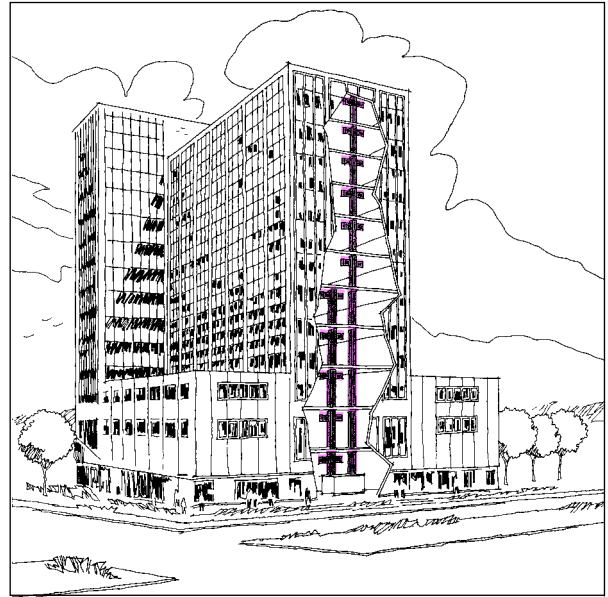
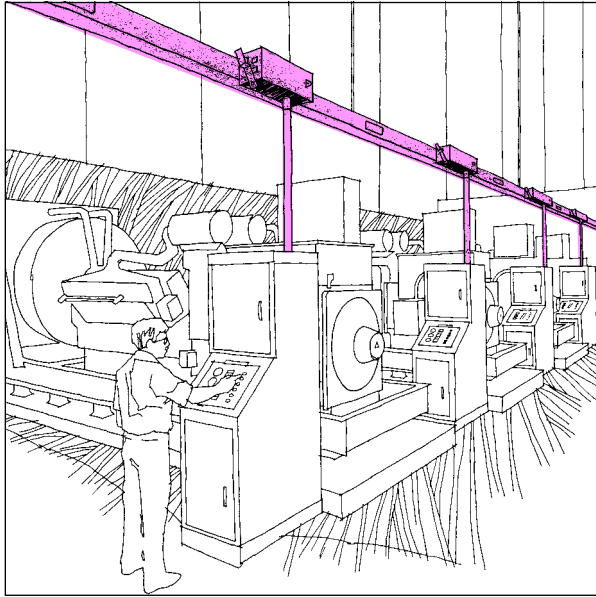
Literature Number	Description
CAT.200.01.T.E	Cutler-Hammer Distribution Products Catalog
B.36B.01.S.E	KT Dry-Type Distribution Transformers for Nonlinear Loads
B.36D.01.S.E	Class 1, Division 2 Hazardous Location Transformers
B.36F.01.S.E	Mini Power Centers
B1228A	Industrial Control Transformer Binder

PRICING INFORMATION

PAD	Pricing and Availability Digest
VISTA/VISTALINE	Discount Symbol DT-1



BUSWAY VS. CABLE AND CONDUIT



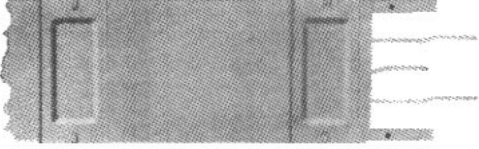
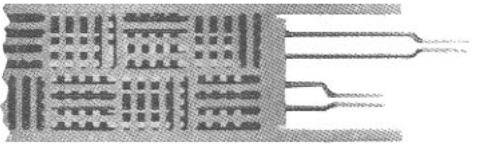
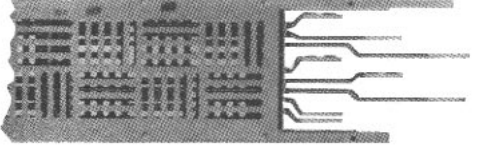
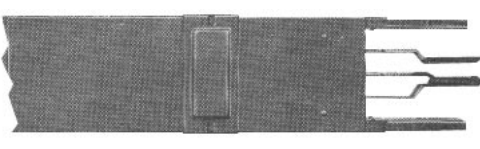
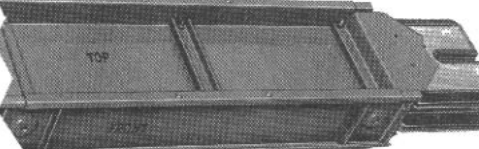
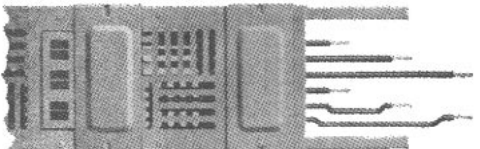
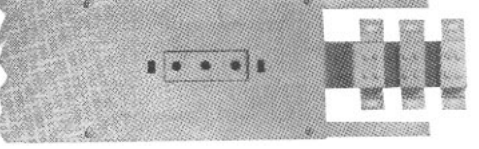
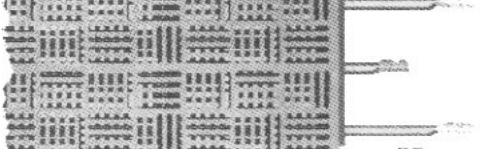


G

Who Buys... Where Do They Use... Why Do They Choose?

Target Customers	Common Uses	Why Busway?
High Rise Construction	Riser Feeder/Plug-in Runs	Lower Installation Costs
Industrial Facilities	Multiple Load Plug-in Busway	Flexibility
Institutions	Single Load Feeder Busway	Compact Size
Small Commercial Businesses	Service Entrance	Lower Voltage Drop



PRODUCT DESCRIPTION

<p>Standard Plug-in</p>  <p>Low Resolution Photo</p>	<p>Electric Utility (DC)</p>  <p>Low Resolution Photo</p>
<p>Low Impedance Feeder</p>  <p>Low Resolution Photo</p>	<p>H5000 Plug-in 225-1000A</p>  <p>Low Resolution Photo</p>
<p>H5000 Feeder</p>  <p>Low Resolution Photo</p>	<p>Low Impedance Plug-in</p>  <p>Low Resolution Photo</p>
<p>High Frequency</p>  <p>Low Resolution Photo</p>	<p>Current Limiting</p>  <p>Low Resolution Photo</p>
<p>Typical Pow-R-Way Plug-in Straight Length</p> 	<p>Typical Pow-R-Way II Plug-in Straight Length</p> 

Low voltage busway consists of aluminum or copper bars inside a metal housing used for power distribution. Busway is available in ampere ratings of 100 - 5000

Amperes. Busway is available as feeder (indoor or outdoor) and plug-in. Feeder busway routes power from point-to-point, whereas plug-in busway allows for power

to be tapped off along a run as needed. Busway is typically used in manufacturing buildings and high rise office buildings.

PRODUCT HISTORY

Westinghouse began marketing low voltage busway in 1938. The first product offering was Power Distribution Busway, utilizing a multiple bolt joint that later evolved into Standard Plug-in Busway. Victory Bus Duct was developed during the Second World War to comply with federal limitations placed on usage of materials such as steel and copper which were critical to the war effort. In 1947, Westinghouse began manufacturing busway at the newly acquired facility in Beaver, PA with Standard Plug-in and feeder bus in ratings up to 1500 amperes. All of these early designs used separated, uninsulated bus bars inside a totally enclosed or perforated steel housing.

In 1951, Low Impedance Feeder Busway was introduced as the first design to utilize heat shrinkable tubing for insulation on the bus bars and a ventilated steel housing. An internal ground bus was not available with this product line but provisions were made for mounting an external ground

bus directly to the busway housing. Low Impedance Feeder and Standard Plug-in Busway accounted for the majority of busway business written by Westinghouse through the 1950s and into the 1960s. Low Impedance Plug-in Busway was introduced in 1961. With this design, the product offering was expanded to a maximum of 5000 amperes for feeder and 4000 amperes for plug-in.

During the 1950s, various other designs were introduced to meet specific customer needs. Westinghouse Lifeline Unibus, rolled out in 1955, provided low impedance characteristics with plug-in openings and incorporated flexible armored cable into the design for use as elbows, offsets and flat to edgewise adapters.

Westinghouse High Frequency Busway was introduced in 1958 to address the inherent problems of transmitting power at frequencies from 180 to 20,000 Hz. Cutler-Hammer also marketed High Frequency BV (balanced voltage) Busway during

the late '50s and early '60s. Westinghouse High Frequency Busway and Cutler-Hammer BV Busway both found success in aircraft manufacturing plants, industrial induction heating systems, military missile and radar bases.

Electric Utility Busway was also introduced by Westinghouse in 1958 and was designed to conduct direct current with low voltage drop. By 1963, Electric Utility Busway had been expanded to meet the growing industrial market for direct current power and was marketed simply as DC Busway. This product line was applied to feeding plating processes, welding installations, mill drives and motors.

In 1958, Westinghouse sold the rights to the Lifeline Unibus product line to EDP of Allentown, PA which marketed EDP Unibus until 1962 when EDP became a wholly owned subsidiary of Cutler-Hammer. Cutler-Hammer successfully marketed Unibus until the product line was discontinued in 1974.



PRODUCT HISTORY, *Continued*

In 1966, Westinghouse introduced its first true sandwich bus design with H5000 feeder busway. H5000 was also the first single bolt joint design offered by Westinghouse and it initially utilized a PVC shrink tubing and later a mylar wrap for bus bar insulation. A combination of steel and aluminum channels were used to form a lightweight non-magnetic housing. The grounding method for H5000 was similar to Low Impedance Busway and an external ground bus mounted onto the housing was the only offering. H5000 Plug-in Busway rolled out in 1968 as a non-sandwich design with separated and uninsulated bus bars.

In 1970, the Cutler-Hammer Bethlehem, PA plant introduced CP2 SAFETYBUS which utilized an innovative single bolt, bridge joint design with a steel housing for plug-in and a combination of steel and aluminum channels for the feeder housing. CP2 used a mylar wrap for busbar insulation and an Alstan process for plating. The feeder busway was a sandwich design while the plug-in design utilized separated bus bars which were braced and support-

ed by corrugations formed in the housing sides.

Westinghouse introduced the Pow-R-Way product line in 1971. Pow-R-Way employed the sandwich design in both feeder and plug-in. At that time Pow-R-Way utilized a combination of PVC, applied by the fluidized bed process, and mylar sheeting for busbar insulation which achieved a Class A, 105° C rating. Silver plating of all joint and contact surfaces was applied by a Zincate process. Pow-R-Way is a bolt end/slot end design with a single bolt connection at the joint and is rated from 600 to 5000 amperes. Pow-R-Way II was rolled out in 1975 with ratings of 225 and 400 amperes in feeder and plug-in. Pow-R-Way II is a single, captive, bolt per bar design for indoor, horizontal, applications only.

During 1980, Cutler-Hammer upgraded its busway design and began marketing CP3 SAFETYBUS. CP3 featured an improved bridge joint package and a polyethylene terephthalate wrap for busbar insulation. CP3 maintained the CP2 housing design with busbar separation in the plug-in product configuration.

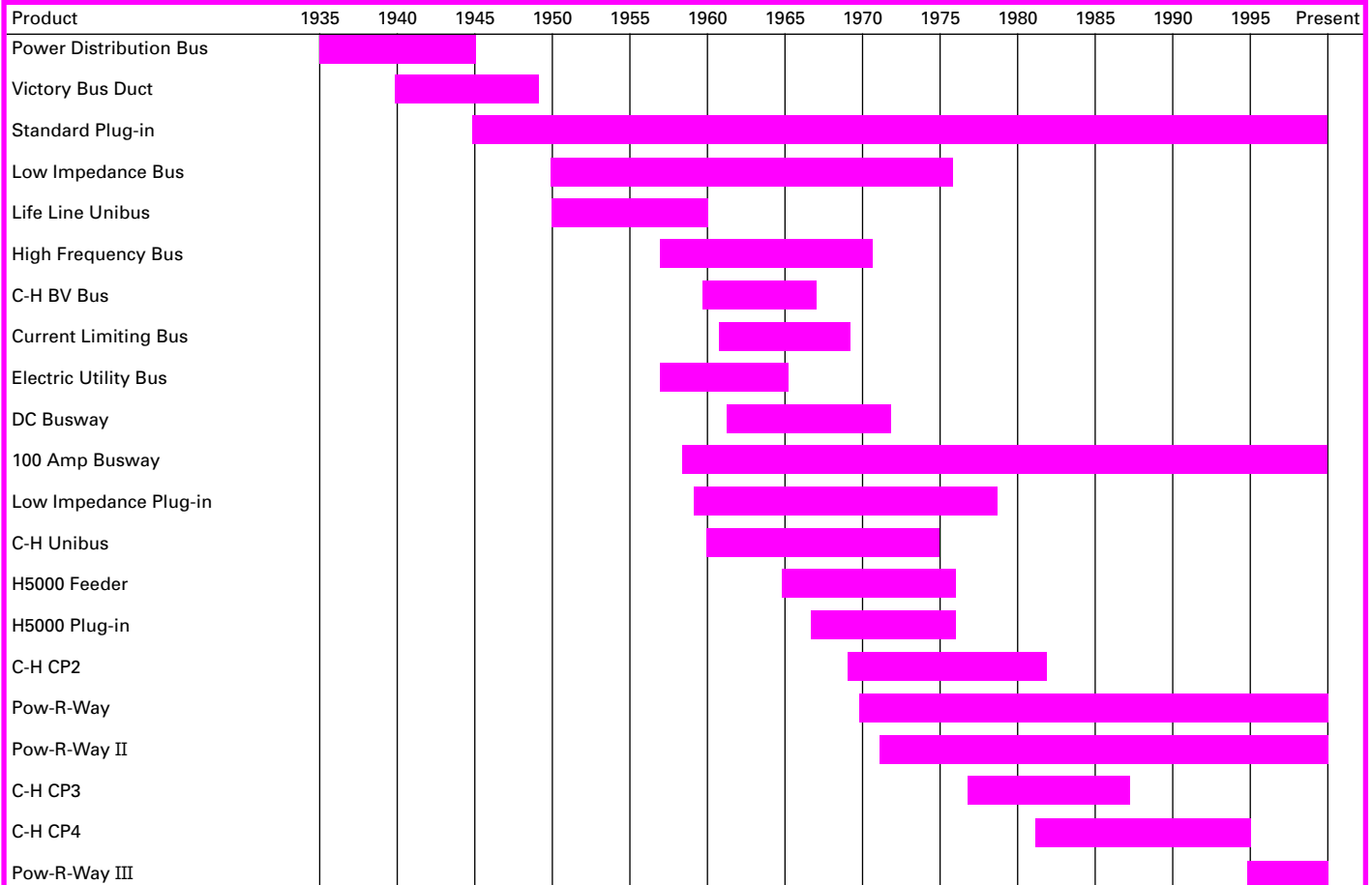
Cutler-Hammer introduced CP4 SAFETYBUS in 1985 and incorporated the sandwich design into the plug-in busway. CP4 featured a UL recognized case ground path rating, and 130° C mylar busbar insulation. CP4 utilized the CP3 bridge joint package and accepted CP2 and CP3 Bus Plugs. The CP4 product line was successful in both the commercial and industrial markets until it was discontinued in 1994.

In 1988, Westinghouse moved the busway product line to the Greenwood, SC manufacturing facility. At that time an improved Alstan plating process was implemented for silver plating the joint and contact surfaces. In 1993, the automated fluidized bed process was changed to Class B, 130° C, epoxy insulation.

In 1997, Cutler-Hammer introduced Pow-R-Way III. As in the past, specific customer needs have driven the design of this product line. High short circuit ratings, finger safe protection at the plug-in openings, integral housing ground path, two piece extruded aluminum housing, and an optional 200% neutral are just some of the features with this product line.

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PRODUCT HISTORY TIMELINE

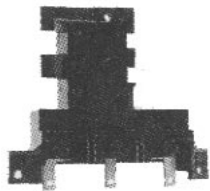




REPLACEMENT CAPABILITIES

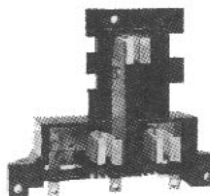
Busway Types	Bus	Adapter❶	Plugs	Busway Types	Bus	Adapter❶	Plugs
Power Distribution Bus	No	No	No	Low Impedance Plug-in	No	Yes	Yes
Victory Bus Duct	No	No	No	C-H Unibus	No	No	No
Standard Plug-in	Yes	No	Yes	H5000 Feeder	No	No	—
Low Impedance Bus	No	Yes	—	H5000 Plug-in	No	No	Yes
Life Line Unibus	No	No	No	C-H CP2	No	Yes	Yes❷
High Frequency Bus	No	No	No	Pow-R-Way	Yes	Yes	Yes
C-H BV Bus	No	No	No	Pow-R-Way II	Yes	Yes	Yes
Current Limiting Bus	No	Yes	—	C-H CP3	No	Yes	Yes❷
Electric Utility Bus	No	No	No	C-H CP4	No	Yes	Yes❷
DC Busway	No	No	No	Pow-R-Way III	Yes	Yes	Yes
100 Ampere Busway	Yes	No	Yes				

**Pow-R-Way Plug-in Unit
Stab Base Assembly
For Breaker and Fusible Types**



Low Resolution Photo

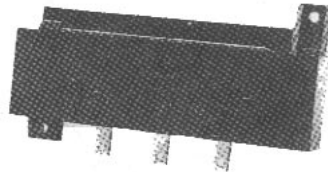
Top View



Low Resolution Photo

Bottom View

**Old Line Busway Plug-in Unit
Stab Base Assembly
For Breaker and Fusible Types**



Low Resolution Photo

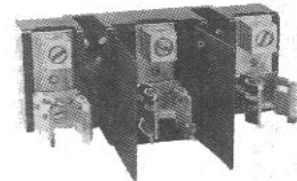
Top View



Low Resolution Photo

Bottom View

**Fuse Base Assembly
For All Busway**



Low Resolution Photo

30 Ampere Max

**Fuse Base Assembly
For All Busway**



Low Resolution Photo

200 Ampere Max

OLD LINE BUSWAY

Originally a Cutler-Hammer Product

- Replacement pieces or additions to old line Cutler-Hammer bus (CP2, CP3, CP4) are being handled whenever possible by transitioning to our current design Pow-R-Way bus.
- Obtain style number and complete nameplate information from existing busway and contact your Low Voltage Busway product engineer for pricing and availability.
- Plugs for old line Cutler-Hammer bus and Pow-R-Way bus are not interchangeable.
- Aftermarket support for Unibus busway is not provided.

❶ Busway adapter (transposition) available from old line to Pow-R-Way only.
 ❷ Fusible units only. No breaker units available.



REPLACEMENT CAPABILITIES, *Continued*

Originally a Westinghouse Product

Breaker Plug-in Units

Reference Catalog Number for Existing Complete Plug-in Unit	Replacement Stab Base Assembly	Reference Catalog Number for Existing Complete Plug-in Unit	Replacement Stab Base Assembly
Pow-R-Way		Standard Plug-in and Low Impedance Busway^o	
IBPFB	2528D04G01	BPFB	2528D03G01
IBPFBP	2528D04G01	BPFBP	2528D03G01
IBPFCL	2528D04G01	BPFCCL	2528D03G01
IBPFD	2528D04G01	BPFDD	2528D03G01
IBPJD	2528D04G12	BPJD	2528D03G10
IBPKB	2528D04G07	BPKB	2528D03G07
IBPKD	2554D03G06	BPKD	2537D20G06
IBPLAP	2532D45G06	BPLAP	5D01988G01
IBPLB	2554D03G05	BPLB	2537D20G05
IBPLCL	2554D03G03	BPLCL	2537D20G01
IBPMC	2537D17G03	BPMC	374D017G03
IBPNBP	2537D17G07		

Fusible Plug-in Units

Reference Catalog Number for Existing Complete Plug-in Unit	Replacement Stab Base Assembly	Replacement Fuse Base
Pow-R-Way Busway		
ITAP321	2528D04G02	5009D52G01
ITAP361	2528D04G02	5009D52G13
ITAP322	2528D04G02	5009D52G03
ITAP362	2528D04G02	5009D52G04
ITAP323	2528D04G02	5009D52G05
ITAP363	2528D04G02	5009D52G05
ITAP324	767A373G02	2532D78G01
ITAP364	767A373G02	2532D78G01
ITAP325	2554D03G03	627B426G02
ITAP365	2554D03G03	627B426G02
ITAP326	2554D03G02	627B426G04
ITAP366	2554D03G02	627B426G04
ITAP367	2554D03G01	2553D93G02
ITAP361H	2528D04G02	2535D92G09
ITAP362H	2528D04G02	2535D92G10
ITAP363H	2528D04G02	2535D92G11
ITAP364H	2568D13G09	2532D78G02
ITAP365H	2554D03G03	1205C02G02
ITAP366H	2554D03G02	2599D97G02

Standard Plug-in and Low Impedance Busway^o

TAP321	2528D03G02	5009D52G01
TAP361	2528D03G02	5009D52G13
TAP322	2528D03G02	5009D52G03
TAP362	2528D03G02	5009D52G04
TAP323	2528D03G02	5009D52G05
TAP363	2528D03G02	5009D52G05
TAP324	767A373G01	2532D78G01
TAP364	767A373G01	2532D78G01
TAP325	2537D20G04	627B426G02
TAP365	2537D20G04	627B426G02
TAP326	2584D73G01	627B426G04
TAP366	2584D73G01	627B426G04
TAP361H	2528D03G02	2535D92G09
TAP362H	2528D03G02	2535D92G10
TAP363H	2528D03G02	2535D92G11
TAP364H	767A373G01	2532D78G02
TAP365H	2537D20G04	1448D09G05
TAP366H	374D017G03	373D043G06

^o Check VISTA for pricing and minimum order quantities.

^o Replacement stab base assembly and fuse base style numbers specified correspond to the most recent design of the reference catalog number for the complete plug-in unit. For verification that this style number is the correct replacement for your existing plug-in unit, contact your local Cutler-Hammer Field Sales Office.



REPLACEMENT CAPABILITIES, *Continued*

Originally a Westinghouse Product

Catalog Numbers

Duct Only Includes One Hanger per 10 ft. of Busway [Ⓢ]	Catalog Numbers for 10 ft. Lengths		Fittings Price of footage through each fitting must be added.		
Ampere Rating	Aluminum	Copper	Universal Cable Tap Box [Ⓢ] (Lugs Included) [Ⓢ]	End Closer [Ⓢ]	
	Catalog Number			Aluminum	Copper

3-Phase, 3-Wire, 600 Volts with 50% Ground Bus

225	AST302G	ST302G	UCTB302G	UEC10	UEC10
400	AST304G	ST304G	UCTB304G	UEC20	UEC15
600	AST306G	ST306G	UCTB306G	UEC35	UEC20
800	AST308G	ST308G	UCTB308G	UEC50	UEC30
1000	AST310G	ST310G	UCTB310G	UEC60	UEC40

3-Phase, 4-Wire, Full Neutral, 277/480 Volts with 50% Ground Bus

225	AST502G	ST502G	UCTB402G	UEC10	UEC10
400	AST504G	ST504G	UCTB404G	UEC20	UEC15
600	AST506G	ST506G	UCTB406G	UEC35	UEC20
800	AST508G	ST508G	UCTB408G	UEC50	UEC30
1000	AST510G	ST510G	UCTB410G	UEC60	UEC40

Cantilever Hangers[Ⓢ]

Ampere Rating	Aluminum	Copper
	Catalog Number	
3-Phase, 3-Wire, 600 Volts		
225	CLH10	CLH10
400	CLH20	CLH15
600	CLH35	CLH20
800	CLH50	CLH30
1000	CLH60	CLH40
3-Phase, 4-Wire, Full Neutral, 277/480 Volts		
225	CLH10	CLH10
400	CLH20	CLH15
600	CLH35	CLH20
800	CLH50	CLH30
1000	CLH60	CLH40

Miscellaneous Accessories

Description
Wall/Floor Flange
Extra Cantilever Hangers
Hookstick Kit (8-14 ft.) HS8-14 [Ⓢ]
Renewal Parts
Joint Hardware – EXWK10
Access Covers (two)
Splice Plates (two)



Typical Standard Plug-in Straight Length

Ⓢ Normally available from stock.

Ⓢ Suitable for horizontal mounting only.

Ⓢ When ordering from stock, all hangers must be shown as a separate item marked included in price.

Ⓢ If UCTB is used on end of run, an end closer must also be used for that end.



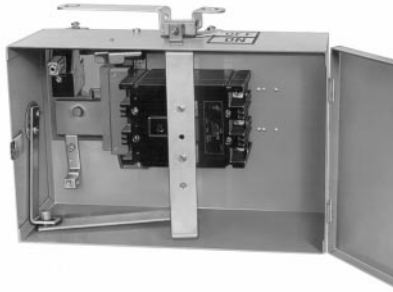
BUSWAY (LOW VOLTAGE)

Standard and Low Impedance Plug-in Busway – Circuit Breaker Units

REPLACEMENT CAPABILITIES, *Continued*

Originally a Westinghouse Product

Circuit Breaker Plug-in Units❶ (Breaker Not Included)



Circuit Breaker Plug-in Units.

The enclosure, circuit breaker, neutral, and ground are ordered and shipped assembled.

Catalog Numbers

Breaker Frame	Enclosure	Neutral (If Required)❷		Ground (If Required)❸
		Standard Plug-in	Low Impedance	
Catalog Number				
EHD, FDB, FD, HFD, FDC (15-150A)	BPFDS	N110S (15-110A) N250KB (125-150A)	ZN110S (15-110A) ZN250KB (125-150A)	GS104S
JDB, JD, HJD, JDC, (70-250A)	BPJD	N250KB (125-250A)	ZN250KB (125-250A)	GS104S
KDB, KD, HKD, KDC (125-400A)	BPKD	N400S (250-400A)	ZN400S (250-400A)	GS104S
LDB, LD, HLD, LDC (300-600A)	BPLD	❹	❹	❹
MC, HMC (500-800A)	BPMC	Not Available	❹	❹
NC, HNC (900-1200A)	BPNC	❹	❹	❹
FB (TRI-PAC) (15-100A)	BPFBP	N110S (15-100A)	ZN110 (15-100A)	GS104S
LA (TRI-PAC) (125-400A)	BPLAP	N400S (125-400A)	ZN400S (125-400A)	GS104S
NB (TRI-PAC) (500-800A)	BPBPN	❹	❹	GS104S

Circuit Breaker Selection and Interrupting Ratings

Breaker Frame	Ampere Rating	Symmetrical Amperes		
		240VAC	480VAC	600VAC
EHD	15- 60	18000	14000	.....
	70- 100	18000	14000	.....
FDB	15- 60	18000	14000	14000
	70- 100	18000	14000	14000
	110- 150	18000	14000	14000
FD	15- 60	65000	25000	18000
	70- 100	65000	25000	18000
	110- 150	65000	25000	18000
HFD	15- 60	100000	65000	25000
	70- 100	100000	65000	25000
	110- 150	100000	65000	25000
FDC	15- 60	200000	100000	50000
	70- 100	200000	100000	50000
	110- 150	200000	100000	50000
JDB	70- 225	65000	25000	18000
	250	65000	25000	18000
JD	70- 225	65000	25000	18000
	250	65000	25000	18000
HJD	70- 225	100000	65000	25000
	250	100000	65000	25000
JDC	70- 225	200000	100000	50000
	250	200000	100000	50000
KDB	250- 400	65000	35000	25000
KD	250- 400	65000	35000	25000
HKD	250- 400	100000	65000	35000
KDC	250- 400	200000	100000	50000
LDB	300- 600	65000	45000	25000
LD	300- 600	65000	45000	25000
HLD	300- 600	100000	65000	35000
LDC	300- 600	200000	100000	50000
MC	500- 800	42000	30000	22000
HMC	500- 800	65000	50000	25000
NC	900-1200	42000	30000	22000
HNC	900-1200	65000	50000	25000
FB (TRI-PAC)	15- 100	200000	200000	200000
LA (TRI-PAC)	125- 225	200000	200000	200000
	250- 400	200000	200000	200000
NB (TRI-PAC)	500- 600	200000	200000	200000
	700- 800	200000	150000	200000

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❶ Normally available from stock.

❷ For units mounting at the joint and feeder type ducts, see bolt-on units – standard plug-in, low impedance, and H5000.

❸ Full neutral. For half neutral, contact your local Cutler-Hammer Field Sales Office.

❹ Not available for low impedance busduct.

❺ Contact your local Cutler-Hammer Field Sales Office for delivery. Order by description.

BUSWAY (LOW VOLTAGE)

Standard and Low Impedance Plug-in Busway – Fusible Units

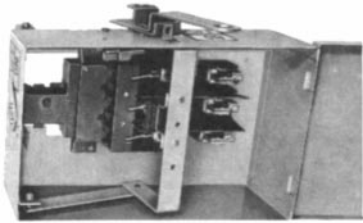


REPLACEMENT CAPABILITIES, *Continued*

Originally a Westinghouse Product

Fusible Plug-in Units

For Standard Plug-in and Low Impedance Plug-in Busway (Not for use on Pow-R-Way Busway)



Fusible TAP

Fusible Switch Horsepower Ratings

Ampere Rating	240 Volts		480 Volts		600 Volts	
	NEC Std.	Time Delay	NEC Std.	Time Delay	NEC Std.	Time Delay
30	3	7½	5	15	7½	20
60	7½	15	15	30	15	50
100	15	30	25	60	30	75
200	25	60	50	125	60	150
400	50	100	100	250	125	350
600	75	100	200	400	200	500

Fuses not included, mechanical lugs only.
 Plug-in unit, neutral, and ground ordered separately and shipped unassembled.

Ampere Rating	600 Volts	240 Volts	Neutral (If Required)		Ground (If Required)	Class R Fuse Clips (If Required)	
			Standard Plug-in	Low Impedance		600 Volts	240 Volts
Catalog Number							
30	TAP361®	TAP321®	N110®	ZN110®	GS104®❶	RFK161®	RFK121®
60	TAP362®	TAP322®	N110®	ZN110®	GS104®❶	RFK262®	RFK222®
100	TAP363®	TAP323®	N110®	ZN110®	GS104®❶	RFK464®	RFK464®
200	TAP364®	TAP324®	N250KB®	ZN250KB®	GS104®❶	RFK464®	RFK464®
400	TAP365®	TAP325®	N400®	ZN400®	GS104®❶	RFK666®	RFK666®
600	TAP366®	TAP326®	N400®❷	❸	❹	RFK666®	RFK666®
800	❹	❹					

Special Industry Fusible Plug-in Units

Special industry plugs are I²t rated. Knockouts are not provided.
 Grounding lug included on 200A and above. Lugs ordered and shipped separately. Fuses are not included.
 If neutral or ground assembly required, refer to Cutler-Hammer/Westinghouse Busway.

3-Wire, 600 Volt Plug-in Unit		Neutral (If Required)	Ground (If Required)	Terminal Kits for Industry Fusible Plug-in Units					
Catalog Number				Mechanical Lugs®			Compression Lugs®		
Ampere Rating	Catalog Number			Catalog Number	Lugs Per Phase	Wire Size	Catalog Number	Lugs Per Phase	Wire Size
30	TAP361H®	❸	❸	MTK30SC	1	#14 to #4	CTK30SC	1	#12 to #10
60	TAP362H®	❸	❸	MTK160SC	1	#14 to 1/0	CTK60SC	1	#8
100	TAP363H®	❸	❸	MTK160SC	1	#14 to 1/0	CTK100SC	1	#4
200	TAP364H®	❸	❸	MTK200SC	1	#6-350MCM	CTK200BSC	1	2/0
400	TAP365H®	❸	❸	MTK400DPW	2	#2 to 4/0	CTK400SPW	1	750 MCM
600	TAP366H®	❸	❸	MTK600DFW	2	500 MCM	CTK600DPM	2	500 MCM

Ground Detector and Neutralizer Plug

3-Wire	
Catalog Number	Maximum Volts
GND36®	600

® Normally available from stock.

- ❶ Not available for low impedance busduct.
- ❷ Only half neutral available. For full neutral use a TAP366BO or TAP326BO unit.
- ❸ Must be factory assembled. Order by description.
- ❹ For units mounting on all feeder type ducts, see the Busway section of the Quick Selector Catalog 25-000.



BUSWAY (LOW VOLTAGE)

Standard and Low Impedance Plug-in Busway – Bolt-On Units

REPLACEMENT CAPABILITIES, Continued

Originally a Westinghouse Product

Bolt-on Units

Breaker Frame	Ampere Rating	Enclosure	Neutral ^② (If Required)	Ground ^③ (If Required)
		Catalog Number		
Circuit Breaker Bolt-on Units (Breaker Not Included)				
EHD, FDB, FD HFD, FDC	15-150	BPFDBO	④	④
JDB, JD, HJD, JDC	125-250	BPJDBO	④	④
KDB, KD, HKD, KDC	250-400	BPKDBO	④	④
LDB, LD, HLD LDC	300-600	BPLDBO	④	④
MC, HMC	500-800	BPMCBO	④	④
FB (TRI-PAC)	15-100	BPFBPBO	④	④
LA (TRI-PAC)	125-400	BPLAPBO	④	④
NB (TRI-PAC)	500-800	BPNBPBO	④	④

Fusible Bolt-on Units

240 Volts	30	TAP321BO	④	④
	60	TAP322BO	④	④
	100	TAP323BO	④	④
	200	TAP324BO	④	④
	400	TAP325BO	④	④
	600	TAP326BO	④	④
	800	TAP327BO	④	④
600 Volts	30	TAP361BO	④	④
	60	TAP362BO	④	④
	100	TAP363BO	④	④
	200	TAP364BO	④	④
	400	TAP365BO	④	④
	600	TAP366BO	④	④
	800	TAP367BO	④	④

Circuit Breaker Selection and Interrupting Ratings

Breaker Frame	Ampere Rating	Symmetrical Amperes		
		240VAC	480VAC	600VAC
EHD	15- 60 70-100	18000 18000	14000 14000	.....
FDB	15- 60 70-100 110-150	18000 18000 18000	14000 14000 14000	14000 14000 14000
FD	15- 60 70-100 110-150	65000 65000 65000	25000 25000 25000	18000 18000 18000
HFD	15- 60 70-100 110-150	100000 100000 100000	65000 65000 65000	25000 25000 25000
FDC	15- 60 70-100 110-150	200000 200000 200000	100000 100000 100000	50000 50000 50000
JDB	70-225 250	65000 65000	25000 25000	18000 18000
JD	70-225 250	65000 65000	25000 25000	18000 18000
HJD	70-225 250	100000 100000	65000 65000	25000 25000
JDC	70-225 250	200000 200000	100000 100000	50000 50000
KDB	250-400	65000	35000	25000
KD	250-400	65000	35000	25000
HKD	250-400	100000	65000	35000
KDC	250-400	200000	100000	50000
LDB	300-600	65000	45000	25000
LD	300-600	65000	45000	25000
HLD	300-600	100000	65000	35000
LDC	300-600	200000	100000	50000
MC	500-800	42000	30000	22000
HMC	500-800	65000	50000	25000
FB (TRI-PAC)	15-100	200000	200000	200000
LA (TRI-PAC)	125-225 250-400	200000 200000	200000 200000	200000 200000
NB (TRI-PAC)	500-600 700-800	200000 200000	200000 150000	200000

- ① Factory assembled. Contact your local Cutler-Hammer Field Sales Office for delivery and order entry information. When ordering, you must specify:
 1. Load left or load right.
 2. Front or rear mounting.
 3. Type of busway to which unit is to be mounted.
- ② Full neutral. For half neutral, contact your local Cutler-Hammer Field Sales Office.
- ③ Not available for low impedance busduct.
- ④ Order by description with bolt-on unit.
- ⑤ These bolt-on units include an adapter for mounting at the joint. They do not require a power take-off unit.
- ⑥ Refer to Price List 29-020 for breaker list prices.



BUSWAY (LOW VOLTAGE) Unibus Saf-Key Fusible Plugso



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BUSWAY (LOW VOLTAGE) Unibus Saf-Key Circuit Breaker Plugs

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BUSWAY (LOW VOLTAGE)

Plug-in Units – Used With CP2, CP3 or CP4 Safetybus Busway



REPLACEMENT CAPABILITIES, *Continued*

Originally a Cutler-Hammer Product

Fusible Switch Plug-in Units

Class R Fuse Clip Included				
Ampere Rating	Max. HP Rating ^❶	Catalog Number	Max. HP Rating ^{❷❸}	Catalog Number
240V, 3-Phase, 3-Wire			120-208V, 3-Phase, 4-Wire	
30	7½	CP4HD321	5	CP4HD421
60	15	CP4HD322	10	CP4HD422
100	30	CP4HD323	25	CP4HD423
200	60	CP4HD324	60	CP4HD424
400	100	CP4HD325	250	CP4HD425
600 ^❹	100	CP4HD326	400	CP4HD426
600V, 3-Phase, 3-Wire			277-480V, 3-Phase, 4-Wire	
30	20	CP4HD361	15	CP4HD461
60	50	CP4HD362	30	CP4HD462
100	75	CP4HD363	60	CP4HD463
200	100	CP4HD364	100	CP4HD464
400	350	CP4HD365	250	CP4HD465
600 ^❹	500	CP4HD366	400	CP4HD466

NOTE: We have replaced the 3-Phase, 3-Wire plugs with 3-Phase, 4-Wire plugs.

- ❶ Maximum HP ratings apply when time delay fuses are used.
- ❷ 120-208V HP ratings are based on 200V motor usage.
- ❸ Requires two adjacent plug-in outlets that do not span a busway joint.
- ❹ For ground stab to engage internal ground bus, add suffix "G" to Catalog Number.
- ❺ Requires two adjacent plug outlets that do not span a busway joint.
- ❻ Also accepts (2) #1 – 300 kcmil Al/Cu.

Plug-in Cable Tap Boxes

Plug into CP2, CP3 or CP4 Busway^❹ – 600A and 800A Size Also Have Bolt-on Clips

Volts	Ampere Rating	Catalog Number	Approximate Dimensions In Inches						Load Lugs Each Phase
			Wide	High	Deep	Mounting Clearance		Conduit Sizes	
						Top	Front		
3-Phase, 3-Wire 600V Maximum	225	CP2SB34	15.5	8.1	6.9	6.3	10.5	1½, 2, 2½, 3	(1) #6 – 300 kcmil Al/Cu
	400	CP2SB35	22.3	8.1	7.9	7.0	11.3	.....	(1) #1/0 – 750 kcmil Al/Cu ^❹
	600	CP2SB36 ^❹	37.2	15.8	11.7	12.5	16.8	.....	(2) #2 – 600 kcmil Al/Cu
	800	CP2SB37 ^❹	37.2	15.8	11.7	12.5	16.8	.....	(3) #2 – 600 kcmil Al/Cu
3-Phase, 4-Wire 120/208V or 277/480V 100% Neutral	225	CP2SB44	15.5	8.1	6.9	6.3	10.5	1½, 2, 2½, 3	(1) #6 – 300 kcmil Al/Cu
	400	CP2SB45	22.3	8.1	7.9	7.0	11.3	.....	(1) #1/0 – 750 kcmil Al/Cu ^❹
	600	CP2SB46 ^❹	37.2	15.8	11.7	12.5	16.8	.....	(2) #2 – 600 kcmil Al/Cu
	800	CP2SB47 ^❹	37.2	15.8	11.7	12.5	16.8	.....	(3) #2 – 600 kcmil Al/Cu

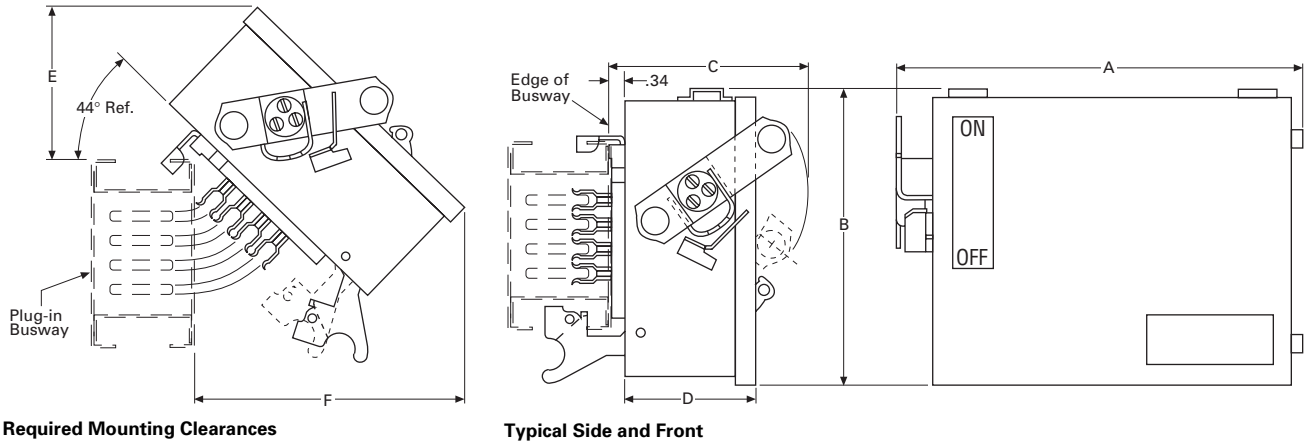


BUSWAY (LOW VOLTAGE) Plug-in Units – Used With CP2, CP3 or CP4 Safetybus Busway

REPLACEMENT CAPABILITIES, Continued

Originally a Cutler-Hammer Product

Approximate Dimensions



Plug-in Units

May be Used with Either CP2, CP3 or CP4 Plug-in Busway Sections

Frame or Type	Maximum Ampere Rating	Dimensions in Inches							Conduit Sizes Top, Bottom and Side	Wire Size Range Al/Cu						
		A	B	C	D	E	F									
Fusible Switch Type																
CP4HD	30	19.3	11.5	8.8	5.2	7.0	9.0	1/2, 3/4, 1, 1 1/4, 1 1/2, 2	(1) #14-2 (1) #14-2 (1) #14-1/0							
	60															
	100															
CP4HD	200	23.0	16.5	9.2	6.0	7.5	13.3	1 1/2, 2, 2 1/2, 3	(1) #6-300 kcmil							
	400Ⓢ									45.6	24.3	15.8	13.1	14.0	20.5	(1) #1/0-300 kcmil or (1) 750 kcmil
	600Ⓢ									45.6	24.3	15.8	13.1	14.0	20.5	(2) #2-600 kcmil

- ① Requires two adjacent busway outlets that do not span a busway joint.
- ② Provided with busway bolt-on clip and straps for 1/2 inch hanger rods.
- ③ Unit extends 10 1/2 inches below busway.



CLIPPER POWER SYSTEMS, BUSWAY TVSS PROTECTION

The Low Voltage Busway aftermarket product offering includes Transient Voltage Surge Suppression (TVSS) which is ideal for busway fed distribution systems. Cutler-Hammer has developed the Clipper Power System (CPS) family of products to ensure that the quality power required to maximize productivity in today's competitive environment is supplied to commercial, industrial, medical and institutional facilities. Without power protection devices, microprocessors and electronic based loads are not provided with the noise and disturbance-free power which they require. Since microprocessor loads are now

common in every facility, engineers must ensure the AC power supply is properly filtered. The CPS busway family of products consists of transient voltage surge suppression and filter components (TVSS filter) integrated into a bus plug with a fusible disconnect. TVSS bus plugs are available for the following types of plug-in busway:

Westinghouse Standard Plug-in
Westinghouse Low Impedance Plug-in
Westinghouse H5000 Plug-in
Cutler-Hammer CP2 Plug-in
Cutler-Hammer CP3 Plug-in
Cutler-Hammer CP4 Plug-in

Westinghouse Pow-R-Way
Westinghouse Pow-R-Way II
Cutler-Hammer Pow-R-Way III

Significant performance advantages are achieved by integrating TVSS filters into busway systems. Since the TVSS unit is directly connected to the busway, the CPS minimizes let-through voltage, a significant performance advantage compared to cable-connected TVSS solutions. Due to the integrated design, the CPS bus plug also saves the user wall space and greatly reduces the installed project cost.

CPS (TVSS) Bus Plug-in Units Performance Specification

Key Feature	CPS-M	CPS-H	CPS-S2	CPS-S	CPS-B
Surge current per phase	400kA	250kA	160kA	120kA	90kA
Surge current mode:					
Line-Neutral	200kA	125kA	60kA	60kA	45kA
Line-Ground	200kA	125kA	60kA	60kA	45kA
Neutral-Ground	200kA	125kA	60kA	60kA	45kA
Line-Line (Delta and ungrounded applications only)	200kA	125kA	60kA	60kA	45kA
Protection modes:					
3-phase wye system	7	7	7	7	7
3-phase delta system	6	6	6	6	6
Filter attenuation at 100 kHz (based on MIL-STD-22A)	55dB	55dB	55dB	55dB	55dB
IEEE Cat B3 Ringwave suppression (I-n mode; 6000V 500A)	<150V	<150V	<150V	<150V	<150V
Surge Withstand capabilities IEEE C3 Wave (10kA)	>4000	>3500	>2500	>2500	>1500
TVSS TRI-Monitor system					
1. Overcurrent Protection	Yes	Yes	Yes	Yes	Yes
2. Infrared Detection	Yes	Yes	Yes	Yes	Optional
3. Thermal Detection	Yes	Yes	Yes	Yes	Optional

Catalog Numbers for CPS Bus Plugs^⓪

TVSS Unit	Standard Plug-in	Low Impedance	H5000 Plug-in	CP2/CP3 Plug-in	CP4 Plug-in	Pow-R-Way Pow-R-Way II	Pow-R-Way III
90kA	TAP-CPSB	ZTAP-CPSB	HTAP-CPSB	CP3-CPSB	CP4-CPSB	ITAP-CPSB	P3F-CPSB
120kA	TAP-CPSS	ZTAP-CPSS	HTAP-CPSS	CP3-CPSS	CP4-CPSS	ITAP-CPSS	P3F-CPSS
160kA	TAP-CPS2	ZTAP-CPS2	HTAP-CPS2	CP3-CPS2	CP4-CPS2	ITAP-CPS2	P3F-CPS2
250kA	TAP-CPSH	ZTAP-CPSH	HTAP-CPSH	CP3-CPSH	CP4-CPSH	ITAP-CPSH	P3F-CPSH
400kA	TAP-CPSM	ZTAP-CPSM	HTAP-CPSM	CP3-CPSM	CP4-CPSM	ITAP-CPSM	P3F-CPSM

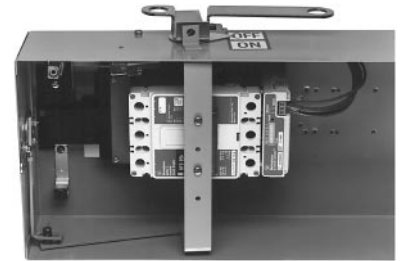
^⓪ CPS bus plugs are not stock items. Specify if ground and neutral stabs are required as they must be factory installed on CPS bus plugs.



IQ ENERGY SENTINEL FOR BUS PLUGS

The IQ Energy Sentinel was designed as part of the Cutler-Hammer Integrated Monitoring Protection and Control Communications System (IMPACC) and is a highly accurate, microprocessor-based submeter which monitors power and energy. It offers a centralized alternative to individually mounted watt meters, watt hour meters, and watt demand meters. Key advantages include unmatched savings in space, lower installation costs, and the capability to communicate data readings in a variety of ways. IQ Energy Sentinels with built in Current Transformers (CTs) and communications have the added benefit of overall system accuracy. The IQ Energy Sentinel mounts on the load side of Cutler-Hammer F, J and K breakers within

the bus-plug enclosure. The IQ Energy Sentinel is also available with a universal mounting which utilizes external CTs and is offered for fusible bus plug applications. Submetering application examples for the IQ Energy Sentinel include energy monitoring and demand management, energy cost analysis/allocation and tenant or inter-departmental billing. To accomplish the communications system, the customer must provide a twisted pair communication cable in half-inch conduit between the IQ Energy Sentinel bus plug and a Cutler-Hammer Central Energy Display or customer computer to display the information. IQ Energy Sentinel bus plugs are available for Pow-R-Way, Pow-R-Way II and Pow-R-Way III busway.



Bus Plug with Energy Sentinel

G

CUSTOMER REQUIRED INFORMATION

Originally a Westinghouse Product

1. Style number or shop order number from existing busway nameplate and complete nameplate information.
2. Height and width dimensions of housing from existing busway.
3. Order by Style Number on Suffix Q77.

Originally a Cutler-Hammer Product

1. Leadtime 14-16 weeks; check VISTA for pricing.
2. Order by catalog number on suffix Q73.

FURTHER INFORMATION

Literature Number	Description
AD 30-560	Application Data for Pow-R-Way
AD 30-560	Application Data for Pow-R-Way II
TD.42.01A.T.E	Technical Data for Pow-R-Way III

PRICING INFORMATION

VISTA/VISTALINE	Discount Symbols CE3 and CE4
Contact your local Cutler-Hammer Field Sales Office.	

NOTE: Additional information may be required for manufacturing.



Please refer to Catalog 2001, Section 26 of the Distribution Volume pages 26-1 through 26-56 or Section 56 of the Control Volume pages 56-1 through 56-56 for current IQ Products.

WEB Reference: Power Management Products on www.ch.cutler-hammer.com

The IMPACC Series III is no longer available, but is supported. Please refer to Catalog 2001 pages 26-57 through 26-86 or pages 56-57 through 56-86 for the PowerNet Software Suite and communications products.

WEB Reference: Power Management Products on www.ch.cutler-hammer.com



GENERAL INFORMATION

Application Overview Chart

	IQ Data	IQ Generator	IQ Energy Sentinel	MP-4000	IQ Anal.
Power Quality Functions					
% Total Harmonic Distortion (THD)					•
Harmonic Distortion Factors					•
Customized Power Quality Events					•
Monitoring and Alarm					•
Waveform Capture					•
Waveform Display at Device					•
Sub-cycle Voltage Disturbance					•
Metering					
3-Phase Amps	•			•	•
3-Phase Volts	•			•	•
Frequency				•	•
Watts				•	•
VARs				•	•
VAs				•	•
Power Demand				•	•
Power Factor				•	•
Minimum and Maximum Values				•	•
Event Output Contacts				•	•
Energy Monitoring					
Watts			•	•	•
Watts Demand			•	•	•
Watthours			•	•	•
Communications Capability					
		OPTION	YES	OPTION	OPTION

Refer to Page 130 of this document.



IQ PRODUCTS

Electronic Relay and Motor Protection

GENERAL INFORMATION			
Application Overview Chart			
	IQ 500	IQ 1000 II	Digitrip 3000/MV
Displayed Values			
3-Phase Amps		•	
Ground Amps		•	
Maximum Values		•	
Trip Status	•	•	
Amps as a % of FLA		•	
Remaining Starts			
% Trip Level			
Temperature Readings (RTD)			
Run Time			
Operation Count			
Number of Trips by Type			
CT Ratio			
Programmed Settings			
Protection			
3-Phase Overcurrent			•
3-Phase Instantaneous			•
Residual Ground Overcurrent			•
Residual Ground Instantaneous			•
Zero Sequence Ground Overcurrent			•
Zero Sequence Ground Instantaneous		•	•
Jam Protection		•	
Underload Protection		•	
Positive/Negative Sequence		•	
Unbalance		•	
Phase Reversal		•	
Transition and Feedback		•	
RTD Temperature Input		OPTION	
Long Acceleration Input	OPTION		
Zone Selective Interlocking			•
Event Output Control	•	•	•
Programmable	•	•	•
Communications	OPTION	OPTION	OPTION

Refer to Page 130 of this document.

H



GENERAL INFORMATION/TECHNOLOGY UPGRADES

IQ Data



The IQ Data provides simultaneous current and voltage metering. In one compact, standard package, this device provides an alternative to individually mounted and wired ammeters, voltmeters, ammeter and voltmeter switches.

Features and Benefits

- Space savings in structure – Replaces ammeter, voltmeter, selector switches and frequency meter (IQ Generator).
- Standardization of design – One door-mounted device.
- Direct voltage input up to 600V – No additional Potential Transformers (PTs) required.
- User friendly – Field settable DIP switches.
- Standard model derives power from separate source 120/240VAC supply.
- Only two style numbers
- No need to stock multiple units for different Current Transformers (CTs) and PT ratios.

- Interface capability for computer network for data collection, storage and/or printout via IMPACC.
- Membrane faceplate, designed and tested to perform in harsh industrial environment (NEMA 3R, 12).
- Retains preset parameters through power failure with use of field settable DIP switches (no batteries).

Catalog Number

IQDATA
IQDATAAPM

IQ Generator



The IQ Generator provides simultaneous current and voltage metering. In addition, the IQ Generator monitors frequency. This device provides an alternative to individually mounted and wired ammeters, voltmeters, ammeter and voltmeter switches, and frequency meters.

Features and Benefits

- Space savings in structure – Replaces ammeter, voltmeter, selector switches and frequency meter (IQ Data).
- Standardization of design – One door-mounted device.
- Direct voltage input up to 600V – No additional Potential Transformers (PTs) required.
- User friendly – Field settable DIP switches.
- Standard model derives power from separate source 120/240VAC supply.
- Only two style numbers
- No need to stock multiple units for different Current Transformers (CTs) and PT ratios.

- Interface capability for computer network for data collection, storage and/or printout via IMPACC.
- Membrane faceplate, designed and tested to perform in harsh industrial environment (NEMA 3R, 12).
- Retains preset parameters through power failure with use of field settable DIP switches (no batteries).

Description	Catalog Number
Basic Metering	IQGEN
Basic Metering with 3-Phase Power Module	IQGENPM

IQ Energy Sentinels



The IQ Energy Sentinel provides a unique and effective method to implement submetering at lower levels in the distribution system economically.

metering often is less accurate than CTs and separate transformers. They have inaccuracies of 1% or more.

The IQ Energy Sentinel provides a unique and effective method to implement submetering at lower levels in the distribution system economically.

metering application examples for the IQ Energy Sentinel include energy monitoring and demand management, product cost analysis, process/machine tool efficiency and productivity improvement. Additional applications include energy cost allocation of tenant billing for commercial, industrial, recreational, and residential facilities.

Retrofitting

The space saving design characteristics of the breaker mount IQ Energy Sentinels allow them to be added to existing Series C Circuit Breakers at any time — often with no additional space or modifications required.

Or they may be installed when upgrading to Series C from older circuit breakers — often with no additional space or modifications required.

The Universal mount IQ Energy Sentinel with internal CTs may be utilized wherever breaker mounting is not feasible or possible.

The Universal mount IQ Energy Sentinel for external CTs may be utilized for monitoring loads larger than 400 amperes or when the use of existing CTs is desired.

Description	Catalog Number
For F-Frame Breakers	*IQESF_ _ _
For J-Frame Breakers	*IQESJ_ _ _
For K-Frame Breakers	*IQESK_ _ _
Universal with Internal CTs	*IQESUI_ _ _
Universal for External CTs	*IQESUE_ _ _

* Final three characters of catalog number are for Voltage Rating
ie. 2 0 8 for 120/240, 240, 208Y/120 Systems

Refer to Page 130 of this document.



GENERAL INFORMATION/TECHNOLOGY UPGRADES, *Continued*

IQ DP-4000/4100



The IQ DP-4000 is a microprocessor-based monitoring and protective device that provides complete electrical metering and system voltage protection. In one compact, standard package the IQ DP-4000 will provide an alternative to individually mounted and wired conventional meters

and switches. The new IQ DP-4000 also monitors Apparent Power (VA), Reactive Energy (VAR-Hours), Apparent Energy (VA-Hours), and percent Total Harmonic Distortion (THD) to provide the user with basic power quality information. The IQ DP-4000 meets and surpasses UL/CSA/CE standards.

Features and Benefits

- Space savings in structure – Replace conventional individual metering devices
- Standardization of design – One mounted device.
- Direct voltage input up to 600V
- New DIP switch design.
- Standardization of CT and PT connections.
- With additional setpoint options used in HV setting.

- Reliability
- (Microprocessor-based) computer storage
- Cutler-Hammer distribution
- meters through non-volatile memory.

Description	Catalog Number
without I/O	IQDP-4010
with I/O	IQDP-4030
with I/O	IQDP-4110
with I/O	IQDP-4130

IQ Analyzer



The IQ Analyzer is a complete solution for users who want to monitor all aspects of their electrical distribution system. It provides extensive metering, power quality analysis, remote input monitoring, communications capability. All programming can be done through the faceplate or through the communications option. The on-line Help Pushbutton feature

information on device programming and

Features and Benefits

- All information common
- Quality with harmonic
- Metering
- Soidal crest factor.
- units, kilo
- meters at the
- custom screens.
- Analyzer Model 6200 with
- day at the device and sub-
- disturbance capture

provides the capability to monitor a wide range of harmonic parameters. These include harmonic voltage, current magnitudes and phase angles as well as system disturbances such as transient voltage disturbances and sub-cycle voltage interruptions. This unit is also available in a portable version.

Description	Catalog Number
IQ Analyzer, Model 6000 Power from line	IOA6030
IQ Analyzer, Model 6000 Requires special control power	IOA6010
IQ Analyzer, Model 6200 Power from line	IOA6230
IQ Analyzer, Model 6200 Requires special control power	IOA6210
Wave Form Display Software	WAVEDISP

Digitrip 3000/MV Trip Unit



The Digitrip 3000 multi-fuse overcurrent protection (MFI) and IEC type mounted self-contained unit. The Digitrip MV design provides RMS sensing design of each phase and ground current. Only one trip unit is required for each three-phase circuit. Current monitoring and operator selectable protective func-

is integral to each trip unit. The MV features a user friendly operation panel to monitor, program and test trip unit. Operating parameters and troubleshooting information are displayed in the two highly visible display windows. In addition, all locally viewed trip unit data and information can be delivered to a host computer equipped with the appropriate software. A "Communication Trip" and "Communication Close" control command can also be initiated by a host computer, if desired.

Two styles are available with both offering the same features and functions except for the communication capability. One style includes a built-in INCOM communication capability compatible with the Westinghouse IMPACC system. The other style includes provisions for future communication by simply field installing a Product Operated Network Interface (PONI) communications module.

Electrical Power System Protection

Digitrip MV Trip Units provide phase and ground protection for most types of medium voltage electrical power distribution systems. Protection curves are similar to those on low-voltage power circuit breaker trip units, and provide close coordination with downstream devices, as well as upstream fuse and/or electromagnetic relays. Just one Digitrip MV Trip Unit replaces the normal complement of three or four conventional electromagnetic overcurrent relays, an ammeter, a demand ammeter, an ammeter switch and, in some situations, a lockout relay switch (device 86).

Description	Catalog Number
Digitrip with communication	DTMV01
Digitrip MV with provision for future communication	DTMV02

Refer to Page 130 of this document.

H



ACCESSORIES

IQ Flange

For applications where extra door mounting space is required, a flange-mounting unit is available. The IQ Flange provides an extra 2.5 in. of clearance for the device.



Description	Catalog Number
IQ Flange Option, to provide extra clearance when mounting	IQFLANGE

IQ Surface Mount Enclosure

NEMA 1, 12, 3R



Heavy Gauge #14 painted A enclosure for mounting IQ family wall, panels, or doors with large cutouts. Six mounting hardware included. No drilling for (three) P IQ or PB products

Description
7.375 in. W x 6.13 in. D for Plus II, with commu

IQ Cable

For applications where remote mounting power supply is required, a 36 in. extension cable is available. Two types of cable are available. The first (catalog number IQ CABLE) is for the IQ Data, Generator, and Data Plus II. The second (catalog number IQA CABLE) is exclusively for the IQ Analyzer.

Description	Catalog Number
36 in. extension cable IQ Data, Generator, Data Plus II	IQCABLE
36 in. extension cable IQ Analyzer	IQACABLE
45 in. extension cable IQ Analyzer	IQA45CABLE

The IQ DC Power Supply inverter module requires DC power. The IQ DC Power Supply is available in 1000 IIs, IQ Data, Generator, and Data Plus II. Electronic Monitor II and Data Plus II are also IQ devices requiring power. The IQ DC Power Supply is available at any power factor.

Description	Catalog Number
IQ DC Power Supply	IQDCPS

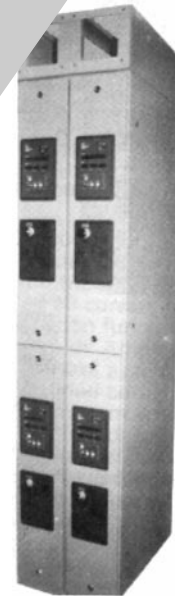
IQ Floor Mount Enclosure

NEMA 1, 12, 3R

Standard floor mount enclosure, pair of doors, up extra 2.5 in. of clearance for the device. Each door has a 1/2 in. (two) door handle. The IQ product line includes the IQ product line.

Style Number
2147A95G35

Enclosures (Shown with Plus Compartment)



Addressable Relay II



The Addressable Relay II has two status inputs and a Form C contact output. Input rating: 48-120 VAC, 48-125 VDC. Output contact rating: 10A @ 277 VAC, 10A @ 30 VDC. Features include a communications watchdog and relay pulse. Baud rate is selectable.

Description	Catalog Number
Addressable Relay II	ARII

Refer to Page 130 of this document.



IQ PRODUCTS

Discontinued Product – Upgrade Options

IQ 2000



IQ 2000 Model A



IQ 2000 Model B

Recommended Replacement:
 The IQ 2000 Model A and B units are being replaced with the IQ 1000 II units. The IQ 1000 II units are electronic trip units that provide motor protection while the IQ 2000 units provide electrical protection. For more information on the IQ 1000 II units, please contact your local Cutler-Hammer Office.

RTD MODULES



Universal RTD Module

Recommended Replacement:

The RTD Modules for the IQ 2000 units have been discontinued. No new universal RTD Modules are being produced. All of the RTD modules for the IQ 2000 Model A and B IQ 2000 units and all of the RTD modules for the IQ 1000 II and all of the RTD modules for the protection products are being replaced with the Universal RTD Module.

Product	Catalog Number
Universal RTD Module	URTD

IQ DATA PLUS II



IQ Data Plus II

The IQ Data Plus II units were introduced to begin to replace the IQ Data Plus I units in 1997.

Replacement:

PRICING INFORMATION

IQ Products	VISTA/ VISTALINE	Discount Symbol C10-S24
Digitrip MV	VISTA/ VISTALINE	Discount Symbol MV-3

FURTHER INFORMATION

Product	Number	Description
IQ Data		Descriptive Bulletin for the IQ Data
IQ Data Plus		Descriptive Bulletin for the IQ Data Plus II
IQ Data Plus High Voltage Unit		Descriptive Bulletin for the IQ Data Plus High Voltage Unit
IQ DP-4000	SA-12020	Descriptive Bulletin for the IQ DP-4000
IQ Generator	DB 8172	Descriptive Bulletin for the IQ Generator
IQ Analyzer	SA-11991, SA-11992, SA-11993, SA-12143	Descriptive Bulletin for the IQ Analyzer Sales Aid for the IQ Analyzer
IQ Energy Sentinel	DB 8178	Descriptive Bulletin for the IQ Energy Sentinel
IQ Energy Sentinel	SA-11991, SA-11992, SA-11993	Sales Aid for IQ Energy Sentinel
Assembled AEM II	DB 8175	Descriptive Bulletin for the AEM II
IQ Central Monitoring Unit	DB 8178	Descriptive Bulletin for the IQ CED II
IQ 1000 II	DB 8173	Descriptive Bulletin for the IQ 1000 II
IQ 500 Modular Control Relay	CS 8177	Catalog Section for the IQ 500 Series
Digitrip MV	DB 33-750, SA-12020	Descriptive Bulletin for the Digitrip MV Trip Unit+C56+C11 Sales Aid for the Digitrip MV Trip Unit
IMPACC System	SA-11998A	Sales Aid for the Integrated Monitoring Protection and Control Communications System
Central Monitoring Unit	CS 8266	Catalog Section for the Central Monitoring Unit

Refer to Page 130 of this document.



PRODUCT DESCRIPTION



IMPACC and IQ Family of Hardware and Software Products

Integrated Monitoring Protection and Control Communications (IMPACC) provides reliable low cost communication capabilities to electrical equipment to enhance the performance of a facility's electrical distribution system. IMPACC communication is done via the Cutler-Hammer INCOM chip which permits information to be transferred from IQ Devices by radio frequency signal over a shielded twisted pair of wires to a master computer.

IMPACC is designed to help manage your entire electrical system investment – equipment operational and manpower costs, energy cost and the electrical impact on product quality.

Some Significant Benefits of an IMPACC System Includes:

Improved Energy Management

- Historical trending functions used to develop daily or seasonal load profiles
- Rapid reaction to utility load requirements
- Accurate allocation of energy within a facility
- Reduce loads to peak requirements
- Equalize loads to reduce downtime

Scheduled Maintenance

- Preventive maintenance can be developed to meet specific time measurement requirements

- Alerts are provided for preventive maintenance on monitored equipment
- Costs can be reduced by maintenance on actual intervals.
- Emergency response is reduced

Early Warning Problems

- Troubleshooting systems begin to be

...ing peak ... by shedding ... while the cause is ...
... and correct prob- ...
... are that a process or ... to run.

Troubleshooting

- Information on which breaker tripped, cause and magnitude is available
- Instantaneously.
- Systems with time stamping provide an indication of which event occurred first, second and so forth. This narrows the potential cause of a given trip.
- Maintenance personnel are provided with information to identify the problem and to have the system up and operating in minutes instead of hours.

Personnel Productivity

- Time-consuming data collection by maintenance personnel is not necessary, thereby freeing up time to keep the equipment and facility operating.
- Scheduled maintenance based on real time eliminates unnecessary maintenance.
- Time-consuming troubleshooting to determine overload or fault source is eliminated.

Standard Devices

IMPACC provides a complete family of solid-state products including protective relays, meters, and control relays. These are designed to provide superior protection and metering from the utility incoming line down to a 15 ampere breaker or fractional HP motor. The IQ family of IMPACC compatible microprocessor-based devices can be applied to virtually any 480V to 230 kV power system. IMPACC, the only communication network designed for power distribution duty, provides the necessary information to the right person in real time. IMPACC is also "open" to communicate with other systems used in plant.

Refer to Page 130 of this document.



COMMUNICATIONS SYSTEMS (IMPACC) For New and Existing Electrical Equipment

PRODUCT HISTORY

Originally a Westinghouse Product

The Integrated Monitoring Protection and Control Communications (IMPACC) product line emerged in 1987 with the introduction of the first microprocessor-based multifunctional meters, the IQ Data Plus. The IQ Data Plus set the standard for a new class of intelligent meters which offered modular communication capability. The first modular communication card, the Product Operated Network Interface (PONI), targeted the noisy environment associated with electrical distribution equipment. The introduction of the PONI card provided the ability to daisy chain a thousand devices back to a computer in order to continuously monitor and trend all points.

In 1988, Westinghouse offered IMPACC Series III software, the first Microsoft® Windows compatible electrical distribution monitoring package. Since that time, the speed of communication has improved tremendously. Today, over twenty different devices found in motor control centers, low and medium voltage switchgear, switchboards and transfer switches can be linked with Series III software.

The technology and solutions available to customers now are greater than ever before. Cutler-Hammer has introduced three new software programs in 1995 which work in conjunction with the 1995 software.

IMPACC communications systems allow every IQ and electrical device to be linked to a computer. This allows for the monitoring of electrical systems. It is possible to monitor every IQ and electrical device placed in a system. Bus, Ethernet and other protocols can be linked with Series III software. This allows customers several proprietary protocols to be used in distributed control systems, monitoring systems and protection systems. IMPACC software is your key to the power of the system.

PRODUCT HISTORY TIMELINE

Page	Product	1985	1990	1995	Present
144	IMPACC Series I CONI				
144	PONI (1200) MINT				
145	IMPACC Series III TSF PONI (9600)				
144	MINT II IPONI				
145	Waveform				
144	BPONI				
145	E-BILL				
145	Trip Curve				

GENERAL INFORMATION

IMPACC communications can be added to existing equipment with IQ devices as standard in new Cutler-Hammer assemblies and instrumentation. These communications are already communications in existing Cutler-Hammer/Westinghouse equipment. With the simple addition of a communications card, the communications information can be transmitted to a master computer over a twisted pair of wires.

Westinghouse and other manufacturers' power circuit breakers.

Metering and Instrumentation
IQ devices can also replace many electro-mechanical, thermal or analog devices on Cutler-Hammer/Westinghouse and other manufacturers' equipment to provide a significant improvement to the quality and quantity of information available. For example, an IQ Data Plus II can replace an ammeter, voltmeter, ammeter and voltmeter switch, wattmeter, varmeter, power factor meter, frequency meter, and watt-hour meter with one compact solid-state unit. **Refer to the IQ Products section of this catalog for simple, easy to install methods of adding IQ devices to existing equipment.**

For more information on retrofitting electrical distribution equipment, contact your local Cutler-Hammer Field Sales Office.

Existing Cutler-Hammer/Westinghouse Equipment

Not Equipped with IQ Devices
IQ devices can be added to existing Cutler-Hammer/Westinghouse equipment. This provides a significant improvement to the quality and quantity of information available. **Refer to the IQ Products section of this catalog for simple, easy to install methods of adding IQ devices to existing equipment.**

Other Manufacturers' Equipment

Protection and Monitoring
Retrofit kits of the Digitrip RMS microprocessor-based trip units are available for other manufacturers' low-voltage power circuit breakers as well as Cutler-Hammer/Westinghouse DB, DS and SPB breakers. The Digitrip RMS trip units provide true RMS current sensing, circuit protection, testing and energy monitoring functions for electrical circuits as well as remote communications with the IMPACC system. **Refer to the Low Voltage Switchgear section of this catalog for more information on retrofitting Cutler-Hammer/Westinghouse equipment.**

Equipped with IQ Devices
Many Cutler-Hammer/Westinghouse electrical assemblies manufactured since 1989

Refer to Page 130 of this document.

® Microsoft is a registered trademark of Microsoft Corporation.



GENERAL INFORMATION, *Continued*

The Power of Information

Centralized Data Collection

An IMPACC System collects, processes and stores distribution system operational data. Trend data can help analyze overall electrical distribution system operation or a specific load's historical performance.

Early Warning

Constant monitoring can alert an operator to potential problems before they occur, thus minimizing costly downtime while keeping the distribution system running smoothly.

Troubleshooting

Time and effort are saved to solve problems.

Monitoring, Controlling and Communicating from a Central Location – On-site

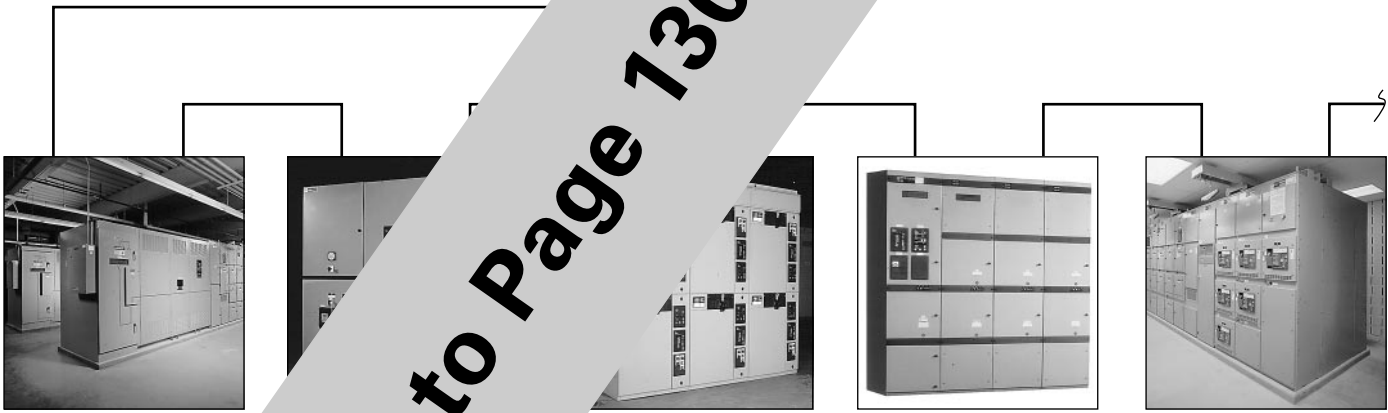
From a master control PC, either on-site or off-site, the plant operator, facilities engineer and/or maintenance engineer can monitor and/or control the entire power distribution system. Information can be made available to other PCs at different locations within a facility.

Shielded twisted pair communications wire in an IMPACC System can extend 7,500 ft. without the use of repeaters. Phone lines and modems may be used to extend an IMPACC System to monitor and control off-site locations that may be hundreds or thousands of miles from the master control unit.

On-site Location



Refer to Page 130 of this document.



WLI Load Interrupter Switchgear

- Metering Information
- Switch Position
- Blown Fuse Indication

AMPGARD Medium Voltage Starters

- Motor Status (Stop/Run/Trip)
- Cause and Magnitude of Trip
- Motor Control (Trip/Reset)
- Operational Data (Motor Run Time, Number of Operations)
- Metering Data
- Time Stamping of Events
- Trip Setup Values
- Motor Winding/Bearing Temperatures

Low Voltage Switchgear Type DS II

- Breaker Status (Open/Close/Trip)
- Cause and Magnitude of Trip
- Breaker Control (Open/Control)
- Metering Values
- Trip Rating
- Time Stamping of Events

Low Voltage Switchboards – Pow-R-M-S and Pow-R-M-S/F

- Breaker Status (Open/Close/Trip)
- Cause and Magnitude of Trip
- Breaker Control (Open/Close)
- Metering Values
- Trip Rating
- Time Stamping of Events



GENERAL INFORMATION, *Continued*

Network Integration

IMPACC can be integrated with other area networks through an approved personal computer or PLC.

Scheduled Maintenance

Preventive maintenance schedules can be developed easily from the stored database to improve equipment performance and prevent downtime.

Time Savings

An IMPACC System eliminates the necessity to individually read, record and compile data from electrical distribution assemblies and equipment.

Energy Consumption

Inexpensive monitoring of energy consumption can be performed at desired locations in the electrical distribution system providing for energy cost reductions and/or allocation of energy costs to specific departments or functions.

Password

Password protection of the system prevents unauthorized access to data and control functions and/or

Monitoring, Controlling and Communicating from a Central Location -

With IMPACC compatible devices, the customer has the ability to monitor, control and obtain information at the individual equipment or equipment lineup.



Low Voltage Switch and Pow-R-Line 4F boards

- Metering
- Energy
- Trip
- Control
- Start/Reset
- Cause and Magnitude of Trip
- Operational Data (Motor Run Time, Number of Operations)
- Metering Data
- Time Stamping of Events
- Trip Setup Values

PWM Adjustable Frequency Controllers

- Drive Status
- Metering Values
- Cause and Magnitude of Trip
- Start, Stop, Speed Control of Drive
- Time Stamping of Events

Transfer Switches

- Metering Data
- Transfer Switch Status
- Remote Test

Busway Systems

- Energy Usage Readings
- Power Usage Readings

Refer to Page 130 of this document.



GENERAL INFORMATION, Continued

Electronic Device IMPACC System Selection Chart

FUNCTION	Device Name	Descriptive Bulletin	Assembly Applications																
			Medium Voltage (Above 600V)					Low Voltage (600V and Below)											
			Substation Breakers	Metal-Clad Switchgear (VacClad)	Metal-Enclosed Switchgear (WVVB)	Fused Metal-Enclosed Switchgear (WLI)	Motor Starter (Ampgard)	Substation/Unit Sub Transformer	Metal-Enclosed Switchgear (DS)	Motor Starter (Ampgard)	Automatic Transfer Switches								
METERING AND MONITORING	IQ Analyzer	8179	RI/RF	RI/OF	RI/OF	RI/OF													
	IQ DP-4000	8170		RF	RF	RF	RIF												
	IQ Data Plus II (< 14.4 kV)	8176		RF	RF	RF	RF												
	IQ Data Plus II HV (> 14.4 kV)	8176		RF	RF	RF	RF												
	IQ Data	8171																	
	IQ Generator	8172																	
	IQ Energy Sentinel 1	8178										RF					RF		
OVERCURRENT PROTECTION	Digitrip MV	33-750	R	R	R														
	Digitrip RMS 810																		
	Digitrip RMS 910																		
	Digitrip OPTIM 750								R	OF							O		
	Digitrip OPTIM 1050								O	OF							O		
MOTOR PROTECTION	IQ 1000 II	8173		RF															
	IQ 500	8177																	
	ADVANTAGE Starter																		
	AFD Device Panel																R		
OTHER DEVICES	IQ Transfer																	R	
	Addressable Relay II		O															O	
	RTD Module																	O	
LOCAL DISPLAY UNITS	Central Energy Display II - CED II (IQ Energy Sentinel)	8178										R	R	R					
	Central Monitoring Unit - CMU (ADVANTAGE Starter)	8226												R					
	Assemblies Electronic Monitor - AEM II (Digitrip RMS)	8175											R	R					
	OPTIM Breaker Interface Module - BIM (Digitrip OPTIM and Digitrip RMS 810 and 910)													R	R	R			
IMPACC COMMUNICATIONS	IMPACC SYSTEMS																		
	SOFTWARE	Standard Software																	
		Graphic Software																	
		Power Distribution System																	
		Power Analysis Software																	
		Network Diagnostic																	
	HARDWARE	PONI																	
		CONI																	
		MINT																	
		PLC Interface																	
Mod Bus																			
Ethernet																			
IQ DC																			

Refer to Page 130 of this document.

Legend:



COMMUNICATIONS SYSTEMS (IMPACC) For New and Existing Electrical Equipment

GENERAL INFORMATION, Continued

Electronic Device IMPACC System Selection Chart

FUNCTION	Device Name	Descriptive Bulletin	Electrical Parameters																Cause/Type of Trip	Starter/Breaker Contact Status	External I/O	Special Functions
			Volts	Volt-Demand	Amperes	Ampere-Demand	Watts	Watt-Demand	Watt-Hours	Vars	Var-Demand	Var-Hours	...	...	...	...	...	...
METERING AND MONITORING	IQ Analyzer	8179	M/C	M/C	M/C	M/C	M/C	M/C	M/C	M/C	M/C	M/C	M/C	M/C	M/C	M/C	M	M	M/C	1, 4, 5		
	IQ DP-4000	8170	M/C		M	M	M	M	M	M	M	M	M	M	M	M			M/C	1, 4		
	IQ Data Plus II (< 14.4 kV)	8176	M/C		M		M	M	M	M	M	M	M	M	M	M						
	IQ Data Plus II HV (> 14.4 kV)	8176	M/C		M		M	M	M	M	M	M	M	M	M	M						
	IQ Data	8171	M		M																	
	IQ Generator	8172	M		M																	
	IQ Energy Sentinel	8178					M	M													3	
OVERCURRENT PROTECTION	Digitrip MV	33-750			P/M	M											M	M	M/C	1, 2, 3		
	Digitrip RMS 810				P/M	M	M										M	M	M/C	3		
	Digitrip RMS 910		M		P/M	M								M	M		M	M	M/C	3		
	Digitrip OPTIM 750				P/M	M											M	M	M/T	1, 2, 3		
	Digitrip OPTIM 1050		M		P/M	M								M	M	M	M	M	M/T	1, 2, 3		
MOTOR PROTECTION	IQ 1000 II	8173	M/C		P/M												M	M	M/C			
	IQ 500	8177															M	M	M/T			
	ADVANTAGE Starter																M	M	M/C			
	AFD Device Panel		M												M/C		M	M	M/C	M/C		
OTHER DEVICES	IQ Transfer		M														M	M/C	M/C			
	Addressable Relay II																M	M	M/C	3		
	RTD Module																		M			
LOCAL DISPLAY UNITS	Central Energy Display II - CED II (IQ Energy Sentinel)	8178																				
	CENTRAL MONITORING UNIT - CMU (ADVANTAGE STARTER)																D	D		D		
	Assemblies Electronic Monitor - AEM (Digitrip RMS)																D	D				
	OPTIM Breaker Interface Module (Digitrip OPTIM and Digitrip RMS and 910, IQ Energy Sentinel)																D	D	D	D		
IMPACC COMMUNICATIONS SOFTWARE	IMPACC SYSTEMS																					
	Standard Software										Data Logging Software											
	Graphic Software										Equipment Graphic Software											
	Power Distribution										System Coordination Software											
	Power Analysis										Operation Diagnostic Software											
	Network Data										Units Device Data Over Communication Network											
	PONI										Interfaces Network Communication to Personal Computer											
	CONI										Translates Network Communication to RS-232 Protocol											
	MINI										Translates Network Communication to PLC Interface											
	EPI										Translates Network Communication to Mod Bus Protocol											
EPI										Translates Network Communication to Ethernet Protocol												
EPI										Used for IQ Devices That Do Not Directly Accept DC Power												

Refer to Page 130 of this document.

- Special Functions:
1. Download setpoints
 2. Enhanced curve shaping
 3. Built-in communication capability
 4. Min./Max.
 5. CBEMA (2)



IMPACC HARDWARE

INCOM Product Operated Network Interface (IPONI) Card



The IPONI Card adds communications to various Cutler-Hammer products, including the IQ Data, IQ Generator, IQ Data Plus II, IQ Data Plus II HV, IQ DP-4000, IQ Analyzer version 1.06 and later, IQ Transfer, IQ 1000 II, Digitrip MV, IQ Central Energy Display II (CED II), Assemblies Electronic Monitor II (AEM II), Central Monitoring Unit (CMU) and the Breaker Interface Module (BIM), enabling these devices to communicate with a master control unit over an INCOM network. (Several other devices, such as the IQ Energy Sentinel, Digitrip MV, Digitrip RMS trip units, OPTIM trip units, the Addressable Relay II, and the Universal RTD Module contain built-in communications capability and do not require a PONI.) The PONI can be easily mounted on the back of these devices and requires no external power. Selectable communication rate of 1200 or 9600 baud is available.

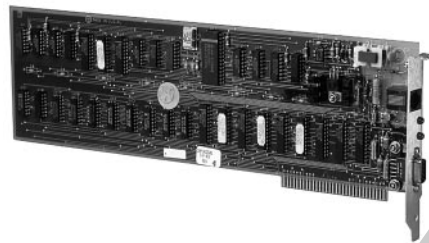
Also available are the special RS-232 PONI and the Telephone Modem PONI, which enable the above mentioned devices to communicate with a master control unit through either an RS-232 channel or over a telephone line. Two application restrictions must be considered when utilizing either of these special PONI's: 1 - they both operate exclusively at 1200 baud; 2 - they both operate over a single point-to-point (non-shared) communication channel.

Buffered PONI (BPONI)



The function of the above mentioned products: Universal RTD AF 400 IQ 500 IQ 1000 IQ Analyzer 1.05 and earlier

Computer Operated Network Interface (CONI) Card



The CONI Card interfaces the information from IMPACC devices to personal computer software. It is installed into the expansion slot of an IBM compatible with an ISA/EISA bus.

Master INCOM Network (MINT) II



The MINT II network interface is a master RS-232C serial interface for the IMPACC network. Some models are available in the rackmount format and receive and transmit data. The MINT II is a multiple baudband LAN's, short haul modem. It allows additional IMPACC data line (five lines per MINT II). The MINT II is either table or panel mount. It requires a 120 VAC, 60 Hz power supply. Selectable communication rate of 1200 or 9600 baud is available. The burden of the MINT II is 7 VA.

PLC Interface



The IMPACC Interface connects a network directly to a PLC. The NL-583 performs control and status functions with ADVANTAGE and contactors. The NL-583 performs control and complete status functions with ADVANTAGE. Either module is easily mounted in the expansion unit of the PLC and is equipped with two LEDs, which indicate: the status of the module; and when it is transmitting.

Network Gateways/Bridges



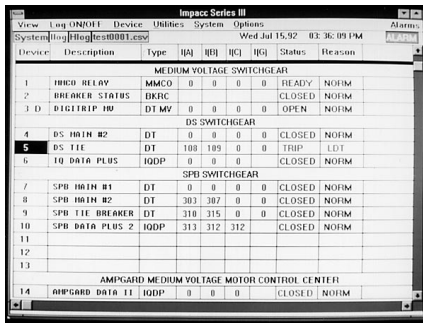
The Mod Bus Gateway and Ethernet Bridge translate INCOM network communications into either Mod Bus or Ethernet protocol. The Mod Bus Gateway uses a register mapping technique to place information from up to 200 IMPACC meters and protective relays into Mod Bus registers. The gateway also supports control features to allow the customer (Mod Bus master) to send control commands to the IMPACC devices. The Ethernet Bridge provides the ability to bridge all IMPACC information onto a new or existing Ethernet network.

Refer to Page 130 of this document.



IMPACC SOFTWARE

IMPACC Series III Software

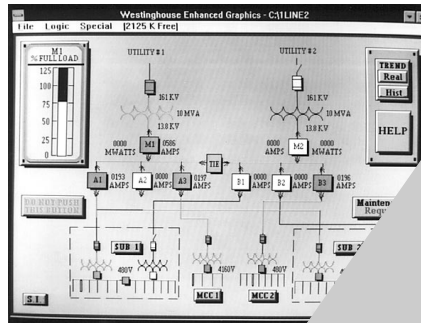


IMPACC Series III software is a Microsoft Windows based program that provides complete monitoring and controlling functions from a centralized location. Data can be stored to generate standard or customized reports, charts or graphs. Series III can expand with the system as devices are added.

Software Features

- Real time monitoring
- Alarming
- Control
- Trend/Report generation
- Maintenance scheduling
- Available in 20, 200 or 1000 device packages

Enhanced Graphics Software

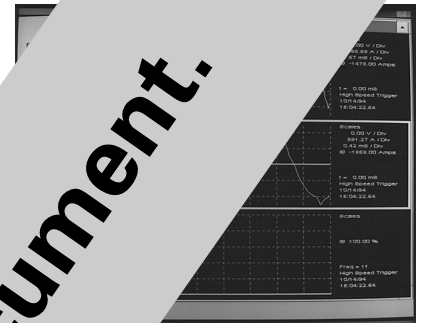


Enhanced Graphics is an advanced software package to IMPACC Series III. It provides a complete set of graphics capabilities including, data logging, alarming, and networking. It also offers advanced graphics capabilities.

Software Features

- Custom on-line site plans
- Color coding
- Maintenance scheduling
- Alarming

Waveform

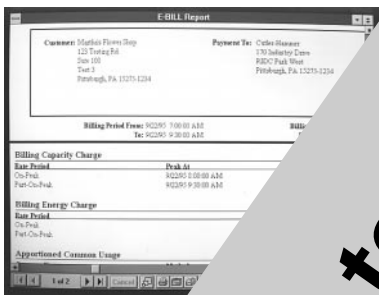


Waveform analysis software provides a display of captured waveforms from the IQ Analyzer, Digitrip 910, and OptiM 1050.

It displays waveforms for phase-to-phase, phase-to-neutral and neutral-to-ground voltages, and phases A, B, C, N and G currents.

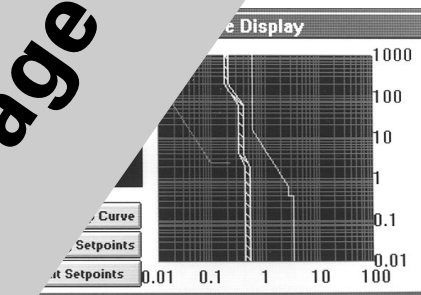
- Displays waveform data in three ways:
 1. Eight cycles of actual waveform.
 2. Zoomed in view of two cycles of high speed sample waveform.
 3. Spectrum chart showing frequency content and magnitude.
- Provides snapshot metering and power quality data at the time of wave capture.

E-Bill Software



- Create "electrical department"
- Use both demand
- Provide bill of materials

Coordination Software



- Displays coordination curves based on actual breaker settings
- Remotely configures breaker trip settings
- Allows dragging of breaker curves to adjust settings dynamically

PRICING INFORMATION

Literature Number	SA-11998A	Price and Availability Digest for Westinghouse IMPACC System
Literature Number	SA-11931	Discount Symbol for IMPACC Compatible Devices

PRICING INFORMATION

PAD	Price and Availability Digest
VISTA/VISTALINE	Discount Symbol C10-S25

Refer to Page 130 of this document.

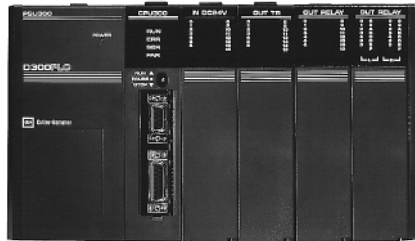


PRODUCT DESCRIPTION



D50

Programmable Logic Controllers (PLC) are microprocessor-based devices used to control industrial processes or machines. PLCs were originally designed to replace the control relays, timers, and counters found in conventional hardwired control systems. From this origin, PLCs have expanded in capability to perform virtually



D300

all of the complex functions required to control an industrial process or machine. Today's PLCs can provide advanced functions, including analog monitoring, control and high speed motion control. Also, newer PLCs can share data over communications networks.

PRODUCT HISTORY

The company has offered programmable controller products since the early '70s. These products have been marketed under several trade names such as Numa-Logic and model names such as D100.

Westinghouse entered the solid-state logic and control business with the Numa-Logic 300 series products. The 300 series was a set of hardwired logic components that could be custom wired to perform the desired logic functions.

Cutler-Hammer entered the market with its first programmable control in 1977. The unit was called the D120 and was a true programmable control with no hard wiring required.

Many models have been introduced since then.

Organizationally, the programmable controller product line is located in the Milwaukee OTC facility. It is a part of the Industrial Control Division.

PRODUCT HISTORY TIMELINE

Page	Product	1965	1970	1975	1980	1985	1990	1995	1998	Present
	Westinghouse 50/55									
147	Westinghouse 100/110									
147	Westinghouse 300									
147	Westinghouse 400									
	Westinghouse 500									
	Westinghouse 700									
	Westinghouse 900									
	Westinghouse 1100									
	Westinghouse 1200									
	Westinghouse 1500/1700									
	Westinghouse 2000									
	Westinghouse I/O Plus									
148	Cutler-Hammer D120									
148	Cutler-Hammer MPC1									
	Cutler-Hammer D100									
148	Cutler-Hammer D500									
	Cutler-Hammer D200									
	Cutler-Hammer D50									
	Cutler-Hammer D300									



100/110 SERIES



Low Resolution Photo

Introduction and Description

The Numa-Logic 100/110 Series, known as “the Pico,” consisted of the PC-100 and PC-110 models. Both products were “brick” style PLCs and provided a small number of digital inputs and outputs mounted in the same enclosure as the processor.

Various styles offered the ability to select the type and amount of I/O required. I/O expanders were available to expand the I/O capacity.

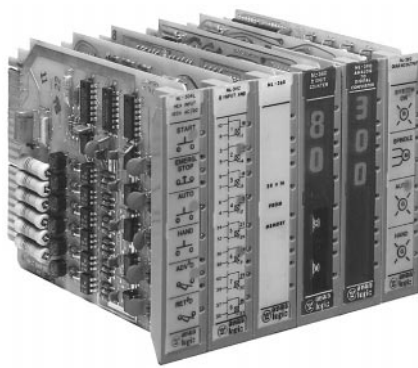
Chronology

The 100/110 Series PLCs were offered as current product from 1981 until 1989. In 1989 the product was discontinued.

Replacement

A PC-100 or PC-110 can be functionally replaced with either a PC-50 or PC-500 with the appropriate I/O modules.

300 SERIES



Introduction and Description

The Numa-Logic 300 Series was Westinghouse’s original solid-state controls offering. The 300 Series consisted of printed circuit boards (modules) that performed specific logic functions (AND, OR, NOT, etc.). These modules could then be custom wired by the user to perform the required control functions.

All 300 Series components can be identified by catalog numbers of NL-3XX.

Chronology

The Numa-Logic 300 Series products were manufactured by Westinghouse beginning in the early 1970s and continuing until 1988. Replacement products are currently available from Instrument Specialties, Inc.

Replacement

For replacement of the 300 Series, contact:

Instrument Specialties, Inc.
1886 Larchwood
Troy, MI 48083
(313) 689-0176

400 SERIES

Introduction and Description

The Numa-Logic 400 Series was Westinghouse’s first PLC offering. After being manufactured for two years, the 400 Series was replaced by the 700 Series of products. Few, if any, 400 Series systems remain in service today.

Chronology

The 400 Series was manufactured by Westinghouse in Madison Heights, MI from 1975 until 1978. The product was no longer manufactured after 1979.

Replacement

400 Series can be replaced by a 50 Series or 500 Series PLC along with the appropriate expansion I/O modules.



D120 SERIES



Introduction and Description

The D120 Family of PLCs consisted of several I/O cards and the racks used to mount them.

The self-contained troubleshooting was identical in concept to the buzzer and jumpers common to relay controls. The D120 requires no new language. It utilizes decimal numbering and memory size is determined simply by adding all elements on the ladder diagram.

Chronology

The D120 products were offered by Cutler-Hammer from 1976 through 1983.

Replacement

For replacements of the D120 products, contact:

ATS Inc.
East Peoria, IL
309-698-5700

MPC1 SERIES



Introduction and Description

The MPC1 was a complete PLC system for applications up to 128 I/O. Programmed in easily understood relay ladder logic with digital and analog capabilities. Analog processor has the same functions as the discrete version and supports "intelligent" analog input and output modules.

Chronology

The MPC1 products were offered by Cutler-Hammer from 1983 through 1993.

Replacement

For replacements of the MPC1 products, contact:

ICS Inc.
Decatur, IL
217-422-6700

D500 SERIES



Introduction and Description

The D500 Family of PLCs consisted of several I/O cards and the racks used to mount them. The D500 was a full function programmable logic controller offering all of the capabilities of larger frame PLCs in a compact, economical, space saving design.

Chronology

The D500 products were offered by Cutler-Hammer from 1985 through 1994.

PRODUCT SUPPORT SERVICES

Technical Application Assistance

Cutler-Hammer can provide technical application assistance via the Technical Resource Center. Available by telephone, Cutler-Hammer personnel quickly respond to customer needs, including troubleshooting, analyzing system operation, and coordinating component repair or replacement. The Technical Resource Center can be reached by telephoning:

1-800-809-2772

Training

Cutler-Hammer provides comprehensive training on all aspects of Cutler-Hammer programmable controllers from our Pittsburgh Training Center. Courses cover system configuration and design, programming, troubleshooting and maintenance. The Training Center also offers on-site training for all its courses. Course description, schedule and pricing can be found through training department:

412-494-3715

Repair Services

Contact CORE at:

1-800-410-2910

FURTHER INFORMATION

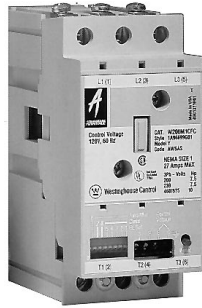
For currently manufactured products, see the Programmable Logic Controllers section of Catalog 25-000 or the following Cutler-Hammer publications.

PRICING INFORMATION

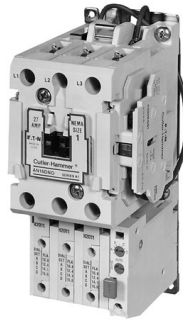
VISTA/VISTALINE | Discount Symbol 2CD-3



PRODUCT DESCRIPTION



ADVANTAGE



Freedom

The Cutler-Hammer line of starters and contactors were and are designed to control functions of a connected motor by starting, stopping, reversing, regulating and protecting. When functions do not include speed regulation, this device is known as a starter rather than a controller.

Applications for starter functions are fans, pumps, constant horsepower, constant or variable torque machine tools, constant torque metal working machinery, variable torque and horsepower fans and blowers, constant power heating, lighting, pumps and motors for all types of applications.

PRODUCT HISTORY

The Cutler-Hammer line of contactors and starters dates back to the early 1920s in Milwaukee, WI. Changes in coil construction, making the first moisture-proof vacuum with impregnated coils, were innovations in this line of contactors and starters manufactured before the 3-Star line (now known as the Pre 3-Star). Eutectic alloy overloads were used later in this design with the design change to the 3-Star line. A few of the new features of the 3-Star line of contactors and starters were the first standard three coil overload relays, new molding compounds, new metals and cast resin coils.

The Type F magnetic contactor is the first magnetically controlled contactor in our Westinghouse records. It was open in design, simple in construction and was state-of-the-art due to its magnetically controlled armature. The Type F contactor was replaced by the De-ion contactor which featured the Westinghouse trademark De-ion arc quenching. The De-ion was followed by the Type DN, Type N, and the Type A, today known as the A200. The Type B was developed in the late 1970s and was obsoleted two or three years later. The A200 open control is still a current offering. Prior to 1985, some of the larger sizes (5-9) were known as GCA and GCD.

The Citation line of contactors and starters was introduced in 1968 with many new features: the new CI non-wearing totally enclosed permanent air gap magnet structure; dual wound magnet coil with plug-in feature; color coded, twin break dust-safe contacts; and straight through wiring. Although the Citation line was obsoleted in 1997, replacement contact kits, magnet coils and heater coils will continue to be available.

Today, the Freedom contactor, launched in 1986, coexists with the solid-state heaterless ADVANTAGE contactor, a microprocessor-controlled magnetic contactor introduced in 1991.

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A200	
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A202 Lighting Contactor	172-173
JF Autostarter	174
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Pricing Information	175

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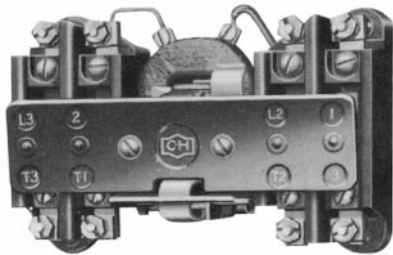
PRODUCT HISTORY TIMELINE FOR PRE 3-STAR, BULLETIN 9586

Originally a Cutler-Hammer Product

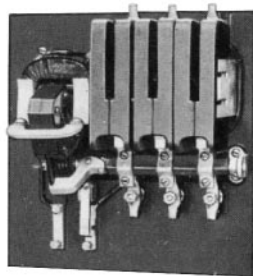
Size	1920	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985
Sizes 00-5														

GENERAL INFORMATION

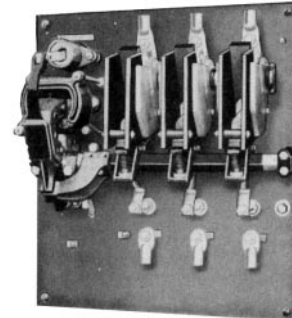
Pre 3-Star



Size 1 Contactor



Size 2 Contactor



Size 5 Contactor

Parts are no longer available for Pre-3 Star

REPLACEMENT CAPABILITIES

There are no replacement parts available. Replace with new contactor or starter.

TECHNOLOGY UPGRADES

Size 00-3 ADVANTAGE, Freedom or IT
 Size 4-5 ADVANTAGE, Freedom, Vacuum or IT

For all NEMA rated starters, please contact the Industrial Controls Division (ICD) Aftermarket at 1-800-535-8992.



CONTACTORS AND STARTERS

3-Star

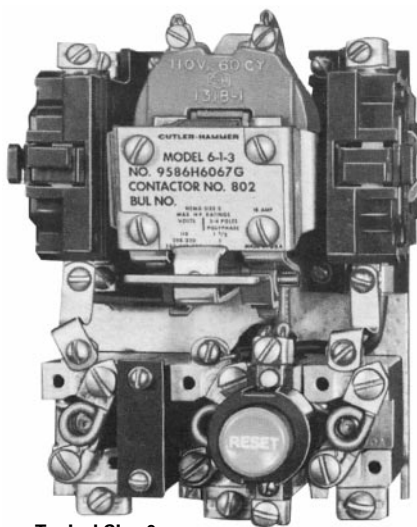
151

PRODUCT HISTORY TIMELINE FOR 3-STAR, BULLETIN 9560, 9586, 9589, 9591, 9556, 9658, 9736, 9739

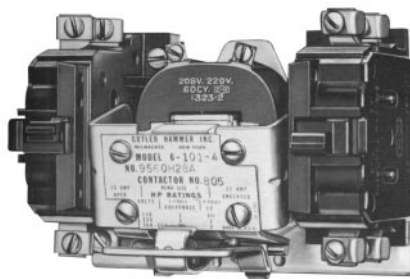
Size	1950	1955	1960	1965	1970	1975	1980	1985	
Size 0		[Redacted]							
Size 1		[Redacted]							
Size 2		[Redacted]							
Size 3		[Redacted]							
Size 4			[Redacted]						
Size 5			[Redacted]						

GENERAL INFORMATION

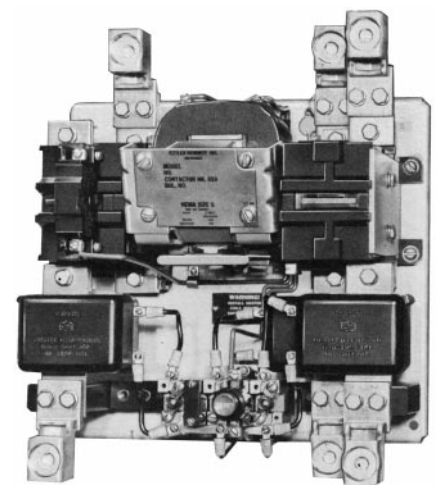
3-Star



Typical Size 0 Starter



Typical Size 1 Contactor



Typical Size 5 Starter

K

REPLACEMENT CAPABILITIES

NEMA Size	Replacement 3-Pole Contact Kits Part Number	AC Coils		
		Control Voltage and Hertz		
		120/110V 60/50 Hz	240/220V 60/50 Hz	480/440V 60/50 Hz
		Part Number		
0	②	9-1318-108	9-1318-109	9-1318-110
1	②	9-1323-68	9-1323-92	9-1323-93
2	②	9-1359-41	9-1359-67	9-1359-68
3	②	9-1360-41	9-1360-59	9-1360-60
4	②	9-1360-41	9-1360-59	9-1360-60
5	③	9-1510-14	9-1510-15	9-1510-16

TECHNOLOGY UPGRADES

Sizes 00-3 ADVANTAGE, Freedom or IT
 Sizes 4-5 ADVANTAGE, Freedom, Vacuum or IT

① For all NEMA rated bulletin 9586 starters, please contact ICD Aftermarket at 1-800-535-8992.
 ② No longer available, replace with new Freedom or ADVANTAGE starter or contactor.
 ③ Advise complete nameplate data.



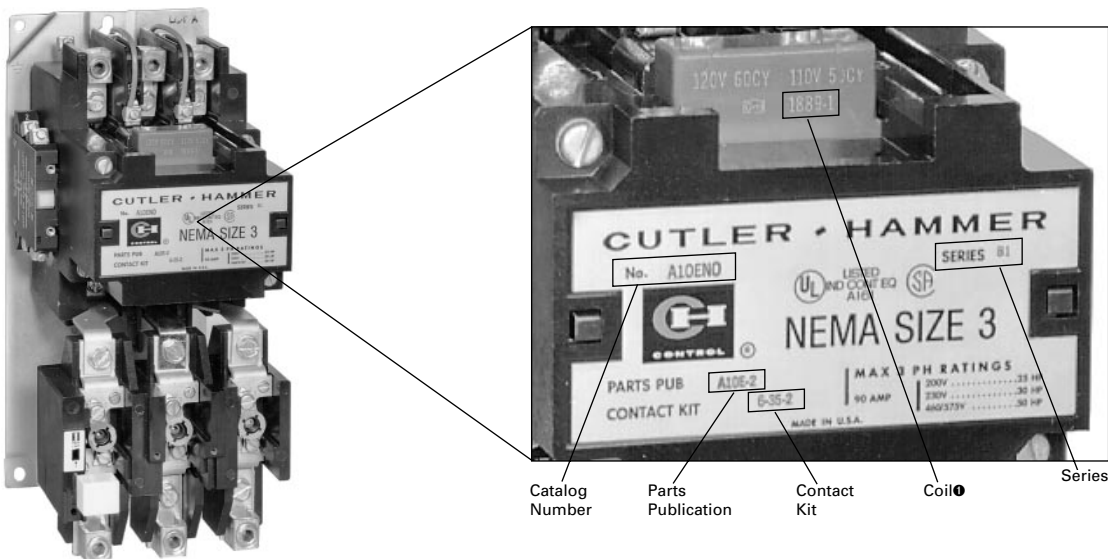
PRODUCT HISTORY TIMELINE FOR CITATION A10, A11, A13, A30, A31, A40, A41, A50, A51, A70, A71, A80, A81, B10, B11, B50, B51, B52, C10, C30, C50

Originally a Cutler-Hammer Product

NEMA Size	Series	1965	1970	1975	1980	1985	1990	1995	1997	Present	
Size 00	A1		█								
	B1					█					
	C1						█				
	D1							█			
Size 0	A1	█									
Size 1	A1	█									
Size 2	A1	█									
	B1					█					
Size 3	A1	█									
	B1					█					
Size 4	A1	█									
	B1					█					
Size 5	A1				█						
Size 6	A1			█							
	B1					█					
	C1						█				
Size 7	A1		█								
	B1					█					
Size 8	A1		█								
	B1					█					

GENERAL INFORMATION

Citation Starter and Nameplate



Although the number "9" is not imprinted on the coil, it must be used when ordering. For example, the proper ordering number for a 120V, 60 Hz, AC magnet coil would be 9-1887-1 (Refer to the style numbers on page 153).



CONTACTORS AND STARTERS

Citation

REPLACEMENT CAPABILITIES

Contacts and Coils

Description	Size 00				Size 0	Size 1	Size 2		Size 3		
	Series A1 ^①	Series B1	Series C1	Series D1			Series A1	Series B1	Series A1	Series B1	
	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers			Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	
CONTACT KITS											
Part No. on Contactor or Starter Name Plate											
2-Pole without Interlock	6-21	②	②	②	6-22	6-23	6-24	6-34	6-25	6-35	
3-Pole without Interlock	6-21-2	②	②	②	6-22-2	6-23-2	6-24-2	6-34-2	6-25-2	6-35-2	
3-Pole with Interlock	6-21-3	②	②	...	.....	.....	.....	.....	.....	.....
4-Pole without Interlock	.....	...	...	...	6-22-3	6-23-3	.....	6-34-3	.....	.....
5-Pole without Interlock	.....	...	...	...	6-22-4	6-23-4	.....	6-34-4	.....	.....
MAGNET COILS											
	Coil Suffix										
120V 60 Hz or 110V 50 Hz	A	9-1945-1	9-2183-1	9-2650-1	9-2823-1	9-1887-1	9-1887-1	9-1889-1	9-2526-1	9-1891-1	9-1889-1
240V 60 Hz or 220V 50 Hz	B	9-1945-2	9-2183-2	9-2650-2	9-2823-2	9-1887-2	9-1887-2	9-1889-2	9-2526-2	9-1891-2	9-1889-2
480V 60 Hz or 440V 50 Hz	C	9-1945-3	9-2183-5	9-2650-3	9-2823-3	9-1887-3	9-1887-3	9-1889-3	9-2526-3	9-1891-3	9-1889-3
600V 60 Hz or 550V 50 Hz	D	9-1945-4	9-2183-19	9-2650-4	9-2823-4	9-1887-4	9-1887-4	9-1889-4	9-2526-4	9-1891-4	9-1889-4
208V 60 Hz	E	9-1945-5	9-2183-17	9-2650-5	9-2823-5	9-1887-5	9-1887-5	9-1889-13	9-2526-5	9-1891-13	9-1889-13
24V 60 Hz	T	9-1945-8	9-2183-16	9-2650-7	9-2823-18	9-1887-7	9-1887-7	9-1889-20	9-2526-6	9-1891-15	9-1889-20
380V 50 Hz	L	9-1945-6	9-2183-3	9-2650-6	9-2421-18 ^③	9-1887-8	9-1887-8	9-1889-14	9-2526-7	9-1891-14	9-1889-14
120/240V 60 Hz or 110/220V 50 Hz	F	.....	.....	.....	.....	9-1888-1	9-1888-1	9-1890-1	9-2527-1	9-1892-1	9-1890-1
240/480V 60 Hz or 220/440V 50 Hz	G	.....	.....	.....	.....	9-1888-2	9-1888-2	9-1890-2	9-2527-2	9-1892-2	9-1890-2
277V 60 Hz	H	9-1945-16	9-2183-18	9-2650-13	9-2823-12	9-1887-16	9-1887-16	9-1889-31	9-2526-15	9-1891-26	9-1889-31
					9-2823-17						
120V DC ^④	A1	.....	.....	.....	.....	9-2024-2	9-2024-2	9-2025-2	9-2626-2	9-2026-2	9-2025-2
240V DC ^④	B1	.....	.....	.....	.....	9-2024-1	9-2024-1	9-2025-1	9-2626-1	9-2026-1	9-2025-1
24V DC ^④	T1	.....	.....	.....	.....	9-2024-4	9-2024-4	9-2025-4	9-2626-4	9-2026-4	9-2025-4
48V DC ^④	W1	.....	.....	.....	.....	9-2024-3	9-2024-3	9-2025-3	9-2626-3	9-2026-3	9-2025-3

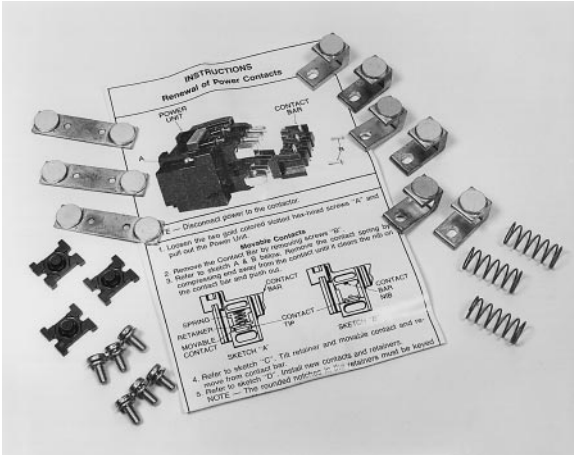
Description	Size 4		Size 5	Size 6			Size 7		Size 8		
	Series A1	Series B1		Series A1	Series B1	Series C1	Series A1	Series B1	Series A1	Series B1	
	Style and Part Numbers	Style and Part Numbers		Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	
CONTACT KITS											
Part No. on Contactor or Starter Name Plate											
2-Pole without Interlock	6-26	6-36-3	6-27	6-28	.....	6-601-2	6-28	.....	.....	.....
3-Pole without Interlock	6-26-2	6-36-4	6-27-2	6-28-2	6-570	6-601	6-28-2	6-570	646C829G05	6-571	
3-Pole with Interlock	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4-Pole without Interlock	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5-Pole without Interlock	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
MAGNET COILS											
	Coil Suffix										
120V 60 Hz or 110V 50 Hz	A	9-1891-1	9-1891-1	9-1891-1	9-1875-1	9-2651	9-2698	9-1875-1	9-2651	438C805G12	9-2654
240V 60 Hz or 220V 50 Hz	B	9-1891-2	9-1891-2	9-1891-2	9-1875-2	9-2651-2	9-2698-2	9-1875-2	9-2651-2	438C805G11	9-2654-2
480V 60 Hz or 440V 50 Hz	C	9-1891-3	9-1891-3	9-1891-3	9-1875-3	9-2651-3	9-2698-3	9-1875-3	9-2651-3	438C805G10	9-2654-3
600V 60 Hz or 550V 50 Hz	D	9-1891-4	9-1891-4	9-1891-4	9-1875-4	9-2651-4	9-2698-4	9-1875-4	9-2651-4	.....	9-2654-4
208V 60 Hz	E	9-1891-13	9-1891-13	9-1891-13	9-1875-14	9-2651-6	9-2698-5	9-1875-14	9-2651-6	438C805G11	9-2654-6
24V 60 Hz	T	9-1891-15	9-1891-15	9-1891-15	.....	.....	.....	.....	.....	.....	.....
380V 50 Hz	L	9-1891-14	9-1891-14	9-1891-14	9-1875-19	9-2651-5	9-2698-6	9-1875-19	9-2651-5	438C805G15	9-2654-5
120/240V 60 Hz or 110/220V 50 Hz	F	9-1892-1	9-1892-1	9-1892-1	.....	.....	.....	.....	.....	.....	.....
240/480V 60 Hz or 220/440V 50 Hz	G	9-1892-2	9-1892-2	9-1892-2	.....	.....	.....	.....	.....	.....	.....
277V 60 Hz	H	9-1891-26	9-1891-26	9-1891-26	.....	.....	.....	.....	.....	.....	.....
120V DC ^④	A1	9-2026-2	9-2026-2	9-2026-2	.....	.....	.....	.....	.....	.....	.....
240V DC ^④	B1	9-2026-1	9-2026-1	9-2026-1	.....	.....	.....	.....	.....	.....	.....
24V DC ^④	T1	9-2026-4	9-2026-4	9-2026-4	.....	.....	.....	.....	.....	.....	.....
48V DC ^④	W1	9-2026-3	9-2026-3	9-2026-3	.....	.....	.....	.....	.....	.....	.....

K

- ① For non-reversing contactors and starters only.
- ② Replace complete contactor.
- ③ Non-encapsulated coil.
- ④ For use in existing DC operated devices. Not for conversion of existing AC operated devices to DC.



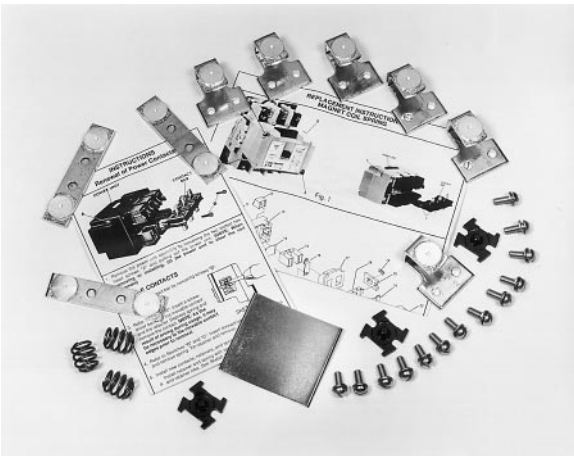
REPLACEMENT CAPABILITIES, *Continued*



3-Pole Contact Kit, Size 3, Series B1



Magnet Coil, 120V/60 Hz for Size 3, Series A1



3-Pole Contact Kit, Size 5

TECHNOLOGY UPGRADES

- Sizes 00-3 ADVANTAGE, Freedom or IT
- Sizes 4-6 ADVANTAGE, Freedom, Vacuum or IT
- Sizes 7-8 Freedom

Adapter Plates

The following adapter plates make it possible to replace a Citation starter with a Freedom or ADVANTAGE starter and the same mounting holes can be used.

NEMA Size	Adapter Plate Catalog Number	
	Freedom	ADVANTAGE
00, 0	C321CMP0	
1	C321CMP1	WBASE12
2	C321CMP2	WBASE 12
3	C321CMP3	WBASE 34
4	C321CMP4	WBASE 34
5	C321CMP5	



CONTACTORS AND STARTERS

Citation

REPLACEMENT CAPABILITIES, *Continued*

Overload Relays

Description	Size 00				Size 0	Size 1	Size 2		Size 3	
	Series A1	Series B1	Series C1	Series D1			Series A1	Series B1	Series A1	Series B1
	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers
REPLACEMENT THERMAL ELEMENTS										
Standard Trip Eutectic	10-4767	10-4767	10-4767	10-4767	10-4767	10-4767	10-4767	10-4767	10-4767	10-4767
Slow Trip Eutectic	10-5018	10-5018	10-5018	10-5018	10-5018	10-5018	10-5018	10-5018	10-5018	10-5018

Description	Size 4		Size 5	Size 6			Size 7		Size 8	
	Series A1	Series B1		Series A1	Series B1	Series C1	Series A1	Series B1	Series A1	Series B1
	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers	Style and Part Numbers
REPLACEMENT THERMAL ELEMENTS										
Standard Trip Eutectic	10-4767	10-4767	10-4767	10-4767	10-4767	10-4767	10-4767	10-4767	10-4767	10-4767
Slow Trip Eutectic	10-5018	10-5018	10-5018	.....	.....	.....	.....	.....	.....	.....
CURRENT TRANSFORMER	.....	.....	42-2807	9-1914-1	42-3418-3	42-3418-3	42-2648	42-3418	.....	42-3418-2





REPLACEMENT CAPABILITIES, *Continued*

Heater Selection

For Replacement in Existing Applications Only

Heaters are rated to protect 40°C rise of motors; and, open and drip proof motors having a service factor of 1.15 where the motor and the controller are at the same ambient temperature.

For other conditions:

- a. For 50°C, 55°C, 75°C rise motors and enclosed motors having a service factor of 1.0, select one size smaller.
- b. Ambient temperature of the starter lower than the motor by 26°C (47°F), use one size smaller.

- c. Ambient temperature of the starter higher than the motor by 26°C (47°F), use one size larger.

Ultimate tripping current of heaters is approximately 1.25 times the minimum current rating listed in the tables.

INDEX OF OVERLOAD RELAY HEATER SELECTION TABLES

Use This Index to Cross-Reference the Tables on Pages 157-162

Relay Type Catalog Number	Type	Heater Selection Table Numbers							
		NEMA Size of Starter							
		00-0-1 (1-1/2)	2	3	4	5	6	7	8
A10	Open Enclosed	ST-1 ST-2	ST-3 ST-4	ST-5 ST-6	ST-7 ST-7	ST-16 ST-16	ST-10 ST-10	ST-11 ST-11	ST-12 ST-12
A11	Open Enclosed	BNC-1 BNC-2	BNC-3 BNC-4	BNC-5 BNC-6	BNC-7 BNC-7	BNC-9 BNC-9	..........	..........	..........
A13	Open Enclosed	LT-2 LT-1	LT-4 LT-3	LT-6 LT-5	LT-7 LT-7	LT-8 LT-8	..........	..........	..........
A30 and A40	Enclosed	ST-9	ST-3	ST-6	ST-7	ST-16	ST-10	ST-11	ST-12
A31 and A41	Enclosed	BNC-8	BNC-3	BNC-6	BNC-7	BNC-9	.....	.....	.....
A50	Open Enclosed	ST-1 ST-2	ST-3 ST-4	ST-5 ST-6	ST-7 ST-7	ST-16 ST-16	ST-10 ST-10	ST-11 ST-11	ST-12 ST-12
A51	Open Enclosed	BNC-1 BNC-2	BNC-3 BNC-4	BNC-5 BNC-6	BNC-7 BNC-7	BNC-9 BNC-9	..........	..........	..........
A70 and A80	Enclosed	ST-9	ST-3	ST-6	ST-7	ST-16	ST-10	ST-11	ST-12
A71 and A81	Enclosed	BNC-8	BNC-3	BNC-5	BNC-7	BNC-9	.....	.....	.....
A400-A420	Enclosed	.....	.....	ST-14	ST-15	ST-16	ST-10	ST-11	ST-12
A460❶	Enclosed	ST-2❶	ST-4❶	ST-6❶	ST-7❶	ST-16❶	ST-10❶	ST-11❶	ST-12❶
A490❷	Enclosed	ST-2❷	ST-4❷	ST-6❷	ST-7❷	ST-16❷	ST-10❷	ST-11❷	ST-12❷
A700	Open Enclosed	ST-1 ST-2	ST-3 ST-4	ST-5 ST-6	ST-7 ST-7	ST-16 ST-16	..... ST-10	..........	..........
A800-A803	Enclosed	ST-9	ST-3	ST-5	ST-7	ST-16	ST-10	ST-11	.....
A804-A806	Enclosed	ST-9	ST-3	ST-5	.....	.....	.....	.....	.....
A808-A809	Enclosed	.....	ST-13	ST-5	ST-5	.....	.....	.....	.....
B10 B50	Enclosed	ST-1	ST-3	ST-5	ST-7	.....	.....	.....	.....
B11 and B51	Open Enclosed	BNC-1 BNC-2	..... BNC-3	..... BNC-5	..........	..........	..........	..........	..........
C300	Open and Enclosed	ST-1	ST-3	ST-5	ST-7	.....	.....	.....	.....
C301	Open and Enclosed	BNC-1	BNC-4	BNC-5	BNC-7	.....	.....	.....	.....
C303	Open and Enclosed	LT-2	LT-4	LT-6	LT-7	.....	.....	.....	.....

NOTE: Individually boxed heaters master packed 10 per carton.

❶ Select heaters for 50% of rated full load current.

❷ Select heaters for 68% of rated full load current.



CONTACTORS AND STARTERS

Citation

OVERLOAD RELAY HEATER SELECTION TABLES, *Continued*

Type ST Standard Trip Eutectic Alloy

For Replacement in Existing Applications Only

For Motors with 1.15 Service Factor

Table ST-1	Table ST-2	Table ST-3	Table ST-4	Table ST-5	Table ST-6	Heater Catalog Number
NEMA Sizes 00, 0, 1, 1-1/2		NEMA Size 2		NEMA Size 3		
For Open Type Cat. No. A10, A50, A700, B10, B50, C300 For Enclosed Type Cat. No. B10, B50, C300	For Enclosed Type Cat. No. A10, A50, A460⓪, A490⓪, A700	For Open Type Cat. No. A10, A50, A700, B10, C300 For Enclosed Type Cat. No. B10, C300, A30, A40, A70, A80, A800-A803	For Enclosed Type Cat. No. A10, A50, A460⓪, A490⓪, A700	For Open Type Cat. No. A10, A50, A700, B10, C300 For Enclosed Type Cat. No. A70, A80, A800-A803, B10	For Enclosed Type Cat. No. A10, A30, A40, A50, A460⓪, A490⓪, A700	
Heater Ampere Range						
.167- .187	.155- .173	.....	.....	.....	.....	H1101
.188- .210	.174- .195	.....	.....	.....	.....	H1102
.211- .237	.196- .220	.....	.....	.....	.....	H1103
.238- .266	.221- .247	.....	.....	.....	.....	H1104
.267- .298	.248- .278	.....	.....	.....	.....	H1105
.299- .334	.279- .310	.....	.....	.....	.....	H1106
.335- .376	.311- .349	.....	.....	.....	.....	H1107
.377- .422	.350- .391	.....	.....	.....	.....	H1108
.423- .474	.392- .441	.....	.....	.....	.....	H1109
.475- .532	.442- .495	.....	.....	.....	.....	H1110
.533- .598	.496- .555	.....	.....	.....	.....	H1111
.599- .672	.556- .624	.....	.....	.....	.....	H1112
.673- .757	.625- .703	.....	.....	.....	.....	H1113
.758- .855	.704- .795	.....	.....	.....	.....	H1114
.865- .959	.796- .895	.....	.....	.....	.....	H1115
.960- 1.07	.896- 0.999	.....	.....	.....	.....	H1116
1.08 - 1.21	1.00 - 1.12	.....	.....	.....	.....	H1117
1.22 - 1.35	1.13 - 1.25	.....	.....	.....	.....	H1018
1.36 - 1.52	1.26 - 1.41	.....	.....	.....	.....	H1019
1.53 - 1.70	1.42 - 1.58	.....	.....	.....	.....	H1020
1.71 - 1.90	1.59 - 1.77	.....	.....	.....	.....	H1021
1.91 - 2.10	1.78 - 1.96	.....	.....	.....	.....	H1022
2.11 - 2.33	1.97 - 2.17	.....	.....	.....	.....	H1023
2.34 - 2.62	2.18 - 2.44	.....	.....	.....	.....	H1024
2.63 - 2.93	2.45 - 2.72	.....	.....	.....	.....	H1025
2.94 - 3.27	2.73 - 3.04	.....	.....	.....	.....	H1026
3.28 - 3.64	3.05 - 3.38	.....	.....	.....	.....	H1066
3.65 - 4.06	3.39 - 3.73	3.72 - 4.10	.....	.....	.....	H1027
4.07 - 4.55	3.74 - 4.18	4.11 - 4.59	3.86 - 4.31	.....	.....	H1028
4.56 - 5.03	4.19 - 4.63	4.60 - 5.07	4.32 - 4.77	.....	.....	H1029
5.04 - 5.59	4.64 - 5.15	5.08 - 5.65	4.78 - 5.31	.....	.....	H1030
5.60 - 6.25	5.16 - 5.68	5.66 - 6.29	5.32 - 5.90	.....	.....	H1031
6.26 - 6.92	5.69 - 6.30	6.30 - 7.00	5.91 - 6.55	.....	.....	H1032
6.93 - 7.75	6.31 - 7.05	7.01 - 7.82	6.56 - 7.33	.....	.....	H1033
7.76 - 8.63	7.06 - 7.76	7.83 - 8.79	7.34 - 8.15	8.32 - 9.27	8.24 - 9.19	H1034
8.64 - 9.59	7.77 - 8.63	8.80 - 9.67	8.16 - 9.03	9.28 -10.1	9.20 -10.1	H1035
9.60 -10.6	8.64 - 9.51	9.68 -10.8	9.04 -10.1	10.2 -11.4	10.2 -11.3	H1036
10.7 -11.9	9.52 -10.5	10.9 -12.0	10.2 -11.2	11.5 -12.8	11.4 -12.7	H1037
12.0 -13.3	10.6 -11.8	12.1 -13.4	11.3 -12.5	12.9 -14.3	12.8 -14.1	H1038
13.4 -14.7	11.9 -13.1	13.5 -14.9	12.6 -13.9	14.4 -16.0	14.2 -15.8	H1039
14.8 -16.6	13.2 -14.8	15.0 -17.6	14.0 -15.7	16.1 -17.8	15.9 -17.7	H1040
16.7 -18.8	14.9 -16.7	17.7 -19.0	15.8 -17.5	17.9 -20.3	17.8 -20.1	H1041
18.9 -21.2	16.8 -18.9	19.1 -21.5	17.6 -19.8	20.4 -22.9	20.2 -22.7	H1042
21.3 -23.9	19.0 -21.3	21.6 -24.5	19.9 -22.3	23.0 -26.0	22.8 -25.5	H1043
24.0 -27.0	21.4 -24.1	24.6 -27.9	22.4 -25.4	26.1 -29.5	25.6 -28.9	H1044
.....	24.2 -27.0	28.0 -32.0	25.5 -28.7	29.6 -33.5	29.0 -32.5	H1045
.....	.....	32.1 -36.6	28.8 -32.5	33.6 -37.8	32.6 -36.7	H1046
.....	.....	36.7 -41.8	32.6 -36.6	37.9 -42.8	36.8 -41.0	H1047
.....	.....	41.9 -45.0	36.7 -41.0	42.9 -48.5	41.1 -46.0	H1048
.....	.....	.....	41.1 -45.0	48.6 -55.1	46.1 -51.8	H1049
.....	.....	.....	.....	55.2 -62.3	51.9 -58.6	H1050
.....	.....	.....	.....	62.4 -69.5	58.7 -64.6	H1051
.....	.....	.....	.....	69.6 -79.1	64.7 -72.7	H1052
.....	.....	.....	.....	79.2 -90.0	72.8 -83.1	H1054
.....	.....	.....	.....	.....	83.2 -90.0	H1055

NOTE: Individually boxed heaters master packed 10 per carton.
 ⓪ For A460 controllers, select heaters at 50% of rated full load current.
 ⓪ For A490 controllers, select heaters at 58% of rated full load current.



OVERLOAD RELAY HEATER SELECTION TABLES, *Continued*

Type ST Standard Trip Eutectic Alloy

For Replacement in Existing Applications Only

For Motors With 1.15 Service Factor

Table ST-7		Table ST-8		Table ST-9	
NEMA Size 4		NEMA Size 5		NEMA Size 0 and 1	
For Open Type Cat. No. A10, A50, C300 For Enclosed Type Cat. No. A10, A30, A40, A50, A70, A80, A460Ⓞ, A490Ⓞ, A700, A800-A803		For Open and Enclosed Type A10, A50, A30-40, A70, A80, A400, A410, A420, A460, A490, A800-A801		For Enclosed Type Cat. No. A30, A40, A70, A80, A800-A803	
Heater Ampere Range		Heater Ampere Range		Heater Ampere Range	
.....	H1034	92-101	H1020	.164- .183	H1101
.....	H1035	102-113	H1021	.184- .205	H1102
.....	H1036	114-125	H1022	.206- .232	H1103
.....	H1037	126-139	H1023	.233- .260	H1104
.....	H1038	140-157	H1024	.261- .293	H1105
.....	H1039	158-175	H1025	.294- .328	H1106
.....	H1040	176-196	H1026	.329- .369	H1107
20.6- 23.3	H1041	197-218	H1066	.370- .414	H1108
23.4- 26.3	H1042	219-243	H1027	.415- .465	H1109
.....	H1043	244-270	H1028	.466- .522	H1110
26.4- 30.8	H1044			.523- .586	H1111
30.9- 34.0	H1045			.587- .659	H1112
34.1- 38.3	H1046			.660- .743	H1113
38.4- 43.4	H1047			.744- .839	H1114
43.5- 49.3	H1048			.840- .943	H1115
49.4- 55.8	H1049			.944- 1.05	H1116
55.9- 63.1	H1050			1.06 - 1.17	H1117
63.2- 70.4	H1051			1.18 - 1.31	H1018
70.5- 79.9	H1052			1.32 - 1.47	H1019
80.0- 92.7	H1054			1.48 - 1.66	H1020
92.8-105	H1055			1.67 - 1.85	H1021
106 -121	H1056			1.86 - 2.04	H1022
122 -135	H1057			2.05 - 2.26	H1023
				2.27 - 2.54	H1024
				2.55 - 2.85	H1025
				2.86 - 3.18	H1026
				3.19 - 3.53	H1066
				3.54 - 3.95	H1027
				3.96 - 4.41	H1028
				4.42 - 4.88	H1029
				4.89 - 5.42	H1030
				5.43 - 6.07	H1031
				6.08 - 6.64	H1032
				6.65 - 7.43	H1033
				7.44 - 8.23	H1034
				8.24 - 9.19	H1035
				9.20 -10.1	H1036
				10.2 -11.3	H1037
				11.4 -12.6	H1038
				12.7 -14.0	H1039
				14.1 -15.7	H1040
				15.8 -17.7	H1041
				17.8 -19.8	H1042
				19.9 -22.0	H1043
				22.1 -24.9	H1044
				25.0 -27.0	H1045

Table ST-10	Table ST-11	Table ST-12	Heater Catalog Number
NEMA Size 6	NEMA Size 7	NEMA Size 8	
For Open Type — Cat. No. A10, A50, A700 For Enclosed Type — Cat. No. A10, A30, A40, A50, A70, A80, A400, A460Ⓞ, A490Ⓞ, A700			
Heater Ampere Range			
.....	229-255	.....	H1018
154-171	256-287	384- 429	H1019
172-192	288-321	430- 482	H1020
193-215	322-359	483- 538	H1021
216-237	360-397	539- 595	H1022
238-263	398-439	596- 657	H1023
264-295	440-492	658- 741	H1024
296-330	493-551	742- 827	H1025
331-369	552-615	828- 924	H1026
370-410	616-685	925-1027	H1066
411-458	686-763	1028-1147	H1027
459-512	764-855	1148-1285	H1028
513-574	.....	.....	H1029

NOTE: Individually boxed heaters master packed 10 per carton.
 Ⓞ For A460 controllers, select heaters for 50% of rated full load current.
 Ⓞ For A490 controllers, select heaters for 58% of rated full load current.



OVERLOAD RELAY HEATER SELECTION TABLES, *Continued*

Type ST Standard Trip Eutectic Alloy

For Replacement in Existing Applications Only

For Motors with 1.15 Service Factor

Table ST-13	Table ST-14	Table ST-15	Heater Catalog Number
NEMA Size 2	NEMA Size 3	NEMA Size 4	
For Enclosed Type A808, A809	For Enclosed Type A400	For Enclosed Type A400	
Heater Ampere Range			
3.89- 4.35	.....	.....	H1028
4.36- 4.81	.....	.....	H1029
4.82- 5.35	.....	.....	H1030
5.36- 5.96	.....	.....	H1031
5.97- 6.63	.....	.....	H1032
6.64- 7.41	.....	.....	H1033
7.42- 8.23	7.84- 8.71	.....	H1034
8.24- 9.19	8.72- 9.67	.....	H1035
9.20-10.2	9.68-10.8	.....	H1036
10.3 -11.4	10.9 -12.0	.....	H1037
11.5 -12.8	12.1 -13.5	.....	H1038
12.9 -14.1	13.6 -15.0	.....	H1039
14.2 -15.9	15.1 -16.8	.....	H1040
16.0 -18.1	16.9 -19.1	.....	H1041
18.2 -20.4	19.2 -21.6	19.5 - 21.9	H1042
20.5 -23.3	21.7 -24.5	22.0 - 24.7	H1043
23.4 -26.5	24.6 -27.8	24.8 - 29.0	H1044
26.6 -30.3	27.9 -31.5	29.1 - 31.9	H1045
30.4 -34.7	31.6 -35.5	32.0 - 36.1	H1046
34.8 -39.6	35.6 -40.3	36.2 - 40.7	H1047
39.7 -45.0	40.4 -45.6	40.8 - 46.2	H1048
.....	45.7 -51.8	46.3 - 52.4	H1049
.....	51.9 -58.6	52.5 - 59.2	H1050
.....	58.7 -65.2	59.3 - 66.3	H1051
.....	65.3 -74.3	66.4 - 75.1	H1052
.....	74.4 -86.3	75.2 - 87.1	H1054
.....	86.4 -90.0	87.2 - 99.9	H1055
.....	100. -113.0	H1056
.....	114. -129.0	H1057
.....	130. -135.0	H1058

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NOTE: Individually boxed heaters master packed 10 per carton.



OVERLOAD RELAY HEATER SELECTION TABLES, *Continued*

Type BNC Bimetal

For Replacement in Existing Applications Only

For Motors with 1.15 Service Factor

Table BNC-1	Table BNC-2	Table BNC-3	Table BNC-4	Heater Catalog Number
NEMA Sizes 00, 0, 1, 1-1/2		NEMA Size 2		
For Open Type Cat. No. A11, A51, B11, B51, C301 For Enclosed Type Cat. No. C301	For Enclosed Type Cat. No. A11, A51, B11, B51	For Open Type Cat. No. A11, A51, B11, C301 For Enclosed Type Cat. No. A31, A41, A71, A81, B11	For Enclosed Type Cat. No. A11, A51, C301	
Heater Ampere Range				
.180- .201	.167- .187	.....	.....	H1101
.202- .226	.188- .210	.....	.....	H1102
.227- .254	.211- .236	.....	.....	H1103
.255- .285	.237- .266	.....	.....	H1104
.286- .320	.267- .297	.....	.....	H1105
.321- .357	.298- .332	.....	.....	H1106
.358- .402	.333- .373	.....	.....	H1107
.403- .451	.374- .419	.....	.....	H1108
.452- .506	.420- .470	.....	.....	H1109
.507- .568	.471- .528	.....	.....	H1110
.569- .638	.529- .592	.....	.....	H1111
.639- .716	.593- .663	.....	.....	H1112
.717- .799	.664- .743	.....	.....	H1113
.800- .911	.744- .847	.....	.....	H1114
.912- 1.01	.848- .951	.....	.....	H1115
1.02 - 1.14	.952- 1.06	.....	.....	H1116
1.15 - 1.29	1.07 - 1.20	.....	.....	H1117
1.30 - 1.44	1.21 - 1.33	.....	.....	H1018
1.45 - 1.61	1.34 - 1.49	.....	.....	H1019
1.62 - 1.80	1.50 - 1.67	.....	.....	H1020
1.81 - 2.03	1.68 - 1.89	.....	.....	H1021
2.04 - 2.25	1.90 - 2.09	.....	.....	H1022
2.26 - 2.49	2.10 - 2.32	.....	.....	H1023
2.50 - 2.76	2.33 - 2.57	.....	.....	H1024
2.77 - 3.05	2.58 - 2.83	.....	.....	H1025
3.06 - 3.39	2.84 - 3.15	.....	.....	H1026
3.40 - 3.83	3.16 - 3.51	3.87 - 4.18	.....	H1066
3.84 - 4.22	3.52 - 3.87	4.19 - 4.60	3.94 - 4.33	H1027
4.23 - 4.63	3.88 - 4.25	4.61 - 5.10	4.34 - 4.78	H1028
4.64 - 5.19	4.26 - 4.76	5.11 - 5.60	4.79 - 5.27	H1029
5.20 - 5.73	4.77 - 5.27	5.61 - 6.20	5.28 - 5.83	H1030
5.74 - 6.49	5.28 - 5.90	6.21 - 6.92	5.84 - 6.51	H1031
6.50 - 7.32	5.91 - 6.63	6.93 - 7.76	6.52 - 7.29	H1032
7.33 - 8.07	6.64 - 7.35	7.77 - 8.63	7.30 - 8.07	H1033
8.08 - 9.03	7.36 - 8.15	8.64 - 9.67	8.08 - 9.03	H1034
9.04 - 9.99	8.16 - 8.87	9.68 -10.5	9.04 - 9.99	H1035
10.0 -11.1	8.88 - 9.99	10.6 -11.8	10.0 -11.1	H1036
11.2 -12.5	10.0 -11.1	11.9 -13.2	11.2 -12.3	H1037
12.6 -14.1	11.2 -12.5	13.3 -15.0	12.4 -14.1	H1038
14.2 -15.9	12.6 -14.1	15.1 -17.2	14.2 - 16.1	H1039
16.0 -18.0	14.2 -16.1	17.3 -19.1	16.2 -17.8	H1040
18.1 -19.8	16.2 -17.7	19.2 -21.5	17.9 -19.9	H1041
19.9 -22.2	17.8 -19.8	21.6 -23.6	20.0 -21.9	H1042
22.3 -25.0	19.9 -22.2	23.7 -27.0	22.0 -24.7	H1043
25.1 -27.0	22.3 -25.0	27.1 -30.6	24.8 -27.9	H1044
.....	25.1 -27.0	30.7 -35.1	28.0 -31.6	H1045
.....	.....	35.2 -39.8	31.7 -35.3	H1046
.....	.....	39.9 -45.0	35.4 -39.4	H1047
.....	.....	.....	39.5 -44.4	H1048
.....	.....	.....	44.5 -45.0	H1049

NOTE: Individually boxed heaters master packed 10 per carton.



OVERLOAD RELAY HEATER SELECTION TABLES, *Continued*

Type BNC Bimetal

For Replacement in Existing Applications Only

For Motors with 1.15 Service Factor

Table BNC-5	Table BNC-6	Table BNC-7	Heater Catalog Number
NEMA Size 3			
For Open Type Cat. No. A11, B11, A51, C301 For Enclosed Type Cat. No. B11, A71, A81	For Enclosed Type Cat. No. A11, A31, A41, A51	For Open Type Cat. No. A11, A51, C301 For Enclosed Type Cat. No. A11, A31, A41, A51, A71, A81	
Heater Ampere Range			
7.57- 8.47 8.48- 9.35 9.36-10.1 10.2 -11.2 11.3 -12.2	7.57- 8.39 8.40- 9.27 9.28-10.1 10.2 -11.1 11.2 -12.1	..... ..... ..... ..... .....
12.3 -13.7 13.8 -15.7 15.8 -17.3 17.4 -19.9 20.0 -22.9	12.2 -13.6 13.7 -15.5 15.6 -17.2 17.3 -19.8 19.9 -22.7	..... ..... ..... ..... 20.0- 22.9
23.0 -26.4 26.5 -30.6 30.7 -35.5 35.6 -41.2 41.3 -46.5	22.8 -26.0 26.1 -30.0 30.1 -34.4 34.5 -39.5 39.6 -44.3	23.0- 26.4 26.5- 30.6 30.7- 35.5 35.6- 41.2 41.3- 46.5	
46.6 -52.4 52.5 -57.8 57.9 -63.6 63.7 -69.9 70.0 -79.5	44.4 -49.9 50.0 -54.3 54.4 -59.8 59.9 -65.1 65.2 -73.1	46.6- 52.4 52.5- 57.8 57.9- 63.6 63.7- 69.9 70.0- 79.5	
79.6 -90.0	73.2 -83.9 84.0 -90.0	79.6- 92.0 92.1-104.0 105 -119.0 120 -135.0	

For Motors with 1.15 Service Factor

Table BNC-8	Heater Catalog Number	
NEMA Size 0 and 1		
For Enclosed Type Cat. No. A31, A41, A71, A81		
Heater Ampere Range		
.176- .198 .199- .221 .222- .249 .250- .279 .280- .313	H1101 H1102 H1103 H1104 H1105	
.314- .350 .351- .395 .396- .442 .443- .497 .498- .556	H1106 H1107 H1108 H1109 H1110	
.557- .626 .627- .703 .704- .783 .784- .895 .896- .999	H1111 H1112 H1113 H1114 H1115	
1.00 - 1.12 1.13 - 1.25	H1116 H1117	
1.26 - 1.40 1.41 - 1.56 1.57 - 1.74	H1018 H1019 H1020	
1.75 - 1.97 1.98 - 2.19 2.20 - 2.42 2.43 - 2.68 2.69 - 2.95	H1021 H1022 H1023 H1024 H1025	
2.96 - 3.29 3.30 - 3.72 3.73 - 4.10 4.11 - 4.49 4.50 - 5.04	H1026 H1066 H1027 H1028 H1029	
5.05 - 5.56 5.57 - 6.23 6.24 - 7.03 7.04 - 7.75 7.76 - 8.71	H1030 H1031 H1032 H1033 H1034	
8.72 - 9.59 9.60 -10.5 10.6 -11.8 11.9 -13.3 13.4 -14.9	H1035 H1036 H1037 H1038 H1039	
15.0 -16.9 17.0 -18.5 18.6 -20.7 20.8 -23.0 23.1 -25.7	H1040 H1041 H1042 H1043 H1044	
25.8 -27.0	H1045	

For Motors with 1.15 Service Factor

Table BNC-9	Heater Catalog Number	
NEMA Size 5		
For Open and Enclosed Type A11, A31-41, A51, A71, A81		
Heater Ampere Range		
96.8-108 109 -121 122 -135 136 -149 150 -166	H1020 H1021 H1022 H1023 H1024	
167 -182 183 -203 204 -229 230 -253 254 -283	H1025 H1026 H1066 H1027 H1028	

NOTE: Individually boxed heaters master packed 10 per carton.





OVERLOAD RELAY HEATER SELECTION TABLES, *Continued*

Type LT Slow Trip Eutectic Alloy

For Replacement in Existing Applications Only

For Motors with 1.15 Service Factor

Table LT-1	Table LT-2	Table LT-3	Table LT-4	Heater Catalog Number
NEMA Sizes 00, 0, 1, 1-1/2		NEMA Size 2		
For Enclosed Type Cat. No. A13	For Open Type Cat. No. A13, C303 For Enclosed Type Cat. No. C303	For Enclosed Type Cat. No. A13	For Open Type Cat. No. A13, C303 For Enclosed Type Cat. No. C303	
Heater Ampere Range				
.167- .186	.167- .186	.....	.....	H1001
.187- .209	.187- .209	.....	.....	H1002
.210- .233	.210- .233	.....	.....	H1003
.234- .260	.234- .260	.....	.....	H1004
.261- .293	.261- .293	.....	.....	H1005
.294- .329	.294- .329	.....	.....	H1006
.330- .373	.330- .373	.....	.....	H1007
.374- .417	.374- .417	.....	.....	H1008
.418- .471	.418- .471	.....	.....	H1009
.472- .531	.472- .531	.....	.....	H1010
.532- .591	.532- .591	.....	.....	H1011
.592- .660	.592- .660	.....	.....	H1012
.661- .739	.661- .739	.....	.....	H1013
.740- .823	.740- .823	.....	.....	H1014
.824- .919	.824- .919	.....	.....	H1015
.920- 1.01	.920- 1.01	.....	.....	H1016
1.02 - 1.14	1.02 - 1.14	.....	.....	H1017
1.15 - 1.27	1.15 - 1.27	.....	.....	H1018
1.28 - 1.41	1.28 - 1.41	.....	.....	H1019
1.42 - 1.61	1.42 - 1.61	.....	.....	H1020
1.62 - 1.86	1.62 - 1.86	.....	.....	H1021
1.87 - 2.01	1.87 - 2.01	.....	.....	H1022
2.02 - 2.27	2.02 - 2.27	.....	.....	H1023
2.28 - 2.51	2.28 - 2.51	.....	.....	H1024
2.52 - 2.80	2.52 - 2.80	.....	.....	H1025
2.81 - 3.21	2.81 - 3.21	.....	.....	H1026
3.22 - 3.51	3.22 - 3.51	.....	.....	H1066
3.52 - 3.86	3.52 - 3.86	3.67 - 3.99	3.67 - 3.99	H1027
3.87 - 4.36	3.87 - 4.36	4.00 - 4.51	4.00 - 4.51	H1028
4.37 - 4.78	4.37 - 4.83	4.52 - 5.03	4.52 - 5.03	H1029
4.79 - 5.35	4.84 - 5.41	5.04 - 5.59	5.04 - 5.59	H1030
5.36 - 6.00	5.42 - 6.07	5.60 - 6.20	5.60 - 6.20	H1031
6.01 - 6.59	6.08 - 6.66	6.21 - 6.88	6.21 - 6.88	H1032
6.60 - 7.35	6.67 - 7.51	6.89 - 7.80	6.89 - 7.80	H1033
7.36 - 8.14	7.52 - 8.31	7.81 - 8.71	7.81 - 8.71	H1034
8.15 - 9.11	8.32 - 9.27	8.72 - 9.59	8.72 - 9.59	H1035
9.12 -10.0	9.28 -10.3	9.60 -10.5	9.60 -10.7	H1036
10.1 -11.3	10.4 -11.7	10.6 -11.8	10.8 -12.0	H1037
11.4 -12.5	11.8 -13.0	11.9 -13.3	12.1 -13.4	H1038
12.6 -13.9	13.1 -14.5	13.4 -14.8	13.5 -14.9	H1039
14.0 -15.5	14.6 -16.3	14.9 -16.6	15.0 -16.8	H1040
15.6 -17.0	16.4 -18.1	16.7 -18.5	16.9 -18.8	H1041
17.1 -18.9	18.2 -20.3	18.6 -20.7	18.9 -21.1	H1042
19.0 -21.2	20.4 -23.0	20.8 -23.3	21.2 -24.1	H1043
21.3 -23.3	23.1 -25.9	23.4 -26.5	24.2 -27.3	H1044
23.4 -26.1	26.0 -27.0	26.6 -30.0	27.4 -31.3	H1045
26.2 -27.0	.....	30.1 -33.7	31.4 -35.5	H1046
.....	.....	33.8 -37.5	35.6 -40.3	H1047
.....	.....	37.6 -41.9	40.4 -45.0	H1048
.....	.....	42.0 -45.0	.....	H1049

For Motors with 1.15 Service Factor

Table LT-5	Table LT-6	Table LT-7	Heater Catalog Number
NEMA Size 3		NEMA Size 4	
For Enclosed Type Cat. No. A13	For Open Type Cat. No. A13, C303	For Open Type Cat. No. A13, C303 For Enclosed Type Cat. No. A13	
Heater Ampere Range			
8.16- 9.11	8.24- 9.19	.....	H1034
9.12- 9.99	9.20-10.0	.....	H1035
10.0 -11.2	10.1 -11.3	.....	H1036
11.3 -12.3	11.4 -12.5	.....	H1037
12.4 -13.9	12.6 -14.1	.....	H1038
14.0 -15.5	14.2 -15.7	.....	H1039
15.6 -17.4	15.8 -17.6	.....	H1040
17.5 -19.6	17.7 -19.8	.....	H1041
19.7 -21.9	19.9 -22.1	20.0- 22.3	H1042
22.0 -24.7	22.2 -25.2	22.4- 25.5	H1043
24.8 -28.1	25.3 -28.7	25.6- 28.9	H1044
28.2 -31.8	28.8 -32.7	29.0- 33.7	H1045
31.9 -36.1	32.8 -37.3	33.8- 37.5	H1046
36.2 -40.7	37.4 -42.3	37.6- 42.6	H1047
40.8 -45.5	42.4 -47.9	42.7- 48.2	H1048
45.6 -52.0	48.0 -55.4	48.3- 55.9	H1049
52.1 -58.2	55.5 -61.9	56.0- 62.3	H1050
58.3 -63.2	62.0 -67.9	62.4- 68.4	H1051
63.3 -68.3	68.0 -73.3	68.5- 73.7	H1052
68.4 -79.9	73.4 -87.9	73.8- 88.7	H1054
80.0 -89.5	88.8 -90.0	88.8- 99.9	H1055
89.6 -90.0	.....	100. -113.0	H1056
.....	.....	114. -128.0	H1057
.....	.....	129. -135.0	H1058

Note: Individually boxed heater coils master packed 10 per carton.

For Motors with 1.15 Service Factor

Table LT-8	Heater Catalog Number
NEMA Size 5	
For Open and Enclosed Type A13	
Heater Ampere Range	
96.8-111	H1021
112 -120	H1022
121 -136	H1023
137 -150	H1024
151 -168	H1025
169 -192	H1026
193 -210	H1066
211 -231	H1027
232 -261	H1028
262 -293	H1029

NOTE: Individually boxed heaters master packed 10 per carton.



CONTACTORS AND STARTERS

Definite Purpose

PRODUCT HISTORY TIMELINE FOR DEFINITE PURPOSE, BULLETIN 9560, 9584 AND 9586											
Originally a Cutler-Hammer Product											
Poles	Amperes	1955	1960	1965	1970	1975	1980	1985	1990	1995	1997
9560 Contactors											
2P, 3P, 4P	25, 30, 40A										
2P, 3P	50, 60A										
2P, 3P	75, 90A										
9584 Starters											
1P	30A										
	40A										
	50A										
	60A										
9586 Starters											
1P	30A										
	40A										
	50A										
	60A										

REPLACEMENT CAPABILITIES

Contact Kits for Types 9560, 9584, 9586							
Description	Contact Kit Part Number						
	Contactor or Starter Size, Amperes						
	12 Inductive 15 Resistive	25, 30 Inductive 30, 40 Resistive	40 Inductive 50 Resistive	50, 60 Inductive 60, 75 Resistive	75 Inductive 90 Resistive	90 Inductive 120 Resistive	
Auxiliary Contact (1 NO – 1 NC)	10-3654	10-3654	10-3654	10-3654
Auxiliary Contact (1 NO – 1 NO)	10-3654-5	10-3654-5	10-3654-5	10-3654-5
2-pole	Ⓢ	6-331-10	6-331-11	6-331-38	6-331-13	6-331-24	
2-pole w/Quick Connect Terminals	6-331-9	.....	.....	.....	.....
3-pole	Ⓢ	6-331-15	6-331-16	6-331-39	6-331-18	6-331-25	
3-pole w/Quick Connect Terminals	6-331-14	.....	.....	.....	.....
4-pole	Ⓢ	6-331-20	6-331-21	.....	.....	.....
4-pole w/Quick Connect Terminals	6-331-19	.....	.....	.....	.....

Magnetic Coils for Types 9560, 9584, 9586

Coil Suffix	Coil Voltage		Coil Part Number		
			Ampere Rating		
	60 Hz	50 Hz	12, 25 and 30 Inductive 15, 30 and 40 Resistive	40 Inductive 50 Resistive	50, 60, 75 and 90 Inductive 60, 75, 90 and 120 Resistive
-7	....	380	Ⓢ	Ⓢ	Ⓢ
-47	277	....	Ⓢ	Ⓢ	Ⓢ
-49	104 – 120	104 – 120	Ⓢ	9-1814-21	9-1518-22
-50	208 – 240	208 – 240	Ⓢ	9-1814-8	Ⓢ
-69	24	24	Ⓢ	9-1814-1	Ⓢ
-72	480	480	Ⓢ	Ⓢ	Ⓢ
-74	600	600	Ⓢ	Ⓢ	Ⓢ

TECHNOLOGY UPGRADES

Type	A25	C25	C32	B25
9560 Contactors	.....	15 Thru 90A	120 Thru 350A	.....
9584 Starters	.....	.....	.....	25 Thru 40A
9586 Starters	25 Thru 60A	.....	.....	.....

Ⓢ Use for ampere rated starters/contactors only.
 Ⓢ Obsolete.



PRODUCT HISTORY TIMELINE FOR TYPE N

Originally a Westinghouse Product

Size	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990
0-4											

REPLACEMENT CAPABILITIES

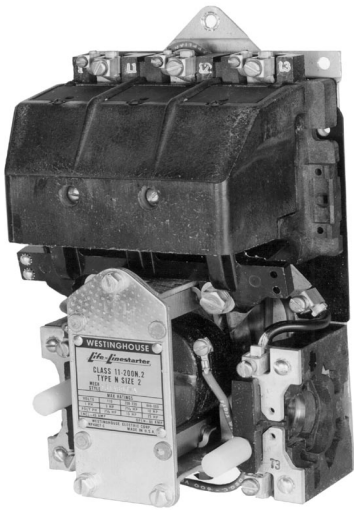
Contact Kits

NEMA Size	Poles	Style Number
0	3	1605226
1	3	1605212
2	3	1605202
3	3	1625563
4	3	1625564

AC Coils

To order, specify complete part number — 9969D followed by number listed in table. Example: 9969D90G01.

Voltage	Hz	Part Numbers			
		2-, 3-Pole		4-, 5-Pole	
		Original	New	Original	
SIZE 0, 1					
110	60	1470241	9969D90G01	1470261	9969D90G16
110/208/220	25/60/60	1470242	9969D90G02	1470262	9969D90G17
220/380/440	25/50/60	1470243	9969D90G03	1470263	9969D90G18
550	60	1470244	9969D90G04	N/A	N/A
220	50	1470247	9969D90G06	N/A	N/A
440	50	1470248	9969D90G07	1470268	9969D90G19
440	25	1470250	9969D90G08	1470270	9969D90G21
120	60	1605268	9969D90G09	N/A	N/A
115/208/230	60/60/60	1605513	9969D90G15	N/A	N/A
600	60	1470245	9969D90G20	N/A	N/A
550	25	1470251	9969D90G22	N/A	N/A
SIZE 2					
110	60	1470201	9969D92G01	1470221	9969D93G01
110/208/220	25/60/60	1470202	9969D92G02	1470222	9969D93G02
220/380/440/480	25/50/60/60	1470203	9969D92G03	N/A	N/A
550	60	1470204	9969D92G04	1470224	9969D93G10
110	50	1470206	9969D92G05	1470226	9969D93G05
220	50	1470207	9969D92G06	1470227	9969D93G06
440	50	1470208	9969D92G07	1470228	9969D93G07
600	60	1470205	9969D92G08	1470225	9969D93G08
440	25	1470210	9969D92G09	N/A	N/A
120/110	60/50	1605478	9969D92G10	N/A	N/A
550	50	1470209	9969D92G11	N/A	N/A
415	50	N/A	N/A	L1557647	9969D93G09
220/380/440	25/60/60	N/A	N/A	1470223	9969D93G03
SIZE 3					
110	60	1490645	9969D96G04	1490645	9969D96G04
110/208/220	25/60/60	1490646	9969D96G05	1490646	9969D96G05
220/380/400/440	25/50/50/60	1490647	9969D96G06	1490647	9969D96G06
110	50	1490652	9969D96G08	1490652	9969D96G08
120/110	60/50	1600770	9969D96G09	1600770	9969D96G09
600/500	60/50	1490649	9969D96G21	1490649	9969D96G21
600/500/400	60/50/40	1659421	9969D96G23	1659421	9969D96G23
220	50	1490653	9969D96G24	1490653	9969D96G24
550	60	1490648	9969D96G29	1490648	9969D96G29
SIZE 4					
110	60	1596633	9969D96G10	1597723	9969D96G01
110/208/220	25/60/60	1490658	9969D96G11	1597724	9969D96G02
110	50	1596636	9969D96G13	N/A	N/A
220	50	1596637	9969D96G14	N/A	N/A
240	50	1596639	9969D96G15	N/A	N/A
600/500	60/50	1596635	9969D96G16	1490649	9969D96G21
440	25	1596641	9969D96G17	N/A	N/A
600	60	1596634	9969D96G19	N/A	N/A
440	60	1490659	9969D96G12	N/A	N/A
120/110	60/50	1600771	9969D96G20	N/A	N/A
220/380/400/440	25/50/50/60	N/A	N/A	1597725	9969D96G31



Type N Contactor

TECHNOLOGY UPGRADES

Sizes 00-3 ADVANTAGE, Freedom or IT
 Sizes 4-5 ADVANTAGE, Freedom, Vacuum or IT



CONTACTORS AND STARTERS

A200

165

PRODUCT HISTORY TIMELINE FOR A200, A201, A203, A204, A206, A210, A211, A213, A214, A216, A220, A223, A224, A226, A250, A251, A600, A603, A604, A606, A700, A703, A704, A706, A800, A804, A806

Originally a Westinghouse Product

Size	Model	1960	1965	1970	1975	1980	1985	1990	1995	Present
00-3	J									
4	J									
	K									
5-6	Electrically Held									
5-6	Mechanically Held									
7-8										
9										

REPLACEMENT CAPABILITIES

Kits for Model J, Sizes 00, 0, 1, 2[Ⓚ]

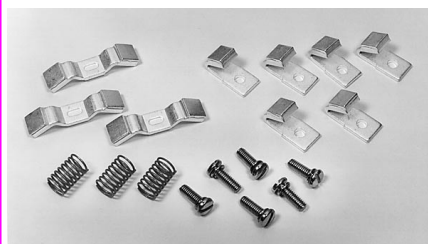
Description	Poles	Size 00	Size 0	Size 1	Size 2
Contact Kit	2	373B331G17	373B331G02	373B331G07	373B331G11
	3	373B331G18	373B331G04	373B331G09	373B331G12
	4	373B331G18	373B331G04	373B331G09	373B331G13 [Ⓚ]
	5	373B331G19	373B331G05	373B331G10	373B331G14 [Ⓚ]
Arc Box [Ⓚ]	2-4	6714C74G01	6714C74G02	6714C74G03	6714C74G07 (2-, 3-pole)
	5	6714C74G04	6714C74G05	6714C74G06	6714C74G08 (4-, 5-pole)
Cross Bar	2-3	N/A	N/A	N/A	672B788G32
	4-5	N/A	N/A	N/A	672B788G34
Upper Base (for single rated coils only)	2-3	N/A	N/A	N/A	672B788G33
	4-5	N/A	N/A	N/A	672B788G35
Lower Base	2-3	N/A	N/A	N/A	1250C33G09
	4-5	N/A	N/A	N/A	1250C33G05
KO Spring (Pk. of 10)	All	N/A	N/A	N/A	503C796G01
Terminal Line/Load (Pk. of 3)	All	N/A	N/A	N/A	371B870G03

AC Coils

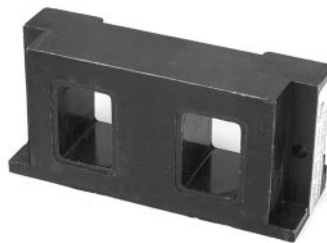
Voltage	Hz	Size 00, 0, 1		Size 2	
		2-, 3-, 4-Pole	5-Pole	2-, 3-Pole	4-, 5-Pole
120/110	60/50	505C806G01	505C808G01	505C806G01	505C818G01
208	60	505C806G02	505C808G02	505C806G02	505C818G02
600/550	60/50	505C806G05	505C808G05	505C806G05	505C818G05
380	50	505C806G07	505C808G07	505C806G07	505C818G07
240/220	60/50	505C806G12	505C808G12	505C806G12	505C818G12
480/440	60/50	505C806G13	505C808G13	505C806G13	505C818G13
24	60	505C806G16	N/A	505C806G16	505C818G15
227	60	505C806G18	505C808G16	505C806G18	505C818G16
240/480 [Ⓚ]	60/60	505C806G03	505C808G03	505C806G03	505C818G03
120/240 [Ⓚ]	60/60	505C806G10	505C808G10	505C806G10	505C818G10

DC Coils[Ⓚ]

Voltage	Size 0, 1, 2	
	1-, 2-, 3-, 4-Pole	1-, 2-, 3-Pole
12		1268C86G07
24		1268C86G04
48		1268C86G05
125		1268C86G02
250		1268C86G01
125/250 [Ⓚ]		1268C86G03



Contact Kit for A200 Model J, Size 2, 3-Pole



A200 AC Coil, 120/110V 60/50 Hz, 2-, 3-, 4-Pole, Size 00, 0, 1

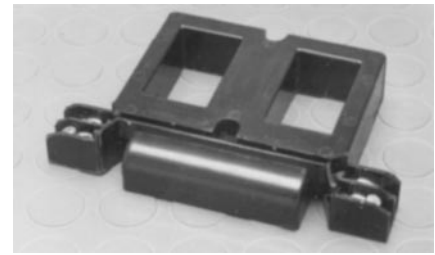
- Ⓚ Model C contact kits and coils 00-4, 2-, 3-, 4- and 5-pole contactors are same as Model J. All other parts are unavailable.
- Ⓚ Use Qty 2 – 373B331G11 (2-pole kit).
- Ⓚ Use one each of 373B331G11 (2-pole kit) and 373B331G12 (3-pole kit).
- Ⓚ Mounting hardware included.
- Ⓚ Dual voltage coils. Use only on contactors or starters originally supplied with a dual voltage coil.
- Ⓚ Use only on contactors originally supplied with a DC coil.



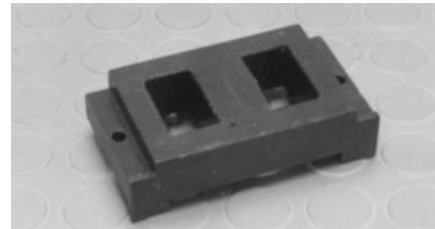
REPLACEMENT CAPABILITIES, Continued

Kits for Model J-K, Sizes 3, 4[ⓐ]

Description	Poles	Size 3 – Model J	Size 4 – Model J	Size 4 – Model K [ⓑ]
Contact Kit	2	626B187G12	626B187G16	5250C81G16
	3	626B187G13	626B187G17	5250C81G17
	4	626B187G14 [ⓐ]	626B187G18 [ⓐ]	5250C81G18
	5	626B187G15 [ⓐ]	626B187G19 [ⓐ]	5250C81G19
Arc Box	2-3	6714C74G09	6714C74G11	6714C74G11
	4-5	6714C74G10	6714C74G12	6714C74G12
Cross Bar	2-3	672B788G36	672B788G36	672B788G40
	4-5	672B788G38	672B788G38	
Upper Base	2-3	672B788G37	672B788G37	672B788G52
	4-5	672B788G39	672B788G39	
Lower Base	2-3	1250C33G03	1250C33G03	1250C33G10
	4-5	1250C33G06	1250C33G06	
KO Spring (Pk. of 10)	All	503C796G02	503C796G02	672B788G50
Terminals Line/Load (Pk. of 3)	All	372B357G12	372B357G13	372B357G13



A200 AC Coil, 110/120V 60Hz, Size 6



A200 AC Coil, 120/110V 60/50 Hz, 2-, 3-pole, Size 3 and 4 Model J

AC Coils

Voltage	Hz	Model J Size 3-4		Model K Size 4 [ⓑ]	
		2-, 3-Pole	4-, 5-Pole	2-, 3-Pole	4-, 5-Pole
120/110	60/50	505C633G01	505C635G01	5250C79G01	5250C80G01
208	60	505C633G02	505C635G02	5250C79G02	5250C80G02
600/550	60/50	505C633G05	505C635G05	5250C79G05	5250C80G05
380	50	505C633G07	505C635G07	5250C79G07	5250C80G07
240/220	60/50	505C633G12	505C635G12	5250C79G12	5250C80G12
480/440	60/50	505C633G13	505C635G13	5250C79G13	5250C80G13
24	60	505C633G34	N/A	5250C79G34	N/A
277	60	505C633G14	N/A	5250C79G14	N/A
240/480 [ⓑ]	60/60	505C633G03	505C635G03	5250C79G03	5250C80G03
120/240 [ⓑ]	60/60	505C633G10	505C635G10	5250C79G10	5250C80G10

DC Coils[ⓑ]

Voltage	Model J Size 3-4	
	2-, 3-Pole	
24	1255C68G04	
48	1255C68G05	
125	1255C68G01	
250	1255C68G02	
125/250	1255C68G03	

- ⓐ Model C contact kits and coils 00-4, 2-, 3-, 4- and 5-pole contactors are same as Model J. All other parts are unavailable.
- ⓑ Model K replaces Model J.
- ⓒ Use Qty 2 – 626B187G12 (2-pole Kits).
- ⓓ Use one of each of 626B187G12 (2-pole Kit) and 626B187G13 (3-pole Kit).
- ⓔ Use Qty 2 – 626B187G16 (2-pole Kit).
- ⓕ Use one each of 626B187G16 (2-pole Kit) and 626B187G17 (3-pole Kit).
- ⓖ Dual voltage coils. Use only on contactors or starters originally supplied with a dual voltage coil.
- ⓗ Use only on units originally supplied with DC coil.

REPLACEMENT CAPABILITIES, Continued

Kits for GCA 530/630, Sizes 5-9 — and GPD Sizes 7-9[ⓐ]

Kit	Size 5	Size 6	Size 7	Size 8	Size 9
Contact Kit (1 per pole)	477B477G05 [ⓐ]	2066A10G11	461A757G17	646C829G05	5264C42G01 (Rear Connected) 5264C42G02 (Front Connected)
Arc Box	2050A15G45	2066A10G45	831D580G01	831D580G01	9917D69G02
Magnet Assy	2050A15G46	2050A15G46	N/A	N/A	N/A
Mag. Spg. Kit	2050A15G47	2050A15G47	N/A	N/A	N/A
Arc Cup Kit	2050A15G48	N/A	N/A	N/A	N/A
Load Conn. Kit	2050A15G49	2066A10G49	N/A	N/A	N/A
Line Conn. Kit	2050A15G50	2066A10G50	N/A	N/A	N/A
KO Spring-6	2050A15G51	2066A10G46	N/A	N/A	N/A
CT 300/5	655C285H03	N/A	N/A	N/A	N/A
CT 400/5	655C285H04				
CT 600/5 [ⓑ]	N/A	2066A10G18	N/A	N/A	N/A
CT 800/5 [ⓑ]	N/A	2066A10G19	N/A	N/A	N/A
Phase Barrier	N/A	N/A	640C441G01	640C441G01	5264C35G03 (Rear Connected)
Cross Bar	2050A15G12	2066A10G15	N/A	N/A	N/A
Shunt	N/A	2066A10G48	650C129G01	646C831G02 (Set of 3)	5264C39G02 (Set of 4)

Coils

Voltage	Hz	Size 5	Size 6
110/120	60	2050A14G05	2050A12G05
110/120	50	2050A14G06	2050A12G06
200/208	50	2050A14G07	2050A12G07
220/240	50	2050A14G08	2050A12G08
200/208	60	2050A14G09	2050A12G09
220/240	60	2050A14G10	2050A12G10
277/303	60	2050A14G12	2050A12G12
380/415	50	2050A14G14	2050A12G14
440/480	60	2050A14G15	2050A12G15
440/480	50	2050A14G16	2050A12G16
550/600	60	2050A14G17	2050A12G17
550/600	50	2050A14G18	2050A12G18
380/415	60	2050A14G19	2050A12G19
120/240	60	2050A14G20	2050A12G20
24 DC		2050A14G21	2050A12G21
48 DC		2050A14G22	2050A12G22
125 DC		2050A14G25	2050A12G25
250 DC		2050A14G27	2050A12G27

- ⓐ Catalog No. A201/A200 Series replaces GCA/GPD series. Renewal parts are the same.
- ⓑ Use 477B477G06 for Silver Tungsten applications.
- ⓒ CT Kit which replaces the single molded one CT assembly used on the old size six airbrake. The kit includes a single molded three CT assembly, two bus bar, and hardware. This CT Kit also replaces the single molded three CT assembly used on the present size six airbrake and size six vacuum contactor.
- ⓓ Rectifier 125V 2018A40G01 (one required).
- ⓔ Rectifier 250V 2018A40G02 (one required).
- ⓕ Rectifier 600V 2018A40G03 (one required).
- ⓖ These coils require an external rectifier. If the rectifier needs to be replaced, order by the appropriate style number.

Line Voltage	Size 7-8	Req.	Size 9
115V DC	438C805G01	2	100V DC
125V DC	438C805G04	2	5264C34G01
230V DC	438C805G02	2	(Contains coil & resistor)
250V DC	438C805G03	2	
110/120VAC [ⓑ]	438C805G12	2	
220/240VAC [ⓑ]	438C805G11	2	
380VAC [ⓑ]	438C805G15	2	
440/480VAC [ⓑ]	438C805G10	2	
550/575VAC [ⓑ]	438C805G13	2	



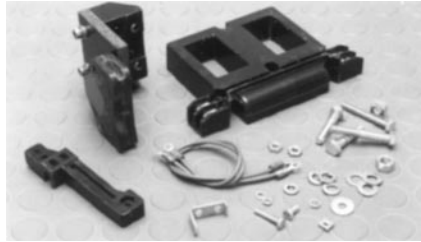
REPLACEMENT CAPABILITIES, *Continued*

Accessories for Size 5-9 AC Contactors

Coils

AC Contactors	Voltage	AC/DC Coil Conversion Kit	Replacement Coil
Size 5	120VAC	7864A28G01	7856A15G05
	240VAC	7864A28G02	7856A15G10
	480VAC	7864A28G03	7856A15G15
Size 6	120VAC	7864A29G01	7856A16G05
	240VAC	7864A29G02	7856A16G10
	480VAC	7864A29G03	7856A16G15

A rectifier circuit converts the AC supply to DC supply. This conversion provides quiet operation and improves pick up and drop out characteristics. All necessary parts are included in the kit.



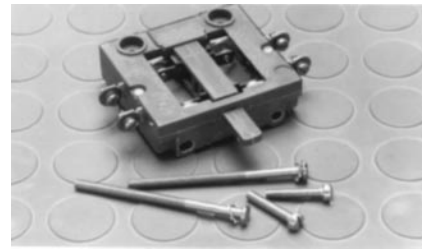
DC Coil Conversion Kit
Style No. 7864A29G01

Auxiliary Electrical Interlock

Contactor Size	Catalog Number (Obsolete)	Style Number (Obsolete)	Circuits	Catalog Number Current	Style Number Current
00-6	(L-56)	(2609D01G01)	1 NO & 1 NC	J11	9084A17G01
	(L-56D)	(2609D01G02)	2 NO	J20	9084A17G02
	(L-56E)	(2609D01G03)	1 NO & 1 NC	J11	9084A17G01
	(L-56B)	(2609D01G04)	2 NO	J20	9084A17G02
	(L-56H)	(2609D01G05)	2 NO	J20	9084A17G02
	(L-56J)	(2609D01G06)	1 NO & 1 NC DB	J1C	9084A17G04
	(T-56A)	(2609D01G07)	N/A	N/A	N/A
	(T-56B)	(2609D01G08)	N/A	N/A	N/A
	(L-56F)	(2609D01G09)	N/A	N/A	N/A
	(L-56G)	(2609D01G10)	1 NO & 1 NC DB	J1C	9084A17G04
	(L-56C)	(2609D01G11)	2 NC	J02	9084A17G03
	(L-56M)	(2609D01G12)	N/A	N/A	N/A
	(L-56P)	(2609D01G17)	1 NO & 1 NC	J11	9084A17G01
	(L-56R)	(2609D01G18)	2 NC	J02	9084A17G03
	(L-56S)	(2609D01G19)	1 NO & 1 NC	J11	9084A17G01
	7-8	L63	NO	....	578D461G01
L63		.....	NC	....	578D461G03
9	L64	.....	NO/NC	....	843D943G04
	L64	.....	2 NO	....	843D943G05
	L64	.....	2 NC	....	843D943G06



L63
Style No. 578D461G01



L64
Style No. 843D943G04

TECHNOLOGY UPGRADES

Sizes 00-3 ADVANTAGE, Freedom or IT
 Sizes 4-6 ADVANTAGE, Freedom, Vacuum or IT
 Sizes 7-8 Freedom
 Size 9 No upgrade available



PRODUCT DESCRIPTION

Manual Reset, Class 20, Thermal Type B

Application

The Type B overload relay is designed to protect industrial motors against overload conditions. Using modern block-type, bimetallic design, this relay will provide Class 20 operation in either single phase or 3-phase applications.

Features

- Ambient compensation standard
- Alarm contact field mountable
- Class 20-600 volt design
- Inverse time delay trip
- Test trip device for weld check
- High visibility up front trip indication
- Trip free reset mechanism

Operation

The Type B overload relay is a bimetallic actuated device. The bimetal elements are operated by precisely calibrated heaters. The heater elements connect either directly in the circuit to be measured, or through current transformers on applications NEMA Size 5 and larger.

As the bimetals are heated by motor current flow, a deflection force is produced. Upon a sustained level of abnormal current flow, the deflection becomes great enough to open the snap action output contact.

Ambient Compensation

The Type B ambient compensated design is supplied as standard on all A200 starters. This design uses a second compensating bimetal responsive to ambient air temperature in the surrounding enclosure. This feature reduces nuisance tripping in applications using compact control panels and motor control centers where internal temperature rise is significant compared to motor ambient temperature. The compensating characteristic is maintained in ambient temperatures from 40°C to 77°C.

Design Standards

UL508, CSA, ANSI/NEMA ICS 2-222

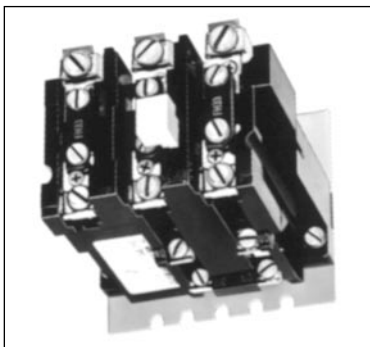
OVERLOAD RELAY SELECTION TABLE

For Replacement in Existing Applications Only

Motor Full Load Amperes	Panel Mounted Catalog Numbers		Starter Mounted Catalog Numbers			
			Replacement for Type B Overload Relays		Replacement for Type A Overload Relays in Manual Reset Mode (3-Pole Only)❶	
	Ambient Comp.	Non-Comp.	Ambient Comp.	Non-Comp.	Ambient Comp.	Non-Comp.
1-Pole (One NC Contact)						
.25 - 26.2	BA11JP	BN11JP	BA11A	BN11A	.....	.....
26.3 - 45.0	BA21JP	BN21JP	BA21A	BN21A	.....	.....
19.0 - 90.0 19.0 -135.0 } }	Use 3-pole design, wire 3-poles in series					
3-Pole (One NC Contact)						
.25 - 26.2	BA13JP	BN13JP	BA13A❷	BN13A❷	BA13J	BN13J
26.3 - 45.0	BA23JP	BN23JP	BA23A	BN23A	BA23J	BN23J
19.0 - 90.0	BA33P	BN33P	BA33A	BN33A	BA33A	BN33A
19.0 -135.0	BA43P	BN43P	BA43A	BN43A	BA43A	BN43A

Alarm Contact Kit Selection

Type B Overload Relay Size	Catalog Number
1, 2	B3NO-2
3, 4	B3NO-4



Type B Overload Relay Panel Mounted



Field Mountable Alarm Contact❸

❶ Includes contactor mounting bracket, overload relay and connection straps to contactor.

❷ For replacement on B200 sizes 00, 0, 1, use BA23A instead of BA13A and use BN23A instead of BN13A.

❸ Alarm contact available as factory modification of field mountable. For factory modification, add suffix B.

HEATERS

Price of overload relay does not include heaters. Select from table on **page 171**.



PRODUCT DESCRIPTION

Auto/Manual Reset, Class 20, Thermal Type A

Application

The Type A overload relay is designed to protect industrial motors against overload conditions. Using modern block-type, bimetallic design, this relay will provide Class 20 operation in either single or 3-phase applications.

Features

- Field selectable manual/auto reset
- Alarm contact factory available
- Class 20-600 volt design
- Inverse time delay trip
- Adjustable trip rating $\pm 15\%$
- Color-coded reset rod:
Compensated (Gray)
Non-compensated (Red)

Operation

The Type A overload relay is a bimetallic actuated device. The bimetal elements are operated by precisely calibrated heaters. The heater elements connected either directly in the circuit to be measured, or through current transformers on applications NEMA Size 5 and larger.

As the bimetals are heated by motor current flow, a deflection force is produced. Upon a sustained level of abnormal current flow, the deflection becomes great enough to open the snap action output contact.

Automatic Reset

The Type A overload relay can be supplied as an option on all A200 starters to provide automatic reset operation. The overload relay is always shipped in the non-automatic mode. To set up auto operation, reposition the reset rod by loosening and re-tightening a hold down clamp at the base of overload relay.

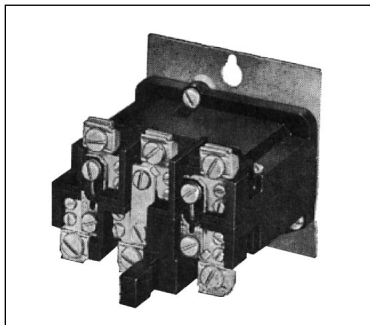
Design Standards

UL508, CSA, ANSI/NEMA ICS 2-222

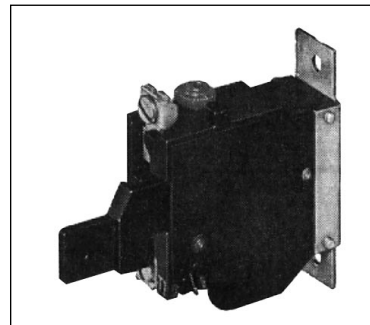
OVERLOAD RELAY SELECTION TABLE

For Replacement in Existing Applications Only

Motor Full Load Amperes	Panel Mounted Catalog Numbers		Starter Mounted Catalog Numbers	
	Ambient Comp.	Non-Comp.	Ambient Comp.	Non-Comp.
1-Pole (One NC Contact)				
.25 - 26.2	AA11P	AN11P	AA11A	AN11A
26.3 - 45.0	AA21P	AN21P	AA21A	AN21A
19.0 - 90.0	AA31P	AN31P	AA31A	AN31A
19.0 - 135.0	AA41P	AN41P	AA41A	AN41A
3-Pole (One NC Contact)Ⓢ				
.25 - 26.2	AA13P	AN13P	AA13A	AN13A
26.3 - 45.0	AA23P	AN23P	AA23A	AN23A
19.0 - 90.0	AA33P	AN33P	AA33A	AN33A
19.0 - 135.0	AA43P	AN43P	AA43A	AN43A



3-Pole Panel Mounted



1-Pole Panel Mounted

HEATERS

Price of overload relay does not include heaters. Select from table on **page 171**.

NOTE: Alarm Contact available only as factory modification on Type A relay.

Ⓢ 3-pole Type B Overload Relay is a suitable alternative to a 3-pole Type A Overload Relay in Manual Reset Mode. For example, BA13JP for AA13P, BN23J for AN23A, etc. (See previous page.)



PRODUCT DESCRIPTION

Type FT Fast Trip, Class 10

Application

The Type FT overload relay is designed to protect special purpose motors having restricted thermal and locked rotor capabilities. Using modern block-type, bimetallic design, this relay will provide Class 10 operation in single or 3-phase applications.

Features

- Class 10-600 volt design
- Inverse time delay trip
- Color coded reset rod - green
- Alarm contact factory available
- Field selectable manual/auto reset
- Adjustable trip rating $\pm 20\%$
- Ambient compensation included

Operation

The Type FT overload relay is a bimetallic actuated device. The bimetal elements are operated directly from line current, thus separate calibrating heater elements are not utilized. The overload relay may be wired directly in the motor circuit, or through current transformers on applications larger than 150 amperes.

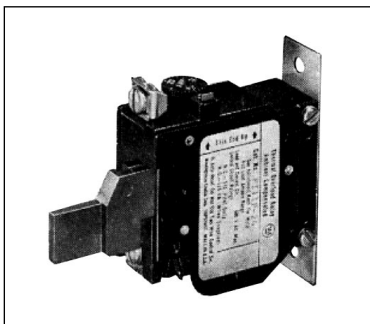
As the bimetals are heated by motor current flow, a deflection is produced. Upon a sustained level of abnormal current flow, the deflection becomes great enough to open the snap action output contact.

OVERLOAD RELAY SELECTION TABLE

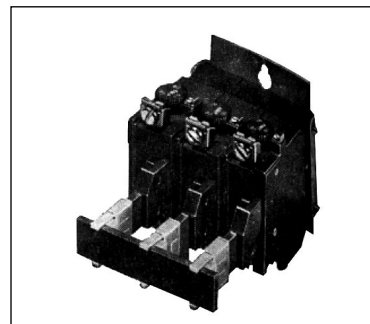
For Replacement in Existing Applications Only

1-Pole (One NC Contact); 3-Phase (Three NC Contacts in Series)

Motor Full Load Amperes	Panel Mounted Catalog Numbers		Starter Mounted Catalog Numbers ^①	
	1-Pole ^②	3-Pole ^②	NEMA Size	1-Pole
.76 - 1.1	FT11P-1.1	FT13P-1.1	...	FT11A-1.1
1.1 - 1.6	FT11P-1.6	FT13P-1.6	...	FT11A-1.6
1.6 - 2.4	FT11P-2.4	FT13P-2.4	0, 1	FT11A-2.4
2.4 - 3.6	FT11P-3.6	FT13P-3.6	0, 1	FT11A-3.6
3.6 - 5.4	FT11P-5.4	FT13P-5.4	0, 1	FT11A-5.4
5.4 - 8.0	FT11P-8	FT13P-8	0, 1	FT11A-8
8.0 - 12	FT11P-12	FT13P-12	0, 1	FT11A-12
12 - 18	FT11P-18	FT13P-18	1	FT11A-18
16 - 24	FT11P-24	FT13P-24	1	FT11A-24
22 - 32	FT11P-32	FT13P-32	0, 1	FT11A-32
24 - 36	FT21P-36	FT23P-36	2	FT21A-36
36 - 54	FT21P-54	FT23P-54	2	FT21A-54
22 - 32	FT31P-32	FT33P-32	3	FT31A-32
32 - 48	FT31P-48	FT33P-48	3	FT31A-48
48 - 72	FT31P-72	FT33P-72	3	FT31A-72
72 - 110	FT41P-110	FT43P-110	4	FT41A-110
100 - 150	FT41P-150	FT43P-150	4	FT41A-150



1-Pole Fast Trip, Panel Mounted



3-Pole Fast Trip, Panel Mounted

① 1-pole (One NO – NC Contact): Add suffix B.
 ② 3-pole (Three NO – NC Contacts): Add suffix B.
 EXAMPLE: FT13PB-12



PRODUCT DESCRIPTION

Types A and B

Each heater is identified by a catalog number stamped on one terminal. The heater application table indicates the range of full load motor current to which a given heater may be applied.

Heaters should be selected on the basis of the actual full load current and service factor as shown on the motor nameplate or in the manufacturer's published literature.

When motor and overload relay are in the same ambient and the service factor of the motor is

1.15 to 1.25, select heaters from the heater application table. If the service factor of the motor is 1.0, or there is no service factor shown, or a maximum of 115% protection is desired, select one size smaller heater than indicated.

When motor and overload relay are in different ambients and when using non-compensated overload relays, select heaters from the table using adjusted motor currents as follows: decrease rated motor current 1% for each °C

motor ambient exceeds controller ambient. Increase rated motor current 1% for each °C controller ambient exceeds motor ambient.

For temperature compensated overload relays, select heaters according to the table and selection information above regardless of ambient.

Protect the starter against short circuits by providing branch circuit protection per National Electric Code (NEC).

OVERLOAD RELAY HEATER SELECTION TABLES

For Replacement in Existing Applications Only

For Type A and B Overload Relays, Size 00, 0, 1 and 2 Starters

Size Starter	Heater Catalog Number	Non-Compensated Open Starters and Ambient Comp. Open and Encl. Starters		Heater Catalog Number	Non-Compensating Enclosed Starters	
		Block Type Overload Using 3 Heaters	Single-Pole Type Overload		Block Type Overload Using 3 Heaters	Single-Pole Type Overload
Full Load Current of Motor (Amperes) ①②						
↑↑↑ For Size 2 Starters For Size 1 Starters For Size 0 Starters	FH03	.25 - .27	.29 - .31	FH03	.24 - .25	.28 - .30
	FH04	.28 - .31	.32 - .35	FH04	.26 - .28	.31 - .34
	FH05	.32 - .34	.36 - .39	FH05	.29 - .31	.35 - .37
	FH06	.35 - .38	.40 - .43	FH06	.32 - .35	.38 - .42
	FH07	.39 - .42	.44 - .48	FH07	.36 - .39	.43 - .47
	FH08	.43 - .46	.49 - .53	FH08	.40 - .43	.48 - .52
	FH09	.47 - .50	.54 - .58	FH09	.44 - .47	.53 - .56
	FH10	.51 - .55	.59 - .64	FH10	.48 - .51	.57 - .63
	FH11	.56 - .62	.65 - .71	FH11	.52 - .57	.64 - .70
	FH12	.63 - .68	.72 - .79	FH12	.58 - .63	.71 - .77
	FH13	.69 - .75	.80 - .87	FH13	.64 - .70	.78 - .85
	FH14	.76 - .83	.88 - .96	FH14	.71 - .77	.86 - .94
	FH15	.84 - .91	.97 - 1.06	FH15	.78 - .85	.95 - 1.03
	FH16	.92 - 1.00	1.07 - 1.16	FH16	.86 - .93	1.04 - 1.13
	FH17	1.01 - 1.11	1.17 - 1.28	FH17	.94 - 1.03	1.14 - 1.25
	FH18	1.12 - 1.22	1.29 - 1.41	FH18	1.04 - 1.13	1.26 - 1.38
	FH19	1.23 - 1.34	1.42 - 1.55	FH19	1.14 - 1.25	1.39 - 1.52
	FH20	1.35 - 1.47	1.56 - 1.71	FH20	1.26 - 1.37	1.53 - 1.67
	FH21	1.48 - 1.62	1.72 - 1.87	FH21	1.38 - 1.51	1.68 - 1.83
	FH22	1.63 - 1.78	1.88 - 2.06	FH22	1.52 - 1.65	1.84 - 2.01
FH23	1.79 - 1.95	2.07 - 2.26	FH23	1.66 - 1.81	2.02 - 2.21	
FH24	1.96 - 2.15	2.27 - 2.48	FH24	1.82 - 1.99	2.22 - 2.43	
FH25	2.16 - 2.35	2.49 - 2.72	FH25	2.00 - 2.19	2.44 - 2.66	
FH26	2.36 - 2.58	2.73 - 2.99	FH26	2.20 - 2.39	2.67 - 2.92	
FH27	2.59 - 2.83	3.00 - 3.28	FH27	2.40 - 2.63	2.93 - 3.21	
FH28	2.84 - 3.11	3.29 - 3.60	FH28	2.64 - 2.89	3.22 - 3.53	
FH29	3.12 - 3.42	3.61 - 3.95	FH29	2.90 - 3.17	3.54 - 3.87	
FH30	3.43 - 3.73	3.96 - 4.31	FH30	3.18 - 3.47	3.88 - 4.22	
FH31	3.74 - 4.07	4.32 - 4.71	FH31	3.48 - 3.79	4.23 - 4.61	
FH32	4.08 - 4.39	4.72 - 5.14	FH32	3.80 - 4.11	4.62 - 4.9	
FH33	4.40 - 4.87	5.15 - 5.6	FH33	4.12 - 4.55	5.0 - 5.5	
FH34	4.88 - 5.3	5.7 - 6.2	FH34	4.56 - 5.0	5.6 - 6.0	
FH35	5.4 - 5.9	6.3 - 6.8	FH35	5.1 - 5.5	6.1 - 6.6	
FH36	6.0 - 6.4	6.9 - 7.5	FH36	5.6 - 5.9	6.7 - 7.3	
FH37	6.5 - 7.1	7.6 - 8.2	FH37	6.0 - 6.6	7.4 - 8.0	
FH38	7.2 - 7.8	8.3 - 9.0	FH38	6.7 - 7.2	8.1 - 8.7	
FH39	7.9 - 8.5	9.1 - 9.9	FH39	7.3 - 7.9	8.8 - 9.7	
FH40	8.6 - 9.4	10.0 - 10.8	FH40	8.0 - 8.7	9.8 - 10.5	
FH41	9.5 - 10.3	10.9 - 11.9	FH41	8.8 - 9.5	10.6 - 11.7	
FH42	10.4 - 11.3	12.0 - 13.1	FH42	9.6 - 10.5	11.8 - 12.7	
FH43	11.4 - 12.4	13.2 - 14.3	FH43	10.6 - 11.5	12.8 - 14.0	
FH44	12.5 - 13.5	14.4 - 15.7	FH44	11.6 - 12.6	14.1 - 15.3	
FH45	13.6 - 14.9	15.8 - 17.2	FH45	12.7 - 13.8	15.4 - 16.6	
FH46	15.0 - 16.3	17.3 - 18.9	FH46	13.9 - 15.1	16.7 - 18.3	
FH47	16.4 - 18.0	19.0 - 20.8	FH47	15.2 - 16.7	18.4 - 20.0	
FH48	18.1 - 19.8	20.9 - 22.9	FH48	16.8 - 18.3	20.1 - 21.9	
FH49	19.9 - 21.7	23.0 - 25.2	FH49	18.4 - 20.2	22.0 - 23.9	
FH50	21.8 - 23.9	25.3 - 27.6	FH50	20.3 - 22.2	24.0 - 26.2	
FH51	24.0 - 26.2	27.7 - 30.3	FH51	22.3 - 24.3	26.3 - 28.8	
FH52	26.3 - 28.7	30.4 - 33.3	FH52	24.4 - 26.6	28.9 - 31.4	
FH53	28.8 - 31.4	33.4 - 36.4	FH53	26.7 - 29.1	31.5 - 34.5	
FH54	31.5 - 34.0	36.5 - 39.9	FH54	29.2 - 32.0	34.6 - 37.9	
FH55	34.6 - 37.9	42.0 - 43.9	FH55	32.1 - 35.2	38.0 - 41.9	
FH56	38.0 - 41.5		FH56	35.3 - 38.5	42.0 - 45.0	
FH57	41.6 - 45.0		FH57	38.6 - 42.3		

For Type A and B Overload Relays, Size 3 and 4 Starters ①②③

Size Starter	Ambient Compensated Encl. Starters	Non-Compensated Encl. Starters	Heater Catalog Number
Full Load Current of Motor (Amperes) ①			
↑↑↑ For Size 4 Starters For Size 3 Starters	12.8 - 14.1	11.9 - 13.0	FH68
	14.2 - 15.5	13.1 - 14.3	FH69
	15.6 - 17.1	14.4 - 15.9	FH70
	17.2 - 18.9	16.0 - 17.4	FH71
	19.0 - 20.8	17.5 - 19.1	FH72
	20.9 - 22.9	19.2 - 21.1	FH73
	23.0 - 25.2	21.2 - 23.2	FH74
	25.3 - 27.8	23.3 - 25.6	FH75
	27.9 - 30.6	25.7 - 28.1	FH76
	30.7 - 33.5	28.2 - 30.8	FH77
	33.6 - 37.5	30.9 - 34.5	FH78
	37.6 - 41.5	34.6 - 38.2	FH79
	41.6 - 46.3	38.3 - 42.6	FH80
	46.4 - 50	42.7 - 46	FH81
	51 - 55	47 - 51	FH82
56 - 61	52 - 56	FH83	
62 - 66	57 - 61	FH84	
67 - 73	62 - 67	FH85	
74 - 78	68 - 72	FH86	
79 - 84	73 - 77	FH87	
85 - 92	78 - 84	FH88	
	85 - 91	FH89	
	102 - 110	92 - 99	FH90
	111 - 122	100 - 110	FH91
	123 - 129	111 - 122	FH92
	130 - 133	123 - 128	FH93
	—	129 - 133	FH94

For Type A and B Overload Relays, Size 5 and 6 Starters ④

Compensated Overload Relay		Heater Catalog Number
Open Starter	Enclosed Starter	
Full Load Current of Motor (Amperes)		
Size 5 (With 300/5 current transformers)		
—	—	FH23
118-129	118-129	FH24
130-141	130-141	FH25
142-155	142-155	FH26
156-170	156-170	FH27
171-187	171-187	FH28
188-205	188-205	FH29
206-224	206-224	FH30
225-244	225-244	FH31
245-263	245-263	FH32
264-292	264-292	FH33
293-300	—	FH34
Size 6 (With 600/5 current transformers)		
—	—	FH23
236-259	236-259	FH24
260-283	260-283	FH25
284-310	284-310	FH26
311-340	311-340	FH27
341-374	341-374	FH28
375-411	375-411	FH29
412-448	412-448	FH30
449-489	449-489	FH31
490-527	490-527	FH32
528-585	528-540	FH33
586-600	—	FH34
Size 7 and Larger: Advise Full Load Current		

① Based on 60°C and 75°C wire for 30 amperes or less.
② Based on 60°C wire for 31 to 95 amperes.

③ Based on 75°C wire for greater than 95 amperes.
④ Based on 75°C wire.

NOTE: Heaters are packaged in strips of six. Minimum ordering quantity is 12.

CONTACTORS AND STARTERS

A202 Lighting Contactor (Electrically Held/Magnetically Latched)



PRODUCT HISTORY TIMELINE

Originally A Westinghouse Product

Size	Amperes	Model	1965	1970	1975	1980	1985	1990	1995	Present
Size 1	30A									
Size 2	60A									
Size 3	100A									
Size 4	200A	J								
Size 4	200A	K								

A202 REPLACEMENT CAPABILITIES

Kits for 30A to 200A

Description	Poles	30A	60A	100A	200A — Model J [Ⓢ]	200A — Model K [Ⓢ]
Contact Kit	2	373B331G07	373B331G11	626B187G12	626B187G16	5250C81G16
	3	373B331G09	373B331G12	626B187G13	626B187G17	5250C81G17
	4	373B331G09	①	②	③	5250C81G18
	5	373B331G10	②	③	④	5250C81G19
Arc Box	2-, 3-, 4	6714C74G03	6714C74G07	6714C74G09	6714C74G11	6714C74G11
	5	6714C74G06	6714C74G08	6714C74G10	6714C74G12	6714C74G12
Cross Bar	2-3	N/A	672B788G32	672B788G36	672B788G36	672B788G40
	4-5	N/A	672B788G34	672B788G38	672B788G38	
Upper Base (for single rated coils only)	2-3	N/A	672B788G33	672B788G37	672B788G37	672B788G52
	4-5	N/A	672B788G35	672B788G39	672B788G39	
Lower Base	2-3	N/A	1250C33G09	1250C33G03	1250C33G03	1250C33G10
	4-5	N/A	1250C33G05	1250C33G06	1250C33G06	

Electrically Held Only

KO Spring (Pk of 10)	All	N/A	503C796G01	503C796G02	503C796G02	672B788G50
Terminal Line/Load (Pk of 3)	All	N/A	371B870G03	372B357G12	372B357G13	372B357G13

AC Coils Electrically Held

Voltage	Hz	30A		60A	
		2-, 3-, 4-Pole	5-Pole	2-, 3-Pole	4-, 5-Pole
120/110	60/50	505C806G01	505C808G01	505C806G01	505C818G01
208	60	505C806G02	505C808G02	505C806G02	505C818G02
600/550	60/50	505C806G05	505C808G05	505C806G05	505C818G05
380	50	505C806G07	505C808G07	505C806G07	505C818G07
240/220	60/50	505C806G12	505C808G12	505C806G12	505C818G12
480/440	60/50	505C806G13	505C808G13	505C806G13	505C818G13
24	60	505C806G16	N/A	505C806G16	505C818G15
227	60	505C806G18	505C808G16	505C806G18	505C818G16
240/480 [Ⓢ]	60/60	505C806G03	505C808G03	505C806G03	505C818G03
120/240 [Ⓢ]	60/60	505C806G10	505C808G10	505C806G10	505C818G10
Voltage	Hz	100A and 200A — Model J		200A — Model K [Ⓢ]	
		2-, 3-Pole	4-, 5-Pole	2-, 3-Pole	4-, 5-Pole
120/110	60/50	505C633G01	505C635G01	52050C79G01	5250C80G01
208	60	505C633G02	505C635G02	52050C79G02	5250C80G02
600/550	60/50	505C633G05	505C635G05	52050C79G05	5250C80G05
380	50	505C633G07	505C635G07	52050C79G07	5250C80G07
240/220	60/50	505C633G12	505C635G12	52050C79G12	5250C80G12
480/440	60/50	505C633G13	505C635G13	52050C79G13	5250C80G13
24	60	505C633G34	N/A	52050C79G34	N/A
227	60	505C633G14	N/A	52050C79G14	N/A
240/480 [Ⓢ]	60/60	505C633G03	505C635G03	52050C79G03	5250C80G03
120/244 [Ⓢ]	60/60	505C633G10	505C635G10	52050C79G10	5250C80G10

- ① Use Qty 2 – 373B331G11 (2-pole kit).
- ② Use one each of 373B331G11 (2-pole kit) and 373B331G12 (3-pole kit).
- ③ Use Qty 2 – 626B187G12 (2-pole kit).
- ④ Use one each of 626B187G12 (2-pole kit) and 626B187G13 (3-pole kit).
- ⑤ For 200 ampere A202 Magnetically Latched Lighting contactors order 3-pole contact kit style 672B788G07.
- ⑥ Use Qty 2 – 626B187G16 (2-pole kit).
- ⑦ Use one each of 626B187G16 (2-pole kit) and 626B187G17 (3-pole kit).
- ⑧ Model K replaces Model J, offering superior design and life characteristics. Renewal parts are different. **Use parts for proper model only.**
- ⑨ Dual voltage coils. Use only on contactors or starters originally supplied with a dual voltage coil.



CONTACTORS AND STARTERS

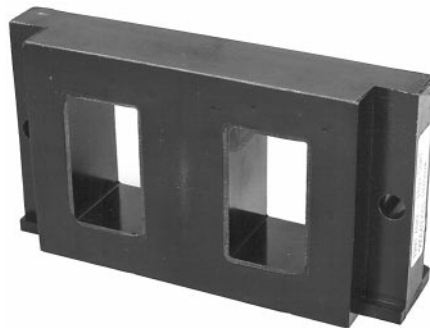
A202 Lighting Contactor (Electrically Held/Magnetically Latched)

A202 REPLACEMENT CAPABILITIES, *Continued*

AC Coils Magnetically Latched							
Voltage		Hz		2-, 3-, 4-Pole		5-Pole	
30A							
110/120		50/60		7874A93G01		7874A89G01	
208/240		50/60		7874A93G02		7874A89G02	
277		50/60		7874A93G03		7874A89G03	
440/480		50/60		7874A93G04		7874A89G04	
575		50/60		7874A93G05		7874A89G05	
60A							
				2-, 3-Pole		4-, 5-Pole	
110/120		50/60		7874A93G01		7874A87G01	
208/240		50/60		7874A93G02		7874A87G02	
277		50/60		7874A93G03		7874A87G03	
440/480		50/60		7874A93G04		7874A87G04	
575		50/60		7874A93G05		7874A87G05	
100A and 200A							
110/120		50/60		7874A85G01		7874A83G01	
208/240		50/60		7874A85G02		7874A83G02	
277		50/60		7874A85G03		7874A83G03	
440/480		50/60		7874A85G04		7874A83G04	
550/575		50/60		7874A85G05		7874A83G05	
Terminals (Line and Load)							
Size							
30A		2-, 3-, 4-Pole				5-Pole	
		N/A				N/A	
60A		2-Pole		3-Pole		4-Pole	
		179C755G17		179C755G16		179C755G17①	
100A		2-Pole		3-Pole		4-Pole	
		179C755G19		179C755G18		179C755G19①	
200A		2-Pole		3-Pole		4-Pole	
		Model K		Model J		Model K	
		179C755G28		179C755G31		179C755G27 + G28②	
		Model K		Model J		Model K	
		179C755G28		179C755G31		179C755G27 + G28②	
		Model K		Model J		Model K	
		179C755G28		179C755G31		179C755G27 + G28②	
		Model K		Model J		Model K	
		179C755G28		179C755G31		179C755G27 + G28②	
		Model K		Model J		Model K	
		179C755G28		179C755G31		179C755G27 + G28②	
Other Accessories							
30A to 200A		Control Module (Rectifier)				3915B98G01	

K

PRODUCT PICTURES



120V Coil for Electrically Held Lighting Contactor
Style No. 505C633G01

① Order quantity of two for 4-pole design.
② Group numbers for the 5-pole terminals represent the combination of the 2-pole and 3-pole number.



PRODUCT HISTORY TIMELINE

Originally a Westinghouse Product

Type	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995
AF														
A														
MB														
JF														

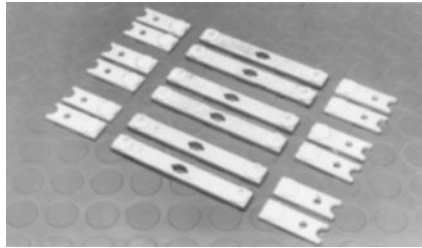
REPLACEMENT CAPABILITIES

Manual Autostarter Kits

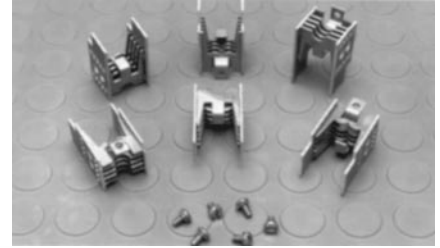
Frame Size	Start Contacts	Required	Run Contacts	Required	Grid Stack Kit	Required
2-3	38A7018G12	1	38A7018G13	1	3354D90G10	1
4-5, 5L	550D409G18	1	550D409G19	1	3354D90G10	1
5M-5MM	3354D90G08	1	3354D90G09	1	3354D90G10	2



Start Kit
Style No. 550D409G18



Run Kit
Style No. 550D409G19



Grid Kit
Style No. 3354D90G10

Solenoid Assembly with Coil (All Sizes)❶

Volt	Hz	Style❷
115	60	5264C05H01
230	60	5264C05H02
460	60	5264C05H03
575	60	5264C05H04

Kits contain a complete set of moving contacts, stationary contacts, and springs.

TECHNOLOGY UPGRADES

- ECN42 – ECN44 reduced voltage auto-transformer starter
- IT or ADVANTAGE solid-state reduced voltage starter

❶ When replacing solenoid assembly series 416C160, use adapter plate style 9917D02H01 - Qty 1 required.

❷ These styles replace coil style 296B892G_-. When ordering new style as replacement, customer must order adapter plate 9917D02H01, Qty 1 required.



FURTHER INFORMATION	
Literature Number	Description
SA-135	Quick Reference Guide for Contactor and Starter Replacement Contact Kits and Coils
SA-175A	Cutler-Hammer Motor Starters Selection Guide
SA-161	Enclosed Control Cross Reference Guide
SA-11746A	Westinghouse Full Family of Vacuum Contactors and Starters
SA-509	Continuing Citation Support
B8K01SE	Facts to Consider Before Purchasing Third-Party Contact Kits for Your Cutler-Hammer Starters
LEM006	When You Need Cutler-Hammer Replacement Control Parts

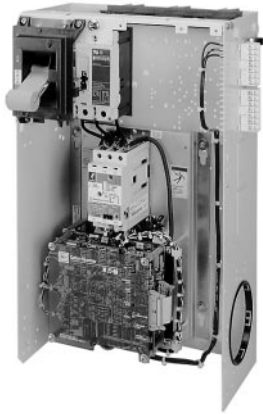
For replacement parts information, contact LV Control Aftermarket at **1-800-535-8992**.

PRICING INFORMATION	
Literature Number	Description
CAT.201.01.T.E	Control Products
VISTA/VISTALINE	Discount Symbol 1CD-5C Discount Symbol 1CD-1C Discount Symbol 1CD-1

K



PRODUCT DESCRIPTION



Easy Start Reduced Voltage Solid-State Motor Starter Motor Control Center Plug-in Unit

Reduced voltage solid-state motor starters serve to provide reduced voltage starting, protection, and control for standard three-phase induction motors. They are commonly found in applications like conveyors, compressors, extruders, pumps, blowers, etc.

Reduced voltage starting is beneficial because current and torque are reduced during the motor starting process. This reduces the electrical and mechanical shock experienced during motor starting, prolonging motor and equipment life. Reduced voltage starters also provide for maximum efficiency of the motor duty cycle by electronically sensing the motor load and reducing the voltage applied to the motor when it is running at less than full load torque.

Solid-state motor starters also provide short circuit and various types of electronic protective functions. Common features include phase loss, undervoltage, current balance, phase rotation, current limit, over temperature, etc.

Reduced voltage solid-state controllers are similar to reduced voltage motor starters, except they include no overload or short-circuit protection. Motor controllers are applied in series with conventional electromechanical starters to provide the benefits of reduced voltage starting at lower cost. Electromechanical starter contact life is also improved by the reduced voltage motor controller.

PRODUCT HISTORY

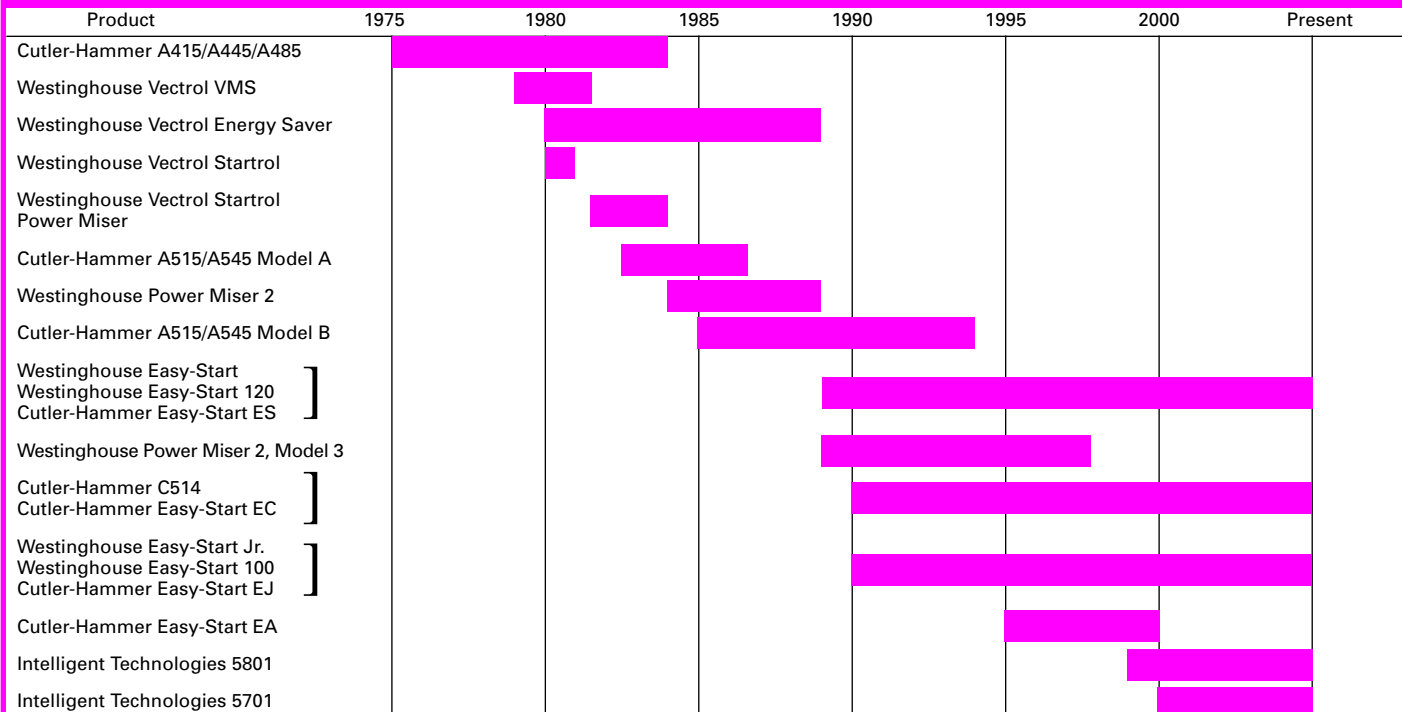
Cutler-Hammer's present line of reduced voltage starters is the culmination of 38 years of product development. In 1958, Vectrol Engineering began manufacturing SCR Gate Driver circuitry and progressed into their own soft starter product line, known as the Vectrol Motor Starter (VMS). In 1980, Vectrol was purchased by Westinghouse. The VMS was quickly phased out of production and the Vectrol ES (Energy Saver) solid-state reduced voltage starter was introduced. The Vectrol ES combined features of automatic power

factor adjustment and reduced voltage, maximizing the efficiency of the motor duty cycle. The Vectrol ES starter was actively manufactured until 1988 when the Easy-Start Motor Starter was introduced.

Cutler-Hammer entered the market in 1975 with the A415, A445, and A485 product lines. By 1983, Cutler-Hammer had released the A515/A545 Model A Solid-State Reduced Voltage Starter and followed up in late 1984 with the improved Model B A515. This starter utilized a solid-state controller,

overload relay, and a six SCR full-wave power section. In 1988, Westinghouse introduced its Easy Start and Easy Start Jr. product lines that also utilized a solid-state control circuit and a six SCR full-wave power section. In 1995, the newly formed Solid-State Motor Control Division (SSMC) of the new Cutler-Hammer released the Easy Start EA Reduced Voltage Starter, combining the voltage control of SCRs with the durability of the ADVANTAGE motor starter into a uniquely small package.

PRODUCT HISTORY TIMELINE





SOLID-STATE LOW VOLTAGE MOTOR CONTROL

Reduced Voltage Motor Starters

SUPPORT CHART

	(See below for topic definitions)						Recommended Replacement
	PCB Repair	Upgrade Kits	Factory Repair	Field Service	Technical Support	Spare Parts	
Cutler-Hammer Solid-State Reduced Voltage Starters							
A415/A445/A485	●		●	●	●	●	Intelligent Technologies S801
A515/A545 Model A	●		●	●	●	●	Intelligent Technologies S801
A515/A545 Model B	●		●	●	●	●	Intelligent Technologies S801
C514	●		●	●	●	●	Intelligent Technologies S801
Westinghouse Solid-State Reduced Voltage Starters							
Vectrol VMS	●		●			●●	Intelligent Technologies S801
Vectrol Energy Saver	●	●	●		●	●●	Intelligent Technologies S801
Easy-Start/Easy-Start 120	●		●	●	●	●	Intelligent Technologies S801
Easy-Start Jr./Easy-Start 100	●		●	●	●	●	Intelligent Technologies S801
Startrol							Intelligent Technologies S801
Startrol Power Miser							Intelligent Technologies S801
Power Miser 2	●		●	●	●	●	Intelligent Technologies S801
Power Miser 2, Model 3	●		●	●	●	●	Intelligent Technologies S801
Easy-Start ADVANTAGE	●	●	●	●	●	●	Intelligent Technologies S801

Definitions

PCB Repair: Printed circuit boards may be returned to the factory for repair. All PCBs are upgraded to the most current revision at the time of the repair.

Upgrade Kits: Kits are available to upgrade the basic performance of certain vintage products.

Factory Repair: Entire assemblies may be returned to the factory for repair, upgrade or refurbishment. A test-and-inspect fee applies to assemblies to evaluate the cost of repair.

Field Service: Over 25 factory service employees nationwide provide first party service solely on SSMC products.

Technical Support: Field service specialists located in major cities are prepared to offer on-site expertise.

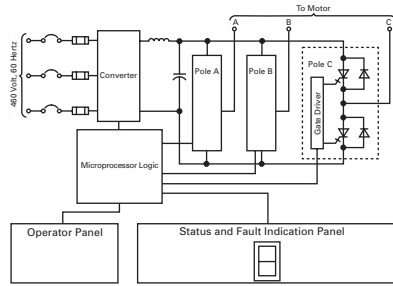
Spare Parts: Parts are available from factory stock.

● Original Printed Circuit Boards (PCB) are not available as spares. Please select the appropriate upgrade board for replacement.





PRODUCT DESCRIPTION

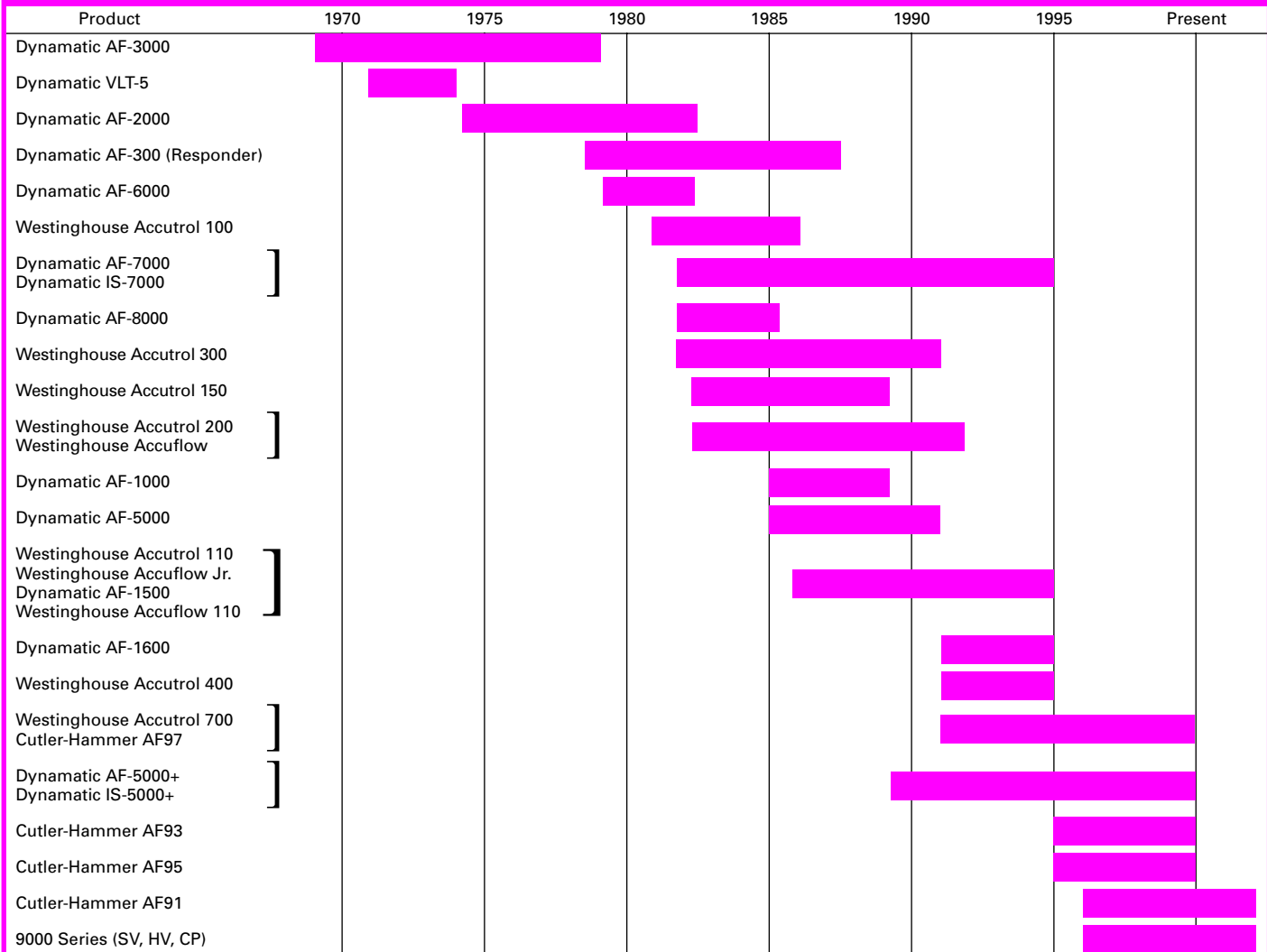


Typical Adjustable Frequency Controller Block Diagram

Adjustable Frequency Controllers (AFCs) serve to provide adjustable speed and control for standard AC induction motors. AFCs rectify the incoming AC line voltage to supply a fixed potential DC bus. An inverter section is employed to invert the DC bus voltage to an adjustable frequency output voltage. The solid-state logic section controls the inverter and ultimately the magnitude and frequency of the output voltage to the motor. Input to the solid-state logic can be manual (from an operator type keypad) or automatic (from design features programmed into the drive logic).

The advent of microprocessor-based logic and the advancements of solid-state power technology have dramatically reduced the costs of AFCs and enhanced their product features. This has permitted a more economical solution for adjustable speed motor applications because AFCs permit the use of standard squirrel cage induction motors instead of DC motors, which are more expensive and harder to maintain. AFCs are ideal for variable torque applications, like centrifugal pumps and fans, and constant torque applications, like conveyers and extruders.

PRODUCT HISTORY TIMELINE





SOLID-STATE LOW VOLTAGE MOTOR CONTROL

Adjustable Frequency AC Drives

GENERAL INFORMATION

Model	HP Range	Input Voltage	Output Devices	Output Algorithmn	Control Type
VLT-5	1 to 5	240, 415	SCR	VVI	Analog
AF-1000	1 to 5 ^①	230, 480	Transistors	PWM	Analog
AF-1500	1 to 30	240, 480	Transistors	PWM	Digital
AF-1600	1 to 20	240, 480	IGBT	Vector PWM	Digital
AF-2000	5 to 10	230	SCR	VVI	Analog
AF-300	N/A	N/A	SCR	CSI	Analog
AF-3000 ^②	30 to 250	230, (460 opt)	SCR	PWM	Analog
AF-5000	5 to 100	380 to 480	Transistor	PWM	Analog
AF-5000+	5 to 600	380 to 480	Transistor	PWM	Digital
AF-6000	15 to 300	480	SCR	VVI	Analog
AF-7000	20 to 600	480, 575	Transistor	VVI	Analog
AF-8000	3 and 5	480	SCR	PWM	Analog
Accutrol 100	1 to 5	230	Transistor	PWM	Analog
Accutrol 110	1 to 75	230, 460	Transistor	PWM	Digital ^③
Accutrol 150	3 to 50	460	Transistor ^④	PWM	Analog
Accutrol 200	3 to 250	460	Transistor ^④	PWM	Analog
Accutrol 300	15 to 600	460, 575	Gate Turn-off Thyristor	VVI	Analog
Accutrol 400	3 to 150	460	Transistor	PWM	Digital
Accutrol 700	100 to 600	480	IGBT	Vector PWM	Digital
AF93	2 to 20	240, 480	Insulated Gate Bi-polar Transistor	Vector PWM	Digital
AF95	15 to 200	480	Insulated Gate Bi-polar Transistor	PWM	Digital
AF97	100 to 600	480	Insulated Gate Bi-polar Transistor	Vector PWM	Digital
AF91	Fractional to 10	240, 460	Insulated Gate Bi-polar Transistor	PWM	Digital
9000 Series	Fractional to 1100	208 to 690	Insulated Gate Bi-polar Transistor	PWM	Digital

- ① Also available with a single-phase output.
- ② Standard 220V output only.
- ③ Analog controls on pre-1988 models.

REPLACEMENT CAPABILITIES

	(See below for topic definitions)						
	PCB Repair	Upgrade Kits	Factory Repair	Field Service	Technical Support	Spare Parts	Recommended Replacement
Dynamic Adjustable Frequency Drives							
VLT-5							AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-1000							AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-1500 ^①	●		●	●	●	●	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-1600	●		●	●	●	●	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-2000							AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-300 (Responder)							AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-3000							AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-5000	●		●	●	●	●	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-5000+ / IS-5000+	●		●	●	●	●	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-6000	②	②	②	②	②	②	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-7000 / IS-7000	●		●	●	●	●	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
AF-8000							AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
Westinghouse Adjustable Frequency Drives							
Accutrol 100		②					AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
Accutrol 110/Accuflow Jr. ^①	●		●	●	●	●	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
Accutrol 150	●	●③	●	●	●	●	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
Accutrol 200/Accuflow	●	●③	●	●	●	●	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
Accutrol 300	●		●	●	●	●④	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
Accutrol 400	●		●	●	●	●	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP
Accutrol 700	●	●	●	●	●	●	AF91 Fractional to 10HP or SV9000 Fractional to 1100HP

- ① The AF-1500, Accutrol 110 and Accuflow Jr. are identical units.
- ② Though not fully factory-supported, repair may be possible in some cases.
- ③ No upgrades are available for Gate Turn-off Thyristor (GTO) versions. Transistor versions are identified by a leading "A1T" or "A2T" in the model number.
- ④ GTOs are not available as spare parts for models below 100 HP.

Definitions

- PCB Repair:** Printed circuit boards may be returned to the factory for repair. All PCBs are upgraded to the most current revision at the time of the repair.
- Upgrade Kits:** Retrofit kits are available to upgrade the basic performance of certain vintage products.
- Factory Repair:** Entire assemblies may be returned to the factory for repair, upgrade or refurbishment. A test-and-inspect fee applies to assemblies to evaluate the cost of repair.
- Field Service:** Over 25 factory service employees nationwide provide first party service solely on SSMC products.
- Technical Support:** Field service specialists located in major cities are prepared to offer on-site expertise.
- Spare Parts:** Series 9000 parts are available from factory stock. Vintage (legacy) parts are available through ATS 1-877-645-3606.



TECHNOLOGY UPGRADES

Reduced Voltage Motor Starter

Easy Start EA Reduced Voltage Starters utilize SCRs to provide adjustable voltage soft starts and stops and the ADVANTAGE

starter for operation at full motor voltage. These are combined into a unique com-

pact package which makes it the perfect solution for new or retrofit applications.

Adjustable Frequency Drives

The 9000 series of Adjustable Frequency Drives offers a broad range of high performance AC drives.

The breadth of the 9000 series provides the maximum flexibility needed to meet the demands of today's commercial and industrial applications.

The full range of horsepowers and voltage ratings, enclosure types, control, communication and power options positions the 9000 series as one of the most complete AC lines available.

PRODUCT SUPPORT SERVICES

For all Product Support Services, Call 1-800-322-4486 or Fax 813-852-6532

Service

Technical support and services for the AF91 and 9000 series adjustable frequency drives are coordinated through the Product Integrity Center (PIC) located in Watertown, WI. Contact the PIC at 1-800-322-4986 for all your aftermarket in relation to these products.

The vintage (legacy) drive products referenced in the previous charts are supported through Advanced Technology Systems (ATS). Contact ATS at 1-877-645-3606.

Training

Factory training on the AF91 and 9000 series adjustable frequency drives is available on a regularly scheduled basis. A schedule of classes can be located on the C-H University web page. Registration can be completed online. If factory training is not convenient, on-site training can be performed. To schedule on-site training contact the PIC.

Renewal Parts

Renewal parts are available for both the current and vintage products. Parts for the 9000 series adjustable frequency drives can be purchased as complete kits covering a given frame size or as individual components. Contact the PIC for help in identifying your 9000 series adjustable frequency drives parts requirements.

For help in identifying your vintage (legacy) drive parts requirements contact ATS.

Repair Services

Complete assemblies related to the 9000 series can be tested, upgraded, repaired and re-warranted upon return to the PIC. All factory repair use genuine, original parts.

Repair of vintage (legacy) products is available through ATS.

Telephone Support

Technical support and troubleshooting are available via the PIC toll-free number 1-800-322-4986. You will be connected to a PIC engineer who can assist you with your questions.

In addition, warranty claims and renewal parts can all be handled through this single point of contact. Normal business hours for telephone support are Monday – Friday, 8 a.m. to 5 p.m. Central Standard Time. Emergency assistance is available 24 hours a day.

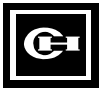
FURTHER INFORMATION

Literature Number	Description
LEL-019	Solid-State Motor Control Quick Reference Guide
CAT.201.01.T.E	Control Products Catalog Pages 39-1 through 39-28
PG.08.04.T.E	Cutler-Hammer Power Control Products Guide
PL.08H.13A.P.E	Series 9000 Spare Parts Price List

- Eddy Current Product Line was sold in 1995 to Dynamatic Corporation, Kenosha, WI (1-800-548-2169)

PRICING INFORMATION

Literature Number	Description
PL 8790	Price List of Renewal Parts for Solid-State Reduced Voltage Starters and Adjustable Frequency Drives
PL 8791	Price List of Factory Repair for Solid-State Reduced Voltage Starters and Adjustable Frequency Drives
CAT.201.01.T.E	Control Products Catalog Pages 39-1 through 39-28
PL 8810	Price List for AMPGARD MV Starters
VISTA/VISTALINE	Discount Symbols SS-1 1CD1 SS-2 SS-3 SS-4



SYNCHRONOUS MOTOR CONTROL

Relay or Solid-State Mark V Slipsyn® Motor Control for Brush and Brushless Motors

PRODUCT DESCRIPTION

Synchronous Motors

Polyphase synchronous motors are employed primarily to obtain high pullout torques, constant operating speed or generation of leading reactive kVA for Power Factor (PF) correction. To bring a motor to a constant speed, DC power is applied to a special winding in a synchronous motor. This winding is called a field coil winding and is controlled by "field control." DC power for a brush type motor is usually supplied with the starter and entails using an exciter. DC power for a brushless type motor is supplied by an exciter mounted on the motor. Refer to **pages 182 and 183** for further description of brush and brushless type motors.

Synchronous Motor Control — Westinghouse Slipsyn®
Synchronous motor "field application

control" generally includes a synchronous device to apply DC power to the motor field circuit at the optimum speed. It may also include protective features such as locked rotor protection, failure to synchronize, incomplete sequence, field failure, pull-out protection, etc. depending on the type of field application control selected. Refer to **pages 182 and 183** for further description on the control required for brush and brushless type motors.

Relay Type vs. Solid-State Type — Mark V

Relay Type

The relay type uses the ASR synchronizing relay. Inherent in using the relay type are the problems that are associated with using contacts or mechanical closing devices such as arcing, spring and bearing deterioration and wear, dirty atmospheres etc.

Solid-State — Mark V

The Mark V is 100% solid-state and features a "soft-turn-on" circuit which applies DC field voltage to the motor field. It enables all required functions for correct synchronization to be accomplished without the use of moving contacts or mechanical closing devices.

With the Mark V, the static exciter power supply is always supplied and is part of the "system."

Also available as a modification with the Mark V is a VAR/PF/DC field current regulator. The regulator consists of a printed circuit board, auxiliary devices and potentiometers for adjustment.

PRODUCT HISTORY

Originally a Westinghouse Product

Synchronous Motor Control

Westinghouse has offered brush type synchronous field control since the 1940s. Motor starters for brushless synchronous motors have been offered since the late 1960s. Synchronous motors can be medium voltage (2300 – 7200V) or low voltage (600V and below). A synchronous motor starter includes the basic motor control PLUS the synchronous control and protection functions. Typically, the basic motor control and the field application control are mounted in separate compartments within the starter. Ratings of synchronous control are in terms of the maximum DC field amperes required by the motor. Current ratings are 45, 90, 135, 160, 200 and 270A DC, through 6000 HP and 5 kV.

Relay and Solid-State Type Control

Relay type Slipsyn was introduced in 1947 and uses the ASR synchronizing relay. This type of control is still available and used today. Forms of solid-state type Slipsyn were introduced in the late '50s and early '60s but were not completely solid-state and had some of the operation problems the relay type control encountered. These were called Mark I and Mark II Static Slipsyn. In 1989 the Mark V Solid-State Slipsyn field control was introduced.

Medium Voltage (AMPGARD) Starters

The AMI AMPGARD synchronous starter (1957–1970) used a 60-inch deep enclosure with the synchronous control in the low voltage section in the front bottom 2/3 of the starter enclosure. The basic motor control was located in the rear bottom 2/3 of the enclosure, barriered off from the low voltage section. The AMI AMPGARD for synchronous motors used the ASR relay type control.

The LF AMPGARD (1962–1988) primarily used the ASR field application relay control. Mark I and Mark II Static Slipsyn were also used during their availability periods. The LF AMPGARD for synchronous motors included the basic induction motor control (ISO switch, contactor and starter control) in the bottom half of the structure. The upper half contained the step down static excitation transformer with current limiting fuses, the Silicon Controlled Rectifier (SCR) type static exciter and the synchronizing control and motor field protection panel.

The SJ AMPGARD (1982 – 2000) family of synchronous control is very similar to the LF AMPGARD. Until the availability of the Mark V solid-state synchronous control, the SJ used the ASR relay type field con-

trol. With the advent of the Mark V, 90% of the synchronous starters are supplied with this type control. In both ASR and Mark V control schemes the synchronous gear is usually mounted in the top half of the starter.

Low Voltage Synchronous Starters

Low voltage synchronous starters are similar in nature to high voltage synchronous starters except in two regards. High voltage starters, unlike low voltage starters, must isolate the low voltage from the high voltage. The components for the field control are the same.

The second difference lies in the primary disconnect used in the starters. Low-voltage starters can be supplied with no short circuit protection, with a non-fusible disconnect, a fusible disconnect switch or with a molded case circuit breaker. Low voltage synchronous starters were manufactured in the late '40s, with the introduction of the ASR relay, until September of 1989. In 1991 the product was reintroduced using the Mark V solid-state field control. Marketing for the current line is handled in Asheville, NC. The starters are manufactured in Fayetteville, NC.

PRODUCT HISTORY TIMELINE

Page	Product	1945	1950	1960	1965	1970	1975	1980	1985	1990	1995	Present	
182	ASR Relay Slipsyn (Brush Type)	[Timeline bar from 1945 to Present]											
	Mark I Static Slipsyn (Brush Type)			[Timeline bar from 1960 to 1970]									
	Mark II Static Slipsyn (Brush Type)					[Timeline bar from 1970 to 1975]							
184	Mark V Static Slipsyn									[Timeline bar from 1990 to Present]			
190	Brushless Motor Control						[Timeline bar from 1970 to Present]						



GENERAL INFORMATION

Brush Type Synchronous Motor

Brush type (slip ring) motors have stators similar to squirrel-cage induction motors and most have rotors with DC slip-ring circuits which must be energized for normal operation. They have two basic switching functions. The first is the energizing of the stator to produce breakaway torque and acceleration to synchronizing speed. The second is the energizing of the DC rotor field at optimum speed and rotor stator pole relationship.

Motor Field Excitation – Brush Type

For brush type motors, DC power for the field circuit is required. This DC power may be obtained from plant buses, direct drive DC generators or individual MG sets. An alternative to the above is a factory installed static power exciter which may be supplied with the field application panel. This unit may be a “constant potential” exciter with silicon diodes and transformer with adjustable taps or an “adjustable potential” exciter with SCRs which has its voltage output adjustable via a door mounted potentiometer.

Ratings:

Low Voltage – 600V max.
Medium Voltage – 7200V max.
High Voltage – 15,000V max. (Service)

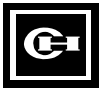
Chronology:

Synchronous control was introduced in 1947 at Buffalo General Control. The product moved with General Control to Asheville, NC in 1978 where it is currently manufactured.

Selection Guide — Brush Type Control

Catalog Number	Primary 3-Phase Voltage	Relay Type with or without Static Exciter — Maximum Field Amperes 400	Solid-State Type — Mark V with Static Exciter — Max. Field Amperes 400	Page Number this Publication or Price List	Synchronous Motor Control Instructions	Comments
14-100 Field application panel only	208-600 2300-7200 2300-15000 208-600 2300-7200 2300-15000	● ● ●	● ● ●	184-185 184-185 184-185 186-187 186-187 186-187	IL 17097 IL 17097 IL 17097 IL 17224 IL 17224 IL 17224	Primary control existing or supplied by others. Primary control may be low-voltage motor starter, Full Voltage (FV) or Reduced Voltage (RV) or medium-voltage motor starter, FV or RV or circuit breaker motor control
14-200, 14-203, 14-204, 14-206, 14-600, 14-603, 14-604, 14-606 Complete synchronous low-voltage starter	208-600	①	●	188-189	IL 17097 IL 17224	Primary control consists of low-voltage FV or RV motor starter — combination or non-combination type
S/V F02, S/V R02, S/V A02 Complete synchronous AMPGARD medium-voltage starter	2300-7200	①	●	PL 8810	IL 17097 IL 17224 IB 48008 IB 48009	Primary control consists of an AMPGARD type medium-voltage, FV motor starter — full-voltage or reduced voltage type

① Contact your local Cutler-Hammer Field Sales Office.



SYNCHRONOUS MOTOR CONTROL

Selection Guide for Brushless Type Motors

GENERAL INFORMATION

Brushless Type Synchronous Motor

Synchronous motors are available without slip rings and are referred to as "Brushless Synchronous Motors." Such motors have rotors equipped with rectifier and sensing circuits providing self-contained DC supplies for the rotor field. The AC power to the rotor is supplied from alternator armatures or through rotary transformers (shaft driven). Rotor field currents are adjusted by proportional values in the stationary excitation windings. The rotor circuits contain means for static switching of discharge resistor and excitation power at preset speed-slip angle points. Thus brushless motors provide self-contained excitation sources and automatic field application.

Brushless Type Control

This type of control consists basically of the following:

- A. Field contactor
- B. Power factor relay
- C. Timing relay to block the power factor relay from tripping during start
- D. Damper winding relay to protect the motor in the event that it fails to start or accelerate
- E. Constant voltage transformer which allows the motor to respond to momentary drops in line voltage
- F. Full wave bridge rectifier that provides DC for the motor exciter field

- G. Volt cap for protecting the rectifier from voltage spikes
- H. Auto-transformer (powerstat) to adjust the voltage to the motor exciter field
- I. DC field ammeter.

Ratings:

Low Voltage – 600V max.
 Medium Voltage – 7200V max.
 High Voltage – 15,000V max.

Chronology:

Synchronous control was introduced in 1947 at Buffalo General Control. The product moved with General Control to Asheville, NC in 1978 where it is currently manufactured.

Selection Guide — Brushless Type Control

Catalog Number	Primary 3-Phase Voltage	Relay Type	Solid-State Type — Mark V with Static Exciter with VAR/PF/DC Current Field Regulator	Page Number this Publication or Price List	Synchronous Instructions	Comments
14-100 Field application panel only	208-600 2300-7200 2300-15000 208-600 2300-7200 2300-15000	● ● ●	● ● ●	190, 191 190, 191 190, 191 192 192 192	IL 17097 IL 17097 IL 17097 IL 17224, IL 17381 IL 17381, IL 17224 IL 17224, IL 17381	Primary control existing or supplied by others. Primary control may be low-voltage motor starter, FV or RV or medium-voltage motor starter, FV or RV or circuit breaker motor control
14-200, 14-203, 14-204, 14-206, 14-600, 14-603, 14-604, 14-606	208-600	●		①	IL 17097	Primary control consists of low-voltage, full-voltage, or reduced-voltage motor starter — combination or non-combination type
S/V F02, S/V R02, S/V A02	2400-7200	●	●	PL 8810	IL 17097 (Relay) IL 17381 (S-State) IL 17224 (S-State) IB 48008 IB 48009	Primary control consists of an AMPGARD type medium-voltage, full-voltage motor starter — full-voltage or reduced-voltage type

M

① Contact your local Cutler-Hammer Field Sales Office.



PRODUCT DESCRIPTION

Relay Slipsyn Automatic Field Application Panel

Automatic Field Application Control

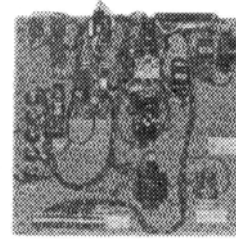
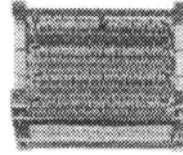
The field application panel provides Slipsyn automatic field application identical to that in complete synchronous motor starters. It is designed for use in conjunction with a primary line closing device such as a circuit breaker or a linestarter. One interlock on the primary device is used to actuate the field application control. When the motor accelerates to proper speed for pull in, the field is automatically applied.

The controller is available for floor mounting. Floor mounted cabinets are NEMA 1 with hinged front door and removable rear plates.

The cabinets contain the following equipment:

- 1 – Polarized slip frequency field application relay type ASR (FR) with half-wave rectifier (REC).
- 1 – Time relay with contacts available for unloader circuit (2TR).
- 1 – Pull-out relay and transformer (PO).
- 1 – Field contactor, 2-pole (FC).
- 1 – Damper winding protective relay (SC).
- 1 – Starting and field discharge resistor (when size permits; otherwise, provided for separate mounting) (IRES).
- 1 – DC field ammeter, panel type, semi-flush mounted.
- 1 – DC field ammeter shunt.
- 1 – DC field failure protection (FLA).
- 2 – Auxiliary relays (2TRX), (2MX).
- 1 – Incomplete sequence relay (IS).

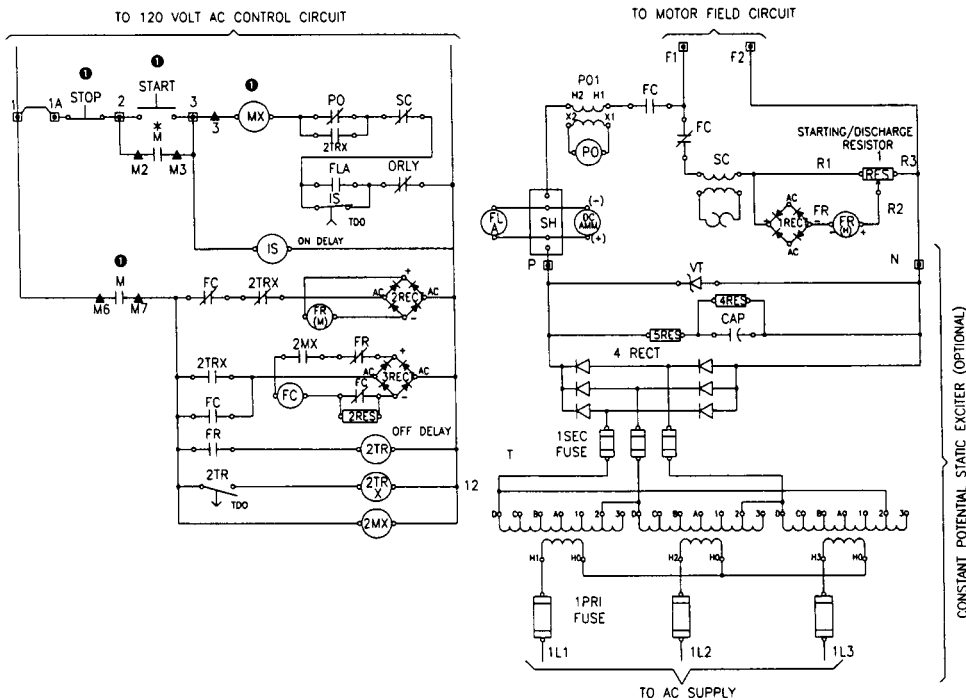
Starting and Discharge Resistor



Field Panel without Static Exciter

Low Resolution Photo

Typical Schematic



Typical 14-100 Panel with Constant Potential Static Exciter (Optional) for use with Primary Motor Starter.

Static Excitation Power Supply Panel

Constant Potential Type

AC to DC power conversion units are designed for individual synchronous motor field excitation. These units are convection cooled, solid state and completely assembled and wired as a self-contained package with a relay Slipsyn automatic field application control. The connections necessary to the external circuits are line leads, motor leads, field connections, and control interconnection.

The static system consists of a convection-cooled silicon rectifier three-phase full-wave bridge assembly, a set of current limiting fuses in the secondary side of the transformer, and a set of surge protecting devices. The transformer has secondary taps that are adjustable with four coarse taps which provide approximately 12% adjustment per tap and three fine taps which provide 4% adjustment per tap.

Adjustable Potential Type

An adjustable potential exciter is similar to the constant potential exciter except that it utilizes SCRs and the voltage adjustment is made with a potentiometer mounted on the door.

❶ Not supplied with 14-100 panel or static exciter.



SYNCHRONOUS MOTOR CONTROL

Brush Type Relay Slipsyn®

Class 14-100 Field Application Panel

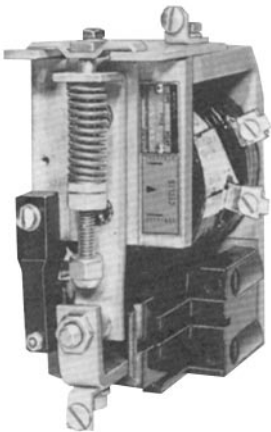
GENERAL INFORMATION

Modifications		List Price Addition
Modification		
Enclosures		
a. NEMA 1, with gasketed door		\$ 340
b. NEMA 3, weather-resisting		2740
c. NEMA 12, dust-tight		2500
Omit Enclosure (Floor Mounted)⓪		Deduct 375
Space Heater		140
Thermostat for Space Heater		100
Voltmeter DC — Panel Type		480
Voltmeter DC — Switchboard Type		680
Ammeter DC — Switchboard Type (In lieu of Panel Type)		200
DC voltage failure protection — Shuts down motor if field voltage is lost while motor is running		
		740
Adjustable potential voltage static exciter Contact your local Cutler-Hammer Field Sales Office. For additional modifications, refer to PL 8810.		

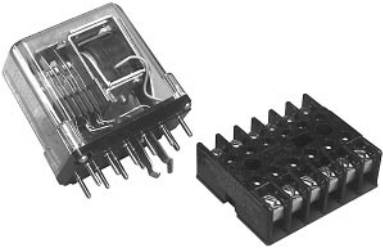
List Price					
Relay Slipsyn Field Panel With and Without Static Exciter NEMA 1 Enclosure					
Max. Field Amps DC	Field Panel Only Without Exciter	With Constant Potential Exciter			
		Primary Volts			
		Low Voltage 230/460 3PH, 60 Hz		Medium Voltage 2300/4160, 3PH, 60 Hz	
		DC Field Volts		DC Field Volts	
		125	250	125	250
45	\$ 9454	\$17725	\$19480	\$21350	\$24530
90	10515	18825	20700	22740	26080
135	11575	19970	22005	24045	27630
160	12065	21030	23100	25430	29260
200	13285	23150	25430	28040	32200
270	14955	26410	29015	31900	36650

DIMENSIONS IN INCHES				
Approximate only				
Field Panel Only — Open Panel				Over 135 Amps.
135 Amps. Max.				
Height	Width	Depth		
24	24	12		Contact your local Cutler-Hammer Field Sales Office


REPLACEMENT CAPABILITIES — TYPICAL RELAY COMPONENTS



ASR Synchronous Relay



PO Pull-Out Relay



DP Damper Protective Relay

Typical Relay Components used in Relay Slipsyn — Refer to RPD 8855S for renewal parts for synchronous control

Field Panel with Static Exciter 13 kW Max.					
Open Cell			Floor Mounted — NEMA 1		
Height	Width	Depth	Height	Width	Depth
45	36	30	90	36	30

- #### CUSTOMER REQUIRED INFORMATION
- Complete motor data: HP, volts, amperes, rpm, phase, power factor, Hz, locked rotor amperes, full load DC amperes, excitation volts, induced field amperes at zero speed, induced field amperes at 95% and 0% speed, recommended discharge resistor ohms, maximum locked time at zero speed.
 - Excitation control.
For exciter field rheostat or motor field resistor to adjust motor excitation, refer to Cutler-Hammer.
 - Application data (including any unusual service conditions) and 100% synchronous motor data MUST accompany each other.

- #### PRICING INFORMATION
- Enter order on AMP
 - Discount Symbol: SYNCH

⓪ If enclosure is omitted, starting and discharge resistor and DC ammeter will be supplied loose and unmounted.

SYNCHRONOUS MOTOR CONTROL

Brush Type Mark V Solid-State Slipsyn[®]

Class 14-100 Field Application Panel



PRODUCT DESCRIPTION

Slipsyn Automatic Field Application Panel with Static Exciter

Automatic Field Application Control

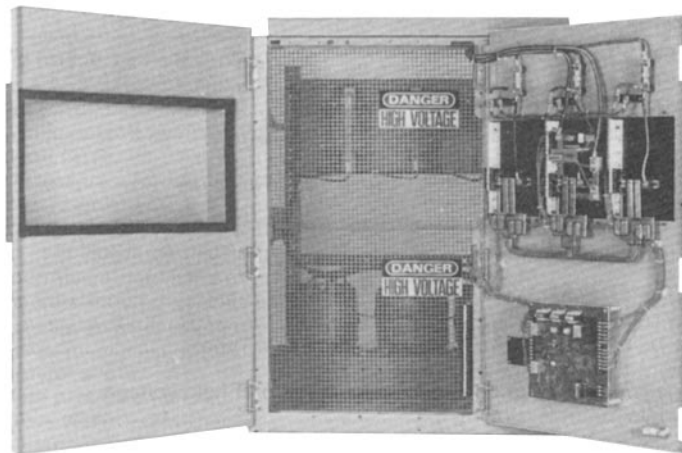
The Slipsyn panel provides automatic field application identical to that in complete synchronous motor starters. It is designed for use in conjunction with a primary line closing device, such as a circuit breaker or a linestarter. When the motor accelerates to proper speed for pull in, the field is automatically applied.

The solid-state Mark V Slipsyn controller will provide the following protective functions:

- A. Locked rotor protection
- B. Incomplete sequence
- C. Failure to synchronize
- D. Fuse failure (Mark V)
- E. Pull out protection
- F. DC current failure protection

Also the application of the DC power to the motor field windings is accomplished without mechanically moving parts, and the device features a "soft-turn-on" circuit when applying DC voltage to the motor field.

Depending on the size of the solid-state application panel, the controller is available in a NEMA 1 floor mounted enclosure or an AMPGARD type cell construction.



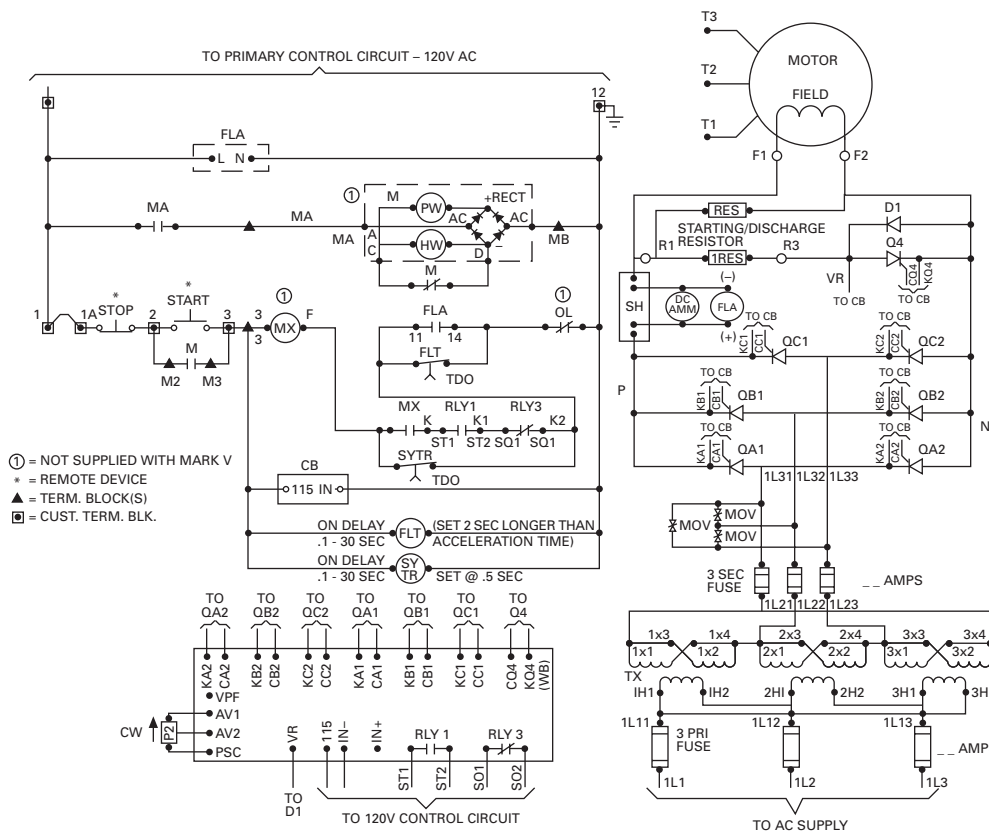
Low Resolution Photo

In both designs, a hinged front door with externally ventilated heat sinks will be provided. The cabinets will contain the following equipment:

- 1 - Step down exciter transformer - 3-Phase (TX)
- 3 - Primary fuses (3 PRI)
- 3 - Secondary fuses (3 seconds)
- 1 - "SCR" power supply panel

- 1 - Synchronous control board (CB)
- 1 - DC ammeter - panel type (DC Amm)
- 3 - "MOV" for surge protection (MOV)
- 1 - Starting and field discharge resistor (when size permits; otherwise provided for separate mounting)
- 1 - Field failure relay (FLA)
- 1 - Incomplete SEQ Timer (FLT)
- 1 - Start Timer (SYTR)
- 1 - Potentiometer (P2)

Typical Schematic





SYNCHRONOUS MOTOR CONTROL

Brush Type Mark V Solid-State Slipsyn®

Class 14-100 Field Application Panel

GENERAL INFORMATION

Modifications

Modification	List Price Addition
--------------	---------------------

Enclosures

a. NEMA 1, with gasketed door	\$ 340
b. NEMA 3, weather-resisting	2740
c. NEMA 12, dust-tight.....	2500

Omit Enclosure (Floor Mounted)⓪ Deduct 375

Space Heater 140

Thermostat for Space Heater 100

Voltmeter DC — Panel Type..... 480

Voltmeter DC — Switchboard Type..... 680

Ammeter DC — Switchboard Type (In lieu of Panel Type) 200

Automatic Power Factor/VAR/DC Current Regulations⓪ 9780

For additional modifications, refer to PL 8810.

List Price

Solid-State Slipsyn Field Panel With Static Exciter NEMA 1 Enclosure

Max. Field Amps DC	Primary Motor Volts, 3PH, 60 Hz			
	Low Voltage 230/460 3PH, 60 Hz		Medium Voltage 2300/4160, 3PH, 60 Hz	
	DC Field Volts		DC Field Volts	
	125	250	125	250
36	\$16300	\$17930	\$19725	\$22740
60	17445	19185	21110	24290
100	18585	20440	22495	25920
160	20700	22775	25100	28935
200	22820	25100	27710	32520
260	31300	34425	37870	43560
300	41400	45545	49310	57865
400	45640	50200	55420	63750

DIMENSIONS IN INCHES

Approximate only

Field Panel with Static Exciter 20 kW Max.

Open Cell			Floor Mounted — NEMA 1		
Height	Width	Depth	Height	Width	Depth
45	36	30	90	36	30

REPLACEMENT CAPABILITIES — TYPICAL SOLID-STATE COMPONENTS



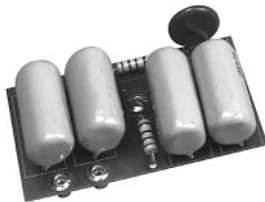
Power Module, 200A, 3 req'd



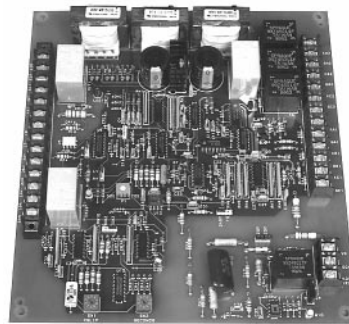
Heat Sink



MOV



Snubber for Thyristor Stack



Main Synchronizing Control/Protection Board

Typical Solid-State components used in Mark V Slipsyn — Refer to RPD 8855S for renewal parts for synchronous control.

CUSTOMER REQUIRED INFORMATION

1. Complete motor data: HP, volts, amperes, rpm, phase, power factor, Hz, locked rotor amperes, full load DC amperes, excitation volts, recommended discharge resistor ohms, amperes, and time.
2. Application data (including any unusual service conditions) and 100% synchronous motor data MUST accompany each other.

PRICING INFORMATION

1. Enter order on AMP
2. Discount Symbol: SYNCH

⓪ If enclosure is omitted, starting and discharge resistor and DC ammeter will be supplied loose and unmounted.
 ⓪ Power Factor Regulation — Cannot provide regulation below 50% of rated voltage and/or 25% of rated current. Regulation cannot be accomplished on light loads, i.e., less than 20% load. Not for use with reciprocating compressors.

SYNCHRONOUS MOTOR CONTROL

Brush Type Mark V Solid-State Slipsyn® Class 14-200 Low-Voltage Motor Starters



PRODUCTION DESCRIPTION

Application

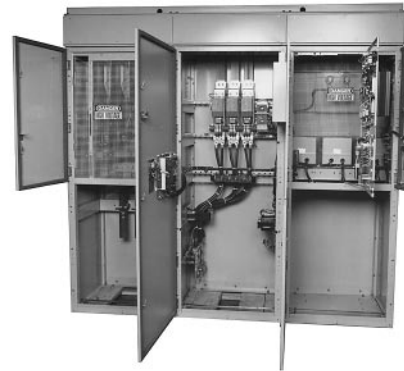
Slipsyn magnetic starters provide reliable, automatic starting of synchronous motors. Automatic synchronization is provided by the Mark V Solid-State Field Panel which assures application of the field at proper motor speed, and at a favorable angular position of stator and rotor poles. As a result, line disturbance resulting from synchronization is reduced and effective motor pull-in torque is increased. Application of DC power to motor field windings is accomplished without mechanically moving parts, and the device features a "soft-turn on" circuit when applying DC voltage to the motor field.

The solid-state Mark V Slipsyn controller will provide the following protective functions:

- A. Locked rotor protection
- B. Incomplete sequence
- C. Failure to synchronize
- D. Fuse failure (Mark V)
- E. Pull out protection
- F. DC current failure protection

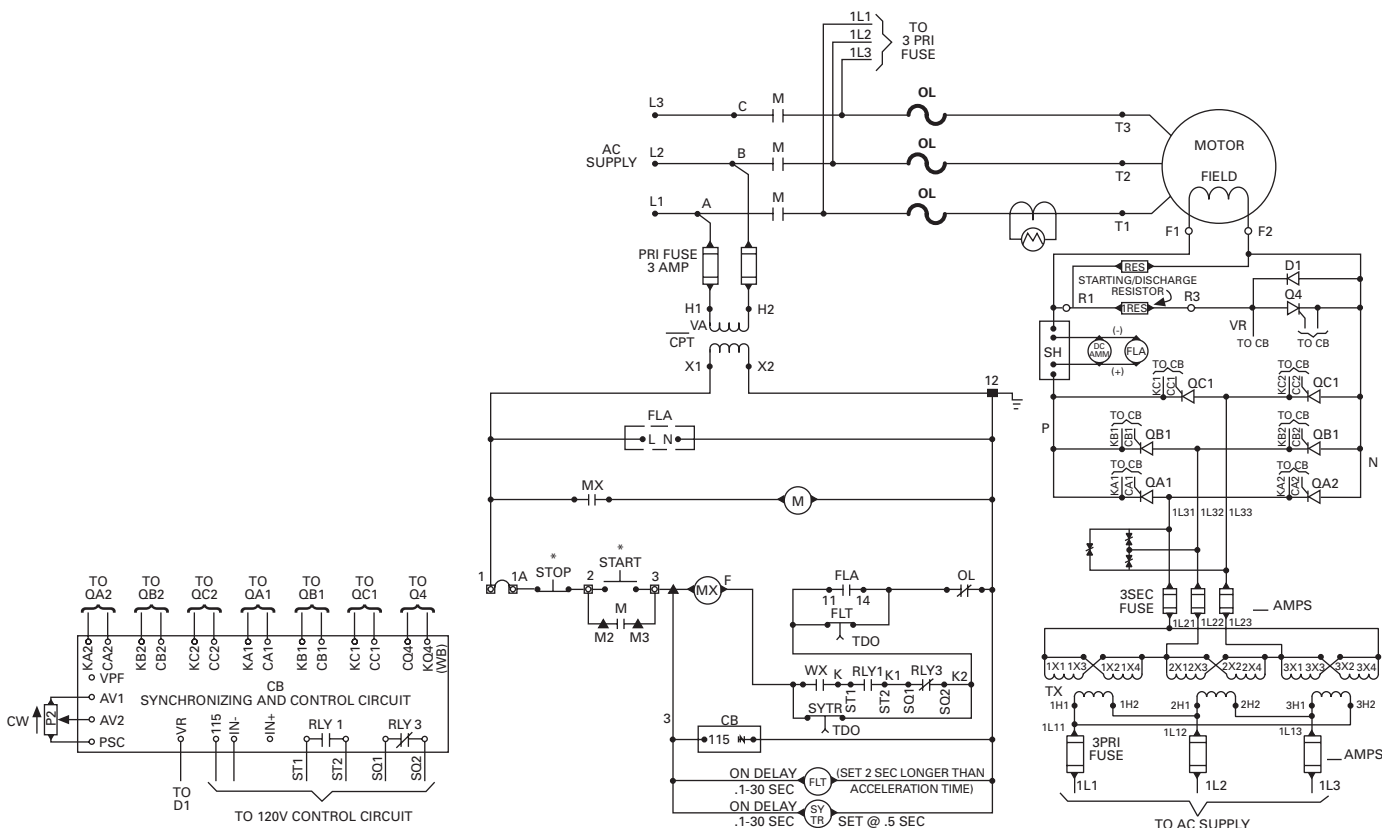
The cabinet will contain the following:

- 1 - Primary starter full voltage or reduced voltage
- 1 - Ammeter shunt (when required)



- 1 - Auxiliary relay for main line contactor (when required) (MX)
- 1 - Starting and field discharge resistor (IRES)
- 1 - Current transformer for AC ammeter through NEMA Size 4; Sizes 5 and larger use three current transformers for overload relays and AC ammeter
- 1 - Set control circuit terminal blocks
- 3 - Type AN manual reset thermal overload relay and three heater elements (OL)
- 1 - Step down exciter transformer - 3 phase (TX)
- 3 - Primary fuses (3 PRI)
- 3 - Secondary fuses (3 SEC)
- 1 - SCR power supply panel
- 1 - Synchronous control board (CB)
- 3 - MOV for surge protection (MOV)
- 1 - Starting and field discharge resistor (when size permits; otherwise provided for separate mounting)
- 1 - AC ammeter, panel type (AM)
- 1 - DC ammeter, panel type (DC AMM)
- 1 - Exciter field potentiometer (P2)
- 1 - Field failure relay (FLA)
- 1 - Incomplete SEQ Timer (FLT)
- 1 - Start Timer (SYTR)

Typical Schematic



Typical Schematic Full Voltage Starter, Class 14-200 Non-Combination Type

* Remote Device



SYNCHRONOUS MOTOR CONTROL

Brush Type Mark V Solid-State Slipsyn®

Class 14-200 Low-Voltage Motor Starters

GENERAL INFORMATION

Volts 3-Phase 60 Hz	Maximum HP		Size	Full-Voltage Starters Non-reversing Classes 14-200, 14-203, 14-204, 14-206 in NEMA 1 Enclosure								Reduced Voltage Adder for Auto-transformer Type – NEMA 1 Enclosure [ⓐ]	
	1.0 PF	0.8 PF		Without Short Circuit Protection [ⓑ]		With Non-Fusible Disconnect [ⓑ]		Disconnect Fusible or Fused [ⓐ]		With Molded Case Circuit Breaker		Catalog Number 14-60_	List Price
				Catalog Number 14-200	List Price	Catalog Number 14-203	List Price	Catalog Number 14-204	List Price	Catalog Number 14-206	List Price		
230	40	30	3	S3	\$16270	S3	\$17045	S3	\$17310	S3	\$17220	S3	\$ 4000
	60	50	4	S4	17220	S4	18275	S4	19040	S4	18960	S4	5800
	125	100	5	S5	20945	S5	22865	S5	23760	S5	24350	S5	7600
	250	200	6	S6	25800	S6	28560	S6	29840	S6	30020	S6	14490
	350	300	7	S7	34290	S7	38165	S7	38760	S7	46020	S7	21770
	500	400	8	S8	36110	S8	41720	S8	42330	S8	47330	S8	30600
460	30	25	2	S2	15895	S2	16507	S2	16660	S2	16770	S2	3200
	60	50	3	S3	16270	S3	17045	S3	17310	S3	17220	S3	4200
	125	100	4	S4	17220	S4	18275	S4	19040	S4	18960	S4	5940
	250	200	5	S5	20945	S5	22865	S5	23760	S5	24350	S5	8730
	500	400	6	S6	25800	S6	28560	S6	29840	S6	30020	S6	15230
	700	600	7	S7	34290	S7	38720	S7	38760	S7	46020	S7	23100

MODIFICATIONS

Modification	List Price Addition
Enclosures	
a. NEMA 1, with gasketed door	\$ 340
b. NEMA 12, dust-tight	2740
Space Heater (per enclosure)	140
Thermostat for space heater (per enclosure)	100
Voltmeter DC — Panel Type	480
Voltmeter DC — Switchboard Type	680
Ammeter DC — Switchboard Type (In lieu of Panel Type)	200
IQ1000 II with G.F. Current Transformer	3650
RTD Module for IQ1000 II	2000
IQ Data Plus II	3000
IQ Data	1150
Pilot Devices	
Pushbuttons	80
Selector Switches	100
Indicator Lights – Full Voltage	120
Indicator Lights – Push-to-Test	220
Automatic Power Factor/VAR/DC Field Current Regulations [ⓐ]	9780
For Vacuum or ADVANTAGE Type Contactors, contact your local Cutler-Hammer Field Sales Office.	

DIMENSIONS IN INCHES

Contact your local Cutler-Hammer Field Sales Office.

CUSTOMER REQUIRED INFORMATION

1. Complete motor data: HP, volts, amperes, rpm, phase, power factor, Hz, locked rotor amperes, full load DC amperes, excitation volts, recommended discharge resistor ohms, amperes, and time.
2. Application data (including any unusual service conditions) and 100% synchronous motor data MUST accompany each other.

PRICING INFORMATION

1. Enter order on AMP
2. Discount Symbol: SYNCH

ⓑ Interrupting capacity: 10 times motor full load current.
 ⓐ Fuses not included up to and including size 5. Sizes 6, 7, 8 include current limiting fuses with 100KAIC asymmetrical amperes interrupting capacity. A load break disconnect is supplied.
 ⓐ For reduced voltage auto-transformer starter — Add list price from column #1 or #2, or #3 or #4 to column #5 price — This total will be list price for reduced voltage autotransformer — synchronous starter. Also ordering catalog number becomes 14-60_ not 14-20_.
 ⓐ Power Factor Regulation — Note: Cannot provide regulation below 50% of rated voltage and/or 25% of rated current. Regulation cannot be accomplished on light loads, i.e., less than 20% load. Not for use with reciprocating compressors.

SYNCHRONOUS MOTOR CONTROL

Brushless Type Relaysyn[®] Class 14-100 Field Application Panel



PRODUCT DESCRIPTION

Relay Slipsyn Automatic Field Application Panel

This field application panel provides DC power to the exciter field and is designed for use in conjunction with a primary line closing device such as a contactor motor starter or a circuit breaker motor starter. A normally open electrical interlock on the primary device is used to actuate the field application control. This panel utilizes electromechanical devices to apply DC power to the motor exciter field circuit. Note that the power rectifiers for the motor field circuit and automatic synchronizer are mounted on the synchronous motor rotor.

Brushless Synchronous Control

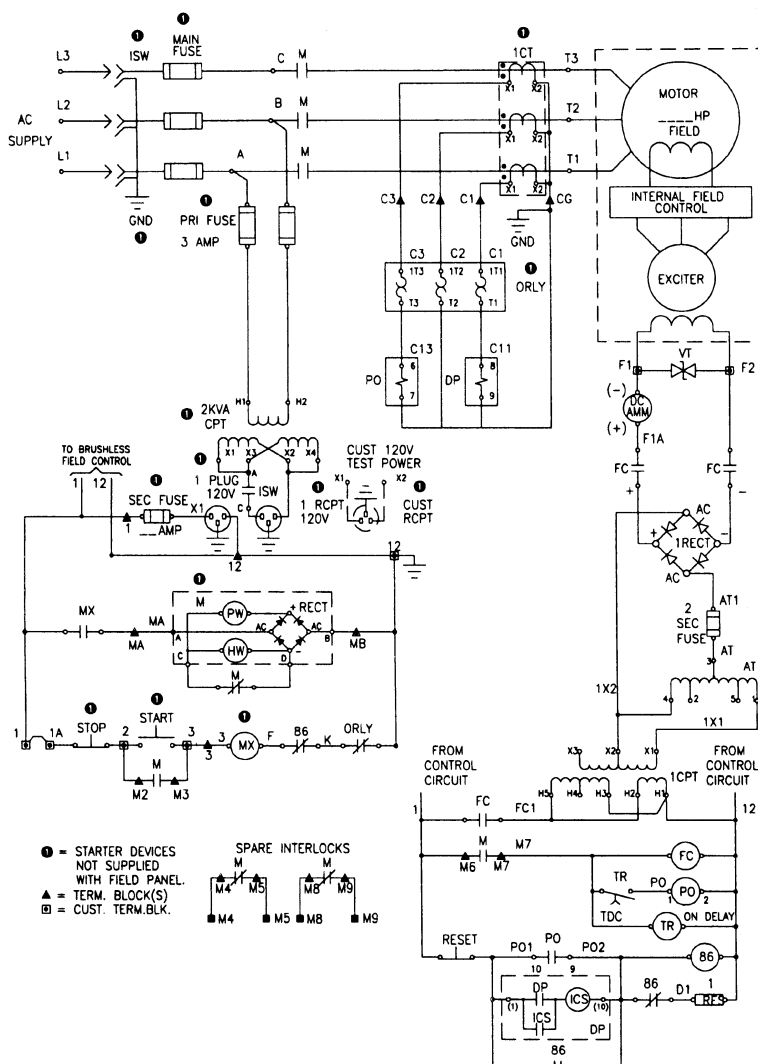
The controller can be supplied with or without enclosure. Panel mounted, or open cell are suitable for mounting within other larger enclosures.

The cabinet or open panel or open cell contains the following equipment:

- 1 – Sola transformer (1 CPT)
- 1 – Power factor relay (PO)
- 1 – Auto-transformer (AT) Powerstat
- 1 – Damper winding protection relay (DP)
- 1 – Field contactor (FC)
- 1 – Volt trap (VT)
- 1 – Rectifier (REC)
- 1 – Sequence relay (TR)
- 1 – Damper winding protection hold in relay (DPX) – if required
- 2 – Fuses (SEC FU), (2 SEC FU)
- 1 – DC ammeter – panel type



Typical Schematic



Typical Starter Schematic. Devices shown without ● constitute 14-100 panel.



SYNCHRONOUS MOTOR CONTROL

Brushless Type Relay Slipsyn®

Class 14-100 Field Application Panel

GENERAL INFORMATION

Modifications

Modification	List Price Addition
--------------	---------------------

Enclosures

a. NEMA 1, with gasketed door.....	\$ 340
b. NEMA 3, weather-resisting	2740
c. NEMA 12, dust-tight	2500

Omit Cabinet

Floor Mounted..... **Deduct 375**

Space Heater..... **140**

Thermostat for Space Heater..... **100**

Voltmeter DC — Panel Type..... **480**

Voltmeter DC — Switchboard Type..... **680**

Ammeter DC — Switchboard Type (In lieu of Panel Type)..... **200**

DC voltage failure protection — Shuts down motor if field voltage is lost while motor is running..... **740**

DC current failure protection with incomplete sequence — Shuts down motor if field current is interrupted..... **1020**

For additional modifications, refer to PL 8810.

List Price

Relay Slipsyn Field Panel NEMA 1 Enclosure — Floor Mounted

Max. Field Amperes DC	DC Field Volts	
	125	250
9	\$10465	\$11510
22	13450	14795

DIMENSIONS IN INCHES

Approximate Only

			Open Panel ^①		
			Height 24	Width 24	Depth 12
Open Cell			Floor Mounted — NEMA 1		
Height	Width	Depth	Height	Width	Depth
45	36	30	90	36	30

CUSTOMER REQUIRED INFORMATION

1. Complete motor data: HP, volts, amperes, rpm, phase, power factor, Hz, locked rotor amperes, full load DC amperes, excitation volts, maximum locked time at zero speed.
2. Application data (including any unusual service conditions) and 100% synchronous motor data **MUST** accompany each other.

REPLACEMENT CAPABILITIES — TYPICAL COMPONENTS



Rectifier



Damper Winding Protection Relay



Volt Trap



Pullout/Power Factor Relay



Powerstat

Typical components used in Relay Slipsyn Brushless Control — Refer to RPD 8855S for renewal parts for synchronous control.

PRICING INFORMATION

1. Enter order on AMP
2. Discount Symbol: SYNCH

M

① Damper winding protection relay and DC ammeter supplied loose and unmounted.

SYNCHRONOUS MOTOR CONTROL

Brushless Type Mark V Solid-State Slipsyn®

Class 14-100 Field Application Panel



PRODUCT DESCRIPTION

Slipsyn Automatic Field Application Panel with Static Exciter

Automatic Field Application Control

The field application panel provides Slipsyn automatic field application identical to that in complete synchronous motor starters. It is designed for use in conjunction with a primary line closing device such as a circuit breaker or a linestarter. Automatic synchronization is provided by the Mark V Solid-State Field Panel which assures application of the field at proper motor speed and at a favorable angular position of stator and rotor poles. As a result, line disturbance resulting from synchronization is reduced and effective motor pull-in torque is increased. Application of DC power to motor field windings is accomplished without mechanically moving parts, and the device features a "soft-turn-on" circuit when applying DC field voltage to the motor field.

This unit also comes standard with a VAR/PF/DC field current regulator. The VAR regulator controls the AC reactive current flow out of the motor during varying load

conditions by varying the motor field excitation. The PF regulator controls the motor power factor under varying load conditions by varying the motor field excitation. The DC field current regulator compensates for the motor field resistance as the motor field heats up by increasing the motor field voltage.❶

The solid-state Mark V Slipsyn controller will provide the following protective functions:

- A. Locked rotor protection
- B. Incomplete sequence
- C. Failure to synchronize
- D. Fuse failure (Mark V)
- E. Pull out protection
- F. DC current failure protection

This control is available in a NEMA 1 floor mounted enclosure or an AMPGARD type cell construction. In both designs, a hinged front door with externally ventilated heat sinks will be provided.

The cabinets will contain the following equipment:

- 1 – Step down exciter transformer – 3 phase (TX)
- 3 – Primary fuses (3 PRI)
- 3 – Secondary fuses (3 Sec)
- 1 – SCR power supply panel
- 1 – Synchronous control board (CB)
- 3 – MOV for surge protection (MOV)
- 1 – Starting and field discharge resistor (when size permits; otherwise provided for separate mounting)
- 1 – AC ammeter, panel type (AM)
- 1 – DC ammeter, panel type (DC AMM)
- 4 – Potentiometer (P2, P3, P4, P5)
- 1 – Field failure relay (FLA)
- 1 – Incomplete SEQ Timer (FLT)
- 1 – Start Timer (SYTR)
- 1 – MP 3000 w/o RTD module
- 1 – DP 4000
- 1 – VAR/PF/DC field current board (CB1)
- 1 – Auto/manual selector switch (SSI)
- 1 – Timer (AUTO)
- 1 – Pullout relay (PO)

GENERAL INFORMATION

Modifications

Modification	List Price Addition
Enclosures	
a. NEMA 1, with gasketed door	\$ 340
b. NEMA 3, weather-resisting	2740
c. NEMA 12, dust-tight.....	2500
Omit Enclosure	
Floor Mounted.....	Deduct 375
Space Heater	140
Thermostat for Space Heater	100
Voltmeter DC — Panel Type.....	480
Voltmeter DC — Switchboard Type.....	680
Ammeter DC — Switchboard Type (In lieu of Panel Type)	200

For additional modifications, refer to PL 8810.

List Price

Solid-State Slipsyn Field Panel With Static Exciter NEMA 1 Enclosure

Max. Field Amps DC	Primary Motor Volts, 3PH, 60 Hz			
	Low Voltage 230/460, 3PH, 60 Hz		Medium Voltage 2300/4160, 3PH, 60 Hz	
	DC Field Volts		DC Field Volts	
	125	250	125	250
22	\$34230	\$38410	\$37650	\$40670

DIMENSIONS IN INCHES

Approximate

Open Cell			Floor Mounted — NEMA 1		
Height	Width	Depth	Height	Width	Depth
45	36	30	90	36	30

CUSTOMER REQUIRED INFORMATION

- Complete motor data: HP, volts, amperes, rpm, phase, power factor, Hz, locked rotor amperes, full load DC amperes, excitation volts, maximum locked time at zero speed.
- Application data (including any unusual service conditions) and 100% synchronous motor data MUST accompany each other.

PRICING INFORMATION

- Enter order on AMP
- Discount Symbol: SYNCH

❶ Power Factor Regulation – Note: Cannot provide regulation below 50% of rated voltage and/or 25% of rated current. Regulation cannot be accomplished on light loads, i.e., less than 20% load.



SYNCHRONOUS MOTOR CONTROL

Relay and Solid-State Slipsyn® Control

CUSTOMER REQUIRED INFORMATION

Identifying Renewal Parts

Renewal parts data for the entire history of synchronous control is contained in RPD 8855S, which provides the proper identification of standard parts which may be required under normal operation:

1. Identify the design of synchronous control (Relay, Mark I, Mark II or Mark V Slipsyn) from the synchronous panel nameplate.

2. Now that you have identified the type of the synchronous control, determine from the photographs in RPD 8855S which parts are required and identify them by style number.
3. Since many starters are supplied to meet specific customer requirements, other parts not shown in 8855S might occasionally be needed. Price and availability of parts not listed may be

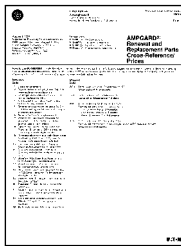
obtained by contacting Aftermarket Products Asheville, NC. Provide a complete description of the part, along with the complete data on the starter nameplate which is found in the low voltage area. Be sure to include the following: ratings, shop order and diagram reference.

FURTHER INFORMATION

Product	Date	Literature Number	Description
AMPGARD	Aug. 94	P/LSNI 8855	AMPGARD Renewal and Replacement Parts Cross Reference and Price List
Synchronous	Apr. 91	RPD 8855S	Renewal Parts Data for Slipsyn Synchronous Control
Product Literature	Oct. 89	DB 8850	Descriptive Bulletin for AMPGARD Starters
Relay Slipsyn	Oct. 85	IL 17097	Instruction Leaflet for Relay Slipsyn
Solid State Slipsyn	Nov. 97	IB 48008	Instruction Leaflet for Solid-State Slipsyn
Mark V	Nov. 97	IB 48009	Instruction Leaflet for Mark V VAR/PF/DC Field Current Regulator



Renewal Parts Data 8855S
Slipsyn — Synchronous
Field Control



Renewal Parts Cross Reference
Price List/Style Number
Index 8855

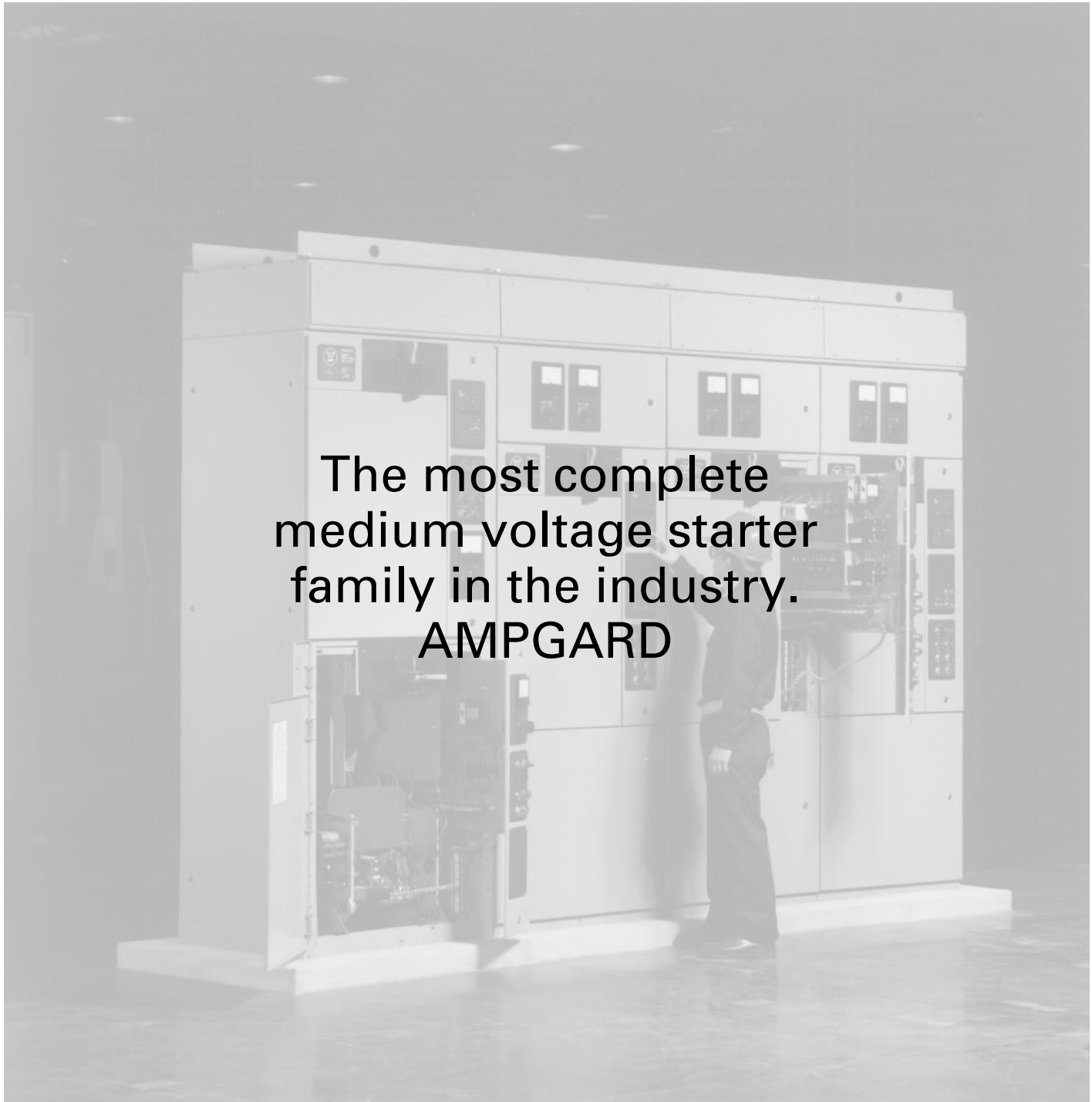
PRICING INFORMATION

Product	Date	Literature Number	Description
Synchronous	Mar. 93	PL 8810 VISTA/VISTALINE	Price List for Complete Synchronous AMPGARD Control Discount Symbol: SYNCH

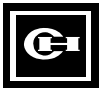
M



STARTERS (MEDIUM VOLTAGE)



The most complete
medium voltage starter
family in the industry.
AMPGARD



STARTERS (MEDIUM VOLTAGE) AMPGARD Assemblies, Retrofit Kits and Renewal Parts

PRODUCT DESCRIPTION



A medium voltage starter is an assembly used to control and protect an alternating current (AC) electric motor rated at 2300V, 4160V or 7200V. The controlling function is provided by a magnetically held contactor. The overload protection is provided by an overload relay of some type, and the short circuit protection is provided by a non-load break fused disconnect switch. 400A starters are typically mounted two high in a 90-inch high enclosure. 800A starters are mounted one high.

PRODUCT HISTORY

Originally a Westinghouse Product

The AMPGARD starter line originated in the early 1940s and has undergone two major design changes and one major evolution.

Prior to the introduction of the AMI, the AMPGARD was simply a fused motor starter in a cabinet with no disconnect switch. It was built in the early 1940s through the 1950s. There was no standard design.

The AMI AMPGARD (1950s through 1960s) was a standardized design. The AMI was one starter per structure de-

signed to cover all ratings and incorporated a disconnect switch (Iso-Switch) in the upper compartment and either an air or oil contactor in the bottom compartment.

In the mid 1960s, a full line of starters was introduced – tailored to the horsepower requirement of the motor and utilizing the LF air contactor. The starter incorporated the Iso-Switch and power fuses into the same cell as the air contactor. Starters were one, two or three high per structure, depending on rating required. The ratings of the LF AMPGARD were 200, 400 and 700A.

Cutler-Hammer manufactured MV Motor Control from 1966-1976. It was Bulletin 9950 Series, stacked two-high, with no specific trade name (such as AMPGARD).

In the 1980s with the advent of vacuum technology, the LF air contactor design was obsolete. The SJ vacuum contactor was matched with a fused isolation switch. Now two current ratings are offered – 400A, one or two high, and 800A, one high. Starters are sized per the motor horsepower and full load amperes.

PRODUCT HISTORY TIMELINE

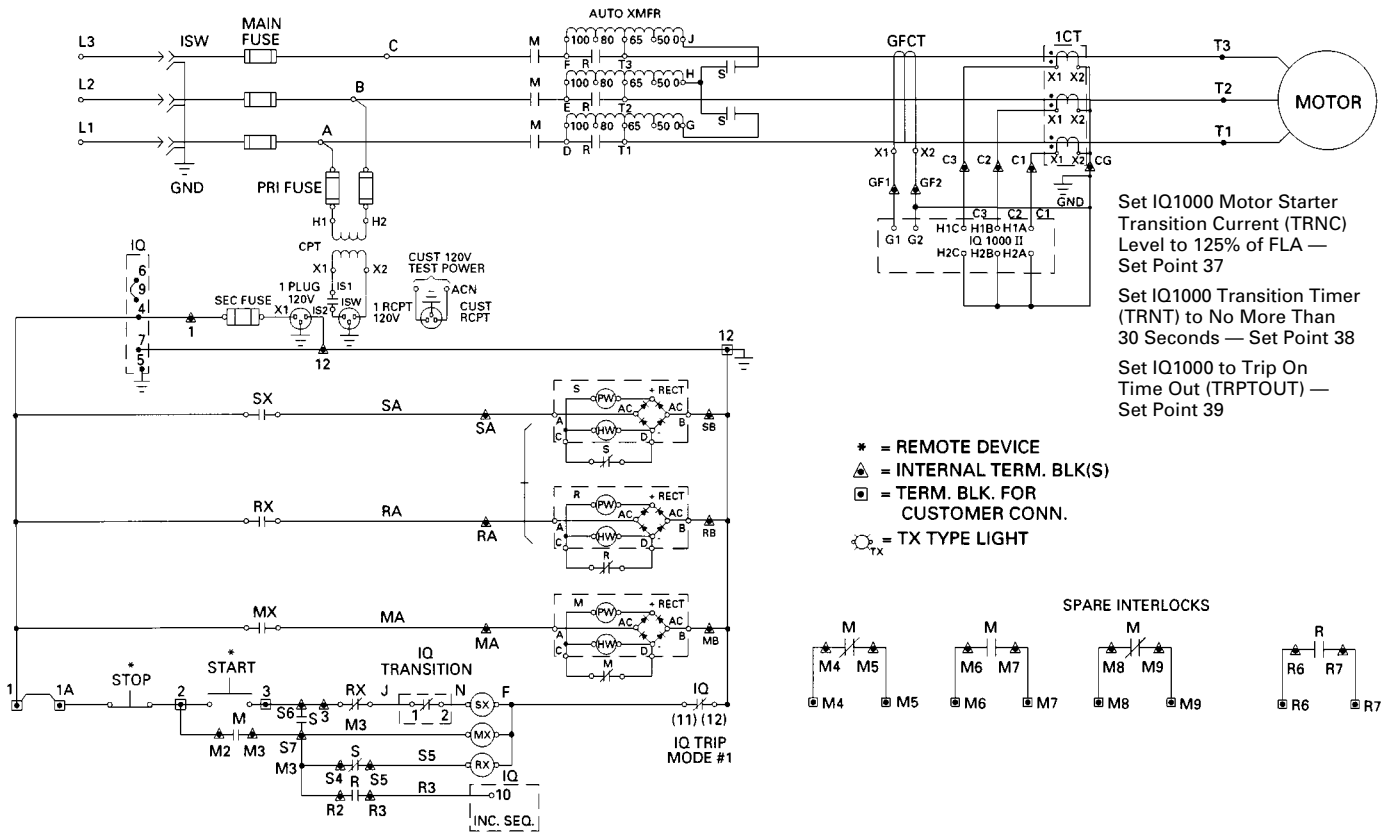
Page	Product	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	Present	
	AMPGARD Oil	[Timeline bar from 1945 to 1960]													
	AMPGARD AH	[Timeline bar from 1945 to 1960]													
202	AMI	[Timeline bar from 1955 to 1970]													
203	LF Air	[Timeline bar from 1960 to 1990]													
	- 25L2 200A	[Timeline bar from 1965 to 1980]													
	- 50L2 200A	[Timeline bar from 1965 to 1980]													
	- 25/50L4 400A	[Timeline bar from 1970 to 1995]													
	- 25/50L7 700A	[Timeline bar from 1970 to 1995]													
206	SJ Vacuum	[Timeline bar from 1980 to 2000]													
	- SJA 400A (roll out)	[Timeline bar from 1985 to 2000]													
	- SJA 800A (roll out)	[Timeline bar from 1990 to 2000]													
	- SJA 400A (slide out)	[Timeline bar from 1995 to 2000]													

NOTE: Manufacturing moved from Buffalo, NY to Asheville, NC in 1978.

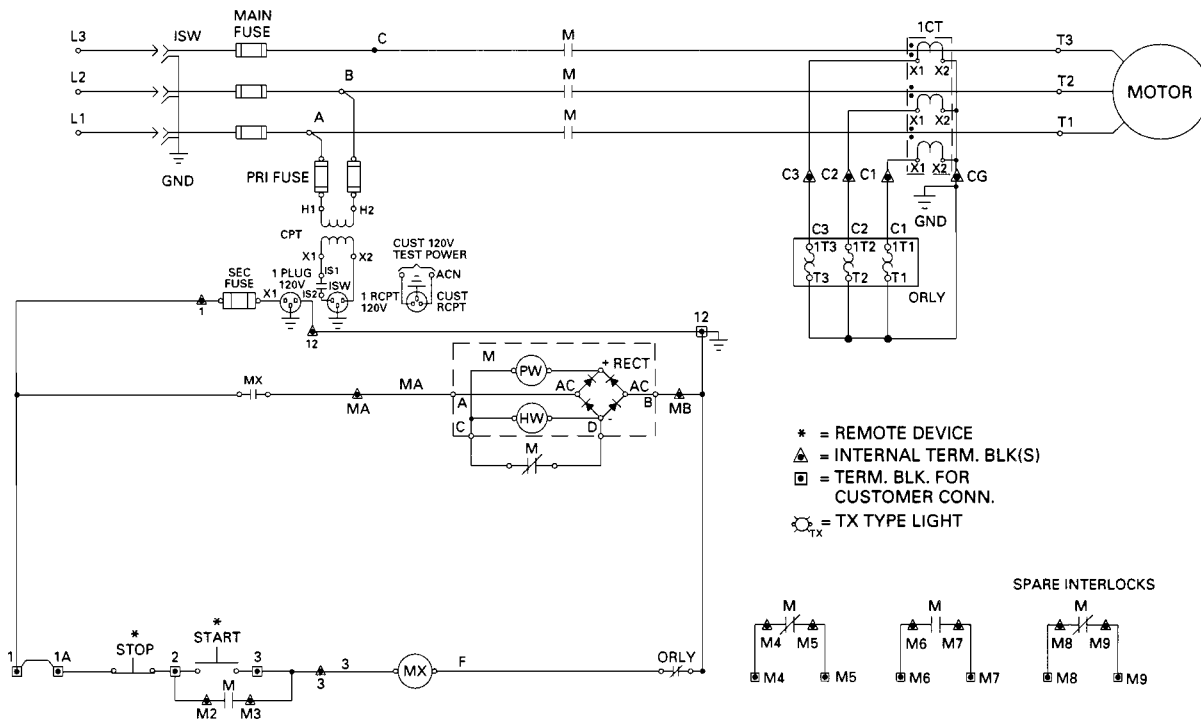


GENERAL INFORMATION

Typical Schematic Diagram Reduced Voltage Autotransformers with IQ 1000 II



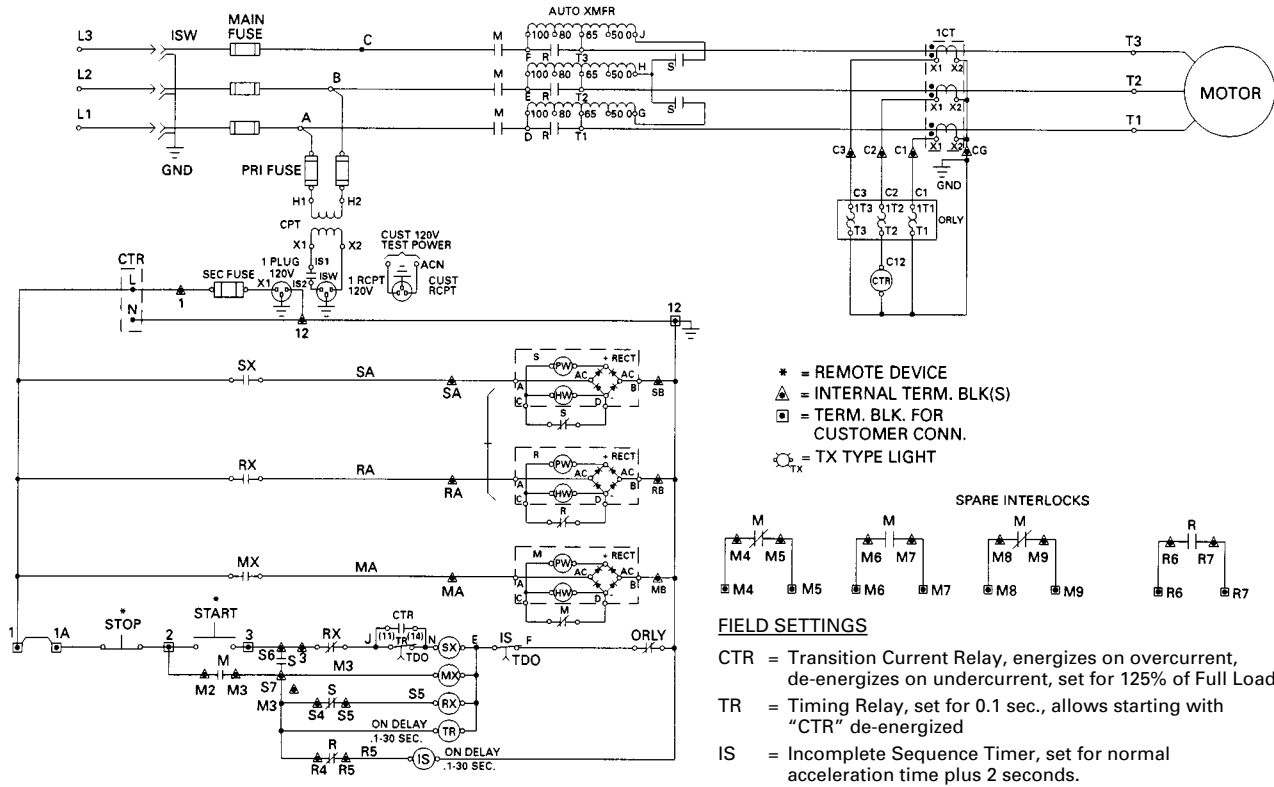
Typical Schematic Diagram FVNR (Type A Thermal Overload Relay)





GENERAL INFORMATION, *Continued*

Typical Schematic Diagram Reduced Voltage Autotransformer (Type A Thermal Overload Relay)





GENERAL INFORMATION, Continued

SJO 400A OEM Vacuum Break Contactors

All dimensions are in inches.
Weight – 70 lbs. approx.
Refer to SA-11244A for ratings.

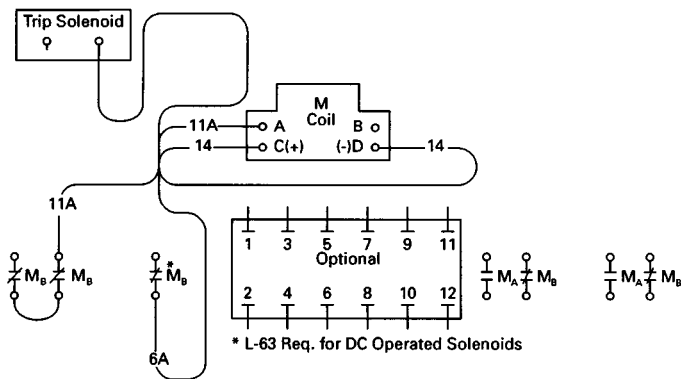
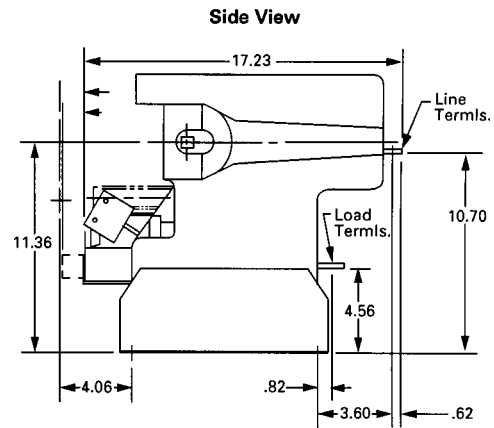
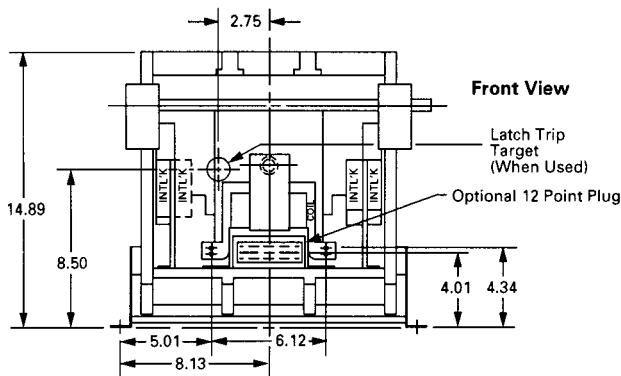
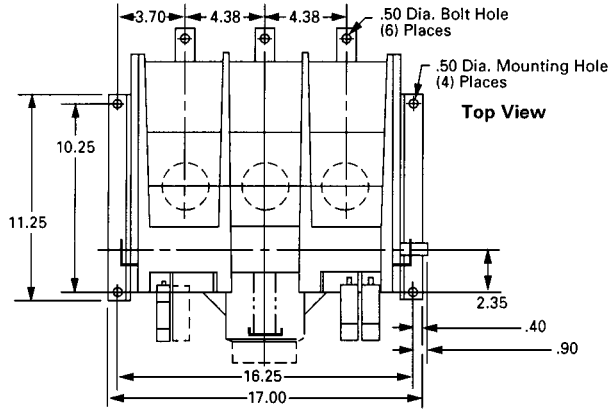


Fig. 1 – Wiring Diagram, Single DC Operated Solenoid (Latch)

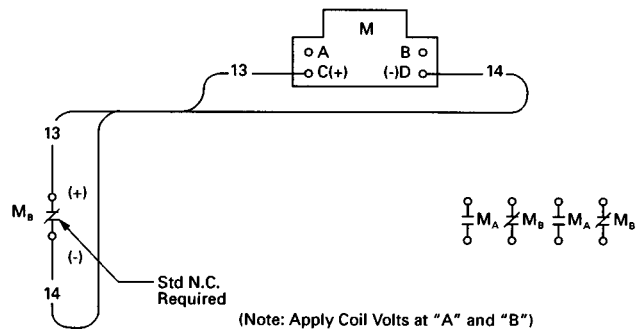
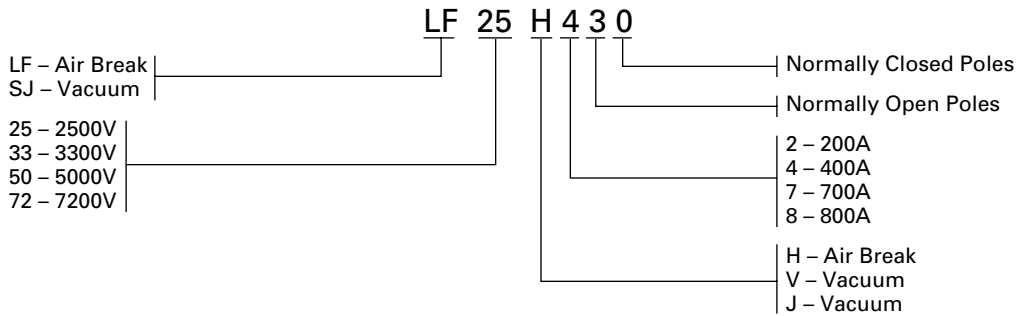


Fig. 2 – Wiring Diagram, Without Latch

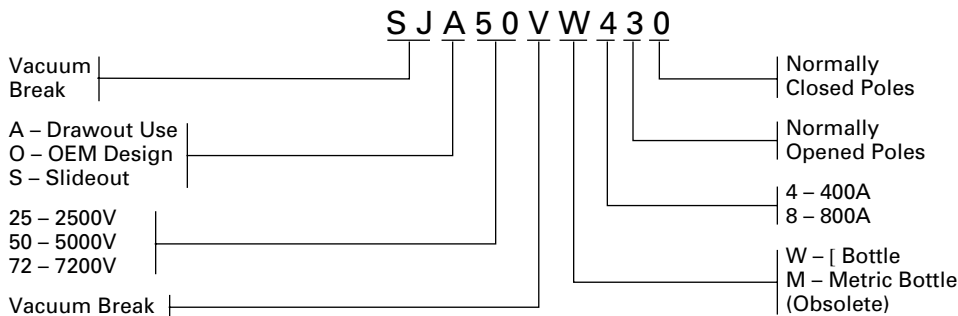


GENERAL INFORMATION, *Continued*

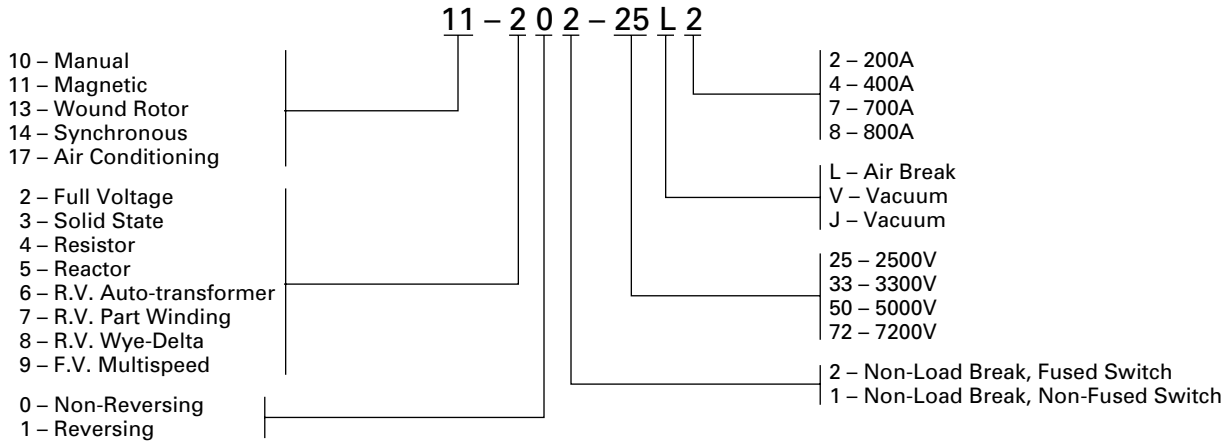
Old Catalog System – Contactors Only



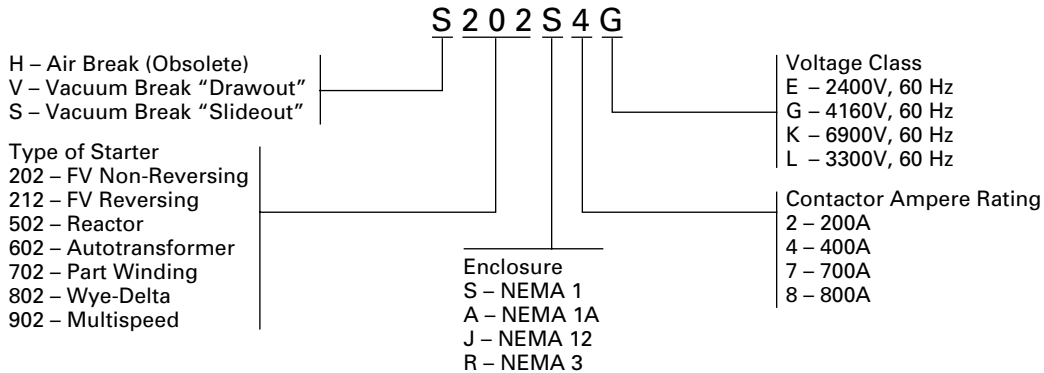
Current Catalog System – Contactors Only



Old Catalog System – Starters (with Isolating Switch, Power Fuses, Contactor, etc.)



Current Catalog System – Starters (with Isolating Switch, Power Fuses, Contactors, etc.)





TECHNOLOGY UPGRADES

AMPGARD Selection Table

Installed Equipment	Vintage	AMPGARD Aftermarket Products Available							Reference Material
		Add-on Structure ^①	Cell ^②	Isolation Switch ^③	Contactors ^④	Parts ^⑤	Vacuum Retrofits ^⑥	Tune-Up Service ^⑦	
AMPGARD OIL	1945 - 1957						●		RPD8855C
AMPGARD AH	1948 - 1957						●		RPD8855C
AMPGARD AMI	1957 - 1970						●		RPD8855C
AMPGARD 25L2	1962 - 1990		●	●	●	●		●	RPD8855A
AMPGARD 50L2	1963 - 1981					●	●	●	RPD8855A,C
AMPGARD 50V4	1972 -	●	●	●			●		RPD8855A,V,C
AMPGARD 25/50 L4	1966 - 1989	●	●		●	●	●	●	RPD8855A,C
AMPGARD 25/50 L7	1969 - 1989		●	●	●	●	●	●	RPD8855A,C
AMPGARD V202	1982	●	●	●	●	●		●	RPD8855C,V
AMPGARD S202	1987	●	●	●	●	●		●	RPD8855C,V
Non-W MV Starters	1950 -		●	●	●		●		RPD8855C
Synchronous Control	1950 -	●	●	●		●	●		CAT 26000, RPD8855S

NOTE: 8855V updated and expanded RP.48J.01.T.E, March 2000.



- ① Add-on structures, air or vacuum.
- ② Complete cell including frame, Iso switch, vacuum or air contactor, and all components to complete a starter.
- ③ Isolation switch only.
- ④ Complete contactor, air or vacuum, manufactured with all new parts and per original specs.
- ⑤ New, genuine parts per original specs. Recommended spare parts.
- ⑥ Vacuum retrofits – OIL, AH, AMI (typ. one high starters)

50L2	Complete cell retrofit
50V4, 25/50L7	Vacuum retrofit kit
25/50L4	Complete cell retrofit
Synchronous	Direct replacement vacuum contactor
Non-Westinghouse Starters	Mark V solid state control retrofit
	Complete cell retrofit
- ⑦ Asheville, NC contactor tune-up service for air and vacuum break contactors.

STARTERS (MEDIUM VOLTAGE)

AMI AMPGARD Assemblies, Retrofit Kits and Renewal Parts



PRODUCT DESCRIPTION

Originally a Westinghouse Product

The AMI design AMPGARD starter, introduced in 1957, was a complete line of starters for magnetic control of squirrel cage, wound rotor and synchronous motors. The AMI was the first front accessible starter and was available with air break (type H) or oil immersed (type K) contactors. The standard AMI for full voltage starting was 30 inches deep, 38 inches wide and 90 inches high. All components were accessible from the front through three doors opening into separate compartments. The top compartment enclosed the isolating switch and current limiting power fuses. The middle compartment enclosed the AC low voltage control panel, and behind it, the CTs. The bottom compartment housed the contactor.



As a note, the pre-AMI design was a rear access assembly with two compartments—current limiting fuses on the top and the contactor below.

Ratings (maximum)

400A
1500 HP @ 2500V; 2500 HP @ 5000V

Chronology

The AMI design AMPGARD was manufactured from 1957 until 1970 at the General Control Division in Buffalo, NY and Westinghouse Manufacturing and Repair (M&R) facilities around the country. The air contactor was available through 1966. The oil contactor was available through 1970.

REPLACEMENT CAPABILITIES

Synchronous Control Retrofit Using Mark V Solid-State Control

To include replacing existing relay type synchronous control with state-of-the-art Solid-State Mark V control. Refer to

pages 186-189, 192 of this publication for synchronous motor field control panels.

Add-on Structure

New add-on vacuum structures as an extension to the AMI type structure may

be connected directly to the main bus without a transition section using special bus links. Contact your local Cutler-Hammer Field Sales Office.

TECHNOLOGY UPGRADES

AMI Starter Retrofits

Standard AMI 36-inch Wide Vacuum Starter Retrofit Kit

This kit is used to include a standard full voltage non-reversing vacuum starter in a welded cell assembly with horizontal top barriers and deep flanged doors. It will retrofit the AMI designs that are at least 36 inches wide and 30 inches deep. The cell is 45 inches high.

Refer to RPD 8855C, for more details.

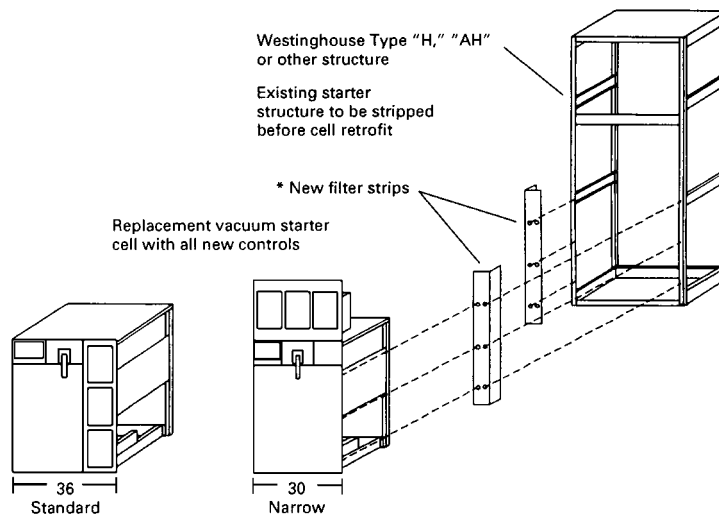
Style No. 2147A95G41

Narrow AMI 30-inch Wide Vacuum Starter Retrofit Kit

This kit is used to include a standard full voltage non-reversing vacuum starter in a welded cell assembly with horizontal top barriers and deep flanged doors. It will retrofit the AMI designs that are at least 30 inches wide and 30 inches deep. The cell is 58 inches high.

Refer to RPD 8855C, for more details.

Style No. 2147A95G42



IQ Retrofit Kits



IQ Surface Mounting for IQ Products

Includes drilling for (one) IQ device and (three) 30mm devices. Supplied with or without IQ and PB devices. Refer to RPD 8855C for more details.

IQ Floor Mounted Enclosure for Mounting IQ Products

Includes standard AMPGARD structure construction to be used as a line-up

extension. Each 10-inch wide, 90-inch high and 30-inch deep section comes with (two) doors, each with a works-in-a-drawer draw-out panel. Each door has (three) standard IQ cutouts with device panels. Supplied with or without IQ and PB devices. Refer to RPD 8855C for more details.



STARTERS (MEDIUM VOLTAGE)

LF Air AMPGARD Assemblies, Retrofit Kits and Renewal Parts

203

PRODUCT DESCRIPTION

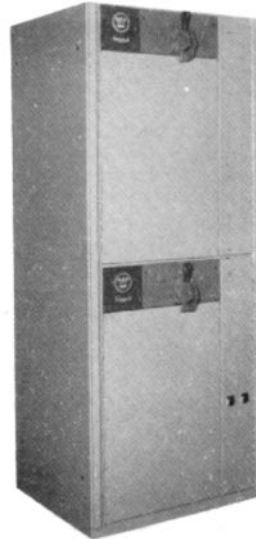
Originally a Westinghouse Product

The LF air-break design AMPGARD starter was introduced in 1962. The LF design introduced the component-to-component circuitry concept. This design greatly reduced the current-carrying connections and allowed significant space savings.

The 25L2 and 50L2 floor mounted NEMA 1 starters were 26 inches wide x 30 inches deep x 90 inches high. These 200 ampere starters could have been mounted two or three high per structure, respectively.

The 25L4 and 50L4 floor mounted NEMA 1 starters were 36 inches wide x 30 inches deep x 90 inches high. These 400 ampere starters could have been mounted two high per structure.

The 25L7 and 50L7 floor mounted NEMA 1 starters were 40 inches wide x 30 inches deep x 90 inches high. These 700 ampere starters were mounted one per vertical structure.



Low Resolution Photo

Ratings (Max.)

200A, 400A, 700A
2500 HP @ 2500V; 4500 HP @ 5000V

Chronology

The LF air-break design starter was introduced in the early 60s, first with the 2500V, 200 ampere starter, then with the 5000V design and the 400 and 700 ampere ratings. The starters were built in Buffalo, NY until the operation was transferred to Asheville, NC in 1978, where it was obsoleted in the late 1980s.

REPLACEMENT CAPABILITIES

Renewal and Replacement Parts for LF Design Starters

Refer to RPD 8855A for identifying the parts needed. Refer to Price/Style Number Index 8855 for prices by style number and old style number-to-new style number cross reference information.

Among the parts available are:

- Current and Potential Transformers
- Control Transformers
- Fuses
- O/L Heaters
- ADM Switches
- Enclosure Parts

Synchronous Control Retrofit Using Mark V Solid-State Control

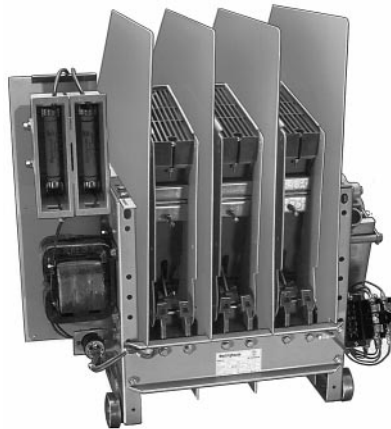
Replace existing relay type synchronous control with state-of-the-art Solid-State Mark V control. Refer to **pages 186-189, 192** of this publication for synchronous motor field control panels.

Add-on Vacuum Starter Structures

New add-on vacuum structures as an extension to the LF type starter assembly may be connected directly to the main bus without a transition section. Contact your local Cutler-Hammer Field Sales Office for more information.

Replacement Air Contactors

New replacement air break contactors are available for the following ratings: 25L2, 25L4, 50L4, 25L7, 50L7.



Replacement 50L4 Contactor

Factory Repair/Refurbishment of LF and SJ Contactors – Tune-up Service

Cutler-Hammer offers a factory repair and refurbishment service for Westinghouse AMPGARD type LF and SJ medium-voltage contactors. This is a factory service using the original manufacturing techniques, tooling, design and test specifications. All replacement components are genuine new Cutler-Hammer replacement parts. No refurbished, used or rebuilt parts are used. Contact your local Cutler-Hammer Field Sales Office for more information.

N

STARTERS (MEDIUM VOLTAGE)

LF Air AMPGARD Assemblies, Retrofit Kits and Renewal Parts

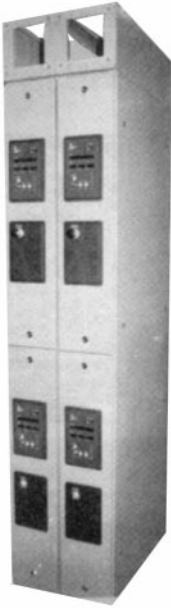


TECHNOLOGY UPGRADES, *Continued*

IQ Retrofit Kits

IQ Floor Mounted Enclosure

This kit is for mounting IQ family products. Includes standard AMPGARD structure construction to be used as a line-up extension. Each 90-inch high x 30-inch deep section comes with two doors, each with a works-in-a-drawer drawout panel. Each door has a maximum of three standard IQ cutouts with device panels. Supplied with or without IQ and PB devices. Refer to RPD 8855C for more details. (Photo below shows two auxiliary sections with optional bus enclosure, IQ and PB devices.)



Low Resolution Photo

IQ Surface Mount

For mounting IQ family products. Includes drilling for one IQ device and three 30mm devices. Supplied with or without IQ and PB devices. Refer to RPD 8855C for more details.



Low Resolution Photo

Slanted Enclosure for High Structure Mounting

IQ 1000 II and Data Plus II Retrofit Kit

(Refer to picture on **page 206**.) This kit includes parts necessary to retrofit IQ products into AMPGARD starters very easily. The IQ devices are included and are pre-wired to terminal blocks on the drawout panel.

Included: Typical starter schematics, 400A low-voltage door with three-device panels
Works-in-a-drawer panel with terminal blocks
IQ 1000 II (without RTD)
IQ Data Plus II (with MWH counter)

Style No. 2147A95G37

IQ 2000 Retrofit Kit

IQ 2000 Models A and B can be retrofitted depending on functions needed. IQ 1000 II is supplied for current protection. IQ 1000 II and Data Plus II are supplied for current and voltage protection. These kits include new low voltage control sections. Contact your local Cutler-Hammer Field Sales Office for more information.

Description	Style Number
Auxiliary section with cutouts only. 12-inch wide x 30-inch deep x 90-inch high (Does not include bus enclosure, IQ or PB devices)	2147A95G35

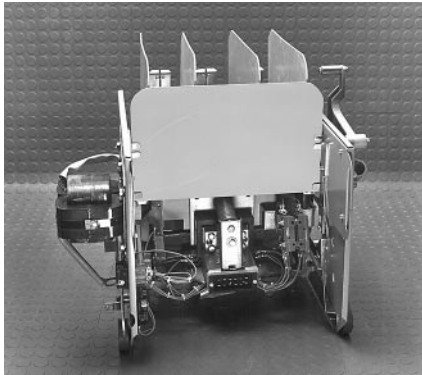


STARTERS (MEDIUM VOLTAGE)

LF Air AMPGARD Assemblies, Retrofit Kits and Renewal Parts

TECHNOLOGY UPGRADES, *Continued*

LF Starter Retrofit Kits

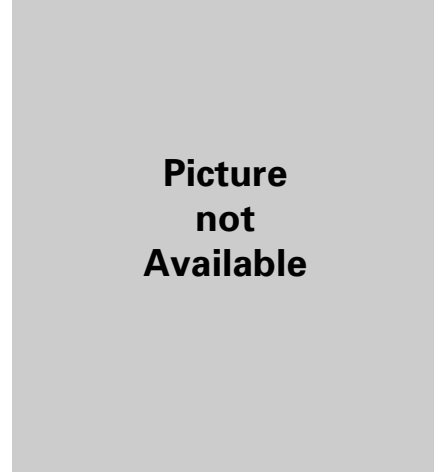


Front View



Drawout Design

Low Resolution Photo



Picture
not
Available

400A Air to Vacuum Contactor Retrofit Kit

This kit is for retrofitting an existing 400A LF air contactor with the directly interchangeable 400A SJA contactor.

Refer to RPD 8855V for further information.

Complete contactor 2300/120V, 750VA transformer.

Style No. 2147A45G01

Complete contactor 2300/120V, 2 kVA transformer.

Style No. 2147A45G02

Complete contactor 4160/120V, 600VA transformer.

Style No. 2147A45G03

Complete contactor 4160/120V, 2 kVA transformer.

Style No. 2147A45G04

400A Air to Vacuum Starter Retrofit Kit

Complete full voltage, non-reversing, induction, vacuum AMPGARD motor starter, 400A, 7200V max., for mounting in existing 36-inch wide enclosure. Includes main contactor, isolation switch, three power fuses, IQ 1000 II motor protection without RTD module, (3) current transformers, vertical bus, high and low voltage doors, and welded cell assembly for mounting in existing 36-inch wide enclosure.

Refer to RPD 8855C for more details.

Style No. 2147A95G01 (Slideout)

Style No. 2147A95G02 (Rollout)

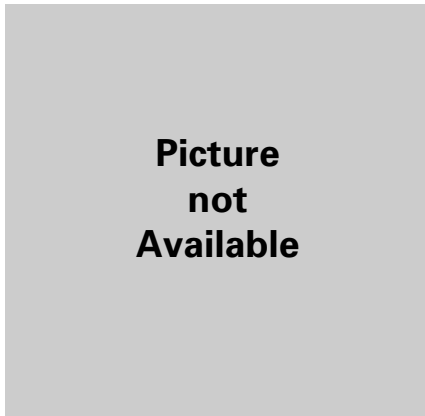
700A Air to Vacuum Conversion Kit

This kit will convert an existing full-voltage non-reversing 700A air break starter to vacuum rated, either 450A maximum full-load current or 720A maximum full-load current.

Refer to RPD 8855C for more details.

Style No. 2147A95G31 450-630A max.

Style No. 2147A95G32 720A max.



Picture
not
Available

50L2 Air-to-Vacuum Retrofit Kit

This kit replaces the out-of-production 5000 volt, 200 ampere air break contactor with an SJ vacuum contactor, for starters built after 1974 with Iso-Switch shutter mechanism mounted in the cell. The customer keeps the existing starter cell and isolation switch and modifies the cell to accept the SJ contactor which is mechanically interlocked with the isolation switch. The rating remains 200 ampere.

Refer to RPD 8855C for more details.

Style No. 2147A95G30 200A max.

Contact your local Cutler-Hammer Field Sales Office for 320 ampere design and pre-1974 50L2 retrofit kits.

N



PRODUCT DESCRIPTION

Originally a Westinghouse Product

The SJ Vacuum Contactor was designed and engineered specifically for use in AMPGARD starters. The contactor is a low-chop design that permits application matching of the starter to the motor for 2200V - 7200V and ratings of 400A and 800A. The 400A contactor is available in both slide-out and roll-out configurations. The 800A contactor is available in the roll-out design only. The SJ AMPGARD is a horsepower specific starter design that uses the component-to-component circuitry concept. The full-voltage 400A rating in a NEMA 1 enclosure is 36 inches wide x 30 inches deep x 90 inches high. These 400A starters are mounted one or two high per structure. The 800A rating in an enclosure is 40 inches wide x 30 inches

deep x 90 inches high in a one-high construction for a full voltage starter.

Ratings (max.)

400A, 800A
3000 HP @ 2500V; 5500 HP @ 5000V;
8000 HP @ 7200V

Chronology

The SJ vacuum design AMPGARD starter was introduced in 1982 with the 400A rating. The 800A rating followed in 1987. With the introduction of the vacuum contactor, the air break starter has been gradually phased out and is rarely specified in an assembly. The starters are built in Asheville, NC.



REPLACEMENT CAPABILITIES

Renewal and Replacement Parts for SJ Design Starters

Refer to RPD 8855V or RP.48J.01.T.E for identifying the parts needed. Refer to Price List/Style Number Index 8855 for prices by style number and old style number-to-new style number cross-reference information.

Synchronous Control Retrofit Using Mark V Solid-State Control

Replace existing relay type synchronous control with state-of-the-art solid-state Mark V control. Refer to **pages 186-189, 192** of this publication for synchronous motor field control panels.

Add-on Vacuum Starter Structures

New add-on vacuum structures as an extension to the SJ type structure may be connected directly to the main bus without a transition section. Contact your local Cutler-Hammer Field Sales Office.

Replacement Vacuum Contactors

New replacement vacuum break contactors are available for all SJ model ratings.

TECHNOLOGY UPGRADES

Vacuum Starter Retrofits

400A Vacuum Starter Retrofit Kit

Complete full-voltage, non-reversing, induction, vacuum AMPGARD motor starter, 400A, 7200V max., for mounting in existing 36-inch wide enclosure. Includes main contactor, isolation switch three power fuses, IQ 1000 II motor protection without RTD module, three current transformers, vertical bus, high- and low-voltage doors, and welded cell assembly for mounting in existing 36-inch wide customer enclosure. Refer to RPD 8855C for more details.

Style No. 2147A95G01 (Slideout)

Style No. 2147A95G02 (Rollout)

IQ Retrofit Kits

IQ 1000 II and Data Plus II Retrofit Kit

This kit includes parts necessary to retrofit IQ products into AMPGARD starters very easily. The IQ devices are included and are pre-wired to terminal blocks on the drawout panel.

Included: Typical starter schematics, 400A Low-voltage door with three device panels
Works-in-a-drawer panel with terminal blocks
IQ 1000 II (without RTD)
IQ Data Plus II (with MWH counter)

Style No. 2147A95G37

IQ Surface Mounted Enclosure

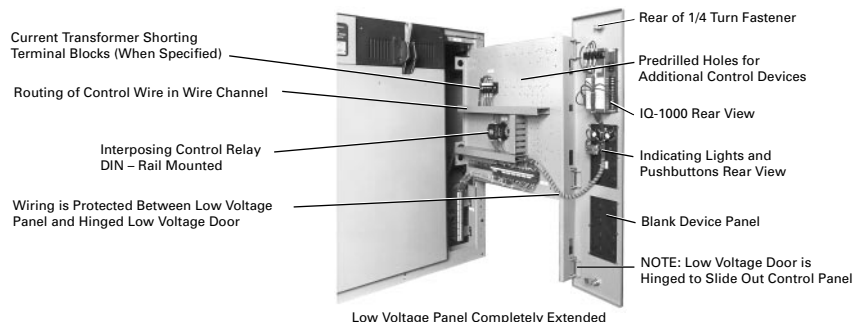
For mounting IQ family products. Includes drilling for one IQ device and three 30mm devices. Supplied with or without IQ and PB devices. Refer to RPD 8855C for more details.

IQ Floor Mounted Enclosure

For mounting IQ family products. Includes standard AMPGARD structure construction to be used as a line-up extension. Each 12-inch wide x 90-inch high x 30-inch deep section comes with two doors, each with a works-in-a-drawer drawout panel. Each door has three standard IQ cutouts with device panels. Supplied with or without IQ and PB devices. Refer to RPD 8855C for more details.



Low Resolution Photo



Low Voltage Panel Completely Extended
IQ 1000 II/Data Plus II Retrofit



CUSTOMER REQUIRED INFORMATION

Procedure for Identifying Renewal Parts

AMI

The AMI is an obsolete design with very few parts available. Retrofitting an AMI starter is possible with up-to-date AMPGARD components. Refer to **p3age 202** for your options or refer to the Asheville, NC Aftermarket Team for more information.

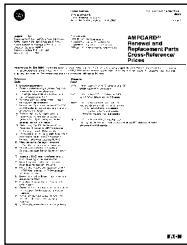
Limited parts are available as follows:

- 1) AMI Iso-Switch – transferred to Phoenix Elec., Boston, MA 617-821-0200 Type H and K contactors – some parts available through Homewood Electromechanical Parts and Products Center, Pittsburgh, PA 412-665-2700.

LF Air and SJ Vacuum

We have published AMPGARD renewal parts in the RPD 8855 series of books which provide the proper identification of standard parts which may be required. All of the complete contactors, isolation switches and subassemblies that are available are shown photographically in kit form. All of the parts shown in the kits are compatible with the design from 1962 to the present (or noted otherwise). The method of identifying parts is simple. Using the guidelines in the correct RPD 8855 book, identify the style of the complete contactor and determine from the photographs in the RPD which parts are required and identify them by style number.

Since many starters are supplied to meet specific customer requirements, other parts not shown in the RPD might occasionally be needed. Price and availability of parts not listed may be obtained by contacting the Asheville, NC Aftermarket Team. Provide a complete description of the part, along with the complete data on the starter nameplate which is found in the low-voltage area. Be sure to include ratings, shop order and diagram reference.



Renewal Parts Cross Reference Price List/Style Number Index 8855



Renewal Parts Data 8855A AMPGARD, Air Break 200, 400, 700A



Renewal Parts Data 8855C AMPGARD, Electrical Components



Renewal Parts Data 8855V AMPGARD, Vacuum Break 400, 800A



Renewal Parts Data 8855S Slipsyn – Synchronous Field Control

FURTHER INFORMATION

Product	Date	Literature Number	Description
AMPGARD	Aug. 94	PL/SNI8855	AMPGARD Renewal and Replacement Parts Cross Reference and Price List
	Sept. 88	RPD8855A	Renewal/Replacement Parts for Air Break 200, 400, 700A
	Aug. 94	RPD8855V	Renewal/Replacement Parts for Vacuum Break 400, 800A
	Mar. 00	RP.48J.01.T.E	Renewal/Replacement Parts for Vacuum Break 400, 800A
	Aug. 94	RPD8855C	AMPGARD Starter Retrofit Kits, IQ Retrofit Kits
	Apr. 91	RPD8855S	Renewal Parts Data Slipsyn Synchronous Control
General Information	Oct. 89	DB8850 SA-11841 SA-LEL012 SA-LEL013	Descriptive Bulletin for AMPGARD Starters Sales Aid AMPGARD Contactors – Air to Vacuum Retrofit Sales Aid Tune-up Service – LF Contactor Sales Aid Tune-up Service – SJ Contactor

PRICING INFORMATION

Product	Date	Literature Number	Description
AMPGARD Parts	Aug. 94	PL/SNI8855	AMPGARD Renewal and Replacement Parts Cross Reference and Price List
AMPGARD Assemblies		PL8810	Price List for AMPGARD Assemblies
AMPGARD Parts		VISTA/VISTALINE	Discount Symbol AMP-RP
AMPGARD Assemblies		VISTA/VISTALINE	Discount Symbol AMP

● In revision; to be available 1997.



PRODUCT DESCRIPTION



F2100

Nearly fifty years ago, Cutler-Hammer and Westinghouse introduced the low voltage Motor Control Center (MCC) assembly, enabling the group mounting of low voltage (600V class) electrical controls. This allowed for supervision and safe operation of motor starter units, feeder tap units and auxiliary equipment in a flexible structure arrangement at a centralized location.

The foundation for today's MCCs is a modular plug-in combination motor controller assembly with components of proven electrical and mechanical integrity. These assemblies are enclosed in metal structures which prevent accidental contact with live electrical parts.

The MCC structure consists of structural steel, horizontal and vertical wireways for conduit and load cable entry and exit and vertical and horizontal bus systems for distributing power throughout the MCC. The starter unit consists of a rugged steel shell (wrapper) for mounting the unit components, a combination motor starter with factory wired control, a handle mechanism for on/off operation and a rigid unit door.

PRODUCT HISTORY

Group mounted motor control was originally developed by Westinghouse in 1937. What came to be known as motor control centers were built in 14 manufacturing and repair shops around the country, including a plant in Chicago, IL which opened in 1941. In 1963, Chicago became the primary MCC manufacturing plant. The Fayetteville, NC operation was opened in 1980 to relieve some of Chicago's volume. The Fayetteville plant was expanded in 1984 and the Chicago operation was closed. Motor control centers are currently manufactured in Fayetteville and in eight service centers around the country.

The Westinghouse plug-in starter design for group mounted control (called motor control centers) was first introduced in 1937, and in 1950 became known as the Type 11-300 motor control center and utilized the 11-200 motor starter. The Type W MCC replaced the 11-300 in 1965, first using the 11-200 starter and then moving to the A200 starter. The 5 Star was introduced in

1975 to replace the Type W. It, too, used the A200 motor starter. The Series 2100 updated the 5 Star design in 1987, but is mechanically compatible with the 5 Star. The ADVANTAGE MCC was introduced as a sister product to the Series 2100 in 1991 with the introduction of the ADVANTAGE starter. It was also mechanically compatible with the 5 Star. With the merger of Cutler-Hammer and Westinghouse Electric Distribution and Control Business Unit in 1994, a new hybrid motor control center line was introduced. It was called the F2100 MCC and featured the Freedom starter.

The Cutler-Hammer plug-in starter design motor control center was introduced in the late 1950s as the 9800 Series Unitrol. These motor control centers used the 3-Star type motor starter. In 1968, the Citation line of starters replaced the 3-Star type in the 9800 MCC. The motor control center was totally redesigned around the Citation starter in 1972 and was called the

F10 Unitrol. The next generation of MCC was introduced in 1989, using the Freedom line of starters, called the Freedom Unitrol. Freedom Unitrol was discontinued in 1994 and replaced with the Cutler-Hammer F2100 motor control center.

Cutler-Hammer motor control centers were originally built in Milwaukee, WI. In 1962, manufacturing moved out of Milwaukee to plants in Atlanta, GA, Bethlehem, PA, Chicago, IL, Los Angeles, CA, Dallas, TX, San Francisco, CA, and Cleveland, TN. In 1972, these plants consolidated to Atlanta, Bethlehem, Chicago, Dallas, and Los Angeles. In 1984, another consolidation left manufacturing in only Atlanta and Los Angeles. With the introduction of the Freedom starter in 1989, all manufacturing was moved to Atlanta. After the merger all motor control center manufacturing moved to the Fayetteville, NC location.

PRODUCT HISTORY TIMELINE

Page	Product	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	Present
210	Westinghouse 11-300		█	█	█	█							
211	Cutler-Hammer 9800				█	█	█	█					
212	Westinghouse Type W					█	█	█					
213	Cutler-Hammer F10							█	█	█	█		
215	Westinghouse 5 Star								█	█	█		
214	Cutler-Hammer Freedom Unitrol											█	█
215	Westinghouse Series 2100											█	█
216	Westinghouse ADVANTAGE												█
217	Cutler-Hammer F2100												█



GENERAL INFORMATION

Procedure for Identifying Motor Control Center Types

In the event that the nameplate is missing, it is possible to identify the MCC design by the type of handle mechanism, starter type, bucket width, and door width.

MCC Type	Type of Handle Mechanism	Starter Type	Bucket Width (Inches)	Door Width (Inches)	Page Number
11-300	Rotary	11-200 Life Line Type N	15-3/4	20	210
9800	Rotary	3 Star	16-1/8	19-3/8	211
Type W	Slider	A200 or 11-200	11-3/4	13-3/8	212
F10	Slider	Citation	14	14-3/4 w/Wireway 19-1/2 w/o Wireway	213
Freedom Unitrol	Slider	Freedom Series	13-7/8	15-1/2	214
5 Star/Series 2100	Lever	A200	13-3/4	15-5/8	215
ADVANTAGE	Lever	ADVANTAGE	13-3/4	15-5/8	216
F2100	Lever	Freedom Series	13-3/4	15-5/8	217



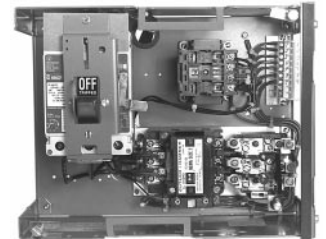
11-300



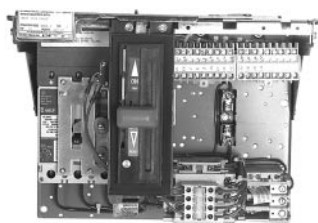
9800



Type W



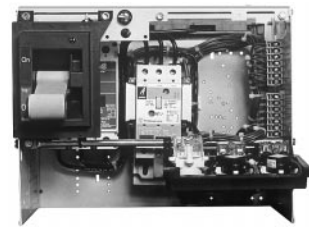
F10



Freedom Unitrol



5 Star/Series 2100



ADVANTAGE



F2100



PRODUCT DESCRIPTION

Originally a Westinghouse Product

Introduced in 1937, Westinghouse manufactured the 11-300 MCC through 1965 and it was available as match and line-up until 1974. It used standard structures each 20 inches wide, 90-3/8 inches high and either 20-1/4 inches or 12 inches deep for front mounted and 20-1/4 inches for back-to-back mounting. Vertical sections could be bolted together to form a single line-up with continuous horizontal bus and open horizontal wireways.

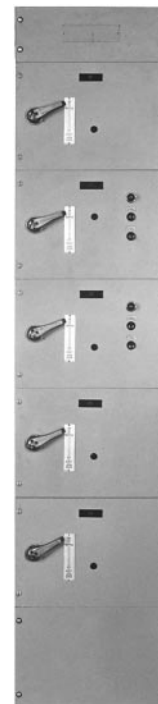
Unit height was measured in either 9-1/3-inch or 14-inch increments up to a maximum of 70 inches of usable vertical space. ANSI 61 light gray enamel was used on all structural parts. The unit door hinged on the right and covered the entire width of the structure.

The 11-300 starter unit was most easily recognized by the slide plate type of handle mechanism. Bus and support systems were typically braced to withstand fault currents of 25,000A.

Maximum Ratings:
3-phase, 600V, 600 HP, 2500A bus



Unit with A200 Starter



REPLACEMENT CAPABILITIES

Replacement Starter Units

Replacement starter cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan, and all necessary mounting hardware. Features of the replacement unit include:

- Size 1-5 starter units
- UL labeled
- Series C disconnect device
- A200 or ADVANTAGE starter
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



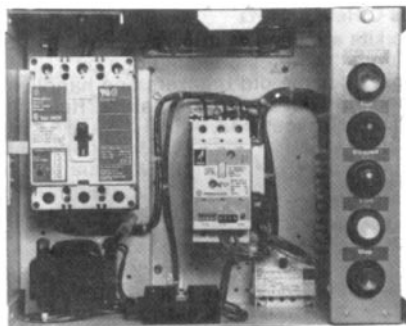
Don't forget the option to upgrade to ADVANTAGE.

- Solid-state
- Communication capability
- Reduced coil wear
- No heater
- Smaller size
- Built-in over-current and ground fault protection

Replacement Feeder Units

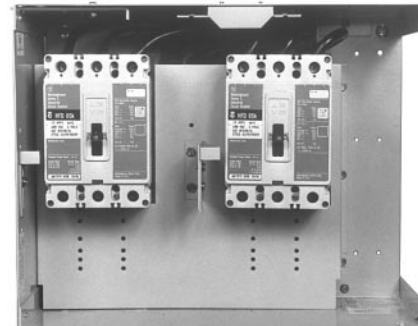
Replacement feeder cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

- Feeder breakers and fusible switches through 400A
- UL labeled
- Series C disconnect device
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



Unit with ADVANTAGE Starter

Low Resolution Photo



11-300 Dual Feeder



PRODUCT DESCRIPTION

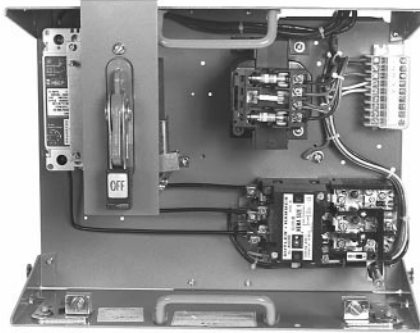
Originally a Cutler-Hammer Product

Introduced in 1956, the 9800 was Cutler-Hammer's initial offering in the motor control center product grouping. The door of the unit measured 19-3/8 inches wide and the bucket width measured 16-1/8 inches. Unit height was measured in 9-1/3-inch and 14-inch increments. The MCC did not utilize a wireway.

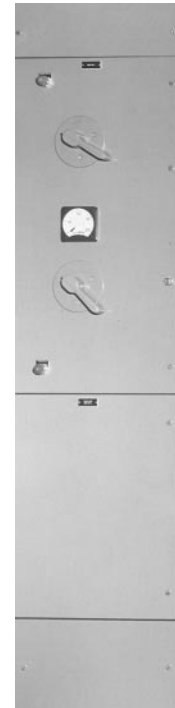
ANSI 49 was applied to the units, structural framework, roof, sidesheets, and all exterior doors.

9800 starter units were originally supplied with a 3-Star starter and a rotary handle mechanism. Replacements today utilize the newer Citation starter and a slider handle mechanism and new door. The rotary handle mechanism is no longer available. Bus and bus systems were typically braced to withstand fault currents of 25,000A.

Maximum Ratings:
3-phase, 600V, 100 HP, 2500A bus



Unit with Citation Starter



REPLACEMENT CAPABILITIES

Replacement Starter Units

Replacement starter cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan, and all necessary mounting hardware. Features of the replacement unit include:

- Size 1-4 starter units
- UL labeled
- Series C disconnect device
- Citation, Freedom or ADVANTAGE starter
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



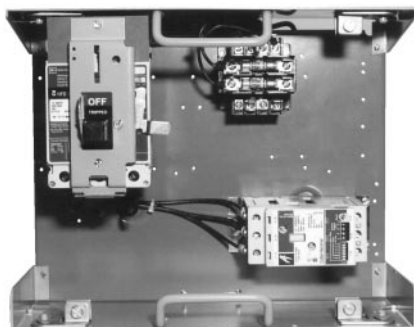
Don't forget the option to upgrade to ADVANTAGE.

- Solid-state
- Communication capability
- Reduced coil wear
- No heater
- Smaller size
- Built-in over-current and ground fault protection

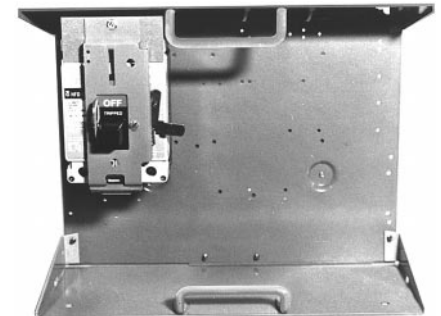
Replacement Feeder Units

Replacement feeder cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

- Feeder breakers and fusible switches through 400A
- UL labeled
- Series C disconnect device
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



Unit with ADVANTAGE Starter



9800 Feeder Unit



PRODUCT DESCRIPTION

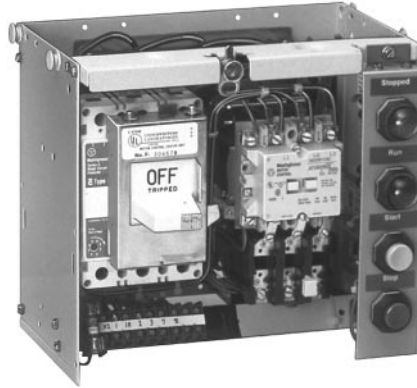
Originally a Westinghouse Product

Manufactured from 1965 to 1975, this Westinghouse MCC used standard structures each 19 inches wide, 90 inches high, and either 15 inches or 20 inches deep for front mounted or 20 inches deep for back-to-back mounting. Vertical sections were bolted together forming a single line-up with continuous horizontal bus. Unit height is measured in 6-inch increments up to a maximum of 72 inches of usable vertical space. Starter units are 13-1/2 inches wide.

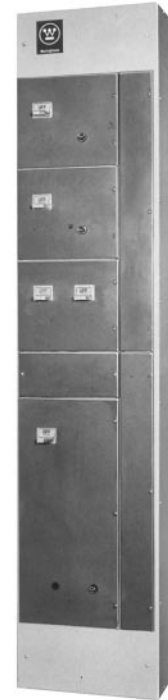
A two-tone light/dark enamel paint system was used with an ANSI 70 light gray applied to the structural framework and cover plates. A dark gray was used for unit and wireway doors.

The Type W starter units are easily recognized by their sliding handle mechanism, the MC Motor Control type. Bus and bus support systems were typically braced to withstand fault currents of 22,000A.

Maximum Ratings:
3-phase, 600V, 400 HP, 2500A bus



Unit with A200 Starter



REPLACEMENT CAPABILITIES

Replacement Starter Units

Replacement starter cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan, and all necessary mounting hardware. Features of the replacement unit include:

- Size 1-5 starter units
- UL labeled
- Series C disconnect device
- A200 or ADVANTAGE starter
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



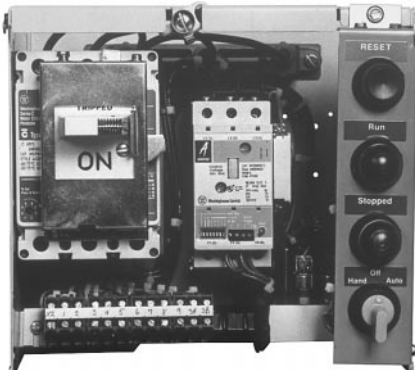
Don't forget the option to upgrade to ADVANTAGE.

- Solid-state
- Communication capability
- Reduced coil wear
- No heater
- Smaller size
- Built-in over-current and ground fault protection

Replacement Feeder Units

Replacement feeder cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

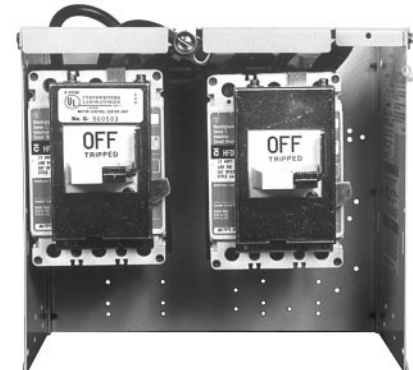
- Feeder breakers and fusible switches through 400A
- UL labeled
- Series C disconnect device
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



Unit with ADVANTAGE Starter

Add-on MCCs

New F2100 or ADVANTAGE MCCs can be added to existing line-up through a transition section.



Type W Dual Feeder



PRODUCT DESCRIPTION

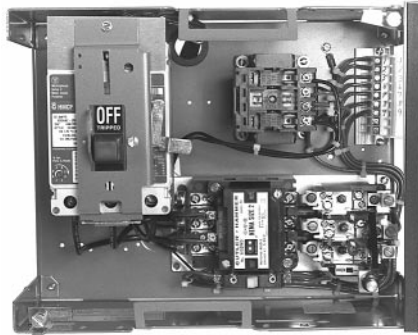
Originally a Cutler-Hammer Product

Introduced in 1972, this Cutler-Hammer MCC was available in both 16 inches wide (with wireway) and 20 inches wide (without wireway). Bucket width is 14 inches and replacement units are available with both designs. Unit height is measured in 6-inch increments.

ANSI 40 was applied to the units, structural framework, roof, sidesheets and all exterior doors.

The F10 MCC utilized the Citation starter and was identified by the slider type handle mechanism. Bus and bus support systems were typically braced to withstand fault currents of 42,000A.

Maximum Ratings:
3-phase, 600V, 150 HP, 2000A bus



Unit with Citation Starter



REPLACEMENT CAPABILITIES

Replacement Starter Units

Replacement starter cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

- Size 1-5 starter units
- UL labeled
- Series C disconnect device
- Citation, Freedom or ADVANTAGE starter
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



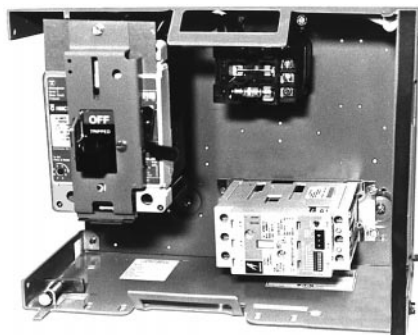
Don't forget the option to upgrade to ADVANTAGE.

- Solid-state
- Communication capability
- Reduced coil wear
- No heater
- Smaller size
- Built-in over-current and ground fault protection

Replacement Feeder Units

Replacement feeder cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

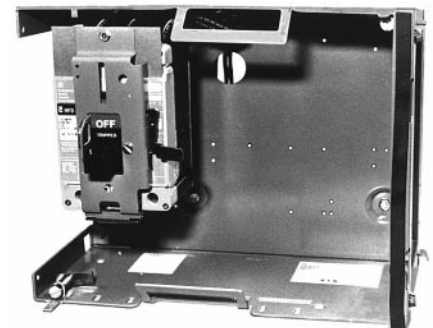
- Feeder breakers and fusible switches through 400A
- UL labeled
- Series C disconnect device
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



Unit with ADVANTAGE Starter

Add-on MCCs

New F2100 or ADVANTAGE MCCs can be added to existing line-up through a bus splice kit.



F10 Feeder Unit



PRODUCT DESCRIPTION

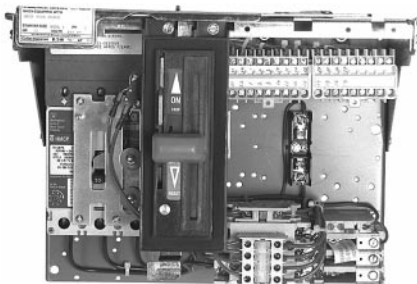
Originally a Cutler-Hammer Product

Introduced in 1989, this Cutler-Hammer MCC had vertical structures that measured 20 inches wide, 91-1/2 inches high and either 15 inches or 20 inches deep. It allowed a 6-inch size 1 unit design.

ANSI 49 was applied to the units, structural framework, roof, sidesheets and all exterior doors.

The Freedom Unitrol utilized the Freedom starter and was identified by the slider type handle mechanism. Bus and bus support systems were typically braced to withstand fault currents of 42,000A with the option to increase to 65,000A.

Maximum Ratings:
3-phase, 600V, 400 HP, 2500A bus



Unit with Freedom Starter



REPLACEMENT CAPABILITIES

Replacement Starter Units

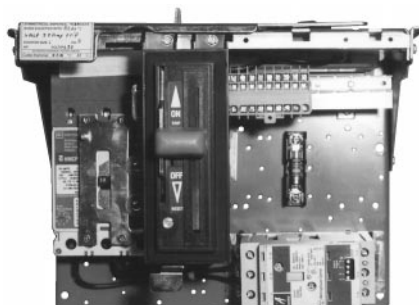
Replacement starter cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

- Size 1-5 starter units
- UL labeled
- Series C disconnect device
- Freedom or ADVANTAGE starter
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



Don't forget the option to upgrade to ADVANTAGE.

- Solid-state
- Communication capability
- Reduced coil wear
- No heater
- Smaller size
- Built-in over-current and ground fault protection



Unit with ADVANTAGE Starter

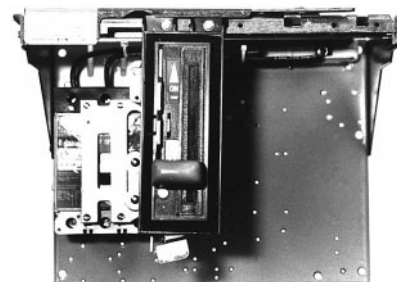
Add-on MCCs

New F2100 or ADVANTAGE MCCs can be added to existing line-up through a bus splice kit.

Replacement Feeder Units

Replacement feeder cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

- Feeder breakers and fusible switches through 400A
- UL labeled
- Series C disconnect device
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



Freedom Unitrol Feeder Unit



PRODUCT DESCRIPTION

Originally a Westinghouse Product

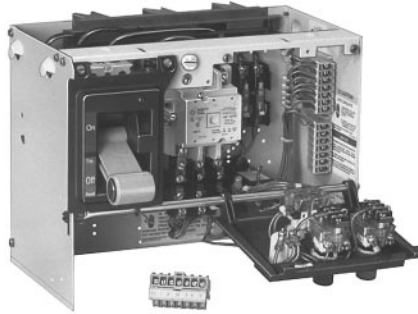
The 5 Star MCC was introduced by Westinghouse in 1975. The structure design was the basis for the Series 2100, ADVANTAGE and F2100 products later. The Series 2100 updated the 5 Star design in 1987 with higher ratings and newer components.

The vertical structures are normally 20 inches wide, 90 inches high, and 16 inches or 21 inches deep. Vertical sections may be bolted together forming a single line-up with continuous horizontal bus and open horizontal wireways. Unit height is measured in 6-inch increments up to a maximum of 72 inches of usable vertical space.

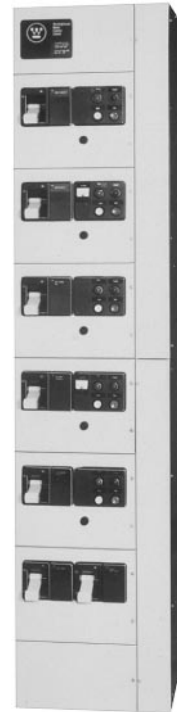
A two-tone light/dark enamel paint system is used for this design. ANSI 70 off white is applied to the structural framework and units. ANSI 61 gray is applied to the roof and side sheets and all exterior doors. Starter units are 13-3/4 inches wide.

The 5 Star/Series 2100 starter unit's handle mechanism is a gray toggle type handle with a black exterior mounting panel and is used on the ADVANTAGE and F2100 designs. Bus and bus support systems are typically braced to withstand fault currents of 42,000A on the 5 Star and 65,000A on the Series 2100.

Maximum Ratings:
3-phase, 60V, 600 HP, 2500A bus



Unit with A200 Starter



REPLACEMENT CAPABILITIES

Replacement Starter Units

Replacement starter cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

- Size 1-5 starter units
- UL labeled
- Series C disconnect device
- A200 starter
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



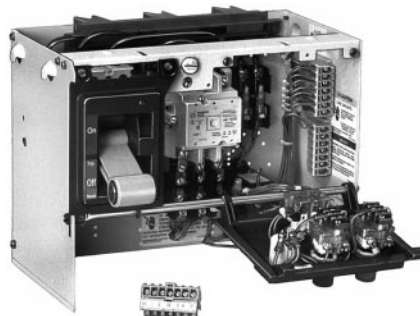
Don't forget the option to upgrade to ADVANTAGE.

- Solid-state
- Communication capability
- Reduced coil wear
- No heater
- Smaller size
- Built-in over-current and ground fault protection

Replacement Feeder Units

Replacement feeder cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

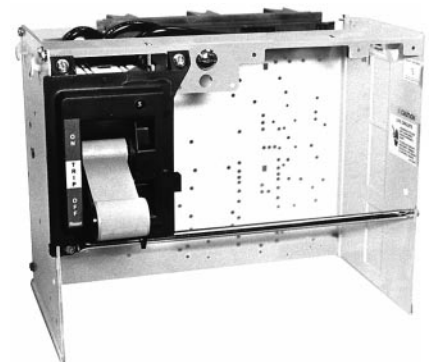
- Feeder breakers and fusible switches through 400A
- UL labeled
- Series C disconnect device
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



Unit with A200 Starter

Add-on MCCs

New F2100 or ADVANTAGE MCCs can be added to existing line-up through a bus splice kit.



5 Star/Series 2100 Feeder Unit



INTRODUCTION AND DESCRIPTION

Originally a Westinghouse Product

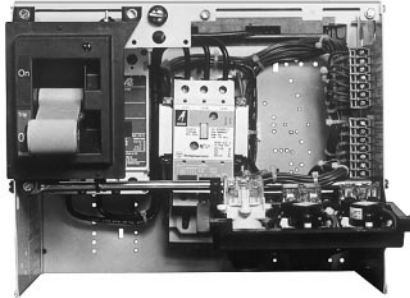
Introduced in 1991 as a sister to the Westinghouse Series 2100 MCC, the ADVANTAGE starter design revolutionized the industry. It uses state-of-the-art technology to solve motor control application problems, such as coil burnout and contact chatter/welding.

The vertical structures are normally 20 inches wide, 90 inches high, and 16 inches or 21 inches deep. Vertical sections may be bolted together forming a single line-up with continuous horizontal bus and open horizontal wireways. Unit height is measured in 6-inch increments up to a maximum of 72 inches of usable vertical space.

A two-tone light/dark enamel paint system is used for this design. ANSI 70 off white is applied to the structural framework and units. ANSI 61 gray is applied to all exterior back sheets, side sheets and doors. Starter units are 13-3/4 inches wide and are interchangeable with the 5 Star and Series 2100 design.

ADVANTAGE starter unit's handle mechanism is a gray toggle type handle with a black exterior mounting panel and is used on the 5 Star/Series 2100 and Freedom 2100 designs. Bus and bus support systems were typically braced to withstand fault currents of 65,000A.

Maximum Ratings:
3-phase, 600V, 600 HP, 2500A bus



Unit with ADVANTAGE Starter

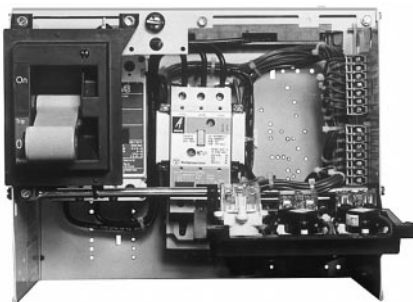


REPLACEMENT CAPABILITIES

Replacement Starter Units

Replacement starter cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

- Size 1-5 starter units
- UL labeled
- Series C disconnect device
- ADVANTAGE starter
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



Unit with ADVANTAGE Starter

Device Panel Upgrade

While incorporating ADVANTAGE Starters, increase the information shown on the unit device panel with one or two of the ADVANTAGE Control Modules (ACM) available. These units fit into the standard device panel cutout and provide pushbutton, pilot light and metering functions with reduced wiring costs.

The device panel is hinged on a horizontal rod extending across the front of the unit. With the unit door open, loosening two captive retaining screws at the top of the panel and sliding it 1/2 inches left permits it to swing down. This provides ready access to the rear of the panel and increased accessibility to the unit interior.

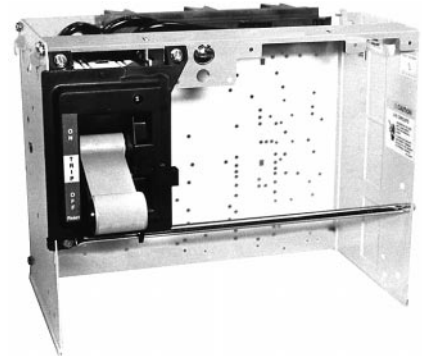


ADVANTAGE Device Panel with ACM and Metering Module

Replacement Feeder Units

Replacement feeder cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

- Feeder breakers and fusible switches through 400A
- UL labeled
- Series C disconnect device
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



ADVANTAGE Feeder Unit



INTRODUCTION AND DESCRIPTION

Cutler-Hammer introduced the F2100 in 1995.

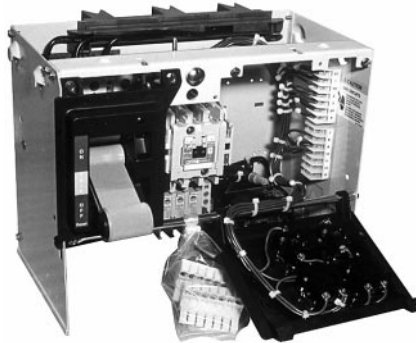
The structure is based on the 5 Star, Series 2100 and ADVANTAGE MCC design. Vertical structures are normally 20 inches wide, 90 inches high, and 16 inches or 21 inches deep. Vertical sections may be bolted together forming a single line-up with continuous horizontal bus and open horizontal wireways. Unit height is measured in 6-inch increments up to a maximum of 72 inches of usable vertical space.

A two-tone paint system is used for this design. ANSI 70 is applied to the structural framework and units. ANSI 61 gray is applied to the exterior and doors. Starter units are 13-3/4 inches wide with 4-5/8-inch wireways.

The Freedom starter is used in this design along with the HMCP motor circuit protector.

The F2100 starter unit's handle mechanism is a gray toggle type handle with a black exterior mounting panel and is used on the ADVANTAGE and 5 Star/Series 2100 designs. Bus and bus support systems are typically braced to withstand fault currents of 65,000A.

Maximum Ratings:
3-phase, 600V, 600 HP, 2500A bus



Unit with Freedom Starter



REPLACEMENT CAPABILITIES

Replacement Starter Units

Replacement starter cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

- Size 1-5 starter units
- UL labeled
- Series C disconnect device
- Freedom starter
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



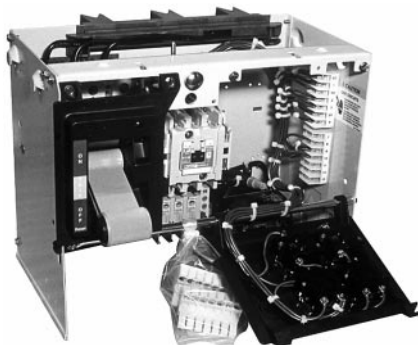
Don't forget the option to upgrade to ADVANTAGE.

- Solid-state
- Communication capability
- Reduced coil wear
- No heater
- Smaller size
- Built-in over-current and ground fault protection

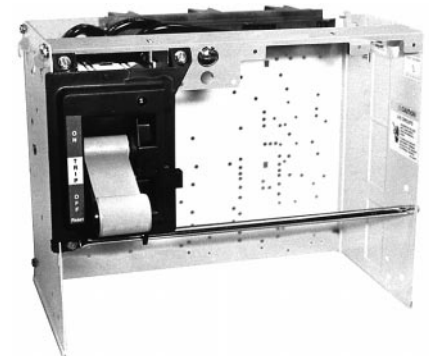
Replacement Feeder Units

Replacement feeder cell units are available for all plug-in MCC designs. A complete unit for adding to an existing MCC includes a unit door, divider pan and all necessary mounting hardware. Features of the replacement unit include:

- Feeder breakers and fusible switches through 400A
- UL labeled
- Series C disconnect device
- New tin-plated copper stab assembly
- New door, handle mechanism and hardware



Unit with Freedom Starter



F2100 Feeder Unit



REPLACEMENT CAPABILITIES

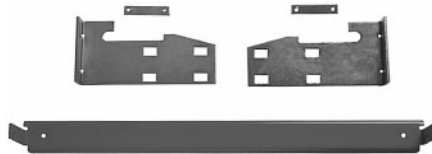
Replacement Parts

In addition to replacement units, a large number of replacement parts are available for each vintage.

Examples:



F2100 Horizontal Wireway Door



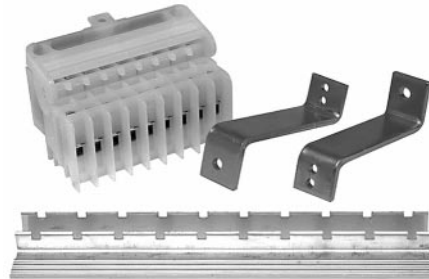
9800 Unit Mounting Hardware Kit



Type W Horizontal Bus Bar



F10 Handle Mechanism



Freedom Unitrol Terminal Block Mounting Kit



Series 2100 Bus Splice Kit

For information on these and additional parts, refer to RPD 8991.

For parts not listed or shown in RPD 8991, contact your local Cutler-Hammer Field Sales Office.

MCC Replacement Circuit Breakers

Cutler-Hammer Motor Control Center Replacement Circuit Breakers are newly manufactured and tested to the latest applicable standards at the Cutler-Hammer molded case circuit breaker plant in Beaver, PA. This plant has a long and well recognized tradition of product safety, integrity and quality.

All Motor Control Center Replacement Circuit Breakers are easily identified by the prefix "RMC" added to the out-of-production type circuit breaker catalog number they replace.

Out-of-Production Circuit Breaker	MCC Replacement Circuit Breaker
F	RMCF
HF	RMCHF
FA	RMCFA
HFA	RMCHFA

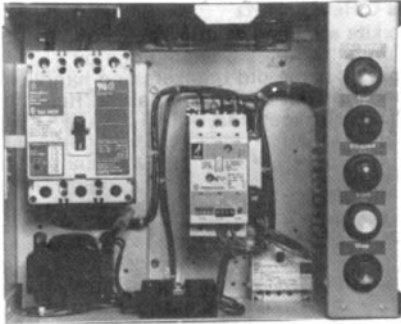
Motor Control Center Replacement Breakers do not have the same physical dimensions or mounting holes as the breakers they replace. Types RMCF and RMCHF are 6 inches in length and the breakers they replace, F and HF, are 9-1/8 inches in length. Types RMCF and RMCHF are 6 inches in length and the breakers they replace, FA and HFA, are 6-1/2 inches in length. A mounting plate is provided with each breaker to resolve these differences, and must be installed to ensure a proper fit.



ADVANTAGE TECHNOLOGY RETROFITS

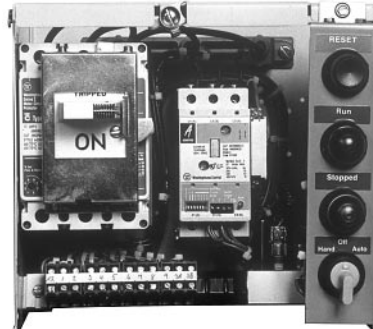


In addition to standard retrofit capabilities, every vintage of MCC can be upgraded with ADVANTAGE motor starters. Consult Factory for other Manufacturer's Motor Control Centers.

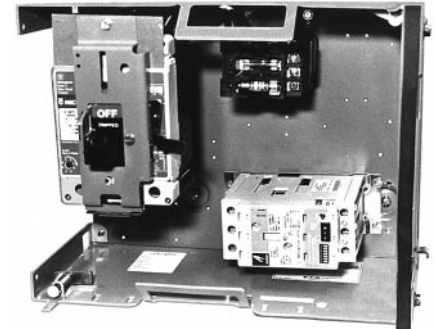


11-300

Low Resolution Photo

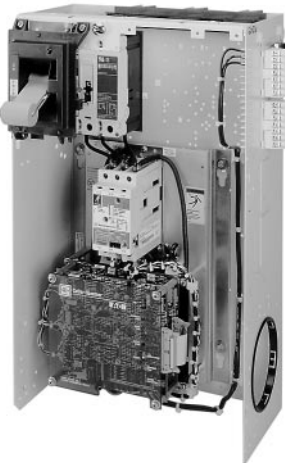


Type W



F10

EASY START ADVANTAGE STARTER

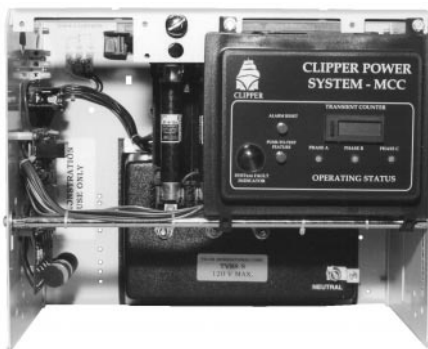


F2100 Easy Start EA Unit

The Easy Start EA

The Easy Start EA offers reduced voltage starting capability in a small, cool running package. The Easy Start EA uses SCRs to provide smooth, stepless acceleration for NEMA three-phase induction motors. Once the motor reaches full speed, an ADVANTAGE bypass contactor is automatically energized in parallel to the SCRs to handle the motor's continuous duty requirements. Available in current ranges from 45 to 135 amperes, the Easy Start EA is the smallest solid-state reduced voltage starter in the industry. Consult the factory for availability and dimensions in replacement motor control center units.

TVSS UPGRADE



F2100 TVSS Unit

Transient Voltage Surge Suppression MCC Units

A Transient Voltage Surge Suppression (TVSS) system is a hybrid MOV filter based suppression device that protects sensitive electronic equipment from damaging transients and electrical line noise. The TVSS is installed in parallel to the electrical circuits in a motor control center and provides clean power to the motor starting circuits. The TVSS will only react and draw (surge) current when the transient voltages or high frequency noise enters the motor starting circuit and exceeds the system's nominal operating voltage. Installed in a plug-in MCC unit, the TVSS maximizes performance by

minimizing cable runs to the bus system and saves "outboard" wall space and field installation costs. A TVSS MCC unit is available for all Cutler-Hammer and Westinghouse vintage MCCs. Consult the factory for further information.



IQ RETROFIT KITS

Each IQ Retrofit Kit includes the device selected, mounted and wired to terminal blocks in a new wrapper and door. Wiring diagrams and instruction book accompany each bucket for easy installation and operation.

IQ Data Plus II™



The IQ Data Plus II is a microprocessor-based monitoring and protective device that provides complete electrical metering and system voltage protection. In one compact, standard package, the IQ Data Plus II provides an alternative to individually mounted and wired ammeters, voltmeters, ammeter and voltmeter switches, watt meters, watt-hour meters and more.

IQ Analyzer (The Ultimate in Monitoring)



The IQ Analyzer displays the most comprehensive list of metered parameters in its class. The dot-matrix, gas plasma display provides the flexibility of exhibiting large characters with high visibility and small characters for detailed descriptions. Multiple parameters (e.g. currents of phases A, B, and C) are displayed simultaneously for more thorough real-time monitoring. Custom screens can also be configured. Available information includes current, voltage, power, energy, demand and an extensive array of harmonic data.

IQ 1000 II



The IQ 1000 II is a multifunctional, motor protective relay that monitors three-phase AC current and, optionally, temperature. It makes separate trip and alarm decisions based on user-programmed motor current and temperature set points. The IQ 1000 II's patented motor protection algorithm is based on proven positive and negative (unbalanced) sequence current sampling and true RMS calculations. Ten years of experience has proven that this algorithm provides the user with maximum motor utilization, virtually eliminating nuisance trips, while providing unparalleled motor protection.

Central Monitoring Unit (CMU)



The ADVANTAGE Central Monitoring Unit (CMU) is a microprocessor-based, self-contained, door-mounted device designed to monitor and display parameters of up to 99 ADVANTAGE starters, contactors, overload relays, IQ-500's and ADVANTAGE Control Modules (ACM) equipped with PONI communicator modules. The CMU can also pass this information to a remote master computer.

How to Order:

Define the type of Motor Control Center to be upgraded, the type of device and the CT ratio. Then develop a catalog number based on the following:

FT

Type of MCC:

FZ = Freedom 2100
 FK = ADVANTAGE
 FS = Series 2100/5 Star
 FD = Freedom Unitrol
 FR = F10
 FT = Type W
 FN = 9800
 FJ = 11-300

IQK

Type of IQ Device:

IQK = IQ Data Plus II
 IQL = IQ Analyzer
 IQM = IQ 1000 II
 IQN = CMU

0600

CT's:

0100 = 100/5 0800 = 800/5
 0200 = 200/5 1000 = 1000/5
 0250 = 250/5 1200 = 1200/5
 0300 = 300/5 1500 = 1500/5
 0400 = 400/5 1600 = 1600/5
 0500 = 500/5 2000 = 2000/5
 0600 = 600/5 2500 = 2500/5
 0700 = 700/5
 0000 = No CT's (CMU)

P1

Options:

P1 = PONI Card for IMPACC
 P2 = PONI Card for RS232
 Blank = No Options

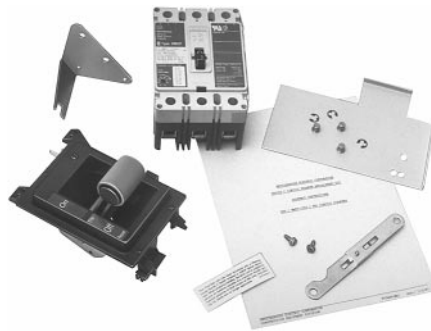


SERIES C RETROFIT KITS

Series C Retrofit Kits are to be used to upgrade existing Type W and 5 Star Motor Control Center buckets by changing out the old breakers with the Series C. These kits can be applied to both starter and feeder units.

The old breakers that these kits will upgrade include, but are not limited to, the MCP, F, FA, FB, HFB, K, KA, KB, HKB, L, LA, LB and HLB breakers.

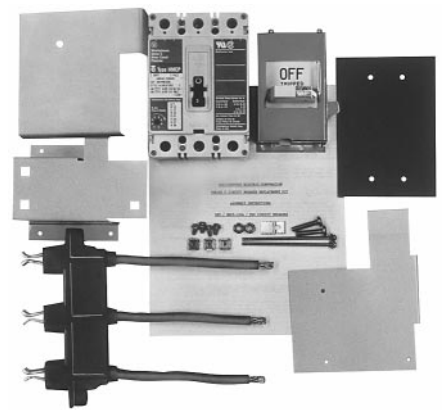
5 Star Series C Retrofit Kit



The 5 Star Series C Retrofit Kit Includes:

- A. Series C device, 65kA (either HMCP or thermal magnetic breaker)
- B. Operating handle mechanism, including tripped indication and push-to-trip
- C. Label stating that the MCC unit has been retrofitted with Series C device suitable for 65kA (similar to UL quality label)
- D. Templates for desired frame size
- E. Assembly instructions

Type W Series C Retrofit Kit



The Type W Series C Retrofit Kit Includes:

- A. Series C device, 65kA (either HMCP or thermal magnetic breaker)
- B. Operating handle mechanism, including tripped indication and push-to-trip
- C. Label stating that the MCC unit has been retrofitted with Series C device suitable for 65kA (similar to UL quality label)
- D. Templates for proper hole placement for desired frame size
- E. Series C breaker mounting hardware
- F. New door and hardware
- G. New stab assembly
- H. Assembly instructions

How to Order:

Step 1: Select the correct Series C device from the table on **page 167** of RPD 8991.

Step 2: Create a catalog number based on the MCC type, device selected, modifications, door size and device panel.

Step 3: Select price from PL 8991A **page 26**.

FT

MCC Type:
FT = Type W
FS = Five Star

H M C P 0 3 0 H 1

Device Catalog Number:
Use table on **page 167** of RPD8991.

C

Modification:
C = Copper lugs for HMCP
L = Lugs for molded case breaker

12

Door Size:
Height of door in inches, 6-inch increments

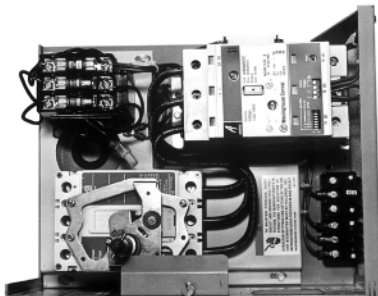
N

Device Panel:
D = With device panel
N = No device panel

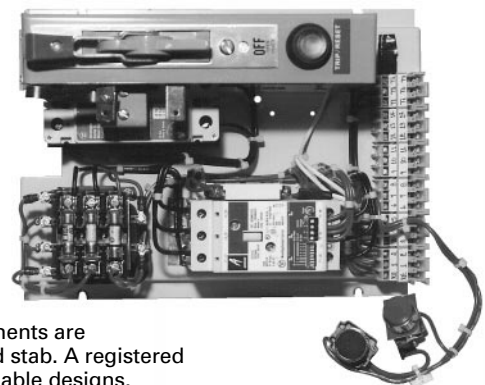
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COMPETITIVE UPGRADES

GE7700 Unit Retrofitted with ADVANTAGE and HMCP



Gould 5600 Unit Retrofitted with ADVANTAGE and HMCP



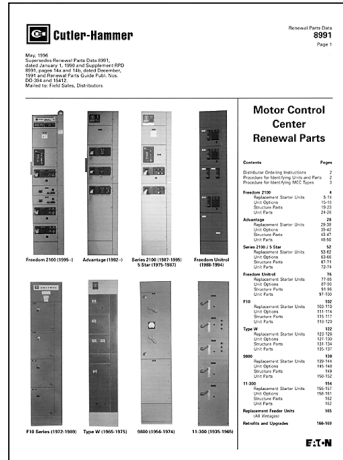
All new, UL recognized components are used in every ADVANTAGE retrofit. Components are pre-assembled on a panel for simple insertion, utilizing the existing unit wrapper and stab. A registered UL open industrial control panel is affixed to each panel. Contact the factory for available designs.



CUSTOMER REQUIRED INFORMATION

Procedure for identifying Renewal Parts:

1. Refer to the proper page of RPD 8991 to identify MCC units and parts.
2. RPs listed below identify those replacement parts which are most frequently ordered and which are readily available from manufacturing stock.
3. For parts not shown in YES or listed in the RPs below, contact your local Cutler-Hammer Field Sales Office or call 1-800-OLD-UNIT.



RPD 8991



Poster SA-11940

PRODUCT SUPPORT SERVICES

The following replacement units can be obtained from the Fayetteville manufacturing plant:

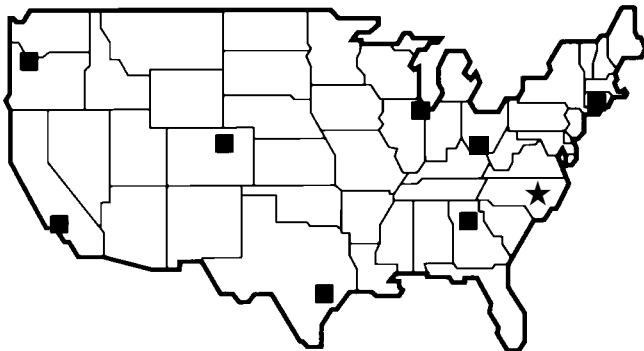
- F2100
- ADVANTAGE
- 5 Star/Series 2100
- Freedom Unitrol
- F10
- Type W
- 9800
- 11-300
- ADVANTAGE technology retrofits

The following replacement units can be obtained from any of the nine regionally located service centers:

- F2100
- ADVANTAGE
- 5 Star/Series 2100

Nine Service Centers are located in:

- | | | |
|-------------------------------------|---|--------------------------------------|
| Atlanta
(770) 739-6282 | Denver
(303) 373-2133 | Houston
(713) 939-9696 |
| Chicago
(847) 299-1911 | ★ Fayetteville
1-800-OLD-UNIT | Los Angeles
(562) 944-6413 |
| Cincinnati
(513) 682-4000 | Hartford
(860) 683-4221 | Portland
(503) 636-8333 |



Visit our ExtraNet web page at <https://www.ch.cutler-hammer.com/docs/mcc/>

FURTHER INFORMATION

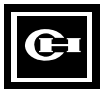
Literature Number	Description
RP.3A.01A.S.E	Renewal Parts – F2100 MCC
RP.3A.02A.S.E	Renewal Parts – ADVANTAGE MCC
RP.3A.03A.S.E	Renewal Parts – 2100/5-Star MCC
RP.3A.04A.S.E	Renewal Parts – Freedom Unitrol MCC
RP.3A.05A.S.E	Renewal Parts – F10 MCC
RP.3A.06A.S.E	Renewal Parts – Type W MCC
RP.3A.07A.S.E	Renewal Parts – 9800 Unitrol MCC
RP.3A.08A.S.E	Renewal Parts – 11-300 MCC
SA-11940	Sales Aid MCC Wall Poster
LEM002A	Tri-fold Mailer “We Have The Solutions”
LEM005	Tri-fold Mailer “MCC Units with TVSS”
LEM006	Tri-fold Mailer “Technology Upgrades”
SA-11848	Sales Aid ADVANTAGE MCC
SA-162	Sales Aid F2100

ADDITIONAL INFORMATION

Literature Number	Description
PL.03A.03.P.E	Price List All MCC Vintages
PL.03A.01C.P.E	Price List Freedom 2100 MCC
PL.03A.02C.P.E	Price List ADVANTAGE MCC
SA.8K.02.S.E	Sales Aid QDS II Aftermarket Tri-fold
PL.3A.20.P.E	Price List QDS II Freedom 2100 MCC
PL.08.01.P.E	Price List QDS II ADVANTAGE MCC
VISTALINE	Discount Symbol 1CD-2C

PRICING INFORMATION

Literature Number	Description
PL 8991A	Price List Aftermarket Renewal Parts
PL 8915	Price List Freedom 2100
PL 8916	Price List Freedom QDS II
PL 8912	Price List ADVANTAGE MCC
PL 8913	Price List ADVANTAGE MCC QDS II
VISTA/VISTALINE	Discount Symbol 1CD-2C



PRODUCT DESCRIPTION



WRI Switchboard, St. Louis Vintage with Fixed Molded Case Breakers (Pow-R-I is of similar look)

Low voltage distribution switchboards serve to switch power and protect circuits in industrial and commercial distribution systems. Distribution switchboards can be



Pow-R-M-S/F Switchboard with Fixed SPB Breakers

classified into two categories, Power Distribution and Service Distribution. The power distribution switchboards typically use insulated case SPB or air DS power

circuit breakers as mains and individually compartmentalized feeders. The service distribution switchboards use insulated case SPB, air DS, molded case (all types), and fusible switches as mains and molded case circuit breakers as feeders.

Distribution switchboards can be a free-standing structure(s) or close coupled as the secondary section of a power center or substation. Power distribution switchboards primarily use individually mounted, fixed or drawout devices. Service distribution switchboards primarily use main devices as individually mounted, fixed or drawout with group mounted molded case circuit breakers. Numerous combinations of devices can be used depending on the specification. Class III (Power Distribution) and Class II (Service Distribution) switchboards are commonly used descriptions for the class of distribution switchboards. Distribution switchboards are built in accordance with all applicable provisions of UL891 and NEMA PB-2.

PRODUCT HISTORY

Originally a Westinghouse Product

Distribution switchboards have been around since the 1950s. Each switchboard was designed and built without regard to a standard design. The first generation of distribution switchboards (WF/WRP) was designed as an oversized free-standing panelboard using the circuit protective devices of that time. In the mid 1970s, standard designs were created for distribution switchboards. In addition to standardizing the manufacturing, the common construction gave a uniform and distinctive appearance throughout the product line.

In the mid '70s through the 1980s, distribution switchboards were built in St. Louis, MO. The designs built included Pow-R-Gear switchboards using SPB drawout

circuit breakers, WRI switchboards using predominantly molded case individually mounted circuit breakers and WF/WRP switchboards using group mounted circuit breakers. Some special switchboards, including Generator Switchboards, were built in the Cincinnati, OH plant until the plant closed in 1985.

During the mid-80s the service distribution switchboards were transferred to new facilities in Visalia, CA., and Sumter, SC. The designs built were WF/WRP switchboards and WRI switchboards. In 1962, Cutler-Hammer entered the switchboard market with its version of the WF/WRP using Westinghouse molded case circuit breakers exclusively. This design was later enhanced to the ES switchboard

for Cutler-Hammer and the Pow-R-Line C switchboard design for Westinghouse.

In 1989, the product line was moved to Asheville, NC. New designs were introduced enhancing the St. Louis designs. The Pow-R-Gear design became the Pow-R-M-S design. The WRI design became the Pow-R-I design. In 1991, the Pow-R-I design was further refined and split into two-types of switchboards, SPB mains and SPB/RD fixed individually mounted feeders. The SPB/RD are built in the new Pow-R-M-S/F switchboard in Asheville, NC and SPB mains and molded case circuit breakers or fused switches as feeders in a fixed compartmentalized design called Pow-R-Line I switchboards are built in Sumter, SC.

P

PRODUCT HISTORY TIMELINE

Page	Product	1955	1960	1965	1970	1975	1980	1985	1990	1995	Present
228	WF/WRP Switchboard										
224	WRI Switchboard										
226	Pow-R-Gear Switchboard										
228	Pow-R-Line C Switchboard										
226	Pow-R-M-S Switchboard										
224	Pow-R-I Switchboard										
228	ES Switchboard										
224	Pow-R-M-S/F Switchboard										
224	Pow-R-Line I Switchboard										

DISTRIBUTION SWITCHBOARDS (LOW VOLTAGE)

WRI, Pow-R-I, Pow-R-M-S/F, Pow-R-Line-I Assemblies, Power Circuit Breakers and Renewal Parts



PRODUCT DESCRIPTION



WRI Switchboard with Individually Mounted Molded Case Breakers

This class of switchboard is commonly called a Class III switchboard. Generally speaking, this means individually mounted main and feeder devices.

The WRI switchboard that was built in St. Louis, MO consisted of rear and front accessible enclosures with all sections flush front to rear. The WRI board was designed for mounting away from the wall. Main devices could be DS, SPB, SCB-II, CBC or molded case circuit breakers or



Pow-R-Line I Switchboard with Individually Mounted Molded Case Breakers

FDP fusible switches. Individually mounted feeders could be either FDP fusible switches or molded case circuit breakers. The WRI design moved to Asheville, NC as the Pow-R-I design with little change, except fusible was not offered with Pow-R-I. Some different structural and bussing methods were used on the Pow-R-I also.

The Pow-R-I product was split in 1991. Switchboards requiring main and individually mounted feeders using SPB break-

ers and the RD Series C breaker were incorporated in the Pow-R-M-S/F design using the same design as the draw/out Pow-R-M-S switchboard except fixed devices. The smaller current individually mounted devices were incorporated into the Pow-R-Line I design introduced in 1991 at Sumter, SC.

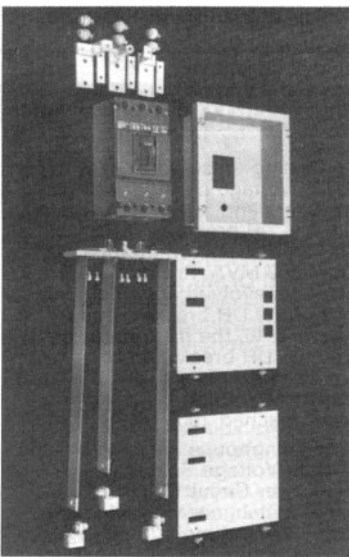
Ratings

WRI/Pow-R-I	
Switchboard Bus	800-4000A
Protective Devices	400-4000A
Voltage	120-600V
Interrupting Capacity	30-200kA
Pow-R-M-S/F	
Switchboard Bus	800-5000A
SPB/RD Breaker	400-5000A
Voltage	240-600V
Interrupting Capacity	42-100kA
Pow-R-Line I	
Switchboard Bus	800-4000A
Protective Devices	70-4000A
Voltage	240-600V
Interrupting Capacity	30-200kA

Chronology:

WRI was introduced in St. Louis, MO in 1977. In 1990, the design was transferred to Asheville, NC as Pow-R-I. Pow-R-I was discontinued in 1991 and the Pow-R-M-S/F took its place and is the current design.

REPLACEMENT CAPABILITIES



Parts for WRI Switchboard

Cutler-Hammer offers an extensive amount of products to support WRI, Pow-R-I, Pow-R-M-S/F and Pow-R-Line I Switchboards.

Low Resolution Photo

Pow-R-M-S/F Match and Lineup Cubicles

Newly manufactured Pow-R-M-S/F switchboard structures match and lineup to existing Pow-R-M-S/F switchboards. New Pow-R-M-S/F structures can also connect to existing switchboards (Types WRI, Pow-R-I) with a transition section.

New Circuit Breakers

New SPB, DS, RD and molded case circuit breakers are available for replacement or to fill existing vacant cells. All breakers are newly manufactured and are mechanically and electrically the same as the breakers originally specified and supplied.

Circuit Breaker Provisions/Connector

Breaker provisions are required in switchboards when there is an existing space in a structure that is to be filled with a breaker. Provisions/connectors are available for most ratings of the WRI design, except prior to 1967. Provisions are available for all ratings of the Pow-R-I, Pow-R-M-S/F and Pow-R-Line I designs including all parts required to complete the cell in accordance with the switchboard as originally supplied.

Factory Repair Service for SPB Breakers

Factory authorized non-warranty repair for all SPB breaker frames. Refer to **page 226** of this publication.

Factory Modification and Repair for DS Breakers

Factory modifications and repairs are available for new or customer owned DS circuit breakers. This UL approved service includes trip unit replacements, conversion from manually operated to electrically operated, breaker calibrations and the addition of numerous accessories for the DS and DSL circuit breaker.

Circuit Breaker Parts

An extensive inventory of newly manufactured breaker renewal parts are available for SPB, DS, RD and molded case circuit breakers.

Switchboard Structure Parts

Switchboard parts are available for most designs. Newly manufactured replacement parts (such as doors, breaker provisions, lift trucks, metering, etc.) are available.

Digtrip Trip Unit Retrofit Kits

Trip unit retrofit kits are available for all SPB and DS Breaker frames. Refer to **pages 258-261** of this publication.



DISTRIBUTION SWITCHBOARDS (LOW VOLTAGE) WRI, Pow-R-I, Pow-R-M-S/F, Pow-R-Line-I Assemblies, Power Circuit Breakers and Renewal Parts

225

TECHNOLOGY UPGRADES

IQ and PowerNet Communications Retrofits

Cutler-Hammer offers IQ products to replace existing analog meters, instruments, and protective relays with microprocessor-based solid-state true-RMS sensing devices. IQ products can be furnished as components for field installation on the switchgear, or can be provided as new replacement front panels. The new replacement front panels available for WRI, Pow-R-I, Pow-R-S/F, and Pow-R-Line I switchboard assemblies include the IQ devices mounted

and wired. The IQ products can be matched in numerous combinations to include the IQ Analyzer, IQ Data Plus II, IQ Data, IQ Generator, IQ Data Plus-4000/4100, and the Assemblies Electronic Monitor (AEM II). Communications can then be tied to the Cutler-Hammer PowerNet System.

Digtrip Trip Unit Retrofit Kits

Trip unit retrofit kits are available for all SPB and DS breaker frames. Refer to **pages 258-261** of this publication.

Clipper Power System

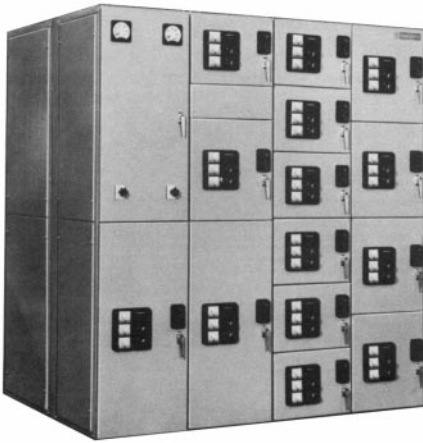
Transient voltage surge suppression system. Refer to **page 229** of this publication.

Pow-R-Command Lighting Control System

Microprocessor-based lighting control system. Refer to **page 229** of this publication.



PRODUCT DESCRIPTION



Pow-R-Gear Switchboard, St. Louis Vintage with Drawout SPB Breakers

Pow-R-Gear, and now Pow-R-M-S, switchboards were/are designed exclusively for the Systems Pow-R Breaker line of encased power circuit breakers. These switchboards were/are designed for high current applications and include the following features: drawout breaker elements,



Pow-R-M-S Switchboard, Current Asheville Design with Drawout SPB Breakers

individual breaker compartmentalization, in-gear breaker contact inspection and minimum floor space design. Both versions were/are manufactured in accordance with all applicable provisions of UL 891 and NEMA PB-2 covering low voltage distribution switchboards.

The primary differences between the original Pow-R-Gear and its successor Pow-R-M-S are: structural (frame design), trip units (Pow-R-Gear used the Pow-R-Trip 7; Pow-R-M-S uses the Digtrip RMS sensing trip family), bus design (Pow-R-Gear used aluminum of varying heights; Pow-R-M-S uses bolted copper of full height) and vertical spacing (Pow-R-Gear accommodated six high 800 ampere breakers, Pow-R-M-S accommodates four high 800 ampere breakers).

Ratings

Pow-R-Gear	
Switchboard Bus	800-4000A
Protective Devices	100-5000A
Voltage	120-600V
Interrupting Capacity	100kA
Pow-R-M-S	
Switchboard Bus	800-5000A
SPB Breaker	400-5000A
Voltage	240-600V
Interrupting Capacity	42-100kA

Chronology

Pow-R-Gear was built in St. Louis, MO from 1977 to 1990. Pow-R-M-S was introduced in 1990 and is built in Asheville, NC.

REPLACEMENT CAPABILITIES



Systems Pow-R-Breaker Type SPB-65 with Pow-R-Trip 7 Trip Unit

Cutler-Hammer offers an extensive amount of products to support Pow-R-Gear and Pow-R-M-S switchboards.

Factory Repair Service for SPB Breakers

These repair services apply to breakers which have exceeded the original factory warranty and are now referred to as non-warranty repairs. The System Pow-R-Breaker family consists of fixed breakers, either front connected or rear connected, and drawout breakers, either behind-the-

door or through-the-door design. Four pole breakers are only available in the fixed design front or rear connected.

Cutler-Hammer's SPB Factory Authorized Non-Warranty Repair service features:

- Quality SPB repair specified and audited by factory engineers according to procedures.
- Only genuine new Cutler-Hammer replacement parts are used.
- Original factory specifications and design drawings are used by factory trained technicians.
- One year factory warranty issued from date of shipment from repair center in Beaver, PA.
- Repair lead time is four to six weeks.

Pow-R-M-S Match and Lineup Cubicles

Newly manufactured Pow-R-M-S switchboard structures to match and lineup to existing Pow-R-M-S switchboards. New Pow-R-M-S structures can also connect to existing Pow-R-Gear switchboards with a transition section.

New SPB Circuit Breakers

New SPB breakers are available for replacement or to fill existing vacant cells. All breakers are newly manufactured and are mechanically and electrically the same as the breakers originally specified and supplied.

SPB Circuit Breaker Provisions

Breaker provisions are required in switchboards when there is an existing space in a structure that is to be filled with a breaker. Provisions are available for most ratings of Pow-R-Gear switchboards and all ratings of the Pow-R-I switchboards which include all parts required to complete the cell in accordance with the switchboard as originally supplied.

SPB Circuit Breaker Parts

An extensive inventory of newly manufactured breaker renewal parts are available for SPB circuit breakers.

Switchboard Structure Parts

Switchboard parts are available for all ratings. Newly manufactured replacement parts (such as doors, breaker provisions, lift trucks, metering, etc.) are available.

Pow-R-Trip 7 Trip Unit Upgrades

Pow-R-Trip 7 was the solid-state trip unit used on Pow-R-Gear switchboards. An upgrade from the Pow-R-Trip 7 trip unit is also available. Modification to the breaker and existing switchboard is required.

Digtrip Trip Unit Retrofit Kits

Trip unit retrofit kits are available for all SPB Breaker frames. Refer to pages 260-261 of this publication.



Pow-R-Gear, Pow-R-M-S Assemblies, SPB Circuit Breakers and Renewal Parts

TECHNOLOGY UPGRADES

IQ and PowerNet Communications Retrofits

Cutler-Hammer offers IQ products to replace existing analog meters, instruments, and protective relays with microprocessor-based solid-state true-RMS sensing devices. IQ products can be furnished as components for field installation on the switchgear, or can be provided as new replacement front panels. The new replacement front panels available for Pow-R-Gear and Pow-R-M-S switchboard assemblies include the IQ devices mounted and wired.

The IQ products can be matched in numerous combinations to include the IQ Analyzer, IQ Data Plus II, IQ Data, IQ Generator, IQ Data Plus 4000/4100, and the Assemblies Electronic Monitor (AEM II). Communications can then be tied to the Cutler-Hammer PowerNet System.

Digtrip Trip Unit Retrofit Kits

Trip unit retrofit kits are available for all SPB and DS breaker frames. Refer to **pages 258-261** of this publication.

Clipper Power System

Transient voltage surge suppression system. Refer to **page 229** of this publication.

Pow-R-Command Lighting Control System

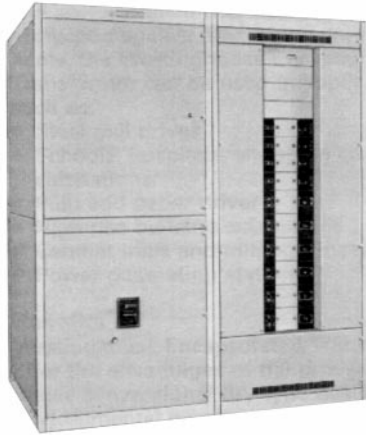
Microprocessor-based lighting control system. Refer to **page 229** of this publication.

DISTRIBUTION SWITCHBOARDS (LOW VOLTAGE)

WF/WRP, ES, Pow-R-Line C Assemblies, Circuit Breakers, Fusible Switches and Renewal Parts



PRODUCT DESCRIPTION



WRP Switchboard, Rear Access with Panel Mounted Molded Case Breakers

This class of switchboard is commonly called a Class II switchboard. Generally speaking, this means individually or panel mounted main and panel mounted feeder devices.

The WF/WRP switchboard that was built in St. Louis, MO consisted of front or rear accessible enclosures with various depths depending on the devices within the structure. In the front access design, type WF, the rear of the switchboard was flush for all structures, the rear access design, type WRP, was flush in the front and rear. The WF/WRP switchboard design accommodated the use of DS, SPB, Bolted Pressure Switch (CBC), molded case circuit breaker or FDP fusible switches as main devices.



Pow-R-Line C Switchboard, Front Access with Panel Mounted Molded Case Breakers

Panel mounted feeder devices could be either molded case circuit breakers or FDP fusible switches. The WF/WRP design was moved to Sumter, SC and Visalia, CA, and consequently enhanced with the introduction of the Series C breaker and some structural and bussing changes.

In 1962, Cutler-Hammer entered the switchboard market with the purchase of Mullenbach. Soon after the Mullenbach acquisition, Cutler-Hammer entered into an agreement with Westinghouse to supply breakers and fusible devices for panelboards and switchboards. This led to the introduction of the ES switchboard using exclusively Westinghouse molded case circuit breakers.

In the late 1980s, Westinghouse introduced a new and improved version of the WF/WRP switchboard using the Series C breaker. This new switchboard line, Pow-R-Line C, designates a family of service distribution switchboards incorporating new design concepts that fit the ever increasing need for applications on high short circuit systems, while retaining maximum standardization, safety and convenience throughout the line.

Ratings

WF/WRP	
Switchboard Bus	600-4000A
Protective Devices	15-4000A
Voltage	120-600V
Interrupting Capacity	10-200kA
ES Switchboard Bus	600-4000A
Protective Devices	15-4000A
Voltage	120-600V
Interrupting Capacity	10-200kA
Pow-R-Line C	
Switchboard Bus	600-6000A
Protective Devices	15-6000A
Voltage	208-600V
Interrupting Capacity	10-200kA

Chronology:

WF/WRP was introduced in St. Louis, MO in 1955. In 1988, the design was transferred to Sumter, SC and Visalia, CA as Pow-R-Line C switchboards. Consequently, the Cutler-Hammer version, type ES switchboard was later introduced in 1991 as a replacement for their version of the WF/WRP switchboard.

REPLACEMENT CAPABILITIES

Cutler-Hammer offers an extensive amount of products to support WF/WRP, ES and Pow-R-Line C Switchboards.

Pow-R-Line C Match and Lineup Cubicles

Newly manufactured Pow-R-Line C switchboard structures to match and lineup to existing WF/WRP switchboards. New Pow-R-Line C structures can also connect to existing switchboards (Types ES) with a transition section.

New Circuit Breakers

New SPB, DS, RD and molded case circuit breakers are available for replacement or to fill existing vacant cells. All breakers are newly manufactured and are mechanically and electrically the same as the breakers originally specified and supplied.

Circuit Breaker Provisions/Connector

Breaker provisions are required in switchboards when there is an existing space in a structure that is to be filled with a breaker. Provisions/connectors are available for most ratings of the WF/WRP design. Provisions are available for all ratings of the Pow-R-Line C designs including all parts required to complete the cell in accordance with the switchboard as originally supplied.

Factory Repair Service for SPB Breakers

Factory authorized non-warranty repair for all SPB breaker frames. Refer to **pages 260-261** of this publication.

Circuit Breaker Parts

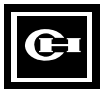
An extensive inventory of newly manufactured breaker renewal parts are available for SPB, DS, RD and molded case circuit breakers.

Switchboard Structure Parts

Switchboard parts are available for most designs. Newly manufactured replacement parts (such as doors, breaker provisions, lift trucks, metering, etc.) are available.

Digitrip Trip Unit Retrofit Kits

Trip unit retrofit kits are available for all SPB and DS Breaker frames. Refer to **pages 258-261** of this publication.



DISTRIBUTION SWITCHBOARDS (LOW VOLTAGE) WF/WRP, ES, Pow-R-Line C Assemblies, Circuit Breakers, Fusible Switches and Renewal Parts

TECHNOLOGY UPGRADES

Clipper Power System is a hybrid transient voltage surge suppressor used to protect sensitive electronic equipment from the damaging effects of voltage transients and electrical line noise. The Clipper's hybrid design combines both suppression and filtering elements to provide best in class performance. Field installation is required.



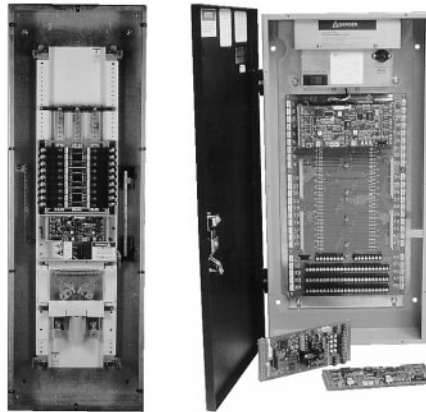
**Clipper Power System
Transient Voltage Surge Suppressor**

Benefits

- Clipper can be externally mounted to existing distribution equipment
- Five Models – 90kA, 120kA, 160kA, 250kA and 400kA
- Standard NEMA 12 Enclosure, Optional NEMA 4
- Surface or Flush Mounting
- Full range of diagnostic options including the Tri-Monitor
- Five Year Warranty

For more information about Clipper Power Systems, contact your local Cutler-Hammer Field Sales Office.

Pow-R-Command is a microprocessor-based lighting control system designed for today's modern facilities. The system may be utilized as a stand-alone or networked as a system for the control of lighting and other branch circuits.



Pow-R-Command Lighting Control System

System Features Include:

- Day/Date/Time of Day Scheduling
- Holiday Scheduling—up to 30 Days/Year
- Astronomical Time Scheduling
- Real Time Clock
- Hardware Diagnostics
- Off Warning by Blinking Lights
- Manual Load Override Control
- Brownout and Power Failure Recovery
- Telephone Override of Schedules
- Switch Override of Schedules
- Remote Access to System
- Dimming Systems for Fluorescent Fixtures
- Priority Load Management

Existing facilities can be retrofitted to include various *Pow-R-Command* scenarios, allowing customers varying degrees of control. For more information on upgrading your building to include the energy savings and control of *Pow-R-Command*, contact your local Cutler-Hammer Field Sales Office.

IQ and IMPACC Communications Retrofits
Cutler-Hammer offers IQ products to replace existing analog meters, instruments and protective relays with microprocessor-based solid-state true-RMS sensing devices. IQ products can be furnished as components for field installation on the switchgear or can be provided as new replacement front panels. The new replacement front panels available for DB switchgear assemblies include the IQ devices mounted and wired. The IQ products can be matched in numerous combinations to include the IQ Analyzer, IQ Data Plus II, IQ Data, IQ Generator, IQ Data Plus 4000/ 4100 and the Assemblies Electronic Monitor (AEM II). Communications can then be tied to the Cutler-Hammer IMPACC System.

Digtrip Trip Unit Retrofit Kits

Trip unit retrofit kits are available for all SPB breaker frames. Refer to **pages 260-261** of this publication.

**FURTHER INFORMATION**

Product	Literature Number	Description
General Information	Catalog 55-000	Cutler-Hammer Product Catalog

PRICING INFORMATION

Product	Literature Number	Description
Pow-R-M-S Switchboards	PL 32-624A	Price List for Pow-R-M-S Switchboard
SPB Breakers	PL.22A.01.P.E	Price List for SPB Breakers



HIGH RESISTANCE PULSING GROUND SYSTEM (LOW VOLTAGE)

Type C-HRG

PRODUCT DESCRIPTION



Wall Mounted C-HRG (resistors not shown)



Free Standing C-HRG

The C-HRG is designed to improve the continuity of electrical service to critical processes. Systems designers sometimes use ungrounded distribution systems to avoid interrupting service during a ground fault. However, ungrounded systems have a significant disadvantage — the distribution system is subject to the harmful effects of ground faults, like high transient over-voltages. C-HRG helps customers add the benefits of a grounded system to their ungrounded system.

PRODUCT HISTORY

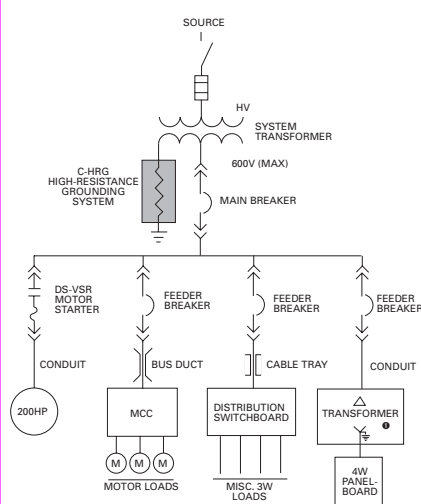
Originally A Westinghouse Product

High resistance grounding technology has been offered as an integral system within our LV switchgear and switchboard

products since the early 1970s. In 1994, Cutler-Hammer adopted the technology into the C-HRG, which is a stand-alone or

wall-mounted product ideal for adapting to the existing electrical system.

GENERAL INFORMATION



Typical C-HRG Application

Overview

Where continuity of service is a high priority, high resistance grounding can add the safety of a grounded system while minimizing the risk of service interruptions due to grounds. The concept is a simple one: provide a path for ground current via a resistance that limits the current magnitude, and monitor to determine when an abnormal condition exists.

The ground current path is provided at the point where the service begins by placing resistance in the connection from system neutral to ground. Control equipment continuously measures ground current; a relay detects when the current exceeds a predetermined level. An alarm alerts building personnel that a ground exists. The system has built-in fault tracing means to assist in finding the source of the ground. An integral transformer provides control power from the primary source.

Minimum Criteria for Use

High resistance grounding systems can be applied to either grounded or ungrounded 3-wire distribution systems. Per NEC 1996, 250-5(b) exception No. 5, the following criteria must be met before using the C-HRG:

- A. The conditions of maintenance and supervision ensure that only qualified persons will service the installation.
- B. Continuity of power is required.
- C. Ground detectors are installed on the system.
- D. Line-to-neutral loads are not served.

Q

1 Phase-to-neutral loads require a Wye-Delta distribution transformer. The neutral on the secondary side of this transformer must be solidly grounded. Not to be confused with the upstream system transformer.



GENERAL INFORMATION, *Continued*

Wye or Delta System

Adding the Type C-HRG to a Wye connected system requires only that the resistors supplied be connected in series with the neutral-to-ground connection of the power source. Adding the Type C-HRG to an ungrounded Delta system requires the creation of a neutral point. Transformers are supplied for that purpose in the enclosure. The resistors supplied are then connected at that point. In both cases, the components supplied are chosen to limit the ground current to a maximum value of 5 amperes.

Ground Fault Detection

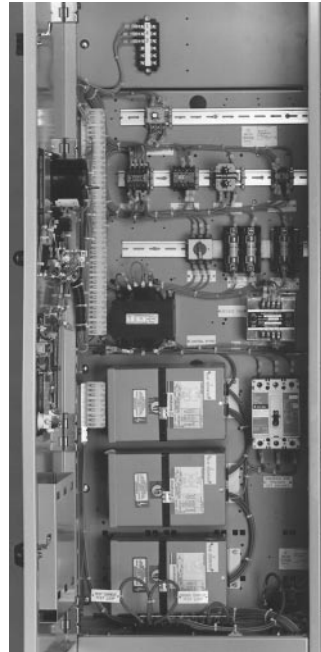
When one phase of a system becomes grounded, additional current will flow. As all ground current must flow through the grounding resistor assembly, a current sensing relay is placed in this circuit allowing detection when a ground fault occurs. If chosen, a voltage sensing relay can be provided to accomplish the same function.

Pulsar Circuit

The pulsar circuit offers a convenient means to locate the faulted feeder and trace the fault to its origin. The pulsar is available any time a fault has been detected. The "pulse" light flashes on and off, corresponding to the on-off cycles of the pulsing contactor. The pulsar contactor switches a bank of resistors on and off, allowing a momentary increase in the ground current.

Ground Fault Location

The current pulses can be noted with a clamp-on ammeter when the ammeter is placed around the cables or conduit feeding the fault. The operation tests each conduit or set of cables until the pulsing current is noted. By moving the ammeter along the conduit, the fault can be traced to its origin. The fault may be located at the point where the pulsing current drops off or stops. If little or no change in the pulsing current is noted along the entire length of a conduit, then the fault may be in the connected load.



C-HRG Cabinet Internal Control

Standard Features

- NEMA 1 Enclosure
- Current Sensing Ground Fault Detection (1-5 Ampere Pickup)
- Ground Current Transformer
- Fused Control Circuit Disconnect Switch
- Lockable Door Handle
- Ground Current Ammeter
- Indicating Lights
 - Red (Ground Fault)
 - Green (Normal)
 - White (Pulse)
- Adjustable Pulsing Timer
- Tapped Resistor
- 3-Position Selector Switch
- Manual or Automatic Reset
- Ground Fault Contacts (1-NO and 1-NC)
- UL Label
- Front Accessible
- Nylon Flag-type Wire Markers

SEQUENCE OF OPERATIONS

Normal

Green "normal" light on.
Red "ground fault" light off.
White "pulse" light off.
System control switch in "normal" position.
Reset control switch in either "auto" or "manual."

Test

Turn and hold the system control switch in the "test" position. Phase B will be grounded via the test resistor. The ground current will activate the sensing circuit, causing the green "normal" light to turn off and the red "ground fault" light to turn on. The pulsar will be activated as well. The white "pulse" light will turn on and off as the pulsar contactor closes and opens. The ground current ammeter will display the total ground current, including the incremental pulse current. When ready, return the system control switch to "normal." The pulsar will stop. If the reset control is in the "manual" position, turn it to "reset" to reset the fault sensing circuit. The red "ground fault" light will turn off, and the green "normal" light will turn on. Test mode is not available if the system is detecting a ground. The sensing circuit will disable the test circuit.

Ground Fault

When the sensing circuit detects a fault, the green "normal" light will turn off and the red "ground fault" light will turn on. The ground current ammeter will indicate the total ground current. To use the pulsar, turn the system control switch to "pulse." The pulsar contactor will cycle on and off as controlled by the recycle timer relay. Use the clamp-on ammeter to locate the faulted feeder. Open the feeder and clear the fault. If the reset control switch is in the "manual" position, turn it to "reset" to reset the sensing circuit. (If reset control is in "auto," it will reset itself.) When ready to restore service to the load, close the feeder. Return the system control to "normal."



HIGH RESISTANCE PULSING GROUND SYSTEM (LOW VOLTAGE) Type C-HRG

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CUSTOMER REQUIRED INFORMATION

Selection Table

A C-HRG High-Resistance Grounding Assembly can be completely described and priced by a nine or ten digit catalog number using the option codes from column #4.

Catalog Digit	Feature	Feature Description	Option Code	Option Description
1	Enclosure Type	Free-standing enclosures provide for mounting the grounding resistors internally. A wall-mounted enclosure requires a separately-mounted grounding resistor. The "no enclosure" option includes a door-mounted panel, a control panel and a separately-mounted resistor assembly. (See Catalog Digit 10 to specify wire harness length.	F S R W N	Free-standing NEMA 1 Free-standing NEMA 1 with screened vents Free-standing NEMA 3R Wall-Mounted NEMA 1 No Enclosure
2	Distribution System Voltage	Voltage of the distribution system.	6 4 3 2	600V, 60 Hz 480V, 60 Hz 380V, 50 Hz 208-240V, 60 Hz
3	System Neutral Point	Choose Wye when the neutral point of the power source is accessible for direct connection to the grounding resistor. Choose Delta when there is no neutral, or when the neutral is not conveniently accessed. See page 2 for complete description.	W Z D	Wye Delta (Zig-Zag grounding transformers) Delta (Wye-Broken Delta grounding transformers) Requires circuit breaker. See Catalog Digit 4
4	Distribution System Fault Current	The distribution system voltage and fault current will determine the grounding transformer's primary breaker for Zig-Zag or Wye-Broken Delta systems. A Wye system does not require this additional breaker.	6 1 2 N	<u>600V</u> <u>480V</u> <u>240V</u> 25kA 65kA 100kA ... 150kA 200kA 200kA 200kA 200kA Not Applicable (Note: Wye system is rated for 200kA)
5	Fault Sensing	Current-sensing. Voltage-sensing.	C D	Overcurrent relay Double-setpoint voltmeter relay
6	Audible Alarm	Alarm contacts are standard in all assemblies.	N R	No Audible Alarm Alarm Horn with Re-Alarm Timer
7	Loss of Control Power Alarm	A relay is connected across the output of the control power transformer for customer use.	N L	No Relay Alarm Relay with 1-NO and 1-NC contact wired to a terminal block
8	Indicating Lights	Standard lights are industrial, oil-tight, full-voltage type. Optional are the same type lights except with a push-to-test feature and/or transformer with 6.3V lamp.	S L P D T X	Standard, incandescent lamps Standard, LED lamps Push-to-test, incandescent lamps Push-to-test, LED lamps Transformer-type, incandescent lamp Push-to-test transformer type
9	Wire Markers	Marks all internal wiring for ease of maintenance	F H	Standard nylon flag-type Heat-shrink sleeve-type
10	Wire Harness Length (No Enclosure model only)	Wiring from the door panel plugs to the left edge of the control panel. Choose a harness length that will allow for a hinge loop at the edge of the door.	4 6 8 0 2	4 foot harness 6 foot harness 8 foot harness 10 foot harness 12 foot harness

Example: F4WNCRNSF

Defines a free-standing NEMA 1 enclosure, 480/60 Hz Wye-connected system, current-sensing control scheme, alarm horn with re-alarm timer, standard-type incandescent lights, flag-type wire markers.

Accessory: Portable Clamp on Detector with Case (1/2/5/10/20 Ampere Scales with Shorting Switch) [Option Add Item]

FURTHER INFORMATION

Literature Number	Description
SN.44C.01.S.E	Sales Notes for C-HRG
PL.44C.01A.P.E	Price List for C-HRG
TD.44C.01.T.E	Technical Data for C-HRG
SA-32-602B	Sales Aid for High Resistance Grounding Systems
IB 32-698B	Instruction Booklet for High Resistance Grounding System
Catalog 25-000	Cutler-Hammer Quick Selector Catalog
Catalog 55-000	Cutler-Hammer Consulting Application Guide CAT.71.01.T.E

PRICING INFORMATION

Contact your Local Cutler-Hammer Distributor.

Q

SWITCHGEAR (LOW VOLTAGE) Assemblies, Power Circuit Breakers and Renewal Parts



PRODUCT DESCRIPTION



DSII Switchgear with DS Air Circuit Breakers



DS Switchgear with DS Air Circuit Breakers

Low voltage switchgear is designed to protect power circuits so that the flow of short circuit current can be safely and quickly interrupted to isolate the fault, while the other circuits remain in operation and continue to supply the various loads. Low voltage switchgear is built in accordance with ANSI C37.20.1 for metal enclosed drawout switchgear. The current product offering uses the DSII/DSLII air circuit breakers.

PRODUCT HISTORY

Originally a Westinghouse Product

DB switchgear with electromechanical trip units was introduced around 1950. The switchgear ratings were 15A-4000A with a system voltage of 208V-600V.

During the late 1960s, Westinghouse Electric introduced the DS circuit breaker

and switchgear. This switchgear assembly was used for both industrial and commercial applications. This switchgear assembly also introduced the first solid-state trip unit (Amptector) which eventually lead to today's standard of the Digitrip III RMS Trip Unit.

Although the switchgear assembly itself underwent a variety of changes and relocation of manufacturing facilities, it has proven to be a durable and long lasting product. The DS switchgear ratings today are 800A-5000A with a system voltage of 208V-600V.

PRODUCT HISTORY TIMELINE

Page	Product	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	Present	
235	DB Switchgear – East Pittsburgh	[Timeline bar from 1950 to 1980]											
237	DS Switchgear – East Pittsburgh (Vintage 1)					[Timeline bar from 1970 to 1975]							
237	DS Switchgear – East Pittsburgh (Vintage 2)						[Timeline bar from 1975 to 1980]						
237	WPA Switchgear – St. Louis						[Timeline bar from 1975 to 1985]						
237	DS Switchgear – St. Louis (Vintage 3)								[Timeline bar from 1985 to 1985]				
237	DS Switchgear – St. Louis (Vintage 4)								[Timeline bar from 1985 to 1990]				
237	DS Switchgear – St. Louis (Vintage 5)										[Timeline bar from 1990 to 1995]		
238	DSII Switchgear w/ DS Breaker – Asheville											[Timeline bar from 1995 to Present]	
238	DSII Switchgear w/ DSII Breaker – Asheville												[Timeline bar from Present to Present]

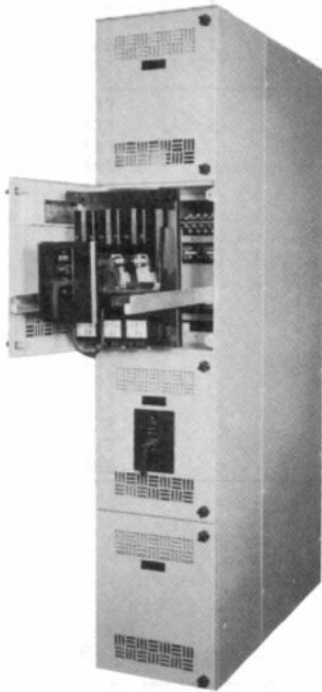


SWITCHGEAR (LOW VOLTAGE)

DB Assemblies, Power Circuit Breakers and Renewal Parts

235

PRODUCT DESCRIPTION



DB Switchgear with DB Air Circuit Breakers

Westinghouse DB switchgear used the DB breaker in its design. Among the breakers used were the DB15, DB25, DB50, DB75, DB100 and the current limiting type DBL25 and DBL50. A characteristic of the DB switchgear was that the panel door could be kept closed when the breaker was in the open, test and disconnected position of the three-position DB breaker. The single position DB breaker also had this feature but did not have a test position. In either case, both the three- and single-position DB breakers utilized the electromechanical trip unit.

The DB switchgear structures were approximately 90 3/8-inch high construction with a universal frame that accommodated

breaker compartment widths of 18, 26, 30 and 36 inches. All main bus joints and tap connections are silver plated and tightly clamped with through-bolts to insure maximum conductivity. The outdoor switchgear was a walk-in type with rear hinged doors for easy access to connections.

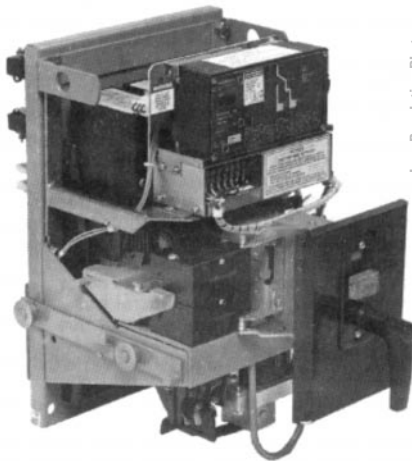
Ratings

DB Switchgear Bus	800 – 4000A
DB Breaker	15 – 4000A
Voltage	208 – 600V
Interrupting Capacity	15 – 150kA

Chronology

This switchgear started in East Pittsburgh, PA approximately 1950 and final production ended around 1980.

REPLACEMENT CAPABILITIES



Low Resolution Photo

Remanufactured DB-25 Breaker Including Digitrip RMS 810 Trip Unit

Cutler-Hammer offers an extensive amount of products to support DB Switchgear:

New DB Air Circuit Breakers

Completely new factory manufactured breakers are still available for DB25, DB50, DBL25, DBL50, DBF6 and DBF16.

Remanufactured DB Breakers and Factory Repair Service

Factory remanufacturing of most frame sizes of DB circuit breakers are available. All are asbestos-free, in accordance with ANSI C37.59, calibrated per original specifications and equipped with Digitrip RMS 510 trip units as standard.

DB Breaker Parts

A complete line of DB breaker replacement parts are available built from the original drawings and design specifications. Among the items stocked are asbestos-free arc chutes, complete pole units, contacts, primary disconnects and coils.

DB Switchgear Structure Parts

DB switchgear parts are available for most DB designs. Newly manufactured replacement parts (such as doors, breaker provisions, lift trucks, metering, etc.) are available.

Digitrip Trip Unit Retrofit Kits

Trip unit retrofit kits are available for all DB breaker frames. Refer to pages 256-257 of this publication.

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SWITCHGEAR (LOW VOLTAGE)

DB Assemblies, Power Circuit Breakers and Renewal Parts



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SWITCHGEAR (LOW VOLTAGE)

DS Switchgear Assemblies

Chronology/Description of Vintages

GENERAL INFORMATION

DS Switchgear Vintage I and II 1969 through 1984 at East Pittsburgh, PA

The first vintage of DS switchgear was the first switchgear that incorporated the DS breaker with a solid-state trip unit (Amp-tector). During this time, the DS532 breaker was used. The DS532 breaker was a 3000 ampere frame breaker with an interrupting rating of 50,000 symmetrical amperes. The structures themselves were of a stepped roof design that incorporated a standard bolted copper or flash welded aluminum bus design. Other characteristics of this switchgear include the following: rear frame height was 87.5 inches, flat roof sheets, ventilated front doors, wire ducts, removable instrument modules and a welded frame design. The breaker

compartments were also different with fuse trucks stacked above the mains, the DS840, DS532 and the newly developed DS632. The outdoor design incorporated the use of a walk-in type side door entry.

The second vintage of switchgear was a new design that incorporated the use of both bolted copper and welded extruded aluminum rise bus. It is basically the same as the first vintage but with a revised bus design.

Ratings
800-4000A
208/600V

Chronology

The first vintage was built from September of 1969 to approximately September of 1973 in East Pittsburgh, PA using the shop order numbers with a prefix of 24Y. The second DS vintage was also built in East Pittsburgh which used the 27Y prefix on shop orders. This vintage was built the same time as the WPA design in St. Louis, MO. The switchgear in East Pittsburgh was designed to be used for industrial applications, whereas the St. Louis design was built for commercial applications.

DS Switchgear Vintage III 1984 at St. Louis, MO

The third generation of DS switchgear was introduced due to the change of plant locations. It is classified as a vintage because it was the beginning of the merge between two plants (St. Louis and East Pittsburgh). The engineering was completed in East Pittsburgh and the assembly was built in St. Louis, along with the Cincinnati, OH plant to help pick up the slack until full production in St. Louis. This vintage was similar to the previous 27Y

style with a few modifications. It was the first time that both DS and DSL were used in switchgear by the use of a conjunction box. The physical appearance also changed by increasing the height to 92 inches and adding top hat vents that protruded 4 inches above the switchgear. Internally the neutral bus was located in the bus compartment along with unified breaker compartments for the variety of breakers.

Ratings
800-4000A
208/600V

Chronology

This vintage lasted from May of 1984 to approximately October of 1984 in East Pittsburgh. Usually the switchgear shop order number is defined by a prefix of 28Y.

WPA Switchgear 1973-1984 at St. Louis, MO

The WPA switchgear was designed for commercial applications that also used DS Breakers which was similar to the East Pittsburgh design for industrial applications. The two designs differed structurally but used the same breakers. Some characteristics of the WPA design are as follows: riser bus was tapered design, frames were bolted and not welded, height of 90 inches, neutral bus mounted

on rear frame, did not use removable instrument compartments and outdoor design had front and rear doors. In all, the WPA design differed extensively compared to the East Pittsburgh design.

Ratings
800-4000A
208/600V

Chronology

This vintage was built from February of 1973 to approximately October of 1984 in St. Louis. Usually the switchgear is identified by General Order and Item numbers. Shop Order numbers were not used.

DS Switchgear Vintage IV 1984-1990 at St. Louis, MO

This vintage of switchgear was a combination of the St. Louis WPA and East Pittsburgh design. The design was classified as a hybrid between the two that consisted of the East Pittsburgh design in the front compartments that held the DS breaker and the St. Louis design in the rear compartment that housed the bus. The rear compartment still used the tapered riser bus (a characteristic of the St. Louis design)

which was used right up until the DS switchgear moved to Asheville, NC. The design was very similar to the design today except for the different riser bus along with the height being 92 inches.

Ratings
800-4000A
208/600V

Chronology

This vintage was built from October of 1984 to approximately May of 1990 in St. Louis. Usually the switchgear is identified by General Order and Item numbers. 28Y Shop Order numbers started in 1987 and continued into the Asheville design.

DS Switchgear Vintage V 1990-1994 at St. Asheville, NC

The vintage was built from May of 1990 to the end of 1996 in Asheville. The switchgear is identified by Shop Order number 28Y. The switchgear incorporates both designs with the option for the variety of IQ products. The riser bus went back to a full rated type that is bolted copper only. Aluminum bus work was initially done only on special orders at customer request.

The switchgear also has many improvements such as the design of an instrument panel door that was able to accommodate three device panels across DS632 in the C and D compartments and a variety of communication capabilities with IMPACC. The outdoor design changed with the concept of a side walk-in enclosure.

Ratings
800-4000A
208/600V

Chronology

This vintage was built from May of 1990 to the end of 1996 in Asheville. The switchgear is identified by Shop Order number 28Y.

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SWITCHGEAR (LOW VOLTAGE)

DS Switchgear Assemblies

Chronology/Description of Vintages



GENERAL INFORMATION, *Continued*

DSII Switchgear Original Design 1994-Present at Asheville, NC

The original design of DSII switchgear manufactured in Asheville includes the DS/DSL Circuit Breaker and the new and improved DSII Switchgear enhancements. These enhancements were developed with the input of our valued customers.

DSII switchgear provides enhanced operational features and a new control wiring configuration that builds upon the reliability and flexibility of the original DS switchgear design. The quality and reliability of DS Switchgear has been consistently proven for over 25 years.

DSII switchgear continues to utilize DS/DSL 100% rated air circuit breakers, which represent the largest installed base of domestic low voltage power circuit breakers. Microprocessor-based Digitrip RMS Trip Units are standard on the circuit breakers. This vintage of DSII is what we offer to match existing line-ups of DS switchgear via 13 inch wide transition section.

Ratings

800-6000A
208/600V

Chronology

This vintage was built from April of 1994 to the present in Asheville. The switchgear is identified by Shop Order number 82Y1000 through 82Y3000.

DSII Switchgear New Design 1995-Present at Asheville, NC

The new design of DSII switchgear manufactured in Asheville includes the new and improved DSII/DSLII low voltage power circuit breakers. The DSII/DSLII breakers now include the Digitrip 510 Trip Unit as standard with the DSLII providing extended interrupting ratings up to 200kA. A variety of trip units are now available that offer numerous features to benefit the customer: Digitrip 510, 610, 810, 910 and the OPTIM 750 and 1050.

Consequently, they are used on systems where the overload protection and switching functions of air power circuit breakers are required and available fault currents exceed the interrupting ratings of the circuit breakers alone and/or exceed the withstand and interrupting ratings of downstream circuit components.

Ratings

800-6000A
208/600V

Chronology

This vintage was built from February of 1996 to the present in Asheville. The switchgear is identified by Shop Order numbers larger than 82Y3000.



SWITCHGEAR (LOW VOLTAGE)

DS Assemblies, Power Circuit Breakers and Renewal Parts

PRODUCT DESCRIPTION



DS Switchgear Assembly
Typical Asheville Design, 1991

Westinghouse DS switchgear with type DS (non-limiting) and type DSL (with limiters) low voltage air power circuit breakers was introduced in 1969. There have been many product design changes, as well as, plant movements that have necessitated product improvements. Overall, the product has remained the standard for low voltage switchgear in the industry.

Typical DS switchgear is constructed in accordance with ANSI C37.20.1 standards for low voltage, metal-enclosed drawout switchgear. As such, it contains low voltage power circuit breakers, type DS or DSL, as the principal overcurrent protective devices both as main and as feeder protection. The drawout feature of DS breakers facilitates testing and maintenance important in many applications.

Compartmentalization of the drawout breakers is part of the standard construction. DS and DSL circuit breakers are designed to ANSI standards C37.13, C37.16 and C37.17 in frame sizes ranging from 800A to 5000A. Type DS switchgear is designed in accordance with ANSI standard C37.20.1, C37.51 and UL Standard 1558.

Ratings

DS Switchgear Bus	800 – 6000A
DS/DSL Breaker	15 – 5000A
Voltage	120 – 600V
Interrupting Capacity	30 – 200kA

Chronology

There have been five vintages of DS switchgear since the original design was manufactured in 1969. Today, many capabilities still exist to support the different vintages of DS Switchgear.

REPLACEMENT CAPABILITIES



View Showing Controls on the Panel – DS416

Cutler-Hammer offers an extensive amount of products to support DS Switchgear.

New DS Air Circuit Breakers

New DS circuit breakers are available for replacement or to fill existing vacant cells. All breakers are newly manufactured and are mechanically and electrically the same as the breakers as originally specified and supplied.

DS Circuit Breaker Provisions

Breaker provisions are required in switchgear when there is an existing space in a structure that is to be filled with a breaker. Provisions are available for all ratings and include all parts required to complete the cell in accordance with the switchgear as originally supplied.

Factory Modification and Repair

Factory modifications and repairs are available for new or customer owned DS circuit breakers. This UL approved service includes trip unit replacements, conversion from manually operated to electrically operated, breaker calibrations and the addition of numerous accessories for the DS and DSL circuit breaker.

DS Breaker Parts

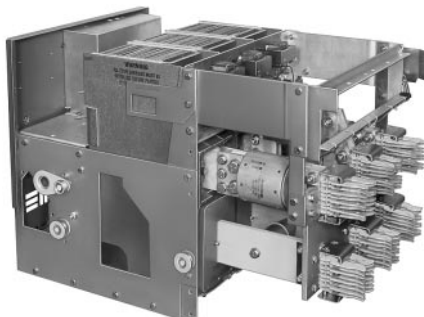
An extensive inventory of newly manufactured renewal parts for DS and DSL power circuit breakers are available. Refer to RPD33-790-IH for an in-depth listing of renewal parts.

DS Switchgear Structure Parts

DS switchgear parts are available for most DS designs. Newly manufactured replacement parts (such as doors, breaker provisions, lift trucks, metering, etc.) are available. Contact your local Cutler-Hammer Distributor for availability.

Digitrip Trip Unit Retrofit Kits

Trip unit retrofit kits are available for all DB Breaker frames. Refer to **pages 256-257** of this publication.



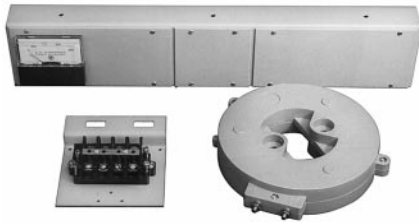
DSL416 Breaker – Side View

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REPLACEMENT CAPABILITIES, *Continued*

Divider Panel Kits



Between the circuit breakers in switchgear are divider pans which usually hold a variety of components for breaker control and metering. The most common components are the ammeter, ammeter switch, kirk key interlock and electrically operated push button and lights. (120VAC Std.)



Each kit requested is completely pre-assembled, pre-wired with the appropriate hardware and includes instructions for ease of installation.

Kits are for the following DS circuit breakers.

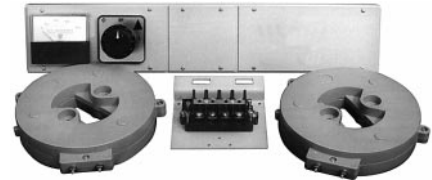
Breaker Type	Frame Size
DS-206	800
DS-206S, H	800
DSL-206	800
DS-416	1600
DS-416S, H	1600
DSL-416	1600
DS-420	2000

Divider panel with ammeter and current transformer and shorting block

Style Number	Ammeter Scale
3A73104G01	0 - 100
3A73104G02	0 - 150
3A73104G03	0 - 200
3A73104G04	0 - 300
3A73104G05	0 - 400
3A73104G06	0 - 500
3A73104G07	0 - 600
3A73104G08	0 - 800
3A73104G09	0 - 1000
3A73104G10	0 - 1200
3A73104G11	0 - 1500
3A73104G12	0 - 1600
3A73104G13	0 - 2000

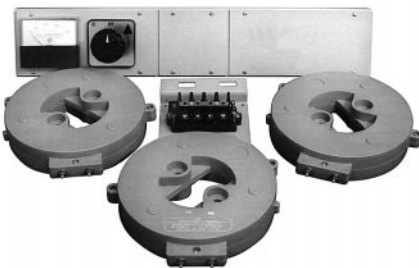
Divider panel with ammeter, switch, pushbuttons, lights, three current transformers and shorting block.

Style Number	Ammeter Scale
3A73114G01	0 - 100
3A73114G02	0 - 150
3A73114G03	0 - 200
3A73114G04	0 - 300
3A73114G05	0 - 400
3A73114G06	0 - 500
3A73114G07	0 - 600
3A73114G08	0 - 800
3A73114G09	0 - 1000
3A73114G10	0 - 1200
3A73114G11	0 - 1500
3A73114G12	0 - 1600
3A73114G13	0 - 2000



Divider panel with ammeter, switch, two current transformers and shorting block.

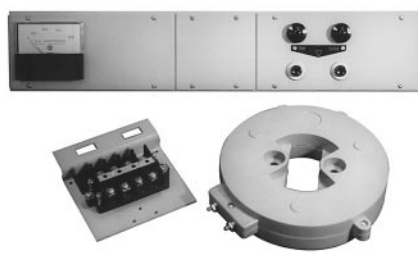
Style Number	Ammeter Scale
3A73106G01	0 - 100
3A73106G02	0 - 150
3A73106G03	0 - 200
3A73106G04	0 - 300
3A73106G05	0 - 400
3A73106G06	0 - 500
3A73106G07	0 - 600
3A73106G08	0 - 800
3A73106G09	0 - 1000
3A73106G10	0 - 1200
3A73106G11	0 - 1500
3A73106G12	0 - 1600
3A73106G13	0 - 2000



Order Entry Point - LVP

Divider panel with ammeter, switch, three current transformers and shorting block.

Style Number	Ammeter Scale
3A73107G01	0 - 100
3A73107G02	0 - 150
3A73107G03	0 - 200
3A73107G04	0 - 300
3A73107G05	0 - 400
3A73107G06	0 - 500
3A73107G07	0 - 600
3A73107G08	0 - 800
3A73107G09	0 - 1000
3A73107G10	0 - 1200
3A73107G11	0 - 1500
3A73107G12	0 - 1600
3A73107G13	0 - 2000



Divider panel with ammeter, pushbuttons, lights, one current transformer and shorting block.

Style Number	Ammeter Scale
3A73112G01	0 - 100
3A73112G02	0 - 150
3A73112G03	0 - 200
3A73112G04	0 - 300
3A73112G05	0 - 400
3A73112G06	0 - 500
3A73112G07	0 - 600
3A73112G08	0 - 800
3A73112G09	0 - 1000
3A73112G10	0 - 1200
3A73112G11	0 - 1500
3A73112G12	0 - 1600
3A73112G13	0 - 2000



Divider panel with ammeter, switch, pushbuttons, lights, two current transformers and shorting block.

Style Number	Ammeter Scale
3A73113G01	0 - 100
3A73113G02	0 - 150
3A73113G03	0 - 200
3A73113G04	0 - 300
3A73113G05	0 - 400
3A73113G06	0 - 500
3A73113G07	0 - 600
3A73113G08	0 - 800
3A73113G09	0 - 1000
3A73113G10	0 - 1200
3A73113G11	0 - 1500
3A73113G12	0 - 1600
3A73113G13	0 - 2000

Divider panel with pushbuttons and lights
Style Number 3A73115G02 (Not Shown)



SWITCHGEAR (LOW VOLTAGE)

DS Assemblies, Power Circuit Breakers and Renewal Parts

REPLACEMENT CAPABILITIES, *Continued*

Switchgear Kits and Renewal Parts

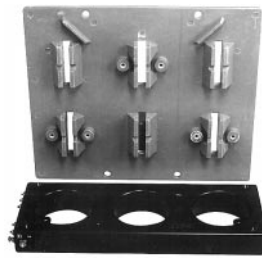


Neutral Sensors

The sensor kit includes a fourth current sensor and mounting hardware for four wire ground fault protection. Additional wiring needs to be done to the DS circuit breaker. (If there is no ground fault protection on the existing DS circuit breaker, the trip unit also needs to be changed).

Kit contains one neutral sensor, mounting plate, and hardware.

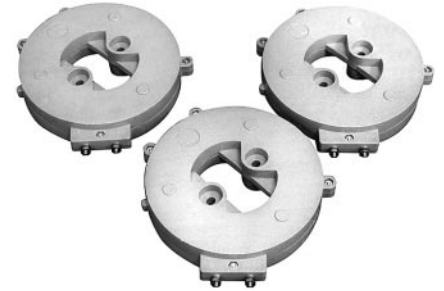
Sensor Rating Amperes	Sensor Style Number
50	3A73101G01
100	3A73101G02
150	3A73101G03
200	3A73101G04
300	3A73101G05
400	3A73101G06
600	3A73101G07
800	3A73101G08
1200	3A73101G09
1600	3A73101G10
2000	3A73101G11



Three-Phase Current Transformer

Below is a three-phase current transformer that takes the guess work out of wiring along with a new glass polyester barrier and required hardware. This can be used instead of the individual current transformers for metering and instrumentation only. Only applicable for DS206, DS206H, DS206S, DSL206, DS416, DS416S, DS416H, DSL416 and DS420 circuit breakers.

Ratio	Style Number
250:5	3A73102G01
300:5	3A73102G02
400:5	3A73102G03
500:5	3A73102G04
600:5	3A73102G05
750:5	3A73102G06
800:5	3A73102G07
1000:5	3A73102G08
1200:5	3A73102G09
1500:5	3A73102G10
1600:5	3A73102G11
2000:5	3A73102G12



Current Transformers

The current transformers shown below are for metering and instrumentation only. Do not use these current transformers for relaying. Kit contains three current transformers and required hardware.

Current Transformer Type

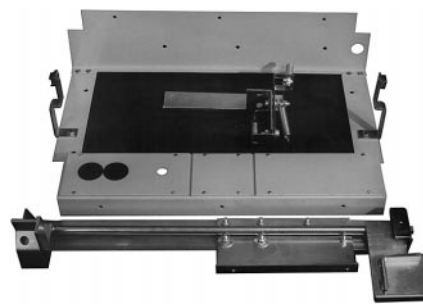
DSM-16	DSM-32	DSM-40
DS206, S, H DS416, S, H DS420 DSL206 DSL416	DS632 DSL632	DS840 DSL840
Type	Ratio	Style Number
DSM-16	100:5	3A73103G01
DSM-16	150:5	3A73103G02
DSM-16	200:5	3A73103G03
DSM-16	250:5	3A73103G04
DSM-16	300:5	3A73103G05
DSM-16	400:5	3A73103G06
DSM-16	500:5	3A73103G07
DSM-16	600:5	3A73103G08
DSM-16	800:5	3A73103G09
DSM-16	1000:5	3A73103G10
DSM-16	1200:5	3A73103G11
DSM-16	1500:5	3A73103G12
DSM-16	1600:5	3A73103G13
DSM-16	2000:5	3A73103G14
DSM-16	2500:5	3A73103G15
DSM-16	3000:5	3A73103G16
DSM-32	2400:5	3A73103G17
DSM-32	2500:5	3A73103G18
DSM-32	3000:5	3A73103G19
DSM-32	3200:5	3A73103G20
DSM-32	4000:5	3A73103G21
DSM-40	4000:5	3A73103G22
DSM-40	5000:5	3A73103G23
DSM-40	6000:5	3A73103G24



CTD-2 CTD-10

Capacitor Trip Device

120 Vac DS Switchgear Style Number CTD-1 (330 Microfarad) Style Number CTD-2 (1500 Microfarad)
DSII Switchgear Style Number CTD-10 (330 Microfarad)



Key Interlock Provisions

The key interlock provision kit includes all of the necessary hardware to complete a provision for all DS circuit breakers. The kit includes a new divider panel and blank plates to accept a key interlock. (two cylinders max.)

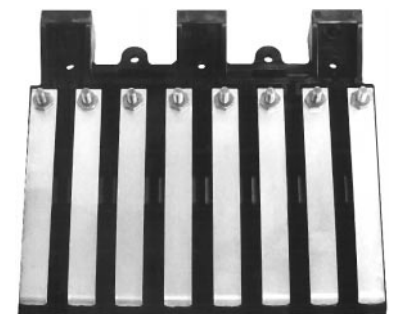
Key Interlock Provision for DS-206, DS-206S, DS-206H, DSL-206, DS-416, DS-416S, DS-416H, DSL-416, and DS-420 Style Number 3A73116G01
Key Interlock Provision for DS-632 and DSL-632. Style Number 3A73116G02
Key Interlock Provision for DS-840 and DSL-840 Style Number 3A73116G03



Order Entry Point – LVP

DS Breaker Cell Switch

3-NO, 3-NC Style Number 2A8901G01
6-NO, 6-NC Style Number 2A8901G02



Secondary Contact (Eight Point)
Style Number 590C808G01

SWITCHGEAR (LOW VOLTAGE)

DS Assemblies, Power Circuit Breakers and Renewal Parts



REPLACEMENT CAPABILITIES, *Continued*

Breaker Accessories



New Test Kit (including adapter)
Includes 140D481G03 tester and the 6779C02G03 adapter.

This test kit can be used for testing DS Breakers that have either the Amptector or Digitrip RMS trip units. This test kit also works on the new DSII Breakers.

Style Number 8779C02G02



Breaker Transport Cart
Floor running portable circuit breaker transfer truck with manual lifting mechanism. Requires 60-inch deep front aisle space.

Style Number 6727D63H20



Breaker Test Cabinet
Test Cabinet for electrically operated breakers, with pushbuttons, control cable and receptacle, for separate mounting.

Style Number 6500C57G01
120 VAC/125 VDC

Style Number 6500C57G02
240 VAC/250 VDC

Calibration and Repair Services

Test Unit Style	Service Options
140D481G01	Trade-in Only
140D481G02	Trade-in Only
140D481G03	Repair Available

Trade-in Program

If you have one of these:	You can get this with a Trade-in:
140D481G01	8779C02G02
140D481G02	8779C02G02

Send us your old test units, and receive the new test kit, at a discounted price.

Contact you local Cutler-Hammer Field Sales Office for details.



Breaker Lifting Device
Includes gear lifter, spreaderbar and crank. Top rails not included.

Style Number 694C616G01



Adapter

In May of 1993, Cutler-Hammer changed the test port on DS circuit breakers that have Digitrip RMS trip units. The test port was moved from the front cover to the left-hand side, as you face the front of the breaker. The new port was also changed from an 11 pin, banana plug to a 9 pin plug. The adapter is for using a 140D481(G02R), (G02RR), or (G03) tester to test DS breakers with Digitrip that have the new side-mounted, 9 pin plug. The adapter converts the banana plugs on the tester to a 9 pin plug. DO NOT use the adapter with the old 140D481G01 or 140D481G02 tester.

Style Number 8779C02G03

Background Information

Style Number	Description
140D481G01	(Obsolete Test Unit, only for use with Amptector)
140D481G02	(Obsolete Test Unit, only for use with Amptector)
140D481G02R	(Same as 140D481G02, except retrofitted to test both Amptector and Digitrip)
140D481G02RR	(Same as 140D481G02, except retrofitted to test both Amptector and Digitrip)
8779C02G01	(Obsolete Test Kit Adapter, superseded by 8779C02G03)

The following parts are used with any breaker that was upgraded with "Digitrip Retrofit Kits." Refer to Section "S" of this catalog for further information on Digitrip Retrofit Kits.

Style Number	Description
6503C53G01	(Wire harness with female banana plugs for temporary connection direct from tester to the auxiliary CT module on the retrofitted breaker)
6503C54G01	(Adapter harness for converting banana from the tester to a 12 pin plug for retrofitted breakers equipped with a 6503C55G01)
6503C54G02	New Adapter for converting 12 pin plug on 6503C55G01 into 9 pin plug for connecting to the test unit adapter style # 8779C02G03.
6503C55G01	(Wire harness with 12 pin plug for permanent connection to auxiliary CT module on the retrofitted breaker; plug connects to 6503C54G01 or 6503C54G02)
1267C16G01	(Current Auxiliary Power Module for supplying power to Digitrip trip unit during test procedures, also identical to catalog number PRTAAPM)



SWITCHGEAR (LOW VOLTAGE)

DS Switchgear Assemblies and Power Circuit Breakers

TECHNOLOGY UPGRADES

Application

Cutler-Hammer DS-VSR is a self-contained vacuum starter replacement for a DS draw-out air circuit breaker used for motor starting applications.

Type DS Air Circuit Breakers have been manufactured for over 25 years and have proven their quality and dependability in applications for which they were designed.

In some cases, DS Air Circuit Breakers are used for motor starting applications. Air circuit breakers are not designed to withstand the frequent switching service and mechanical stresses associated with repetitive motor starting duty. This is due to the breaker mechanism which must be designed to close and latch against a fault. In order to meet these requirements, the mechanism must close at high speeds with a great deal of force. Frequent closing operations stress and deteriorate the breaker mechanisms.

The Cutler-Hammer DS-VSR is a self-contained replacement vacuum starter for a DS drawout air circuit breaker. The DS-VSR is interchangeable with all quarter-high DS breaker elements and requires no cell modifications.



Ratings

The DS-VSR vacuum starter is rated as follows:

Max. Continuous Current	320A
Max. Voltage Rating	600V
Fuse Size	400A
Fuse Type	Class J
Short Circuit Rating	
at 600V	65 kA
at 480V	100kA
Max. Motor Hp at 480V	250 Hp
Max. Motor Hp at 240V	125 Hp

Advantages

The use of a DS-VSR vacuum starter can prolong device life and significantly reduce maintenance repair and downtime.

A DS-206 air circuit breaker has an effective life of 4,000 operations while a DS-VSR vacuum starter has an effective life of 1,000,000 operations. For example, a

motor starting application that required 2 starts per hour on continuous duty would require a major rebuild of the DS Breaker within 3 months. The expected life of a DS-VSR vacuum starter would be over 50 years.

The DS-VSR vacuum starter fits in a DS-206, DS-206H, DS-416, DS-416S, DS-420 cell without modifications to the switchgear assembly. Since it is a roll-out, roll-in solution, no costly downtime is associated with this change-out.

The DS-VSR vacuum starter uses state-of-the-art Cutler-Hammer vacuum interrupters. The interrupters employ the latest vacuum technology with long life, resistance to environmental contaminants, and positive contact wear indicators.

The integral, solid-state, trip units used on the DS Breakers are designed primarily for cable and transformer protection. Motors require more precisely set overcurrent devices that prevent motor damage as well as avoiding nuisance tripping. A solid-state relay, Cutler-Hammer Type IQ-500, provides overload protection, Class II ground fault protection, and phase unbalance protection. This relay was designed exclusively for motor protection.

Features

Motor Starter

The DS-VSR consists of a Cutler-Hammer V201 vacuum contactor, Class J current limiting fuses, KD molded case switch, IQ-500 multi-function motor protective relay, three (3) current transformers and an integral control power transformer.

Vacuum Contactor

The Cutler-Hammer V201 vacuum contactor is designed for starting and controlling three-phase, 50/60 Hz ac motors. Current interruption is contained within the vacuum bottles and no arc by-products are vented to the outside environment. Contact condition is given by wear indicators.

Series Current Limiting Fuses

Class J, current limiting fuses provide short circuit protection and allow a combination rating of 65 kA at 600V and 100 kA at 480V.

Disconnect Device

Cutler-Hammer Series C, type KD molded case switch permits positive disconnection of the motor controller.

IQ-500 Motor Protective Relay

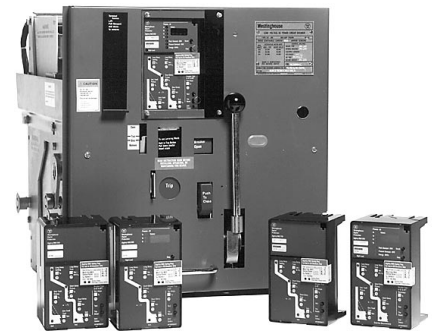
The Cutler-Hammer IQ-500 multi-function solid-state, motor protection relay provides the following features:

- Overload protection, Class 5, 10, 20 or 30
- Ground fault protection, Class II
- Phase unbalance protection, 10%, 20% or 50%
- Manual or automatic reset
- Isolated alarm relay output contact

- LED status indication
- IMPACC/PowerNet communication (option)
- JAM overtorque protection (option)
- Long acceleration (option)
- Underload protection (option)
- Load control (option)



DS Replacement Door with AEMII, IQ Data PlusII, Poni Cards (2), and Blank Plate



DSII Circuit Breaker with Digitrip RMS Trip Unit Family (T510, T610, T810, T910)

IQ and PowerNet Communications Retrofits

Cutler-Hammer offers IQ products to replace existing analog meters, instruments, and protective relays with microprocessor-based solid-state true rms sensing devices. IQ products can be furnished as components for field installation on the switchgear or can be provided as new replacement front panels. The new replacement door panels available for DS switchgear assemblies include the IQ devices mounted and wired. The instrument compartment door will fit all vintages of DS switchgear from 1968 to the present. Door panels can be supplied with analog instruments, breaker control devices, or any other device that will physically fit. The IQ products can be matched in numerous combinations to include the IQ Analyzer, IQ Data PlusII, IQ Data, IQ Generator, IQ Data Plus 4000/4100 and the Assemblies Electronic Monitor (AEMII). Communications can then be tied to the Cutler-Hammer PowerNet System.

Digitrip Trip Unit Retrofit Kits

Trip unit retrofit kits are available for all DB breaker frames. Refer to pages 256-257 of this publication.

SWITCHGEAR (LOW VOLTAGE)

DSII Assemblies, Power Circuit Breakers and Renewal Parts



PRODUCT DESCRIPTION



DSII Switchgear Assembly
Typical Asheville Design, 1993

Westinghouse DSII switchgear with type DS (non-limiting) and type DSL (with limiters) low voltage air power circuit breakers was introduced in 1993. The DSII and DSLII circuit breakers were incorporated in the DSII switchgear assembly in 1996. The design of the new DSII switchgear was not undertaken without the valued input of our customers. To determine what needed to be improved, changed and added, a survey of many of our customers was made. The results of this input centered around quality, cycle time reduction during both production and maintenance, standardization of wiring, placement of repetitive devices and ease of maintenance.

DSII switchgear is constructed in accordance with ANSI C37.20.1, C37.51, NEMA SG3 and SG5, and UL Standards 1558 for low voltage, metal-enclosed drawout switchgear. As such, it contains low voltage power circuit breakers, type DS/DSL or DSII/DSLII as the principal overcurrent protective devices both as main and as feeder protection. The enhanced structure features of DSII switchgear allows the

breakers to be positioned in the "connected," "test," "disconnected," or "remove" position with the breaker compartment door closed. This eliminates the danger of exposed live circuits or protruding breakers commonly associated with "through the door drawout" construction.

Compartmentalization of the drawout breakers is part of the standard construction. DS/DSL or DSII/DSLII circuit breakers are designed to ANSI standards C37.13, C37.16 and C37.17 in frame sizes ranging from 800A to 5000A.

Ratings

DSII Switchgear Bus	800 – 6000A
DSII/DSLII Breaker	15 – 5000A
Voltage	208 – 600V
Interrupting Capacity	30 – 200kA

Chronology

There have been five vintages of DS switchgear since the original design was manufactured in 1969. Today, many capabilities still exist to support the different vintages of DS switchgear.

REPLACEMENT CAPABILITIES

Cutler-Hammer offers an extensive amount of products to support DSII switchgear:

New DSII Air Circuit Breakers

New DSII circuit breakers are available for replacement or to fill existing vacant cells. All breakers are newly manufactured and are mechanically and electrically the same as the breakers originally specified and supplied.

DSII Circuit Breaker Provisions

Breaker provisions are required in switchgear when there is an existing space in a structure that is to be filled with a breaker. Provisions are available for all ratings and

include all parts required to complete the cell in accordance with the switchgear as originally supplied.

Factory Modification and Repair

Factory modifications and repairs are available for new or customer owned DSII circuit breakers. This UL approved service includes trip unit replacements, conversion from manually operated to electrically operated, breaker calibrations, and the addition of numerous accessories for the DSII and DSLII circuit breaker.

DSII Breaker Parts

An extensive inventory of newly manufactured renewal parts for DSII and DSLII circuit breakers are available.

DSII Switchgear Structure Parts

DSII switchgear parts are available for most DS designs. Newly manufactured replacement parts (such as doors, breaker provisions, lift trucks, metering, etc.) are available.

TECHNOLOGY UPGRADES



PowerNet Monitoring and Control System

IQ and PowerNet Communications Retrofits

Cutler-Hammer offers IQ products to replace existing analog meters, instruments, and protective relays with microprocessor-based solid-state true-RMS sensing devices.

IQ products can be furnished as components for field installation on the switchgear or can be provided as new replacement front panels. The new replacement door panels available for DS switchgear assemblies include the IQ devices mounted and wired. The instrument compartment door will fit all vintages of DS switchgear from 1968 to the present. Door panels can be supplied with analog instruments, breaker control devices, or any other device that will physically fit. The IQ products can be matched in numerous combinations to include the IQ Analyzer, IQ Data PlusII, IQ Data, IQ Generator, IQ Data Plus 4000/4100, and the Assemblies Electronic Monitor (AEMII). Communications can then be tied to the Cutler-Hammer PowerNet System.



DSII Circuit Breaker with Digitrip RMS Trip Unit Family (T510, T610, T810, T910)

Digitrip Trip Unit Retrofit Kits

Trip unit retrofit kits are available for all DB breaker frames. Refer to **pages 256-257** of this publication.



CUSTOMER REQUIRED INFORMATION

Procedure for Identifying Renewal Parts

For all switchgear requests, include information from the list at right to ensure that parts and breakers supplied will consist of correct options and settings. With the variety of switchgear vintages, the information is needed to supply the correct parts. There might be modifications needed to the breaker cell or the bus work to accommodate the breaker that will only be recognized by the drawings.

For all requests include the following:

- Shop Order Number
- Front View Drawing Number
- General Order Number (G0#)
- Manufacturing Date
- Item Number
- Metering Required
- Optional Relays
- CTs
- What changes have been made since equipment was originally installed in the field?

Requests requiring additional or replacement breakers also require the following information:

- Breaker Type
- Trip Rating
- MO or EO
- Trip Unit
- 3-wire or 4-wire
- Trip Settings (LSIG)
- Fixed or Drawout
- Which Compartment
- Any New Options

FURTHER INFORMATION

Product	Literature Number	Description
DB Breakers	RPD 32-254 LEL005A SA-11745	Renewal Parts Data for DB, DBL, DBF Breakers Sales Aid for the DB Remanufacture Program Sales Aid for Custom Fluidized Switchgear Bus
DS Breakers	RP.22B.01.TE	Renewal Parts Data for DS Breakers
DSII Breakers	RP.22B.02.TE	Renewal Parts Data for DSII Breakers
DS/DSII Switchgear Assemblies	RP.44B.01.TE LEL017	Renewal Parts Data for DS/DSII Switchgear Assemblies Sales Aid for the LV Switchgear Cell Retrofits using DS/DSL and SPB Breakers
DSII Switchgear and Breaker	SA-32-610A AD 32-650A	Sales Aid for DSII Low Voltage Switchgear Application Data for DSII Switchgear

PRICING INFORMATION

Product	Literature Number	Description
DS Breakers	PL.22G.01.PE	Price List for DS Breakers and Accessories, Discount Symbol DS-1
DSII Breakers	PL.22B.01.PE	Price List for DSII Breakers and Accessories
DS Breaker Parts	VISTA/VISTALINE	Discount Symbol Y1
DSII Breaker Parts	VISTA/VISTALINE	Discount Symbol Y1

R



PRODUCT DESCRIPTION

Application

Digitrip RMS trip unit retrofit kits are fully engineered, field installable retrofit kits that enable the user to completely replace an existing tripping system. They are applicable to (600 VAC) low-voltage power breakers and are designed for application on both Westinghouse and non-Westinghouse power breakers.

Digitrip RMS trip unit retrofit kits provide true RMS sensing, the most accurate and current

state-of-the-art technology for measuring amperage loads. True RMS sensing removes the possibility of false tripping due to harmonic distortion of the power waveform and enables greater accuracy in selective coordination of the power distribution system. The microprocessor-based Digitrip trip unit also allows communications for remote monitoring to a host computer or local Assemblies Electronic Monitor (AEM) via the Integrated Monitoring Protection and Control Communications (PowerNet) communication system.

Ratings

Digitrip RMS trip unit retrofit kits are available for a wide variety of both Westinghouse and non-Westinghouse low-voltage power breaker frames. Ratings range from 100 amperes to 4000 amperes. Multitapped CTs, interchangeable rating plugs, programmable pickup and time delay settings provide the user with flexibility.

PRODUCT HISTORY

Originally a Westinghouse Product

In the past there have been three types of automatic control for low voltage power breakers: electromechanical trip units, solid-state peak sensing trip units, and state-of-the-art true RMS sensing trip units.

Electromechanical Trip Units:

Electromechanical trip units were initially used in the early 1940s and phased out by all manufacturers in the mid-1970s.

Westinghouse used these trip devices on types DA and DK power circuit breakers. They were also used initially on the DB power circuit breaker. The electromechanical trip units were the conventional form of protection on all manufacturers' breakers, up until the 1970s.

Electromechanical trip units were composed of a solenoid, springs, a diaphragm, seals, and air venting apertures. Three trip units were required per breaker. Due to age or harsh environments these devices would fail or lose calibration. They required a great deal of preventative maintenance.

Solid State Peak Sensing Trip Units:

In 1970, the Amptector Trip Unit was introduced as the standard trip unit on the Westinghouse type DS power circuit breaker. The Amptector solid-state trip system provided much greater accuracy and reliability and included new features like ground fault (G) protection, mode of trip indication, and the ability to perform secondary injection testing.

Electromechanical trip devices immediately became obsolete, creating a retrofit market. Amptector retrofit kits were introduced to convert the type DB breakers that had been factory equipped with the electromechanical type trip units.

In 1976, the POW-R-Trip 7 trip unit was introduced on the Westinghouse SPB insulated case power circuit breaker. A more simplified version with only two trip functions, known as the POW-R-Trip; became available in 1978. Then in 1982 the POW-R Digitrip trip unit became available and offered on the SPB breakers.

In 1985, RK trip units and retrofit kits were introduced to provide a solid-state trip unit small enough to retrofit General Electric breakers as well as the Westinghouse type DB breakers.

Peak sensing trip units were an improvement and provided improved reliability and accuracy. Only one trip unit was required per breaker; however, peak sensing trip units were not able to handle harmonic conditions. They caused nuisance tripping and unnecessary downtime.

True RMS Sensing Trip Units:

In 1987, Westinghouse introduced the Digitrip II RMS trip unit (standard version) for use on type DS and SPB power circuit breakers. Digitrip II RMS was the first microprocessor-based true RMS sensing trip unit.

True RMS trip units enabled the measuring of current rather than the sensing of current. Since they are microprocessor-based digital devices, they are capable of taking discrete samples of the current waveform in each phase. By applying a mathematical algorithm, the current is accurately mapped out and measured. This method of measurement provides the ability to adapt to a changing harmonic content while providing repeatable and reliable protection.

PRODUCT HISTORY TIMELINE

Page	Product	1955	1960	1965	1970	1975	1980	1985	1990	1995	Present	
	Electromechanical Trip Devices (DB Breakers)	[Timeline bar from 1955 to 1970]										
	Amptector Trip Units and Accessories (DS Breakers)	[Timeline bar from 1970 to 1995]										
	Amptector Retrofit Kits, Trip Units, and Accessories (DB Breakers)	[Timeline bar from 1970 to 1995]										
	POW-R-Trip 7 Trip Units (SPB Breakers)	[Timeline bar from 1976 to 1995]										
	POW-R-Trip Trip Units (SPB Breakers)	[Timeline bar from 1978 to 1995]										
	POW-R Digitrip I Trip Units (SPB Breakers)	[Timeline bar from 1982 to 1995]										
250	Rating Plugs	[Timeline bar from 1975 to 1995]										
	RK Retrofit Kits, Trip Units, and Accessories (DB Breakers)	[Timeline bar from 1985 to 1995]										
	RK Retrofit Kits, Trip Units, and Accessories (GE AK-2A Breakers)	[Timeline bar from 1985 to 1995]										
247	Digitrip II RMS Trip Units (RMS500, RMS600, RMS700, RMS800)	[Timeline bar from 1987 to 1995]										
247	Digitrip III RMS Trip Units (RMS510, RMS610, RMS810, RMS910)	[Timeline bar from 1987 to 1995]										
255	• Westinghouse DA and DK Breakers	[Timeline bar from 1940 to 1970]										
256	• Westinghouse DB Breakers	[Timeline bar from 1940 to 1970]										
258	• Westinghouse DS Breakers	[Timeline bar from 1970 to 1995]										
260	• Westinghouse SPB Breakers	[Timeline bar from 1970 to 1995]										
262	• GE AK-1, AK-2/2A, AK-3/3A, AKR-50, AL-2EO, AL-2-50 Breakers	[Timeline bar from 1985 to 1995]										
266	• Allis Chalmers LA Series Breakers	[Timeline bar from 1985 to 1995]										
268	• ITE K-Line Breakers	[Timeline bar from 1985 to 1995]										
271	• Siemens - Allis Breakers	[Timeline bar from 1985 to 1995]										
272	• Federal Pacific Breakers	[Timeline bar from 1985 to 1995]										
273	• Other Breakers	[Timeline bar from 1985 to 1995]										



GENERAL INFORMATION

State-of-the-Art Features

Digitrip RMS trip unit retrofit kits come in several different model types. Among these types, they provide a variety of accommodating features (see table below).

True RMS measurement and protection. Extremely accurate and able to compensate for harmonic content and disturbances.

Ground fault may be added to an existing power breaker. Ground fault is offered in a 3-wire and a 4-wire version.

Zone interlocking is available on the short time and ground fault modes of protection. This enables enhanced selectivity for high fault and ground fault coordination between the main and feeder breakers.

Local monitoring via a display. A red Light Emitting Diode (LED) display enables the user to step through and read currents and energy readings for each phase and ground.

Communications via the PowerNet system. This allows all pertinent information, regarding static and dynamic operation of the breaker, to be remotely monitored either by a host computer or IQ AEM. This facilitates energy management and power management. Remember:

"If you can't measure it, you can't manage it."

The Packaged Kit

Each Digitrip RMS trip unit retrofit kit includes a Digitrip trip unit, an auxiliary CT module, a Direct Trip Actuator (DTA), qty. (3) current sensors, a rating plug, interconnecting wiring harnesses, mounting brackets, copper connectors (when required), hardware, and installation instructions. Digitrip RMS retrofit kits are complete tripping systems engineered specifically for each breaker type and frame rating. All kits are designed for field installation.

Application and Service Condition

In order to ensure that Digitrip RMS trip unit retrofit kits are successfully applied, installation must only be done by a qualified individual.

Appropriate testing must be performed to qualify the retrofitted breaker prior to placing the breaker in service. Digitrip RMS trip unit retrofit kits will provide protection based on their published time-current curves when the breaker is properly maintained and operated in accordance with the original manufacturer's specification and instructions.

Service Life

The physical structure, the bus assemblies, and control wiring of switchgear are normally in good condition. The replacement of the trip system coupled along with either refurbishment or reconditioning of the breaker will prolong the life of the switchgear and provide modern state-of-the-art protection.

Availability

Digitrip RMS trip unit retrofit kits are currently available for select breaker frames from the following manufacturers:

Westinghouse	General Electric
ITE	Allis-Chalmers
Siemens-Allis	Federal Pacific
Roller Smith	

Order Information

In order to obtain the proper kit, the following information should be provided to your authorized Cutler-Hammer distributor: breaker manufacturer, breaker frame designation, breaker frame rating, breaker continuous current rating, kit type (see table below) (i.e., RMS510...RMS810), modes of protection, sensor rating, rating plug rating.

FUNCTIONAL COMPARISONS OF TRIP UNITS

Past Technology					Features	Present Technology				
RMS 500	RMS 500 Zone	RMS 600	RMS 700	RMS 800		RMS 510	RMS 510 Zone	RMS 610	RMS 810	RMS 910
●	●	●	●	●	Cause of trip LED indicators	●	●	●	●	●
●	●	●	●	●	Integral self test	●	●	●	●	●
●	●	●	●	●	Trip reset button	●	●	●	●	●
●	●	●	●	●	Hardware driven thermal memory					
					Software driven thermal memory (sel. O/O)	●	●	●	●	●
●	●	●	●	●	Discriminator circuit on LS and LSG protection modes					
					Discriminator circuit on LS and LSG protection modes selectable (on/off)	●	●	●	●	●
	●	●	●	●	Zone protective interlocking for short time and ground fault modes of protection		●	●	●	●
	●	●	●	●	Auxiliary contact for long time, short circuit, and ground fault functions		●	●	●	●
		●	●	●	Local display of phase currents			●	●	●
		●	●	●	Local display of ground currents			●	●	●
		●	●	●	Local display of cause of trip			●	●	●
				●	Local display of energy (MWh)				●	●
				●	Local display of peak demand (MW)				●	●
				●	Local display of present demand (MW)				●	●
			●	●	Communication with PowerNet communicated data includes: All display values, trip unit status, high load alarm, cause of trip, rating plug status, breaker status, reason for breaker status				●	●
					Trip settings				●	●
					Power factor				●	●
			●	●	Control via the PowerNet system (open/close)				●	●
					Voltage phase-to-phase, displayed on trip unit and communicated via PowerNet communications.					●
					Total harmonic distortion (THD); phase A, B, C. Displayed on trip unit and communicated via PowerNet communications.					●
					Total harmonic distortion per harmonic from the 2nd through the 27th harmonic displayed on trip unit and communicated via PowerNet communications.					●
					System power factor. Displayed on trip unit and communicated via PowerNet communications.					●

S

SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Trip Units for Power Circuit Breakers



REPLACEMENT CAPABILITIES

Digitrip RMS Trip Unit Replacement

When a Digitrip RMS trip unit requires replacement, it can be replaced directly using the enclosed charts. Observe the following restrictions:

1. The group function (G) cannot be added in the field just by changing the trip unit.

Trip Functions

All Digitrip RMS retrofit kit types are available with the necessary combinations of Long, Short, Instantaneous, and Ground Fault (LSIG) modes of protection as depicted and deemed necessary by industry standards.

The combinations of modes of protection are:

LI	LS
LSI	LIG
LSG	LSIG

Rating Plug Replacement

When changing or replacing rating plugs, use the charts provided on **pages 251-253** for DS, SPB and all other retrofitted breakers.

Standard Retrofit RMS Replacement Trip Units for DS and SPB Breakers

Past Technology				Present Technology			
Digitrip Model	Protective Functions	Catalog Number	Style Number	Digitrip Model	Protective Functions	Catalog Number	Style Number
RMS 500	LI	T51BLI	1230C97G01	RMS 510	LI	S51LI	7829C05G01
	LSI	T52BLSI	1230C97G02		LSI	S52LSI	7829C05G02
	LS	T53BLS	1230C97G03		LS	S53LS	7829C05G03
	LIG	T54BLIG	1230C97G04		LIG	S54LIG	7829C05G04
	LSG	T55BLSG	1230C97G05		LSG	S55LSG	7829C05G05
	LSIG	T56BLSIG	1230C97G06		LSIG	S56LSIG	7829C05G06
RMS 600	LI	T61BLI	1230C97G07	RMS 610	LI	S61LI	7829C10G01
	LSI	T62BLSI	1230C97G08		LSI	S62LSI	7829C10G02
	LS	T63BLS	1230C97G09		LS	S63LS	7829C10G03
	LIG	T64BLIG	1230C97G10		LIG	S64LIG	7829C10G04
	LSG	T65BLSG	1230C97G11		LSG	S65LSG	7829C10G05
	LSIG	T66BLSIG	1230C97G12		LSIG	S66LSIG	7829C10G06
RMS 700	LI	T71BLI	1230C97G19	There is no direct replacement for Digitrip RMS 700. Use Digitrip RMS 810 or 910. See below.			
	LSI	T72BLSI	1230C97G20				
	LS	T73BLS	1230C97G21				
	LIG	T74BLIG	1230C97G22				
	LSG	T75BLSG	1230C97G23				
	LSIG	T76BLSIG	1230C97G24				
RMS 800	LI	T81BLI	1230C97G13	RMS 810	LI	S81LI	7829C08G01
	LSI	T82BLSI	1230C97G14		LSI	S82LSI	7829C08G02
	LS	T83BLS	1230C97G15		LS	S83LS	7829C08G03
	LIG	T84BLIG	1230C97G16		LIG	S84LIG	7829C08G04
	LSG	T85BLSG	1230C97G17		LSG	S85LSG	7829C08G05
	LSIG	T86BLSIG	1230C97G18		LSIG	S86LSIG	7829C08G06
				RMS 910	LI	S91LI	7829C09G01
					LSI	S92LSI	7829C09G02
					LS	S93LS	7829C09G03
					LIG	S94LIG	7829C09G04
					LSG	S95LSG	7829C09G05
					LSIG	S96LSIG	7829C09G06

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910. From 1989-1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units.

Remember when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.

Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units.**

Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Trip Units for Power Circuit Breakers

REPLACEMENT CAPABILITIES, *Continued*

Horizontal Retrofit RMS/R Replacement Trip Units for all Other Breakers

Past Technology				Present Technology			
Digitrip Model	Protective Functions	Catalog Number	Style Number	Digitrip Model	Protective Functions	Catalog Number	Style Number
RMS/R 500 Horizontal	LI	RH51BLI	1232C84G01	RMS 510	LI	SRH51LI	7801C36G01
	LSI	RH52BLSI	1232C84G02		LSI	SRH52LSI	7801C36G02
	LS	RH53BLS	1232C84G03		LS	SRH53LS	7801C36G03
	LIG	RH54BLIG	1232C84G04		LIG	SRH54LIG	7801C36G04
	LSG	RH55BLSG	1232C84G05		LSG	SRH55LSG	7801C36G05
LSIG	RH56BLSIG	1232C84G06	LSIG	SRH56LSIG	7801C36G06		
RMS/R 600 Horizontal	LI	RH61BLI	1232C84G07	RMS 610	LI	SRH61LI	7801C46G01
	LSI	RH62BLSI	1232C84G08		LSI	SRH62LSI	7801C46G02
	LS	RH63BLS	1232C84G09		LS	SRH63LS	7801C46G03
	LIG	RH64BLIG	1232C84G10		LIG	SRH64LIG	7801C46G04
	LSG	RH65BLSG	1232C84G11		LSG	SRH65LSG	7801C46G05
LSIG	RH66BLSIG	1232C84G12	LSIG	SRH66LSIG	7801C46G06		
RMS/R 700 Horizontal	LI	RH71BLI	1232C84G19	There is no direct replacement for Digitrip RMS/R 700 Horizontal. Use Digitrip RMS 810 or 910. See below.			
	LSI	RH72BLSI	1232C84G20				
	LS	RH73BLS	1232C84G21				
	LIG	RH74BLIG	1232C84G22				
	LSG	RH75BLSG	1232C84G23				
LSIG	RH76BLSIG	1232C84G24					
RMS/R 800 Horizontal	LI	RH81BLI	1232C84G13	RMS 810	LI	SRH81LI	7801C48G01
	LSI	RH82BLSI	1232C84G14		LSI	SRH82LSI	7801C48G02
	LS	RH83BLS	1232C84G15		LS	SRH83LS	7801C48G03
	LIG	RH84BLIG	1232C84G16		LIG	SRH84LIG	7801C48G04
	LSG	RH85BLSG	1232C84G17		LSG	SRH85LSG	7801C48G05
LSIG	RH86BLSIG	1232C84G18	LSIG	SRH86LSIG	7801C48G06		
				RMS 910	LI	SRH91LI	7801C49G01
					LSI	SRH92LSI	7801C49G02
					LS	SRH93LS	7801C49G03
					LIG	SRH94LIG	7801C49G04
					LSG	SRH95LSG	7801C49G05
				LSIG	SRH96LSIG	7801C49G06	

Vertical Retrofit RMS/R Replacement Trip Units for all Other Breakers

RMS/R 500 Vertical	LI	RV51BLI	1232C97G01	RMS 510	LI	SRV51LI	7801C37G01
	LSI	RV52BLSI	1232C97G02		LSI	SRV52LSI	7801C37G02
	LS	RV53BLS	1232C97G03		LS	SRV53LS	7801C37G03
	LIG	RV54BLIG	1232C97G04		LIG	SRV54LIG	7801C37G04
	LSG	RV55BLSG	1232C97G05		LSG	SRV55LSG	7801C37G05
LSIG	RV56BLSIG	1232C97G06	LSIG	SRV56LSIG	7801C37G06		
RMS/R 600 Vertical	LI	RV61BLI	1232C97G07	RMS 610	LI	SRV61LI	7801C41G01
	LSI	RV62BLSI	1232C97G08		LSI	SRV62LSI	7801C41G02
	LS	RV63BLS	1232C97G09		LS	SRV63LS	7801C41G03
	LIG	RV64BLIG	1232C97G10		LIG	SRV64LIG	7801C41G04
	LSG	RV65BLSG	1232C97G11		LSG	SRV65LSG	7801C41G05
LSIG	RV66BLSIG	1232C97G12	LSIG	SRV66LSIG	7801C41G06		
RMS/R 700 Vertical	LI	RV71BLI	1232C97G19	There is no direct replacement for Digitrip RMS/R 700 Vertical. Use Digitrip RMS 810 or 910. See below.			
	LSI	RV72BLSI	1232C97G20				
	LS	RV73BLS	1232C97G21				
	LIG	RV74BLIG	1232C97G22				
	LSG	RV75BLSG	1232C97G23				
LSIG	RV76BLSIG	1232C97G24					
RMS/R 800 Vertical	LI	RV81BLI	1232C97G13	RMS 810	LI	SRV81LI	7801C42G01
	LSI	RV82BLSI	1232C97G14		LSI	SRV82LSI	7801C42G02
	LS	RV83BLS	1232C97G15		LS	SRV83LS	7801C42G03
	LIG	RV84BLIG	1232C97G16		LIG	SRV84LIG	7801C42G04
	LSG	RV85BLSG	1232C97G17		LSG	SRV85LSG	7801C42G05
LSIG	RV86BLSIG	1232C97G18	LSIG	SRV86LSIG	7801C42G06		
				RMS 910	LI	SRV91LI	7801C43G01
					LSI	SRV92LSI	7801C43G02
					LS	SRV93LS	7801C43G03
					LIG	SRV94LIG	7801C43G04
					LSG	SRV95LSG	7801C43G05
				LSIG	SRV96LSIG	7801C43G06	

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910. From 1989-1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units.

Remember when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.

Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units.**

Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.



INTRODUCTION AND DESCRIPTION

Rating plugs for Digitrip RMS Trip Units determine the continuous current rating of the circuit breaker. All protection function settings on the face of the trip unit are expressed in per unit multiples of the rating plug ampere rating (I_n).

The rating plug is interlocked with the tripping mechanism to automatically "open" the breaker when the plug is removed. The breaker will remain "trip free" with the plug removed.



SPB Rating Plug and Details

SPB rating plugs must be selected to match the desired continuous current rating of the breaker as well as the frame rating and the system frequency, i.e., 50 or 60 Hz.

DS and retrofit rating plugs must be selected to match the desired continuous current rating of the breaker, the sensor tap setting and the system frequency, i.e., 50 or 60 Hz.

Rating plugs are equipped with a backup battery to maintain the mode of trip operation following a circuit breaker tripping

when external power is not available. The battery is a long-life lithium type, that is accessible from the front of the trip unit, without removing the rating plug.

Replacement types and instructions are provided in Application Data 33-855.

Following a trip operation and with no supplementary control power available, the battery will maintain the mode of trip LED for approximately 60 hours.



Rating Plug for all Other Retrofitted Breakers



DS Rating Plug

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910. From 1989-1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units.

Remember when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.

Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units.**

Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Rating Plugs

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REPLACEMENT CAPABILITIES

Rating Plugs for DS Breakers

Past Technology (500/600/700/800)				Present Technology (510/610/810/910)			
Sensor Tap Connection	Rating Plug Rating	60 Hz ^① Catalog Number	60 Hz ^① Style Number	Sensor Tap Connection	Rating Plug Rating	50/60 Hz Catalog Number ^②	50/60 Hz Style Number ^②
200	100	PD6D02A010	2613D10G01	200	100	RP6D02A010	3D86734G01
200	200	PD6D02A020	2613D10G02	200	200	RP6D02A020	3D86734G02
300	200	PD6D03A020	2613D10G03	300	200	RP6D03A020	3D86734G03
300	250	PD6D03A025	2613D10G04	300	250	RP6D03A025	3D86734G04
300	300	PD6D03A030	2613D10G05	300	300	RP6D03A030	3D86734G05
400	200	PD6D04A020	2613D10G06	400	200	RP6D04A020	3D86734G06
400	250	PD6D04A025	2613D10G07	400	250	RP6D04A025	3D86734G07
400	300	PD6D04A030	2613D10G08	400	300	RP6D04A030	3D86734G08
400	400	PD6D04A040	2613D10G09	400	400	RP6D04A040	3D86734G09
600	300	PD6D06A030	2613D10G10	600	300	RP6D06A030	3D86734G10
600	400	PD6D06A040	2613D10G11	600	400	RP6D06A040	3D86734G11
600	600	PD6D06A060	2613D10G12	600	600	RP6D06A060	3D86734G12
800	400	PD6D08A040	2613D10G13	800	400	RP6D08A040	3D86734G13
800	600	PD6D08A060	2613D10G14	800	600	RP6D08A060	3D86734G14
800	800	PD6D08A080	2613D10G15	800	800	RP6D08A080	3D86734G15
1200	600	PD6D12A060	2613D10G16	1200	600	RP6D12A060	3D86734G16
1200	800	PD6D12A080	2613D10G17	1200	800	RP6D12A080	3D86734G17
1200	1000	PD6D12A100	2613D10G18	1200	1000	RP6D12A100	3D86734G18
1200	1200	PD6D12A120	2613D10G19	1200	1200	RP6D12A120	3D86734G19
1600	800	PD6D16A080	2613D10G20	1600	800	RP6D16A080	3D86734G20
1600	1000	PD6D16A100	2613D10G21	1600	1000	RP6D16A100	3D86734G21
1600	1200	PD6D16A120	2613D10G22	1600	1200	RP6D16A120	3D86734G22
1600	1600	PD6D16A160	2613D10G23	1600	1600	RP6D16A160	3D86734G23
2000	1000	PD6D20A100	2613D10G24	2000	1000	RP6D20A100	3D86734G24
2000	1200	PD6D20A120	2613D10G25	2000	1200	RP6D20A120	3D86734G25
2000	1600	PD6D20A160	2613D10G26	2000	1600	RP6D20A160	3D86734G26
2000	2000	PD6D20A200	2613D10G27	2000	2000	RP6D20A200	3D86734G27
2400	1600	PD6D24A160	2613D10G28	2400	1600	RP6D24A160	3D86734G28
2400	2000	PD6D24A200	2613D10G29	2400	2000	RP6D24A200	3D86734G29
2400	2400	PD6D24A240	2613D10G30	2400	2400	RP6D24A240	3D86734G30
3200	1600	PD6D32A160	2613D10G31	3200	1600	RP6D32A160	3D86734G31
3200	2000	PD6D32A200	2613D10G32	3200	2000	RP6D32A200	3D86734G32
3200	2400	PD6D32A240	2613D10G33	3200	2400	RP6D32A240	3D86734G33
3200	3200	PD6D32A320	2613D10G34	3200	3200	RP6D32A320	3D86734G34
4000	2000	PD6D40A200	2613D10G35	4000	2000	RP6D40A200	3D86734G35
4000	2400	PD6D40A240	2613D10G36	4000	2400	RP6D40A240	3D86734G36
4000	3200	PD6D40A320	2613D10G37	4000	3200	RP6D40A320	3D86734G37
4000	4000	PD6D40A400	2613D10G38	4000	4000	RP6D40A400	3D86734G38

NOTE: Choose the rating plug to match the continuous current rating and the sensor tap selected.

When ordering as part of a retrofit kit, refer to **pages 254 thru 273**.

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910. From 1989-1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units.

Remember when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.

Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units.**

Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.

① 50 Hz rating plugs are available. Contact Cutler-Hammer for details.

② Rating plugs may be ordered separately by above style number or as part of a complete retrofit kit.



REPLACEMENT CAPABILITIES, *Continued*

Rating Plugs for SPB Breakers

Past Technology (500/600/700/800)				Present Technology (510/610/810/910)			
Sensor Tap Connection	Rating Plug Rating	60 Hz ^⓪ Catalog Number	60 Hz ^⓪ Style Number	Sensor Tap Connection	Rating Plug Rating	50/60 Hz Catalog Number ^⓪	50/60 Hz Style Number ^⓪
400	200	PD6S04A020	2613D09G01	400	200	RP6S04A020	3D86737G01
400	250	PD6S04A025	2613D09G02	400	250	RP6S04A025	3D86737G02
400	300	PD6S04A030	2613D09G03	400	300	RP6S04A030	3D86737G03
400	400	PD6S04A040	2613D09G04	400	400	RP6S04A040	3D86737G04
800	400	PD6S08A040	2613D09G05	800	400	RP6S08A040	3D86737G05
800	600	PD6S08A060	2613D09G07	800	600	RP6S08A060	3D86737G07
800	800	PD6S08A080	2613D09G08	800	800	RP6S08A080	3D86737G08
1200	600	PD6S12A060	2613D09G09	1200	600	RP6S12A060	3D86737G09
1200	800	PD6S12A080	2613D09G10	1200	800	RP6S12A080	3D86737G10
1200	1000	PD6S12A100	2613D09G11	1200	1000	RP6S12A100	3D86737G11
1200	1200	PD6S12A120	2613D09G12	1200	1200	RP6S12A120	3D86737G12
1600	800	PD6S16A080	2613D09G13	1600	800	RP6S16A080	3D86737G13
1600	1000	PD6S16A100	2613D09G14	1600	1000	RP6S16A100	3D86737G14
1600	1200	PD6S16A120	2613D09G15	1600	1200	RP6S16A120	3D86737G15
1600	1600	PD6S16A160	2613D09G16	1600	1600	RP6S16A160	3D86737G16
2000C	1000	PD6S21A100	2613D09G17	2000C	1000	RP6S21A100	3D86737G17
2000C	1200	PD6S21A120	2613D09G18	2000C	1200	RP6S21A120	3D86737G18
2000C	1600	PD6S21A160	2613D09G19	2000C	1600	RP6S21A160	3D86737G19
2000C	2000	PD6S21A200	2613D09G20	2000C	2000	RP6S21A200	3D86737G20
2000	1600	PD6S20A160	2613D09G21	2000	1600	RP6S20A160	3D86737G21
2000	2000	PD6S20A200	2613D09G22	2000	2000	RP6S20A200	3D86737G22
2500	1600	PD6S25A160	2613D09G23	2500	1600	RP6S25A160	3D86737G23
2500	2000	PD6S25A200	2613D09G24	2500	2000	RP6S25A200	3D86737G24
2500	2500	PD6S25A250	2613D09G25	2500	2500	RP6S25A250	3D86737G25
3000	1600	PD6S30A160	2613D09G26	3000	1600	RP6S30A160	3D86737G26
3000	2000	PD6S30A200	2613D09G27	3000	2000	RP6S30A200	3D86737G27
3000	2500	PD6S30A250	2613D09G28	3000	2500	RP6S30A250	3D86737G28
3000	3000	PD6S30A300	2613D09G29	3000	3000	RP6S30A300	3D86737G29
4000	2000	PD6S40A200	2613D09G30	4000	2000	RP6S40A200	3D86737G30
4000	2500	PD6S40A250	2613D09G31	4000	2500	RP6S40A250	3D86737G31
4000	3000	PD6S40A300	2613D09G32	4000	3000	RP6S40A300	3D86737G32
4000	3200	PD6S40A320	2613D09G33	4000	3200	RP6S40A320	3D86737G33
4000	4000	PD6S40A400	2613D09G34	4000	4000	RP6S40A400	3D86737G34
5000	3000	PD6S50A300	2613D09G35	5000	3000	RP6S50A300	3D86737G35
5000	3200	PD6S50A320	2613D09G36	5000	3200	RP6S50A320	3D86737G36
5000	4000	PD6S50A400	2613D09G37	5000	4000	RP6S50A400	3D86737G37
5000	5000	PD6S50A500	2613D09G38	5000	5000	RP6S50A500	3D86737G38

NOTE: Choose the rating plug to match the continuous current rating and the sensor tap selected.

When ordering as part of a retrofit kit, refer to **pages 254 thru 273**.

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910. From 1989-1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units.

Remember when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.

Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units.**

Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.

⓪ 50 Hz rating plugs are available. Contact Cutler-Hammer for details.

⓪ Rating plugs may be ordered separately by above style number or as part of a complete retrofit kit.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Rating Plugs

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REPLACEMENT CAPABILITIES, *Continued*

Rating Plugs for All Other Breakers

Past Technology (500/600/700/800)				Present Technology (510/610/810/910)			
Sensor Tap Connection	Rating Plug Rating	60 Hz [Ⓛ] Catalog Number	60 Hz [Ⓛ] Style Number	Sensor Tap Connection	Rating Plug Rating	50/60 Hz Catalog Number [Ⓢ]	50/60 Hz Style Number [Ⓢ]
200	100	PR6A02A010	3D86709G01	200	100	RP6A02A010	3D86766G01
200	200	PR6A02A020	3D86709G02	200	200	RP6A02A020	3D86766G02
250	250	PR6A02A025	3D86709G11	250	250	RP6A02A025	3D86766G11
300	200	PR6A03A020	3D86709G36	300	200	RP6A03A020	3D86766G36
300	250	PR6A03A025	3D86709G12	300	250	RP6A03A025	3D86766G12
300	300	PR6A03A030	3D86709G37	300	300	RP6A03A030	3D86766G37
400	200	PR6A04A020	3D86709G13	400	200	RP6A04A020	3D86766G13
400	250	PR6A04A025	3D86709G14	400	250	RP6A04A025	3D86766G14
400	300	PR6A04A030	3D86709G15	400	300	RP6A04A030	3D86766G15
400	400	PR6A04A040	3D86709G03	400	400	RP6A04A040	3D86766G03
600	300	PR6A06A030	3D86709G16	600	300	RP6A06A030	3D86766G16
600	400	PR6A06A040	3D86709G17	600	400	RP6A06A040	3D86766G17
600	600	PR6A06A060	3D86709G04	600	600	RP6A06A060	3D86766G04
800	400	PR6A08A040	3D86709G18	800	400	RP6A08A040	3D86766G18
800	600	PR6A08A060	3D86709G19	800	600	RP6A08A060	3D86766G19
800	800	PR6A08A080	3D86709G05	800	800	RP6A08A080	3D86766G05
1200	600	PR6A12A060	3D86709G20	1200	600	RP6A12A060	3D86766G20
1200	800	PR6A12A080	3D86709G21	1200	800	RP6A12A080	3D86766G21
1200	1000	PR6A12A100	3D86709G22	1200	1000	RP6A12A100	3D86766G22
1200	1200	PR6A12A120	3D86709G10	1200	1200	RP6A12A120	3D86766G10
1600	800	PR6A16A080	3D86709G23	1600	800	RP6A16A080	3D86766G23
1600	1000	PR6A16A100	3D86709G24	1600	1000	RP6A16A100	3D86766G24
1600	1200	PR6A16A120	3D86709G25	1600	1200	RP6A16A120	3D86766G25
1600	1600	PR6A16A160	3D86709G06	1600	1600	RP6A16A160	3D86766G06
2000	1000	PR6A20A100	3D86709G26	2000	1000	RP6A20A100	3D86766G26
2000	1200	PR6A20A120	3D86709G27	2000	1200	RP6A20A120	3D86766G27
2000	1600	PR6A20A160	3D86709G28	2000	1600	RP6A20A160	3D86766G28
2000	2000	PR6A20A200	3D86709G07	2000	2000	RP6A20A200	3D86766G07
3000	1600	PR6A30A160	3D86709G29	3000	1600	RP6A30A160	3D86766G29
3000	2000	PR6A30A200	3D86709G30	3000	2000	RP6A30A200	3D86766G30
3000	2500	PR6A30A250	3D86709G31	3000	2500	RP6A30A250	3D86766G31
3000	3000	PR6A30A300	3D86709G08	3000	3000	RP6A30A300	3D86766G08
3200	1600	PR6A32A160	3D86709G39	3200	1600	RP6A32A160	3D86766G39
3200	2000	PR6A32A200	3D86709G40	3200	2000	RP6A32A200	3D86766G40
3200	2400	PR6A32A240	3D86709G41	3200	2400	RP6A32A240	3D86766G41
3200	3200	PR6A32A320	3D86709G42	3200	3200	RP6A32A320	3D86766G42
4000	2000	PR6A40A200	3D86709G32	4000	2000	RP6A40A200	3D86766G32
4000	2500	PR6A40A250	3D86709G33	4000	2500	RP6A40A250	3D86766G33
4000	3000	PR6A40A300	3D86709G34	4000	3000	RP6A40A300	3D86766G34
4000	3200	PR6A40A320	3D86709G35	4000	3200	RP6A40A320	3D86766G35
4000	4000	PR6A40A400	3D86709G09	4000	4000	RP6A40A400	3D86766G09

NOTE: Choose the rating plug to match the continuous current rating and the sensor tap selected.

When ordering as part of a retrofit kit, refer to **pages 254 thru 273**.

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910. From 1989-1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units. Remember when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.

Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units.**

Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.

Ⓛ 50 Hz rating plugs are available. Contact Cutler-Hammer for details.

Ⓢ Rating plugs may be ordered separately by above style number or as part of a complete retrofit kit.



CUSTOMER REQUIRED INFORMATION

How To Select A Retrofit Kit

To properly select a retrofit kit, the following information is required:

- Breaker Nameplate Information
 - Manufacturer
 - Breaker Type
 - Ampere Frame Size
 - Manually or Electrically Operated
- Drawout or Fixed Mounting
- Fused or Non-Fused
- Digitrip Trip Unit Type Required
 - 510, 610, 810, 910
- Protective Functions Required
 - LI, LSI, LS, LIG, LSG, LSIG

- Continuous Current Rating Required (Trip Rating of Breaker)
- 3-wire or 4-wire system (determines number of sensors required)

To properly select options, the following questions need to be answered:

- Will customer supply 120 VAC control power or is breaker-mounted CPT needed?
 - applies only to Digitrip 610, 810, and 910
- Are zone interlocks required?
- Does the application require relay outputs from the Digitrip 610, 810, or 910 for remote indication?
- Does the breaker have an existing Amptector or Digitrip Trip Unit installed? If so, what is it?

How To Generate A Catalog Number

Refer to **pages 255-273** to view the Retrofit Kit Catalog Numbers for specific breaker manufacturers and frames. When used in

conjunction with the information obtained from the section above, these pages con-

tain all the information necessary to generate a Catalog Number.

How To Price A Kit

To correctly price a Low Voltage Digitrip Retrofit Kit, refer to the Retrofit Kit Product Guide. It is also available on FRED II

(412-937-6400) as Document #9375487. This Product Guide includes base prices,

adders and options for all Low Voltage Digitrip Retrofit Kits.

ACCESSORIES

Catalog Number	Style Number	Description
PRTAAPM	1267C16G01	Aux. Power Module
	8779C02G02	Amptector and Digitrip Test Set (Tests for both)
	6503C53G01	Amptector Adapter Harness
	6503C54G01	Amptector 2-Piece Adapter Harness (Test Set Half)
	6503C55G01	Amptector 2-Piece Adapter Harness (Breaker Half)
	6502C83G01	External Harness (Zone Interlock Shorting Plug)
	8259A91G05	Auxiliary CPT Kit (Non-DS)
	8259A91G06	Auxiliary CPT Kit (DS)
	6506C34G01	Simplified Cell Harness 1 ft.
	6506C34G02	Simplified Cell Harness 6 ft.
	6506C34G03	Simplified Cell Harness 4 ft.

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910. From 1989-1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units. Remember when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.

Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units.**

Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.

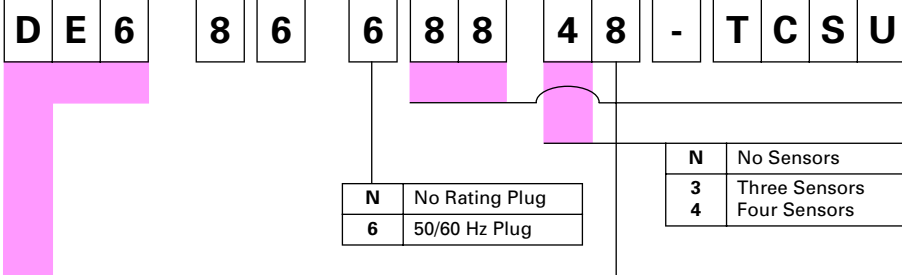
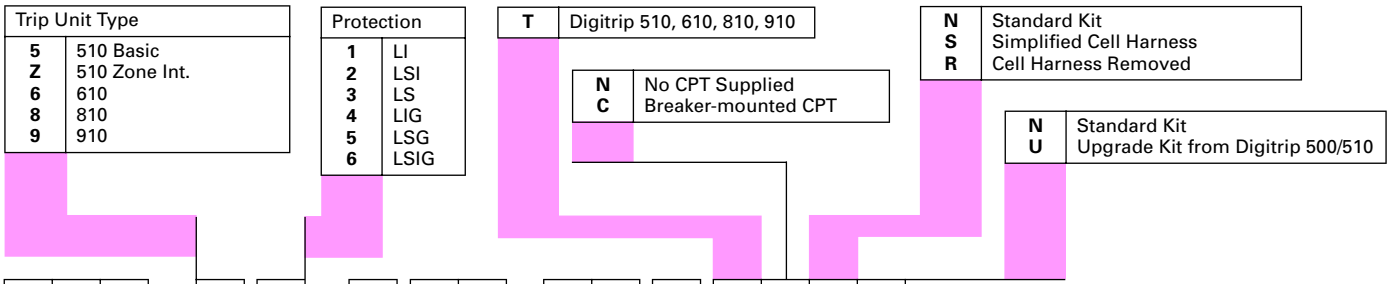


SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip Retrofit Kits for Westinghouse DA and DK Breakers

255

CATALOG NUMBER



Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
DE2	DK-15	2	200
DE6	DK-25	6	600
		4	400
		2	200
DT8 DW8	DA-50-800 Manual "Tulip" Clusters "Spring Wrapped" Finger Cluster	8	800, 400
DTC DWC DEH	DA-50-1600 Manual "Tulip" Finger Cluster "Spring Wrapped" Finger Cluster DA-75 Electric & Manual	C	1600, 800
		8	800, 400
		H	3000

RP Cat. Code	No Rating Plug Current Rating	
	Tap	Plug
21	200	100
22	200	200
32	300	200
3Q	300	250
33	300	300
42	400	200
4Q	400	250
43	400	300
44	400	400
63	600	300
64	600	400
66	600	600
84	800	400
86	800	600
88	800	800
T6	1200	600
T8	1200	800
TA	1200	1000
TT	1200	1200
C8	1600	800
CA	1600	1000
CT	1600	1200
CC	1600	1600

Sample shown is a Digitrip Retrofit Kit for a DK-25, with an RMS 810 trip unit, with LSI protection, with a 60 Hz Plug, rated at 800A for a sensor tap of 800A, four sensors (for a 4-wire ground system) that have a sensor tap of 800A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified

(only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

REPLACEMENT AND UPGRADE

Create the Digitrip RMS Retrofit Kit catalog number to match the Westinghouse DA or DK breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT, and type of kit required for application. See the example provided above.

Application Notes for DA and DK Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for Drawout Power Circuit Breakers only. Refer all fixed mounted breaker applications to the Cutler-Hammer Digitrip Retrofit Kit Technical Service Center at 1-800-937-5487.
3. The breaker compartment doors on the switchgear assembly must be free

of panel mounted instruments and devices (i.e. ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.

4. When the Ground Fault (G) option is selected, please observe the following:
 - a. For 3-phase, 3-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For 3-phase, 4-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the

current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.

5. RMS 510 Zone, 610, 810, and 910 Retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
6. RMS 610, 810, and 910 Retrofit Kits require a customer supplied 120 VAC source connected to the cell terminal block assembly to power the Digitrip RMS Digital Displays and Communications functions (as applicable).

● Maximum ampere rating is 200 amperes.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

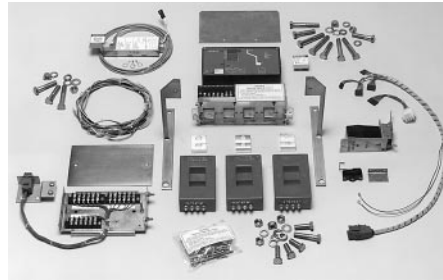
Digitrip RMS Retrofit Kits for Westinghouse DB Breakers



INTRODUCTION AND DESCRIPTION



DB-25 Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for a DB-25 Power Circuit Breaker

Digitrip RMS Retrofit Kits for Westinghouse DB and DBL Power Circuit Breakers were first introduced in 1989. For a complete description of the Digitrip RMS Trip System and the features of Models RMS 510, 610, 810, and 910, see **page 247**.

Ratings

Digitrip RMS Retrofit Kits are applied on DB breakers with frame ratings from 225A (DB-15) to 4000A (DB-100) as identified below. The rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short circuit settings.

Chronology

Digitrip RMS Retrofit Kits and replacement trip units for DB Breakers became available around 1989. The Digitrip RMS 510 Model is the modern day replacement for the Amptector and RK Trip Systems.

REPLACEMENT AND UPGRADE

Create the Digitrip RMS retrofit kit catalog number to match the Westinghouse DB breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT, and type of kit required for application. See the example provided on **page 257**.

Application Notes for Westinghouse DB and DBL Power Circuit Breakers

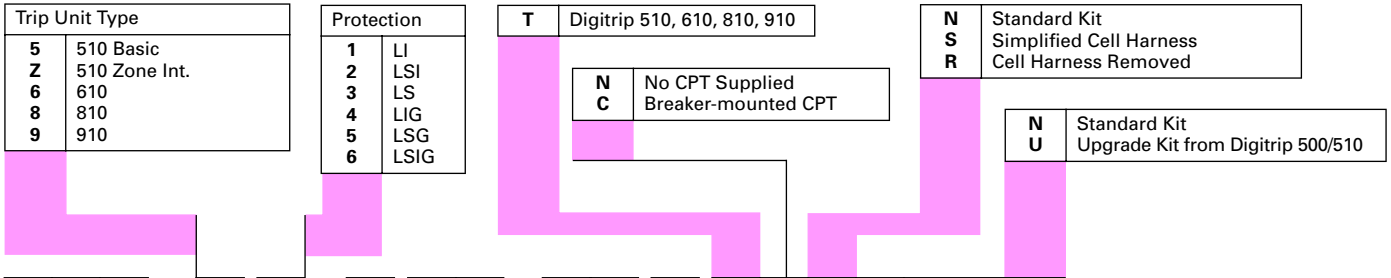
- Retrofit kits are for use on 50 and 60 Hz distribution systems.
- All retrofit kits are designed for Drawout Power Circuit Breakers only. Refer all fixed mounted breaker applications to the Cutler-Hammer Digitrip Retrofit Kit Technical Service Center at **1-800-937-5487**.
- The breaker compartment doors on the switchgear assembly must be free of panel mounted instruments and devices (i.e. ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
- Type DB-15 and DBL breaker components may have a metal baffle on the inside of the compartment door. If so, the baffle will have to be removed to accommodate the retrofitted DB breaker.
- Contact Cutler-Hammer if the existing DB breaker has an Undervoltage Trip Device (UVTA), Bell Alarm, or Shunt Trip.
- When the Ground Fault (G) option is selected, please observe the following:
 - For 3-phase, 3-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - For 3-phase, 4-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
- RMS 510 Zone, 610, 810, and 910 Retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
- RMS 610, 810, and 910 Retrofit Kits require a customer supplied 120 VAC source connected to the cell terminal block assembly to power the Digitrip RMS Digital Displays and Communications functions (as applicable).
- If the existing DB breaker has been retrofitted with an Amptector Trip System, and a Digitrip RMS retrofit is desired, contact the Cutler-Hammer Digitrip Retrofit Kit Technical Service Center at **1-800-937-5487** for details.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip Retrofit Kits for Westinghouse DB Breakers

CATALOG NUMBER



D B 6 **8 6** **6 4 Q** **4 6** **-** **T C S U**

N	No Rating Plug	N	No Sensors
6	50/60 Hz Plug	3	Three Sensors
		4	Four Sensors

Cat. Code	Current Rating	
	Tap	Plug
21	200	100
22	200	200
32	300	200
30Q	300	250
33	300	300
42	400	200
40Q	400	250
43	400	300
44	400	400
63	600	300
64	600	400
66	600	600
84	800	400
86	800	600
88	800	800
T6	1200	600
T8	1200	800
TA	1200	1000
TT	1200	1200
C8	1600	800
CA	1600	1000
CT	1600	1200
CC	1600	1600
DA	2000	1000
DT	2000	1200
DC	2000	1600
DD	2000	2000
HC	3000	1600
HD	3000	2000
HP	3000	2500
HH	3000	3000
KD	4000	2000
KP	4000	2500
KH	4000	3000
KJ	4000	3200
KK	4000	4000

Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
DB2	DB-15 ^①	2	200
DB6	DB-25, DBL-25	6	600, 400, 300, 200
DBC	DB-50, DBL-50	C	1600, 1200, 800, 600, 400
		2	200
DBH	DB-75	H	3000, 2000
DBK	DB-100	K	4000
WU2	DB-15 Upgrade from Amptector	2	200
WU6	DB-25, DBL-25 Upgrade from Amptector	6	600, 400, 300, 200
WUC	DB-50, DBL-50 Upgrade from Amptector	C	1600, 1200, 800, 600, 400
		2	200
WUH	DB-75 Upgrade from Amptector	H	3000, 2000
WUK	DB-100 Upgrade from Amptector	K	4000

Sample shown is a Digitrip Retrofit Kit for a DB-25, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a 4-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

^① Maximum ampere rating is 200 amperes.

SWITCHGEAR (TRIP UNIT RETROFIT KITS)

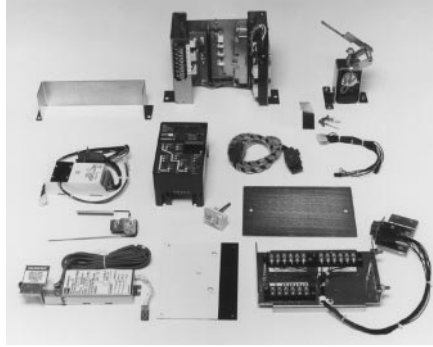
Digitrip RMS Retrofit Kits for Westinghouse DS Breakers



INTRODUCTION AND DESCRIPTION



DS Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for a DS Power Circuit Breaker

Digitrip RMS Retrofit Kits for Westinghouse DS and DSL Power Circuit Breakers were first introduced in 1987. For a complete description of the Digitrip RMS Trip System and the features of Models RMS 510, 610, 810, and 910, see **page 247**.

Ratings

Digitrip RMS Retrofit Kits are applied on DS breakers with frame ratings from 800A (DS-206) to 4000A (DS-840) as identified below. The rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short circuit settings.

Chronology

Digitrip RMS Retrofit Kits and replacement trip units for DS Breakers became available around 1987. The Digitrip RMS 510 Model is the modern day replacement for the Amprector Trip Systems.

REPLACEMENT AND UPGRADE

Create the Digitrip RMS Retrofit Kit catalog number to match the Cutler-Hammer or Westinghouse DS breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT, and type of kit required for application. See the example provided on **page 259**.

Application Notes for Cutler-Hammer or Westinghouse DS and DSL Power Circuit Breakers

- Retrofit kits are for use on 50 and 60 Hz distribution systems.
- All retrofit kits are designed for Draw-out Power Circuit Breakers only. Refer all fixed mounted breaker applications to the Cutler-Hammer Digitrip Retrofit Kit Technical Service Center at **1-800-937-5487**.
- The breaker compartment doors on the switchgear assembly must be free of panel mounted instruments and devices (i.e. ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
- When the Ground Fault (G) option is selected, please observe the following:
 - For 3-phase, 3-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - For 3-phase, 4-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
- RMS 510, 610, 810, and 910 Retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
- RMS 610, 810, and 910 Retrofit Kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS Digital Displays and Communications functions (as applicable).



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Retrofit Kits for Westinghouse DS Breakers

259

CATALOG NUMBER

Trip Unit Type	
5	510 Basic
Z	510 Zone Int.
6	610
8	810
9	910

Protection	
1	LI
2	LSI
3	LS
4	LIG
5	LSG
6	LSIG

T Digitrip 510, 610, 810, 910

N No CPT Supplied
C Breaker-mounted CPT

N Standard Kit
S Simplified Cell Harness
R Cell Harness Removed

N Standard Kit
U Upgrade Kit from Factory Modular Mounting
B Upgrade Kit from Factory Box Mounting

D R 6 **8** **6** **6** **4 Q** **4 4** - **T N N N**

N No Rating Plug
6 50/60 Hz Plug

N No Sensors
3 Three Sensors
4 Four Sensors

Cat. Code	No Rating Plug	
	Tap	Plug
21	200	100
22	200	200
32	300	200
3Q	300	250
33	300	300
42	400	200
4Q	400	250
43	400	300
44	400	400
63	600	300
64	600	400
66	600	600
84	800	400
86	800	600
88	800	800
T6	1200	600
T8	1200	800
TA	1200	1000
TT	1200	1200
C8	1600	800
CA	1600	1000
CT	1600	1200
CC	1600	1600
DA	2000	1000
DT	2000	1200
DC	2000	1600
DD	2000	2000
FC	2400	1600
FD	2400	2000
FF	2400	2400
JC	3200	1600
JD	3200	2000
JF	3200	2400
JJ	3200	3200
KD	4000	2000
KP	4000	2400
KJ	4000	3200
KK	4000	4000

Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps		
	ALL FRAMES	S	NO SENSORS PROVIDED		
DR6	DS(L)-206	8	800		
		6	600		
		4	400		
		3	300		
		2	200		
		C	1600		
DRC	DS(L)-416	T	1200		
		8	800		
		6	600		
		4	400		
		3	300		
		2	200		
		DRD	DS-420	D	2000
				C	1600
T	1200				
8	800				
6	600				
4	400				
3	300				
2	200				
DRJ	DS-632 (Must replace Ampptector Sensors)	J	3200		
		F	2400		
DRK	DS-840	K	4000		
		J	3200		

Sample shown is a Digitrip Retrofit Kit for a DS-206, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a 4-wire ground system) that have a sensor tap of 400A, and there are no other features so this is a standard original kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

● If breaker has been previously retrofitted, call the Digitrip Retrofit Kit Technical Service Center at 1-800-937-5487.

SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Retrofit Kits for Westinghouse SPB Breakers



INTRODUCTION AND DESCRIPTION



SPB-100 Series-3000 Ampere Frame — Digitrip RMS



Rear View of Plug Adaptor Box and Digitrip RMS 510. Typical Parts of Retrofit Kit.

Digitrip RMS Retrofit Kits for Westinghouse SPB Power Circuit Breakers equipped with Pow-R Trip 7 or Pow-R Digitrip Trip Units were first introduced in 1989. Field retrofits are limited to the RMS 510 model. For a complete description of the Digitrip RMS Trip System, see [page 247](#).

Ratings

Digitrip RMS 510 Retrofit Kits are applied on SPB breakers with frame ratings from 400A (SPB-50) to 5000A (SPB-150) as identified on [page 105](#). The rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short circuit settings.

Chronology

Digitrip RMS Retrofit Kits for SPB Breakers became available around 1989. The Digitrip RMS 510 Model is the only model that is available. Retrofits are limited to SPB Breakers equipped with a Pow-R Trip 7 or Pow-R Digitrip (also known as Digitrip 1) Trip Units.

REPLACEMENT AND UPGRADE

Create the Digitrip RMS Retrofit Kit catalog number to match the Cutler-Hammer or Westinghouse SPB breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT, and type of kit required for application. See the example provided on [page 261](#).

Application Notes for Cutler-Hammer or Westinghouse SPB Power Circuit Breakers

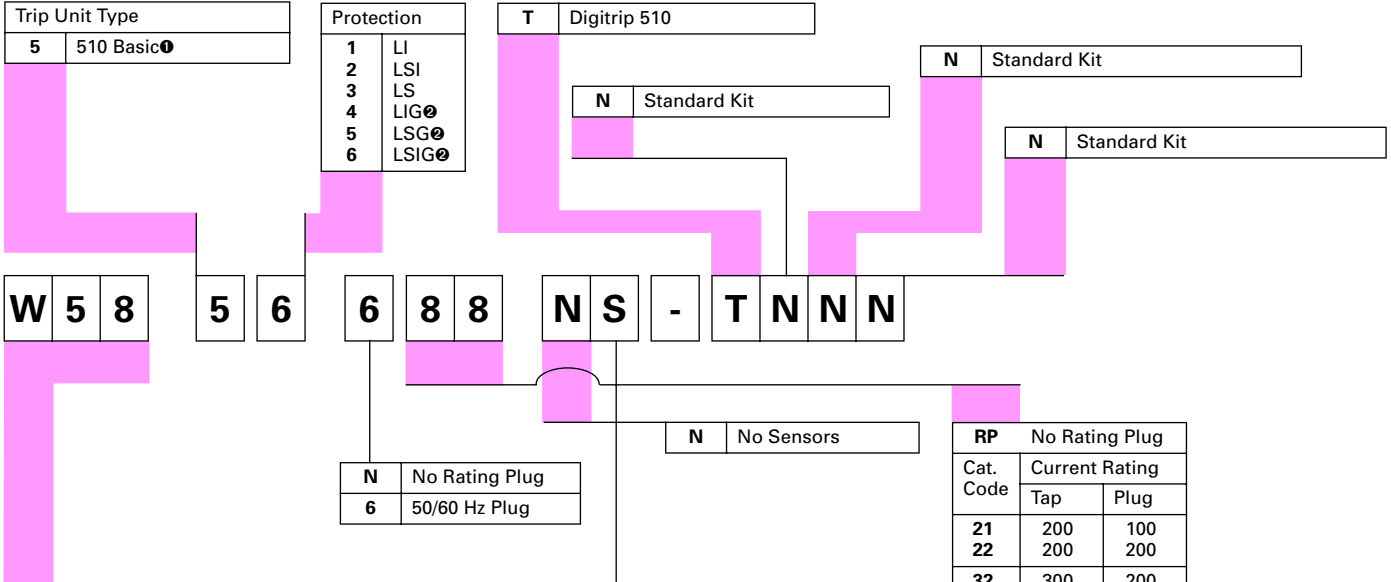
1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. Only SPB breakers equipped with a Pow-R Trip 7 or Pow-R Digitrip (also known as Digitrip 1) Trip Units are retrofittable at this time. Breakers equipped with a Pow-R Trip cannot be retrofitted.
3. SPB breakers installed in automatic transfer switches and equipped with a bell alarm contact cannot be retrofitted at this time.
4. An automatic trip relay (ATR) is a remote mounted accessory designed to provide visual trip mode indication, alarm and lockout interlocking circuitry following a breaker automatic tripping operation. SPB breakers equipped with Pow-R Trip 7 and this ATR cannot be retrofitted at this time.
5. An SPB breaker with a 250 ampere frame rating can not be retrofitted.
6. Ground fault protection cannot be added to the SPB breaker. The breaker must be originally equipped with ground fault protection, for ground fault protection to be selected. Changing the ground fault protection from 3-wire to 4-wire is not permitted. Interchanging between LI, LS, LSI, LIG, LSG, or LSIG is not permitted.
7. SPB breakers equipped with zone interlocking for short time and/or ground fault time delays can be retrofitted, provided the existing zone interlock configuration is not changed.
8. For Digitrip RMS Trip Unit replacements, see [page 248](#). For Pow-R Trip 7 Trip Unit Replacements, see [page 261](#).
9. A factory retrofit is possible for applications requiring Digitrip RMS 610, 810 and 910. Contact your local Cutler-Hammer Field Sales Office at **1-800-222-9773**.
10. SPB breakers retrofitted with Digitrip RMS can be tested with primary injection testing and trip unit self test. Secondary injection testing is not available.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Retrofit Kits for Westinghouse SPB Breakers

CATALOG NUMBER



Code	Breaker Frame Description	Breaker Frame Rating and Sensor Tap
W34	SPB-50-400	400
W38	SPB-50-800	800
W4T	SPB-65-1200	1200
W4C	SPB-65-1600	1600
W4E	SPB-65-2000 Compact	2000C
W54	SPB-100-400	400
W58	SPB-100-800	800
W5T	SPB-100-1200	1200
W5C	SPB-100-1600	1600
W5D	SPB-100-2000	2000
W5E	SPB-100-2000 Compact	2000C
W5P	SPB-100-2500	2500
W5H	SPB-100-3000	3000
W5K	SPB-100-4000	4000
W5L	SPB-100-5000	5000
W64	SPB-150-400	400
W68	SPB-150-800	800
W6T	SPB-150-1200	1200
W6C	SPB-150-1600	1600
W6D	SPB-150-2000	2000
W6E	SPB-150-2000 Compact	2000C
W6P	SPB-150-2500	2500
W6H	SPB-150-3000	3000
W6K	SPB-150-4000	4000
W6L	SPB-150-5000	5000

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

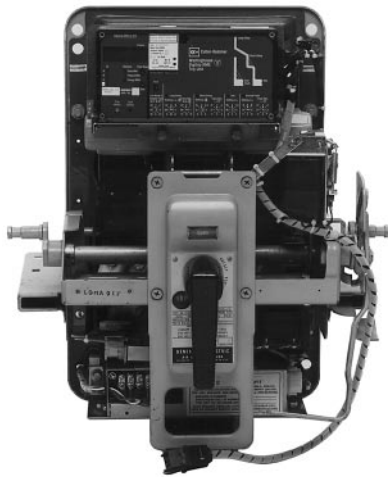
S

① Digitrip 610, 810, and 910 are not available for SPB Breaker Retrofit Kits. A factory upgrade program is available. Call factory for more information at 1-800-222-9773.
 ② SPB Breakers supplied from factory without ground fault (G) cannot be retrofitted in the field to include ground fault.



Digitrip RMS Retrofit Kits for General Electric AK Breakers

INTRODUCTION AND DESCRIPTION



AK-2A-25 Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for GE AK-2A-25 Power Circuit Breaker

Digitrip RMS Retrofit Kits for various GE power circuit breakers were first introduced in 1989. For a complete description of the Digitrip RMS trip system and the features of models RMS 510, 610, 810, and 910, see [page 247](#).

Rating

Digitrip RMS Retrofit Kits are applied on GE breakers of the types listed and with frame ratings from 225-4000A as indicated on [pages 263-265](#).

Chronology

Digitrip RMS Retrofit Kits and replacement trip units for GE breakers became available around 1989. The Digitrip RMS 510 model is the modern day replacement for electromechanical trip device or peak sensing solid state trip systems.

REPLACEMENT AND UPGRADE

Choose or create the Digitrip RMS Retrofit Kit catalog number to match the GE, AK, AL and other breaker types, retrofit kit type, protection function, rating plug type, current sensor type, CPT, and type of kit required for application. See the example provided on [pages 263-265](#).

Application Notes for GE, AK, AL and other Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for Drawout Power Circuit Breakers only. Refer all fixed mounted breaker applications to the Cutler-Hammer Digitrip Retrofit Kit Technical Service Center at **1-800-937-5487**.
3. The breaker compartment doors on the switchgear assembly must be free of panel mounted instruments and

devices (i.e. ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.

4. When the Ground Fault (G) option is selected, please observe the following:
 - a. For 3-phase, 3-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For 3-phase, 4-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary

disconnecting contacts) are not included in the kit.

5. RMS 510 Zone, 610, 810, and 910 Retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
6. RMS 610, 810, and 910 Retrofit Kits require a customer supplied 120 VAC source connected to the cell terminal block assembly to power the Digitrip RMS Digital Displays and Communications functions (as applicable).
7. Refer all AKU Series (AK breakers with current limiters) breakers to the Cutler-Hammer Digitrip Retrofit Kit Technical Service Center at **1-800-937-5487** for evaluation.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Retrofit Kits for General Electric AK Breakers

CATALOG NUMBER

Trip Unit Type	
5	510 Basic
Z	510 Zone Int.
6	610
8	810
9	910

Protection	
1	LI
2	LSI
3	LS
4	LIG
5	LSG
6	LSIG

T Digitrip 510, 610, 810, 910

N C No CPT Supplied
Breaker-mounted CPT

N S R Standard Kit
Simplified Cell Harness
Cell Harness Removed

N U Standard Kit
Upgrade Kit from Digitrip 500/510

G 3 6 **8 6** **6 4 Q** **4 6** - **T C S U**

NRP No Rating Plug
6 50/60 Hz Plug

N No Sensors "NS"
3 Three Sensors
4 Four Sensors

Cat. Code	Current Rating	
	Tap	Plug
21	200	100
22	200	200
32	300	200
3Q	300	250
33	300	300
42	400	200
4Q	400	250
43	400	300
44	400	400
63	600	300
64	600	400
66	600	600
84	800	400
86	800	600
88	800	800
C8	1600	800
CA	1600	1000
CT	1600	1200
CC	1600	1600
DA	2000	1000
DT	2000	1200
DC	2000	1600
DD	2000	2000
HC	3000	1600
HD	3000	2000
HP	3000	2500
HH	3000	3000
KD	4000	2000
KP	4000	2500
KH	4000	3000
KJ	4000	3200
KK	4000	4000

Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
G12	AK-1-15 Manual ¹	2	200
G16	AK-1-25	6	600, 400
G2C	AK-1-50, AK-2/2A-50, AK-3/3A-50 (if frameless use GMC)	C	1600, 800
		8	800, 400
		4	400, 200
GMC	AK-1-50 Slow Close No Top Frame	C	1600, 800
		8	800, 400
		4	400, 200
G2H	AK-1-75, AK-2/2A-75, AK-3/3A-75	H	3000, 2000
G2K	AK-1-100, AK-2/2A-100, AK-3/3A-100	K	4000
G22	AK-2/2A-15 Manually Operated ¹	2	200
G26	AK-2/2A-25	6	600, 400, 300, 200
GTD	AKT-2A-50	C	2000
G36	AK-3/3A-25	6	600, 400, 300, 200
GU6	AKU-2/2A-25 ²	6	600, 400, 300, 200
GU7	AKU-3/3A-25 ²	6	600, 400, 300, 200
GUC	AKU-2A/3A-50 ²	C	1600, 800
		8	800, 400
		4	400, 200
G58	AKR(u)-7D-305	8	800
GA8	AKR-4A/5A-30	8	800
GAC	AKR-4A/5A-50	C	1600
GAD	AKRT-4A/5C-50	D	2000

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

¹ Maximum ampere rating is 200 amperes.
² Use GU6, GU7, GUC kits only for breakers with top mounted fuses. For breakers with bottom mounted fuses use standard kit.



Digitrip Retrofit Kits for General Electric AL-2-50/75 Breakers

CATALOG NUMBER

Trip Unit Type	
5	510 Basic
Z	510 Zone Int.
6	610
8	810
9	910

Protection	
1	LI
2	LSI
3	LS
4	LIG
5	LSG
6	LSIG

T	Digitrip 510, 610, 810, 910
N	No CPT Supplied
C	Breaker-mounted CPT

N	Standard Kit
S	Simplified Cell Harness
R	Cell Harness Removed

N	Standard Kit
U	Upgrade Kit from Digitrip 500/510

G Q 6 **8** **6** **6** **4** **Q** **4** **6** **-** **T** **C** **S** **U**

N	No Rating Plug
6	50/60 Hz Plug

N	No Sensors
3	Three Sensors
4	Four Sensors

RP	No Rating Plug	
	Cat. Code	Current Rating
21	200	100
	200	200
32	300	200
	300	250
	300	300
42	400	200
	400	250
	400	300
	400	400
63	600	300
	600	400
	600	600
84	800	400
	800	600
	800	800
T6	1200	600
	1200	800
	1200	1000
	1200	1200
C8	1600	800
	1600	1000
	1600	1200
	1600	1600
DA	2000	1000
	2000	1200
	2000	1600
	2000	2000

Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
GQ6	AL-2-50-600 Manually Operated	6	600, 400, 300, 200
GQ8	AL-2-50-800 Manually Operated	8	800, 600, 400
		2	200
GQT	AL-2-50-1200 Manually Operated	T	1200, 600
		8	800, 600, 400
		2	200
GQC	AL-2-50-1600 Manually Operated	C	1600, 1200
		8	800, 600, 400
		2	200
GL6	AL-2-600 Electrically Operated	6	600, 400, 300, 200
GL8	AL-2-800 Electrically Operated	8	800, 600, 400
		2	200
GLT	AL-2-1200 Electrically Operated	T	1200, 600
		8	800, 600, 400
		2	200
GLC	AL-2-1600 Electrically Operated	C	1600, 1200
		8	800, 600, 400
		2	200
GLD	AL-2-75-2000 Electrically Operated	D	2000

Sample shown is a Digitrip Retrofit Kit for an AL-2-50-600 Manually Operated, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a 4-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip Retrofit Kits for Other General Electric Breakers

CATALOG NUMBER

Trip Unit Type	
5	510 Basic
Z	510 Zone Int.
6	610
8	810
9	910

Protection	
1	LI
2	LSI
3	LS
4	LIG
5	LSG
6	LSIG

T	Digitrip 510, 610, 810, 910
----------	-----------------------------

N	No CPT Supplied
C	Breaker-mounted CPT

N	Standard Kit
S	Simplified Cell Harness
R	Cell Harness Removed

N	Standard Kit
U	Upgrade Kit from Digitrip 500/510

GE 6 8 6 6 4 Q 4 6 - T C S U

N	No Rating Plug
6	50/60 Hz Plug

N	No Sensors
3	Three Sensors
4	Four Sensors

Cat. Code	No Rating Plug	
	Tap	Plug
21	200	100
22	200	200
32	300	200
3Q	300	250
33	300	300
42	400	200
4Q	400	250
43	400	300
44	400	400
63	600	300
64	600	400
66	600	600

Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
GE6	AE-1-25, AE-1B	6	600, 400, 300, 200

Sample shown is a Digitrip Retrofit Kit for an AE-1-25, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a 4-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Retrofit Kits for Allis Chalmers LA Breakers



INTRODUCTION AND DESCRIPTION



Allis Chalmers LA 600 Gold Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical RMS 810 Retrofit Kit for Allis Chalmers LA 600 Gold Power Circuit Breaker

Digitrip RMS Retrofit Kits for Allis Chalmers, LA power circuit breakers were first introduced in 1991. For a complete description of the Digitrip RMS trip system and the features of models RMS 510, 610, 810, and 910, see [page 247](#).

Ratings

Digitrip RMS Retrofit Kits are applied on Allis Chalmers breakers from 600A (LA 600) to 3000A (LA 3000). The rating plug and the current sensor act in concert to provide for a wide spectrum of overload and short circuit settings.

Chronology

Digitrip RMS Retrofit Kits and replacement trip units for Allis Chalmers LA breakers became available in 1991. The Digitrip RMS 510 model is the modern day replacement for electromechanical trip device or peak sensing solid state trip systems.

REPLACEMENT AND UPGRADE

Choose or create the Digitrip RMS Retrofit Kit catalog number to match the Allis Chalmers LA breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT, and type of kit required for application. See the example provided on [page 267](#).

Application Notes for Allis Chalmers LA Power Circuit Breakers

- Retrofit kits are for use on 50 and 60 Hz distribution systems.
- All retrofit kits are designed for Draw-out Power Circuit Breakers only. Refer all fixed mounted breaker applications to the Cutler-Hammer Digitrip Retrofit Kit Technical Service Center at **1-800-937-5487**.
- The breaker compartment doors on the switchgear assembly must be free of panel mounted instruments (i.e. meters, instruments, control switches, indicating lamps, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
- When the Ground Fault (G) option is selected, please observe the following:
 - For 3-phase, 3-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - For 3-phase, 4-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
- RMS 510 Zone, 610, 810, and 910 Retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
- RMS 610, 810, and 910 Retrofit Kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS Digital Displays and Communications functions (as applicable).
- Refer all LAF (LA breakers with current limiters) breakers to the Cutler-Hammer Digitrip Retrofit Kit Technical Service Center at **1-800-937-5487** for evaluation.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Retrofit Kits for Allis Chalmers LA Breakers

CATALOG NUMBER

Trip Unit Type	
5	510 Basic
Z	510 Zone Int.
6	610
8	810
9	910

Protection	
1	LI
2	LSI
3	LS
4	LIG
5	LSG
6	LSIG

T Digitrip 510, 610, 810, 910

N No CPT Supplied
C Breaker-mounted CPT

N Standard Kit
S Simplified Cell Harness
R Cell Harness Removed

N Standard Kit
U Upgrade Kit from Digitrip 500/510

A 2 6 **8** **6** **6** **4 Q** **4 6** **-** **T C S U**

N No Rating Plug
6 50/60 Hz Plug

N No Sensors
3 Three Sensors
4 Four Sensors

Cat. Code	No Rating Plug	
	Current Rating Tap	Plug
21	200	100
22	200	200
32	300	200
3Q	300	250
33	300	300
42	400	200
4Q	400	250
43	400	300
44	400	400
63	600	300
64	600	400
66	600	600
84	800	400
86	800	600
88	800	800
T6	1200	600
T8	1200	800
TA	1200	1000
TT	1200	1200
C8	1600	800
CA	1600	1000
CT	1600	1200
CC	1600	1600
DA	2000	1000
DT	2000	1200
DC	2000	1600
DD	2000	2000
HC	3000	1600
HD	3000	2000
HP	3000	2500
HH	3000	3000

Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
A16	LA-600 Blue Cover (Plastic)	6	600, 400, 300, 200
A1C	LA-1600 Blue Cover (Plastic)	C	1600, 1200, 800, 600, 400
		2	200
A26	LA-600 Gold Cover (Metal)	6	600, 400, 300, 200
A2C	LA-1600 Gold Cover (Metal)	C	1600, 1200, 800, 600, 400
		2	200
A2H	LA-3000 Gold/Blue	H	3000, 2000
A4H	LA-3000A	H	3000, 2000
A36	LA-25A Manually Operated	6	600, 400, 300, 200
A3C	LA-50A Manually Operated	C	1600, 1200, 800, 600, 400
		8	800, 600, 400
		2	200
A3H	LA-75A Manually Operated	H	3000, 2000
G5C	G-50A	C	1600

Sample shown is a Digitrip Retrofit Kit for an LA-600 Gold, with a RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a 4-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

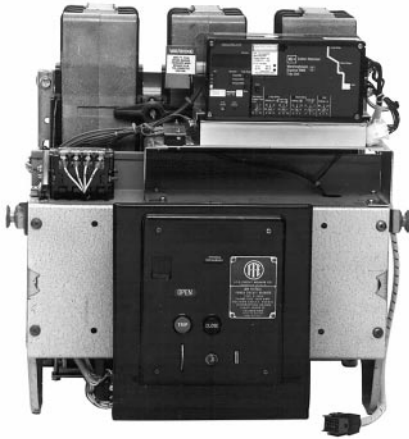
NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Retrofit Kits for ITE K-Line Breakers



INTRODUCTION AND DESCRIPTION



K-1600 Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for ITE K-1600 Power Circuit Breaker

Digitrip RMS Retrofit Kits for ITE K-Line power circuit breakers were first introduced in 1991. For a complete description of the Digitrip RMS trip system and the features of models RMS 510, 610, 810 and 910, see page 247.

Ratings

Digitrip RMS Retrofit Kits are applied on ITE K-Line breakers from 225A (K-225) to 3000A (K-3000), the rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short circuit settings.

Chronology

Digitrip RMS retrofit kits and replacement trip units for ITE K-Line breakers became available in 1991. The Digitrip RMS 510 model is the modern day replacement for electromechanical trip device or peak sensing solid state trip systems.

REPLACEMENT AND UPGRADE

Choose or create the Digitrip RMS Retrofit Kit catalog number to match the ITE K-Line and other breaker types, retrofit kit type, protection function, rating plug type, current sensor type, CPT, and type of kit required for application. See the example provided on pages 269-270.

Application Notes for ITE K-Line and other Power Circuit Breakers

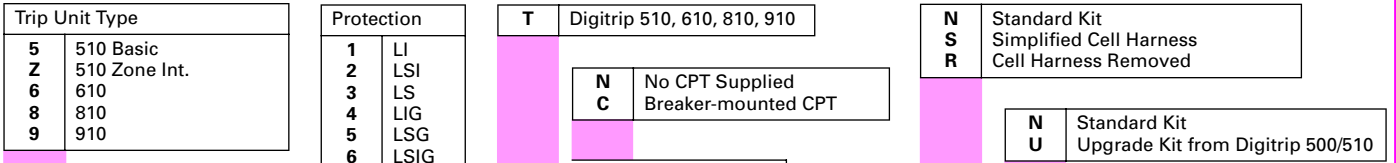
1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for Draw-out Power Circuit Breakers only. Refer all fixed mounted breaker applications to the Cutler-Hammer Digitrip Retrofit Kit Technical Service Center at 1-800-937-5487.
3. The breaker compartment doors on the switchgear assembly must be free of panel mounted instruments and devices (i.e. ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
4. When the Ground Fault (G) option is selected, please observe the following:
 - a. For 3-phase, 3-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For 3-phase, 4-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
5. RMS 510 Zone, 610, 810 and 910 Retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
6. RMS 610, 810 and 910 Retrofit Kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS Digital Displays and Communications functions (as applicable).
7. Refer all K-DON Series (K-Line breakers with current limiters) breakers to the Cutler-Hammer Digitrip Retrofit Kit Technical Service Center at 1-800-937-5487 for evaluation.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip RMS Retrofit Kits for ITE K-Line Breakers

CATALOG NUMBER



K 2 6 8 6 6 4 Q 4 6 - T C S U

N	No Rating Plug
6	50/60 Hz Plug
N	No Sensors
3	Three Sensors
4	Four Sensors

Cat. Code	No Rating Plug	
	Tap	Plug
21	200	100
22	200	200
32	300	200
3Q	300	250
33	300	300
42	400	200
4Q	400	250
43	400	300
63	600	300
64	600	400
66	600	600
84	800	400
86	800	600
88	800	800
T6	1200	600
T8	1200	800
TA	1200	1000
TT	1200	1200
C8	1600	800
CA	1600	1000
CT	1600	1200
CC	1600	1600
DA	2000	1000
DT	2000	1200
DC	2000	1600
DD	2000	2000
HC	3000	1600
HD	3000	2000
HP	3000	2500
HH	3000	3000
KD	4000	2000
KP	4000	2500
KH	4000	3000
KJ	4000	3200
KK	4000	4000

Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
K120	K-225 Black	2	200
K1C0	K-1600 Black	C	1600, 1200
		8	800, 600, 400
		2	200
K220	K-225 Red	2	200
K260	K-600 Red/Black, KDON Bottom Mounted Fuses	6	600, 400, 300, 200
K2C0	K-1600 Red, KDON Bottom Mounted Fuses	C	1600, 1200
		8	800, 600, 400
		2	200
K2D0	K-2000 Red	D	2000
K3H0	K-3000 Red	H	3000
K2K0	K-4000 Red	K	4000
K460	KDON-600 Black/Red (Top Mounted Fuses)	6	600, 400, 300, 200
K4C0	KDON-1600 Red (Top Mounted Fuses)	C	1600, 1200
		8	800, 600, 400
		2	200
K5C0	KDON-1600 Red (2000 Amp Round Finger Cluster), (Bottom Mounted Fuses)	C	1600, 1200
		8	800, 600, 400
		2	200
K6C	KDON-1600 Black	?	?
K7C	KDON-1600 Red (2000 Amp Round) Top Fuses	?	?

Sample shown is a Digitrip Retrofit Kit for a K-600 with Red backplane insulation, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a 4-wire ground system) that have a sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. **(412-937-6400)**

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

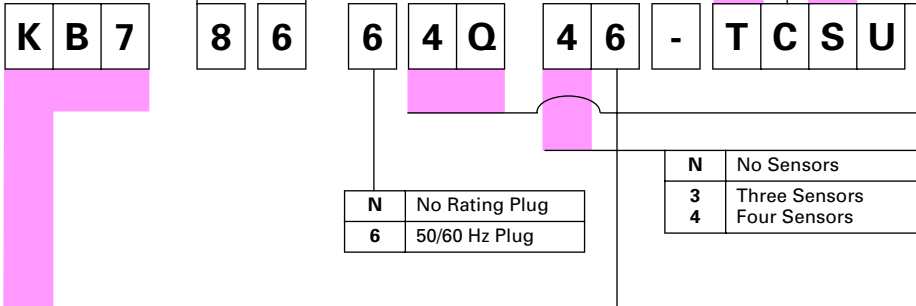
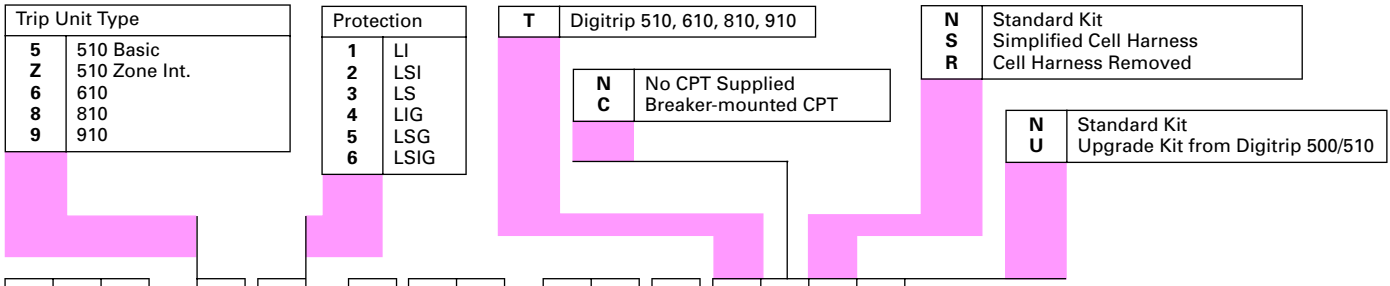
● Black and Red refer to the color of the back plane insulation material.

SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip Retrofit Kits for Other ITE Breakers



CATALOG NUMBER



Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
KB6	KB-600 Fixed	6	600, 400, 300, 200
KB7	KB-600 Draw-out	6	600, 400, 300, 200
KC6	KC-600	6	600
		4	400
		2	200
KCC	KC-1600	C	1600
		T	1200
		8	800
		6	600
KDH	KD-3000	H	3000

Cat. Code	Current Rating	
	Tap	Plug
21	200	100
22	200	200
32	300	200
3Q	300	250
33	300	300
42	400	200
4Q	400	250
43	400	300
44	400	400
63	600	300
64	600	400
66	600	600
84	800	400
86	800	600
88	800	800
T6	1200	600
T8	1200	800
TA	1200	1000
TT	1200	1200
C8	1600	800
CA	1600	1000
CT	1600	1200
CC	1600	1600
HC	3000	1600
HD	3000	2000
HP	3000	2500
HH	3000	3000

Sample shown is a Digitrip Retrofit Kit for a KB-600 Draw-out breaker, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a 4-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

Call the Digitrip Retrofit Kit Technical Service Center at 1-800-937-5487 for technical clarification on these kits.

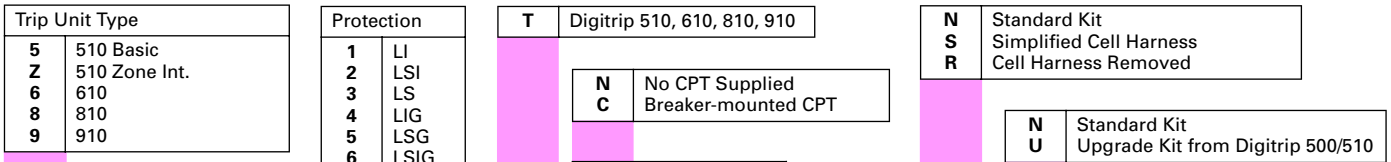


SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip Retrofit Kits for Siemens and Siemens-Allis Breakers

271

CATALOG NUMBER



L A 8 8 6 6 4 Q 4 6 - T C S U

N	No Rating Plug
6	50/60 Hz Plug
N	No Sensors
3	Three Sensors
4	Four Sensors

Cat. Code	Current Rating	
	Tap	Plug
21	200	100
22	200	200
32	300	200
3Q	300	250
33	300	300
42	400	200
4Q	400	250
43	400	300
44	400	400
63	600	300
64	600	400
66	600	600
84	800	400
86	800	600
88	800	800
T6	1200	600
T8	1200	800
TA	1200	1000
TT	1200	1200
C8	1600	800
CA	1600	1000
CT	1600	1200
CC	1600	1600

Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
LA8	LAF-800	8	800, 400
		6	600, 400, 300, 200
RX8	RL(X)-800	8	800
		6	600
		4	400
		3	300
		2	200
RXC	RL(X)-1600	C	1600
		T	1200
		8	800
		6	600
		4	400
		3	300
		2	200
RLJ	RL-3200	J	3200
RLK	RL-4000	K	4000

Sample shown is a Digitrip Retrofit Kit for an LAF-800, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a 4-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

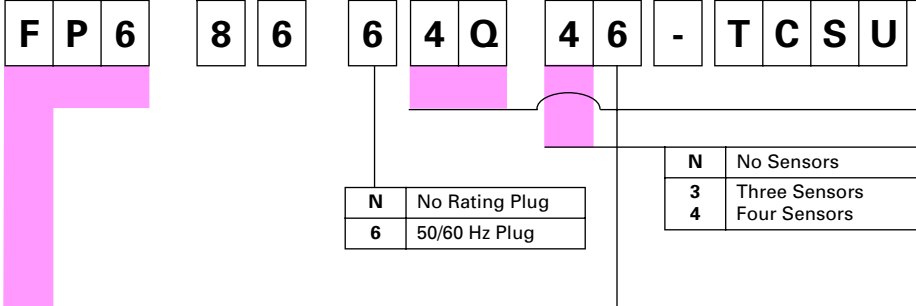
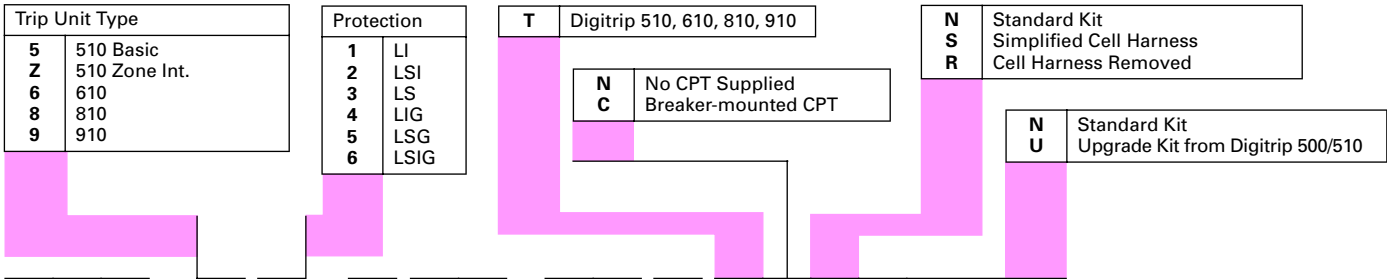
Call the Digitrip Retrofit Kit Technical Service Center at 1-800-937-5487 for technical clarification on these kits.

SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip Retrofit Kits for Federal Pacific Breakers



CATALOG NUMBER



Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
FP6	FP-25	6	600, 400, 300, 200
FP8	FP-50-800	8	800, 400
		6	600, 400, 300, 200
FPC	FP-50-1600	C	1600, 1200
		8	800, 600, 400
		2	200
		6	600, 400, 300, 200
FS8	FPS-50-800	8	800, 400
		6	600, 400, 300, 200
FSC	FPS-50-1600	C	1600, 1200
		8	800, 600, 400
		2	200
FSH	FPS-75	H	3000, 2000

Cat. Code	Current Rating	
	Tap	Plug
21	200	100
22	200	200
32	300	200
3Q	300	250
33	300	300
42	400	200
4Q	400	250
43	400	300
44	400	400
63	600	300
64	600	400
66	600	600
84	800	400
86	800	600
88	800	800
T6	1200	600
T8	1200	800
TA	1200	1000
TT	1200	1200
C8	1600	800
CA	1600	1000
CT	1600	1200
CC	1600	1600
DA	2000	1000
DT	2000	1200
DC	2000	1600
DD	2000	2000
HC	3000	1600
HD	3000	2000
HP	3000	2500
HH	3000	3000

Sample shown is a Digitrip Retrofit Kit for an FP-25, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a 4-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

Call the Digitrip Retrofit Kit Technical Service Center at 1-800-937-5487 for technical clarification on these kits.



SWITCHGEAR (TRIP UNIT RETROFIT KITS)

Digitrip Retrofit Kits for Other Breakers

273

CATALOG NUMBER

Trip Unit Type	
5	510 Basic
Z	510 Zone Int.
6	610
8	810
9	910

Protection	
1	LI
2	LSI
3	LS
4	LIG
5	LSG
6	LSIG

T Digitrip 510, 610, 810, 910

N No CPT Supplied
C Breaker-mounted CPT

N Standard Kit
S Simplified Cell Harness
R Cell Harness Removed

N Standard Kit
U Upgrade Kit from Digitrip 500/510

R S 6 8 6 6 4 Q 4 6 - T C S U

N No Rating Plug
6 50/60 Hz Plug

N No Sensors
3 Three Sensors
4 Four Sensors

Cat. Code	No Rating Plug	
	Tap	Plug
21	200	100
22	200	200
32	300	200
3Q	300	250
33	300	300
42	400	200
4Q	400	250
43	400	300
44	400	400
63	600	300
64	600	400
66	600	600
84	800	400
86	800	600
88	800	800
T6	1200	600
T8	1200	800
TA	1200	1000
TT	1200	1200
C8	1600	800
CA	1600	1000
CT	1600	1200
CC	1600	1600

Code	Breaker Frame Description	Sensor Code	Current Rating of Sensor and Available Taps
	ALL FRAMES	S	NO SENSORS PROVIDED
RS6	Roller-Smith RS-25A	6	600, 400, 300, 200
SS8	GTE-Sylvania SSPB 800	8	800, 400, 200
SSC	GTE-Sylvania SSPB 1600	C	1600, 1200

Sample shown is a Digitrip Retrofit Kit for an RS-25A, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a 4-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information resides on Fred II. (412-937-6400)

NOTE: At the time of this publication, the standard trip units for Low Voltage Digitrip Retrofit Kits are the RMS 510/610/810/910.

**FURTHER INFORMATION**

Literature Number	Description
SA-11723C	Sales Aid for Digitrip RMS Retrofit Kits
AD 33-855	Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers
SA-11581D	Sales Aid for Digitrip Trip Units
IL 29-885-A	Instruction Leaflet for Digitrip RMS 510 Trip Unit
IL 29-886	Instruction Leaflet for Digitrip RMS 610 Trip Unit
IL 29-888	Instruction Leaflet for Digitrip RMS 810 Trip Unit
IL 29-889	Instruction Leaflet for Digitrip RMS 910 Trip Unit
AD 32-870	Application Data for Time Current Curves for DS and DSL Circuit Breakers

PRICING INFORMATION

Literature Number	Description
Document #9375487	Retrofit Kit Product Guide on Fred II (412-937-6400) Discount Symbol Y1-R



SWITCHGEAR (MEDIUM VOLTAGE)

Assemblies, Power Circuit Breakers, and Renewal Parts

275

PRODUCT DESCRIPTION



Medium Voltage Switchgear Assembly (Type DHP with Drawout Breaker)

Medium voltage switchgear serves to channel and switch power in industrial, commercial and utility electrical distribution systems. It is manufactured to industry standards that define the requirements for its ratings, design, construction and testing. ANSI C37.20.2-1987 is the current applicable industry standard for medium voltage switchgear, defining the rated maximum voltage range to be from 4.76 kV to 38 kV.

Medium voltage switchgear consists of one or more metal structures that house draw-out power circuit breakers, phase bus conductors, auxiliary, control,

metering and protective devices. These switchgear components are customized in various combinations during manufacturing to satisfy the application requirements of the switchgear user. Control switches, meters, instruments and protective relays are generally mounted on the switchgear front panels to provide for breaker control, metering and circuit protection.

Medium voltage switchgear is characterized by metal-clad construction, which means that the switchgear compartments enclosing primary voltage are separated from adjacent compartments by grounded metal barriers.

PRODUCT HISTORY

Originally a Westinghouse Product

In 1939, Westinghouse introduced type DH medium voltage air magnetic power circuit breakers and associated switchgear. Initially, DH breakers were rated up to 5 kV with a maximum interrupting capacity of 150 MVA. Product design enhancements evolved and additional variations of the DH breaker became available. In 1946, the maximum rated voltage of the DH breaker was extended to 15 kV. Eventually, the maximum rated interrupting capacity of the DH breaker reached 1000 MVA.

In 1963, Westinghouse introduced type DHP medium voltage porcelain air magnetic power circuit breakers and associated switchgear with all live parts insulated to ground by high strength porcelain insulation. Porcelain provided excellent high dielectric, non-tracking, non-combustible, non-hygroscopic, and non-aging insulation characteristics. This was a technological improvement over the first DH breakers, which were furnished with a paper phenolic insulation. DHP switchgear was manufactured in ratings from 5 kV, 75 MVA to 15 kV, 1000 MVA. In 1978, Westinghouse introduced the DVP breaker, the first Westinghouse medium voltage power

circuit breaker to use vacuum interrupters. The DVP vacuum breaker was manufactured in 500 and 750 MVA interrupting ratings and was directly interchangeable with DHP air magnetic breakers of the same ratings.

In 1981, Westinghouse introduced Vac-Clad medium voltage metal-clad switchgear with type VCP vacuum power circuit breakers. VCP breakers were furnished with vacuum interrupters, greatly reducing breaker size and weight. The reduced size permitted most breaker ratings to be stacked two-high in the switchgear enclosure, saving on switchgear installation space. VCP breakers included a design improvement called the patented V-flex current transfer system, which eliminated the transfer of primary current over a moving hinge or sliding contact assembly on the breaker. Porcelain insulation was maintained on the breaker elements and in the switchgear, except for the 5 kV switchgear cell insulation which was glass polyester. The switchgear phase bus was insulated with a fluidized bed epoxy insulation system, which was a technological improvement over the epoxy impreg-

nated kraft paper or noryl sleeving that was used over phase bus bars in previous switchgear designs. Vac-Clad switchgear was manufactured in ratings from 5 kV, 250 MVA to 15 kV, 1000 MVA.

In 1986, Westinghouse introduced VacClad-W World Class medium voltage metal-clad switchgear with type VCP-W vacuum power circuit breakers. VCP-W switchgear included product improvements in manufacturing design and product performance. However, many of the attractive design features of VCP switchgear were maintained, including two-high breaker stacking, V-flex breaker current transfer and fluidized epoxy insulation on the switchgear phase buses. VCP-W breakers and switchgear were furnished with high grade glass polyester insulation as standard. Optional insulation upgrades included cycloaliphatic epoxy insulation for breaker element insulation (VCP-WSE breakers) and porcelain insulation for the switchgear cell contact bottles. VacClad-W switchgear is manufactured in ratings from 5 kV, 250 MVA to 15 kV, 1500 MVA to 38 kV and at 27 kV, 1250 MVA.

PRODUCT HISTORY TIMELINE

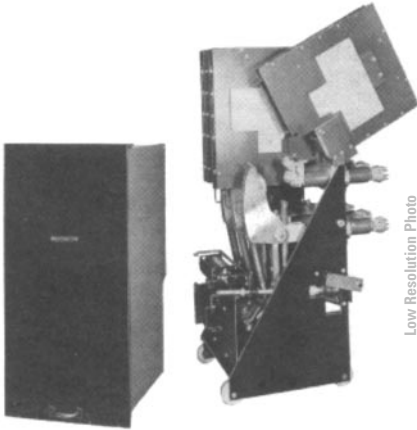
Page	Product	1955	1960	1965	1970	1975	1980	1985	1990	Present
276	DH Switchgear and Breakers	█								
277	DHP Switchgear and Breakers		█							
277	DHP-VR Replacement Breaker								█	
278	VCP Vac-Clad Switchgear and Breakers						█			
279	VCP-W Vac-Clad Switchgear and Breakers							█		

SWITCHGEAR (MEDIUM VOLTAGE)

DH Switchgear Assemblies, Power Circuit Breakers, and Renewal Parts



PRODUCT DESCRIPTION



Westinghouse DH Draw-out Air Magnetic Power Circuit Breaker (Interphase Barrier Removed)

Low Resolution Photo

Westinghouse DH medium voltage metal-clad switchgear with type DH "De-Ion" air circuit breakers was introduced in 1939. The draw-out breaker element consists of an operating mechanism that drives a set of three pole units. When the breaker is tripped, the moving and stationary contacts separate. The resulting arc on each phase is drawn up and into the arc chutes which dissipate the arc through ceramic splitter plates. The de-ionizing interruption process is aided magnetically by the arc chute blow out coil assembly.

DH switchgear was available in indoor and in sheltered aisle and aisle-less outdoor enclosures. DH metal-clad switchgear structure dimensions were standardized, but varied with individual breaker ratings. Widths varied from 20 inches for the 50DH75 (1200 ampere) light duty rating to 26 inches for the 50DH250 (1200 ampere) rating to 36 inches for most 2000 ampere and 7.5 and 15kV ratings.

Ratings

DH switchgear ratings started with the light duty 50DH75 (5 kV, 75 MVA) 1200 ampere breaker. The spectrum of ratings also included 7.5 and 15kV ratings. The maximum breaker rating produced was the 150DH1000 (15kV, 1000 MVA) 3000 ampere.

Chronology

DH switchgear was introduced in 1939 and was actively manufactured by Westinghouse in complete switchgear assemblies until the introduction of DHP switchgear in 1963. As production activity tapered after 1963, only match and lineup additions to existing DH switchgear were manufactured along with complete replacement circuit breakers and renewal parts. The last new manufactured DH breakers and switchgear cells were produced in 1983.

REPLACEMENT CAPABILITIES



50DH250E 1200 Ampere DH-VR Breaker

New DH factory manufactured switchgear structures and breakers are no longer available. However, Cutler-Hammer offers the following through qualified retrofitting organizations.

DH-VR Vacuum Replacement Breakers

The DH-VR is a brand new direct roll-in replacement vacuum breaker for DH air magnetic breakers. The DH-VR breaker permits DH switchgear modernization by using state-of-the-art Cutler-Hammer VCP-W vacuum breaker technology. The DH-VR is factory designed and manufactured with complete factory and ANSI design testing.

Renewal Parts

Cutler-Hammer no longer offers new manufactured renewal parts for DH switchgear structures and breakers. Contact Home-wood Products at **412-665-2718**.

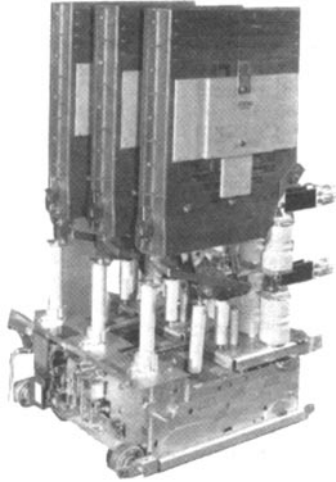


SWITCHGEAR (MEDIUM VOLTAGE)

DHP Switchgear Assemblies, Power Circuit Breakers, and Renewal Parts

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PRODUCT HISTORY



Low Resolution Photo

Type DHP Drawout Air Magnetic Power Circuit Breaker (Front Interphase Barrier Removed)

Westinghouse DHP medium voltage porcelain metal-clad switchgear with type DHP air magnetic power circuit breakers was introduced in 1963. DHP breakers and switchgear were similar to, but not interchangeable with, the older DH product. DHP was provided with porcelain insulation on all live parts to ground in the switchgear and on the breaker element. DHP switchgear was available in indoor and in sheltered aisle and aisle-less outdoor enclosures.

DHP air magnetic breakers were subject to three major design changes that were phased in during their manufacturing life. The first DHP breakers were furnished with solenoid operated mechanisms with cast parts and monolithic pole units. From 1964 to 1968, the stored energy spring mechanism gradually phased out the solenoid operator. After 1968, cast mechanisms were phased out by fabricated mechanisms. After 1970, monolithic pole

units were phased out by the post-insulator pole unit (PIP) design.

DVP vacuum breakers were introduced in 1978. DVP breakers were first generation vacuum breakers that were interchangeable in DHP switchgear with DHP air magnetic breakers of the same ratings.

Ratings

DHP Breakers: 5 kV (75, 250 and 350 MVA)
7.5 kV (500 MVA)
15 kV (500, 750 and 1000 MVA)

DVP Breakers: 7.5 kV (500 MVA) and 15 kV (500 and 750 MVA)

Chronology

DHP switchgear was introduced in 1963 and was actively manufactured by Westinghouse in complete switchgear assemblies until 1984.

REPLACEMENT CAPABILITIES



Cutler-Hammer offers an extensive amount of products to support DHP switchgear.

DHP Match and Lineup Cubicles

New manufactured DHP switchgear structures to match and line up to existing Westinghouse DHP switchgear are available in indoor and in outdoor sheltered aisle and aisle-less enclosure construction.

DHP-VR Vacuum Replacement Breakers

The DHP-VR is a brand new direct roll-in replacement vacuum breaker for DHP air magnetic and DVP vacuum breakers. The DHP-VR breaker permits DHP switchgear modernization by using state-of-the-art Cutler-Hammer VCP-W vacuum breaker technology. The DHP-VR is factory designed and manufactured with complete factory and ANSI design testing.

New DHP Air Magnetic Breakers

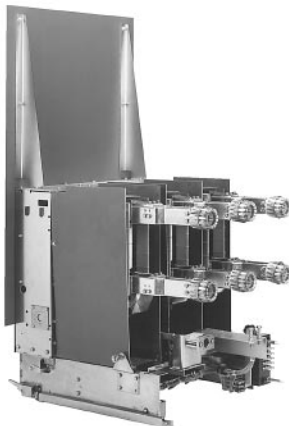
Completely new factory manufactured DHP air magnetic power circuit breakers are still available in ratings from 50DHP250 1200 ampere to 150DHP1000 3000 ampere.

Remanufactured DHP Breakers and Factory Repair Service

Factory remanufacturing of DHP breakers and factory repair service for DHP breakers are available.

Renewal Parts

Cutler-Hammer offers an extensive inventory of newly manufactured renewal parts for DHP switchgear structures and breakers.



150DHP-VR500 1200 Ampere Vacuum Replacement Breaker for DHP Switchgear

SWITCHGEAR (MEDIUM VOLTAGE)

VCP Vac-Clad Switchgear Assemblies, Power Circuit Breakers, and Renewal Parts



PRODUCT HISTORY



Vac-Clad Switchgear with Type VCP Drawout Vacuum Power Circuit Breakers

Westinghouse Vac-Clad medium voltage metal-clad switchgear with type VCP vacuum power circuit breakers was introduced in 1981. Vacuum interrupter technology provided many advantages over the previous DH and DHP air magnetic breaker designs. Vacuum interrupters permitted the breaker size and weight to be significantly reduced, allowing for two-high stacking construction of most breaker

ratings in the switchgear enclosure. VCP breakers withdraw onto switchgear rail assemblies for ease of inspection. Maintenance associated with air magnetic arc chutes was eliminated and contact maintenance was reduced to visual inspection of wear gap indicators.

VCP breakers included a design improvement called the patented V-flex current

transfer system, which eliminated the transfer of primary current over a moving hinge (like DHP breakers) or sliding contact assembly (like DVP breakers). Porcelain insulation was maintained on the breaker elements and in the switchgear except for the 5 kV switchgear cell insulation, which was glass polyester as standard. The switchgear phase bus was insulated with a fluidized bed epoxy insulation system, which was a major improvement over the epoxy impregnated kraft paper or noryl that was used as sleeving on phase bus bars in previous switchgear designs. Vac-Clad switchgear was manufactured in indoor and in sheltered aisle and aisle-less outdoor enclosures.

Ratings

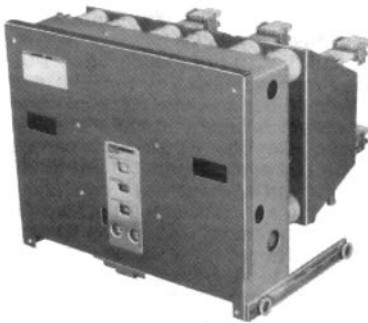
VCP switchgear provided the first complete line of Westinghouse vacuum breakers in the medium voltage ratings:

- 5 kV (250 and 350 MVA)
- 7.5 kV (500 MVA)
- 15 kV (500, 750 and 1000 MVA)

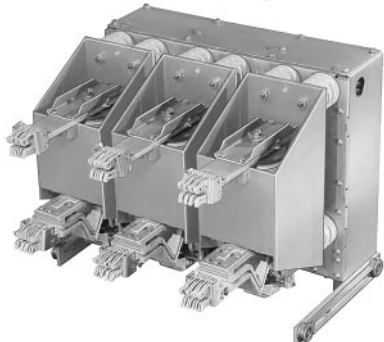
Chronology

Vac-Clad switchgear was introduced in 1981 and was manufactured by Westinghouse in complete switchgear assemblies until the introduction of VacClad-W switchgear in 1986. Today, many capabilities still exist to support Vac-Clad switchgear.

REPLACEMENT CAPABILITIES



Low Resolution Photo



Type VCP-W Vacuum Power Circuit Breaker
(Front and Rear Views)

Cutler-Hammer offers an extensive amount of products to support Vac-Clad switchgear.

New VCP Vacuum Breakers

Completely new factory manufactured VCP vacuum power circuit breakers are still available in ratings from 50VCP250 1200 ampere to 150VCP1000 3000 ampere.

Remanufactured VCP Breakers and Factory Repair Service

Factory remanufacturing of VCP Breakers and factory repair service for VCP Breakers are available.

Renewal Parts

Cutler-Hammer offers an extensive inventory of newly manufactured renewal parts for VCP switchgear structures and breakers.

Fluidized Switchgear Bus

Cutler-Hammer offers new fluidized epoxy bus – insulated bus to replace existing switchgear phase bus insulation.



SWITCHGEAR (MEDIUM VOLTAGE)

VCP-W Vac-Clad Switchgear Assemblies, Power Circuit Breakers, and Renewal Parts

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PRODUCT HISTORY



VacClad-W Switchgear with Type VCP-W Drawout Vacuum Power Circuit Breakers

Westinghouse VacClad-W world class medium voltage metal-clad switchgear with type VCP-W vacuum power circuit breakers was introduced in 1986. VCP-W breakers and switchgear were similar to but not interchangeable with the original Vac-Clad (VCP) product.

The VCP-W design includes a consolidation of improvements in product design

and performance that enables the introduction of IEC and 27 kV breaker ratings. However, VCP-W still includes many of the proven product features of VCP switchgear design, including two-high breaker stacking, V-flex breaker current transfer and fluidized epoxy insulation on the switchgear phase buses. VCP-W breakers withdraw onto removable switchgear rail assemblies for ease of inspection. VCP-W breakers and

switchgear were furnished with high grade glass polyester insulation as standard. Optional insulation upgrades included cycloaliphatic epoxy insulation for breaker element insulation (VCP-WSE breakers) and porcelain insulation for the switchgear cell contact bottles. VacClad-W switchgear is manufactured in indoor and in sheltered aisle and aisle-less outdoor enclosures.

ANSI Ratings	IEC Ratings
5.0 kV (250 and 350 MVA)	3.6 kV (25, 31.5, 40 kA RMS SC MAKE)
7.5 kV (500 MVA)	7.2 kV (25, 31.5, 40 kA RMS SC MAKE)
15.0 kV (500, 750, and 1000 MVA)	12.0 kV (25, 31.5, 40 kA RMS SC MAKE)
27.0 kV (1250 MVA)	17.5 kV (31.5, 40 kA RMS SC MAKE)
38.0 kV	24.0 kV (25 kA RMS SC MAKE)

Chronology

VacClad-W switchgear was introduced in 1986 and is the current state-of-the-art Westinghouse switchgear product. The VCP-WSE breaker with special cycloaliphatic epoxy insulation and the 27 kV VCP-W rating were introduced in 1990. IEC VCP-W ratings were introduced in 1991. 38 kV was introduced in 1995.

REPLACEMENT CAPABILITIES



Type VCP-W Vacuum Power Circuit Breaker (Front and Rear Views)

Cutler-Hammer offers an extensive amount of products to support VacClad-W switchgear.

Complete New VacClad-W Switchgear Assemblies

Complete new manufactured VacClad-W switchgear assemblies are available to replace obsolete existing switchgear with new Cutler-Hammer state-of-the-art vacuum switchgear.

VacClad-W Match and Lineup Cubicles

New manufactured VacClad-W switchgear structures to match and line up to existing Westinghouse VacClad-W switchgear. New VCP-W structures can also connect to existing non-current Westinghouse indoor switchgear (types DH, DHP, and VCP) with a transition section.

New VCP-W Vacuum Breakers

Completely new factory manufactured VCP-W vacuum power circuit breakers are available in all published ratings.

Renewal Parts

Cutler-Hammer offers an extensive inventory of newly manufactured renewal parts for VCP-W switchgear structures and breakers.

Fluidized Switchgear Bus

Cutler-Hammer offers new fluidized epoxy bus – insulated bus to replace existing switchgear phase bus insulation.



IQ AND IMPACC COMMUNICATIONS RETROFITS

DHP, VCP, VCP-W



New VCP-W Front Panel with Digitrip MV and IQ Data Plus II

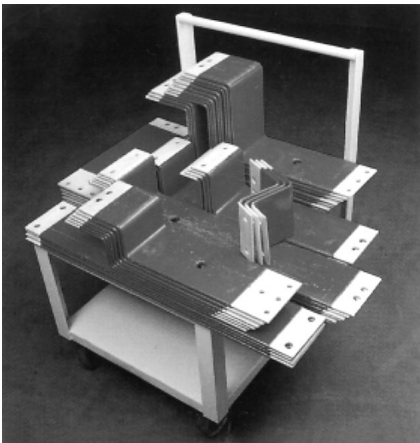
Cutler-Hammer offers IQ products to replace existing analog meters, instruments and protective relays with microprocessor-based solid-state true-RMS sensing devices. IQ products can be furnished as components for field installation on the switchgear or can be provided as new replacement front panels. The new replacement front panels available for DHP, VCP and VCP-W switchgear assemblies includes the IQ devices mounted and wired. Wire markers and wiring diagrams are provided for ease of installation. The existing panel is removed, the new panel is set in place and the solid-state devices are wired into the switchgear unit. The IQ products can be matched in numerous combinations to include the Digitrip MV, IQ Analyzer, IQ Data Plus II, IQ Data, IQ Generator and the IQ Data Plus 4000/4100. Communications can then be tied to the Cutler-Hammer IMPACC System.



New VCP-W Front Panel with Digitrip MV and IQ Analyzer

FLUIDIZED SWITCHGEAR BUS

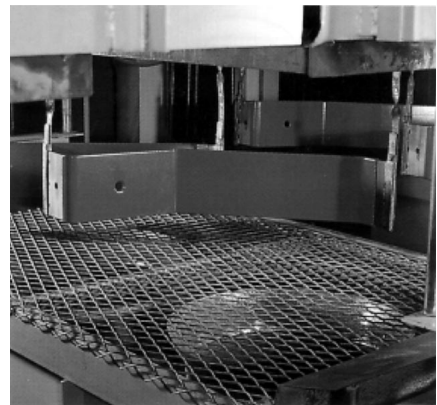
DHP



Any bus bar shape or configuration is uniformly coated. There are no dielectric weak spots and taping is not necessary.

Cutler-Hammer offers a cost effective program that can extend the life of any manufacturers' equipment by reconditioning or replacing the bus and insulating it with fluidized bed epoxy. The bus insulation in many existing switchgear assemblies may be Noryl, Micarta, redacta, heat shrink tubing or fiberglass. These materials are adversely affected by aging, environment and operating conditions. The solution to these concerns can be answered with the high quality, state-of-the-art system and superiority offered by the fluidized bed epoxy process. Customers can utilize any of the following services to fit specific switchgear applications from 600V to 15kV:

- Bus Reconditioning
- Bus Replacement
- Bus Duct Reconditioning
- Bus Duct Replacement



Coated bus bars pass through a post-heat oven to cure and fuse the epoxy.

SWITCHGEAR UPGRADES

DHP, VCP, VCP-W

Switchgear upgrades are available from Cutler-Hammer to increase the MVA and continuous current ratings of the entire assembly.



SWITCHGEAR (MEDIUM VOLTAGE) DHP, VCP, VCP-W Switchgear Assemblies

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FURTHER INFORMATION

Product	Literature Number	Description
DHP Switchgear and Breaker	RPD 32-253-4D LEL006A SA-11876B LEL014 RPD 32-290	Renewal Parts Data for DHP Breaker and Switchgear Parts Sales Aid for the DHP Remanufacture Program Sales Aid for the DHP-VR Vacuum Replacement Breaker Sales Aid for the DHP-VR Breaker vs. Retrofitted Breaker Renewal Parts Data for the DHP-VR Vacuum Replacement Breaker
VCP Switchgear and Breaker	RPD 32-274 LEL007A	Renewal Parts Data for VCP Breaker and Switchgear Parts Sales Aid for the VCP Remanufacture Program
VCP-W Switchgear and Breaker	RPD 32-255A SA-11671 DB 32-255 AD 32-265	Renewal Parts Data for VCP-W Switchgear Parts Sales Aid for VCP-W Switchgear Descriptive Bulletin for VCP-W Switchgear Application Data for VCP-W Switchgear
Fluidized Bus	SA-11745	Sales Aid for Custom Fluidized Switchgear Bus
General Information	SA-11936B LEL004A SA-104	Sales Aid for Greenwood Aftermarket Product Center Capabilities Sales Aid for Breaker Remanufacture Program Sales Aid for MV Switchgear Replacement Front Panels with IQ Devices

PRICING INFORMATION

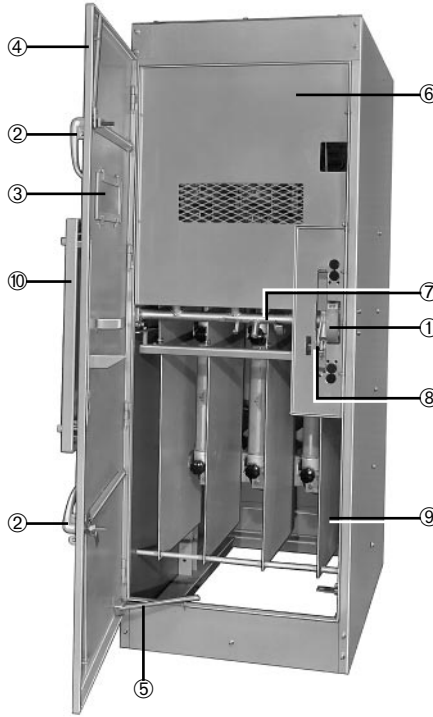
Product	Literature Number	Description
VCP-W Breaker	PL 33-729	Price List for VCP-W Breaker Parts
VCP-WR Breaker	PL 33-724	Price List for VCP-WR Fixed Vacuum Breakers
MV Air/Vacuum Switchgear Parts	VISTA/VISTALINE	Discount Symbol Y1

T



PRODUCT DESCRIPTION

Approximately 40 years ago, Westinghouse began to produce a three-phase load interrupter medium-voltage switch housed in a metal enclosure. The switch is rated 5 to 15 kV and 600 to 1200 amperes. This switch was an economical visible disconnect used primarily for unit substations, main service entrance and distribution of service entrance via a line-up of these switches. Most switches have a fuse for circuit protection on the load side. The switch structure consists of 11 gauge structural steel. The appearance of the switch has not changed drastically over the years.



Standard Manually Operated Fused WLI Switch

- ① Switch Position Indicator/Operator Mechanism
- ② Provisions for Padlocking Door
- ③ Inspection Window
- ④ Full Height Main Door
- ⑤ Door Stop, Foot Operated
- ⑥ Grounded Metal Safety Barrier
- ⑦ Door Interlock
- ⑧ Switch Interlock
- ⑨ Interphase Barrier
- ⑩ Switch Operator Mechanism Access Door

PRODUCT HISTORY

Originally a Westinghouse Product

Metal enclosed load break air interrupter switches were first produced in 1952 under the name Load Break Fusible (LBF) at M & R facilities around the country. In 1964, the manufacturing of the product was consolidated in the Cincinnati, OH facility. The product was discontinued in 1972 and replaced with Westinghouse Load Interrupter (WLI) having many design changes and improvements. Parts for the two products are incompatible but the current WLI design can be added to existing LBF lineups. The WLI product line

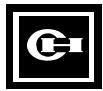
was moved to the Sumter, SC manufacturing facility in 1979.

As stated earlier, LBF and WLI look similar in design. They can be differentiated by the nameplate located behind the operating handle access door. The front is largely covered by the main door, with viewing window, providing access to the switch and fuse compartment. A smaller access door on the main door allows access to the switch operating mechanism. Upon opening the main door, the switch in the

upper part of the structure is covered by a protective screen barrier which allows visual inspection. The fuses, when provided, are located in the lower part of the structure, and are readily visible for easy maintenance when the main door is open. The rear of the switch structure is generally used for cable entrance and/or exit. Access to the cable entrance/exit area is via a rear cover or door.

PRODUCT HISTORY TIMELINE

Page	Product	1950	1955	1960	1965	1970	1975	1980	1985	1990	Present
283	Westinghouse LBF										
284	WLI + MVS										



SWITCHGEAR (MEDIUM VOLTAGE) FUSIBLE LBF Load Interrupter Metal Enclosed Switchgear

283

PRODUCT DESCRIPTION

LBF Load Break Switch

The LBF switch standard structure was 33-inch wide, 90.38-inch high (indoor), 98.88-inch high (outdoor), with varying depths. Vertical sections were freestanding, close coupled to transformers, and bolted together forming lineups. ANSI 61

light gray enamel was the internal color for all structures and external color for indoor structures. ANSI 24 dark gray enamel was the external color for outdoor structures.

LBF Ratings

Three-phase, 5 and 15 kV maximum, 600 and 1200 amperes.

REPLACEMENT CAPABILITIES

The LBF product line was discontinued in 1972. Due to design change and retooling, replacement parts are no longer available.

TECHNOLOGY UPGRADES

The MVS product, which replaces the LBF, is a completely new and improved design and parts are incompatible.



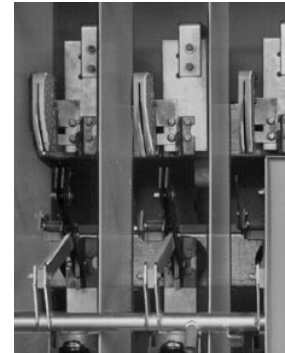
PRODUCT DESCRIPTION

MVS Load Break Switch

The MVS switch standard structures for 5 and 15 kV gear is 33 to 48 in. wide, 90.38 in. high (indoor), 98.88 in. high (outdoor), with varying depths. The WLI switch standard structures for 25.8 and 38 kV gear is 48 to 54 in. wide, 101.5 or 127 in. high (indoor), 110 or 135.5 in. high (outdoor), with varying depths. Vertical sections are freestanding, close coupled to transformers, and bolted together forming lineups. ANSI 61 light gray enamel is the standard internal color for all structures and became the standard external color for all structures in 1984. ANSI 24 dark gray enamel was the external color for outdoor structures prior to this date.

MVS Ratings

Three-phase, 5 and 15 kV maximum, 600 and 1200 amperes
 Three-phase, 25.8 and 38 kV maximum, 600 amperes



MVS Switch Mechanism
 (Refer to pictures below for part identification)

REPLACEMENT CAPABILITIES

	Part Description	Style Number	Quantity per Switch	List Price Each
Switch Pole Assemblies				
	Switch Pole Assemblies Three-pole set includes main and flicker blades, break jaws, arc chutes and adjustment tool kit. (60 kV BIL or 95 kV BIL) 5 and 15 kV – 600 amperes 5 and 15 kV – 1200 amperes	7278A27G01	1 set	\$10130
		7278A27G02	1 set	13220
	(110 kV BIL) 15 kV – 600 amperes	7278A27G03	1 set	10520
	15 kV – 1200 amperes	7278A27G04	1 set	13600
	(125 kV BIL or 150 kV BIL) 25 and 38 kV – 600 amperes	7278A27G05	1 set	14400
Arcing Contact Assemblies				
	Arcing Contact Assemblies Three-pole set includes flicker blades and arc chutes. This kit is not required when switch pole assemblies above are ordered. (60 kV BIL or 95 kV BIL) 5 and 15 kV – 600 amperes 5 and 15 kV – 1200 amperes	7278A27G06	1 set	2540
		7278A27G07	1 set	3320
	(125 kV BIL or 150 kV BIL) 25 and 38 kV – 600 amperes	7278A27G08	1 set	3600
Drive Rod Link (Polyester)				
	Drive Rod Link (polyester, set of three) 5 kV (60 kV BIL) 15 kV (95 kV BIL) 15 kV (110 kV BIL) 25 and 38 kV (125 kV BIL or 150 kV BIL)	7278A27G09	1 set	450
		7278A27G10	1 set	550
		7278A27G11	1 set	590
		7278A27G12	1 set	650



SWITCHGEAR (MEDIUM VOLTAGE) FUSIBLE

MVS Load Interrupter Metal Enclosed Switchgear Renewal Parts

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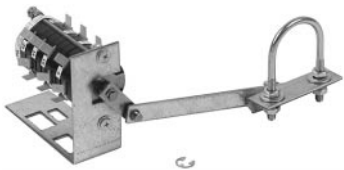



REPLACEMENT CAPABILITIES

	Part Description	Style Number	Quantity per Switch	List Price Each
Drive Rod Link (Porcelain)				
	Drive Rod Link (porcelain) (set of three)			
	5 kV (60 kV-BIL)	7278A27G13	1 set	\$4350
	15 kV (95 kV-BIL)	7278A27G14	1 set	5350
	(125 kV-BIL or 150 kV-BIL) 25 and 38 kV	7278A27G15	1 set	6350
Insulators				
 <p style="text-align: center;">Polyester Porcelain</p>	Insulators (one each) (60 kV-BIL)			
	5 kV Glass Polyester	4892A97H03	as required	100
	5 kV Porcelain	548D224G07	as required	440
	(95 kV-BIL)			
	15 kV Glass Polyester	4892A97H04	as required	100
	15 kV Porcelain	548D235G07	as required	500
	(110 kV-BIL)			
	15 kV Porcelain	548D236G07	as required	540
(125 kV-BIL or 150 kV-BIL) 25 and 38 kV Porcelain	1707C41G01	as required	3480	
Removable Handle				
	Removable Handle All Ratings			
		7274A49H01	1 each	90
Switch Spring Mounting Assembly				
	Switch Spring Mounting Assembly			
	5-15 kV – 40 kA Fault Close	7278A27G16	1 set	450
	5 kV – 61 kA Fault Close	7278A27G17	1 set	450
	15 kV – 61 kA Fault Close	7278A27G18	1 set	450
	25 kV – 20 kA Fault Close	7278A27G19	1 set	1000
	25 kV – 40 kA Fault Close	7278A27G20	1 set	1500
	25 kV – 60 kA Fault Close	7278A27G21	1 set	1500
	38 kV – 20 kA Fault Close	7278A27G22	1 set	1050
38 kV – 30 kA Fault Close	7278A27G23	1 set	1500	
Switch or Fuse Barrier Assembly				
	Switch Barrier Assembly			
	5 and 15 kV	7278A27G24	1 set	1540
	25 and 38 kV	7278A27G25	1 set	3200
	Fuse Barrier Assembly			
	15 kV	7278A27G26	1 set	1540
	25 and 38 kV	7278A27G27	1 set	3200

SWITCHGEAR (MEDIUM VOLTAGE) FUSIBLE MVS Load Interrupter Metal Enclosed Switchgear Renewal Parts



REPLACEMENT CAPABILITIES

	Part Description	Style Number	Quantity per Switch	List Price Each
Open Close Indicator/Interlock Cam				
	Open-Close Indicator/Interlock Cam for Lock open/close or Lock open only	220C934H01	1 each	\$250
	Open-Close Indicator/Interlock Cam for Lock close only	220C934H02	1 each	250
Auxiliary Switch Assembly				
	Auxiliary Switch Assembly (5 NO and 5 NC Contacts)	7278A27G28	1 each	770
Switch Adjustment Tool Kit				
	Switch Adjustment Tool Kit 5 and 15 kV	221C113G01	1 each	450
	25 and 38 kV	221C113G02	1 each	450
Fuse Live Part Kit				
	Fuse Live Part Kit Non Disconnect (Three-Phase – Top and Bottom)			
	RBA200 5 – 15 kV	7278A27G29	1 each	890
	RBA400 5 – 15 kV	7278A27G30	1 each	925
	RBA200 25 – 38 kV	7278A27G31	1 each	1050
	RBA400 25 – 38 kV	7278A27G32	1 each	1125
	CLE-1 5 – 15 kV	7278A27G33	1 each	890
	CLE-2 5 – 15 kV	7278A27G34	1 each	925
	CLE-3 5 – 15 kV	7278A27G35	1 each	1050
	CX 5 – 15 kV	7278A27G36	1 each	775
	CXN-1 5 – 15 kV (Single Barrel – 3 inch Dia.)	7278A27G37	1 each	890
	CXN-1 5 – 15 kV (Single Barrel – 4 inch Dia.)	7278A27G38	1 each	890
	CXN-2 5 – 15 kV (Double Barrel – 3 inch Dia.)	7278A27G39	1 each	1175
	CXN-2 5 – 15 kV (Double Barrel – 4 inch Dia.)	7278A27G40	1 each	1175
NX25 kV	7278A27G41	1 each	850	
EJO38 kV	7278A27G42	1 each	1190	
Space Heaters				
	Space Heaters (Voltage shown is half Rated Voltage) 125 V	220C974G03	as required	275
	250 V	220C974G04	as required	275

Other Replacement Parts

Other replacement parts are available but must be considered on a job-by-job basis.

Include switch nameplate information located behind the switch operating handle access door with any correspondence. Be sure this includes the "CN" or "SM" number.

FURTHER INFORMATION

Literature Number	Description
DB 31-935	Descriptive Bulletin for WLI Load Interrupter Metal Enclosed Switchgear
IL 31-930-C	Instruction Leaflet for WLI and WVB Metal Enclosed Switchgear

PRICING INFORMATION

VISTA/VISTALINE	Discount Symbol Y2
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PRODUCT DESCRIPTION



Medium Voltage Fuses

Medium voltage fuses offer such diverse characteristics that almost any fuse application, within the practical range of such interrupting devices, may be satisfied. These diverse characteristics are offered, in part, by the production of both expulsion and current limiting power fuses.

Expulsion and current limiting fuses provide diverse characteristics by employing different areas of fuse technology. This difference in technology along with the diverse characteristics require that different questions be answered when applying expulsion and current-limiting fuses.

PRODUCT HISTORY

Originally a Westinghouse Product

The Cutler-Hammer Power Fuse product line was introduced in the 1930s by Westinghouse Electric Corporation. As power systems grew in size, the need to sectionalize utility feeders and protect equipment became apparent. The initial fuse development efforts resulted in the creation of Non-Current Limiting, Expulsion Type Fuses. As the available fault currents grew, the need for a current limiting fuse was apparent and resulted in new interruption techniques.

While basic fuse technology has not changed greatly over the years, gradual improvements have been made to make the fuses more current limiting and easier to manufacture and install. Because standards for fuses (ANSI C37) detail only test methods and basic performance requirements, many different varieties of fuses (length, diameter, short circuit interruption curves) have been introduced over the years.

Cutler-Hammer presently manufactures medium voltage fuses in Cabo Rojo, PR, where it was moved from East Pittsburgh, PA in 1972.

PRODUCT HISTORY TIMELINE

Page	Product	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	Present
	BAL ^①														
	BAL-R ^②														
289	CLE														
289	CLS														
289	CLEPT														
289	CLT														
289	CX/CXN														
289	HLE														
	BA ^③														
	DBA ^④														
290	RBA														
290	RBD														
	DBS ^⑤ CE														
290	DBU														

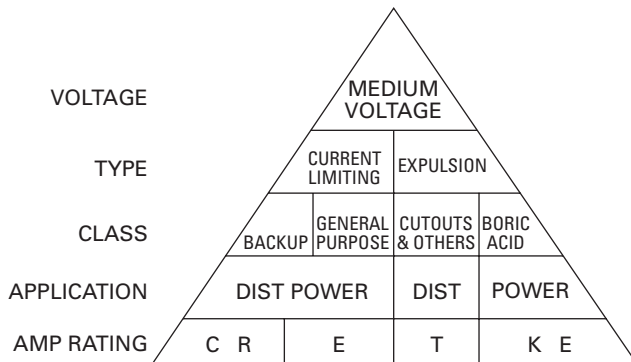
- ① BAL superseded by CLE.
- ② BAL-R superseded by CLS.
- ③ BA – Refills and holders only, new installations use RBA.
- ④ DBA – Refills only.
- ⑤ DBS – Superseded by DBU.





GENERAL INFORMATION

Fuses in Perspective



Advantages

Medium Voltage Fuse Comparison

Expulsion	Current Limiting
— Vented	— Sealed
— Electro-Mechanical	— Static
— Expels Gases/Noise	— No Gases/Noise
— Interrupts at Natural Current Zero	— Limits Fault Current
— Generally Higher Voltage/Current Applications	— Generally Higher Interrupting Ratings
— Differences in Time/Current Characteristics	— Differences in Time/Current Characteristics

Application Guide

Selection Guide				Ratings	Feeder Circuit Sectionalizing	Fused Switches	Power Transformers	Substation Service Transformers	Dip Pole	Underground Distribution Transformers	Pole Mounted Transformers	Pad-Mounted Distribution Transformers	Motor Starters	Potential Transformers	Substation Capacitor Banks	
Type	Class	Use	Brand	kV, Amp, kA												
Current Limiting	General Purpose	Power	CLE/HLE	2.4kV - 15.5kV 10E - 1350A to 85kA	●	●	●		●						●	
		Dist.	CX, CXN	4.3kV - 15.5kV 3.5C - 300C 50kA				●				●				
			CLT	2.4kV - 15.5kV 4A - 150A 25kA								●				
	Backup	Power	CLEPT	2.4kV - 38kV 0.25E - 10E to 80kA											●	
		Dist.	CLS	2.4kV - 8.3kV 2R - 36R 50kA										●		
Expulsion	Boric Acid	Power	RBA	4.8kV - 34.5kV 0.5E - 7200E	●	●	●								●	
			RDB	4.8kV - 34.5kV 0.5E - 7200E	●		●	●	●					●	●	
			DBU	14.4kV - 38kV 15E - 200E 1A - 200K	●	●	●	●	●						●	

Guide to Names:

CLE	Current Limiting E-Rated
HLE	Current Limiting, E-Rated, Interchangeable with General Electric and Gould Shawmut
CX, CXN	Current Limiting Interchangeable with McGraw-Edison's NX Brand Fuses, C-Rated
CLT	Current Limiting Transformer Fuse
CLEPT	Current Limiting E-Rated for Potential Transformers
CLS	Current Limiting for Motor Starters, R-Rated
RBA	Refillable Boric Acid Expulsion Fuse (Indoor Use)
RDB	Refillable Dropout Boric Acid Expulsion Fuse (Outdoor Use)
DBU	Dropout Boric Acid Fuse (Refill Only) Interchangeable with S&C's SMU-20 Refill

Guide to Amp Ratings:

"E" Designation	Fuse rated 100E or below will melt in 300 seconds at a current value between 2.0 and 2.4 times the E number. Fuse rated above 100E will melt in 600 seconds at a current value between 2.2 and 2.64 times the E number. If the current is higher than 2.0 to 2.4 or 2.64 times the E number, the user must consult the time-current curves for that particular fuse.
"R" Designation	The fuse will melt in 15 to 35 seconds when the current equals 100 times the R number. If the current is higher than 100 times the R number, the user must consult the time-current curves for that fuse.

"C" Designation

The fuse will melt in 1000 seconds at a current value, between 1.7 and 2.4 times the C number.

If the current is higher than 2.4 times the C number, the user must consult the time-current curves for that particular fuse.

Expulsion fuses can also be E-rated, K-rated and T-rated and are also covered in the ANSI standards. The K and T ratings refer, respectively, to relatively "fast" and "slow" melting expulsion fuses. Detailed time-current tables would be needed to adequately define the ratings.



PRODUCT DESCRIPTION



CLE and HLE
Current Limiting – E Rated



CLEPT
Current Limiting E-Rated for Potential Transformer Protection



CLS
Current Limiting for Motor Starter



CX
Current Limiting – Interchangeable with McGraw Edison's NX Type



CLT
Current Limiting for Transformer Protection

Current limiting fuses are constructed with pure silver fuse elements, high purity silica sand filler, a specially designed core and a glass resin outer casing.

A high fault current melts the silver element almost instantly and loses energy to the surrounding sand. The sand melts and forms fulgurite, a glass-like substance.

The arc voltage rapidly increases to nearly three times the fuse voltage rating and

forces the current to zero. Low fault current melts a solder drop on the silver fuse element which, in turn, melts the silver.

The element burns back until there is a sufficient internal gap to interrupt the current. This is known as the M-effect.

Cutler-Hammer offers current limiting fuses in two basic types: backup and general purpose. Backup fuses have a published minimum interrupting current

and require a series device for breaking the circuit for currents below this minimum level. General purpose fuses have improved low current interruption capability and are designed to interrupt low fault currents that cause the fuse to melt in one hour or less.

GENERAL INFORMATION

Applications

Current limiting technologies can be used to meet almost every fuses application. Typical applications for utility, industrial, construction and OEM customers include:

- Feeder circuit sectionalizing
- Power transformers
- Substation service transformers
- Underground distribution transformers
- Pole-mounted transformers
- Pad-mounted distribution transformers
- Fused switches
- Dip poles
- Motor starters
- Potential transformers
- Substation capacitor banks

Accessories

A wide assortment of mountings, live parts, end fittings, filters and condensers are available to facilitate power fuse installation.

Mountings include a base, porcelain or glass polyester insulators and live parts. They help enable the fuse to be safely attached to the gear. Mountings can be either disconnect, nondisconnect, or dropout.

Live Parts attach the fuse to the mountings and are considered part of the mounting. All parts above the insulators are live parts.

End Fittings are metal parts that attach to each end of the fuse at the ferrules. They are used only on disconnect fuses or when converting a nondisconnect to a disconnect fuse.



Live Parts



PRODUCT DESCRIPTION



RBA – Refillable Boric Acid

Cutler-Hammer expulsion fuses use boric acid as the interrupting medium. Under a fault condition, arc heat decomposes the boric acid which produces gases and boric anhydride. The water vapor blast extinguishes the arc in a deionizing action and exits from the bottom of the fuse.

Type RBA indoor expulsion fuses can be fitted with a muffler, comprised of a discharge filter or condenser, that moderates



RDB – Refillable Dropout Boric Acid

the discharge exhaust. The discharge filter limits the exhaust to a small and relatively inert amount of gas and lowers the noise level without affecting the fuse interrupting rating. Steam discharge, that can affect the interrupting, is fully restricted by the condenser.

Type RDB outdoor dropout fuses include an ejector spring which forces the arcing rod through the top of the fuse. The arcing



DBU – Dropout Boric Acid – Interchangeable with S & C's SMU – 20

rod strikes a latch on the mounting which forces the fuse to swing outward through a 180° arc into the dropout position.

Refill units can be field installed into RBA and RDB expulsion fuses. Once the old unit has been removed, the separately purchased unit can be easily installed into the fuse holder.

GENERAL INFORMATION

Applications

Expulsion technologies can be used to meet a number of fuse applications. Typical applications for utility, industrial construction and OEM customers include:

- Feeder circuit sectionalizing
- Fused switches
- Power transformers
- Substation service transformers
- Dip poles
- Potential transformers
- Substation capacitor banks

Accessories

The following accessories are available for expulsion fuses:

Mountings include a base, porcelain or glass polyester insulators and live parts. They help enable the fuse to be safely attached to the gear. Mountings can be either disconnect, nondisconnect, or dropout. Fuses may be vertical or underhung.

Live Parts attach the fuse to the mountings and are considered part of the mounting. All parts above the insulators are live parts.

Filters and Condensers are for indoor applications of RBA expulsion fuses. They confine the arc within the fuse and substantially reduce the noise and exhaust when the fuse interrupts.

FURTHER INFORMATION

Product	Literature Number	Description
Current Limiting Fuses	36-691	Technical Data for CLS Fuse
	36-693	Fuse Curves for CLS Fuse
	36-710	Technical Data for CLE, CLEPT Fuses
	36-711	Technical Data for CLE, CLEPT Fuses
	36-713	Technical Data for CX, CXN Fuses
	36-715	Fuse Curves for CLE, CLEPT Fuses
	36-733	Fuse Curves for CX Fuse
	36-901	Fuse Curves for CLE, HLE Fuses
	36-933-A	Fuse Curves for CXN Fuse
	General Information	36-610	Literature Index for Current Limiting Fuses
36-612		Supersedure Index for Current Limiting Fuses
36-686		Application Data for Current Limiting Fuses
Expulsion Fuses	36-630	Technical Data for RDB Fuse
	36-631	Technical Data for RDB Fuse
	36-632	Descriptive Bulletin for RDB Fuse
	36-633	Technical Data for RBA Fuse
	36-634	Descriptive Bulletin for RBA Fuse
	36-635	Fuse Curves for RBA, RDB Fuses
	36-642	Descriptive Bulletin DBU Fuse
	36-643	Fuse Curves for DBU Fuse
General Information	36-610	Literature Index for Current Limiting Fuses
	36-612	Supersedure Index for Current Limiting Fuses
	36-616	Application Data for Current Limiting Fuses
	SA-11888	Sales Aid for Expulsion Fuses

PRICING INFORMATION

Literature Number	Description
PL 36-609	Price List for Medium Voltage Fuses
VISTA/ VISTALINE	Discount Symbol Y1-F
PAD	Pricing and Availability Digest



EXCITATION CONTROL EQUIPMENT

Voltage Regulators and Static Excitation Systems

PRODUCT DESCRIPTION

Excitation control equipment is the equipment which provides excitation power, regulation, control, and protection for a synchronous machine.

The primary function of the equipment is to provide field current. In controlling the

field current, the output voltage of the synchronous generator may be regulated. Equally important is the regulation, control, and protection aspects of a modern excitation system. These functions are accomplished automatically by appropriate changes in the level of machine excitation.

Excitation control equipment is applied primarily as a voltage regulator for synchronous generators. There are also some limited applications of products applied for supplying excitation for synchronous motors.



PRX-400B Solid-state Regulator for Multi-field Excitation System



WTA-300B Potential Source Static Excitation System



MGR Solid-state Regulator for Single-field Excitation System

PRODUCT HISTORY

Originally a Westinghouse Product

The Excitation Control Equipment Product Line began manufacturing excitation equipment in the 1920s under the name of Westinghouse Electric Corporation. As power systems grew in size, the need to regulate the output voltage of the generator

became apparent. The first voltage regulators were electromechanical designs. Eventually, magnetic designs replaced the electromechanical designs. The magnetic type designs were replaced by solid-state designs which were introduced in the

1960s. Since the introduction of solid-state designs in the 1960s, steady improvements have been made to these designs. Excitation equipment was manufactured in Pittsburgh, PA until 1985 at which time it was moved to Asheville, NC.

PRODUCT HISTORY TIMELINE

Page	Product	1920	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	Present
292	BJ-30❶																	
292	WR-20❷																	
292	SRA/SRD❶																	
292	WMA❷																	
292	PRX❸																	
292	TRA❸																	
292	WTA❸																	
	WHS❸																	
292	WTA-300❸																	
292	WTA-300B❸																	
292	MGR❸																	
292	WDR-2000❸																	

- ❶ Electromechanical.
- ❷ Magnetic amplifier design.
- ❸ Solid-state design.
- ❹ Digital design.



GENERAL INFORMATION

Current System Selection Guide

Application selection for various field current requirements. Consult the factory for quotation.

Equipment Type	Application		Specific	Features
	AVR	SEVR		
MGR	●	●	<ul style="list-style-type: none"> New generators Existing generators 	<ul style="list-style-type: none"> Supplies excitation to single field exciters or generator fields up to 600 amperes Multi-function logic modularity Front access only cubicle Fixed power rectifiers
PRX-302 PRX-302 ^① PRX-302X5 ^①	●		<ul style="list-style-type: none"> New installations Combustion turbines Steam turbines Prime movers (i.e., diesel engines) 	<ul style="list-style-type: none"> Supplies excitation for brushless exciters for generators up to 100 MVA Modular logic Provisions for redundancy Front access only design
PRX-400B	●		Retrofit applications	<ul style="list-style-type: none"> Retrofit for WMA and WR-20 regulators Modular logic Provisions for redundancy
WTA-300B Brushless	●		<ul style="list-style-type: none"> New steam turbine installations > 100 MVA Retrofit applications 	<ul style="list-style-type: none"> Supplies excitation for generators 100 MVA and up Primary retrofit for WMA brushless systems Modular logic Provisions for redundancy Draw-out power rectifiers Draw-out AC disconnect
PRX-300		●	<ul style="list-style-type: none"> New generators Existing generators 	<ul style="list-style-type: none"> Supplies excitation for generator fields up to 400 amperes Modular logic Provisions for redundancy Fixed power rectifiers
WTA-300B		●	<ul style="list-style-type: none"> New generators Existing generators 	<ul style="list-style-type: none"> Supplies excitation for generator fields 500 amperes and up Modular logic Provisions for redundancy Draw-out power rectifiers Draw-out AC disconnect
WDR-2000	●	●	<ul style="list-style-type: none"> New generation Existing generators 	<ul style="list-style-type: none"> Supplies excitation to exciter field or directly to the generator field Digital Logic Provisions for redundancy Draw-out power rectifiers Draw-out AC disconnect
Portable excitation systems	●	●	<ul style="list-style-type: none"> Portable standby excitation systems 	<ul style="list-style-type: none"> Supplies excitation for systems 6000 amperes and up Supplied in outdoor enclosure Multi-generator design Utilizes WTA-300B system Trailer or skid mounted

AVR = Automatic voltage regulator (supplies excitation to exciter field)

SEVR = Static exciter voltage regulator (supplies excitation to generator field)

REPLACEMENT CAPABILITIES



Renewal Parts

Renewal Parts

Cutler-Hammer offers a complete line of spare parts for current systems as well as parts for some systems not currently manufactured. The table to the right lists systems that have spare parts available. For those systems that do not have spare parts available, the recommended replacement system is listed.



TRA Voltage Regulator

Renewal Parts Available

Product	Parts Not Available	Parts Available	Current Replacement
BJ-30	●		MGR
WMA	●		PRX-400
WMA BR ^②	●		WTA-300
WR-20	●		PRX-400
Turbograph		●	
SRA/SRD	●		TRA-TRD
TRA/TRD/TRX		●	
XASV		●	XMC
XMC		●	
WTA		●	WTA-300B
WTA-300		●	
SEVR		●	
PRX-300		●	
PRX-302		●	
PRX-400		●	
MGR		●	
WDR-2000		●	

FURTHER INFORMATION

Literature Number	Description
SA-151	Sales Aid for MGR Excitation Systems
SA-231	Sales Aid for WDR Digital Regulator
SA-234	Sales Aid for WDRT Digital Test Kit
SA-106	Sales Aid for Potentiometer Replacement
SA-247	Sales Aid for Voltage Regulation Is Our Business

Service Information

For service information contact your local Cutler-Hammer Field Sales Office or Westinghouse Engineering Services.

PRICING INFORMATION

Call the Cutler-Hammer Asheville Plant for pricing.

① PRX302 = 420 Hz PMG (permanent magnet generator) supply, PRX302X = 60 Hz XMFR supply, PRX302X5 = 50 Hz XMFR supply.

② WMA brushless.



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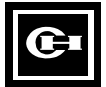
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Description

**Type CA, CAH and HCA
Circuit Breakers**

2 and 3 Poles, 240 Vac
Non-Interchangeable Trip
Type CA: 100-225 Amperes,
10,000 AIC
Type CAH: 100-225 Amperes,
22,000 AIC
Type HCA: 100-225 Amperes,
42,000 AIC



Type CA 3-Pole

Accessories

Description	Catalog Number
Handle Locks: Non-padlockable	CA23NPL
Handle Locks: Padlockable	CA23PL CA23LOCK
Mounting Hardware: Base mounting hardware – 2-pole	CA2BHW
Base mounting hardware – 3-pole	CA3BHW
Mounting Bracket – 2-pole	CA2MB
Mounting Bracket – 3-pole	CA3MB
Terminals: #3 to 300MCM	TA225CA2

Breaker Catalog Numbers

Continuous Ampere Rating at 40°C	Catalog Number			
	Breaker Shipped with:			
	Line and Load Terminal Installed	Load Terminals Only Installed	Line Terminals Only Installed	No Terminals Installed

**Type: CA 10,000 Ampere I.C. Thermal-Magnetic Breakers
2-Pole, 240 Vac**

100	CA2100	CA2100X	CA2100Y	CA2100W
125	CA2125	CA2125X	CA2125Y	CA2125W
150	CA2150	CA2150X	CA2150Y	CA2150W
175	CA2175	CA2175X	CA2175Y	CA2175W
200	CA2200	CA2200X	CA2200Y	CA2200W
225	CA2225	CA2225X	CA2225Y	CA2225W
225 MCS	–	–	–	CA2225WK

3-Pole, 240 Vac

100	CA3100	CA3100X	CA3100Y	CA3100W
125	CA3125	CA3125X	CA3125Y	CA3125W
150	CA3150	CA3150X	CA3150Y	CA3150W
175	CA3175	CA3175X	CA3175Y	CA3175W
200	CA3200	CA3200X	CA3200Y	CA3200W
225	CA3225	CA3225X	CA3225Y	CA3225W
225 MCS	–	–	–	CA3225WK

**Type: CAH 22,000 Ampere I.C. Thermal-Magnetic Breakers
2-Pole, 240 Vac**

100	CAH2100	CAH2100X	CAH2100Y	CAH2100W
125	CAH2125	CAH2125X	CAH2125Y	CAH2125W
150	CAH2150	CAH2150X	CAH2150Y	CAH2150W
175	CAH2175	CAH2175X	CAH2175Y	CAH2175W
200	CAH2200	CAH2200X	CAH2200Y	CAH2200W
225	CAH2225	CAH2225X	CAH2225Y	CAH2225W

3-Pole, 240 Vac

100	CAH3100	CAH3100X	CAH3100Y	CAH3100W
125	CAH3125	CAH3125X	CAH3125Y	CAH3125W
150	CAH3150	CAH3150X	CAH3150Y	CAH3150W
175	CAH3175	CAH3175X	CAH3175Y	CAH3175W
200	CAH3200	CAH3200X	CAH3200Y	CAH3200W
225	CAH3225	CAH3225X	CAH3225Y	CAH3225W

**Type: HCA 42,000 Ampere I.C. Thermal-Magnetic Breakers
2-Pole, 240 Vac**

100	HCA2100	HCA2100X	HCA2100Y	HCA2100W
125	HCA2125	HCA2125X	HCA2125Y	HCA2125W
150	HCA2150	HCA2150X	HCA2150Y	HCA2150W
175	HCA2175	HCA2175X	HCA2175Y	HCA2175W
200	HCA2200	HCA2200X	HCA2200Y	HCA2200W
225	HCA2225	HCA2225X	HCA2225Y	HCA2225W

3-Pole, 240 Vac

100	HCA3100	HCA3100X	HCA3100Y	HCA3100W
125	HCA3125	HCA3125X	HCA3125Y	HCA3125W
150	HCA3150	HCA3150X	HCA3150Y	HCA3150W
175	HCA3175	HCA3175X	HCA3175Y	HCA3175W
200	HCA3200	HCA3200X	HCA3200Y	HCA3200W
225	HCA3225	HCA3225X	HCA3225Y	HCA3225W

Modifications

Description	Catalog Suffix
Shunt Trip	S1 to S16
Auxiliary Switch	A1 to A16
Special Calibration (50°C)	V
Freeze Testing	H
Moisture-Fungus Treatment	F

Further Information

Selling Policy 25-000
Application Data 29-160