WPSa Catalog

Door way Series

www.petra-eng.com

Quality HVAC Equipment

Perta Water Cooled Water Chiller
With Semi Hermetic Screw Compressor
110 - 275 Nominal Tons

Part 1 — General

1.01 SYSTEM

A. This section includes a microprocessor controlled water-cooled liquid chiller with twin-screw semi hermetic compressors, electronic expansion valves and independent refrigeration circuits. Chiller shall be DOORWAY design and will have the scheduled capacities as shown and indicated on the plans tables and drawings

1.02 QUALITY ASSURANCE

A. Chiller unit shall be designed, manufactured, tested and rated in accordance with the applicable section of the following standards and codes:

1. AHRI 550/590, “Water Chilling Package Using the Vapor Compression Cycle” latest edition
2. ASHRAE 90.1, “Energy Standard for Buildings Except Low-Rise Residential Buildings”
3. ANSI/ASHRAE 15, “Safety Code for Mechanical Refrigeration”. Comply with ASHRAE guideline 3 for refrigerant leaks, recovery, handling and storage requirements
4. ANSI/NFPA 70, “National Electrical Code (NEC)”
5. OSHA, “Occupational Safety and Health Act”
6. ASME Compliance: Fabricate and label water chiller heat exchangers (Barrel) to comply with “ASME Boiler and Pressure Vessel Code: Section VIII, Division I”
7. Manufactured in a facility registered to ISO 9001-2008, “Manufacturing Quality Standard” that define, establish, and maintain an effective quality assurance system for manufacturing and service industries and ISO 14001-2004, “Environmental Management System” that identify and control the environment impact and constantly improve the organization environmental performance
8. Conform to UL 1995-2000 under “Intertek Testing Services” for construction of chillers and bear the ETL/cETL mark

B. Factory Run Test

1. Unit shall be full load run tested at the factory. This includes pressure testing, evacuation of refrigeration circuits and charging afterward with refrigerant and oil. The run test will be carried out in a controlled environment based on entering and leaving water temperatures and with water flowing through the barrel (evaporator) and condenser

1.03 DELIVERY, STORAGE AND HANDLING

A. Unit controls shall be capable of withstanding 65.5 °C (150 °F) storage temperatures in the control compartment

B. Unit shall be delivered to job site fully assembled with all interconnecting refrigeration piping and internal wiring ready for field installation and charged with refrigerant and oil by the manufacturer

C. Unit to have a protective transparent shipping cover over the whole. This cover shall be secured to the unit base through special welded steel rods with nylon robes. Barrel and condenser opening shall be protected with plastic caps. The protective shipping cover should be kept in place until the equipment is ready for installation

D. Unit shall be stored and handled per unit manufacturer's recommendations. Chiller should be stored indoor and protected from construction dirt and moisture

1.04 WARRANTY

A. Manufacturer shall warrant the equipment (parts only) against defects of workmanship and/or material for a period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever occurs first

Part 2 — PRODUCTS

2.01 APROVED MANUFACTURERS

A. The design shown on the Plans & Drawings is based on PETRA model WPSa chiller manufactured by Petra Engineering Industries Co. Alternate equipment will be acceptable if the manufacturer's equipment meets the scheduled performance and complies with these specifications.
If equipment manufactured by a manufacturer other than that scheduled is utilized, then the Mechanical Contractor shall be responsible for coordinating with the General Contractor and all affected Subcontractors to insure proper provisions for installation of the furnished unit. This coordination shall include, but not be limited to, the following:

1. Electrical power requirements, wire and conduit sizes, circuit breakers and feeders sizes and overcurrent protection size

2. Structural supports for units
3. Chiller physical size on plant layout and apace availability
4. Water piping sizes and water connection locations on the unit
5. Compliance with the proper international codes such as AHRI, ANSI, NFPA, UL and ASME

B. The Mechanical Contractor shall be Responsible for all costs incurred by the General contractor, Subcontractors, and Consultants to modify the building provisions to accept the furnished alternate equipment

2.02 GENERAL

A. Description:

1. Furnish, install and commission a factory assembled DOORWAY DESIGN single piece chassis water cooled screw compressor chiller unit that is charged and run tested in the factory as specified herein and shown on the Drawings. Chiller shall include, but is not limited to: twin screw semi hermetic compressors, a complete refrigeration system with dual (2) independent refrigerant circuit, shell and tube DX type barrel (evaporator), shell & tube condenser, a full charge of R-134a refrigerant, flanged on lubrication system, interconnecting wiring, safety and operating controls and all special features as specified herein or required for safe and automatic operation

B. Unit Paint and Color:

1. Unit structural members, control and electrical boxes shall be constructed of a minimum of G-60-90 galvanized steel that shall be coated with a polyester oven baked powder paint that meets a minimum 5,000 hours salt spray tested in accordance with the ASTM B117 standard. Color code will be RAL 9002 (White Gray). Any other paint process that meets less than 5,000 hours shall not be accepted

C. Unit Base Structure And Finish:

1. Unit will be supported by a structural welded steel C-channel of heights of 150 mm (5.5”). The base shall incorporate cross members to support internal components and will be equipped with screwed-in lifting lugs (eye bolts) of suitable loading capacity. Each lifting lug will be fitted on a welded bracket to the side of the C-channel.

The base members shall be coated with mono component catalyzed primer sprayed paint. Welded rods inside the C-channel shall be added to tie-in the unit roof cover for shipment purposes

2. OPTIONAL: *Sprayed base by two layers of the same color epoxy paint*

2. OPTIONAL: *Galvanized steel structural C-channel base, sprayed base by two layers of the same color epoxy paint*

D. Unit Cabinet Structure:

1. All self-tapping screws and Bolts/Nuts used shall be made from Stainless steel with a built in rubber retainer included
2. All electrical panels are made from gauge 18 (1.25 mm {0.051”}) thickness galvanized

E. Compressors:

1. Twin rotary screw semi-hermetic compressors
2. Direct drive Compressor, suction gas cooled motor with a nominal speed of 2900/3500 rpm (50/60 power supply cycle). Motor shall be protected by a solid state motor protector feeding from imbedded motor temperature sensors on all three phases
3. Compressors shall be equipped with a flanged on oil separator that utilized the oil collection with a fine mesh oil filter and all necessary safeties. External oil separators with pumps shall not accepted
4. A crank case heater is fitted to the compressor to heat up the oil before startups. It is recommended to turn on the chiller controls before at least 24-hours to energize the crank case heater
5. Compressors shall be equipped with a discharge valve as part of the compressor
6. Compressors shall start unloaded with the unit microprocessor to load the compressor to match the system load
7. Compressor starting shall be part winding or Wye-Delta
8. Capacity control shall utilize an infinitely step less modulating slide valve to modulate capacity to match load requirements
9. Compressor shall be supported by rubber in shear vibration isolators and provided with ample space around it for service and removal
10. Compressor shall be equipped with a built in low pressure protection through a pressure transmitter connected to unit controller
11. Compressor shall have an oil level switch and a high efficiency suction strainer

D. Barrels (Evaporator Cooler):

1. Shall be a shell-and-tube, Direct Expansion (DX) type. It will be mechanically cleanable tubes removable head(s). Water in the shell and refrigerant in tubes
2. Tubes shall be internally enhanced seamless copper type rolled into tube sheets. Baffles shall be provided in the shell to ensure maximum water distribution for best heat transfer
3. Barrels shall be designed with dual (2) independent refrigeration circuits (one per each compressor)
4. *Shall be insulated with a closed cell foam insulation of 19 mm (3/4") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*
4. ***OPTIONAL:*** *Shall be insulated with a closed cell foam insulation of 25 mm (1") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*
4. ***OPTIONAL:*** *Shall be insulated with a closed cell foam insulation of 38 mm (1 1/2") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*
4. ***OPTIONAL:*** *Shall be insulated with a closed cell foam insulation of 50 mm (2") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*
5. Cooler shall have a built on drain and vent connection
6. It shall be equipped with Victaulic-type water connections that are supplied as loose items and shipped within the chiller enclosure
7. Cooler shall be tested and stamped in accordance with ASME Code for refrigerant. Refrigerant side design working pressure shall be 1000 kPa (145 psig) and the maximum water side design working pressure shall be 1500 kPa (220 psig)
8. ***OPTIONAL:*** *Aluminum protective Cladding cover that shall be applied above barrel (cooler) insulation. Aluminum cladding shall be of gauge 22 [0.7 mm (0.03")] thick*
8. ***OPTIONAL:*** *Stainless steel protective Cladding cover that shall be applied above barrel (cooler) insulation. Aluminum cladding shall be of gauge 22 [0.7 mm (0.03")] thick*
8. ***OPTIONAL:*** *Painted galvanized steel protective Cladding cover that shall be applied above barrel (cooler) insulation. Aluminum cladding shall be of gauge 22 [0.7 mm (0.03")] thick*
9. ***OPTIONAL:*** *Water flow switch shall be supplied as a loose item to be field installed by contractor. Flow switch shall be of the paddle type. The paddle shall be made from copper alloy.*

Switch shall be SPDT, IP 42 protection, with operating range of water temperature of -20°C to 80°C (-4°F to 176°F)

G. Condenser

1. Shall be a shell-and-tube type. It will be mechanically cleanable tubes removable head(s). Water in the tubes and refrigerant in shell
2. Tubes shall be internally enhanced seamless copper type rolled into tube sheets. Baffles shall be provided in the shell to ensure maximum liquid refrigerant distribution for best heat transfer
3. Condensers shall be designed with one (1) refrigeration circuits, so each chiller shall be equipped with two (2) condensers (one per each compressor)
4. Condenser shall have a built on drain and vent (purge) connection
5. Chiller unit shall be equipped with one inlet and outlet water connections with Victaulic-type connections that are supplied as loose items and shipped within the chiller enclosure. The on inlet and outlet water shall be based of 100% water flow rate through condensers and without any valves
6. Condenser shall be tested and stamped in accordance with ASME Code for refrigerant. Refrigerant side design working pressure shall be 1500 kPa (220 psig) and the maximum water side design working pressure shall be 1500 kPa (220 psig)
7. ***OPTIONAL:*** *Water flow switch shall be supplied as a loose item to be field installed by contractor. Flow switch shall be of the paddle type. The paddle shall be made from copper alloy. Switch shall be SPDT, IP 42 protection, with operating range of water temperature of -20°C to 80°C (-4°F to 176°F)*

D. Refrigeration Circuits and Components:

1. Refrigerant used shall be R-134a
2. Unit shall have independent refrigeration circuits for each compressor
3. Refrigeration circuit components shall include replaceable-core filter drier, moisture indicating sight glass, electronic expansion valve, discharge & suction compressor service valves, liquid line service valve and a complete operating charge of refrigerant R-134a and compressor oil
4. Each compressor shall be equipped with an external high pressure cut outs

5. All suction lines shall be sand papered, insulated with closed cell foam insulation, wrapped with protective material and finally epoxy coated
6. All other exposed refrigeration pipes shall be sand papered cleaned and epoxy coated afterwards
7. All safety devices and valves are marked after unit run test to indicate factory position for each component
8. ***OPTIONAL:*** Mechanically controlled Hot Gas By Pass (HGBP) valve to enable compressor to operate below its minimum load point
9. ***OPTIONAL:*** Pressure Relief Valve with a brass body, a pressure setting of 4650 kPa (675 psig), a working temperature range between -40°C and 107°C (-40°F and 225°F) and conforms to ASME VIII, Division I. The valve is a conventional back pressure dependent type and therefore required to discharge to atmosphere
10. ***OPTIONAL:*** High and low pressure gauges for each refrigeration circuit. Gauges shall be Bourdon type with stainless steel housing oil

D. Acoustical Data:

1. Provide acoustical sound power or sound pressure level data in decibels (dB) at the scheduled eight (8) octave band center frequencies and/or at 1/3 of each octave band upon request. A-weighted sound data alone is not acceptable
2. Supplied equipment shall not exceed scheduled sound power or sound pressure level data at any load point. The mechanical Contractor shall be responsible for any additional costs associated with equipment deviation
3. Acoustical performance ratings shall be in accordance with AHRI 370 and ISO BS 3744 Standards
4. ***OPTIONAL:*** *Compressor Jacket to meet the specified sound levels scheduled in the plans at full load and all other load points (if requested). Compressor jacket shall consists of a 9.5 mm (3/8") thick closed cell rubber sound insulation material encapsulated in a sound deflecting vinyl cover*

J. Operating Characteristics:

1. Unit shall be capable of starting up with 35°C (95°F) entering fluid temperature to the cooler

K. Power & Electrical:

1. Power/Control Panel:
   a. Factory installed and wired IP 54 (NEMA 3R) panel, that shall be made from welded G-60/90 (as a minimum) galvanized steel gauge 18 (1.25 mm {0.05"}). Panel shall be equipped with lockable and gasket sealed access doors with a minimum of two external handles and multiple hinges
   a. ***OPTIONAL:*** *Factory installed and wired IP 54 (NEMA 4X) panel, that shall be made from fully welded all around G-60/90 (as a minimum) galvanized steel gauge 12 (3 mm {0.12"}). Panel shall be equipped with lockable and gasket sealed access doors with a minimum of two external handles and multiple hinges*
   a. ***OPTIONAL:*** *Factory installed and wired IP 54 (NEMA 4X) panel, that shall be made from fully welded all around Stainless steel gauge 12 (3 mm {0.12"}). Panel shall be equipped with lockable and gasket sealed access doors with a minimum of two external handles and multiple hinges*
   b. Panel doors shall be provided with a door retainer for each door to keep the door open during service
   c. Unit shall be provided with two separate panels, one for control and one for power
   d. Panel door shall be provided with a pocket to place the laminated wiring diagrams and IOM manuals
   e. Panel shall have a transparent solid PVC NFPA rated piece to cover the power input bus bars
   f. All bus brass pars shall be coated with a zinc coat to prevent brass corrosion
   g. Panel shall have one power entry either
2. Main Power and Control components:
   a. Compressor electronic current monitoring overload motor protector
   b. Free terminal for ON/OFF unit connection
   c. Free terminal for general alarm output
   d. Interlock for pump and water flow switch
   e. Circuit breaker for each compressor
   f. Starting contactors for each compressor
   g. ON/OFF switch for each compressor
   h. Control circuit breaker for short circuit protection
   I. Short cycling protection timer for each compressor

j. Control transformer mounted and wired that shall supply all unit control voltage from the main unit power supply to internal components such as (not limited to) solenoid valves, compressor motor protector, compressor crank case heater and Microprocessor controller
k. Power supply monitor (Phase Failure Relay) to protect power circuit against over voltage, under voltage, phase loss, phase imbalance and phase reversing conditions
l. Control transformer for the secondary and controller voltages
m. Microprocessor controller
n. All running wiring inside panels must be contained within PVC trunks
o. All wires connection shall be marked with a clear and typed on tags to identify each wire
p. An extra loop of wires must be provided for each power connection to a circuit breaker, contactor or motor start to allow for a clamp on measuring current device to be installed during start up and service
q. Full documentation shall be provided inside the electrical panel pocket. This shall include (not limited to) a laminated wiring diagram, IOM manual, hard copy of wiring diagram and quality check list

*r. **OPTIONAL:** Power Factor correction capacitor:*
1. Provide unit with power factor correction capacitors upon request to maintain a displacement power factor of 95% at all load conditions. The installing contractor shall be responsible for any and all additional cost to furnish and install power factor correction capacitors if they are requested and not

*s. **OPTIONAL:** Earth Leakage Relay:*
1. Provide unit with an earth leakage relay for the unit power supply to shut down the unit if the amount of leakage is above the set point
2. Provide unit with an earth leakage relay for the each compressor power supply to shut down the associated compressor if the amount of leakage is above the set point

*t. **OPTIONAL:** External over load for each compressor*

*u. **OPTIONAL:** Control transformer to supply power input to auxiliary components at 120 or 220 volt, such as bulk head light and GFI outlet*

*v. **OPTIONAL:** Bulk Head Light for electrical panel:*
1. IP 54 protection, class I electric safety bulk head light fixture shall be installed in the electrical panel for inspection purposes. The bulb shall be supplied at field by the installing contractor

*w. **OPTIONAL:** Ampere-meter and Volt-meter:*
1. Shall be mounted on power panel exterior door. Ampere-meter shall be provided for each phase and the Volt-meter shall be provide for one phase

*x. **OPTIONAL:** 120 Volt power supply with Transformer and GFI outlet socket:*
1. A 120 volt power supply shall be connected through a transformer to provide a 120 volt circuit, to connect a female GFI outlet socket to provide connection to site appliances such as laptop, tablet or cell phone. 120 volt power circuit shall be connected after the unit main disconnect switch, so as to be OFF upon main disconnect switch OFF position
2. A 120 volt power supply shall be connected through a transformer to provide a 120 volt circuit, to connect a GFI outlet socket to provide connection to site appliances such as laptop, tablet or cell phone. 120 volt power circuit shall be connected before the unit main disconnect switch, so as to be ON upon main disconnect switch OFF position

3. Power Entry:

b. Provide a SINGLE point power entry connection to chiller, that shall be of THREE phase as per scheduled voltage
b. Terminal Block connections shall be provided at the point of incoming single point connection for
c. The incoming power wiring must comply with local codes

*d. **OPTIONAL:** A Main Non-Fused Disconnect Switch lockable external handle shall be supplied to isolate the unit power voltage for servicing. Disconnect switch shall be provided for all power connections to the unit*

*d. **OPTIONAL:** A Main Fused Disconnect Switch lockable external handle shall be supplied to isolate the unit power voltage for servicing. Disconnect switch shall be provided for all power connections to the unit*

*e. **OPTIONAL:** Provide a DUAL point power connection to chiller, that shall be of THREE phase as per scheduled voltage. One connection shall be for circuit 1 compressors and the second connection shall be for circuit 2 compressor. Each power connection can be equipped with a separate main disconnect switch*

4. Power and Control wiring:

   a. All power & control wiring from the electrical power and control panels shall be routed through metal duct in the unit base and shall be connected to each components through and PCV, UV-stabilized, non-metallic conduit beside each component

5. Minimum Circuit Ampacity (MCA):

   a. All power & control wiring from the electrical power and control panels shall be routed through metal duct in the unit base and shall be connected to each components through and PCV, UV-stabilized, non-metallic conduit beside each component

6. Control Circuit components:

   a. Unit control circuit shall include the following minimum components:
      1. Microprocessor with non-volatile memory. Battery backup system shall not be accepted
      2. Separate terminal block for power and controls
      3. Separate 220 volt power supply to serve all controllers, relay, control controllers, relays and control components
      4. ON/OFF control switch by the controller key pad
      5. Replaceable solid-state controller
      6. Pressure sensors installed to measure suction, discharge and oil pressure. Thermistors installed to measure barrel (cooler) entering and leaving fluid temperatures and outside air temperature

   b. Microprocessor controller shall contain the following:
      1. Microprocessor main board designed to supervise and monitor the unit with access port for external connection to a laptop
      2. I/O expansion board with additional input/output terminals
      3. LCD screen display with I/O status and ability to adjust set point. The LCD consists of a liquid crystal display) with adjustable contrast and backlighting

   c. Displayed data on the LCD display:
      1. Leaving and return water temperatures
      2. Compressor discharge pressure and temperature
      3. Compressor suction pressure and temperature
      4. Compressor drawn current
      5. Suction and discharge super heat
      6. Compressor load percentage
      7. Saturated suction and discharge
      8. Compressor oil differential
      9. Compressor times
      10. Digital inputs status
      11. Output relays status
      12. Protection status
      13. Historical alarms
      14. Schedules
      15. Adjustable set point

   d. Unit controls shall include the following functions:
      1. Automatic circuit lead/lag
      2. Capacity control based on leaving chilled fluid temperature and compensated by rate of change of leaving fluid temperature
      3. Limiting the chilled fluid temperature pull-down rate at start-up to an adjustable range to prevent excessive demand spikes at start-up
      4. Seven-day time schedule. Two operating schedules per day of the week and 8-holiday shall e supported by the microprocessor
      5. Leaving and return chilled fluid temperature reset from BMS system
      6. Chilled water pump and water flow interlock connection
      7. High discharge pressure protection
      8. Low leaving water temperature protection
      9. Unloaded start for all compressors

   e. LCD display panel features:
      1. Display shall allow access to configuration, maintenance, alarm history, set points, time schedule and status data
      2. Display shall have one button for chiller ON/OFF
      3. Display shall include three levels of password protection against unauthorized access to programming files and imbedded set points
      4. Display shall allow for easy connection of a portable hand held technician tool such as a laptop to access information and upload and/ or download chiller settings

f. Safeties and Alarms:
   1.Cutout and unloading
   2.High discharge pressure
   3.High discharge temperature
   4.Low suction pressure
   5.Low suction temperature
   6.Freeze state
   7.High ampere state
   8.Low discharge pressure
   9.Unsafe suction pressure
   10.Unsafe discharge pressure
   11.Flow switch (no flow protection)
   12.Phase loss protection
   13.Low oil differential pressure
   14.Unsafe oil pressure
   15.Low oil level
   16.Motor temperature
   17.Low motor amps
   18.Probe error alarm

g. Supporting protocols:
   1.Bacnet IP
   2.Bacnet MS/TP with a BMS gateway module
   3.Modbus IP
   4.Modbus RTU
   5.Johnson N2 with a BMS gateway
   6.Lontalk with a BMS gateway

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Rig and Install in full accordance with manufacturer's requirements, Project drawings, and contract documents

B. Location
   1. Locate chiller as indicated on drawings, including cleaning and service maintenance clearance per manufacturer instructions. Adjust and level chiller on support structure

C. Components
   1. Installing Contractor shall provide and install all auxiliary devices and accessories for fully operational chiller

D. Electrical
   1. Coordinate electrical requirements and connections for all power feeds with Electrical Contractor

E. Controls
   1. Coordinate all control requirements and connections with Controls Contractor

F. Finish
   1. Installing Contractor shall paint damaged and abraded factory finish with touch-up paint matching factory finish

TABLE OF CONTENTS

INTRODUCTION

Petra Engineering Industries Company is a highly established HVAC manufacturing company that produces a wide range of sophisticated, high quality commercial and industrial HVAC equipment. Petra's products meet the requirements of globally recognized standards and procedures

To ensure the highest level of quality all procedures are carried out according to and ISO 9001:2008, Quality management systems ISO14001:2004 environmental management system. Also, all Petra's major products are UL and ETL listed

Petra's water cooled liquid chillers (WPSa - Door way series) with a wide range of capacities and exceptionally high efficiencies , were designed to meet customer requirements for a variety of applications. Petra WPSa chillers offer state of the art low sound, high quality and reliability, optimized performance and a compact physical footprint

Petra WPSa chillers with semi-hermetic screw compressors and R-134a HFC refrigerant are 100% factory tested and commissioned to ensure efficient performance at specified operating conditions

OUTSTANDING FEATURES

Superior Efficiency

The WPSa series meets or exceeds the new ASHRAE 90.1 efficiency levels at both full and part load efficiency

Compact Physical Footprint

The WPSa chillers feature compact footprints and are suitable for close-spacing installation to serve the areas that have space constraints

Quality Assurance

To ensure the best performance, all the chillers in the APSa series are factory-run tested and produced in an ISO 9001-2008 listed manufacturing facility

Easy Installation

Installation is made quick and easy with complete factory wiring, easy lifting provisions, factory installed options and start-up. To eliminate potential start-up problems, a complete factory- test run is performed on each unit

Door way Compact Footprint

Petra introduces the WPSa chillers with nominal kW up to 967 (nominal tons of 275), with a total width of 850 mm (33.5 inch), as a single piece unit with single power entry

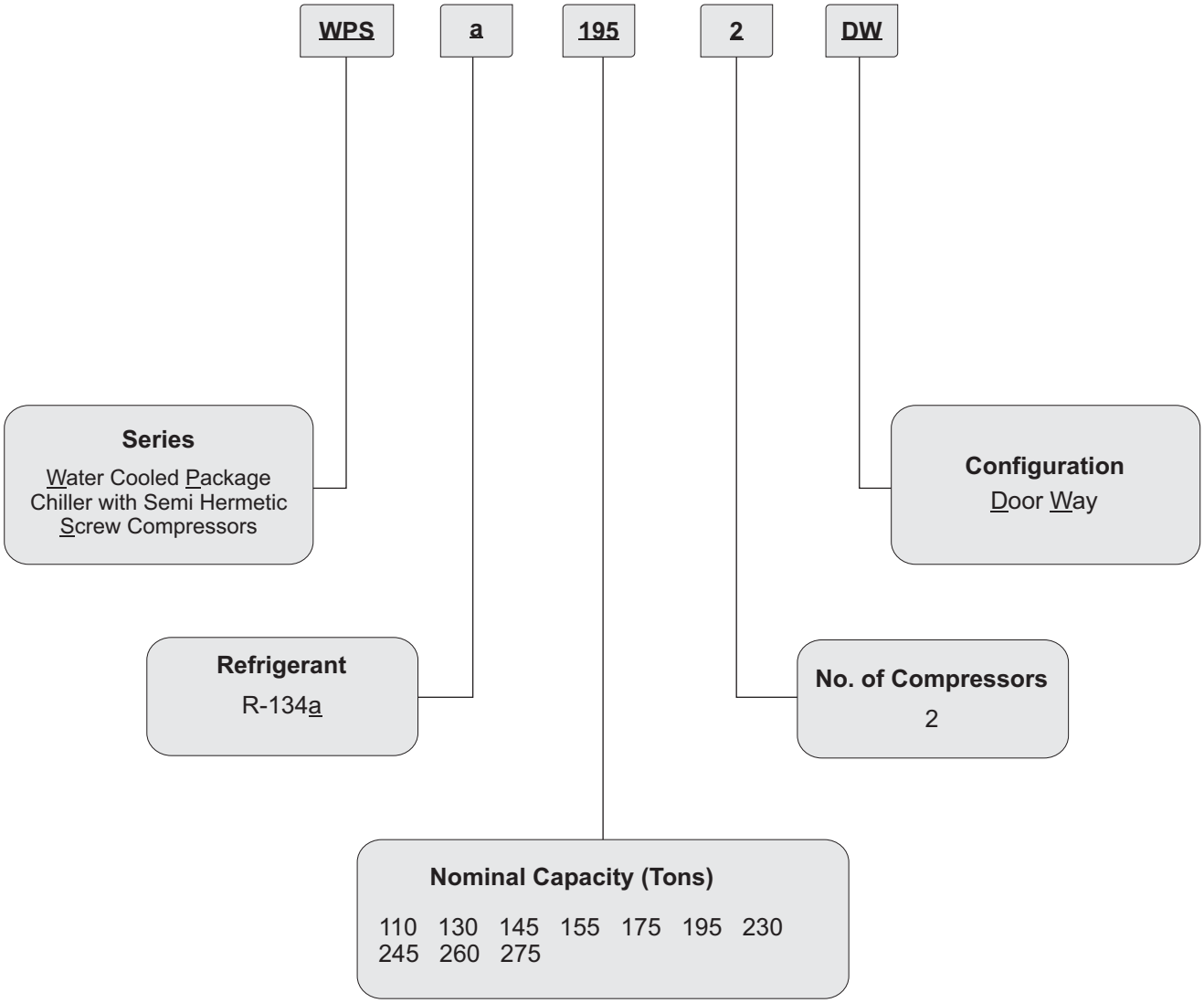
This unique single unit design provides the largest capacity in one chiller model with door way dimension

Outstanding Finishing

Suction lines are insulated with closed cell foam insulation, then wrapped with a special protective material and finally epoxy coated. This gives further protection for the insulation against weather and other factors

Petra paint is certified according to ASTM 117 A&B 5000 hours salt fog test

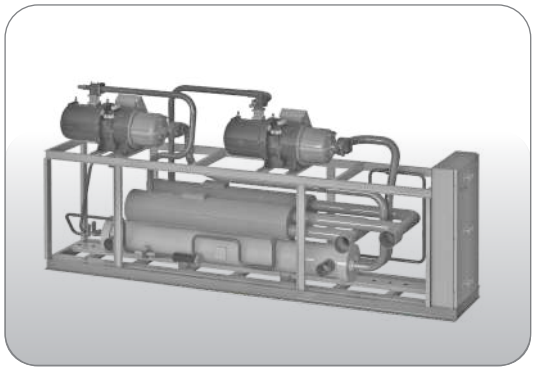
NOMENCLATURE



STANDARD FEATURES & BENEFITS

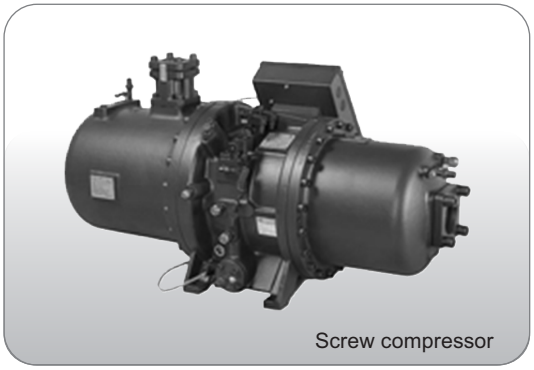
Construction

- Welded structural C-channel base painted with mono component catalyzed primer sprayed paint
- Base is equipped with welded brackets for heavy duty lifting lugs
- Easily accessible system components



Compressor

- Suction gas-cooled semi-hermetic twin screw compressor
- Variable slide valves allow the chillers to match actual load conditions, delivering exceptional part load performance
- Rain-tight terminal box
- Double walled pressure compensated rotor housing, which is extremely stable and results in additional sound attenuation
- Proven, long life bearings with pressure unloading
- Optimized oil management with built-in directly flanged on oil separator
- Long life fine filter mesh and magnets on oil circuit
- Pressure relieved bearing chamber ensures minimum refrigerant dilution in the oil

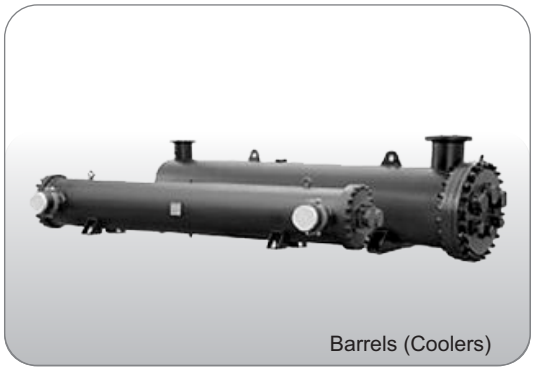


Screw compressor

- Large volume motor suitable for part winding or Star-Delta starting with integrated embedded sensors in each winding
- Intelligent electronics including thermal motor temperature monitoring, phase sequence monitoring, manual reset lock-out and discharge temperature
- Compressor starts unloading
- Suction & discharge shut off valve are standard features for each compressor motor
- Rubber-in-shear vibration isolation
- Oil level switch, high efficiency suction strainer, crank case heater and built-in safety pressure relief valve
- Compressor shall be equipped with a built-in low pressure protection by a pressure transmitter connected to unit controller

Coolers (Barrels)

- High efficiency direct expansion (DX) shell and tube type coolers with inner grooved tubes to optimize the cooler's efficiency
- Coolers are tested and stamped for refrigerant side design pressure of 1000 kPa (145 Psi) and for a maximum water side working pressure of 1500 kPa (220 Psi)
- These working pressures comply with applicable sections of the ASME standard, and the European codes of ISPESL and TUV
- Coolers are equipped with internal water baffles in the shell. They are fabricated from brass for maximum corrosion resistance
- Coolers are provided with water vents and drain connection plugs and are insulated with 19 mm (3/4 inch) closed cell foam insulation
- Cooler shall be tested & stamped in accordance with ASME code



Barrels (Coolers)

STANDARD FEATURES & BENEFITS

Shell & tube condenser

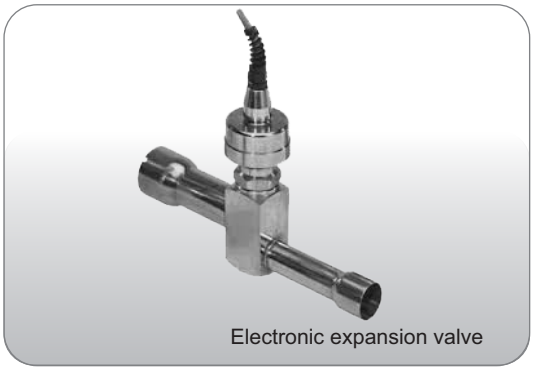
- High efficiency shell and tube type with inner grooved tubes to optimize efficiency
- Condensers shall be tested and stamped for refrigerant side design pressure of 1500 kPa (220 Psi) and for a maximum water side working pressure of 1500 kPa (220 Psi)
- These working pressures comply with applicable sections of the ASME standard, and the European codes of ISPESL and TUV
- Condensers are equipped with internal water baffles in the shell. They are fabricated from brass for maximum corrosion resistance
- Condensers are provided with water vents (purge) and drain connection plugs
- Condensers shall be tested in accordance with ASME code

Barrels (Coolers)

Refrigeration

- Independent refrigeration circuit per compressor
- Liquid, discharge and suction pipes are all hard copper pipes. They are formed using automated CNC pipe bending machines in order to minimize pipe-brazed joints which in turn increases system reliability
- Epoxy paint for all exposed copper piping system of the refrigeration circuit
- Components of each refrigeration circuit:
  - Liquid line solenoid valve
  - Liquid line shut off valve
  - Liquid line moisture indicator sight glass
  - Replaceable core type filter
  - Fully charged unit with R-134a refrigerant
  - High safety pressure switch (capsule Type; factory pre-set)
- Electronic expansion valve

Electronically operated ptep motor flow control valves, intended for the precise control of liquid refrigerant flow. Synchronized signals to the motor provide discrete angular movement, which translates into precise linear positioning of the valve piston. Easily interfaced with microprocessor based controllers



Electronic expansion valve

Electrical

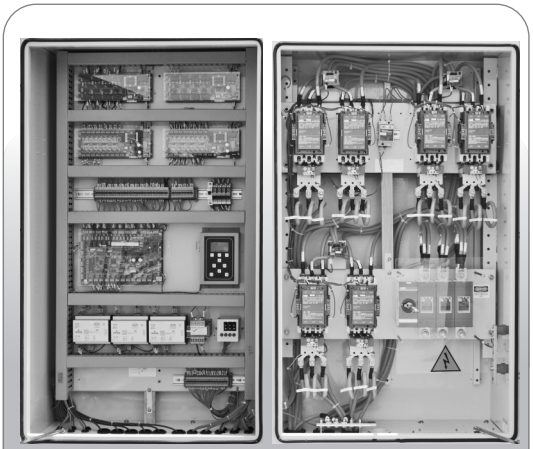
- Compressor electronic current monitor and overload protection through controller
- Free terminal for remote ON/OFF connection
- Free terminal for general alarm output
- Control voltage is 220-240V for all components
- Single point power connection for each electrical panel
- Circuit breaker for each compressor
- Starting contactors for compressors
- ON/OFF switch for each compressor
- Control circuit breaker for short circuit protection
- Short cycling protection for compressors (time delay)
- Control transformer supplies all unit control voltage from main unit power supply to internal components such as (not limited to) solenoid valves, compressor motor protector, compressor crank case heater and microprocessor controller
- Microprocessor controller for full management of chiller operation and safety circuits
- Power supply monitor (phase failure relay) used to protect the power circuit against over or under voltage conditions and against phase loss or loss reversing conditions

Phase failure relay

STANDARD FEATURES & BENEFITS

Electrical Panels

- Nema 3X with IP54 minimum enclosure standard electrical panel
- Two separate panels, one for power & the other for control
- Electrical panel is equipped with a heavy gauge galvanized steel access door
- Panel is painted with oven baked polyester electrostatic powder paint which is certified up to 5000 hours salt spray (fog) test as per ASTM 117 A&B



Electrical and contoal panel

- Each door is equipped with external handle with key and tooled latch. Door contains sealing heavy duty clip on bulb gasket between the door and the panel that provides effective sealing
- All doors have multiple hinges
- Each door has a door retainer to keep door open during service
- Each door has a built-in pocket to accommodate a laminated wiring diagrams & IOM (Installation & Operation Manual) documents

OPTIONAL FEATURES

Compressor jacket

Compressor jacket shall consists of a 9.5 mm (3/8 inch) thick closed cell rubber sound insulation material inside a sound deflecting vinyl cover to provide superior sound reduction for screw compressors

Cooler tape heater protection down to 0°C (32°F), -18°C (0°F) & -29°C (-20°F)

Electrical resistance heating tape is wrapped around the barrel (cooler) shell to help protect the evaporator fluid contents from freezing down to 0°C (32°F), -18°C (0°F) & -29°C (-20°F) ambient temperature. The heater has to be maintained “ON” 24/7, so the power supply to chiller has to be “ON” 24/7. This device will not protect external water pipe work connected to the unit and additional frost protection measures are required at field

Cooler insulation thickness materials

Cooler can be insulated with closed cell foam insulation of 25 mm (1 inch), 38 mm (1.5 inch) & 50 mm (2 inch)
The insulation density is 48 kg/m^3 (3 lb/ft^3) with a K-factor of 0.035 W/(m.°K) [0.0203 BTUH/(ft.°F)]

Cooler cladding

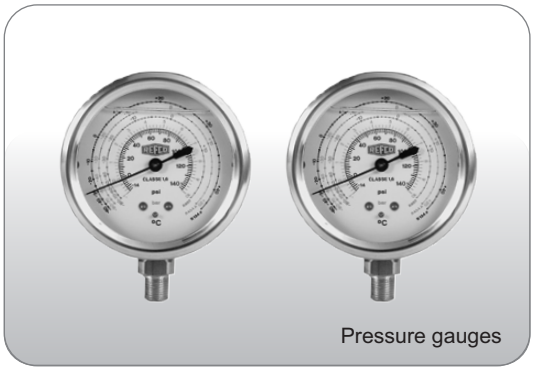
Cooler cladding can be aluminum, stainless steel or painted galvanized steel {made from gauge 22 [0.7 mm (0.03 inch)}. Cladding shall be applied above barrel (cooler) insulation

Hot gas bypass

The hot gas bypass consists of a mechanical valve capacity regulator used to adapt compressor capacity to actual evaporator load. It is installed in a bypass line between the high and low pressure sides of the refrigeration system and is designed for hot gas injection into the evaporator just after the expansion valve.
The hot gas bypass valve is UL listed, file SA7200. The hot gas bypass valve allows additional capacity reduction for units operating below the minimum step of unloading for the compressor. If the hot gas bypass is installed on the lead compressor only, the “lead/lag” function (for the compressor) will be eliminated.
(for hot gas by pass typical piping schematic, please refer to page 44)

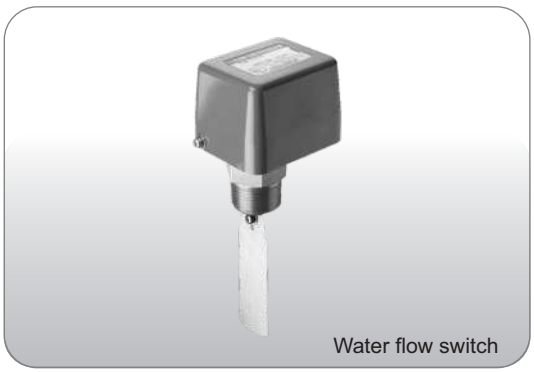
High and low Pressure gauges

Optional pressure gauges for monitoring of refrigeration discharge and suction pressure. Additionally, the gauges are used to verify suitable refrigerant charge and proper system performance. The gauges shall be Bourdon type, stainless steel housing oil filled. Oil filled pressure gauges provide users with a number of advantages in certain applications. The oil fill minimizes the effect of these severe environments, protects the gauge internals and provides continuous lubrication in the mechanism, all adding up to extended service life. Oil filling provides greater protection of the gauge internals from corrosive atmospheres. The gauges are provided with a dual scale of both PSI and BAR


Pressure gauges

Water flow switch

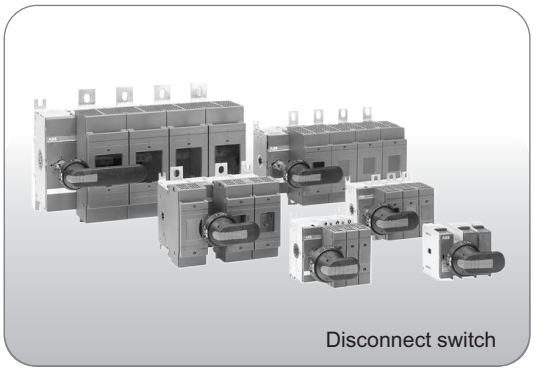
CE & UL approved safety interlock to prevent operation of unit without evaporator water flow (available for field installation only)
The water flow switch is used to provide a proof water flow rate of suitable amount is flowing to the Barrel (cooler), by establishing contact in an electric circuit when flow starts or stop
It is a paddle type, and the paddle consists of three segments that can be removed or trimmed and sized to the water pipe size. The paddle is made of copper alloy. Water flow switch is supplied as a loose item for field installation


Water flow switch

OPTIONAL FEATURES

Main disconnect switch

This is used to de energize the power supply to the chiller during the servicing or repairing works because of the door interlock. It has an external handle that is installed on the electric panel door. Switch has to be de-energized to open electric panel
These disconnect switch can be supplied with built in fuse or a non fuse type



Disconnect switch

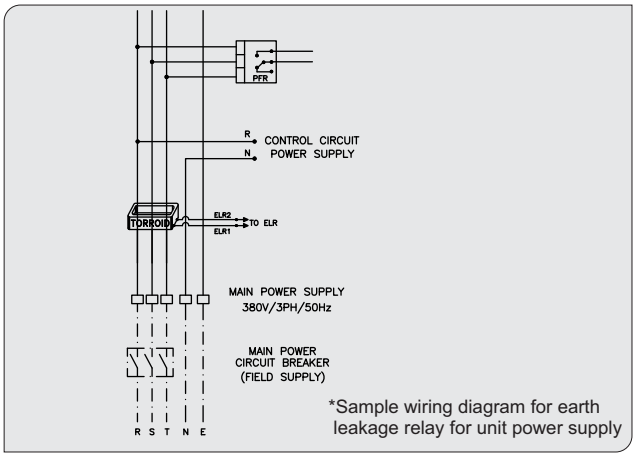
Power factor correction capacitor

Power factor correction is used to improve the power factor level . Maximizing power factor improves system reliability , minimizes voltage drops and gives better power quality. Advanced safety capacitors with harmonic filters and a main microprocessor controller are provided to manage the required capacity for the capacitor stages. Only one capacitor panel is needed for the chiller regardless the number of compressors or fans
Power factor is usually installed on a separate electrical box depending on unit size (refer to the nearest Petra sales office for more details)

Power factor capacitor

Earth leakage relay

A safety device used in electrical installations with high earth impedance to prevent shock. It detects small stray voltages on the metal enclosures of electrical equipment, and interrupts the circuit if a dangerous voltage is detected
Earth leakage relay can be supplied for the whole unit power supply or for each compressor (refer to the nearest Petra sales office for more details)



*Sample wiring diagram for earth leakage relay for unit power supply

Pressure relief valve

Pressure relief valves is constructed in accordance with the requirements of the ASME (Boiler and Pressure Vessel Code Section VIII, Division 1)
The pressure is relieved by allowing the pressurized fluid to flow from an auxiliary passage out of the system to the atmosphere. The relief valve is designed or set to open at a predetermined set pressure to protect pressure vessels and other equipment from being subjected to pressures that exceed their design limits

Control transformer

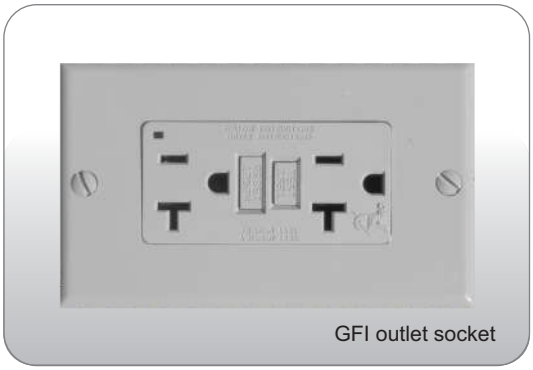
Control transformer to supply power input to auxiliary components at 120 or 220 volts, such as (not limited to) bulk head light and GFI outlet

Control transformer

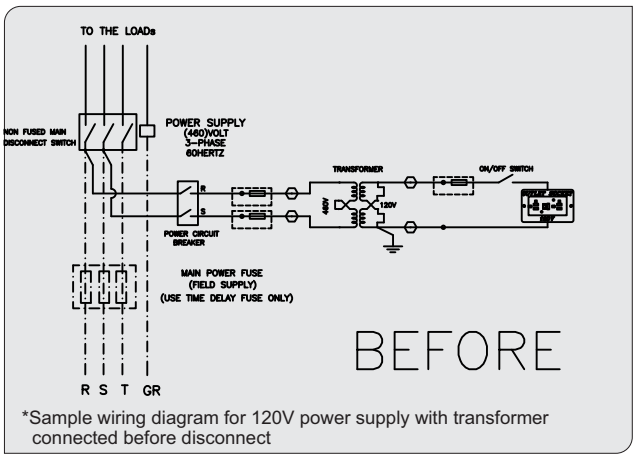
OPTIONAL FEATURES

120V power supply with transformer & GFI outlet socket

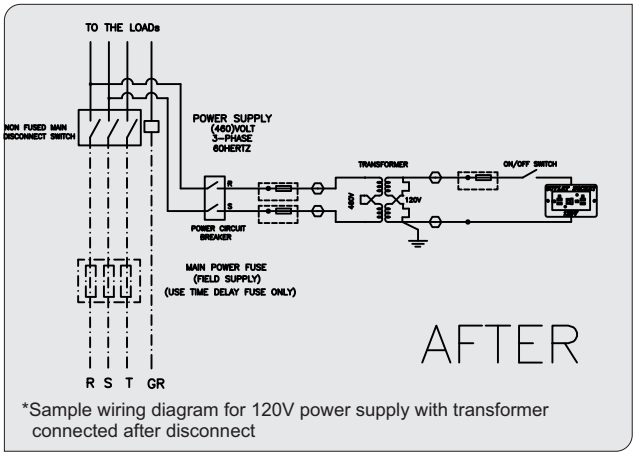
The 120 volt power supply shall be connected through the transformer to provide a 120 volt single phase circuit It can be connected before or after the disconnect
GFI socket is used to operate the electric appliances at site such as laptops, tablets and cell phones



GFI outlet socket



*Sample wiring diagram for 120V power supply with transformer connected before disconnect



*Sample wiring diagram for 120V power supply with transformer connected after disconnect

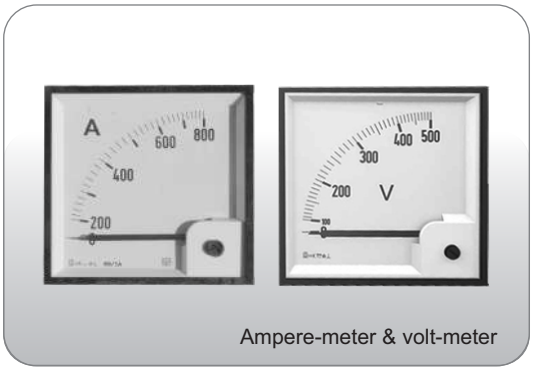
Bulk head light for the electrical panel

IP 54 protection, class I electric safety bulk head light enclosure shall be used in electrical panel for inspection purposes. Light fixture shall be supplied without a bulb

Bulk head light

Ampere-meter & volt-meter

Ampere-meter & volt-meter are used to measure the power current & voltage consumption
Ampere-meter is used for each phase. Voltmeter device is used to measure the voltage of the power supply between each phase and the another one and between each phase and the neutral



Ampere-meter & volt-meter

Electrical component options

- External over load for each compressor
- Circuit breaker for each condenser fan motor
- Nema 4x electrical panels made from galvanized steel
- Nema 4x electrical panels made from stainless steel

MICROPROCESSOR CONTROLLER

Microprocessor controller system enhances the water-cooled screw chiller by providing the intelligent chiller control technology. The microprocessor control helps in accurate control of various chiller operating parameters. Windows based support system to provide complete status on all operation both locally and remotely. History, static and dynamic graphing to help in commissioning, troubleshooting and evaluation. It will interface locally with a null Modem serial cable, remotely through an Ethernet connection, and also through building management systems
The Microprocessor control offers a great deal of flexibility with adjustable set points and control options that can be set prior to activating a system or even when the unit is operational. The Microprocessor controller is designed to safeguard the system being controlled, minimize the need for manual intervention, and to provide a simple but meaningful user interface

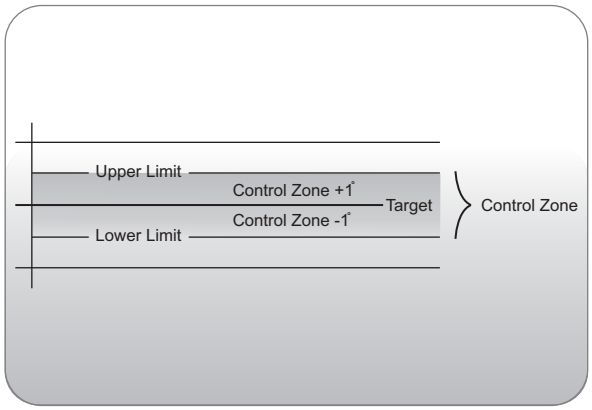
SEQUENCE OF CONTROL

Start up

For initial startup, the following must be met:

- Control circuit breaker switched on
- Energize the microprocessor control through keypad, remote start/stop, schedule or BMS command
- Chilled Water pump running
- Flow has been proven
- All safeties condition satisfied

When the water out temperature above the target set point, the first compressor will start after the call for the cooling
The control strategy is designed to modulate the compressor(s) capacity to maintain the control sensor Reading within the specified control zone. To accomplish this, the Microprocessor controller will constantly monitor the control
Value, its rate of change and position in relationship to the control zone and make adjustments accordingly



Capacity control

The Capacity control logic will increase or decrease the compressors and maintain the compressors require as followings:

A. If the Chilled Water Out temperature is above the target and the Chilled Water Rate Of Change is not indicating the water temperature is already decreasing at a Sufficient rate, the chiller's capacity control logic will ask for more capacity by adding cooling step. Once the step control has increased, the capacity control logic has a time delay before allowing the new step to increase again. This time delay on how far the temperature is far away from the target set point

B. If the chilled water out temperature is in the control zone, special logic functions will keep the chiller within the control zone

C. If the chilled water out temperature is below the control zone and if the Chilled Water Rate of Change is not indicating the water temperature is already increasing at a sufficient rate, the chiller's capacity control logic ask for less capacity by subtracting from the steps. Once the step has been decreased the capacity control logic has a time delay before allowing more steps to be decreased again

Low Suction Unloading & Holding

This protection is activated when the setpoint (LOW SUCTION UNLOAD is active). The purpose of this Protection is to take corrective action to prior to a safety being tripped

High Discharge Pressure Unloading & Holding

This protection is activated when the setpoint(HGHI DISCHARGE UNLOAD) is active. The purpose of this Protection is to take corrective action prior to a safety being tripped: The system will begin unloading that compressor until the discharge pressure drops below the calculated value

Low water out Temperature Unload

This protection is activated when the set point(HIGH DISCHARGE UNLOAD) is active. The purpose of this Protection is to take corrective action prior to a safety being tripped: The system will begin unloading that compressor until the discharge pressure drops below the calculated value

Chilled Water Reset

This is a function of a signal from the building management system. This value is used to adjust the control setpoint. The amount of the actual adjustment is proportionally based upon the associated analog input value. The analog value can be between 0 and 5 volts

Operating Schedules

Two operating schedules per each day of the week and 8 holidays are supported by the microprocessor controller software. Each schedule contains a start and end time. If the time and day of the Microprocessor controller clock is within these limits then the schedule is true and the system will be allowed to run. If not, the system will be off due to schedule

Soft Load Function

The compressors will start un-loaded to ensure soft start function, and then it will start loading gradually and according to load request, to prevent sudden load changing and save energy

System Protection

PETRA provides special advanced software designed to be proactive; that is, to take corrective action to keep a safety condition from occurring. If a safety does occur, the software attempts to restart the unit when the system returns to normal. This approach eliminates most, if not all of the nuisance alarms that occur

Displayed Data

- Leaving/Entering water temperature
- Ambient temperature
- Compressor discharge pressure/temperature
- Compressor suction pressure/temperature
- Compressor drawn current
- Suction/Discharge super heat
- Compressor load percentage
- Saturated suction/discharge
- Compressor oil diff
- Compressor timers
- Digital input status
- Output relays status
- Protections status
- Historical alarm
- Schedule
- Adjustable setpoint

Safeties and Alarms

- Cutout and Un-loading:
- High discharge pressure
- High discharge temperature
- Low suction pressure
- Low suction temperature
- Freeze state
- High ampere state
- Low discharge pressure
- Unsafe suction pressure
- Unsafe discharge pressure
- Flow switch (No flow protection)
- Phase loss protection
- Low differential oil pressure
- Unsafe oil pressure
- Low oil level
- Motor temperature
- Low motor amps
- Probe error alarm

PC Support Software for Smart LinkII

MCS- Connect program provides both local and remote Communications to the controller independent of the type of software. Through this program, the status of the controller can be viewed and proper authorization changes can be made to the system

The controller automatically performs history logging; this program has complete graphic functions

Ethernet Port

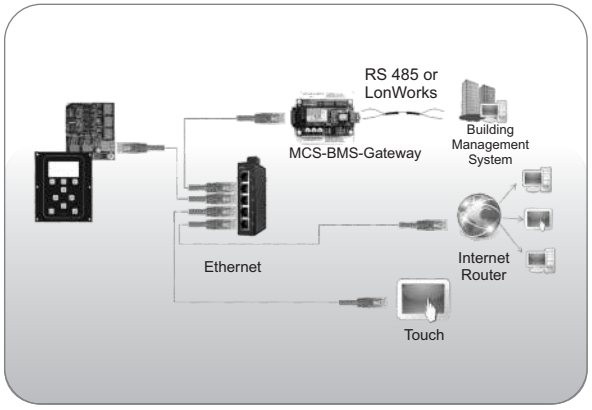
Communications can be through the 100 MBPS Ethernet Communications port on the Controller. It is necessary to use a crossover cable when connected directly to this port from a PC BMS Communication Protocols

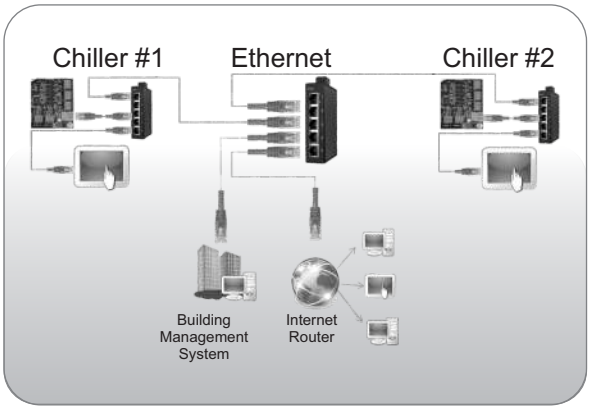
RS 485 Network

The controller RS 485 Network can support up to 20 chiller controllers and their associated I/O's. Access to this network can be local, via RS 232 connection, or remote via 14.4K Baud modem
When using the dial up through the modem, there will be no degradation in the performance of the network. Each controller in the network must be assigned to a unique address . This address will be the key in establishing communications with the appropriate Controller system. This address can be changed from the LCD/keypad of the unit. The current address of controller can be viewed or changed with factory authorization. RS 232 transmission should not exceed 9 mtr. in length and RS 485 transmission should not exceed 1000 mtr without repeater

Smart Link II controller supports the following protocols

1- Bacnet IP
2- Modbus IP
3- Modbus RTU
4- Bacnet MS/TP (need BMS gateway module)
5- Johnson N2 (need BMS gateway module)
6- Lontalk (need BMS gateway module)





BMS Hard wired

Within the hard wire structure there are six features as follows:

1- RUN / STOP - (BMS to controller)
2- EMER. STOP - (BMS to controller)
3- CHILLED WATER RESET - (BMS to controller)
4- DEMAND LIMITING - (BMS to controller)
5- COMPRESSOR RUN - (controller to BMS)
6- ALARM - (controller to BMS)

PHYSICAL DATA - SI - 50/60 Hz

MODEL	WPSa	110-2	130-2	145-2	155-2	175-2
COMPRESSOR						
Type		Semi Hermetic Twin Rotary Screw				
Qty		2	2	2	2	2
Oil charge (ck1/ck2)	Liter	14/14	16/16	16/16	16/16	15/15
Speed	rpm	2,950/3,550				
WEIGHT						
Operating weight	kg	3,000	3,800	3,800	3,800	4,200
Shipping weight	kg	2,815	3,518	3,509	3,515	3,886
REFRIGERANT						
Refrigerant type		R-134a				
No. of independent circuits		2	2	2	2	2
Refrigerant charge 50 Hz	kg	29	34	39	42	47
Refrigerant charge 60 Hz	kg	33	40	45	48	54
EVAPORATOR						
Type		DX Shell & Tube				
Qty		1	1	1	1	1
Net fluid volume	Liter	147	240	240	234	258
Max. refrigeration pressure	Pa	1500				
Max water pressure	Pa	1500				
Water connection size	mm	150	200	200	200	150
Water connection type		Victaulic coupling				
Drain connection size	mm	13				
CONDENSER						
Type		DX Shell & Tube				
Qty		2	2	2	2	2
Net fluid volume	Liter	38.3	41.8	51	51	56.2
Max. refrigeration pressure	Pa	1500				
Max water pressure	Pa	1500				
Water connection type		Victaulic coupling				
GENERAL						
No. of capacity steps		Stepless continuous unloading for each compressor				
% minimum unit load		25%	25%	25%	25%	25%
Minimum ambient temperature	°C	7				
Length	mm	4500	5000	5000	5000	5500
Width	mm	850	850	850	850	850
Height	mm	2350	2350	2350	2350	2400

LEGEND

Ckt : Refrigeration circuit

NOTE

* Shipping & operating weights are based on standard design components, selected options may add weight on the unit.

PHYSICAL DATA - SI - 50/60 Hz

MODEL	WPSa	195-2	230-2	245-2	260-2	275-2
COMPRESSOR						
Type		Semi Hermetic Twin Rotary Screw				
Qty		2	2	2	2	1+1
Oil charge (ck1/ck2)	Liter	18/18	20/20	23/23	20/20	20/28
Speed	rpm	2,950/3,550				
WEIGHT						
Operating weight	kg	4,600	6,000	6,000	6,000	6,000
Shipping weight	kg	4,268	5,382	5,382	5,373	5,366
REFRIGERANT						
Refrigerant type		R-134a				
No. of independent circuits		2	2	2	2	2
Refrigerant charge 50 Hz	kg	53	61	66	70	76
Refrigerant charge 60 Hz	kg	60	71	76	80	87
EVAPORATOR						
Type		DX Shell & Tube				
Qty		1	1	1	1	1
Net fluid volume	Liter	258	535	535	535	535
Max. refrigeration pressure	Pa	1500				
Max water pressure	Pa	1500				
Water connection size	mm	150	200	200	200	200
Water connection type		Victaulic coupling				
Drain connection size	mm	13				
CONDENSER						
Type		DX Shell & Tube				
Qty		2	2	2	2	2
Net fluid volume	Liter	74.5	83.2	83.2	91.9	98.8
Max. refrigeration pressure	Pa	1500				
Max water pressure	Pa	1500				
Water connection type		Victaulic coupling				
GENERAL						
No. of capacity steps		Stepless continuous unloading for each compressor				
% minimum unit load		25%	25%	25%	25%	23%
Minimum ambient temperature	°C	7				
Length	mm	5500	6500	6500	6500	6500
Width	mm	950	1000	1000	1000	1000
Height	mm	2400	2500	2500	2500	2500

LEGEND

Ckt : Refrigeration circuit

NOTE

* Shipping & operating weights are based on standard design components, selected options may add weight on the unit.

PHYSICAL DATA - IMP - 50/60 Hz

MODEL	WPSa	110-2	130-2	145-2	155-2	175-2
COMPRESSOR						
Type		Semi Hermetic Twin Rotary Screw				
Qty		2	2	2	2	2
Oil charge (ck1/ck2)	gal	3.7/3.7	4.2/4.2	4.2/4.2	4.2/4.2	4.0/4.0
Speed	rpm	2,950/3,550				
WEIGHT						
Operating weight	lb	6,615	8,379	8,379	8,379	9,261
Shipping weight	lb	6,206	7,758	7,737	7,758	8,568
REFRIGERANT						
Refrigerant type		R-134a				
No. of independent circuits		2	2	2	2	2
Refrigerant charge 50 Hz	lb	64	76	85	92	104
Refrigerant charge 60 Hz	lb	74	88	99	106	120
EVAPORATOR						
Type		DX Shell & Tube				
Qty		1	1	1	1	1
Net fluid volume	gal	39	63	63	62	68
Max. refrigeration pressure	psig	220				
Max water pressure	psig	220				
Water connection size	inch	6	8	8	8	6
Water connection type		Victaulic coupling				
Drain connection size	inch	1/2				
CONDENSER						
Type		DX Shell & Tube				
Qty		2	2	2	2	2
Net fluid volume	gal	10	11	13	13	15
Max. refrigeration pressure	psig	220				
Max water pressure	psig	220				
Water connection type		Victaulic coupling				
GENERAL						
No. of capacity steps		Stepless continuous unloading for each compressor				
% minimum unit load		25%	25%	25%	25%	25%
Minimum ambient temperature	°F	45				
Length	inch	177	177	177	177	217
Width	inch	34	34	34	34	34
Height	inch	93	93	93	93	95

LEGEND

Ckt : Refrigeration circuit

NOTE

* Shipping & operating weights are based on standard design components, selected options may add weight on the unit.

PHYSICAL DATA - IMP - 50/60 Hz

MODEL	WPSa	195-2	230-2	245-2	260-2	275-2
COMPRESSOR						
Type		Semi Hermetic Twin Rotary Screw				
Qty		2	2	2	2	1+1
Oil charge (ck1/ck2)	gal	4.8/4.8	5.3/5.3	6.1/6.1	5.3/5.3	5.3/7.4
Speed	rpm	2,950/3,550				
WEIGHT						
Operating weight	lb	10,143	13,230	13,230	13,230	13,230
Shipping weight	lb	9,410	11,867	11,867	11,848	11,832
REFRIGERANT						
Refrigerant type		R-134a				
No. of independent circuits		2	2	2	2	1+1
Refrigerant charge 50 Hz	lb	116	135	145	155	168
Refrigerant charge 60 Hz	lb	133	156	167	177	192
EVAPORATOR						
Type		DX Shell & Tube				
Qty		1	1	1	1	1
Net fluid volume	gal	68	141	141	141	141
Max. refrigeration pressure	psig	220				
Max water pressure	psig	220				
Water connection size	inch	6	8	8	8	8
Water connection type		Victaulic coupling				
Drain connection size	inch	1/2				
CONDENSER						
Type		DX Shell & Tube				
Qty		2	2	2	2	1+1
Net fluid volume	gal	20	22	22	24	26
Max. refrigeration pressure	psig	220				
Max water pressure	psig	220				
Water connection type		Victaulic coupling				
GENERAL						
No. of capacity steps		Stepless continuous unloading for each compressor				
% minimum unit load		25%	25%	25%	25%	25%
Minimum ambient temperature	°F	45				
Length	inch	217	256	256	256	256
Width	inch	37	39	39	39	39
Height	inch	95	98	98	98	98

LEGEND

Ckt : Refrigeration circuit

NOTE

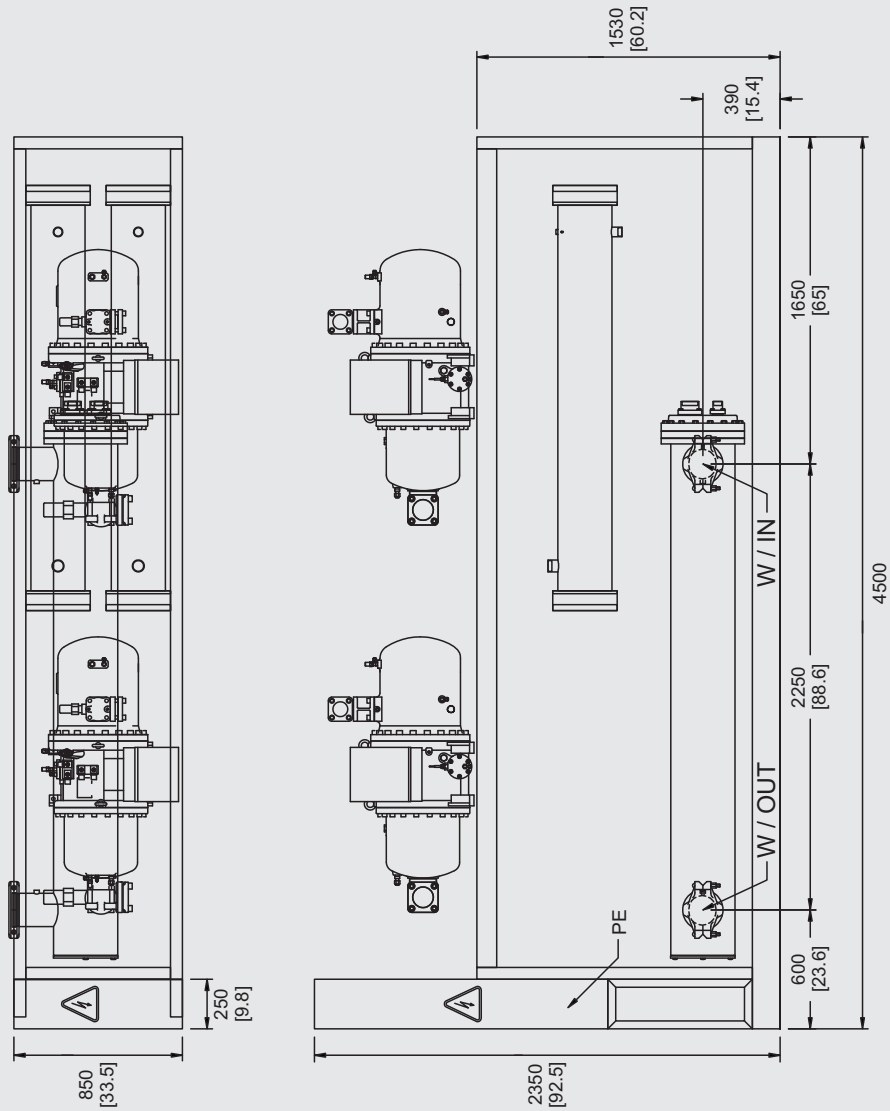
* Shipping & operating weights are based on standard design components, selected options may add weight on the unit.

MODEL LAYOUT

Model

WPSa 110-2

All dimensions are in mm [inch]



LEGEND

W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

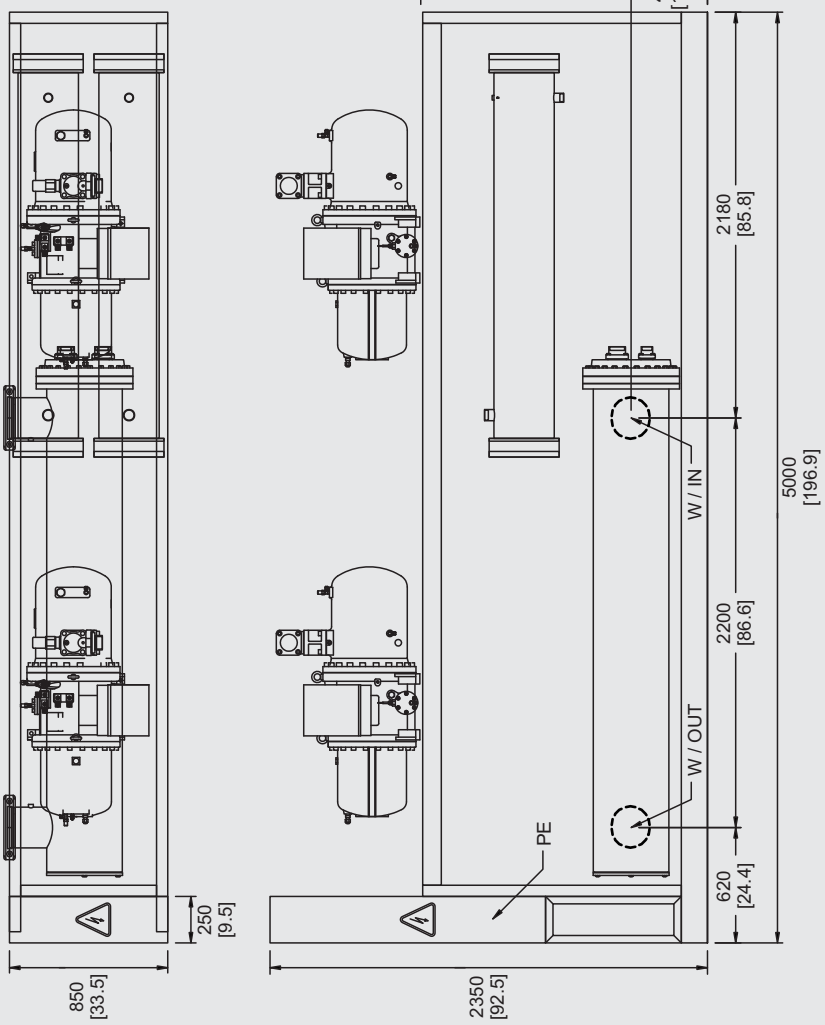
NOTE

Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.5 m (5.0 ft)
- Barrel (cooler) end side for core removal: 4.0 m (13.1 ft)
- Power entry size: 200x200 mm [7.9x7.9] inch

MODEL LAYOUT

Model
WPSa 130-2
WPSa 145-2
WPSa 155-2

All dimensions are in mm [inch]



LEGEND

W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

NOTE

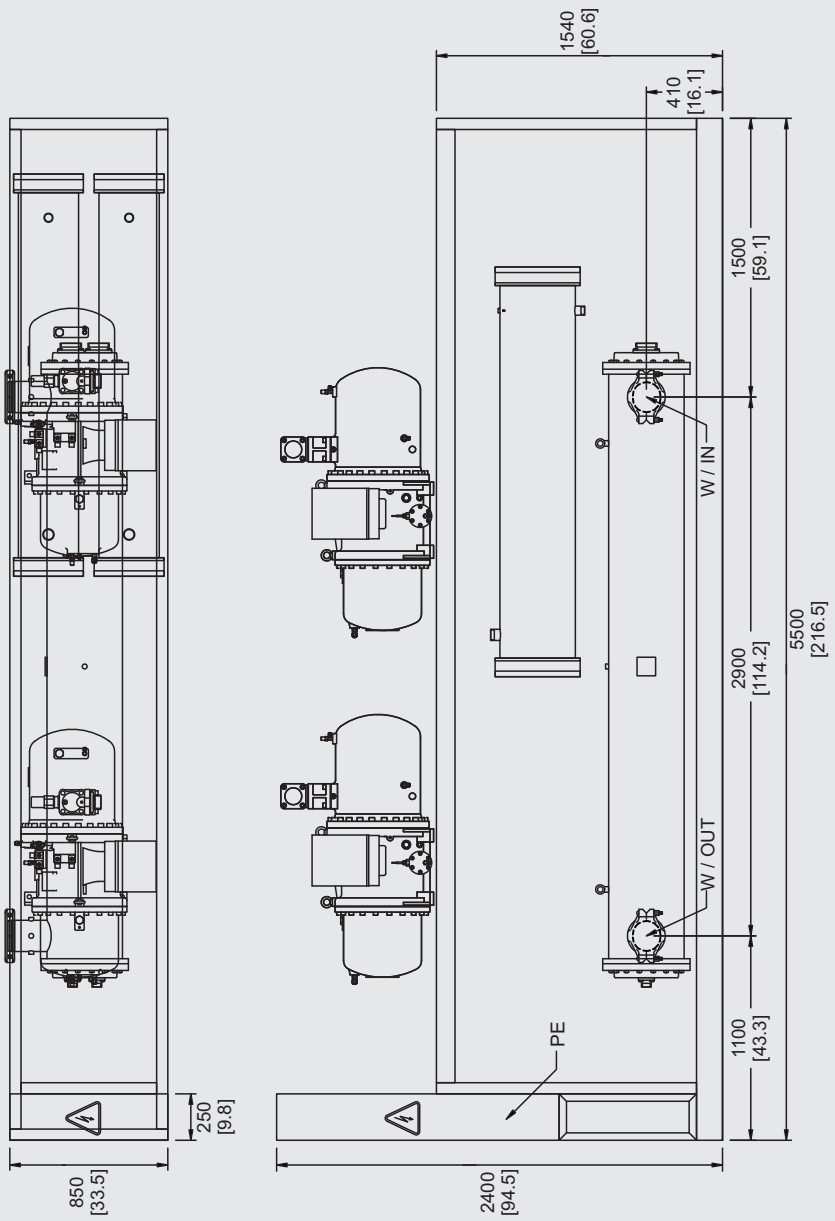
Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.5 m (5.0 ft)
- Barrel (cooler) end side for core removal: 4.0 m (13.1 ft)
- Power entry size: 200x200 mm [7.9x7.9] inch

MODEL LAYOUT

Model

WPSa 175-2

All dimensions are in mm [inch]



LEGEND

W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

NOTE

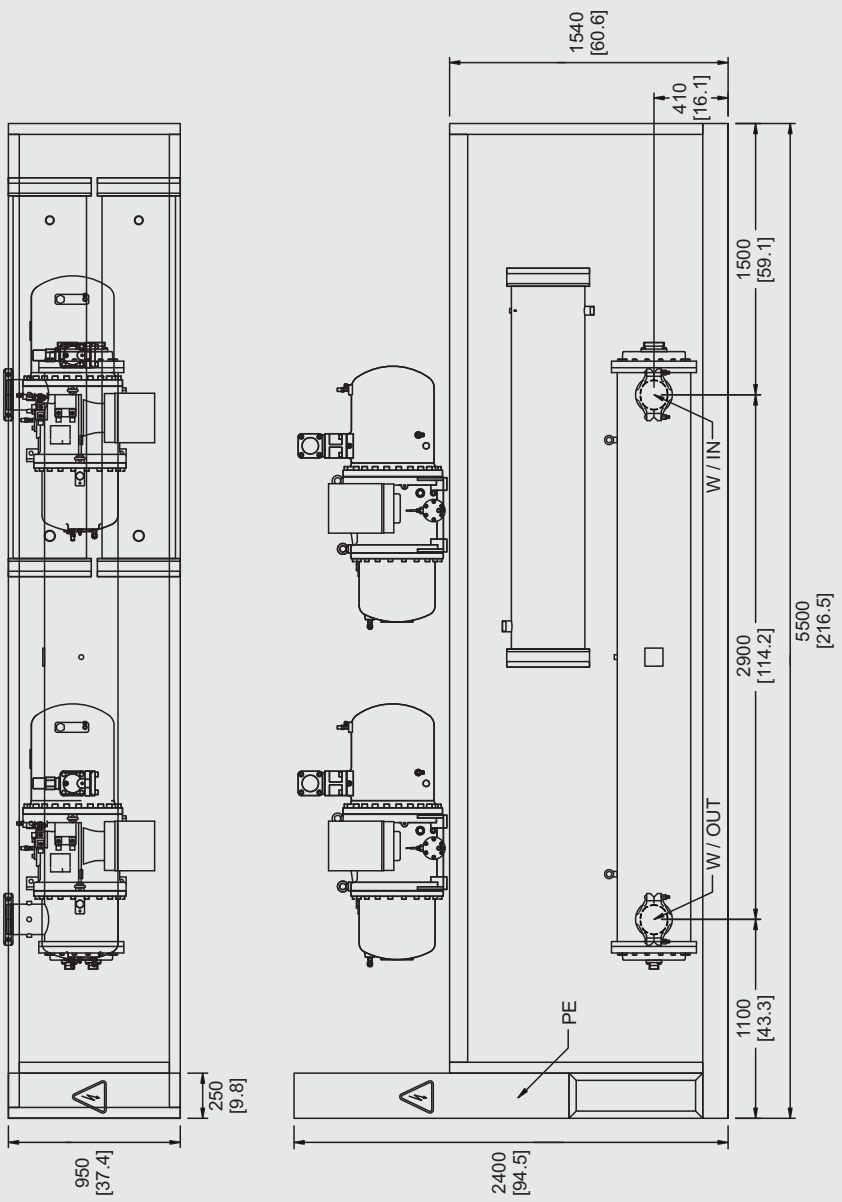
Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.5 m (5.0 ft)
- Barrel (cooler) end side for core removal: 4.5 m (14.8 ft)
- Power entry size: 200x200 mm [7.9x7.9] inch

MODEL LAYOUT

Model

WPSa 195-2

All dimensions are in mm [inch]



LEGEND

W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

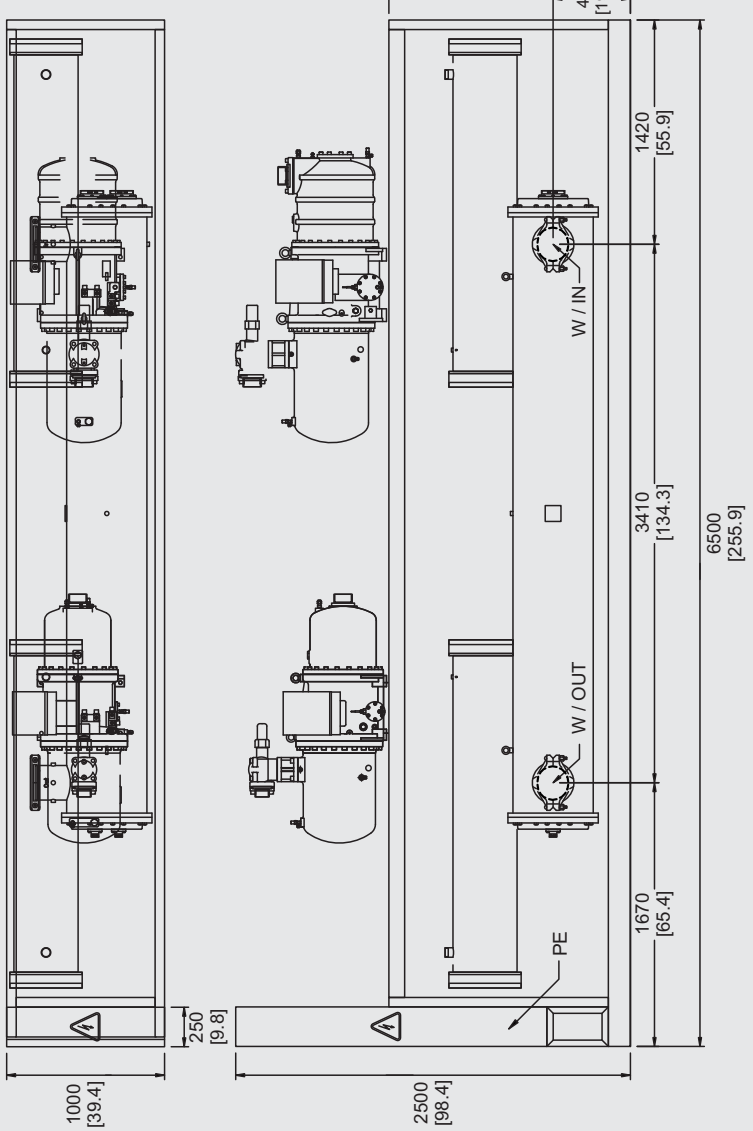
NOTE

Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.5 m (5.0 ft)
- Barrel (cooler) end side for core removal: 4.5 m (14.8 ft)
- Power entry size: 200x200 mm [7.9x7.9] inch

MODEL LAYOUT

Model
WPSa 230-2
WPSa 245-2
WPSa 260-2
WPSa 275-2

All dimensions are in mm [inch]



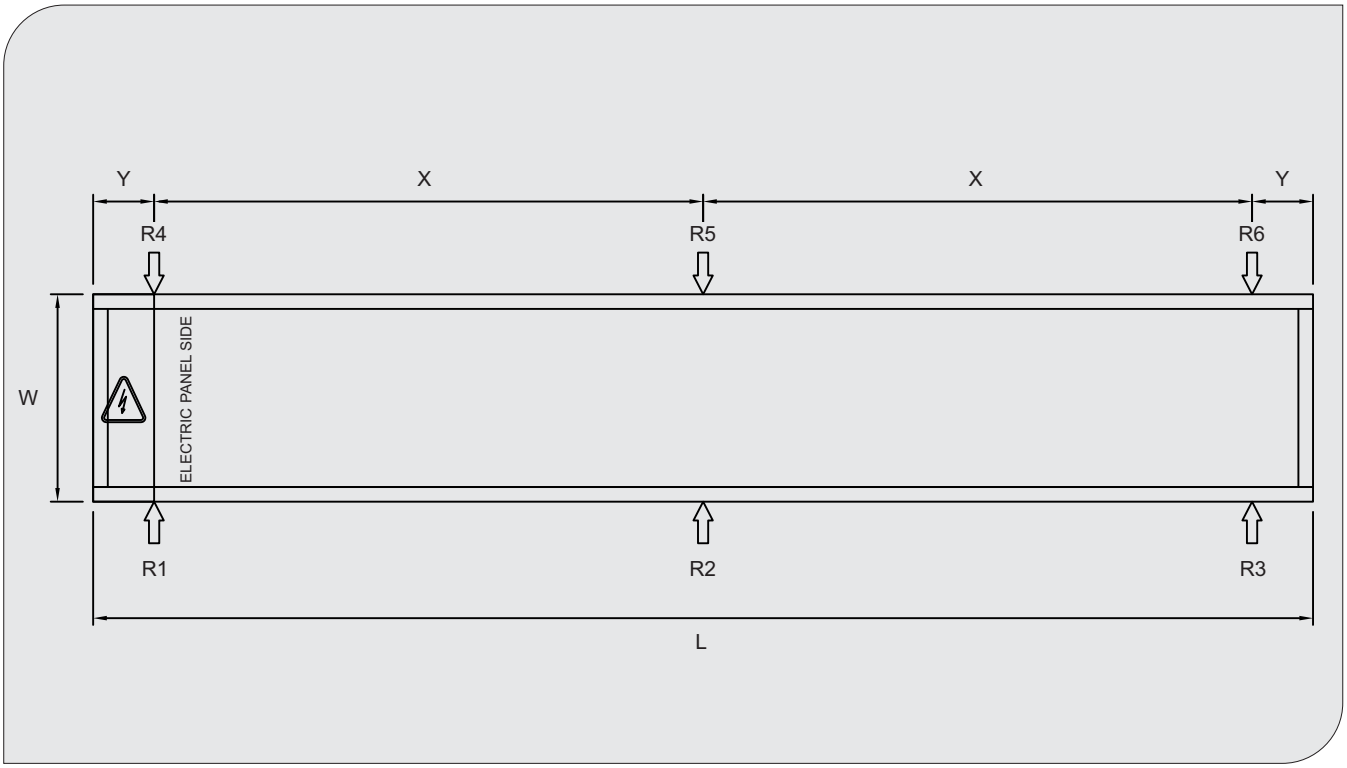
LEGEND

W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

NOTE

Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.5 m (5.0 ft)
- Barrel (cooler) end side for core removal: 5.0 m (16.4 ft)
- Power entry size: 200x400 mm [7.9x15.7] inch

LOAD DISTRIBUTION



MODEL (WPSa)	L		W		X		Y	
	mm	[Inch]	mm	[Inch]	mm	[Inch]	mm	[Inch]
110-2	4500	[177.2]	850	[33.5]	2000	[78.7]	250	[9.8]
130-2	5000	[196.9]	850	[33.5]	2250	[88.6]	250	[9.8]
145-2	5000	[196.9]	850	[33.5]	2250	[88.6]	250	[9.8]
155-2	5000	[196.9]	850	[33.5]	2250	[88.6]	250	[9.8]
175-2	5500	[216.5]	850	[33.5]	2500	[98.4]	250	[9.8]
195-2	5500	[216.5]	950	[37.4]	2500	[98.4]	250	[9.8]

MODEL (WPSa)	R1		R2		R3		R4		R5		R6		Total	
	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]
110-2	460	[1,014]	480	[1,058]	460	[1,014]	510	[1,025]	580	[1,279]	510	[1,025]	3,000	[6,615]
130-2	630	[1,389]	640	[1,411]	610	[1,345]	630	[1,389]	680	[1,499]	610	[1,345]	3,800	[8,379]
145-2	630	[1,389]	640	[1,411]	610	[1,345]	630	[1,389]	680	[1,499]	610	[1,345]	3,800	[8,379]
155-2	630	[1,389]	640	[1,411]	610	[1,345]	630	[1,389]	680	[1,499]	610	[1,345]	3,800	[8,379]
175-2	680	[1,499]	740	[1,632]	650	[1,433]	700	[1,544]	780	[1,720]	650	[1,433]	4,200	[9,261]
195-2	770	[1,698]	780	[1,720]	730	[1,610]	770	[1,698]	820	[1,808]	730	[1,610]	4600	[10,143]

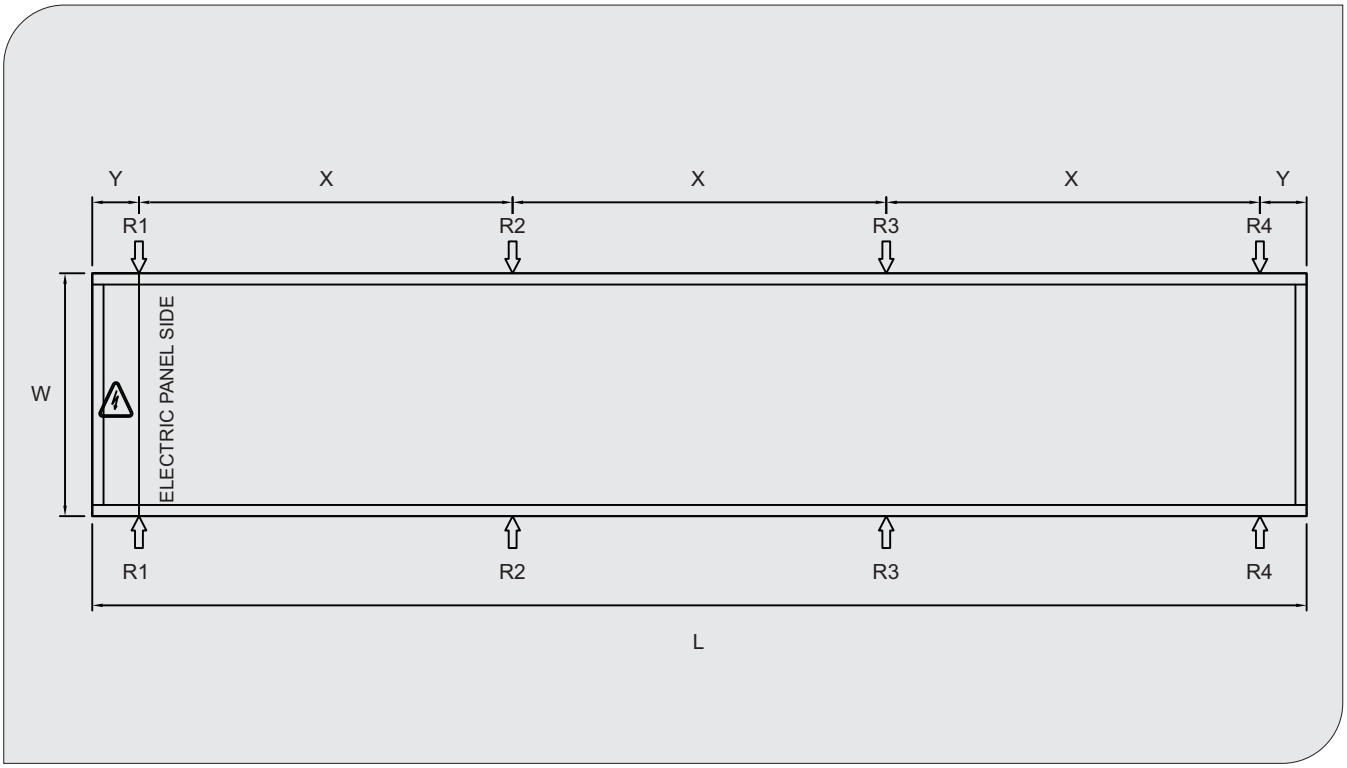
LEGEND

L: BASE LENGTH
W: BASE WIDTH
X: DISTANCE BETWEEN SUPPORTS
Y: DISTANCE BETWEEN SUPPORTS
R1, R2 , R3 , R4 , R5 , R6 : SUPPORT LOADS

NOTE

- load points & total weights are shipping point without cooler fluid content

LOAD DISTRIBUTION



MODEL (WPSa)	L		W		X		Y	
	mm	[Inch]	mm	[Inch]	mm	[Inch]	mm	[Inch]
230-2	6500	[255.9]	1300	[51.2]	2000	[78.7]	250	[9.8]
245-2	6500	[255.9]	1300	[51.2]	2000	[78.7]	250	[9.8]
260-2	6500	[255.9]	1300	[51.2]	2000	[78.7]	250	[9.8]
275-2	6500	[255.9]	1300	[51.2]	2000	[78.7]	250	[9.8]

MODEL (WPSa)	R1		R2		R3		R4		Total	
	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]
230-2	750	[1,654]	800	[1,764]	800	[1,764]	650	[1,433]	6,000	[13,230]
245-2	750	[1,654]	800	[1,764]	800	[1,764]	650	[1,433]	6,000	[13,230]
260-2	750	[1,654]	800	[1,764]	800	[1,764]	650	[1,433]	6,000	[13,230]
275-2	750	[1,654]	800	[1,764]	800	[1,764]	650	[1,433]	6,000	[13,230]

LEGEND

L: BASE LENGTH
W: BASE WIDTH
X: DISTANCE BETWEEN SUPPORTS
Y: DISTANCE BETWEEN SUPPORTS
R1, R2 , R3 , R4 : SUPPORT LOADS

NOTE

- load points & total weights are shipping point without cooler fluid content

SELECTION PROCEDURE

Before you proceed with unit selection, the capacity should be corrected according to the location where the chiller will be installed.

Selection:

To select any chiller from the WPSa series, the following should be provided.
Design capacity in kW (Tons) of refrigeration
Entering and leaving water temperature for cooler (barrel) in ºC (ºF)
Entering condenser water temperature in ºC (ºF)
Altitude of space where chiller is to be installed

Example:

Use the following data:

Design capacity	710 kW (202.0 Tons)
EWT/LWT for barrel (cooler)	12.2/6.7 ºC (54/44 ºF)
EWT for condenser	29.4 ºC (85 ºF)
Power supply	380V/3Ph/60Hz
Fouling factor (Cooler)	0.00010 ft^2.hr.ºF/BTU (0.0176 m^2.ºC/W)

Result of selection:

From the performance table on page 36 and the pressure drop curves on page 40, the operating data for the selected unit:

- Unit:	WPSa 195-2
- Capacity:	717.8 kW (204.1 Tons)
- Power input:	140.4 kW
- EWFR:	31.0 L/s (490.8 GPM)
- EWPD:	41.9 kPa (6.08 Psi)
- CWFR:	371. L/s (587.7 GPM)
- CWPD:	12.8 kPa (1.86 Psi)

LEGEND

EWT	: Entering Water Temperature
LWT	: Leaving Water Temperature
EWFR	: Evaporator Water Flow Rate
EWPD	: Evaporator Water Pressure Drop
CWFR	: Condenser Water Flow Rate
CWPD	: Condenser Water Pressure Drop

PERFORMANCE - 50 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
4	110-2	311.3	65.1	13.5	16.3	303.9	66.6	13.2	16.0	294.0	68.9	12.8	15.8
	130-2	371.7	74.2	16.1	19.3	360.1	76.4	15.6	18.9	350.6	79.2	15.1	18.5
	145-2	417.8	84.6	18.1	21.7	405.2	87.1	17.6	21.3	394.6	89.6	17.1	21.0
	155-2	451.2	91.3	19.6	23.5	437.5	93.9	19.0	23.1	425.9	97.3	18.4	22.6
	175-2	528.3	103.7	22.9	27.3	512.1	106.8	22.2	26.8	495.9	110.7	21.6	26.3
	195-2	530.4	115.7	25.7	30.5	513.8	119.1	25.0	29.9	556.0	122.3	24.0	29.3
	230-2	670.7	128.3	29.1	34.5	654.2	132.1	28.2	33.9	637.6	136.0	27.5	33.4
	245-2	724.2	138.0	31.3	37.1	702.3	142.2	30.4	36.5	680.2	147.4	29.4	35.8
	260-2	765.7	144.9	33.2	39.4	742.4	149.2	32.2	38.6	723.4	153.4	31.4	38.1
	275-2	829.0	159.7	36.1	42.9	806.8	164.4	35.0	42.0	786.0	169.1	34.1	41.4

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
4	110-2	284.2	71.8	12.4	15.5	274.3	75.2	11.9	15.2
	130-2	341.1	81.9	14.7	18.3	329.2	85.8	14.2	17.9
	145-2	381.2	93.3	16.6	20.6	367.9	97.7	16.0	20.2
	155-2	414.3	100.5	17.9	22.2	399.5	105.3	17.3	21.8
	175-2	479.7	115.5	20.8	25.9	462.8	121.1	20.1	25.4
	195-2	537.7	127.4	23.2	28.7	517.4	133.5	22.4	28.3
	230-2	616.9	141.6	26.6	32.8	595.8	148.4	25.7	32.2
	245-2	662.3	152.4	28.7	35.3	639.4	159.6	27.7	34.6
	260-2	699.5	159.9	30.4	37.4	675.3	167.5	29.4	36.7
	275-2	759.7	176.1	33.0	40.6	732.9	184.5	31.8	39.9

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
5	110-2	323.9	65.5	14.0	16.8	314.1	67.5	13.6	16.5	306.0	69.4	13.2	16.3
	130-2	384.8	74.8	16.7	19.9	374.6	77.0	16.2	19.5	362.6	79.8	15.7	19.2
	145-2	432.9	85.2	18.8	22.4	421.7	87.7	18.2	22.0	410.8	90.2	17.7	21.6
	155-2	469.2	91.9	20.3	24.2	454.7	94.6	19.7	23.8	440.0	98.1	19.1	23.4
	175-2	562.0	105.1	23.2	27.9	497.0	107.2	22.8	27.3	479.7	111.2	22.1	26.8
	195-2	575.0	116.0	26.0	30.8	557.1	119.4	25.3	30.3	538.8	123.8	24.5	29.7
	230-2	692.8	129.1	30.1	35.6	674.6	133.1	29.2	34.9	653.5	138.0	28.3	34.3
	245-2	745.6	138.9	32.4	38.3	726.6	143.1	31.4	37.6	703.8	148.4	30.4	36.9
	260-2	794.1	145.7	34.2	40.5	769.9	150.1	33.3	39.8	745.6	155.7	32.3	39.0
	275-2	860.6	160.7	37.2	44.1	834.2	165.5	36.1	43.3	807.5	171.6	35.0	42.5

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
5	110-2	295.8	72.3	12.8	16.0	285.6	75.8	12.4	15.7
	130-2	350.3	83.2	15.2	18.8	340.4	86.4	14.8	18.6
	145-2	397.1	94.0	17.1	21.3	383.0	98.4	16.5	20.9
	155-2	425.2	102.3	18.5	22.9	411.1	107.2	17.8	22.5
	175-2	505.7	116.7	21.4	27.0	488.2	122.4	20.7	26.5
	195-2	510.7	128.4	24.2	29.3	492.7	134.5	23.4	28.8
	230-2	636.2	142.7	27.6	33.8	614.4	149.5	26.6	33.2
	245-2	680.5	154.8	29.4	36.2	656.6	162.4	28.4	35.5
	260-2	725.6	160.9	31.4	38.5	700.6	168.6	30.3	37.7
	275-2	785.7	177.4	34.1	41.8	758.3	185.8	32.9	41.1

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 50 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
6	110-2	335.5	66.0	14.5	17.3	325.3	68.0	14.1	17.0	315.1	70.5	13.6	16.7
	130-2	399.2	75.3	17.3	20.6	389.7	77.5	16.8	20.1	377.4	80.4	16.3	19.8
	145-2	449.1	85.8	19.4	23.1	435.4	88.4	18.9	22.7	422.7	91.6	18.3	22.3
	155-2	483.9	93.0	20.9	24.9	472.0	95.3	20.4	24.6	456.9	98.8	19.8	24.1
	175-2	549.7	105.1	23.7	28.3	537.4	107.7	23.2	27.8	520.5	111.6	22.4	27.3
	195-2	612.3	116.5	26.5	31.6	594.4	120.1	25.8	31.0	576.4	124.5	25.0	30.4
	230-2	719.6	129.9	31.0	36.7	698.1	133.9	30.2	36.0	676.3	138.9	29.2	35.3
	245-2	768.1	140.6	33.2	39.3	749.1	144.1	32.5	38.7	729.1	149.4	31.4	38.0
	260-2	819.8	146.7	35.4	41.8	794.8	151.1	34.4	41.0	769.5	156.8	33.4	40.2
	275-2	889.4	161.7	38.4	45.4	862.4	166.6	37.3	44.6	834.6	172.8	36.2	43.7

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
6	110-2	306.7	72.9	13.3	16.5	295.8	76.4	12.8	16.2
	130-2	364.7	83.9	15.7	19.4	354.5	87.1	15.3	19.1
	145-2	411.5	94.7	17.8	22.0	396.7	99.2	17.2	21.6
	155-2	441.4	103.1	19.1	23.7	425.9	108.1	18.5	23.2
	175-2	502.2	116.5	21.7	26.8	463.2	122.7	21.5	26.8
	195-2	560.6	128.7	24.3	29.9	542.3	134.7	23.4	29.4
	230-2	661.9	143.6	28.4	34.8	639.4	150.5	27.5	34.1
	245-2	705.2	155.9	30.4	37.3	680.5	163.5	29.4	36.6
	260-2	749.1	162.1	32.5	39.6	726.3	169.8	31.3	38.8
	275-2	812.1	178.6	35.2	43.1	786.8	187.1	34.0	42.2

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
7	110-2	347.5	66.4	15.0	17.9	339.0	68.4	14.6	17.6	328.1	71.0	14.1	17.2
	130-2	413.2	76.2	17.8	21.1	403.0	78.1	17.4	20.8	390.4	81.0	16.9	20.4
	145-2	467.8	86.3	20.1	23.9	453.7	89.0	19.5	23.4	438.9	92.3	18.9	23.0
	155-2	502.9	93.6	21.6	25.7	490.6	96.0	21.1	25.3	474.8	99.5	20.5	24.9
	175-2	569.4	105.8	24.6	29.2	551.8	109.2	23.9	28.7	538.5	112.5	23.3	28.2
	195-2	638.7	117.3	27.4	32.5	620.4	120.9	26.6	31.9	598.9	125.3	25.8	31.4
	230-2	746.3	130.7	32.0	37.7	723.8	134.8	31.1	37.1	701.3	139.8	30.2	36.4
	245-2	793.1	141.4	34.3	40.5	779.4	144.9	33.5	39.8	754.7	150.4	32.5	39.1
	260-2	847.2	147.6	36.6	43.0	821.2	152.1	35.5	42.2	799.1	157.8	34.4	41.4
	275-2	920.4	162.7	39.6	46.7	891.9	167.7	38.5	45.9	863.4	173.9	37.3	45.0

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
7	110-2	317.2	74.1	13.7	16.9	308.1	76.9	13.3	16.7
	130-2	377.4	84.5	16.3	20.1	364.0	88.6	15.8	19.7
	145-2	424.2	96.3	18.3	22.6	412.2	100.0	17.8	22.2
	155-2	459.0	103.8	19.8	24.4	442.4	108.9	19.1	24.0
	175-2	521.2	117.4	22.6	27.8	504.0	123.1	21.7	27.2
	195-2	580.0	130.8	25.0	30.8	563.4	135.8	24.3	30.3
	230-2	678.4	145.9	29.2	35.7	659.8	151.6	28.4	35.2
	245-2	729.8	156.9	31.4	38.4	704.5	164.6	30.3	37.7
	260-2	772.3	164.6	33.3	40.6	750.9	171.0	32.4	40.0
	275-2	834.2	181.4	36.1	44.2	814.2	188.4	35.1	43.5

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 50 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
8	110-2	360.5	66.9	15.5	18.5	349.6	68.9	15.1	18.2	340.1	71.5	14.6	17.8
	130-2	427.7	76.7	18.4	21.8	414.7	79.2	17.9	21.4	406.6	81.5	17.4	21.1
	145-2	483.2	86.9	20.8	24.7	468.5	89.6	20.2	24.2	456.5	92.9	19.6	23.7
	155-2	519.8	94.3	22.4	26.6	504.0	97.3	21.8	26.1	492.7	100.2	21.2	25.7
	175-2	590.9	106.6	25.5	30.2	573.6	109.9	24.7	29.5	556.7	114.2	24.0	29.1
	195-2	662.3	118.1	28.5	33.7	640.4	121.7	27.6	33.0	621.5	126.3	26.8	32.4
	230-2	770.9	131.5	33.1	38.9	748.1	135.6	32.2	38.2	724.5	140.8	31.2	37.5
	245-2	819.8	142.3	35.5	41.7	800.8	146.9	34.4	40.9	780.4	151.4	33.5	40.3
	260-2	871.2	149.3	37.5	44.1	849.7	153.1	36.7	43.5	822.6	158.8	35.6	42.7
	275-2	947.1	164.5	40.6	47.9	923.6	168.7	39.7	47.2	894.0	175.0	38.5	46.3

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
8	110-2	328.8	74.6	14.2	17.5	319.7	77.5	13.8	17.2
	130-2	393.2	85.1	16.9	20.7	379.5	89.3	16.3	20.3
	145-2	441.0	96.9	18.9	23.3	425.6	101.7	18.3	22.8
	155-2	476.2	104.6	20.5	25.2	459.3	109.7	19.8	24.7
	175-2	542.0	118.3	23.4	28.6	524.7	124.0	22.5	28.0
	195-2	601.1	131.8	25.9	31.8	585.6	136.8	25.1	31.3
	230-2	700.9	146.9	30.2	36.8	676.7	154.2	29.2	36.1
	245-2	754.7	158.0	32.5	39.5	728.7	165.8	31.3	38.8
	260-2	799.1	165.7	34.4	41.8	771.3	173.8	33.2	41.0
	275-2	863.8	182.6	37.3	45.4	833.5	191.6	36.0	44.6

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
10	110-2	385.8	68.1	16.6	19.6	376.3	69.9	16.2	19.3	364.7	72.5	15.7	19.0
	130-2	459.0	77.7	19.8	23.2	445.3	80.3	19.2	22.8	433.3	83.4	18.6	22.4
	145-2	516.3	88.5	22.2	26.2	500.5	91.5	21.6	25.7	491.0	94.2	21.0	25.2
	155-2	559.6	95.5	24.0	28.3	542.3	98.6	23.3	27.8	524.7	102.5	22.6	27.3
	175-2	637.3	107.9	27.4	32.2	616.5	111.5	26.6	31.6	598.9	115.9	25.8	31.0
	195-2	707.3	120.4	30.4	35.8	689.3	123.5	29.7	35.3	668.6	128.2	28.9	34.6
	230-2	816.6	133.8	35.1	41.1	797.0	137.3	34.3	40.5	776.6	142.6	33.3	39.7
	245-2	879.6	143.9	37.7	44.2	852.9	148.7	36.7	43.4	825.4	154.6	35.6	42.6
	260-2	930.9	151.0	40.0	46.8	902.1	156.0	38.9	45.9	879.3	160.9	37.9	45.2
	275-2	1010.1	166.5	43.3	50.8	978.8	172.0	42.1	49.8	953.5	177.3	41.1	49.1

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
10	110-2	352.4	75.7	15.2	18.6	340.4	79.4	14.7	18.3
	130-2	421.7	86.3	18.1	22.0	406.9	90.6	17.5	21.6
	145-2	474.4	98.4	20.3	24.8	457.9	103.2	19.6	24.3
	155-2	509.3	107.1	21.9	26.7	494.8	111.3	21.3	26.3
	175-2	578.9	121.2	25.0	30.4	559.2	127.2	24.1	29.8
	195-2	646.8	133.7	27.9	33.9	625.7	140.3	26.9	33.3
	230-2	751.2	148.9	32.2	39.0	725.6	156.2	31.1	38.2
	245-2	798.0	161.6	34.4	41.8	780.1	168.0	33.4	41.0
	260-2	853.9	167.9	36.7	44.3	824.4	176.2	35.4	43.4
	275-2	925.3	185.0	39.7	48.1	893.0	194.1	38.4	47.1

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 50 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
40	110-2	90.0	65.3	217.3	261.6	87.3	67.2	211.0	256.9	85.5	69.1	205.3	252.8
	130-2	107.6	74.5	259.1	309.7	104.4	76.7	251.7	304.0	101.0	79.5	244.0	298.5
	145-2	120.5	84.9	291.5	349.1	116.8	87.4	283.1	342.8	114.2	89.9	275.7	337.4
	155-2	130.8	91.5	315.1	377.1	126.8	94.2	306.0	370.3	122.7	97.6	296.5	363.5
	175-2	135.9	104.6	370.4	443.9	148.7	107.1	357.0	430.1	144.0	111.0	346.1	422.3
	195-2	173.6	116.1	403.4	491.2	168.3	119.6	391.8	482.2	147.4	122.7	388.5	475.3
	230-2	193.6	128.7	467.8	555.0	187.8	132.6	454.4	544.9	184.3	136.4	442.5	536.1
	245-2	208.0	138.5	503.7	597.6	202.7	142.6	488.4	585.8	196.3	147.8	473.5	575.0
	260-2	221.5	145.2	533.2	631.7	214.7	149.6	518.0	620.1	207.9	155.1	502.1	608.6
	275-2	239.9	160.2	579.1	687.7	232.5	164.9	562.5	675.0	225.1	170.9	545.2	662.5

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
40	110-2	82.7	72.0	198.7	248.3	79.8	75.4	191.7	244.0
	130-2	98.3	82.2	237.6	294.2	94.9	86.1	229.3	288.9
	145-2	110.4	93.6	266.7	331.3	106.5	98.0	257.3	325.3
	155-2	118.5	101.8	286.7	356.9	115.1	105.7	278.6	351.8
	175-2	139.2	115.8	334.8	414.6	133.8	121.5	323.6	407.8
	195-2	142.7	127.8	375.9	466.6	137.7	133.9	362.8	458.1
	230-2	178.3	142.1	428.3	526.3	172.2	148.9	413.5	516.7
	245-2	189.8	154.2	458.1	564.5	184.5	160.1	445.3	556.3
	260-2	202.4	160.3	489.0	599.7	195.3	168.0	472.1	588.5
	275-2	219.0	176.7	530.9	652.8	211.3	185.1	512.4	640.7

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
42	110-2	93.7	65.8	226.2	271.2	90.9	67.8	219.7	266.4	88.9	69.7	214.0	262.2
	130-2	111.6	75.1	270.1	321.5	108.7	77.3	261.9	315.1	105.2	80.1	253.9	309.4
	145-2	125.9	85.5	302.8	361.4	122.1	88.1	294.1	354.8	118.1	91.3	285.1	348.3
	155-2	136.0	92.2	328.1	391.2	132.5	95.0	317.9	383.3	128.2	98.4	308.1	376.3
	175-2	149.3	105.0	376.0	450.5	143.9	107.7	369.8	441.6	139.3	111.7	358.5	433.6
	195-2	171.4	116.2	413.1	492.7	166.7	119.6	400.7	483.1	161.1	124.0	388.3	474.1
	230-2	202.0	129.5	484.4	573.1	195.9	133.5	470.7	562.7	189.8	138.5	456.5	552.4
	245-2	217.2	139.4	521.2	616.6	210.7	143.6	506.4	605.4	204.0	149.0	491.1	594.2
	260-2	229.9	146.3	552.9	653.0	222.9	150.7	537.1	641.0	215.8	156.3	520.8	629.1
	275-2	248.3	161.3	601.0	711.4	241.6	166.1	582.7	697.2	233.9	172.2	565.0	684.3

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
42	110-2	85.9	72.6	207.1	257.6	82.9	76.1	199.9	253.0
	130-2	101.7	83.6	245.6	303.8	98.8	86.8	238.7	299.4
	145-2	114.9	94.4	277.7	343.3	110.9	98.9	268.0	337.1
	155-2	123.9	102.7	298.0	369.4	119.5	107.7	287.5	362.6
	175-2	134.7	116.5	346.9	425.7	130.0	122.2	334.8	418.0
	195-2	155.1	128.2	381.4	473.2	149.7	134.4	368.2	464.6
	230-2	184.8	143.2	444.7	544.4	178.5	150.1	429.6	534.4
	245-2	197.3	155.4	475.1	583.3	190.4	163.0	458.6	572.5
	260-2	210.0	161.6	507.3	619.8	202.8	169.3	489.9	608.2
	275-2	228.9	178.0	548.8	672.7	220.9	186.5	529.8	660.1

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 10°F cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 50 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
44	110-2	97.8	66.3	235.1	280.8	94.8	68.3	228.4	275.8	92.3	70.8	220.8	270.2
	130-2	116.5	75.6	280.6	332.8	113.0	77.9	272.6	326.7	109.4	80.8	264.3	320.8
	145-2	131.0	86.2	315.0	374.5	127.0	88.8	306.0	367.7	123.7	92.0	295.9	360.1
	155-2	140.9	93.4	339.2	403.8	138.1	95.7	330.5	397.0	133.7	99.2	320.5	389.7
	175-2	160.5	105.6	385.1	458.0	156.4	108.2	376.3	451.4	151.3	112.2	364.9	443.2
	195-2	178.4	117.1	430.7	511.7	173.2	120.6	417.7	501.5	168.4	125.0	403.9	491.2
	230-2	208.4	130.5	503.4	593.6	203.3	134.5	488.2	581.7	197.0	139.5	473.5	571.0
	245-2	223.2	141.1	538.2	635.8	217.8	144.7	525.9	626.5	212.0	150.1	509.1	613.9
	260-2	237.9	147.3	573.8	675.6	232.2	151.7	556.0	661.5	224.8	157.4	539.2	649.2
	275-2	258.4	162.4	622.0	734.2	251.9	167.2	602.7	718.9	243.8	173.4	584.4	705.5

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
44	110-2	89.8	73.2	215.1	266.4	86.7	76.7	207.8	261.7
	130-2	106.2	84.3	255.3	314.4	102.5	88.4	246.4	308.6
	145-2	119.5	96.0	286.3	353.6	116.1	99.7	278.3	348.4
	155-2	129.2	103.5	310.0	382.6	124.6	108.6	299.2	375.5
	175-2	146.3	117.1	353.1	435.1	141.2	122.8	340.8	427.2
	195-2	164.1	129.2	393.4	484.0	158.1	135.4	379.9	475.2
	230-2	190.5	145.6	458.4	560.5	185.3	151.2	445.8	552.3
	245-2	205.0	156.6	492.7	602.5	197.9	164.3	475.7	591.4
	260-2	217.3	164.2	521.8	637.0	211.3	170.6	507.4	627.5
	275-2	235.6	181.0	565.4	692.4	229.0	187.9	549.8	682.1

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
46	110-2	101.8	66.8	244.4	290.9	98.7	68.8	237.5	285.7	95.6	71.4	230.3	280.5
	130-2	120.8	76.6	289.9	343.3	117.1	79.1	281.6	337.0	114.1	81.5	274.8	332.1
	145-2	136.0	86.8	328.0	388.5	132.4	89.5	318.1	380.7	128.2	92.8	308.5	373.8
	155-2	146.9	94.1	352.5	418.1	142.4	97.1	342.4	410.4	138.7	100.1	334.0	404.4
	175-2	166.7	106.4	401.0	475.2	162.5	109.8	388.8	465.7	156.7	114.1	377.7	458.0
	195-2	186.7	117.9	447.7	529.9	180.9	121.6	435.0	520.2	175.2	126.1	421.1	509.7
	230-2	216.8	131.3	521.5	613.1	210.3	135.5	506.9	601.9	204.9	140.5	490.7	589.7
	245-2	232.3	142.1	557.2	656.3	225.2	146.7	541.4	644.2	219.5	151.2	528.3	634.8
	260-2	246.7	149.0	589.9	693.9	240.7	152.8	576.5	683.7	233.0	158.6	559.2	670.9
	275-2	266.5	164.4	640.8	755.4	259.8	168.5	626.1	744.3	253.0	174.7	605.6	728.6

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
46	110-2	92.4	74.5	222.9	275.5	90.2	77.4	216.4	271.1
	130-2	110.3	85.0	266.0	326.0	107.2	89.1	256.1	319.2
	145-2	124.6	96.8	297.7	366.0	121.1	100.5	289.5	360.7
	155-2	134.0	104.4	323.2	396.9	129.8	109.5	311.4	388.9
	175-2	152.7	118.1	367.2	450.5	147.4	123.8	354.6	442.3
	195-2	169.5	131.5	407.5	500.3	164.7	136.6	396.3	493.0
	230-2	198.7	146.7	474.7	578.3	191.9	153.9	458.5	567.6
	245-2	212.2	157.8	511.4	623.0	204.9	165.6	494.0	611.3
	260-2	225.2	165.5	541.3	658.3	217.4	173.6	522.8	645.9
	275-2	244.5	182.3	586.1	714.9	235.9	191.2	565.9	701.4

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 10°F cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 50 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
48	110-2	105.2	67.6	252.8	300.3	102.7	69.4	247.1	296.0	100.1	71.9	239.0	289.9
	130-2	125.7	77.1	301.4	355.6	121.9	79.7	292.8	349.1	118.8	82.1	285.8	344.0
	145-2	140.9	87.9	338.7	400.5	137.5	90.2	331.0	394.7	133.7	93.5	320.5	386.7
	155-2	153.3	94.8	366.0	432.6	148.6	97.9	355.5	424.6	143.8	101.7	344.7	416.8
	175-2	174.3	107.1	416.2	491.5	169.2	110.6	404.4	482.5	164.0	115.0	392.2	473.6
	195-2	194.6	118.8	464.9	548.4	189.3	122.5	451.9	538.3	182.9	127.1	438.3	528.4
	230-2	224.5	132.9	536.8	630.2	219.7	136.3	524.2	620.6	212.8	141.6	508.6	609.1
	245-2	240.9	143.0	577.6	678.2	233.5	147.7	561.3	665.7	226.1	153.5	544.4	653.3
	260-2	254.8	150.1	612.4	718.0	248.5	153.9	598.6	707.4	241.8	159.7	579.5	692.9
	275-2	277.3	165.4	662.7	779.0	270.4	169.6	647.7	767.6	261.7	176.0	628.3	753.2

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
48	110-2	96.7	75.1	231.3	284.7	93.4	78.8	223.4	279.5
	130-2	115.4	85.7	276.1	337.0	111.3	89.9	266.7	330.7
	145-2	129.2	97.6	310.2	379.6	124.7	102.4	299.6	372.5
	155-2	139.9	105.3	335.8	410.6	134.9	110.4	324.3	403.0
	175-2	159.6	119.0	382.1	466.7	153.8	124.9	369.1	458.1
	195-2	176.7	132.6	424.3	518.6	170.7	139.2	409.8	508.9
	230-2	205.8	147.8	492.6	597.8	198.8	155.1	475.9	586.6
	245-2	221.2	158.9	529.3	642.4	214.1	166.7	510.9	629.8
	260-2	233.7	166.7	561.1	679.8	225.6	174.9	542.0	666.9
	275-2	252.9	183.7	608.2	739.0	244.0	192.7	587.4	724.9

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
50	110-2	109.7	68.1	262.6	310.8	107.0	69.9	256.7	306.3	103.7	72.5	249.1	300.7
	130-2	130.5	77.7	313.5	368.5	126.6	80.3	304.6	361.7	123.2	83.4	294.8	354.3
	145-2	146.8	88.5	351.9	414.6	142.3	91.5	341.9	406.9	139.6	94.2	332.7	399.9
	155-2	159.1	95.5	380.9	448.5	154.2	98.6	370.1	440.2	149.2	102.5	358.9	432.0
	175-2	181.2	107.9	433.9	510.3	175.3	111.5	421.7	501.0	170.3	115.9	409.0	491.7
	195-2	201.1	120.4	482.3	567.5	196.0	123.5	471.4	559.3	190.1	128.2	457.4	548.9
	230-2	232.2	133.8	556.9	651.8	226.6	137.3	544.4	642.3	220.8	142.6	527.2	629.1
	245-2	250.1	143.9	598.2	700.2	242.5	148.7	581.4	687.3	234.7	154.6	564.0	674.4
	260-2	264.7	151.0	634.0	741.1	256.5	156.0	616.1	727.2	250.0	160.9	601.3	716.4
	275-2	287.2	166.5	686.7	804.7	278.3	172.0	667.3	789.7	271.1	177.3	651.3	777.9

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
50	110-2	100.2	75.7	241.2	295.3	96.8	79.4	232.9	289.8
	130-2	119.9	86.3	287.3	349.1	115.7	90.6	277.6	342.6
	145-2	134.9	98.4	322.1	392.5	130.2	103.2	311.2	385.2
	155-2	144.8	107.1	346.6	423.2	140.7	111.3	337.1	416.9
	175-2	164.6	121.2	395.9	482.6	159.0	127.2	381.6	472.7
	195-2	183.9	133.7	442.0	537.7	177.9	140.3	427.0	527.6
	230-2	213.6	148.9	510.7	617.4	206.3	156.2	493.6	605.8
	245-2	226.9	161.6	546.0	661.8	221.8	168.0	530.0	650.6
	260-2	242.8	167.9	581.1	701.5	234.4	176.2	561.5	688.1
	275-2	263.1	185.0	629.3	761.8	253.9	194.1	607.9	747.3

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 10°F cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 60 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
4	110-2	360.1	78.2	15.6	19.0	351.3	80.1	15.3	18.7	340.1	83.0	14.8	18.4
	130-2	432.6	89.3	18.8	22.6	419.2	92.1	18.2	22.2	408.3	94.8	17.7	21.8
	145-2	481.8	101.7	20.9	25.3	469.9	104.1	20.4	24.9	457.2	107.7	19.7	24.4
	155-2	519.5	109.5	22.6	27.2	502.9	112.9	21.9	26.7	487.1	117.1	21.2	26.2
	175-2	617.9	124.8	26.1	31.6	529.3	128.6	26.1	31.0	571.5	133.1	24.7	30.4
	195-2	668.6	138.5	29.0	34.9	651.7	141.8	28.3	34.4	632.0	146.9	27.4	33.8
	230-2	773.0	154.1	33.5	40.1	754.0	157.9	32.8	39.5	730.1	163.7	31.8	38.8
	245-2	833.2	165.7	35.9	43.0	807.2	170.8	34.9	42.2	781.1	177.3	33.8	41.4
	260-2	877.8	173.8	38.1	45.5	856.0	178.0	37.2	44.8	828.3	184.4	36.0	44.0
	275-2	947.1	191.4	41.1	49.3	923.2	196.0	40.1	48.5	895.1	203.0	38.8	47.6

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
4	110-2	329.2	86.5	14.3	18.0	317.2	90.7	13.8	17.7
	130-2	394.3	98.8	17.2	21.4	380.2	103.6	16.5	21.1
	145-2	441.4	112.3	19.0	23.9	425.2	117.8	18.4	23.5
	155-2	475.5	121.0	20.5	25.8	458.3	126.9	19.8	25.3
	175-2	551.8	138.9	23.9	29.9	536.0	144.4	23.2	29.5
	195-2	610.2	153.2	26.5	33.2	588.4	160.7	25.6	32.6
	230-2	705.5	170.7	30.7	38.1	680.9	179.0	29.6	37.4
	245-2	759.7	183.4	32.9	40.8	732.9	192.3	31.7	40.1
	260-2	802.9	192.3	34.8	43.1	774.1	201.6	33.5	42.3
	275-2	864.1	211.7	37.5	46.7	833.2	222.0	36.2	45.9

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
5	110-2	374.9	78.8	16.2	19.6	365.8	80.7	15.8	19.3	353.8	83.7	15.4	19.0
	130-2	450.5	89.9	19.4	23.3	436.5	92.7	18.8	22.8	422.4	96.2	18.2	22.4
	145-2	502.6	102.4	21.7	26.1	486.8	105.6	21.1	25.7	474.1	108.7	20.6	25.3
	155-2	542.0	110.4	23.5	28.2	525.1	113.8	22.8	27.7	509.3	118.1	22.0	27.2
	175-2	590.5	125.1	27.1	32.7	573.6	129.0	26.3	32.1	554.6	133.8	25.5	31.5
	195-2	650.3	139.4	30.1	36.3	630.2	143.7	29.2	35.6	608.1	148.1	28.6	34.9
	230-2	800.5	155.1	34.6	41.3	775.9	160.0	33.6	40.5	756.2	164.8	32.8	40.0
	245-2	856.7	166.8	37.2	44.4	833.5	172.0	36.1	43.5	806.4	178.5	34.9	42.7
	260-2	907.4	174.9	39.3	46.8	878.9	180.4	38.2	46.0	858.9	185.7	37.2	45.2
	275-2	982.6	192.7	42.5	50.8	951.3	198.6	41.2	49.8	926.4	204.5	40.2	49.1

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
5	110-2	341.9	87.2	14.9	18.7	329.5	91.5	14.3	18.3
	130-2	410.8	99.6	17.8	22.1	396.0	104.4	17.1	21.7
	145-2	457.9	113.4	19.9	24.8	442.4	118.9	19.1	24.4
	155-2	491.3	123.3	21.3	26.7	477.3	128.1	20.7	26.3
	175-2	535.6	139.8	24.7	30.9	516.3	146.7	23.8	30.4
	195-2	587.0	154.4	27.7	34.3	566.2	162.0	26.7	33.7
	230-2	735.4	171.8	31.6	39.2	709.4	180.2	30.5	38.4
	245-2	779.0	186.4	33.8	41.9	756.9	193.7	32.8	41.3
	260-2	830.0	193.6	35.9	44.4	800.1	203.1	34.7	43.6
	275-2	897.2	213.2	38.8	48.1	865.2	223.6	37.4	47.2

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 60 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
6	110-2	390.0	79.4	16.8	20.2	377.7	81.8	16.3	19.9	367.9	84.3	15.9	19.6
	130-2	465.3	90.6	20.1	24.1	453.3	93.4	19.5	23.6	438.6	96.9	18.9	23.1
	145-2	523.0	103.1	22.5	27.0	506.4	106.4	21.8	26.5	489.9	110.4	21.2	26.0
	155-2	560.3	111.8	24.2	29.0	546.2	114.6	23.6	28.6	528.3	119.0	22.8	28.1
	175-2	630.2	126.3	27.3	32.8	618.3	129.4	26.6	32.2	598.2	134.3	25.8	31.6
	195-2	693.9	139.7	30.4	36.7	674.2	144.0	29.5	36.0	651.0	149.5	28.6	35.3
	230-2	826.5	156.1	35.8	42.6	806.1	161.0	34.7	41.7	780.4	167.2	33.6	40.9
	245-2	889.1	167.8	38.3	45.6	861.3	173.1	37.2	44.8	833.5	179.7	36.1	44.0
	260-2	938.0	176.0	40.6	48.2	912.0	181.5	39.4	47.3	882.1	188.4	38.1	46.4
	275-2	1014.3	193.9	43.9	52.3	985.5	199.9	42.5	51.3	957.0	207.4	41.1	50.2

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
6	110-2	355.6	87.9	15.4	19.2	342.9	92.2	14.8	18.9
	130-2	423.4	101.2	18.3	22.7	411.5	105.2	17.8	22.4
	145-2	476.2	114.2	20.6	25.6	459.0	119.8	19.9	25.2
	155-2	510.0	124.2	22.1	27.5	491.3	130.4	21.3	27.0
	175-2	576.1	140.3	25.0	31.1	555.0	147.3	24.1	30.6
	195-2	628.8	154.8	28.0	34.6	606.7	162.4	27.0	34.0
	230-2	759.3	173.0	32.7	40.3	732.6	181.5	31.6	39.6
	245-2	805.0	187.7	34.9	43.2	776.6	197.1	33.7	42.4
	260-2	858.1	195.0	37.1	45.7	831.8	204.4	35.7	44.8
	275-2	930.6	214.6	40.0	49.5	897.2	225.1	38.6	48.5

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
7	110-2	403.8	79.9	17.4	20.9	391.1	82.4	16.9	20.5	378.4	85.6	16.4	20.2
	130-2	480.4	91.7	20.7	24.7	468.5	94.1	20.2	24.4	453.3	97.7	19.6	23.9
	145-2	539.5	103.9	23.4	27.9	524.0	107.1	22.7	27.4	506.8	111.2	22.0	26.9
	155-2	581.7	112.6	25.0	29.9	563.4	116.3	24.3	29.4	548.3	119.9	23.7	29.0
	175-2	657.3	127.1	28.3	33.8	634.5	131.3	27.5	33.2	619.3	135.4	26.8	32.8
	195-2	726.6	140.7	31.4	37.5	704.5	145.1	30.5	36.8	681.6	150.6	29.5	36.1
	230-2	854.3	157.1	37.0	43.8	833.5	162.1	35.8	42.9	806.8	168.3	34.7	42.1
	245-2	910.6	169.9	39.4	46.9	891.2	174.2	38.4	46.1	862.4	180.9	37.3	45.3
	260-2	973.2	177.1	41.8	49.6	942.6	182.7	40.6	48.7	911.6	189.7	39.4	47.8
	275-2	1046.7	195.2	45.3	53.9	1021.7	201.1	43.8	52.7	987.9	208.8	42.5	51.7

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
7	110-2	369.3	88.6	15.9	19.9	356.3	92.9	15.4	19.5
	130-2	439.6	102.0	18.9	23.5	423.8	107.1	18.3	23.0
	145-2	491.0	116.1	21.2	26.3	476.6	120.7	20.6	25.9
	155-2	529.7	125.2	22.9	28.4	510.3	131.4	22.1	27.9
	175-2	598.6	141.4	25.9	32.2	578.2	148.4	24.9	31.5
	195-2	659.4	157.1	28.4	35.3	640.1	163.4	27.7	34.9
	230-2	785.0	174.2	33.8	41.5	757.6	182.7	32.6	40.8
	245-2	833.2	189.0	36.0	44.4	803.3	198.4	34.8	43.6
	260-2	887.0	196.3	38.4	47.1	855.3	205.9	37.0	46.2
	275-2	953.8	218.1	41.1	50.7	926.4	226.6	39.9	50.0

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 60 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
8	110-2	419.9	80.4	18.0	21.5	407.3	83.0	17.5	21.2	393.9	86.2	17.0	20.8
	130-2	499.8	92.3	21.4	25.5	483.9	95.4	20.8	25.0	471.3	98.4	20.3	24.7
	145-2	557.8	105.2	24.0	28.6	543.7	107.9	23.5	28.2	525.8	112.0	22.7	27.7
	155-2	601.4	113.4	26.0	30.9	582.4	117.1	25.2	30.4	564.8	121.7	24.4	29.8
	175-2	681.6	128.0	29.3	35.0	661.5	132.2	28.4	34.2	639.4	137.5	27.6	33.7
	195-2	753.7	141.8	32.6	38.8	731.2	146.2	31.6	38.1	710.1	151.7	30.5	37.2
	230-2	885.9	158.0	38.1	45.1	858.5	163.1	37.0	44.3	831.1	169.5	35.9	43.4
	245-2	942.9	170.9	40.7	48.2	913.4	176.6	39.5	47.3	893.0	182.1	38.4	46.5
	260-2	1005.2	178.1	43.2	51.0	973.5	183.9	42.0	50.1	941.9	191.0	40.7	49.2
	275-2	1077.6	197.4	46.5	55.1	1050.2	202.5	45.4	54.3	1018.9	210.2	43.9	53.2

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
8	110-2	380.5	90.0	16.4	20.4	369.6	93.6	15.9	20.1
	130-2	455.5	102.8	19.6	24.2	438.9	107.9	18.9	23.8
	145-2	509.6	117.0	21.9	27.2	491.3	122.8	21.2	26.7
	155-2	551.8	126.0	23.7	29.3	531.8	132.3	22.8	28.7
	175-2	624.3	142.4	26.7	33.1	600.4	149.6	25.9	32.6
	195-2	686.2	158.4	29.5	36.5	661.2	166.3	28.4	35.9
	230-2	806.8	177.0	34.7	42.6	783.9	184.0	33.7	41.9
	245-2	862.7	190.2	37.2	45.7	832.1	199.8	35.9	44.8
	260-2	909.5	199.5	39.3	48.2	887.0	207.2	38.2	47.4
	275-2	983.4	219.6	42.5	52.2	947.8	230.6	41.0	51.3

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
10	110-2	448.8	82.0	19.2	22.9	434.7	84.8	18.7	22.4	423.4	87.4	18.2	22.1
	130-2	534.6	93.6	23.0	27.2	521.2	96.7	22.3	26.6	504.3	100.6	21.6	26.1
	145-2	598.6	106.6	25.8	30.5	579.6	110.2	25.0	30.0	562.7	114.6	24.2	29.4
	155-2	642.2	115.6	27.7	32.8	628.1	118.7	27.0	32.3	607.4	123.5	26.1	31.7
	175-2	729.4	130.6	31.4	37.2	712.2	134.1	30.6	36.6	690.0	139.6	29.6	35.9
	195-2	809.6	144.5	34.8	41.2	784.3	149.4	33.7	40.4	764.9	154.0	32.9	39.8
	230-2	939.0	160.8	40.4	47.6	909.8	166.4	39.3	46.7	892.6	171.6	38.2	45.9
	245-2	1005.5	172.9	43.4	51.1	978.1	178.8	42.0	50.0	946.1	186.0	40.7	49.1
	260-2	1068.8	181.3	45.7	53.8	1035.1	187.5	44.4	52.8	1007.6	193.4	43.3	52.0
	275-2	1148.3	199.8	49.5	58.4	1115.6	206.5	48.0	57.2	1078.3	214.8	46.5	56.1

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)							
		32				35			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
10	110-2	409.0	91.4	17.6	21.7	394.6	95.9	17.0	21.3
	130-2	486.8	105.2	20.9	25.7	473.0	109.5	20.3	25.3
	145-2	547.2	118.7	23.6	28.9	530.4	124.6	22.7	28.3
	155-2	589.4	129.1	25.2	31.0	568.0	135.7	24.3	30.4
	175-2	666.8	146.0	28.7	35.3	642.6	153.4	27.7	34.6
	195-2	738.9	160.9	31.8	39.0	712.2	168.9	30.7	38.3
	230-2	862.4	179.3	37.0	45.1	832.1	188.3	35.7	44.2
	245-2	913.7	194.6	39.4	48.2	891.2	202.4	38.2	47.4
	260-2	973.2	202.1	41.9	51.0	938.3	212.2	40.4	50.0
	275-2	1051.9	222.4	45.2	55.2	1014.0	233.6	43.6	54.2

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
40	110-2	104.5	78.5	252.1	305.4	101.9	80.4	246.2	301.1	98.6	83.3	238.6	295.8
	130-2	125.0	89.6	302.1	362.9	121.1	92.4	293.2	356.3	117.2	95.9	284.0	349.8
	145-2	140.0	102.0	337.2	406.5	135.6	105.1	327.3	399.1	132.1	108.2	319.1	393.4
	155-2	150.6	109.9	364.0	438.6	145.9	113.3	353.3	430.6	141.3	117.5	341.6	422.2
	175-2	165.1	124.5	420.9	508.1	159.9	128.4	408.6	498.9	154.7	133.2	395.8	489.9
	195-2	194.2	138.9	466.2	560.5	189.5	142.2	455.0	552.1	183.5	147.4	440.6	541.7
	230-2	223.7	154.6	538.8	643.6	218.2	158.3	526.3	634.4	211.2	164.1	510.2	622.9
	245-2	239.7	166.2	578.4	691.1	232.3	171.4	561.6	678.5	226.0	177.8	542.7	664.7
	260-2	252.8	174.3	612.7	731.0	245.8	179.7	593.8	716.5	240.5	184.9	577.6	704.5
	275-2	274.1	192.0	661.8	792.0	265.5	197.9	642.3	777.5	258.5	203.7	626.3	766.1

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
40	110-2	95.3	86.9	230.7	290.6	91.8	91.1	222.4	285.5
	130-2	114.4	99.1	275.9	344.3	110.2	104.0	266.1	338.1
	145-2	127.5	112.9	308.5	386.3	122.9	118.3	297.4	379.4
	155-2	136.4	122.7	330.0	414.6	132.4	127.5	320.4	408.7
	175-2	149.1	139.1	382.6	481.1	143.8	144.8	373.8	471.9
	195-2	177.2	153.7	425.9	531.9	170.9	161.1	410.7	522.3
	230-2	204.2	171.2	493.5	611.6	197.0	179.6	476.1	600.5
	245-2	219.9	183.9	528.2	655.1	212.1	192.9	509.5	643.2
	260-2	232.4	192.8	558.5	691.5	224.1	202.2	538.6	678.8
	275-2	250.4	212.4	604.4	750.9	241.3	222.7	582.8	737.1

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
42	110-2	108.9	79.1	262.3	316.5	105.9	81.6	254.1	310.2	103.2	84.0	247.8	305.9
	130-2	130.2	90.3	314.3	376.1	126.1	93.1	305.1	369.3	122.5	96.6	295.1	362.0
	145-2	145.4	102.9	351.9	422.4	142.0	106.0	340.2	413.2	137.3	110.0	329.6	405.7
	155-2	156.2	111.5	377.7	454.1	153.2	114.2	367.2	445.9	148.2	118.5	355.8	437.8
	175-2	177.4	125.2	429.1	514.8	185.7	129.6	414.9	506.4	166.5	133.9	402.9	495.6
	195-2	188.7	140.0	486.9	571.9	182.3	144.3	472.8	561.5	194.9	148.8	450.9	564.0
	230-2	232.2	155.6	558.5	665.1	225.1	160.6	542.4	653.0	219.3	165.4	529.1	643.6
	245-2	249.6	167.3	598.7	713.3	241.8	172.6	581.3	700.2	234.0	179.2	563.3	687.4
	260-2	263.3	175.5	633.8	754.0	255.1	181.0	615.4	740.1	248.4	186.4	600.2	729.3
	275-2	284.4	193.4	685.7	818.1	276.6	199.3	664.0	801.3	267.5	206.8	643.3	786.5

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
42	110-2	99.7	87.6	239.6	300.4	96.1	91.8	231.1	295.2
	130-2	118.3	100.9	285.3	355.4	114.8	104.9	277.2	350.3
	145-2	133.5	113.8	320.8	399.9	128.7	119.4	309.4	392.7
	155-2	143.0	123.8	343.8	429.8	137.8	129.9	331.4	422.0
	175-2	154.8	140.4	400.1	488.3	149.4	147.4	385.9	479.5
	195-2	188.2	155.2	436.0	553.8	181.5	162.7	420.5	543.7
	230-2	212.0	172.5	511.9	631.9	204.5	181.0	494.0	620.4
	245-2	226.0	187.1	544.7	674.8	219.6	194.5	529.2	665.0
	260-2	240.0	194.4	580.5	715.7	231.5	203.9	560.0	702.4
	275-2	260.1	214.0	626.1	775.0	250.8	224.4	603.9	760.6

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 10°F cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
44	110-2	113.2	79.7	273.1	328.2	110.1	82.2	264.7	321.8	106.5	85.4	256.5	316.0
	130-2	135.6	91.0	326.7	389.6	131.4	93.9	317.3	382.5	127.7	97.4	307.0	374.9
	145-2	151.8	103.6	365.6	437.2	147.1	106.9	355.0	429.2	142.7	110.9	343.4	420.7
	155-2	163.1	112.3	392.3	469.9	158.6	116.0	379.8	460.3	154.3	119.5	370.3	453.6
	175-2	184.5	126.8	442.7	530.3	180.1	130.1	432.4	522.7	174.2	135.0	419.0	513.2
	195-2	204.1	140.4	490.8	587.7	197.5	144.7	476.5	577.0	191.1	150.2	461.7	566.5
	230-2	240.4	156.8	579.5	687.9	233.0	161.8	562.9	675.3	226.5	168.0	544.6	661.9
	245-2	257.1	169.5	617.1	734.2	250.7	173.9	602.8	723.6	242.6	180.5	584.3	710.3
	260-2	272.4	176.8	657.6	779.8	264.9	182.3	637.4	764.1	256.2	189.3	617.8	749.9
	275-2	294.8	194.7	710.4	845.0	286.4	200.8	688.6	828.1	277.0	208.4	667.3	812.7

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
44	110-2	103.6	88.3	249.8	311.6	99.9	92.7	241.0	306.1
	130-2	123.3	101.7	296.8	368.1	118.8	106.8	286.3	361.4
	145-2	137.8	115.8	332.0	413.1	133.8	120.4	322.5	407.1
	155-2	149.0	124.8	357.9	445.3	143.6	131.0	345.2	437.2
	175-2	168.0	141.0	405.2	503.9	162.2	148.1	390.8	494.8
	195-2	186.1	155.5	449.5	558.3	179.7	163.0	432.8	547.3
	230-2	220.4	173.8	530.4	652.3	212.7	182.3	512.1	640.3
	245-2	234.3	188.6	565.1	697.2	226.0	198.0	545.2	684.3
	260-2	250.6	195.8	599.9	737.2	241.6	205.4	579.0	723.4
	275-2	267.4	217.6	645.1	797.6	259.6	226.2	626.8	785.9

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
46	110-2	118.0	80.3	283.8	339.8	114.9	82.9	274.9	332.9	111.2	86.0	266.5	326.9
	130-2	140.3	92.2	337.8	402.1	137.6	94.6	329.1	395.3	133.2	98.2	319.0	388.1
	145-2	157.6	105.0	377.3	450.4	153.6	107.7	368.5	443.9	148.6	111.8	357.2	435.8
	155-2	169.9	113.2	407.8	486.7	164.5	116.9	395.9	477.7	159.1	121.6	383.6	469.0
	175-2	192.4	127.8	461.1	550.1	186.2	132.1	447.7	540.1	180.7	137.3	433.0	529.4
	195-2	212.5	141.5	511.4	609.9	205.9	146.0	496.6	598.8	200.4	151.4	479.1	585.5
	230-2	250.8	157.7	599.1	709.1	243.1	162.9	582.0	696.1	235.3	169.2	564.3	683.3
	245-2	266.8	170.6	639.3	758.2	258.5	176.3	620.8	744.3	251.7	181.9	605.5	733.4
	260-2	283.0	177.9	680.7	804.8	275.6	183.6	659.4	788.0	266.6	190.6	639.2	773.3
	275-2	305.0	197.1	729.9	867.3	297.3	202.2	713.0	854.5	287.4	209.9	691.0	838.6

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
46	110-2	107.4	89.9	257.7	321.0	104.3	93.4	250.5	316.5
	130-2	128.6	102.6	308.6	380.9	124.0	107.7	297.7	373.9
	145-2	143.5	116.8	345.4	427.8	138.3	122.7	333.3	420.0
	155-2	155.1	125.9	372.7	461.4	149.5	132.2	359.5	452.9
	175-2	175.4	142.1	420.3	520.5	169.5	149.3	406.7	512.2
	195-2	193.6	158.1	463.3	574.8	187.4	164.3	450.2	566.4
	230-2	227.4	176.7	546.0	670.8	221.0	183.7	530.9	661.0
	245-2	243.2	190.0	585.7	719.8	234.5	199.5	565.3	706.5
	260-2	257.5	199.1	618.2	758.8	250.1	207.0	600.9	747.5
	275-2	277.5	219.3	668.3	823.0	267.5	230.2	644.6	807.5

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 10°F cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
48	110-2	122.1	81.4	293.5	350.6	119.1	83.6	286.7	345.6	115.6	86.8	277.4	338.7
	130-2	146.4	92.9	350.8	416.0	141.9	96.0	340.7	408.4	137.2	99.8	330.2	400.8
	145-2	164.2	105.8	392.1	466.3	160.0	108.5	383.0	459.6	154.8	112.7	371.3	451.1
	155-2	177.1	114.0	423.7	503.7	171.5	117.8	411.4	494.5	165.8	122.5	398.7	485.3
	175-2	200.1	128.8	481.0	571.4	194.3	133.1	466.2	560.0	189.5	138.6	453.6	551.7
	195-2	221.3	143.3	528.1	628.7	215.7	147.1	515.9	619.6	208.6	152.7	500.1	608.2
	230-2	257.0	159.8	618.9	731.2	252.3	164.0	603.0	718.7	244.2	170.4	584.7	705.5
	245-2	276.0	171.8	663.1	783.8	267.3	177.6	644.0	769.3	259.6	184.7	623.1	753.9
	260-2	293.0	180.1	699.4	826.0	285.6	184.9	683.3	813.8	276.2	192.0	662.5	798.6
	275-2	315.4	198.5	756.9	896.3	305.4	205.1	735.0	879.7	298.3	211.4	715.4	865.2

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
48	110-2	111.7	90.6	268.4	332.6	108.2	95.1	258.3	325.9
	130-2	133.5	103.4	321.5	395.0	129.2	108.6	309.7	387.0
	145-2	149.5	117.8	359.2	442.8	144.1	123.7	346.7	434.6
	155-2	160.1	128.1	385.5	476.4	155.9	133.2	373.8	468.6
	175-2	182.1	144.7	435.7	538.4	176.7	150.5	423.4	530.5
	195-2	201.2	159.5	483.7	597.0	194.6	167.5	465.9	585.0
	230-2	236.0	178.0	565.9	692.4	227.7	187.0	546.4	679.6
	245-2	252.5	191.4	606.8	742.8	243.5	201.0	585.8	728.9
	260-2	266.8	200.6	641.0	783.6	257.2	210.6	618.7	768.8
	275-2	288.0	220.9	692.0	848.9	277.5	231.9	667.8	832.9

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
50	110-2	127.6	82.0	304.4	362.3	123.6	84.8	295.6	355.7	120.4	87.4	288.4	350.6
	130-2	152.0	93.6	365.1	431.2	148.2	96.7	353.5	422.2	143.4	100.6	342.7	414.4
	145-2	170.2	106.6	408.3	483.7	164.8	110.2	396.6	474.8	160.0	114.6	383.6	465.2
	155-2	182.6	115.6	438.7	520.3	178.6	118.7	427.6	511.9	172.7	123.5	414.4	502.4
	175-2	207.4	130.6	497.8	590.1	202.5	134.1	484.8	580.0	196.2	139.6	469.9	569.3
	195-2	230.2	144.5	550.8	652.9	223.0	149.4	534.9	640.9	217.5	154.0	520.8	630.5
	230-2	267.0	160.8	640.7	754.5	258.7	166.4	622.3	740.6	253.8	171.6	605.4	727.8
	245-2	285.9	172.9	687.1	809.6	278.1	178.8	666.1	793.1	269.0	186.0	645.7	778.4
	260-2	303.9	181.3	724.1	852.5	294.3	187.5	703.3	836.6	286.5	193.4	686.1	824.1
	275-2	326.5	199.8	784.3	925.6	317.2	206.5	760.1	906.8	306.6	214.8	736.7	889.8

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)							
		90				95			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
50	110-2	116.3	91.4	279.1	344.3	112.2	95.9	269.4	338.0
	130-2	138.4	105.2	331.5	406.7	134.5	109.5	322.3	400.7
	145-2	155.6	118.7	373.6	458.4	150.8	124.6	359.6	448.7
	155-2	167.6	129.1	399.6	491.8	161.5	135.7	385.6	482.6
	175-2	189.6	146.0	454.6	558.8	182.7	153.4	438.7	548.5
	195-2	210.1	160.9	503.9	618.8	202.5	168.9	486.4	607.2
	230-2	245.2	179.3	586.0	714.3	236.6	188.3	565.9	700.9
	245-2	259.8	194.6	624.7	763.8	253.4	202.4	606.0	751.1
	260-2	276.7	202.1	664.0	808.6	266.8	212.2	641.1	793.2
	275-2	299.1	222.4	716.0	875.0	288.3	233.6	691.1	858.4

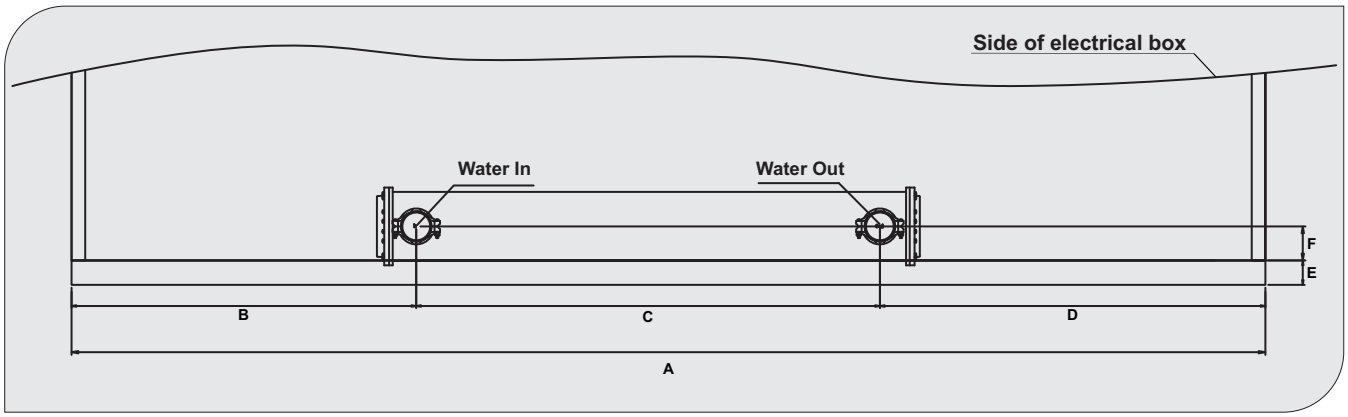
LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 10°F cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (46) should be referred for the same

BARREL (COOLER) CONNECTIONS

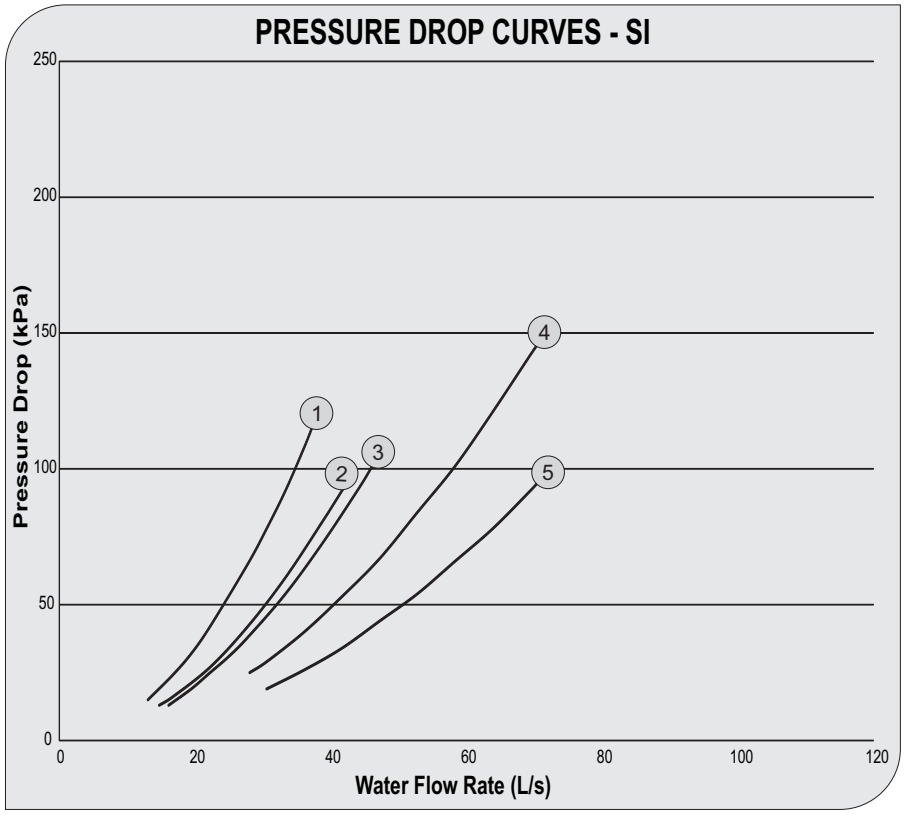


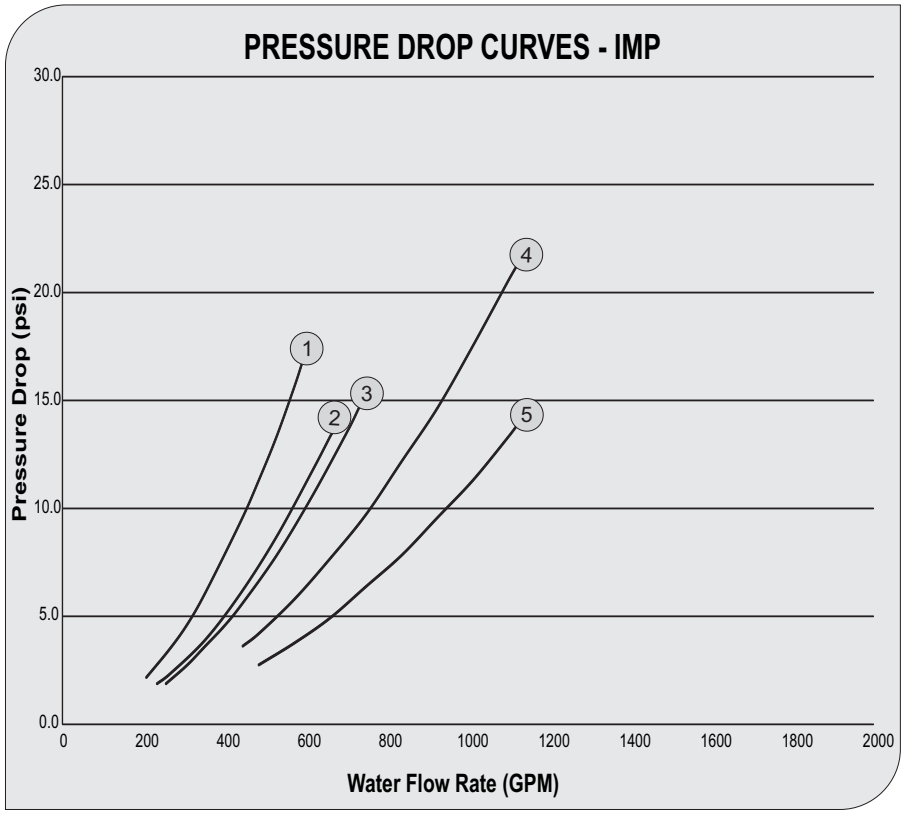
Model WPSa	A mm	A [inch]	B mm	B [inch]	C mm	C [inch]	D mm	D [inch]	E mm	E [inch]	F mm	F [inch]	Water in connection diameter mm	Water in connection diameter [inch]	Water out connection diameter mm	Water out connection diameter [inch]
110-2	4500	[177]	600	[24]	2250	[89]	1650	[65]	140	[6]	250	[10]	150	[6]	150	[6]
130-2	5000	[197]	620	[24]	2200	[87]	2180	[86]	140	[6]	270	[11]	200	[8]	200	[8]
145-2	5000	[197]	620	[24]	2200	[87]	2180	[86]	140	[6]	270	[11]	200	[8]	200	[8]
155-2	5000	[197]	620	[24]	2200	[87]	2180	[86]	140	[6]	270	[11]	200	[8]	200	[8]
175-2	5500	[217]	1100	[43]	2900	[114]	1500	[59]	140	[6]	270	[11]	150	[8]	150	[6]
195-2	5500	[217]	1100	[43]	2900	[114]	1500	[59]	140	[6]	270	[11]	150	[8]	150	[6]
230-2	5500	[217]	1200	[47]	3410	[134]	890	[35]	140	[6]	350	[14]	200	[8]	200	[8]
245-2	5500	[217]	1200	[47]	3410	[134]	890	[35]	140	[6]	350	[14]	200	[8]	200	[8]
260-2	5500	[217]	1200	[47]	3410	[134]	890	[35]	140	[6]	350	[14]	200	[8]	200	[8]
275-2	5500	[217]	1200	[47]	3410	[134]	890	[35]	140	[6]	350	[14]	200	[8]	200	[8]

NOTE

- Water connections are victaulic coupling
- Water connections are shipped loose & tied inside chiller enclosure

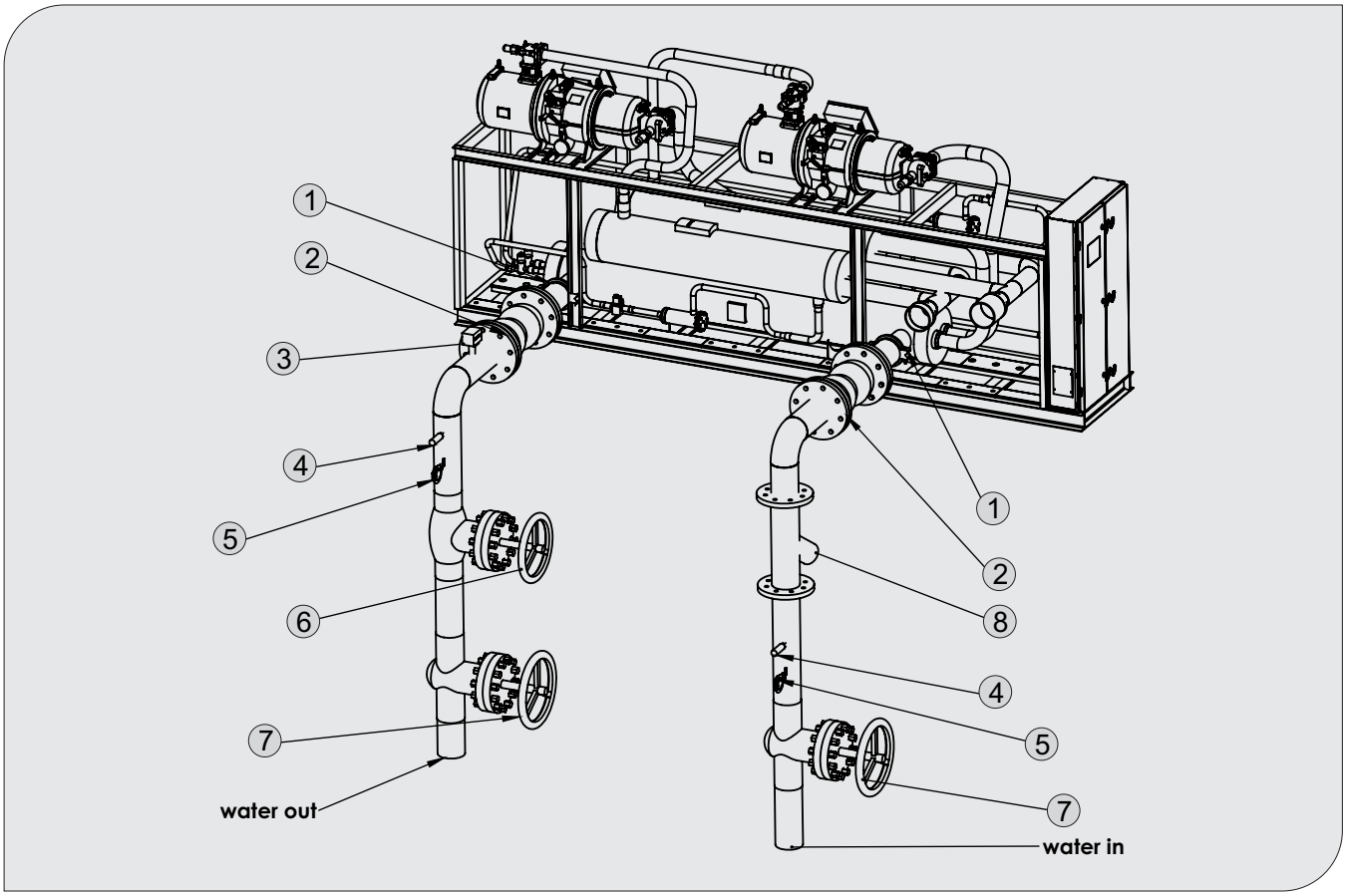
BARREL (COOLER) PRESSURE DROP CURVES





	WPSa
1	(110-2)
2	(130-2, 145-2)
3	(155-2)
4	(175-2, 195-2)
5	(230-2, 245-2, 260-2, 275-2)

TYPICAL PIPING

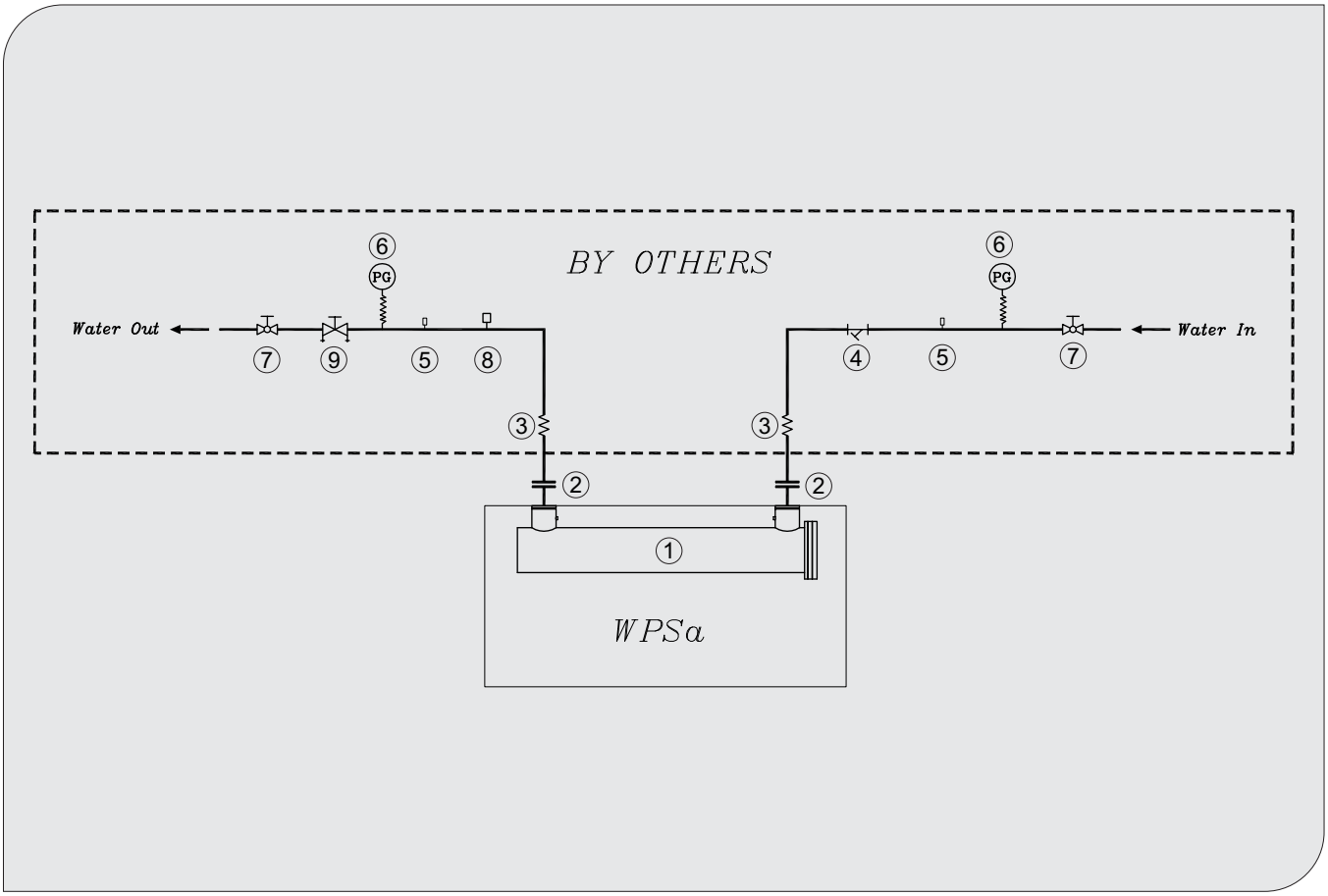


COMPONENTS	
1	flange adapter
2	flexible joint
3	flow switch
4	thermometer
5	pressure gauge
6	balance valve
7	valve
8	strainer

NOTE

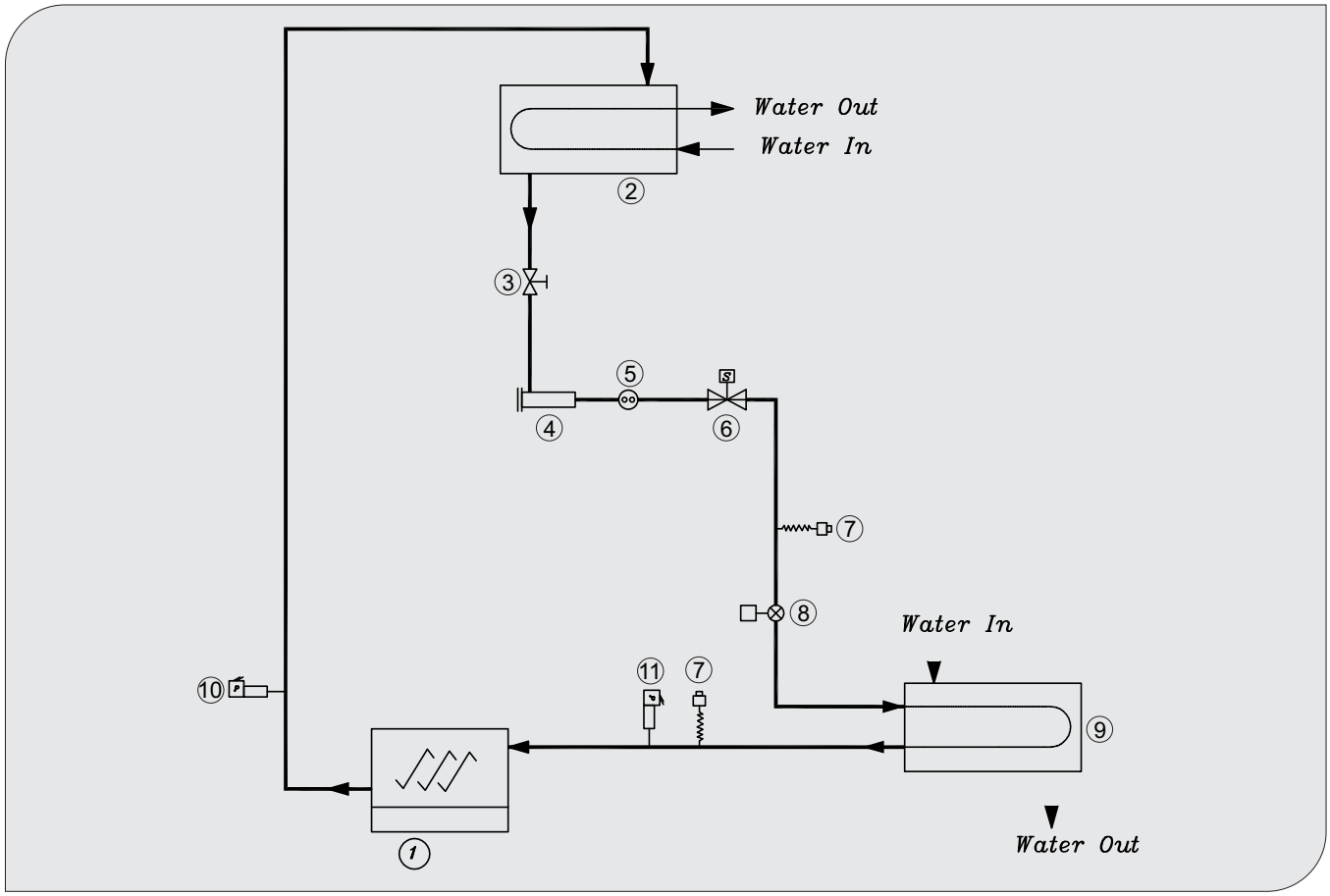
1. Piping shown are general points of connection guides only and are not intended for a specific installation
2. Piping shown are for a quick overview of system and are not in accordance with recognized standards
3. All piping must follow standard piping techniques. Refer to appropriate ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) handbook for details.

WATER SCHEMATIC DIAGRAM



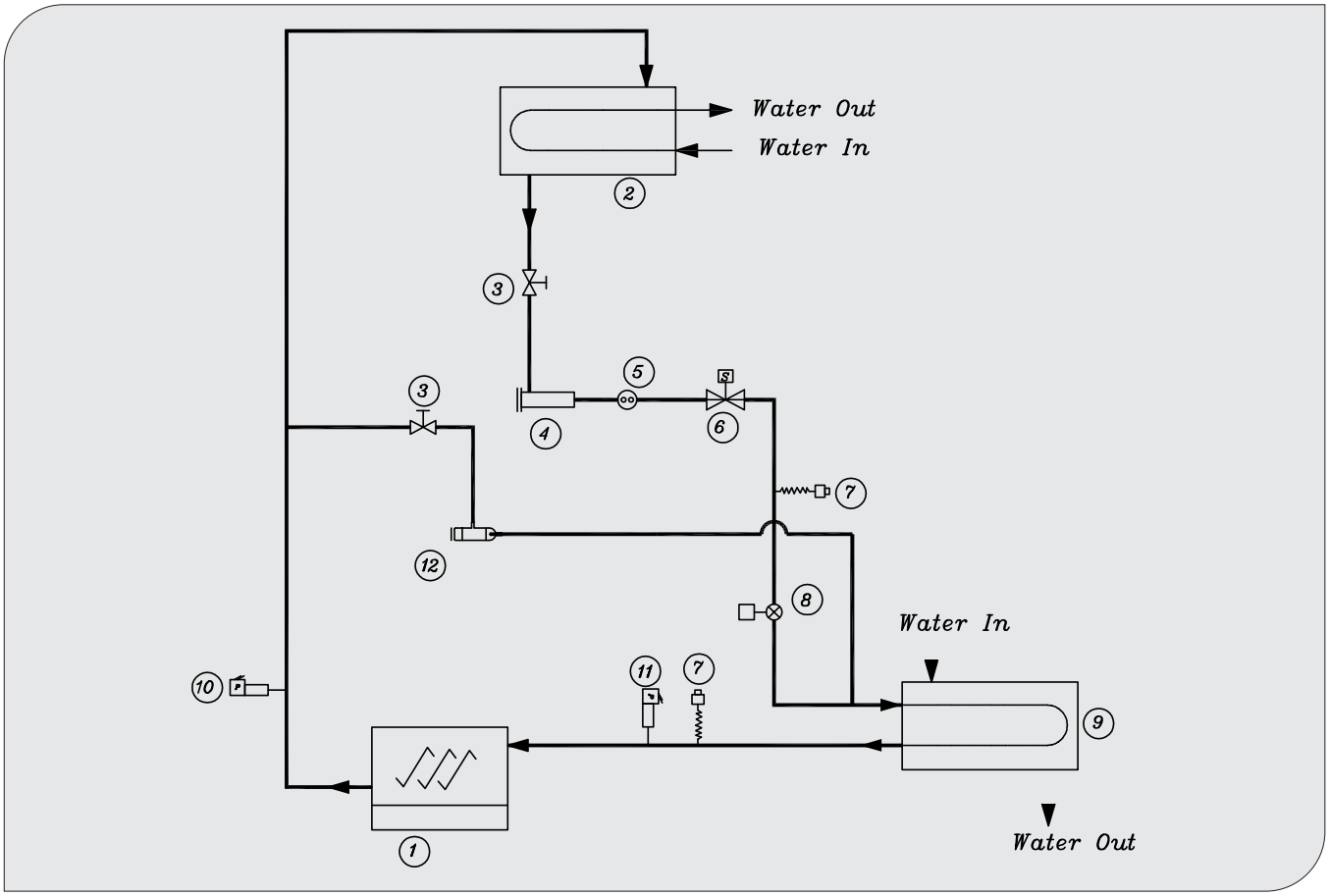
ITEM	
1	Cooler
2	Flange
3	Flexible joint
4	Strainer
5	Thermometer
6	Water pressure gauge
7	Valve
8	Flow switch
9	Balancing Valve

REFRIGERATION SCHEMATIC DIAGRAM



ITEM	
1	Screw compressor
2	Shell & tube condenser
3	Shut off valve
4	Filter drier
5	Sight glass
6	Solenoid valve
7	Charging nipple
8	Electronic expansion valve
9	Shell & tube barrel (evaporator)
10	High pressure switch
11	Low pressure switch

HGBP SCHEMATIC DIAGRAM (OPTIONAL)



ITEM	
1	Screw compressor
2	Shell & tube condenser
3	Shut off valve
4	Filter drier
5	Sight glass
6	Solenoid valve
7	Charging nipple
8	Electronic expansion valve
9	Shell & tube barrel (evaporator)
10	High pressure switch
11	Low pressure switch
12	Hot gas controller

SOUND DATA

380V/3Ph/50Hz

Model (WPSa)	Sound Power (dBA)								
	Band Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	Total
110-2	44	52	63	67	80	79	74	60	83
130-2	44	52	64	68	81	79	74	61	84
145-2	45	53	64	69	82	80	75	61	85
155-2	46	54	65	70	83	81	76	62	86
175-2	47	55	67	71	85	83	77	63	87
195-2	48	56	68	72	86	84	78	64	89
230-2	49	57	69	73	87	85	79	65	90
245-2	50	58	70	74	88	86	80	66	91
260-2	50	58	70	74	88	86	81	66	91
275-2	51	59	71	75	89	87	81	66	91

380-460V/3Ph/60Hz

Model (WPSa)	Sound Power (dBA)								
	Band Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	Total
110-2	46	54	65	69	82	81	76	62	85
130-2	46	54	66	70	83	81	76	63	86
145-2	47	55	66	71	84	82	77	63	87
155-2	48	56	67	72	85	83	78	64	88
175-2	49	57	69	73	87	85	79	65	89
195-2	50	58	70	74	88	86	80	66	91
230-2	51	59	71	75	89	87	81	67	92
245-2	52	60	72	76	90	88	82	68	93
260-2	52	60	72	76	90	88	83	68	93
275-2	53	61	73	77	91	89	83	68	93

NOTES

- Sound data is calculated based on standard components design
- Sound data shall be as per AHRI 370 and ISO BS 3744 standard
- Sound data are ± 2 dBA

ELECTRICAL DATA

MODEL (WPSa)	POWER SUPPLY (V/Ph/Hz)	SUPPLIED VOLTAGE		COMPRESSOR				MCA	MOP	MDS
				No.	RLA (A)	LRA				
		MIN	MAX			PW	Y-D			
110-2	380/3/50	357	403	2	83.8	505	-	188.6	250	200
	415/3/50	390	440		76.7	445	-	172.6	225	200
	208/3/60	196	220		204.0	538	-	459.0	600	600
	380/3/60	357	403		99.6	600	-	224.1	300	250
	460/3/60	432	488		82.3	475	-	185.2	250	200
130-2	380/3/50	357	403	2	96.6	565	-	217.4	300	250
	415/3/50	390	440		88.4	520	-	198.9	250	250
	208/3/60	196	220		243.0	663	-	547.0	600	600
	380/3/60	357	403		113.7	690	-	255.8	350	315
	460/3/60	432	488		93.9	530	-	211.3	300	250
145-2	380/3/50	357	403	2	108.9	710	-	245.0	350	315
	415/3/50	390	440		99.7	630	-	224.3	300	250
	208/3/60	196	220		281.0	663	-	632.0	800	800
	380/3/60	357	403		129.9	840	-	292.3	400	315
	460/3/60	432	488		107.3	650	-	241.4	300	250
155-2	380/3/50	357	403	2	117	710	-	263.3	350	315
	415/3/50	390	440		107.1	630	-	241.0	300	315
	208/3/60	196	220		303.0	663	-	682.0	800	800
	380/3/60	357	403		139.8	840	-	314.6	450	400
	460/3/60	432	488		115.5	650	-	259.9	350	315
175-2	380/3/50	357	403	2	132.3	730	-	297.7	400	315
	415/3/50	390	440		121.2	660	-	272.7	350	315
	380/3/60	357	403		157.6	850	-	354.6	500	400
	460/3/60	432	488		130.2	765	-	293.0	400	315
195-2	380/3/50	357	403	2	147.5	840	-	331.9	450	400
	415/3/50	390	440		135.1	755	-	304.0	400	315
	380/3/60	357	403		175.3	995	-	394.4	500	600
	460/3/60	432	488		144.8	880	-	325.8	450	400
230-2	380/3/50	357	403	2	161.3	840	-	362.9	500	400
	415/3/50	390	440		147.7	755	-	332.3	450	400
	380/3/60	357	403		192.3	995	-	432.7	600	600
	460/3/60	432	488		158.9	880	-	357.5	500	400
245-2	380/3/50	357	403	2	172.7	905	-	388.6	500	400
	415/3/50	390	440		158.1	875	-	355.7	500	400
	380/3/60	357	403		207.2	1145	-	466.2	600	600
	460/3/60	432	488		171.2	950	-	385.2	500	400
260-2	380/3/50	357	403	2	180.8	905	-	406.8	500	600
	415/3/50	390	440		165.5	875	-	372.4	500	400
	380/3/60	357	403		217.7	1145	-	489.8	700	600
	460/3/60	432	488		179.8	950	-	404.6	500	600
275-2	380/3/50	357	403	2	180.8+213.9	905	1340	448.2	600	600
	415/3/50	390	440		165.5+195.9	875	1295	410.4	600	600
	380/3/60	357	403		217.7+255.5	1145	1750	537.1	700	600
	460/3/60	432	488		179.8+211.1	950	1400	443.7	600	600

LEGEND

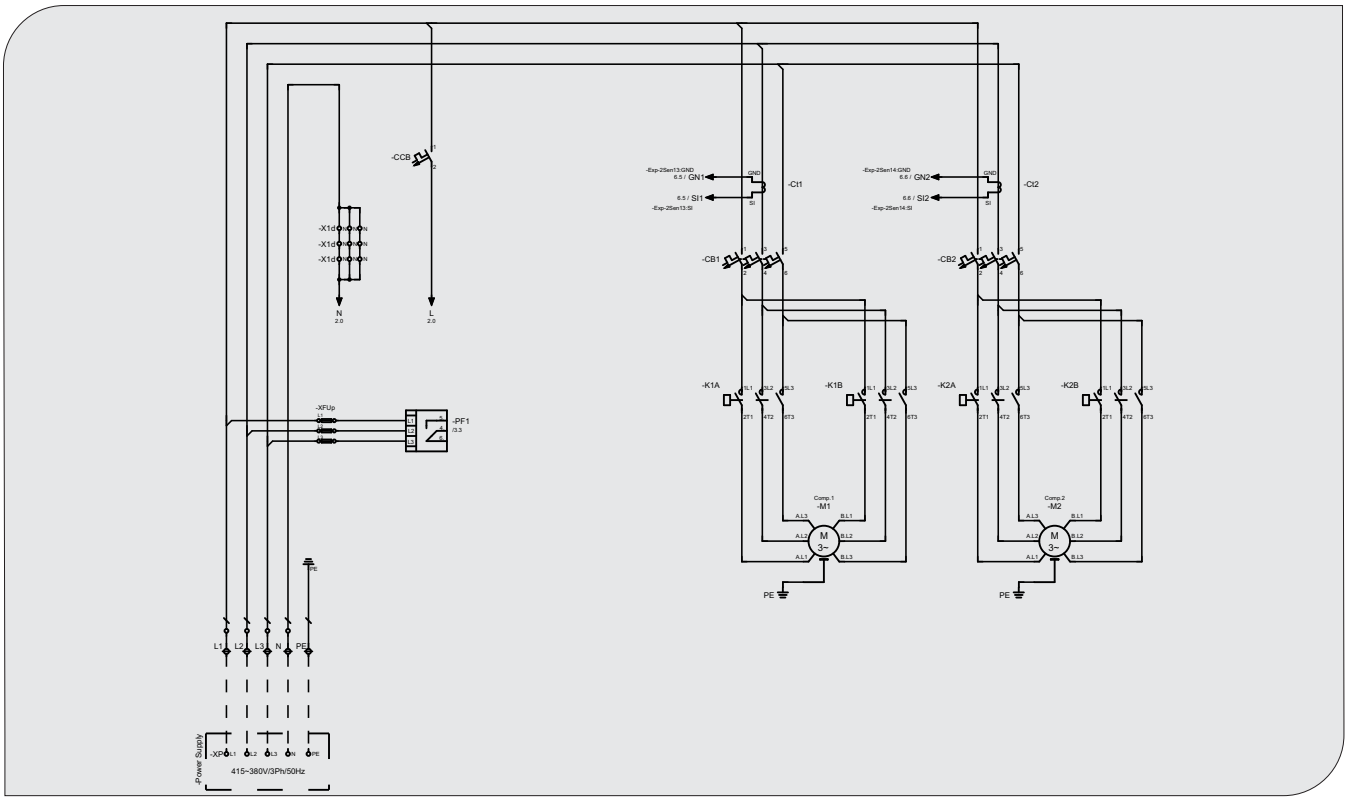
RLA: Rated Load Ampere
MOP: Maximum Overcurrent Protection
MDS: Non-Fused Main Disconnect Switch
LRA: Locked Rotor Ampere
MCA: Minimum Circuit Ampacity
PW: Part winding connection
Y-D: Star-Delta connection

NOTE

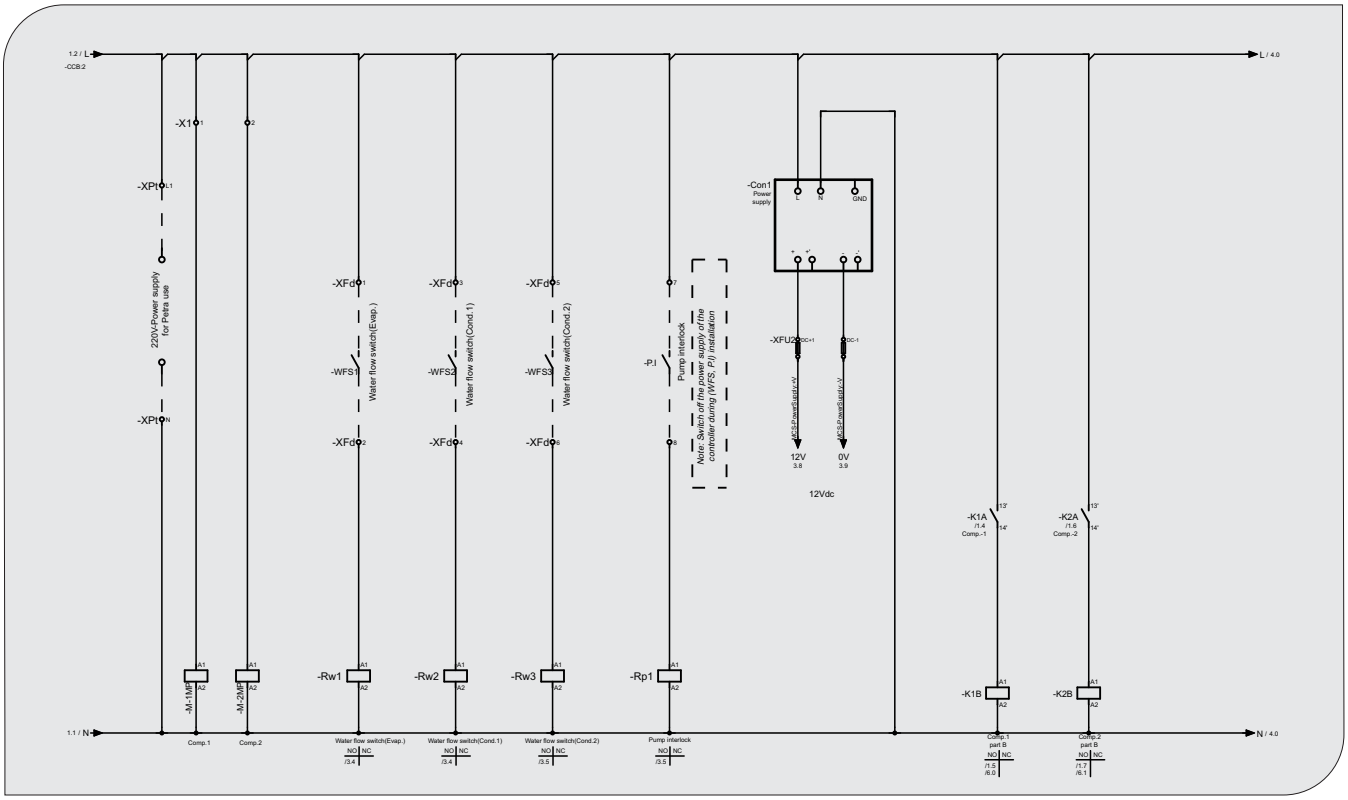
* The power supply (208V/3Ph/60Hz) applies only for the following models: (110-2, 130-2, 145-2 & 155-2)
* MCA is based on 125% of the RLA for the largest motor plus 100% of the RLA for all other loads included in the circuit (NEC-Article 430-24).
* MOP is based on 225% of the RLA for the largest motor plus 100% of the RLA for all other loads included in the circuit (NEC-Article 440-22).
* MDS is based on 115% of the total summation of RLA for all loads included in the circuit (NEC-Article 440- 12A1).

TYPICAL WIRING - 380~415V/3Ph/50Hz

Control Diagram

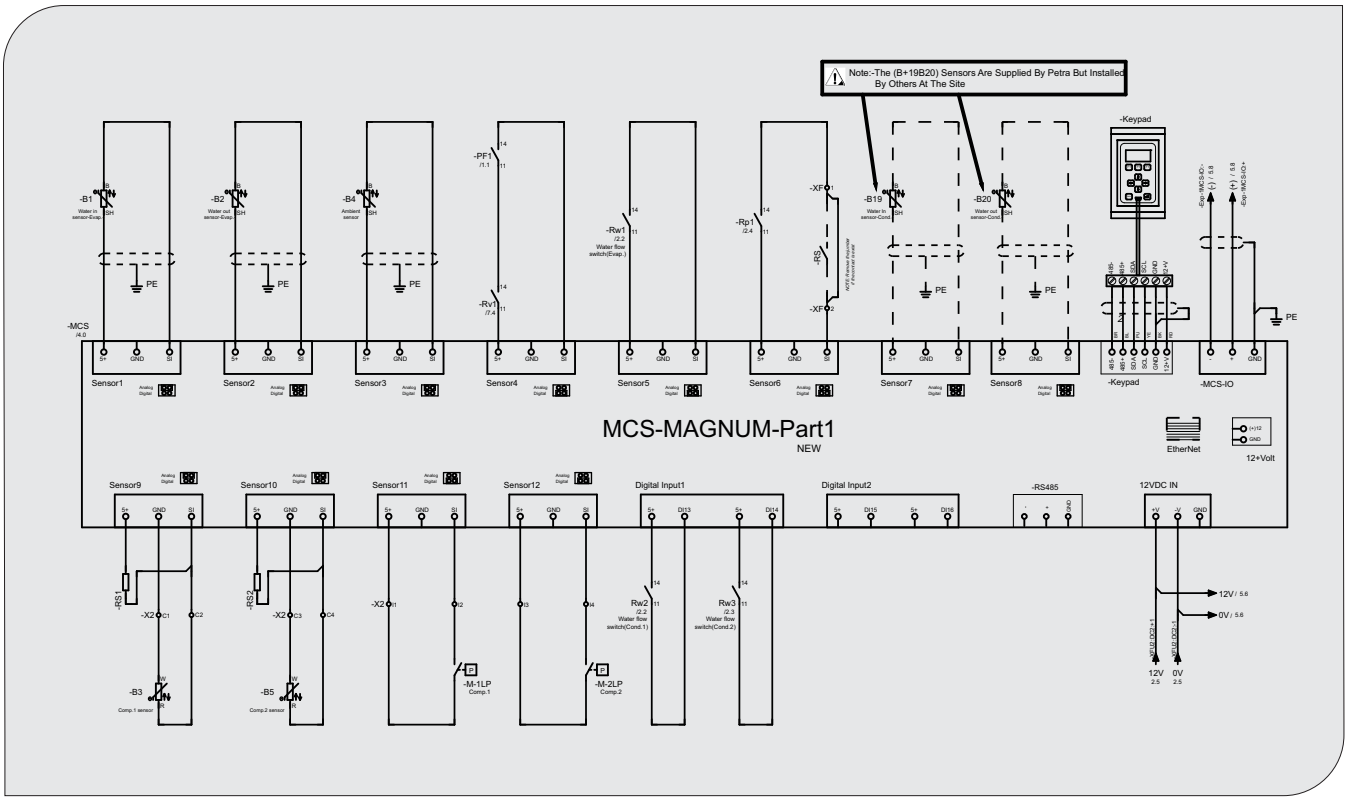


Control Diagram

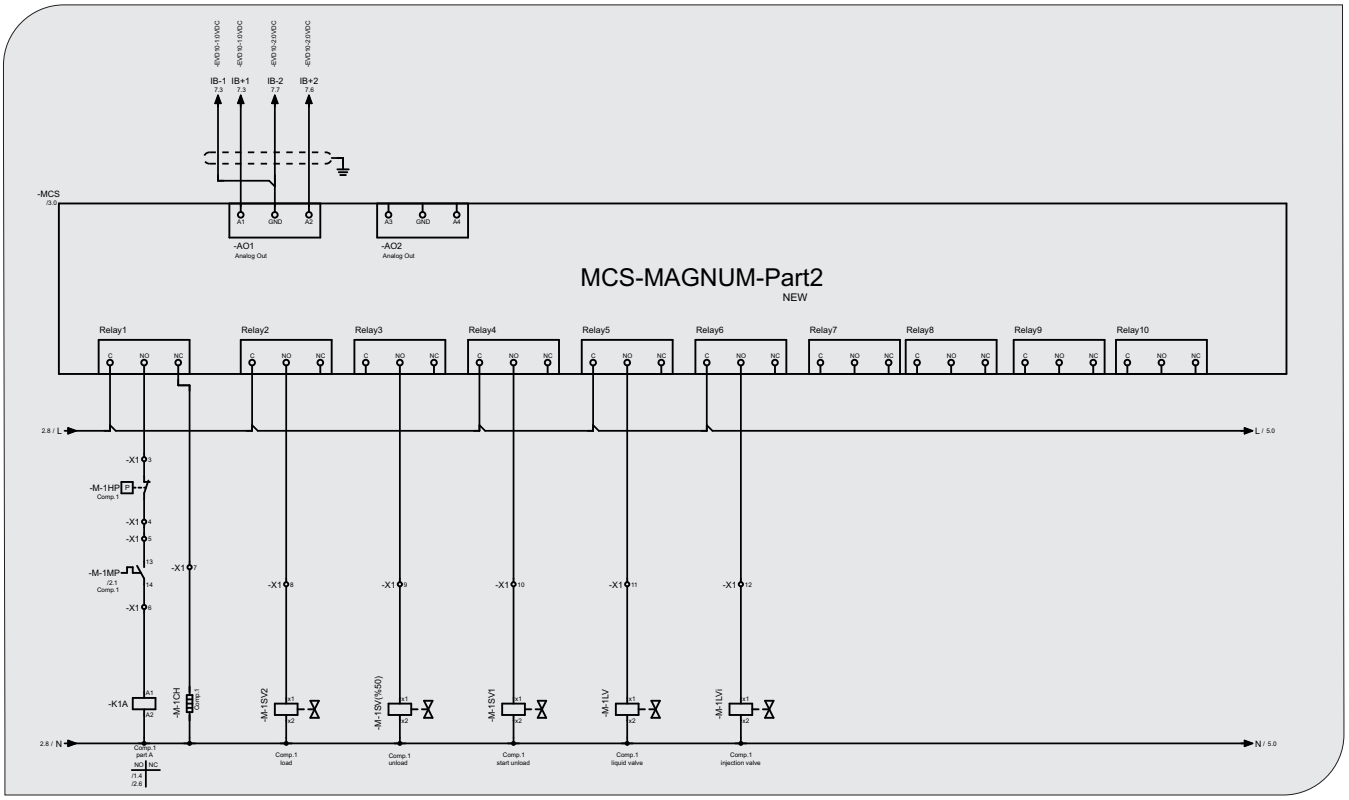


TYPICAL WIRING - 380~415V/3Ph/50Hz

Control Diagram

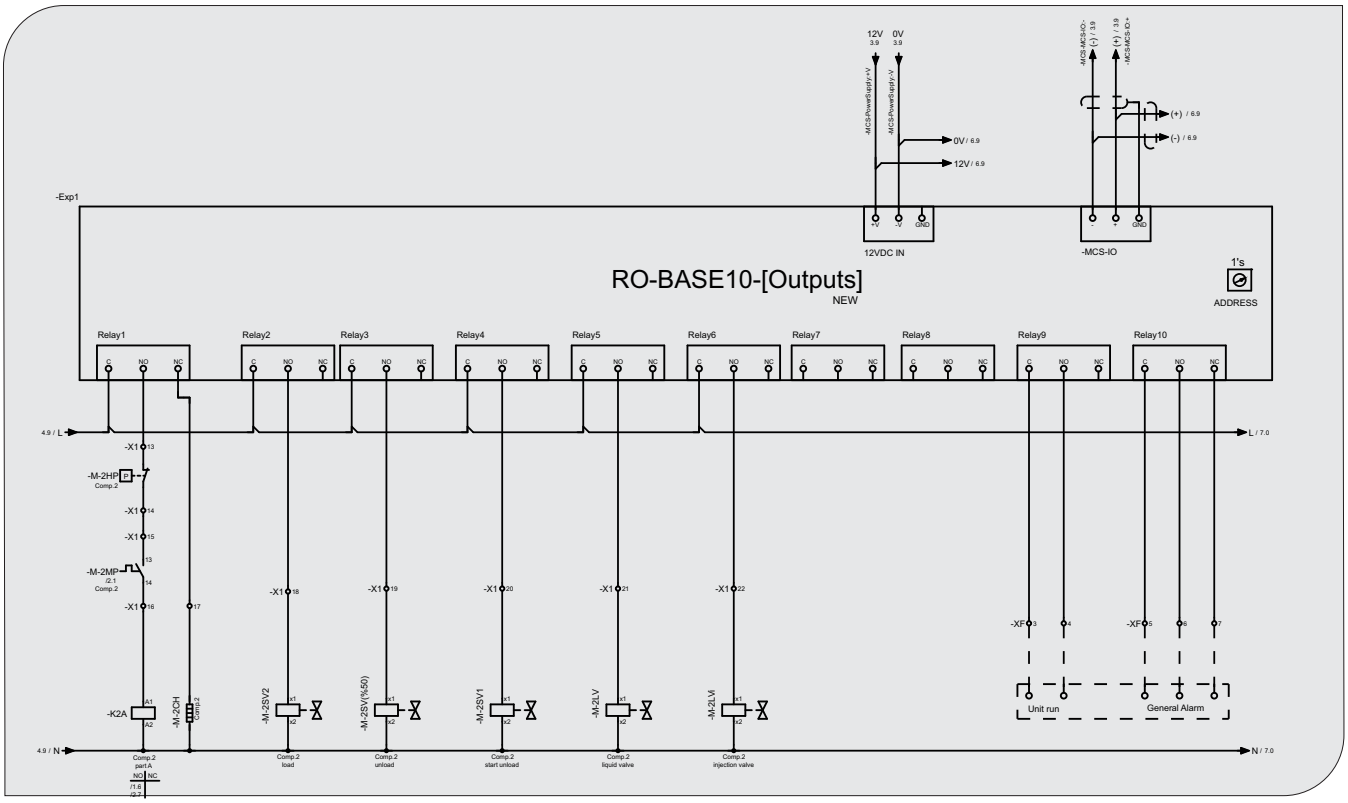


Control Diagram

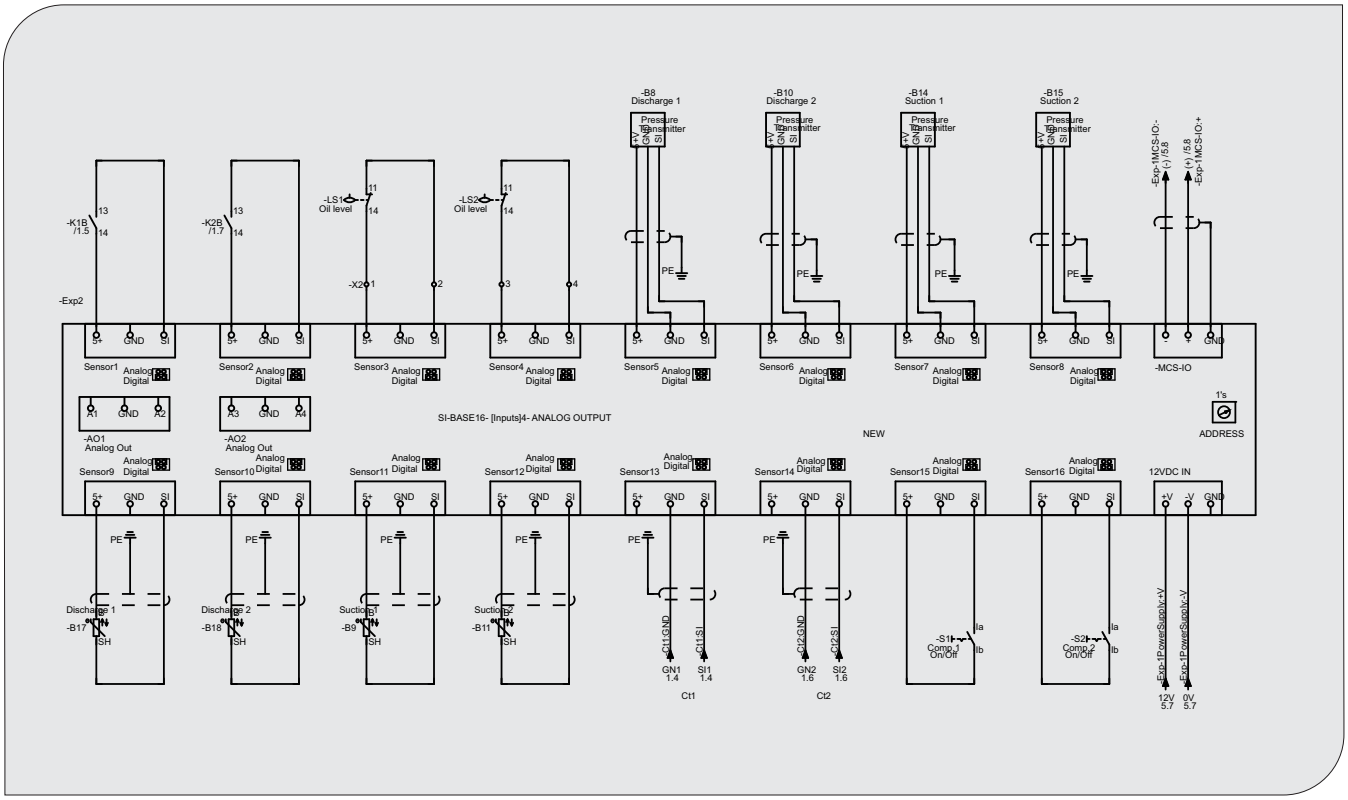


TYPICAL WIRING - 380~415V/3Ph/50Hz

Electronic Expansion Valve Drive

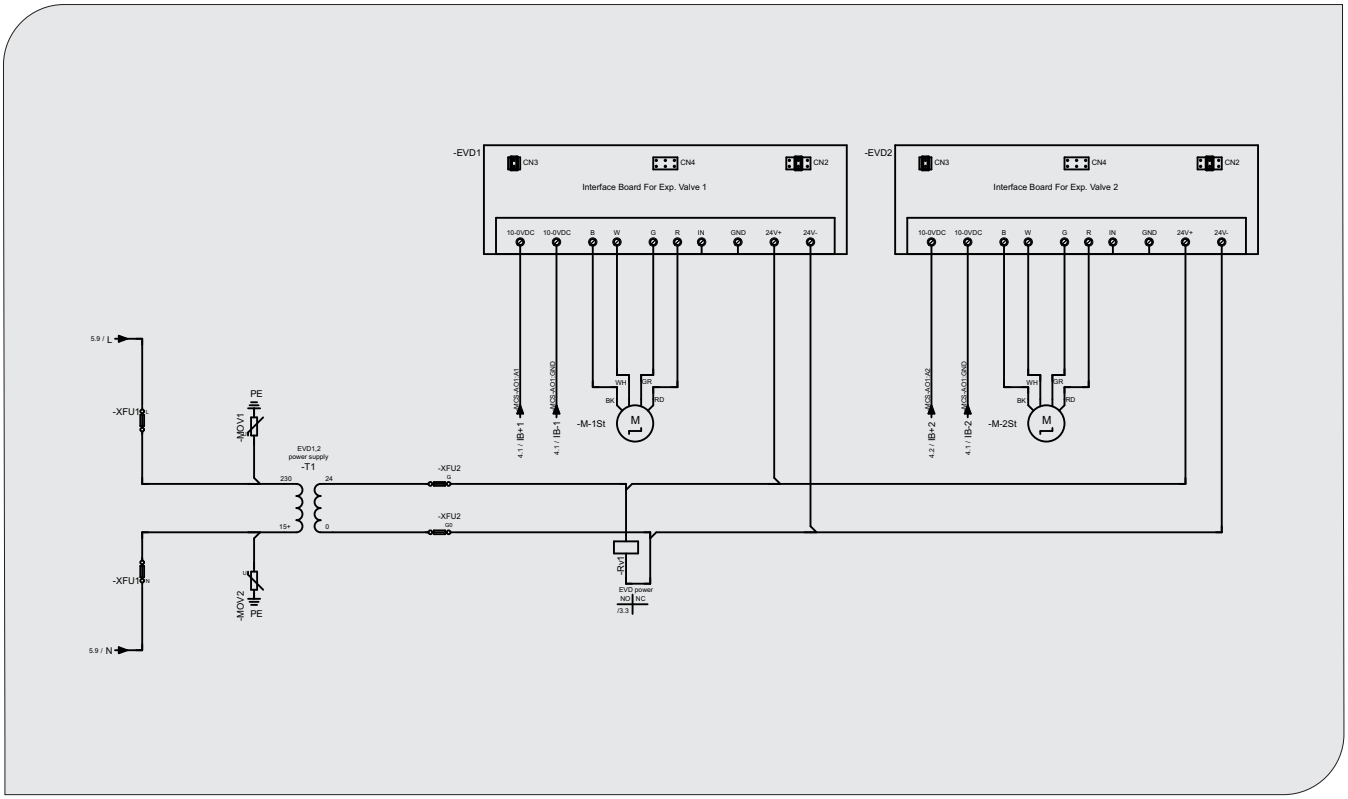


Power Diagram



TYPICAL WIRING - 380~415V/3Ph/50Hz

Lists & Tables



Lists & Tables

MCS DISPLAY

ALARM:

1* IN CASE OF "COMP. PROOF" ALARM MESSAGE FOR ANY CIRCUIT
CHECK : (HPS,MP,OL) RELATED TO THAT CIRCUIT

2* IN CASE OF "FREEZE" ALARM IT MEANS ONE OF THE FOLLOWING:
-FREEZE CONDITION
-WATER OUT SENSOR ISN'T CONNECTED OR DOESN'T OPERATE

LEGEND:

DISC.P :- DISCHARGE PRESSURE
SUC.P :- SUCTION PRESSURE
DISC.T :- DISCHARGE TEMPERATURE
SUC.T :- SUCTION TEMPERATURE

ACCESS TO SET POINT

PRESS MENU BUTTON (Menu) ON THE CONTROLLER KEYPAD

GO TO THE (SETPOINTS) BY PRESSING (▶) AND THEN PRESS ENTER

GO TO THE (CHW OUT TRGT) AND THEN PRESS (▼) BUTTON

AND THEN PRESS (↵) TO ENABLE MODIFYING THE VALUE

NOW YOU CAN CHANGE IT BY PRESSING (▲) AND (▼) AND THEN PRESS (↵) TO SAVE

THEN PRESS (Menu) TO EXIT TO THE MAIN MENU

PFR INDICATOR LIGHT DIAGNOSTICS	
RUN	GREEN
RESTART DELAY	GREEN
REVERSE PHASE	RED
UNBALANCE/SINGLE PHASE	RED
HIGH/LOW VOLTAGE	RED

Potentials table

Potential	Volt	Wires color
L	480~110V	Red
N	Neutral (if exist)	Black
G	24~1Vac/dc	Red
G0	GND	White

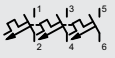
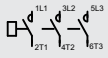
RS

Remote switch LOGIC
RS=OPEN (Unit OFF)
RS=CLOSE (Unit ON)

Field connection device

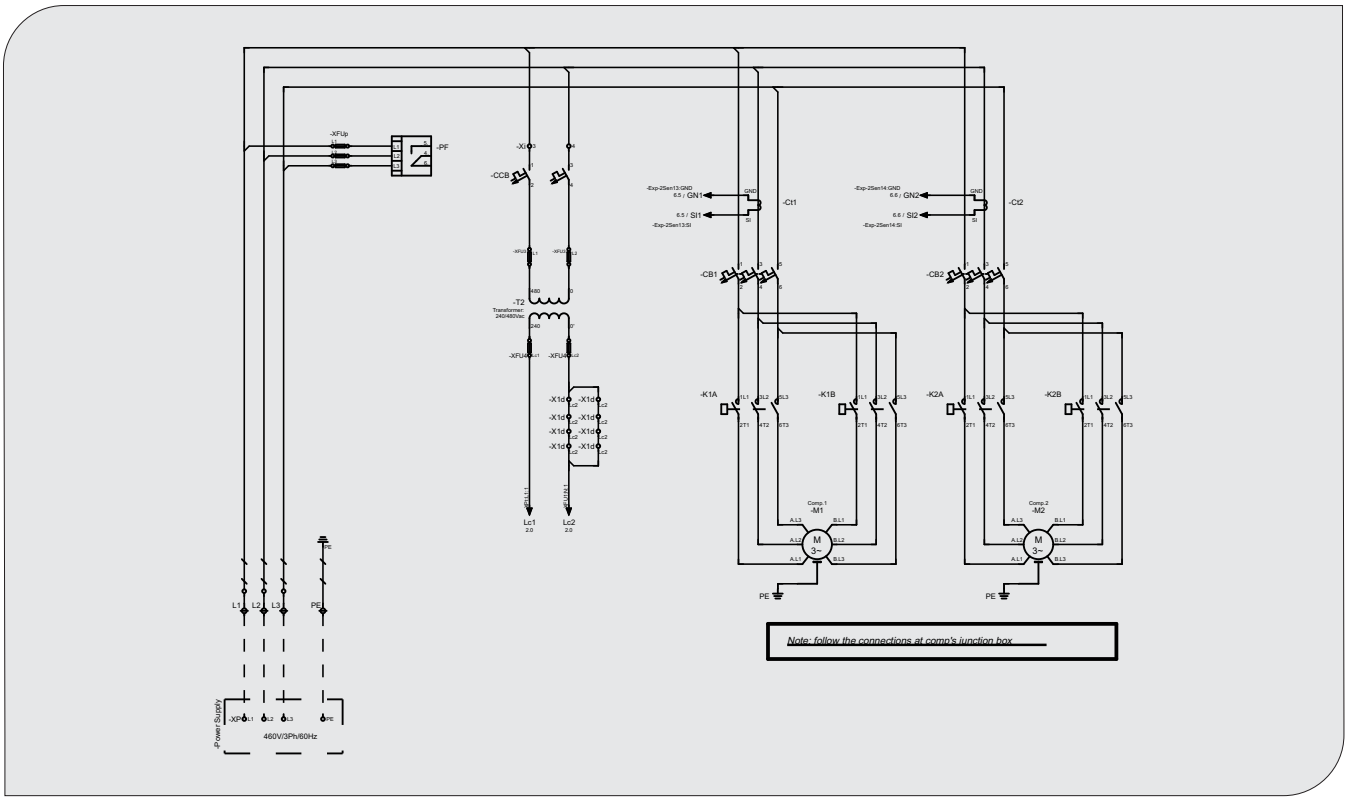
Lists & Tables

Symbol overview

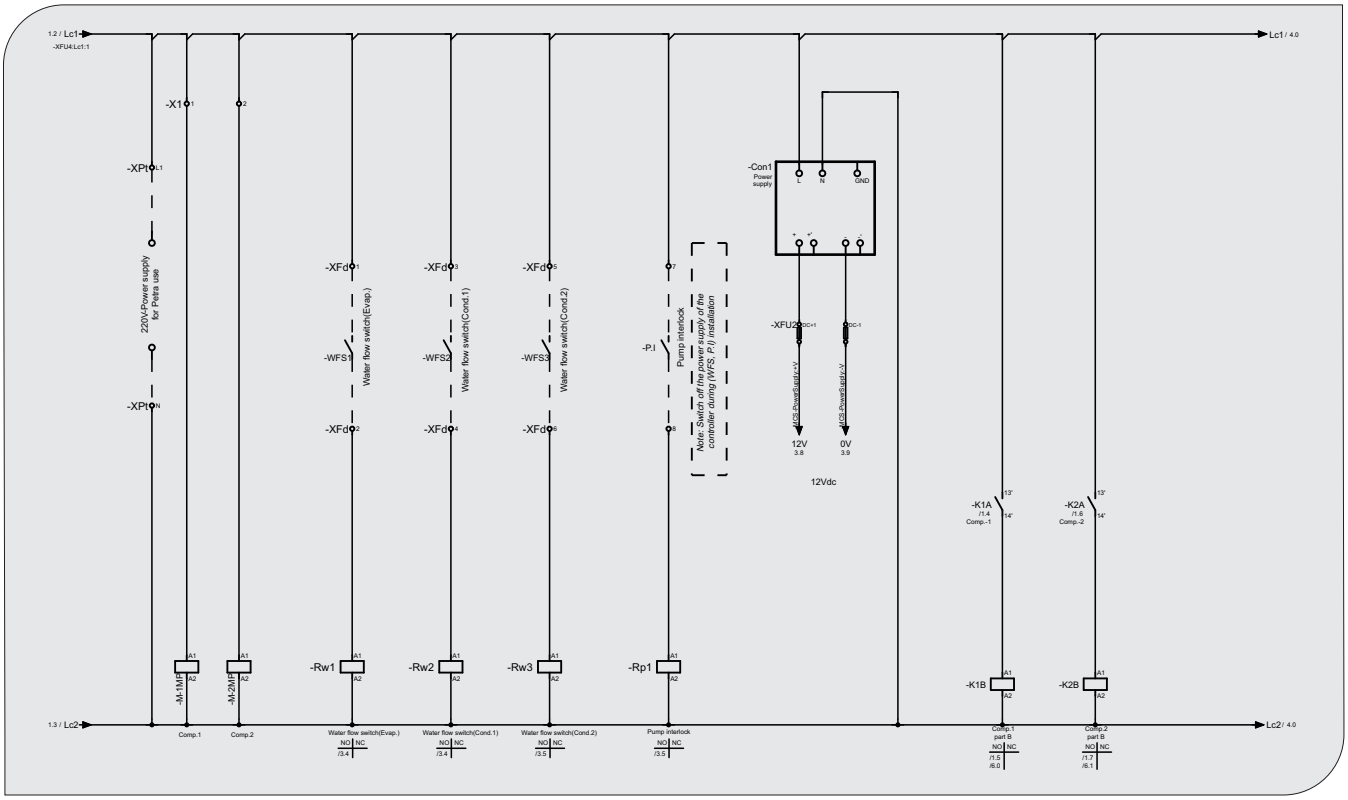
Device tag	Designation		
-B1...-B5;-B9;-B11;-B17...-B20 Resistor, NTC thermistor		-M-1St;-M-2St Stepping motor, general	
		-MOV1;-MOV2 Resistor, voltage-dependent / varistor	
		-PF1 Phase Failure Relay	
-B8;-B10;-B14;-B15 MCSPressure Sensor		-RS1;-RS2 Resistor, general	
-CB1;-CB2 Circuit breaker, three-pole		-S1;-S2 Switch, NO contact, general	
-CCB Circuit breaker, single-pole		-T1 Single-phase transformer with two windings	
-Ct1;-Ct2 Current transformer (path 1)			
-K1A;-K1B;-K2A;-K2B Contactor 3Pole			
-LS1;-LS2 Float switch, NC contact			
-M1;-M2 Three-phase asynchronous motor, one winding, change-pole, two rotation speeds			
-M-1CH;-M-2CH Heating element			
-M-1HP;-M-2HP High Pressure switch, NC contact			
-M-1LP;-M-2LP Pressure switch, NO contact			
-M-1LV;-M-1LV/-M-1SV1-M-1SV2;-M-1SV(%50);-M-2LV;-M-2LV/-M-2SV1-M-2SV2-M-2SV(%50) Solenoid valve, general			
-M-1MP;-M-2MP;-Rp1;-Rv1;-Rw1...-Rw3 Electromechanical operating device, general / relay coil, general			

TYPICAL WIRING - 460V/3Ph/60 Hz

Control Diagram

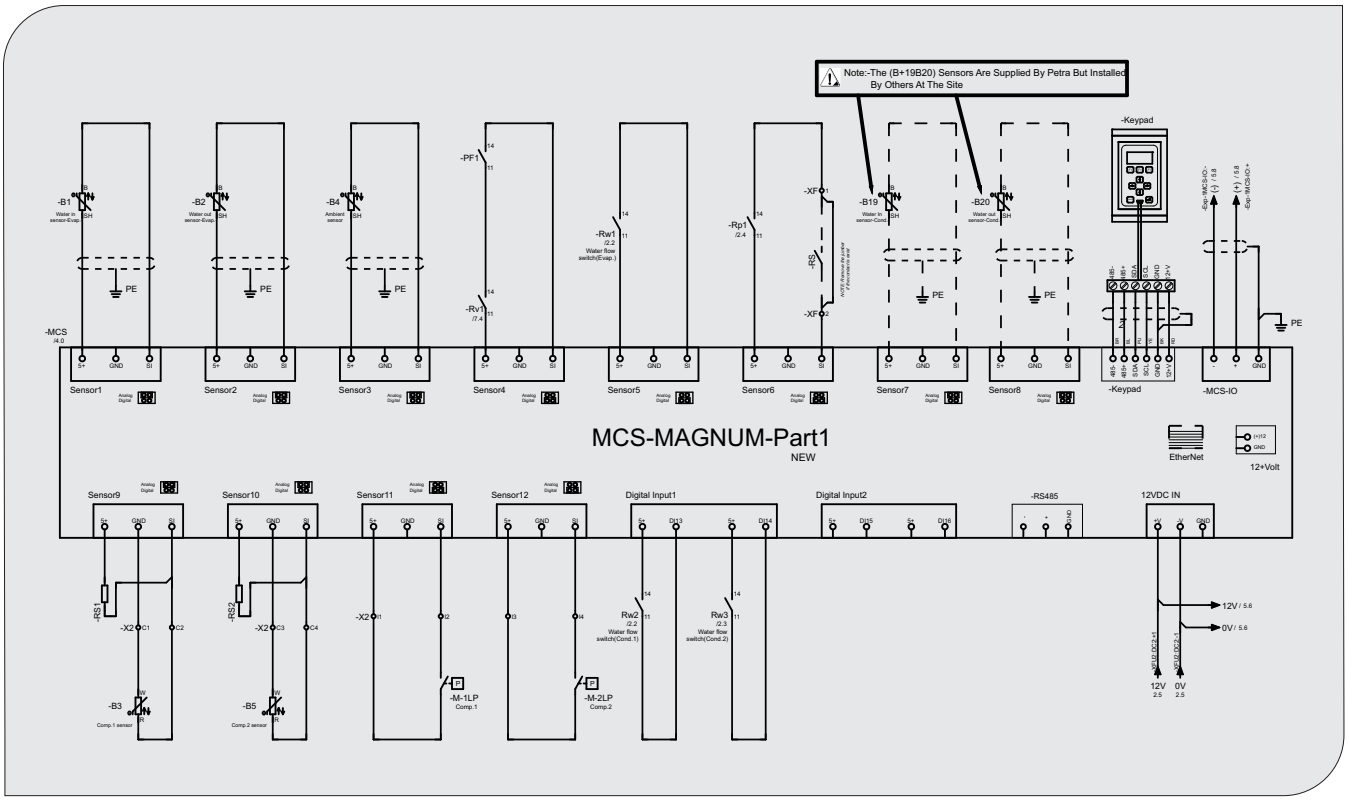


Control Diagram

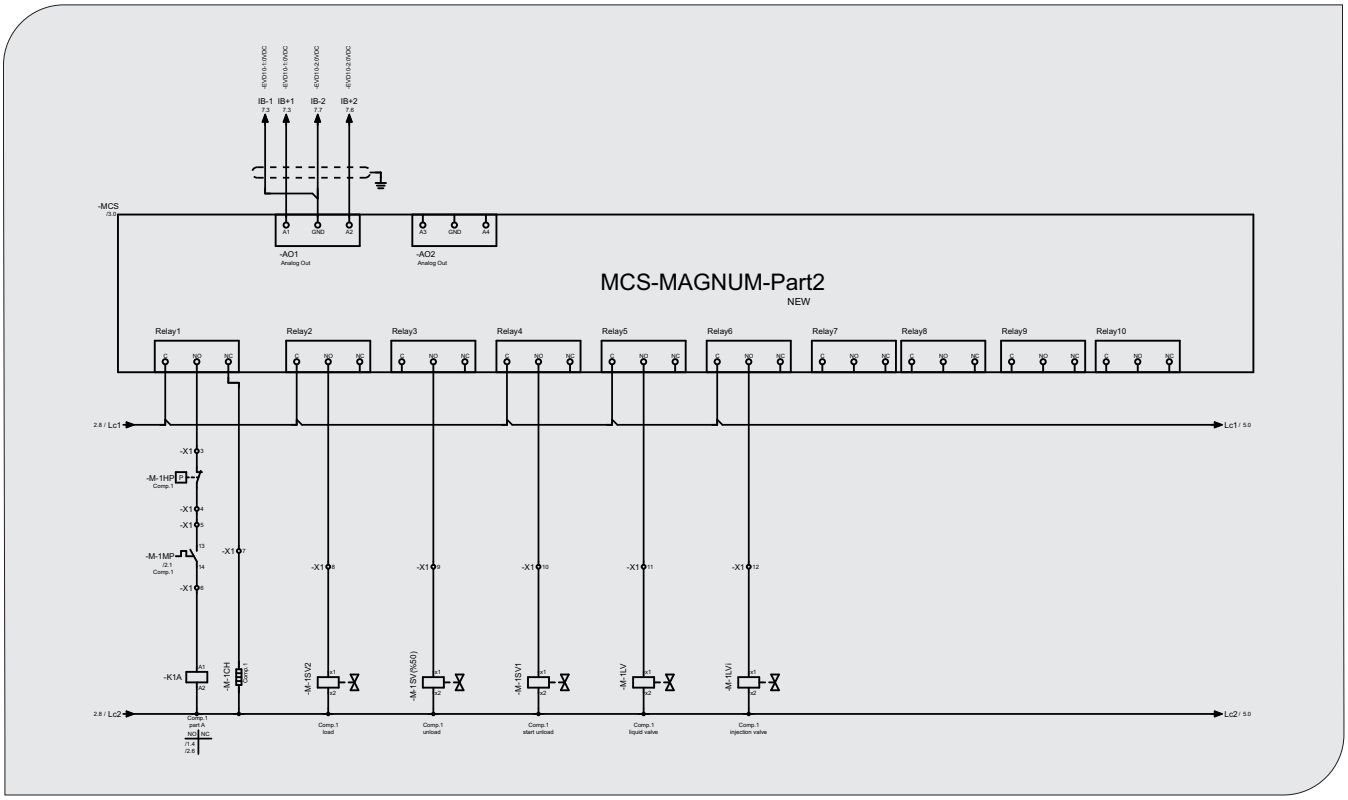


TYPICAL WIRING - 460V/3Ph/60 Hz

Control Diagram

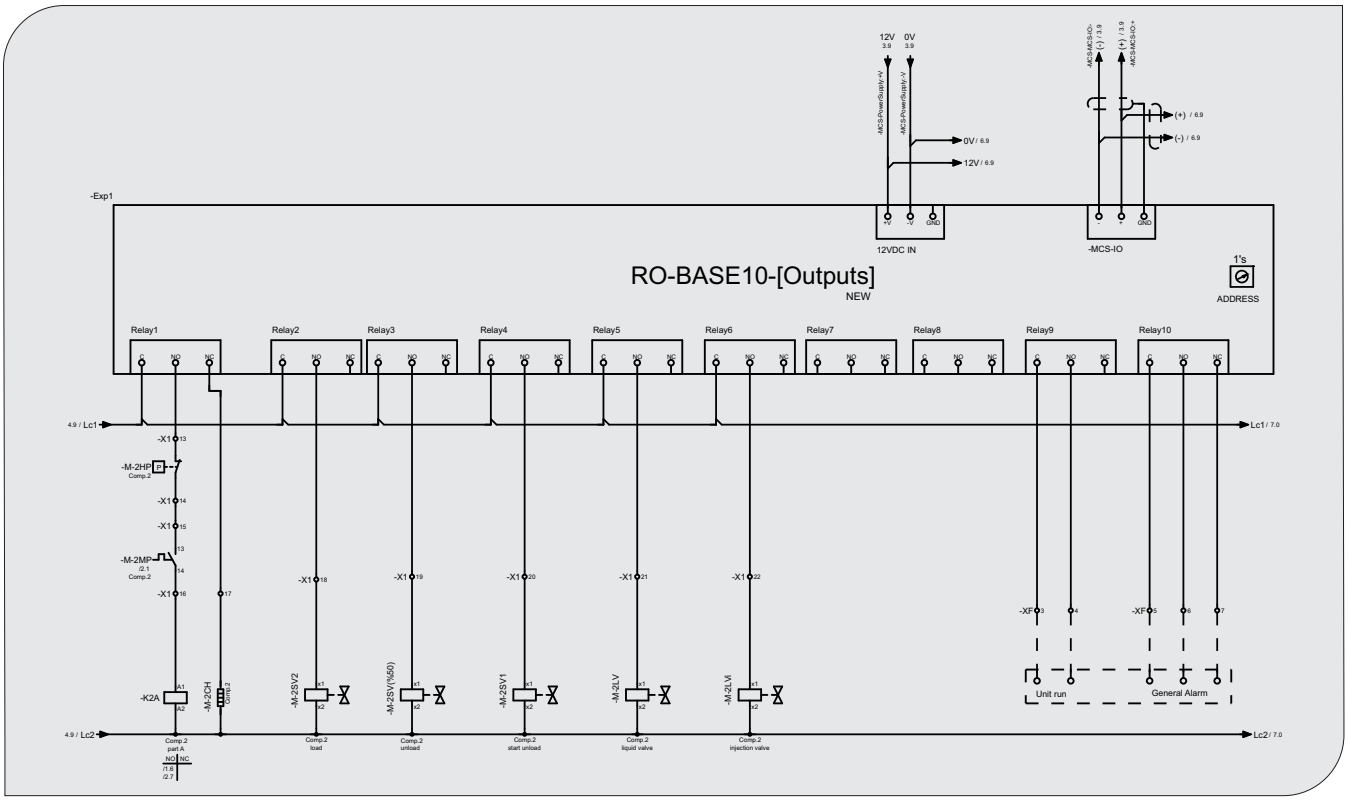


Control Diagram

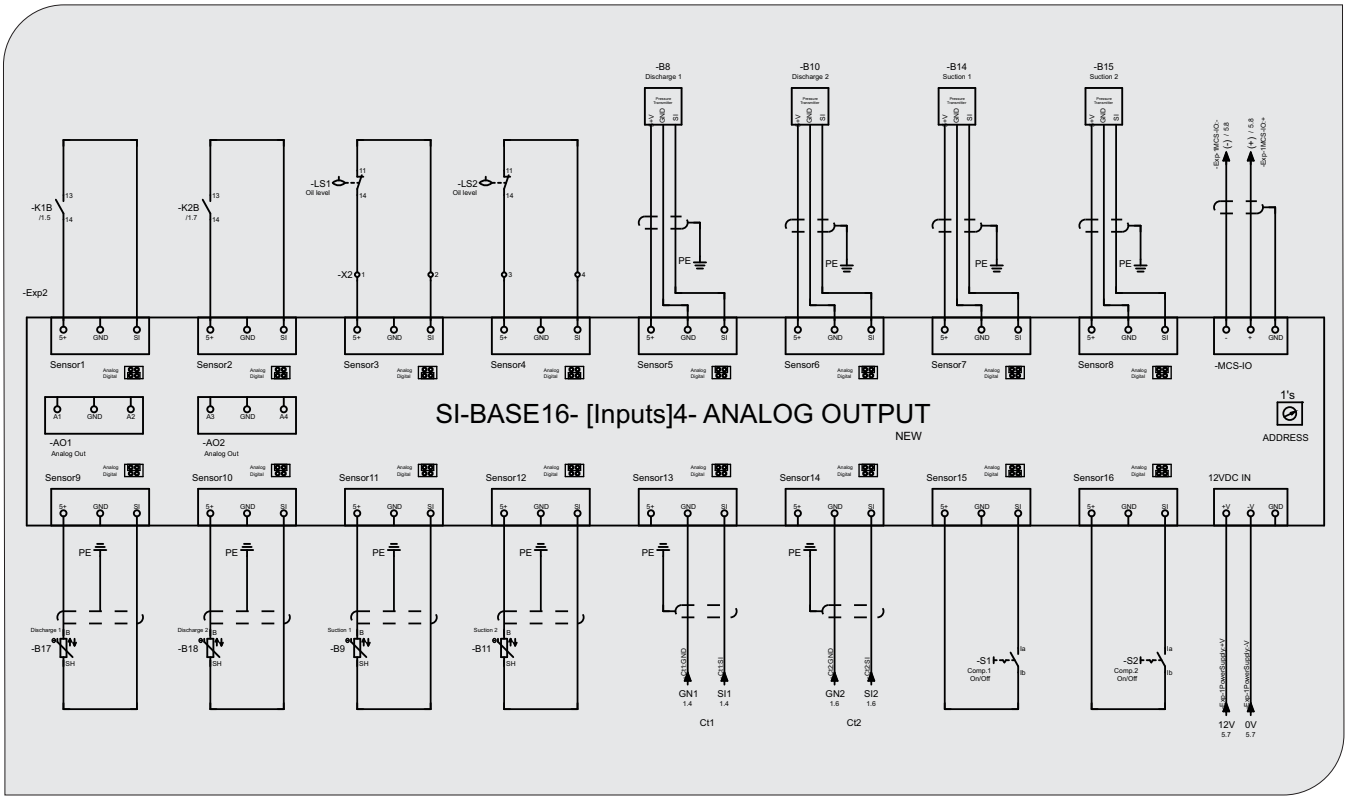


TYPICAL WIRING - 460V/3Ph/60 Hz

Electronic Expansion Valve Drive

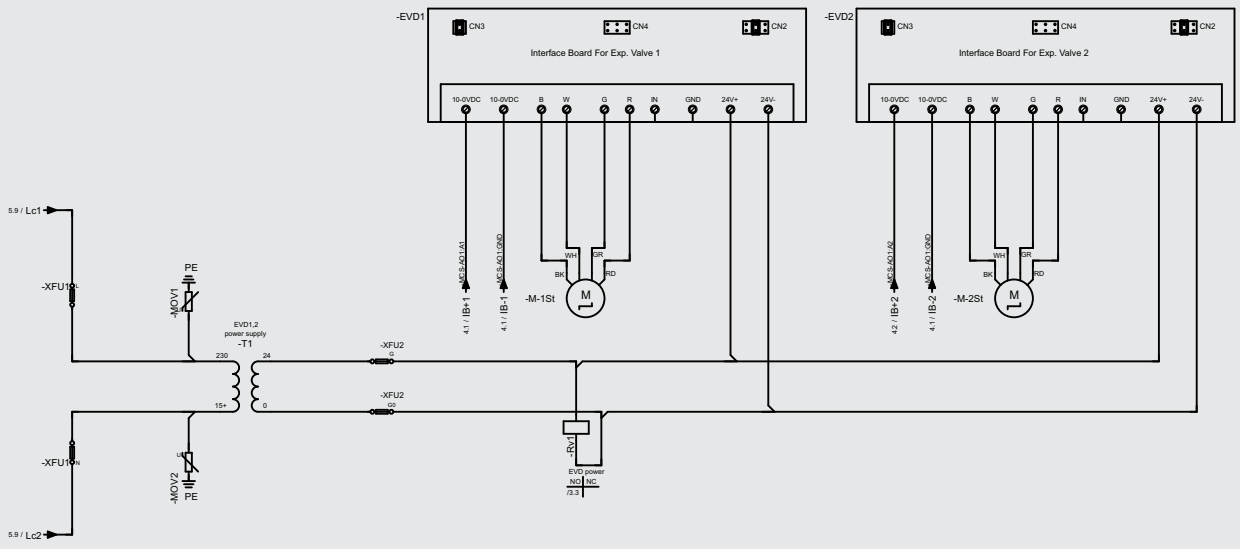


Power Diagram



TYPICAL WIRING - 460V/3Ph/60 Hz

Lists & Tables



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MCS DISPLAY

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CHECK : (HPS,MP,OL) RELATED TO THAT CIRCUIT

*٢ IN CASE OF "FREEZE" ALARM IT MEANS ONE OF THE FOLLOWING:
-FREEZE CONDITION
-WATER OUT SENSOR ISN'T CONNECTED OR DOESN'T OPERATE

LEGEND:

DISC.P :- DISCHARGE PRESSURE
SUC.P :- SUCTION PRESSURE
DISC.T :- DISCHARGE TEMPERATURE
SUC.T :- SUCTION TEMPERATURE

ACCESS TO SET POINT

PRESS MENU BUTTON (Menu) ON THE CONTROLLER KEYPAD

GO TO THE (SETPOINTS) BY PRESSING (◄►) AND THEN PRESS ENTER

GO TO THE (CHW OUT TRGT) AND THEN PRESS (↵) BUTTON

AND THEN PRESS (↵) TO ENABLE MODIFYING THE VALUE

NOW YOU CAN CHANGE IT BY PRESSING (▲) AND (▼) AND THEN PRESS (↵) TO SAVE

THEN PRESS (Menu) TO EXIT TO THE MAIN MENU

PFR INDICATOR LIGHT DIAGNOSTICS	
RUN	GREEN
RESTART DELAY	GREEN
REVERSE PHASE	RED
UNBALANCE/SINGLE PHASE	RED
HIGH/LOW VOLTAGE	RED

Potentials table

Potential	Volt	Wires color
L	٤٨٠~١١٠V	Red
N	Neutral (if exist)	Black
G	٢٤~١Vac/dc	Red
G٠	GND	White

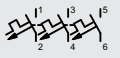
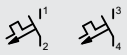
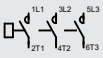
RS

Remote switch LOGIC
RS=OPEN (Unit OFF)
RS=CLOSE (Unit ON)

Field connection device

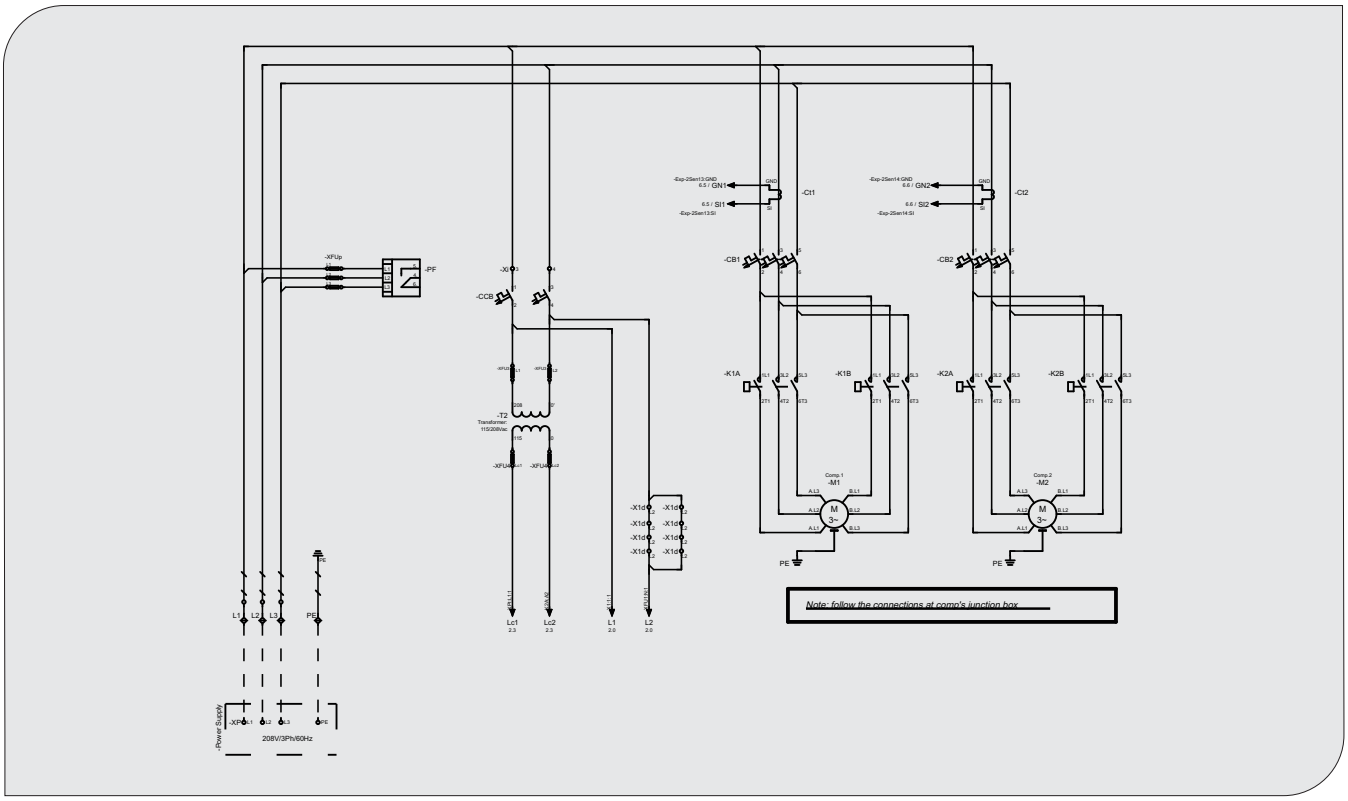
Lists & Tables

Symbol overview

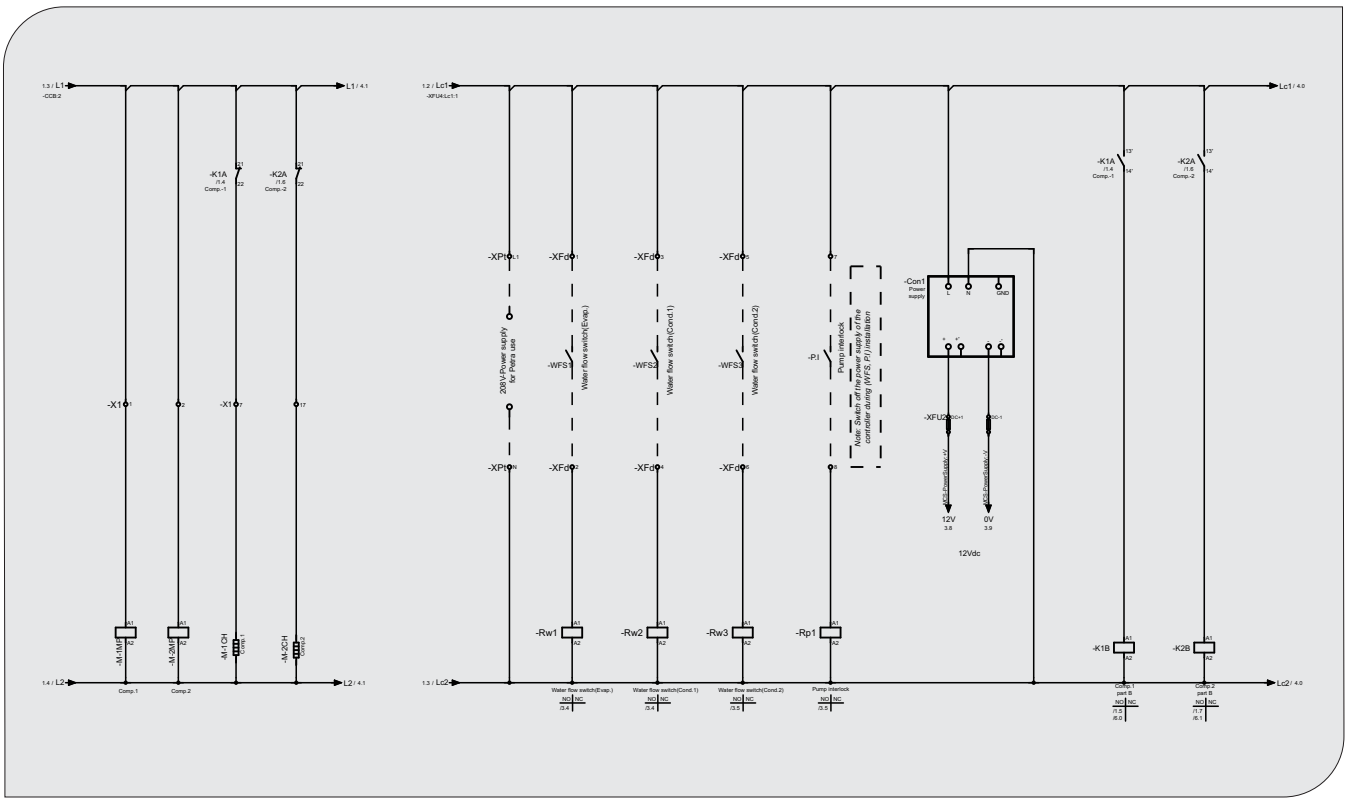
Device tag	Designation
-B1...-B5;-B9;-B11;-B17...-B20 Resistor, NTC thermistor	
	
	
-B8;-B10;-B14;-B15 MCSPressure Sensor	
-CB1;-CB2 Circuit breaker, three-pole	
-CCB Circuit breaker, two-pole	
-Ct1;-Ct2 Current transformer (path 1)	
-K1A;-K1B;-K2A;-K2B Contactor 3Pole	
-LS1;-LS2 Float switch, NC contact	
-M1;-M2 Three-phase asynchronous motor, one winding, change-pole, two rotation speeds	
-M-1CH;-M-2CH Heating element	
-M-1HP;-M-2HP High Pressure switch, NC contact	
-M-1LP;-M-2LP Pressure switch, NO contact	
-M-1LV;-M-1LVI;-M-1SV1;-M-1SV2;-M-1SVI(%50);-M-2LV;-M-2LVI;-M-2SV1;-M-2SV2;-M-2SVI(%50) Solenoid valve, general	
-M-1MP;-M-2MP;-Rp1;-Rv1;-Rw1...-Rw3 Electromechanical operating device, general / relay coil, general	
-M-1St;-M-2St Stepping motor, general	
-MOV1;-MOV2 Resistor, voltage-dependent / varistor	
-PF Phase Failure Relay	
-PF1 NO contact	
-RS1;-RS2 Resistor, general	
-S1;-S2 Switch, NO contact, general	
+TrBox-T2;-T1 Single-phase transformer with two windings	
	

TYPICAL WIRING - 208V/3Ph/60 Hz

Control Diagram

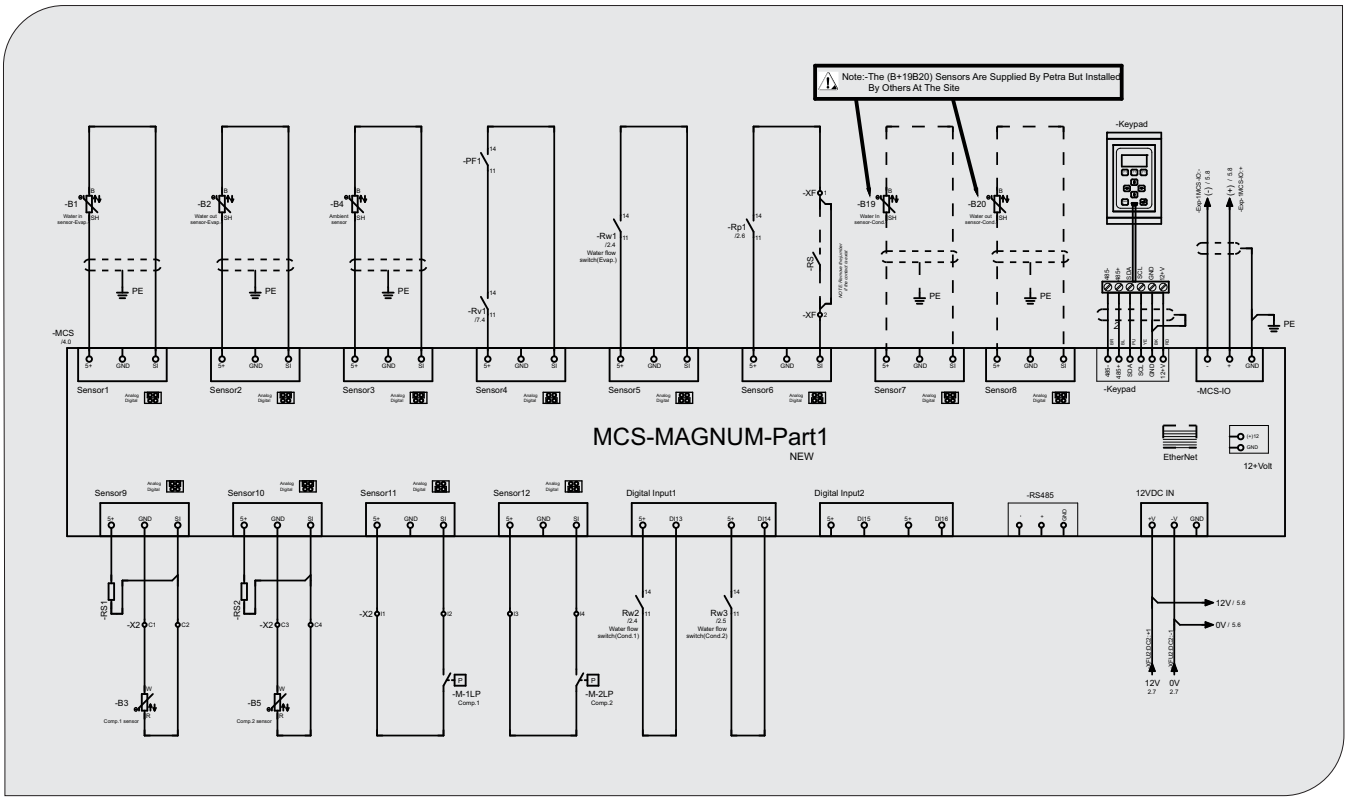


Control Diagram

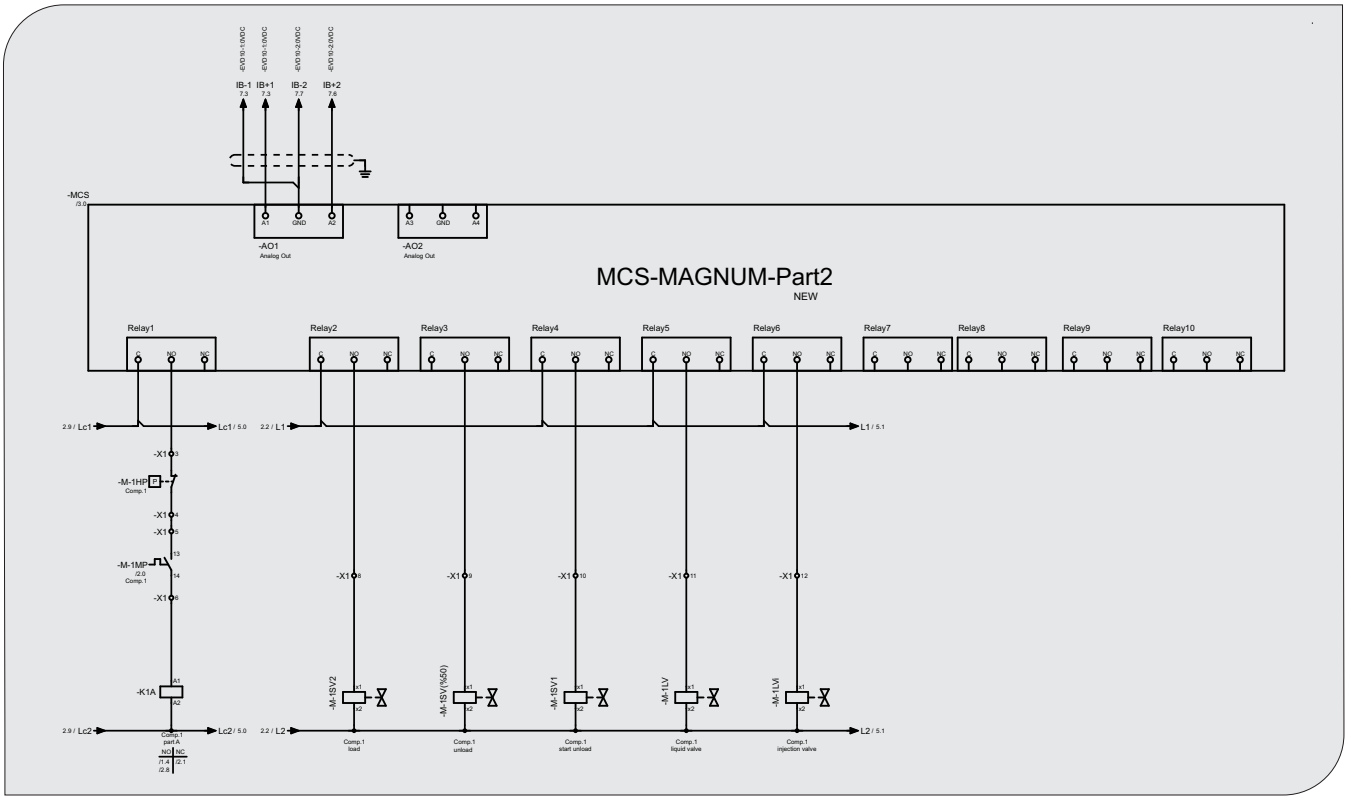


TYPICAL WIRING - 208V/3Ph/60 Hz

Control Diagram

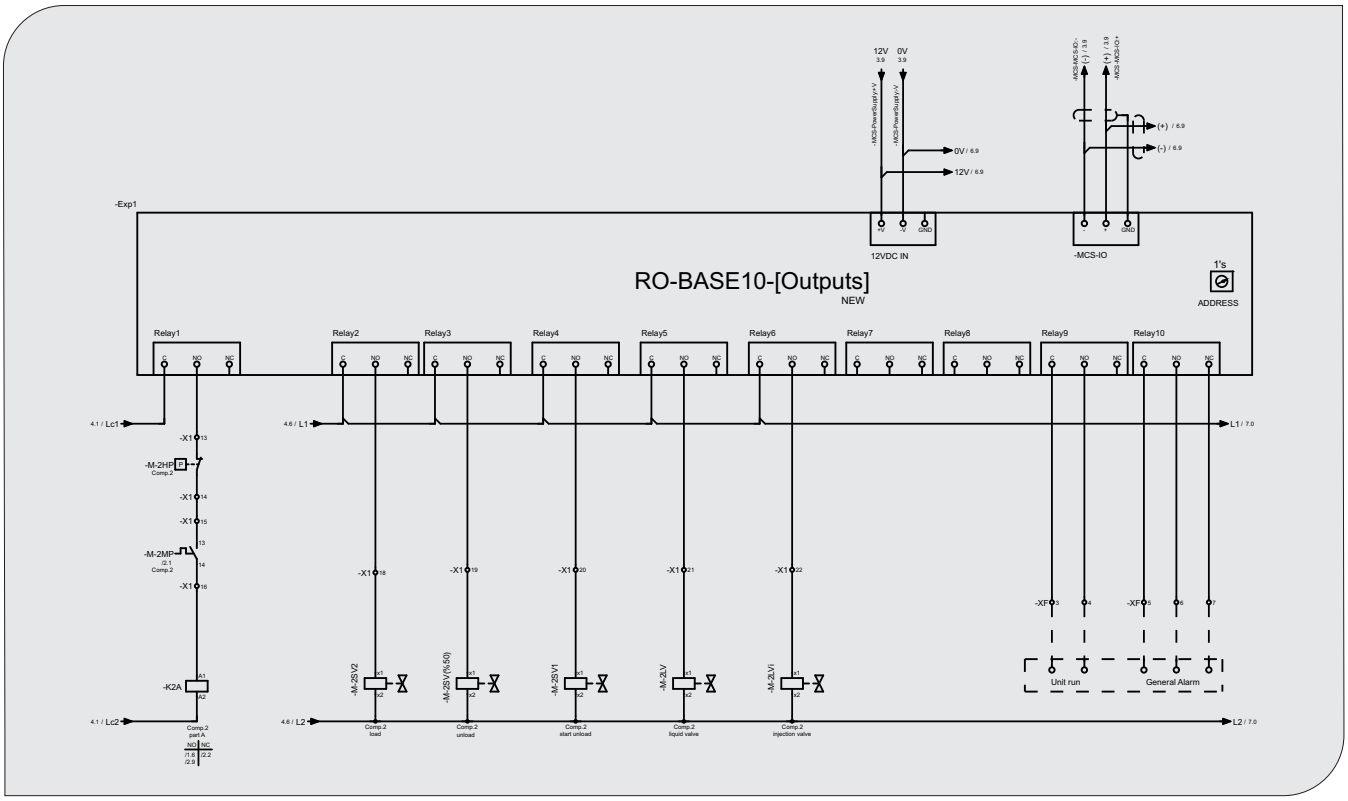


Control Diagram

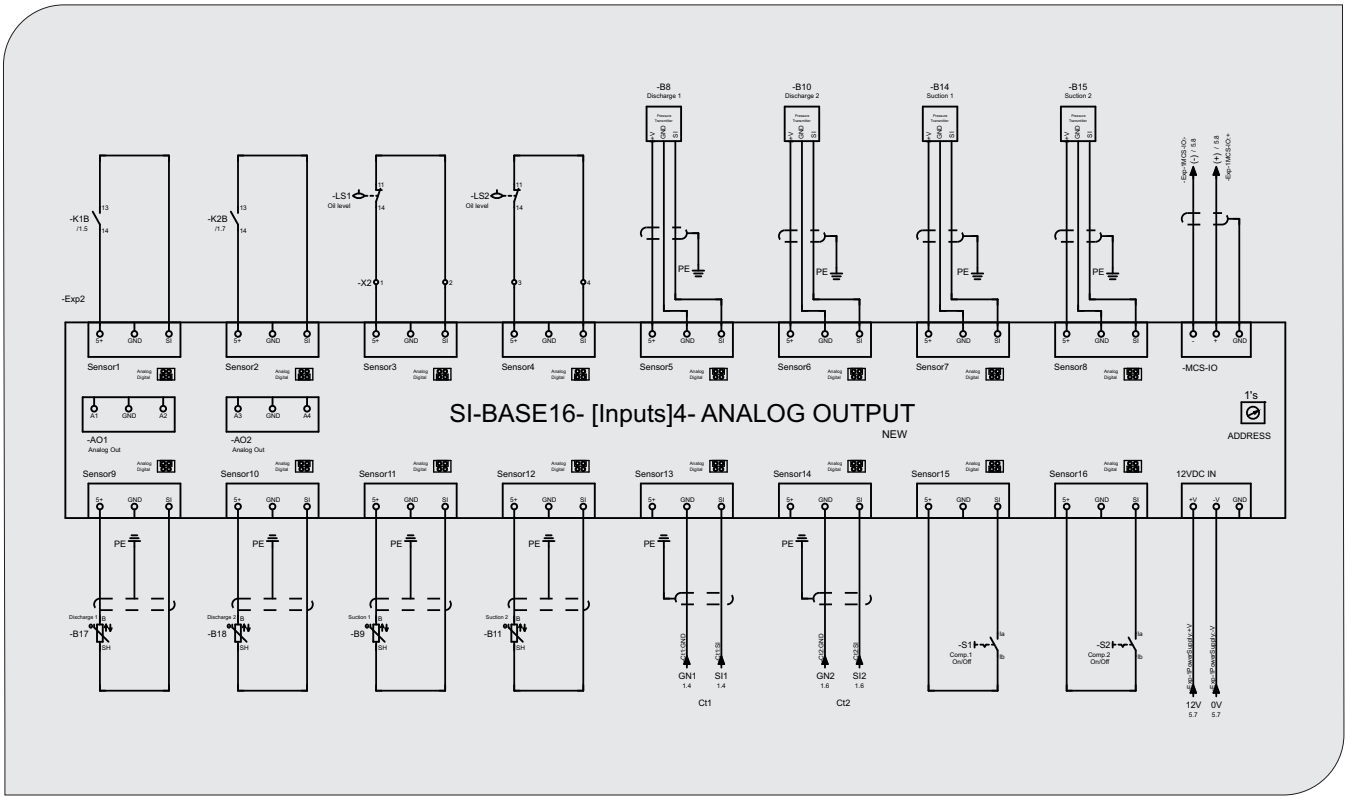


TYPICAL WIRING - 208V/3Ph/60 Hz

Elec. Expansion Valve Driver

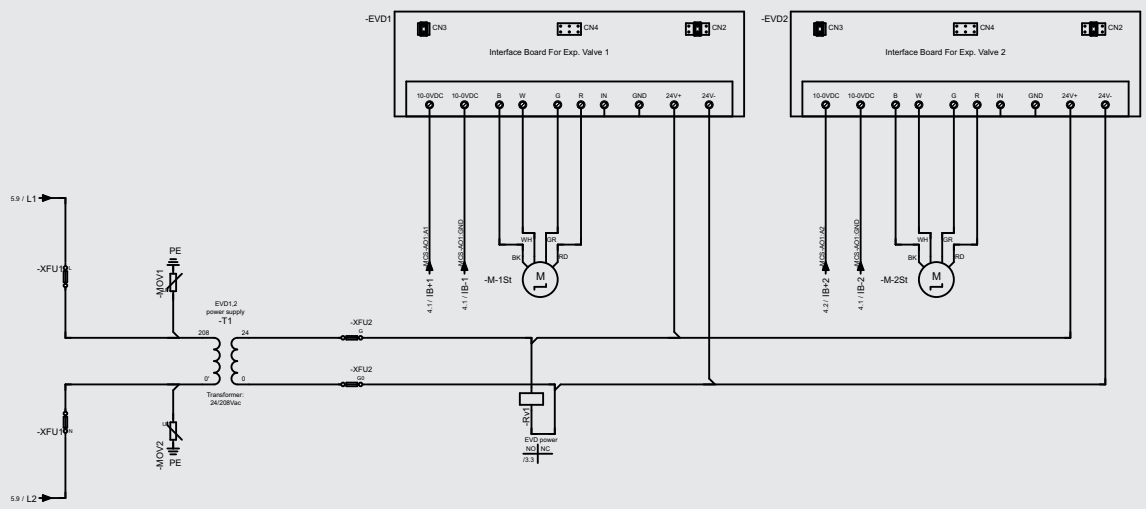


Power Diagram



TYPICAL WIRING - 208V/3Ph/60 Hz

Lists & Tables



Lists & Tables

MCS DISPLAY

ALARM:

1* IN CASE OF "COMP. PROOF" ALARM MESSAGE FOR ANY CIRCUIT
CHECK : (HPS,MP,OL) RELATED TO THAT CIRCUIT

2* IN CASE OF "FREEZE" ALARM IT MEANS ONE OF THE FOLLOWING:
-FREEZE CONDITION
-WATER OUT SENSOR ISN'T CONNECTED OR DOESN'T OPERATE

LEGEND:

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SUC.P :- SUCTION PRESSURE
DISC.T :- DISCHARGE TEMPERATURE
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Potentials table

Potential	Volt	Wires color
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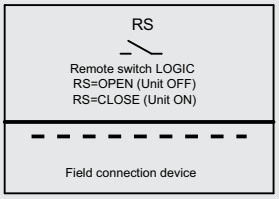
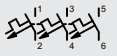
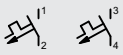
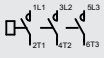
G	24~1Vac/dc	Red
G0	GND	White



Lists & Tables

Symbol overview

Device tag	Designation		
-B1...-B5;-B9;-B11;-B17...-B20 Resistor, NTC thermistor		-M-1St;-M-2St Stepping motor, general	
		-MOV1;-MOV2 Resistor, voltage-dependent / varistor	
		-PF Phase Failure Relay	
-B8;-B10;-B14;-B15 MCSPressure Sensor		-PF1 NO contact	
-CB1;-CB2 Circuit breaker, three-pole		-RS1;-RS2 Resistor, general	
-CCB Circuit breaker, two-pole		-S1;-S2 Switch, NO contact, general	
-Ct1;-Ct2 Current transformer (path 1)		+TrBox-T2;-T1 Single-phase transformer with two windings	
-K1A;-K1B;-K2A;-K2B Contactor 3Pole			
-LS1;-LS2 Float switch, NC contact			
-M1;-M2 Three-phase asynchronous motor, one winding, change-pole, two rotation speeds			
-M-1CH;-M-2CH Heating element			
-M-1HP;-M-2HP High Pressure switch, NC contact			
-M-1LP;-M-2LP Pressure switch, NO contact			
-M-1LV;-M-1LVi;-M-1SV1;-M-1SV2;-M-1SV(%50);-M-2LV;-M-2LVi;-M-2SV1;-M-2SV2;-M-2SV(%50) Solenoid valve, general			
-M-1MP;-M-2MP;-Rp1;-Rv1;-Rw1...-Rw3 Electromechanical operating device, general / relay coil, general			

APPLICATION DATA

Unit Leveling

Unit must be leveled when installed to ensure proper oil return to the compressor. unit must be installed indoor and protected from construction dirt and moisture

Barrel (Cooler) Fluid Temperature

1. Maximum leaving chilled fluid temperature for unit is 10ºC (50ºF). For continuous operation, it is recommended that return fluid temperature does not exceed 16ºC (60ºF) (If continuous operation is required for return water temperature above 16ºC (60ºF) please refer to Petra nearest sales office)
2. Minimum leaving chilled fluid temperature for a standard unit is 4ºC (40ºF) (for lower leaving temperature contact Petra nearest sales office)

Barrel (Cooler) protection

Protection against low ambient freeze-up is required for ambient temperatures below 0ºC (32°F)
Protection should be in the form of

1- Inhibited ethylene glycol or any other suitable glycol (please contact Petra nearest sales office)
2- Cooler is equipped with an electric tape heat that prevents freeze-up (Optional)

Barrel (Cooler) Flow Range

Chiller ratings and performance data pertain to a fluid temperature rise of 5.5ºC (10°F). Chillers may be suitable for operation in a range from 3ºC (5.4°F) to 9ºC (16°F) temperature rise without adjustment and provided flow limits are within the minimum flow rate limits outlined in the table below. (for larger or smaller temperature rise, a mixing loop is required; please contact Petra nearest sales office)

Minimum Barrel (Cooler) Flow

Is based on the maximum permissible temperature rise across the cooler of 9ºC (16°F)

Barrel (Cooler) Fluid loop volume

To obtain proper temperature control, the loop fluid volume must be at least 297 (L/s)/kW (5 GPM/Ton) based on a 5.5ºC (10°F) temperature rise for chiller nominal capacity in air conditioning applications, taking into consideration the minimum system volume

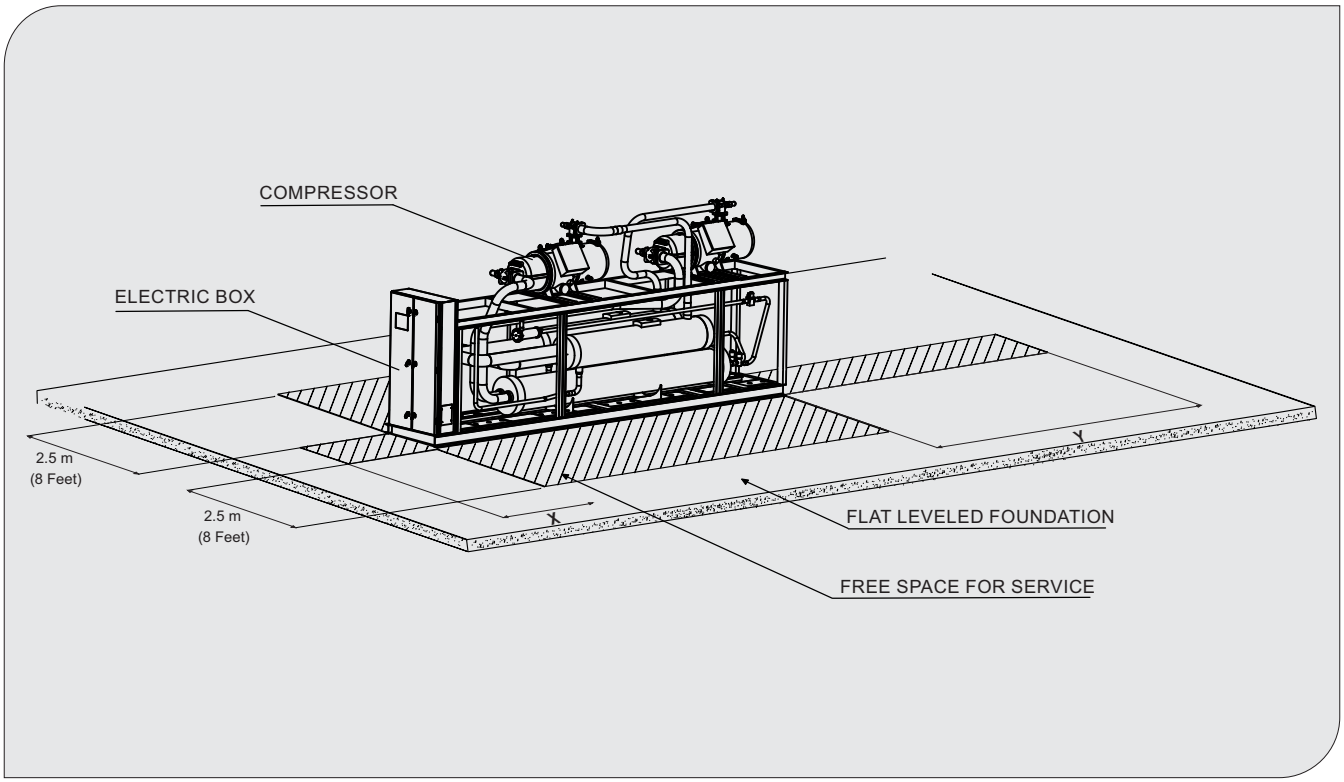
Condenser Fluid Temperature

Maximum leaving chilled fluid temperature is 43ºC (110ºF). For continuous operation, it is recommended that return fluid temperature does not exceed 21ºC (70ºF) (If continuous operation is required for return water temperature above 21ºC (70ºF) please refer to Petra nearest sales office)

Model (WPSa)	Nominal cooler water flow rate				Minimum cooler water flow rate				Minimum cooler loop volume			
	50 Hz		60 Hz		50 Hz		60 Hz		50 Hz		60 Hz	
	L/s	GPM	L/s	GPM	L/s	GPM	L/s	GPM	Liter	gallon	Liter	gallon
110-2	14	221	16	257	10	154	11	178	4,180	1,104	4,855	1,283
130-2	17	264	19	307	12	182	13	213	5,003	1,322	5,810	1,535
145-2	19	296	22	343	13	206	15	238	5,601	1,480	6,499	1,717
155-2	20	320	23	370	14	223	16	257	6,065	1,602	7,008	1,851
175-2	23	365	26	419	16	252	18	290	6,906	1,824	7,931	2,095
195-2	25	404	29	462	18	281	20	319	7,645	2,020	8,739	2,309
230-2	30	474	34	545	21	328	24	378	8,963	2,368	10,308	2,723
245-2	32	509	37	584	22	353	26	404	9,635	2,545	11,058	2,921
260-2	34	539	39	618	24	375	27	427	10,205	2,696	11,693	3,089
275-2	37	584	42	667	26	406	29	462	11,061	2,922	12,629	3,336

NOTE

- Nominal water flow rate is based on AHRI condition of 29.4 ºC (85 ºF) entering water temperature and leaving water temperature of 35.0 ºC (95 ºF) for condenser, and 12.2ºC (54ºF) entering water temperature and leaving water temperature of 6.7ºC (44ºF) for cooler (barrel)
- Minimum water flow rate is based on leaving water temperature of 4ºC (40ºF) and inlet water temperature of 13ºC (55ºF)
- Minimum cooler loop volume is based on normal air conditioning application



MODEL (WPSa)	X m [ft]
110-2 ~ 275-2	1.5 [5.0]

MODEL (WPSa)	Y m [ft]
110-2 ~ 155-2	4.0 [13.1]
175-2 ~ 195-2	4.5 [14.8]
230-2 ~ 275-5	5.0 [16.4]

NOTE

- Y: Barrel (cooler) core removal clearance
- X: Electrical box clearance

LEGEND

- Unit must be leveled
- Service area above is the minimum accepted
- For any other site installation requirements or multiple chiller installation, please contact your nearest Petra sales office

Part 1 — General

1.01 SYSTEM

A. This section includes a microprocessor controlled water-cooled liquid chiller with twin-screw semi hermetic compressors, electronic expansion valves and independent refrigeration circuits. Chiller shall be DOORWAY design and will have the scheduled capacities as shown and indicated on the plans tables and drawings

1.02 QUALITY ASSURANCE

A. Chiller unit shall be designed, manufactured, tested and rated in accordance with the applicable section of the following standards and codes:

1. AHRI 550/590, “Water Chilling Package Using the Vapor Compression Cycle” latest edition
2. ASHRAE 90.1, “Energy Standard for Buildings Except Low-Rise Residential Buildings”
3. ANSI/ASHRAE 15, “Safety Code for Mechanical Refrigeration”. Comply with ASHRAE guideline 3 for refrigerant leaks, recovery, handling and storage requirements
4. ANSI/NFPA 70, “National Electrical Code (NEC)”
5. OSHA, “Occupational Safety and Health Act”
6. ASME Compliance: Fabricate and label water chiller heat exchangers (Barrel) to comply with “ASME Boiler and Pressure Vessel Code: Section VIII, Division I”
7. Manufactured in a facility registered to ISO 9001-2008, “Manufacturing Quality Standard” that define, establish, and maintain an effective quality assurance system for manufacturing and service industries and ISO 14001-2004, “Environmental Management System” that identify and control the environment impact and constantly improve the organization environmental performance
8. Conform to UL 1995-2000 under “Intertek Testing Services” for construction of chillers and bear the ETL/cETL mark

B. Factory Run Test

1. Unit shall be full load run tested at the factory. This includes pressure testing, evacuation of refrigeration circuits and charging afterward with refrigerant and oil. The run test will be carried out in a controlled environment based on entering and leaving water temperatures and with water flowing through the barrel (evaporator) and condenser

1.03 DELIVERY, STORAGE AND HANDLING

A. Unit controls shall be capable of withstanding 65.5 °C (150 °F) storage temperatures in the control compartment

B. Unit shall be delivered to job site fully assembled with all interconnecting refrigeration piping and internal wiring ready for field installation and charged with refrigerant and oil by the manufacturer

C. Unit to have a protective transparent shipping cover over the whole. This cover shall be secured to the unit base through special welded steel rods with nylon robes. Barrel and condenser opening shall be protected with plastic caps. The protective shipping cover should be kept in place until the equipment is ready for installation

D. Unit shall be stored and handled per unit manufacturer's recommendations. Chiller should be stored indoor and protected from construction dirt and moisture

1.04 WARRANTY

A. Manufacturer shall warrant the equipment (parts only) against defects of workmanship and/or material for a period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever occurs first

Part 2 — PRODUCTS

2.01 APROVED MANUFACTURERS

A. The design shown on the Plans & Drawings is based on PETRA model WPSa chiller manufactured by Petra Engineering Industries Co. Alternate equipment will be acceptable if the manufacturer's equipment meets the scheduled performance and complies with these specifications.
If equipment manufactured by a manufacturer other than that scheduled is utilized, then the Mechanical Contractor shall be responsible for coordinating with the General Contractor and all affected Subcontractors to insure proper provisions for installation of the furnished unit. This coordination shall include, but not be limited to, the following:

1. Electrical power requirements, wire and conduit sizes, circuit breakers and feeders sizes and overcurrent protection size

2. Structural supports for units
3. Chiller physical size on plant layout and apace availability
4. Water piping sizes and water connection locations on the unit
5. Compliance with the proper international codes such as AHRI, ANSI, NFPA, UL and ASME

B. The Mechanical Contractor shall be Responsible for all costs incurred by the General contractor, Subcontractors, and Consultants to modify the building provisions to accept the furnished alternate equipment

2.02 GENERAL

A. Description:

1. Furnish, install and commission a factory assembled DOORWAY DESIGN single piece chassis water cooled screw compressor chiller unit that is charged and run tested in the factory as specified herein and shown on the Drawings. Chiller shall include, but is not limited to: twin screw semi hermetic compressors, a complete refrigeration system with dual (2) independent refrigerant circuit, shell and tube DX type barrel (evaporator), shell & tube condenser, a full charge of R-134a refrigerant, flanged on lubrication system, interconnecting wiring, safety and operating controls and all special features as specified herein or required for safe and automatic operation

B. Unit Paint and Color:

1. Unit structural members, control and electrical boxes shall be constructed of a minimum of G-60-90 galvanized steel that shall be coated with a polyester oven baked powder paint that meets a minimum 5,000 hours salt spray tested in accordance with the ASTM B117 standard. Color code will be RAL 9002 (White Gray). Any other paint process that meets less than 5,000 hours shall not be accepted

C. Unit Base Structure And Finish:

1. Unit will be supported by a structural welded steel C-channel of heights of 150 mm (5.5”). The base shall incorporate cross members to support internal components and will be equipped with screwed-in lifting lugs (eye bolts) of suitable loading capacity. Each lifting lug will be fitted on a welded bracket to the side of the C-channel.

The base members shall be coated with mono component catalyzed primer sprayed paint. Welded rods inside the C-channel shall be added to tie-in the unit roof cover for shipment purposes

2. OPTIONAL: *Sprayed base by two layers of the same color epoxy paint*

2. OPTIONAL: *Galvanized steel structural C-channel base, sprayed base by two layers of the same color epoxy paint*

D. Unit Cabinet Structure:

1. All self-tapping screws and Bolts/Nuts used shall be made from Stainless steel with a built in rubber retainer included
2. All electrical panels are made from gauge 18 (1.25 mm {0.051”}) thickness galvanized

E. Compressors:

1. Twin rotary screw semi-hermetic compressors
2. Direct drive Compressor, suction gas cooled motor with a nominal speed of 2900/3500 rpm (50/60 power supply cycle). Motor shall be protected by a solid state motor protector feeding from imbedded motor temperature sensors on all three phases
3. Compressors shall be equipped with a flanged on oil separator that utilized the oil collection with a fine mesh oil filter and all necessary safeties. External oil separators with pumps shall not accepted
4. A crank case heater is fitted to the compressor to heat up the oil before startups. It is recommended to turn on the chiller controls before at least 24-hours to energize the crank case heater
5. Compressors shall be equipped with a discharge valve as part of the compressor
6. Compressors shall start unloaded with the unit microprocessor to load the compressor to match the system load
7. Compressor starting shall be part winding or Wye-Delta
8. Capacity control shall utilize an infinitely step less modulating slide valve to modulate capacity to match load requirements
9. Compressor shall be supported by rubber in shear vibration isolators and provided with ample space around it for service and removal
10. Compressor shall be equipped with a built in low pressure protection through a pressure transmitter connected to unit controller
11. Compressor shall have an oil level switch and a high efficiency suction strainer

D. Barrels (Evaporator Cooler):

1. Shall be a shell-and-tube, Direct Expansion (DX) type. It will be mechanically cleanable tubes removable head(s). Water in the shell and refrigerant in tubes
2. Tubes shall be internally enhanced seamless copper type rolled into tube sheets. Baffles shall be provided in the shell to ensure maximum water distribution for best heat transfer
3. Barrels shall be designed with dual (2) independent refrigeration circuits (one per each compressor)
4. *Shall be insulated with a closed cell foam insulation of 19 mm (3/4") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*
4. ***OPTIONAL:*** *Shall be insulated with a closed cell foam insulation of 25 mm (1") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*
4. ***OPTIONAL:*** *Shall be insulated with a closed cell foam insulation of 38 mm (1 1/2") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*
4. ***OPTIONAL:*** *Shall be insulated with a closed cell foam insulation of 50 mm (2") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*
5. Cooler shall have a built on drain and vent connection
6. It shall be equipped with Victaulic-type water connections that are supplied as loose items and shipped within the chiller enclosure
7. Cooler shall be tested and stamped in accordance with ASME Code for refrigerant. Refrigerant side design working pressure shall be 1000 kPa (145 psig) and the maximum water side design working pressure shall be 1500 kPa (220 psig)
8. ***OPTIONAL:*** *Aluminum protective Cladding cover that shall be applied above barrel (cooler) insulation. Aluminum cladding shall be of gauge 22 [0.7 mm (0.03")] thick*
8. ***OPTIONAL:*** *Stainless steel protective Cladding cover that shall be applied above barrel (cooler) insulation. Aluminum cladding shall be of gauge 22 [0.7 mm (0.03")] thick*
8. ***OPTIONAL:*** *Painted galvanized steel protective Cladding cover that shall be applied above barrel (cooler) insulation. Aluminum cladding shall be of gauge 22 [0.7 mm (0.03")] thick*
9. ***OPTIONAL:*** *Water flow switch shall be supplied as a loose item to be field installed by contractor. Flow switch shall be of the paddle type. The paddle shall be made from copper alloy.*

Switch shall be SPDT, IP 42 protection, with operating range of water temperature of -20°C to 80°C (-4°F to 176°F)

G. Condenser

1. Shall be a shell-and-tube type. It will be mechanically cleanable tubes removable head(s). Water in the tubes and refrigerant in shell
2. Tubes shall be internally enhanced seamless copper type rolled into tube sheets. Baffles shall be provided in the shell to ensure maximum liquid refrigerant distribution for best heat transfer
3. Condensers shall be designed with one (1) refrigeration circuits, so each chiller shall be equipped with two (2) condensers (one per each compressor)
4. Condenser shall have a built on drain and vent (purge) connection
5. Chiller unit shall be equipped with one inlet and outlet water connections with Victaulic-type connections that are supplied as loose items and shipped within the chiller enclosure. The on inlet and outlet water shall be based of 100% water flow rate through condensers and without any valves
6. Condenser shall be tested and stamped in accordance with ASME Code for refrigerant. Refrigerant side design working pressure shall be 1500 kPa (220 psig) and the maximum water side design working pressure shall be 1500 kPa (220 psig)
7. ***OPTIONAL:*** *Water flow switch shall be supplied as a loose item to be field installed by contractor. Flow switch shall be of the paddle type. The paddle shall be made from copper alloy. Switch shall be SPDT, IP 42 protection, with operating range of water temperature of -20°C to 80°C (-4°F to 176°F)*

D. Refrigeration Circuits and Components:

1. Refrigerant used shall be R-134a
2. Unit shall have independent refrigeration circuits for each compressor
3. Refrigeration circuit components shall include replaceable-core filter drier, moisture indicating sight glass, electronic expansion valve, discharge & suction compressor service valves, liquid line service valve and a complete operating charge of refrigerant R-134a and compressor oil
4. Each compressor shall be equipped with an external high pressure cut outs

5. All suction lines shall be sand papered, insulated with closed cell foam insulation, wrapped with protective material and finally epoxy coated
6. All other exposed refrigeration pipes shall be sand papered cleaned and epoxy coated afterwards
7. All safety devices and valves are marked after unit run test to indicate factory position for each component
8. ***OPTIONAL:*** Mechanically controlled Hot Gas By Pass (HGBP) valve to enable compressor to operate below its minimum load point
9. ***OPTIONAL:*** Pressure Relief Valve with a brass body, a pressure setting of 4650 kPa (675 psig), a working temperature range between -40°C and 107°C (-40°F and 225°F) and conforms to ASME VIII, Division I. The valve is a conventional back pressure dependent type and therefore required to discharge to atmosphere
10. ***OPTIONAL:*** High and low pressure gauges for each refrigeration circuit. Gauges shall be Bourdon type with stainless steel housing oil

D. Acoustical Data:

1. Provide acoustical sound power or sound pressure level data in decibels (dB) at the scheduled eight (8) octave band center frequencies and/or at 1/3 of each octave band upon request. A-weighted sound data alone is not acceptable
2. Supplied equipment shall not exceed scheduled sound power or sound pressure level data at any load point. The mechanical Contractor shall be responsible for any additional costs associated with equipment deviation
3. Acoustical performance ratings shall be in accordance with AHRI 370 and ISO BS 3744 Standards
4. ***OPTIONAL:*** *Compressor Jacket to meet the specified sound levels scheduled in the plans at full load and all other load points (if requested). Compressor jacket shall consists of a 9.5 mm (3/8") thick closed cell rubber sound insulation material encapsulated in a sound deflecting vinyl cover*

J. Operating Characteristics:

1. Unit shall be capable of starting up with 35°C (95°F) entering fluid temperature to the cooler

K. Power & Electrical:

1. Power/Control Panel:
   a. Factory installed and wired IP 54 (NEMA 3R) panel, that shall be made from welded G-60/90 (as a minimum) galvanized steel gauge 18 (1.25 mm {0.05"}). Panel shall be equipped with lockable and gasket sealed access doors with a minimum of two external handles and multiple hinges
   a. ***OPTIONAL:*** *Factory installed and wired IP 54 (NEMA 4X) panel, that shall be made from fully welded all around G-60/90 (as a minimum) galvanized steel gauge 12 (3 mm {0.12"}). Panel shall be equipped with lockable and gasket sealed access doors with a minimum of two external handles and multiple hinges*
   a. ***OPTIONAL:*** *Factory installed and wired IP 54 (NEMA 4X) panel, that shall be made from fully welded all around Stainless steel gauge 12 (3 mm {0.12"}). Panel shall be equipped with lockable and gasket sealed access doors with a minimum of two external handles and multiple hinges*
   b. Panel doors shall be provided with a door retainer for each door to keep the door open during service
   c. Unit shall be provided with two separate panels, one for control and one for power
   d. Panel door shall be provided with a pocket to place the laminated wiring diagrams and IOM manuals
   e. Panel shall have a transparent solid PVC NFPA rated piece to cover the power input bus bars
   f. All bus brass pars shall be coated with a zinc coat to prevent brass corrosion
   g. Panel shall have one power entry either
2. Main Power and Control components:
   a. Compressor electronic current monitoring overload motor protector
   b. Free terminal for ON/OFF unit connection
   c. Free terminal for general alarm output
   d. Interlock for pump and water flow switch
   e. Circuit breaker for each compressor
   f. Starting contactors for each compressor
   g. ON/OFF switch for each compressor
   h. Control circuit breaker for short circuit protection
   I. Short cycling protection timer for each compressor

j. Control transformer mounted and wired that shall supply all unit control voltage from the main unit power supply to internal components such as (not limited to) solenoid valves, compressor motor protector, compressor crank case heater and Microprocessor controller
k. Power supply monitor (Phase Failure Relay) to protect power circuit against over voltage, under voltage, phase loss, phase imbalance and phase reversing conditions
l. Control transformer for the secondary and controller voltages
m. Microprocessor controller
n. All running wiring inside panels must be contained within PVC trunks
o. All wires connection shall be marked with a clear and typed on tags to identify each wire
p. An extra loop of wires must be provided for each power connection to a circuit breaker, contactor or motor start to allow for a clamp on measuring current device to be installed during start up and service
q. Full documentation shall be provided inside the electrical panel pocket. This shall include (not limited to) a laminated wiring diagram, IOM manual, hard copy of wiring diagram and quality check list

*r. **OPTIONAL:** Power Factor correction capacitor:*
1. Provide unit with power factor correction capacitors upon request to maintain a displacement power factor of 95% at all load conditions. The installing contractor shall be responsible for any and all additional cost to furnish and install power factor correction capacitors if they are requested and not

*s. **OPTIONAL:** Earth Leakage Relay:*
1. Provide unit with an earth leakage relay for the unit power supply to shut down the unit if the amount of leakage is above the set point
2. Provide unit with an earth leakage relay for the each compressor power supply to shut down the associated compressor if the amount of leakage is above the set point

*t. **OPTIONAL:** External over load for each compressor*

*u. **OPTIONAL:** Control transformer to supply power input to auxiliary components at 120 or 220 volt, such as bulk head light and GFI outlet*

*v. **OPTIONAL:** Bulk Head Light for electrical panel:*
1. IP 54 protection, class I electric safety bulk head light fixture shall be installed in the electrical panel for inspection purposes. The bulb shall be supplied at field by the installing contractor

*w. **OPTIONAL:** Ampere-meter and Volt-meter:*
1. Shall be mounted on power panel exterior door. Ampere-meter shall be provided for each phase and the Volt-meter shall be provide for one phase

*x. **OPTIONAL:** 120 Volt power supply with Transformer and GFI outlet socket:*
1. A 120 volt power supply shall be connected through a transformer to provide a 120 volt circuit, to connect a female GFI outlet socket to provide connection to site appliances such as laptop, tablet or cell phone. 120 volt power circuit shall be connected after the unit main disconnect switch, so as to be OFF upon main disconnect switch OFF position
2. A 120 volt power supply shall be connected through a transformer to provide a 120 volt circuit, to connect a GFI outlet socket to provide connection to site appliances such as laptop, tablet or cell phone. 120 volt power circuit shall be connected before the unit main disconnect switch, so as to be ON upon main disconnect switch OFF position

3. Power Entry:

b. Provide a SINGLE point power entry connection to chiller, that shall be of THREE phase as per scheduled voltage
b. Terminal Block connections shall be provided at the point of incoming single point connection for
c. The incoming power wiring must comply with local codes

*d. **OPTIONAL:** A Main Non-Fused Disconnect Switch lockable external handle shall be supplied to isolate the unit power voltage for servicing. Disconnect switch shall be provided for all power connections to the unit*

*d. **OPTIONAL:** A Main Fused Disconnect Switch lockable external handle shall be supplied to isolate the unit power voltage for servicing. Disconnect switch shall be provided for all power connections to the unit*

*e. **OPTIONAL:** Provide a DUAL point power connection to chiller, that shall be of THREE phase as per scheduled voltage. One connection shall be for circuit 1 compressors and the second connection shall be for circuit 2 compressor. Each power connection can be equipped with a separate main disconnect switch*

4. Power and Control wiring:

   a. All power & control wiring from the electrical power and control panels shall be routed through metal duct in the unit base and shall be connected to each components through and PCV, UV-stabilized, non-metallic conduit beside each component

5. Minimum Circuit Ampacity (MCA):

   a. All power & control wiring from the electrical power and control panels shall be routed through metal duct in the unit base and shall be connected to each components through and PCV, UV-stabilized, non-metallic conduit beside each component

6. Control Circuit components:

   a. Unit control circuit shall include the following minimum components:
      1. Microprocessor with non-volatile memory. Battery backup system shall not be accepted
      2. Separate terminal block for power and controls
      3. Separate 220 volt power supply to serve all controllers, relay, control controllers, relays and control components
      4. ON/OFF control switch by the controller key pad
      5. Replaceable solid-state controller
      6. Pressure sensors installed to measure suction, discharge and oil pressure. Thermistors installed to measure barrel (cooler) entering and leaving fluid temperatures and outside air temperature

   b. Microprocessor controller shall contain the following:
      1. Microprocessor main board designed to supervise and monitor the unit with access port for external connection to a laptop
      2. I/O expansion board with additional input/output terminals
      3. LCD screen display with I/O status and ability to adjust set point. The LCD consists of a liquid crystal display) with adjustable contrast and backlighting

   c. Displayed data on the LCD display:
      1. Leaving and return water temperatures
      2. Compressor discharge pressure and temperature
      3. Compressor suction pressure and temperature
      4. Compressor drawn current
      5. Suction and discharge super heat
      6. Compressor load percentage
      7. Saturated suction and discharge
      8. Compressor oil differential
      9. Compressor times
      10. Digital inputs status
      11. Output relays status
      12. Protection status
      13. Historical alarms
      14. Schedules
      15. Adjustable set point

   d. Unit controls shall include the following functions:
      1. Automatic circuit lead/lag
      2. Capacity control based on leaving chilled fluid temperature and compensated by rate of change of leaving fluid temperature
      3. Limiting the chilled fluid temperature pull-down rate at start-up to an adjustable range to prevent excessive demand spikes at start-up
      4. Seven-day time schedule. Two operating schedules per day of the week and 8-holiday shall e supported by the microprocessor
      5. Leaving and return chilled fluid temperature reset from BMS system
      6. Chilled water pump and water flow interlock connection
      7. High discharge pressure protection
      8. Low leaving water temperature protection
      9. Unloaded start for all compressors

   e. LCD display panel features:
      1. Display shall allow access to configuration, maintenance, alarm history, set points, time schedule and status data
      2. Display shall have one button for chiller ON/OFF
      3. Display shall include three levels of password protection against unauthorized access to programming files and imbedded set points
      4. Display shall allow for easy connection of a portable hand held technician tool such as a laptop to access information and upload and/ or download chiller settings

f. Safeties and Alarms:
   1.Cutout and unloading
   2.High discharge pressure
   3.High discharge temperature
   4.Low suction pressure
   5.Low suction temperature
   6.Freeze state
   7.High ampere state
   8.Low discharge pressure
   9.Unsafe suction pressure
   10.Unsafe discharge pressure
   11.Flow switch (no flow protection)
   12.Phase loss protection
   13.Low oil differential pressure
   14.Unsafe oil pressure
   15.Low oil level
   16.Motor temperature
   17.Low motor amps
   18.Probe error alarm

g. Supporting protocols:
   1.Bacnet IP
   2.Bacnet MS/TP with a BMS gateway module
   3.Modbus IP
   4.Modbus RTU
   5.Johnson N2 with a BMS gateway
   6.Lontalk with a BMS gateway

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Rig and Install in full accordance with manufacturer's requirements, Project drawings, and contract documents

B. Location
   1. Locate chiller as indicated on drawings, including cleaning and service maintenance clearance per manufacturer instructions. Adjust and level chiller on support structure

C. Components
   1. Installing Contractor shall provide and install all auxiliary devices and accessories for fully operational chiller

D. Electrical
   1. Coordinate electrical requirements and connections for all power feeds with Electrical Contractor

E. Controls
   1. Coordinate all control requirements and connections with Controls Contractor

F. Finish
   1. Installing Contractor shall paint damaged and abraded factory finish with touch-up paint matching factory finish

Celebrating 25 Years

PETRA®

Petra Engineering Industries Co.

WPSa CATALOG

Extended Chassis Series

50/60 Hz - SI/IMP

Water Cooled Water Chiller
with Semi-Hermetic Screw Compressor
918 - 3,180 Nominal kW @ 50 Hz
(261 - 904 Nominal Tons)
1,045 - 3,608 Nominal kW @ 60 Hz
(297 - 1,026 Nominal Tons)

TABLE OF CONTENTS

INTRODUCTION

Petra Engineering Industries Company is a highly established HVAC manufacturing company that produces a wide range of sophisticated, high quality commercial and industrial HVAC equipment. Petra's products meet the requirements of globally recognized standards and procedures

To ensure the highest level of quality all procedures are carried out according to ISO 9001:2008, Quality management systems and ISO14001:2004 environmental management system. Petra's major products are UL and ETL listed

Petra's water cooled liquid chillers (WPSa - Extended chassis) with a wide range of capacities and exceptionally high efficiencies , were designed to meet customer requirements for a variety of applications. Petra WPSa chillers offer state of the art low sound, high quality and reliability, optimized performance and a compact physical footprint

Petra WPSa chillers with semi-hermetic screw compressors and R-134a HFC refrigerant are 100% factory tested and commissioned to ensure efficient performance at specified operating conditions

OUTSTANDING FEATURES

Superior Efficiency

The WPSa series meets or exceeds the new ASHRAE 90.1 efficiency levels at both full and part load efficiency

Compact Physical Footprint

The WPSa chillers feature compact footprints and are suitable for close-spacing installation to serve the areas that have space constraints

Quality Assurance

To ensure the best performance, all the chillers in the APSa series are factory-run tested and produced in an ISO 9001-2008 listed manufacturing facility

Easy Installation

Installation is made quick and easy with complete factory wiring, easy lifting provisions, factory installed options and start-up. To eliminate potential start-up problems, a complete factory- test run is performed on each unit

Large Capacity Compact Footprint

Petra introduces the WPSa chillers with nominal kW of 2110, 2460, 2640, 2810, 3170 & 3520 (nominal tons of 600, 700, 750, 800, 900 & 1000), as a single piece unit with single power entry

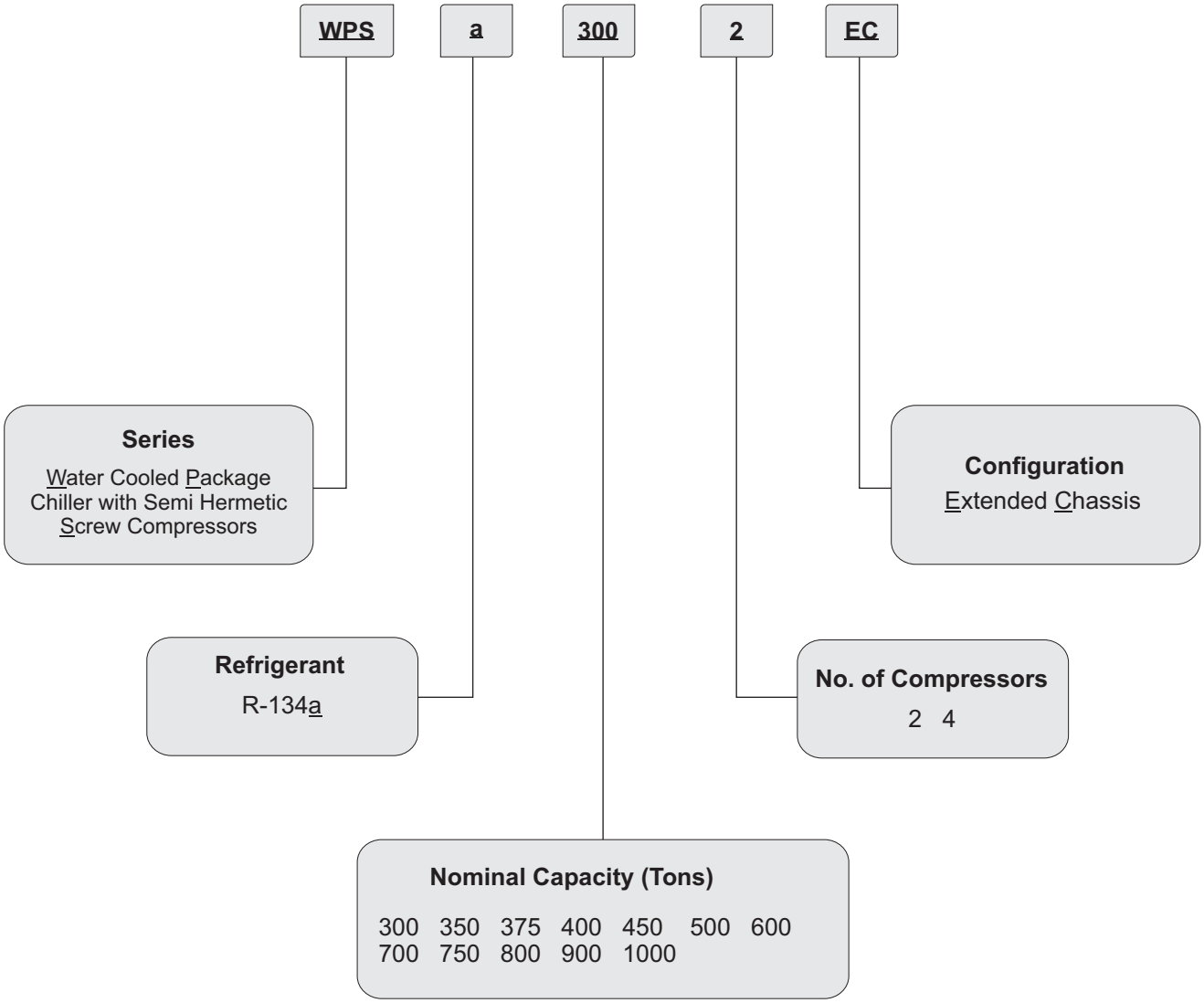
This unique single unit design provides the largest capacity in one chiller model with the minimum footprint

Outstanding Finishing

Suction lines are insulated with closed cell foam insulation, then wrapped with a special protective material and finally epoxy coated. This gives further protection for the insulation against weather and other factors

Petra paint is certified according to ASTM 117 A&B 5000 hours salt spray test

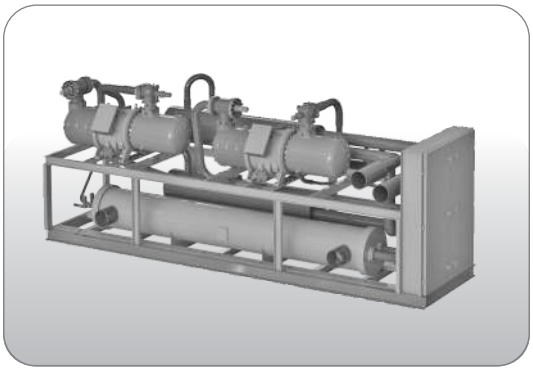
NOMENCLATURE



STANDARD FEATURES & BENEFITS

Construction

- Welded structural C-channel base painted with mono component catalyzed primer sprayed paint
- Base is equipped with welded brackets for heavy duty lifting lugs
- Easily accessible system components

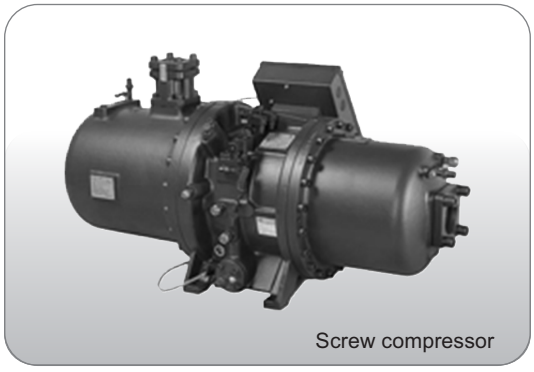


Compressor

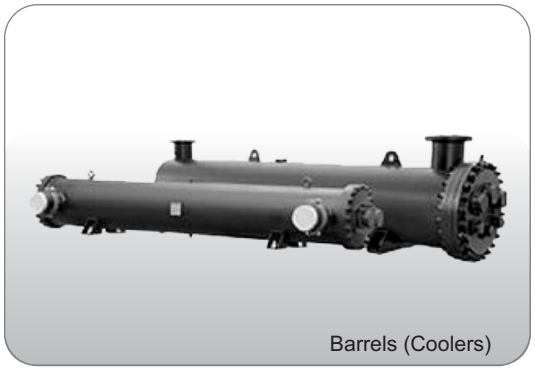
- Suction gas-cooled semi-hermetic twin screw compressor
- Variable slide valves allow the chillers to match actual load conditions, delivering exceptional part load performance
- Rain-tight terminal box
- Double walled pressure compensated rotor housing, which is extremely stable and results in additional sound attenuation
- Proven, long life bearings with pressure unloading
- Optimized oil management with built-in directly flanged on oil separator
- Long life fine filter mesh and magnets on oil circuit
- Pressure relieved bearing chamber ensures minimum refrigerant dilution in the oil
- Large volume motor suitable for part winding or Star-Delta starting with integrated embedded sensors in each winding
- Intelligent electronics including thermal motor temperature monitoring, phase sequence monitoring, manual reset lock-out and discharge temperature
- Compressor starts unloading
- Discharge shut off valve for each compressor motor
- Rubber-in-shear vibration isolation
- Oil level switch, high efficiency suction strainer, crank case heater
- Compressor shall be equipped with a built-in low pressure protection by a pressure transmitter connected to unit controller

Coolers (Barrels)

- High efficiency direct expansion (DX) shell and tube type coolers with inner grooved tubes to optimize the cooler's efficiency
- Coolers are tested and stamped for refrigerant side design pressure of 1000 kPa (145 Psi) and for a maximum water side working pressure of 1500 kPa (220 Psi)
- These working pressures comply with applicable sections of the ASME standard, and the European codes of ISPESL and TUV
- Coolers are equipped with internal water baffles in the shell. They are fabricated from brass or plastic for maximum corrosion resistance
- Coolers are provided with water vents and drain connection plugs and are insulated with 19 mm (3/4 inch) closed cell foam insulation
- Cooler shall be tested & stamped in accordance with ASME code



Screw compressor



Barrels (Coolers)

STANDARD FEATURES & BENEFITS

Shell & tube condenser

- High efficiency shell and tube condenser with inner grooved tubes to optimize efficiency
- Condensers shall be tested and stamped for refrigerant side design pressure of 1500 kPa (220 Psi) and for a maximum water side working pressure of 1500 kPa (220 Psi)
- These working pressures comply with applicable sections of the ASME standard, and the European codes of ISPESL and TUV
- Condensers are provided with water vents (purge) and drain connection plugs
- Condensers shall be tested in accordance with ASME code

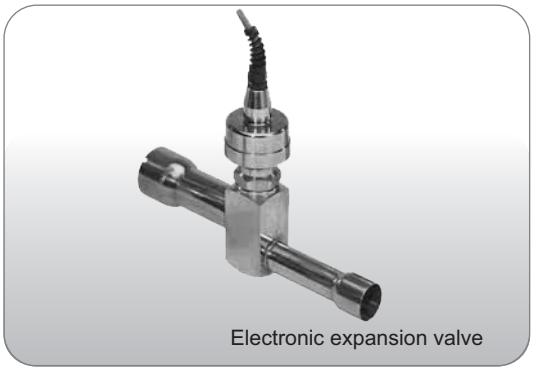

Condenser

Refrigeration

- Independent refrigeration circuit per compressor
- Liquid, discharge and suction pipes are all hard copper pipes. They are formed using automated CNC pipe bending machines in order to minimize pipe-brazed joints which in turn increases system reliability
- Epoxy paint for all exposed copper piping system of the refrigeration circuit
- Components of each refrigeration circuit:
  - Liquid line solenoid valve
  - Liquid line shut off valve
  - Liquid line moisture indicator sight glass
  - Replaceable core type filter
  - Fully charged unit with R-134a refrigerant
  - High safety pressure switch (capsule Type; factory pre-set)
- Electronic expansion valve

Electronically operated step motor flow control valves, intended for the precise control of liquid refrigerant flow. Synchronized signals to the motor provide discrete angular movement, which translates into precise linear positioning of the valve piston.

Easily interfaced with microprocessor based controllers


Electronic expansion valve

Electrical

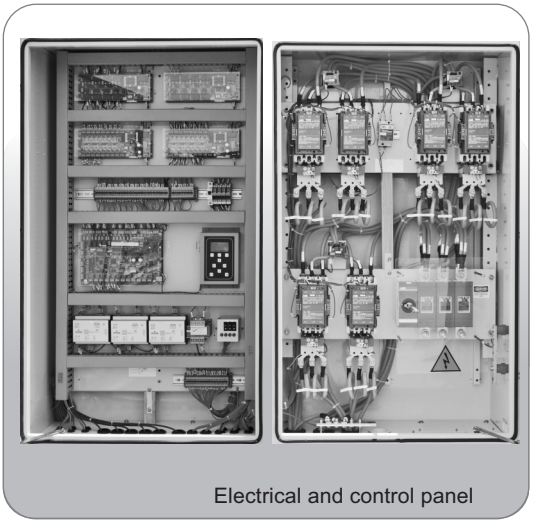
- Compressor electronic current monitor and overload protection through controller
- Free terminal for remote ON/OFF connection
- Free terminal for general alarm output
- Control voltage is 220-240V for all components
- Single point power connection for each electrical panel
- Circuit breaker for each compressor
- Starting contactors for compressors
- ON/OFF switch for each compressor
- Control circuit breaker for short circuit protection
- Short cycling protection for compressors (time delay)
- Control transformer supplies all unit control voltage from main unit power supply to internal components such as (not limited to) solenoid valves, compressor motor protector, compressor crank case heater and microprocessor controller
- Microprocessor controller for full management of chiller operation and safety circuits
- Power supply monitor (phase failure relay) used to protect the power circuit against over or under voltage conditions and against phase loss or loss reversing conditions

Phase failure relay

STANDARD FEATURES & BENEFITS

Electrical Panels

- Nema 3X with IP54 minimum enclosure standard electrical panel
- Two separate panels, one for power and the other for control
- Electrical panel is equipped with a heavy gauge galvanized steel access door
- Panel is painted with oven baked polyester electrostatic powder paint which is certified up to 5000 hours salt spray test as per ASTM 117 A&B
- Each door is equipped with external handle with key and tooled latch. The door contains a heavy duty clip on bulb gasket between the door and the panel that provides effective sealing
- All doors have multiple hinges
- Each door has a door retainer to keep door open during service
- Each door has a built-in pocket to accommodate a laminated wiring diagrams & IOM (Installation & Operation Manual) documents



Electrical and control panel

OPTIONAL FEATURES

Compressor jacket

Compressor jacket shall consists of a 9.5 mm (3/8 inch) thick closed cell rubber sound insulation material inside a sound deflecting vinyl cover to provide superior sound reduction for screw compressors

Cooler tape heater protection down to 0°C (32°F), -18°C (0°F) & -29°C (-20°F)

Electrical resistance heating tape is wrapped around the barrel (cooler) shell to help protect the evaporator fluid contents from freezing down to 0°C (32°F), -18°C (0°F) & -29°C (-20°F) ambient temperature. Continuous power supply to the chiller shall be provided to maintain operation of the heater for 24 hours, 7 days a week. This device will not protect external water pipe work connected to the unit, additional frost protection measures are required

Cooler insulation thickness materials

Cooler can be insulated with closed cell foam insulation of 25 mm (1 inch), 38 mm (1.5 inch) & 50 mm (2 inch)
The insulation density is 48 kg/m^3 (3 lb/ft^3) with a K-factor of 0.035 W/(m.°K) [0.0203 BTUH/(ft.°F)]

Cooler cladding

Cooler cladding can be aluminum, stainless steel or painted galvanized steel {made from gauge 22 [0.7 mm (0.03 inch)}. Cladding shall be applied over barrel (cooler) insulation

Hot gas bypass

The hot gas bypass consists of a mechanical valve capacity regulator used to adapt compressor capacity to actual evaporator load. It is installed in a bypass line between the high and low pressure sides of the refrigeration system and is designed for hot gas injection into the evaporator just after the expansion valve.
The hot gas bypass valve is UL listed, file SA7200.
The hot gas bypass valve allows additional capacity reduction for units operating below the minimum step of unloading for the compressor. If the hot gas bypass is installed on the lead compressor only, the “lead/lag” function (for the compressor) will be eliminated.
(for hot gas by pass typical piping schematic, please refer to page 57)

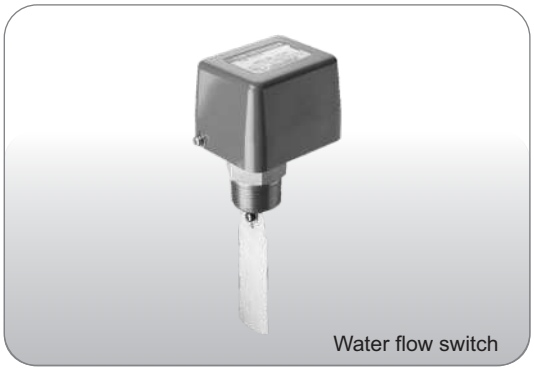
High and low Pressure gauges

Optional pressure gauges for monitoring of refrigeration discharge and suction pressure. Additionally, the gauges are used to verify suitable refrigerant charge and proper system performance. The gauges shall be Bourdon type, stainless steel housing oil filled. Oil filling provides greater protection of the gauge internals from corrosive atmospheres. The gauges are provided with a dual scale of both PSI and BAR


Pressure gauges

Water flow switch

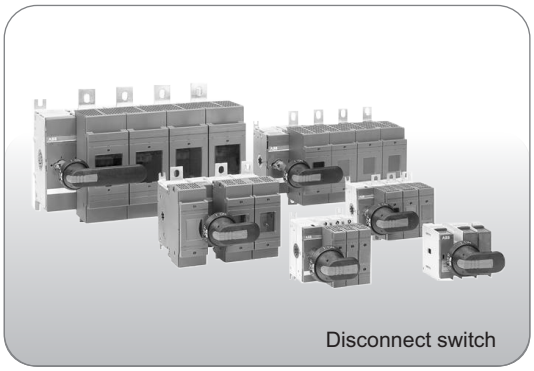
CE & UL approved safety interlock to prevent operation of unit without evaporator water flow (available for field installation only)
The water flow switch functions as a safety that ensures water flow rate into the barrel (cooler), and sends a signal to shut off the chiller if no water flow exists due to pump failure or other causes
The water flow switch paddle consists of three segments that can be removed or trimmed and sized to the water pipe size. The paddle is made of copper alloy. Water flow switch is supplied as a loose item for field installation


Water flow switch

OPTIONAL FEATURES

Main disconnect switch

the main disconnect switch with door interlock is used to de-energize the power supply to the chiller during service or repair works. It has an external handle that is installed on the electric panel door. The switch has to be de-energized to open electric panel door. The disconnect switch can be supplied with built-in fuses or a non fused type



Disconnect switch

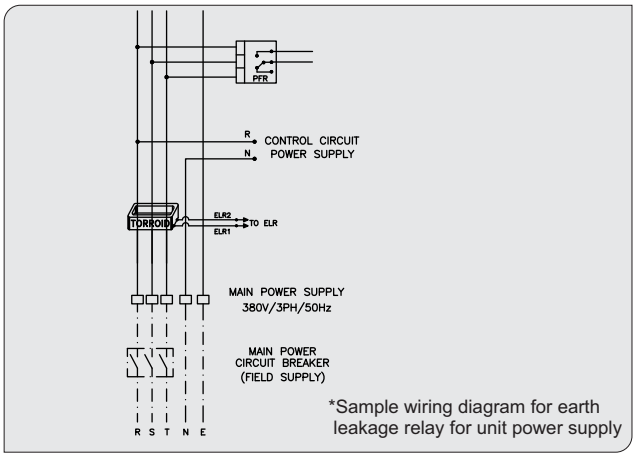
Power factor correction capacitor

Power factor correction is used to improve the power factor level . Maximizing power factor improves system reliability , minimizes voltage drops and gives better power quality. Advanced safety capacitors with harmonic filters and a main microprocessor controller are provided to manage the required capacity for the capacitor stages. Only one capacitor panel is needed for the chiller regardless of the number of compressors or fans Power factor correction capacitors are usually installed in a separate electrical box depending on unit size (refer to the nearest Petra sales office for more details)

Power factor capacitor

Earth leakage relay

The earth leakage relay functions as a safety device used in electrical installations with high earth impedance to prevent shock. It detects small stray voltages on the metal enclosures of electrical equipment, and interrupts the circuit if a dangerous voltage is detected
Earth leakage relay can be supplied for the whole unit power supply or for each compressor (refer to the nearest Petra sales office for more details)



*Sample wiring diagram for earth leakage relay for unit power supply

Pressure relief valve

Pressure relief valves are installed in accordance with the requirements of the ASME (Boiler and Pressure Vessel Code Section VIII, Division 1)
The pressure is relieved by allowing the pressurized fluid to flow from an auxiliary passage out of the system to the atmosphere. The relief valve is designed to open at a predetermined set pressure to protect pressure vessels and other equipment from being subjected to pressures that exceed their design limits

Control transformer

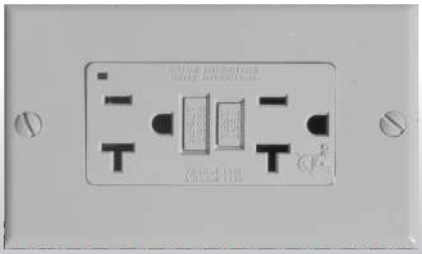
Control transformer to supply power input to auxiliary components at 120 or 220 volts, such as (not limited to) bulk head light and GFI outlet

Control transformer

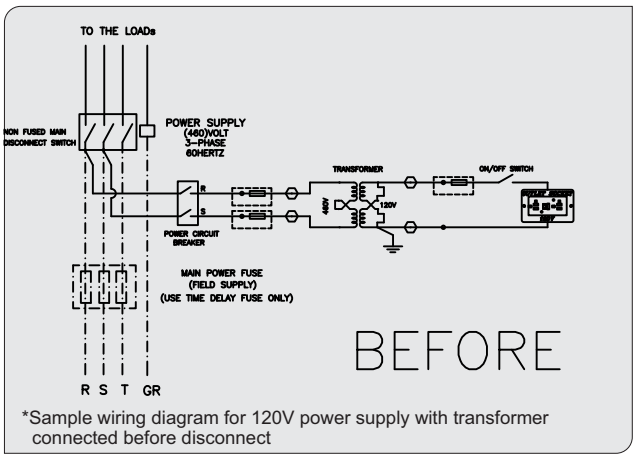
OPTIONAL FEATURES

120V power supply with transformer & GFI outlet socket

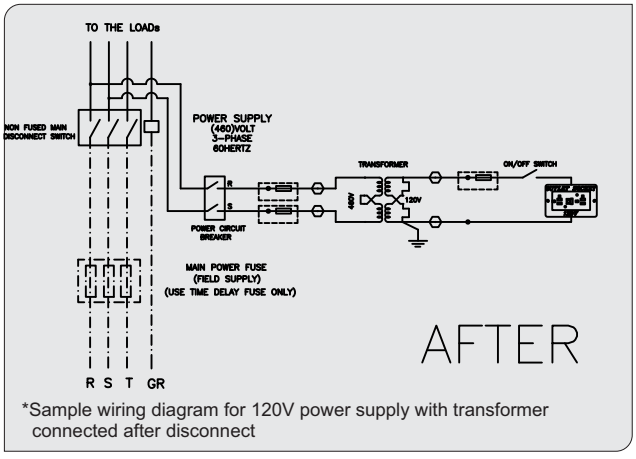
The 120 volt single phase power supply shall be provided through the transformer that may be connected before or after non fused main disconnect switch. The GFI socket shall be used to operate electric devices on site such as laptops, tablets and cell phones



GFI outlet socket



*Sample wiring diagram for 120V power supply with transformer connected before disconnect



*Sample wiring diagram for 120V power supply with transformer connected after disconnect

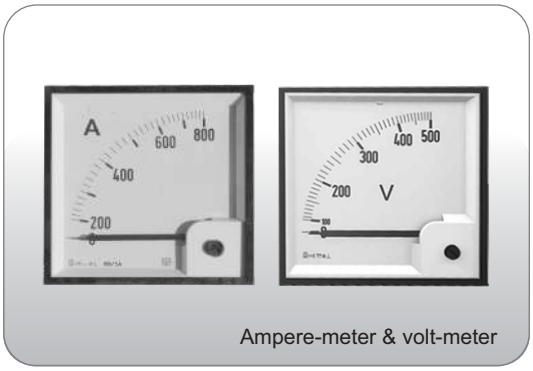
Bulk head light for the electrical panel

An IP 54 protection, class I electric safety bulk head light shall be used in the electrical panel for inspection purposes. The light fixture shall be supplied without a bulb

Bulk head light

Ampere-meter and Volt-meter

Ampere-meter and volt-meter are used to measure the power current and voltage consumption
The ampere-meter is used for each phase. The voltmeter device is used to measure the voltage of the power supply between each phase and the other and between each phase and the neutral



Ampere-meter & volt-meter

Electrical component options

- External over load for each compressor
- Circuit breaker for each condenser fan motor
- Nema 4X electrical panels made from galvanized steel
- Nema 4X electrical panels made from stainless steel

MICROPROCESSOR CONTROLLER

Microprocessor controller system enhances the water-cooled screw chiller operation by providing intelligent chiller control technology. The microprocessor control accurately controls various chiller operating parameters. Windows based support system provides complete status on all operation both locally and remotely. Features include history, static and dynamic graphing to help in commissioning, troubleshooting and evaluation. It will interface locally with a null Modem serial cable, remotely through an Ethernet connection, and also through building management systems
The Microprocessor control offers a great deal of flexibility with adjustable set points and control options that can be set prior to activating a system or even when the unit is operational. The Microprocessor controller is designed to safeguard the system being controlled, minimize the need for manual intervention, and to provide a simple but meaningful user interface

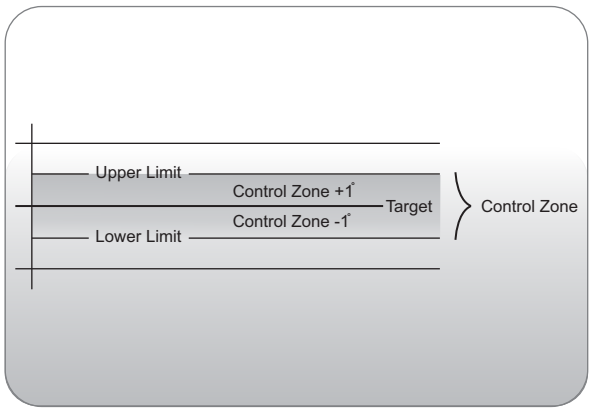
SEQUENCE OF CONTROL

Start-Up

For initial startup, the following must be met:

- Control circuit breaker must be switched on
- Energize the microprocessor control through keypad, remote start/stop, schedule or BMS command
- Chilled water pump running
- Flow has been proven
- All safeties condition satisfied

When the water out temperature is above the target set point, the first compressor will start after the call for cooling. The control strategy is designed to modulate the compressor(s) capacity to maintain the control sensor reading within the specified control zone. To accomplish this, the Microprocessor controller will constantly monitor the control value, its rate of change and position in relationship to the control zone and make adjustments accordingly



Capacity Control

The Capacity control logic will control the sequence of operation of the compressors as follows:

A. If the Chilled Water Out temperature is above the target set point and the Chilled Water Rate Of Change is not decreasing at a Sufficient rate, the chiller's capacity control logic will increase capacity steps. Once the step control has increased, the capacity control logic has a time delay before allowing the new step to increase again. This time delay depends on how far the temperature is from the target set point
B. If the chilled water out temperature is in the control zone, special logic functions will keep the chiller within the control zone
C. If the chilled water out temperature is below the control band and if the Chilled Water Rate of Change is not increasing at a sufficient rate, the chiller's capacity control logic will reduce steps. Once the step has been decreased the capacity control logic has a time delay before allowing more steps to be decreased again

Low Suction Unloading & Holding

This protection is activated when the set point (LOW SUCTION UNLOAD is active). The purpose of this Protection is to take corrective action prior to a safety being tripped

High Discharge Pressure Unloading & Holding

This protection is activated when the set point (HIGH DISCHARGE UNLOAD) is active. The purpose of this Protection is to take corrective action prior to a safety being tripped: The system will begin unloading the compressor until the discharge pressure drops below the calculated value

Chilled Water Reset

This is a function associated with the building management system. This value is used to adjust the control setpoint. The amount of actual adjustment is proportionally based on the associated analog input value. The analog value can be between 0 and 5 volts

Operating Schedules

Two operating schedules per day and 8 holidays are supported by the microprocessor controller software. Each schedule contains a start and end time. If the time and day of the Microprocessor controller clock is within these limits then the schedule is true and the system will be allowed to run. If not, the system will be off based on the schedule

Soft Load Function

To ensure soft starting of the compressors, the initial operation will be at part load with gradual loading based on load demand. This starting method prevents sudden load change and saves energy

Displayed Data

- Leaving/Entering water temperature
- Ambient temperature
- Compressor discharge pressure/temperature
- Compressor suction pressure/temperature
- Compressor drawn current
- Suction/Discharge super heat
- Compressor load percentage
- Saturated suction/discharge
- Compressor oil diff
- Compressor timers
- Digital input status
- Output relays status
- Protections status
- Historical alarm
- Schedule
- Adjustable setpoint

Safeties and Alarms

- Cutout and Un-loading:
- High discharge pressure
- High discharge temperature
- Low suction pressure
- Low suction temperature
- Freeze state
- High ampere state
- Low discharge pressure
- Unsafe suction pressure
- Unsafe discharge pressure
- Flow switch (No flow protection)
- Phase loss protection
- Low differential oil pressure
- Unsafe oil pressure
- Low oil level
- Motor temperature
- Low motor amps
- Probe error alarm

PC Support Software for Smart LinkII

MCS- connect program provides both local and remote Communication to the controller independent of the type of software. Through this program, the status of the controller can be viewed and proper authorization changes can be made to the system

The controller automatically performs history logging; this program has complete graphic functions

Ethernet Port

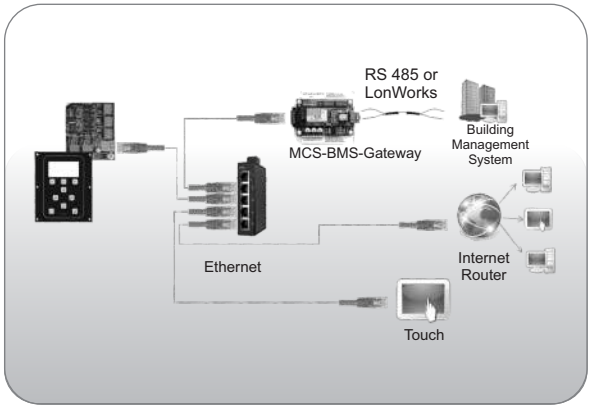
Communications can be through the 100 MBPS Ethernet Communications port on the Controller. It is necessary to use a crossover cable when connecting directly to this port from a PC BMS Communication Protocols

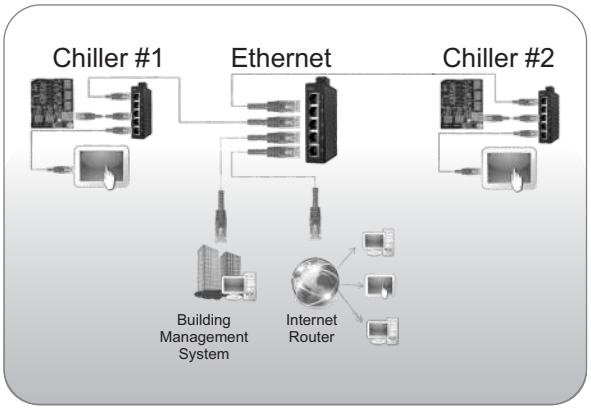
RS 485 Network

The controller RS 485 Network can support up to 20 chiller controllers and their associated I/O's. Access to this network can be local, via RS 232 connection, or remote via 14.4K Band modem
When using the dial up through the modem, there will be no degradation in the performance of the network. Each controller in the network must be assigned to a unique address . This address will be the key in establishing communication with the appropriate Controller system. This address can be changed from the LCD/keypad of the unit. The current address of controller can be viewed or changed with factory authorization. RS 232 transmission should not exceed 9 m (30 ft). in length and RS 485 transmission should not exceed 1000 m (3280 ft) without repeater

Smart Link II controller supports the following protocols

1- Bacnet IP
2- Modbus IP
3- Modbus RTU
4- Bacnet MS/TP (need BMS gateway module)
5- Johnson N2 (need BMS gateway module)
6- Lontalk (need BMS gateway module)





BMS Hard wired

Within the hardwire structure there are six features as follows:

1- RUN / STOP - (BMS to controller)
2- EMER. STOP - (BMS to controller)
3- CHILLED WATER RESET - (BMS to controller)
4- DEMAND LIMITING - (BMS to controller)
5- COMPRESSOR RUN - (controller to BMS)
6- ALARM - (controller to BMS)

PHYSICAL DATA - SI - 50/60 Hz

MODEL	WPSa	300-2	350-2	375-2	400-2	450-2	500-2
COMPRESSOR							
Type		Semi Hermetic Twin Rotary Screw					
Qty		2	2	1+1	2	2	2
Oil charge (ck1/ck2)	Liter	28/28	28/28	28/28	28/28	40/40	40/40
Speed	rpm	2,950/3,550					
WEIGHT							
Operating weight	kg	6,300	7,600	7,600	7,600	10,000	10,000
Shipping weight	kg	5,666	6,945	6,929	6,904	9,163	9,160
REFRIGERANT							
Refrigerant type		R-134a					
No. of independent circuits		2	2	2	2	2	2
Refrigerant charge 50 Hz	kg	81	95	102	109	120	133
Refrigerant charge 60 Hz	kg	93	109	117	125	137	151
EVAPORATOR							
Type		DX Shell & Tube					
Qty		1	1	1	1	1	1
Net fluid volume	Liter	535	517	506	506	647	600
Max. refrigeration pressure	Pa	1,500					
Max water pressure	Pa	1,500					
Water connection size	mm	200	200	200	200	200	200
Water connection type		Victaulic coupling					
Drain connection size	mm	13					
CONDENSER							
Type		Shell & Tube					
Qty		2					
Net fluid volume (each)	Liter	99	138	165	190	190	240
Max. refrigeration pressure	Pa	1,500					
Max water pressure	Pa	1,500					
Water connection type		Victaulic coupling					
GENERAL							
No. of capacity steps		Stepless continuous unloading for each compressor					
% minimum unit load		25%	25%	23%	25%	25%	25%
Minimum ambient temperature	°C	7					
Length	mm	5500	5500	5500	5500	6000	6000
Width	mm	1300	1400	1400	1400	2230	2230
Height	mm	2200	2200	2200	2200	2340	2340

LEGEND

Ckt : Refrigeration circuit

NOTE

* Shipping & operating weights are based on standard design components, selected options may add weight on the unit.

PHYSICAL DATA - SI - 50/60 Hz

MODEL	WPSa	600-4	700-4	750-4	800-4	900-4	1000-4
COMPRESSOR							
Type		Semi Hermetic Twin Rotary Screw					
Qty		4	4	2+2	4	4	4
Oil charge (ck1/ck2/ck3/ck4)	Liter	28/28/28/28	28/28/28/28	28/28/28/28	28/28/28/28	40/40/40/40	40/40/40/40
Speed	rpm	2,950/3,550					
WEIGHT							
Operating weight	kg	13,600	15,800	15,800	15,800	19,000	19,000
Shipping weight	kg	12,966	15,145	15,129	15,104	18,163	18,160
REFRIGERANT							
Refrigerant type		R-134a					
No. of independent circuits		4	4	4	4	4	4
Refrigerant charge 50 Hz	kg	163	190	205	218	240	266
Refrigerant charge 60 Hz	kg	186	217	234	249	273	302
EVAPORATOR							
Type		DX Shell & Tube					
Qty		2	2	2	2	2	2
Net fluid volume	Liter	535	517	506	506	647	600
Max. refrigeration pressure	Pa	1,500					
Max water pressure	Pa	1,500					
Water connection size	mm	200	200	200	200	200	200
Water connection type		Victaulic coupling					
Drain connection size	mm	13					
CONDENSER							
Type		Shell & Tube					
Qty		4					
Net fluid volume (each)	Liter	99	138	165	190	190	240
Max. refrigeration pressure	Pa	1,500					
Max water pressure	Pa	1,500					
Water connection type		Victaulic coupling					
GENERAL							
No. of capacity steps		Stepless continuous unloading for each compressor					
% minimum unit load		23%	23%	11%	23%	23%	23%
Minimum ambient temperature	°C	7					
Length	mm	12000	12000	12000	12000	12000	12000
Width	mm	2230	2230	2230	2230	2230	2230
Height	mm	2350	2350	2350	2350	2350	2350

LEGEND

Ckt : Refrigeration circuit

NOTE

* Shipping & operating weights are based on standard design components, selected options may add weight on the unit.

PHYSICAL DATA - IMP - 50/60 Hz

MODEL	WPSa	300-2	350-2	375-2	400-2	450-2	500-2
COMPRESSOR							
Type		Semi Hermetic Twin Rotary Screw					
Qty		2	2	1+1	2	2	2
Oil charge (ck1/ck2)	gal	7.4/7.4	7.4/7.4	7.4/7.4	7.4/7.4	10.6/10.6	10.6/10.6
Speed	rpm	2,950/3,550					
WEIGHT							
Operating weight	lb	13,893	16,758	16,758	16,758	22,050	22,050
Shipping weight	lb	12,494	15,314	15,278	15,223	20,204	20,198
REFRIGERANT							
Refrigerant type		R-134a					
No. of independent circuits		2	2	2	2	2	2
Refrigerant charge 50 Hz	lb	179	209	226	241	264	294
Refrigerant charge 60 Hz	lb	205	240	258	275	301	333
EVAPORATOR							
Type		DX Shell & Tube					
Qty		1	1	1	1	1	1
Net fluid volume	gal	141	137	134	134	171	159
Max. refrigeration pressure	psig	220					
Max water pressure	psig	220					
Water connection size	inch	8	8	8	8	8	8
Water connection type		Victaulic coupling					
Drain connection size	inch	1/2					
CONDENSER							
Type		Shell & Tube					
Qty		2					
Net fluid volume (each)	gal	26	36	44	50	50	63
Max. refrigeration pressure	psig	220					
Max water pressure	psig	220					
Water connection type		Victaulic coupling					
GENERAL							
No. of capacity steps		Stepless continuous unloading for each compressor					
% minimum unit load		25%	25%	23%	25%	25%	25%
Minimum ambient temperature	°F	45					
Length	inch	217	217	217	217	236	236
Width	inch	51	55	55	55	88	88
Height	inch	87	87	87	87	92	92

LEGEND

Ckt : Refrigeration circuit

NOTE

* Shipping & operating weights are based on standard design components, selected options may add weight on the unit.

PHYSICAL DATA - IMP - 50/60 Hz

MODEL	WPSa	600-4	700-4	750-4	800-4	900-4	1000-4
COMPRESSOR							
Type		Semi Hermetic Twin Rotary Screw					
Qty		4	4	2+2	4	4	4
Oil charge (ck1/ck2)	gal	7.4/7.4 /7.4/7.4	7.4/7.4 /7.4/7.4	7.4/7.4 /7.4/7.4	7.4/7.4 /7.4/7.4	10.6/10.6 /10.6/10.6	10.6/10.6 /10.6/10.6
Speed	rpm	2,950/3,550					
WEIGHT							
Operating weight	lb	29,988	34,839	34,839	34,839	41,895	41,895
Shipping weight	lb	28,590	33,395	33,359	33,304	40,049	40,043
REFRIGERANT							
Refrigerant type		R-134a					
No. of independent circuits		4	4	4	4	4	4
Refrigerant charge 50 Hz	lb	359	418	451	482	529	587
Refrigerant charge 60 Hz	lb	410	480	515	550	602	667
EVAPORATOR							
Type		DX Shell & Tube					
Qty		2	2	2	2	2	2
Net fluid volume	gal	141	137	134	134	171	159
Max. refrigeration pressure	psig	220					
Max water pressure	psig	220					
Water connection size	inch	8	8	8	8	8	8
Water connection type		Victaulic coupling					
Drain connection size	inch	1/2					
CONDENSER							
Type		Shell & Tube					
Qty		4					
Net fluid volume (each)	gal	26	36	44	50	50	63
Max. refrigeration pressure	psig	220					
Max water pressure	psig	220					
Water connection type		Victaulic coupling					
GENERAL							
No. of capacity steps		Stepless continuous unloading for each compressor					
% minimum unit load		13%	13%	11%	13%	13%	13%
Minimum ambient temperature	°F	45					
Length	inch	472	472	472	472	472	472
Width	inch	88	88	88	88	88	88
Height	inch	93	93	93	93	93	93

LEGEND

Ckt : Refrigeration circuit

NOTE

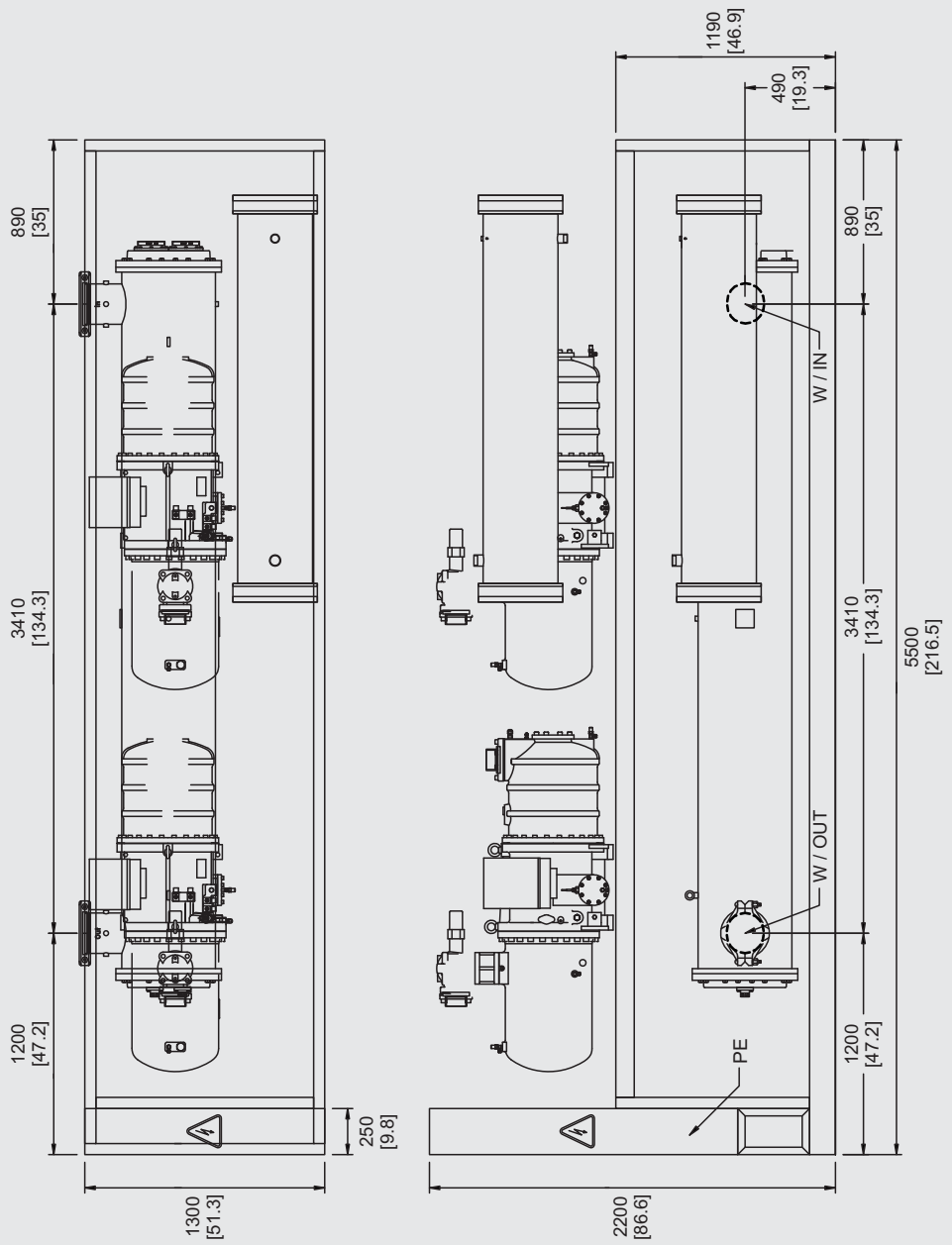
* Shipping & operating weights are based on standard design components, selected options may add weight on the unit.

MODEL LAYOUT

Model

WPSa 300-2

All dimensions are in mm [inch]



LEGEND

W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

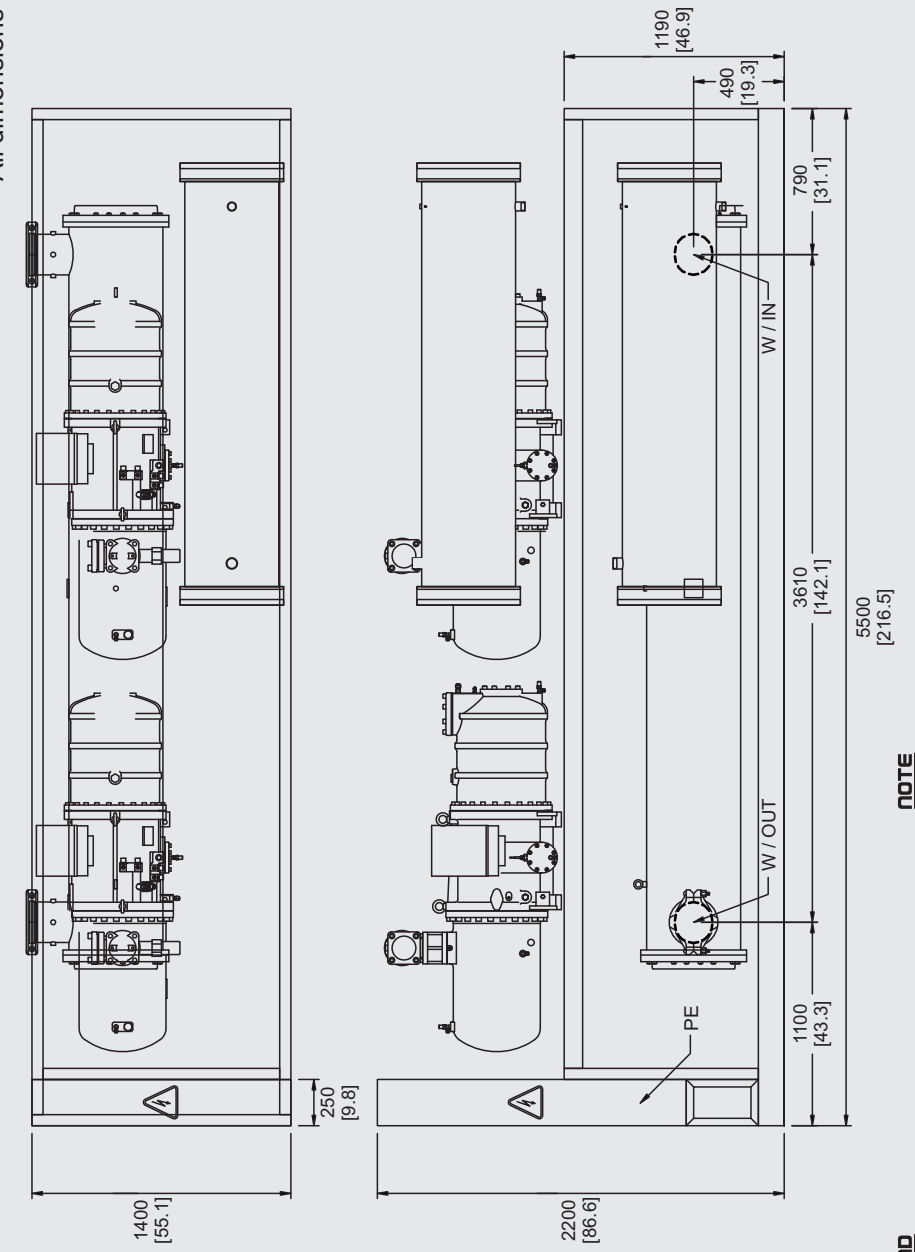
NOTE

Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.5 m (5.0 ft)
- Barrel (cooler) end side for core removal: 5.0 m (16.4 ft)
- Power entry size: 200x400 mm [7.9x15.7] inch

MODEL LAYOUT

Model
WPSa 350-2
WPSa 750-2
WPSa 400-2

All dimensions are in mm [inch]



LEGEND

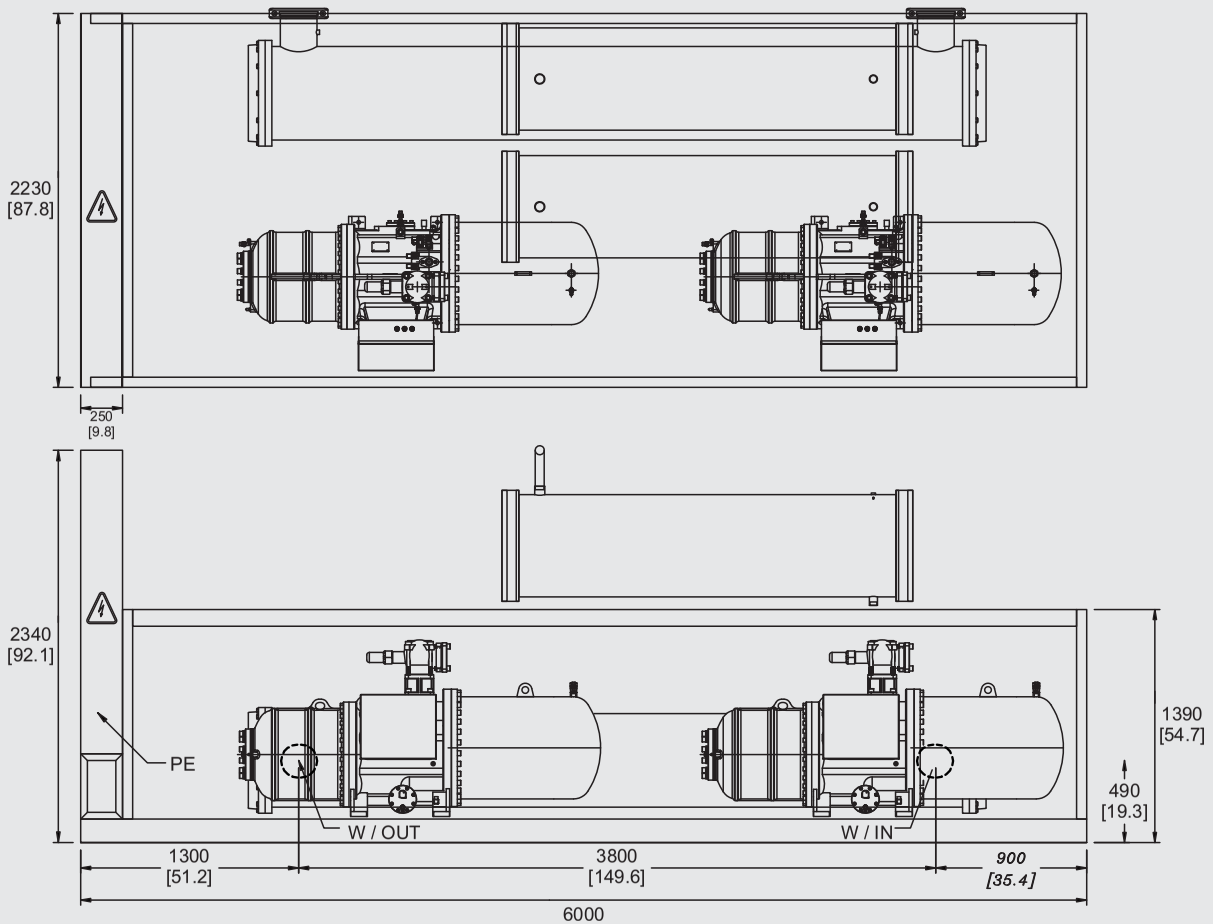
W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

NOTE

Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.5 m (5.0 ft)
- Barrel (cooler) end side for core removal: 5.0 m (16.4 ft)
- Power entry size: 200x400 mm [7.9x15.7] inch

Model
WPSa 450-2
WPSa 500-2

All dimensions are in mm [inch]



LEGEND

W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

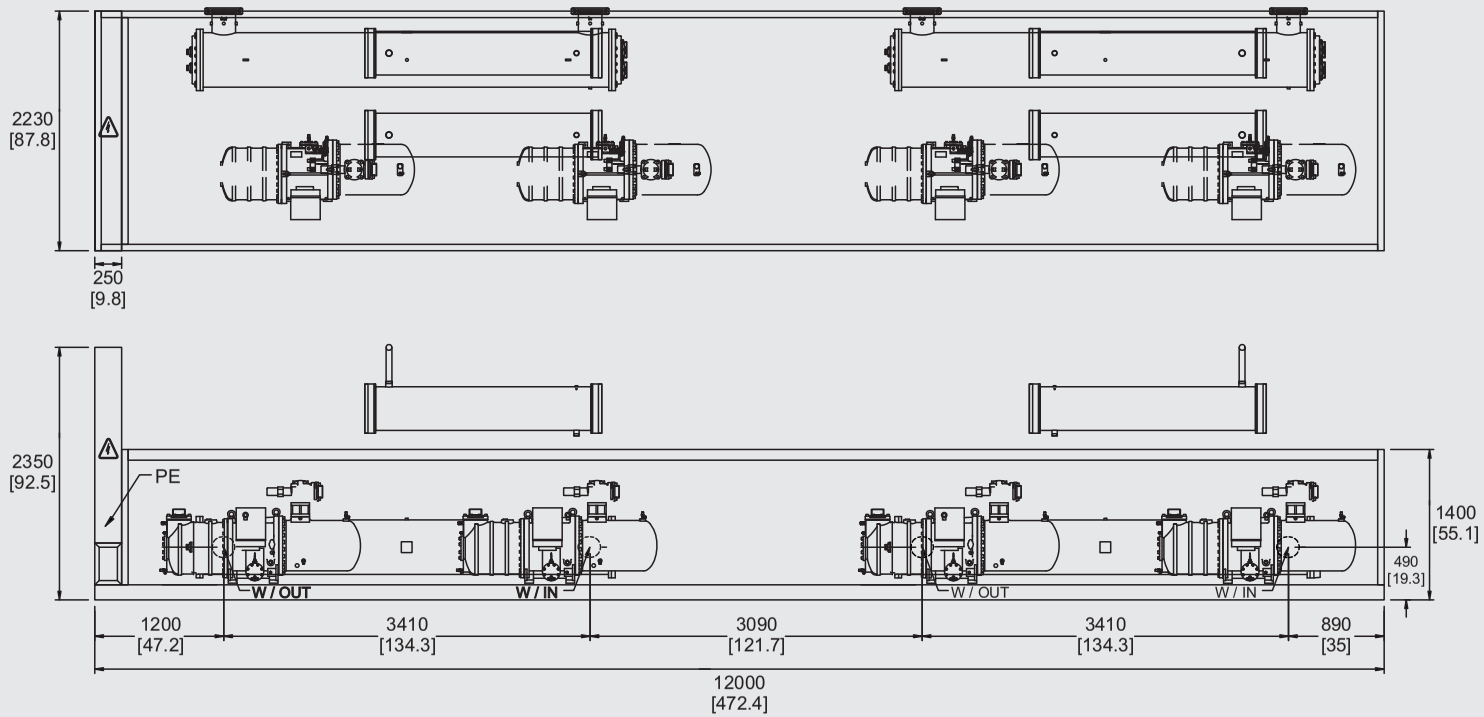
NOTE

Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.7 m (5.5 ft)
- Barrel (cooler) end side for core removal: 5.0 m (16.4 ft)
- Power entry size: 200x400 mm [7.9x15.7] inch for WPSa 450-2
- Power entry size: 200x500 mm [7.9x19.7] inch for WPSa 500-2

Model

WPSa 600-4

All dimensions are in mm [inch]



LEGEND

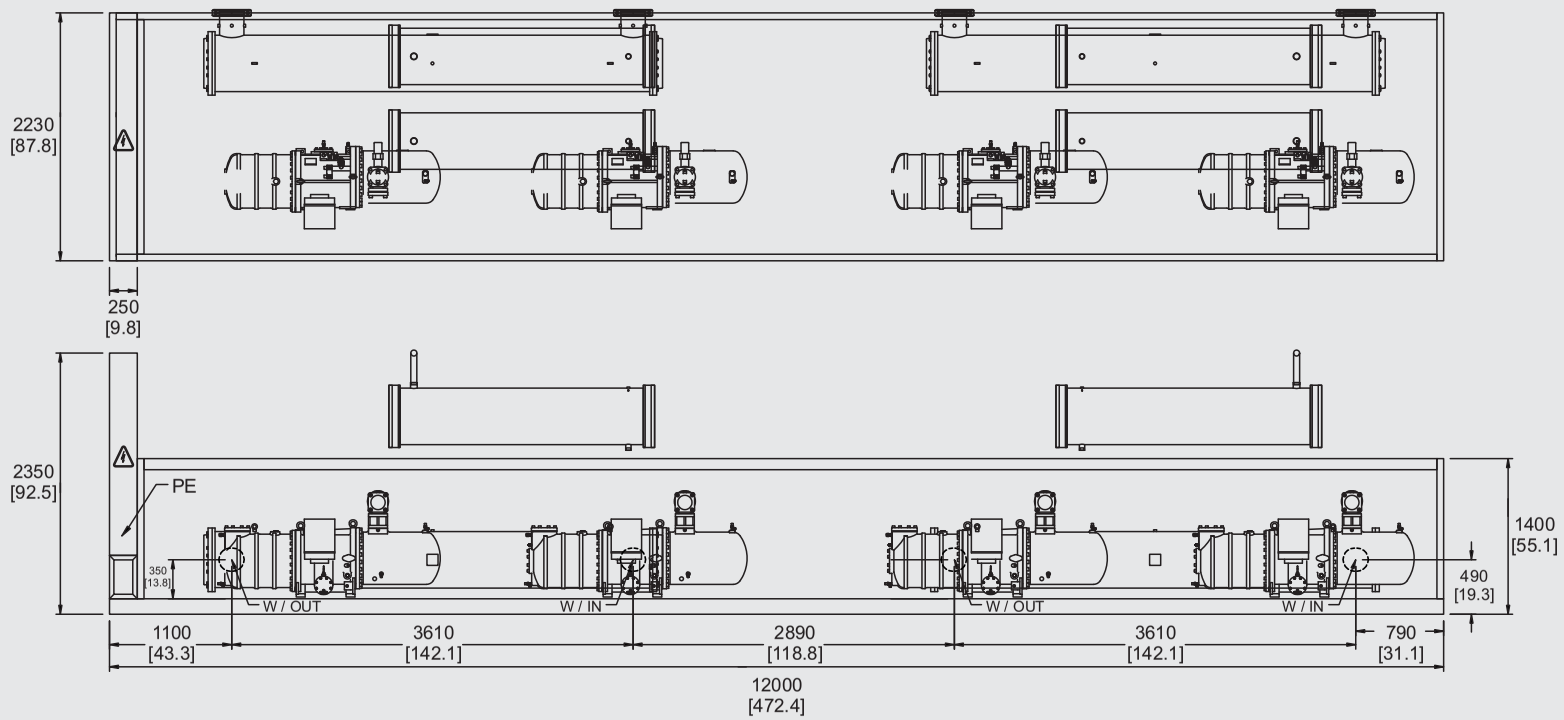
W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

NOTE

Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.7 m (5.5 ft)
- Barrel (cooler) end side for core removal: 5.0 m (16.4 ft)
- Power entry size: 200x500 mm [7.9x19.7] inch

Model
WPSa 700-4
WPSa 750-4
WPSa 800-4

All dimensions are in mm [inch]



LEGEND

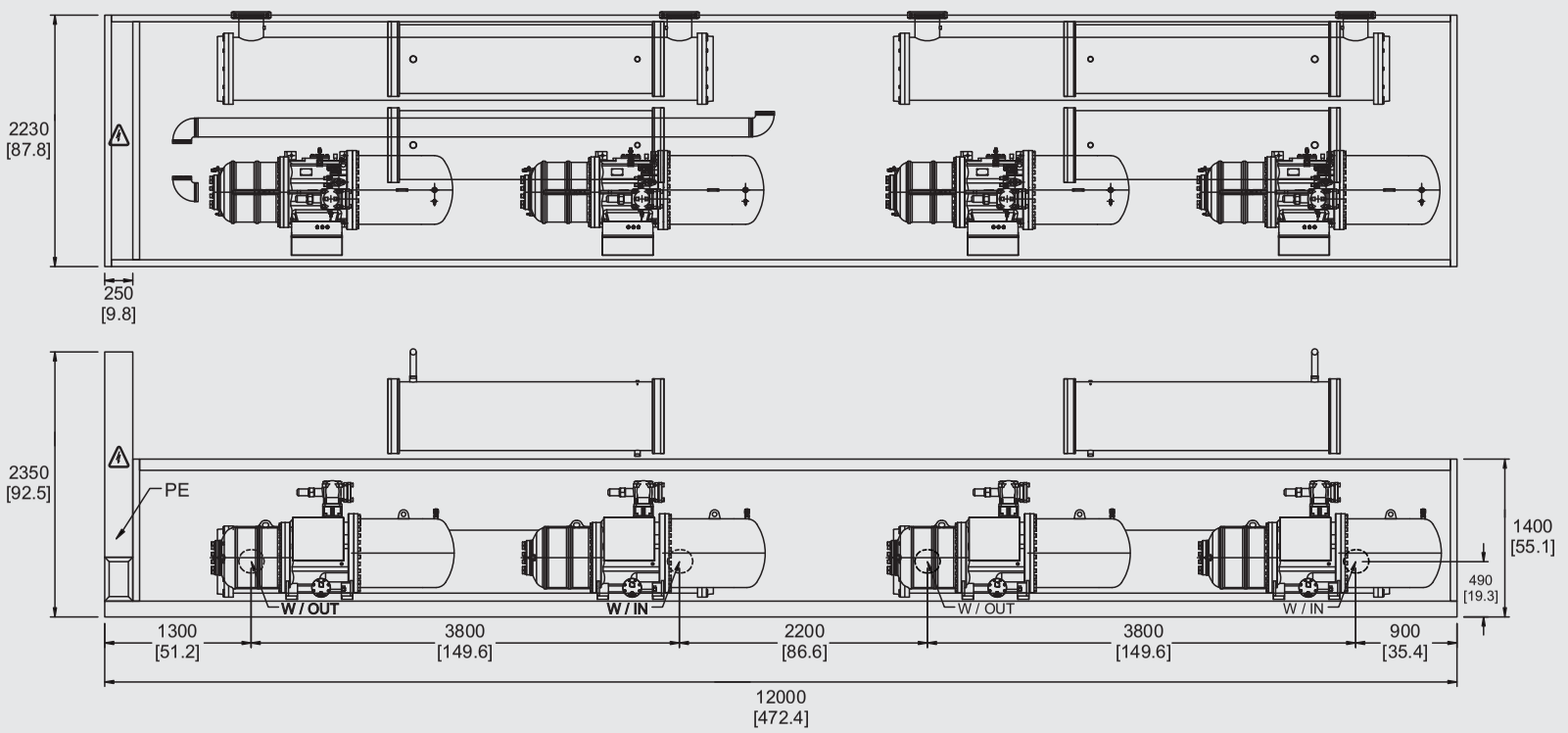
W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

NOTE

Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.7 m (5.5 ft)
- Barrel (cooler) end side for core removal: 5.0 m (16.4 ft)
- Power entry size: 200x500 mm [7.9x19.7] inch for WPSa 700-4
- Power entry size: 300x600 mm [11.8x23.6] inch for WPSa 750-4 & 800-4

Model
WPSa 900-4
WPSa 1000-4

All dimensions are in mm [inch]



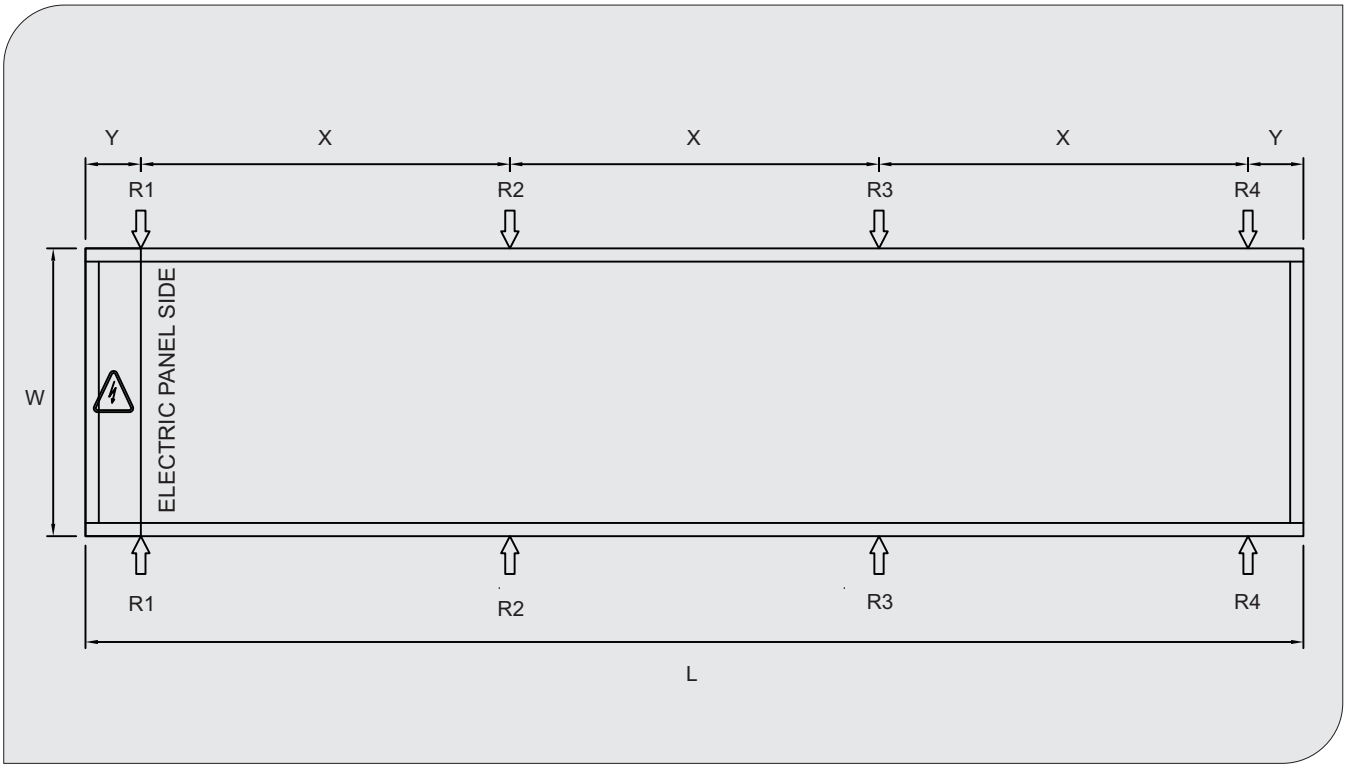
LEGEND

W / OUT: Cooler (Barrel) water outlet
W / IN: Cooler (Barrel) water inlet
PE: Power entry

NOTE

Unit clearance
- Sides: 2.5 m (8.0 ft)
- Electric panel end side: 1.7 m (5.5 ft)
- Barrel (cooler) end side for core removal: 5.0 m (16.4 ft)
- Power entry size: 300x600 mm [11.8x23.6] inch for WPSa 900-4
- Power entry size: 300x500 mm [11.8x19.7] inch for WPSa 1000-4

LOAD DISTRIBUTION



MODEL (WPSa)	L		W		X		Y	
	mm	[Inch]	mm	[Inch]	mm	[Inch]	mm	[Inch]
300-2	5500	[216.5]	1300	[51.2]	1667	[65.6]	250	[9.8]

MODEL (WPSa)	R1		R2		R3		R4		Total	
	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]
300-2	700	[1,544]	850	[1,874]	850	[1,874]	750	[1,654]	6300	[13,893]

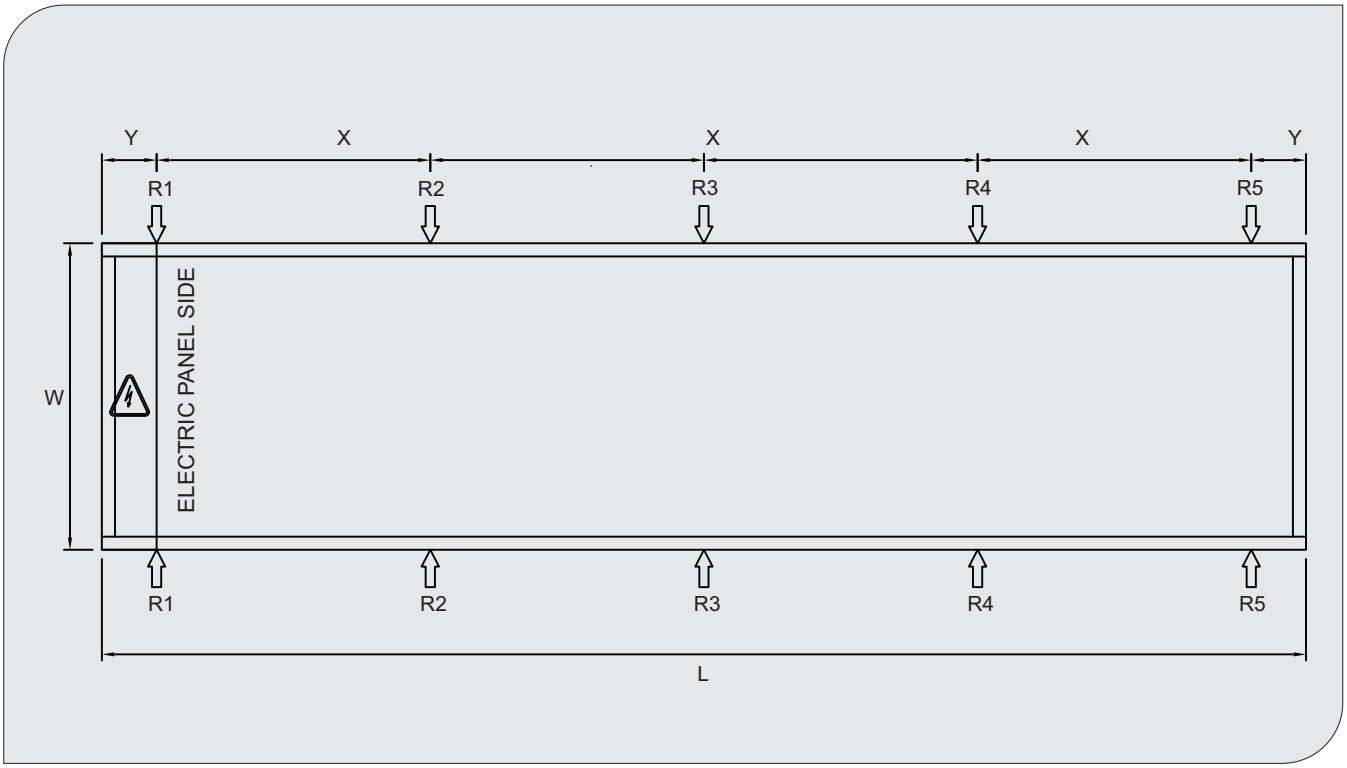
LEGEND

L: BASE LENGTH
W: BASE WIDTH
X: DISTANCE BETWEEN SUPPORTS
Y: DISTANCE BETWEEN SUPPORTS
R1, R2 , R3 , R4 : SUPPORT LOADS

NOTE

- load points & total weights are shipping point without cooler fluid content

LOAD DISTRIBUTION



MODEL (WPSa)	L		W		X		Y	
	mm	[Inch]	mm	[Inch]	mm	[Inch]	mm	[Inch]
350-2	5500	[216.5]	1400	[55.1]	1250	[49.2]	250	[9.8]
375-2	5500	[216.5]	1400	[55.1]	1250	[49.2]	250	[9.8]
400-2	5500	[216.5]	1400	[55.1]	1250	[49.2]	250	[9.8]
450-2	6000	[236.2]	2230	[87.8]	1375	[54.1]	250	[9.8]
500-2	6000	[236.2]	2230	[87.8]	1375	[54.1]	250	[9.8]

MODEL (WPSa)	R1		R2		R3		R4		R5		Total	
	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]
350-2	650	[1,433]	800	[1,764]	850	[1,874]	800	[1,764]	700	[1,544]	7,600	[16,758]
375-2	650	[1,433]	800	[1,764]	850	[1,874]	800	[1,764]	700	[1,544]	7,600	[16,758]
400-2	650	[1,433]	800	[1,764]	850	[1,874]	800	[1,764]	700	[1,544]	7,600	[16,758]
450-2	700	[1,544]	1,100	[2,426]	1200	[2,646]	1,100	[2,426]	900	[1,985]	10,000	[22,050]
500-2	700	[1,544]	1,100	[2,426]	1200	[2,646]	1,100	[2,426]	900	[1,985]	10,000	[22,050]

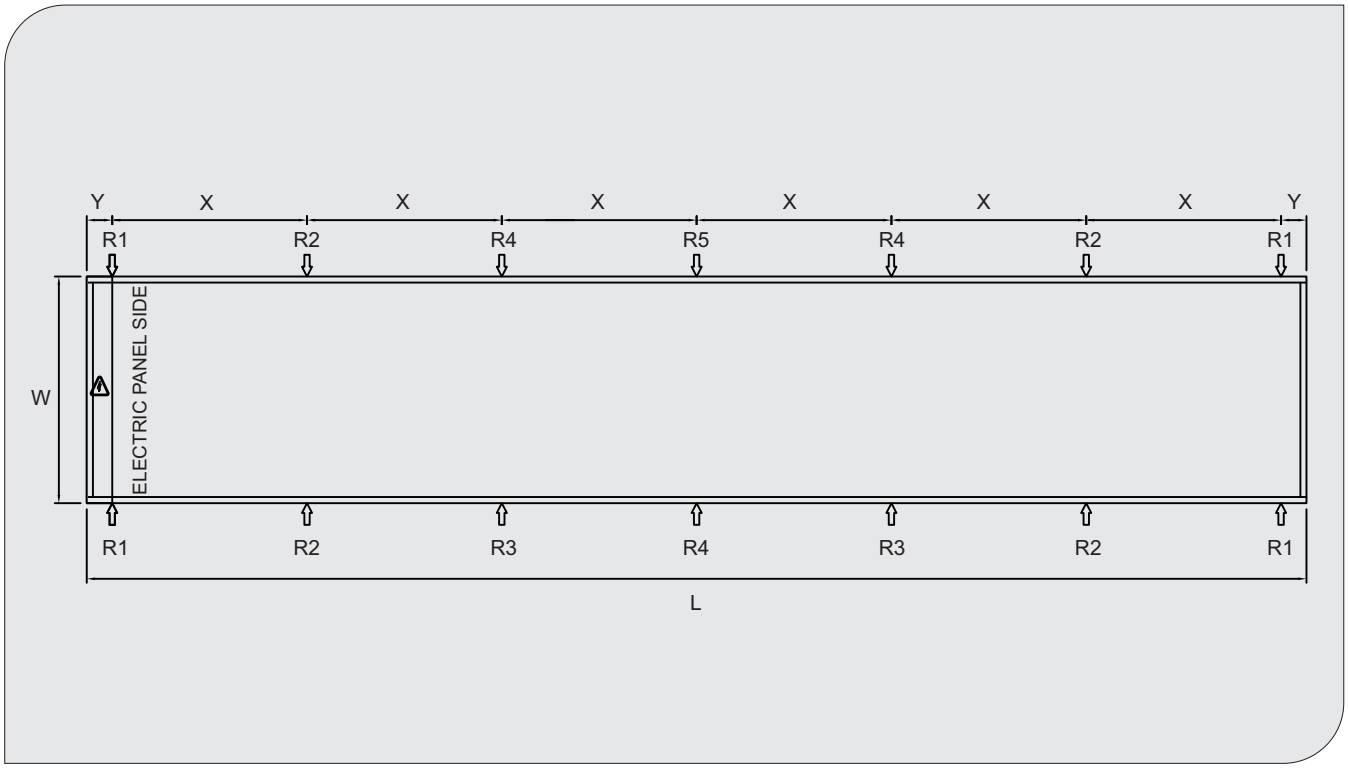
LEGEND

L: BASE LENGTH
W: BASE WIDTH
X: DISTANCE BETWEEN SUPPORTS
Y: DISTANCE BETWEEN SUPPORTS
R1, R2 , R3 , R4 , R5 : SUPPORT LOADS

NOTE

- load points & total weights are shipping point without cooler fluid content

LOAD DISTRIBUTION



MODEL (WPSa)	L		W		X		Y	
	mm	[Inch]	mm	[Inch]	mm	[Inch]	mm	[Inch]
600-4	12000	[472.4]	2230	[87.8]	1917	[75.5]	250	[9.8]

MODEL (WPSa)	R1		R2		R3		R4		R5		Total	
	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]
600-4	875	[1,929]	900	[1,985]	1,000	[2,205]	1,100	[2,426]	1,200	[2,646]	13,600	[29,988]

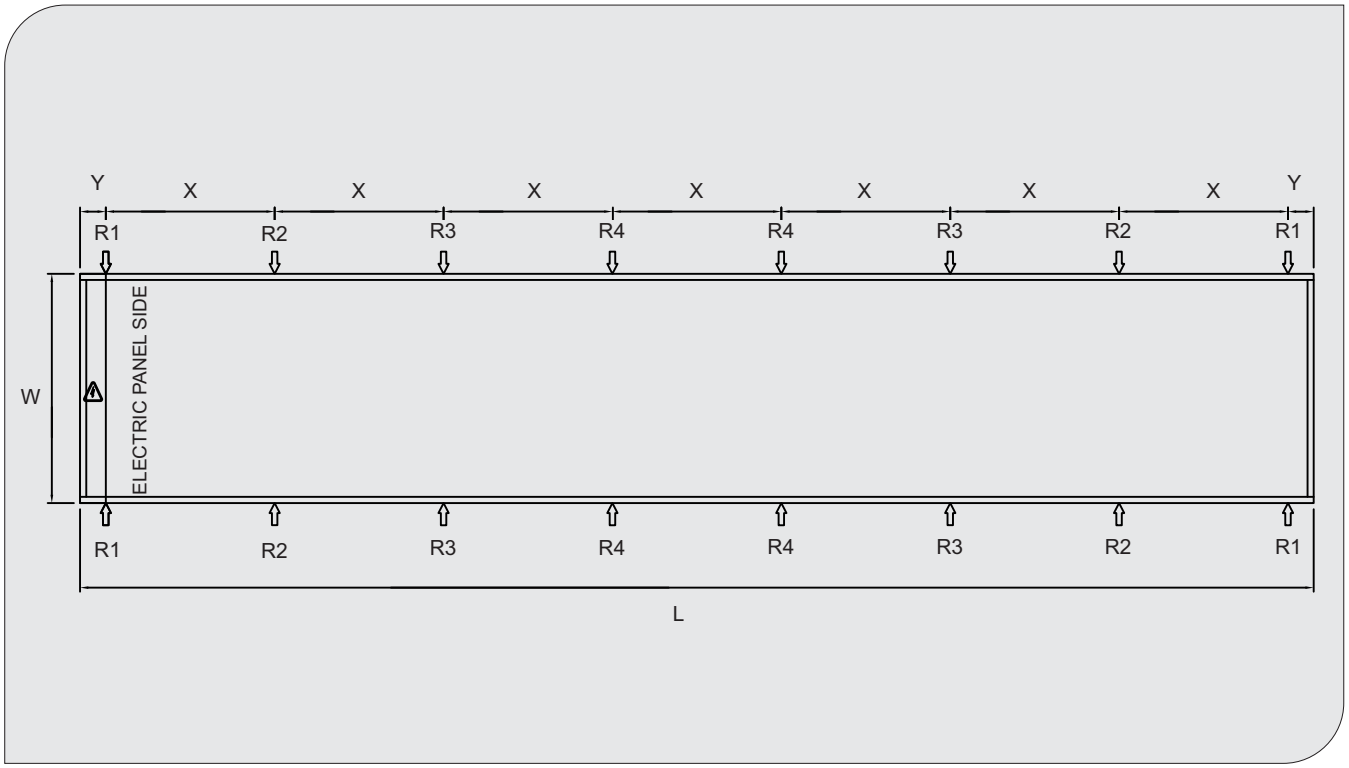
LEGEND

L: BASE LENGTH
W: BASE WIDTH
X: DISTANCE BETWEEN SUPPORTS
Y: DISTANCE BETWEEN SUPPORTS
R1, R2 , R3 , R4 , R5 : SUPPORT LOADS

NOTE

- load points & total weights are shipping point without cooler fluid content

LOAD DISTRIBUTION



MODEL (WPSa)	L		W		X		Y	
	mm	[Inch]	mm	[Inch]	mm	[Inch]	mm	[Inch]
700-4	12000	[472.4]	2230	[87.8]	1643	[64.7]	250	[9.8]
750-4	12000	[472.4]	2230	[87.8]	1643	[64.7]	250	[9.8]
800-4	12000	[472.4]	2230	[87.8]	1643	[64.7]	250	[9.8]

MODEL (WPSa)	R1		R2		R3		R4		Total	
	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]
700-4	900	[1,985]	950	[2,095]	1,000	[2,205]	1,100	[2,426]	15,800	[34,839]
750-4	900	[1,985]	950	[2,095]	1,000	[2,205]	1,100	[2,426]	15,800	[34,839]
800-4	900	[1,985]	950	[2,095]	1,000	[2,205]	1,100	[2,426]	15,800	[34,839]

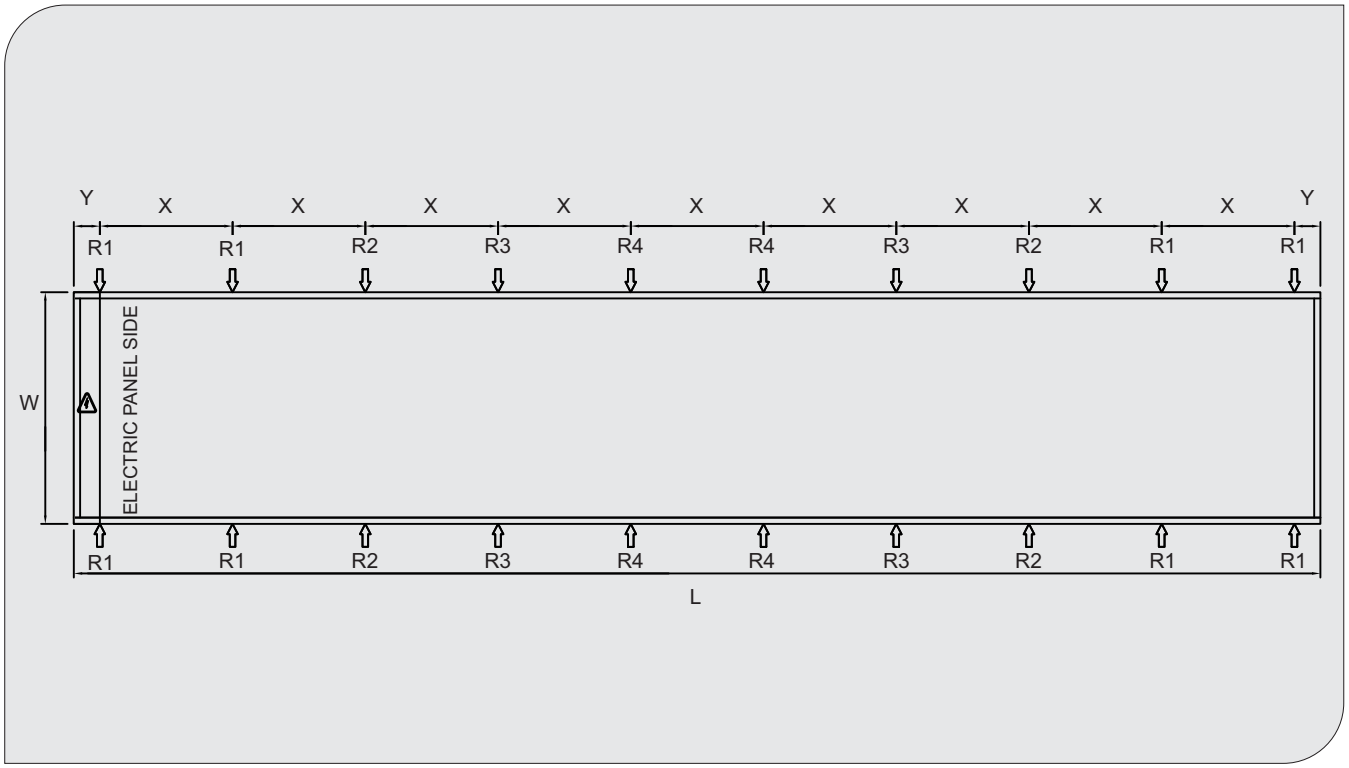
LEGEND

L: BASE LENGTH
W: BASE WIDTH
X: DISTANCE BETWEEN SUPPORTS
Y: DISTANCE BETWEEN SUPPORTS
R1, R2 , R3 , R4 : SUPPORT LOADS

NOTE

- load points & total weights are shipping point without cooler fluid content

LOAD DISTRIBUTION



MODEL (WPSa)	L		W		X		Y	
	mm	[Inch]	mm	[Inch]	mm	[Inch]	mm	[Inch]
900-4	12000	[472.4]	2230	[87.7]	1278	[50.3]	250	[9.8]
1000-4	12000	[472.4]	2230	[87.7]	1278	[50.3]	250	[9.8]

MODEL (WPSa)	R1		R2		R3		R4		Total	
	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]	kg	[lb]
900-4	850	[1,874]	950	[2,095]	1,000	[2,205]	1,100	[2,426]	19,000	[41,895]
1000-4	850	[1,874]	950	[2,095]	1,000	[2,205]	1,100	[2,426]	19,000	[41,895]

LEGEND

L: BASE LENGTH
W: BASE WIDTH
X: DISTANCE BETWEEN SUPPORTS
Y: DISTANCE BETWEEN SUPPORTS
R1, R2 , R3 , R4 : SUPPORT LOADS

NOTE

- load points & total weights are shipping point without cooler fluid content

SELECTION PROCEDURE

Before you proceed with unit selection, the capacity should be corrected according to the location where the chiller will be installed.

Selection:

To select any chiller from the WPSa series, the following should be provided.
Design capacity in kW (Tons) of refrigeration
Entering and leaving water temperature in for cooler (barrel) ºC (ºF)
Entering condenser water temperature in ºC (ºF)
Altitude of space where chiller is to be installed

Example:

Use the following data:

Design capacity	710 kW (202.0 Tons)
EWT/LWT for barrel (cooler)	12.2/6.7 ºC (54/44 ºF)
EWT for condenser	29.4 ºC (85 ºF)
Power supply	380V/3Ph/60Hz
Fouling factor (Cooler)	0.00010 ft^2.hr.ºF/BTU (0.0176 m^2.ºC/W)

Result of selection:

From the performance table on page 46 and the pressure drop curves on page 53, the operating data for the selected unit:

- Unit:	WPSa 195-2
- Capacity:	717.8 kW (204.1 Tons)
- Power input:	140.4 kW
- EWFR:	31.0 L/s (490.8 GPM)
- EWPD:	41.9 kPa (6.08 Psi)
- CWFR:	371. L/s (587.7 GPM)
- CWPD:	12.8 kPa (1.86 Psi)

LEGEND

EWT	: Entering Water Temperature
LWT	: Leaving Water Temperature
EWFR	: Evaporator Water Flow Rate
EWPD	: Evaporator Water Pressure Drop
CWFR	: Condenser Water Flow Rate
CWPD	: Condenser Water Pressure Drop

PERFORMANCE - 50 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
4	300-2	893.0	174.4	38.7	46.2	869.4	179.5	37.5	45.2	841.3	186.0	36.4	44.4
	350-2	1,043.1	195.2	45.0	53.4	1,010.4	201.0	43.7	52.4	977.7	208.4	42.4	51.4
	375-2	1,125.8	210.8	48.6	57.6	1,090.3	217.1	47.2	56.5	1,054.4	225.0	45.8	55.5
	400-2	1,191.2	225.9	51.6	61.3	1,161.0	231.1	50.4	60.4	1,127.2	239.2	48.8	59.2
	450-2	1,318.2	254.5	57.3	68.1	1,280.9	261.9	55.5	66.7	1,238.7	271.5	53.8	65.5
	500-2	1,454.6	279.2	63.0	74.9	1,418.1	285.6	61.6	73.8	1,376.6	295.5	59.6	72.4
	600-4	1,785.6	348.9	77.5	92.3	1,738.8	359.0	75.0	90.4	1,682.2	372.0	72.7	88.8
	700-4	2,086.3	390.4	90.1	106.7	2,021.2	402.1	87.5	104.7	1,955.1	416.8	84.8	102.8
	750-4	2,251.9	421.6	97.2	115.2	2,180.9	434.1	94.4	113.1	2,108.8	450.0	91.6	111.0
	800-4	2,382.1	451.8	103.3	122.5	2,321.6	462.2	100.9	120.7	2,254.0	478.3	97.7	118.3
	900-4	2,636.0	509.0	114.5	136.2	2,561.8	523.9	111.0	133.5	2,477.0	542.9	107.6	131.0
	1000-4	2,908.9	558.4	126.1	149.9	2,835.8	571.1	123.2	147.7	2,753.1	590.9	119.2	144.7

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
4	300-2	812.4	194.0	35.2	43.6	789.2	201.4	34.2	42.9	760.0	212.1	32.9	42.1
	350-2	944.3	217.4	41.0	50.4	917.2	225.7	39.9	49.7	883.1	237.7	38.4	48.8
	375-2	1,018.2	234.7	44.3	54.5	988.6	243.7	43.0	53.6	951.3	256.6	41.4	52.6
	400-2	1,088.2	249.1	47.2	58.1	1,049.1	261.0	45.6	57.0	1,009.4	274.8	43.9	55.9
	450-2	1,204.2	280.6	52.4	64.5	1,161.0	294.0	50.5	63.3	1,117.0	309.6	48.6	62.2
	500-2	1,329.8	307.7	57.7	71.0	1,281.9	322.4	55.6	69.7	1,234.1	339.5	53.5	68.4
	600-4	1,625.2	387.9	70.3	87.1	1,578.8	402.8	68.3	85.9	1,520.0	424.2	65.7	84.3
	700-4	1,888.6	434.7	82.0	100.9	1,834.5	451.4	79.7	99.4	1,766.2	475.3	76.7	97.5
	750-4	2,036.0	469.3	88.5	108.9	1,977.3	487.4	86.0	107.3	1,902.7	513.2	82.8	105.3
	800-4	2,176.3	498.2	94.5	116.1	2,097.9	522.0	91.2	113.9	2,018.4	549.7	87.7	111.8
	900-4	2,408.4	561.2	104.7	129.1	2,321.9	587.9	101.1	126.7	2,234.4	619.1	97.2	124.3
	1000-4	2,659.2	615.5	115.3	142.0	2,564.2	644.8	111.3	139.4	2,467.9	679.0	107.1	136.8

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
5	300-2	924.3	175.5	40.0	47.5	895.8	180.7	38.8	46.6	866.6	187.4	37.6	45.8
	350-2	1,074.1	196.5	46.6	55.0	1,045.6	202.4	45.2	53.9	1,011.5	209.8	43.8	52.9
	375-2	1,159.9	212.2	50.3	59.4	1,128.3	218.5	48.8	58.2	1,091.0	226.5	47.3	57.1
	400-2	1,233.4	227.3	53.3	63.1	1,194.0	234.1	51.8	61.9	1,169.4	240.7	50.4	60.8
	450-2	1,365.7	256.1	59.0	70.1	1,322.4	263.7	57.4	68.8	1,283.4	273.3	55.5	67.4
	500-2	1,501.4	281.0	65.1	77.2	1,459.6	289.2	63.2	75.7	1,421.2	297.5	61.6	74.6
	600-4	1,848.5	351.1	79.9	95.0	1,791.2	361.5	77.7	93.3	1,733.2	374.7	75.3	91.6
	700-4	2,148.5	393.0	93.2	110.1	2,091.2	404.7	90.4	107.9	2,023.0	419.6	87.6	105.9
	750-4	2,319.8	424.4	100.6	118.8	2,256.5	437.0	97.5	116.4	2,182.3	453.1	94.6	114.3
	800-4	2,466.8	454.6	106.6	126.1	2,388.4	468.2	103.5	123.8	2,338.5	481.4	100.7	121.7
	900-4	2,731.3	512.1	118.1	140.1	2,644.8	527.4	114.7	137.5	2,566.7	546.5	111.0	134.8
	1000-4	3,002.8	561.9	130.3	154.4	2,919.5	578.5	126.3	151.3	2,842.8	595.0	123.2	149.1

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
5	300-2	839.5	195.3	36.3	44.9	809.6	204.9	35.1	44.0	785.3	213.6	34.0	43.4
	350-2	977.0	218.9	42.4	52.0	948.9	227.3	41.2	51.2	913.7	239.3	39.7	50.2
	375-2	1,060.4	236.2	45.6	55.9	1,029.8	245.3	44.3	55.1	991.1	258.3	42.7	54.1
	400-2	1,129.0	250.8	48.7	59.7	1,088.5	262.8	47.0	58.6	1,047.4	276.7	45.3	57.5
	450-2	1,239.0	285.0	53.7	66.1	1,203.2	296.0	52.2	65.2	1,157.8	311.7	50.2	63.9
	500-2	1,380.1	309.8	59.5	73.0	1,330.8	324.5	57.4	71.6	1,280.9	341.7	55.2	70.3
	600-4	1,679.0	390.7	72.7	89.8	1,619.2	409.7	70.1	88.1	1,570.7	427.2	68.0	86.8
	700-4	1,954.0	437.8	84.8	103.9	1,898.1	454.6	82.4	102.4	1,827.4	478.7	79.3	100.4
	750-4	2,120.4	472.4	91.2	111.9	2,059.2	490.5	88.7	110.2	1,981.8	516.5	85.4	108.2
	800-4	2,258.3	501.6	97.5	119.4	2,176.7	525.5	94.1	117.2	2,094.4	553.4	90.6	115.0
	900-4	2,478.1	570.0	107.3	132.3	2,406.3	591.9	104.3	130.3	2,315.6	623.3	100.4	127.9
	1000-4	2,760.1	619.5	118.9	146.0	2,661.7	649.0	114.8	143.3	2,562.1	683.4	110.5	140.6

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
6	300-2	949.9	177.6	41.0	48.7	926.0	181.9	40.1	48.0	896.1	188.6	38.9	47.1
	350-2	1,106.1	198.8	47.8	56.4	1,078.3	203.7	46.7	55.6	1,050.2	211.2	45.2	54.4
	375-2	1,194.4	214.6	51.6	60.9	1,164.1	220.0	50.4	60.0	1,133.2	228.0	48.8	58.8
	400-2	1,273.5	228.7	55.0	65.0	1,240.4	235.5	53.3	63.6	1,207.7	242.4	52.0	62.7
	450-2	1,411.4	257.7	61.0	72.1	1,374.1	265.3	59.1	70.6	1,328.7	275.1	57.3	69.3
	500-2	1,560.1	282.6	67.1	79.3	1,510.9	291.1	65.2	77.9	1,471.5	299.5	63.6	76.7
	600-4	1,899.9	355.2	82.1	97.5	1,852.1	363.9	80.2	96.0	1,791.9	377.2	77.7	94.3
	700-4	2,212.5	397.5	95.6	112.9	2,156.6	407.4	93.4	111.2	2,100.7	422.4	90.4	108.9
	750-4	2,388.7	429.2	103.2	121.8	2,327.9	439.9	100.8	120.0	2,266.0	456.0	97.5	117.5
	800-4	2,547.4	457.5	110.1	129.9	2,481.2	471.1	106.7	127.2	2,415.1	484.7	104.1	125.3
	900-4	2,822.7	515.3	121.9	144.3	2,748.2	530.6	118.1	141.3	2,657.4	550.1	114.5	138.6
	1000-4	3,120.3	565.2	134.1	158.7	3,022.2	582.2	130.3	155.7	2,942.7	598.9	127.1	153.4

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
6	300-2	868.7	196.7	37.5	46.2	837.7	206.3	36.2	45.3	806.4	217.4	34.8	44.5
	350-2	1,014.7	220.3	43.7	53.4	978.4	231.1	42.2	52.4	948.9	240.9	40.9	51.6
	375-2	1,094.1	237.9	47.2	57.7	1,054.4	249.5	45.5	56.6	1,022.7	260.1	44.2	55.7
	400-2	1,166.2	252.5	50.4	61.5	1,124.0	264.6	48.6	60.3	1,081.8	278.6	46.8	59.2
	450-2	1,282.6	286.9	55.4	68.0	1,236.2	301.0	53.4	66.7	1,198.6	313.8	51.8	65.8
	500-2	1,421.2	312.0	61.5	75.3	1,370.6	326.9	59.4	73.9	1,319.2	344.2	57.2	72.5
	600-4	1,737.4	393.3	75.0	92.4	1,675.5	412.6	72.4	90.6	1,612.9	434.8	69.7	88.9
	700-4	2,029.0	440.6	87.4	106.9	1,956.5	462.2	84.4	104.8	1,898.1	481.9	81.9	103.3
	750-4	2,187.9	475.7	94.3	115.3	2,109.1	499.0	91.1	113.1	2,045.1	520.2	88.4	111.4
	800-4	2,332.1	505.1	100.7	123.0	2,248.4	529.2	97.3	120.7	2,163.3	557.3	93.7	118.4
	900-4	2,565.7	573.9	110.8	136.0	2,472.5	601.9	106.9	133.5	2,397.5	627.6	103.7	131.5
	1000-4	2,842.4	624.0	123.0	150.5	2,741.1	653.8	118.8	147.7	2,638.5	688.4	114.4	144.9

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
7	300-2	980.2	178.7	42.4	50.2	953.1	184.3	41.1	49.2	928.1	189.8	40.1	48.5
	350-2	1,142.3	200.0	49.4	58.1	1,121.6	204.9	48.1	57.2	1,085.0	212.6	46.7	56.1
	375-2	1,233.8	216.0	53.3	62.7	1,210.6	221.3	51.9	61.7	1,170.5	229.5	50.4	60.5
	400-2	1,316.8	230.1	56.8	66.9	1,282.6	237.0	55.1	65.5	1,240.1	245.9	53.4	64.3
	450-2	1,452.9	260.6	62.5	73.9	1,415.6	267.1	61.1	72.8	1,368.8	277.0	59.2	71.4
	500-2	1,607.3	284.4	69.3	81.8	1,556.6	293.0	67.4	80.2	1,511.3	303.8	65.2	78.6
	600-4	1,960.7	357.4	84.8	100.4	1,906.2	368.6	82.2	98.4	1,856.3	379.7	80.2	96.9
	700-4	2,284.6	400.0	98.8	116.3	2,242.8	409.9	96.3	114.3	2,169.6	425.2	93.4	112.2
	750-4	2,467.5	431.9	106.6	125.5	2,420.8	442.5	103.9	123.3	2,340.9	459.1	100.7	121.0
	800-4	2,633.2	460.2	113.6	133.8	2,565.3	474.1	110.1	131.0	2,480.2	491.7	106.8	128.5
	900-4	2,905.7	521.2	125.0	147.8	2,831.5	534.1	122.1	145.6	2,738.0	554.0	118.4	142.9
	1000-4	3,214.5	568.7	138.6	163.5	3,113.2	586.0	134.7	160.5	3,022.5	607.5	130.4	157.2

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
7	300-2	901.4	197.9	38.7	47.5	869.4	207.6	37.3	46.6	836.7	218.8	35.9	45.7
	350-2	1,048.1	221.8	45.2	55.0	1,010.4	232.7	43.6	54.0	972.8	245.3	42.0	53.0
	375-2	1,130.4	239.5	48.7	59.4	1,089.6	251.2	47.1	58.2	1,048.4	264.8	45.3	57.1
	400-2	1,205.6	254.2	52.0	63.3	1,162.4	266.4	50.2	62.1	1,118.4	280.5	48.4	60.9
	450-2	1,326.6	288.9	57.2	70.0	1,278.8	303.0	55.2	68.7	1,230.2	319.4	53.1	67.4
	500-2	1,469.8	314.1	63.5	77.4	1,425.4	328.9	61.2	75.8	1,372.0	346.4	58.9	74.4
	600-4	1,802.8	395.9	77.4	94.9	1,738.5	415.2	74.7	93.1	1,673.4	437.6	71.9	91.4
	700-4	2,095.8	443.7	90.4	110.1	2,021.2	465.4	87.3	108.0	1,945.3	490.5	84.0	105.9
	750-4	2,260.4	479.0	97.5	118.7	2,179.1	502.5	94.1	116.5	2,096.5	529.6	90.6	114.3
	800-4	2,411.3	508.5	104.0	126.6	2,324.4	532.8	100.5	124.2	2,236.8	561.1	96.8	121.8
	900-4	2,653.6	577.7	114.4	140.0	2,557.6	606.0	110.4	137.3	2,460.5	638.7	106.2	134.7
	1000-4	2,939.9	628.2	127.0	154.9	2,850.5	657.8	122.3	151.6	2,744.3	692.7	117.8	148.7

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
8	300-2	1,012.5	179.8	43.8	51.7	984.8	185.5	42.4	50.6	952.4	192.6	41.1	49.7
	350-2	1,181.0	201.2	51.0	59.9	1,152.2	207.6	49.4	58.6	1,121.9	214.0	48.2	57.7
	375-2	1,278.4	217.2	55.0	64.5	1,237.6	224.3	53.4	63.3	1,204.9	231.1	52.1	62.4
	400-2	1,362.5	231.5	58.6	68.8	1,319.2	238.6	57.0	67.5	1,283.4	247.4	55.1	66.1
	450-2	1,499.3	262.2	64.5	76.1	1,451.5	270.6	62.7	74.7	1,418.4	278.7	61.0	73.4
	500-2	1,658.6	286.1	71.6	84.2	1,612.5	294.8	69.4	82.5	1,559.8	305.8	67.3	80.9
	600-4	2,025.4	359.6	87.5	103.4	1,969.2	371.0	84.9	101.3	1,904.8	385.3	82.3	99.4
	700-4	2,362.4	402.4	102.0	119.7	2,304.3	415.3	98.8	117.2	2,243.8	428.0	96.4	115.5
	750-4	2,556.9	434.4	109.9	129.1	2,475.6	448.5	106.8	126.7	2,409.8	462.2	104.2	124.8
	800-4	2,725.0	462.9	117.2	137.6	2,638.1	477.3	113.9	135.1	2,566.7	494.9	110.2	132.2
	900-4	2,998.6	524.4	129.1	152.2	2,902.6	541.2	125.4	149.3	2,836.5	557.4	122.1	146.9
	1000-4	3,316.9	572.2	143.2	168.4	3,225.4	589.6	138.8	165.0	3,119.2	611.6	134.7	161.9

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
8	300-2	931.3	199.3	39.9	48.8	898.2	209.0	38.6	47.9	864.8	220.3	37.1	47.0
	350-2	1,083.6	223.3	46.7	56.6	1,044.9	234.3	45.1	55.6	1,005.9	246.9	43.4	54.5
	375-2	1,169.1	241.1	50.3	61.1	1,126.8	252.9	48.6	59.9	1,084.3	266.6	46.8	58.8
	400-2	1,238.7	258.2	53.3	64.8	1,202.8	268.2	51.9	63.9	1,157.8	282.4	50.0	62.6
	450-2	1,369.2	290.8	59.1	72.0	1,327.3	304.9	56.9	70.5	1,277.0	321.4	54.8	69.2
	500-2	1,514.8	318.9	65.0	79.2	1,471.2	331.2	63.2	78.0	1,416.3	348.7	60.9	76.5
	600-4	1,862.6	398.5	79.9	97.7	1,796.5	418.1	77.1	95.8	1,729.3	440.6	74.3	94.0
	700-4	2,167.2	446.6	93.3	113.3	2,090.2	468.6	90.1	111.1	2,012.1	493.8	86.8	109.0
	750-4	2,337.7	482.2	100.7	122.2	2,253.7	505.8	97.2	119.9	2,168.6	533.1	93.6	117.6
	800-4	2,477.7	516.4	106.6	129.7	2,405.6	536.4	103.7	127.7	2,315.2	564.8	99.9	125.3
	900-4	2,738.7	581.6	118.1	144.1	2,654.6	609.8	113.7	141.0	2,554.0	642.7	109.5	138.3
	1000-4	3,029.5	637.8	129.9	158.4	2,942.3	662.3	126.4	156.0	2,832.6	697.4	121.8	153.1

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
10	300-2	1,083.6	181.9	46.5	54.7	1,049.5	187.8	45.2	53.7	1,021.0	195.0	43.7	52.5
	350-2	1,260.5	203.6	54.4	63.5	1,229.9	210.2	52.7	62.1	1,189.4	218.5	51.1	60.9
	375-2	1,361.8	219.8	58.6	68.4	1,328.0	227.0	56.8	67.0	1,283.7	235.9	55.1	65.7
	400-2	1,441.6	235.5	62.1	72.7	1,413.8	241.5	60.5	71.4	1,366.7	250.7	58.7	70.0
	450-2	1,594.6	265.3	68.8	80.7	1,550.3	273.9	66.7	79.0	1,504.6	284.6	64.6	77.4
	500-2	1,759.9	291.0	75.7	88.7	1,715.2	298.5	74.0	87.4	1,665.7	309.7	71.7	85.6
	600-4	2,167.2	363.7	93.1	109.3	2,099.3	375.6	90.4	107.3	2,042.0	390.1	87.5	105.0
	700-4	2,521.0	407.1	108.7	126.9	2,459.8	420.4	105.3	124.2	2,378.9	437.0	102.1	121.9
	750-4	2,723.9	439.5	117.2	136.9	2,655.7	453.9	113.5	133.9	2,567.4	471.8	110.1	131.4
	800-4	2,882.9	471.0	124.3	145.3	2,827.3	482.9	121.1	142.8	2,733.4	501.3	117.5	140.1
	900-4	3,189.6	530.6	137.6	161.3	3,100.2	547.9	133.4	158.0	3,009.1	569.1	129.1	154.7
	1000-4	3,519.8	582.0	151.5	177.5	3,430.5	597.0	148.0	174.9	3,331.7	619.3	143.3	171.2

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
10	300-2	985.8	203.8	42.3	51.5	957.7	211.8	41.1	50.7	922.2	223.3	39.6	49.8
	350-2	1,156.7	226.3	49.8	60.0	1,115.6	237.4	48.1	58.9	1,074.1	250.2	46.4	57.7
	375-2	1,248.2	244.3	53.7	64.7	1,203.2	256.3	51.8	63.5	1,157.8	270.1	50.0	62.2
	400-2	1,319.2	261.7	56.9	68.7	1,277.4	274.4	54.8	67.3	1,238.7	286.1	53.2	66.2
	450-2	1,462.7	294.6	62.9	76.2	1,410.0	309.1	60.8	74.8	1,364.6	325.6	58.4	73.1
	500-2	1,618.2	323.0	69.2	83.8	1,560.1	338.9	66.8	82.2	1,513.4	353.3	64.9	80.9
	600-4	1,972.0	407.6	84.6	103.0	1,915.4	423.7	82.3	101.5	1,844.3	446.5	79.3	99.5
	700-4	2,313.5	452.5	99.5	120.0	2,231.2	474.8	96.2	117.7	2,148.2	500.5	92.7	115.4
	750-4	2,496.4	488.5	107.3	129.4	2,406.7	512.6	103.7	126.9	2,315.9	540.2	99.9	124.5
	800-4	2,638.8	523.3	113.8	137.4	2,554.4	548.8	109.7	134.5	2,477.0	572.2	106.5	132.5
	900-4	2,925.4	589.2	125.8	152.4	2,819.9	618.2	121.5	149.5	2,729.2	651.2	116.7	146.2
	1000-4	3,236.3	646.0	138.4	167.6	3,120.3	677.8	133.6	164.3	3,026.7	706.6	129.8	161.8

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
40	300-2	257.5	175.0	623.0	741.6	249.5	180.1	605.0	728.0	242.3	186.6	585.3	713.5
	350-2	299.7	195.8	725.5	858.3	291.7	201.6	703.5	841.1	282.2	209.0	682.0	825.5
	375-2	323.6	211.4	783.1	926.5	315.4	217.7	758.8	907.3	305.0	225.7	735.5	890.4
	400-2	343.9	226.5	830.0	983.6	335.2	231.8	811.0	969.2	326.0	239.8	784.4	949.1
	450-2	380.7	255.2	920.0	1,093.1	370.6	262.6	891.3	1,070.6	358.3	272.2	863.9	1,050.8
	500-2	420.8	279.9	1,012.4	1,202.2	410.2	286.3	989.2	1,184.6	396.8	296.4	959.1	1,162.6
	600-4	515.0	349.9	1,245.9	1,483.2	499.1	360.2	1,210.0	1,455.9	484.5	373.2	1,170.7	1,426.9
	700-4	599.4	391.6	1,451.0	1,716.5	583.4	403.2	1,407.0	1,682.2	564.4	418.1	1,364.0	1,651.0
	750-4	647.1	422.9	1,566.3	1,853.0	630.8	435.3	1,517.5	1,814.6	609.9	451.3	1,471.1	1,780.9
	800-4	687.9	453.1	1,660.0	1,967.2	670.4	463.6	1,622.0	1,938.4	652.1	479.7	1,568.9	1,898.2
	900-4	761.4	510.4	1,840.0	2,186.2	741.2	525.3	1,782.7	2,141.2	716.7	544.5	1,727.7	2,101.5
	1000-4	841.6	559.8	2,024.9	2,404.5	820.4	572.7	1,978.4	2,369.3	793.7	592.8	1,918.3	2,325.2

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
40	300-2	235.2	194.5	564.6	698.8	228.5	202.0	548.5	688.5	218.9	212.8	529.1	677.2
	350-2	272.5	218.0	659.7	810.1	264.8	226.4	641.2	798.2	254.9	238.4	617.3	783.3
	375-2	296.6	233.3	716.3	877.3	285.9	244.4	691.4	860.9	275.2	257.4	665.6	844.8
	400-2	314.8	249.8	759.0	931.4	303.5	261.8	732.5	914.0	292.0	275.6	705.0	896.9
	450-2	345.9	283.9	835.3	1,031.2	335.9	294.8	811.7	1,016.1	323.2	310.5	781.1	997.1
	500-2	383.3	308.7	927.9	1,140.9	369.6	323.4	895.4	1,119.6	355.7	340.6	861.7	1,098.7
	600-4	470.3	389.0	1,129.1	1,397.5	456.9	403.9	1,097.1	1,377.1	437.8	425.6	1,058.3	1,354.4
	700-4	545.1	436.1	1,319.3	1,620.2	529.5	452.8	1,282.3	1,596.3	509.8	476.8	1,234.5	1,566.5
	750-4	593.1	466.6	1,432.6	1,754.6	571.9	488.8	1,382.9	1,721.8	550.4	514.7	1,331.2	1,689.6
	800-4	629.6	499.7	1,517.9	1,862.8	606.9	523.5	1,465.0	1,828.0	583.9	551.3	1,410.0	1,793.8
	900-4	691.8	567.8	1,670.6	2,062.5	671.8	589.6	1,623.3	2,032.1	646.4	620.9	1,562.1	1,994.3
	1000-4	766.6	617.4	1,855.8	2,281.9	739.2	646.8	1,790.8	2,239.3	711.5	681.1	1,723.3	2,197.4

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
42	300-2	265.5	177.1	641.9	763.3	259.8	181.4	626.0	750.9	251.4	188.0	606.8	737.0
	350-2	311.4	197.2	751.7	886.8	303.1	203.1	729.0	868.9	293.3	210.6	706.9	852.8
	375-2	336.3	212.9	811.3	957.1	325.7	219.4	788.2	939.3	316.4	227.4	762.8	920.3
	400-2	356.3	228.1	860.7	1,017.0	346.4	234.9	834.6	996.5	337.2	241.7	814.4	981.8
	450-2	396.2	256.9	951.8	1,127.7	383.7	264.6	924.5	1,106.9	371.0	274.3	896.3	1,086.3
	500-2	435.6	281.9	1,050.0	1,243.0	421.9	290.3	1,019.9	1,220.0	412.4	298.6	993.3	1,200.1
	600-4	531.1	354.2	1,283.9	1,526.5	519.6	362.8	1,252.0	1,501.9	502.8	376.1	1,213.6	1,474.1
	700-4	622.9	394.3	1,503.5	1,773.5	606.3	406.2	1,458.0	1,737.9	586.5	421.2	1,413.7	1,705.5
	750-4	672.6	425.8	1,622.5	1,914.1	651.3	438.7	1,576.3	1,878.6	632.7	454.8	1,525.6	1,840.6
	800-4	712.5	456.3	1,721.5	2,034.0	692.7	469.9	1,669.3	1,993.1	674.3	483.4	1,628.7	1,963.7
	900-4	792.4	513.8	1,903.6	2,255.5	767.3	529.2	1,849.1	2,213.7	741.9	548.7	1,792.5	2,172.6
	1000-4	871.2	563.8	2,099.9	2,486.1	843.8	580.7	2,039.8	2,439.9	824.7	597.1	1,986.5	2,400.2

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
42	300-2	244.1	196.0	585.4	721.7	235.4	205.6	564.7	708.3	228.3	214.3	547.6	697.9
	350-2	283.3	219.7	683.9	836.8	273.1	230.5	660.1	821.1	264.9	240.3	640.4	808.9
	375-2	305.5	237.2	738.0	903.1	294.4	248.8	712.2	886.1	285.5	259.4	690.9	872.9
	400-2	326.9	251.8	786.7	961.9	315.1	263.8	759.5	943.9	303.2	277.8	731.3	926.1
	450-2	359.5	286.1	865.3	1,064.4	346.5	300.0	834.9	1,044.4	335.9	312.8	809.7	1,029.0
	500-2	398.3	311.1	961.2	1,177.7	386.2	325.7	925.4	1,153.0	371.7	343.0	890.8	1,131.3
	600-4	488.1	392.0	1,170.7	1,443.5	470.7	411.2	1,129.4	1,416.6	456.7	428.7	1,095.3	1,395.7
	700-4	566.5	439.4	1,367.8	1,673.6	546.3	460.9	1,320.1	1,642.2	529.9	480.5	1,280.7	1,617.8
	750-4	610.9	474.4	1,475.9	1,806.1	588.9	497.6	1,424.4	1,772.2	571.0	518.8	1,381.8	1,745.7
	800-4	653.8	503.5	1,573.4	1,923.9	630.3	527.6	1,519.0	1,887.7	606.5	555.5	1,462.6	1,852.1
	900-4	719.0	572.1	1,730.6	2,128.7	692.9	600.1	1,669.7	2,088.9	671.9	625.6	1,619.3	2,057.9
	1000-4	796.6	622.1	1,922.3	2,355.3	772.3	651.4	1,850.8	2,306.0	743.4	686.0	1,781.7	2,262.6

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
44	300-2	275.9	178.3	664.6	787.8	269.0	182.7	649.3	776.3	261.2	189.4	628.4	760.6
	350-2	321.5	199.6	774.4	912.4	313.4	204.6	756.7	899.0	304.7	212.2	732.5	880.7
	375-2	347.2	215.5	835.5	984.5	338.4	220.9	816.4	970.0	328.7	229.1	790.2	950.3
	400-2	370.4	229.6	890.9	1,049.7	358.6	236.7	865.6	1,030.1	348.2	245.4	837.8	1,009.2
	450-2	406.8	260.2	982.1	1,162.0	398.0	266.5	957.8	1,143.1	386.9	276.2	926.2	1,119.1
	500-2	451.8	283.8	1,087.5	1,283.8	440.0	292.3	1,053.8	1,257.0	425.6	303.1	1,021.7	1,233.4
	600-4	551.9	356.6	1,329.1	1,575.6	538.1	365.4	1,298.6	1,552.5	522.5	378.8	1,256.7	1,521.2
	700-4	643.1	399.2	1,548.8	1,824.8	626.9	409.2	1,513.4	1,798.0	609.4	424.3	1,464.9	1,761.4
	750-4	694.4	431.0	1,671.0	1,969.0	676.7	441.8	1,632.8	1,940.0	657.5	458.1	1,580.5	1,900.6
	800-4	740.9	459.3	1,781.8	2,099.3	717.3	473.3	1,731.2	2,060.3	696.4	490.7	1,675.6	2,018.4
	900-4	813.6	520.3	1,964.3	2,323.9	795.9	533.0	1,915.6	2,286.1	773.9	552.5	1,852.4	2,238.3
	1000-4	903.6	567.6	2,175.1	2,567.5	880.0	584.5	2,107.5	2,513.9	851.1	606.1	2,043.5	2,466.9

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
44	300-2	252.4	197.6	607.9	746.4	243.4	207.2	586.7	732.4	234.3	218.4	564.6	718.7
	350-2	294.3	221.4	708.8	864.2	283.8	232.2	684.4	847.9	273.2	244.7	659.0	831.8
	375-2	317.4	239.0	764.7	932.4	306.0	250.7	738.3	914.8	294.4	264.2	710.8	897.4
	400-2	338.6	253.7	816.1	994.2	328.4	265.7	786.0	973.1	316.0	279.8	757.1	954.7
	450-2	373.6	288.2	896.1	1,098.2	360.1	302.3	864.8	1,077.5	346.4	318.6	832.4	1,057.2
	500-2	413.9	313.4	995.3	1,215.1	399.1	328.3	961.0	1,192.2	384.2	345.7	925.5	1,169.6
	600-4	504.7	395.2	1,215.8	1,492.8	486.8	414.5	1,173.3	1,464.9	468.6	436.8	1,129.2	1,437.4
	700-4	588.6	442.7	1,417.7	1,728.4	567.6	464.4	1,368.7	1,695.7	546.3	489.5	1,318.0	1,663.6
	750-4	634.8	478.0	1,529.4	1,864.8	611.9	501.4	1,476.5	1,829.5	588.8	528.4	1,421.7	1,794.8
	800-4	677.1	507.4	1,632.3	1,988.4	656.7	531.4	1,572.0	1,946.2	631.9	559.6	1,514.2	1,909.3
	900-4	747.1	576.4	1,792.1	2,196.3	720.1	604.5	1,729.6	2,155.0	692.8	637.2	1,664.7	2,114.3
	1000-4	827.8	626.7	1,990.5	2,430.2	798.3	656.6	1,922.0	2,384.3	768.5	691.4	1,851.0	2,339.1

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
46	300-2	286.7	179.5	687.8	813.0	277.7	185.2	668.1	797.9	270.4	190.8	651.8	786.1
	350-2	332.9	201.0	803.1	943.3	324.0	207.4	778.6	924.1	315.5	213.7	759.8	910.4
	375-2	359.6	217.0	866.2	1,017.6	352.9	222.4	844.1	1,000.1	341.2	230.7	818.8	981.3
	400-2	384.0	231.2	923.0	1,084.3	371.8	238.3	896.9	1,064.1	361.0	247.2	868.2	1,042.3
	450-2	422.9	261.9	1,016.0	1,198.6	412.1	268.4	992.8	1,180.9	400.0	278.3	960.9	1,156.9
	500-2	467.8	285.7	1,127.1	1,326.4	454.9	294.4	1,093.1	1,299.5	439.9	305.4	1,060.1	1,275.1
	600-4	573.3	359.0	1,375.7	1,625.9	555.4	370.5	1,336.2	1,595.8	540.8	381.7	1,303.6	1,572.2
	700-4	665.9	401.9	1,606.1	1,886.5	648.1	414.8	1,557.2	1,848.1	631.1	427.5	1,519.5	1,820.7
	750-4	719.2	433.9	1,732.4	2,035.2	705.7	444.7	1,688.2	2,000.1	682.5	461.4	1,637.5	1,962.6
	800-4	768.1	462.3	1,846.0	2,168.6	743.6	476.7	1,793.9	2,128.2	722.1	494.3	1,736.5	2,084.6
	900-4	845.8	523.7	2,032.0	2,397.2	824.2	536.8	1,985.6	2,361.9	800.1	556.7	1,921.9	2,313.8
	1000-4	935.6	571.4	2,254.2	2,652.8	909.7	588.8	2,186.2	2,599.0	879.9	610.7	2,120.2	2,550.2

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
46	300-2	262.2	199.0	629.5	770.1	252.9	208.8	607.7	755.6	243.4	220.0	585.1	741.3
	350-2	306.9	222.9	733.3	890.9	296.0	233.9	708.2	874.0	284.9	246.5	682.1	857.3
	375-2	329.5	240.8	792.5	962.8	317.6	252.6	765.3	944.4	305.6	266.2	737.2	926.4
	400-2	350.7	257.8	837.9	1,020.1	340.5	267.7	814.9	1,004.8	327.7	281.9	785.2	985.6
	450-2	386.2	290.4	929.9	1,135.1	372.3	304.6	897.8	1,113.6	359.6	321.0	862.7	1,090.7
	500-2	426.5	318.5	1,023.9	1,248.9	414.3	330.8	995.6	1,230.2	398.8	348.3	959.2	1,206.7
	600-4	524.4	398.1	1,259.0	1,540.1	505.8	417.5	1,215.4	1,511.1	486.9	440.1	1,170.1	1,482.6
	700-4	613.9	445.9	1,466.6	1,781.9	592.0	467.7	1,416.3	1,748.1	569.9	493.0	1,364.3	1,714.7
	750-4	659.0	481.5	1,585.0	1,925.5	635.2	505.1	1,530.6	1,888.9	611.3	532.4	1,474.3	1,852.7
	800-4	701.3	515.5	1,675.8	2,040.2	681.0	535.4	1,629.8	2,009.6	655.4	563.8	1,570.4	1,971.2
	900-4	772.4	580.8	1,859.9	2,270.2	744.5	609.3	1,795.5	2,227.3	719.1	641.9	1,725.4	2,181.3
	1000-4	853.0	637.0	2,047.7	2,497.9	828.5	661.5	1,991.3	2,460.3	797.6	696.6	1,918.4	2,413.4

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
48	300-2	297.0	180.7	712.6	839.6	287.7	186.6	692.3	824.0	279.4	193.7	669.9	807.2
	350-2	347.7	202.2	829.6	971.9	336.8	208.8	806.1	953.7	327.9	215.2	786.7	939.5
	375-2	372.9	218.4	897.3	1,051.0	363.6	225.4	869.3	1,028.6	353.9	232.4	848.3	1,013.3
	400-2	398.6	232.7	955.5	1,119.2	385.9	240.0	928.7	1,098.3	375.5	248.9	898.3	1,074.9
	450-2	437.7	263.6	1,053.0	1,238.3	425.4	272.1	1,020.9	1,213.1	414.0	280.4	996.2	1,195.0
	500-2	486.1	287.5	1,165.7	1,368.0	470.8	296.5	1,132.9	1,342.4	457.1	307.5	1,096.7	1,314.9
	600-4	594.1	361.4	1,425.3	1,679.3	575.5	373.1	1,384.6	1,648.0	558.7	387.4	1,339.8	1,614.4
	700-4	695.5	404.3	1,659.2	1,943.7	673.6	417.6	1,612.2	1,907.4	655.9	430.5	1,573.4	1,879.0
	750-4	745.9	436.8	1,794.6	2,102.0	727.2	450.9	1,738.5	2,057.3	707.9	464.7	1,696.6	2,026.6
	800-4	797.2	465.3	1,911.1	2,238.4	771.8	479.9	1,857.4	2,196.6	750.9	497.7	1,796.5	2,149.8
	900-4	875.3	527.2	2,105.9	2,476.6	850.8	544.2	2,041.8	2,426.1	828.1	560.7	1,992.3	2,390.1
	1000-4	972.1	575.0	2,331.5	2,735.9	941.5	592.9	2,265.8	2,684.9	914.3	615.0	2,193.4	2,629.7

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
48	300-2	271.7	200.5	652.5	795.1	262.1	210.4	630.1	780.1	252.3	221.7	606.9	765.2
	350-2	316.8	224.7	761.7	921.7	305.5	235.7	735.8	904.1	295.5	248.3	707.5	885.2
	375-2	341.8	242.5	821.3	994.1	329.5	254.5	793.4	975.1	318.6	268.1	762.8	954.6
	400-2	362.4	259.7	869.6	1,054.5	351.9	269.8	845.9	1,038.6	338.7	284.1	815.3	1,018.6
	450-2	401.4	292.5	962.3	1,170.4	386.9	306.8	929.3	1,148.2	372.2	323.4	895.1	1,126.2
	500-2	441.5	320.9	1,061.6	1,289.9	431.3	333.1	1,029.5	1,267.3	415.2	350.7	992.2	1,243.0
	600-4	543.5	401.0	1,305.0	1,590.3	524.1	420.7	1,260.2	1,560.2	504.6	443.4	1,213.7	1,530.4
	700-4	633.5	449.3	1,523.3	1,843.4	611.0	471.4	1,471.6	1,808.2	591.1	496.7	1,415.0	1,770.3
	750-4	683.5	485.1	1,642.6	1,988.2	658.9	508.9	1,586.7	1,950.1	637.1	536.1	1,525.7	1,909.2
	800-4	724.9	519.5	1,739.1	2,109.0	703.9	539.6	1,691.7	2,077.1	677.4	568.2	1,630.6	2,037.2
	900-4	802.7	585.0	1,924.6	2,340.8	773.7	613.7	1,858.6	2,296.3	744.5	646.8	1,790.2	2,252.3
	1000-4	882.9	641.8	2,123.1	2,579.9	862.5	666.2	2,059.1	2,534.6	830.4	701.5	1,984.3	2,486.0

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 50 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
50	300-2	308.1	181.9	737.7	866.6	298.4	187.8	716.8	850.4	290.3	195.0	693.0	832.3
	350-2	358.4	203.6	861.5	1,005.8	349.7	210.2	834.6	984.3	338.2	218.5	809.5	965.7
	375-2	387.2	219.8	928.8	1,084.7	377.6	227.0	899.8	1,061.5	365.0	235.9	872.8	1,041.4
	400-2	409.9	235.5	984.8	1,151.7	402.0	241.5	959.6	1,131.7	388.6	250.7	931.1	1,110.3
	450-2	453.4	265.3	1,090.4	1,278.4	440.8	273.9	1,057.3	1,252.2	427.8	284.6	1,023.2	1,226.4
	500-2	500.4	291.0	1,200.4	1,406.6	487.7	298.5	1,173.2	1,385.8	473.6	309.7	1,135.9	1,357.2
	600-4	616.2	363.7	1,475.5	1,733.1	596.9	375.6	1,433.6	1,700.8	580.6	390.1	1,386.1	1,664.5
	700-4	716.8	407.1	1,722.9	2,011.7	699.4	420.4	1,669.2	1,968.7	676.4	437.0	1,619.1	1,931.5
	750-4	774.5	439.5	1,857.6	2,169.3	755.1	453.9	1,799.6	2,122.9	730.0	471.8	1,745.5	2,082.8
	800-4	819.7	471.0	1,969.5	2,303.5	803.9	482.9	1,919.3	2,263.3	777.2	501.3	1,862.2	2,220.6
	900-4	906.9	530.6	2,180.7	2,556.7	881.5	547.9	2,114.5	2,504.4	855.6	569.1	2,046.4	2,452.7
	1000-4	1,000.8	582.0	2,400.8	2,813.2	975.4	597.0	2,346.4	2,771.5	947.3	619.3	2,271.7	2,714.3

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
50	300-2	280.3	203.8	670.7	816.5	272.3	211.8	652.2	804.2	262.2	223.3	628.4	788.8
	350-2	328.9	226.3	788.9	951.2	317.2	237.4	762.3	932.9	305.4	250.2	734.8	914.9
	375-2	354.9	244.3	850.5	1,025.7	342.1	256.3	821.8	1,006.0	329.2	270.1	792.1	986.5
	400-2	375.1	261.7	901.5	1,089.1	363.2	274.4	869.1	1,066.3	352.2	286.1	844.0	1,049.9
	450-2	415.9	294.6	996.9	1,207.9	400.9	309.1	963.0	1,184.8	388.0	325.6	925.0	1,159.0
	500-2	460.1	323.0	1,096.4	1,327.9	443.6	338.9	1,059.1	1,302.4	430.3	353.3	1,028.3	1,282.5
	600-4	560.7	407.6	1,341.3	1,633.0	544.6	423.7	1,304.4	1,608.3	524.4	446.5	1,256.7	1,577.5
	700-4	657.8	452.5	1,577.8	1,902.4	634.4	474.8	1,524.6	1,865.9	610.8	500.5	1,469.6	1,829.8
	750-4	709.8	488.5	1,701.0	2,051.3	684.3	512.6	1,643.5	2,011.9	658.5	540.2	1,584.1	1,972.9
	800-4	750.3	523.3	1,803.1	2,178.3	726.3	548.8	1,738.3	2,132.5	704.3	572.2	1,687.9	2,099.9
	900-4	831.8	589.2	1,993.8	2,415.9	801.8	618.2	1,925.9	2,369.6	776.0	651.2	1,850.0	2,318.0
	1000-4	920.2	646.0	2,192.9	2,655.7	887.2	677.8	2,118.2	2,604.8	860.6	706.6	2,056.6	2,565.0

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
4	300-2	1,010.1	208.7	43.8	52.7	982.3	214.9	42.4	51.6	949.6	222.9	41.0	50.6
	350-2	1,191.9	234.3	51.7	61.7	1,159.6	241.4	50.1	60.4	1,120.9	250.5	48.5	59.3
	375-2	1,287.6	252.8	55.7	66.5	1,245.7	260.6	54.1	65.2	1,203.5	270.4	52.4	64.0
	400-2	1,369.9	269.2	59.1	70.6	1,325.6	277.1	57.4	69.3	1,280.9	287.1	55.6	68.0
	450-2	1,494.0	304.6	64.9	77.9	1,448.7	313.8	62.9	76.3	1,406.4	325.2	60.7	74.7
	500-2	1,657.2	332.5	71.9	86.1	1,612.5	341.9	69.5	84.2	1,558.4	354.2	67.4	82.6
	600-4	2,020.2	417.4	87.7	105.5	1,964.9	429.8	84.7	103.2	1,899.2	445.8	82.1	101.3
	700-4	2,383.8	468.5	103.4	123.4	2,319.1	482.7	100.1	120.8	2,241.4	500.9	97.0	118.6
	750-4	2,575.1	505.7	111.4	132.9	2,491.4	521.2	108.1	130.5	2,407.0	540.9	104.7	128.1
	800-4	2,739.7	538.5	118.2	141.1	2,651.1	554.1	114.8	138.5	2,561.4	574.2	111.2	136.0
	900-4	2,988.4	609.2	129.8	155.8	2,897.3	627.5	125.8	152.7	2,813.2	650.5	121.3	149.4
	1000-4	3,314.8	665.1	143.8	172.1	3,225.1	683.8	139.1	168.4	3,117.1	708.4	134.7	165.3

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
4	300-2	916.5	232.7	39.6	49.7	889.4	241.8	38.5	49.0	855.3	254.9	37.0	48.1
	350-2	1,089.2	259.1	47.2	58.4	1,049.8	271.8	45.5	57.3	1,009.4	286.4	43.8	56.3
	375-2	1,173.6	279.7	50.9	63.0	1,130.4	293.3	49.0	61.8	1,086.8	309.2	47.2	60.7
	400-2	1,235.5	299.4	53.7	66.7	1,201.8	310.7	52.1	65.7	1,155.3	327.2	50.1	64.4
	450-2	1,366.7	336.5	59.0	73.6	1,316.1	352.9	56.9	72.2	1,265.1	372.0	54.6	70.9
	500-2	1,503.9	369.3	65.1	81.1	1,448.7	387.3	62.7	79.6	1,404.0	403.8	60.8	78.5
	600-4	1,832.7	465.3	79.3	99.4	1,778.9	483.6	76.9	98.0	1,711.0	509.8	73.9	96.2
	700-4	2,178.8	518.2	94.4	116.9	2,099.3	543.5	91.0	114.7	2,019.1	572.9	87.5	112.6
	750-4	2,347.2	559.4	101.7	126.0	2,260.7	586.6	98.1	123.7	2,173.5	618.4	94.3	121.4
	800-4	2,471.0	598.7	107.5	133.5	2,403.5	621.4	104.2	131.3	2,311.0	654.4	100.2	128.9
	900-4	2,733.1	672.9	118.0	147.2	2,632.1	705.7	113.7	144.5	2,530.1	743.9	109.3	141.8
	1000-4	3,008.1	738.6	130.2	162.2	2,897.3	774.6	125.5	159.2	2,808.0	807.7	121.6	156.9

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
5	300-2	1,046.7	211.4	45.2	54.3	1,019.9	216.7	44.1	53.5	985.8	224.8	42.7	52.5
	350-2	1,237.3	235.7	53.3	63.4	1,197.9	243.0	51.7	62.2	1,157.4	252.2	50.1	61.1
	375-2	1,329.1	254.5	57.5	68.5	1,286.2	262.4	55.8	67.2	1,247.1	272.2	54.0	65.9
	400-2	1,410.7	272.4	60.7	72.5	1,374.1	279.0	59.3	71.4	1,327.7	289.2	57.5	70.1
	450-2	1,557.7	306.7	67.2	80.4	1,507.0	316.2	65.2	78.9	1,456.0	328.1	63.2	77.4
	500-2	1,713.1	336.7	74.1	88.6	1,668.8	344.7	72.4	87.3	1,617.8	357.1	70.0	85.5
	600-4	2,093.7	422.8	90.3	108.5	2,039.9	433.3	88.2	106.9	1,971.6	449.6	85.4	105.0
	700-4	2,474.6	471.3	106.5	126.8	2,395.4	486.0	103.4	124.5	2,315.2	504.4	100.2	122.2
	750-4	2,658.5	509.0	115.0	136.9	2,572.3	524.8	111.7	134.4	2,493.9	544.5	108.0	131.7
	800-4	2,821.7	544.9	121.5	144.9	2,747.8	558.0	118.7	142.8	2,655.0	578.3	115.0	140.2
	900-4	3,115.4	613.5	134.3	160.7	3,014.1	632.3	130.4	157.8	2,911.7	656.1	126.3	154.8
	1000-4	3,426.3	673.4	148.2	177.2	3,338.0	689.5	144.7	174.6	3,235.6	714.2	140.0	171.1

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
5	300-2	951.3	234.7	41.3	51.5	916.5	246.4	39.8	50.6	888.4	257.1	38.5	49.8
	350-2	1,117.0	263.3	48.4	59.9	1,084.3	273.7	47.0	59.1	1,042.8	288.5	45.3	58.0
	375-2	1,211.6	281.7	52.6	64.9	1,167.3	295.4	50.7	63.7	1,126.1	311.3	48.7	62.4
	400-2	1,280.5	301.5	55.6	68.8	1,237.3	316.1	53.5	67.4	1,198.9	329.6	51.9	66.4
	450-2	1,408.2	342.4	60.9	75.9	1,371.3	355.6	59.0	74.6	1,318.2	374.9	56.7	73.2
	500-2	1,566.8	372.2	67.5	83.8	1,509.1	390.4	65.1	82.2	1,451.1	411.5	62.6	80.7
	600-4	1,902.7	469.4	82.5	103.0	1,833.1	492.8	79.5	101.1	1,776.4	514.2	77.0	99.6
	700-4	2,234.0	526.7	96.9	119.9	2,168.6	547.4	94.1	118.1	2,085.9	577.0	90.5	115.9
	750-4	2,423.6	563.4	105.1	129.8	2,334.6	590.8	101.4	127.4	2,252.3	622.5	97.4	124.8
	800-4	2,561.4	603.1	111.2	137.5	2,474.6	632.3	107.0	134.8	2,397.5	659.2	103.8	132.8
	900-4	2,816.8	684.8	121.8	151.8	2,742.6	711.3	118.0	149.2	2,636.3	749.8	113.5	146.5
	1000-4	3,133.3	744.4	135.0	167.6	3,018.6	780.7	130.2	164.4	2,902.6	823.0	125.2	161.4

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
6	300-2	1,081.8	212.8	46.7	55.9	1,054.0	218.2	45.6	55.1	1,018.9	226.4	44.2	54.1
	350-2	1,274.6	237.2	55.1	65.4	1,233.8	244.7	53.5	64.2	1,196.1	253.9	51.8	62.9
	375-2	1,374.4	256.1	59.4	70.5	1,336.8	264.0	57.5	69.0	1,291.4	274.0	55.7	67.7
	400-2	1,455.3	274.2	62.7	74.6	1,407.9	282.8	60.9	73.3	1,374.1	291.1	59.3	72.1
	450-2	1,592.5	310.5	69.1	82.5	1,562.3	318.1	67.2	81.0	1,509.1	330.1	65.1	79.5
	500-2	1,775.7	338.7	76.3	91.0	1,718.4	349.2	74.1	89.3	1,672.0	359.5	72.2	88.0
	600-4	2,164.0	425.6	93.4	111.8	2,108.1	436.4	91.2	110.2	2,037.7	452.8	88.3	108.2
	700-4	2,549.1	474.4	110.2	130.7	2,467.2	489.4	107.0	128.3	2,392.3	507.9	103.5	125.8
	750-4	2,748.9	512.1	118.7	140.9	2,673.6	528.0	115.0	138.0	2,583.2	548.1	111.4	135.5
	800-4	2,910.7	548.4	125.5	149.3	2,815.4	565.5	121.8	146.5	2,747.8	582.1	118.6	144.1
	900-4	3,185.0	621.0	138.1	165.1	3,124.5	636.2	134.3	162.1	3,018.3	660.3	130.1	159.1
	1000-4	3,551.5	677.3	152.6	182.0	3,436.8	698.3	148.2	178.6	3,344.0	719.0	144.5	176.0

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
6	300-2	986.2	236.3	42.6	53.0	949.9	248.1	41.1	52.0	913.4	261.7	39.5	51.1
	350-2	1,154.3	265.2	50.0	61.7	1,124.7	275.5	48.5	60.7	1,081.8	290.4	46.7	59.6
	375-2	1,245.7	286.2	53.9	66.5	1,209.1	297.4	52.3	65.5	1,162.4	313.5	50.4	64.2
	400-2	1,331.5	303.4	57.2	70.6	1,282.3	318.2	55.2	69.2	1,232.7	335.4	53.1	68.0
	450-2	1,455.7	344.7	62.9	78.1	1,401.5	361.9	60.6	76.6	1,357.9	377.6	58.7	75.5
	500-2	1,613.6	374.9	69.9	86.4	1,554.5	393.2	67.4	84.7	1,494.7	414.5	64.8	83.2
	600-4	1,972.3	472.6	85.2	106.0	1,899.9	496.2	82.1	104.0	1,827.1	523.5	78.9	102.1
	700-4	2,308.6	530.4	100.1	123.4	2,249.1	551.0	97.1	121.4	2,163.3	580.8	93.4	119.1
	750-4	2,491.8	572.3	107.7	132.9	2,417.9	594.8	104.7	131.0	2,325.1	626.9	100.7	128.5
	800-4	2,663.4	606.8	114.4	141.1	2,564.9	636.4	110.4	138.5	2,465.4	670.8	106.2	135.9
	900-4	2,911.4	689.4	125.8	156.1	2,803.0	723.8	121.2	153.2	2,715.8	755.3	117.5	150.9
	1000-4	3,227.2	749.9	139.7	172.7	3,109.0	786.5	134.8	169.5	2,989.8	829.0	129.6	166.3

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
7	300-2	1,115.9	214.2	48.2	57.6	1,082.9	221.1	46.7	56.4	1,058.3	227.8	45.4	55.5
	350-2	1,310.1	240.0	56.5	67.0	1,283.4	246.1	55.0	65.9	1,240.1	255.5	53.4	64.6
	375-2	1,415.9	259.0	60.8	72.1	1,379.0	265.7	59.4	71.1	1,332.2	275.9	57.6	69.8
	400-2	1,500.7	275.9	64.8	76.9	1,456.7	284.5	62.8	75.3	1,424.0	292.9	61.1	74.0
	450-2	1,652.6	312.3	71.1	84.7	1,598.5	322.5	69.0	83.2	1,554.9	332.5	67.3	81.9
	500-2	1,829.2	340.9	78.9	93.8	1,770.1	351.5	76.6	92.0	1,715.6	364.8	74.1	90.2
	600-4	2,231.5	428.4	96.5	115.2	2,166.1	442.2	93.5	112.9	2,116.5	455.6	90.9	111.0
	700-4	2,619.8	480.0	113.0	134.0	2,566.4	492.2	110.1	131.7	2,480.5	511.1	106.7	129.3
	750-4	2,831.9	518.1	121.6	144.3	2,758.0	531.5	118.8	142.2	2,664.5	551.8	115.1	139.5
	800-4	3,001.8	551.9	129.6	153.8	2,913.5	569.1	125.6	150.7	2,848.1	585.8	122.2	148.1
	900-4	3,305.6	624.6	142.2	169.4	3,197.3	645.0	138.0	166.3	3,109.7	664.9	134.5	163.9
	1000-4	3,658.4	681.7	157.7	187.5	3,540.2	703.1	153.1	184.0	3,431.5	729.5	148.1	180.3

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
7	300-2	1,021.3	237.9	43.9	54.5	984.1	249.7	42.4	53.4	946.1	263.4	40.7	52.4
	350-2	1,196.8	266.9	51.6	63.4	1,152.9	280.2	49.8	62.2	1,117.7	292.4	48.3	61.3
	375-2	1,285.1	288.2	55.7	68.4	1,242.2	302.4	53.6	67.0	1,203.9	315.5	52.0	66.0
	400-2	1,373.7	305.5	59.1	72.7	1,323.1	320.4	57.0	71.3	1,271.7	337.7	54.9	69.9
	450-2	1,504.2	347.0	64.9	80.3	1,448.3	364.4	62.6	78.8	1,392.0	384.4	60.2	77.3
	500-2	1,667.4	377.5	72.1	88.8	1,606.6	395.9	69.6	87.2	1,544.7	417.3	66.9	85.5
	600-4	2,042.7	475.7	87.9	108.9	1,968.1	499.4	84.7	106.9	1,892.5	526.9	81.4	104.9
	700-4	2,393.7	533.8	103.2	126.9	2,306.1	560.5	99.5	124.5	2,235.4	584.8	96.5	122.6
	750-4	2,570.6	576.3	111.3	136.9	2,484.4	604.9	107.2	134.1	2,407.4	631.1	104.0	132.1
	800-4	2,747.5	611.0	118.2	145.3	2,645.8	640.9	114.1	142.6	2,543.5	675.5	109.8	139.9
	900-4	3,008.4	694.1	129.8	160.6	2,897.0	728.7	125.2	157.5	2,784.1	768.8	120.4	154.6
	1000-4	3,334.8	754.9	144.2	177.6	3,212.8	791.8	139.1	174.3	3,089.7	834.5	133.8	171.0

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
8	300-2	1,153.6	215.5	49.7	59.2	1,121.2	222.5	48.2	58.0	1,083.6	231.2	46.7	56.9
	350-2	1,352.3	241.5	58.3	69.0	1,316.1	249.5	56.5	67.5	1,280.5	257.3	55.1	66.5
	375-2	1,462.0	260.6	62.8	74.3	1,414.2	269.3	61.0	72.9	1,375.9	277.7	59.4	71.8
	400-2	1,553.8	277.5	66.8	79.0	1,503.2	286.4	64.9	77.5	1,456.7	297.3	62.8	76.0
	450-2	1,704.3	314.3	73.4	87.2	1,648.4	324.6	71.2	85.6	1,608.3	334.6	69.3	84.2
	500-2	1,885.8	343.0	81.4	96.5	1,830.6	353.7	78.9	94.6	1,777.1	367.0	76.3	92.6
	600-4	2,307.2	431.0	99.5	118.5	2,242.4	444.9	96.3	116.0	2,166.8	462.5	93.3	113.8
	700-4	2,704.6	483.0	116.7	138.0	2,631.8	498.9	113.0	135.1	2,561.1	514.5	110.2	133.1
	750-4	2,924.0	521.3	125.6	148.5	2,828.4	538.7	121.9	145.7	2,751.3	555.5	118.9	143.6
	800-4	3,107.6	555.1	133.6	158.0	3,006.3	572.7	129.7	155.1	2,913.8	594.5	125.5	151.9
	900-4	3,408.3	628.5	146.8	174.5	3,296.5	649.3	142.5	171.2	3,216.6	669.1	138.7	168.4
	1000-4	3,772.0	685.9	162.8	193.0	3,661.5	707.4	157.9	189.2	3,553.9	734.1	152.6	185.2

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
8	300-2	1,053.0	239.5	45.4	56.1	1,014.7	251.5	43.8	55.0	975.6	265.3	42.1	54.0
	350-2	1,235.5	268.7	53.3	65.3	1,190.5	282.2	51.4	64.1	1,144.8	297.6	49.5	62.8
	375-2	1,332.2	290.0	57.4	70.3	1,283.0	304.5	55.4	69.0	1,233.1	321.2	53.3	67.7
	400-2	1,415.6	307.6	61.1	74.8	1,367.8	322.6	58.9	73.3	1,315.0	340.0	56.7	71.9
	450-2	1,558.4	349.2	66.9	82.4	1,500.4	366.7	64.5	80.9	1,442.0	386.8	62.0	79.4
	500-2	1,714.5	383.3	73.8	90.9	1,663.9	398.4	71.7	89.5	1,600.2	419.9	69.0	87.8
	600-4	2,106.0	479.0	90.8	112.2	2,029.0	502.9	87.6	110.1	1,951.2	530.6	84.2	108.0
	700-4	2,471.4	537.4	106.6	130.6	2,381.0	564.3	102.9	128.1	2,289.6	595.3	99.0	125.7
	750-4	2,664.1	580.0	114.8	140.6	2,565.7	609.0	110.7	138.0	2,466.5	642.4	106.6	135.4
	800-4	2,830.8	615.3	122.2	149.7	2,735.9	645.1	117.7	146.6	2,630.0	679.9	113.3	143.8
	900-4	3,116.4	698.5	133.7	164.9	3,000.7	733.4	129.0	161.8	2,884.3	773.6	124.1	158.7
	1000-4	3,428.7	766.6	147.5	181.7	3,327.8	796.8	143.4	179.0	3,200.5	839.8	138.0	175.6

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - SI

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		24				27				30			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
10	300-2	1,222.9	219.4	52.6	62.4	1,183.5	227.0	51.1	61.2	1,154.6	234.4	49.8	60.3
	350-2	1,445.1	244.3	62.1	73.0	1,398.4	252.7	60.3	71.6	1,359.0	262.7	58.3	70.1
	375-2	1,557.0	263.8	66.9	78.7	1,506.0	272.7	65.0	77.2	1,458.5	283.6	62.9	75.6
	400-2	1,643.1	282.5	70.7	83.4	1,605.9	289.9	69.0	82.0	1,551.0	301.1	66.9	80.4
	450-2	1,806.3	319.9	77.6	91.9	1,758.5	328.7	75.8	90.5	1,703.6	341.7	73.3	88.6
	500-2	1,998.7	349.0	86.1	101.7	1,940.0	360.6	83.4	99.6	1,896.0	371.7	81.1	97.9
	600-4	2,446.1	438.8	105.2	124.8	2,367.3	454.1	102.2	122.5	2,309.6	468.7	99.6	120.7
	700-4	2,890.3	488.7	124.1	146.0	2,796.7	505.4	120.6	143.2	2,718.3	525.4	116.5	140.2
	750-4	3,114.0	527.5	133.8	157.3	3,012.0	545.5	129.9	154.4	2,917.0	567.3	125.8	151.3
	800-4	3,286.6	565.0	141.5	166.7	3,211.4	579.7	138.0	164.0	3,102.0	602.3	133.8	160.9
	900-4	3,612.3	639.8	155.2	183.7	3,516.6	657.3	151.6	181.0	3,407.6	683.3	146.6	177.3
	1000-4	3,997.4	698.0	172.2	203.3	3,879.6	721.2	166.9	199.2	3,792.0	743.4	162.3	195.7

ELWT (°C)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°C)											
		32				35				38			
		T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)	T.CAP (kW)	PI (kW)	EWFR (L/s)	CWFR (L/s)
10	300-2	1,126.5	245.1	48.2	59.2	1,085.0	257.6	46.4	58.1	1,043.1	272.0	44.7	57.0
	350-2	1,311.1	274.8	56.4	68.8	1,272.5	285.9	54.8	67.7	1,223.9	301.5	52.8	66.4
	375-2	1,412.1	296.6	60.7	74.1	1,370.2	308.5	59.0	73.0	1,324.5	325.2	56.6	71.4
	400-2	1,501.1	314.5	64.6	78.8	1,452.9	330.0	62.2	77.1	1,407.5	344.3	60.3	75.9
	450-2	1,650.5	357.1	70.7	86.8	1,601.3	371.5	68.7	85.5	1,539.4	391.9	66.1	83.8
	500-2	1,829.2	388.3	78.5	96.0	1,762.0	407.7	75.8	94.2	1,694.1	430.1	72.9	92.4
	600-4	2,252.6	490.2	96.3	118.4	2,170.0	515.2	92.9	116.1	2,086.3	543.9	89.4	113.9
	700-4	2,622.3	549.6	112.7	137.5	2,545.3	571.7	109.6	135.4	2,447.8	603.1	105.5	132.8
	750-4	2,824.2	593.1	121.4	148.1	2,740.1	617.0	118.0	145.9	2,649.0	650.5	113.3	142.7
	800-4	3,002.1	629.0	129.2	157.5	2,905.4	660.1	124.3	154.1	2,815.0	688.7	120.6	151.8
	900-4	3,301.1	714.2	141.3	173.5	3,202.6	743.0	137.3	170.9	3,078.4	783.7	132.2	167.6
	1000-4	3,658.4	776.6	157.0	192.0	3,524.0	815.5	151.5	188.4	3,387.9	860.2	145.8	184.7

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
40	300-2	293.4	209.3	704.4	846.4	284.0	215.7	683.6	830.9	274.6	223.7	662.0	815.6
	350-2	343.6	234.9	831.5	990.8	333.8	242.1	805.8	971.1	322.6	251.3	780.6	953.1
	375-2	370.7	253.6	896.2	1,068.2	360.5	261.3	867.9	1,046.3	348.3	271.2	840.7	1,026.9
	400-2	395.1	270.2	953.1	1,136.3	382.3	278.1	925.5	1,115.3	370.6	288.1	895.4	1,093.1
	450-2	432.4	305.6	1,045.5	1,252.9	420.6	314.7	1,010.8	1,225.6	406.3	326.5	978.8	1,203.0
	500-2	478.1	335.2	1,148.8	1,376.2	465.8	343.2	1,121.8	1,356.1	450.2	355.6	1,086.9	1,331.0
	600-4	586.8	418.6	1,408.8	1,692.8	568.1	431.3	1,367.2	1,661.7	549.1	447.5	1,323.9	1,631.1
	700-4	687.2	469.9	1,662.9	1,981.6	667.6	484.3	1,611.6	1,942.2	645.3	502.6	1,561.3	1,906.3
	750-4	741.3	507.2	1,792.4	2,136.5	720.9	522.7	1,735.8	2,092.6	696.5	542.4	1,681.5	2,053.8
	800-4	790.2	540.3	1,906.2	2,272.7	764.6	556.2	1,851.0	2,230.7	741.1	576.1	1,790.7	2,186.2
	900-4	864.9	611.2	2,091.0	2,505.8	841.2	629.4	2,021.5	2,451.2	812.6	653.0	1,957.7	2,405.9
	1000-4	956.3	670.4	2,297.6	2,752.4	931.6	686.3	2,243.7	2,712.2	900.4	711.1	2,173.8	2,662.0

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
40	300-2	265.0	233.6	639.5	800.6	257.2	242.7	620.8	788.9	247.4	255.9	596.6	774.5
	350-2	313.6	260.0	759.8	939.2	303.3	272.6	731.5	920.4	290.6	287.4	704.7	904.7
	375-2	338.4	280.6	818.2	1,011.8	326.0	294.3	789.1	993.0	313.4	310.2	758.8	974.6
	400-2	357.5	300.4	865.6	1,072.8	344.2	315.0	834.6	1,052.9	334.6	328.4	807.5	1,036.0
	450-2	394.8	337.8	952.4	1,185.4	380.2	354.2	918.1	1,163.5	365.5	373.4	882.4	1,142.1
	500-2	434.5	370.7	1,050.5	1,306.3	418.5	388.8	1,012.7	1,282.1	405.6	405.4	981.3	1,263.3
	600-4	529.9	467.1	1,278.9	1,601.1	514.4	485.5	1,241.6	1,577.9	494.7	511.7	1,193.1	1,549.0
	700-4	627.2	520.0	1,519.5	1,878.3	606.5	545.1	1,463.0	1,840.8	581.3	574.8	1,409.4	1,809.3
	750-4	676.8	561.2	1,636.4	2,023.6	651.9	588.5	1,578.2	1,986.1	626.8	620.3	1,517.6	1,949.2
	800-4	714.9	600.8	1,731.1	2,145.6	688.4	630.1	1,669.2	2,105.8	669.2	656.7	1,615.0	2,071.9
	900-4	789.6	675.5	1,904.7	2,370.8	760.4	708.5	1,836.1	2,327.0	731.0	746.8	1,764.8	2,284.2
	1000-4	868.9	741.5	2,101.1	2,612.6	837.0	777.6	2,025.4	2,564.2	811.2	810.8	1,962.6	2,526.7

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
42	300-2	302.7	212.2	730.3	875.7	295.0	217.6	713.1	862.9	287.1	225.6	687.9	844.0
	350-2	357.1	236.6	860.8	1,022.8	347.5	243.8	833.7	1,001.6	335.9	253.1	807.8	983.1
	375-2	386.3	255.3	926.4	1,101.2	373.8	263.3	899.5	1,080.8	361.1	273.3	871.5	1,060.7
	400-2	406.8	273.5	982.0	1,169.3	397.5	280.0	957.5	1,150.4	385.9	290.1	925.7	1,126.6
	450-2	450.7	307.8	1,083.9	1,294.8	436.0	317.3	1,052.3	1,270.8	421.2	329.3	1,019.3	1,247.3
	500-2	495.6	337.9	1,195.7	1,427.1	479.6	348.3	1,160.7	1,400.7	468.1	358.5	1,129.9	1,378.1
	600-4	605.5	424.5	1,460.7	1,751.4	589.9	435.2	1,426.1	1,725.8	574.1	451.2	1,375.7	1,688.0
	700-4	714.3	473.1	1,721.5	2,045.6	695.1	487.7	1,667.3	2,003.3	671.8	506.2	1,615.6	1,966.1
	750-4	772.6	510.6	1,852.7	2,202.4	747.6	526.5	1,798.9	2,161.7	722.3	546.5	1,743.0	2,121.5
	800-4	813.7	547.0	1,963.9	2,338.5	795.1	560.1	1,915.0	2,300.8	771.8	580.2	1,851.4	2,253.2
	900-4	901.3	615.7	2,167.9	2,589.5	872.0	634.7	2,104.5	2,541.7	842.4	658.6	2,038.6	2,494.6
	1000-4	991.2	675.8	2,391.4	2,854.2	959.2	696.6	2,321.5	2,801.3	936.1	717.0	2,259.7	2,756.1

ELWT (°F)	MODEL (WPSa)												
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
42	300-2	277.0	235.5	664.7	828.4	266.9	247.3	640.6	813.1	258.7	258.0	620.6	801.2
	350-2	324.2	264.3	780.9	964.8	314.6	274.7	758.7	950.5	302.6	289.5	729.9	932.8
	375-2	348.4	285.3	842.5	1,041.0	339.3	296.5	817.0	1,024.0	326.2	312.5	785.9	1,004.9
	400-2	372.3	302.6	895.2	1,105.6	358.5	317.3	863.4	1,085.0	344.6	334.5	830.4	1,064.7
	450-2	407.5	343.7	983.4	1,222.4	395.4	357.2	955.0	1,204.4	380.1	376.5	918.3	1,182.0
	500-2	451.7	373.9	1,092.4	1,352.4	436.4	392.0	1,051.7	1,325.3	419.7	413.1	1,011.2	1,300.6
	600-4	554.1	471.0	1,329.4	1,656.8	533.8	494.5	1,281.2	1,626.2	517.3	516.0	1,241.2	1,602.5
	700-4	648.3	528.6	1,561.8	1,929.5	629.3	549.4	1,517.4	1,901.1	605.3	579.1	1,459.8	1,865.6
	750-4	696.7	570.7	1,685.0	2,081.9	678.5	592.9	1,633.9	2,048.0	652.4	624.9	1,571.9	2,009.7
	800-4	744.5	605.1	1,790.3	2,211.2	717.0	634.7	1,726.8	2,170.0	689.2	668.9	1,660.8	2,129.4
	900-4	814.9	687.4	1,966.7	2,444.7	790.7	714.4	1,910.1	2,408.8	760.2	753.1	1,836.7	2,364.1
	1000-4	903.4	747.7	2,184.8	2,704.8	872.9	783.9	2,103.3	2,650.6	839.3	826.3	2,022.4	2,601.1

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
44	300-2	315.0	213.7	754.8	902.4	304.9	220.6	732.5	885.7	296.7	227.4	714.1	872.7
	350-2	368.8	239.5	885.8	1,051.3	359.3	245.7	865.1	1,035.9	347.3	255.1	838.5	1,016.6
	375-2	396.5	258.6	955.9	1,134.6	387.6	265.2	931.9	1,116.2	376.5	275.2	900.8	1,092.9
	400-2	422.9	275.3	1,015.7	1,206.0	409.0	284.0	986.3	1,183.6	399.2	292.3	960.2	1,164.3
	450-2	463.4	311.8	1,117.0	1,332.4	452.6	319.6	1,088.8	1,310.8	439.2	331.6	1,052.3	1,283.7
	500-2	512.9	340.3	1,239.2	1,474.4	500.0	350.6	1,198.1	1,441.6	483.2	363.9	1,160.8	1,414.7
	600-4	630.1	427.3	1,509.6	1,804.8	609.8	441.2	1,465.1	1,771.5	593.4	454.7	1,428.2	1,745.5
	700-4	737.7	479.0	1,771.5	2,102.6	718.6	491.4	1,730.2	2,071.7	694.6	510.2	1,676.9	2,033.2
	750-4	793.0	517.2	1,911.8	2,269.3	775.2	530.4	1,863.8	2,232.4	752.9	550.3	1,801.5	2,185.7
	800-4	845.7	550.7	2,031.3	2,411.9	818.1	568.0	1,972.5	2,367.1	798.5	584.7	1,920.4	2,328.6
	900-4	926.8	623.5	2,233.9	2,664.7	905.3	639.2	2,177.7	2,621.7	878.4	663.1	2,104.6	2,567.3
	1000-4	1,025.8	680.6	2,478.4	2,948.7	1,000.1	701.2	2,396.1	2,883.2	966.4	727.8	2,321.6	2,829.5

ELWT (°F)	MODEL (WPSa)												
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
44	300-2	286.3	237.4	690.3	856.5	275.9	249.3	665.5	840.6	265.3	263.0	639.7	825.0
	350-2	336.4	266.3	809.3	996.0	324.1	279.6	780.6	977.3	314.1	291.7	756.9	962.8
	375-2	363.1	287.4	871.0	1,072.4	349.7	301.7	840.1	1,052.2	338.9	314.8	814.5	1,036.6
	400-2	385.1	304.9	928.8	1,142.5	370.9	319.8	896.1	1,121.1	357.7	337.0	860.6	1,098.3
	450-2	423.6	346.2	1,017.2	1,259.7	407.9	363.5	980.8	1,236.2	392.0	383.5	942.9	1,213.1
	500-2	469.6	376.6	1,129.9	1,393.8	452.4	394.9	1,090.0	1,367.7	435.0	416.3	1,048.6	1,342.0
	600-4	572.7	474.8	1,380.5	1,713.1	551.7	498.5	1,331.0	1,681.2	530.5	525.9	1,279.5	1,649.9
	700-4	672.8	532.6	1,618.6	1,991.9	648.2	559.2	1,561.3	1,954.6	628.3	583.5	1,513.9	1,925.5
	750-4	726.3	574.7	1,742.0	2,144.8	699.4	603.4	1,680.1	2,104.5	677.7	629.6	1,629.0	2,073.1
	800-4	770.3	609.9	1,857.5	2,285.0	741.8	639.7	1,792.2	2,242.1	715.5	674.0	1,721.3	2,196.5
	900-4	847.2	692.4	2,034.4	2,519.5	815.8	727.0	1,961.5	2,472.4	784.0	767.0	1,885.8	2,426.1
	1000-4	939.1	753.1	2,259.9	2,787.6	904.8	789.9	2,180.0	2,735.4	870.1	832.6	2,097.1	2,684.0

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
46	300-2	325.6	215.2	783.0	932.9	315.1	222.3	760.1	915.6	306.7	230.8	733.0	895.1
	350-2	381.4	241.2	918.7	1,086.8	370.5	249.2	890.3	1,064.8	360.5	256.9	868.3	1,049.1
	375-2	411.7	260.3	989.3	1,170.8	400.4	268.9	957.9	1,146.3	389.5	277.3	934.2	1,129.3
	400-2	437.8	277.2	1,052.3	1,245.6	425.6	285.9	1,019.3	1,219.5	411.1	296.8	987.9	1,196.7
	450-2	482.4	313.7	1,153.5	1,372.0	466.6	324.1	1,119.7	1,346.5	453.8	334.1	1,091.8	1,326.7
	500-2	533.8	342.4	1,279.7	1,518.3	516.6	353.2	1,242.7	1,490.0	500.7	366.6	1,202.1	1,459.9
	600-4	651.3	430.4	1,566.0	1,865.8	630.3	444.5	1,520.1	1,831.2	613.5	461.6	1,465.9	1,790.3
	700-4	762.8	482.4	1,837.4	2,173.7	741.0	498.3	1,780.6	2,129.7	721.0	513.9	1,736.6	2,098.2
	750-4	823.4	520.7	1,978.7	2,341.6	800.8	537.7	1,915.9	2,292.5	778.9	554.5	1,868.4	2,258.6
	800-4	875.7	554.4	2,104.7	2,491.1	851.3	571.8	2,038.6	2,439.1	822.3	593.7	1,975.8	2,393.4
	900-4	964.8	627.5	2,306.9	2,744.1	933.1	648.1	2,239.4	2,693.1	907.6	668.2	2,183.5	2,653.3
	1000-4	1,067.7	684.8	2,559.4	3,036.6	1,033.2	706.5	2,485.4	2,980.1	1,001.5	733.2	2,404.2	2,919.7

ELWT (°F)	MODEL (WPSa)												
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
46	300-2	298.1	239.1	713.3	881.9	287.2	251.0	688.0	865.4	276.2	264.8	661.6	849.2
	350-2	349.9	268.2	837.5	1,026.9	337.1	281.7	808.1	1,007.5	324.1	297.1	777.6	988.5
	375-2	375.7	289.6	903.6	1,108.0	361.8	304.1	871.8	1,087.1	347.8	320.8	838.9	1,066.5
	400-2	399.4	307.2	962.0	1,178.9	386.0	322.1	926.7	1,154.8	371.1	339.5	892.0	1,132.9
	450-2	437.7	348.9	1,055.7	1,301.8	422.8	366.2	1,016.3	1,275.4	406.4	386.3	977.5	1,251.3
	500-2	485.3	382.6	1,159.2	1,429.2	471.0	397.7	1,126.4	1,407.9	452.9	419.2	1,084.0	1,381.3
	600-4	596.2	478.1	1,426.7	1,763.9	574.4	502.0	1,375.9	1,730.9	552.4	529.6	1,323.2	1,698.5
	700-4	699.7	536.5	1,675.1	2,053.8	674.1	563.3	1,616.2	2,015.1	648.3	594.2	1,555.3	1,976.9
	750-4	751.4	579.2	1,807.1	2,216.1	723.6	608.1	1,743.6	2,174.2	695.6	641.5	1,677.7	2,132.9
	800-4	798.9	614.4	1,924.0	2,357.8	772.0	644.2	1,853.4	2,309.6	742.2	679.0	1,784.0	2,265.8
	900-4	875.4	697.9	2,111.3	2,603.6	845.6	732.4	2,032.6	2,550.7	812.7	772.7	1,954.9	2,502.6
	1000-4	970.5	765.3	2,318.5	2,858.4	941.9	795.4	2,252.8	2,815.8	905.8	838.3	2,167.9	2,762.6

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
48	300-2	337.6	216.6	810.5	962.6	326.7	223.8	786.9	944.7	316.7	232.6	761.0	925.6
	350-2	396.4	242.8	950.2	1,120.8	383.6	250.9	922.7	1,099.9	372.8	260.8	891.7	1,076.5
	375-2	426.3	262.1	1,025.0	1,209.2	414.7	270.8	992.5	1,183.6	400.5	281.6	961.9	1,161.4
	400-2	454.7	279.0	1,088.3	1,284.4	439.8	288.0	1,057.1	1,260.4	426.3	299.0	1,022.8	1,234.7
	450-2	497.3	316.0	1,197.5	1,419.4	484.4	326.3	1,157.9	1,388.0	467.8	339.2	1,121.9	1,362.0
	500-2	550.6	346.6	1,315.6	1,558.9	536.2	355.6	1,285.0	1,535.9	518.2	369.3	1,245.6	1,507.1
	600-4	675.2	433.3	1,621.0	1,925.2	653.5	447.7	1,573.8	1,889.4	633.4	465.2	1,521.9	1,851.1
	700-4	792.9	485.5	1,900.4	2,241.6	767.2	501.9	1,845.5	2,199.8	745.6	521.7	1,783.5	2,153.1
	750-4	852.6	524.2	2,050.0	2,418.3	829.3	541.6	1,985.0	2,367.3	801.0	563.2	1,923.7	2,322.8
	800-4	909.3	558.0	2,176.6	2,568.7	879.6	575.9	2,114.3	2,520.8	852.6	597.9	2,045.7	2,469.3
	900-4	994.6	632.0	2,395.1	2,838.8	968.7	652.6	2,315.7	2,775.9	935.6	678.5	2,243.7	2,723.9
	1000-4	1,101.2	693.2	2,631.1	3,117.9	1,072.5	711.2	2,570.0	3,071.9	1,036.3	738.6	2,491.2	3,014.2

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
48	300-2	305.6	243.2	735.6	908.2	297.5	252.9	713.3	893.2	286.1	266.8	686.2	876.4
	350-2	362.3	270.3	868.3	1,060.5	349.0	283.8	838.1	1,040.3	335.7	299.4	806.8	1,020.5
	375-2	389.1	291.8	936.6	1,144.0	376.2	306.2	902.1	1,120.3	361.6	323.0	868.3	1,098.9
	400-2	411.1	312.3	989.4	1,211.3	400.3	324.5	959.9	1,191.1	384.9	342.0	924.3	1,168.4
	450-2	454.4	351.4	1,092.1	1,341.7	437.6	369.0	1,053.7	1,316.3	421.9	389.1	1,011.8	1,289.3
	500-2	501.5	385.6	1,202.4	1,476.3	483.1	404.8	1,160.0	1,448.3	470.3	422.2	1,121.9	1,423.1
	600-4	611.1	486.5	1,471.2	1,816.4	594.9	505.8	1,426.5	1,786.4	572.1	533.6	1,372.4	1,752.7
	700-4	724.6	540.5	1,736.6	2,120.9	698.1	567.6	1,676.2	2,080.7	671.4	598.7	1,613.6	2,041.0
	750-4	778.2	583.5	1,873.2	2,288.0	752.3	612.5	1,804.2	2,240.7	723.2	646.1	1,736.7	2,197.8
	800-4	822.3	624.6	1,978.8	2,422.6	800.6	648.9	1,919.8	2,382.3	769.7	684.0	1,848.5	2,336.8
	900-4	908.8	702.8	2,184.2	2,683.4	875.2	738.0	2,107.4	2,632.7	843.9	778.2	2,023.7	2,578.5
	1000-4	1,003.0	771.1	2,404.8	2,952.5	966.1	809.7	2,320.1	2,896.5	940.5	844.3	2,243.8	2,846.2

LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

PERFORMANCE - 60 Hz - IMP

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		75				80				85			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
50	300-2	347.7	219.4	834.0	989.1	336.5	227.0	809.6	970.7	328.3	234.4	789.3	956.3
	350-2	410.9	244.3	983.9	1,156.9	397.6	252.7	955.6	1,135.3	386.4	262.7	923.6	1,111.0
	375-2	442.7	263.8	1,060.1	1,246.9	428.2	272.7	1,029.6	1,223.5	414.7	283.6	996.6	1,199.0
	400-2	467.2	282.5	1,121.3	1,321.2	456.6	289.9	1,093.3	1,299.4	441.0	301.1	1,060.1	1,274.9
	450-2	513.6	319.9	1,229.8	1,456.0	500.0	328.7	1,201.1	1,434.5	484.4	341.7	1,161.7	1,405.1
	500-2	568.3	349.0	1,364.4	1,611.3	551.6	360.6	1,322.3	1,578.4	539.1	371.7	1,286.1	1,551.1
	600-4	695.5	438.8	1,668.1	1,978.2	673.1	454.1	1,619.1	1,941.3	656.7	468.7	1,578.7	1,912.5
	700-4	821.8	488.7	1,967.7	2,313.7	795.2	505.4	1,911.2	2,270.5	772.9	525.4	1,847.1	2,222.0
	750-4	885.4	527.5	2,120.2	2,493.7	856.4	545.5	2,059.2	2,447.0	829.4	567.3	1,993.2	2,397.9
	800-4	934.5	565.0	2,242.5	2,642.4	913.1	579.7	2,186.5	2,598.7	882.0	602.3	2,120.1	2,549.8
	900-4	1,027.1	639.8	2,459.6	2,912.0	999.9	657.3	2,402.1	2,869.0	968.9	683.3	2,323.3	2,810.2
	1000-4	1,136.6	698.0	2,728.8	3,222.6	1,103.1	721.2	2,644.6	3,156.9	1,078.2	743.4	2,572.1	3,102.2

ELWT (°F)	MODEL (WPSa)	CONDENSER ENTERING WATER TEMPERATURE (°F)											
		90				95				100			
		T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)	T.CAP (Tons)	PI (kW)	EWFR (GPM)	CWFR (GPM)
50	300-2	320.3	245.1	763.2	938.2	308.5	257.6	736.2	920.5	296.6	272.0	708.2	902.9
	350-2	372.8	274.8	893.4	1,089.9	361.8	285.9	868.4	1,073.4	348.0	301.5	836.3	1,052.8
	375-2	401.5	296.6	962.0	1,174.1	389.6	308.5	935.1	1,156.3	376.6	325.2	897.7	1,131.2
	400-2	426.8	314.5	1,023.6	1,248.5	413.1	330.0	985.1	1,221.6	400.2	344.3	955.8	1,203.1
	450-2	469.3	357.1	1,120.1	1,375.1	455.3	371.5	1,088.5	1,354.5	437.7	391.9	1,047.7	1,328.6
	500-2	520.1	388.3	1,244.1	1,521.7	501.0	407.7	1,200.7	1,492.7	481.7	430.1	1,155.6	1,464.1
	600-4	640.5	490.2	1,526.5	1,876.5	617.0	515.2	1,472.4	1,840.9	593.2	543.9	1,416.3	1,805.9
	700-4	745.6	549.6	1,786.7	2,179.8	723.7	571.7	1,736.9	2,146.8	696.0	603.1	1,672.6	2,105.6
	750-4	803.0	593.1	1,924.0	2,348.1	779.1	617.0	1,870.2	2,312.6	753.2	650.5	1,795.4	2,262.3
	800-4	853.6	629.0	2,047.2	2,497.1	826.1	660.1	1,970.2	2,443.2	800.4	688.7	1,911.6	2,406.1
	900-4	938.6	714.2	2,240.2	2,750.3	910.6	743.0	2,177.0	2,708.9	875.3	783.7	2,095.3	2,657.2
	1000-4	1,040.2	776.6	2,488.3	3,043.4	1,002.0	815.5	2,401.4	2,985.4	963.3	860.2	2,311.3	2,928.1

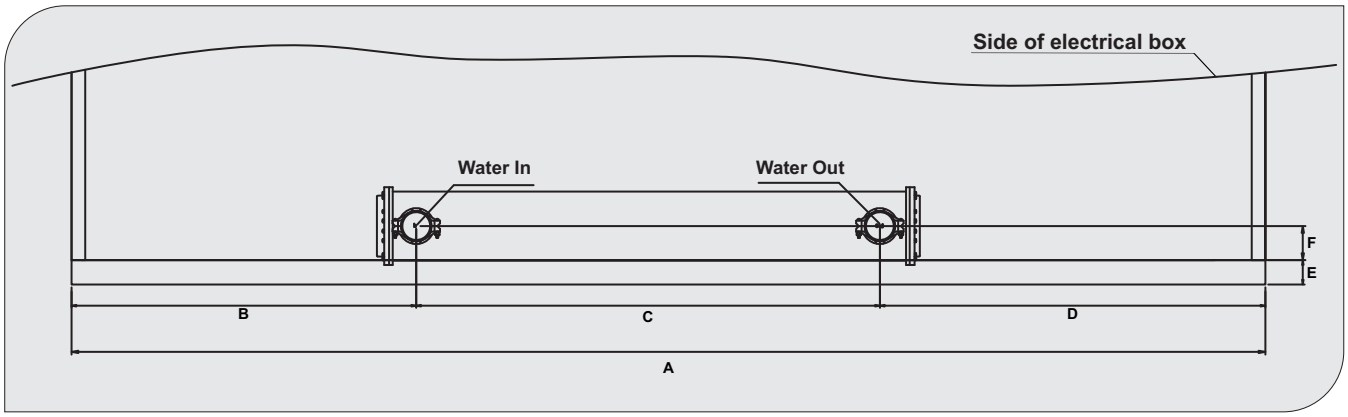
LEGEND

ELWT : Evaporator Leaving Water Temperature
T. CAP : Total Capacity
EWFR : Evaporator Water Flow Rate
CWFR : Condenser Water Flow Rate
PI : Compressor Power Input

NOTE

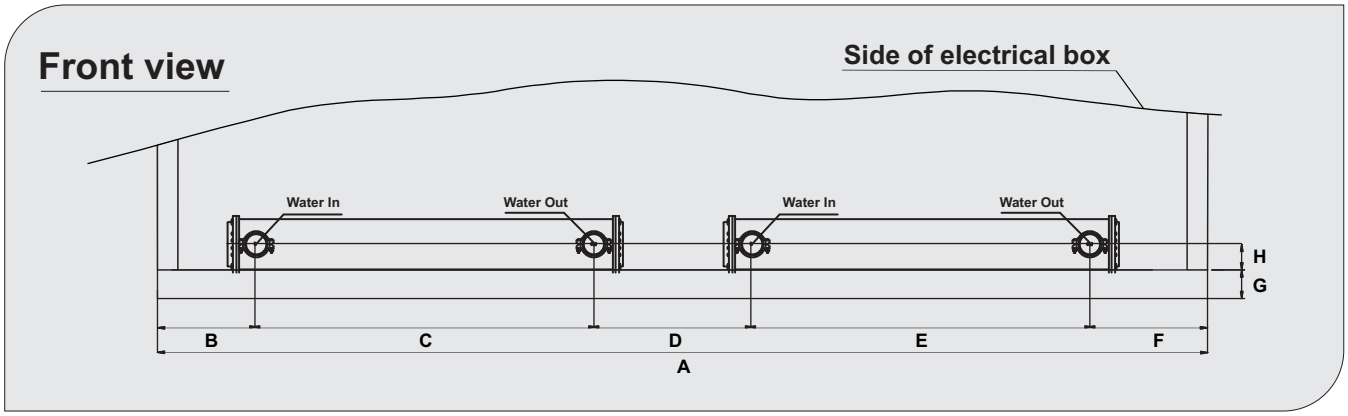
- Ratings based on 5.5°C cooler (evaporator & condenser) water temperature difference between inlet and outlet water temperature
- Power input in this page should not be used for cable or breaker selection. MCA and MOP values in the electrical data page (59) should be referred for the same

BARREL (COOLER) CONNECTIONS



Model WPSa	A mm	A [inch]	B mm	B [inch]	C mm	C [inch]	D mm	D [inch]	E mm	E [inch]	F mm	F [inch]	Water in connection diameter mm	Water in connection diameter [inch]	Water out connection diameter mm	Water out connection diameter [inch]
300-2	5500	[217]	1200	[47]	3410	[134]	890	[35]	140	[6]	350	[14]	200	[8]	200	[8]
350-2	5500	[217]	1100	[43]	3610	[142]	790	[31]	140	[6]	350	[14]	200	[8]	200	[8]
375-2	5500	[217]	1100	[43]	3610	[142]	790	[31]	140	[6]	350	[14]	200	[8]	200	[8]
400-2	5500	[217]	1100	[43]	3610	[142]	790	[31]	140	[6]	350	[14]	200	[8]	200	[8]
450-2	6000	[236]	1300	[51]	3800	[150]	900	[35]	140	[6]	350	[14]	200	[8]	200	[8]
500-2	6000	[236]	1300	[51]	3800	[150]	900	[35]	140	[6]	350	[14]	200	[8]	200	[8]

Front view

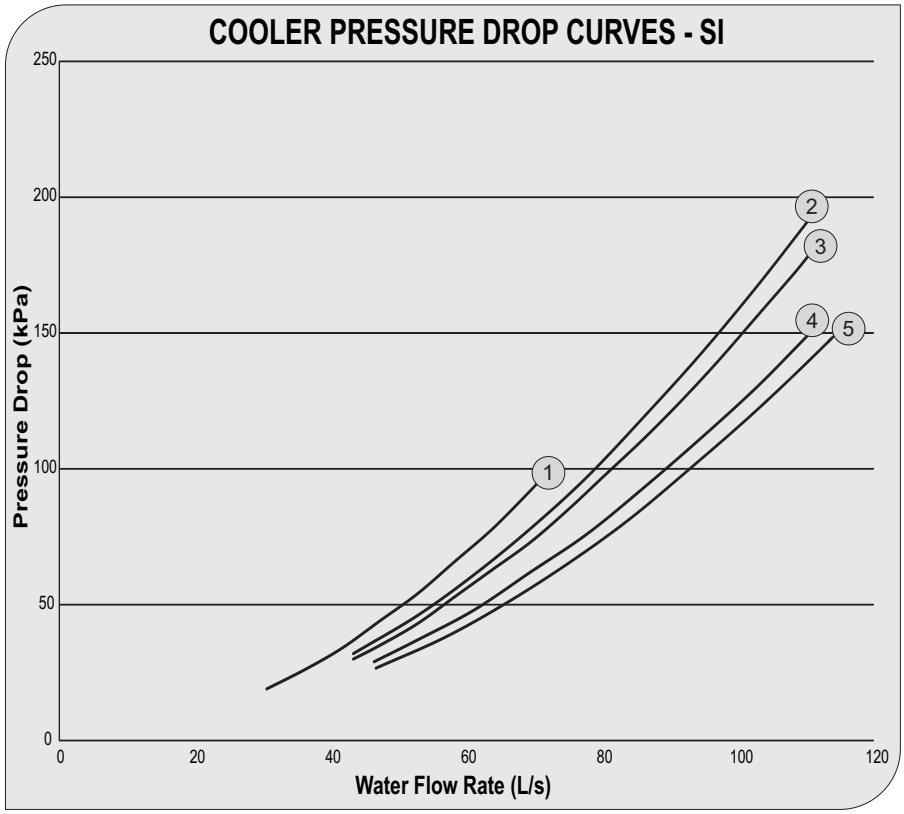


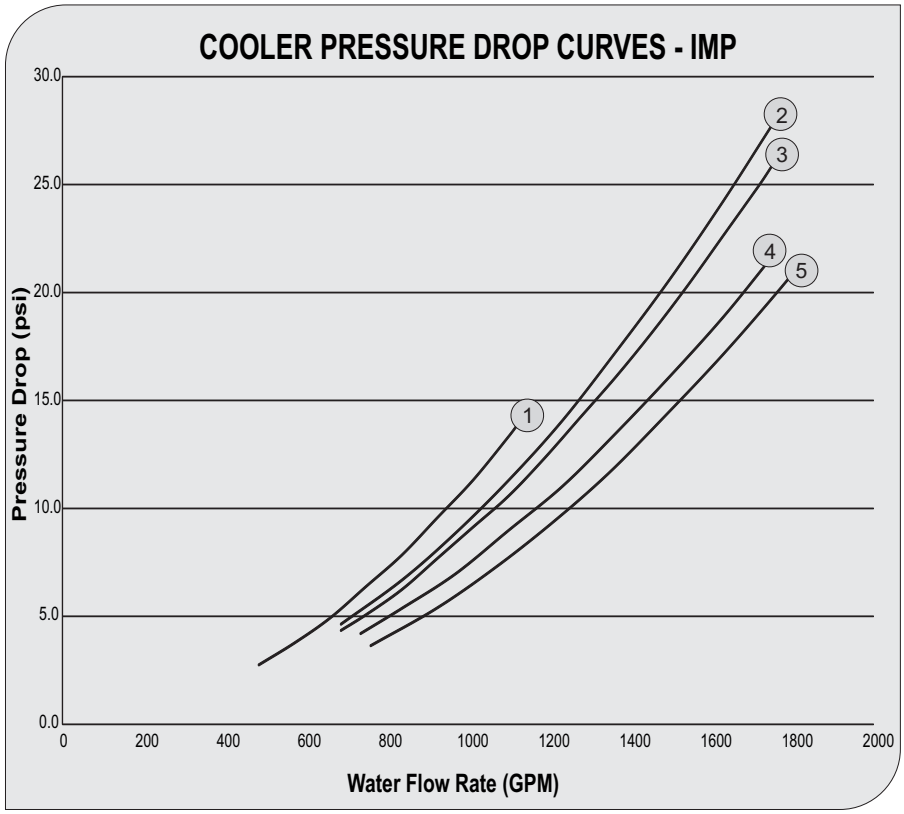
Model WPSa	A mm	A [inch]	B mm	B [inch]	C mm	C [inch]	D mm	D [inch]	E mm	E [inch]	F mm	F [inch]	G mm	G [inch]	H mm	H [inch]	Water in connection (Qty diameter) mm	Water in connection (Qty diameter) [inch]	Water out connection (Qty diameter) mm	Water out connection (Qty diameter) [inch]
600-4	12000	[472]	1200	[47]	3410	[134]	3090	[472]	3410	[134]	890	[35]	140	[6]	350	[14]	200	[8]	200	[8]
700-4	12000	[472]	1100	[43]	3610	[142]	2890	[472]	3610	[142]	790	[31]	140	[6]	350	[14]	200	[8]	200	[8]
750-4	12000	[472]	1100	[43]	3610	[142]	2890	[472]	3610	[142]	790	[31]	140	[6]	350	[14]	200	[8]	200	[8]
800-4	12000	[472]	1100	[43]	3610	[142]	2890	[472]	3610	[142]	790	[31]	140	[6]	350	[14]	200	[8]	200	[8]
900-4	12000	[472]	1300	[51]	3800	[150]	2200	[472]	3800	[150]	900	[35]	140	[6]	350	[14]	200	[8]	200	[8]
1000-4	12000	[472]	1300	[51]	3800	[150]	2200	[472]	3800	[150]	900	[35]	140	[6]	350	[14]	200	[8]	200	[8]

NOTE

- Water connections are victaulic coupling
- Water connections are shipped loose & tied inside chiller enclosure

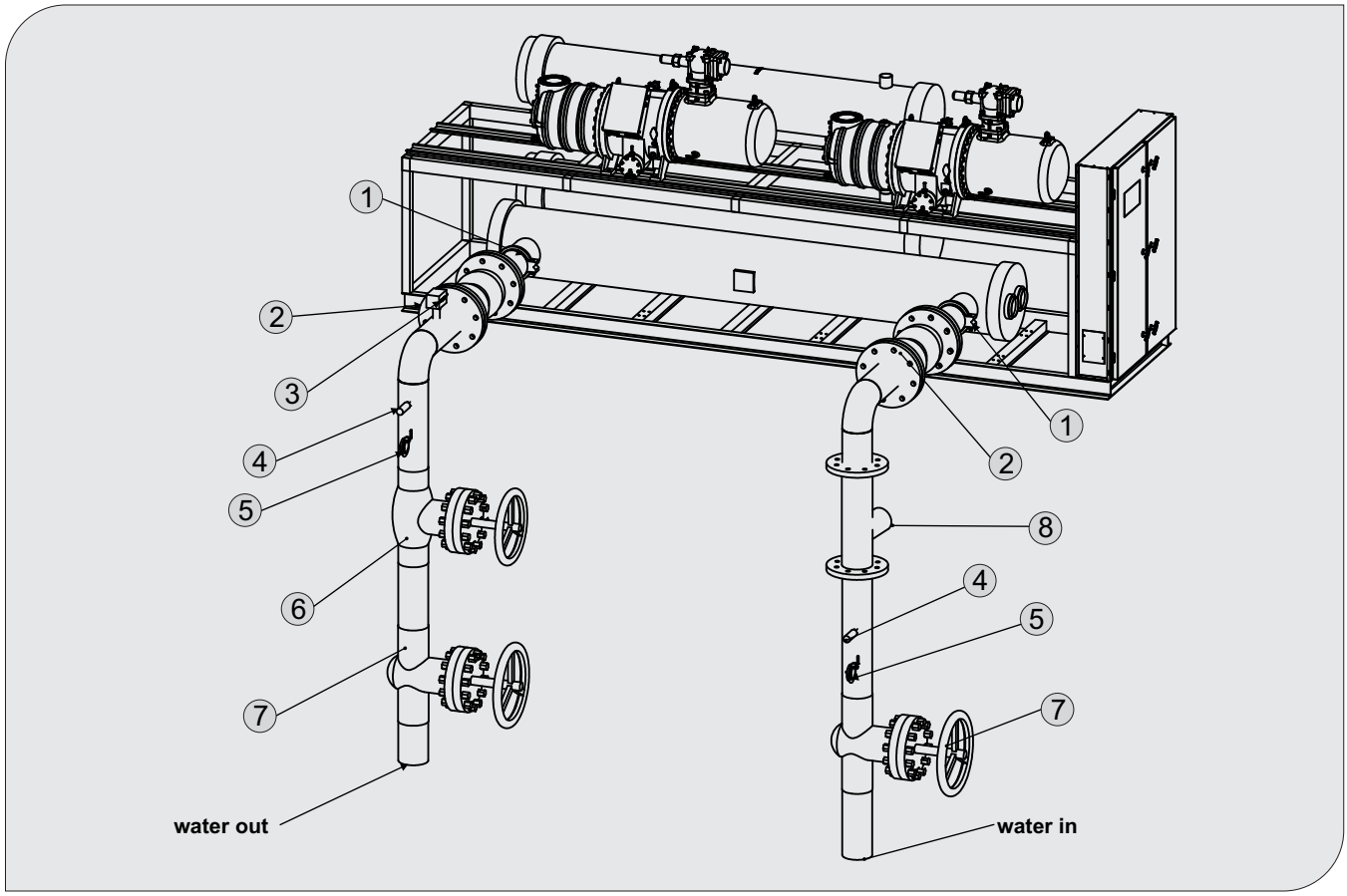
PRESSURE DROP CURVES





	WPSa
1	(300-2, 600-4)
2	(375-2, 400-2, 750-4, 800-4)
3	(350-2, 700-4)
4	(450-2, 900-4)
5	(500-2, 1000-4)

TYPICAL PIPING

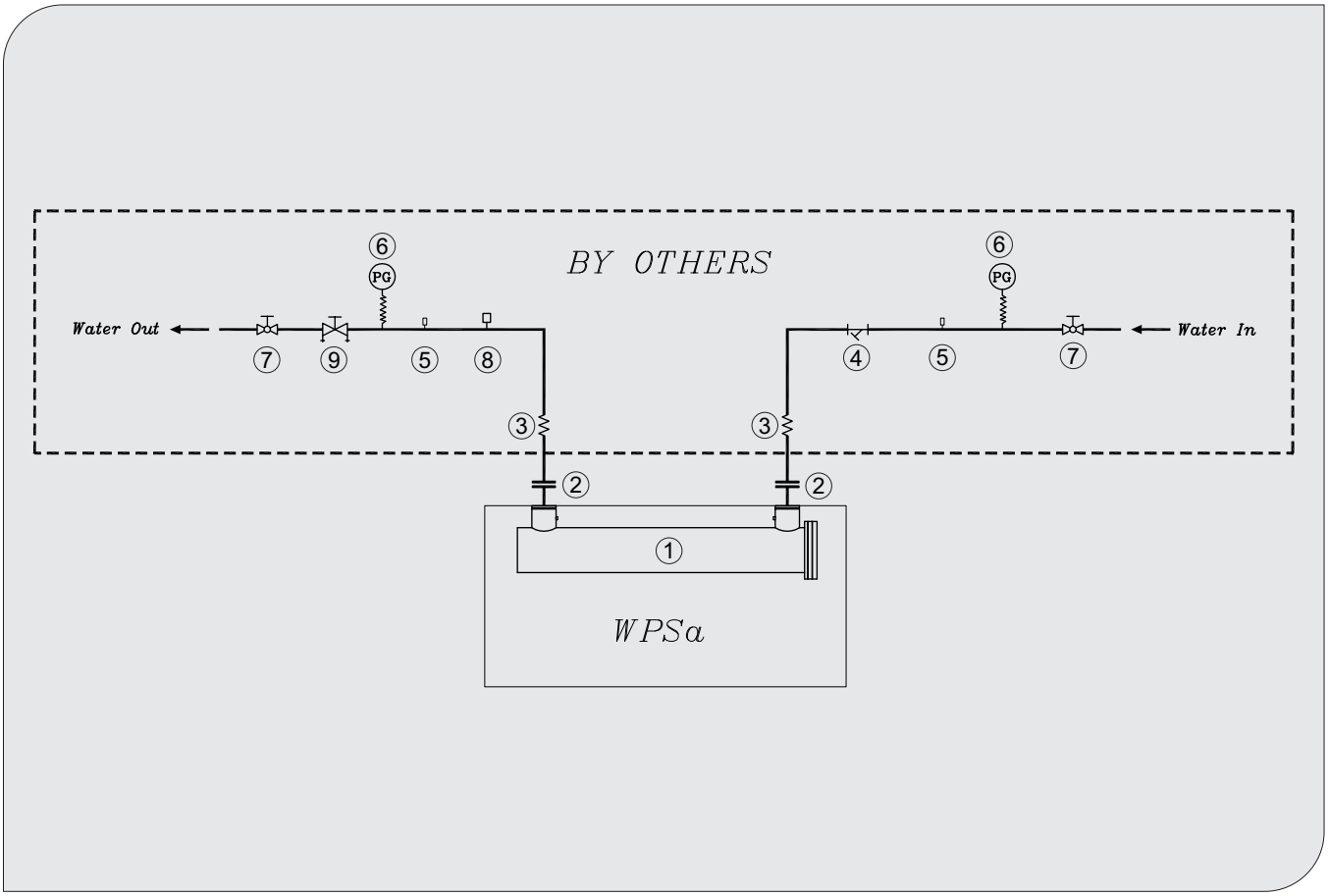


COMPONENTS	
1	flange adapter
2	flexible joint
3	flow switch
4	thermometer
5	pressure gauge
6	balance valve
7	valve
8	strainer

NOTE

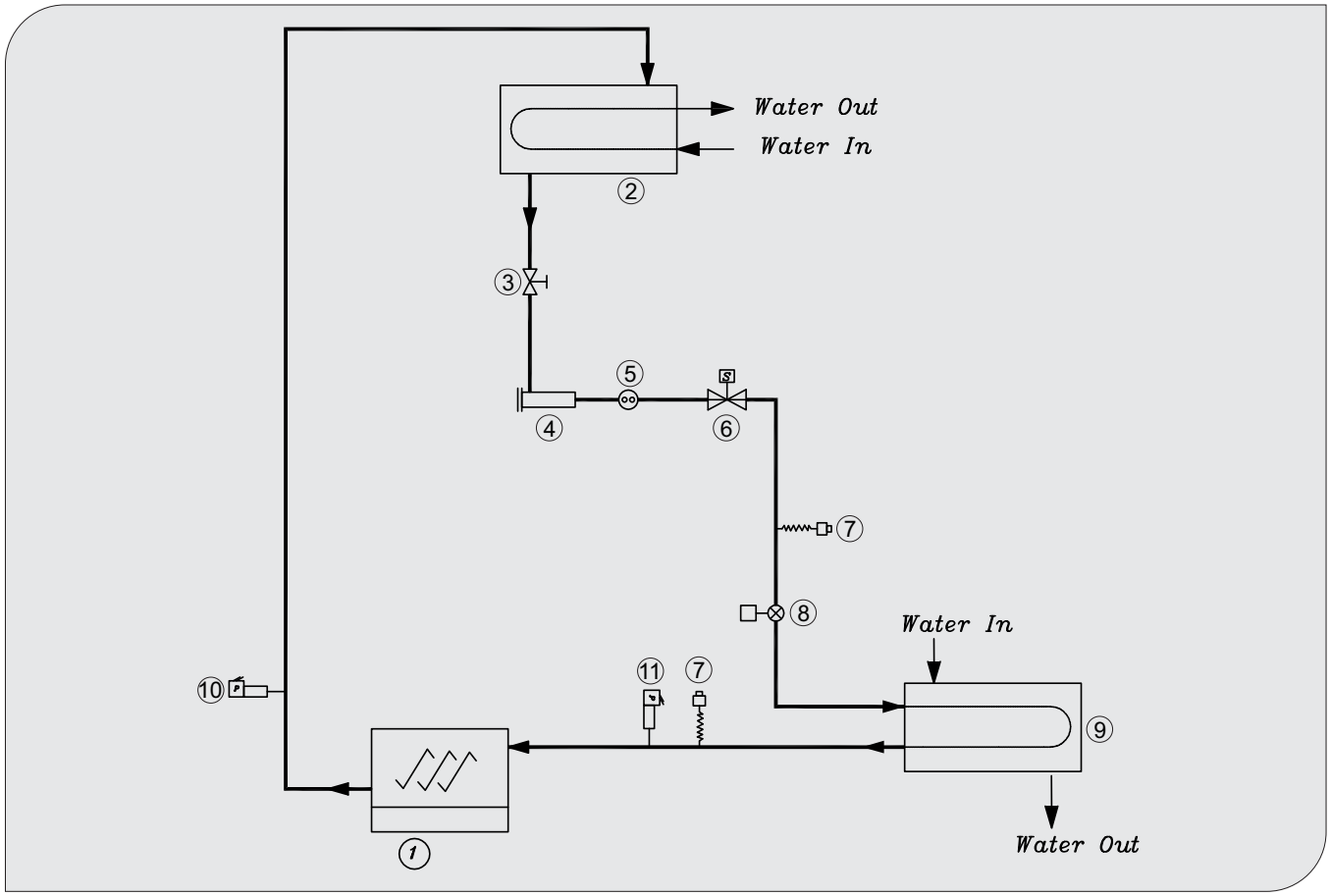
1. Piping shown are general points of connection guides only and are not intended for a specific installation
2. Piping shown are for a quick overview of system and are not in accordance with recognized standards
3. All piping must follow standard piping techniques. Refer to appropriate ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) handbook for details.

WATER SCHEMATIC DIAGRAM



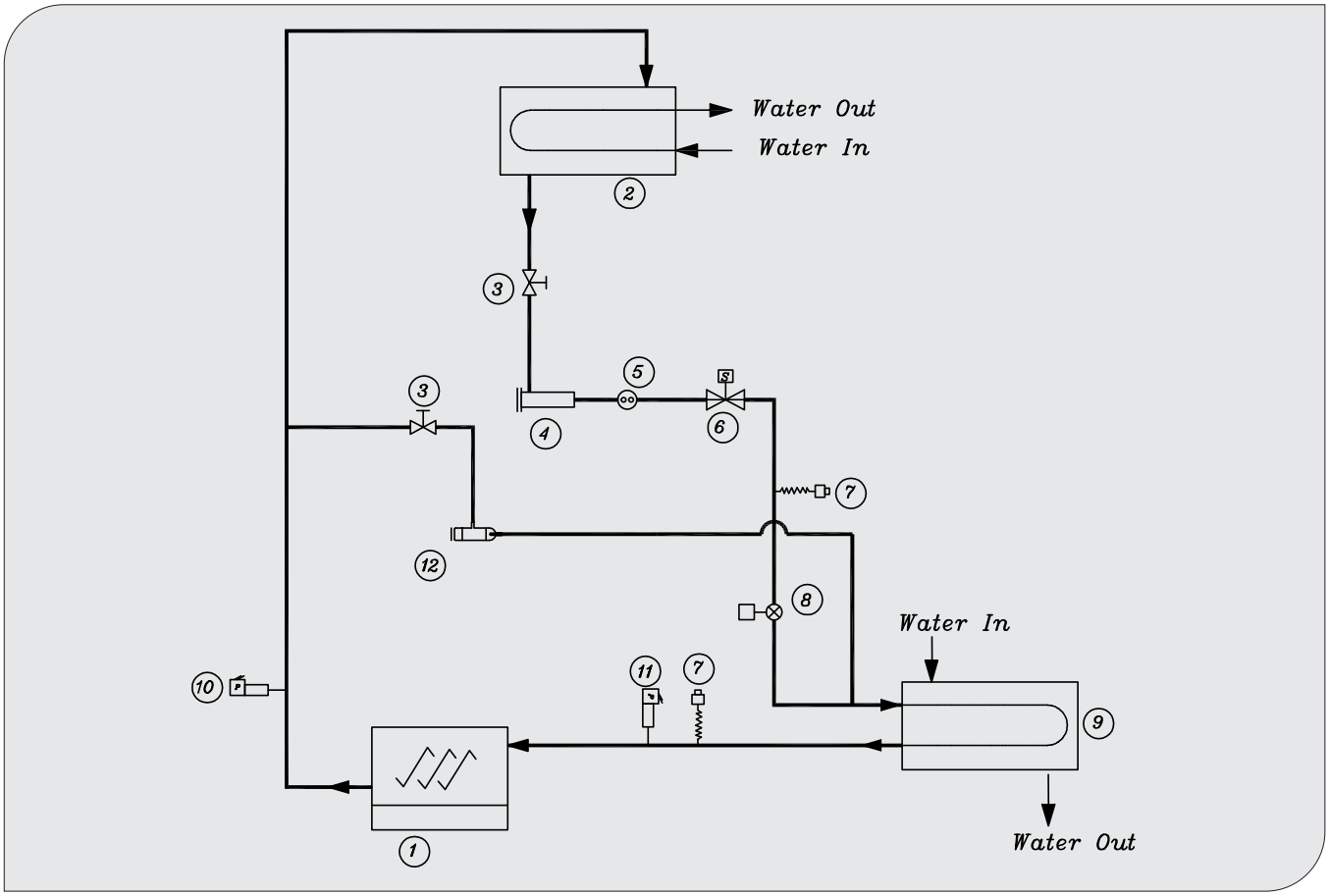
ITEM	
1	Cooler
2	Flange
3	Flexible joint
4	Strainer
5	Thermometer
6	Water pressure gauge
7	Valve
8	Flow switch
9	Balancing Valve

REFRIGERATION SCHEMATIC DIAGRAM



ITEM	
1	Screw compressor
2	Shell & tube condenser
3	Shut off valve
4	Filter drier
5	Sight glass
6	Solenoid valve
7	Charging nipple
8	Electronic expansion valve
9	Shell & tube barrel (evaporator)
10	High pressure switch
11	Low pressure switch

HGBP SCHEMATIC DIAGRAM (OPTIONAL)



ITEM	
1	Screw compressor
2	Shell & tube condenser
3	Shut off valve
4	Filter drier
5	Sight glass
6	Solenoid valve
7	Charging nipple
8	Electronic expansion valve
9	Shell & tube barrel (evaporator)
10	High pressure switch
11	Low pressure switch
12	Hot gas controller

SOUND DATA - 380V/3Ph/50Hz

380v/3ph/50Hz

Model (WPSa)	Sound Power (dBA)								
	Band Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	Total
300-2	51	59	71	75	89	87	81	66	92
350-2	51	59	71	75	89	87	81	67	92
375-2	51	59	72	75	90	88	82	67	92
400-2	52	60	72	76	90	88	82	67	93
450-2	54	62	74	78	92	90	84	69	95
500-2	54	62	74	78	93	91	85	69	95
600-4	54	62	74	78	92	90	84	69	95
700-4	54	62	74	78	92	90	84	70	95
750-4	54	62	75	78	93	91	85	70	95
800-4	55	63	75	79	93	91	85	70	96
900-4	57	65	77	81	95	93	87	72	98
1000-4	57	65	77	81	96	94	88	72	98

380-460v/-ph/60Hz

Model (WPSa)	Sound Power (dBA)								
	Band Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	Total
300-2	53	61	73	77	91	89	83	68	94
350-2	53	61	73	77	91	89	83	69	94
375-2	53	61	74	77	92	90	84	69	94
400-2	54	62	74	78	92	90	84	69	95
450-2	56	64	76	80	94	92	86	71	97
500-2	56	64	76	80	95	93	87	71	97
600-4	56	64	76	80	94	92	86	71	97
700-4	56	64	76	80	94	92	86	72	97
750-4	56	64	77	80	95	93	87	72	97
800-4	57	65	77	81	95	93	87	72	98
900-4	59	67	79	83	97	95	89	74	100
1000-4	59	67	79	83	98	96	90	74	100

NOTES

- Sound data is calculated based on standard components design
- Sound data shall be as per AHRI 370 and ISO BS 3744 standard
- Sound data are ± 2 dBA

ELECTRICAL DATA

MODEL (WPSa)	POWER SUPPLY (V/Ph/Hz)	SUPPLIED VOLTAGE		COMPRESSOR				MCA	MOP	MDS
				No.	RLA (A)	LRA				
		MIN	MAX			PW	Y-D			
300-2	380/3/50	357	403	2	213.9	-	1340	481.3	600	600
	415/3/50	390	440		195.9	-	1295	440.8	600	600
	380/3/60	357	403		255.5	-	1750	574.9	800	600
	460/3/60	432	488		211.1	-	1400	475.0	600	600
350-2	380/3/50	357	403	2	235.6	-	1430	530.1	700	600
	415/3/50	390	440		215.8	-	1370	485.6	700	600
	380/3/60	357	403		280	-	1930	630.0	800	800
	460/3/60	432	488		231.3	-	1495	520.4	700	600
375-2	380/3/50	357	403	2	235.6+281.6	-	1430+1990	587.6	800	600
	415/3/50	390	440		215.8+257.8	-	1370+1850	538.1	700	600
	380/3/60	357	403		280+336.7	-	1930+2470	700.9	1000	800
	460/3/60	432	488		231.3+278.1	-	1495+2080	578.9	800	600
400-2	380/3/50	357	403	2	281.6	-	1990	633.6	800	800
	415/3/50	390	440		257.8	-	1850	580.1	800	800
	380/3/60	357	403		336.7	-	2470	757.6	1000	800
	460/3/60	432	488		278.1	-	2080	625.7	800	800
450-2	380/3/50	357	403	2	320.3	-	2260	720.7	1000	800
	415/3/50	390	440		293.3	-	2070	659.9	800	800
	380/3/60	357	403		383.6	-	2835	863.1	1200	1000
	460/3/60	432	488		316.9	-	2380	713.0	1000	800
500-2	380/3/50	357	403	2	350.7	-	2230	789.1	1000	1000
	415/3/50	390	440		321.1	-	2070	722.5	1000	800
	380/3/60	357	403		419.8	-	2835	944.6	1200	1000
	460/3/60	432	488		346.8	-	2380	780.3	1000	800

LEGEND

RLA: Rated Load Ampere
MOP: Maximum Overcurrent Protection
MDS: Non-Fused Main Disconnect Switch
LRA: Locked Rotor Ampere
MCA: Minimum Circuit Ampacity
PW: Part winding connection
Y-D: Star-Delta connection

NOTE

* MCA is based on 125% of the RLA for the largest motor plus 100% of the RLA for all other loads included in the circuit (NEC-Article 430-24).
* MOP is based on 225% of the RLA for the largest motor plus 100% of the RLA for all other loads included in the circuit (NEC-Article 440-22).
* MDS is based on 115% of the total summation of RLA for all loads included in the circuit (NEC-Article 440- 12A1).

ELECTRICAL DATA

MODEL (WPSa)	POWER SUPPLY (V/Ph/Hz)	SUPPLIED VOLTAGE		COMPRESSOR				MCA	MOP	MDS
				No.	RLA (A)	LRA				
		MIN	MAX			PW	Y-D			
600-4	380/3/50	357	403	4	213.9	-	1340	909.1	1000	1000
	415/3/50	390	440		195.9	-	1295	832.6	1000	1000
	380/3/60	357	403		255.5	-	1750	1085.9	1200	1200
	460/3/60	432	488		211.1	-	1400	897.2	1000	1000
700-4	380/3/50	357	403	4	235.6	-	1430	1001.3	1200	1200
	415/3/50	390	440		215.8	-	1370	917.2	1000	1000
	380/3/60	357	403		280	-	1930	1190.0	1200	1600
	460/3/60	432	488		231.3	-	1495	983.0	1200	1200
750-4	380/3/50	357	403	4	2*235.6+2*281.6	-	1430+1990	1104.8	1200	1200
	415/3/50	390	440		2*215.8+2*257.8	-	1370+1850	1011.7	1200	1200
	380/3/60	357	403		2*280+2*336.7	-	1930+2470	1317.6	1600	1600
	460/3/60	432	488		2*231.3+2*278.1	-	1495+2080	1088.3	1200	1200
800-4	380/3/50	357	403	4	281.6	-	1990	1196.8	1200	1600
	415/3/50	390	440		257.8	-	1850	1095.7	1200	1200
	380/3/60	357	403		336.7	-	2470	1431.0	1600	1600
	460/3/60	432	488		278.1	-	2080	1181.9	1200	1600
900-4	380/3/50	357	403	4	320.3	-	2260	1361.3	1600	1600
	415/3/50	390	440		293.3	-	2070	1246.5	1200	1600
	380/3/60	357	403		383.6	-	2835	1630.3	2000	2000
	460/3/60	432	488		316.9	-	2380	1346.8	1600	1600
1000-4	380/3/50	357	403	4	350.7	-	2230	1490.5	1600	2000
	415/3/50	390	440		321.1	-	2070	1364.7	1600	1600
	380/3/60	357	403		419.8	-	2835	1784.2	2000	2000
	460/3/60	432	488		346.8	-	2380	1473.9	1600	1600

LEGEND

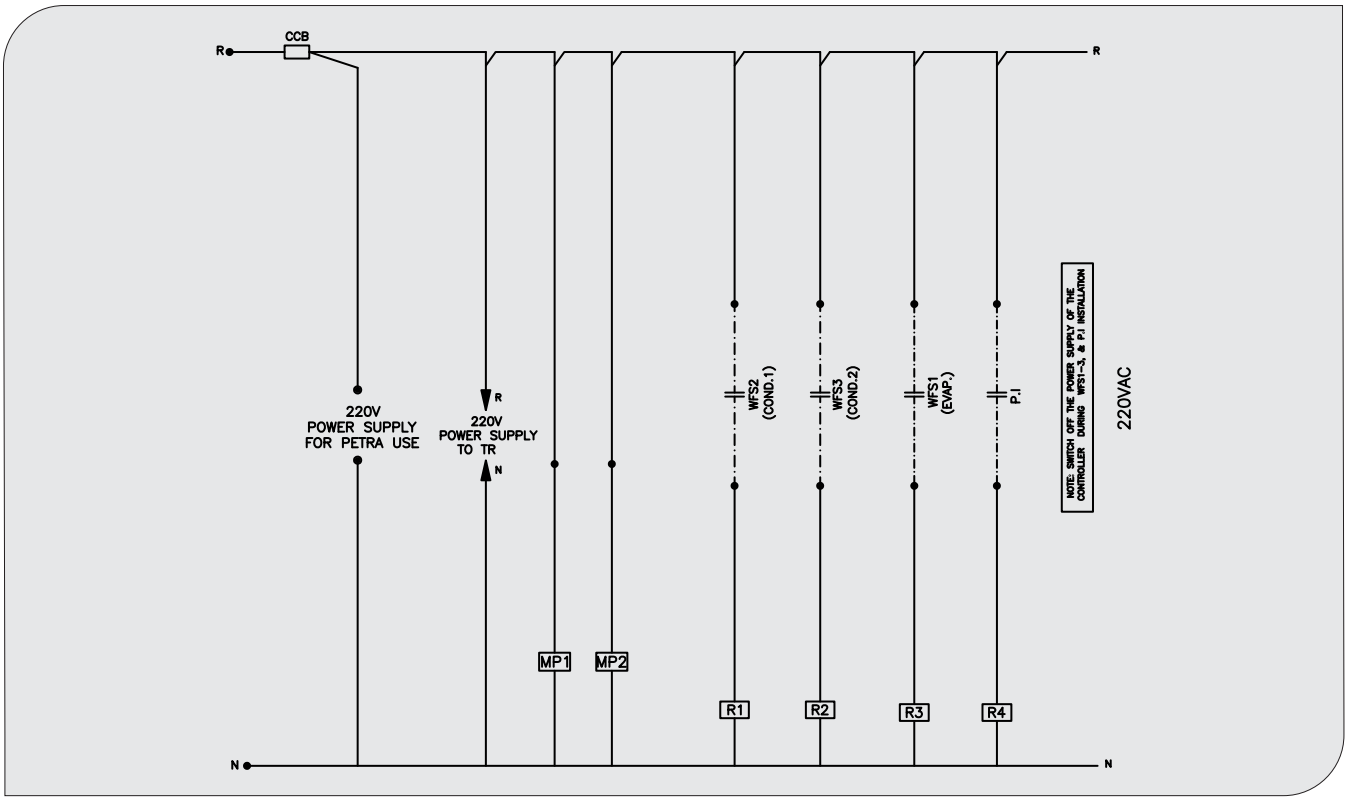
RLA: Rated Load Ampere
MOP: Maximum Overcurrent Protection
MDS: Non-Fused Main Disconnect Switch
LRA: Locked Rotor Ampere
MCA: Minimum Circuit Ampacity
PW: Part winding connection
Y-D: Star-Delta connection

NOTE

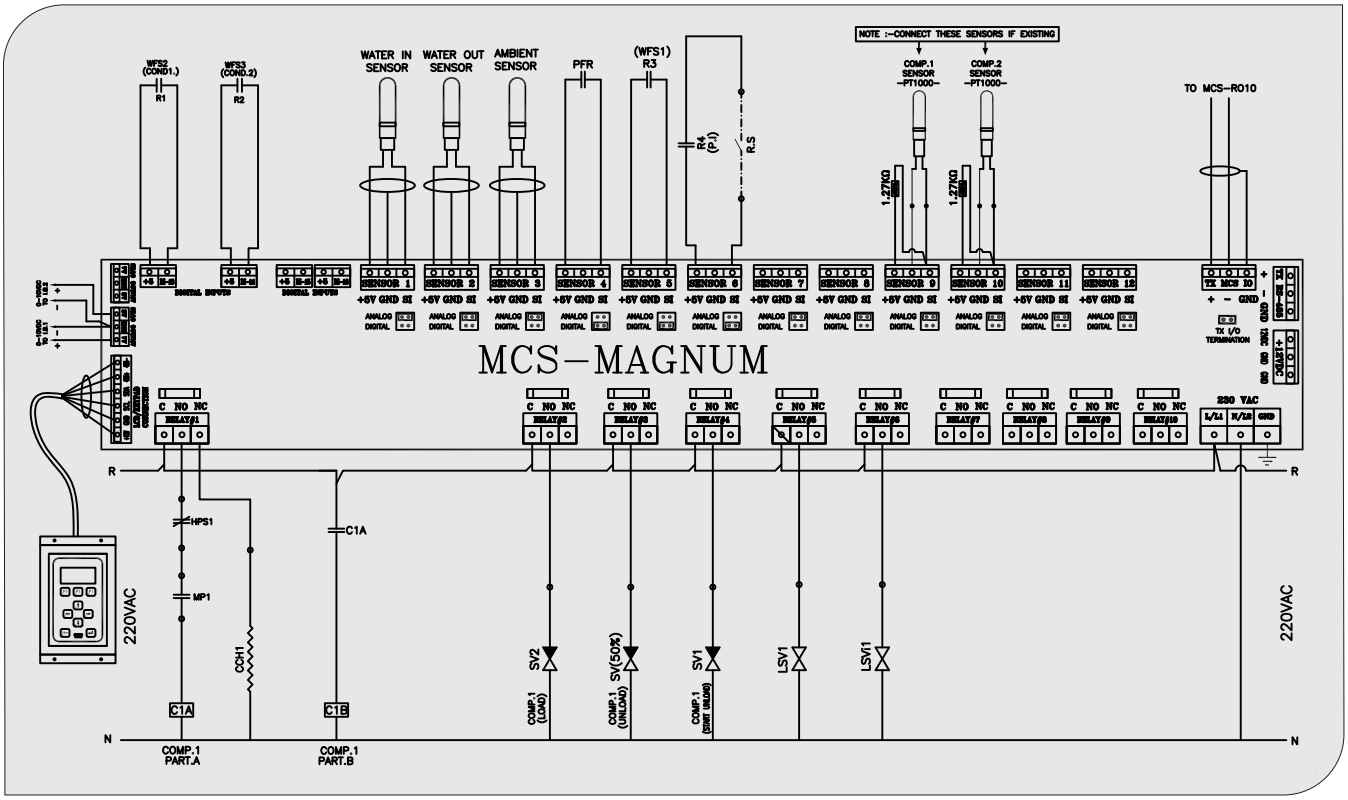
* MCA is based on 125% of the RLA for the largest motor plus 100% of the RLA for all other loads included in the circuit (NEC-Article 430-24).
* MOP is based on 225% of the RLA for the largest motor plus 100% of the RLA for all other loads included in the circuit (NEC-Article 440-22).
* MDS is based on 115% of the total summation of RLA for all loads included in the circuit (NEC-Article 440- 12A1).

TYPICAL WIRING - 380~415V/3Ph/50Hz

Control Diagram

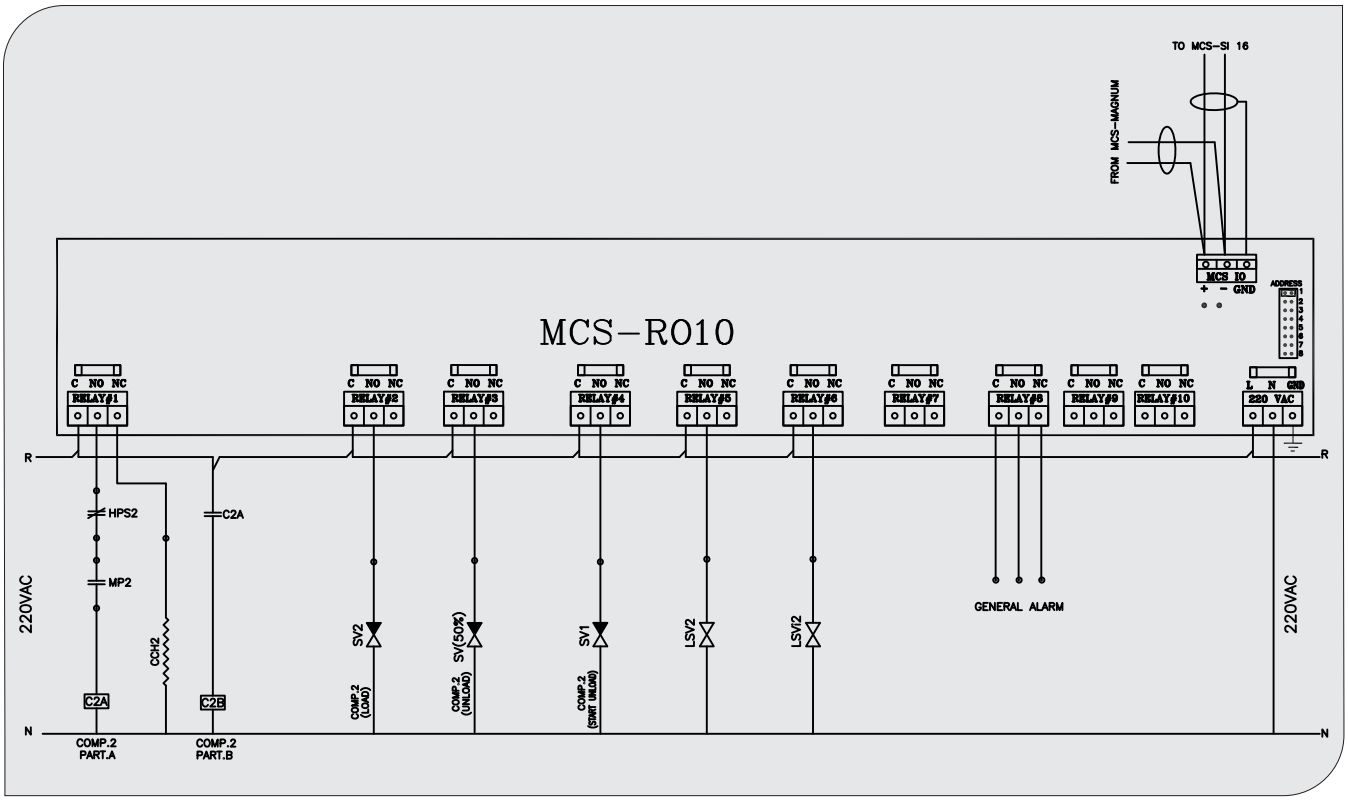


Control Diagram

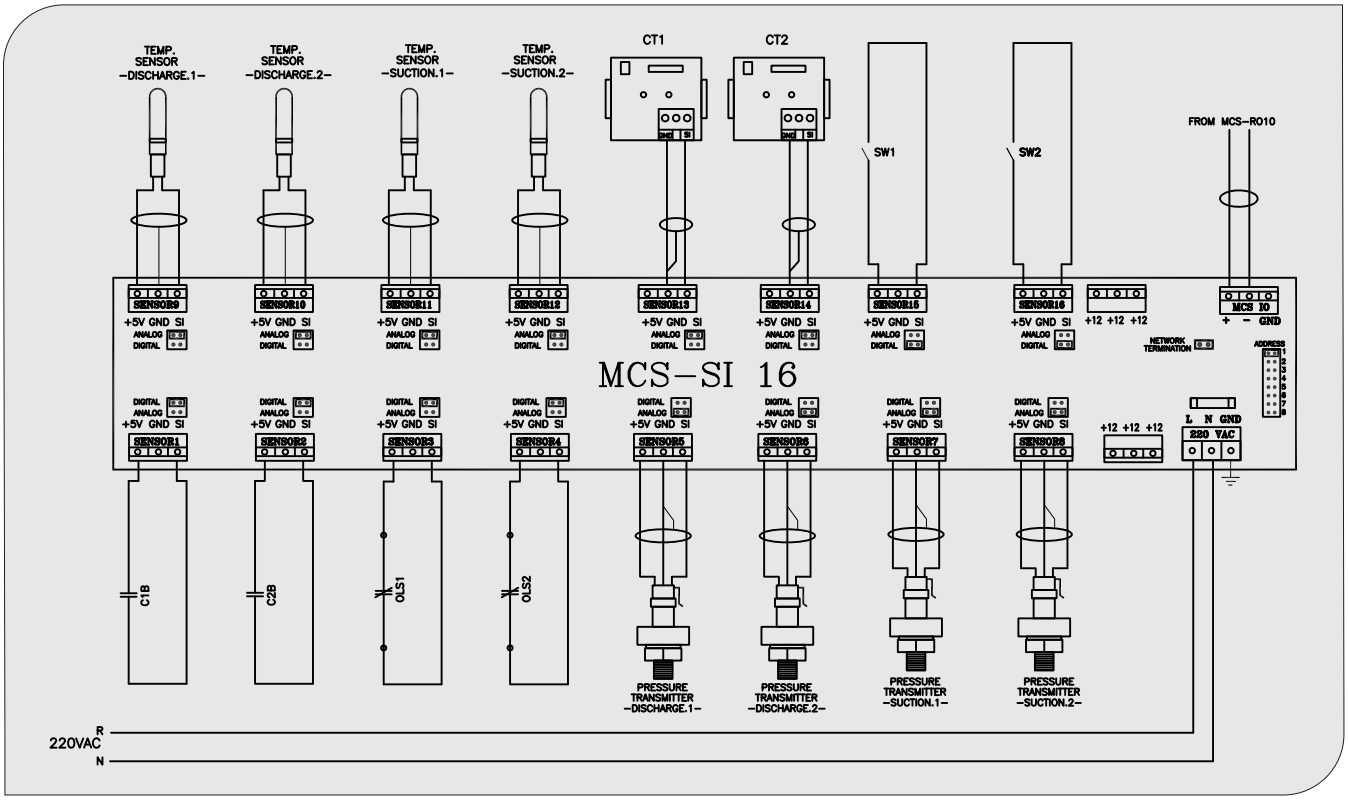


TYPICAL WIRING - 380~415V/3Ph/50Hz

Control Diagram

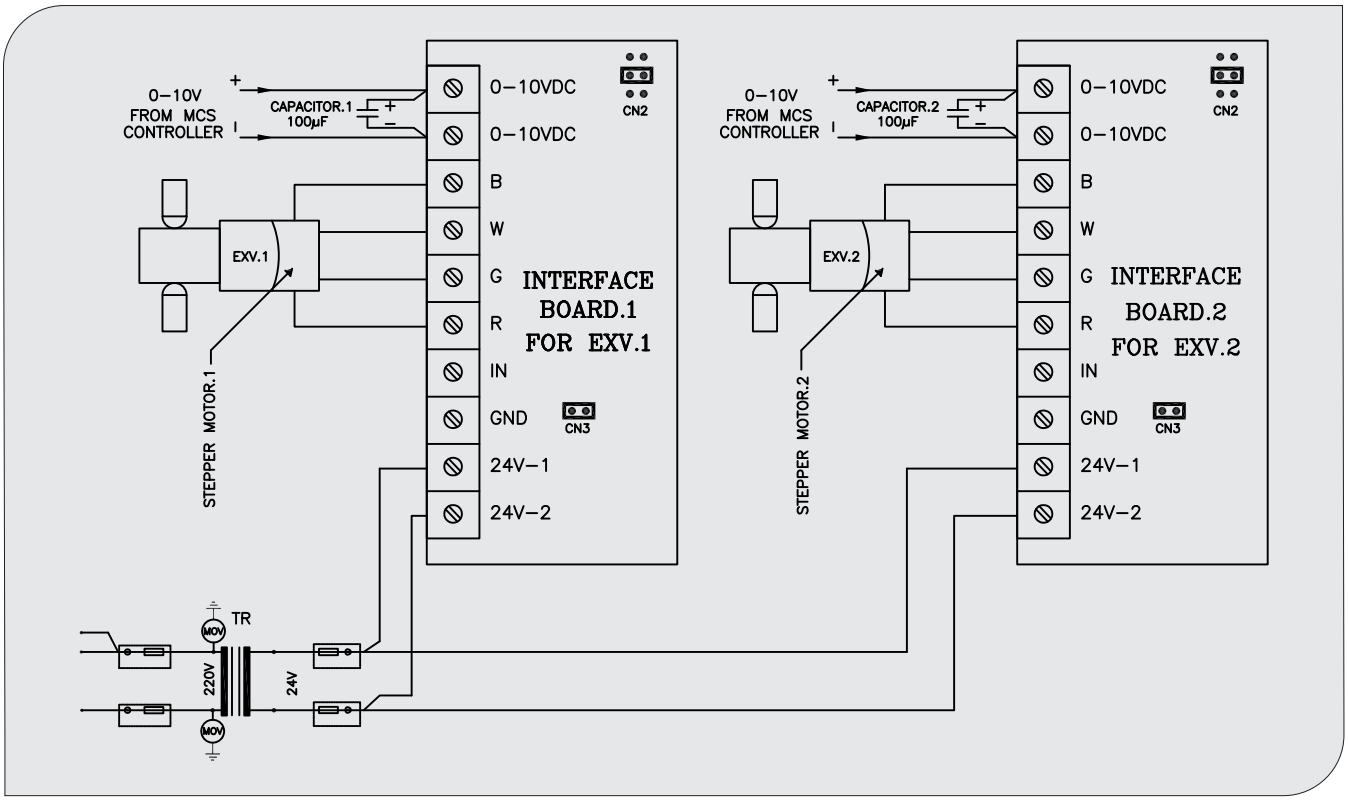


Control Diagram

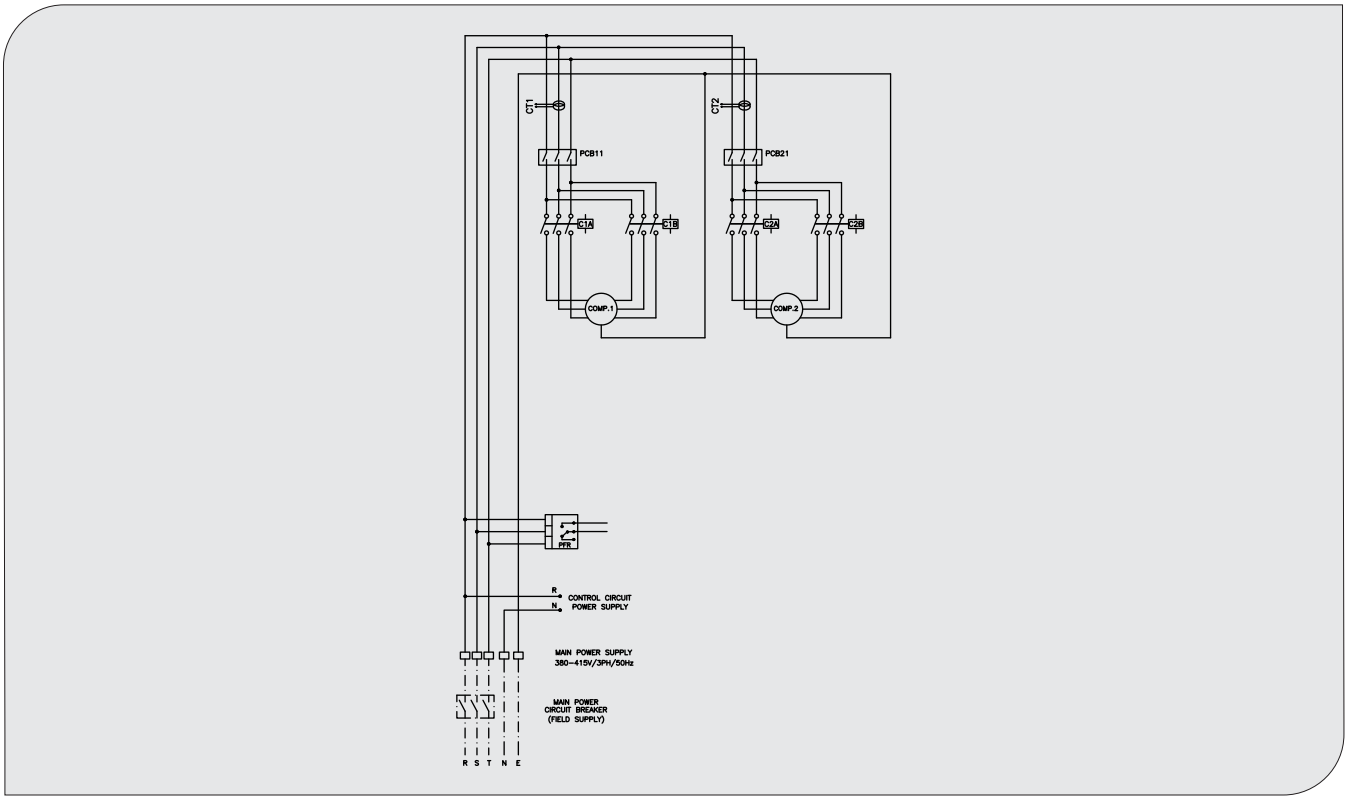


TYPICAL WIRING - 380~415V/3Ph/50Hz

Electronic Expansion Valve Drive



Power Diagram



TYPICAL WIRING - 380~415V/3Ph/50Hz

Lists & Tables

LEGEND			
COMP.	COMPRESSOR	HPS	HIGH PRESSURE SWITCH
COND.	CONDENSER	OLS	OIL LEVEL SWITCH
CCB	CONTROL CIRCUIT BREAKER	SV	SLIDING VALVE
C	CONTACTOR	WFS	WATER FLOW SWITCH
PFR	PHASE FAILURE RELAY	LSVi	LIQUID SOLENOID VALVE INJECTION
CCH	CRANK CASE HEATER	TR	TRANSFORMER
LSV	LIQUID SOLENOID VALVE	R.S	REMOTE SWITCH
MP	MOTOR PROTECTOR	R	CONTROL RELAY
PI	PUMP INTERLOCK	MMS	MANUAL MOTOR STARTER
CT	CURRENT TRANSFORMER	MOV	METAL OXIDE VARISTER
SW	SWITCH	PCB	POWER CIRCUIT BREAKER
EXV	ELECTRONIC EXPANSION VALVE	⊙n	TERMINAL NUMBER
I.B	INTERFACE BOARD	Wn	WIRING NUMBER
EVAP.	EVAPORATOR	—·—·—	FEILD CONNECTION (BY OTHERS)

Lists & Tables

MCS DISPLAY

ALARM:

1* IN CASE OF "COMP. PROOF" ALARM MESSAGE FOR ANY CIRCUIT CHECK : (HPS,MP) RELATED TO THAT CIRCUIT

2* IN CASE OF "FREEZE" ALARM IT MEANS ONE OF THE FOLLOWING:
- –FREEZE CONDITION
- –WATER OUT SENSOR ISN'T CONNECTED OR DOESN'T OPERATE

LEGEND:

DISC.P :– DISCHARGE PRESSURE
SUC.P :– SUCTION PRESSURE
DISC.T :– DISCHARGE TEMPERATURE
SUC.T :– SUCTION TEMPERATURE

PFR INDICATOR LIGHT DIAGNOSTICS	
RUN	GREEN
RESTART DELAY	GREEN
REVERSE PHASE	RED
UNBALANCE/SINGLE PHASE	RED
HIGH/LOW VOLTAGE	RED

ACCESS TO SET POINT

PRESS MENU BUTTON (Menu 8) ON THE CONTROLLER KEYPAD

GO TO THE (SETPOINTS) BY PRESSING (→ 6) AND THEN PRESS ENTER

GO TO THE (CHW OUT TRGT) AND THEN PRESS ON (↵) BUTTON

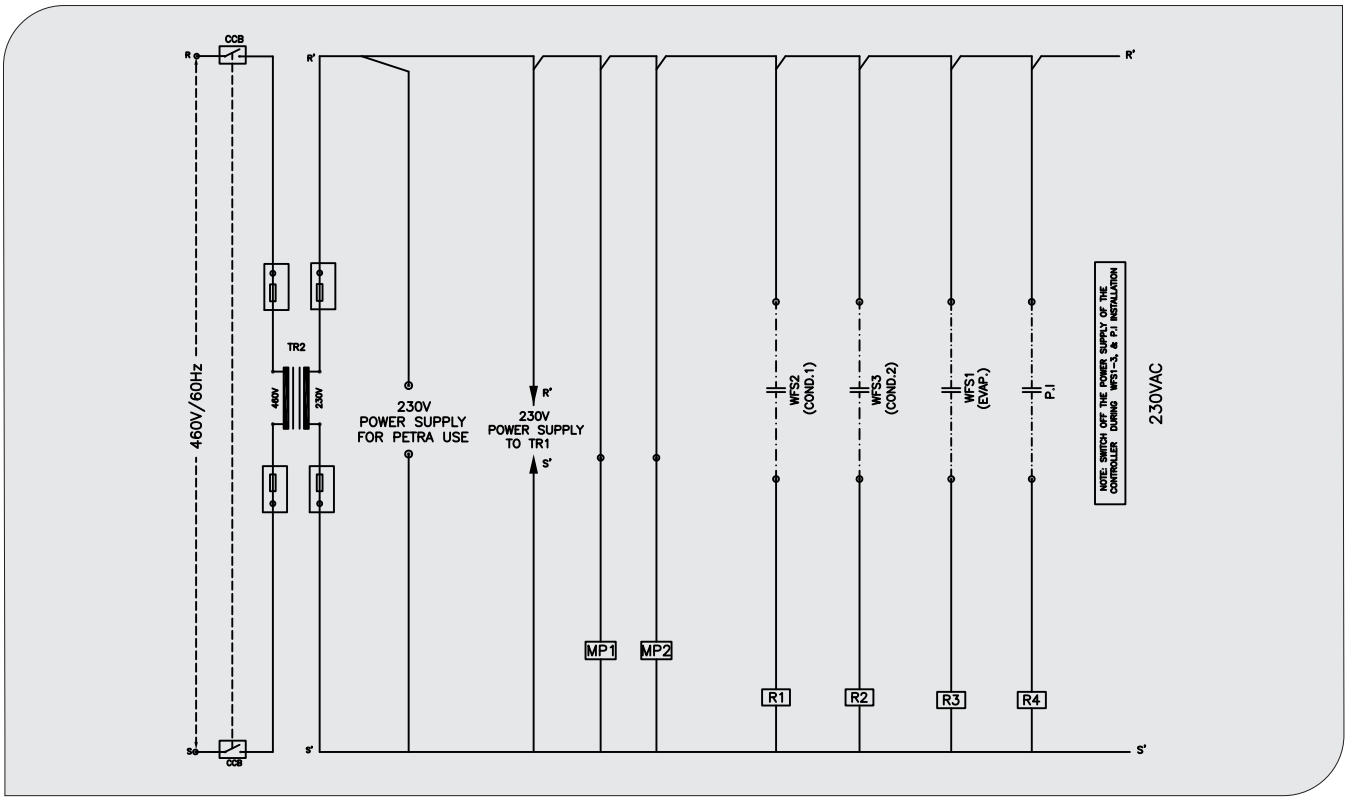
AND THEN PRESS (↵) TO ENABLE MODIFYING THE VALUE

NOW YOU CAN CHANGE IT BY PRESSING (↑ 4) AND (↓ 7) AND THEN PRESS (↵) TO SAVE

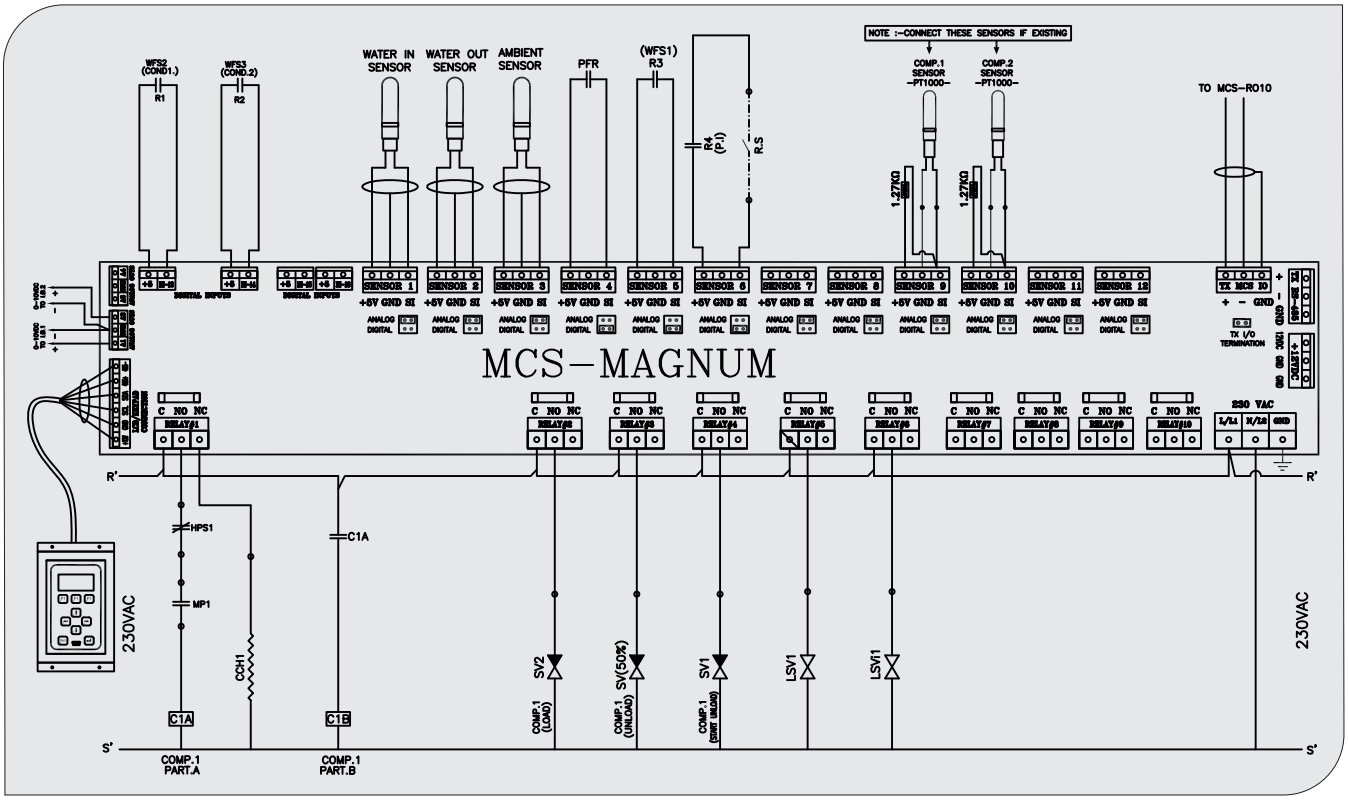
THEN PRESS (Menu 8) TO EXIT TO THE MAIN MENU

TYPICAL WIRING - 460V/3Ph/60 Hz

Control Diagram

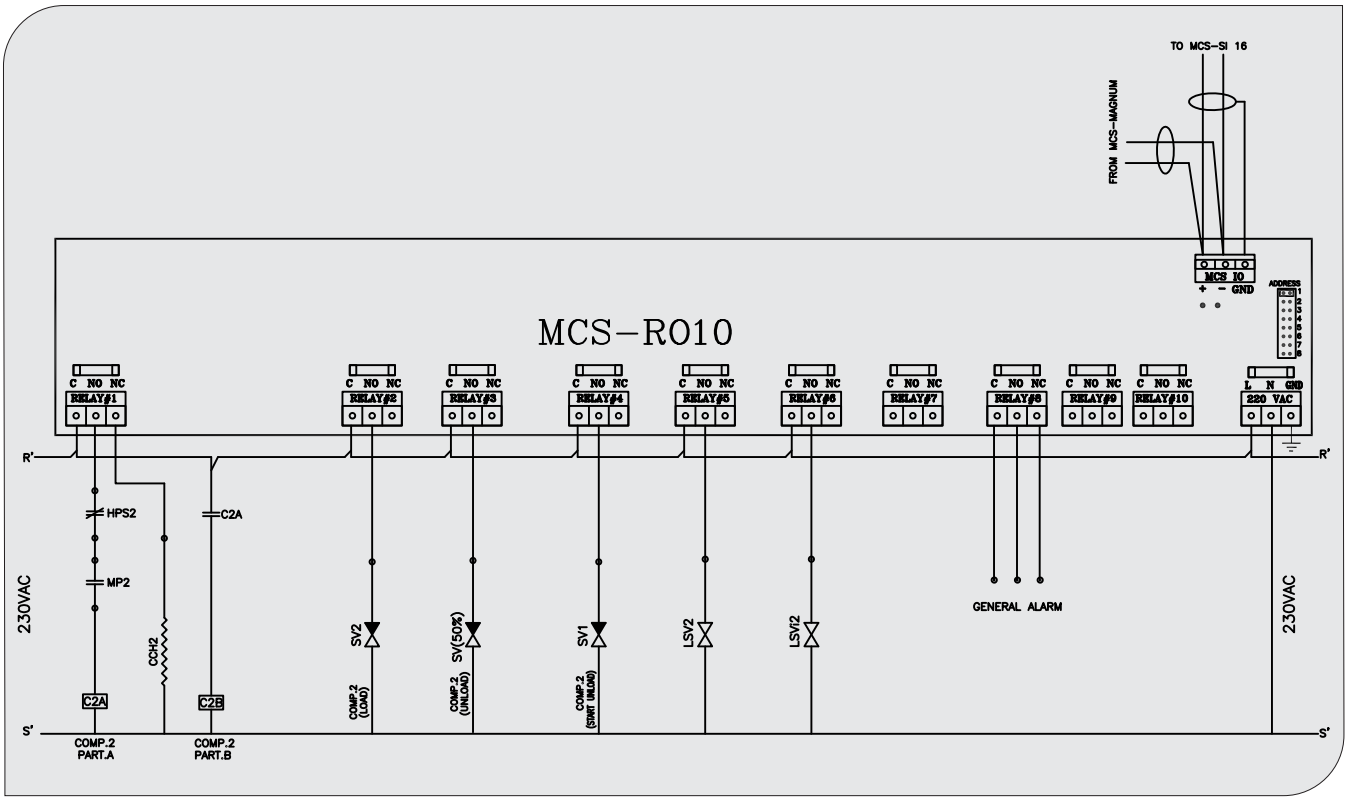


Control Diagram



TYPICAL WIRING - 460V/3Ph/60 Hz

Control Diagram



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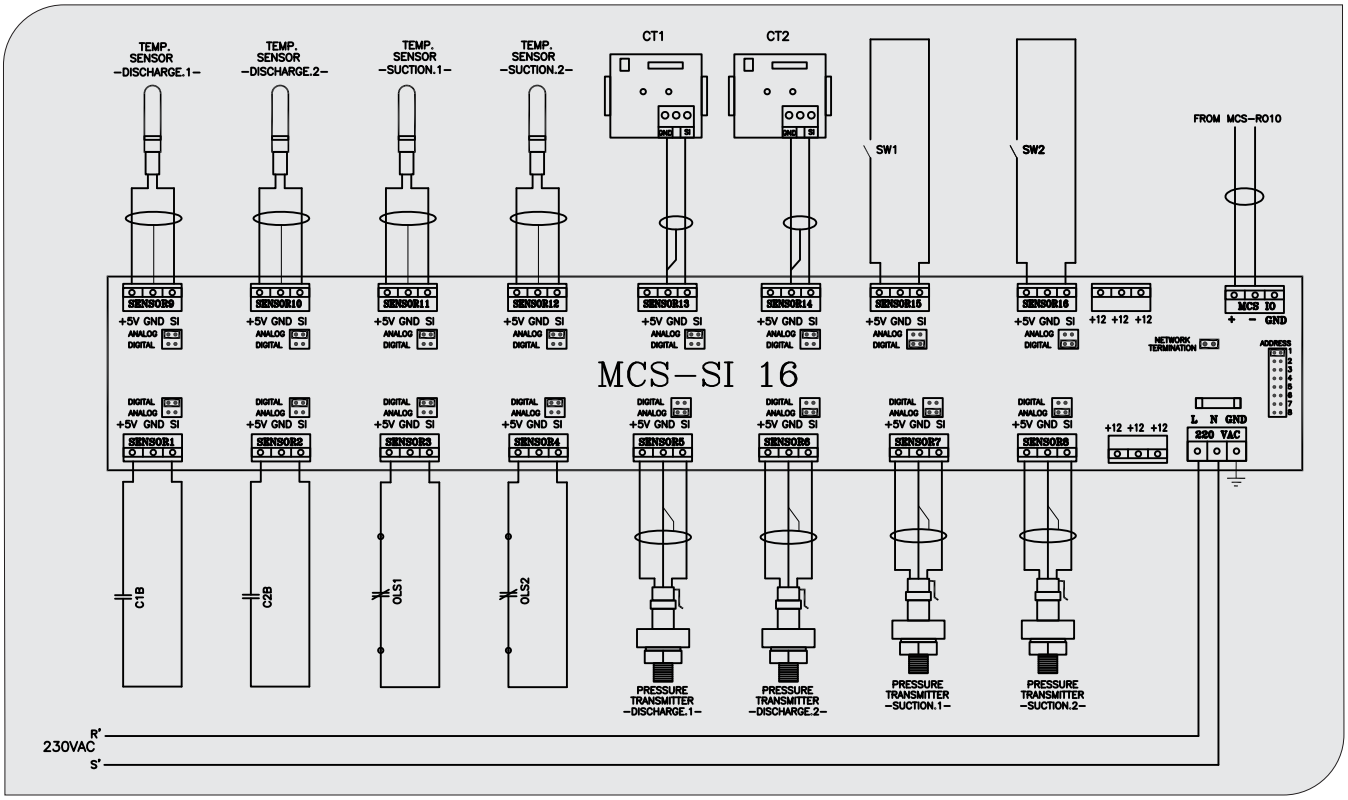
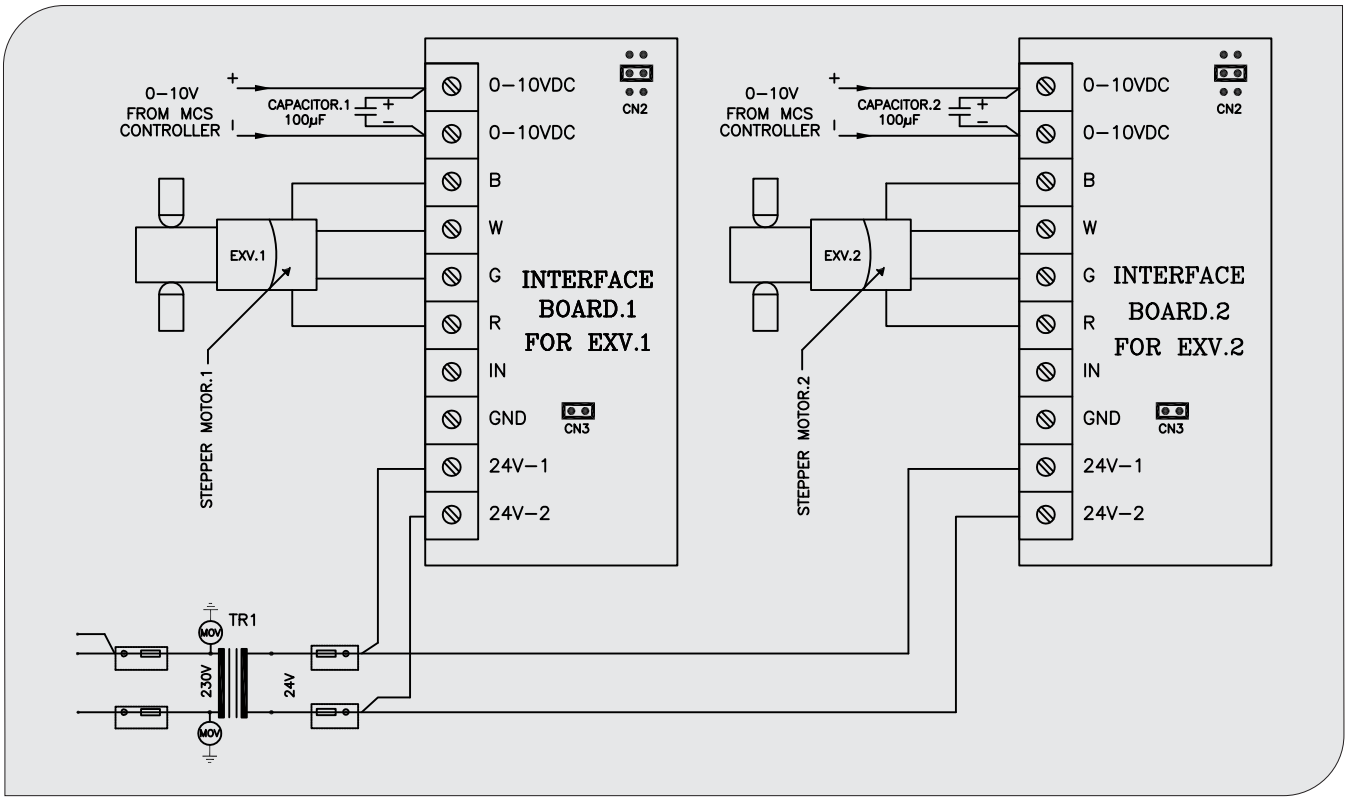
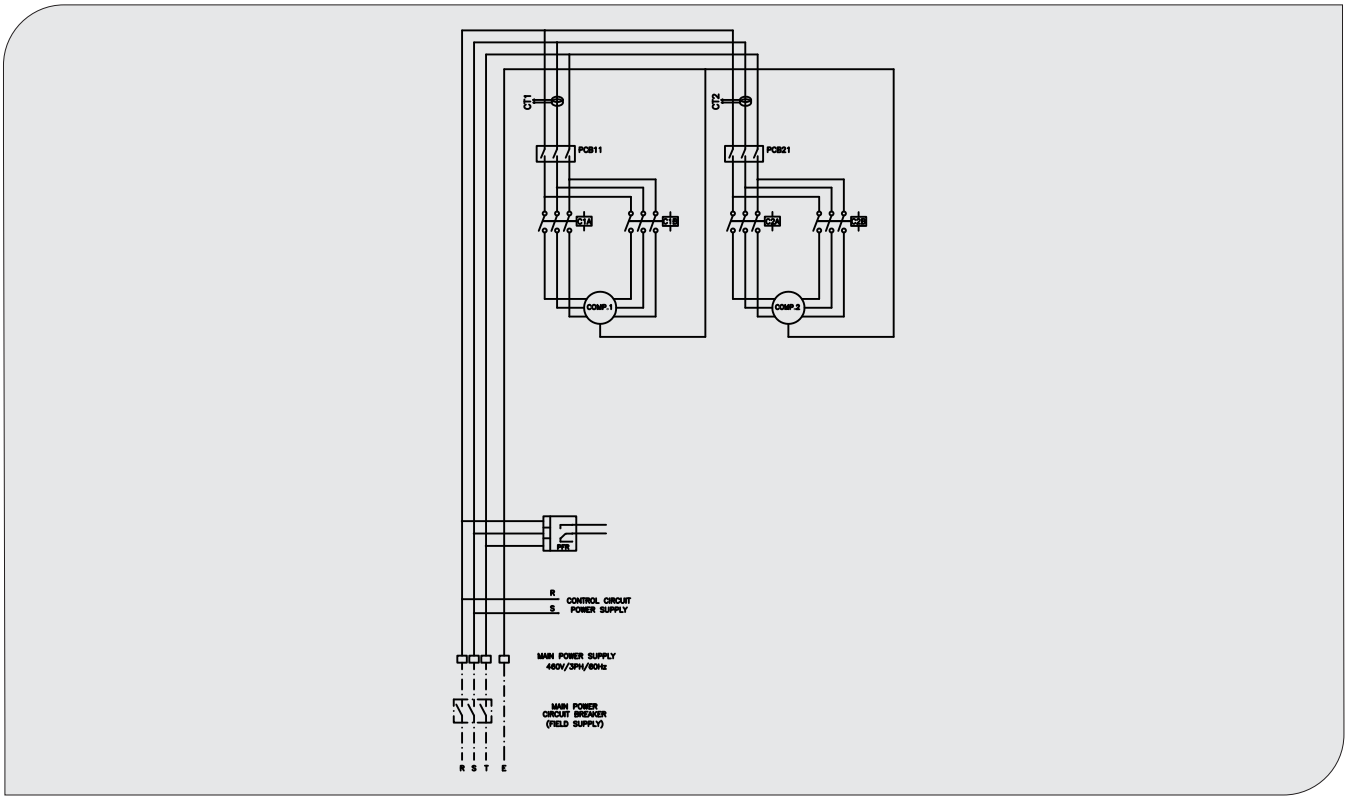


TYPICAL WIRING - 460V/3Ph/60 Hz

Electronic Expansion Valve Drive



Power Diagram



TYPICAL WIRING - 460V/3Ph/60 Hz

Lists & Tables

LEGEND			
COMP.	COMPRESSOR	HPS	HIGH PRESSURE SWITCH
COND.	CONDENSER	OLS	OIL LEVEL SWITCH
CCB	CONTROL CIRCUIT BREAKER	SV	SLIDING VALVE
C	CONTACTOR	WFS	WATER FLOW SWITCH
PFR	PHASE FAILURE RELAY	LSVi	LIQUID SOLENOID VALVE INJECTION
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SUC.P :– SUCTION PRESSURE
DISC.T :– DISCHARGE TEMPERATURE
SUC.T :– SUCTION TEMPERATURE

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RESTART DELAY	GREEN
REVERSE PHASE	RED
UNBALANCE/SINGLE PHASE	RED
HIGH/LOW VOLTAGE	RED

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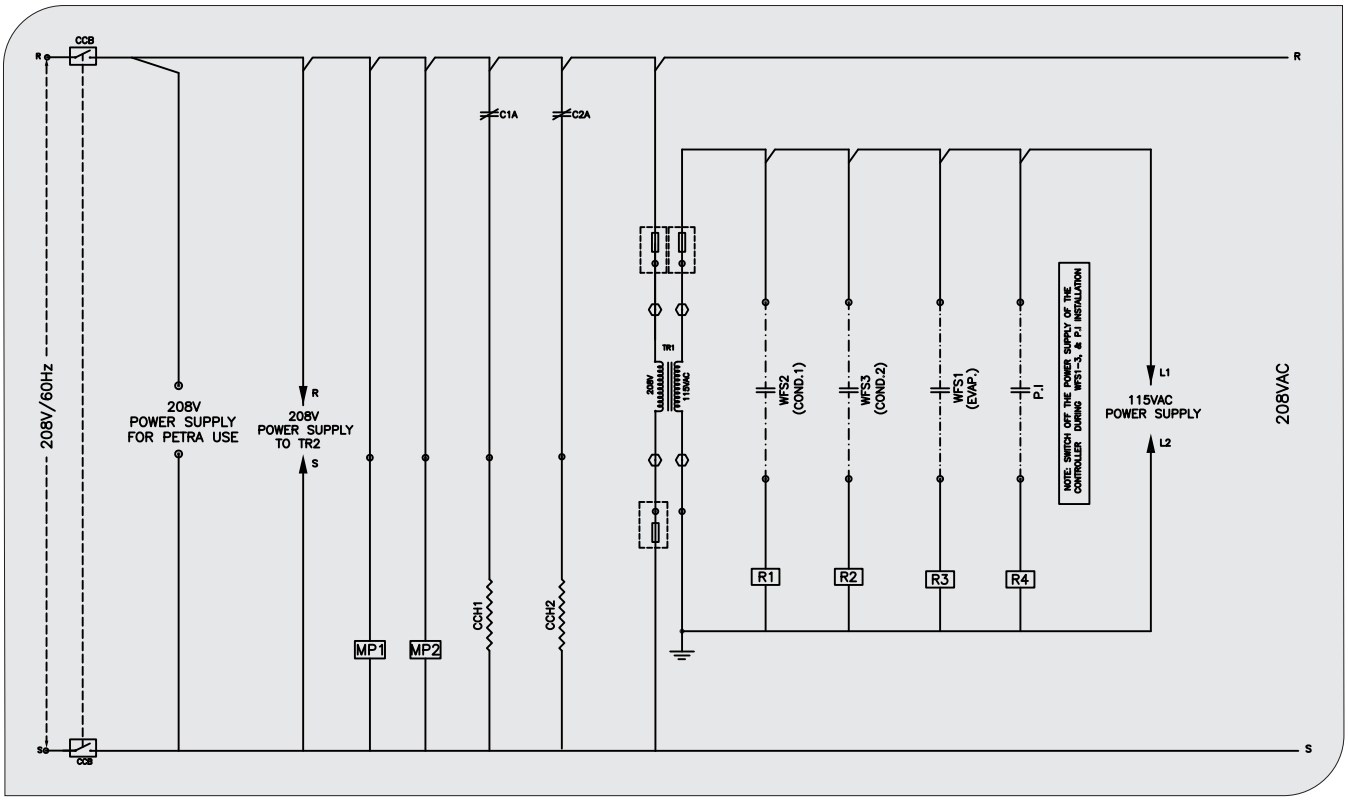
AND THEN PRESS (↵) TO ENABLE MODIFYING THE VALUE

NOW YOU CAN CHANGE IT BY PRESSING (↑ 4) AND (↓ 7) AND THEN PRESS (↵) TO SAVE

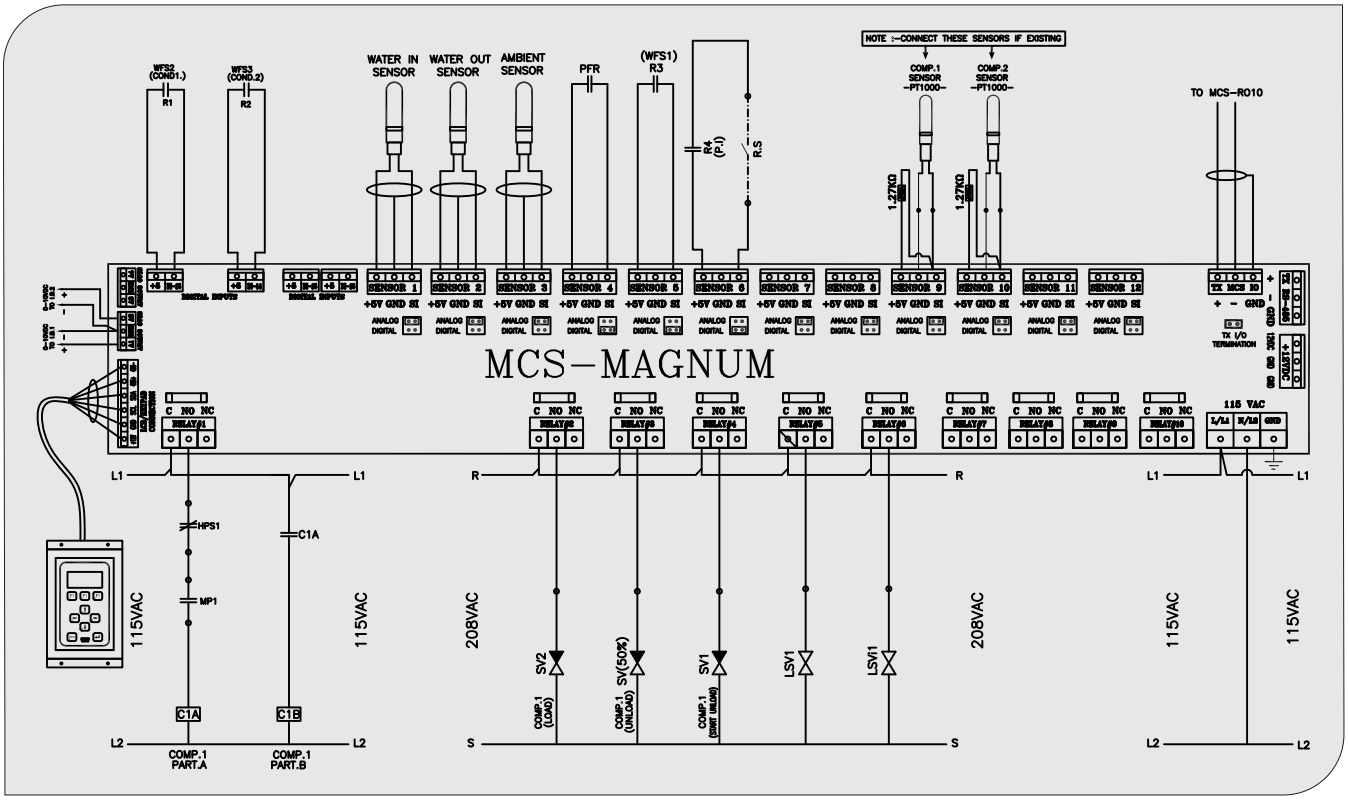
THEN PRESS (Menu 8) TO EXIT TO THE MAIN MENU

TYPICAL WIRING - 208V/3Ph/60 Hz

Control Diagram

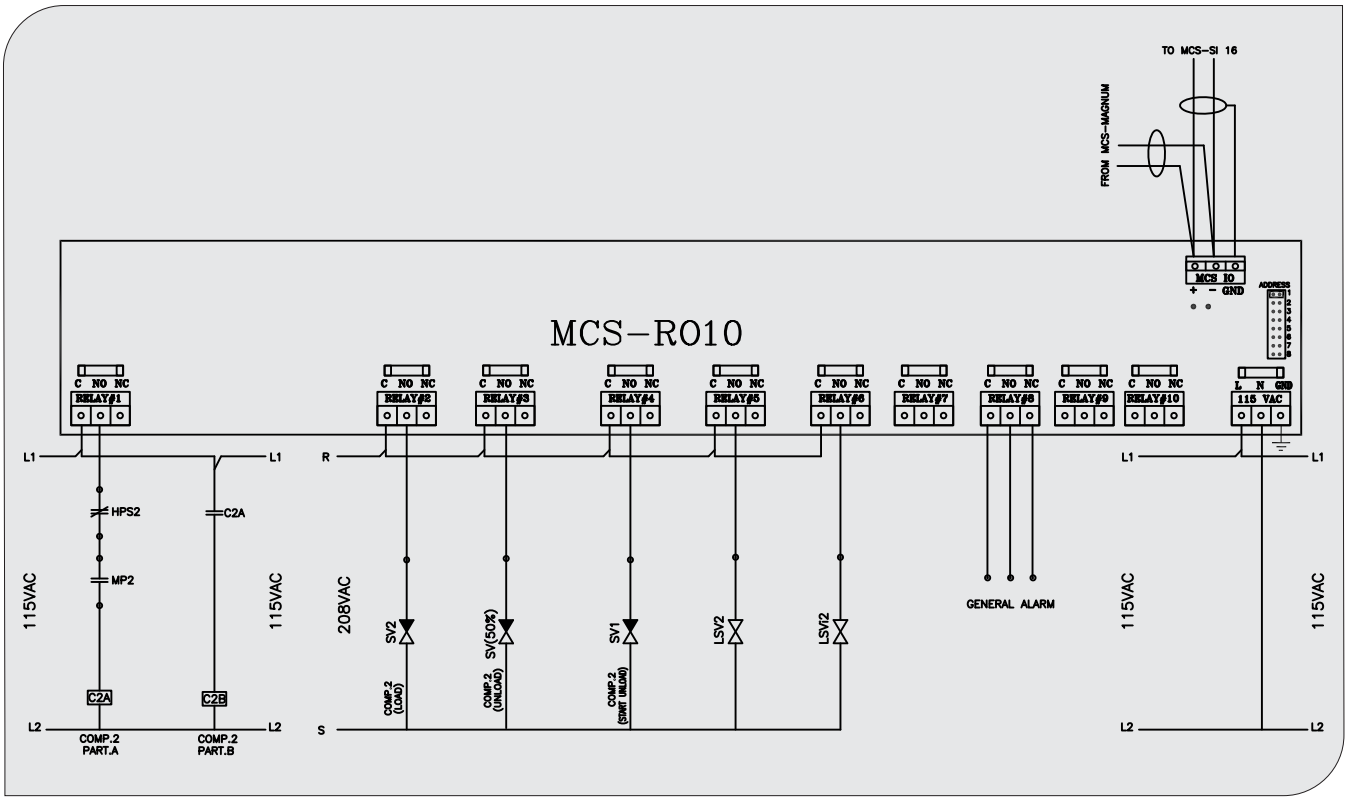


Control Diagram

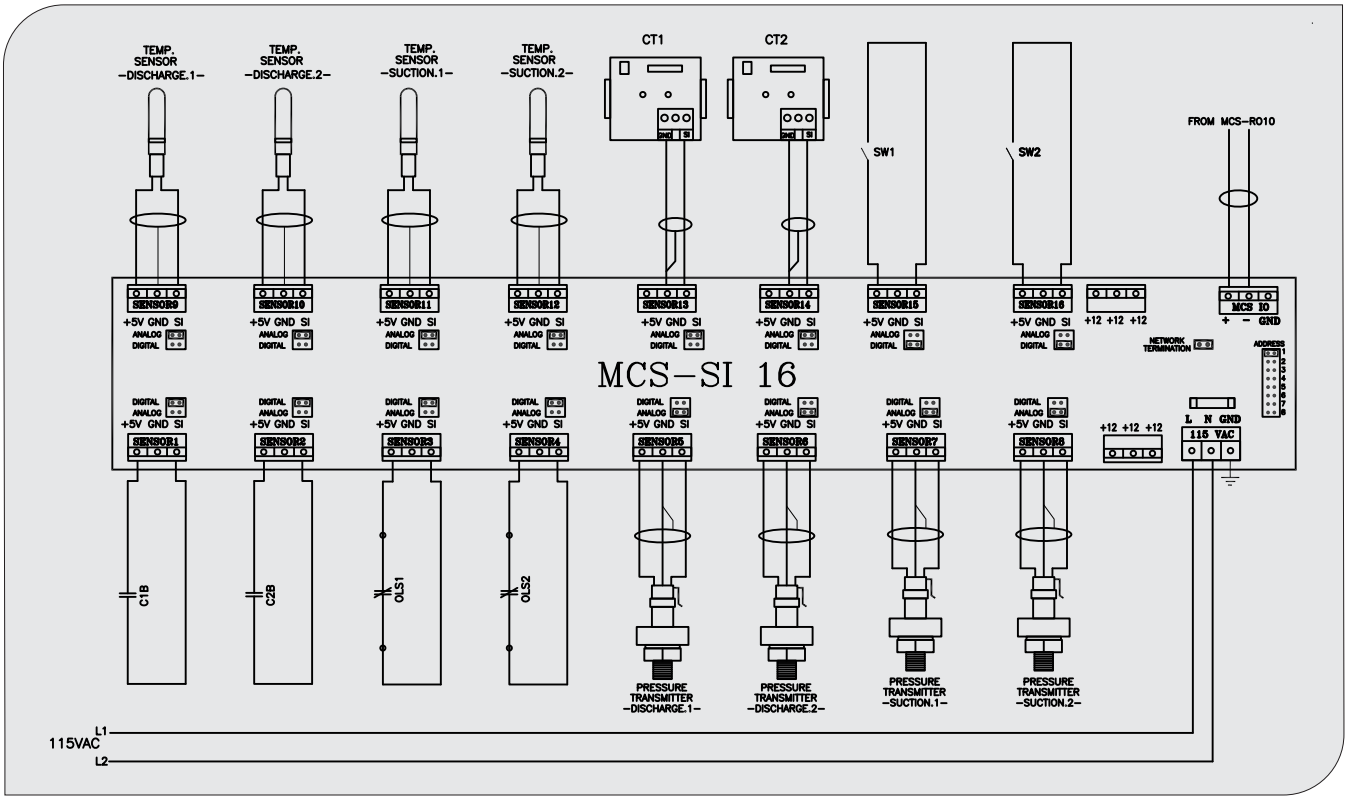


TYPICAL WIRING - 208V/3Ph/60 Hz

Control Diagram

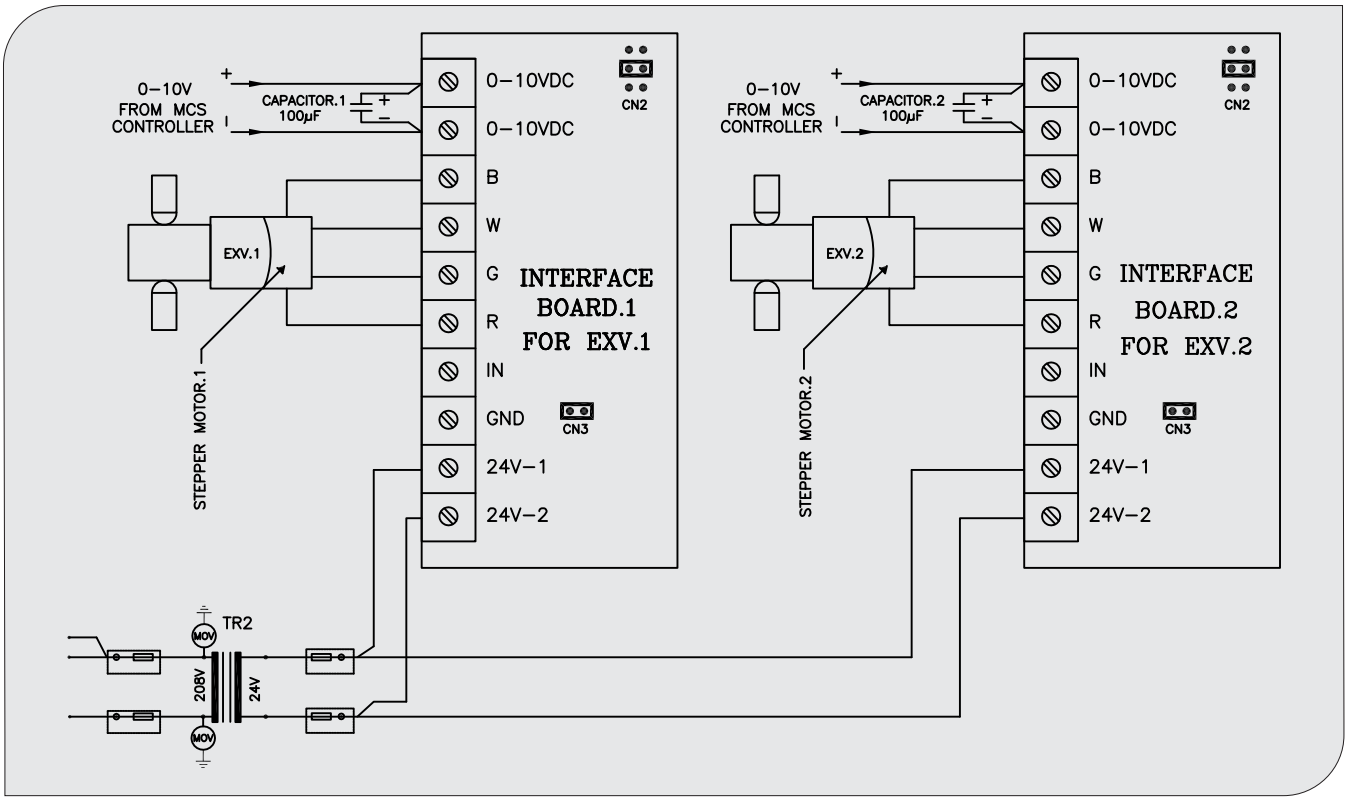


Control Diagram

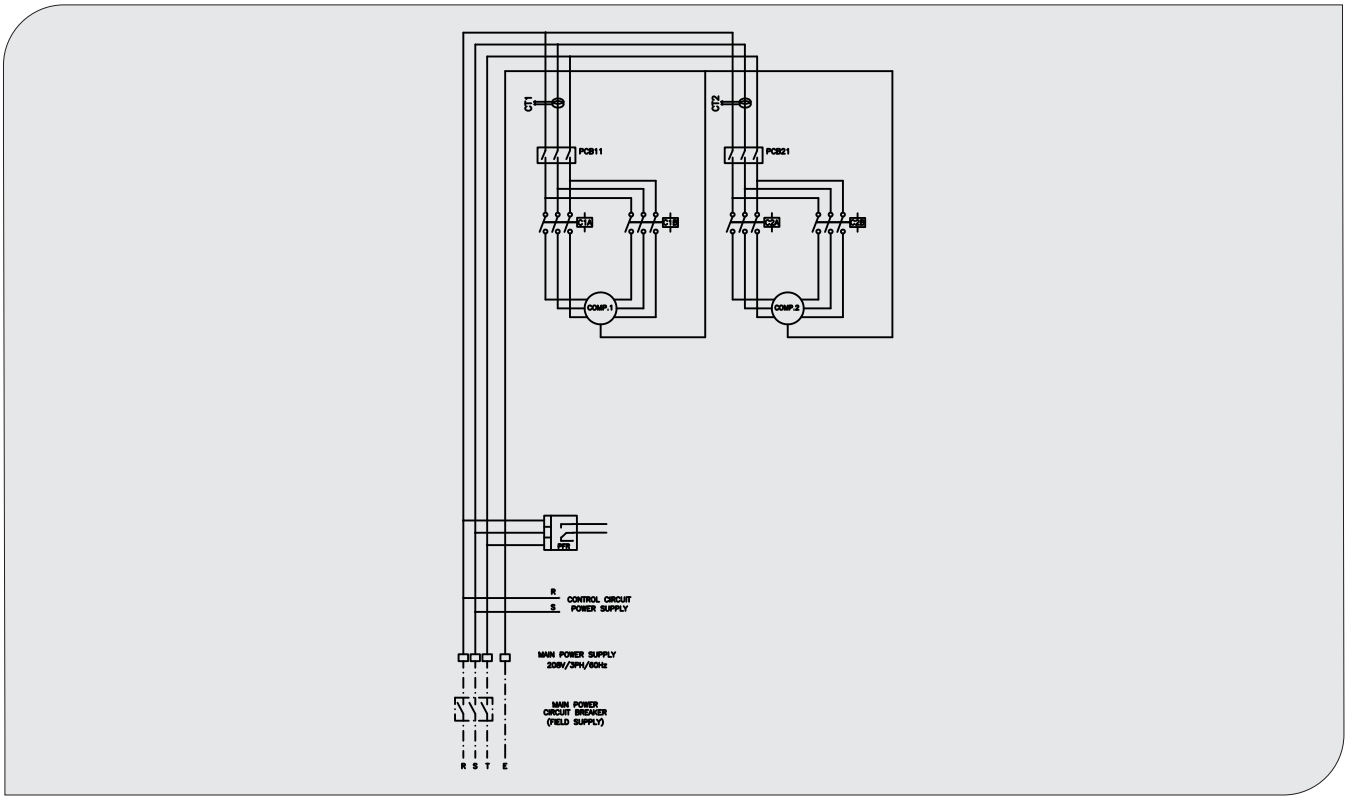


TYPICAL WIRING - 208V/3Ph/60 Hz

Elec. Expansion Valve Driver



Power Diagram



TYPICAL WIRING - 208V/3Ph/60 Hz

Lists & Tables

LEGEND			
COMP.	COMPRESSOR	HPS	HIGH PRESSURE SWITCH
COND.	CONDENSER	OLS	OIL LEVEL SWITCH
CCB	CONTROL CIRCUIT BREAKER	SV	SLIDING VALVE
C	CONTACTOR	WFS	WATER FLOW SWITCH
PFR	PHASE FAILURE RELAY	LSVi	LIQUID SOLENOID VALVE INJECTION
CCH	CRANK CASE HEATER	TR	TRANSFORMER
LSV	LIQUID SOLENOID VALVE	R.S	REMOTE SWITCH
MP	MOTOR PROTECTOR	R	CONTROL RELAY
PI	PUMP INTERLOCK	MMS	MANUAL MOTOR STARTER
CT	CURRENT TRANSFORMER	MOV	METAL OXIDE VARISTER
SW	SWITCH	PCB	POWER CIRCUIT BREAKER
EXV	ELECTRONIC EXPANSION VALVE	⊙n	TERMINAL NUMBER
I.B	INTERFACE BOARD	Wn	WIRING NUMBER
EVAP.	EVAPORATOR	—·—·—	FEILD CONNECTION (BY OTHERS)

Lists & Tables

MCS DISPLAY

ALARM:

1* IN CASE OF "COMP. PROOF" ALARM MESSAGE FOR ANY CIRCUIT CHECK : (HPS,MP) RELATED TO THAT CIRCUIT

2* IN CASE OF "FREEZE" ALARM IT MEANS ONE OF THE FOLLOWING:
- –FREEZE CONDITION
- –WATER OUT SENSOR ISN'T CONNECTED OR DOESN'T OPERATE

LEGEND:

DISC.P :– DISCHARGE PRESSURE
SUC.P :– SUCTION PRESSURE
DISC.T :– DISCHARGE TEMPERATURE
SUC.T :– SUCTION TEMPERATURE

PFR INDICATOR LIGHT DIAGNOSTICS	
RUN	GREEN
RESTART DELAY	GREEN
REVERSE PHASE	RED
UNBALANCE/SINGLE PHASE	RED
HIGH/LOW VOLTAGE	RED

ACCESS TO SET POINT

PRESS MENU BUTTON (Menu 8) ON THE CONTROLLER KEYPAD

GO TO THE (SETPOINTS) BY PRESSING (→ 6) AND THEN PRESS ENTER

GO TO THE (CHW OUT TRGT) AND THEN PRESS ON (↵) BUTTON

AND THEN PRESS (↵) TO ENABLE MODIFYING THE VALUE

NOW YOU CAN CHANGE IT BY PRESSING (↑ 4) AND (↓ 7) AND THEN PRESS (↵) TO SAVE

THEN PRESS (Menu 8) TO EXIT TO THE MAIN MENU

Unit Leveling

Unit must be leveled when installed to ensure proper oil return to the compressor. unit must be installed indoor and protected from construction dirt and moisture

Barrel (Cooler) Fluid Temperature

1. Maximum leaving chilled fluid temperature for unit is 10ºC (50ºF). For continuous operation, it is recommended that return fluid temperature does not exceed 16ºC (60ºF) (If continuous operation is required for return water temperature above 16ºC (60ºF) please refer to Petra nearest sales office)
2. Minimum leaving chilled fluid temperature for a standard unit is 4ºC (40ºF) (for lower leaving temperature contact Petra nearest sales office)

Barrel (Cooler) protection

Protection against low ambient freeze-up is required for ambient temperatures below 0ºC (32°F)
Protection should be in the form of

1- Inhibited ethylene glycol or any other suitable glycol (please contact Petra nearest sales office)
2- Cooler is equipped with an electric tape heat that prevents freeze-up (Optional)

Barrel (Cooler) Flow Range

Chiller ratings and performance data pertain to a fluid temperature rise of 5.5ºC (10°F). Chillers may be suitable for operation in a range from 3ºC (5.4°F) to 9ºC (16°F) temperature rise without adjustment and provided flow limits are within the minimum flow rate limits outlined in the table page 74. (for larger or smaller temperature rise, a mixing loop is required; please contact Petra nearest sales office)

Minimum Barrel (Cooler) Flow

Is based on the maximum permissible temperature rise across the cooler of 9ºC (16°F)

Barrel (Cooler) Fluid loop volume

To obtain proper temperature control, the loop fluid volume must be at least 297 (L/s)/kW (5 GPM/Ton) based on a 5.5ºC (10°F) temperature rise for chiller nominal capacity in air conditioning applications, taking into consideration the minimum system volume

Condenser Fluid Temperature

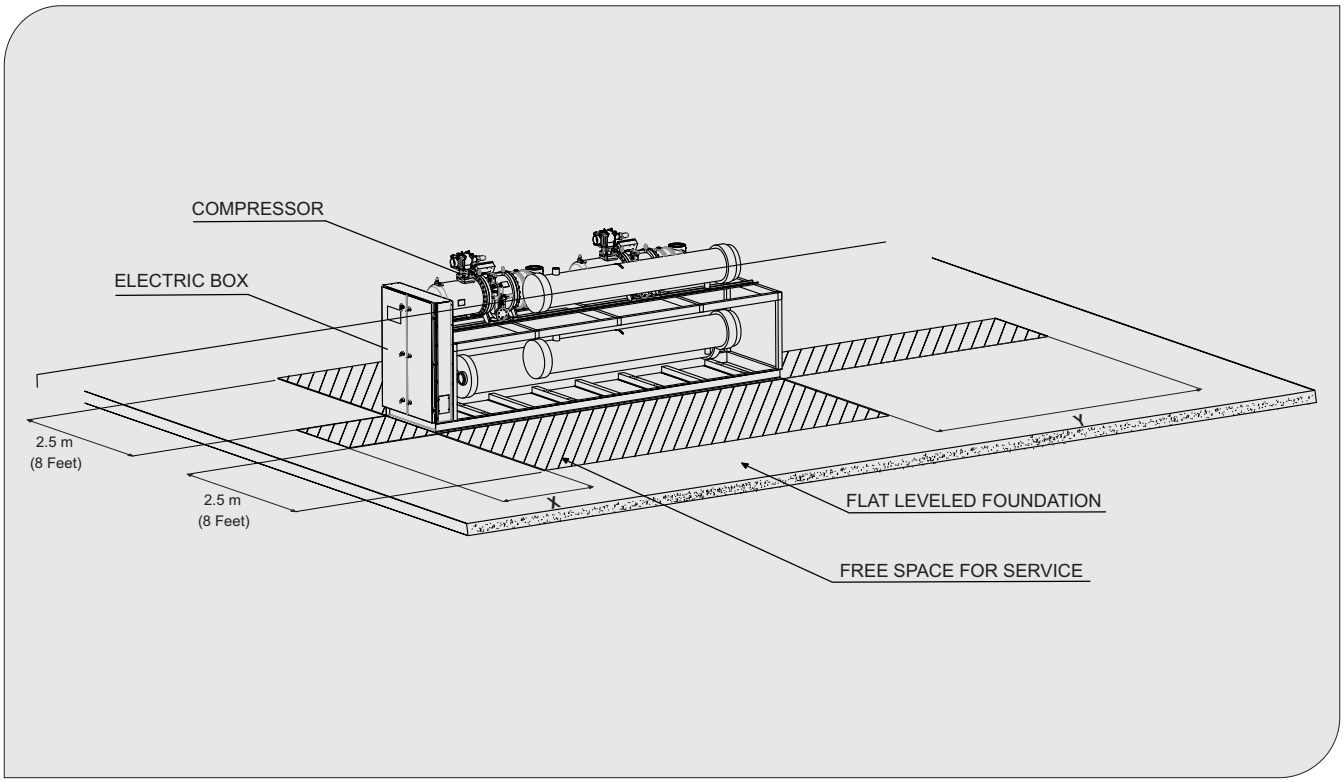
1. Maximum leaving chilled fluid temperature is 43ºC (110ºF). For continuous operation, it is recommended that return fluid temperature does not exceed 21ºC (70ºF) (If continuous operation is required for return water temperature above 21ºC (70ºF) please refer to Petra nearest sales office)
2. Unit shall start at entering condenser water temperature above 18ºC (65ºF)

APPLICATION DATA

Model (WPSa)	Nominal Water flow rate				Minimum Water flow rate				Minimum loop volume			
	50 Hz		60 Hz		50 Hz		60 Hz		50 Hz		60 Hz	
	L/s	GPM	L/s	GPM	L/s	GPM	L/s	GPM	Liter	gallon	Liter	gallon
300-2	40	628	45	714	27	435	31	495	11,893	3,142	13,516	3,571
350-2	46	732	53	838	32	508	37	579	13,863	3,662	15,870	4,192
375-2	50	790	57	901	35	548	40	628	14,956	3,951	17,048	4,504
400-2	53	838	61	960	37	580	42	665	15,857	4,189	18,173	4,801
450-2	58	926	66	1,052	41	645	46	732	17,530	4,631	19,917	5,262
500-2	64	1,022	73	1,161	45	709	51	805	19,338	5,109	21,970	5,804
600-4	79	1,257	90	1,428	55	871	62	989	23,786	6,284	27,032	7,141
700-4	92	1,465	106	1,677	64	1,016	73	1,158	27,727	7,325	31,739	8,385
750-4	100	1,580	114	1,802	69	1,096	79	1,255	29,913	7,902	34,097	9,008
800-4	106	1,676	121	1,920	73	1,161	84	1,331	31,713	8,378	36,347	9,602
900-4	117	1,852	133	2,105	81	1,290	92	1,464	35,060	9,262	39,834	10,523
1000-4	129	2,043	146	2,322	89	1,419	102	1,611	38,677	10,217	43,940	11,608

NOTE

- Nominal water flow rate is based on AHRI condition of 29.4 ºC (85 ºF) entering water temperature and leaving water temperature of 35.0 ºC (95 ºF) for condenser, and 12.2ºC (54ºF) entering water temperature and leaving water temperature of 6.7ºC (44ºF) for cooler (barrel)
- Minimum water flow rate is based on leaving water temperature of 4ºC (40ºF) and inlet water temperature of 13ºC (55ºF)
- Minimum cooler loop volume is based on normal air conditioning application



MODEL (WPSa)	X m [ft]
300-2 ~ 400-2	1.5 [5.0]
450-2 ~ 1000-2	1.7 [5.5]

MODEL (WPSa)	Y m [ft]
300-2 ~ 1000-4	5.0 [16.4]

NOTE

- Y: Barrel (cooler) core removal clearance
- X: Electrical box clearance

LEGEND

- Unit must be leveled
- Service area above is the minimum accepted
- For any other site installation requirements or multiple chiller installation, please contact your nearest Petra sales office

Part 1 — General

1.01 SYSTEM

A. This section includes a microprocessor controlled water-cooled liquid chiller with twin-screw semi hermetic compressors, electronic expansion valves and independent refrigeration circuits. Chiller shall be EXTENDED CHASSIS design and will have the scheduled capacities as shown and indicated on the plans tables and drawings

1.02 QUALITY ASSURANCE

A. Chiller unit shall be designed, manufactured, tested, rated and certified in accordance with the applicable section of the following standards and codes:

1. AHRI 550/590, “Water Chilling Package Using the Vapor Compression Cycle” latest edition
2. ASHRAE 90.1, “Energy Standard for Buildings Except Low-Rise Residential Buildings”
3. ANSI/ASHRAE 15, “Safety Code for Mechanical Refrigeration”. Comply with ASHRAE guideline 3 for refrigerant leaks, recovery, handling and storage requirements
4. ANSI/NFPA 70, “National Electrical Code (NEC)”
5. OSHA, “Occupational Safety and Health Act”
6. ASME Compliance: Fabricate and label water chiller heat exchangers (Barrel) to comply with “ASME Boiler and Pressure Vessel Code: Section VIII, Division I”
7. Manufactured in a facility registered to ISO 9001-2008, “Manufacturing Quality Standard” that define, establish, and maintain an effective quality assurance system for manufacturing and service industries and ISO 14001-2004, “Environmental Management System” that identify and control the environment impact and constantly improve the organization environmental performance
8. Conform to UL 1995-2000 under “Intertek Testing Services” for construction of chillers and bear the ETL/cETL mark

B. Factory Run Test

1. Unit shall be full load run tested at the factory. This includes pressure testing, evacuation of refrigeration circuits and charging afterward with refrigerant and oil. The run test will be carried out in a controlled environment based on entering and leaving water temperatures and with water flowing through the barrel (evaporator) and condenser

1.03 DELIVERY, STORAGE AND HANDLING

A. Unit controls shall be capable of withstanding 65.5 °C (150 °F) storage temperatures in the control compartment

B. Unit shall be delivered to job site fully assembled with all interconnecting refrigeration piping and internal wiring ready for field installation and charged with refrigerant and oil by the manufacturer

C. Unit to have a protective transparent shipping cover over the whole. This cover shall be secured to the unit base through special welded steel rods with nylon robes. Barrel and condenser opening shall be protected with plastic caps. The protective shipping cover should be kept in place until the equipment is ready for installation

D. Unit shall be stored and handled per unit manufacturer's recommendations. Chiller should be stored indoor and protected from construction dirt and moisture

1.04 WARRANTY

A. Manufacturer shall warrant the equipment (parts only) against defects of workmanship and/or material for a period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever occurs first

Part 2 — PRODUCTS

2.01 APROVED MANUFACTURERS

A. The design shown on the Plans & Drawings is based on PETRA model WPSa chiller manufactured by Petra Engineering Industries Co. Alternate equipment will be acceptable if the manufacturer's equipment meets the scheduled performance and complies with these specifications.
If equipment manufactured by a manufacturer other than that scheduled is utilized, then the Mechanical Contractor shall be responsible for coordinating with the General Contractor and all affected Subcontractors to insure proper provisions for installation of the furnished unit. This coordination shall include, but not be limited to, the following:

1. Electrical power requirements, wire and conduit sizes, circuit breakers and feeders sizes and overcurrent protection size
2. Structural supports for units
3. Chiller physical size on plant layout and apace availability

4. Water piping sizes and water connection locations on the unit
5. Compliance with the proper international codes such as AHRI, ANSI, NFPA, UL and ASME
6. Site noise considerations

B. The Mechanical Contractor shall be Responsible for all costs incurred by the General contractor, Subcontractors, and Consultants to modify the building provisions to accept the furnished alternate equipment

2.02 GENERAL

A. Description:

1. Furnish, install and commission a factory assembled EXTENDED CHASSIS DESIGN single piece chassis water cooled screw compressor chiller unit that is charged and run tested in the factory as specified herein and shown on the Drawings. Chiller shall include, but is not limited to: twin screw semi hermetic compressors, a complete refrigeration system with three (3) or four (4) independent refrigerant circuit, shell and tube DX type barrel (evaporator), shell & tube condenser, a full charge of R-134a refrigerant, flanged on lubrication system, interconnecting wiring, safety and operating controls and all special features as specified herein or required for safe and automatic operation

B. Unit Paint and Color:

1. Unit structural members, control and electrical boxes shall be constructed of a minimum of G-60-90 galvanized steel that shall be coated with a polyester oven baked powder paint that meets a minimum 5,000 hours salt spray tested in accordance with the ASTM B117 standard. Color code will be RAL 9002 (White Gray). Any other paint process that meets less than 5,000 hours shall not be accepted

C. Unit Base, Structure And Finish:

1. Unit will be supported by a structural welded steel C-channel of heights of 150 mm (5.5”). The base shall incorporate cross members to support internal components and will be equipped with screwed-in lifting lugs (eye bolts) of suitable loading capacity. Each lifting lug will be fitted on a welded bracket to the side of the C-channel. The base members shall be coated with mono component catalyzed primer sprayed paint. Welded rods inside the C-channel shall be added to tie-in the unit roof cover for shipment purposes

2.OPTIONAL: *Sprayed base by two layers of the same color epoxy paint*

2.OPTIONAL: *Galvanized steel structural C-channel base, sprayed base by two layers of the same color epoxy paint*

D. Unit Cabinet Structure:

1. All self-tapping screws and Bolts/Nuts used shall be made from Stainless steel with a built in rubber retainer included
2. All electrical panels are made from gauge 18 (1.25 mm {0.051”}) thickness galvanized

E. Compressors:

1. Twin rotary screw semi-hermetic compressors
2. Direct drive Compressor, suction gas cooled motor with a nominal speed of 2900/3500 rpm (50/60 power supply cycle). Motor shall be protected by a solid state motor protector feeding from imbedded motor temperature sensors on all three phases
3. Compressors shall be equipped with a flanged on oil separator that utilized the oil collection with a fine mesh oil filter and all necessary safeties. External oil separators with pumps shall not accepted
4. A crank case heater is fitted to the compressor to heat up the oil before startups. It is recommended to turn on the chiller controls before at least 24-hours to energize the crank case heater
5. Compressors shall be equipped with a discharge valve as part of the compressor
6. Compressors shall start unloaded with the unit microprocessor to load the compressor to match the system load
7. Compressor starting shall be part winding or Wye-Delta
8. Capacity control shall utilize an infinitely step less modulating slide valve to modulate capacity to match load requirements
9. Compressor shall be supported by rubber in shear vibration isolators and provided with ample space around it for service and removal
10. Compressor shall be equipped with a built in low pressure protection through a pressure transmitter connected to unit controller
11. Compressor shall have an oil level switch, high efficiency suction strainer

F. Barrels (Evaporator Cooler):

1. Shall be a shell-and-tube, Direct Expansion (DX) type. It will be mechanically cleanable tubes removable head(s). Water in the shell and refrigerant in tubes
2. Tubes shall be internally enhanced seamless copper type rolled into tube sheets. Baffles shall be provided in the shell to ensure maximum water distribution for best heat transfer
3. Barrels shall be designed with three (3) or four (4) independent refrigeration circuits (one per each compressor)
4. Shall be insulated with a closed cell foam insulation of 19 mm (3/4") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}

4. OPTIONAL: *Shall be insulated with a closed cell foam insulation of 25 mm (1") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*

4. OPTIONAL: *Shall be insulated with a closed cell foam insulation of 38 mm (1 1/2") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*

4. OPTIONAL: *Shall be insulated with a closed cell foam insulation of 50 mm (2") thickness with a maximum K factor of 0.035 W/(m-K°) {0.020 BTUH/(ft-°F)}*

5. *Cooler shall h*ave a built on drain and vent connection
6. It shall be equipped with Victaulic-type water connections that are supplied as loose items and shipped within the chiller enclosure
7. Cooler shall be tested and stamped in accordance with ASME Code for refrigerant. Refrigerant side design working pressure shall be 1000 kPa (145 psig) and the maximum water side design working pressure shall be 1500 kPa (220 psig)

8. OPTIONAL: *Aluminum protective Cladding cover that shall be applied above barrel (cooler) insulation. Aluminum cladding shall be of gauge 22 [0.7 mm (0.03")] thick*

8. *OPTIONAL: Stainless steel protective Cladding cover that shall be applied above barrel (cooler) insulation. Aluminum cladding shall be of gauge 22 [0.7 mm (0.03")] thick*

8. OPTIONAL: *Painted galvanized steel protective Cladding cover that shall be applied above barrel (cooler) insulation. Aluminum cladding shall be of gauge 22 [0.7 mm (0.03")] thick*

9. OPTIONAL: *Water flow switch shall be supplied as a loose item to be field installed by contractor. Flow switch shall be of the paddle type. The paddle shall be made from copper alloy. Switch shall be SPDT, IP 42 protection, with operating range of water temperature of -20°C to 80°C (-4°F to 176°F)*

G. Condenser:

1. Shall be a shell-and-tube type. It will be mechanically cleanable tubes removable head(s). Water in the tubes and refrigerant in shell
2. Tubes shall be internally enhanced seamless copper type rolled into tube sheets. Baffles shall be provided in the shell to ensure maximum liquid refrigerant distribution for best heat transfer
3. Condensers shall be designed with one (1) refrigeration circuits, so each chiller shall be equipped with three (3) or four (4) condensers (one per each compressor)
4. Condenser shall have a built on drain and vent (purge) connection
5. Chiller unit shall be equipped with one inlet and outlet water connections with Victaulic-type connections that are supplied as loose items and shipped within the chiller enclosure. The on inlet and outlet water shall be based of 100% water flow rate through condensers and without any valves
6. Condenser shall be tested and stamped in accordance with ASME Code for refrigerant. Refrigerant side design working pressure shall be 1500 kPa (220 psig) and the maximum water side design working pressure shall be 1500 kPa (220 psig)

7. OPTIONAL: *Water flow switch shall be supplied as a loose item to be field installed by contractor. Flow switch shall be of the paddle type. The paddle shall be made from copper alloy. Switch shall be SPDT, IP 42 protection, with operating range of water temperature of -20°C to 80°C (-4°F to 176°F)*

H. Refrigeration Circuits and Components:

1. Refrigerant used shall be R-134a
2. Unit shall have independent refrigeration circuits for each compressor
3. Refrigeration circuit components shall include replaceable-core filter drier, moisture indicating sight glass, electronic expansion valve, discharge & suction compressor service valves, liquid line service valve and a complete operating charge of refrigerant R-134a and compressor oil
4. Each compressor shall be equipped with an external high pressure cut outs

5. All suction lines shall be sand papered, insulated with closed cell foam insulation, wrapped with protective material and finally epoxy coated
6. All other exposed refrigeration pipes shall be sand papered cleaned and epoxy coated afterwards
7. All safety devices and valves are marked after unit run test to indicate factory position for each component

8. OPTIONAL: *Mechanically controlled Hot Gas By Pass (HGBP) valve to enable compressor to operate below its minimum load point*

9. OPTIONAL: *Pressure Relief Valve with a brass body, a pressure setting of 4650 kPa (675 psig), a working temperature range between -40°C and 107°C (-40°F and 225°F) and conforms to ASME VIII, Division I. The valve is a conventional back pressure dependent type and therefore required to discharge to atmosphere*

10. OPTIONAL: *High and low pressure gauges for each refrigeration circuit. Gauges shall be Bourdon type with stainless steel housing oil filled*

I. Acoustical Data:

1. Provide acoustical sound power or sound pressure level data in decibels (dB) at the scheduled eight (8) octave band center frequencies and/or at 1/3 of each octave band upon request. A-weighted sound data alone is not acceptable
2. Supplied equipment shall not exceed scheduled sound power or sound pressure level data at any load point. The mechanical Contractor shall be responsible for any additional costs associated with equipment deviation
3. Acoustical performance ratings shall be in accordance with AHRI 370 and ISO BS 3744 Standards

4. OPTIONAL: *Compressor Jacket to meet the specified sound levels scheduled in the plans at full load and all other load points (if requested). Compressor jacket shall consists of a 9.5 mm (3/8") thick closed cell rubber sound insulation material encapsulated in a sound deflecting vinyl cover*

4. OPTIONAL: *Standard compressor acoustic compartment to meet the specified sound levels scheduled in the plans at full load and all other load points (if requested. Compartment shall be made from a single wall gauge 16 [1.5 mm (0.06")] thick galvanized steel sheet metal with 9.5 mm (3/8") thick closed cell rubber sound insulation. All galvanized sheet metal shall be painted with the same unit paint*

4. OPTIONAL: *Advanced Compressor acoustic compartment to meet the specified sound levels scheduled in the plans at full load and all other load points (if requested)*

J. Operating Characteristics:

1. Unit shall be capable of starting up with 35°C (95°F) entering fluid temperature to the cooler

K. Power & Electrical:

1. Power/Control Panel:
   a. Factory installed and wired IP 54 (NEMA 3R) panel, that shall be made from welded G-60/90 (as a minimum) galvanized steel gauge 18 (1.25 mm {0.05"}). Panel shall be equipped with lockable and gasket sealed access doors with a minimum of two external handles and multiple hinges

   a. OPTIONAL: *Factory installed and wired IP 54 (NEMA 4X) panel, that shall be made from fully welded all around G-60/90 (as a minimum) galvanized steel gauge 12 (3 mm {0.12"}). Panel shall be equipped with lockable and gasket sealed access doors with a minimum of two external handles and multiple hinges*

   a. OPTIONAL: *Factory installed and wired IP 54 (NEMA 4X) panel, that shall be made from fully welded all around Stainless steel gauge 12 (3 mm {0.12"}). Panel shall be equipped with lockable and gasket sealed access doors with a minimum of two external handles and multiple hinges*

   b. Panel doors shall be provided with a door retainer for each door to keep the door open during service
   c. Unit shall be provided with two separate panels, one for control and one for power
   d. Panel door shall be provided with a pocket to place the laminated wiring diagrams and IOM manuals
   e. Panel shall have a transparent solid PVC NFPA rated piece to cover the power input bus bars
   f. All bus brass pars shall be coated with a zinc coat to prevent brass corrosion
   g. Panel shall have one power entry either form the side or bottom

2. Main Power and Control components:
   a. Compressor electronic current monitoring overload motor protector
   b. Free terminal for ON/OFF unit connection
   c. Free terminal for general alarm output
   d. Interlock for pump and water flow switch
   e. Circuit breaker for each compressor
   f. Starting contactors for each compressor
   g. ON/OFF switch for each compressor

h. Control circuit breaker for short circuit protection
i. Short cycling protection timer for each compressor
j. Control transformer mounted and wired that shall supply all unit control voltage from the main unit power supply to internal components such as (not limited to) solenoid valves, compressor motor protector, compressor crank case heater and Microprocessor controller
k. Power supply monitor (Phase Failure Relay) to protect power circuit against over voltage, under voltage, phase loss, phase imbalance and phase reversing conditions
l. Control transformer for the secondary and controller voltages
m. Microprocessor controller
n. All running wiring inside panels must be contained within PVC trunks
o. All wires connection shall be marked with a clear and typed on tags to identify each wire
p. An extra loop of wires must be provided for each power connection to a circuit breaker, contactor or motor start to allow for a clamp on measuring current device to be installed during start up and service
q. Full documentation shall be provided inside the electrical panel pocket. This shall include (not limited to) a laminated wiring diagram, IOM manual, hard copy of wiring diagram and quality check list

r. OPTIONAL: *Power Factor correction capacitor:*

1. *Provide unit with power factor correction capacitors upon request to maintain a displacement power factor of 95% at all load conditions. The installing contractor shall be responsible for any and all additional cost to furnish and install power factor correction capacitors if they are requested and not factory mounted and wired*

s. OPTIONAL: *Earth Leakage Relay:*

1. *Provide unit with an earth leakage relay for the unit power supply to shut down the unit if the amount of leakage is above the set point*
2. *Provide unit with an earth leakage relay for the each compressor power supply to shut down the associated compressor if the amount of leakage is above the set point*

t. OPTIONAL: *External over load for each compressor*

u. OPTIONAL: *Control transformer to supply power input to auxiliary components at 120 or 220 volt, such as bulk head light and GFI outlet*

v. OPTIONAL: *Bulk Head Light for electrical panel:*

1. *IP 54 protection, class I electric safety bulk head light fixture shall be installed in the electrical panel for inspection purposes. The bulb shall be supplied at field by the installing contractor*

w. OPTIONAL: *Ampere-meter and Volt-meter:*

1. *Shall be mounted on power panel exterior door. Ampere-meter shall be provided for each phase and the Volt-meter shall be provide for one phase*

x. OPTIONAL: *120 Volt power supply with Transformer and GFI outlet socket:*

1. *A 120 volt power supply shall be connected through a transformer to provide a 120 volt circuit, to connect a female GFI outlet socket to provide connection to site appliances such as laptop, tablet or cell phone. 120 volt power circuit shall be connected after the unit main disconnect switch, so as to be OFF upon main disconnect switch OFF position*
2. *A 120 volt power supply shall be connected through a transformer to provide a 120 volt circuit, to connect a GFI outlet socket to provide connection to site appliances such as laptop, tablet or cell phone. 120 volt power circuit shall be connected before the unit main disconnect switch, so as to be ON upon main disconnect switch OFF position*

3. Power Entry:
   a. Provide a SINGLE point power entry connection to chiller, that shall be of THREE phase as per scheduled voltage
   b. Terminal Block connections shall be provided atthe point of incoming single point connection for
   c. The incoming power wiring must comply with local codes

d. OPTIONAL: A Main Non-Fused Disconnect Switch lockable external handle shall be supplied to isolate the unit power voltage for servicing. Disconnect switch shall be provided for all power connections to the unit

d. OPTIONAL: A Main Fused Disconnect Switch lockable external handle shall be supplied to isolate the unit power voltage for servicing. Disconnect switch shall be provided for all power connections to the unit

e. OPTIONAL: Provide a DUAL point power connection to chiller, that shall be of THREE phase as per scheduled voltage. One connection shall be for circuit 1 compressors and the second connection shall be for circuit 2 compressor. Each power connection can be equipped with a separate main disconnect switch

4. Power and Control wiring:
   a. All power & control wiring from the electrical power and control panels shall be routed through metal duct in the unit base and shall be connected to each components through and PCV, UV-stabilized, non-metallic conduit beside each component
5. Minimum Circuit Ampacity (MCA):
   a. Supplied equipment shall not exceed the scheduled Minimum Circuit Ampacity (MCA). The mechanical Contractor shall be responsible for any additional costs associated with equipment deviation in this matter
6. Control Circuit components:
   a. Unit control circuit shall include the following minimum components:
      1. Microprocessor with non-volatile memory. Battery backup system shall not be accepted
      2. Separate terminal block for power and controls
      3. Separate 220 volt power supply to serve all controllers, relay, control controllers, relays and control components
      4. ON/OFF control switch by the controller key pad
      5. Replaceable solid-state controller
      6. Pressure sensors installed to measure suction, discharge and oil pressure. Thermistors installed to measure barrel (cooler) entering and leaving fluid temperatures and outside air temperature

   b. Microprocessor controller shall contain the following:
      1. Microprocessor main board designed to supervise and monitor the unit with access port for external connection to a laptop
      2. I/O expansion board with additional input/output terminals
      3. LCD screen display with I/O status and ability to adjust set point. The LCD consists of a liquid crystal display) with adjustable contrast and backlighting

   c. Displayed data on the LCD display:
      1. Leaving and return water temperatures
      2. Compressor discharge pressure and temperature
      3. Compressor suction pressure and temperature
      4. Compressor drawn current
      5. Suction and discharge super heat
      6. Compressor load percentage
      7. Saturated suction and discharge
      8. Compressor oil differential
      9. Compressor times
      10. Digital inputs status
      11. Output relays status
      12. Protection status
      13. Historical alarms
      14. Schedules
      15. Adjustable set point

   d. Unit controls shall include the following functions:
      1. Automatic circuit lead/lag
      2. Capacity control based on leaving chilled fluid temperature and compensated by rate of change of leaving fluid temperature
      3. Limiting the chilled fluid temperature pull-down rate at start-up to an adjustable range to prevent excessive demand spikes at start-up
      4. Seven-day time schedule. Two operating schedules per day of the week and 8-holiday shall e supported by the microprocessor
      5. Leaving and return chilled fluid temperature reset from BMS system
      6. Chilled water pump and water flow interlock connection
      7. High discharge pressure protection
      8. Low leaving water temperature protection
      9. Unloaded start for all compressors

   e. LCD display panel features:
      1. Display shall allow access to configuration, maintenance, alarm history, set points, time schedule and status data
      2. Display shall have one button for chiller ON/OFF
      3. Display shall include three levels of password protection against unauthorized access to programming files and imbedded set points
      4. Display shall allow for easy connection of a portable hand held technician tool such as a laptop to access information and upload and/ or download chiller settings

f. Safeties and Alarms:
1. Cutout and unloading
2. High discharge pressure
3. High discharge temperature
4. Low suction pressure
5. Low suction temperature
6. Freeze state
7. High ampere state
8. Low discharge pressure
9. Unsafe suction pressure
10. Unsafe discharge pressure
11. Flow switch (no flow protection)
12. Phase loss protection
13. Low oil differential pressure
14. Unsafe oil pressure
15. Low oil level
16. Motor temperature
17. Low motor amps
18. Probe error alarm

g. Supporting protocols:
1. Bacnet IP
2. Bacnet MS/TP with a BMS gateway module
3. Modbus IP
4. Modbus RTU
5. Johnson N2 with a BMS gateway
6. Lontalk with a BMS gateway

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
1. Rig and Install in full accordance with manufacturer's requirements, Project drawings, and contract documents

B. Location:
1. Locate chiller as indicated on drawings, including cleaning and service maintenance clearance per manufacturer instructions. Adjust and level chiller on support structure

C. Components:
1. Installing Contractor shall provide and install all auxiliary devices and accessories for fully operational chiller

D. Electrical:
1. Coordinate electrical requirements and connections for all power feeds with Electrical Contractor

E. Controls:
1. Coordinate all control requirements and connections with Controls Contractor

F. Finish:
1. Installing Contractor shall paint damaged and abraded factory finish with touch-up paint matching factory finish

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