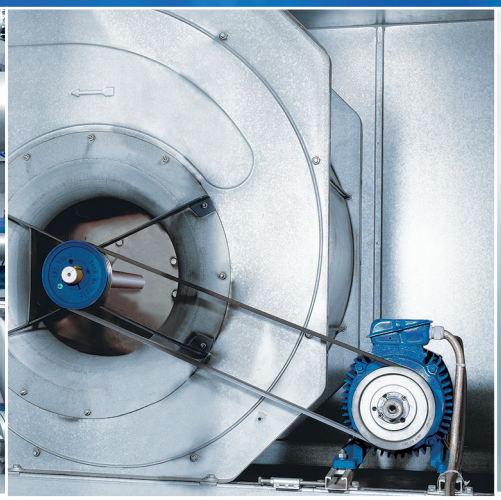
DE1 variable speed starters
DS7 and **S801+/S811+** soft starters

DC1, DA1, DG1 and **SVX/SPX** variable frequency drives
Rapid Link 4.0 distributed, electronic drive system

Product Range Catalog

Efficient Engineering for Starting and Controlling Motors



EATON
Powering Business Worldwide

Eaton Online Catalog – find product details quickly and efficiently!

You can find comprehensive up-to-date product information at http://ecat.moeller.net

Lookup

You can search by keywords, product names, article numbers, technical data: The search understands everything and takes you straight to the product you're looking for.

Graphical navigation

Graphical representation of the fields of application and product groups.

Selection aids

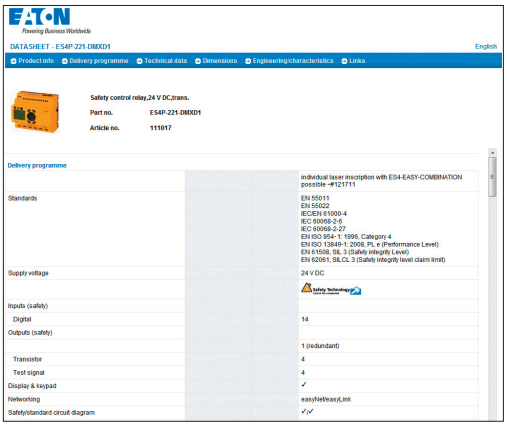
Tailored to the typical expert's approach, this search aid helps you quickly find the product you need.

Data sheets

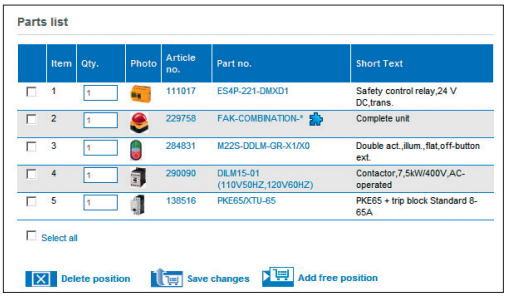
For every article the catalog can generate a technical data sheet, which you can convert to a PDF file for printing or saving with a single click.

Parts lists

From your search results you can create a parts list that you can then send to your Eaton sales partner as a query.



HTML data sheet; can be saved as PDF file.



Parts list, e.g. for queries to Eaton Sales.

You can find comprehensive up-to-date information about Eaton's automation products and switchgear in our Online Catalog.

Contents

Powering business worldwide

As a global power management company, we help customers worldwide manage the power needed for buildings, aircraft, trucks, cars, machinery and businesses.

Eaton's innovative technologies help customers manage electrical, hydraulic and mechanical power more reliably, efficiently, safely and sustainably.

EATON

Powering Business Worldwide

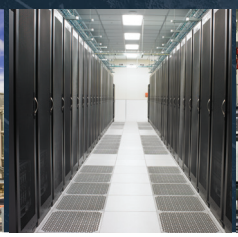
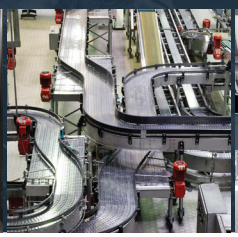


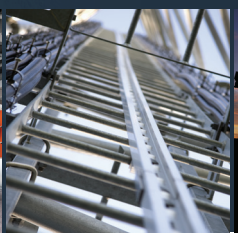

We deliver:

- **Electrical solutions** that use less energy, improve power reliability and make the places we live and work safer and more comfortable
- **Hydraulic and electrical solutions** that enable machines to deliver more productivity without wasting power
- **Aerospace solutions** that make aircraft lighter, safer and less costly to operate, and help airports operate more efficiently
- **Vehicle drivetrain and powertrain solutions** that deliver more power to cars, trucks and buses, while reducing fuel consumption and emissions

We provide integrated solutions that help make energy, in all its forms, more practical and accessible.

With 2014 sales of $22.6 billion, Eaton has approximately 100,000 employees around the world and sells products in more than 175 countries.



Eaton's electrical business

Eaton is a global leader with expertise in:

- Power distribution and circuit protection
- Backup power protection
- Solutions for harsh and hazardous environments
- Lighting and security
- Structural solutions and wiring devices
- Control and automation
- Engineering services

Eaton is positioned through its global solutions to answer today's most critical electrical power management challenges. With 100 years of electrical experience behind us, we're energized by the challenge of powering up a world that demands twice as much energy as today. We're anticipating needs, engineering products and creating solutions to energize our markets today and in the future.

We are dedicated to ensuring that reliable, efficient and safe power is available when it's needed most.

Eaton.com

			PowerXL DE1	PowerXL DC1
Mains voltage (50/60Hz)				
U_e = 115 V AC, single-phase	U_{LN}	V	-	110 (-10%) - 115 (+10%)
U_e = 230 V AC, 1-phase	U_{LN}	V	200 (-10%) - 240 (+10%)	200 (-10%) - 240 (+10%)
U_e = 230 V AC, 3-phase	U_{LN}	V	-	200 (-10%) - 240 (+10%)
U_e = 400 V AC, 3-phase	U_{LN}	V	380 (-10%) - 480 (+10%)	380 (-10%) - 480 (+10%)
U_e = 500 V AC, 3-phase	U_{LN}	V	-	-
U_e = 690 V AC, 3-phase	U_{LN}	V	-	-
Rated operational current				
U_2 = 115 V AC, single-phase	I_e	A	-	7 - 10.5
U_2 = 230 V AC, single-phase	I_e	A	-	4.3 - 10.5
U_2 = 230 V AC, 3-phase	I_e	A	1.3 - 9.6	2.3 - 18
U_2 = 400 V AC, 3-phase	I_e	A	1.3 - 16	2.2 - 24
U_2 = 500 V AC, 3-phase	I_e	A	-	-
U_2 = 690 V AC, 3-phase	I_e	A	-	-
Overload current at I_L (low overload)/Overload current at I_H (High overload)	I_L/I_H	%	-/150	-/150
Overload cycle for 60 s every 600 s				
max. starting current (High Overload)				
for 2 seconds every 20 seconds		%	-	175
for 1.875 seconds every 600 seconds		%	200	-
for 4 seconds every 40 seconds		%	-	-
Operation Mode				
U/f control			✓	✓
Speed control with slip compensation			✓	✓
sensorless vector control (SLV)			-	-
optional: Vector control with feedback (CLV)			-	-
CT = Constant torque /VT = Variable torque			✓/-	✓/-
Assigned motor rating				
at 115 V, 50 Hz	P	kW	-	0.37 - 0.55
at 230 V, 50 Hz	P	kW	-	0.37 - 1.1
at 230 V, 50 Hz	P	kW	0.25 - 2.2	0.37 - 4
at 400 V, 50 Hz	P	kW	0.37 - 7.5	0.75 - 11
at 500 V, 50 Hz	P	kW	-	-
at 690 V, 50 Hz	P	kW	-	-
Output Frequency	f_2	Hz	0 - 50/60 (max. 300)	0 - 50/60 (max. 500)
Switching frequency	f_{PWM}	kHz	adjustable 4 - 32 (audible)	adjustable 4 - 32 (audible)
Degree of Protection			IP20/NEMA 0	IP20/NEMA 0, IP66/NEMA4X
Ambient temperature at I_L/I_H (operation)				
IP00	ϑ	°C	-	-
IP20/IP21	ϑ	°C	-10 - +50 (max. +60)	-10 - +50
IP54/IP55	ϑ	°C	-	-
IP66	ϑ	°C	-	-10 - +40
Fitted with				
Radio interference suppression filter			-/✓	-/✓
Brake chopper			-	-/✓
DC link choke			-	-
Additional PCB protection (coated board)			-	-
7-digital display assembly			-	✓
OLED display			-	-
Multi-line graphic display			-	-
Safety function STO (Safe Torque Off)			-	-
Interface/field bus (built-in)				
OP-Bus (RS485)/Modbus RTU			✓	-
OP-Bus (RS485)/Modbus RTU, CANopen®			-	✓
Modbus RTU, Modbus TCP, BACnet MS/TP, Ethernet IP			-	-
Fieldbus connection (optional)			-	-
Connection to SmartWire-DT			optional	optional
Analog inputs			1 (0 - 10 V, 0/4 - 20 mA)	1/2 (0 - 10 V, 0/4 - 20 mA)
Analog outputs			-	-
Digital inputs (24 V)			3/4	3/4
Digital outputs (24 V)			-	-/1
Relay outputs			1 (N/O)	1 (N/O)
Standards			IEC/EN 61800-2, IEC/EN 61800-3, IEC/EN 61800-5	
Certifications			CE, UL, cUL, c-Tick	CE, cUL, UL, c-Tick, Ukr Sepro, EAC
Approvals			-	-

			9000X	
DA1	**DL1**	**DG1**	**SVX**	**SPX**
-	-	-	-	-
200 (-10%) - 240 (+10%)	-	-	-	-
200 (-10%) - 240 (+10%)	-	208 (-15%) - 240 (+10%)	-	-
380 (-10%) - 480 (+10%)	380 (-10%) - 480 (+10%)	380 (-15%) - 480 (+10%)	380 (-15%) - 500 (+10%)	380 (-15%) - 500 (+10%)
500 (-10%) - 600 (+10%)	-	-	-	-
-	-	-	525 (-15%) - 690 (±10%)	525 (-15%) - 690 (±10%)
-	-	-	-	-
-	-	-	-	-
4.3 - 248	-	3.7 - 170	-	-
2.2 - 450	9.5 - 72	2.2 - 170	2.2 - 245	2.2 - 1940
2.1 - 150	-	-	-	-
-	-	-	3.2 - 170	3.2 - 1900
-/150	-/150	110/150	110/150	110/150
-	-	200	-	-
-	-	-	-	-
200	200	-	-	-
✓	✓	✓	✓	✓
✓	✓	✓	-	-
✓	✓	✓	✓	✓
✓	✓	✓	-	✓
✓/✓	✓/✓	✓ at I_H/✓ at I_L	✓ at I_H/✓ at I_L	✓ at I_H/✓ at I_L
-	-	-	-	-
-	-	-	-	-
0.75 - 75	-	0.75 - 45	-	-
0.75 - 250	4 - 37	0.75 - 90	0.75 - 132	0.75 - 900
1.1 - 90	-	-	-	-
-	-	-	2.2 - 160	2.2 - 1800
0 - 50/60 (max. 500)	0 - 50/60 (max. 500)	0 - 50/60 (max. 400)	0 - 50/60 (max. 320)	0 - 50/60 (max. 320)
adjustable 4 - 32 (audible)	adjustable 4 - 32 (audible)	adjustable 1 - 12 (real)	adjustable 1 - 16 (real)	adjustable 1 - 16 (real)
IP20/NEMA 0, IP55, IP55/NEMA 3, IP66/NEMA4X	IP20/NEMA 0, IP55/NEMA 3	IP21, IP54	IP21, IP54	IP00, IP21, IP54
-	-	-	-	-10 - +40
-10 - +50	-10 - +50	-10 - +40/-10 - +50	-10 - +40/-10 - +50	-10 - +40/-10 - +50
-10 - +40	-10 - +40	-10 - +40/-10 - +50	-10 - +40/-10 - +50	-10 - +40/-10 - +50
-10 - +40	-	-	-	-
✓	✓	✓	✓	✓
-/✓	✓	✓	-/✓	-/✓
✓ (FS5 - FS7)	✓ (FS 5 - FS7)	✓	-/✓	-/✓
✓	-/✓	✓	-/Option	-/Option
✓	✓	-	-	-
✓	-	-	✓	✓
-	-	✓	-	-
✓	✓	✓	-	-
-	-	-	-	-
✓	✓	-	-	-
-	-	✓	-	-
Ethernet IP, DeviceNet, PROFIBUS, PROFINET, Modbus-TCP, EtherCAT, BACnet/IP		PROFIBUS	PROFIBUS-DP, LonWorks, CANopen®, DeviceNet, Modbus-TCP, BACnet/IP	
optional	optional	-	-	-
1/2 (0 - 10 V, 0/4 - 20 mA)	1/2 (0 - 10 V, 0/4 - 20 mA)	2 (0 - 10 V, 0/4 - 20 mA)	2 (0 - 10 V, 0/4 - 20 mA)	2 (0 - 10 V, 0/4 - 20 mA)
1/2 (0 - 10 V, 0/4 - 20 mA)	1/2 (0 - 10 V, 0/4 - 20 mA)	2 (0 - 10 V, 0/4 - 20 mA)	1 (0/4 - 20 mA)	1 (0/4 - 20 mA)
4/5	4/5	8	6	6
1/2	1/2	1	1	1
2 (1 x N/O, 1 x changeover contact)	2 (1 x N/O, 1 x changeover contact)	3 (2 x N/O, 1 x changeover contact)	2 (N/O)	2 (N/O)
IEC/EN 61800-2, IEC/EN 61800-3, IEC/EN 61800-5				
CE, cUL, UL, c-Tick, Ukr Sepro, EAC		CE, UL, cUL, c-Tick	CE, UL, cUL, c-Tick	CE, UL, cUL, c-Tick
DNV	-	-	DNV	DNV

PowerXL™ DE1 Variable Speed Starters

The new PowerXL™ DE1 variable speed starter combines ease of use and maximum reliability with variable motor speeds and improved machine energy efficiency. This new category of devices is the first to close the gap between conventional motor starters and variable frequency drives and combine all the advantages in a single unit.

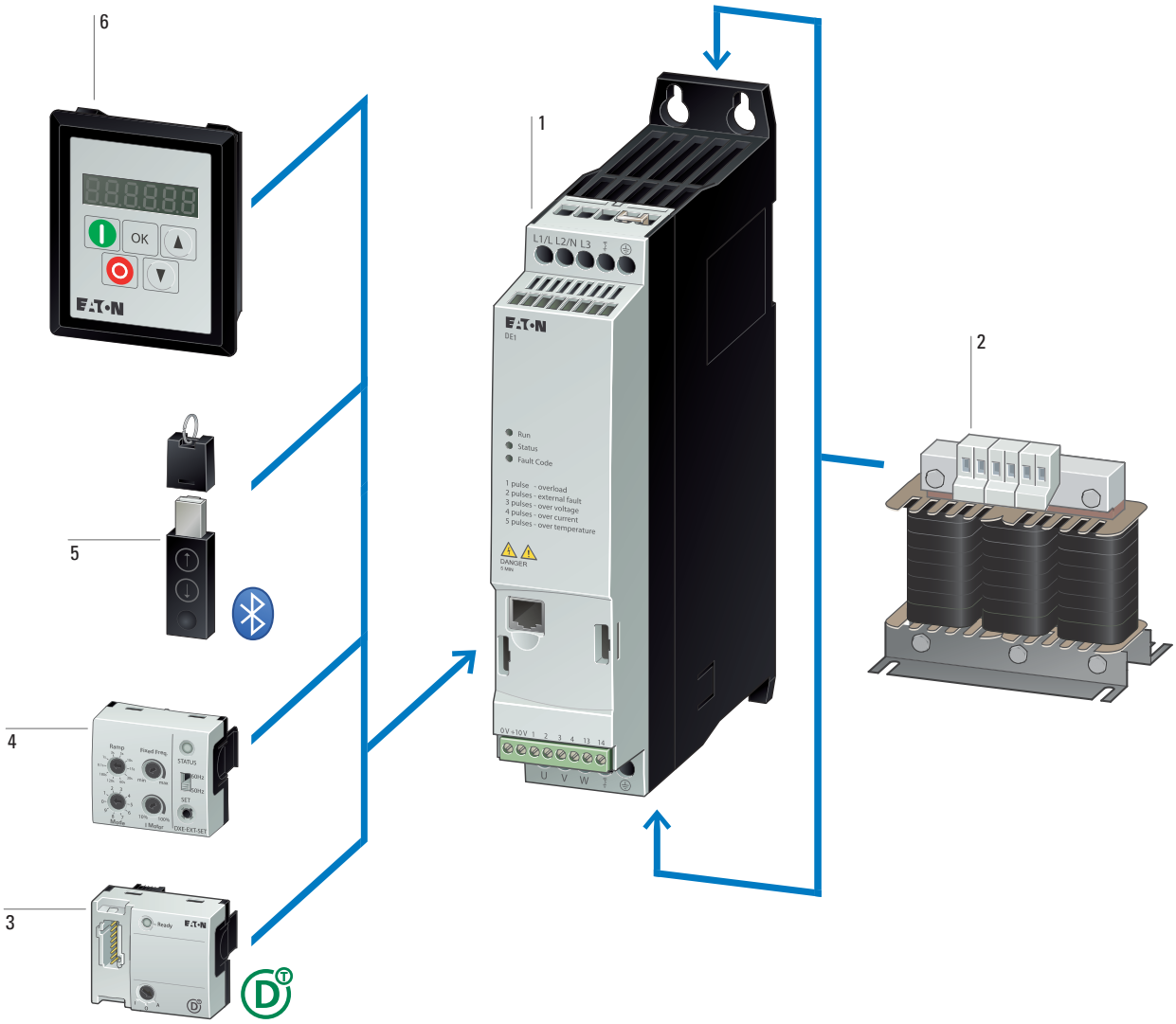
Performance range:
- 0.25 … 2.2 kW (U_e: 1~ 230 V, U_2: 3~ 230 V)
- 0.37 … 7.5 kW (U_e: 3~ 400 V, U_2: 3~ 400 V)

Features:
Compact: 45-mm width
Out-of-the-box commissioning without parameterization
- No special drives engineering skills or knowledge required
- Screwdriver parameterization can be set with an optional configuration module (DXE-EXT-SET)
- Trip-free-design ensures maximum machine availability
- Suitable for use in ambient temperatures of up to 60 °C
- International standards (CE, UL, cUL, cTick, RoHS)

Accessories:
- **Plug-in configuration module**
- SmartWire-DT connection
- External LED keypad
- Mains chokes
- Motor chokes
- Sine filters
- drivesConnect parameter configuration software
- Parameter Copy Stick
- External EMC filter

Applications:
- Fans, pumps
- Simple Machines
- Retrofits in machines and systems in order to replace conventional motor starters or contactors for motor control

DE1, frame size 1



DE1 variable speed starter → page 10	1
Mains choke, motor choke, sine filter → page 60, → page 61	2
SmartWire-DT module → page 11	3
Configuration module → page 11	4
Memory and Bluetooth communication stick → page 11	5
External keypad → page 11	6

Key to type references

DE1 - 3 4 3D6 F N - N 20 N

Device series
DE1 = variable speed starter, economical series 1
(D = Drives, E = Economy, 1 = Series 1) VSS

Connection in power section
1 = single-phase mains connection/
three-phase motor connection
3 = three-phase mains connection/
three-phase motor connection

Mains voltage category
2 = 230 V (200 - 240 V ± 10 %)
4 = 400 V (380 - 480 V ± 10 %)

Rated operational current (examples)
1D4 = 1.4 A
9D6 = 9.6 A
016 = 16 A

Type
N = Standard basic device

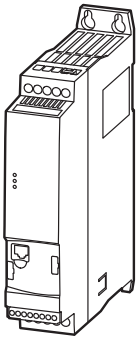
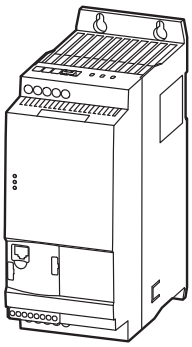
Degree of protection
20 = IP20/NEMA 0

Display unit (display)
N = no Display

B = Brake chopper
N = no internal brake chopper

EMC (radio interference suppression filter)
N = no internal RFI filter
F = Internal RFI filter

Sizes and degree of protection

Frame size	Degree of Protection
	IP20/NEMA 0
FS1	
FS2	

UL/CSA

Information relevant for export to North America

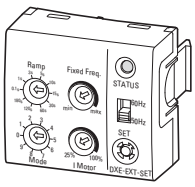
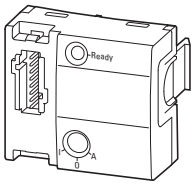
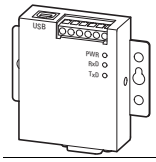
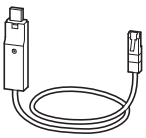
Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E172143
UL Category Control No.	NMMS, NMMS7
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits
Max. Voltage Rating	1~ 240 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)
	3~ 480 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)
Degree of Protection	IEC: IP20

Rated operational current[1), 2)] I_e A	Assigned motor rating[2), 3), 4)] P kW	P HP	Radio interference suppression filter	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DE1 Speed Starters								
U_e 230 V AC, 1-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V								
1.4	0.25	0.33	-	FS1	IP20/NEMA 0	**DE1-121D4NN-N20N** 177359		1 off
			✓			**DE1-121D4FN-N20N** 174327		
2.3	0.37	0.5	-			**DE1-122D3NN-N20N** 177360		
			✓			**DE1-122D3FN-N20N** 174328		
2.7	0.55		-			**DE1-122D7NN-N20N** 177361		
			✓			**DE1-122D7FN-N20N** 174329		
4.3	0.75	1	-			**DE1-124D3NN-N20N** 177362		
			✓			**DE1-124D3FN-N20N** 174330		
7	1.5	2	-			**DE1-127D0NN-N20N** 177363		
			✓			**DE1-127D0FN-N20N** 174331		
9.6	2.2	3	-	FS2		**DE1-129D6NN-N20N** 177364		
			✓			**DE1-129D6FN-N20N** 174332		
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 380 (-10%) - 480 (+10%) V								
1.3	0.37	0.5	-	FS1	IP20/NEMA 0	**DE1-341D3NN-N20N** 177365		1 off
			✓			**DE1-341D3FN-N20N** 174333		
2.1	0.75	1	-			**DE1-342D1NN-N20N** 177366		
			✓			**DE1-342D1FN-N20N** 174334		
3.6	1.5	2	-			**DE1-343D6NN-N20N** 177367		
			✓			**DE1-343D6FN-N20N** 174335		
5	2.2	3	-	FS2		**DE1-345D0NN-N20N** 177368		
			✓			**DE1-345D0FN-N20N** 174336		
6.6	3		-			**DE1-346D6NN-N20N** 177369		
			✓			**DE1-346D6FN-N20N** 174337		
8.5	4	5	-			**DE1-348D5NN-N20N** 177370		
			✓			**DE1-348D5FN-N20N** 174338		
11.3	5.5	7.5	-			**DE1-34011NN-N20N** 177371		
			✓			**DE1-34011FN-N20N** 174339		
16	7.5	10	-			**DE1-34016NN-N20N** 177372		
			✓			**DE1-34016FN-N20N** 174340		

Notes

[1)] Rated operational current at an operating frequency of 16 kHz and an ambient air temperature of +50 °C
[2)] Overload cycle: 150 % for 60 s every 600 s
[3)] DE1-12…: at 230 V, 50 Hz/at 220 - 240 V, 60 Hz
DE1-34…: at 400 V, 50 Hz/at 440 - 480 V, 60 Hz
[4)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz

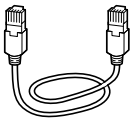
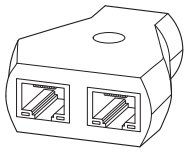
Information relevant for export to North America → Page 9

	Description	Length	For use with	**Part no.** Article no.	**Price** see price list	Std. pack
External keypad						
	With 7-digital display assembly Front IP54 With approx. 3 m-long, plug-in connection cable (RJ45, 8-pin)	3	DE1, DC1, DA1, DL1	**DX-KEY-LED** 169132		1 off
Configuration module						
Plug-in module (front)						
	With selector switch for ramp time and operating mode With potentiometer for motor protection and fixed frequency	-	DE1	**DXE-EXT-SET** 174621		1 off
SmartWire-DT Modules						
	Plug-in module (front) with slot for SWD4-8SF2-5 external device plug	-	DE1, DC1 (IP20)	**DX-NET-SWD3** 169131		1 off
PC communication						
Parameter storage unit and Bluetooth communication stick						
	For storage, copying parameters, and/or transferring parameters to a PC with the drivesConnect software via Bluetooth With 2 function keys for uploading and downloading parameters with configuration memory	-	DE1, DC1, DA1, DL1	**DX-COM-STICK** 169134		1 off
Interface converter For directly connecting the variable-frequency drive to a computer with drivesConnect software						
	Interface converter USB/RS485 with connection cable, RJ45, 8 pole electrically isolated 1 × SUB-D plug, 9-pole Terminal strip, 5-terminal Status-LED	-	DE1, DC1, DA1, DL1	**DX-COM-PCKIT** 169135		1 off
	Interface converter USB/RS485 with connection cable, RJ45, 8 pole electrically isolated	-	DE1, DC1, DA1, DL1	**DX-CBL-PC-1M5** 171018		1 off

Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking DXE-EXT-SET: UL 508C; CSA-C22.2 No. 274; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E172143
UL Category Control No.	NMMS, NMMS7
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits

PC communication

	Description	Length	For use with	Part no. Article no.	Price see price list	Std. pack
Connecting cable						
	Patch cord with RJ45 plugs, 8 pole	0.5	DE1, DC1, DA1, DL1	**DX-CBL-RJ45-0M5** 169137		1 off
		1		**DX-CBL-RJ45-1M0** 169138		
		3		**DX-CBL-RJ45-3M0** 169139		
Bus terminating resistor						
	RJ45 8 pole Connection to CANopen® (pin 1/2, 124 Ω) or to Modbus RTU (pin 7/8, 120 Ω)	-	easyNet DX-SPL-RJ45-2SL-1PL	**EASY-NT-R** 256281		2 off
Splitter						
	RJ45, 8-pin, 3 sockets	-	DX-CBL-RJ45…	**DX-SPL-RJ45-3SL** 169141		1 off
	RJ45, 8-pin, 2 sockets/1 plug	-	DX-CBL-RJ45…	**DX-SPL-RJ45-2SL1PL** 169142		1 off

Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking DXE-EXT-SET: UL 508C; CSA-C22.2 No. 274; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E172143
UL Category Control No.	NMMS, NMMS7
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits

EASY-NT-R:

Product Standards	IEC/EN see Technical Data; UL 508; CSA C22.2 No. 142-M1987; CSA C22.2 No. 213-M1987; CE marking
UL File No.	E135462
UL Category Control No.	NRAQ
CSA File No.	012528
CSA Class No.	2258-02
North America Certification	UL listed, CSA certified
Degree of Protection	IEC: IP20, UL/CSA Type: -

PowerXL™ Variable Frequency Drives DC1 Compact Machinery Drive

The compact PowerXL™ DC1 variable frequency drive is particularly well-suited for use with simple pump, fan, and conveyor belt systems. It can be quickly and easily configured and commissioned, resulting in tangible savings.

Performance range:
- 0.37 … 0.55 kW (U_e: 1~ 115 V, U_2: 1~ 115 V)
- 0.37 … 1.1 kW (U_e: 1~ 115 V, U_2: 3~ 230 V)
- 0.37 … 1.1 kW (U_e: 1~ 230 V, U_2: 1~ 230 V)
- 0.37 … 4 kW (U_e: 1~ 230 V, U_2: 3~ 230 V)
- 0.37 … 4 kW (U_e: 3~ 230 V, U_2: 3~ 230 V)
- 0.75 … 11 kW (U_e: 3~ 400 V, U_2: 3~ 400 V)

Features:
- Fast commissioning with 14 basic parameters
- Large overload capability: 150% for 60 seconds, 175% for 2 seconds
- Ambient air temperature up to 50 °C without derating
- Integrated CANopen and Modbus RTU
- Degrees of protection IP20 and IP66
- Integrated EMC filter
- Integrated braking transistor
- Integrated PI controller
- V/F control
- Voltage boost
- DC braking
- Detachable control signal terminal strip
- International standards (CE, UL, cUL, c-Tick, RoHS, Gost-R, UkrSEPRO)

Accessories:
- SmartWire-DT connection
- I/O expansions
- External keypad
- Mains chokes
- Motor chokes
- Sine filters
- Braking resistances
- drivesConnect parameter configuration software
- External EMC filter

Applications:
- Pumps, fans
- Machines
- Coating systems
- Conveyor belts
- Filling machines
- Distributed applications (IP66)
- Applications with single-phase motors

System overview

DC1 with IP20 degree of protection

DC1 variable frequency drives → page 18	1
Mains choke, motor choke, sine filter → page 60, → page 61	2
Braking resistance → page 56	3
Expansion modules → page 26	4
SmartWire-DT module → page 26	5
Memory and Bluetooth communication stick → page 26	6
External keypad → page 26	7

Key to type references

DC1 - 1 2 4D1 F N - A 20 N

Device series
DC1 = variable frequency drive, compact, series 1
(D = Drives, C = Compact, 1 = Series 1)

Connection in power section
1 = single-phase mains connection/
three-phase motor connection
3 = three-phase mains connection/
three-phase motor connection
S = single-phase mains connection/
single-phase motor connection

Mains voltage category
1 = 110 V (110 - 115 V ± 10 %)
2 = 230 V (200 - 240 V ± 10 %)
4 = 400 V (380 - 480 V ± 10 %)
D = 110 V input/230 V output
(voltage doubler)

Rated operational current (examples)
2D2 = 2.2 A
4D1 = 4.1 A
024 = 24 A

Type
N = Standard basic device

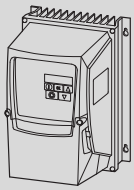
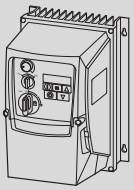
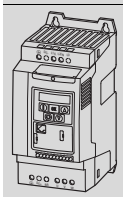
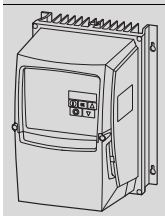
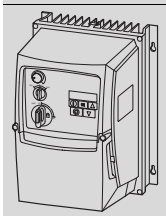
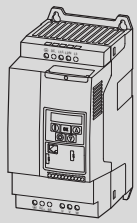
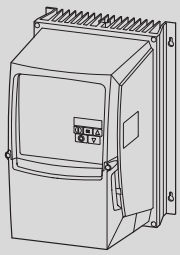
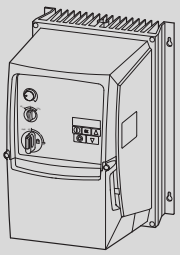
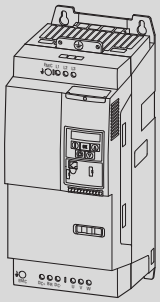
Degree of protection
20 = IP20/NEMA 0
66 = IP66/NEMA 4X
6S = IP66 with switch/NEMA 4X, switched

Display unit (display)
A = LED display

B = Brake chopper
N = no internal brake chopper
B = Brake chopper

EMC (radio interference suppression filter)
N = no internal RFI filter
F = Internal RFI filter

Sizes and degree of protection

Frame size	Degree of Protection		
	IP20/NEMA 0	IP66/NEMA 4X	IP66/NEMA 4X Local controls
FS1			
FS2			
FS3			
FS4			

UL/CSA

Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E172143
UL Category Control No.	NMMS, NMMS7
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits
Max. Voltage Rating	1~ 120 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey) 1~ 240 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey) 3~ 240 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey) 3~ 480 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)

Rated operational current[1), 4)] I_e A	Assigned motor rating[1), 2), 3)] P kW	P HP	Fitted with: Radio interference suppression filter	Brake chopper	7-digital display assembly	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DC1 variable frequency drives										
U_e 115 V AC, single-phase / U_2 115 V AC, single-phase Mains voltage (50/60Hz) U_{LN} 110 (-10%) - 115 (+10%) V										
7	0.37	0.5	-	-	✓	FS1	IP20/NEMA 0	**DC1-S17D0NN-A20N** 169497		1 off
10.5	0.55	0.75	-	✓	✓	FS2		**DC1-S1011NB-A20N** 169500		
U_e 230 V AC, 1-phase / U_2 230 V AC, single-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V										
4.3	0.37	0.5	-	-	✓	FS1	IP20/NEMA 0	**DC1-S24D3NN-A20N** 169512		1 off
			✓	-	✓			**DC1-S24D3FN-A20N** 169521		
7	0.75	1	-	-	✓			**DC1-S27D0NN-A20N** 169515		
			✓	-	✓			**DC1-S27D0FN-A20N** 169524		
10.5	1.1	1.5	-	✓	✓	FS2		**DC1-S2011NB-A20N** 169518		
			✓	✓	✓			**DC1-S2011FB-A20N** 169527		

Notes

[1)] Overload cycle: 150 % for 60 s every 600 s
[2)] DC1-S1…: at 115 V, 50 Hz/at 110 - 120 V, 60 Hz
DE1-34…:DC1-S2…: at 230 V, 50 Hz/at 220 - 240 V, 60 Hz
[3)] For AC motors with internal and external ventilation with 50/60 Hz without additional start capacitor
[4)] Rated operational current at an operating frequency of 16 kHz and an ambient air temperature of +50 °C

Information relevant for export to North America → Page 17

Rated operational current[1), 4)] I_e A	Assigned motor rating[1), 2), 3)] P kW	P HP	Fitted with: Radio interference suppression filter	Brake chopper	7-digital display assembly	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DC1 variable frequency drives										
U_e 115 V AC, single-phase / U_2 230 V AC, 3-phase The mains voltage of 115 V is raised to 230 V (output voltage) through an internal voltage double connection. Mains voltage (50/60Hz) U_{LN} 110 (-10%) - 115 (+10%) V										
2.3	0.37	0.5	-	-	✓	FS1	IP20/NEMA 0	**DC1-1D2D3NN-A20N** 169503		1 off
4.3	0.75	1	-	-	✓			**DC1-1D4D3NN-A20N** 169506		
5.8	1.1	1.5	-	✓	✓	FS2		**DC1-1D5D8NB-A20N** 169509		
U_e 230 V AC, 1-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V										
2.3	0.37	0.5	-	-	✓	FS1	IP20/NEMA 0	**DC1-122D3NN-A20N** 169222		1 off
			✓	-	✓			**DC1-122D3FN-A20N** 169240		
4.3	0.75	1	-	-	✓			**DC1-124D3NN-A20N** 169225		
			✓	-	✓			**DC1-124D3FN-A20N** 169243		
7	1.5	2	-	-	✓			**DC1-127D0NN-A20N** 169228		
			✓	-	✓			**DC1-127D0FN-A20N** 169246		
			-	✓	✓	FS2		**DC1-127D0NB-A20N** 169231		
			✓	✓	✓			**DC1-127D0FB-A20N** 169249		
10.5	2.2	3	-	✓	✓			**DC1-12011NB-A20N** 169234		
			✓	✓	✓			**DC1-12011FB-A20N** 169252		
15[5)]	4	5	-	✓	✓	FS3		**DC1-12015NB-A20N** 169237		

Notes

[1)] Overload cycle: 150 % for 60 s every 600 s
[2)] at 230 V, 50 Hz/at 220 - 240 V, 60 Hz
[3)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[4)] Rated operational current at an operating frequency of 16 kHz and an ambient air temperature of +50 °C
[5)] Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +50 °C

Information relevant for export to North America → Page 17

Rated operational current[1), 4)]	Assigned motor rating[1), 2), 3)]		Fitted with			Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
			Radio interference suppression filter	Brake chopper	7-digital display assembly					
I_e A	P kW	P HP								
PowerXL™ DC1 variable frequency drives										
U_e 230 V AC, 3-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V										
2.3	0.37	0.5	-	-	✓	FS1	IP20/NEMA 0	**DC1-322D3NN-A20N** 169255		1 off
4.3	0.75	1	-	-	✓			**DC1-324D3NN-A20N** 169258		
7	1.5	2	-	-	✓			**DC1-327D0NN-A20N** 169261		
			-	✓	✓	FS2		**DC1-327D0NB-A20N** 169264		
			✓	✓	✓			**DC1-327D0FB-A20N** 169444		
10.5	2.2	3	-	✓	✓			**DC1-32011NB-A20N** 169438		
			✓	✓	✓			**DC1-32011FB-A20N** 169447		
18	4	5	-	✓	✓	FS3		**DC1-32018NB-A20N** 169441		
			✓	✓	✓			**DC1-32018FB-A20N** 169450		
24	5.5	7.5	-	✓	✓			**DC1-32024NB-A20N** 180458		
			✓	✓	✓			**DC1-32024FB-A20N** 180455		
30	7.5	10	-	✓	✓	FS4		**DC1-32030NB-A20N** 180459		
			✓	✓	✓			**DC1-32030FB-A20N** 180456		
46	11	15	-	✓	✓			**DC1-32046NB-A20N** 180460		
			✓	✓	✓			**DC1-32046FB-A20N** 180457		
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 380 (-10%) - 480 (+10%) V										
2.2	0.75	1	-	-	✓	FS1	IP20/NEMA 0	**DC1-342D2NN-A20N** 169453		1 off
			✓	-	✓			**DC1-342D2FN-A20N** 169475		
4.1	1.5	2	-	-	✓			**DC1-344D1NN-A20N** 169456		
			✓	-	✓			**DC1-344D1FN-A20N** 169478		
			-	✓	✓	FS2		**DC1-344D1NB-A20N** 169459		
			✓	✓	✓			**DC1-344D1FB-A20N** 169481		
5.8	2.2	3	-	✓	✓			**DC1-345D8NB-A20N** 169462		
			✓	✓	✓			**DC1-345D8FB-A20N** 169484		
9.5	4	5	-	✓	✓			**DC1-349D5NB-A20N** 169465		
			✓	✓	✓			**DC1-349D5FB-A20N** 169487		

Notes

[1)] Overload cycle: 150 % for 60 s every 600 s
[2)] DC1-32…: at 230 V, 50 Hz/at 220 - 240 V, 60 Hz
DC1-34…: at 400 V, 50 Hz/at 440 - 480 V, 60 Hz
[3)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[4)] Rated operational current at an operating frequency of 16 kHz and an ambient air temperature of +50 °C
[5)] Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +50 °C

Rated operational current[1), 4)]	Assigned motor rating[1), 2), 3)]		Fitted with			Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_e A	P kW	P HP	Radio interference suppression filter	Brake chopper	7-digital display assembly					
PowerXL™ DC1 variable frequency drives										
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 380 (-10%) - 480 (+10%) V										
14[4)]	5.5	10	-	✓	✓	FS3	IP20/NEMA 0	**DC1-34014NB-A20N** 169468		1 off
			✓	✓	✓			**DC1-34014FB-A20N** 169490		
18[4)]	7.5		-	✓	✓			**DC1-34018NB-A20N** 169471		
			✓	✓	✓			**DC1-34018FB-A20N** 169493		
24[4)]	11	15	-	✓	✓			**DC1-34024NB-A20N** 169474		
			✓	✓	✓			**DC1-34024FB-A20N** 169496		
30	15	20	-	✓	✓	FS4		**DC1-34030NB-A20N** 180464		
			✓	✓	✓			**DC1-34030FB-A20N** 180461		
39	18.5	25	-	✓	✓			**DC1-34039NB-A20N** 180465		
			✓	✓	✓			**DC1-34039FB-A20N** 180462		
46	22	30	-	✓	✓			**DC1-34046NB-A20N** 180466		
			✓	✓	✓			**DC1-34046FB-A20N** 180463		

Notes

[1)] Overload cycle: 150 % for 60 s every 600 s
[2)] DC1-34…: at 400 V, 50 Hz/at 440 - 480 V, 60 Hz
[3)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[4)] Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +50 °C

Rated operational current[1), 4)] I_e A	Assigned motor rating[1), 2), 3)] P kW	P HP	Fitted with: Radio interference	Brake chopper	7-digital display assembly	Local controls	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DC1 variable frequency drives											
U_e 115 V AC, single-phase / U_2 115 V AC, single-phase Mains voltage (50/60Hz) U_{LN} 110 (-10%) - 115 (+10%) V											
7	0.37	0.5	-	-	✓	-	FS1	IP66/NEMA 4X	**DC1-S17D0NN-A66N** 169498		1 off
			-	-	✓	✓			**DC1-S17D0NN-A6SN** 169499		
10.5	0.55	0.75	-	✓	✓	-	FS2		**DC1-S1011NB-A66N** 169501		
			-	✓	✓	✓			**DC1-S1011NB-A6SN** 169502		
U_e 230 V AC, 1-phase / U_2 230 V AC, single-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V											
4.3	0.37	0.5	-	-	✓	-	FS1	IP66/NEMA 4X	**DC1-S24D3NN-A66N** 169513		1 off
			-	-	✓	✓			**DC1-S24D3NN-A6SN** 169514		
			✓	-	✓	-			**DC1-S24D3FN-A66N** 169522		
			✓	-	✓	✓			**DC1-S24D3FN-A6SN** 169523		
7	0.75	1	-	-	✓	-			**DC1-S27D0NN-A66N** 169516		
			-	-	✓	✓			**DC1-S27D0NN-A6SN** 169517		
			✓	-	✓	-			**DC1-S27D0FN-A66N** 169525		
			✓	-	✓	✓			**DC1-S27D0FN-A6SN** 169526		
10.5	1.1	1.5	-	✓	✓	-	FS2		**DC1-S2011NB-A66N** 169519		
			-	✓	✓	✓			**DC1-S2011NB-A6SN** 169520		
			✓	✓	✓	-			**DC1-S2011FB-A66N** 169528		
			✓	✓	✓	✓			**DC1-S2011FB-A6SN** 169529		

Notes

1) Overload cycle: 150 % for 60 s every 600 s
2) DC1-S1…: at 115 V, 50 Hz/at 110 - 120 V, 60 Hz
DE1-34…:DC1-S2…: at 230 V, 50 Hz/at 220 - 240 V, 60 Hz
3) For AC motors with internal and external ventilation with 50/60 Hz without additional start capacitor
4) Rated operational current at a switching frequency of 16 kHz and an ambient air temperature of +40 °C

Information relevant for export to North America → Page 17

Rated operational current[1), 4)] I_e A	Assigned motor rating[1), 2), 3)] P kW	P HP	Fitted with: Radio interference	Brake chopper	7-digital display assembly	Local controls	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DC1 variable frequency drives											
U_e 115 V AC, single-phase / U_2 230 V AC, 3-phase The mains voltage of 115 V is raised to 230 V (output voltage) through an internal voltage double connection. Mains voltage (50/60Hz) U_{LN} 110 (-10%) - 115 (+10%) V											
2.3	0.37	0.5	-	-	✓	-	FS1	IP66/NEMA 4X	**DC1-1D2D3NN-A66N** 169504		1 off
			-	-	✓	✓			**DC1-1D2D3NN-A6SN** 169505		
4.3	0.75	1	-	-	✓	-			**DC1-1D4D3NN-A66N** 169507		
			-	-	✓	✓			**DC1-1D4D3NN-A6SN** 169508		
5.8	1.1	1.5	-	✓	✓	-	FS2		**DC1-1D5D8NB-A66N** 169510		
			-	✓	✓	✓			**DC1-1D5D8NB-A6SN** 169511		
U_e 230 V AC, 1-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V											
2.3	0.37	0.5	-	-	✓	-	FS1	IP66/NEMA 4X	**DC1-122D3NN-A66N** 169223		1 off
			-	-	✓	✓			**DC1-122D3NN-A6SN** 169224		
			✓	-	✓	-			**DC1-122D3FN-A66N** 169241		
			✓	-	✓	✓			**DC1-122D3FN-A6SN** 169242		
4.3	0.75	1	-	-	✓	-			**DC1-124D3NN-A66N** 169226		
			-	-	✓	✓			**DC1-124D3NN-A6SN** 169227		
			✓	-	✓	-			**DC1-124D3FN-A66N** 169244		
			✓	-	✓	✓			**DC1-124D3FN-A6SN** 169245		
7	1.5	2	-	-	✓	-			**DC1-127D0NN-A66N** 169229		
			-	-	✓	✓			**DC1-127D0NN-A6SN** 169230		
			✓	-	✓	-			**DC1-127D0FN-A66N** 169247		
			✓	-	✓	✓			**DC1-127D0FN-A6SN** 169248		
			-	✓	✓	-	FS2		**DC1-127D0NB-A66N** 169232		
			-	✓	✓	✓			**DC1-127D0NB-A6SN** 169233		
			✓	✓	✓	-			**DC1-127D0FB-A66N** 169250		
			✓	✓	✓	✓			**DC1-127D0FB-A6SN** 169251		
10.5	2.2	3	-	✓	✓	-			**DC1-12011NB-A66N** 169235		
			-	✓	✓	✓			**DC1-12011NB-A6SN** 169236		
			✓	✓	✓	-			**DC1-12011FB-A66N** 169253		
			✓	✓	✓	✓			**DC1-12011FB-A6SN** 169254		
15[5)]	4	5	-	✓	✓	-	FS3		**DC1-12015NB-A66N** 169238		
			-	✓	✓	✓			**DC1-12015NB-A6SN** 169239		

Notes

[1)] Overload cycle: 150 % for 60 s every 600 s
[2)] at 230 V, 50 Hz/at 220 - 240 V, 60 Hz
[3)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[4)] Rated operational current at a switching frequency of 16 kHz and an ambient air temperature of +40 °C
[5)] Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +40 °C

Information relevant for export to North America → Page 17

Rated operational current[1), 4)] I_e A	Assigned motor rating[1), 2), 3)] P kW	P HP	Fitted with: Radio interference	Brake chopper	7-digital display assembly	Local controls	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DC1 variable frequency drives											
U_e 230 V AC, 3-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V											
2.3	0.37	0.5	-	-	✓	-	FS1	IP66/NEMA 4X	**DC1-322D3NN-A66N** 169256		1 off
			-	-	✓	✓			**DC1-322D3NN-A6SN** 169257		
4.3	0.75	1	-	-	✓	-			**DC1-324D3NN-A66N** 169259		
			-	-	✓	✓			**DC1-324D3NN-A6SN** 169260		
7	1.5	2	-	-	✓	-			**DC1-327D0NN-A66N** 169262		
			-	-	✓	✓			**DC1-327D0NN-A6SN** 169263		
			-	✓	✓	-	FS2		**DC1-327D0NB-A66N** 169436		
			-	✓	✓	✓			**DC1-327D0NB-A6SN** 169437		
			✓	✓	✓	-			**DC1-327D0FB-A66N** 169445		
			✓	✓	✓	✓			**DC1-327D0FB-A6SN** 169446		
10.5	2.2	3	-	✓	✓	-			**DC1-32011NB-A66N** 169439		
			-	✓	✓	✓			**DC1-32011NB-A6SN** 169440		
			✓	✓	✓	-			**DC1-32011FB-A66N** 169448		
			✓	✓	✓	✓			**DC1-32011FB-A6SN** 169449		
18[5)]	4	5	-	✓	✓	-	FS3		**DC1-32018NB-A66N** 169442		
			-	✓	✓	✓			**DC1-32018NB-A6SN** 169443		
			✓	✓	✓	-			**DC1-32018FB-A66N** 169451		
			✓	✓	✓	✓			**DC1-32018FB-A6SN** 169452		

Notes

[1)] Overload cycle: 150 % for 60 s every 600 s
[2)] at 230 V, 50 Hz/at 220 - 240 V, 60 Hz
[3)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[4)] Rated operational current at a switching frequency of 16 kHz and an ambient air temperature of +40 °C
[5)] Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +40 °C

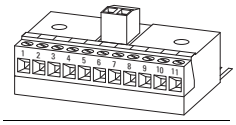
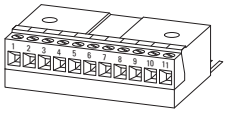
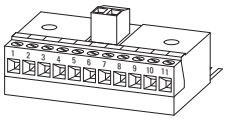
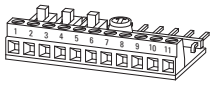
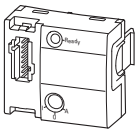
Information relevant for export to North America → Page 17

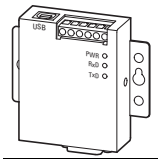
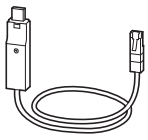
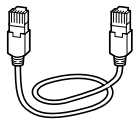
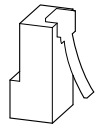
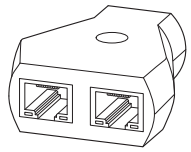
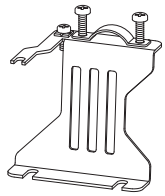
Rated operational current[1), 4)] I_e A	Assigned motor rating[1), 2), 3)] P kW	P HP	Fitted with: Radio interference	Brake chopper	7-digital display assembly	Local controls	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DC1 variable frequency drives											
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 380 (-10%) - 480 (+10%) V											
2.2	0.75	1	-	-	✓	-	FS1	IP66/NEMA 4X	**DC1-342D2NN-A66N** 169454		1 off
			-	-	✓	✓			**DC1-342D2NN-A6SN** 169455		
			✓	-	✓	-			**DC1-342D2FN-A66N** 169476		
			✓	-	✓	✓			**DC1-342D2FN-A6SN** 169477		
4.1	1.5	2	-	-	✓	-			**DC1-344D1NN-A66N** 169457		
			-	-	✓	✓			**DC1-344D1NN-A6SN** 169458		
			✓	-	✓	-			**DC1-344D1FN-A66N** 169479		
			✓	-	✓	✓			**DC1-344D1FN-A6SN** 169480		
			-	✓	✓	-	FS2		**DC1-344D1NB-A66N** 169460		
			-	✓	✓	✓			**DC1-344D1NB-A6SN** 169461		
			✓	✓	✓	-			**DC1-344D1FB-A66N** 169482		
			✓	✓	✓	✓			**DC1-344D1FB-A6SN** 169483		
5.8	2.2	3	-	✓	✓	-			**DC1-345D8NB-A66N** 169463		
			-	✓	✓	✓			**DC1-345D8NB-A6SN** 169464		
			✓	✓	✓	-			**DC1-345D8FB-A66N** 169485		
			✓	✓	✓	✓			**DC1-345D8FB-A6SN** 169486		
9.5	4	5	-	✓	✓	-			**DC1-349D5NB-A66N** 169466		
			-	✓	✓	✓			**DC1-349D5NB-A6SN** 169467		
			✓	✓	✓	-			**DC1-349D5FB-A66N** 169488		
			✓	✓	✓	✓			**DC1-349D5FB-A6SN** 169489		
14[5)]	5.5	10	-	✓	✓	-	FS3		**DC1-34014NB-A66N** 169469		
			-	✓	✓	✓			**DC1-34014NB-A6SN** 169470		
			✓	✓	✓	-			**DC1-34014FB-A66N** 169491		
			✓	✓	✓	✓			**DC1-34014FB-A6SN** 169492		
18[5)]	7.5	10	-	✓	✓	-			**DC1-34018NB-A66N** 169472		
			-	✓	✓	✓			**DC1-34018NB-A6SN** 169473		
			✓	✓	✓	-			**DC1-34018FB-A66N** 169494		
			✓	✓	✓	✓			**DC1-34018FB-A6SN** 169495		

Notes

[1)] Overload cycle: 150 % for 60 s every 600 s
[2)] at 400 V, 50 Hz/at 440 - 480 V, 60 Hz
[3)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[4)] Rated operational current at a switching frequency of 16 kHz and an ambient air temperature of +40 °C
[5)] Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +40 °C

Information relevant for export to North America → Page 17

	Description	Length	For use with	Part no. Article no.	Price see price list	Std. pack
External keypad						
	With 7-digital display assembly Front IP54 With approx. 3 m-long, plug-in connection cable (RJ45, 8-pin)	3	DE1, DC1, DA1, DL1	**DX-KEY-LED** 169132		1 off
	with OLED display Front IP54 Multilingual With approx. 3 m-long, plug-in connection cable (RJ45, 8-pin)	3	DC1, DA1, DL1	**DX-KEY-OLED** 169133		
Expansion modules						
Output expansion						
	2 relay outputs (N/O, 250 V AC/220 V DC, max. 1 A) 1 analog output (0 - +10 V, max. 20 mA) For connecting to the control signal terminals on the DC1	-	DC1	**DXC-EXT-2RO1AO** 169030		1 off
	2 relay outputs (N/O, 250 V AC/220 V DC, max. 1 A) For connecting to the control signal terminals on the DC1	-	DC1	**DXC-EXT-2RO** 169031		
Coupling module						
	115-V-AC input (electrically isolated) for 4 digital inputs For connecting to the control signal terminals on the DC1	-	DC1	**DXC-EXT-IO110** 169032		1 off
	230-V-AC input (electrically isolated) for 4 digital inputs For connecting to the control signal terminals on the DC1	-	DC1	**DXC-EXT-IO230** 169033		
Demo case and simulator						
Control signal terminal simulator						
Commissioning and testing simulator 	3 digital inputs (+24 V) 1 relay output (max. 30 V DC) 3 microswitches 1 reference value potentiometer (0 - +10 V / = 0 - f_{max}) For connecting to the control signal terminals on the DC1	-	DC1	**DXC-EXT-LOCSIM** 169034		1 off
SmartWire-DT Modules						
	Plug-in module (front) with slot for SWD4-8SF2-5 external device plug	-	DE1, DC1 (IP20)	**DX-NET-SWD3** 169131		1 off
PC communication						
Parameter storage unit and Bluetooth communication stick						
	For storage, copying parameters, and/or transferring parameters to a PC with the drivesConnect software via Bluetooth With 2 function keys for uploading and downloading parameters with configuration memory	-	DE1, DC1, DA1, DL1	**DX-COM-STICK** 169134		1 off

	Description		Length	For use with	Part no. Article no.	Price see price list	Std. pack
PC communication							
Interface converter For directly connecting the variable-frequency drive to a computer with drivesConnect software							
	Interface converter USB/RS485 with connection cable, RJ45, 8 pole electrically isolated 1 × SUB-D plug, 9-pole Terminal strip, 5-terminal Status-LED		-	DE1, DC1, DA1, DL1	**DX-COM-PCKIT** 169135		1 off
	Interface converter USB/RS485 with connection cable, RJ45, 8 pole electrically isolated		-	DE1, DC1, DA1, DL1	**DX-CBL-PC-1M5** 171018		1 off
Connecting cable							
	Patch cord with RJ45 plugs, 8 pole		0.5	DE1, DC1, DA1, DL1	**DX-CBL-RJ45-0M5** 169137		1 off
			1		**DX-CBL-RJ45-1M0** 169138		
			3		**DX-CBL-RJ45-3M0** 169139		
Bus terminating resistor							
	RJ45 8 pole Connection to CANopen® (pin 1/2, 124 Ω) or to Modbus RTU (pin 7/8, 120 Ω)		-	easyNet DX-SPL-RJ45-2SL-1PL	**EASY-NT-R** 256281		2 off
Splitter							
 -	RJ45, 8-pin, 3 sockets		-	DX-CBL-RJ45…	**DX-SPL-RJ45-3SL** 169141		1 off
	RJ45, 8-pin, 2 sockets/1 plug		-	DX-CBL-RJ45…	**DX-SPL-RJ45-2SL1PL** 169142		
mounting accessories							
mounting adapter With gland plates							
	For installing the connection cables on the mains side	Size FS1	-	DC1	**DX-EMC-MNT-1N** 172925		1 off
		Size FS2	-	DC1, DA1, DL1	**DX-EMC-MNT-2N** 172927		
		Size FS3	-	DC1, DA1, DL1	**DX-EMC-MNT-3N** 172929		
	For installing the connection cables on the motor side	Size FS1	-	DC1	**DX-EMC-MNT-1M** 172926		
		Size FS2	-	DC1, DA1, DL1	**DX-EMC-MNT-2M** 172928		
		Size FS3	-	DC1, DA1, DL1	**DX-EMC-MNT-3M** 172930		

Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E172143
UL Category Control No.	NMMS, NMMS7
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits

EASY-NT-R:

Product Standards	IEC/EN see Technical Data; UL 508; CSA C22.2 No. 142-M1987; CSA C22.2 No. 213-M1987; CE marking
UL File No.	E135462
UL Category Control No.	NRAQ
CSA File No.	012528
CSA Class No.	2258-02
North America Certification	UL listed, CSA certified
Degree of Protection	IEC: IP20, UL/CSA Type: -

PowerXL™ Variable Frequency Drive DA1 Advanced Machinery Drive

The PowerXL™ DA1 variable frequency drive, designed for the machine and system building industry, is characterized by its enormous flexibility in terms of communications protocols, a function block editor (PLC) that makes it possible to configure the drive as necessary for specific applications, and a powerful vector control mode for highly dynamic applications.

Performance range:
- 0.75 … 2.2 kW (U_e: 1~ 230 V, U_2: 3~ 230 V)
- 0.75 … 75 kW (U_e: 3~ 230 V, U_2: 3~ 230 V)
- 0.75 … 250 kW (U_e: 3~ 400 V, U_2: 3~ 400 V)
- 0.75 … 110 kW (U_e: 3~ 575 V, U_2: 3~ 575 V)

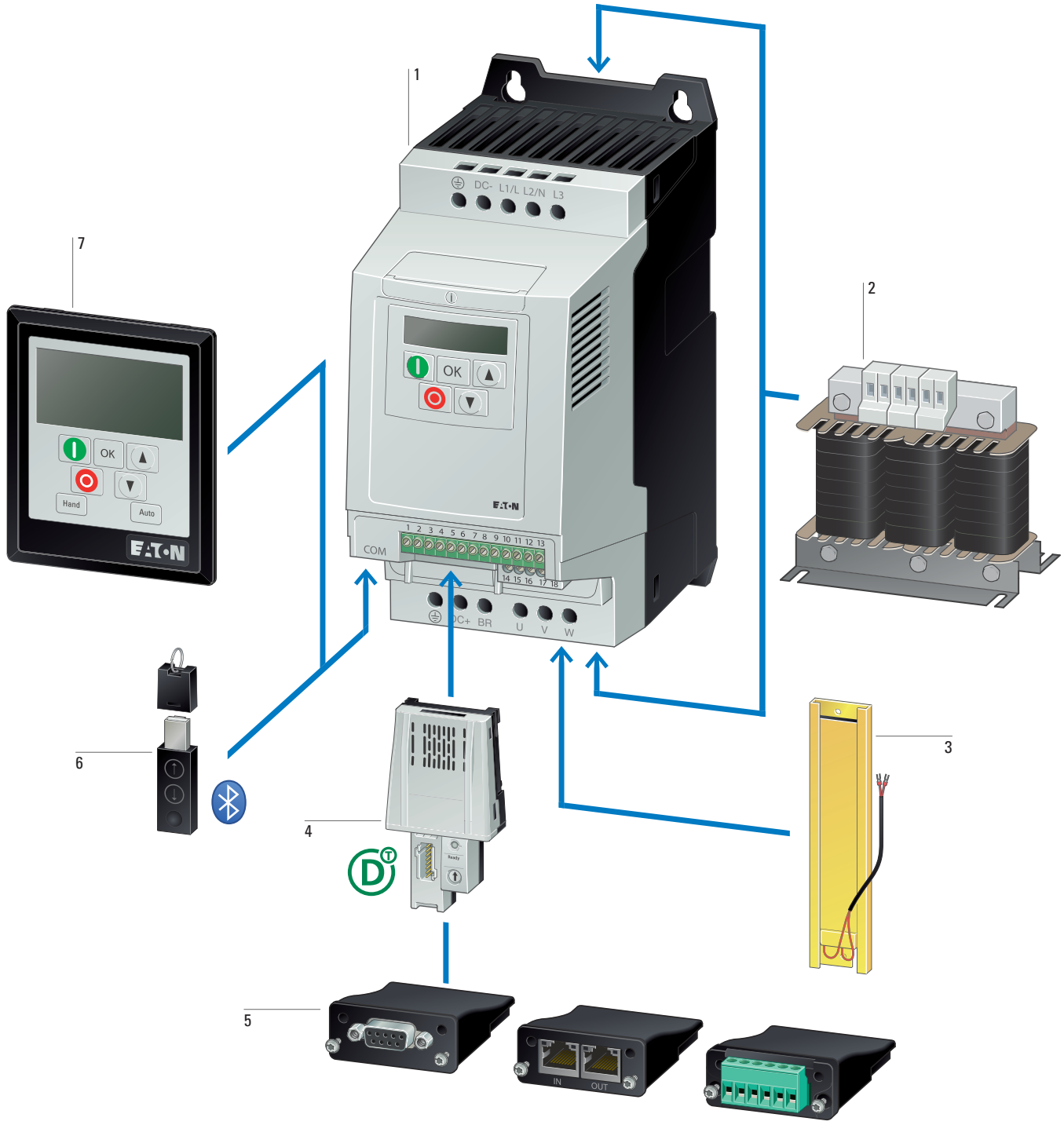
Features:
- Large overload capability: 150% for 60 seconds, 200% for 4 seconds
- Integrated Modbus RTU and CANopen
- Ambient air temperature up to 50 °C without derating
- Integrated EMC filter
- Integrated braking transistor
- Various I/O expansions
- V/F control, vector SL and CL, PM motor, BLDC motor, SynRel motor
- Optional field bus connections
- Safe Torque Off (STO, SIL 2/Pl d)
- Optional high-resolution OLED display
- International standards (CE, UL, cUL, c-Tick, RoHS, Gost-R, UkrSEPRO, DNV (754–757))

Accessories:
- SmartWire-DT connection
- Communication modules (PROFIBUS, PROFINET, Ethernet/IP, EtherCAT, DeviceNet, etc.)
- I/O expansions
- External keypad
- Mains chokes
- Motor chokes
- Sine filters
- Braking resistances
- drivesConnect parameter configuration software
- External EMC filter

Applications:
- Winding machines
- Respooler machines
- Coating systems
- Compressors
- Mills, roller mills, shredders
- Extruders
- Cranes and lifting systems
- Marine
- Distributed applications (IP66)

System overview

DA1 with IP20 degree of protection



DA1 variable frequency drives 1
→ page 33

Mains choke, motor choke, sine filter 2
→ page 60, → page 61

Braking resistance 3
→ page 56

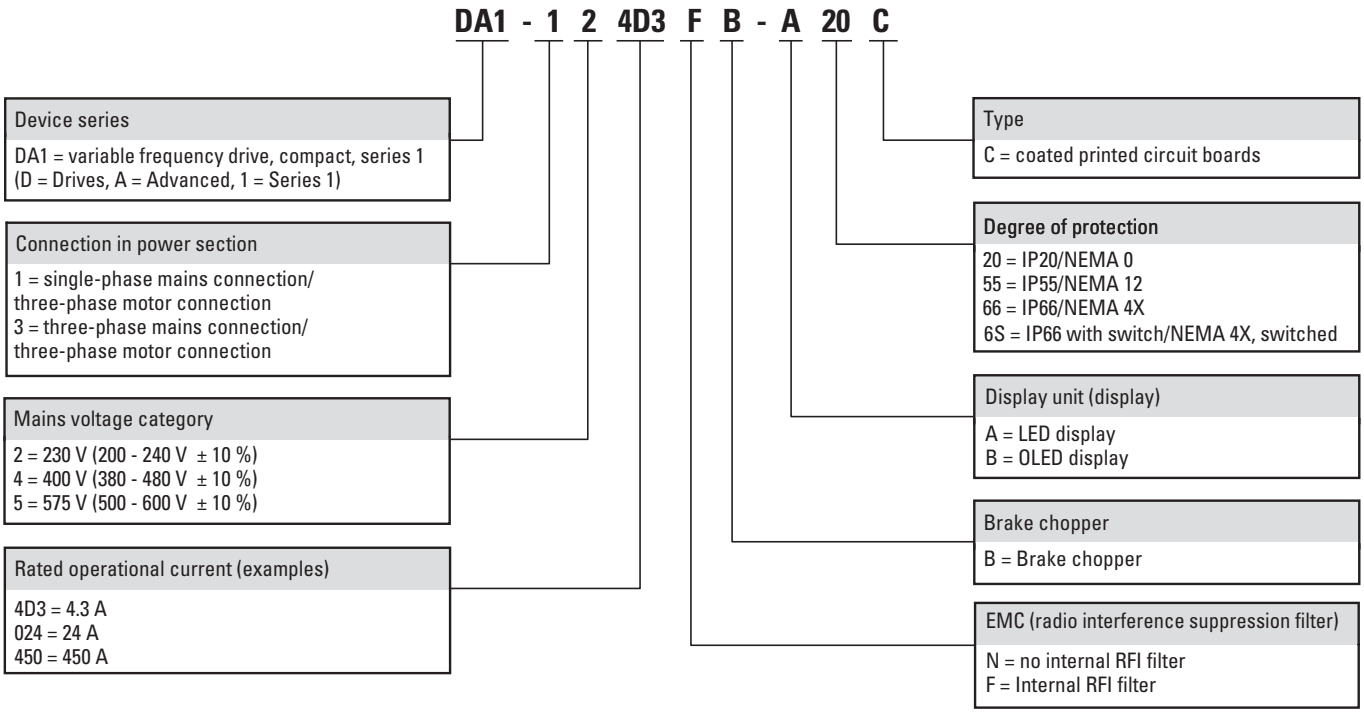
SmartWire-DT module 4
→ page 38

Communication modules, expansion modules 5
→ page 38

Memory and Bluetooth communication stick 6
→ page 39

External keypad 7
→ page 38

Key to type references

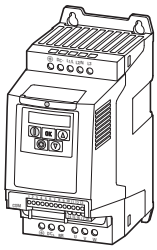
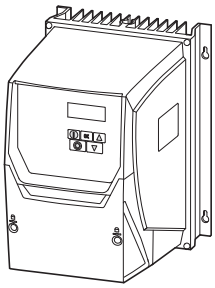
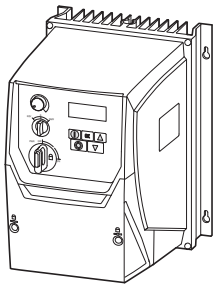
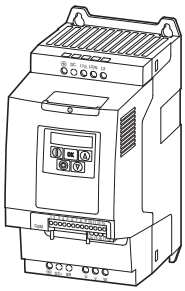
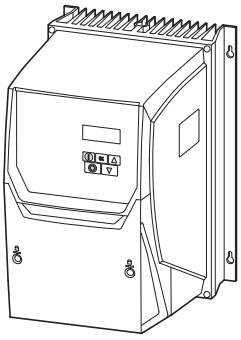
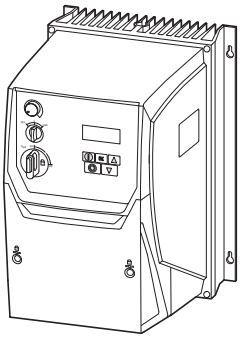


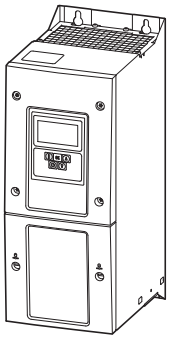
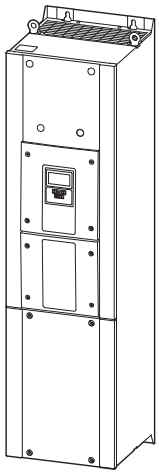
UL/CSA

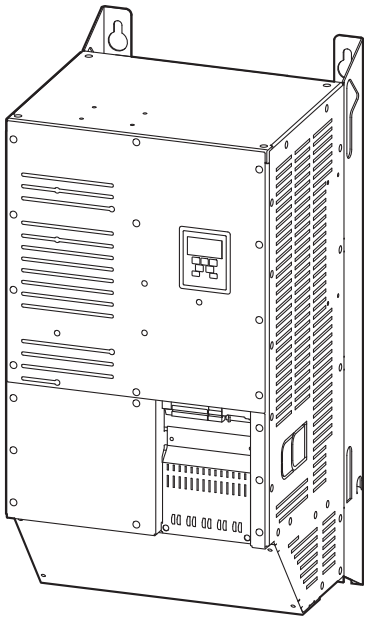
Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E172143
UL Category Control No.	NMMS, NMMS7
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits
Max. Voltage Rating	3~ 240 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)
	3~ 480 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)

Sizes and degree of protection

Frame size	Degree of Protection IP20/NEMA 0	IP66/NEMA 4X	IP66/NEMA 4X Local controls
FS2			
FS3			

Frame size	Degree of Protection IP55/NEMA 12
FS4-FS7	 …  FS4 FS7

Frame size	Degree of Protection IP20/NEMA 0
FS8	

Note: Figures are not true to scale

Rated operational current[1), 4)] I_e A	Assigned motor rating[1), 2), 3)] P kW	P HP	Fitted with: Radio interference	Brake chopper	DC link choke	7-digital display assembly	OLED display	Additional PCB protection	Local controls	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DA1 variable frequency drives														
U_e 230 V AC, 1-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V														
4.3	0.75	1	✓	✓	-	✓	-	✓	-	FS2	IP20/NEMA 0	**DA1-124D3FB-A20C** 169078		1 off
7	1.5	2	✓	✓	-	✓	-	✓	-			**DA1-127D0FB-A20C** 169081		
10.5	2.2	3	✓	✓	-	✓	-	✓	-			**DA1-12011FB-A20C** 169084		
U_e 230 V AC, 3-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V														
4.3	0.75	1	✓	✓	-	✓	-	✓	-	FS2	IP20/NEMA 0	**DA1-324D3FB-A20C** 169087		1 off
7	1.5	2	✓	✓	-	✓	-	✓	-			**DA1-327D0FB-A20C** 169090		
10.5	2.2	3	✓	✓	-	✓	-	✓	-			**DA1-32011FB-A20C** 169093		
18	4	5	✓	✓	-	✓	-	✓	-	FS3		**DA1-32018FB-A20C** 169096		
24	5.5	7.5	✓	✓	-	✓	-	✓	-			**DA1-32024FB-A20C** 169099		
24[5)]			✓	✓	-	-	✓	✓	-	FS4	IP55/NEMA 12	**DA1-32024FB-B55C** 169361		
30	7.5	10	✓	✓	-	-	✓	✓	-			**DA1-32030FB-B55C** 169362		
46	11	15	✓	✓	-	-	✓	✓	-			**DA1-32046FB-B55C** 169363		
61	15	20	✓	✓	✓	-	✓	✓	-	FS5		**DA1-32061FB-B55C** 169364		
72	22	25	✓	✓	✓	-	✓	✓	-			**DA1-32072FB-B55C** 169365		
90[5)]	22	30	✓	✓	✓	-	✓	✓	-	FS6		**DA1-32090FB-B55C** 169367		
110[5)]	30	40	✓	✓	✓	-	✓	✓	-			**DA1-32110FB-B55C** 169369		
150[5)]	45	50	✓	✓	✓	-	✓	✓	-			**DA1-32150FB-B55C** 169371		
180[5)]	55	60	✓	✓	✓	-	✓	✓	-			**DA1-32180FB-B55C** 169373		
202[5)]		75	✓	✓	✓	-	✓	✓	-	FS7		**DA1-32202FB-B55C** 169375		
248[5)]	75	100	✓	✓	✓	-	✓	✓	-			**DA1-32248FB-B55C** 169377		

Notes

[1)] Overload cycle for 60 s every 600 s
[2)] at 230 V, 50 Hz/at 220 - 240 V, 60 Hz
[3)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[4)] IP20/NEMA 0: Rated operational current at an operating frequency of 16 kHz and an ambient air temperature of +50 °C
IP55/NEMA 12: Rated operational current at a switching frequency of 16 kHz and an ambient air temperature of +40 °C
[5)] IP20/NEMA 0: Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +50 °C
IP55/NEMA 12: Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +40 °C

Information relevant for export to North America → Page 31

Rated operational current[1), 4)] I_e A	Assigned motor rating[1), 2), 3)] P kW	P HP	Fitted with: Radio interference	Brake chopper	DC link choke	7-digital display assembly	OLED display	Additional PCB protection	Local controls	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DA1 variable frequency drives														
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 380 (-10%) - 480 (+10%) V														
2.2	0.75	1	✓	✓	-	✓	-	✓	-	FS2	IP20/NEMA 0	**DA1-342D2FB-A20C** 169117		1 off
4.1	1.5	2	✓	✓	-	✓	-	✓	-			**DA1-344D1FB-A20C** 169120		
5.8	2.2	3	✓	✓	-	✓	-	✓	-			**DA1-345D8FB-A20C** 169051		
9.5	4	5	✓	✓	-	✓	-	✓	-			**DA1-349D5FB-A20C** 169054		
14	5.5	10	✓	✓	-	✓	-	✓	-	FS3		**DA1-34014FB-A20C** 169057		
18	7.5	10	✓	✓	-	✓	-	✓	-			**DA1-34018FB-A20C** 169060		
24	11	15	✓	✓	-	✓	-	✓	-			**DA1-34024FB-A20C** 169063		
			✓	✓	-	-	✓	✓	-	FS4	IP55/NEMA 12	**DA1-34024FB-B55C** 169390		
30	15	20	✓	✓	-	-	✓	✓	-			**DA1-34030FB-B55C** 169391		
39	18.5	25	✓	✓	-	-	✓	✓	-			**DA1-34039FB-B55C** 169392		
46	22	30	✓	✓	-	-	✓	✓	-			**DA1-34046FB-B55C** 169393		
61	30	40	✓	✓	✓	-	✓	✓	-	FS5		**DA1-34061FB-B55C** 169394		
72	37	50	✓	✓	✓	-	✓	✓	-			**DA1-34072FB-B55C** 169395		
90[5)]	45	60	✓	✓	✓	-	✓	✓	-	FS6		**DA1-34090FB-B55C** 169397		
110[5)]	55	75	✓	✓	✓	-	✓	✓	-			**DA1-34110FB-B55C** 169399		
150[5)]	75	100	✓	✓	✓	-	✓	✓	-			**DA1-34150FB-B55C** 169401		
180[5)]	90	150	✓	✓	✓	-	✓	✓	-			**DA1-34180FB-B55C** 169403		
202[5)]	110		✓	✓	✓	-	✓	✓	-	FS7		**DA1-34202FB-B55C** 169405		
240[5)]	132	200	✓	✓	✓	-	✓	✓	-			**DA1-34240FB-B55C** 169407		
302[5)]	160	250	✓	✓	✓	-	✓	✓	-			**DA1-34302FB-B55C** 169217		
370[5)]	200	300	✓	✓	-	-	✓	✓	-	FS8	IP20/NEMA 0	**DA1-34370FB-B20C** 169219		
450[5)]	250	350	✓	✓	-	-	✓	✓	-			**DA1-34450FB-B20C** 169221		

Notes

[1)] Overload cycle for 60 s every 600 s
[2)] at 400 V, 50 Hz/at 440 - 480 V, 60 Hz
[3)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[4)] IP20/NEMA 0: Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +50 °C
IP55/NEMA 12: Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +40 °C
[5)] IP20/NEMA 0: Rated operational current at an operating frequency of 4 kHz and an ambient air temperature of +50 °C
IP55/NEMA 12: Rated operational current at an operating frequency of 4 kHz and an ambient air temperature of +40 °C

Information relevant for export to North America → Page 31

Rated operational current[1), 4)] I_e A	Assigned motor rating[1), 2), 3)] P kW	P HP	Fitted with: Radio interference	Brake chopper	DC link choke	7-digital display assembly	OLED display	Additional PCB protection	Local controls	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DA1 variable frequency drives														
U_e 500 V AC, 3-phase / U_2 500 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 500 (-10%) - 600 (+10%) V														
2.1	0.75	1.5	-	✓	-	✓	-	✓	-	FS2	IP20/NEMA 0	**DA1-352D1NB-A20C** 177034		1 off
3.1	1.5	2	-	✓	-	✓	-	✓	-			**DA1-353D1NB-A20C** 177035		
4.1	2.2	3	-	✓	-	✓	-	✓	-			**DA1-354D1NB-A20C** 177036		
6.5	4	5	-	✓	-	✓	-	✓	-			**DA1-356D5NB-A20C** 177037		
9	5.5	7.5	-	✓	-	✓	-	✓	-			**DA1-359D0NB-A20C** 177038		
12	7.5	10	-	✓	-	✓	-	✓	-	FS3		**DA1-35012NB-A20C** 177039		
17	11	15	-	✓	-	✓	-	✓	-			**DA1-35017NB-A20C** 177040		
22	15	20	-	✓	-	✓	-	✓	-			**DA1-35022NB-A20C** 177041		
			-	✓	-	-	✓	✓	-	FS4	IP55/NEMA 12	**DA1-35022NB-B55C** 176965		
28	18.5	25	-	✓	-	-	✓	✓	-			**DA1-35028NB-B55C** 176966		
34	22	30	-	✓	-	-	✓	✓	-			**DA1-35034NB-B55C** 176967		
43	30	40	-	✓	✓	-	✓	✓	-	FS5		**DA1-35043NB-B55C** 176968		
54	37	50	-	✓	✓	-	✓	✓	-			**DA1-35054NB-B55C** 176969		
65	45	60	-	✓	✓	-	✓	✓	-			**DA1-35065NB-B55C** 176970		
78[5)]	55	75	-	✓	✓	-	✓	✓	-	FS6		**DA1-35078NB-B55C** 176971		
105[5)]	75	100	-	✓	✓	-	✓	✓	-			**DA1-35105NB-B55C** 176972		
130[5)]	90	125	-	✓	✓	-	✓	✓	-			**DA1-35130NB-B55C** 176973		
150[5)]	110	150	-	✓	✓	-	✓	✓	-			**DA1-35150NB-B55C** 176974		

Notes

1) Overload cycle for 60 s every 600 s
2) at 500 V, 50 Hz/at 550 - 600 V, 60 Hz
3) for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
4) IP20/NEMA 0: Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +50 °C
IP55/NEMA 12: Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +40 °C
5) IP20/NEMA 0: Rated operational current at an operating frequency of 4 kHz and an ambient air temperature of +50 °C
IP55/NEMA 12: Rated operational current at an operating frequency of 4 kHz and an ambient air temperature of +40 °C

Information relevant for export to North America → Page 31

Rated operational current[1), 4)] I_e A	Assigned motor rating[1), 2), 3)] P kW	P HP	Fitted with: Radio interference	Brake chopper	DC link choke	7-digital display assembly	OLED display	Additional PCB protection	Local controls	Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
PowerXL™ DA1 variable frequency drives														
U_e 230 V AC, 1-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V														
4.3	0.75	1	✓	✓	-	-	✓	✓	-	FS2	IP66/NEMA 4X	**DA1-124D3FB-B66C** 169347		1 off
			✓	✓	-	-	✓	✓	✓			**DA1-124D3FB-B6SC** 169348		
7	1.5	2	✓	✓	-	-	✓	✓	-			**DA1-127D0FB-B66C** 169349		
			✓	✓	-	-	✓	✓	✓			**DA1-127D0FB-B6SC** 169350		
10.5	2.2	3	✓	✓	-	-	✓	✓	-			**DA1-12011FB-B66C** 169351		
			✓	✓	-	-	✓	✓	✓			**DA1-12011FB-B6SC** 169352		
U_e 230 V AC, 3-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 200 (-10%) - 240 (+10%) V														
4.3	0.75	1	✓	✓	-	-	✓	✓	-	FS2	IP66/NEMA 4X	**DA1-324D3FB-B66C** 169353		1 off
			✓	✓	-	-	✓	✓	✓			**DA1-324D3FB-B6SC** 169354		
7	1.5	2	✓	✓	-	-	✓	✓	-			**DA1-327D0FB-B66C** 169355		
			✓	✓	-	-	✓	✓	✓			**DA1-327D0FB-B6SC** 169356		
10.5	2.2	3	✓	✓	-	-	✓	✓	-			**DA1-32011FB-B66C** 169357		
			✓	✓	-	-	✓	✓	✓			**DA1-32011FB-B6SC** 169358		
18	4	5	✓	✓	-	-	✓	✓	-	FS3		**DA1-32018FB-B66C** 169359		
			✓	✓	-	-	✓	✓	✓			**DA1-32018FB-B6SC** 169360		

Notes

1) Overload cycle for 60 s every 600 s
2) at 230 V, 50 Hz/at 220 - 240 V, 60 Hz
3) for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
4) Rated operational current at a switching frequency of 16 kHz and an ambient air temperature of +40 °C

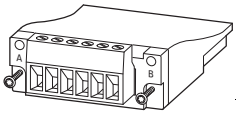
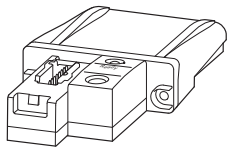
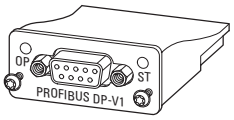
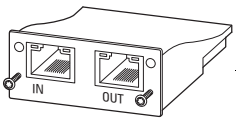
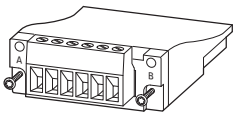
Information relevant for export to North America → Page 31

Rated operational current[1), 4)]	Assigned motor rating[1), 2), 3)]		Fitted with							Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
			Radio interference	Brake chopper	DC link choke	7-digital display assembly	OLED display	Additional PCB protection	Local controls					
I_e A	P kW	P HP												
PowerXL™ DA1 variable frequency drives														
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 380 (-10%) - 480 (+10%) V														
2.2	0.75	1	✓	✓	-	-	✓	✓	-	FS2	IP66/NEMA 4X	**DA1-342D2FB-B66C** 169378		1 off
			✓	✓	-	-	✓	✓	✓			**DA1-342D2FB-B6SC** 169379		
4.1	1.5	2	✓	✓	-	-	✓	✓	-			**DA1-344D1FB-B66C** 169380		
			✓	✓	-	-	✓	✓	✓			**DA1-344D1FB-B6SC** 169381		
5.8	2.2	3	✓	✓	-	-	✓	✓	-			**DA1-345D8FB-B66C** 169382		
			✓	✓	-	-	✓	✓	✓			**DA1-345D8FB-B6SC** 169383		
9.5	4	5	✓	✓	-	-	✓	✓	-			**DA1-349D5FB-B66C** 169384		
			✓	✓	-	-	✓	✓	✓			**DA1-349D5FB-B6SC** 169385		
14	5.5	10	✓	✓	-	-	✓	✓	-	FS3		**DA1-34014FB-B66C** 169386		
			✓	✓	-	-	✓	✓	✓			**DA1-34014FB-B6SC** 169387		
18	7.5	10	✓	✓	-	-	✓	✓	-			**DA1-34018FB-B66C** 169388		
			✓	✓	-	-	✓	✓	✓			**DA1-34018FB-B6SC** 169389		
U_e 500 V AC, 3-phase / U_2 500 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 500 (-10%) - 600 (+10%) V														
2.1	0.75	1.5	-	✓	-	-	✓	✓	-	FS2	IP66/NEMA 4X	**DA1-352D1NB-B66C** 176984		1 off
			-	✓	-	-	✓	✓	✓			**DA1-352D1NB-B6SC** 177012		
3.1	1.5	2	-	✓	-	-	✓	✓	-			**DA1-353D1NB-B66C** 176985		
			-	✓	-	-	✓	✓	✓			**DA1-353D1NB-B6SC** 177013		
4.1	2.2	3	-	✓	-	-	✓	✓	-			**DA1-354D1NB-B66C** 176986		
			-	✓	-	-	✓	✓	✓			**DA1-354D1NB-B6SC** 177014		
6.5	4	5	-	✓	-	-	✓	✓	-			**DA1-356D5NB-B66C** 176987		
			-	✓	-	-	✓	✓	✓			**DA1-356D5NB-B6SC** 177015		
9	5.5	7.5	-	✓	-	-	✓	✓	-			**DA1-359D0NB-B66C** 176988		
			-	✓	-	-	✓	✓	✓			**DA1-359D0NB-B6SC** 177016		
12	7.5	10	-	✓	-	-	✓	✓	-	FS3		**DA1-35012NB-B66C** 176989		
			-	✓	-	-	✓	✓	✓			**DA1-35012NB-B6SC** 177017		
17	11	15	-	✓	-	-	✓	✓	-			**DA1-35017NB-B66C** 176990		
			-	✓	-	-	✓	✓	✓			**DA1-35017NB-B6SC** 177018		

Notes

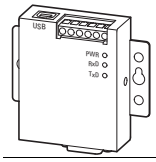
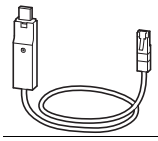
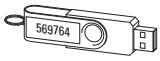
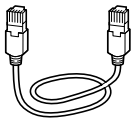
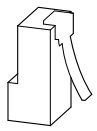
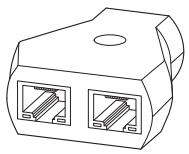
1) Overload cycle for 60 s every 600 s
2) DA1-34…: at 400 V, 50 Hz/at 440 - 480 V, 60 Hz
DA1-35…: at 500 V, 50 Hz/at 550 - 600 V, 60 Hz
3) for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
4) Rated operational current at a switching frequency of 8 kHz and an ambient air temperature of +40 °C

Information relevant for export to North America → Page 31

	Description	Length	For use with	Part no. Article no.	Price see price list	Std. pack
External keypad						
	With 7-digital display assembly Front IP54 With approx. 3 m-long, plug-in connection cable (RJ45, 8-pin)	3	DE1, DC1, DA1, DL1	**DX-KEY-LED** 169132		1 off
	with OLED display Front IP54 Multilingual With approx. 3 m-long, plug-in connection cable (RJ45, 8-pin)	3	DC1, DA1, DL1	**DX-KEY-OLED** 169133		
Expansion modules						
	Output expansion Plug-in module with plug-in terminal block, 5 pole 3 relay outputs (N/O, 250 V AC, max. 6 A/ 30 V DC, max. 5 A)	-	DA1, DL1	**DXA-EXT-3RO** 169121		1 off
	I/O expansion Plug-in module with plug-in terminal blocks, 6 pole 3 digital inputs (+24 V) 1 relay output (N/O, 250 V AC, max. 6 A/ 30 V DC, max. 5 A)	-	DA1, DL1	**DXA-EXT-3DI1RO** 169036		
	Encoder module Plug-in module with plug-in terminal block, 5 pole 2-channel max. 500 kHz 5 V TTL, A & B, /A & /B, 5 V DC, max. 200 mA 24 V HTL, A & B, /A & /B, 24 V DC, external power supply required, max. 30 V DC	-	DA1, DL1	**DXA-EXT-ENCOD** 169035		
SmartWire-DT Modules						
	Plug-in module with slot for SWD4-8SF2-5 external device plug	-	DA1 (IP20, IP55)	**DX-NET-SWD1** 169129		1 off
Fieldbus modules						
	PROFIBUS-DP SUB-D socket, 9-pole	-	DA1, DL1	**DX-NET-PROFIBUS** 169124		1 off
	PROFINET 2 x RJ45, 8 pole Plug-in module	-	DA1, DL1	**DX-NET-PROFINET-2** 169125		
	Modbus-TCP 2 x RJ45, 8 pole	-	DA1, DL1	**DX-NET-MODBUSTCP-2** 169126		
	EtherNet/IP 2 x RJ45, 8 pole	-	DA1, DL1	**DX-NET-ETHERNET-2** 169122		
	EtherCAT 2 x RJ45, 8 pole	-	DA1, DL1	**DX-NET-ETHERCAT-2** 169127		
	DeviceNet	-	DA1, DL1	**DX-NET-DEVICENET** 169123		

Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E172143
UL Category Control No.	NMMS, NMMS7
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits

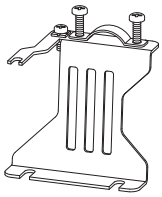
	Description	Length	For use with	Part no. Article no.	Price see price list	Std. pack
PC communication						
Parameter storage unit and Bluetooth communication stick						
	For storage, copying parameters, and/or transferring parameters to a PC with the drivesConnect software via Bluetooth With 2 function keys for uploading and downloading parameters with configuration memory	-	DE1, DC1, DA1, DL1	**DX-COM-STICK** 169134		1 off
Interface converter For directly connecting the variable-frequency drive to a computer with drivesConnect software						
	Interface converter USB/RS485 with connection cable, RJ45, 8 pole electrically isolated 1 × SUB-D plug, 9-pole Terminal strip, 5-terminal Status-LED	-	DE1, DC1, DA1, DL1	**DX-COM-PCKIT** 169135		1 off
	Interface converter USB/RS485 with connection cable, RJ45, 8 pole electrically isolated	-	DE1, DC1, DA1, DL1	**DX-CBL-PC-1M5** 171018		1 off
License Keys to activate the function block editor in the DrivesConnect software						
	USB flash drive	-	DA1, DL1	**DX-COM-SOFT** 169136		
Connecting cable						
	Patch cord with RJ45 plugs, 8 pole	0.5	DE1, DC1, DA1, DL1	**DX-CBL-RJ45-0M5** 169137		1 off
		1		**DX-CBL-RJ45-1M0** 169138		
		3		**DX-CBL-RJ45-3M0** 169139		
Bus terminating resistor						
	RJ45 8 pole Connection to CANopen® (pin 1/2, 124 Ω) or to Modbus RTU (pin 7/8, 120 Ω)	-	easyNet DX-SPL-RJ45-2SL-1PL	**EASY-NT-R** 256281		2 off
Splitter						
	RJ45, 8-pin, 3 sockets	-	DX-CBL-RJ45…	**DX-SPL-RJ45-3SL** 169141		1 off
	RJ45, 8-pin, 2 sockets/1 plug	-	DX-CBL-RJ45…	**DX-SPL-RJ45-2SL1PL** 169142		

Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E172143
UL Category Control No.	NMMS, NMMS7
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits

EASY-NT-R:

Product Standards	IEC/EN see Technical Data; UL 508; CSA C22.2 No. 142-M1987; CSA C22.2 No. 213-M1987; CE marking
UL File No.	E135462
UL Category Control No.	NRAQ
CSA File No.	012528
CSA Class No.	2258-02
North America Certification	UL listed, CSA certified
Degree of Protection	IEC: IP20, UL/CSA Type: -

	Description		Length	For use with	Part no. Article no.	Price see price list	Std. pack
mounting accessories							
mounting adapter with gland plates							
	For installing the connection cables on the mains side	Size FS2	-	DC1, DA1, DL1	**DX-EMC-MNT-2N** 172927		1 off
		Size FS3	-	DC1, DA1, DL1	**DX-EMC-MNT-3N** 172929		
	For installing the connection cables on the motor side	Size FS2	-	DC1, DA1, DL1	**DX-EMC-MNT-2M** 172928		
		Size FS3	-	DC1, DA1, DL1	**DX-EMC-MNT-3M** 172930		

Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E172143
UL Category Control No.	NMMS, NMMS7
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits

PowerXL™ Variable Frequency Drive DG1 General Purpose Drive

PowerXL™ DG1 general-purpose drives are variable frequency drives in Eaton's "Next-Generation" PowerXL™ series. They are specifically designed for modern, sophisticated applications:

In fact, energy-saving algorithms, high short-circuit values, and a heavy-duty design all enable them to provide maximum efficiency, safety, and reliability.

Performance range:
- 0.75 … 90 kW (U_e: 3~ 230 V, U_2: 3~ 230 V)
- 0.75 … 160 kW (U_e: 3~ 400 V, U_2: 3~ 400 V)

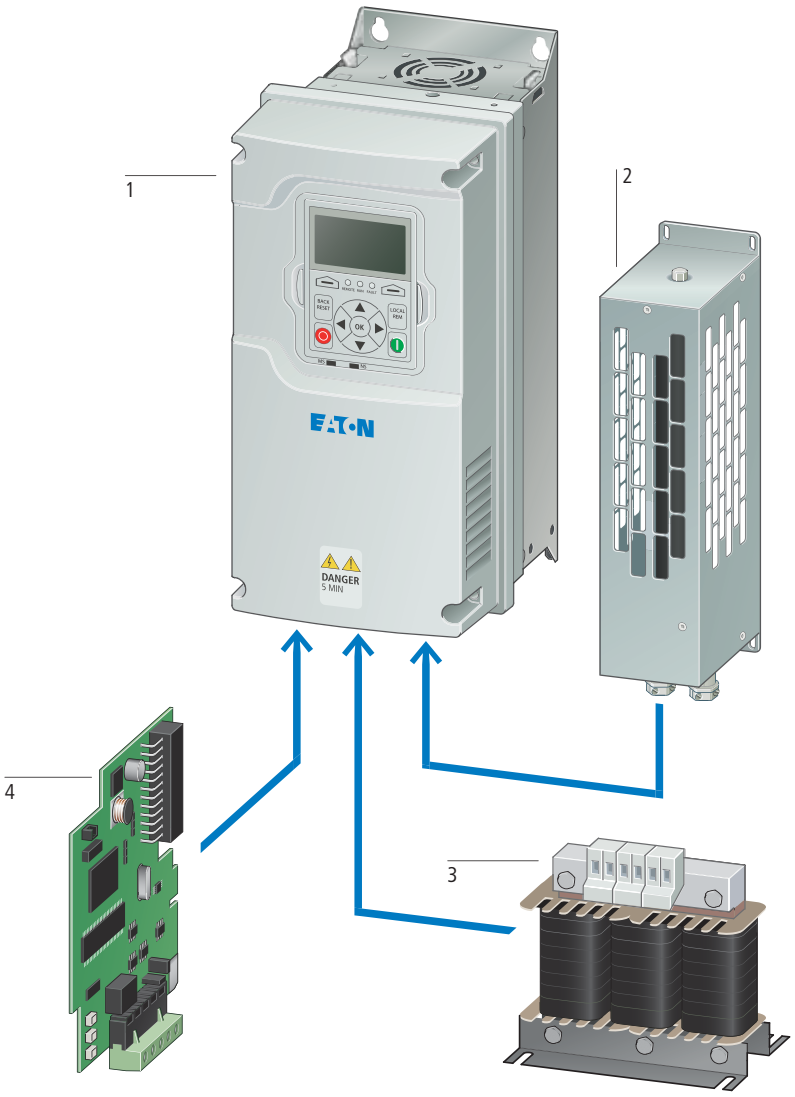
Features:
- **Ease of use:** Startup Wizard, inControl PC Tool software, four built-in applications, diagnostics, local/remote button, removable keypad with copy/paste functionality.
- **Communicative:** Modbus RTU, Modubs TCP, Ethernet IP and BacNet MS/TP Standard on each device. In addition to that extensive I/O above the standard in this device class
- **Efficiency:** Active energy control algorithm, 5% DC choke, input surge protection, EMC filter built-in
- **Rugged and reliable:** Dual rating with high (CT) and low (VT) overload capability, conformal coated boards, brake chopper circuit, durable metal power section, 50°C rating (60°C de-rating), removable keypad rated IP54
- **Global acceptance:** UL®, CE, cUL®, RoHS, C-Tick

Accessories:
- Communication modules (PROFIBUS, PROFINET, DeviceNet, etc.)
- I/O expansions
- External keypad
- Motor chokes
- Sine filters
- Braking resistances
- Power Xpert inControl operating software

Applications:
- Multi-pump applications
- HVAC
- Roller and chain conveyors
- Compressors, mills
- Production machines
- Centrifuges and extruders
- Traction drives, conveyor belts
- Sawing, drilling, dosing unit drives
- Chemical and primary industries
- Water jet cutting, crushers

System overview

DG1, frame size FR1



DG1 variable frequency drives → page 46	1
Braking resistance → page 56	2
Mains choke, motor choke, sine filter → page 60	3
Communication modules, expansion modules → page 56	4

Key to type references

DG1 - 3 4 2D2 F B - C 21 C

Device series
DG1 = variable frequency drive, universal, series 1
(D = Drives, G = General purpose, 1 = Series 1)

Connection in power section
3 = three-phase mains connection/
three-phase motor connection

Mains voltage category
2 = 230 V (208 - 240 V, -15 %, ± 10 %)
4 = 400 V (380 - 500 V, -15 %, ± 10 %)
5 = 575 V (525 - 600 V, -15 %, ± 10 %)

Rated operational current (examples)
2D2 = 2.2 A
012 = 12 A
261 = 261 A

Type
C = Additional PCB protection

Degree of protection
21 = IP21/NEMA 1
54 = IP54/NEMA 12

Display unit (display)
C = LCD (graphic)

Brake chopper
N = no internal brake chopper
B = Brake chopper

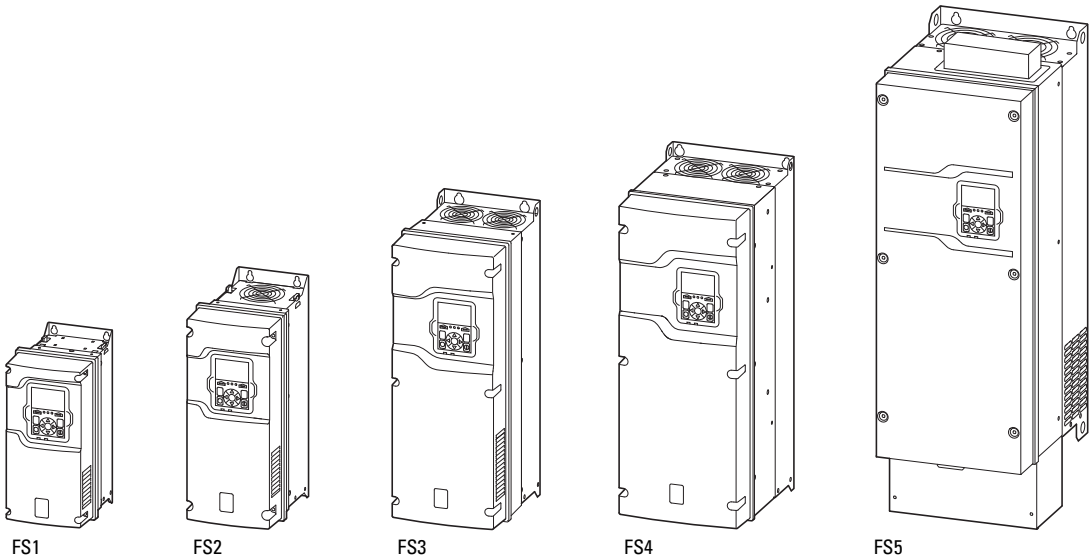
EMC (radio interference suppression filter)
F = Internal RFI filter

UL/CSA

Information relevant for export to North America

Product Standards	UL508C, CSA-C22.2 No. 274-13; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E134360
UL Category Control No.	NMMS, NMMS7
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits
Max. Voltage Rating	3~ 240 V AC IEC: TN-S UL/CSA: 'Y' (Solidly Grounded Wey)
	3~ 500 V AC IEC: TN-S UL/CSA: 'Y' (Solidly Grounded Wey)

Sizes



FS1 FS2 FS3 FS4 FS5

Ordering

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with					Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
						Radio interference	Brake chopper	DC link choke	Multi-line graphic display	Additional PCB protection					
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP										
U_e 230 V AC, 3-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 208 (-15%) - 240 (+10%) V															
3.7	0.75	0.75	4.8	1.1	1	✓	✓	✓	✓	✓	FS1	IP21	**DG1-323D7FB-C21C** 9701-1002-00P		1 off
4.8	1.1	1	6.6	1.5	1.5	✓	✓	✓	✓	✓			**DG1-324D8FB-C21C** 9701-1004-00P		
6.6	1.5	1.5	7.8		2	✓	✓	✓	✓	✓			**DG1-326D6FB-C21C** 9701-1006-00P		
7.8		2	11	2.2	3	✓	✓	✓	✓	✓			**DG1-327D8FB-C21C** 9701-1008-00P		
11	2.2	3	12.5	3		✓	✓	✓	✓	✓			**DG1-32011FB-C21C** 9701-1001-00P		
12.5	3		17.5	4	5	✓	✓	✓	✓	✓	FS2		**DG1-32012FB-C21C** 9701-2002-00P		
17.5	4	5	25	5.5	7.5	✓	✓	✓	✓	✓			**DG1-32017FB-C21C** 9701-2004-00P		
25	5.5	7.5	31	7.5	10	✓	✓	✓	✓	✓			**DG1-32025FB-C21C** 9701-2001-00P		
31	7.5	10	48	11	15	✓	✓	✓	✓	✓	FS3		**DG1-32031FB-C21C** 9701-3002-00P		
48	11	15	61	15	20	✓	✓	✓	✓	✓			**DG1-32048FB-C21C** 9701-3001-00P		
61	15	20	75	22	25	✓	-	✓	✓	✓	FS4		**DG1-32061FN-C21C** 9701-4004-00P		
						✓	✓	✓	✓	✓			**DG1-32061FB-C21C** 9701-4002-00P		
75	22	25	88	22	30	✓	✓	✓	✓	✓			**DG1-32075FN-C21C** 9701-4008-00P		
						✓	✓	✓	✓	✓			**DG1-32075FB-C21C** 9701-4006-00P		
88		30	114	30	40	✓	✓	✓	✓	✓			**DG1-32088FN-C21C** 9701-4001-00P		
						✓	✓	✓	✓	✓			**DG1-32088FB-C21C** 9701-4010-00P		
114	30	40	143	45	50	✓	✓	✓	✓	✓			**DG1-32114FN-C21C** 9701-5004-00P		
						✓	✓	✓	✓	✓			**DG1-32114FB-C21C** 9701-5002-00P		
143	45	50	170		60	✓	✓	✓	✓	✓	FS5		**DG1-32143FN-C21C** 9701-5008-00P		
						✓	✓	✓	✓	✓			**DG1-32143FB-C21C** 9701-5006-00P		
170		60	211	55	75	✓	-	✓	✓	✓			**DG1-32170FN-C21C** 9701-5001-00P		
						✓	✓	✓	✓	✓			**DG1-32170FB-C21C** 9701-5010-00P		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 230 V, 50 Hz/at 220 - 240 V, 60 Hz

Information relevant for export to North America → Page 45

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with					Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
						Radio interference	Brake chopper	DC link choke	Multi-line graphic display	Additional PCB protection					
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP										
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 380 (-15%) - 500 (+10%) V															
2.2	0.75	1	3.3	1.1	1.5	✓	✓	✓	✓	✓	FS1	IP21	**DG1-342D2FB-C21C** 9702-1002-00P		1 off
3.3	1.1	1.5	4.3	1.5	2	✓	✓	✓	✓	✓			**DG1-343D3FB-C21C** 9702-1004-00P		
4.3	1.5	2	5.6	2.2	3	✓	✓	✓	✓	✓			**DG1-344D3FB-C21C** 9702-1006-00P		
5.6	2.2	3	7.6	3		✓	✓	✓	✓	✓			**DG1-345D6FB-C21C** 9702-1008-00P		
7.6	3		9	4	5	✓	✓	✓	✓	✓			**DG1-347D6FB-C21C** 9702-1001-00P		
9	4	5	12	5.5	7.5	✓	✓	✓	✓	✓			**DG1-349D0FB-C21C** 9702-1011-00P		
12	5.5	7.5	16	7.5	10	✓	✓	✓	✓	✓	FS2		**DG1-34012FB-C21C** 9702-2002-00P		
16	7.5	10	23	11	15	✓	✓	✓	✓	✓			**DG1-34016FB-C21C** 9702-2004-00P		
23	11	15	31	15	20	✓	✓	✓	✓	✓			**DG1-34023FB-C21C** 9702-2001-00P		
31	15	20	38	18.5	25	✓	✓	✓	✓	✓	FS3		**DG1-34031FB-C21C** 9702-3002-00P		
38	18.5	25	46	22	30	✓	✓	✓	✓	✓			**DG1-34038FB-C21C** 9702-3004-00P		
46	22	30	61	30	40	✓	✓	✓	✓	✓			**DG1-34046FB-C21C** 9702-3001-00P		
61	30	40	72	37	50	✓	✓	✓	✓	✓	FS4		**DG1-34061FB-C21C** 9702-4002-00P		
72	37	50	87	45	60	✓	-	✓	✓	✓			**DG1-34072FN-C21C** 9702-4008-00P		
						✓	✓	✓	✓	✓			**DG1-34072FB-C21C** 9702-4006-00P		
87	45	60	105	55	75	✓	-	✓	✓	✓			**DG1-34087FN-C21C** 9702-4001-00P		
						✓	✓	✓	✓	✓			**DG1-34087FB-C21C** 9702-4010-00P		
105	55	75	140	75	100	✓	-	✓	✓	✓	FS5		**DG1-34105FN-C21C** 9702-5004-00P		
						✓	✓	✓	✓	✓			**DG1-34105FB-C21C** 9702-5002-00P		
140	75	100	170	90	125	✓	-	✓	✓	✓			**DG1-34140FN-C21C** 9702-5008-00P		
						✓	✓	✓	✓	✓			**DG1-34140FB-C21C** 9702-5006-00P		
170	90	125	205	110	150	✓	-	✓	✓	✓			**DG1-34170FN-C21C** 9702-5001-00P		
						✓	✓	✓	✓	✓			**DG1-34170FB-C21C** 9702-5010-00P		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 400 V, 50 Hz/at 440 - 480 V, 60 Hz

Information relevant for export to North America → Page 45

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with					Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
						Radio interference suppression filter	Brake chopper	DC link choke	Multi-line graphic display	Additional PCB protection					
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP										
U_e 230 V AC, 3-phase / U_2 230 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 208 (-15%) - 240 (+10%) V															
3.7	0.75	0.75	4.8	1.1	1	✓	✓	✓	✓	✓	FS1	IP54	**DG1-323D7FB-C54C** 9701-1101-00P		1 off
4.8	1.1	1	6.6	1.5	1.5	✓	✓	✓	✓	✓			**DG1-324D8FB-C54C** 9701-1103-00P		
6.6	1.5	1.5	7.8		2	✓	✓	✓	✓	✓			**DG1-326D6FB-C54C** 9701-1105-00P		
7.8	1.5	2	11	2.2	3	✓	✓	✓	✓	✓			**DG1-327D8FB-C54C** 9701-1107-00P		
11	2.2	3	12.5	3		✓	✓	✓	✓	✓			**DG1-32011FB-C54C** 9701-1109-00P		
12.5	3		17.5	4	5	✓	✓	✓	✓	✓	FS2		**DG1-32012FB-C54C** 9701-2101-00P		
17.5	4	5	25	5.5	7.5	✓	✓	✓	✓	✓			**DG1-32017FB-C54C** 9701-2103-00P		
25	5.5	7.5	31	7.5	10	✓	✓	✓	✓	✓			**DG1-32025FB-C54C** 9701-2105-00P		
31	7.5	10	48	11	15	✓	✓	✓	✓	✓	FS3		**DG1-32031FB-C54C** 9701-3101-00P		
48	11	15	61	15	20	✓	✓	✓	✓	✓			**DG1-32048FB-C54C** 9701-3103-00P		
61	15	20	75	22	25	✓	-	✓	✓	✓	FS4		**DG1-32061FN-C54C** 9701-4103-00P		
						✓	✓	✓	✓	✓			**DG1-32061FB-C54C** 9701-4101-00P		
75	22	25	88		30	✓	-	✓	✓	✓			**DG1-32075FN-C54C** 9701-4107-00P		
						✓	-	✓	✓	✓			**DG1-32075FB-C54C** 9701-4105-00P		
88		30	114	30	40	✓	-	✓	✓	✓			**DG1-32088FN-C54C** 9701-4111-00P		
						✓	-	✓	✓	✓			**DG1-32088FB-C54C** 9701-4109-00P		
114	30	40	143	45	50	✓	-	✓	✓	✓			**DG1-32114FN-C54C** 9701-5103-00P		
						✓	-	✓	✓	✓			**DG1-32114FB-C54C** 9701-5101-00P		
143	45	50	170		60	✓	-	✓	✓	✓	FS5		**DG1-32143FN-C54C** 9701-5107-00P		
						✓	-	✓	✓	✓			**DG1-32143FB-C54C** 9701-5105-00P		
170		60	211	55	75	✓	-	✓	✓	✓			**DG1-32170FN-C54C** 9701-5111-00P		
						✓	✓	✓	✓	✓			**DG1-32170FB-C54C** 9701-5109-00P		

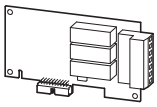
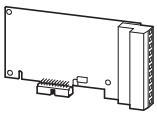
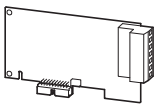
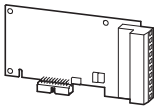
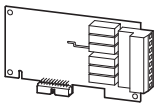
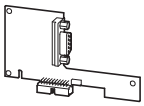
Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 230 V, 50 Hz/at 220 - 240 V, 60 Hz

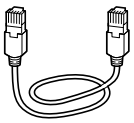
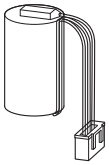
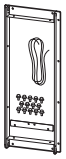
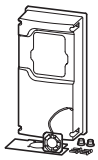
Information relevant for export to North America → Page 45

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with					Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
						Radio interference suppression filter	Brake chopper	DC link choke	Multi-line graphic display	Additional PCB protection					
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP										
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase															
Mains voltage (50/60Hz) U_{LN}: 380 (-15%) - 500 (+10%) V															
2.2	0.75	1	3.3	1.1	1.5	✓	✓	✓	✓	✓	FS1	IP54	**DG1-342D2FB-C54C** 9702-1101-00P		1 off
3.3	1.1	1.5	4.3	1.5	2	✓	✓	✓	✓	✓			**DG1-343D3FB-C54C** 9702-1103-00P		
4.3	1.5	2	5.6	2.2	3	✓	✓	✓	✓	✓			**DG1-344D3FB-C54C** 9702-1105-00P		
5.6	2.2	3	7.6	3		✓	✓	✓	✓	✓			**DG1-345D6FB-C54C** 9702-1107-00P		
7.6	3		9	4	5	✓	✓	✓	✓	✓			**DG1-347D6FB-C54C** 9702-1109-00P		
9	4	5	12	5.5	7.5	✓	✓	✓	✓	✓			**DG1-349D0FB-C54C** 9702-1111-00P		
12	5.5	7.5	16	7.5	10	✓	✓	✓	✓	✓	FS2		**DG1-34012FB-C54C** 9702-2101-00P		
16	7.5	10	23	11	15	✓	✓	✓	✓	✓			**DG1-34016FB-C54C** 9702-2103-00P		
23	11	15	31	15	20	✓	✓	✓	✓	✓			**DG1-34023FB-C54C** 9702-2105-00P		
31	15	20	38	18.5	25	✓	✓	✓	✓	✓	FS3		**DG1-34031FB-C54C** 9702-3101-00P		
38	18.5	25	46	22	30	✓	✓	✓	✓	✓			**DG1-34038FB-C54C** 9702-3103-00P		
46	22	30	61	30	40	✓	✓	✓	✓	✓			**DG1-34046FB-C54C** 9702-3105-00P		
61	30	40	72	37	50	✓	✓	✓	✓	✓	FS4		**DG1-34061FB-C54C** 9702-4101-00P		
						✓	-	✓	✓	✓			**DG1-34061FN-C54C** 9702-4103-00P		
72	37	50	87	45	60	✓	-	✓	✓	✓			**DG1-34072FN-C54C** 9702-4107-00P		
						✓	✓	✓	✓	✓			**DG1-34072FB-C54C** 9702-4105-00P		
87	45	60	105	55	75	✓	-	✓	✓	✓			**DG1-34087FN-C54C** 9702-4111-00P		
						✓	✓	✓	✓	✓			**DG1-34087FB-C54C** 9702-4109-00P		
105	55	75	140	75	100	✓	-	✓	✓	✓	FS5		**DG1-34105FN-C54C** 9702-5103-00P		
						✓	✓	✓	✓	✓			**DG1-34105FB-C54C** 9702-5101-00P		
140	75	100	170	90	125	✓	-	✓	✓	✓			**DG1-34140FN-C54C** 9702-5107-00P		
						✓	✓	✓	✓	✓			**DG1-34140FB-C54C** 9702-5105-00P		
170	90	125	205	110	150	✓	-	✓	✓	✓			**DG1-34170FN-C54C** 9702-5111-00P		
						✓	✓	✓	✓	✓			**DG1-34170FB-C54C** 9702-5109-00P		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 400 V, 50 Hz/at 440 - 480 V, 60 Hz

Information relevant for export to North America → Page 45

	Description	Length	For use with	Part no. Article no.	Price see price list	Std. pack
External keypad						
	with OLED display Front IP54 Multilingual	-	DG1	**DXG-KEY-LCD** 730-32047-00P		1 off
	Mounting frame with approx. 0.5 m-long, plug-in connection cable	0.5	DXG-KEY-LCD	**DXG-KEY-RMTKIT** 730-32033-00P		
	Mounting frame	-		**DXG-KEY-HOLDER** 730-32032-00P		
	Cover for RJ45 interface	-		**DXG-KEY-N12PLUG** 730-32038-00P		
Expansion modules						
	Output expansion 3 relay outputs	-	DG1	**DXG-EXT-3RO** 744-A2614-00P		1 off
	I/O expansion 3 digital inputs 3 Digital outputs 1 Thermistor input	-	DG1	**DXG-EXT-3DI3DO1T** 744-A2612-00P		
	I/O expansion 1 Analog input 2 Analog outputs	-	DG1	**DXG-EXT-1AI2AO** 744-A2613-00P		
	Input expansion Thermistor input	-	DG1	**DXG-EXT-THER1** 744-A2615-00P		
	Input expansion 240-V-AC input (electrically isolated) for 6 digital inputs	-	DG1	**DXG-EXT-6DI** 744-A2616-00P		
Fieldbus modules						
	PROFIBUS-DP SUB-D socket, 9-pole	-	DG1	**DXG-NET-PROFIBUS** 744-A2617-00P		1 off
	Interface converter from 9-pin SUB-D plug to 3-pin control signal terminal	-	DXG-NET-PROFIBUS	**DXG-MNT-PROFIBUS** 744-A2618-00P		

	Description	Length	For use with	Part no. Article no.	Price see price list	Std. pack
PC communication						
parameter software						
	-	-	DG1	**DXG-ACC-SOFTWARE** 730-32036-00P		1 off
Connecting cable						
	Patch cord with RJ45 plugs, 8 pole	1	DG1	**DXG-CBL-1M0** 730-32034-00P		1 off
		3		**DXG-CBL-3M0** 730-32035-00P		
PC programming cable	RJ45/USB, with CD	-	DG1	**DXG-CBL-PCCABLE** 730-32037-00P		
Demo case and simulator						
-	DG1 simulator (control section)	-	-	**DG1-DEM01** 178125		1 off
-	DG1 simulator	-	-	**DG1-DEM02-230** 178126		
Battery						
	Battery for real-time clock	-	-	**DXG-ACC-RTBATT** 730-32039-00P		1 off
mounting accessories						
mounting frame For the power section's push-through installation outside the control panel						
	Frame parts and fixing screws	-	DG1 (frame size FS1)	**DXG-ACC-FR1N12FK** 730-32022-00P		1 off
		-	DG1 (frame size FS2)	**DXG-ACC-FR2N12FK** 730-32023-00P		
		-	DG1 (frame size FS3)	**DXG-ACC-FR3N12FK** 730-32024-00P		
		-	DG1 (frame size FS4)	**DXG-ACC-FR4N12FK** 730-32025-00P		
		-	DG1 (frame size FS5)	**DXG-ACC-FR5N12FK** 730-32026-00P		
Mounting set For increasing the degree of protection from IP21/NEMA 1 to IP54/NEMA 12						
	Enclosure cover with seals and extra fan	-	DG1-34... (frame size FS1, 400/480 V)	**DXG-ACC-4FR1N12KIT** 730-32029-00P		
		-	DG1 (frame size FS2)	**DXG-ACC-FR2N12KIT** 730-32030-00P		
		-	DG1 (frame size FS3)	**DXG-ACC-FR3N12KIT** 730-32031-00P		
		-	DG1-32... (frame size FS1, 230 V)	**DXG-ACC-2FR1N12KIT** 744-A2815-00P		





Accessories and Engineering

With PowerXL variable speed starters and PowerXL and 9000X variable frequency drives, you can rest assured knowing that your variable-speed power drive system (PDS) needs will be well taken care of. These units are known for their compact design and wide applicability, making them the ideal choice for most applications on the global market.

But that's not all: Additional options such as mains chokes, motor chokes, sine filters, and braking resistors make it possible not only to expand the devices' range of applications, but also to adapt to a variety of EMC environments and mains-side operating conditions.

DX-LN… mains chokes
DX-LN1…: single phase, max. 260 V, 50/60 Hz, 6 - 32 A
DX-LN3…: 3-phase max. 550 V, 50/60 Hz, 4 - 450 A

Motor choke DX-LM3…
DX-LM3…: 3-phase, max. 750 V, 0 - 400 Hz, 5 - 450 A

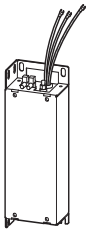
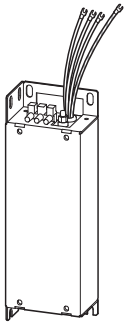
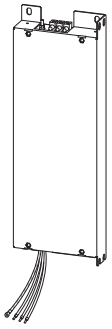
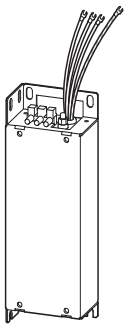
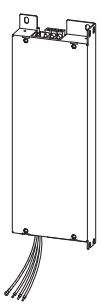
Radio interference suppression filter DX-EMC…
Calibrated and assigned radio interference suppression filter for Series DA1, DC1 and DL1
DX-EMC12…: single phase, with prefabricated connection cables, base-mounted filter
DX-EMC34…: 3-phase, with prefabricated connection cables, base-mounted filter, low leakage current
DX-EMC34…: 3-phase, 100 – 750 A, low leakage current

Sine filter DX-SIN3…
DX-SIN3…: 3-phase, 0 – 520 V, 0 - 150 Hz, 4 - 480 A
Sine filters used with variable frequency drives require the frequency to be set to a fixed value within a range of 4 – 8 kHz.

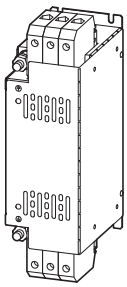
DX-BR… braking resistance
- with prefabricated connection cables for installation in DA1, DC1, and DL1 devices
- with 1-m long connection cable, temperature monitoring switch, 75 – 400 ohms, 0.4 – 1.6 kW
- with temperature monitoring switch, 2 – 100 Ohm, 0.2 – 102.4 kW

Ordering

Engineering

		Connection type	Rated operational current I_e A	For use with[1]	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
Radio interference suppression filters								
Base-mounted filter, side-mounting filter								
	Single-phase, Mains voltage (50/60Hz) U_{LN} [V] max. 250 + 10%							
		Connection terminal, PE stud, prefabricated cables	14	DC1	IP00 IP20 when connected	**DX-EMC12-014-FS1** 172273		1 off
			14	DC1, DA1		**DX-EMC12-014-FS2** 172275		
			19	DE1		**DX-EMC12-019-FS1** 172274		
			25	DE1, DC1		**DX-EMC12-025-FS2** 172276		
			31	DC1		**DX-EMC12-031-FS3** 172277		
 	three-phase, Mains voltage (50/60Hz) U_{LN} [V] max. 520 + 10%							
		Connection terminal, PE stud, prefabricated cables	8	DE1, DC1	IP00 IP20 when connected	**DX-EMC34-008-FS1** 172278		1 off
			11	DC1, DA1		**DX-EMC34-011-FS2** 172279		
			15	DC1, DA1, DL1		**DX-EMC34-015-FS3** 172280		
			19	DE1, DC1, DA1, DL1		**DX-EMC34-019-FS3** 179611		
			25	DC1, DA1		**DX-EMC34-025-FS3** 172281		
			31	DA1, DL1		**DX-EMC34-031-FS4** 172282		
			48			**DX-EMC34-048-FS4** 172283		
			75			**DX-EMC34-075-FS5** 172284		
 	low leakage current	Connection terminal, PE stud, prefabricated cables	8	DE1, DC1	IP00 IP20 when connected	**DX-EMC34-008-FS1-L** 174604		1 off
			11	DC1, DA1		**DX-EMC34-011-FS2-L** 174605		
			15	DC1, DA1, DL1		**DX-EMC34-015-FS3-L** 174606		
			19	DE1, DC1, DA1, DL1		**DX-EMC34-019-FS3-L** 179612		
			25	DC1, DA1		**DX-EMC34-025-FS3-L** 174607		
			31	DA1, DL1		**DX-EMC34-031-FS4-L** 174608		
			48			**DX-EMC34-048-FS4-L** 174609		
			75			**DX-EMC34-075-FS5-L** 174610		

Notes [1] See assigned switching and protective elements for an article-specific selection

		Connection type	Rated operational current I_e A	For use with[1]	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
Radio interference suppression filters								
Separate mounting								
 three-phase, Mains voltage (50/60Hz) U_{LN} [V] max. 520 + 10%								
		Screw terminal, PE stud	100	DA1	IP20	**DX-EMC34-100** 172285		1 off
			130			**DX-EMC34-130** 172286		
			180			**DX-EMC34-180** 172287		
			250			**DX-EMC34-250** 172288		
		Flat copper bar, PE stud	400	DA1	IP00	**DX-EMC34-400** 172289		1 off
			750			**DX-EMC34-750** 177636		
	low leakage current	Screw terminal, PE stud	100	DA1	IP20	**DX-EMC34-100-L** 174611		1 off
			130			**DX-EMC34-130-L** 174612		
			180			**DX-EMC34-180-L** 174613		
			250			**DX-EMC34-250-L** 174614		
		Flat copper bar, PE stud	400	DA1	IP00	**DX-EMC34-400-L** 174615		1 off
			750			**DX-EMC34-750-L** 177637		

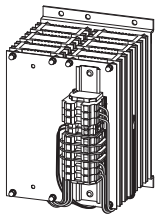
Notes [1] See assigned switching and protective elements for an article-specific selection

	Resistance value R Ω	Continuous braking rating P_{DB} kW	Degree of Protection	For use with[1]	**Part no.** Article no.	**Price** see price list	Std. pack
Braking resistances							
Wire wound resistor in aluminum case for direct installation in frequency inverter enclosure of frame sizes FS2 und FS3 With prefabricated connection cable							
	100	0.2	IP54	DC1, DA1, DL1	**DX-BR3-100** 169150		1 off
Wire wound resistor in ceramic potting compound inside aluminum case for direct installation in frequency inverter enclosure of frame sizes FS4 und FS5							
	33	0.5	IP54	DA1, DL1	**DX-BR5-033** 169151		1 off
Wire wound resistor in ceramic potting compound inside aluminum case with temperature monitoring switch with connection cables (approx. 0.5 m long)							
	27	0.24	IP65	DC1, DA1, DL1, DG1, SPX	**DX-BR027-240** 174243		1 off
	40	0.2			**DX-BR040-200** 174242		
	47	0.24			**DX-BR047-240** 174236		
	50	0.2			**DX-BR050-200** 174235		
	100	0.1			**DX-BR100-100** 174241		
	100	0.2			**DX-BR100-200** 174237		
	100	0.24			**DX-BR100-240** 174238		
	150	0.2			**DX-BR150-200** 174248		
	210	0.2			**DX-BR210-200** 174247		
	430	0.1			**DX-BR430-100** 174246		

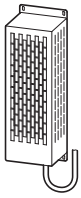
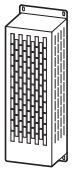
Notes [1] See assigned switching and protective elements for an article-specific selection

Information relevant for export to North America

Product Standards	UL508; C22.2
UL File No.	E300273
UL Category Control No.	NMTR2, NMTR8
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits
Max. Voltage Rating	1000
Degree of Protection	IEC: IP00

	Resistance value R Ω	Continuous braking rating P_{DB} kW	Degree of Protection	For use with[1]	**Part no.** Article no.	**Price** see price list	Std. pack
Braking resistances							
Resistor combination (size 1) with temperature monitoring switch with connection terminals							
	20	0.96	IP20	DC1, DA1, DL1, DG1, SPX	**DX-BR020-960** 174257		1 off
	24	0.4			**DX-BR024-400** 174244		
	24	0.6			**DX-BR024-600** 174267		
	24	0.72			**DX-BR024-720** 174245		
	42	0.72			**DX-BR042-720** 174266		
	50	0.4			**DX-BR050-400** 174239		
	50	0.6			**DX-BR050-600** 174240		
	50	0.72			**DX-BR050-720** 174265		
	50	0.96			**DX-BR050-960** 174250		
	75	0.4			**DX-BR075-400** 174249		
	100	0.6			**DX-BR100-600** 174251		
	100	0.72			**DX-BR100-720** 174252		
	100	0.96			**DX-BR100-960** 174253		
	150	0.8			**DX-BR150-800** 174262		
	216	0.6			**DX-BR216-600** 174268		
	400	0.4			**DX-BR400-400** 174261		
Resistor combination (size 2) with temperature monitoring switch with connection terminals							
	25	1.44	IP20	DC1, DA1, DL1, DG1, SPX	**DX-BR025-1440** 174258		1 off
	25	1.92			**DX-BR025-1920** 174259		
	27	2.88			**DX-BR027-2880** 174260		
	50	1.44			**DX-BR050-1440** 174254		
	50	1.92			**DX-BR050-1920** 174255		
	50	2.88			**DX-BR050-2880** 174264		
	54	2.88			**DX-BR054-2880** 174256		
	84	1.44			**DX-BR084-1440** 174263		

Notes [1] See assigned switching and protective elements for an article-specific selection

	Resistance value R Ω	Continuous braking rating P_{DB} kW	Degree of Protection	For use with[1]	**Part no.** Article no.	**Price** see price list	Std. pack
Braking resistances							
Wire wound resistor in ceramic potting compound inside aluminum case, combined Installed in a housing designed to prevent accidental contact and featuring a temperature monitoring switch and a 1-meter connection cable							
	75	1.1	IP20	DA1, DL1, DG1, SVX, SPX	**DX-BR075-1K1** 171917		1 off
	100	1.1	IP20		**DX-BR100-1K1** 171896		
	100	0.8	IP20		**DX-BR100-0K8** 171907		
	100	1.6	IP20		**DX-BR100-1K6** 171924		
	150	0.5	IP20		**DX-BR150-0K5** 171916		
	150	1.1	IP20		**DX-BR150-1K1** 171895		
	200	0.8	IP20		**DX-BR200-0K8** 171894		
	200	0.4	IP20		**DX-BR200-0K4** 171915		
	400	0.4	IP20		**DX-BR400-0K4** 171914		
Wire wound resistor in ceramic potting compound inside aluminum case, combined Installed in a housing designed to prevent accidental contact and featuring a temperature monitoring switch and internal connecting terminals							
	35	1.1	IP20	DA1, DL1, DG1, SVX, SPX	**DX-BR035-1K1** 171927		1 off
	50	0.4	IP20		**DX-BR050-0K4** 171906		
	50	9.8	IP20		**DX-BR050-0K8** 171910		
	100	0.2	IP20		**DX-BR100-0K2** 171909		
	100	0.4	IP20		**DX-BR100-0K4** 171926		

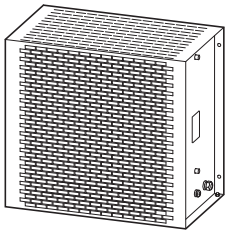
Notes [1] See assigned switching and protective elements for an article-specific selection

Information relevant for export to North America

Product Standards	UL508; C22.2
UL File No.	E300273
UL Category Control No.	NMTR2, NMTR8
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits
Max. Voltage Rating	600
Degree of Protection	IEC: IP00

Braking resistances

Steel grid resistor, combined
Installed in a housing designed to prevent accidental contact and featuring a temperature monitoring switch and internal connection terminals/terminal bolts

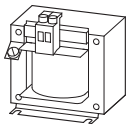
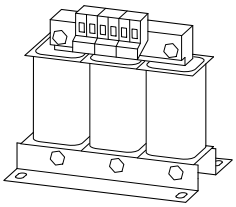
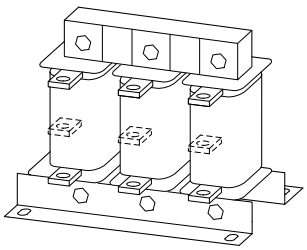
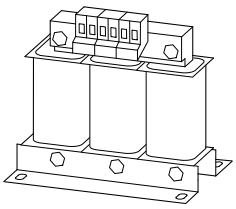


Resistance value R Ω	Continuous braking rating P_{DB} kW	Degree of Protection	For use with[1]	Part no. Article no.	Price see price list	Std. pack
2	54.3	IP20	DC1, DA1, DL1, DG1, SVX, SPX	**DX-BR002-54K3** 171923		1 off
	102.4			**DX-BR002-102K4** 171903		
6	5.1			**DX-BR006-5K1** 171913		
	9.2			**DX-BR006-9K2** 171893		
	18.1			**DX-BR006-18K1** 171922		
	33.3			**DX-BR006-33K3** 171902		
12	3.1			**DX-BR012-3K1** 171912		
	5.1			**DX-BR012-5K1** 171929		
	9.2			**DX-BR012-9K2** 171921		
	18.1			**DX-BR012-18K1** 171901		
22	1.4			**DX-BR022-1K4** 171911		
	3.1			**DX-BR022-3K1** 171928		
	5.1			**DX-BR022-5K1** 171920		
	9.2			**DX-BR022-9K2** 171900		
40	3.1			**DX-BR040-3K1** 171919		
	5.1			**DX-BR040-5K1** 171899		
47	3.1			**DX-BR047-3K1** 171908		
	5.1			**DX-BR047-5K1** 171925		
	9.2			**DX-BR047-9K2** 171905		
50	3.1			**DX-BR050-3K1** 171918		
	5.1			**DX-BR050-5K1** 171898		
75	5.1			**DX-BR075-5K1** 171897		
100	6.2			**DX-BR100-6K2** 171904		

Notes [1] See assigned switching and protective elements for an article-specific selection

Information relevant for export to North America

Product Standards	UL508; C22.2
UL File No.	E300273
UL Category Control No.	NMTR2, NMTR8
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits
Max. Voltage Rating	1000
Degree of Protection	IEC: IP00

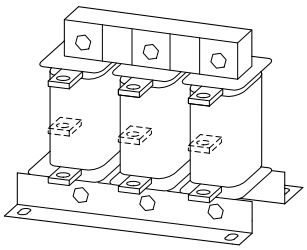
	Rated operational current I_e A	Inductance L mH	Maximum heat dissipation P_v W	For use with	**Part no.** Article no.	**Price** see price list	Std. pack
Mains chokes							
Ambient air temperature: + 40 °C, max. 70 °C with derating							
Single-phase Max. permissible connection voltage V AC: 260 V + 0% (50/60 Hz)							
	5.8	5.05	9	DE1, DC1	**DX-LN1-006** 269490		1 off
	8.6	3.41	11	DE1, DC1	**DX-LN1-009** 269495		
	13	2.25	12	DE1, DC1, DA1	**DX-LN1-013** 269496		
	18	1.63	17	DE1, DC1, DA1	**DX-LN1-018** 269497		
	24	1.22	20	DE1, DC1, DA1	**DX-LN1-024** 269498		
	32	0.92	24	DC1	**DX-LN1-032** 169791		
three-phase Max. permissible connection voltage V AC: 550 V + 0% (50/60 Hz)							
	3.9	7.51	17	DE1, DC1, DA1, SVX, SPX	**DX-LN3-004** 269500		1 off
	6	4.9	19	DE1, DC1, DA1, SVX, SPX	**DX-LN3-006** 269501		
	10	2.94	33	DE1, DC1, DA1, DL1, SVX, SPX	**DX-LN3-010** 269502		
	16	1.84	44	DE1, DC1, DA1, DL1, SVX, SPX	**DX-LN3-016** 269503		
	25	1.18	57	DC1, DA1, DL1, SVX, SPX	**DX-LN3-025** 269504		
	40	0.64	59	DA1, DL1, SVX, SPX	**DX-LN3-040** 269505		
	50	0.37	58	DA1, DL1, SVX, SPX	**DX-LN3-050** 269506		
	60	0.31	60	DA1, DL1, SVX, SPX	**DX-LN3-060** 269507		
	80	0.23	86	DA1, DL1, SVX, SPX	**DX-LN3-080** 269508		
	100	0.18	101	DA1, SVX, SPX	**DX-LN3-100** 269509		
	120	0.15	100	DA1, SVX, SPX	**DX-LN3-120** 269510		
	160	0.11	140	DA1, SVX, SPX	**DX-LN3-160** 269511		
	200	0.09	154	DA1, SVX, SPX	**DX-LN3-200** 269512		
	250	0.07	155	DA1, SVX, SPX	**DX-LN3-250** 269513		
	300	0.06	196	DA1, SVX, SPX	**DX-LN3-300** 269514		
	303	0.06	230	DA1, SVX, SPX	**DX-LN3-303** 169143		
	370	0.05	290	DA1	**DX-LN3-370** 169144		
	450	0.04	300	DA1	**DX-LN3-450** 169145		
Motor chokes							
Ambient air temperature: + 40 °C, max. 70 °C with derating							
three-phase Max. permissible connection voltage V AC: 750 V + 0% (0 - 400 Hz) Max. permissible pulse frequency: $f_{PWM} \leq 12$ kHz (rms)							
	5	2	24	DE1, DC1, DA1, DG1, SVX, SPX	**DX-LM3-005** 269538		1 off
	8	4.1	54	DE1, DC1, DA1, DG1, SVX, SPX	**DX-LM3-008** 269539		
	11	3	71	DE1, DC1, DA1, DL1, DG1, SVX, SPX	**DX-LM3-011** 269541		
	16	1.5	78	DE1, DC1, DA1, DL1, DG1, SVX, SPX	**DX-LM3-016** 269542		
	35	1	116	DC1, DA1, DL1, DG1, SVX, SPX	**DX-LM3-035** 269543		
	50	0.6	168	DA1, DL1, DG1, SVX, SPX	**DX-LM3-050** 269544		

Information relevant for export to North America → Page 61

Motor chokes

Ambient air temperature: + 40 °C, max. 70 °C with derating

three-phase
Max. permissible connection voltage V AC: 750 V + 0% (0 - 400 Hz)
Max. permissible pulse frequency: f_{PWM} ≤ 12 kHz (rms)

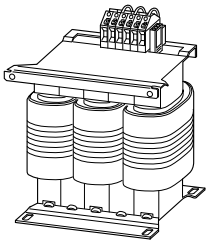


Rated operational current I_e A	Inductance L mH	Maximum heat dissipation P_v W	For use with	Part no. Article no.	Price see price list	Std. pack
63	0.5	193	DA1, DL1, DG1, SVX, SPX	**DX-LM3-063** 269545		1 off
80	0.5	206	DA1, DL1, DG1, SVX, SPX	**DX-LM3-080** 269546		
100	0.45	294	DA1, DG1, SVX, SPX	**DX-LM3-100** 269547		
150	0.35	424	DA1, DG1, SVX, SPX	**DX-LM3-150** 269548		
180	0.3	439	DA1, DG1, SVX, SPX	**DX-LM3-180** 269549		
220	0.2	517	DA1, SVX, SPX	**DX-LM3-220** 269560		
260	0.15	520	DA1, SVX, SPX	**DX-LM3-260** 269561		
303	0.15	-	DA1, SPX	**DX-LM3-303** 169146		
370	0.12	-	DA1	**DX-LM3-370** 169147		
450	0.1	-	DA1, SPX	**DX-LM3-450** 169148		

Sine filter

Ambient air temperature: + 40 °C, max. 50 °C with derating

three-phase
Max. permissible connection voltage V AC: 520 V + 0% (0 - 150 Hz)
Max. permissible pulse frequency: f_{PWM} = Constant 4 - 8 kHz (rms).

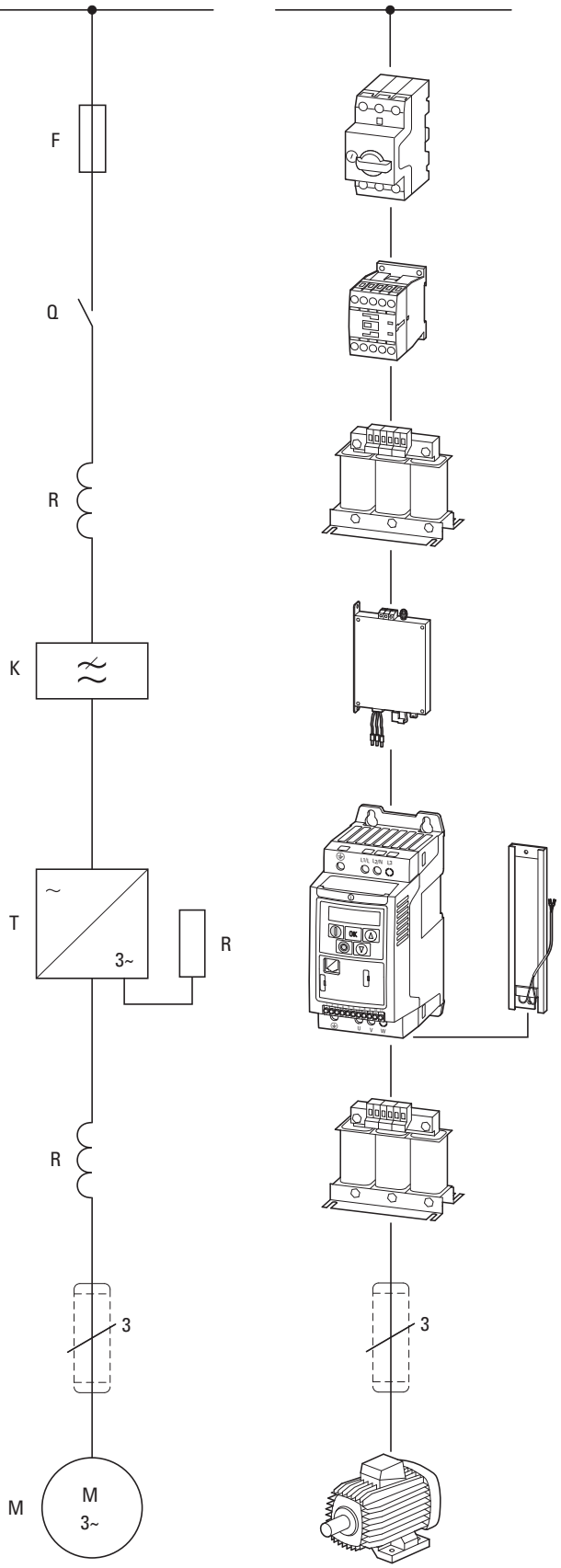


Rated operational current I_e A	Inductance L mH	Maximum heat dissipation P_v W	For use with	Part no. Article no.	Price see price list	Std. pack
4	11	50	DC1, DA1, DG1, SVX, SPX	**DX-SIN3-004** 271538		1 off
10	5.1	100	DC1, DA1, DL1, DG1, SVX, SPX	**DX-SIN3-010** 271590		
16.5	3.07	70	DC1, DA1, DL1, DG1, SVX, SPX	**DX-SIN3-016** 271591		
23.5	2.5	125	DC1, DA1, DL1, DG1, SVX, SPX	**DX-SIN3-023** 271593		
32	2	100	DA1, DL1, DG1, SVX, SPX	**DX-SIN3-032** 271594		
37	1.7	100	DG1	**DX-SIN3-037** 271595		
48	1.2	240	DA1, DL1, DG1, SVX, SPX	**DX-SIN3-048** 271597		
61	1	280	DA1, DL1, SVX, SPX	**DX-SIN3-061** 271599		
72	0.95	300	DA1, DG1, SVX, SPX	**DX-SIN3-072** 271600		
90	0.8	290	DA1, DL1, DG1, SVX, SPX	**DX-SIN3-090** 271601		
115	0	460	DA1, DG1, SVX, SPX	**DX-SIN3-115** 271602		
150	0.5	530	DA1, DG1, SVX, SPX	**DX-SIN3-150** 271603		
180	0.4	500	DA1, DG1, SVX, SPX	**DX-SIN3-180** 271604		
250	0.35	550	DA1, SVX, SPX	**DX-SIN3-250** 271605		
440	0.14	650	DA1, SPX	**DX-SIN3-440** 271606		1 off
480	0.14	1550	DA1	**DX-SIN3-480** 169149		1 off

Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	DX-LN3…/DX-LM3…: E167225 DX-SIN…: E300273
UL Category Control No.	DX-LN3…/DX-LM3…: XPTQ2, XPTQ8 DX-SIN…: NMTR2, NMTR8
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits
Max. Voltage Rating	1~ 240 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey), 3~ 240 V AC IEC: TN-

Engineering



Equipment code
F = fuses and circuit-breakers
Q = controlled switching within energy flow (contactors, circuit-breakers)
R = limitation (reactors, resistors)
K = radio interference suppression filters
T = variable-frequency drives
M = motors

AC supply system: variable-frequency drives can be connected without restriction to AC supply systems with an earthed star point (TN/TT grounding systems). Directly connecting them to and running them on unbalanced or B phase-grounded systems (e.g., USA) is not permissible.
Fuses (circuit-breakers) enable you to protect wiring and electrical devices and appliances. For personal protection, additional AC/DC sensitive residual current circuit-breakers (RCD type B) are required.

Contactors serve to engage and disengage mains voltage.

Mains chokes damp any harmonic distortion (THD) that occurs as well as current spikes and limit inrush currents (the link capacitor's charging current).In addition, they protect the mains rectifier from voltage peaks coming from the supply mains.

Radio interference suppression filters damp high-frequency electromagnetic emissions from devices and appliances. They ensure that the EMC limit values for conducted interference specified in the applicable product standards are complied with (variable-frequency drives).
Note: External radio interference suppression filters (option) permit longer motor cables and have low leakage currents. Normally, they should only be used with variable-frequency drives that do not feature an internal radio interference suppression filter.
Exception: directly assigned variable-frequency drives with internal filters (calibrated combination)

Variable frequency drives permit the infinitely variable speed control of three-phase motors. To do this, the variable-frequency drive converts the voltage of the AC supply system with a constant voltage and a constant frequency to a new AC voltage with a variable amplitude and a variable frequency.

A **braking resistance** converts the generator braking energy of the variable frequency drive into heat. The variable frequency drive must be equipped with a brake chopper, which connects the braking resistance parallel to the internal DC link.

Motor chokes
- Compensate the capacitive capacitive currents,
- Reduce current ripple and the motor's current change noise,
- Attenuate the retroaction on parallel connection of several motors.

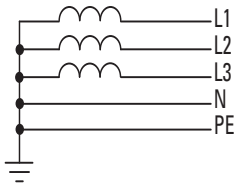
Sine filter
- Smoothen the output voltage sinusoidally,
- reduce motor noise through du/dt reduction, and thereby increase the motor insulation's lifespan,
- Reduce the leakage currents to allow better motor performance at improved EMC values.

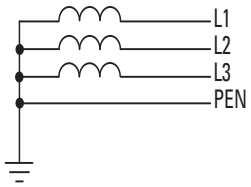
Screened motor cables attenuate emitted and conducted high-frequency emissions within the limit values specified in the applicable product standard (EMC). They must be connected to the earth potential on both sides across a large area (PES).

A three-phase asynchronous motor (standard motor) converts electrical power ($P \sim U \times I$) into mechanical power ($P \sim M \times n$).

Electrical mains connection

Variable frequency drives can be connected and operated without restriction on star-point-grounded AC supply systems (according to IEC 60364).





Connecting them to and operating them on asymmetrically earthed networks, such as phase-earthed delta networks (grounded delta, USA) or non-earthed or high-resistance earthed (> 30 Ω) IT networks is permitted with limitations. In these networks, only variable frequency drives without internal radio interference suppression filters (EMC) may be used. On devices with internal radio interference suppression, the ground connection of the filter must be disconnected.

The standardized rated operating voltages of the power supply (EVU) assure the following conditions at the transfer point to the consumer:

- maximum deviation from the rated value for the voltage (U_{LN}): ±10 %
- Maximum deviation in the voltage symmetry: ±3 %
- Maximum deviation from the rated frequency value: ±4 %

In reference to the lower voltage value (U_{LN} -10 %) the supply voltage is allowed to experience a further voltage drop of up to 4% in the consumer networks.

In ring-shaped powered network systems (e.g. in the EU), the standardized consumer voltages (230 V / 400 V / 690 V) are identical to the power supply levels of the utility companies. In star networks (for example in North America/USA), the stated consumer voltages take the voltage drop from the utility company's infeed point to the last consumer into account.

Table: North American voltage level

Supply voltage U_{LN} of the utility company	Motor voltage according to UL 508 C	Consumer voltage, rated value for the motors
120 V	110 - 120 V	115 V
240 V	220 - 240 V	230 V
400 V	440 - 480 V	460 V
600 V	550 - 600 V	575 V

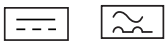
Safety and switching

With a variable frequency drive the assignment of components on the mains side in accordance with the rated operational current at the input end I_{LN} and the utilization category AC-1.

Fuses, circuit-breakers and conductor cross-sections must meet the national and regional requirements and the required approvals at the point of operation.

To prevent fires and to protect people and farm animals from unacceptably high contact voltages, residual current devices (RCD) must be used in conjunction with a three-phase variable frequency drive, only AC/DC sensitive residual current devices (RCD, Type B) can be used.

Designation of residual current device for AC/DC-sensitive RCDs: Type B:



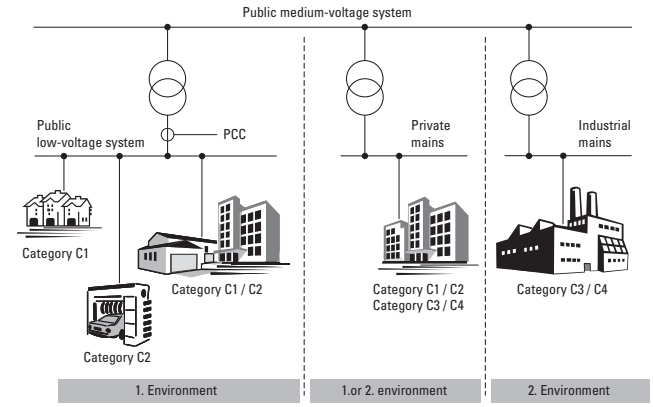
Earth leakage currents will be produced when using frequency-controlled drives due to the nature of the system. The main reasons for this consist of external capacitances between the phases of the motor cable, the motor cable's screening, star capacitors in the variable frequency drive, and radio interference suppression filters, as well as earthing measures at the motor's site of operation. These leakage currents can exceed 3.5 mA (AC) and/or greater than 10 mA (DC) can require improved PDS earthing as per EN 50178 (earth cable cross-section ≥ 10 mm (cable cross-section of earthing wire ≥ 10 mm²).

EMC compliance

Variable frequency drives work with fast electronic switches (IGBT) in the inverter. This can cause radio interference in a magnet system, which, in turn, can adversely affect nearby electronic equipment. To provide protection from these high-frequency interference sources, these should be spatially separated and screened from frequency-controlled drives.

In Europe, compliance with the EMC directive is mandatory, and is an essential requirement for CE marking. The EMC conditions for drive systems (PDS) are described in standard IEC/EN 61800-3. This product standard considers the complete magnet system from mains-side power supply right through to the motor.

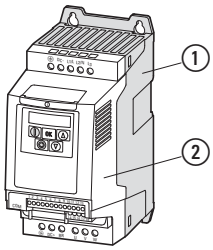
The Eaton variable frequency drive and speed starter with internal/external radio interference suppressor satisfy the requirements of the EMC product standard for the sensitive residential sector (first environment) and therefore also the higher limit values in the industrial sector (second environment).



Variable frequency drives

A variable frequency drive is an electronic apparatus used for the variable-speed control of three-phase motors. It is intended for installation in a machine or for assembly with other components to a machine or plant. The main components of a compact design of modern variable frequency drive are a power section ① and a control section ②.

Functional actuation of the variable frequency drive and the output parameters in the power section (e.g. frequency, voltage and current) can be adjusted through:



- Control signal terminals (I/O) with analog and digital (binary) inputs,
- A keypad with function keys and display units,
- Serial interfaces (BUS) with RS485 (Modbus RTU) and optional fieldbus connections (CANopen, PROFIBUS-DP etc.) and an optional PC connection.

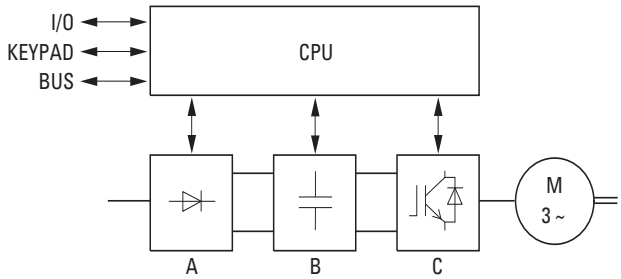
Internal open and closed-loop control circuits monitor all variable values in the variable frequency drive and automatically switch the process off if a value reaches a dangerous level.

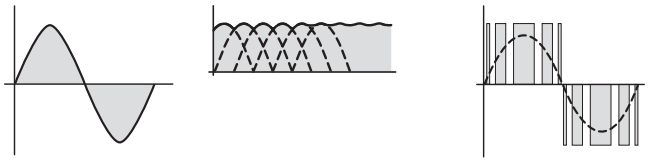
① **Power section** with:
A = Rectifier
B = DC link
C = Inverter module (IGBT)

② **Control section** with:
I/O = analog and binary inputs and outputs

KEYPAD = keypad with display unit

BUS = serial interfaces (RS485, fieldbus, PC interface)





U_{LN} = Phase voltage from supplying AC mains

U_{DC} = DC link voltage
U_{DC} = 1.41 x U_{LN}

Output voltage = switched DC link voltage with sinusoidal pulse width modulation (PWM)

Block diagram with main components of a variable frequency drive

Control methods

The IGBTs in the inverter of the variable frequency drive are controlled with sinusoidal pulse-width modulation (PWM). In real-life applications, the industry draws a distinction between the following control methods:

- Voltage frequency control (U/f control),
- V/Hz control with slip compensation
- Sensorless vector control (speed control)
- Vector control (closed-loop), speed control.

The **voltage-frequency control section** is the best known and most frequently used process. A simple characteristic curve (linear or quadratic) defines the motor's rotating field frequency and the corresponding three-phase line-to-line motor voltage is selected such that the motor is neither over nor under-magnetized.

The main applications of the U/f control section are:

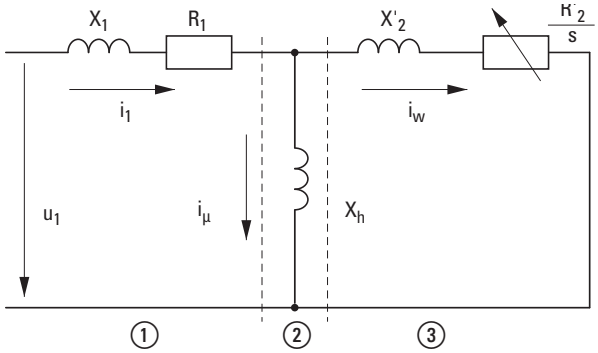
- pump and fan drives,
- horizontal conveying and transportation systems,
- multiple motor drives (parallel operation of several motors at the variable frequency drive's output).

With the **U/f control section with slip compensation** the load-dependent speed change of individual drives can be compensated for (without sensors).

With **sensor-less vector control** the magnetic fields of rotor and stator are opposed to one another. With asynchronous motors the magnetic flux in the rotor must be mapped in an electronic model of the motor. This requires the input of the physical parameters of the rating plate on the motor.
In vector operation, the variable frequency drive can only control one motor at the output end. A parallel operation of several motors is not possible here. The exact calculation of the phase voltages at the variable frequency drive's output, however, improves the motor's operational behavior. The motor also heats up less in the lower speed range. The field-oriented vector control results in a significant improvement in the drive dynamics as well as optimizing performance; it also increases the range of possible applications.
The main applications of sensorlessvector control are:

- Material machining and processing equipment
- Condensors (compressor),
- Heavy starting duty (extruder, agitators, mixer),
- Lifting mechanisms and lifting gear (vertical movement, crane, lift).

With the **vector feedback control** the output current of the variable frequency drive acts serves a controlled variable. This makes it possible to perfectly adjust the three-phase motor in line with the corresponding torque boost. The motor speed can be controlled in connection with an rpm sensor (tachometer, pulse generator) (closed loop).



① Stator winding
② Air gap
③ transformed rotor winding

Simplified equivalent circuit diagram of a three-phase motor

Motor model

Regardless of the control method used, a variable frequency drive uses the measured voltage and current values on the stator winding (u1, i1) to calculate the required manipulated variable for flux-generating component i_μ and the torque-forming magnitude in rotor iw. The motor's load dependent slip is represented as resistor R'2/s. During no-load operation, this value approaches infinity (iw → 0). On the other hand, the value approaches zero as the load increases. The current in the rotor grows at this point.

Explanation:

EMC = Electromagnetic compatibility
EVU = Utility company
IGBT = Insulated gate bipolar transistor
PDS = Power drives system
RCD = Residual current device

Energy-efficient drive control technology (ErP directive)

The need for energy efficiency in a PDS and legislative specifications (EC 640/2009) has been redefined by the minimum efficiency ratings of motors. From 1 January 2017, all new motors entering service with a performance range of 0.75 to 315 kW shall not be less efficient than the IE3 efficiency level or shall meet the IE2 efficiency level and be equipped with an electronic speed control (variable frequency drive, variable speed starter). Under these conditions, the following versions of three-phase motor predominate at the present time:

- Three-phase asynchronous motor (DASM),
- Permanent magnet motor (PM),
- Synchronous reluctance motor (SynRM)

Within the same efficiency class, these three motor technologies have a comparable efficiency rating at their nominal operating point. However, there are significant differences in terms of startup behavior, in part-load operation, in respect of acquisition costs and in terms of size.

The asynchronous motor functions in accordance with the familiar principle whereby the creation of magnetic fields in stator and rotor give rise to repulsion and, in response to that, to rotational movement. This motor can be started directly off the mains supply.

PM motor are synchronous motors, i.e. there is no slip between the rotational fields of rotor and stator. The magnets assure magnetization of the rotor. That reduces losses in the rotor and increases the efficiency rating, especially at low speed. For starting and operational purposes, the PM motor needs to have a variable frequency drive (DA1).

With the SynRM motor, the rotor plates have specific cut sections. These guide the magnetic lines into the interior of the rotor and generate what is known as a reluctance torque. This results in a change of magnetic resistance and is characterized from about 11 kW by a very good efficiency rating at reduced speeds that changes under load. Here too, operation without friction and optimum speed control are only assured through the use of variable frequency drives (DA1).

In principle, all three variants operate using what is known as the U/f characteristics curve but the efficiency benefits of individual technologies are only guaranteed by feedback control algorithms adapted to suit the prevailing motor technology. With algorithms of this kind, motor operation can be optimized at every operating point, even with alternating loads.

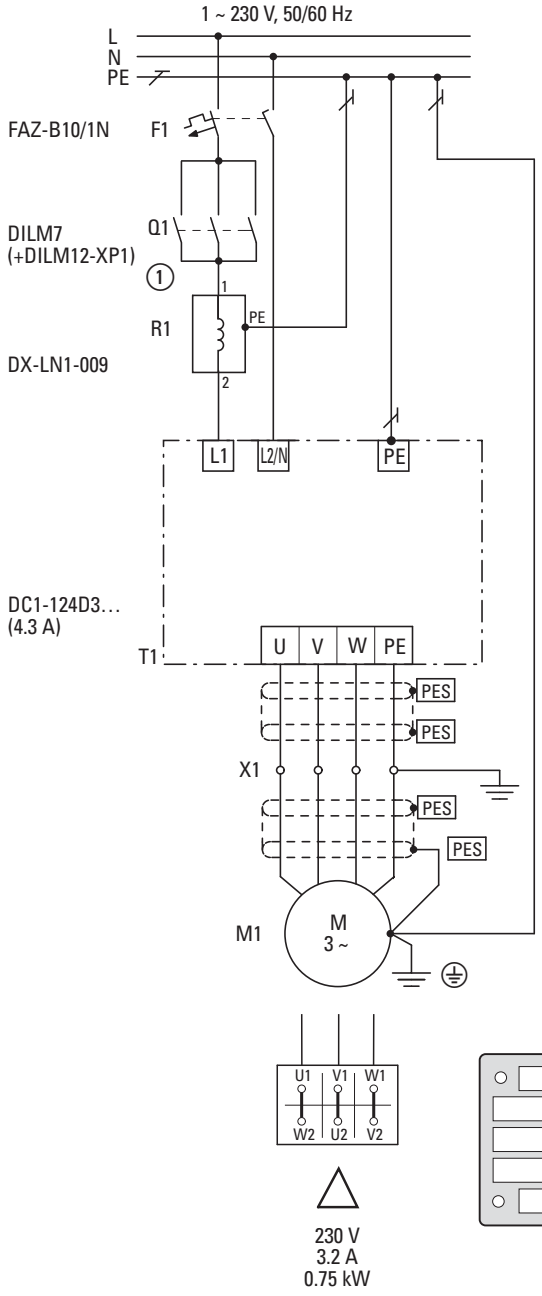
Connection example for a 0.75 kW motor

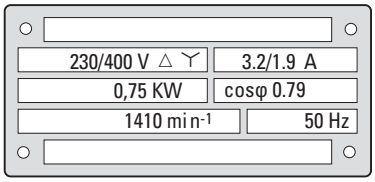
Motor: P = 0.75 kW
Supply system: 3/N/PE 400 V 50/60 Hz
Connection examples meeting EMC requirements: Power section (see figure below)

Variant A:

Motor connected in a „delta circuit“

DC1… variable frequency drive with single-phase supply conductors (230 V)



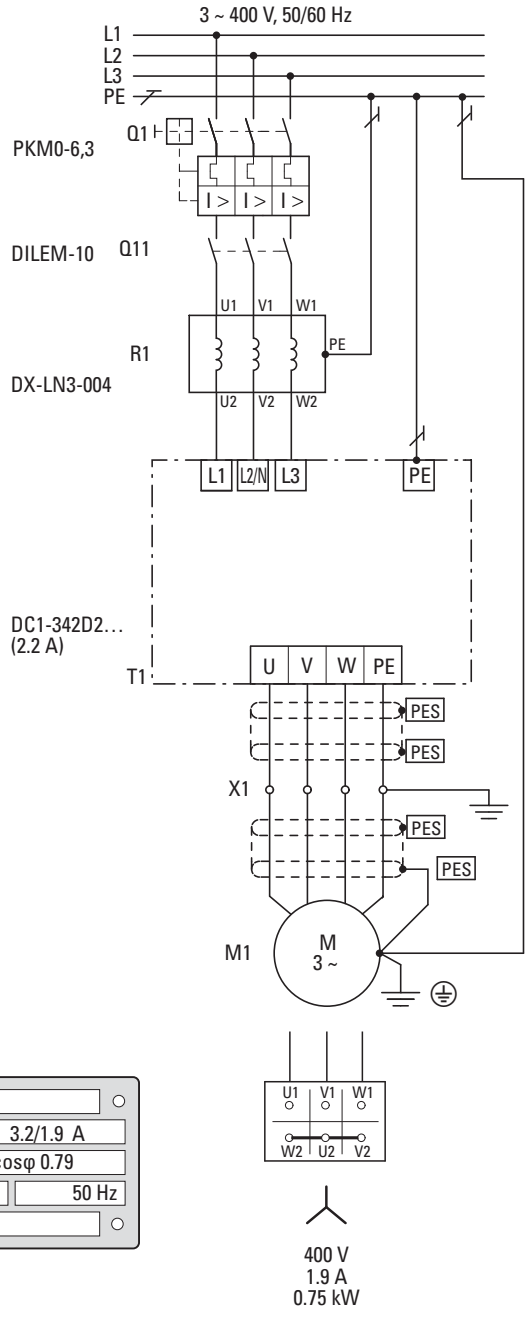


The 0.75 kW motor listed above can be connected up using a delta connection to a single-phase 230V mains supply (variant A) or in a star circuit on a 400V mains circuit (variant B).
Taking due account of the selected mains voltage, the choice of variable frequency drive can either be 230V for 1 AC (DC1-124D3...) or 400V for 3 AC (MMX34AA2D4) and type-specific accessories.

Variant B:

Motor with 'star' circuit topology

variable frequency drive DC1… with three-phase mains supply conductors (400 V)



① An optional connection option for single-phase connection

Part no.	Motor	Frequency inverters		Power Wiring			
	Assigned motor rating[1), 2)]	Rated operational current[1)]	Input current	Safety device (fuse or miniature circuit-breaker)		Mains contactor	Main choke
	I_H = 150 %	I_H = 150 %	I_H = 150 %	IEC (Typ B, gG)	UL (Class CC or J)	I_H = 150 % (CT/I_H, at 50 °C)	I_H = 150 %
	P	I_e	I_{LN}				
	kW	A	A		A		
PowerXL™ DE1 variable speed starters							
230 V AC, 1-phase/230 V AC, 3-phase							
DE1-121D4…	0.25	1.4	3.6	FAZ-B10/1N	10	DILEM-… + P1DILEM	DX-LN1-006
DE1-122D3…	0.37	2.3	6.2	FAZ-B10/1N	10	DILEM-… + P1DILEM	DX-LN1-006
DE1-122D7…	0.55	2.7	7.3	FAZ-B10/1N	10	DILEM-… + P1DILEM	DX-LN1-009
DE1-124D3…	0.75	4.3	11.3	FAZ-B16/1N	15	DILEM-… + P1DILEM	DX-LN1-013
DE1-127D0…	1.5	7	17.4	FAZ-B20/1N	20	DILEM-… + P1DILEM	DX-LN1-018
DE1-129D6…	2.2	9.6	23.2	FAZ-B32/1N	35	DILM7-… + DILM12-XP1	DX-LN1-024
400 V AC, 3-phase/400 V AC, 3-phase							
DE1-341D3…	0.37	1.3	1.7	FAZ-B6/3	6	DILEM-…	DX-LN3-004
DE1-342D1…	0.75	2.1	3.1	FAZ-B6/3	6	DILEM-…	DX-LN3-004
DE1-343D6…	1.5	3.6	4.9	FAZ-B6/3	6	DILEM-…	DX-LN3-006
DE1-345D0…	2.2	5	7	FAZ-B16/3	15	DILEM-…	DX-LN3-010
DE1-346D6…	3	6.6	8.5	FAZ-B16/3	15	DILEM-…	DX-LN3-010
DE1-348D5…	4	8.5	10	FAZ-B16/3	15	DILEM-…	DX-LN3-010
DE1-34011…	5.5	11.3	12	FAZ-B16/3	15	DILEM-…	DX-LN3-016
DE1-34016…	7.5	16	16.5	FAZ-B25/3	25	DILEM-…	DX-LN3-016
PowerXL™ variable frequency drives DC1							
115 V AC, single-phase/115 V AC, single-phase							
DC1-S17D0…	0.37	7	12.4	FAZ-B16/1N	15	DILEM-… + P1DILEM	DX-LN1-013
DC1-S1011…	0.55	10.5	16.1	FAZ-B25/1N	25	DILM7-… + DILM12-XP1	DX-LN1-018
230 V AC, 1-phase/230 V AC, single-phase							
DC1-S24D3…	0.37	4.3	6.8	FAZ-B10/1N	10	DILEM-… + P1DILEM	DX-LN1-009
DC1-S27D0…	0.75	7	12.8	FAZ-B16/1N	15	DILEM-… + P1DILEM	DX-LN1-013
DC1-S2011…	1.1	10.5	16.2	FAZ-B25/1N	25	DILM7-… + DILM12-XP1	DX-LN1-018
115 V AC, single-phase/230 V AC, 3-phase							
DC1-1D2D3…	0.37	2.3	11	FAZ-B16/1N	15	DILEM-… + P1DILEM	DX-LN1-013
DC1-1D4D3…	0.75	4.3	19	FAZ-B25/1N	25	DILM7-… + DILM12-XP1	DX-LN1-024
DC1-1D5D8…	1.1	5.8	25	FAZ-B32/1N	35	DILM7-… + DILM12-XP1	-
230 V AC, 1-phase/230 V AC, 3-phase							
DC1-122D3…	0.37	2.3	5	FAZ-B10/1N	10	DILM7	DX-LN1-006
DC1-124D3…	0.75	4.3	8.5	FAZ-B10/1N	10	DILM7	DX-LN1-009
DC1-127D0…	1.5	7	13.9	FAZ-B16/1N	15	DILM7	DX-LN1-018
DC1-12011…	2.2	10.5	19.5	FAZ-B25/1N	25	DILM7	DX-LN1-024
DC1-12015…	4	15	30.5	FAZ-B40/1N	50	DILM7	DX-LN1-032
230 V AC, 3-phase/230 V AC, 3-phase							
DC1-322D3…	0.37	2.3	3	FAZ-B6/3	6	DILM7	DX-LN3-004
DC1-324D3…	0.75	4.3	4.5	FAZ-B6/3	6	DILM7	DX-LN3-006
DC1-327D0…	1.5	7	7.3	FAZ-B10/3	10	DILM7	DX-LN3-010
DC1-32011…	2.2	10.5	11	FAZ-B16/3	15	DILM7	DX-LN3-016
DC1-32018…	4	18	18.8	FAZ-B20/3	20	DILM7	DX-LN3-025
400 V AC, 3-phase/400 V AC, 3-phase							
DC1-342D2…	0.75	2.2	2.4	FAZ-B6/3	6	DILM7	DX-LN3-004
DC1-344D1…	1.5	4.1	4.3	FAZ-B6/3	6	DILM7	DX-LN3-006
DC1-345D8…	2.2	5.8	6.1	FAZ-B10/3	10	DILM7	DX-LN3-010
DC1-349D5…	4	9.5	9.8	FAZ-B16/3	15	DILM7	DX-LN3-010
DC1-34014…	5.5	14	14.6	FAZ-B20/3	20	DILM7	DX-LN3-016
DC1-34018…	7.5	18	18.1	FAZ-B25/3	25	DILM7	DX-LN3-025
DC1-34024…	11	24	24.7	FAZ-B32/3	35	DILM17	DX-LN3-025

Notes

[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] Optional external radio interference suppression filter for longer motor cable lengths and for use in different EMC environments

Power Wiring	**DC link connection**		**Motor feeder**	
Radio interference suppression filter (external)[3]	Braking resistance		motor choke	Sine filter
	10 % duty factor (DF)	20 % duty factor (DF)	I_H = 150 % (CT/I_H, at 50 °C)	I_H = 150 % (CT/I_H, at 50 °C)
DX-EMC12-019-FS1	-	-	DX-LM3-005	-
DX-EMC12-019-FS1	-	-	DX-LM3-005	-
DX-EMC12-019-FS1	-	-	DX-LM3-005	-
DX-EMC12-019-FS1	-	-	DX-LM3-005	-
DX-EMC12-019-FS1	-	-	DX-LM3-008	-
DX-EMC12-025-FS2	-	-	DX-LM3-011	-
DX-EMC34-008-FS1…	-	-	DX-LM3-005	-
DX-EMC34-008-FS1…	-	-	DX-LM3-005	-
DX-EMC34-008-FS1…	-	-	DX-LM3-005	-
DX-EMC34-019-FS3…	-	-	DX-LM3-005	-
DX-EMC34-019-FS3…	-	-	DX-LM3-008	-
DX-EMC34-019-FS3…	-	-	DX-LM3-011	-
DX-EMC34-019-FS3…	-	-	DX-LM3-011	-
DX-EMC34-019-FS3…	-	-	DX-LM3-016	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	DX-LM3-005	DX-SIN3-004
-	-	-	DX-LM3-005	DX-SIN3-010
-	-	-	DX-LM3-008	DX-SIN3-010
DX-EMC12-014-FS1	-	-	DX-LM3-005	DX-SIN3-004
DX-EMC12-014-FS1	-	-	DX-LM3-005	DX-SIN3-010
DX-EMC12-014-FS1	-	-	DX-LM3-008	DX-SIN3-010
DX-EMC12-025-FS2	DX-BR050-0K4	DX-BR050-0K8	DX-LM3-011	DX-SIN3-016
DX-EMC12-031-FS3	DX-BR050-0K4	DX-BR050-0K8	DX-LM3-016	DX-SIN3-016
DX-EMC34-008-FS1…	-	-	DX-LM3-005	DX-SIN3-004
DX-EMC34-008-FS1…	-	-	DX-LM3-005	DX-SIN3-010
DX-EMC34-008-FS1…	-	-	DX-LM3-008	DX-SIN3-010
DX-EMC34-011-FS2…	DX-BR050-0K4	DX-BR050-0K8	DX-LM3-011	DX-SIN3-016
DX-EMC34-019-FS3…	DX-BR050-0K4	DX-BR050-0K8	DX-LM3-035	DX-SIN3-023
DX-EMC34-008-FS1…	-	-	DX-LM3-005	DX-SIN3-004
DX-EMC34-008-FS1…	-	-	DX-LM3-005	DX-SIN3-010
DX-EMC34-011-FS2…	DX-BR100-0K8	DX-BR100-1K6	DX-LM3-008	DX-SIN3-010
DX-EMC34-011-FS2…	DX-BR100-0K8	DX-BR100-1K6	DX-LM3-011	DX-SIN3-010
DX-EMC34-015-FS3…	DX-BR047-3K1	DX-BR047-5K1	DX-LM3-016	DX-SIN3-016
DX-EMC34-019-FS3…	DX-BR047-3K1	DX-BR047-5K1	DX-LM3-035	DX-SIN3-023
DX-EMC34-025-FS3…	DX-BR047-3K1	DX-BR047-5K1	DX-LM3-035	DX-SIN3-023

Part no.	Motor	Frequency inverters		Power Wiring			
	Assigned motor rating[1), 2)]	Rated operational current[1)]	Input current	Safety device (fuse or miniature circuit-breaker)		Mains contactor	Main choke
	I_H = 150 %	I_H = 150 %	I_H = 150 %	IEC (Typ B, gG)	UL (Class CC or J)	I_H = 150 % (CT/I_H, at 50 °C)	I_H = 150 %
	P	I_e	I_{LN}				
	kW	A	A		A		
PowerXL™ variable frequency drives DA1							
230 V AC, 1-phase/230 V AC, 3-phase							
DA1-124D3…	0.75	4.3	8.5	FAZ-B16/1N	16	DILM7	DX-LN1-013
DA1-127D0…	1.5	7	13.9	FAZ-B20/1N	20	DILM7	DX-LN1-018
DA1-12011…	2.2	10.5	19.5	FAZ-B25/1N	25	DILM7	DX-LN1-024
230 V AC, 3-phase/230 V AC, 3-phase							
DA1-324D3…	0.75	4.3	4.5	FAZ-B6/3	6	DILM7	DX-LN3-006
DA1-327D0…	1.5	7	7.3	FAZ-B10/3	10	DILM7	DX-LN3-010
DA1-32011…	2.2	10.5	11	FAZ-B16/3	15	DILM7	DX-LN3-016
DA1-32018…	4	18	18.8	FAZ-B20/3	20	DILM7	DX-LN3-025
DA1-32024…	5.5	24	24.8	FAZ-B32/3	35	DILM17	DX-LN3-025
DA1-32030…	7.5	30	40	FAZ-B50/3	50	DILM17	DX-LN3-040
DA1-32046…	11	46	47.1	FAZ-B63/3	63	DILM40	DX-LN3-050
DA1-32061…	15	61	62.4	NZMC1-S80	80	DILM50	DX-LN3-080
DA1-32072…	22	72	74.1	NZMC1-S80	80	DILM65	DX-LN3-080[3)]
DA1-32090…	22	90	92.3	NZMC2-S100	100	DILM80	DX-LN3-100[3)]
DA1-32110…	30	110	112.7	NZMC2-S125	125	DILM95	DX-LN3-120[3)]
DA1-32150…	45	150	153.5	NZMC2-S160	160	DILM150	DX-LN3-160[3)]
DA1-32180…	55	180	183.8	NZMC2-S200	200	DILM170	DX-LN3-200[3)]
DA1-32202…	55	202	206.2	NZMC3-S250	250	DILM185A	DX-LN3-250[3)]
DA1-32248…	75	248	252.8	NZMC3-S320	320	DILM185A	DX-LN3-300[3)]
400 V AC, 3-phase/400 V AC, 3-phase							
DA1-342D2…	0.75	2.2	2.4	FAZ-B6/3	6	DILM7	DX-LN3-004
DA1-344D1…	1.5	4.1	4.3	FAZ-B6/3	6	DILM7	DX-LN3-006
DA1-345D8…	2.2	5.8	6.1	FAZ-B10/3	10	DILM7	DX-LN3-010
DA1-349D5…	4	9.5	9.8	FAZ-B16/3	15	DILM7	DX-LN3-010
DA1-34014…	5.5	14	14.6	FAZ-B20/3	20	DILM7	DX-LN3-016
DA1-34018…	7.5	18	18.1	FAZ-B25/3	25	DILM7	DX-LN3-025
DA1-34024…	11	24	24.7	FAZ-B32/3	35	DILM17	DX-LN3-025
DA1-34030…	15	30	30.8	FAZ-B40/3	40	DILM17	DX-LN3-040
DA1-34039…	18.5	39	40	FAZ-B50/3	50	DILM25	DX-LN3-040
DA1-34046…	22	46	47.1	FAZ-B63/3	63	DILM40	DX-LN3-050
DA1-34061…	30	61	62.8	NZMC1-S80	80	DILM50	DX-LN3-080[3)]
DA1-34072…	37	72	73.8	NZMC1-S80	80	DILM65	DX-LN3-080[3)]
DA1-34090…	45	90	92.2	NZMC1-S100	100	DILM80	DX-LN3-100[3)]
DA1-34110…	55	110	112.5	NZMC2-S125	125	DILM95	DX-LN3-120[3)]
DA1-34150…	75	150	153.2	NZMC2-S160	160	DILM150	DX-LN3-160[3)]
DA1-34180…	90	180	183.7	NZMC2-S200	200	DILM170	DX-LN3-200[3)]
DA1-34202…	110	202	205.9	NZMC3-S250	250	DILM185A	DX-LN3-250[3)]
DA1-34240…	132	240	244.5	NZMC3-S320	320	DILM185A	DX-LN3-250[3)]
DA1-34302…	160	302	307.8	NZMC3-S400	400	DILM225A	DX-LN3-370[3)]
DA1-34370…	200	370	359	NZMC3-S400	400	DILM400	DX-LN3-370[4)]
DA1-34450…	250	450	437	NZMC3-S500	500	DILM400	DX-LN3-450[4)]

Notes

[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] Mains choke recommended only if the power quality is poor. Current harmonics (THD) are attenuated by internal DC link chokes.
[4)] A mains choke (U_k = 1 - 4%) must be used for operation.
[5)] Optional external radio interference suppression filter for longer motor cable lengths and for use in different EMC environments

Power Wiring	DC link connection		Motor feeder	
	Braking resistance		motor choke	Sine filter
Radio interference suppression filter (external)[5]	10 % duty factor (DF)	20 % duty factor (DF)	I_H = 150 % (CT/I_H, at 50 °C)	I_H = 150 % (CT/I_H, at 50 °C)
-	DX-BR100-0K2	DX-BR100-0K4	DX-LM3-005	DX-SIN3-010
-	DX-BR050-0K4	DX-BR050-0K8	DX-LM3-008	DX-SIN3-010
-	DX-BR050-0K8	DX-BR035-1K1	DX-LM3-011	DX-SIN3-016
DX-EMC34-011-FS2…	DX-BR100-0K2	DX-BR100-0K4	DX-LM3-005	DX-SIN3-010
DX-EMC34-011-FS2…	DX-BR050-0K4	DX-BR050-0K8	DX-LM3-008	DX-SIN3-010
DX-EMC34-011-FS2…	DX-BR050-0K8	DX-BR035-1K1	DX-LM3-011	DX-SIN3-016
DX-EMC34-019-FS3…	DX-BR022-1K4	DX-BR022-3K1	DX-LM3-035	DX-SIN3-023
DX-EMC34-025-FS3…	DX-BR022-1K4	DX-BR022-3K1	DX-LM3-035	DX-SIN3-032
DX-EMC34-048-FS4…	DX-BR022-1K4	DX-BR022-3K1	DX-LM3-035	DX-SIN3-032
-	DX-BR022-1K4	DX-BR022-3K1	DX-LM3-050	DX-SIN3-048
-	DX-BR012-3K1	DX-BR012-5K1	DX-LM3-063	DX-SIN3-061
DX-EMC34-075-FS5…	DX-BR012-3K1	DX-BR012-5K1	DX-LM3-080	DX-SIN3-072
DX-EMC34-100…	DX-BR006-5K1	DX-BR006-9K2	DX-LM3-100	DX-SIN3-090
DX-EMC34-130…	DX-BR006-5K1	DX-BR006-9K2	DX-LM3-150	DX-SIN3-115
DX-EMC34-180…	DX-BR006-5K1	DX-BR006-9K2	DX-LM3-150	DX-SIN3-150
DX-EMC34-180…	DX-BR006-5K1	DX-BR006-9K2	DX-LM3-180	DX-SIN3-180
DX-EMC34-250…	DX-BR006-5K1	DX-BR006-9K2	DX-LM3-220	DX-SIN3-250
DX-EMC34-250…	DX-BR006-5K1	DX-BR006-9K2	DX-LM3-260	DX-SIN3-250
DX-EMC34-011-FS2…	DX-BR400-0K4	DX-BR400-0K4	DX-LM3-005	DX-SIN3-004
DX-EMC34-011-FS2…	DX-BR200-0K4	DX-BR200-0K8	DX-LM3-005	DX-SIN3-010
DX-EMC34-011-FS2…	DX-BR150-0K5	DX-BR150-1K4	DX-LM3-008	DX-SIN3-010
DX-EMC34-011-FS2…	DX-BR100-0K8	DX-BR100-1K4	DX-LM3-011	DX-SIN3-010
DX-EMC34-015-FS3…	DX-BR075-1K4	DX-BR075-5K1	DX-LM3-016	DX-SIN3-016
DX-EMC34-019-FS3…	DX-BR050-3K1	DX-BR050-5K1	DX-LM3-035	DX-SIN3-023
DX-EMC34-025-FS3…	DX-BR040-3K1	DX-BR040-5K1	DX-LM3-035	DX-SIN3-023
DX-EMC34-031-FS4…	DX-BR022-5K1	DX-BR022-9K2	DX-LM3-035	DX-SIN3-032
DX-EMC34-048-FS4…	DX-BR022-5K1	DX-BR022-9K2	DX-LM3-050	DX-SIN3-048
-	DX-BR022-5K1	DX-BR022-9K2	DX-LM3-050	DX-SIN3-048
-	DX-BR012-9K2	DX-BR012-18K1	DX-LM3-063	DX-SIN3-061
DX-EMC34-075-FS5…	DX-BR012-9K2	DX-BR012-18K1	DX-LM3-080	DX-SIN3-090
DX-EMC34-100…	DX-BR006-18K1	DX-BR006-33K3	DX-LM3-100	DX-SIN3-090
DX-EMC34-130…	DX-BR006-18K1	DX-BR006-33K3	DX-LM3-150	DX-SIN3-115
DX-EMC34-180…	DX-BR006-18K1	DX-BR006-33K3	DX-LM3-150	DX-SIN3-150
DX-EMC34-180…	DX-BR006-18K1	DX-BR006-33K3	DX-LM3-180	DX-SIN3-180
DX-EMC34-250…	DX-BR006-18K1	DX-BR006-33K3	DX-LM3-220	DX-SIN3-250
DX-EMC34-250…	DX-BR006-18K1	DX-BR006-33K3	DX-LM3-260	DX-SIN3-250
DX-EMC34-400…	DX-BR006-18K1	DX-BR006-33K3	DX-LM3-303	DX-SIN3-440
DX-EMC34-400…	DX-BR002-54K3	DX-BR002-102K4	DX-LM3-370	DX-SIN3-440
DX-EMC34-750…	DX-BR002-54K3	DX-BR002-102K4	DX-LM3-450	DX-SIN3-480

Part no.	Motor	Frequency inverters		Power Wiring			
	Assigned motor rating[1), 2)]	Rated operational current[1)]	Input current	Safety device (fuse or miniature circuit-breaker)		Mains contactor	Main choke
	I_H = 150 %	I_H = 150 %	I_H = 150 %	IEC (Typ B, gG)[3)]	UL (Class CC or J)[4)]	I_H = 150 % (CT/I_H, at 50 °C)	I_H = 150 %
	P	I_e	I_{LN}				
	kW	A	A		A		
PowerXL™ variable frequency drives DA1							
500 V AC, 3-phase/500 V AC, 3-phase							
DA1-352D1…	1.1	2.1	2.5	6NHG000B	LPJ-6SP	DILM7	DX-LN3-004
DA1-353D1…	1.5	3.1	3.7	6NHG000B	LPJ-6SP	DILM7	DX-LN3-004
DA1-354D1…	2.2	4.1	4.9	10NHG000B	LPJ-10SP	DILM7	DX-LN3-006
DA1-356D5…	3	6.5	7.8	10NHG000B	LPJ-10SP	DILM7	DX-LN3-010
DA1-359D0…	4	9	10.8	16NHG000B	LPJ-15SP	DILM7	DX-LN3-016
DA1-35012…	5.5	12	14.4	20NHG000B	LPJ-20SP	DILM7	DX-LN3-016
DA1-35017…	7.5	17	20.6	32NHG000B	LPJ-30SP	DILM17	DX-LN3-025
DA1-35022…	11	22	26.7	40NHG000B	LPJ-35SP	DILM17	DX-LN3-040
DA1-35028…	15	28	34	50NHG000B	LPJ-45SP	DILM17	DX-LN3-040
DA1-35034…	18.5	34	41.2	63NHG000B	LPJ-60SP	DILM25	DX-LN3-050
DA1-35043…	22	43	49.5	63NHG000B	LPJ-70SP	DILM40	DX-LN3-050
DA1-35054…	30	54	62.2	80NHG000B NZMC1-S80	LPJ-80SP	DILM50	DX-LN3-080
DA1-35065…	37	65	75.8	100NHG000B NZMC1-S100	LPJ-100SP	DILM80	DX-LN3-080
DA1-35078…	45	78	90.9	125NHG00B NZMC2-S125	LPJ-125SP	DILM95	DX-LN3-100
DA1-35105…	55	105	108.2	160NHG00B NZMC2-S160	LPJ-150SP	DILM95	DX-LN3-120
DA1-35130…	75	130	127.7	160NHG00B NZMC2-S160	LPJ-175SP	DILM115	DX-LN3-160
DA1-35150…	90	150	134.8	200NHG1B NZMC2-S200	LPJ-175SP	DILM150	DX-LN3-160

Notes

[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] NH fuse used together with TB00-D fuse base
[4)] LPJ fuse used together with J60060-3 fuse base
[5)] Optional external radio interference suppression filter for longer motor cable lengths and for use in different EMC environments

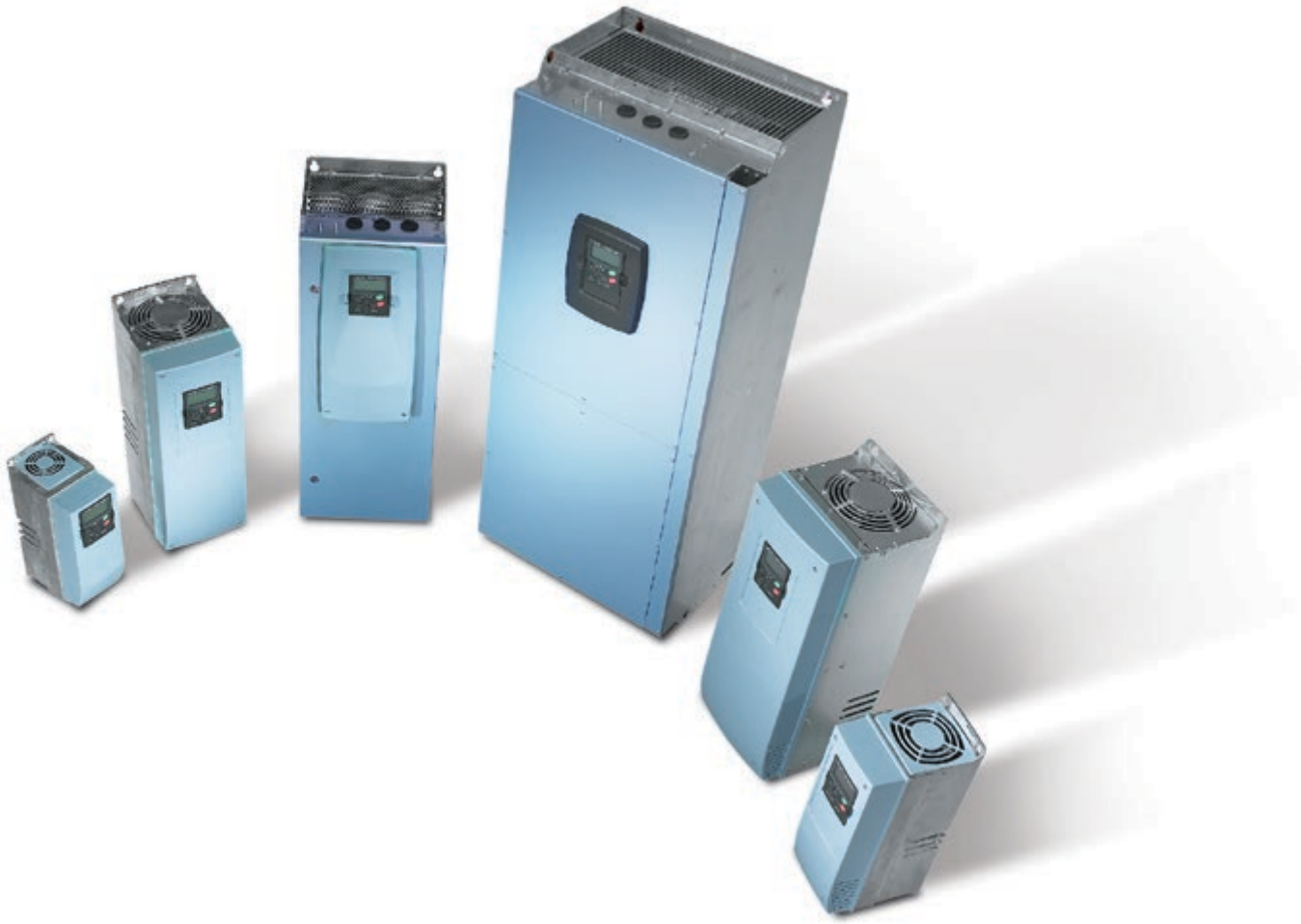
Power Wiring	DC link connection		Motor feeder	
	Braking resistance		motor choke	Sine filter
Radio interference suppression filter (external)[5]	10 % duty factor (DF)	20 % duty factor (DF)	I_H = 150 % (CT/I_H, at 50 °C)	I_H = 150 % (CT/I_H, at 50 °C)
-	-	-	DX-LM3-005	SIN-0005-6-0-P
-	DX-BR400-0K4	-	DX-LM3-005	SIN-0005-6-0-P
-	DX-BR200-0K4	DX-BR200-0K8	DX-LM3-005	SIN-0005-6-0-P
-	DX-BR150-0K5	DX-BR150-1K4	DX-LM3-008	SIN-0008-6-0-P
-	DX-BR100-0K8	DX-BR100-1K4	DX-LM3-011	SIN-0014-6-0-P
-	DX-BR100-0K8	DX-BR100-1K6	DX-LM3-016	SIN-0014-6-0-P
-	DX-BR050-3K1	DX-BR050-5K1	DX-LM3-035	SIN-0023-6-0-P
-	DX-BR040-3K1	DX-BR040-5K1	DX-LM3-035	SIN-0035-6-0-P
-	DX-BR040-3K1	DX-BR040-5K1	DX-LM3-035	SIN-0035-6-0-P
-	DX-BR022-3K1	DX-BR022-5K1	DX-LM3-035	SIN-0052-6-0-P
-	DX-BR022-3K1	DX-BR022-5K1	DX-LM3-050	SIN-0052-6-0-P
-	DX-BR022-3K1	DX-BR022-5K1	DX-LM3-063	SIN-0085-6-0-P
-	DX-BR012-3K1	DX-BR012-5K1	DX-LM3-080	SIN-0085-6-0-P
-	DX-BR012-3K1	DX-BR012-5K1	DX-LM3-080	SIN-0085-6-0-P
-	DX-BR012-3K1	DX-BR012-5K1	DX-LM3-150	SIN-0122-6-0-P
-	DX-BR012-3K1	DX-BR012-9K2	DX-LM3-150	SIN-0185-6-0-P
-	DX-BR012-3K1	DX-BR012-18K1	DX-LM3-150	SIN-0185-6-0-P

Part no.	Motor		Frequency inverters				Power Wiring			
	Assigned motor rating[1), 2)]		Rated operational current[1)]		Input current		Safety device (fuse or miniature circuit-breaker)		Mains contactor	
	I_H = 150 %	I_L = 110 %	I_H = 150 %	I_L = 110 %	I_H = 150 %	I_L = 110 %	IEC (Typ B, gG)	UL (Class CC or J)	I_H = 150 % (CT/I_H, at 50 °C)	I_L = 110 % (VT/I_L, at 40 °C)
	P	P	I_e	I_e	I_{LN}	I_{LN}				
	kW	kW	A	A	A	T		A		
PowerXL™ variable frequency drive DG1										
230 V AC, 3-phase/230 V AC, 3-phase										
DG1-323D7…	0.75	1.1	3.7	4.8	3.2	4.4	FAZ-B6/3	6	DILEM	DILEM
DG1-324D8…	1.1	1.5	4.8	6.6	4.4	6.1	FAZ-B10/3	10	DILEM	DILEM
DG1-326D6…	1.5	1.5	6.6	7.8	6.1	7.2	FAZ-B16/3	15	DILEM	DILEM
DG1-32011…	2.2	3	11	12.5	10.2	11.6	FAZ-B16/3	15	DILEM	DILEM
DG1-32012…	3	4	12.5	17.5	10.2	16.3	FAZ-B20/3	20	DILEM	DILM7
DG1-32017…	4	5.5	17.5	25	16.2	23.2	FAZ-B32/3	35	DILEM	DILM17
DG1-32025…	5.5	7.5	25	31	23.1	29	FAZ-B40/3	40	DILM17	DILM17
DG1-32031…	7.5	11	31	48	28.7	44.2	FAZ-B50/3	50	DILM17	DILM40
DG1-32048…	11	15	48	61	44.4	56	FAZ-B63/3	63	DILM40	DILM50
DG1-32061…	15	22	61	75	56.4	64.4	NZMC1-S80	80	DILM50	DILM50
DG1-32075…	22	22	75	88	69.4	78	NZMC2-S100	100	DILM72	DILM72
DG1-32114…	30	45	114	143	105.5	129	NZMC2-S160	160	DILM95	DILM115
DG1-32143…	45	45	143	170	132.3	157	NZMC2-S200	200	DILM150	DILM150
400 V AC, 3-phase/400 V AC, 3-phase										
DG1-342D2…	0.75	1.1	2.2	3.3	2	3.1	FAZ-B6/3	6	DILEM	DILEM
DG1-343D3…	1.1	1.5	3.3	4.3	3.1	4	FAZ-B6/3	6	DILEM	DILEM
DG1-344D3…	1.5	2.2	4.3	5.6	4.1	5.2	FAZ-B10/3	10	DILEM	DILEM
DG1-345D6…	2.2	3	5.6	7.6	5.2	7.1	FAZ-B16/3	15	DILEM	DILEM
DG1-347D6…	3	4	7.6	9	7.1	8.4	FAZ-B16/3	15	DILEM	DILEM
DG1-349D0…	4	5.5	9	12	8.4	11.2	FAZ-B16/3	15	DILEM	DILEM
DG1-34012…	5.5	7.5	12	16	11.2	15	FAZ-B20/3	20	DILEM	DILEM
DG1-34016…	7.5	11	16	23	14.9	21.5	FAZ-B25/3	25	DILEM	DILM17
DG1-34023…	11	15	23	31	21.4	29	FAZ-B32/3	35	DILM17	DILM17
DG1-34031…	15	18.5	31	38	28.8	35.2	FAZ-B40/3	40	DILM17	DILM17
DG1-34038…	18.5	22	38	46	35.3	42.6	FAZ-B50/3	50	DILM17	DILM40
DG1-34046…	22	30	46	61	42.8	55.7	FAZ-B63/3	63	DILM40	DILM50
DG1-34061…	30	37	61	72	56.7	65.7	NZMC1-S80	80	DILM50	DILM50
DG1-34072…	37	45	72	87	66.9	79.4	NZMC2-S100	100	DILM65	DILM65
DG1-34087…	45	55	87	105	80.9	97	NZMC2-S125	125	DILM65	DILM95
DG1-34105…	55	75	105	140	97.6	129	NZMC2-S160	160	DILM95	DILM115
DG1-34140…	75	90	140	170	130.1	157	NZMC2-S200	200	DILM115	DILM150
DG1-34170…	90	110	170	205	158	189	NZMC3-S250	250	DILM150	DILM250

Notes

[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] Optional external radio interference suppression filter for longer motor cable lengths and for use in different EMC environments

DC link connection			Motor feeder			
Braking resistance			motor choke		Sine filter	
10 % duty factor (DF)	20 % duty factor (DF)	40 % duty factor (DF)	I_H = 150 % (CT/I_H, at 50 °C)	I_L = 110 % (VT/I_L, at 40 °C)	I_H = 150 % (CT/I_H, at 50 °C)	I_L = 110 % (VT/I_L, at 40 °C)
2 x DX-BR035-1K1	DX-BR022-3K1	DX-BR022-5K1	DX-LM3-005	DX-LM3-005	DX-SIN3-004	DX-SIN3-010
2 x DX-BR035-1K1	DX-BR022-3K1	DX-BR022-5K1	DX-LM3-005	DX-LM3-008	DX-SIN3-010	DX-SIN3-010
2 x DX-BR035-1K1	DX-BR022-3K1	DX-BR022-5K1	DX-LM3-008	DX-LM3-008	DX-SIN3-010	DX-SIN3-010
2 x DX-BR035-1K1	DX-BR022-3K1	DX-BR022-5K1	DX-LM3-016	DX-LM3-011	DX-SIN3-016	DX-SIN3-016
DX-BR012-3K1	DX-BR012-5K1	DX-BR012-9K2	DX-LM3-016	-	DX-SIN3-016	DX-SIN3-023
DX-BR012-3K1	DX-BR012-5K1	DX-BR012-9K2	DX-LM3-035	-	DX-SIN3-023	DX-SIN3-032
DX-BR012-3K1	DX-BR012-5K1	DX-BR012-9K2	DX-LM3-035	-	DX-SIN3-032	DX-SIN3-032
DX-BR012-3K1	DX-BR012-9K2	DX-BR012-18K1	DX-LM3-035	-	DX-SIN3-032	DX-SIN3-061
DX-BR012-3K1	DX-BR012-9K2	DX-BR012-18K1	DX-LM3-050	-	DX-SIN3-048	DX-SIN3-072
-	-	-	DX-LM3-063	DX-LM3-080	DX-SIN3-072	DX-SIN3-072
-	-	-	DX-LM3-080	DX-LM3-100	DX-SIN3-090	DX-SIN3-090
-	-	-	DX-LM3-150	DX-LM3-150	DX-SIN3-115	DX-SIN3-150
-	-	-	DX-LM3-150	DX-LM3-180	DX-SIN3-150	DX-SIN3-180
DX-BR040-3K1	DX-BR040-5K1	DX-BR047-9K2	DX-LM3-005	DX-LM3-005	DX-SIN3-004	DX-SIN3-004
DX-BR040-3K1	DX-BR040-5K1	DX-BR047-9K2	DX-LM3-005	DX-LM3-005	DX-SIN3-004	DX-SIN3-010
DX-BR040-3K1	DX-BR040-5K1	DX-BR047-9K2	DX-LM3-005	DX-LM3-005	DX-SIN3-010	DX-SIN3-010
DX-BR040-3K1	DX-BR040-5K1	DX-BR047-9K2	DX-LM3-008	DX-LM3-008	DX-SIN3-010	DX-SIN3-010
DX-BR040-3K1	DX-BR040-5K1	DX-BR047-9K2	DX-LM3-008	DX-LM3-011	DX-SIN3-010	DX-SIN3-010
DX-BR040-3K1	DX-BR040-5K1	DX-BR047-9K2	DX-LM3-011	DX-LM3-016	DX-SIN3-010	DX-SIN3-016
DX-BR022-5K1	DX-BR022-9K2	2 x DX-BR047-9K2	DX-LM3-016	DX-LM3-016	DX-SIN3-016	DX-SIN3-016
DX-BR022-5K1	DX-BR022-9K2	2 x DX-BR047-9K2	DX-LM3-016	DX-LM3-035	DX-SIN3-016	DX-SIN3-023
DX-BR022-5K1	DX-BR022-9K2	2 x DX-BR047-9K2	DX-LM3-035	DX-LM3-035	DX-SIN3-023	DX-SIN3-032
DX-BR022-9K2	2 x DX-BR047-9K2	-	DX-LM3-035	DX-LM3-050	DX-SIN3-032	DX-SIN3-037
DX-BR022-9K2	2 x DX-BR047-9K2	-	DX-LM3-050	DX-LM3-050	DX-SIN3-037	DX-SIN3-048
DX-BR022-9K2	2 x DX-BR047-9K2	-	DX-LM3-050	DX-LM3-063	DX-SIN3-048	DX-SIN3-072
2 x DX-BR006-18K1	2 x DX-BR006-33K3	-	DX-LM3-063	DX-LM3-080	DX-SIN3-072	DX-SIN3-072
-	-	-	DX-LM3-080	DX-LM3-100	DX-SIN3-072	DX-SIN3-090
-	-	-	DX-LM3-100	DX-LM3-150	DX-SIN3-090	DX-SIN3-115
-	-	-	DX-LM3-150	DX-LM3-150	DX-SIN3-115	DX-SIN3-150
-	-	-	DX-LM3-150	DX-LM3-180	DX-SIN3-150	DX-SIN3-180
-	-	-	DX-LM3-180	DX-LM3-260	DX-SIN3-180	DX-SIN3-250



9000X SVX, SPX variable frequency drive

9000X variable frequency drives are perfect for applications that require only the best. The SVX series of standard variable frequency drives is designed to easily meet the needs of simple and complex motor controllers in the industrial machine-building industry, while the SPX series of special-purpose variable frequency drives is ideal for sophisticated, high-performance applications. Whether run in open-loop or closed-loop mode, their vector control ensures reliable and dynamically responsive motor control for three-phase induction and PM motors.

SVX variable frequency drive

Variable frequency drives for operation with two overload profiles: 150% or 110%. The compact enclosures are available in IP21 (NEMA 1) and IP54 (NEMA 12) versions and feature an integrated radio interference suppression filter. A braking chopper is always integrated in frame sizes of up to FR6, and there are two types available.

SVX…-4A…: U_{IN} 3~400 V/U_{OUT} 3~400 V, allocated motor outputs 0.75 – 132 kW

SVX…-5A…: U_{IN} 3~690 V/U_{OUT} 3~690 V, allocated motor outputs 2.2 – 160 kW

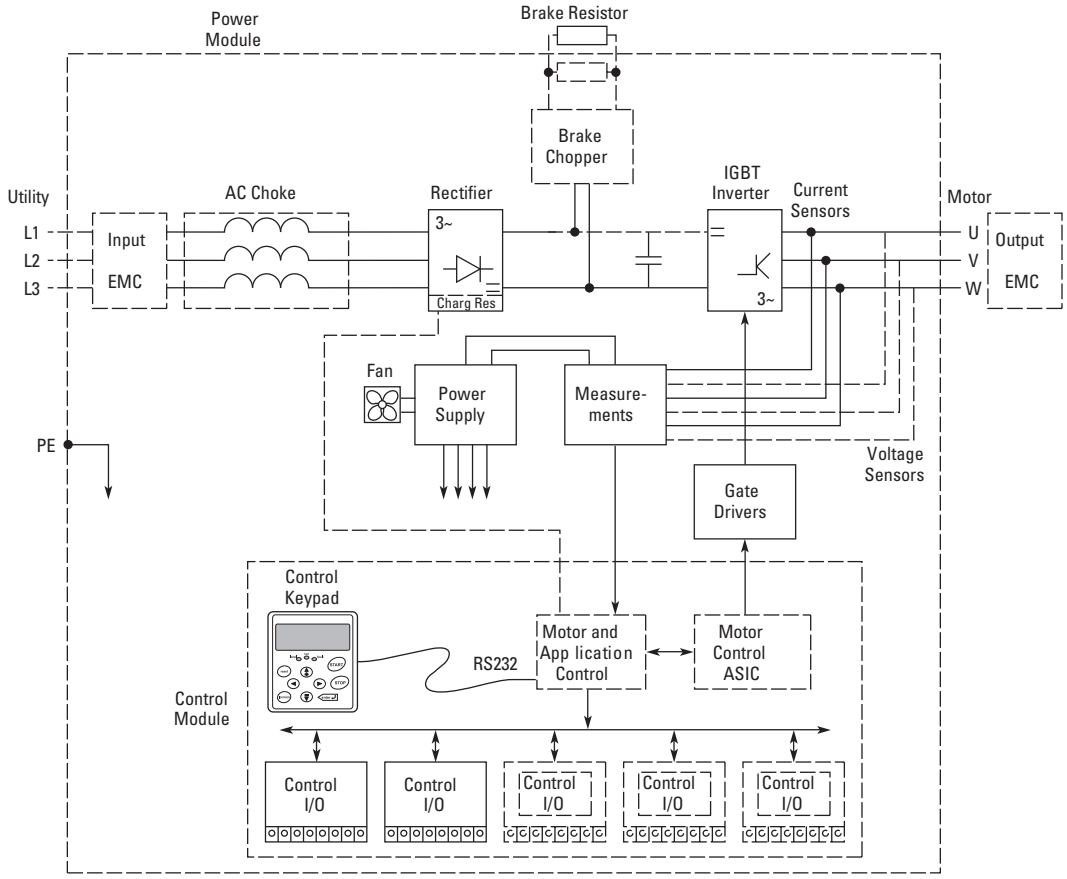
SPX variable frequency drive

Variable frequency drives for operation with two overload profiles of 150% and 110%. The enclosures for these compact devices are available in versions with an IP21 (NEMA 1) or IP54 (NEMA 12) degree of protection and feature an integrated radio interference suppression filter. A braking chopper is always integrated in frame sizes of up to FR6, and there are two types available.

SPX…-4A…: U_{IN} 3~400 V/U_{OUT} 3~400 V, allocated motor outputs 0.75 – 1200 kW

SPX…-5A…: U_{IN} 3~690 V/U_{OUT} 3~690 V, allocated motor outputs 2.2 – 2000 kW

Description



SVX variable frequency drive

SVX units are heavy-duty, all-purpose standard variable frequency drives. Featuring a variety of application settings, they can be configured to meet virtually any challenge that arises when used to control induction motors, including applications involving multiple motors or multiple pumps run in parallel. SVX variable frequency drives are suitable for all standard applications in machines, buildings, and industrial projects. One of the factors contributing to this is their sturdy design, which features integrated chokes and EMC filters and provides effective protection against interference from the grid. In addition, their sophisticated motor control design and effective protection features for both motor and variable frequency drive guarantee reliable operation.

Essential features

- Performance range:
  – 0.75 - 132 kW (U_{IN}: 3~ 400 V / U_{OUT}: 3~ 400 V)
  – 2.2 - 160 kW (U_{IN}: 3~ 690 V / U_{OUT}: 3~ 690 V)
- High load capacity:
  – H = 2x rated operational current (2 seconds/20 seconds) and 150% overload (60 seconds/600 seconds)
  – L = 2x rated operational current (2 seconds/20 seconds) and 110% overload (60 seconds/600 seconds)
- Ambient air temperature: -10 °C up to +50 °C without derating
- Degree of protection with compact design: IP21 (NEMA1) and IP54 (NEMA12)
- I/O expansion with plug-in modules (5 slots)
- Optional fieldbus connection (CANopen, PROFIBUS-DP, DeviceNet), LonWorks
- PID control and power factor correction (PFC) for 1 to 5 pumps
- Programmable start and application wizard for an easy parameter configuration process
- Multiple display (multi-monitoring) for monitoring up to 3 different readings at the same time
- V/Hz control with boost and slip compensation
- Dynamic open-loop and closed-loop vector control
- Internal braking chopper available in sizes of up to FR9 (compact design)

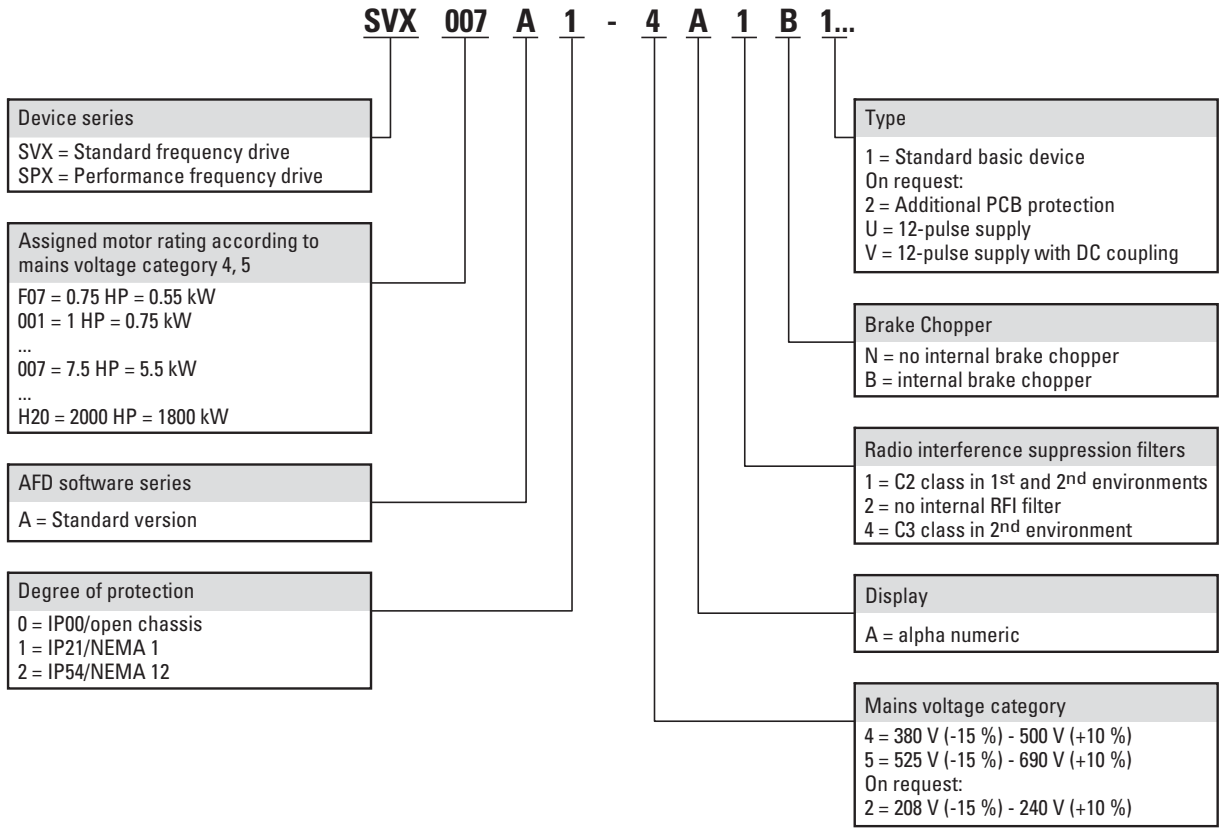
SPX variable frequency drive

SPX variable frequency drives are the perfect choice when it comes to demanding applications in which reliability, a highly dynamic response, precision, and power are a must. Popular applications include lifting equipment and conveyances (cranes, winches, elevators, lifts), compressors and oil pumps, chippers, crushers, mixers, extruders, take-up and pay-off units, and tunnel boring machines. Multi-purpose SPX variable frequency drives are designed to cover a wide variety of applications while keeping things simple. In fact, with their excellent flexibility, they make it easy to adapt to additional process requirements for custom and complex applications used to control induction and permanent magnet motors. On top of this, their sturdy design, which features integrated chokes and EMC filters, provides effective protection against interference from the grid. Finally, their sophisticated motor control design and effective protection features for both motor and variable frequency drive guarantee reliable operation.

Essential features

- Performance range:
  – 0.75 - 132 kW (U_{IN}: 3~ 400 V / U_{OUT}: 3~ 400 V)
  – 2.2 - 160 kW (U_{IN}: 3~ 690 V / U_{OUT}: 3~ 690 V)
- Expanded performance range with distributed design (IP00). Please enquire:
  – up to 1100 kW (U_{IN}: 3~ 400 V / U_{OUT}: 3~ 400 V)
  – up to 2000 kW (U_{IN}: 3~ 690 V / U_{OUT}: 3~ 690 V)
- High load capacity:
  – H = 2x rated operational current (2 seconds/20 seconds) and 150% overload (60 seconds/600 seconds)
  – L = 2x rated operational current (2 seconds/20 seconds) and 110% overload (60 seconds/600 seconds)
- Ambient air temperature: -10 °C up to +50 °C without derating
- Degree of protection with compact design: Up to 132/160 kW: IP21 (NEMA1) and IP54 (NEMA12)
- I/O expansion with plug-in modules (5 slots)
- Optional fieldbus connection (CANopen, PROFIBUS-DP, DeviceNet), LonWorks
- PID control and power factor correction (PFC)
- Direct and parallel circuit solutions, even for PM motors with high outputs
- Programmable start and application wizard for an easy parameter configuration process
- Multiple display (multi-monitoring) for monitoring up to 3 different readings at the same time
- V/Hz control with boost and slip compensation
- Dynamic open-loop and closed-loop vector control
- Internal braking chopper available in sizes up to FR9

Key to type references



UL/CSA

Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E134360
UL Category Control No.	NMMS, NMMS2, NMMS7. NMMS8
CSA File No.	UL report applies to both US and Canada
CSA Class No.	3211-06
North America Certification	UL listed, certified by UL for use in Canada
Specially designed for North America	No
Suitable for	Branch circuits
Max. Voltage Rating	
SVX/SPX…-4…	3~ 480 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)
SVX/SPX…-5…	3~ 690 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)
Degree of Protection	
SPX…A0…	IEC: IP00
SVX/SPX…A1…	IEC: IP21
SVX/SPX…A2…	IEC: IP54

Ordering

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 380 (-15%) - 500 (+10%) V												
2.2	0.75	1	3.3	1.1	1.5	✓	✓	FR4	IP21	**SVX001A1-4A1B1** 125676		1 off
3.3	1.1	1.5	4.3	1.5	2	✓	✓			**SVXF15A1-4A1B1** 125707		
4.3	1.5	2	5.6	2.2	3	✓	✓			**SVX002A1-4A1B1** 125748		
5.6	2.2	3	7.6	3	5	✓	✓			**SVX003A1-4A1B1** 125679		
7.6	3	5	9	4	6	✓	✓			**SVX005A1-4A1B1** 125749		
9	4	6	12	5.5	7.5	✓	✓			**SVX006A1-4A1B1** 125682		
12	5.5	7.5	16	7.5	10	✓	✓	FR5		**SVX007A1-4A1B1** 125684		
16	7.5	10	23	11	15	✓	✓			**SVX010A1-4A1B1** 125686		
23	11	15	31	15	20	✓	✓			**SVX015A1-4A1B1** 125688		
31	15	20	38	18.5	25	✓	✓	FR6		**SVX020A1-4A1B1** 125690		
38	18.5	25	46	22	30	✓	✓			**SVX025A1-4A1B1** 125691		
46	22	30	61	30	40	✓	✓			**SVX030A1-4A1B1** 125693		
61	30	40	72	37	50	✓	-	FR7		**SVX040A1-4A1N1** 125695		
						✓	✓			**SVX040A1-4A1B1** 132656		
72	37	50	87	45	60	✓	✓			**SVX050A1-4A1B1** 138430		
						✓	-			**SVX050A1-4A1N1** 125750		
87	45	60	105	55	75	✓	✓			**SVX060A1-4A1B1** 138431		
						✓	-			**SVX060A1-4A1N1** 125751		
105	55	75	140	75	100	✓	-	FR8		**SVX075A1-4A1N1** 125699		
						✓	✓			**SVX075A1-4A1B1** 132657		
140	75	100	170	90	125	✓	-			**SVX100A1-4A1N1** 125701		
						✓	✓			**SVX100A1-4A1B1** 132658		
170	90	125	205	110	150	✓	-			**SVX125A1-4A1N1** 125702		
						✓	✓			**SVX125A1-4A1B1** 135242		
205	110	150	261	132	200	✓	-	FR9		**SVX150A1-4A1N1** 125704		
						✓	✓			**SVX150A1-4A1B1** 138432		
245	132	200	300	160	250	✓	-			**SVX200A1-4A1N1** 125752		
						✓	✓			**SVX200A1-4A1B1** 132900		

Notes

[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 400 V, 50 Hz/at 440 - 480 V, 60 Hz

Information relevant for export to North America → Page 77

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 690 V AC, 3-phase / U_2 690 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 525 (-15%) - 690 (±10%) V												
3.2	2.2	2	4.5	3	3	✓	-	FR6	IP21	**SVX002A1-5A4N1** 125756		1 off
						✓	✓			**SVX002A1-5A4B1** 138480		
4.5	3	3	5.5	4	5	✓	-			**SVX003A1-5A4N1** 125757		
						✓	✓			**SVX003A1-5A4B1** 138481		
5.5	4	5	7.5	5.5	5	✓	-			**SVX004A1-5A4N1** 125758		
						✓	✓			**SVX004A1-5A4B1** 138482		
7.5	5.5	5	10	7.5	7.5	✓	-			**SVX005A1-5A4N1** 125759		
						✓	✓			**SVX005A1-5A4B1** 138483		
10	7.5	7.5	13.5	11	10	✓	-			**SVX007A1-5A4N1** 125760		
						✓	✓			**SVX007A1-5A4B1** 138484		
13.5	11	10	18	15	15	✓	-			**SVX010A1-5A4N1** 125761		
						✓	✓			**SVX010A1-5A4B1** 138485		
18	15	15	22	18.5	20	✓	-			**SVX015A1-5A4N1** 125762		
						✓	✓			**SVX015A1-5A4B1** 138486		
22	18.5	20	27	22	25	✓	-			**SVX020A1-5A4N1** 125763		
						✓	✓			**SVX020A1-5A4B1** 138487		
27	22	25	34	30	30	✓	-			**SVX025A1-5A4N1** 125764		
						✓	✓			**SVX025A1-5A4B1** 138488		
34	30	30	41	37	40	✓	-	FR7		**SVX030A1-5A4N1** 125765		
						✓	✓			**SVX030A1-5A4B1** 138489		
41	37	40	52	45	50	✓	-			**SVX040A1-5A4N1** 125766		
						✓	✓			**SVX040A1-5A4B1** 138490		
52	45	50	62	55	60	✓	-	FR8		**SVX050A1-5A4N1** 125767		
						✓	✓			**SVX050A1-5A4B1** 138491		
62	55	60	80	75	75	✓	-			**SVX060A1-5A4N1** 125768		
						✓	✓			**SVX060A1-5A4B1** 138492		
80	75	75	100	90	100	✓	-			**SVX075A1-5A4N1** 125769		
						✓	✓			**SVX075A1-5A4B1** 138493		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 690 V, 50 Hz/at 690 V, 60 Hz

Information relevant for export to North America → Page 77

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 690 V AC, 3-phase / U_2 690 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 525 (-15%) - 690 (±10%) V												
100	90	100	125	110	125	✓	-	FR9	IP21	**SVX100A1-5A4N1** 125770		1 off
						✓	✓			**SVX100A1-5A4B1** 138494		
125	110	125	144	132	150	✓	-			**SVX125A1-5A4N1** 125771		
						✓	✓			**SVX125A1-5A4B1** 138495		
144	132	150	170	160	200	✓	-			**SVX150A1-5A4N1** 125772		
						✓	✓			**SVX150A1-5A4B1** 138496		
170	160	200	208	200	200	✓	-			**SVX175A1-5A4N1** 125773		
						✓	✓			**SVX175A1-5A4B1** 138497		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 690 V, 50 Hz/at 690 V, 60 Hz

Information relevant for export to North America → Page 77

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 380 (-15%) - 500 (+10%) V												
2.2	0.75	1	3.3	1.1	1.5	✓	✓	FR4	IP54	**SVX001A2-4A1B1** 125677		1 off
3.3	1.1	1.5	4.3	1.5	2	✓	✓			**SVXF15A2-4A1B1** 125708		
4.3	1.5	2	5.6	2.2	3	✓	✓			**SVX002A2-4A1B1** 125678		
5.6	2.2	3	7.6	3	5	✓	✓			**SVX003A2-4A1B1** 125680		
7.6	3	5	9	4	6	✓	✓			**SVX005A2-4A1B1** 125753		
9	4	6	12	5.5	7.5	✓	✓			**SVX006A2-4A1B1** 125683		
12	5.5	7.5	16	7.5	10	✓	✓	FR5		**SVX007A2-4A1B1** 125685		
16	7.5	10	23	11	15	✓	✓			**SVX010A2-4A1B1** 125687		
23	11	15	31	15	20	✓	✓			**SVX015A2-4A1B1** 125689		
31	15	20	38	18.5	25	✓	✓	FR6		**SVX020A2-4A1B1** 125754		
38	18.5	25	46	22	30	✓	✓			**SVX025A2-4A1B1** 125692		
46	22	30	61	30	40	✓	✓			**SVX030A2-4A1B1** 125694		
61	30	40	72	37	50	✓	-	FR7		**SVX040A2-4A1N1** 125696		
						✓	✓			**SVX040A2-4A1B1** 138452		
72	37	50	87	45	60	✓	-			**SVX050A2-4A1N1** 125697		
						✓	✓			**SVX050A2-4A1B1** 138453		
87	45	60	105	55	75	✓	-			**SVX060A2-4A1N1** 125698		
						✓	✓			**SVX060A2-4A1B1** 138454		
105	55	75	140	75	100	✓	-	FR8		**SVX075A2-4A1N1** 125700		
						✓	✓			**SVX075A2-4A1B1** 138455		
140	75	100	170	90	125	✓	-			**SVX100A2-4A1N1** 125755		
						✓	✓			**SVX100A2-4A1B1** 138456		
170	90	125	205	110	150	✓	-			**SVX125A2-4A1N1** 125703		
						✓	✓			**SVX125A2-4A1B1** 138457		
205	110	150	261	132	200	✓	-	FR9		**SVX150A2-4A1N1** 125705		
						✓	✓			**SVX150A2-4A1B1** 138458		
245	132	200	300 300	160	250	✓	-			**SVX200A2-4A1N1** 125706		
						✓	✓			**SVX200A2-4A1B1** 138459		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 400 V, 50 Hz/at 440 - 480 V, 60 Hz

Information relevant for export to North America → Page 77

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 690 V AC, 3-phase / U_2 690 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 525 (-15%) - 690 (±10%) V												
3.2	2.2	2	4.5	3	3	✓	-	FR6	IP54	**SVX002A2-5A4N1** 125774		1 off
						✓	✓			**SVX002A2-5A4B1** 138498		
4.5	3	3	5.5	4	5	✓	-			**SVX003A2-5A4N1** 125775		
						✓	✓			**SVX003A2-5A4B1** 138499		
5.5	4	5	7.5	5.5		✓	-			**SVX004A2-5A4N1** 125776		
						✓	✓			**SVX004A2-5A4B1** 138500		
7.5	5.5		10	7.5	7.5	✓	-			**SVX005A2-5A4N1** 125777		
						✓	✓			**SVX005A2-5A4B1** 138501		
10	7.5	7.5	13.5	11	10	✓	-			**SVX007A2-5A4N1** 125778		
						✓	✓			**SVX007A2-5A4B1** 138502		
13.5	11	10	18	15	15	✓	-			**SVX010A2-5A4N1** 125779		
						✓	✓			**SVX010A2-5A4B1** 138503		
18	15	15	22	18.5	20	✓	-			**SVX015A2-5A4N1** 125780		
						✓	✓			**SVX015A2-5A4B1** 138504		
22	18.5	20	27	22	25	✓	-			**SVX020A2-5A4N1** 125781		
						✓	✓			**SVX020A2-5A4B1** 138505		
27	22	25	34	30	30	✓	-			**SVX025A2-5A4N1** 125782		
						✓	✓			**SVX025A2-5A4B1** 138506		
34	30	30	41	37	40	✓	-	FR7		**SVX030A2-5A4N1** 125783		
						✓	✓			**SVX030A2-5A4B1** 138507		
41	37	40	52	45	50	✓	-			**SVX040A2-5A4N1** 125784		
						✓	✓			**SVX040A2-5A4B1** 138508		
52	45	50	62	55	60	✓	-	FR8		**SVX050A2-5A4N1** 125785		
						✓	✓			**SVX050A2-5A4B1** 138509		
62	55	60	80	75	75	✓	-			**SVX060A2-5A4N1** 125786		
						✓	✓			**SVX060A2-5A4B1** 138510		
80	75	75	100	90	100	✓	-			**SVX075A2-5A4N1** 125787		
						✓	✓			**SVX075A2-5A4B1** 138511		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 690 V, 50 Hz/at 690 V, 60 Hz

Information relevant for export to North America → Page 77

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 690 V AC, 3-phase / U_2 690 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 525 (-15%) - 690 (±10%) V												
100	90	100	125	110	125	✓	-	FR9	IP54	**SVX100A2-5A4N1** 125788		1 off
						✓	✓			**SVX100A2-5A4B1** 138512		
125	110	125	144	132	150	✓	-			**SVX125A2-5A4N1** 125789		
						✓	✓			**SVX125A2-5A4B1** 138513		
144	132	150	170	160	200	✓	-			**SVX150A2-5A4N1** 125790		
						✓	✓			**SVX150A2-5A4B1** 138514		
170	160	200	208	200	200	✓	-			**SVX175A2-5A4N1** 125791		
						✓	✓			**SVX175A2-5A4B1** 138515		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 690 V, 50 Hz/at 690 V, 60 Hz

Information relevant for export to North America → Page 77

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 380 (-15%) - 500 (+10%) V												
2.2	0.75	1	3.3	1.1	1.5	✓	✓	FR4	IP21	**SPX001A1-4A1B1** 125203		1 off
3.3	1.1	1.5	4.3	1.5	2	✓	✓			**SPXF15A1-4A1B1** 125675		
4.3	1.5	2	5.6	2.2	3	✓	✓			**SPX002A1-4A1B1** 125657		
5.6	2.2	3	7.6	3	5	✓	✓			**SPX003A1-4A1B1** 125658		
7.6	3	5	9	4	6	✓	✓			**SPX005A1-4A1B1** 125659		
9	4	6	12	5.5	7.5	✓	✓			**SPX006A1-4A1B1** 125249		
12	5.5	7.5	16	7.5	10	✓	✓	FR5		**SPX007A1-4A1B1** 125660		
16	7.5	10	23	11	15	✓	✓			**SPX010A1-4A1B1** 125661		
23	11	15	31	15	20	✓	✓			**SPX015A1-4A1B1** 125663		
31	15	20	38	18.5	25	✓	✓	FR6		**SPX020A1-4A1B1** 125665		
38	18.5	25	46	22	30	✓	✓			**SPX025A1-4A1B1** 125666		
46	22	30	61	30	40	✓	✓			**SPX030A1-4A1B1** 125667		
61	30	40	72	37	50	✓	-	FR7		**SPX040A1-4A1N1** 125319		
						✓	✓			**SPX040A1-4A1B1** 134844		
72	37	50	87	45	60	✓	-			**SPX050A1-4A1N1** 125331		
						✓	✓			**SPX050A1-4A1B1** 138606		
87	45	60	105	55	75	✓	-			**SPX060A1-4A1N1** 125668		
						✓	✓			**SPX060A1-4A1B1** 138607		
105	55	75	140	75	100	✓	-	FR8		**SPX075A1-4A1N1** 125354		
						✓	✓			**SPX075A1-4A1B1** 138608		
140	75	100	170	90	125	✓	-			**SPX100A1-4A1N1** 125365		
						✓	✓			**SPX100A1-4A1B1** 131744		
170	90	125	205	110	150	✓	-			**SPX125A1-4A1N1** 125669		
						✓	✓			**SPX125A1-4A1B1** 134489		
205	110	150	261	132	200	✓	-	FR9		**SPX150A1-4A1N1** 125381		
						✓	✓			**SPX150A1-4A1B1** 129701		
245	132	200	300	160	250	✓	-			**SPX200A1-4A1N1** 125670		
						✓	✓			**SPX200A1-4A1B1** 134845		

Notes

[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 400 V, 50 Hz/at 440 - 480 V, 60 Hz

Information relevant for export to North America → Page 77

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 380 (-15%) - 500 (+10%) V												
300	160	250	385	200	300	✓	✓	FR10	IP21	**SPX250A1-4A4B1** 133131		1 off
						✓	-			**SPX250A1-4A4N1** 125671		
385	200	300	460	250	350	✓	-			**SPX300A1-4A4N1** 125673		
460	250	350	520			✓	-			**SPX350A1-4A4N1** 125424		
520	250	400	590	315	500	✓	-	FR11		**SPX400A1-4A4N1** 125432		
590	315	500	650	355	550	✓	-			**SPX500A1-4A4N1** 125444		
650	355	550	730	400	600	✓	-			**SPX550A1-4A4N1** 125451		
300	160	250	385	200	300	-	✓	FR10	IP00	**SPX250A0-4A2B1** 133130		
						-	-			**SPX250A0-4A2N1** 125402		
385	200	300	460	250	350	-	✓			**SPX300A0-4A2B1** 138617		
						-	-			**SPX300A0-4A2N1** 125412		
460	250	350	520			-	✓			**SPX350A0-4A2B1** 129686		
						-	-			**SPX350A0-4A2N1** 125711		
520		400	590	315	500	-	✓	FR11		**SPX400A0-4A2B1** 138618		
						-	-			**SPX400A0-4A2N1** 125428		
590	315	500	650	355	550	-	✓			**SPX500A0-4A2B1** 138619		
						-	-			**SPX500A0-4A2N1** 125440		
650	355	550	730	400	600	-	✓			**SPX550A0-4A2B1** 138620		
						-	-			**SPX550A0-4A2N1** 125674		
730	400	600	820	450	650	-	✓	FR12		**SPX600A0-4A2B1** 129687		
						-	-			**SPX600A0-4A2N1** 125453		
820	450	650	920	500	700	-	-			**SPX650A0-4A2N1** 125457		
920	500	700	1030	560	800	-	-			**SPX700A0-4A2N1** 125459		
1030	560	800	1150	630	900	-	-	FR13		**SPX800A0-4A2N1** 125463		
1150	630	900	1300	710	1000	-	-			**SPX900A0-4A2N1** 125467		
1300	710	1000	1450	800	1200	-	-			**SPXH10A0-4A2N1** 125482		
1600	900	1200	1770	1000	1600	-	-	FR14		**SPXH12A0-4A2N1** 125486		
1940	1100	1600	2150	1200	2000	-	-			**SPXH16A0-4A2N1** 125492		

Notes

[1] Overload cycle for 60 s every 600 s
[2] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3] at 400 V, 50 Hz/at 440 - 480 V, 60 Hz

Information relevant for export to North America → Page 77

SVX/SPX

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 690 V AC, 3-phase / U_2 690 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 525 (-15%) - 690 (±10%) V												
3.2	2.2	2	4.5	3	3	✓	-	FR6	IP21	**SPX002A1-5A4N1** 125212		1 off
						✓	✓			**SPX002A1-5A4B1** 138638		
4.5	3	3	5.5	4	5	✓	-			**SPX003A1-5A4N1** 125222		
						✓	✓			**SPX003A1-5A4B1** 138639		
5.5	4	5	7.5	5.5		✓	-			**SPX004A1-5A4N1** 125232		
						✓	✓			**SPX004A1-5A4B1** 138640		
7.5	5.5		10	7.5	7.5	✓	-			**SPX005A1-5A4N1** 125241		
						✓	✓			**SPX005A1-5A4B1** 138641		
10	7.5	7.5	13.5	11	10	✓	-			**SPX007A1-5A4N1** 125256		
						✓	✓			**SPX007A1-5A4B1** 138642		
13.5	11	10	18	15	15	✓	-			**SPX010A1-5A4N1** 125267		
						✓	✓			**SPX010A1-5A4B1** 138643		
18	15	15	22	18.5	20	✓	-			**SPX015A1-5A4N1** 125277		
						✓	✓			**SPX015A1-5A4B1** 138644		
22	18.5	20	27	22	25	✓	-			**SPX020A1-5A4N1** 125287		
						✓	✓			**SPX020A1-5A4B1** 138645		
27	22	25	34	30	30	✓	-			**SPX025A1-5A4N1** 125298		
						✓	✓			**SPX025A1-5A4B1** 138646		
34	30	30	41	37	40	✓	-	FR7		**SPX030A1-5A4N1** 125309		
						✓	✓			**SPX030A1-5A4B1** 138647		
41	37	40	52	45	50	✓	-			**SPX040A1-5A4N1** 125321		
						✓	✓			**SPX040A1-5A4B1** 138648		
52	45	50	62	55	60	✓	-	FR8		**SPX050A1-5A4N1** 125333		
						✓	✓			**SPX050A1-5A4B1** 138649		
62	55	60	80	75	75	✓	-			**SPX060A1-5A4N1** 125344		
						✓	✓			**SPX060A1-5A4B1** 138650		
80	75	75	100	90	100	✓	-			**SPX075A1-5A4N1** 125356		
						✓	✓			**SPX075A1-5A4B1** 138651		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 690 V, 50 Hz/at 690 V, 60 Hz

Information relevant for export to North America → Page 77

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 690 V AC, 3-phase / U_2 690 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 525 (-15%) - 690 (±10%) V												
100	90	100	125	110	125	✓	-	FR9	IP21	**SPX100A1-5A4N1** 125367		1 off
						✓	✓			**SPX100A1-5A4B1** 138652		
125	110	125	144	132	150	✓	-			**SPX125A1-5A4N1** 125375		
						✓	✓			**SPX125A1-5A4B1** 138653		
144	132	150	170	160	200	✓	-			**SPX150A1-5A4N1** 125383		
						✓	✓			**SPX150A1-5A4B1** 138654		
170	160	200	208	200		✓	-			**SPX175A1-5A4N1** 125389		
						✓	✓			**SPX175A1-5A4B1** 138655		
208	200		261	250	300	✓	-	FR10		**SPX200A1-5A4N1** 125396		
261	250	250	325	315		✓	-			**SPX250A1-5A4N1** 125407		
325	315	300	385	355	400	✓	-			**SPX300A1-5A4N1** 125417		
385	355	400	460	450	450	✓	-	FR11		**SPX400A1-5A4N1** 125434		
460	450	450	502	500	500	✓	-			**SPX450A1-5A4N1** 125438		
502	500	500	590	560	600	✓	-			**SPX500A1-5A4N1** 125446		
208	200	200	261	250	300	-	-	FR10	IP00	**SPX200A0-5A2N1** 129600		1 off
261	250	250	325	315		-	-			**SPX250A0-5A2N1** 129602		
325	315	300	385	355	400	-	-			**SPX300A0-5A2N1** 129604		
385	355	400	460	450	450	-	-	FR11		**SPX400A0-5A2N1** 129607		
460	450	450	502	500	500	-	-			**SPX450A0-5A2N1** 129608		
502	500	500	590	560	600	-	-			**SPX500A0-5A2N1** 129610		
590	560	600	650	630	750	-	-	FR12		**SPX550A0-5A2N1** 129612		
650	630		750	710	850	-	-			**SPX600A0-5A2N1** 129614		
750	710	850	820	800		-	-			**SPX700A0-5A2N1** 129617		
820	800		920	900	1100	-	-	FR13		**SPX800A0-5A2N1** 129618		
920	900	1100	1030	1000		-	-			**SPX900A0-5A2N1** 129619		
1030	1000		1180	1150	1300	-	-			**SPXH10A0-5A2N1** 129620		
1300	1300	1300	1500	1500		-	-	FR14		**SPXH13A0-5A2N1** 129621		
1500	1500		1900	1800		-	-			**SPXH15A0-5A2N1** 129622		
1900	1800		2250	2000		-	-			**SPXH20A0-5A2N1** 129623		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 690 V, 50 Hz/at 690 V, 60 Hz

Information relevant for export to North America → Page 77

Variable frequency drive 9000X

SPX, for three-phase motors 400 V AC, IP54

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 400 V AC, 3-phase / U_2 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 380 (-15%) - 500 (+10%) V												
2.2	0.75	1	3.3	1.1	1.5	✓	✓	FR4	IP54	**SPX001A2-4A1B1** 125207		1 off
3.3	1.1	1.5	4.3	1.5	2	✓	✓			**SPXF15A2-4A1B1** 125480		
4.3	1.5	2	5.6	2.2	3	✓	✓			**SPX002A2-4A1B1** 125216		
5.6	2.2	3	7.6	3	5	✓	✓			**SPX003A2-4A1B1** 125226		
7.6	3	5	9	4	6	✓	✓			**SPX005A2-4A1B1** 125245		
9	4	6	12	5.5	7.5	✓	✓			**SPX006A2-4A1B1** 125251		
12	5.5	7.5	16	7.5	10	✓	✓	FR5		**SPX007A2-4A1B1** 125260		
16	7.5	10	23	11	15	✓	✓			**SPX010A2-4A1B1** 125662		
23	11	15	31	15	20	✓	✓			**SPX015A2-4A1B1** 125664		
31	15	20	38	18.5	25	✓	✓	FR6		**SPX020A2-4A1B1** 125291		
38	18.5	25	46	22	30	✓	✓			**SPX025A2-4A1B1** 125302		
46	22	30	61	30	40	✓	✓			**SPX030A2-4A1B1** 125313		
61	30	40	72	37	50	✓	-	FR7		**SPX040A2-4A1N1** 125325		
						✓	✓			**SPX040A2-4A1B1** 138609		
72	37	50	87	45	60	✓	-			**SPX050A2-4A1N1** 125337		
						✓	✓			**SPX050A2-4A1B1** 138610		
87	45	60	105	55	75	✓	-			**SPX060A2-4A1N1** 125348		
						✓	✓			**SPX060A2-4A1B1** 138611		
105	55	75	140	75	100	✓	-	FR8		**SPX075A2-4A1N1** 125359		
						✓	✓			**SPX075A2-4A1B1** 138612		
140	75	100	170	90	125	✓	-			**SPX100A2-4A1N1** 125370		
						✓	✓			**SPX100A2-4A1B1** 138613		
170	90	125	205	110	150	✓	-			**SPX125A2-4A1N1** 125377		
						✓	✓			**SPX125A2-4A1B1** 138614		
205	110	150	261 261	132	200	✓	-	FR9		**SPX150A2-4A1N1** 125385		
						✓	✓			**SPX150A2-4A1B1** 138615		
245	132	200	300	160	250	✓	-			**SPX200A2-4A1N1** 125398		
						✓	✓			**SPX200A2-4A1B1** 138616		
300	160	250	385	200	300	✓	-	FR10		**SPX250A2-4A4N1** 125672		
385	200	300	460	250	350	✓	-			**SPX300A2-4A4N1** 125419		
460	250	350	520			✓	-			**SPX350A2-4A4N1** 125426		

Notes

[1] Overload cycle for 60 s every 600 s

[2] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz

[3] at 400 V, 50 Hz/at 440 - 480 V, 60 Hz

Information relevant for export to North America → Page 77

Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 690 V AC, 3-phase / U_2 690 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 525 (-15%) - 690 (±10%) V												
3.2	2.2	2	4.5	3	3	✓	-	FR6	IP54	**SPX002A2-5A4N1** 125218		1 off
						✓	✓			**SPX002A2-5A4B1** 129582		
4.5	3	3	5.5	4	5	✓	-			**SPX003A2-5A4N1** 125228		
						✓	✓			**SPX003A2-5A4B1** 129583		
5.5	4	5	7.5	5.5		✓	✓			**SPX004A2-5A4B1** 129584		
						✓	-			**SPX004A2-5A4N1** 125236		
7.5	5.5		10	7.5	7.5	✓	-			**SPX005A2-5A4N1** 125247		
						✓	✓			**SPX005A2-5A4B1** 129585		
10	7.5	7.5	13.5	11	10	✓	-			**SPX007A2-5A4N1** 125262		
						✓	✓			**SPX007A2-5A4B1** 129586		
13.5	11	10	18	15	15	✓	-			**SPX010A2-5A4N1** 125272		
						✓	✓			**SPX010A2-5A4B1** 129587		
18	15	15	22	18.5	20	✓	-			**SPX015A2-5A4N1** 125282		
						✓	✓			**SPX015A2-5A4B1** 129588		
22	18.5	20	27	22	25	✓	-			**SPX020A2-5A4N1** 125293		
						✓	✓			**SPX020A2-5A4B1** 129589		
27	22	25	34	30	30	✓	-			**SPX025A2-5A4N1** 125304		
						✓	✓			**SPX025A2-5A4B1** 129590		
34	30	30	41	37	40	✓	-	FR7		**SPX030A2-5A4N1** 125315		
						✓	✓			**SPX030A2-5A4B1** 129591		
41	37	40	52	45	50	✓	-			**SPX040A2-5A4N1** 125327		
						✓	✓			**SPX040A2-5A4B1** 129592		
52	45	50	62	55	60	✓	-	FR8		**SPX050A2-5A4N1** 125339		
						✓	✓			**SPX050A2-5A4B1** 129593		
62	55	60	80	75	75	✓	-			**SPX060A2-5A4N1** 125350		
						✓	✓			**SPX060A2-5A4B1** 129594		
80	75	75	100	90	100	✓	-			**SPX075A2-5A4N1** 125361		
						✓	✓			**SPX075A2-5A4B1** 129595		

Notes
[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 690 V, 50 Hz/at 690 V, 60 Hz

Information relevant for export to North America → Page 77

SVX/SPX

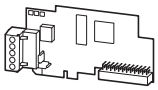
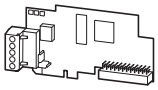
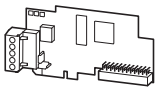
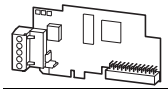
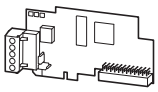
Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Rated operational current[1]	Assigned motor rating [1), 2), 3)]		Fitted with		Frame size	Degree of Protection	**Part no.** Article no.	**Price** see price list	Std. pack
I_H = 150 % I_e A	I_H = 150 % P kW	I_H = 150 % P HP	I_L = 110 % I_e A	I_L = 110 % P kW	I_L = 110 % P HP	Radio interference suppression filter	Brake chopper					
U_e 690 V AC, 3-phase / U_2 690 V AC, 3-phase Mains voltage (50/60Hz) U_{LN}: 525 (-15%) - 690 (±10%) V												
100	90	100	125	110	125	✓	-	FR9	IP54	**SPX100A2-5A4N1** 125372		1 off
						✓	✓			**SPX100A2-5A4B1** 129596		
125	110	125	144	132	150	✓	-			**SPX125A2-5A4N1** 125379		
						✓	✓			**SPX125A2-5A4B1** 129597		
144	132	150	170	160	200	✓	-			**SPX150A2-5A4N1** 125387		
						✓	✓			**SPX150A2-5A4B1** 129598		
170	160	200	208	200		✓	-			**SPX175A2-5A4N1** 125391		
						✓	✓			**SPX175A2-5A4B1** 129599		
208	200		261	250	300	✓	-	FR10		**SPX200A2-5A4N1** 125400		
261	250	250	325	315		✓	-			**SPX250A2-5A4N1** 125410		
325	315	300	385	355	400	✓	-			**SPX300A2-5A4N1** 125421		

Notes

[1)] Overload cycle for 60 s every 600 s
[2)] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3)] at 690 V, 50 Hz/at 690 V, 60 Hz

Information relevant for export to North America → Page 77

Accessories

	Description	For use with	Part no. Article no.	Price see price list	Std. pack
External keypad					
	With illuminated LCD display Plain text, multi-line With control buttons and function keys Front IP54	SVX, SPX	**KEYPAD-LOC/REM** 139787		1 off
External keypad					
	Mounting frame for control panel door 2 m	KEYPAD-LOC/REM	**OPTRMT-KIT** 126868		1 off
Connection cable					
	Connection between variable frequency drive and PC 1.5 m	SVX, SPX	**SVDRIVECABLE** 129001		1 off
Expansion modules					
The expansion module is plugged into the variable-frequency drive.					
Adapters					
	System bus adapter	SPX	**OPTD1** 125077		1 off
	System bus adapter with CANopen® interface	SPX	**OPTD2** 125078		
	RS232 adapter	SPX	**OPTD3** 125079		
Output expansion					
	1 relay output (NO/NC) 1 relay output (NC) 1 Thermistor input	SPX	**OPTA3** 125050		1 off
	2 relay outputs (NO/NC)	SVX, SPX	**OPTA2** 125049		
	1 relay output (NO) 5 digital inputs (42 - 240 V AC)	SVX, SPX	**OPTB9** 125064		
	3 relay outputs (NO)	SVX, SPX	**OPTB5** 125062		
	1 relay output (NO/NC) 1 relay output (NO) 1 Thermistor input	SVX, SPX	**OPTB2** 125060		
I/O expansion					
	6 digital inputs External 24 V supply	SVX, SPX	**OPTB1** 125059		1 off
	6 digital inputs 1 digital output 2 analog inputs (mA/V) 1 analog output	SVX, SPX	**OPTA9** 125055		
	3 digital inputs 1 relay output (NO/NC) 1 digital output	SVX, SPX	**OPTAA** 125056		
	6 digital inputs 1 digital output 2 analog inputs (mA/V) 1 analog output	SPX	**OPTA8** 125054		
	1 analog input (mA, isolated) 2 analog outputs (mA, isolated)	SVX, SPX	**OPTB4** 125061		
Encoder module					
	HTL (+15 V/24 V) Master / Slave capability	SPX	**OPTA7** 125053		1 off
Temperature sensor expansion					
	3 Pt100 External 24 V supply	SVX, SPX	**OPTB8** 125063		1 off

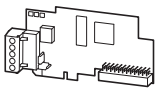
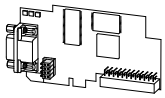
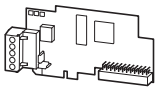
Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E134360
UL Category Control No.	NMMS, NMMS2, NMMS7. NMMS8
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits

SVX/SPX

Fieldbus modules

The field bus module is plugged into the variable-frequency drive.

	Description	For use with	Part no. Article no.	Price see price list	Std. pack
	Modbus RS485 Screw terminals	SVX, SPX	**OPTC2** 125067		1 off
	PROFIBUS-DP Screw terminals	SVX, SPX	**OPTC3** 125068		
	LonWorks Screw terminals	SVX, SPX	**OPTC4** 125069		
	CANopen® Screw terminals	SVX, SPX	**OPTC6** 125710		
	PROFIBUS-DP SUB-D 9 pole, socket	SVX, SPX	**OPTC5** 125070		
	DeviceNet SUB-D 9 pole, socket	SVX, SPX	**OPTC7** 125071		
	Modbus RS485 SUB-D 9 pole, socket	SVX, SPX	**OPTC8** 125072		
	Modbus-TCP RJ45, 8-pole	SVX, SPX	**OPTCI** 125075		
	BACnet/IP RJ45, 8-pole	SVX, SPX	**OPTCJ** 125076		

Information relevant for export to North America

Product Standards	UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking
UL File No.	E134360
UL Category Control No.	NMMS, NMMS2, NMMS7. NMMS8
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, certified by UL for use in Canada
Suitable for	Branch circuits

Variable frequency drive 9000X

Assigned switching and protective elements for SVX, SPX

Part no.	Motor		Frequency inverters		Power Wiring	Motor feeder			
	Assigned motor rating		Rated operational current		Main choke	motor choke		Sine filter	
	I_H = 150 %	I_L = 110 %	I_H = 150 %	I_L = 110 %	I_H = 150 % (CT/I_H, at 50 °C)	I_H = 150 % (CT/I_H, at 50 °C)	I_L = 110 % (VT/I_L, at 40 °C)	I_H = 150 % (CT/I_H, at 50 °C)	I_L = 110 % (VT/I_L, at 40 °C)
	P	P	I_e	I_e					
	kW	kW	A	A					
SVX variable frequency drive									
400 V AC, 3-phase/400 V AC, 3-phase									
SVX001A1-4…	0.75	1.1	2.2	3.3	DX-LN3-004	DX-LM3-005	DX-LM3-005	DX-SIN3-004	DX-SIN3-004
SVXF15A1-4…	1.1	1.5	3.3	4.3	DX-LN3-006	DX-LM3-005	DX-LM3-005	DX-SIN3-004	DX-SIN3-010
SVX002A1-4…	1.5	2.2	4.3	5.6	DX-LN3-006	DX-LM3-005	DX-LM3-008	DX-SIN3-010	DX-SIN3-010
SVX003A1-4…	2.2	3	5.6	7.6	DX-LN3-010	DX-LM3-008	DX-LM3-008	DX-SIN3-010	DX-SIN3-010
SVX005A1-4…	3	4	7.6	9	DX-LN3-010	DX-LM3-008	DX-LM3-011	DX-SIN3-010	DX-SIN3-010
SVX006A1-4…	4	5.5	9	12	DX-LN3-016	DX-LM3-011	DX-LM3-016	DX-SIN3-010	DX-SIN3-016
SVX007A1-4…	5.5	7.5	12	16	DX-LN3-016	DX-LM3-016	DX-LM3-016	DX-SIN3-016	DX-SIN3-016
SVX010A1-4…	7.5	11	16	23	DX-LN3-025	DX-LM3-016	DX-LM3-035	DX-SIN3-016	DX-SIN3-023
SVX015A1-4…	11	15	23	31	DX-LN3-040	DX-LM3-035	DX-LM3-035	DX-SIN3-023	DX-SIN3-032
SVX020A1-4…	15	18.5	31	38	DX-LN3-040	DX-LM3-035	DX-LM3-050	DX-SIN3-032	DX-SIN3-048
SVX025A1-4…	18.5	22	38	46	DX-LN3-050	DX-LM3-050	DX-LM3-050	DX-SIN3-048	DX-SIN3-048
SVX030A1-4…	22	30	46	61	DX-LN3-080	DX-LM3-050	DX-LM3-063	DX-SIN3-048	DX-SIN3-061
SVX040A1-4…	30	37	61	72	DX-LN3-080	DX-LM3-063	DX-LM3-080	DX-SIN3-061	DX-SIN3-072
SVX050A1-4…	37	45	72	87	DX-LN3-100	DX-LM3-080	DX-LM3-100	DX-SIN3-072	DX-SIN3-090
SVX060A1-4…	45	55	87	105	DX-LN3-120	DX-LM3-100	DX-LM3-150	DX-SIN3-090	DX-SIN3-115
SVX075A1-4…	55	75	105	140	DX-LN3-160	DX-LM3-150	DX-LM3-150	DX-SIN3-115	DX-SIN3-150
SVX100A1-4…	75	90	140	170	DX-LN3-200	DX-LM3-150	DX-LM3-180	DX-SIN3-150	DX-SIN3-180
SVX125A1-4…	90	110	170	205	DX-LN3-250	DX-LM3-180	DX-LM3-220	DX-SIN3-180	DX-SIN3-250
SVX150A1-4…	110	132	205	261	DX-LN3-300	DX-LM3-220	DX-LM3-260	DX-SIN3-250	DX-SIN3-440
SVX200A1-4…	132	160	245	300	DX-LN3-300	DX-LM3-260	DX-LM3-303	DX-SIN3-250	DX-SIN3-440
690 V AC, 3-phase/690 V AC, 3-phase									
SVX002A1-5…	2.2	3	3.2	4.5	DX-LN3-006	DX-LM3-005	DX-LM3-005	SIN-0005-6-0-P	SIN-0005-6-0-P
SVX003A1-5…	3	4	4.5	5.5	DX-LN3-006	DX-LM3-005	DX-LM3-008	SIN-0008-6-0-P	SIN-0008-6-0-P
SVX004A1-5…	4	5.5	5.5	7.5	DX-LN3-010	DX-LM3-008	DX-LM3-008	SIN-0008-6-0-P	SIN-0008-6-0-P
SVX005A1-5…	5.5	7.5	7.5	10	DX-LN3-010	DX-LM3-008	DX-LM3-011	SIN-0014-6-0-P	SIN-0014-6-0-P
SVX007A1-5…	7.5	11	10	13.5	DX-LN3-016	DX-LM3-011	DX-LM3-016	SIN-0014-6-0-P	SIN-0014-6-0-P
SVX010A1-5…	11	15	13.5	18	DX-LN3-025	DX-LM3-016	DX-LM3-035	SIN-0023-6-0-P	SIN-0023-6-0-P
SVX015A1-5…	15	18.5	18	22	DX-LN3-025	DX-LM3-035	DX-LM3-035	SIN-0023-6-0-P	SIN-0023-6-0-P
SVX020A1-5…	18.5	22	22	27	DX-LN3-040	DX-LM3-035	DX-LM3-035	SIN-0035-6-0-P	SIN-0035-6-0-P
SVX025A1-5…	22	30	27	34	DX-LN3-040	DX-LM3-035	DX-LM3-035	SIN-0035-6-0-P	SIN-0035-6-0-P
SVX030A1-5…	30	37	34	41	DX-LN3-050	DX-LM3-035	DX-LM3-050	SIN-0052-6-0-P	SIN-0052-6-0-P
SVX040A1-5…	37	45	41	52	DX-LN3-080	DX-LM3-050	DX-LM3-063	SIN-0052-6-0-P	SIN-0052-6-0-P
SVX050A1-5…	45	55	52	62	DX-LN3-080	DX-LM3-063	DX-LM3-063	SIN-0085-6-0-P	SIN-0085-6-0-P
SVX060A1-5…	55	75	62	80	DX-LN3-080	DX-LM3-063	DX-LM3-080	SIN-0085-6-0-P	SIN-0085-6-0-P
SVX075A1-5…	75	90	80	100	DX-LN3-100	DX-LM3-080	DX-LM3-100	SIN-0122-6-0-P	SIN-0122-6-0-P
SVX100A1-5…	90	110	100	125	DX-LN3-160	DX-LM3-100	DX-LM3-150	SIN-0122-6-0-P	SIN-0185-6-0-P
SVX125A1-5…	110	132	125	144	DX-LN3-160	DX-LM3-150	DX-LM3-150	SIN-0185-6-0-P	SIN-0185-6-0-P
SVX150A1-5…	132	160	144	170	DX-LN3-200	DX-LM3-150	DX-LM3-180	SIN-0185-6-0-P	SIN-0185-6-0-P
SVX175A1-5…	160	200	170	208	DX-LN3-250	DX-LM3-180	DX-LM3-220	SIN-0287-6-0-P	SIN-0287-6-0-P
SPX variable frequency drive									
400 V AC, 3-phase/400 V AC, 3-phase									
SPX001A1-4…	0.75	1.1	2.2	3.3	DX-LN3-004	DX-LM3-005	DX-LM3-005	DX-SIN3-004	DX-SIN3-004
SPXF15A1-4…	1.1	1.5	3.3	4.3	DX-LN3-006	DX-LM3-005	DX-LM3-005	DX-SIN3-004	DX-SIN3-010
SPX002A1-4…	1.5	2.2	4.3	5.6	DX-LN3-006	DX-LM3-005	DX-LM3-008	DX-SIN3-010	DX-SIN3-010
SPX003A1-4…	2.2	3	5.6	7.6	DX-LN3-010	DX-LM3-008	DX-LM3-008	DX-SIN3-010	DX-SIN3-010
SPX005A1-4…	3	4	7.6	9	DX-LN3-010	DX-LM3-008	DX-LM3-011	DX-SIN3-010	DX-SIN3-010
SPX006A1-4…	4	5.5	9	12	DX-LN3-016	DX-LM3-011	DX-LM3-016	DX-SIN3-010	DX-SIN3-016
SPX007A1-4…	5.5	7.5	12	16	DX-LN3-016	DX-LM3-016	DX-LM3-016	DX-SIN3-016	DX-SIN3-016
SPX010A1-4…	7.5	11	16	23	DX-LN3-025	DX-LM3-016	DX-LM3-035	DX-SIN3-016	DX-SIN3-023
SPX015A1-4…	11	15	23	31	DX-LN3-040	DX-LM3-035	DX-LM3-035	DX-SIN3-023	DX-SIN3-032
SPX020A1-4…	15	18.5	31	38	DX-LN3-040	DX-LM3-035	DX-LM3-050	DX-SIN3-032	DX-SIN3-048
SPX025A1-4…	18.5	22	38	46	DX-LN3-050	DX-LM3-050	DX-LM3-050	DX-SIN3-048	DX-SIN3-048
SPX030A1-4…	22	30	46	61	DX-LN3-080	DX-LM3-050	DX-LM3-063	DX-SIN3-048	DX-SIN3-061
SPX040A1-4…	30	37	61	72	DX-LN3-080	DX-LM3-063	DX-LM3-080	DX-SIN3-061	DX-SIN3-072
SPX050A1-4…	37	45	72	87	DX-LN3-100	DX-LM3-080	DX-LM3-100	DX-SIN3-072	DX-SIN3-090

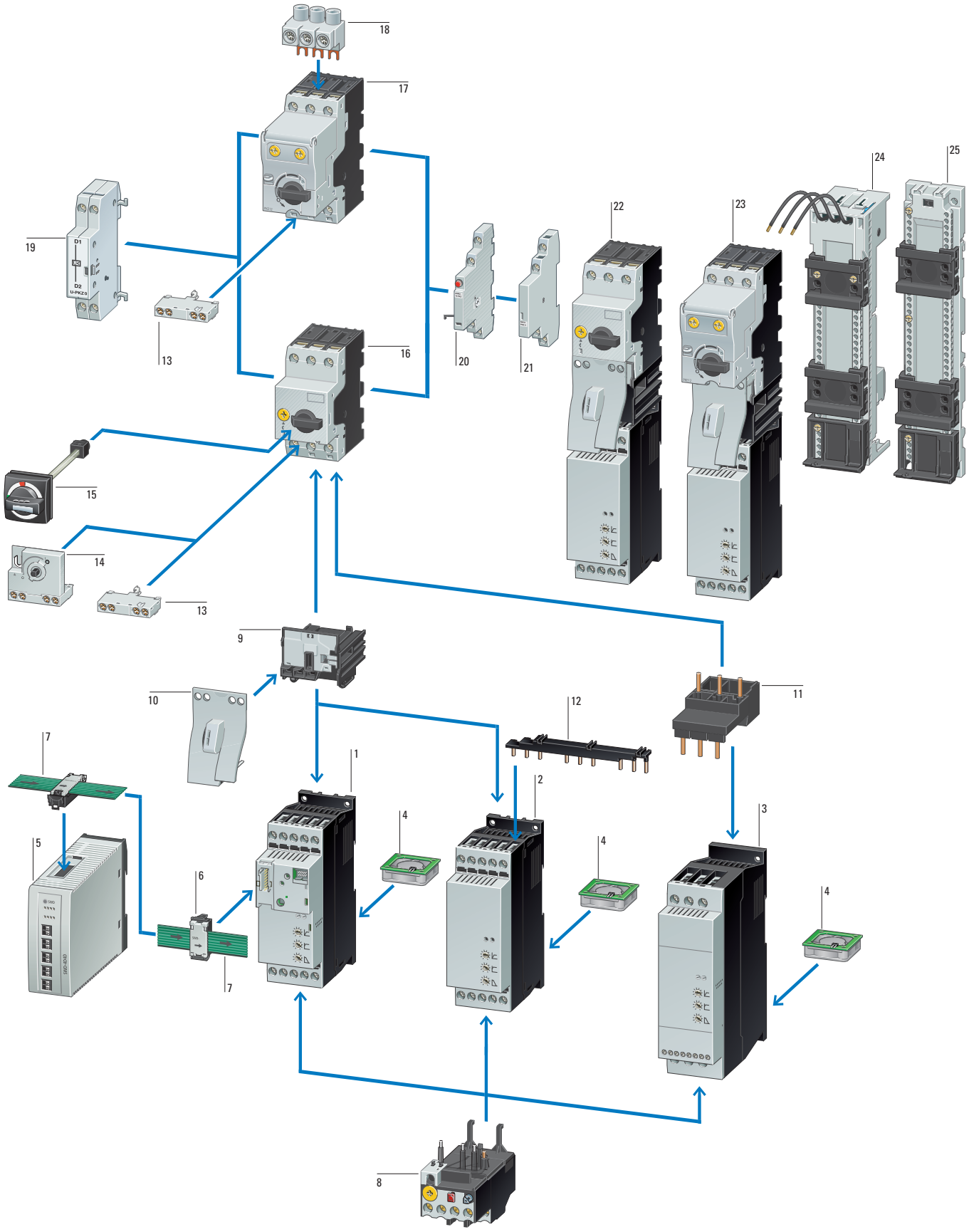
Part no.	Motor		Frequency inverters		Power Wiring	Motor feeder			
	Assigned motor rating		Rated operational current		Main choke	motor choke		Sine filter	
	I_H = 150 %	I_L = 110 %	I_H = 150 %	I_L = 110 %	I_H = 150 % (CT/I_H, at 50 °C)	I_H = 150 % (CT/I_H, at 50 °C)	I_L = 110 % (VT/I_L, at 40 °C)	I_H = 150 % (CT/I_H, at 50 °C)	I_L = 110 % (VT/I_L, at 40 °C)
	P kW	P kW	I_e A	I_e A					
SPX060A1-4…	45	55	87	105	DX-LN3-120	DX-LM3-100	DX-LM3-150	DX-SIN3-090	DX-SIN3-115
SPX075A1-4…	55	75	105	140	DX-LN3-160	DX-LM3-150	DX-LM3-150	DX-SIN3-115	DX-SIN3-150
SPX100A1-4…	75	90	140	170	DX-LN3-200	DX-LM3-150	DX-LM3-180	DX-SIN3-150	DX-SIN3-180
SPX125A1-4…	90	110	170	205	DX-LN3-250	DX-LM3-180	DX-LM3-220	DX-SIN3-180	DX-SIN3-250
SPX150A1-4…	110	132	205	261	DX-LN3-300	DX-LM3-220	DX-LM3-260	DX-SIN3-250	DX-SIN3-440
SPX200A1-4…	132	160	245	300	DX-LN3-300	DX-LM3-260	DX-LM3-303	DX-SIN3-250	DX-SIN3-440
SPX250A0-4…	160	200	300	385	-	DX-LM3-303	DX-LM3-450	DX-SIN3-440	DX-SIN3-440
SPX300A0-4…	200	250	385	460	-	DX-LM3-450	DUT-0590-6-0-S	DX-SIN3-440	DX-SIN3-480
SPX350A0-4…	250	250	460	520	-	DUT-0590-6-0-S	DUT-0590-6-0-S	SIN-0600-5-0-P	SIN-0600-5-0-P
SPX400A0-4…	250	315	520	590	-	DUT-0590-6-0-S	DUT-0590-6-0-S	SIN-0600-5-0-P	SIN-0600-5-0-P
SPX500A0-4…	315	355	590	650	-	DUT-0820-6-0-S	DUT-0820-6-0-S	SIN-0600-5-0-P	SIN-0840-5-0-P
SPX550A0-4…	355	400	650	730	-	DUT-0820-6-0-S	DUT-1100-6-0-S	SIN-0840-5-0-P	SIN-0840-5-0-P
SPX600A0-4…	400	450	730	820	-	DUT-1250-6-0-S	DUT-1100-6-0-S	SIN-0840-5-0-P	SIN-0840-5-0-P
SPX650A0-4…	450	500	820	920	-	DUT-1250-6-0-S	DUT-1100-6-0-S	SIN-1160-5-0-P	SIN-1160-5-0-P
SPX700A0-4…	500	560	920	1030	-	DUT-1250-6-0-S	DUT-1100-6-0-S	SIN-1160-5-0-P	SIN-1160-5-0-P
SPX800A0-4…	560	630	1030	1150	-	DUT-1250-6-0-S	DUT-1250-6-0-S	SIN-1480-5-0-P	SIN-1160-5-0-P
SPX900A0-4…	630	710	1150	1300	-	DUT-1600-6-0-S	DUT-1600-6-0-S	SIN-1480-5-0-P	SIN-1480-5-0-P
SPXH10A0-4…	710	800	1300	1450	-	DUT-1600-6-0-S	DUT-1600-6-0-S	SIN-1480-5-0-P	SIN-1480-5-0-P
SPXH12A0-4…	900	1000	1600	1770	-	-	-	-	-
SPXH16A0-4…	1100	1200	1940	2150	-	-	-	-	-
690 V AC, 3-phase/690 V AC, 3-phase									
SPX002A1-5…	2.2	3	3.2	4.5	DX-LN3-006	DX-LM3-005	DX-LM3-005	SIN-0005-6-0-P	SIN-0005-6-0-P
SPX003A1-5…	3	4	4.5	5.5	DX-LN3-006	DX-LM3-008	DX-LM3-008	SIN-0008-6-0-P	SIN-0008-6-0-P
SPX004A1-5…	4	5.5	5.5	7.5	DX-LN3-010	DX-LM3-008	DX-LM3-008	SIN-0008-6-0-P	SIN-0008-6-0-P
SPX005A1-5…	5.5	7.5	7.5	10	DX-LN3-010	DX-LM3-011	DX-LM3-011	SIN-0014-6-0-P	SIN-0014-6-0-P
SPX007A1-5…	7.5	11	10	13.5	DX-LN3-016	DX-LM3-016	DX-LM3-016	SIN-0014-6-0-P	SIN-0014-6-0-P
SPX010A1-5…	11	15	13.5	18	DX-LN3-025	DX-LM3-035	DX-LM3-035	SIN-0023-6-0-P	SIN-0023-6-0-P
SPX015A1-5…	15	18.5	18	22	DX-LN3-025	DX-LM3-035	DX-LM3-035	SIN-0023-6-0-P	SIN-0023-6-0-P
SPX020A1-5…	18.5	22	22	27	DX-LN3-040	DX-LM3-035	DX-LM3-035	SIN-0035-6-0-P	SIN-0035-6-0-P
SPX025A1-5…	22	30	27	34	DX-LN3-040	DX-LM3-035	DX-LM3-035	SIN-0035-6-0-P	SIN-0035-6-0-P
SPX030A1-5…	30	37	34	41	DX-LN3-050	DX-LM3-035	DX-LM3-050	SIN-0052-6-0-P	SIN-0052-6-0-P
SPX040A1-5…	37	45	41	52	DX-LN3-080	DX-LM3-050	DX-LM3-063	SIN-0052-6-0-P	SIN-0052-6-0-P
SPX050A1-5…	45	55	52	62	DX-LN3-080	DX-LM3-063	DX-LM3-063	SIN-0085-6-0-P	SIN-0085-6-0-P
SPX060A1-5…	55	75	62	80	DX-LN3-080	DX-LM3-063	DX-LM3-080	SIN-0085-6-0-P	SIN-0085-6-0-P
SPX075A1-5…	75	90	80	100	DX-LN3-100	DX-LM3-080	DX-LM3-100	SIN-0122-6-0-P	SIN-0122-6-0-P
SPX100A1-5…	90	110	100	125	DX-LN3-160	DX-LM3-100	DX-LM3-150	SIN-0122-6-0-P	SIN-0185-6-0-P
SPX125A1-5…	110	132	125	144	DX-LN3-160	DX-LM3-150	DX-LM3-150	SIN-0185-6-0-P	SIN-0185-6-0-P
SPX150A1-5…	132	160	144	170	DX-LN3-200	DX-LM3-150	DX-LM3-180	SIN-0185-6-0-P	SIN-0185-6-0-P
SPX175A1-5…	160	200	170	208	DX-LN3-250	DX-LM3-180	DX-LM3-220	SIN-0287-6-0-P	SIN-0287-6-0-P
SPX200A0-5…	200	250	208	261	DX-LN3-300	DX-LM3-220	DX-LM3-303	SIN-0287-6-0-P	SIN-0287-6-0-P
SPX250A0-5…	250	315	261	325	-	DX-LM3-260	DX-LM3-450	SIN-0390-6-0-P	SIN-0390-6-0-P
SPX300A0-5…	315	355	325	385	-	DX-LM3-450	DX-LM3-450	SIN-0390-6-0-P	SIN-0390-6-0-P
SPX400A0-5…	355	450	385	460	-	DX-LM3-450	DUT-0590-6-0-S	SIN-0460-6-0-P	SIN-0460-6-0-P
SPX450A0-5…	450	500	460	502	-	DUT-0590-6-0-S	DUT-0590-6-0-S	SIN-0460-6-0-P	SIN-0620-6-0-P
SPX500A0-5…	500	560	502	590	-	DUT-0590-6-0-S	DUT-0590-6-0-S	SIN-0620-6-0-P	SIN-0620-6-0-P
SPX550A0-5…	560	630	590	650	-	DUT-0820-6-0-S	DUT-0820-6-0-S	SIN-0780-6-0-P	SIN-0780-6-0-P
SPX600A0-5…	630	710	650	750	-	DUT-0820-6-0-S	DUT-0820-6-0-S	SIN-0780-6-0-P	SIN-0780-6-0-P
SPX700A0-5…	710	800	750	820	-	DUT-1250-6-0-S	DUT-0820-6-0-S	SIN-0920-6-0-P	SIN-0920-6-0-P
SPX800A0-5…	800	900	820	920	-	DUT-1250-6-0-S	DUT-1250-6-0-S	SIN-1180-6-0-P	SIN-0920-6-0-P
SPX900A0-5…	900	1000	920	1030	-	DUT-1250-6-0-S	DUT-1250-6-0-S	SIN-1180-6-0-P	SIN-1180-6-0-P
SPXH10A0-5…	1000	1150	1030	1180	-	DUT-1250-6-0-S	DUT-1250-6-0-S	SIN-1180-6-0-P	SIN-1180-6-0-P
SPXH13A0-5…	1300	1500	1300	1500	-	DUT-1600-6-0-S	DUT-1600-6-0-S	-	-
SPXH15A0-5…	1500	1800	1500	1900	-	-	-	-	-
SPXH20A0-5…	1800	2000	1900	2250	-	-	-	-	-

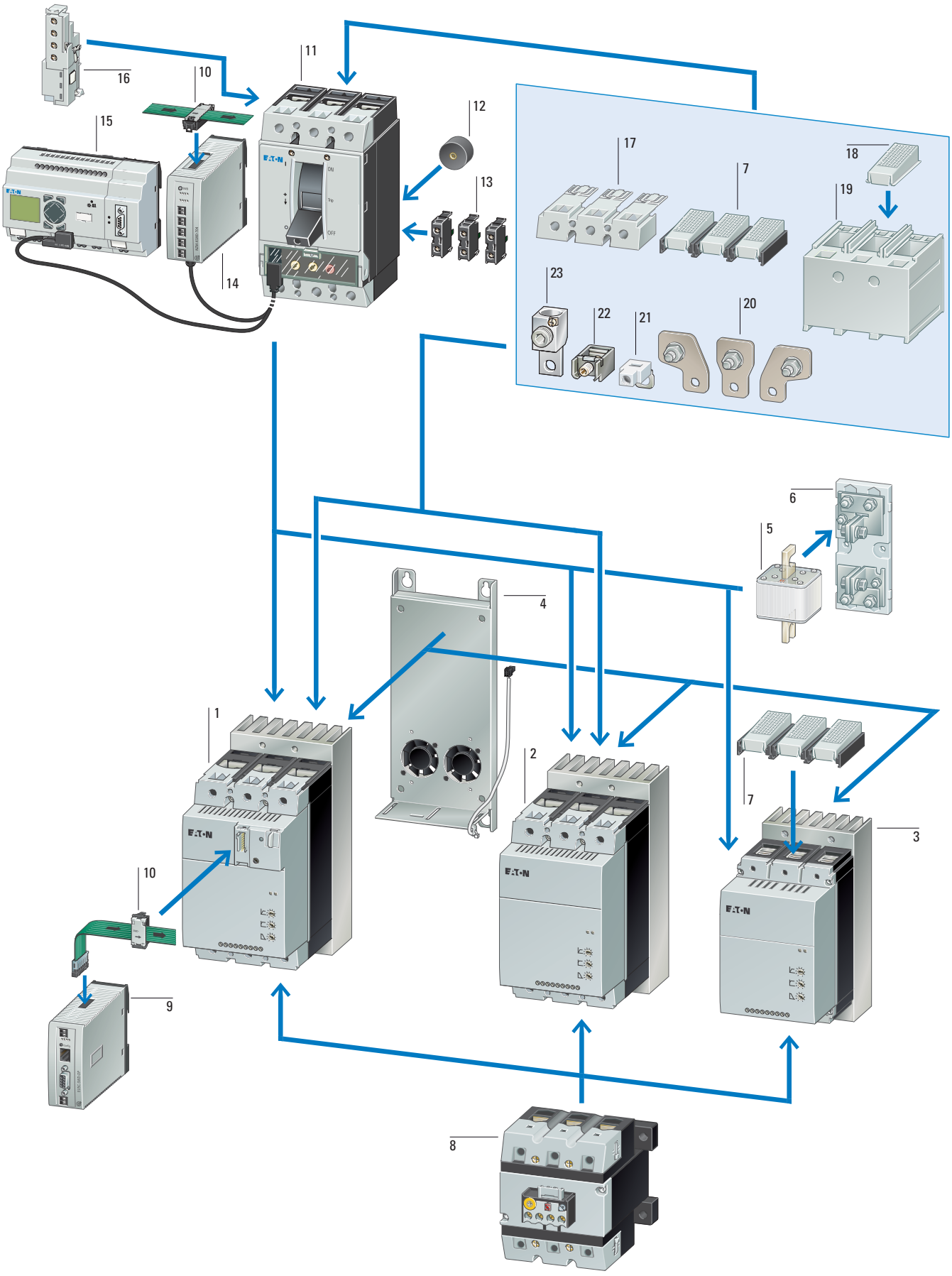
Soft Starter DS7 of System xStart – Soft at the Start, High on Torque

Soft starters have become a well-established alternative to the star-delta starter. This is where the DS7, featuring two-phase control and designed to work seamlessly with DILM and PKZ switchgear, comes in. The DS7 can be flexibly combined with other units and adds the ability to "start motors softly" to the switching, protection, and starting functions common to control panels. A patented method ensures that motor run-ups will be exceptionally soft while providing a higher torque than other available solutions. Longer service intervals and reduced operating costs are welcome side effects of this.

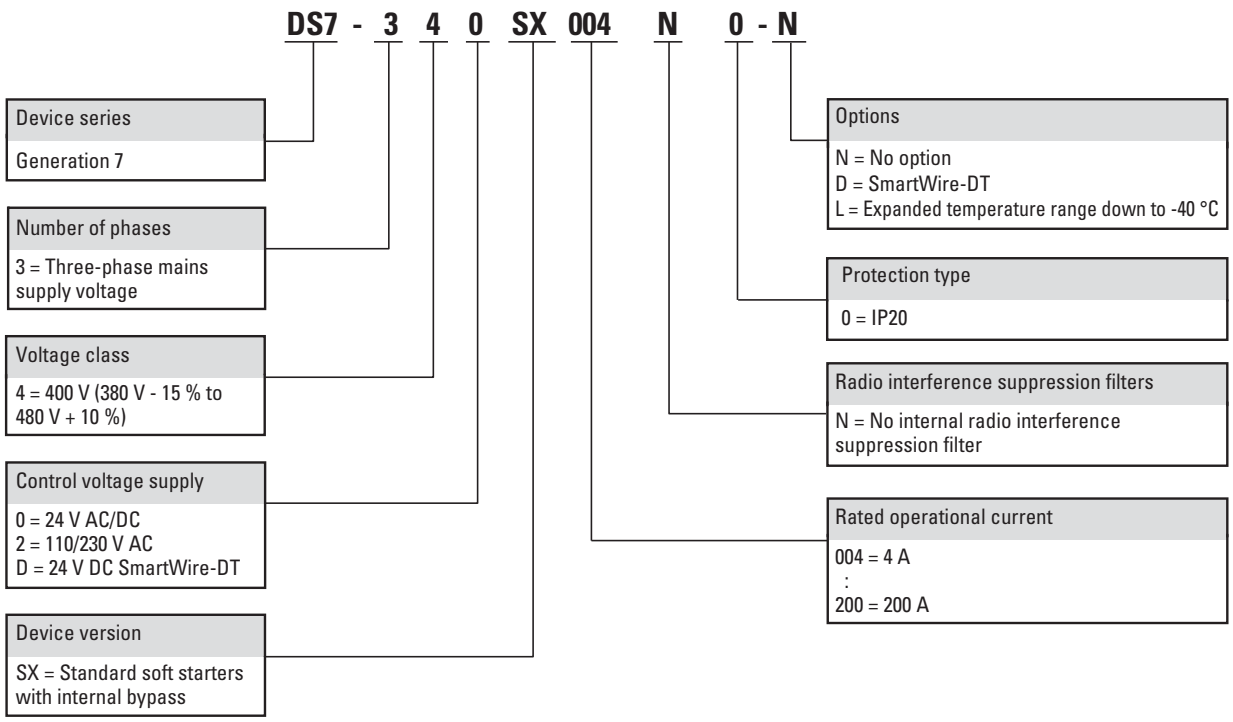
Designed for normal applications such as pumps, fans and small conveyors, the compact DS7 is ideal. The DS7 is also available with a SmartWire-DT connection to simplify wiring and enhance functionality as an automation solution.

System overview




16
10
11
15
12
13
14
17
18
7
19
23
22
21
20
6
5
4
1
2
7
3
10
9
8

Key to type references



Description

Application

The DS7 series soft starters are two-phased controlled soft starters used for soft starting three-phase AC motors for applications with a normal operating frequency and a performance range of 3 to 200 A (1.1 to 110 kW with a 400 V mains voltage). Closing transients and DC components during startup are effectively suppressed and guarantee even motor starting.
The special actuation method (asymmetrical trigger phase control) for the soft starter function avoids the DC components (Eaton patent) that would normally occur in two-phase-controlled soft starters. This suppresses the generation of an elliptical rotating field, which would cause uneven motor starting and increase the motor's acceleration. The true run behavior of the DS7 is therefore comparable with that of a three-phase controlled soft starter.

Functions

Typical fields of application for Series DS7 soft starters are:
- Pump drives: pressure surges are prevented through soft starting. The mechanical load on the whole plant is reduced and its service life increases.
- Fan drives: soft starting keeps fan belts from slipping, preventing premature wear. This lowers operating costs and extends the system's lifespan.
- Conveyor belts: conveyor belts start running smoothly, instead of starting with a jolt. This ensures that any goods being conveyed do not topple over. Mechanical damage to the belt itself is avoided, making it more durable.

Features

- The ramp time can be adjusted by potentiometer within a range of 1 to 30 s (for starting) or 0 to 30 s (for stopping) with a potentiometer
- The start voltage (or start torque) can be adjusted within a range of 30 to 100 percent of the mains voltage with a potentiometer
- Significant reduction in switch-on current, achieved with a short soft start ramp time (min. 1 s) for lamp and heating loads
- Internal bypass relay: switches on automatically after the end of the ramp, bypassing the internal thyristors.
- This makes it possible to comply with radio interference level B without any additional measures.
- The motor's thermal load is smaller than it would be without asymmetric ignition control.
- Designed specifically for long cables

Documentation

Surface mounting and standard mounting procedures are described in the corresponding mounting instructions and in the manual.

Instructional leaflets:
IL03902003Z: for size 1 devices (up to 12 A motor output)
IL03902004Z: for size 2 devices (up to 32 A motor output)
IL03902005Z: for size 3, 4 devices (up to 200 A motor output)

Manual:
MN03901001Z

You can download the documentation for the DS7 soft starters from the Internet
at: www.moeller.net/support

Communication interface SmartWire-DT

Our SmartWire-DT interface completely eliminates the need for conventional control wiring. This has several advantages:
- No incorrect wiring
- Faster wiring
- Cost saving

The interface can be used to send control commands to the DS7-SWD and change and diagnose its parameter configuration; in addition, the control electronics can be powered via the SmartWire-DT cable. The device is controlled with one of three selectable profiles:
- A "start/stop" profile, which should already be familiar from the PKE motor-protective circuit-breaker and contactor combination
- An 8 bit-wide profile for the soft starter, which is provided the same way for the variable frequency drive and features more options
- A control profile comparable to a PROFIdrive profile, just like the one available for the variable frequency drive.

Regardless of the profile chosen, the DS7-SWD's parameters can be read and written to at any time by using acyclic services.
DS7-SWD makes it possible to read and write to all device parameters. The mechanisms of the parameter channel that is described for the drives in the PROFIdrive profile are used for this purpose. This profile provides a standardized parameter access method for variable frequency drives and soft starters.
It is also possible to overwrite the potentiometer settings on the DS7-SWD, which can come in handy, for instance, when a change made to the machine needs to be undone.

The DS7-SWD comes with a detailed diagnostic system with options that extend far beyond those of wired devices. In addition to having an error log, the DS7-SWD can detect and report nine different device faults. A warning parameter reports any present alarm messages. Moreover, the response to each individual fault can be customized. Finally, there are 35 additional messages for communication errors. Using the DS7 in connection with the PKE opens up new functionalities that were previously thought impossible to implement with a low-cost soft starter and that were reserved to significantly more expensive devices. Combining a PKE unit and a DS7-SWD makes it possible to completely protect the DS7-SWD device against overloads. In addition, it provides a current limiting function and can report thermal capacity utilization levels to higher level controllers.

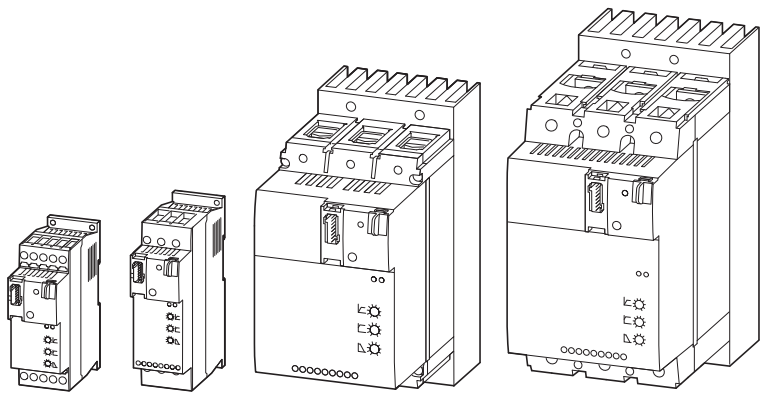
Expanded temperature range

DS7-340SX…-L soft starters can operate at temperatures as low as -40 °C.

Ordering

Rated operational current	Assigned motor rating		Part no.	Article no.	Price see price list	Part no.	Article no.	Price see price list	Std. pack
Device (AC-53)	at 400 V, 50 Hz	at 460 V, 60 Hz							
I_e	P	P							
A	kW	HP	**U_C 24 V AC/DC U_s 24 V AC/DC Standard temperature range**			**U_C 24 V AC/DC U_s 24 V AC/DC Expanded temperature range down to -40 °C**			
Soft starters									
Soft starters for three-phase loads Mains supply voltage (50/60 Hz) U_{LN} 200 - 480 V AC									
4	1.5	2	**DS7-340SX004N0-N**	134847		**DS7-340SX004N0-L**	171740		1 off
7	3	5	**DS7-340SX007N0-N**	134849		**DS7-340SX007N0-L**	171741		
9	4	5	**DS7-340SX009N0-N**	134910		**DS7-340SX009N0-L**	171742		
12	5.5	10	**DS7-340SX012N0-N**	134911		**DS7-340SX012N0-L**	171743		
16	7.5	10	**DS7-340SX016N0-N**	134912		**DS7-340SX016N0-L**	171744		
24	11	15	**DS7-340SX024N0-N**	134913		**DS7-340SX024N0-L**	171745		
32	15	25	**DS7-340SX032N0-N**	134914		**DS7-340SX032N0-L**	171746		
41	22	30	**DS7-340SX041N0-N**	134916		**DS7-340SX041N0-L**	171747		
55	30	40	**DS7-340SX055N0-N**	134917		**DS7-340SX055N0-L**	171748		
70	37	50	**DS7-340SX070N0-N**	134918		**DS7-340SX070N0-L**	171749		
81	45	60	**DS7-340SX081N0-N**	134919		**DS7-340SX081N0-L**	171750		
100	55	75	**DS7-340SX100N0-N**	134920		**DS7-340SX100N0-L**	171751		
135	75	100	**DS7-340SX135N0-N**	134921		**DS7-340SX135N0-L**	171752		
160	90	125	**DS7-340SX160N0-N**	134922		**DS7-340SX160N0-L**	171753		
200	110	150	**DS7-340SX200N0-N**	134923		**DS7-340SX200N0-L**	171754		
			U_C 110 - 230 V AC U_s 110 - 230 V AC			**U_C 24 V DC U_s 24 V DC**			
4	1.5	2	**DS7-342SX004N0-N**	134925		**DS7-34DSX004N0-D**	134943		1 off
7	3	5	**DS7-342SX007N0-N**	134927		**DS7-34DSX007N0-D**	134945		
9	4	5	**DS7-342SX009N0-N**	134928		**DS7-34DSX009N0-D**	134946		
12	5.5	10	**DS7-342SX012N0-N**	134929		**DS7-34DSX012N0-D**	134947		
16	7.5	10	**DS7-342SX016N0-N**	134930		**DS7-34DSX016N0-D**	134948		
24	11	15	**DS7-342SX024N0-N**	134931		**DS7-34DSX024N0-D**	134949		
32	15	25	**DS7-342SX032N0-N**	134932		**DS7-34DSX032N0-D**	134950		
41	22	30	**DS7-342SX041N0-N**	134934		**DS7-34DSX041N0-D**	134952		
55	30	40	**DS7-342SX055N0-N**	134935		**DS7-34DSX055N0-D**	134953		
70	37	50	**DS7-342SX070N0-N**	134936		**DS7-34DSX070N0-D**	134954		
81	45	60	**DS7-342SX081N0-N**	134937		**DS7-34DSX081N0-D**	134955		
100	55	75	**DS7-342SX100N0-N**	134938		**DS7-34DSX100N0-D**	134956		
135	75	100	**DS7-342SX135N0-N**	134939		**DS7-34DSX135N0-D**	134957		
160	90	125	**DS7-342SX160N0-N**	134940		**DS7-34DSX160N0-D**	134958		
200	110	150	**DS7-342SX200N0-N**	134941		**DS7-34DSX200N0-D**	134959		

Notes



4 - 12 A 16 - 32 A 41 - 100 A 135 - 200 A

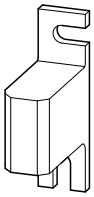
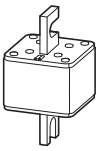
Information relevant for export to North America

UL/CSA applies only for DS7…-N

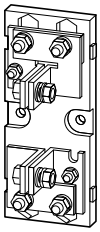
Product Standards	IEC/EN 60947-4-2; GB 14048.6; UL 508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE marking
UL File No.	E251034
CSA File No.	2511305
CSA Class No.	321106
Suitable for	Branch circuits
Max. Voltage Rating	480 V
Degree of Protection	IP20; UL/CSA Type 1

Superfast semiconductor fuses

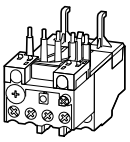
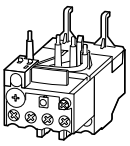
DIN 43653, 690/700 V (IEC/UL)
Inside micrometer 80 mm

	Rated device current A	Maximum power loss P_v W	Frame size	For use with	**Part no.** Article no.	**Price** see price list	Std. pack	**Information relevant for export to North America**
	16	5.5	000	DS7-34…SX004N0-…	**170M1359** 171968		10 off	Product Standards: IEC/EN 60269-4; UL 248-1; CSA-C22.2 No. 248.14; CE marking UL File No.: E125085 UL Category Control No.: JFHR2 CSA File No.: 053787_C_000 CSA Class No.: 1422-30 North America Certification: UL recognized, CSA certified Suitable for: semiconductor protection
	25	9	000	DS7-34…SX007N0-…	**170M1361** 171969			
	32	10	000	DS7-34…SX009N0-… DS7-34…SX012N0-…	**170M1362** 171970			
	40	12	000	DM4-340-7K5	**170M1363** 171971			
	50	15	000	DS4-340-2K2-M DS4-340-2K2-MR DS4-340-2K2-M-DC DS7-34…SX016N0-…	**170M1364** 171972			
	63	16	000	DS4-340-4K0-M DS4-340-4K0-MR DS4-340-7K5-MX DS4-340-7K5-MXR DS7-34…SX024N0-…	**170M1365** 171973			
	80	19	000	DS4-340-5K5-M DS4-340-5K5-MR DS4-340-11K-MX DS4-340-11K-MXR DS7-34…SX032N0-…	**170M1366** 171974			
	100	21	S1*	DS6-340-22K-MX	**170M3012** 171976			
	125	26	S1*	DS4-340-7K5-M DS4-340-7K5-MR DS4-340-15K-MX DS4-340-15K-MXR DM4-340-22K DM4-340-30K DS7-34…SX041N0-… DS7-34…SX055N0-…	**170M3013** 173799			
	160	30	S1*	DS4-340-11K-M DS4-340-11K-MR	**170M3014** 171977			
	200	45	S1	DM4-340-37K DM4-340-45K DS6-340-37K-MX DS6-340-45K-MX DS6-340-55K-MX DS7-34…SX070N0-… DS7-34…SX081N0-… DS7-34…SX100N0-…	**170M4008** 171978			
	315	58	S1	DS6-340-75K-MX DS7-34…SX135N0-…	**170M4010** 171979			
	350	60	S1	DM4-340-55K DM4-340-75K	**170M4011** 171980			
	400	65	S2	DS6-340-90K-MX DS7-34…SX160N0-…	**170M5008** 171984			
	450	70	S1	DM4-340-90K DM4-340-110K	**170M4013** 171981			
	500	72	S1	DM4-340-132K DM4-340-160K	**170M4014** 171982			
	500	95	S3	DS6-340-110K-MX DS7-34…SX200N0-… DM4-340-132K DM4-340-160K	**170M6008** 171985			
	630	80	S1	DM4-340-200K	**170M4016** 171983			
	900	120	S3	DM4-340-250K DM4-340-315K	**170M6013** 171986			
	1250	140	S3	DM4-340-400K DM4-340-500K	**170M6016** 171987			

Fuse Bases

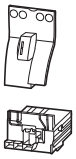
	For use with	Part no. Article no.	Price see price list	Std. pack	Information relevant for export to North America
 Dimensions (W x H x D) mm 145 x 43 x 50	000, 00	**170H1007** 171988		3 off	Product Standards: IEC/EN 60269-1; UL 512; CE marking UL File No.: E14853 UL Category Control No.: IZLT2 North America Certification: UL listed Suitable for: DIN 43653 fuses
205 x 88 x 80	S1*, S1, S2, S3	**170H3004** 171989			

Overload relays

	For use with	Part no. Article no.	Price see price list	Std. pack	Information relevant for export to North America
	DS7-34…SX004…	**ZB12-4** 278438		1 off	Product Standards: UL 508; CSA-C22.2 No. 14; IEC/EN 60947-4-1; IEC/EN 60947-5-1; CE marking UL File No.: E29184 UL Category Control No.: NKCR CSA File No.: 12528 CSA Class No.: 3211-03 North America Certification: UL listed, CSA certified Suitable for: Branch circuits Max. Voltage Rating: 600 V AC Degree of Protection: IEC: IP20, UL/CSA Type: -
	DS7-34…SX007… DS7-34…SX009…	**ZB12-10** 278440			
	DS7-34…SX012…	**ZB12-12** 278441			
	DS7-34…SX016…	**ZB32-16** 278452			
	DS7-34…SX024…	**ZB32-24** 278453			
	DS7-34…SX032…	**ZB32-32** 278454			

Wiring set

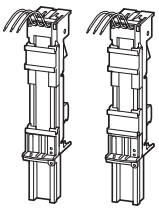
For DOL Starter

	For use with	Part no. Article no.	Price see price list	Std. pack	Information relevant for export to North America
	DS7-34…SX004… DS7-34…SX007… DS7-34…SX009… DS7-34…SX012…	**PKZM0-XDM12** 283149		1 off	Product Standards: UL 508; CSA-C22.2 No. 14; IEC60947-4-1; CE marking UL File No.: E36332 UL Category Control No.: NLRV CSA File No.: 165628 CSA Class No.: 3211-05 North America Certification: UL listed, CSA certified

Electric contact module

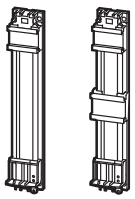
	For use with	Part no. Article no.	Price see price list	Std. pack	Information relevant for export to North America
	DS7-34…SX016… DS7-34…SX024… DS7-34…SX032…	**PKZM0-XM32DE** 239349		5 off	Product Standards: UL 508; CSA-C22.2 No. 14; IEC60947-4-1; CE marking UL File No.: E36332 UL Category Control No.: NLRV CSA File No.: 165628 CSA Class No.: 3211-05 North America Certification: UL listed, CSA certified

Busbar adapters

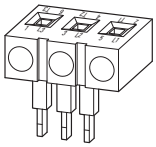
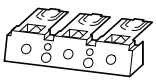
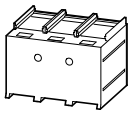
	For use with	Part no. Article no.	Price see price list	Std. pack
	PKZM0, PKE + DS7...004N... PKZM0, PKE + DS7...007N... PKZM0, PKE + DS7...009N... PKZM0, PKE + DS7...012N...	**BBA0L-25** 142526		1 off
	PKZM0, PKE + DS7...016N... PKZM0, PKE + DS7...024N... PKZM0, PKE + DS7...032N...	**BBA0L-32** 142527		1 off

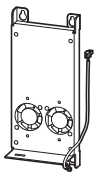
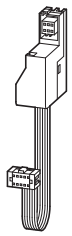
Top-hat rail adapter

45 mm wide adapter plate

	For use with	Part no. Article no.	Price see price list	Std. pack
	PKZM0, PKE + DS7...004N... PKZM0, PKE + DS7...007N... PKZM0, PKE + DS7...009N... PKZM0, PKE + DS7...012N...	**PKZM0-XC45L** 142529		1 off
	PKZM0, PKE + DS7...016N... PKZM0, PKE + DS7...024N... PKZM0, PKE + DS7...032N...	**PKZM0-XC45L/2** 142570		1 off

DS7

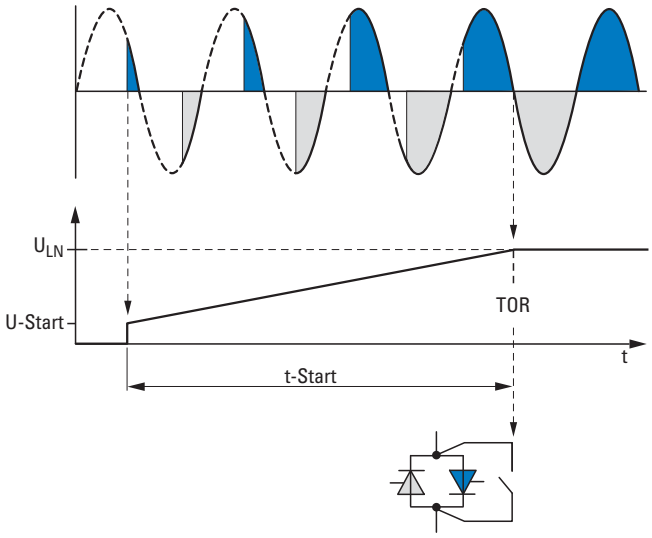
	For use with	Part no. Article no.	Price see price list	Std. pack	Notes	Information relevant for export to North America
Three-phase commoning links						
protected against accidental contact, short-circuit proof, U_e = 690 V, I_u = 35 A can be extended by rotating installation (∑ Iu ≦ 35 A)						
	DS7-34…SX004… DS7-34…SX007… DS7-34…SX009… DS7-34…SX012…	**DILM12-XDSB0/3** 240084		5 off	For the primary side of DS7 Suitable for 3 DS7 soft starters Length 112 mm	Product Standards: IEC/EN 60947-4-1; UL 508; CSA-C22.2 No. 14-05; CE marking UL File No.: E36332 UL Category Control No.: NLRV CSA File No.: 012528 CSA Class No.: 2411-03 North America Certification: UL listed, CSA certified
		**DILM12-XDSB0/4** 240085			For the primary side of DS7 Suitable for 4 DS7 soft starters Length 157 mm	
		**DILM12-XDSB0/5** 240086			For the primary side of DS7 Suitable for 5 DS7 soft starters Length 202 mm	
Incoming connection block						
	DS7-34…SX004… DS7-34…SX007… DS7-34…SX009… DS7-34…SX012…	**DILM12-XEK** 240083		5 off	For three-phase commoning link, protected against accidental contact, U_e = 690 V, I_u = 35 A. Connection cross section: Stranded 2.5…16 mm² Flexible with ferrule 2.5…16 mm² AWG14…8	Product Standards: IEC/EN 60947-4-1; UL 508; CSA-C22.2 No. 14-05; CE marking UL File No.: E36332 UL Category Control No.: NLRV CSA File No.: 012528 CSA Class No.: 2411-03 North America Certification: UL listed, CSA certified
Terminal cover						
Type contains parts for a terminal located at top or bottom for 3 pole circuit-breakers.						
knockout For box terminal 	DS7-34…SX041… DS7-34…SX055… DS7-34…SX070… DS7-34…SX081… DS7-34…SX100…	**NZM1-XKSFA** 100780		1 off	Enhancement of the busbar tag shroud (simple protection against contact with a finger). Cannot be combined with NZM-XSTK control circuit terminal.	UL/CSA certification not required
knockout 	DS7-34…SX135… DS7-34…SX160… DS7-34…SX200…	**NZM2-XKSFA** 104640		1 off	Enhancement of the busbar tag shroud (simple protection against contact with a finger). Protection when reaching into the cable connection area with the connection of cables in the box terminal. With 2 conductors max cross section 22 mm² or AWG4. Cannot be combined with NZM-XSTK control circuit terminal.	UL/CSA certification not required
	DS7-34…SX135… DS7-34…SX160… DS7-34…SX200…	**NZM2-XKSA** 260038		1 off	Busbar tag shroud where cable lugs, busbars or tunnel terminals are used. When using insulated conductor material to IP1X.	Product Standards: UL489; CSA-C22.2 No. 5-09; IEC60947, CE marking UL File No.: E31593 UL Category Control No.: DIHS CSA File No.: 22086 CSA Class No.: 1432-01 North America Certification: UL listed, CSA certified Suitable for: Refer to main component information

	For use with	Part no. Article no.	Price see price list	Std. pack	Notes	Information relevant for export to North America
IP2X protection against contact with a finger Type contains parts for a terminal located at top or bottom for 3 pole circuit-breakers. Enhancement of the busbar tag shroud to IP2X.						
For box terminal 	NZM2, PN2, N2	**NZM2-XIPK** 266773		1 off	Protection when reaching into the cable connection area with the connection of cables in the box terminal. With 2 conductors max cross section 25 mm² or AWG4. Cannot be combined with NZM-XSTK control circuit terminal.	UL/CSA certification not required
for cover NZM2-XKSA or NZM2 or NZM2...(C)NA und N(S)2...NA 	NZM2, PN2, N(S)2	**NZM2-XIPA** 266777		1 off	When mounting NZM2-..-(C)NA or NZM...-NA the following applies: with 2 conductors max cross section 25 mm² or AWG4.	UL/CSA certification not required
Mounting kit when using covers NZM1-XKSFA and NZM2-XKSA						
	DS7-34xSX041N0-x DS7-34xSX055N0-x DS7-34xSX070N0-x DS7-34xSX081N0-x DS7-34xSX100N0-x DS7-34xSX135N0-x DS7-34xSX160N0-x DS7-34xSX200N0-x	**DE6-MNT-NZM** 107323		1 off	-	
Device fans flush-mounted fan						
	DS7-34…SX004… DS7-34…SX007… DS7-34…SX009… DS7-34…SX012… DS7-34…SX016… DS7-34…SX024… DS7-34…SX032…	**DS7-FAN-032** 135553		1 off	flush-mounted fan	UL/CSA certification not required
	DS7-34…SX041… DS7-34…SX055… DS7-34…SX070… DS7-34…SX081… DS7-34…SX100…	**DS7-FAN-100** 169021			Bottom fans	
	DS7-34…SX135… DS7-34…SX160… DS7-34…SX200…	**DS7-FAN-200** 169022				
PKE communications cable 6-Pole Prefabricated with two plugs For connecting the PKE to DS7-SWD						
	DS7…SWD	**PKE32-COM** 168970		1 off		
Switched-mode power supply units easyPOW 1-phase Nominal input voltage 100 - 240 V AC Rated output voltage 24 V DC (± 3%) Rated output current 1.25 A						
		**EASY400-POW** 212319		1 off		

Engineering

Generalized phase control of motor voltage

By means of generalized phase control, the soft starter adjusts the grid's voltage (U_{LN}smoothly from an adjustable start value to 100 % of the rated value U_{LN} .

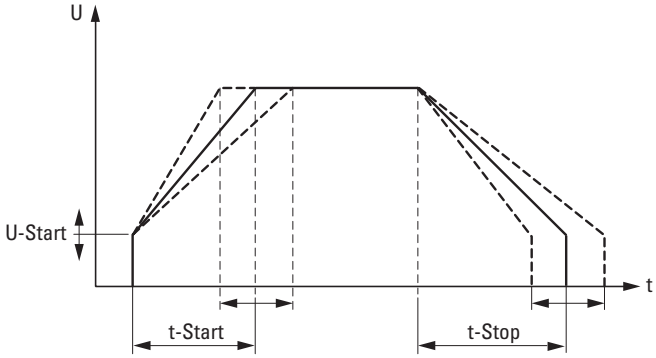


U_{LN}:Mains supply voltage
U-Start: start voltage
t-Start: Ramp time of the voltage change at start
TOR (Top of Ramp): Signals the end of the set "t-Start" ramp time (output voltage U_2 = Mains supply voltage U_{LN}). The internal bypass contacts are closed after this.

This voltage control enables the inrush current of a three-phase asynchronous motor to be limited and its starting torque to be reduced. This enables a smooth and jerk-free increase in torque, adjusted in line with the machine's load behavior. This has a positive effect on the lifespan, operating behavior, and operating processes of the mechanical equipment and prevents negative effects such as:

- Impacting of cog edges in the gearbox
- Pressure surge in pipe systems (water impact),
- Slipping of V belts or
- Jitter with conveyor systems.

In DS7 and S801+/S811+ series soft starters, generalized phase control is achieved with anti-parallel thyristors that are bypassed for continuous operation by using bypass contacts (TOR = Top Of Ramp) after the time for a time-triggered voltage change (t-Start) has elapsed. The transition resistance of these bypass contacts is considerably lower than the transition resistance of the power semiconductors. This reduces the heat dissipation in the soft starter and extends the lifespan of the power semiconductors.
As well as the time-controlled startup of a motor, the soft starter also enables a time-controlled reduction of the motor voltage and thus a controlled stopping of the motor.



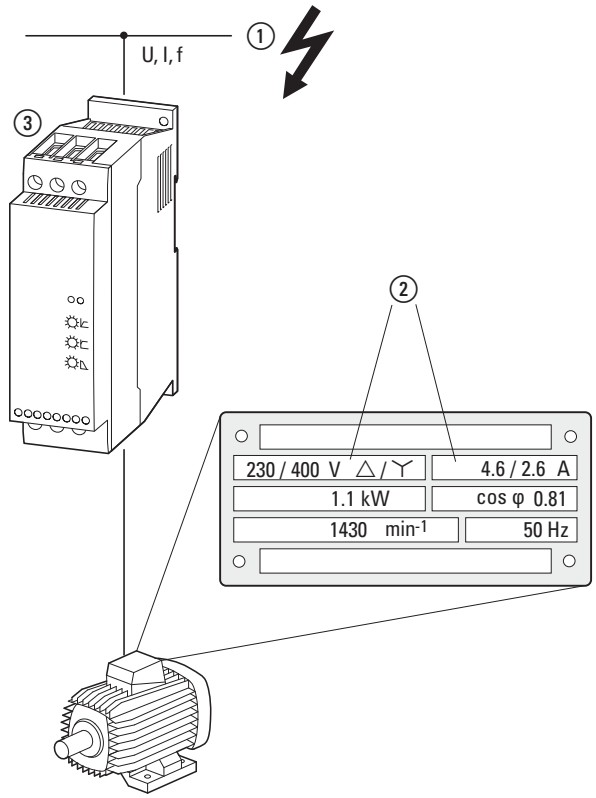
The output voltage of a soft starter determines the torque of the motor (M ~ U^2). Because of this, it is necessary to make sure that, when a machine starts up, the selected U-Start start voltage is not too low and the t-Start ramp time for the linear voltage change is set to be as short as possible.

Please note:

- Long ramp times (t-Start) will produce a soft startup behavior, but will also result in a higher thermal load on the thyristors
- A high start voltage (U-Start) will produce a higher torque and a high starting current
- Set the lowest possible start voltage and the shortest possible start ramps.

The following pages include application and setting configuration examples for DS7 soft starters.
If controlled deceleration is required, t-Stop must be set to a longer time than would be necessary for the machine to coast freely based on the load. For the thyristors, the controlled deceleration constitutes a load comparable to that produced during startup. If, for example, the deceleration ramp is activated on a soft starter with a maximum of 10 permissible starts per hour, the number of permissible starts will be reduced to five per hour (plus five stops within that hour).

Selection criteria



Soft starters ③ are selected based on the supply voltage of the corresponding grid ① (ULN) and the rated operational current of the assigned motor ②. The motor's circuit configuration (Δ/Y) must be selected in such a way that it matches the supply voltage. In addition, the soft starter's rated operational current (Ie) must be at least equal to that of the motor.

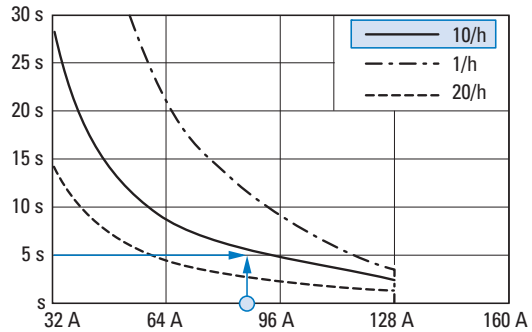
Additional selection criteria include:
- Ambient air temperature (rated value +40 °C)
- The number of starts per hour (< 10 starts, take stops into account)
- Load torque (quadratic, linear)
- Starting torque

Centrifugal pumps, centrifugal fans, simple and smooth-running conveyor belts and traction drives, and circular saws and ribbon saws are some of the typical applications for which soft starters are used. Reciprocating compressors, mixers, mills, crushers, and lifting gear are instead categorized as heavy starting duty machines. In this case, the soft starter must be oversized in terms of its overload capacity.

In the case of applications that are typical for a soft starter, such as water pumps (centrifugal pumps), and that feature comparable operational data (operating frequency, run-up time, and/or inrush currents) a soft starter can be assigned directly to the motor on the basis of the rated operational current.

Example:
- 15 kW Pump motor
- 400 V
- Rated operational current 29 A
- About three times the starting current (I_{LRP} = 87 A),
- A maximum of 10 starts per hour
- 5-second start-up time
- ambient air temperature 40 °C.

=> DS7-34…032… (I_e = 32 A)



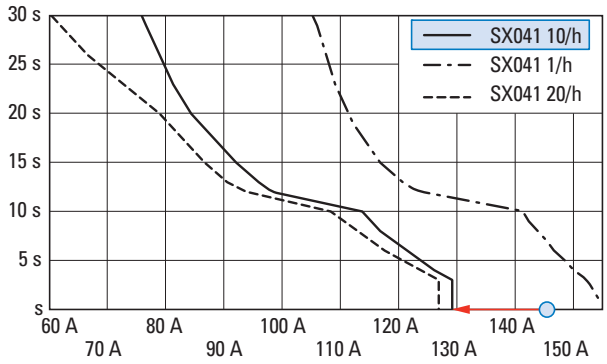
When different operating frequencies, run-up times and/or starting currents are involved, the thermal capacity of the DS7 soft starter must be taken into account in the design. This can be done by using the following diagrams or by calculating the I^2t values. These I^2t values define the corresponding load capacity and overload cycle and are defined in product standard IEC/EN 60947-4-2.

DS7-34…SX032…soft starter:
- 32A: AC-53a: 3-5: 75-10
- Rated operational current (I_e) 32 A
- Load cycle AC-53a
- 300% overcurrent for 5 seconds
- 75% duty factor with 10 starts per hour

The resulting I^2t value is: $(3 \times 32\ A)^2 \times 5\ s = 46.080\ A^2s$
The maximum I^2t value of the connected motor load must be smaller:
$(3 \times 29\ A)^2 \times 5\ s = 37.845\ A^2s$
Soft starter DS7-34…SX032… is the right choice for this application.

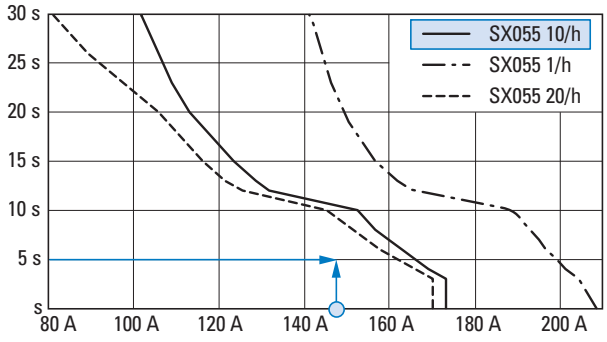
If the motor had a higher inrush current, e.g., 5 times the starting current, a more powerful soft starter would have to be selected:
- Motor inrush current: $I_{LRP} = 5 \times 29 = 145$ A, I^2t value = $(5 \times 29\ A)^2 \times 5\ s = 105.125\ A^2s$
- DS7-34…SX041…: 41A:
  AC-53a: 3-5: 75-10
  => $(3 \times 41\ A)^2 \times 5\ s = 75.645\ A^2s$

Soft starter DS7-34…SX041… cannot meet the required startup and load conditions required in this case.

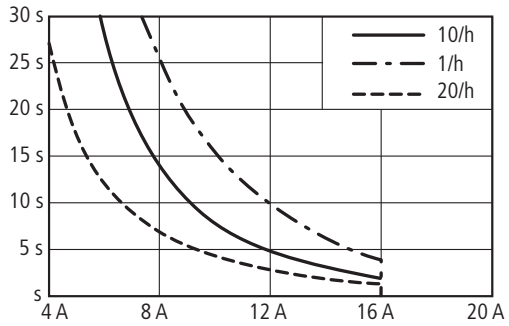


DS7-34…SX055…:
55A: AC-53a: 3-5: 75-10
=> $(3 \times 55\ A)^2 \times 5\ s = 136.125\ A^2s$
Soft starter DS7-34…SX055…, however, does meet the required startup and load conditions.

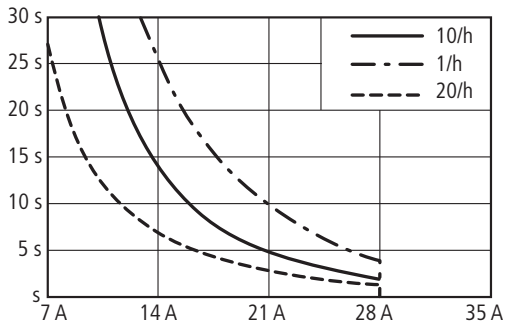
Note: As the following diagram shows, the DS7-34…SX055… unit can handle even more demanding startup and load requirements, e.g., up to 20 starts per hour and longer start-up times (up to 10 seconds).



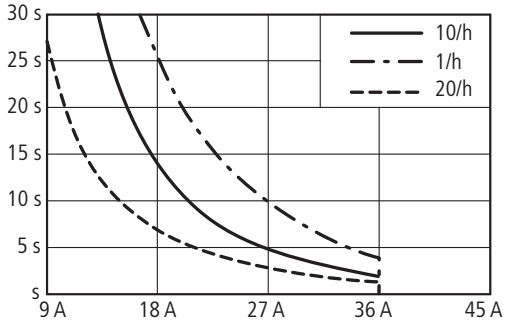
DS7-34...SX004...



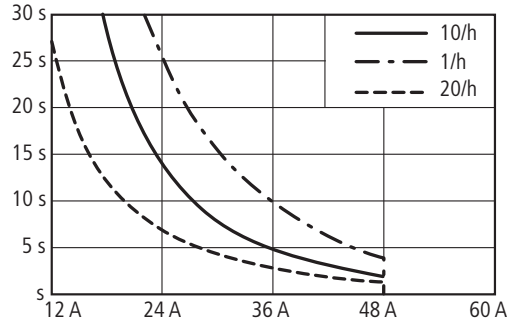
DS7-34...SX007...



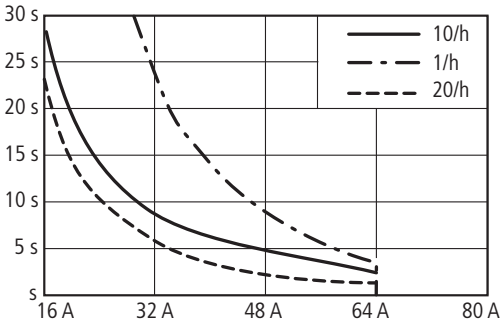
DS7-34...SX009...



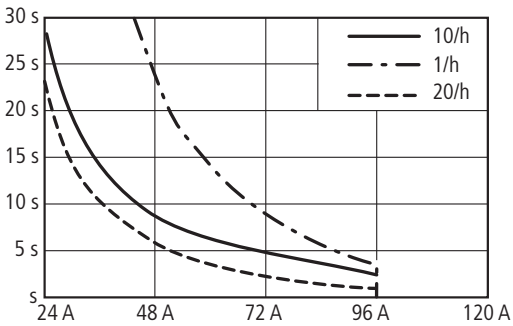
DS7-34...SX012...



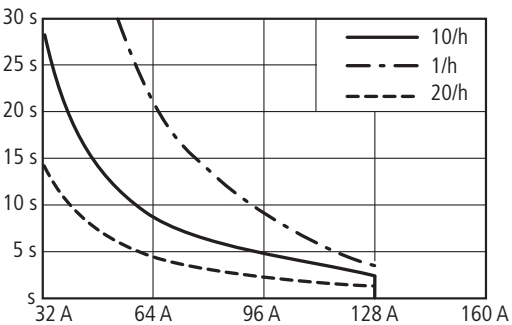
DS7-34...SX016...



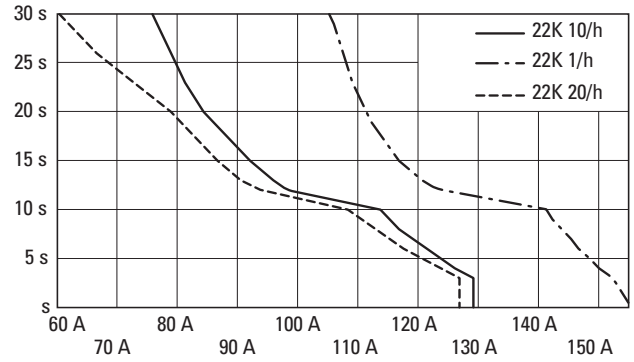
DS7-34...SX024...



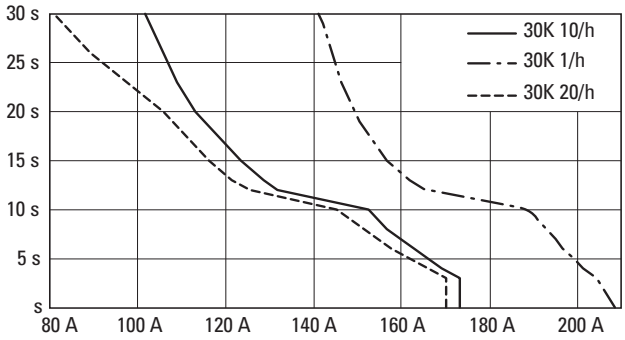
DS7-34...SX032E...



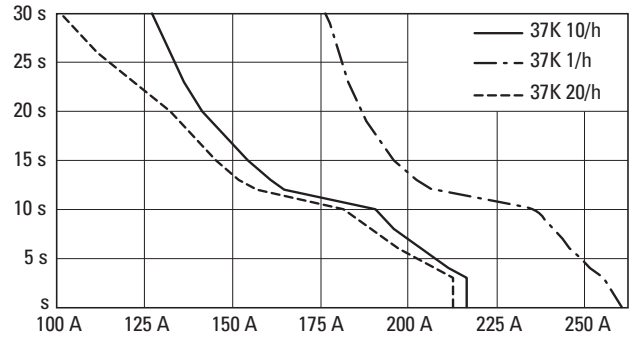
DS7-34...SX041N0-...



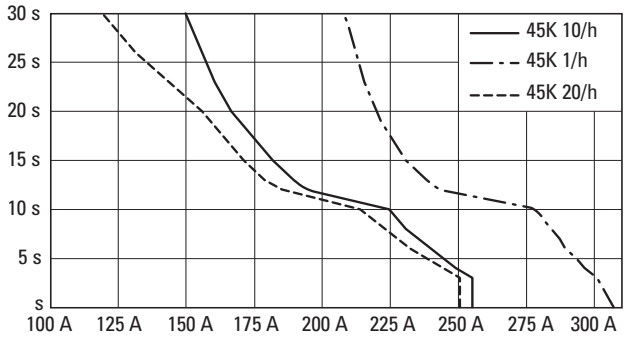
DS7-34...SX055N0-...



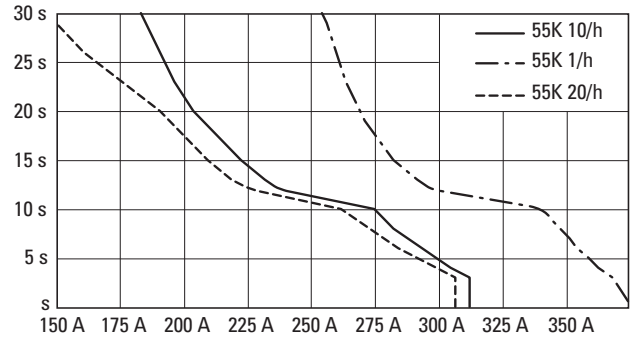
DS7-34...SX070N0-...



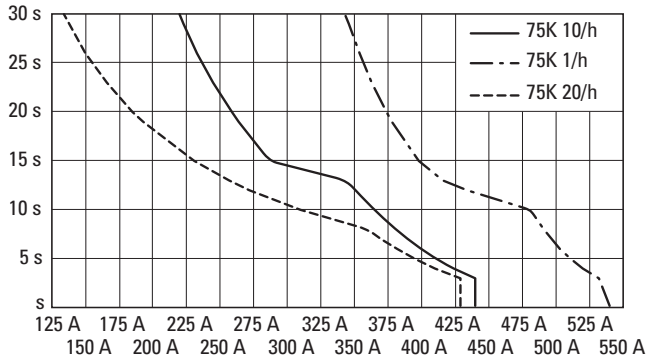
DS7-34...SX081N0-...



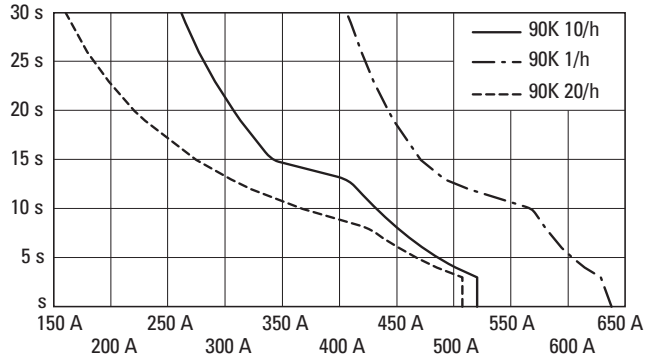
DS7-34...SX100N0-...



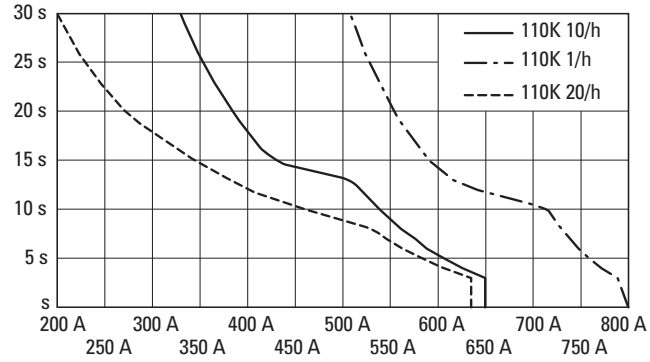
DS7-34...SX135N0-...



DS7-34...SX160N0-...

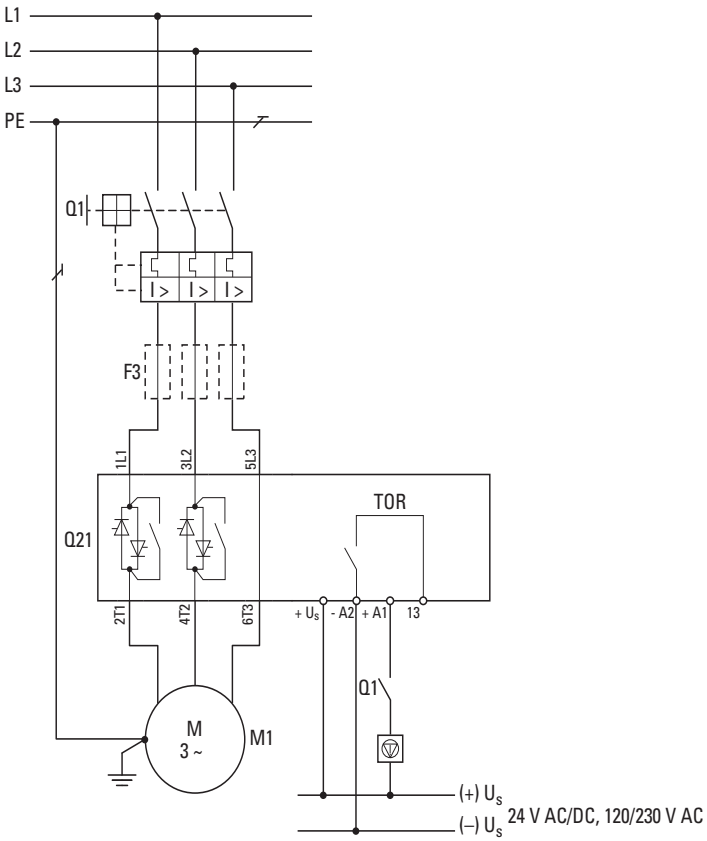


DS7-34...SX200N0-...

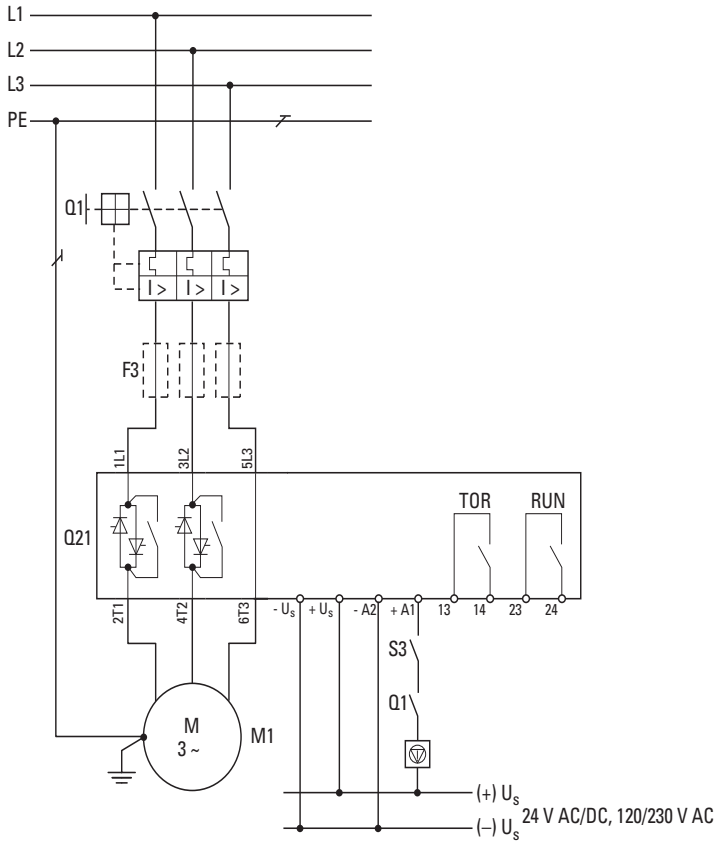


DS7

Standard connection
up to 12 A



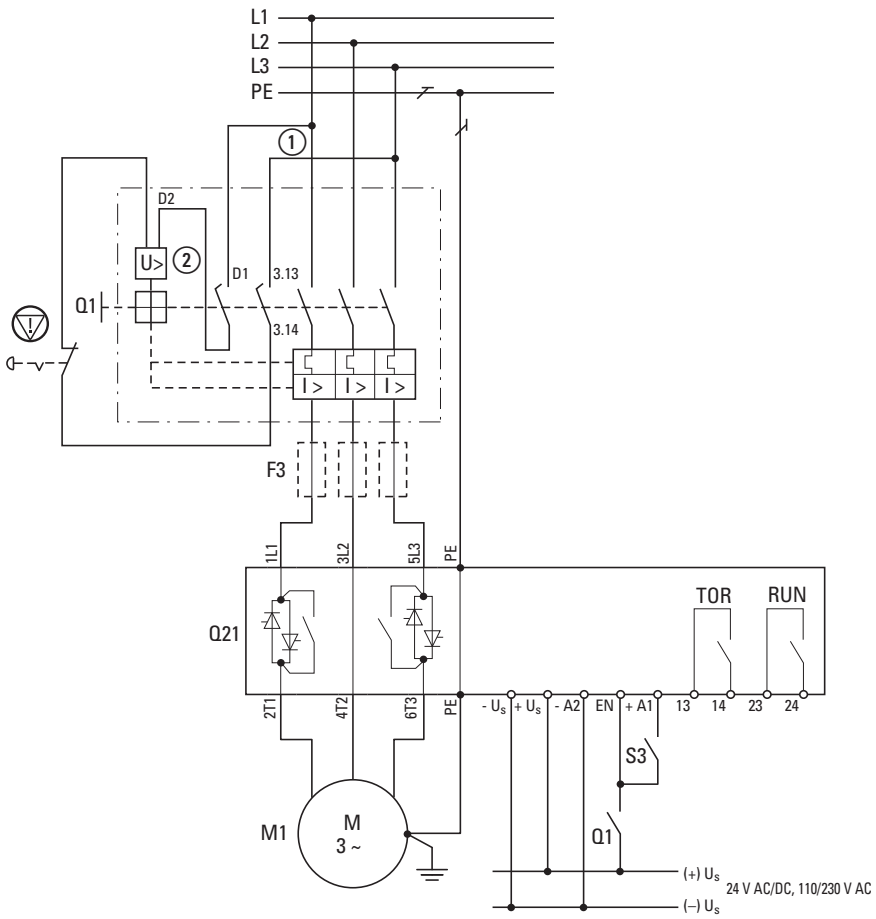
Standard connection
up to 32 A



Standard connection

41 - 200 A

With Emergency switching off function according to IEC/EN 60 204-1 and VDE 0113 Part 1



= EMERGENCY SWITCHING OFF

Q 1 = Cable and motor protection (NZM (NZM1, NZM2)

Q21 = Soft starter DS7

M1 = Motor

F3 = superfast semiconductor fuse, optional for type 2 coordination (in addition to Q1)

① Control circuit terminal

② Undervoltage release with early-make auxiliary contact

assigned Motor output at		Rated operational current[1]		Part no. Soft starters (device to be selected)	Soft starter function
400 V	480 V	Motor	Soft starters		Cable protection[2]
P	P	I_e	I_e		Type "1" coordination
kW	HP	A	A		
				Soft starters for three-phase mains connection, low operating frequency (5 s, 3 x I_e, 10 starts/h)	
1.5	2	3.6	4	**DS7-34xSX004N0-x**	PKZM0-4 (+ CL-PKZ0)
3	3	6.6	7	**DS7-34xSX007N0-x**	PKZM0-10 (+ CL-PKZ0)
4	5	8.5	9	**DS7-34xSX009N0-x**	PKZM0-10 (+ CL-PKZ0)
5.5	7.5	11.3	12	**DS7-34xSX012N0-x**	PKZM0-12 (+ CL-PKZ0)
7.5	10	15.2	16	**DS7-34xSX016N0-x**	PKZM0-16 (+ CL-PKZ0)
11	15	21.7	24	**DS7-34xSX024N0-x**	PKZM0-25 (+ CL-PKZ0)
15	20	29.3	32	**DS7-34xSX032N0-x**	PKZM0-32 (+ CL-PKZ0)
22	25	41	41	**DS7-34xSX041N0-x**	NZMN1-M50 / PKZM4-50
30	30	55	55	**DS7-34xSX055N0-x**	NZMN1-M63 / PKZM4-58
37	40	68	70	**DS7-34xSX070N0-x**	NZMN1-M80
45	50	81	81	**DS7-34xSX081N0-x**	NZMN1-M100
55	60	99	100	**DS7-34xSX100N0-x**	NZMN1-M100
75	75	134	135	**DS7-34xSX135N0-x**	NZMN2-M160
90	100	160	160	**DS7-34xSX160N0-x**	NZMN2-M200
110	125	196	200	**DS7-34xSX200N0-x**	NZMN2-M200

Notes

[1] Rated operational current based on the load cycle specified here.

[2] Used to specify the circuit-breaker required for the specified load cycle. At different duty cycles (operating frequency, overcurrent, overcurrent time, duty factor), this value changes and must then be adapted accordingly.

[3] An external overload relay is required if the main contacts should not be disconnected in the event of an overload and a controlled soft stop is desired instead.

[4] A mains contactor is not required. Disconnection characteristics in accordance with VDE can only be ensured with the specified circuit-breaker.

[5] The superfast semiconductor fuses protect the soft starter from short circuits on the motor side. This can not, however, prevent damage caused by voltage peaks, for example through lightning strike.

Soft starter function with soft stop in case of overload		Mains contactor	Semiconductor contactor (optional, in addition to the protective devices for type 1 coordination, required for type 2 coordination)[5]	
Cable protection[2] Type "1" coordination	overload relay[3]	optional[4]	Fuses Number x Part no.	Fuse holders Number x Part no.
PKM0-4 (+ CL-PKZ0)	ZB12-4	DILM7	3 × 170M1359	3 x 170H1007
PKM0-10 (+ CL-PKZ0)	ZB12-10	DILM9	3 × 170M1361	3 x 170H1007
PKM0-10 (+ CL-PKZ0)	ZB12-10	DILM9	3 × 170M1362	3 x 170H1007
PKM0-12 (+ CL-PKZ0)	ZB12-12	DILM12	3 × 170M1362	3 x 170H1007
PZM0-16 (+ CL-PKZ0)	ZB32-16	DILM17	3 × 170M1364	3 x 170H1007
PZM0-25 (+ CL-PKZ0)	ZB32-24	DILM25	3 × 170M1365	3 x 170H1007
PZM0-32 (+ CL-PKZ0)	ZB32-32	DILM32	3 × 170M1366	3 x 170H1007
NZMN1-M50 / PKZM4-50	ZB65-40+ZB65-XEZ	DILM50	3 × 170M1366	3 x 170H1007
NZMN1-M63 / PKZM4-58	ZB65-57+ZB65-XEZ	DILM65	3 × 170M2615	3 x 170H1007
NZMN1-M80	ZB150-70/KK	DILM80	3 × 170M4008	3 x 170H3004
NZMN1-M100	ZB150-100/KK	DILM95	3 × 170M4008	3 x 170H3004
NZMN1-M100	ZB150-100/KK	DILM115	3 × 170M4008	3 x 170H3004
NZMN2-M160	ZB150-150/KK	DILM150	3 × 170M4011	3 x 170H3004
NZMN2-M200	Z5-160/FF250	DILM185	3 × 170M5008	3 x 170H3004
NZMN2-M200	Z5-220/FF250	DILM225	3 × 170M6008	3 x 170H3004

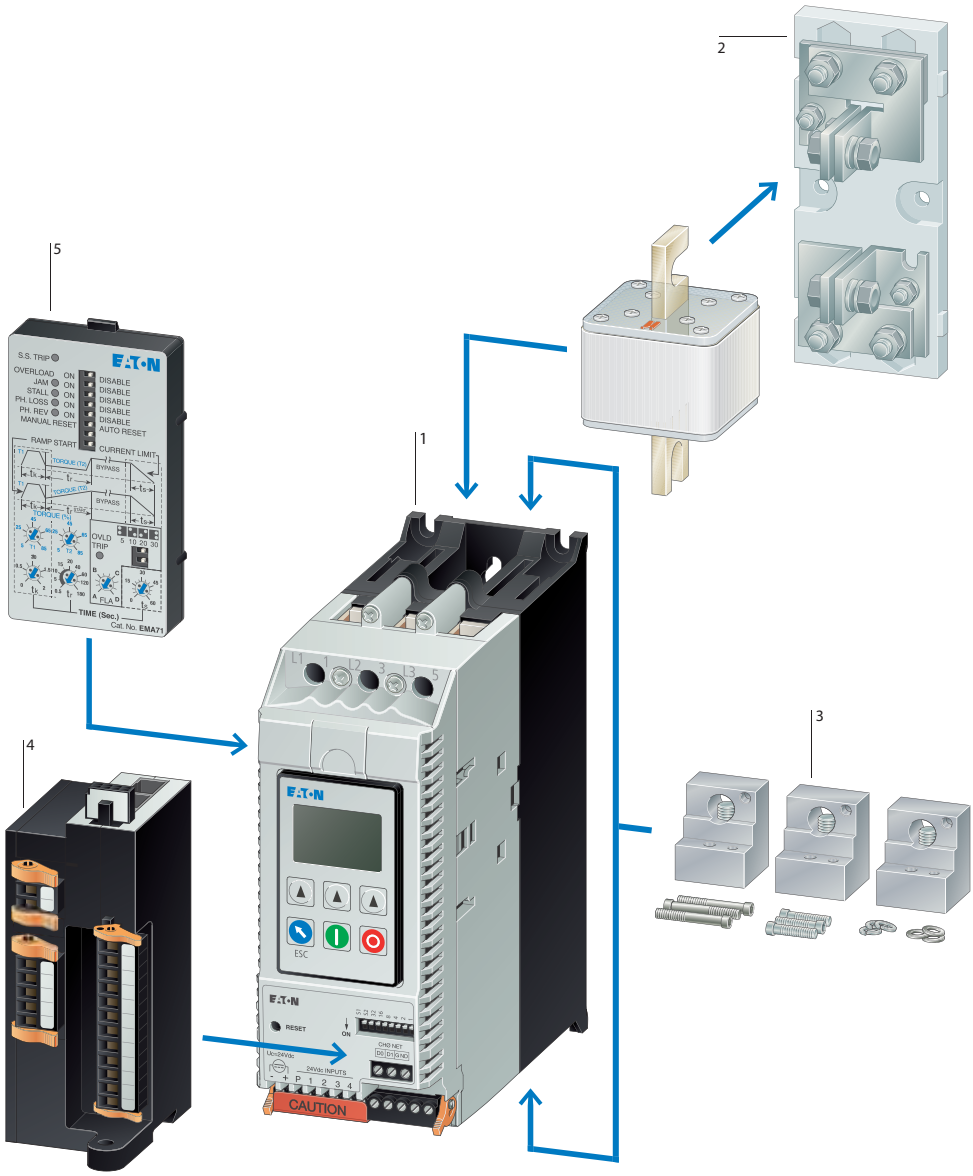
S801+/S811+ Soft Starters – a Powerful Presence in a Small Design

The unparalleled performance and features behind S801+ and S811+ soft starters build upon the proven capabilities of our soft starter series. With only five frame sizes and rated operational currents of 37 A to 1000 A for supply voltages of 200 V to 690 V, S801+ and S811+ units are some of the world's smallest compact soft starters.

These three-phase-controlled soft starters, which feature an internal bypass and comprehensive monitoring and protection mechanisms, provide a soft start and ensure that three-phase motors can remain in continuous operation safely and reliably even in applications with large load torques.

S801+ soft starters are designed with standard applications in mind and make a strong case with their ease of use, while S811+ devices feature a digital control and display unit that provides access to advanced functions for sophisticated applications. In addition, S811+ units can be used not only in a standard line (outside the delta) configuration, but also with an inside-the-delta configuration.

System overview



S801+ / S811+ → page 121	1
Superfast semiconductor fuses → page 104	2
Terminal blocks → page 123	3
EtherNet/IP - Modbus/TCP adapter → page 123	4
External keypad → page 123	5

Description

The soft starters in series S801+ assure reliable operation even under tough and challenging ambient conditions. This series makes a compelling case as a result of its ease of use and is the perfect choice for standard applications such as pumps, fans, compressors, and conveyor belts.

S801+ soft starters have three-phase control and are equipped with internal bypass contacts for continuous operation.With their comprehensive protection and monitoring functions, S801+ soft starters ensure a soft startup, as well as safe and reliable continuous operation, for three-phase motors with rated operational currents of 11 A to 1,000 A when working with mains voltages of 200 V to 600 V. For example, when used in pump applications, they prevent water impact by using controlled deceleration (soft stop control) and torque monitoring, significantly reducing the mechanical loads exerted on pump systems in the process.

Essential features S801+ / S811+

- Rated operational current: 37 - 1000 A
- Parameterizable overload settings: 31–100%
- Adjustable overload classes: class 5, 10, 20, 30
- Base setting: 15 s start ramp, 4 starts per hour, 300% starting current at 40 °C ambient temperature
- Allocated motor outputs for in-line connection:
  – 7.5 - 250 kW (3~ 230 V)
  – 18.5 - 560 kW (3~ 400 V)
- Ambient air temperature: -30 °C to +50 °C
- any required mounting position
- Degree of protection with compact design (IP20 optional)
- 5 compact designs
- Adjustable torque control
- Adjustable kick start
- Efficient use of power achieved with internal bypass contacts during continuous operation
- 24-V control voltage:
  – External supply required
  – 1 A continuous current
  – 10 A Inrush current (peak value for 150 ms)

S801+ specific characteristics

- Microswitches and potentiometers make it easy to configure these soft starters

S811+ series soft starters provide all the features and characteristics of S801+ soft starters, plus expanded functionality and an operating unit (DIM = digital interface module).
With the S811+, motors can be connected using the standard line configuration or using the delta circuit (inside-the-delta configuration / six-wire connection). Using an inside-the-delta configuration will reduce the current flowing through the soft starter by approximately 42%. This way, a 58 A soft starter can be used to start and run a motor with a rated operational current of 100 A, for example.

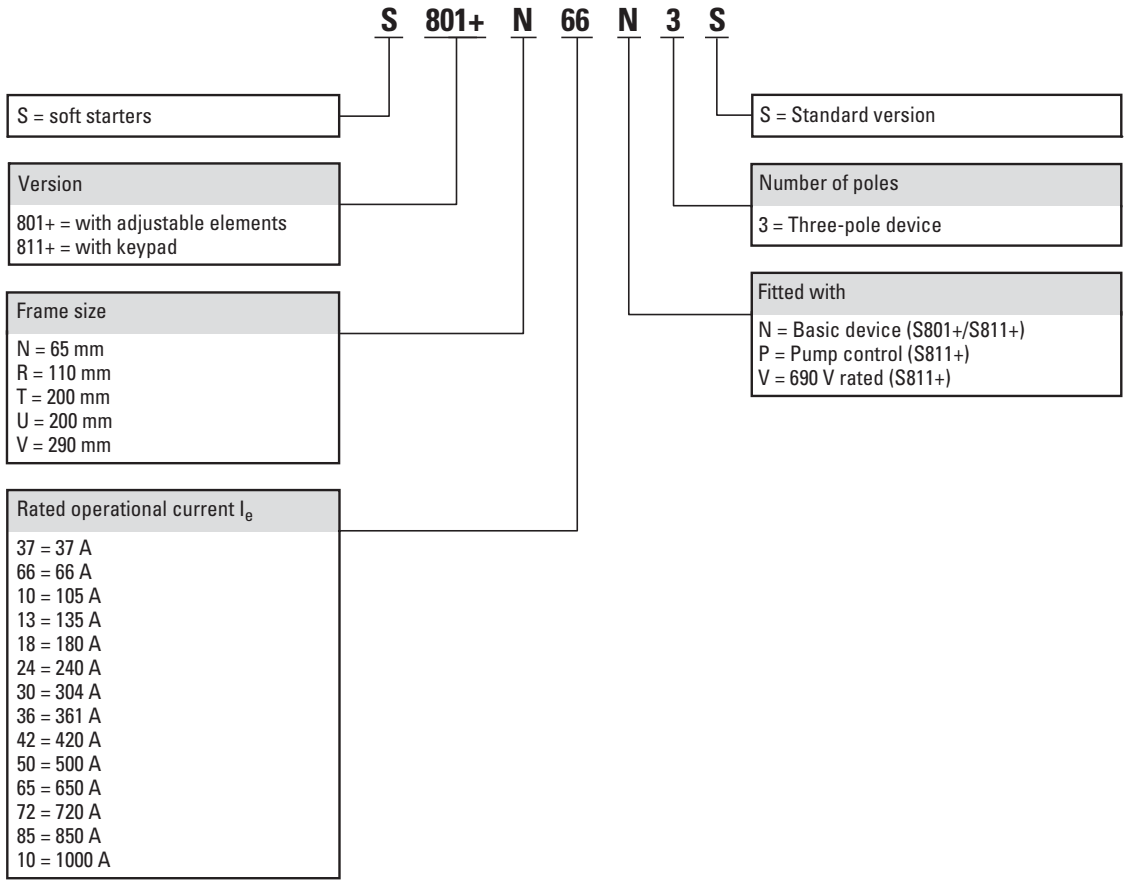
Important operating unit characteristics (S811+)

- Language-neutral LCD display with backlight
- Easy to use and configure with function keys
- System parameter configuration
- Diagnostic and monitoring options
- Reading display (e.g., L1, L2, L3 phase currents)
- Error Display
- Offset placement (mounted on door), connection via plug-in patch cord with RJ11 plug
- Front IP54

S811+ specific characteristics

- Mains voltage up to 690 V
- Allocated motor outputs for in-line connection:
  – 7.5 - 250 kW (3~ 230 V)
  – 18.5 - 560 kW (3~ 400 V)
  – 160 - 710 kW (3~ 690 V)
- Special pump control algorithm with prolonged soft stop ramp
- In-delta connection, see "Engineering, connecting examples"
- RS485 Modbus Connection
- EtherNet-IP/Modbus-TCP with option C441 (communication adapter).

Key to type references



UL/CSA

Information relevant for export to North America

	S801+N..., S801+R..., S801+T... (600 V) **S811+N..., S811+R..., S811+T... (600 V)**	**S801+U..., S801+V... bis 850 A (600 V)** **S811+U..., S811+V... bis 850 A (600 V)**
Product Standards	IEC/EN 60947-4-2; UL 508; CSA C22.2 No. 14; CE marking	IEC/EN 60947-4-2; UL 508; CSA C22.2 No. 14; CE marking
UL File No.	E202571	E202571
UL CCN	NMFT	NMFT
CSA File No.	LR 353	LR 353
CSA Class No.	3211-06, 2411-01	3211-06
NA Certification	UL Listed, CSA Certified	UL Listed, CSA Certified
Conditions of Acceptability	None	None
Suitable for	Branch Circuits, not as BCPD	Branch Circuits, not as BCPD
Max. Voltage Rating	600 Vac	600 Vac
Degree of Protection	IP20 with kit	IP20 with kit

	S801+V..., 1000 A (600 V) **S811+V..., 1000 A (600 V)**	**S811+...V3S (690 V)**
Product Standards	IEC/EN 60947-4-2; UL 508; CSA C22.2 No. 14; CE marking	IEC/EN 60947-4-2; UL 508; CE marking
UL File No.	E202571	E202571
UL CCN	NMFT2	NMFT
CSA File No.	LR 353	
CSA Class No.	3211-06	
NA Certification	UL Recognized, CSA Certified	UL Listed
Conditions of Acceptability	98-115 CFM fan and 4" x 4" vent req'd	None
Suitable for	Branch Circuits, not as BCPD	Branch Circuits, not as BCPD
Max. Voltage Rating	600 Vac	690 Vac
Degree of Protection	IP20 with kit	IP20 with kit

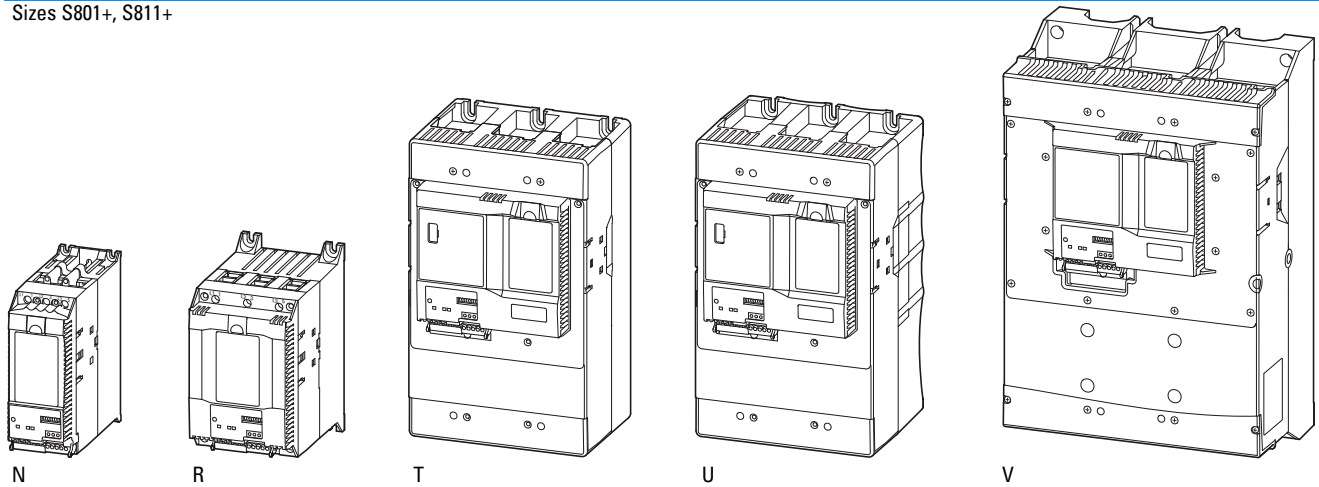
Ordering

Frame size	Rated operational current AC-53 I_e A	Assigned motor rating at 230 V, 50 Hz kW	at 230 V, 60 Hz HP	at 400 V, 50 Hz kW	at 460 V, 60 Hz HP	Part no.	Article no.	Price see price list	Std. pack
Soft starters									
Supply voltage U_s: 24 V DC Control voltage U_C: 24 V DC With internal bypass contacts Terminal blocks for the terminals are required for frame sizes T, U, and V -> Accessories									
Soft starters for three-phase loads Mains supply voltage (50/60 Hz) U_{LN}: 200 - 600 V AC In-line configuration									
N	37	7.5	10	18.5	25	**S801+N37N3S**	169852		1 off
	66	18.5	20	30	50	**S801+N66N3S**	169853		
R	105	30	40	55	75	**S801+R10N3S**	169854		
	135	37	50	75	100	**S801+R13N3S**	169855		
T	180	55	60	90	150	**S801+T18N3S**	169856		
	240	75	75	132	200	**S801+T24N3S**	169857		
	304	90	100	160	250	**S801+T30N3S**	169858		
U	361	110	125	200	300	**S801+U36N3S**	169859		
	420	132	150	200	350	**S801+U42N3S**	169860		
V	361	110	125	200	300	**S801+V36N3S**	169863		
	420	132	150	200	350	**S801+V42N3S**	169864		
	500	160	200	250	400	**S801+V50N3S**	169865		
	650	200	250	315	500	**S801+V65N3S**	169866		
	720	250	-	400	600	**S801+V72N3S**	169867		
	850	-	-	450	600	**S801+V85N3S**	169868		
	1000	-	-	560	750	**S801+V10N3S**	169862		
Soft starter for three-phase loads, with control unit Mains supply voltage (50/60 Hz) U_{LN}: 200 - 600 V AC In-line configuration/In-delta configuration									
N	37	7.5	10	18.5	25	**S811+N37N3S**	168976		1 off
	66	18.5	20	30	50	**S811+N66N3S**	168978		
R	105	30	40	55	75	**S811+R10N3S**	168980		
	135	37	50	75	100	**S811+R13N3S**	168982		
T	180	55	60	90	150	**S811+T18N3S**	168984		
	240	75	75	132	200	**S811+T24N3S**	168987		
	304	90	100	160	250	**S811+T30N3S**	168990		
U	361	110	125	200	300	**S811+U36N3S**	169869		
	420	132	150	200	350	**S811+U42N3S**	169870		
V	361	110	125	200	300	**S811+V36N3S**	168993		
	420	132	150	200	350	**S811+V42N3S**	168996		
	500	160	200	250	400	**S811+V50N3S**	168999		
	650	200	250	315	500	**S811+V65N3S**	169002		
	720	250	-	400	600	**S811+V72N3S**	169005		
	850	-	-	450	600	**S811+V85N3S**	169008		
	1000	-	-	560	750	**S811+V10N3S**	169011		

Notes **Information relevant for export to North America** → Page 120

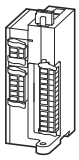
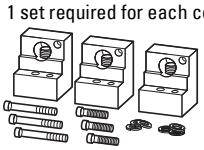
Frame size	Rated operational current AC-53 I_e A	Assigned motor rating at 230 V, 50 Hz kW	at 230 V, 60 Hz HP	at 400 V, 50 Hz kW	at 460 V, 60 Hz HP	at 690 V, 50 Hz kW	Part no.	Article no.	Price see price list	Std. pack
Soft starters										
Supply voltage U_s: 24 V DC Control voltage U_C: 24 V DC With internal bypass contacts Terminal blocks for the terminals are required for frame sizes T, U, and V -> Accessories										
Soft starter for three-phase loads, with control unit and pump algorithm Mains supply voltage (50/60 Hz) U_{LN}: 200 - 600 V AC In-line configuration/In-delta configuration										
N	37	7.5	10	18.5	25	-	**S811+N37P3S**	168977		1 off
	66	18.5	20	30	50	-	**S811+N66P3S**	168979		
R	105	30	40	55	75	-	**S811+R10P3S**	168981		
	135	37	50	75	100	-	**S811+R13P3S**	168983		
T	180	55	60	90	150	-	**S811+T18P3S**	168985		
	240	75	75	132	200	-	**S811+T24P3S**	168988		
	304	90	100	160	250	-	**S811+T30P3S**	168991		
U	361	110	125	200	300	-	**S811+U36P3S**	169872		
	420	132	150	200	350	-	**S811+U42P3S**	169873		
V	361	110	125	200	300	-	**S811+V36P3S**	168994		
	420	132	150	200	350	-	**S811+V42P3S**	168997		
	500	160	200	250	400	-	**S811+V50P3S**	169000		
	650	200	250	315	500	-	**S811+V65P3S**	169003		
	720	250	-	400	600	-	**S811+V72P3S**	169006		
	850	-	-	450	600	-	**S811+V85P3S**	169009		
	1000	-	-	560	750	-	**S811+V10P3S**	169012		
Soft starter for three-phase loads, with control unit and pump algorithm, for 690-V grids Mains supply voltage (50/60 Hz) U_{LN}: 200 - 690 V AC In-line configuration										
T	180	55	60	90	150	160	**S811+T18V3S**	168986		1 off
	240	75	75	132	200	200	**S811+T24V3S**	168989		
	304	90	100	160	250	250	**S811+T30V3S**	168992		
V	361	110	150	200	300	315	**S811+V36V3S**	168995		
	420	132	150	200	350	400	**S811+V42V3S**	168998		
	500	160	200	250	400	500	**S811+V50V3S**	169001		
	650	200	250	315	500	630	**S811+V65V3S**	169004		
	720	250	-	400	600	630	**S811+V72V3S**	169007		
	850	-	-	450	600	710	**S811+V85V3S**	169010		

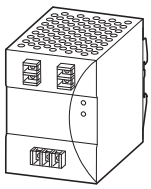
Sizes S801+, S811+



N R T U V

Information relevant for export to North America → Page 120

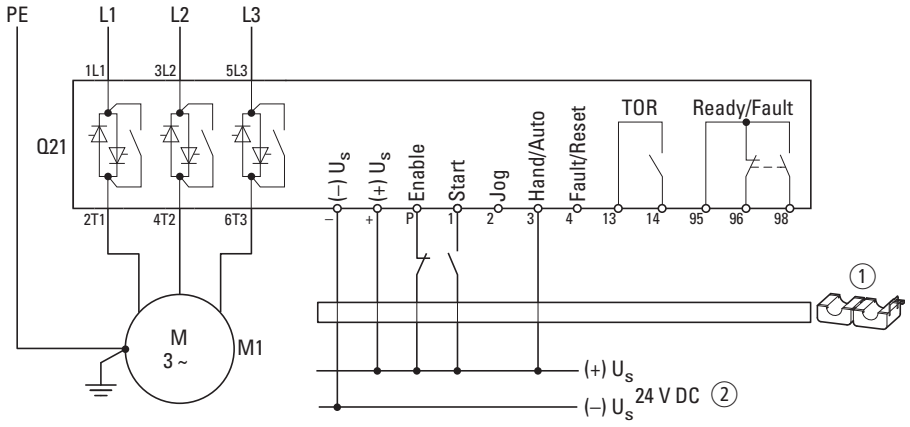
Description	For use with	Part no. Article no.	Price see price list	Std. pack	Information relevant for export to North America
Control unit					
With adjusting elements (potentiometer, microswitch)	S801+	**EMA71** 144346		1 off	Product Standards: IEC/EN 60947-4-2; UL 508; CSA C22.2 No. 14; CE marking UL File No.: E202571 CSA File No.: LR 353 Conditions of Acceptability: UL unlisted component, CSA Investigated Component
With illuminated LCD display With control buttons and function keys Front IP54 RJ11 plug, 6-pin	S811+	**EMA91** 144570			
Cover					
Protection for installation space in S811+ if the control unit is set up externally.	S801+	**EMA68** 144556		1 off	
Mounting frame					
For mounting the EMA91 control unit externally with surface mounting (e.g., installation in control panel door).					
with connection cable RJ11, 6 pole, 1 m	EMA91	**EMA69A** 144557		1 off	Product Standards: IEC/EN 60947-4-2; UL 508; CSA C22.2 No. 14; CE marking UL File No.: E202571 UL Category Control No.: NMFT2 CSA File No.: LR 353 CSA Class No.: 3211-06 North America Certification: UL listed, CSA certified
1.5 m	EMA91	**EMA69B** 144558			
2 m	EMA91	**EMA69C** 144559			
3 m	EMA91	**EMA69D** 144560			
EtherNet/IP - Modbus/TCP adapter					
	S811+	**C441V** 172306		1 off	Product Standards: IEC/EN 60947-4-1; UL 508; CSA C22.2 No. 14; CE marking UL File No.: E1230 UL Category Control No.: NKCR CSA File No.: LR 353 CSA Class No.: 3211-03 Max. Voltage Rating: 240 Vac (auxiliary contacts)
Control terminal strip					
Spare part	S801+, S811+	**EMA75** 144561		1 off	
Terminal blocks					
Tools with dimensions in inches required 1 set required for each connection side.					
					
Terminal capacities					
2 x 4-1/0MCM, 2 x 25-50 mm²	S801+, S811+, frame sizes T and U	**EML22** 127661		1 off	Product Standards: UL 1059 UL File No.: E60693 UL Category Control No.: NMFT CSA File No.: LR 353 CSA Class No.: 6223-02 North America Certification: UL listed, CSA certified Conditions of Acceptability: 10A min, Use group C or D, 30 to 12 AWG solid/stranded Max. Voltage Rating: 300 V_{ac}
4/0-500 MCM, 120-240 mm² S801+, S811+, frame sizes T and U		**EML23** 127662			Product Standards: UL508, CSA C22.2 No. 65 UL File No.: E202571 UL Category Control No.: NMFT CSA File No.: LR 353 CSA Class No.: 6223-02 North America Certification: UL listed, CSA certified
2 x 4/0-500 MCM, 2 x 120-240 mm² S801+, S811+, frame sizes T and U		**EML24** 127663			
1 x 2/0-300 MCM, 1 x 70-150 mm² S801+, S811+, frame sizes T and U		**EML25** 127664			
2 x 2/0-300 MCM, 2 x 70-150 mm² S801+, S811+, frame sizes T and U		**EML26** 127665			
2 x 4/0-500 MCM, 2 x 120-240 mm² S801+, S811+, frame size V	S801+, S811+, frame sizes T and U	**EML28** 127666			
4 x 4/0-500 MCM, 4 x 120-240 mm² S801+, S811+, frame size V		**EML30** 127667			
6 x 4/0-500 MCM, 6 x 120-240 mm² S801+, S811+, frame size V		**EML32** 127668			
4 x 2/0-300 MCM, 4 x 70-150 mm² S801+, S811+, frame size V		**EML33** 127669			

	Description	For use with	Part no. Article no.	Price see price list	Std. pack	Information relevant for export to North America
terminal shroud						
	For increasing the degree of protection to IP20 1 set required for each connection side.	S801+, S811+, frame size N	**SS-IP20-N** 171990		1 off	
		S801+, S811+, frame size R	**SS-IP20-R** 171991			
		S801+, S811+, frame sizes T und U	**SS-IP20-TU** 171992			
		S801+, S811+, frame size V	**SS-IP20-V** 158650			
TVSS						
	SMD metal-oxide varistors (MOVs) with connection cables for the grid and motor connection sides	S801+, S811+, up to 600 V	**EMS39** 127671		1 off	Product Standards: UL 508; CSA C22.2 No. 14 UL File No.: E202571 CSA File No.: LR 353 Conditions of Acceptability: UL and CSA Investigated Component Max. Voltage Rating: 1000 V_{ac} 3 ph
		S811+, up to 690 V	**EMS41** 127672		1 off	
Power supplies PSG						
Rated output voltage 24 V DC (± 2%) Rated output current 10 A						
	Nominal input voltage 100 - 240 V AC 125 – 250 V DC_x 1-phase		**PSG240E24RM** 172893			
	Nominal input voltage 3 x 400 - 500 V AC 3-phase		**PSG240F24RM** 172884			

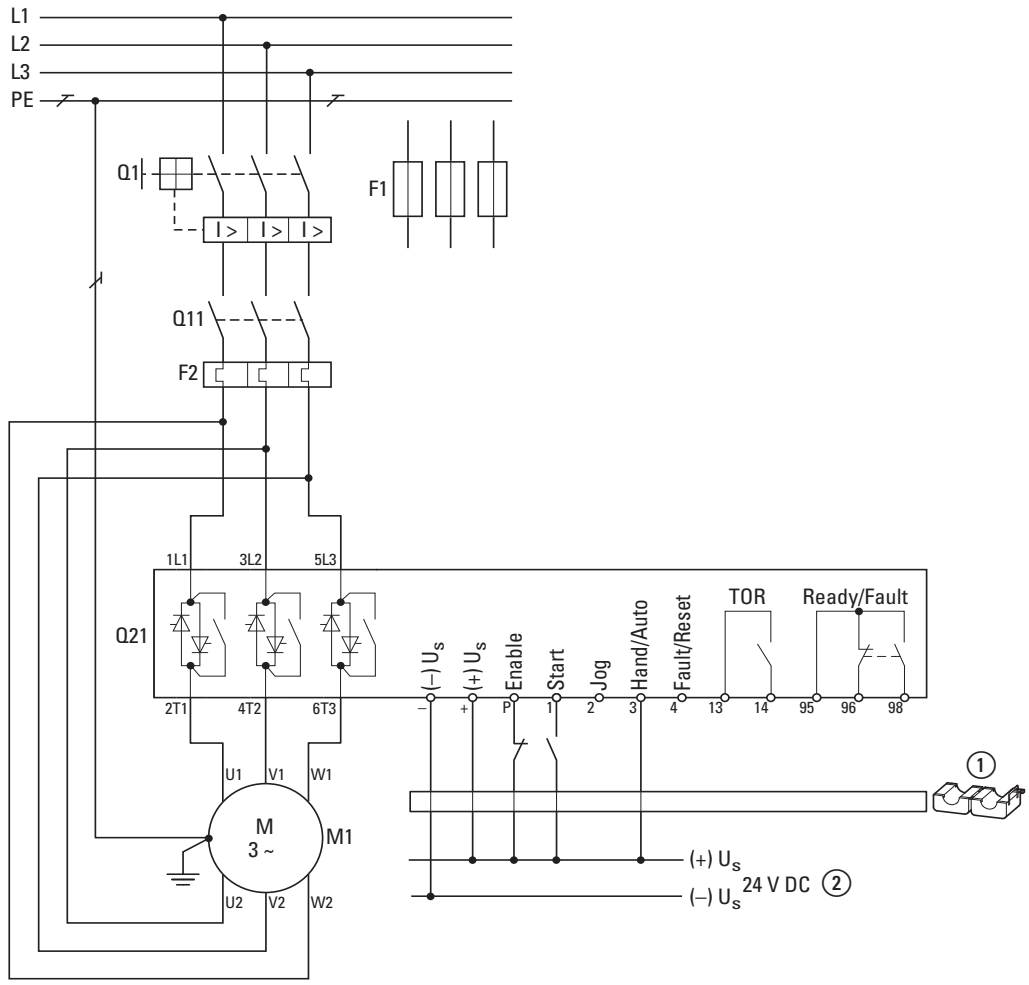
Engineering

Connection examples for S811+…N3S

Standard connection (in-line connection)



Delta circuit (inside-the-delta circuit)



① Snap-on ferrite core, included as standard
② External control voltage (24 VDC) required, I_S 1 A, I_{Peak} = 10 A for 150 ms when bypass contacts are switched
Short-circuit and cable protection: Q1 circuit-breakers or F1 fuses.

Motor	IEC	NEMA
	U1-V1-W1	T1-T2-T3
	U2-V2-W2	T4-T5-T6

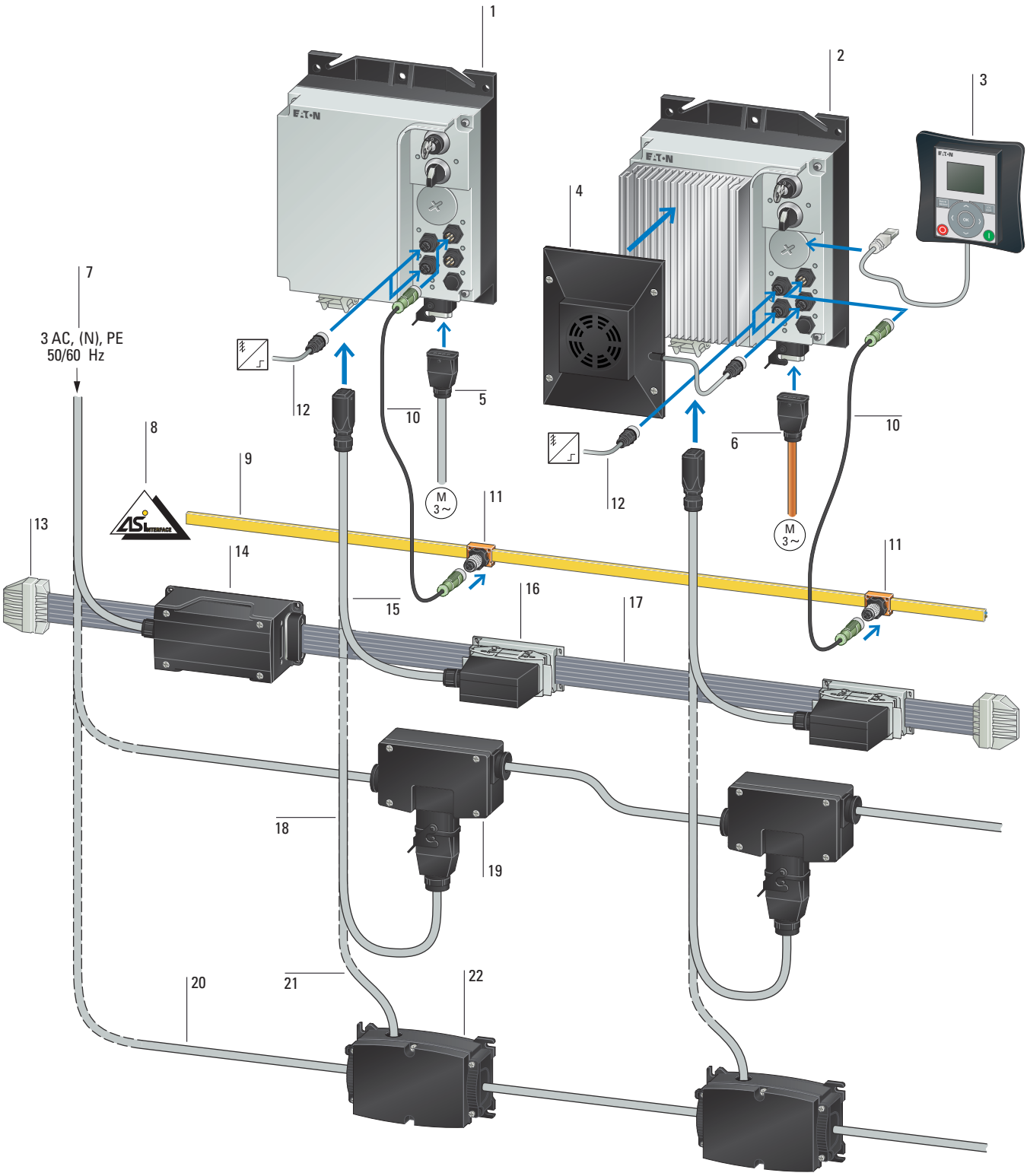
Distributed Drive System Rapid Link 4.0

Standardized installation procedures, the ability to directly and locally configure parameters with a plug and play configuration, and networked communications – these are the needs of material handling system applications today when it comes to state-of-the-art drive engineering and the systems it produces.
Eaton delivers a modern answer with the Rapid Link 4.0 distributed drive system. With its flexible power spectrum, its simple handling and its intelligent programming options, this new motor starter and variable frequency drives generation is the first choice for all kinds of conveying engineering applications.

RAMO electronic motor starters
Electronic DOL and reversing starters with a lifespan of more than 10 million operations, degree of protection IP65
Rated operational current, adjustable between 0.3 – 6.6 A when using a three-phase mains connection with 400 V – 480 V, for rated motor outputs of up to 3.0 kW (400 V) / 3 HP (460 V)
RAMO-D…: DOL starter
RAMO-W…: reversing starter

RASP speed controllers
Frequency-controlled motor starters with Volts-per-Hertz control (V/Hz control) and slip compensation or vector control, as well as an integrated radio interference suppression filter (EMC); IP65 degree of protection.
RASP-2…: Rated operational current of 0.48 – 2.4 A with three-phase mains connection of 400 V – 480 V, allocated motor output of up to 0.75 kW (400 V) / 1 HP (460 V)
RASP-3…: Rated operational current of 0.66 – 3.3 A with three-phase mains connection of 400 V – 480 V, allocated motor output of up to 1.1 kW (400 V) / 1.5 HP (460 V)
RASP-4…: Rated operational current of 0.86 – 4.3 A with three-phase mains connection of 400 V – 480 V, allocated motor output of up to 1.5 kW (400 V) / 2 HP (460 V)
RASP-5…: Rated operational current of 1.12 – 5.6 A with three-phase mains connection of 400 V – 480 V, allocated motor output of up to 2.2 kW (400 V) / 3 HP (460 V)

System overview



Function modules

Motor starter (Motor Control Unit) 1
Three-phase electronic DOL starter or reversing starter
→ page 132

Speed controller RASP (Speed Control Unit) 2
Three phase frequency-controlled motor starter (fixed speeds, two rotational directions, adjustable acceleration and deceleration ramps)
→ page 133

Operating unit 3
for parameter setting
→ page 134

Fans 4
for operation at high temperatures without derating
→ page 134

Motor feeder

Unscreened motor cable 5
→ page 134

Screened motor supply cable (EMC) 6
→ page 134

Power and data bus

Energy supply (3 AC 400 V) via circuit-breaker for overload and short-circuit protection 7
for protection against short-circuit and overload

AS-Interface® supply 8

AS-Interface® flat cable 9

AS-Interface® connection cable 10
→ page 137

AS-Interface® junction 11
→ page 137

Sensor connection 12
→ page 137

End-piece for flat cable 13
→ page 136

Distribution module 14
for 400-V-AC incoming unit of the flat cable
→ page 135

Power connection cable 15
to flexible busbar junction
→ page 134

flexible busbar junction 16
→ page 135

Ribbon cable for 400 V AC 17
→ page 134

Power connection cable 18
to round cable junction
→ page 136

Round cable junction 19
→ page 136

Round cable for 400 V AC 20

Power connection cable 21
to round cable junction
→ page 136

Round cable junction 22
→ page 136

Rapid Link 4.0 is a modern, efficient drive and PLC. It is the competent further development of the Rapid Link 2.1/3.0 device series, suitable for simple and complex tasks in all aspects of material handling. For example in airports, industrial production and logistics centers.
The Rapid Link system consists of the RAMO electronic motor starters and the RASP frequency controlled motor starters.

The RAMO and RASP motor starters are designed with IP65 protection and can be installed in direct proximity to the drive. Their versions and mounting depend on the required specifications and the local conditions.
The RAMO and RASP are connected with standard plug connectors to the energy and databus systems predominantly used in material handling systems (AS-Interface). Connection can be implemented without interrupting the required location. This simplifies installation and reduces the wiring requirement.







Overview of features

RAMO 4.0 electronic motor starters

Application and function
The RAMO motor starters enable the electronic DOL or reversing starting of three-phase motors in automatic or manual mode. The electronic overload protection for motor ratings from 90 W to 3 kW at 400 V (50/60 Hz) is configured with DIP switches. Full motor protection is ensured when used in connection with temperature sensors.
The operating mode is set via the AUTO - OFF/RESET – MANUAL key switch and can be combined with the 'Quick stop' and 'Interlocked manual operation' via the two sensor inputs (M12 sockets). Operating states are diagnosed and error messages (Reset) acknowledged on the device or via the AS-Interface.
RAMO is available in different versions:
- with actuator output (24 V DC) for a direct actuation of external switching devices, e.g. solenoid valves.
- with electronic actuation for mechanical motor brakes.
- with lockable repair switch for diagnostic and maintenance work, making it possible to safely de-energize the device locally.

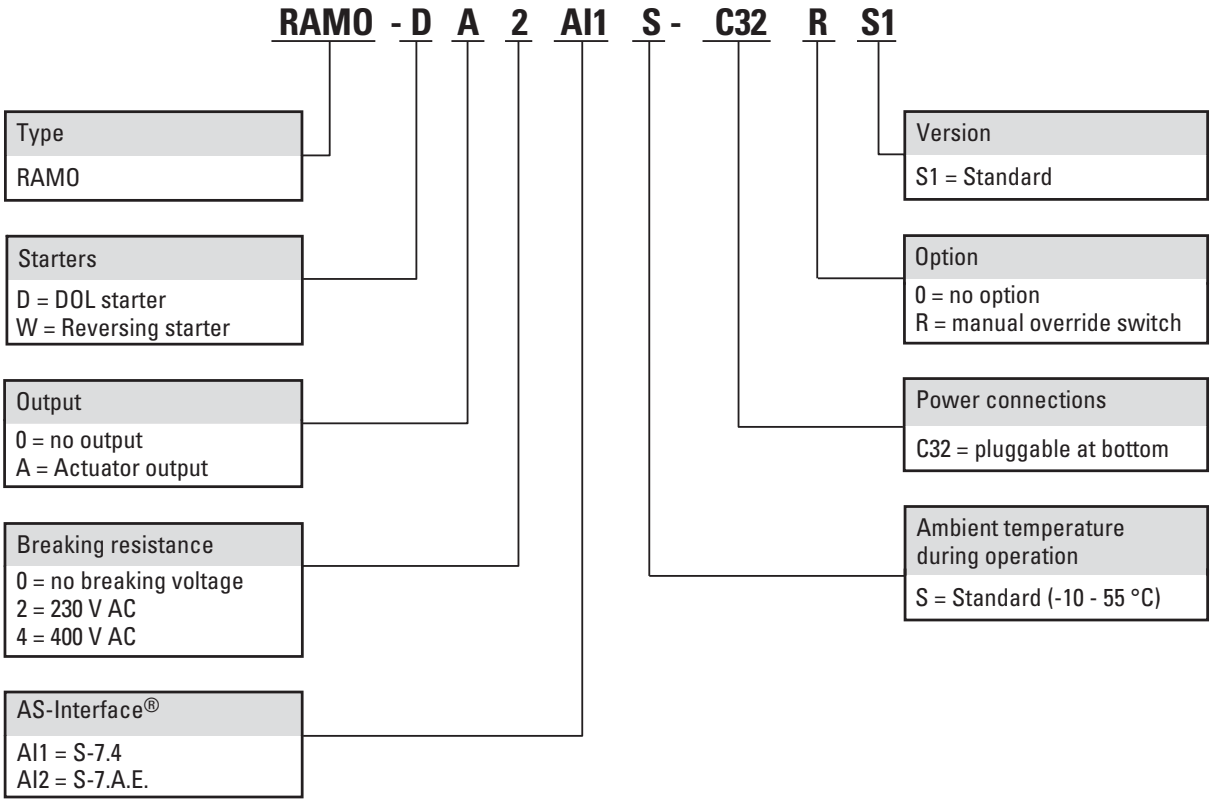
Essential features
- Standard size in square enclosure. The bottom section with the two power terminals (power plug, motor feeder socket) and the repair and maintenance switch can be turned 90° clockwise and counterclockwise.
- Long lifespan up to 10 million switching operations and up to 3,000 switch cycles per hour at 2.2 kW.
- Rated operational current 6.6 A.
- Operating and ambient temperature from -10 to +55 °C, without derating.
- Monitoring of thermistor and motor cable.
- Maximum motor cable length: 10 m.

Frequency controlled motor starter RASP 4.0

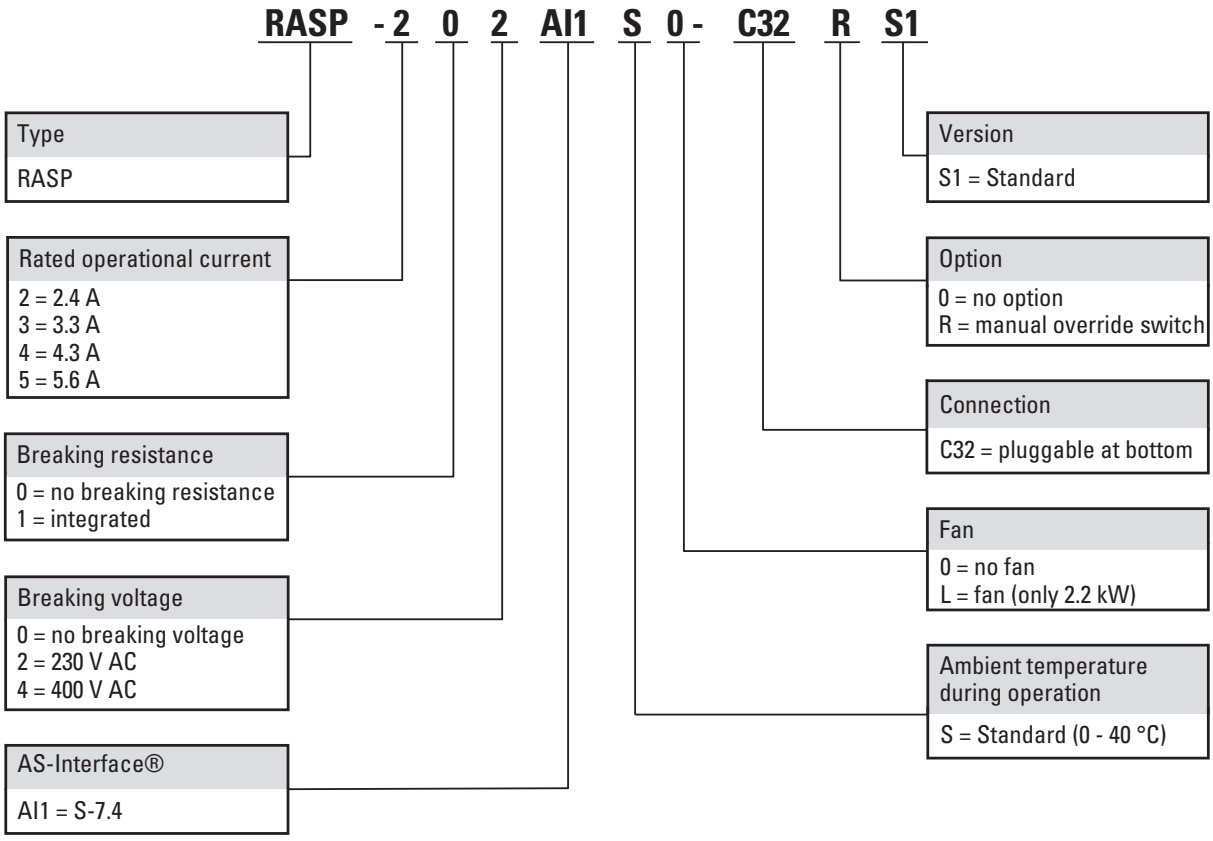
Application and function
The RASP motor starter enables the infinitely variable speed control of three-phase motors in the range from zero to 320 Hz . The standard size for 400 V (50/60 Hz) is assigned four motor ratings: 0.75 kW, 1.1 kW, 1.5 kW and 2.2 kW. Full motor protection is ensured by the adjustable current limitation (I^2t controller).
The operating mode is set via the AUTO - OFF/RESET – MANUAL key switch and can be combined with the 'Quick stop' and 'Interlocked manual operation' via the two sensor inputs (M12 sockets). Settable fixed frequencies and cyclical program sequences extend the application range and relieve the load on the higher-level head-end controller (PLC). Operating states are diagnosed and error messages (Reset) acknowledged on the device or via the AS-Interface. A hand-held programmer and a PC interface are available for the parameterization of the variable frequency drive module.
RASP is available in different versions:
- with integrated brake chopper with braking resistance for dynamic braking.
- with electronic actuation for mechanical motor brakes.
- with lockable repair switch for diagnostic and maintenance work, making it possible to safely de-energize the device locally.

Essential features
- Standard size in square enclosure. The bottom section with the two power terminals (power plug, motor feeder socket) and the repair and maintenance switch can be turned 90° clockwise and counterclockwise.
- Monitoring of thermistor and motor cable.
- Operating and ambient temperatures from 0 to +40 °C without derating, with optional fan in the performance range up to 1.5 kW max. +55 °C.
- Rated operational current: 2.4 A, 3.3 A, 4.3 A, 5.6 A
- EMC class C3 in 2nd environment
- Maximum motor cable length: 5 m.

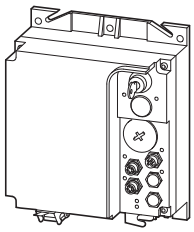
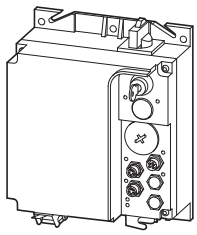
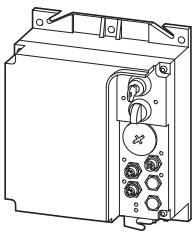
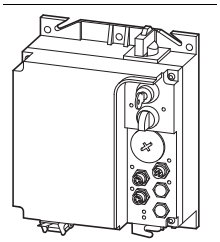
Electronic motor starters RAMO



Frequency controlled motor starter RASP

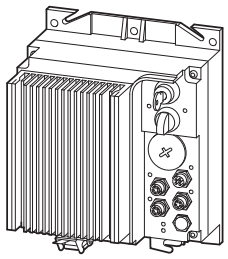
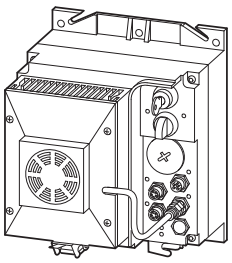
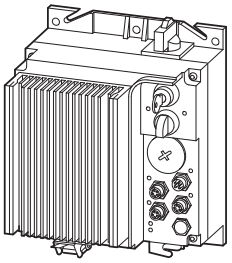
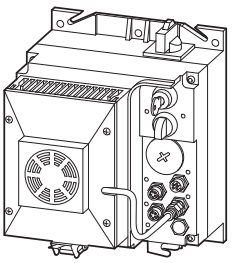


Ordering

	Rated operational current[1]	assigned motor rating P[2, 3]		Control voltage external brake (50/60 Hz)[4]	Actuator output[5]	AS-Interface profile cable		Part no. Article no.	Price see price list	Std. pack
	I_e	P	P			S-7.4 for 31 modules	S-7.A.E. for 62 modules			
	A	kW	HP	V AC	Number					
Motor starter RAMO										
Rated operational voltage 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 380 (-10%) - 480 (+10%) V										
DOL starters										
	6.6	0,09 - 3	0,125 - 3	-	-	✓	-	**RAMO-D00AI1S-C320S1** 150150		1 off
				230	-	✓	-	**RAMO-D02AI1S-C320S1** 150152		
				230	-	-	✓	**RAMO-D02AI2S-C320S1** 171776		
				230	1	✓	-	**RAMO-DA2AI1S-C320S1** 164321		
				400	-	✓	-	**RAMO-D04AI1S-C320S1** 169799		
				400	-	-	✓	**RAMO-D04AI2S-C320S1** 171778		
				400	1	✓	-	**RAMO-DA4AI1S-C320S1** 169800		
with manual override switch										
	6.6	0,09 - 3	0,125 - 3	-	-	✓	-	**RAMO-D00AI1S-C32RS1** 150158		1 off
				230	-	✓	-	**RAMO-D02AI1S-C32RS1** 150160		
				230	-	-	✓	**RAMO-D02AI2S-C32RS1** 171782		
				400	-	✓	-	**RAMO-D04AI1S-C32RS1** 169801		
				400	-	-	✓	**RAMO-D04AI2S-C32RS1** 171784		
Reversing starter with selector switch REV - OFF - FWD										
	6.6	0,09 - 3	0,125 - 3	-	-	✓	-	**RAMO-W00AI1S-C320S1** 150151		1 off
				230	-	✓	-	**RAMO-W02AI1S-C320S1** 150153		
				230	-	-	✓	**RAMO-W02AI2S-C320S1** 171777		
				230	1	✓	-	**RAMO-WA2AI1S-C320S1** 164322		
				230	1	-	✓	**RAMO-WA2AI2S-C320S1** 174473		
				400	-	✓	-	**RAMO-W04AI1S-C320S1** 169802		
				400	-	-	✓	**RAMO-W04AI2S-C320S1** 171779		
				400	1	✓	-	**RAMO-WA4AI1S-C320S1** 169803		
with manual override switch										
	6.6	0,09 - 3	0,125 - 3	-	-	✓	-	**RAMO-W00AI1S-C32RS1** 150159		1 off
				230	-	✓	-	**RAMO-W02AI1S-C32RS1** 150161		
				230	-	-	✓	**RAMO-W02AI2S-C32RS1** 171783		
				400	-	✓	-	**RAMO-W04AI1S-C32RS1** 169804		
				400	-	-	✓	**RAMO-W04AI2S-C32RS1** 171785		

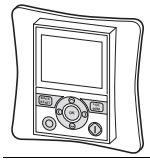
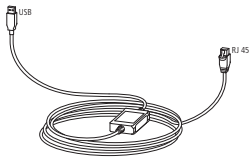
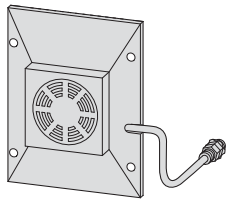
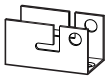
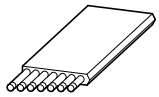
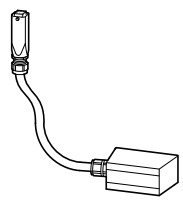
Instructions

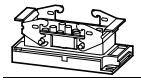
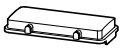
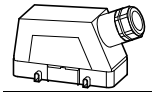
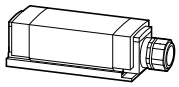
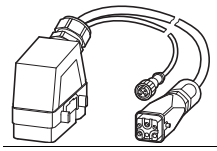
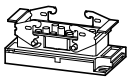
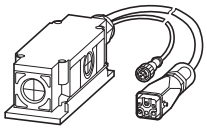
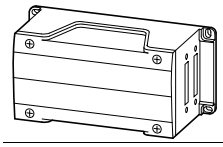
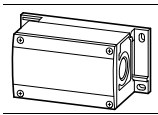
[1] 0.3 - 6.6 adjustable
[2] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3] at 400 V, 50 Hz
at 440 - 480 V, 60 Hz
[4] for actuation of motors with mechanical brake
[5] Operation with external 24V DC supply

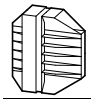
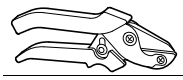
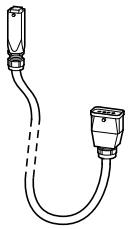
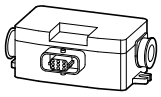
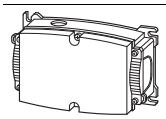
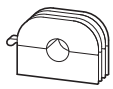
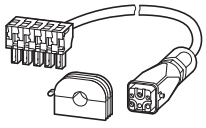
	Rated operational current[1]	assigned motor rating P[3]		Control voltage external brake (50/60 Hz)[3]	Part no. Article no.	Price see price list	with braking resistance[4] Part no. Article no.	Price see price list	Std. pack
	I_e	P	P						
	A	kW	HP	V AC					
RASP speed controllers									
Rated operational voltage 400 V AC, 3-phase Mains voltage (50/60Hz) U_{LN} 380 (-10%) - 480 (+10%) V AS-Interface profile cable S-7.4 for 31 modules									
	2.4	0.75	1	-	**RASP-200AI1S0-C320S1** 150168		**RASP-210AI1S0-C320S1** 150172		1 off
				230	**RASP-202AI1S0-C320S1** 150176		**RASP-212AI1S0-C320S1** 150180		
				400	**RASP-204AI1S0-C320S1** 169805		**RASP-214AI1S0-C320S1** 169809		
	3.3	1.1	1.5	-	**RASP-300AI1S0-C320S1** 150169		**RASP-310AI1S0-C320S1** 150173		
				230	**RASP-302AI1S0-C320S1** 150177		**RASP-312AI1S0-C320S1** 150181		
				400	**RASP-304AI1S0-C320S1** 169806		**RASP-314AI1S0-C320S1** 169810		
	4.3	1.5	2	-	**RASP-400AI1S0-C320S1** 150170		**RASP-410AI1S0-C320S1** 150174		
				230	**RASP-402AI1S0-C320S1** 150178		**RASP-412AI1S0-C320S1** 150182		
				400	**RASP-404AI1S0-C320S1** 169807		**RASP-414AI1S0-C320S1** 169811		
	5.6	2.2	3	-	**RASP-500AI1SL-C320S1** 150171		**RASP-510AI1SL-C320S1** 150175		
				230	**RASP-502AI1SL-C320S1** 150179		**RASP-512AI1SL-C320S1** 150183		
				400	**RASP-504AI1SL-C320S1** 169808		**RASP-514AI1SL-C320S1** 169812		
with manual override switch									
	2.4	0.75	1	-	**RASP-200AI1S0-C32RS1** 150200		**RASP-210AI1S0-C32RS1** 150204		1 off
				230	**RASP-202AI1S0-C32RS1** 150208		**RASP-212AI1S0-C32RS1** 150212		
				400	**RASP-204AI1S0-C32RS1** 169813		**RASP-214AI1S0-C32RS1** 169817		
	3.3	1.1	1.5	-	**RASP-300AI1S0-C32RS1** 150201		**RASP-310AI1S0-C32RS1** 150205		
				230	**RASP-302AI1S0-C32RS1** 150209		**RASP-312AI1S0-C32RS1** 150213		
				400	**RASP-304AI1S0-C32RS1** 169814		**RASP-314AI1S0-C32RS1** 169818		
	4.3	1.5	2	-	**RASP-400AI1S0-C32RS1** 150202		**RASP-410AI1S0-C32RS1** 150206		
				230	**RASP-402AI1S0-C32RS1** 150210		**RASP-412AI1S0-C32RS1** 150214		
				400	**RASP-404AI1S0-C32RS1** 169815		**RASP-414AI1S0-C32RS1** 169819		
	5.6	2.2	3	-	**RASP-500AI1SL-C32RS1** 150203		**RASP-510AI1SL-C32RS1** 150207		
				230	**RASP-502AI1SL-C32RS1** 150211		**RASP-512AI1SL-C32RS1** 150215		
				400	**RASP-504AI1SL-C32RS1** 169816		**RASP-514AI1SL-C32RS1** 169820		

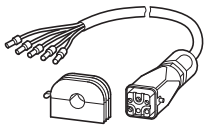
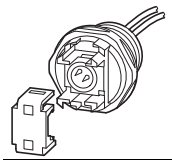
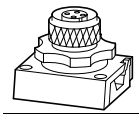
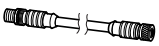
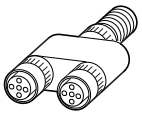
Instructions

[1] Rated operational current at an operating frequency of 6 kHz and an ambient air temperature of +40 °C
[2] for normal internally and externally ventilated 4 pole, three-phase asynchronous motors with 1500 rpm^{-1} at 50 Hz or 1800 min^{-1} at 60 Hz
[3] at 400 V, 50 Hz
at 440 - 480 V, 60 Hz
[4] for actuation of motors with mechanical brake
[5] integrated brake chopper with braking resistance for dynamic braking

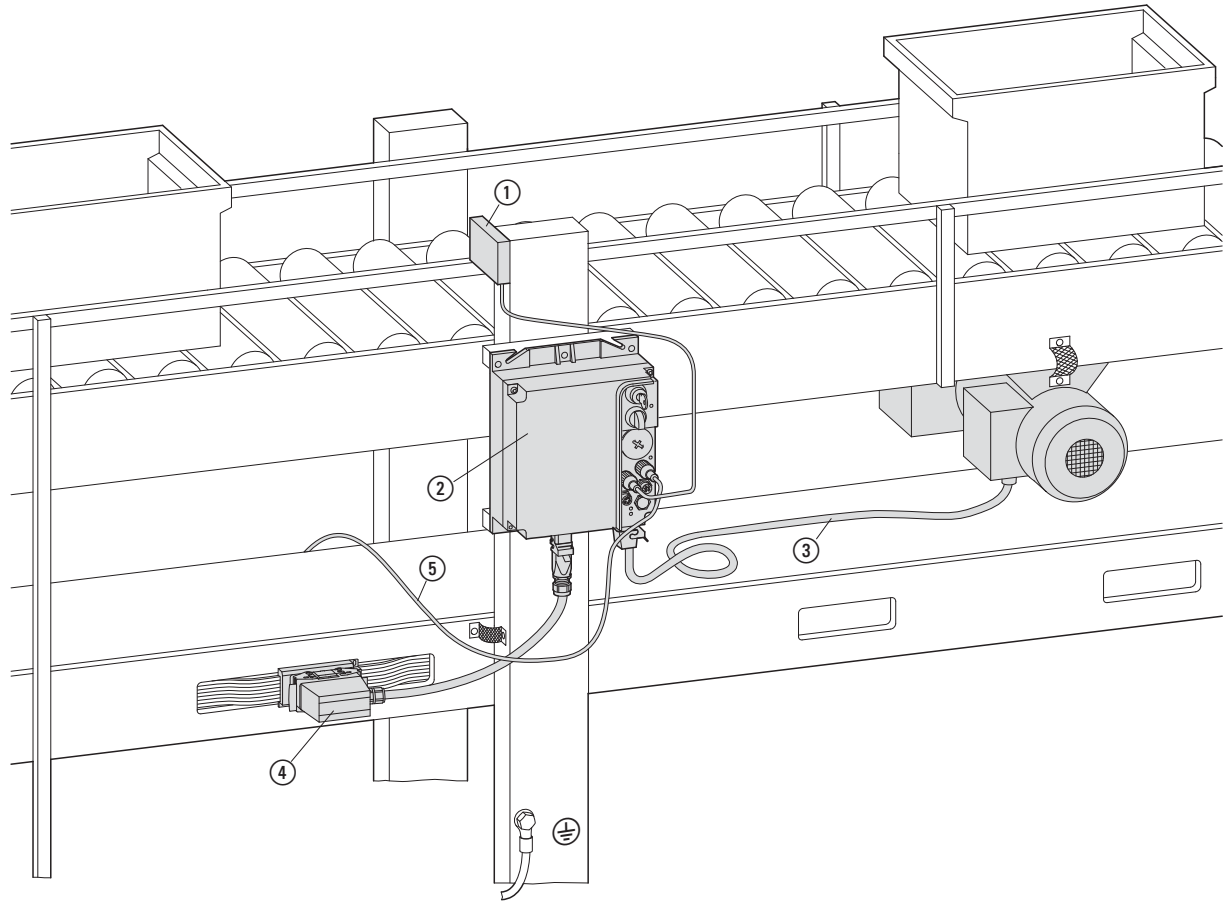
	Description		For use with	Part no. Article no.	Price see price list	Std. pack	Instructions
Communications							
Operating unit for setting the device parameters							
	with non-volatile parameter memory for copying parameter sets Equipment supplied: including 1 m connection cable with RJ45 connectors		RASP	**RASP-KEY-S1** 156644		1 off	-
Programming cable for connecting the device to the PC							
	For configuring the device's parameters with the MaxConnect computer program with RJ 45 plug and USB plug	Length 3.4 m	RASP	**XMX-CBL-3M4-USB** 153448		1 off	-
Device fans							
RASP device fan for operation at high temperatures without derating							
	Power supply and control via RASP through M12 plug connector Enhanced cooling for ambient temperatures of up to +55 °C for RASP-2…, RASP-3…., and RASP-4... Spare part for RASP-5...		RASP	**RASP-FAN-S1** 156643		1 off	-
Motor feeder							
Motor cable for connecting the motor starter to the motor		Length m					
	halogen free, 8 x 1.5 mm², plastic plug	2	RAMO	**RAMO-CM1-2M0** 164282		1 off	-
		5	RAMO	**RAMO-CM1-5M0** 164283		1 off	-
		10	RAMO	**RAMO-CM1-10M** 164284		1 off	-
	halogen free, screened, 4 x 1.5 mm² + 2 x (2 x 0.75 mm²), plastic plug	2	RASP	**RASP-CM1-2M0** 164285		1 off	-
		5	RASP	**RASP-CM1-5M0** 164286		1 off	-
Locking brackets for the safe isolation of the motor cables from power							
	For motor cables and motor plugs, disconnection device to EN 60204-1		RAMO-CM1… RASP-CM1…	**SET-M-LOCK** 272085		1 off	For padlocks with hasp thickness up to 8 mm
Power supply at flat cable RA-C1							
Flat cable for 400 V AC/24 V DC decentralized power supply or AS-Interface							
	halogen free, 7 x 4 mm²		RA-C1…	**RA-C1-7X4HF** 230860		100 runn. m	Paint film contaminant/ silicon-free
Power connection cable for connecting the device with the 400 V AC flexible busbar junction							
	with power plug and plug for flexible busbar junction, halogen-free, 5 x 1.5 mm²		RAMO RASP RA-C1-PLF	**RA-C3/C1-1,5HF** 290210		1 off	-

	Description	For use with	Part no. Article no.	Price see price list	Std. pack	Instructions
Power supply at flat cable RA-C1						
Flexible busbar junction 400 V AC/24 V DC Connection socket for power connection cable						
	Insulation piercing terminals, terminal socket with lock mechanism	RA-C1-7X4HF RA-C3/C1-1,5HF	**RA-C1-PLF** 290188		5 off	-
Protection cover for protecting the 400 V AC/24 V DC flexible busbar junction						
	-	RA-C1-PLF	**RA-C1-COV** 254693		10 off	-
Plug connector for 400 V AC/24 V DC flexible busbar junction						
	Plug insert with hood	RA-C1-PLF	**RA-C1-VP-PLM** 231574		5 off	Order cable gland V-M25 separately.
Distributor module for feeding the 400-V-AC/24-V-DC of the ribbon cable with a round cable						
	Termination with piercing screws, 2 x V-M25 and 2 x V-M20 knockout plates, connection module with spring-loaded terminals, connection of round cables up to 4 mm².	RA-C1-7X4HF	**RA-C1-AM-7** 290214		5 off	Order cable gland V-M25 or V-M20 separately.
Power/AS-Interface connection cable for connecting the device with the 400 V AC AS-Interface flexible busbar junction						
	Double cable with outgoer plug (flexible busbar end) and M12 plug and power plug (device end)	RAMO RASP RA-C1-PLF1	**RA-C1-PLM/C3-1M5** 112624		1 off	Can be used when AS-Interface implemented in flat cable.
400 V AC/AS-Interface flexible busbar junction Connection socket for power/AS-Interface cable						
	Insulation piercing terminals, terminal socket with lock mechanism	RA-C1-7X4HF RA-C1-PLM/C3-1M5	**RA-C1-PLF1** 116904		1 off	Can be used when AS-Interface implemented in flat cable.
Power/AS-Interface connection cable For connecting the device with 400 V AC/24 V DC/AS-Interface flexible busbar						
	Double cable with connection module (flexible busbar end) and M12 plug as well as power plug (device end), termination with piercing screws, knockouts Length 1.5 m	RAMO RASP RA-C1-7X4HF	**RA-C1-AM/C3-1M5** 112625		1 off	Can be used when AS-Interface implemented in flat cable.
Distributor module for the 400V AC feeding to the ribbon cable with a round cable						
	With 3 flexible busbar inputs and 2 round cable inputs Connection of round cables 4 mm²	RA-C1-7X4HF	**RA-C1-VM-7** 264244		2 off	Order V-M25/V-M20 cable gland and RA-C1-DF bushing separately.
Flexible busbar bushing for bushing for flat cable in distributor module or control cabinet						
	-	RA-C1-VM-7	**RA-C1-DF** 264243		10 off	-
Distributor module 24 V DC control voltage is taken from the ribbon cable						
	Termination with piercing screws, connection sockets with screw contacts	RA-C1-7X4HF	**RA-C1-VP-AM-2** 264315		5 off	Order cable gland V-M20 separately
Flexible busbars for fastening the ribbon cable						
	-	RA-C1-7X4HF	**RA-C1-FIX** 272086		100 off	One set with 100 clips.

	Description	Length m	For use with	**Part no.** Article no.	**Price** see price list	Std. pack	**Instructions**
Power supply at flat cable RA-C1							
End-piece for terminating the ribbon cable							
	-		RA-C1-7X4HF	**RA-C1-END1** 290189		10 off	-
Tools							
	For cutting flat cable		RA-C1-7X4HF	**RA-C1-CUT** 254690		1 off	-
	for removing casing at the ends of the flat cable		RA-C1-7X4HF	**RA-C1-AZ-4** 272087		1 off	A standard engineer's pliers is required.
Power supply at round cable RA-C2							
Power connection cable for connecting the device with the round cable junction							
	with power plug and plug for round cable junction, halogen-free, 5 x 1.5 mm²	1.5	RAMO RASP RA-C2-S1-4	**RA-C3/C2-1,5HF** 290211		1 off	-
Round cable junction Connection socket for power connection cable							
	for 7 x 2.5/4 mm², 400 V AC and 24 V DC, termination with insulation piercing technology, cable fixing with metal screws, pre-wired socket insert, suitable for cable outer diameters 10 - 13 mm.		RA-C3/C2-1,5HF	**RA-C2-S1-4** 257830		1 off	Equipment supplied: 1 pairs of gaskets for these cable diameters, 1 lock mechanism.
Blanking plug for closing the last round cable junction in the power line							
	-		RA-C2-S1-4	**RA-C2-SBL** 265357		10 off	One set with 10 blanking plugs.
Power supply at round cable RA-C4							
Round cable junction Connection socket for power cables from 2.5 - 6 mm²							
	T junction via spring-cage terminal, 1.5 to 6 mm² and/or plug connection of 0.5 - 4 mm², Enclosure IP65		RA-C4-PPB/C3-1M5 RA-C4-X/C3-1M5	**RA-C4-PB65** 116905		1 off	Tools required: Stripping tool AM16 from Weidmüller or similar. Enclosure continuous seals must be ordered separately.
Gasket Slotted enclosure bushing seal							
	for Ø 11 - 13 mm EPDM round cable, silicon free and halogen free, IP65		RA-C4-PB65	**RA-C4-D13** 116907		10 off	-
	for Ø 13 - 15 mm EPDM round cable, silicon free and halogen free, IP65		RA-C4-PB65	**RA-C4-D15** 116908		10 off	-
	for Ø 15 - 17 mm EPDM round cable, silicon free and halogen free, IP65		RA-C4-PB65	**RA-C4-D17** 116909		10 off	-
Blanking plug for closing off unused housing openings							
	Enclosure seal, closed, EPDM, silicon free and halogen free, IP65		RA-C4-PB65	**RA-C4-D0** 116960		10 off	One set with 10 blanking plugs.
Power connection cable for connecting the device with the round cable junction							
	Cable 5 x 1.5 mm², halogen-free, with RA-C4-PPB plug for round cable junction, power plug and gasket IP65	1.5	RAMO RASP RA-C4-PB65	**RA-C4-PPB/C3-1M5** 116962		1 off	-

	Description	Length m	For use with	**Part no.** Article no.	**Price** see price list	Std. pack	**Instructions**
Power connection cable for user assembly for connecting the device with the round cable junction							
	Cable 5 x 1.5 mm² halogen free, with ferrules, power plug and IP65 gasket	1.5	RAM0 RASP RA-C4-PB65	**RA-C4-X/C3-1M5** 116961		1 off	-
AS-Interface connection and sensors							
Connection clip for AS-Interface flat cable to AS-Interface incomer/outgoer for connection modules							
	with integrated AS-Interface overvoltage protection, protection against interference on switch operations or short-circuit, cable termination with insulation displacement		RA-C1-AM-7 RA-C1-AM/C3-1M5 RA-C1-VP-AM-2	**RA-C1-AZPG** 112978		1 off	-
AS-Interface link M12 connection socket for AS-Interface connection cable							
	IDC termination		RAM0 RASP	**ZB2-100-AZ1** 082667		1 off	-
24V/AS-Interface connection cable for supplying the device with 24 V/AS-Interface							
	with M12 socket and double outgoer for AS-Interface and 24 V, cable termination with insulation displacement	1	RAM0 RASP	**RA-XAZ2-1M** 292253		1 off	-
AS-Interface connection cable for connecting the device with AS-Interface junction							
	with M12 socket and M12 plug, 3-pole	1	RAM0 RASP	**RA-XM12-1M** 272057		1 off	Pins 1, 3, 4 are assigned
Y connector For connecting up to 2 sensors per M12 socket							
	-		RASP	**RA-XM12-Y** 290424		1 off	-
Spare keys							
for AUTO - OFF/RESET - HAND key-switches							
	Lock mechanism MS1		RAM0 RASP	**M22-ES-MS1** 216416		5 off	-

The Rapid Link 4.0 electronic drive system enables remote and flexible installation in the direct proximity of the drive unit. The entire system is designed with protection to IP65. All electrical connections (mains voltage, motor feeder, sensors) are implemented simply with the standard connectors that are primarily used in materials handling applications.



① Sensor (light barriers)
② RAMO
③ Motor connection cable
④ Mains connection on power bus
⑤ AS-Interface

Motor starter selection

All motor starters (RAMO, RASP) can provide electronic motor protection and the additional connection of temperature sensors (thermistor, ThermoClick, PTC). The motor starters are available in the following variants, with or without a lockable repair switch (mains transfer switch):

- RAMO-D, electronic DOL starter for one operating direction.
- RAMO-W, electronic reversing starter (two operating directions).
- RASP, frequency-controlled motor starter with several speeds for two operating direction in assigned ratings.

Electrical mains connection

The motor starters can be connected to and operated on 400 V three-phase, star point-earthed AC supply systems (in accordance with IEC 60364) without any restriction. The neutral conductor must be connected for motor starter variants that actuate a 230 V motor brake.

Safety and protective device

The power bus must have short-circuit protection. The length of the power bus depends on the upstream group protection. Calculations for design examples are provided in the Rapid Link manual (MN03406003Z):

- PKZM0-25 motor-protective circuit-breaker, max. approx. 40 m.
- FAZ C25/3 miniature circuit-breaker, max. approx. 60 m.
- PKE32/XTU-32 system protective circuit-breaker, 50 m to 220 m.

The group protective devices listed here protect:

- the power bus from overloads and short-circuits.
- the spur lines to the motor starter (RAMO, RASP) from overloads and short-circuits.
- the motor feeder of the RAMO

On the RASP frequency-controlled motor starter, the motor feeder is protected by the internal variable frequency drive.

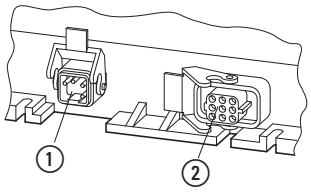
When using residual current devices, a Type B AC/DC sensitive residual current circuit-breaker must be used with the RASP frequency-controlled motor starter.

EMC compliance

All motor starters observe the required EMC limit values when connected as specified. The RASP frequency-controlled motor starter must be provided with a shielded motor cable (RASP-CM1-…) and installed with the specified EMC measures. The internal RFI filter then allows operation in accordance with category C3 in the second environment.

Terminal Models

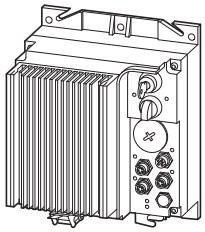
The electrical connection in the power section (mains voltage, motor feeder) is implemented with plug-in terminals in the base.



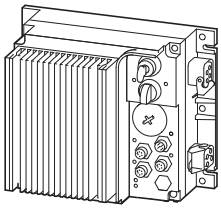
① 5-pole power connector for connecting the 3 AC 400 V mains voltage, (N), PE.
② 8-pole motor feeder socket as per DESINA specification.

By rotating the base 90 degrees, connection is also possible from the right or left. This makes it possible to keep the operating and connection area and the heat sink on the RASP in the preferred vertical position.

Example RASP:

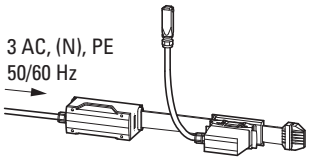


Connection from below (standard)

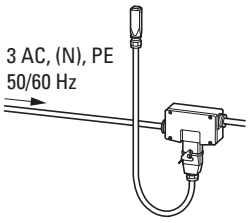


Connection from the right (90 degree rotation of the base to the left)

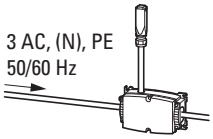
Three installation systems are available for connecting the power plug to the mains:



RA-C1, flat cable system



RA-C2, round cable system with plug connectors

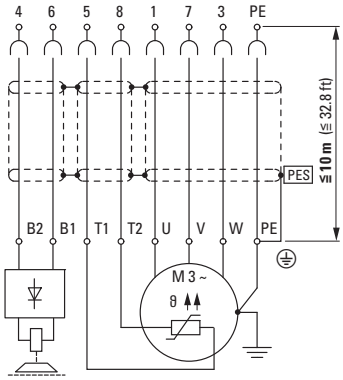


RA-C4, round cable system with contact connectors

Device variants with a repair switch (RAMO-…-C32R…, RASP-….-C32R…) ensure that the drive can be isolated locally from the power supply for repair or maintenance work, even when it is still connected. A padlock can be used to secure the repair switch.

The 8-pole motor feeder can be used to connect:

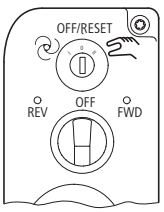
- a three-phase AC motor (U1, V1, W1, PE),
- a motor brake (B1, B2) with a control voltage of 230 V AC or 400 V AC,
- a thermistor or temperature switch (ThermoClick). These connection cables (T1, T2) can at the same time be used to monitor the motor cable and the connection of the motor feeder plug.



Example: Motor feeder with shielded motor cable on the RASP

Control level

The control level features a selector switch (key switch) for selecting automatic mode and manual mode locally. The RAMO-W and RASP motor starters are also provided with a selector switch for reversing the motor direction in manual mode.



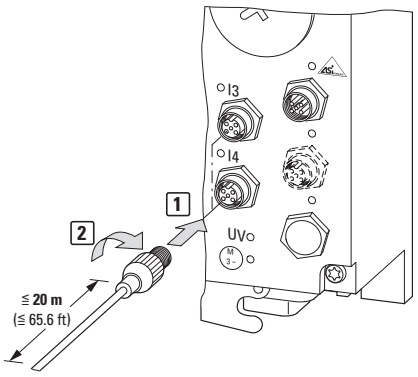
The automatic mode and the control voltage power supply are implemented via the AS-Interface. All connections in the control level (AS-i, sensors etc.) are implemented with M12 plug connectors. For this the M12 connectors just have to be fitted on [1] and rotated to secure them [2] (see illustration below).

The sensor inputs (I3, I4) enable the Rapid Link motor starters to execute sensor-controlled functions immediately and independently of PLC and bus cycle times:

- Interlocked manual operation,
- Quick Stop,
- Rotation direction change (on RAMO-W and RASP),
- Controlled speeds (only RASP)

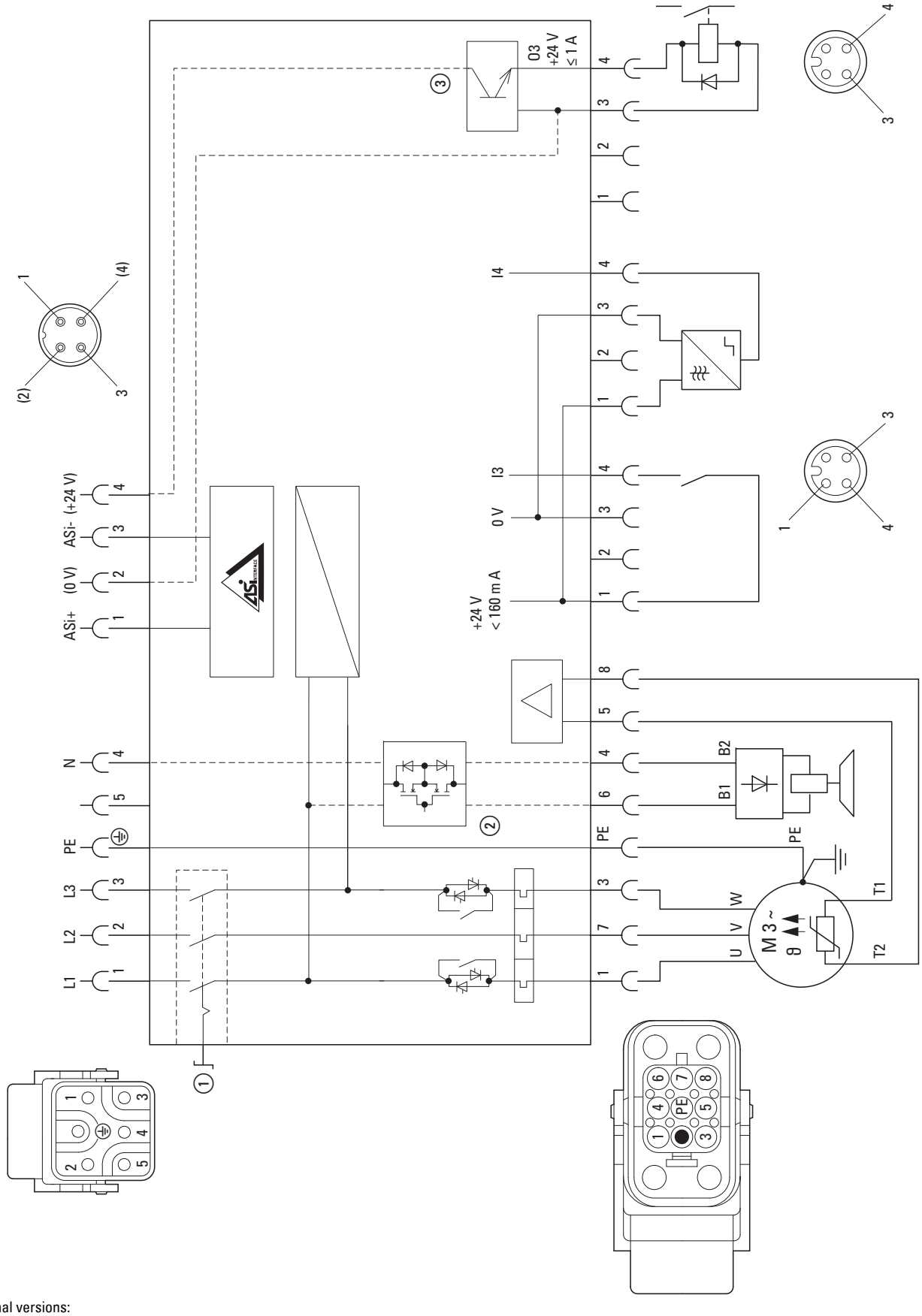
On the RAMO-DA… and RAMO-WA… a 24 V DC output (max. 1 A, O3) also makes it possible to control external actuators (valves, couplings, indicator lights) directly.

The functions are selected directly on the motor starter via microswitches. On the RASP additional settings (variable frequency drives) can be made from a hand-held terminal or from the parameter software.



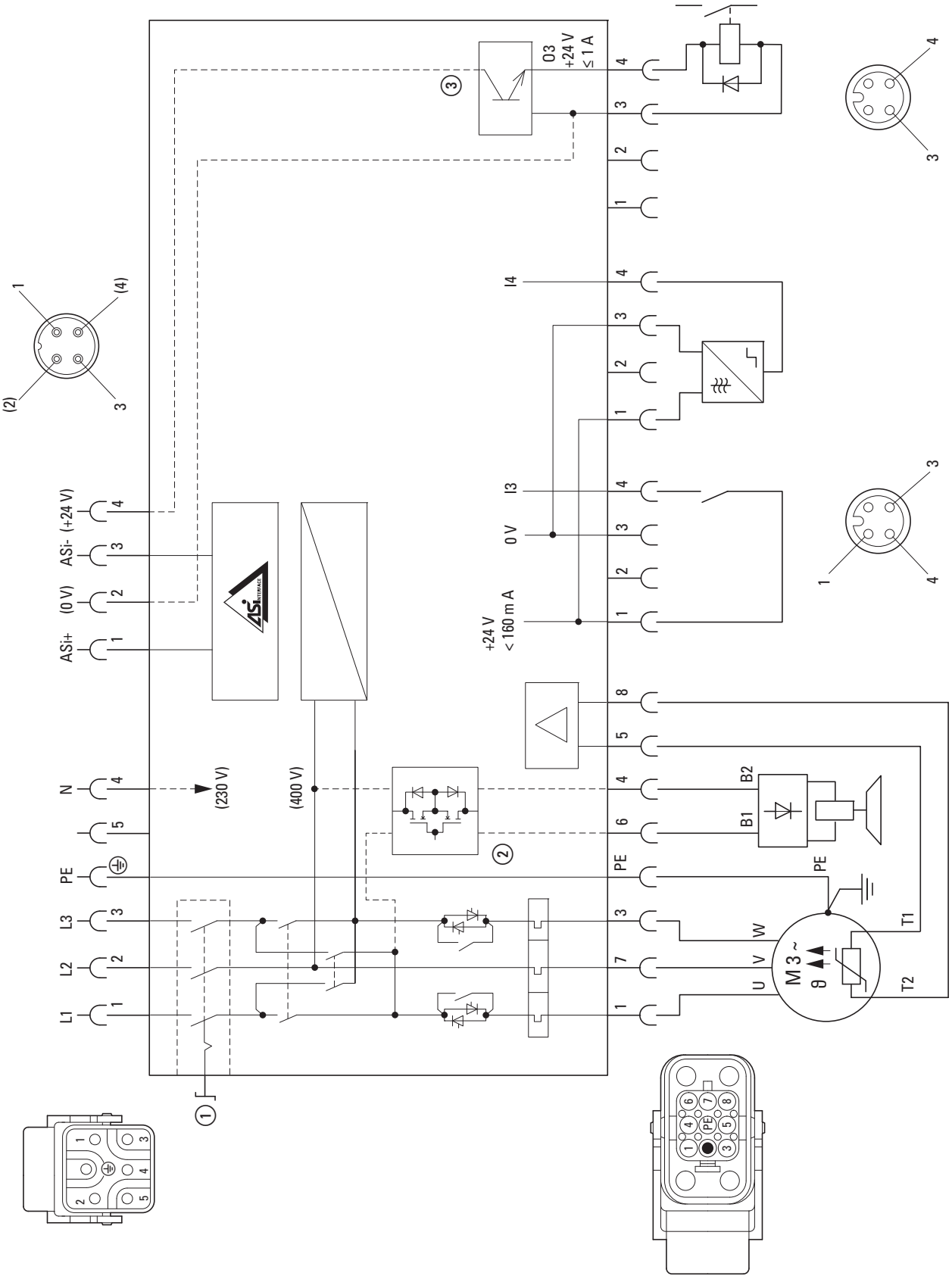
Engineering

Block diagram DOL starter RAMO-D



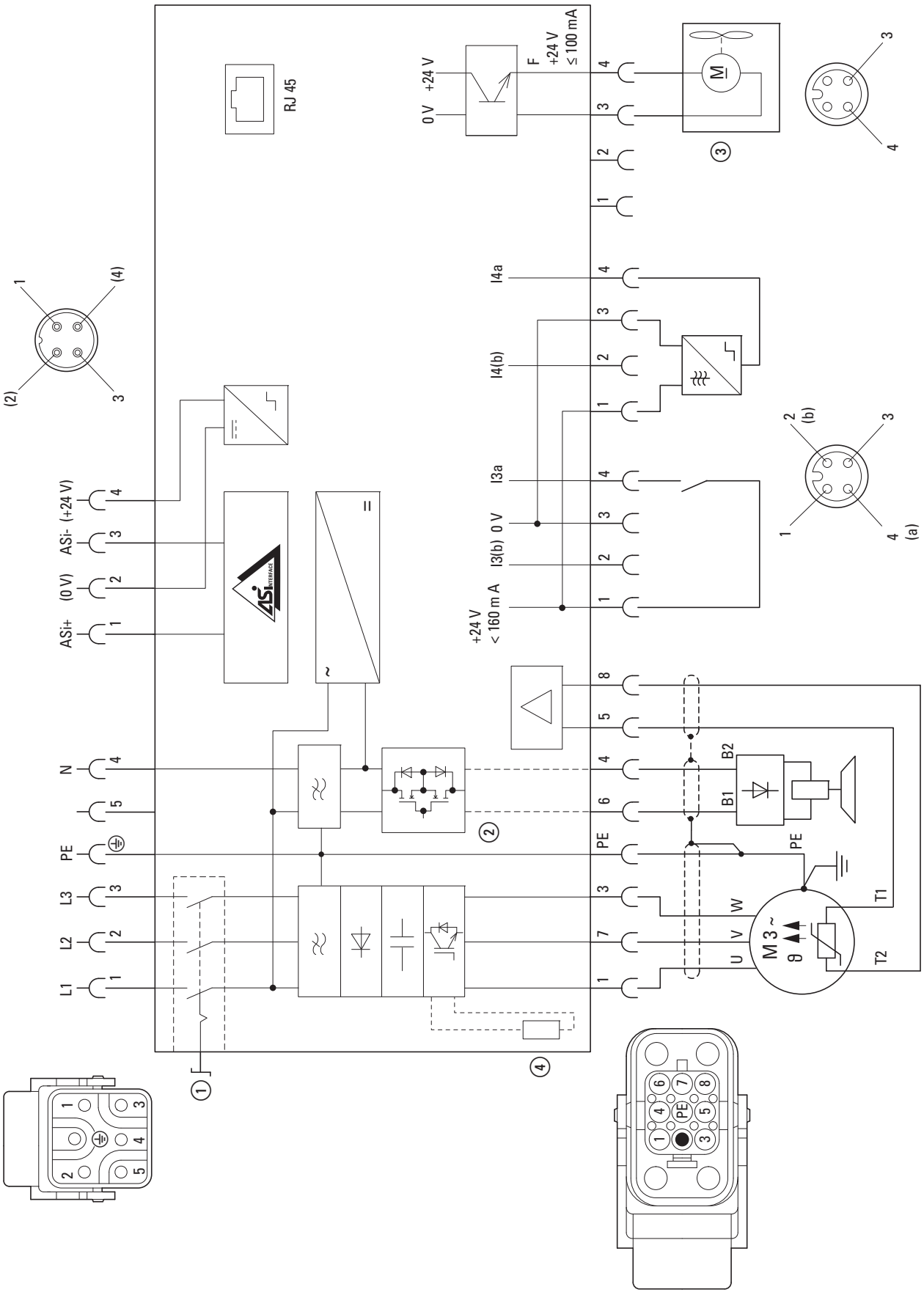
Optional versions:
① Repair and maintenance switch RAMO-D…-C32R…
② Activation of external brake: 230/277 V at RAMO-Dx2… or 400/480 V at RAMO-Dx4…
③ actuator output, RAMO-DA…

Block diagram RAMO-W reversing starter



Optional versions:
① Repair and maintenance switch RAMO-W…-C32R…
② Actuation of external brake: 230/277 V on RAMO-Dx2… or 400/480 V on RAMO-Dx4…
③ actuator output, RAMO-WA…

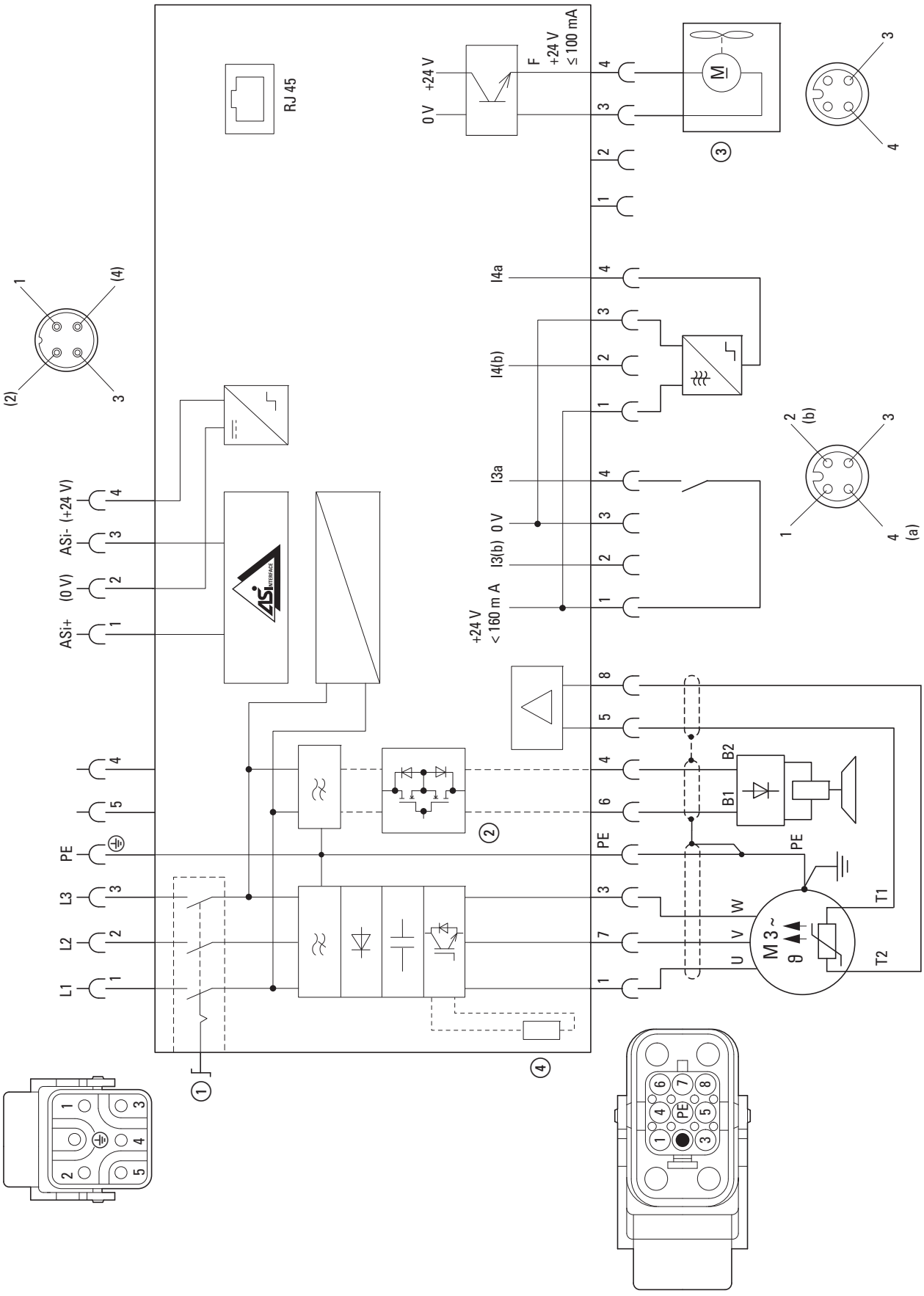
Block diagram RASP with 230V brake



Optional versions:
① Repair and maintenance switch, RASP-…C32R…
② Activation of external brake (230 V), RASP-…xx2…
③ Device fan, RASP-…L-C32…
④ internal braking resistance, RASP-x1…

Notes:
Y connector RA-XM12-Y is required in order to connect 4 sensors (I3a, I3b/I4a, I4b) (→ accessory)

Block diagram RASP with 400V brake

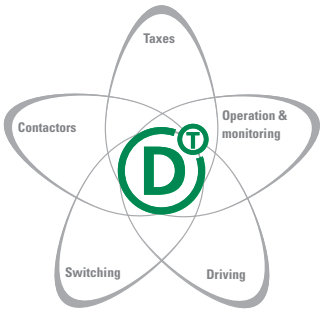


Optional versions:
① Repair and maintenance switches, RASP-…C32R…
② Activation of external brake (400 V), RASP-…xx4…
③ Device fan, RASP-…L-C32…
④ internal braking resistance, RASP-x1…

Notes:
Y connector RA-XM12-Y is required in order to connect 4 sensors (I3a, I3b/I4a, I4b) (→ accessory)

SmartWire-DT™
The easy way to connect

SmartWire-DT® – Cost-optimized Communication for Switchgear



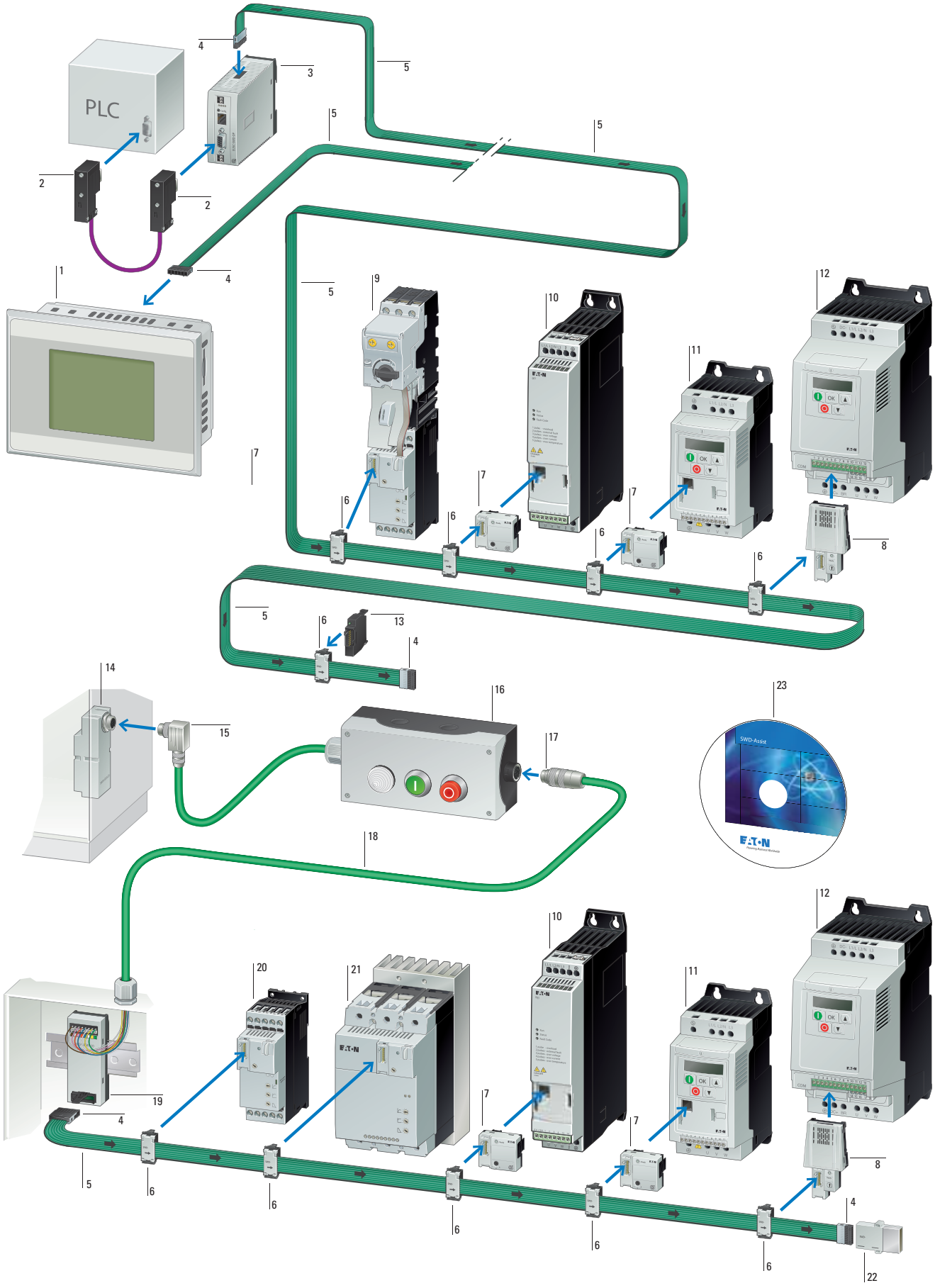
Manufacturers of machines and systems strive to achieve a balance between the maximum level of functionality and cost optimization. SmartWire-DT is a communication system for industrial switchgear based on the concept of continued development in the control panel and peripherals: from control through to protection and switching, and extending to driving, operation and monitoring. One technology from which you will profit, now and in the future.

Drives and soft starters – communicate with SmartWire-DT®

Being able to use a controller to directly access all the parameters in soft starters, variable speed starters, and variable frequency drives via SmartWire-DT® is the epitome of ease of operation. For example, this enables users to easily read and overwrite setpoints, as well as to retrieve extended status, error, and diagnostic messages directly and establish absolute data transparency. Moreover, easy-to-use SmartWire-DT® plug-in units make installation fast and error-free, with the resulting connection including the control current supply for DS7 soft starters.

PowerXL™ DE1, DC1, and DA1 devices can be easily expanded with plug-in modules and connected to SmartWire-DT®, with function blocks enabling simple communication with Eaton controllers (PLCs, HMIs). Moreover, more advanced communication is also possible based on the PROFIdrive profile and other profiles as well. This not only makes it possible to configure all drive parameters, but also provides advanced diagnostic options.

System overview



Note: You can find the entire SmartWire-DT range of products by consulting our industrial main catalog or our online catalog at http://ecat.moeller.net

Features

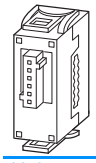
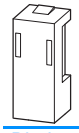
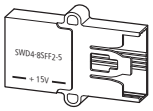
SmartWire-DT HMI-PLC
- with SmartWire-DT master interface and PLC function
- Compact design with light plastic enclosures
- Wide selection of onboard interfaces
- 3.5", 5.7" or 7" TFT-LCD screen

SmartWire-DT Gateways
- Connection of SmartWire-DT to field bus.
- Field bus address setting with dip switches
- Automatic baud rate detection
- Feeding the supply voltage for the SmartWire-DT modules
- Supplies the control voltage for the motor starter or contactor
- Configuration button for automatic addressing of the SmartWire-DT slaves.
- Support of up to 99 SmartWire-DT modules.

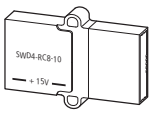
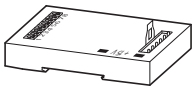
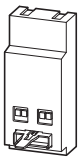
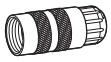
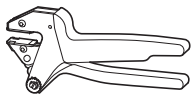
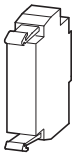
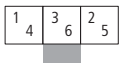
SmartWire-DT module
- Function element for connecting to RMQ-Titan pilot devices.
- Function element for connecting to DLM contactors
- Function element for connecting to PKZ/PKE motor-protective circuit-breakers
- Function module for connecting to NZM2,3,4 circuit-breakers
- Connection of digital and analog input/output modules
- DS7 Soft starter connection
- Function element for connecting to PowerXL™ DC1, DA1 variable frequency drives and DE1 variable speed starter

SmartWire-DT Assist (SWD-Assist)
- Easy creation of SmartWire-DT networks
- Integrated validity check
- Generation of ordering lists.
- Online-Functionality
  – Simple pre-commissioning
  – Configuration check and comparison
  – Display of parameters and diagnostics
  – easy diagnostics of SmartWire-DT slave
- Free download under: http://downloadcenter.moeller.net

Ordering

	Description	Baud Rates	Number of SmartWire-DT slaves	Part no. Article no.	Price see price list	Std. pack
SmartWire-DT Gateways						
supply of the SmartWire-DT modules and switchgear						
	For connection to PROFIBUS-DP field bus field bus connection through 9-pin SUB-D socket Separate RS232 diagnostics interface (RJ45)	up to 12 MBit/s	Max. 58	**EU5C-SWD-DP** 116308		1 off
	For connection to CANopen® field bus Field bus connection through 9-pin SUB-D plug Separate RS232 diagnostics interface (RJ45)	up to 1 MBit/s	Max. 99	**EU5C-SWD-CAN** 116307		
	For connection to the Ethernet-IP/MODBUS-TCP field bus Field bus connection via Ethernet Switch Separate RS232 diagnostics interface (RJ45)	10/100 MBit/s	Max. 99	**EU5C-SWD-EIP-MODTCP** 153163		
	for connection to field bus PROFINET as PROFINET IO-Device Field bus connection via Ethernet Switch Separate USB diagnostics interface (Mini-USB)	100 MBit/s	Max. 99	**EU5C-SWD-PROFINET** 170124		1off
Flat band conductor, 8 pole						
For connecting the SmartWire-DT modules within the control panel 8 pole						
	not ready-assembled		Length 100 m	**SWD4-100LF8-24** 116026		1 off
	prefabricated with two blade terminals SWD4-8MF2		Length 3 m	**SWD4-3LF8-24-2S** 116027		
			Length 5 m	**SWD4-5LF8-24-2S** 116028		
			Length 10 m	**SWD4-10LF8-24-2S** 116029		
External device plugs						
	For connecting the ribbon cable to SmartWire-DT modules in the control panel			**SWD4-8SF2-5** 116022		10 off
Link						
	For bridging open mounting locations for external device plugs Front fixing			**SWD4-SEL8-10** 116021		5 off
Blade terminal						
	For connecting the ribbon cable to the gateway, power feeder module, coupling, SWD4-RC8-10 bus termination resistor			**SWD4-8MF2** 116023		10 off
Coupling						
	via SWD4 8MF2- blade terminal to connect ribbon cable			**SWD4-8SFF2-5** 116024		1 off

Notes **Information relevant for export to North America** → **Page 149**

	Description	Part no. Article no.	Price see price list	Std. pack
Network terminator				
	For the SmartWire-DT bus termination resistor on the SmartWire-DT ribbon cable	**SWD4-RC8-10** 116020		1 off
Cable adapters				
	SWD cable adapters	**SWD4-8FRF-10** 121377		1 off
Switch cabinet bushing				
For transition from SWD ribbon cable to SWD round cable Connection of ribbon cable with blade terminal SWD4-8MF2 8 pole double conductor run pluggable Additional control voltage feeder for the motor starter and contactors.				
	Connection round cable via socket	**SWD4-SFL8-20** 121380		1 off
	Connection round cable via plug	**SWD4-SML8-20** 121381		
Round conductor				
For laying the SmartWire-DT network outside of the control panel.				
	For connecting pilot devices in CI surface mounting enclosures 8 pole HK-S0-Li2YY, 8 mm diameter Length 50 m	**SWD4-50LR8-24** 116030		1 off
Connectors for SWD round conductors				
	8 pole socket Straight	**SWD4-SF8-67** 116033		1 off
	8-pinplug connector Straight	**SWD4-SM8-67** 116034		
	8 pole socket 90° angled	**SWD4-SF8-67W** 116035		
	8-pinplug connector 90° angled	**SWD4-SM8-67W** 116036		
Tools for plugs				
	Pliers for connecting external device plug and ribbon cable	**SWD4-CRP-1** 116025		1 off
	Pliers for making contacts with blade terminals and ribbon cables	**SWD4-CRP-2** 116699		
Universal slave				
for configured but not yet installed SmartWire-DT slaves Front mount				
	Configuration 	**M22-SWD-NOP** 147637		20 off

Notes

Information relevant for export to North America

UL File No.	E29184
UL Category Control No.	NKCR
CSA File No.	2324643
CSA Class No.	3211-07
North America Certification	UL listed, CSA certified

EU5C-SWD-PROFINET

UL File No.	E221530
UL Category Control No.	NRQA
CSA File No.	UL report applies to both US and Canada
North America Certification	UL listed, CSA certified

Full-load motor-running currents in amperes corresponding to various AC horsepower ratings

HP	110 - 120 V			220 - 240 V[a,b]			360 - 380 V		440 - 480 V			550 - 600 V		
	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase	Single phase	Three phase	Single phase	Two phase	Three phase	Single phase	Two phase	Three phase
1/10	3.0	-	-	1.5	-	-	1.0	-	-	-	-	-	-	-
1/8	3.8	-	-	1.9	-	-	1.2	-	-	-	-	-	-	-
1/6	4.4	-	-	2.2	-	-	1.4	-	-	-	-	-	-	-
1/4	5.8	-	-	2.9	-	-	1.8	-	-	-	-	-	-	-
1/3	7.2	-	-	3.6	-	-	2.3	-	-	-	-	-	-	-
1/2	9.8	4.0	4.4	4.9	2.0	2.2	3.2	1.3	2.5	1.0	1.1	2.0	0.8	0.9
3/4	13.8	4.8	6.4	6.9	2.4	3.2	4.5	1.8	3.5	1.2	1.6	2.8	1.0	1.3
1	16.0	6.4	8.4	8.0	3.2	4.2	5.1	2.3	4.0	1.6	2.1	3.2	1.3	1.7
1-1/2	20.0	9.0	12.0	10.0	4.5	6.0	6.4	3.3	5.0	2.3	3.0	4.0	1.8	2.4
2	24.0	11.8	13.6	12.0	5.9	6.8	7.7	4.3	6.0	3.0	3.4	4.8	2.4	2.7
3	34.0	16.6	19.2	17.0	8.3	9.6	10.9	6.1	8.5	4.2	4.8	6.8	3.3	3.9
5	56.0	26.4	30.4	28.0	13.2	15.2	17.9	9.7	14.0	6.6	7.6	11.2	5.3	6.1
7-1/2	80.0	38.0	44.0	40.0	19.0	22.0	27.0	14.0	21.0	9.0	11.0	16.0	8.0	9.0
10	100	48.0	56.0	50.0	24.0	28.0	33.0	18.0	26.0	12.0	14.0	20.0	10.0	11.0
15	135	72.0	84.0	68.0	36.0	42.0	44.0	27.0	34.0	18.0	21.0	27.0	14.0	17.0
20	-	94.0	108	88.0	47.0	54.0	56.0	34.0	44.0	23.0	27.0	35.0	19.0	22.0
25	-	118	136	110	59.0	68.0	70.0	44.0	55.0	29.0	34.0	44.0	24.0	27.0
30	-	138	160	136	69.0	80.0	87.0	51.0	68.0	35.0	40.0	54.0	28.0	32.0
40	-	180	208	176	90.0	104	112	66.0	88.0	45.0	52.0	70.0	36.0	41.0
50	-	226	260	216	113	130	139	83.0	108	56.0	65.0	86.0	45.0	52.0
60	-	-	-	-	133	154	-	103	-	67.0	77.0	-	53.0	62.0
75	-	-	-	-	166	192	-	128	-	83.0	96.0	-	66.0	77.0
100	-	-	-	-	218	248	-	165	-	109	124	-	87.0	99.0
125	-	-	-	-	-	312	-	208	-	135	156	-	108	125
150	-	-	-	-	-	360	-	240	-	156	180	-	125	144
200	-	-	-	-	-	480	-	320	-	208	240	-	167	192
250	-	-	-	-	-	602	-	403	-	-	302	-	-	242
300	-	-	-	-	-	-	-	482	-	-	361	-	-	289
350	-	-	-	-	-	-	-	560	-	-	414	-	-	336
400	-	-	-	-	-	-	-	636	-	-	477	-	-	382
500	-	-	-	-	-	-	-	786	-	-	590	-	-	472

[a] To obtain full-load currents for 200 and 208 V motors, increase corresponding 220 - 240 V ratings by 15 and 10 percent, respectively.
[b] To obtain full-load currents for 265 and 277 V motors, decrease corresponding 220 - 240 V ratings by 13 and 17 percent, respectively.

Zitiert aus "Power Conversion Equipment - UL 508C, May 3, 2002".
Reproduced from UL 508 C, Power Conversion Equipment, 3rd edition (May 2, 2002) with permission of Underwriters Laboratories Inc.

Full-load motor-running currents in amperes corresponding to various AC horsepower ratings

Minimum fuse sizes for short-circuit protection of three-phase motors
The maximum value depends on the switching device or the overload relay.

Motor power			230 V			400 V			440 V			500 V			690 V		
			Motor rated operational current	Fuse Starting		Motor rated operational current	Fuse Starting		Motor rated operational current	Fuse Starting		Motor rated operational current	Fuse Starting		Motor rated operational current	Fuse Starting	
				DOL	Y/Δ		DOL	Y/Δ		DOL	Y/Δ		DOL	Y/Δ		DOL	Y/Δ
kWh	p.f.	η (%)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
0.06	0.7	58	0.37	2	–	0.21	2	–	0.19	2	–	0.17	2	–	0.12	2	–
0.09	0.7	60	0.54	2	–	0.31	2	–	0.28	2	–	0.25	2	–	0.18	2	–
0.12	0.7	60	0.72	4	2	0.41	2	–	0.37	2	–	0.33	2	–	0.24	2	–
0.18	0.7	62	1.04	4	2	0.6	2	–	0.54	2	–	0.48	2	–	0.35	2	–
0.25	0.7	62	1.4	4	2	0.8	4	2	0.76	2	–	0.7	2	–	0.5	2	–
0.37	0.72	66	2	6	4	1.1	4	2	1	4	2	0.9	2	2	0.7	2	–
0.55	0.75	69	2.7	10	4	1.5	4	2	1.4	4	2	1.2	4	2	0.9	4	2
0.75	0.79	74	3.2	10	4	1.9	6	4	1.7	4	2	1.5	4	2	1.1	4	2
1.1	0.81	74	4.6	10	6	2.6	6	4	2.4	4	2	2.1	6	4	1.5	4	2
1.5	0.81	74	6.3	16	10	3.6	6	4	3.3	6	4	2.9	6	4	2.1	6	4
2.2	0.81	78	8.7	20	10	5	10	6	4.6	10	6	4	10	4	2.9	10	4
3	0.82	80	11.5	25	16	6.6	16	10	6	16	10	5.3	16	6	3.8	10	4
4	0.82	83	14.8	32	16	8.5	20	10	7.7	16	10	6.8	16	10	4.9	16	6
5.5	0.82	86	19.6	32	25	11.3	25	16	10.2	20	10	9	20	16	6.5	16	10
7.5	0.82	87	26.4	50	32	15.2	32	16	13.8	25	16	12.1	25	16	8.8	20	10
11	0.84	87	38	80	40	21.7	40	25	19.8	32	25	17.4	32	20	12.6	25	16
15	0.84	88	51	100	63	29.3	63	32	26.6	50	32	23.4	50	25	17	32	20
18.5	0.84	88	63	125	80	36	63	40	32.8	63	32	28.9	50	32	20.9	32	25
22	0.84	92	71	125	80	41	80	50	37	80	40	33	63	32	23.8	50	25
30	0.85	92	96	200	100	55	100	63	50	100	63	44	80	50	32	63	32
37	0.86	92	117	200	125	68	125	80	61	125	80	54	100	63	39	80	50
45	0.86	93	141	250	160	81	160	100	74	125	100	65	125	80	47	80	63
55	0.86	93	173	250	200	99	200	125	90	125	100	79	160	80	58	100	63
75	0.86	94	233	315	250	134	200	160	122	160	125	107	200	125	78	160	100
90	0.86	94	279	400	315	161	250	200	146	200	160	129	200	160	93	160	100
110	0.86	94	342	500	400	196	315	200	179	250	200	157	250	160	114	200	125
132	0.87	95	401	630	500	231	400	250	210	250	250	184	250	200	134	250	160
160	0.87	95	486	630	630	279	400	315	254	315	250	224	315	250	162	250	200
200	0.87	95	607	800	630	349	500	400	318	400	315	279	400	315	202	315	250
250	0.87	95	–	–	–	437	630	500	397	630	400	349	500	400	253	400	315
315	0.87	96	–	–	–	544	800	630	495	630	630	436	630	500	316	500	400
400	0.88	96	–	–	–	683	1000	800	621	800	800	547	800	630	396	630	400
450	0.88	96	–	–	–	769	1000	800	699	800	800	615	800	630	446	630	630
500	0.88	97	–	–	–	–	–	–	–	–	–	–	–	–	491	630	630
560	0.88	97	–	–	–	–	–	–	–	–	–	–	–	–	550	800	630
630	0.88	97	–	–	–	–	–	–	–	–	–	–	–	–	618	800	630

Instructions

The rated motor currents apply to normal internally and surface-cooled three-phase motors with 1500 rpm.
DOL starting: Starting current max. 6 × rated motor current.
Starting time max. 5 s.
Y/Δ-start: Starting current max. 2 × motor rated current.
Starting time max. 15 s.
Set overload relay in line to 0.58 × motor rated current.

Fuse ratings at Y/Δ starting apply also to three-phase slipring motors.
For higher rated currents, starting currents and/or longer starting times, larger fuses will be required. Table applies for time delay and gL fuses (VDE 0636)

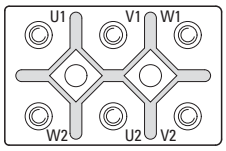
For LV h.b.c. fuse with aM characteristics the fuse should be equal to the rated operational current.

Drives egineering selection criteria

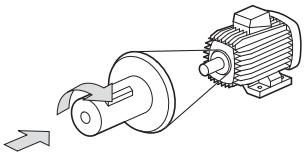
Each drive task requires a drive motor. The speed, torque and controllability of each motor must fulfill the requirements of the task. The following generally applies:
the application determines the drive.
The drive motor most frequently used worldwide in industrial plants and large buildings is the 3-phase asynchronous motor. Its robust and simple construction as well as its high degrees of protection and standard types are the main features of this inexpensive electric motor.

Motor connection

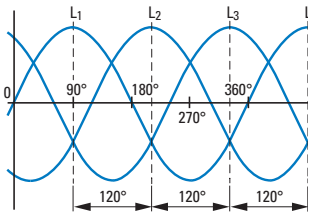
When connecting a 3-phase motor to the mains supply, the data on the rating plate of the motor must correspond to the mains voltage and frequency.
The standard connection is implemented via six screw terminals in the terminal box of the motor and with two types of circuit, the star connection and the delta circuit, depending on the mains voltage.



The rotation direction of a motor is always determined by directly looking at the drive shaft of the motor (from the drive end). On motors with two shaft ends, the driving end is denoted with D (= Drive), the non-driving end with N (= No drive).



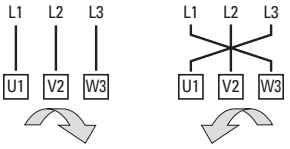
Regardless of the circuit type and the type of three-phase asynchronous motor, the connections must be labeled, so that their alphabetical sequence (e.g. U1, V1, W1) corresponds with the order of the mains voltage phase sequence (L1, L2, L3) and causes the motor to rotate clockwise.



On the three-phase asynchronous motor, three windings are arranged offset from each other by 120°/p (p = number of pole pairs). To generate a rotating field in the motor, an alternating voltage is applied to each phase in turn at a time delay of 120 °.

The effect of inductance causes the rotation field and torque to be formed in the rotor winding. The speed of the motor thus depends on the number of pole pairs and the frequency of the supply voltage. The operating direction can be reversed by swapping over two of the supply phases.

Clockwise (FWD) Anticlockwise operation (REV)

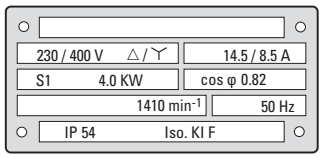


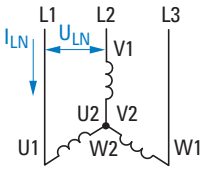
FWD = forward run (clockwise rotation field)
REV = reverse run (anticlockwise rotation field)

Information on the rating plate

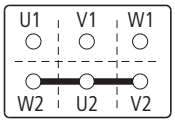
The electrical and mechanical rating data of the motor must be stated on its rating plate (IEC 34-1, VDE 0530). The data on the rating plate describes the stationary operation of the motor in the area of its operating point (MN, e.g. at 400 V and 50 Hz). The operational data is unstable in the motor start phase. The following examples show the rating plates for two motors with a motor shaft output of 4 kW and the respective connection circuits on a 3-phase AC network with 400 V and 50 Hz.

Star circuit



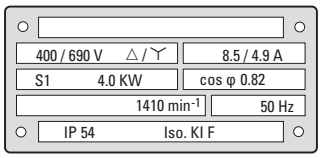


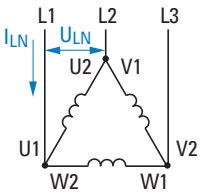
$U_{LN} = \sqrt{3} \times U_W$, $I_{LN} = I_W$



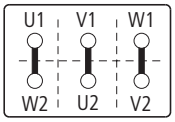
- With the specified 230/400 V voltage, this motor must be connected to the 3-phase system (U_{LN} = 400 V) in a star-connected circuit.
- The voltage of each motor winding is designed for 230 V. The windings must therefore be connected in sequence to the phase voltage (400 V).
- The three winding phases (W2-U2-V2) are configured in the terminal box to the so-called star point. The voltage of the individual phases to the star point is 230 V (= U_W).

Delta circuit





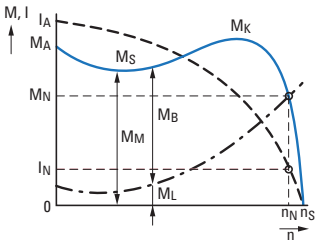
$U_{LN} = U_{W,LN} = \sqrt{3} \times I_W$



- With the specified 400/690 V voltage, this motor must be connected to the 3-phase system (U_{LN} = 400 V) in a delta circuit.
- Each motor winding is designed here for the maximum phase voltage of 400 V and can be connected directly.
- The three winding phases (U1 – W2, V1 – U2, W1 – V2) are combined in the terminal box and connected directly to the individual phases.

Startup characteristics

The following figure shows the characteristic startup curves of a 3-phase asynchronous motor.



I_A: Starting current
I_N: Rated operational current at the operating point
M_A: Starting torque
M_B: Accelerating torque ($M_M > M_L$)
M_K: Breakdown torque
M_L: Load torque
M_M: Motor torque
M_N: Rated load torque, (stable operating point, intersection point of the 3-phase speed torque characteristic with the load characteristic)
M_S: Pull-up torque
n: Speed (actual value)
n_N: Rated speed at the operating point
n_S: Synchronous speed (n_S - n_N = slip speed s)

Synchronous speed:

$$n_s = \frac{f}{p}$$

Slip speed in %:

$$s = \frac{n_s - n}{n_s} \cdot 100\,\%$$

3-phase asynchronous motor speed:

$$n = \frac{f}{p} \cdot (1 - s)$$

f Frequency of voltage in Hz (= s^{-1})
n: Speed in r.p.m.
p Number of pole pairs
s: Slip speed in r.p.m.

Electric power:

$$P_1 = U \times I \times \sqrt{3} \times \cos\varphi$$

P_1: Electrical power in W
U: Rated operating voltage in V
I: Rated operational current in A
cos φ: Power factor

Motor output (power equation):

$$P_2 = \frac{M_N \times n}{9550}$$

P_2: Mechanical shaft output power in kW
M_N: Rated torque in Nm
n: Speed in r.p.m.

Efficiency:

$$\eta = \frac{P_2}{P_1}$$

Planning safety and process optimization – CAD data at the click of a mouse!

ePLAN®

- 10,800 article data items and macros
- Convenient selection tool
- Version P8

CAD ENAS

- Models for approx. 11,000 products
- 80 different neutral & native formats

URL
www.eaton.eu/cad

Eaton is providing its customers with CAD data to offer optimum support during planning. Both electrical and mechanical design data can be called up quickly and conveniently from the Internet at any time. This reduces processing times, minimizes errors and thus reduces costs already in the engineering phase of control panels, systems and machinery.

eCAD: Eaton has product data and macros available for EPLAN Electric P8. After downloading the small EPLANSelection program, you will not only be able to select the items you need from a database containing more than 10,800 products, but will also be able to export them and import them into your own EPLAN item database.

mCAD: Eaton makes 2D and 3D data available for more than 11,000 products. Over 80 different neutral and native formats guarantee compatibility with the project engineering systems of the customer. The models can either be integrated directly into the planning software from the Partcommunity Portal on the Internet or via the CADENAS Partsolution software.

Worldwide export of machines and plants

European machine and system building and worldwide exports are closely related. Even if you don't export your machines at present, you should be prepared for it in the future. Eaton provides switchgear and protective devices with all the essential approvals and certificates for machine and system building. In most countries around the world, conformity with international standards is the sole requirement for successful exports. This is because components in these locations are governed by compliance with well known and established IEC standards. In this respect, the European CE mark is not only the passport for exports within Europe but also far beyond its borders.

World market equipment for machine building

Nearly all the switchgear and protective devices of Eaton's Moeller® series are world market devices. Each product line thus carries all the approvals and certification marks required for worldwide use.

These product lines include those for

- Pilot devices, limit switches
- Contactors and various timing and special relays
- Motor-protective circuit-breakers and relays
- Electronic components and systems.

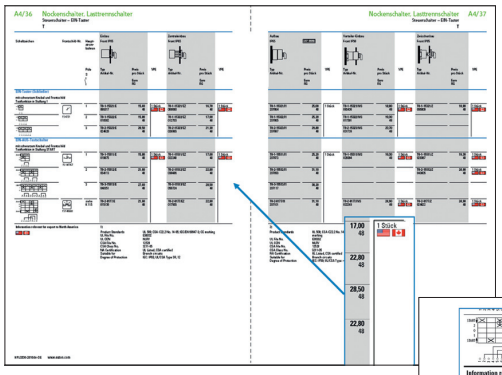
With circuit-breakers and switch-disconnectors, Eaton offers IEC devices for use in most countries in the world and NA devices with virtually the same dimensions and the same accessories for the North American market. This considerably simplifies device selection since the North American standards often involve the need for considerably different technical specifications.

Electrical engineering products and their applications are not harmonized internationally.

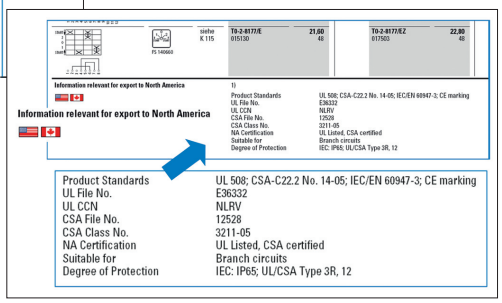
The greatest differences to the IEC world are in North America, i.e. the USA and Canada. For many newcomers to the export business, it is initially surprising to experience the very different approaches and solutions.

Special components, such as handles for main switches that can only be operated by the intentional switching of an additional handle when the control panel door is opened, may sometimes be required for export to North America. Likewise, the European motor-protective circuit-breaker is only accepted with an upstream protective device or with larger air and creepage distances at the incoming terminals. Eaton is the competent partner of choice for export-related issues here.

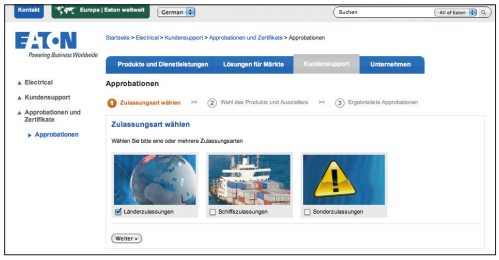
Qualified information is a critical key to success

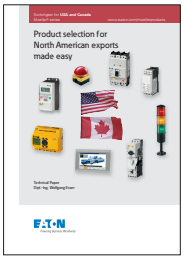


The Eaton Main Catalogue for Moeller® series products provides reliable information for machine and panel builders on the approval of components deployed for North American market. Each selection page provides information such as the relevant product standard, the E-File Number, the Category Control Number or the CSA Class Number. Many customers incorporate this information in their parts lists in order to be well prepared for the acceptance procedures.



Up to 13 data items are listed here for each product, such as the suitability for use in feeders or branch circuits, the maximum operating voltage, or the North American degree of protection, such as UL / CSA Type 4X. The Main Catalogue also contains a glossary with explanations of the American terms.





The link http://applications.eaton.eu shows the relevant approvals or permits for each component type. This therefore enables you to view the certificates provided or, depending on the test authority, also the product report. The information given is the same as what is provided in the databases of the authorities.

Anyone wishing to avoid unfortunate experiences, should make use beforehand of the large number of publications that Eaton is offering on the issue of exports to North America. They contain the implementation of the codes & standards and a description of different practices.

These technical articles can be accessed via
http://www.eaton.eu/Europe/OurCompany/News/Publications/index.htm
They can be downloaded free of charge.

To find the right contact person:

At Eaton, we believe that building and maintaining strong relationships with our customers is something that deserves our undivided attention.

This is why you can rest assured knowing that you will be able to count on us for every project from the very start. To find out whom to contact for your needs, please visit our website:

In just a few steps, we will get you the contact information for the person or team in charge of support for your specific industry in your region.

To find the right contact person anywhere in the world, visit:

→ www.eaton.eu/contact

Support and Service for UPS Systems and Hydraulic System Solutions

Building a strong relationship with you is of utmost importance to us. This is why you can count on us to quickly get your questions, requests, and suggestions to the relevant specialists. After all, your challenges are our challenges.

Questions regarding uninterrupted power supplies (UPS)?

Our Technical Service staff will be more than glad to assist you if you are experiencing any difficulties with an Eaton UPS, DC power supply system, or any other Power Quality product.

Our Technical Support staff is there to answer any questions you may have regarding our products.

To find the right contact person anywhere in the world, please visit
www.eaton.eu/contact

Questions regarding hydraulic system solutions?

Simply contact our customer service head office in Baden-Baden and our staff will be glad to put you in contact with a local contact person.

Customer Service:
Eaton Hydraulics Group
Dr.-Reckeweg-Straße 1
D-76532 Baden-Baden
Germany
Phone: +49 (0)7221 682 - 0
Fax: +49 (0)7221 682 - 788
E-mail: customersupportemea@eaton.com

Eatons After Sales Service

Eaton is known for its unparalleled after-sales support for all low-voltage switchgear, switchgear systems, and services.

For more detailed information, as well as to view our terms and conditions, please visit www.eaton.eu/aftersales

Europe, Middle East, Africa24/7

Hotline

For immediate support please call +49 (0) 180 5 223822* (24/7). You will receive competent and fast, round the clock assistance, with unplanned machine and system stand stills, system malfunctions and device failures.

(* 0,14 Euro per minute from the Deutsche Telekom network AG)

Helpdesk

Eaton specialists: +49 (0) 228 602 3640 (Monday–Friday from 08:00–16:00 CET) or contact your local Eaton representative.

We offer extensive support from commissioning to application queries as well as in the area of fault analysis, which can also include remote diagnostics.

We can also offer you an individual consulting service contract which is tailor-made to suit your requirements. If you would like to communicate your service queries in writing, please use the following e-mail address: AfterSalesEGBonn@eaton.com

Powering Business Worldwide

Eaton has been serving the power management needs of our customers for more than a century. Over the years, we have expanded our expertise and portfolio of products and services by uniting some of the world's most respected names with Eaton's strong heritage of innovation.

Our goal is simple; to provide unique solutions across a wide range of markets that keep businesses on the leading edge of change. That's the power of One Eaton.

Eaton.com

At Eaton, we're energized by the challenge of powering a world that demands more. With over 100 years experience in electrical power management, we have the expertise to see beyond today. From groundbreaking products to turnkey design and engineering services, critical industries around the globe count on Eaton.

We power businesses with reliable, efficient and safe electrical power management solutions. Combined with our personal service, support and bold thinking, we are answering tomorrow's needs today. Follow the charge with Eaton.
Visit **eaton.com/electrical**.

Eaton Industries GmbH
Hein-Moeller-Str. 7–11
D-53115 Bonn/Germany

Printed in Germany 06/15
Publication No.: CA04020001Z-EN-INT
Doku/DHW/ip/MP 05/15
Article No.: 170504
(pages 35 and 37 corrected in 12/2015)

Powering Business Worldwide