

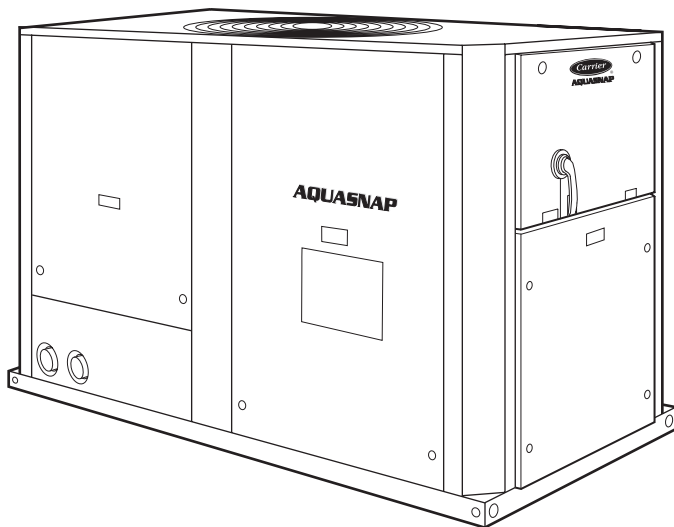


Product Data

AquaSnap® 30RA010-055 Air-Cooled Chillers 50/60 Hz

10 to 55 Nominal Tons
(25 to 200 kW)

AQUASNAP®



Features/Benefits

AquaSnap chillers are simple and economical to install in an all-in-one package that delivers both quiet and efficient operation. Value added features include:

- Integrated pump package
- Accessory fluid storage tank
- Quiet AeroAcoustic™ fan system with nighttime low sound operation
- Scroll compression
- Easy to use *ComfortLink*™ controls
- Low profile construction

AquaSnap chillers cost less to purchase and install, then run quietly and efficiently.

Leave it to Carrier to rethink chiller design in ways noticed at the initial purchase, through installation, and for years afterward. Carrier's new AquaSnap chiller installs quickly and easily on the ground, on the rooftop, or on the factory floor to save money. Then it will run so quietly that you'll hardly know it's there. There is one place, however, where you will definitely be aware of AquaSnap unit — on your electric bill. AquaSnap unit's high efficiency keeps costs down.

Costs less right from the start

Only AquaSnap chillers feature a compact, all-in-one package design. The optional pump and hydronic components are already built in, which costs less than buying and installing the components individually. You'll save when you install an AquaSnap chiller, too. The chiller's fully integrated and pre-assembled hydronic system installs in minutes. Simple water piping and power wire connections make installation a **SNAP**. No other chiller in this



class installs so easily and inexpensively. Use of the optional fluid storage tank reduces installation costs and ensures sufficient fluid volume is available for close-coupled and process cooling applications. The preassembled and integrated hydronic module utilizes top-quality components and pumps to ensure years of reliable operation.

AquaSnap® chillers make noise in the marketplace, not the workplace.

AquaSnap chillers are having a big impact, but they are doing it very quietly. In fact, the AquaSnap chiller's Aero-Acoustic™ fan is almost twice as quiet as the competition's. Much of the reduction is in frequencies where noise is most annoying, which makes AquaSnap chillers ideal for sound-sensitive environments. When cooler temperatures allow part-load operation or during scheduled nighttime operation, the fan operates at lower speeds and becomes even quieter. AquaSnap chillers are quiet during the day and even quieter at night.

The fan is mounted to an extremely rigid tower, which further reduces vibrations and noise by preventing them from being amplified through the unit's casing.

The savings will continue to mount

Besides costing less to buy and install, AquaSnap chillers are also more affordable to operate. They are our most efficient air-cooled models, with full-load EER (Energy Efficiency Ratio) up to 10.1. AquaSnap chillers use ultra-quiet, high-efficiency scroll compressors, operated in tandem for greater efficiency at partial loads.

Proven reliability that's built in

Thousands of AquaSnap chillers are already in service around the world. This field-proven design is backed by a 12-month warranty that includes the hydronic system. The compressors are maintenance-free and protected by an auto-adaptive control that minimizes

compressor wear. Unit sizes 032 and up have two independent refrigerant circuits. Year-round operation is standard, from -20 F (-29 C) (with optional cooler heater and low ambient control) to 125 F (52 C).

ComfortLink™ controls speak your language

Would you rather decipher blinking LEDs and codes, or use controls that communicate in plain English, Portuguese, Spanish or French? The ComfortLink control system makes 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. This intuitive interface greatly reduces start-up and operator training time.

Carrier's exclusive remote, hand-held diagnostic unit — the Navigator™ module — provides expanded information on virtually every aspect of the AquaSnap chiller's operation, helping technicians to quickly diagnose problems and even prevent them from occurring. The Navigator provides convenience and powerful information in the palm of your hand.

All AquaSnap units are ready to be used with the Carrier Comfort Network (CCN).

AquaSnap units minimize the impact on your roofline, as well as your bottom line

The AquaSnap chiller's low profile — all models, is just 4'-4" (1321 mm) high — means it won't stand out if installed on the roof. The other dimensions are equally compact. The integrated hydronics and the chilled fluid storage tank's placement under the chiller further minimize the footprint, allowing easy installation almost anywhere.

Benefits at a glance

For contractors:

- all-in-one package for quick and easy installation
- costs less to buy and install
- easy to use controls — less training needed
- compact size/small footprint
- highly reliable
- callbacks for noise mitigation unlikely
- makes service calls more productive

For consulting engineers:

- high efficiency/low operating costs
- low sound levels mean satisfied owners and neighbors
- compact size/small footprint
- operates year-round, even in extreme temperatures
- costs less to buy and install
- highly reliable
- quick and easy installation means faster start-up, so you'll get paid sooner
- common controls for all 30-series units mean fewer specifications to write

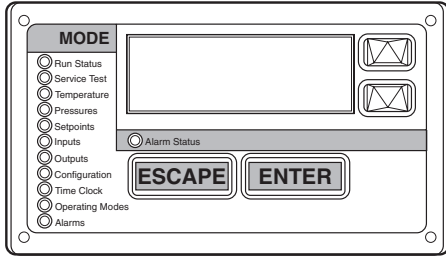
For building owners:

- costs less to buy and install
- extremely quiet operation
- lower energy, operating and maintenance costs
- highly reliable
- easy to operate — less training needed
- compact size
- operates year-round, even in extreme temperatures

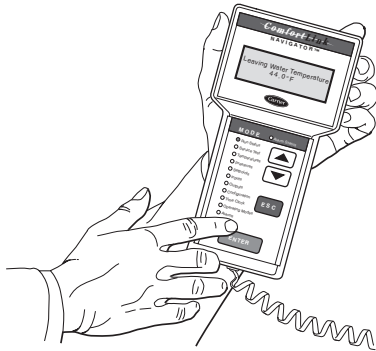
For manufacturing processes:

- high reliability maintains process consistency and minimizes downtime
- operates year-round, even in extreme temperatures
- all-in-one package for quick and easy installation
- easy to operate controls — less training needed
- high efficiency/low operating costs
- costs less to buy and install
- compact size/small footprint
- extremely quiet operation

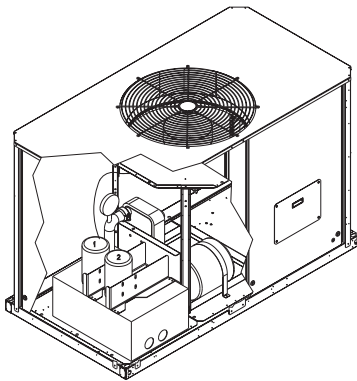
Features/Benefits (cont)



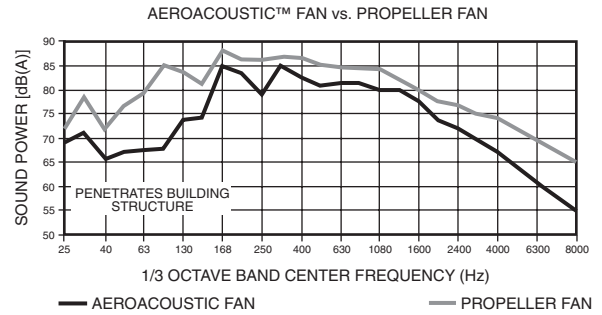
SCROLLING MARQUEE DISPLAY



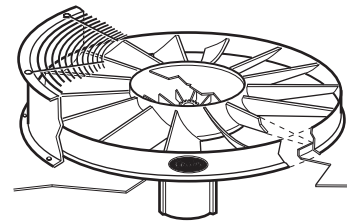
NAVIGATOR™ DISPLAY MODULE



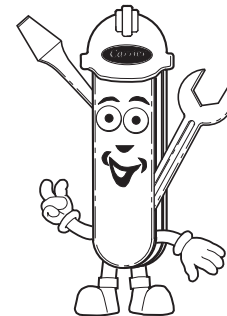
OPTIONAL HYDRONIC PACKAGE



AEROACOUSTIC FAN VS PROPELLER FAN



LOW-NOISE AEROACOUSTIC FAN WITH NIGHTTIME LOW SOUND



INSTALLATION IS A SNAP

Table of contents

	Page
Features/Benefits	1-3
Model Number Nomenclature	4
ARI Capacity Ratings	4
Physical Data	5-7
Options and Accessories	8,9
Dimensions	10-18
Selection Procedure	19-25
Performance Data	26-29
Typical Piping and Wiring	30,31
Electrical Data	32-34
Controls	35,36
Control and Power Wiring Schematic	37-39
Application Data	40-43
Guide Specifications	44-48

Model number nomenclature



AQUASNAP® CHILLER MODEL NUMBER DESIGNATION

3 0 R A N 0 1 0 - - - 6 1 1 - -

38RA – Air-Cooled AquaSnap Chiller

Compressor Start Option
N – Standard XL Start

Nominal Sizes
010 025 040* 055*
015 030* 042†
018 032† 045
022 035 050*

Chilled Fluid Pump Options
– – No pump installed
A – Single Pump, 1.5 HP, 010-030 Sizes Only
B – Single Pump, 2 HP Low Head, All Sizes
C – Single Pump, 2 HP High Head, 010-030 Sizes Only
D – Single Pump, 3 HP, All Sizes
E – Single Pump, 5 HP, 032-055 Sizes Only
F – Dual Pump, 1.5 HP, 010-030 Sizes Only
G – Dual Pump, 2 HP Low Head, All Sizes
H – Dual Pump, 2 HP High Head, 010-030 Sizes Only
J – Dual Pump, 3 HP, All Sizes
K – Dual Pump, 5 HP, 032-055 Sizes Only

Display, Energy Management, GFI Option
– – Standard Scrolling Marquee (SM) Display
E – SM + EMM
S – SM + EMM + GFI Convenience Outlet
(60 Hz, 120 Volt, 4 Amp) [1,4,5,6 Voltages Only]

Condenser Coil Options
– – Standard Copper Tube/Aluminum Fin
C – Copper Tube/Copper Fin, Copper Tube Sheet/Mylar Coil Separator
E – Copper Tube/Aluminum Fin with E-Coat
F – Copper Tube/Copper Fin, Copper Tube Sheet, Mylar Separator with E-Coat
K – Copper Tube/Aluminum Fin Precoated

Voltage
1 – 575-3-60
2 – 380-3-60
4 – 230-3-60
5 – 208/230-3-60
6 – 460-3-60
8 – 230-3-50
9 – 380/415-3-50

Factory-Installed Options (FIOP)

Packaging
1 – Standard Domestic (Coil Cover and Bottom Skid)
3 – Standard Export with Coil Cover, Top and Bottom Skid & Shipping Bag
4 – Full Export Crate
5 – Option #1 with Factory-Installed Coil Grilles
7 – Option #3 with Factory-Installed Coil Grilles
8 – Option #4 with Factory-Installed Coil Grilles

Series – 1

LEGEND

EMM – Energy Management Module
GFI – Ground Fault Interrupting
XL – Across-the-Line

*60 Hz only.
†50 Hz only.



Quality Assurance



Certificate No FM 21837

Approvals:
ISO 9001
EN 9000:2000

ARI capacity ratings

60 Hz

UNIT 30RAN	CAPACITY		COMPRESSOR POWER INPUT (kW)	FAN POWER (kW)	COOLER FLOW		COOLER WATER PRESSURE DROP		FULL LOAD		PART LOAD	
	Tons	kW			GPM	L/s	Ft Water	kPa	EER	COP	EER	COP
010	9.6	33.8	9.7	1.9	22.9	1.4	5.6	16.8	9.8	2.87	12.87	3.77
015	13.7	48.2	14.8	1.9	33.0	2.1	6.8	20.3	9.8	2.87	12.75	3.73
018	15.9	55.9	18.0	1.9	38.1	2.4	7.5	22.4	9.6	2.81	13.43	3.93
022	21.6	76.0	23.8	1.7	51.8	3.3	10.2	30.5	10.1	2.96	14.35	4.20
025	23.8	83.7	27.9	1.7	57.1	3.6	10.8	32.3	9.6	2.81	13.93	4.08
030	27.2	95.7	31.7	1.7	65.3	4.1	12.6	37.7	9.8	2.87	13.99	4.10
035	34.8	122.4	37.8	3.6	83.2	5.2	7.7	23.0	10.0	2.93	14.49	4.24
040	37.7	132.6	42.8	3.6	90.6	5.7	8.2	24.5	9.7	2.84	13.56	3.97
045	43.1	151.6	47.5	3.3	103.4	6.5	11.2	33.5	10.1	2.96	15.15	4.44
050	47.4	166.7	55.8	3.3	113.8	7.2	12.2	36.5	9.6	2.81	14.09	4.13
055	54.3	191.0	63.4	3.3	130.4	8.2	14.4	43.1	9.7	2.84	14.13	4.14

50 Hz

UNIT 30RAN	CAPACITY		COMPRESSOR POWER INPUT (kW)	FAN POWER (kW)	COOLER FLOW		COOLER WATER PRESSURE DROP		FULL LOAD		PART LOAD	
	Tons	kW			GPM	L/s	Ft Water	kPa	EER	COP	EER	COP
010	9.9	34.8	10.7	1.1	23.7	1.5	6.0	18.0	9.9	2.90	12.96	3.80
015	13.1	46.1	14.8	1.1	31.4	2.0	6.2	18.5	9.8	2.87	14.35	4.20
018	14.9	52.4	17.9	1.1	35.9	2.3	6.7	20.0	9.4	2.75	14.01	4.10
022	19.9	70.0	22.3	1.0	47.8	3.0	8.8	26.3	10.2	2.99	14.80	4.33
025	22.8	80.2	27.7	1.0	54.0	3.4	9.9	29.6	9.5	2.78	14.83	4.34
032	29.5	103.8	30.8	2.1	70.7	4.5	5.6	16.8	10.7	3.13	15.79	4.62
035	34.3	120.6	40.1	2.1	82.3	5.2	7.5	22.4	9.7	2.84	14.35	4.20
042	39.6	139.3	44.4	2.0	94.9	6.0	9.5	28.4	10.2	2.99	15.06	4.41
045	44.7	157.2	54.9	2.0	107.2	6.8	12.1	36.2	9.4	2.75	14.83	4.34

LEGEND

COP – Coefficient of Performance
EER – Energy Efficiency Ratio

Physical data



60 Hz ENGLISH

UNIT 30RA	010	015	018	022	025	030	035	040	045	050	055
REFRIGERANT TYPE	R-22, TXV Controlled System										
Refrigerant Charge (lb) Ckt A/Ckt B	18/—	27/—	36/—	37/—	38/—	48/—	44/30	45/30	44/44	45/45	55/55
COMPRESSORS	Scroll, Hermetic										
Quantity	1	1	2	2	2	2	3	3	4	4	4
Speed (Rpm) (Qty) Ckt A	(1) SM125	(1) SM185	(2) SM110	(1) SM115, (1) SM160	(2) SM160	(2) SM185	(1) SM115, (1) SM160	(2) SM160	(1) SM125, (1) SM160	(2) SM160	(2) SM185
(Qty) Ckt B	—	—	—	—	—	—	(1) SM185	(1) SM185	(1) SM125, (1) SM160	(2) SM160	(2) SM185
Oil Charge (Compressor/Pt)	SM110/5.7, SM115/6.7, SM125/6.7, SM160/7.0, SM185/11.6										
No. Capacity Steps	1	1	2	2	2	2	3	3	4	4	4
Standard	2	2	3	3	3	3	4	4	5	5	5
Optional (Maximum)	100	100	50	41	50	50	25	32	22	25	25
Minimum Capacity Step (%)	69	79	32	27	38	39	16	24	15	19	20
Standard	Welded, Direct-Expansion Plate Heat Exchanger										
Optional	1.12	1.61	1.86	2.41	2.84	3.40	6.30	7.00	6.55	7.44	8.56
Net Fluid Volume (gal)	450	450	450	450	450	450	450	450	450	450	450
Maximum Refrigerant Pressure (psig)	150	150	150	150	150	150	150	150	150	150	150
Maximum Fluid Side Pressure Without Pump(s) (psig)	150	150	150	150	150	150	150	150	150	150	150
Maximum Fluid Side Pressure With Pump(s) (psig)	150	150	150	150	150	150	150	150	150	150	150
FLUID CONNECTIONS (in.)	Welded, Direct-Expansion Plate Heat Exchanger										
Inlet and Outlet, FPT	2	2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
Drain (NPT)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
CONDENSER FANS	Welded, Direct-Expansion Plate Heat Exchanger										
Standard Low Noise Type	1140/570	1140/570	1140/570	—/850	—/850	—/850	—/850	—/850	—/850	—/850	—/850
Fan Speed (Rpm) Standard/Low Noise	15...30/—	15...30/—	15...30/—	11...30/—	11...30/—	11...30/—	11...30/—	11...30/—	11...30/—	11...30/—	11...30/—
No. Blades...Diameter (in.) Ckt A/Ckt B	1...1.8	1...1.8	1...1.8	2...2.0	2...2.0	2...2.0	2...2.0 (A), 1...1.8 (B)	2...2.0 (A), 1...1.8 (B)	4...4.0	4...4.0	4...4.0
No. Fans...Total kW	10,500	10,500	10,500	13,600	13,600	14,500	21,000	21,000	27,300	27,300	29,000
Total Airflow (Cfm)	1...2	1...3	1...3	1...3	1...3	1...3	2...3	2...3	2...3	2...3	2...3
Quantity...No. Rows	23	23	23	32	32	40	55	55	64	64	80
Total Face Area (sq ft)	Pump(s), Strainer W/Blowdown Valve, Expansion Tank, Pressure Gages, Drain and Vent Plugs, Flow Switch, and Balance Valve										
HYDRONIC MODULE (Optional)*	Single or Dual, Centrifugal Monocell Pump(s), 3500 Rpm										
Pump	4.4										
Expansion Tank Volume (gal)	10.3										

50 Hz ENGLISH

UNIT 30RA	010	015	018	022	025	032	035	042	045
REFRIGERANT TYPE	R-22, TXV Controlled System								
Refrigerant Charge (lb) Ckt A/Ckt B	18/—	27/—	36/—	37/—	38/—	44/30	44/30	44/44	44/44
COMPRESSORS	Scroll, Hermetic								
Quantity	1	2	2	2	2	3	3	4	4
Speed (Rpm) (Qty) Ckt A	(1) SM160	(2) SM110	(2) SM125	(2) SM160	(2) SM185	(1) SM115, (1) SM160	(2) SM185	(2) SM160	(2) SM185
(Qty) Ckt B	—	—	—	—	—	(1) SM185	(1) SM185	(2) SM160	(2) SM185
Oil Charge (Compressor/Pt)	SM110/5.7, SM115/6.7, SM125/6.7, SM160/7.0, SM185/11.6								
No. Capacity Steps	1	2	2	2	2	3	3	4	4
Standard	2	3	3	3	3	4	4	5	5
Optional (Maximum)	100	50	50	50	50	25	33	25	25
Minimum Capacity Step (%)	71	28	31	35	37	15	25	18	19
Standard	Welded, Direct-Expansion Plate Heat Exchanger								
Optional	1.12	1.61	1.86	2.41	2.84	5.77	6.55	6.77	6.55
Net Fluid Volume (gal)	450	450	450	450	450	450	450	450	450
Maximum Refrigerant Pressure (psig)	150	150	150	150	150	150	150	150	150
Maximum Fluid Side Pressure Without Pump(s) (psig)	150	150	150	150	150	150	150	150	150
Maximum Fluid Side Pressure With Pump(s) (psig)	150	150	150	150	150	150	150	150	150
FLUID CONNECTIONS (in.)	Welded, Direct-Expansion Plate Heat Exchanger								
Inlet and Outlet, FPT	2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2
Drain (NPT)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
CONDENSER FANS	Welded, Direct-Expansion Plate Heat Exchanger								
Standard Low Noise Type	950/475	950/475	950/475	—/700	—/700	—/700	—/700	—/700	—/700
Fan Speed (Rpm) Standard/Low Noise	15...30/—	15...30/—	15...30/—	11...30/—	11...30/—	11...30/—	11...30/—	11...30/—	11...30/—
No. Blades...Diameter (in.) Ckt A/Ckt B	1...1.8	1...1.8	1...1.8	2...2.0	2...2.0	2...2.0 (A), 1...1.8 (B)	2...2.0 (A), 1...1.8 (B)	4...4.0	4...4.0
No. Fans...Total kW	8,750	8,750	8,750	11,330	11,330	17,500	17,500	22,750	22,750
Total Airflow (Cfm)	1...2	1...3	1...3	1...3	1...3	2...3	2...3	2...3	2...3
Quantity...No. Rows	23	23	23	32	32	55	55	64	64
Total Face Area (sq ft)	Pump(s), Strainer W/Blowdown Valve, Expansion Tank, Pressure Gages, Drain and Vent Plugs, Flow Switch, and Balance Valve								
HYDRONIC MODULE (Optional)*	Single or Dual, Centrifugal Monocell Pump(s), 3500 Rpm								
Pump	4.4								
Expansion Tank Volume (gal)	10.3								

TXV — Thermostatic Expansion Valve

*Flow switch and strainer are standard on all units, with or without hydronic package.

Physical data (cont)



60 Hz SI

UNIT 30RA	010	015	018	022	025	030	035	040	045	050	055
REFRIGERANT TYPE	R-22, TXV Controlled System										
Refrigerant Charge (kg) Ckt A/Ckt B	8.2/—	12.2/—	16.3/—	16.8/—	17.2/—	21.8/—	20.0/13.6	20.4/13.6	20.0/20.0	20.4/20.4	25.0/25.0
COMPRESSORS	Scroll, Hermetic										
Quantity	1	1	2	2	2	2	3	3	4	4	4
Speed (r/s)	58.3										
Quantity — Ckt A	(1) SM125	(1) SM185	(2) SM110	(1) SM115, (1) SM160	(2) SM160	(2) SM185	(1) SM115, (1) SM160	(2) SM160	(1) SM125, (1) SM160	(2) SM160	(2) SM185
Quantity — Ckt B	—	—	—	—	—	—	(1) SM185	(1) SM185	(1) SM125, (1) SM160	(2) SM160	(2) SM185
Oil Charge (Compressor/Pt)	SM110/5.7, SM115/6.7, SM125/6.7, SM160/7.0, SM185/11.6										
No. Capacity Steps											
Standard	1	1	2	2	2	2	3	3	4	4	4
Optional (Maximum)	2	2	3	3	3	3	4	4	5	5	5
Minimum Capacity Step (%)											
Standard	100	100	50	42	50	50	25	32	22	25	25
Optional	69	79	32	27	38	39	16	24	15	19	20
COOLER	Welded, Direct-Expansion Plate Heat Exchanger										
Net Fluid Volume (L)	4.22	6.08	7.03	9.12	10.75	12.84	23.84	26.49	24.79	28.12	32.34
Maximum Refrigerant Pressure (kPa)	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103
Maximum Fluid Side Pressure Without Pump(s) (kPa)	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034
Maximum Fluid Side Pressure With Pump(s) (kPa)	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034
FLUID CONNECTIONS (mm)											
Inlet and Outlet, FPT	50.8	50.8	50.8	50.8	50.8	50.8	63.5	63.5	63.5	63.5	63.5
Drain (NPT)	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
CONDENSER FANS	Standard Low Noise Type										
Fan Speed (r/s) Standard/Low Noise	19/9.5	19/9.5	19/9.5	—/14.2	—/14.2	—/14.2	—/14.2	—/14.2	—/14.2	—/14.2	—/14.2
No. Blades...Diameter (mm) Ckt A/Ckt B	15...762/—	15...762/—	15...762/—	11...762/—	11...762/—	11...762/—	11...762/—	11...762/—	11...762/—	11...762/—	11...762/—
No. Fans...Total kW	1...1.8	1...1.8	1...1.8	2...2.0	2...2.0	2...2.0	2...2.0 (A), 1...1.8 (B)	2...2.0 (A), 1...1.8 (B)	4...4.0	4...4.0	4...4.0
Total Airflow (L/s)	4,955	4,955	4,955	6,419	6,419	6,843	9,595	9,595	12,884	12,884	13,687
CONDENSER COILS											
Quantity...No. Rows	1...2	1...3	1...3	1...3	1...3	1...3	2...3	2...3	2...3	2...3	2...3
Total Face Area (sq m)	2.14	2.14	2.14	2.97	2.97	3.72	5.11	5.11	5.95	5.95	7.43
HYDRONIC MODULE (Optional)*	Pump(s), Strainer W/Blowdown Valve, Expansion Tank, Pressure Gages, Drain and Vent Plugs, Flow Switch, and Balance Valve										
Pump	Single or Dual, Centrifugal Monocell Pump(s), 58.3 r/s										
Expansion Tank Volume (L)	16.5						39				

50 Hz SI

UNIT 30RA	010	015	018	022	025	032	035	042	045
REFRIGERANT TYPE	R-22, TXV Controlled System								
Refrigerant Charge (kg) Ckt A/Ckt B	8.2/—	12.2/—	16.3/—	16.8/—	17.2/—	20.0/13.6	20.0/13.6	20.0/20.0	20.0/20.0
COMPRESSORS	Scroll, Hermetic								
Quantity	1	2	2	2	2	3	3	4	4
Speed (r/s)	48.3								
Quantity — Ckt A	(1) SM160	(2) SM110	(2) SM125	(2) SM160	(2) SM185	(1) SM115, (1) SM160	(2) SM185	(2) SM160	(2) SM185
Quantity — Ckt B	—	—	—	—	—	(1) SM185	(1) SM185	(2) SM160	(2) SM185
Oil Charge (Compressor/Pt)	SM110/5.7, SM115/6.7, SM125/6.7, SM160/7.0, SM185/11.6								
No. Capacity Steps									
Standard	1	2	2	2	2	3	3	4	4
Optional (Maximum)	2	3	3	3	3	4	4	5	5
Minimum Capacity Step (%)									
Standard	100	50	50	50	50	25	33	25	25
Optional	71	28	31	35	37	15	25	18	19
COOLER	Welded, Direct-Expansion Plate Heat Exchanger								
Net Fluid Volume (L)	4.22	6.08	7.03	9.12	10.75	21.82	24.77	21.82	24.77
Maximum Refrigerant Pressure (kPa)	3103	3103	3103	3103	3103	3103	3103	3103	3103
Maximum Fluid Side Pressure Without Pump(s) (kPa)	1034	1034	1034	1034	1034	1034	1034	1034	1034
Maximum Fluid Side Pressure With Pump(s) (kPa)	1034	1034	1034	1034	1034	1034	1034	1034	1034
FLUID CONNECTIONS (mm)									
Inlet and Outlet, FPT	50.8	50.8	50.8	50.8	50.8	63.5	63.5	63.5	63.5
Drain (NPT)	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
CONDENSER FANS	Standard Low Noise Type								
Fan Speed (r/s) Standard/Low Noise	15.8/7.9	15.8/7.9	15.8/7.9	—/11.7	—/11.7	—/11.7	—/11.7	—/11.7	—/11.7
No. Blades...Diameter (mm) Ckt A/Ckt B	15...762/—	15...762/—	15...762/—	11...762/—	11...762/—	11...762/—	11...762/—	11...762/—	11...762/—
No. Fans...Total kW	1...1.8	1...1.8	1...1.8	2...2.0	2...2.0	2...2.0 (A), 1...1.8 (B)	2...2.0 (A), 1...1.8 (B)	4...4.0	4...4.0
Total Airflow (L/s)	4,130	4,130	4,130	5,349	5,349	7,995	7,995	10,737	10,737
CONDENSER COILS									
Quantity...No. Rows	1...2	1...3	1...3	1...3	1...3	2...3	2...3	2...3	2...3
Total Face Area (sq m)	2.14	2.14	2.14	2.97	2.97	5.11	5.11	5.95	5.95
HYDRONIC MODULE (Optional)*	Pump(s), Strainer W/Blowdown Valve, Expansion Tank, Pressure Gages, Drain and Vent Plugs, Flow Switch, and Balance Valve								
Pump	Single or Dual, Centrifugal Monocell Pump(s), 58.3 r/s								
Expansion Tank Volume (L)	16.5						39		

TXV — Thermostatic Expansion Valve

*Flow switch and strainer are standard on all units, with or without hydronic package.



UNIT WEIGHTS

60 Hz STD UNITS

30RA SIZE	POUNDS — ALUMINUM				
	A	B	C	D	Total Weight
010	182	210	255	299	946
015	197	245	291	335	1068
018	206	268	377	358	1209
022	336	451	381	355	1523
025	350	464	395	380	1589
030	378	518	409	400	1705
035	748	642	604	850	2844
040	763	653	616	882	2914
045	860	709	746	903	3218
050	876	721	770	946	3313
055	977	753	831	954	3515

30RA SIZE	KILOGRAMS — ALUMINUM				
	A	B	C	D	Total Weight
010	83	95	116	136	430
015	89	111	132	152	484
018	93	122	171	162	548
022	152	205	173	161	691
025	159	210	179	172	720
030	171	235	186	181	773
035	339	291	274	386	1290
040	346	296	279	400	1321
045	390	322	338	410	1460
050	397	327	349	429	1502
055	443	342	377	433	1595

SINGLE PUMP UNITS

30RA SIZE	POUNDS — ALUMINUM				
	A	B	C	D	Total Weight
010	209	241	293	343	1086
015	223	277	329	379	1208
018	230	299	421	399	1349
022	367	492	416	388	1663
025	381	505	430	413	1729
030	409	561	443	433	1845
035	801	687	646	910	3044
040	815	698	658	943	3114
045	913	753	792	959	3418
050	929	765	816	1003	3513
055	1033	796	878	1008	3715

30RA SIZE	KILOGRAMS — ALUMINUM				
	A	B	C	D	Total Weight
010	95	109	133	156	493
015	101	126	149	172	548
018	104	136	191	181	612
022	166	224	189	176	755
025	173	229	195	187	784
030	185	254	201	196	836
035	363	311	293	413	1380
040	370	316	298	427	1411
045	414	342	359	435	1550
050	421	347	370	455	1593
055	468	361	398	458	1685

DUAL PUMP UNITS

30RA SIZE	POUNDS — ALUMINUM				
	A	B	C	D	Total Weight
010	226	262	316	372	1176
015	238	299	353	408	1298
018	244	320	448	427	1439
022	385	521	437	410	1753
025	399	533	451	436	1819
030	427	590	462	456	1935
035	825	707	666	936	3134
040	840	717	678	969	3204
045	938	773	813	984	3508
050	953	784	837	1029	3603
055	1057	816	899	1033	3805

30RA SIZE	KILOGRAMS — ALUMINUM				
	A	B	C	D	Total Weight
010	103	119	144	169	535
015	108	135	160	185	588
018	110	146	203	194	653
022	174	237	198	186	795
025	181	241	204	198	824
030	193	268	210	207	878
035	374	320	302	425	1421
040	381	325	307	440	1453
045	425	351	368	447	1591
050	432	356	380	466	1634
055	479	370	408	469	1726

30RA SIZE	POUNDS — COPPER				
	A	B	C	D	Total Weight
010	194	231	274	326	1025
015	216	280	321	382	1199
018	220	303	411	404	1338
022	364	521	418	410	1713
025	380	532	432	436	1780
030	409	606	441	474	1930
035	854	721	691	958	3224
040	869	731	702	992	3294
045	965	790	833	1011	3599
050	978	805	859	1051	3693
055	1096	857	931	1082	3966

30RA SIZE	KILOGRAMS — COPPER				
	A	B	C	D	Total Weight
010	88	105	124	148	465
015	98	127	146	173	544
018	100	137	186	183	606
022	165	236	190	186	777
025	172	241	196	198	807
030	186	275	200	215	876
035	387	327	313	435	1462
040	394	332	318	450	1494
045	438	358	378	459	1633
050	444	365	390	477	1676
055	497	389	422	491	1799

30RA SIZE	POUNDS — COPPER				
	A	B	C	D	Total Weight
010	221	262	312	370	1165
015	242	312	359	426	1339
018	244	334	455	445	1478
022	395	562	453	443	1853
025	411	573	467	469	1920
030	440	649	475	507	2070
035	907	766	733	1018	3424
040	921	776	744	1053	3494
045	1018	834	879	1067	3799
050	1031	849	905	1108	3893
055	1152	900	978	1136	4166

30RA SIZE	KILOGRAMS — COPPER				
	A	B	C	D	Total Weight
010	108	129	152	181	570
015	117	151	174	206	648
018	117	161	218	215	711
022	187	268	215	211	881
025	194	272	221	224	911
030	208	308	224	241	981
035	422	356	341	474	1593
040	429	361	346	490	1626
045	473	387	408	496	1764
050	479	394	421	514	1808
055	533	417	453	527	1930

30RA SIZE	POUNDS — COPPER				
	A	B	C	D	Total Weight
010	238	283	335	399	1255
015	257	334	383	455	1429
018	258	355	482	473	1568
022	413	591	474	465	1943
025	429	601	488	492	2010
030	458	678	494	530	2160
035	931	786	753	1044	3514
040	946	795	764	1079	3584
045	1043	854	900	1092	3889
050	1055	868	926	1134	3983
055	1176	920	999	1161	4256

30RA SIZE	KILOGRAMS — COPPER				
	A	B	C	D	Total Weight
010	108	129	152	181	570
015	117	151	174	206	648
018	117	161	218	215	711
022	187	268	215	211	881
025	194	272	221	224	911
030	208	308	224	241	981
035	422	356	341	474	1593
040	429	361	346	490	1626
045	473	387	408	496	1764
050	479	394	421	514	1808
055	533	417	453	527	1930

50 Hz STD UNITS

30RA SIZE	POUNDS — ALUMINUM				
	A	B	C	D	Total Weight
010	186	211	262	317	976
015	190	242	456	304	1192
018	205	268	378	358	1209
022	340	453	388	374	1555
025	354	468	410	398	1630
032	746	641	604	848	2839
035	768	652	620	911	2951
042	867	714	761	937	3279
045	886	729	800	985	3400

30RA SIZE	KILOGRAMS — ALUMINUM				
	A	B	C	D	Total Weight
010	84	96	119	144	443
015	86	110	207	138	541
018	93	122	171	162	548
022	154	205	176	170	705
025	161	212	186	181	740
032	338	291	274	385	1288
035	348	296	281	413	1338
042	393	324	345	425	1487
045	402	331	363	447	1543

SINGLE PUMP UNITS

30RA SIZE	POUNDS — ALUMINUM				
	A	B	C	D	Total Weight
010	213	241	300	362	1116
015	212	270	510	340	1332
018	229	299	422	399	1349
022	371	494	423	408	1695
025	384	508	445	432	1770
032	799	686	647	908	3039
035	820	696	662	973	3151
042	920	758	807	994	3479
045	938	772	847	1043	3600

30RA SIZE	KILOGRAMS — ALUMINUM				
	A	B	C	D	Total Weight
010	96	110	136	165	507
015	96	123	231	154	604
018	104	136	191	181	612
022	168	223	192	185	768
025	175	230	202	197	804
032	362	311	293	412	1378
035	372	316	300	441	1429
042	417	344	366	451	1578
045	426	350	384	473	1633

30RA SIZE	POUNDS — COPPER				
	A	B	C	D	Total Weight
010	213	241	300	362	1116
015	212	270	510	340	1332
018	229	299	422	399	1349
022	371	494	423	408	1695
025	384	508	445	432	1770
032	799	686	647	908	3039
035	820	696	662	973	3151
042	920	758	807	994	3479
045	938	772	847	1043	3600

30RA SIZE	KILOGRAMS — COPPER				
	A	B	C	D	Total Weight
010	96	110	136	165	507
015	96	123	231	154	604
018	1				

Options and accessories



ITEM	FACTORY-INSTALLED OPTION	FIELD-INSTALLED ACCESSORY
Hydronic Pump Package	X	
Enviro-Shield™ System Condenser Coil Coatings	X	
Copper Fins	X	
Aluminum Fins, E-coat	X	
Copper Fins, E-coat	X	
Aluminum Fins, Pre-coated	X	
Medium Temperature Brine, 15 F to 40 F LBT	X	
Non-Fused Disconnect	X	
Low-Ambient Protection Package	X	
Motormaster® V Low-Ambient Control	X	X
Minimum Load Control	X	X
Coil Protection Grilles	X	X
Hail Guards		X
Navigator™ Hand Held Display		X
Control Display Access Door		X
Remote Enhanced Display		X
Chillervisor System Manager III Multi-Unit Control		X
GFI Convenience Outlet (60 Hz Only)	X	X
Energy Management Module	X	X
Vibration Isolation		X
Chilled Water Storage Tank		X
Remote Cooler Kit		X
DataLINK™ Control		X
DataPort™ Control		X
BAClink Control		X

LEGEND

GFI — Ground Fault Interrupter
 LBT — Leaving Brine Temperature

Factory-installed options

Hydronic pump package — This option adds circulating pumps, complete with controls, contactor, and insulated expansion tank. Available in single or dual (lead/lag controlled) cooler pump versions, with total dynamic head external to the chiller from approximately 15 to 75 feet.

Low ambient protection package — Cooler heaters provide protection from cooler freezeup to -20 F (-29 C). Includes low ambient protection for optional hydronic package, when provided.

Energy Management Module — This module provides energy management capabilities to minimize chiller energy consumption. Several features are provided with this module including leaving fluid temperature reset, cooling set point reset or demand limit control from a 4 to 20 mA signal, 2-point demand limit control (from 0 to 100%) activated by a remote contact closure, and discrete input for “Ice Done” indication for ice storage system interface.

GFI convenience outlet — The factory installed convenience outlet includes 4-amp GFI (Ground Fault Interrupter) receptacle with independent fuse protection. Convenience outlet is 115-v female receptacle.

Low-ambient Motormaster® V control — This option permits operation of the 30RA units down to -20 F (-29 C) outdoor ambient temperature. The control is also available as a field-installed accessory. Also requires field-installed wind baffles.

Non-fused disconnect — This option provides non-fused disconnect capability for power and control located at the unit.

Minimum load control — This option allows additional capacity reduction for unit operation below the minimum step of unloading (down to 15% of the minimum unit capacity, depending on unit size). Minimum load control is also available as a field-installed accessory.

Condenser coil options (Enviro-Shield™) — Several options are available to match coil construction to the site conditions for the best durability. Consult your Carrier representative for further information.

Coil protection grilles — One-in. by four-in. coated wire grille protects condenser coil from damage.

Medium temperature brine — This option permits supply liquid temperatures to be set from 15 F (-9.4 C) to 40 F (4.4 C). Refrigeration circuit components, such as the expansion device, are modified at the factory to adjust for lower refrigerant flow rates.

Field-installed accessories

Minimum load control — This option allows additional capacity reduction for unit operation below the minimum step of unloading (down to 15% of the minimum unit capacity). Minimum load control is also available as a factory-installed option.



Control display access door — This option provides easy access to the unit control module through a see-through door without having to open the control box panels.

Navigator™ display module — 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 display provides clear language information in English, French, Spanish or Portuguese. The weatherproof enclosure and industrial grade extension cord makes the Navigator 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 — This accessory kit contains a remotely mounted 40-character per line, 16-line display panel for unit diagnostics.

Chillvisor System Manager III multi-unit control — This accessory allows sequencing of between 2 and 8 chillers in parallel or 2 chillers in series. Pump control is also provided.

Hail guards — Sheet metal hood provides protection against hail and flying debris damage.

Coil protection grilles — One-in. x 4-in. coated wire grille protects condenser coil from damage.

Low ambient Motormaster® V head pressure control — Permits starting and operating down to -20 F (-29 C) outside ambient temperature. Requires field-installed wind baffles.

Energy Management Module — This module provides energy management capabilities to minimize chiller energy consumption. Several features are provided with this module including leaving fluid temperature reset, cooling set point reset or demand limit control from a 4 to 20 mA signal; 2-point demand limit control (from 0 to 100%)

activated by a remote contact closure; and discrete input for “Ice Done” indication for ice storage system interface.

GFI convenience outlet — The field-installed convenience outlet includes 4-amp GFI (Ground Fault Interrupter) receptacle with independent fuse protection. Convenience outlet is 115-v female receptacle.

Remote cooler kit — Allows remote installation of cooler. Kit includes thermistor and transducer cable extensions, sheet metal panels for refrigerant pipe extensions and instructions.

Chilled water storage tank — Provides additional loop volume for improved temperature control and chilled water loop stability. Will provide up to 6 gallons per ton. Heater supplied (additional field power supply required) to protect to -20 F (-29 C).

Vibration isolation — The field-installed 1/4-in. neoprene isolator pads (24-in. x 3-in.) reduce vibration transmission from the compressor through the floor and into the conditioned space.

DataPort™ control — DataPort control is an interface device that allows a non-Carrier device such as a personal computer or non-Carrier controller to read values in system elements connected to the CCN Communication Bus using plain english ASCII over its RS-232 connection.

DataLINK™ control — DataLINK control is an interface device that allows a non-Carrier device such as a personal computer or non-Carrier controller to read and change values in system elements connected to the CCN Communication Bus using plain English ASCII over its RS-232 connection.

BAClink control — BAClink control provides an interface between Carrier Comfort Network (CCN) and a BACnet Local Area network (LAN), i.e., Ethernet (ISO8802-3).

CONDENSER COIL CORROSION PROTECTION OPTIONS

ENVIRO-SHIELD™ OPTION*	ENVIRONMENT					
	Standard	Mild Coastal	Moderate Coastal	Severe Coastal	Industrial	Combined Industrial/Coastal
AL Fins (Standard Coils)	X					
CU Fins			X			
AL Fins, E-coat					X	X
CU Fins, E-coat				X		
AL Fins, Precoated		X				

LEGEND

- AL — Aluminum
- CU — Copper

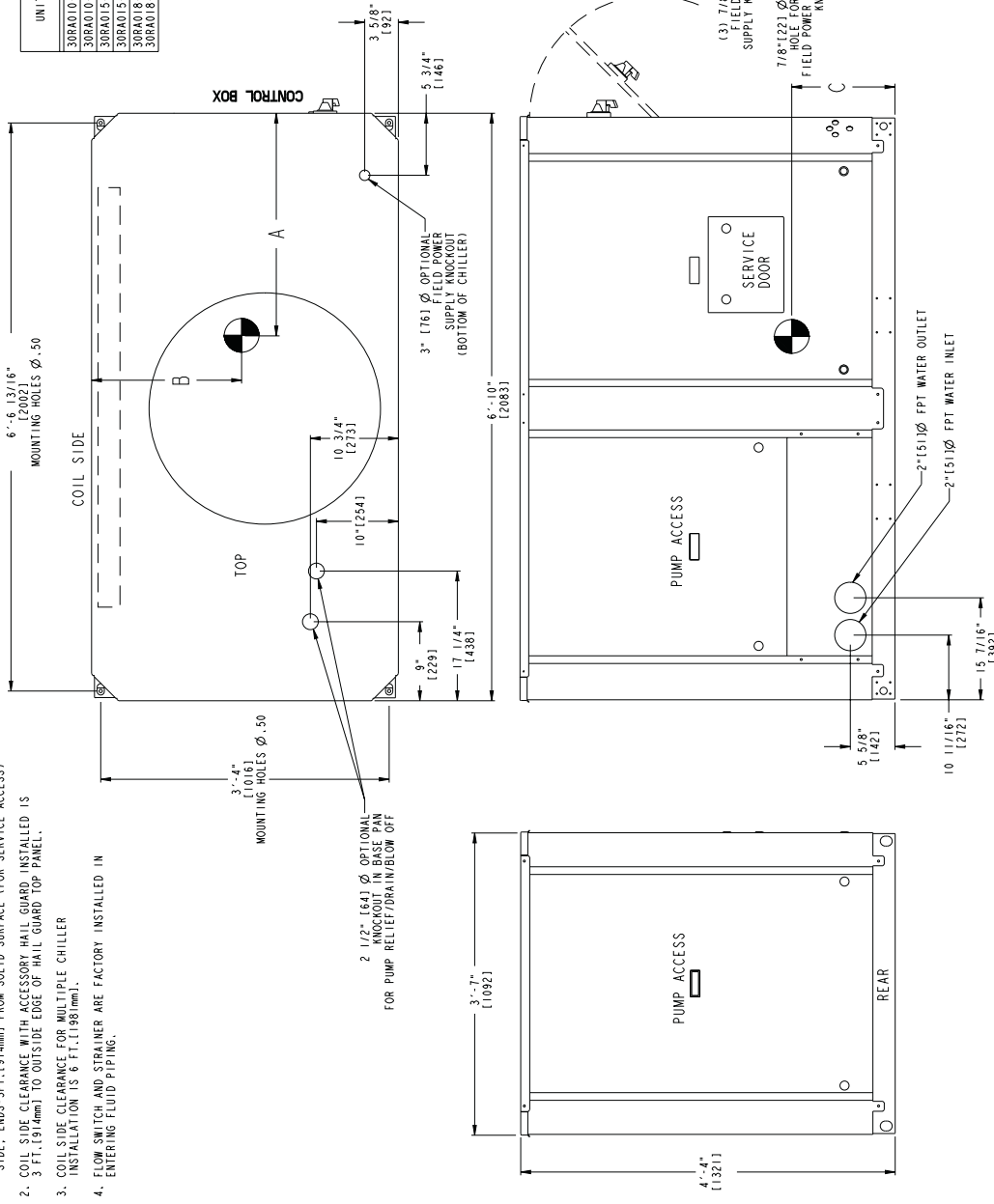
*See page 42 for further description, also see “Environmental Corrosion Protection” for more information (Publications 810-217 and 811-019).

Dimensions — 30RA010,015,018



UNIT	DIM. A	DIM. B	DIM. C	TOTAL OPERATING WEIGHT - AL. FIN		TOTAL OPERATING WEIGHT - CU. FIN	
				LBS.	KG.	LBS.	KG.
30RA010-60HZ	33.75 [8571]	22.00 [5591]	21.00 [5331]	945	428	1024	464
30RA010-50HZ	33.75 [8571]	22.00 [5591]	21.00 [5331]	975	442	1056	479
30RA015-60HZ	34.00 [8641]	21.50 [5461]	21.00 [5331]	1066	483	1197	543
30RA015-50HZ	29.75 [7561]	17.87 [4541]	21.00 [5331]	1190	540	1321	599
30RA018-60HZ	32.12 [8161]	20.12 [5111]	21.00 [5331]	1205	547	1334	605

- NOTES:
- UNIT MUST HAVE CLEARANCES AS FOLLOWS:
 1. TOP-DO NOT RESTRICT IN ANY WAY FROM SOLID SURFACE.
 COIL SIDE - ENDS-3 FT. (914mm) FROM SOLID SURFACE (FOR SERVICE ACCESS)
 CONTROL SIDE - ENDS-3 FT. (914mm) FROM SOLID SURFACE (FOR SERVICE ACCESS)
 - COIL SIDE CLEARANCE WITH ACCESSORY HAIL GUARD INSTALLED IS 3 FT. (914mm) TO OUTSIDE EDGE OF HAIL GUARD TOP PANEL.
 - COIL SIDE CLEARANCE FOR MULTIPLE CHILLER INSTALLATION IS 6 FT. (1830mm).
 - FLOW SWITCH AND STRAINER ARE FACTORY INSTALLED IN ENTERING FLUID PIPING.

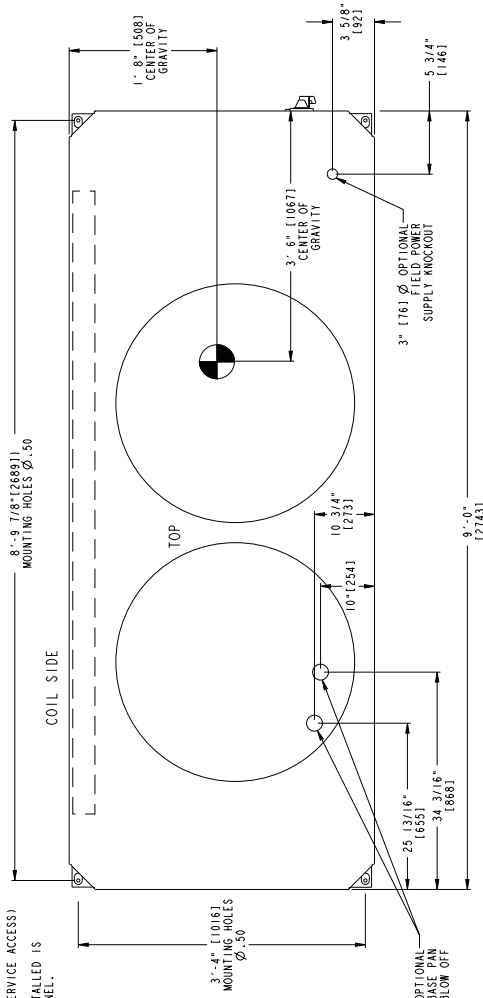


Dimensions — 30RA022,025

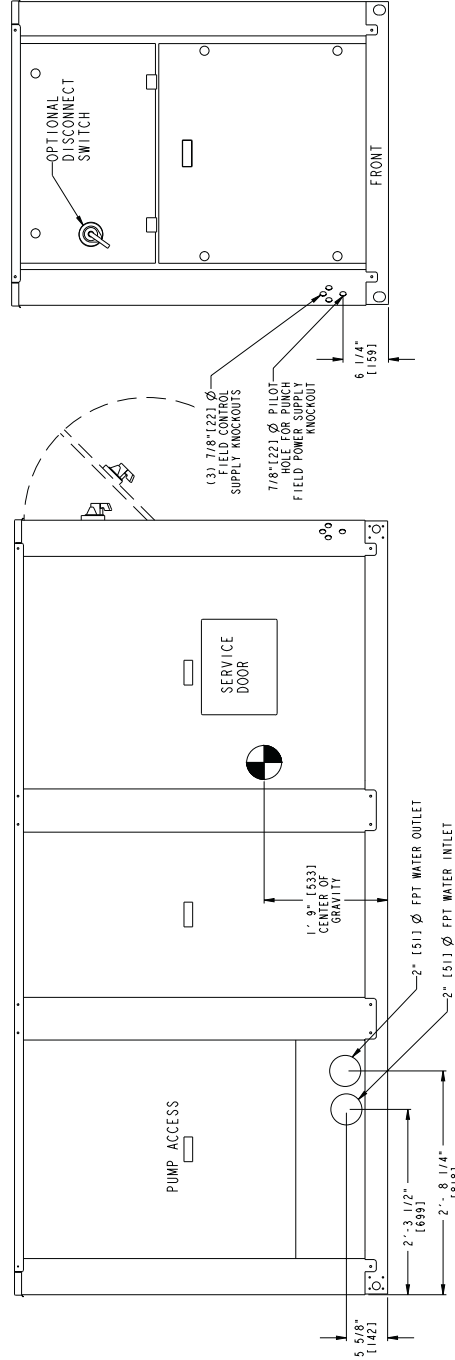
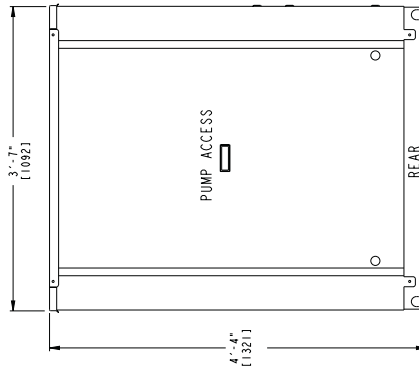


UNIT	TOTAL OPERATING WEIGHT - ALL IN		TOTAL OPERATING WEIGHT - C.F.T.N	
	LEBS.	KG.	LEBS.	KG.
30RA022-60HZ	1519	689	1709	775
30RA022-50HZ	1551	703	1740	789
30RA025-60HZ	1584	718	1775	805
30RA025-50HZ	1625	737	1815	823

- NOTES:
- UNIT MUST HAVE CLEARANCES FOR AIRFLOW AS FOLLOWS:
 TOP-DO NOT RESTRICT IN ANY WAY
 COIL SIDE: 3 1/2 FT. (1067mm) FROM SOLID SURFACE
 SIDE, ENDS-3FT.(914mm) FROM SOLID SURFACE (FOR SERVICE ACCESS)
 - COIL SIDE CLEARANCE WITH ACCESSORY HAIL GUARD INSTALLED IS 3 FT.(914mm) TO OUTSIDE EDGE OF HAIL GUARD TOP PANEL.
 - COIL SIDE CLEARANCE FOR MULTIPLE CHILLER INSTALLATION IS 6 FT.(1829mm).
 - FLOW SWITCH AND STRAINER ARE FACTORY INSTALLED IN ENTERING FLUID PIPING.



2 1/2" (64) Ø OPTIONAL KNOCKOUT IN BASE PAN FOR PUMP RELIEF/DRAIN/BLOW OFF



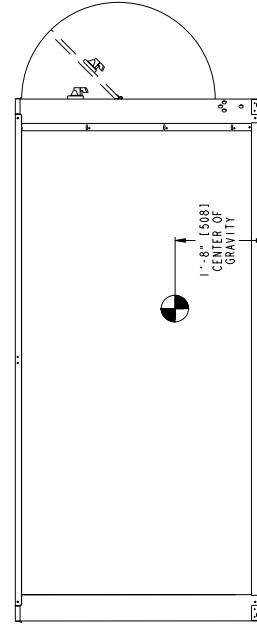
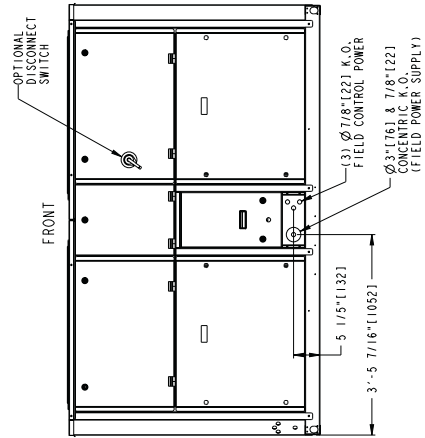
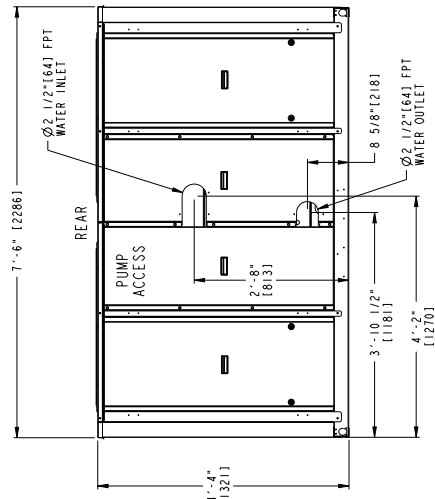
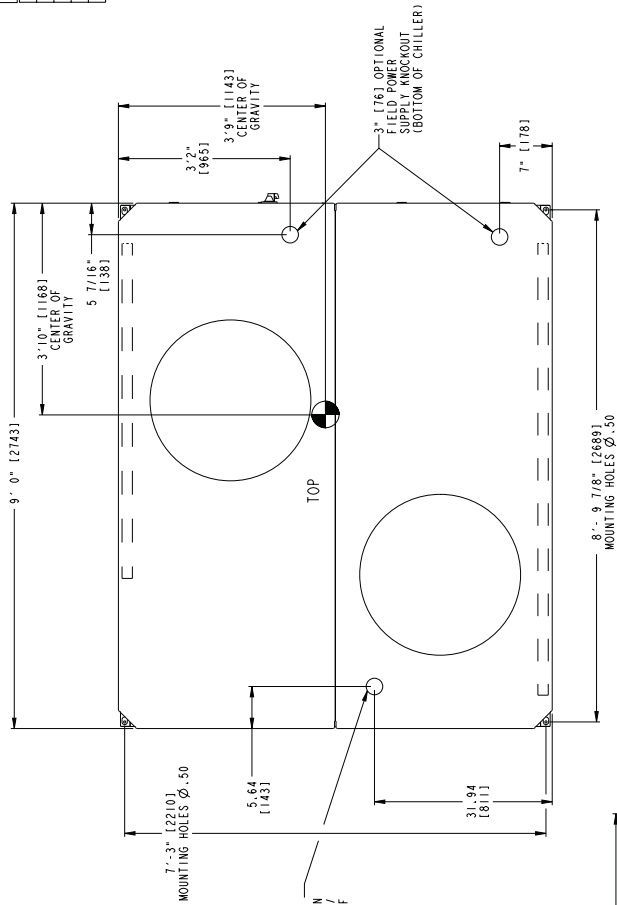
Dimensions — 30RA032-040



UNIT	TOTAL OPERATING WEIGHT - AL.F.IN		TOTAL OPERATING WEIGHT - CU.F.IN	
	LBS.	KG.	LBS.	KG.
30RA032-50HZ	2828	1283	3208	1455
30RA035-60HZ	2833	1285	3213	1458
30RA035-50HZ	2940	1334	3320	1506
30RA040-50HZ	2900	1315	3280	1488

NOTES:
1. UNIT MUST HAVE CLEARANCES FOR AIRFLOW AS FOLLOWS:

- TOP-DO NOT RESTRICT IN ANY WAY
COIL SIDE- 3 1/2 FT. (1.067mm) FROM SOLID SURFACE
SIDE, ENDS-3FT.(.914mm) FROM SOLID SURFACE (FOR SERVICE ACCESS)
- COIL SIDE CLEARANCE WITH ACCESSORY HALL GUARD- INSTALLED IS 3 FT.(.914mm) TO OUTSIDE EDGE OF HALL GUARD TOP PANEL.
- COIL SIDE CLEARANCE FOR MULTIPLE CHILLER
INSTALLATION IS 6 FT.(1.98mm).
- STRAINER IS FACTORY INSTALLED IN ENTERING FLUID PIPING.
FLOW SWITCH IS FACTORY INSTALLED IN LEAVING FLUID PIPING

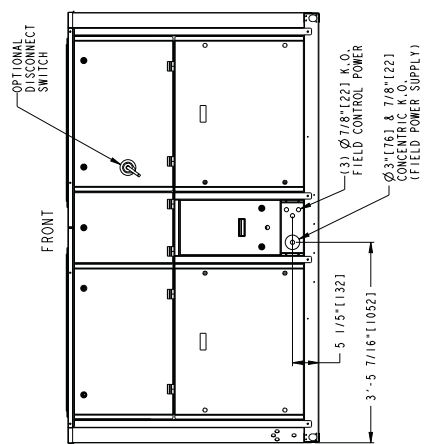
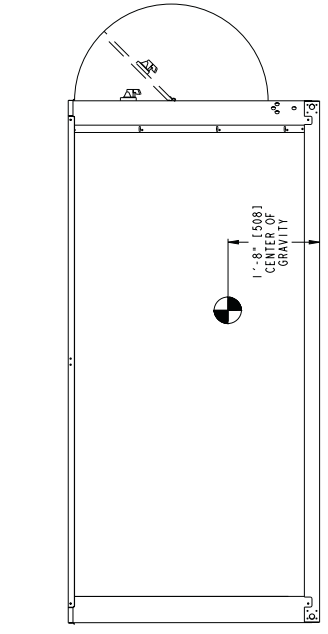
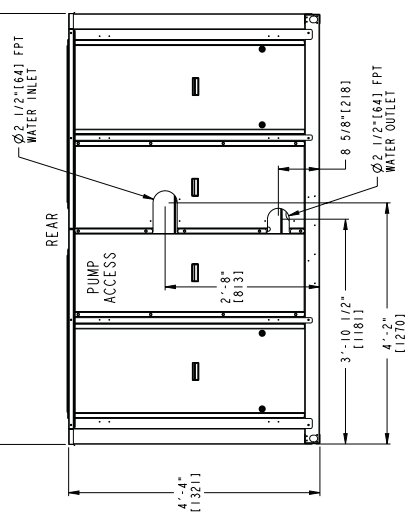
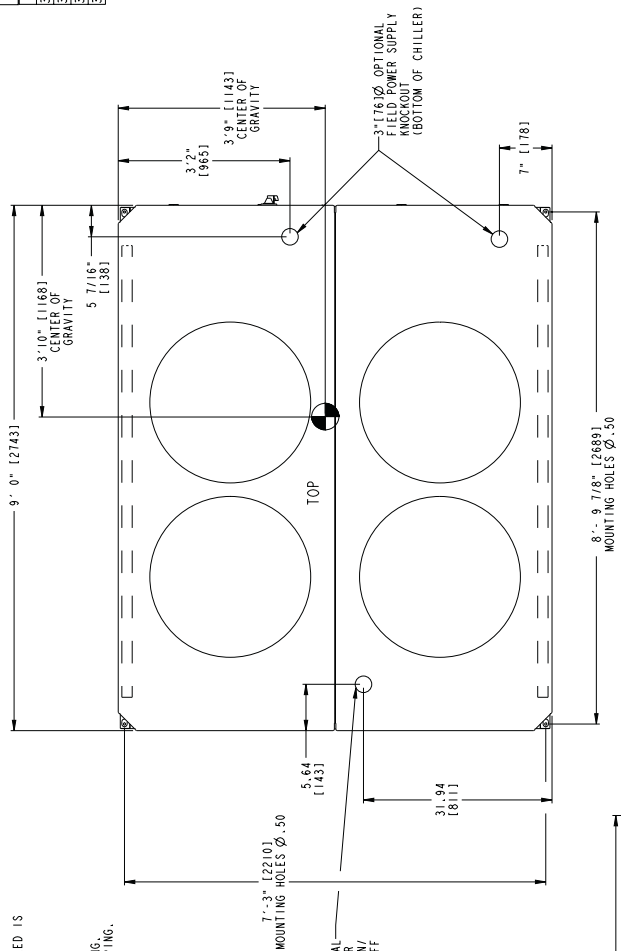


Dimensions — 30RA042-050



UNIT	TOTAL OPERATING WEIGHT - AL.FIN		TOTAL OPERATING WEIGHT - CU.FIN	
	LBS.	KG.	LBS.	KG.
30RA042-50HZ	3266	1483	3848	1655
30RA045-60HZ	3202	1452	3583	1625
30RA045-50HZ	3389	1537	3840	1742
30RA050-60HZ	3295	1495	3675	1667

- NOTES:
- UNIT MUST HAVE CLEARANCES FOR AIRFLOW AS FOLLOWS:
TOP-DO NOT RESTRICT IN ANY WAY FROM SOLID SURFACE.
SIDE - ENDS-3FT.(914mm) FROM SOLID SURFACE (FOR SERVICE ACCESS)
3 FT.(914mm) TO OUTSIDE EDGE OF HAIL GUARD TOP PANEL.
 - COIL SIDE CLEARANCE WITH ACCESSORY HAIL GUARD INSTALLED IS 3 FT.(914mm).
 - COIL SIDE CLEARANCE FOR MULTIPLE CHILLER INSTALLATION IS 6 FT.(1829mm).
 - STRAINER IS FACTORY INSTALLED IN ENTERING FLUID PIPING.
FLOW SWITCH IS FACTORY INSTALLED IN LEAVING FLUID PIPING.

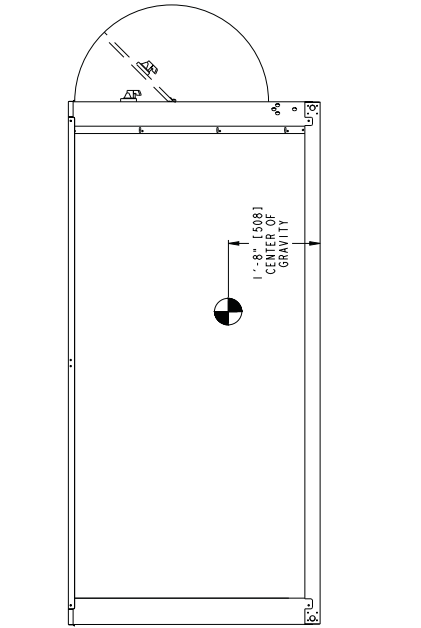
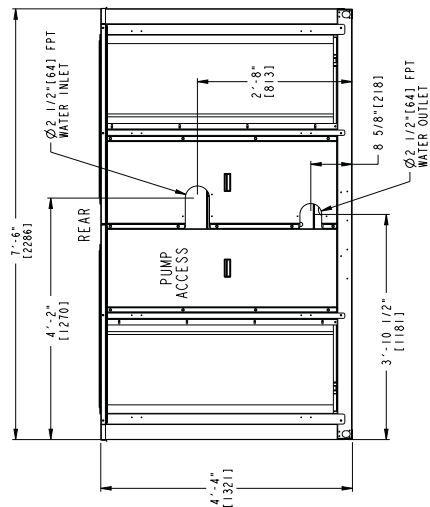
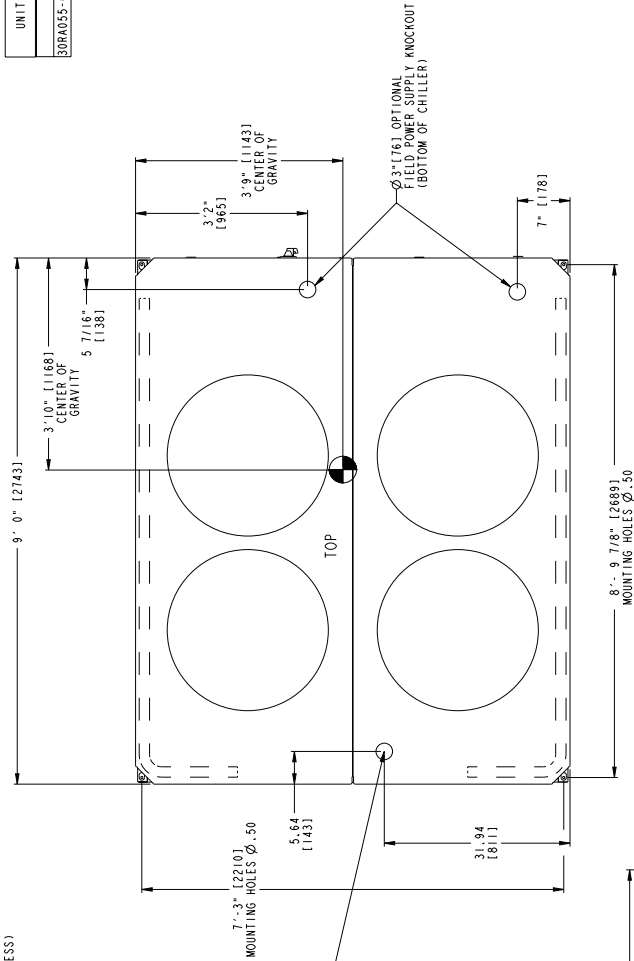


Dimensions — 30RA055



UNIT	TOTAL OPERATING WEIGHT - AL.FIN		TOTAL OPERATING WEIGHT - CU.FIN	
	LBS.	KG.	LBS.	KG.
30RA055-60HZ	3485	1585	3946	1790

- NOTES:
- UNIT MUST HAVE CLEARANCES FOR AIRFLOW AS FOLLOWS:
 TOP-DO NOT RESTRICT IN ANY WAY
 COIL SIDE- 3' 1/2 FT. [1067mm] FROM SOLID SURFACE
 SIDE, ENDS-3 FT. [914mm] FROM SOLID SURFACE (FOR SERVICE ACCESS)
 - COIL SIDE CLEARANCE WITH ACCESSORY HAIL GUARD INSTALLED IS 3 FT. [914mm] TO OUTSIDE EDGE OF HAIL GUARD TOP PANEL.
 - COIL SIDE CLEARANCE FOR MULTIPLE CHILLER INSTALLATION IS 8 FT. [2438mm].
 - STRAINER IS FACTORY INSTALLED IN ENTERING FLUID PIPING.
 FLOW SWITCH IS FACTORY INSTALLED IN LEAVING FLUID PIPING.



Selection procedure



Carrier's electronic catalog chiller selection program provides quick, easy selection of Carrier chillers. The program considers specific temperature, fluid, and flow requirements and other factors, such as fouling and altitude correction.

To select a 30RA chiller, use the electronic catalog or follow one of the procedures below.

ENGLISH (60 Hz)

I Determine 30RA unit size and operating conditions required to meet given capacity at given conditions.

Given:

Capacity 43 Tons
 Leaving Chilled Water Temp (LCWT) 44 F
 Cooler Water Temp Rise 10° F
 Condenser Entering Air Temp 95 F
 Fouling Factor (Cooler) 0.00010

NOTE: For other than 10° F temperature rise, data corrections must be made using the chiller program in the electronic catalog. On some units, a change of controls is also necessary.

II From Chiller Ratings table on page 26 and pressure drop curves on page 22, determine operating data for selected unit.

Unit 30RA-045
 Capacity 43.1 Tons
 Power Input 51.1 kW
 Cooler Water Flow 103.1 gpm
 Internal Pressure Drop 11.2 ft of water

III Pump selection. (See AquaSnap® pump selection on page 20.)

Required GPM (from above) 103.1 gpm
 Chiller Pressure Drop
 (from chart on page 23) 20.5 ft wg
 Additional External System
 Pressure Drop 40 ft wg
 Add Chiller Pressure and External
 Pressure Drop 60.5 ft wg
 Using Pump Curve on page 21
 Select Pump E @ 103.1, 60 ft wg
 To find pump HP, follow the 4.63" impeller curve for pump E on page 21.
 HP: 3.6 bhp
 Max hp = 5 hp, therefore necessary hp does not exceed pump rating.

SI (50 Hz)

I Determine unit size and operating conditions required to meet given capacity at given conditions.

Given:

Capacity 77 kW
 Leaving Chilled Water Temp (LCWT) 6 C
 Cooler Water Temp Rise 6° C
 Condenser Entering Air Temp 35 C
 Fouling Factor (Cooler) 0.00018

NOTE: For other than 6° C temperature rise, data corrections must be made using the chiller program in the electronic catalog.

II From Cooling Capacity table on page 29 and pressure drop curves on page 22, determine operating data for selected unit.

Unit 30RA-025
 Capacity 78.5 kW
 Compressor Motor Power Input 28.5 kW
 Cooler Water Flow 3.4 L/s
 Chiller Pressure Drop 24.5 kPa

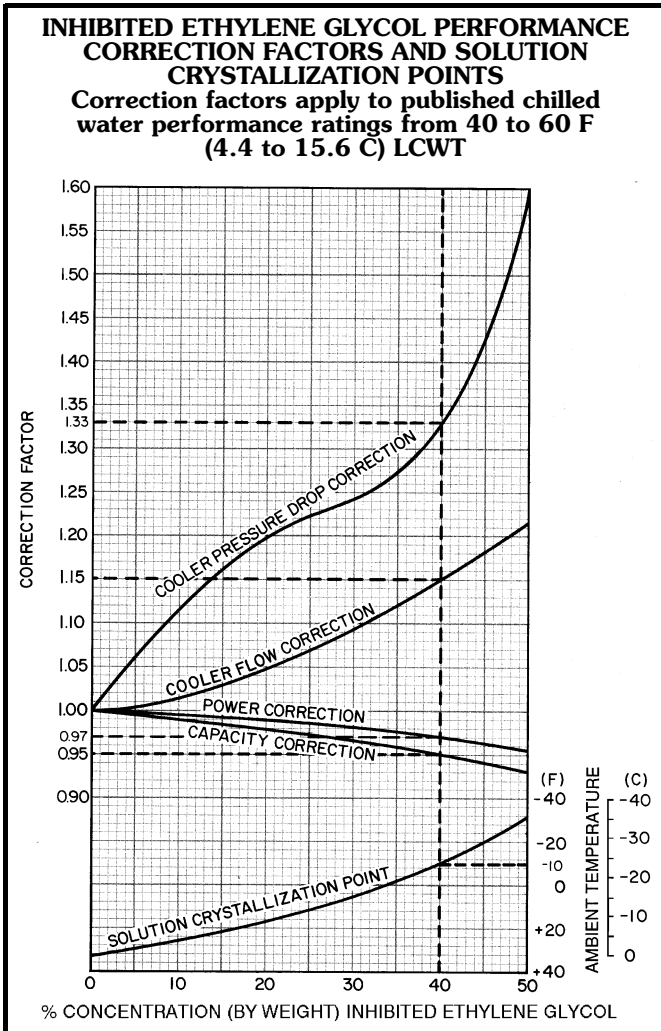
III Pump selection. (See AquaSnap pump selection on page 20.)

Required Flow
 (from above) 3.4 x 3.6 = 12.2 m³/hr
 Chiller Pressure Drop
 (from chart on page 22) 24.5 kPa
 Additional External System
 Pressure Drop 100 kPa
 Add Chiller Pressure and External
 Pressure Drop 125 x .1018 = 12.7 m wg
 Using 3.88" Pump Curve (page 21)
 Select . . . Pump B @ 12.2 m³/hr and 12.7 m wg
 HP = 1.36
 Max HP = 2 HP
 Necessary hp does not exceed unit rating.

PUMP IMPELLER SIZES

PUMP OPTION	PUMP	DIAMETER (in.)
A,F	3/4AAB	4.25
B,G	1 1/4AAB	3.88
C,H	3/4AAB	4.75
D,J	1 1/4AAB	4.50
E,K	1 1/2AAB	4.63

Selection procedure (cont)



1. Calculate the water flow rate (GPM) and the total water pressure drop of the system external to the 30RA chiller.
2. Determine the internal pressure drop of the chiller hydronic package based on the design flow rate (refer to internal Pressure Drop tables on page 22). Values given in these charts are based on units with clean strainers and circuit setter valve wide open.

NOTE: These pressure drops are for water. If glycol is used, correct by multiplying by the factors below.

3. If an optional storage tank is used, determine the internal pressure drop by referencing the internal Pressure Drop tables on page 24.

NOTE: Note that these pressure drops are for water. If glycol is used, correct by multiplying by the factors below.

% GLYCOL	ETHYLENE GLYCOL	PROPYLENE GLYCOL
0 (Pure Water)	1	1
10	1.062	1.077
20	1.114	1.168
30	1.177	1.271
40	1.248	1.393
50	1.316	1.543

4. Add pressure drops found in Steps 1-3. This is the total pressure drop and total head required by the pump.
5. Use the pump envelope charts (page 25) to determine proper pump sizing. Plot water flow rate (Step 1) and total head (Step 4), point on the chart. The region containing the point corresponds to the correct pump.

NOTE: Although pump bhp increases with glycol concentration, pumps and pump overloads are selected such that glycol concentrations up to 50% will not trip pump overloads if run within the recommended gpm ranges.

Example: Required water flow rate for a 30RA018, 60 Hz chiller is 45 GPM. The pressure drop in feet for the water system external to the chiller is 50 feet. The system does not have an accessory storage tank. The single pump is needed. Select the pump.

Since the flow rate and external head losses (Step 1) are known, the internal losses in the hydronic package must be found (Step 2). Using the pressure drop graphs (page 22) for the 30RA018 units, the internal loss at 45 gpm is 15 feet. Since no accessory storage tank is being used (Step 3), the pressure drop is 0 feet.

Add all losses together (Step 4). The total pressure rise needed by the pump is $50 + 15 + 0 = 65$ feet. The pump selection becomes pump C.

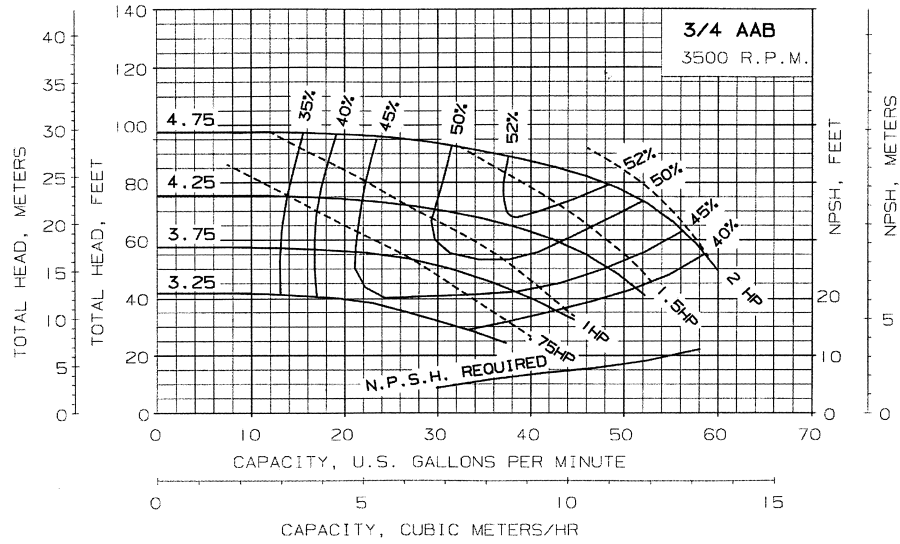
AquaSnap® pump selection

Several pump sizes are available for each AquaSnap chiller size to provide flexibility in matching water system requirements. A dual pump option is also available for primary/standby operation. The Carrier E-Cat Chiller Selection Program (version 2.50 or later) can be used for pump selection, or selection can be done manually.

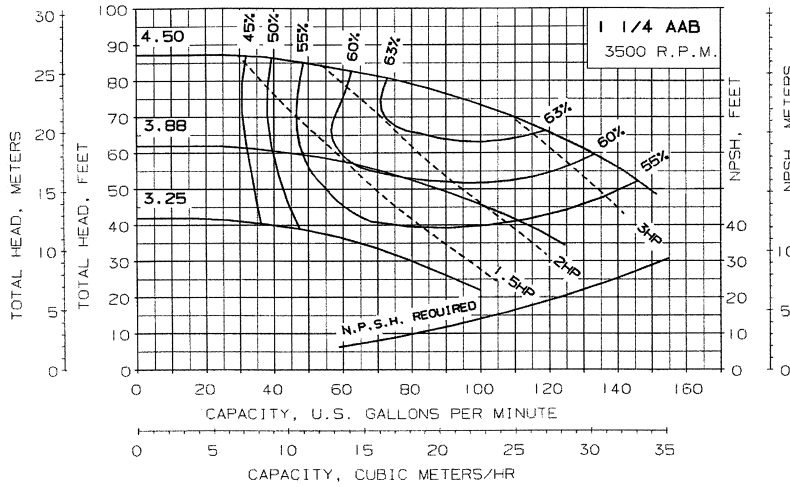
Proper water system design is critical; cooling loads, water pressure drops and proper water line sizing must be accounted for in order to ensure proper system operation. Incorrect or incomplete analysis/design of the water loop could lead to low water flow, loss of water temperature control, and excessive cycling of chiller compressors.

The following are the steps for manual selection of water pumps for the 30RA chillers (refer to Pump Curve tables).

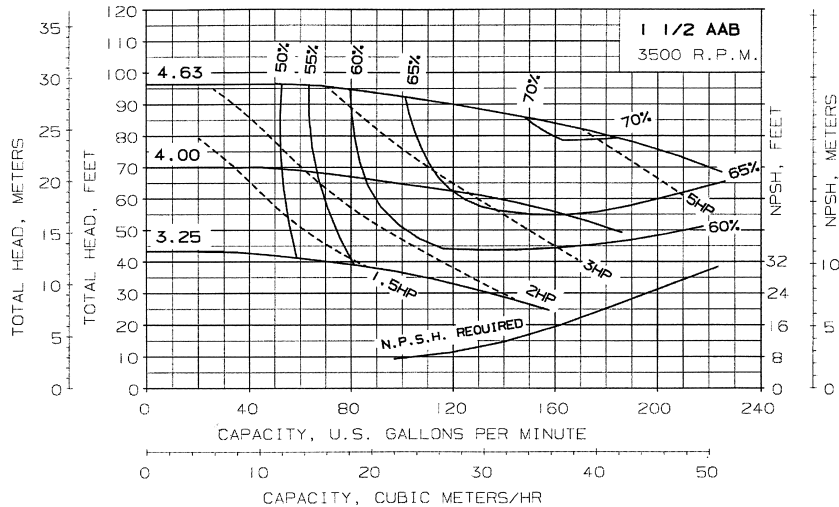
PUMP CURVE FOR HYDRONIC PACKAGE OPTIONS A, C, F, AND H (1.5-2.0 Hp)



PUMP CURVE FOR HYDRONIC PACKAGE OPTIONS B, D, G, AND J (2-3 Hp)



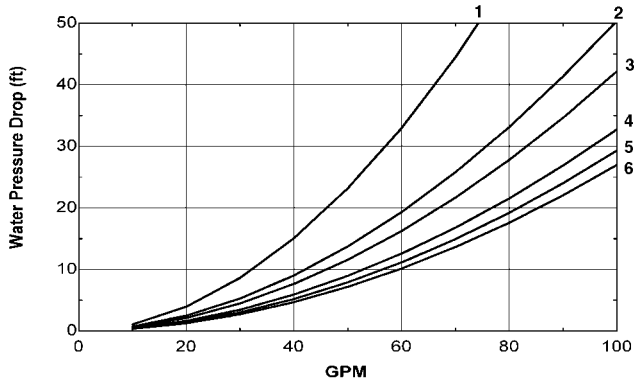
PUMP CURVE FOR HYDRONIC PACKAGE OPTIONS E AND K (5.0 Hp)



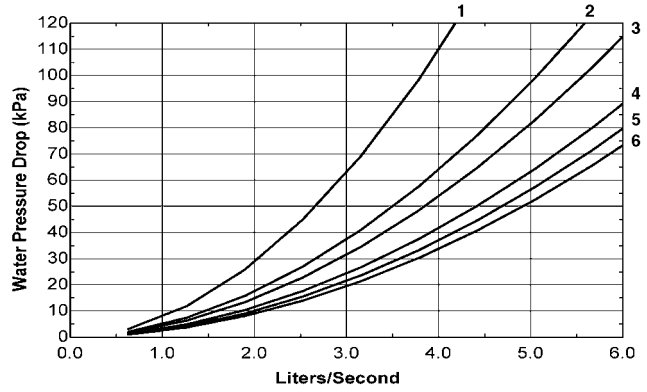
Selection procedure (cont)



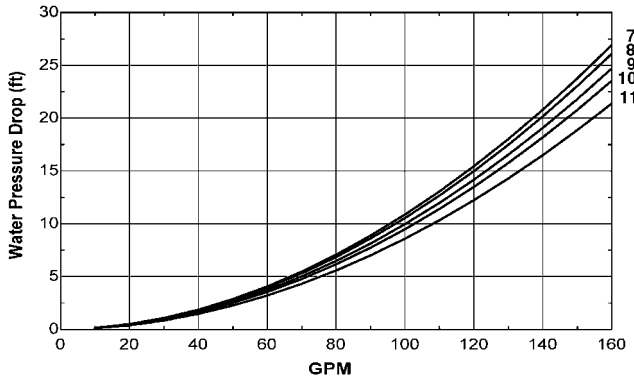
**PRESSURE DROP, WITHOUT PUMP UNITS,
30RA010-030**



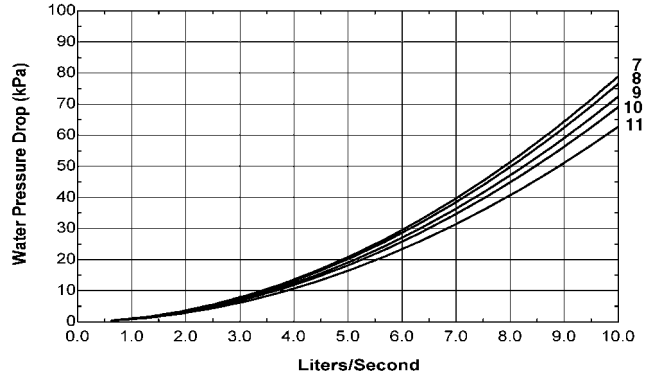
**PRESSURE DROP, WITHOUT PUMP UNITS,
30RA010-030**



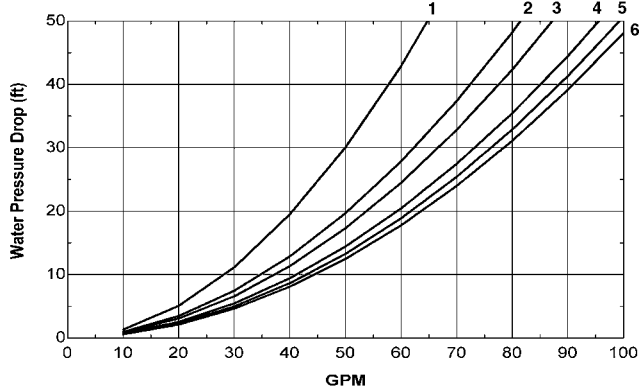
**PRESSURE DROP, WITHOUT PUMP UNITS,
30RA032-055**



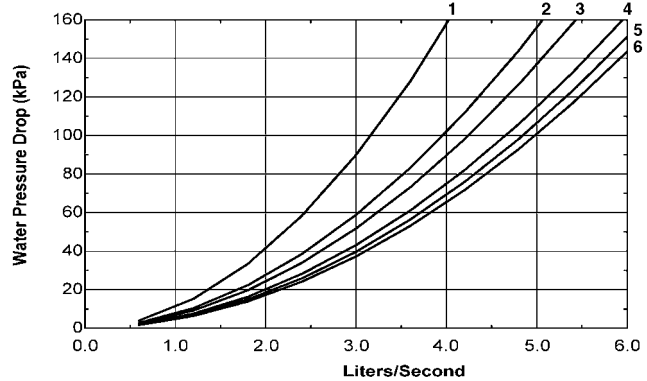
**PRESSURE DROP, WITHOUT PUMP UNITS,
30RA032-055**



**PRESSURE DROP, SINGLE PUMP UNITS,
30RA010-030**



**PRESSURE DROP, SINGLE PUMP UNITS,
30RA010-030**



Use the following formula to convert Feet of water to psi:
Ft of water (.4335) = psi

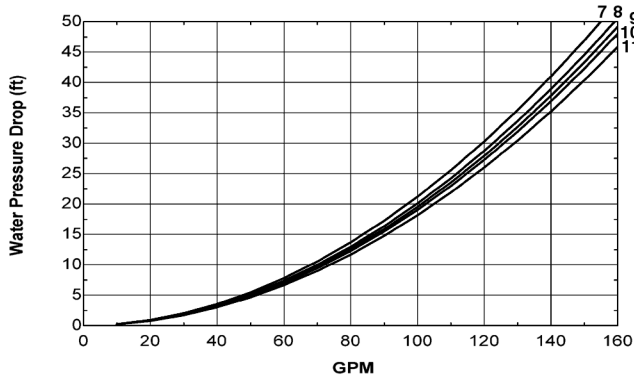
Use the following formula to convert psi to Feet of water:
Psi (2.306) = Ft of water

LEGEND

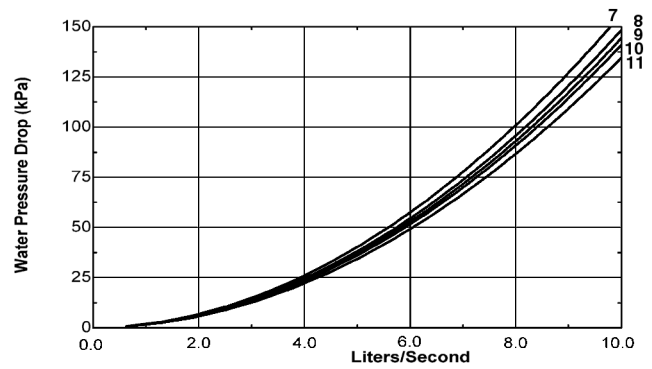
- | | | | | | |
|-------------|-------------|-------------|----------------------|----------------------|--------------|
| 1 — 30RA010 | 3 — 30RA018 | 5 — 30RA025 | 7 — 30RA032, 30RA035 | 9 — 30RA042, 30RA045 | 11 — 30RA055 |
| 2 — 30RA015 | 4 — 30RA022 | 6 — 30RA030 | 8 — 30RA040 | 10 — 30RA050 | |



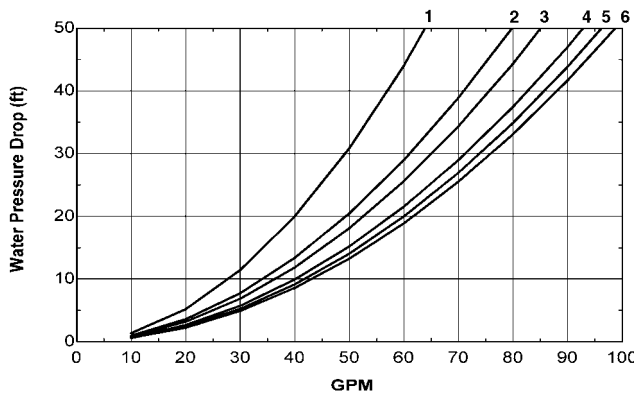
**PRESSURE DROP, SINGLE PUMP UNITS,
30RA032-055**



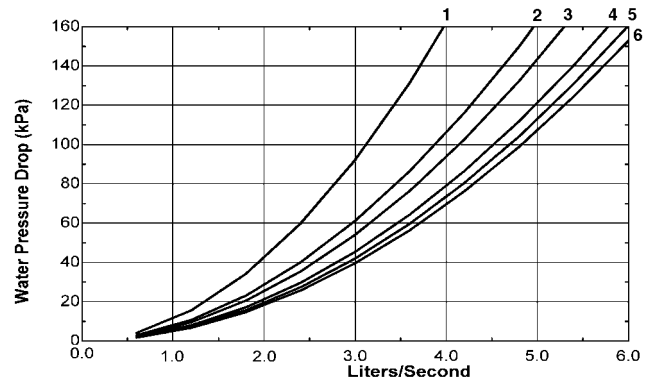
**PRESSURE DROP, SINGLE PUMP UNITS,
30RA032-055**



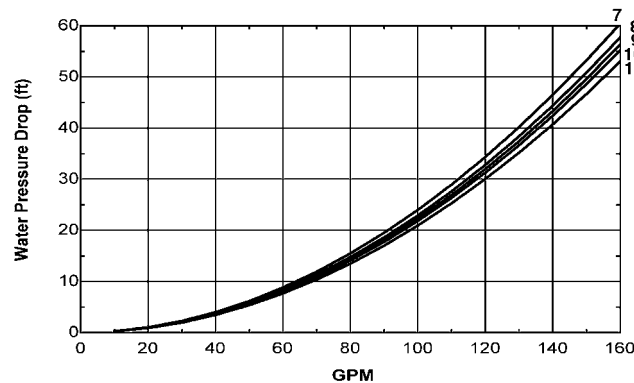
**PRESSURE DROP, DUAL PUMP UNITS,
SIZES 30RA010-030**



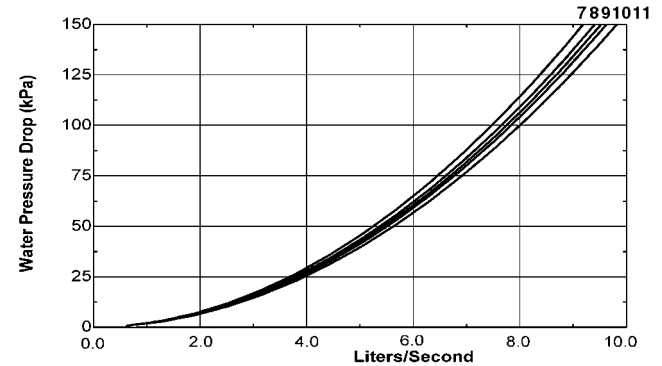
**PRESSURE DROP, DUAL PUMP UNITS,
SIZES 30RA010-030**



**PRESSURE DROP, DUAL PUMP UNITS,
SIZES 30RA032-055**



**PRESSURE DROP, DUAL PUMP UNITS,
SIZES 30RA032-055**



Use the following formula to convert Feet of water to psi:
Ft of water (.4335) = psi

Use the following formula to convert psi to Feet of water:
Psi (2.306) = Ft of water

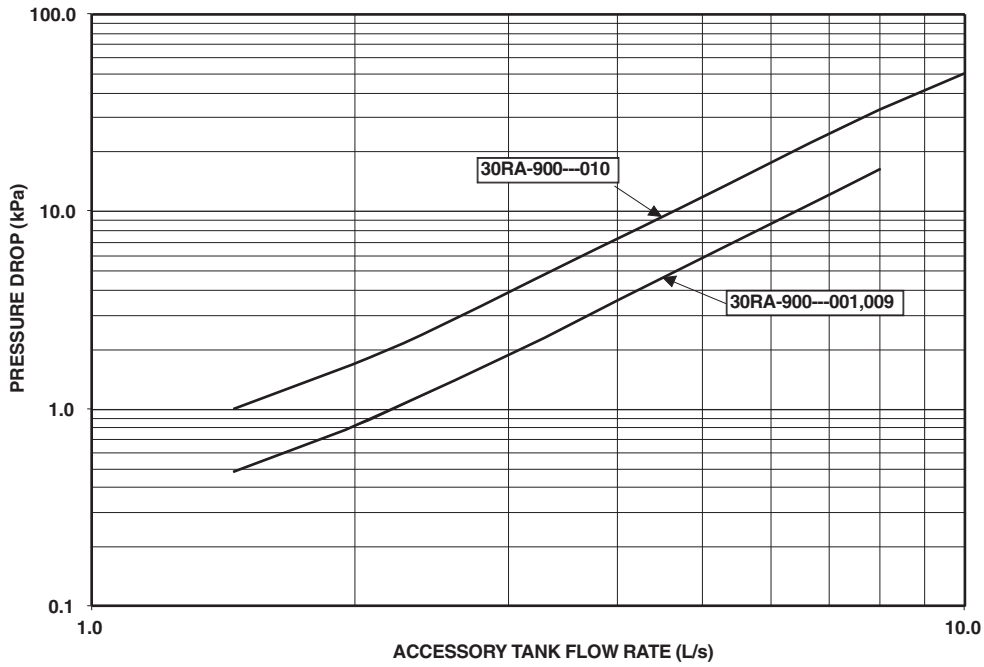
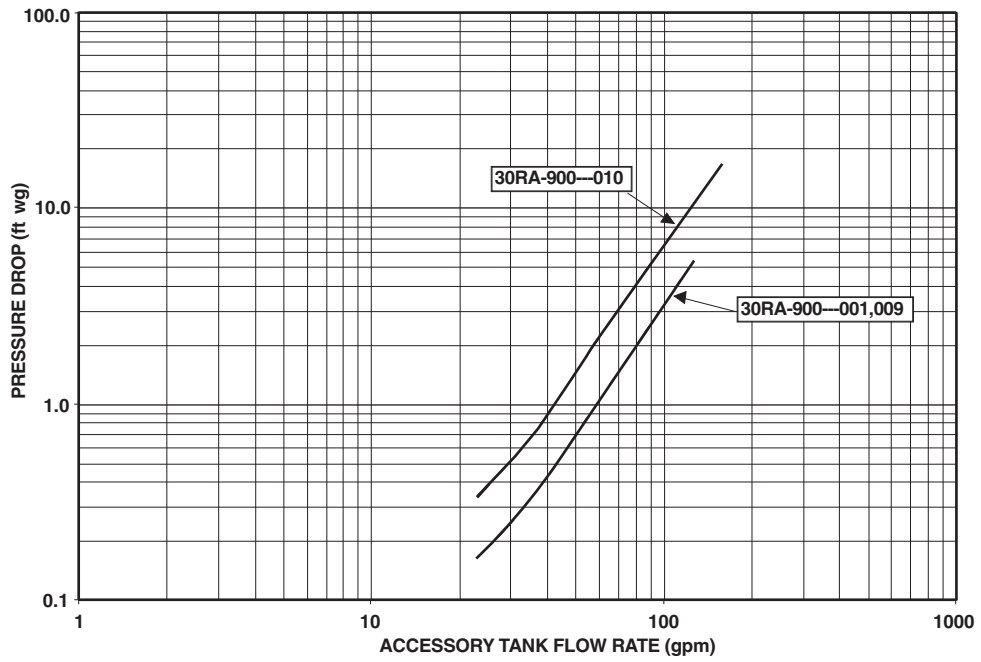
LEGEND

- | | | | | | |
|-------------|-------------|-------------|----------------------|----------------------|--------------|
| 1 — 30RA010 | 3 — 30RA018 | 5 — 30RA025 | 7 — 30RA032, 30RA035 | 9 — 30RA042, 30RA045 | 11 — 30RA055 |
| 2 — 30RA015 | 4 — 30RA022 | 6 — 30RA030 | 8 — 30RA040 | 10 — 30RA050 | |

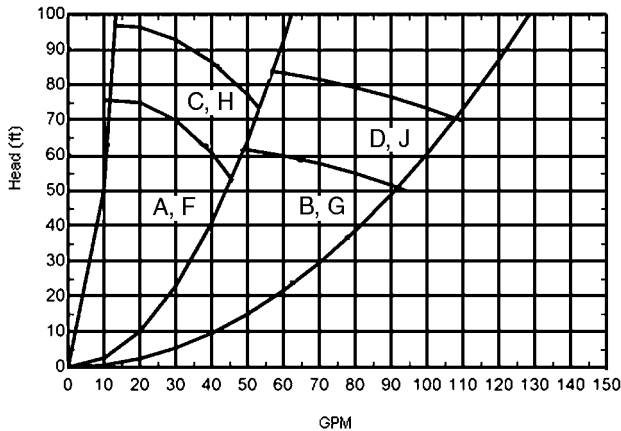
Selection procedure (cont)



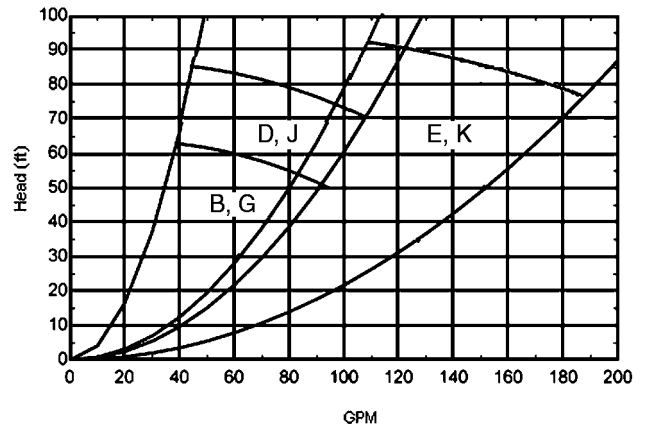
PRESSURE DROP CURVES



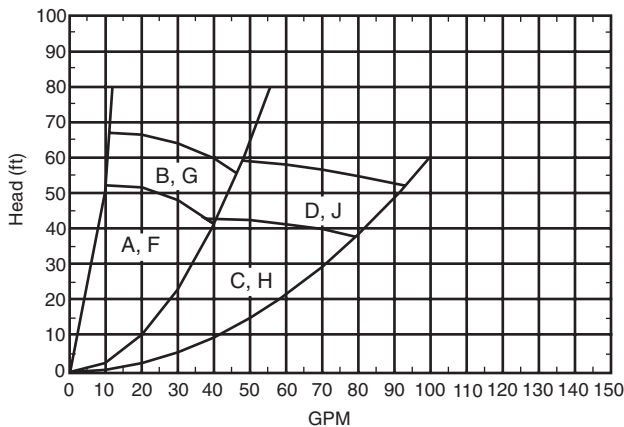
30RA010-030 60 Hz PUMP ENVELOPES



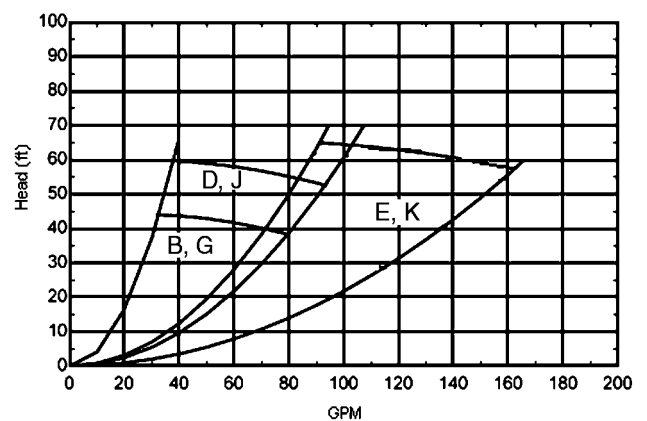
30RA035-055 60 Hz PUMP ENVELOPES



30RA010-030 50 Hz PUMP ENVELOPES



30RA032-045 50 Hz PUMP ENVELOPES



NOTE: Refer to Position 9 in the unit's model number for pump identification.

Expansion tank selection and filling

Expansion tanks are essential to the operation of any closed, pressurized, hydronic system. They perform four important functions: 1) provide for expansion of the liquid as the temperature in the system rises, 2) act as a pressure reference for the system, 3) supply sufficient pressure to prevent cavitation, 4) provide a location to charge the system.

The AquaSnap® optional hydronic package includes a bladder-style expansion tank, pre-charged to 40 psi (277 kPa) pressure and pre-selected for loop volumes up to 6 gallons per ton. If loop volumes in excess of 6 gallons per ton are required, then a field-installed expansion tank must be provided, and the expansion tank in AquaSnap hydronic package must be removed. For maximum loop volumes see page 43.

If the top of the piping system (the highest point in the hydronic piping) is more than 80 ft above the chiller, then

the expansion tank will require additional air pressure charge. The expansion tank must be pressurized to provide at least 4 psi (28 kPa) of positive pressure at the highest point in the hydronic piping system. This will also ensure no air is drawn into the piping. The amount of charge pressure in pounds per square inch (psi) that is required in the expansion tank is equal to 4 psi (28 kPa) plus the height (in feet) from the chiller to the highest point in the hydronic system divided by 2.31.

Example: 30RA AquaSnap elevation is 10 feet. The hydronic system is piped to an air handler on the roof with an elevation of 100 feet. The total pressure required in the expansion tank is:

$$4 \text{ psi} + (100 \text{ ft} - 10 \text{ ft}) / 2.31 = 42.96 \text{ psi}$$

The expansion tank will require an additional 3 psi pressure.

Performance data



PACKAGED AIR-COOLED CHILLER RATINGS TABLE — ENGLISH (60 Hz)

LCWT (F)	UNIT SIZE	CONDENSER ENTERING AIR TEMPERATURE (F)														
		85			95			105			115			120		
		Cap. (Tons)	Input kW	Cooler Flow Rate (Gpm)	Cap. (Tons)	Input kW	Cooler Flow Rate (Gpm)	Cap. (Tons)	Input kW	Cooler Flow Rate (Gpm)	Cap. (Tons)	Input kW	Cooler Flow Rate (Gpm)	Cap. (Tons)	Input kW	Cooler Flow Rate (Gpm)
40.00	30RA-010	9.4	10.5	22.4	8.9	11.5	21.4	8.5	12.7	20.2	8.0	14.0	19.0	7.7	14.7	18.4
	30RA-015	13.4	15.1	32.1	12.8	16.5	30.6	12.1	18.1	28.9	11.4	19.8	27.2	11.0	20.7	26.3
	30RA-018	15.6	17.8	37.4	14.8	19.6	35.5	14.0	21.6	33.4	13.1	23.8	31.3	12.6	25.1	30.2
	30RA-022	21.2	22.8	50.7	20.2	25.1	48.3	19.1	27.7	45.7	17.9	30.5	42.8	17.2	32.0	41.2
	30RA-025	23.4	26.6	56.0	22.3	29.1	53.2	21.0	31.8	50.1	19.5	34.8	46.7	18.7	36.4	44.8
	30RA-030	26.7	29.8	63.7	25.4	32.8	60.6	24.0	36.1	57.3	22.5	39.8	53.8	21.8	41.9	49.8
	30RA-035	34.1	37.2	81.5	32.5	40.8	77.6	30.7	44.8	73.5	28.8	49.3	68.9	27.8	51.7	66.5
	30RA-040	37.1	41.8	88.6	35.2	45.6	84.2	33.3	49.9	79.5	31.1	54.7	74.3	29.9	57.2	71.6
	30RA-045	42.3	45.5	101.0	40.3	50.1	96.3	38.1	55.2	91.0	35.6	60.9	85.2	34.3	63.9	82.1
	30RA-050	46.6	53.1	111.5	44.3	58.1	105.9	41.7	63.5	99.7	38.9	69.5	92.9	37.3	72.7	89.2
30RA-055	53.2	59.7	127.2	50.6	65.5	120.9	47.8	72.1	114.3	44.9	79.5	107.4	43.6	83.3	96.4	
42.00	30RA-010	9.7	10.6	23.2	9.2	11.6	22.1	8.8	12.7	21.0	8.2	14.1	19.7	8.0	14.8	19.1
	30RA-015	13.9	15.3	33.3	13.3	16.7	31.7	12.5	18.2	30.0	11.8	20.0	28.2	11.4	20.9	27.3
	30RA-018	16.2	18.0	38.8	15.4	19.8	36.8	14.5	21.8	34.7	13.6	24.0	32.5	13.1	25.3	31.4
	30RA-022	21.9	23.0	52.5	20.9	25.3	50.0	19.8	27.9	47.3	18.5	30.8	44.3	17.9	32.3	42.7
	30RA-025	24.2	26.9	58.0	23.0	29.4	55.1	21.7	32.1	51.9	20.2	35.2	48.3	19.4	36.8	46.4
	30RA-030	27.6	30.2	66.1	26.3	33.1	62.9	24.9	36.5	59.5	23.3	40.2	55.9	22.3	41.9	49.4
	30RA-035	35.3	37.5	84.4	33.6	41.1	80.4	31.8	45.2	76.1	29.9	49.7	71.5	28.8	52.1	69.0
	30RA-040	38.3	42.2	91.7	36.5	46.1	87.3	34.4	50.4	82.4	32.2	55.2	77.1	31.0	57.8	74.2
	30RA-045	43.7	46.0	104.5	41.7	50.6	97.7	39.4	55.7	94.2	36.9	61.4	88.3	35.6	64.5	85.1
	30RA-050	48.2	53.7	115.4	45.8	58.7	109.7	43.2	64.2	103.3	40.2	70.3	96.2	38.6	73.5	92.4
30RA-055	55.1	60.3	131.9	52.4	66.3	125.5	49.6	72.9	118.6	46.6	80.3	111.5	44.5	83.5	98.7	
44.00	30RA-010	10.0	10.6	24.0	9.6	11.7	22.9	9.1	12.8	21.7	8.5	14.1	20.4	8.3	14.8	19.8
	30RA-015	14.4	15.4	34.5	13.7	16.8	32.9	13.0	18.4	31.1	12.2	20.1	29.3	11.8	21.1	28.3
	30RA-018	16.8	18.2	40.2	15.9	20.0	38.2	15.0	22.0	36.0	14.1	24.2	33.7	13.6	25.5	32.6
	30RA-022	22.7	23.3	54.3	21.6	25.6	51.8	20.4	28.2	49.0	19.2	31.0	45.9	18.5	32.6	44.3
	30RA-025	25.0	27.2	60.0	23.8	29.7	57.0	22.4	32.5	53.7	20.9	35.5	50.1	11.6	36.9	49.8
	30RA-030	28.6	30.5	68.5	27.2	33.5	65.2	25.8	36.8	61.7	24.2	40.6	58.0	22.8	42.9	49.4
	30RA-035	36.5	37.9	87.3	34.8	41.5	83.2	32.9	45.6	78.8	30.9	50.1	74.0	29.9	52.5	71.5
	30RA-040	39.7	42.7	95.0	37.7	46.6	90.3	35.6	50.9	85.3	33.3	55.7	79.8	32.7	58.2	75.8
	30RA-045	45.2	46.5	108.1	43.1	51.1	103.1	40.7	56.3	97.6	38.2	62.0	91.4	36.8	65.0	88.2
	30RA-050	49.9	54.3	119.4	47.4	59.4	113.5	44.7	64.9	106.9	41.6	71.0	99.6	39.9	73.9	95.3
30RA-055	57.1	61.0	136.7	54.3	67.0	130.1	51.4	73.7	123.1	48.3	81.2	115.7	45.5	83.8	101.0	
45.00	30RA-010	10.2	10.7	24.4	9.7	11.7	23.3	9.2	12.9	22.1	8.7	14.2	20.8	8.4	14.9	20.1
	30RA-015	14.7	15.5	35.1	14.0	16.9	33.5	13.2	18.5	31.7	12.5	20.2	29.8	12.0	21.2	28.9
	30RA-018	17.1	18.2	40.9	16.2	20.0	38.8	15.3	22.1	36.7	14.3	24.3	34.4	13.9	25.6	33.2
	30RA-022	23.1	23.4	55.2	22.0	25.7	52.7	20.8	28.3	49.8	19.5	31.2	46.7	18.8	32.7	45.1
	30RA-025	25.5	27.4	61.0	24.2	29.9	58.0	22.8	32.7	54.6	21.3	35.7	50.9	11.8	37.0	49.8
	30RA-030	29.1	30.7	69.7	27.7	33.7	66.4	26.2	37.0	62.8	24.6	40.8	59.0	23.0	41.9	49.4
	30RA-035	37.1	38.1	88.8	35.4	41.7	84.7	33.5	45.8	80.2	31.5	50.3	75.3	30.4	52.7	72.8
	30RA-040	40.3	42.9	96.6	38.4	46.8	91.9	36.2	51.2	86.8	33.9	56.0	81.2	32.2	58.3	57.9
	30RA-045	45.9	46.7	110.0	43.8	51.4	104.9	41.4	56.5	99.2	38.9	62.3	93.0	37.5	65.3	89.7
	30RA-050	50.7	54.7	121.4	48.2	59.7	115.4	45.4	65.3	108.7	42.3	71.3	101.4	40.5	73.4	85.4
30RA-055	58.1	61.4	139.2	55.3	67.4	132.4	52.3	74.1	125.3	49.2	81.6	117.8	46.0	83.9	82.2	
46.00	30RA-010	10.3	10.7	24.8	9.9	11.7	23.7	9.4	12.9	22.5	8.8	14.2	21.2	8.6	14.9	20.5
	30RA-015	14.9	15.6	35.8	14.2	17.0	34.1	13.5	18.5	32.3	12.7	20.3	30.4	12.3	21.3	29.4
	30RA-018	17.4	18.3	41.6	16.5	20.1	39.5	15.6	22.2	37.3	14.6	24.4	35.0	14.1	25.7	33.8
	30RA-022	23.4	23.5	56.1	22.3	25.8	53.5	21.2	28.4	50.7	19.8	31.3	47.5	19.1	32.9	45.9
	30RA-025	25.9	27.5	62.0	24.6	30.1	59.0	23.2	32.9	55.5	21.6	35.9	51.8	12.0	37.0	49.8
	30RA-030	29.6	30.8	71.0	28.2	33.9	67.5	26.7	37.2	63.9	25.1	41.0	60.1	23.2	42.9	49.4
	30RA-035	37.7	38.3	90.3	35.9	41.9	86.1	34.0	46.0	81.6	32.0	50.5	76.6	30.9	53.0	74.1
	30RA-040	41.0	43.1	98.2	39.0	47.1	93.5	36.9	51.5	88.3	34.5	56.3	82.6	32.6	58.4	58.9
	30RA-045	46.7	46.9	111.8	44.5	51.6	106.6	42.1	56.8	100.9	39.5	62.5	94.6	38.1	65.6	91.3
	30RA-050	51.5	55.0	123.5	49.0	60.1	117.4	46.2	65.6	110.6	43.0	71.7	103.1	40.5	74.4	87.4
30RA-055	59.1	61.7	141.6	56.3	67.8	134.8	53.2	74.5	127.5	50.1	82.0	119.9	46.4	83.9	83.3	
48.00	30RA-010	10.7	10.8	25.6	10.2	11.8	24.4	9.7	13.0	23.2	9.1	14.3	21.9	8.8	15.0	21.2
	30RA-015	15.4	15.7	37.0	14.7	17.1	35.3	13.9	18.7	33.4	13.1	20.5	31.5	12.7	21.4	30.5
	30RA-018	18.0	18.5	43.1	17.1	20.3	41.0	16.1	22.4	38.7	15.1	24.6	36.3	14.6	25.9	35.0
	30RA-022	24.2	23.7	58.0	23.1	26.3	55.3	21.9	28.7	52.4	20.5	31.6	49.2	19.8	33.2	47.4
	30RA-025	26.7	27.9	64.1	25.4	30.4	60.9	24.0	33.7	57.4	22.3	36.3	53.6	12.5	37.2	49.8
	30RA-030	30.7	31.2	73.5	29.2	34.3	69.9	27.6	37.7	66.2	26.0	41.4	62.3	24.7	43.9	49.4
	30RA-035	38.9	38.6	93.3	37.1	42.3	89.0	35.2	46.4	84.4	33.1	51.0	79.3	31.7	53.4	76.6
	30RA-040	42.4	43.6	101.6	40.3	47.6	96.7	38.1	52.0	91.3	35.7	56.8	85.5	34.5	58.7	81.1
	30RA-045	48.2	47.4	115.5	46.0	52.1	110.2	43.5	57.3	104.3	40.8	63.1	97.9	39.4	66.2	94.5
	30RA-050	53.3	55.6	127.6	50.6	60.7	121.3	47.7	66.4	114.3	44.5	72.5	106.6	42.8	74.3	95.5
30RA-055	61.2	62.4	146.6	58.2	68.5	139.6	55.1	75.3	132.1	51.9	82.9	124.3	49.4	83.3	91.3	
50.00	30RA-010	11.0	10.8	26.4	10.5	11.9	25.2	10.0	13.0	24.0	9.4	14.3	22.6	9.1	15.1	21.9
	30RA-015	16.0	15.8	38.3	15.2	17.3	36.5	14.4	18.9	34.6	13.6	20.7	32.6	13.2	21.6	31.5
	30RA-018	18.6	18.7	44.6	17.7	20.5	42.4	16.7	22.5	40.0	15.7	24.8	37.6	15.1	26.1	36.3
	30RA-022	25.0	24.0	59.9	23.8	26.4	57.1	22.6	29.0	54.1	21.2	31.9	50.8	20.5	33.5	49.0
	30RA-025	27.6	28.2	66.2	26.2	30.8	62.9	24.7	33.6	59.3	23.1	36.7	55.4	22.9	37.3	49.4
	30RA-030	31.7	31.6	76.0	30.2	34.6	72.4	28.6	38.1	68.5	26.9	41.9	64.5	25.4	43.9	49.4
	30RA-035	40.2	39.0	96.4	38.4	42.7	92.0	36.4	46.8	87.2	34.2	51.4	82.0	33.1	53.9	79.3
	30RA-040	43.8	4													



PACKAGED AIR-COOLED CHILLER RATINGS TABLE — SI (60 Hz)

LCWT (C)	UNIT SIZE	CONDENSER ENTERING AIR TEMPERATURE (C)														
		30			35			40			45			50		
		Cap. (kW)	Input kW	Cooler Flow Rate (L/s)	Cap. (kW)	Input kW	Cooler Flow Rate (L/s)	Cap. (kW)	Input kW	Cooler Flow Rate (L/s)	Cap. (kW)	Input kW	Cooler Flow Rate (L/s)	Cap. (kW)	Input kW	Cooler Flow Rate (L/s)
5.00	30RA-010	33.4	10.6	1.4	32.0	11.6	1.4	30.5	12.6	1.3	28.9	13.7	1.2	27.2	15.0	1.2
	30RA-015	47.9	15.3	2.1	45.8	16.6	2.0	43.6	18.0	1.9	41.3	19.5	1.8	38.8	21.2	1.7
	30RA-018	55.7	18.1	2.4	53.1	19.7	2.3	50.4	21.5	2.2	47.6	23.5	2.0	44.6	25.7	1.9
	30RA-022	75.5	23.1	3.2	72.3	25.2	3.1	68.8	27.5	2.9	65.0	30.0	2.8	60.8	32.8	2.6
	30RA-025	83.4	27.0	3.6	79.6	29.2	3.4	75.5	31.7	3.2	70.9	34.4	3.0	38.1	17.1	1.6
	30RA-030	95.0	30.3	4.1	90.8	32.9	3.9	86.3	35.9	3.7	81.7	39.2	3.5	41.8	19.6	1.8
	30RA-035	121.4	37.7	5.2	116.2	41.0	5.0	110.6	44.6	4.7	104.6	48.5	4.5	98.2	52.9	4.2
	30RA-040	132.0	42.4	5.7	126.1	45.9	5.4	119.8	49.7	5.1	112.9	54.0	4.8	77.9	38.4	3.3
	30RA-045	150.5	46.2	6.4	144.0	50.3	6.2	137.0	54.9	5.9	129.3	60.0	5.5	121.0	65.5	5.2
	30RA-050	166.0	53.9	7.1	158.5	58.4	6.8	150.3	63.3	6.4	141.2	68.6	6.1	75.8	34.1	3.3
30RA-055	189.6	60.6	8.1	181.2	65.9	7.8	172.3	71.8	7.4	163.0	78.4	7.0	83.5	39.2	3.6	
6.00	30RA-010	34.4	10.7	1.5	33.0	11.6	1.4	31.4	12.7	1.3	29.8	13.8	1.3	28.0	15.1	1.2
	30RA-015	49.4	15.5	2.1	47.3	16.7	2.0	45.0	18.1	1.9	42.6	19.7	1.8	40.2	21.4	1.7
	30RA-018	57.5	18.2	2.5	54.9	19.8	2.4	52.1	21.6	2.2	49.2	23.6	2.1	46.1	25.8	2.0
	30RA-022	77.8	23.3	3.3	74.6	25.4	3.2	71.0	27.7	3.0	67.0	30.3	2.9	62.8	33.1	2.7
	30RA-025	85.9	27.2	3.7	82.1	29.5	3.5	77.8	32.0	3.3	73.1	34.7	3.1	39.4	19.7	1.7
	30RA-030	98.1	30.6	4.2	93.7	33.3	4.0	89.2	36.3	3.8	84.4	39.6	3.6	43.3	19.7	1.9
	30RA-035	125.1	38.0	5.4	119.8	41.3	5.1	114.1	44.9	4.9	108.0	48.9	4.6	101.4	53.3	4.3
	30RA-040	136.1	42.8	5.8	130.1	46.3	5.6	123.5	50.2	5.3	116.5	54.4	5.0	80.6	38.7	3.5
	30RA-045	155.1	46.6	6.7	148.5	50.8	6.4	141.3	55.4	6.1	133.4	60.5	5.7	124.9	66.0	5.4
	30RA-050	171.1	54.4	7.3	163.4	59.0	7.0	154.9	63.9	6.6	145.6	69.3	6.2	78.4	34.3	3.4
30RA-055	195.7	61.2	8.4	187.1	66.6	8.0	178.0	72.5	7.6	168.4	79.1	7.2	86.4	39.4	3.7	
7.00	30RA-010	35.4	10.7	1.5	34.0	11.7	1.5	32.4	12.7	1.4	30.7	13.9	1.3	28.9	15.2	1.2
	30RA-015	51.0	15.6	2.2	48.8	16.9	2.1	46.5	18.3	2.0	44.0	19.8	1.9	41.5	21.5	1.8
	30RA-018	59.4	18.4	2.5	56.6	20.0	2.4	53.8	21.8	2.3	50.8	23.8	2.2	26.2	12.3	1.1
	30RA-022	80.2	23.6	3.4	76.8	25.7	3.3	73.1	28.0	3.1	69.1	30.5	3.0	64.7	33.3	2.8
	30RA-025	88.6	27.5	3.8	84.6	29.8	3.6	80.2	32.3	3.4	75.4	35.0	3.2	40.7	17.3	1.7
	30RA-030	101.2	30.9	4.3	96.8	33.6	4.2	92.1	36.6	4.0	87.2	39.9	3.7	44.7	19.8	1.9
	30RA-035	128.9	38.3	5.5	123.5	41.6	5.3	117.6	45.3	5.0	111.3	49.3	4.8	104.6	53.7	4.5
	30RA-040	140.3	43.2	6.0	134.1	46.7	5.8	127.4	50.6	5.5	120.2	54.9	5.2	83.2	38.9	3.6
	30RA-045	159.7	47.0	6.9	153.0	51.2	6.6	145.6	55.9	6.2	137.6	61.0	5.9	128.9	66.5	5.5
	30RA-050	176.3	55.0	7.6	168.4	59.6	7.2	159.7	64.5	6.9	150.1	69.9	6.4	81.0	34.5	3.5
30RA-055	202.0	61.8	8.7	193.1	67.2	8.3	183.8	73.2	7.9	174.0	79.9	7.5	89.4	39.6	3.8	
8.00	30RA-010	36.4	10.8	1.6	35.0	11.7	1.5	33.4	12.8	1.4	31.7	13.9	1.4	29.9	15.2	1.3
	30RA-015	52.6	15.7	2.3	50.4	17.0	2.2	48.0	18.4	2.1	45.5	20.0	2.0	42.9	21.7	1.8
	30RA-018	61.3	18.5	2.6	58.5	20.2	2.5	55.5	22.0	2.4	52.4	24.0	2.3	27.1	12.3	1.2
	30RA-022	82.6	23.8	3.5	79.1	25.9	3.4	75.3	28.2	3.2	71.2	30.8	3.1	66.8	33.6	2.9
	30RA-025	91.2	27.8	3.9	87.1	30.1	3.7	82.6	32.6	3.5	77.7	35.4	3.3	42.1	17.4	1.8
	30RA-030	104.4	31.2	4.5	99.8	33.9	4.3	95.0	37.0	4.1	90.0	40.3	3.9	46.3	19.9	2.0
	30RA-035	132.8	38.7	5.7	127.2	42.0	5.5	121.2	45.6	5.2	114.8	49.7	4.9	107.9	54.1	4.6
	30RA-040	144.5	43.6	6.2	138.2	47.2	5.9	131.3	51.1	5.6	123.9	55.4	5.3	85.9	39.2	3.7
	30RA-045	164.5	47.5	7.1	157.6	51.7	6.8	150.0	56.4	6.4	141.8	61.4	6.1	132.9	67.0	5.7
	30RA-050	181.6	55.6	7.8	173.5	60.2	7.4	164.5	65.2	7.1	154.7	70.6	6.6	83.7	34.7	3.6
30RA-055	208.4	62.4	8.9	199.3	67.9	8.6	189.7	74.0	8.1	179.6	80.6	7.7	92.4	39.8	4.0	
10.00	30RA-010	38.5	10.9	1.7	37.0	11.9	1.6	35.4	12.9	1.5	33.6	14.1	1.4	31.7	15.4	1.4
	30RA-015	55.9	16.0	2.4	53.6	17.3	2.3	51.0	18.7	2.2	48.4	20.3	2.1	45.6	22.0	2.0
	30RA-018	65.2	18.9	2.8	62.2	20.5	2.7	59.1	22.3	2.5	55.8	24.4	2.4	29.0	12.4	1.2
	30RA-022	87.4	24.2	3.8	83.8	26.4	3.6	79.8	28.7	3.4	75.5	31.3	3.2	70.9	34.1	3.0
	30RA-025	96.6	28.4	4.2	92.3	30.8	4.0	87.6	33.3	3.8	82.4	36.0	3.5	44.8	17.6	1.9
	30RA-030	111.0	31.9	4.8	106.2	34.6	4.6	101.1	37.7	4.3	95.8	41.1	4.1	49.4	20.1	2.1
	30RA-035	140.8	39.4	6.1	134.9	42.7	5.8	128.6	46.4	5.5	121.8	50.5	5.2	114.6	54.9	4.9
	30RA-040	153.2	44.5	6.6	146.5	48.1	6.3	139.3	52.1	6.0	131.5	56.4	5.7	91.5	39.7	3.9
	30RA-045	174.1	48.4	7.5	166.9	52.7	7.2	159.0	57.3	6.8	150.4	62.5	6.5	141.1	68.1	6.1
	30RA-050	192.4	56.8	8.3	183.8	61.5	7.9	174.3	66.5	7.5	164.0	72.0	7.1	89.3	35.1	3.8
30RA-055	221.5	63.8	9.5	211.9	69.3	9.1	201.8	75.4	8.7	191.2	82.2	8.2	98.7	40.2	4.2	

LEGEND

LCWT — Leaving Chilled Water Temperature

Performance data (cont)



PACKAGED AIR-COOLED CHILLER RATINGS TABLE — ENGLISH (50 Hz)

LCWT (F)	UNIT SIZE	CONDENSER ENTERING AIR TEMPERATURE (F)														
		85			95			105			115			120		
		Cap. (Tons)	Input kW	Cooler Flow Rate (Gpm)	Cap. (Tons)	Input kW	Cooler Flow Rate (Gpm)	Cap. (Tons)	Input kW	Cooler Flow Rate (Gpm)	Cap. (Tons)	Input kW	Cooler Flow Rate (Gpm)	Cap. (Tons)	Input kW	Cooler Flow Rate (Gpm)
40.00	30RA-010	9.7	10.7	23.1	9.2	11.7	22.0	8.7	12.9	20.7	8.0	14.2	19.2	7.7	14.9	18.5
	30RA-015	12.8	14.2	30.7	12.1	15.7	29.0	11.4	17.5	27.3	10.7	19.4	25.5	10.3	20.5	24.5
	30RA-018	14.6	16.8	34.8	13.8	18.7	33.0	12.9	21.0	30.9	12.0	23.4	28.6	11.4	24.8	27.3
	30RA-022	19.6	20.8	46.7	18.6	22.9	44.4	17.5	25.2	41.8	16.2	27.9	38.8	15.6	29.3	37.3
	30RA-025	22.4	25.4	53.5	21.2	28.1	50.8	20.0	31.0	47.9	18.7	34.4	44.8	10.2	15.8	24.5
	30RA-032	28.8	29.4	68.8	27.4	32.5	65.5	25.9	36.0	61.9	24.2	39.9	57.8	23.3	42.0	55.7
	30RA-035	33.7	37.6	80.5	32.0	41.5	76.4	30.2	45.9	72.1	28.2	50.7	67.5	19.7	33.1	47.1
	30RA-042	38.8	41.5	92.8	36.9	45.6	88.2	34.8	50.4	83.1	32.3	55.6	77.3	31.0	58.5	74.2
30RA-045	44.0	50.4	105.1	41.7	55.8	99.7	39.3	61.7	94.0	36.8	68.3	87.9	20.2	31.6	48.3	
42.00	30RA-010	10.0	10.8	24.0	9.5	11.8	22.8	9.0	13.0	21.5	8.4	14.3	20.0	8.0	15.0	19.2
	30RA-015	13.3	14.3	31.8	12.6	15.9	30.2	11.9	17.6	28.4	11.1	19.6	26.5	10.7	20.6	25.5
	30RA-018	15.1	16.9	36.2	14.4	18.9	34.4	13.5	21.2	32.3	12.5	23.7	29.9	6.7	11.1	16.1
	30RA-022	20.3	21.0	48.5	19.3	23.1	46.1	18.1	25.5	43.3	16.9	28.1	40.3	16.2	29.6	38.7
	30RA-025	23.2	25.7	55.5	22.0	28.4	52.6	20.7	31.4	49.6	19.4	34.7	46.4	10.6	15.9	25.4
	30RA-032	29.8	29.7	71.4	28.4	32.8	68.0	26.9	36.3	64.3	25.1	40.2	60.1	24.2	42.3	57.9
	30RA-035	34.9	38.0	83.4	33.1	42.0	79.2	31.3	46.4	74.8	29.3	51.2	70.0	20.5	33.3	48.9
	30RA-042	40.2	41.9	96.1	38.2	46.1	91.4	36.0	50.9	86.1	33.5	56.2	80.2	32.2	59.0	77.0
30RA-045	45.5	51.1	108.9	43.2	56.4	103.3	40.7	62.4	97.4	38.1	69.1	91.1	21.0	31.8	50.2	
44.00	30RA-010	10.4	10.9	24.9	9.9	11.9	23.7	9.3	13.1	22.3	8.7	14.4	20.8	8.3	15.1	19.9
	30RA-015	13.8	14.4	33.0	13.1	16.0	31.3	12.3	17.7	29.5	11.5	19.7	27.5	11.1	20.8	26.5
	30RA-018	15.7	17.1	37.6	14.9	19.1	35.8	14.0	21.4	33.6	13.0	23.9	31.2	7.0	11.1	16.9
	30RA-022	21.0	21.2	50.2	19.9	23.4	47.7	18.8	25.8	44.9	17.5	28.4	41.8	16.8	29.9	40.1
	30RA-025	24.0	26.0	57.4	22.8	28.8	54.5	21.5	31.8	51.4	20.1	35.1	48.1	11.0	16.0	26.4
	30RA-032	30.9	30.0	74.0	29.5	33.1	70.6	27.9	36.6	66.7	26.1	40.6	62.5	25.2	42.7	60.2
	30RA-035	36.1	38.4	86.4	34.3	42.4	82.1	32.4	46.9	77.5	30.3	51.8	72.6	21.2	33.6	50.8
	30RA-042	41.6	42.4	99.6	39.6	46.6	94.7	37.3	51.4	89.3	34.7	56.7	83.2	33.4	59.6	79.9
30RA-045	47.1	51.7	112.7	44.7	57.1	107.0	42.1	63.2	100.9	39.4	69.8	94.4	21.8	32.0	52.2	
45.00	30RA-010	10.6	10.9	25.3	10.1	12.0	24.1	9.5	13.1	22.7	8.8	14.4	21.2	8.5	15.1	20.3
	30RA-015	14.1	14.5	33.7	13.3	16.1	31.9	12.5	17.8	30.0	11.7	19.8	28.0	11.3	20.9	27.0
	30RA-018	16.0	17.2	38.4	15.2	19.2	36.5	14.3	21.5	34.3	13.3	24.0	31.9	7.2	11.1	17.2
	30RA-022	21.3	21.4	51.1	20.3	23.5	48.6	19.1	25.9	45.7	17.8	28.6	42.6	17.1	30.0	40.9
	30RA-025	24.4	26.2	58.4	23.2	28.9	55.5	21.8	32.0	52.3	20.5	35.3	49.0	11.2	16.1	26.9
	30RA-032	31.5	30.1	75.4	30.0	33.3	71.9	28.4	36.8	68.0	26.6	40.7	63.7	25.6	42.9	61.4
	30RA-035	36.7	38.7	87.9	34.9	42.7	83.5	32.9	47.1	78.9	30.9	52.0	73.9	21.6	33.7	51.8
	30RA-042	42.3	42.6	101.3	40.2	46.9	96.4	37.9	51.7	90.8	35.4	57.0	84.7	34.0	59.9	81.3
30RA-045	47.9	52.0	114.6	45.4	57.5	108.8	42.9	63.5	102.6	40.1	70.2	96.1	22.2	32.1	53.1	
46.00	30RA-010	10.8	11.0	25.8	10.2	12.0	24.5	9.7	13.2	23.1	9.0	14.5	21.6	8.6	15.2	20.7
	30RA-015	14.3	14.6	34.3	13.6	16.1	32.5	12.8	17.9	30.6	11.9	19.9	28.6	11.5	20.9	27.5
	30RA-018	16.3	17.3	39.1	15.5	19.4	37.2	14.6	21.6	35.0	13.6	24.2	32.5	7.4	11.1	17.6
	30RA-022	21.7	21.5	52.0	20.6	23.6	49.4	19.4	26.0	46.6	18.1	28.7	43.4	17.4	30.2	41.6
	30RA-025	24.8	26.4	59.4	23.6	29.1	56.4	22.2	32.2	53.2	20.8	35.5	49.8	11.5	16.1	27.4
	30RA-032	32.0	30.3	76.7	30.5	33.4	73.2	28.9	37.0	69.2	27.1	40.9	64.9	26.1	43.0	62.5
	30RA-035	37.3	38.9	89.4	35.5	42.9	85.0	33.5	47.4	80.2	31.4	52.3	75.2	22.0	33.8	52.7
	30RA-042	43.0	42.8	103.0	40.9	47.1	98.0	38.6	51.9	92.4	36.0	57.3	86.2	34.6	60.2	82.8
30RA-045	48.7	52.4	116.6	46.2	57.8	110.7	43.6	63.9	104.4	40.8	70.6	97.7	22.6	32.2	54.1	
48.00	30RA-010	11.1	11.1	26.7	10.6	12.1	25.4	10.0	13.3	24.0	9.3	14.6	22.4	9.0	15.3	21.5
	30RA-015	14.8	14.7	35.5	14.1	16.3	33.7	13.2	18.0	31.7	12.4	20.0	29.7	11.9	21.1	28.6
	30RA-018	16.9	17.5	40.6	16.1	19.6	38.7	15.2	21.9	36.4	14.2	24.4	33.9	7.7	11.2	18.4
	30RA-022	22.4	21.7	53.8	21.3	23.9	51.2	20.1	26.3	48.2	18.7	29.0	44.9	18.0	30.4	43.1
	30RA-025	25.6	26.7	61.5	24.3	29.5	58.4	23.0	32.6	55.1	21.5	36.0	51.6	11.9	16.2	28.5
	30RA-032	33.2	30.6	79.5	31.6	33.7	75.8	29.9	37.3	71.8	28.1	41.3	67.3	27.1	43.4	64.9
	30RA-035	38.6	39.3	92.5	36.7	43.4	87.9	34.7	47.9	83.1	32.5	52.8	77.9	22.8	34.1	54.7
	30RA-042	44.5	43.3	106.6	42.3	47.6	101.4	39.9	52.5	95.6	37.2	57.8	89.2	35.8	60.7	85.8
30RA-045	50.3	53.0	120.6	47.8	58.6	114.5	45.1	64.7	108.0	42.2	71.4	101.1	23.4	32.4	56.2	
50.00	30RA-010	11.5	11.2	27.7	11.0	12.2	26.3	10.4	13.4	24.8	9.7	14.7	23.2	9.3	15.4	22.3
	30RA-015	15.3	14.9	36.8	14.6	16.4	34.9	13.7	18.2	32.9	12.8	20.2	30.8	12.4	21.2	29.6
	30RA-018	17.6	17.7	42.2	16.8	19.8	40.2	15.8	22.1	37.9	14.7	24.7	35.3	8.0	11.2	19.2
	30RA-022	23.2	22.0	55.6	22.1	24.2	52.9	20.8	26.6	49.9	19.4	29.3	46.5	18.6	30.8	44.7
	30RA-025	26.5	27.1	63.5	25.2	29.9	60.3	23.7	33.0	56.9	12.7	15.6	30.5	12.3	16.3	29.5
	30RA-032	34.3	30.9	82.3	32.8	34.1	78.5	31.0	37.6	74.4	29.1	41.6	69.8	28.1	43.8	67.4
	30RA-035	39.9	39.8	95.7	37.9	43.9	90.9	35.8	48.4	85.9	33.6	53.4	80.6	23.6	34.4	56.7
	30RA-042	45.9	43.8	110.2	43.7	48.2	104.9	41.3	53.0	98.9	38.5	58.4	92.3	37.0	61.3	88.8
30RA-045	52.0	53.7	124.6	49.3	59.3	118.3	46.6	65.5	111.6	43.6	72.3	104.6	24.3	32.6	58.2	
55.00	30RA-010	12.5	11.4	30.1	11.9	12.5	28.7	11.3	13.7	27.1	10.5	15.0	25.3	10.1	15.7	24.4
	30RA-015	16.7	15.2	40.1	15.8	16.8	38.0	14.9	18.6	35.9	14.0	20.6	33.6	13.5	21.7	32.4
	30RA-018	19.3	18.3	46.2	18.4	20.4	44.1	17.4	22.8	41.8	16.3	25.4	39.1	8.7	11.3	20.8
	30RA-022	25.2	22.7	60.4	23.9	24.9	57.5	22.6	27.3	54.2	21.1	30.1	50.6	20.3	31.5	48.6
	30RA-025	28.7	28.0	68.8	27.2	30.9	65.4	25.7	34.0	61.7	13.6	15.8	32.7	13.2	16.6	31.6
	30RA-032	37.3	31.7	89.6	35.7	34.9	85.6	33.7	38.5	81.0	31.6	42.5	76.0	30.5	44.7	73.3
	30RA-035	43.2	41.0	103.8	41.1	45.2	98.6	38.8								



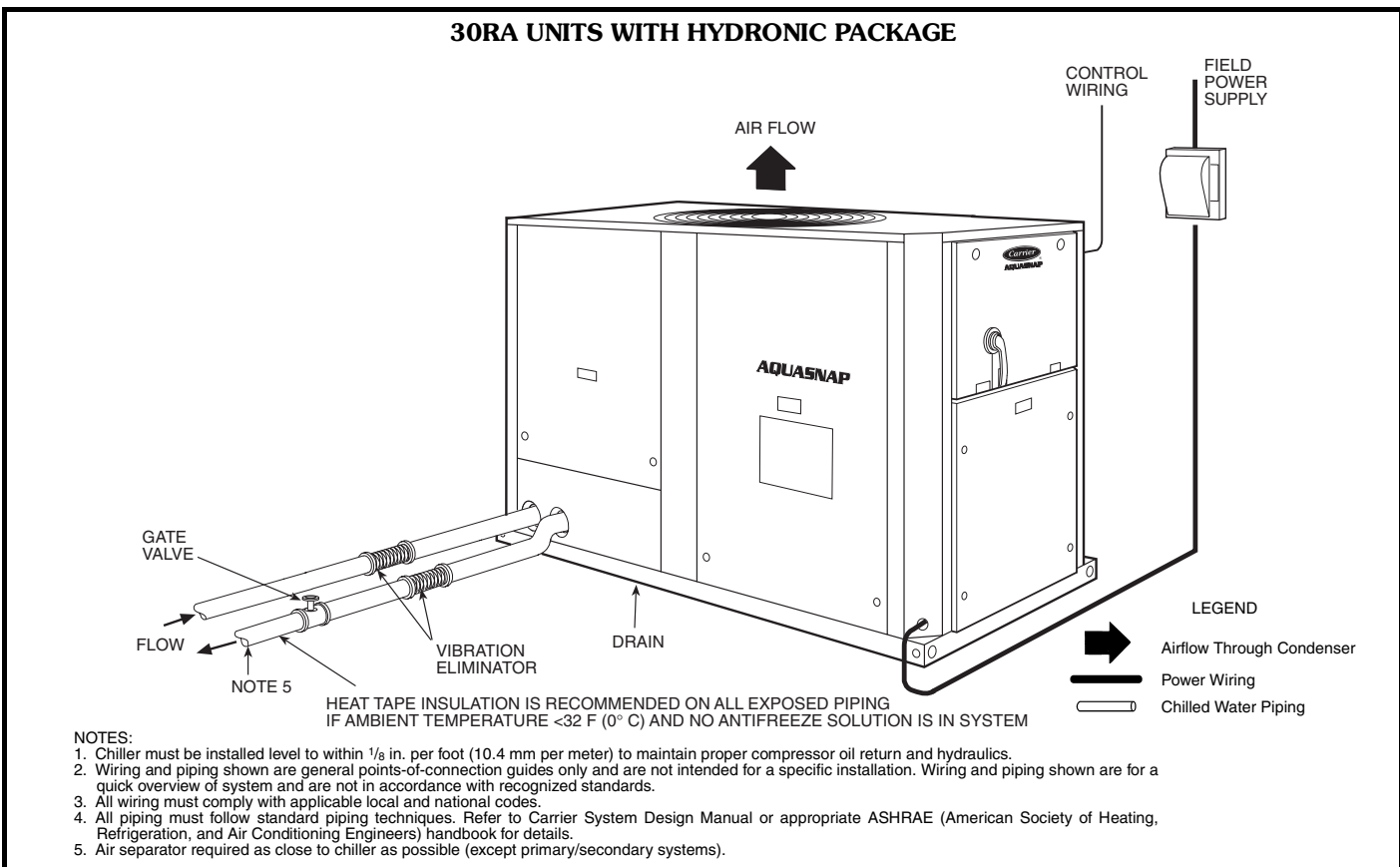
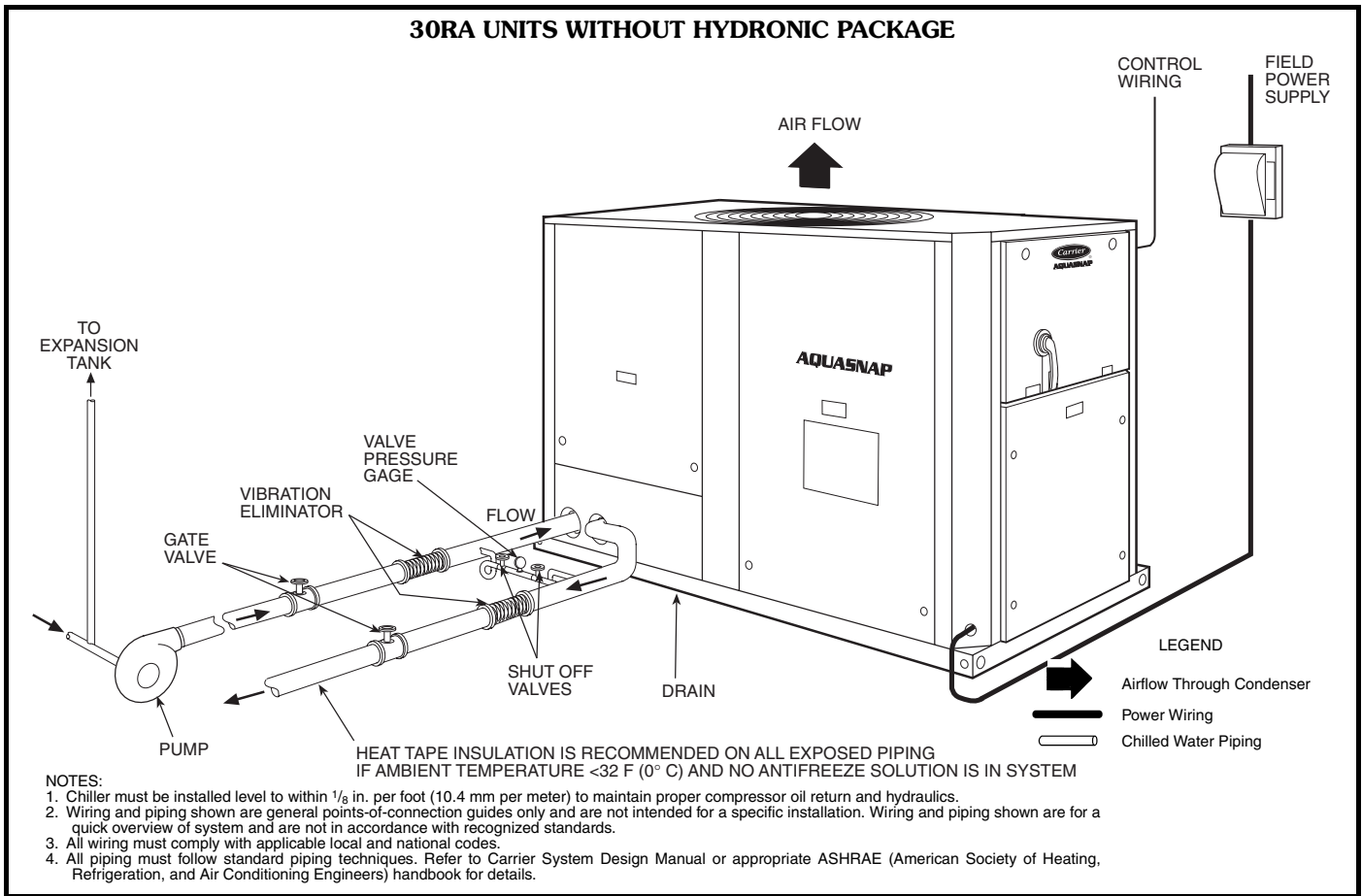
PACKAGED AIR-COOLED CHILLER RATINGS TABLE — SI (50 Hz)

LCWT (C)	UNIT SIZE	CONDENSER ENTERING AIR TEMPERATURE (C)														
		30			35			40			45			50		
		Cap. (kW)	Input kW	Cooler Flow Rate (L/s)	Cap. (kW)	Input kW	Cooler Flow Rate (L/s)	Cap. (kW)	Input kW	Cooler Flow Rate (L/s)	Cap. (kW)	Input kW	Cooler Flow Rate (L/s)	Cap. (kW)	Input kW	Cooler Flow Rate (L/s)
5.00	30RA-010	34.5	10.9	1.5	32.9	11.8	1.4	31.2	12.8	1.3	29.3	13.9	1.3	27.2	15.2	1.2
	30RA-015	45.7	14.4	2.0	43.5	15.8	1.9	41.2	17.3	1.8	38.8	19.1	1.7	36.2	21.0	1.6
	30RA-018	52.0	17.0	2.2	49.6	18.8	2.1	46.8	20.8	2.0	43.7	23.0	1.9	22.8	11.3	1.0
	30RA-022	69.7	21.1	3.0	66.5	23.0	2.9	63.0	25.1	2.7	59.1	27.5	2.5	54.9	30.0	2.4
	30RA-025	79.7	25.8	3.4	76.1	28.2	3.3	72.1	30.9	3.1	68.0	33.9	2.9	36.2	16.2	1.6
	30RA-032	102.6	29.9	4.4	98.2	32.7	4.2	93.3	35.8	4.0	88.0	39.2	3.8	82.2	43.1	3.5
	30RA-035	119.9	38.2	5.1	114.4	41.7	4.9	108.6	45.7	4.7	102.5	50.0	4.4	69.6	33.9	3.0
	30RA-042	138.3	42.1	5.9	132.1	45.9	5.7	125.2	50.1	5.4	117.6	54.8	5.0	109.2	59.9	4.7
30RA-045	156.5	51.2	6.7	149.3	56.1	6.4	141.6	61.5	6.1	133.5	67.3	5.7	71.4	32.3	3.1	
6.00	30RA-010	35.6	10.9	1.5	34.0	11.9	1.5	32.3	12.9	1.4	30.3	14.0	1.3	28.2	15.3	1.2
	30RA-015	47.3	14.5	2.0	45.0	15.9	1.9	42.6	17.5	1.8	40.1	19.2	1.7	37.5	21.1	1.6
	30RA-018	53.8	17.2	2.3	51.3	19.0	2.2	48.5	21.0	2.1	45.4	23.2	1.9	23.8	11.3	1.0
	30RA-022	71.9	21.3	3.1	68.7	23.2	2.9	65.1	25.4	2.8	61.1	27.7	2.6	56.7	30.3	2.4
	30RA-025	82.3	26.1	3.5	78.5	28.5	3.4	74.4	31.2	3.2	70.2	34.2	3.0	37.4	16.3	1.6
	30RA-032	106.0	30.1	4.5	101.4	32.9	4.4	96.5	36.1	4.1	91.0	39.5	3.9	85.1	43.4	3.7
	30RA-035	123.7	38.5	5.3	118.1	42.1	5.1	112.2	46.1	4.8	105.9	50.4	4.5	72.0	34.1	3.1
	30RA-042	142.6	42.5	6.1	136.3	46.3	5.8	129.3	50.6	5.5	121.5	55.3	5.2	112.9	60.4	4.8
30RA-045	161.4	51.8	6.9	154.0	56.7	6.6	146.1	62.1	6.3	137.8	68.0	5.9	73.9	32.5	3.2	
7.00	30RA-010	36.8	11.0	1.6	35.1	12.0	1.5	33.3	13.0	1.4	31.3	14.1	1.3	29.1	15.4	1.3
	30RA-015	48.8	14.6	2.1	46.5	16.0	2.0	44.1	17.6	1.9	41.5	19.3	1.8	38.8	21.3	1.7
	30RA-018	55.7	17.4	2.4	53.2	19.2	2.3	50.3	21.2	2.2	47.1	23.5	2.0	24.7	11.4	1.1
	30RA-022	74.2	21.5	3.2	70.8	23.5	3.0	67.1	25.6	2.9	63.1	28.0	2.7	58.6	30.5	2.5
	30RA-025	84.8	26.4	3.6	80.9	28.9	3.5	76.8	31.6	3.3	72.4	34.6	3.1	38.7	16.4	1.7
	30RA-032	109.4	30.4	4.7	104.8	33.2	4.5	99.7	36.4	4.3	94.1	39.8	4.0	88.1	43.7	3.8
	30RA-035	127.6	38.9	5.5	121.8	42.6	5.2	115.7	46.5	5.0	109.3	50.9	4.7	74.4	34.3	3.2
	30RA-042	147.1	42.9	6.3	140.6	46.8	6.0	133.3	51.0	5.7	125.3	55.8	5.4	116.6	60.9	5.0
30RA-045	166.4	52.4	7.1	158.7	57.3	6.8	150.6	62.8	6.5	142.1	68.7	6.1	76.4	32.7	3.3	
8.00	30RA-010	37.9	11.1	1.6	36.3	12.0	1.6	34.4	13.1	1.5	32.4	14.2	1.4	30.1	15.5	1.3
	30RA-015	50.4	14.8	2.2	48.0	16.2	2.1	45.5	17.7	2.0	42.9	19.5	1.8	40.1	21.4	1.7
	30RA-018	57.6	17.6	2.5	55.0	19.4	2.4	52.2	21.4	2.2	48.9	23.7	2.1	25.7	11.4	1.1
	30RA-022	76.5	21.7	3.3	73.1	23.7	3.1	69.3	25.8	3.0	65.1	28.2	2.8	34.6	13.8	1.5
	30RA-025	87.4	26.7	3.8	83.4	29.2	3.6	79.1	31.9	3.4	74.7	34.9	3.2	40.0	16.5	1.7
	30RA-032	112.9	30.6	4.8	108.2	33.5	4.6	103.0	36.7	4.4	97.3	40.1	4.2	91.1	44.0	3.9
	30RA-035	131.6	39.4	5.6	125.6	43.0	5.4	119.3	47.0	5.1	112.7	51.4	4.8	76.9	34.6	3.3
	30RA-042	151.6	43.3	6.5	144.9	47.2	6.2	137.5	51.5	5.9	129.3	56.3	5.6	94.2	44.4	4.0
30RA-045	171.5	53.0	7.4	163.6	58.0	7.0	155.3	63.4	6.7	146.5	69.4	6.3	79.0	32.9	3.4	
10.00	30RA-010	40.4	11.3	1.7	38.6	12.2	1.7	36.7	13.3	1.6	34.5	14.4	1.5	32.2	15.7	1.4
	30RA-015	53.7	15.0	2.3	51.2	16.4	2.2	48.5	18.0	2.1	45.7	19.8	2.0	42.8	21.7	1.8
	30RA-018	61.6	17.9	2.6	58.9	19.8	2.5	56.0	21.9	2.4	52.6	24.1	2.3	27.7	11.5	1.2
	30RA-022	81.2	22.2	3.5	77.6	24.2	3.3	73.6	26.3	3.2	69.2	28.7	3.0	37.0	13.9	1.6
	30RA-025	92.7	27.3	4.0	88.5	29.9	3.8	84.0	32.6	3.6	79.3	35.7	3.4	42.7	16.7	1.8
	30RA-032	120.2	31.2	5.2	115.2	34.1	5.0	109.7	37.3	4.7	103.8	40.8	4.5	97.3	44.7	4.2
	30RA-035	139.6	40.2	6.0	133.4	43.9	5.7	126.8	47.9	5.4	119.8	52.4	5.1	82.0	35.0	3.5
	30RA-042	160.8	44.2	6.9	153.8	48.2	6.6	146.0	52.5	6.3	137.4	57.3	5.9	74.1	27.9	3.2
30RA-045	181.8	54.3	7.8	173.5	59.3	7.5	164.7	64.8	7.1	155.5	70.9	6.7	84.3	33.3	3.6	

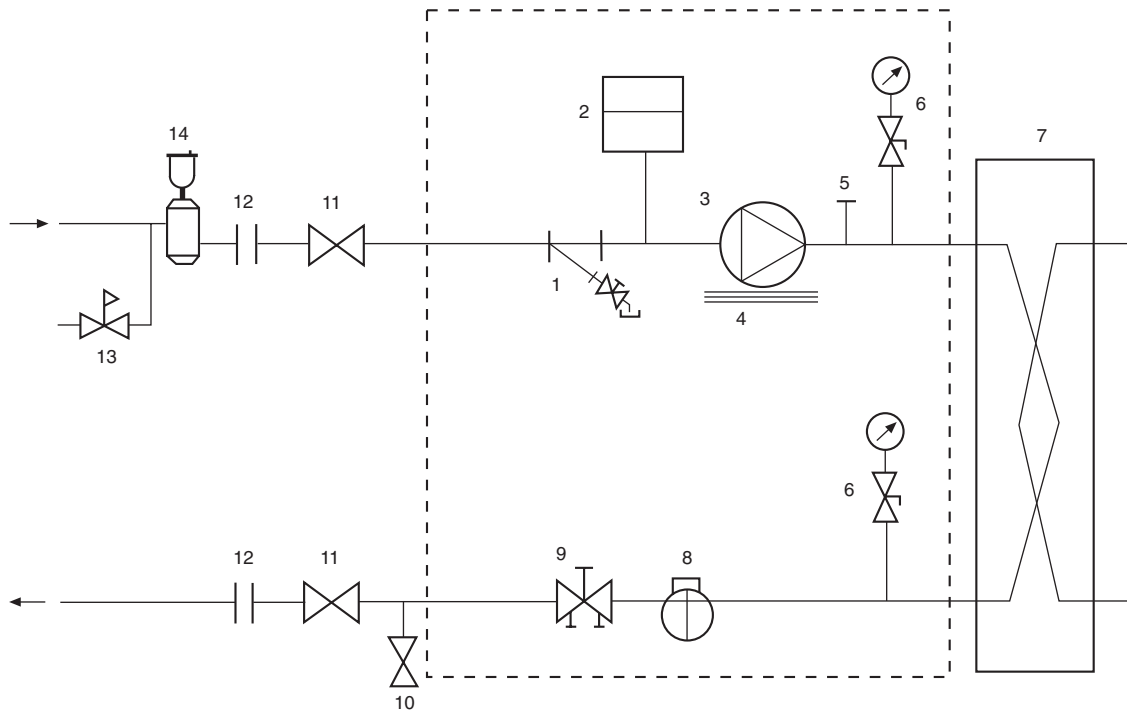
LEGEND

LCWT — Leaving Chilled Water Temperature

Typical piping and wiring



TYPICAL PIPING DIAGRAM ON 30RA UNITS WITH HYDRONIC PACKAGE



LEGEND

- | | |
|------------------------------|-----------------------------------|
| 1 — Strainer/Blow-Down Valve | 8 — Flow Switch |
| 2 — Expansion Tank | 9 — Balance Valve/Drain Plug |
| 3 — Pump | 10 — Pressure Relief |
| 4 — Electric Heater | 11 — Isolation Valves |
| 5 — Air Vent Connection Port | 12 — Flex Connections |
| 6 — Pressure Gages/Petcocks | 13 — Pressure Reducing/Fill Valve |
| 7 — Heat Exchanger | 14 — Air Separator and Vent |

Electrical data



30RA ELECTRICAL DATA

UNIT 30RA	UNIT VOLTAGE			POWER SUPPLY QTY. REQD.	NO HYDRONIC PACKAGE				1.5/1.0 HP PUMP Pump Options 'A' or 'F'			2.0/1.5 HP (STD) PUMP Pump Options 'B' or 'G'			2.0/1.5 HP (ALT) PUMP Pump Options 'C' or 'H'			3.0/2.0 HP PUMP Pump Options 'D' or 'J'			5.0/3.0 HP PUMP Pump Options 'E' or 'K'		
	V-Hz (3 Ph)	Supplied			MCA	MOCP	ICF	Rec Fuse Size	MCA	MOCP	Rec Fuse Size	MCA	MOCP	Rec Fuse Size	MCA	MOCP	Rec Fuse Size	MCA	MOCP	Rec Fuse Size	MCA	MOCP	Rec Fuse Size
		Min	Max																				
010	230-60	207	253	1	46.2	70	272.6	60	50.2	80	60	51.4	80	60	51.4	80	60	53.6	80	70	—	—	—
	208/230-60	187	253	1	51.3	80	273.4	60	55.7	90	70	57.0	90	70	57.0	90	70	59.5	90	70	—	—	—
	460-60	414	506	1	23.8	35	123.8	30	25.8	40	30	26.4	40	35	26.4	40	35	27.5	40	35	—	—	—
	575-60	518	633	1	19.2	30	83.0	25	20.8	30	25	21.2	30	25	21.2	30	25	22.1	30	25	—	—	—
	380-60	342	418	1	29.9	50	159.6	35	32.3	50	40	33.0	50	40	33.0	50	40	34.3	50	40	—	—	—
	380/415-50	342	440	1	28.5	45	138.8	35	30.2	50	40	31.0	50	40	31.0	50	40	31.6	50	40	—	—	—
230-50	207	253	1	48.9	80	231.3	60	51.7	80	70	52.9	80	70	52.9	80	70	54.0	80	70	—	—	—	
015	230-60	207	253	1	62.4	100	387.6	80	66.4	110	80	67.6	110	80	67.6	110	80	69.8	110	90	—	—	—
	208/230-60	187	253	1	69.3	110	388.4	90	73.7	110	90	75.0	110	90	75.0	110	90	77.5	125	90	—	—	—
	460-60	414	506	1	33.6	50	178.8	40	35.6	50	45	36.2	50	45	36.2	50	45	37.3	60	45	—	—	—
	575-60	518	633	1	26.7	45	143.0	35	28.3	45	35	28.7	45	35	28.7	45	35	29.6	45	35	—	—	—
	380-60	342	418	1	42.2	70	239.6	50	44.6	70	60	45.4	70	50	45.4	70	50	46.7	70	60	—	—	—
	380/415-50	342	440	1	36.0	50	148.1	40	37.6	50	45	38.4	50	45	38.4	50	45	39.1	50	45	—	—	—
230-50	207	253	1	64.5	90	242.2	80	67.3	90	80	68.5	90	80	68.5	90	80	69.7	90	80	—	—	—	
018	230-60	207	253	1	67.3	90	271.2	80	71.3	90	80	72.5	90	80	72.5	90	80	74.7	100	90	—	—	—
	208/230-60	187	253	1	74.8	100	274.9	90	79.2	100	90	80.5	110	90	80.5	110	90	83.0	110	100	—	—	—
	460-60	414	506	1	35.5	45	147.9	40	37.5	50	45	38.1	50	45	38.1	50	45	39.2	50	45	—	—	—
	575-60	518	633	1	28.5	35	99.3	35	30.1	40	35	30.5	40	35	30.5	40	35	31.4	40	35	—	—	—
	380-60	342	418	1	44.0	60	182.1	50	48.4	60	60	47.1	60	60	47.1	60	60	48.5	60	60	—	—	—
	380/415-50	342	440	1	38.9	50	139.4	40	40.6	50	45	41.3	50	45	41.3	50	45	42.0	50	45	—	—	—
230-50	207	253	1	69.5	90	239.4	80	72.3	100	80	73.5	100	90	73.5	100	90	74.6	100	90	—	—	—	
022	230-60	207	253	1	84.9	110	311.3	100	88.9	125	100	90.1	125	100	90.1	125	100	92.3	125	110	—	—	—
	208/230-60	187	253	1	94.3	125	316.4	110	98.7	125	110	100.1	125	125	100.1	125	125	102.5	125	125	—	—	—
	460-60	414	506	1	44.7	60	154.4	50	46.7	60	60	47.3	60	60	47.3	60	60	48.4	60	60	—	—	—
	575-60	518	633	1	36.8	50	136.0	45	38.4	50	45	38.9	50	45	38.9	50	45	39.8	50	45	—	—	—
	380-60	342	418	1	57.7	80	194.7	70	60.1	80	70	60.9	80	70	60.9	80	70	62.2	80	70	—	—	—
	380/415-50	342	440	1	49.2	60	159.4	60	50.9	70	60	51.6	70	60	51.6	70	60	52.3	70	60	—	—	—
230-50	207	253	1	84.4	110	266.8	100	87.2	110	100	88.4	110	100	88.4	110	100	89.5	110	100	—	—	—	
025	230-60	207	253	1	92.2	125	311.3	110	96.2	125	110	97.4	125	110	97.4	125	110	99.6	125	110	—	—	—
	208/230-60	187	253	1	102.4	125	316.4	125	106.8	125	125	108.2	125	125	108.2	125	125	110.6	150	125	—	—	—
	460-60	414	506	1	50.3	70	160.0	60	52.3	70	80	52.9	70	80	52.9	70	80	54.0	70	80	—	—	—
	575-60	518	633	1	41.2	50	140.4	50	42.8	50	50	43.3	50	50	43.3	50	50	44.2	60	50	—	—	—
	380-60	342	418	1	65.2	90	202.2	80	67.6	90	80	68.4	90	80	68.4	90	80	69.7	90	80	—	—	—
	380/415-50	342	440	1	59.1	80	203.8	70	60.8	80	70	61.5	80	70	61.5	80	70	62.2	80	70	—	—	—
230-50	207	253	1	101.3	125	359.3	125	104.0	125	125	105.3	125	125	105.3	125	125	106.4	125	125	—	—	—	
030	230-60	207	253	1	108.2	150	433.4	125	112.2	150	125	113.4	150	125	113.4	150	125	115.6	150	150	—	—	—
	208/230-60	187	253	1	120.2	150	439.3	150	124.6	150	150	125.9	150	150	125.9	150	150	128.4	175	150	—	—	—
	460-60	414	506	1	58.4	80	203.6	70	60.4	80	70	61.0	80	70	61.0	80	70	62.1	80	70	—	—	—
	575-60	518	633	1	46.4	60	162.7	60	48.0	60	60	48.4	60	60	48.4	60	60	49.3	60	60	—	—	—
	380-60	342	418	1	73.5	100	270.9	90	76.0	100	90	76.7	100	90	76.7	100	90	78.0	100	90	—	—	—
	380/415-50	342	440	1	73.0	90	217.7	80	—	—	—	75.4	90	90	—	—	—	76.1	100	90	78.2	100	90
230-50	207	253	1	126.2	150	384.2	150	—	—	—	130.2	150	150	—	—	—	131.3	150	150	134.9	150	150	
035	230-60	207	253	1	138.1	175	463.4	150	—	—	—	143.3	175	175	—	—	—	145.5	175	175	150.7	175	175
	208/230-60	187	253	1	153.4	200	472.5	175	—	—	—	159.1	200	175	—	—	—	161.6	200	175	167.3	200	200
	460-60	414	506	1	73.2	90	218.4	80	—	—	—	75.8	90	90	—	—	—	76.9	100	90	79.5	100	90
	575-60	518	633	1	59.3	70	175.7	70	—	—	—	61.4	80	70	—	—	—	62.3	80	70	64.3	80	70
	380-60	342	418	1	93.3	110	290.7	110	—	—	—	96.5	125	110	—	—	—	97.8	125	110	101.0	125	110
	380/415-50	342	440	1	87.1	110	231.8	100	—	—	—	89.5	110	100	—	—	—	90.2	110	100	92.3	110	100
230-50	207	253	1	149.1	175	407.1	175	—	—	—	153.1	175	175	—	—	—	154.2	175	175	157.8	175	175	
040	230-60	207	253	1	145.4	175	470.6	175	—	—	—	150.6	175	175	—	—	—	152.8	175	175	158.0	200	175
	208/230-60	187	253	1	161.5	200	480.6	175	—	—	—	167.2	200	200	—	—	—	169.7	200	200	175.4	200	200
	460-60	414	506	1	78.8	100	224.0	90	—	—	—	81.4	100	90	—	—	—	82.5	100	90	85.1	100	100
	575-60	518	633	1	63.7	80	180.1	70	—	—	—	65.8	80	80	—	—	—	66.7	80	80	68.7	80	80
	380-60	342	418	1	100.8	125	298.2	110	—	—	—	104.0	125	125	—	—	—	105.3	125	125	108.5	125	125
	380/415-50	342	440	1	84.2	100	194.4	90	—	—	—												



FAN ELECTRICAL DATA

UNIT 30RA	UNIT VOLTAGE	STANDARD CONDENSER FANS			
	V-Hz (3 Ph)	Circuit A Quantity	FLA (each)	Circuit B Quantity	FLA (each)
010	230-60	1	7.6	—	—
	208/230-60	1	8.4	—	—
	460-60	1	3.8	—	—
	575-60	1	3.0	—	—
	380-60	1	4.6	—	—
	380/415-50 230-50	1 1	3.8 6.3	— —	— —
015	230-60	1	7.6	—	—
	208/230-60	1	8.4	—	—
	460-60	1	3.8	—	—
	575-60	1	3.0	—	—
	380-60	1	4.6	—	—
	380/415-50 230-50	1 1	3.8 6.3	— —	— —
018	230-60	1	7.6	—	—
	208/230-60	1	8.4	—	—
	460-60	1	3.8	—	—
	575-60	1	3.0	—	—
	380-60	1	4.6	—	—
	380/415-50 230-50	1 1	3.8 6.3	— —	— —
022	230-60	2	4.8	—	—
	208/230-60	2	5.3	—	—
	460-60	2	2.4	—	—
	575-60	2	1.9	—	—
	380-60	2	2.9	—	—
	380/415-50 230-50	2 2	2.3 3.8	— —	— —
025	230-60	2	4.8	—	—
	208/230-60	2	5.3	—	—
	460-60	2	2.4	—	—
	575-60	2	1.9	—	—
	380-60	2	2.9	—	—
	380/415-50 230-50	2 2	2.3 3.8	— —	— —
030	230-60	2	4.8	—	—
	208/230-60	2	5.3	—	—
	460-60	2	2.4	—	—
	575-60	2	1.9	—	—
	380-60	2	2.9	—	—
032	380/415-50	2	2.3	1	3.8
	230-50	2	3.8	1	6.3
035	230-60	2	4.8	1	7.6
	208/230-60	2	5.3	1	8.4
	460-60	2	2.4	1	3.8
	575-60	2	1.9	1	3.0
	380-60	2	2.9	1	4.6
	380/415-50 230-50	2 2	2.3 3.8	1 1	3.8 6.3
040	230-60	2	4.8	1	7.6
	208/230-60	2	5.3	1	8.4
	460-60	2	2.4	1	3.8
	575-60	2	1.9	1	3.0
	380-60	2	2.9	1	4.6
042	380/415-50	2	2.3	2	2.3
	230-50	2	3.8	2	3.8
045	230-60	2	4.8	2	4.8
	208/230-60	2	5.3	2	5.3
	460-60	2	2.4	2	2.4
	575-60	2	1.9	2	1.9
	380-60	2	2.9	2	2.9
	380/415-50 230-50	2 2	2.3 3.8	2 2	2.3 3.8
050	230-60	2	4.8	2	4.8
	208/230-60	2	5.3	2	5.3
	460-60	2	2.4	2	2.4
	575-60	2	1.9	2	1.9
	380-60	2	2.9	2	2.9
055	230-60	2	4.8	2	4.8
	208/230-60	2	5.3	2	5.3
	460-60	2	2.4	2	2.4
	575-60	2	1.9	2	1.9
	380-60	2	2.9	2	2.9

LEGEND

FLA — Full Load Amps

PUMP ELECTRICAL DATA

PUMP OPTION	PUMP SIZE	PUMP RPM	UNIT VOLTAGE	FLA (each)	LRA (each)
			V-Hz (3 Ph)		
'A' or 'F'	1.5 HP	3500	230-60	4.0	32.0
		3500	208/230-60	4.4	36.0
		3500	460-60	2.0	16.0
		3500	575-60	1.6	14.4
		3500	380-60	2.4	21.8
	1.0 HP	2925	380/415-50	1.7	16.0
		2925	230-50	2.8	32.0
'B', 'C' 'G' or 'H'	2.0 HP	3490	230-60	5.2	42.0
		3490	208/230-60	5.8	47.0
		3490	460-60	2.6	21.0
		3490	575-60	2.1	18.8
		3490	380-60	3.1	28.4
	1.5 HP	2910	380/415-50	2.4	21.5
		2910	230-50	4.0	42.0
'D' or 'J'	3.0 HP	3480	230-60	7.4	53.0
		3480	208/230-60	8.2	58.0
		3480	460-60	3.7	26.5
		3480	575-60	3.0	25.6
		3480	380-60	4.5	38.7
	2.0 HP	2900	380/415-50	3.1	29.0
		2900	230-50	5.1	53.0
'E' or 'K'	5.0 HP	3450	230-60	12.6	126.0
		3450	208/230-60	13.9	136.8
		3450	460-60	6.3	63.0
		3450	575-60	5.0	55.4
		3450	380-60	7.6	83.9
	3.0 HP	2850	380/415-50	5.3	68.0
		2850	230-50	8.7	126.0

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amps

NOTES:

- Units are suitable for use on electrical systems where voltage supplied to the unit terminals is not below or above the listed minimum and maximum limits. Maximum allowable phase imbalance is: voltage, 2%; amps 10%.
- All units/modules have single point primary power connection. (Each unit/module requires its own power supply.) Main power must be supplied from a field-supplied disconnect.
- The unit control circuit power transformer (24 v, single-phase for all voltages) is factory supplied.
- Cooler heaters are wired into the control circuit so they are always operable as long as the control circuit power supply disconnect is on, even if any safety device is open, and the unit ON/OFF switch is in the OFF position.
- Incoming wire size ranges are shown below:
 - Size 010-030 terminal block no. 8 - no. 2/0 AWG
 - Size 032-055 terminal block no. 6 - 350 kcmil
 - 60 and 100 amp non-fused disconnect option no. 6 - no. 1 AWG
 - 250 amp non-fused disconnect option no. 6 AWG - 350 kcmil

ACCESSORY TANK — ELECTRICAL DATA

30RA- 900---	UNIT VOLTAGE			POWER SUPPLY QTY. REQD.	FLA	MCA	MOCP
	V-Hz (1-Ph)	Supplied					
		Min	Max				
001	230-50/60	207	253	1	14.1	17.6	30
009	230-50/60	207	253	1	14.1	17.6	30
010	230-50/60	207	253	1	28.2	35.3	60

LEGEND

FLA — Full Load Amp
MCA — Minimum Current Amp
MOCP — Maximum Overcurrent Protection

Electrical data (cont)



COMPRESSOR ELECTRICAL DATA

UNIT 30RA	UNIT VOLTAGE	COMPRESSOR							
	V-Hz (3 Ph)	A1		A2		B1		B2	
		RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA
010	230-60	30.9	265	—	—	—	—	—	—
	208/230-60	34.3	265	—	—	—	—	—	—
	460-60	16.0	120	—	—	—	—	—	—
	575-60	12.9	80	—	—	—	—	—	—
	380-60	20.2	155	—	—	—	—	—	—
	380/415-50	19.8	135	—	—	—	—	—	—
	230-50	34.1	225	—	—	—	—	—	—
015	230-60	43.8	380	—	—	—	—	—	—
	208/230-60	48.7	380	—	—	—	—	—	—
	460-60	23.8	175	—	—	—	—	—	—
	575-60	18.9	140	—	—	—	—	—	—
	380-60	30.1	235	—	—	—	—	—	—
	380/415-50	14.3	130	14.3	130	—	—	—	—
	230-50	25.9	210	25.9	210	—	—	—	—
018	230-60	26.6	237	26.6	237	—	—	—	—
	208/230-60	29.5	237	29.5	237	—	—	—	—
	460-60	14.1	130	14.1	130	—	—	—	—
	575-60	11.3	85	11.3	85	—	—	—	—
	380-60	17.5	160	17.5	160	—	—	—	—
	380/415-50	15.6	120	15.6	120	—	—	—	—
	230-50	28.1	205	28.1	205	—	—	—	—
022	230-60	29.4	265	36.7	265	—	—	—	—
	208/230-60	32.7	265	40.8	265	—	—	—	—
	460-60	14.6	120	20.2	135	—	—	—	—
	575-60	12.2	80	16.6	120	—	—	—	—
	380-60	18.9	155	26.4	170	—	—	—	—
	380/415-50	19.8	135	19.8	135	—	—	—	—
	230-50	34.1	225	34.1	225	—	—	—	—
025	230-60	36.7	265	36.7	265	—	—	—	—
	208/230-60	40.8	265	40.8	265	—	—	—	—
	460-60	20.2	135	20.2	135	—	—	—	—
	575-60	16.6	120	16.6	120	—	—	—	—
	380-60	26.4	170	26.4	170	—	—	—	—
	380/415-50	24.2	175	24.2	175	—	—	—	—
	230-50	41.6	310	41.6	310	—	—	—	—
030	230-60	43.8	380	43.8	380	—	—	—	—
	208/230-60	48.7	380	48.7	380	—	—	—	—
	460-60	23.8	175	23.8	175	—	—	—	—
	575-60	18.9	140	18.9	140	—	—	—	—
	380-60	30.1	235	30.1	235	—	—	—	—
032	380/415-50	14.5	120	19.8	135	24.2	175	—	—
	230-50	26.2	205	34.1	225	41.6	310	—	—
035	230-60	29.4	265	36.7	265	43.8	380	—	—
	208/230-60	32.7	265	40.8	265	48.7	380	—	—
	460-60	14.6	120	20.2	135	23.8	175	—	—
	575-60	12.2	80	16.6	120	18.9	140	—	—
	380-60	18.9	155	26.4	170	30.1	235	—	—
	380/415-50	24.2	175	24.2	175	24.2	175	—	—
	230-50	41.6	310	41.6	310	41.6	310	—	—
040	230-60	36.7	265	36.7	265	43.8	380	—	—
	208/230-60	40.8	265	40.8	265	48.7	380	—	—
	460-60	20.2	135	20.2	135	23.8	175	—	—
	575-60	16.6	120	16.6	120	18.9	140	—	—
	380-60	26.4	170	26.4	170	30.1	235	—	—
042	380/415-50	19.8	135	19.8	135	19.8	135	19.8	135
	230-50	34.1	225	34.1	225	34.1	225	34.1	225
045	230-60	30.9	265	36.7	265	30.9	265	36.7	265
	208/230-60	34.3	265	40.8	265	34.3	265	40.8	265
	460-60	16.0	120	20.2	135	16.0	120	20.2	135
	575-60	12.9	80	16.6	120	12.9	80	16.6	120
	380-60	20.2	155	26.4	170	20.2	155	26.4	170
	380/415-50	24.2	175	24.2	175	24.2	175	24.2	175
	230-50	41.6	310	41.6	310	41.6	310	41.6	310
050	230-60	36.7	265	36.7	265	36.7	265	36.7	265
	208/230-60	40.8	265	40.8	265	40.8	265	40.8	265
	460-60	20.2	135	20.2	135	20.2	135	20.2	135
	575-60	16.6	120	16.6	120	16.6	120	16.6	120
	380-60	26.4	170	26.4	170	26.4	170	26.4	170
055	230-60	43.8	380	43.8	380	43.8	380	43.8	380
	208/230-60	48.7	380	48.7	380	48.7	380	48.7	380
	460-60	23.8	175	23.8	175	23.8	175	23.8	175
	575-60	18.9	140	18.9	140	18.9	140	18.9	140
	380-60	30.1	235	30.1	235	30.1	235	30.1	235

LEGEND

LRA — Locked Rotor Amps
 RLA — Rated Load Amps

Controls



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, fan control, display control, diagnostic control, output relay control, demand limit, capacity control, head pressure 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 to ON position. Pump control of external pumps (where so configured) or optional internal pump, will energize the cooler pump to the internal (or CCN) time schedule (or input occupied signal from external system).

Where dual pumps are utilized, control will also stagger start of pumps based on last started. When the unit receives a call for cooling (based on a deviation from chilled water set point), the unit stages up in capacity to maintain the cooler fluid set point. The first compressor starts 1 to 3 minutes after the call for cooling. The *ComfortLink* microprocessor controls the capacity of the chiller by cycling compressors at a rate to satisfy actual dynamic load conditions. The control maintains leaving-fluid temperature set point shown on the Scrolling Marquee display board through intelligent cycling of unloaders. Accuracy depends on loop volume, loop flow rate, load, outdoor-air temperature, number of stages, and particular stage being cycled off. No adjustment for cooling range or cooler flow rate is required, because the control automatically compensates for cooling range by measuring both return-fluid temperature and leaving-fluid temperature. This is referred to as leaving-fluid temperature control with return-fluid temperature compensation.

The basic logic for determining when to add or remove a stage is a time band integration of deviation from set point plus rate of change of leaving-fluid temperature. When leaving-fluid temperature is close to set point and slowly moving closer, logic prevents addition of another stage. If leaving-fluid temperature is less than 34 F (1.1 C) for water, or 6° F (3.3° C) below the set point for brine units, the unit is shut off until the fluid temperature goes to 34 F (1.1 C) or to 6° F (3.3° C) above the set point to protect against freezing.

If 1° F per minute (0.6° C per minute) pulldown control has been selected (adjustable setting), no additional steps of capacity are added as long as difference between leaving-fluid temperature and set point is greater than 4° F (2.2° C) and rate of change in leaving-fluid temperature is less than 1° F per minute (0.6° C per minute). If it has been less than 90 seconds since the last capacity change, compressors will continue to run unless a safety device trips. This prevents rapid cycling and also helps return oil during short on periods.

Sensors — Three thermistors are used for temperature-sensing inputs to microprocessor. Additional thermistor sensors may be used as remote temperature sensors for optional LCWT reset.

- Cooler leaving chilled fluid temperature (T1)
- Cooler entering fluid (return) temperature (T2)
- Outside air temperature (T9)

Two refrigerant pressure transducers are used in each circuit for sensing suction and discharge pressure. The microprocessor uses these inputs to control capacity and fan cycling.

- Saturated condensing temperature
- Cooler saturation temperature

The microprocessor uses these temperatures and pressures to control capacity and fan cycling.

Control sequence

Off cycle — If ambient temperature is below 36 F (2 C), cooler heaters (if equipped) are also energized.

Start-up — After control circuit switches on, the prestart process takes place, then microprocessor checks itself, starts pump (if configured) and waits for temperature to stabilize. The controlled pulldown feature limits compressor loading on start-up to reduce demand on start-up and unnecessary compressor usage. The microprocessor limits supply-fluid temperature decrease (start-up only) to 1° F (0.6° C) per minute.

Capacity control — On first call for cooling, microprocessor starts initial compressor and fan stage on lead circuit.

As additional cooling is required, additional compressors are energized.

Speed at which capacity is added or reduced is controlled by temperature deviation from set point and rate of temperature change of chilled fluid.

The Main Base Board (MBB) responds to temperature of supply chilled water to cycle the compressor(s) and to control compressor unloading and loading to match cooling load requirements.

Minimum Load control valve is energized by the MBB. Valve allows hot gas to pass directly into the cooler circuit on the final step of unloading, maintaining constant suction pressure and permitting the unit to operate at lower loads with less compressor cycling.

CAPACITY CONTROL STEPS

UNIT 30RA	STANDARD CAPACITY STEPS (%) (60 Hz Models)	STANDARD CAPACITY STEPS (%) (50 Hz Models)
010	0,100	0, 100
015	0,100	0, 50, 100
018	0, 50, 100	0, 50, 100
022	0, 41, 100	0, 50, 100
025	0, 50, 100	0, 50, 100
030	0, 50, 100	n/a
032	n/a	0, 25, 60, 100
035	0, 25, 60, 100	0, 33, 67, 100
040	0, 32, 63, 100	n/a
042	n/a	0, 25, 50, 75, 100
045	0, 22, 44, 72, 100	0, 25, 50, 75, 100
050	0, 25, 50, 75, 100	n/a
055	0, 25, 50, 75, 100	n/a

Controls (cont)



Standard ComfortLink™ controls with Scrolling Marquee display module — A four-digit alphanumeric display shows all of the *ComfortLink* control codes (with 60 character expandable clear language), plus set points, time of day, temperatures, pressures, and superheat. Additional information can be displayed all at once with the accessory Navigator™ display.

Low-temperature override — This feature prevents LCWT (leaving chilled fluid temperature) from overshooting the set point and possibly causing a nuisance trip-out by the freeze protection.

High-temperature override — This feature allows chiller to add capacity quickly during rapid load variations.

Abnormal conditions — All control safeties in chiller operate through compressor protection board or control relay and microprocessor.

Loss of feedback signal to the MBB will cause the compressor(s) to shut down. For other safeties, microprocessor makes appropriate decision to shut down a compressor due to a safety trip or bad sensor reading and displays appropriate failure code on the display. Chiller holds in safety mode until reset. It then reverts to normal control when unit is reset.

Low-pressure safety — Safety cuts out if system pressure drops below minimum.

High-pressure cutout — Switch shuts down compressors if compressor discharge pressure increases to 426 psig (2937 kPa).

Compressor anti-cycling — This feature limits compressor cycling.

Loss of flow protection — Proof of flow switches are standard and installed on all 30RA chillers.

Sensor failures — Failures are detected by the microprocessor.

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.

Temperature reset — If applied, microprocessor compares either return fluid, space temperature, or outdoor-air temperature with the accessory board settings, and adjusts LCWT appropriately. The Energy Management Module can also be added for 4 to 20 mA reset.

Accessory controls — Demand can be limited by controlling the chiller capacity through the demand limit control (the Energy Management Module is required for this function). This FIOP/accessory interfaces with microprocessor to control unit so that chiller's kW demand does not exceed its setting. It is activated from an external switch or a 4 to 20 mA signal.

The standard *ComfortLink* control is programmed to accept various accessory temperature reset options (based on outdoor-air temperature [std], return-fluid temperature, or space temperature), that reset the LCWT. An accessory thermistor (T10) is required if outdoor-air temperature or

space temperature reset is selected. The Energy Management Module (EMM) is only required for temperature reset that is initiated by a 4 to 20 mA signal.

Demand limit — If applied, limits the total power draw of unit to selected point by controlling number of operational compressors during periods of peak electrical demand.

The Energy Management Module is required for either 2-stage or 4 to 20 mA demand limit.

Navigator display module — An optional 4-line, 20-character per line display is also available as a field-installed accessory.

Thermostatic expansion valve (TXV) — The TXV controls refrigerant flow to the cooler for different operating conditions. An equalization line and temperature-controlled sensing bulb are used to maintain a fixed setting of super-heated refrigerant leaving the cooler.

Diagnostics — The microprocessor may be put through a service test (see Controls, Start-Up, Operation, Service, and Troubleshooting literature). 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 fans and compressors.

Default settings — To facilitate quick start-ups, 30RA 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 settings will be based on any options or accessories included with the unit at the time of manufacturing.

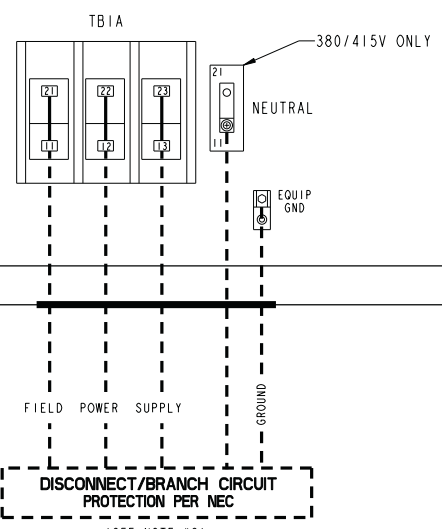
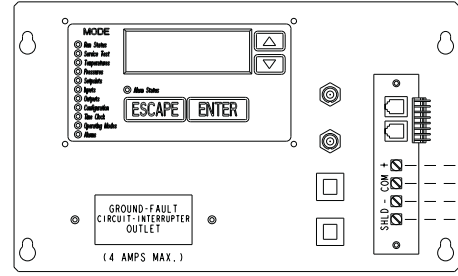
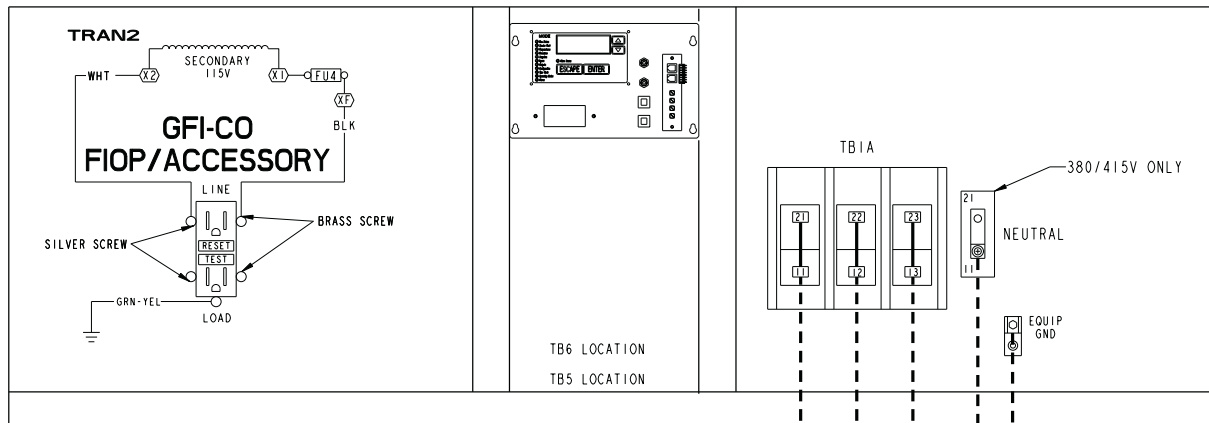
Date and time are set to U.S.A. Central Time zone and will need reconfiguring based on location and local time zone. If operation based on occupancy scheduling is desired, this will also need to be set during installation.

Ice duty — *ComfortLink* controls have the capability of reduced leaving fluid temperature operation for thermal storage, or ice duty. The optional Energy Management Module includes input contacts for the "ice done" signal generated by the thermal storage control system. The ice duty feature may be configured to start on an external input command or by the *ComfortLink* standard internal scheduling function. The ice duty function requires brine modification for leaving fluid temperatures below 40 F (4.4 C). Ice duty may be used in combination with any other standard features offered by the Energy Management Module and *ComfortLink* controls.

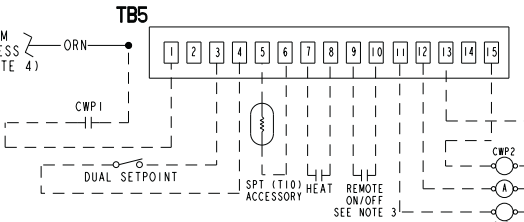
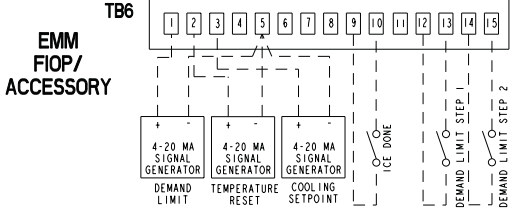
The production of ice, which is stored for peak cooling demands, can significantly decrease energy costs. The unit produces ice (normally at night) by supplying ice storage tanks with low temperature cooling fluid. The chiller takes advantage of reduced ambient conditions at night for ice-making mode, so the capacity suffers a lower penalty for the low leaving fluid temperatures.

At peak cooling demands the chiller and the stored ice may share the cooling load to reduce operating costs. The thermal storage system may potentially reduce the size of the chiller plant required to meet demand loads.

Control and power wiring schematic, sizes 032-055



DISCONNECT BRANCH CIRCUIT PROTECTION PER NEC (SEE NOTE #2)
STANDARD POWER

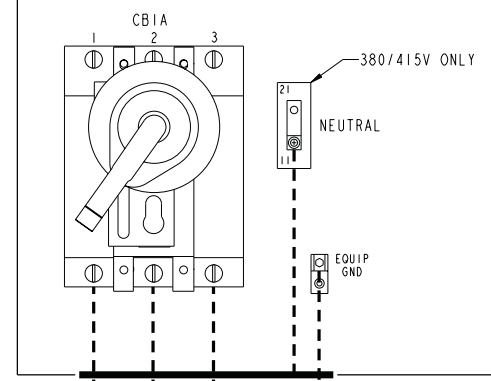


NOTES:

- FACTORY WIRING IS IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC). FIELD MODIFICATIONS OR ADDITIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.
- WIRING FOR MAIN FIELD SUPPLY MUST BE RATED 75C MINIMUM. USE COPPER FOR ALL UNITS. MAXIMUM INCOMING WIRE SIZE FOR THE TERMINAL BLOCK IS 350 KCMIL. MAXIMUM INCOMING WIRE SIZE FOR 100 AMP NON-FUSED DISCONNECT IS #1 AWG. MAXIMUM INCOMING WIRE SIZE FOR 250 AMP NON-FUSED DISCONNECT IS 350 KCMIL.
- TERMINALS 9 AND 10 OF TB5 ARE FOR FIELD EXTERNAL CONNECTIONS FOR REMOTE ON-OFF. THE CONTACTS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 MA.
- TERMINALS 1 AND 2 OF TB5 ARE CONNECTED TO THE FACTORY INSTALLED CHILLED WATER FLOW SWITCH (CWFS). TO ADD CHILLED WATER PUMP INTERLOCK CONTACTS, REMOVE THE ORANGE HARNESS WIRE FROM TB5-1 AND WIRE CONTACTS IN SERIES AS SHOWN. THE CONTACTS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 MA.
- TERMINALS 11 AND 13 OF TB5 ARE FOR CONTROL OF CHILLED WATER PUMP1 (CWP1) STARTER. TERMINALS 13 AND 15 OF TB5 ARE FOR CONTROL OF CHILLED WATER PUMP2 (CWP2) STARTER. THE MAXIMUM LOAD ALLOWED FOR THE CHILLED WATER PUMP RELAY IS 75 VA SEALED, 360 VA INRUSH AT 115V. FIELD POWER SUPPLY IS NOT REQUIRED.
- TERMINALS 12 AND 13 OF TB5 ARE FOR AN ALARM RELAY. THE MAXIMUM LOAD ALLOWED FOR THE ALARM RELAY IS 75 VA SEALED, 360 VA INRUSH AT 115V. FIELD POWER SUPPLY IS NOT REQUIRED.
- MAKE APPROPRIATE CONNECTIONS TO TB6 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 A 24VAC LOAD UP TO 50 MA.

LEGEND:

- A - ALARM
- CWP1 - CHILLED WATER PUMP INTERLOCK
- CWP - CHILLED WATER PUMP
- EMM - ENERGY MANAGEMENT
- SPT - SUCTION PRESSURE TRANSDUCER
- TB - TERMINAL BLOCK
- - - - - FIELD POWER WIRING
- - - - - FIELD CONTROL WIRING
- _____ FACTORY INSTALLED WIRING



DISCONNECT BRANCH CIRCUIT PROTECTION PER NEC (SEE NOTE #2)
NON-FUSED DISCONNECT POWER

Control and power wiring schematic, storage tank

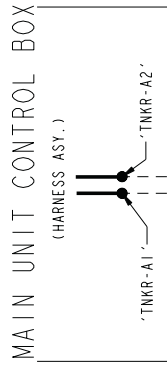


NOTES:

1. FACTORY WIRING IS IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC). FIELD MODIFICATIONS OR ADDITIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.
2. WIRING FOR MAIN FIELD SUPPLY MUST BE RATED 75C MINIMUM. USE COPPER FOR ALL UNITS. MAXIMUM INCOMING WIRE SIZE FOR THE TERMINAL BLOCK IS 2/0.

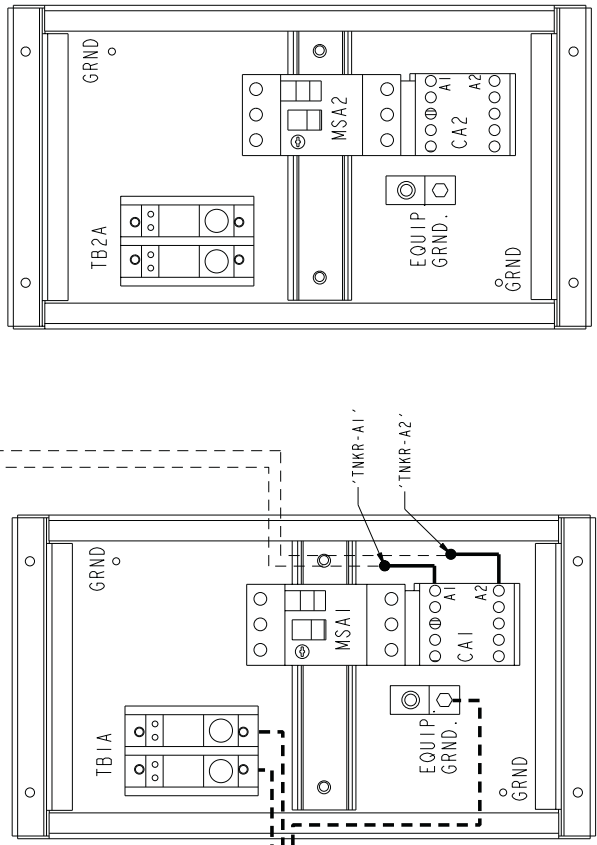
LEGEND:

- FIELD POWER WIRING
- - - FIELD CONTROL WIRING
- FACTORY INSTALLED WIRING
- CA CONTACTOR
- C.B. CONTROL BOX
- GRND GROUND
- MS MANUAL STARTER
- TB TERMINAL BLOCK



CONTROL POWER

FIELD CONTROL WIRING TO MAIN UNIT CONTROL BOX



FIELD POWER SUPPLY
230-1-60

DISCONNECT BRANCH CIRCUIT PROTECTION PER NEC
(SEE NOTE #2)

STANDARD POWER

Application data



Chiller location

Do not locate near sound sensitive areas without proper acoustic consideration. Pad isolated from building rooftop mounting requires consideration for structure-borne transmission. Unit must be level within 1/8-in. per ft when installed to ensure proper oil return to the compressors. Clearances must be provided around chillers for airflow, service and local code requirements. See dimensional drawings for specific unit clearance requirements. Chiller fan discharge must be at or above adjacent solid walls. Installation in pits is not recommended.

Oversizing chillers

Oversizing chillers by more than 15% at design conditions must be avoided as the system operating efficiency is adversely affected (resulting in greater or excessive electrical demand). When future expansion of equipment is anticipated, install a single chiller to meet present load requirements and add a second chiller to meet the additional load demand. It is also recommended that 2 smaller chillers be installed where operation at minimum load is critical. The operation of a smaller chiller loaded to a greater percentage over minimum is preferred to operating a single chiller at or near its minimum recommended value. Minimum Load Control should not be used as a means to allow oversizing chillers. Minimum Load Control should be given consideration where substantial operating time is anticipated below the minimum unloading step.

Cooler fluid temperature

1. Maximum leaving chilled fluid temperature (LCWT) for unit is 70 F (21 C). Unit can start and pull down with up to 95 F (35 C) entering-fluid temperature. It is recommended that entering-fluid temperature not exceed 85 F (29.4 C).
2. Minimum LCWT for standard unit is 40 F (3.3 C). For leaving-fluid temperatures from 34 to 39.9 F (1° to 3.28 C) a 20% anti-freeze solution, or greater is required. Application of chiller within the 39.9 to

15 F (3.3 to -9.4 C) range is possible by ordering the factory-installed 'brine' option.

NOTE: Water flowing through cooler should not exceed 100 F (38 C).

Cooler flow/range

Ratings and performance data in this publication are for a cooling temperature rise of 10° F (6° C), and are suitable for a range from 5 to 20 F (2.8 to 11.1 C) temperature rise without adjustment. The 30RA chillers may be operated using a different temperature range, provided flow limits are not exceeded. For minimum flow rates, see Minimum and Maximum Cooler Flow Rates table. High flow rate is limited by pressure drop that can be tolerated. If another temperature range is used, apply LCWT correction as given in Selection Procedure example on page 19.

Minimum cooler flow (maximum cooler temperature range)

The minimum cooler flow for standard units is shown in Minimum Cooler Fluid Flow Rates and Minimum Loop Volume table. When gpm (L/s) required is lower (or rise higher) follow recommendations below:

1. Multiple smaller chillers may be applied in series, each providing a portion of the design temperature rise.
2. Cooler fluid may be recirculated to raise flow rate. However, mixed temperature entering cooler must be maintained a minimum of at least 5° F (2.8° C) above the LCWT.

Maximum cooler flow

The maximum cooler flow (> 5 gpm/ton or < 5° F rise [$> 0.09 \text{ L/s} \cdot \text{kW}$ or $< 2.7^\circ \text{ C rise}$]) results in practical maximum pressure drop through cooler.

In process applications, return fluid may bypass the cooler to keep pressure drop through cooler within acceptable limits. This permits a higher temperature with lower fluid flow through cooler and mixing after the cooler.

MINIMUM AND MAXIMUM COOLER FLOW RATES

ENGLISH (60 Hz)

30RA SIZE	MIN. FLOW RATE (Gpm)	MAX. FLOW RATE (Gpm)	MIN. LOOP VOLUME (Gal.)
010	12	46	40
015	16	66	55
018	19	76	48
022	26	104	65
025	29	114	71
030	33	131	82
035	42	167	104
040	45	181	113
045	52	206	129
050	57	227	142
055	65	260	163

ENGLISH (50 Hz)

30RA SIZE	MIN. FLOW RATE (Gpm)	MAX. FLOW RATE (Gpm)	MIN. LOOP VOLUME (Gal.)
010	12	48	40
015	16	63	39
018	18	72	45
022	24	96	60
025	27	109	68
032	35	142	89
035	41	165	103
042	48	190	119
045	54	215	134

SI (60 Hz)

30RA SIZE	MIN. FLOW RATE (L/s)	MAX. FLOW RATE (L/s)	MIN. LOOP VOLUME (Liters)
010	0.76	2.90	151.20
015	1.01	4.16	207.90
018	1.20	4.79	181.44
022	1.64	6.55	245.70
025	1.83	7.18	268.38
030	2.08	8.25	309.96
035	2.65	10.52	393.12
040	2.84	11.40	427.14
045	3.28	12.98	487.62
050	3.59	14.30	536.76
055	4.10	16.38	616.14

SI (50 Hz)

30RA SIZE	MIN. FLOW RATE (L/s)	MAX. FLOW RATE (L/s)	MIN. LOOP VOLUME (Liters)
010	0.76	3.02	151.20
015	1.01	3.97	147.42
018	1.13	4.54	170.10
022	1.51	6.05	226.80
025	1.70	6.87	257.04
032	2.21	8.95	336.42
035	2.58	10.40	389.34
042	3.02	11.97	449.82
045	3.40	13.55	506.52

Variable cooler flow rates

Variable rates may be applied to standard chiller. Unit will, however, attempt to maintain a constant leaving chilled fluid temperature. In such cases, minimum flow must be in excess of minimum flow given in Minimum Cooler Fluid Flow Rates and Minimum Loop Volume table, and flow rate must change in steps of less than 10% per minute. Apply 6 gal. per ton (6.5 L per kW) water loop volume minimum if flow rate changes more rapidly.

Tank volume

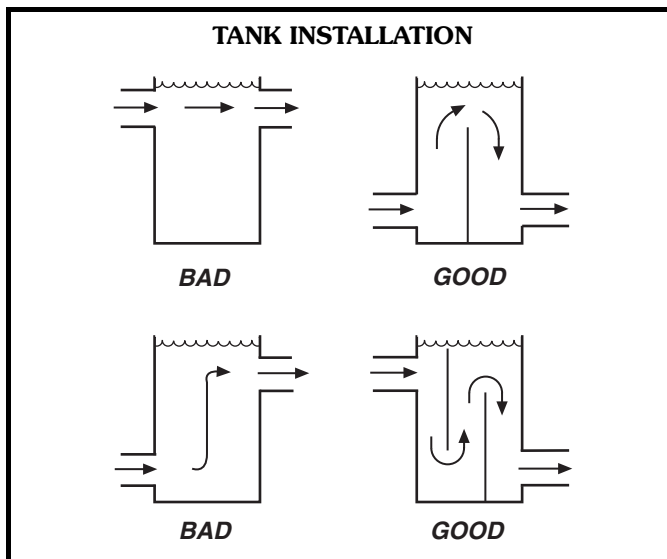
A properly baffled storage tank is available as an accessory. These tanks are designed to physically fit beneath the corresponding 30RA unit, taking up the same footprint. Available volume is as follows:

30RA010-018	110 gallons
30RA022-030	152 gallons
30RA032-055	305 gallons

Fluid loop volume

The volume in circulation must equal or exceed 3 gal. per nominal ton (3.25 L per kW) of cooling for temperature stability and accuracy in normal air conditioning applications. In process cooling applications, or for operation at ambient temperature below 32 F (0° C) with low 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.



Cooler fouling factor

The fouling factor used to calculate tabulated ratings was 00010 ft² · hr · °F/Btu (.000018 m² · °C/W). As fouling factor is increased, unit capacity decreases and compressor power increases. Standard ratings should be corrected using following multipliers:

FOULING FACTORS

FOULING FACTOR (English) (ft ² · hr · F/Btu)	FOULING FACTOR (SI) (m ² · C/kW)	CAPACITY MULTIPLIER	COMPRESSOR POWER MULTIPLIER
.00025	.000044	0.991	0.995
.00050	.000088	0.977	0.987
.00075	.000132	0.955	0.979
.00175	.000308	0.910	0.952

Cooler and hydronic system freeze protection

Protection against low ambient freeze-up is required for unit operation in areas that experience temperatures below 32 F (0° C). Protection should be in the form of inhibited ethylene glycol or other suitable brine.

Even though unit cooler is equipped with insulation and an electric heater that helps prevent freeze-up, it does not protect fluid piping external to cooler or if there is a power failure. Use only antifreeze solutions approved for heat exchanger duty. Use of automotive-type antifreezes is not recommended because of the fouling that can occur once their relatively short-lived inhibitor breaks down. Draining cooler and outdoor piping is recommended if system is not to be used during freezing weather conditions. See Low Ambient Temperature Operation section.

High ambient temperature operation

High outdoor ambient chiller start-up and operation (fully loaded) is possible for standard 30RA chillers at ambient temperatures up to 120 F (50 C) at nominal voltage.

Low ambient temperature operation

Units will start and operate down to 45 F (7.2 C) (sizes 010-018) and 32 F (0° C) (sizes 022-055) as standard.

Operation to -20 F (-29 C) requires optional Motor-master® V condenser head pressure control as well as wind baffles (field fabricated and installed to all units for operation below 32 F [0° C] if wind velocity is anticipated to be greater than 5 mph (8 km/h). Inhibited propylene glycol or other suitable corrosion-resistant anti-freeze solution must be field supplied and installed in all units for unit operation below 32 F (0° C). Solution must be added to fluid loop to protect loop down to 15° F (8° C) below minimum operating ambient temperature. Concentration should be based on expected minimum temperature and either "Burst" or "Freeze" protection levels. At least 6 gal per ton (6.5 L per kW) of fluid volume is the recommended minimum for a moderate system load.

Application data (cont)



Altitude correction factors

Correction factors must be applied to standard ratings at altitudes above 2000 ft (610 m) using the following multipliers:

ALTITUDE CORRECTION FACTORS

ALTITUDE (ft)	ALTITUDE (m)	CAPACITY MULTIPLIER	COMPRESSOR POWER MULTIPLIER
2,000	610	0.99	1.01
4,000	1220	0.98	1.02
6,000	1830	0.97	1.03
8,000	2440	0.96	1.04
10,000	3050	0.95	1.05

Freeze versus burst protection

If chiller operation is not required during winter/off season, lower glycol concentrations based on “burst” protection criteria should be considered. Often use of burst protection results in lower fluid costs and has less impact on chiller cooler capacity and flow rate. Consult glycol fluid manufacturers for burst protection recommendations and fluid specifications.

Multiple chillers

Where chiller capacities greater than 55 tons (180 kW) are required, or where standby capability is desired, chillers may be installed in parallel. The flow must be balanced according to the recommendations for each chiller.

Where applied in parallel with optional hydronic package, expansion tank must be disconnected and a single expansion tank must be installed in the system.

Unit software is capable of controlling two units as a single plant. Refer to Controls, Start-Up, Operation, Service, and Troubleshooting guide for further details. Hydronic pump package may not be applied in series applications.

Condenser coil protection (Enviro-Shield™)

Pre-coated aluminum-fin coils have a durable epoxy-phenolic coating applied to the fin prior to the fin stamping process to provide protection in mildly corrosive coastal environments. Pre-coated coils have an inert barrier between the aluminum fin and copper tube. This barrier

electrically disconnects the dissimilar metals to minimize the potential for galvanic corrosion. This economical option provides substantial corrosion protection beyond the standard uncoated coil construction.

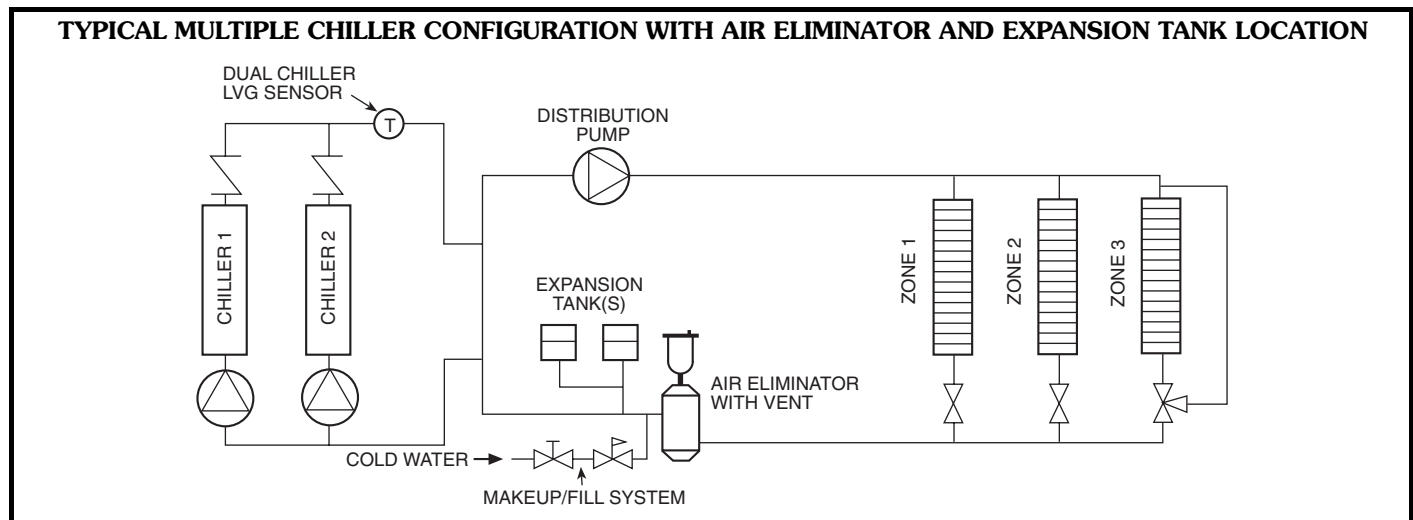
Copper-fin coils provide increased corrosion resistance in moderate coastal environments where industrial air pollution is not present. All copper coils eliminate bimetallic construction to eliminate the potential for galvanic corrosion. Application in industrial environments is not recommended due to potential attack from sulfur, sulfur oxide, nitrogen oxides, carbon and several other industrial airborne contaminants. In moderate seacoast environments, copper-fin coils have extended life compared to standard or pre-coated aluminum-fin coils.

E-coated aluminum-fin coils have an extremely flexible and durable epoxy coating uniformly applied to all coil surfaces. Unlike brittle phenolic dip and bake coatings, E-coat provides superior protection with unmatched flexibility, edge coverage, metal adhesion, thermal performance and most importantly, corrosion resistance. E-coated coils provide this protection since all coil surfaces are completely encapsulated from environmental contamination. Specify E-coated aluminum-fin coils for industrial environments with high levels of air pollution. This option also provides better protection compared to standard or pre-coated aluminum-fin coils in industrial environments.

E-coated copper-fin coils have the same flexible and durable epoxy coating as E-coated aluminum-fin coils. However, this option combines the natural salt and environmental resistance of all-copper construction with the highest level of corrosion protection. Specify E-coated copper-fin coils in the harshest combination of coastal and industrial environments.

Electrical/utility interests

Energy management — Use of energy management practices can significantly reduce operating costs, especially during off-peak modes of operation. Demand limiting and temperature reset are 2 techniques for accomplishing efficient energy management. See Demand Limiting (also called load shedding) section on page 43 for further details.





Demand limiting (load shedding)

When a utility's demand for electricity exceeds a certain level, loads are shed to keep electricity demand below a prescribed maximum level. Typically, this happens on hot days when air conditioning is most needed. The Energy Management Module (EMM) can be added to accomplish this reduction. Demand may be limited on unit by resetting fluid temperature, or by unloading the chiller to a given predetermined percentage of the load. Demand limit may also be driven by an external 4 to 20 mA signal. These features require a signal from an intelligent central control. Do not cycle demand limiter for less than 10 minutes on and 5 minutes off. Duty cycling cycles electrical loads at regular intervals regardless of need. This reduces the electrical operating costs of building by "fooling" demand indicating devices. Duty cycling of compressors or fans is not recommended since motor winding and bearing life will suffer from constant cycling.

Remote on-off control

Remote on-off control may be applied by hard-wired connection (see Controls and Troubleshooting literature) or by connection to a Carrier Comfort Network (CCN).

Optional hydronic system selection

Select pump GPM from resulting chiller selection and total pressure loss in the system plus the chiller internal pressure loss.

NOTE: Maximum gpm (L/s), pressure and pump hp must not exceed maximum on pump curve.

Pump flow can be reduced using factory-supplied balancing valve up to 10%. Beyond that, impeller trimming is recommended to reduce energy consumption. Contact your Carrier representative for specific amount of trim required.

Expansion tank supplied will allow loop expansion due to ambient fluctuations for loop volumes of up to the values in the table at the right. If loop volume exceeds that, a larger expansion tank must be field supplied.

30RA010-030 4.4 total gal., 3.2 acceptance volume
30RA032-055 10.3 total gal., 10.3 acceptance volume

MAX LOOP VOLUME (gal)

	30RA010-030	30RA032-055
PURE WATER	310	725
10% EG	180	425
20% EG	175	410
30% EG	155	370
40% EG	150	350
10% PG	175	410
20% PG	150	350
30% PG	128	300
40% PG	118	275

LEGEND

EG — Ethylene Glycol
PG — Propylene Glycol

NOTE: Max loop volume is based on typical system of 12 psi and 30 psi of min/max pressures, and 100 F mean temperature. If the volume in the system is greater than the limits listed below, then extra expansion tank volume must be added to the system.

Parallel chillers with hydronic packages require that pump inlets be equalized to prevent pump cavitation. Pump expansion tanks must be removed and located together in the common pump suction header. All materials needed for expansion tank relocation are field supplied. Appropriate measures must be taken for freeze protection.

Air separation

The 30RA AquaSnap® chiller will require a field-supplied air separation device when the optional pumping package is provided.

Air must be controlled in a hydronic system if it is to perform properly. Air can block the flow of chilled water to its destinations and can cause cavitation in the pump, which will aerate the pump and potentially cause pump failure. The air separator is sized according to the total flow through the system. The air separator should be located inside the building. There are several types of air separators to choose from. For more information and product selection contact your local manufacturer's representative.

Guide specifications



Air-Cooled Liquid Chiller

HVAC Guide Specifications

Size Range: **9.6 to 54.3 Tons**
(25 to 200 kW) Nominal

Carrier Model Number: **30RA**

Part 1 — General

1.01 SYSTEM DESCRIPTION

Microprocessor controlled, air-cooled liquid chiller utilizing scroll compressors, low sound fans, optional hydronic pump system and fluid storage tank.

1.02 QUALITY ASSURANCE

- A. Unit shall be rated in accordance with ARI Standard 550/590, latest revision (U.S.A.).
- B. Unit construction shall comply with ASHRAE 15 Safety Code, NEC, and ASME applicable codes (U.S.A. codes).
- C. Unit shall be manufactured in a facility registered to ISO 9001:2000 Manufacturing Quality Standard.
- D. Unit shall be full load run tested at the factory.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Unit controls shall be capable of withstanding 150 F (66 C) storage temperatures in the control compartment.
- B. Unit shall be stored and handled per unit manufacturer's recommendations.

Part 2 — Products

2.01 EQUIPMENT

A. General:

Factory assembled, single-piece chassis, air-cooled liquid chiller. Contained within the unit cabinet shall be all factory wiring, piping, controls, refrigerant charge (R-22), and special features required prior to field start-up.

B. Unit Cabinet:

1. Frame shall be of heavy-gage galvanized steel.
2. Cabinet shall be galvanized steel casing with a baked enamel powder or pre-painted finish.
3. Cabinet shall be capable of withstanding 500-hour salt spray test in accordance with the ASTM (U.S.A.) B-117 standard.

C. Fans:

1. Condenser fans shall be direct-driven, 11-blade airfoil cross-section, reinforced polymer construction, shrouded-axial type, and shall be statically and dynamically balanced with inherent corrosion resistance.
2. Two-speed or single fan operation shall allow reduced sound levels during scheduled unoccupied operating periods. Manufacturers without unoccupied reduced sound capability shall submit $1/3$ octave band data and sound power data as measured by ARI 370 as confirmation of unit sound characteristics.
3. Air shall be discharged vertically upward.

4. Fans shall be protected by coated steel wire safety guards.

D. Compressors:

1. Fully hermetic scroll type compressors.
2. Direct drive, 3500 rpm (60 Hz) 2900 rpm (50 Hz), protected by either line break device or discharge gas thermostat, depending on motor, suction gas cooled motor.
3. External vibration isolation - rubber in shear.

E. Cooler:

1. Cooler shall be rated for a refrigerant working-side pressure of 450 psig (3103 kPa) and shall be tested for a maximum fluid-side pressure of 150 psig (1034 kPa) (in Canada, 250 psig [1724 kPa] per Canadian National Registry requirements).
2. Shall be single-pass, ANSI type 316 stainless steel, brazed plate construction.
3. Shell shall be insulated with $3/4$ -in. (19 mm) closed-cell, polyvinyl-chloride foam with a maximum K factor of 0.28.
4. Shall incorporate 2 independent refrigerant circuits on sizes 032 to 055; sizes 010 to 030 shall have one independent refrigerant circuit.
5. Cooler shall have an optional factory-installed heater, to protect cooler from ambient temperature freeze down to -20 F (-29 C).

F. Condenser:

1. Coil shall be air-cooled with integral subcooler, and shall be constructed of aluminum fins mechanically bonded to seamless copper tubes.
2. Tubes shall be cleaned, dehydrated, and sealed.
3. Assembled condenser coils shall be leak tested and pressure tested at 450 psig (3103 kPa).

G. Refrigeration Components:

Refrigerant circuit components shall include filter drier, moisture indicating sight glass, thermal expansion device, and complete operating charge of both refrigerant R-22 and compressor oil.

H. Controls, Safeties, and Diagnostics:

1. Controls:

- a. Unit controls shall include the following minimum components:
- b. Microprocessor with non-volatile memory. Battery backup system shall not be accepted.
- c. Single terminal block for power and controls.
- d. Control transformer to serve all controllers, relays, and control components.
- e. ON/OFF control switch.
- f. Replaceable solid-state relay panels and controllers.
- g. Pressure sensors installed to measure cooler entering and leaving saturated temperatures and outside air temperature. Thermistors



installed to measure cooler entering and leaving fluid temperatures. Provision for field installation of accessory sensor to measure compressor return gas temperature.

2. Unit controls shall include the following functions.
 - a. Automatic circuit lead/lag for dual circuit chillers.
 - b. Capacity control based on leaving chilled fluid temperature and compensated by rate of change of return-fluid temperature with temperature set point accuracy to 0.1° F (0.06° C).
 - c. Limiting the chilled fluid temperature pull-down rate at start-up to an adjustable range of 0.2° F to 2° F (0.11° C to 1.1° C) per minute to prevent excessive demand spikes at start-up.
 - d. Seven-day time schedule.
 - e. Leaving chilled fluid temperature reset from return fluid.
 - f. Chilled water pump start/stop control and primary/standby sequencing to ensure equal pump run time.
 - g. Dual chiller control for parallel chiller applications without addition of hardware modules, control panels, thermometer wells.
 - h. Unoccupied low sound operation to limit condenser fan sound during scheduled periods.
 - i. Timed maintenance scheduling to signal maintenance activities for pumps, condenser coil cleaning, strainer maintenance and user-defined maintenance activities.
 - j. Boiler enable signal to initiate system heating mode.
 - k. Low ambient protection to energize cooler and hydronic system heaters.
 - l. Periodic pump start to ensure pump seals are properly maintained during off-season periods.
3. 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) Cooler freeze protection.
 - 5) Thermistor malfunction.
 - 6) Entering and leaving-fluid temperature.
 - 7) Evaporator and condenser pressure.
 - 8) Time of day:
 - a) 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, fan, and compressor before chiller is started.

- b) 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.
 - c) 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.
 - d) The chiller controller shall include multiple connection ports for communicating with the local equipment network, the Carrier Comfort Network (CCN) and the ability to access all chiller control functions from any point on the chiller.
 - e) The control system shall allow software upgrade without the need for new hardware modules.
4. Safeties:
 - a. Unit shall be equipped with thermistors and all necessary components in conjunction with the control system to provide the unit with the following protections:
 - 1) Loss of refrigerant charge.
 - 2) Reverse rotation.
 - 3) Low chilled fluid temperature.
 - 4) Thermal overload.
 - 5) High pressure.
 - 6) Electrical overload.
 - 7) Loss of phase.
 - b. Condenser fan and factory pump motors shall have external overcurrent protection.

I. Operating Characteristics:

1. Unit shall be capable of starting and running at outdoor ambient temperatures from 45 F (7 C) to 120 F (50 C) for sizes 010-018 or 32 F to 120 F (0° to 52 C) for sizes 022-055.
2. Unit shall be capable of starting up with 95 F (35 C) entering fluid temperature to the cooler.

J. Motors:

Condenser fan motors shall be totally enclosed single speed, 3-phase type with permanently lubricated bearings and Class F insulation (except Motor-master® V control motors which shall be open type and shall have Class B insulation).

Guide specifications (cont)



K. Electrical Requirements:

1. Unit primary electrical power supply shall enter the unit at a single location (some units have multiple poles).
2. Primary electrical power supply shall be rated to withstand 120 F (50 C) operating ambient.
3. Unit shall operate on 3-phase power at the voltage shown in the equipment schedule.
4. Control points shall be accessed through terminal block.
5. Unit shall be shipped with factory control and power wiring installed.
6. Accessory storage tank cooler heater requires a separate power source.

L. Hydronic System:

1. Field pipe connections shall be copper NPT and shall be extended to the outside of the unit chassis.
2. Optional single or primary/stand-by operation pump systems. Dual pump systems shall have pump discharge check valves.
3. Pumps shall be single stage design, for installation in vertical or horizontal position and capable of being serviced without disturbing piping connections.
 - a. Pump casing shall be of class 30 cast iron.
 - b. The impeller shall be of cast bronze, closed type, dynamically balanced, keyed to the shaft and secured by locking cap screw.
 - c. The liquid cavity shall be sealed off at the motor shaft by an internally flushed mechanical seal with ceramic seal seat and carbon seal ring.
 - d. Pump shall be rated for 150 psig working pressure.
 - e. The pump case shall have gauge tapings at the suction and discharge nozzles and include drain ports.
 - f. Motors shall totally enclosed 3-phase type with grease lubricated ball bearings.
 - g. Each pump shall be factory tested per Hydraulic Institute Standards.
4. Fluid expansion tank shall be factory installed within the chiller cabinet insulates, pre-charged and rated for a maximum working pressure of 150 psig.
5. Water pressure gages (2) shall be factory installed across the cooler and rated for 150 psig.
6. Proof-of-flow switch shall be factory installed and rated for 150 psig.
7. Balancing valve shall be factory installed to set flow gage ports shall be factory installed and rated for 300 psig.

8. Hydronic assembly shall have factory supplied electric freeze protection to -20 F (-29 C).
9. Piping shall be type-L seamless copper tubing.
10. Copper body strainer with 20 mesh screen and ball type blow down.

M. 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. Low-Ambient Operation:

- a. Unit shall be capable of starting and running at outdoor ambient temperatures down to -20 F (-29 C) with the addition of antifreeze in the cooler circuit, wind baffles, and field- or factory-installed low-ambient kit (cooler heater).
- b. Unit shall be capable of operating down to -20 F (-29 C) with the addition of the field- or factory-installed solid-state Motormaster® V control with condenser coil temperature sensor. In addition, adequate field-supplied antifreeze with suitable corrosion inhibitor protection shall be field-installed in the evaporator circuit — and where wind velocity greater than 5 mph (8 km/h) is anticipated, field-fabricated and installed wind baffles shall be required.

2. Non-Fused Disconnect:

Unit shall be supplied with factory-installed, non-fused electrical disconnect for main power supply.

3. Optional Condenser Coil Materials:

a. Pre-coated aluminum fin coils:

Shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.

b. Copper-fin coils:

Shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to minimize potential for galvanic corrosion between the coil and pan. All copper construction shall provide protection in moderate coastal applications.



- c. E-Coated aluminum-fin coils:

Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss — 60° of 65-90% per ASTM ID523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lbs (ASTM D2794-93). Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 3000 hours salt spray per ASTM B117-90. Coil construction shall be aluminum fins mechanically bonded to copper tubes.
- d. E-Coated copper-fin coils:

Shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss — 60° of 65-90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lbs (ASTM D2794-93). Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 3000 hours salt spray per ASTM B117-90. Coil construction shall be copper-fins mechanically bonded to copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to maintain coating integrity and minimize corrosion potential between the coil and pan.
4. Remote Enhanced Display:

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

Unit shall be factory modified to start and operate at leaving chilled fluid temperatures between 15 F (–9 C) and 40 F (4.4 C).
6. Chillervisor System Manager Multi-Unit Control:

Field-installed control shall sequence between 2 and 8 chillers in parallel in a single system. System shall control chilled and water pumps.
7. Minimum Load Control:

Unit shall be equipped with factory (or field) installed, microprocessor-controlled, minimum-load control that shall permit unit operation down to a minimum of 15% capacity (varies with unit size).
8. Energy Management Control Module:

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 reset 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.
9. Coil Protection Grilles:

Unit shall be supplied with factory (or field) installed, PVC-coated grilles to protect the condenser coil from physical damage.
10. Hail Guards/Security Grille:

Field-installed accessory kit shall include set of metal grilles for the protection of the condensing coils, coils from damage including hail.
11. Vibration Isolation:

Vibration isolation pads shall be supplied for field installation at unit mounting points. Pads shall help to reduce vibration transmission into the occupied space.
12. Control Display Access Door:

Unit shall be provided with a transparent control box door that allows see-through viewing of control display without opening the control box.
13. Chilled Water Storage Tank:
 - a. Fluid storage tank shall be rated for a maximum of 150 psig.
 - b. Shall provide a minimum 6 gallon per ton fluid storage capacity.
 - c. Shall fit under the chiller to minimize system footprint requirements. Tanks fitted outside of the chiller footprint shall not be acceptable.
 - d. Tank shall be constructed a cold rolled carbon steel shell.
 - e. Tank shall be insulated with $\frac{3}{4}$ -in. (19 mm) closed-cell, polyvinyl-chloride foam with a maximum K factor of 0.28.
 - f. Tank shall be baffled to prevent temperature stratification.
 - g. Tank shall have NPT threaded connections.

Guide specifications (cont)



- h. Tank shall have vent and drain plugs accessible from outside tank enclosure.
 - i. Internal heaters shall provide freeze protection to -20 F (-29 C).
14. DataPort™ control:
Unit shall be supplied with field-installed interface device that allows a non-Carrier device such as a personal computer or non-Carrier controller to *read* values in system elements connected to the CCN Communication Bus using plain english ASCII over its RS-232 connection.
15. DataLINK™ control:
Unit shall be supplied with field installed interface device that allows a non-Carrier device such as a personal computer or non-Carrier controller to *read and change values* in system elements connected to the CCN Communication Bus using plain english ASCII over its RS-232 connection.
16. BAclink control:
Unit shall be supplied with field-installed interface between Carrier Comfort Network (CCN) and a BACnet Local Area network (LAN, i.e., Ethernet (ISO8802-3)).
17. 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.
18. Leaving chilled fluid temperature reset from return fluid, outdoor air temperature, space temperature or 4 to 20 mA input.

