YLAA0180SE-YLAA0485SE & YLAA0195HE-YLAA0515HE

ENGINEERING GUIDE	Revision 3	PC181-100 (GB 0809)

AIR COOLED LIQUID CHILLERS
WITH SCROLL COMPRESSORS
STYLE A

(Cooling Capacities: 180 kW to 520 kW)

Tempo

EUROVENT CERTIFIED PERFORMANCE

CE

R410A

YORK
BY JOHNSON CONTROLS

Johnson Controls

TEMPO Features

YORK TEMPO is a fully packaged air-cooled liquid chiller, with scroll compressors, designed to be located outside on the roof of a building or at ground level

There are two levels of operating efficiency:

- Standard efficiency SE models
- High efficiency HE models

Standard SE and HE chillers have normal speed fans and no compressor enclosure.

Each efficiency level has a selection of acoustic options:

- Two speed fans
- Acoustically lined compressor enclosure
- Acoustically lined compressor enclosure and two speed fans
- Low sound (LS) models with acoustically lined compressor enclosure and fixed low speed fans

Economical operating costs year round

The incorporation of multiple scroll compressors results in high full and part load efficiencies. As each compressor represents a cooling capacity step there is no efficiency reduction when the chiller operates at part load. As the cooling capacity demand falls the available condenser surface increases, in comparison to the load demand, and therefore the part load efficiency exceeds the full load efficiency.

Specifically designed for low sound operation

Most major cities today have rigorous noise control legislation and many applications such as medical, educational, hotels and theatres are extremely noise sensitive. In such situations a chiller must not only meet sound level requirements during the day, when background noise levels often mask chiller sound levels, but also during evenings and at night when legislated levels are more stringent and background levels are diminished.

The TEMPO LS chiller has been specifically designed for low sound operation, to satisfy these varied requirements, by incorporating slow speed fans and arranging all the compressors together in one location and enclosing them in an acoustically treated chamber.

Suits locations where space is restricted

TEMPO has a compact design to suit locations where space is restricted.

Fast and easy installation

TEMPO has a single electrical power connection and optional, factory fitted, water circulating pump(s), water filter and flow switch to provide fast and easy installation.

Buffer tank not normally required

TEMPO requires a minimum water volume to satisfy only one minute of chiller operation at minimum cooling capacity. Therefore on standard air-conditioning systems, such as Fan-Coil etc. a buffer tank is not normally required.

Heat Recovery

An additional dual refrigerant circuit plate heat exchanger provides warm water up to 50ºC. Suitable for air driven heating systems and domestic hot water preheat.

Tested for operating reliability

Every TEMPO chiller is fully factory tested before being shipped in order to ensure trouble free installed operation.

Dual refrigeration circuits

TEMPO dual refrigerant circuits and multiple scroll compressors provide system stand-by security.

Plain language 40-character display

TEMPO has a microprocessor controller with a 40-character, plain language, display of temperatures, pressures, operating hours, number of starts and start stop/holiday times. Control functions include accurate leaving liquid temperature, compressor lead/lag, system safety protection and integral circulating pumps.

Efficient low sound fans

TEMPO has aerodynamically designed low sound fans located in separate compartments to prevent air recirculation and to reduce inefficient fan start/stop operation.

All aluminium condenser coils

The incorporation of microchannel aluminium coils provide improved heat transfer, reduced fan power, require less refrigerant and eliminates the possibility of galvanic corrosion, caused by the contact between dissimilar metals. The coil headers, tubes and fins are all aluminium. Coils can be easily pressure washed (100 bar maximum), saving time and sustaining efficiency.

High Efficiency Evaporator

All models have high efficiency evaporators to provide high cooling capacities and low water pressure drops

Nominal Data

YLAA - SE	Fan Speed	YLAA 0180SE	YLAA 0210SE	YLAA 0240SE	YLAA 0285SE	YLAA 0320SE	YLAA 0360SE	YLAA 0400SE	YLAA 0435SE	YLAA 0485SE
Cooling Capacity kW (1)	Normal	179	196	218	276	310	344	386	418	466
Energy Efficiency Ratio (EER) (1/1a)		2.84	2.41	2.69	2.71	2.56	2.66	2.55	2.69	2.57
Eurovent Class		C	E	D	C	D	D	D	D	D
ESEER (2)		3.95	3.42	3.65	4.09	3.97	3.94	3.79	3.92	3.83
Cooling Capacity kW (1)	Low (LS)	177	193	214	269	301	336	374	408	452
Energy Efficiency Ratio (EER) (1/1a)		2.75	2.3	2.63	2.59	2.42	2.54	2.41	2.57	2.43
Eurovent Class		C	E	D	D	E	D	E	D	E
ESEER (2)		3.88	3.34	3.67	4.01	3.89	3.96	3.79	3.89	3.80
Sound Pressure at 10 meters dB(A) (3)	Normal (4)	57	58	59	61	62	62	62	64	64
	Normal (5)	52	53	54	58	57	58	58	59	59
	Low (6)	48	49	51	54	54	54	54	56	56
	Low (7)	49	50	52	55	55	55	55	57	57

YLAA - HE	Fan Speed	YLAA 0195HE	YLAA 0260HE	YLAA 0300HE	YLAA 0350HE	YLAA 0390HE	YLAA 0440HE	YLAA 0455HE	YLAA 0515HE
Cooling Capacity kW (1)	Normal	196	253	310	346	386	429	451	521
Energy Efficiency Ratio (EER) (1/1a)		3.08	3.03	3.1	3.1	3.03	3.04	3.07	3.06
Eurovent Class		B	B	A	A	B	B	B	B
ESEER (2)		4.39	4.72	4.14	3.99	4.15	4.14	4.17	4.33
Cooling Capacity kW (1)	Low (LS)	194	248	304	340	377	421	443	510
Energy Efficiency Ratio (EER) (1/1a)		2.98	2.94	3.01	3.03	2.93	2.96	3.01	2.96
Eurovent Class		B	B	B	B	B	B	B	B
ESEER (2)		4.26	4.59	4.22	4.01	4.22	4.19	4.22	4.37
Sound Pressure at 10 meters dB(A) (3)	Normal (4)	57	61	61	62	63	63	64	64
	Normal (5)	52	58	56	57	58	58	59	59
	Low (6)	48	54	53	54	55	55	56	56
	Low (7)	49	55	54	55	56	56	57	57

(1) At 7ºC leaving chilled water and 35ºC ambient

(1a) EER = Cooling Capacity / Total kW Input from compressors and fans

(2) ESEER is European Seasonal Energy Efficiency Ratio. ESEER = 0.03A + 0.33B + 0.41C + 0.23D

A = EER at 100% capacity at 35ºC ambient. B = EER at 75% capacity at 30ºC ambient.

C = EER at 50% capacity at 25ºC ambient. D = EER at 25% capacity at 20ºC ambient.

(3) Sound Pressure in free field conditions

(4) Fans operating at normal speed without compressor enclosure at 7ºC leaving chilled water and 35ºC ambient.

(5) Fans operating at normal speed with compressor enclosure at 7ºC leaving chilled water and 35ºC ambient.

(6) Optional dual speed fans operating at low speed with compressor enclosure at 7ºC leaving chilled water and 25ºC ambient.

(7) LS Model: fixed low speed fans with compressor enclosure at 7ºC leaving chilled water and 35ºC ambient

Data based on 5ºC chilled liquid temperature difference and 0.018m²ºC/kW fouling factor

Specification

YLAA air-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 R410A and oil in each of the independent refrigerant circuits. After assembly, an operational test is performed with water flowing through the evaporator 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)).

YLAA chillers are designed and manufactured within an EN ISO 9001 accredited organisation and in conformity with the following European Directives:

- Machinery Directive (98/37/EC)
- Low Voltage Directive (2006/95/EC)
- EMC Directive (2004/108/EC)
- Pressure Equipment Directive (97/23/EC)

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, and soft start is available as an option.

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

The motor terminal boxes have IP 54 weather protection.

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.

Liquid line components include: a service valve with charging port, a high absorption removable core filter-drier, a solenoid valve, a sight glass with moisture indicator and a thermal expansion valve. Liquid lines between the expansion valve and the cooler are insulated with flexible, closed-cell foam.

Suction line components include: a pressure relief valve, a pressure transducer and a service valve. Suction lines are insulated with flexible, closed-cell foam.

Discharge lines include service and isolation ball valves, a high-pressure cutout switch, a pressure transducer and a pressure relief valve.

Evaporator

The evaporator on models YLAA0180SE, YLAA0210SE and YLAA0240SE is a stainless steel plate type heat exchanger with a design working pressure of 10 barg on the water side. All other models have a shell and tubes type evaporator.

The 2-pass dual circuit shell and tube type direct expansion (DX) evaporator has refrigerant in the tubes and chilled liquid flowing through the baffled shell. The waterside (shell) design working pressure of the cooler is 10.3 bar g. The refrigerant side (tubes) design working pressure is 27.6 bar g. The refrigerant side is protected by pressure relief valve(s).

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

Air Cooled Condensers

Each condenser coil is a single piece all aluminium construction including headers, tubes and fins to avoid galvanic corrosion due to dissimilar metals. Coils and headers are brazed as one piece. Integral subcooling is included. The design working pressure is 43 bar.

The condenser fans have metal ‘sickle’ blades integrated into the rotor of an external rotor motor. They 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 IP 54 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, latched and gasket sealed outer doors.

The power panel includes:

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

The control panel includes:

- A Liquid Crystal Display (two display lines of twenty characters per line) with Light Emitting Diode backlighting for easy viewing
- A Colour coded 12-button keypad
- Customer terminal 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, automatic pumpdown on shutdown, evaporator pump and unit alarm contacts. Automatic reset to normal chiller operation after power failure.
- Remote water temperature setpoint reset via a pulse width modulated (PWM) input signal or up to two steps of demand (load) limiting
- Software is loaded into the microprocessor controller via a SD card, with programmed setpoints retained in a lithium battery backed real time clock (RTC) memory.
- Forty character liquid crystal display, with description available in five languages (English, French, German, Spanish or Italian)

Programmable setpoints:

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

Displayed Data:

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

System Safeties:

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

Unit Safeties:

- They are automatic reset and cause compressor to shut down
- Low leaving chilled liquid temperature
- Under voltage
- Loss of liquid flow (through flow switch)

Alarm Contacts:

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

Accessories and Options

Power Factor Correction

Factory mounted passive (static) power factor correction capacitors to correct unit compressor power factors to a target of 0.9 (depending on operating conditions). Option not available on compressors fitted with soft start option.

Soft Starters

Factory mounted soft starters reduce the inrush current to the last compressor on each refrigerant circuit. They are preset so that no field adjustment is required. . This option is not available for units operating in ambients greater than 35°C.

Language LCD and Keypad

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

Multi-Chiller Sequencer

The multi-chiller sequencer has been designed to manage up to four chillers, piped in parallel, from a common chilled water sensor. The sequencer is factory mounted in an IP55 panel with viewing window, lockable door and an electrical isolator. To be field fitted and wired to power supply and chillers.

Heat Recovery

Stainless steel, dual refrigerant circuit, plate heat exchanger with victaulic water connections.

Hydrokit

Factory fitted Hydrokit suitable for water glycol systems with up to 35% glycol at leaving liquid temperatures down to -7°C. The kit is available in single or dual motor configuration (dual as standby duty only), with totally enclosed permanently lubricated pump motors.

The Hydrokit option is provided with a balancing valve, flow switch, pressure ports (gauges to be supplied by others), suction guide, strainer, bleed and drain valves and frost protection.

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

Victaulic Flange Kit

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

38 mm Evaporator Insulation

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

Flow Switch

Vapour Proof, paddle-type with 1"NPT connection for upright mounting in horizontal pipe. This flow switch or its equivalent must be supplied with each unit to protect the evaporator from loss of liquid flow (Field Mounted)

Dual Pressure Relief Valves

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

Low Sound (LS) Unit

Includes low speed fans and compressor acoustic enclosures (factory fit).

Compressor Acoustic Enclosure

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

Dual speed fans

Fans operate either in high mode (920 RPM) or in low mode (670 RPM). Fan speed reduces automatically from high to low mode as head pressure falls, or at programmed times within the control software.

High Pressure Fans

Fans and motors suitable for high external static conditions up to 120 Pa.

High Ambient Kit

Double skinned control panel, to offset solar heat, should be selected for all units operating in ambients greater than 46°C.

Low Ambient Kit

This accessory includes fan speed control, on one fan per refrigerant circuit, to permit chiller operation below -1°C and down to -18°C ambient temperature.

Condenser Coil Louvred Panels

Louvred panels mounted over the condenser coils.

Condenser Coil Louvred Panels and Unit Wire Guards

Louvred panels mounted over the condenser coils, and welded wire mesh guards mounted around the bottom of the unit.

Unit Wire Enclosure

Welded wire mesh guards over condenser coils and around the bottom of the unit.

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.

Neoprene Pads Isolators

Recommended for normal installations (Field mounted)

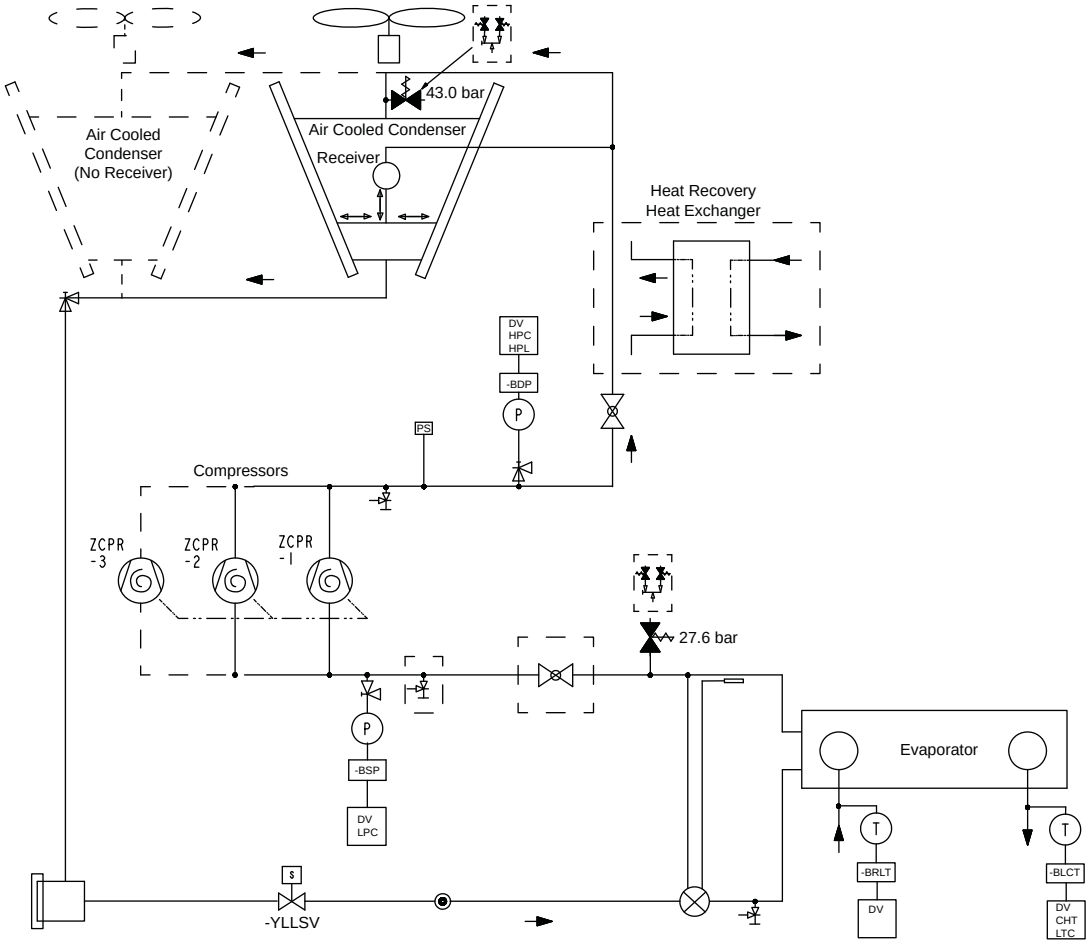
25 mm Spring Isolators

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

Lifting Lug Kit

One set of ISO MK5 camlocs to enable safe and easy unit handling.

Refrigerant Flow Diagram



Components:

- Pressure Relief Valve
- Service (Ball) Valve
- Expansion Valve
- Solenoid Valve
- Sight Glass
- Sensor Pressure or Temperature
- Service (Stop) Access Valve
- Pressure Switch
- Filter Drier (Removable Core)

Control Functions:
CHT - Chilled Liquid Temperature
HPC - High Pressure Cutout
LPC - Low Pressure Cutout
HPL - High Pressure Load Limiting
HTC - High Temperature Cutout
LTC - Low Temperature Cutout
DV - Display Value

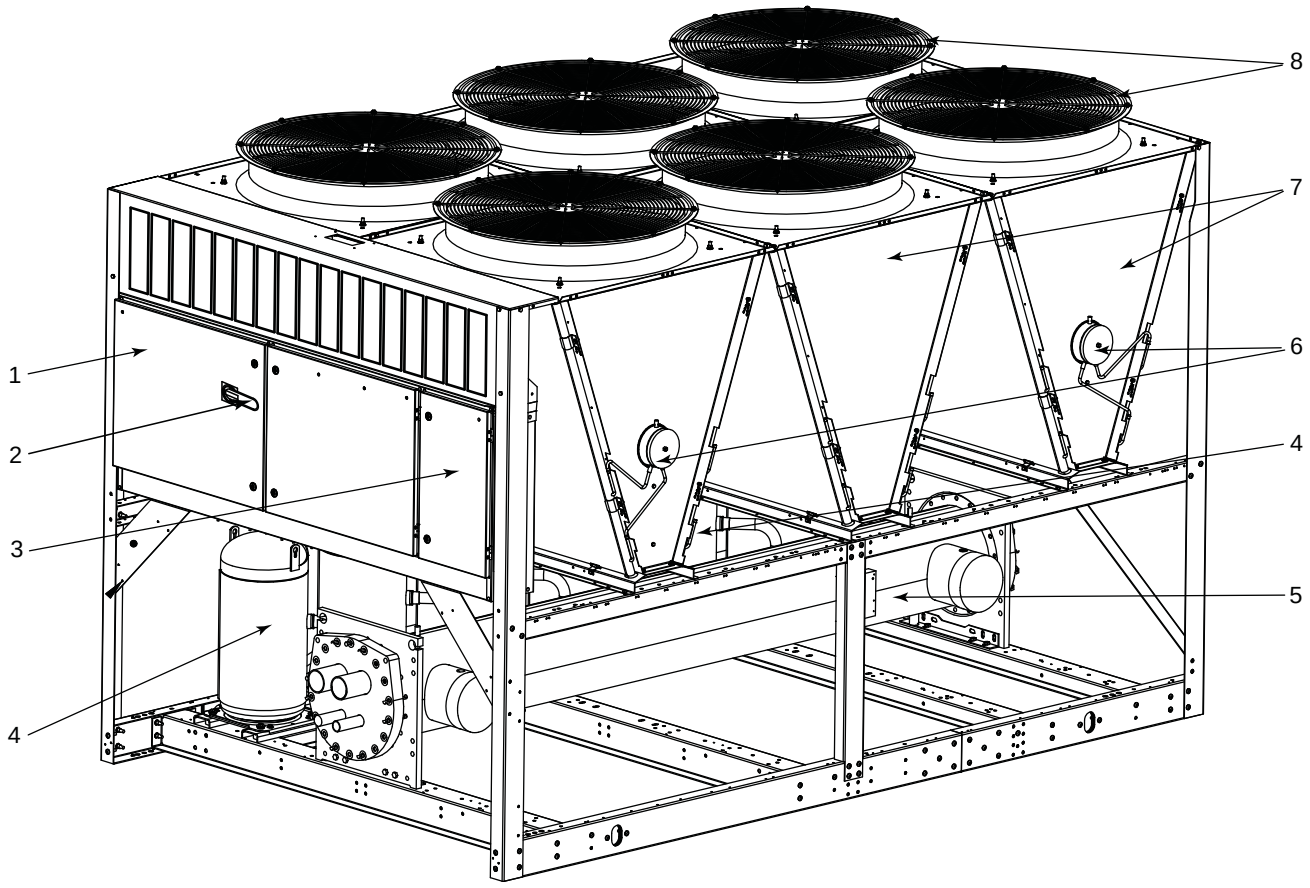
Pressure Transducers:
-BDP Discharge Pressure
-BSP Suction Pressure

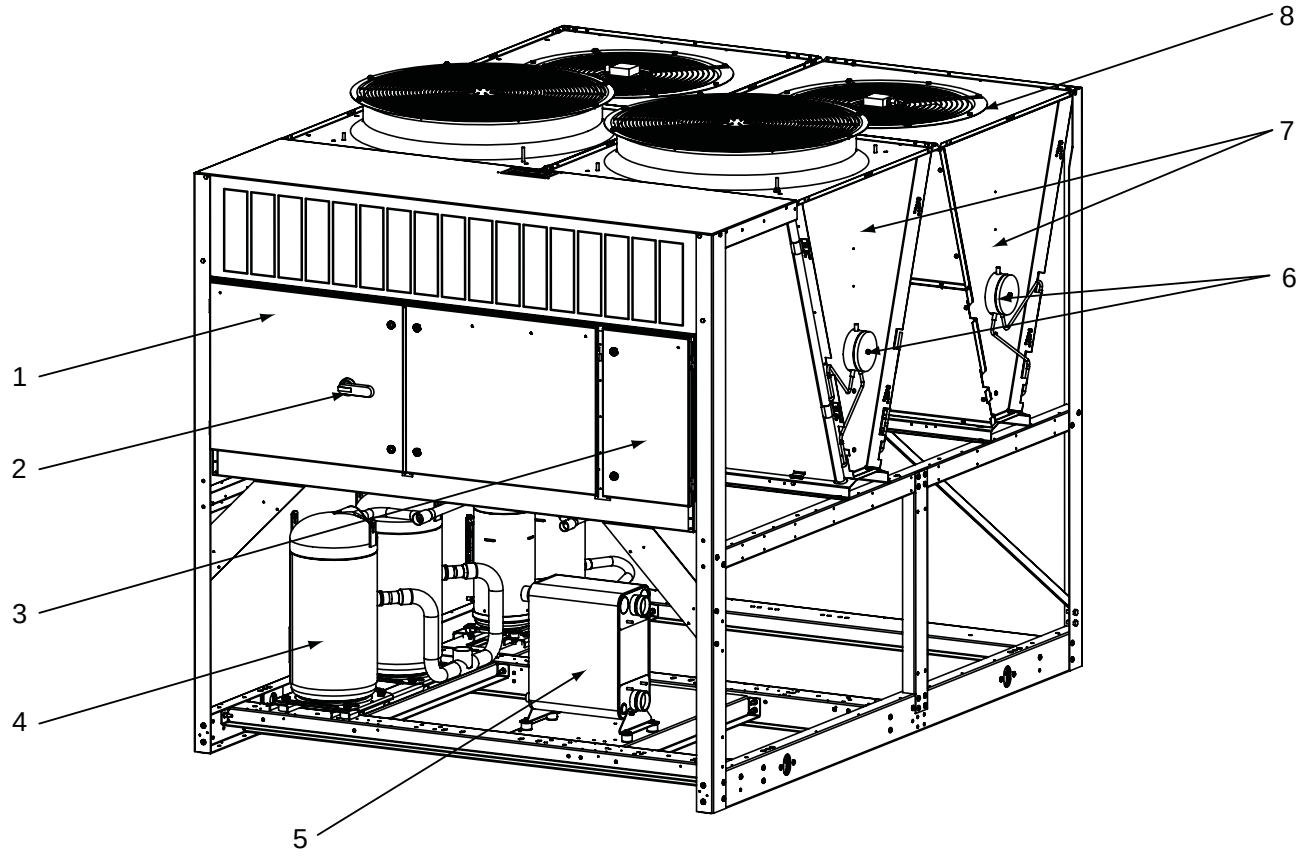
Temperature Sensors:
-BLCT Leaving Chilled Temperature
-BRLT Return Liquid Temperature

Solenoid Valves:
-YLLSV Liquid Line Solenoid Valve

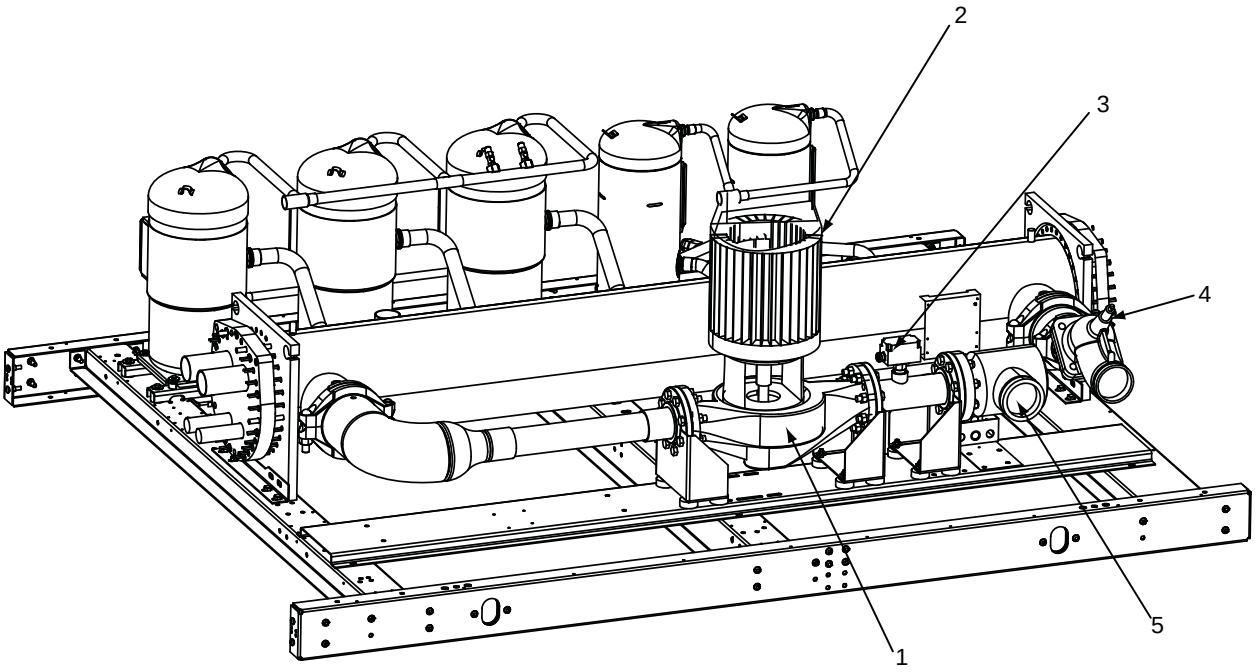
Low pressure liquid refrigerant enters the evaporator and is evaporated and superheated by the heat energy absorbed from the chilled liquid. Low pressure vapour enters the compressor where pressure and superheat are increased. The high pressure vapour is fed to the air cooled condenser coil and fans where heat is removed. The fully condensed and subcooled liquid passes through the expansion valve where pressure is reduced and further cooling takes place before returning to the evaporator.

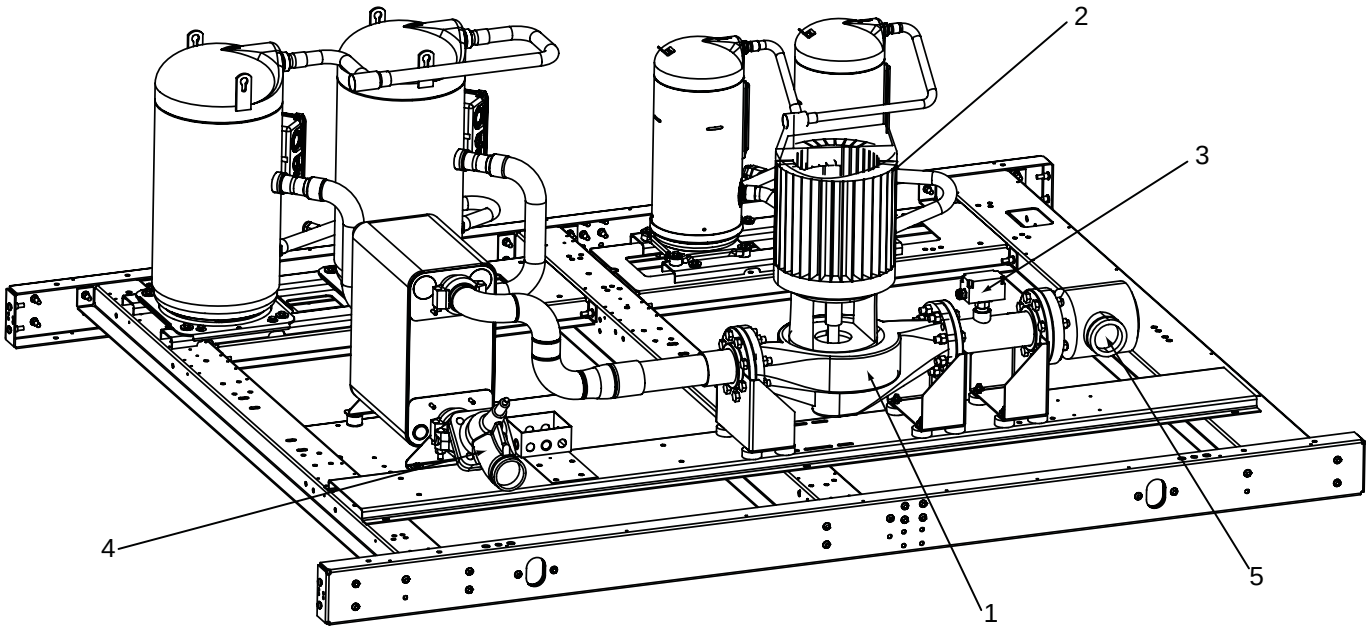
Component Location Diagrams





1 Power Panel
2 Non-Fused Disconnect Switch
3 Control Panel
4 Compressor
5 Evaporator
6 Receiver
7 Condenser
8 Fans





1 Pump Body (Single or Dual)
2 Pump Motor (Single or Dual)
3 Flow Switch
4 Balancing valve with flow check and shut-off functions
5 Suction Guide with integrated strainer

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 high voltage 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. Any ductwork or attenuators fitted to the unit must not have a total static pressure resistance, at full unit air-flow, exceeding the capability of the fans installed in the unit.

Indoor installations

The unit can be installed in an enclosed plant room, provided the floor is level and of suitable strength to support the full operating weight of the unit. It is essential that there is adequate clearance for air flow to the unit. The discharge air from the top of the unit must be ducted away to prevent re-circulation of air within the plant room. If common ducts are used for fans, non-return dampers must be fitted to the outlet from each fan.

The discharge ducting must be properly sized with a total static pressure loss, together with any intake static pressure loss, less than the available static pressure capability for the type of fan fitted.

The discharge air duct usually rejects outside the building through a louvre. The outlet must be positioned to prevent the air being drawn directly back into the air intake for the condenser coils, as such re-circulation will affect unit performance.

Operating in low ambient conditions

If low cooling capacities are required, at lower ambient conditions (below -1°C), the refrigerant pressure will fall. To prevent operational problems the low ambient kit option should be used.

For efficient head pressure control in ambients below -1°C, where unusually high wind gusts are expected, it is recommended that, if the customer has not provided a wind break, the optional condenser louvred enclosure panels are included.

High static fan ductwork connection

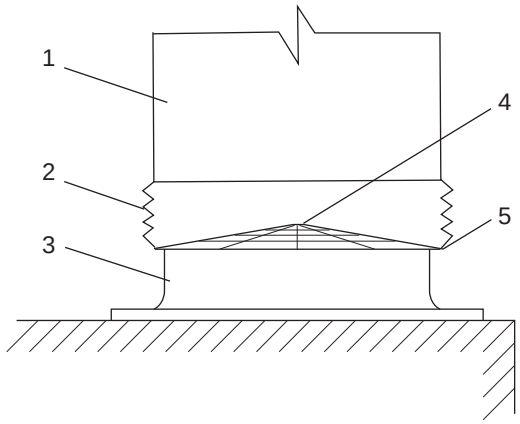
The following ductwork recommendations are intended to ensure satisfactory operation of the unit, when optional high static fans are used. Failure to follow these recommendations could cause damage to the unit, or loss of performance, and may invalidate the warranty. When ducting is to be fitted to the fan discharge it is recommended that the duct should be the same cross sectional area as the fan outlet and straight for at least 1 meter to obtain static regain from the fan.

Ductwork should be suspended with flexible hangers to prevent noise and vibration being transmitted to the structure. A flexible joint is also recommended between the duct attached to the fan and the next section for the same reason. Flexible connectors should not be allowed to concertina.

The unit is not designed to take structural loading. No significant amount of weight should be allowed to rest on the fan outlet flange, deck assemblies or condenser coil module. No more than 1 meter of light construction ductwork should be supported by the unit.

Where cross-winds may occur, any ductwork must be supported to prevent side loading on the unit. If the ducts from two or more fans are to be combined into a common duct, back-flow dampers should be fitted in the individual fan ducts. This will prevent re-circulation of air when only one of the fans is running.

Units are supplied with outlet guards for safety and to prevent damage to the fan blades. If these guards are removed to fit ductwork, adequate alternative precautions must be taken to ensure persons cannot be harmed or put at risk from rotating fan blades.



1 Solid Duct
2 Flexible Duct
3 Fan
4 Fan Guard
5 Backing Ring

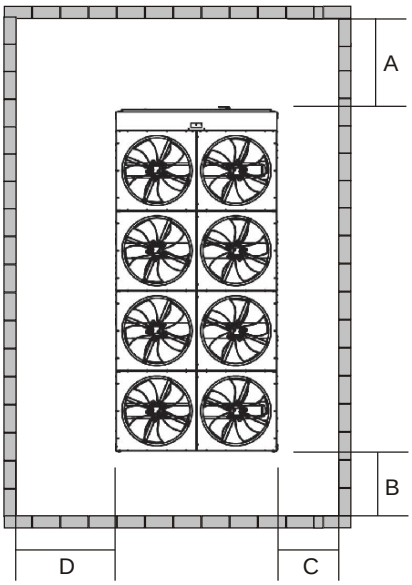
Location Clearances

Adequate clearances around the unit(s) are required for the unrestricted air-flow for the air-cooled condenser coils and to prevent re-circulation of warm 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. If the enclosure is of louvred construction, the same requirement of static pressure loss applies as for ducts and attenuators stated above. Where accumulation of snow is likely, additional height must be provided under the unit to ensure normal air-flow to the unit.

A1



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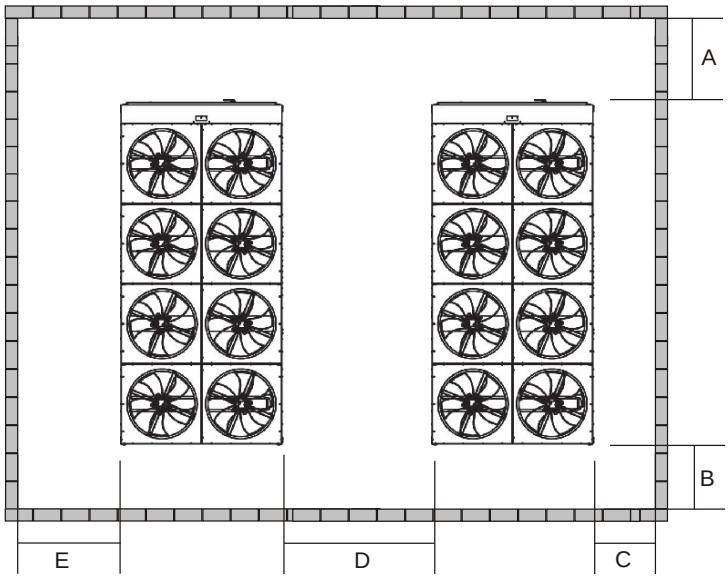

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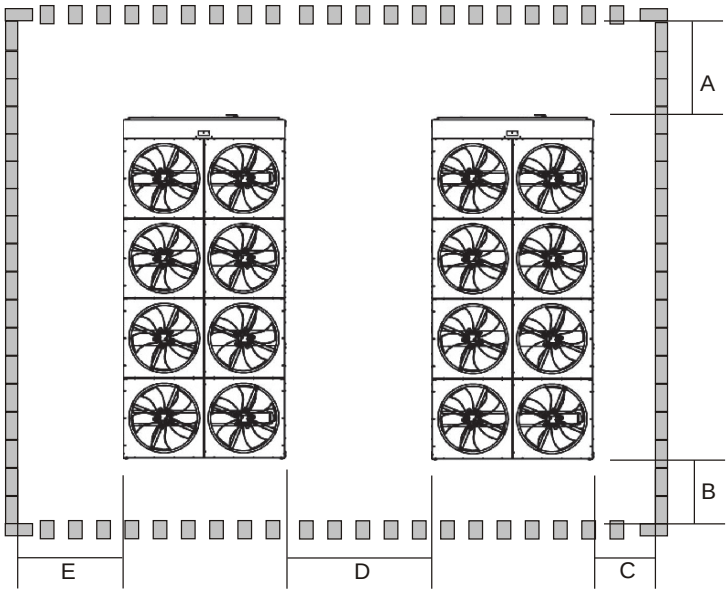

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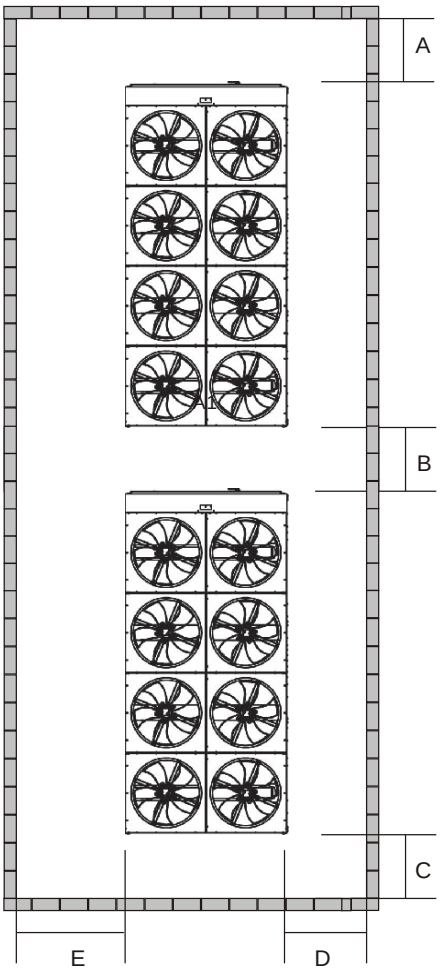

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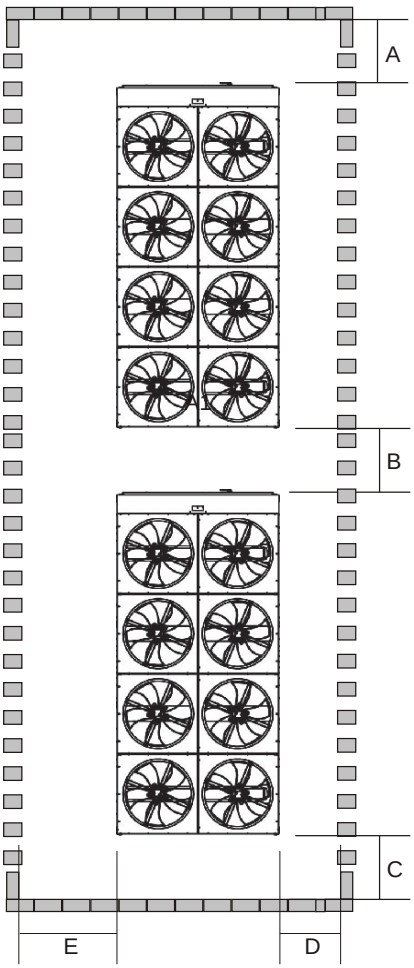


Location Clearances - SE & SELS Models

YLAA	Dim. (m)	YLAA-SE			YLAA-SE-LS		
		0180 0210 0240 0285 0320	0360 0400	0435 0485	0180 0210 0240 0285 0320	0360 0400	0435 0485
Arrangement A1 Solid Walls	A	1.2	1.2	1.2	1.2	1.2	1.2
	B	0.8	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	0.8	0.8
	D	1.4	1.4	1.4	1.4	1.4	1.4
Arrangement A2 Solid Walls	A	1.2	1.2	1.2	1.2	1.2	1.2
	B	0.8	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	0.8	0.8
	D	1.9	2.2	2.7	1.6	1.9	2.2
	E	1.4	1.4	1.4	1.4	1.4	1.4
Arrangement A3 Louvres on 2 walls	A	1.2	1.2	1.2	1.2	1.2	1.2
	B	0.8	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	0.8	0.8
	D	1.7	1.8	2.3	1.4	1.7	2
	E	1.4	1.4	1.4	1.4	1.4	1.4
Arrangement A4 Solid Walls	A	1.2	1.2	1.2	1.2	1.2	1.2
	B	1.2	1.2	1.2	1.2	1.2	1.2
	C	0.8	0.8	0.8	0.8	0.8	0.8
	D	1.0	1.3	1.5	1.0	1.0	1.4
	E	1.4	1.4	1.5	1.4	1.4	1.4
Arrangement A5 Louvres on 2 walls	A	1.2	1.2	1.2	1.2	1.2	1.2
	B	1.2	1.2	1.2	1.2	1.2	1.2
	C	0.8	0.8	0.8	0.8	0.8	0.8
	D	0.8	0.8	0.8	0.8	0.8	0.8
	E	1.4	1.4	1.4	1.4	1.4	1.4

Location Clearances - HE & HELS Models

YLAA	Dim. (m)	YLAA-HE					YLAA-HE-LS				
		0195 0260	0300	0350 0390	0440	0455 0515	0195 0260	0300	0350 0390	0440	0455 0515
Arrangement A1 Solid Walls	A	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	B	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	D	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Arrangement A2 Solid Walls	A	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	B	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	D	1.9	2.2	2.7	2.7	3.0	1.6	1.9	2.2	2.2	2.6
	E	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Arrangement A3 Louvres on 2 walls	A	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	B	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	D	1.7	1.8	2.3	2.3	2.8	1.4	1.7	2	2	2.2
	E	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Arrangement A4 Solid Walls	A	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	B	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	C	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	D	1.0	1.3	1.5	1.5	1.7	1.0	1.0	1.4	1.4	1.4
	E	1.4	1.4	1.5	1.5	1.7	1.4	1.4	1.4	1.4	1.4
Arrangement A5 Louvres on 2 walls	A	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	B	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	C	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	D	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	E	1.4	1.4	1.4	1.4	1.4	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.

If an optional Hydrokit has not been selected, 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

Alternatively, a differential pressure switch fitted across an orifice plate may be used, preferably of the high/low limit type.

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, preferably of 20 mesh, fitted as close as possible to the liquid inlet connection, and provided with a means of local isolation.

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

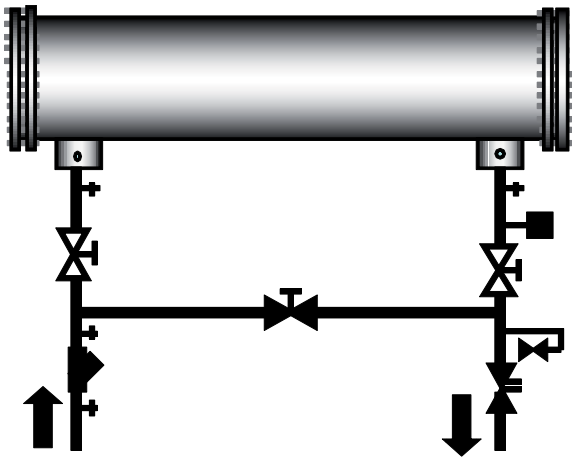
Heater tape of 21 W/m under the insulation is recommended, supplied independently and controlled by an ambient temperature thermostat set to switch on at approximately 2.2ºC above the freezing temperature of the chilled liquid.

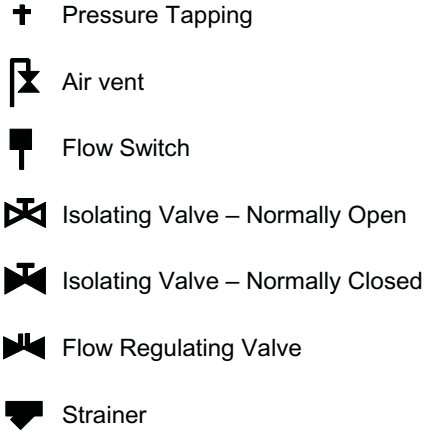
The evaporator is protected by two heater mats placed under the insulation, which are powered from the unit control system power supply. During cold weather when there is a risk of freezing, chiller power should be left switched on to provide the freeze protection function unless the liquid systems have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

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.

Chilled Liquid System



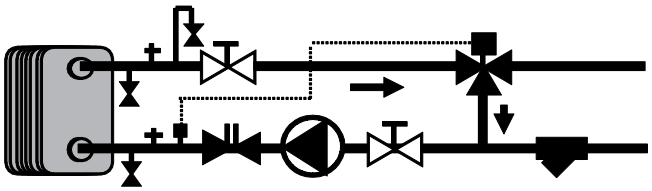


Connection Types and Sizes

Standard pipework connections are of the Victaulic groove type.

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

Heat Recovery System



Pressure Tapping

Air vent

Drain

Isolating Valve – Normally Open

3 Way Control Valve

Flow Regulating Valve

Strainer

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 evaporator 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. For critical or complex installations refer to EN13136.

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

D5=1.447 x 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.

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 400 V, 3-phase, 50 Hz nominal supplies only.

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

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

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

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

Single Point Power Supply Wiring

All models require one field provided 400 V, 3Ø, 50 Hz + PE (Protected Earth) supply to the unit with circuit protection.

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

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

Control Circuit Transformer

The control circuit transformer (400 V, 2Ø, 50 Hz) providing the 115 V, 1Ø, 50 Hz supply to the unit control system is fitted in a separate enclosure mounted on top of the control panel.

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, 110 V, AC-15. The device should be wired into terminals L and 5 in the power panel after removing the factory fitted link.

Control Wiring - Voltage Free 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.

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

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

Chilled Liquid Pump Starter

Terminals 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.

Flow Switch

A chilled liquid flow switch of suitable type must be connected to terminals 13 and 18 to provide adequate protection against loss of liquid flow.

Remote Start/Stop

Connect a remote switch to terminals 13 and 14 to provide remote start/stop control if required.

Remote Reset of Chilled Liquid Setpoint

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

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.

Fan Full Speed Inhibit

The fan full speed inhibit input is 30 Vdc and the customer voltage free contact and wiring must be suitable for 30 Vdc.

To reduce unit noise the fans can be limited to run at a maximum step of all fans in star (reduced speed) i.e. fan full speed is inhibited. Connect a customer voltage free contact to terminals 13 & 16 in the fan panel. The contact must be rated for 30 Vdc, connecting wiring need to be run in screened cable. When the contact is closed fan full speed inhibit is in effect.

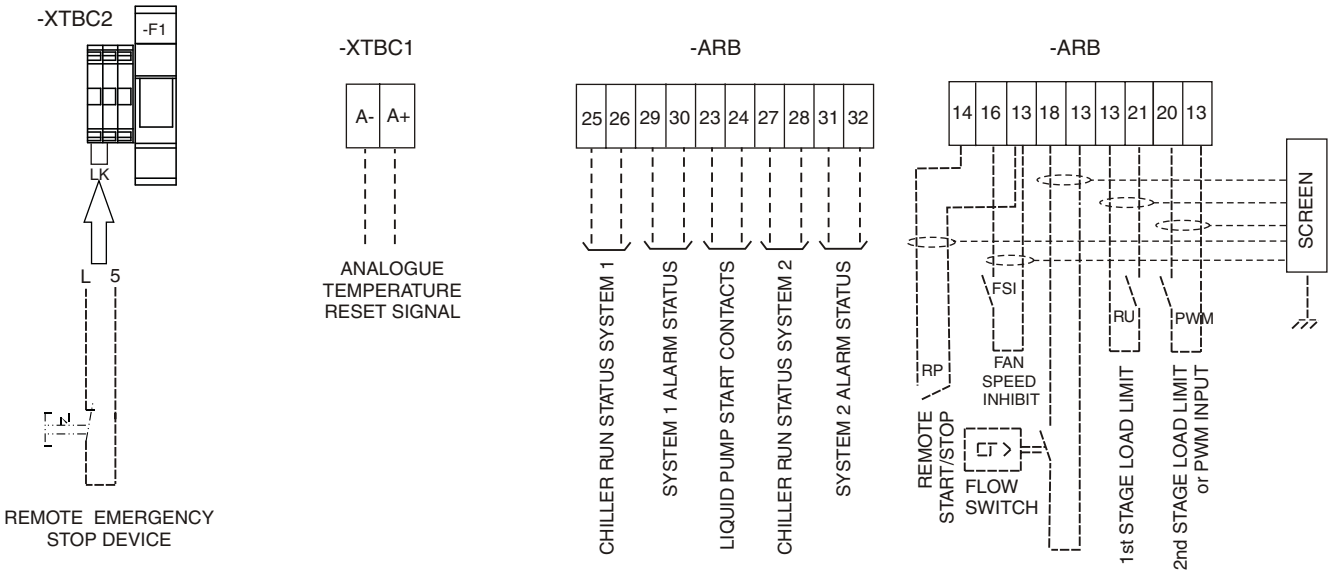
EMS Analogue Input

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

Modbus and BACnet MS/TP

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

Connection Diagram



YLAA Customer Controls

Evaporator pressure drop graph