YCRL0200HE-YCRL0610HE

INSTALLATION, OPERATION & MAINTENANCE	Revision 0	Form 150.27-NM2.EN.CE (0312)

035-21965-100

REMOTE CONDENSER SCROLL LIQUID CHILLERS
STYLE A (50 HZ)
(178-556 KW)
HE - HIGH EFFICIENCY

R410A

YORK
BY JOHNSON CONTROLS

Johnson Controls

IMPORTANT!

Read BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, oils, materials under pressure, rotating components, and lethal voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to areas of potential hazard:

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

NOTE is used to highlight additional information which may be helpful to you.

External wiring, unless specified as an optional connection in the manufacturer's product line, is not to be connected inside the micro panel cabinet. Devices such as relays, switches, transducers and controls may not be installed inside the panel. No external wiring is allowed to be run through the micro panel. All wiring must be in accordance with Johnson Controls published specifications and must be performed only by qualified Johnson Controls personnel. Johnson Controls will not be responsible for damages/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this will void the manufacturer's warranty and cause serious damage to property or injury to persons.

CHANGEABILITY OF THIS DOCUMENT

In complying with Johnson Controls policy for continuous product improvement, the information contained in this document is subject to change without notice. While Johnson Controls makes no commitment to update or provide current information automatically to the manual owner, that information, if applicable, can be obtained by contacting the nearest Johnson Controls Service Centre.

It is the responsibility of operating/service personnel to verify the applicability of these documents to the equipment in question. If there is any question in the mind of operating/service personnel as to the applicability of these documents, then prior to working on the equipment, they should verify with the owner whether the equipment has been modified and if current literature is available.

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GENERAL CHILLER INFORMATION & SAFETY

INTRODUCTION

YORK YCRL Remote Condenser Liquid Chillers provide chilled water for all air conditioning applications that use central station air handling or terminal units. They are self-contained and are designed for indoor (new or retrofit) installation. Each unit includes hermetic scroll compressors, a liquid evaporator, and a user-friendly, diagnostic MicroComputer Control Center all mounted on a rugged steel base. Remote condensers (model VDC) are available separately from Johnson Controls.

The units are produced at an ISO 9001 registered facility and manufactured to the highest design and construction standards to ensure high performance, reliability and adaptability to all types of air conditioning installations..

The unit is intended for cooling water or glycol solutions and is not suitable for purposes other than those specified in this manual.

This manual contains all the information required for correct installation and commissioning of the unit, together with operating and maintenance instructions. The manuals should be read thoroughly before attempting to operate or service the unit.

All procedures detailed in the manuals, including installation, commissioning and maintenance tasks must only be performed by suitably trained and qualified personnel.

The manufacturer will not be liable for any injury or damage caused by incorrect installation, commissioning, operation or maintenance resulting from a failure to follow the procedures and instructions detailed in the manuals.

WARRANTY

Johnson Controls warrants all equipment and materials against defects in workmanship and materials for a period of eighteen months from date of shipment, unless labour or extended warranty has been purchased as part of the contract.

The warranty is limited to parts only replacement and shipping of any faulty part, or sub-assembly, which has failed due to poor quality or manufacturing errors. All claims must be supported by evidence that the failure has occurred within the warranty period, and that the unit has been operated within the designed parameters specified.

All warranty claims must specify the unit model, serial number, order number and run hours/starts. Model and serial number information is printed on the unit identification plate.

The unit warranty will be void if any modification to the unit is carried out without prior written approval from Johnson Controls.

For warranty purposes, the following conditions must be satisfied:

- The initial start of the unit must be carried out by trained personnel from an Authorized Johnson Controls Service Centre. See Section 5, Commissioning.
- Only genuine Johnson Controls approved spare parts, oils, coolants, and refrigerants must be used.
- All the scheduled maintenance operations detailed in this manual must be performed at the specified times by suitably trained and qualified personnel. See Section 7, Maintenance,

Failure to satisfy any of these conditions will automatically void the warranty..

SAFETY

Standards for Safety

YCRL units are designed and built within an EN ISO 9002 accredited manufacturing organisation.

The YCRL unit does not have a Declaration of Conformity (CE Mark) as the unit can not be used independently without a remote condenser.

It is the installers responsibility to ensure the completed system conforms to CE standards and local regulations.

The YCRL unit is shipped with a Declaration of Incorporation and the unit components have Declarations of Conformity where applicable (i.e. compressors, vessels, safety devices etc.) assembly instructions are also included with the shipment.

FLUORINATED GREENHOUSE GASES

- The equipment **when installed** will contain fluorinated greenhouse gases covered by the Kyoto Protocol.
- The global warming potential of the refrigerant (R410A) **that will be used** in this unit is 1720.
- The refrigerant quantity required will be **dependant on system design**.
- The fluorinated greenhouse gases **that will be used** in this equipment may not be vented to the atmosphere.
- This equipment should only be serviced by qualified technicians.

RESPONSIBILITY FOR SAFETY

Every care has been taken in the design and manufacture of the unit to ensure compliance with the safety requirements listed above. However, the individual operating or working on any machinery is primarily responsible for:

- Personal safety, safety of other personnel, and the machinery.
- Correct utilization of the machinery in accordance with the procedures detailed in the manuals.

It is the installers responsibility to ensure the completed system conforms to CE standards and local regulations. The Installer is also responsible for approvals by a Notified Body and CE marking of the completed system, before the system goes into operation.

In addition, the installer is responsible for ensuring the following are performed for the installed system:

Relevant EC directives:

Pressure Equipment Directive 97/23/EC

Machinery Safety 2006/42/EC

EMC2004/108/EC.

Applied harmonized standards:

EN60204-1(2006),

EN378-2(2008)/A1(2009)*,

EN61000-6-4(2007), EN61000-6-2(2005)

* Safety accessories according to essential requirements in PED paragraph 2.11.1 have been calculated according to EN13136:2001/A1:2005 and are not following the requirements in EN378-2:2008 paragraph 6.2.6.2, unless dual relief valves are fitted.

The contents of this manual include suggested best working practices and procedures. These are issued for guidance only, and they do not take precedence over the above stated individual responsibility and/or local safety regulations.

This manual and any other document supplied with the unit are the property of Johnson Controls which reserves all rights. They may not be reproduced, in whole or in part, without prior written authorization from an authorized Johnson Controls representative.

MISUSE OF EQUIPMENT

Suitability for Application

The unit is intended for cooling water or glycol solutions and is not suitable for purposes other than those specified in these instructions. Any use of the equipment other than its intended use, or operation of the equipment contrary to the relevant procedures may result in injury to the operator, or damage to the equipment.

The unit must not be operated outside the design parameters specified in this manual.

Structural Support

Structural support of the unit must be provided as indicated in these instructions. Failure to provide proper support may result in injury to the operator, or damage to the equipment and/or building.

Mechanical Strength

The unit is not designed to withstand loads or stresses from adjacent equipment, pipework or structures. Additional components must not be mounted on the unit. Any such extraneous loads may cause structural failure and may result in injury to the operator, or damage to the equipment.

General Access

There are a number of areas and features, which may be a hazard and potentially cause injury when working on the unit unless suitable safety precautions are taken. It is important to ensure access to the unit is restricted to suitably qualified persons who are familiar with the potential hazards and precautions necessary for safe operation and maintenance of equipment containing high temperatures, pressures and voltages.

Pressure Systems

The unit will contain refrigerant vapour and liquid under pressure, release of which can be a danger and cause injury. The user should ensure that care is taken during installation, operation and maintenance to avoid damage to the pressure system. No attempt should be made to gain access to the component parts of the pressure system other than by suitably trained and qualified personnel.

Electrical

The unit must be earthed. No installation or maintenance work should be attempted on the electrical equipment without first switching power OFF, isolating and locking-off the power supply. Servicing and maintenance on live equipment must only be performed by suitably trained and qualified personnel. No attempt should be made to gain access to the control panel or electrical enclosures during normal operation of the unit.

Refrigerants and Oils

Refrigerants and oils used in the unit are generally nontoxic, non-flammable and non-corrosive, and pose no special safety hazards. Use of gloves and safety glasses is, however, recommended when working on the unit. The build up of refrigerant vapour, from a leak for example, does pose a risk of asphyxiation in confined or enclosed spaces and attention should be given to good ventilation.

High Temperature and Pressure Cleaning

High temperature and pressure cleaning methods (e.g. steam cleaning) should not be used on any part of the pressure system as this may cause operation of the pressure relief device(s). Detergents and solvents, which may cause corrosion, should also be avoided.

Emergency Shutdown

In case of emergency, the control panel is fitted with a incoming supply non-fused disconnect switch which can be used as the emergency stop device. When operated it removes the electrical supply to the control circuit thus shutting down the unit.

Safety Labels

The following labels are fixed to each unit to give instruction, or to indicate potential hazards which may exist.

White symbol on blue background
For safe operation, read the Instructions first

Black symbol on yellow background

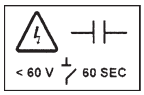
Warning: This machine may start automatically without prior warning

Black symbol on yellow background
Warning: Hot surface

Black symbol on yellow background
Warning: Safety relief valve may discharge gas or liquid without prior warning

Black symbol on yellow background
Warning: Isolate all electrical sources of supply before opening or removing the cover, as lethal voltages may exist

Black symbol on yellow background
General attention symbol



Black symbol on yellow background
Power Factor Correction fitted
Warning: On isolating the supply it may take up to 60 seconds for the capacitor voltage to fall below 60 volts

MATERIAL SAFETY DATA

Refrigerant Safety Data R410A:		
COMPOSITION/INFORMATION ON INGREDIENTS		
Components Material	PENTAFLUOROETHANE (HFC-125)	DIFLUOROMETHANE (HFC-32)
CAS Number	354-33-6	75-10-5
%	50	50
HAZARDS IDENTIFICATION		
Potential Health Effects	Inhalation of high concentrations of vapour is harmful and may cause heart irregularities, unconsciousness, or death. Intentional misuse or deliberate inhalation may cause death without warning. Vapour reduces oxygen available for breathing and is heavier than air. Liquid contact can cause frostbite. At flame temperatures, this material can decompose to hydrogen fluoride which can be lethal at much lower concentrations.	
Human Health Effects	Overexposure to the vapours by inhalation may include temporary nervous system depression with anaesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness. Higher exposures to the vapours may cause temporary alteration of the heart's electrical activity with irregular pulse, palpitations, or inadequate circulation. Gross overexposure may be fatal. Skin contact with the liquid may cause frostbite. Individuals with preexisting diseases of the central nervous or cardiovascular system may have increased susceptibility to the toxicity of increased exposures.	
Carcinogenicity Information	None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.	
FIRST AID MEASURES		
Inhalation	If inhaled, immediately remove to fresh air. Keep person calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.	
Skin Contact	Flush area with lukewarm water. Do not use hot water. If frostbite has occurred, call a physician.	
Eye Contact	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.	
Ingestion	Do not induce vomiting. Give plenty of water in sips	
Notes to Physicians	THIS MATERIAL MAY MAKE THE HEART MORE SUSCEPTIBLE TO ARRHYTHMIAS. Catecholamines such as adrenaline, and other compounds having similar effects, should be reserved for emergencies and then used only with special caution.	
FIRE FIGHTING MEASURES		
Flammable Properties	Flash Point : No flash point Flammable Limits in Air, % by Volume: LEL : None per ASTM E681 UEL : None per ASTM E681 Autoignition: Not determined	
Fire and Explosion Hazards	Cylinders may rupture under fire conditions. Decomposition may occur. Contact of welding or soldering torch flame with high concentrations of refrigerant can result in visible changes in the size and colour of torch flames. This flame effect will only occur in concentrations of product well above the recommended exposure limit, therefore stop all work and ventilate to disperse refrigerant vapours from the work area before using any open flames. R-410A is not flammable in air at temperatures up to 100 deg C (212 deg F) at atmospheric pressure. However, mixtures of R-410A with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. R-410A can also become combustible in an oxygen enriched environment (oxygen concentrations greater than that in air). Whether a mixture containing R-410A and air, or R-410A in an oxygen enriched atmosphere becomes combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, R-410A should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example: R-410A should NOT be mixed with air under pressure for leak testing or other purposes.	

Refrigerant Safety Data R410A:	
Extinguishing Media	As appropriate for combustibles in area.
Fire Fighting Instructions	Cool cylinder with water spray or fog. Self-contained breathing apparatus (SCBA) is required if cylinders rupture and contents are released under fire conditions. Water runoff should be contained and neutralized prior to release.
ACCIDENTAL RELEASE MEASURES	
Safeguards (Personnel)	NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.
Accidental Release Measures	Ventilate area, especially low or enclosed places where heavy vapours might collect. Extinguish open flames. Use self-contained breathing apparatus (SCBA) for large spills or releases. Eliminate electrical sources.
HANDLING AND STORAGE	
Handling (Personnel)	Avoid breathing vapour. Avoid liquid contact with eyes and skin. Use with sufficient ventilation to keep employee exposure below recommended limits. See Fire and Explosion Data section.
Storage	Clean, dry area. Do not heat above 52 deg C (125 deg F).
EXPOSURE CONTROLS/PERSONAL PROTECTION	
Engineering Controls	Avoid breathing vapours. Avoid contact with skin or eyes. Use with sufficient ventilation to keep employee exposure below the recommended exposure limit. Local exhaust should be used if large amounts are released. Mechanical ventilation should be used in low or enclosed places.
Personal Protective Equipment	Impervious gloves should be used to avoid prolonged or repeated exposure. Chemical splash goggles should be available for use as needed to prevent eye contact. Under normal manufacturing conditions, no respiratory protection is required when using this product provided exposure is maintained at or below occupational limits. Self-contained breathing apparatus (SCBA) is required if a large release occurs.
Exposure Guidelines	Applicable Exposure Limits PENTAFLUOROETHANE (HFC-125) PEL (OSHA) : None Established TLV (ACGIH) : None Established AEL * (DuPont) : 1000 ppm, 8 & 12 Hr. TWA WEEL (AIHA) : 1000 ppm, 4900 mg/m^3, 8 Hr. TWA DIFLUOROMETHANE (HFC-32) AEL * (DuPont) : 1000 ppm, 8 & 12 Hr. TWA WEEL (AIHA) : 1000 ppm, 8 Hr. TWA * AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.
PHYSICAL AND CHEMICAL PROPERTIES	
Physical Data	Boiling Point : - 60.8 F (-51.6 C) @ 1 atm Vapour Pressure : 239.7 psia 25 C (77 F) % Volatiles : 100 WT% Evaporation Rate : (Cl4 = 1) Greater than 1 Solubility in Water : Not determined Odour : Slight ethereal Form : Liquefied gas Colour : Clear, colourless Specific Gravity : 1.066 @ 25 C (77 F)
STABILITY AND REACTIVITY	
Chemical Stability	Material is stable. However, avoid open flames and high temperatures.
Incompatibility with Other Materials	Incompatible with active metals, alkali or alkaline earth metals--powdered Al, Zn, Be, etc.
Decomposition	Decomposition products are hazardous. This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid and possibly carbonyl fluoride. These materials are toxic and irritating. Contact should be avoided.

Refrigerant Safety Data R410A:	
Polymerization	Polymerization will not occur.
Other Hazards	Decomposition : Decomposition products are hazardous. This material can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrofluoric acid, and possibly carbonyl halides.
TOXICOLOGICAL INFORMATION	
Animal Data	The blend is untested. HFC-125 Inhalation 4-hour ALC: >709,000 ppm in rats Single exposure to high doses caused: Lethargy. Laboured breathing. Weak cardiac sensitization, a potentially fatal disturbance of heart rhythm caused by a heightened sensitivity to the action of epinephrine. Lowest-Observed-Adverse-Effect-Level for cardiac sensitization: 100,000 ppm. Repeated exposure caused: No significant toxicological effects. No-Observed-Adverse-Effect-Level(NOAEL): 50,000 ppm ADDITIONAL TOXICOLOGICAL EFFECTS: No animal data are available to define the following effects of this material: carcinogenicity, reproductive toxicity. In animal testing this material has not caused developmental toxicity. Tests have shown that this material does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. This material has not been tested for its ability to cause permanent genetic damage in reproductive cells of mammals (not tested for heritable genetic damage). HFC-32 Inhalation 4 hour-ALC: > 520,000 ppm in rats Single exposure caused: Lethargy. Spasms. Loss of mobility in the hind limbs. Other effects include weak cardiac sensitization, a potentially fatal disturbance of heart rhythm caused by a heightened sensitivity to the action of epinephrine. 250,000 ppm. Repeated exposure caused pathological changes of the lungs, liver, spleen, kidneys. In more recent studies repeated exposure caused: No significant toxicological effects. No-Observed-Effect-Level (NOEL): 49,100 ppm. No animal data are available to define the following effects of this material: carcinogenicity, reproductive toxicity. Animal data show slight fetotoxicity but only at exposure levels producing other toxic effects in the adult animal. Tests have shown that this material does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. This material has not been tested for its ability to cause permanent genetic damage in reproductive cells of mammals (not tested for heritable genetic damage).
DISPOSAL CONSIDERATIONS	
Waste Disposal	Comply with Federal, State, and local regulations. Reclaim by distillation or remove to a permitted waste disposal facility.
TRANSPORTATION INFORMATION	
Shipping Information	DOT/IMO/IATA Proper Shipping Name : Liquefied Gas, N.O.S. (Pentafluoroethane and Difluoromethane) Hazard Class : 2.2 UN No. : 3163 Label(s) : Nonflammable Gas Shipping Containers : Tank Cars. Cylinders. Ton Tanks

Oil Safety Data YORK 'V' Oil:

Section 1 Substance Product Information

Product Trade Name: YORK "V" Oil.
Chemical Name: Carboxylic Ester.

Section 2 Components and Hazard Statement

This product is non-hazardous. This material has no known hazards under applicable laws.

Section 3 Safe Handling and Storage

Handling: Keep containers closed when not in use. Wash thoroughly after handling. Empty container contains product
Storage: No special storage precautions required.

Section 4 Physical Data

Appearance: Clear liquid.
Boiling Point: Not Determined.
Vapour Pressure: Not Determined.
Specific Gravity (water=1): 0.97 @ 15.6°C.
Volatiles, Percent by Volume: Unknown.
Odour: Mild.
Solubility in Water: Insoluble.
Evaporation Rate: Not Determined.

Section 5 Fire and Explosion Hazards

Flash Point: > 232°C, 450°F COC (Minimum).
Flammable Limits: not established.
Autoignition Temperature: no data.
Extinguishing Media: CO2, dry chemical or foam. Water can be used to cool and protect exposed material.
Unusual Fire and Explosion Hazards: Toxic fumes, gases or vapours may evolve on burning.
Special Fire Fighting Techniques: Firefighters should use approved self-contained breathing apparatus. Water may cause

Section 6 Reactivity Data

Stability: Material is normally stable at moderately elevated temperatures and pressures.
Hazardous Polymerization: Will not occur.
Incompatible Materials: Strong acids. Strong bases. Strong oxidizing agents.
Decomposition Temperature: Not Determined.
Thermal Decomposition: Smoke, carbon monoxide, carbon dioxide, aldehydes and other products of incomplete combustion.

Section 7 Health Hazard Data

First Aid Procedures

Ingestion: DO NOT INDUCE VOMITING. If conscious, give 2 glasses of water. Get immediate medical attention.
Eyes: Flush with water at least 15 minutes. Get medical attention if eye irritation develops or persists.
Skin: Wash with soap and water. Get medical attention if irritation develops. Launder contaminated clothing before reuse.
Inhalation: Remove exposed person to fresh air if adverse effects are observed.
Additional Information: Note to physician: Treat symptomatically.

Section 8 Personal Protection Information

Respiratory Protection: Use respirator with an organic vapour cartridge if exposure limit is exceeded.
Ventilation: Use with adequate ventilation.
Protective Gloves: Neoprene.
Eye/Face Protection: Safety glasses.
Clothing: Long sleeve shirt is recommended.

Section 9 Spill or Leak Procedures

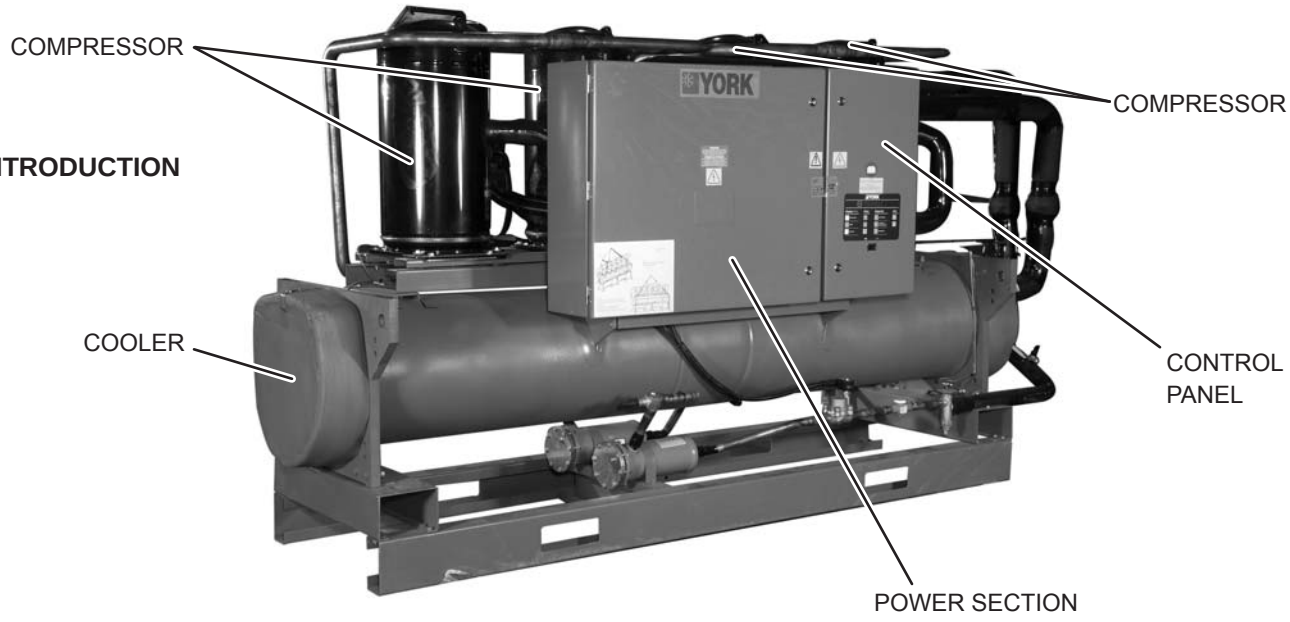
Spill Procedures: Personal Protective Equipment must be worn, see Personal Protection Information (Section 8). Ventilate

Section 10 Waste Disposal Methods

This material, if discarded, should be disposed of in a licensed facility in accordance with local regulations.

Thermal & Acoustic Materials Data	
Health Hazard & First Aid	Toxicity Index <10 to NES713 Issue 3 (1991): Non-hazardous, non-toxic. No first aid necessary.
Stability / Reactivity	Stable.
Handling / Use / Disposal	No special handling precautions required. Dispose of according to local laws and regulations governing non-biodegradable non-hazardous solid wastes.
Fire & Explosion	Flammability rating Class 1 to BS 476 pt 7: Non-flammable. If forced to burn, combustion products are typically over 95% carbon dioxide and carbon monoxide.

PRODUCT DESCRIPTION



YORK YCRL chillers are designed for water or water-glycol cooling.

All models are designed for indoor installation. The units are completely assembled with all interconnecting refrigerant piping and internal wiring ready for field connection to a remote condenser.

The unit consists of 4 or 6 scroll compressors in two separate refrigerant circuits (2 or 3 compressors per circuit), a shell and tube DX evaporator (cooler), and a power and control panel.

Before delivery, the unit is pressure tested, evacuated, and fully charged with a nitrogen holding charge and YORK "V" oil (POE synthetic) in each of the independent refrigerant circuits. After assembly, an operational test is performed with water flowing through the cooler to ensure that each refrigerant circuit operates correctly.

Y

CAUTION

Additional oil change may be required depending upon the length of piping.

The unit framework is fabricated using heavy-gauge galvanized steel which is zinc phosphate pre-treated and powder coated to minimize corrosion.

Compressors

The unit has suction-cooled, hermetic scroll compressors. High efficiency is achieved through a controlled orbit and the use of advanced scroll geometry. The compressors incorporate a compliant scroll design in both the axial and radial directions. All rotating parts are statically and dynamically balanced. A large internal volume and oil reservoir provides greater liquid tolerance.

The compressor motors have integral protection against overloads. The overload protection will automatically reset. Starting is direct on line, but soft start is available as an option.

The compressors are switched On and Off by the unit microprocessor to provide capacity control. Each compressor is fitted with a crankcase strap heater. All compressors are mounted on isolator pads to reduce transmission of vibration to the rest of the unit.

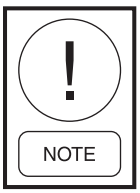
Refrigerant Circuits

Two independent refrigerant circuits are provided on each unit. All piping will be copper with brazed joints.

Liquid line components include: a shut off valve with charging port, a high absorption removable core filter-drier, a solenoid valve, a sight glass with moisture indicator and a thermal expansion valve. The entire suction line and the liquid lines between the expansion valve and the cooler are covered with flexible, closed-cell insulation.

Suction line components include: a pressure relief valve, a pressure transducer and a service valve. Optional isolation ball valves are available. Suction lines are covered with flexible, closed-cell insulation.

Discharge lines include service and isolation (ball) valves, one or two high-pressure cutout switches, and a pressure transducer.



Refrigerant R410A is field supplied.

Evaporator

The 2-pass dual circuit shell and tube type direct expansion (DX) evaporator has refrigerant in the tubes and chilled liquid flowing through the baffled shell. The waterside (shell) design working pressure of the cooler is 10.3 bar g. The refrigerant side (tubes) design working pressure is 31.0 bar g. The refrigerant side is protected by pressure relief valves on the suction lines.

The evaporator shall have water pass baffles fabricated from galvanised steel to resist corrosion. Removable heads are provided for access to internally enhanced, seamless, copper tubes. Water vent and drain connections are included. The cooler is insulated with flexible closed-cell foam.

Water Connection to the evaporator is via victaulic-grooved connections. Flange connections are available as an option.

A strainer with a mesh size between .5 and 1.5 mm (40 mesh) is recommended upstream of the evaporator to prevent clogging.

Condenser

The condenser can be either a field supplied YORK VDC remote air-cooled condenser (available separately from Johnson Controls) or an evaporative condenser.

Power and Control Panels

All power and controls are contained in a IP32 cabinet with hinged, latched and gasket sealed outer doors.

The power panel includes:

- A factory mounted non-fused disconnect switch with external, lockable handle to enable connection of the unit power supply. The disconnect switch can be used to isolate the power for servicing.
- Factory mounted compressor contactors and manual motor starters to provide overload and short circuit protection.
- Factory mounted control transformer to convert the unit supply voltage to 110 V - 1 Ø - 50 Hz for the control system.
- Control supply fuses and connections for a remote emergency stop device.

The control panel includes:

- A Liquid Crystal Display (two display lines of twenty characters per line) with Light Emitting Diode backlighting for easy viewing.
- A Colour coded 12-button keypad.
- Customer terminal block for control inputs and liquid flow switch.

The microprocessor control includes:

- Automatic control of compressor start/stop, anti-coincidence and anti-recycle timers, automatic pumpdown on shutdown, evaporator pump and unit alarm contacts. Automatic reset to normal chiller operation after power failure.
- Remote water temperature reset via a pulse width modulated (PWM) input signal or up to two steps of demand (load) limiting
- Software is loaded into the microprocessor controller via a SD card, with programmed setpoints retained in a lithium battery backed real time clock (RTC) memory.
- Forty character liquid crystal display, with description available in several languages.

Programmable setpoints:

- Chilled liquid temperature setpoint and range
- Remote reset temperature range
- Set daily schedule/holiday for start/stop
- Manual override for servicing
- Low liquid temperature cutout
- Low suction pressure cutout
- High discharge pressure cutout
- Anti-recycle timer (compressor start cycle time)
- Anti-coincident timer (delay compressor starts)

Displayed Data:

- Return and leaving liquid temperature
- Low leaving liquid temperature cutout setting
- Metric or Imperial data
- Discharge and suction pressure cutout settings
- System discharge and suction pressures
- Anti-recycle timer status for each compressor
- Anti-coincident system start timer condition
- Compressor run status
- No cooling load condition
- Day, date and time
- Daily start/stop times
- Holiday status
- Automatic or manual system lead/lag control
- Lead system definition
- Compressor starts & operating hours (each compressor)
- Run permissive status
- Number of compressors running
- Liquid solenoid valve status
- Load & unload timer status
- Water pump status

System Safeties:

Cause individual compressors to perform auto shut down and require manual reset in the event of 3 trips in a 90-minute time period:

- High discharge pressure
- Low suction pressure
- High pressure switches
- Motor protector

Unit Safeties:

Are automatic reset and cause compressor to shut down

- Low leaving chilled liquid temperature
- Under voltage
- Loss of liquid flow (through flow switch)

Alarm Contacts:

- Low leaving chilled liquid temperature
- Low voltage
- Low battery
- High discharge pressure (per system)
- Low suction pressure (per system)

ACCESSORIES AND OPTIONS

Soft Starters

Factory mounted soft starters reduce the inrush current to the last compressor on each refrigerant circuit. They are preset so that no field adjustment is required.

Language LCD and Keypad

English, French, German, Italian and Spanish unit LCD read-out and keypad available. Standard language is English.

38 mm Evaporator Insulation

Double thickness insulation provided for enhanced efficiency, and low temperature applications.

Dual Pressure Relief Valves

Two pressure relief valves mounted on a 3-way valve in parallel of which one is operational and the other one assist during maintenance.

Suction Service Valves

A ball valve is added to each suction line pipework for isolation.

Victaulic Flange Kit

Victaulic PN10 Flange joint kit supplied loose for field installation. Includes flange and companion flange and all necessary nuts, bolts and gaskets.

Compressor Acoustic Blankets

Each compressor is individually enclosed in an acoustic sound blanket. The sound blankets are made with one layer of acoustical absorbent textile fibre of 15 mm thickness and one layer of anti vibrating heavy material thickness of 3 mm. Both are closed by two sheets of welded PVC, reinforced for temperature and UV resistance.

Flow switch

Vapour Proof, paddle-type, 10.3 barg DWP, -29°C to 121°C with 1”NPT connection for upright mounting in horizontal pipe. This flow switch or its equivalent must be supplied with each unit to protect vessels from loss of liquid flow (Field Mounted)

Differential Pressure Switch

Alternative to the paddle type flow switch. 0-3 bar range with ¼” NPTE pressure connections (field mounted).

Neoprene Pad Isolators

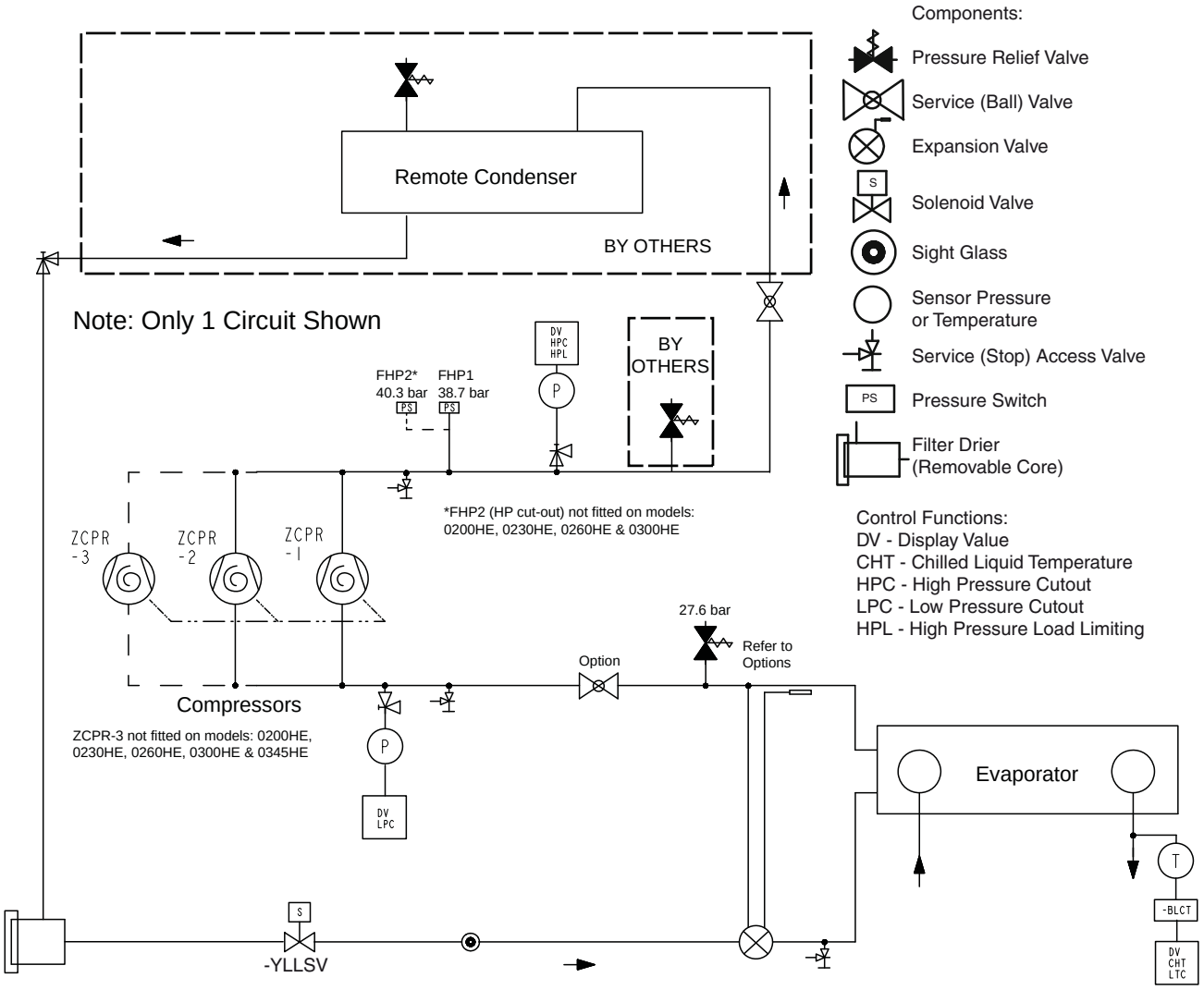
Recommended for normal installations (field mounted).

25 mm Spring Isolators

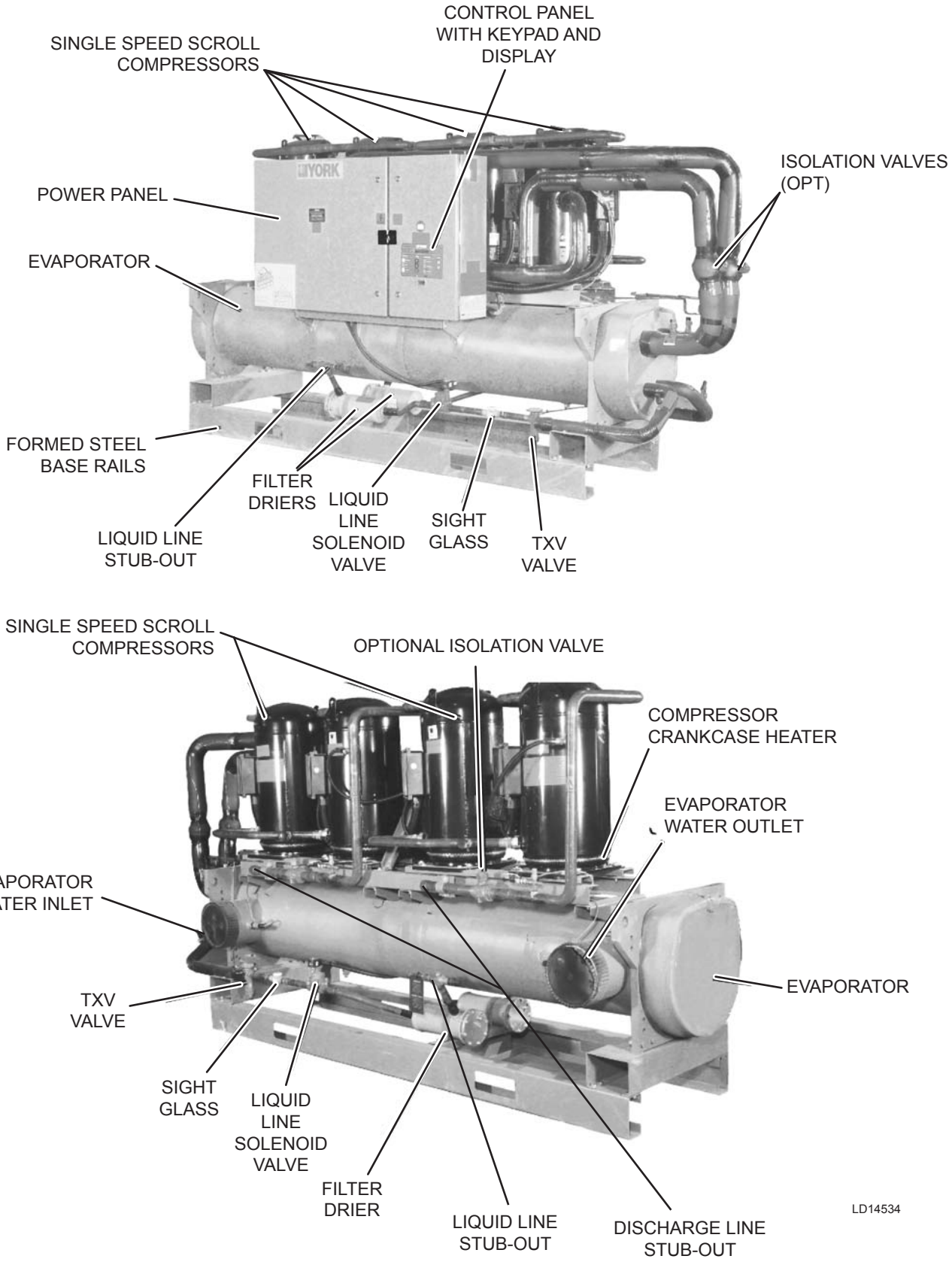
Level adjustable, spring and cage type isolators for mounting under the unit base rails (field mounted).

REFRIGERANT FLOW DIAGRAM

Low-pressure liquid refrigerant enters the cooler tubes and is evaporated and superheated by the heat energy absorbed from the chilled liquid passing through the cooler shell. Low-pressure vapour enters the compressor where pressure and superheat are increased. The high pressure superheat refrigerant enters the remote air cooled condenser where heat is rejected via the condenser coil & fans The fully condensed and subcooled liquid leaves the remote air cooled condenser and enters the expansion valve, where pressure reduction and further cooling takes place. The low-pressure liquid refrigerant then returns to the cooler.



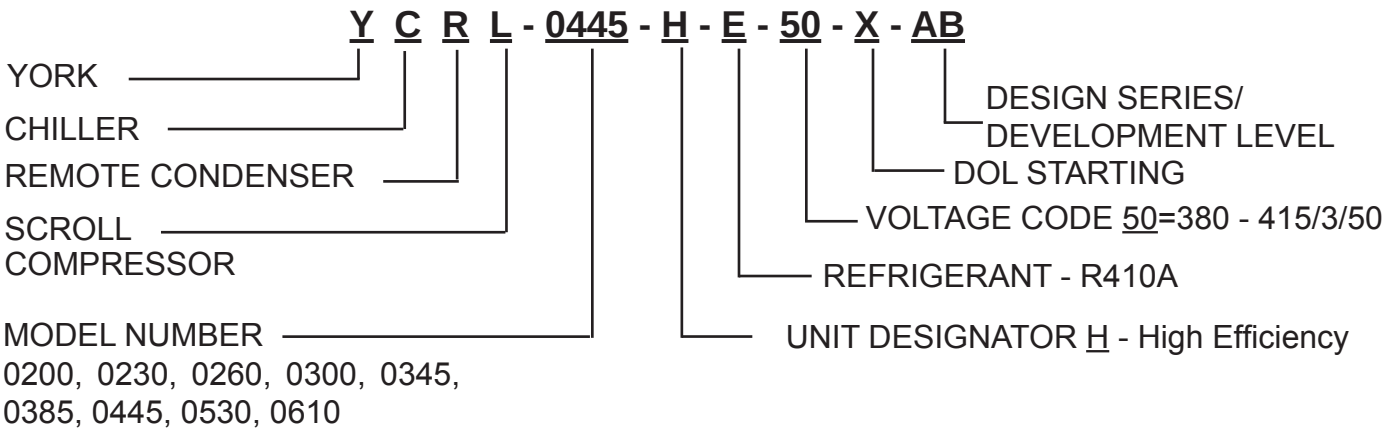
UNIT COMPONENTS



UNIT MODEL NUMBER NOMENCLATURE

NOMENCLATURE

The model number denotes the following characteristics of the unit.



HANDLING AND STORAGE

DELIVERY AND STORAGE

To ensure consistent quality and maximum reliability, all units are tested and inspected before leaving the factory. Units are shipped completely assembled and containing a nitrogen holding charge. Units are shipped without export crating unless crating has been specified on the Sales Order.

If the unit is to be put into storage, prior to installation, the following precautions should be observed:

- Ensure that all openings, such as water connections, are securely capped.
- Do not store where exposed to ambient air temperatures exceeding 42°C.
- The unit should be stored in a location where there is minimal activity in order to limit the risk of accidental physical damage.
- To prevent inadvertent operation of the pressure relief devices the unit must not be steam cleaned.
- It is recommended that the unit is periodically inspected during storage.

INSPECTION

Remove any transit packing and inspect the unit to ensure that all components have been delivered and that no damage has occurred during transit. If any damage is evident, it should be noted on the carrier's freight bill and a claim entered in accordance with the instructions given on the advice note.

Major damage must be reported immediately to your local Johnson Controls representative.

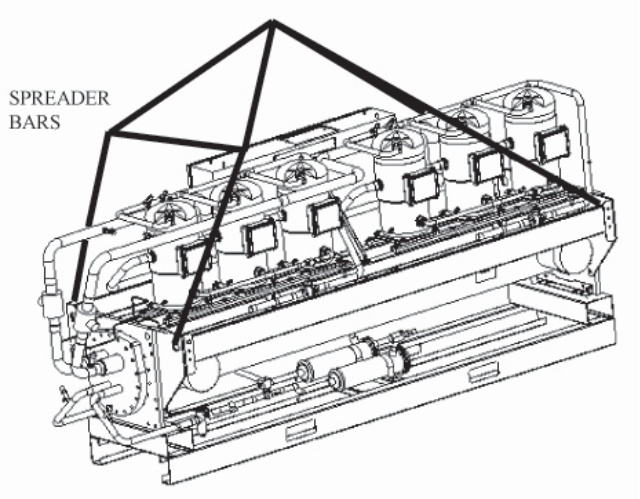
MOVING THE CHILLER

Prior to moving the unit, ensure that the installation site is suitable for installing the unit and is easily capable of supporting the weight of the unit and all associated services.

The units are designed to be lifted using lifting chains.

Lifting by Crane/Hoist

Attach the lifting chains to the lifting lugs on each corner of the unit framework. A spreader frame should be used to prevent damage to the unit from the lifting chains.



The unit must only be lifted at the points provided.

LIFTING WEIGHTS

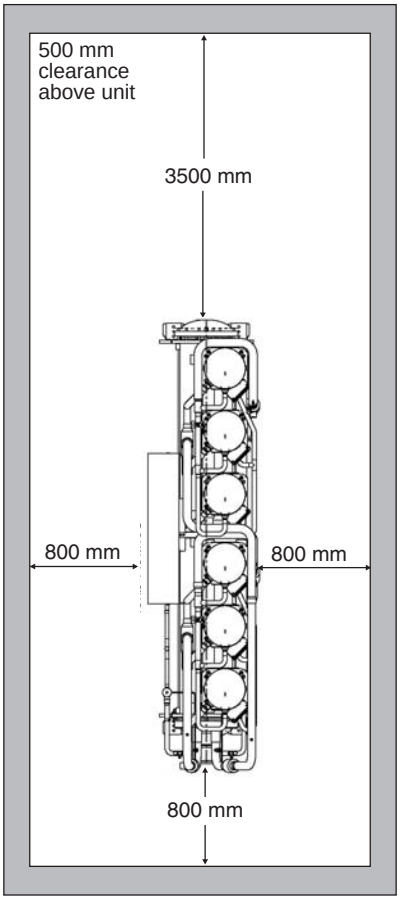
Lifting weights are given in the table below.

LIFTING WEIGHTS - High Efficiency (HE)								
YCRL MODEL (kg)								
0200HE	0230HE	0260HE	0300HE	0345HE	0385HE	0445HE	0530HE	0610HE
(1309)	(1481)	(1471)	(1593)	(1683)	(1947)	(2266)	(2264)	(2263)

INSTALLATION

Location Requirements

To achieve optimum performance and trouble-free service, it is essential that the proposed installation site meet with the location and space requirements for the model being installed.



The clearances recommended are nominal for the safe operation and maintenance of the unit and power and control panels. Local health and safety regulations, or practical considerations for service replacement of large components, may require larger clearances than those given in this manual.

Units are designed for indoor installation and not intended for wet, corrosive or explosive atmospheres. Installation should allow for water drain, ventilation and sufficient clearance for service, including tube cleaning/removal.

For installation in equipment rooms near noise-critical areas, common walls should be of adequate sound attenuating construction, all doors should be tightly gasketed, and the unit should have vibration isolators fitted.

The concrete base must capable of supporting 150% of the operating weight. In case of upper floors, the unit and piping should be isolated from walls and ceiling. The unit may be bolted to the foundation using the 13mm Ø holes. When lower transmitted vibration levels are required optional anti-vibration isolators can be supplied loose for site installation.

Installation of Vibration Isolators

An optional set of spring type vibration isolators can be supplied loose with each unit.

Pipework Connection

The following piping recommendations are intended to ensure satisfactory operation of the unit. Failure to follow these recommendations could cause damage to the unit, or loss of performance, and may invalidate the warranty.

The maximum flow rate and pressure drop for the cooler must not be exceeded at any time.

The water must enter the heat exchanger by the inlet connection.

A flow switch must be installed in the customer pipework at the outlet of the exchanger as shown in the arrangement diagrams, and wired back to the control panel using screened cable. This is to prevent damage to the exchanger caused by inadequate liquid flow.

The liquid pumps installed in the pipework systems should discharge directly into the unit heat exchanger sections of the system. The pumps require an auto-starter (by others) to be wired to the control panel.

Pipework and fittings must be separately supported to prevent any loading on the heat exchanger. Flexible connections are recommended which will also minimize transmission of vibrations to the building. Flexible connections must be used if the unit is mounted on anti-vibration mounts as some movement of the unit can be expected in normal operation.

Pipework and fittings immediately next to the heat exchanger should be readily de-mountable to enable cleaning prior to operation, and to facilitate visual inspection of the exchanger nozzles.

The heat exchanger must be protected by a strainer, preferably of 20 microns, fitted as close as possible to the liquid inlet connection, and provided with a means of local isolation.

The heat exchanger must not be exposed to flushing velocities or debris released during flushing. It is recommended that a suitably sized by-pass and valve arrangement be installed to allow flushing of the pipework system. The by-pass can be used during maintenance to isolate the heat exchanger without disrupting flow to other units.

Thermometer and pressure gauge connections should be provided on the inlet and outlet connections of the heat exchanger.

Drain and air vent connections should be provided at all low and high points in the pipework to permit drainage of the system, and to vent any air in the pipes.

Liquid systems at risk of freezing, due to low ambient temperatures, should be protected using insulation and heater tape and/or a suitable glycol solution. The liquid pumps must also be used to ensure liquid is circulated when the ambient temperature approaches freezing point. Insulation should also be installed around the heat exchanger nozzles.

Water Treatment

The unit performance given in the Design Guide is based on a fouling factor of 0.044 m² °C/kW. Dirt, scale, grease and certain types of water treatment will adversely affect the heat exchanger surfaces and therefore unit performance. Foreign matter in the water system(s) can increase the heat exchanger pressure drop, reducing the flow rate and causing potential damage to the heat exchanger tubes.

Aerated, brackish or salt water is not recommended for use in the water systems. Johnson Controls recommends that a water treatment specialist be consulted to determine that the proposed water composition will not affect the evaporator materials of carbon steel and copper. The pH value of the water flowing through the heat exchangers must be kept between 7 and 8.5.

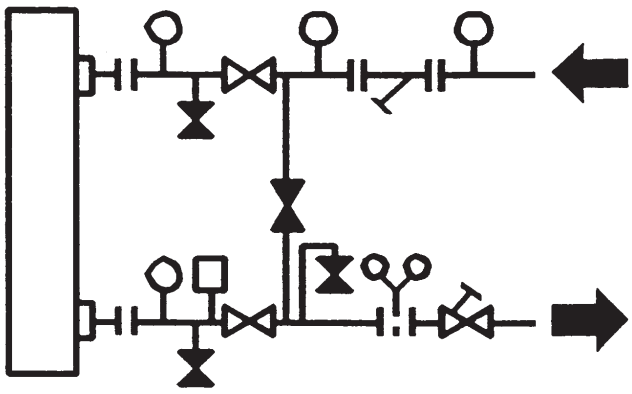
For unit operation with chilled liquid temperatures leaving the cooler at below 4.5°C, glycol solutions should be used to help prevent freezing. This manual gives recommended solution strength with water, as a percentage by weight, for the most common types of glycol. It is important to check glycol concentration regularly to ensure adequate concentration and avoid possible freeze-up in the cooler.

PIPEWORK ARRANGEMENT

The following are suggested pipework arrangements for single unit installations. For multiple unit installations, each unit should be piped as shown.

Recommendations of the Building Services Research Association

Chilled Liquid System



Connection Types & Sizes

For connection sizes relevant to individual models refer to the physical data tables in this manual

Refrigerant Relief Valve Piping

The cooler (evaporator) is protected against internal refrigerant over-pressure and fire by refrigerant relief valves. The pressure relief valve is set at the design pressure of the system and has discharge capacity required by the relevant standard.

It is recommended that each valve should be piped to the exterior of the building so that when the valve is activated the release of high pressure gas and liquid cannot be a danger or cause injury.

The size of any pipework attached to a relief valve must be of sufficient diameter so as not to cause resistance to the operation of the valve. For critical or complex installations refer to EN13136.

Unless otherwise specified by local regulations, the internal diameter depends on the length of pipe required and can be estimated with the following formula:

$D^5=1.447 \times L$

Where:

D = minimum pipe internal diameter (cm)

L = length of pipe (m).

If relief pipework is common to more than one valve its cross sectional area must be at least the total required by each valve. Valve types should not be mixed on a common pipe. Precautions should be taken to ensure that the exit of relief valves/vent pipe remain clear of obstructions at all times.

SYSTEM REFRIGERANT PIPING

General

This section is for guidance only and other good practice references must be consulted to adhere to EN 378-2. Great care is needed on pipework thickness type (L or K), pipe size and pressure rating.

Improper design and sizing of refrigerant piping may result in loss of system efficiency and/or eventual failure of the system. Factors that must be considered in a piping design are the inter-relationships between velocity, pressure, friction, as well as, economics. Economics favour the use of the smallest possible line sizes. However, high suction and discharge line pressure drops will cause loss in capacity and increased power consumption. Another important design criterion is oil return to the compressor. The refrigerant line velocities have to be sufficiently high to carry oil up suction or hot gas risers at all operating capacities.

The Installer should refer to JOHNSON CONTROLS (Yorkworks selection) for part load and full load capacities for pipe sizing / oil return issues.

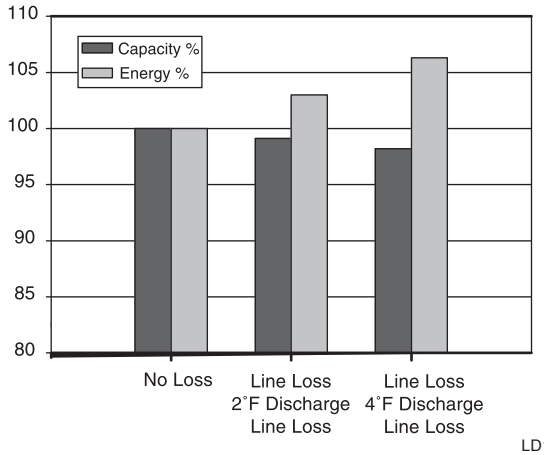
NOTE

JOHNSON CONTROLS ASSUMES NO WARRANTY RESPONSIBILITY FOR SYSTEM OPERATION OR FAILURES DUE TO IMPROPER PIPING OF PIPING DESIGN.

Refrigerant Line Losses

The pressure drops (line losses) are typically presented as a given change in the corresponding saturation temperature. The effect of line losses on the capacity and energy consumption (kW/ton) is illustrated in the figure below. Line sizing is a balance between pressure drop (reflected in system performance) and oil return (for system reliability).

DISCHARGE LINE



EXAMPLE OF TYPICAL EFFECT OF SUCTION AND DISCHARGE LINE PRESSURE DROP ON CAPACITY AND POWER (ASHRAE). System operating at 37.7°C (100°F) saturated condensing and 4.5°C (40°F) saturated evaporating temperature. Energy percentage is rated at kW/ton.

Pressure Drop Considerations

Pressure drop calculations are determined as pressure changes associated with a change in saturation temperature of the refrigerant. Systems are typically sized for pressure losses of 0.55°C (2°F) or less for the discharge, suction and liquid lines. This is the conventional method for sizing and is accepted practice throughout the industry (ASHRAE).

The tables on the following pages show capacities (HFC-410A) at specified pressure drops for the various refrigerant lines.

DISCHARGE AND LIQUID LINE CAPACITIES IN TONS FOR REFRIGERANT 410A

LINE SIZE TYPE L COPPER, O.D.	DISCHARGE LINES (DELTA T = 1°F, DELTA P = 4.75 PSI) SATURATED SUCTION TEMPERATURE, °F DELTA P = 4.75						LINE SIZE TYPE L COPPER, O.D.		LIQUID LINES		
									VEL. = 100 FPM	DELTA T = 1°F	DELTA T = 5°F
										DELTA P = 4.75	DELTA P = 23.3
	-60	-40	-20	0	20	40					
1/2	1.13	1.17	1.22	1.26	1.30	1.33	1/2		2.00	4.60	10.81
5/8	2.11	2.20	2.29	2.36	2.43	2.49	5/8		3.20	8.60	20.24
3/4	3.59	3.74	3.88	4.02	4.14	4.23	3/4		4.70	14.30	33.53
7/8	5.53	5.76	5.99	6.19	6.38	6.52	7/8		6.70	22.60	52.92
1-1/8	11.16	11.64	12.09	12.50	12.88	13.17	1-1/8		11.40	45.80	106.59
1-3/8	19.39	20.21	21.00	21.72	22.37	22.88	1-3/8		17.40	79.70	185.04
1-5/8	30.63	31.92	33.16	34.30	35.33	36.14	1-5/8		24.60	125.90	291.48
2-1/8	63.20	65.88	68.44	70.78	72.90	74.57	2-1/8		42.80	260.70	601.13
2-5/8	111.20	115.90	120.41	124.53	128.25	131.20	2-5/8		66.00	459.70	1056.39
3-1/8	177.12	184.62	191.80	198.36	204.29	208.98	3-1/8		94.20	733.00	1680.52
3-5/8	262.44	273.54	284.19	293.90	302.70	309.64	3-5/8		127.40	1087.50	2491.00
4-1/8	369.45	385.08	400.07	413.75	426.13	435.90	4-1/8		165.70	1530.20	3500.91
5-1/8	658.32	686.18	712.88	737.26	759.31	776.72	5-1/8		258.20	2729.80	6228.40
6-1/8	1054.47	1099.10	1141.87	1180.91	1216.24	1244.13	6-1/8		371.10	4383.70	9980.43
STEEL											
IPS	SCH							IPS	SCH			
3/8	80	0.81	0.84	0.88	0.91	0.93	0.95	3/8	80.00	1.90	3.40	7.60
1/2	80	1.59	1.66	1.73	1.78	1.84	1.88	0.50	80.00	3.20	6.70	15.00
3/4	80	3.59	3.74	3.88	4.02	4.14	4.23	0.75	80.00	6.00	15.10	33.60
1	80	7,02	7.32	7.60	7.86	8.10	8.28	1	80.00	10.00	29.50	65.80
1-1/4	80	15.03	15.67	16.28	16.83	17.34	17.74	1-1/4	80.00	17.70	63.30	140.90
1-1/2	80	22.89	23.86	24.79	25.64	26.41	27.01	1-1/2	80.00	24.40	96.60	214.70
2	40	53.16	55.41	57.57	59.54	61.32	62.73	2	40.00	46.40	224.20	498.00
2-1/2	40	84.56	88.14	91.57	94.70	97.53	99.77	2-1/2	40.00	66.20	356.50	793.00
3	40	149.44	155.76	161.82	167.36	172.37	176.32	3	40.00	102.20	630.00	1398.40
4	40	304.02	316.88	329.21	340.47	350.66	358.70	4	40.00	176.10	1284.60	2851.70
5	40	548.97	572.20	594.46	614.79	633.19	647.71	5	40.00	276.50	2313.70	5137.00
6	40	886.76	924.29	960.25	993.09	1022.80	1046.26	6	40.00	399.60	3741.90	8308.90

The refrigerant cycle for determining capacity is based on saturated gas leaving the evaporator and no subcooling in the condenser. Discharge superheat is 40.5°C (105°F). The saturated suction temperature 4.5°C (40°F) for liquid line sizing.

Multiply table capacities by the following factors for condensing temperatures other than 40.5°C (105°F).

CONDENSING TEMPERATURE, °F	SUCTION LINE	DISCHARGE LINE
80	1.16	0.81
90	1.09	0.89
100	1.03	0.96
110	0.97	1.03
120	0.9	1.1
130	0.83	1.16
140	0.76	1.19

MINIMUM REFRIGERATION CAPACITY IN TONS FOR OIL ENTRAINMENT UP HOT GAS RISERS (TYPE L COPPER TUBING)

REFRIGERANT	SATURATION TEMP. °F	DISCHARGE GAS TEMP. °F	PIPE O.D., IN.					
			1/2	5/8	3/4	7/8	1-1/8	1-3/8
			AREA, IN2					
				0.233	0.348	0.484	0.825	1.256
410A	80	110	0.30	0.54	0.88	1.33	2.60	4.40
		140	0.28	0.50	0.82	1.24	2.41	4.08
		170	0.25	0.45	0.74	1.11	2.17	3.67
	90	120	0.30	0.54	0.90	1.36	2.64	4.47
		150	0.28	0.50	0.83	1.25	2.43	4.11
		180	0.25	0.45	0.75	1.13	2.21	3.73
	100	130	0.31	0.55	0.91	1.37	2.67	4.51
		160	0.27	0.48	0.80	1.20	2.34	3.96
		190	0.26	0.46	0.76	1.15	2.23	3.77
	110	140	0.31	0.55	0.91	1.37	2.67	4.52
		170	0.27	0.49	0.80	1.21	2.36	3.99
		200	0.26	0.46	0.76	1.15	2.24	3.79
	120	150	0.30	0.54	0.90	1.36	2.64	4.47
		180	0.27	0.48	0.80	1.21	2.35	3.98
		210	0.26	0.46	0.76	1.15	2.23	3.78

REFRIGERANT	SATURATION TEMP. °F	DISCHARGE GAS TEMP. °F	PIPE O.D., IN.					
			1-5/8	2-1/8	2-5/8	3-1/8	3-5/8	4-1/8
			AREA, IN2					
			1.780	3.094	4.770	6.812	9.213	11.970
410A	80	110	6.80	13.56	23.30	36.38	53.06	73.60
		140	6.31	12.60	21.64	33.79	49.28	68.36
		170	5.67	11.32	19.44	30.35	44.27	61.41
	90	120	6.91	13.80	23.70	37.00	53.96	74.85
		150	6.36	12.69	21.79	34.02	49.62	68.83
		180	5.77	11.52	19.79	30.89	45.05	62.49
	100	130	6.98	13.93	23.93	37.36	54.49	75.59
		160	6.13	12.23	21.01	32.79	47.83	66.35
		190	5.84	11.65	20.01	31.24	45.56	63.19
	110	140	6.99	13.95	23.96	37.41	54.56	75.69
		170	6.16	12.30	21.13	32.98	48.11	66.73
		200	5.86	11.70	20.10	31.37	45.76	63.47
	120	150	6.91	13.80	23.70	37.00	53.97	74.86
		180	6.15	12.28	21.09	32.92	48.02	66.61
		210	5.84	11.66	20.03	31.27	45.61	63.27

Refrigeration capacity in tons is based on a saturated suction temperature of -6.6°C (20°F) with 8.3°C (15°F) superheat at the indicated saturated condensing temperature with 8.3°C (15°F) subcooling. The saturated condensing and suction conditions are referenced to the dewpoint for R-407C. For other saturated suction temperatures with 8.3°C (15°F) superheat, use correction factors to the capacity given in the table below.

REFRIGERANT	SATURATED SUCTION TEMPERATURE, °F			
	-40	-20	0	40
410A	0.91	0.94	0.97	1.02

Refrigerant Line Sizing

Refrigerant piping systems must be designed to provide practical line sizes without excessive pressure drops, prevent compressor oil from being "trapped" in the refrigerant piping, and ensure proper flow of liquid refrigerant to the thermal expansion valve. Considerations should be given to:

1) Discharge line pressure drop due to refrigerant flow.

2) Discharge line refrigerant velocity for oil return.

3) Liquid line pressure drop due to refrigerant flow.

4) Liquid line pressure drop (or gain) due to vertical rise of the liquid line.

To ensure a solid column of liquid refrigerant to the expansion valve, the total liquid line pressure drop should never exceed 275 kPa. Refrigerant vapour in the liquid line will measurably reduce valve capacity and poor system performance can be expected.

To allow adequate oil return to the compressor, discharge risers should be sized for a minimum of 5.1 m/s while the system is operating at minimum capacity to ensure oil return up the suction riser.

Chiller Below Condenser

On a system where the chiller is located below the condenser, the discharge line must be sized for both pressure drop and oil return. In some cases a double discharge riser must be installed to ensure reliable oil return at reduced loads.

Condenser Below Chiller

When the condenser is located below the chiller, the liquid line must be designed for both friction loss and static head loss due the vertical rise. The value of static head loss of 11.3 kPa/m must be added to the friction loss pressure drop in addition to all pressure drops due to driers, valves, etc.

Oil traps

All horizontal discharge lines should be pitched at least 2 cm/m in the direction of the refrigerant flow to aid in the return of oil to the chiller. All discharge lines with a vertical rise exceeding 90 cm should have a "P" trap at the bottom and top of the riser. Discharge lines with a vertical rise exceeding 7.5 m should be trapped every 4.5 m.

Refrigerant Charge

The chiller is charged and shipped with a dry nitrogen holding charge. The chiller and the remote piping condenser must be evacuated and the operating charge for the chiller, remote condenser and refrigerant piping must be weighed in after all refrigerant piping is installed, leak checked, and evacuated. A minimum of 70% of the calculated complete system charge must be installed before attempting to operate a system. Final adjustment of refrigerant charge should be verified by subcooling values (refer to commissioning for details).

REFRIGERANT PIPING REFERENCE

R-410A Copper Line Sizing

When selecting pipe diameter and material for remote condenser piping R-410A systems such as used with YCRL chillers, it is recommended that ASTM B280 material, type "L" or "K" is used. According to ASME Standard B31.5-2006 (table 502.3.1), ASTM B280 copper does not require a derate when brazed. By comparison, ASTM B88 material does take an annealing penalty when brazing, which, in some applications, could reduce the calculated yield strength to a level below the system design.

YCRL Line Sizing Notes

The YCRL chiller has a maximum design working pressure of 43 barg (for liquid and discharge lines, fittings and components on the incomplete chiller unit), a mechanical high pressure cutout to shut the unit off is set at 38.7 barg (on larger a units an additional cutout is set at 40.3 barg). The maximum discharge pipe diameter on the YCRL is 2-1/8.

ASTM B280, type "L" pipe, 2-1/8" diameter has a pressure rating of 41.9 bar (608 psi) per ASME B31.5-2006 section 504.1.2, with an additional 20% increase allowed in section 502.2.3 "Ratings: Allowance for Variations from Normal Operation" for a maximum allowable pressure of 50.3 bar (730 psi).

Care is needed with type L, 2-1/8" diameter and above, as they will not be adequately pressure rated for the YCRL. All installed pipework, fittings, components, condenser, etc need to be equal or above 43 barg for YCRL pressure rating and HPCOs. Using Type K pipe, capacity tables of this pipe need to be used. Installer needs to consult ASHRAE or supplier for this.

Type "K" pipe (thicker wall), per ASME B31.5-2006 section 504.1.2, has a rating of 50 bar (725 psi) before the additional 20% allowance is taken.

For more details, refer to *"ASHRAE Refrigeration Handbook, Chapter 2", "the tables above" and YORK DX Piping Guide "Form 050.40-ES2"*

Please note the above is for illustration/guidance purposes only as it based on ASME code. Hence, the installer must consult EN378 to ensure all pipework, fittings and line components are adequately sized and pressure rated for the correct operation and provision of safety protection for the specific installation.

1. Table capacities are in tons of refrigeration.

   Δp = Pressure drop due to line friction, PSI per 100 feet equivalent length.

   Δt = Change in saturation temperature corresponding to pressure drop, °F per 100 feet.

2. Line capacity for other saturation temperatures Δt and equivalent lengths.

$$\text{Line Capacity} = \text{Table Capacity} \times \left(\frac{\text{Table } L_e}{\text{Actual } L_e}\right) \times \left(\frac{\text{Actual } \Delta t}{\text{Table } \Delta t}\right)^{0.55}$$

3. Saturation temperature Δt (for other capacities and equivalent lengths L_e

$$\Delta t = \text{Table } \Delta t \times \left(\frac{\text{Actual } L_e}{\text{Table } L_e} \times \frac{\text{Actual Capacity}}{\text{Table Capacity}}\right)^{1.8}$$

YCRL Connection Sizes

Piping connection sizes are provided in the table below. These sizes indicate the connection size that is provided on the chiller where the remote piping connects.

The connection sizes should not be used as a guide for sizing remote piping, since sizing of the remote piping will vary to assure oil return and limit pressure drop.

YCRL Chiller Charge Capability

The table below provides the approximate refrigerant charge capability for each refrigerant circuit in the chiller. This information is valuable when calculating the total charge needed for each of the completed refrigerant systems. Simply add the approximate circuit charge capability to the calculated charge of all the field piping and remote condenser in the circuit to compute the total approximate charge required for each refrigerant system in the chiller.

The system charge calculation and refrigerant charging must be carried out by the installer.

YCRL CHILLER CHARGES

Model	Approximate Unit Charge (kg)	Per Circuit (kg)
0200HE	15	7.5
0230HE	20	10
0260HE	18	9
0300HE	18	9
0345HE	35	17.5
0385HE	38	19
0445HE	45	22.5
0530HE	45	22.5
0610HE	45	22.5

Note: Charge for remote condenser and interconnecting piping must be calculated separately.

YCRL CONNECTION LINE SIZES

Model	LIQUID LINE SYSTEM 1, IN.	LIQUID LINE SYSTEM 2, IN.	DISCHARGE LINE SYSTEM 1, IN.	DISCHARGE LINE SYSTEM 2, IN.
0200HE	7/8	7/8	1 3/8	1 3/8
0230HE	1 1/8	7/8	1 5/8	1 3/8
0260HE	1 1/8	1 1/8	1 5/8	1 5/8
0300HE	1 1/8	1 1/8	1 5/8	1 5/8
0345HE	1 1/8	1 1/8	1 5/8	1 5/8
0385HE	1 1/8	1 1/8	2 1/8	2 1/8
0445HE	1 1/8	1 1/8	2 1/8	2 1/8
0530HE	1 3/8	1 1/8	2 1/8	2 1/8
0610HE	1 3/8	1 3/8	2 1/8	2 1/8

System Pressure Relief Valves (PRV) - (By Others / Installer) and Unit HPCO

Pressure relief valves downstream of compressor and upstream of discharge line isolation valve (closed valve condition), must be sized in accordance with the compressor swept volumes (contact JCI sales office for information) and calculated using EN13136.

In addition, when the high pressure side of the installed system is rated at a lower pressure than the discharge lines of the unit. The unit HPCO must be replaced with a lower pressure rated HPCO based on the lower pressure of the system. EN378-2, shows the calculation required for sizing the HPCO for a specific PRV setting (PS/ DWP). Refer to Annex A for further details.

ELECTRICAL CONNECTION

The following connection recommendations are intended to ensure safe and satisfactory operation of the unit. Failure to follow these recommendations could cause harm to persons, or damage to the unit, and may invalidate the warranty.

No additional controls (relays, etc.) should be mounted in the control panel. Power and control wiring not connected to the control panel should not be run through the control panel. If these precautions are not followed it could lead to a risk of electrocution. In addition, electrical noise could cause malfunctions or damage the unit and its controls.

Power Wiring

These units are suitable for 380 - 415 V, 3 phase, 50 Hz nominal supplies only.

All electrical wiring should be carried out in accordance with local regulations. Route properly sized cables to the cable entries in the top of the power panel.

In accordance with EN 60204 it is the responsibility of the user to install over current protection devices between the supply conductors and the power supply terminals on the unit.

To ensure that no eddy currents are set up in the power panel, the cables forming each 3 phase power supply must enter via the same cable entry.

All sources of supply to the unit must be taken via a common point of isolation (not supplied by Johnson Controls).

Single Point Power Supply Wiring

All models require one field provided 380 - 415 V, 3Ø, 50 Hz + PE (Protected Earth) supply to the unit with circuit protection.

Connect the 3 phase supply to the non-fused disconnect switch located in the power panel using M10 lugs

Connect the earth wire to the main protective earth terminal located in the power panel.

Remote Emergency Stop Device

If required, a remote emergency stop device may be wired into the unit. This device should be rated at 16 amps, 110 V, AC-15. The device should be wired into terminals L and 5 in the power panel after removing the factory fitted link.

Control Wiring - Voltage Free Contacts

All wiring to the voltage free contact terminal block requires a supply provided by the customer maximum voltage 254 Vac, 28 Vdc.

The customer must take particular care deriving the supplies for the voltage free terminals with regard to a common point of isolation. Thus, these circuits when used must be fed via the common point of isolation so the voltage to these circuits is removed when the common point of isolation to the unit is opened. This common point of isolation is not supplied by Johnson Controls.

In accordance with EN 60204 it is recommended that the customer wiring to these terminals uses orange wires. This will ensure that circuits not switched off by the units supply disconnecting device are distinguished by colour, so that they can easily be identified as live even when the unit disconnecting devices are off. The Johnson Controls voltage free contacts are rated at 125 VA.

All inductive devices (relays) switched by the Johnson Controls voltage free contacts must have their coil suppressed using standard RC suppressors. If these precautions are not followed, electrical noise could cause malfunctions or damage to the unit and its controls.

Chilled Liquid Pump Starter

Terminals 23 and 24 close to start the liquid pump. This contact is closed if there is a 'Leaving Liquid Temperature Cutout' or any of the compressors are running or the daily schedule is not calling for a shutdown with the unit switch on.

The contact must be used to ensure that the pump is running in the event of a 'Leaving Liquid Temperature Cutout'.

The pump contact will not close to run the pump if the unit has been powered up for less than 30 seconds, or if the pump has run in the last 30 seconds, to prevent pump motor overheating.

Run Contacts

Terminals 25 and 26 close to indicate that refrigerant system 1 is running and terminals 27 and 28 close to indicate that refrigerant system 2 is running.

Alarm Contacts

Each refrigerant system has a voltage-free normally open contact that will close when control power is applied to the panel, if no fault conditions are present. When a fault occurs which locks a system out, or there is a power failure the contact opens. To obtain a system alarm signal, connect the alarm circuit to terminals 29 and 30 for No. 1 system and terminals 31 and 32 for No. 2 system.

Control Wiring - System Inputs

All wiring to the control terminal block (nominal 30 Vdc) must be run in screened cable, with the screen earthed at the panel end only. Run screened cable separately from mains cable to avoid electrical noise pick-up.

The voltage free contacts must be suitable for 30 Vdc (gold contacts recommended). If the voltage free contacts form part of a relay or contactor, the coil of the device must be suppressed using a standard RC suppressor. The above precautions must be taken to avoid electrical noise which could cause a malfunction or damage to the unit and its controls.

Flow Switch

A chilled liquid flow switch of suitable type must be connected to terminals 13 and 14 to provide adequate protection against loss of liquid flow.

Remote Start/Stop

Connect a remote switch to terminals 13 and 51 to provide remote start/stop control if required.

Remote Reset of Chilled Liquid Setpoint

The PWM input (terminals 13 and 20) allows reset of the chilled liquid setpoint by supplying a 'timed' contact closure. Refer to Section 6 for details.

Remote Load Limiting

Load limiting prevents the unit from loading beyond a desired value. The unit % load limit depends on the number of compressors on the unit. The load limit inputs to terminals 13 and 21 work in conjunction with the PWM input to terminals 13 and 20.

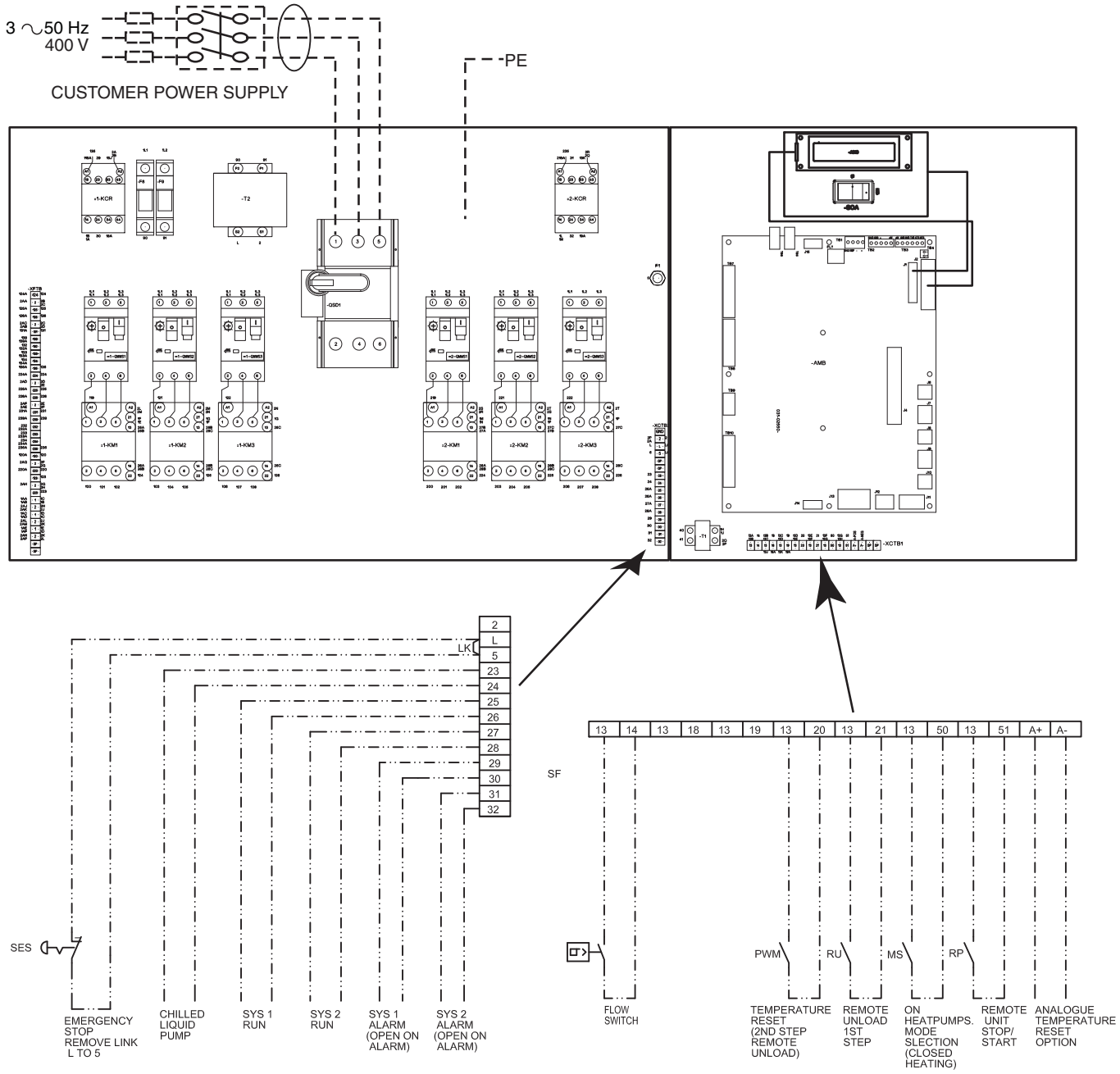
EMS Analogue Input

Provides a means of resetting the leaving chilled liquid temperature from the BAS/EMS. Accepts 4 to 20 mA, 0 to 20 mA, 0 to 10 Vdc or 2-10 Vdc. Connect to terminal A+ and A-. Disabled when using Modbus or BACnet MS/TP communications.

Modbus and BACnet MS/TP

Enable communications with building protocol systems using Modbus or BACnet protocol. Connect through standard RS485 port. Disabled when using EMS Analogue Input.

CONNECTION DIAGRAM



COMMISSIONING

PREPARATION

Commissioning of this unit should only be carried out by Johnson Controls Authorised personnel.

The unit On/Off switch on the front of the control panel has been set to the Off position at the factory. This switch must remain in the Off position, preventing running of the unit until commissioned by Authorised personnel. If the switch has been set to the On position before commissioning then it must be reported to Johnson Controls otherwise the warranty may be invalidated.

Preparation - Power Off

The following checks should be made with the customer supply/supplies to the unit switched OFF.

Inspection: Inspect unit for installation damage. If found take action and/or repair as appropriate.

Refrigerant charge: Units are shipped without refrigerant and have a nitrogen holding charge. The refrigerant circuits will be charged during installation, check that refrigerant pressure is present in both systems and that no leaks are apparent.

If no pressure is present a leak test must be undertaken, the leak(s) located and repaired. Repaired systems must be evacuated with a suitable vacuum pump/recovery unit as appropriate to below 100 microns before charging.

Do not charge liquid refrigerant with static water in the evaporator. Care must also be taken to charge liquid refrigerant slowly to avoid excessive thermal stress at the charging point.

Liquid sub-cooling measured at the liquid line should be between 8.5 and 11.0 °C at circuit full load. Sub-cooling is determined by the level of refrigerant charge in each system.

Valves: Ensure that the compressor discharge and suction service valves are set correctly (OPEN).

Compressor oil: The oil level in multiple scroll compressors (piped in parallel) must be checked directly after all compressors are shut down and have been allowed time to stabilise.

The oil level must be between the bottom and middle of the oil sight glass mounted in the oil equalising line between the compressors.

Isolation/protection: Verify that all sources of electrical supply to the unit are taken from a point of isolation.

Control panel: Check the panel to see that it is free of foreign materials (wire, metal chips, etc.) and clean out if required.

Power connections: Check the customer power cables are connected correctly. Ensure that connections of power cables within the power panel to the non-fused switch disconnects are tight.

Earthing: Verify that the unit earth terminal is properly connected to a suitable earthing point. Ensure that all unit internal earth connections are tight.

Compressor Overload Settings: Check the factory setting of the Compressor Motor Starters (when fitted) as follows:

	SYS 1	SYS 2
YCRL0200HE	23.8	23.8
YCRL0230HE	31.2	23.8
YCRL0260HE	31.2	31.2
YCRL0300HE	35.9	35.9
YCRL0345HE	51.6	35.9
YCRL0385HE	31.2	31.2
YCWL0425HE	51.6	51.6
YCRL0445HE	35.9	35.9
YCRL0530HE	51.6	35.9
YCRL0610HE	51.6	51.6

Supply voltage: Verify that the site voltage supply corresponds to the unit requirement and is within the limits given in the Technical Data, Section 6. The phase imbalance should less than 2% of the average voltage.

Soft Start (Option)

Due to vibration during transport the soft starter internal bypass contactor may be in a undefined state. If the following procedure is not followed this may result in the compressor momentarily starting when the unit power is first turned on.

IMPORTANT
During commissioning or if the soft start is replaced the following procedure MUST BE PERFORMED.

1. With the unit switch and unit switch disconnect set to OFF to isolate the unit, remove the fuses from the compressors fitted with a soft starter.
2. Turn ON the unit switch disconnect to turn on the unit supply and thus apply control circuit voltage to soft starter terminals A1 and A2.
3. Turn OFF the unit disconnect switch and refit the compressor fuses.

Switch Settings: Ensure that the unit On/Off toggle switch on the control panel is set to OFF. Set the non-fused disconnect switch to ON. The customers disconnection devices can now be set to ON.

THE MACHINE IS NOW LIVE!

Crankcase Heaters: Verify the heaters are energised.

Depending upon the ambient temperature the crankcase heaters must be on for 12 to 24 hours before start-up.

Water System: Verify that the chilled liquid system has been installed correctly, and has been commissioned with the correct direction of water flow through the evaporator. Inlet should be at the refrigerant pipework connection end of the evaporator. Purge air from the evaporator using the air vent mounted in the pipework.

Flow rates and pressure drops must be within the limits given in the Technical Data, Section 6. Operation outside of these limits is undesirable and could cause damage.

Flow switch: Verify a chilled liquid flow switch is correctly fitted in the customer's pipework on the cooler outlet, and wired into the control panel correctly.

Temperature sensor(s): Ensure the leaving (-BLCT) liquid temperature sensor is coated with heat conductive compound (Part No. 013-00890-000) and are inserted in the water inlet and outlet sensor pockets of the cooler.

Control supply: Verify the control panel display is illuminated.

HP cut-out reset: Check that the hand reset mechanical high pressure cut-outs mounted on the discharge lines are at the correct setting and are reset.

Programmed options: Verify that the options factory programmed into the Microprocessor Control Centre are in accordance with the customers order requirements by pressing the 'OPTIONS' key on the keypad and reading the settings from the display (refer to 035-21976-110 for details).

Programmed settings: Ensure the system cut-out and operational settings are in accordance with operational requirements by pressing the 'PROGRAM' key (refer to 035-21976-110 for details).

Date & time: Press the 'CLOCK' key and set the date and time (refer to 035-21976-110 for details).

Start/Stop schedule: Programme the daily and holiday start/stop by pressing the 'SCHEDULE/ADVANCE DAY' key (refer to 035-21976-110 for details).

Setpoints: Set the required leaving chilled liquid temperature set-point and control range using the 'COOLING SETPOINTS' key (refer to 035-21976-110 for details).

Compressor Operation: Use the 'OPTIONS' key to switch off each refrigerant system in turn (refer to MBCS Manual) and then check the compressors on the active system:

Connect a manifold gauge to each refrigerant circuit suction and discharge service valves and temporarily start each compressor and check that the discharge pressure rises and the suction pressure decreases to ensure that the compressors are operating in the correct direction. Any faults found must be corrected before starting the unit.

After completing the checks on both circuits, set both systems to on using the 'OPTIONS' key.

FIRST TIME START-UP

During the commissioning period there should be sufficient heat load to run the unit under stable full load operation to enable the unit controls, and system operation to be set up correctly and a commissioning log taken. Read the following section in conjunction with 035-21976-110, then proceed step by step as follows:

Interlocks: Verify that liquid is flowing through the evaporator and that heat load is present. Ensure that any remote run interlocks are in the run position and that the run schedule requires the unit to run or is overridden.

Start-up: Set the unit switch to the ON position to start the unit (there may be a few seconds delay before the first compressor starts because of the anti-recycle timer). Be ready when each compressor starts, to switch the unit off immediately if any unusual noises or other adverse conditions develop. Refer to the Section 6 for the normal operating sequence from start-up.

Refrigerant flow: When a compressor starts a flow of liquid refrigerant will be seen in the liquid line sight glass. After several minutes operation and providing a full charge of refrigerant is in the system, the bubbles will disappear and be replaced by a solid column of liquid. Check that the moisture indicator is satisfactory (Green).

System Operation: Use the 'OPER DATA' key to check the system pressures and temperatures.

Suction Superheat: Check suction superheat at steady full system load only. It is important that no bubbles show in the liquid line sight glass. Measure suction temperature on the copper line about 150 mm before the compressor suction service valve. Measure suction pressure at the compressor service valve. Superheat should be 5.5°C to 7.0°C relative to the 'dew' temperature.

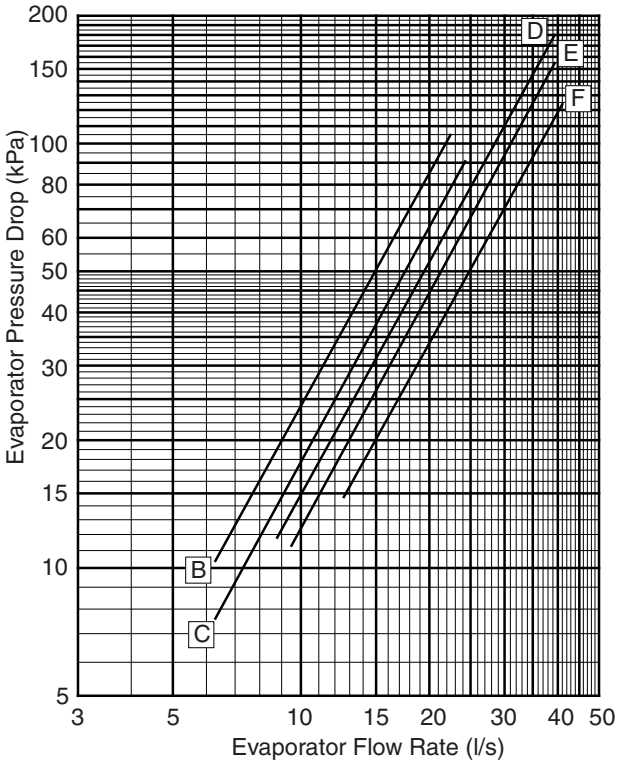
Thermal Expansion valve (when fitted) adjustment: The expansion valves are factory set and should not need adjustment. If any superheat values are out of range, however, the expansion valve adjusting screw should be adjusted no more than 1 turn at a time ('in' to increase superheat, 'out' to decrease superheat), allowing at least 10 minutes for the valve to stabilise before rechecking the value of superheat.

Subcooling: Check liquid subcooling at steady full compressor load only. Measure liquid line temperature on the copper line beside the main liquid line service valve. Measure liquid pressure at the liquid line service valve. Subcooling should be 5°C to 7°C relative to the 'bubble' temperature. If subcooling is out of range add or remove refrigerant as required. Do not overcharge the unit.

General operation: After completion of the above checks for System 1 repeat the process for system 2. In addition, check that loading occurs as specified in the Section 6 and that general operation is correct.

TECHNICAL DATA

EVAPORATOR PRESSURE DROP GRAPH



PRESSURE DROP FORMULAE

High Efficiency (HE) Models	Evaporator Pressure Drop (kPa)	Line
YCRL0200	P= 0.3651 x Flow Rate (l/s) ^ 1.8204	**B**
YCRL0230	P= 0.2240 x Flow Rate (l/s) ^ 1.8204	**D**
YCRL0260	P= 0.2542 x Flow Rate (l/s) ^ 1.8425	**C**
YCRL0300	P= 0.2542 x Flow Rate (l/s) ^ 1.8425	**C**
YCRL0345	P= 0.2240 x Flow Rate (l/s) ^ 1.8204	**D**
YCRL0385	P= 0.1844 x Flow Rate (l/s) ^ 1.8320	**E**
YCRL0445	P= 0.1287 x Flow Rate (l/s) ^ 1.8061	**F**
YCRL0530	P= 0.1287 x Flow Rate (l/s) ^ 1.8061	**F**
YCRL0610	P= 0.1287 x Flow Rate (l/s) ^ 1.8061	**F**

OPERATING LIMITATIONS - YCRL-HE

YCRL Condenserless Models			0200		0230		0260		0300		0345	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Chilled Liquid	Liquid Outlet Temperature (Water)	°C	4.5 to 15									
	Liquid Outlet Temperature Range	°C	3 to 8									
	Evaporator Flow Rate	l/s	6.3	22.4	8.8	39.4	6.3	24.3	6.3	24.3	8.8	39.4
	Evaporator Pressure Drop	kPa	10.4	104.8	11.8	180.0	7.6	90.7	7.6	90.7	11.8	180.0
	Maximum Water Side Pressure	bar	10									
Saturated Discharge Temperature		°C	26 to 55									
Maximum Refrigerant Side Pressure		bar	38.6									
Power Supply Voltage 400V, 3 ~, 50 Hz (nominal)		V	360 to 440									
Recommended Minimum System Water Volume		l	620		726		818		944		1129	
Minimum Ambient Air Temperature		°C	4.5									
Maximum Ambient Air Temperature		°C	46									

YCRLCondenserless Models			0385		0445		0530		0610	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Chilled Liquid	Liquid Outlet Temperature (Water)	°C	4.5 to 15							
	Liquid Outlet Temperature Range	°C	3 to 8							
	Evaporator Flow Rate	l/s	9.5	39.4	12.6	41.0	12.6	41.0	12.6	41.0
	Evaporator Pressure Drop	kPa	11.3	154.6	14.7	123.9	14.7	123.9	14.7	123.9
	Maximum Water Side Pressure	bar	10							
Saturated Discharge Temperature		°C	26 to 55							
Maximum Refrigerant Side Pressure		bar	38.6							
Power Supply Voltage 400V, 3 ~, 50 Hz (nominal)		V	360 to 440							
Recommended Minimum System Water Volume		l	1244		1432		1670		1914	
Minimum Ambient Air Temperature		°C	4.5							
Maximum Ambient Air Temperature		°C	46							

PHYSICAL DATA - YCRL-HE

Condenserless YCRL-HE Models			0200	0230	0260	0300	0345
Number of refrigerant circuits			2				
Oil Charge	Circuit 1 / Circuit 2	kg	8.3/8.3	12.4/12.4	9.3/8.3	14/12.4	9.3/9.3
Compressor	Number of Compressors		4				
	Type		Scroll				
	Capacity Control	%	100/74/ 48/23	100/71/ 49/22	100/74/ 49/24	100/74/ 49/24	100/71/ 49/20
Evaporator	Number of Evaporator		1				
	Type		Shell and Tubes				
	Water Volume	l	183	292	134	134	292
	Water Connections	Inch	6	8	6	6	8
Connection Sizes	Discharge Line (circuit 1 - circuit 2)	Inch	1 3/8-1 3/8	1 5/8-1 3/8	1 5/8-1 5/8	1 5/8-1 5/8	1 5/8-1 5/8
	Liquid Line (circuit 1 - circuit 2)	Inch	7/8-7/8	1 1/8-7/8	1 1/8-1 1/8	1 1/8-1 1/8	1 1/8-1 1/8
Dimensions	Length	mm	3086	3061	3076	3076	3061
	Width	mm	826	856	843	843	856
	Height	mm	1438	1615	1547	1544	1608
Weight	Shipping Weight	kg	1309	1481	1471	1593	1683

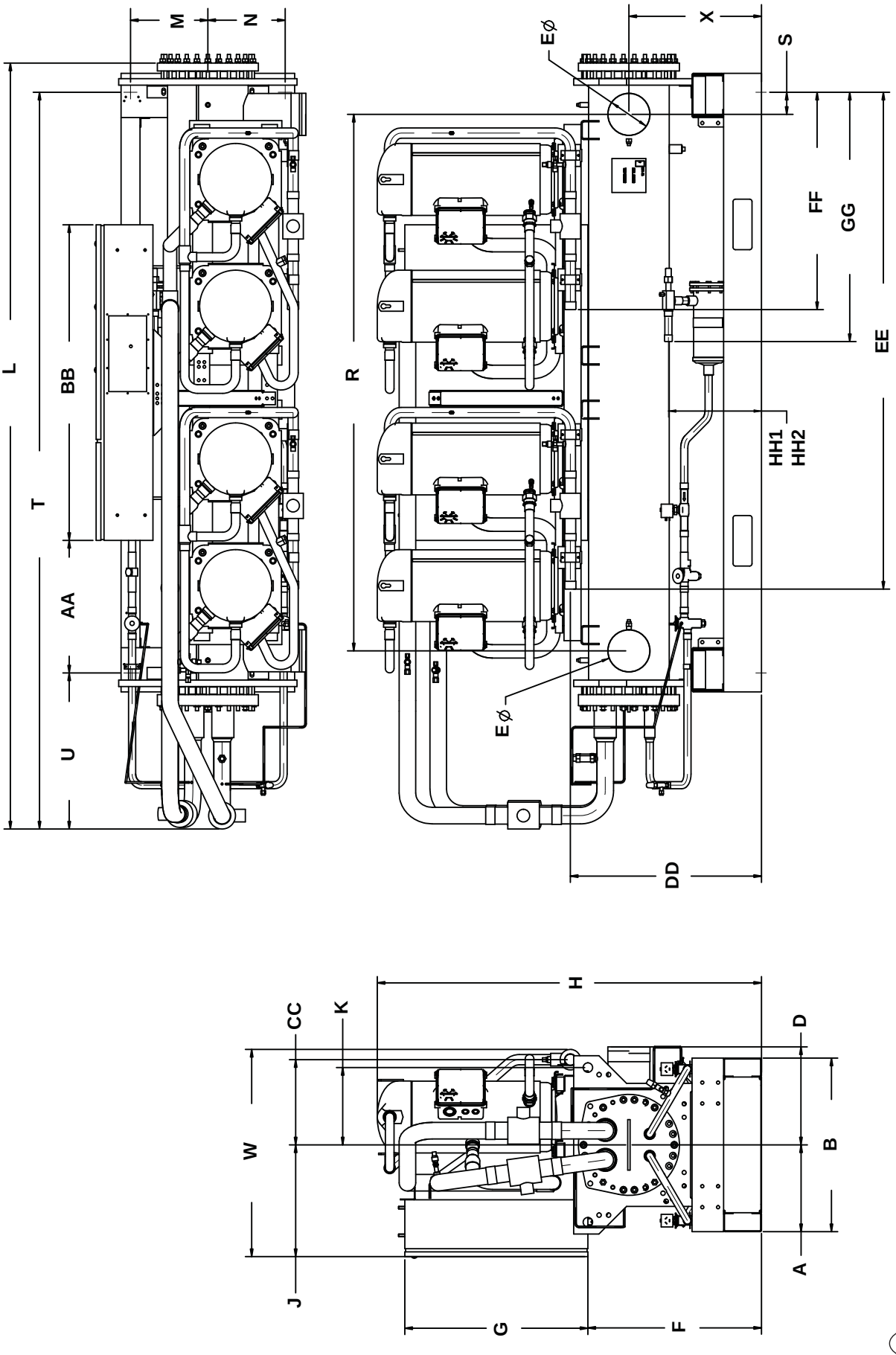
Condenserless YCRL-HE Models			0385	0445	0530	0610
Number of refrigerant circuits			2			
Oil Charge	Circuit 1 / Circuit 2	kg	14/14	17.7/17.7	18.9/17.7	18.9/18.9
Compressor	Number of Compressors		6			
	Type		Scroll			
	Capacity Control	%	100/83/66 /49/33/17	100/83/65 /48/32/17	100/82/66 /46/32/13	100/84/67 /49/32/16
Evaporator	Number of Evaporator		1			
	Type		Shell and Tubes			
	Water Volume	l	233	293	293	293
	Water Connections	Inch	8	8	8	8
Connection Sizes	Discharge Line (circuit 1 - circuit 2)	Inch	2 1/8-2 1/8	2 1/8-2 1/8	2 1/8-2 1/8	2 1/8-2 1/8
	Liquid Line (circuit 1 - circuit 2)	Inch	1 1/8-1 1/8	1 1/8-1 1/8	1 3/8-1 1/8	1 3/8-1 3/8
Dimensions	Length	mm	3617	3576	3576	3576
	Width	mm	965	965	965	902
	Height	mm	1641	1638	1641	1641
Weight	Shipping Weight	kg	1947	2266	2264	2263

ELECTRICAL DATA - YCRL HE

High Efficiency Units						
YCRL	Nominal Running Conditions		Maximum Running Conditions		Start up Amps Direct on Line	Start up Amps Optional Soft Start
	kW	Amps(1) at 400 V	Amps(2) at 360V	Amps(2) at 400V		
0200	37	70	92	95	251	194
0230	44	80	106	110	285	218
0260	48	90	120	125	293	226
0300	61	103	138	144	327	252
0345	69	123	167	175	402	284
0385	73	135	180	187	338	271
0445	92	155	207	215	379	304
0530	105	185	251	262	464	346
0610	118	215	295	310	489	371

(1) For YCRL units, nominal running amps at 45ºC saturated discharge temperature and 7ºC leaving
(2) Maximum running amps at maximum opearating conditions
(3) Start-up amps is the largest compressor starting with all other compressors operating at nominal conditions
(4) Soft Start is only fitted on the largest compressor in each system

DIMENSIONS - YCRL0200HE, 0230HE, 0260HE, 0300HE AND 0345HE

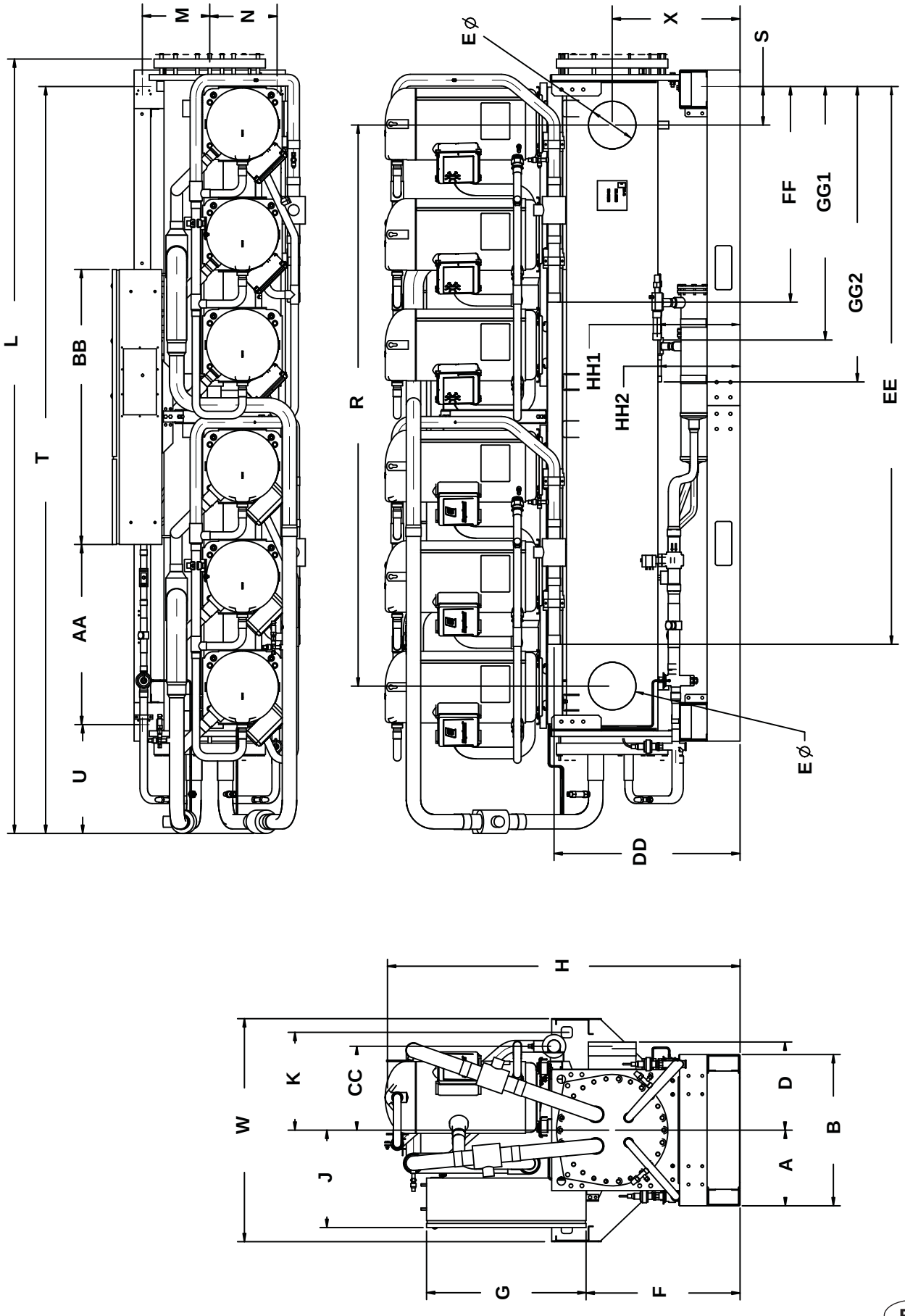


EN

W = Unit width
H = Unit height
L = Uni length
A = Unit centreline to base frame front edge
B = Unit base frame width
D = Unit centreline to evaporator liquid connection face
E = Evaporator liquid connection diameter
F = Unt base to control panel base
G = Control panel height
J = Unit centreline to control panel face
K = Unit centreline to lifting eye
M = Unit centreline to AVM mounting hole centreline
N = Unit centreline to AVM mounting hole centreline
R = Distance between centrelines of evaporator connections
S = AVM mounting hole centreline to evaporator outlet centreline
T = End of unit to AVM mounting hole centreline
U = End of unit to AVM mounting hole centreline
X = Unt base to evaporator connections centreline
AA = Centreline to AVM mounting hole to control panel edge
BB = Control panel width
CC = Unit centreline to centleline of discharge connections
DD = Unt base to centleline of discharge connections
EE = AVM mounting hole centreline to Sys 2 discharge connection face
FF = AVM mounting hole centreline to Sys 1 discharge connection face
GG-1 = AVM mounting hole centreline to Sys 1 liquid connection face
GG-2 = AVM mounting hole centreline to Sys 2 liquid connection face
HH-1 = Reference point to centleline of Sys 1 liquid connection
HH-2 = Reference point to centleline of Sys 2 liquid connection

YCRL	0200HE	0230HE	0260HE	0300HE	0345HE
Dim.	mm	mm	mm	mm	mm
W	824	834	834	834	846
H	1437	1616	1546	1544	1613
L	3085	3062	3082	3082	3062
A	349	349	349	349	349
B	699	692	699	699	699
D	299	407	394	394	407
E	219	219	168	168	219
F	622	737	699	699	737
G	737	737	737	737	737
J	450	450	450	450	450
K	311	324	311	311	324
M	311	311	311	311	311
N	311	311	311	311	311
R	2159	2108	2159	2159	2108
S	89	114	89	89	114
T	2965	2938	2965	2965	2938
U	628	601	628	628	601
X	533	565	533	533	565
AA	533	533	533	533	533
BB	1270	1270	1270	1270	1270
CC	343	343	343	343	356
DD	780	838	769	769	838
EE	2059	2085	1999	1999	2008
FF	947	886	875	875	883
GG-1	1003	1003	1003	965	1040
GG-2	1003	1003	1003	965	1040
HH-1	466	375	375	375	378
HH-2	466	375	375	375	378

DIMENSIONS - YCRL0385HE, 0445HE, 0530HE AND 0610HE

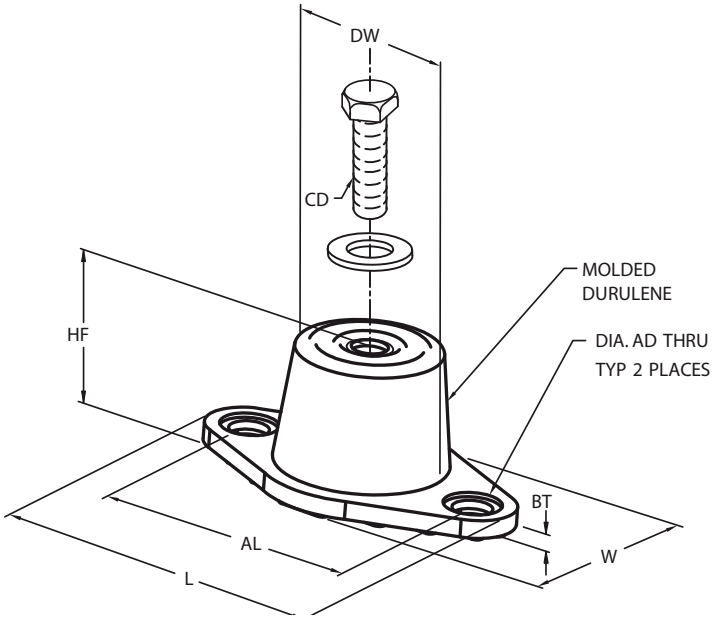


EN

W = Unit width
H = Unit height
L = Uni length
A = Unit centreline to base frame front edge
B = Unit base frame width
D = Unit centreline to evaporator liquid connection face
E = Evaporator liquid connection diameter
F = Unt base to control panel base
G = Control panel height
J = Unit centreline to control panel face
K = Unit centreline to lifting eye
M = Unit centreline to AVM mounting hole centreline
N = Unit centreline to AVM mounting hole centreline
R = Distance between centrelines of evaporator connections
S = AVM mounting hole centreline to evaporator outlet centreline
T = End of unit to AVM mounting hole centreline
U = End of unit to AVM mounting hole centreline
X = Unt base to evaporator connections centreline
AA = Centreline to AVM mounting hole to control panel edge
BB = Control panel width
CC = Unit centreline to centleline of discharge connections
DD = Unt base to centleline of discharge connections
EE = AVM mounting hole centreline to Sys 2 discharge connection face
FF = AVM mounting hole centreline to Sys 1 discharge connection face
GG-1 = AVM mounting hole centreline to Sys 1 liquid connection face
GG-2 = AVM mounting hole centreline to Sys 2 liquid connection face
HH-1 = Reference point to centleline of Sys 1 liquid connection
HH-2 = Reference point to centleline of Sys 2 liquid connection

YCRL	0385HE	0445HE	0530HE	0610HE
Dim.	mm	mm	mm	mm
W	1030	1030	965	902
H	1641	1628	1641	1641
L	3633	3576	3576	3576
A	349	349	349	349
B	699	699	699	699
D	406	407	407	407
E	219	219	219	219
F	711	711	711	711
G	737	737	737	737
J	450	450	450	450
K	452	452	452	452
M	311	311	311	311
N	311	311	311	311
R	2591	2591	2591	2591
S	178	178	178	178
T	3509	3449	3449	3449
U	563	502	502	502
X	591	591	592	587
AA	832	832	832	832
BB	1270	1270	1270	1270
CC	387	387	387	387
DD	859	859	859	859
EE	2499	2575	2575	2575
FF	919	995	995	995
GG-1	1466	1171	1171	1171
GG-2	1466	1364	1364	1364
HH-1	378	383	383	383
HH-2	378	379	379	379

DURULENE ISOLATOR SPECIFICATIONS

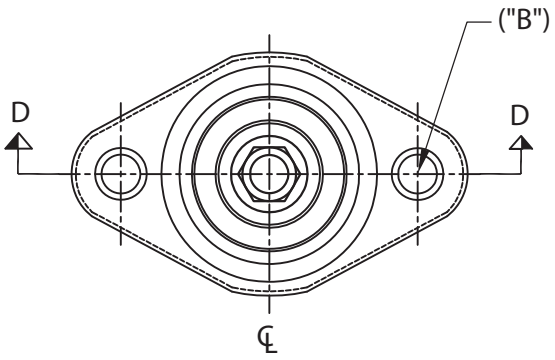


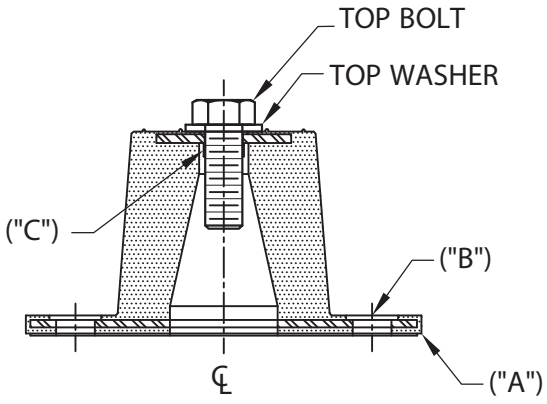
	Dimensions (inches)							
Mount Type	**L**	**W**	**HF**	**AL**	**AD**	**BT**	**CD**	**DW**
RD3	5.50	3.38	2.88	4.13	0.56	0.25	1/2-13UNC x 1	2.50
RD4	6.25	4.63	2.75	5.00	0.56	0.38	1/2-13UNC x 1	3.00

Weight Range (kgs)*	Type	Colour	York P/N
255 to 375	RD3	Charcoal	029-25335-001
375 to 766	RD4	Brick Red	029-25335-002
766 to 1361	RD4	Charcoal	029-25335-004

*Values de-rated by 25%

DURULENE ISOLATOR INSTALLATION

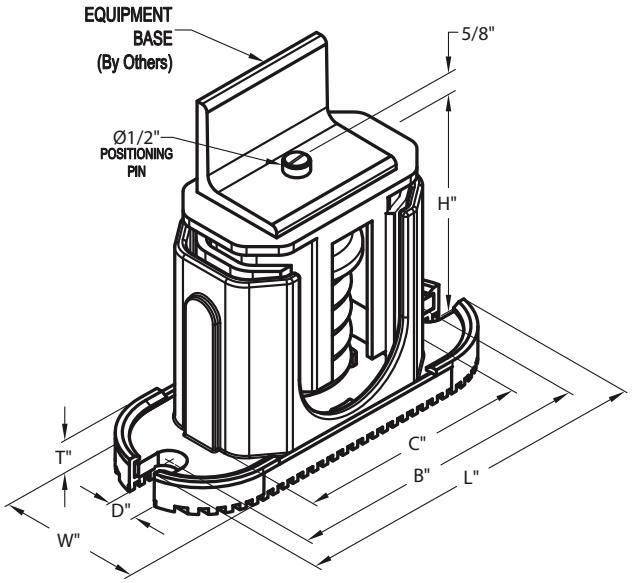




SECTION D-D

1. Read the following instructions before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on floor, housekeeping pad or subbase, ensuring that all isolators centrelines match the equipment mounting holes. The VMC group recommends that the isolator base (“A”) be installed on a level surface. Shim or grout as required, leveling all isolator bases to the same elevation (0.03125-inch maximum difference can be tolerated).
4. Bolt or anchor all isolators to supporting structure utilising base thru holes (“B”).
5. Remove top bolt and top washer. Place equipment on top of isolators so that mounting holes in equipment or base line up with threaded hole (“C”).
6. Reinstall top bolt and washer and tighten down.

25 MM ISOLATOR SPECIFICATION



	Dimensions (inches)						
Mount Type	**W**	**D**	**L**	**B**	**C**	**T**	**H**
CP	3	0.625	7.75	6.5	4.75	0.5	5.625
C2P	3	0.625	10.5	9.25	7.75	0.5625	6

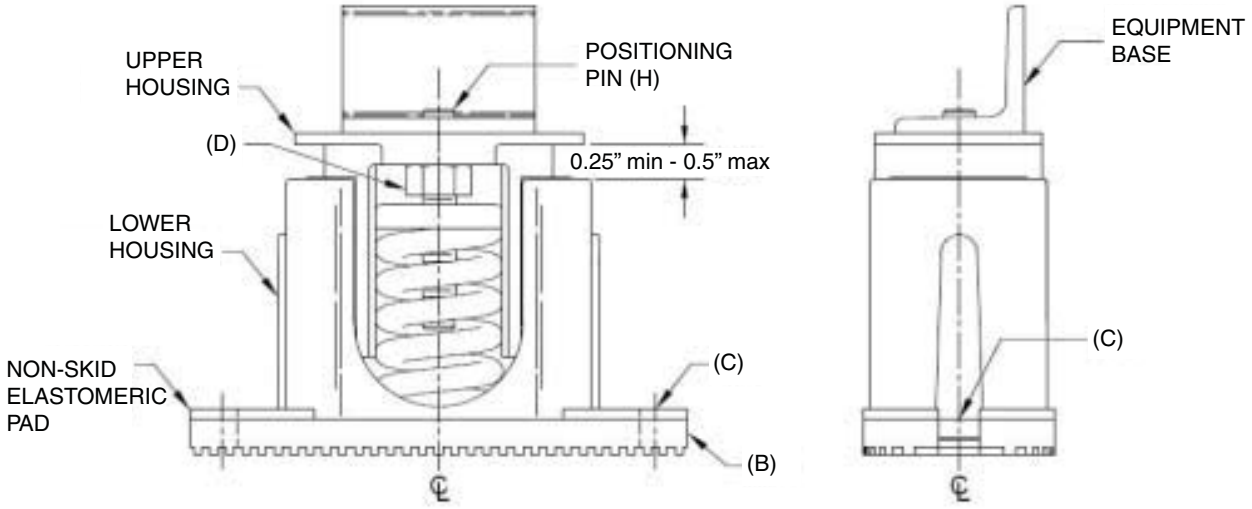
Weight Range (kgs)*	Type	Colour	York P/N
345 to 463	CP	Grey	029-25334-004
463 to 525	CP	White	029-25334-005
525 to 688	CP	Grey/Red	029-25334-006
694 to 926	C2P	Grey	029-25334-010
926 to 1094	C2P	White	029-25334-012

*Values de-rated by 15%

Notes:

1. Use either all CP's or all CP2's at all locations on a unit.
2. Installation requires bolting or anchoring mount to support structure with a 2 x 0.625" diameter bolts or 2 x 0.5" diameter concrete anchors.
3. All springs are designed for 50% over-travel.

25 MM ISOLATOR INSTALLATION



1. Read the following instructions before beginning installation.
2. Isolators are shipped fully assembled and are to be positioned in accordance with the submittal drawings or as otherwise recommended.
3. Set isolators on floor, housekeeping pad or subbase, ensuring that all isolators centrelines match the equipment mounting holes. The VMC group recommends that the isolator base (“B”) be installed on a level surface. Shim or grout as required, leveling all isolator bases to the same elevation (0.25-inch maximum difference can be tolerated).
4. Bolt or anchor all isolators to supporting structure utilising base slotted holes (“C”).
5. Place equipment on top of isolators making sure that mounting holes of the equipment line up with isolator positioning pin (“H”).
6. The adjustment process can only begin after the equipment or machine is at its full operating weight.
7. Adjust each isolator in sequence by turning spring adjusting bolt (“D”) one full counterclockwise turn at a time. Repeat this procedure on all isolators, one at a time.
8. Continue adjusting each isolator until a minimum of 0.25” clearance is achieved between the lower housing and upper housing. (See illustration above).
9. Fine adjust isolators to level equipment.

UNIT OPERATION

GENERAL DESCRIPTION

The units are designed to work independently, or in conjunction with other equipment via a YORK ISN building management system or other automated control system. When operating, the unit controls monitor the chilled liquid system temperatures at the unit and take the appropriate action to maintain the temperatures within desired limits. This action will involve running one or more compressors to match the cooling effect of the refrigerating systems to the heat load on the liquid system. The heat removed from the chilled liquid is then rejected from the air cooled condenser coils.

The following sections give an overview of the operation of the unit. For detailed information, reference should be made to the MBCS Operating Instructions for the unit.

START-UP

Check the main power supplies to the unit are 'ON', all refrigerant service valves are open (anti-clockwise one turn short of fully open) and chilled liquid flow has been established (unless the unit chilled liquid pump start control is being used, in which case just ensure the pump supply is on). Ensure that the system switches under the 'OPTIONS' key are in the 'ON' position.

Press the 'STATUS' key on the keypad and then switch the unit 'ON/OFF' switch below the keypad to the 'ON' position.

The controller will perform a pre-check to ensure that the daily/holiday schedule and any remote interlocks will allow the unit to run, all safety cut-outs are satisfied and that cooling load is required (i.e. that the chilled liquid temperature is outside the set limits). Any problems found by the pre-check will be displayed if present. If no problems are present and cooling duty is required the lead compressor will start. The display will show the anti-coincidence timer status for the lag compressor.

NORMAL RUNNING AND CYCLING

Once the unit has been started, all operations are fully automatic. After an initial period of operation with the lead compressor, the control system will adjust the unit load depending on the chilled liquid temperature and rate of temperature change. If high heat load is present, the controller will increase the capacity of the unit and start-up the next compressor.

If very little heat load is present, the lead compressor may continue to operate or may simply stop again to avoid overcooling the liquid. If the latter is the case, one compressor will restart automatically should the liquid temperature rise again.

When a compressor is running the controller monitors oil pressure, motor current, and various other system parameters such as discharge pressure, chilled liquid temperature, etc. Should any problems occur, the control system will immediately take appropriate action and display the nature of the fault (see MBCS Manual).

SHUTDOWN

The unit can be stopped at any time by switching the unit 'ON/OFF' switch just below the keypad to the 'OFF' position. The compressor heaters will energise to prevent refrigerant condensing in the compressor rotors and to prevent the compressor oil becoming saturated with refrigerant.

To prevent damage to the unit the control supply to the compressor heaters should not be switched off, even when the unit is not required to run.

If mains power must be switched off, (for extended maintenance or a shutdown period), the compressor suction, discharge and liquid line service valves on both systems should be closed (clockwise) and if there is a possibility of liquid freezing due to low ambient temperatures, the cooler and condenser should be drained. The valves should be opened, the cooler and condenser refilled and the power must be switched on for at least 8 hours before the unit is restarted.

MAINTENANCE

GENERAL REQUIREMENTS

The units have been designed to operate continuously provided they are regularly maintained and operated within the limitations given in this manual. Each unit should be included in a routine schedule of daily maintenance checks by the operator/customer, backed up by regular service inspection and maintenance visits by a suitably qualified Service Engineer.

It is entirely the responsibility of the owner to provide for these regular maintenance requirements and/or enter into a maintenance agreement with a Johnson Controls service organisation to protect the operation of the unit. If damage or a system failure occurs due to improper maintenance during the warranty period, Johnson Controls shall not be liable for costs incurred to return the unit to satisfactory condition.

This maintenance section applies to the basic unit only and may, on individual contracts, be supplemented by additional requirements to cover any modifications or ancillary equipment as applicable.

The Safety Section of this manual should be read carefully before attempting any maintenance operations on the unit. This section should be read in conjunction with the Section 7.

DAILY MAINTENANCE

The following maintenance checks should be carried out on a daily basis by the operator/customer. Please note that the units are not generally user serviceable and no attempt should be made to rectify faults or problems found during daily checks unless competent and equipped to do so. If in any doubt, contact your local Johnson Controls Service Centre.

Unit status: Press the 'STATUS' key on the keypad and ensure no fault messages are displayed (refer to the MBCS Manual for explanation of messages and the Trouble Shooting section for courses of action).

Operating conditions: Read the operating pressures and temperatures at the control panel using the 'OPER DATA' key and check that these are within the operating limitations given in the MBCS Manual.

Refrigerant leaks: Visually check the cooler, condenser, compressors and pipework for damage and gas leaks.

Compressor oil level: Check the compressor oil level when the compressor is operating normally. The oil level should be between the ½ and ¾ in the oil sight glass.

At shutdown the oil level can fall to the lower limit of the oil sight glass.

Compressor Oil Quality: The oil used in the compressors is pale in colour. If the oil colour darkens or exhibits a change in colour, this may be an indication of contaminants in the refrigerant system. If this occurs, an oil sample should be taken and analysed. If contaminants are present, the system must be cleaned to prevent compressor failure.

Refrigerant Charge: When a system starts up, or sometimes after a change of capacity, a flow of bubbles will be seen in the liquid line sight glass. After a few minutes of stable operation, the bubbles should clear leaving just liquid refrigerant showing in the sight glass.

In addition to the checks listed above, periodic inspections of the unit should be carried out to ensure proper equipment operation. Items such as loose equipment, component operation, unusual noises, etc. should be investigated and corrected immediately.

SCHEDULED MAINTENANCE

The maintenance operations detailed in the following table should be carried out on a regular basis by a suitably qualified Service Engineer. It should be noted that the interval necessary between each 'minor' and 'major' service can vary depending on, for instance, application, site conditions and expected operating schedule. Normally a 'minor' service should be carried out every three to six months and a 'major' service once a year. It is recommended that your local Johnson Controls Service Centre is contacted for recommendations for individual sites.

SERVICE SCHEDULE	MINOR SERVICE	MAJOR SERVICE All items under Minor Service plus:
Unit general:	Check thermal insulation. Check vibration isolators.	Check main structure. Check paint-work.
Refrigerant systems general:	Check relief valves. Check for pipework damage. Check for leaks. Check moisture indicator. Check suction superheat. Check liquid subcooling.	Check solenoid valves.
Compressors:	Check oil level. Check condition of oil.	
Evaporator:	Check water flow. Check water pressure drop. Check heater mats.	Check water pH / glycol strength.
Power & Control system general:	Check panel condition. Check mains and control wiring. Check sensor locations. Check mechanical HP cut-outs.	Check all connections. Check compressor contactors. Check sensor / transducer calibration. Check motor protectors. Check contactor contacts.
Microprocessor controls:	Check fault history. Check program settings. Check HP / LP cut-out function's. Check pump-down function. Check load / unload function.	Check ambient cut-out function.

Evaporator In-Service Inspection

There is no corrosion on the refrigerant side therefore in-service inspection on the refrigerant side is not necessary.

For the water side, if the water used is treated in accordance with Section 4, in-service inspection is not necessary. In the design of the vessels used in the unit, a 1 mm corrosion allowance has been used to consider slight corrosion on the water side. This allowance is sufficient to cover the lifetime of the unit.

Johnson Controls believes that periodic in service proof testing (e.g.; hydro tests) is not required. However, Johnson Controls recognises that national regulations may require such testing to be conducted.

TROUBLE SHOOTING

Competent Persons Trouble Shooting Guide

PROBLEM	POSSIBLE CAUSE	ACTION
No display on panel — Unit will not operate	Mains supply to unit off.	Switch on mains supply if safe to do so.
	Emergency stop device off.	Check if remote emergency stop device is in the 'OFF' position. Turn to 'ON' position if safe to do so.
	No supply to -T1.	Check wiring to -T1 and fuse -F1.
	No 24 Vac supply to microprocessor board.	Check wiring from -T1 to microprocessor board.
	No 24 Vac output from Transformer -T1.	Replace -T1.
	Short circuit in wiring to temperature sensors or pressure transducers.	Unplug connections at microprocessor board to isolate.
	Defective microprocessor board or display board.	Replace board after contacting YORK Service.
FLOW SWITCH / REM STOP NO RUN PERMISSIVE displayed	No liquid flow through the cooler.	Ensure that liquid pumps are running. Valves are correctly set and flow is established.
	Flow switch contacts are not made.	Check the flow switch is functional and is installed according to the manufacturers instructions. Note: On some systems the pump starter may be wired to the unit and controlled to start by the unit.
	Defective flow switch.	Replace flow switch.
	Remote cycling device open.	Check cycling devices connected to terminals 13 and 14 on the EEV Interface PCB terminal block.
UNIT FAULT: LOW AMBIENT TEMP displayed	Incorrect Low Ambient Mode Settings.	Set Ambient Control Type to 'Low Ambient Mode' and Set Low Ambient Cutout to -17.8°C.
UNIT FAULT: LOW LIQUID TEMP displayed	Improperly adjusted leaving chilled liquid temperature cut-out (glycol only).	Re-program the leaving chilled liquid temperature cut-out.
	Control panel setpoint/range values improperly programmed.	Re-adjust setpoint/range.
	Chilled liquid flow too low.	Increase chilled liquid flow.
	Defective -BLCT or -BECT sensor. (Check the sensor is properly installed in the bottom of the well with a generous amount of heat conductive compound).	Compare sensor against a known good temperature sensing device. Refer to sensor calibration tables.
UNIT FAULT: 115 VAC UNDERVOLTAGE displayed	Poor mains supply voltage.	Check mains supply is stable and within allowable limits. Check for voltage dip on compressor start.

PROBLEM	POSSIBLE CAUSE	ACTION
SYS X HIGH DSCH PRES displayed	Discharge pressure cut-out incorrectly set. Air in refrigerant system. Excessive refrigerant charge. Measured pressure is incorrect.	Adjust in accordance with recommended setting. Check for non-condensables (air) in system. Evacuate and recharge system. Remove refrigerant. Check discharge transducer calibration and wiring.
SYS X LOW SUCT PRESS displayed	Suction pressure cut-out incorrectly set. Faulty expansion valve. Reduced cooler performance. Low refrigerant charge. Restricted refrigerant flow. Measured pressure incorrect.	Adjust in accordance with recommended setting. Replace valve Check for restricted chilled liquid flow. Check for fouled tube surfaces. Check for leaks. Check for blocked filter/drier. Check -YLLSV is operating correctly Check for moisture in the system. Check suction pressure transducer calibration/pressure switch and wiring.
SYS X MP/HPCO FAULT displayed	Compressor internal motor protector (MP) open. External overload tripped. -FHP switch open. Defective -FHP switch. Defective -K1 relay.	Verify refrigerant charge is not low. Verify superheat setting of 5.6° - 8.3°C. Verify correct compressor rotation. Verify compressor is not over loaded. Determine cause and reset. See 'High Discharge Pressure Fault'. Replace -FHP switch. Replace relay.
Compressor(s) do not start	Demand not sufficient. Defective water temperature sensor. Contactor/Overload failure. Compressor failure.	No problem. Compare the display with a thermometer. Should be within +/- 2 degrees. Refer to BECT/ BLCT calibration charts. Replace defective part. Diagnose cause of failure and replace.
Lack of cooling effect	Fouled cooler surface. (Low suction pressure will be observed). Improper flow through the cooler Low refrigerant charge. (Low suction pressure will be observed).	Contact the local YORK service representative. Reduce flow to within unit design specification. Check subcooling and add charge as needed. Check for leaks.
!! LOW BATTERY !! CHECK PROG / SETP / OPTN displayed	RTC battery (U17) flat.	Replace U17 and reprogram setpoints, values, options, time and schedule.

Sensor Calibration Charts

Liquid Temperature (-BLCT and BECT)

Temperature °C	Resistance ohms	Microboard Voltage Vdc	Sensor Voltage Vdc
-8	14896	1.57	3.43
-6	13388	1.69	3.31
-4	12047	1.81	3.19
-2	10856	1.93	3.07
0	9795	2.05	2.95
2	8849	2.17	2.83
4	8005	2.30	2.70
6	7251	2.42	2.58
8	6575	2.54	2.46
10	5970	2.66	2.34
12	5427	2.78	2.22
14	4937	2.90	2.10

Red wire = 5 V, Black wire = Signal

Test points :

Leaving Liquid Temperature (-BLCT)

Sensor Voltage Input 5V -AMB J6-8/5
Microboard Voltage Input 0V -AMB J6-8/2

Entering Liquid Temperature (-BECT)

Sensor Voltage Input 5V -AMB J6-7/4
Microboard Voltage Input 0V -AMB J6-4/1

Discharge Pressure (-BDP) and Suction (-BSP) Transducers

0 - 400 PSI Transducer		0 - 600 PSI Transducer	
Pressure barg	Voltage Vdc	Pressure barg	Voltage Vdc
0	0.5	0	0.5
50	1.0	75	1.0
100	1.5	150	1.5
150	2.0	225	2.0
200	2.5	300	2.5
250	3.0	375	3.0
300	3.4	450	3.4
350	4.0	525	4.0
400	4.5	600	4.5

Red wire = 5 V, Black wire = 0 V, White wire = signal

Test points :

Discharge Pressure (-BDP) 0 - 600 PSI Transducer:

Refrigerant Circuit 1 -AMB J7-11/7
Refrigerant Circuit 2 -AMB J9-11/9

Voltage = (Pressure (barg) X 0.145) + 0.5

Suction Pressure (-BSP) 0 - 400 PSI Transducer:

Refrigerant Circuit 1 -AMB J7-10/9
Refrigerant Circuit 2 -AMB J9-10/9

0 - 400 PSI Transducer Voltage = (Pressure (PSI) X 0.02) + 0.5
0 - 600 PSI Transducer Voltage = (Pressure (PSI) X 0.01) + 0.5

SPARE PARTS

RECOMMENDED SPARES

It is recommended that the common spare parts listed below are held for preventative of corrective maintenance operations.

Details of unit spare parts are given in the Renewal Parts List 035-21977-000. Contact your local Johnson Controls Sales and Service Centre for information and please quote the unit model number and serial number.

Description	Item	Part Number
Pressure Transducer 400psi	-BSP	025-41756-002
Pressure Transducer 600psi	-BDP	025-41756-003
Sensor, Temperature	LWT	025-40273-009
Sensor, Temperature	EWT	025-40273-010
Switch, High Pressure - Manual Reset	-FHP1	025-40663-000
Switch, High Pressure - Internal Reset	-FHP2	025-40670-000

RECOMMENDED COMPRESSOR OIL

The correct type of oil must be used in the unit as shown on the unit data plate and labels. Standard units use the following oil:

Refrigerant	Compressor Oil
R410A	York grade V

ASSOCIATED DRAWINGS

Wiring Diagrams	
Models	**YCRL-HE**
Schematic	035-21499-401 & 035-21499-402
Connection	035-21499-403 & 035-21499-404 035-21499-405
Models	**YCRL-HE with Soft Start**
Connection/Schematic	035-21499-406
Models	**YCRL-HE with EEV**
Schematic	035-21499-407
Connection	035-21499-408
Legend/Notes	035-21499-409

DECOMMISSIONING. DISMANTLING AND DISPOSAL

Never release refrigerant to the atmosphere when emptying the refrigerating circuits. Suitable retrieval equipment must be used. If reclaimed refrigerant cannot be reused. It must be returned to the manufacturer.

Never discard used compressor oil, as it contains refrigerant in solution. Return used oil to the oil manufacturer.

Unless otherwise indicated, the operations described below can be performed by any properly trained maintenance technician.

GENERAL

Isolate all sources of electrical supply to the unit including any control system supplies switched by the unit. Ensure that all points of isolation are secured in the 'OFF' position. The supply cables may then be disconnected and removed. For connection points refer to Section 4.

Remove all refrigerant from each system of the unit into a suitable container using a refrigerant reclaim or recovery unit. This refrigerant may then be re-used, if appropriate, or returned to the manufacturer for disposal. Under NO circumstances should refrigerant be vented to atmosphere. Drain the refrigerant oil from each system into a suitable container and dispose of according to local laws and regulations governing the disposal of oily wastes. Any spilt oil should be mopped up and similarly disposed of.

Isolate the unit heat exchanger from the external water systems and drain the heat exchanger section of the system. If no isolation valves are installed it may be necessary to drain the complete system.

If glycol or similar solutions have been used in the water system, or chemical additives are contained, the solution MUST be disposed of in a suitable and safe manner. Under NO circumstances should any system containing glycol or similar solutions be drained directly into domestic waste or natural water systems.

After draining, the water pipework may be disconnected and removed.

Packaged units can generally be removed in one piece after disconnection as above. Any fixing down bolts should be removed and then the unit should be lifted from position using the points provided and equipment of adequate lifting capacity.

Reference should be made to Section 4 for unit installation instructions, Section 6 for unit weights and Section 3 for handling.

Units which cannot be removed in one piece after disconnection as above must be dismantled in position. Special care should be taken regarding the weight and handling of each component. Where possible units should be dismantled in the reverse order of installation.

Residual refrigerant oil and glycol or similar solutions may remain in some parts of the system. These should be mopped up and disposed of as described above.

It is important to ensure that whilst components are being removed the remaining parts are supported in a safe manner.

Only use lifting equipment of adequate capacity.

After removal from position the unit parts may be disposed of according to local laws and regulations.

ANNEX A - INSTALLER RESPONSIBILITIES FOR DESIGN, SAFETY, CERTIFICATION AND CE MARKING OF INSTALLED CHILLER

The YCRL is an incomplete unit, which requires the installer to design the rest of the system to complete the chiller install. The design includes sizing condenser, pipework, fittings, vibration isolation and all other accessories, required for the installation to allow for specified performance of the system and system safety requirements.

The system performance requires the cooling capacity, sound and other specified parameters are adhered to in the design. The installer must assess oil return requirements at full load and part load, particularly if double risers are required for adequate part/full load oil return. Please refer to installation section for some guidance. Also, the installer must assess if liquid receivers are required on the system to allow for adequate operation. Installers must consult best practice design guidance documentation to ensure correct system operation.

The installer must then ensure the safety of the completed pressure system is adhered to into standards EN378-2(2008)/A1(2009) and EN13136:2001/A1:2005.

The selected system components for the high pressure side must be assessed to determine where pressure relief valves are required and how they must sized. The YCRL will be supplied with high pressure cutouts (HPCO) each at a set pressure. EN378-2(2008)/A1(2009) shows how to calculate HPCOs and how they should be sized.

Using the supplied HPCOs, the system high pressure side pressure setting of any high pressure side pressure relief valves designed by the installer, must be calculated using EN378-2(2008)/A1(2009). The installer must then assess the high pressure side components and determine the pressure rating of every system component from their component suppliers. Documentation and where available declaration of conformities must be obtained of each system components.

If there is a component that has pressure rating below the pressure setting of the high side pressure relief valve, then this pressure relief valve must be lowered in pressure setting to this lowest pressure rated component. Also, the supplied HPCOs must be replaced with new HPCOs and the pressure setting must be calculated using the new lower pressure relief valve pressure setting and using EN378-2(2008)/A1(2009).

The requirement of pressure relief valves on the high pressure side is determined by the installer in conjunction with the standards EN378-2(2008)/A1(2009) and EN13136:2001/A1:2005. The over-pressurisation cases of positive displacement devices operating against closed valves must be assessed using standards EN378-2(2008)/A1(2009) and EN13136:2001/A1:2005.

For example, the requirement of pressure relief valve(s) between the compressors and discharge line isolation valve (closed valve condition) must be assessed by the installer. Johnson Controls cannot supply pressure relief valves here because Johnson Controls will not know what the final installed pressure components are in every installation. The installer must use the compressors swept volumes (contact Johnson Controls sales office for information) and other data to calculate the pressure relief valve size using standards EN378-2(2008)/A1(2009) and EN13136:2001/A1:2005.

Another case of over pressurisation is thermal expansion due to ambient changes and fire conditions. The installer must use standards EN378-2(2008)/A1(2009) and EN13136:2001/A1:2005 to determine where pressure relief valves are required, for instance pipework trapped between isolation valves, any vessels used, condenser, etc. Using standards EN378-2(2008)/A1(2009) and EN13136:2001/A1:2005, the installer can size the pressure relief valves.

Once the installer has completed the design and safety requirements, using all documentation and declaration of conformities and declaration of incorporations from the YCRL unit, along with all of the system component documentation and declaration of conformities selected by the installer, must be registered and approved with a notified body before the system can be CE marked and put into operation. The installer must ensure other standards are assessed, adhered to and then supplied to the notified body for the system to ensure approval and CE marking, which are:

Relevant EC directives:

Pressure Equipment Directive 97/23/EC

Machinery Safety 2006/42/EC

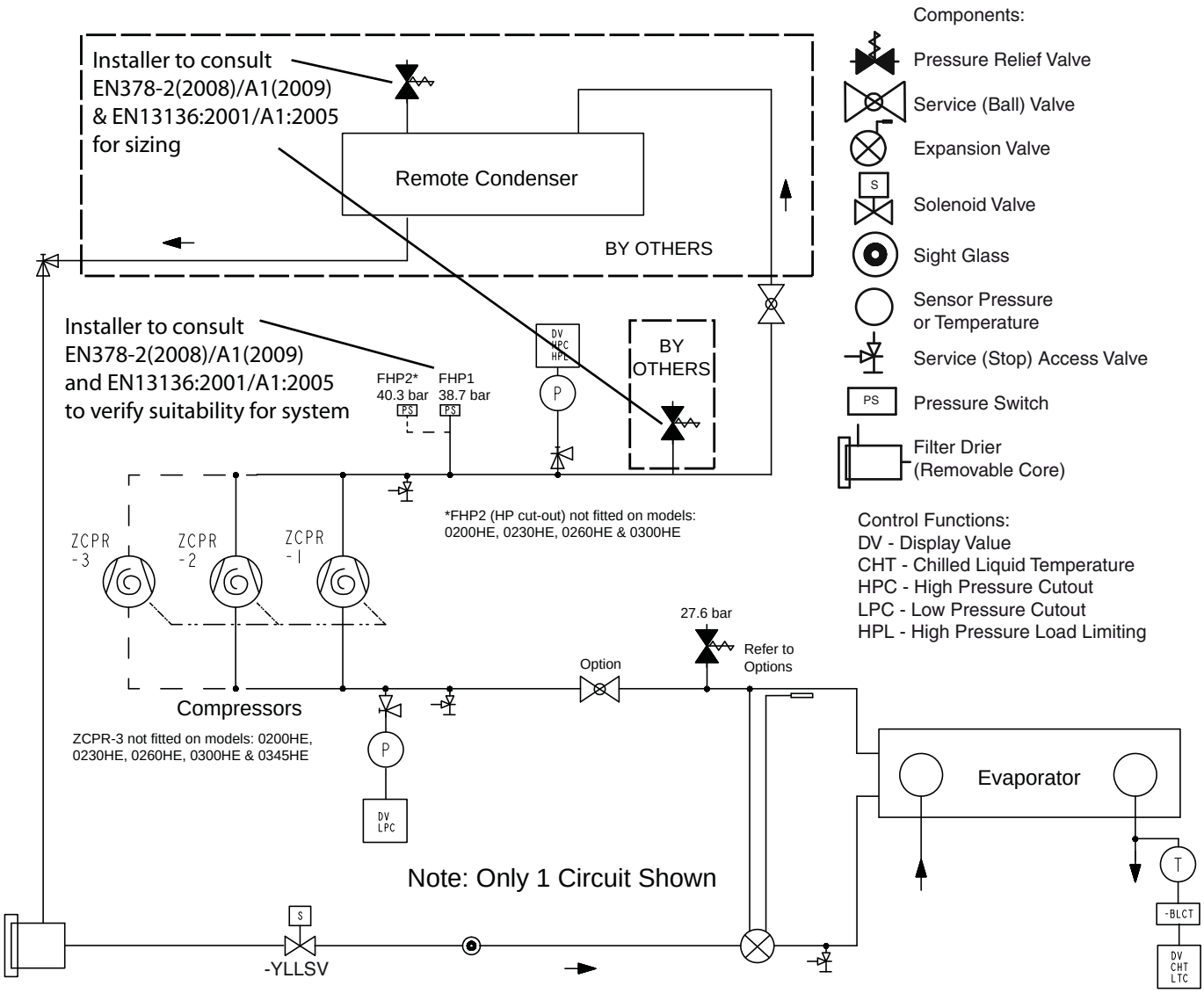
EMC2004/108/EC.

Applied harmonized standards:

EN60204-1(2006), EN378-2(2008)/A1(2009)*,

EN61000-6-4(2007), EN61000-6-2(2005)

* Safety accessories according to essential requirements in PED paragraph 2.11.1 have been calculated according to EN13136:2001/A1:2005 and are not following the requirements in EN378-2:2008 paragraph 6.2.6.2, unless dual relief valves are fitted.



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