YORK®	AIR-COOLED CHILLER AND HEAT PUMP	
INSTALLATION,COMMISSIONING, OPERATION & MAINTENANCE	Supersedes: 6U6K-B01E-NA-EN	FORM NO.: 6U6K-B01E-NB-EN

YMAA / YMPA 0045-0260

AIR-COOLED CHILLER AND HEAT PUMP

50Hz

44-255kW

R410A

CE

Issue Date:
February 26, 2018

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

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

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

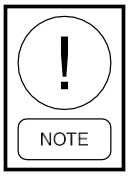
SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to specific situations:

Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.

Indicates a potentially hazardous situation which will result in possible injuries or damage to equipment if proper care is not taken.

Identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution if proper care is not taken or instructions and are not followed.



Highlights additional information useful to the technician in completing the work being performed properly.

External wiring, unless specified as an optional connection in the manufacturer's product line, is not to be connected inside the control cabinet. Devices such as relays, switches, transducers and controls and any external wiring must not be installed inside the micro panel. All wiring must be in accordance with Johnson Controls' published specifications and must be performed only by a qualified electrician. Johnson Controls will NOT be responsible for damage/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this warning will void the manufacturer's warranty and cause serious damage to property or personal injury.

CHANGEABILITY OF THIS DOCUMENT

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

It is the responsibility of rigging, lifting, and operating/ service personnel to verify the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, rigging, lifting, and operating/service personnel should verify whether the equipment has been modified and if current literature is available from the owner of the equipment prior to performing any work on the chiller.

CHANGE BARS

Revisions made to this document are indicated with a line along the left or right hand column in the area the revision was made. These revisions are to technical information and any other changes in spelling, grammar or formatting are not included.

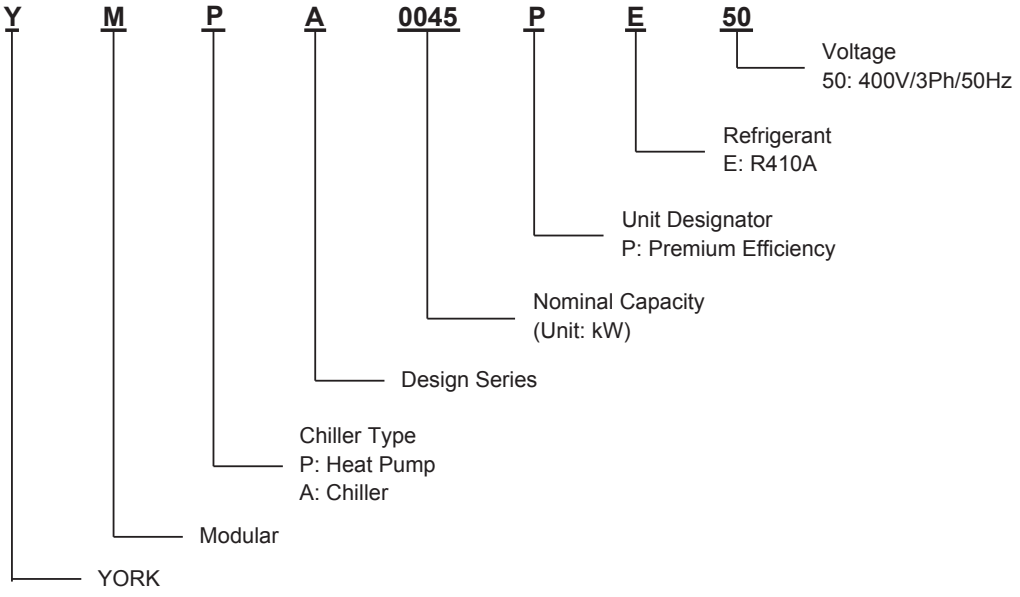
ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
SC-EQ Communication Card Installation Instructions	450.50-N1

SINGLE CIRCUIT AND DUAL CIRCUIT MODELS

This manual contains installation, operation and maintenance instructions for both single and dual refrigerant circuit models. If your unit is a single circuit model (YMAA/YMPA 0045-0065), disregard references to "System 2" which may appear in this manual. Any references to Sys 2 are applicable to YMAA/YMPA 0080-0260 models.

BASIC UNIT NOMENCLATURE



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SECTION 1 – GENERAL INFORMATION AND SAFETY

INTRODUCTION

YORK YMAA/YMPA 0045-0260 (12-72 ton, 44-255 kW) chillers and heat pumps are manufactured to the highest design and construction standards to ensure high performance, reliability and adaptability to all types of air conditioning installations.

The unit combines a multiple step control design with an industry leading DC Inverter technology allowing the unit's compressors to operate more efficiently than constant speed units across all capacity-load and ambient-temperature conditions. It is designed for part-load efficiency exceeding EcoDesign 2021.

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

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

All procedures detailed in the manual, 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 manual.

WARRANTY

Johnson Controls warrants all equipment and materials against defects in workmanship and materials for a period of one year from date of initial start-up or eighteen (18) months from date of shipment, whichever occurs first, unless labor or extended warranty has been purchased as part of the contract.

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

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

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

For warranty purposes, the following conditions must be satisfied:

- The initial start of the unit must be carried out by trained personnel from an Authorized Johnson Controls Service Center *(see SECTION 6 – COMMISSIONING)*.
- Only genuine YORK approved spare parts, oils, coolants, and refrigerants must be used.
- All the scheduled maintenance operations detailed in this manual must be performed at the specified times by suitably trained and qualified personnel *(see SECTION 11 – MAINTENANCE)*.
- Failure to satisfy any of these conditions will automatically void the warranty *(see Warranty Policy)*.

SAFETY

Standards for Safety

YMAA/YMPA units are designed and built within an ISO 9001 accredited design and manufacturing organization. The units comply with the applicable sections of the following Standards and Codes:

- Machinery Directive (2006/42/EC)
- EMC Directive (2014/30/EU)
- Pressure Equipment Directive (2014/68/EU)
- Safety Code for Mechanical Refrigeration EN 378-2
- Safety of machinery - Electrical Equipment of Machine (EN 60204-1)
- Generic emissions and immunity standards for industrial environment EN61000-6-4&61000-6-2
- Fluorinated greenhouse gases regulation ((EU) No 517/2014)

In addition, the units conform to European Conformity (CE) for

construction of units and provide CE Listing Label.

Fluorinated Greenhouse Gases

- This equipment contains fluorinated greenhouse gases covered by the Kyoto Protocol.
- The GWP (global warming potential) of the refrigerant (R410A) used in this unit is 2088.
- The refrigerant quantity is stated in the Physical Data table of this document.
- The fluorinated greenhouse gases in this equipment may not be vented to the atmosphere.
- This equipment should only be serviced by qualified technicians.

Responsibility for Safety

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

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

ABOUT THIS MANUAL

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

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

MISUSE OF EQUIPMENT

Suitability for Application

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

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

Structural Support

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

Mechanical Strength

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

General Access

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

Pressure Systems

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

Heat Radiation

Some of the visible parts like discharge pipe and driver heat sink may work under high temperatures, thus radiate high heat flux. Special attention must be paid while getting close to the unit. Touching is prohibited during normal operation.

Rotating Parts

Fan guards must be fitted at all times and not removed unless the power supply has been isolated.

Sharp Edges

The fins on the air-cooled condenser coils have sharp metal edges. Reasonable care should be taken when working in contact with the coils to avoid the risk of minor abrasions and lacerations. The use of gloves is recommended.

Frame rails, panels, and other components may also have sharp edges. Reasonable care should be taken when working in contact with any components to avoid risk of minor abrasions and lacerations.

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. They are pre-charged before delivery to customer and normally dispense with the need of additional charging, unless the machine is not working properly.

Use of gloves and safety glasses is, however, recomm-ended when working on the unit. The buildup of refrigerant vapor, from a leak for example, does pose a risk of asphyxiation in confined or enclosed spaces and attention should be given to good ventilation.

High Temperature and Pressure Cleaning

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

Emergency Shutdown

In case of emergency, the HMI panel or the control panel is fitted with a Unit Switch to stop the unit in an emergency. When operated, it removes the low voltage 230 VAC electrical supply of the control panel, thus shutting down the unit.

Safety Labels

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

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

SECTION 2 – PRODUCT DESCRIPTION

INTRODUCTION

YORK Air-Cooled Modular Chiller and Heat Pump provide chilled water or (and) hot water for all air conditioning applications using central station air handling or terminal units. They are completely self-contained and are designed for outdoor (roof or ground level) installation. Each complete packaged unit includes hermetic scroll compressors, a liquid cooler, air cooled condensers, a charge of refrigerant R410A and a weather resistant microprocessor control center, all mounted on a welded steel base.

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

Prior to delivery, the packaged unit is pressure-tested, evacuated, and fully charged with Refrigerant-R410A and oil.

After assembly, a complete operational test is performed with water flowing through the cooler to assure that the refrigeration circuit operates correctly.

The unit structure is heavy-gauge, galvanized steel. This galvanized steel is coated with baked-on powder paint, which, when subjected to ISO 9227 500 hour, salt spray testing, yields a minimum ISO 10289 rating of "6". Corrosion resistant wire mesh grills and lower panels are added to protect the condenser coil from incidental damage and restrict unauthorized access to internal components.

All exposed power wiring is routed through liquid-tight, UV-stabilized, non-metallic conduit.

The unit conforms with the essential requirements of the following relevant EC directives:

- Pressure Equipment Directive 2014/68/EU
- EMC Directive 2014/30/EU
- Machinery Directive 2006/42/EC
- Ecodesign Directive (2009/125/EC)
- Energy Label Directive 2010/30/EU

GENERAL SYSTEM DESCRIPTION

Compressor

Each unit has a DC (direct current) inverter scroll compressor which is driven directly by an external driver, located next to the control panel. The compressor is capable to run at the speed of 40 to 110 Hz. Standard sound insulation includes an acoustic blanket and a sheet metal enclosure.

The unit also has fixed speed, hermetic, scroll compressors. High efficiency is achieved through a controlled orbit and the use of advanced scroll geometry. The compressors incorporate a compliant scroll design in both the axial and radial direction.

All rotating parts are statically and dynamically balanced. A large internal volume and oil reservoir provides greater liquid tolerance. Compressor crankcase heaters are also included for extra protection against liquid migration.

Refrigerant Circuits

One or two independent refrigerant circuits are provided on each unit. Each 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.

Each circuit shall incorporate all components necessary for the designed operation including: a suction accumulator, a liquid receiver, a four way reversing valve, service valves, pressure relief valves, an oil separator (only available for inverter system), a bi-flow electrical expansion valve. Suction lines shall be covered with closed-cell insulation.

Electronic Expansion Valve

Electronic Expansion Valve works as throttle device. The valve supports automatic adjustment of refrigerant flow rate and makes the system work under optimized conditions for the purpose of fast cooling or heating, precise temperature control and energy saving. It permits operation at both low temperatures and comfort cooling applications without a capacity loss or derate at either condition **(Factory mounted).**

Evaporator (Heat Exchanger)

The compact, high efficiency Brazed Plate Heat Exchanger (BPHE) is constructed with 316 stainless steel corrugated channel plates with a filler material between each plate. It offers

excellent heat transfer performance with a compact size and low weight, reducing structural steel requirements on the job site.

The heat exchanger is manufactured in a precisely controlled vacuum-brazing process that allows the filler material to form a brazed joint at every contact point between the plates, creating complex channels.

The units with two refrigerant systems use dual circuit BPHEs. Asymmetric channels provide optimal efficiency in the most compact design. This results in low refrigerant charge or lower pressure drop on the water or brine side. The asymmetry guarantees the best performance in both full and partial-load conditions. The integrated distribution system ensures an even distribution of the refrigerant throughout the plate package.

The refrigerant side design working pressure of the heat exchanger is 45 bar and the waterside (piping) design working pressure is 10 bar.

The Brazed Plate Heat Exchanger is equipped with a heater controlled by the microprocessor. The heater provides freeze protection for the cooler down to -20 °C ambient. The cooler is covered with 1-1/2" (38mm) flexible, closed-cell, foam insulation.

Installing contractor must include accommodations in the chilled water piping to allow proper drainage and venting of the heat exchanger. Water inlet and outlet connections are grooved for compatibility with factory supplied victaulic connections.

A strainer with a mesh size between 0.8 and 1.0 mm (20 mesh) is recommended upstream of the heat exchanger to prevent clogging.

A factory-wired flow switch is standard, installed in a pipe section at the outlet of the evaporator.

Condenser

Coils – Fin and tube condenser coils of seamless, internally-enhanced, high-condensing-coefficient, corrosion resistant copper tubes are arranged in staggered rows, mechanically expanded into hydrophilic aluminum fins. The design working pressure of the coil is 45 bar (650 PSIG).

Fans – The condenser fans are composed of corrosion resistant aluminum blades sprayed with PP plastic and galvanized sheet steel fan housing coated with black plastic. They are designed for maximum efficiency with integrated variable speed drive. They are directly driven by independent EC motors, and positioned for vertical air discharge. All blades are statically and dynamically balanced for vibration-free operation. The fan grilles are constructed of heavy-gauge, rust-resistant, coated steel.

EC Motors – The fans are directly driven by EC (Electrical Commutation) motors. Thermal loading protection and line under-voltage, phase failure detections are integrated. Fan speed is controlled through ModBus communication. They feature ball bearings that are double-sealed and permanently lubricated.

OPTIVIEW LT CONTROLLER

The HMI is contained in a protection class IP54 cabinet installed in the middle beam with hinged outer door and includes a 7-inch controller backlighting for outdoor viewing.

Different operation levels are accessible for viewer, operator and service. Password will be required for high level entries. Refer to Section 7 - *OPTIVIEW LT OPERATION* for details.

POWER PANEL

The control elements are fitted in a factory installed and wired IP54 rain/dust tight, powder painted steel cabinets with tool lockable, hinged, latched, and gasket sealed outer doors. Main power connection(s), compressor starters, current overloads are provided and factory wired.

A unit-mounted Circuit Breaker with external lockable handle shall be provided at the point of incoming single point connection for field connection, interconnecting wiring to the compressors, and isolating the power voltage for servicing. Incoming power wiring must comply with local codes. Circuit breaker shall be sized to provide the motor branch circuit protection, short circuit protection and ground fault protection for the motor branch-circuit conductors, the motor control apparatus and the motors.

Power panel contains:

- IPU3 (including I/O board and core board)
- Compressor and fan contactors
- Compressor thermal relays
- Main circuit breaker
- Power sequence protector
- Power and control wiring terminals
- Compressor power terminals

Short Circuit Withstand Rating of the unit electrical enclosure shall be (400V: 5,000 Amps). Rating shall be published in accordance with EN 60204-1.

The power wiring is routed through liquid-tight conduit to the compressors, fans, driver and transformer.

DRIVER PANEL

The inverter compressor driver is enclosed in a separate panel on the base frame. It converts alternating current into direct current to drive the compressor rotating at the rate of 10 RPS (round per second) as a minimum and 130 RPS as a maximum. To improve the heat emission efficiency, a cooling fan is fitted at the backside of the panel for forced convection. Driver operation status and faults are displayed through the flicker of the LEDs.

Driver panel contains:

- Filter board
- Rectification circuit
- Inverter
- Terminals
- Cooling fins and fan

All the wirings inside are factory-mounted.

STANDARD EQUIPMENT

DISCHARGE PRESSURE TRANSDUCERS – The addition of pressure transducers allows models to sense and display discharge pressure. This allows the unit to automatically adjust condenser fan speed to suit different ambient conditions, as well as protect the unit from over pressure **(Factory-Mounted)**.

SUCTION PRESSURE TRANSDUCERS – Permits unit to sense and display suction pressure. This capability is standard on all models. The suction pressure is monitored for system superheat control **(Factory-Mounted)**.

CONTROL TRANSFORMER – Power panel shall be supplied with a factory mounted and wired control transformer that will supply all unit control voltage from the main unit power supply. Transformer shall utilize scheduled line voltage on the primary side and provide 230V/1N on secondary **(Factory-Mounted)**.

COMMUNICATIONS – Communication capability for BACnet (MS/TP), Modbus and N2 as standard via SC-EQUIP (SC-EQ) board **(Factory-Mounted)**.

The SC-EQ board is designed with four active serial ports: The J12 BAS (RS-485) port, the J7 Equipment (RS-232) port, the J8 Equipment (RS-485) port and the J1 CS port which allows equipment data to be sent to the Johnson Controls Remote Operation Center for remote unit monitoring and diagnostics. Refer to Wiring Diagram for details.

SERVICE ISOLATION VALVE – Service suction and discharge (ball type) isolation valves are added to unit per system **(Factory-Mounted)**.

DUAL RELIEF VALVES – Two relief valves are fitted at low pressure, and two relief valves at high pressure side for each refrigeration circuit **(Factory-Mounted)**.

FLOW SWITCH – Vapor proof, paddle-type with 1"NPT connection for upright mounting in horizontal pipe. This flow switch or its equivalent must be supplied with each unit to protect the heat exchanger from loss of liquid flow **(Factory Mounted)**.

ENCLOSURE PANELS – Consists of steel panel guards mounted on bottom part of the unit to prevent unauthorized access **(Factory mounted).**

COMPRESSOR ACOUSTIC BLANKETS AND ENCLOSURES – The inverter compressor is individually enclosed in an acoustic sound blanket made of two layers of acoustical absorbent polyester fiber of 15 mm thickness and one layer of anti-vibrating heavy material thickness of 1 mm with lined cotton. The blanket is closed by two sheets of PVC, reinforced for temperature and UV resistance. Also it goes

with acoustically lined, painted galvanized steel, enclosure with removable panels for maintenance purposes **(Factory Mounted).**

OPTIONS

TOUCH SCREEN WIRE CONTROLLER – The wire controller is applicable for dual HMI control, together with standard 7 inch HMI. Both of the controllers are valid to operate the unit simultaneously **(Field-Mounted)**.

LOW SOUND KIT – The option provides sound attenuation configurations. It is composed of compressor acoustic blankets for all the compressors and melamine foam for lower panels. Also the fan configuration is changed to provide lower sound emissions. They are recommended for residential or other similar sound sensitive locations **(Factory-Mounted).**

VIBRATION ISOLATION

Elastomeric Isolation – This option is recommended for normal installations. It provides very good performance in most applications for the least cost **(Field-Mounted)**.

25 mm (1") Spring Isolators – Spring and cage type isolators for mounting under the unit base rails are available to support unit. They are level adjustable. 25 mm (1") nominal deflection may vary slightly by application **(Field-Mounted)**.

50 mm (2") Restrained Spring Isolators – Restrained Spring-Flex Mounting isolators incorporate a rugged welded steel housing with vertical and horizontal limit stops. Housings designed to withstand a minimum 1.0g accelerated force in all directions up to 51 mm (2"). The deflection may vary slightly by application. They are level adjustable **(Field-Mounted)**.

MODULARITY KITS – An additional outlet water temperature sensor will be required for modular control. The sensor is used for compressor sequencing and water side protections **(Field-Mounted)**.

HYDRO KIT

Factory fitted Hydro Kit is suitable for water and glycol systems with up to 30% glycol. DOWTHERM SR-1 or other equivalent solutions are recommended as inhibited ethylene glycol-based heat transfer fluids. Contact local JCI service representatives for any applications that require a higher concentration of glycol or the composition is different **(Factory-Mounted)**.

Variable speed pump is optional for all models. The kit is available in single, standard head, with open drive air cooled Electrical Commutation motor.

Fixed speed pump is optional for models from 45 to 130 kW.

The hydro-kit option comes standard with a single pump, a 30 mesh strainer, an expansion tank, an air purger and drainage valves.

Auxiliary heaters are strapped around the water pipes to provide anti-freezing protections.

The pumps are factory wired to the unit control system to provide auto pump starting and running.

REFRIGERANT FLOW DIAGRAM

SYSTEM PID

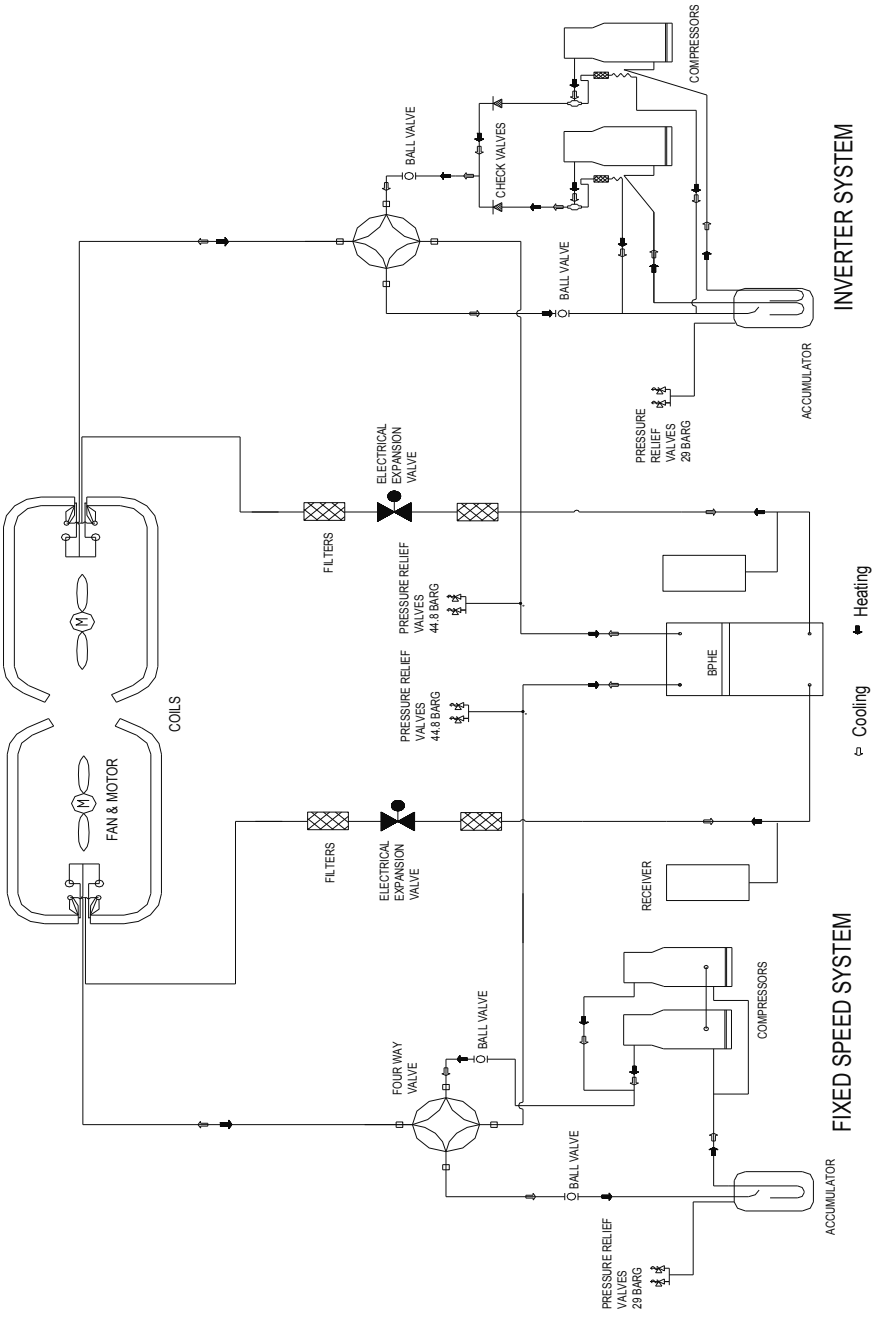


FIGURE 1 – REFRIGERANT FLOW DIAGRAM

Notes

1.The piping and instrument diagram is exemplified by dual circuit YMPA130;

2.Configurations may vary for different models.

COOLING MODE

Low pressure liquid refrigerant enters the evaporator BPHE and is evaporated and superheated by the heat energy absorbed from the chilled liquid. Through 4-way valve, suction accumulator, the superheated low pressure vapor enters the compressors and is compressed to high pressure. The high pressure vapor is fed to the ambient coils and fans, via the four way reversing valve, where heat is removed. The fully condensed and subcooled liquid passes through the electronic expansion valve where pressure is reduced and turned into two-phase refrigerant mixture to make chilled water in evaporator BPHE.

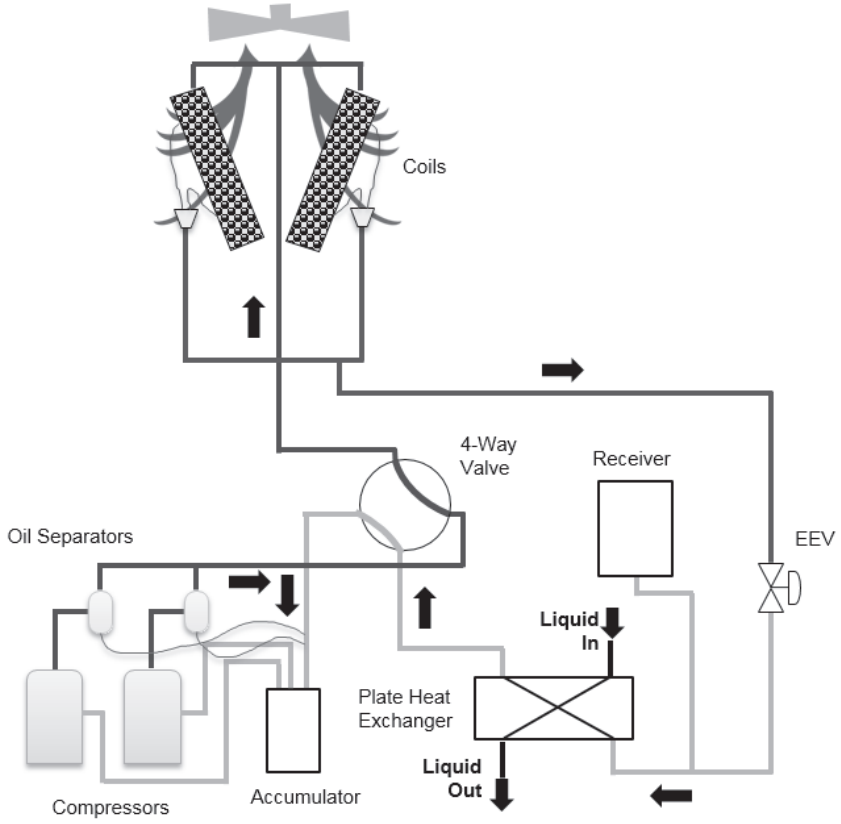


FIGURE 2 – COOLING FLOW DIAGRAM

HEATING MODE

Two-phase refrigerant liquid enters RTPF (round tube and plate fin) coils and fully evaporated there by absorbing the heat from the flowing air driven by the EC fan. Through 4-way valve and accumulator, superheated low suction vapor enters the compressor(s). The compressors rework to compress vapor to higher pressure, which flow into BPHE (as a condenser) and condensed into refrigerant liquid by rejecting the heat to the flowing water to make hot water. The subcooled refrigerant liquid goes through EEV and re-enters into RTPF coils (as evaporator) to repeat the circulation.

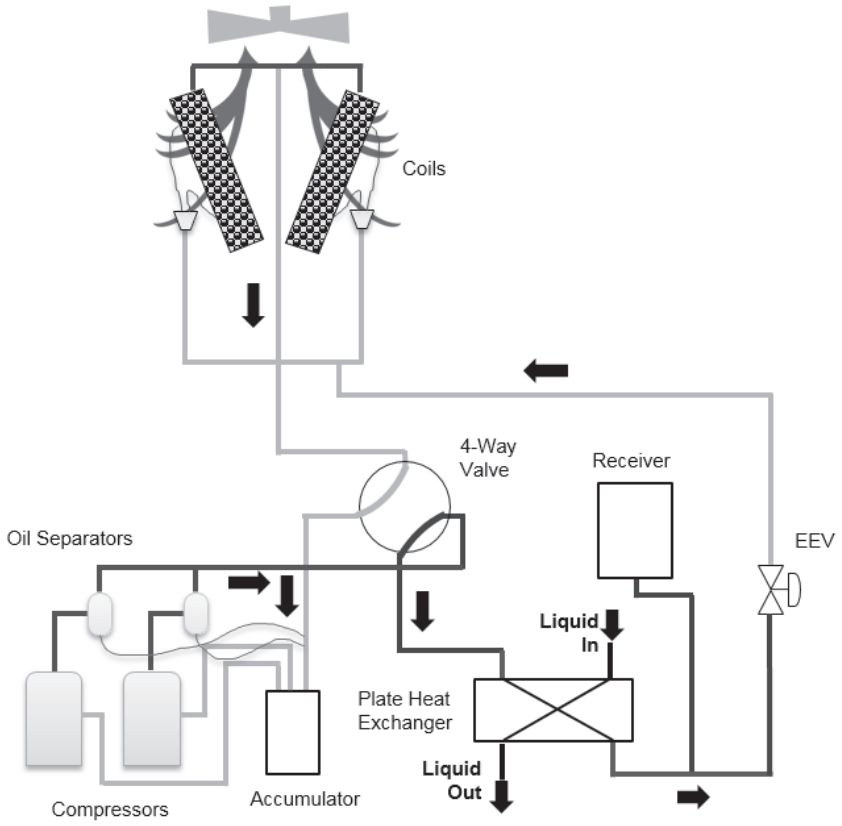


FIGURE 3 – HEATING FLOW DIAGRAM

DEFROST

When ice builds up on the ambient coils defrost is initiated by operating the machine in a cooling mode. The two refrigerant circuits will be defrosted individually without affecting each other for dual circuit units. When one system is in defrosting, the other must be working in heating mode even though it is the time to defrost.

UNIT COMPONENTS YMAA/YMPA0045-0065

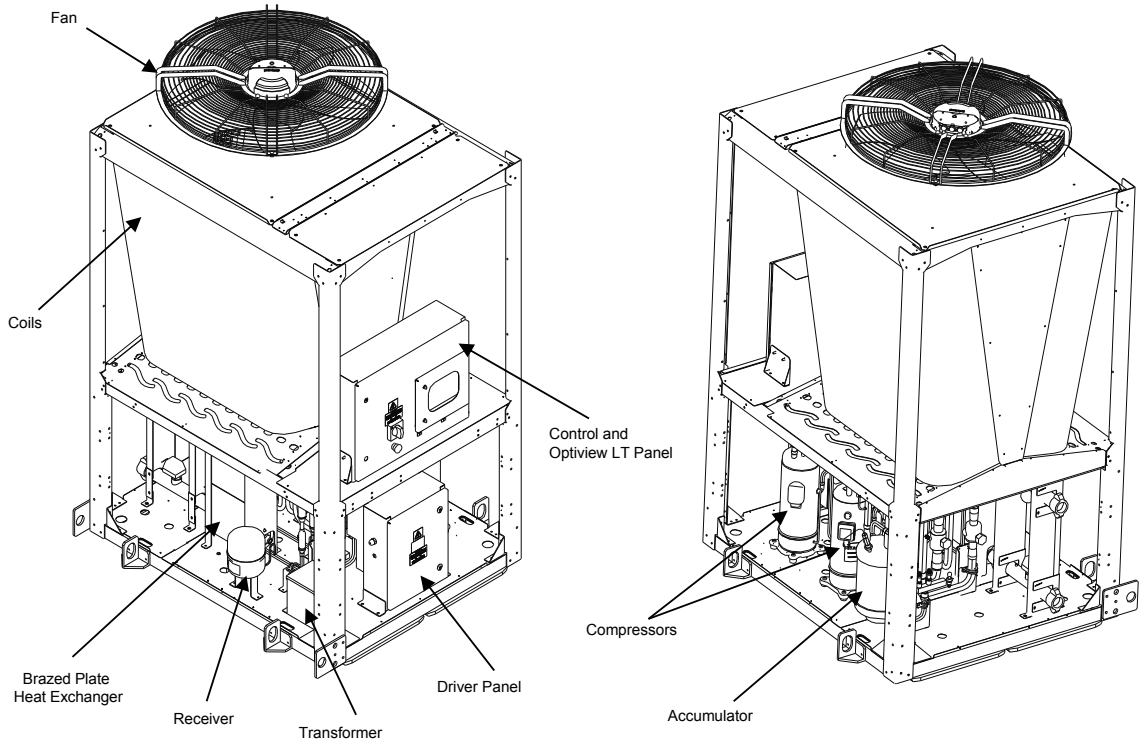


FIGURE 4 – COMPONENTS YMAA/YMPA0045-0065

UNIT COMPONENTS – YMAA/YMPA0080-0100

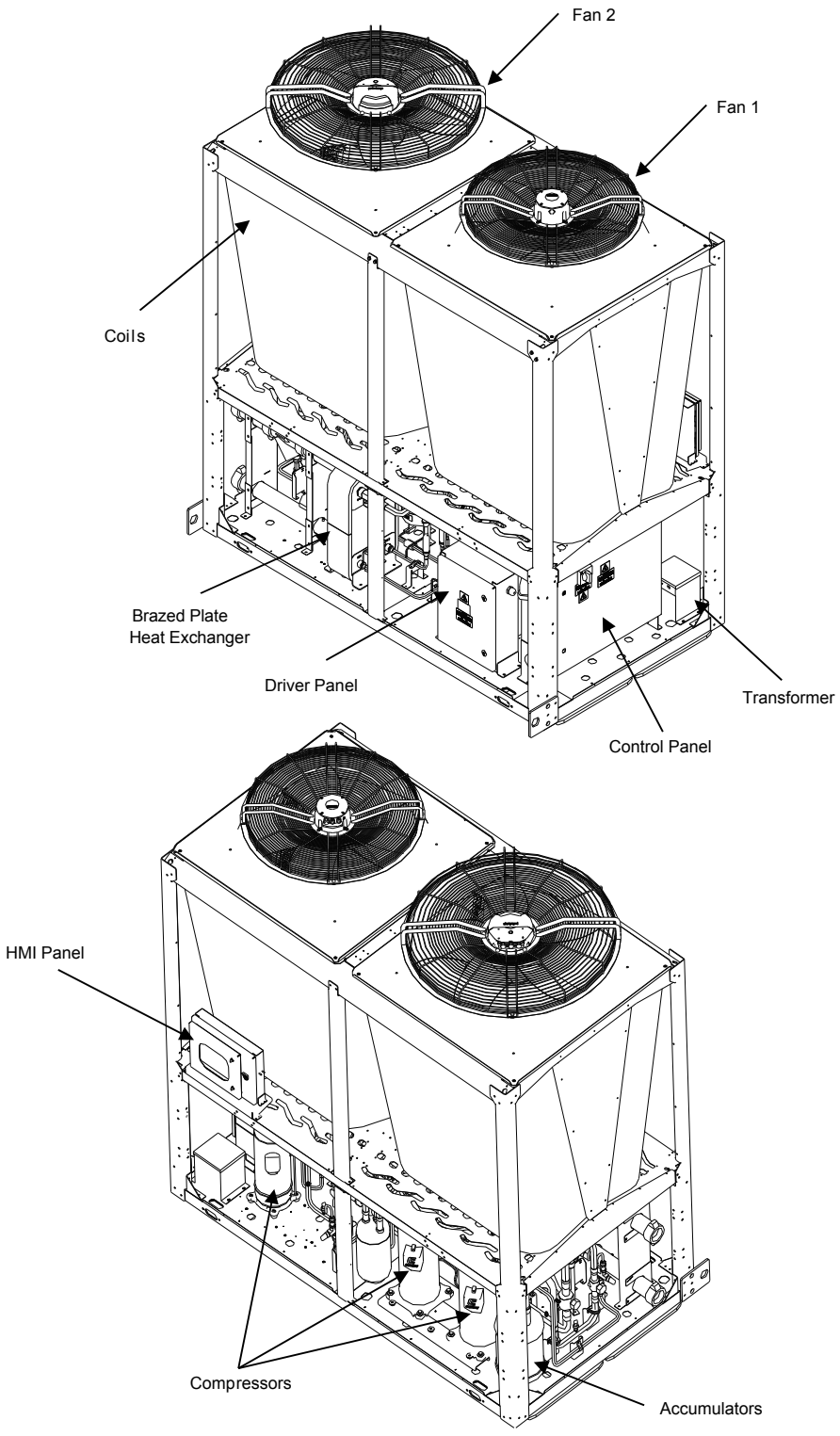


FIGURE 5 – COMPONENTS YMAA/YMPA0080-0100

UNIT COMPONENTS – YMAA/YMPA0130

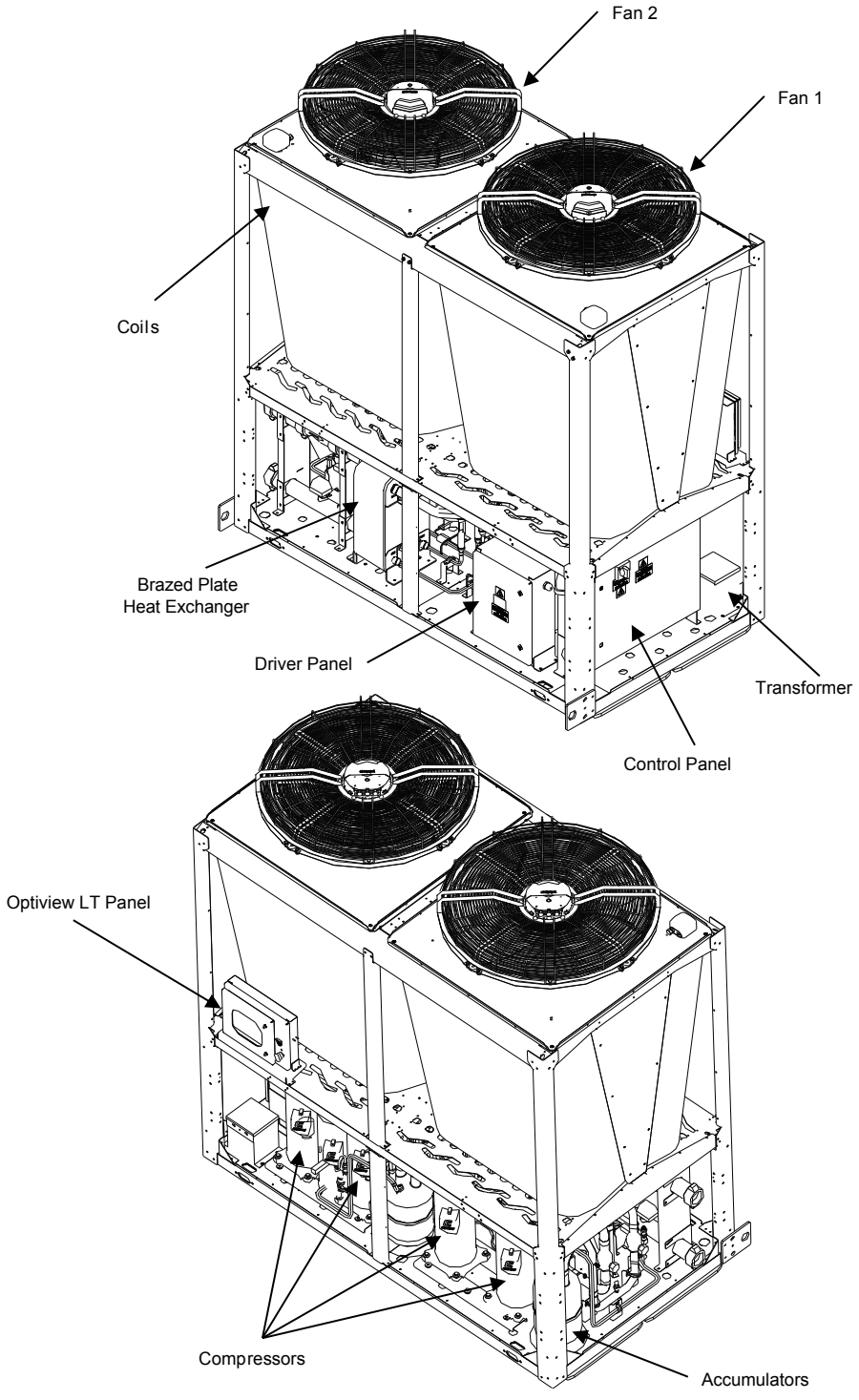


FIGURE 6 – COMPONENTS YMAA/YMPA0130

UNIT COMPONENTS - YMAA/YMPA0160-0200

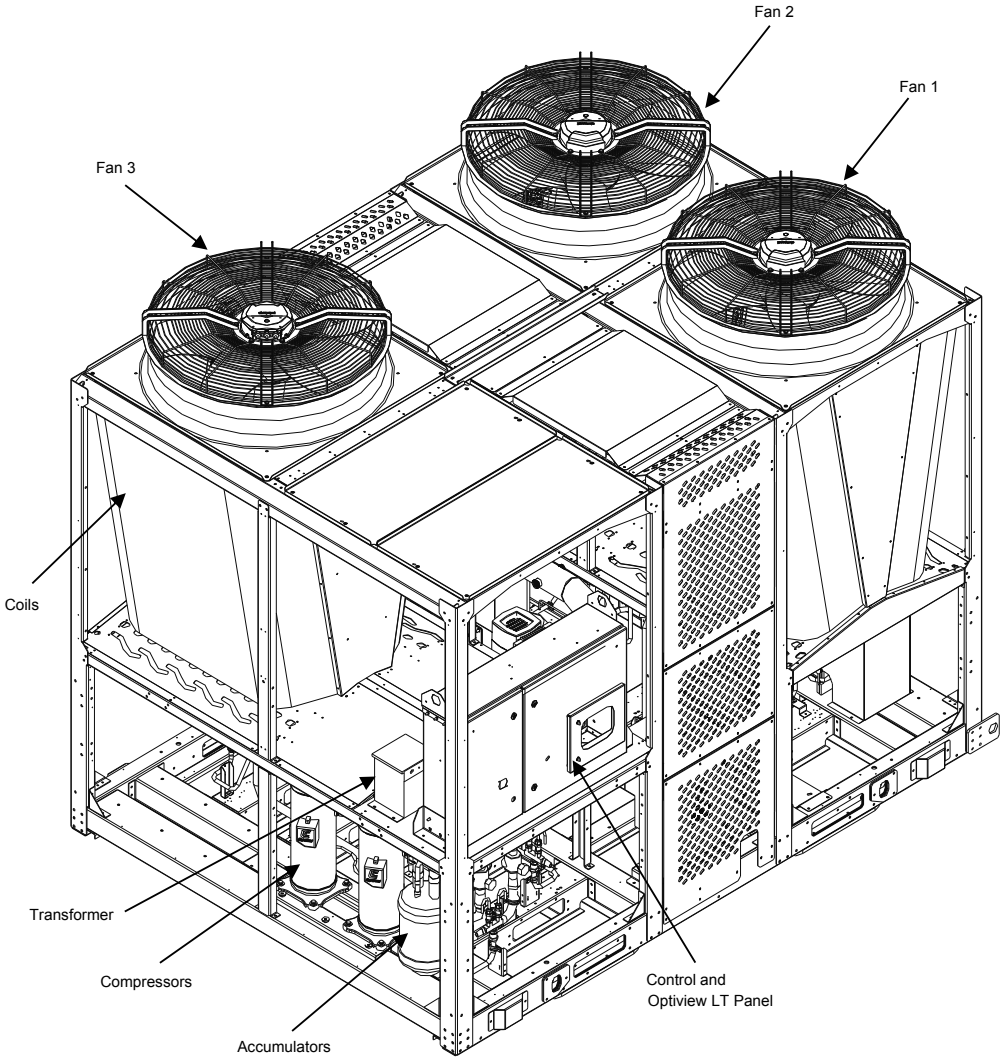


FIGURE 7 – COMPONENTS YMAA/YMPA0160-0200

UNIT COMPONENTS - YMAA/YMPA0230-0260

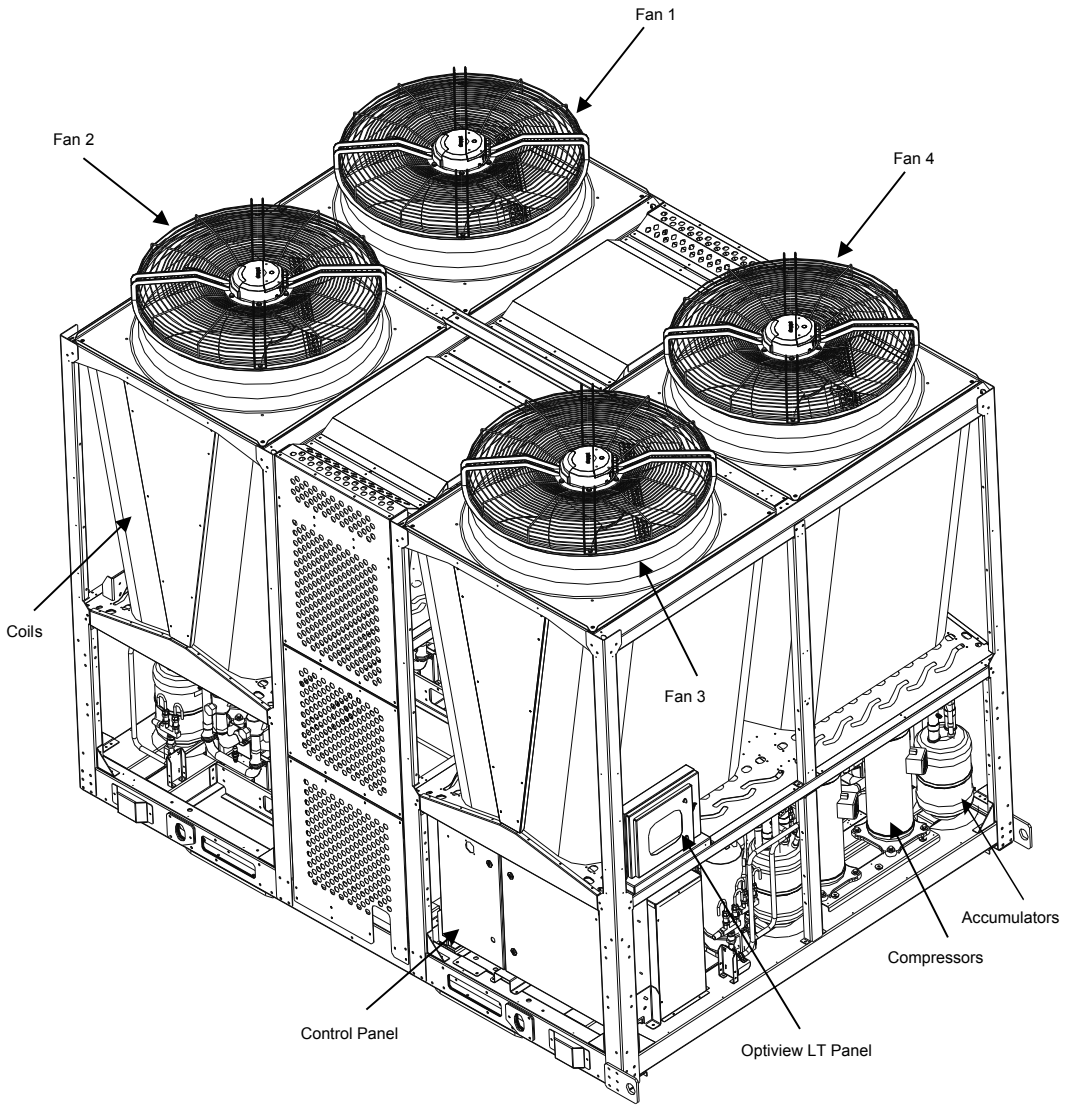


FIGURE 8 – COMPONENTS YMAA/YMPA0230-0260

UNIT COMPONENTS - YMAA/YMPA0045-0065 HYDRO KIT

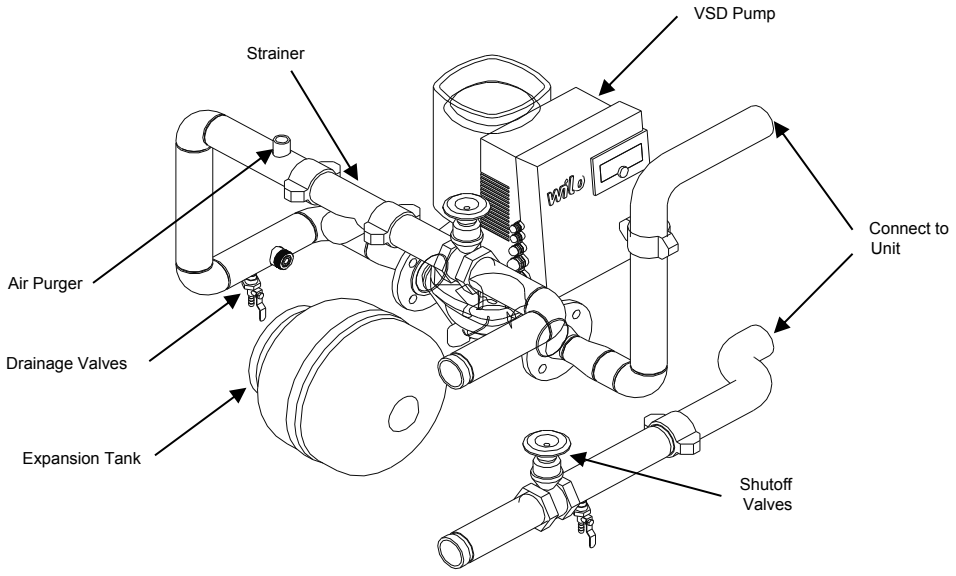


FIGURE 9 – YMAA/YMPA0045-0065 HYDRO KIT (SINGLE PUMP)

UNIT COMPONENTS - YMAA/YMPA0080-0130KW HYDRO KIT

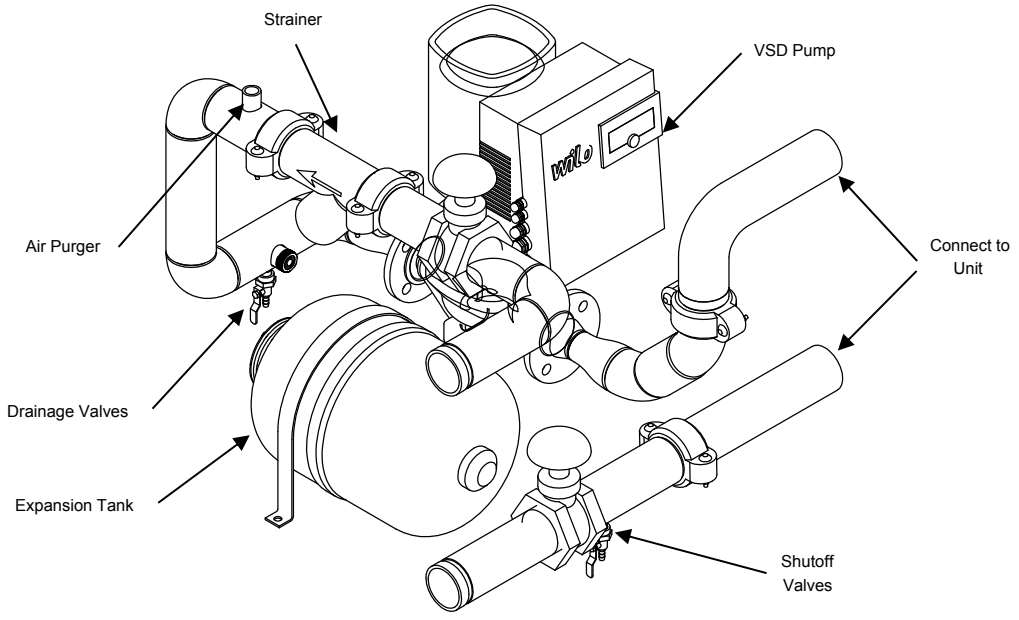


FIGURE 10 – YMAA/YMPA0080-0130 HYDRO KIT (SINGLE PUMP)

UNIT COMPONENTS - YMAA/YMPA0160-0260 HYDRO KIT

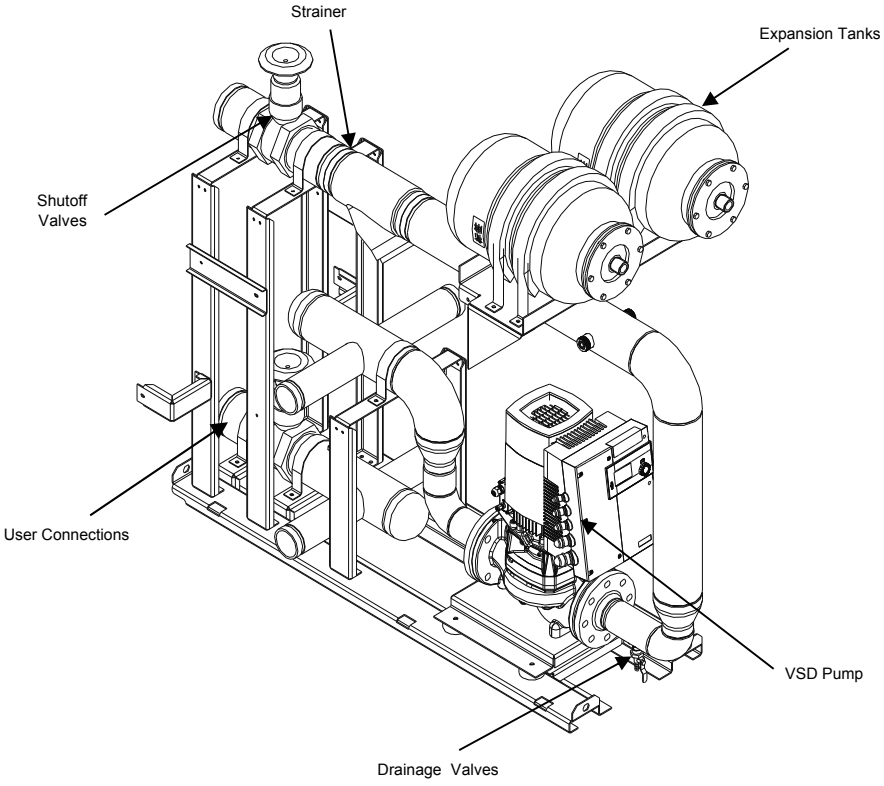


FIGURE 11 – YMAA/YMPA0160-0260 HYDRO KIT (SINGLE PUMP)

TABLE 1 – PRODUCT IDENTIFICATION NUMBER (PIN)

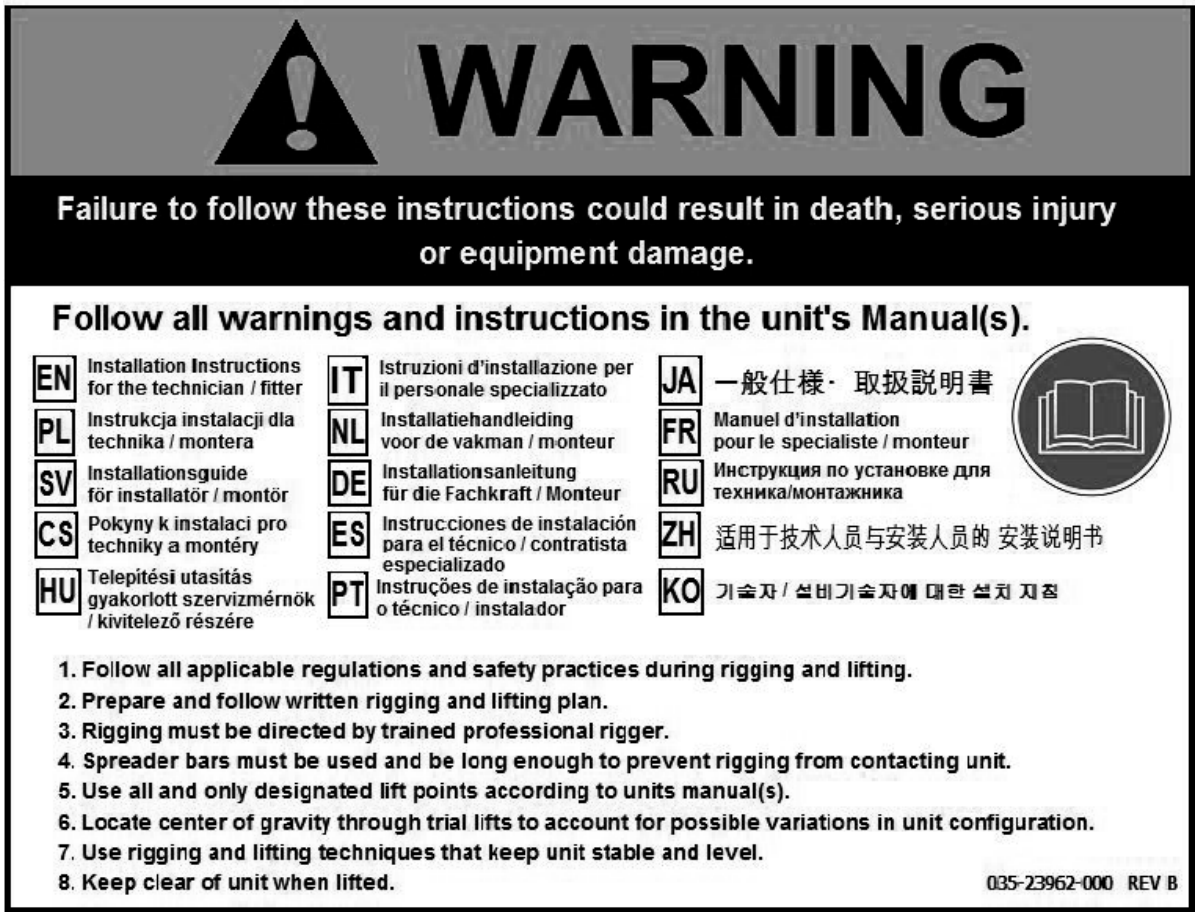
FEATURE	PIN NUMBER	OPTION	OPTION DESCRIPTION
BASE PRODUCT TYPE	Model (PIN1)	Y	YORK
	Compressor Type (PIN2)	M	Modular
	Chiller Type (PIN3)	A P	A: Air cooled chillers P: Air sourced heat pumps
	Design Series (PIN4)	A	Design Series
NOMINAL CAPACITY	PIN5-8	XXXX	0045
			0065
			0080
			0100
			0130
			0160
			0200
			0230
			0260
UNIT DESIGNATOR	PIN9	P	Premium efficiency
REFRIGERANT	PIN10	E	R410A
VOLTAGE	PIN11-12	50	400/3/50
BRANDING KITS	PIN13	Y	York branding kits
COIL DESIGN	PIN14	A	Copper tube aluminum fin coils
		Q	Special Quote
OPERATION DISPLAY	PIN15	X	Optiview LT ™ HMI Controller
		A	Indoor wire controller
POWER FIELD	PIN16/17	BX	SP Circuit Breaker w/ Lockable Handle
LOW/HIGH AMBIENT KITS	PIN18	A	Low Ambient Kit
COMMUNICATION	PIN19	S	BACnet (SC-EQ, factory mounted), Verasys compatible
MODULARITY APPLICATION	PIN20	M	Modularity kits
		S	Single unit
LANGUAGE/DISPLAY	PIN21	A	English
		F	French
		G	German
		I	Italian
		S	Spanish
		R	Russian
		D	Dutch
		P	Polish
		W	Swedish
SAFETY CODE	PIN22	C	European Safety Code (CE)
LEAVING WATER TEMP	PIN 23/24	XX	Leaving water temperature
VALVE OPTION	PIN 25	G	Both Service Isolation and Dual Relief Values
BPHE INSULATION	PIN 26	D	38mm cooler insulation

TABLE 1 – PRODUCT IDENTIFICATION NUMBER (PIN) (CONT'D)

FEATURE	PIN NUMBER	OPTION	OPTION DESCRIPTION
WATER PIPE CONNECTION TYPE	**PIN 27**	**X**	Groove connection with victaulic kits
FLOW SWITCH	**PIN 28**	**S**	One Paddle type Flow Switch per unit
PRESSURE VESSEL CODE	**PIN 29**	**A**	PED Pressure Vessel Codes
FAN TYPE	**PIN 30**	**X**	Electrical Commutation Fan
AETHETIC ENCLSOURE PANELS	**PIN 31**	**1**	Steel panel enclosure
		2	Wire coil guard
		3	Steel panel enclosure and wire coil guard
		X	No selection
SOUND REDUCTION KITS	**PIN 32**	**X**	No sound reduction
		L	Low Sound Kits
VIBRATION ISOLATORS	**PIN 33**	**X**	No selection
		1	1" Deflection Isolators
		S	2" Spring Isolators
		N	Neoprene Isolators
HYDRO KITS	**PIN 34**	**X**	No selection
		A	Single Pump, Variable Speed Drive, Standard Head YMAA/YMPA0045-0065
		B	Single Pump, Variable Speed Drive, Standard Head YMAA/YMPA0080-0130
		C	Single Pump, Variable Speed Drive, Standard Head YMAA/YMPA0160-0200
		D	Single Pump, Variable Speed Drive, Standard Head YMAA/YMPA0230-0260
		1	Single Pump, Fix Speed, Standard Head YMAA/YMPA0045-0065
		2	Single Pump, Fix Speed, Standard Head YMAA/YMPA0080-0130
SPECIAL APPLICATION	**PIN 35**	**X**	No option
SPECIAL REQUIRED DOCUMENTS	**PIN 36**	**X**	Base documents
		Q	Other special documents
SHIPPING PACKAGE	**PIN 38**	**X**	Shipping package readiness from facotory
SOURCING LOCATION	**PIN 39**	**FMF**	Hungary

DON'T touch the exposed pipes and refrigerant circuit components when the unit is running or during the 30 minutes after unit shutdown in case of empyrosis, if the lower enclosure panels (PIN31 or PIN32) are not installed.

SECTION 3 – HANDLING AND STORAGE



Rigging and lifting should only be done by a professional rigger in accordance with a written rigging and lifting plan. The most appropriate rigging and lifting method will depend on job specific factors, such as the rigging equipment available and site needs. Therefore, a professional rigger must determine the rigging and lifting method to be used, and it is beyond the scope of this manual to specify rigging and lifting details.

LIFTING WEIGHTS

Refer to the unit nameplate for unit shipping weight. Note that weight may vary depending on unit configuration at the time of lifting. Refer to the Physical Data tables within this manual for further information regarding shipping and operating weights.

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 crating has been specified on the Sales Order.

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

- The unit must be “blocked” so that the base is not permitted to sag or bow.
- Ensure that all openings, such as water connections, are securely capped.
- Do not store where exposed to high ambient air temperatures that may exceed relief valve settings.

- The condensers should be covered to protect the coils and fins from potential damage and corrosion, particularly where building work is in progress.
- The unit should be stored in a location where there is minimal activity in order to limit the risk of accidental physical damage.
- To prevent inadvertent operation of the pressure relief devices the unit must not be steam cleaned.
- It is recommended that the unit is periodically inspected during storage.

OPERATING AND STORAGE CONDITIONS

Standard leaving chilled water temp. (Comfort chiller): 5~20°C
Standard leaving chilled water temp. (Brine chiller): -8~20°C
Standard ambient at cooling mode: -17.8~48°C
Standard leaving hot water temp.: 25~55°C
Ambient temp. at heating mode: -15~25°C
Unit storage ambient temp.: -20~55°C

INSPECTION

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

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

MOVING THE UNIT BY FORKLIFT TRUCKS

For models of YMAA/YMPA 0045-0130, with or without hydro kits, it is recommended that the units are moved by forklift trucks for transit transfer. A wooden pallet is added for forklift use before shipment.

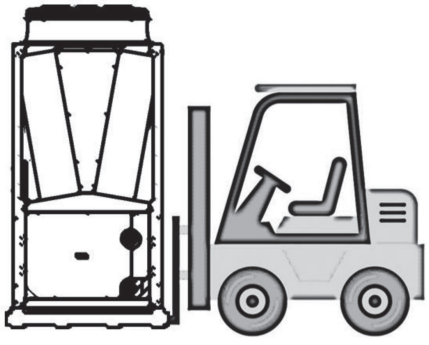


FIGURE 12 – MOVING BG BY FORKLIFT TRUCKS

For models of YMAA/YMPA 0160-0260, forklift truck for moving the unit is NOT recommended.

LIFTING THE UNIT

Units are provided with lifting holes in the base frame which accept the accessory lifting lug set as shown in the figure below. Units are lifted with a spreader bar or frame of sufficient width to prevent damage to the unit from the lifting chains. The lugs 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.

FIGURE 13 – LIFTING LUGS

DO NOT use the "dragging plates" as lifting lugs when lifting the units. Please refer to "Lifting Instructions" on each unit before you lift units.

For models of YMAA/YMPA 0045-0130, the rigging plates are used for site lifting after being mounted on unit. Two of the plates must be mounted on Hydro Kit if selected. See figure 14.

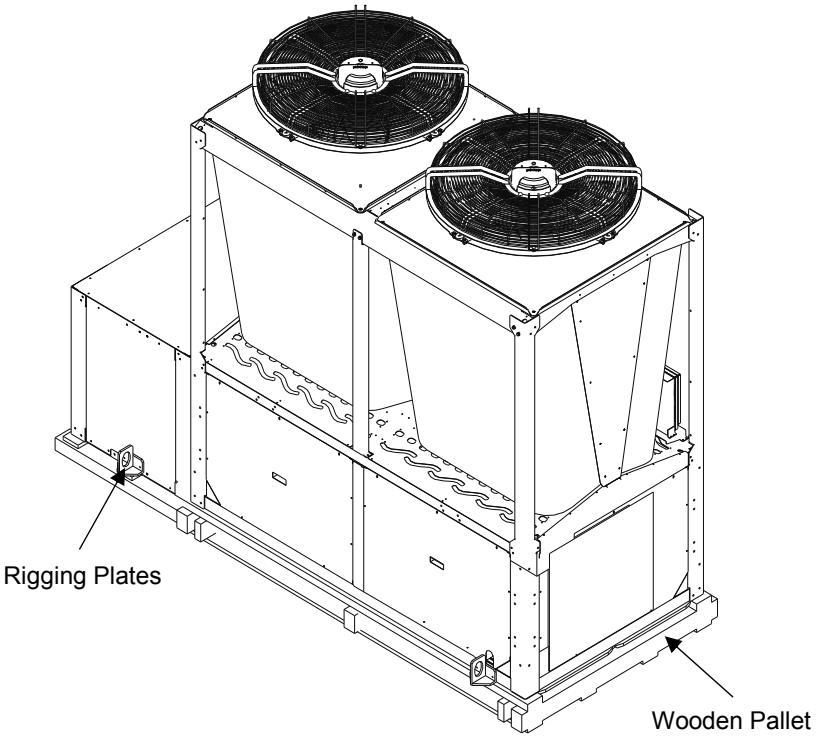


FIGURE 14 – RIGGING PLATES YMAA/YMPA0045-0130

Notes

The rigging plates are factory mounted.

For models of YMAA/YMPA 0160-0260, the rigging plates are factory mounted. The forklift holes on base frame unit is not recommended for moving unit by forklift trucks. See figure 15.

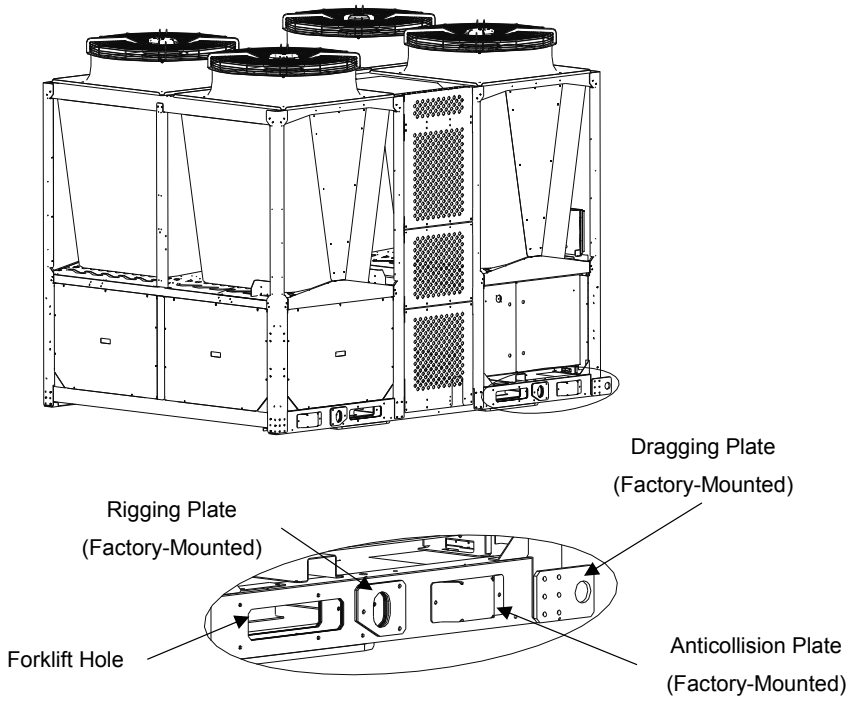


FIGURE 15 – RIGGING PLATES YMAA/YMPA0160-0260

Notes

1.Dragging plates and anticollision plates are only used during container transport;

2.Forklift holes are for in-plant transfer;

3.Four rigging plates are installed before delivery.

SECTION 4 – INSTALLATION

To ensure warranty coverage, this equipment must be commissioned and serviced by an authorized YORK service mechanic or a qualified service person experienced in unit installation. Installation must comply with all applicable codes, particularly in regard to electrical wiring and other safety elements such as relief valves, HP cutout settings, design working pressures, and ventilation requirements consistent with the amount and type of refrigerant charge.

Lethal voltages exist within the control panels. Before servicing, open and tag all disconnect switches.

INSTALLATION CHECKLIST

The following items, 1 through 5, must be checked before placing the units in operation.

1.Inspect the unit for shipping damage.

2.Rig unit using spreader bars.

3.Open the unit only to install water piping system. Do not remove protective covers from water connections until piping is ready for attachment. Check water piping to ensure cleanliness.

4.Pipe unit using good piping practice.

5.Check to see that the unit is installed and operated within limitations (*Refer to Operational Limitations*).

The following pages outline detailed procedures to be followed to install and start-up the unit.

HANDLING

These units are shipped as completely assembled units containing full operating charge, and care should be taken to avoid damage due to rough handling.

INSPECTION

Immediately upon receiving the unit, it should be inspected for possible damage which may have occurred during transit. If damage is evident, it should be noted in the carrier's freight bill. A written request for inspection by the carrier's agent should be made at once.

LOCATION AND CLEARANCES

These units are designed for outdoor installations on ground level, rooftop, or besides a building. Location should be selected for minimum sun exposure and away from boiler flues and other sources of airborne chemicals that could attack the ambient coils and steel parts of the unit. The units must be installed with sufficient clearances for air entrance to the condenser coil to ensure adequate supply of fresh air, for air discharge away from the condenser, and for servicing access.

In installations where winter operation is intended and snow accumulations are expected, additional height must be provided to prevent ice accretion in base frame of the unit.

Clearances are listed under "Notes" in the Dimensions section.

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

Foundation

The unit should be mounted on a flat and level foundation, floor, or rooftop capable of supporting the entire operating weight of the equipment. See PHYSICAL DATA for operating weight. If the unit is elevated beyond the normal reach of service personnel, a suitable catwalk must be capable of supporting service personnel, their equipment, and the compressors.

Ground Level Locations

It is important that the units be installed on a substantial base that will not settle. A one piece concrete slab with footers extended below the frost line is highly recommended. Additionally, the slab should not be tied to the main building foundations as noise and vibration may be transmitted. Mounting holes are provided in the steel channel for bolting the unit to its foundation (see *Dimensions* section).

For ground level installations, precautions should be taken to protect the unit from tampering by or injury to unauthorized persons. Screws and/or latches on access panels will prevent casual tampering. However, further safety precautions such as a fenced-in enclosure or locking devices on the panels may be advisable. This will help to prevent the possibility of vandalism, accidental damage, or possible harm caused by unauthorized removal of protective guards or opening panels to expose rotating or electrically live components.

Rooftop Locations

Choose a spot with adequate structural strength to safely support the entire weight of the unit and service personnel. Care must be taken not to damage the roof.

The unit can be mounted on a concrete slab, similar to ground floor locations, or on steel channels of suitable strength. The channels should be spaced with the same centers as the unit side and front base rails. This will allow vibration isolators to be fitted if required.

Consult the building contractor or architect if the roof is bonded. Roof installations should have wooden beams (treated to reduce deterioration), cork, rubber, or vibration isolators under the base to minimize vibration. Isolators are recommended for rooftop locations.

Noise Sensitive Locations

Efforts should be made to assure that the unit is not located next to occupied spaces or noise sensitive areas where unit noise level would be a problem. Unit noise is a result of compressor and fan operation. Considerations should be made utilizing noise levels published in the YORK Engineering Guide for the specific unit model. Sound blankets for the compressors and enclosure panels are available as options.

Cold Climate Locations

If the unit is operating in low ambient temperature, be sure to follow the instructions listed below.

1.A baffle plate installed on the airside of the unit is recommended to prevent exposure to snow in winter.

2.In heavy snowfall areas, make sure the coil and fan will not be affected by the snow. Construct a lateral canopy if necessary.

3.Deice before operating if the fan blades fail to rotate after long time standby in snow.

4.Flexible hoses must be installed to ensure effective condensation water drainage while operating.

Corrosion Locations

The unit is designed to withstand most of the climate conditions. If the unit is installed near the sea where high levels of salt may shorten the life of the unit, make sure it is not exposed to sea winds directly.

For any units being installed at the seashore, or where salt spray may hit the units, or where acid rain is prevalent, please contact Johnson Controls.

ISOLATORS (OPTIONAL)

An optional set of vibration isolators can be supplied loose with each unit. When ordered, four (4) isolators will be furnished if the unit is installed without pump kit. Two (2) additional isolators will be required if pump kit is picked.

Identify the isolator, locate at the proper mounting point, and adjust per instructions.

COMPRESSOR MOUNTING

The compressors are mounted on four (4) rubber or steel isolators. The mounting bolts should not be loosened or adjusted at installation of the unit.

CHILLED LIQUID PIPING

General – When the unit(s) has been located in its final position, the unit water piping may be connected. Normal installation precautions should be observed in order to receive maximum operating efficiencies. Piping should be kept free of all foreign matter. All chilled water evaporator piping must comply in all respects with local plumbing codes and ordinances.

Since elbows, tees and valves decrease pump capacity, all piping should be kept as straight and as simple as possible. **All piping must be supported independent of the unit.**

Consideration should be given to compressor and control panel access when laying out water piping. Routing the water piping too close to the unit could make compressor/ control panel servicing/ replacement difficult.

Hand stop valves should be installed in all lines to facilitate servicing.

Piping to the inlet and outlet connections of the unit should include high-pressure rubber hose or piping loops to ensure against transmission of water pump vibration. The necessary components must be obtained in the field.

Drain connections should be provided at all low points to permit complete drainage of the cooler and system water piping.

A small valve or valves should be installed at the highest point or points in the chilled water piping to allow any trapped air to be purged. Vent and drain connections should be extended beyond the insulation to make them accessible.

The piping to and from the cooler must be designed to suit the individual installation. It is important that the following considerations be observed:

1.The chilled liquid piping system should be laid out so that the circulating pump discharges directly into the cooler. The suction for this pump should be taken from the piping system return line and not the cooler. This piping scheme is recommended, but is not mandatory.

2.Standard pipework connections are victaulic connections. The inlet and outlet cooler connection sizes are 2" (YMAA/ YMPA 0045-0065), 2-1/2" (YMAA/YMPA 0080-0130) and 4" (YMAA/YMPA 0160-0260) .

3.A strainer is integrated in the cooler inlet line just ahead of the cooler. This is important to protect the cooler from entrance of large particles which could cause damage to the evaporator.

4.All chilled liquid piping should be thoroughly flushed to free it from foreign material before the system is placed into operation. Use care not to flush any foreign material into or through the cooler. It is recommended that a suitably sized by-pass and valve arrangement be installed to allow flushing of the pipework system. The by-pass can be used during maintenance to isolate the cooler without disrupting flow to other units.

5.As an aid to servicing, thermometers and pressure gauges should be installed in the inlet and outlet water lines.

6.The chilled water lines that are exposed to outdoor ambient should be wrapped with supplemental heater cable and insulated to protect against freeze-up during low ambient periods, and to pre- vent formation of condensation on lines in warm humid locations.

7.The cooler is protected by heater mats placed under the insulation, which are powered from the unit control system power supply. During cold weather when there is a risk of freezing, unit power should be left switched on to provide the freeze protection function unless the liquid systems have been drained.

8.A chilled water flow switch is already installed in the leaving water piping of the cooler. If the units are modularized, it is recommended to install another flow switch in main liquid leaving pipe. There should be a straight horizontal run of at least 5 diameters on each side of the switch. Adjust the flow switch paddle to the size of the pipe in which it is to be installed (see manufacturer's instructions furnished with the switch).

The Flow Switch MUST NOT be used to start and stop the unit (i.e. starting and stopping the chilled water pump). It is intended only as a safety switch.

PIPEWORK ARRANGEMENT

Most of the accessories are integrated for units with VSD pumps. Strainer and flow switch are shipped loose for units with fixed speed pumps. Refer to Modular Connections if the units are installed in a group.

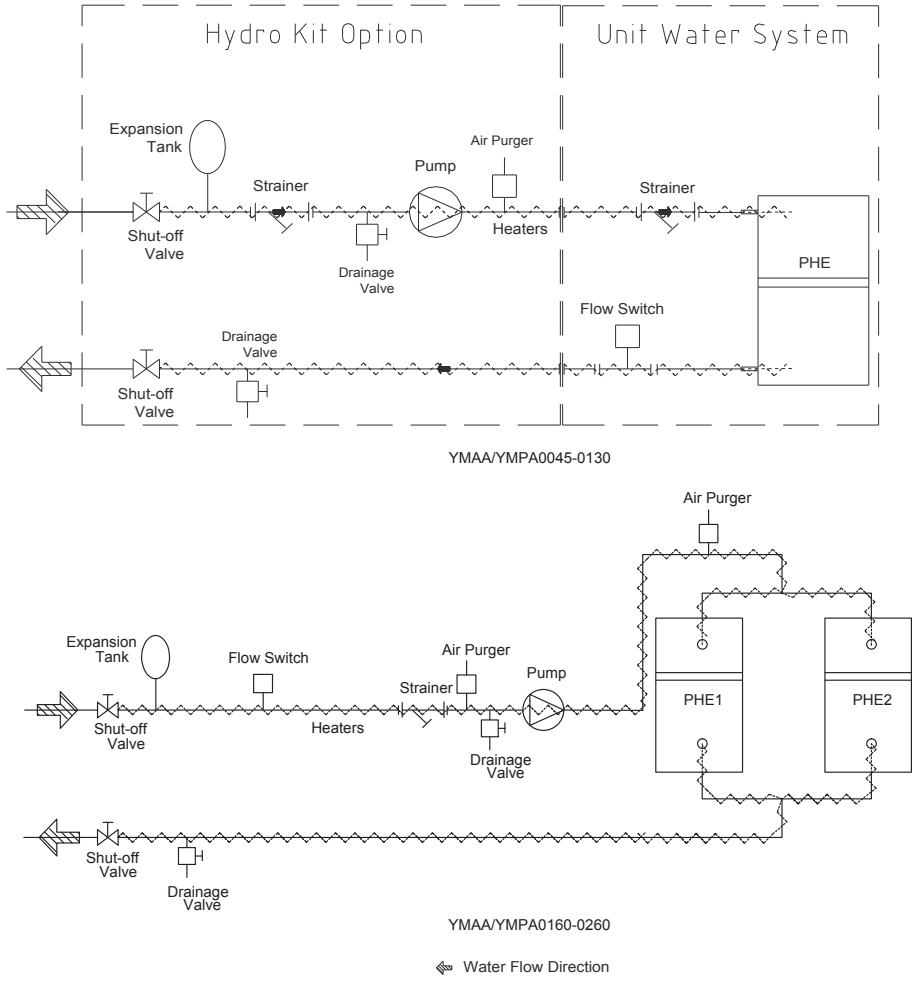


FIGURE 16 – VARIABLE FLOW DIAGRAM

The units are able to be connected in a pipe network for centralized control. The control system is designed to work effectively within a maximum of 32 control boards (communication addresses) connected. Follow the arrangements below for combinations.

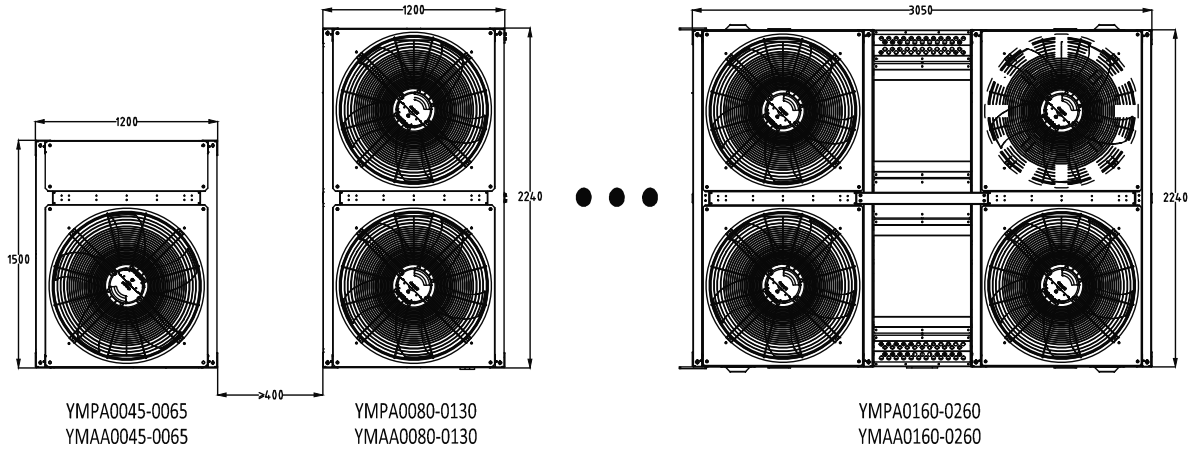


FIGURE 17 – MODULAR CONNECTIONS

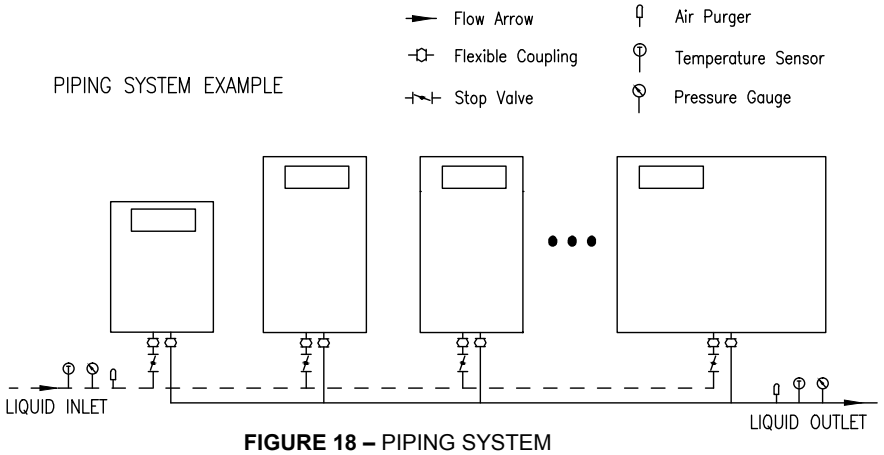


FIGURE 18 – PIPING SYSTEM

Notes

1.Placement on a level surface free of obstructions (including snow, for winter operation) or air recirculation ensures rated performance, reliable operation and ease of maintenance.

2.Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable air flow patterns and possible diminished performance. York's unit controls will optimize operation without nuisance high pressure safety cutout; however, the system designer must consider potential performance degradation.

3.The distances between the walls and peripheral units should employ the same rules as shown in Dimensions section, if the units are surrounded by walls

4.No more than one adjacent wall may be higher than the unit.

5.Installing contractor must include vent and drain accommodations in chilled water piping near the evaporator.

6.Stop valves must be installed at the inlet of each unit to balance chilled liquid distribution.

7.A minimum interval of 700 mm must be reserved for field wiring, commissioning and maintenance.

8.Refer to single unit drawings for detailed dimensions.

WIRING

The units are shipped with all factory-mounted controls wired for operation.

Field Wiring – Power wiring must be provided through a protector device (fused disconnect switch or circuit breaker) to the input unit terminals in accordance with CE or local code requirements. Maximum current is given in *Electrical Data*.

Copper power wiring only should be used for supplying power to the unit. This is recommended to avoid safety and reliability issues resulting from connection failure at the power connections to the unit. Aluminum wiring is not recommended due to thermal characteristics that may cause loose terminations resulting from the contraction and expansion of the wiring. Aluminum oxide may also build up at the termination causing hot spots and eventual failure. If aluminum wiring is used to supply power to the unit, AL-CU compression fittings should be used to transition from aluminum to copper. This transition should be done in an external box separate to the power panel. Copper conductors can then be run from the box to the unit.

See unit wiring diagrams for field and power wiring connections, communication wiring connections, modular wiring, alarm contacts, inverter pump contacts, remote start/ stop input, remote cooling/ heating switch, etc. Refer to *SECTION 9 – UNIT OPERATION* for a detailed description of operation concerning aforementioned contacts and inputs.

Pump Start Contacts

Terminal block XTB2 – terminals 21 to 22, are normally-open contacts that can be used to switch field supplied power to provide a start signal to the pump contactor. User-provided pump contactor and thermal relay are required if the pump is field installed. The contacts will be closed when any of the following conditions occur:

1.Any compressor is running

2.The unit(s) is on and no flow fault occurred

3.Anti-freezing operation

4.Pump circulation mode

The pump will not run if the micro panel has been powered up for less than 30 seconds, or if the pump has run in the last 30 seconds, to prevent pump motor overheating. Refer to unit wiring diagram.

Alarm Status Contacts

Normally-open contacts are available for each unit. These normally-open contacts remain open when the system is functioning normally. The respective contacts will close when the unit is shut down on a unit fault, or locked out on a system fault. For modular applications, the master unit will not only output internal fault, but also the fault of subordinate units. Field connections are at XTB2 terminals 23 to 24.

Remote Start/ Stop Contacts

To remotely start and stop the unit, dry contacts can be wired to XTB2 terminals 80G to 87. Refer to unit wiring diagram.

The function will be available after being activated through HMI.

Remote Cooling/ Heating Switch

The contacts are used to switch unit operating mode remotely. Dry contacts can be wired to XTB2 terminals 80F to 86. Refer to unit wiring diagram.

The function will be available after being activated through HMI.

Flow Switch Input

For modular combinations, it is recommended to install an additional flow switch in outlet main pipe. The switch is to be wired to terminals 80E – 85 of XTB2 located in the control panel, as shown on the unit wiring diagram.

External Interlock

The unit will be allowed to run only if the interlock is connected. It is used to link external facilities like fire alarms in case there's an emergency cutoff. It is wired to terminals 80H - 88 on block XTB2.

Make sure External Interlock is short-circuited or is linked to external facilities before operation.

CIRCUIT BREAKER

The handle of the circuit breaker is installed on the door of the control panel. The circuit has to be switched off before opening the door.

EMERGENCY CUTOUT BUTTON

Immediate shutdown of the unit can be accomplished by pressing a factory-installed emergency button to break the electrical circuit of the control system. The red button is installed on the door of the control panel or HMI panel.

COMPRESSOR HEATERS

Compressor heaters are standard. All compressors utilize two heaters with 40 W each.

If the unit is powered on for the first time, the crankcase heaters must be energized for at least 8 hours prior to restarting a compressor. This will assure that liquid slugging and oil dilution does not damage the compressors on start.

BPHE AND PIPING HEATERS

Heat exchanger and piping heaters will be switched on in standby mode when air temperature is below 3 °C. The purpose is to prevent water temperature drop below freezing point.

DUAL PRESSURE RELIEF VALVES

Relief valves are located on both the high and low pressure side of the piping. High side relief valve pressure setting is 44.8 bar. Low side relief valve pressure setting is 29 bar.

Dual relief valves are standard configuration for YMAA/ YMPA series, with shut off valves to change individually without decanting system.

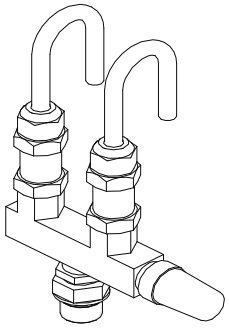


FIGURE 19 – DUAL PRESSURE RELIEF VALVES

PRESSURE CUTOUT

One high pressure cutout and two low pressure cutouts (one LP cutout for cooling only unit) are installed in the discharge and suction piping of each system. The HP cutout opens at 4.03 MPa (585 PSIG) and closes at 3.1 MPa (450 PSIG). The cooling LP cutout opens at 0.3 MPa (44 PSIG) and closes at 0.5 MPa (73 PSIG). The heating LP cutout opens at 0.15MPa (22 PSIG) and closes at 0.3 MPa (44 PSIG).

WIRE CONTROLLER

Dual HMI is available on YMAA/YMPA. Once the function is activated, the chip will automatically overwrite the memory by the latest settings sent from either of the controllers.

SC-EQUIPMENT COMMUNICATION CARD

The SC-EQ (Smart Chiller Equipment) Communication Card is an economical and versatile communications device that provides a communication connection between the unit and standard open BAS protocols. It efficiently manages all of the communication protocols used by York equipment, exposing the data in a consistent, organized, and defined fashion.

The SC-EQ Communication Card is available as a card that is already fitted directly inside the control panel. The SC- EQ detects the model of the unit and the BAS protocol and then automatically configures itself to communicate with both.

POWER SUPPLY CONNECTION

Electrical Legends

TABLE 2 - ABBREVIATIONS OF ELECTRICAL COMPONENTS

CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	DESCRIPTION
-YMEV	MAIN EEV	-MC	COMPR MOTOR	-FHP	HIGH PRESS SWITCH
-YWSV	WATER SOL VALVE	-KWP	WATER PUMP RELAY	-EPH	WATER PIPING HEATER
-YMSV	MODE SOL VALVE	-KPW	POWER FAULT RELAY	-EEPH	PHE PIPING HEATER
-XTB	TERMINAL BLOCK	-KPF	POWER PROTECTOR	-EEH	PHE HEATER
-T	TRANSFORMER	-KM	COMPR CONTACTOR	-ECH	CRANK CASE HEATER
-SRE	REMOTE START SWITCH	-KFS	FAN SPEED RELAY	EXT	EXTERNAL PART
-SF2	SYSTEM FLOW SWITCH	-KFP	FR & FHP RELAY	-BSP	SUCTION PRESS
-SF1	MODULE FLOW SWITCH	-KFL	FAN LOW SPEED CONTACTOR	-BDP	DISCHARGE PRESS
-SEM	EMERGENCY BUTTON	-KFH	FAN HIGH SPEED CONTACTOR	-BLMT	LEAVING MODULE TEMP
-SEL	EXTERNAL INTERLOCK SWITCH	-KF	FAN CONTROL CONTACTOR	-BLST	LEAVING SYSTEM TEMP
-SC/H	COOLING/HEATING SWITCH	-KEM	EMERGENCY RELAY	-BEST	ENTERING SYSTEM TEMP
-RC	RC ABSORBER	-KCH11	INV COMPR HTR RELAY	-BDT	DISCHARGE TEMP
-QMCB	MAIN CIRCUIT BREAKER	-KAL	ALARM RELAY	-BAMB	AMBIENT TEMP
-QCB	CIRCUIT BREAKER	-KAH	AUX HEATER CONTACTOR	-BACDT	AIR COIL DEFROST TEMP
PE	PROTECTIVE EARTH	-H1	ALARM LAMP	-BAIT	ACCUMULATOR INLET TEMP
-MP	PUMP MOTOR	-FR	OVERLOAD RELAY	-AMGB	MODBUS GATEWAY BOARD
-MF	FAN MOTOR	-FLP*2	HEATING LOW PRESS SWITCH	-AMB	MAIN BOARD
-MDF	DRIVER FAN MOTOR	-FLP*1	COOLING LOW PRESS SWITCH		

Power Supply Connection – Single Unit

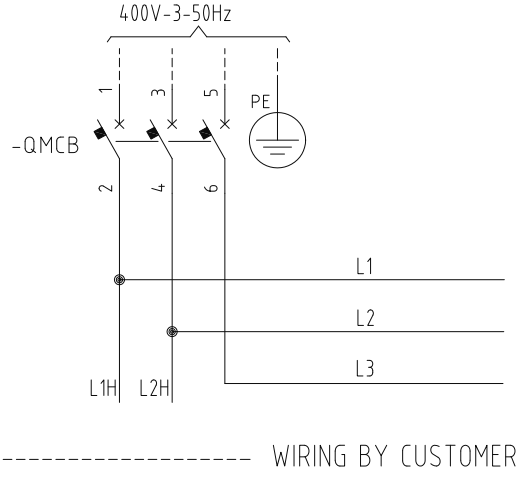


FIGURE 20 – SINGLE UNIT POWER SUPPLY CONNECTION

Power Supply Connection – Modular

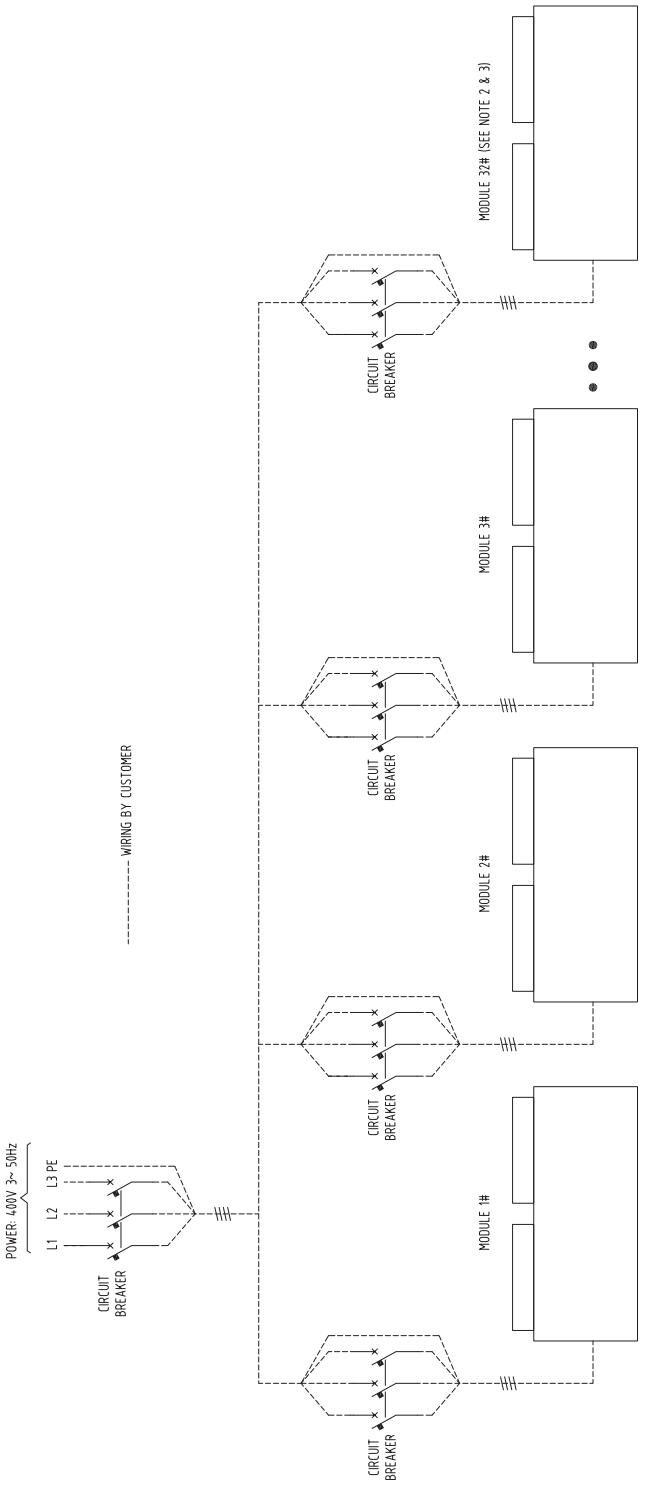


FIGURE 21 – MODULAR POWER SUPPLY CONNECTION

Notes

1.Power wiring must be provided through a protect device (fused disconnect switch or circuit breaker) to the input terminals of the unit in accordance with CE or local code requirements.

2.Every control board is assigned with one ID address. If a single module includes two control boards, then two ID addresses have to be assigned in the module. The modules above 130 kW have two control boards in the panel.

3.The maximum quantity of modules above 130 kW combined should be 16. The quantity of modules in the same communication network is based on the sum total of control boards in the network.

The unit evaporator heater uses 230VAC. Disconnecting 230VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

The unit evaporator heater uses 230VAC. Disconnecting 230VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

CONTROL WIRING

Communication Wiring – Optiview LT

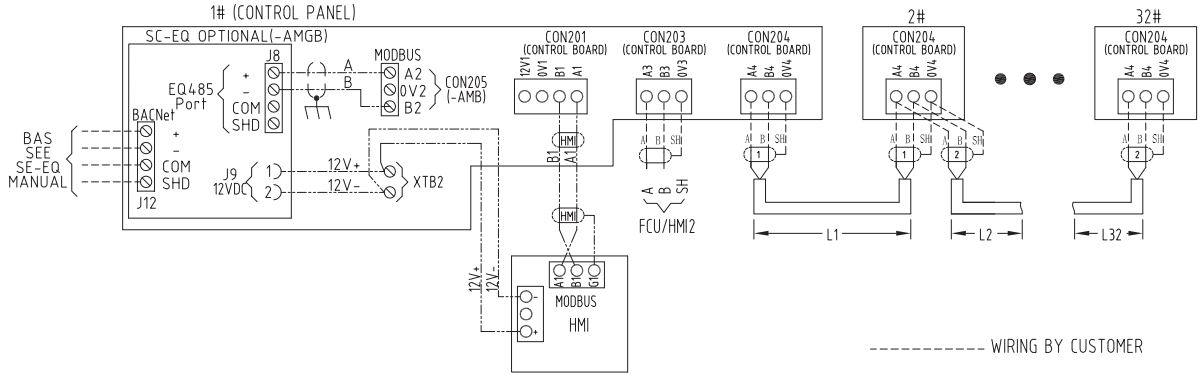


FIGURE 22 – OPTIVIEW LT COMMUNICATION WIRING

Communication Wiring – Wire Controller

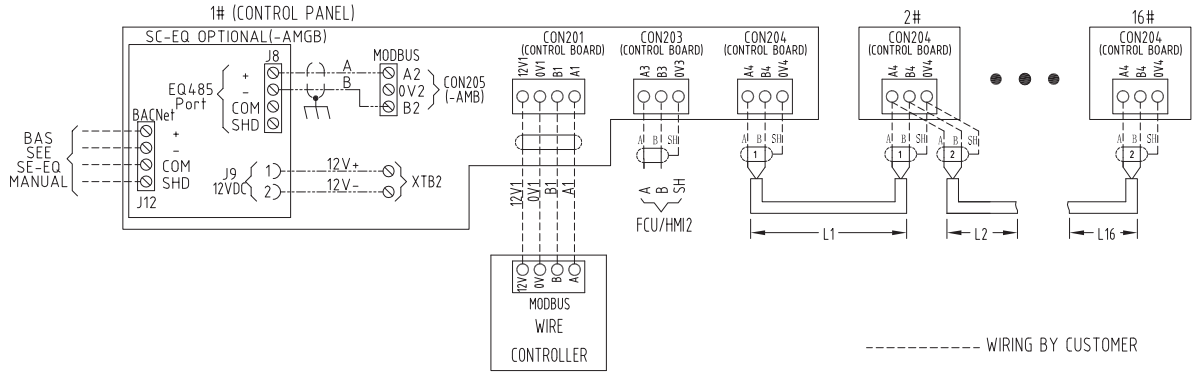


FIGURE 23 – WIRE CONTROLLER COMMUNICATION WIRING

Note

Optiview LT can be rewired to CON203 if wire controller is connected.

TABLE 3 – COMMUNICATION CABLE REQUIREMENT

TOTAL LENGTH	L=L1+L2+L3+…+Ln (n=32 or n=16, unit: m)		
	L < 100 m	100 m < L < 500 m	L > 500 m
CABLE TYPE	RVVPS 2×0.75mm^2	RVVPS 2×1.0mm^2	CONTACT JCI SERVICE

Notes

1. The total length of the communication cable L= L1+L2+L3...+Ln. The communication cable should be shielded twisted in pairs. Refer to the table above for cable requirement.

2.Every control board is assigned one ID address. If a single module includes two control boards, then two ID addresses have to be assigned in the module. The modules above 130 kW have two control boards in the panel. If the ID address of main board is assigned as number "n", then the auxiliary board should be assigned as number "n+1".

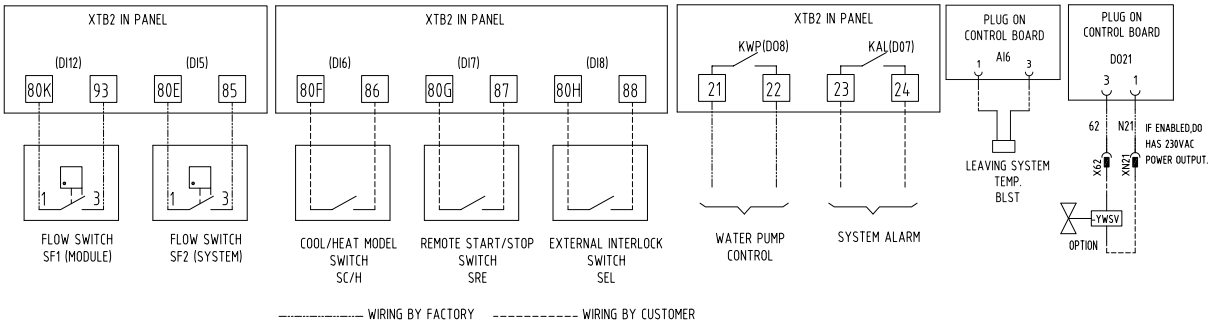
3.The maximum quantity of modules above 130 kW combined should be 16. The quantity of modules in the same communication network is based on the sum total of control boards in the network.

4.The maximum quantity of the control boards in the same communication network should be 32, and different control boards should use different ID addresses. If not, the control board will be broken.

5.The control boards should not be energized while setting the addresses, or the control board will be broken.

6.Another HMI (wire controller or Optiview LT) can be connected to the communication port CON203 on control board if the DIP switch SW302-8 is set to OFF.

Field Wirings



Notes

1. External interlock is short-circuited or is linked to external facilities before operation;

2. Water pump control is connected by factory before delivery if hydro kit is selected;

3. 45-130 models: SF1 (DI12/XTB2:80K&93) -- Factory installation; SF2 (DI5/XTB2:80E&85) -- Short-circuited before delivery;

160-260 models: SF1 (DI12/XTB2:80K&93) -- Short-circuited before delivery; SF2 (DI5/XTB2:80E&85) -- Factory installation;

4. For digital input signals (SF1/SF2, SC/H, SRE, SEL), the loop resistance should be less than 100Ω when the external contact closes. The voltage at both ends of DI switch is 12VDC when DI switch/signal opens;

5. For output signals, the output from the control board is active signal with 230VAC, and the accepted Amps capacity is 1A;

For pump/alarm output, a relay (KWP/KAL) has been connected to the output port on control board before delivery to transfer active signal to free contact, and the contact capacity is 1A @250VAC.

6. For additional information, please see wiring diagram.

FIGURE 24– FIELD WIRINGS

CAUTION

The unit evaporator heater uses 230VAC. Disconnecting 230VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

WARNING

It is possible that multiple sources of power can be supplying the unit power panel. To prevent serious injury or death, the technician should verify that NO LETHAL VOLTAGES are present inside the panel AFTER disconnecting power, PRIOR to working on equipment.

SECTION 5 – TECHNICAL DATA
OPERATIONAL LIMITATIONS

TABLE 4 – TEMPERATURES AND FLOWS (COOLING CONDITION, CHILLER AND HEAT PUMP)

YMAA YMPA	LEAVING WATER TEMPERATURE (°C)		LIQUID FLOW (L/S)		AIR ON CONDENSER (°C)	
	MIN	MAX	MIN	MAX	MIN	MAX
0045	5	20	1.1	2.8	-17.8	48
0065	5	20	1.4	3.7	-17.8	48
0080	5	20	1.9	5	-17.8	48
0100	5	20	2.4	6.2	-17.8	48
0130	5	20	3.0	7.8	-17.8	48
0160	5	20	3.7	11.1	-17.8	48
0200	5	20	4.5	13.6	-17.8	48
0230	5	20	5.3	15.8	-17.8	48
0260	5	20	6.0	17.9	-17.8	48

Notes

1.The evaporator is protected against freezing to -20°C with an electric heater as standard;

2.Brine (ethylene or propylene glycol) should be used for anti-freezing in low ambient temperature cooling conditions;

3.The lower liquid flow limit is recommended and does not represent the cut-off value of the flow switch.

TABLE 5 – TEMPERATURES AND FLOWS (HEATING CONDITION, HEAT PUMP)

YMPA	LEAVING WATER TEMPERATURE (°C)		LIQUID FLOW (L/S)		AIR ON CONDENSER (°C)	
	MIN	MAX	MIN	MAX	MIN	MAX
0045	25	55	1.1	2.8	-15	25
0065	25	55	1.4	3.7	-15	25
0080	25	55	1.9	5	-15	25
0100	25	55	2.4	6.2	-15	25
0130	25	55	3.0	7.8	-15	25
0160	25	55	3.7	11.1	-15	25
0200	25	55	4.5	13.6	-15	25
0230	25	55	5.3	15.8	-15	25
0260	25	55	6.0	17.9	-15	25

Notes

1.The evaporator is protected against freezing to -20°C with an electric heater as standard;

2.The lower liquid flow limit is recommended and does not represent the cut-off value of the flow switch.

TABLE 6 – TEMPERATURES AND FLOWS (COOLING CONDITION, MEDIUM TEMPERATURE PROCESS CHILLER)

YMAA	LEAVING WATER TEMPERATURE (°C)		LIQUID FLOW (L/S)		AIR ON CONDENSER (°C)	
	MIN	MAX	MIN	MAX	MIN	MAX
0045	-8	20	1.1	2.8	-17.8	48
0065	-8	20	1.4	3.7	-17.8	48
0080	-8	20	1.9	5	-17.8	48
0100	-8	20	2.4	6.2	-17.8	48
0130	-8	20	3.0	7.8	-17.8	48
0160	-8	20	3.7	11.1	-17.8	48
0200	-8	20	4.5	13.6	-17.8	48
0230	-8	20	5.3	15.8	-17.8	48
0260	-8	20	6.0	17.9	-17.8	48

Notes

1. Low liquid temperature process cooling is only applicable for YMAA (cooling only) units;
2. The evaporator is protected against freezing to -20°C with an electric heater as standard;
3. Brine (ethylene or propylene glycol) should be used for anti-freezing;
4.The lower liquid flow limit is recommended and does not represent the cut-off value of the flow switch.

Excessive flow will cause damage to the cooler. Do not exceed max. liquid flow. Special care should be taken when multiple units are fed by a single pump.

Voltage Limitations

The following voltage limitations are absolute and operation beyond these limitations may cause serious damage to the compressor.

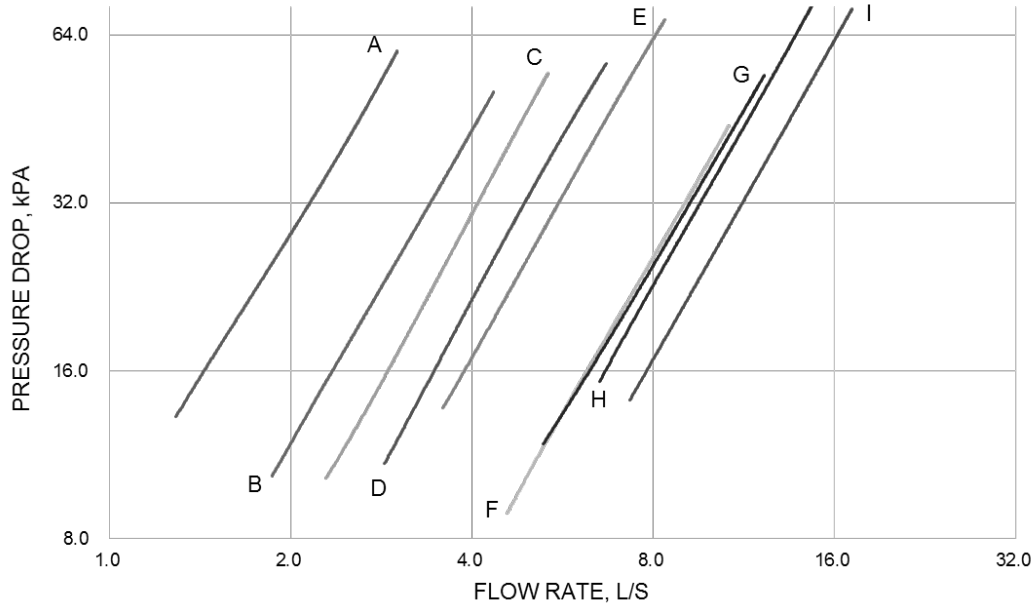
TABLE 7 - VOLTAGE LIMITATIONS

UNIT POWER	MIN.	MAX.
400-3-50	360	440

Altitude

The data in this manual is based on unit operation at sea level. The maximum allowable altitude of the unit is 2000 m. Contact local JCI service representatives for any applications that require a higher altitude.

OPERATIONAL LIMITATIONS
HEAT EXCHANGER PRESSURE DROP



YMAA/YMPA	PRESSURE DROP CURVE	CORRELATION
0045	A	y = 1.4169*x^3 - 2.7902*x^2 + 18.488*x - 9.0295
0065	B	y = 0.1071*x^3 + 1.3526*x^2 + 4.525*x - 3.4853
0080	C	y = -0.1316*x^3 + 3.4848*x^2 - 6.0541*x + 7.4083
0100	D	y = -0.1233*x^3 + 2.6949*x^2 - 4.8171*x + 5.4692
0130	E	y = -0.0589*x^3 + 1.8285*x^2 - 3.8203*x + 6.6512
0160	F	y = 0.0117*x^3 + 0.0583*x^2 + 2.7108*x - 5.8985
0200	G	y = -0.0041*x^3 + 0.4305*x^2 - 0.4644*x + 2.9758
0230	H	y = 0.0065*x^3 + 0.0985*x^2 + 2.5877*x - 7.5858
0260	I	y = 0.0004*x^3 + 0.2096*x^2 + 0.5379*x - 1.1606

Notes

1.Pressure Drop is the total water resistance across BPHE and water piping;

2.In Correlations, x represents Flow Rate in L/s, and y represents Pressure Drop in kPa.

FIGURE 25 – HEAT EXCHANGER PRESSURE DROP CURVE

PHYSICAL DATA

TABLE 8 - PHYSICAL DATA (YMAA/YMPA0045-0130)

Model			YMAA/YMPA				
			0045PE	**0065PE**	**0080PE**	**0100PE**	**0130PE**
Compressor	Type	/	DC inverter scroll and fixed speed scroll				
	Quantity	pcs	2	2	3	3	4
Air side heat exchanger	Fan Motor Type	/	EC motor				
	Fan Qty	pcs	1	1	2	2	2
	Working ambient temp. cooling mode	°C	-17.8~48	-17.8~48	-17.8~48	-17.8~48	-17.8~48
	Working ambient temp. heating mode	°C	-15~25	-15~25	-15~25	-15~25	-15~25
Water side heat exchanger	Type	/	Brazed Plate Heat Exchanger				
	Unit water volume (without Hydro Kit)	L	7	10	14	16	16
	Pump type		VSD pump				
	Nominal flow rate	L/s	2.2	2.9	3.8	4.8	6.0
	Flow rate range	L/s	1.1~2.8	1.4~3.7	1.9~5.0	2.4~6.2	3.0~7.8
	Total pressure drop	kPa	30	30	28	32	36
	Working range water leaving temp. cooling	°C	5~20 -8~20	5~20 -8~20	5~20 -8~20	5~20 -8~20	5~20 -8~20
	Working range water leaving temp. heating	°C	25~55	25~55	25~55	25~55	25~55
Dimensions (without Hydro Kit)	Overall length	mm	1500	1500	2240	2240	2240
	Overall width	mm	1200	1200	1200	1200	1200
	Overall height	mm	2440	2440	2440	2440	2440
Dimensions (with Hydro Kit)	Overall length	mm	2300	2300	3050	3050	3050
	Overall width	mm	1200	1200	1200	1200	1200
	Overall height	mm	2440	2440	2440	2440	2440
Weight (without Hydro Kit)	Shipping weight	kg	605	625	919	944	1023
	Operating weight	kg	587	610	893	920	999
Weight (with Hydro Kit)	Shipping weight	kg	806	826	1131	1156	1235
	Operating weight	kg	782	805	1105	1132	1211

Notes

1.Each unit is configured with one inverter scroll compressor;

2.The units are tested in compliance with EN14511-3;

3.Unit dimension for base model only.

TABLE 9 - PHYSICAL DATA (YMAA/YMPA0160-0260)

Model			YMAA/YMPA			
			0160PE	0200PE	0230PE	0260PE
Compressor	Type	/	DC inverter scroll and fixed speed scroll			
	Quantity	pcs	5	6	7	8
Air side heat exchanger	Fan Motor Type	/	EC motor			
	Fan Qty	pcs	3	3	4	4
	Working ambient temp. cooling mode	°C	-17.8~48	-17.8~48	-17.8~48	-17.8~48
	Working ambient temp. heating mode	°C	-15~25	-15~25	-15~25	-15~25
Water side heat exchanger	Type	/	Brazed Plate Heat Exchanger			
	Unit water volume (without Hydro Kit)	L	27	29	32	34
	Pump type		VSD pump			
	Nominal flow rate	L/s	7.4	9.1	10.5	11.9
	Flow rate range	L/s	3.7~11.1	4.5~13.6	5.3~15.8	6.0~17.9
	Total pressure drop	kPa	23	29	41	38
	Working range water leaving temp. cooling	°C	5~20 -8~20	5~20 -8~20	5~20 -8~20	5~20 -8~20
	Working range water leaving temp. heating	°C	25~55	25~55	25~55	25~55
Dimensions (without Hydro Kit)	Overall length	mm	2240	2240	2240	2240
	Overall width	mm	3050	3050	3050	3050
	Overall height	mm	2500	2500	2500	2500
Dimensions (with Hydro Kit)	Overall length	mm	2240	2240	2240	2240
	Overall width	mm	3050	3050	3050	3050
	Overall height	mm	2500	2500	2500	2500
Weight (without Hydro Kit)	Shipping weight	kg	1895	1974	2203	2282
	Operating weight	kg	1922	2003	2235	2316
Weight (with Hydro Kit)	Shipping weight	kg	2071	2150	2379	2458
	Operating weight	kg	2115	2196	2428	2509

Notes

1.Each unit is configured with one inverter scroll compressor;

2.The units are tested in compliance with EN14511-3;

3.Unit dimension for base model only.

TABLE 10 - REFRIGERANT AND OIL CHARGE

YMAA/YMPA			0045	0065	0080	0100	0130	0160	0200	0230	0260
Refrigerant Charge	SYS1	kg	9.5	12.3	8.5	9.5	11.4	9.5	11	9.5	11.4
	SYS2	kg	/	/	9.05	11	11.4	10	10.5	11	11.4
	SYS3	kg	/	/	/	/	/	10	10.5	11.4	11.4
	SYS4	kg	/	/	/	/	/	/	/	11.4	11.4
Tonnes of CO_2 Equivalent (GWP)		CO_2eq (t)	19.9	25.7	36.7	42.9	47.7	61.6	66.9	90.5	95.3
Oil Charge	SYS1	L	2.9	5	1.6	1.6	5	1.6	5	1.6	5
	SYS2	L	/	/	5.6	5.6	5.6	5.6	5.6	5.6	5.6
	SYS3	L	/	/	/	/	/	5.6	5.6	5.6	5.6
	SYS4	L	/	/	/	/	/	/	/	5.6	5.6

Notes

1. SYS1 oil type: FV68H;
2. SYS2 oil type: RL 32-3MAF;
3. Both of the systems are charged with additional oil before delivery.

Charge with proper oil for each system when additional oil is required. Mix-ups of different oils may cause compressor failure.

ELECTRICAL DATA

TABLE 11 - YMAA ELECTRICAL DATA (WITHOUT HYDRO KIT)

YMAA	0045PE	0065PE	0080PE	0100PE	0130PE
Nominal Voltage/Voltage Limits	400V-3PH-50Hz/360V-440V				
Nominal Current at 400V (A)	25.7	36.2	40.6	55.0	70.6
Max Current at 400V (A)	35.1	38.3	60.9	71.7	85.2
Max Current at 360V (A)	40.9	45.2	68.1	82.1	98.9
Unit Short Circuit Current Withstand (kA)	5	5	5	5	5
Maximum Instantaneous Current (A)	90.4	108.4	163.4	198.8	212.1

TABLE 12 - YMPA ELECTRICAL DATA (WITHOUT HYDRO KIT)

YMPA	0045PE	0065PE	0080PE	0100PE	0130PE
Nominal Voltage/Voltage Limits	400V-3PH-50Hz/360V-440V				
Nominal Current at 400V (A)	25.7	34.5	43.7	56.4	74.2
Max Current at 400V (A)	35.1	38.3	60.9	71.7	85.2
Max Current at 360V (A)	40.9	45.2	68.1	82.1	98.9
Unit Short Circuit Current Withstand (kA)	5	5	5	5	5
Maximum Instantaneous Current (A)	90.4	108.4	163.4	198.8	212.1

TABLE 13 - YMAA ELECTRICAL DATA (WITH HYDRO KIT)

YMAA	0045PE	0065PE	0080PE	0100PE	0130PE
Nominal Voltage/Voltage Limits	400V-3PH-50Hz/360V-440V				
Nominal Current at 400V (A)	29.3	39.8	45.3	59.7	75.3
Max Current at 400V (A)	38.7	41.9	65.6	76.4	89.9
Max Current at 360V (A)	44.5	48.8	72.8	86.8	103.6
Unit Short Circuit Current Withstand (kA)	5	5	5	5	5
Maximum Instantaneous Current (A)	90.4	108.4	163.4	198.8	212.1

TABLE 14 - YMPA ELECTRICAL DATA (WITH HYDRO KIT)

YMPA	0045PE	0065PE	0080PE	0100PE	0130PE
Nominal Voltage/Voltage Limits	400V-3PH-50Hz/360V-440V				
Nominal Current at 400V (A)	29.3	38.1	48.4	61.1	78.9
Max Current at 400V (A)	38.7	41.9	65.6	76.4	89.9
Max Current at 360V (A)	44.5	48.8	72.8	86.8	103.6
Unit Short Circuit Current Withstand (kA)	5	5	5	5	5
Maximum Instantaneous Current (A)	90.4	108.4	163.4	198.8	212.1

TABLE 15 - YMAA ELECTRICAL DATA (WITHOUT HYDRO KIT)

YMAA	0160PE	0200PE	0230PE	0260PE
Nominal Voltage/Voltage Limits	400V-3PH-50Hz/360V-440V			
Nominal Current at 400V (A)	88.5	103.1	124.7	139.1
Max Current at 400V (A)	119.5	133.1	166.4	179.9
Max Current at 360V (A)	136.8	153.7	190.6	207.4
Unit Short Circuit Current Withstand (kA)	5	5	5	5
Maximum Instantaneous Current (A)	247.9	261.2	294.3	307.6

TABLE 16 - YMPA ELECTRICAL DATA (WITHOUT HYDRO KIT)

YMPA	0160PE	0200PE	0230PE	0260PE
Nominal Voltage/Voltage Limits	400V-3PH-50Hz/360V-440V			
Nominal Current at 400V (A)	96.4	107.8	139.0	148.6
Max Current at 400V (A)	119.5	133.1	166.4	179.9
Max Current at 360V (A)	136.8	153.7	190.6	207.4
Unit Short Circuit Current Withstand (kA)	5	5	5	5
Maximum Instantaneous Current (A)	247.9	261.2	294.3	307.6

TABLE 17 - YMAA ELECTRICAL DATA (WITH HYDRO KIT)

YMAA	0160PE	0200PE	0230PE	0260PE
Nominal Voltage/Voltage Limits	400V-3PH-50Hz/360V-440V			
Nominal Current at 400V (A)	95.9	110.5	132.1	146.5
Max Current at 400V (A)	126.9	140.5	173.8	187.3
Max Current at 360V (A)	144.2	161.1	198.0	214.8
Unit Short Circuit Current Withstand (kA)	5	5	5	5
Maximum Instantaneous Current (A)	247.9	261.2	294.3	307.6

TABLE 18 - YMPA ELECTRICAL DATA (WITH HYDRO KIT)

YMPA	0160PE	0200PE	0230PE	0260PE
Nominal Voltage/Voltage Limits	400V-3PH-50Hz/360V-440V			
Nominal Current at 400V (A)	103.8	115.2	146.4	156.0
Max Current at 400V (A)	126.9	140.5	173.8	187.3
Max Current at 360V (A)	144.2	161.1	198.0	214.8
Unit Short Circuit Current Withstand (kA)	5	5	5	5
Maximum Instantaneous Current (A)	247.9	261.2	294.3	307.6

It is possible that multiple sources of power can be supplying the unit power panel. To prevent serious injury or death, the technician should verify that NO LETHAL VOLTAGES are present inside the panel AFTER disconnecting power, PRIOR to working on equipment.

The unit evaporator heater uses 230VAC. Disconnecting 230VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

ELECTRICAL DIAGRAM

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

It is the responsibility of the user to install over current protection devices between the supply conductors and the power supply terminals on the unit.

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

WIRING DIAGRAM

YMAA/YMPA0045-0065

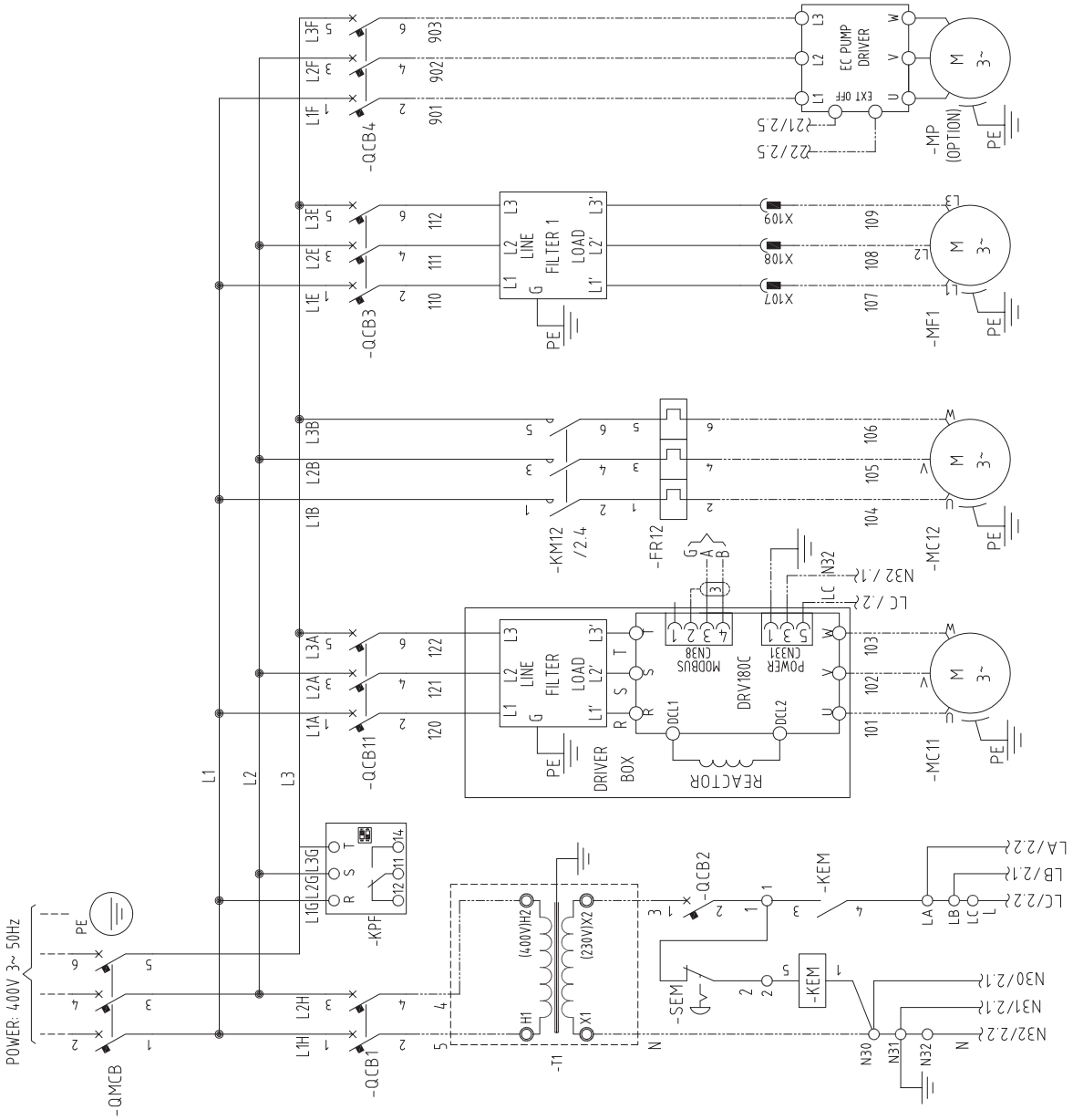


FIGURE 26 – YMAA/YMPA0045-0065 WIRING DIAGRAM

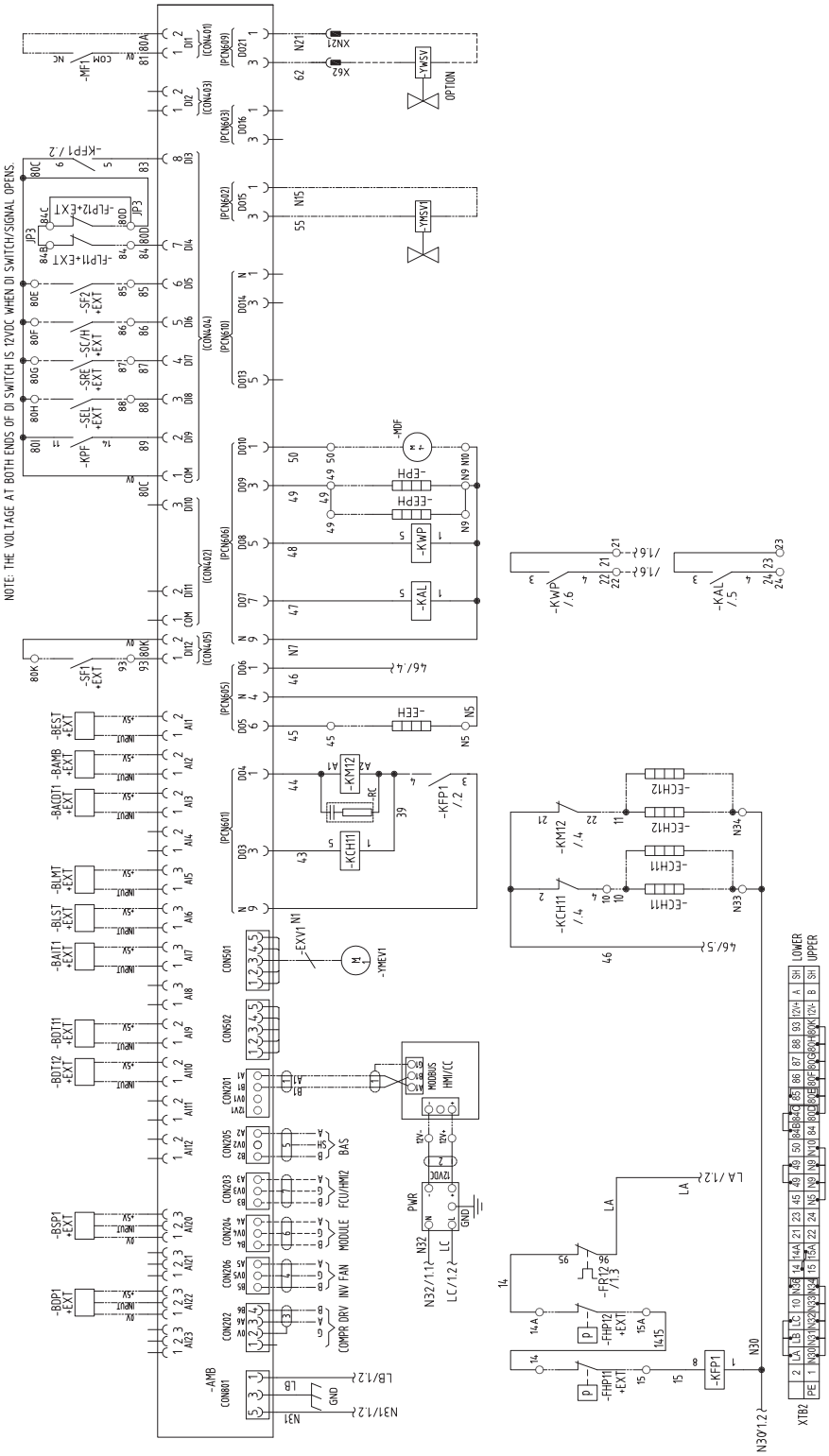


FIGURE 27 – YMAA/YMPA0045-0065 MICROBOARD WIRING DIAGRAM

YMAA/YMPA0080-0130

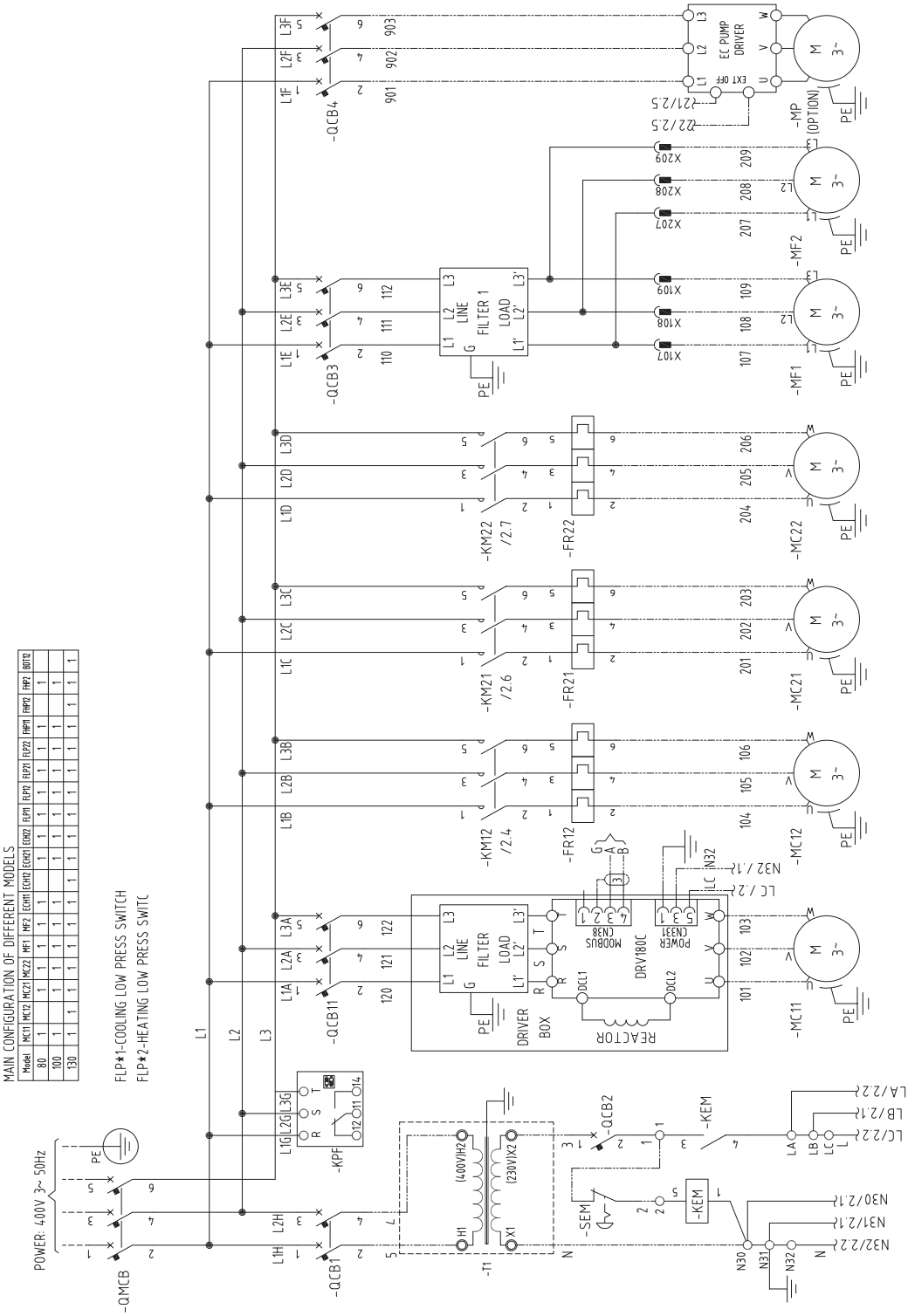


FIGURE 28 – YMAA/YMPA0080-0130 WIRING DIAGRAM

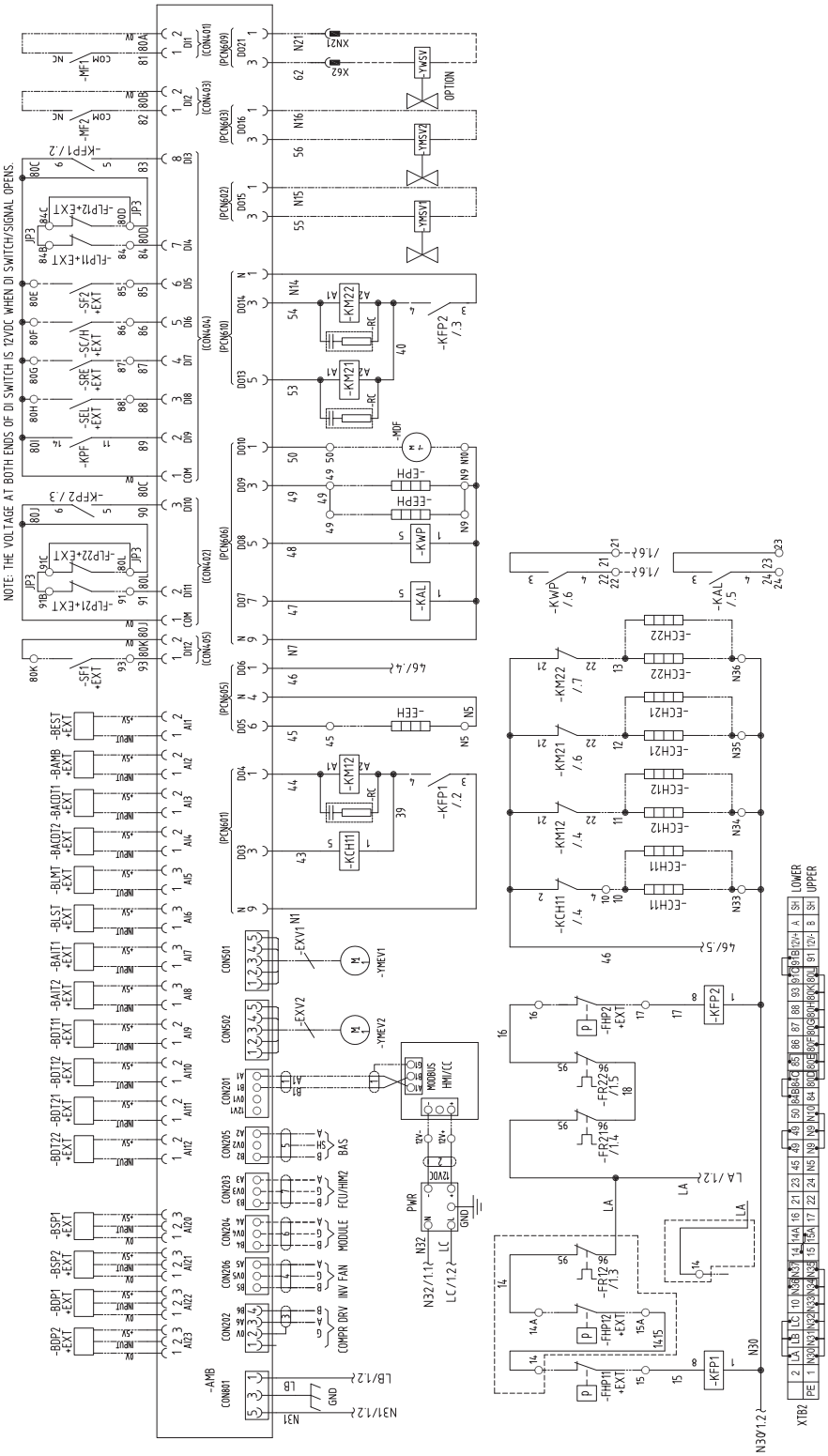
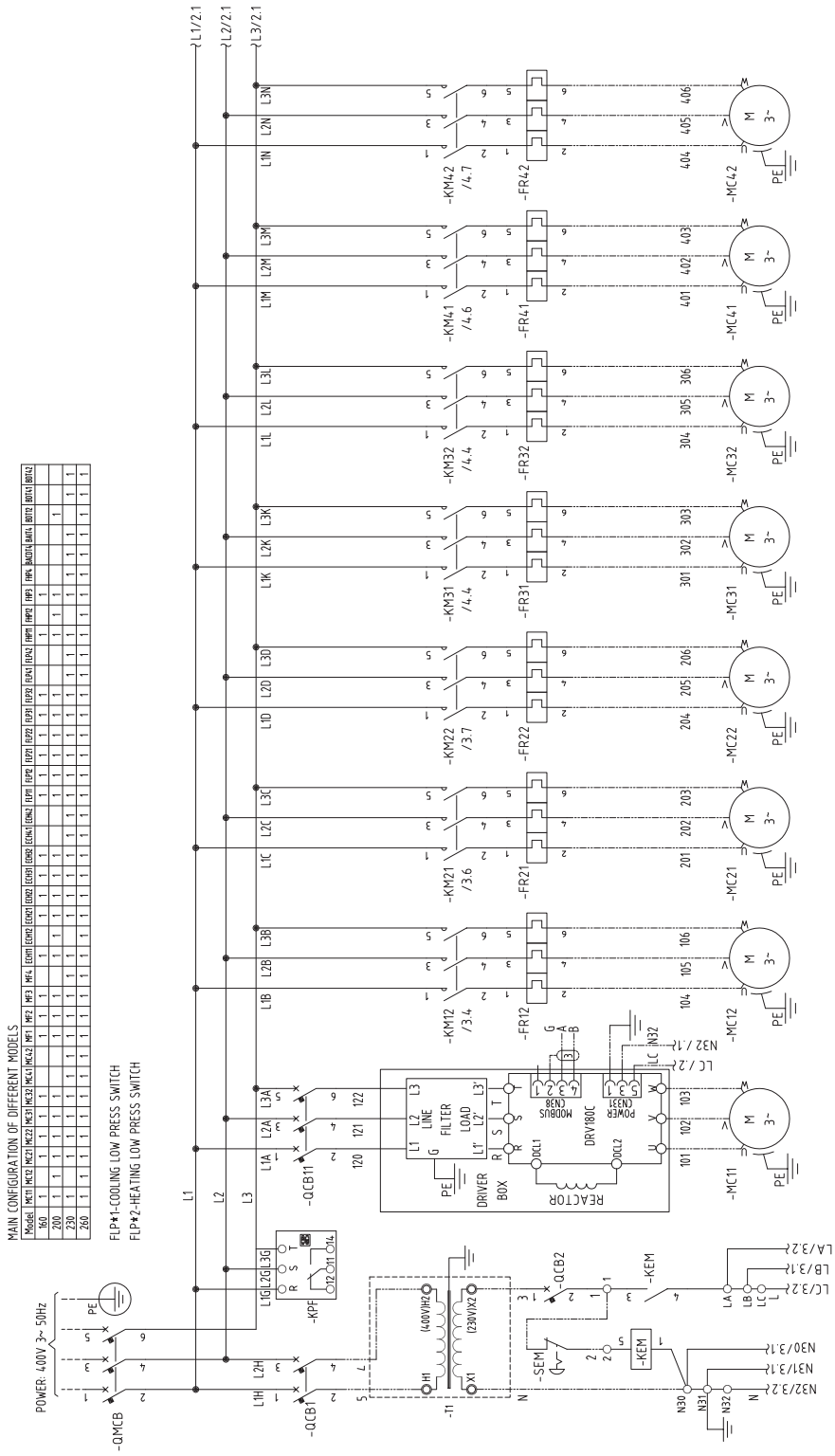


FIGURE 29 – YMAA/YMPA0080-0130 MICROBOARD WIRING DIAGRAM

YMAA/YMPA0160-0260



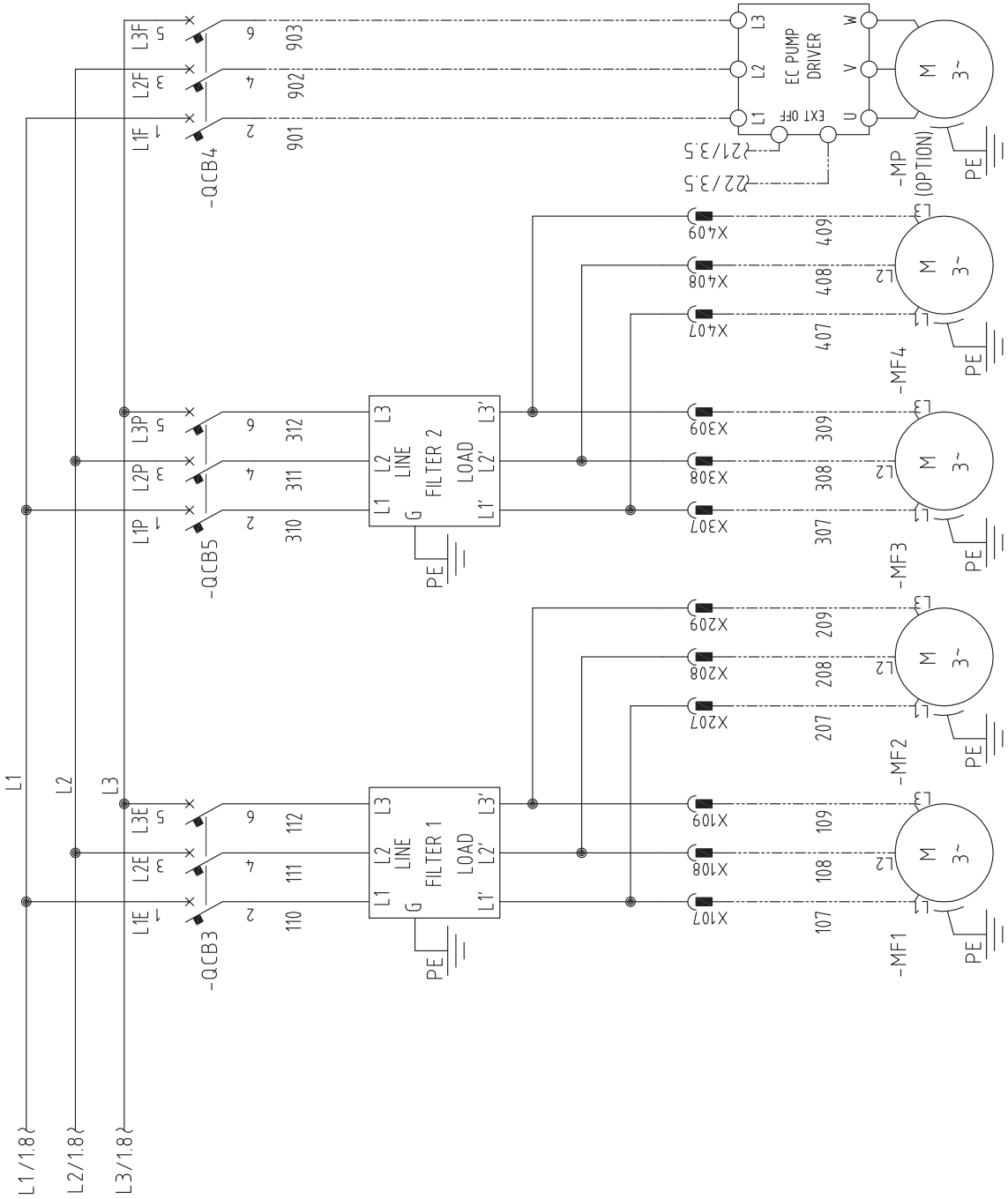
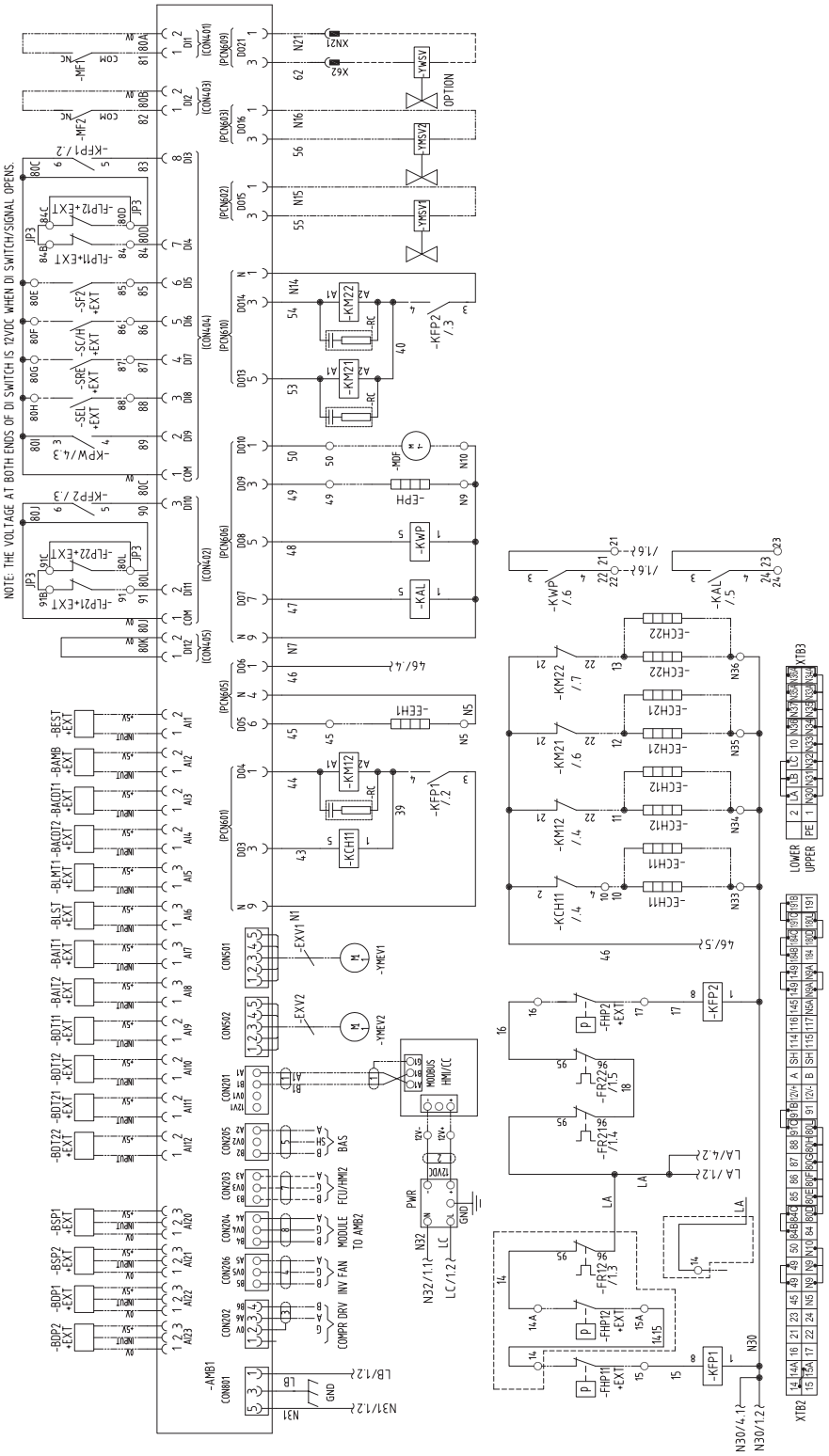


FIGURE 30 – YMAA/YMPA0160-0260 WIRING DIAGRAM


NOTE: THE VOLTAGE AT BOTH ENDS OF DI SWITCH IS 12VDC WHEN DI SWITCH/SIGNAL OPENS.
-AMB1
CON601
-EXV1
-YMEV1
-EXV2
-YMEV2
-KFP1
-KFP2
-KWP
-KAL
-KCH11
-KM12
-KM21
-KM22
-EPH
-EEH1
-ECH11
-ECH12
-ECH21
-ECH22
-FHP11
-FHP12
-FHP2
-FR12
-FR21
-FR22
-MBF
-YMSV1
-YMSV2
-YMSV3
OPTION
MODBUS
HMI/CC
PWR
MODULE
FCU/HMM2
TO AMB2
COMPR DRV
INV FAN
BAS
XTB2
XTB3
LOWER
UPPER

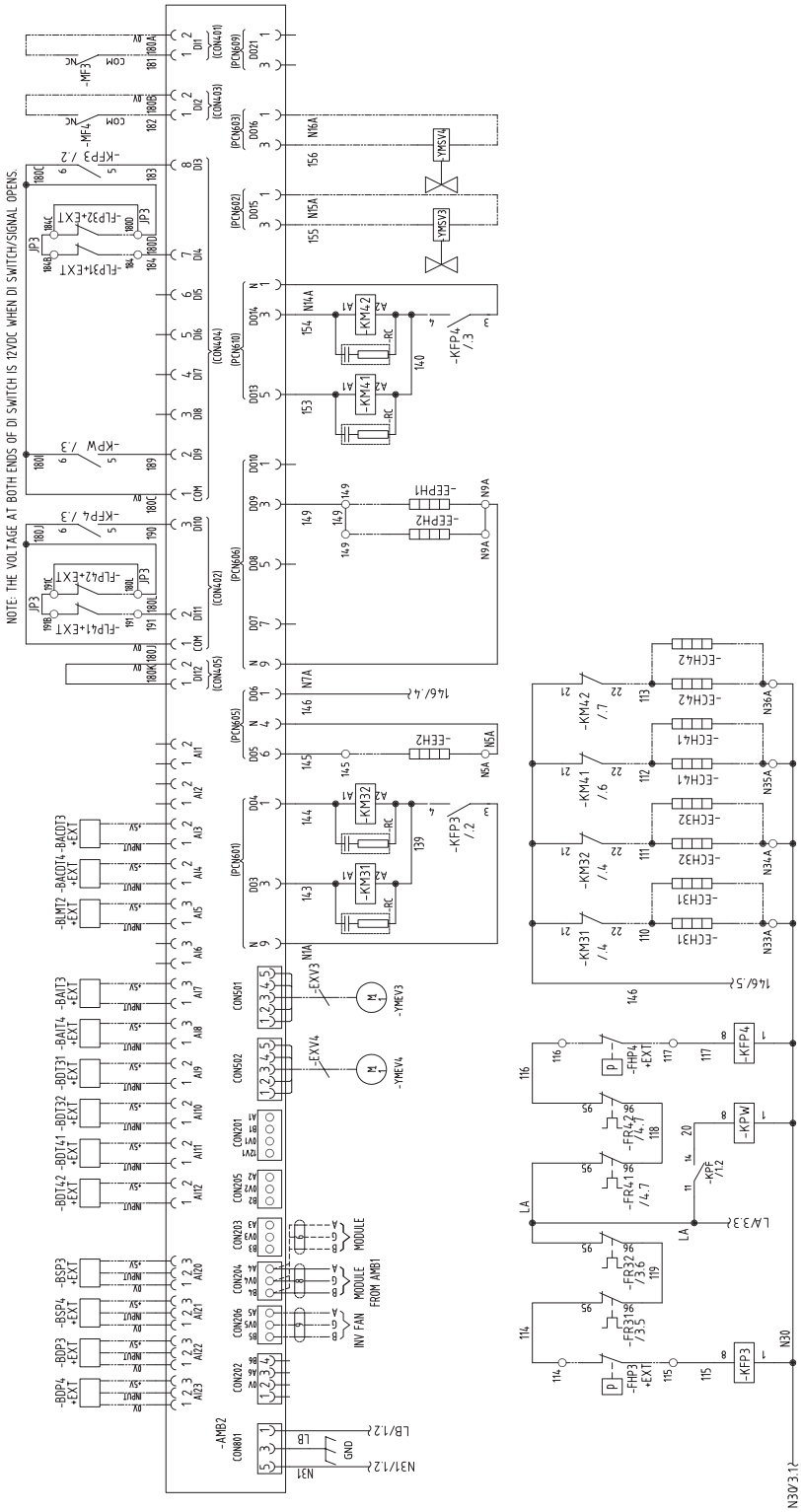
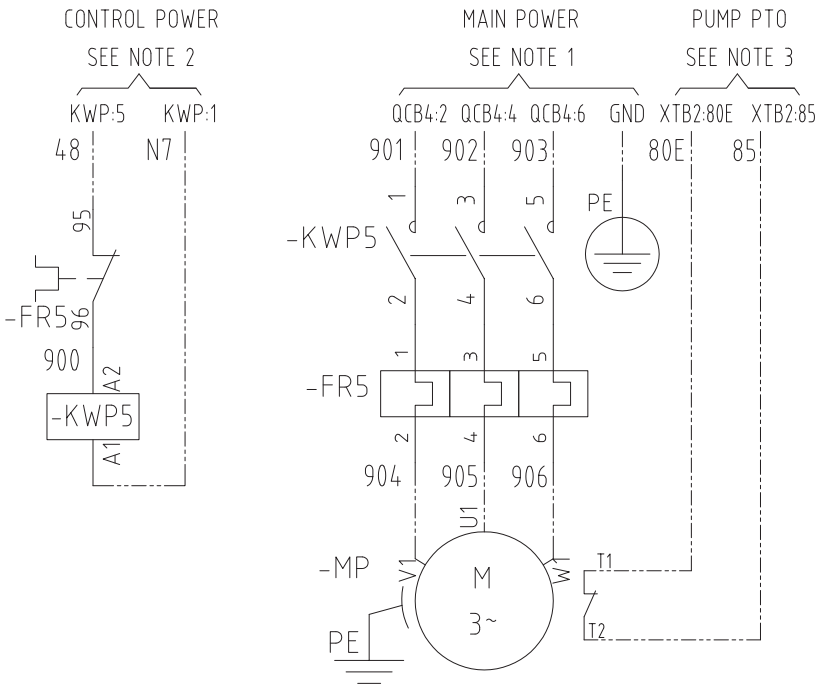


FIGURE 31 – YMAA/YMPA0160-0260 MICROBOARD WIRING DIAGRAM



ITEM	COMMENTS
-KWP5	PUMP CONTACTOR
-FR5	OVERLOAD RELAY
-MP	PUMP MOTOR
MAIN POWER	380/400VAC
CONTROL POWER	220/230VAC
FR5 SETTING	45/65MODEL: 2.5A
	80/100/130MODEL: 3.2A

FIGURE 32 – YMAA/YMPA0045-0130 FIXED SPEED PUMP WIRING DIAGRAM

Notes

1.Main power is connected to micro breaker QCB4 in control panel;

2.Control power is connected to both ends of the relay (KWP) coil in control panel;

3.Pump PTO is connected to XTB2: 80E&85 for system flow switch SF2.

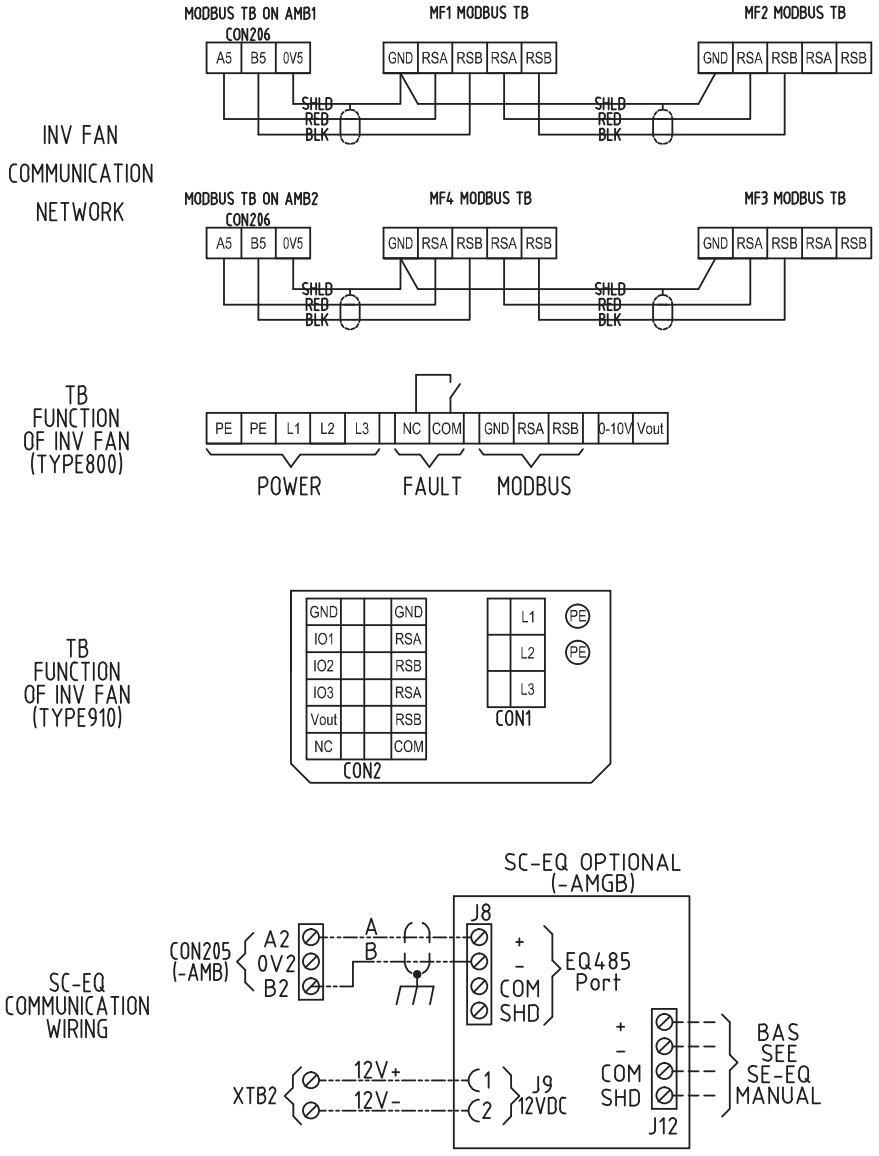


FIGURE 33 – COMMUNICATION AND SC-EQ WIRING

Notes

1.Refer to installation commissioning operation and maintenance manual for customer connections and notes. Non-compliance to these instructions will invalidate unit warranty.

2.Customer should provide power according to unit nameplate voltage.

3.Emergency button is installed at the location easily operated.

4.-SC/H should not be installed by customer on the unit of cold only.

5.Air coil defrost temp. -BACDT only for heat pump.

6.Model solenoid valve -YMSV only for heat pump.

7.Low pressure switch -FLP*2 only for heat pump.

8.See table "main configuration" for different models, the quantities of contactors, overload relays, sensors, high or low pressure switch (FHP or FLP), and wiring are provided according to the configuration of different models.

9.The transformer is installed outside of the panel.

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DIP SWITCH SETTING

Microboard DIP Switch

Two DIP switches, SW301 and SW302, are located on the IPU3 micro board. SW301 is an eight-digit switch and the first five digits are used to set communication addresses for each module. It is converted from decimalism to binary.

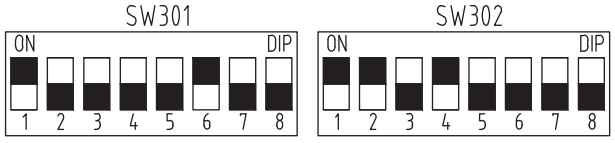


FIGURE 34 - MICROBOARD DIP SWITCH

Address Setting

The control system allows a maximum of 32 micro boards combined as a communication network. The addresses are set as follows.

TABLE 19 - DIP ADDRESS SETTING

MODULE	SW301-1	SW301-2	SW301-3	SW301-4	SW301-5
1#	ON	OFF	OFF	OFF	OFF
2#	OFF	ON	OFF	OFF	OFF
3#	ON	ON	OFF	OFF	OFF
4#	OFF	OFF	ON	OFF	OFF
5#	ON	OFF	ON	OFF	OFF
6#	OFF	ON	ON	OFF	OFF
7#	ON	ON	ON	OFF	OFF
8#	OFF	OFF	OFF	ON	OFF
9#	ON	OFF	OFF	ON	OFF
10#	OFF	ON	OFF	ON	OFF
11#	ON	ON	OFF	ON	OFF
12#	OFF	OFF	ON	ON	OFF
13#	ON	OFF	ON	ON	OFF
14#	OFF	ON	ON	ON	OFF
15#	ON	ON	ON	ON	OFF
16#	OFF	OFF	OFF	OFF	ON
17#	ON	OFF	OFF	OFF	ON
18#	OFF	ON	OFF	OFF	ON
19#	ON	ON	OFF	OFF	ON
20#	OFF	OFF	ON	OFF	ON
21#	ON	OFF	ON	OFF	ON
22#	OFF	ON	ON	OFF	ON
23#	ON	ON	ON	OFF	ON
24#	OFF	OFF	OFF	ON	ON
25#	ON	OFF	OFF	ON	ON
26#	OFF	ON	OFF	ON	ON
27#	ON	ON	OFF	ON	ON
28#	OFF	OFF	ON	ON	ON
29#	ON	OFF	ON	ON	ON
30#	OFF	ON	ON	ON	ON
31#	ON	ON	ON	ON	ON
32#	OFF	OFF	OFF	OFF	OFF

Model and Function Setting

The last 3 digits of SW301 are used to set models.

TABLE 20 - MODEL SETTING

MODEL	SW301-6	SW301-7	SW301-8
0045	OFF	OFF	OFF
0065	OFF	OFF	ON
0080	OFF	ON	OFF
0100	OFF	ON	ON
0130	ON	OFF	OFF

Note

Large models above 130 kW are smaller models physically connected thus with two mainboards individually and differently set before delivery.

TABLE 21 - LARGE MODEL SETTING

MODEL	1#BOARD	2#BOARD
0160	0100	0065
0200	0130	0065
0230	0100	0130
0260	0130	0130

SW302-3 and SW302-4 are used to set applications.

TABLE 22 - FUNCTION SETTING

CONDITION	SW302-3	SW302-4	NOTE
BRINE	OFF	OFF	
STANDARD	OFF	ON	DEFAULT
RESERVED	ON	OFF	
RESERVED	ON	ON	

Configuration Setting

The other digits of SW302, except for SW302-1, are used to set the configurations of the unit. This is already finished before unit delivery.

TABLE 23 - CONFIGURATION SETTING

DIP	OFF	ON	DEFAULT
SW302-1	NORMAL		OFF
SW302-2		EC FAN	ON
SW302-5	COOLING ONLY	HEAL PUMP	OFF
SW302-6	CE		OFF
SW302-7	INVERTER COMP.	FIXED COMP.	OFF
SW302-8	WIRE CONTROLLER		OFF

Wire Controller DIP Switch

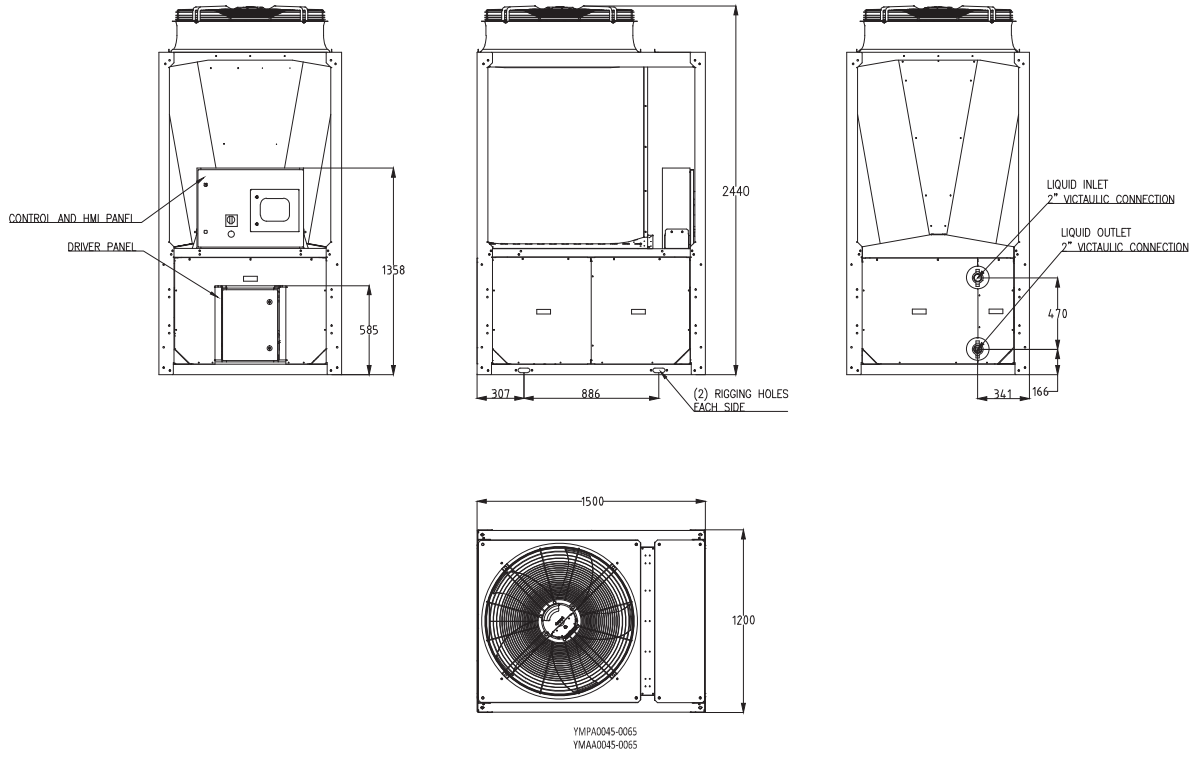
The 6-digit switch used to set the unit type is positioned in the back of the wire controller. The DIPs are preset in accordance with Microboard before delivery.

SW1-1	SW1-2	SW1-3	UNIT TYPE
OFF	OFF	OFF	HEAT PUMP (DEFAULT)
ON	OFF	OFF	CHILLER
OFF	ON	OFF	BRINE CHILLER

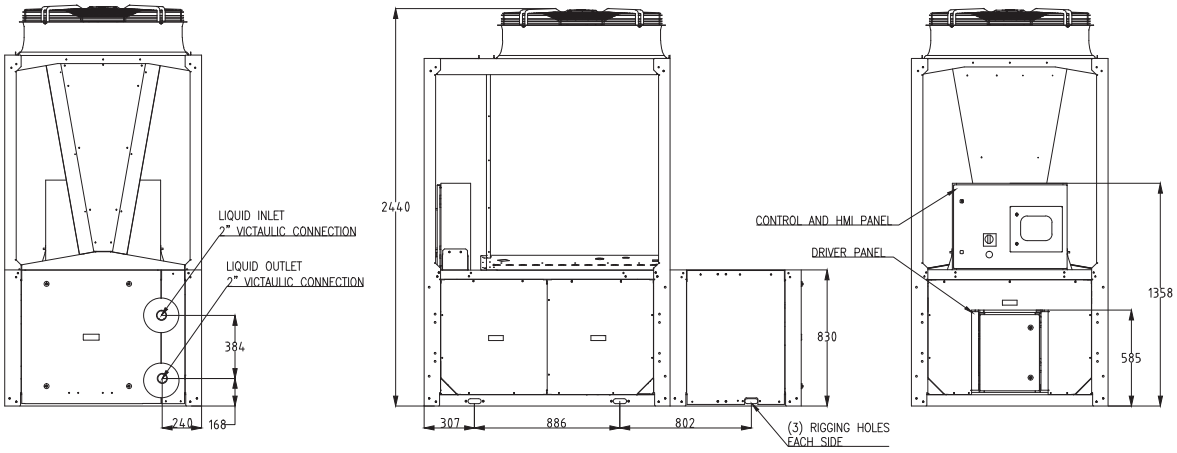
FIGURE 35 - WIRE CONTROLLER DIP SWITCH

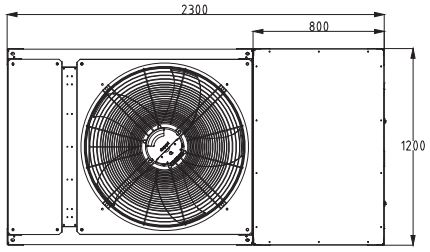
DIMENSIONS

YMAA/YMPA0045-0065 (WITHOUT HYDRO KIT)



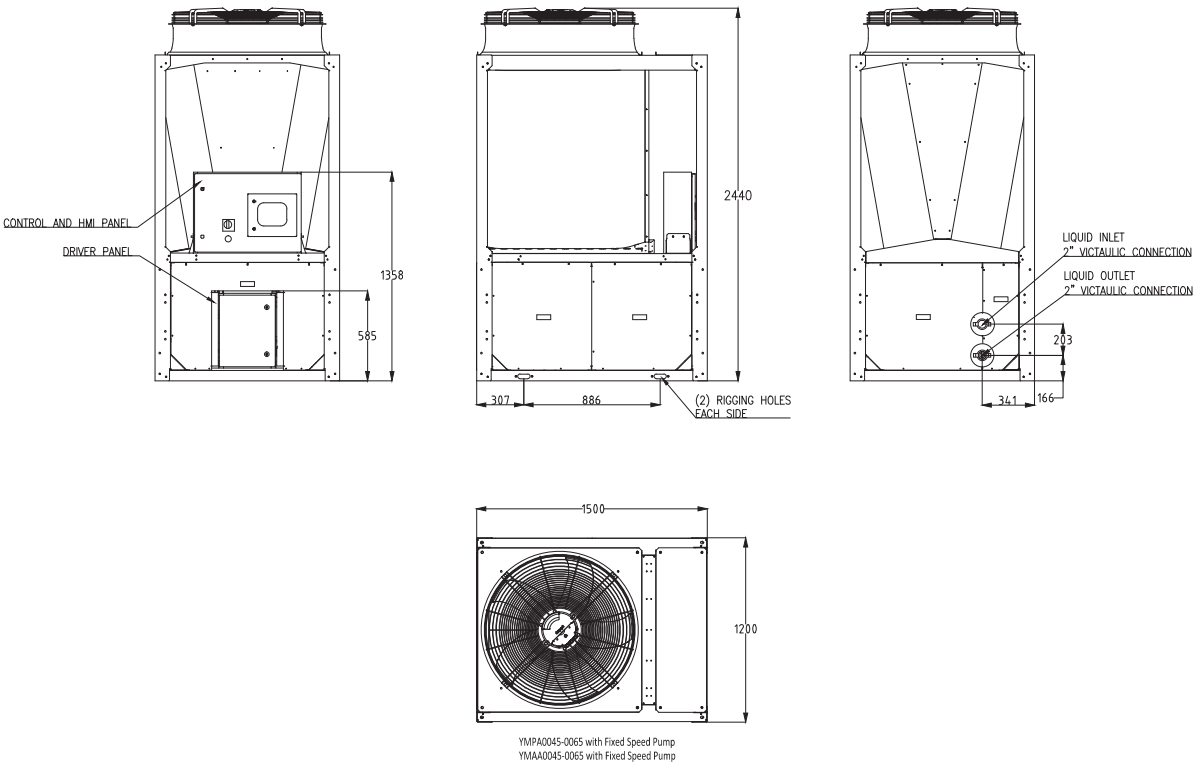
YMAA/YMPA0045-0065 (WITH HYDRO KIT)





YMPA0045-0065 with VSD Pump
YMAA0045-0065 with VSD Pump

YMAA/YMPA0045-0065 (WITH FIXED SPEED PUMP)



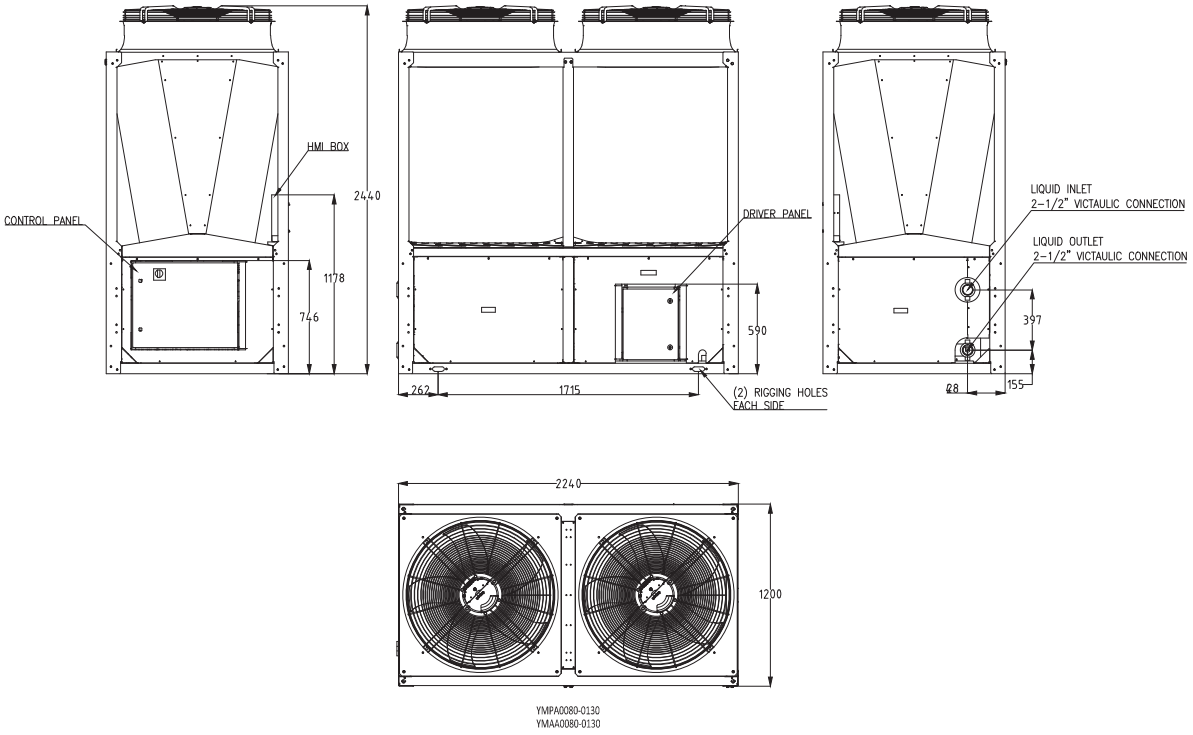
Note: *All dimensions are in mm unless specified otherwise.*

Note:

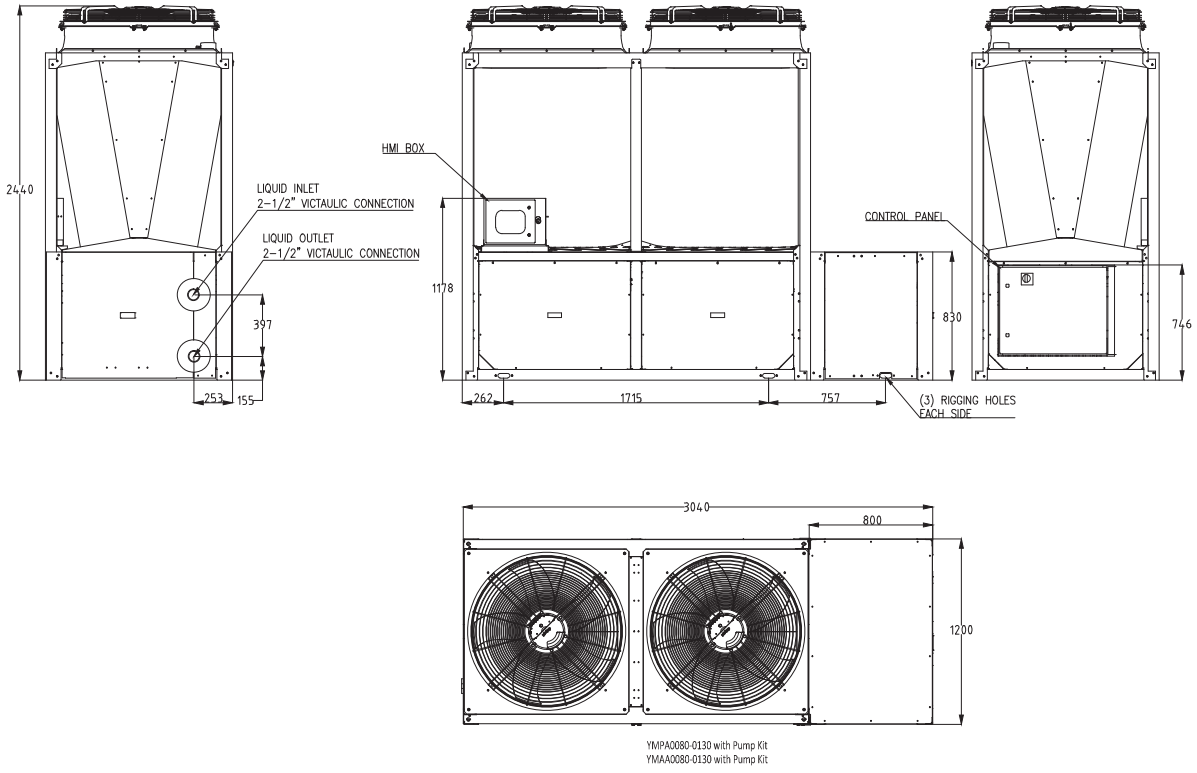
Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; control panel end to wall – 2m; cooler end to wall – 2m; top – no obstructions allowed; distance between adjacent units – 400mm or 700mm, refer to Piping System Connections. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 150mm.

FIGURE 36 – YMAA/YMPA0045-0065 DIMENSIONS

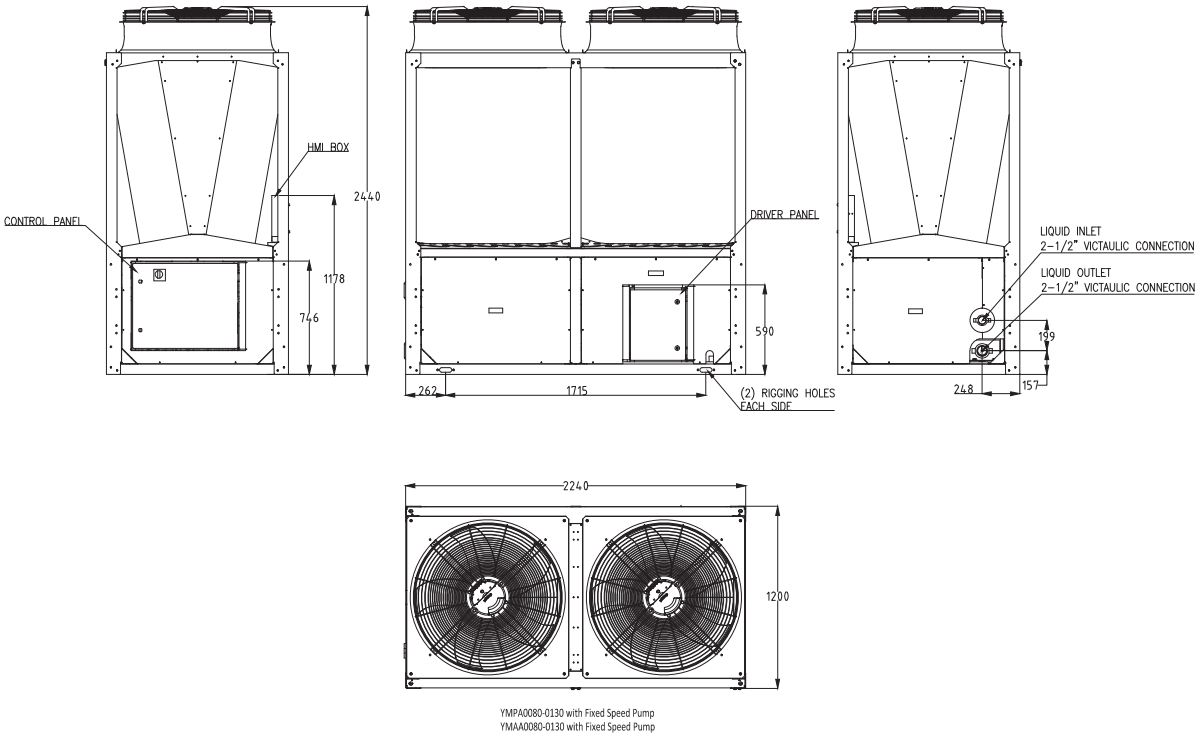
YMAA/YMPA0080-0130 (WITHOUT HYDRO KIT)



YMAA/YMPA0080-0130 (WITH HYDRO KIT)



YMAA/YMPA0080-0130 (WITH FIXED SPEED PUMP)



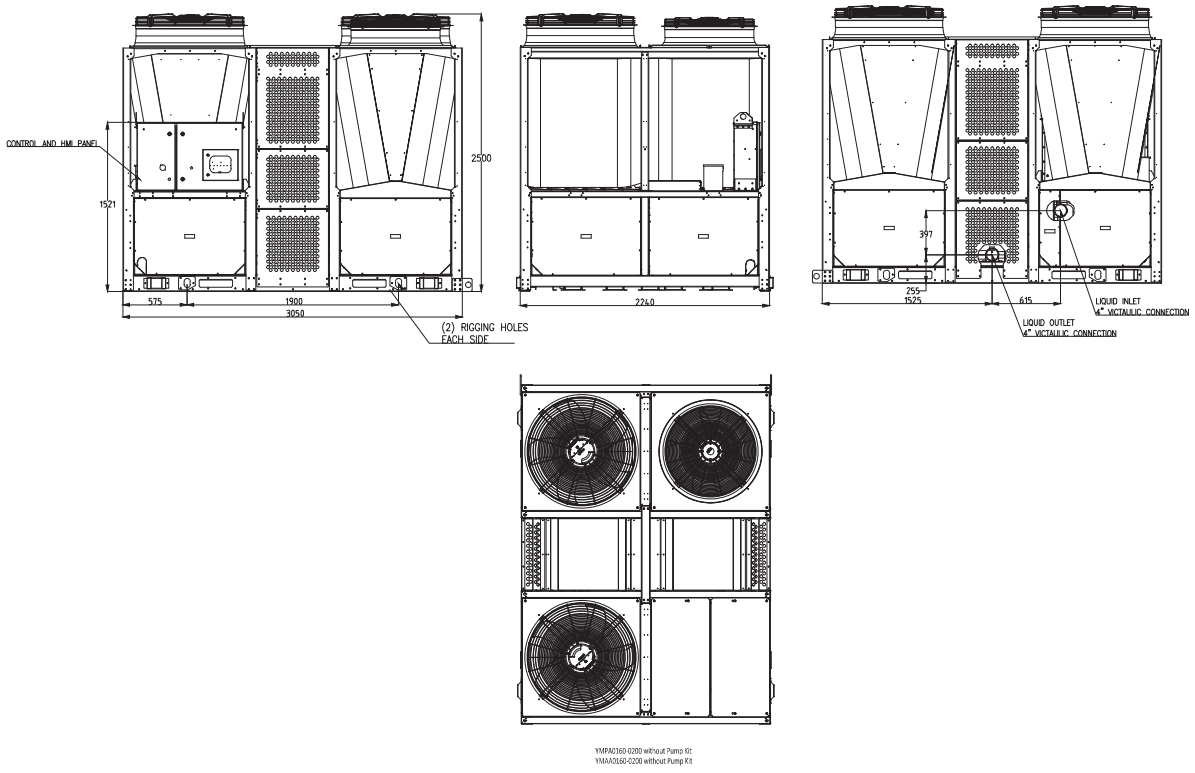
Note: *All dimensions are in mm unless specified otherwise.*

Note:

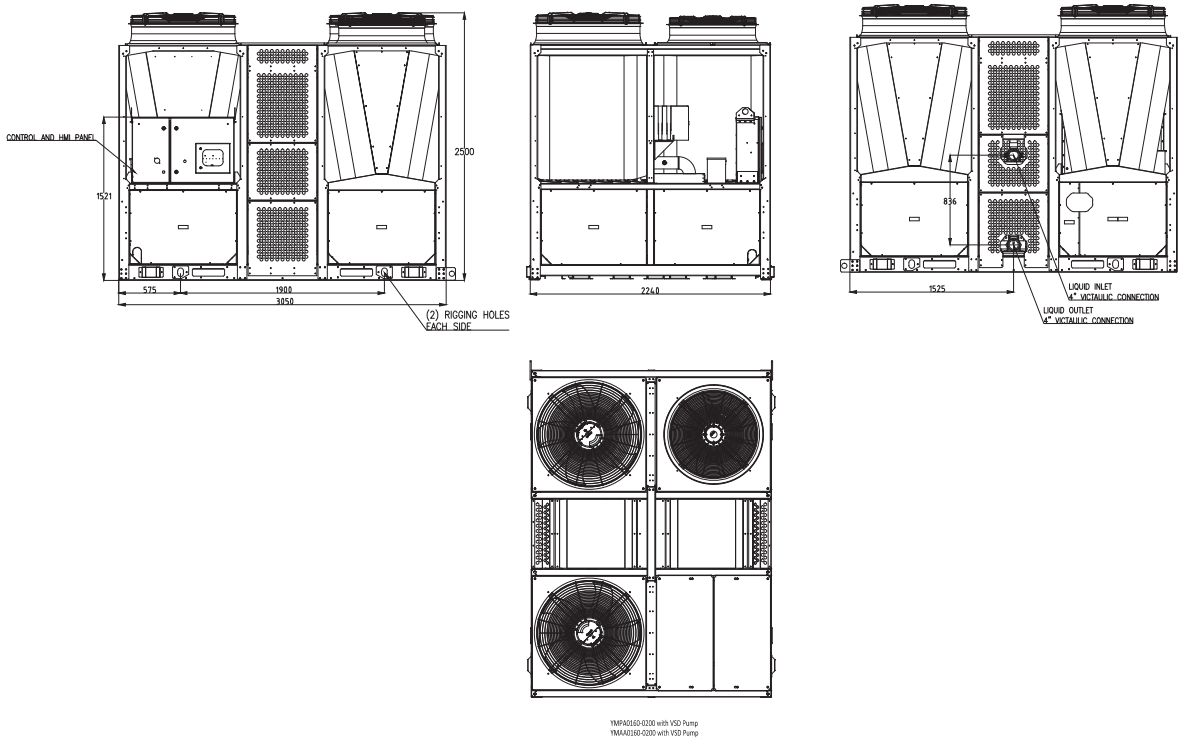
Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; control panel end to wall – 2m; cooler end to wall – 2m; top – no obstructions allowed; distance between adjacent units – 400mm or 700mm, refer to Piping System Connections. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 150mm.

FIGURE 37 – YMAA/YMPA0080-0130 DIMENSIONS

YMAA/YMPA0160-0200 (WITHOUT HYDRO KIT)



YMAA/YMPA0160-0200 (WITH HYDRO KIT)



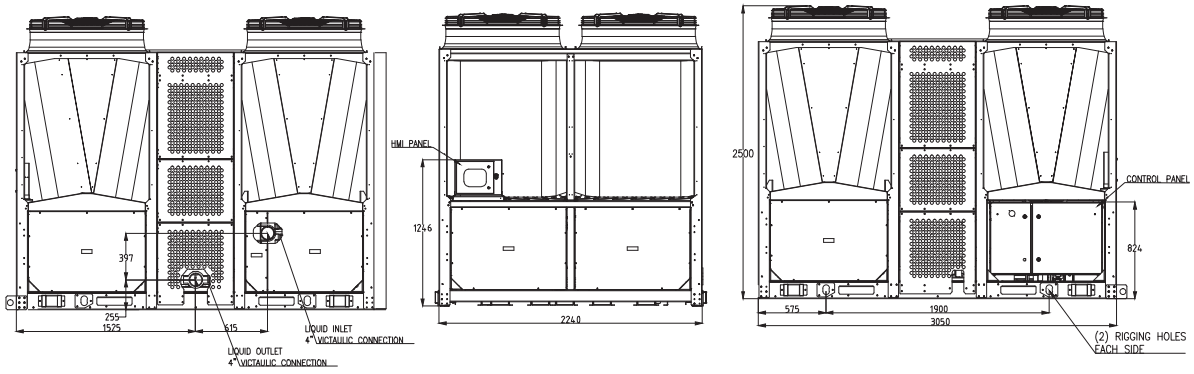
Note: *All dimensions are in mm unless specified otherwise.*

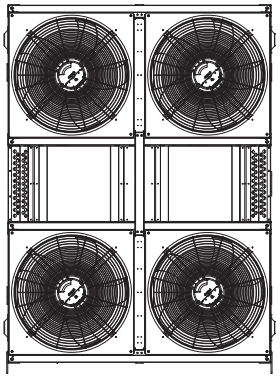
Note:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; control panel end to wall – 2m; cooler end to wall – 2m; top – no obstructions allowed; distance between adjacent units – 400mm or 700mm, refer to Piping System Connections. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 150mm.

FIGURE 38 – YMAA/YMPA0160-200 DIMENSIONS

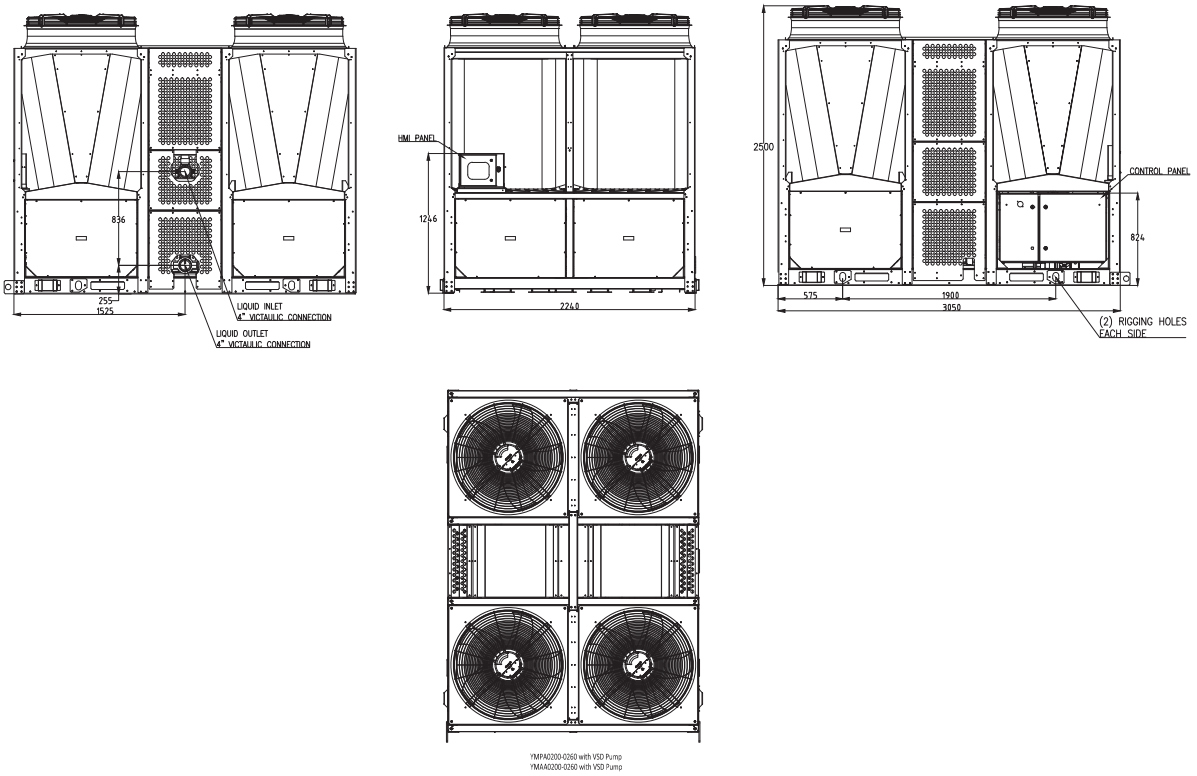
YMAA/YMPA0230-0260 (WITHOUT HYDRO KIT)





YMP40200-0260 without Pump Kit
YMAA0200-0260 without Pump Kit

YMAA/YMPA0230-0260 (WITH HYDRO KIT)



Note: *All dimensions are in mm unless specified otherwise.*

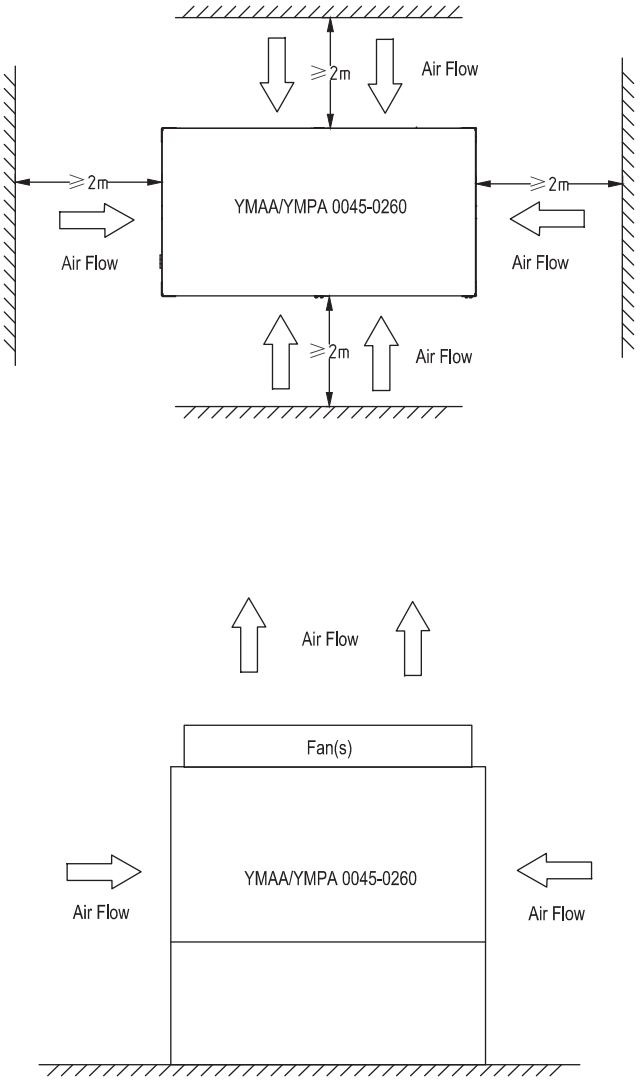
Note:

Placement on a level surface of free of obstructions (including snow, for winter operation) or air circulation ensures rated performance, reliable operation, and ease of maintenance. Site restrictions may compromise minimum clearances indicated below, resulting in unpredictable airflow patterns and possible diminished performance. YORK's unit controls will optimize operation without nuisance high-pressure safety cutouts; however, the system designer must consider potential performance degradation. Recommended minimum clearances: front to wall – 2m; rear to wall – 2m; control panel end to wall – 2m; cooler end to wall – 2m; top – no obstructions allowed; distance between adjacent units – 400mm or 700mm, refer to Piping System Connections. No more than one adjacent wall may be higher than the unit. 1" nominal deflection isolators (not shown) will increase overall unit height by 150mm.

FIGURE 39 – YMAA/YMPA0230-0260 DIMENSIONS

TECHNICAL DATA – CLEARANCES

YMAA/YMPA0080-0130 (WITHOUT HYDRO KIT)



Notes

1.The figure above uses 130 kW unit as an example but also applies to all models;

2.No obstructions allowed above the unit;

3.Only one adjacent wall may be higher than the unit.

The condenser fans are propeller-type and are not recommended for use with ductwork, filters or other impediments to airflow in the condenser air stream. If the unit is restrained for indoor application, induced fans must be installed except for ductwork to prevent air flow decrease.

FIGURE 40 – INSTALLATION CLEARANCES

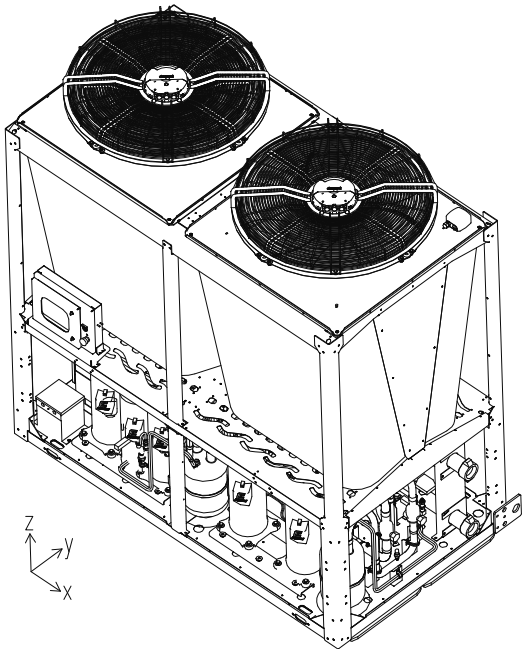
ISOLATORS – WEIGHT DISTRIBUTION AND ISOLATOR MOUNTING POSITIONS

GENERAL

Weights of specific unit models vary significantly as options are added. As a result, total weights, weights at individual isolator positions, and actual isolator selection at each position cannot be published due to the vast number of possible combinations. This information will be available when the specific unit/ option selection is made from the local Johnson Controls sales office. Be aware, weights may change with each option along with possible isolator changes. Weights and isolators may need to be recalculated when the option selections are changed.

Whenever the isolator option is ordered, the isolators will be shipped loose with the unit. Packed with the unit is a mass distribution label indicates the loads specifically for each unit, based on the option selection. The label will be similar to the ones shown below. The label will show the isolator locations along with the weight in kilograms at the specific location, isolator position, and location measurements for each isolator.

CENTER OF GRAVITY



Note

X-axis is in parallel with liquid outler direction.

TABLE 24 - GRAVITY CENTER OF STANDARD UNIT

YMAA/YMPA Without Hydro Kit	Gravity Center (mm)		
	x	y	z
0045	-1.1	-20.6	-104.3
0065	7.1	-2.1	-126.2
0080	33.1	-25.3	-98.5
00100	40.6	-27.7	-115.8
00130	3.6	-46.8	-142.2
0160	5.4	-71.6	-139.1
0200	-11.2	-112.9	-132
0230	-2.8	34.5	-147.1
0260	-11.4	-4.2	-148.8

Note

Co-ordinates measured from geometric center of the unit.

TABLE 25 - GRAVITY CENTER OF UNIT WITH HYDRO KIT

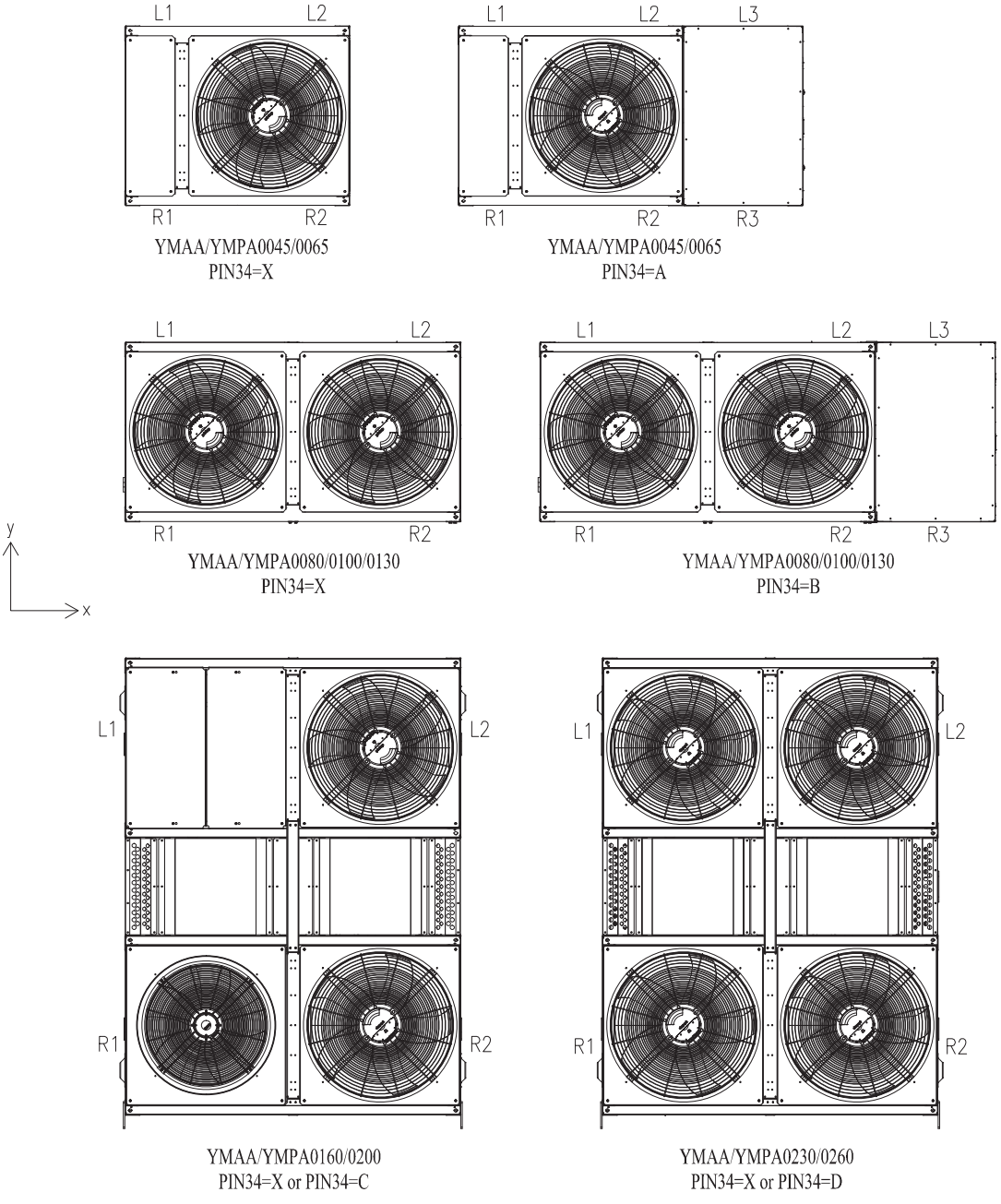
YMAA/YMPA With Hydro Kit	Gravity Center (mm)		
	x	y	z
0045	236.3	-30.4	-368.9
0065	222.2	-12.8	-376.2
0080	253.6	-20.7	-221.9
00100	248.5	-23.6	-325.4
00130	218.4	-43.4	-302.9
0160	10.6	-65.5	-134.6
0200	-4.3	-102.9	-129.6
0230	8.1	32.7	-160
0260	-0.2	-3.2	-161.2

Note

1.Co-ordinates measured from geometric center of the unit (excluding Hydro Kit);

2.The units with fixed speed pump have the same dimensions and weight distributions as base models.

AVM COORDINATES AND WEIGHT



“SAMPLE PRINTOUT” TYPICAL OF THE INFORMATION SUPPLIED IN THE MASS DISTRIBUTION LABEL

FIGURE 41 – COODINATE LOCATIONS

TABLE 26 - COORDINATES

YMAA YMPA	Options Description	PIN Conditions	Coordinate	R1	R2	R3
0045PE	Base Model	34(X)	(X,Y)	(307, 39)	(1193, 39)	/
	Single VSD Pump, standard head	34(A)	(X,Y)	(307, 39)	(1193, 39)	(1995, 39)
0065PE	Base Model	34(X)	(X,Y)	(307, 39)	(1193, 39)	/
	Single VSD Pump, standard head	34(A)	(X,Y)	(307, 39)	(1193, 39)	(1995, 39)
0080PE	Base Model	34(X)	(X,Y)	(262, 39)	(1978, 39)	/
	Single VSD Pump, standard head	34(B)	(X,Y)	(262, 39)	(1978, 39)	(2735, 39)
0100PE	Base Model	34(X)	(X,Y)	(262, 39)	(1978, 39)	/
	Single VSD Pump, standard head	34(B)	(X,Y)	(262, 39)	(1978, 39)	(2735, 39)
0130PE	Base Model	34(X)	(X,Y)	(262, 39)	(1978, 39)	/
	Single VSD Pump, standard head	34(B)	(X,Y)	(262, 39)	(1978, 39)	(2735, 39)
0160PE	Base Model	34(X)	(X,Y)	(53, 575)	(2187, 575)	/
	Single VSD Pump, standard head	34(C)	(X,Y)	(53, 575)	(2187, 575)	/
0200PE	Base Model	34(X)	(X,Y)	(53, 575)	(2187, 575)	/
	Single VSD Pump, standard head	34(C)	(X,Y)	(53, 575)	(2187, 575)	/
0230PE	Base Model	34(X)	(X,Y)	(53, 575)	(2187, 575)	/
	Single VSD Pump, standard head	34(D)	(X,Y)	(53, 575)	(2187, 575)	/
0260PE	Base Model	34(X)	(X,Y)	(53, 575)	(2187, 575)	/
	Single VSD Pump, standard head	34(D)	(X,Y)	(53, 575)	(2187, 575)	/

YMAA YMPA	Options Description	PIN Conditions	Coordinate	L1	L2	L3
0045PE	Base Model	34(X)	(X,Y)	(307, 1161)	(1193, 1161)	/
	Single VSD Pump, standard head	34(A)	(X,Y)	(307, 1161)	(1193, 1161)	(1995, 1161)
0065PE	Base Model	34(X)	(X,Y)	(307, 1161)	(1193, 1161)	/
	Single VSD Pump, standard head	34(A)	(X,Y)	(307, 1161)	(1193, 1161)	(1995, 1161)
0080PE	Base Model	34(X)	(X,Y)	(262, 1161)	(1978, 1161)	/
	Single VSD Pump, standard head	34(B)	(X,Y)	(262, 1161)	(1978, 1161)	(2735, 1161)
0100PE	Base Model	34(X)	(X,Y)	(262, 1161)	(1978, 1161)	/
	Single VSD Pump, standard head	34(B)	(X,Y)	(262, 1161)	(1978, 1161)	(2735, 1161)
0130PE	Base Model	34(X)	(X,Y)	(262, 1161)	(1978, 1161)	/
	Single VSD Pump, standard head	34(B)	(X,Y)	(262, 1161)	(1978, 1161)	(2735, 1161)
0160PE	Base Model	34(X)	(X,Y)	(53, 2475)	(2187, 2475)	/
	Single VSD Pump, standard head	34(C)	(X,Y)	(53, 2475)	(2187, 2475)	/
0200PE	Base Model	34(X)	(X,Y)	(53, 2475)	(2187, 2475)	/
	Single VSD Pump, standard head	34(C)	(X,Y)	(53, 2475)	(2187, 2475)	/
0230PE	Base Model	34(X)	(X,Y)	(53, 2475)	(2187, 2475)	/
	Single VSD Pump, standard head	34(D)	(X,Y)	(53, 2475)	(2187, 2475)	/
0260PE	Base Model	34(X)	(X,Y)	(53, 2475)	(2187, 2475)	/
	Single VSD Pump, standard head	34(D)	(X,Y)	(53, 2475)	(2187, 2475)	/

TABLE 27 - AVM WEIGHT

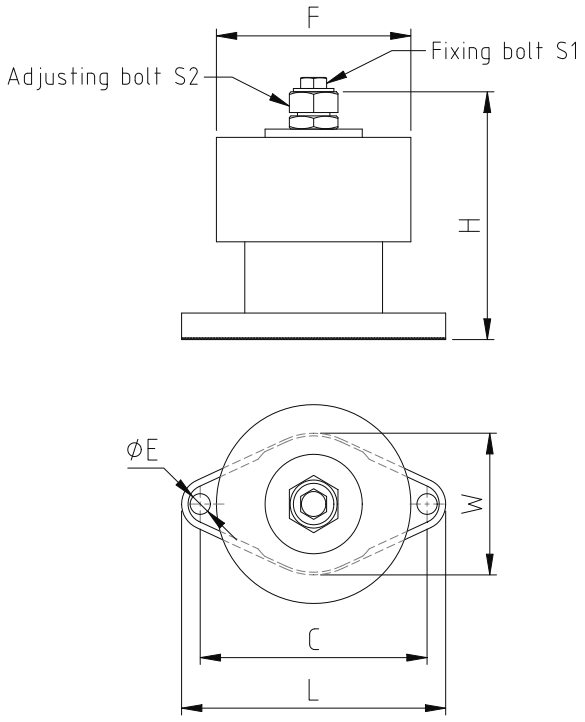
YMAA YMPA	Options Description	PIN Conditions	Weight	R1	R2	R3	L1	L2	L3
0045PE	Base Model	34(X)	kg	153	151	/	140	143	/
	Single VSD Pump, standard head	34(A)	kg	151	112	114	161	123	121
0065PE	Base Model	34(X)	kg	156	160	/	144	150	/
	Single VSD Pump, standard head	34(A)	kg	158	111	118	169	126	123
0080PE	Base Model	34(X)	kg	218	248	/	213	214	/
	Single VSD Pump, standard head	34(B)	kg	222	183	124	225	210	141
0100PE	Base Model	34(X)	kg	223	259	/	217	221	/
	Single VSD Pump, standard head	34(B)	kg	225	189	127	229	218	144
0130PE	Base Model	34(X)	kg	264	275	/	233	227	/
	Single VSD Pump, standard head	34(B)	kg	242	197	124	269	232	147
0160PE	Base Model	34(X)	kg	485	552	/	470	415	/
	Single VSD Pump, standard head	34(C)	kg	533	601	/	513	468	/
0200PE	Base Model	34(X)	kg	541	582	/	470	410	/
	Single VSD Pump, standard head	34(C)	kg	587	633	/	513	463	/
0230PE	Base Model	34(X)	kg	534	550	/	585	566	/
	Single VSD Pump, standard head	34(D)	kg	577	603	/	626	622	/
0260PE	Base Model	34(X)	kg	585	585		584	562	/
	Single VSD Pump, standard head	34(D)	kg	627	637	/	625	620	/

Note:

Isolators are selected using a service factor.

ISOLATOR DETAILS – ONE INCH DEFLECTION SPRING
ISOLATOR CROSS-REFERENCE

Outline Drawing - Type MHS Isolators

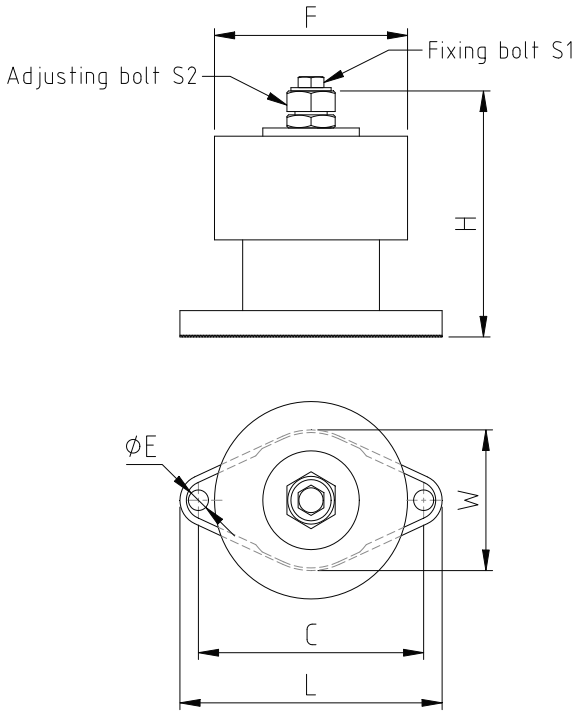


Technical Data - Type MHS Isolators

MODEL	LOAD（kg）	LOAD（N）	DEFLECTION（mm）	VERTICAL RIGIDITY (kg/mm)	OUTER SIZE(±2mm)							
					L	C	W	φE	F	H	S1	S2
MHS-160	160	1568	20～25	6.40	174	140	89	12.5	120	150	M10X20	M20X60
MHS-180	180	1764		7.20								
MHS-200	200	1960		8.00								
MHS-230	230	2254		9.20								
MHS-250	250	2450		10.00								
MHS-300	300	2940		12.00								
MHS-330	330	3234		13.20								
MHS-360	360	3528		14.40								

ISOLATOR DETAILS – ONE INCH DEFLECTION SPRING
ISOLATOR CROSS-REFERENCE

Outline Drawing - Type MHD Isolators



Technical Data - Type MHD Isolators

MODEL	LOAD (kg)	LOAD (N)	DEFLECTION (mm)	VERTICAL RIGIDITY (kg/mm)	OUTER SIZE (±2mm)							
					L	C	W	ϕE	F	H	S1	S2
MHD-550	550	5390	20～25	22.00	206	165	108	12.5	147	172	M12X25	M20X60
MHD-650	650	6370		26.00								
MHD-730	730	7154		29.20								
MHD-810	810	7938		32.40								

ISOLATOR TYPES

YMAA YMPA	Options Description	PIN Conditions	R1	R2	R3
0045PE	Base Model	34(X)	MHS-200	MHS-200	NA
	Single VSD Pump, standard head	34(A)	MHS-230	MHS-160	MHS-160
0065PE	Base Model	34(X)	MHS-200	MHS-200	NA
	Single VSD Pump, standard head	34(A)	MHS-230	MHS-160	MHS-160
0080PE	Base Model	34(X)	MHS-300	MHS-330	NA
	Single VSD Pump, standard head	34(B)	MHS-300	MHS-300	MHS-180
0100PE	Base Model	34(X)	MHS-300	MHS-330	NA
	Single VSD Pump, standard head	34(B)	MHS-300	MHS-300	MHS-200
0130PE	Base Model	34(X)	MHS-360	MHS-360	NA
	Single VSD Pump, standard head	34(B)	MHS-360	MHS-300	MHS-200
0160PE	Base Model	34(X)	MHD-650	MHD-730	NA
	Single VSD Pump, standard head	34(C)	MHD-650	MHD-810	NA
0200PE	Base Model	34(X)	MHD-650	MHD-730	NA
	Single VSD Pump, standard head	34(C)	MHD-730	MHD-810	NA
0230PE	Base Model	34(X)	MHD-730	MHD-730	NA
	Single VSD Pump, standard head	34(D)	MHD-810	MHD-810	NA
0260PE	Base Model	34(X)	MHD-730	MHD-730	NA
	Single VSD Pump, standard head	34(D)	MHD-810	MHD-810	NA

YMAA YMPA	Options Description	PIN Conditions	L1	L2	L3
0045PE	Base Model	34(X)	MHS-180	MHS-180	NA
	Single VSD Pump, standard head	34(A)	MHS-200	MHS-160	MHS-160
0065PE	Base Model	34(X)	MHS-200	MHS-200	NA
	Single VSD Pump, standard head	34(A)	MHS-230	MHS-160	MHS-160
0080PE	Base Model	34(X)	MHS-300	MHS-300	NA
	Single VSD Pump, standard head	34(B)	MHS-300	MHS-250	MHS-160
0100PE	Base Model	34(X)	MHS-300	MHS-300	NA
	Single VSD Pump, standard head	34(B)	MHS-300	MHS-250	MHS-180
0130PE	Base Model	34(X)	MHS-300	MHS-300	NA
	Single VSD Pump, standard head	34(B)	MHS-330	MHS-250	MHS-180
0160PE	Base Model	34(X)	MHD-650	MHD-550	NA
	Single VSD Pump, standard head	34(C)	MHD-650	MHD-650	NA
0200PE	Base Model	34(X)	MHD-650	MHD-550	NA
	Single VSD Pump, standard head	34(C)	MHD-650	MHD-650	NA
0230PE	Base Model	34(X)	MHD-730	MHD-730	NA
	Single VSD Pump, standard head	34(D)	MHD-810	MHD-810	NA
0260PE	Base Model	34(X)	MHD-730	MHD-730	NA
	Single VSD Pump, standard head	34(D)	MHD-810	MHD-810	NA

ONE INCH DEFLECTION – SPRING ISOLATORS INSTALLATION INSTRUCTIONS

Installation Instructions

1.Read instructions in their entirety before beginning installation.

2.Isolators are shipped fully assembled. Make sure the AVM types are correct (print codes and adhesive labels) and match each load point with corresponding isolators.

3.Twist off the fixing bolt and washer anticlockwise.

4.Set isolators on floor. Ensure that all isolator centerlines match the equipment mounting holes. The isolator base be installed on a level surface. Leveling all isolator bases to the same elevation (1/4-inch maximum difference can be tolerated).

5.Place equipment on top of isolators making sure that mounting holes of the equipment line up with isolator installation holes.

6.Place the fixing bolt and washer but do not tighten them.

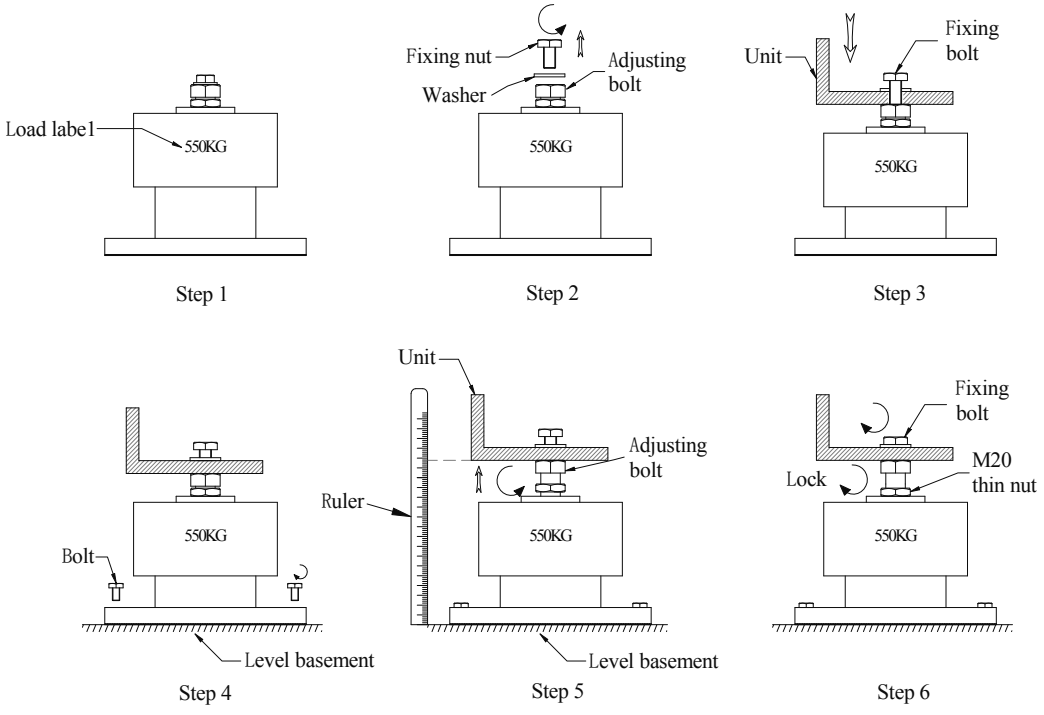
7.Ensure the verticality of the isolators and use bolts to fix the bases of the isolators to the level floor. Use the same torque to fasten the bolts.

8.The adjustment process can only begin after the equipment or machine is at its full operating weight.

9.Measure the height of the housing. Adjust each isolator in sequence by turning adjusting bolt. Repeat this procedure on all isolators, one at a time.

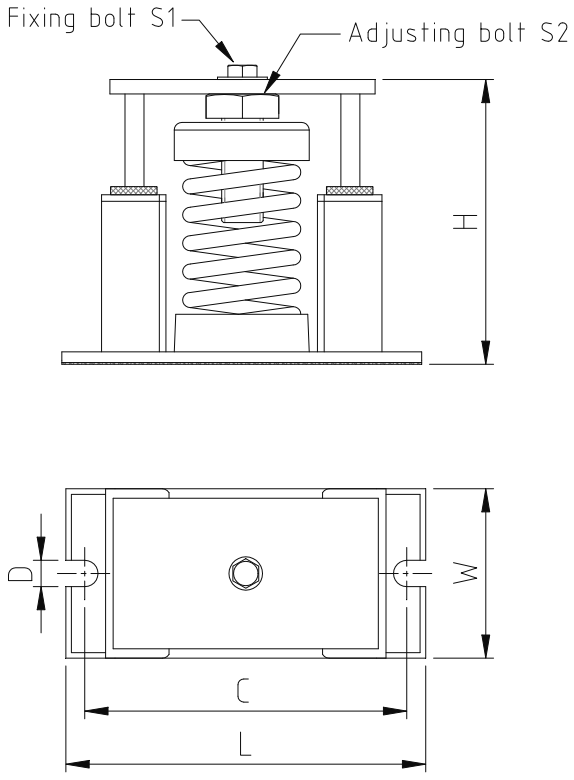
10.Fine adjust isolators to level equipment. Fasten the M20 thin nut and fixing bolt.

11.Installation is complete.



TWO INCH DEFLECTION SPRING ISOLATOR CROSS-REFERENCE

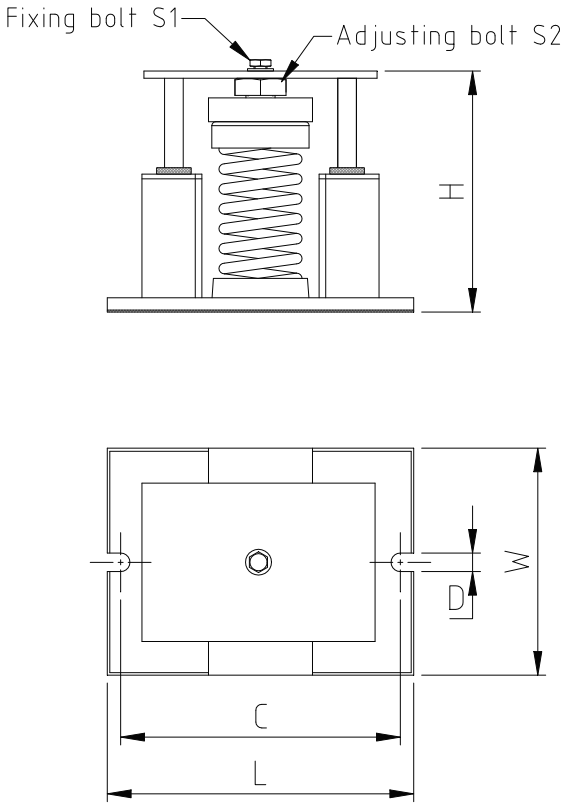
Outline Drawing – Type LAT Isolators



Technical Data - Type LAT Isolators

MODEL	LOAD （kg）	LOAD （N）	DEFLECTION （mm）	VERTICAL RIGIDITY (kg/mm)	OUTER SIZE(±2mm)						
					L	W	H	C	ØD	S1	S2
LAT-160	160	1568	45～50	3.20	196	95	170	170	13.5	M10X30	M20X60
LAT-180	180	1764		3.60							
LAT-200	200	1960		4.00							
LAT-230	230	2254		4.60							
LAT-250	250	2450		5.00							
LAT-300	300	2940		6.00							

Outline Drawing – Type LAT2 Isolators



Technical Data - Type LAT2 Isolators

MODEL	LOAD (kg)	LOAD (N)	DEFLECTION (mm)	VERTICAL RIGIDITY (kg/mm)	OUTER SIZE (±2mm)						
					L	W	H	C	∅D	S1	S2
LAT2-280	280	2744	45～50	5.60	230	172	189	210	13	M10X30	M20X60
LAT2-320	320	3136		6.40							
LAT2-360	360	3528		7.20							
LAT2-600	600	5880		5.60							
LAT2-720	720	7056		6.40							
LAT2-800	800	7840		7.20							

ISOLATOR PART NUMBERS

YMAA YMPA	Options Description	PIN Conditions	R1	R2	R3
0045PE	Base Model	34(X)	LAT-200	LAT-200	NA
	Single VSD Pump, standard head	34(A)	LAT-230	LAT-160	LAT-160
0065PE	Base Model	34(X)	LAT-200	LAT-200	NA
	Single VSD Pump, standard head	34(A)	LAT-230	LAT-160	LAT-160
0080PE	Base Model	34(X)	LAT-300	LAT2-320	NA
	Single VSD Pump, standard head	34(B)	LAT-300	LAT2-280	LAT-180
0100PE	Base Model	34(X)	LAT-300	LAT2-320	NA
	Single VSD Pump, standard head	34(B)	LAT-300	LAT2-280	LAT-200
0130PE	Base Model	34(X)	LAT2-360	LAT2-320	NA
	Single VSD Pump, standard head	34(B)	LAT2-360	LAT-300	LAT-200
0160PE	Base Model	34(X)	LAT2-600	LAT2-720	NA
	Single VSD Pump, standard head	34(C)	LAT2-720	LAT2-800	NA
0200PE	Base Model	34(X)	LAT2-720	LAT2-720	NA
	Single VSD Pump, standard head	34(C)	LAT2-720	LAT2-800	NA
0230PE	Base Model	34(X)	LAT2-720	LAT2-720	NA
	Single VSD Pump, standard head	34(D)	LAT2-800	LAT2-800	NA
0260PE	Base Model	34(X)	LAT2-720	LAT2-720	NA
	Single VSD Pump, standard head	34(D)	LAT2-800	LAT2-800	NA

YMAA YMPA	Options Description	PIN Conditions	L1	L2	L3
0045PE	Base Model	34(X)	LAT-180	LAT-180	NA
	Single VSD Pump, standard head	34(A)	LAT-200	LAT-160	LAT-160
0065PE	Base Model	34(X)	LAT-200	LAT-200	NA
	Single VSD Pump, standard head	34(A)	LAT-230	LAT-160	LAT-160
0080PE	Base Model	34(X)	LAT-300	LAT-300	NA
	Single VSD Pump, standard head	34(B)	LAT-300	LAT-250	LAT-160
0100PE	Base Model	34(X)	LAT-300	LAT-300	NA
	Single VSD Pump, standard head	34(B)	LAT-300	LAT-250	LAT-180
0130PE	Base Model	34(X)	LAT-300	LAT-300	NA
	Single VSD Pump, standard head	34(B)	LAT2-320	LAT-250	LAT-180
0160PE	Base Model	34(X)	LAT2-600	LAT2-600	NA
	Single VSD Pump, standard head	34(C)	LAT2-720	LAT2-600	NA
0200PE	Base Model	34(X)	LAT2-600	LAT2-600	NA
	Single VSD Pump, standard head	34(C)	LAT2-720	LAT2-600	NA
0230PE	Base Model	34(X)	LAT2-720	LAT2-720	NA
	Single VSD Pump, standard head	34(D)	LAT2-800	LAT2-800	NA
0260PE	Base Model	34(X)	LAT2-720	LAT2-720	NA
	Single VSD Pump, standard head	34(D)	LAT2-800	LAT2-800	NA

TWO INCH DEFLECTION SPRING ISOLATOR INSTALLATION AND ADJUSTMENT

Installation Instructions

1.Read instructions in their entirety before beginning installation.

2.Isolators are shipped fully assembled. Make sure the AVM types are correct (print codes and adhesive labels) and match each load point with corresponding isolators.

3.Twist off the fixing bolt and washer anticlockwise.

4.Set isolators on floor. Ensure that all isolator centerlines match the equipment mounting holes. The isolator base be installed on a level surface. Leveling all isolator bases to the same elevation (1/4-inch maximum difference can be tolerated).

5.Place equipment on top of isolators making sure that mounting holes of the equipment line up with isolator installation holes.

6.Place the fixing bolt and washer but do not tighten them.

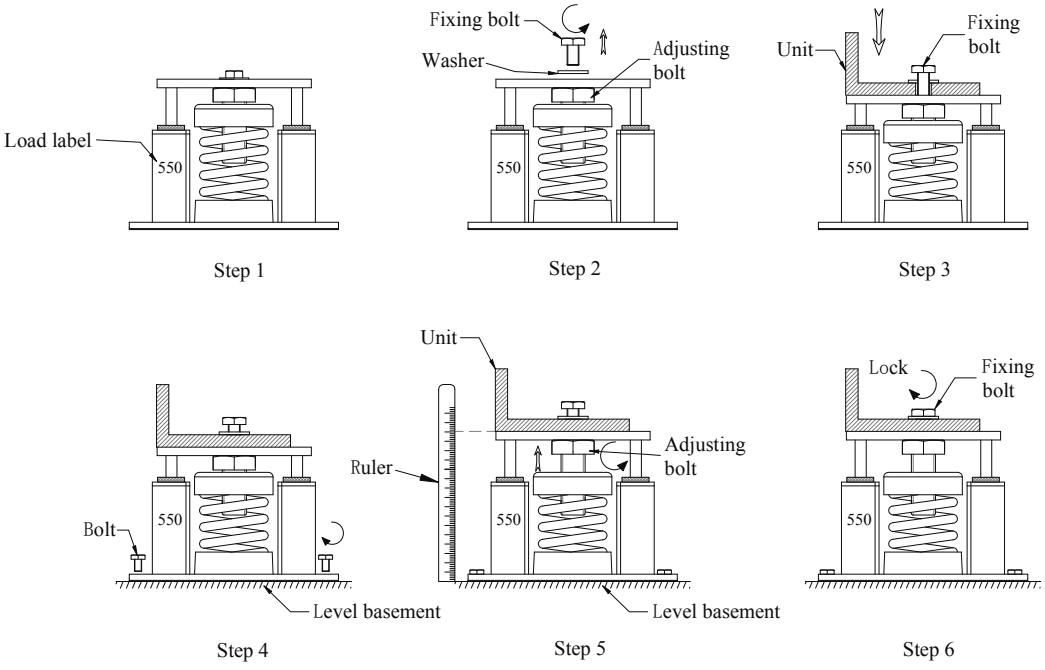
7.Ensure the verticality of the isolators and use bolts to fix the bases of the isolators to the level floor. Use the same torque to fasten the bolts.

8.The adjustment process can only begin after the equipment or machine is at its full operating weight.

9.Measure the height of the housing. Adjust each isolator in sequence by turning adjusting bolt. Repeat this procedure on all isolators, one at a time.

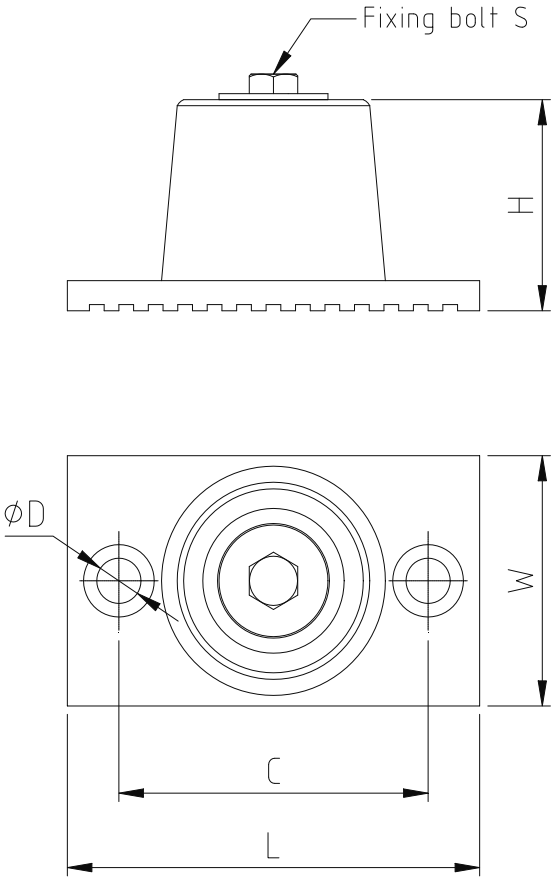
10.Fine adjust isolators to level equipment. Fasten the nut and fixing bolt.

11.Installation is complete.



NEOPRENE ISOLATOR CROSS-REFERENCE

Outline Drawing – Type JD Isolators

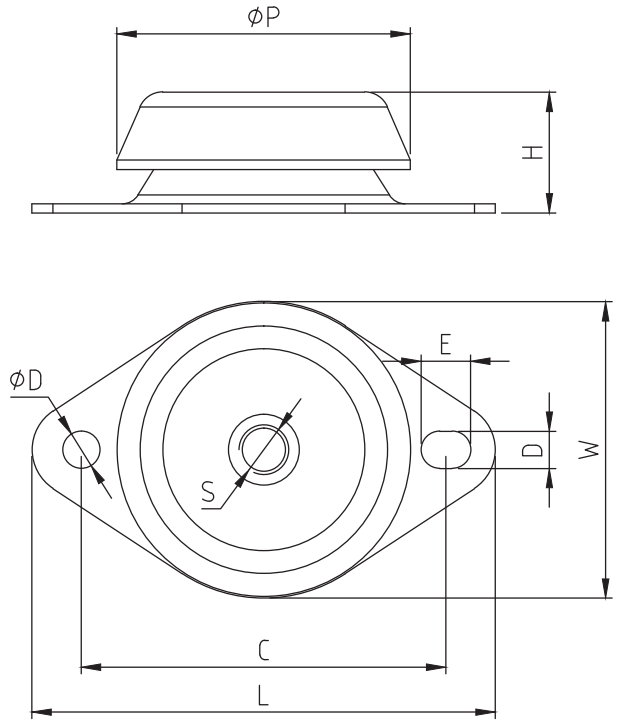


Technical Data – Type JD Isolators

MODEL	LOAD (kg)	LOAD (N)	DEFLECTION (mm)	VERTICAL RIGIDITY (kg/mm)	OUTER SIZE(±2mm)					
					L	W	H	C	ØD	S
JD-160	160	1568	6～12	16.00	140	83	70	105	15	M12X30
JD-200	200	1960		20.00						
JD-240	240	2352		24.00						
JD-300	300	2940		30.00						

NEOPRENE ISOLATOR CROSS-REFERENCE

Outline Drawing - Type JR Isolators



Technical Data - Type JR Isolators

MODEL	LOAD (kg)	LOAD (N)	DEFLECTION (mm)	VERTICAL RIGIDITY (kg/mm)	OUTER SIZE (±2mm)							
					L	W	H	C	D	E	ØP	S
JR-600	600	5880	2～4	150.00	151	97	42	119	12	16	95	M12
JR-700	700	6860		175.00								
JR-800	800	7840		200.00								

ISOLATOR TYPES

YMAA YMPA	Options Description	PIN Conditions	R1	R2	R3
0045PE	Base Model	34(X)	JD-200	JD-200	NA
	Single VSD Pump, standard head	34(A)	JD-240	JD-160	JD-160
0065PE	Base Model	34(X)	JD-200	JD-200	NA
	Single VSD Pump, standard head	34(A)	JD-240	JD-160	JD-160
0080PE	Base Model	34(X)	JD-300	JD-300	NA
	Single VSD Pump, standard head	34(B)	JD-300	JD-300	JD-160
0100PE	Base Model	34(X)	JD-300	JD-300	NA
	Single VSD Pump, standard head	34(B)	JD-300	JD-300	JD-200
0130PE	Base Model	34(X)	JD-300	JD-300	NA
	Single VSD Pump, standard head	34(B)	JD-300	JD-300	JD-200
0160PE	Base Model	34(X)	JR-700	JR-700	NA
	Single VSD Pump, standard head	34(C)	JR-700	JR-800	NA
0200PE	Base Model	34(X)	JR-700	JR-700	NA
	Single VSD Pump, standard head	34(C)	JR-700	JR-800	NA
0230PE	Base Model	34(X)	JR-700	JR-700	NA
	Single VSD Pump, standard head	34(D)	JR-800	JR-800	NA
0260PE	Base Model	34(X)	JR-800	JR-800	NA
	Single VSD Pump, standard head	34(D)	JR-800	JR-800	NA

YMAA YMPA	Options Description	PIN Conditions	L1	L2	L3
0045PE	Base Model	34(X)	JD-200	JD-200	NA
	Single VSD Pump, standard head	34(A)	JD-200	JD-160	JD-160
0065PE	Base Model	34(X)	JD-200	JD-200	NA
	Single VSD Pump, standard head	34(A)	JD-240	JD-160	JD-160
0080PE	Base Model	34(X)	JD-300	JD-300	NA
	Single VSD Pump, standard head	34(B)	JD-300	JD-240	JD-160
0100PE	Base Model	34(X)	JD-300	JD-300	NA
	Single VSD Pump, standard head	34(B)	JD-300	JD-240	JD-200
0130PE	Base Model	34(X)	JD-300	JD-300	NA
	Single VSD Pump, standard head	34(B)	JD-300	JD-300	JD-200
0160PE	Base Model	34(X)	JR-600	JR-600	NA
	Single VSD Pump, standard head	34(C)	JR-700	JR-600	NA
0200PE	Base Model	34(X)	JR-600	JR-600	NA
	Single VSD Pump, standard head	34(C)	JR-700	JR-600	NA
0230PE	Base Model	34(X)	JR-700	JR-700	NA
	Single VSD Pump, standard head	34(D)	JR-800	JR-800	NA
0260PE	Base Model	34(X)	JR-800	JR-800	NA
	Single VSD Pump, standard head	34(D)	JR-800	JR-800	NA

NEOPRENE ISOLATOR INSTALLATION AND ADJUSTMENT

Installation Instructions

1.Read instructions in their entirety before beginning installation.

2.Isolators are shipped fully assembled. Make sure the AVM types are correct (print codes and adhesive labels) and match each load point with corresponding isolators.

3.Use spanner to twist off the fixing bolt and washer.

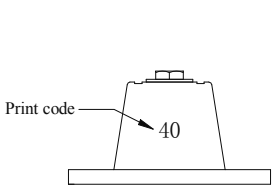
4.Set isolators on floor. Ensure that all isolator centerlines match the equipment mounting holes. The isolator base be installed on a level surface. Leveling all isolator bases to the same elevation.

5.Place equipment on top of isolators making sure that mounting holes of the equipment line up with isolator installation holes.

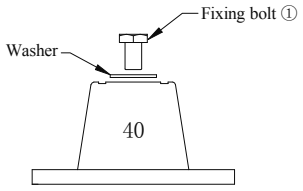
6.Tighten the fixing bolt and ensure the verticality of the isolators.

7.Tighten the bolts at the base of the isolator.

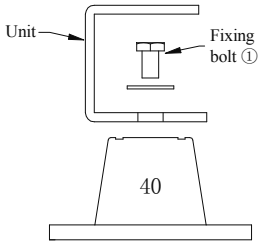
8.Installation is complete.



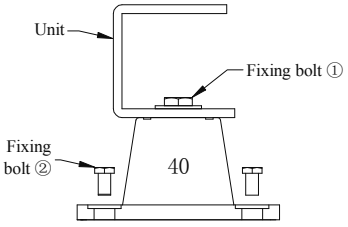
Step 1



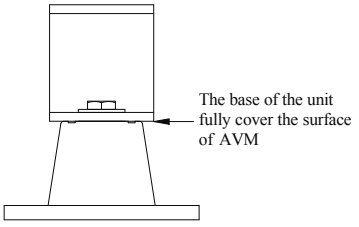
Step 2



Step 3



Step 4



Step 5

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SECTION 6 – COMMISSIONING

COMMISSIONING

Commissioning of this unit should only be carried out by YORK Authorized personnel.

Commissioning personnel should be thoroughly familiar with the information contained in this literature, in addition to this section.

Perform the commissioning using the detailed checks outlined in the *START-UP CHECK LIST* as the commissioning procedure is carried out.

PREPARATION – POWER OFF

The following basic checks should be made with the customer power to the unit switched OFF.

Inspection

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

Refrigerant Charge

Packaged units are normally shipped as standard with a full refrigerant operating charge. Check that refrigerant pressure is present in each system and that no leaks are apparent. If no pressure is present, a leak test must be undertaken, the leak(s) located and repaired. Repaired systems must be evacuated with a suitable vacuum pump/recovery unit as appropriate to below 100 microns before charging.

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

Once the vacuum is broken, charge into the condenser coils with the full operating charge as given in the *Technical Data* section.

Liquid subcooling measured at the liquid line should be between 5ºC and 8ºC when unit is operating in cooling mode and fully loaded. Subcooling is determined by the level of refrigerant charge in each system.

Service Valves

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

Compressor Oil

The units are charged with sufficient oil to ensure the effective and reliable operation in full envelope. However, the units may need additional oil charge in field in case leakage is detected or the compressor is being replaced.

To add oil to a circuit – connect a YORK hand oil pump to the 1/4” oil charging connection before the accumulator with a length of clean hose or copper line, but do not tighten the flare nut. Using clean oil of the correct type (FVC68D for Hitachi compressors and POE oil for Copeland compressor), pump oil until all air has been purged from the hose then tighten the nut. Stroke the oil pump to add oil to the oil system. Approximately 1.6 liters is present in single compressor system and 5.0~5.5 liters in tandem compressor system. Too much oil may cause excessive oil carryover in the system. High oil concentration in the system may cause nuisance trips resulting from incorrect readings on temperature sensors. Temperature sensor errors may result in poor liquid control and resultant liquid overfeed and subsequent damage to the compressor.

Fans

Check that all fans are free to rotate and are not damaged. Ensure blades are at the same height when rotated. Ensure fan guards are securely fixed.

Isolation / Protection

Verify all sources of electrical supply to the unit are taken from a single point of isolation. Check that the m aximum recommended air switch sizes given in the *Technical Data* section has not been exceeded.

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 that the customer power cables are connected correctly to

the terminal blocks or circuit breaker. Ensure that connections of power cables within the panels to the circuit breaker or terminal blocks are tight.

Grounding

Verify that the unit's protective ground terminal(s) are properly connected to a suitable grounding point. Ensure that all unit internal ground connections are tight.

Supply Voltage

Verify that the site voltage supply corresponds to the unit requirement and is within the limits given in the Technical Data section.

PREPARATION – POWER ON

Perform the commissioning using the detailed checks outlined in the START-UP CHECKLIST as the commissioning procedure is carried out.

Apply power to the unit. Turn ON the panel circuit breaker.

The machine is now live!

Switch Settings

Assure the status of the unit is OFF. Place the circuit breaker handle on the panel door to ON. The customer's disconnection devices can now be set to ON.

Water System

Verify the chilled liquid system has been installed correctly, and has been commissioned with the correct direction of water flow through the cooler. The inlet should be at the higher end of the cooler. Purge air from the top of the water system using the plugged air vent mounted on the top of the piping.

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

If mains power must be switched OFF for extended maintenance or an extended shutdown period, the com- pressor suction and discharge service stop valves should be closed (clockwise). If there is a possibility of liquid freezing due to low ambient temperatures, the coolers should be drained or power should be applied to the unit. This will allow the cooler heater to protect the cooler from freezing down to –20 °C. Before placing the unit back in service, valves should be opened and power must be switched on (if power is removed for more than 8 hours) for at least 8 hours before the unit is restarted.

Flow Switch

A unit flow switch has been fitted on the cooler outlet. If the units are connected for central control, it is recommended to install an additional flow switch on the main outlet. Make sure the switch is wired into the control panel correctly using shielded cable.

There should be a straight run of at least 5 pipe diameters on either side of the flow switch.

Temperature Sensor(s)

Leaving liquid temperature sensor is used for modular control. Ensure the sensor is coated with heat conductive compound and is inserted to the bottom of the water outlet sensor well in the main pipe. This sensor also provides some anti-freezing protection and must always be fully inserted in the water outlet sensor well.

Control Supply

Verify the control panel display is illuminated.

YORK®
INSTALL CONFIDENCE

YMPA0045-0260
YMAA0045-0260

START-UP CHECKLIST

CUSTOMER:_____
ADDRESS:_____
PHONE:_____
JCI TEL NO: _____ JCI ORDER NO: _____ JCI CONTRACT NO:_____

JOB NAME: _____
LOCATION:_____
CUSTOMER ORDER NO: _____

UNIT MODEL NO:_____**UNIT SERIAL NO**: _____

The work (as checked below) is in process and will be completed by:_____/_____/_____
Month Day Year

The following work must be completed in accordance with installation instructions:

A. CHECKING THE SYSTEM PRIOR TO INITIAL START (NO POWER)

Unit Checks

1.Unit checked for shipping damage. .....☐
NOTE: Any damage MUST be reported to Johnson Controls immediately for inspection.

Initials: _____

Company Name: _____

Date:

2.Unit assembled (if shipped dismantled) and refrigerant piping installed. .....☐

3.Visually check for refrigerant piping leaks. .....☐

4.Open suction line ball valve and discharge line ball valve for each system. .....☐

5.If hydro kit is selected, check for the wirings between pump and control panel. .....☐

6.If the water pump is field installed, check and adjust water pump flow rate and pressure drop across the unit. Verify flow switch operation.....☐

Excessive flow may cause catastrophic damage to the heat exchanger (evaporator).

7.Check the control panel, VSD panel and HMI panel to ensure they are free of foreign material (wires, metal chips, etc.). .....☐

8.Visually inspect wiring (power and control). Wiring MUST meet CE and local codes.....☐

9.Check tightness of power wiring inside the power panel on both sides of the motor contactors and overloads.....☐

10.Check for proper circuit breakers in main and control circuits, and verify overload setting corresponds with RLA and FLA values. *Refer to Electrical Data in the ICOM or unit nameplate.* .....☐

11.Be certain all water temp sensors are inserted completely in their respective wells and are coated with heat conductive compound.....☐

12.Assure that all solenoid coils (EEVs, reverse valves) are properly installed and firmly fixed. Be aware of the systems of dual circuit units.....☐

B. COMPRESSOR HEATERS (POWER ON – 8 HOURS PRIOR TO START)

Apply 230VAC and verify its value between terminals. The voltage should be 230VAC +/- 10%. .....☐
NOTE: Power must be applied 8 hours prior to start-up. Each heater should draw approximately 2A.

C. PANEL CHECKS
(POWER ON - BOTH UNIT SWITCH OFF)

1.Apply 3-phase power and verify its value. Voltage imbalance should be no more than 2% of the average voltage. ..... ☐

2.Apply 400VAC and verify its value on the terminal block in the Power Panel. Make the measurement between terminals. The voltage should be 400VAC +/- 10%. ..... ☐

3.Check for the communications between control panel, HMI, fan and VSD driver. Make sure no fault displays occur. ..... ☐

4.Access into Service level to program/verify the Setpoints, and record the values in the table on the right. ..... ☐

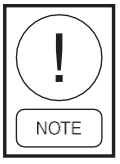
5.Cycle each condenser fan manually to ensure proper rotation. .....☐

6.Place the Unit Switch in the control panel to the "ON" position and startup the unit through HMI. As each compressor cycles on, ensure that the discharge pressure rises and the suction pressure decreases. If this does not occur, the compressor being tested is operating in the reverse direction and must be corrected. .....☐

7.Continuously detect the suction pressure to ensure the EEVs are working properly. .....☐

8.Verify the reverse valves in heating mode. Ensure that the Coil Temperature is below Ambient Temperature.....☐

The liquid setpoint may need to be temporarily lowered (in cooling mode) or elevated (in heating mode) to ensure all compressors cycle "ON".



This unit uses scroll compressors which can only operate in one direction. Fail ure to observe this will lead to compressor failure.

HMI	
Display Language	
Date and Time	
SYSTEM SETPOINTS	
Unit Type	
Operating Mode	
Cool RT Setpoint	
Heat RT Setpoint	
Cool LT Setpoint	
Heat LT Setpoint	
Low Sound Mode	
Cooling Control Select	
Heating Control Select	
Unit Quantity	
BAS Modbus Address	
Mode Control Select	
ON/OFF Control Select	
Memory In Power Off or On/Off	
Cooling Control Select	
SYSTEM	
** Chiller Return Temperature	
** Chiller Leaving Temperature	
** Ambient Temperature	
UNIT	
** Software Version A	
** Software Version B	
Ckt1 Fan Motor Fault	
Ckt2 Fan Motor Fault	
Ckt1 HPS and Comp.1/2 Overload	
Ckt1 LPS	
Chiller WFS	
Cool/Heat Switch	
ON/OFF Switch	
* External Lock	
Power Protector	
Ckt2 HPS and Comp1/2 Overload	
Ckt2 LPS	
Unit WFS	
Total # of Compressors	
Number of Fans/System	
* Unit/Sys Voltage	
** Unit ID	

* Not on all models. ** Viewable only.

D. CHECKING SUPERHEAT AND SUBCOOLING

The subcooling temperature of each system can be calculated by recording the temperature of the liquid line at the outlet of the condenser and subtracting it from the liquid line saturation temperature (liquid line saturation temp. is converted from a temperature/pressure chart).

Example:

Liquid line pressure =
2700kPa converted to temp. 46 °C
Minus liquid line temp. - 40 °C
Subcooling = 6 °C

The subcooling should be adjusted to 6~9 °C at design conditions.

1.Record the liquid line pressure and its corresponding temperature, liquid line temperature and subcooling below: ..... ☐

	SYS 1	SYS 2	
Liq. Line Press =	————	————	kPa
Saturated Temp =	————	————	°C
Liq. Line Temp =	————	————	°C
Subcooling =	————	————	°C

After the subcooling is verified, the suction superheat should be checked. The superheat should be checked only after steady state operation of the unit has been established, the leaving water temperature, and the unit is running in a fully loaded condition. Correct superheat setting for a system is 5 °C - 9 °C) in cooling mode.

Superheat should typically be set for not less than 5 °C in cooling mode and 3 °C in heating mode. The superheat is calculated as the difference between the actual temperature of the returned refrigerant gas in the suction line entering the compressor and the temperature corresponding to the suction pressure as shown in a standard pressure/temperature chart.

Example:

Suction Temp = 10 °C
Minus Suction Pressure
800kPa converted to Temp 4 °C
Superheat = 6 °C

Assure that superheat is set at a minimum of 5 °C with a single compressor running on each circuit.

2. Recordthe suction temperature, suction pressure, suction saturation temperature, and superheat of each system below:

	SYS 1	SYS 2	
Suction Temp =	————	————	kPa
Suction Pressure =	————	————	°C
Saturation Temp =	————	————	°C
Superheat =	————	————	°C

E. LEAK CHECKING

Leak check compressors, fittings, and piping to ensure no leaks. ..... ☐

If the unit is functioning satisfactorily during the initial operating period, no safeties trip and the compressors cycle to control water temperature to setpoint, the unit is ready to be placed into operation.

UNIT OPERATING SEQUENCE

The operating sequence described below relates to operation on a starting process after power has been applied, such as start-up commissioning. When a compressor starts, internal timers limit the minimum time before another compressor can start to 40 seconds (20-120 seconds, adjustable).

1.When power is applied to the system, the micro- processor 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 no faults are unsettled. Any problems found by the pre-check will be displayed if present.

2.For the unit to run, there must be an 'ON' command given by controller or BAS (Building Automation System) for the unit to respond to. Once the unit is ON, the water pump contactor will close instantly. The unit will then detect the status of the flow switch to ensure sufficient liquid flow is supplied.

3.If no problems are present and duty is required the inverter compressor will start. After an initial period of operation with the inverter compressor, the control system will adjust the unit load depending on the liquid temperature and rate of temperature change. If high load is present, the controller will increase the speed of the inverter compressor, or simply start-up the next compressor. If very little load is present, the inverter compressor may continue to operate or may simply stop. If the latter is the case, one compressor will restart automatically should the liquid temperature require.

4.When a compressor is running the controller monitors suction pressure and various other system parameters such as discharge pressure, liquid temperature, etc. Should any problems occur, the control system will immediately take appropriate action and display the nature of the fault.

5.The corresponding condenser fan will be cycled on when compressor starts. See the section on *EC Fan Control* for details concerning condenser fan cycling.

6.Each system is fitted with an EEV (electrical expansion valve) in the liquid line between condenser coil and cooler. The device will automatically adjust the steps to satisfy refrigerant flow demand, based on the difference between actual and target superheat. There is a pre-adjustment of the opening before compressor loading up or shutting down within one refrigerant circuit.

7.If demand requires, another system (for dual circuit units), or another unit (for modular control), will cycle on with the same timing sequences as the inverter system. Refer to the section on *Liquid Temp. Control* for a detailed explanation of system and compressor staging.

8.As the load decreases below setpoint, the compressors will be shut down in sequence. This will normally occur at intervals of 40 seconds based on water temperature as compared to set-point and the rate of temperature change. See the section on *Liquid Temp. Control* for a detailed explanation.

9.When the last compressor in a "system" (one or two compressors per system), is to be cycled off, the system will switch off its fan and EEV shortly afterwards.

10.The unit can be stopped at any time by switching. The compressor heaters will energize to prevent refrigerant condensing in the compressor rotors and to prevent the compressor oil becoming saturated with refrigerant.

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

HYDRO KIT COMMISSIONING

The variable speed pump is already configured for end customer use and no additional adjustments are necessary after installation. Contact local JCI representatives if any reconfiguration is required.

CIRCULATION PUMP

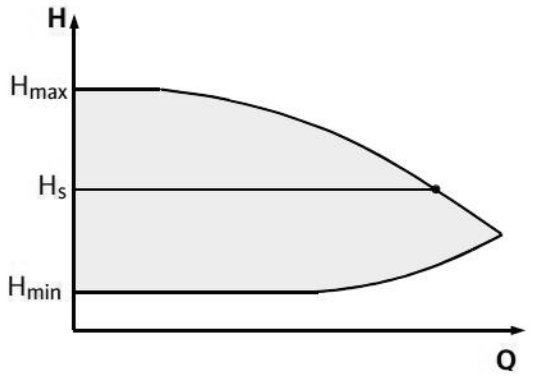
The high-efficiency pumps are glanded pumps with built-in power adjustment and "Electronic Commutated Motor" (ECM) technology. The pumps are designed as single-stage

low pressure centrifugal pumps with flange connection and mechanical seal.

CONTROL MODES

The selectable control modes are:

Δp-c:



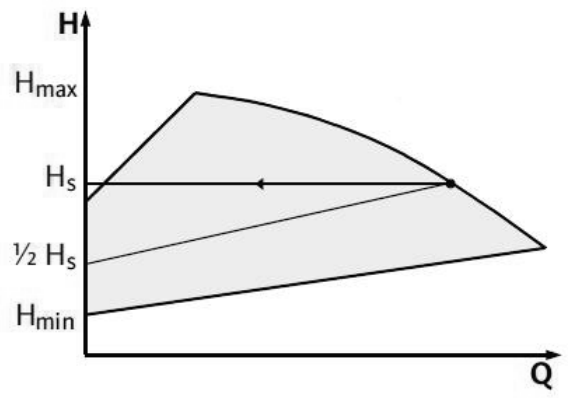
The electronics keep the differential pressure created by the pump above the permitted feed flow range constantly at the pre-selected differential pressure setpoint Hs up to the maximum pump curve.

Q = Volume flow

H = Differential pressure (min./max.)

HS = Differential pressure setpoint

Δp-v:

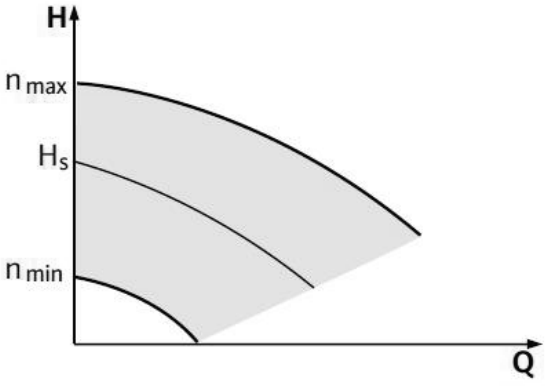


The electronics linearly change the differential pressure setpoint to be kept by the pump between the delivery heads Hs and ½ Hs. The differential pressure setpoint Hs decreases or increases with the volume flow.

Q = Volume flow

H = Differential pressure (min./max.)

HS = Differential pressure setpoint



Manual control mode:

The speed of the pump can be kept to a constant speed between nmin and nmax. “Manual control” mode deactivates all other control modes.

PID control:

If the aforementioned standard control modes cannot be used – e.g. if other sensors are to be used or the distance between the sensors and the pump is very large – then the PID control (Proportional- Integral-Differential control) is available.

By selecting a good combination of individual control portions, the operator can ensure fast reacting, constant control without lasting setpoint deviations.

The output signal of the selected sensor can take any intermediate value. The respective actual value reached (sensor signal) will be shown as a percent (100 % = maximum measurement range of the sensor) on the status page of the menu.

MODE SETTING

Δp-c/Δp-v control:

Setting	Δp-c	Δp-v
Duty point on maximum pump curve	Starting at the duty point, draw towards the left. Read off setpoint HS and set the pump to this value.	Starting at the duty point, draw towards the left. Read off setpoint HS and set the pump to this value.
Duty point within the control range	Starting at the duty point, draw towards the left. Read off setpoint HS and set the pump to this value.	Move to max. pump curve along control curve, then horizontally to the left, read off setpoint HS and set the pump to this value.
Setting range	Hmin, Hmax See pump curves (e.g. on data sheet)	Hmin, Hmax See pump curves (e.g. on data sheet)

Manual control mode:

"Manual control" mode deactivates all other control modes. The speed of the pump is kept to a constant value and set using the rotary knob.

The speed range is dependent on the motor and pump type.

PID control:

The PID controller in the pump is a standard PID controller, as described in control technology literature. The controller compares a measured process value to a predefined setpoint and attempts to adjust the process value to match the setpoint as closely as possible.

Provided appropriate sensors are used, a variety of control systems (including pressure, differential pressure, temperature and flow control) can be realized.

The control behavior can be optimized by adjusting the P, I and D parameters. The P (or proportional) term of the controller contributes a linear gain of the deviation between the process (actual) value and the setpoint to the controller output. The sign of the P term determines the controller's direction of action.

The I (or integral) term of the controller provides integral control based on the system deviation. A constant deviation results in a linear increase at the controller output. Hence a continuous system deviation is avoided.

The D (or derivative) term responds directly to the rate of change of the system deviation. This affects the rate at which the system responds. In the factory settings, the D term is set to zero, since this is an appropriate setting for a number of applications.

These parameters should only be changed in small increments, and the effects on the system should be monitored continuously. Parameter values should only be tuned by someone with training in control technology.

Controller term	Factory setting	Setting range	Increment
P	0.5	-30.0 ~ -2.0 -1.99 ~ -0.01 0.00 ~ 1.99 2.0 ~ 30.0	0.1 0.01 0.01 0.1
I	0.5 s	10 ~ 990 ms 1 ~ 300 s	10 ms 1 s
D	0 s (= deactivated)	0 ~ 990 ms 1 ~ 300 s	10 ms 1 s

The direction of action of the controller is determined by the sign of the P term.

Positive PID control (default):

If the sign of the P term is positive and the process value drops below the setpoint, the control will increase the pump speed until the setpoint has been reached.

Negative PID control:

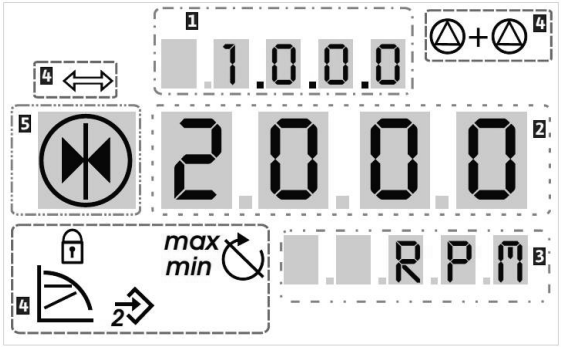
If the sign of the P term is negative and the process value drops below the setpoint, the control will decrease the pump speed until the setpoint has been reached.

NOTE:

Check the controller's direction of action if PID control is being used, but the pump is only running at minimum or maximum speed without responding to changes in the parameter values.

DISPLAY

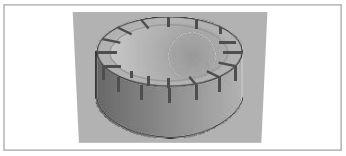
Information appears on the display as shown in the sample illustration below:



Item Description	Item Description
1 Menu number	4 Standard symbols
2 Value display	5 Symbol display
3 Units display	

OPERATION

The Red Button



The red button can be turned to select menu elements and used to change values. Pressing the red button activates a selected menu element and confirms values.

DIP Switch

The DIP switches are located under the housing cover.

- Switch 1 is for switching between the standard and service mode.
- Switch 2 allows activations or deactivation of the access disable feature.
- Switches 3 and 4 permit termination of the multi-pump communication.

Operation

The control mode is preset as Δp-v with a delivery head of 20m. To increase or decrease the duty point of the pump, press the red button for 2 seconds to enter the navigation menu and make corresponding adjustments.

Refer to the operation instruction of the pump and contact local Johnson Controls representative for further field settings.

Pump Settings

Units equipped with factory fitted Hydro Kits are shipped with the following settings on the pump VSD. All other settings are default.

DIP switches S3 and S4 are set to off (single pump application).
Operation Mode is set to Δp-v.
Pump Head is set to H = 20m.

It is strictly prohibited to circulate the liquid system with external devices in case unexpected current induced which may damage the pump.

SECTION 7 – OPTIVIEW LT OPERATION

INTRODUCTION

The 7 inch resistive touch screen HMI is used to configure unit running parameters and for readout. It is protected by an IP55 insulation panel.

The controller is connected with the mainboard by RS485 communication port. Different access levels are available through the button at the upper right of the screen.

NOTE

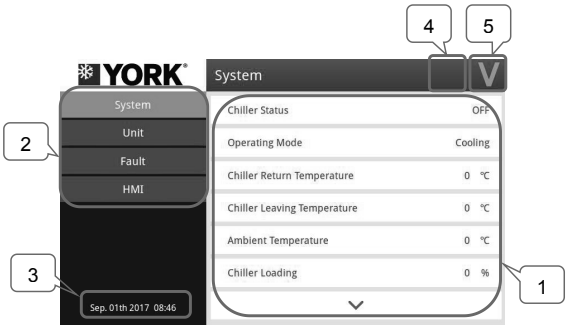
The initial password for customers to access "Operator" level is 9017. Remember the password entry is for one-shot operation and the access level will return back to "Viewer" as the screen dims down.

TABLE 28 – ACCESS LEVELS

Functions	Viewer	Operator	Service
System	√	√	√
Unit	√	√	√
Fault	√	√	√
Diagnosis	×	×	√
Schedule	×	√	√
HMI	√	√	√

MAIN INTERFACE

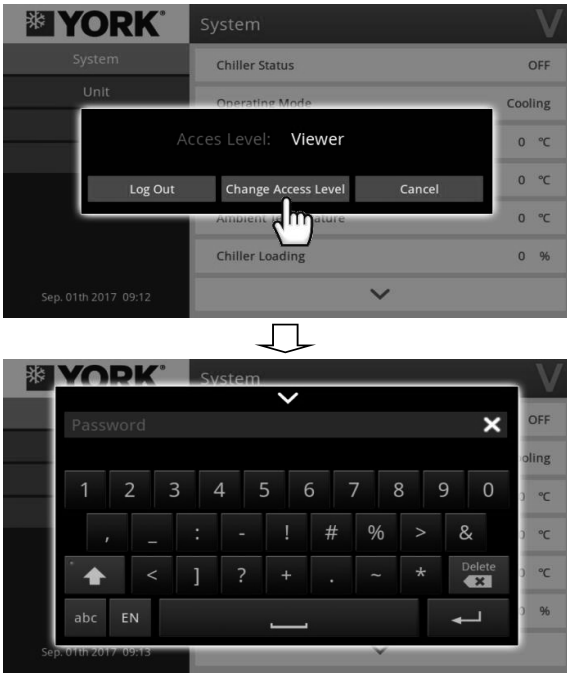
A starting process of about one minute is required before the window comes out, as shown below. The default privilege level of operation is Visitor at the first startup and only part of the parameters are visible. The interface is divided into five areas.



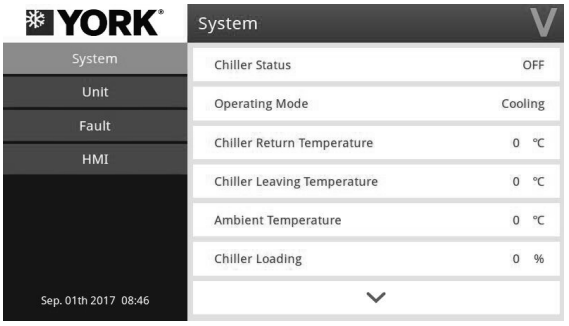
Area 1: System operating status;
Area 2: Functions;
Area 3: Date and time;
Area 4: Faults (hide if no fault exists);
Area 5: Privilege level.

PRIVILEGE MANAGEMENT

Press the icon in Area 5 to enter the privilege management interface. Password will be required to elevate the operation level. A pop-up will appear if the password is incorrect and the input will be locked for 15 minutes if wrong passwords are keyed in for five times consecutively.



SYSTEM



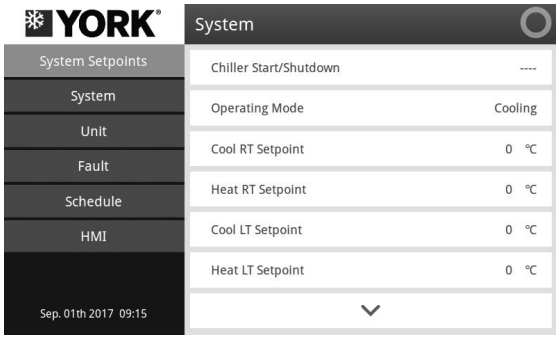
This is used for system running status readout. The following parameters will be displayed in order:

1	Chiller Status	6	Chiller Loading	11	Low Noise
2	Operating Mode	7	Available Mode	12	Pump Status
3	Chiller Return Temperature	8	Total Run Hours	13	Comp. Run Status
4	Chiller Leaving Temperature	9	Anti-freezing	14	Oil Preheat
5	Ambient Temperature	10	Defrosting		

SYSTEM SETPOINTS

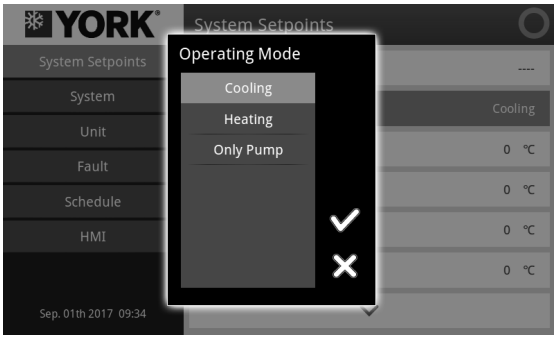
The user can set unit running mode and water temperature set points in this display page. This is for Operator and Service level permissions. Following is the order of the programmable parameters that will appear:

1	Chiller Start/ Shutdown	19	Heater Off Water Temp Diff.	37	Oil Pre-heat Time
2	Operating Mode	20	Heater On Ambient Temp.	38	Unit Cooling Target SSH
3	Cool RT Setpoint	21	Low LT Alarm	39	Unit 1 Heating Target SSH
4	Heat RT Setpoint	22	High LT Alarm	40	Manual Defrost Unit
5	Cool LT Setpoint	23	Defrost Temp. (Ambient Temp.＜0℃)	41	Limited Hours
6	Heat LT Setpoint	24	Defrost Temp. (Ambient Temp.≥0℃)	42	Cooling Min. Ambient Temp. Limit
7	Noise Reduction	25	Defrost Time LimitDefrost Interval	43	Heating Max. Ambient Temp. Limit
8	Default Setting	26	Coil Temp. After Defrost	44	Cooling LT Setpoint A (CE Standard)
9	Cooling Control Select	27	Mode Control Select	45	Cooling LT Setpoint B(CE Standard)
10	Heating Control Select	28	ON/ OFF Control Select	46	Cooling LT Setpoint C (CE Standard)
11	Temp. Control Cycle	29	Memory In Power Off or On/ Off	47	Cooling LT Setpoint D (CE Standard)
12	Water Temp. Control Diff.	30	Clear Running Time	48	Cooling LT Setpoint D (CE Standard)
13	Unit Quantity	31	ModBus Terminal Quantity	49	Heating LT Setpoint A (CE Standard)
14	BAS Modbus Address	32	EXV Cooling Initial Steps	50	Heating LT Setpoint B (CE Standard)
15	Chiller RT Offset	33	EXV Heating Initial Steps	51	Heating LT Setpoint C(CE Standard)
16	Chiller LT Offset	34	EXV Cooling Min. Steps	52	Heating LT Setpoint D (CE Standard)
17	WT Pulldown Rate	35	EXV Heating Min. Steps	53	Heating LT Setpoint E (CE Standard)
18	Heater On Water Temp Diff.	36	EXV Defrost Initial Steps		

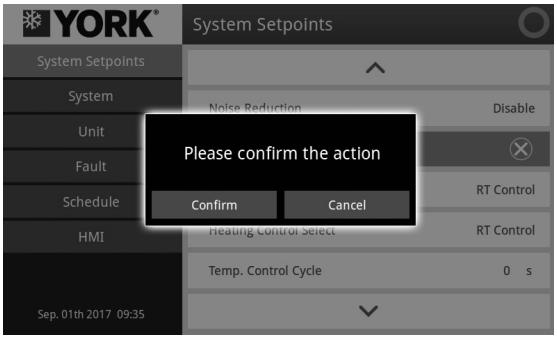


There are three basic inputs to change unit running modes and parameters.

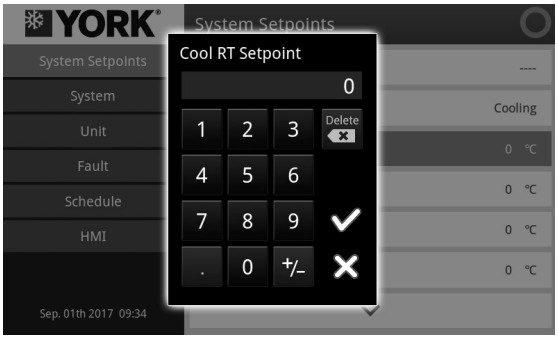
Option:



Confirm Action:



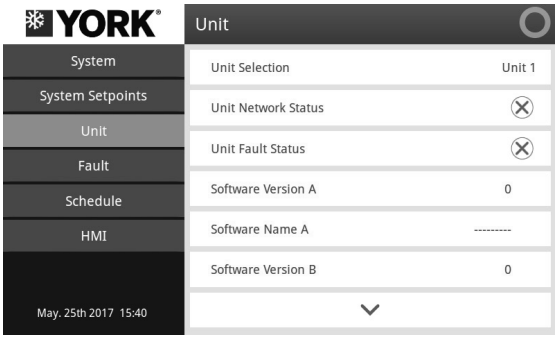
Infilling:



UNIT

Selection unit to view the operating status of different modules in the network. The following parameters will appear in order:

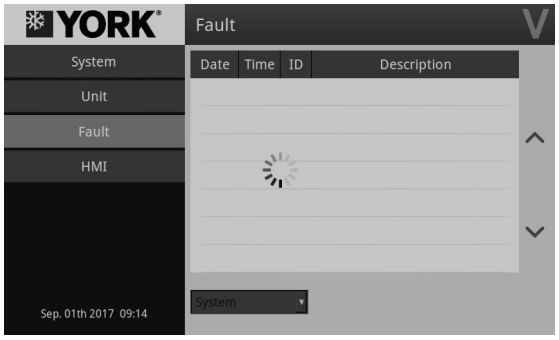
1	Unit Selection	21	Ckt1 Suct Pr	41	Unit Water Valve
2	Unit Network Status	22	Ckt2 Suct Pr	42	Ckt1 Fan Motor
3	Unit Fault Status	23	Ckt1 Disch Pr	43	Ckt1 Fan Motor Speed
4	Software Version A	24	Ckt2 Disch Pr	44	Ckt1 Comp.1
5	Software Name A	25	Ckt1 Fan Motor Fault	45	Ckt1 Comp.2
6	Software Version B	26	Ckt2 Fan Motor Fault	46	EVA Heater
7	Software Name B	27	Ckt1 HPS and Comp.1/2 Overload	47	Ckt1 Oil Heater
8	Unit Loading	28	Ckt1 LPS	48	Fault Output
9	Chiller Return Temperature	29	Chiller WFS	49	Chiller Pump
10	Ambient Temperature	30	Cool/Heat Switch	50	Water Heater
11	Ckt1 Coil Temp.	31	ON/OFF Switch	51	VSD Cooling Fan
12	Ckt2 Coil Temp.	32	External Interlock	52	Ckt2 Fan Motor
13	Unit Leaving Temperature	33	Power Protector	53	Ckt2 Fan Motor Speed
14	Chiller Leaving Temperature	34	Ckt2 HPS and Comp1/2 Overload	54	Ckt2 Comp.1
15	Ckt1 Suct Temperature	35	Ckt2 LPS	55	Ckt2 Comp.2
16	Ckt2 Suct Temperature	36	Unit WFS	56	Ckt1 FWV
17	Ckt1 Comp1 DPT	37	Ckt2 EEV	57	Ckt2 FWV
18	Ckt1 Comp2 DPT	38	Ckt1 Fan Speed	58	Ckt1 EEV
19	Ckt2 Comp1 DPT	39	Ckt2 Fan Speed		
20	Ckt2 Comp2 DPT	40	Inverter Compressor Speed		



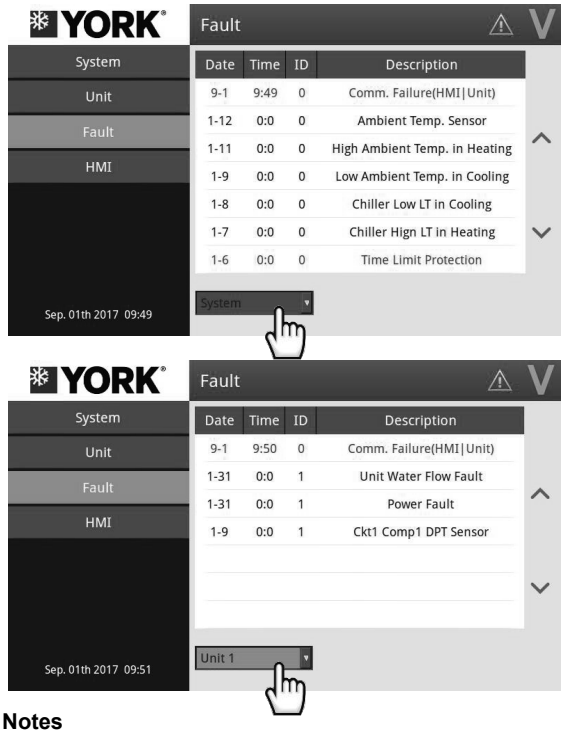
Use “Unit Selection” to switch between the units if modular connected.

FAULT

This is for fault readout and reset. There will be an about 6-second delay while entering the interface, caused by the information reading from the mainboard.



In the lower part of the page, a select box is designed to screen out the faults needed. If "System" is selected, the system faults will be displayed. Different module selection is also available for unit fault display.

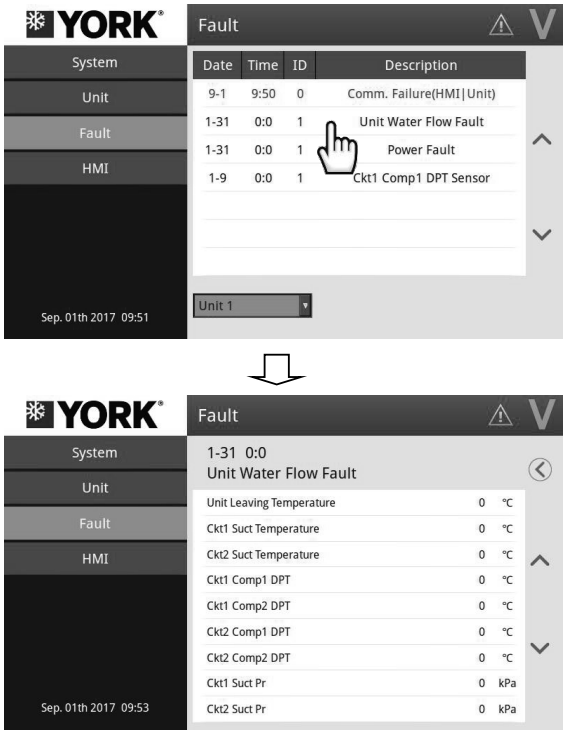


Notes

1.Current faults are displayed in blue and history faults in black;

2.The Unit number will be displayed as 0 if the fault is a systematic one.

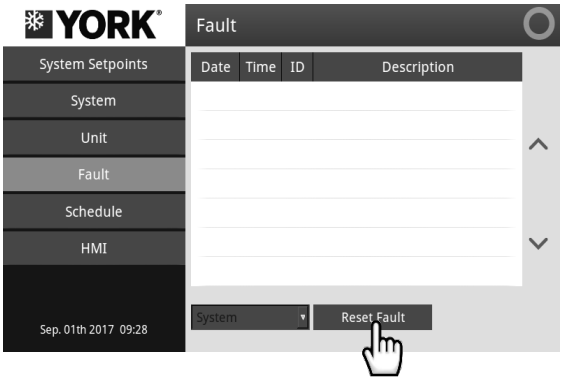
Detailed information is accessible by pressing the faults, except for communication fault between HMI and the units.



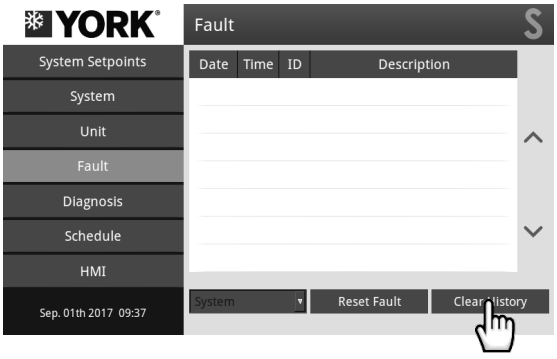
Information – System fault	
Chiller Status	Opearting Mode
Water Pump	Water Flow Switch
Ambient Temperature	Chiller Leaving Temperature
Chiller Return Temperature	Load Ratio

Information – Unit fault	
Unit Leaving Temperature	Ckt1 Suct Temperature
Ckt2 Suct Temperature	Ckt1 Comp1 DPT
Ckt1 Comp2 DPT	Ckt2 Comp1 DPT
Ckt2 Comp2 DPT	Ckt1 Suct Pr
Ckt2 Suct Pr	Ckt1 Disch Pr
Ckt2 Disch Pr	Ckt1 EEV
Ckt2 EEV	Ckt1 Fan Speed
Ckt2 Fan Speed	Inverter Compressor Speed
DO16-1	VSD Fault Code

Use “Unit Selection” to switch between the units if modular connected.



In Service level, the faults can be reset and cleared.



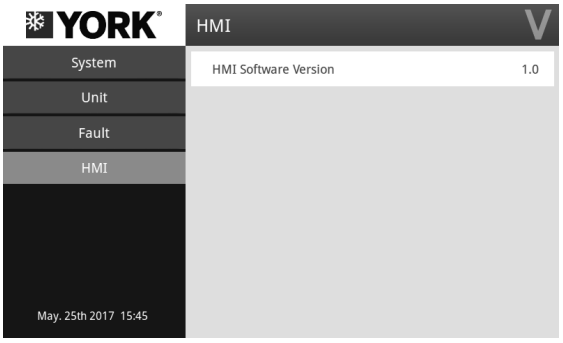
HMI

The settings relate to HMI displays and software upgrades are available under this menu. Elevate permission level to enable more settings.

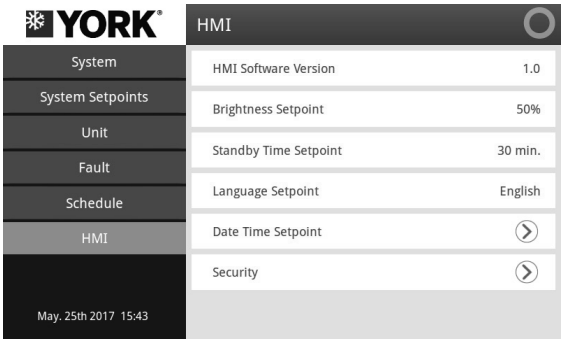
TABLE 29 – HMI DISPLAY PRIVILEGE LEVELS

First Menu	Sub Menu	Privilege Level
HMI	HMI Software Version	Viewer
	Brightness	Operator
	Standby Time	Operator
	Language	Operator
	Date and Time	Operator
	Security	Operator
	Software Upgrade	Service
	Brand	Service

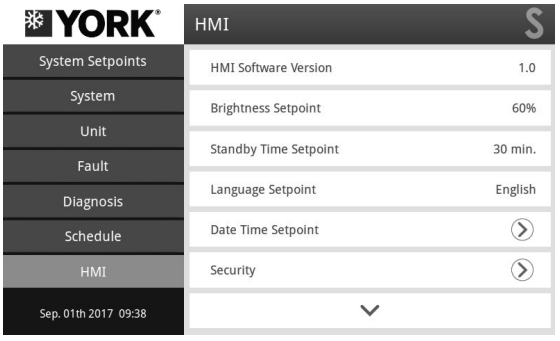
Viewer’s interface

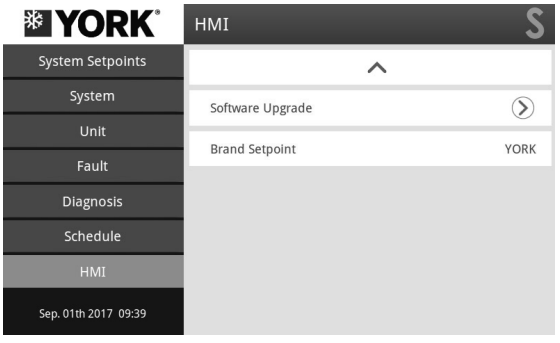


Operator’s interface



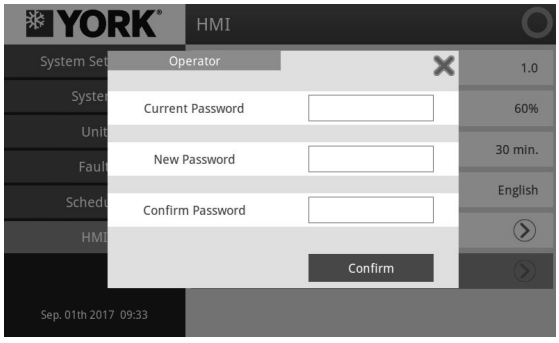
Service’s interface



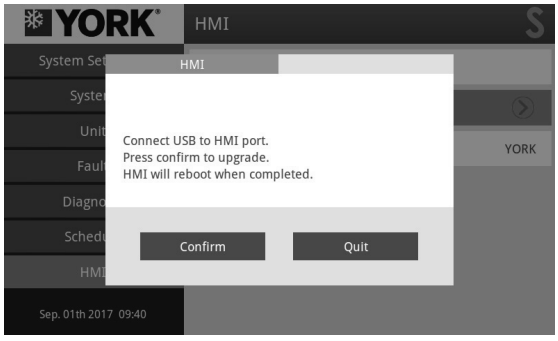


Date and time setting:

The password change for “Operator” is available by pressing the “Security” button.



Service password reset and software upgrade are accessible in Service level.



SCHEDULE

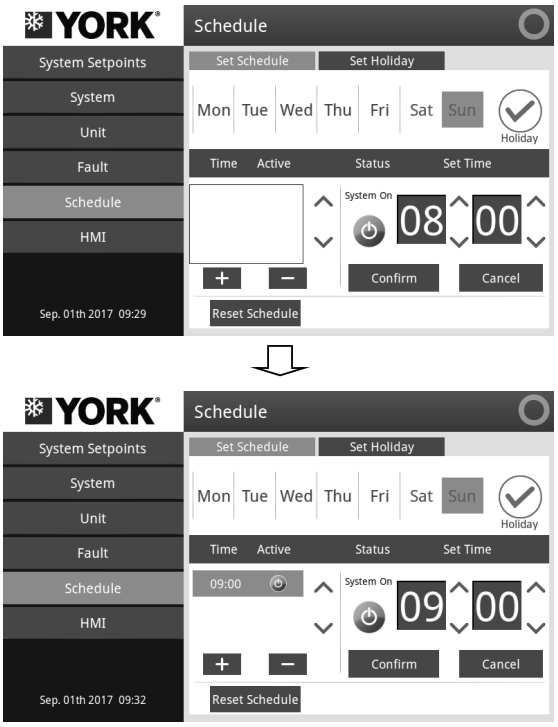
The function is used to automatically startup and shutdown the unit in weeks or holidays. This is accessible in Operator and Service.

Schedule Setting

Press the “+” icon to add a new item and configure the action/ time using the icons on the right.

Press the “-” icon to delete an item.

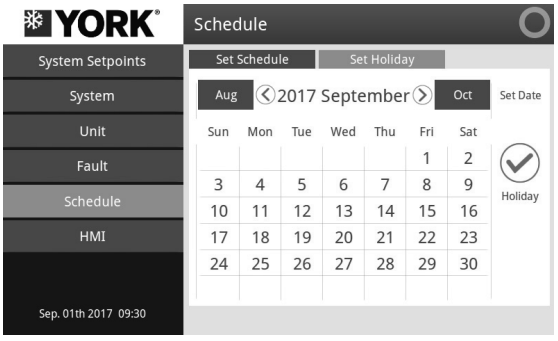
Press the “Reset Schedule” button to clear all schedule settings.



Holiday Setting

The Holiday Setting is used to set specified dates as holidays. Choose the dates in the calendar and press the confirm button. The dates selected will be displayed in red.

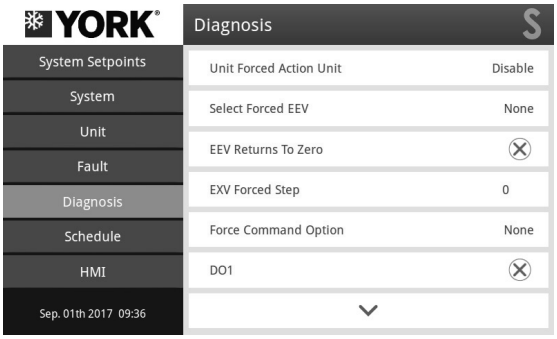
A maximum of 30 days is allowed in Holiday Setting.



DIAGNOSIS

This is only available for Service level. Some mandatory inputs are available for the service personal to diagnose the unit more effectively when fault exists. The following outputs listed in order can be set manually.

1	Forced Action Unit	4	EEV Forced Step	7	INV Forced Frequency
2	Select Forced EEV	5	Force Command Option	8	Fan1 Motor Forced Speed
3	EEV Returns to Zero	6	DO1 - DO32	9	Fan2 Motor Forced Speed



SECTION 8 – WIRE CONTROLLER OPERATION

Don't touch the screen with sharp points or edges which may damage the controller. Don't twist or pull the wires of the controller. Don't wipe the controller with benzene, diluent or chemical cloth. Otherwise discoloration or mechanical failure may occur. To remove dirt, dip the cloth in the water with a neutral detergent and wring the water before cleaning. Wipe dry the controller with dry cloth. Do not e xert excessive force on the display or connection in order to avoid changes in hue.

INTRODUCTION

The touch screen wire controller is optional for remote controls of YMAA/YMPA units. The functions of parameter setting, operating status viewing and fault recording are available. Instead of describing the information above, the wire controller utilizes graphic icons in user interface.

INTERFACE

Area 1: Date and time display;
Area 2: Timer display;
Area 3: Temperature display (include the set point and actual controlled water temperature);
Area 4: Serial number display;
Area 5: Operating mode setting;
Area 6: Running status display;
Area 7: Touch-keys.
The meanings of the icons are listed in Table 30.

TABLE 30 – HMI DISPLAY PRIVILEGE LEVELS

KEY	MEANING	KEY	MEANING	KEY	MEANING
	COOLING		FUNCTION		FAULT
	HEATING		TIMER		PUMP
	CONFIRM		UP		LOCK
	CANCEL		DOWN		LOW SOUND

BASIC OPERATIONS

Start and Stop the Unit

Press the button below the screen to start or stop the unit.

Operating Mode

Press the key of “COOLING” or “HEATING” to set or switch operating modes. The “SET” icon will be showing during the process. Press “CONFIRM” to finish the setting, or the controller will autosave if there’s no operation for 10 seconds. Press “CANCEL” to abandon the setting.

Liquid Temperature Setpoint

Press “UP” or “DOWN” key in daily display screen to set target liquid temperatures. Press “CONFIRM” to finish the setting, or the controller will autosave if there’s no operation for 10 seconds. Press “CANCEL” to abandon the setting.

ADVANCED OPERATIONS

Date and Time

Press the “TIMER” and “FUNCTION” keys simultaneously for 5 seconds to enter the Date and Time setting screen. The “TIMER” and “SET” icons will flicker while the function is activated.

Press “TIMER” to toggle between Year, Month, Day, Hour and Minute. Press “UP” and “DOWN” icons to modify the values. Touch and hold the icons to increase or decrease the values by 5 each time.

Press “CONFIRM” to save the value and auto switch to the next setting. Press “TIMER” to cancel the operation and auto switch to the next setting.

The setting will terminate if there’s no operation for 5 seconds or “CANCEL” is pressed.

Schedule Timer

Press the “TIMER” key for 5 seconds to enter Schedule Timer setting screen. The “TIMER”, “SET” and “ON” icons will flicker while the function is activated.

The Schedule Timer will toggle between Timer ON, Timer OFF and Timer Mode.

Press “FUNCTION” to select Hour and Minute which are able to be set by “UP” and “DOWN” keys. Once the setting is finished, press “CONFIRM” to save the value and auto switch to the next setting. Press “TIMER” to cancel the operation and auto switch to the next setting.

In Timer Mode setting, press "FUNCTION" to switch the modes between ONCE, DAILY and WEEKLY. Press "CONFIRM" to save the value and auto switch to the next setting. Press "TIMER" to cancel the operation and auto switch to the next setting.

In WEEKLY timer setting, the weekdays are able to be switched over by pressing "FUNCTION" key. Press "UP" to "CONFIRM" the weekday timer activation and move on to the next weekday. Press "DOWN" to cancel the activation of the weekday and move on to the next.

The Schedule Timer setting will terminate if there's no operation for 5 seconds or "CANCEL" is pressed.

Parameter Setting

Press the "FUNCTION" key in daily display for 5 seconds to enter System Parameter Setting screen. Repeat the operation to enter Module Parameter Setting screen. The "LOCK" icon will appear while the function is activated.

In System Parameter Setting, the parameters will be displayed in hour display area (Area 1) in sequence by pressing "FUNCTION" key.

In Module Parameter Setting, the modules can be switched over by pressing "TIMER" key.

Press "UP" or "DOWN" to set the value and press "CONFIRM" to save the value. The setting will terminate if there's no operation for 5 seconds or "CANCEL" is pressed.

Fault Diagnosis

Press "FUNCTION" and "CANCEL" keys for 5 seconds to enter Fault Diagnosis. The "FAULT" icon will appear while the function is activated.

The fault codes will be displayed in temperature display area (Area 3) with time recorded. The serial number of the module will be displayed as 10-bit of Area 4.

Press "UP" and "DOWN" for more fault information. A maximum of 16 faults can be recorded.

The setting will terminate if there's no operation for 5 seconds or "CANCEL" is pressed.

Running Status

Press "FUNCTION" and "CONFIRM" keys for 5 seconds to enter Running Status viewing screen. The digital and analog inputs and outputs are displayed in sequence in hour display area (Area 1) by pressing "UP" and "DOWN" keys.

The modules can be switched over by pressing "TIMER" key.

Fault Reset

Press "CONFIRM" and "CANCEL" keys for 5 seconds to reset the faults manually.

Keylock

Press "TIMER" and "DOWN" icons for 5 seconds to enter Keylock function. The "LOCK" icon will appear and all touch-keys and the physical button will be disabled while the function is activated.

Press "TIMER" and "DOWN" again to terminate the function.

Pump Circulation

Press "COOLING" key for 5 seconds in daily display to enter Pump Circulation function. The "PUMP" icon will appear. The pump will operate with no compressor running while this function is activated.

Low Sound Mode

Press "CONFIRM" key for 5 seconds in temperature setting display to enable Low Sound Mode. Press "FUNCTION" and "CONFIRM" keys for 5 seconds in temperature setting display to enable Night Low Sound Mode. In Night Low Sound Mode the low sound function will only be activated during 21:00 to 6:00.

Manual Defrost

Press "COOLING" and "FUNCTION" keys for 5 seconds in temperature setting display to enter Manual Defrost setting. The modules can be selected by pressing "TIMER" and defrost will begin once pressing "CONFIRM".

Press "CANCEL" to terminate this setting.

SECTION 9 – UNIT OPERATION

CAPACITY CONTROL

To initiate the start sequence of the unit, all run permissive inputs must be satisfied (liquid flow, remote start/stop switch, power supply, etc.), and no unit or system faults exist.

The first phase of the start sequence is initiated by the startup command through HMI or daily schedule. If the unit is shut down on the daily schedule, the chilled water pump microboard contacts will close to start the pump when the daily schedule start time has been reached. Once flow has been established and the flow switch closes, capacity control functions are initiated, if the remote cycling contacts wired in series with the flow switch are closed.

It should be noted that the chilled water pump contacts are not required to be used to cycle the chilled water pump. However, in all cases the flow switch must be closed to allow unit operation.

The control system will evaluate the need for cooling (or heating) by comparing the actual leaving or return chilled liquid temperature to the desired setpoint, and regulate the leaving or return chilled liquid temperature to meet that desired setpoint. The rate of water temperature change is also considered to calculate the required load. If the temperature changes too fast towards the target, the loading process will slow down to avoid system fluctuations, and vice versa.

SUCTION PRESSURE LIMIT CONTROLS

The anticipatory controls are intended to prevent the unit from ever actually reaching a low-pressure cutout. Loading is prevented, if the suction pressure drops below the limitations listed in Table 31. Loading may reoccur after suction pressure rises above the unload point and a period of one energy control cycle.

TABLE 31 - LP LOADING PREVENTION LIMITATIONS

	Cooling	Heating
Fixed Speed SYS.	720 kPa	300 kPa
Inverter SYS.	670 kPa	200 kPa

If the suction pressure drops lower, the unit will unload to prevent unexpected shutdown. The limitations are listed in Table 32.

TABLE 32 - LP UNLOAD LIMITATIONS

	Cooling	Heating
Fixed Speed SYS.	615 kPa	200 kPa
Inverter SYS.	650 kPa	190 kPa

The cooling suction pressure control is not available for glycol applications.

DISCHARGE PRESSURE LIMIT CONTROLS

The discharge pressure limit controls prevent a system to load or unload the system before it reaches a safety limit due to high load or dirty condenser coils. The micro monitors discharge pressure and decides to maintain current running load, or unloads the compressor, when discharge pressure exceeds the programmed setpoint. Reloading will occur when the discharge pressure on the affected system drops below the setpoint and a loading request is received. Table 33 lists the discharge pressure limitations to prevent a system to load.

TABLE 33 - HP LOADING PREVENTION LIMITATIONS

	Cooling	Heating
Fixed Speed SYS.	3100 kPa	3250 kPa
Inverter SYS.	3420 kPa	3420 kPa

The pressures listed in Table 34 indicate the limitations when unload is mandatory.

TABLE 34 - HP UNLOAD LIMITATIONS

	Cooling	Heating
Fixed Speed SYS.	3800 kPa	3750 kPa
Inverter SYS.	3490 kPa	3490 kPa

COMPRESS RATIO LIMIT CONTROLS

Compress ratio is calculated by absolute discharge pressure divided by absolute suction pressure. In most cases, the

pressures detected are measured by gauge pressure. The ratio must be kept in a certain range to make sure the compressor is running within its envelope.

Compress ratio = (Pd+100) / (Ps+100);
Where:
Pd: Discharge gauge pressure, kPa;
Ps: Suction gauge pressure, kPa.

The ratio limitations are listed in Table 35 when loading is prevented.

TABLE 35 - COMPRESS RATIO LOADING PREVENTION LIMITATIONS

	Cooling	Heating
Fixed Speed SYS.	6.2	6.6
Inverter SYS.	7.8	7.8

The ratio limitations are listed in Table 36 when unload is mandatory.

TABLE 36 - COMPRESS RATIO UNLOAD LIMITATIONS

	Cooling	Heating
Fixed Speed SYS.	8.1	8.1
Inverter SYS.	8.1	8.1

DISCHARGE TEMPERATURE CONTROLS

Discharge temperature controls are available on inverter system. External temperature sensors are fitted in the discharge lines of each compressor for continuous detection. The inverter compressor will be prevented to load or forced to unload if the temperature is too high. The limitations in cooling mode are listed in Table 37.

TABLE 37 - COOLING DT LIMITATIONS

DT (°C)	Duration (s)	Inverter Compressor
DT<108° C	/	Normal operation
108≤DT≤111	/	Load prevented
111<DT≤115	/	Unload 1Hz/5s
DT>115	<30	Unload 2Hz/5s
DT>115	≥30	Reduce to minimum frequency (40Hz)

INVERTER FREQUENCY CONTROL

The frequency of the inverter compressor start-up, operation and stop when rising speed and descending speed should be in accordance with the figure below.

The compressor must be maintained on the stable platform (40 to 75 RPS, 50 as default) for at least 1 minute before load or unload.

The frequency change rate of rising speed and descending speed is 1 RPS (revolution per second).

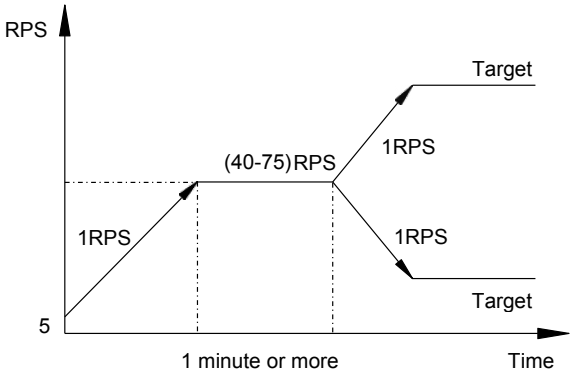


FIGURE 42 – INVERTER LOADING PROCESS

LIQUID TEMP. CONTROL

The setpoint, when programmed for Return Liquid Temp. Control or Leaving Liquid Temp. Control, is the temperature the unit will control to within +/- the (control) cooling or heating range. A Shift Value "D" is applied to define the range.

Figure 36 should be utilized to aid in understanding the following description of Liquid Temp. Control.

The acquisition interval of liquid temperatures is 20 seconds and then the microprocessor will further calculate the demand for loading or unloading. The difference △Ts and change rate △Tw are applied herein.

Cooling: △Ts=Twi –Tset, △Tw=Twi –Twi-1
Heating: △Ts=Tset –Twi, △Tw=Twi-1 –Twi
Where:
△Tw is defined by °C/min;
Twi – Current liquid temperature detected;
Twi-1 – Liquid temperature in previous cycle;
Tset – Target liquid temperature;
△Ts – Temperature deviation from Tset;
△Tw – Rate of temperature change.

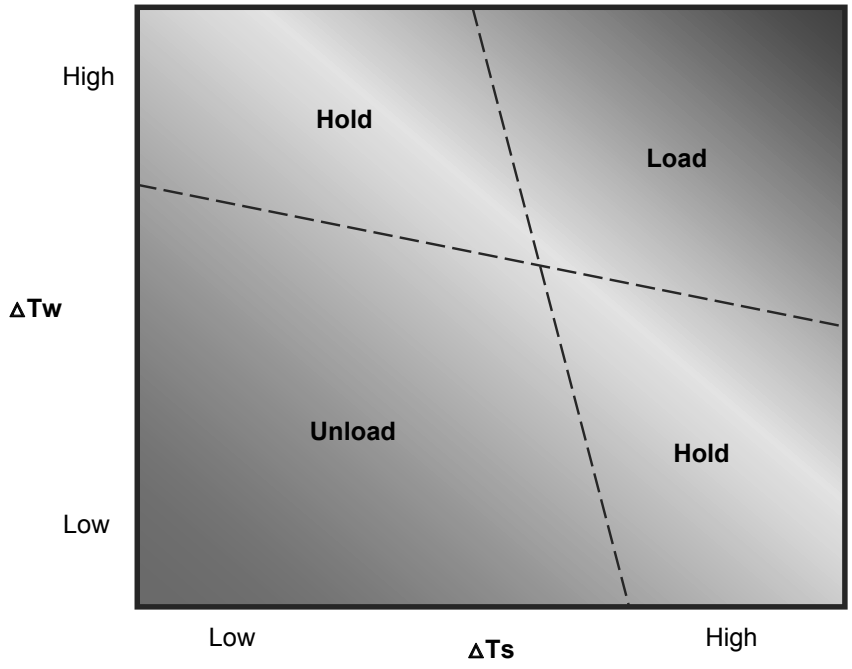


FIGURE 43 – CAPACITY CONTROL MATRIX

As shown in the figure, there're roughly four regions to define the energy control. The X-axis, △Ts, is divided by Shift Value "D" (programmable from 1 to 3 °C). And the Y-axis, △Tw, is divided by Temp. Change Rate "N" (selectable from 0 to 6).

If the liquid temperature is far above the setpoint in cooling mode or below the setpoint in heating mode, the control parameters will locate in "Load" region, thus the lead compressor on the lead system will be energized. Upon energizing any compressor, the 40 second Anti-Coincidence timer will be initiated to prevent multiple compressors from turning on.

If after 40 seconds of run-time the liquid temperature is still not reaching the Hold region, the compressor will increase its speed if the lead compressor is an inverter one, or the next compressor in sequence will be energized.

The Temp. Change Rate, △Tw, is introduced to prevent the liquid temperature from changing too fast. If the liquid

temperature changes toward setpoint rapidly, the compressor will not be allowed to load even if current temperature is still not achieving the setpoint.

Additional compressors will be energized at a rate of once every 40 seconds if the liquid temperature remains in “Load” region. The fixed speed compressors will run at least 3 minutes before unload.

In cooling mode, the leaving chilled liquid setpoint is programmable from 5 °C to 20 °C in water chilling mode and from -10 °C to 20 °C in glycol chilling mode. In heating mode, the leaving hot liquid setpoint is programmable from 20 °C to 55 °C.

In cooling mode, the return chilled liquid setpoint is programmable from 10 °C to 25 °C in water chilling mode and from -7 °C to 25 °C in glycol chilling mode. In heating mode, the leaving hot liquid setpoint is programmable from 15 °C to 50 °C.

Return Chilled Liquid Control MUST only be used when constant chilled liquid flow is ensured.

The range MUST always be programmed to equal the temperature drop across the evaporator when the chiller is “fully loaded”. Otherwise, chilled liquid temperature will over or under shoot. Variable flow must never be used in return chilled liquid mode.

VARIABLE LEAVING WATER TEMPERATURE CONTROLS

Variable Leaving Water Temperature Controls are applicable in water chilling mode and heating mode. The controls will automatically reset cooling or heating liquid temperature setpoints to match the required cooling or heating load as ambient temperature changes. Four liquid temperature setpoints in cooling, and five setpoints in heating, are programmable to formulate the variable target liquid temperature. The microboard will interpolate to calculate the setpoints in between.

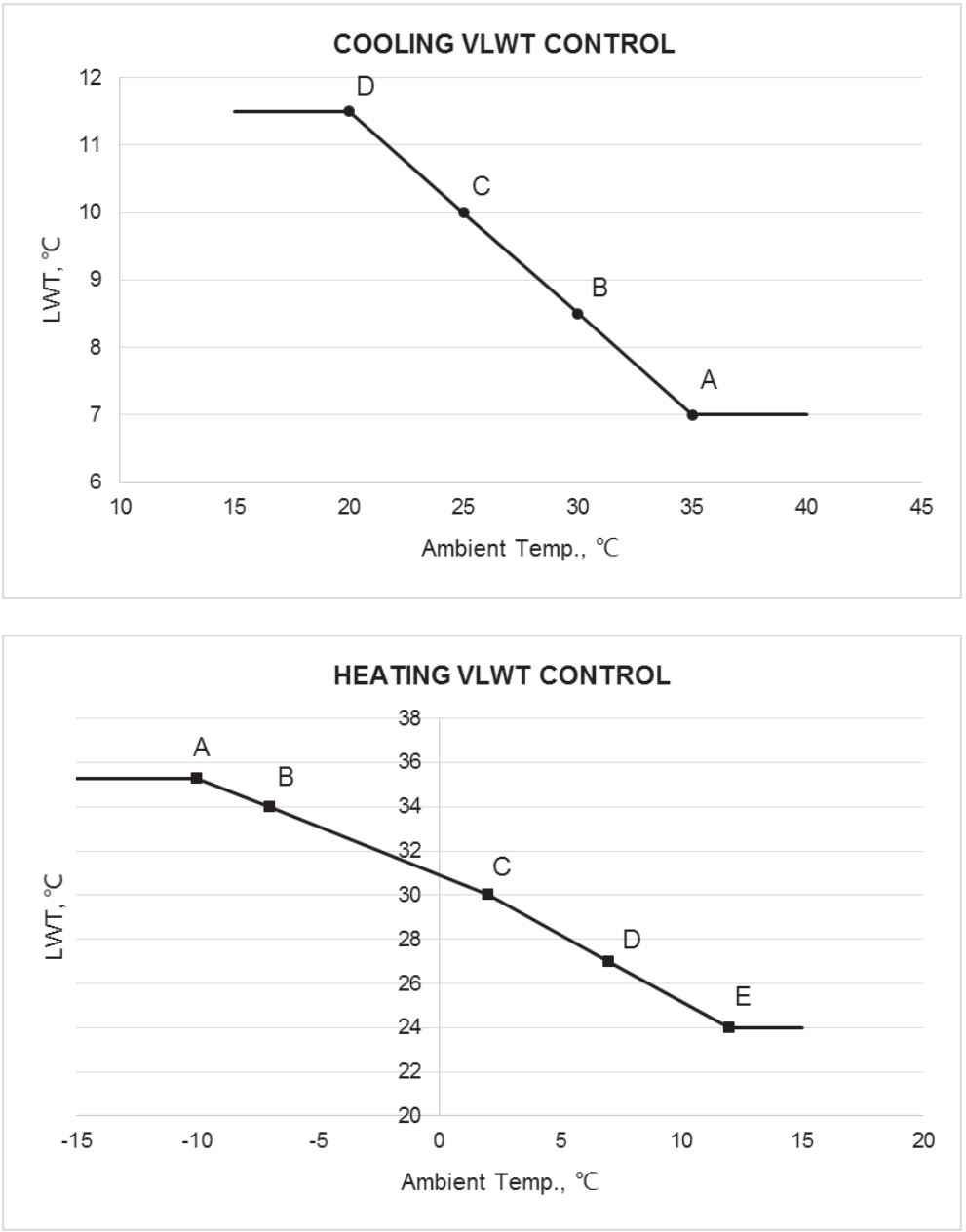


FIGURE 44 – VARIABLE LWT CONTROL

COMPRESSOR SEQUENCING

The cumulative run time of each system is stored to help equalize average run hours between systems with 2 refrigerant systems or in modular applications.

The systems will be prioritized in sequence based on different system configurations (inverter system or fixed speed system) and run hours. In initial startup, the inverter compressor will always be the first compressor to load.

Each compressor in a tandem fixed speed system will be assigned an arbitrary priority number 1, 2. The non-running compressor within a system with the lowest priority number will always be the next compressor to start. The running compressor with priority number 1 will always be the next to shut off. Whenever a compressor is shut off, the priority numbers of all compressors will be decreased by 1 with wrap-around. This control scheme assures the same compressor does not repeatedly cycle on and off.

The priorities while loading compressors are listed as follows:
1.Idle inverter compressor;

2.Running inverter system with load lower than 60% of full system load;

3.Idle compressor in tandem fixed speed system with one compressor running;

4.Idle compressor in tandem fixed speed system with no compressor running;

5.Inverter system below full load.

The micro will select the compressor with least run hours if there're more than one compressors being able to load. This will only occur in modular applications.

TABLE 38 - SAMPLE CAPACITY CONTROL FOR 4 COMPRESSORS (6 STEPS)

STEP	SYSTEM 1		SYSTEM 2	
	INVERTER	FIXED SPEED	FIXED SPEED	FIXED SPEED
0	OFF	OFF	OFF	OFF
1	ON ↑	OFF	OFF	OFF
2	ON	ON	OFF	OFF
3	ON ↑	ON	OFF	OFF
4	ON	ON	ON	OFF
5	ON	ON	ON	ON
6	ON ↑	ON	ON	ON

Notes

1.The inverter system will load to a stable platform (50Hz) in Step 1.
2.Step 2 is skipped when there's no fixed speed compressor in inverter system (80 & 100 kW units).
3.The running frequency of inverter system will increase in Step 3 and Step 6.
4.The compressor with less run hours in SYS2 will load in Step 4.

DEFROST CONTROLS

The purpose of any defrost system is to remove frost and ice from the ambient coils. The adaptive defrost system achieves this by optimizing the setpoint of defrosts dependent on ambient temperature and duration with the aim of improving overall unit efficiency. The field programmable setpoints are:

- DEFROST INTERVAL (Program range 15 to 120 minutes, 40 as default)
- DEFROST INITIATION TEMPERATURE DIFFERENCE (Temperature difference between coil temperature and ambient temperature; Program range -10 to 0 °C, 7 °C as default)
- DEFROST TERMINATION TIME (Program range 180 to 600 seconds, 360 seconds as default)
- DEFROST TERMINATION COIL TEMPERATURE (Program range 6 to 20 °C, 10 °C as default)

The temperature sensors used are the defrost sensor(s) mounted on the capillary of ambient coils.

The successful implementation of the adaptive defrost is dependent on the location of the temperature sensor. The sensor is factory positioned where in general the frost is most persistent.

There is one defrost sensor fitted on each system of the YMPA units. Two sensors are fitted on dual system units as the defrost strategy ensures that both systems do not defrost at the same time, which assists in maintaining some stability to the leaving water temperature during heat pump mode. Coils defrost normally when operating in lower ambient temperatures below +7 °C.

Defrost Interval

The interval is the delay between defrosts within a system and its value can be set in the range of 15 to 120 minutes with a recommended setting of 40 minutes.

Defrost Initiation Temperature Difference

The difference between coil temperature and ambient temperature indirectly indicates the formation of frost at the surface of the coil. The value can be set in the range of -10 to 0 °C with a recommended setting of 7 °C.

If the temperature difference is below the initiation value, a defrost cycle is initiated. The system mode solenoid changes to the cooling mode. During defrost the low pressure cut-out is ignored. The compressors within the system will start with a 30 seconds delay.

The fan for the system will stop, except when the discharge pressure rises above 34 BARG and does not fall below 28 BARG. In this case the fan will run at fixed speed. The other system continues to operate in the heat pump mode and the unit continues to be controlled to the heating setpoint.

Defrost Termination

When the frost is removed, the coil temperature rises rapidly and soon reaches the termination temperature of 10°C. The compressors will be powered off and heat loading will be enabled.

If coil temperature is still under the termination temperature in 360 seconds, the defrost process will also terminate. Other protective exit criteria include discharge temperature, discharge pressure and unit outlet liquid temperature.

Defrost Sensor Mounting and Position

The Coil Defrost Temperature sensors are mounted on the left hand side of the V-shaped coils on a system looking from the side-view. Within the coil the sensor is on the second capillary counted from the bottom. The sensor is correctly positioned during manufacture but may need to be re-positioned at site, to either suit site operating conditions or optimize the defrost cycle time.

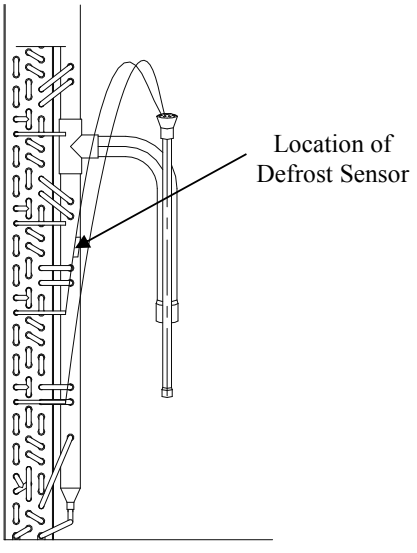


FIGURE 45 – LOCATIONS OF DEFROST SENSOR

If the sensor has to be repositioned it should remain in contact with the coil capillary and be placed adjacent to the coil end plate which indicates the frost situations of the coils.

ANTI-RECYCLE TIMER

The anti-recycle timer assures that systems do not cycle. This timer is set to 180 seconds to reduce cycling and motor heating. The anti-recycle timer starts the timer when the either of the compressors in a system starts. The timer begins to count down and the corresponding compressor will not be permitted to start until the anti-recycle timer has timed out.

ANTI-COINCIDENCE TIMER

This timer is present in software to assure compressors within a circuit or between systems do not start simultaneously. The anti-coincidence timer assures there is at least a 40 seconds delay between compressor loadings. This timer is programmable from 20 to 120 seconds. The load timers further assure that there is a minimum time between compressor starts within a control network.

EVAPORATOR AND PIPING HEATER CONTROLS

The evaporator and piping heaters are controlled by ambient air temperature. When the ambient temperature drops below 3 °C the heaters are turned on. When the temperature rises above 5 °C the heaters are turned off.

COMPRESSOR CRANKCASE HEATERS

Each compressor is fitted with two crankcase heaters which will be powered on when ambient temperature drops below 20 °C. The heaters are connected to DO6 of IPU3 through the terminals.

AUXILIARY HEATER CONTROL

The field-mounted auxiliary heater will be powered on when ambient temperature is below 5 °C (programmable) and controlled liquid temperature is 5 °C (programmable) below setpoint. The output will be cut off when liquid temperature rises to 5 °C (programmable) below setpoint.

EC FAN CONTROL

Each refrigerant system has one fan installed for forced air circulation. The micro is responsible for EC fan speed control by the running parameters.

1.Cooling mode: the fans are controlled by the discharge pressure;

2.Heating mode: the fans are controlled by the temperature difference between ambient temperature and saturated suction temperature;

3.Defrost mode: the fans are off unless the discharge pressure is above 34 BARG.

ALARM STATUS

System or unit shutdown is indicated by normally-open alarm contacts opening whenever the unit shuts down on a unit fault, locks out on a system fault, or experiences a loss of power to the unit electronics . The alarm contacts are located at XTB2 – terminals 47 to N7. The alarm contacts will close when conditions allow the unit to operate, or the fault is reset during a loss of power, the contacts will remain open until power is reapplied and no fault conditions exist.

SECTION 10 – SERVICE AND TROUBLESHOOTING

SERVICE MODE

Service Mode is a mode that allows the user to enable or disable all of the outputs on the unit, change configuration setup parameters and view all the inputs.

Refer to Section 7, the HMI operating instructions to view the following inputs and outputs.

ANALOG AND DIGITAL INPUTS

Table 39 is a quick reference list providing the description of the inputs. All input connections pertain to the connections at the microboard.

TABLE 39 – INPUTS DEFINITIONS

Port	Definition	0045-0065		0080-0100		0130	
		Heat Pump	Cooling Only	Heat Pump	Cooling Only	Heat Pump	Cooling Only
ANALOG INPUTS							
AI1	System return liquid temperature	Y	Y	Y	Y	Y	Y
AI2	Ambient temperature	Y	Y	Y	Y	Y	Y
AI3	SYS1 fin temperature	Y	Y	Y	Y	Y	Y
AI4	SYS2 fin temperature	N ②	N	Y	Y	Y	Y
AI5	Unit leaving liquid temperature	Y	Y	Y	Y	Y	Y
AI6	System leaving liquid temperature	Y	Y	Y	Y	Y	Y
AI7	SYS1 suction temperature	Y	Y	Y	Y	Y	Y
AI8	SYS2 suction temperature	N	N	Y	Y	Y	Y
AI9	SYS1 Compressor discharge temperature 1	Y	Y	Y	Y	Y	Y
AI10	SYS1 Compressor discharge temperature 2	Y	Y	N	N	Y	Y
AI11	SYS2 Compressor discharge temperature 1	N	N	Y	Y	Y	Y
AI12	SYS2 Compressor discharge temperature 2	N	N	Y	Y	Y	Y
AI20	SYS1 low pressure transducer	Y	Y	Y	Y	Y	Y
AI21	SYS2 low pressure transducer	N	N	Y	Y	Y	Y
AI22	SYS1 high pressure transducer	Y	Y	Y	Y	Y	Y
AI23	SYS2 high pressure transducer	N	N	Y	Y	Y	Y
DIGITAL INPUTS							
DI1	SYS1 fan motor overload	Y	Y	Y	Y	Y	Y
DI2	SYS2 fan motor overload	N	N	Y	Y	Y	Y
DI3	SYS1 high pressure and comp. overload	Y	Y	Y	Y	Y	Y
DI4	SYS1 low pressure	Y	Y	Y	Y	Y	Y
DI5	System water flow switch ①	Y	Y	Y	Y	Y	Y
DI6	Cooling/heating switch ①	Y	N	Y	N	Y	N
DI7	Remote ON/OFF ①	Y	Y	Y	Y	Y	Y
DI8	External interlock ①	Y	Y	Y	Y	Y	Y
DI9	Power protection	Y	Y	Y	Y	Y	Y
DI10	SYS2 high pressure and comp. overload	N	N	Y	Y	Y	Y
DI11	SYS2 low pressure	N	N	Y	Y	Y	Y
DI12	Unit water flow switch	Y	Y	Y	Y	Y	Y

Notes

①.Only applicable for first unit in modular applications;

②.N: Not applicable.

③.Large models (160 to 260 kW) are regarded as two units combined: 160/200 kW: 3 (2+1) systems, 230/260 kW: 4 (2+2) systems.

DIGITAL/PWM OUTPUTS AND COMMUNICATIONS

Table 40 is a quick reference list providing the description of the outputs and communication ports. All output and communication connections pertain to the connections at the microboard.

TABLE 40 – OUTPUTS AND COMMINICATIONS DEFINITIONS

Port	Definition	0045-0065		0080-0100		0130	
		Heat Pump	Cooling Only	Heat Pump	Cooling Only	Heat Pump	Cooling Only
DIGITAL OUTPUTS							
DO1	SYS1 fan motor	Y	Y	Y	Y	Y	Y
DO3	SYS1 compressor 1	Y	Y	Y	Y	Y	Y
DO4	SYS1 compressor 2	Y	Y	N ②	N	Y	Y
DO5	BPHE heater	Y	Y	Y	Y	Y	Y
DO6	Compressor heater	Y	Y	Y	Y	Y	Y
DO7	Alarm output	Y	Y	Y	Y	Y	Y
DO8	Water pump ①	Y	Y	Y	Y	Y	Y
DO9	Auxiliary heater ①	Y	N	Y	N	Y	N
DO10	Driver cooling fan	Y	Y	Y	Y	Y	Y
DO11	SYS2 fan motor	N	N	Y	Y	Y	Y
DO13	SYS2 compressor 1	N	N	Y	Y	Y	Y
DO14	SYS2 compressor 2	N	N	Y	Y	Y	Y
DO15	SYS1 four way valve	Y	N	Y	N	Y	N
DO16	SYS2 four way valve	N	N	Y	N	Y	N
DO17	Water valve	Y	Y	Y	Y	Y	Y
PWM OUTPUTS							
CON501	SYS1 EEV	Y	Y	Y	Y	Y	Y
CON502	SYS2 EEV	N	N	Y	Y	Y	Y
COMMUNICATIONS (RS-485)							
CON201	HMI	Y	Y	Y	Y	Y	Y
CON202	Compressor driver	Y	Y	Y	Y	Y	Y
CON203	FCU ①	Y	Y	Y	Y	Y	Y
CON204	Modular connection	Y	Y	Y	Y	Y	Y
CON205	BAS ①	Y	Y	Y	Y	Y	Y
CON206	EC fan	Y	Y	Y	Y	Y	Y

Notes

①.Only applicable for first unit in modular applications;

②.N: Not applicable.

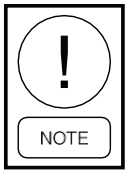
③. Large models (160 to 260 kW) are regarded as two units combined: 160/200 kW: 3 (2+1) systems, 230/260 kW: 4 (2+2) systems.

RUNNING STATUS

The HMI allows the user to retrieve system and unit information that is useful for monitoring unit operation, diagnosing potential problems, troubleshooting, and commissioning the unit. Refer to the Optiview LT operation section for more information.

TROUBLESHOOTING

TABLE 41 - TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
No display on HMI. Unit will not operate.	1. No 230VAC to 24VAC Transformer. 2. No 24VAC to Microboard. 3. Control Transformer defective, no 24VAC output. 4. Defective IPU II & I/O Board or the Display Board.	1 a. Check wiring and power supply. b. Check wiring emergency stop contacts of terminal block. c. Replace Control Transformer. 2. Check wiring Control Transformer to Microboard. 3. Replace Control Transformer. 4. Replace IPU3 & I/O Board or the Display Board.  ***Contact YORK Service before replacing circuit boards!***
"Chiller Water Flow" Fault	1. No chilled liquid flow. 2. Too much air in piping system. 3. Flow switch improperly installed. 4. Defective flow switch. 5. Remote cycling device open.	1. Check chilled liquid flow. 2. Purge the air though a release valve. 3. Check that the flow switch is installed according to manufacturer's instructions. 4. Replace flow switch. 5. Check cycling devices connected to terminals of the terminal Block.
"Low Suction Pressure" Fault	1. Suction service valve not open or valve defective. 2. Low refrigerant charge. 3. Fouled or clogged BPHE. 4. EEV defective. 5. Reduced flow of chilled. 6. Defective suction pressure transducer/low pressure switch or wiring. 7. Fans not operating (in heating mode).	1. Open or replace suction service valve. 2. Repair leak if necessary and add refrigerant. 3. Clean BPHE. 4. Check the wiring, or replace EEV. 5. Check liquid flow rate. Check operation of pump, clean pump strainer, purge chilled liquid system of air. 6. Replace transducer/low pressure switch or faulty wiring. 7. Check fan wiring and communication.
"High Discharge Pressure or Compressor Overload" Fault	1. Discharge service valve not open or valve defective. 2. Condenser fans not operating or operating backwards. 3. Too much refrigerant. 4. Air in refrigerant system. 5. Defective discharge pressure transducer. 6. Compressor motor locked.	1. Open or replace discharge service valve. 2. Check fan motor, and contactors. Assure fan blows air upward. 3. Remove refrigerant. 4. Evacuate and recharge system. 5. Replace discharge pressure transducer. 6. Replace compressor (and oil if necessary).

TROUBLESHOOTING (CONT'D)

TABLE 41 - TROUBLESHOOTING (CONT'D)

PROBLEM	CAUSE	SOLUTION
"High Discharge Pressure or Compressor Overload" Fault	7. Compressor internal motor protector (MP) open. 8. External overload tripped. 9. Defective high pressure cutout switch. 10. Defective CR relay.	7. Verify refrigerant charge is not low. Verify superheat setting (3-5°C). Verify correct compressor rotation. Verify compressor is not over loaded. 8. Determine cause and reset. 9. Replace switch. 10. Replace relay.
"Low Liquid Leaving Temp" Fault	1. Improperly adjusted leaving chilled liquid temp. cutout (glycol only). 2. Micro panel setpoint/range values improperly programmed. 3. Chilled liquid flow too low. 4. Defective LWT or RWT sensor (as- sure the sensor is properly installed in the bottom of the well with a generous amount of heat conductive compound).	1. Re-program the leaving chilled liquid temp. cutout. 2. Re-adjust setpoint/range. 3. Increase chilled liquid flow - refer to limitations in installation section. 4. Compare sensor against a known good temperature sensing device.
Compressor(s) Won't Start	1. Demand not great enough. 2. Defective water temperature sensor. 3. Contactor/Overload failure. 4. Driver failure (for inverter compressor). 5. Compressor failure.	1. No Problem. Consult "Installation" Manual to aid in understanding compressor operation and capacity control. 2. Compare the display with a thermometer. Should be within +/- 2 degrees. Refer to service section for RWT/ LWT temp./voltage table. 3. Replace defective part. 4. Check driver running status and the flicker of LEDs. 5. Diagnose cause of failure and replace.
Fan Protect	1. Power or communication loss. 2. Internal fan fault.	1. Check the wiring; 2. Contract local service for further fault analysis.
Lack of Cooling or Heating Effect	1. Fouled evaporator surface (in cooling mode). Low suction pressure will be observed. 2. Fouled coil surface (in heating mode). Low suction pressure will be observed. 3. Improper flow through the evaporator. 4. Low refrigerant charge. Low suction pressure will be observed.	1. Contact the local Johnson Controls representative. 2. Contact the local Johnson Controls representative. 3. Reduce flow to within chiller design specs. See limitations in Installation section. 4. Check subcooling and add charge as needed.

SECTION 11 – MAINTENANCE

It is the responsibility of the equipment owner to provide maintenance on the system.

IMPORTANT

If system failure occurs due to improper maintenance during the warranty period, YORK will not be liable for costs incurred to return the system to satisfactory operation. The following is intended only as a guide and covers only the unit components. It does not cover other related system components which may or may not be furnished by YORK. System components should be maintained according to the individual manufacture's recommendations as their operation will affect the operation of the unit.

COMPRESSORS

Oil Charge

The oil used in these compressors is pale yellow in color (PVE and POE oils). If one of the compressors in a refrigerant system fails to rotate and a replacement is needed, it is strongly recommended to clean the system and refill the oil. Examine the oil color during the process. If the oil darkens or exhibits a change in color, this may be an indication of contaminants in the refrigerant system.

Never use the scroll compressor to pump the refrigerant system down into a vacuum. Doing so will cause internal arcing of the compressor motor which will result in failure of compressor.

CONDENSER COILS

Dirt should not be allowed to accumulate on the con- denser coil surfaces. Cleaning should be as often as necessary to keep coils clean.

Exercise care when cleaning the coil so that the coil fins are not damaged.

OPERATING PARAMETERS

Regular checks of the system should be performed to ensure that operating temperatures and pressures are within limitations, and that the operating controls are set within proper limits. Refer to the Operation, Start- Up, and Installation sections of this manual.

CONDENSER FAN MOTORS

Condenser fan motors are permanently lubricated and require no maintenance.

BPHE (EVAPORATOR) HEATER

The Brazed Plate Heat Exchanger (evaporator) heater is 230VAC. Disconnecting 230VAC power from the unit, at or below freezing temperatures, can result in damage to the evaporator and unit as a result of the chilled liquid freezing.

OVERALL UNIT INSPECTION

In addition to the checks listed on this page, periodic overall inspections of the unit should be accomplished to ensure proper equipment operation. Items such as loose hardware, component operation, refrigerant leaks, unusual noises, isolators, etc. should be investigated and corrected immediately.

EXPANSION TANK

Unless otherwise stated, at least once every year the expansion tank must be checked to verify that the pre-charge is within the value indicated on the label with a tolerance of ± 20%.

PRESSURE RELIEF VALVES

The Dual Pressure Relief Valves are standard for each system. A shut off valve is installed to allow individual valves to be removed for testing or calibrating as required by local regulations. The locations of the valves are indicated in Figure 47, 48 and 49.

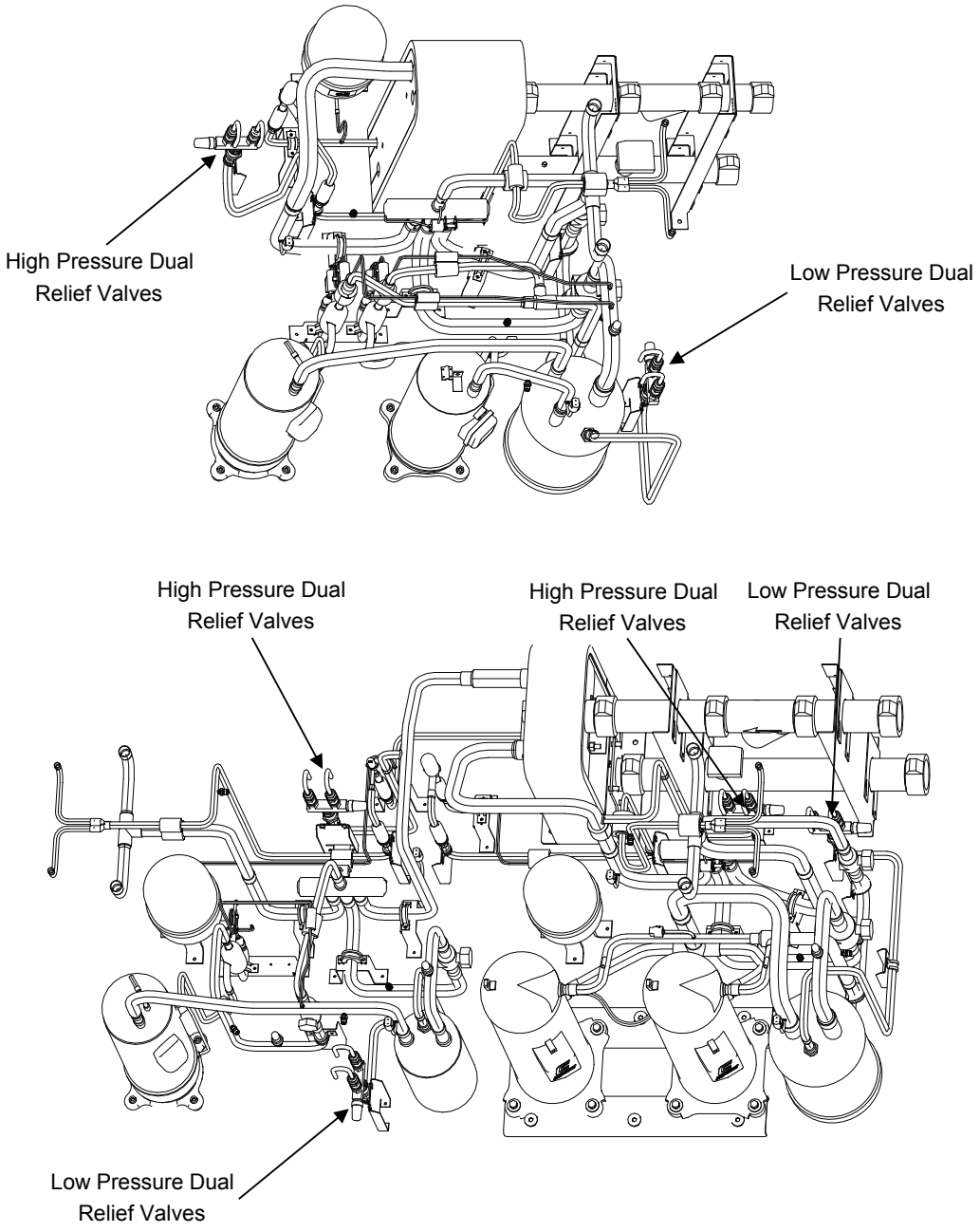


FIGURE 46 – LOCATIONS OF DUAL RELIEF VALVES YMAA/YMPA0045-0130

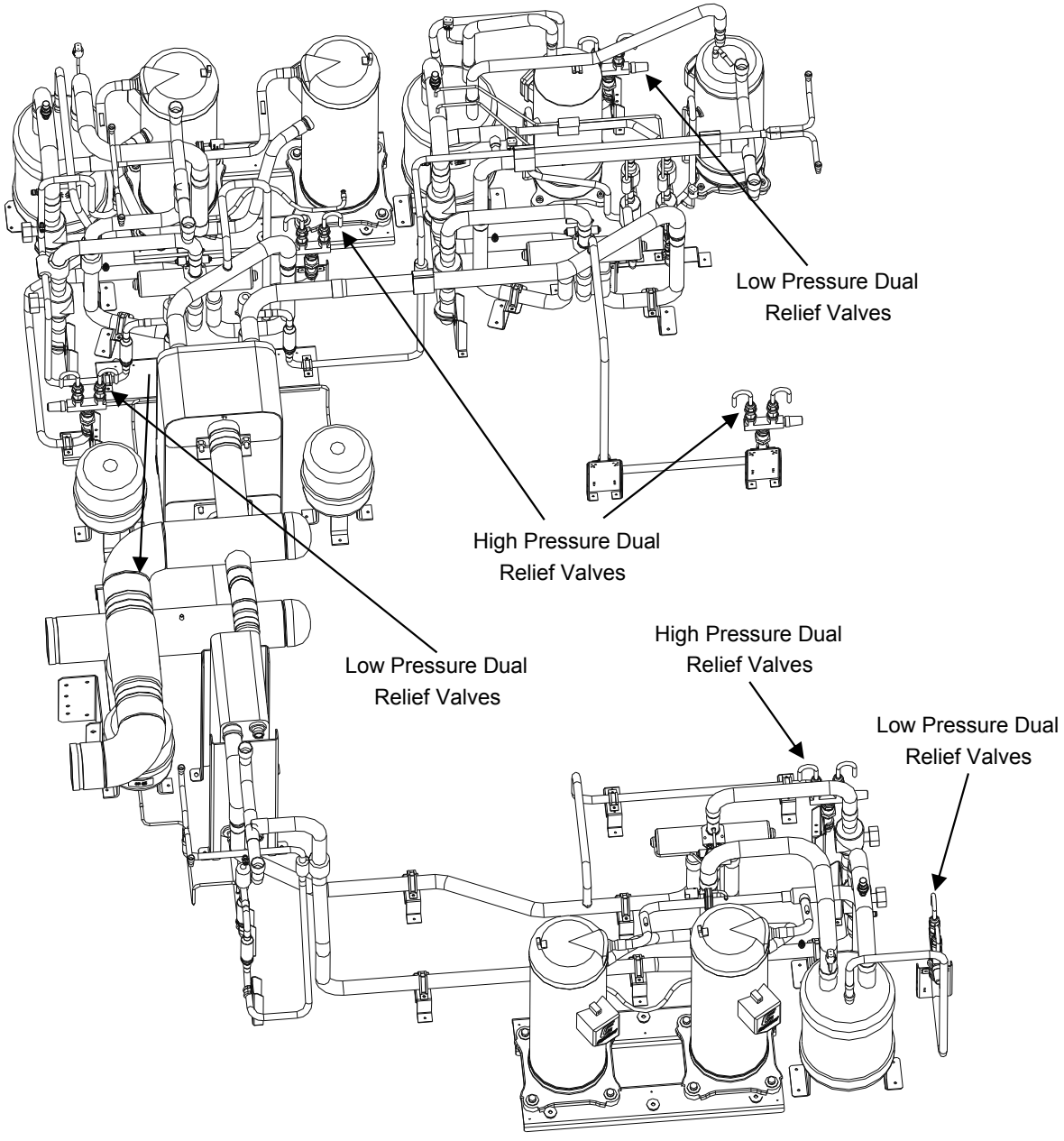


FIGURE 47 – LOCATIONS OF DUAL RELIEF VALVES YMAA/YMPA0160-0200

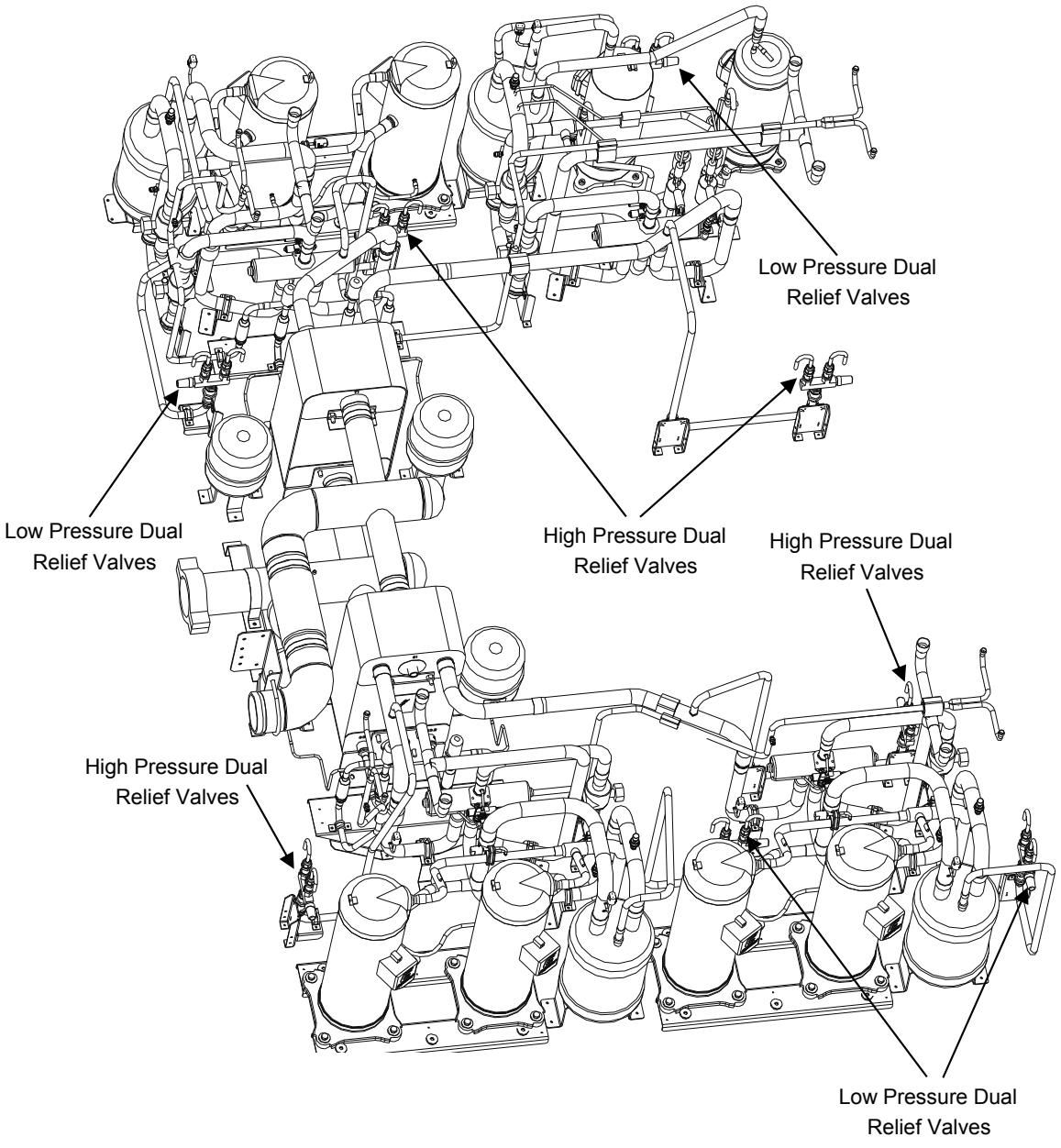


FIGURE 48 – LOCATIONS OF DUAL RELIEF VALVES YMAA/YMPA0230-260

MODBUS PROTOCOL

TABLE 42 - DEFINITIONS

NO.	ITEM	DESCRIPTION
1	Data Flow	Communication Baud rate: 9600bps; 8-N-1: 1 start bit,1 stop bit, check bit-none, 8 data bits; Modbus-RTU Protocol; CRC: Cyclic Redundancy Check; Hexadecimal data.
2	Master - Slave	Modbus as master; 1# microboard as slave.
3	Temperature (Control Panel)	Unit: 0.1 °C; Actual temperature = Register value/10; e.g.: Cool RT Setpoint Register value 0x0078 = 120, then the setpoint is 12.0 °C.
4	Temperature (VSD)	Unit: 0.1 °C; Actual temperature = Register value/10.
5	Pressure	Unit: kPa; Actual pressure = Register value.
6	EEV Opening Degree	Unit: Step; Actual EEV Opening Degree = Register value.
7	Fan Speed	Unit: RPM; Actual Fan Speed = Register value.
8	Compressor Speed	Unit: 0.1 RPS; Actual Compressor Speed = Register value/10.
9	Access Mechanism	BAS parameter setpoint may exceed unit default range and it is required for BAS to read the setpoints from the microboard.
10	BAS Enable	The BAS Modbus addresses of subordinates are set through HMI; Set the corresponding parameters in HMI to enable and disable the BAS Start/Stop and Operating Mode functions.
11	Start/Stop Status	The Start/Stop Command (Register value = 0) is only used to start/stop the unit; Actual Start/Stop Status is accessible by reading Register value = 100.

TABLE 43 – SYSTEM SETPOINTS

NO.	Short Name (BACnet Object Name)	Function Code	Register Address	Note
System Setpoints				
1	Chiller ON/OFF	3, 6, 16	0	0-Invalid, 1-On, 2-Off
2	Mode Setting	3, 6, 16	1	0-Cooling, 1-Heating, 8-Pump Circulation
3	Cool RT Setpoint	3, 6, 16	2	-7~25
4	Heat RT Setpoint	3, 6, 16	3	15~50
5	Cool LT Setpoint	3, 6, 16	4	-10~20
6	Heat LT Setpoint	3, 6, 16	5	20~55
7	Low Sound Mode	3, 6, 16	7	1-Enabled
8	Fault Reset	3, 6, 16	8	1-Reset
9	Cooling Control Select	3, 6, 16	9	0-Fixed RT, 1-Fixed LT, 3-Variable LT
10	Heating Control Select	3, 6, 16	10	0-Fixed RT, 1-Fixed LT, 3-Variable LT
11	Temperature Control Cycle	3, 6, 16	11	20~120, Unit: s
12	Water Temp. Contol Diff.	3, 6, 16	12	1~3
13	WT Pulldown Rate	3, 6, 16	14	0~6
14		3, 6, 16	16~99	

TABLE 44 – SYSTEM PARAMETERS

NO.	Short Name (BACnet Object Name)	Function Code	Register Address	Note
System Setpoints				
1	Chiller ON/OFF	3	100	0-OFF, 1-ON
2	System Status	3	101	0-Cooling、1-Heating、8-Pump
3	Other status	3	102	bit0: 1-Antifreezing bit1: 1-Defrost bit2: 1-Low Sound Mode bit3: Pump Status, 1-On, 0-Off Bit4: Compressor Status, 1-On, 0-Off
4	HMI Communication status	3	103	1-ON, 0-OFF
5	Unit Networks status	3	104	bit0-16: Unit1-16, 1-ON, 0-OFF
6	Unit fault status	3	109	bit0-16: Unit1-16, 1-Fault
7	Chiller EWT	3	110	
8	Chiller LWT	3	111	
9	Ambient Temp	3	113	
10	Chiller loading	3	114	0-100: 0-100%
11	Available mode	3	115	0-Heat pump, 1-Cooling only
12	Total run hours	3	117	
13	Unit Networks status	3	121	bit0-16: unit17-32, 1-On, 0-Off
14	Unit fault status	3	122	bit0-16: unit17-32, 1-Fault

TABLE 45 – UNIT PARAMETERS

NO.	Short Name (BACnet Object Name)	Function Code	Register Address	Note
Unit				
1	Software Versions A	3	1000-1009	
2	AI1-32	3	1021-1052	
3	Chiller EWT	3	1021	
4	Ambient Temp	3	1022	
5	Ckt1 Coil Temp	3	1023	
6	Ckt2 Coil Temp	3	1024	
7	Unit LWT	3	1025	
8	Chiller LWT	3	1026	
9	Ckt1 Suct Temp	3	1027	
10	Ckt2 Suct Temp	3	1028	
11	Ckt1 Comp1 DLT	3	1029	
12	Ckt1 Comp2 DLT	3	1030	
13	Ckt2 Comp1 DLT	3	1031	
14	Ckt2 Comp2 DLT	3	1032	
15	Ckt1 Suct Pr	3	1040	
16	Ckt2 Suct Pr	3	1041	
17	Ckt1 Disch Pr	3	1042	
18	Ckt2 Disch Pr	3	1043	
19	DI1-16 Status	3	1054	
20	Ckt1 fan motor fault	3		Bit1: 1-Fault
21	Ckt2 fan motor fault	3		Bit2: 1-Fault
22	Ckt1 HPS and Comp1/2 overload	3		Bit3: 1-Fault
23	Ckt1 LPS	3		Bit4: 1-Fault
24	Chiller WFS	3		Bit5: 1-Fault
25	Cooling/Heating mode	3		Bit6: 0-Cooling, 1-Heating
26	Start/Stop mode	3		Bit7: 0-Stop, 1-Start
27	External Interlock	3		Bit8: 1-Fault
28	Power protector	3		Bit9: 1-Fault
29	Ckt2 HPS and Comp1/2 overload	3		Bit10: 1-Fault
30	Ckt2 LPS	3		Bit11: 1-Fault
31	Unit WFS	3		Bit12: 1-Fault
32	DO17-32 Status	3	1055	
33	Unit water valve	3		bit0: 1-ON, 0-OFF
34	DO1-16 Status	3	1056	
35	Ckt1 fan motor	3		bit0: 1-ON, 0-OFF
36	Ckt1 fan motor speed	3		bit1: 1-ON, 0-OFF
37	Ckt1 Comp1	3		bit2: 1-ON, 0-OFF
38	Ckt1 Comp2	3		bit3: 1-ON, 0-OFF
39	EVA heater	3		bit4: 1-ON, 1-OFF
40	Ckt1 oil heater	3		bit5: 1-ON, 1-OFF

TABLE 45 – UNIT PARAMETERS (CONT'D)

NO.	Short Name (BACnet Object Name)	Function Code	Register Address	Note
41	Fault Output	3		bit6: 1-ON, 1-OFF
42	Chiller Pump	3		bit7: 1-ON, 1-OFF
43	Water Heater	3		bit8: 1-ON, 1-OFF
44	VSD fan	3		bit9: 1-ON, 1-OFF
45	Ckt2 Fan Motor	3		bit10: 1-ON, 1-OFF
46	Ckt2 Fan Motor speed	3		bit11: 1-ON, 1-OFF
47	Ckt2 Comp1	3		bit12: 1-ON, 1-OFF
48	Ckt2 Comp2	3		bit13: 1-ON, 1-OFF
49	Ckt1 FWV	3		bit14: 1-ON, 1-OFF
50	Ckt2 FWV	3		bit15: 1-ON, 1-OFF
51	Ckt1 EEV	3	1057	
52	Ckt2 EEV	3	1058	
53	Ckt1 Fan Speed	3	1065	
54	Ckt2 Fan Speed	3	1066	
55	Dial switch Status	3	1073	
56	VSD Info	3	1075-1090	16 addresses for VSD Info
57	Fault Word 1	3	1155	Modular fault codes, 128 bits
58	Fault Word 2	3	1156	
59	Fault Word 3	3	1157	
60	Fault Word 4	3	1158	
61	Fault Word 5	3	1159	
62	Fault Word 6	3	1160	
63	Fault Word 7	3	1161	
64	Fault Word 8	3	1162	

TABLE 46 – FAULT DEFINITIONS

Address		Fault (BACnet Object Name)	Fault Code	Note	Class
Fault Word 1	Bit0	Chiller EWT sensor fault ★	1A	Bit0: 1-Fault	System
	Bit1	Ambient temp sensor fault ★	2A	Bit1: 1-Fault	System
	Bit2	Ckt1 Coil temp sensor fault	3A	Bit2: 1-Fault	Unit
	Bit3	Ckt2 Coil temp sensor fault	4A	Bit3: 1-Fault	Unit
	Bit4	unit LWT sensor fault	5A	Bit4: 1-Fault	Unit
	Bit5	Chiller LWT sensor fault ★	6A	Bit5: 1-Fault	System
	Bit6	Ckt1 Accu Inlet temp sensor fault	7A	Bit6: 1-Fault	Unit
	Bit7	Ckt2 Accu Inlet temp sensor fault	8A	Bit7: 1-Fault	Unit
	Bit8	Ckt1 Comp1 DLT sensor fault	9A	Bit8: 1-Fault	Unit
	Bit9	Ckt1 Comp2 DLT sensor fault	10A	Bit9: 1-Fault	Unit
	Bit10	Ckt2 Comp1 DLT sensor fault	11A	Bit10: 1-Fault	Unit
	Bit11	Ckt2 Comp2 DLT sensor fault	12A	Bit11: 1-Fault	Unit
	Bit12		13A		
	Bit13		14A		
	Bit14		15A		
	Bit15		16A		
Fault Word 2	Bit0		1b		
	Bit1		2b		
	Bit2		3b		
	Bit3	Ckt1 LPT fault	4b	Bit12: 1-Fault	Unit
	Bit4	Ckt2 LPT fault	5b	Bit13: 1-Fault	Unit
	Bit5	Ckt1 HPT fault	6b	Bit14: 1-Fault	Unit
	Bit6	Ckt2 HPT fault	7b	Bit15: 1-Fault	Unit
	Bit7		8b		
	Bit8		9b		
	Bit9		10b		
	Bit10		11b		
	Bit11		12b		
	Bit12		13b		
	Bit13		14b		
	Bit14		15b		
	Bit15		16b		

TABLE 46 – FAULT DEFINITIONS (CONT'D)

Address		Fault (BACnet Object Name)	Fault Code	Note	Class
Fault Word 3	Bit0	Ckt1 Fan fault	1d	Bit0: 1-Fault	Unit
	Bit1	Ckt2 Fan fault	2d	Bit1: 1-Fault	Unit
	Bit2	Ckt1 HPS fault/ Comp 1 or 2 overload fault	3d	Bit2: 1-Fault	Unit
	Bit3	Ckt1 LPS fault	4d	Bit3: 1-Fault	Unit
	Bit4	Chiller Water flow fault ★	5d	Bit4: 1-Fault	System
	Bit5		6d	Bit5: 1-Fault	
	Bit6		7d	Bit6: 1-Fault	
	Bit7	External interlock fault ★	8d	Bit7: 1-Fault	System
	Bit8	Power fault	9d	Bit8: 1-Fault	Unit
	Bit9	Ckt2 HPS fault/ Comp 1 or 2 overload fault	10d	Bit9: 1-Fault	Unit
	Bit10	Ckt2 LPS fault	11d	Bit10: 1-Fault	Unit
	Bit11	Unit water flow fault	12d	Bit11: 1-Fault	
	Bit12		13d		
	Bit13		14d		
	Bit14		15d		
	Bit15		16d		
Fault Word 4	Bit0		1C		
	Bit1		2C		
	Bit2		3C		
	Bit3		4C		
	Bit4		5C		
	Bit5		6C		
	Bit6		7C		
	Bit7		8C		
	Bit8		9C		
	Bit9		10C		
	Bit10		11C		
	Bit11		12C		
	Bit12		13C		
	Bit13		14C		
	Bit14		15C		
	Bit15		16C		

TABLE 46 – FAULT DEFINITIONS (CONT'D)

Address		Fault (BACnet Object Name)	Fault Code	Note	Class
Fault Word 5	Bit0	Comm. Failure (Slave unit with master)	1E	Bit0: 1-Fault	Unit
	Bit1	Chiller Dial Switch setting error	2E	Bit1: 1-Fault	
	Bit2	Time limit protection	3E	Bit2: 1-Fault	System
	Bit3	Low ambient temperature in cooling	4E	Bit3: 1-Fault	System
	Bit4	High ambient temperature in heating	5E	Bit4: 1-Fault	System
	Bit5	Chiller Low LWT in cooling	6E	Bit5: 1-Fault	System
	Bit6	Chiller High LWT in heating	7E	Bit6: 1-Fault	System
	Bit7		8E		
	Bit8		9E		
	Bit9		10E		
	Bit10	Unit Low LWT in cooling	11E	Bit10: 1-Fault	Unit
	Bit11		12E		Unit
	Bit12	Unit high LWT in heating	13E	Bit12: 1-Fault	Unit
	Bit13		14E		Unit
	Bit14	Unit low LWT in heating	15E	Bit14: 1-Fault	Unit
	Bit15		16E		Unit
Fault Word 6	Bit0	Ckt1 comp1 High DPT	1F	Bit0: 1-Fault	Unit
	Bit1	Ckt1 comp2 High DPT	2F	Bit1: 1-Fault	Unit
	Bit2	Ckt2 comp1 High DPT	3F	Bit2: 1-Fault	Unit
	Bit3	Ckt2 comp2 High DPT	4F	Bit3: 1-Fault	Unit
	Bit4		5F		Unit
	Bit5		6F		Unit
	Bit6		7F		Unit
	Bit7		8F		Unit
	Bit8	Ckt1 BPHE anti-freeze protect	9F	Bit8: 1-Fault	Unit
	Bit9	Ckt2 BPHE anti-freeze protect	10F	Bit9: 1-Fault	Unit
	Bit10		11F		
	Bit11		12F		
	Bit12		13F		
	Bit13		14F		
	Bit14	Ckt1 FWV failure	15F	Bit14: 1-Fault	Unit
	Bit15	Ckt2 FWV failure	16F	Bit15: 1-Fault	Unit

TABLE 46 – FAULT DEFINITIONS (CONT'D)

Address		Fault (BACnet Object Name)	Fault Code	Note	Class
Fault Word 7	Bit0	Unit Dial Switch setting error	1p	Bit0: 1-Fault	Unit
	Bit1	Comm failure(unit with driver)	2p	Bit1: 1-Fault	Unit
	Bit2	Comm failure(unit with fan 1)	3p	Bit2: 1-Fault	Unit
	Bit3	Comm failure(unit with fan 2)	4p	Bit3: 1-Fault	Unit
	Bit4		5p		
	Bit5	Driver fault or INV comp fault	6p	Bit5: 1-Fault	Unit
	Bit6		7p		
	Bit7		8p		
	Bit8		9p		
	Bit9		10p		
	Bit10		11p		
	Bit11		12p		
	Bit12		13p		
	Bit13		14p		
	Bit14		15p		
	Bit15		16p		
Fault Word 8	Bit0		1q		
	Bit1		2q		
	Bit2	Ckt1 High pressure alarm	3q	Bit2: 1-Fault	Unit
	Bit3	Ckt2 High pressure alarm	4q	Bit3: 1-Fault	Unit
	Bit4	Ckt1 Low discharge pressure alarm	5q	Bit4: 1-Fault	Unit
	Bit5	Ckt2 Low discharge pressure alarm	6q	Bit5: 1-Fault	Unit
	Bit6	Ckt1 Low pressure alarm	7q	Bit6: 1-Fault	Unit
	Bit7	Ckt2 Low pressure alarm	8q	Bit7: 1-Fault	Unit
	Bit8		9q		
	Bit9		10q		
	Bit10		11q		
	Bit11		12q		
	Bit12		13q		
	Bit13		14q		
	Bit14		15q		
	Bit15		16q		

TABLE 47 – VSD FAULT DEFINITIONS

Address			Short Name (BACnet Object Name)	Fault Code	Note
BAS	**Driver**				
1076	1101	bit15			1: Fault
		bit14			
		bit13	Temp sensor fault	103	
		bit12			
		bit11	Current sensor checkout failure	105	
		bit10			
		bit9			
		bit8	Bus undervoltage fault	108	
		bit7	Bus overvoltage fault	109	
		bit6	Precharge fault	110	
		bit5	FOCx/APFCx over-temp fault	111	
		bit4	Current sensor fault	112	
		bit3	Open phase	113	
		bit2	Driver internal fault	114	
		bit1	Driving fault	115	
		bit0	FOCx/APFCx overcurrent fault	116	

BACNET POINT TABLE

TABLE 48 – WRITE DATA

Short Name (BACnet Object Name)	Data Type	Modify	IP Min Value	IP Max Value	IP Units	IP Display Prec	SI Min Value	SI Max Values	SI Units	SI Display Prec	Enum Set	BACoid (Customer BAS BACnet)
Chiller On|Off (Command)	Enum	Yes			None	1			None	1	0-Invalid, 1-On, 2-Off	MV1
Running Mode	Enum	Yes			None	1			None	1	0-Cooling, 1-Heating, 8-Pump Circulation	MV2
Cool EWT Setpoint	Float	Yes	500	770	°F	0.1	100	250	°C	0.1		AV1
Heat EWT Setpoint	Float	Yes	590	1220	°F	0.1	150	500	°C	0.1		AV2
Cool LWT Setpoint	Float	Yes	410	680	°F	0.1	50	200	°C	0.1		AV3
Heat LWT Setpoint	Float	Yes	680	1310	°F	0.1	200	550	°C	0.1		AV4
Noise Reduction	Boolean	Yes			None	1			None	1		BV1
Fault Restore	Boolean	Yes			None	1			None	1		BV2
Cooling Control Select	Enum	Yes			None	1			None	1	0-Manual EWT control, 1-Manual LWT control, 2-Auto LWT control	MV3
Heating Control Select	Enum	Yes			None	1			None	1	0-Manual EWT control, 1-Manual LWT control, 2-Auto LWT control	MV4
Temp Control Cycle	Float	Yes	10	120	S	1	10	120	S	1		AV5
Water Temp Control Diff	Float	Yes	18	54	°F	0.1	10	30	°C	0.1		AV6
EWT Pulldown Rate Select	Unsigned	Yes	0	6	None	1	0	6	None	1		AV7
Module Number	Unsigned	Yes	1	32	None	1	1	32	None	1		AV8

TABLE 49 – READ DATA

Short Name (BACnet Object Name)	Data Type	Modify	IP Min Value	IP Max Value	IP Units	IP Display Prec	SI Min Value	SI Max Values	SI Units	SI Display Prec	Enum Set	BACoid (Customer BAS BACnet)
Chiller On|Off (Status)	Boolean	No			None	1			None	1		BV100
System Status	Enum	No			None	1			None	1	0-Cooling, 1-Heating, 8-Pump	MV101
Other Status	Unsigned	No			None	1			None	1		AV102
HMI Communication Status	Boolean	No			None	1			None	1		BV103
Unit Network Status (1-16)	Unsigned	No			None	1			None	1		AV104
Unit Fault Status (1-16)	Unsigned	No			None	1			None	1		AV109
Chiller EWT	Float	No			°F	0.1			°C	0.1		AV110
Chiller LWT	Float	No			°F	0.1			°C	0.1		AV111
Ambient Temp	Float	No			°F	0.1			°C	0.1		AV113
Chiller Loading	Float	No			%	0.1			%	0.1		AV114
Available Mode	Enum	No			None	1			None	1		MV115
Total Run Hours	Unsigned	No			Hours	1			Hours	1	0-Heat pump, 1-Cooling only	AV117
Unit Network Status (17-32)	Unsigned	No			None	1			None	1		AV121
Unit Fault Status (17-32)	Unsigned	No			None	1			None	1		AV122
Unit Quantity	Unsigned	No			None	1			None	1		AV123

TABLE 50 – MULTIPLEX READ DATA

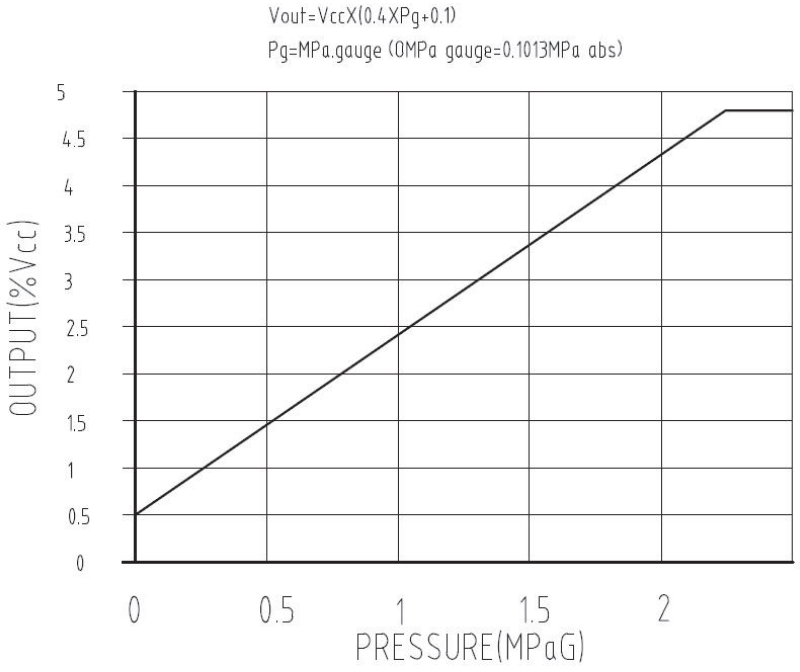
Short Name (BACnet Object Name)	Data Type	Modify	IP Min Value	IP Max Value	IP Units	IP Display Prec	SI Min Value	SI Max Values	SI Units	SI Display Prec	Enum Set	BACoid (Customer BAS BACnet)
Chiller EWT	Float	No			°F	0.1			°C	0.1		AV1021
Ambient Temp	Float				°F	0.1			°C	0.1		AV1022
Ckt1 Coil Temp	Float	No			°F	0.1			°C	0.1		AV1023
Ckt2 Coil Temp	Float	No			°F	0.1			°C	0.1		AV1024
Unit LWT	Float	No			°F	0.1			°C	0.1		AV1025
Chiller LWT	Float	No			°F	0.1			°C	0.1		AV1026
Ckt1 Suct Temp	Float	No			°F	0.1			°C	0.1		AV1027
Ckt2 Suct Temp	Float	No			°F	0.1			°C	0.1		AV1028
Ckt1 Comp1 DLT	Float	No			°F	0.1			°C	0.1		AV1029
Ckt1 Comp2 DLT	Float	No			°F	0.1			°C	0.1		AV1030
Ckt2 Comp1 DLT	Float	No			°F	0.1			°C	0.1		AV1031
Ckt2 Comp2 DLT	Float	No			°F	0.1			°C	0.1		AV1032
Ckt1 Suct Prs	Float	No			PSI	0.1			kPa	1		AV1040
Ckt2 Suct Prs	Float	No			PSI	0.1			kPa	1		AV1041
Ckt1 Disch Prs	Float	No			PSI	0.1			kPa	1		AV1042
Ckt2 Disch Prs	Float	No			PSI	0.1			kPa	1		AV1043
DI17-32	Unsigned	No			None	1			None	1		AV1053
DI1-16	Unsigned	No			None	1			None	1		AV1054

TABLE 50 – MULTIPLEX READ DATA (CONT'D)

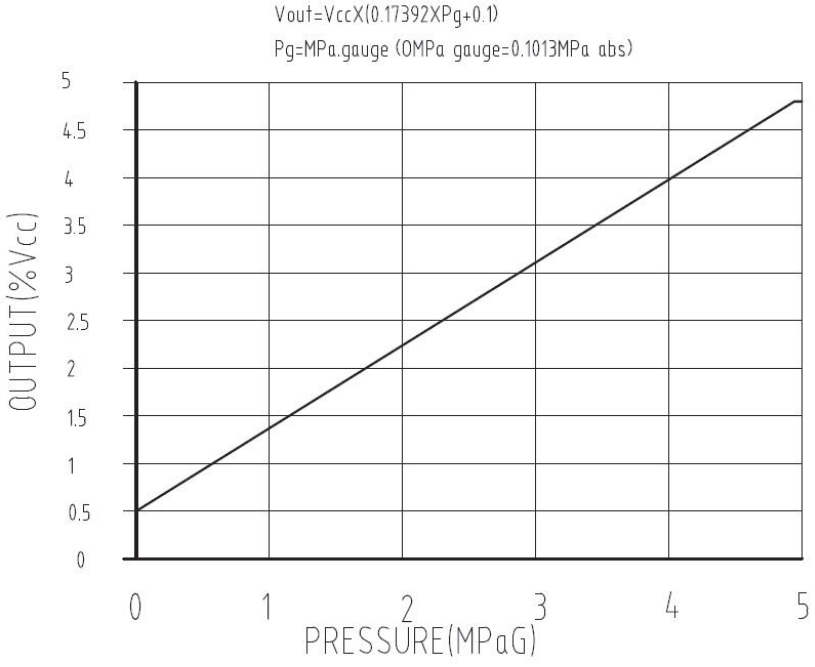
Short Name (BACnet Object Name)	Data Type	Modify	IP Min Value	IP Max Value	IP Units	IP Display Prec	SI Min Value	SI Max Values	SI Units	SI Display Prec	Enum Set	BACoid (Customer BAS BACnet)
DO17-33	Unsigned	No			None	1			None	1		AV1055
DO1-16	Unsigned	No			None	1			None	1		AV1056
Ckt1 EEV	Unsigned	No			None	1			Psig	1		AV1057
Ckt2 EEV	Unsigned	No			None	1			Psig	1		AV1058
Ckt1 Fan Speed	Unsigned	No			RPM	1			RPM	1		AV1065
Ckt2 Fan Speed	Unsigned	No			RPM	1			RPM	1		AV1066
Dial Switch Status	Unsigned	No			None	1			None	1		AV1073
INV Comp Freq	Unsigned	No			Hz	0.1			Hz	0.1		AV1080
Fault Status 1	Unsigned	No			None	1			None	1		AV1155
Fault Status 2	Unsigned	No			None	1			None	1		AV1156
Fault Status 3	Unsigned	No			None	1			None	1		AV1157
Fault Status 4	Unsigned	No			None	1			None	1		AV1158
Fault Status 5	Unsigned	No			None	1			None	1		AV1159
Fault Status 6	Unsigned	No			None	1			None	1		AV1160
Fault Status 7	Unsigned	No			None	1			None	1		AV1161
Fault Status 8	Unsigned	No			None	1			None	1		AV1162
Model Number	Unsigned	No			None	1			None	1		AV1163

PRESSURE TRANSDUCER DIAGRAM

Low Pressure Transducer



High Pressure Transducer



EC FAN SPEED CHART

Fan Step	Fan Speed φ910 RPM	Fan Speed φ800 RPM
0	0	0
1	150	150
2	200	200
3	250	250
4	300	300
5	350	350
6	400	400
7	450	450
8	500	490
9	550	530
10	600	570
11	650	610
12	700	650
13	750	690
14	800	730
15	850	770

R410A PRESSURE TEMPERATURE CHART

Gauge Pressure kPa	Temperature °C	Transducer Output
60	-40	-400
70	-39	-390
80	-38	-380
90	-37	-370
100	-36	-360
110	-35	-350
120	-34	-340
140	-33	-330
150	-32	-320
160	-31	-310
170	-30	-300
180	-29	-290
190	-28	-280
210	-27	-270
220	-26	-260
230	-25	-250
250	-24	-240
260	-23	-230
270	-22	-220
290	-21	-210
300	-20	-200
320	-19	-190
340	-18	-180
350	-17	-170
370	-16	-160
380	-15	-150
400	-14	-140
420	-13	-130
440	-12	-120
460	-11	-110
480	-10	-100
500	-9	-90
520	-8	-80
540	-7	-70
560	-6	-60
580	-5	-50
600	-4	-40
630	-3	-30
650	-2	-20
670	-1	-10
700	0	0
720	1	10

Gauge Pressure kPa	Temperature °C	Transducer Output
750	2	20
780	3	30
800	4	40
830	5	50
860	6	60
890	7	70
920	8	80
950	9	90
980	10	100
1010	11	110
1050	12	120
1080	13	130
1120	14	140
1150	15	150
1190	16	160
1220	17	170
1260	18	180
1300	19	190
1340	20	200
1380	21	210
1420	22	220
1460	23	230
1510	24	240
1550	25	250
1600	26	260
1640	27	270
1690	28	280
1740	29	290
1780	30	300
1830	31	310
1890	32	320
1940	33	330
1990	34	340
2040	35	350
2100	36	360
2150	37	370
2210	38	380
2270	39	390
2330	40	400
2390	41	410
2450	42	420
2510	43	430

R410A PRESSURE TEMPERATURE CHART (CONT'D)

Gauge Pressure kPa	Temperature °C	Transducer Output
2570	44	440
2640	45	450
2700	46	460
2770	47	470
2840	48	480
2910	49	490
2980	50	500
3050	51	510
3120	52	520
3200	53	530
3270	54	540
3350	55	550
3430	56	560
3510	57	570
3590	58	580
3670	59	590
3750	60	600
3840	61	610
3920	62	620
4010	63	630
4100	64	640
4190	65	650
4280	66	660
4370	67	670
4470	68	680
4560	69	690
4600	70	700

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