YLCS - SA, HA & AA MODELS

INSTALLATION, OPERATION & MAINTENANCE	Revision 5	035L02630-100 (0410)

WATER COOLED LIQUID CHILLER AND REMOTE AIR COOLED CHILLER

YLCS WsPak

EUROVENT CERTIFIED PERFORMANCE

CE

R134a

YORK BY JOHNSON CONTROLS

Johnson Controls

Contents

1 SUPPLIER INFORMATION

1.1 Introduction

York YLCS chillers are manufactured to the highest design and construction standards to ensure high performance, reliability and adaptability to all types of air conditioning installations.

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

This manual and the Microprocessor Based Control System Operating Instructions contain 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.

1.2 Warranty

Johnson Controls warrants all equipment and materials against defects in workmanship and materials for eighteen months from delivery unless extended warranty has been agreed as part of the contract.

The warranty is limited to free 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 and order number. These details are printed on the unit identification plate, fitted on the outer edge of the options panel.

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 Authorised York Service Centre.

Only genuine York approved spare parts, oils 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.

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

1.3 Safety

Standards for Safety

YLCS chillers are designed and built within an EN ISO 9001 accredited design and manufacturing organisation and, within the limits specified in this manual, are in conformity with the essential health and safety requirements of the following European Union Directives:

Machinery Directive (2006/42/EC)

EMC Directive (2004/108/EC)

Safety Code for Mechanical Refrigeration
(EN378-2 (2008))

Refrigeration equipment built at Johnson Controls Nantes conforms to the applicable and essential safety requirements of Pressure Equipment Directive 97/23/EC and bear CE marking.

1.4 Responsibility for Safety

Every care has been taken in the design and manufacture of the units to ensure that they meet the safety requirements listed in the previous paragraph. However, the individual operating or working on any machinery is primarily responsible for:

Personal safety, safety of other personnel, and the machinery.

Correct utilisation of the machinery in accordance with the procedures detailed in the manuals.

1.5 About this Manual

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

A Warning is given in this document to identify a hazard which could lead to personal injury. Usually an instruction will be given, together with a brief explanation and the possible result of ignoring the instruction.

A **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 and the possible result of ignoring the instruction.

A **Note** is used to highlight additional information which may be helpful to you but where there are no special safety implications.

The contents of this manual include suggested best working practices and procedures. These are issued for guidance only, 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 YORK which reserves all rights. They may not be reproduced, in whole or in part, without prior written authorisation from an Authorised YORK representative.

1.6 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 limits 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.

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 with 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 contains 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 electrical equipment without first switching off, isolating and locking-off the power supplies. Work on live equipment must only be carried-out by suitably trained and qualified personnel. No attempt should be made to gain access to inside of the control panel, wiring or other electrical enclosures during normal operation of the unit.

Refrigerants and Oils

Refrigerants and oils used in the unit are generally non-toxic, non-flammable and non-corrosive, and pose no special safety hazards. Use of gloves and safety glasses are, however, recommended when working on the unit. 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. For more comprehensive information on safety precautions for use of refrigerants and oils, refer to the Materials Safety Data tables provided.

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.

1.7 Emergency Shutdown

In case of emergency the common input section of the control panel is fitted with an emergency stop device (QCSD/ESD), this can be identified as red in colour and sited on a yellow back plate. When operated, it removes the 230 Vac supply to the control system. The device can be locked in the 0 (OFF) position using a padlock.

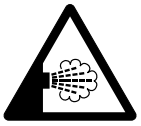
1.8 Safety Labels

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

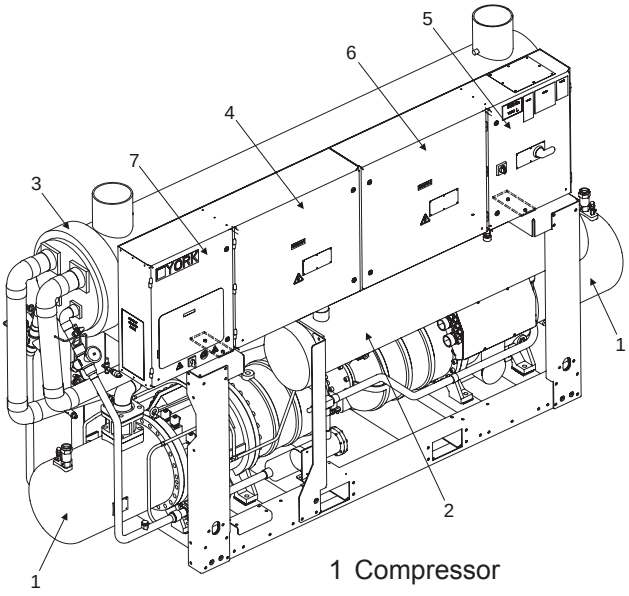
1.9 Material Safety Data

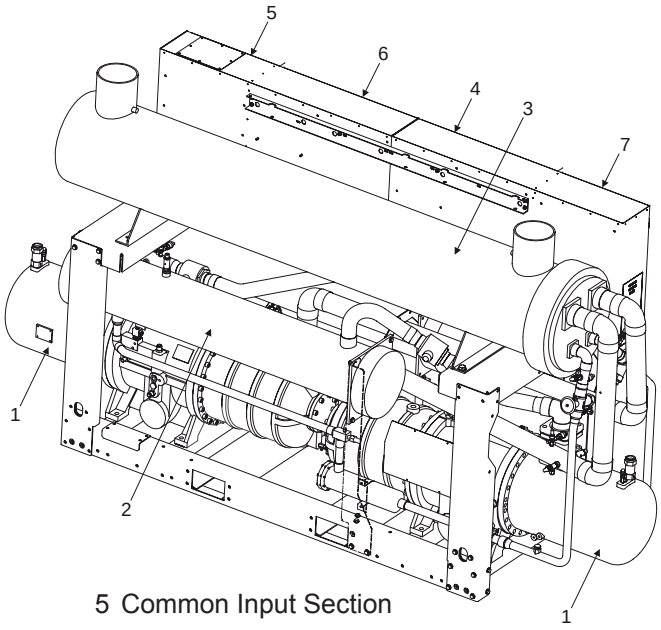
Refrigerant Data:	
Safety Data	**R134a**
Toxicity	Low.
In contact with skin	Liquid splashes or spray may cause freeze burns. Unlikely to be hazardous by skin absorption. Thaw affected areas with water. Remove contaminated clothing carefully — may adhere to skin in case of freeze burns. Wash affected areas with plenty of warm water. If symptoms occur (irritation or blistering) obtain medical attention.
In contact with eyes	Vapour has no effect. Liquid splashes or spray may cause freeze burns. Immediately irrigate with eyewash solution or clean water for at least 10 minutes. Obtain immediate medical attention.
Ingested	Highly unlikely to occur — but should this occur freeze burn will occur. Do not induce vomiting.
	Provided patient is conscious, wash mouth with water and give about 250 ml (0.5 pint) to drink.
	Obtain immediate medical attention.
Inhalation	High atmospheric concentrations may have an anaesthetic effect, including loss of consciousness.
	Very high exposures may cause an abnormal heart rhythm and prove suddenly fatal.
	At higher concentration there is a danger from asphyxiation due to reduced oxygen content of atmosphere. Remove patient to fresh air, keep warm and at rest. Administer oxygen if necessary.
	Apply artificial respiration if breathing has ceased or shows signs of failing. In event of cardiac arrest apply external cardiac massage. Obtain immediate medical attention.
Further medical advice	Symptomatic and supportive therapy is indicated. Cardiac sensitisation has been described which may, in the presence of circulating catecholamines such as adrenalin, give rise to cardiac arrhythmia's and subsequent arrest following exposure to high concentrations.
Long term exposure	A lifetime inhalation study in rats has shown that exposure to 50,000 ppm resulted in benign tumours of the testis. This is not considered to be of relevance to humans exposed to concentrations at or below the occupational exposure limit.
Occupational exposure limits	Recommended limit: 1000 ppm v/v - 8 hr TWA.
Stability	Not specified.
Conditions to avoid	Use in presence of naked flames, red hot surfaces and high moisture levels.
Hazardous reactions	May react violently with sodium, potassium, barium and other alkali and alkaline earth metals. Incompatible materials: Magnesium and alloys containing more then 2% magnesium.
Hazardous decomposition products	Halogen acids by thermal decomposition and hydrolysis.
General precautions	Avoid inhalation of high concentrations of vapours. Atmospheric concentrations should be minimised and kept as low as reasonably practicable below the occupational exposure limit. The vapour is heavier than air and collects at low level and in confined areas. Ventilate by extraction at lowest levels.
Respiratory protection	Where doubt exists on atmospheric concentration, HSE approved breathing apparatus should be worn. This should be self contained or of the long breather type.
Storage	Keep containers dry and in a cool place away from fire risk, direct sunlight, and all sources of heat such as radiators. Keep at temperatures not exceeding 45 °C.
Protective clothing	Wear overalls, impervious gloves and goggles/face protection.

Spill/leak procedure	Ensure suitable personal protective clothing and respiratory protection is worn. Provided it is safe to do so, isolate the source of the leak. Allow small spillage's to evaporate provided there is suitable ventilation.
	Large spillage's: Ventilate area. Contain spillage's with sand, earth or any suitable absorbent material. Prevent liquid from entering drains, sewers, basements and work pits since vapour may create a suffocating atmosphere.
Disposal	Best to recover and recycle. If this is not possible, destruction is to be in an approved facility which is equipped to absorb and neutralise acids and other toxic processing products.
Fire extinguishing data	Non-flammable at atmospheric conditions.
Containers	Fire exposed containers should be kept cool with water sprays. Containers may burst if overheated.
Fire fighting protective equipment	Self contained breathing apparatus and protective clothing must be worn in fire conditions.

Refrigerant Oil Data	
Safety Data	**York "L" Oil**
Classification	Non-hazardous
In contact with skin	Minimally irritating. No first aid necessary. Exercise reasonable personal cleanliness including cleansing exposed skin areas several times daily with soap and water. Launder soiled work clothes at least weekly.
In contact with eyes	Flush eyes with eyewash solution or clean water for 15 minutes and consult a physician.
Ingested	May cause nausea and diahorrhea. Obtain immediate medical attention.
Inhalation	If oil mist is inhaled, remove to fresh air and consult a physician.
Occupational exposure limits	Not determined.
Stability	Stable but hygroscopic - store in sealed containers.
Conditions to avoid	Strong oxidisers, caustic or acid solutions, excessive heat. May degrade some paints and rubber materials.
Hazardous decomposition	Not fully, Analogous compounds evolve carbon monoxide, carbon dioxide and other unidentified fragments when burned. Burning may evolve irritating/noxious fumes.
Respiratory protection	Use in well ventilated areas - ventilate locally.
Protective clothing	Goggles or face shield should be worn. Gloves not necessary, but recommended, especially for prolonged exposure.
Spill / Leak procedure	Wear suitable protective equipment. Especially goggles. Stop source of spill. Use absorbent materials to soak up fluid (i.e. sand, sawdust and commercially available materials).
Disposal	Incinerate the oil and all associated wastes in an approved facility in accordance with local laws and regulations governing oily wastes.
Fire extinguishing data	Flash point over 300°C. Use dry chemical, carbon dioxide or foam. Spraying water on hot or burning liquid may cause frothing or splashing.
	If a leak or spill has not ignited use water spray to disperse the vapours and to provided protection for persons attempting to stop the leak.
Containers	Fire exposed containers should be kept cool with water sprays.
Fire fighting protective equipment	Self contained breathing apparatus should be worn in fire conditions.

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.





1 Compressor
2 Condenser
3 Cooler
4 Power Section - System 1
5 Common Input Section
6 Power Section - System 2
7 Control section

2 PRODUCT DESCRIPTION

2.1 Introduction

York YLCS chillers are designed for water or water-glycol cooling. Models are available in three versions: standard units (SA), units for applications requiring high condensing temperatures (HA) and units for applications where remote condensers are necessary (AA).

All models are designed for indoor installation. The units are completely assembled with all interconnecting refrigerant piping and internal wiring, ready for field installation.

The unit consists of 2 screw compressors with integral oil separators in separate refrigerant circuits, each with a single circuit water cooled condenser (SA & HA models), and a dual circuit shell and tube DX evaporator.

Before delivery, the SA & HA unit is pressure tested, evacuated, and fully charged with refrigerant and oil 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. For AA units, the unit shall be pressure tested, evacuated, and filled with 0.35 bar g pressure of nitrogen per independant circuit. After assembly, a simulated functional test is performed on the unit.

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

2.2 Compressor

Twin helical semi-hermetic screw compressors, are provided to ensure high operational efficiencies and reliable performance. A microprocessor controlled output pressure regulating capacity control valve commands compressor capacity independent of control valve input pressure and balances the compressor capacity with the cooling load. The compressor is a positive displacement type characterised by two helically grooved rotors which are manufactured from forged steel. The 50 Hz motor operates at 2950 rpm to direct drive the male rotor which in turn drives the female rotor on a light film of oil.

Each compressor is direct drive, semi-hermetic, rotary twin screw type with integral oil separator and includes the following items:

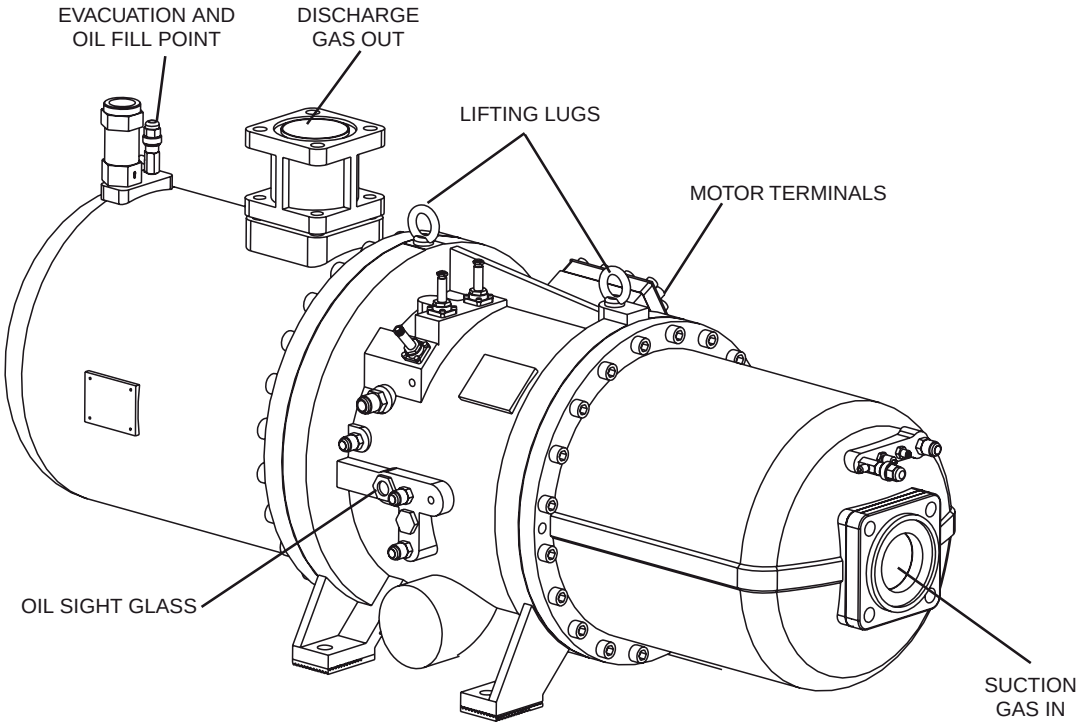
Two screw rotors, with asymmetric profiles, manufactured from forged steel.

A cast iron compressor housing precision machined to provide optimal clearance for the rotors.

An integral discharge check valve to prevent rotor backspin during shutdown.

Discharge shut-off service valves.

A reliable suction gas cooled high efficiency, accessible hermetic motor with overload protection using both thermistor and over current protection.



A suction gas screen and serviceable, 17 micron full flow oil filter within the compressor housing.

Refrigerant gas is injected into the void created by the unmeshing of the five lobed male and seven lobed female rotor. Further meshing of the rotors closes the rotor threads to the suction port and progressively compresses the gas in an axial direction to the discharge port. The gas is compressed in volume and increased in pressure before exiting at a designed volume at the discharge end of the rotor casing. Since the intake and discharge cycles overlap, a resulting smooth flow of gas is maintained.

The rotors are housed in a cast iron compressor housing precision machined to provide optimal clearances for the rotors. Contact between the male and female rotor is primarily rolling on a contact band on each of the rotor's pitch circle. This results in virtually no rotor wear and increased reliability.

The compressor incorporates a complete anti-friction bearing design for reduced power input and increased reliability. Separated, cylindrical, roller bearings handle radial loads. Angular-contact ball bearings handle axial loads. Together they maintain accurate rotor positioning at all pressure ratios, thereby minimising leakage and maintaining efficiency. A spring loaded check valve is installed on the compressor discharge housing to prevent compressor rotor backspin due to system refrigerant pressure gradients during shutdown.

Motor cooling is provided by suction gas from the evaporator flowing across the motor.

The compressor is lubricated by removing oil from the discharged refrigerant gas within the integral oil separator. For HA & AA units liquid injection is provided into discharge rotor for discharge gas and oil cooling. The compressor design working pressure is 28kg/cm².

A 300 watt (230 V 1 Ø 50 Hz) immersion heater is located in the compressor. The heater is temperature activated to prevent refrigerant condensation.

Motor Starting

Two types of compressor motor starting are available: star/delta open transition starter and optional star/delta closed transition starter.

The standard star/delta starter utilises 3 motor contactors and a transition delay relay. The optional closed Star/Delta starter utilises 4 motor contactors, a set of transition resistors and a transition delay relay. The star/delta start allows inrush current to be limited to approximately 33% LRA with the closed transition option reducing the transient star to delta current.

When the microprocessor initiates a start signal to run a compressor, it runs in Star for 4 seconds and then transitions to Delta.

Capacity Control

The loading control range is approximately 30% to 100% per compressor via control steps. The micro controller will adjust compressor loading to balance the cooling load. This will take account of the discharge pressure

and motor current should either approach their limiting value.

The automatic spring return of the capacity control valve to the minimum load position will ensure compressor starting at minimum motor load.

2.3 Refrigerant Circuits

Each refrigerant circuit uses copper refrigerant pipe formed on computer controlled bending machines to reduce the number of brazed joints resulting in a reliable and leak resistant system.

Liquid line components include: a manual shut-off valve with charging port, a high absorption removable core filter-drier, a solenoid valve, a sight glass with moisture indicator, and a thermostatic expansion valve.

Suction lines are covered with closed-cell insulation.

2.4 Condenser (SA and HA Models)

The two single refrigerant circuit water-cooled condensers are cleanable shell and tube type with seamless external finned 19mmODcopper tubes rolled into tube sheets. The design working pressures are 10 bar g on the waterside and 30 bar g on the refrigerant side which is protected by pressure relief valve(s).

The condenser has removable steel water heads. The water connections have standard female threads (refer to Section 9 - dimension drawings for details). Optional extension or manifold kits are available with victualic couplings or flanges.

For AA units water cooled condensers are factory removed. Remote air-cooled condenser supplied by others (field installed).

2.5 Cooler

The 2 pass dual circuit shell and tube type direct expansion (DX) evaporator has chilled liquid circulating back and forth across the tubes from one end to the other. The waterside (shell) design working pressure of the cooler is 10 bar g. The refrigerant side (tubes) design working pressure is 20 bar g on models 0350 to 0670 and 1120 and 24 bar g on models 0750 to 0980. The refrigerant side is protected by pressure relief valve(s).

The evaporator shall have water pass baffles fabricated from non metalic composite materials (0335 to 0750) and corrosion resistant galvanised steel (0860 to 1120). 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.

Models 0335 to 0750 have vertical water nozzles (standard) with victualic couplings (shipped loose) for field installation by contractor. Horizontal water nozzles with victaulic couplings (shipped loose) are available as an option.

Models 0860 and 1120 have horizontal water nozzles with victaulic grooves (victaulic couplings to be supplied by others).

Optional ISO EN1092-1 type 01.A welded flanges and companion flanges, complete with nuts, bolts and gaskets are available on all models.

2.6 Power and Control Panels

All controls and motor starting equipment are factory wired and function tested. The panel enclosures are designed to IP42 and are manufactured from powder painted galvanised steel. Component mounting panels are of non-painted galvanised steel to ensure effective earthing protection.

The panel is divided into power sections for each electrical system, a control section and a common input section. Power entry is from the top of the control panel common input section. Each section has separate hinged, latched, and gasket sealed doors.

Each power section contains:

Compressor fuses, compressor contactors, phase rotation relay, compressor motor current transformer and a control circuit fuse.

The control section contains:

On/Off switch, microcomputer keypad and display, microprocessor board (AMB), power supply board (APB) and relay board (ARB).

The common input section contains:

An incoming non-fused disconnect switch for connection of the customer provided single power supply. Internal factory wiring to two fused protected power sections. The control supply is derived internally. (Refer to «Electrical Connection Options» for details).

The common input section also contains the control circuit switch disconnect/emergency stop device, a transformer (to provide the necessary 24 Vac supply for the power supply board), control fuses, residual current circuit breaker, and terminals for a remote emergency stop device.

2.7 Microprocessor Controls

The microprocessor has the following functions and displays:

A liquid crystal 40 character display with text provided on two lines and light emitting diode backlighting for outdoor viewing.

A colour coded, 35 button, sealed keypad with sections for Display, Entry, Setpoints, Clock, Print, Program and the unit Auto/Off switch.

The standard functions include: water or glycol cooling, automatic pump down after shutdown, run signal contact, demand load limiting from external building automation system input, remote reset liquid temperature reset input, unit alarm contacts, chilled liquid pump control, automatic or manual reset after power failure, automatic system optimisation to match operating conditions.

The software is stored in non-volatile memory (EPROM) to eliminate unit failure due to AC power failure. The programmed setpoint is stored in a lithium battery backed memory.

2.8 Motor Current Protection

The microprocessor motor protection provides high current protection to assure that the motor is not damaged due to voltage, excess refrigerant, or other problems that could cause excessive motor current.

If the motor current exceeds the 115% FLA trip point after 9 seconds of operation, or is above 105% for 30 seconds, the microprocessor will shut the system down and lock it out after three faults occur in 90 minutes. A manual reset of the respective system switch is required to clear the fault and restart the system after a lockout. A thorough check of the motor, wiring, and refrigerant system should be carried out before restarting a system that has faulted on high motor current.

The microprocessor also provides low motor current protection when it senses a motor current less than 15% FLA. Low motor current protection is activated 9 seconds after start. The microprocessor will shut the system down whenever low motor current is sensed and will lock out a system if three faults occur in 90 minutes. Once a system is locked out on Low Motor Current, it must be manually reset with the system switch.

The microprocessor also senses low motor current whenever a High Pressure Cut-out (HPCO) or Motor Protector (MP) or Phase Rotation Relay (KPR) contact opens. The MP, HPCO and KPR contacts are connected in series with the motor contactor. Whenever any of these devices are open, the contactor de-energises and the motor shuts down. Since the microprocessor is sending a run signal to the contactor, it senses the low motor current below 15% FLA and shuts the system down.

Motor Protector Module

The motor protector module provides thermal overload protection.

Three thermistors in the motor windings of each phase provide thermal protection. If the motor temperature rise above 110°C the motor protector module contact will open. The contact will re-close at 75°C.

Phase Rotation relay (KPR)

Each power section is fitted with a phase rotating relay to monitors the 3 phase voltage. Provided the phase rotation is correct the relay will close its contact in the compressor contactor circuit.

2.9 Keypad Controls

For a detailed description of the keypad controls refer to the Microprocessor Based Control System Operating Instructions.

Status Key

This key provides a display of the current operational and/or fault status of the unit or the individual refrigerant systems. The display will show the ‘highest priority" information as determined by the microprocessor.

The main categories of messages are: General Status Messages; Unit Warnings; Anticipation Control Status Messages; Chiller Fault Status Messages; System Fault Status Messages.

Display Keys

Each key provides a real-time display of commonly required information about the chiller and individual refrigerant system operating conditions and settings. This is particularly useful during commissioning, monitoring the operation of the chiller, diagnosing potential future problems and service troubleshooting. Parameters may be displayed in Imperial (°F and PSIG) or Metric (°C and Bar) units.

Print Keys

These keys allow control panel display or remote printout of both current real-time operating and programmed data as well as fault history data from the most recent three safety shutdowns.

Printouts are via the RS232 port and a separate printer.

Entry Keys

The numeric and associated keys are used for entering data required for programming the chiller. The 'ENTER" key is also used for scrolling through information available after pressing other keys.

Setpoints Keys

These keys are used for display and programming of the local and remote offset chilled liquid temperature setpoints.

Clock Keys

These keys are used for display and programming of the clock and operating schedule for the chiller.

Temperature Offset

Pulse width modulating (PWM) input is provided to remotely adjust the leaving chilled water temperature setpoint to a higher value.

Program Key

This key is used for display and programming of the chiller operational settings and limits.

2.10 Accessories and Options

Power Supply Connection

Units are available with either single point or multi point power supply connections:

Single Point - System Fused Disconnect Switches

A non-fused disconnect switch in the common input section of the panel for connection of the customer provided single power supply. Internal factory wiring to two door interlocked fused disconnect switches mounted in the power sections. The control supply is derived internally from the terminal block.

Single Point - System Circuit Breakers
(Not available on the YLCS0955, 1050, 110 HA & AA)

A terminal block in the common input section of the panel for connection of the customer provided single power supply. Internal factory wiring to two door interlocked circuit breakers, mounted in the power sections. The control supply is derived internally from the terminal block.

Multi-Point - System Circuit Breakers

Two door interlocked circuit breakers, mounted in the power sections, for connection of the customer provided power supplies. A non-fused disconnect switch / emergency stop device (QCSD/ESD) in the common input section with termination for the customer (400 V, 2 Ø, 50 Hz) control supply.

Building Automation System (BAS) / EMS Interface

Provides a means to reset the leaving chilled liquid temperature and from the BAS / EMS (Factory Mounted):

Printed circuit board to accept 4 to 20 mA, 0 to 10 Vdc, or dry contact closure input from the BAS / EMS.

A YORK ISN Building Automation System can provide a Pulse Width Modulated (PWM) signal direct to the standard control panel via the standard on-board RS485 port.

E-Link Gateway

Interface to enable communication with building control systems using BACnet, MODBUS, LON or N2 protocols. See separate York documentation.

Anti-Vibration Mounts

Optional 25mm deflection, open spring, anti-vibration mounts with levelling screw. Supplied loose for field installation.

Optional floor mounting kit with 25 mm neoprene pads. Supplied loose for field installation.

Power Factor Correction:

Factory mounted passive (static) correction capacitors to correct unit compressor power factors to 0.95 (depending on operating conditions).

Flow Switch

Switch with 1 inch BSP thread suitable for 10 barg DWP and having gold contacts for low voltage/current, to protect unit from loss of water flow. Supplied loose for field installation,

or

Factory fitted pressure differential switch on cooler.

Suction Shut-off Valves

A ball valve in the low pressure (suction) pipework per refrigerant circuit for isolation.

Evaporator Kits

Models 0350 to 0750, horizontal water nozzles with victaulic couplings (shipped loose), vertical nozzle cooler with EN1092-1 Type 01.A welded/companion flange kit, or horizontal nozzle cooler with EN1092-1 Type 01.A welded/companion flange kit. Models 0860 to 1120, ISO EN1092-1 Type 01.A welded/companion flange kit for standard horizontal nozzle cooler (**Note:** vertical nozzle coolers are not available).

Low temperature Evaporator Kits

Low temperature evaporator configurations are identical to the standard or options detailed above.

Pressure Relief Valves Options

- Pressure Relief (CE/PED) Serviceable Valve & Dual Kit.
  High & Low side vessels' dual relief valves fitted with 3 way changeover valves and compressors' single relief valves fitted with ball valves, to assist valve replacement during maintenance without loss of refrigerant charge.
- Pressure Relief (CE/PED) Serviceable Valve & Dual Kit & Burst.
  High & Low side vessels' dual relief valves fitted with bursting disks and 3 way changeover valves and compressors' single relief valves fitted with bursting disks and ball valves, to assist valve replacement during maintenance without loss of refrigerant charge.

Dual Pressure Switch

Dual HP pressure cut-outs on both circuits.

Heat Pump Sensor Kit:

Capability of controlling condenser water off for heat pump applications.

Closed Transition Star/Delta

With the addition of closed transition contactors and resistors, the change over spike during starting can be reduced to nearer the star inrush level thus reducing the risk of electrical interference during compressor start.

Mechanical Gauge Kit

Factory fitted mechanical gauges for display of suction and discharge pressures, one complete set per system.

Double Thickness Insulation

The cooler is covered with 38 mm (1 ½ inch) flexible, UV-stable colour co-ordinated closed-cell, foam insulation to prevent sweating in humid environment.

Condenser extension / Manifold kits

Condenser extension kit simplifies connections to customer pipework. Both options come with either Victaulic coupling or welded Flange/companion flange kit.

IP54

Panel enclosure designed to IP54.

Language LCD and Keypad

Standard display language and keypad is English. French, German, Italian, Spanish, Portugese and Hungarian are available as options.

Sequence Controller:

Monitors mixed leaving chilled water or glycol temperature from two to four units and controls to maintain required mixed temperature whilst running the minimum number of units.

Printer

Hand held printer for obtaining printout of unit operating data and history data.

Paint Overspray

Complete unit finish in Carribean Blue.

Lifting Lug Kit

One set of ISO Mk5 cam locks to enable safe and easy unit handling.

Factory Witness Test:

To perform a customer functional witness test of cooling capacity only, test is carried out in factory test area.

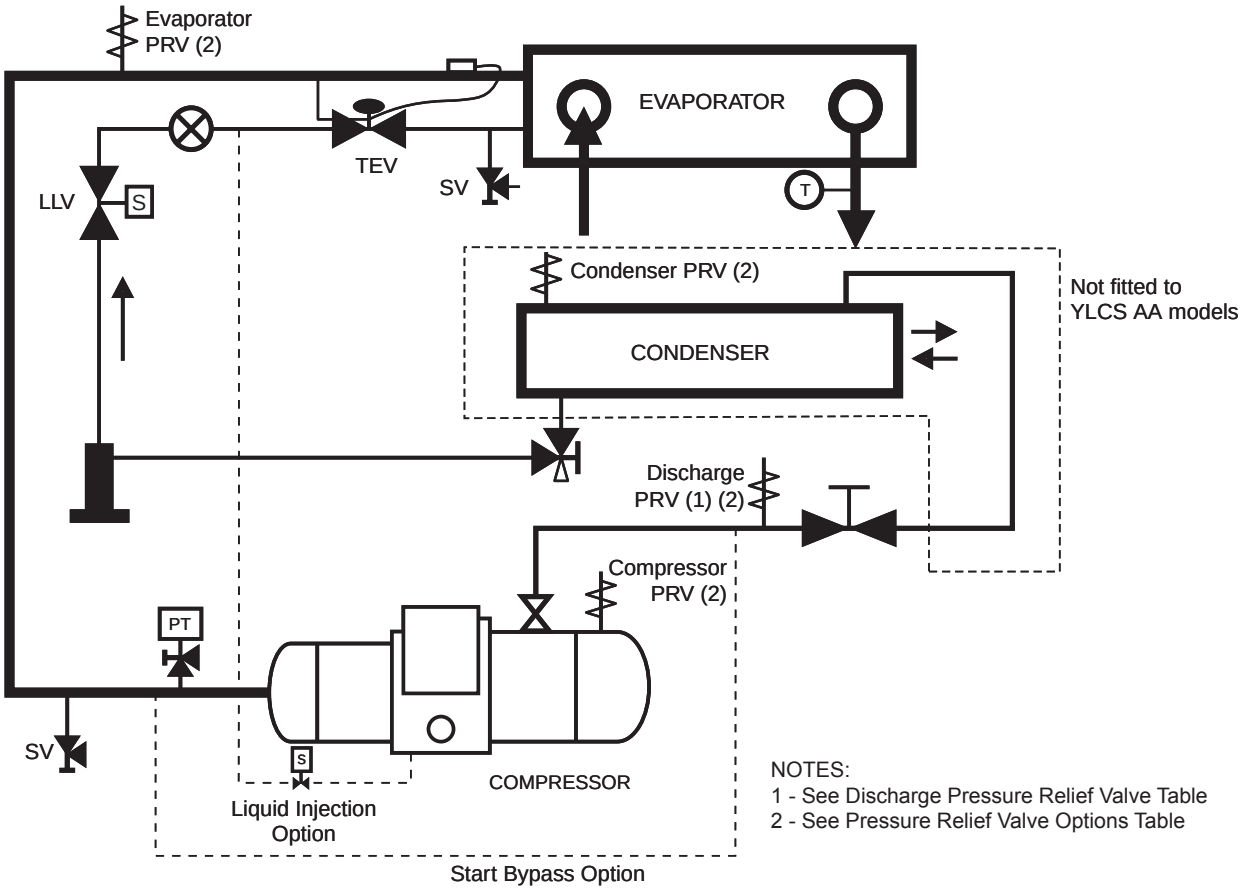
2.11 Nomenclature

YLCS0350SA50YAA

1 2 3 4	5 6 7 8	9	10	11 12 13	14 15
BASE PRODUCT TYPE	MODEL NUMBER	UNIT DESIGNATOR	REFRIGERANT	VOLTAGE / STARTER	DESIGN / DEVELOPMENT LEVEL
Y : York	# # # # kW	S : Standard Unit	A : R-134a	5 0	A : Design Series A
L : Liquid	:0350 :0415 :0480 :0530 :0575	H : High Condensing Temperature		Y : 380-415 / 3 / 50 Star Delta	A : Engineering Change or PIN Level
C : Chiller	:0620 :0660 :0725 :0840 :0955	A : Remote Condensor			
S : Screw	:1050 :1110				

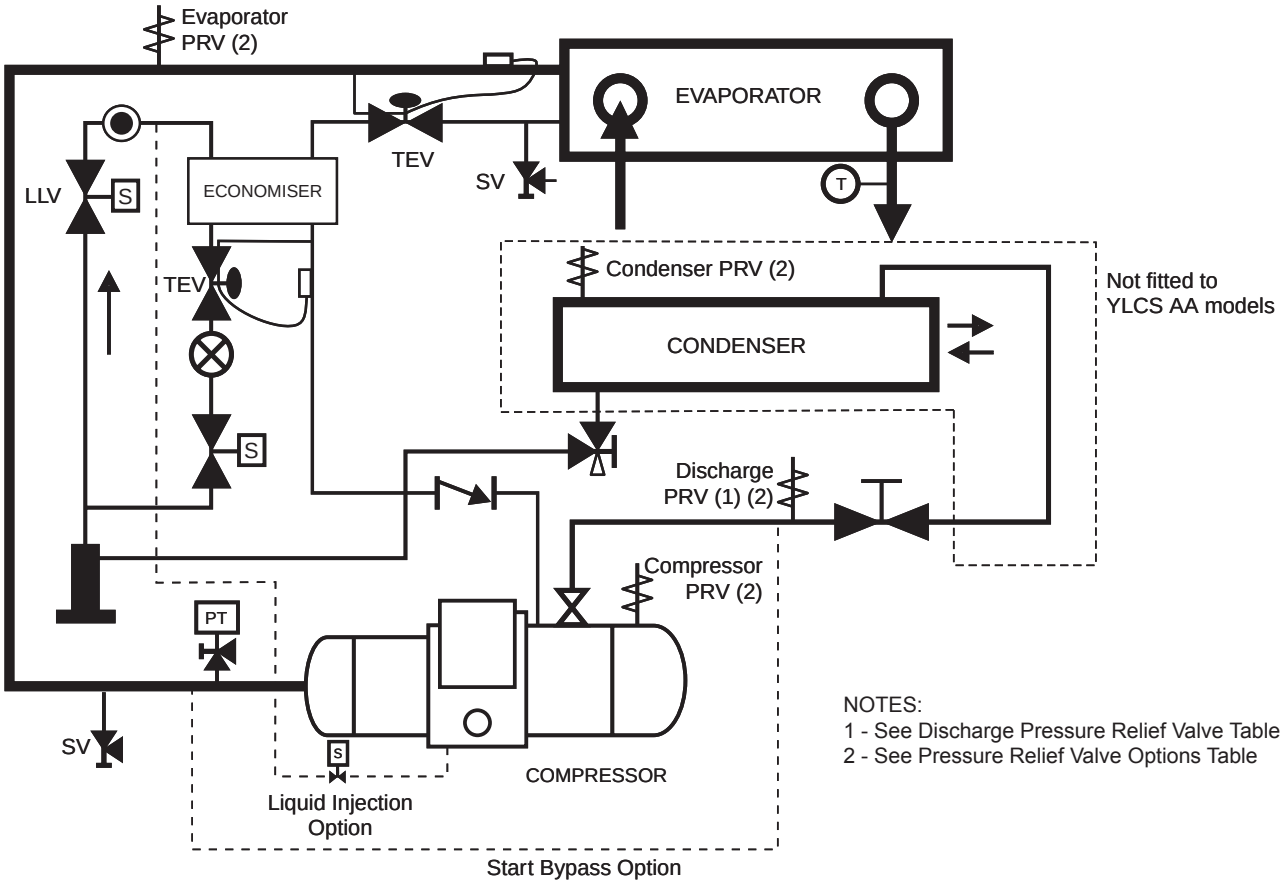
2.12 Functional Description

YLCS Models 0350 to 0620



NOTES:
1 - See Discharge Pressure Relief Valve Table
2 - See Pressure Relief Valve Options Table

YLCS Models 0670 to 1120



YLCS SA & HA

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. High pressure vapour is passed through the oil separator in the compressor where compressor oil is removed and reticulated to the compressor. High pressure superheated refrigerant enters the condenser shell where heat is rejected to the condenser water passing through the tubes. The fully condensed and subcooled liquid leaves the condenser and enters the expansion valve, where pressure reduction and further cooling takes place. The low pressure liquid refrigerant then returns to the cooler.

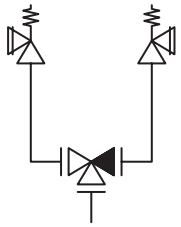
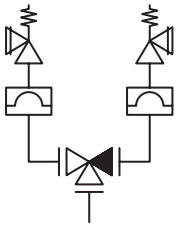
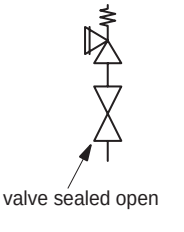
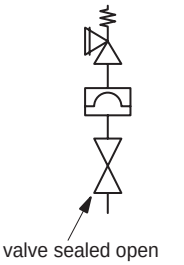
YLCS AA (remote air cooled condenser)

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. High pressure vapour is passed through the oil separator in the compressor where compressor oil is removed and reticulated to the compressor. 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 condenser and enters the expansion valve, where pressure reduction and further cooling takes place. The low pressure liquid refrigerant then returns to the cooler.

Discharge Pressure Relief Valves

Model	SA		HA & AA	
	System **1**	System **2**	System **1**	System **2**
0350	No Valve	No Valve	No Valve	No Valve
0415	Valve	No Valve	No Valve	No Valve
0480	Valve	Valve	No Valve	No Valve
0530	Valve	Valve	No Valve	No Valve
0575	Valve	Valve	No Valve	No Valve
0620	Valve	Valve	No Valve	No Valve
0670	Valve	Valve	No Valve	No Valve
0750	Valve	Valve	No Valve	No Valve
0860	Valve	Valve	Valve	No Valve
0980	Valve	Valve	Valve	Valve
1120	Valve	Valve	Valve	Valve

Pressure Relief Valve Options

	Pressure Relief (CE/PED) Serviceable Valve	
	with Dual Kit	**with Dual Kit and Burst**
Vessels		
Compressors & Discharge		

3 TRANSPORTATION, HANDLING AND STORAGE

3.1 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 refrigerant under pressure. Units are shipped without export crating unless this has been specified on the Sales Order.

If the unit is to be put into storage, before 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 below 4°C or above 46°C.

The unit should be stored in a location where there is minimal activity 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.

3.2 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 shipment documentation and a claim entered according to the instructions given.

Major damage must be reported immediately to your local York representative.

3.3 Moving the Unit

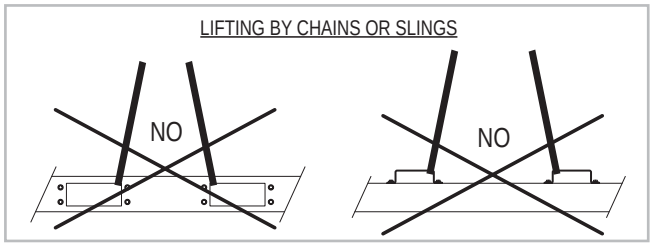
Before moving the unit, ensure that the installation site is suitable for installing the unit and is capable of supporting the weight of the unit and all associated services.

The units are designed to be lifted using either lifting chains or a fork lift.

Lifting by Crane/Hoist

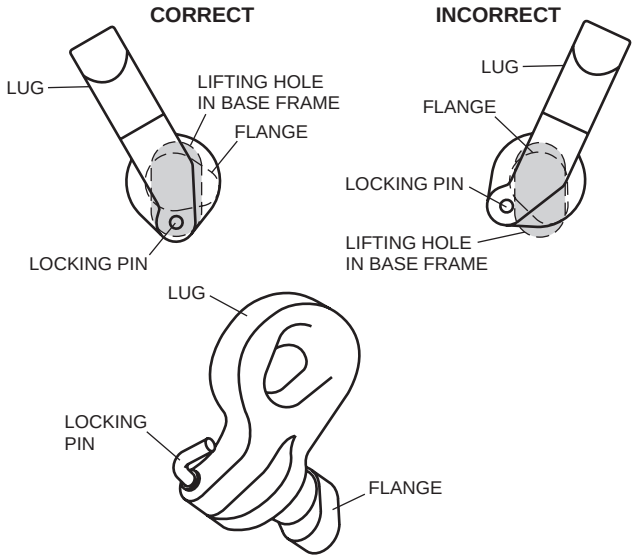
Attach the lifting chains to the lifting lugs on each corner of the unit framework. A spreader frame should be used to prevent damage to the unit from the lifting chains.

The unit must only be lifted at the points provided.



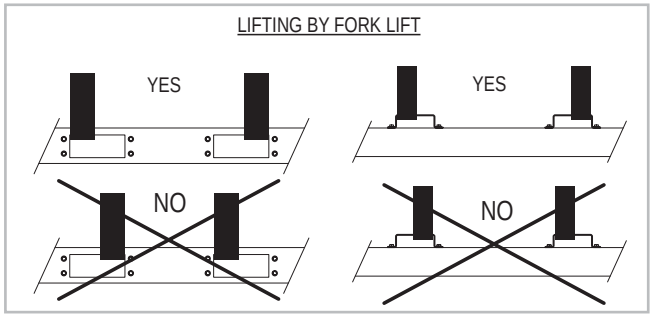
Units are provided with four lifting holes in the base frame which accept the accessory lifting lug set (part number 026L00261-000).

The four lugs (2 x RH and 2 x LH) should be inserted into the respective holes in the base frame and turned so that the spring loaded pin engages into the hole and the flanges on the lug lock behind the hole. The lugs should be attached to the cables/chains using shackles or safety hooks.



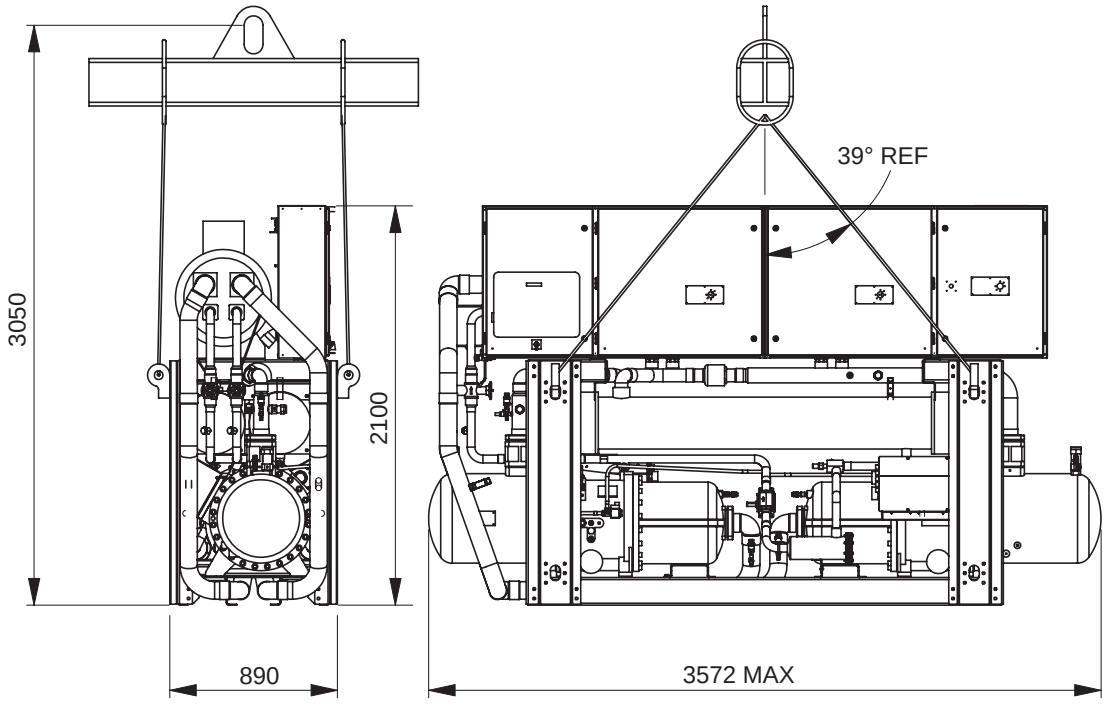
Lifting by Fork lift

Insert the forks into the lifting slots in the base frame. The forks must pass through the lifting slots on both sides of the unit to prevent damage.

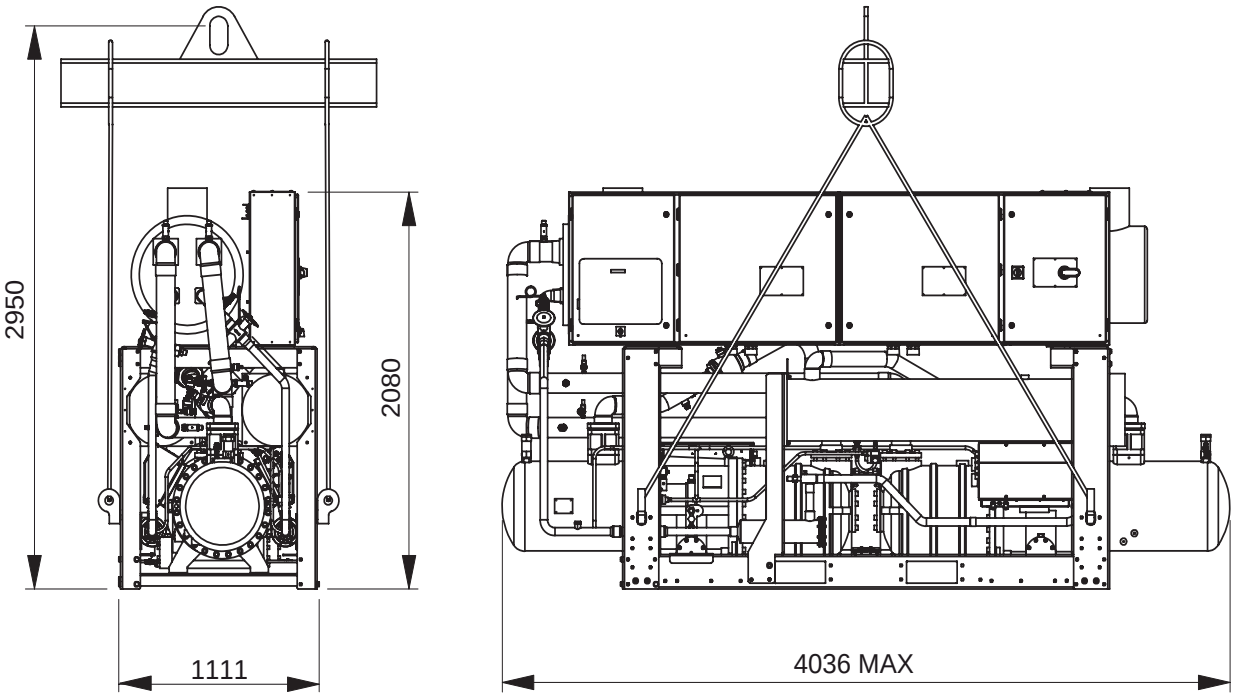


3.4 Lifting Weights

For details of weights and weight distribution refer to Section 9.



YLCS 0350 - 0670



YLCS 0750 - 1120

4 INSTALLATION

4.1 Location Requirements

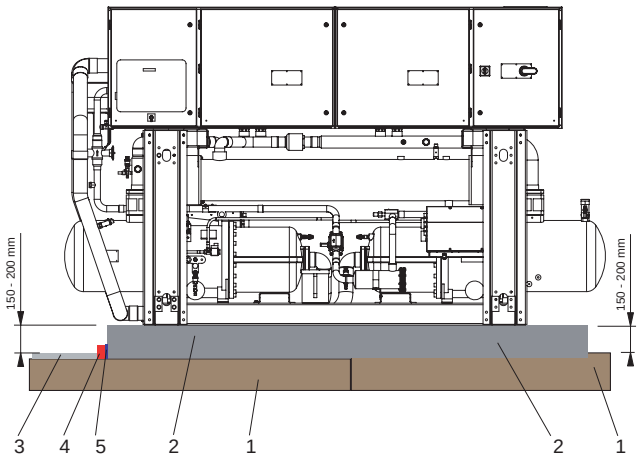
To achieve optimum performance and trouble-free service, it is essential that the proposed installation site meets with the location and space requirements for the model being installed. For dimensions, weight and space requirements, including service access details, refer to Section 9.

NOTE

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 Section 9.

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 unit must be installed on a suitable flat and level concrete base (2) that extends to fully support the unit base frame. If a sound enclosure is required the concrete base must be extended to support the enclosure.

On basement foundations remove a portion of the basement floor (3) so that a concrete base can be poured resting on the ground (1) , with a corkboard (4) installed on both sides, and a waterproof sealing compound (5).

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 14 mm Ø holes. When lower transmitted vibration levels are required optional anti-vibration isolators can be supplied loose for site installation.

4.2 Installation of Vibration Isolators

An optional set of spring type vibration isolators can be supplied loose with each unit (refer to Section 9 for details). Identify each mount and its correct location on the unit. Install and adjust the mounts in accordance with Section 9.

4.3 Pipework Connection

General Requirements

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.

CAUTION

The maximum flow rate and pressure drop for the cooler and condenser must not be exceeded at any time. Refer to Section 9 for details.

- The water must enter the heat exchanger(s) by the inlet connection. Refer to Section 9 for details.
- A flow switch must be installed in the customer pipework at the outlet of the exchangers as shown in the arrangement diagrams, and wired back to the control panel using screened cable. For details refer to "Electrical Connection". This is to prevent damage to the exchanges caused inadequate liquid flow.

NOTE

The flow switch used must have gold plated contacts for low voltage/current operation. Paddle type flow switches suitable for 10 barg working pressure and having a 1» BSP connection can be obtained from York as an option for the unit.

- The liquid pump(s) installed in the pipework system(s) should discharge directly into the unit heat exchanger section of the system. The pump(s) require an auto-starter (by others) to be wired to the control panel. For details refer to "Electrical Connection".

- Pipework and fittings must be separately supported to prevent any loading on the heat exchanger(s). Flexible connections are recommended which wi l l also minimise 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 exchangers should be readily de-mountable to enable cleaning prior to operation, and to facilitate visual inspection of the exchanger nozzles.

- Each heat exchanger must be protected by a strainer, preferably of 40 mesh, fitted as close as possible to the liquid inlet connection, and provided with a means of local isolation.

- The heat exchanger(s) must not be exposed to flushing velocities or debris released during flushing. It is recommended that a suitably sized by-pass and valve arrangement is 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 each 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 pump(s) 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.

Heater tape of 21 watts per metre under the insulation is recommended, supplied independently and controlled by an ambient temperature thermostat set to switch on at 3°C above the freezing temperature of the liquid.

Any debris left in the water pipework between the strainer and heat exchanger could cause serious damage to the tubes in the heat exchanger and must be avoided. The installer/ user must also ensure that the quality of the water in circulation is adequate, without any dissolved gasses which can cause oxidation of steel parts within the heat exchanger(s).

4.4 Water Treatment

The unit performance given in the Design Guide is based on a fouling factor of 0.044 m² °C/kW (0.00025 ft²hr °F/Btu). 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 system(s). York recommend that a water treatment specialist is 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.

Glycol Solutions

For unit operation with chilled liquid temperatures leaving the cooler at below 4.5°C, glycol solutions should be used to help prevent freezing. Section 9, 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.

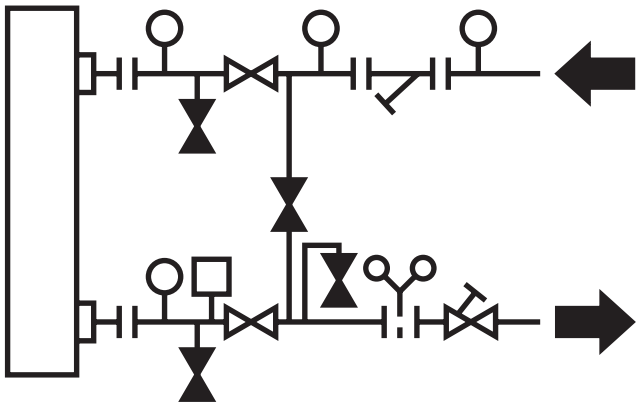
When using glycol solutions, pressure drops are higher than with water. Special care must be taken not to exceed the maximum pressure drop allowed.

4.5 Pipework Arrangement

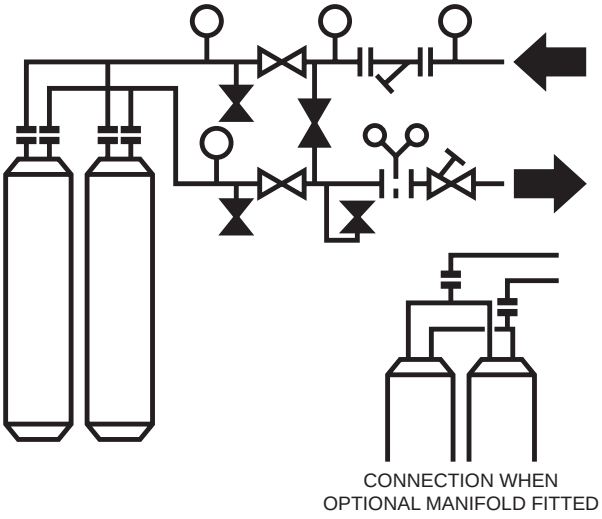
The following are suggested pipework arrangements for single unit installations. For multiple unit installations, each unit should be piped as shown.

Recommendations of the Building Services Research Association

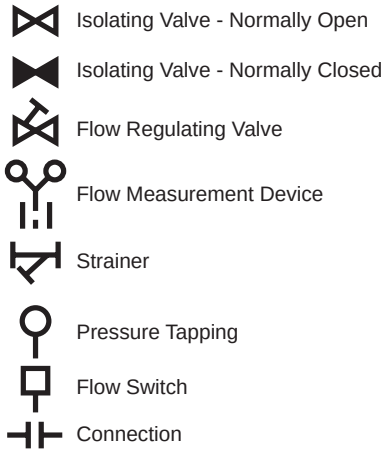
Chilled Liquid System



Condenser Cooling Liquid System (SA & HA Models)



Pipework Arrangement Legend



4.6 Connection Types & Sizes

For connection sizes relevant to individual models refer to Section 9.

4.7 Refrigerant Relief Valve Piping

The compressor, cooler and condenser are each 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 is given by the following formula:

$$D^5 = C \times L$$

Where:

D = minimum pipe internal diameter in centimetres

L = length of pipe in metres. C = value in table below

	Inlet / Outlet	C
Vessels	1/2" - 5/8"	9,4
Compressor	1/2" - 1/2"	24
	1" - 1"	136
	1" - 1" 1/2	288
	DN 20 - DN 25	193
	DN 25 - DN 32	477
	DN 32 - DN 40	1037

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.

4.8 Condenser Cooling Liquid Systems

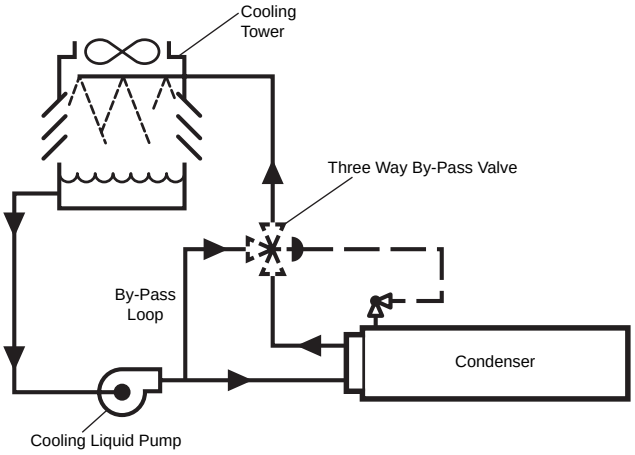
For primary cooling of units, condensers are usually piped in conjunction with a cooling tower, although in some cases they can be cooled by well water.

With liquid cooled units it is necessary to control coolant flow and / or temperature into the condenser to maintain refrigerant pressure as constant as possible to ensure satisfactory operation of the expansion valves and oil cooling.

Direct Pressure Control (By others)

With YLCS units it is possible, if desired, to control the condenser cooling liquid inlet temperature / flow directly from the unit refrigerant pressure.

The refrigerant pressure can either be used to control cooling tower effectiveness by controlling fans or dampers on the tower, or to control condenser flow using a three way bypass valve.



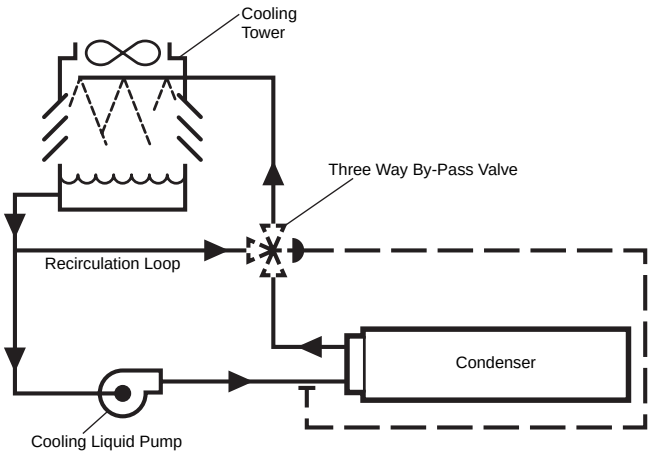
The aim is to maintain a stable discharge pressure as low as possible, but at least 5.2 bar above suction pressure. This can be done at a fixed value above the highest expected suction pressure, or by also measuring suction pressure and using differential control. In either case condenser cooling liquid flow and temperature limits must also be observed.

Remote monitoring of system pressures requires a building management interface option, configured according to the installation.

Outlet Temperature Control (By others)

For a cooling tower system the simplest forms of control are to use fan cycling, fan speed control, or air damper control, with the tower having a thermostat in its sump. This will ensure stable condenser cooling liquid temperature sensing at design conditions and should be adjusted to ensure a condenser cooling liquid leaving temperature of not lower than 30°C at lower ambient conditions.

If these methods are not available, or a cooling tower is not the source of cooling water, then a three way valve recirculation system can be used with control based on condenser outlet liquid temperature. In this case the objective is to maintain the inlet cooling liquid temperature as low as possible, although still observing the minimum limit of 30°C.



Variable speed condenser water pump(s) may be used to control the condensing condition by varying the liquid flow from either the Direct Pressure or Outlet Temperature control method.

4.9 Remote Refrigerant Condenser Systems

General

For cooling of AA units, condensers are usually of the remote air-cooled type either roof or ground level mounted. Refrigerant systems should be designed and installed by suitably qualified persons in compliance with relevant national codes and standards. The complete pipework system and condenser **MUST** have a Design Working Pressure of at least 27.6 barg.

Suitable controls (e.g. fan cycling) should be included to keep discharge pressure within the unit operational limits and at least 4.0 bar above suction pressure.

The condenser should be designed to provide sufficient subcooling at its outlet to ensure that no ‘flashing" will occur in the liquid line to the unit, or in the filter/drier and liquid valves on the unit itself. Liquid subcooling should be 4°C to 10°C on arrival at the unit.

On YLCS AA systems it is important to ensure that for each system the remote condenser and liquid line volume is at least 1.65 times the liquid volume of the operating refrigerant charge.

When the unit has been located in its final position, the refrigerant system pipework can be connected. Pipework and fittings **MUST** be separately supported and not cause any loading on the unit. Flexible connections are recommended and will also minimise 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 operation.

Pipework Design

The following notes give guidance but should not be considered exhaustive:

- Discharge lines MUST be sized for guaranteed oil transfer at minimum load step on the compressor. P-traps and double risers may be required when the condenser is sighted above the unit. Horizontal runs should be inclined slightly towards the condenser to aid oil transfer.

- Where the condenser is above or level with the unit, the discharge line should rise to at least the top edge of the condenser at some point. This will prevent liquid draining back to the compressor during the off cycle.

- Elbows, bends and valves should be minimised to reduce pressure drop and prevent loss of performance. The liquid line in particular should be designed for minimum pressure drop to avoid ‘flashing" in the liquid line which will cause loss of performance and fault conditions to occur. Particular care should be taken where the condenser is below or level with the unit.

- To avoid the risk of discharge gas pulsation’s causing undesired noise within the building, a suitably sized discharge gas muffler may be fitted in the discharge line near the unit. A slight loss of performance may, however, result at full load.

Incorrectly or badly designed and/or installed pipework systems may invalidate unit warranty.

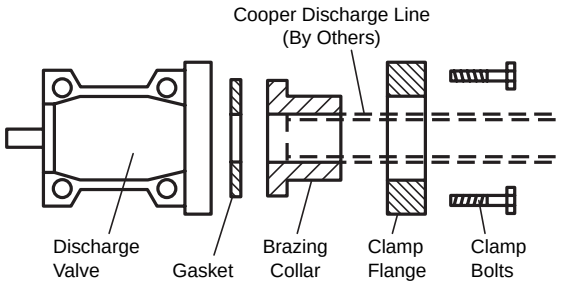
Refrigerant Connections

Units are supplied with a nitrogen holding charge. This should be relieved carefully via the compressor suction service valve connections and the liquid line stop valve service connection.

Discharge Line

Each discharge line is brazed capped at the factory. Remove cap to install discharge line to remote air-cooled condenser. Refer to AA unit dimension in section 9 for pipe sizes. Remove the clamp bolts on the compressor discharge service valve and slide the flange over the discharge line pipe. Remove the brazing collar careful from the gasket and braze to the discharge line. Oil the gasket with appropriate refrigerant oil and reassemble the joint.

On units fitted with a Starting Bypass Line or Loadminder Hot Gas Injection Line, a short length of discharge line may already be fitted to the valve. In this case simply cut the blank from the end of the line and make an appropriate swage joint.



Liquid Lines

On AA units the liquid line connection is made at the liquid line service valve. Pipework can be brazed directly onto the valve taking care to protect the valve from excess heat which may cause distortion. Refer to AAunit dimension diagrams in section 9 for pipe sizes.

System Testing

All newly installed pipework must be pressure/leak tested to national code requirements (normally 1.1 x Design Working Pressure) then fully evacuated before charging. Refer to the Section 5 for correct charging methods.

4.10 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.

After connection do not switch on mains power to the unit until it has been commissioned by York Authorised personnel. Some internal components are live when mains is switched on.

The unit ON/OFF switch on the front of the control panel has been set in the "OFF" position at the factory.

This switch MUST remain in the "OFF" position until the unit is commissioned by York Authorised personnel. If the switch is set to the "ON" position before commissioning then it must be reported to York, otherwise the warranty may be invalidated.

4.11 Power Wiring

The units are suitable for 380 or 400 V, 3 phase, 50 Hz nominal supplies only.
Minimum allowable 360 V.
Maximum allowable 440 V.

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

In accordance with EN 60204 it is the responsibility of the user to install overcurrent 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 metal gland plate the cables forming each 3 phase power supply must enter via the same hole in the gland plate. If separate entries for each cable forming the 3 phase supplies are used, the metal gland plate must be replaced by a non-metallic gland plate, with due regard given to sealing the panel to IP42.

All sources of supply to the unit must be taken via acommonpoints of isolation (not supplied by York).

Units with Standard Single Point Power Supply Wiring - Non Fused Disconnect Switch (Internal power distribution to fuses)

Models require one field provided 400V 3Ø, 50HZ + PE supply to the unit with circuit protection.

The cable should enter the common input section through the gland plate on the top of the section.

Connect the 3 phase supply to the non-fused disconnect switch located in the common input section, refer to section 9 for connection size/details.

Connect the earth wire (PE) to the main protective earth terminal located in the common input section using a M10 lug.

Units with Single Point Power Supply Wiring - Non Fused Disconnect Switch (Option) (Internal power distribution to fused disconnect switches)

Models require one field provided 400V 3Ø, 50HZ + PE supply to the unit with circuit protection.

The cable should enter the common input section through the gland plate on the top of the section.

Connect the 3 phase supply to the non-fused disconnect switch located in the common input section, refer to section 9 for connection size/details.

Connect the earth wire (PE) to the main protective earth terminal located in the common input section using a M10 lug.

Units with Single Point Power Supply Wiring - Input Terminal Block (Option) (Internal power distribution to circuit breakers)
(Not available on YLCS0955, 1050, 1110 HH & AA)

Models require one field provided 400V 3Ø, 50HZ + PE supply to the unit with circuit protection.

The cable should enter the common input section through the gland plate on the top of the section.

Connect the 3 phase supply to the input terminal block located in the common input section, refer to section 9 for connection size/details.

Connect the earth wire (PE) to the main protective earth terminal located in the common input section using a M10 lug.

Units with Multi Point Power Supply Wiring - Circuit Breakers (Option)

Models require two field provided 400V 3Ø, 50HZ + PE supplies to the two input terminal blocks located in the common input section , refer to section 9 for connection size/details. The two sets of three supply cables should enter via the gland plate in the top of the common input power section.

Connect each of the earth wires (PE) to the main protective earth terminals in the common input power section using M10 lugs.

Connect the 2 phase control supply to the non-fused disconnect switch / emergency stop device (QCSD/ESD) located in the common input section, refer to section 9 for connection size/details.

Connect the control supply earth wire to the main protective earth terminals in the common input power section using M4 lugs.

4.12 Output Signals

All wiring to the voltage free contact terminal block on the relay board 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 York.

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 York voltage free contacts are rated at 125 VA.

All inductive devices (relays) switched by the York 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 33 and 34 close to start chilled liquid pump. This contact can be used as a master start/stop for the pump in conjunction with the daily start/stop schedule. If no schedule is set and the customer has master control of the pump, the contact must be used so that the contact can start the pump in the event of a low temperate liquid condition.

Run Contact

Terminals 35 and 36 close to indicate that a system is running.

Alarm Contacts

Each refrigerant system has a voltage-free change over contact which will operate to signal an alarm condition whenever a system locks out, or there is a power failure. To obtain system alarm signal, connect the alarm circuit to volt free terminals 30 and 32 (open on alarm) or 31 and 32 (close on alarm) for No. 1 system and volt free terminals 37 and 39 (open on alarm) or 38 and 39 (close on alarm) for No. 2 system.

4.13 System Inputs

All wiring to the relay board input signal 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 cables should be routed via the gland plate in the bottom of the common input section.

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 10 to provide adequate protection against loss of liquid flow.

Remote Start/Stop

Remote start/stop can be accomplished using a time clock, manual contact or other ‘voltage free" contact, terminals 11 and 14 with terminals 14 and 15 linked in the control section of the control panel. The contact must be closed to allow the unit to run. Any time the contact opens, the unit will shutdown and the ‘NO RUN PERM" message will be displayed.

For individual system start/stop contacts connect No. 1 system to terminals 11 and 14 and No. 2 system to terminals 12 and 15. With the associated contact open the ‘NO RUN PERM" message will be displayed and the associated systems will not run.

Remote Set Point Offset - Temperature

Timed closure of suitable contacts connected to terminals 13 and 17 (PWM contacts) will give remote offset function of the chilled liquid set point if required.

Remote Unloading (not available when Remote Setpoint Reset is used)

The microprocessor is capable of remote unloading or Pull-down demand limiting in two steps:

The first contact imposes a maximum load step of two on the lag system. The second step imposes a maximum load of two steps on the lead system. For the first step of unloading a voltage free contact can be fitted to terminals 16 & 13 for the second step to 13 & 17.

The following two cautions should be observed when using these functions to assure that undesirable operation does not result.

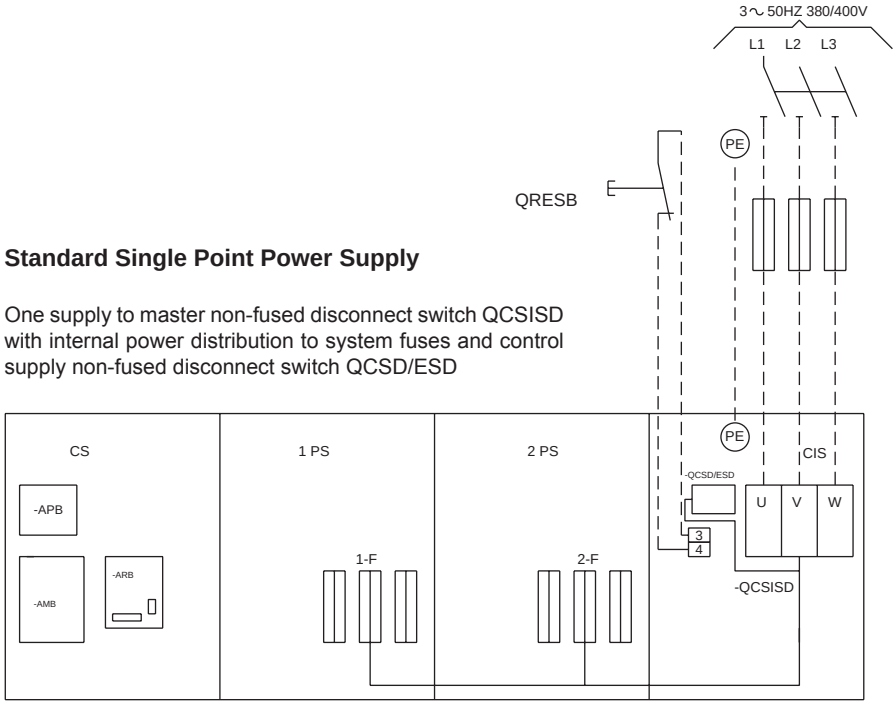
Terminal 13 & 17 contact should always be closed after or simultaneous with those on 13 & 16, when two steps of unloading are required. Otherwise, the microprocessor may mistake the closed contacts on 13 & 17 as a signal for a setpoint reset.

Terminals 13 & 17 contact should always be opened before or simultaneous with those on 13 & 16 when loading is desired. Otherwise, the microprocessor may mistake the closed contacts on 13 & 17 as a signal for a setpoint reset.

Remote Heatpump Mode Selection (YLCS HA only)

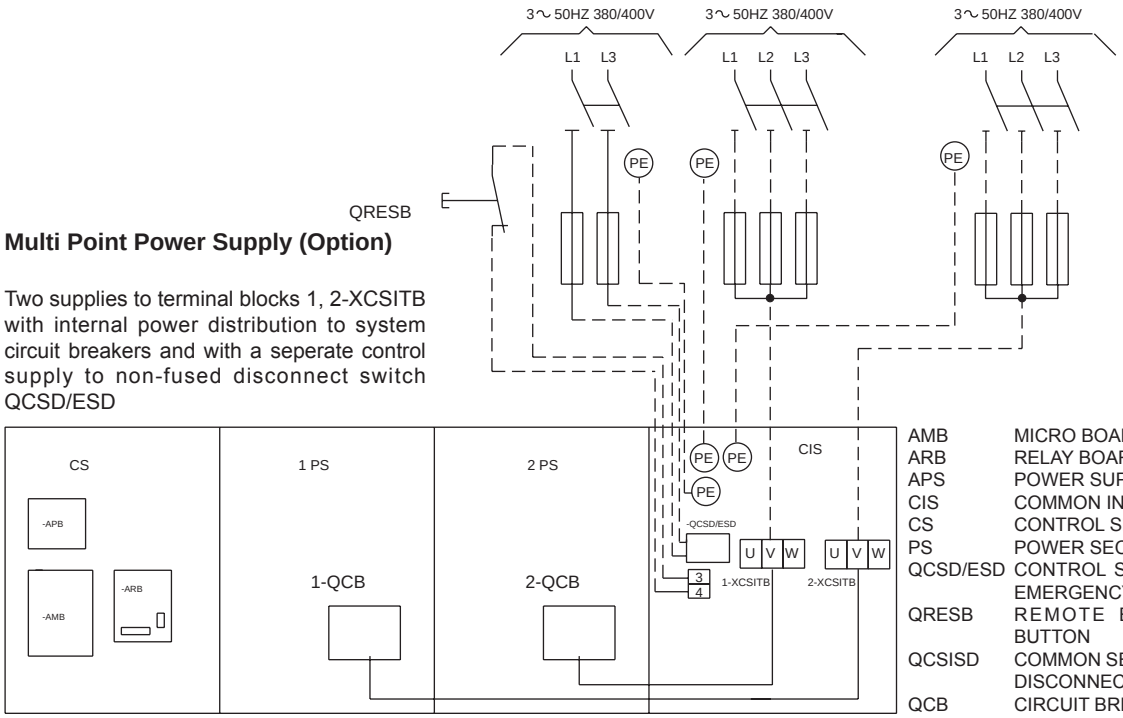
Heatpump mode can be remotely selected on YLCS HA units by closure of a voltage free contact connected to terminals 13 and 20.

4.14 Power Supply Connections



Standard Single Point Power Supply

One supply to master non-fused disconnect switch QCSISD with internal power distribution to system fuses and control supply non-fused disconnect switch QCSD/ESD



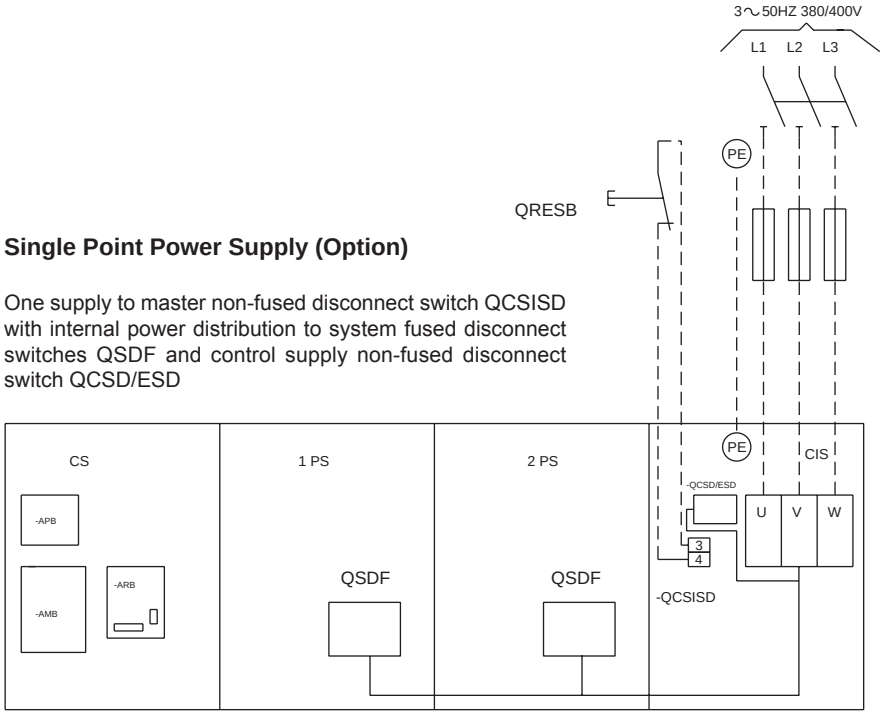
Multi Point Power Supply (Option)

Two supplies to terminal blocks 1, 2-XCSITB with internal power distribution to system circuit breakers and with a seperate control supply to non-fused disconnect switch QCSD/ESD

AMB	MICRO BOARD
ARB	RELAY BOARD
APS	POWER SUPPLY BOARD
CIS	COMMON INPUT SECTION
CS	CONTROL SECTION
PS	POWER SECTION
QCSD/ESD	CONTROL SWITCH DISCONNECT/ EMERGENCY STOP DEVICE
QRESB	REMOTE EMERGENCY STOP BUTTON
QCSISD	COMMON SECTION INPUT SWITCH DISCONNECT
QCB	CIRCUIT BREAKER
QSDF	SWITCH DISCONNECT FUSE
XCSITB	COMMON SECTION INPUT TERMINAL BLOCK

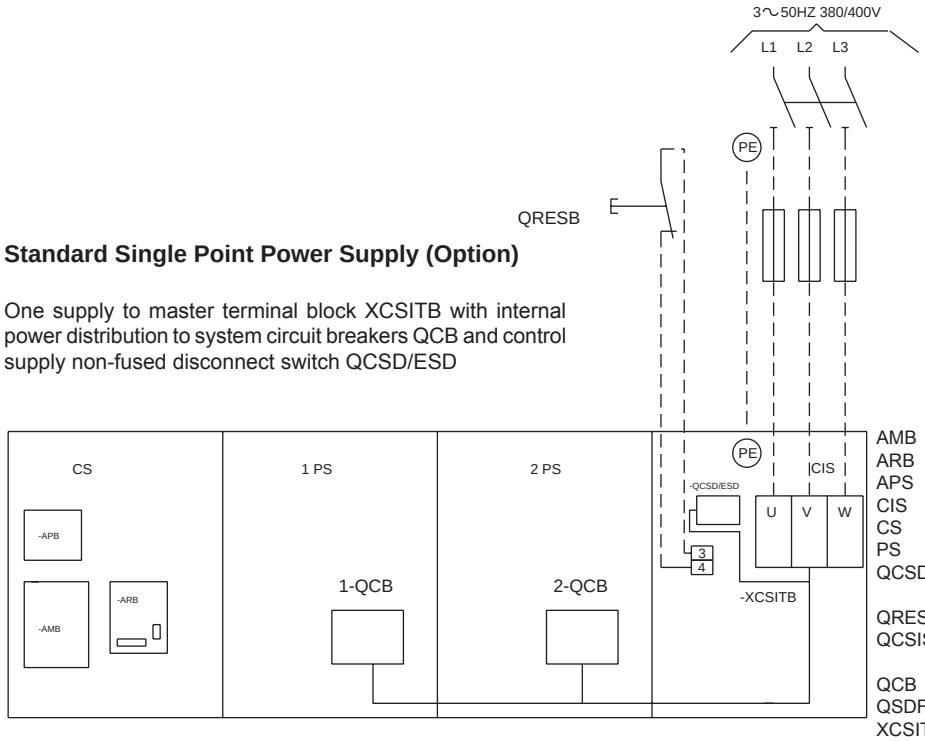
Single Point Power Supply (Option)

One supply to master non-fused disconnect switch QCSISD with internal power distribution to system fused disconnect switches QSDF and control supply non-fused disconnect switch QCSD/ESD



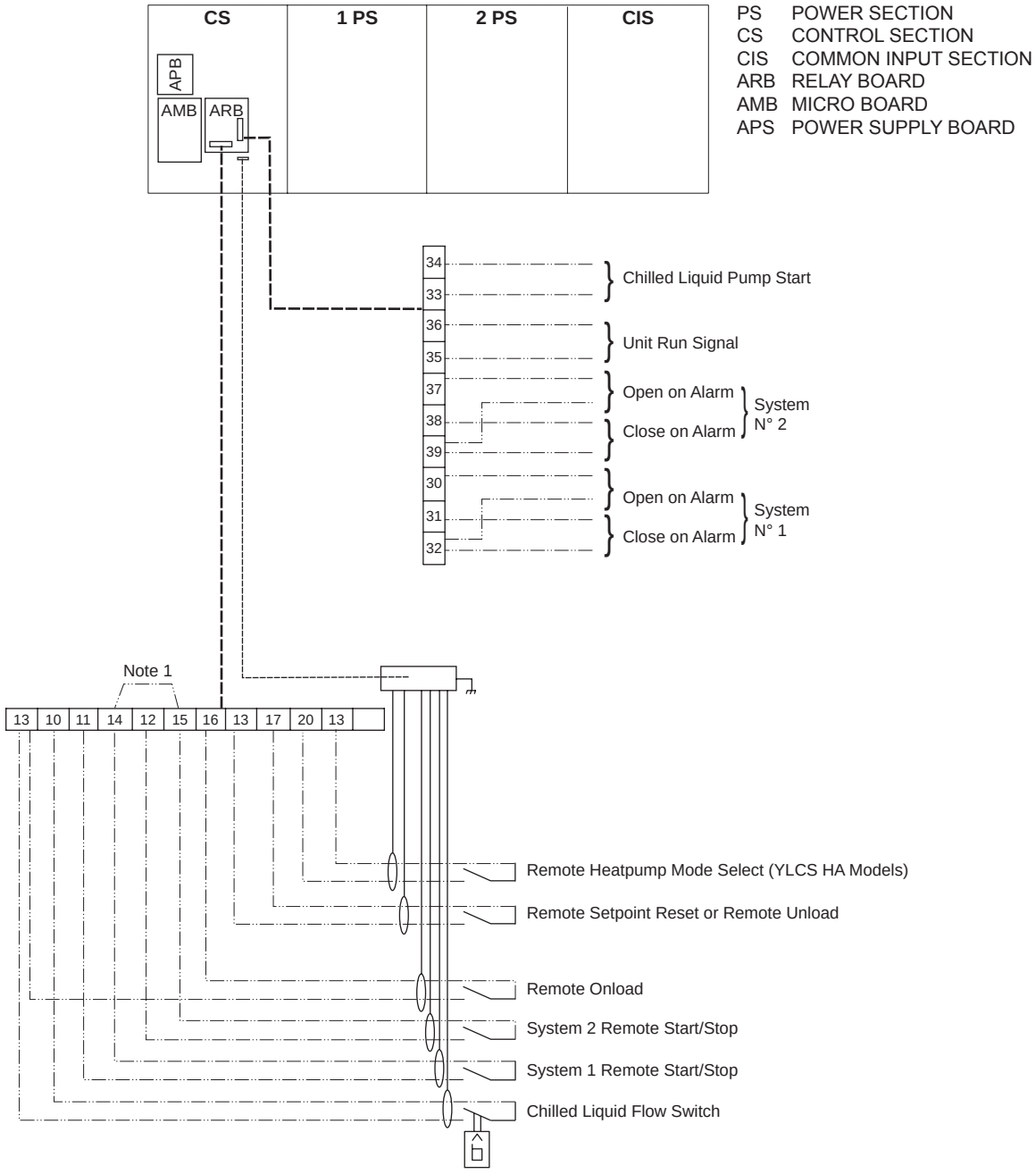
Standard Single Point Power Supply (Option)

One supply to master terminal block XCSITB with internal power distribution to system circuit breakers QCB and control supply non-fused disconnect switch QCSD/ESD



AMB	MICRO BOARD
ARB	RELAY BOARD
APS	POWER SUPPLY BOARD
CIS	COMMON INPUT SECTION
CS	CONTROL SECTION
PS	POWER SECTION
QCSD/ESD	CONTROL SWITCH DISCONNECT/ EMERGENCY STOP DEVICE
QRESB	REMOTE EMERGENCY STOP BUTTON
QCSISD	COMMON SECTION INPUT SWITCH DISCONNECT
QCB	CIRCUIT BREAKER
QSDF	SWITCH DISCONNECT FUSE
XCSITB	COMMON SECTION INPUT TERMINAL BLOCK

4.15 Connection Diagram



Note 1: Fit link between terminals 14 and 15 and connect a voltage free contact to terminals 11 and 14 for Remote Unit Start/Stop.

5 COMMISSIONING

5.1 Preparation

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

The Microprocessor Based Control System (MBCS) Operating Instructions must be read in conjunction with this section.

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 York Authorised personnel. If the switch has been set to the "ON" position before commissioning then it must be reported to York 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.

Remote Condenser Systems (AA Models)

All units require a suitable remote refrigerant condenser system. Verify that the system has been installed correctly and that the condenser has discharge pressure control capable of maintaining a reasonably stable working pressure.

Refrigerant charge (SA and HA)

Units are normally shipped as standard with a full refrigerant operating charge. 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 and units supplied with a nitrogen holding charge must be evacuated with a suitable vacuum pump/recovery unit as appropriate to below 100 microns.

Refrigerant	Break vacuum from bottle connection for:	Raise system pressure to approximately:
R134a	Vapour	2.0 barg (30 psig)

Do not charge liquid refrigerant with static water in the cooler. Care must also be taken to charge liquid refrigerant slowly to avoid excessive thermal stress at the charging point. Once the vacuum is broken, charge into the condenser with the full operating charge as given in Section 9.

Valves: Open the compressor discharge, suction (if fitted) and liquid line service valves on both systems.

Compressor oil: The compressor oil level must be between the two sight glasses on the oil separators.

Isolation/protection: Verify that all sources of electrical supply to the unit are taken from point(s) 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 panels to the circuit breakers, terminal blocks or switch disconnectors are tight.

Earthing: Verify that the units protective terminal(s) are properly connected to a suitable earthing point. Ensure that all unit internal earth connections are tight.

Supply voltage: Verify that the site voltage supply corresponds to the unit requirement and is within the limits given in Section 9.

Switch Settings: Ensure that the unit "ON/OFF" switch on the control panel and the microprocessor board system switches "S1" and "S2" are set to "OFF". Set the red emergency stop device on the common input section to "1" (ON). For units fitted with door interlocked isolators the power section doors must be closed and the devices set to "1" (ON). The customers disconnection devices can now be set to "ON".

The unit is now live!

Compressor heaters: Verify the compressor heaters are energised.

Chilled Liquid System: Verify that the chilled liquid system has been installed correctly, and has been commissioned with the correct direction of water flow through the cooler. Purge air from the top of the cooler using the plugged air vent mounted on the top of the cooler body.

Cooling Liquid System: Verify that the cooling liquid system has been installed correctly, and has been commissioned with the correct direction of water flow through the condenser. Purge air from the top of the condenser using the plugged air vent mounted at the top of the condenser water head.

Cooler and Condenser flow rates and pressure drops must be within the limits given in Section 9. 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 chilled liquid temperature sensors are coated with heat conductive compound (part no. 013-00890-000) and inserted in the sensor pockets of the cooler. This outlet sensor also acts as the freeze protection thermostat sensor and must always be fitted.

Ensure the cooling liquid temperature sensor is coated with heat conductive compound (part no. 013-00890-000) and inserted in the outlet sensor pocket of the condenser.

Ensure the condenser water temperature sensor is coated with heat conductive compound (part no. 013-00890-000) and inserted in the sensor pocket. The pocket should be installed in the external condenser outlet pipework within 4 metres of the control panel.

Control supply: Verify the control panel display is illuminated.

HP cut-out reset: Check that the hand reset mechanical high pressure cut-outs (optional) mounted on the compressors are at the correct setting and are reset.

Programmed options: Verify that the options factory programmed into the Microprocessor Based Control System 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 the MBCS Manual for notes and explanation of messages.

Programmed settings: Ensure the system cut-out and operational settings are in accordance with the instructions given in the MBCS Manual and with operational requirements by pressing the "PROGRAM" key.

Date & time: Programme the date and time by first ensuring that the CLK jumper J18 on the microprocessor board is in the "ON" position. Then press the "SET TIME/DATE" key and set the date and time (see MBCS Manual).

Start/Stop schedule: Programme the daily and holiday start/stop by pressing the "SET SCHEDULE/HOLIDAY" key (see MBCS Manual).

Set-points: Set the required leaving chilled liquid temperature set-point and control range using the "LOCAL COOLING SETPOINTS" and "REMOTE COOLING SETPOINTS" keys. (see MBCS Manual).

5.2 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 the MBCS Manual, then proceed step by step as follows:

Interlocks: Verify that liquid is flowing through the cooler 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.

System switches: Set the system 1 switch on the microprocessor board to the "ON" position — see operating sequence in the MBCS Manual.

Start-up: Press the "STATUS" key, and 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. Use the emergency stop device if necessary. Also refer to the MBCS Manual for the normal operating sequence from start-up.

Oil pressure: When a compressor starts, press the relevant "SYSTEM DATA" key and verify that oil differential pressure develops immediately. If oil pressure does not develop, the automatic controls will shut down the compressor. Under no circumstances should a restart attempt be made on a compressor which does not develop oil pressure immediately.

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.

Suction Superheat: Check suction superheat at steady full compressor load only. It is important that no bubbles show in the liquid line sight glass. Superheat should be 4°C to 5°C relative to the "saturated suction" temperature.

Expansion valve 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. It is important that cooling system is operating correctly. Subcooling should be 5°C to 7°C relative to the "saturated suction" temperature.

General operation: After completion of the above checks for system 1 repeat the process for system 2.

When the checks are complete stop the unit, switch both system switches to the "ON" position and restart the unit. Check that loading occurs as specified in the MBCS and that general operation is correct.

6 UNIT OPERATION

6.1 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 temperature at the unit and take the appropriate action to maintain this temperature within desired limits. This action will involve running one or both compressors at a suitable load step to match the cooling effect of the refrigerating systems to the heat load on the liquid system. The heat removed from the the chilled liquid is then rejected via the water cooled condenser.

On AA units the heat removed from the chilled liquid is usually rejected directly to atmosphere from remote 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.

6.2 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 system 1 and 2 switches on the microprocessor circuit board 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.

6.3 Normal Running and Cycling

Once the unit has been started, all operations are fully automatic. After an initial period at minimum capacity on 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 lead compressor and/or start-up the other compressor.

If very little heat load is present, the lead compressor will continue at minimum capacity 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 (seeMBCSManual).

6.4 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.

7 MAINTENANCE

7.1 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 York International service organisation to protect the operation of the unit. If damage or a system failure occurs due to improper maintenance during the warranty period, York 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 MBCS Manual.

7.2 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 York Service Agent.

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).

Refrigerant leaks: Visually check the heat exchangers, compressors and pipework for damage and gas leaks.

Operating conditions: Read the operating pressures and temperatures at the control panel using the display keys and check that these are within the operating limitations given in the MBCS manual.

Compressor oil level: Check the compressor oil level after the compressor has been operating on ‘FULL LOAD" for approximately half an hour. The oil level should be between the upper and lower sight glasses on the compressor housing.

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.

7.3 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 York Service Centre is contacted for recommendations for individual sites.

Standard Units

SERVICE SCHEDULE	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 fusible plugs. Check for pipework damage. Check for leaks. Check moisture indicator. Check suction superheat. Check liquid subcooling.	Check solenoid valves.
Compressors:	Check oil level. Check oil pressure. Check unloader operation. Check crankcase heater. Check condition of oil.	
Cooler:	Check water flow. Check water pressure drop.	Check water pH / glycol strength.
Condenser:	Check water flow. Check water pressure drop.	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 emergency stop.	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 low and high ambient cut-out functions. Check low LCHLT cut-out function. Check low differential oil pressure function. Check low evaporator temperature cut-out function.

7.4 Pressure Vessel 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 4.4, in-service inspection is not necessary. In the design of the vessels used in the unit a 1mm corrosion allowance has been used to consider slight corrosion on the water side. This allowance is sufficient to cover the lifetime of the unit.

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

8 TROUBLE SHOOTING

8.1 Competent Persons Trouble Shooting Guide

PROBLEM	POSSIBLE CAUSE	ACTION
No display on panel — unit will not operate	Mains supply to control system off	Switch on mains supply if safe to do so.
	Emergency stop device off.	Check if control panel emergency stop switch and any remote emergency stop devices are in the ‘OFF" position. Turn to ‘ON" position (1) if safe to do so.
	No supply to -T2.	Check fuses.
	No 24 Vac supply to power board.	Check QRCD is reset, fuse F4 and wiring from -T2 to power board and fuse -F5.
	No +12 V output from power board.	Replace power board or isolate excessive load on the board.
NO RUN PERM displayed (No run permissive)	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.
SYS # HIGH OIL TEMP displayed	Measured temperature incorrect.	Check for blockages in condenser coils and check oil cooler. Check sensor calibration, location and wiring.
Chiller FAULT: LOW AMBIENT TEMP displayed	Ambient air temperature is lower than the programmed operating limit.	Use the ‘ambient temp." key to display the temperature and confirm that the displayed value is approximately correct. The warning message should clear when the ambient air temperature reaches the programmed operating limit. Check the programmed settings are correct for the options fitted to the unit.
	Measured temperature is incorrect.	Check sensor calibration, location and wiring.
Chiller FAULT: HIGH AMBIENT TEMP displayed	Ambient air temperature is higher than the programmed operating limit.	Use the ‘ambient temp." key to display the temperature and confirm that the displayed value is approximately correct. The warning message should clear when the ambient air temperature falls below the programmed operating limit. Check the programmed settings are correct for the options fitted to the unit.
	Measured temperature is incorrect.	Check sensor calibration, location and wiring.
Chiller FAULT: LOW WATER TEMP displayed	Leaving liquid drops below the programmed low limit faster than the unit can unload.	Check for restrictions in the liquid flow line. Check the liquid flow is stable.
	Unit is not unloading.	Check the supply to the unloader valve solenoid. Check the compressor unloads correctly.
	Measured temperature is incorrect.	Check sensor calibration, location and wiring.
Chiller FAULT: VAC UNDERVOLTAGE displayed	Poor mains supply voltage.	Check mains supply is stable and within allowable limits. Check for voltage dip on compressor start.
SYS # HIGH DSCH displayed (High discharge pressure trip)	Poor cooling liquid flow through the condenser.	Check for restricted cooling liquid flow. Check for non-condensables (air) in system.
	Excessive refrigerant charge.	Check sub-cooling is correct.
	Measured pressure is incorrect.	Check discharge transducer calibration and wiring.
SYS # HIGH DSCH TEMP displayed (High discharge temperature)	Suction superheat too high.	Check suction superheat is within range. Check for restricted cooling liquid flow.
	Measured temperature incorrect.	Check sensor calibration, location and wiring.

PROBLEM	POSSIBLE CAUSE	ACTION
SYS # DSCH LIMITING displayed (Discharge pressure unloading)	Discharge pressure unloading due to unit operating above load limit. See also SYS # HIGH DSCH.	Check chilled liquid temperature is within range.
SYS # LOW SUCTION displayed	Badly adjusted or faulty expansion valve.	Check superheat.
	Reduced evaporator performance.	Check for restricted chilled liquid flow. Check for fouled tube surfaces. Check superheat.
	Low refrigerant charge.	Check subcooling is correct. Check for leaks.
	Restricted refrigerant flow.	Check for blocked filter/drier. Check YLLSV operating correctly
	Measured pressure incorrect.	Check suction pressure transducer calibration and wiring.
SYS # LOW CURR/MP/HP displayed	Compressor current too low.	Check compressor mains supply, fuses, contactors and wiring. Check mains supply voltage is within tolerance.
	Measured current is incorrect.	Check for defective current transformer (resistance should be between 42 and 44 Ohms). Check calibration resistor is correctly fitted.
	Compressor motor protector signal failure.	Check motor protector and wiring. Check compressor motor.
	Mechanical high pressure cut-out trip.	Check compressor discharge valve is open. Check cut-out setting and wiring.
	No motor cooling.	Check motor cooling service valve is open Check operation of motor cooling, TEVs and liquid solenoid valve.
SYS # CURR LIMITING displayed (Compressor current unloading).	High compressor motor current has activated unloading.	Check liquid temperature is within operating limits. Check if ambient air temperature is above operating limits.

8.2 Sensor Calibration Charts

Chilled Leaving Water (BLCT)
Hot Leaving Water (BHLT) fitted on HA units only

Temperature °C	Resistance ohms	Voltage Vdc
-10	16598	1,45
-8	14896	1,57
-6	13388	1,69
-4	12047	1,80
-2	10856	1,93
0	9795	2,05
2	8849	2,17
4	8005	2,30
6	7251	2,42
8	6575	2,54
10	5970	2,66
20	3748	3,22
30	2417	3,69
40	1598	4,05

Test points :

Leaving Water (BLCT) AMB J11-7/4

Oil Temperature (BOT) Sensor

Temperature °C	Resistance ohms	Voltage Vdc
-10	55330	0,97
-5	42227	1,20
0	32650	1,45
5	25390	1,72
10	19900	2,00
15	15710	2,29
20	12490	2,58
25	10000	2,85
30	8057	3,11
35	6530	3,35
40	5327	3,57

Test point :

Ambient Air (BAMB) AMB J11-9/6

Oil Temperature (BOT):
Refrigerant Circuit 1 AMB J11-8/5
Refrigerant Circuit 2 AMB J16-6/5

Discharge (BDT) Temperature Sensors

Temperature °C	Resistance ohms	Voltage Vdc
0	163250	0,282
10	99500	0,447
20	62450	0,676
30	40285	0,976
40	26635	1,34
50	18015	1,76
60	12440	2,20
70	8760	2,63
80	6290	3,04
90	4588	3,40
100	3400	3,71
110	2556	3,96
120	1946	4,17
130	1504	4,33
140	1174	4,46
150	926	4,57

Test points :

Discharge Temperature (BDT):
Refrigerant Circuit 1 AMB J17-9/6
Refrigerant Circuit 2 AMB J17-10/7

Oil (BOP-400psig), Discharge (BDP-400psig) and Suction (BSP-200psig) Pressure Transducers

0 - 200 psig Transducer		0 - 400 psig Transducer	
Pressure psig	Voltage Vdc	Pressure psig	Voltage Vdc
0	0,5	0	0,5
25	1,0	50	1,0
50	1,5	100	1,5
75	2,0	150	2,0
100	2,5	200	2,5
125	3,0	250	3,0
150	3,5	300	3,5
175	4,0	350	4,0
200	4,5	400	4,5

Red wire = 5 V, Black wire = 0 V, White/Green wire = signa

Test points :

Oil Pressure (BOP):
Refrigerant Circuit 1 AMB J13-8/3
Refrigerant Circuit 2 AMB J14-8/3

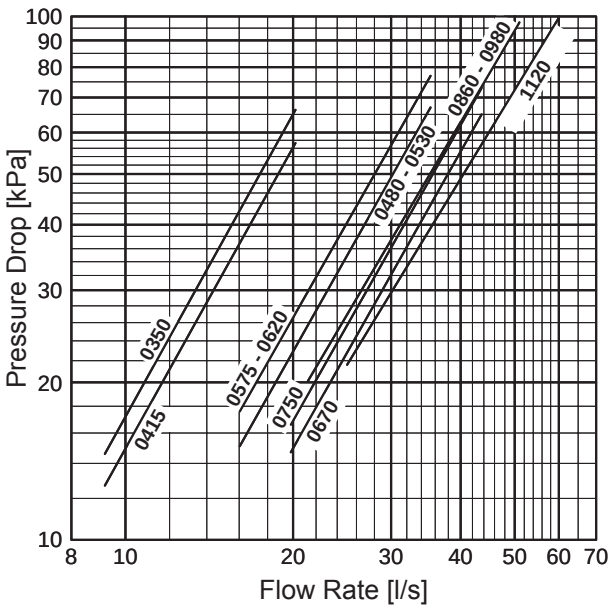
Discharge Pressure (BSP):
Refrigerant Circuit 1 AMB J15-8/3
Refrigerant Circuit 2 AMB J15-7/1

Suction Pressure (BSP):
Refrigerant Circuit 1 AMB J13-7/1
Refrigerant Circuit 2 AMB J14-7/1

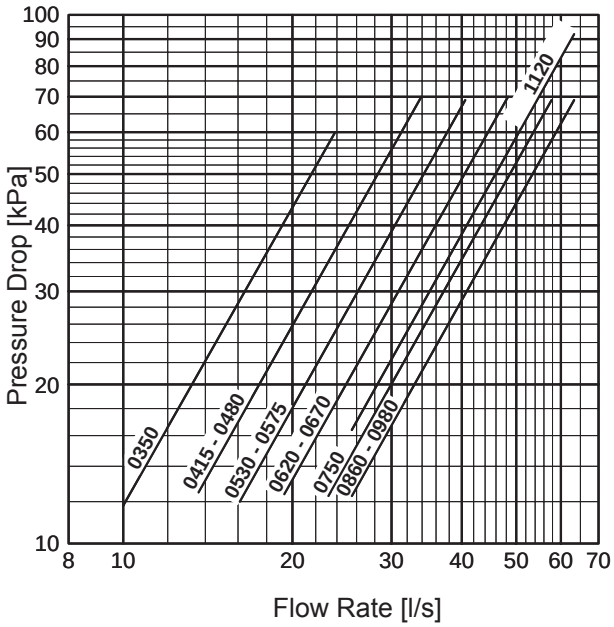
9 TECHNICAL DATA

9.1 Flow Rate and Pressure Drop Graphs

Cooler Water Pressure Drop



Condenser Water Pressure Drop



Pressure Drop Calculations

Pressure drop calculated as following:

$\Delta p = a \cdot qv \,\hat{}\, b$

with Δp : pressure drop [kPa]
qv : flow rate [l/s]
a, b: factors (see table here below)

Model	Evaporator Pressure Drop Calculation		Condenser Pressure Drop Calculation	
	Factor **a**	Factor **b**	Factor **a**	Factor **b**
0350	0.2072	1.9192	0.1583	1.8725
0415	0.1835	1.9109	0.0903	1.8886
0480	0.0796	1.8898	0.0903	1.8886
0530	0.0796	1.8898	0.0619	1.8948
0575	0.0975	1.8719	0.0619	1.8948
0620	0.0975	1.8719	0.0461	1.8889
0670	0.0527	1.8854	0.0461	1.8889
0750	0.0608	1.8784	0.0265	1.8956
0860	0.0813	1.8027	0.0265	1.8956
0980	0.0813	1.8027	0.0354	1.8956
1120	0.0789	1.7436	0.0354	1.8956

NOTE

The cooler and condenser design allows for an increase in pressure drop of up to 15% above the design value given. Debris in the water may also cause additional pressure drop.

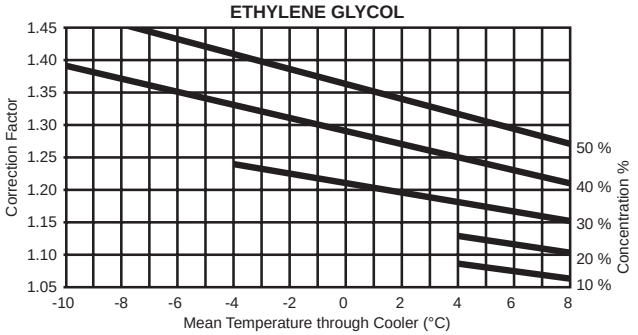
CAUTION

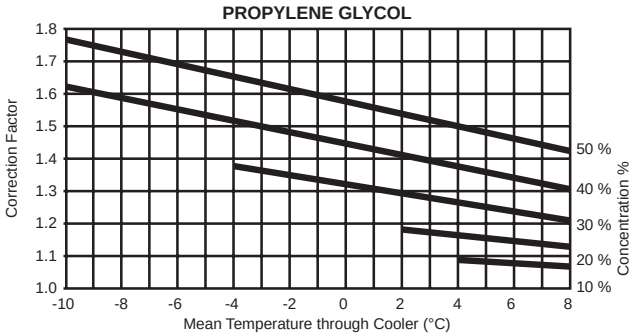
When using glycol solutions, pressure drops are higher than with water. Special care must be taken not to exceed the maximum allowed.

Recommended Glycol Solution Strengths

Leaving Liquid Temperature °C	Ethylene Glycol Concentration % Weight	Propylene Glycol Concentration % Weight
5	6.0	5.5
4	10.0	10.0
3	13.0	13.5
2	16.0	17.0
1	18.0	19.0
0	20.0	21.5
-1	22.0	23.5
-2	24.0	26.0
-3	26.0	28.0
-4	28.5	30.5
-5	30.0	32.0
-6	31.5	33.5
-7	33.0	35.0
-8	34.5	36.0
-9	35.5	37.0
-10	37.0	38.5
-11	38.0	39.5
-12	39.0	40.5

Glycol Pressure drop Correction Factors





9.2 Operating Limitations

YLCS Models SA - HA - AA			0350		0415		0480		0530	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Chilled Liquid	Liquid outlet temperature (water)	°C	4.5 to 15							
	Liquid outlet temperature (glycol) (3)	°C	-12 to 15							
	Liquid outlet temperature range	°C	3.3 to 8							
	Flow rate	l/s	9.2	20.2	9.2	20.2	16.0	35.3	16.0	35.3
	Pressure drop	kPa	14.6	66.3	12.7	57.3	15.1	67.0	15.1	67.0
	Maximum working pressure	barg	10							
Cooling Liquid	Liquid outlet temperature	°C	30 to 40 (SA) / 60 (HA/AA)							
	Liquid outlet temperature range	°C	3.3 to 8							
	Total flow rate (2)	l/s	10.0	23.8	13.6	33.9	13.6	33.9	16.1	40.6
	Pressure drop	kPa	11.8	60.0	12.5	70.0	12.5	70.0	12.0	69.0
	Maximum working pressure	barg	10							
Refrigerant System High pressure side		barg	18 (SA) / 22 (HA/AA)							
Power supply voltage 400 V, 3 Ø, 50 Hz (nominal)		V	360 to 440							
Recommended system water volume (1)		l	1400		1700		1900		2000	
Air temperature surrounding unit		°C	4 to 46							

YLCS Models SA - HA - AA			0575		0620		0670		0750	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Chilled Liquid	Liquid outlet temperature (water)	°C	4.5 to 15							
	Liquid outlet temperature (glycol) (3)	°C	-12 to 15							
	Liquid outlet temperature range	°C	3.3 to 8							
	Flow rate	l/s	16.0	35.3	16.0	35.3	19.8	43.6	19.8	43.6
	Pressure drop	kPa	17.6	77.0	17.6	77.0	14.7	65.0	16.6	73.0
	Maximum working pressure	barg	10							
Cooling Liquid	Liquid outlet temperature	°C	30 to 40 (SA) / 60 (HA/AA)							
	Liquid outlet temperature range	°C	3.3 to 8							
	Total flow rate (2)	l/s	16.1	40.6	19.3	48.3	19.3	48.3	25.5	63.3
	Pressure drop	kPa	12.0	69.0	12.4	70.0	12.4	70.0	12.3	69.0
	Maximum working pressure	barg	10							
Refrigerant System High pressure side		barg	18 (SA) / 22 (HA/AA)							
Power supply voltage 400 V, 3 Ø, 50 Hz (nominal)		V	360 to 440							
Recommended system water volume (1)		l	2200		2400		2600		2900	
Air temperature surrounding unit		°C	4 to 46							

YLCS Models SA - HA - AA			0860		0980		1120	
			Min.	Max.	Min.	Max.	Min.	Max.
Chilled Liquid	Liquid outlet temperature (water)	°C	4.5 to 15					
	Liquid outlet temperature (glycol) (3)	°C	-12 to 15					
	Liquid outlet temperature range	°C	3.3 to 8					
	Flow rate	l/s	21.3	51.0	21.3	51.0	25.0	60.0
	Pressure drop	kPa	20.1	97.4	20.1	97.4	21.6	99.4
	Maximum working pressure	barg	10					
Cooling Liquid	Liquid outlet temperature	°C	30 to 40 (SA)					
	Liquid outlet temperature range	°C	3.3 to 8					
	Total flow rate (2)	l/s	25.5	63.3	25.5	63.3	25.5	63.3
	Pressure drop	kPa	12.3	69.0	16.4	92.0	16.4	92.0
	Maximum working pressure	barg	10					
Refrigerant System High pressure side		barg	18 (SA) / 22 (HA/AA)					
Power supply voltage 400 V, 3 Ø, 50 Hz (nominal)		V	360 to 440					
Recommended system water volume (1)		l	3400		3800		4400	
Air temperature surrounding unit		°C	4 to 46					

(1) Table shows minimum water volume of system
(2) Shared equally between condensers
(3) Glycol operation only available for HA/AA models

9.3 Physical Data

			0350	0415	0480	0530	0575	0620
Refrigerant circuits			2	2	2	2	2	2
Refrigerant Charge	Circuit 1	kg	30	52	52	60	62	60
	Circuit 2	kg	30	52	52	60	62	60
Oil Charge	Circuit 1	l	16	15	15	18	18	23
	Circuit 2	l	16	16	15	15	18	18
Compressor	Number		2	2	2	2	2	2
	Type (circuit 1)		YTS FAD	YTS HAE	YTS HAE	YTS IAF	YTS IAF	YTS JAG
	Type (circuit 2)		YTS FAD	YTS FAD	YTS HAE	YTS HAE	YTS IAF	YTS IAF
	Capacity Control	%	15, 27, 39, 51, 63, 75, 87, 100					
Evaporator	Number		1	1	1	1	1	1
	Type		DED315	DED350	DED535	DED535	DED585	DED585
	Water volume	l	129.5	113.5	184	184	222	222
	Victaulic connection sizes	in	5"	5"	6"	6"	6"	6"
Condenser	Number		2	2	2	2	2	2
	Type		CDEW240	CDEW300	CDEW300	CDEW360	CDEW360	CDEW450
	Water volume (each)	l	17	27.7	27.7	31.2	31.2	35.7
	BSPPint / Victaulic connection sizes	in	2.1/2"	3"	3"	3"	3"	3"
	Discharge Connection Line Size (AA models)	in	2.1/8"	2.5/8"	2.5/8"	2.5/8"	2.5/8"	2.5/8"
	Liquid Connection Line Size (AA models)	in	1.3/8"	1.3/8"	1.5/8"	1.5/8"	1.5/8"	1.5/8"
Weight	Operating (SA-HA)	kg	3420	3880	4170	4270	4370	4540
	Operating (AA)	kg	3090	3265	3555	3650	3750	3905
	Shipping (SA-HA)	kg	3100	3510	3800	3900	4000	4150
	Shipping (AA)	kg	2860	3105	3395	3470	3570	3695
	Cooler only	kg	417	570	650	650	730	730
Dimensions	Length	mm	3225	3244	3274	3274	3544	3600
	Width - vertical nozzle evaporator	mm	890	890	890	890	890	890
	Width - horizontal nozzle evaporator	mm	967	967	1010	1010	1010	1010
	Height	mm	2100	2100	2100	2100	2100	2100

			0670	0750	0860	0980	1120
Refrigerant circuits			2	2	2	2	2
Refrigerant Charge	Circuit 1	kg	68	78	81	86	86
	Circuit 2	kg	68	78	81	86	86
Oil Charge	Circuit 1	l	20	23	23	28	28
	Circuit 2	l	18	23	23	23	28
Compressor	Number		2	2	2	2	2
	Type (circuit 1)		YTS IAE	YTS JAF	YTS LAG	YTS MAH	YTS MAH
	Type (circuit 2)		YTS IAE	YTS JAF	YTS LAG	YTS LAG	YTS MAH
	Capacity Control	%	15, 27, 39, 51, 63, 75, 87, 100				
Evaporator	Number		1	1	1	1	1
	Type		DED645	DED715	M200	M200	M240
	Water volume	l	252	295	430	430	501
	Victaulic connection sizes	in	8	8	10	10	10
Condenser	Number		2	2	2	2	2
	Type		CDEW450	CDEW550	CDEW550	CDEW550X	CDEW550X
	Water volume (each)	l	35.7.	47.5	47.5	63	63
	BSPPint / Victaulic connection sizes	in	3"	4"	4"	4"	4"
	Discharge Connection Line Size (AA models)	in	3.5/8"	3.5/8"	4.1/8"	4.1/8"	4.1/8"
	Liquid Connection Line Size (AA models)	in	1.5/8"	1.5/8"	1.5/8"	1.5/8"	1.5/8"
Weight	Operating (SA-HA)	kg	4510	5010	5620	6090	6610
	Operating (AA)	kg	4010	4320	4940	5190	5710
	Shipping (SA-HA)	kg	4180	4610	5090	5530	5980
	Shipping (AA)	kg	3620	3860	4340	4580	5030
	Cooler only	kg	825	960	1200	1200	1420
Dimensions	Length	mm	3600	3800	3700	3800	4000
	Width - vertical nozzle evaporator	mm	1295	1295	NA	NA	NA
	Width - horizontal nozzle evaporator	mm	1295	1295	1295	1295	1295
	Height	mm	2145	2145	2145	2145	2145

1) Width includes control panel but does not include switch disconnect or circuit breaker handles.

9.4 Electrical Data - YLCS SA Models

Unit Data

	Nominal Running		Maximum Running		
	AMPS		AMPS		
	380	400	360	380	400
Model SA	Without Power Factor Correction				
	With Optional Power Factor Correction fitted				
0350	136	130	162	154	146
	130	122	156	146	138
0415	165	156	195	186	176
	156	146	187	176	166
0480	194	182	228	218	206
	182	170	218	206	194
0530	207	196	245	233	221
	197	186	237	224	212
0575	220	210	262	248	236
	212	202	256	242	230
0620	239	228	285	270	257
	230	219	277	262	248
0670	232	220	274	260	247
	215	204	254	241	229
0750	269	255	317	301	286
	249	236	294	278	265
0860	297	282	353	334	318
	275	262	327	310	294
0980	332	316	390	369	351
	308	292	361	342	325
1120	379	360	448	425	403
	351	334	415	393	374

System Data

			Nominal Running			Maximum Running			
			Power	AMPS		Power	AMPS		
			kW	380	400	kW	360	380	400
Model SA	**SYS N°**	**Comp's Motor**	Without Power Factor Correction						
			With Optional Power Factor Correction fitted						
0350	**1 & 2**	YTS 15-A-D	41	68	65	46.2	81	77	73
				65	61		78	73	69
0415	**1**	YTS 16-A-E	56.5	97	91	63.9	114	109	103
				91	85		109	103	97
0480	**2**	YTS 15-A-D	41	68	65	46.2	81	77	73
				65	61		78	73	69
0530	**1 & 2**	YTS 16-A-E	56.5	97	91	63.9	114	109	103
				91	85		109	103	97
0575	**1**	YTS 17-A-F	67.4	110	105	76.1	131	124	118
				106	101		128	121	115
0620	**2**	YTS 16-A-E	56.5	97	91	63.9	114	109	103
				91	85		109	103	97
0670	**1 & 2**	YTS I-A-E (1)	67	116	110	75	137	130	123
				107	102		127	120	114
0750	**1 & 2**	YTS J-A-F (1)	78	134	128	87	159	150	143
				124	118		147	139	132
0860	**1 & 2**	YTS L-A-G (1)	86	149	141	97	176	167	159
				138	131		163	155	147
0980	**1**	YTS M-A-H (1)	108	186	177	120	218	207	196
				172	164		202	191	182
	2	YTS L-A-G (1)	85	146	139	94	172	163	155
				135	128		159	151	143
1120	**1 & 2**	YTS M-A-H (1)	110	190	180	123	224	212	202
				176	167		208	197	187

(1) economised

			Locked Rotor Conditions			
			Star for Star/Delta		Star for Star/Delta	
Model SA	**SYS N°**	**Comp's Motor**	AMPS		AMPS	
			380	400	380	400
0350	**1 & 2**	YTS 15-A-D	157	167	470	500
0415	**1**	YTS 16-A-E	175	187	525	560
	2	YTS 15-A-D	157	167	470	500
0480	**1 & 2**	YTS 16-A-E	175	187	525	560
0530	**1**	YTS 17-A-F	215	228	645	685
	2	YTS 16-A-E	175	187	525	560
0575	**1 & 2**	YTS 17-A-F	215	228	645	685
0620	**1**	YTS 18-A-G	233	248	700	745
	2	YTS 17-A-F	215	228	645	685
0670	**1 & 2**	YTS I-A-E (1)	268	282	805	845
0750	**1 & 2**	YTS J-A-F (1)	288	303	865	910
0860	**1 & 2**	YTS L-A-G (1)	387	407	1160	1220
0980	**1**	YTS M-A-H (1)	467	492	1400	1475
	2	YTS L-A-G (1)	387	407	1160	1220
1120	**1 & 2**	YTS M-A-H (1)	467	492	1400	1475

(1) economised

Nominal: @ 7°C leaving liquid temperature and 45°C leaving condenser liquid temperature

Maximum: @ 15°C leaving liquid temperature and 60°C leaving condenser liquid temperature

Notes on Protective Devices

Fuses

The maximum fuse size given :

1. Means that the conditional short-circuit current of the (optional) fused disconnect switch is 50KA.
2. Ensures a minimum of TYPE 1 co-ordination for contactors to EN 60947-1:1992 with a conditional short circuit current of 50KA
3. Ensures that the ultimate allowable short-time conductor temperature under short-circuit conditions is not exceeded in accordance with EN 60204-1:1992

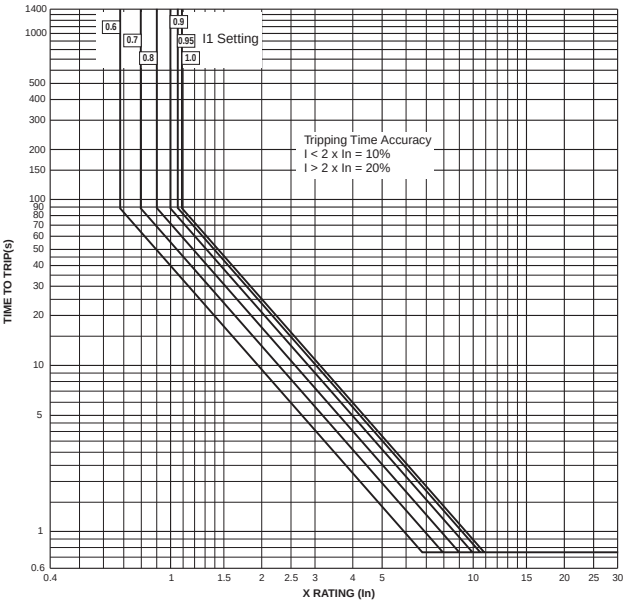
Fuses not exceeding the 5 second interruption current in the tables must be used.

Circuit Breakers

Short circuit protection - the circuit Breakers will trip at 4 times the rating of the Circuit Breaker (In) within 60ms.

Overload Protection - Refer to the Overload Protection Graph and the Settings (I1) given in the tables.

Overload Protection Tripping Times Graph



Standard Single Point Power Connection

Common Input Section Non-fused Switch Disconnect with Power section System Fuses

	Common Input Section		Power Section(s)			
	Standard Non-fused Switch Disconnect		System Fuses Max IEC 269-2-1 gG fuse Size			
Model YLCS SA	Rating Ie	Input Lug Size	**System**	Rating (A)	Din NH Size	Max. 5 S Interrupt (A)
0350	500	M10	**1 & 2**	125	1	610
0415	500	M10	**1**	160	1	810
			2	125	1	610
0480	500	M10	**1 & 2**	160	1	810
0530	500	M10	**1**	160	1	810
			2	160	1	810
0575	500	M10	**1 & 2**	160	1	810
0620	500	M10	**1**	200	1	1000
			2	160	1	810
0670	500	M10	**1 & 2**	200	1	1000
0750	500	M10	**1 & 2**	200	1	1000
0860	500	M10	**1**	355	2	2200
			2	200	1	1000
0980	500	M10	**1 & 2**	355	2	2200
1120	630	M12	**1 & 2**	355	2	2200

Optional Single Point Power Connection

Common input Non-Fused Switched Disconnect with System Power Sections Switch Disconnect Fuse or Common input terminal Block with System Power Section Circuit Breakers

		Common Input		Power Section(s)				Common Input		Power Section(s)		
		Standard Non-fused Switch Disconnect		Fused Disconnect Switch Option				Terminal Block		Circuit Breaker Option		
					Max IEC 269-2-1 gG fuse Size							
Model YLCS SA	**System**	Rating Ie	Input Lug Size	Rating Ie	Rating (A)	Din NH Size	Max. 5 S Interrupt (A)	Rating Ie	Input Lug Size	Rating In	Setting (I1)	Effective Setting
0350	**1 & 2**	500	M10	160	125	0	610	400	M10	160	0.6	96
0415	**1**	500	M10	160	160,	0	810	400	M10	160	0.8	128
	2			160	125	0	610			160	0.6	96
0480	**1 & 2**	500	M10	160	160,	0	810	400	M10	160	0.8	128
0530	**1**	500	M10	250	160	1	810	400	M10	160	0.9	144
	2			250	160	1	810			160	0.8	128
0575	**1 & 2**	500	M10	250	160	1	810	400	M10	160	0.9	144
0620	**1**	500	M10	250	200	1	1000	400	M10	250	0.7	175
	2			250	160	1	810			160	0.9	144
0670	**1 & 2**	500	M10	250	200	1	1000	400	M10	250	0.7	175
0750	**1 & 2**	500	M10	250	200	1	1000	400	M10	250	0.7	175
0860	**1**	500	M10	400	355	2	2200	630	M12	250	0.9	225
	2			250	200	1	1000			250	0.7	175
0980	**1 & 2**	500	M10	400	355	2	2200	630	M12	250	0.9	225
1120	**1 & 2**	630	M12	400	355	2	2200	630	M12	400	0.7	280

Optional Multi Point Power Connection

Common Input Terminal Block with Power Section System Circuit Breakers

		Common Input Section		Power Section(s)		
		Terminal Blocks		Circuit Breaker Option		
Model YLCS SA	**System No**	Rating Ie	Lug Size	Rating In	Setting (I1)	Effective Setting
0350	**1 & 2**	400	M10	160	0.6	96
0415	**1**	400	M10	160	0.8	128
	2	400	M10	160	0.6	96
0480	**1 & 2**	400	M10	160	0.8	128
0530	**1**	400	M10	160	0.9	144
	2	400	M10	160	0.8	128
0575	**1 & 2**	400	M10	160	0.9	144
0620	**1**	400	M10	250	0.7	175
	2	400	M10	160	0.9	144
0670	**1 & 2**	400	M10	250	0.7	175
0750	**1 & 2**	400	M10	250	0.7	175
0860	**1**	400	M10	250	0.9	225
	2	400	M10	250	0.7	175
0980	**1 & 2**	400	M10	250	0.9	225
1120	**1 & 2**	400	M10	400	0.7	280

Multi Point Power Supply

Control Supply Load at 400 V (A)	3
Internal Fuse Rating Class aM	10
Maximum Customer Fuse Rating	16
Maximum customer wire size	4 mm^2

9.5 Electrical Data - YLCS HA & AA Models

Unit Data

	Nominal Running		Maximum Running		
	AMPS		AMPS		
	380	400	360	380	400
Model HA/AA	Without Power Factor Correction				
	With Optional Power Factor Correction fitted				
0350	174	164	252	234	222
	166	156	244	226	214
0415	210	198	307	285	269
	200	189	297	275	259
0480	246	232	362	336	316
	234	222	350	324	304
0530	263	249	386	359	339
	253	240	376	349	329
0575	280	266	410	382	362
	272	258	402	374	354
0620	305	290	444	416	394
	296	280	434	405	384
0670	282	268	467	443	421
	261	248	433	410	390
0750	327	310	541	512	487
	303	287	501	474	451
0860	362	344	601	569	541
	335	319	557	527	501
0980	402	382	662	628	596
	372	353	614	581	552
1120	460	437	744 (1)	724	687
	426	405	708	670	637

(1) electrical panel limitation

System Data

Model HA/AA	SYS N°	Comp's Motor	Nominal Running Power kW	Nominal Running AMPS 380	Nominal Running AMPS 400	Maximum Running Power kW	Maximum Running AMPS 360	Maximum Running AMPS 380	Maximum Running AMPS 400
			Without Power Factor Correction						
			With Optional Power Factor Correction fitted						
0350	1 & 2	YTS 15-A-D	52.1	87	82	69.8	126	117	111
				83	78		122	113	107
0415	1	YTS 16-A-E	72.1	123	116	96.5	181	168	158
				117	111		175	162	152
	2	YTS 15-A-D	52.1	87	82	69.8	126	117	111
				83	78		122	113	107
0480	1 & 2	YTS 16-A-E	72.1	123	116	96.5	181	168	158
				117	111		175	162	152
0530	1	YTS 17-A-F	85.5	140	133	115	205	191	181
				136	129		201	187	177
	2	YTS 16-A-E	72.1	123	116	96.5	181	168	158
				117	111		175	162	152
0575	1 & 2	YTS 17-A-F	85.5	140	133	115	205	191	181
				136	129		201	187	177
0620	1	YTS 18-A-G	101	165	157	135	239	225	213
				160	151		233	218	207
	2	YTS 17-A-F	85.5	140	133	115	205	191	181
				136	129		201	187	177
0670	1 & 2	YTS I-A-E (1)	82	141	134	128	234	221	210
				131	124		216	205	195
0750	1 & 2	YTS J-A-F (1)	95	163	155	148	270	256	243
				151	144		250	237	225
0860	1 & 2	YTS L-A-G (1)	105	181	172	165	300	285	270
				168	159		278	264	250
0980	1	YTS M-A-H (1)	130	225	214	203	371	351	334
				208	198		343	325	309
	2	YTS L-A-G (1)	102	177	168	160	292	276	263
				164	156		270	256	243
1120	1 & 2	YTS M-A-H (1)	133	230	219	210	372 (2)	362	344
				213	203		354	335	318

(1) economised (2) electrical panel limitation

Model HA/AA	SYS N°	Comp's Motor	Locked Rotor Conditions Star for Star/Delta AMPS 380	Locked Rotor Conditions Star for Star/Delta AMPS 400	Locked Rotor Conditions AMPS 380	Locked Rotor Conditions AMPS 400
0350	1 & 2	YTS 15-A-D	157	167	470	500
0415	1	YTS 16-A-E	175	187	525	560
	2	YTS 15-A-D	157	167	470	500
0480	1 & 2	YTS 16-A-E	175	187	525	560
0530	1	YTS 17-A-F	215	228	645	685
	2	YTS 16-A-E	175	187	525	560
0575	1 & 2	YTS 17-A-F	215	228	645	685
0620	1	YTS 18-A-G	233	248	700	745
	2	YTS 17-A-F	215	228	645	685
0670	1 & 2	YTS I-A-E (1)	268	282	805	845
0750	1 & 2	YTS J-A-F (1)	288	303	865	910
0860	1 & 2	YTS L-A-G (1)	387	407	1160	1220
0980	1	YTS M-A-H (1)	467	492	1400	1475
	2	YTS L-A-G (1)	387	407	1160	1220
1120	1 & 2	YTS M-A-H (1)	467	492	1400	1475

(1) economised

Nominal: @ 7°C leaving liquid temperature and 45°C leaving condenser liquid temperature

Maximum: @ 15°C leaving liquid temperature and 60°C leaving condenser liquid temperature

Standard Single Point Power Connection

Common Input Section Non-fused Switch Disconnect with Power section System Fuses

	Common Input Section		Power Section(s)			
	Standard Non-fused Switch Disconnect		System Fuses Max IEC 269-2-1 gG fuse Size			
Model YLCS HA/AA	Rating Ie	Input Lug Size	**System**	Rating (A)	Din NH Size	Max. 5 S Interrupt (A)
0350	500	M10	**1 & 2**	160	1	810
0415	500	M10	**1**	200	1	1000
			2	160	1	810
0480	500	M10	**1 & 2**	200	1	1000
0530	500	M10	**1**	250	2	1300
			2	200	1	1000
0575	500	M10	**1 & 2**	250	2	1300
0620	500	M10	**1**	355	2	2200
			2	250	2	1300
0660	500	M10	**1 & 2**	355	2	2200
0725	630	M12	**1 & 2**	355	2	2200
0840	630	M12	**1**	500	3	3300
			2	355	2	2200
0955	1000	2*M12	**1 & 2**	500	3	3300
1050	1000	2*M12	**1 & 2**	500	3	3300
1110	1000	2*M12	**1 & 2**	500	3	3300

Optional Single Point Power Connection

Common input Non-Fused Switched Disconnect with System Power Sections Switch Disconnect Fuse or Common input terminal Block with System Power Section Circuit Breakers

		Common Input		Power Section(s)				Common Input		Power Section(s)		
		Standard Non-fused Switch Disconnect		Fused Disconnect Switch Option				Terminal Block		Circuit Breaker Option		
					Max IEC 269-2-1 gG fuse Size							
Model YLCS HA/AA	**System**	Rating Ie	Input Lug Size	Rating Ie	Rating (A)	Din NH Size	Max. 5 S Interrupt (A)	Rating Ie	Input Lug Size	Rating In	Setting (I1)	Effective Setting
0350	**1 & 2**	500	M10	160	160,	0	810	400	M10	160	0.8	128
0415	**1**	500	M10	250	200	1	1000	400	M10	250	0.8	200
	2			160	160,	0	810			160	0.8	128
0480	**1 & 2**	500	M10	250	200	1	1000	400	M10	250	0.8	200
0530	**1**	500	M10	400	250	2	1300	400	M10	250	0.9	225
	2			250	200	1	1000			250	0.8	200
0575	**1 & 2**	500	M10	400	250	2	1300	630	M12	250	0.9	225
0620	**1**	500	M10	400	355	2	2200	630	M12	250	1	250
	2			400	250	2	1300			250	0.9	225
0660	**1 & 2**	500	M10	400	355	2	2200	630	M12	250	1	250
0725	**1 & 2**	630	M12	400	355	2	2200	630	M12	400	0.7	280
0840	**1**	630	M12	630	500	3	3300	630	M12	400	0.9	360
	2			400	355	2	2200			400	0.7	280
0955	**1 & 2**	1000	M12	630	500	3	3300	-	-	-	-	-
1050	**1 & 2**	1000	2*M12	630	500	3	3300	-	-	-	-	-
1110	**1 & 2**	1000	2*M12	630	500	3	3300	-	-	-	-	-

Optional Multi Point Power Connection

Common Input Terminal Block with Power Section System Circuit Breakers

		Common Input Section		Power Section(s)		
		Terminal Blocks		Circuit Breaker Option		
Model YLCS HA/AA	**System No**	Rating Ie	Lug Size	Rating In	Setting (I1)	Effective Setting
0350	**1 & 2**	400	M10	160	0.8	128
0415	**1**	400	M10	250	0.8	200
	2	400	M10	160	0.8	128
0480	**1 & 2**	400	M10	250	0.8	200
0530	**1**	400	M10	250	0.9	225
	2	400	M10	250	0.8	200
0575	**1 & 2**	400	M10	250	0.9	225
0620	**1**	400	M10	250	1	250
	2	400	M10	250	0.9	225
0660	**1 & 2**	400	M10	250	1	250
0725	**1 & 2**	400	M10	400	0.7	280
0840	**1**	400	M10	400	0.9	360
	2	400	M10	400	0.7	280
0955	**1 & 2**	400	M10	400	0.9	360
1050	**1 & 2**	400	M10	400	0.95	380
1110	**1 & 2**	400	M10	400	0.95	380

Multi Point Power Supply

Control Supply Load at 400 V (A)	3
Internal Fuse Rating Class aM	10
Maximum Customer Fuse Rating	16
Maximum customer wire size	4 mm^2

9.6 Sound Data

Model	dB A	SOUND PRESSURE (dB)								Total (dB A)
SA/HA/AA	**SWL**	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1000Hz**	**2000Hz**	**4000Hz**	**8000Hz**	**EN 292-1991**
0350	93	53	50	71	76	66	65	53	53	73
0415	93	53	50	71	76	66	65	53	53	73
0480	93	53	50	71	76	66	65	53	53	73
0530	95	57	67	66	76	74	64	54	47	75
0575	95	57	67	66	76	74	64	54	47	75
0620	95	57	67	66	76	74	64	54	47	75
0670	95	57	67	66	76	74	64	54	47	75
0750	95	57	67	66	76	74	64	54	47	75
0860	101	53	63	72	78	81	72	60	50	85
0980	101	53	63	72	78	81	72	60	50	85
1120	101	53	63	72	78	81	72	60	50	85

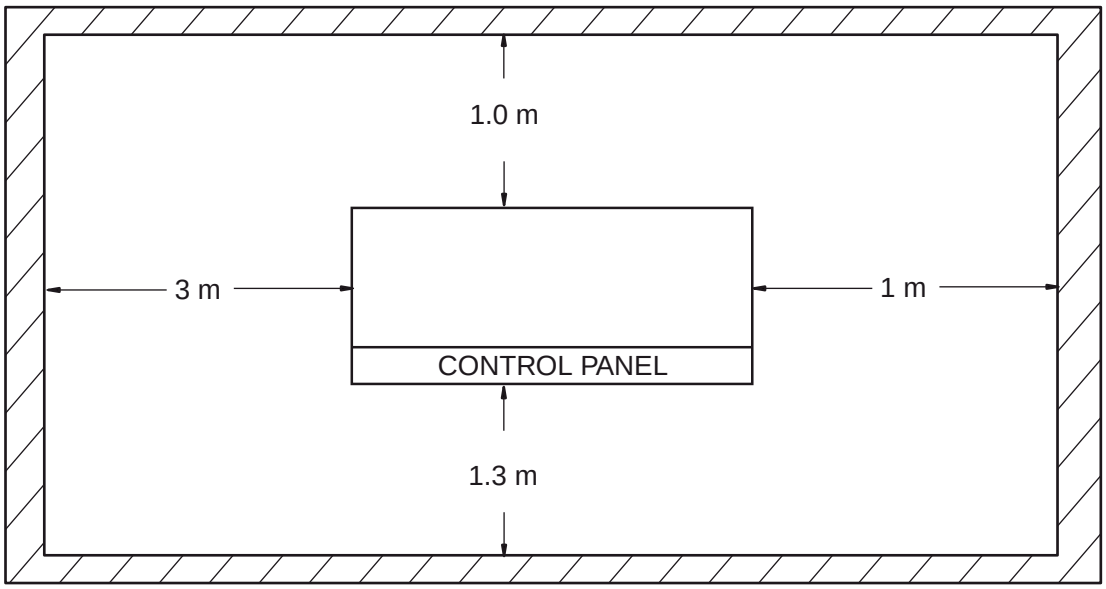
SWL = Sound Power Level

Notes:

1. Sound Power tolerance is + 3 dB as per Eurovent Specification.
2. Frequency band tolerances range from +/- 5 dB in each frequency band.
3. Sound Pressure values to ISO 3744.
4. Sound Pressure values for EN 292-1991, 1 metre from Control Panel and 1.5 metres from Ground Level.

9.7 Clearances

The recommended clearances below are the distances between the edge of the unit and the architectural enclosure surrounding the unit. The clearances allow for access of the control panel and for component removal.



Notes:

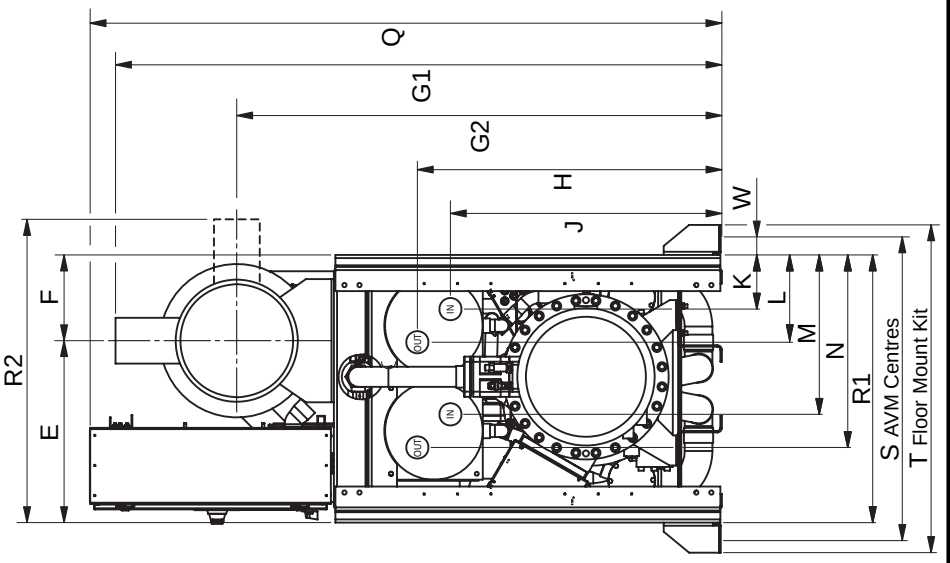
Clearances around the unit are recommended for safe operation and maintenance of the unit and control power panels.

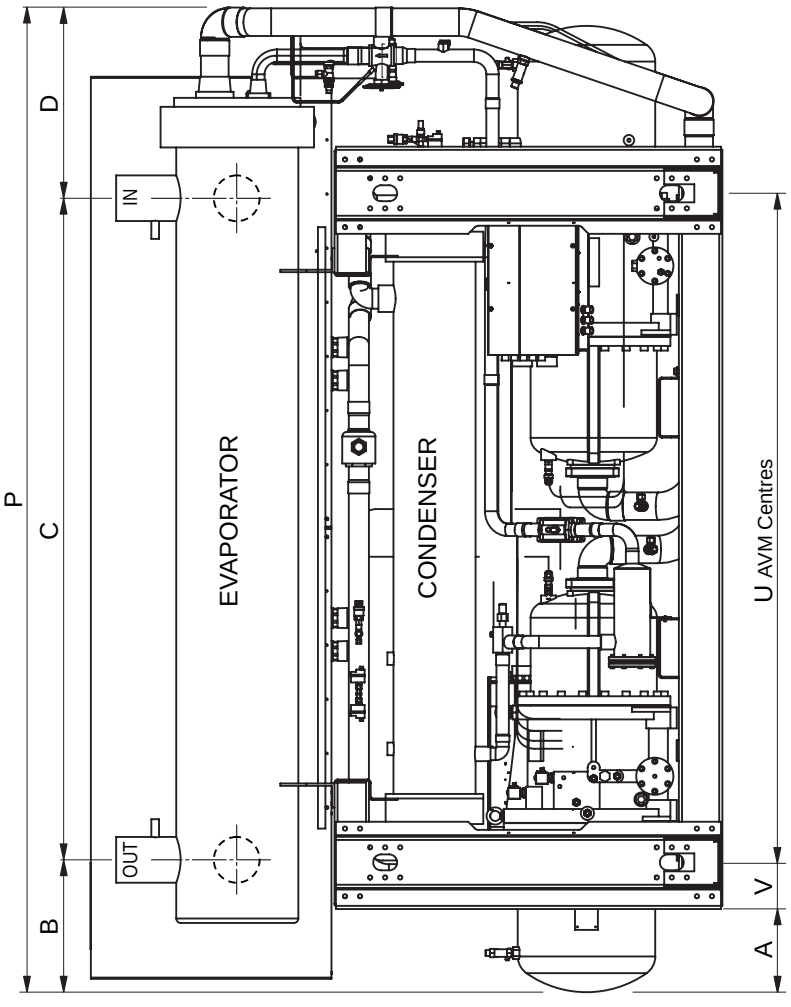
Local Health & Safety regulations or practical considerations for service replacement of large components, may require larger clearances than those shown above.

Optional sound enclosure must be taken into consideration, all clearance dimensions must be taken from outside of sound enclosure. Refer to sound enclosure documentation for these dimensions.

9.8 Dimensions

0350SA/HA - 0670SA/HA Models

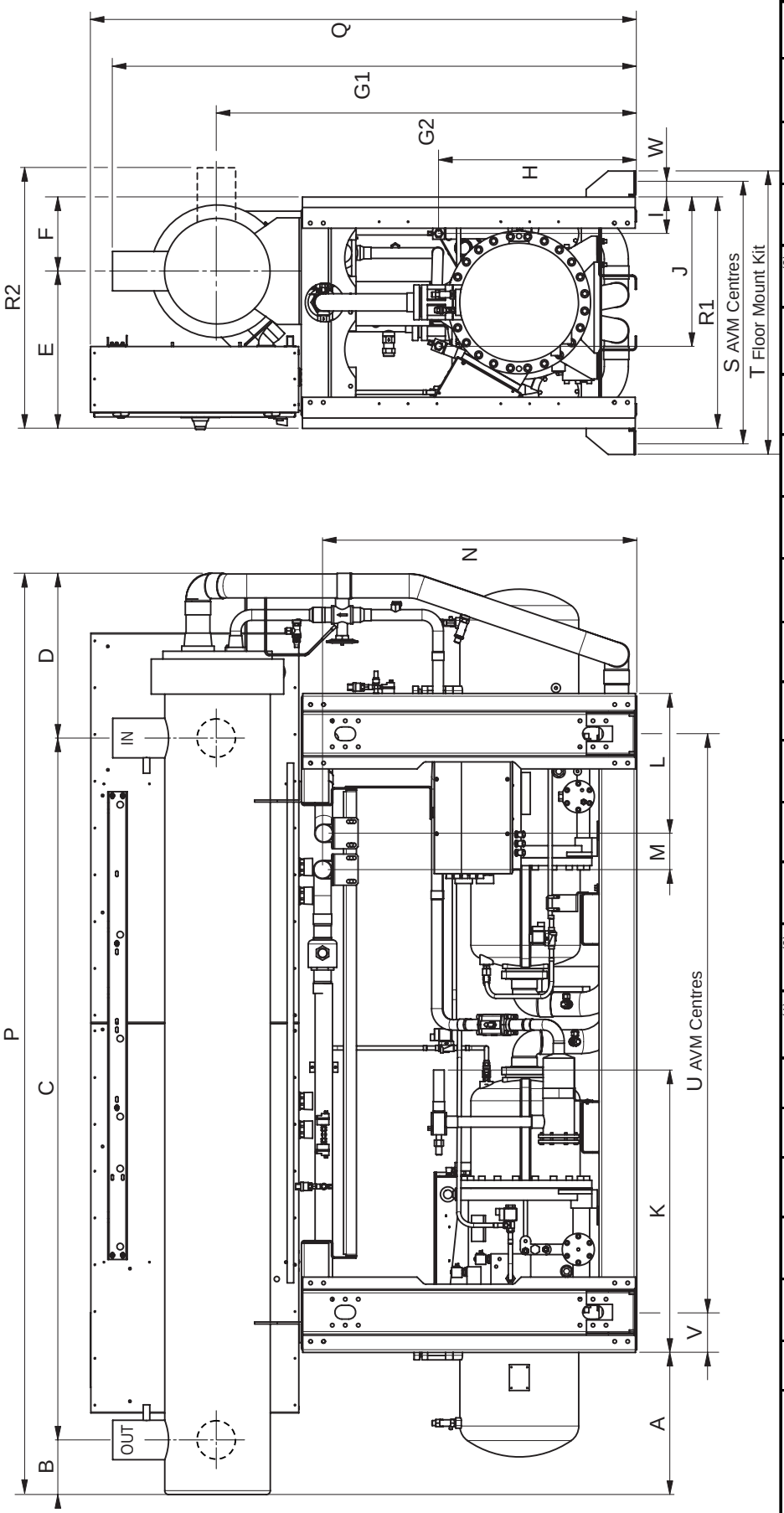




Model	A	B	C	D	E	F	G1[1]	G2[2]	H	J	K	L	M	N	P	Q	R1	R2[2]	S	T	U	V	W
350-SA & 350-HA	247	417	2250	558	605	285	1914	1550	1033	963	200	270	550	620	3225	2100	890	967	1010	1090	2225	155	60
415-SA & 415-HA	247	411	2250	583	605	285	1915	1550	1013	903	180	290	530	640	3244	2100	890	967	1010	1090	2225	155	60
480-SA & 480-HA	277	440	2200	634	605	285	2016	1615	1013	903	180	290	530	640	3274	2100	890	1010	1010	1090	2225	155	60
530-SA & 530-HA	277	440	2200	634	605	285	2016	1615	1013	903	180	290	530	640	3274	2100	890	1010	1010	1090	2225	155	60
575-SA & 575-HA	550	210	2700	634	605	285	2016	1615	1013	903	180	290	530	640	3544	2100	890	1010	1010	1090	2225	155	60
620-SA & 620-HA	550	210	2700	690	605	285	2016	1615	1013	903	180	290	530	640	3600	2100	890	1010	1010	1090	2225	155	60
670-SA & 670-HA	520	704	2130	738	605	285	2117	1640	1013	903	180	290	530	640	3572	2100	890	1084	1010	1090	2225	155	60

All Dimensions in millimetres. Dimensions exclude insulation and options. Refer to Physical Data Section for connection sizes. For reference only, please refer to York Product drawing for complete drawing.
(1) With Vertical nozzle cooler only. (2) With horizontal nozzle cooler only

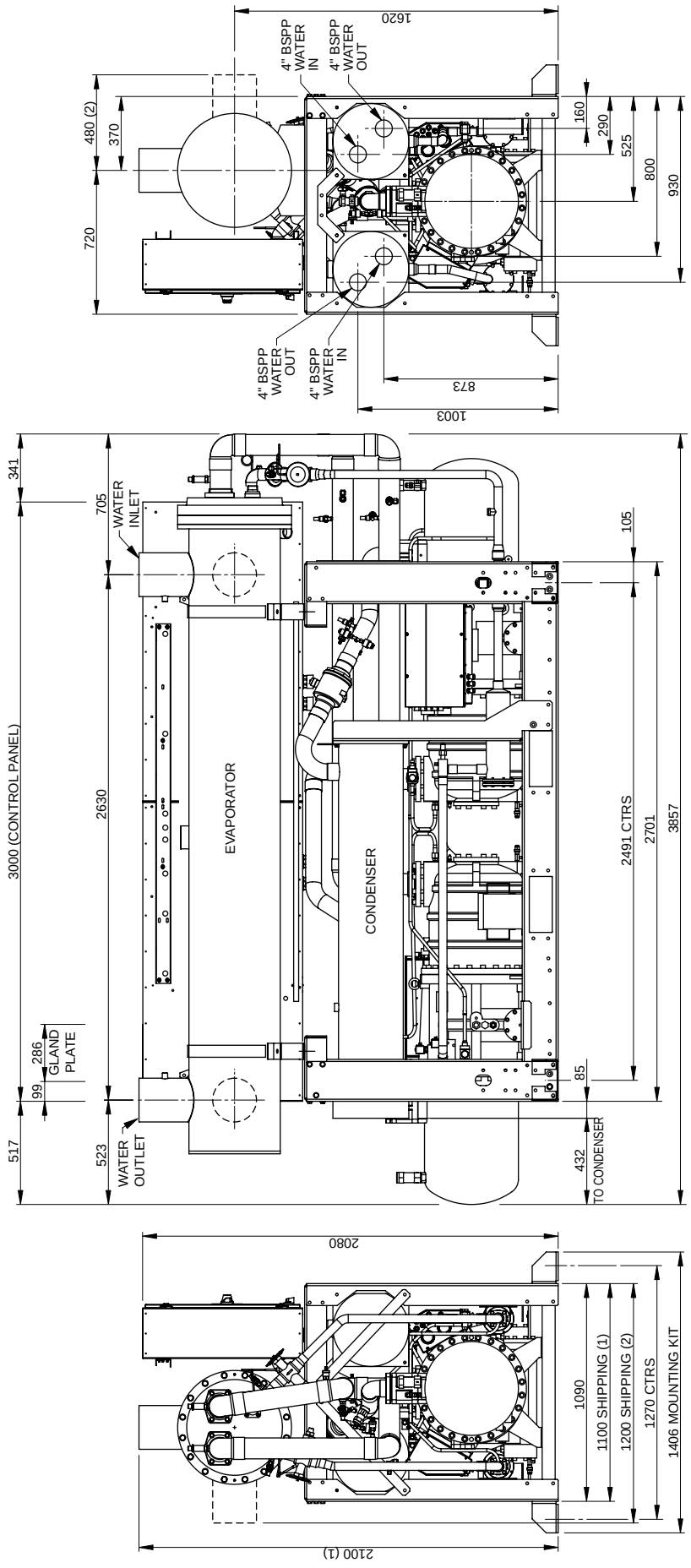
0350AA - 0670AA Models



Model	A	B	C	D	E	F	G1[1]	G2[2]	H	I	J	K	L	M	N	P	Q	R1	R2[2]	S	T	U	V	W
350-AA	247	417	2250	558	605	285	1914	1550	761	140	573	1032	538	140	1200	3225	2100	890	967	1010	1090	2225	155	60
415-AA	247	411	2250	583	605	285	1915	1550	761	140	573	1032	538	140	1204	3244	2100	890	967	1010	1090	2225	155	60
480-AA	277	440	2200	634	605	285	2016	1615	761	140	573	1087	538	140	1204	3274	2100	890	1010	1010	1090	2225	155	60
530-AA	277	440	2200	634	605	285	2016	1615	761	140	573	1087	538	140	1204	3274	2100	890	1010	1010	1090	2225	155	60
575-AA	550	210	2700	634	605	285	2016	1615	761	140	573	1087	538	140	1204	3544	2100	890	1010	1010	1090	2225	155	60
620-AA	550	210	2700	690	605	285	2016	1615	761	140	573	1087	538	140	1204	3600	2100	890	1010	1010	1090	2225	155	60
670-AA	520	704	2130	738	605	285	2117	1640	761	140	573	1087	538	140	1204	3572	2100	890	1084	1010	1090	2225	155	60

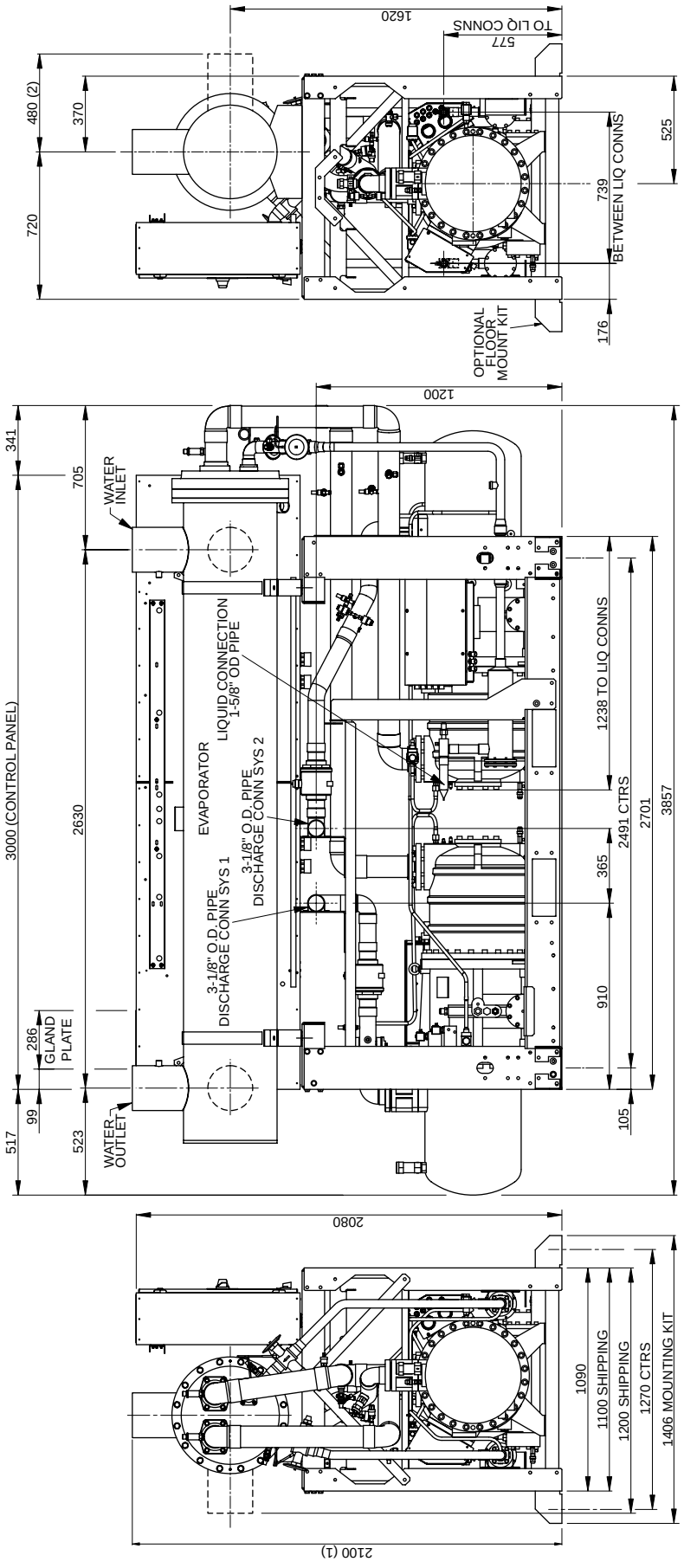
All Dimensions in millimetres. Dimensions exclude insulation and options. Refer to Physical Data Section for connection sizes. For reference only, please refer to York Product drawing for complete drawing.
(1) With Vertical nozzle cooler only. (2) With horizontal nozzle cooler only

0750SA/HA Model



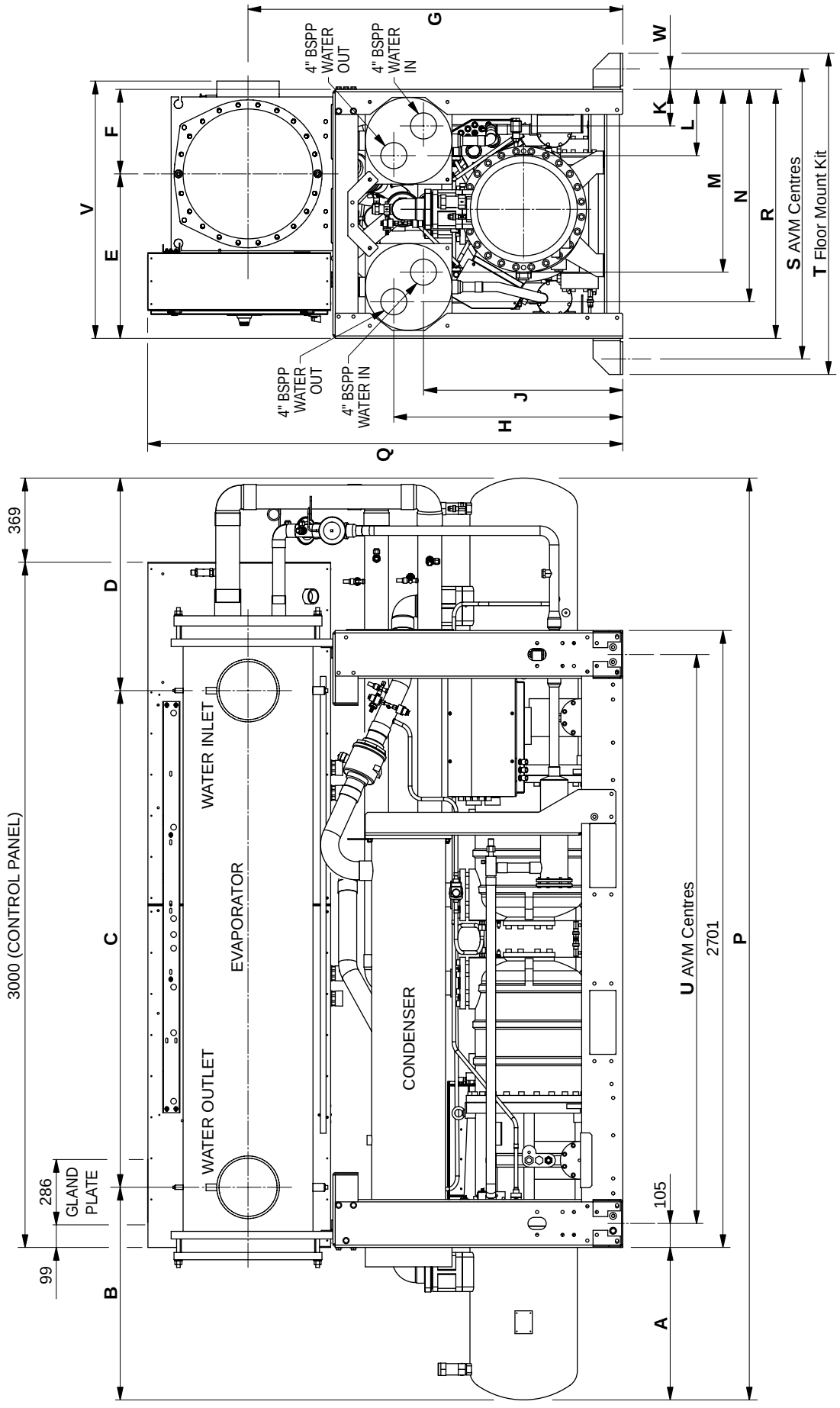
Notes:
All Dimensions in millimetres. Dimensions exclude insulation and options. Refer to Physical Data Section for connection sizes. For reference only, please refer to York Product drawing for complete drawing.
(1) With Vertical nozzle cooler only. (2) With horizontal nozzle cooler only

0750AA Model



Notes:
All Dimensions in millimetres. Dimensions exclude insulation and options. Refer to Physical Data Section for connection sizes. For reference only, please refer to York Product drawing for complete drawing.
(1) With Vertical nozzle cooler only. (2) With horizontal nozzle cooler only

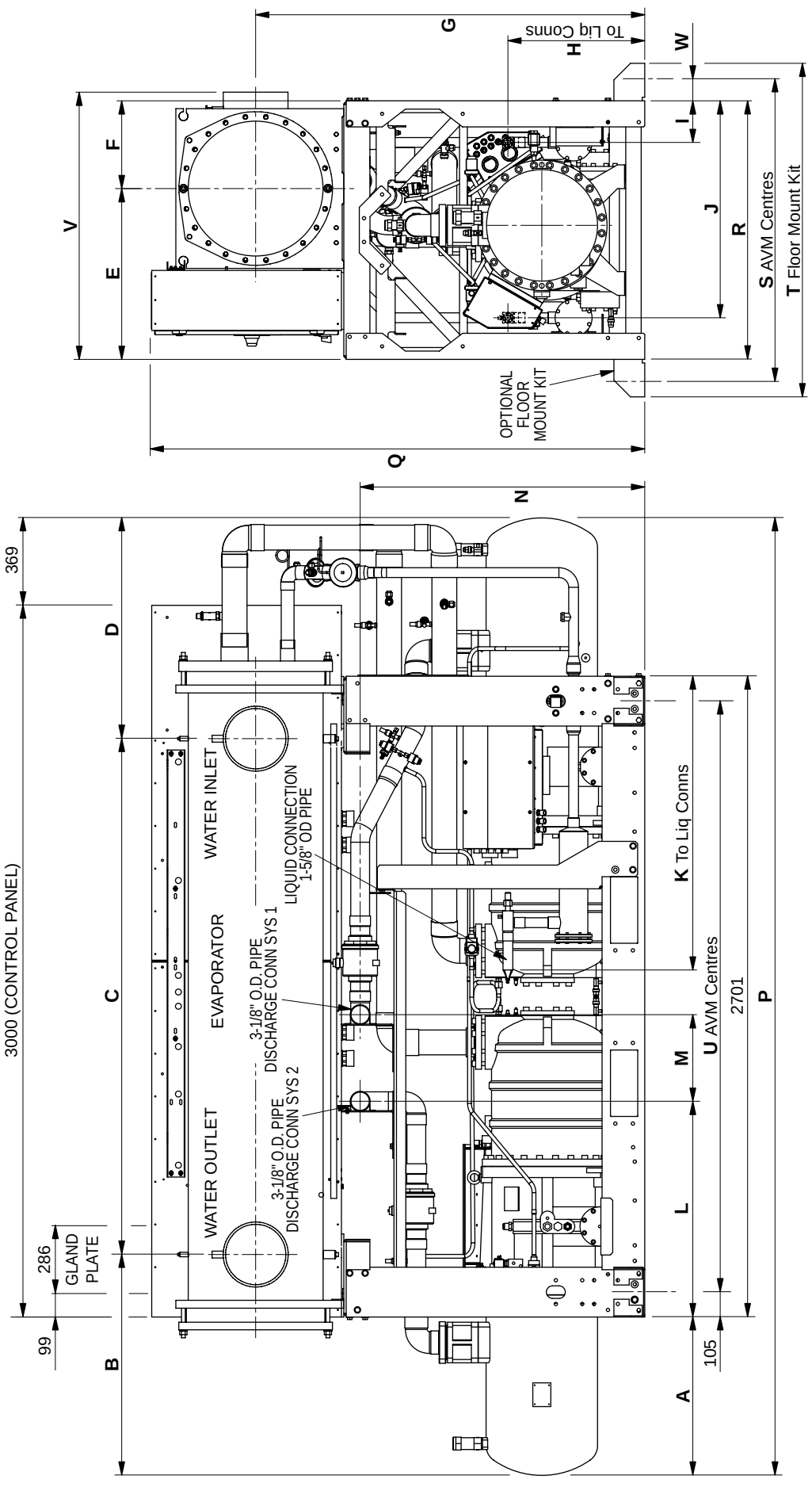
0860SA/HA - 1120SA/HA Models



Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W
860-SA & 860-HA	517	780	2175	930	720	370	1641	1003	873	160	290	800	930	3885	2080	1090	1270	1406	2491	1136	90
980-SA & 980-HA	668	930	2175	930	720	370	1641	1003	873	160	290	800	930	4036	2080	1090	1270	1406	2491	1126	90
1120-SA & 1120-HA	668	1025	2010	1000	835	455	1721	1045	915	211	341	950	1080	4036	2144	1290	1470	1606	2491	1295	90

All Dimensions in millimetres. Dimensions exclude insulation and options. Refer to Physical Data Section for connection sizes. For reference only, please refer to York Product drawing for complete drawing.

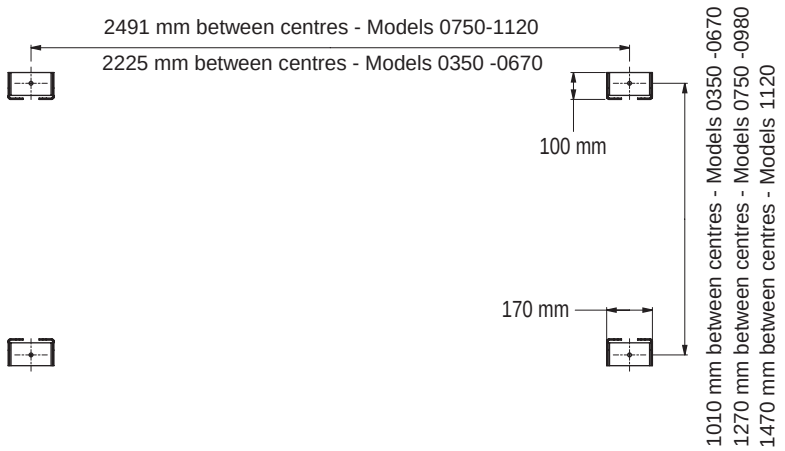
0860AA - 1120AA Models



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	U	V	W
860-AA	517	780	2175	930	720	370	1641	577	175	915	1238	910	365	1200	3885	2080	1090	1270	1406	2491	1136	90
980-AA	668	930	2175	930	720	370	1641	577	175	915	1238	910	365	1200	4036	2080	1090	1270	1406	2491	1126	90
1120-AA	668	1025	2010	1000	835	455	1721	577	275	1015	1407	785	246	963	4036	2144	1290	1470	1606	2491	1295	90

All Dimensions in millimetres. Dimensions exclude insulation and options. Refer to Physical Data Section for connection sizes. For reference only, please refer to York Product drawing for complete drawing.

9.9 Weight Distribution and Isolator Positions

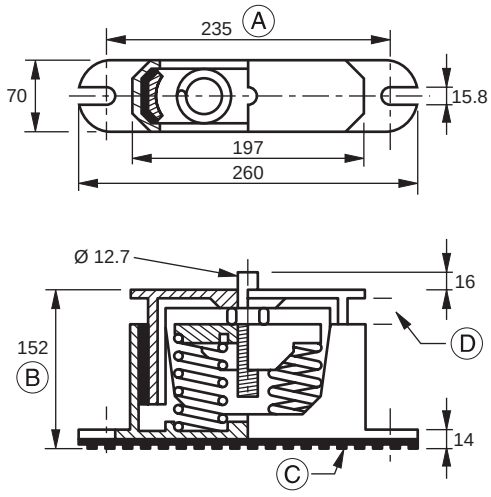


Isolator Data

Optional 25 mm deflection anti-vibration mounts:
Models 0350 to 0670 use kit 362L18081 (which includes mounts and brackets).
Models 0750 to 1120 use kit 362L18733 (which includes mounts and brackets).

The optional floor mounting kit includes brackets and 25 mm thick neoprene pads.

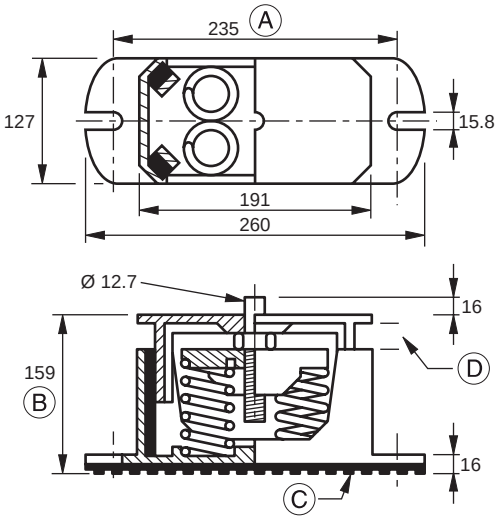
Kit 362L18081Mounts



Nominal Rating: 1180 kg, Spring Colour: White

Deflection at Nominal Load: 19 mm

Kit 362L18733 Mounts



Nominal Rating: 1966 kg, Spring Colour: Grey

Deflection at Nominal Load: 21 mm

Key

A: Foundation Bolts, B: Free and Nominal Working Height, C: 6 mm Acoustic Non-skid Neoprene Pad
D: Adjust height to ensure upper housing clears lower by 6 mm minimum / 13 mm maximum.

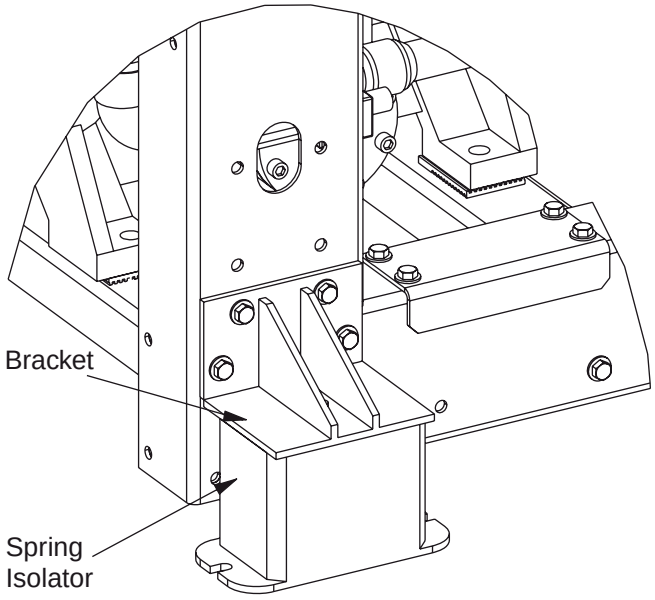
Weight Distribution

The operating weight is distributed equally between the four mounting points.

Installation

Isolators are shipped fully assembled and are to be spaced and located in accordance with installation drawings or as otherwise recommended.

The brackets shipped with the isolators must be fitted to the base frame as shown below.



Set mountings on base, shimming or grouting where required to provide flat and level surface at the same elevation for all mountings (6.4mmmaximum difference in elevation can be tolerated). Support the full underside of the base plate - do not straddle gaps or small shims.

Unless specified, mountings need not be fastened to floor in any way. If required, bolt mountings to floor through slots.

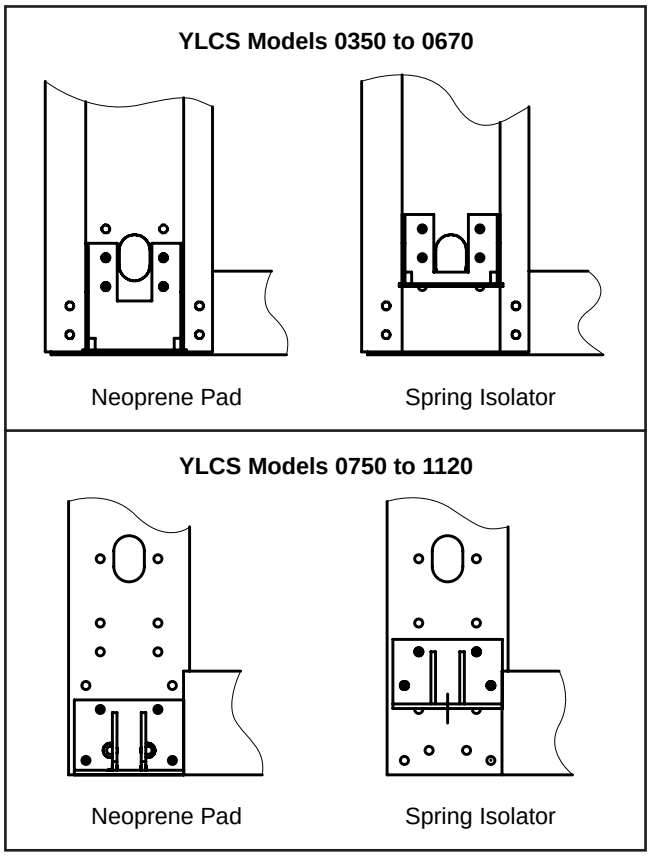
Set the unit on the mountings. The weight of the unit will cause the upper housing of the mount to go down, possibly resting on the lower housing.

If clearance between the upper housing and lower housing is less than 6.3 mm on any mounting, using a wrench turn up one complete turn on the adjusting bolt of each mounting. Repeat this procedure until 6.3 mm, clearance at is obtained on all mountings.

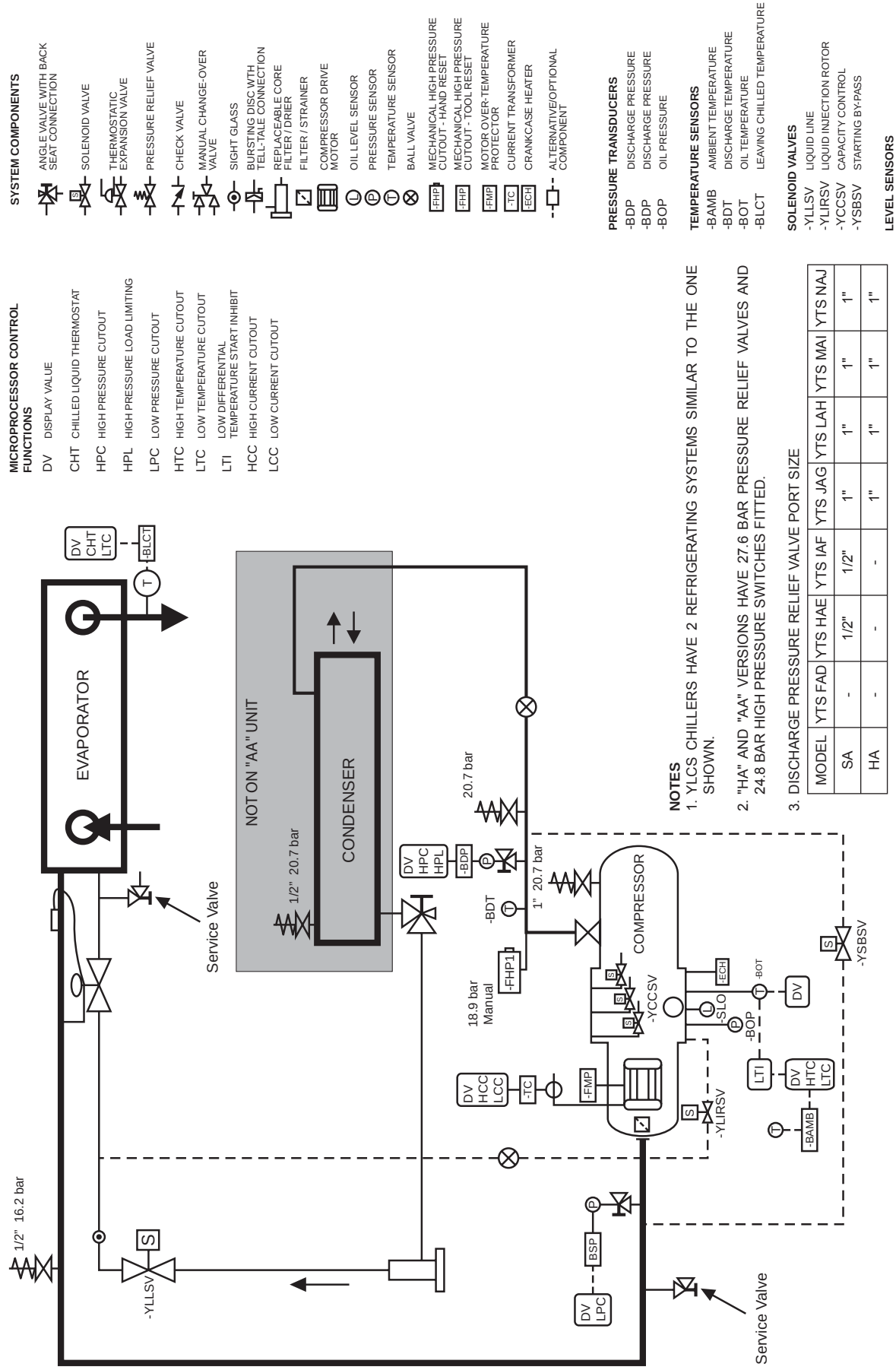
Level the unit by taking additional turns on all mounts at the low side. The clearance between the upper housing and lower housing should not exceed 12.7 mm, greater clearance indicate that mountings were not all installed at the same elevation, and shims are required

Some bolts have to be removed to fit the bracket.

Bracket fitting holes positioning



9.10 Process and Instrumentation Diagram (Models 0350SA/HA/AA to 0620SA/HA/AA)

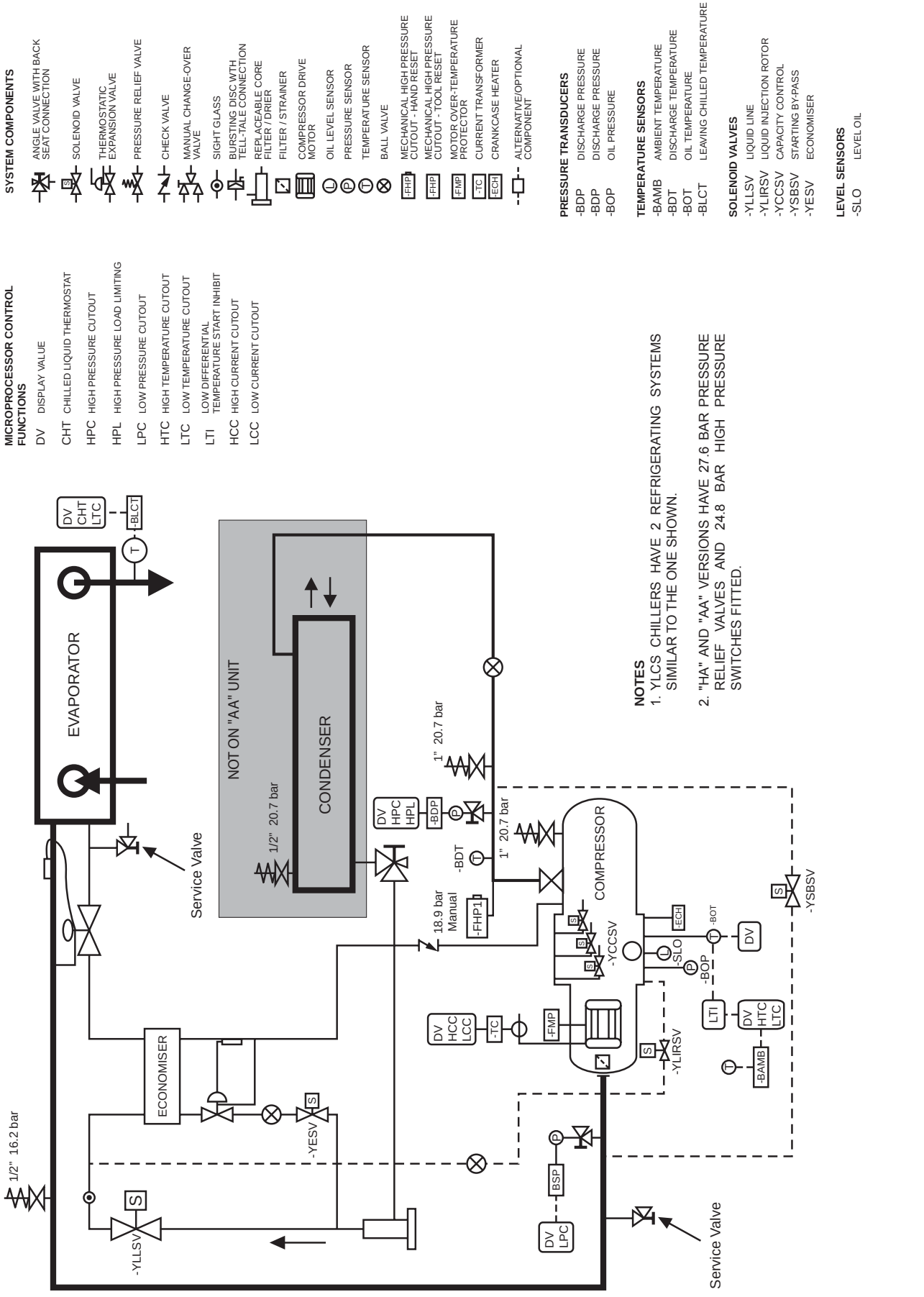


NOTES

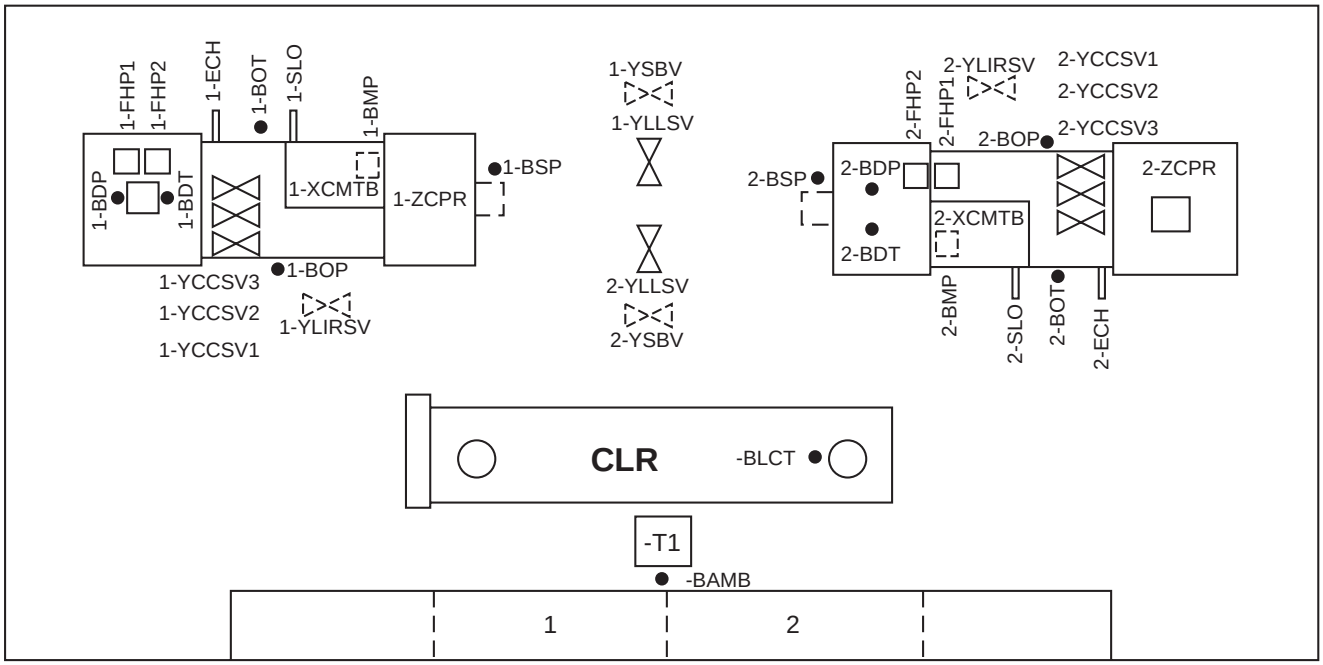
1. YLCS CHILLERS HAVE 2 REFRIGERATING SYSTEMS SIMILAR TO THE ONE SHOWN.
2. "HA" AND "AA" VERSIONS HAVE 27.6 BAR PRESSURE RELIEF VALVES AND 24.8 BAR HIGH PRESSURE SWITCHES FITTED.
3. DISCHARGE PRESSURE RELIEF VALVE PORT SIZE

MODEL	YTS FAD	YTS HAE	YTS IAF	YTS JAG	YTS LAH	YTS MAI	YTS NAJ
SA	-	1/2"	1/2"	1"	1"	1"	1"
HA	-	-	-	1"	1"	1"	1"

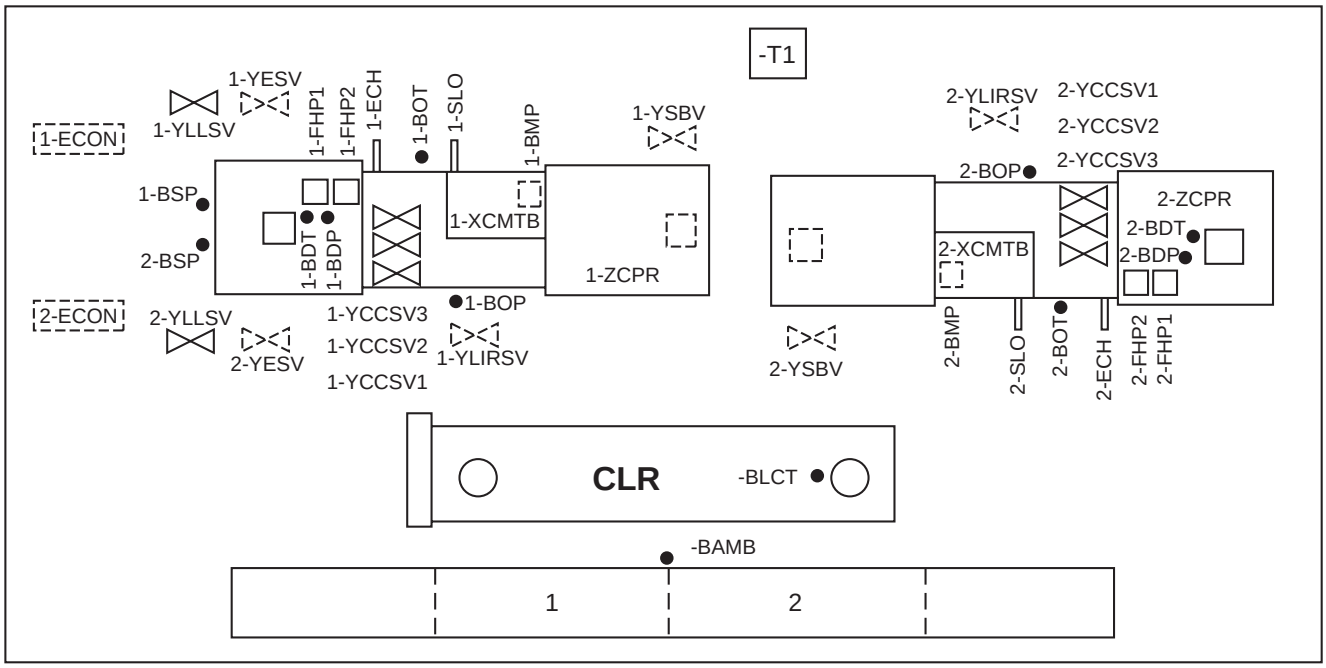
9.11 Process and Instrumentation Diagram (Models 0670SA/HA/AA to 1120SA/HA/AA)



9.12 Component Layout (Models 0350SA/HA/AA to 0980SA/HA/AA)



9.13 Component Layout (Models 1120SA/HA/AA)



10 SPARE PARTS

10.1 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 035L02701-00. Contact your local York Sales and Service Centre for information and please quote the unit model number and serial number.

When ordering spare parts, we will require the following information to ensure the correct parts are supplied:

Full unit model number, serial number, application and details of the parts required.

All requests for parts should be made to your local York Sales and Service Centre.

Description	Item	Part Number
Pressure Transducer 200psi	-BSP	025L01916-000
Pressure Transducer 400psi	-BDP, -BOP	025L01917-000
Sensor High Temperature	-BOT, -BDT	025-30440-000
Sensor Ambient Temperature	-BAMB	025-28663-001
Sensor Water Temperature	-BLCT, -BLHT	025-29964-000

10.2 Recommended Compressor Oils

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
R134a	York Grade L

10.3 Associated Drawings

Models		All
Wiring Diagrams	Schematic	035L02643-000
	Connection	035L02644-000
	Legend/Notes	035L02603-GB0

The following table gives dimension drawing numbers for all models, and condenser extension and manifold kits.

Model	Dimension Drawing		Condenser Extension Kit		Condenser Manifold
	Vertical Nozzles	Horizontal Nozzles	Victaulic	Flanged	
350-SA & 350-HA	035L02652-000	035L02652-001	362I18512-000	N/A	362I180XX-XXX
415-SA & 415-HA	035L02653-000	035L02653-001	362I18513-000	362I18513-001	362I180XX-XXX
480-SA & 480-HA	035L02654-000	035L02654-001	362I18513-000	362I18513-001	362I180XX-XXX
530-SA & 530-HA	035L02655-000	035L02655-001	362I18513-000	362I18513-001	362I180XX-XXX
575-SA & 575-HA	035L02656-000	035L02656-001	362I18513-000	362I18513-001	362I180XX-XXX
620-SA & 620-HA	035L02657-000	035L02657-001	362I18513-000	362I18513-001	362I180XX-XXX
670-SA & 670-HA	035L02658-000	035L02658-001	362I18513-000	362I18513-001	362I180XX-XXX
750-SA & 750-HA	035L02659-000	035L02659-001	362I18514-000	362I18514-001	362I180XX-XXX
860-SA & 860-HA	N/A	035L02660-001	362I18514-000	362I18514-001	362I180XX-XXX
980-SA & 980-HA	N/A	035L02661-001	362I18514-000	362I18514-001	362I180XX-XXX
1120-SA & 1120-HA	N/A	035L02716-000	362I18514-000	362I18514-001	362I180XX-XXX

Model	Dimension Drawing	
	Vertical Nozzles	Horizontal Nozzles
350-AA	035L02723-000	035L02723-001
415-AA	035L02724-000	035L02724-001
480-AA	035L02725-000	035L02725-001
530-AA	035L02726-000	035L02726-001
575-AA	035L02727-000	035L02727-001
620-AA	035L02728-000	035L02728-001
670-AA	035L02729-000	035L02729-001
750-AA	035L02730-000	035L02730-001
860-AA	N/A	035L02731-001
980-AA	N/A	035L02732-001
1120-AA	N/A	035L02733-000

11 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.

11.1 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 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 exchangers from the external water systems and drain the heat exchanger section of the systems. 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 can be disconnected and removed.

Units can generally be removed in one piece after disconnection as above. Any mounting 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 9 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.

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