YAES

QPak-sb

QPak-sb Sonata

AIR COOLED SCREW CHILLER

R407C REFRIGERANT

COOLING CAPACITIES 369 kW to 613 kW

The YAES (*QPak*) range of chillers are designed for water or water-glycol cooling.

There are two product families, standard and high efficiency, which are equipped with semi-hermetic twin helical screw compressors and fuzzy logic control to provide high full and part load efficiencies and reliable performance.

An optional low sound version (*Sonata*) of both the standard and high efficiency models has an acoustically treated enclosure, containing the compressors, pipework, valves and the evaporator head, and specially designed low sound two speed fans.

Optional heat recovery condensers or desuperheaters are also available.

All units are designed to be located outside on the roof or at ground level.

CONTENTS

AVAILABLE MODELS, NOMINAL CAPACITIES and SOUND PRESSURE LEVELS

TABLE 1

Standard Family - YAES-SB		0415	0465	0525	0565	0595	0625
Cooling	kW	369	415	482	503	541	578
Standard Units	dB (A)	60.9	60.9	60.9	62.7	62.7	62.7
Sonata Units (fans at high speed)	dB (A)	59.1	59.1	59.1	60.9	60.9	60.9
Sonata Units (fans at low speed)	dB (A)	56.7	56.7	56.7	58.5	58.5	58.5
Heat Recovery	kW	435	435	435	527	527	527
DeSuperheater	kW	33	37	43	45	48	52

High Efficiency Family - YAES-HB		0495	0515	0535	0585	0615	0655
Cooling	kW	446	476	505	527	570	613
Standard Units	dB (A)	62.7	62.7	62.7	65.7	65.7	65.7
Low Sound Units (fans at high speed)	dB (A)	60.9	60.9	60.9	63.7	63.7	63.7
Low Sound Units (fans at low speed)	dB (A)	58.5	58.5	58.5	61.3	61.3	61.3
Heat Recovery	kW	435	435	435	527	527	527
DeSuperheater	kW	40	42	45	47	51	55

Cooling capacities at 7°C leaving chilled liquid temperature and 35°C ambient.
Optional heat recovery capacities at 40°C leaving hot liquid temperature and 7°C leaving chilled liquid temperature.
Optional Desuperheater capacities at 60°C leaving hot liquid temperature, 7°C leaving chilled liquid temperature and 35°C ambient air temperature.
Sound pressure levels for standard and low sound units are at 10 metres.

FEATURES	BENEFITS
Optional acoustic component enclosure and two speed fans	Low sound operation.
High efficiency version.	Reduced operating costs.
High efficiency semi hermetic screw compressors.	Energy efficient, long life reliability.
Two independent refrigerant circuits.	System standby security.
Separate power and control compartments with lockable doors and emergency stop device.	Operator safety considerations.
Microprocessor control with visual display of temperatures, Pressures, motor currents, operating hours, number of starts and start/stop schedules.	System data logging and temperature setpoint reset capability. Energy management and improved operating efficiency.
Fuzzy logic control.	Maximise capacity control.
Unit remote alarm contacts.	Warning notification.
Building management system interface.	For central data logging and single point full system monitoring and control.
Open transition star delta starters.	Low starting current.
Optional closed transition star delta starters.	Reduced changeover spike reduces the risk of electrical interference. Additionally smoothed low starting current.
Optional power factor correction	Reduces energy costs.
Heat Recovery and Desuperheater options.	Low cost hot water for heating or domestic supply.
Full factory run test.	Verifies quality control and ensures that the unit operates satisfactorily prior to delivery.
Manufactured to ISO 9001 EN 29001.	High standard of quality control.

SPECIFICATION

The YAES air cooled chiller shall be completely assembled with all interconnecting refrigerant piping and internal wiring, ready for field installation. The unit shall be pressure tested, evacuated, and fully factory charged with refrigerant and oil in each of the independent refrigerant circuits.

After assembly, an operational test shall be performed with water flowing through the evaporator to ensure that each refrigerant circuit operates correctly.

The unit structure shall be manufactured from heavy gauge, galvanised steel and coated with baked-on powder paint (Desert Sand (RAL 1019)).

Compressors
Each compressor shall be direct drive, semi-hermetic, rotary twin screw type and include the following items:

- Two screw rotors, with asymmetric profiles, manufactured from forged steel.
- A cast iron compressor housing precision machined to provide optimal clearance for the rotors.
- The entire compressor, from suction to discharge shall have a design working pressure of 31 bar.
- Capacity Control: The compressors shall start at the minimum load position and provide a capacity control range from 100% to 10% of the full chiller load using a continuous function slide valve. A microprocessor controlled output pressure regulating capacity control valve shall be supplied to command compressor capacity independent of control valve input pressure and to balance the compressor capacity with the cooling load.
- An automatic spring return of capacity control valve to the minimum load position to ensure compressor starting at minimum motor load.
- An internal discharge check valve to prevent rotor backspin upon shutdown.
- An acoustically tuned, internal discharge muffler to minimise noise at the source, while optimising flow for maximum performance.
- Discharge shut-off service valves (with optional suction shut-off valves).
- A reliable suction gas cooled high efficiency, accessible hermetic motor.
- Two types of compressor motor starting are available: star/delta open transition starter and optional star/delta closed transition starter.
- A suction gas screen and serviceable, 0.5 micron full flow oil filter within the compressor housing.
- A 350 W compressor body heater.

Oil Separator
Oil separators with a design working pressure of 31 bar shall be the high efficiency, augmented gas impingement type to maximise oil extraction.

Oil Cooler
Oil cooling shall be provided by a dedicated air-cooled finned tube type heat exchanger located in the condenser section of the unit.

Refrigerant Circuits
An independent refrigerant circuit shall be provided per compressor. Each circuit will use 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 shall include: manual shut-off valve with charging port, high absorption removable core filter-drier, sight glass with moisture indicator, and thermostatic expansion valve.

Suction lines shall be covered with closed-cell insulation.

Evaporator
The evaporator is a shell and tube design with refrigerant on the tube side and water on the shell side. Tubes are formed in a 'U' shape and held in a tube bundle, which is free to expand independent of the shell. An independent circuit shall be provided for each compressor. The shell design working pressure shall be 10.3 bar (150 psi), and 24.5 bar (355 psi) for the tubes.

The evaporator shall have water pass baffles manufactured from corrosion resistant/non metallic composite material, removable heads for access to internally enhanced, seamless, copper tubes. Water vent and drain connections shall also be included.

The water nozzles are fitted with PN16 flanges per ISO 7005 part 1a. Companion weld flanges to match evaporator flanges shall be supplied loose for field installation by contractor. All necessary nuts, bolts and gaskets shall be included.

The evaporator shall be equipped with a thermostatically controlled heater for protection to -29°C ambient and insulated with 19 mm flexible closed-cell foam.

Economiser
Selected models in the range have an economiser fitted to the refrigerant circuits. This is a refrigerant-to-refrigerant plate type heat exchanger to maximise unit capacity and efficiency by achieving additional liquid refrigerant sub-cooling. The unit control system controls the economiser via a dedicated solenoid valve.

Condenser
Standard units have condensers fitted with single speed fans. Low sound units have two speed fans fitted.

Fans - The fans shall be dynamically and statically balanced, direct drive with corrosion resistant glass fibre reinforced composite blades moulded into low sound, full airfoil cross section, providing vertical air discharge from extended orifices for efficiency and low sound. Each fan shall be located in a separate compartment to prevent cross flow during fan cycling. Guards of heavy gauge, PVC (polyvinyl chloride) coated galvanised steel shall be provided.

Motors - The fan motors shall be the high efficiency, direct drive, 8 pole, 3 phase, Class-"F", current overload protected, totally enclosed (TEAC) type with double sealed, permanently lubricated, ball bearings.

Coils - Fin and tube condenser coils shall be manufactured from seamless, internally enhanced, high condensing coefficient, corrosion resistant copper tubes arranged in staggered rows and mechanically expanded into corrosion resistant aluminium alloy with full height fin collars. The design working pressure shall be 31 bar and each coil shall be pressure tested to 34 bar.

Power and Control Panel
All controls and motor starting equipment necessary for unit operation shall be factory wired and function tested.

The panel enclosure shall be designed to IP55 (rain/dust tight) and be manufactured from powder painted galvanised steel. Component mounting panels are of non-painted galvanised steel to ensure optimum protective circuit (earthing).

The Power and Control Panel shall be divided into a power section for each electrical system, a control section and a common input section. All sections shall have a separate hinged, latched, and gasket sealed door equipped with wind struts for safer servicing.

Each power compartment shall contain:

Compressor fuses, compressor and fan contactors, fan manual motor starters to give overload and short circuit protection phase rotation relay and a control circuit fuse.

The control section shall contain:

On/Off switch, microcomputer keypad and display, microprocessor board, I/O expansion board, relay boards and power supply board.

Models with Standard Single Point Power Supply Connection
The common input section contains:

An incoming non-fused disconnect switch for connection of the customer provided single power supply. Internal factory wiring to two fused protected power sections. The control supply is derived internally from the incoming power supply.

The common input section also contains the control circuit switch disconnect/emergency stop device, a transformer (to provide the necessary 24V and 12V supplies for the power supply board, and I/O board), control fuses, residual current circuit breaker, and terminals for a remote emergency stop device.

Microprocessor Controls
Fuzzy Logic control will be incorporated in the YAES range of chillers. Fuzzy logic allows the control system to monitor several key variables to provide tighter, more stable, chilled water temperature control. The control system monitors the leaving chilled water temperature to track where it has been, where it is now, how fast it is moving, and accurately adjusts chiller operation in anticipation of expected performance to minimise hunting and save energy.

The microprocessor shall have the following functions and displays:

- A liquid crystal 40 character display with text provided on two lines and light emitting diode backlighting for outdoor viewing.
- A colour coded, 35 button, sealed keypad with sections for Display, Entry, Setpoints, Clock, Print, Program and Unit On/Off switch.
- The standard controls shall include: glycol chilling or thermal storage, automatic pump down, run signal contacts, demand load limit from external building automation system input, remote reset liquid temperature reset input, unit alarm contacts, chilled liquid pump control, automatic or manual reset after power failure, automatic system optimisation to match operating conditions, software stored in non-volatile memory (EPROM) to eliminate chiller failure due to AC power failure.
- Programmed Setpoint shall be retained in a lithium battery backed RTC memory for a minimum of 5 years.

DISPLAY – In Metric (°C and Bar) or English (°F and psi) units. For each circuit, the following items shall be displayed:

- Return and leaving chilled liquid, and ambient temperature.
- Day, date and time. Daily start/stop times. Holiday and Manual Override status.
- Compressor operating hours and starts. Automatic or manual lead/lag. Lead compressor identification.
- Run permissive status. No cooling load condition. Compressor run status.
- Anti-recycle timer and anti-coincident start timer status per compressor.
- System suction (and suction superheat), discharge, and oil pressures and temperatures.
- Percent full load compressor motor current. Compressor capacity control valve input steps.
- Cut-out status and set-points for: supply fluid temperature, low suction pressure, high discharge pressure and temperature, high oil temperature, low and high ambient, high and low current, and low leaving liquid temperature.
- Unloading limit setpoints for high discharge pressure and compressor motor current.
- Liquid pull-down rate sensitivity (0.3°C to 3°C/minute in 0.05°C increments).
- Status of: evaporator heater, condenser fans, chilled liquid pump.
- "Out of range" message.
- Up to 6 fault shut down conditions.
- Standard Display Language is English, with other language options.

ENTRY – Enter set point changes, cancel inputs, advance day, and change AM/PM.

SET POINTS – Chilled liquid temperature, chilled liquid range, remote reset temperature range.

CLOCK – Time, daily or holiday start/stop schedule, manual override for servicing.

PRINT – Operating data or system fault shutdown history for last six faults, and software version. Printouts through an RS-232 port via a separate printer (by others).

PROGRAM – For setting language, high discharge pressure cut-out, high discharge pressure unload, suction pressure cut-out, high ambient cut-out, low ambient cut-out, leaving liquid temperature cut-out, high motor current unload, anti-recycle time (300 - 600 seconds), local remote control, lead lag control, power failure reset and average motor current cut-out. Settings for liquid temperature set-point reset signal from YORK ISN or building automation system.

Temperature and Current Offset

Pulse width modulating (PWM) controls are provided to remotely limit the running current of each compressor and to adjust the leaving chilled water temperature setpoint to a higher value.

Motor Protection
The microprocessor motor protection provides high current protection to ensure that the motor is not damaged due to voltage, excess refrigerant or other problems that could cause excessive motor current. If the motor current exceeds the 115% FLA trip point after 3 seconds of operation, the microprocessor will shut the system down and lock it out after one fault.

The microprocessor also provides low motor current protection when it senses a motor current of less than 10% FLA.

A motor protector module provides thermal overload protection.

ACCESSORIES AND OPTIONS

POWER OPTIONS

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

Power Supply Connection Options:

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

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

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

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

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

CONTROL OPTIONS

BAS/EMS Interface
Provides a means to reset the leaving chilled liquid temperature and/or percent full load amps (current limiting) from the building automation system (BAS) / energy management system (EMS), factory mounted:

Printed circuit board to accept 4 to 20 mA or 0 to 10 Vdc from the BAS/EMS.
(Cannot be fitted when a Multi-unit Sequence Control is fitted).

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

Multi Unit Sequencer
Monitors mixed leaving chilled water or glycol temperature from two or more units and controls to maintain required mixed temperature whilst running the minimum number of units.
(Cannot be fitted when a BAS/EMS Interface is fitted).

Control Panel Display Language
English (standard), German, Spanish, French or Italian panels and EPROMs available. Portuguese EPROM available.

REFRIGERANT CIRCUIT OPTIONS

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

Handed Evaporator Liquid Connections
Evaporator connections on standard units are on the right-hand side (when viewed from the control panel). The connections are available on left-hand side as an option, to assist in pipework design etc.

Flow Switch Accessory
Vapour-proof SPDT, NEMA 4X switch, 10.3 bar DWP, -29°C to 121°C, with 1" NPT (IPS) connection for upright mounting in horizontal pipe. A flow switch must be field installed with each unit.

Additional PED safety devises for Holland and Sweden:
Holland - relief valves with bursting disks and 3 way change - over valve;
Sweden - relief valves with 3 way change - over valve.

CONDENSER/EXTERIOR OPTIONS

Gold Epoxy Fin Condenser Coils
Coated condenser fins are available as an option.

Copper Fin Condenser Coils
Condenser coils are constructed with corrosion resistant copper fins.

Condenser Wired Guards
Heavy gauge welded wire mesh guards mounted over the exterior condenser coil faces (factory mounted).

Unit Aesthetic Panels
Non acoustically lined infill panels manufactured from powder painted galvanised steel, for below the power and control panel, the sides of the unit near the power and control panel and at the rear of the unit covering the ends of the condenser coil.

High Pressure Fans
Fans and motors suitable for high external static conditions.

HEAT RECOVERY OPTIONS

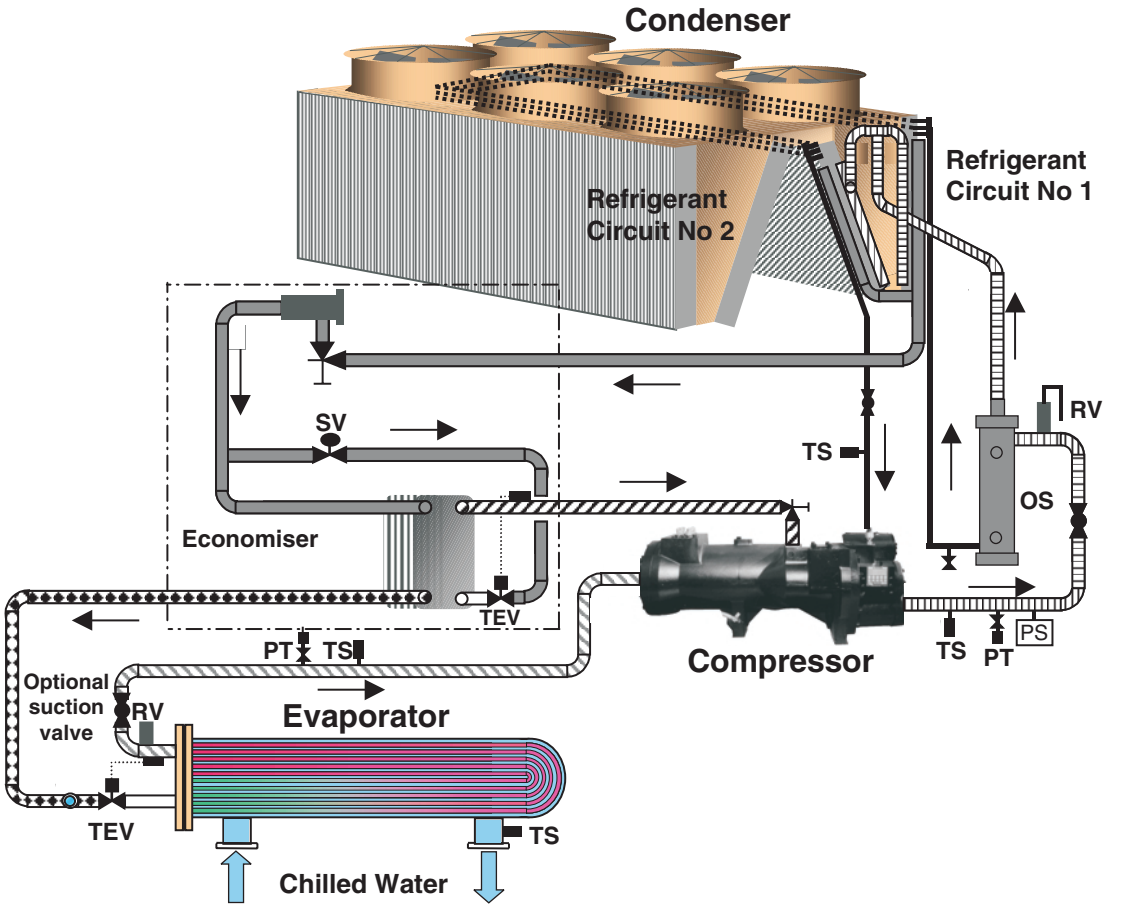
Heat Recovery
Factory fitted plate heat exchanger to provide warm water during cooling to satisfy heating and domestic hot water requirements.

Desuperheaters
Factory fitted desuperheaters on compressor discharge lines to provide hot water during cooling.

VIBRATION ISOLATION

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

REFRIGERANT FLOW DIAGRAM FIGURE 1



Oil

Low Pressure Liquid

High Pressure Subcooled Liquid

High Pressure Further Subcooled Liquid

Low Pressure Superheated Vapour

High Pressure Superheated Vapour

Medium Pressure Vapour

TEV Thermostatic expansion valve
SV Solenoid valve
PT Pressure tapping
PS Pressure sensor
RV Relief valve
TS Temperature sensor
OS Oil separator

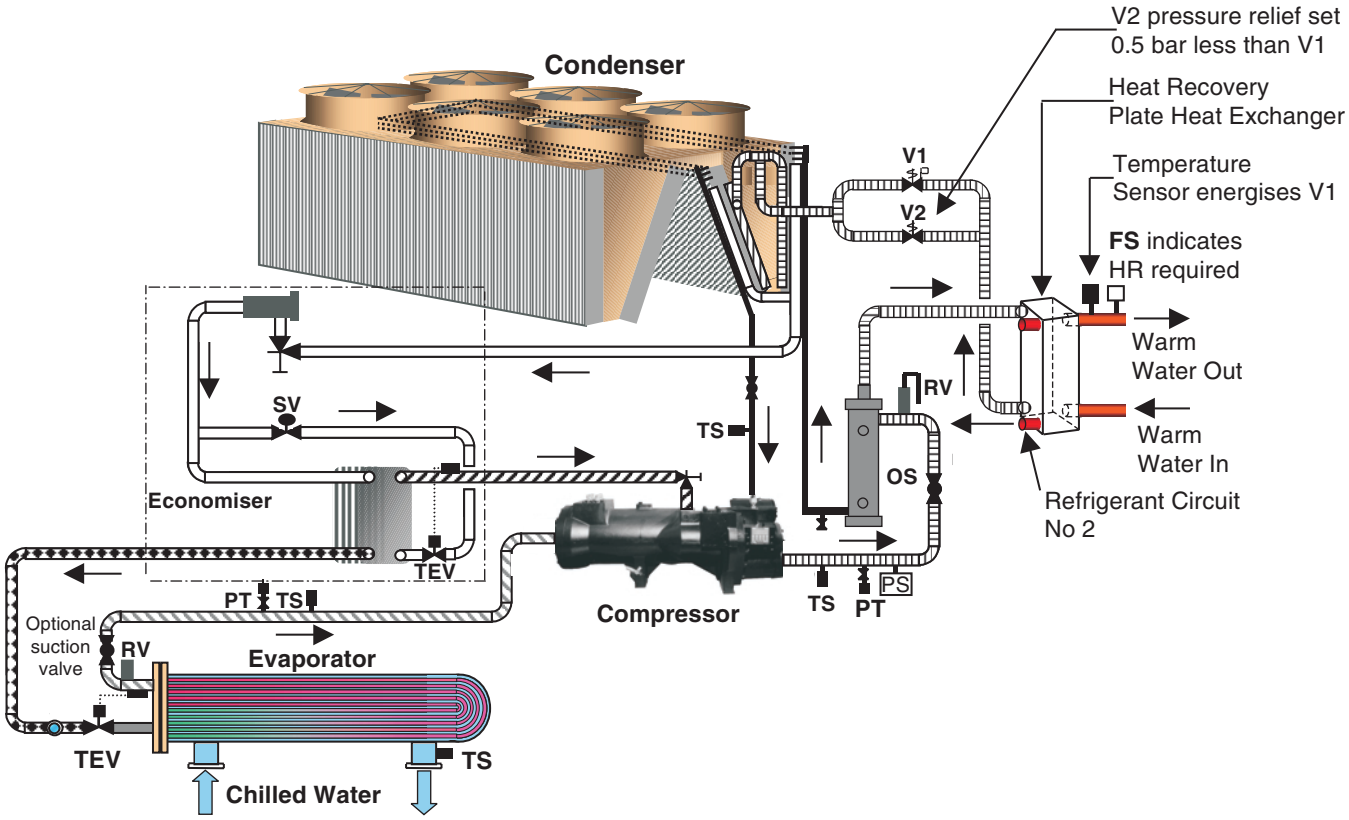
Note: Economiser (plate heat exchanger) fitted to selected models only.

Cooling (Figure 1)
Low pressure liquid refrigerant enters the evaporator and is evaporated and superheated by the heat energy absorbed from the chilled water passing through the evaporator shell. Low pressure vapour enters the compressor where pressure and superheat are increased. High pressure vapour is passed through the oil separator where compressor oil is removed and recirculated to the compressor via the oil cooler. The high pressure oil-free vapour is fed to the air cooled condenser coil and fans where the heat is removed. The fully condensed liquid enters the economiser. A small percentage of the liquid passes through an expansion valve, into the other side of the economiser where it is evaporated. This low pressure liquid subcools the major part of the refrigerant. Medium pressure vapour then returns to the compressor. The subcooled refrigerant then passes through the expansion valve where pressure is reduced and further cooling takes place before returning to the evaporator.

Optional Heat Recovery (Figure 1a)
If the warm water flow switch detects water flow the heat recovery pressure regulating valves are energised. The valves allow high-pressure superheated refrigerant, from the oil separators, to enter the twin circuit heat recovery plate heat exchanger. The refrigerant is partially condensed as the warm water absorbs heat energy.

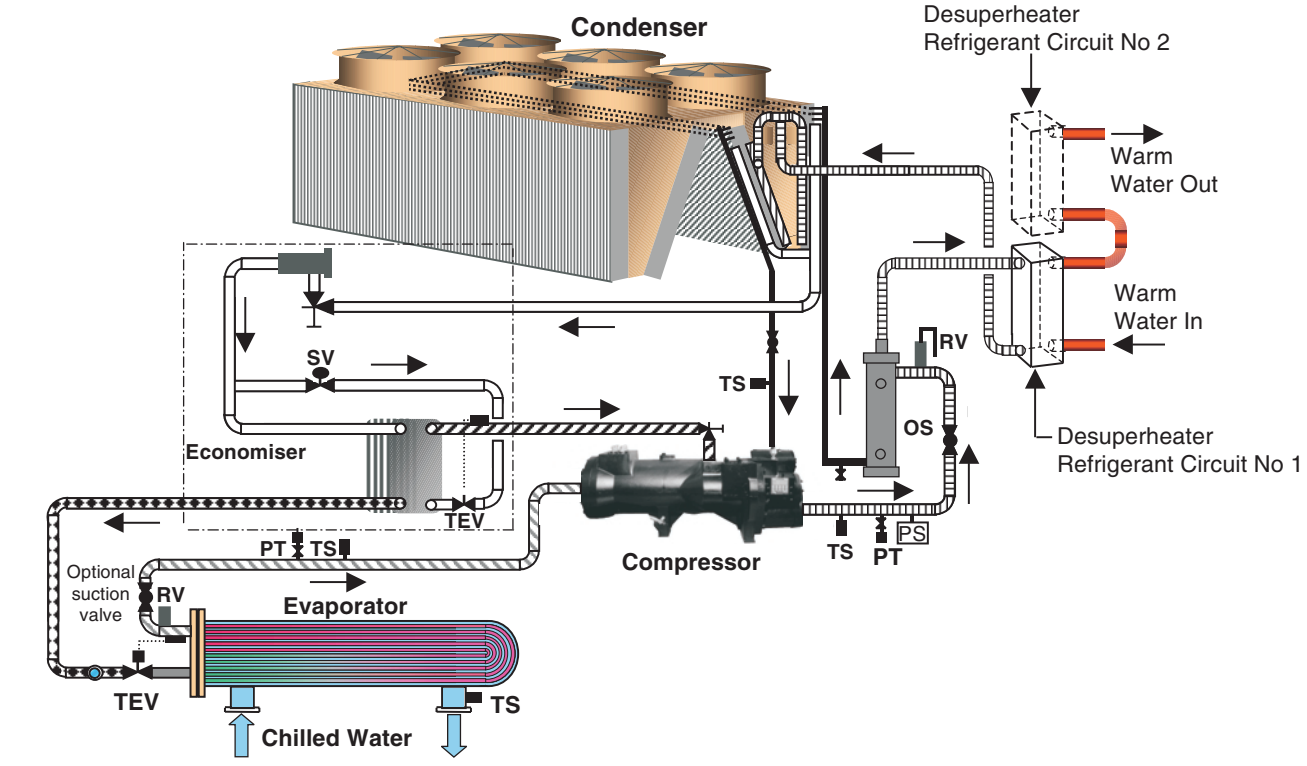
The valves are de-energised when the leaving warm water temperature sensor registers the high point of the set point dead band. If water flow is maintained the valves are re-energised if the temperature sensor registers the low point of the set point dead band.

FIGURE 1a REFRIGERANT FLOW DIAGRAM MODELS WITH OPTIONAL HEAT RECOVERY



Refer to figure 1 for legend.

FIGURE 1b REFRIGERANT FLOW DIAGRAM MODELS WITH OPTIONAL DESUPERHEATERS



Refer to figure 1 for legend.

OPERATING LIMITATIONS - STANDARD MODELS

TABLE 2

Model YAES-SB				0415		0465		0525		0565		0595		0625	
				Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Chilled Liquid	Liquid outlet temperature	Water outlet	°C	5 to 13											
		Glycol outlet	°C	-10 to 13											
		Temp. spread	°C	3 to 10											
	Flow rate		l/s	13.8	33.0	13.8	33.0	13.8	33.0	15.3	33.0	15.3	33.0	15.3	33.0
	Pressure drop		kPa	7.5	38.0	7.5	38.0	7.5	38.0	10.5	43.5	10.5	43.5	10.5	43.5
	Maximum working pressure		bar	10											
Ambient Air	Air entering temperature		°C	-18 to 52											
	Fan	Standard fans	Pa	10											
	Available Static	2 speed fans	Pa	10											
	Pressure	High pressure fans	Pa	120											
Refrigerant System High Pressure Side			bar	31											
Power Supply Voltage 400 V, 3 Ø, 50 Hz (nominal)			V	342 to 440											
Recommended System Water Volume			l	1270		1426		1585		1722		1824		1945	

OPERATING LIMITATIONS - HIGH EFFICIENCY MODELS

TABLE 2

Model YAES-HB				0495		0515		0535		0585		0615		0655	
				Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Chilled Liquid	Liquid outlet temperature	Water outlet	°C	5 to 13											
		Glycol outlet	°C	-10 to 13											
		Temp. spread	°C	3 to 10											
	Flow rate		l/s	15.3	33.0	15.3	33.0	15.3	33.0	15.3	33.0	15.3	33.0	15.3	33.0
	Pressure drop		kPa	10.5	43.5	10.5	43.5	10.5	43.5	10.5	43.5	10.5	43.5	10.5	43.5
	Maximum working pressure		bar	10											
Ambient Air	Air entering temperature		°C	-18 to 52											
	Fan	Standard fans	Pa	10											
	Available Static	2 speed fans	Pa	10											
	Pressure	High pressure fans	Pa	120											
Refrigerant System High Pressure Side			bar	31											
Power Supply Voltage 400 V, 3 Ø, 50 Hz (nominal)			V	342 to 440											
Recommended System Water Volume			l	1506		1576		1642		1780		1888		1996	

SELECTION GUIDE - COOLING

DATA REQUIRED

To select a YORK YAES chiller the following information is required:

1. Required cooling capacity.
2. Design chilled water entering and leaving temperatures.
3. Design water flow rate if one of the temperatures in item 3 are unknown.
4. Design condenser entering air temperature. This will normally be the design summer ambient air temperature unless location or other factors have an influence.
5. Altitude above sea level.
6. Design evaporator fouling factor.
7. Static pressure resistance against condenser entering and leaving air flow (where ducts, louvres, attenuators, etc., are used) at full unit air volume.

Note: Items 1, 2 and 3 must be linked by the following formulae:

Cooling Capacity (kW) = Range (°C) x Flow (litres/sec) x 4.18

Where:
Range = Entering liquid temperature - Leaving liquid temperature.

CHILLER SELECTION METHOD

1. Determine the correct size of chiller by selecting the model which most closely matches the required capacity at the design conditions of leaving water temperature and entering air temperature (Table 5).
2. Apply correction factors for fouling factor (Table 3) and altitude (Table 4) to the capacity and power values from the capacity tables (Table 5). Ensure the corrected capacity is still sufficient for requirements.
3. Using the corrected capacity of the selected chiller adjust the design temperature range, or flow rate, to balance the formulae shown in “Data Required”.
4. Physical and electrical data can now be determined from Tables 11 and 12.
5. Always re-check that selections fall within the design limitations specified in Table 2.

FOULING FACTORS

TABLE 3

COOLER		
Fouling Factor m² °C/kW	Capacity Factor	Comp. Input Factor
0.044	1.000	1.000
0.088	0.987	0.995
0.176	0.964	0.985
0.352	0.915	0.962

ALTITUDE FACTORS

TABLE 4

Altitude (m)	Capacity Factor	Comp. Input Factor
0	1.000	1.000
600	0.987	1.010
1200	0.973	1.020
1800	0.958	1.029
2400	0.943	1.038

YAES SAMPLE SELECTION - COOLING

A chiller is required to cool water from 12°C to 7°C having a cooling capacity of 500 kW at a design flow rate of 24 l/s. Other design conditions applying are:

Ambient air entering condenser:	35°C
Fouling factor:	0.044 m² °C./kW
Altitude:	Sea level

From a cursory examination of Capacity Table 5, a model YAES0565SB gives approximately the required capacity:

Capacity	= 502.7 kW
Compressor power	= 189.6 kW

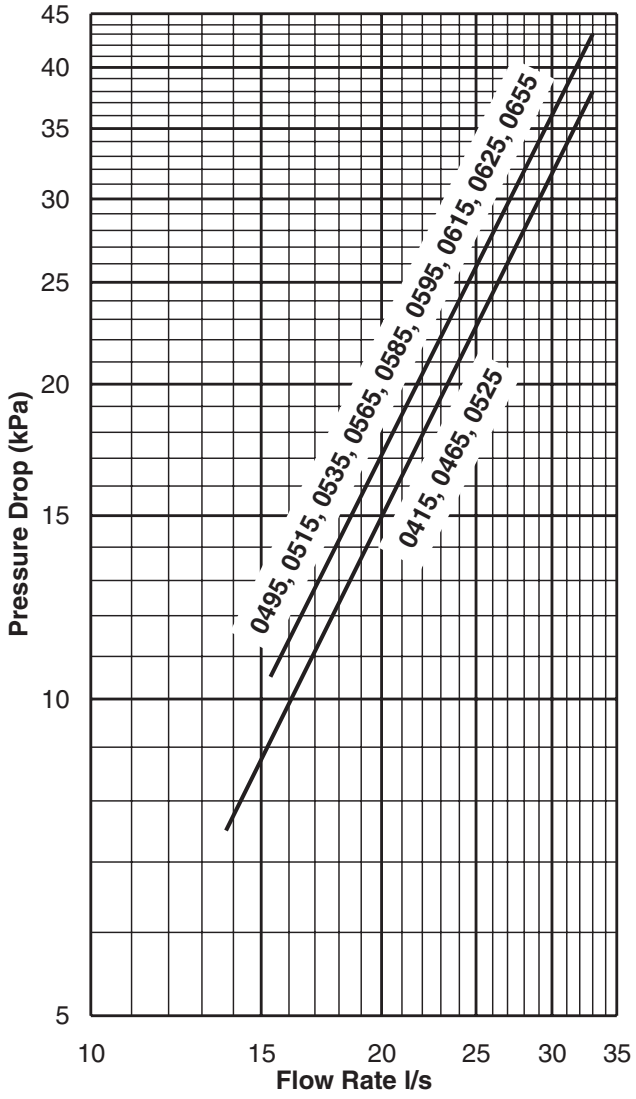
No correction factors apply therefore, after calculating the flow rate, the conditions will be as follows:

Cooling capacity:	502.7 kW
Water temperature:	12°C to 7°C (Range = 5°C)
Water flow rate:	24.1 l/s
Compressor power:	189.6 kW

All values are within the operating limits in Table 2. From Pressure Drop Graph (Figure 2), YAES0565SB evaporator water pressure drop = 24.3 kPa at the calculated flow of 24.1 l/s.

Model	Pressure Drop Calculation
0415, 0465, 0525	Pressure Drop [kPa] = 0.0567 x (Flow Rate [l/s]$^{1.8612}$)
0495, 0515, 0535, 0565, 0585, 0595, 0615, 0625, 0655	Pressure Drop [kPa] = 0.0677 x (Flow Rate [l/s]$^{1.8492}$)

FIGURE 2 EVAPORATOR PRESSURE DROPS



SELECTION GUIDE - HEAT RECOVERY

YAES SAMPLE SELECTION - COOLING with HEAT RECOVERY

A chiller is required to cool water from 12°C to 7°C having a cooling capacity of approximately 500 kW at a design flow rate of 24.0 l/s. Other design conditions applying are:

Ambient air entering condenser: 35°C
Fouling factor: 0.044 m² °C./kW
Altitude: Sea level
Required hot leaving Temperature 50°C
Hot water temperature range 12°C

A model YAES0565SB meets the cooling requirements, see sample selection above.

From Table 5 and the heat recovery capacity tables below, model YAES0565SB gives the following data when providing hot water at 50°C.

LWT	Cool (kW)	Power (kW)	Heat (kW)
7°C	502.7	189.6	350

The heating capacity should be corrected by the temperature range factor (opposite): 350 kW x 1.02 = 357

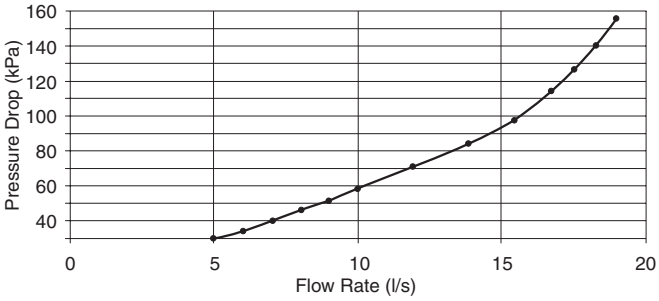
Heat recovery water flow: $\frac{357}{12°C \times 4.18}$ = 7.1 l/s

Heat recovery pressure drop from graph (opposite) is 40 kPa at the calculated flow of 7.1 l/s.

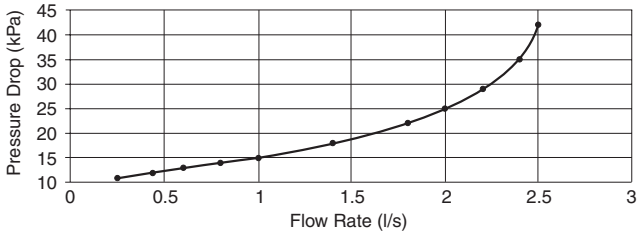
TEMPERATURE RANGE FACTORS

Temperature Range	Capacity Factor	Temperature Range	Capacity Factor
8	0.98	11	1.01
9	0.99	12	1.02
10	1.00	13	1.03
		14	1.04

HEAT RECOVERY PRESSURE DROP



DESUPERHEATERS PRESSURE DROP



The water pressure drop values shown in figures 3 and 4 are for two refrigerant circuit models with flow rates based on 10°C hot water temperature range.

HEAT RECOVERY CAPACITY - STANDARD MODELS

Models	Leaving Chilled Water °C	Leaving Hot Water Temperature °C		
		40	45	50
	5.0	415	371	285
	6.0	***425***	***380***	***292***
	7.0	435	389	299
0415	***8.0***	***446***	***399***	***306***
0465	9.0	457	408	313
0525	***10.0***	***467***	***417***	***320***
	11.0	478	427	327
	12.0	***489***	***436***	***334***
	13.0	500	446	341

Models	Leaving Chilled Water °C	Leaving Hot Water Temperature °C		
		40	45	50
	5.0	***503***	***452***	***336***
	6.0	515	462	343
	7.0	***527***	***473***	***350***
0565	8.0	540	484	357
0595	***9.0***	***552***	***495***	***365***
0625	10.0	565	506	372
	11.0	***577***	***517***	***380***
	12.0	590	529	388
	13.0	***603***	***540***	***395***

HEAT RECOVERY CAPACITY - HIGH EFFICIENCY MODELS

Models	Leaving Chilled Water °C	Leaving Hot Water Temperature °C		
		40	45	50
	5.0	***415***	***371***	***285***
	6.0	425	380	292
	7.0	***435***	***389***	***299***
0495	8.0	446	399	306
0515	***9.0***	***457***	***408***	***313***
0535	10.0	467	417	320
	11.0	***478***	***427***	***327***
	12.0	489	436	334
	13.0	***500***	***446***	***341***

Models	Leaving Chilled Water °C	Leaving Hot Water Temperature °C		
		40	45	50
	5.0	***503***	***452***	***336***
	6.0	515	462	343
	7.0	***527***	***473***	***350***
0585	8.0	540	484	357
0615	***9.0***	***552***	***495***	***365***
0655	10.0	565	506	372
	11.0	***577***	***517***	***380***
	12.0	590	529	388
	13.0	***603***	***540***	***395***

Model	Leaving Liquid Temp. °C	Condenser Entering Air Temperature °C																	
		20		25		30		35		38		40		42		44		45	
		Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW
YAES 0415SB	5.0	411.0	111.3	389.8	120.2	368.6	129.0	333.0	138.8	312.7	147.4	299.1	153.1	285.5	159.7	271.8	166.4	265.0	169.7
	6.0	***425.9***	***112.7***	***402.5***	***121.7***	***379.2***	***130.6***	***350.9***	***140.0***	***327.9***	***149.3***	***312.7***	***155.6***	***298.2***	***161.8***	***283.7***	***168.1***	***276.5***	***171.3***
	7.0	440.8	114.1	415.3	123.2	389.8	132.2	368.7	141.2	343.2	151.3	326.2	158.0	310.9	163.9	295.6	169.8	288.0	172.8
	8.0	***474.5***	***114.9***	***443.4***	***124.0***	***412.2***	***133.2***	***387.6***	***143.1***	***362.4***	***152.9***	***345.6***	***159.5***	***328.8***	***165.6***	***312.1***	***171.7***	***303.7***	***174.8***
	10.0	508.2	115.6	471.4	124.9	434.7	134.2	406.5	144.9	381.6	154.6	364.9	161.0	346.8	167.3	328.6	173.6	319.5	176.8
	12.0	***541.9***	***116.4***	***499.5***	***125.8***	***457.1***	***135.2***	***425.4***	***146.8***	***400.8***	***156.2***	***384.3***	***162.5***	***364.7***	***169.0***	***345.1***	***175.5***	***335.3***	***178.8***
YAES 0465SB	5.0	462.1	131.8	438.3	142.3	414.5	152.8	374.5	164.4	351.6	174.6	336.4	181.3	321.0	189.2	305.7	197.1	298.0	201.0
	6.0	***478.9***	***133.5***	***452.7***	***144.1***	***426.4***	***154.7***	***394.6***	***165.8***	***368.8***	***176.9***	***351.6***	***184.3***	***335.3***	***191.7***	***319.1***	***199.1***	***310.9***	***202.8***
	7.0	495.7	135.2	467.0	145.9	438.3	156.6	414.6	167.3	385.9	179.2	366.8	187.2	349.6	194.2	332.4	201.2	323.8	204.7
	8.0	***533.6***	***136.0***	***498.6***	***146.9***	***463.5***	***157.8***	***435.9***	***169.4***	***407.5***	***181.1***	***388.6***	***188.9***	***369.8***	***196.2***	***351.0***	***203.4***	***341.6***	***207.1***
	10.0	571.5	136.9	530.1	147.9	488.8	159.0	457.2	171.6	429.1	183.1	410.4	190.7	389.9	198.2	369.5	205.7	359.3	209.4
	12.0	***609.3***	***137.8***	***561.7***	***149.0***	***514.0***	***160.1***	***478.4***	***173.8***	***450.6***	***185.0***	***432.1***	***192.5***	***410.1***	***200.2***	***388.0***	***207.9***	***377.0***	***211.8***
YAES 0525SB	5.0	533.6	132.8	507.8	148.0	481.9	163.2	441.5	182.8	406.2	191.2	380.1	195.5	354.0	199.8	327.9	204.1	314.8	206.3
	6.0	***550.7***	***133.4***	***522.7***	***149.3***	***494.8***	***165.2***	***461.6***	***185.1***	***424.0***	***193.6***	***400.7***	***198.0***	***377.3***	***202.4***	***354.0***	***206.8***	***342.3***	***209.0***
	7.0	567.7	134.0	537.7	150.6	507.6	167.2	481.9	187.3	441.9	196.0	421.3	200.5	400.6	205.0	380.0	209.5	369.7	211.7
	8.0	***583.3***	***134.6***	***557.2***	***152.6***	***531.2***	***170.5***	***503.3***	***189.5***	***462.8***	***198.4***	***441.9***	***203.0***	***421.0***	***207.6***	***400.1***	***212.2***	***389.6***	***214.5***
	10.0	598.8	135.2	576.8	154.5	554.8	173.8	524.7	193.9	483.6	201.6	462.5	205.5	441.3	209.4	420.2	213.4	409.6	215.4
	12.0	***591.6***	***135.9***	***589.2***	***156.5***	***586.7***	***177.1***	***545.9***	***198.0***	***504.4***	***204.6***	***483.1***	***208.0***	***461.7***	***211.4***	***440.3***	***214.8***	***429.7***	***216.5***
YAES 0565SB	5.0	587.2	140.9	546.3	155.5	505.4	170.1	465.9	182.6	430.2	189.7	394.4	196.7	377.3	204.8	360.1	212.9	351.6	216.9
	6.0	***604.5***	***142.9***	***561.7***	***157.9***	***519.0***	***172.9***	***484.3***	***186.1***	***447.3***	***192.5***	***410.4***	***198.9***	***391.6***	***206.9***	***372.9***	***214.9***	***363.5***	***219.0***
	7.0	621.7	144.8	577.1	160.2	532.5	175.6	502.7	189.6	464.5	195.3	426.3	201.0	406.0	209.0	385.7	217.0	375.5	221.0
	8.0	***651.8***	***148.6***	***610.5***	***162.9***	***569.2***	***177.2***	***529.0***	***192.9***	***497.5***	***200.3***	***466.1***	***207.8***	***440.5***	***214.1***	***414.8***	***220.4***	***402.0***	***223.5***
	10.0	681.8	152.4	643.8	165.6	605.9	178.8	555.2	196.1	530.6	205.4	505.9	214.6	474.9	219.2	443.9	223.7	428.4	226.0
	12.0	***711.8***	***156.2***	***677.2***	***168.3***	***642.6***	***180.4***	***581.5***	***199.4***	***563.6***	***210.4***	***545.7***	***221.4***	***509.4***	***223.2***	***473.0***	***225.1***	***454.9***	***226.0***
YAES 0595SB	5.0	605.6	148.7	574.4	163.8	543.3	179.0	503.0	197.0	463.4	204.2	423.8	211.4	397.2	215.4	370.6	219.4	357.3	221.5
	6.0	***618.8***	***150.6***	***588.2***	***166.1***	***557.6***	***181.7***	***521.8***	***199.9***	***482.3***	***206.2***	***442.9***	***212.4***	***413.0***	***216.4***	***383.1***	***220.5***	***368.2***	***222.5***
	7.0	632.0	152.5	602.0	168.4	571.9	184.4	540.6	202.8	501.3	208.2	462.0	213.5	428.8	217.5	395.6	221.5	379.0	223.5
	8.0	***655.7***	***156.1***	***627.2***	***171.1***	***598.6***	***186.1***	***561.4***	***205.3***	***523.8***	***211.1***	***486.2***	***216.9***	***450.6***	***220.0***	***414.9***	***223.2***	***397.1***	***224.8***
	10.0	688.2	161.5	660.9	175.0	633.6	188.6	589.8	208.8	550.1	214.6	510.3	220.3	472.3	222.6	434.3	224.9	415.3	226.0
	12.0	***720.6***	***166.8***	***694.6***	***179.0***	***668.6***	***191.1***	***618.3***	***212.3***	***576.4***	***218.0***	***534.5***	***223.7***	***U***	***224.6***	***453.6***	***225.5***	***433.4***	***226.0***
YAES 0625SB	5.0	624.0	156.4	602.6	172.2	581.2	187.9	540.1	211.4	496.6	218.7	453.2	226.0	417.1	226.0	381.0	226.0	363.0	226.0
	6.0	***633.1***	***158.3***	***617.1***	***174.4***	***596.3***	***190.6***	***559.3***	***213.7***	***517.3***	***219.9***	***475.4***	***226.0***	***434.4***	***226.0***	***393.3***	***226.0***	***372.8***	***226.0***
	7.0	642.2	160.1	631.6	176.7	611.4	193.2	578.4	216.0	538.0	221.0	497.6	226.0	451.6	226.0	405.6	226.0	382.5	226.0
	8.0	***659.6***	***163.6***	***648.8***	***179.3***	***628.0***	***194.9***	***593.8***	***217.8***	***550.0***	***221.9***	***506.2***	***226.0***	***460.6***	***226.0***	***415.1***	***226.0***	***392.3***	***226.0***
	10.0	694.5	170.5	683.1	184.5	661.4	198.4	624.4	221.5	569.6	223.8	514.8	226.0	469.7	226.0	424.6	226.0	402.1	226.0
	12.0	***729.4***	***177.4***	***717.5***	***189.7***	***694.7***	***201.9***	***655.1***	***225.2***	***589.2***	***225.6***	***523.4***	***226.0***	***523.4***	***226.0***	***434.2***	***226.0***	***411.9***	***226.0***

The table is based on the following:

1. Power (kW) is for compressors only.
2. All performance data is for the standard unit.
3. The cooling capacities for the *Sonata* (low sound) versions are reduced by the following percentages: YAES 0415, 0465 and 0525 = 3%, YAES 0565, YAES 0595 and YAES 0625 = 2%.
4. Power consumption of all fans running: YAES 0415, 0465 and 0525 = 10.2 kW at high speed and 7.8 kW at slow speed, YAES 0565, 0595, 0625 = 13.6 kW at high speed and 10.4 kW at slow speed.
   Power consumption with high pressure fans - all fans running: YAES 0415, 0465, 0525 = 18.0 kW, YAES 0565, 0595, 0625 = 24.0 kW.

Model	Leaving Liquid Temp. °C	Condenser Entering Air Temperature °C																	
		20		25		30		35		38		40		42		44		45	
		Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW
YAES 0495HB	5.0	479.5	116.4	458.2	128.2	437.1	139.6	408.6	154.1	392.7	162.7	383.7	168.0	366.6	173.0	349.7	177.8	340.9	180.3
	6.0	***498.8***	***117.3***	***473.5***	***129.9***	***448.3***	***142.1***	***427.3***	***154.3***	***408.6***	***163.9***	***398.0***	***169.8***	***380.7***	***174.9***	***363.6***	***180.0***	***354.8***	***182.6***
	7.0	518.2	118.1	488.7	131.6	459.4	144.7	446.0	154.4	424.5	165.0	412.2	171.5	394.8	176.8	377.5	182.1	368.6	184.8
	8.0	***522.8***	***119.3***	***499.0***	***132.7***	***475.4***	***145.8***	***459.0***	***157.1***	***439.2***	***167.0***	***427.9***	***173.1***	***413.8***	***179.1***	***394.2***	***184.7***	***384.1***	***187.0***
	10.0	532.1	121.6	519.6	135.0	507.4	148.1	484.9	162.5	468.6	170.9	459.3	176.3	441.6	182.3	424.2	188.4	415.2	191.4
	12.0	***550.9***	***124.5***	***541.7***	***137.6***	***533.0***	***150.3***	***513.2***	***166.1***	***497.4***	***174.8***	***488.4***	***180.3***	***465.4***	***184.3***	***443.2***	***189.0***	***431.7***	***188.5***
YAES 0515HB	5.0	513.4	121.1	486.7	134.6	460.0	147.8	435.7	165.0	417.8	171.7	408.1	175.6	389.7	180.4	371.5	185.2	362.2	187.7
	6.0	***529.3***	***122.0***	***503.5***	***136.4***	***477.8***	***150.6***	***455.7***	***165.1***	***434.6***	***172.9***	***423.3***	***177.4***	***404.7***	***182.5***	***386.3***	***187.5***	***376.9***	***190.0***
	7.0	547.8	122.9	520.2	138.2	492.8	153.3	475.6	165.2	451.5	174.1	438.4	179.2	419.7	184.5	401.1	189.7	391.6	192.4
	8.0	***559.2***	***124.1***	***534.6***	***139.4***	***510.2***	***154.5***	***489.4***	***168.1***	***467.1***	***176.2***	***455.1***	***180.9***	***438.0***	***186.6***	***418.2***	***192.1***	***408.1***	***194.7***
	10.0	582.0	126.5	563.0	141.7	544.2	156.9	517.1	173.9	498.5	180.4	488.5	184.2	469.5	190.2	450.7	196.2	441.1	199.3
	12.0	***608.3***	***129.5***	***592.4***	***144.4***	***576.7***	***159.2***	***547.2***	***177.7***	***529.2***	***184.5***	***519.5***	***188.5***	***495.0***	***191.9***	***471.0***	***195.7***	***458.6***	***196.2***
YAES 0535HB	5.0	547.3	125.8	515.1	141.0	482.9	156.1	462.8	175.8	442.8	180.7	432.5	183.2	412.9	187.9	393.4	192.6	383.4	195.0
	6.0	***559.7***	***126.7***	***533.5***	***142.9***	***507.3***	***159.0***	***484.0***	***175.9***	***460.6***	***182.0***	***448.6***	***185.1***	***428.7***	***190.1***	***409.1***	***195.0***	***399.0***	***197.5***
	7.0	577.4	127.7	551.8	144.7	526.1	161.8	505.2	176.1	478.4	183.3	464.7	187.0	444.6	192.2	424.8	197.3	414.5	199.9
	8.0	***595.6***	***128.9***	***570.3***	***146.0***	***545.0***	***163.1***	***519.9***	***179.1***	***495.1***	***185.5***	***482.3***	***188.7***	***462.2***	***194.1***	***442.2***	***199.5***	***432.0***	***202.3***
	10.0	631.9	131.4	606.5	148.5	581.1	165.6	549.2	185.3	528.4	189.8	517.7	192.2	497.4	198.1	477.3	204.0	466.9	207.1
	12.0	***665.8***	***134.5***	***643.1***	***151.3***	***620.4***	***168.1***	***581.3***	***189.4***	***561.0***	***194.2***	***550.5***	***196.6***	***524.5***	***199.5***	***498.7***	***202.4***	***485.5***	***203.9***
YAES 0585HB	5.0	599.5	136.0	553.1	150.0	506.8	164.0	483.1	178.1	455.9	187.9	437.8	194.5	418.5	201.5	399.3	208.5	389.6	212.0
	6.0	***613.1***	***137.0***	***572.7***	***152.0***	***532.3***	***167.0***	***505.2***	***178.3***	***474.5***	***189.2***	***454.0***	***196.5***	***434.6***	***203.8***	***415.2***	***211.0***	***405.5***	***214.7***
	7.0	632.4	138.0	592.3	154.0	552.1	170.0	527.4	178.4	493.1	190.5	470.3	198.5	450.7	206.0	431.1	213.5	421.3	217.3
	8.0	***652.3***	***139.3***	***611.8***	***155.3***	***571.9***	***171.3***	***542.7***	***181.5***	***510.0***	***192.8***	***488.2***	***200.3***	***468.5***	***208.2***	***448.8***	***216.0***	***439.0***	***219.9***
	10.0	692.2	142.0	651.0	158.0	609.8	174.0	573.3	187.7	543.7	197.5	524.0	204.0	504.2	212.4	484.4	220.9	474.5	225.1
	12.0	***729.2***	***145.4***	***690.1***	***161.0***	***651.0***	***176.6***	***606.8***	***191.9***	***577.4***	***202.2***	***557.2***	***208.7***	***539.9***	***216.7***	***520.0***	***221.0***	***493.4***	***221.6***
YAES 0615HB	5.0	619.8	140.1	583.9	158.0	548.0	175.9	529.3	190.4	503.1	201.6	485.7	209.2	461.8	213.1	437.9	217.3	426.0	219.0
	6.0	***631.7***	***142.7***	***600.2***	***160.2***	***568.6***	***177.8***	***549.8***	***190.2***	***520.7***	***202.5***	***501.4***	***210.7***	***475.5***	***214.4***	***449.6***	***218.5***	***436.7***	***220.3***
	7.0	646.5	145.3	616.5	162.5	586.4	179.8	570.4	190.0	538.4	203.4	517.0	212.3	489.2	215.8	461.3	219.8	447.4	221.7
	8.0	***669.2***	***147.7***	***638.6***	***164.4***	***608.3***	***181.0***	***586.3***	***193.2***	***555.0***	***204.8***	***534.1***	***212.6***	***506.7***	***216.9***	***479.2***	***221.0***	***465.5***	***222.9***
	10.0	701.8	150.8	670.5	166.9	639.2	183.0	609.9	198.0	580.1	207.5	560.2	213.9	533.1	219.2	506.0	221.8	492.5	222.5
	12.0	***713.9***	***144.9***	***705.2***	***169.5***	***696.5***	***194.1***	***634.9***	***201.8***	***605.2***	***210.2***	***588.2***	***216.9***	***559.6***	***221.4***	***532.8***	***222.5***	***511.1***	***223.8***
YAES 0655HB	5.0	640.0	144.1	614.6	165.9	589.2	187.7	575.6	202.6	550.4	215.3	533.6	223.8	505.1	224.7	476.5	226.0	462.3	226.0
	6.0	***650.3***	***148.3***	***627.6***	***168.5***	***604.9***	***188.6***	***594.5***	***202.1***	***567.0***	***215.8***	***548.7***	***224.9***	***516.4***	***225.1***	***484.1***	***226.0***	***467.9***	***226.0***
	7.0	660.6	152.5	640.7	171.0	620.7	189.5	613.4	201.6	583.6	216.2	563.7	226.0	527.7	225.5	491.6	226.0	473.6	226.0
	8.0	***686.1***	***156.1***	***665.4***	***173.4***	***644.7***	***190.8***	***629.9***	***205.0***	***600.0***	***216.9***	***580.1***	***224.9***	***544.9***	***225.6***	***509.6***	***226.0***	***492.0***	***226.0***
	10.0	711.5	159.6	690.1	175.8	668.7	192.0	646.5	208.3	616.5	217.5	596.5	223.7	562.1	226.0	527.7	226.0	510.5	226.0
	12.0	***739.5***	***163.0***	***720.3***	***178.0***	***700.4***	***194.1***	***663.1***	***211.7***	***633.0***	***218.2***	***619.1***	***225.0***	***579.3***	***226.0***	***545.7***	***226.0***	***528.9***	***226.0***

The table is based on the following:

1. Power (kW) is for compressors only.
2. All performance data is for the high efficiency unit.
3. The cooling capacities for the *Sonata* (low sound) versions are reduced by the following percentages: YAES 0495, 0515 and 0535 = 2%, YAES 0585, YAES 0615 and YAES 0655 = 1.5%.
4. Power consumption of all fans running: YAES 0495, 0515 and 0535 = 13.6 kW at high speed and 10.4 kW at slow speed, YAES 0585, 0615, 0655 = 17.0 kW at high speed and 13.0 kW at slow speed.
   Power consumption with high pressure fans - all fans running: YAES 0495, 0515, 0535 = 24.0 kW, YAES 0585, 0615, 0655 = 30 kW.

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SELECTION GUIDE - GLYCOL COOLING

DATA REQUIRED

To select a YORK YAES glycol chiller, the following information is required:

1. Required cooling capacity.
2. Design chilled liquid entering and leaving temperatures.
3. Design glycol flow rate, if only one of the temperatures in item 2 is unknown.
4. Design condenser entering air temperature. This will normally be the design summer ambient air temperature unless location or other factors have an influence.
5. Altitude above sea level.
6. Design cooler fouling factor.
7. Static pressure resistance (against condenser entering and leaving airflow where ducts, louvres, attenuators, etc., are used) at full unit air flow.

Note: Items 1, 2 and 3 must be linked by the following formulae:

$$\text{Cooling capacity kW} = \frac{\text{l/s chilled liquid x °C range}}{\text{Glycol Factor}}$$

Where:
Range = Entering liquid temperature - leaving liquid temperature.

The glycol factor is obtained from table 6 using the design leaving liquid temperature and the percentage by weight glycol concentration. **Recommended glycol concentration for the unit is given in table 7.**

SELECTION METHOD

1. Determine the correct size of chiller by selecting the model which most closely matches the required capacity at the design conditions of leaving glycol temperature and entering air temperature.
2. Apply the relevant correction factors for fouling and altitude (Tables 3 and 4) and glycol concentration (Table 8), to the capacity and power values from the capacity table (Table 10). Ensure the corrected capacity is sufficient for requirements.
3. Using the customer requested duty or corrected capacity of the selected chiller, adjust the design temperature range, or flow rate, to balance the formulae shown in “Data Required”.
4. Physical and electrical data can now be determined from Tables 11 and 12.
5. Always re-check that selections fall within the design limitations specified (Table 2).

YAES SAMPLE SELECTION - GLYCOL COOLING

A YAES chiller is required to cool ethylene glycol from 3°C to -2°C having a cooling capacity of 330 kW.

Other design conditions applying are:

Ambient air entering condenser:	30°C
Fouling factor:	0.088m °C/kW
Altitude:	1200m
Glycol Type:	Ethylene

For a - 2°C ethylene glycol leaving temperature the recommended concentration from table 7 is 24%.

From the capacity table 10, an "Ethylene Glycol" temperature of “-2°C” leaving chilled liquid temperature at 30°C condenser entering air temperature a YAES0565SB gives approximately the required capacity of 349.5 kW.

From the design fouling factor, corrections of capacity x 0.987 and power x 0.995 apply (Table 3).

From the design altitude, corrections of capacity x 0.973 and power x 1.020 apply (Table 4).

From the design ethylene glycol strength, corrections of capacity x 1.0046 and power x 1.0024 apply (Interpolation from Table 8).

Applying these factors to the selection: YAES0565SB

Cooling Capacity= 349.5 x 0.987 x 0.973 x 1.0046 = 337.2 kW

Compressor Power= 164.7 x 0.995 x 1.020 x 1.0024 = 167.6 kW

For the glycol concentration specified and a leaving liquid temperature of - 2°C, the Glycol Factor is 0.2543 from table 6. The flow rate can be determined, therefore, from the formula shown in "Data Required".

$$337.2\ \text{kW} = \frac{(3 - (-2)) \times \text{Flow (l/s)}}{0.2543}$$

$$\text{Flow rate} = \frac{337.2 \times 0.2543}{5} = 17.2\ \text{(l/s)}$$

This satisfies the Operating Limits.

Cooler pressure drop = 13.0 kPa (Figure 2) x 1.072 (correction factor, Table 9 for 24% strength).

Cooler pressure drop = 13.9 kPa.

TABLE 6 GLYCOL FACTORS

LCLT °C	% by Weight				
	10	20	30	40	50
	Ethylene Glycol Factor				
10	0.2404	0.2515	0.2577	0.2734	0.2876
5	0.2399	0.2510	0.2579	0.2753	0.2906
0	0.2397	0.2505	0.2581	0.2772	0.2916
-5	0.2394	0.2501	0.2583	0.2791	0.2936
-10			0.2586	0.2800	0.2977

LCLT °C	% by Weight				
	10	20	30	40	50
	Propylene Glycol Factor				
10	0.2402	0.2444	0.2480	0.2578	0.2683
5	0.2394	0.2435	0.2476	0.2580	0.2693
0	0.2386	0.2426	0.2466	0.2572	0.2700
-5		0.2414	0.2458	0.2574	0.2700
-10			0.2447	0.2570	0.2708

TABLE 7 RECOMMENDED CONCENTRATIONS

Leaving Liquid Temperature °C	Ethylene Gylcol Concentration % Weight	Propylene Gylcol Concentration % Weight
4	11	14
2	17	21
0	21	25
-2	24	29
-4	28	32
-6	32	36
-8	35	38
-10	38	40

TABLE 8 GLYCOL CONCENTRATION FACTORS

% by Weight	Ethylene Glycol		Propylene Glycol	
	Capacity Factor	Power Factor	Capacity Factor	Power Factor
10	1.015	1.007	1.039	1.012
20	1.008	1.004	1.027	1.009
30	1.000	1.000	1.000	1.000
40	0.990	0.995	0.970	0.990
50	0.979	0.989	0.934	0.979

TABLE 9 PRESSURE DROP CORRECTIONS

% by Weight	Pressure Drop Correction Factor	
	Ethylene Glycol	Propylene Glycol
10	1.03	1.05
20	1.06	1.11
30	1.09	1.20
40	1.13	1.29
50	1.16	1.46

30% ETHYLENE GLYCOL CAPACITIES - STANDARD MODELS TABLE 10

Model	Leaving Liquid Temp. °C	Condenser Entering Air Temperature °C											
		20		25		30		35		38		40	
		Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW
YAES 0415SB	4.0	288.7	107.0	282.3	105.1	268.2	113.0	251.2	117.9	234.3	123.5	217.3	129.2
	2.0	***271.4***	***104.7***	***265.3***	***102.8***	***252.4***	***111.0***	***237.1***	***116.4***	***223.6***	***122.0***	***210.0***	***127.7***
	0.0	254.1	102.4	248.4	100.5	237.1	109.0	223.0	114.9	213.1	120.5	203.2	126.2
	-2.0	***242.5***	***100.2***	***237.1***	***98.2***	***220.2***	***107.0***	***211.7***	***113.4***	***203.2***	***119.0***	***194.8***	***124.7***
	-4.0	221.2	97.9	216.2	95.9	204.4	105.1	199.8	112.0	192.5	117.6	185.2	123.1
	-6.0	***207.9***	***95.6***	***203.2***	***93.5***	***189.1***	***103.1***	***180.7***	***110.5***	***175.0***	***116.1***	***169.4***	***121.6***
	-8.0	204.7	93.4	200.1	91.2	180.7	101.1	175.0	109.0	167.4	114.6	159.8	120.1
	-10.0	***201.5***	***91.1***	***197.0***	***88.9***	***172.2***	***99.1***	***169.4***	***107.6***	***159.8***	***113.1***	***150.2***	***118.6***
YAES 0465SB	4.0	352.7	136.9	344.8	134.6	327.6	144.6	306.9	150.8	286.2	158.1	265.5	165.4
	2.0	***331.6***	***134.0***	***324.2***	***131.6***	***308.3***	***142.1***	***289.7***	***149.0***	***273.1***	***156.2***	***256.6***	***163.5***
	0.0	310.4	131.1	303.5	128.6	289.7	139.5	272.4	147.1	260.4	154.3	248.3	161.5
	-2.0	***296.3***	***128.2***	***289.7***	***125.7***	***269.0***	***137.0***	***258.6***	***145.2***	***248.3***	***152.4***	***237.9***	***159.6***
	-4.0	270.2	125.3	264.2	122.7	249.7	134.5	244.1	143.3	235.2	150.5	226.2	157.6
	-6.0	***254.0***	***122.4***	***248.3***	***119.7***	***231.0***	***131.9***	***220.7***	***141.4***	***213.8***	***148.5***	***206.9***	***155.6***
	-8.0	250.1	119.5	244.5	116.8	220.7	129.4	213.8	139.5	204.5	146.6	195.2	153.7
	-10.0	***246.2***	***116.6***	***240.7***	***113.8***	***210.4***	***126.9***	***206.9***	***137.7***	***195.2***	***144.7***	***183.5***	***151.7***
YAES 0525SB	4.0	437.2	162.7	427.5	159.9	406.1	171.8	380.4	179.2	354.8	187.9	329.1	196.5
	2.0	***411.0***	***159.2***	***401.8***	***156.4***	***382.1***	***168.8***	***359.1***	***177.0***	***338.5***	***185.6***	***318.0***	***194.2***
	0.0	384.8	155.8	376.2	152.8	359.1	165.8	337.7	174.8	322.7	183.3	307.8	191.9
	-2.0	***367.3***	***152.3***	***359.1***	***149.3***	***333.4***	***162.8***	***320.6***	***172.5***	***307.8***	***181.0***	***294.9***	***189.6***
	-4.0	334.9	148.9	327.4	145.8	309.5	159.8	302.6	170.3	291.5	178.8	280.4	187.3
	-6.0	***314.8***	***145.5***	***307.8***	***142.3***	***286.4***	***156.8***	***273.6***	***168.0***	***265.0***	***176.5***	***256.5***	***184.9***
	-8.0	310.0	142.0	303.1	138.7	273.6	153.8	265.0	165.8	253.5	174.2	241.9	182.6
	-10.0	***305.2***	***138.6***	***298.4***	***135.2***	***260.7***	***150.8***	***256.5***	***163.6***	***241.9***	***171.9***	***227.4***	***180.3***
YAES 0565SB	4.0	458.3	164.5	448.1	161.7	425.6	173.8	398.8	181.3	371.9	190.1	345.0	198.8
	2.0	***430.8***	***161.1***	***421.2***	***158.2***	***400.6***	***170.8***	***376.4***	***179.0***	***354.9***	***187.8***	***333.3***	***196.5***
	0.0	403.3	157.6	394.3	154.6	376.4	167.7	354.0	176.8	338.3	185.5	322.6	194.1
	-2.0	***385.0***	***154.1***	***376.4***	***151.0***	***349.5***	***164.7***	***336.0***	***174.5***	***322.6***	***183.2***	***309.2***	***191.8***
	-4.0	351.1	150.6	343.2	147.5	324.4	161.6	317.2	172.3	305.6	180.8	293.9	189.4
	-6.0	***330.0***	***147.1***	***322.6***	***143.9***	***300.2***	***158.6***	***286.8***	***170.0***	***277.8***	***178.5***	***268.8***	***187.1***
	-8.0	324.9	143.7	317.7	140.3	286.8	155.6	277.8	167.7	265.7	176.2	253.6	184.7
	-10.0	***319.9***	***140.2***	***312.7***	***136.8***	***273.3***	***152.5***	***268.8***	***165.5***	***253.6***	***173.9***	***238.4***	***182.4***
YAES 0595SB	4.0	489.9	177.8	479.0	174.8	455.0	187.8	426.3	195.9	397.5	205.4	368.8	214.8
	2.0	***460.5***	***174.0***	***450.2***	***170.9***	***428.2***	***184.5***	***402.3***	***193.5***	***379.3***	***202.9***	***356.3***	***212.3***
	0.0	431.1	170.3	421.5	167.0	402.3	181.2	378.4	191.0	361.6	200.4	344.8	209.8
	-2.0	***411.5***	***166.5***	***402.3***	***163.2***	***373.6***	***177.9***	***359.2***	***188.6***	***344.8***	***197.9***	***330.5***	***207.2***
	-4.0	375.3	162.7	366.9	159.3	346.8	174.7	339.1	186.1	326.6	195.4	314.2	204.7
	-6.0	***352.7***	***159.0***	***344.8***	***155.5***	***320.9***	***171.4***	***306.5***	***183.7***	***296.9***	***192.9***	***287.4***	***202.1***
	-8.0	347.4	155.2	339.6	151.6	306.5	168.1	296.9	181.2	284.0	190.4	271.1	199.6
	-10.0	***342.0***	***151.5***	***334.3***	***147.8***	***292.2***	***164.8***	***287.4***	***178.8***	***271.1***	***187.9***	***254.8***	***197.1***
YAES 0625SB	4.0	526.8	189.1	515.0	185.9	489.3	199.8	458.4	208.4	427.5	218.5	396.6	228.5
	2.0	***495.2***	***185.1***	***484.1***	***181.8***	***460.4***	***196.3***	***432.6***	***205.8***	***407.9***	***215.8***	***383.2***	***225.8***
	0.0	463.6	181.1	453.2	177.7	432.6	192.8	406.9	203.2	388.8	213.2	370.8	223.1
	-2.0	***442.5***	***177.1***	***432.6***	***173.6***	***401.7***	***189.3***	***386.3***	***200.6***	***370.8***	***210.5***	***355.4***	***220.4***
	-4.0	403.5	173.1	394.5	169.5	372.9	185.8	364.6	198.0	351.2	207.9	337.8	217.7
	-6.0	***379.3***	***169.1***	***370.8***	***165.4***	***345.1***	***182.3***	***329.6***	***195.4***	***319.3***	***205.2***	***309.0***	***215.0***
	-8.0	373.5	165.1	365.1	161.3	329.6	178.8	319.3	192.8	305.4	202.6	291.5	212.3
	-10.0	***367.7***	***161.1***	***359.5***	***157.2***	***314.2***	***175.3***	***309.0***	***190.2***	***291.5***	***199.9***	***274.0***	***209.6***

The table is based on the following:

1. Power (kW) is for compressors only.
2. All performance data is for the standard unit.
3. The cooling capacities for the *Sonata* (low sound) versions are reduced by the following percentages: YAES 0415, 0465 and 0525 = 3%, YAES 0565, YAES 0595 and YAES 0625 = 2%.
4. Power consumption of all fans running: YAES 0415, 0465 and 0525 = 10.2 kW at high speed and 7.8 kW at slow speed, at slow speed.
   YAES 0565, 0595, 0625 = 13.6 kW at high speed and 10.4 kW
   Power consumption with high pressure fans - all fans running: YAES 0415, 0465, 0525 = 18.0 kW, YAES 0565, 0595, 0625 = 24.0 kW.

Table should also be used for 30% Propylene Glycol after reducing leaving chilled liquid temperature (LCLT) by 1 °C . (For example the cooling capacity when using -1 °C LCLT using Propylene Glycol is equivalent to -2 °C LCLT using Ethylene Glycol).

TABLE 10 30% ETHYLENE GLYCOL CAPACITIES - HIGH EFFICIENCY MODELS

Model	Leaving Liquid Temp. °C	Condenser Entering Air Temperature °C											
		20		25		30		35		38		40	
		Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW	Cool kW	Power kW
YAES 0495HB	4.0	346.5	117.6	338.7	115.6	321.8	124.3	301.5	129.6	281.1	135.9	260.8	142.2
	2.0	***325.7***	***115.2***	***318.4***	***113.1***	***302.8***	***122.1***	***284.5***	***128.0***	***268.3***	***134.3***	***252.0***	***140.5***
	0.0	304.9	112.7	298.1	110.5	284.5	119.9	267.6	126.4	255.7	132.6	243.9	138.8
	-2.0	***291.1***	***110.2***	***284.5***	***108.0***	***264.2***	***117.8***	***254.0***	***124.8***	***243.9***	***131.0***	***233.7***	***137.1***
	-4.0	265.4	107.7	259.5	105.4	245.2	115.6	239.8	123.2	231.0	129.3	222.2	135.4
	-6.0	***249.5***	***105.2***	***243.9***	***102.9***	***226.9***	***113.4***	***216.8***	***121.5***	***210.0***	***127.7***	***203.2***	***133.8***
	-8.0	245.7	102.7	240.2	100.3	216.8	111.2	210.0	119.9	200.9	126.0	191.7	132.1
	-10.0	***241.9***	***100.2***	***236.4***	***97.8***	***206.6***	***109.0***	***203.2***	***118.3***	***191.7***	***124.4***	***180.2***	***130.4***
YAES 0515HB	4.0	373.9	128.7	365.5	126.5	347.3	135.9	325.3	141.8	303.4	148.6	281.5	155.5
	2.0	***351.5***	***126.0***	***343.6***	***123.7***	***326.8***	***133.6***	***307.0***	***140.0***	***289.5***	***146.8***	***272.0***	***153.7***
	0.0	329.0	123.2	321.7	120.9	307.0	131.2	288.8	138.3	276.0	145.0	263.2	151.8
	-2.0	***314.1***	***120.5***	***307.0***	***118.1***	***285.1***	***128.8***	***274.2***	***136.5***	***263.2***	***143.2***	***252.2***	***150.0***
	-4.0	286.4	117.8	280.0	115.3	264.6	126.4	258.8	134.7	249.3	141.4	239.8	148.1
	-6.0	***269.2***	***115.1***	***263.2***	***112.5***	***244.9***	***124.0***	***233.9***	***132.9***	***226.6***	***139.6***	***219.3***	***146.3***
	-8.0	265.1	112.3	259.2	109.8	233.9	121.7	226.6	131.2	216.8	137.8	206.9	144.5
	-10.0	***261.0***	***109.6***	***255.1***	***107.0***	***223.0***	***119.3***	***219.3***	***129.4***	***206.9***	***136.0***	***194.5***	***142.6***
YAES 0535HB	4.0	463.5	152.9	453.1	150.3	430.4	161.5	403.3	168.5	376.1	176.6	348.9	184.8
	2.0	***435.7***	***149.7***	***425.9***	***147.0***	***405.1***	***158.7***	***380.6***	***166.4***	***358.9***	***174.5***	***337.1***	***182.6***
	0.0	407.9	146.4	398.7	143.7	380.6	155.9	357.9	164.3	342.1	172.3	326.2	180.4
	-2.0	***389.3***	***143.2***	***380.6***	***140.3***	***353.4***	***153.0***	***339.8***	***162.2***	***326.2***	***170.2***	***312.6***	***178.2***
	-4.0	355.0	140.0	347.1	137.0	328.0	150.2	320.8	160.1	309.0	168.0	297.2	176.0
	-6.0	***333.7***	***136.7***	***326.2***	***133.7***	***303.6***	***147.4***	***290.0***	***158.0***	***280.9***	***165.9***	***271.9***	***173.8***
	-8.0	328.6	133.5	321.2	130.4	290.0	144.5	280.9	155.9	268.7	163.8	256.5	171.7
	-10.0	***323.5***	***130.3***	***316.3***	***127.1***	***276.4***	***141.7***	***271.9***	***153.8***	***256.5***	***161.6***	***241.0***	***169.5***
YAES 0585HB	4.0	485.8	154.7	474.9	152.0	451.2	163.4	422.7	170.4	394.2	178.7	365.7	186.9
	2.0	***456.7***	***151.4***	***446.4***	***148.7***	***424.6***	***160.5***	***398.9***	***168.3***	***376.1***	***176.5***	***353.4***	***184.7***
	0.0	427.5	148.1	417.9	145.3	398.9	157.7	375.2	166.2	358.6	174.3	342.0	182.5
	-2.0	***408.1***	***144.9***	***398.9***	***142.0***	***370.4***	***154.8***	***356.2***	***164.1***	***342.0***	***172.2***	***327.7***	***180.3***
	-4.0	372.1	141.6	363.8	138.6	343.9	151.9	336.3	161.9	323.9	170.0	311.6	178.1
	-6.0	***349.8***	***138.3***	***342.0***	***135.3***	***318.2***	***149.1***	***304.0***	***159.8***	***294.5***	***167.8***	***285.0***	***175.9***
	-8.0	344.4	135.0	336.7	131.9	304.0	146.2	294.5	157.7	281.6	165.7	268.8	173.7
	-10.0	***339.1***	***131.8***	***331.5***	***128.6***	***289.7***	***143.4***	***285.0***	***155.5***	***268.8***	***163.5***	***252.7***	***171.4***
YAES 0615HB	4.0	519.3	167.1	507.7	164.3	482.3	176.5	451.8	184.1	421.4	193.0	390.9	201.9
	2.0	***488.2***	***163.6***	***477.2***	***160.6***	***453.9***	***173.5***	***426.5***	***181.8***	***402.1***	***190.7***	***377.7***	***199.6***
	0.0	457.0	160.0	446.8	157.0	426.5	170.4	401.1	179.5	383.3	188.4	365.5	197.2
	-2.0	***436.2***	***156.5***	***426.5***	***153.4***	***396.0***	***167.3***	***380.8***	***177.3***	***365.5***	***186.0***	***350.3***	***194.8***
	-4.0	397.8	153.0	388.9	149.8	367.6	164.2	359.4	175.0	346.2	183.7	333.0	192.4
	-6.0	***373.9***	***149.4***	***365.5***	***146.2***	***340.2***	***161.1***	***324.9***	***172.7***	***314.8***	***181.3***	***304.6***	***190.0***
	-8.0	368.2	145.9	360.0	142.5	324.9	158.0	314.8	170.4	301.1	179.0	287.4	187.6
	-10.0	***362.5***	***142.4***	***354.4***	***138.9***	***309.7***	***154.9***	***304.6***	***168.1***	***287.4***	***176.6***	***270.1***	***185.2***
YAES 0655HB	4.0	558.4	177.8	545.9	174.8	518.6	187.8	485.9	195.9	453.1	205.4	420.3	214.8
	2.0	***524.9***	***174.0***	***513.1***	***170.9***	***488.0***	***184.5***	***458.6***	***193.5***	***432.4***	***202.9***	***406.1***	***212.3***
	0.0	491.4	170.3	480.4	167.0	458.6	181.2	431.3	191.0	412.2	200.4	393.0	209.8
	-2.0	***469.1***	***166.5***	***458.6***	***163.2***	***425.8***	***177.9***	***409.4***	***188.6***	***393.0***	***197.9***	***376.7***	***207.2***
	-4.0	427.7	162.7	418.2	159.3	395.2	174.7	386.5	186.1	372.3	195.4	358.1	204.7
	-6.0	***402.1***	***159.0***	***393.0***	***155.5***	***365.8***	***171.4***	***349.4***	***183.7***	***338.5***	***192.9***	***327.5***	***202.1***
	-8.0	395.9	155.2	387.0	151.6	349.4	168.1	338.5	181.2	323.7	190.4	309.0	199.6
	-10.0	***389.8***	***151.5***	***381.0***	***147.8***	***333.0***	***164.8***	***327.5***	***178.8***	***309.0***	***187.9***	***290.4***	***197.1***

The table is based on the following:

1. Power (kW) is for compressors only.
2. All performance data is for the high efficiency unit.
3. The cooling capacities for the *Sonata* (low sound) versions are reduced by the following percentages: YAES 0495, 0515 and 0535 = 2%, YAES 0585, YAES 0615 and YAES 0655 = 1.5%.
4. Power consumption of all fans running: YAES 0495, 0515 and 0535 = 13.6 kW at high speed and 10.4 kW at slow speed, YAES 0585, 0615, 0655 = 17.0 kW at high speed and 13.0 kW at slow speed.
   Power consumption with high pressure fans - all fans running: YAES 0495, 0515, 0535 = 24.0 kW, YAES 0585, 0615, 0655 = 30 kW.

Table should also be used for 30% Propylene Glycol after reducing leaving chilled liquid temperature (LCLT) by 1 °C . (For example the cooling capacity when using -1 °C LCLT using Propylene Glycol is equivalent to -2 °C LCLT using Ethylene Glycol).

PHYSICAL DATA - STANDARD MODELS — TABLE 11

Model YAES-SB				0415	0465	0525	0565	0595	0625
Refrigerant circuits				2	2	2	2	2	2
Refrigerant Charge		Circuit 1	kg	58	58	62	58	62	62
		Circuit 2	kg	60	58	62	58	58	62
Refrigerant Economiser		Circuit 1	kg	No	No	Yes	No	Yes	Yes
		Circuit 2	kg	No	No	Yes	No	No	Yes
Compressor		Number		2	2	2	2	2	2
		Type (circuit 1)		DXS36L	DXS36L	DXS36L-E	DXS45L	DXS45L-E	DXS45L-E
		Nominal cooling capacity	kW	250	250	250	280	280	280
		Type (circuit 2)		DXS24L	DXS36L	DXS36L-E	DXS45L	DXS45L	DXS45L-E
		Nominal cooling capacity	kW	190	250	250	280	280	280
		Capacity Control	%	20 - 100%	20 - 100%	20 - 100%	20 - 100%	20 - 100%	20 - 100%
Oil Charge		Per circuit	l	8	8	8	8	8	8
Evaporator		Number		1	1	1	1	1	1
		Type		C1	C1	C1	C2	C2	C2
		Water volume	l	207	207	207	248	248	248
Air Cooled Condenser		Total coil face area	m²	17.84	17.84	17.84	23.78	23.78	23.78
		Number of tube rows		4	4	4	3	3	3
		Number of fans (cicuit 1)		3	3	3	4	4	4
		Number of fans (cicuit 2)		3	3	3	4	4	4
Fans	Standard	Nominal speed	rpm	700	700	700	715	715	715
		Total airflow	m³/s	36.6	36.6	36.6	50.0	50.0	50.0
	2 Speed (low)	Nominal speed	rpm	585	585	585	600	600	600
		Total airflow	m³/s	30.8	30.8	30.8	42.2	42.2	42.2
	2 Speed (high)	Nominal speed	rpm	700	700	700	715	715	715
		Total airflow	m³/s	36.6	36.6	36.6	50.0	50.0	50.0
	High pressure	Nominal speed	rpm	950	950	950	965	965	965
		Total airflow (@ 120 Pa EXT.)	m³/s	45.6	45.6	45.6	60.8	60.8	60.8
Dimensions [1]		Length	mm	4764	4764	4764	5983	5983	5983
		Width	mm	2242	2242	2242	2242	2242	2242
		Height	mm	2478	2478	2478	2478	2478	2478
Operating Weight [2] [3]	Units with aluminium fin coils (coated)		kg	4557	4598	4698	5123	5144	5164
	Units with copper fin coils		kg	5127	5168	5268	5698	5719	5739
	Heat recovery units (aluminium fin coils)		kg	5085	5126	5226	5672	5693	5713
	Units with Desuperheater (aluminiun fin coils)		kg	4857	4898	4998	5423	5444	5464

(1) Length excludes switch disconnect or circuit breaker handles.
(2) Deduct 210 kg (models 0415, 0465, 0525) or 250 kg (models 0565, 0595, 0625) from operating weight to obtain **shipping weight** on cooling only units. Deduct 260 kg (models 0415, 0465, 0525) or 300 kg (models 0565, 0595, 0625) on heat recovery units. Deduct 240 kg (models 0415, 0465, 0525) or 280 kg (models 0565, 0595, 0625) on units with DeSuperheater.
(3) Add 220 kg (models 0415, 0465, 0525) or 190 kg (models 0565, 0595, 0625) to operating weight and shipping weight on low sound units. Add 150 kg (all models) to operating weight and shipping weight on units with optional aesthetic panels.

A Weighted Sound Power Level dB (A)

		Standard Models									
		Octave Band Levels - Frequency Hz									SPL[1] at
Unit Type	YAES-SB	Mean SWL	63	125	250	500	1000	2000	4000	8000	10 m
Models without acoustic treatment	0415, 0465, 0525	93.0	66.5	76.6	87.0	87.5	87.4	84.8	80.5	71.6	60.9
Low Sound Models (Fans at high speed)		91.5	65.1	75.2	85.6	86.0	85.9	83.3	79.0	70.2	59.1
Low Sound (Fans at low speed)		88.9	61.9	72.2	82.8	83.3	83.2	80.5	76.1	67.1	56.7
Models without acoustic treatment	0565, 0595, 0625	94.8	70.3	77.5	83.2	89.1	91.3	89.1	81.4	73.8	62.7
Low Sound Models (Fans at high speed)		93.5	66.2	76.2	83.6	88.4	88.8	86.5	80.6	72.6	60.9
Low Sound (Fans at low speed)		91.0	59.9	72.7	84.7	86.0	87.4	82.1	75.1	66.7	58.5

Note: Data in accordance with ISO 3744.
1. Sound Pressure level at 10 metres.

TABLE 11 PHYSICAL DATA - HIGH EFFICIENCY MODELS

Model YAES-HB				0495	0515	0535	0585	0615	0655
Refrigerant circuits				2	2	2	2	2	2
Refrigerant Charge		Circuit 1	kg	68	72	72	68	72	72
		Circuit 2	kg	68	68	72	68	68	72
Refrigerant Economiser		Circuit 1	kg	No	Yes	Yes	No	Yes	Yes
		Circuit 2	kg	No	No	Yes	No	No	Yes
Compressor		Number		2	2	2	2	2	2
		Type (circuit 1)		DXS36L	DXS36L-E	DXS36L-E	DXS45L	DXS45L-E	DXS45L-E
		Nominal cooling capacity	kW	250	250	250	280	280	280
		Type (circuit 2)		DXS36L	DXS36L	DXS36L-E	DXS45L	DXS45L	DXS45L-E
		Nominal cooling capacity	kW	250	250	250	280	280	280
		Capacity Control	%	20 - 100%	20 - 100%	20 - 100%	20 - 100%	20 - 100%	20 - 100%
Oil Charge		Per circuit	l	8	8	8	9	9	9
Evaporator		Number		1	1	1	1	1	1
		Type		C2	C2	C2	C2	C2	C2
		Water volume	l	248	248	248	248	248	248
Air Cooled Condenser		Total coil face area	m²	23.78	23.78	23.78	29.73	29.73	29.73
		Number of tube rows		3	3	3	3	3	3
		Number of fans (cicuit 1)		4	4	4	5	5	5
		Number of fans (cicuit 2)		4	4	4	5	5	5
Fans	Standard	Nominal speed	rpm	715	715	715	715	715	715
		Total airflow	m³/s	50.0	50.0	50.0	62.5	62.5	62.5
	2 Speed (low)	Nominal speed	rpm	600	600	600	600	600	600
		Total airflow	m³/s	42.2	42.2	42.2	52.7	52.7	52.7
	2 Speed (high)	Nominal speed	rpm	715	715	715	715	715	715
		Total airflow	m³/s	50.0	50.0	50.0	62.5	62.5	62.5
	High pressure	Nominal speed	rpm	965	965	965	965	965	965
		Total airflow (@ 120 Pa EXT.)	m³/s	60.8	60.8	60.8	76.0	76.0	76.0
Dimensions (1)		Length	mm	5983	5983	5983	7202	7202	7202
		Width	mm	2242	2242	2242	2242	2242	2242
		Height	mm	2478	2478	2478	2478	2478	2478
Operating Weight (2) (3)	Units with aluminium fin coils (coated)		kg	5123	5144	5164	5663	5684	5704
	Units with copper fin coils		kg	5698	5719	5739	6383	6404	6424
	Heat recovery units (aluminium fin coils)		kg	5651	5672	5692	6212	6233	6253
	Units with Desuperheater (aluminiun fin coils)		kg	5423	5444	5464	5963	5984	6004

(1) Length excludes switch disconnect and/or circuit breaker handles.
(2) Deduct 250 kg from operating weight to obtain **shipping weight** on cooling only units. Deduct 300 kg on heat recovery units and 280 kg on units with DeSuperheater.
(3) Add 190 kg (all models) to operating weight and shipping weight on low sound units.
Add 150 kg (all models) to operating weight and shipping weight on units with optional aesthetic panels.

A Weighted Sound Power Level dB (A)

		High Efficiency Models									
		Octave Band Levels - Frequency Hz									SPL(1) at
Unit Type	YAES-HB	Mean SWL	63	125	250	500	1000	2000	4000	8000	10 m
Models without acoustic treatment	0495, 0515, 0535	95.0	68.5	78.6	89.0	89.5	89.4	86.7	82.4	73.6	62.7
Low Sound Models (Fans at high speed)		93.5	67.0	77.1	87.5	88.0	87.9	85.3	80.9	72.1	60.9
Low Sound (Fans at low speed)		91.0	59.9	72.7	84.7	86.0	87.4	82.1	75.1	66.7	58.5
Models without acoustic treatment	0585, 0615, 0655	96.7	72.2	79.5	85.2	91.0	93.3	91.0	83.4	75.8	65.7
Low Sound Models (Fans at high speed)		95.5	68.2	78.2	85.6	90.4	90.7	88.5	82.5	74.6	63.7
Low Sound (Fans at low speed)		93.1	62.6	75.2	86.9	88.2	89.6	84.4	77.5	69.3	61.3

Note: Data in accordance with ISO 3744.
1. Sound Pressure level at 10 metres.

ELECTRICAL DATA - STANDARD MODELS

TABLE 12

	Nominal Running Amps (1)		Maximum Running Amps (2)			Start-up (3)	Locked Rotor(4)	
	@ 380 V	@ 400 V	@342V	@ 380 V	@ 400 V	Amps	Star for Star/Delta	
Model	Without Power Factor Correction						Current Amps	
YAES-SB	With Optional Power Factor Correction fitted						@ 380V	@ 400V
0415	283	279	404	369	358	405	267	283
	260	252	384	347	334	392		
0465	325	319	453	411	399	445	267	283
	301	291	431	389	373	431		
0525	357	349	453	411	399	460	267	283
	333	321	431	389	373	446		
0565	384	374	462	420	408	473	267	283
	362	348	440	398	382	460		
0595	399	388	462	420	408	487	267	283
	377	362	440	398	382	474		
0625	414	402	462	420	408	487	267	283
	392	376	440	398	382	474		

(1) Nominal running amps at 35°C ambient air temperature and 7°C leaving liquid temperature.
(2) Maximum running amps is the maximum current drawn by the unit.
(3) Start-up amps is the largest compressor starting with the other system operating at nominal running amps at 400 V.
(4) Locked rotor conditions are for the largest compressor.
When optional high pressure fans are fitted add 8 amps (models 0415, 0465, 0525) or 11 amps (models 0565, 0595, 0625).

ELECTRICAL DATA - HIGH EFFICIENCY MODELS

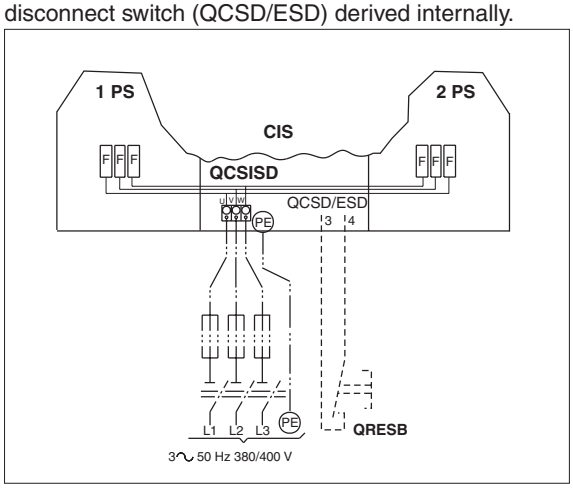
TABLE 12

	Nominal Running Amps (1)		Maximum Running Amps (2)			Start-up (3)	Locked Rotor(4)	
	@ 380 V	@ 400 V	@342V	@ 380 V	@ 400 V	Amps	Star for Star/Delta	
Model	Without Power Factor Correction						Current Amps	
YAES-HB	With Optional Power Factor Correction fitted						@ 380V	@ 400V
0495	304	302	462	420	408	437	267	283
	282	274	440	398	382	423		
0515	316	312	462	420	408	447	267	283
	293	284	440	398	382	433		
0535	328	322	462	420	408	447	267	283
	304	294	440	398	382	433		
0585	358	352	472	430	418	462	267	283
	336	316	450	408	392	444		
0615	370	362	472	430	418	472	267	283
	347	331	450	408	392	459		
0655	382	372	472	430	418	472	267	283
	358	346	450	408	392	459		

(1) Nominal running amps at 35°C ambient air temperature and 7°C leaving liquid temperature.
(2) Maximum running amps is the maximum current drawn by the unit.
(3) Start-up amps is the largest compressor starting with the other system operating at nominal running amps at 400 V.
(4) Locked rotor conditions are for the largest compressor.
When optional high pressure fans are fitted add 11 amps (models 0495, 0515, 0535) or 14 amps (models 0585, 0615, 0655).

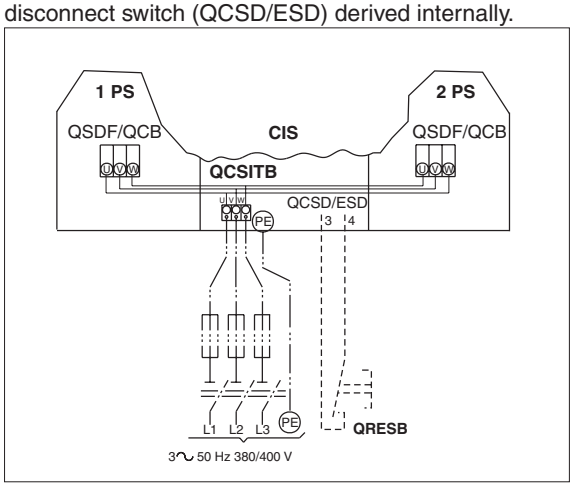
POWER SUPPLY CONNECTION DIAGRAMS (All Models)

Standard Single Point Power Supply
One supply to master non-fused disconnect switch (XCSISD) with internal power distribution to fuses, control supply to non-fused disconnect switch (QCSD/ESD) derived internally.

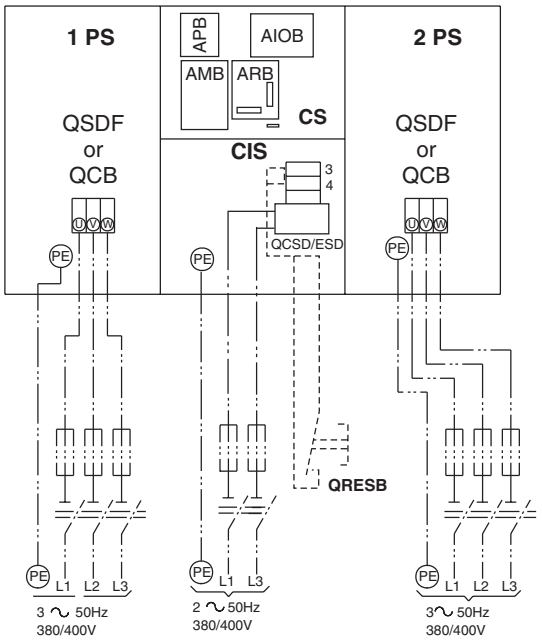


DESIGNATION	DESCRIPTION
AIOB	INPUT/OUTPUT EXPANSION BOARD
AMB	MICROPROCESSOR BOARD
APB	POWER SUPPLY BOARD
ARB	RELAY BOARD
CS	CONTROL SECTION
CIS	COMMON INPUT SECTION
F	FUSE
PE	PROTECTIVE EARTH
PS	POWER SECTION
QCSD/ESD	CONTROL CIRCUIT SWITCH DISCONNECT / EMERGENCY STOP DEVICE
QCB	CIRCUIT BREAKER
QCSISD	COMMON SUPPLY INPUT SWITCH DISCONNECT
QCSITB	COMMON SUPPLY INPUT TERMINAL BLOCK
QRESB	REMOTE EMERGENCY STOP BUTTON
QSDF	SWITCH DISCONNECT FUSED

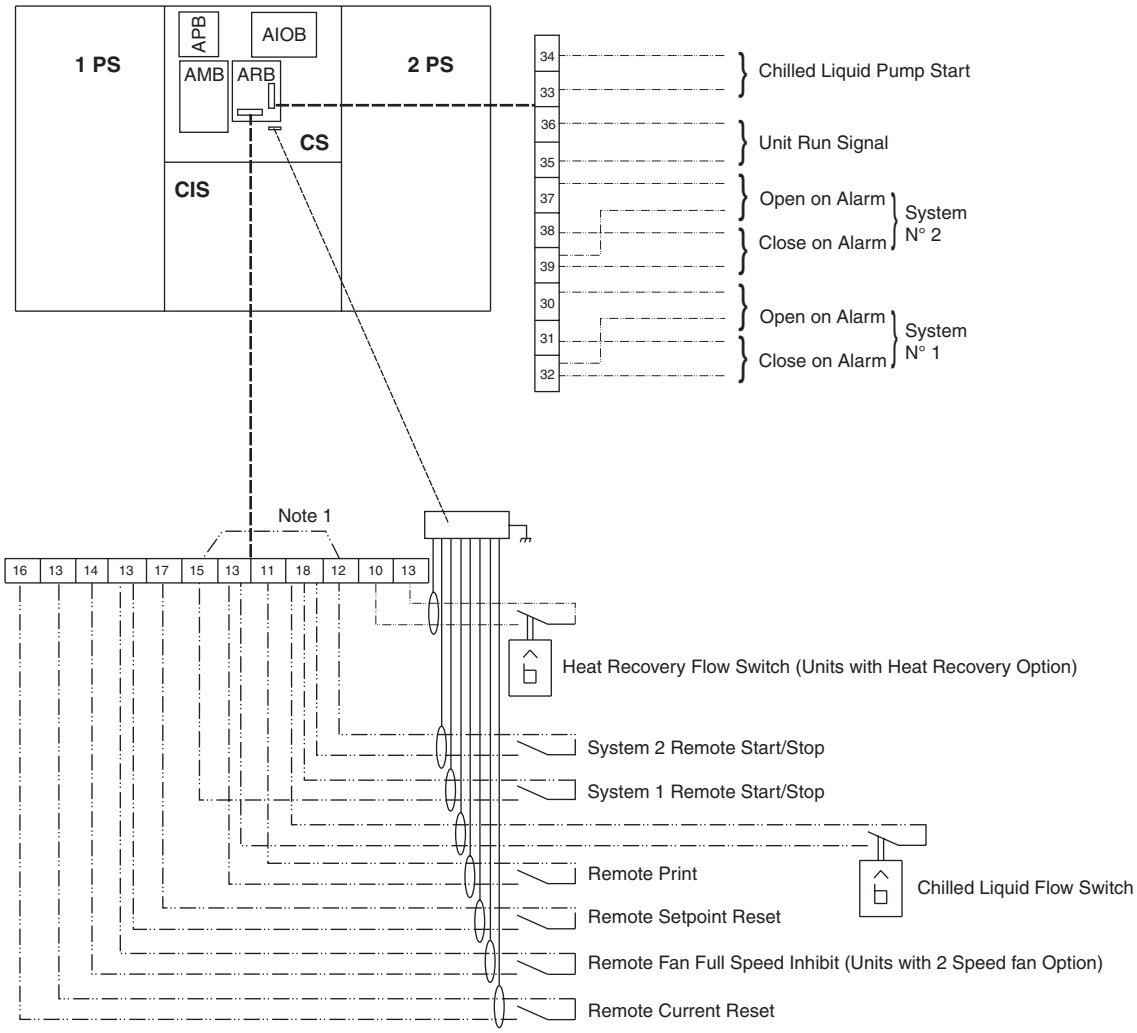
Single Point Power Supply (Option)
One supply to a common terminal block (QCSITB) with internal power distribution to fused disconnect switches (QSDF) or circuit breakers (QCB), control supply to non-fused disconnect switch (QCSD/ESD) derived internally.



Multi Point Power Supply (Option)
Two supplies to fused disconnect switches (QSDF) or circuit breakers (QCB) with separate control supply to non-fused disconnect switch (QCSD/ESD).

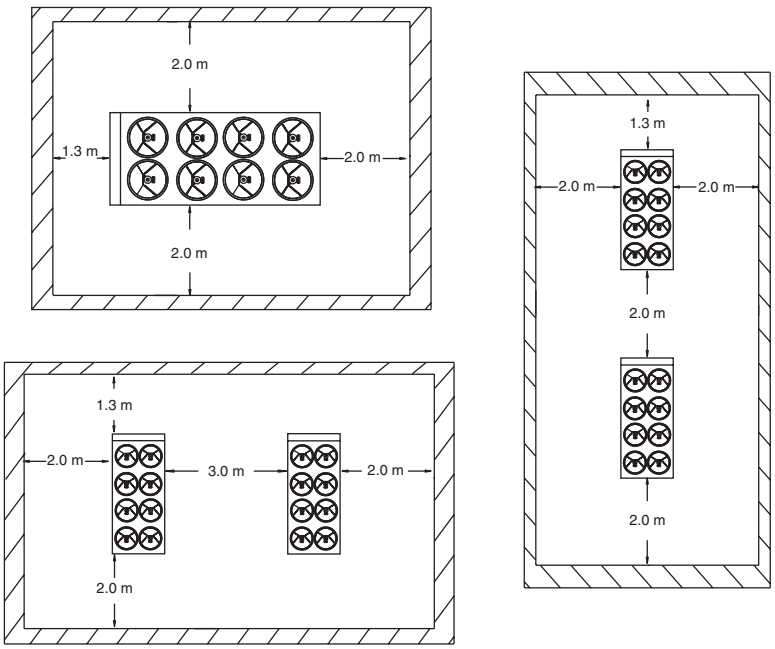


CUSTOMER CONNECTION DIAGRAM (All Models)



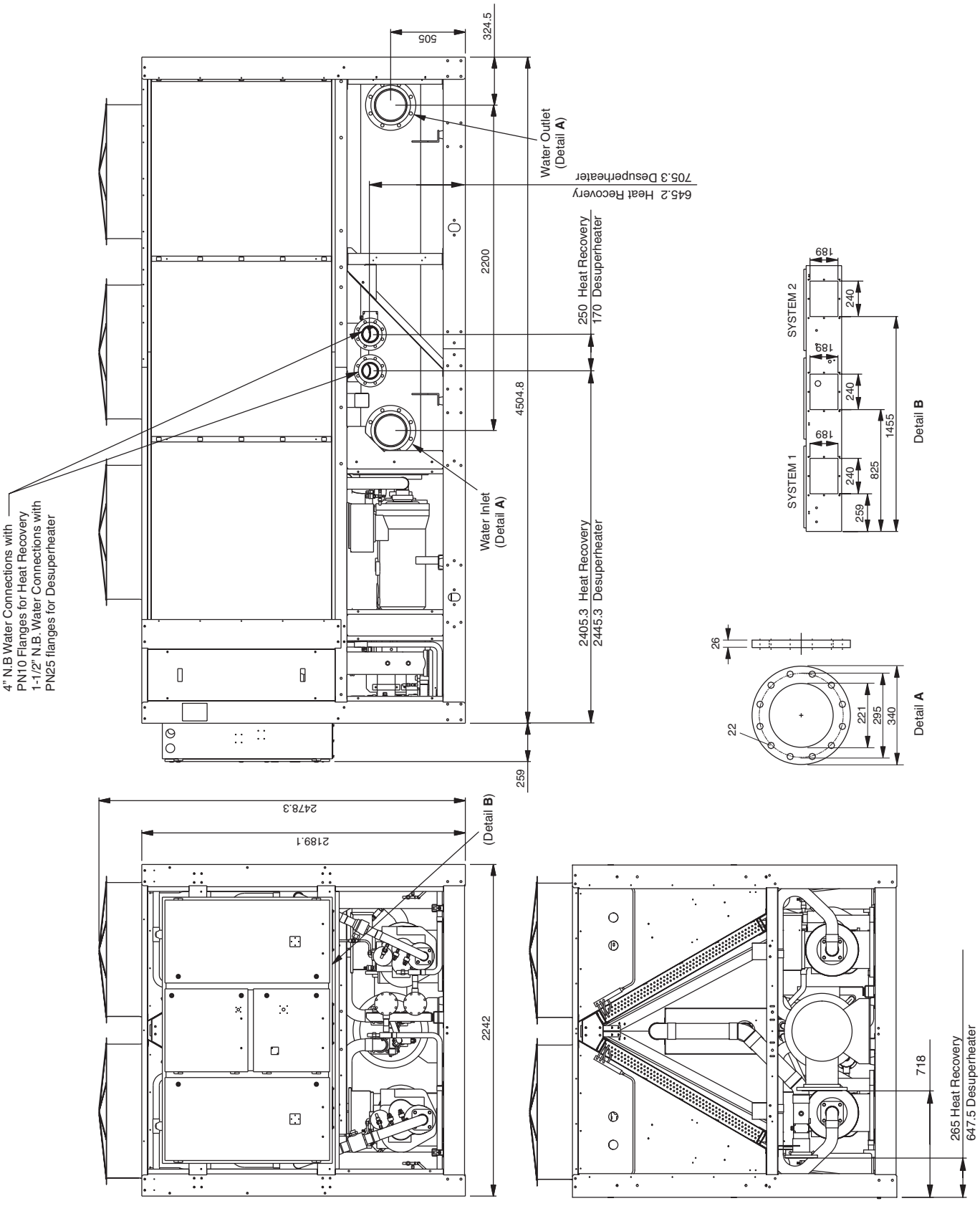
Note 1: Fit link between terminals 12 and 15 and connect a voltage free contact to terminals 15 and 18 for Remote Unit Start/Stop.

CLEARANCES (All Models)



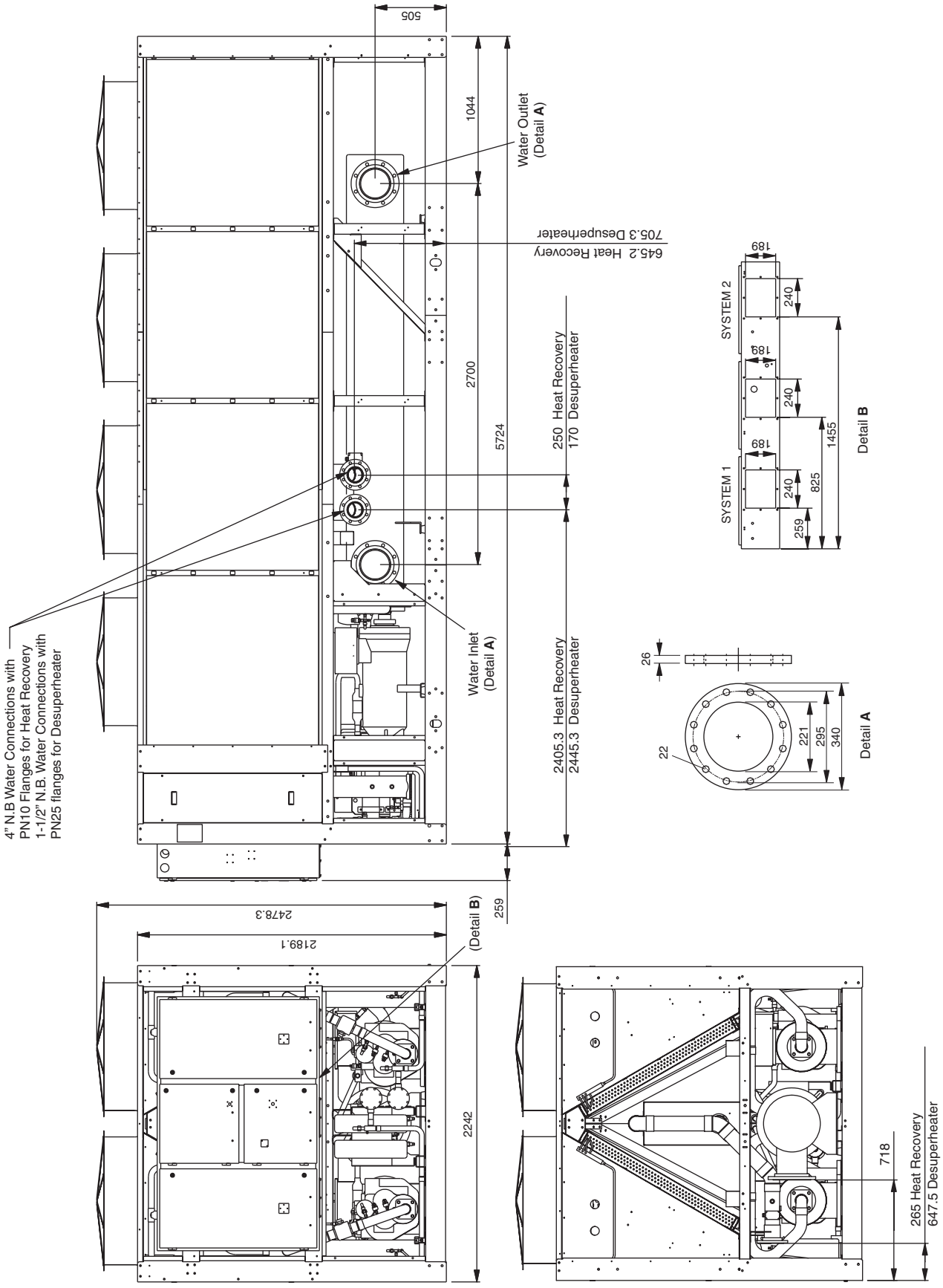
DIMENSIONS

Models YAES0415SB, YAES0465SB and YAES0525SB



DIMENSIONS (continued)

Models YAES0495HE, YAES0515HE, YAES0535HE, YAES0565SB, YAES0595SB and YAES0625SB



DIMENSIONS (continued)

Models YAES0585HE, YAES0615HE and YAES0655HE