YORK®	YVWE VSD WATER COOLED SCREW CHILLERS
Installation, Commissioning, Operation & Maintenance	FORM NO.: 6S7E-B01C-NA-EN(0520)

YVWE VSD WATER COOLED SCREW CHILLERS
STYLE A
Cooling Capacities: 363.7 to 1514 kW (103 to 431 TR)

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1. General Chiller Information and Safety

Introduction

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

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

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

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

Warranty

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

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

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

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

For warranty purposes, the following conditions must be satisfied:

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

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

Standards for Safety

YVWE units are designed and manufactured within an ISO 9001 accredited organisation and in conformity with the following safety standards:

- China Refrigeration and Air Conditioning Association
- NB/T 47012
- GB/T18430.1
- GB25131
- GB9237

Fluorinated Greenhouse Gases

- This equipment contains fluorinated greenhouse gases covered by the Kyoto Protocol.
- The global warming potential of the refrigerant (R134A) used in this unit is 1430.
- 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 following symbols are used in this document to alert the reader to areas of potential hazard.

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

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

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

The contents of this manual include suggested best working practices and procedures. These are issued for guidance only, 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 and 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 vapour and liquid under pressure, release of which can be a danger and cause injury. The user should ensure that care is taken during installation, operation and maintenance to avoid damage to the pressure system. No attempt should be made to gain access to the component parts of the pressure system other than by suitably trained and qualified personnel.

Electrical

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

Refrigerants and Oils

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

High Temperature and Pressure Cleaning

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

Emergency Shutdown

In case of emergency, the control panel is fitted with an emergency stop button (RED) when pressed it removes the electrical supply to the control circuit thus shutting down the unit. The button is locked in the closed (OFF) position and has to be rotated to reset it.

Safety Labels

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

White symbol on blue background

For safe operation, read the instructions first

Black symbol on yellow background

Warning: This machine may start automatically without prior warning

Black symbol on yellow background

Warning: Hot surface

Black symbol on yellow background

Warning: Safety relief valve may discharge gas or liquid without prior warning

Black symbol on yellow background

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

Black symbol on yellow background

General attention symbol

Material Safety Data

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

Refrigerant Data:	
Safety Data	**R134a**
Disposal	Best to recover and recycle. If this is not possible, destruction is to be in an approved facility which is equipped to absorb and neutralise acids and other toxic processing products.
Fire extinguishing data	Non-flammable at atmospheric conditions.
Containers	Fire exposed containers should be kept cool with water sprays. Containers may burst if overheated.
Fire fighting protective equipment	Self contained breathing apparatus and protective clothing must be worn in fire conditions.

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

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

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2. Specification

YVWE water cooled chillers are completely factory assembled with all interconnecting refrigerant piping and wiring ready for field installation.

The unit is pressure tested, evacuated, and fully factory charged with refrigerant R134A and oil in the independent refrigerant circuit. After assembly, an operational test is performed with water flowing through the heat exchanger to ensure that the refrigerant circuit operate correctly.

YVWE units are designed and manufactured within an EN ISO 9001 accredited organisation and in conformity with the following safety standards:

- NB/T 47012
- GB/T18430.1
- GB25131
- GB9237

YVWE units are designed to work independently, or in conjunction with other equipment via Modbus building management systems or other automated control systems.

Sound Standards

The sound data for YVWE water cooled chillers conforms to, and is rated in accordance with ARI Standard 575.

Compressor

A semi-hermetic screw compressor is provided to ensure high operational efficiency and reliable performance. Capacity control is achieved through the VSD and slide valve. The compressor is a positive displacement type characterized by two helically grooved rotors, which are manufactured from forged steel. The VSD enables the compressor speed to match the system load, and the motor operates at variable speed up to 2950 rpm to directly drive the male rotor, which in turn drives the female rotor on a light film of oil.

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

- two screw rotors, manufactured from forged steel;
- a cast iron compressor housing precisely machined;
- a discharge check valve can prevent rotor backspin during shutdown;
- a suction vapour cooled, high efficient and reliable semi- hermetic motor has overload protection: thermistor and current overload protection.

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

The rotors are housed in a cast iron compressor housing precision machined to minimize the void between the housing and the rotors. Contact between the male and female rotor is primarily rolling on a contact band on each of the rotor's pitch circle. It result in virtually no rotor wear and increased reliability.

The compressor incorporates a complete anti- friction bearing design for reduced power input and increased reliability. Four separated, cylindrical, roller bearings handle radial loads. Angular-contact ball bearings handle axial loads. Together they maintain accurate rotor positioning at all pressure ratios, thereby minimizing leakage and maintaining efficiency.

Motor cooling is provided by refrigerant vapour from the evaporator flowing across the motor. Over load protection includes overheat and current overload protections.

Motor Starting

The VSD provides soft starts with no electrical inrush. The lack of heat build-up on start-up also reduces required off time between starts.

Capacity Control

The compressors should start at the minimum load position and provide a capacity control within 15%~100% by using one continuous function slide valve and VSD.

The capacity control valve regulating spring returns the valve to the minimum load position to ensure compressor starting at the minimum motor load.

Oil Separator

The YVWE condenser has a built-in internal oil separator, to remove oil from the refrigerant and return it back to the compressor for lubrication. An oil sump is located in the oil separator, along with an oil level switch to assure the continuous oil supply.

All lubricant must flow through a renewable filter before it is supplied to compressor to lubricate the bearings and the rotors.

After lubricating the bearings, the oil is injected through an orifice located in the closed thread near the suction end of the rotors. The oil is automatically injected because of the pressure difference between the discharge pressure and the pressure at the suction end of the rotors. This lubricates the rotors as well as provides an oil seal against leakage around the rotors to assure refrigerant compression (volumetric efficiency).

An oil heater is located in the oil sump inside the condenser. The heater is thermostatically controlled to prevent refrigerant condensation into lubricant during shutdown.

Refrigerant Circuit

Each unit has an independent refrigeration circuit, the liquid line components include: a filter, a manual shut-off valve and throttling device (EEV or fixed orifice).

Condenser

The water-cooled condenser is a cleanable shell and tube type, with 19 mm thermally enhanced seamless copper tubes.

The condenser shell is equipped with a pressure relief valve set to 20.7 Bar. The condenser is manufactured and tested according to NB/T 47012 or ASME Section 8 Div 1.

The design working pressure is 10 bar on the waterside. The water connections are victaulic grooves as standard, HG20615 welded flanges are available as an option.

The external surface of the condenser shell on Heat Pump and Heat Recovery Units, is covered with 19 mm thick flexible closed-cell foam.

Evaporator

The evaporator is a shell and tube, falling film type heat exchanger equipped with a pressure relief valve set to 20.7 Bar.

The evaporator is manufactured and tested according to NB/T 47012 or ASME Section 8 Div 1.

The external surface of the evaporator shell is covered with 19 mm thick flexible closed-cell foam. The water connections are victaulic grooves as standard, HG20615 welded flanges are available as an option.

Power Panel

All controls are factory-wired and function tested. The panel enclosures are designed according to IP22 and are manufactured from powder-painted steel.

The panel is divided into power supply section, control section and VSD section. The power supply section and control section have separated hinged, latched, and gasket sealed doors.

Control Panel

The control panel includes: Human Machine Interface (HMI), XS09 and microprocessor board IPU3.

The HMI consists of a liquid crystal display, with light emitting diode back-lighting for outdoor viewing of operating parameters and program points. It can display 8 rows and 120 characters in 2 languages (English or Chinese). The keyboard has 20 keys, which is divided into two kinds: Function keys and Programme keys.

Control System

The microprocessor control system is capable of single circuit control to maintain liquid temperature within programmed limits, as well as system safeties, displaying status, and daily schedules.

Remote starting and flow and equipment interlock can be accomplished by field supplied contacts.

Remote indications of alarms, run status and pump control are available as outputs.

Compressor starting/stopping and loading/unloading decisions are performed by the microprocessor to maintain leaving liquid temperature.

Accessories and Options

Flow Switch

A paddle type water flow switch with 10.3 bar DWP, which is applicable to chilled water and cooling water lines.

Rubber Isolator Pads

Rubber isolators for mounting under the tube sheets (field mounted).

Spring Isolators

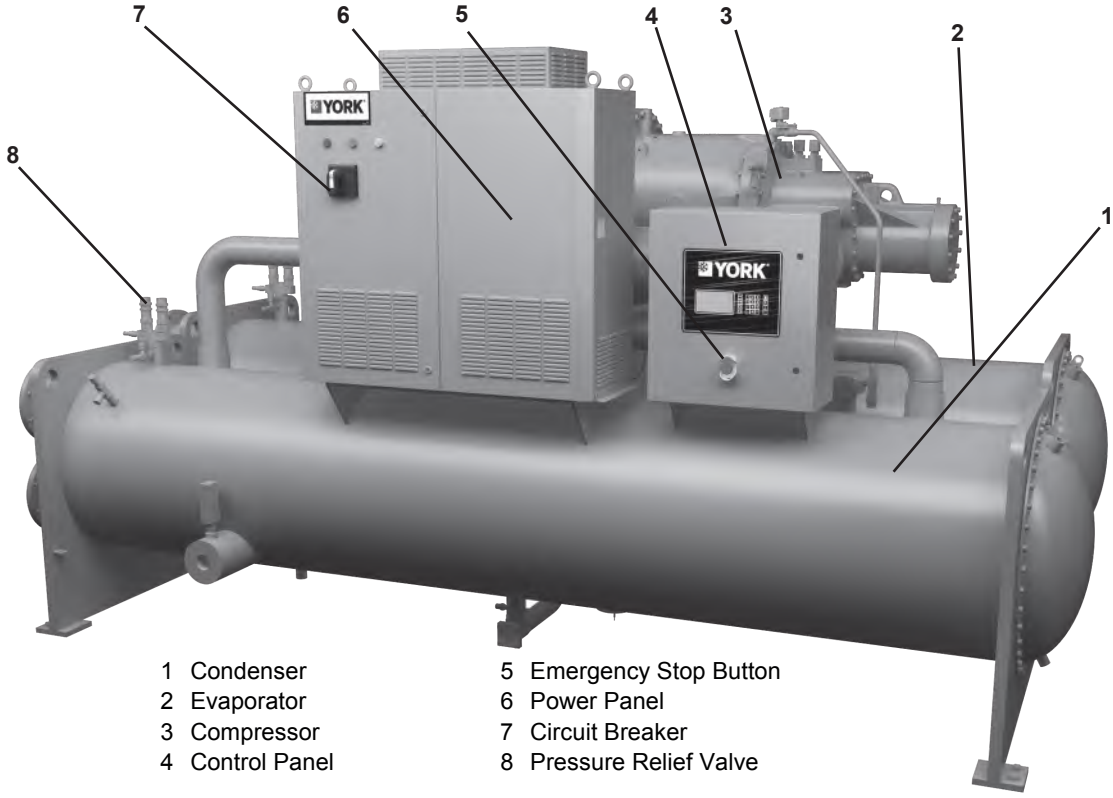
Level adjustable, spring and cage type isolators for mounting under the tube sheets (field mounted).

Nomenclature

YVWE310CA50A

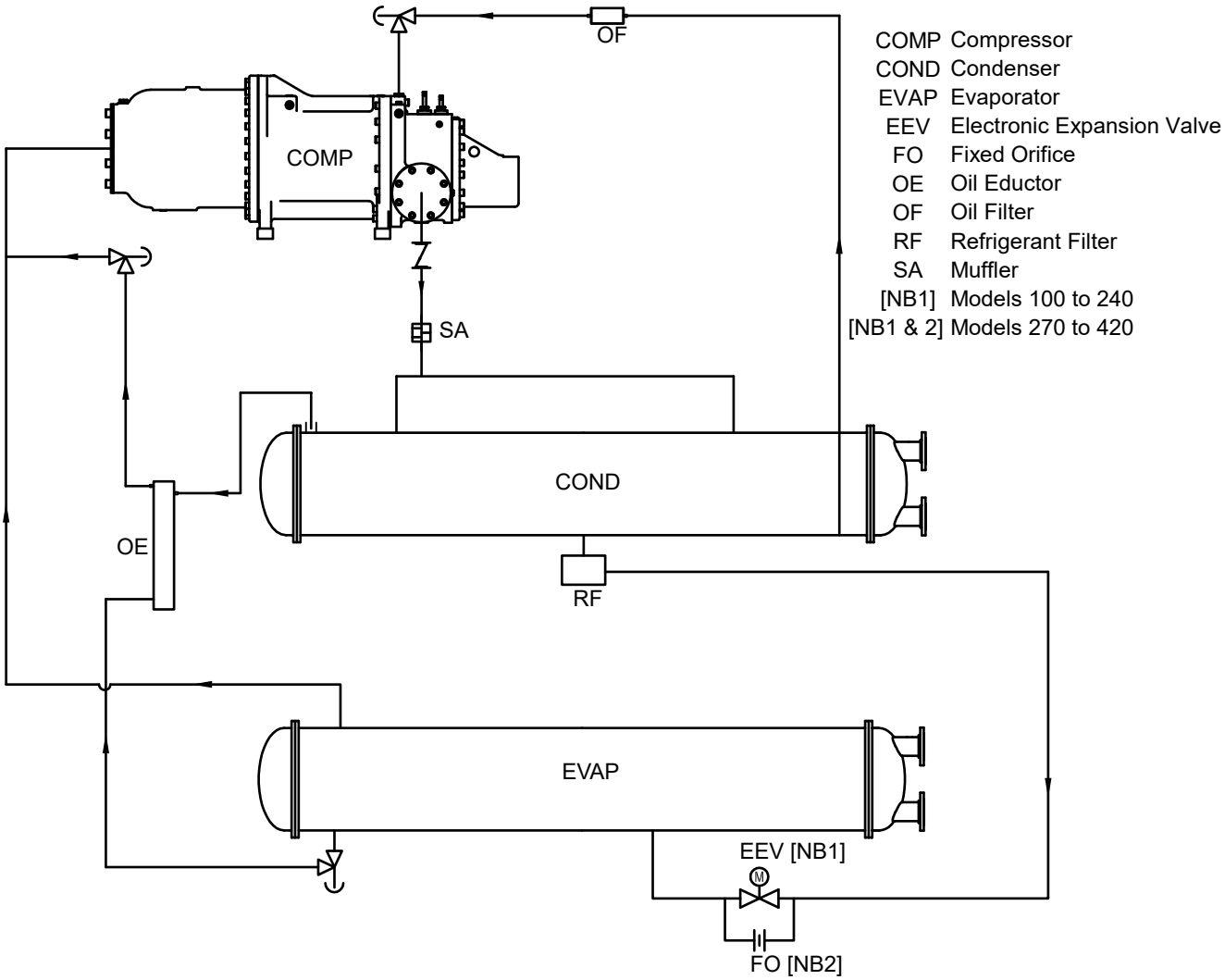
1 2 3 4 BASE PRODUCT TYPE	5 6 7 NOMINAL CAPACITY	8 APPLICATION TYPE	9 REFRIGERANT	10 11 VOLTAGE	12 DESIGN / DEVELOPMENT LEVEL
Y : York V : VSD W : Water cooled E : Standard Efficiency	# # # TR :100, 130, 170, 200, 240, 270, 310, 355, 420	C : Comfort Cooling D : Ice storage dual conditions	A : HFC-134a	50 : 380 / 3 / 50 53 : 400 / 3 / 50 55 : 415 / 3 / 50 60 : 380 / 3 / 60 63 : 400 / 3 / 60 65 : 415 / 3 / 60	A : Design Series

Component Location Diagram



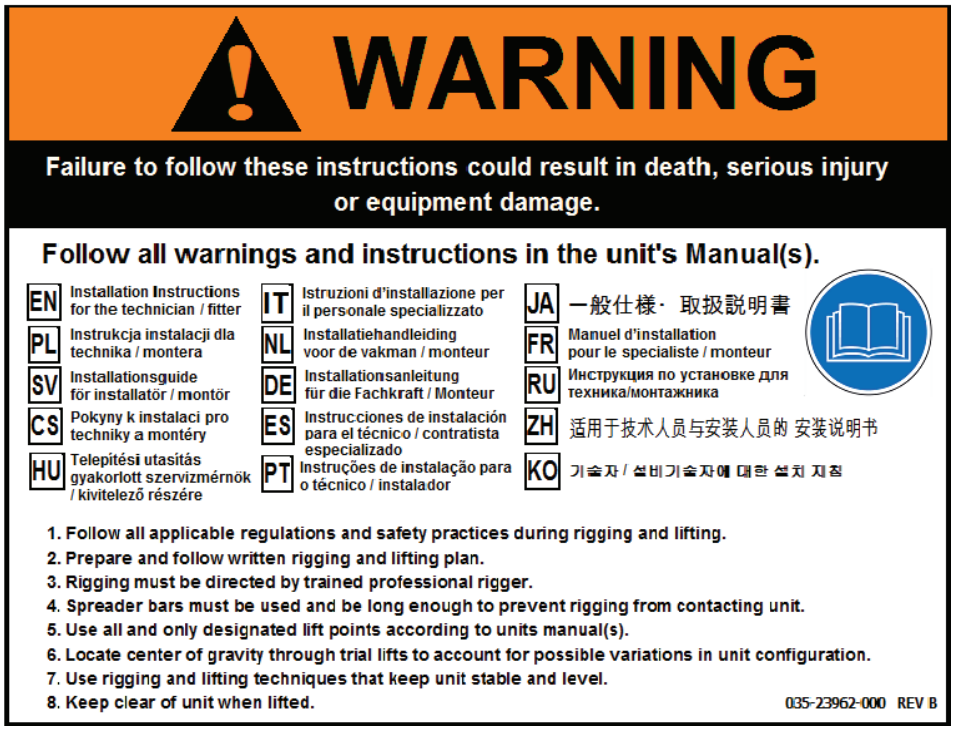
1 Condenser
2 Evaporator
3 Compressor
4 Control Panel
5 Emergency Stop Button
6 Power Panel
7 Circuit Breaker
8 Pressure Relief Valve

Refrigerant Flow Diagram



Low pressure liquid refrigerant enters the cooler and is evaporated and superheated by the heat energy absorbed from the chilled water passing through the cooler tubes. The low pressure vapour is returned to the compressor where the pressure and temperature are increased. The high pressure and temperature refrigerant vapour enters the condenser and is condensed. The fully condensed and subcooled liquid refrigerant then enters the throttling device where pressure reduction and further cooling takes place before returning to the cooler.

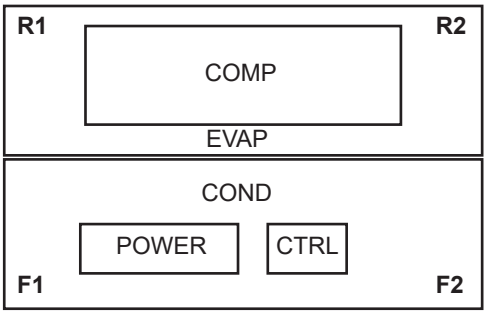
3. Rigging, Lifting, Handling and Storage



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. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN DEATH, SERIOUS INJURY OR EQUIPMENT DAMAGE.

Weights and Weight Distribution

Refer to the unit nameplate for unit shipping weight. Note that weight may vary depending on unit configuration at the time of lifting. Standard weights and weight distribution are given below:



YVWE Model	Weight (kg)		Point Weight (kg)			
	Shipping	Operating	F1	F2	R1	R2
100	2527	2717	605	663	692	758
130	2815	3013	658	728	772	855
170	3554	3837	848	920	992	1077
200	4054	4401	964	1047	1146	1244
240	4077	4424	969	1052	1152	1250
270	5649	6180	1357	1478	1601	1744
310	6698	7359	1704	1803	1871	1980
355	6840	7616	1764	1864	1939	2049
420	7596	8518	2013	2099	2157	2249

Delivery and Storage

To ensure consistent quality and maximum reliability, all units are tested and inspected before leaving the factory. The chiller may be ordered and shipped in any of the following forms:

- Form 1 (shipped complete)
- Form 2 (shipped without refrigerant charge)

Units are filled with YORK L oil and shipped without export crating, unless crating has been specified on the Sales Order.

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

- Ensure that the unit is not exposed to wind and rain.
- Ensure that all openings, such as water connections, are securely capped.
- The unit should be stored in a location where there is minimal activity to limit the risk of accidental physical damage.
- To prevent inadvertent operation of the pressure relief devices the unit must NOT be steam cleaned.
- It is recommended that the unit be periodically inspected during storage.
- If the unit is stored for longer than six months, you must comply with screw chiller requires long-term storage requirements detailed in documents (Form 50.20-NM9 / Form 50.20-CL9 / Form 50.20-NM1).

Inspection

The unit shipment should be checked on arrival to see that all major pieces, boxes and crates are received. Each unit should be checked on the trailer or rail car when received, before unloading, for any visible signs of damage. Any damage of signs of possible damage must be reported to the transportation company immediately for their inspection.

When received at the job site,all containers should be opened and the contents checked against the packing list. Any material shortage should be reported to YORK immediately.

Rigging

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

The unit should be lifted in accordance with the written rigging and lifting plan, using chains and shackles. The shackles should be inserted into the respective holes in the tube end sheets (lifting holes in the tube end sheet are for a 6.8 shackle).

Use spreader bars to avoid lifting chains hitting the chiller. Various methods of spreader bar arrangements may be used, keeping in mind the intent is to keep the unit stable and to keep the chains from hitting the chiller and causing damage.

Do not move the unit on rollers, or lift it using a forklift.

4. Installation

The YVWE unit is shipped as a single factory assembled, piped, wired and refrigerant charged package (or nitrogen holding charge), requiring a minimum of field labour to make chilled water connections, condenser water connections, refrigerant atmospheric relief connections, and electrical power connections.

York representatives will provide unit installation inspection, initial start-up and other services as detailed in the supply contract.

The YORK Warranty will be voided if the following restrictions are not adhered to:

- No valves or connections should be opened under any circumstances because such action will result in loss of the factory charged refrigerant or nitrogen.
- Do not dismantle or open the Unit for any reason except under the supervision of a YORK representative.
- Do not make final power supply connections to the compressor motor or control panel.
- Do not charge the compressor with oil.
- Do not attempt to start the system.
- Do not supply the evaporator with hot water (temperature limit is 38°C (100°F) or steam

Location Requirements

YVWE units are low noise, and low vibration and can be located in any building or structure that is level (within 6 mm) and can withstand the weight of the entire unit.

The unit should be located in an indoor location where temperature ranges from 4°C to 43°C and the altitude is less than 1500 metres.

The units are furnished with neoprene vibration isolator mounts for basement or ground level installations. Unit may by located on upper floor levels providing the floor is capable of supporting the total unit operating weight (in this application, the spring isolator option is recommended).

A level floor, mounting pad or foundation must be provided by others, capable of supporting the operating weight of the unit.

There should be sufficient clearances at the sides and top of the unit to carry out routine maintenance work. In addition, tube removal space should be allowed at one end of the unit for cleaning the evaporator and condenser tubes, a doorway or other suitable hole maybe used.

Maintenance space requirements are as follows: Rear, Ends and Above Unit - 610 mm

Front of Unit - 914 mm

Tube Removal - See following table

YVWE Models	Tube removal space
100	1986 mm
130, 170, 200,240	2591 mm
270, 310, 355, 420	3658mm

Installation of Vibration Isolators

The optional vibration isolators are shipped loose with the chiller.

Please refer to the floor layout drawing, for installation positions for the units.

Isolator Installation

There are two types of isolator available: rubber pads or spring isolators.

Locating and installing isolator pads

The isolator pads should be located in accordance with the floor layout drawing. After the isolator pads have been placed into position on the floor, lower the unit onto the pads. Make sure the pads are even with the edges of the mounting feet. When the unit is in place, remove the rigging equipment and check that the chiller is level, both longitudinally and transversely.

YVWE100,130,170,200,240,270		
Unit Weight (kg)	**Unit Weight (lbs)**	**Part No.**
UP TO 7423	UP TO 16365	028W14462-000

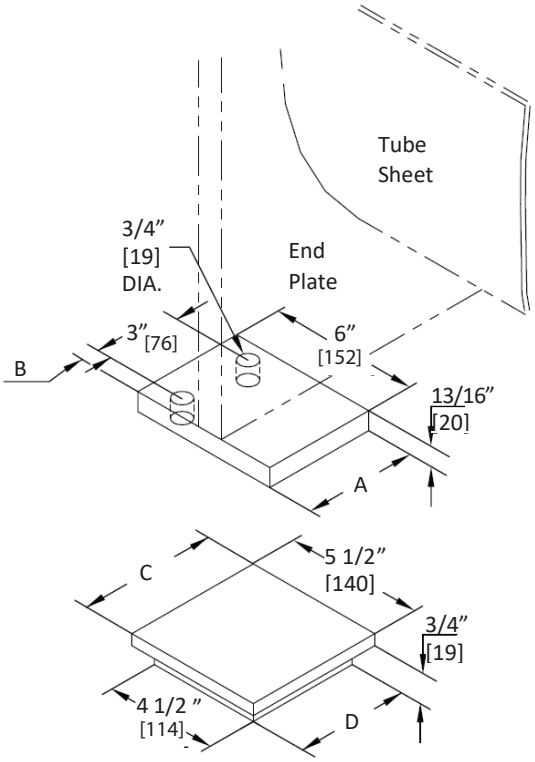
YVWE310,355,420		
Unit Weight (kg)	**Unit Weight (lbs)**	**Part No.**
7424 TO 13079	16366 TO 28835	028W14459-000

The longitudinal alignment of the unit should be checked by placing a level on the top centre of the evaporator shell under the compressor. Transverse alignment should be checked by placing a level on top of the shell end sheets at each end of the unit.

The unit should be level within 6.4 mm from one end to the other end and from front to rear. If the chiller is not level within the amount specified, lift it and place shims between the isolation pad and the tube sheets.

Checking the Isolator Pads Deflection

All isolator pads should be checked for the proper deflection while checking the level of the unit. Each pad should be deflected approximately 4 mm (0.15"). If an isolator pad is under deflected, shim should be placed between the unit tube sheet and the top of the pad to equally deflect all pads.



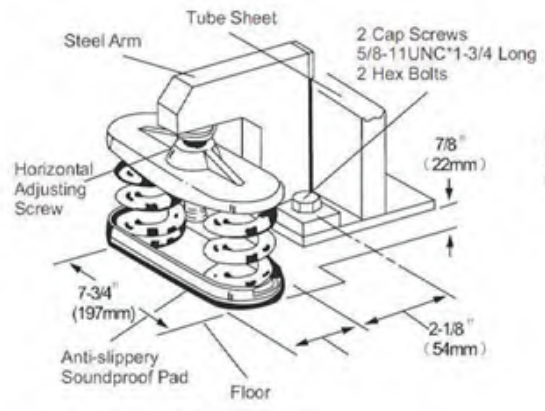
	YVWE Models	
Dim. mm (")	**100,130,170,200,240,270**	**310,355,420**
A	152 (6")	152 (6")
B	38 (1-1/2")	38 (1-1/2")
C	140 (5-1/2“)	178 (7")
D	114 (4-1/2“)	152 (6")

Installing Option Spring Isolators

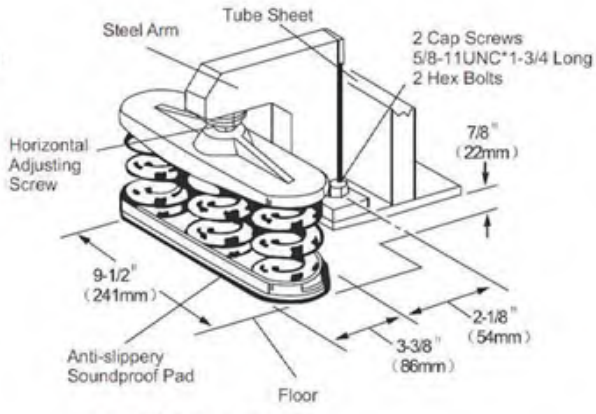
In order to mount spring isolators, first remove the nuts and screws on the spring isolator supports. Before the unit is positioned, the isolator supports should be bolted to the unit support. Position the 4 spring isolators, screw out the adjusting screws on each isolator until they reach out to match the isolator support holes. Then lower down the unit on the adjusting screws.

The levelling bolts should now be rotated one (1) turn at a time, in sequence, until the unit end sheets are clear of the floor or foundation by 22 mm (7/8") and the unit is level. Check that the unit is level, both longitudinally and transversely. If the levelling bolts are not long enough to level unit due to an uneven or sloping floor or foundation, steel shims (ground, if necessary) must be added beneath the isolator assemblies as necessary.

After the unit is levelled, wedge and shim under each corner to solidly support the unit in this position while piping connections are being made, pipe hangers adjusted and connections checked for alignment. Then the unit is filled with water and checked for leaks. The levelling bolts should now be finally adjusted until the wedges and shims can be removed the unit should now be in correct level position, clear of the floor or foundation and without any effect from the weight of the piping.



Part No.: 029W27514-###



Part No.: 029W27515-###

YVWE100,130		
Unit Weight (kg)	**Unit Weight (lbs)**	**Part No.**
UP TO 3115	UP TO 6866	029W27514-001

YVWE170,200,240		
Unit Weight (kg)	**Unit Weight (lbs)**	**Part No.**
3115 TO 4453	6866 TO 9818	029W27514-002

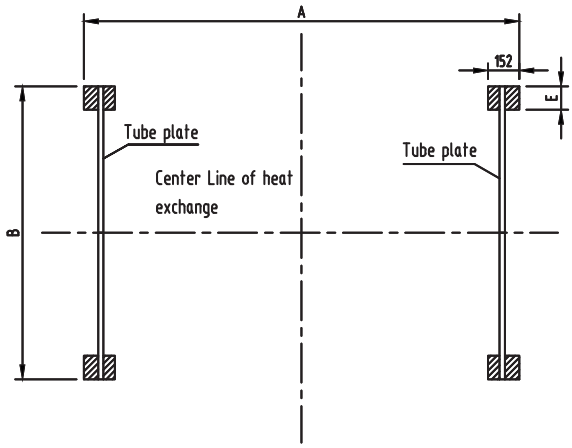
YVWE270		
Unit Weight (kg)	**Unit Weight (lbs)**	**Part No.**
5527 TO 6927	12183 TO 15272	029W27514-004

YVWE310, YVWE355		
Unit Weight (kg)	**Unit Weight (lbs)**	**Part No.**
6928 TO 8288	15273 TO 18272	029W27515-001

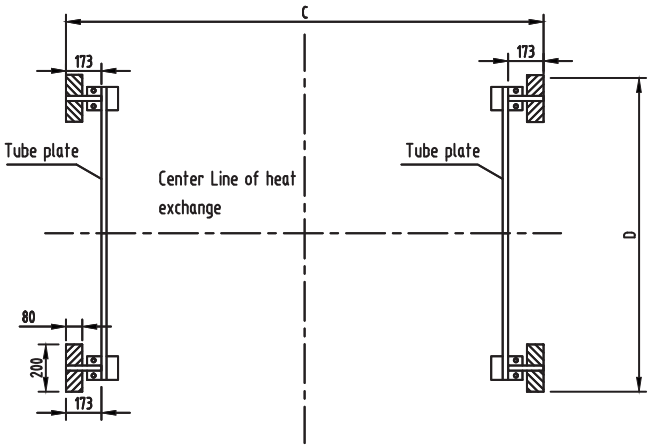
YVWE420		
Unit Weight (kg)	**Unit Weight (lbs)**	**Part No.**
8289 TO 10391	18273 TO 22909	029W27515-002

YVWE Floor Layout Diagram

Rubber Isolator Pad Layout



Spring Isolator Layout



Model	A	B	C	D	E	F
YVWE100	2126	1280	2332	1328	152	200
YVWE130	2731	1280	2937	1328	152	200
YVWE170	2731	1350	2937	1398	152	200
YVWE200	2731	1430	2937	1478	152	200
YVWE240	2731	1430	2937	1478	152	200
YVWE270	3798	1660	4004	1708	152	200
YVWE310	3798	1770	4004	1848	152	230
YVWE355	3798	1770	4004	1848	152	230
YVWE420	3798	1860	4004	1938	152	230

Piping Connections

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

CAUTION

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

A flow switch must be directly in series with the evaporator/ condenser and wired back to the control panel using screened cable. For details, refer to customer connection diagram. This is to prevent damage to the evaporator/ condenser caused by inadequate liquid flow. A paddle type flow switches are suitable for 10 bar working pressure.

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

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

A strainer must be mounted on the waterside of the evaporator and condenser respectively, preferably of 40 mesh, fitted as close as possible to the liquid inlet connection, and provided with a local water cut-off switch.

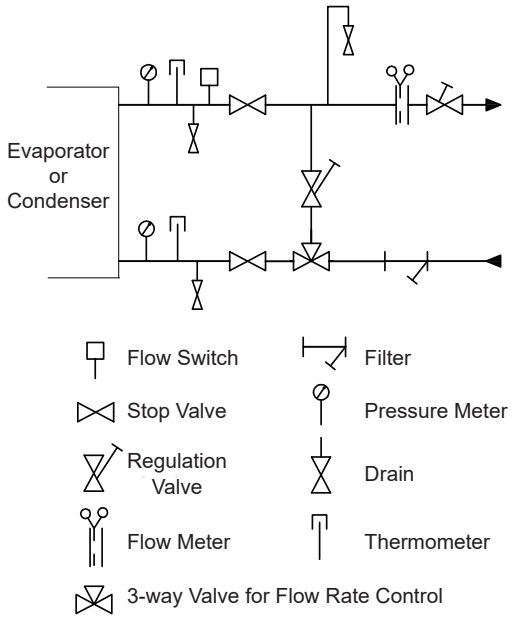
The evaporator must not be exposed to too high flushing velocities or debris deposited during flushing. It is recommended that a suitably sized by-pass and valve arrangement be installed to allow flushing of the pipework system. The by-pass can be used during maintenance to isolate the evaporator without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

Thermometer and pressure gauge connections should be provided on the inlet and outlet connections of the evaporator and condenser.

Drain and vent valves (by others) should be installed in the connections provided in the cooler and condenser liquid heads. These connections may be piped to drain if desired.

CAUTION

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



Water Treatment

The unit performance provided in the design guide is based on a fouling factor of (0.044 m²/KW for condenser and 0.0018 m²/KW for evaporator). Dirt, scale, grease and certain types of water treatment will adversely affect the heat exchanger surfaces and therefore the unit performance. Foreign matter in the water system(s) can increase the heat exchanger pressure drop, reducing the flow rate and causing potential damage to the heat exchanger tubes. YORK recommends that a water treatment specialist should be consulted to determine whether the proposed water composition will adversely affect the evaporator materials of carbon steel and copper. The pH value of the water flowing through the evaporator must be kept in a range between 6.5 and 8.0. The water quality of chiller should be in accordance with local code.

Quality requirement of water used in chiller

Name	Unit	Allowable value	Corrosion	Fouling
PH value(25°C)	-	6.5 to 8.0	X	
Conductivity(25°C)	s/cm	<800	X	
Chloridion	mg/L	<200	X	
Sulphate ion	mg/L	<200	X	
Acid wastage	mg/L	<100		X
Total Hardness	mg/L	<200		X
Calcium Hardness	mg/L	<150		X
SiO2	mg/L	<50		X

Notes:

1. The user should make regular inspections on the water quality before installation and during use. If the water quality does not meet the requirements, the heat exchange tubes will be in the danger of fouling, corruption and even leakage when using the 'Defective' water long term.

2. Testing about the influence of using 'Defective' water whose quality exceeds the limits for long term shows that, the chiller will fail to run normally due to the heat exchanger tubes corrupting and leakage.

3. Fouling testing about the influence of using 'Defective' water whose quality exceeds the limits for long term shows that, the chiller capacity will be decreasing due to the heat exchanger tube fouling.

4. The water should be drained out of the heat exchangers, if the unit is stopped for a long time, it is suggested that the heat exchanger tubes should be cleaned after each long term stop.

5. User will be responsibility for any losses caused by poor water quality.

Pipework Arrangement

The following are suggested pipework arrangements for single unit installations. For multiple unit installations, each unit should be piped as per the relative drawings.

Connection Types and Sizes

Please refer to the physical data table for connection sizes of each model.

The piping connections of evaporator and condenser are victaulic grooves as standard, HG20615 welded flanges are available as an option.

Refrigerant Relief Valve Piping

The evaporator and condenser are each protected against internal refrigerant overpressure by refrigerant relief valves. It is recommended that each valve should be piped to the exterior of the building so that when the valve is activated the release of high pressure gas and liquid cannot be a danger or cause injury.

The size of any pipework attached to a relief valve must be of sufficient diameter so as not to cause resistance to the operation of the valve. Unless otherwise specified by local regulations, the internal diameter depends on the length of pipe required and is given by the following formula:

D5 =1.447 x L

Where:

D = minimum pipe internal diameter in centimetres (cm) L =length of pipe in meters (m)

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

Electrical Connection

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

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

Since some internal components are live when main power is switched on, the unit should not be switched on, until it has been commissioned by York authorized personnel after connection.

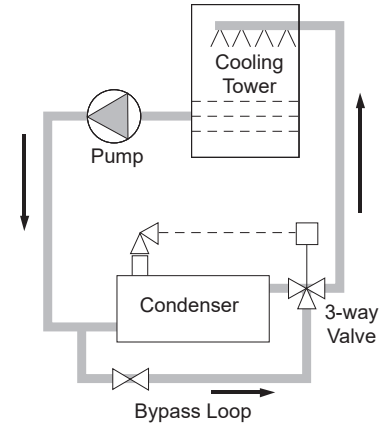
Condenser Cooling Water System

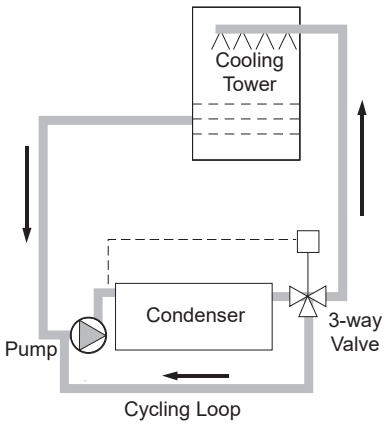
For YVWE units, condensers are usually piped in conjunction with a cooling tower.

With water cooled units it is necessary to control the condenser water flow and/or temperature into the condenser to maintain refrigerant pressure as constant as possible to ensure satisfactory operation of the unit.

Direct Pressure Control

With YVWE units it is possible, if desired, to control the condenser cooling liquid inlet temperature/flow directly from the unit refrigerant pressure. The refrigerant pressure can either be used to control cooling tower effectiveness by controlling fans or dampers on the tower, or to control condenser water flow using a three way bypass valve. The purpose of this method is to keep a low and steady discharge pressure .But with the units using R134 refrigerant, it is essential that the discharge pressure should be higher than suction pressure for more than 3 bar. In that case, units should be controlled by a certain setpoint higher than suction pressure or be controlled by the suction pressure and a pressure difference. However, the temperature and flow rate of cooling water should not exceeds the allowable range.





Inlet Temperature Control

For a cooling tower system the simplest forms of control is to use fan cycling, fan speed control, or air damper control, with the tower having a thermostat in its sump. This will ensure stable condenser cooling liquid temperature and should be adjusted to ensure a condenser cooling liquid entering temperature of not lower than 21°C to 24°C at lower ambient conditions.

If these methods are not available, or a cooling tower is not the source of cooling water, then a three way valve recirculation system can be used with control based on condenser inlet liquid temperature as shown in the diagram above. In this case the objective is to maintain the inlet cooling liquid temperature as low as possible, although still observing the minimum limit of 21°C to 24°C.

Variable Primary Flow

Johnson Controls recommends a maximum 10% per minute flow rate change, based on design flow, for variable primary applications. Provide 8 to 10 gallons per chiller ton (8.6 to 10.8 litres per cooling kW) system water volume. Insufficient system volume and rapid flow changes can cause control problems or chiller shutdowns. There are many other design issues to evaluate with variable primary flow systems. Consult your Johnson Controls Sales Office for more information for YVWE chillers.

Power Wiring

The allowable variation range of power supply voltage is ±10%.

All electrical wiring should be carried out in accordance with local regulations.

In accordance with China National Standard it is the responsibility of the user to install overload protection (current) for input power supply to the unit.

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

Single Point Power Supply Wiring

Models require field provided 380V / 400 V / 415 V, 3P / 50Hz,60Hz power supply to the unit with circuit protection. Connecting power supply to the circuit breaker located in the power panel on site. Refer to

Control Panel Wiring

The power connected to the I/O board input terminals is 12 Vdc while the power connected to the I/O board output terminals is 220 Vac.

The wiring for 220 Vac power must use dry-contacts (It is suggested to use the golden contact).If the dry-contact is part of a relay or a contactor, a capacitance-resistance suppressor winding must be used to minimise Electromagnetic Interference. Make sure that the above precautions are followed to avoid the Electromagnetic Interference, which may result in the fault or damages on the unit or the controller.

The length of cable connected to these terminals should not exceed 7.5 metres.

220 Vac Outputs

Chilled Water pump starter

Terminals 41 and 2A provide a 220 Vac output for water pump control. Starting and stopping of pump can be achieved by a contactor and the programmed start / stop.

Note: The power load should not exceed 5W.

Cooling Water pump starter

Terminals 42 and 2B provide a 220 Vac output for water pump control. Starting and stopping of pump can be achieved by a contactor and the programmed start / stop.

Note: The power load should not exceed 5W.

Hot Water pump starter

Terminals 43 and 2C provide a 220 Vac output for water pump control. Starting and stopping of pump can be achieved by a contactor and the programmed start /stop.

Note: The power load should not exceed 5W.

Run

Terminal 44 and 2D provide a 220 Vac output to indicate a run condition.

Note: The power load should be less than 5W.

Alarm

Terminal 45 and 2E provide a 220 Vac output to indicate an alarm condition.

Note: The power load should be less than 5W.

12 Vdc Inputs

Flow switch

A suitable water flow switch must be connected to terminals 61 and 60A to provide adequate protection against loss of condenser (cooling) liquid flow.

A suitable water flow switch must be connected to terminals 62 and 60B to provide adequate protection against loss of evaporator (chilled) liquid flow.

A suitable water flow switch must be connected to terminals 63 and 60C to provide adequate protection against loss of heat recovery (hot) liquid flow.

Note: Contact resistance should be less than 0.5Ω.

Remote Run/Stop

Connect a remote switch between 70 and 60J to provide remote start/stop if required.

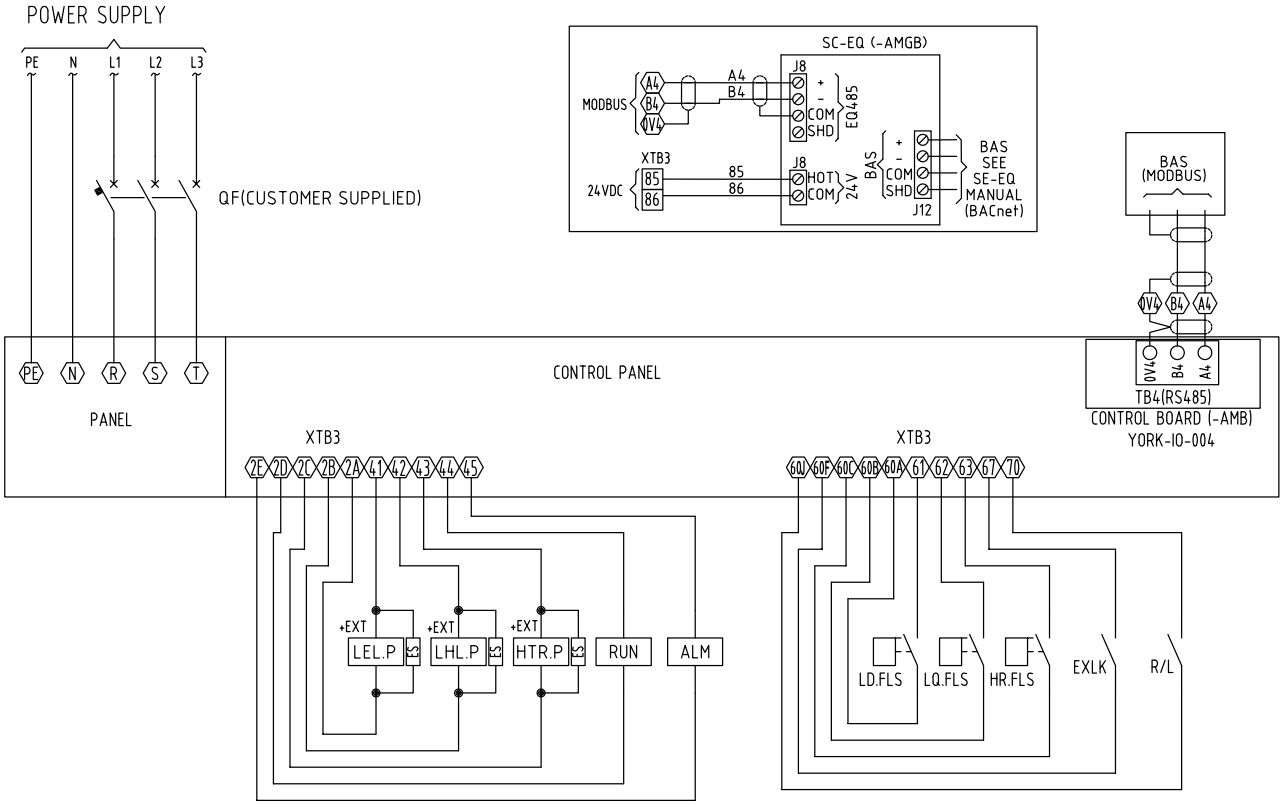
Note: Contact resistance should be less than 0.5Ω.

Remote Interlock

Connect a remote switch between 67 and 60F to provide remote interlock with other equipment if required. If not required, please connect a link between 67 and 60E.

Note: Contact resistance should be less than 0.5Ω.

Customer Connections



LEGENDS

DESIGNATION	DESCRIPTION
QF	MAIN CIRCUIT BREAKER
XTB3	TERMINAL BLOCK
R/L(DI10)	REMOTE START SWITCH
EXLK(DI7)	EXTERNAL INTERLOCK SWITCH
HR.FLS(DI3)	HOT RECOVERY WATER FLOW SWITCH
LQ.FLS(DI2)	LEAVING CHILLED WATER FLOW SWITCH
LD.FLS(DI1)	LEAVING COND WATER FLOW SWITCH
AMGB(A4/B4)	SC-EQUIPMENT GATEWAY OPTION
LEL.P(DO1)	CHILLED LIQUID PUMP CONTACTOR
LHL.P(DO2)	LEAVING CONDENSER PUMP CONTROL
HTR.P(DO3)	HOT WATER PUMP CONTROL
RUN(DO4)	RUNING STATUS RELAY
ALM(DO5)	ALARM RELAY

Electrical requirements:
1. If there is no "external interlock", please short circuit terminals 60J and 67
2. Water flow switches, external interlock and remote start/stop contact resistance of remote start/stop switch is less than 0.5 ohm
3. Water pumps, alarm and operation (AC220V active output, output load power <5W)
4. Wire selection should follow the specifications of the user's location.
5. If the user's power supply is 3-phase and 4-wire, please short the terminals N and PE in the cabinet.
6. The length of the communication line should be less than 1000 meters.

5. Commissioning

Preparation

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

This section must be read in conjunction with the control system operation, in section 6.

Power Off

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

Ensure all sources of supply to the unit are locked off, in the OFF position.

Inspection

Inspect unit for installation damage. If found, take action 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 the system and that no leaks are apparent. If no pressure is present, a leak test must be undertaken, located and repaired the leak(s). These systems must be evacuated with a suitable vacuum pump/recovery unit as appropriate to below 500 mHg.

Valves

Open discharge valve on compressor and liquid line angle valve under condenser fully (counter-clockwise) then close one turn of the stem to ensure operating pressure is fed to pressure transducers. Open all angle valves on the oil return line and eductor line.

Isolation / Protection

Verify all sources of electrical supply to the unit are taken from a single point of isolation.

Control Panel

Make sure the control panel is free of foreign materials (wire, metal chips, etc.) and clean out foreign materials if found.

Power Connections

Check that the customer power cables are connected correctly to the circuit breaker. Ensure that connections of power cables within the panels to the circuit breaker are tight.

Earthing

Make sure all the protective conductor is properly and tightly connected to the ground.

Oil heater

Verify that the oil heater is powered on. If the chiller has not had power applied for more than 15 days, the compressor are not allowed to run unless the oil heater has been on for more than 5 hours.

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 connected to the bottom nozzle of water box of the cooler and the outlet to the top one. Purge air using the plugged air vent mounted on the top of water box.

Flow rates and pressure drops must be within the limits given in the Section 9. Out of these limits is undesirable and could cause damage.

Low Temperature Brine Chiller

Confirm the freezing point of the evaporator brine fluid, using a hydrometer or an optical refractometer to test the concentration of the birne and calculate the freezing point. Concentrations and freezing points of glycol solution:

E.G wt%	Freezing point °C	E.G wt%	Freezing point °C
5	-1.4	20	-7.8
10	-3.28	26	-11.38
15	-5.31	30	-14.04

When working on the ITS mode, the LOW LELT / LEP UNLOAD / LEP SHUT DOWN should be reset. Confirm that the temperature corresponding to the LOW LELT / LEP UNLOAD / LEP SHUT DOWN are higher than the freezing point of brine, and that any of these two values should be at least 3°C higher than the brine freezing point.

Saturated temperature of R134a in difference pressure:

Sat. Temp.°C	Press. kPa	Sat. Temp.°C	Press. kPa	Sat. Temp.°C	Press. kPa
-15	16 4	-8	21 7	-1	282
-14	17 1	-7	22 5	0	293
-13	17 8	-6	23 4	1	304
-12	18 5	-5	24 3	2	315
-11	19 3	-4	25 3	3	326
-10	20 1	-3	26 2	4	338
-9	20 9	-2	27 2	5	350

Flow Switch

Verify a chilled water flow switch is correctly fitted in the customer's piping on the cooler outlet, and wired into the control panel correctly using shielded cable.

Control Panel Power Supply

Confirm the control panel is powered on and the LCD screen can display normally.

Programmed Options

Make sure all the options programmed into the panel are in accordance with the customers order requirements.

Programmed Settings

Make sure all the setpoints are in accordance with the operating requirements. Water temperature should be set according to the unit type and operating conditions.

Time and Date

Set the time/date using the Setting page.

Start-up/Stop Programming

Set the Start/Stop timers, schedule days, special days, alternate day and holidays via the Schedule page.

Setpoints

Set the setpoints and control range of the chilled/hot liquid.

The chiller is now ready to work.

First Time Start-Up

During the commissioning period there should be sufficient heat load to run the unit under stable full load operation to enable the unit controls, and system operation to be set up correctly, and a commissioning log taken. Be sure that the operating instructions in section 6 have been fully understood and the System Start-up Checklist is completed.

Start-up

Press the start key on the control panel keypad, and there may be a few seconds delay before the compressor starts because of the anti-recycle timer. Be ready to push the Emergency Switch immediately if any unusual noises or other adverse conditions appear during the compressor starting.

Oil Pressure

When a compressor starts, inspect the running information on the control panel display, and verify that oil pressure develops immediately. If oil pressure does not develop, the automatic controls will shut down the compressor. Under no circumstances should a restart attempt be made on a compressor, which can not develop oil pressure immediately.

6. Unit Operation

General

Units are designed to work independently, or in conjunction with other equipment via Modbus building management systems or other automated control systems.

Control System

The microprocessor control system is capable refrigerant circuit control to maintain liquid temperature within programmed limits, as well as system safeties, displaying status, and daily schedules.

Remote starting and flow and equipment interlock can be accomplished by field supplied contacts.

Remote indications of alarms, run status and pump control are available as outputs.

Compressor starting/stopping and loading/unloading decisions are performed by the microprocessor to maintain leaving liquid temperature.

Start-up

Check the main power supplies to the unit are 'ON', all refrigerant service valves are open (anti-clockwise one turn short of fully open) and both chilled and cooling liquid have a regular flow rate, then press the start key on the control panel keypad.

The controller will perform a pre-check to ensure that if there is any the daily/holiday schedule or remote interlocks to prohibit the unit to run, and all safety cut-outs are satisfied and the cooling or heating load is required (i.e. that the chilled liquid temperature is outside the set limits). Any problems found by the pre-check will be displayed. If no problems are found and cooling/heating load is required, the compressor will start.

Normal Running and Cycling

Once the unit has been started, all operations are fully automatic. After an initial period at minimum capacity on the compressor, the control system will adjust the unit load depending on the chilled liquid temperature and rate of temperature change. If very little heat load is present, the compressor will continue at minimum capacity or perform a cycling shutdown to avoid overcooling the liquid. In that case, the compressor will restart automatically when the liquid temperature rise again.

Once the compressor is running, the evaporated refrigerant vapour is pumped into the water cooled condenser, which results in the rise of discharge pressure.

Once the compressor is running the controller monitors oil pressure, motor current, and various other system parameters such as discharge pressure, chilled liquid temperature, etc. Should any problems occurs, the control system will immediately take appropriate action and display the nature of the fault.

After the unit stops, the check valve of compressor may send out some noises, which is caused by the internal refrigerant equalizing due to the pressure differential. It is a normal phenomenon and has no influence on the performance and reliability of unit.

Running log

The running situation should be permanently recorded according to the regulated time interval in each 24 hour running cycle.

The following table is the duty record table of WORK for unit examination.

Please record all data correctly, because it is reference for engineer to judge the running conditions. The record values by testing a new unit can be set as the normal situation, which can be compared with the later record value.

For example, if the difference between the leaving cooling water temperature and condensing temperature is higher than the normal value, it shows that the water side of condenser may be too dirty.

Other notes

At any times, the unit will stop once the OFF key in the keyboard is pressed, then the oil heater will be powered on and keep a high oil temperature to prevent refrigerant dissolving into the oil.

In order to prevent the damage to chiller, the chiller should be power on when it is not running for a long period of time (The compressor oil heater is also powered on).

If the main power has to be cut-out in a long period of service, the discharge service valve must be turned off, and the oil heater has to run for more than 5 hours (24 hours suggested) before the chiller starting.

Control System Architecture

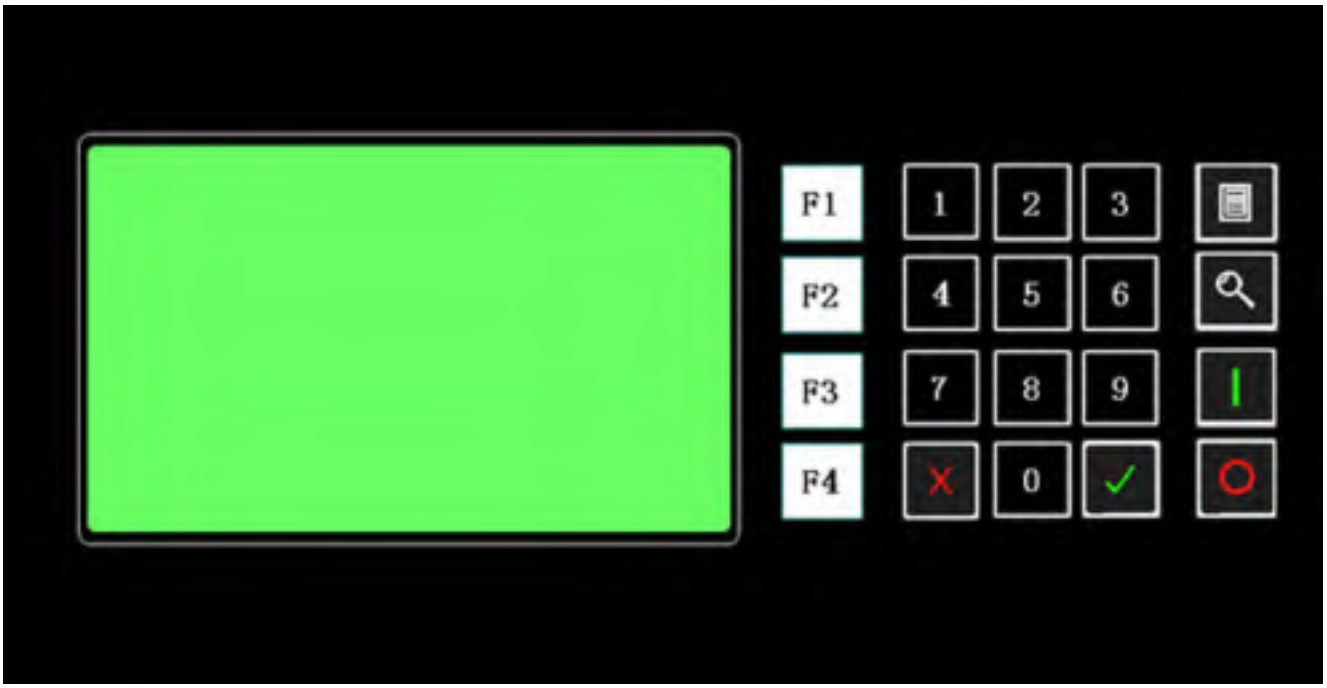
PCB's IPU3 and XS09 function as a single microprocessor.

PCB IPU3 processes the circuit input and output data.

PCB XS09 handles keyboard inputs and display data for the system, using a 240 * 128 dot-matrix liquid crystal display panel, and a 5 * 4 keyboard matrix. The board includes data memory for parameter storage at power down and a real-time clock (with a replaceable battery) for scheduling etc.

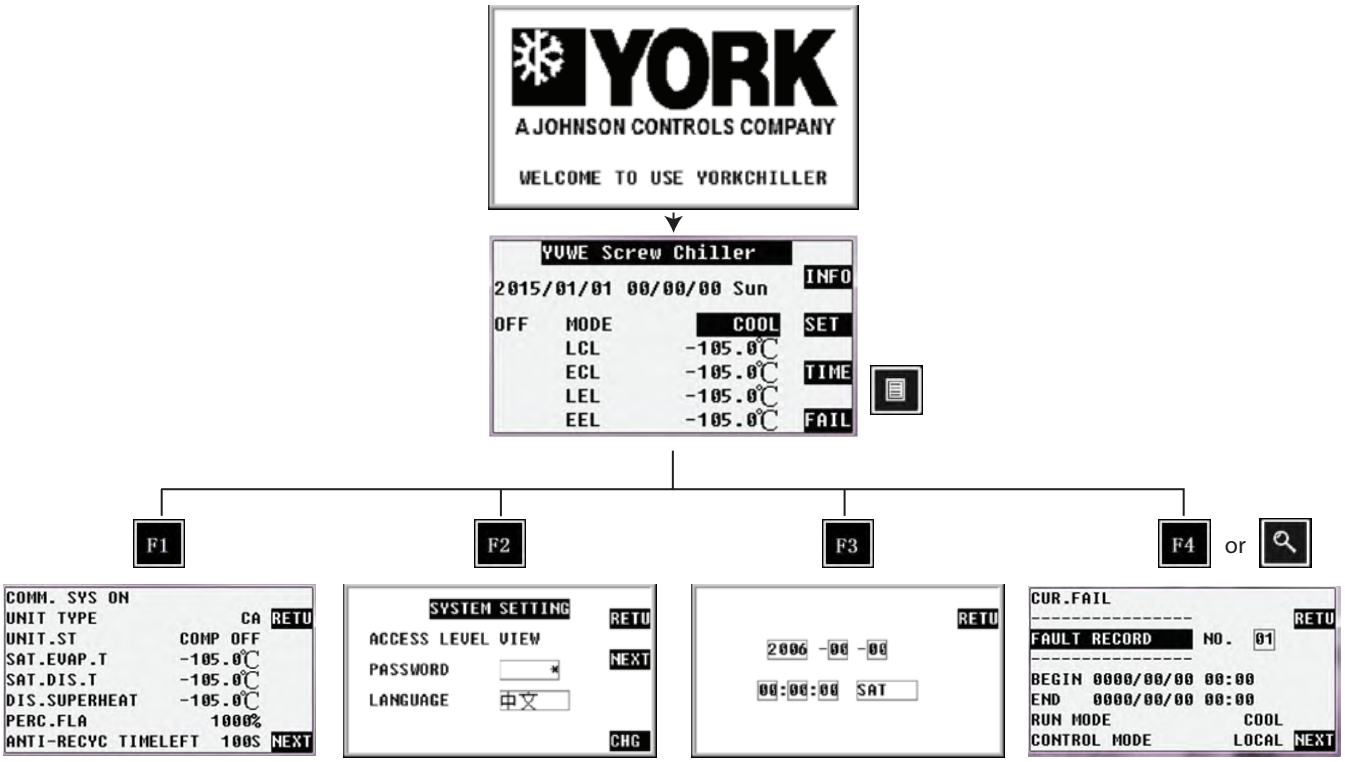
Data exchange between the boards is via a RS485 communication bus.

Control Panel Keys



I + O	Unit start and stop keys.
	Return to the main interface screen ‘Home’ (see screen above).
	View detailed fault information.
F1	View detailed unit status (information), inputs, outputs etc. Key is also used return to the home screen from sub screens.
F2	View and modify system settings (parameters). Key is also used return to first status screen from sub screens.
F3	Setup the system date and time. Key is also used to return to previous screen when navigating sub screens.
F4	View detailed unit fault history (status information at time of fault), inputs, outputs etc. Key is also used to move to next screen when navigating sub screens.
1 2 3 4 5 6 7 8 9 X 0 ✓	Numeric keys for modifying settings, time date etc. ✓ Confirm changes and move to next parameter. X Cancel changes and move to previous parameter. 8 0 Keys are also used for stepping ↑ and ↓ through parameters.

Control Panel Screen - Main Interface / Navigation



This figure above summarises the navigation of the main screens of the control panel.
At power up the first screen will show during initialization until the main interface (home) screen is shown.

Main Interface (Home) Screen

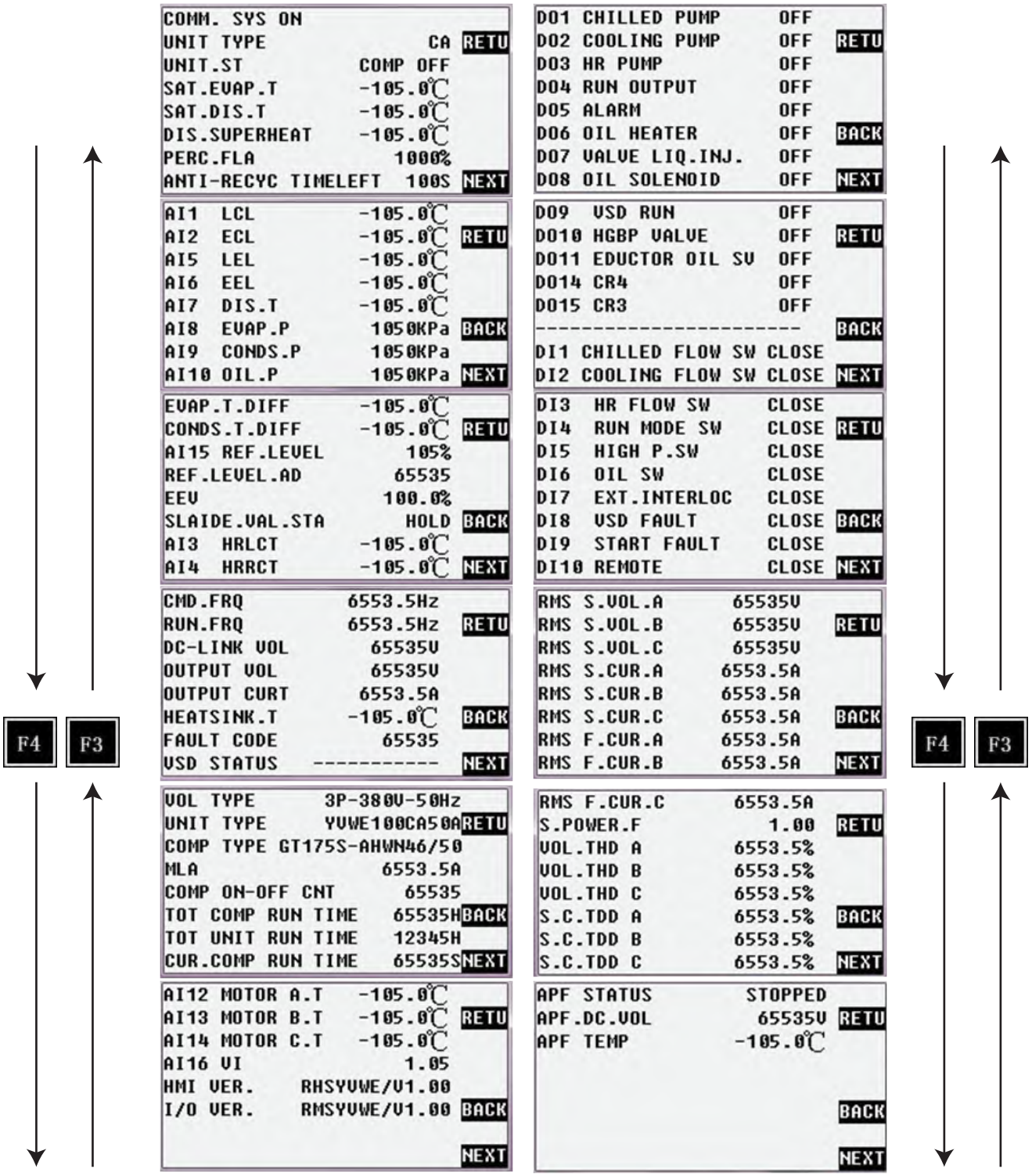
This screen displays the current date and time and the following operating parameters:
ON/OFF: Displays the current operating status of the unit.
MODE: Current running mode of the unit (AC or HEAT).
LCL/LHL: Current leaving condenser liquid temperature.
EHL/ECL: Current entering condenser liquid temperature.
LEL: Current leaving evaporator liquid temperature.
EEL: Current entering evaporator liquid temperature.

OPH, and **LIMT**: indicate that the unit oil preheat and limit are in operation. The legends will not be visible when the systems are off.

FAIL: will flash when a fault exists.

Function keys F1 to F4 are used to navigate to the sub-screens.

Unit Status (information) Screens



These screens display the current status of the unit and it's operating parameters:
Function key F1 is used to enter and exit the status (information) screens, keys F3 and F4 enable navigation forwards and backwards in the sub-screens.

The text below provides an overview of the parameters displayed:
Screen 1:

COMM - communication status.
UNIT TYPE - AC / HR Unit.
COMP STA: Current compressor status: **COMP OFF, STOPPING, STARTING, HIGH DIST UNLOAD** (Discharge temperature is too high), **LOW EVAP UNLOAD** (Evaporating pressure is too low), **HIGH CUR UNLOAD** (Compressor motor current is too high), **HIGH DP UNLOAD** (Discharge pressure is too high), **LOW DISH UNLOAD** (Discharge Superheat is too low), **HIGH DIST HOLD** (Discharge temperature is too high), **LOW DISH HOLD** (Discharge Superheat is too low), **HIGH CUR HOLD** (Compressor motor current is too high), **HIGH DP HOLD** (Discharge pressure is too high), **MANUAL LOAD / UNLOAD** (The compressor executes to load / unload by manual control), **CAP HOLD / CAP LOAD / CAP UNLOAD** (The compressor is holding, loading and unloading), **DIST LOAD** (Compressor protection logic, load), **MINIMUM LOAD** (Compressor motor current is below minimum load setting, load).
SAT.EVAP.T: Saturation temperature of the refrigerant in Evaporator.
SAT.DIS.T: Saturation temperature of the discharge refrigerant.
DIS.SUPERHEAT: Discharge superheat (discharge temperature - saturation temperature of the discharge refrigerant).
PERC.FLA: The value of compressor running current to the unit FLA.
ANTI-RECYC TIMELEFT: time remaining on anti-recyle timer, when applicable.

Screen 2, 3 and 6 displays information on the analogue inputs (refer to Analogue Input definitions).

Screen 4 displays VSD information.

Screen 5: displays information on:

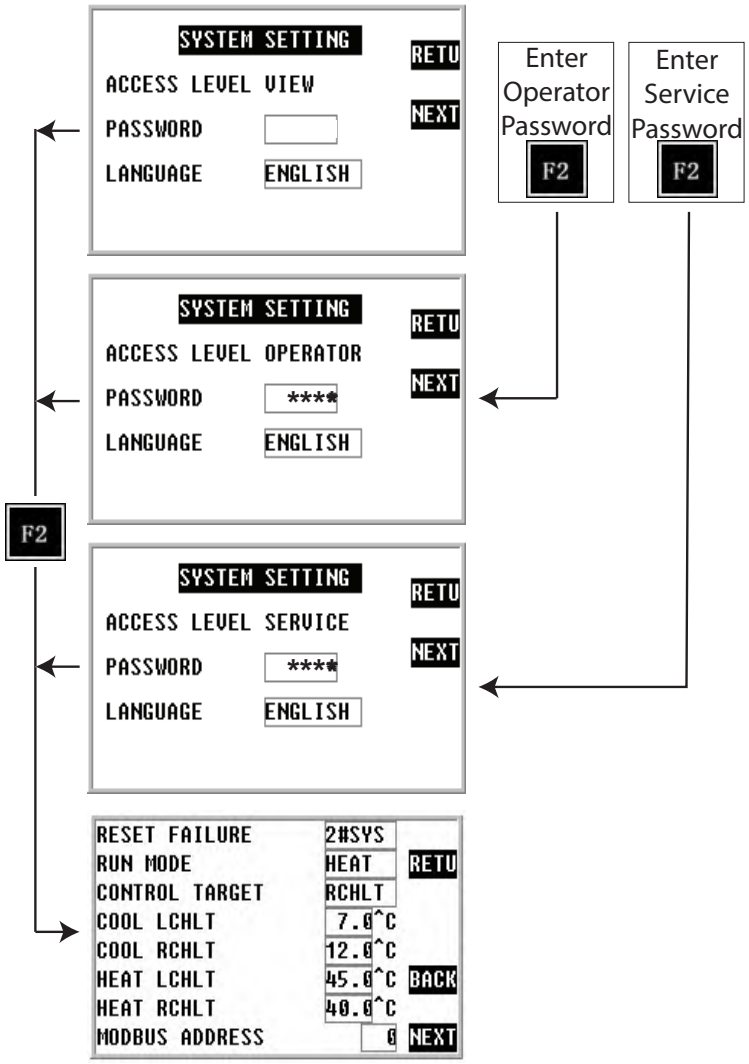
POWER SUPPLY: Power supply of unit.
UNIT TYPE: Unit Model.
COMP MODEL: Model of compressor in this unit.
MAX.LOAD AMP: Maximum load amp of motor.
COMP ON-OFF CNT: Number of compressor start/stops.
TOT COMP RUN TIME: Compressor accumulated running time.
TOT UNIT RUN TIME: Unit accumulated running time.
CURR COMP RUN TIME: Current compressor accumulated running time.

Screen6: displays motor temperture.
HMI VER.: Firmware version of XS09.
I/O VER.: Firmware version of YORK003.

Screen 7 and 8 display information on the digital outputs (refer to Digital Output definitions).

Screen 8 and 9, displays information on the digital inputs (refer to Digital Input definitions).
Screen 10, 11 and 13, displays information on the displays active filter parameters, APF parameters.

System Settings (parameters) Screens



These screens allow the unit control parameters to be programmed.
Function key F2 is used to enter the ACCESS LEVEL VIEW screens.
Three levels of access are avail a be:

- VIEW - to review current parameter settings.
- OPERATOR - to review current parameter settings, and program day to day operating settings.
- SERVICE - to review current parameter settings, and program unit operating settings (commissioning and maintenance).

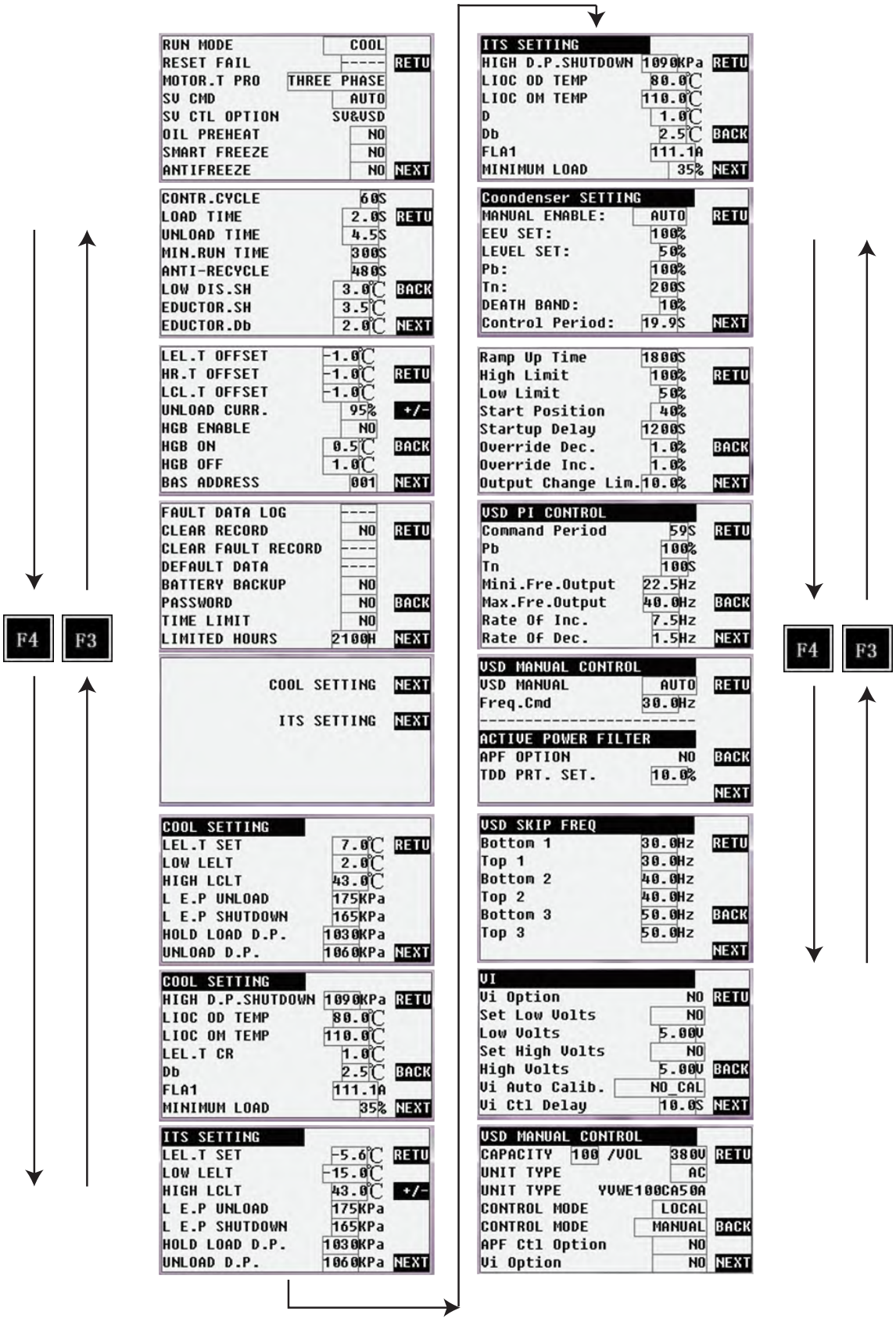
Both the OPERATOR and SERVICE levels require a password for access.

Function key F2 is then used to move to the first settings (parameters) screen

Programming

For numeric programmable items, the data is entered by pressing the number keys 0 to 9.
For non-numeric programmable items, data is selected by pressing the 8 ▲ or 0 ▼ (ARROW) keys.
To store the programmed value and move to the next value, the ✓ (ENTER) key must be pressed.
To cancel the programmed value and move to the previous value, the ✗ (CANCEL) key must be pressed.

Function keys F3 and F4 enable navigation forwards and backwards through the different settings (parameters) screens.



The programmable settings tables below describe the parameter and define the minimum access level.

Operator Programmable Settings

Parameter	Default Value	Lower Limit	Upper Limit	Unit	Remarks
HMI start/stop	0	0	1	/	0：stop，1：start. 1 automatically cleared on reset.
Operating condition selection	0	0	5	/	0:AC, 1:ITS, 2:HP, 3:HR1, 4:HR2, 5:REMOTE
Clear fault/fault reset	0	0	1	/	1：FAULT RESET. 1 automatically cleared on reset.
Standby antifreeze	1	0	1	/	1: VALID
Control source/control channel	0	0	2	/	0：LOCAL，1：REMOTE，2：COMMUNICATION
Message address	1	1	255	/	

Service Programmable Settings

Parameter	Default Value	Lower Limit	Upper Limit	Unit	Remarks
Hot gas bypass	0	0	1	/	1:ON
Oil heating is effective	1	0	1	/	1:ON
Clear all variables	0	0	1	/	1:ON. 1 automatically cleared on reset.
Clear historical faults	0	0	1	/	1:ON. 1 automatically cleared on reset.
Restore system defaults	0	0	1	/	1:ON. 1 automatically cleared on reset.
Power-off automatic restart / power-	1	0	1	/	1:ON
Is the runtime limit valid?	0	0	1	/	1:ON
Intelligent frost protection	0	0	1	/	1:ON
Export historical fault data	0	0	1	/	1:EXPORT. 1 automatically cleared on reset.
Spool valve command 1	0	0	3	/	0:AUTO，1:UNLOAD，2:HOLD，3:LOAD
Spool valve can adjust option 1	0	0	2	/	0:SV & VSD, 1: SV not controlled, 2:SV self (Read Only)
Motor temperature sensor protectio	0	0	3	/	0:Three phase, 1: Disable A, 2: Disable B, 3: Disable C
Adjustable adjustment cycle	10	5	60	S	
Load action time	2	0.5	20	S	
Load shedding time	4.5	0.5	20	S	
Compressor minimum running time	300	120	600	S	
Compressor restart interval	120	120	600	S	
Hot gas bypass opens the set value	0.5	0.5	5.6	℃	
Hot gas bypass close setting	1	1	8	℃	
Low exhaust superheat setting	3	2.5	6	℃	
Return oil exhaust superheat setting	3.5	3	6	℃	
Return oil set value	2	1	6	℃	
Cooling water temperature compen	0	-2	2	℃	
Frozen effluent temperature compe	0	-2	2	℃	
Hot water effluent temperature com	0	-2	2	℃	
Nominal cooling capacity	0	0	9	/	
Unit type setting	0	0	1	/	0：AC 1：ITS
Voltage	0	0	2	/	0：50A; 1：53A; 2：55A
Limit running time	200	0	3000	Hour	

Parameter	Default Value	Lower Limit	Upper Limit	Unit	Remarks
Condenser level control valid	0	0	1	/	0 : AUT0,1: MANUAL
VSD manual control is valid 1	0	0	1	/	0 : AUT0,1: MANUAL
VSD manual control is valid 2	0	0	1	/	0 : AUT0,1: MANUAL
APF control options	0	0	1	/	1 : ON
Vi option	0	0	1	/	0 : No Vi, 1:Variable Vi
Set low voltage	0	0	1	/	1 : ON, 1 automatically cleared on reset.
Set high voltage	0	0	1	/	1 : ON, 1 automatically cleared on reset.
Vi automatic calibration	0	0	2	/	0: Not calibrated 1: Auto calibration 2: Calibrated
Level set point	50	20	80	%	
Proportional band	80	0	999	%	
Integration time	200	0	999	S	
dead zone	0	0	10	%	
Maximum opening	100	40	100	%	
Minimum opening	10	0	50	%	
Control cycle	1	0	20	S	
Start preset opening	40	20	100	%	
Start preset time	360	180	1800	S	
Hill climbing time	300	0	1800	S	
Climbing ratio belt	80	1	100	%	
Climbing integration time	200	0	3000	S	
Forced valve step	0.5	0	5	%	
Forced valve opening step	2	1	5	%	
Opening change limit	3	0.1	10	%	
Proportional band	15	0	300	%	
Integration time	30	1	999	S	
Minimum frequency output	22.5	10	30	Hz	
Maximum frequency output	50	30	60	Hz	
Rate increase limit	0.5	0.5	7.5	HZ	
Forced deceleration limit	1.5	0.5	7.5	HZ	
Lower limit 1	30	22.5	60	Hz	
Upper limit 1	30	22.5	60	Hz	
Lower limit 2	40	22.5	60	Hz	
Upper limit 2	40	22.5	60	Hz	
Lower limit 3	50	22.5	60	Hz	
Upper limit 3	50	22.5	60	Hz	
Frequency command 1	0	0	60	Hz	
TDD protection set point	25	5	35	%	
Low voltage value	1	0	5	V	
High voltage value	5	0	5	V	
Vi control delay	5	0.1	10	M	
EEV valve opening	40	0	100	%	
Percentage of overcurrent	95	10	98	%	

Programmable Settings - Air Conditioning

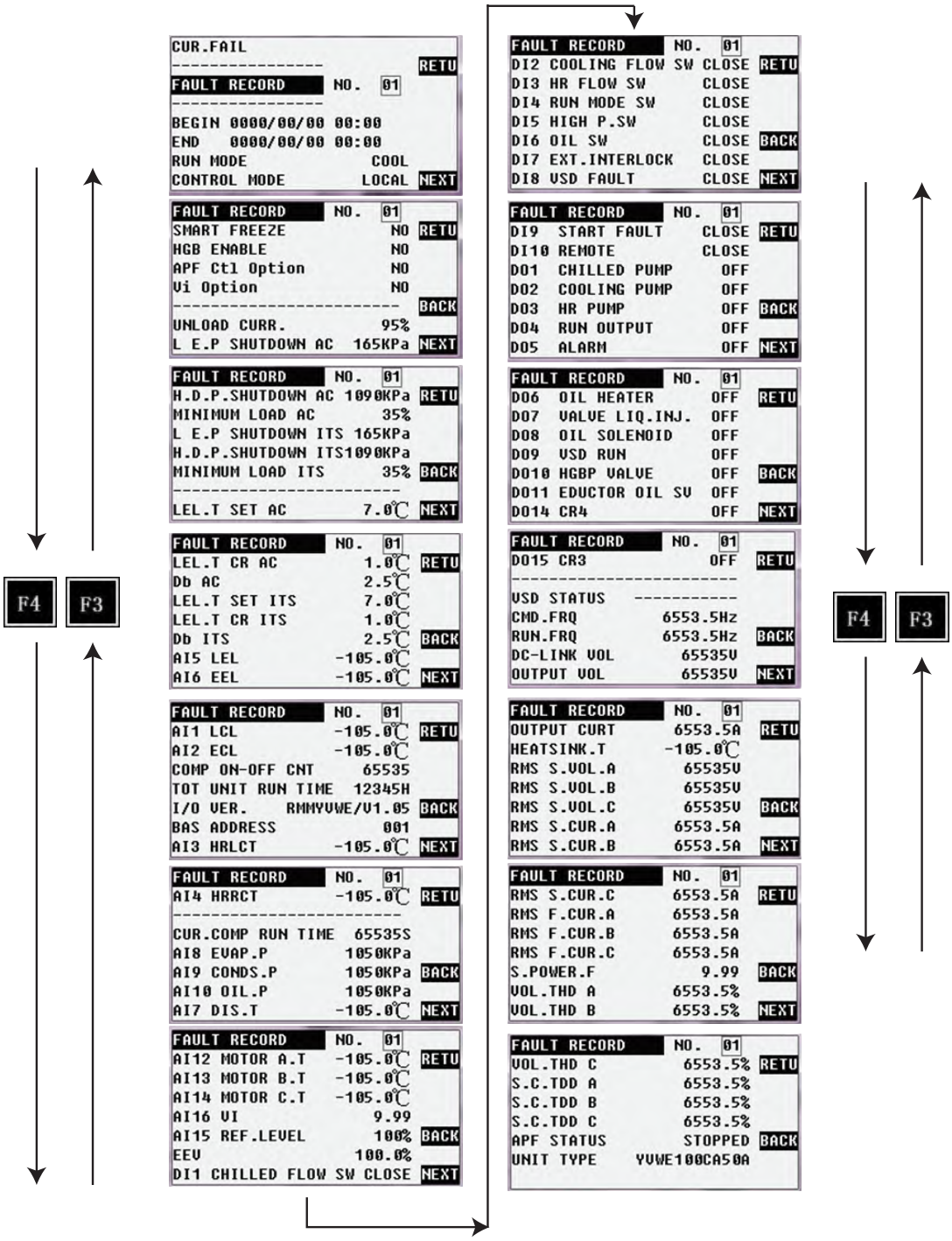
Parameter	Default Value	Lower Limit	Upper Limit	Unit	Access Level
LEL TEMP SET	7	2.2	21	℃	Operator
LOW LELT	2	1	7	℃	Service
HIGH LCLT	43	30	60	℃	Service
LEP UNLOAD	175	150	300	KPA	Service
LEP SHUT DOWN	165	150	300	KPA	Service
HOLD LOAD D.P	1030	100	1300	KPA	Service
UNLOAD D.P	1060	100	1300	KPA	Service
HIGH D.P.SHUTDOWN	1090	100	1350	KPA	Service
LISV TEMP	80	50	80	℃	Service
MOTOR TEMP	95	50	110	℃	Service
LEL TEMP CR	1	0.5	2	℃	Service
CR BUFFER	2.5	0	2.5	℃	Service
MINIMUM LOAD	35	15	75	%	Service
FLA1	111	60	800	A	Service

Programmable Settings - Ice Storage

Parameter	Default Value	Lower Limit	Upper Limit	Unit	Access Level
LEL TEMP SET	-5.6	-7	5	℃	Operator
LOW LELT	2	-15	5	℃	Service
HIGH LCLT	43	30	60	℃	Service
LEP UNLOAD	175	80	300	KPA	Service
LEP SHUT DOWN	165	80	300	KPA	Service
HOLD LOAD D.P	1030	100	1300	KPA	Service
UNLOAD D.P	1060	100	1300	KPA	Service
HIGH D.P.SHUTDOWN	1090	100	1350	KPA	Service
LISV TEMP	80	50	80	℃	Service
MOTOR TEMP	95	50	110	℃	Service
LEL TEMP CR	1	0.5	2	℃	Service
CR BUFFER	2.5	1	2.5	℃	Service
MINIMUM LOAD	35	15	75	%	Service
FLA1	111	60	800	A	Service

Fault Record Screens

The fault record screens display the unit operating parameters at the time of a fault on the unit. 50 Fault records can be stored, fault record [01] is most recent and fault record [50] is the oldest fault. Individual fault records (01 to 50 if available) are selected by entering the fault record number using the keypad and pressing ✓ (ENTER).



The first screen displays the reason for the fault, and the start and end times of fault, and the run and control modes at the time of the fault.

The remainig record screens display other operating parameters, the analogue inputs (**AI)**, the status of the digital inputs **(DI)** and the digital outputs **(DO)** at the time of the fault.

Analogue Input definition

No.	Analog input	Measuring range and status description
AI1	Cooling water outlet temperature	-29°C to 99°C, outside of this range is fault
AI2	Cooling water return temperature	-29°C to 99°C, outside of this range is fault
AI3	Hot water outlet temperature	-29°C to 99°C, outside of this range is fault
AI4	Hot water return temperature	-29°C to 99°C, outside of this range is fault
AI5	Chilled water outlet temperature	-29°C to 99°C, outside of this range is fault
AI6	Chilled water return temperature	-29°C to 99°C, outside of this range is fault
AI7	Discharge temperature	-29°C to 99°C, outside of this range is fault
AI8	Evaporation pressure	0.41 to 5.1 kg /cm² outside of this range is fault
AI9	Condensing pressure	0.41 to 5.1 kg /cm² outside of this range is fault
AI10	Oil pressure	0 to 28 kg /cm², outside of this range is fault
AI12	Motor A temperature	
AI13	Motor B temperature	
AI14	Motor C temperature	
AI15	Refrigerant Level	
AI16	VI	Rated current, open or short circuit is fault

Digital Input definition

DI	Function	Status	Description
DI1	Flow switch - Chilled Liquid	Closed normal / disconnect fault	Startup, shutdown logic, liquid circuit protection
DI2	Flow switch - Cooling Liquid	Closed normal / disconnect fault	Startup, shutdown logic, liquid circuit protection
DI3	Flow switch - Heat Recovery	Closed normal / disconnect fault	Startup, shutdown logic, liquid circuit protection
DI4	Air conditioning switch	Disconnect - AC, closed - ITS	Heat recovery unit
DI5	High Pressure Switch	Closed normal, disconnect fault	Discharge pressure protection
DI6	Oil level switch	Closed normal, disconnect fault	Low oil level protection
DI8	External linkage	Closed normal, disconnect fault	External chain protection
DI7	Motor protection	Closed normal, disconnect fault	Compressor motor protection
DI9	Failed to start	Closed normal, disconnect fault	Boot failure protection
DI10	Remote Switch	Disconnect - power off, power on - closed	

Digital Output definition

DO	Function	Status	Description
DO1	Pump - Chilled Liquid	Normally open, the output is closed	Switch logic
DO2	Pump - Cooling Liquid	Normally open, the output is closed	Switch logic
DO3	Pump - Heat Recovery	Normally open, the output is closed	Switch logic
DO4	Run Output	Normally open, the output is closed	Switch logic
DO5	Alarm output	Normally open, the output is closed	There is no alarm, the output is closed
DO6	Oil heater	Normally open, the output is closed	Oil heater logic
DO7	Valve liquid injection	Normally closed output opens	Switch logic, liquid supply shortage
D08	Oil solenoid valve	Normally closed output opens	Switch logic, liquid supply shortage
DO9	VSD Run	Normally open, the output is closed	Switch logic
DO10	Hot gas bypass valve	Normally closed output opens	Indicates the status of the HGB valve
D011	Eductor oil solenoid valve	Normally closed output opens	Switch logic, liquid supply shortage
DO14	CR4 load solenoid valve	Normally closed output opens	Switch logic, the logic load, unload logic
DO15	CR3 unload solenoid valve	Normally open, the output is open	Switch logic, the logic load, unload logic

7. Maintenance

General Requirements

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

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

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

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

Daily Maintenance

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

Operating conditions: Read the operating pressures and temperatures at the control panel check that these are within the operating limitations given in the Operating Instructions Manual.

Unit Status

Using the keypad check the fault screens to ensure no fault are displayed.

Refrigerant charging and leak checking

Refrigerant leaks checking

Periodic refrigerant leak checking must be part of a comprehensive maintenance program. Leak check the entire chiller using a calibrated electronic leak detector. Confirm leaks with soap bubbles that are found using the electronic leak detector. Check refrigerant relief valve piping and tube rolled joints as part of the comprehensive refrigerant leak checking program.

Repair leaks before adding refrigerant. Visually check the heat exchangers, compressors and pipework for damage and gas leaks.

Determining correct refrigerant charge level

The refrigerant charge level is correct when the measured evaporator approach and discharge superheat are within the values listed in the table below.

Liquid refrigerant will be visible in the evaporator sight glass. The refrigerant level cannot be properly determined by viewing the liquid refrigerant level in the evaporator sight glass.

All YVWE units Form 1 shipped are charged with the correct amount of refrigerant. Under some operating conditions the chiller may appear to be overcharged or undercharged with refrigerant. Consult with YORK Factory prior to removing or adding refrigerant.

Definitions
Evaporator approach= (L.E.L.T) - (S.E.T)
Discharge superheat= (C.D.G.T)-(S.C.T)

When:
S.E.T = Saturated Evaporator Temperature
L.E.L.T =Leaving Evaporator Liquid Temperature
C.D.G.T =Compressor Discharge Gas Temperature
S.C.T = Saturated Condensing Temperature

Refrigerant Charge

Should it become necessary to add refrigerant charge to a YORK YVWE Chiller; add charge until the evaporator approach and refrigerant gas discharge superheat are within the values listed in the following table:

Condition	R134a
Evaporator Approach	1.5°C ~ 2.0°C
Discharge Superheat	7.0°C ~ 10.0°C

A charging valve is located in the liquid line below the evaporator. The size of the charging connection is 1/4 inch male flare. Purge air and non-condensables from the charging hose. Only add new refrigerant, or refrigerant that has been tested and certified to meet American Refrigeration Institute Standard (ARI-700).

Compressor Oil

Yearly oil analysis is recommended to verify the continued use of the compressor oil.

It is very important to take the oil sample after the oil filter. The oil sample should not be left open to the atmosphere for more than 15 minutes since it will absorb moisture from the atmosphere and may yield erroneous results.

Compressor oil should be changed when the oil analysis indicates the oil has moisture and acid numbers are in excess of the limits set in the following table:

YORK OIL TYPE	MOISTURE CONTENT ppm	Total Acid NO.# mgKOH/ml
L(W)	< 300ppm	< 0.5

The YVWE compressors use rolling element bearings (ball and roller bearings); no sleeve bearings are used. Oil analysis that includes metals may cause confusion when the results are compared to other equipment that utilize different bearing types. Iron and copper are examples of metals, which will appear in oil analysis that include metals. Other metals that may appear are Titanium, Zinc, Lead, Tin and Silicon. These metals should be ignored and are acceptable in quantities of less than 100 ppm. If an oil analysis should indicate high levels of Iron (more than 300 ppm) combined with Chromium and Nickel (more than 50 ppm), consult your local YORK Service Office this could indicate bearing damage and wear.

Changing Compressor Oil

Compressor oil is changed by draining oil from the oil sump into a refrigerant recovery container. The oil sump is under positive pressure at ambient temperatures. Connect one end of a refrigeration charging hose to the service valve located at the bottom of the oil sump; connect the other end to an approved refrigerant recovery cylinder. Open the valve and drain the oil from the oil sump.

Charging units with Oil

Oil Charge

YORK 'L' oil is approved for YVWE Units, and the quality of oil required is listed in the Physical Data tables.

Oil Charging Procedure

The oil should be charged into the oil separator using the YORK Oil Charging Pump. To charge oil, proceed as follows:

1. The unit should be shut down.

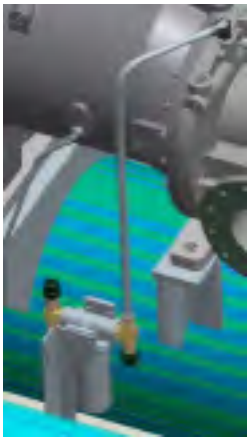
2. Immerse the suction connection of the oil charging pump in a clean container of new oil and connect the discharge connection to the compressor oil charging valve. Do not tighten the connection at the charging valve unless the air is forced out by pumping a few strokes of the oil pump. Filling the lines with oil to prevent air from being pumped into the system.

3. Open the oil charging valve and pump appropriate oil (according the data in oil charge table) into the system. Then close the charging valve and disconnect the hand oil pump.

4. As soon as oil charging is completed, closed the power supply to the starter to energize the oil heater. This will keep the concentration of refrigerant in the oil to a minimum.

Oil filter

A replaceable oil filter is equipped in the external oil supply line(as below picture) . Please make sure all the valves are in open status after the replacement of oil filter.



Condenser and Evaporator

General

Maintenance of condenser and evaporator shells is important to provide trouble free operation of the unit. The water side of the tubes in the shell must be kept clean and free from scale. Proper maintenance such as tube cleaning, and testing for leaks, is covered on the following pages.

Chemical water treatment

Since the mineral content of the water circulated through evaporators and condensers varies with almost every source of supply, it is possible that the water being used may corrode the tubes or deposit heat resistant scale in them.

Reliable water treatment companies are available in most large cities to supply a water treating process which will greatly reduce the corrosive and scale forming properties of almost any type of water. As a preventive measure against scale and corrosion and prolong the life of evaporator and condenser tubes, a chemical analysis of water should be made, preferably before the system is installed. A reliable water treatment company can be consulted to determine whether water treatment is necessary, and if so, to finish the proper treatment for particular water condition.

Condenser and evaporator water side tube cleaning procedure

The standard condenser tubes used in YORK YVWE Chiller are internally enhanced copper tubes.

If the equipment is located in an unheated area that is susceptible to freezing, the water must be drained from the condenser to prevent tube failure from freezing.

Proper condenser water treatment can eliminate or significantly reduce the formation of scale on the waterside of the condenser tubes.

Maintain a minimum condenser water flow rate through the tubes of at least 3.33 ft/sec. (1 meter/sec.). Through tube water velocity should not exceed 12 ft/sec. (3.6 meter/sec.).

Condenser tubes must be maintained to provide proper chiller operation. Condenser Approach Temperature is a useful tool to monitor the performance of the condenser. By recording and logging the Condenser Approach Temperature as part of the chiller maintenance program, this will provide a warning that the waterside condenser tubes are fouled and require cleaning. Condenser Approach Temperature is the difference between the Condenser Leaving Water Temperature and the Saturated Condensing Temperature.

If the approach increases above 5.0°C, or during the annual condenser inspection and the tubes are observed to be fouled, the tubes will require cleaning. For condenser fluids other than water consult with the local YORK Field Service Office for the correct condenser approach temperature.

Condenser water side tube cleaning procedure

Two methods are used for waterside tube cleaning to remove the scale; chemical and mechanical cleaning procedures. The composition of the scale will determine which method will be most effective to remove the scale and dirt.

Consult with the local YORK Field Service Office for a recommendation of the method(s) used in the local area.

Chemical Cleaning Procedure

Chemical cleaning is an effective method to remove scale from internally enhanced copper tubes. However, a company knowledgeable with the chemical cleaning procedure should be contracted or consulted. Follow the chemical cleaning company recommendations concerning solution cleaning strength and time duration of the cleaning process.

Serious damage to the condenser tubes will result if the chemical cleaning procedure is improperly applied.

Mechanical tube cleaning must always follow a chemical cleaning procedure.

When chemical cleaning of the condenser tubes is required, it may be necessary to calculate the internal volume of the waterside condenser tubes. This information is necessary to properly mix the correct concentration of cleaning solution.

Standard materials of construction for YORK YVWE Chiller condensers is copper tubes and mild carbon steel water boxes.

Mechanical Cleaning Procedure

1. Drain the water from the condenser.

2. Remove the water boxes from both ends of the condenser. Use proper lifting equipment when removing the water boxes. Use caution not to damage the threads on the mounting studs that are welded to the tube sheet.

3. Select a tube cleaning brush for 3/4 inch I.D copper condenser tubes. If tubes other than 3/4 inch copper are used, select a tube cleaning brush that is made for the tube size. Generally, brushes made of hard plastic or brass bristled wires are preferred for cleaning copper tubes.

4. Attach the tube cleaning brush to the end of a cleaning machine or cleaning rod.

5. Flush the condenser with clean water to remove the debris.

6. Replace the water box gasket with a new gasket and reassemble the water boxes onto the condenser.

Evaporator tubes

The standard evaporator tubes used in YVWE Chillers are internally enhanced copper tubes.

If the equipment is located in an unheated area that is susceptible to freezing, the water must be drained from the evaporator to prevent tube damage from freezing.

Maintain evaporator water or brine flow rates through the evaporator tubes that the chiller was designed for. Refer to the engineering data on the sales order form for the correct flow rates. Generally, the water or brine that is circulated through the evaporator is part of closed loop circuit that is treated with chemicals to prevent the formation of scale and debris.

Evaporator

It is difficult to determine by a particular test whether possible lack of performance of water evaporator is due to fouled tubes alone or due to a combination of troubles. Trouble which may be due to fouled tubes is indicated when, over a period time, the cooling capacity decreases and the split (temperature difference between the water leaving the evaporator and the refrigerant temperature in the evaporator) increases. A gradual drop off in cooling capacity can also be caused by a gradual leak of refrigerant from the system or by a combination of fouled tubes and shortage of refrigerant charge. An excessive quantity of oil in the evaporator can also contribute to erratic performance.

If cleaning of the evaporator tubes is required, follow the condenser cleaning procedure.

Working conditions

Read the working pressure and temperature from the control panel display. Confirm that these values are within the working limits.

VSD Maintenance

The unit VSD controls the speed of the compressor motor, by converting the fixed voltage and frequency AC input into a variable voltage and frequency AC output.

To ensure reliable operation the VSD must be kept clean, dry and the electrical connections must be tight.

Cleaning

The unit VSD is NEMA 1 category and is susceptible to dust contamination. Dust on VSD hardware can cause a lack of air flow, resulting in diminished performance from heat sinks.

Dust on an electronic device can cause malfunction or even failure. Dust absorbs moisture, which also contributes to failure. Periodically spraying air through the heat sink fan is a good preventitive maintenance measure. Discharging compressed air into a VSD is a viable option in some environments, but typical plant air contains oil and water. To use compressed air for cooling, you must use air that is oil-free and dry or you are likely to do more harm than good. That requires a specialized, dedicated, and expensive air supply. And you still run the risk of generating electrostatic charges (ESD).

A non-static generating spray or a reverse-operated ESD vacuum will reduce static build-up. Common plastics are prime generators of static electricity. The material in ESD vacuum cases and fans is a special, non-static generating plastic. These vacuums, and cans of non-static generating compressed air, are available through companies that specialize in static control equipment.

Condensation Protection

Control boards within the VSD if subjected to moisture will cause corrosion and the eventually leading to "tracking" which will cause premature board failure through short circuit.

If the VSD is operated, all day every day, the normal radiant heat from the heatsink should prevent condensation. The VSD can also be fitted into an enclosure with a thermostatically controlled space heater located inside, when condensation is likely.

Connection Tightness

Heat cycles and mechanical vibration can lead to sub-standard connections, as can poor maintenance practices. Bad connections eventually lead to arcing.

Arcing at the VSD input could result in nuisance over voltage faults, clearing of input fuses, or damage to protective components. Arcing at the VSD output could result in over-current faults, or even damage to the power components.

Loose control wiring connections can cause erratic operation. For example, a loose START/STOP signal wire can cause uncontrollable VSD stops. A loose speed reference wire can cause the drive speed to fluctuate, resulting in scrap, machine damage, or personnel injury.

Scheduled Maintenance

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

8. Trouble Shooting

Competent Persons Trouble Shooting Guide

PROBLEM	POSSIBLE CAUSES	ACTION
Low Evaporator Pressure	Transducer reads incorrectly.	Check transducer against a gauge.
	Chilled water temperature sensor defective.	Check temperature sensor.
	Insufficient refrigerant charge.	Check for leaks and charge refrigerant into system.
	Low evaporator water flow.	Check flow.
	Liquid line filter clog.	Check liquid line filter.
	Feed or flow valve defective.	Repair or replace valve or control.
	Evaporator tubes dirty or restricted.	Clean evaporator tubes.
	EEV failure or fail to open.	Check EEV or EEV drive.
	Insufficient load for system capacity.	Check low water temperature cutout setting and low evaporator pressure cutout setting.
Low Oil Level	Oil heater failure.	Check oil heater.
	Oil level switch failure.	Check oil level switch.
	Condenser water temperature low.	Adjust condenser water flow, increase condenser leaving water temperature.
	Oil filter clog.	Check oil filter.
	Refrigerant over charged.	Recover refrigerant and keep discharge superheat in 7 to 10°C, evaporator small temperature in 0.5 to 2.5°C.
	Eductor failure or oil filter clog,	Repair or replace Eductor or filter.
	insufficient oil charge.	Increasing oil charge.
High Discharge Pressure	High condenser water temperature.	Check sensor.
	Discharge transducer is defective.	Check and clean tubes. Check water conditioning.
	High pressure switch is defective.	Check site pumps, valves, and strainers. Increase quantity of water through the condenser to the proper value.
	Condenser water dirty.	Check tower fan motor/blade, valve, and water circulation.
	Non condensable gas in the chiller.	Vent air from the condenser gas.
	Condenser water flow low.	Check the condenser water flow and distribution.
	Refrigerant over charged.	Recover refrigerant and keep discharge superheat in 7 to 10°C, evaporator small temperature in 0.5 to 2.5°C.
No Display on Control Panel. Unit Will NOT Run	Electric supply to the panel is missing.	High voltage to the chiller is missing.
	Line fuse is blown.	Check fuses.
	Control board is defective.	Replace control board.
	Display board is defective.	Replace display board.
Low Leaving Chilled Liquid Temperature	Leaving chilled liquid temperature drops faster than the unit can unload.	Check for restricted flow.
		Check for rapid flow changes.
		Water loop is too small.
		Flow is below minimum for chiller.
	Chilled water sensor is defective.	Check sensor against temperature gauge in water line.
		Check sensor for intermittent operation.
		Check wiring for short or open circuits.
High Discharge Temperature	Discharge temperature sensor is defective.	Check sensor.
	Condenser tubes are dirty or scaled.	Check and clean tubes. Check water conditioning.
	Condenser water flow low.	Check site pumps, valves, and strainers. Increase quantity of water through the condenser to the proper value.
	Condenser water too warm.	Check tower fan motor/blade, valve, and water circulation.

PROBLEM	POSSIBLE CAUSES	ACTION
High Motor Temperature	High motor temperature input from one of the sensors.	Refrigerant charge low. Check evaporator approach temperature.
		Excess charge in system. High discharge pressure. Check superheat.
		High superheat. Feed valves NOT controlling. Isolate cause.
		Motor sensor reading incorrectly. Program panel to ignore a single sensor.
Motor Current Limiting	High motor current has activated current limiting.	Condenser water temperature is high. Normal response from controller.
		Remote or panel limiting is in effect. Normal response.
		Excess charge in system. Adjust charge.
Oil Pressure Gradually Decreases	Oil filter is dirty.	Change oil filter.
	Extreme bearing wear.	Check compressor.
Excessive Noise and Vibration	Bearing damage or excessive wear.	Check compressor.
	Refrigerant flood back.	Correct system problem.
	Chiller vibration isolators installed improperly.	Install isolators properly according to instructions in this manual.
	Room acoustics are poor.	Evaluate sound attenuation.
	Piping supports not supporting load.	Adjust piping supports.

Modbus Protocol

Modbus Protocol Instructions

Parameter	Value
Baud rate	9600
Word length	8
Parity	None
Stop bits	1
Data mode	RTU
Verify	CRC 16

ModBus communication protocol

Address	Functions	Unit	Description	Note
200	3,6		Communication Start/Stop	0=Stop 1=Start
201	3,6		Running Mode	0 = AC, 1 = ITS, 2 = HP, 3 = HR mode 1 (reserved), 4 = HR mode 2 (reserved), 5 = Remote
202	3,6	°C	Leaving chilled liquid temperature setpoint (AC)	Range: 4.0°C ~ 21.0°C
203	3,6	°C	Leaving chilled liquid temperature setpoint (ITS)	Range: -7 °C ~ 5.0°C
205	3		Fault status	0=no fault, 1= fault
206	3		Time limit	0=no limit, 1=limit
207	3		PreHeat	0=no preheat, 1=preheat
208	3		Control source	0=Local, 1=Communication, 2=Remote
211	3		Fault Code	0=No fault; >0 means there is a fault or alarm. See description
213	3		Software version	

Address	Functions	Unit	Description	Note
100	6		Digital Output	See description
101	6		Digital Input	See description
102	6	°C	Return Condenser liquid temperatur	Unsigned, Div 10
103	6	°C	Return Chilled liquid temperature	Unsigned, Div 10
104	3	°C	Discharge temperature	Unsigned
105	3	kPa	Evaporator Pressure	Unsigned
106	3	kPa	Condenser Pressure	Unsigned
107	3	kPa	Oil Pressure	Unsigned
108	3	AMP	Motor current	Unsigned, Div 10
109	3	%	Refrigerant level	Unsigned, Div 10
110	3	Hours	1# Compressor running hours	Unsigned
111	3	Hours	Pump running hours	Unsigned
112	3	%	EEV	Unsigned, Div 10
113	3	%	Percentage of FLA	Unsigned, Div 10
114	3		Fault Word1	See description
115	3		Fault Word2	
116	3		Fault Word3	
120	3	°C	Leaving Condenser liquid temperatu	Unsigned, Div 10
121	3	°C	Leaving Chilled liquid temperature	Unsigned, Div 10
122	3	%	Refrigerant level Setpoint	Unsigned, Div 10
140	3	°C	Motor temperature(Phase A)	Unsigned, Div 10
141	3	°C	Motor temperature(Phase B)	Unsigned, Div 10
142	3	°C	Motor temperature(Phase C)	Unsigned, Div 10
VSD				
Address	**Functions**	**Unit**	**Description**	**Note**
126	3		VSD Running Status	0=no communication, 1=forward, 2=reverse, 3=Shutdown, 4=Tune, 5=Fault
127	3	Hz	Command frequency	Unsigned, Div 10
128	3	Hz	Running frequency	Unsigned, Div 10
131	3	AMP	Output current	Unsigned, Div 10
133	3	°C	Heatsink Temperature	Unsigned, Div 10
134	3		Fault code	See description
APF				
Address	**Functions**	**Unit**	**Description**	**Note**
170	3	AMP	RMS Supply Current A	Unsigned, Div 10
171	3	AMP	RMS Supply Current B	Unsigned, Div 10
172	3	AMP	RMS Supply Current C	Unsigned, Div 10
173	3	AMP	RMS Filter Current A	Unsigned, Div 10
174	3	AMP	RMS Filter Current B	Unsigned, Div 10
175	3	AMP	RMS Filter Current C	Unsigned, Div 10
194	3	%	Supply Current TDD A	Unsigned, Div 10
195	3	%	Supply Current TDD B	Unsigned, Div 10
196	3	%	Supply Current TDD C	Unsigned, Div 10
380	3		APF running status	0=stop 1=running

Definition of fault alarm code in the content of ModBus communication protocol

Safety fault	
Fault code	**Fault description**
103	Safety Fault-High PRESS Contact Open
104	Safety Fault-Low Level Switch Open
105	Safety Fault- COMP Motor Protection
106	Safety Fault-External Interlock Protection
107	Safety Fault- COMP Running Feedback Fault
108	Safety Fault-Leaving COND TEMP Sensor Fault
109	Safety Fault-Return COND TEMP Sensor Fault
110	Safety Fault-Leaving Chilled TEMP Sensor Fault
111	Safety Fault-Return Chilled TEMP Sensor Fault
112	Safety Fault- DIS TEMP Sensor Fault
115	Safety Fault- EVAP PRESS Out Of Range Fault
116	Safety Fault- COND PRESS Sensor Fault
117	Safety Fault- Oil PRESS Sensor Fault
118	Safety Fault- COND High PRESS
119	Safety Fault-EVAP Low PRESS
120	Safety Fault- DIS High TEMP
121	Safety Fault-COMP Over Current
122	Safety Fault- COMP Low Current
123	Safety Fault- Oil Low DIFF PRESS
124	Safety Fault-Oil Clogged Filter
127	Safety Fault- DIS Low Superheat
128	Safety Fault-Motor High TEMP
151	Safety Fault-Motor Phase A TEMP Sensor Fault
152	Safety Fault-Motor Phase B TEMP Sensor Fault
153	Safety Fault-Motor Phase C TEMP Sensor Fault
162	Start Inhibit- Oil Pre-heat Protection
163	Safety Fault-EVAP Smart Freeze Protection
164	Start Inhibit-Over Run Time Limit
166	Safety Fault-Vi Sensor Fault
167	Safety Fault-EVAP Sensor Fault
168	Safety Fault-COND Liquid Level Sensor Fault
198	Safety Fault-Mainboard Loss Communication with HMI
199	Safety Fault-HMI Loss Communication with Mainboard

APF Fault	
Fault code	**Description**
271	APF Fault-Inverter Short Circuit
272	APF Fault-Output Current Abnormal
273	APF Fault-Auxiliary Power Failure
274	APF Fault-Fuse Failure
275	APF Fault-Fan Failure
276	APF Fault-High Baseplate Temperature
277	APF Fault-CT Ratio Setting Error
278	APF Fault-Input Current Overload
279	APF Fault-Active Harmonic Filter Fault
280	APF Fault-Input Frequency Abnormal
281	APF Fault-Input Voltage Abnormal
282	APF Fault-Wrong Phase Sequence
283	APF Fault-Control Software Compatibility
284	APF Fault-Controller Parameter Settings
285	APF Fault-Monitoring Parameter Settings
286	APF Fault-Capacity Reading Failure
287	APF Fault-Emergency Stop
288	APF Fault-DC Bus Voltage Imbalance
289	APF Fault-CT Calibration Failure
290	APF Fault-Module Communication
291	APF Fault-Module Software Compatibility
298	APF Fault-High Total Demand Distortion
299	APF Fault-Communication Fail

VSD Fault	
Fault Code	**Description**
302	Safety Fault- 0002: Accelerating Current Overload
303	Safety Fault- 0003: Decelerating Current Overload
304	Safety Fault- 0004: Constant Speed Current Overload
305	Safety Fault- 0005: Accelerating Voltage Overload
306	Safety Fault- 0006: Decelerating Voltage Overload
307	Safety Fault- 0007: Constant Speed Voltage Overload
308	Safety Fault- 0008: Buffer Resistance Overload
309	Safety Fault- 0009: Voltage Lack
310	Safety Fault- 000A: VSD Overload
311	Safety Fault- 000B: Motor Overload
312	Safety Fault- 000C: Input Phase Lack
313	Safety Fault- 000D: Output Phase Lack
314	Safety Fault- 000E: Module Overheat
315	Safety Fault- 000F: External Fault
316	Safety Fault- 0010: Communication Abnormal
317	Safety Fault- 0011: Contactor Abnormal
318	Safety Fault- 0012: Current Detection Fault
319	Safety Fault- 0013: Motor Tune Fault
320	Safety Fault- 0014: Encoder/PG Card Fault
321	Safety Fault- 0015: Parameters Read-Write Abnormal
322	Safety Fault- 0016: VSD Hardware Fault
323	Safety Fault- 0017: Motor Short with Ground Trouble
324	Safety Fault- 0018: Reserved
325	Safety Fault- 0019: Reserved
326	Safety Fault- 001A: Up to Run Time
327	Safety Fault- 001B: User Defined Fault 1
328	Safety Fault- 001C: User Defined Fault 2
329	Safety Fault- 001D: Up to Power on Time
330	Safety Fault- 001E: Off Load
331	Safety Fault- 001F: PID Feedback Loss During Running
332	Safety Fault- 0028: Quick Current Limit Overtime Fault
333	Safety Fault- 0029: Switch Motor During Running Fault
334	Safety Fault- 002A: Speed Variation Too Large
335	Safety Fault- 002B: Motor Over-Speed
336	Safety Fault- 002D: Motor Over-Temperature
337	Safety Fault- 005A: Encoder Line Number Error Setting
338	Safety Fault- 005B: Disconnect with Encoder
339	Safety Fault- 005C: Initial Position Error
340	Safety Fault- 005E: Speed Feedback Error
491	Safety Fault-VSD Contact Fault
493	Safety Fault-VSD Communication Fail

Warning	
Fault code	**Description**
501	Warning-EVAP Low PRESS Force Unload
502	Warning-COND High PRESS Stop Load
503	Warning-COND High PRESS Force Unload
504	Warning-Standby Freeze Protection Pump On
507	Warning-EVAP Low PRESS Hold
511	Warning-DIS High TEMP
513	Warning- DIS Low Superheat Stop Load
514	Warning-DIS Low Superheat Force Unload
516	Warning-COMP Over Current Stop Load
521	Warning-COMP Over Current Force Unload
522	Warning-COMP Over Current Fast Force Unload

Cycling fault	
Fault code	**Description**
601	Cycling Stop-Chilled Liquid Flow Switch Open
602	Cycling Stop-COND Liquid Flow Switch Open
603	Cycling Stop- Low Capacity TEMP
618	Cycling Stop-DIS High TEMP
621	Cycling Stop-Leaving COND High TEMP
622	Cycling Stop - Low chilled water TEMP

Table 1 fault word 1 definition

Address: (114)

Bit Number	Fault Code	DI Fault
bit0	601	Cycling Stop-Chilled Liquid Flow Switch Open
bit1	602	Cycling Stop-COND Liquid Flow Switch Open
bit2	103	Safety Fault-High PRESS Contact Open
bit3	104	Safety Fault-Low Level Switch Open
bit5	106	Safety Fault-External Interlock Protection
bit6	107	Safety Fault-COMP Running Feedback Fault
bit8	162	Start Inhibit-Oil Pre-heat Protection
bit9	163	Safety Fault-EVAP Smart Freeze Protection
bit11	491	Safety Fault-VSD Contact Fault
bit13	493	Safety Fault-VSD Communication Fail
bit14	298	APF Fault-High Total Demand Distortion
bit15	299	APF Fault-Communication Fail

Table 2 fault word 2 definition

Address: (115)

Bit Number	Fault Code	AI Fault
bit0	108	Safety Fault-Leaving COND TEMP Sensor Fault(AC/IC)
bit1	109	Safety Fault-Return COND TEMP Sensor Fault(AC/IC)
bit2	110	Safety Fault-Leaving Chilled TEMP Sensor Fault
bit3	111	Safety Fault-Return Chilled TEMP Sensor Fault
bit4	112	Safety Fault- DIS TEMP Sensor Fault
bit5	151	Safety Fault- Motor Phase A TEMP Sensor Fault
bit6	152	Safety Fault- Motor Phase B TEMP Sensor Fault
bit7	153	Safety Fault- Motor Phase C TEMP Sensor Fault
bit11	168	Safety Fault-COND Liquid Level Sensor Fault
bit12	115	Safety Fault-EVAP PRESS Out Of Range Fault
bit13	116	Safety Fault- COND PRESS Sensor Fault
bit14	117	Safety Fault- Oil PRESS Sensor Fault
bit15	166	Safety Fault-Vi Sensor Fault

Table 3 fault word 3 definition

Address: (116)

Bit Number	Fault Code	Run Fault
bit0	118	Safety Fault- COND High PRESS
bit1	119	Safety Fault- EVAP Low PRESS
bit2	120	Safety Fault- DIS High TEMP
bit3	121	Safety Fault- COMP Over Current
bit4	122	Safety Fault- COMP Low Current
bit5	621	Cycling Stop-Leaving COND High Temperature
bit6	622	Cycling Stop-Leaving Chilled Liquid Low Temperature
bit7	123	Safety Fault- Oil Low DIFF PRESS
bit8	124	Safety Fault- Oil Clogged Filter
bit12	127	Safety Fault- DIS Low Superheat
bit13	128	Safety Fault- Motor High TEMP
bit14	618	Cycling Stop- DIS High TEMP
bit15	198	Safety Fault-Mainboard Loss Communication with HMI

Table 4 VSD fault definition
Address: (134)

Fault Code	VSD Fault
2	Safety Fault- 0002: Accelerating Current Overload
3	Safety Fault- 0003: Decelerating Current Overload
4	Safety Fault- 0004: Constant Speed Current Overload
5	Safety Fault- 0005: Accelerating Voltage Overload
6	Safety Fault- 0006: Decelerating Voltage Overload
7	Safety Fault- 0007: Constant Speed Voltage Overload
8	Safety Fault- 0008: Buffer Resistance Overload
9	Safety Fault- 0009: Voltage Lack
000A	Safety Fault- 000A: VSD Overload
000B	Safety Fault- 000B: Motor Overload
000C	Safety Fault- 000C: Input Phase Lack
000D	Safety Fault- 000D: Output Phase Lack
000E	Safety Fault- 000E: Module Overheat
000F	Safety Fault- 000F: External Fault
10	Safety Fault- 0010: Communication Abnormal
11	Safety Fault- 0011: Contactor Abnormal
12	Safety Fault- 0012: Current Detection Fault
13	Safety Fault- 0013: Motor Tune Fault
14	Safety Fault- 0014: Encoder/PG Card Fault
15	Safety Fault- 0015: Parameters Read-Write Abnormal
16	Safety Fault- 0016: VSD Hardware Fault
17	Safety Fault- 0017: Motor Short with Ground Trouble
18	Safety Fault- 0018: Reserved
19	Safety Fault- 0019: Reserved
001A	Safety Fault- 001A: Up to Run Time
001B	Safety Fault- 001B: User Defined Fault 1
001C	Safety Fault- 001C: User Defined Fault 2
001D	Safety Fault- 001D: Up to Power on Time
001E	Safety Fault- 001E: Off Load
001F	Safety Fault- 001F: PID Feedback Loss During Running
28	Safety Fault- 0028: Quick Current Limit Overtime Fault
29	Safety Fault- 0029: Switch Motor During Running Fault
002A	Safety Fault- 002A: Speed Variation Too Large
002B	Safety Fault- 002B: Motor Over-Speed
002D	Safety Fault- 002D: Motor Over-Temperature
005A	Safety Fault- 005A: Encoder Line Number Error Setting
005B	Safety Fault- 005B: Disconnect with Encoder
005C	Safety Fault- 005C: Initial Position Error
005E	Safety Fault- 005E: Speed Feedback Error

Definition of digital input in the content of ModBusModBus communication protocol
Address: (101)

Bit Number	Digital input name	Description
0	Chilled Liquid Flow Switch	1：Close 0：Open
1	Mode Switch	1：Close 0：Open
2	High PRESS Switch	1：Close 0：Open
3	Low Oil Level Switch	1：Close 0：Open
5	External Interlock	1：Close 0：Open
6	Starter Running Feedback	1：Close 0：Open
9	Starter Fault Feedback	1：Close 0：Open
10	Condenser Liquid Flow Switch	1：Close 0：Open

Definition of digital output in the content of ModBus communication protocol
Address: (100)

Bit Number	Digital Output name	Description
0	Liquid Pump	1：On 0：Off
1	COMP Y Contact/VSD Start	1：On 0：Off
3	Oil Heater	1：On 0：Off
4	Hot Gas Bypass	1：On 0：Off
5	Alarm	1：On 0：Off
6	Liquid Injection Oil Cooling	1：On 0：Off
8	Unit Running	1：On 0：Off
9	Oil Supply Circuit	1：On 0：Off
10	Injection Oil Return	1：On 0：Off
14	CR4 Solenoid Valve Load	1：On 0：Off
15	CR3 Solenoid Valve Unload	1：On 0：Off

Sensor Calibration Charts

Chilled Leaving/Return Liquid and Cooling Leaving/Return Liquid Temperature Sensors

Temperature °C	-5	-3	-1	1	3	5	7	9	11	13	15
Resistance kΩ	42.82	38.53	3 4.71	31.32	28.29	2 5.59	23.17	21. 01	1 9.07	17.33	15. 77
Temperature °C	17	19	21	23	25	27	29	31	33	35	37
Resistance kΩ	14.37	13.1	11.96	10.93	10	9.16	8.4	7.71	7 .085	6.517	6

Discharge Temperature Sensor

Temperature °C	0	3	6	9	12	15	18	21	24	27	30
Resistance kΩ	166.75	142 .9	1 22.81	105.83	91.4 43	7 9.219	68.804	59.908	52.291	45.752	40.125
Temperature °C	33	36	39	42	45	48	51	54	57	60	63
Resistance kΩ	35.272	31.0 76	2 7.44	24.283	21.5 35	1 9.137	17.042	15.206	13.595	12.178	10.929

9. Technical Data

Operational Limits

YVWE Models			100		130		170		200		240	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Chilled liquid	Liquid outlet temperature (water)	°C	2.2 to 21									
	Flow rate	l/s	7.1	28.3	9.4	37.5	12.4	49.3	14.6	58.3	14.6	58.3
	Maximum working pressure	barg	10									
Cooling liquid	Liquid outlet temperature	°C	18 to 43									
	Flow rate	l/s	9.1	39	8.2	0	15.4	55.5	18.4	66.3	18.4	66.3
	Maximum working pressure	barg	10									
Refrigerant System High pressure side		barg	18									
Power supply voltage		V	380V, 400V, 415V 3Ø, 50Hz/60Hz (nominal)									
System water volume - Air Conditioning		l	190		198		283		347		347	
Air temperature surrounding unit		°C	4.4 to 43.3									

YVWE Models			270		310		355		420	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Chilled liquid	Liquid outlet temperature (water)	°C	2.2 to 21							
	Flow rate	l/s	14.9	55.4	18.8	65.5	21.2	72.6	26	89.1
	Maximum working pressure	barg	10							
Cooling liquid	Liquid outlet temperature	°C	18 to 43							
	Flow rate	l/s	20.6	64.8	23.7	78.2	26.8	85.8	33	105.3
	Maximum working pressure	barg	10							
Refrigerant System High pressure side		barg	18							
Power supply voltage		V	380V, 400V, 415V 3Ø, 50Hz/60Hz (nominal)							
System water volume - Air Conditioning		l	462		614		660		770	
Air temperature surrounding unit		°C	4.4 to 43.3							

Pressure Drop

The expected waterside pressure drop at design flow is provided on the particular sales order form header. When rated in accordance with AHRI-550, the actual pressure drop for clean tubes is permitted to be lower than or 15% greater than the stated value.

To determine flow or waterside pressure drop at conditions other than sales order design, use the following relationship to calculate the unknown parameter. Ensure consistent units of measure are used during calculation:

$$\frac{Design\ \text{flow}}{\sqrt{Design\ pressure\ \text{drop}}} = \frac{Actual\ \text{flow}}{\sqrt{Actual\ pressure\ \text{drop}}}$$

Physical Data

YVWE Models			100	130	170	200	240
Refrigerant circuits			1				
Refrigerant charge		kg	100	110	120	155	165
Oil Charge		l	17	30	30	30	30
Compressor	Type		Semi-hermetic Screw				
	Capacity Control	%	15%-100%				
Evaporator	Type		Hybrid FF				
	Number of Passes		3	2			
	Connection sizes	inch	4	5	5	6	6
Condenser	Type		Shell-tube				
	Number of Passes		2				
	Connection sizes	inch	4	4	5	6	6
Dimensions	Length	mm	2596	3032	3055	3076	3076
	Width	mm	1336	1336	1420	1500	1500
	Height	mm	1830	1830	1885	2015	2015
Weight	Shipping	kg	2527	2815	3554	4054	4077
	Operating	kg	2717	3013	3837	4401	4424

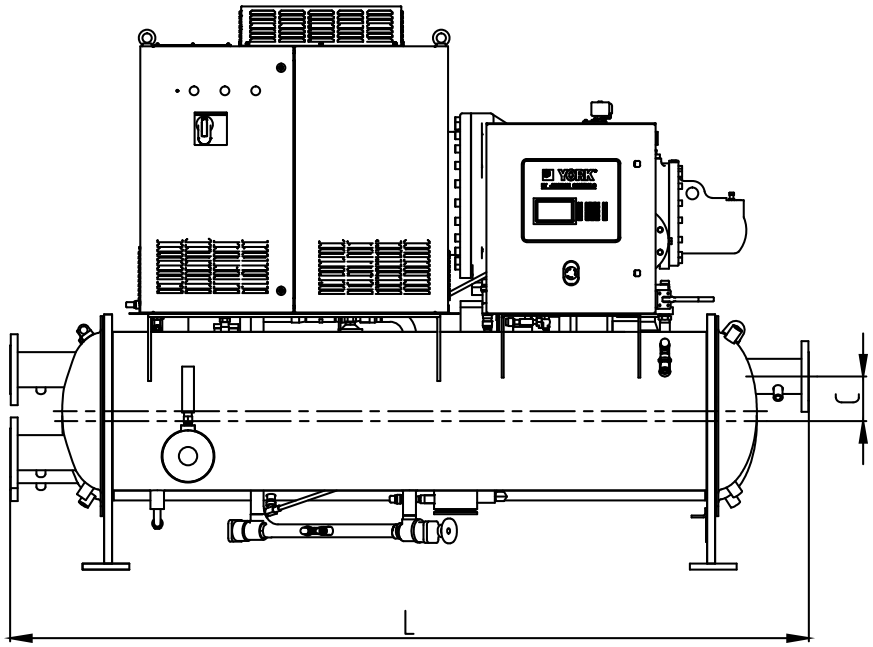
YVWE Models			270	310	355	420
Refrigerant circuits			1			
Refrigerant charge		kg	200	280	280	320
Oil Charge		l	35	40	40	40
Compressor	Type		Semi-hermetic Screw			
	Capacity Control	%	25% ~ 100%			
Evaporator	Type		Hybrid FF			
	Number of Passes		2			
	Connection sizes	inch	6	6	6	8
Condenser	Type		Shell-tube			
	Number of Passes		2			
	Connection sizes	inch	6	8	8	8
Dimensions	Length	mm	4144	4206	4206	4236
	Width	mm	1775	1845	1845	1896
	Height	mm	2075	2215	2215	2225
Weight	Shipping	kg	5649	6698	6840	7596
	Operating	kg	6180	7359	7616	8518

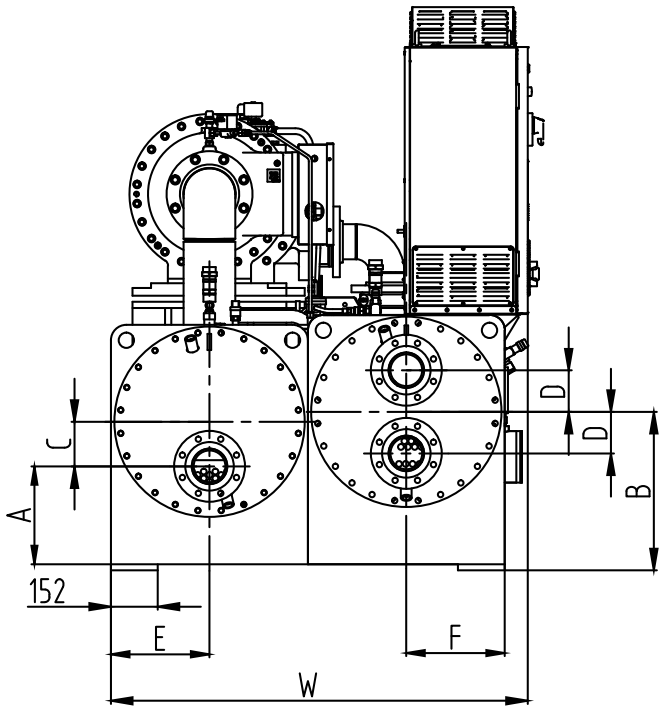
Electrical Connections

Model	YVWE100	YVWE130	YVWE170	YVWE200	YVWE240
INPUT CABLE (RECOMMENDED)	3 × 120 mm² + 1 x 70 mm²	3 × 150 mm² + 1 x 95 mm²	3 × 185 mm² + 1 x 95 mm²	2 x (3 × 185 mm² + 1 x 95 mm²)	2 x (3 × 185 mm² + 1 x 95 mm²)

Model	YVWE270	YVWE310	YVWE355	YVWE420
INPUT CABLE (RECOMMENDED)	2 x (3 × 185 mm² + 1 x 95 mm²)	2 x (3 × 240 mm² + 1 x 95 mm²)	2 x (3 × 240 mm² + 1 x 95 mm²)	2 x (3 × 240 mm² + 1 x 95 mm²)

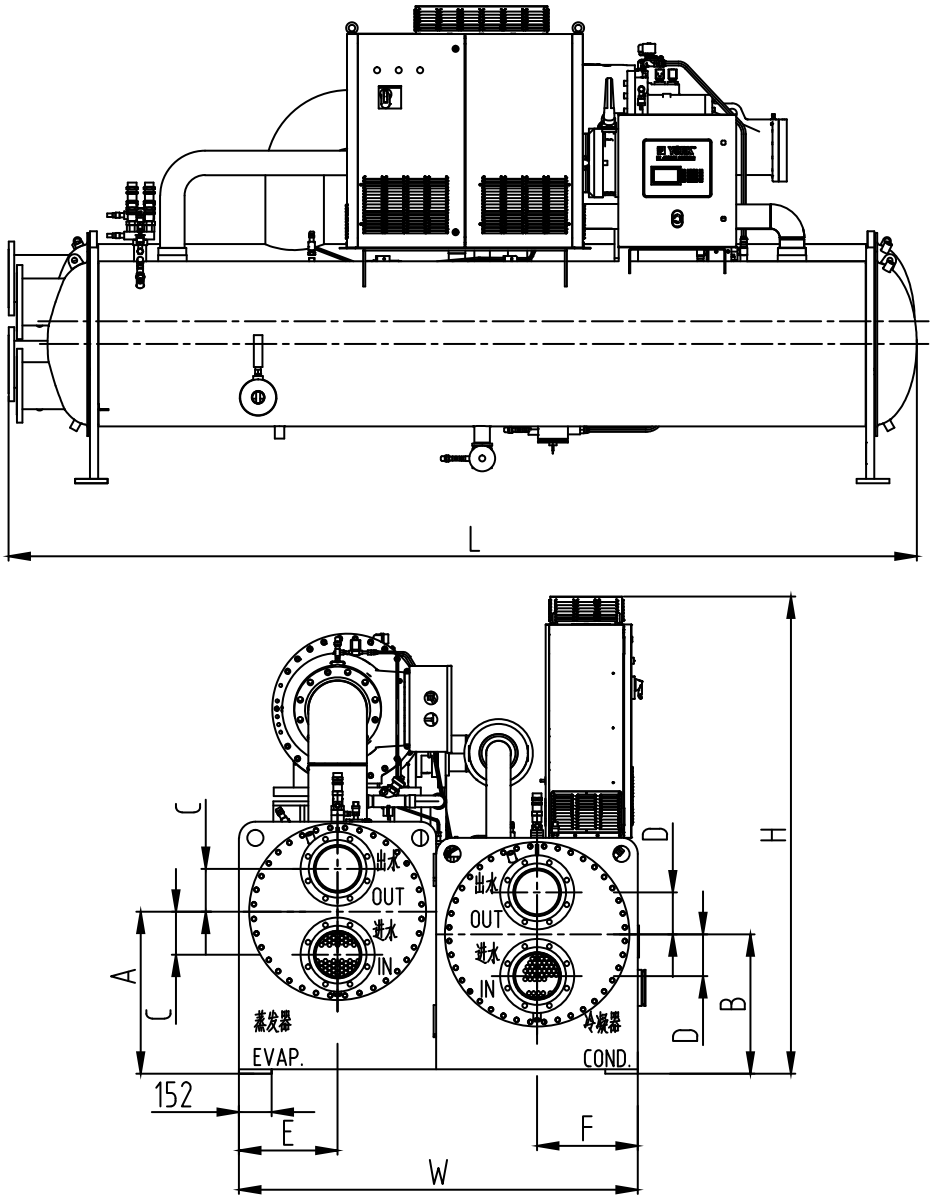
Dimensions YVWE100





MODEL	A	B	C	D	E	F	L	W	H
YVWE100	483	515	145	135	320	320	2596	1336	1830

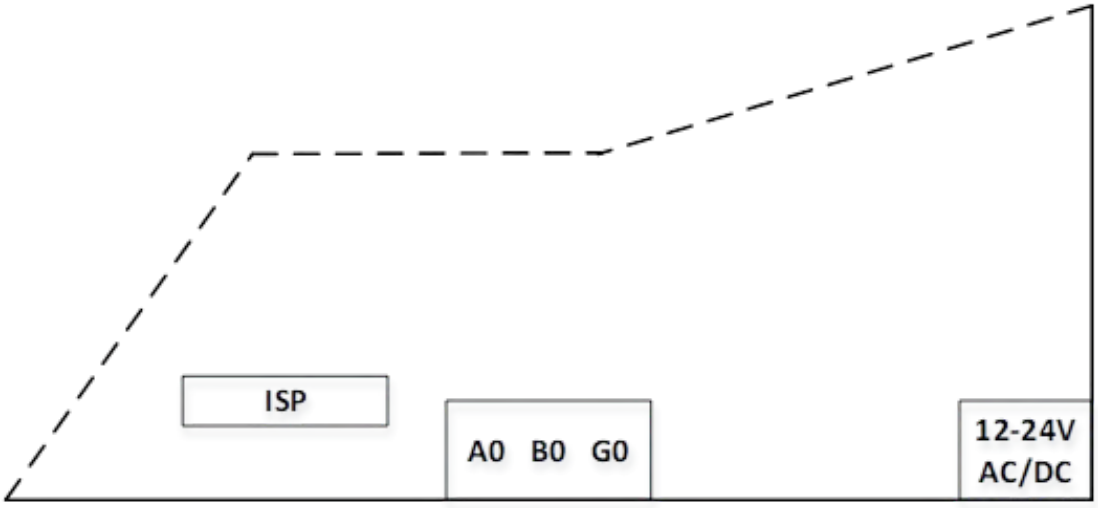
Dimensions YVWE130, YVWE170, YVWE200, YVWE240 YVWE270, YVWE310, YVWE355, YVWE420



MODEL	A	B	C	D	E	F	L	W	H
YVWE130	483	515	145	135	320	320	3032	1336	1830
YVWE170	583	540	145	155	330	345	3055	1420	1885
YVWE200	583	540	165	165	345	370	3076	1500	2015
YVWE240	583	540	165	165	345	370	3076	1500	2015
YVWE270	718	570	165	165	370	425	4144	1775	2075
YVWE310	788	640	170	200	395	445	4206	1845	2215
YVWE355	788	640	170	200	395	445	4206	1845	2215
YVWE420	755	650	200	195	460	470	4236	1896	2225

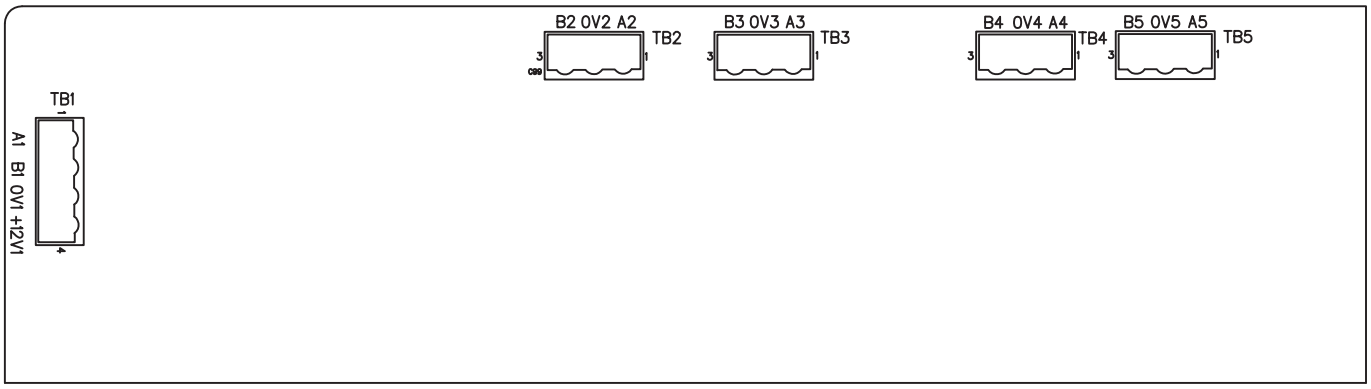
IPU3 Connection Details

HMI (X09) Connections



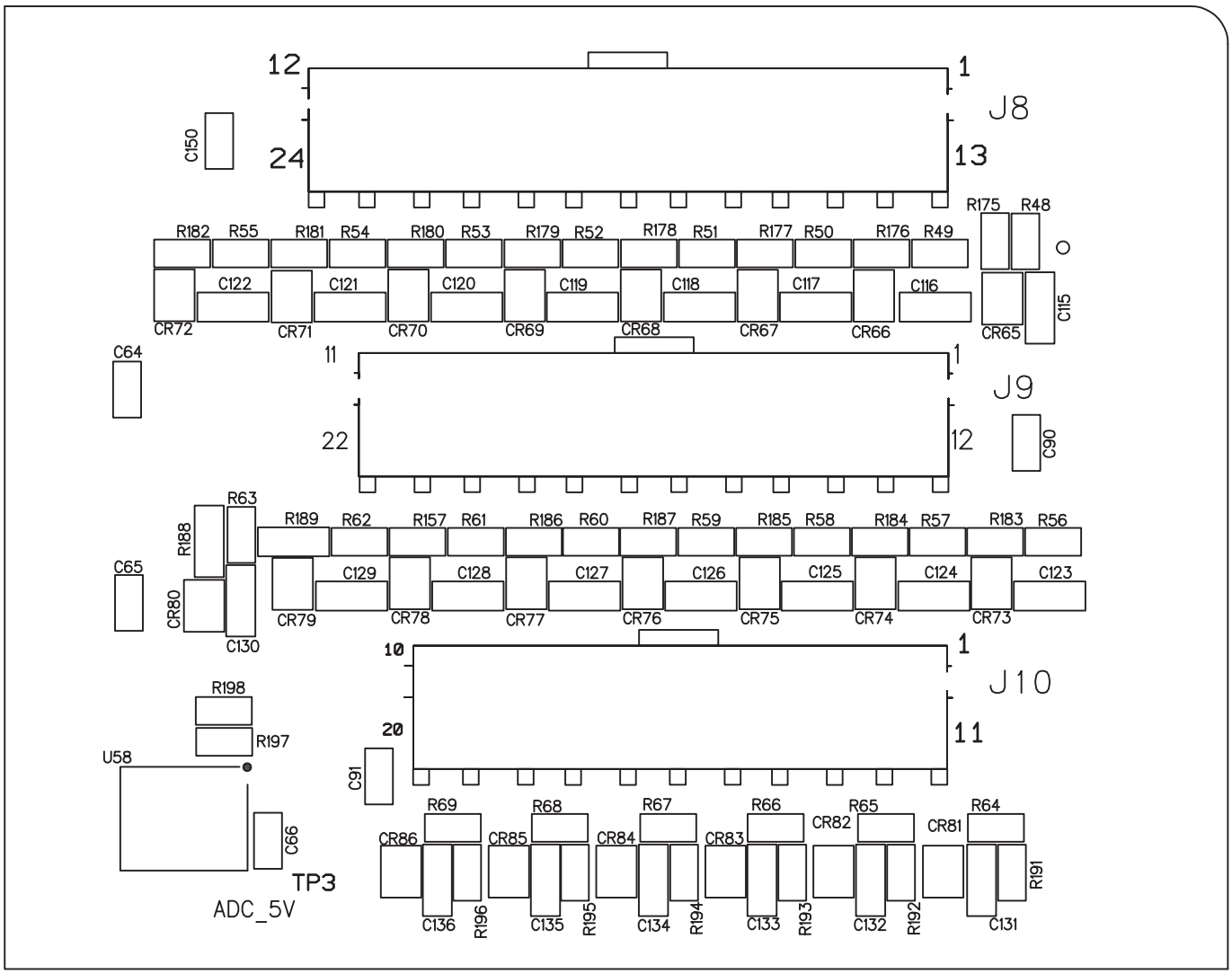
Connection	Description	Remarks
J4(KEY BUS)	Keyboard Interface	
J5	ISP Program Download Interface	use DLO5 to download program
J3	485 Communication Port	A0, B0: communication interface and control board G0 ：ground terminal
J9	Input Power	Input 12-24 Vac / Vdc power supply

Communication Port Connections



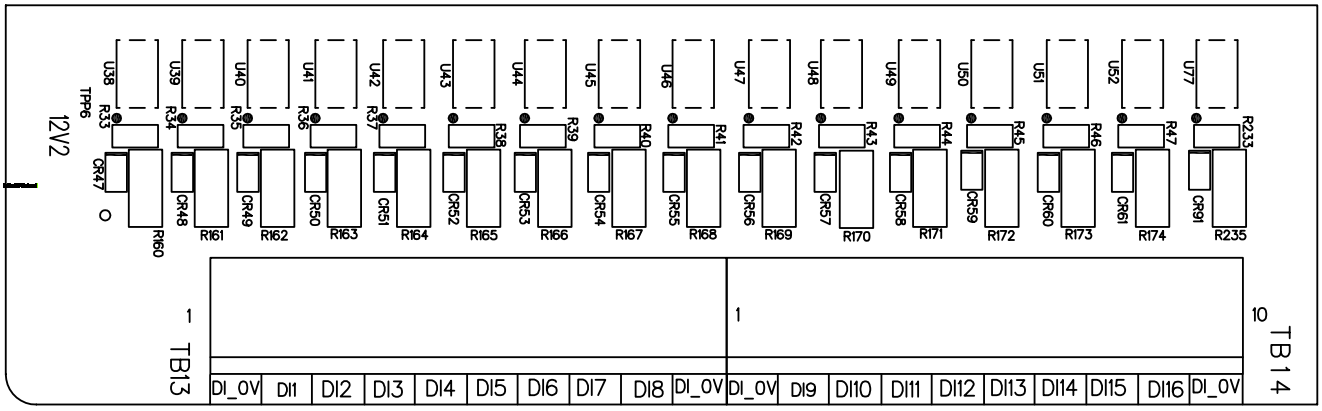
Connection	Description	Remarks
TB1	RS485 Communication Port of HMI	A1, B1 ：Communication Port with main board
TB2	RS485 Communication Port	
TB3	RS485 Communication Port	
TB4	RS485 Communication Port	A4, B4 ：Communication Port with SC-EQ
TB5	RS485 Communication Port	

AI Connections



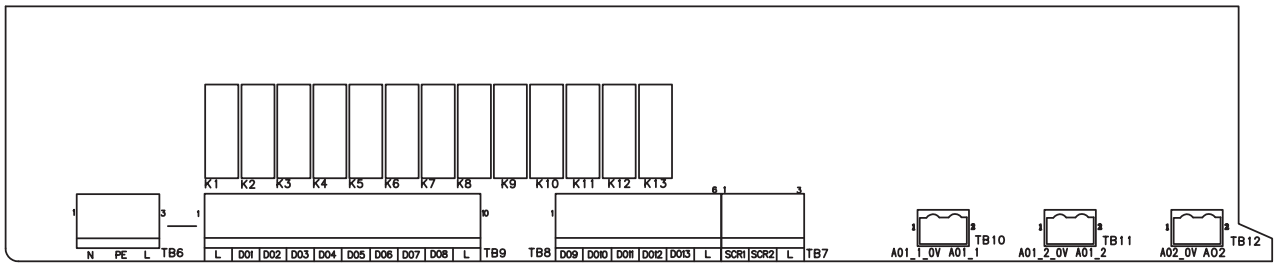
Connection	Description	Remarks
J8/J9/J10	1. AI0-AI10, Pull-down resistor 10K/0.1%, 0-5V input。	
	2. AI11-AI13, Pull-down resistor 1K/0.1%, 0-5V input。	
	3. AI14-AI15, Pull-down resistor 249/0.1%, 4-20mA input。	
	4. AI16-AI21, default Pull-down resistor 10K /0.1%, 0-5V input, or connected with Pull-down resistor 249/0.1% via SW6 (6 bits) , 4-20mA input。	

DI Connections



Connection	Description	Remarks
TB13/TB14	Each digital input is isolated by an optocoupler, and 12VDC is supplied on the board. The incoming external switch is of passive type.	

DO Connections



Connection	Description	Remarks
TB6/TB8/TB9	DO1-DO13 directly drive 13 12V*5A(resistive load) relays	
TB7	SCR1-SCR2 directly drive 2 SCR	
TB10/TB11/TB12	4-20mA output port	

Installation Instructions for HF68 Flow Switches

You MUST carefully read HF68 Flow Switch Manual before installing the flow switch and follow the instruction strictly. If you have any question, please contact the nearest YORK Maintenance Centre.

Application

This switch, a SPDI type flow switch, is a kind of relay used for inspecting and observing liquid flow. Normally, it is applied to air flow adjustment and water supply equipment and induction flow channels where there is flow variation such as water, ethane, ethanediol and other non-hazardous liquids. Its typical application is where linkage or cut-out protection is needed.

Parameters

Maximum working pressure: 1.6 MPa.

Connector size: 1" NPT, 3/4" NPT and 1/2" NPT with three-way pipe connector.

Flow adjustment range and media temperature range

18 l/min ~ 2000 l/min (standard).

5 l/min ~ 3000 l/min (non-standard).

-45°C ~ 120°C.

This switch shall not be used in pipes where freezing is possible. The flow switch is designed to be used as a controller. Failure of its controlling function may result in personal injury and/or property damages. The managerial personnel shall be responsible for installing protection devices (safety device and restriction controller), or adding alarm and monitor systems to guard against its failure.

The controller shall not be used for load in excess of the ratings as shown in the controller label.

Installation

In order to sense the flow variation, its flap shall not be in contact with the pipe wall, neither with any throttle devices in the pipe.

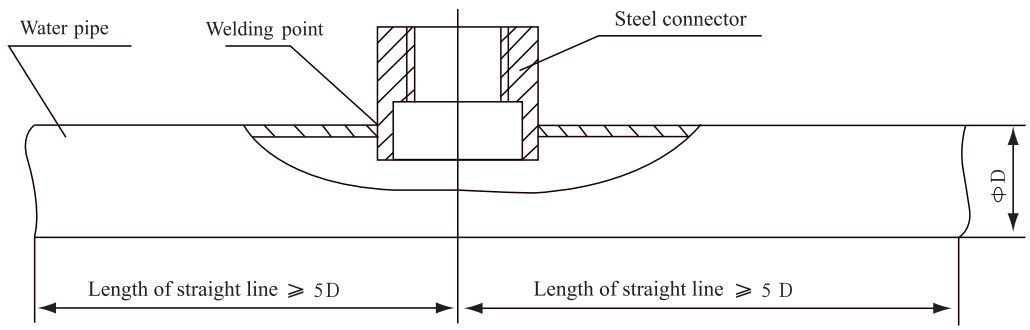
Danger of incorrect operation.

The switch has been set to the minimum flow at the plant, which shall not be exceeded during adjustment as it may result in the switch's failure to reset to no flow position. The HF68 flow switch MUST be installed in a linear pipe at both sides of which there MUST be a linear length with at least five times of the pipe diameter. When a switch is installed, its wiring terminals must be accessible.

The switch should be installed in a position easy for wiring, normally within the outlet stop valve for the convenience of maintenance.

It is suggested to install the flow switch in the following steps:

- Drill the water pipe with the hole size 3-4 mm larger than the outer diameter of the steel connector.
- Weld the steel connector to the hole of the water pipe.
- Tighten the switch on the steel connector with a flat wrench. Note: DO NOT tighten it with the switch housing.
- Ensure that no part is in contact with the pipe wall or its activity is not obstructed.
- Adjust the water flow to the minimum design flow with an adjusting screw. The on/of f action and the arrow on the housing MUST point at the flow direction.



The steel connector MUST be welded directly on the water pipe. The steel pipe shall not be welded to the water pipe to connect the steel connector. The steel connector MUST be the one provided by YORK which is included in the water flow switch packaging box. No use of this connector may result in flow switch explosion.

The flow switch shall not be subject to water hammer. If a snap cut-off valve is installed on the downstream of the flow switch, appropriate water hammer proofing devices MUST be used.

Wiring

All wiring can adopt only copper conductors and NEC or local regulations MUST be observed. HF68 has colour leads with the red one as the centre line. When the flow increases, the red line contacts the yellow line; when the flow decreases, the red line contacts the blue line. Use supplied terminal screws for wiring. Use of other screws may result in improper wiring.

No power shall be supplied during wiring to guard against electric shocks or damages to the equipment.

Steps to adjust the flow switch settings

- Remove the HF68 housing.
- Turn the adjusting screw clockwise to increase the flow . If the flow needs to be decreased, turn the adjusting screw anti-clockwise.
- Press the main lever for a few times to ensure the flow switch setting is no less than the EXW setting. If there is no click sound when the lever is operated, turn the adjusting screw clockwise until click sound appears.

If the water flow switch is used in chilled water pipes, ensure its insulation as described in Water Flow Switch Manual.

The water flow switch is set to the minimum at the plant. It is forbidden to set it below the EXW setting. Otherwise, it may cause that the flow switch cannot reset during water cut-out.

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10. Spare Parts

Recommended Spares

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

Recommended Compressor Oils

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

Oil: YORK 'L' lubricating oil.

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11. Decommissioning, Dismantling and Disposal

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

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

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

General

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

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

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

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

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

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

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

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

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

Only use lifting equipment of adequate capacity

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

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