

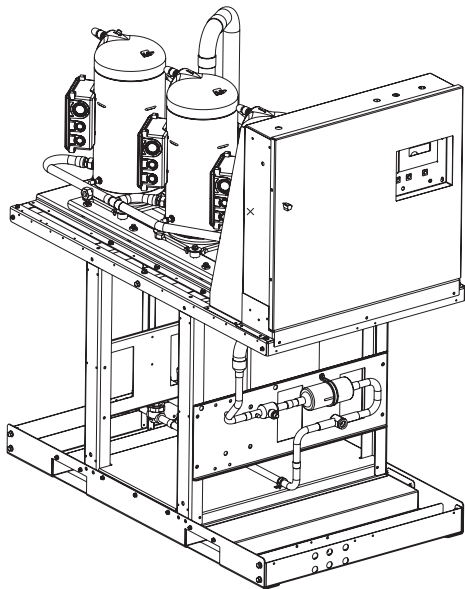


## Product Data

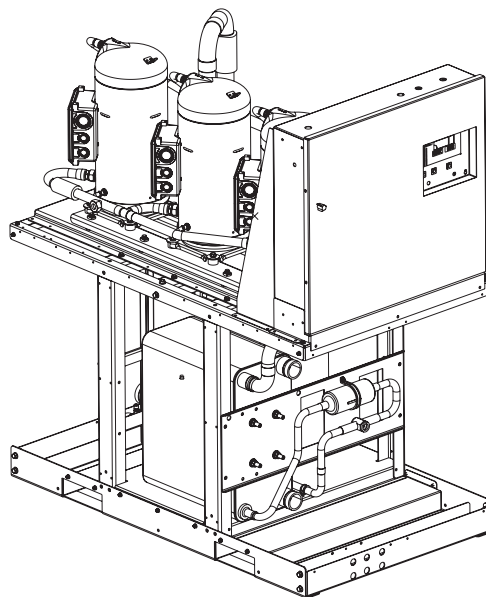
# AQUASNAP® 30MPA, MPW015-045 Liquid Chillers with Scroll Compressors and COMFORTLINK™ Controls

15 to 45 Nominal Tons  
(53 to 158 kW)

# AQUASNAP®



30MPA



30MPW

**ASHRAE  
90.1  
COMPLIANT**

AquaSnap packaged liquid and condenserless chillers feature a rugged, compact modular design for quick and easy installation. This single-circuit modular chiller covers a wide range of applications from ice to heat recovery and various combinations can be easily combined to meet the required plant capacity. Flexible modular design, compact size, and user friendly controls make the 30MP chillers an optimal choice for reliable cooling.

Value-added features include:

- rotary scroll compression
- HFC Puron® refrigerant (R-410A)
- low sound
- easy to use *ComfortLink* controls
- application flexibility
- energy efficiency
- modular design
- optional digital scroll compressors

## Features/Benefits

**Easy to install, scroll chillers offer cost-effective and reliable cooling.**

### Installation ease

The 30MP units are designed to reduce installation time and costs. They arrive at the jobsite able to fit easily through a standard 36-in. (762 mm) door opening due to their compact design. The 30MP units include fork pockets in the frame for use with forklifts or pallet jacks. Optional mobility and height adjustment kits allow units to quickly roll into place and mate with existing piping. Mobility kit wheels are rubber type, pivot for easy unit maneuvering, and are lockable for safety.

## Features/Benefits (cont)



The 30MP height adjustment kit provides a height adjustment mechanism located in each corner of the unit to aid in leveling and facilitate connection to existing piping. The ability to roll the 30MP chiller into most elevators and through most doors combined with the ability to adjust the unit height to match existing piping helps significantly to lower installation expense.

The 30MP units come complete with an insulated evaporator, condenser (30MPW), compressors, controls, refrigerant charge (30MPW), TXV (thermostatic expansion valve), filter drier, sight glass, entering and leaving chilled fluid temperature sensors, evaporator water pressure access port, factory-installed evaporator flow switch, oil charge, and need only the addition of a condenser water supply (30MPW), electrical power, and chilled fluid distribution system. The 30MPA units are designed for use with a remote condenser and include a liquid line isolation valve, liquid line solenoid valve, and have a nitrogen holding charge. The 30MPA chillers may be connected to an air-cooled, evaporative condenser(s) or even liquid condenser(s) sized to meet specific job requirements.

All internal piping and wiring is complete, and since all essential controls and protective devices are installed at the factory, installation is completed in minimal time. The 60-Hz units are ETL and ETL, Canada listed and conform to ASME (American Society of Mechanical Engineers) standards, simplifying the final inspection process.

### Operating reliability and serviceability

The 30MP chiller uses the same compressor sub-assemblies and heat exchangers that are proven to be reliable in AquaSnap® chillers in service around the world. Each unit includes many safeties as standard, including protection from electrical overload, thermal overload, loss of phase, reverse rotation, high pressure, low refrigerant charge, and low chilled fluid temperature. A factory-installed thermal dispersion switch containing no moving parts provides reliable low flow and loss of flow protection. Heat exchangers feature ANSI (American National Standards Institute) 316 stainless steel brazed-plate construction.

The modular design of the 30MP chiller allows units to be installed side by side with no clearance between units to achieve higher capacity. Since each circuit has its own dedicated power supply and controls transformer, an individual chiller can be isolated and serviced while other units continue to operate. The remaining units can provide a supply of chilled water even while a single chiller is down, providing true redundancy and ease of mind.

### ComfortLink™ controls

The *ComfortLink* controls communicate in plain English, making it as easy as possible to monitor and control each AquaSnap chiller while accurately maintaining fluid temperatures. The large scrolling marquee display acts as a window into the unit's operation, providing easy-to-read information about chiller performance and over 15 diagnostic functions. The Carrier 30 Series chillers' *ComfortLink* controls provide features such as chilled water temperature reset, compressor wear minimization and protection. They also display temperature, pressure and other valuable unit operating information.

The 30MP chillers employ more than the latest advanced microprocessor controls, they utilize an expandable platform that can adjust as needs change. *ComfortLink* controls are used in diverse applications from stand-alone operation to remotely monitored and operated multi-chiller plants. The scrolling marquee display also features Spanish, French, and Portuguese languages.

### Operating efficiency and flexibility

The 30MP chillers exceed ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) 90.1 minimum efficiency requirements. At full load, 30MP chillers provide efficiencies better than 0.775 kW/ton at AHRI (Air Conditioning, Heating, and Refrigeration Institute) standard conditions. The 30MP chillers use ultra quiet, high-efficiency scroll compressors, operated in tandem or trio for greater efficiency at partial loads. The 30MP chillers can also be operated with variable flow, allowing building owners to realize even greater overall system energy savings in the chilled water pumping system.

The 30MP chillers also feature a wide, flexible operating range. Standard units can provide up to 140 F leaving condenser water temperature for heat recovery applications while chillers equipped with the medium temperature brine option can provide leaving chilled fluid temperatures down to 15 F for ice build and process cooling. Units have the capability to start and pull down with up to 95 F (35 C) entering-fluid temperature due to the integral pressure limiting feature of the expansion valve.

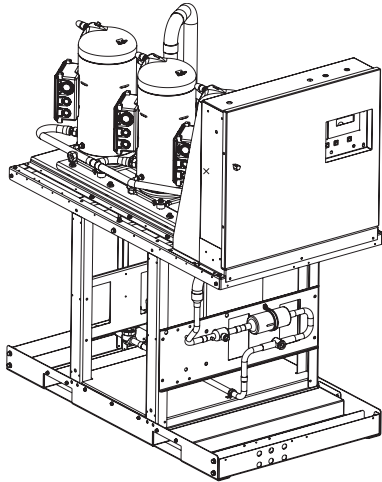
Whether in the classroom, on the production floor, or in the office, *ComfortLink* controls can assist in adaptation to changing weather and business conditions. Accurate temperature control, provided by Carrier's *ComfortLink* system, helps to maintain higher levels of indoor air quality, thermal comfort, and space productivity. While many chillers use only leaving fluid temperature control, the 30MP chillers utilize leaving fluid temperature control with entering fluid temperature compensation. This Carrier exclusive provides smart control and intelligent machine capacity staging.

### Energy management made easy

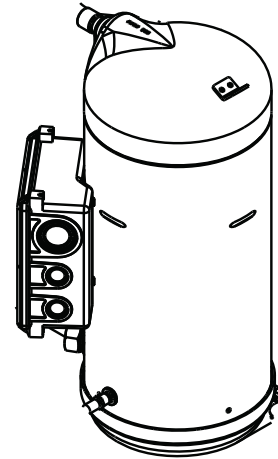
While 30MP chillers have many standard features, such as network communications capability and temperature reset based on return fluid temperature, they can also expand as needs change. Supply temperature reset based on outside air or space temperature is as easy as adding a thermistor. The energy management option allows use of changing utility rate structures with easy to use load shedding, demand limiting and temperature reset capabilities. Reset triggered via a 4 to 20 mA signal (requires EMM [energy management module] option) makes integrating from an existing building management system simple.

### Digital scroll compressors

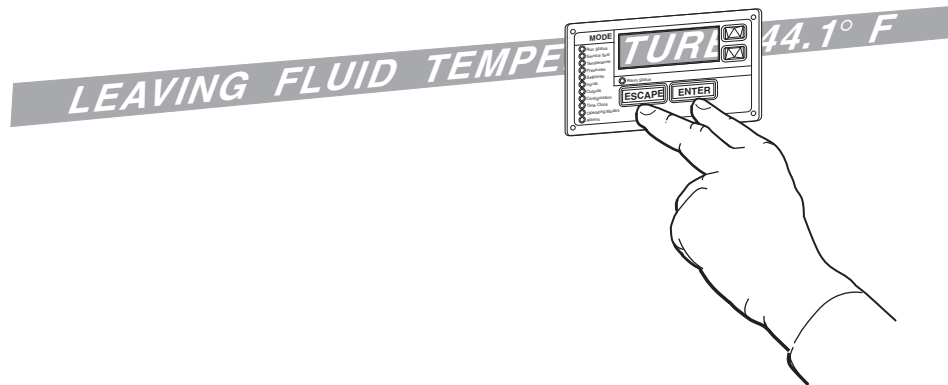
Digital scroll compressors are available as a factory-installed option. These compressors allow incremental unloading with capacity modulation to better match building load when compared to standard scroll compressors.



**30MP COMPACT SIZE**



**SCROLL COMPRESSOR**



**SCROLLING MARQUEE CLEAR LANGUAGE DISPLAY**

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# Model number nomenclature



30MP A 030 6 0 - 0 0 0 0 5

**30MP** – AquaSnap® Liquid Chiller with *ComfortLink™* Controls

**Condenser Option**

- A** – Chiller without Condenser (Air-Cooled)
- W** – Chiller with Condenser (Water-Cooled)

**Unit Size – Nominal Tons (kW)**

- 015** – 15 (53)                      **040** – 40 (141)
- 020** – 20 (70)                      **045** – 45 (158)
- 030** – 30 (106)

**Voltage Options**

- 1** – 575-3-60
- 2** – 380-3-60
- 5** – 208/230-3-60
- 6** – 460-3-60

**Sound/Mounting Options**

- 0** – None
- 1** – Sound Enclosure Panels
- 3** – Height Adjustment Kit
- 4** – Height Adjustment Kit, Sound Enclosure Panels
- 9** – Mobility Kit (Wheels)
- B** – Mobility Kit (Wheels), Sound Enclosure Panels
- D** – Height Adjustment Kit, Mobility Kit (Wheels)
- F** – Height Adjustment Kit, Mobility Kit (Wheels), Sound Enclosure Panels

**Packaging Options**

- 5** – Bag, No Compressor Insulation (Std)
- 7** – Bag, Compressor Insulation
- B** – Export Crating, No Compressor Insulation
- D** – Export Crating, Compressor Insulation

**Controls/Interface Options**

- 0** – Scrolling Marquee Display (Std)
- 5** – Scrolling Marquee Display, EMM

**Disconnect Options**

- 0** – Standard (Terminal Block)
- 1** – Non-Fused Disconnect Switch

**Capacity Control Options**

- 0** – Standard
- 1** – Hot Gas Bypass
- 2** – Digital Compressor

**Comfort Cooling/Medium Temp Brine Options**

- 0** – Comfort Cooling Duty (32-60 F) (0.0°-16.5 C) (Std)
- 7** – Medium Temperature Brine (15-32 F) (-9.4-0.0° C)

**Design Revision Level**

- - Initial Release

LEGEND

**EMM** — Energy Management Module

**Quality Assurance**

Certified to ISO 9001

# AHRI capacity ratings



## AHRI RATINGS (60 Hz only)

UNIT 30	CAPACITY		INPUT POWER (kW)	EVAPORATOR FLOW		EVAPORATOR PRESSURE DROP		CONDENSER FLOW		CONDENSER PRESSURE DROP		EER	FULL LOAD		IPLV	
	Tons	kW		Gpm	L/s	Ft of Water	kPa	Gpm	L/s	Ft of Water	kPa		lkW/Ton	COP	lkW/Ton	COP
MPW015	15.6	54.7	12.4	37.4	2.4	11.8	35.1	46.7	2.9	11.5	34.4	15.1	0.795	4.43	0.564	6.24
MPW020	20.7	72.8	15.6	49.8	3.1	14.9	44.6	62.2	3.9	13.4	40.1	15.9	0.753	4.67	0.585	6.01
MPW030	31.0	109.1	23.6	74.5	4.7	14.0	42.0	93.1	5.9	13.1	39.1	15.8	0.760	4.63	0.578	6.08
MPW040	39.9	140.4	30.2	95.9	6.1	9.7	28.9	119.9	7.6	14.9	44.6	15.9	0.756	4.65	0.560	6.28
MPW045	46.6	163.8	35.1	111.9	7.1	12.2	36.4	139.9	8.8	14.6	43.7	15.9	0.753	4.67	0.568	6.20

### LEGEND

**AHRI** — Air Conditioning, Heating and Refrigeration Institute  
**COP** — Coefficient of Performance  
**EER** — Energy Efficiency Ratio  
**lkW** — Input Kilowatt  
**IPLV** — Integrated Part Load Value

### NOTES:

1. Certified (60 Hz unit) in accordance with AHRI Standard 550/590 at standard rating conditions.
2. Standard rating conditions are as follows:  
 Evaporator Conditions:  
 Leaving Water Temperature: 44 F (6.7 C)  
 Flow: 2.4 gpm per ton (0.043 L/s per kW)  
 Condenser Conditions:  
 Entering Water Temperature: 85 F (29.4 C)  
 Flow: 3.0 gpm per ton (0.054 L/s per kW)

Fouling Factor (Evaporator):

0.00010 hr x sq ft x F per Btuh (0.000018 m<sup>2</sup> x K per W)

Fouling Factor (Condenser):

0.00025 hr x sq ft x F per Btuh (0.000044 m<sup>2</sup> x K per W)

3. IPLV is a single number part load efficiency value calculated from the system full load efficiency values and corrected for a typical building air-conditioning application.
4. All data in this table is rated (60 Hz only) in accordance with AHRI Standard 550/590 as represented in the Packaged Chiller Builder Selection Program (E-Cat) version 3.29.
5. Contact Carrier for custom ratings or for 30MPA remote air-cooled unit ratings.



# Physical data



## 30MPA AIR-COOLED AND 30MPW LIQUID-COOLED UNITS — ENGLISH

UNIT 30MPA,MPW	015	020	030	040	045
<b>NOMINAL TONS</b>	15	20	30	40	45
<b>OPERATING WT (lb)</b>					
MPA	626	635	721	912	934
MPW	680	704	860	1097	1190
<b>REFRIGERANT (lb)</b>			R-410A		
MPA	8.2	10.7	12.5	14.7	15.1
MPW	11.8	15.3	21.0	27.3	34.5
<b>COMPRESSOR</b>			Scroll, Hermetic		
Quantity	2	2	2	3	3
Speed (rpm)	3500	3500	3500	3500	3500
Compressor Nominal Tons	7.5	10	15	13	15
Oil Charge (pt)	10.6	13.8	13.8	20.6	20.6
Capacity Control — Standard					
No. of Steps	2	2	2	3	3
Minimum Step Capacity (%)	50	50	50	33	33
Capacity Control — Optional Hot Gas Bypass					
No. of Steps	3	3	3	4	4
Minimum Step Capacity (%)	18	25	34	21	22
Capacity Control — Optional Digital Compressor					
No. of Steps	—	22	22	33	33
Minimum Step Capacity (%)	—	15	15	10	10
<b>EVAPORATOR</b>					
Weight (lb, empty)	27.5	40.3	91.8	122.3	128.3
Net Fluid Volume (gal.)	0.8	1.2	2.4	3.2	3.4
Maximum Refrigerant Pressure (psig)	505	505	565	565	565
Maximum Fluid-Side Pressure (psig)	300	300	300	300	300
Water Connections (in.)					
Inlet and Outlet (Victualic)	2	2	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>
Drain (NPT)	1/2	1/2	1/2	1/2	1/2
<b>CONDENSER (30MPW Only)</b>					
Weight (lb, empty)	34.9	43.6	104.6	136.7	188.3
Net Fluid Volume (gal.)	1.2	1.6	2.9	4.1	5.9
Maximum Refrigerant Pressure (psig)	505	505	565	565	565
Maximum Fluid-Side Pressure (psig)	300	300	300	300	300
Water Connections (in.)					
Inlet and Outlet (Victualic)	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	2	2	2
<b>CONDENSER REFRIGERANT CONNECTIONS (30MPA Only)</b>					
Liquid Line (ODS) (in.)	1/2	1/2	5/8	5/8	5/8
Discharge Line (ODS) (in.)	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>8</sub>
<b>CHASSIS DIMENSIONS (in.)</b>					
Length	55	55	55	55	55
Width	32	32	32	32	32
Height	62.5	62.5	62.5	62.5	62.5
<b>MINIMUM FLOW RATES (gpm)</b>					
Evaporator	22	28	43	55	64
Condenser	22	28	43	55	64
<b>MAXIMUM FLOW RATES (gpm)</b>					
Evaporator	74	97	148	188	220
Condenser	74	97	148	188	220

\* With optional hot gas bypass.

### NOTES:

1. Operating weight includes refrigerant operating charge and weight of fluid in the heat exchangers.
2. 30MPW units are shipped with full operating charge.



**30MPA AIR-COOLED AND 30MPW LIQUID-COOLED UNITS — SI**

<b>UNIT 30MPA,MPW</b>	<b>015</b>	<b>020</b>	<b>030</b>	<b>040</b>	<b>045</b>
<b>NOMINAL kW</b>	53	70	106	141	158
<b>OPERATING WT (kg)</b>					
MPA	284	288	327	414	424
MPW	308	319	390	498	540
<b>REFRIGERANT (kg)</b>			R-410A		
MPA	3.7	4.9	5.7	6.7	6.8
MPW	5.3	6.9	9.5	12.4	15.6
<b>COMPRESSOR</b>			Scroll, Hermetic		
Quantity	2	2	2	3	3
Speed (r/s)	58	58	58	58	58
Compressor Nominal kW	26	35	53	45	53
Oil Charge (L)	5.0	6.5	6.5	9.8	9.8
Capacity Control — Standard					
No. of Steps	2	2	2	3	3
Minimum Step Capacity (%)	50	50	50	33	33
Capacity Control — Optional Hot Gas Bypass					
No. of Steps	3	3	3	4	4
Minimum Step Capacity (%)	18	25	34	21	22
Capacity Control — Optional Digital Compressor					
No. of Steps	—	22	22	33	33
Minimum Step Capacity (%)	—	15	15	10	10
<b>EVAPORATOR</b>					
Weight (kg, empty)	12.5	18.3	41.6	55.5	58.2
Net Fluid Volume (L)	2.9	4.6	8.9	12.0	13.0
Maximum Refrigerant Pressure (kPa)	3482	3482	3896	3896	3896
Maximum Fluid-Side Pressure (kPa)	2068	2068	2068	2068	2068
Water Connections (in.)					
Inlet and Outlet (Victualic)	2	2	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>
Drain (NPT)	1/2	1/2	1/2	1/2	1/2
<b>CONDENSER (30MPW)</b>					
Weight (kg, empty)	15.8	19.8	47.4	62.0	85.4
Net Fluid Volume (L)	4.5	5.9	11.1	15.4	22.4
Maximum Refrigerant Pressure (kPa)	3482	3482	3896	3896	3896
Maximum Fluid-Side Pressure (kPa)	2068	2068	2068	2068	2068
Water Connections (in.)					
Inlet and Outlet (Victualic)	1 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	2	2	2
<b>CONDENSER REFRIGERANT CONNECTIONS (30MPA Only)</b>					
Liquid Line (ODS) (in.)	1/2	1/2	5/8	5/8	5/8
Discharge Line (ODS) (in.)	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>8</sub>
<b>CHASSIS DIMENSIONS (mm)</b>					
Length	1397	1397	1397	1397	1397
Width	813	813	813	813	813
Height	1588	1588	1588	1588	1588
<b>MINIMUM FLOW RATES (L/s)</b>					
Evaporator	1.4	1.8	2.7	3.5	4.0
Condenser	1.4	1.8	2.7	3.5	4.0
<b>MAXIMUM FLOW RATES (L/s)</b>					
Evaporator	4.7	6.1	9.3	11.9	13.9
Condenser	4.7	6.1	9.3	11.9	13.9

\* With optional hot gas bypass.

**NOTES:**

1. Operating weight includes refrigerant operating charge and weight of fluid in the heat exchangers.
2. 30MPW units are shipped with full operating charge.

# Options and accessories



ITEM	OPTION*	ACCESSORY†
Hot Gas Bypass	X	X
Digital Scroll Compressor (not available on 30MPA,MPW015 models)	X	
Condenserless	X	
EMM	X	X
Vibration Isolators (Pads)		X
Vibration Isolators (Springs)		X
BACnet Translator		X
LON Translator		X
Non-Fused Disconnect	X	
Sound Enclosure Panels	X	X
Mobility Kit (wheels)	X	X
Medium Temperature Brine	X	
Condenser Water Temperature Sensors		X
Height Adjustment (Leveling) Kit	X	X
Compressor Return Gas Sensor		X
Y Strainer		X
Navigator™ Display Module		X
Remote Enhanced Display		X
Compressor Insulation	X	X

\*Factory-installed option.

†Field-installed accessory.

## Factory-installed options

**Hot gas bypass** — Hot gas bypass can be factory-installed to allow additional capacity reduction for unit operation below the minimum step of unloading. This option is not available in combination with medium temperature brine.

**Digital scroll compressor** — Digital scroll compressors are available as a factory-installed option. These compressors allow for incremental unloading with capacity modulation to better match building load when compared to standard scroll compressors. This option is not available on the 30MPA,MPW015 models.

**Condenserless** — Applicable to the 30MPA model only. This option is available for use with remote condensers.

**Energy management module (EMM)** — The Energy management module is used for 4 to 20 mA leaving fluid temperature reset, cooling set point reset, 4 to 20 mA demand limit and two-step demand limit. Temperature reset lets the unit reset the leaving fluid temperature to a higher temperature during low load conditions. Temperature reset can also be accomplished based on return fluid, outdoor air or space temperature. (The EMM option is not required when using entering-water, outdoor-air, or space temperature for temperature reset. These types of reset are available with the main board. However, an accessory thermistor is required for outdoor-air and/or space temperature reset.) Demand limiting allows the unit capacity to be limited during periods of peak energy usage. Demand limit requires an external 4 to 20 mA signal or a 2-step remote pair of dry contacts. Both the 4 to 20 mA and 2-step demand limit percentage values are adjustable. This is also available as a field-installed accessory.

**Non-fused disconnect** — For wiring convenience, an electrical power disconnect for line and control power may be factory-installed.

**Sound enclosure panels** — Units may be ordered with acoustically insulated sheet metal enclosures installed around the unit to reduce radiated sound levels. Panels are also available as a field installed accessory around the unit to reduce radiated sound levels. Panels are also available as a field-installed accessory.

**Medium temperature brine** — Unit may be factory-modified to permit brine operation from 15 to 32 F (–9.4 to 0.0° C) leaving brine temperature. Refrigeration circuit components, such as the expansion device and liquid line solenoid, are modified to permit the low refrigerant flow rates typical of brine duty operation.

**Mobility kit** — Wheels are shipped with the unit for field installation to aid in transportation of unit to its final installation site. Wheels are rubber type, pivot for easy unit maneuvering, and are lockable for safety. Mobility kit is also available as a separately shipped, field-installed accessory for all 30MP units.

**Height adjustment (leveling) kit** — A leveling adjustment mechanism is shipped with the unit and must be field-located in each corner of the unit, to facilitate easy installation and connection to existing piping. Leveling kit is also available as a field-installed accessory.

**Compressor insulation** — Compressor insulation is designed to insulate the scroll compressors and prevent water vapor from condensing on the colder compressor surface.

## Field-installed accessories

**Hot gas bypass** — Hot gas bypass can be field-installed to allow additional capacity reduction for unit operation below the minimum step of unloading. This accessory cannot be used in combination with medium temperature brine.

**Vibration isolators** — Isolators are installed on the base of the unit to reduce vibration transmission from the unit through the floor. This package consists of 4 resilient pads or 4 springs for each model.

**BACnet\* translator control** — Provides an interface between the chiller and a BACnet Local Area Network (LAN, i.e., MS/TP EIA-485).

**LON (local operating network) Translator Control** — Provides an interface between the unit and a local operating network (i.e., LonWorks† FT-10A ANSI/EIA-709.1).

**Condenser water temperature sensors** — This accessory allows measurement of condenser water entry and leaving temperatures.

**Sound enclosure panels** — This accessory is an acoustically insulated sheet metal enclosure that is installed around the unit and reduces radiated sound levels. Panels are also available as a factory-installed option for all 30MP units.

**Energy management module (EMM)** — The Energy management module is used for 4 to 20 mA leaving fluid temperature reset, cooling set point reset, 4 to 20 mA demand limit and two-step demand limit. Temperature reset lets the unit reset the leaving fluid temperature to a higher temperature during low load conditions. Temperature reset can also be accomplished based on return fluid, outdoor air or space temperature. (The EMM accessory is not required when using entering-water,





outdoor-air, or space temperature for temperature reset. These types of reset are available with the main board. However, an accessory thermistor is required for outdoor air and/or space temperature reset.) Demand limiting allows the unit capacity to be limited during periods of peak energy usage. Demand limit requires an external 4 to 20 mA signal or a 2-step remote pair of dry contacts. Both the 4 to 20 mA and 2-step demand limit percentage values are adjustable. This is also available as a factory-installed option.

**Mobility kit** — Wheels may be field-installed on the unit to aid in transportation of unit to its final installation site. Wheels are rubber type, pivot for easy unit maneuvering, and are lockable for safety.

**Height adjustment (leveling) kit** — Leveling adjustment mechanism located in each corner of the unit, to facilitate easy installation and connection to existing piping. Leveling kit is also available as a factory-installed option for all 30MP units.

**Navigator™ display module** — The accessory provides a portable, hand held display module for convenient access to unit status, operation, configuration and troubleshooting diagnostics capability. The 4-line, 80-character LCD (liquid crystal display) display provides clear language information

in English, French, Spanish or Portuguese. The weatherproof enclosure and industrial grade extension cord make the Navigator module ideally suited for outdoor applications. Magnets located on the back of the module allow attachment of any sheet metal component for hands free operation.

**Remote enhanced display** — The accessory kit contains a remotely mounted 40-character per line, 16-line display panel for unit diagnostics.

**Y strainer** — A strainer with a minimum of 40 mesh must be installed within 10 ft (3 m) of the heat exchanger fluid inlet to prevent debris from clogging or damaging the heat exchanger. This strainer is required and is available as an accessory. The strainer is available in sizes from 1.5 to 6 inches.

**Compressor return gas sensor** — Sensor is available as an accessory for field-installation to measure compressor return gas temperature.

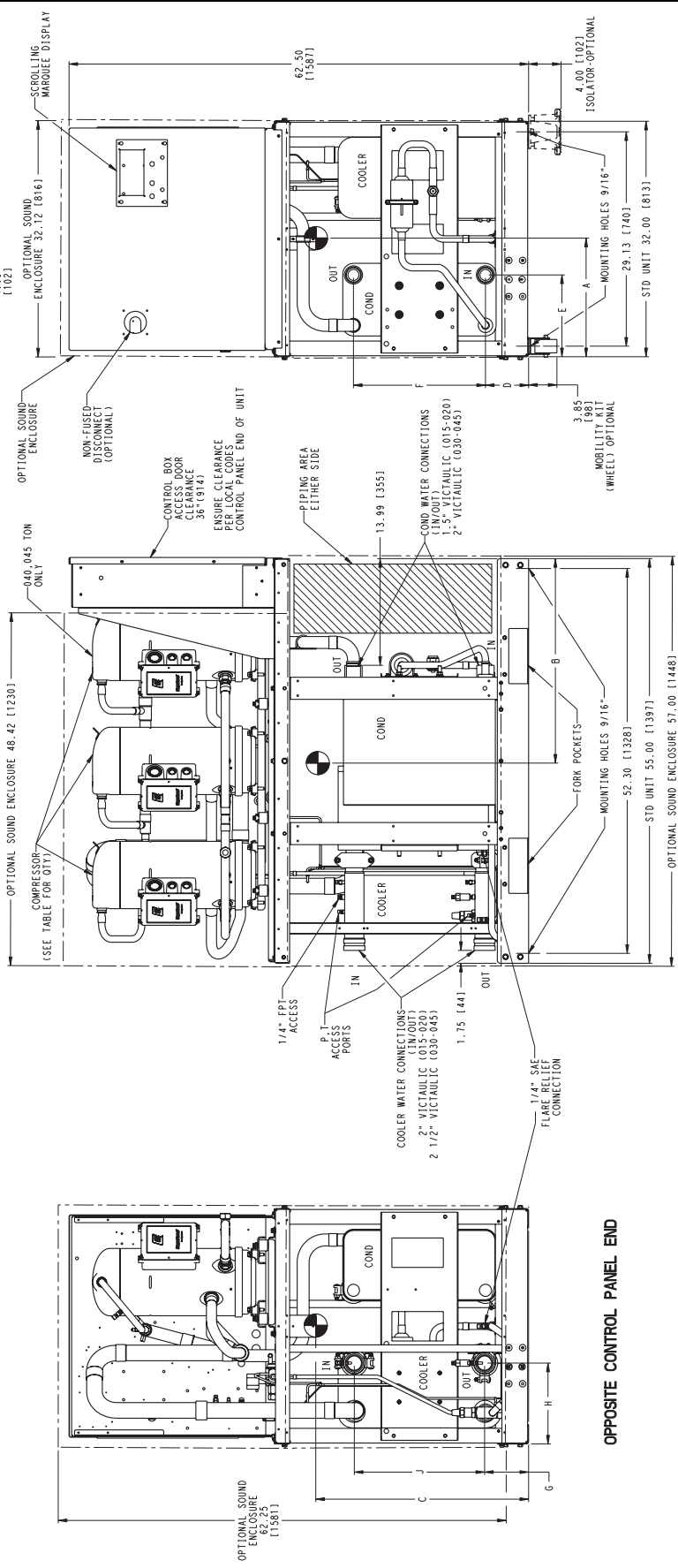
**Compressor insulation** — Compressor insulation is available as an accessory for field-installation to insulate the scroll compressors and prevent water vapor from condensing on the colder compressor surface.

\*Sponsored by ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers).  
†Registered trademark of Echelon Corporation.



### 30MPW015-045 (LIQUID-COOLED CHILLERS)

UNIT	OPERATING WEIGHT (lb)	A	B	C	D	E	F	G	H	J	NO. OF COMPRESSORS
30MPW015	680 (308 kg)	18.50 (470mm)	24.80 (630 mm)	30.53 (775 mm)	5.54 (141 mm)	6.44 (164 mm)	18.50 (470 mm)	5.54 (141 mm)	6.44 (164 mm)	18.50 (470 mm)	2
30MPW020	704 (319 kg)	18.20 (462 mm)	25.20 (640 mm)	28.61 (727 mm)	5.87 (149 mm)	6.89 (175 mm)	16.89 (429 mm)	5.87 (149 mm)	11.12 (282 mm)	17.95 (456 mm)	2
30MPW030	862 (391 kg)	18.60 (472 mm)	25.10 (638 mm)	30.96 (786 mm)	5.87 (149 mm)	11.12 (282 mm)	17.95 (456 mm)	5.99 (152 mm)	11.00 (279 mm)	17.72 (450 mm)	3
30MPW040	1099 (499 kg)	18.90 (480 mm)	24.90 (632 mm)	30.22 (768 mm)							
30MPW045	1190 (540 kg)										



- NOTES:**
- Operating weight includes weight of water and refrigerant.
  - Denotes center of gravity.
  - Dimensions are shown in inches. Dimensions in [ ] are in millimeters.
  - Allow 36-in. (914 mm) clearance on control panel end, opposite control panel end and above the unit. All clearances must be in accordance with local codes.
  - Denotes accessory or factory-installed option.

# Application data



## Leveling unit

To ensure proper oil return, be sure that unit is level, particularly in its major lengthwise dimension, as compressor oil return piping runs in that direction.

It should be determined prior to installation if any special treatment is required to ensure a level installation.

## Evaporator fluid temperature

1. Maximum sustained leaving chilled-fluid temperature (LCWT) is 60 F (16 C). For sustained operation, entering-fluid temperature should not exceed 75 F (24 C). Unit can start and pull down with up to 95 F (35 C) entering-fluid temperature due to the pressure limiting feature of the expansion valve.
2. Minimum LCWT for standard units is 32 F (0° C). For temperatures above 32 F (0° C) and below 40 F (4 C), ensure the chilled water loop has a suitable brine solution. Lower LCWT can be used on medium temperature brine applications. Refer to Medium Temperature Brine Applications section below. For applications with ratings below 40 F (4 C) on standard units, contact your local Carrier representative.

## Medium temperature brine applications (15 to 32 F [-9.4 to 0.0° C])

In all brine duty applications, a suitable brine (or antifreeze and water solution) must be provided to ensure freeze protection. The solution crystallization point of the brine should be below the suction temperature of the evaporator, and at least 15 F (8.3 C) below the leaving brine temperature. The brine solution must also be properly inhibited to provide suitable corrosion protection.

## Condenser (30MPW units) water temperature

1. Maximum leaving condenser-water temperature is 140 F (60.0 C). This temperature is not available for brine units.
2. Minimum entering condenser-water temperature without condenser flow regulation is 65 F (18.3 C).

## Evaporator and liquid-cooled condenser flow range

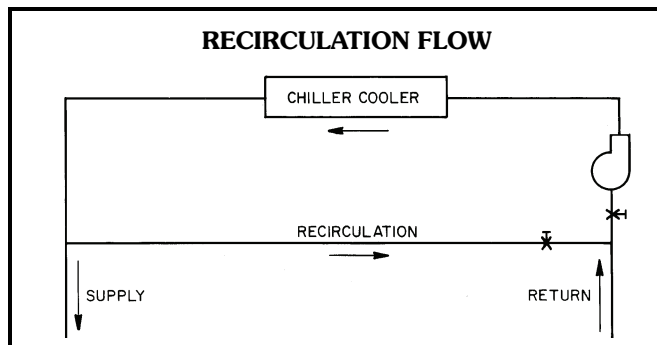
Ratings and performance data in this publication are for a cooling temperature rise of 10 F (5.6 C) and are suitable for a range from 5 to 15 F (2.8 to 8.3 C) temperature rise without adjustment. Units may be operated at a different temperature range, provided flow limits are not exceeded and corrections to capacity, etc. are made. For minimum flow rates, see Minimum Evaporator and Condenser Flow Rates and Minimum Loop Volume tables. High flow rate is limited by pressure drop that can be tolerated.

**Minimum evaporator flow** — The minimum evaporator flow (maximum evaporator temperature rise) for standard units is shown in Minimum Evaporator and Condenser Flow Rates and Minimum Loop Volume tables. When gpm (L/s) required is lower (or rise is higher), follow these recommendations:

- a. Multiple smaller chillers may be applied in series, each providing a portion of the design temperature rise.

- b. Chilled fluid may be recirculated to raise flow rate. However, the mixed temperature entering evaporator must be maintained at a minimum of at least 5 F (2.8 C) above the leaving chilled fluid temperature.

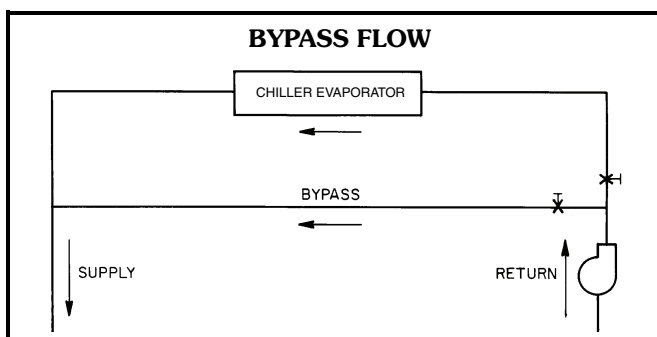
NOTE: Recirculation flow is shown below.



**Maximum evaporator flow (5 gpm/ton or < 5° F rise [0.09 L/s • kW or < 2.7° C rise])** — The maximum evaporator flow results in practical maximum pressure drop through evaporator.

The return fluid may bypass the evaporator to keep pressure drop through the evaporator within acceptable limits. This permits a higher  $\Delta T$  with lower fluid flow through evaporator and mixing after evaporator.

Bypass flow is shown below.



**Variable evaporator flow rates** — These variable rates may be applied to standard chillers. However, the unit will attempt to maintain a constant leaving chilled-fluid temperature. In such cases, minimum fluid loop volume must be in excess of 3 gallons per ton (3.2 L per kW), and flow rate must change in steps of less than 10% per minute. Apply 6 gal. per ton (6.5 L per kW) fluid loop volume minimum if flow rate changes more rapidly.

**Minimum liquid-cooled condenser flow** — This value (maximum rise) is shown in Minimum Evaporator and Condenser Flow Rates and Minimum Loop Volume tables on page 13. Condensers may be piped in series. Ensure leaving-water temperature does not exceed 140 F (60.0 C).

**Chilled fluid loop volume** — The minimum fluid loop volume in circulation must equal or exceed the values listed in the tables on page 13 for temperature stability and accuracy. (For example, a 30MPW040 would require 78.4 gal. [296.7 L] in circulation in system loop — see Minimum Evaporator and Condenser Flow Rates and Minimum Loop Volume tables on page 13.)

### MINIMUM EVAPORATOR AND CONDENSER FLOW RATES

UNIT SIZE	EVAPORATOR		CONDENSER	
	Gal./Min	L/s	Gal./Min	L/s
30MP015	22	1.4	22	1.4
30MP020	28	1.8	28	1.8
30MP030	43	2.7	43	2.7
30MP040	55	3.5	55	3.5
30MP045	64	4.0	64	4.0

### MINIMUM LOOP VOLUME (Comfort Cooling or with Digital Compressor)

UNIT SIZE	MINIMUM EVAPORATOR LOOP VOLUME	
	Gal.	L
30MP015	46.2	174.9
30MP020	60.9	230.5
30MP030	92.4	349.7
30MP040	78.4	296.7
30MP045	91.6	346.7

### MINIMUM LOOP VOLUME (Process Cooling or at Low Ambient Conditions)

UNIT SIZE	MINIMUM EVAPORATOR LOOP VOLUME	
	V	N
30MP015	6 to 10	6.5 to 10.8
30MP020	6 to 10	6.5 to 10.8
30MP030	6 to 10	6.5 to 10.8
30MP040	2 to 6	2.5 to 6.5
30MP045	2 to 6	2.5 to 6.5

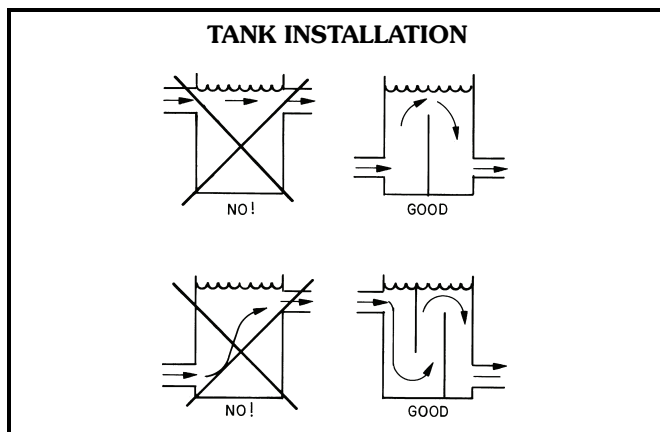
#### LEGEND

AHRI — Air Conditioning, Heating, and Refrigeration Institute  
 N — Liters per kW  
 V — Gallons per ton

NOTES:  
 Gallons = V x AHRI capacity in tons.  
 Liters = N x AHRI capacity in kW.

For process jobs where accuracy is vital or for operation at outdoor ambient temperatures below 32 F (0° C) with low unit loading conditions, there should be from 6 to 10 gal. per ton (6.5 to 10.8 L per kW). To achieve this volume, it is often necessary to install a tank in the loop. Tank should be baffled to ensure there is no stratification, and that water (or brine) entering tank is adequately mixed with liquid in the tank.

NOTE: Tank installation is shown below.



**Fouling factor** — The factor used to calculate tabulated ratings was 0.00010 ft<sup>2</sup> • hr • F/Btuh (.000018 m<sup>2</sup> • k/W). As fouling factor is increased, unit capacity decreases and compressor power increases. To determine selections at other fouling factors, use chiller program in the electronic catalog.

### 30MPA remote condenser requirements

1. Ensure each refrigerant circuit has its own head pressure control.
2. Condenser must provide 15° F (8.3° C) subcooling, a maximum of 40° F (22.2° C) difference between saturated condensing temperature and outdoor ambient temperature (to prevent overload at high ambient temperatures), and a minimum of 20° F (11.1° C) difference (to ensure subcooling).
3. Do not manifold independent refrigerant circuits into a single condenser.
4. Condenser should not be located more than 15 ft (4.57 m) below chiller to maintain subcooling.

### Oversizing chillers

Oversizing chillers by more than 15% at design conditions must be avoided as the system operating efficiency will be adversely affected (resulting in greater and/or excessive electrical demand and cycling of compressors). When future expansion of equipment is anticipated, install a single chiller to meet present load requirements and install a second chiller to meet the additional load demand.

It is also recommended that the installation of 2 smaller chillers be considered where operation at minimum load is critical. The operation of a smaller chiller loaded to a greater percent of minimum is preferred to operating a single chiller at or near its minimum recommended value.

Hot gas bypass should not be used as a means to allow oversizing chillers. Hot gas bypass should be given consideration where substantial operating time is anticipated below the minimum unloading step.

### Strainers

A 40 mesh strainer must be installed in the evaporator and condenser fluid inlet lines, within 10 ft of the heat exchanger in each line, between the pump and the chiller.

### Parallel chillers

Where chiller capacities greater than can be supplied by a single 30MP chiller are required, or where stand-by capability is desired, chillers may be installed in parallel. Units may be of the same or different sizes. However, evaporator and condenser flow rates must be balanced to ensure proper flow to each chiller.

### Series chillers

Where a large temperature drop (greater than 25 F [13.9 C]) is desired and higher fluid pressure drop across the evaporator can be tolerated, chillers may be installed in series. The leaving fluid temperature sensors need not be relocated. However, the evaporator minimum entering fluid temperature limitations should be considered for the chillers located downstream of other chillers. Condensers should be piped in parallel to maximize capacity and

# Application data (cont)



efficiency. This should also minimize condenser pressure drop and saturated condensing temperatures. However, if condensers are piped in series, ensure that the leaving water temperature does not exceed 140 F (60.0 C).

## Energy management

Demand limiting and load shedding are popular techniques used to reduce peak electric demands typically experienced during hot summer days when air conditioning loads are highest. When utility electricity demands exceed a certain level, electrical loads are turned off to keep the peak demands below a prescribed maximum limit. Unit unloading will reduce electrical demand while allowing the chiller to operate under part load capacity and maintain partial chilled fluid cooling. The energy management module can be added to accomplish this.

Electrical demand may be limited by unloading the chiller to a predetermined percentage of the load. One stage of unloading can be initiated by a remote signal to significantly reduce the chiller power consumption. This power reduction applies to the full load power at nominal conditions. The demand limit control should not be cycled less than 10 minutes on and 5 minutes off.

## Vibration isolation

All compressors are isolated. External vibration isolation is not generally required, but is available for 30MP units as an accessory if desired.

## Evaporator and liquid-cooled condenser freeze protection

If chiller or fluid lines are in an area where ambient conditions fall below 40 F (4.4 C), it is recommended that an antifreeze (brine) solution be added to protect the unit and fluid piping to a temperature 15° F (8.3° C) below the lowest anticipated ambient temperature. In applications where the leaving evaporator fluid temperature is below 32 F (0° C), the medium temperature brine option should be selected so that the freeze point is at least 15° F (8.3° C) below the evaporator leaving fluid temperature and below the suction temperature at the evaporator.

Use only antifreeze solutions approved for heat exchanger duty. Use of automotive antifreezes is not recommended because of the fouling that can occur once their relatively short-lived inhibitor breaks down.

If not protected with an antifreeze solution, draining evaporator and outdoor piping is recommended if system is not to be used during freezing weather conditions.

## Water system overview

A system installed incorrectly such that air is not handled properly — pipe leaks, vent leaks, air in pipes, etc. — may behave as an open system and thus have unsatisfactory operation. Pump seal wear can also cause leaks that cause poor system operation.

Proper system design and installation procedures should be followed closely. The system must be constructed with pressure tight components and thoroughly tested for installation leaks.

Installation of water systems should follow sound engineering practice as well as applicable local and industry standards. Improperly designed or installed systems may cause unsatisfactory operation and/or system failure. Consult a water treatment specialist or appropriate literature for information regarding filtration, water treatment, and control devices.

Water quality should be maintained within the limits indicated in the Water Quality Characteristics and Limitations table.

### WATER QUALITY CHARACTERISTICS AND LIMITATIONS

WATER CHARACTERISTIC	QUALITY LIMITATION
Alkalinity (HCO <sub>3</sub> <sup>-</sup> )	70 – 300 ppm
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	Less than 70 ppm
HCO <sub>3</sub> <sup>-</sup> /SO <sub>4</sub> <sup>2-</sup>	Greater than 1.0
Electrical Conductivity	10 – 500 μS/cm
pH	7.5 – 9.0
Ammonium (NH <sub>3</sub> )	Less than 2 ppm
Chlorides (Cl <sup>-</sup> )	Less than 300 ppm
Free chlorine (Cl <sub>2</sub> )	Less than 1 ppm
Hydrogen Sulfide (H <sub>2</sub> S)*	Less than 0.05 ppm
Free (aggressive) Carbon Dioxide (CO <sub>2</sub> )†	Less than 5 ppm
Total Hardness (dH)	4.0 – 8.5
Nitrate (NO <sub>3</sub> )	Less than 100 ppm
Iron (Fe)	Less than 0.2 ppm
Aluminum (Al)	Less than 0.2 ppm
Manganese (Mn)	Less than 0.1 ppm

\*Sulfides in the water quickly oxidize when exposed to air, requiring that no agitation occur as the sample is taken. Unless tested immediately at the site, the sample will require stabilization with a few drops of one Molar zinc acetate solution, allowing accurate sulfide determination up to 24 hours after sampling. A low pH and high alkalinity cause system problems, even when both values are within the ranges shown. The term pH refers to the acidity, basicity, or neutrality of the water supply. Below 7.0, the water is considered to be acidic. Above 7.0, water is considered to be basic. Neutral water contains a pH of 7.0.

†Dissolved carbon dioxide can either be calculated from the pH and total alkalinity values, shown below, or measured on the site using a test kit. Dissolved Carbon Dioxide, PPM = TA x 2<sup>[(6.3-pH)/0.3]</sup> where TA = Total Alkalinity, PPM as CaCO<sub>3</sub>.

### 30MPA REFRIGERANT PIPING

#### SINGLE CIRCUIT 30MPA LINE SIZING CHART

30MPA UNIT	NOMINAL TONS	MINIMUM CAPACITY WITHOUT HGBP	MINIMUM CAPACITY WITH HGBP	MINIMUM CAPACITY WITH DIGITAL COMPRESSOR	MINIMUM CAPACITY BRINE UNIT NO HGBP	UNIT REFRIGERANT CONNECTIONS (CHILLER CONNECTION SIZE) ODS		TOTAL LINEAR LENGTH OF INTERCONNECTING PIPE ft (m)						REFRIGERANT PIPING MINIMUM TONNAGE FOR OIL ENTRAINMENT		
								0 - 50 (0 - 15.4) Equiv. Pipe Length = 75 ft		50 - 100 (15.4 - 30.5) Equiv. Pipe Length = 150 ft		100 - 200 (30.5 - 61.0) Equiv. Pipe Length = 300 ft		Pipe Size ODS	Minimum Capacity	
								L (in.)	D (in.)	L (in.)	D (in.)	L (in.)	D (in.)	D (in.)	Tons	
015	13.9	6.95	2.50	NA	3.65	1/2	1 3/8	1/2	1 3/8	5/8	1 3/8	5/8	1 3/8	1 3/8	1 3/8	4.26
020	18.2	9.10	4.55	2.73	4.65	1/2	1 3/8	5/8	1 3/8	5/8	1 3/8	7/8	1 3/8	1 3/8	1 3/8	4.26
030	27.7	13.85	9.41	4.15	7.00	5/8	1 3/8	7/8	1 3/8	7/8	1 3/8	7/8	1 3/8	1 3/8	1 3/8	4.26
040	35.3	11.65	7.41	3.53	5.90	5/8	1 5/8	7/8	1 5/8	7/8	1 5/8	1 1/8	1 5/8	1 5/8	1 5/8	9.28
045	41.2	13.60	9.06	4.12	6.89	5/8	1 5/8	7/8	1 5/8	7/8	1 5/8	1 1/8	1 5/8	1 5/8	1 5/8	9.28

**LEGEND**

- D** — Discharge Line Size (discharge line size is equal to chiller connection size)
- HGBP** — Hot Gas Bypass
- L** — Liquid Line Size (liquid line size is equal to or greater than chiller connection size)

**NOTES:**

1. Shaded areas indicate Double Discharge Riser required.
2. Brine Unit Conditions are as follows: 15 F chilled water, 2.4 gpm/ton, 30% propylene glycol (PG), 100 ft of pipe, 115 F entering air, no hot gas bypass, 0 ft altitude.

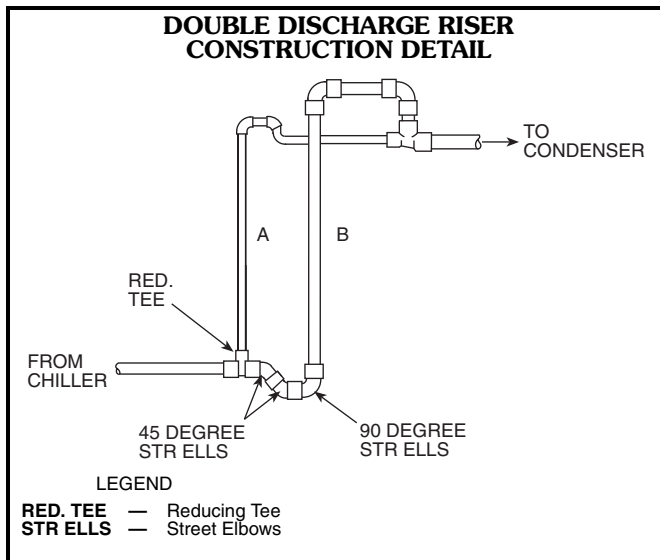
#### DOUBLE DISCHARGE RISER DATA

30MPA UNIT	TOTAL LINEAR LENGTH OF INTERCONNECTING PIPE ft (m)		MINIMUM TONNAGE WITH DOUBLE RISER
	0 - 200 (0 - 61.0)		
	Riser A D (in.)	Riser B D (in.)	
015	7/8	1 1/8	1.86
020	7/8	1 1/8	1.86
030	7/8	1 1/8	1.86
040	7/8	1 3/8	1.86
045	7/8	1 3/8	1.86

#### LIQUID LINE REFRIGERANT CHART

PIPE DIAMETER (in.)	POUNDS PER 10 LINEAR FEET (kg per 3m)
1/2	0.6 (0.27)
5/8	1.0 (0.45)
7/8	2.0 (0.91)

#### DOUBLE DISCHARGE RISER CONSTRUCTION DETAIL



# Application data (cont)



## Insulation

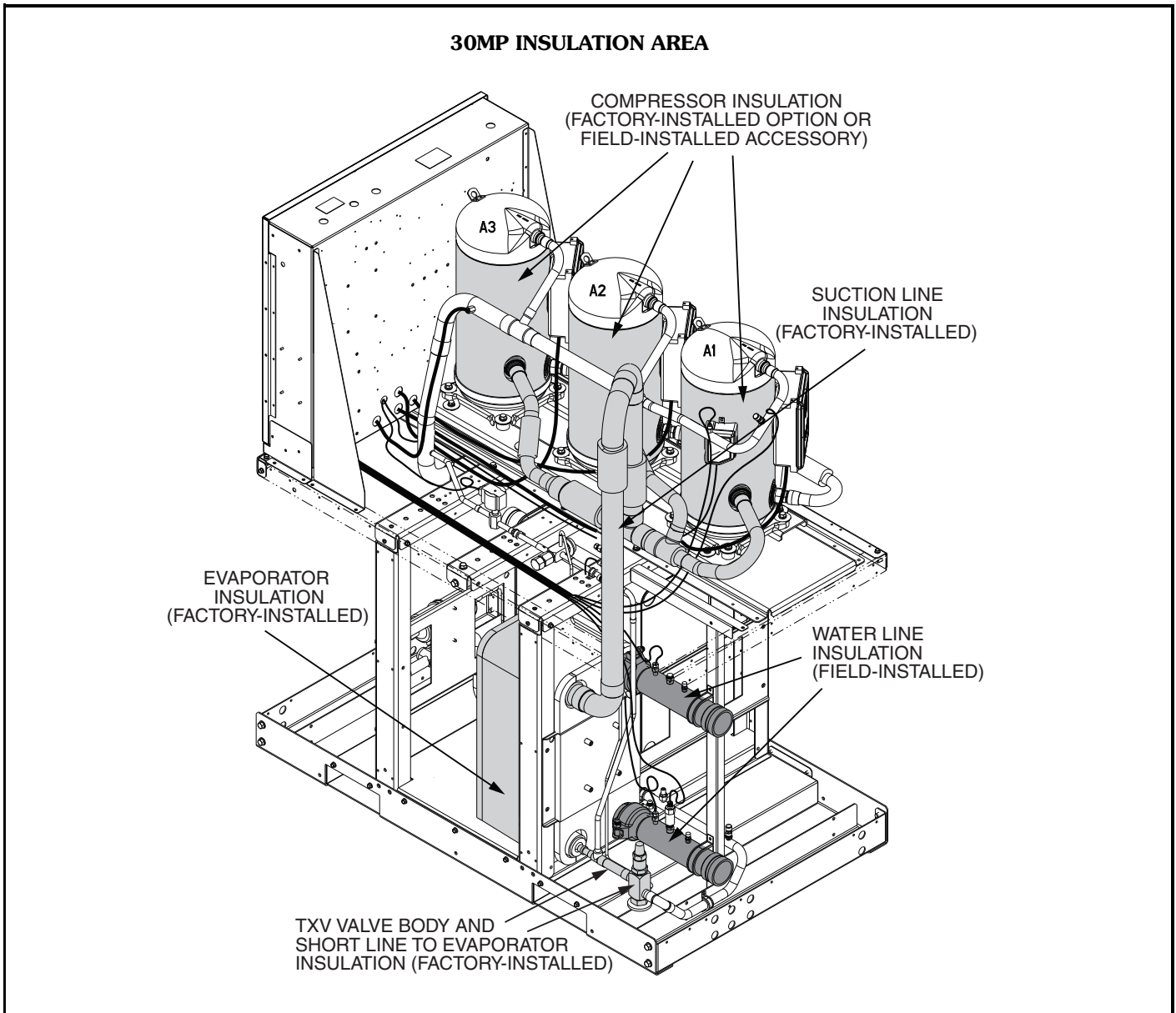
Insulation for 30MP units includes compressor insulation (available as either factory-installed option or field-installed accessory), and factory-installed insulation of suction line to compressors, evaporator, and TXV valve and the line running from TXV valve to evaporator. Field-supplied and installed insulation is recommended for water lines.

As indicated in the Condensation vs Relative Humidity table, the factory insulation provides excellent protection against condensation under most operating conditions. If temperatures in the equipment area exceed the maximum design conditions, extra insulation is recommended.

CONDENSATION VS RELATIVE HUMIDITY\*

AMOUNT OF CONDENSATION	ROOM DRY-BULB TEMP		
	80 F (27 C)	90 F (32 C)	100 F (38 C)
None	80	76	70
Slight	87	84	77
Extensive	94	91	84

\*These approximate figures are based on 35 F (1.7 C) saturated suction temperature. A 2° F (1.1° C) change in saturated suction temperature changes the relative humidity values by 1% in the same direction.





# Selection procedure



Carrier's packaged selection program provides quick, easy selection of Carrier's liquid-cooled chillers. The program considers specific temperature, fluid and flow requirements among other factors such as fouling and altitude corrections.

Before selecting a chiller, consider the following points:

Leaving water (fluid) temperature (LWT):

- The LWT must be at least 40 F (4.4 C) or greater for fresh water applications.
- If the LWT is greater than 32 F (0° C) and less than 40 F (4.4 C), select the standard unit and ensure a suitable brine solution in the water loop.
- If the LWT is below 32 F (0° C), select the medium temperature brine option.
- If the LWT requirement is greater than 60 F (15.5 C), a mixing loop is required.

Entering water (fluid) temperature (EWT):

- If the EWT requirement is greater than 70 F (21.1 C), a mixing loop is required. The EWT should not exceed 70 F (21.1 C) for extended operation. Pulldown can be accomplished from 95 F (35 C).

Evaporator flow rate or evaporator delta-T:

- The evaporator delta-T (EWT – LWT) must fall between 5 and 20° F (2.8 and 11.1° C) while still meeting the maximum entering requirements.

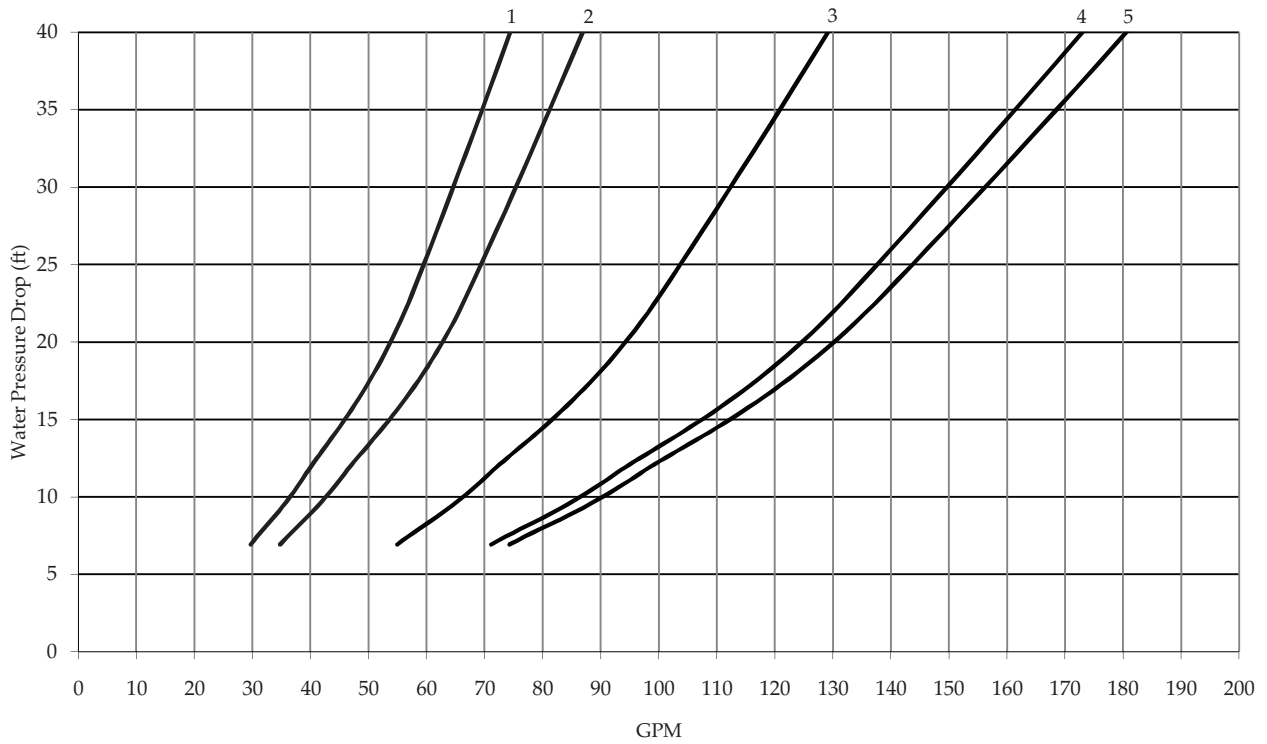
- For larger or smaller delta-T applications, a mixing loop is required. If the evaporator flow is variable, the rate of change of flow should not exceed 10% per minute. The loop volume in circulation must equal or exceed 3 gallons per nominal ton (3.2 L per kW) of cooling for temperature stability and accuracy in normal air conditioning applications. In process cooling applications, there should be 6 to 10 gallons per ton (6.5 to 10.8 L per kW). To achieve this loop volume, it is often necessary to install a tank in the loop. The tank should be baffled to ensure there is no stratification, and that water (or brine) entering the tank is adequately mixed with liquid in the tank. See Chilled Fluid Loop Volume in the Application Data section.

Water quality, fouling factor:

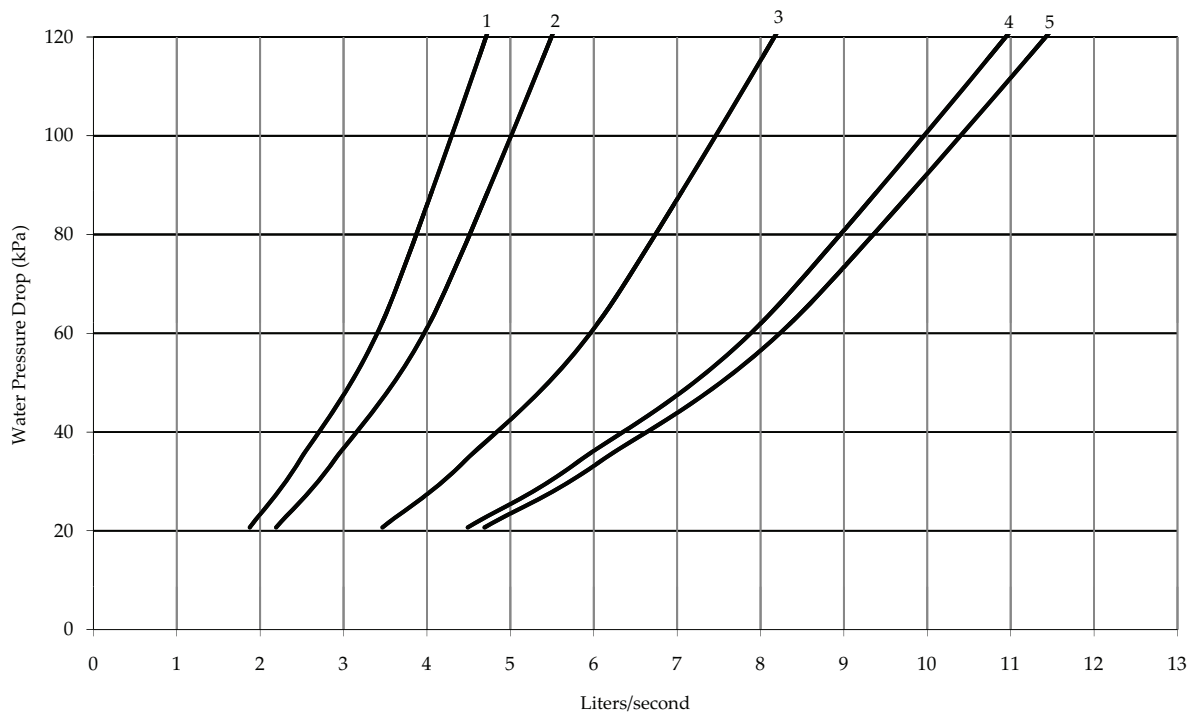
- Poor water quality can increase the required evaporator fouling factor.
- Higher than standard fouling factors lead to lower capacity and higher input kW from a given chiller size compared to running the same application with better water quality (and lower fouling factors).

## EVAPORATOR AND CONDENSER PRESSURE DROP CURVES

### EVAPORATOR PRESSURE DROP CURVE — ENGLISH



### EVAPORATOR PRESSURE DROP CURVE — SI

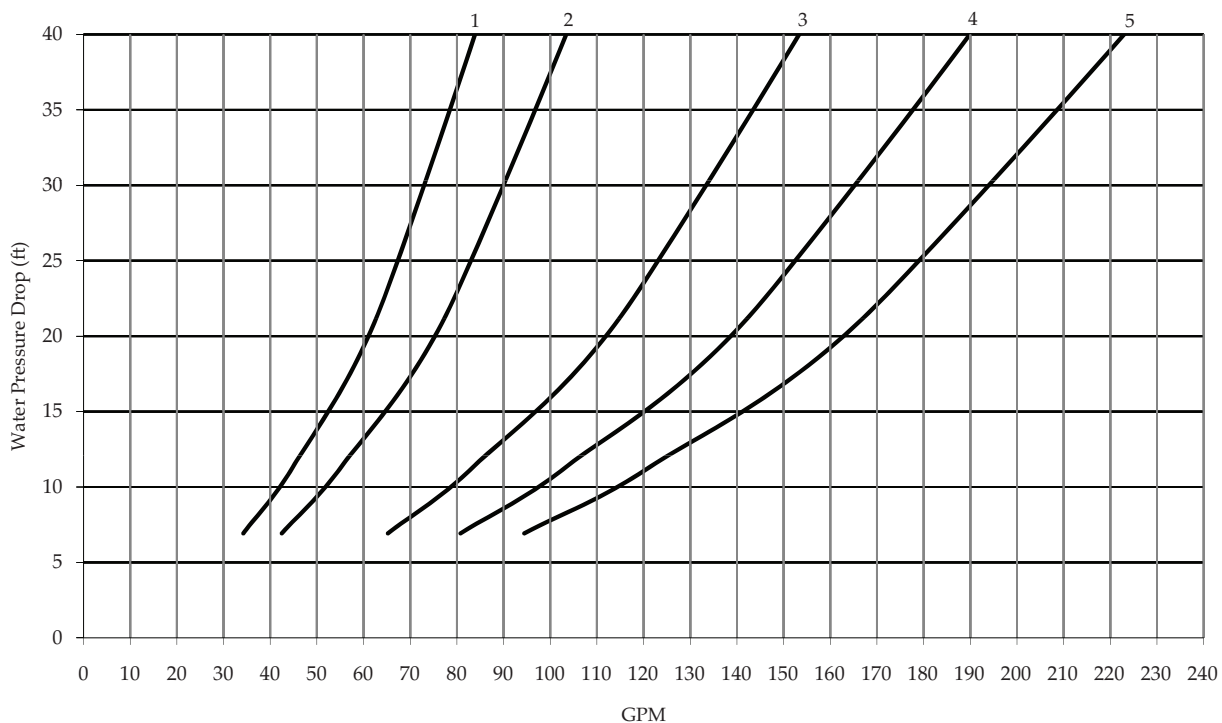


#### LEGEND

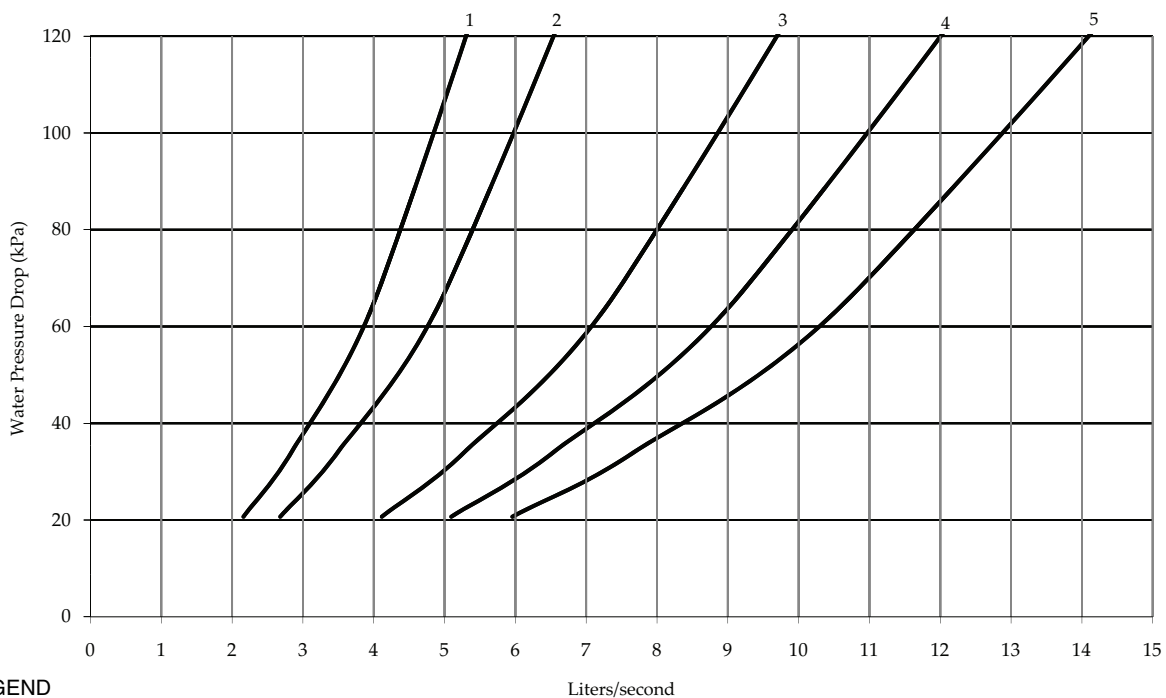
- 1 — 30MP015
- 2 — 30MP020
- 3 — 30MP030
- 4 — 30MP040
- 5 — 30MP045

**EVAPORATOR AND CONDENSER PRESSURE DROP CURVES (cont)**

**CONDENSER PRESSURE DROP CURVE — ENGLISH**



**CONDENSER PRESSURE DROP CURVE — SI**



**LEGEND**

- 1 — 30MP015
- 2 — 30MP020
- 3 — 30MP030
- 4 — 30MP040
- 5 — 30MP045

# Electrical data



UNIT SIZE 30MPA,MPW	VOLTS NAMEPLATE (3 ph, 60 Hz)	VOLTAGE*		COMPRESSOR			UNIT			
		Min	Max	Quantity	RLA (ea.)	LRA (ea.)	MCA	ICF	MOCP	Rec Fuse
015	208/230	187	253	2	29.5	195	66.4	224.5	90	80
	380	342	418		16.7	123	37.6	139.7	50	45
	460	414	508		14.7	95	33.1	109.7	45	40
	575	518	632		12.2	80	27.5	92.2	35	35
020	208/230	187	253	2	35.8	239	80.6	274.8	110	90
	380	342	418		23.7	145	53.4	168.7	70	60
	460	414	508		17.9	125	40.3	142.9	50	45
	575	518	632		14.3	80	32.2	94.3	45	40
030	208/230	187	253	2	55.8	340	125.6	395.8	175	150
	380	342	418		34.0	196	76.5	230.0	110	90
	460	414	508		26.9	179	60.5	205.9	80	70
	575	518	632		23.7	132	53.3	155.7	70	60
040	208/230	187	253	3	51.3	300	166.7	402.6	200	200
	380	342	418		26.9	139	87.4	192.8	110	100
	460	414	508		23.1	150	75.1	196.2	90	90
	575	518	632		19.9	109	64.7	148.8	80	70
045	208/230	187	253	3	55.8	340	181.4	451.6	225	200
	380	342	418		34.0	196	110.5	264.0	125	125
	460	414	508		26.9	179	87.4	232.8	110	100
	575	518	632		23.7	132	77.0	179.4	100	90

### LEGEND

- AWG** — American Wire Gage
- ICF** — Maximum instantaneous current flow during starting.
- kcmil** — Thousand circular mils
- LRA** — Locked rotor amps.
- MCA** — Minimum circuit amps (for wire sizing). Complies with NEC, Section 430-24.
- MOCP** — Maximum Overcurrent Protection
- Rec Fuse** — Recommended dual element fuse amps (150% of compressor RLA). Size up to the next standard fuse size.
- RLA** — Rated Load Amps

\*Supply Range — Units are suitable for use on electrical systems where voltage supplied to the unit terminals is not below or above the listed range limits.

### NOTES:

1. All units have one field power terminal block.
2. Maximum incoming wire size is as follows:  
 For units with terminal block:  
 350 kcmil for unit sizes 030-045; 208/230-3-60 voltages.  
 2/0 for all other unit sizes; all voltages.  
 For units with optional non-fused disconnect:  
 350 kcmil for unit sizes:  
 030-045; 208/230-3-60 voltages.  
 045; 380-3-60 voltage.

3/0 for unit sizes:

- 015,020; 208/230-3-60 voltages.
- 020-040; 380-3-60 voltage.
- 030-045; 460-3-60 and 575-3-60 voltages.

2 AWG for unit sizes:

- 015; 380-3-60 voltage.
- 015-020; 460-3-60 and 575-3-60 voltages.

3. Additional control circuit power is not required.
4. Any field modification of factory wiring must be in compliance with all applicable codes. Field-installed power wires must be rated 75 C minimum.
5. Use copper conductors only.
6. Control circuit power supply is 24-v single phase. Control power is supplied by the factory-installed control transformer.



# Controls



The controls consist of 24-v control circuits. The 24-v circuit provides control power for the *ComfortLink*<sup>™</sup> microprocessor control, all safeties, and the interlock relays.

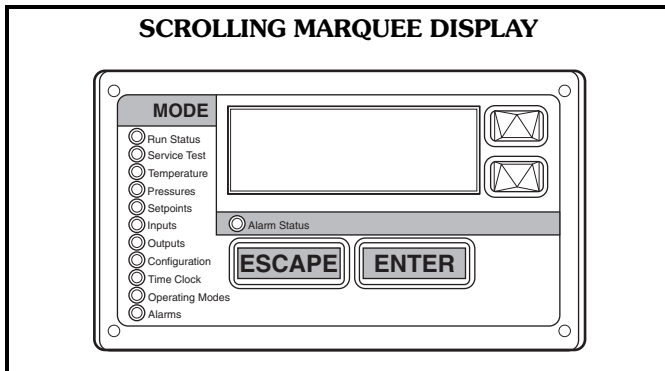
## Microprocessor

The *ComfortLink* microprocessor controls overall unit operation. Its central executive routine controls a number of processes simultaneously. These include internal timers, reading inputs, analog to digital conversions, display control, diagnostic control, output relay control, demand limit, capacity control, and temperature reset. Some processes are updated almost continuously, others every 2 to 3 seconds, and some every 30 seconds.

The microprocessor routine is started by switching the Emergency ON-OFF switch (switch 2) to ON position.

## Scrolling marquee display

Standard control includes a four-digit alphanumeric display that shows all of the *ComfortLink* control codes (with expandable clear language), plus set points, time of day, and temperatures.



## Off cycle

On 30MPA units, during an off cycle, the crankcase heaters remain energized. The crankcase heaters are energized any time all of the compressors in the circuit are off.

## Start-up

When the unit Enable/Off/Remote switch is set to the ENABLE position, the 24-v control circuit will be energized. When there is a call for cooling and all safety devices are satisfied, the compressor will be started after a delay of 2 to 5 seconds. The low pressure switch will be bypassed, and the compressor unloaders will remain energized during a 2-minute time delay after the compressor has been started.

## Capacity control

The 30MP015-030 units have 2 standard stages of capacity control and the 30MP040 and 045 units have 3 standard stages of capacity control. The standard capacity staging is provided by compressor staging. One additional stage of capacity control can be provided by the optional hot gas bypass.

When the leaving fluid temperature rises above the set point, the control will begin to add stages of capacity by starting a compressor. The control uses a leaving-water temperature control with entering water compensation

routine and will add additional stages of capacity as required to meet the required load. If the unit is equipped with hot gas bypass, the hot gas bypass solenoid and a compressor for the circuit will be energized as the first stage of capacity. When the leaving-fluid temperature starts falling below the set point, the control will remove stages of capacity to match the decrease in building load.

On units equipped with the digital compressor option, the controls integrate the modulation of the digital compressor into the capacity routine to match cooling load requirements. The digital compressor provides 22 capacity steps on sizes 020 and 030, and 33 capacity steps on sizes 040 and 045.

The digital scroll option provides better capacity control by incrementally modulating capacity effectively, increasing the number of compression stages compared to chillers that are not equipped with this option.

The digital scroll compressor is not a variable speed device, it modulates the capacity output by allowing the scroll sets to separate during operation, alternating between full capacity and zero capacity. Utilizing a fixed timeframe ratio, the percentage of time that the scroll set is engaged is the percentage capacity of that compressor.

There are two major advantages of this type of capacity control. First, there is closer capacity control operation with all the available capacity steps compared to the on/off cycling control of conventional scrolls. Second, there is much less of a wear factor on digital scrolls compared to standard scroll compressors because the digital scrolls are not subject to as many shutdown/restart cycles as conventional scrolls. Digital scrolls, rather than shutting off, tend to remain on as they vary to deliver the correct capacity.

## Dual chiller control

The *ComfortLink* controller allows 2 chillers (piped in parallel) to operate as a single chilled water plant with standard control functions coordinated through the master chiller controller. This standard *ComfortLink* feature requires a communication link between the 2 chillers and an additional thermistor and well in the common supply line.

## Safeties

**Loss of charge** — This safety will lock out the compressor if the refrigerant pressure falls below the minimum permissible level. See base unit controls and troubleshooting literature for loss of charge logic.

**High-pressure cutout** — This protection will lock out the compressor if the compressor discharge pressure rises above the cutout setting. See base unit controls and troubleshooting literature for pressure settings.

**Compressor circuit breakers** — Provided for short circuit protection.

**Sensor failure protection** — Failures are detected for all thermistors by the microprocessor.

**Loss-of-flow protection** — Loss-of-flow protection is provided by monitoring the standard proof-of-flow switch.

**Compressor anti-cycling** — This feature limits compressor cycling.

# Controls (cont)



## Freeze protection

This safety feature is provided by monitoring of the leaving fluid temperature. If the leaving chilled-fluid temperature falls below the unit freeze point, then the unit will shut off immediately.

## Diagnostics

Microprocessor may be put through service test (see Controls, Start-Up, Operation, Service and Troubleshooting literature) without additional equipment or tools. Service test confirms microprocessor is functional, informs observer through display the condition of each sensor and switch in chiller, and allows observer to check for proper operation of control and compressor(s).

## Sensors

The standard unit is provided with entering fluid, leaving fluid, suction pressure, and discharge pressure transducers. Additional sensors can be added for condenser entering water temperature, leaving water temperature, space temperature, outdoor air temperature, or suction gas temperature to provide additional diagnostics and control features.

## Default settings

To facilitate quick start-ups, all chillers with *ComfortLink™* controls are pre-configured with a default setting that assumes stand-alone operation supplying 44 F (6.7 C) chilled water.

Configuration setting will be based on any options or accessories included with the unit at the time of manufacturing. Date and time are set to U.S.A. eastern time zone and will need reconfiguring based on location and local time zone. If operation based on occupancy scheduling is desired, this will also need to be set during installation.

## Remote alarm

A 24-v alarm signal will be provided to a remote location in the event of a lockout condition.

## Demand limit switch

Demand limiting can be accomplished through switch input or by a field-supplied 4 to 20 mA signal. For either case, Energy Management Module option (also available as

an accessory) is required. The field-supplied, normally open contacts (single or pair) can be used to reduce the total chiller electrical demand during times of peak usage. This is accomplished by reducing the number of capacity stages. In a similar manner, a field-supplied 4 to 20 mA signal can also be used to reduce the total capacity of the chillers.

## Factory-installed optional controls

**Hot gas bypass** — The hot gas bypass will provide an additional stage of capacity control below the minimum standard step of capacity.

## Capacity control steps

Refer to the Capacity Control Steps table below for capacity control steps for standard units.

NOTE: If the optional factory-installed hot gas bypass is used, there will be one more stage of unloading added and the units will be able to operate with an additional step of capacity.

**CAPACITY CONTROL STEPS**

UNIT 30MP	CONTROL STEPS	PERCENT DISPLACEMENT
015	1	100
	2	50
	3*	18
020	1	100
	2	50
	3*	25
030	1	100
	2	50
	3*	34
040	1	100
	2	67
	3	33
	4*	21
045	1	100
	2	67
	3	33
	4*	22

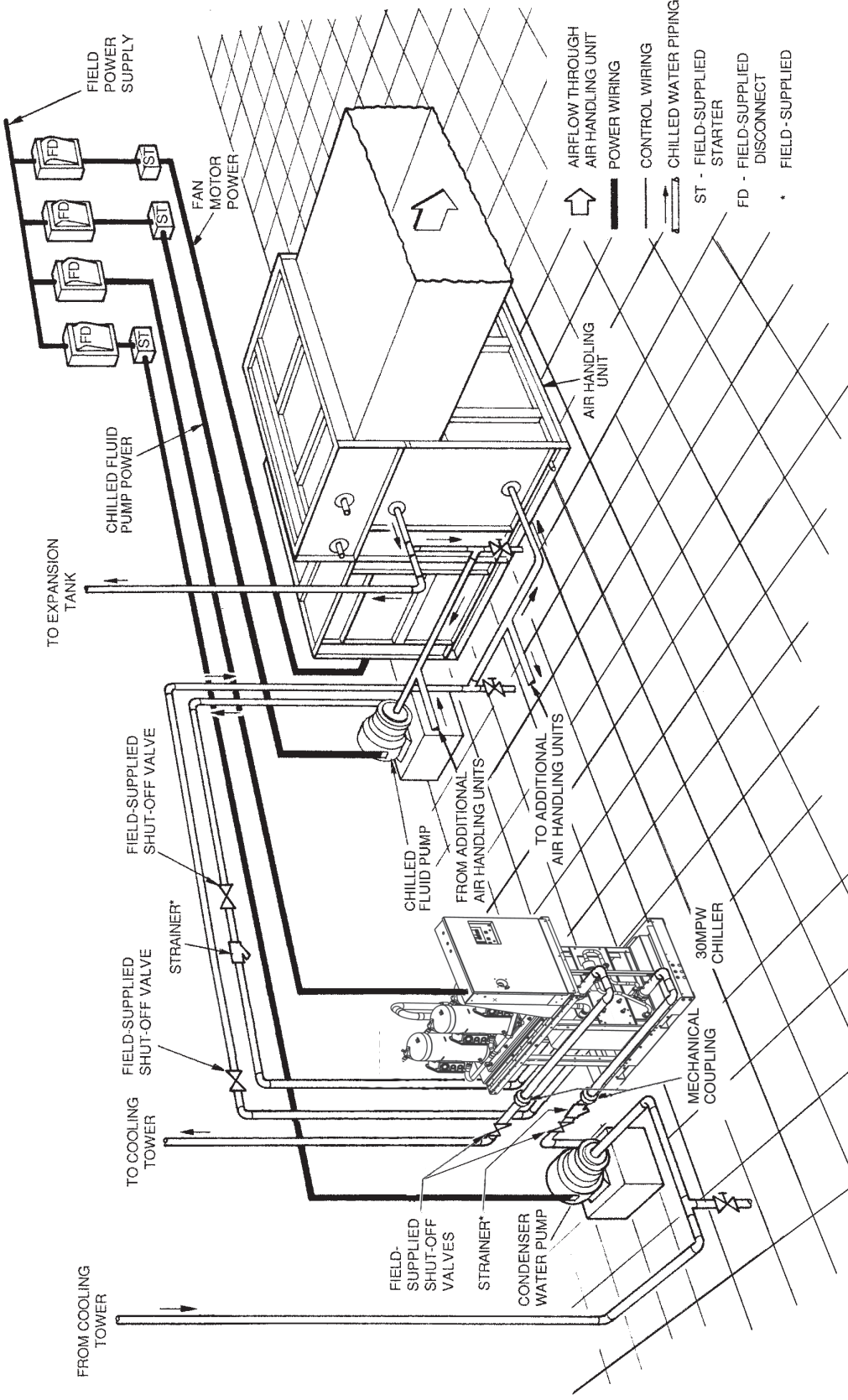
\* Optional hot gas bypass.

NOTE: For digital compressor, see pages 6 and 7.

# Typical piping and wiring



## LIQUID-COOLED 30MPW SHOWN



**NOTES:**

1. Chiller must be installed levelly to maintain proper compressor oil return.
2. Wiring and piping shown are general points-of-connection guides only and are not intended for a specific installation. Wiring and piping shown are for a quick overview of system and are not in accordance with recognized standards.
3. All wiring must comply with applicable local and national codes.
4. All piping must follow standard piping techniques. Refer to Carrier System Design Manual or appropriate ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) handbook for details.
5. See Application Data section on page 12 for minimum system fluid volume. This system may require the addition of a holding tank to ensure adequate volume.

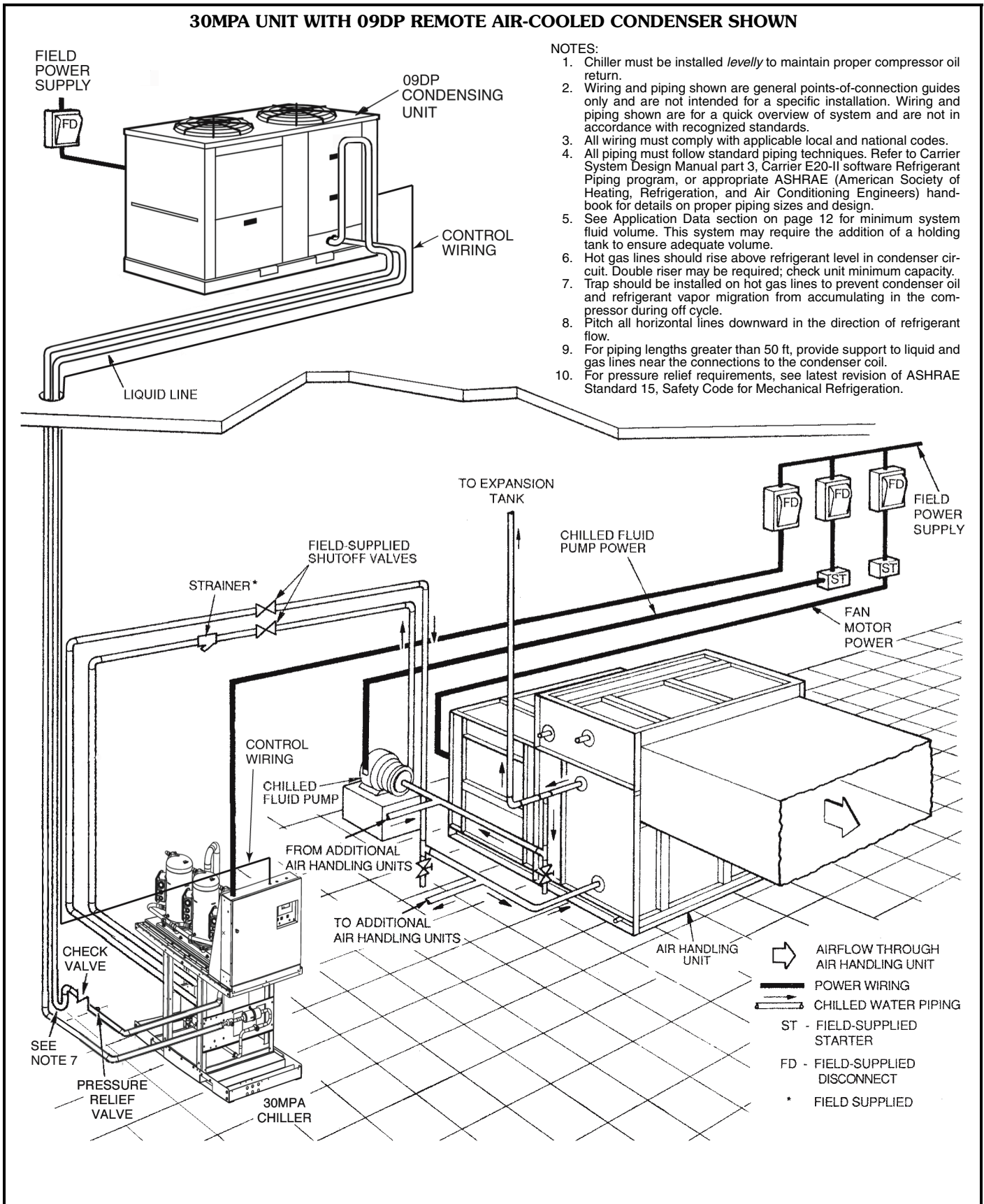
# Typical piping and wiring (cont)



## 30MPA UNIT WITH 09DP REMOTE AIR-COOLED CONDENSER SHOWN

### NOTES:

1. Chiller must be installed *levelly* to maintain proper compressor oil return.
2. Wiring and piping shown are general points-of-connection guides only and are not intended for a specific installation. Wiring and piping shown are for a quick overview of system and are not in accordance with recognized standards.
3. All wiring must comply with applicable local and national codes.
4. All piping must follow standard piping techniques. Refer to Carrier System Design Manual part 3, Carrier E20-II software Refrigerant Piping program, or appropriate ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) handbook for details on proper piping sizes and design.
5. See Application Data section on page 12 for minimum system fluid volume. This system may require the addition of a holding tank to ensure adequate volume.
6. Hot gas lines should rise above refrigerant level in condenser circuit. Double riser may be required; check unit minimum capacity.
7. Trap should be installed on hot gas lines to prevent condenser oil and refrigerant vapor migration from accumulating in the compressor during off cycle.
8. Pitch all horizontal lines downward in the direction of refrigerant flow.
9. For piping lengths greater than 50 ft, provide support to liquid and gas lines near the connections to the condenser coil.
10. For pressure relief requirements, see latest revision of ASHRAE Standard 15, Safety Code for Mechanical Refrigeration.





# Typical control wiring schematic

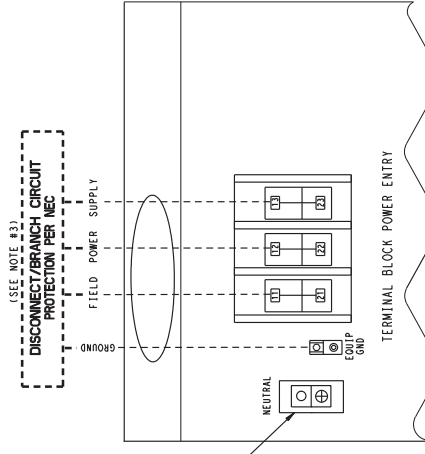


## NOTES:

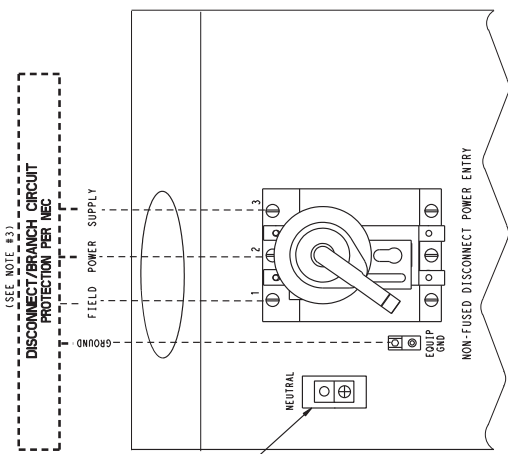
- Factory wiring is in accordance with UL 1995 standards. Field modifications or additions must be in compliance with all applicable codes.
- All units or modules have single point primary power connection. Main power must be supplied from a field or factory supplied disconnect.
- Wiring for main field supply must be rated 75 C. Use copper conductors only.
  - Incoming wire size range for terminal block with MCA (minimum circuit amps) up to 120 amps is 14 AWG (American Wire Gage) to 2/0.
  - Incoming wire size range for terminal block with MCA from 120.1 amps to 310 amps is 6 AWG to 350 kcmil.
  - Incoming wire size range for non-fused disconnect with MCA up to 50 amps is 10 awg to 2 AWG.
  - Incoming wire size range for non-fused disconnect with MCA from 50.1 amps to 90 amps is 6 AWG to 3/0.
  - Incoming wire size range for non-fused disconnect with MCA from 90.1 amps to 250 amps is 4 AWG to 350 kcmil.
- Refer to certified dimensional drawings for exact locations of the main power and control power entrance locations.
- Terminal 24 of the LVT is for control of chilled water pump (CWP) starter. Terminal 20 of the LVT is for control of condenser pump (CNP) starter or condenser fan relay (CFR). The maximum load allowed for the relays is 5 VA sealed, 10 VA inrush at 24 VAC. Field power supply is not required.
- Terminal 25 of LVT is for an alarm relay. The maximum load allowed for alarm relay is 5 VA sealed, 10 VA inrush at 24 VAC. Field power supply is not required.
- Make appropriate connections to LVT as shown for energy management board options. The contacts for demand limit and ice done options must be rated for dry circuit application capable of handling 24 VAC load up to 50 mA. Installation of optional energy management board required.
- Remove jumper between terminals 16 and 17 when field chilled water pump interlock (CWPI) is installed.
- All discrete inputs are 24 VAC.

## LEGEND

- |             |                              |
|-------------|------------------------------|
| <b>ALMR</b> | Alarm Relay (24 V) 5 VA Max  |
| <b>AWG</b>  | American Wire Gage           |
| <b>CFR</b>  | Condenser Fan Relay          |
| <b>CNFS</b> | Condenser Flow Switch        |
| <b>CNP</b>  | Condenser Pump               |
| <b>CNPI</b> | Condenser Pump Interlock     |
| <b>CWP</b>  | Chilled Water Pump           |
| <b>CWPI</b> | Chilled Water Pump Interlock |
| <b>CWV</b>  | Condenser Water Valve        |
| <b>LVT</b>  | Low Voltage Terminal Strip   |
| <b>NEC</b>  | National Electrical Code     |
| <b>OAT</b>  | Outside Air Temperature      |
| <b>SPT</b>  | Space Temperature            |

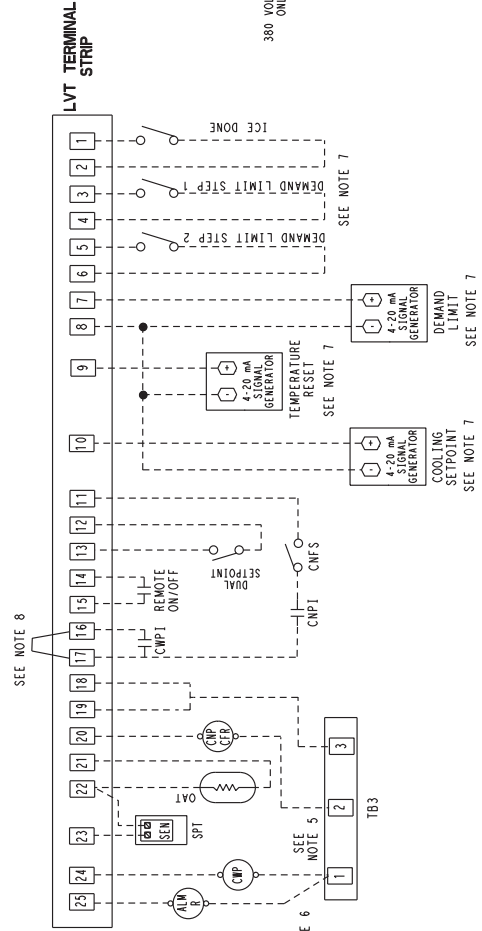


## TERMINAL BLOCK

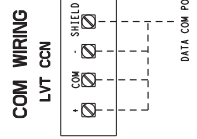


## NON-FUSED DISCONNECT

## LVT CONTROL WIRING



- FIELD POWER WIRING
- - - FIELD CONTROL WIRING
- \_\_\_ FACTORY INSTALLED WIRING



# Guide specifications



## Scroll Liquid Chillers

### HVAC Guide Specifications

Size Range: **15 to 45 Tons (53 to 158 kW)**

Carrier Model Numbers:

#### **30MPA,MPW**

### Part 1 — General

#### 1.01 SYSTEM DESCRIPTION

Microprocessor controlled liquid-cooled condenser (30MPW) or condenserless (30MPA) liquid chiller utilizing scroll type compressors.

#### 1.02 QUALITY ASSURANCE

- A. The 60-Hz unit performance shall be rated per ARHI Standard 550/590, latest edition (U.S.A.) at standard rating conditions.
- B. All units shall be ASHRAE 90.1 compliant.
- C. Unit construction shall comply with ANSI/ASHRAE 15 Safety Standard (latest revision) and NEC.
- D. Unit shall be certified in accordance with ISO 9001 manufacturing quality standard.
- E. Unit shall be ETL and ETL, Canada certified.

#### 1.03 DELIVERY, STORAGE AND HANDLING

- A. Unit shall be shipped factory-assembled with all piping and wiring, precharged with a complete operating charge of R-410A (30MPW) or a holding charge of nitrogen (30MPA) and shall be stored and handled according to manufacturer's recommendations.
- B. Unit controls shall be capable of withstanding 150 F (66 C) storage temperatures in the control compartment.
- C. Chiller and starter should be stored indoors, protected from construction dirt and moisture. An inspection should be conducted under shipping tarps, bags, or crates to be sure water has not collected during transit. Protective shipping covers should be kept in place until machine is ready for installation. The inside of the protective cover should meet the following criteria:
  1. Temperature is between 40 F (4.4 C) and 120 F (48.9 C).
  2. Relative humidity is between 10% and 80% (non-condensing).

### Part 2 — Products

#### 2.01 EQUIPMENT

##### A. General:

Single-piece liquid chiller consisting of compressor(s), BPHE (brazed-plate heat exchanger) evaporator, condenser (30MPW only), controls, safeties, and any hardware required before start-up.

##### B. Unit Cabinet:

1. Frame shall be of heavy-gage galvanized steel with an electrostatically applied baked enamel finish.

2. The unit shall pass through a standard 36-in. (914 mm) door and shall not exceed 57 in. (1448 mm) in length.

##### C. Compressor:

1. Fully hermetic scroll type compressors.
2. Direct drive, 3500 rpm (367 r/s), protected by line break device, suction gas cooled motor.
3. External vibration isolation - rubber in shear.
4. Staging of compressors shall provide unloading capability. Digital compressor unloading is optional.

##### D. Evaporator:

1. Evaporator shall be rated for a maximum refrigerant pressure of 505 psig (3482 kPa) for sizes 015 and 020 and 565 psig (3896 kPa) for sizes 030 to 045 and shall be tested for a maximum water-side pressure of 300 psig (2068 kPa).
2. Shall be single-pass, ANSI type 316 stainless steel, brazed plate construction.
3. Shall be insulated with 3/4-in. (19 mm) closed-cell, polyvinyl-chloride foam with a maximum K factor of 0.28.
4. Unit shall be provided with a factory-installed flow switch.
5. Unit shall be provided with entering and leaving chilled water temperature sensors and water pressure access port.
6. A strainer with a minimum of 40 mesh must be installed within 10 ft (3 m) of the heat exchanger fluid inlet to prevent debris from clogging the heat exchanger. This strainer shall be required and shall be available as an accessory.

##### E. Brazed-Plate Condenser:

1. Condenser shall be rated for a maximum refrigerant pressure of 505 psig (3482 kPa) for sizes 015 and 020 and 565 psig (3896 kPa) for sizes 030 to 045 and shall be tested for a maximum water-side pressure of 300 psig (2068 kPa).
2. Single-pass, liquid-cooled, ANSI type 316, stainless-steel brazed-plate construction that shall provide positive subcooling of liquid refrigerant.
3. Unit shall be equipped with victaulic water connections.
4. A strainer with a minimum of 40 mesh must be installed within 10 ft (3 m) of heat exchanger fluid inlet to prevent debris from clogging the heat exchanger. This strainer shall be required and shall be available as an accessory.

##### F. Refrigerant Components:

1. Each chiller shall contain the following: sight glass; filter drier; liquid line solenoid valve (30MPA); liquid line isolation valve (30MPA); thermostatic expansion valve; and charging port.



2. Thermostatic expansion valve (TXV) shall be located within 12-in. of the evaporator with no bend between TXV and evaporator in accordance with evaporator manufacturer recommendation.

#### G. Controls, Safeties and Diagnostics:

##### 1. Controls:

- a. Unit controls shall include the following minimum components:
  - 1) Microprocessor.
  - 2) Power and control circuit terminal blocks.
  - 3) ON/OFF control switch.
  - 4) Thermistor is installed to measure evaporator entering and leaving fluid temperatures.
  - 5) Terminal block for temporary and/or permanent interface to the Carrier Comfort Network<sup>®</sup> or similar building system control.
- b. Microprocessor with non-volatile memory. Battery backup system shall not be accepted.
- c. Control transformer to serve all controllers, contactors, relays, and control components.
- d. Replaceable solid-state relay panels and controllers.
- e. Pressure transducers (used to calculate saturated suction temperature and saturated condensing temperature).
- f. Provision for field installation of accessory sensor to measure compressor return gas temperature (suction gas thermistor).
- g. Terminals shall be provided in the control box for wiring of accessory field-installed condenser temperature sensors.
- h. Unit controls shall be capable of performing the following functions:
  - 1) Capacity control based on leaving chilled fluid temperature and compensated by rate of change of return-fluid temperature.
  - 2) Limiting of the chilled fluid temperature pulldown rate at start-up to 1° F (0.56° C) per minute to prevent excessive demand spikes (charges) at start-up.
  - 3) Seven-day time schedule.
  - 4) Leaving chilled fluid temperature reset from return fluid.
  - 5) Dual chiller control for parallel chiller applications (common leaving chilled water sensor required).
  - 6) Timed maintenance scheduling to signal maintenance activities.

##### 2. Diagnostics:

- a. The control panel shall include, as standard, a scrolling marquee display capable of indicating the safety lockout condition by

displaying a code for which an explanation may be scrolled at the display.

##### b. Information included for display shall be:

- 1) Compressor lockout.
- 2) Loss of charge.
- 3) Low fluid flow.
- 4) Evaporator freeze protection.
- 5) Thermistor malfunction.
- 6) Entering and leaving-fluid temperature.
- 7) Circuit suction and discharge pressure.
- 8) Time of day.

c. Display module, in conjunction with the microprocessor, must also be capable of displaying the output (results) of a service test. Service test shall verify operation of every switch, thermistor, and compressors before chiller is started.

d. Diagnostics shall include the ability to review a list of the 20 most recent alarms with clear language descriptions of the alarm event. Display of alarm codes without the ability for clear language descriptions shall be prohibited.

e. An alarm history buffer shall allow the user to store no less than 20 alarm events with clear language descriptions, time and date stamp event entry.

f. The chiller controller shall include a connection port for communicating with the local equipment network and the Carrier Comfort Network (CCN) system.

g. The control system shall allow software upgrade without the need for new hardware modules.

##### 3. Safeties:

a. Unit shall be equipped with sensors and all necessary components in conjunction with the control system to provide the unit with the following protections:

- 1) Loss of refrigerant charge protection.
- 2) Low fluid flow detection.
- 3) Low chilled fluid temperature protection.
- 4) Low control voltage (to unit) protection.
- 5) High-pressure switch.
- 6) Reverse rotation.
- 7) Overcurrent protection.
- 8) Loss of phase.

b. Compressors shall be equipped with the following protections:

- 1) High discharge temperature protection.
- 2) Electrical overload through the use of definite-purpose contactors and motor overload protection through internal compressor overload or external current overload.

# Guide specifications (cont)



- 3) Circuit breakers shall open all 3 phases in the event of an overload in any one phase (single-phasing condition).
- 4) Circuit breakers for short circuit protection.

## H. Operating Characteristics:

1. Unit shall be capable of starting with up to 95 F (35 C) fluid temperature entering the evaporator.
2. Unit shall be capable of operating with variable evaporator fluid flow, up to 10% change in flow rate per minute.

## I. Electrical Requirements:

1. Single-point electrical power connection with compressors factory-wired to a terminal block in the control panel. Compressor sensors and system pressure transducers shall be factory-wired to the unit controller.
2. Control interface shall be accessed through low voltage terminal strip or terminal strip.

## J. Chilled Water Circuit:

1. Chilled water circuit shall be rated for 300 psig (2068 kPa).
2. Solid-state flow switch with integral relay shall be factory installed and wired.

## K. Special Features:

Certain standard features are not applicable when the features designated by \* are specified. For assistance in amending the specifications, contact your Carrier representative.

1. Hot Gas Bypass:  
This factory-installed option shall permit chiller to provide an additional step of capacity reduction over standard.
2. Sound Enclosure Panels:  
This acoustic package shall be either factory-installed or field-installed and shall entirely enclose the compressor section to further reduce radiated sound.
3. Mobility Kit (Wheels):  
This package shall be factory-supplied for field installation and shall include 4 swivel wheels for easy unit mobility.
4. Height Adjustment Kit:  
The units shall be shipped with a high adjustment mechanism located in each corner of the unit to aid in leveling the chiller and to facilitate connections to existing piping.
5. Vibration Isolators (Resilient Pads):  
Vibration isolators shall be field-installed before the unit is set into its final location and shall reduce vibration transmission through the mounting area of the chiller.

## 6. Vibration Isolators (Springs):

Vibration isolators shall be field-installed before the unit is set into its final location and shall reduce vibration transmission through the mounting area of the chiller.

## 7. Non-Fused Disconnect:

The non-fused disconnect shall be factory installed and shall disconnect all power to the unit (including control circuit power).

## 8. Brine:

- a. Special modifications shall be made at the factory to permit operation with leaving chilled fluid temperatures between 15 and 32 F (-9.4 to 0.0° C).
- b. Unit shall be provided with a factory-installed liquid line solenoid (per refrigerant circuit) to be used in medium temperature brine and condenserless applications.

## 9. Strainer:

A Y strainer shall be available in sizes 1.5 to 6 in. with a minimum of 40 mesh for field installation.

## 10. Remote Enhanced Display:

Unit shall be supplied with indoor-mounted, remote, 40-character per line, 16-line display panel for field installation.

## 11. Energy Management Module (EMM):

A factory or field-installed module shall provide the following energy management capabilities: 4 to 20 mA signals for leaving fluid temperature reset, cooling set point or demand limit control; 2-point demand limit control (from 15% to 100%) activated by a remote contact closure; and discrete input for "Ice Done" indication for ice storage system interface.

EMM shall be capable of:

- a. Leaving temperature reset form space temperature, outdoor temperature, or 4 to 20 mA signal.
- b. Demand limit or load shed via field supplied 4 to 20 mA signal or 2-step discrete contact closure.

## 12. BACnet Translator Control:

Unit shall be supplied with field-installed interface between the chiller and a BACnet Local Area Network (LAN, i.e., MS/TP EIA-485).

## 13. LON Translator Control:

Unit shall be supplied with field-installed interface between the chiller and a Local Operating Network (LON, i.e., LonWorks FT-10A ANSI/EIA-709.1).



14. Navigator™ Hand Held Display Module:

- a. Portable hand held display module with a minimum of 4 lines and 20 characters per line, or clear English, Spanish, Portuguese or French language.
- b. Display menus shall provide clear language descriptions of all menu items, operating modes, configuration points and alarm diagnostics. Reference to factory codes shall not be accepted.
- c. RJ-14 connection plug shall allow display module to be connected to factory-installed receptacle.
- d. Industrial grade coiled extension cord shall allow the display module to be moved around the chiller.
- e. Magnets shall hold the display module to any sheet metal panel to allow hands-free operation.

- f. Display module shall have NEMA 4x housing suitable for use in outdoor environments.
- g. Display shall have back light and contrast adjustment for easy viewing in bright sunlight or night conditions.
- h. Raised surface buttons with positive tactile response.

15. Digital Compressor Option:

Shall provide factory-installed digital compressor to provide additional steps of capacity (not available on size 015).

16. Compressor Insulation:

Compressor insulation is designed to insulate scroll compressors and prevent water vapor from condensing on the colder compressor surface.





