



YLPA0350BE-YLPA0635BE

ENGINEERING GUIDE

Supersedes: (1019)

FORM 150.68-EG2.EN.GB (1120)

REVERSE CYCLE AIR TO WATER HEAT PUMPS WITH SCROLL COMPRESSORS STYLE B

Cooling Capacities: 350 kW to 645 kW (100 to 183 tons)
Heating Capacities: 358 kW to 680 kW (1220 to 2320 MBH)



R410A

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Nominal Data

YLPA Model		0350BE	0435BE	0520BE	0565BE	0635BE
Cooling Mode	Capacity kW ⁽¹⁾	350	432	510	575	645
	Capacity (tons) ⁽¹⁾	100	123	145	164	183
	Power Input kW ⁽¹⁾	108.5	134.6	159.5	179.7	199.9
	COP	3.23	3.21	3.20	3.20	3.23
Heating Mode	Capacity kW ⁽²⁾	358	445	535	598	680
	Power Input kW ⁽²⁾	110.8	137.1	166.6	190.1	214.5
	COP	3.23	3.25	3.21	3.15	3.17

(1) At 12/7°C leaving chilled water and 35°C ambient.

(2) At 40/45°C leaving hot water and 7°C ambient.

All data in this document is subject to change without prior notice.

Specification

YLPA air-to-water heat pumps are completely factory assembled with all interconnecting refrigerant piping and wiring ready for field installation. Units are available with Braze Plate Heat Exchanger .

The unit is pressure tested, evacuated, and fully factory charged with refrigerant R410A and oil in each of the independent refrigerant circuits. After assembly, an operational test is performed with water flowing through the heat exchanger to ensure that each refrigerant circuit operates correctly.

The unit structure is manufactured from heavy-gauge, galvanised steel coated with baked-on powder paint (Champagne (RAL 7006, Munsell No. 9.8YR4.36/1.2)).

YLPA heat pumps are designed and manufactured within an ISO 9001 accredited organisation and in conformity with the following safety standards:

- GB150 or GB151
- GB/T18430.1
- JB8654

Compressors

The unit has suction-cooled, hermetic scroll compressors. High efficiency is achieved through a controlled orbit and the use of advanced scroll geometry. The compressors incorporate a compliant scroll design in both the axial and radial directions. All rotating parts are statically and dynamically balanced. The compressor motors have integral protection against overloads that will automatically reset. Starting is direct on line.

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

Refrigerant Circuits

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

Each circuit shall incorporate all components necessary for the designed operation including: a suction accumulator, a liquid receiver, a four way reversing valve, service valves, pressure relief valves, a high absorption removable core filter-drier, a sight glass with moisture indicator, a cooling / heating mode expansion valve. Suction lines shall be covered with closed-cell insulation.

Refrigerant to water heat exchanger

The compact, high efficiency Braze Plate Heat Exchanger (BPHX) is constructed with 316 stainless steel corrugated channel plates with a filler material between each plate. It offers excellent heat transfer performance with a compact size and low weight, reducing structural steel requirements on the job site.

The heat exchanger is manufactured in a precisely controlled vacuum-brazing process that allows the filler material to form a brazed joint at every contact point between the plates, creating complex channels. The arrangement is similar to older plate and frame technology, but without gaskets and frame parts.

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

Water connection to the heat exchanger is via flange (to HG20615) connections. A wye-strainer is provided as standard to provide additional protection at the heat exchanger inlet, particularly at system start-up when construction debris may be present in the piping system.

The heat exchanger is equipped with a thermostat-controlled heater for frost protection to -20°C ambient and insulated with flexible, closed-cell foam.

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

Ambient Coils

The ambient coils are seamless copper tubes, arranged in staggered rows, mechanically expanded into coated aluminium fins. Integral sub-cooling is included.

The condenser fans are designed for maximum efficiency and statically and dynamically balanced for vibration free operation. They are directly driven by independent motors, and positioned for vertical air discharge. The fan guards are constructed from heavy-gauge, corrosion resistant, coated steel.

The fan motors are the totally enclosed air-over type with permanently lubricated double-sealed ball bearings.

Power and Controls Panels

All power and controls are contained in an IP 55 cabinet with hinged and gasket sealed outer doors.

The power panel includes:

- A factory mounted non-fused disconnect switch with external red/yellow, lockable handle to enable connection of the unit power supply. The disconnect switch can be used to isolate the power for servicing and as a emergency stop.
- Factory mounted compressor contactors and compressor fuses provide short circuit protection. Overload protection for each compressor is provided by inherent motor winding temperature sensing and a trip module.
- Factory mounted fan contactors and fuses provide short circuit protection. Overload protection for each fan is provided by a inherent motor winding temperature device.
- Control supply fuses and connections for a remote emergency stop device.

The control panel includes:

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

Microprocessor Controls

The microprocessor control includes:

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

Standard control provides full communication to Building Automation Systems, including BACnet (MS/TP), Modbus and N2.

Programmable setpoints:

- Chilled liquid temperature setpoint and range
- Hot liquid temperature setpoint and range
- Remote reset temperature range
- Set daily schedule/holiday for start/stop
- Manual override for servicing
- Low ambient cutout
- High ambient cutout (heating only - fixed)
- Low liquid temperature cutout
- Low suction pressure cutout

- High discharge pressure cutout
- Anti-recycle timer (compressor start cycle time)
- Anti-coincident timer (delay compressor starts)
- Cooling suction superheat
- Heating suction superheat

Displayed Data:

- Leaving liquid temperature
- Air coil defrost temperatures
- Low leaving liquid temperature cutout setting
- Low ambient temperature cutout setting
- EEV output
- Suction superheat
- Suction temperature
- Suction saturated temperature
- Ambient air temperature
- Metric or Imperial data
- Discharge and suction pressure cutout settings
- System discharge and suction pressures
- Anti-recycle timer status for each system
- Anti-coincident system start timer condition
- Compressor run status
- No load condition
- Day, date and time
- Daily start/stop times
- Holiday status
- Automatic or manual system lead/lag control
- Lead system definition
- Compressor starts & operating hours (each compressor)
- Status of evaporator heater and fan operation
- Run permissive status
- Number of compressors running
- Mode solenoid valve status
- Load & unload timer status
- Liquid pump status

System Safeties:

- Cause individual compressors to perform auto shut down and require manual reset in the event of 3 trips in a 90-minute time period
- High discharge pressure
- Low suction pressure
- Low suction superheat
- High-pressure switches
- Motor protector

Unit Safeties:

They are automatic reset and cause compressor to shut down

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

For each system a common alarm contact for:

- Low leaving chilled liquid temperature
- Low voltage

- Low battery
- High discharge pressure (per system)
- Low suction pressure (per system)
- Compressor motor protection

Accessories and Options

Control Transformer

Converts unit power voltage to 220 V - 1 phase - 50 Hz (2.0 kVA capacity). Factory mounting includes primary and secondary wiring between the transformer and the control panel (Factory installed).

Desuperheater

Additional stainless steel plate heat exchangers factory mounted in discharge lines between compressors and 4-way valves. Provides approximately 10 to 40 % heat recovery from total heat rejection at hot leaving water range between 35 and 60°C (no direct control of hot water temperature).

Compressor Acoustic Blankets

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

Compressor Acoustic Enclosure

Factory fit acoustically lined, painted galvanised steel, enclosure with removable panels for maintenance purposes.

Condenser Coil Wire Enclosure

Welded wire mesh guards mounted over the condenser coils (factory mounted).

Condenser Coil Louvred Panels*

Louvred panels mounted over the condenser coils (factory mounted).

Condenser Coil Wire Guards and Unit Louvred Panels

Welded wire mesh guards mounted over the condenser coils and louvred panels mounted around the bottom of the unit (factory mounted).

Unit Wire Enclosure

Welded wire mesh guards over condenser coils and around the bottom of the unit (field or factory mounted).

Unit Louvred Panels*

Louvred panels over condenser coils and around the bottom of the unit (factory mounted).

***Note:** When louvred panels are mounted over the condenser coils there can be a cooling capacity loss of 1% and an efficiency loss of 2%.

Aesthetic Vee Panels

Panels covering the pipework on the side of each condenser module.

Coil End Hail Guard

Louvred panel attached to exposed coil end.

Hydro Kit

Factory fitted Hydro Kit suitable for water glycol systems with up to 50% glycol at leaving water temperatures between 4°C and 55°C. The kit is available in single pump or dual pump variants, with open drive air cooled motor.

Components are mounted on a painted galvanised steel base plate and include: one or two pumps (2nd pump standby duty only), a flow switch and a diffuser.

The pumps and flow switch are factory wired to the unit control system to provide auto pump starting and running. With the dual pump option, in the event of failure of the running pump the standby pump starts automatically.

E-Link Gateway

The E-Link gateway provides full communication to Building Automation Systems using LONworks (refer to separate documentation for details).

38 mm Evaporator Insulation

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

Neoprene Pads Isolators

Recommended for normal installations (Field mounted)

25 mm Spring Isolators

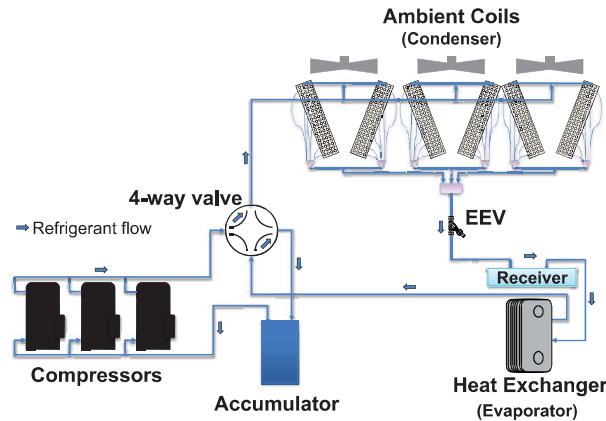
Level adjustable, spring and cage type isolators for mounting under the unit base rails (Field mounted).

Refrigerant Flow Block Diagrams

Cooling and Defrost Modes

Low pressure liquid refrigerant enters the heat exchanger and is evaporated and superheated by the heat energy absorbed from the chilled liquid. Low pressure vapour enters the compressor, via the four-way reversing valve and accumulator, where pressure and superheat are increased. The high pressure vapour is fed to the ambient coils and fans, via the four way reversing valve, where heat is removed. The fully condensed and subcooled liquid passes through the electronic expansion valve where pressure is reduced and further cooling takes place before returning to the heat exchanger.

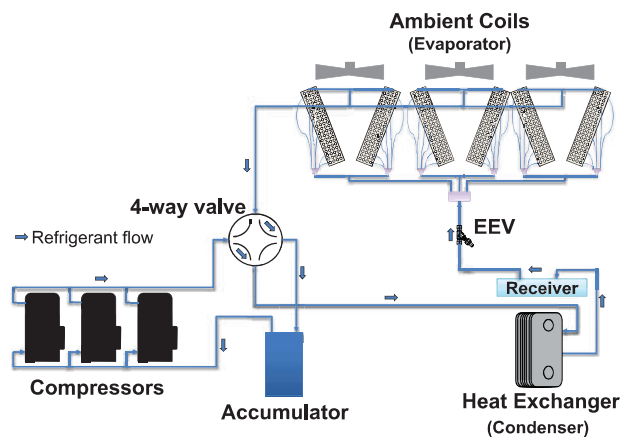
BE Models



Heat Pump Mode

Liquid refrigerant enters the ambient coil and is fully evaporated and superheated by the energy absorbed from the ambient air. Low-pressure superheated refrigerant vapour passes through the four-way reversing valve and the accumulator and enters the compressor, where pressure and superheat are increased. High-pressure superheated refrigerant vapour enters the refrigerant to water plate heat exchanger where heat is rejected to the water. The high-pressure liquid refrigerant, leaving the heat exchanger passes through the liquid receiver and enters the electronic expansion valve where the refrigerant pressure is reduced and subsequently cooled before returning to the ambient coil.

BE Models

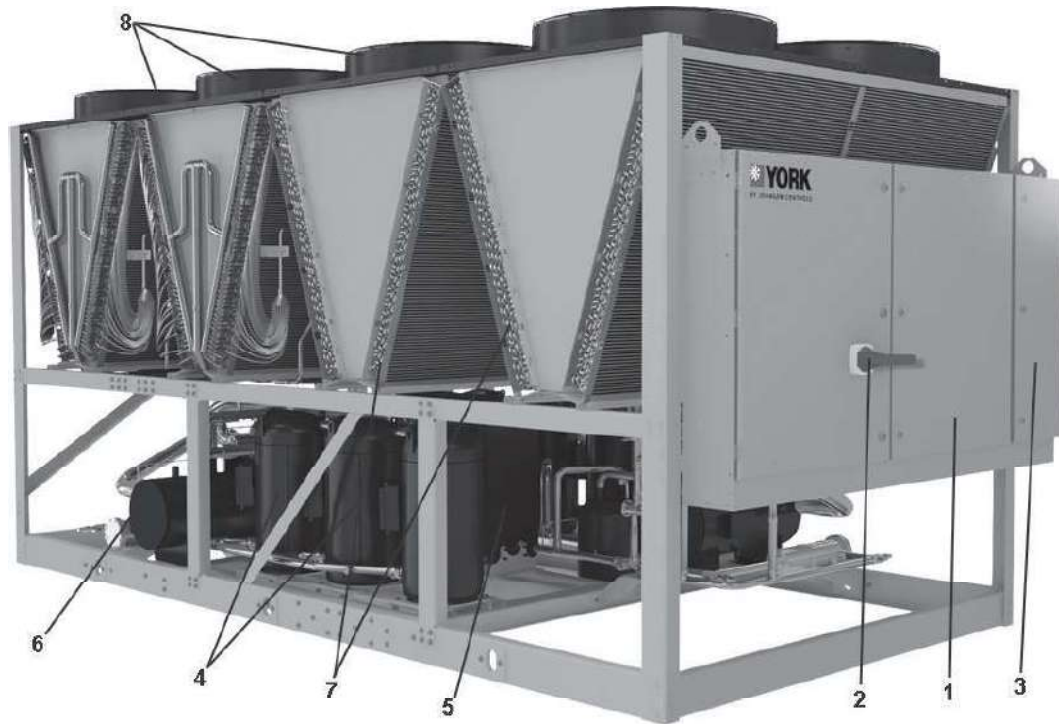


Defrost

When ice builds up on the ambient coils defrost is initiated by operating the machine in a cooling mode. Each of the two refrigerant circuits will be defrosted one at a time. When defrost is operative the circuit operating in heat pump mode is in balance with the circuit operating in defrost (cooling).

Component Location Diagrams

BE Models



- | | |
|-------------------------------|-----------------------|
| 1 Power Panel | 5 Heat Exchanger |
| 2 Non-Fused Disconnect Switch | 6 Suction Accumulator |
| 3 Control Panel | 7 Ambient Coils |
| 4 Compressors | 8 Fans |

Application Data

Location Requirements

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

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

Outdoor installations

The units can be installed at ground level on a suitable at level foundation easily capable of supporting the weight of the unit, or on a suitable rooftop location. In both cases an adequate supply of air is required. Avoid locations where the sound output and air discharge from the unit may be objectionable.

The location should be selected for minimum sun exposure and away from boiler flues and other sources of airborne chemicals that could attack the condenser coils and steel parts of the unit.

If located in an area accessible to unauthorized persons, steps must be taken to prevent access to the unit by means of a protective fence. This will help to prevent the possibility of vandalism, accidental damage, or possible harm caused by unauthorized removal of protective guards or opening panels to expose rotating or electrically live components.

For ground level locations, the unit must be installed on a suitable flat and level concrete base that extends to fully support the two side channels of the unit base frame. A one-piece concrete slab, with footings extending below the frost line is recommended. To avoid noise and vibration transmission, the unit should not be secured to the building foundation.

On rooftop locations, choose a place with adequate structural strength to safely support the entire operating weight of the unit and service personnel. The unit can be mounted on a concrete slab, similar to ground floor locations, or on steel channels of suitable strength. The channels should be spaced with the same centres as the unit side and front base rails. This will allow vibration isolators to be fitted if required. Isolators are recommended for rooftop locations.

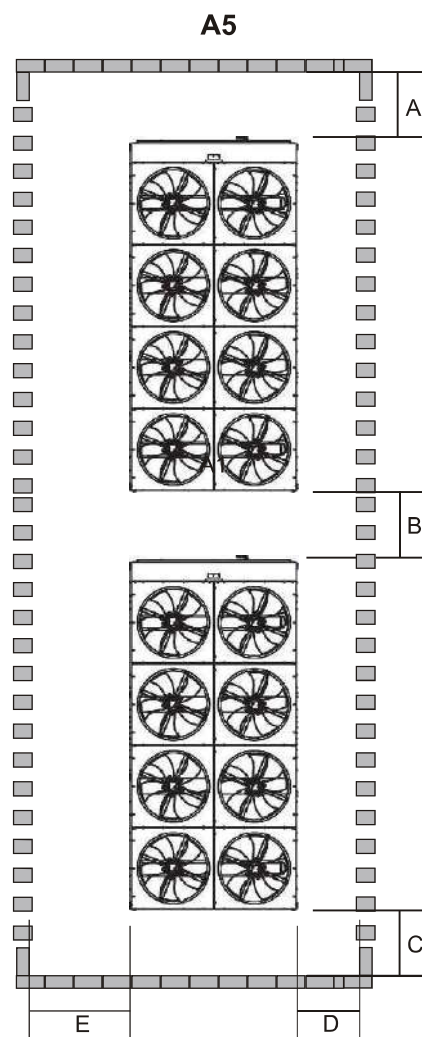
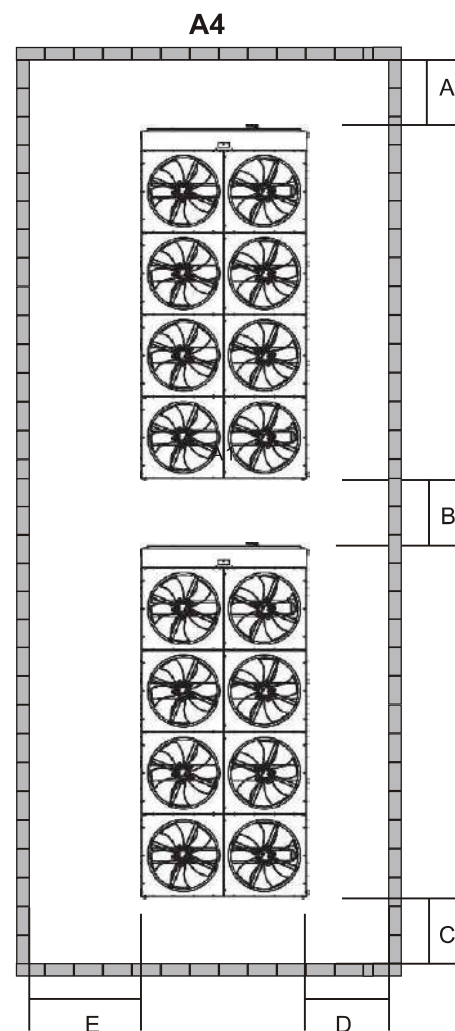
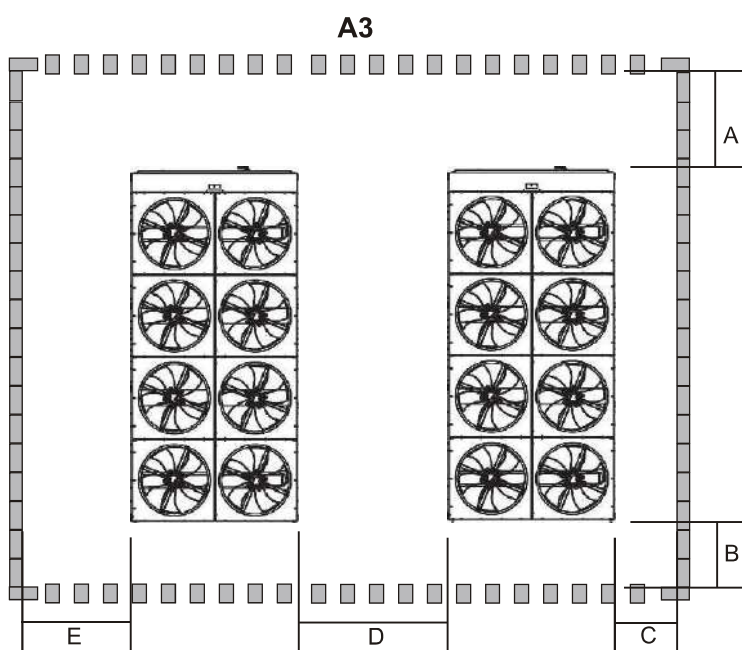
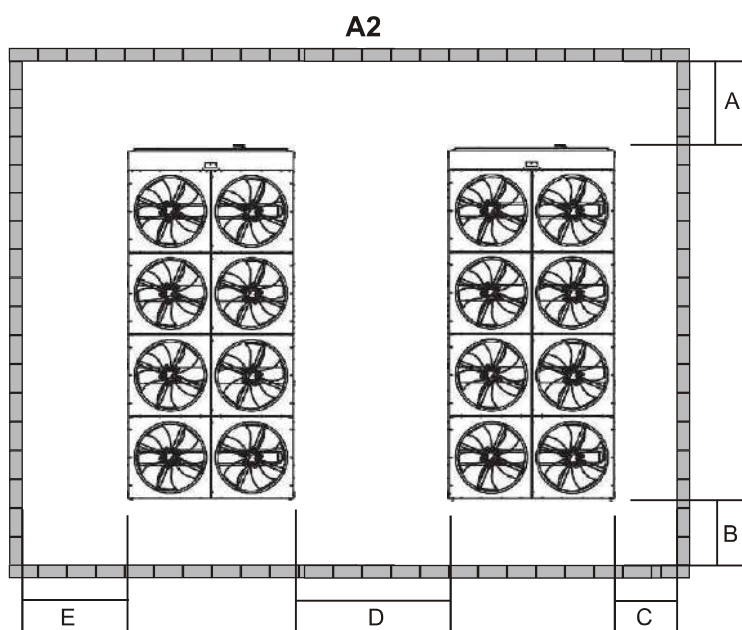
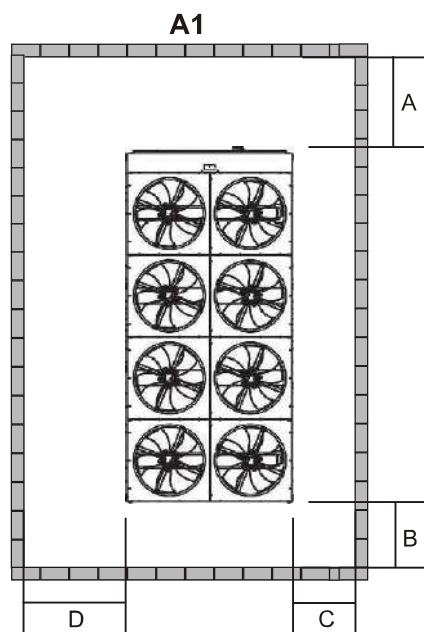
Location Clearances

Adequate clearances around the unit(s) are required for the unrestricted air-flow for the ambient coils and to prevent re-circulation of discharge air back onto the coils. If clearances given are not maintained, air-flow restriction or re-circulation will cause a loss of unit performance, an increase in power consumption, and may cause the unit to malfunction. Consideration should also be given to the possibility of down drafts, caused by adjacent buildings, which may cause re-circulation or uneven unit air-flow.

For locations where significant cross winds are expected, such as exposed roof tops, an enclosure of solid or louvre type is recommended to prevent wind turbulence interfering with the unit air-flow.

When units are installed in an enclosure, the enclosure height should not exceed the height of the unit on more than one side. Where accumulation of snow is likely, additional height must be provided under the unit to ensure normal air-flow to the unit.

	Dim. (m)	YLPA Model				
		0350BE	0435BE	0520BE	0565BE	0635BE
Arrangement A1 Solid Walls	A	2.0	2.0	2.0	2.0	2.0
	B	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	0.8
	D	1.4	1.4	1.4	1.4	1.4
Arrangement A2 Solid Walls	A	2.0	2.0	2.0	2.0	2.0
	B	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	0.8
	D	2.7	2.7	2.7	2.7	2.7
	E	1.4	1.4	1.4	1.4	1.4
Arrangement A3 Louvres on 2 walls	A	2.0	2.0	2.0	2.0	2.0
	B	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	0.8
	D	2.3	2.3	2.8	2.8	2.8
	E	1.4	1.4	1.4	1.4	1.4
Arrangement A4 Solid Walls	A	2.0	2.0	2.0	2.0	2.0
	B	2.0	2.0	2.0	2.0	2.0
	C	0.8	0.8	0.8	0.8	0.8
	D	0.8	0.8	0.8	0.8	0.8
	E	1.7	1.7	1.7	1.7	1.7
Arrangement A5 Louvres on 2 walls	A	2.0	2.0	2.0	2.0	2.0
	B	2.0	2.0	2.0	2.0	2.0
	C	0.8	0.8	0.8	0.8	0.8
	D	0.8	0.8	0.8	0.8	0.8
	E	1.4	1.4	1.4	1.4	1.4



Installation of Vibration Isolators

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

Pipework Connection

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

A flow switch must be installed in the customer pipework at the outlet of the evaporator as shown in the arrangement diagrams, and wired back to the control panel using screened cable. This is to prevent damage to the evaporator caused by inadequate liquid flow. To prevent turbulent flow, there must be straight pipework either side of the flow switch equal in length to at least 5 times the diameter of the pipe.

The flow switches used must have gold plated contacts for low voltage/current operation

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

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

Pipework and fittings immediately next to the heat exchanger(s) should be readily demountable to enable cleaning prior to operation, and to facilitate visual inspection of the exchanger nozzles.

Each heat exchanger must be protected by a strainer, (no less than 20 U.S. mesh) fitted as close as possible to the liquid inlet connection, and provided with a means of local isolation. On BE Models a wye-strainer is provided as standard to provide additional protection at the evaporator inlet.

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

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

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

Liquid systems at risk of freezing, due to low ambient temperatures, should be protected using insulation and heater tape and/or a suitable glycol solution.

The liquid pumps must also be used to ensure liquid is circulated when the ambient temperature approaches freezing point. Insulation should also be installed around the heat exchanger nozzles.

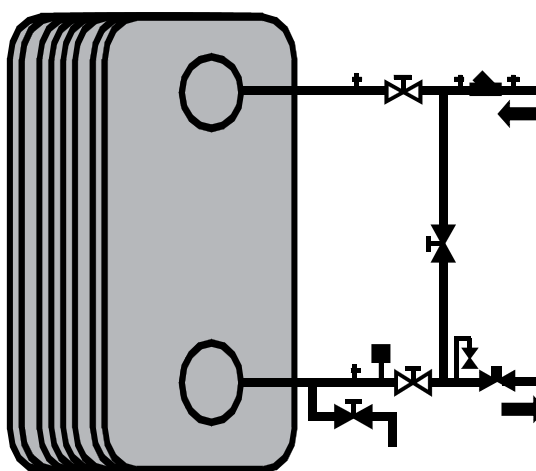
Heater tape of 21 W/m under the insulation is recommended, supplied independently and controlled by an ambient temperature thermostat set to switch on at approximately 2.2°C above the freezing temperature of the chilled liquid.

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

During cold weather, when there is a risk of freezing, and the unit will not be operated for a long period of time. It is recommended that the water system is drained down, to prevent damage to the unit heat exchanger and pipework.

Pipework Arrangement

The following are suggested pipework arrangements for single unit installations. For multiple unit installations, each unit should be piped as shown. These are recommendations of the Building Services Research Association.



- ✚ Pressure Tapping
- ⌫ Air vent
- ⬮ Flow Switch
- ⌘ Isolating Valve – Normally Open
- ⌘ Isolating Valve – Normally Closed
- ⌘ Flow Regulating Valve
- ⬮ Strainer

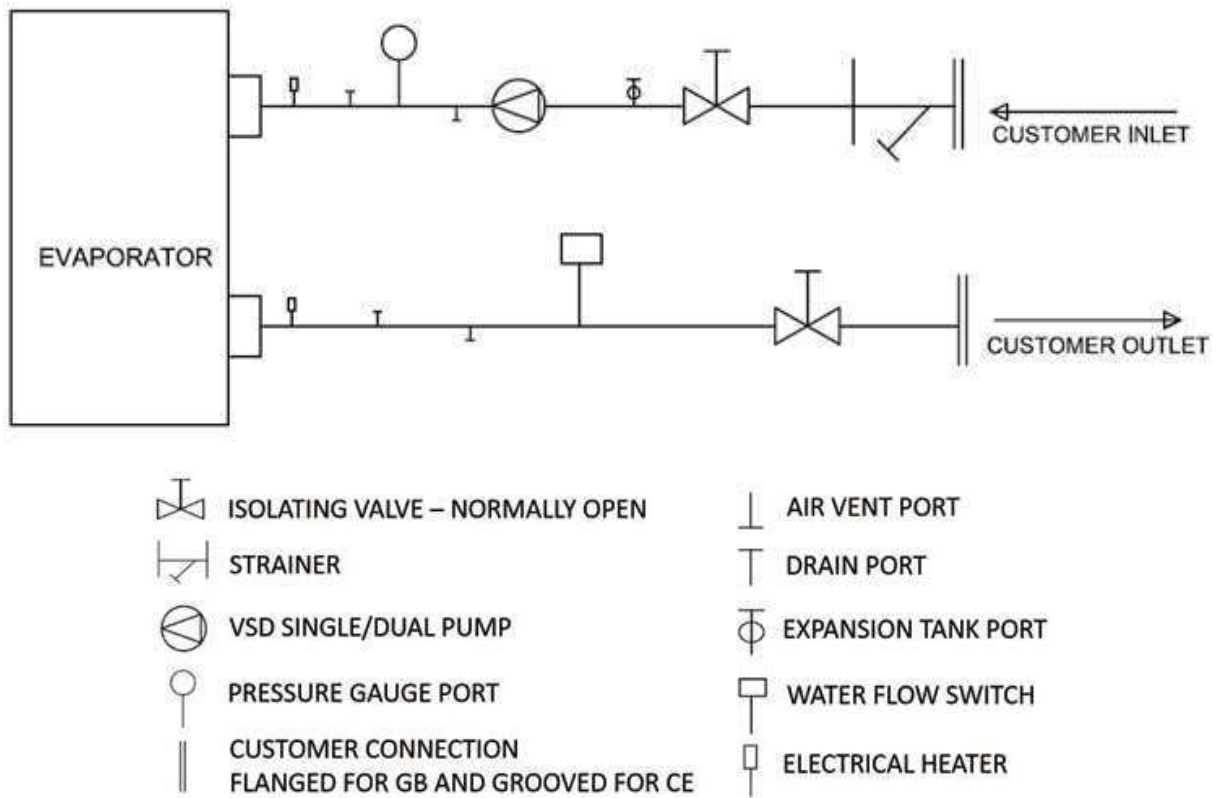
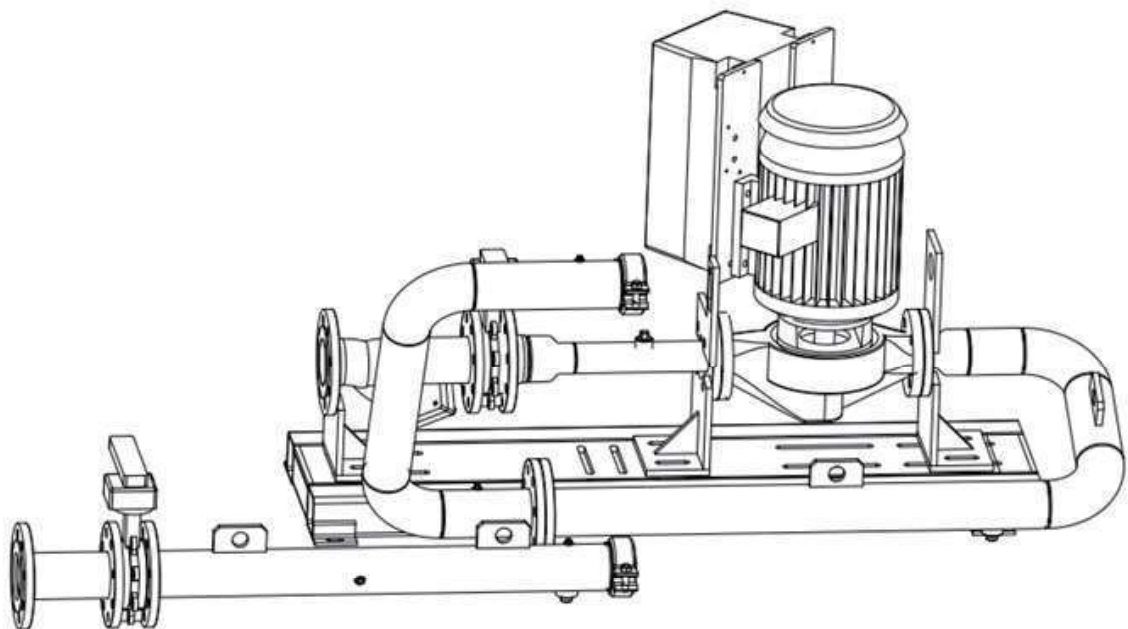


FIGURE 1 - CHILLED LIQUID SYSTEM (WITH VSD PUMP KITS)



FIGUR 2 - 2D DRAWING OF THE HYDRO KITS(ONLY FOR REFERENCE)

NOTICE: EACH OF THE CHILLERS ARE EQUIPPED WITH FOUR KINDS OF VSD PUMP KITS:
 SINGLE VSD PUMP KIT WITH STANDARD HEAD,
 SINGLE VSD PUMP KIT WITH HIGH HEAD,
 DUAL VSD PUMP KIT WITH STANDARD HEAD,
 DUAL VSD PUMP KIT WITH HIGH HEAD.

Connection Types and Sizes

Standard pipework connections are of the welded flange type.

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

Water Treatment

The unit performance given in the Design Guide is based on a fouling factor of 0.018 m² °C/kW. Dirt, scale, grease and certain types of water treatment will adversely affect the heat exchanger surfaces and therefore unit performance. Foreign matter in the water system(s) can increase the pressure drop, reducing the flow rate and causing potential damage.

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

Refrigerant Relief Valve Piping

The heat exchanger is protected against internal refrigerant overpressure by refrigerant relief valves. A pressure relief valve is mounted on each of the main refrigerant lines connecting the evaporator to the compressors.

For indoor installations, pressure relief valves should be piped to the exterior of the building.

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 can be estimated with the following formula:

$$D5=1.447 \times L$$

Where:

D = minimum pipe internal diameter (cm)

L = length of pipe (m).

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

Electrical Connection

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

All customer wiring at the jobsite must be routed to avoid high temperature areas (compressor shells, discharge piping, ambient coils and other hot surfaces) and sharp edges on the unit, to prevent damage to the wiring and possible short circuits. If these precautions are not followed it could lead to a risk of electrocution or damage to the unit and its controls.

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

Power Wiring

These units are suitable for 380 / 400 / 415 V, 3-phase, 50Hz nominal supplies only.

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

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

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

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

Single Point Power Supply Wiring

BE models require one field provided 380 / 400 / 415 V, - 3 phase - 50 Hz + N (Neutral) + PE (Protected Earth) supply to the unit with circuit protection.

Connect the 3-phase supply to the non-fused disconnect switch located in the power panel using M12 lugs.

Connect the neutral wire to TB-N terminal located in the power panel.

Connect the earth wire to the main protective earth terminal located in the power panel using a M10 lug.

Control Supply

The control supply on BE models is derived internally using one of the phases and the neutral. However, when the control transformer option is specified, the factory fitted transformer supplies the control supply.

A factory fitted transformer supplies the control supply on TE models.

Remote Emergency Stop Device

If required, a remote emergency stop device may be wired into the unit. This device should be rated at 20 amps, 220 V, AC-15. The device should be wired into terminals L and 5 in the power panel after removing the factory fitted link.

Control Wiring - Voltage Free Contact

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

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

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

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

Chilled Liquid Pump Starter

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

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

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

Run Contacts

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

Alarm Contacts

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

Control Wiring - System Inputs

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

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

Remote Start/Stop

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

Remote Mode Selection

Remote mode selection can be accomplished by connecting a contact between terminals 13 and 50. With the contact open the unit is in the cooling mode, with the contact closed the unit is in the heating mode.

Remote Reset of Chilled Liquid Setpoint

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

Remote Load Limiting

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

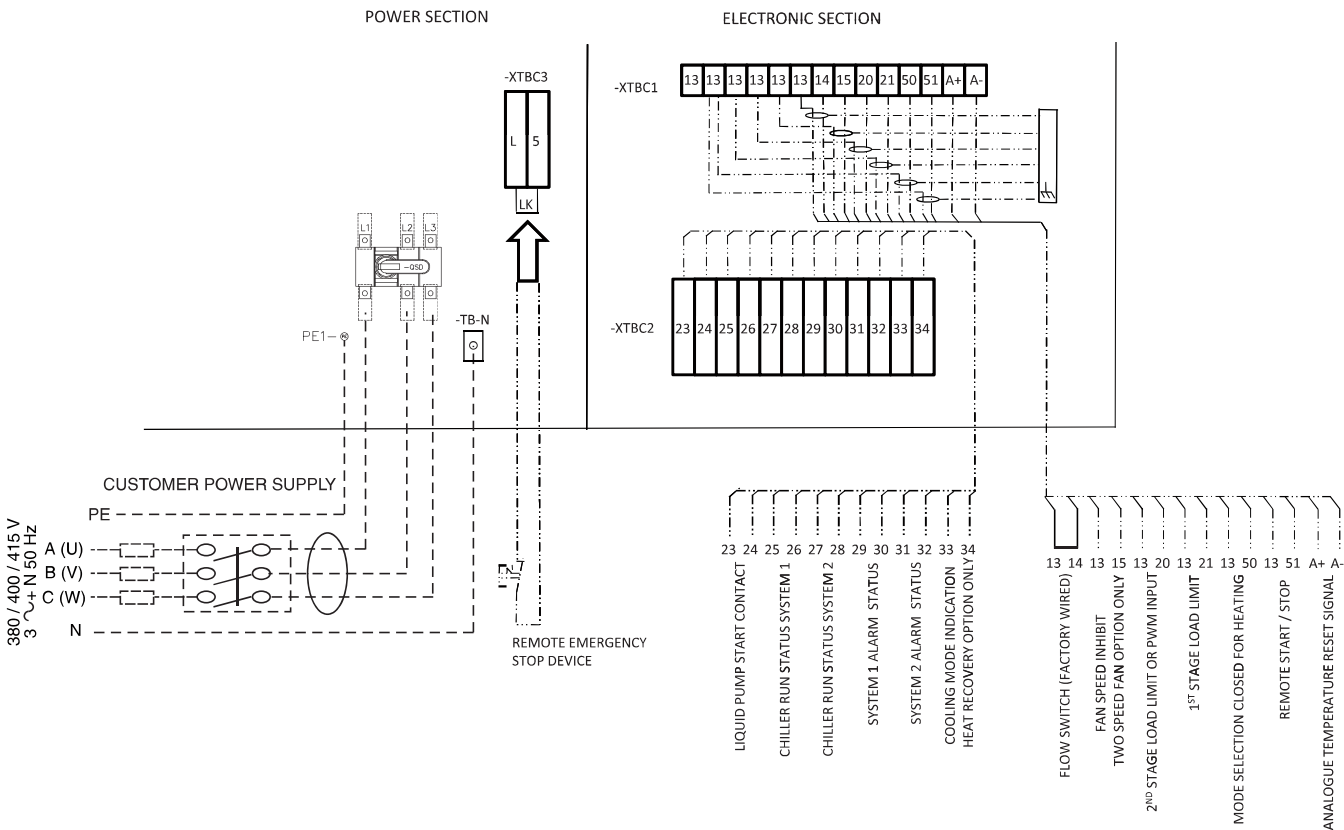
EMS Analogue Input

Provides a means of resetting the leaving chilled or hot liquid temperature from the BAS/EMS. Accepts 4 to 20 mA, 0 to 20 mA, 0 to 10 Vdc or 2-10 Vdc. Connect to terminal A+ and A-.

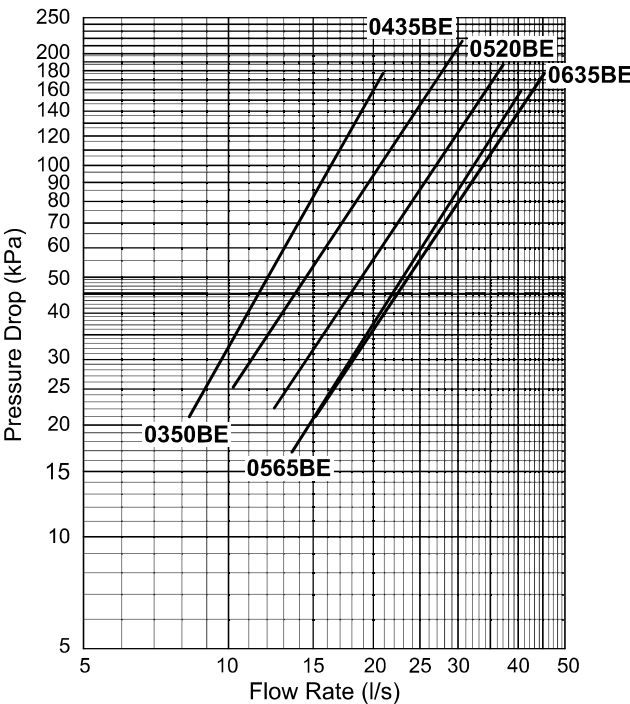
Modbus, BACnet MS/TP and N2

Enable communications with building protocol systems using Modbus, BACnet or N2 protocol. Connect through standard RS485 port.

Connection Diagrams



Refrigerant to Water Heat Exchanger Pressure Drop Graphs



YLPA Model	Evaporator Pressure Drop (kPa)
0350BE	$\Delta P= 0.328 \times \text{Flow Rate (l/s)} ^{1.9575}$
0435BE	$\Delta P= 0.258 \times \text{Flow Rate (l/s)} ^{1.9663}$
0520BE	$\Delta P= 0.161 \times \text{Flow Rate (l/s)} ^{1.9527}$
0565BE	$\Delta P= 0.093 \times \text{Flow Rate (l/s)} ^{2.0089}$
0635BE	$\Delta P= 0.105 \times \text{Flow Rate (l/s)} ^{1.945}$

Operating Limitations

YLPA Model			0350BE		0435BE		0520BE		0565BE		0635BE	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Cooling Mode	Liquid Outlet Temperature (Water)	°C	4 to 15									
	Liquid Outlet Temperature Range (ΔT)	°C	3 to 8									
	Air Temperature - Standard Unit	°C	0 to 46 ⁽¹⁾									
Heating Mode	Liquid Outlet Temperature (Water)	°C	35 to 55									
	Liquid Outlet Temperature Range (ΔT)	°C	3 to 8									
	Air Temperature - Standard Unit	°C	-15 to 35									
Heat Exchanger Flow Rate		l/s	10	25	13	31	15	37	16	40	20	46
Heat Exchanger Presssure Drop ⁽²⁾		kPa	29.7	178.8	40.0	220.8	31.9	185.8	24.4	153.8	35.6	180.0
Minimum System Water Volume		l	1469		1823		2195		2407		2690	
Maximum Water Side Pressure		bar	10.0									
Maximum Refrigerant Side Pressure		bar	45.0									
Power Supply Voltage		V	380 V, 400 V, 415 V, 3Ø, 50Hz (nominal) ⁽³⁾									

(1) Unit may operate unloaded up to 52°C depending on model size and site conditions. When Partial Heat Recovery option is specified the maximum air temperature on the ambient coils is reduced by 2°C to 44°C.

(2) Heat Exchanger Presssure Drop on BE Models includes the factory fitted wye strainer.

(3) Tolerance 380 V / 400 V models +/-10%, 415 V models +6% / -10%.

Physical Data

YLPA Model			0350BE	0435BE	0520BE	0565BE	0635BE
Number of refrigerant circuits			2				
Refrigerant Charge ⁽¹⁾	Circuit 1 / Circuit 2	kg	44/44	61/45.5	61/61	76/62	77/77
Oil Charge	Circuit 1 / Circuit 2	l	11/11	17/11	17/17	18.9/17	18.9/18.9
Compressor	Number of compressors		2 / 2	3 / 2	3 / 3	3 / 3	3 / 3
	Type		Scroll				
Refrigerant to Water Heat Exchanger	Number		1			2	
	Type		Brazen Plate				
	Water Volume ⁽²⁾	l	43.7	50.3	59.7	76.1	79.9
	Water Connections	Inch	3	3	4	4	4
Ambient Coils Fans	Number of Fans (circuit 1 / circuit 2)		3 / 3	4 / 3	4 / 4	6/4	6 / 6
	Total Air Flow - Standard Models	m ³ /s	35	41	47	58	70
Dimensions	Length	mm	4793	4793	4795	5912	7029
	Width	mm	2242	2242	2242	2242	2242
	Height - Standard Fan	mm	2515	2515	2515	2515	2515
	Height - VSD Fan	mm	2391	2391	2391	2391	2391
Basic Unit Weight	Shipping Weight	kg	3719	3950	4099	4622	5359
	Operating Weight	kg	3753	3993	4150	4687	5435

(1) Liquid sub-cooling measured at the liquid line should be between 5,0 and 8,0°C at circuit full load.

Sub-cooling is determined by the level of refrigerant charge in each system

(2) Water volume is the total volume for both single and dual heat exchangers

Fan Data

Fan Data			
FAN TYPE	KW	FLC @400V	LRC@400V
Standard	1.7	3.1	18.9

Values are for each fan. (FLC: Full Load Amps; LRC: Lock Rotor Amps)

Compressor Data

	Compressor Data				
	Nominal		Maximum		Inrush Current
YLPA	kW	Amps @400V	kW	Amps @400V	Amps @400V
0350BE to 0520BE Sys 1 & 2 0565BE Sys 2	25	43.1	31.7	52.9	310
0565BE Sys 1 0635BE Sys 1 & 2	32.3	54.9	40.3	66.7	427

Electrical Data

Unit Data						
YLPA	Nominal Running Conditions		Maximum Running Conditions		Start up Amps Direct on Line ⁽¹⁾	
	Amps @ 400 V ⁽²⁾	Amps @ 380 V ⁽³⁾	Amps @ 400 V ⁽²⁾	Amps @ 380 V ⁽³⁾	Amps @ 400 V ⁽²⁾	Amps @ 380 V ⁽³⁾
0350BE	191	201	230	242	458	450
0435BE	237	249	286	301	504	499
0520BE	283	298	342	360	550	547
0565BE	325	342	390	411	659	652
0635BE	367	386	437	460	701	696

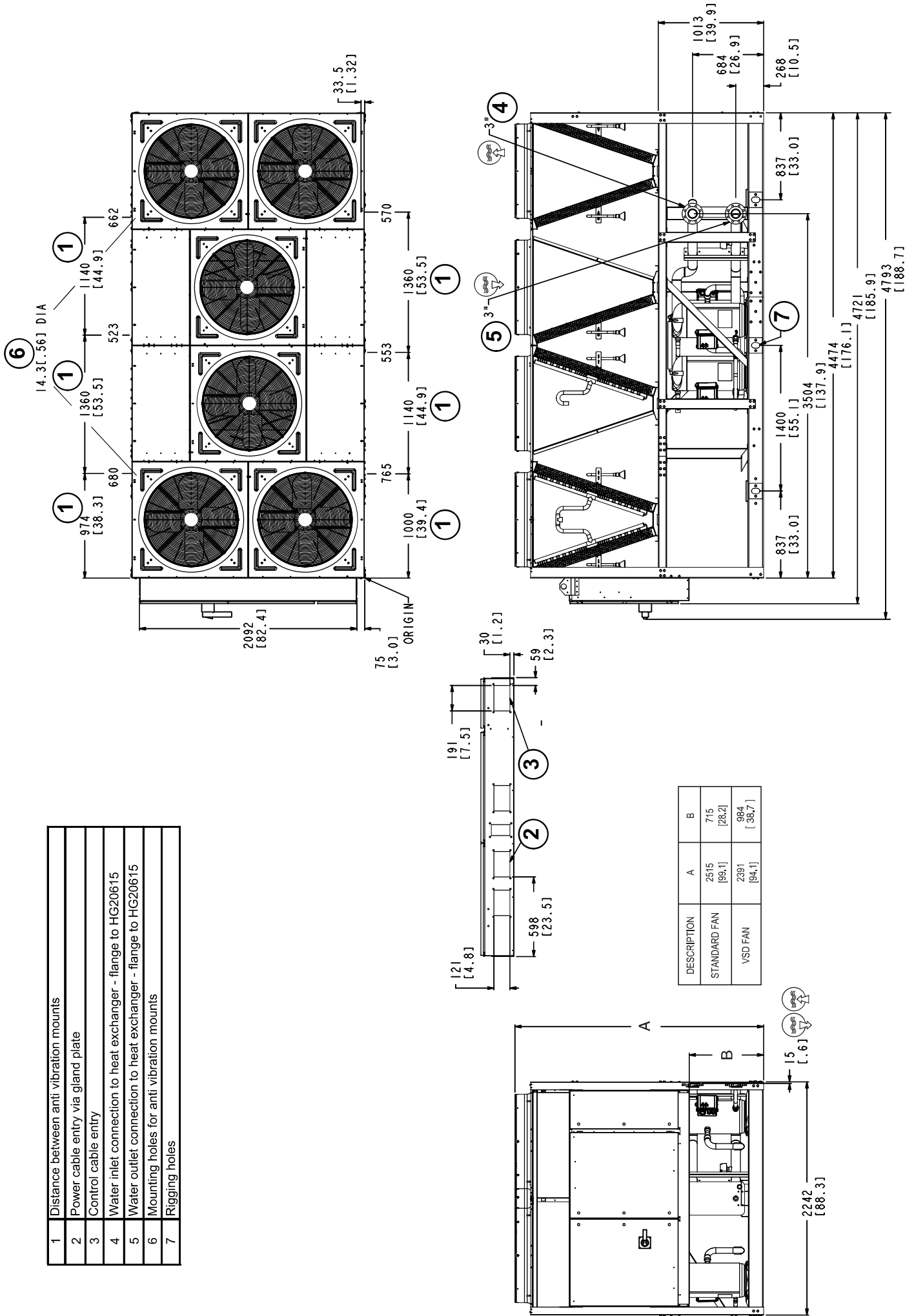
(1) Start up amps is the largest compressor starting with all other compressors/fans operating at nominal conditions.

(2) 400V, 3Ø, 50Hz (nominal, +/- 10% tolerance)

(3) 380V, 3Ø, 50Hz (nominal, +/- 10% tolerance).

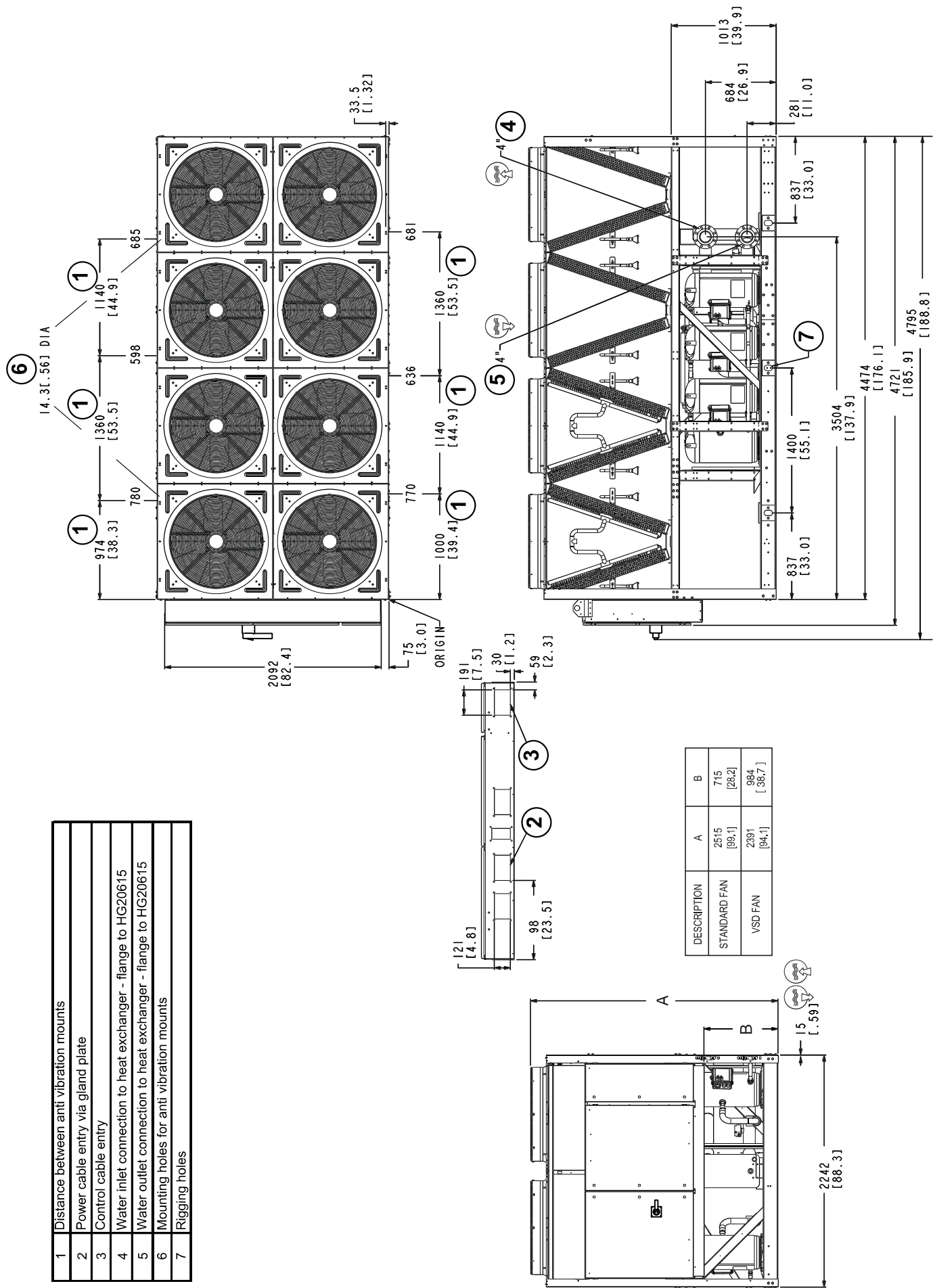
Power factor @380V is assumed to be the same as 400V.

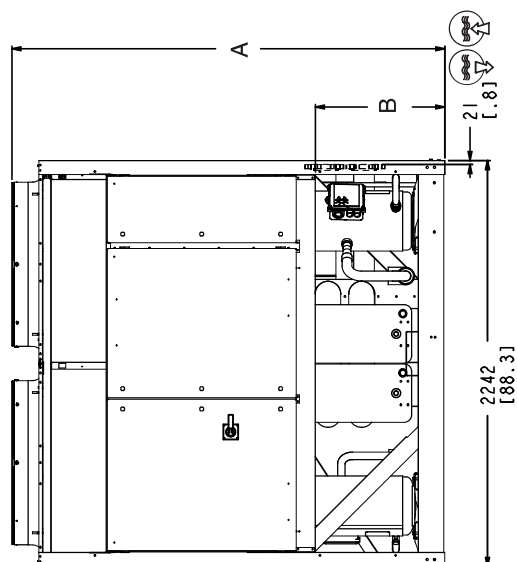
1	Distance between anti vibration mounts
2	Power cable entry via gland plate
3	Control cable entry
4	Water inlet connection to heat exchanger - flange to HG20615
5	Water outlet connection to heat exchanger - flange to HG20615
6	Mounting holes for anti vibration mounts
7	Rigging holes



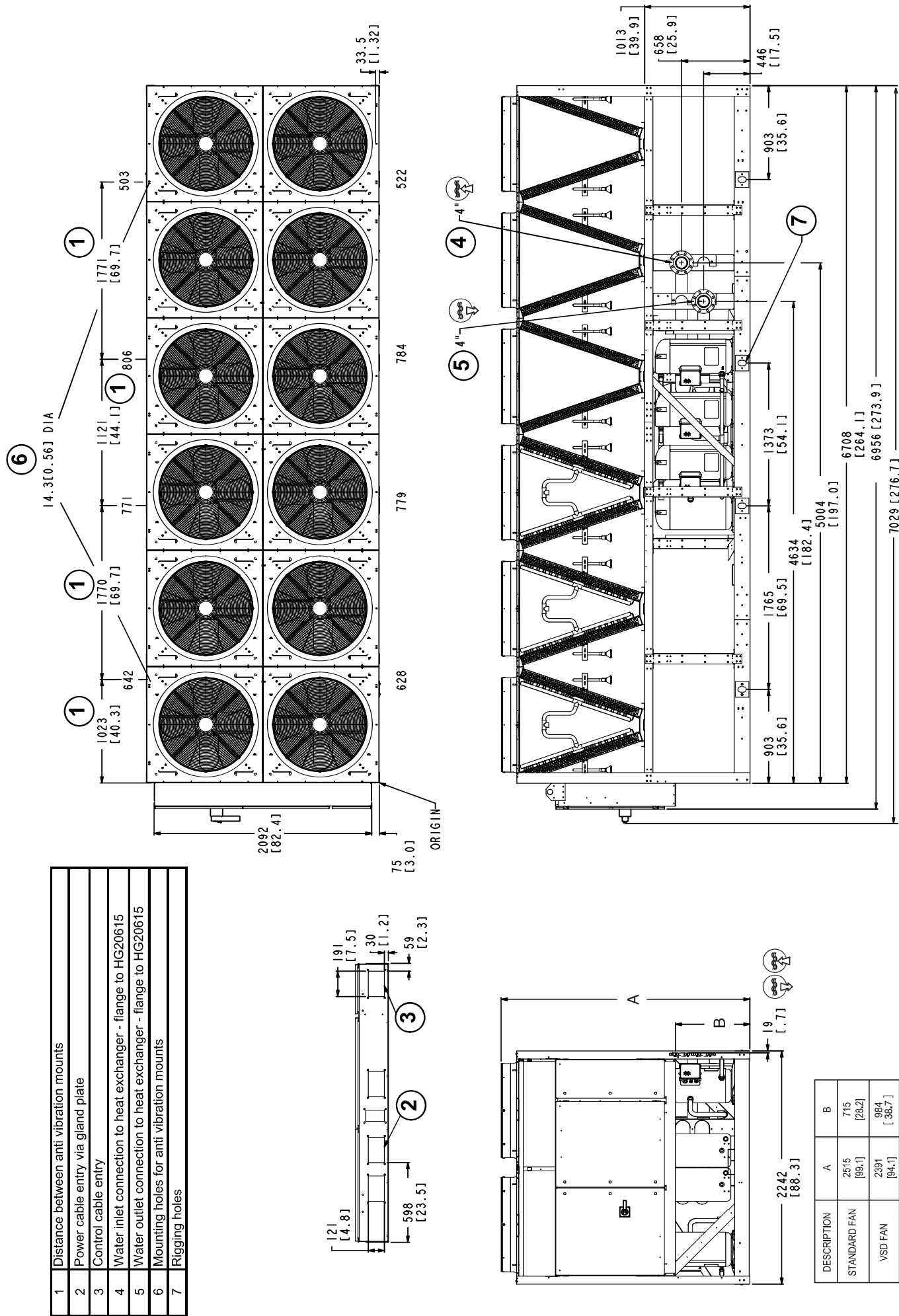
DESCRIPTION	A	B
STANDARD FAN	2515 [99,1]	715 [28,2]
VSD FAN	2391 [94,1]	984 [38,7]







DESCRIPTION	A	B
STANDARD FAN	2515 [99.1]	715 [28.2]
VSD FAN	2391 [94.1]	984 [38.7]





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