

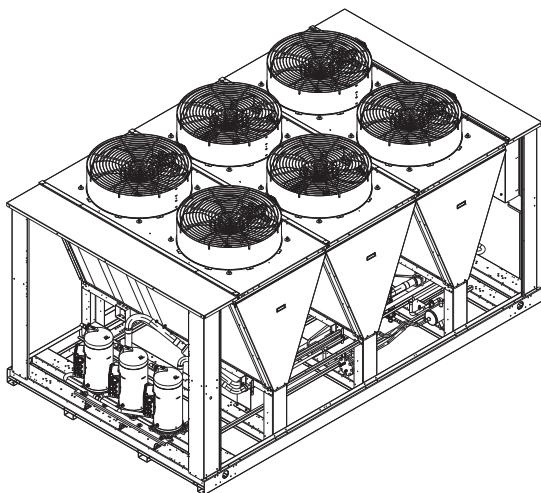
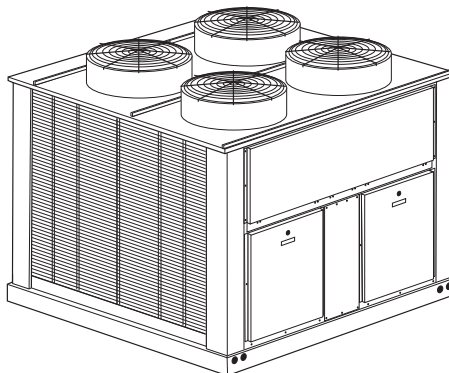
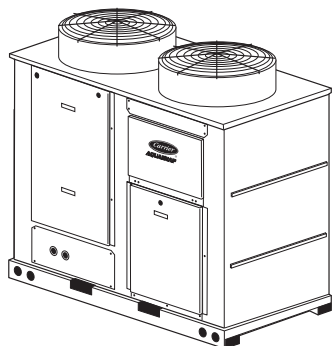


Product Data

AQUASNAP® 30RAP010-090 Air-Cooled Chillers with PURON® Refrigerant (R-410A)

10 to 90 Nominal Tons
(35 to 316 Nominal kW)

AQUASNAP®



The AquaSnap chiller is an effective all-in-one package that is easy to install and easy to own. AquaSnap chillers operate quietly and efficiently. Value-added features include:

- Rotary scroll compression
- HFC Puron® refrigerant (R-410A)
- Low-sound AeroAcoustic™ fan system
- Easy to use ComfortLink™ controls
- Optional integrated hydronic pump package with VFD (variable frequency drive) compatible motors, with optional VFD on 070-090 models
- Microchannel condenser coil technology
- Accessory fluid storage tank on 010 - 060 models
- Optional digital scroll compressors

Features/Benefits

Carrier's superior chiller design provides savings at initial purchase, at installation, and for years afterward.

Costs less right from the start

Carrier's AquaSnap chillers feature a compact, all-in-one package design that installs quickly and easily on the ground or the rooftop. The optional pump and hydronic components are already built in; this costs less than buying and installing the components individually. The chiller's fully integrated and pre-assembled hydronic system installs in minutes. No other chiller in this class installs so easily and inexpensively. The preassembled and integrated hydronic module utilizes top-quality components and pumps to ensure years of reliable operation.

Use of the optional fluid storage tank, available on size 010-060 models, reduces installation costs and ensures sufficient fluid volume is available for close-coupled and process cooling applications. The AquaSnap unit's high efficiency keeps costs down.



Features/Benefits (cont)



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

The AquaSnap chiller's low-sound AeroAcoustic™ fan produces up to half the sound level of propeller fans. Much of the noise reduction is in frequencies where noise is most annoying, which makes AquaSnap chillers ideal for sound-sensitive environments. When lower ambient temperatures allow part-load operation or during scheduled nighttime operation, the units operate with fewer fans and become even quieter. AquaSnap chillers are quiet during the day and even quieter at night.

The savings will continue to mount

Besides costing less to buy and install, AquaSnap chillers are also more affordable to operate. Carrier's Aqua Series chillers are our most efficient air-cooled models. The AquaSnap chiller provides full load EER (Energy Efficiency Ratio) up to 10.5 and IPLV (integrated part load value) up to 15.9. AquaSnap chillers use ultra-quiet, high-efficiency rotary scroll compressors, operated in single (sizes 010 and 015) tandem (sizes 018 to 060), and tandem or trio (sizes 070 to 090) per independent circuit for greater efficiency at partial loads.

Electronic expansion valve (EXV) allows for precise control through all operating ranges, resulting in higher efficiency and improved reliability.

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 035 and up have two independent refrigerant circuits. Year-round operation is standard, from -20 F (-29 C) (with optional cooler heater, low ambient control, and wind baffles) to 120 F (50 C).

Rotary scroll compressors provide smooth, quiet and reliable operation.

All-in-one package

AquaSnap chillers provide the most comprehensive chilled water circuit available for any air-cooled chiller. Included is a brazed plate direct expansion cooler that may be remote-mounted. The cooler is also completely drainable with factory-installed vents and drains.

Electronic thermal-dispersion flow switch is included with the cooler. The switch is factory installed and tested and contains no moving parts for high reliability.

Optional integrated hydronics package is more than just a pump, it is an entire chilled water system, including:

- Single/dual pumps up to 15 hp and 160 ft head
- Regular strainer
- Cleanout strainer
- Flow regulator

- Freeze protection to -20 F (-29 C) (with freeze protection option)
- Heaters
- Required piping
- Pressure/temperature taps
- Isolation valves for dual pump systems
- VFD available on sizes 070 to 090, and VFD compatibility on all models

The factory-installed and tested hydronics package provides faster, simpler and less expensive installation.

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

Environmentally sound

Carrier's Puron® refrigerant (R-410A) enables you to make a responsible decision in the protection of the earth's ozone layer. Puron refrigerant is an HFC refrigerant that does not contain chlorine that is damaging to the ozone layer. Puron refrigerant is unaffected by the Montreal Protocol. Puron refrigerant is a safe, non-toxic*, efficient and environmentally sound refrigerant for the future.

Durable construction

The 30RAP chillers have a structurally sound base that can be point-loaded, therefore, no perimeter base rail is required. All 30RAP units have weatherized cabinets constructed of heavy-duty galvanized steel with exterior panels painted with corrosion-resistant baked enamel. Inside and outside surfaces are protected to ensure long life and good appearance. The durable, galvanized steel, painted components exceed the requirements of the 500-hour salt spray test per ASTM (American Society for Testing and Materials) B117.

ComfortLink™ controls speak your language

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

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temperature reset, demand limiting, compressor wear minimization and protection, temperature and pressure displays and diagnostic functions. These controls result in higher chiller reliability, simplified training and more productive service calls with correspondingly lower operational and maintenance costs.

Carrier's exclusive accessory hand-held Navigator™ display provides convenience and powerful information in the palm of your hand. The Navigator display helps technicians to quickly diagnose problems and even prevent them from occurring.

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

A BACnet† communication option is also available for the i-Vu® Open control system or a BACnet building automation system.

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

The integrated hydronics and the chilled fluid storage tank's placement under the chiller minimize the footprint, allowing easy installation almost anywhere.

Novation® heat exchanger technology

The Novation heat exchanger design with microchannel (MCHX) condenser coil is a robust, cost effective alternative to traditional coil design. These coils are offered coated or uncoated to match coil protection to site conditions. The Carrier Electronic Catalog (E-Cat) can be used to determine whether or not corrosion protection is recommended for particular applications in coastal/marine environments. Following the input of the requested

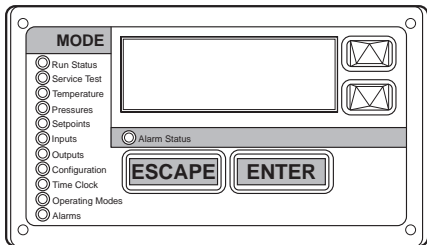
data, the E-Cat program output will advise the appropriate coil to be used. Other factors described in "Selection Guide: Environmental Corrosion Protection, Novation Heat Exchanger with Microchannel Coil Technology" catalog number 04-581042-01 must also be considered to determine if corrosion protection is required.

Microchannel coils are more robust than other coil types, making them easier to clean without causing damage to the coil.

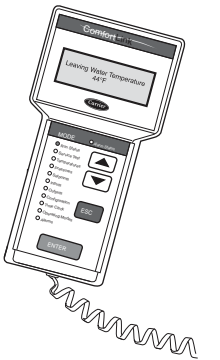
Due to the compact all aluminum design, microchannel coils will reduce average unit operating weight by 25% compared to the previous 30RA units. The streamlined MCHX coil design also reduces refrigerant charge by an average of 60% compared to the previous 30RA units.

* Under ASHRAE Standard 34-1992, R-410A is classified as an A1 refrigerant.

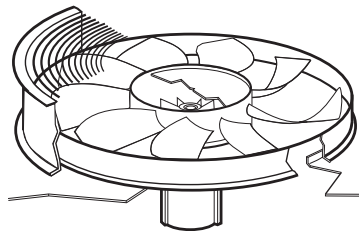
† Sponsored by ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers).



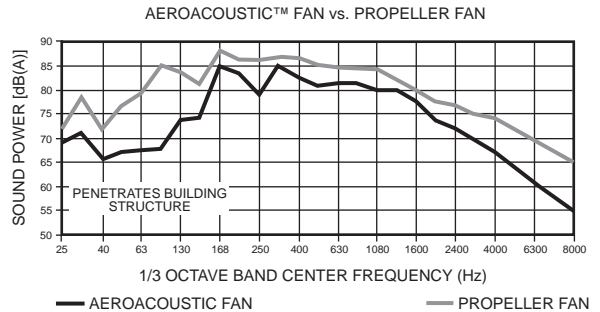
SCROLLING MARQUEE DISPLAY



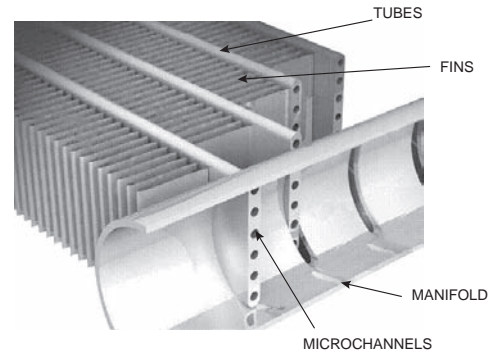
NAVIGATOR™ DISPLAY MODULE



LOW-SOUND AEROACOUSTIC FAN WITH NIGHTTIME LOW



AEROACOUSTIC FAN VS PROPELLER FAN



NOVATION® HEAT EXCHANGER TECHNOLOGY WITH MICROCHANNEL CONDENSER COILS

Model number nomenclature



AQUASNAP® CHILLER MODEL NUMBER DESIGNATION

30RA P 010 6 D - 0 6 0 0 0

30RA – Air-Cooled AquaSnap Chiller

Refrigerant Type

P – Puron®

Unit Sizes

010 025 045 070
015 030 050 080
018 035 055 090
020 040 060

Voltage

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

Condenser Coil/Low Sound Options

5 – MCHX, Value Sound Fan
6 – MCHX, E-coat, Value Sound Fan
D – MCHX, AeroAcoustic™ Fan
F – MCHX, E-coat, AeroAcoustic™ Fan
J – MCHX, AeroAcoustic Fan, Compressor Blanket(s)
K – MCHX, E-coat, AeroAcoustic Fan, Compressor Blanket(s)

Revision Level

A – Current Revision Level

Hydronic System

30RAP010-060

0 – No Pump
2 – Single Pump, 1.5 Hp
3 – Single Pump, 3 Hp
4 – Single Pump, 3 Hp High Head
5 – Single Pump, 5 Hp
6 – Single Pump, 5 Hp High Head
7 – Single Pump, 7.5 Hp
Z – Single Pump, 10 Hp
9 – Dual Pump, 1.5 Hp
B – Dual Pump, 3 Hp
C – Dual Pump, 3 Hp High Head
D – Dual Pump, 5 Hp
F – Dual Pump, 5 Hp High Head
G – Dual Pump, 7.5 Hp
H – Dual Pump, 10 Hp

30RAP070-090

0 – No Pump
1 – Single Pump, 3 Hp
2 – Single Pump, 5 Hp
3 – Single Pump, 7.5 Hp
4 – Single Pump, 10 Hp
5 – Single Pump, 15 Hp
6 – Dual Pump, 3 Hp
7 – Dual Pump, 5 Hp
8 – Dual Pump, 7.5 Hp
9 – Dual Pump, 10 Hp
B – Dual Pump, 15 Hp
C – Single Pump, 3 Hp with VFD
D – Single Pump, 5 Hp with VFD
F – Single Pump, 7.5 Hp with VFD
G – Single Pump, 10 Hp with VFD
H – Single Pump, 15 Hp with VFD
J – Dual Pump, 3 Hp with VFD
K – Dual Pump, 5 Hp with VFD
L – Dual Pump, 7.5 Hp with VFD
M – Dual Pump, 10 Hp with VFD
N – Dual Pump, 15 Hp with VFD

Packaging/Security Options

0 – Std Packaging
4 – Security Grilles/Hail Guards Only
8 – Skid Only
D – Skid, Security Grilles/Hail Guards
J – Skid, Top Crate, Bag
N – Skid, Top Crate, Bag, Security Grilles/Hail Guards

Controls/Communications Options

0 – Std
1 – Std, BACnet Communication
5 – EMM
6 – EMM, BACnet Communication
B – EMM, GFI
C – EMM, GFI, BACnet Communication
H – GFI
J – GFI, BACnet Communication

Electrical Options

30RAP010-060

0 – No Disconnect, No Cooler Heater
1 – No Disconnect, Cooler Heater
D – Non-Fused Disconnect, No Cooler Heater
F – Non-Fused Disconnect, Cooler Heater

30RAP070-090

0 – Single Point, No Disconnect, No Cooler Heater
1 – Single Point, No Disconnect, Cooler Heater
2 – Single Point, Non-Fused Disconnect, No Cooler Heater
3 – Single Point, Non-Fused Disconnect, Cooler Heater
4 – Dual Point, No Disconnect, No Cooler Heater
5 – Dual Point, No Disconnect, Cooler Heater

Ambient/Capacity Control/Interrupt Options

0 – Std Comp, Std Interrupt
1 – Hot Gas Bypass, Std Interrupt
2 – Digital Comp, Std Interrupt
3 – Std Comp, High Interrupt
4 – Hot Gas Bypass, High Interrupt
5 – Digital Comp, High Interrupt
6 – Low Ambient, Std Comp, Std Interrupt
7 – Low Ambient, Hot Gas Bypass, Std Interrupt
8 – Low Ambient, Digital Comp, Std Interrupt
9 – Low Ambient, Std Comp, High Interrupt
B – Low Ambient, Hot Gas Bypass, High Interrupt
C – Low Ambient, Digital Comp, High Interrupt
D – Std Comp, Std Interrupt, Suction Service Valve
F – Hot Gas Bypass, Std Interrupt, Suction Service Valve
G – Digital Comp, Std Interrupt, Suction Service Valve
H – Std Comp, High Interrupt, Suction Service Valve
J – Hot Gas Bypass, High Interrupt, Suction Service Valve
K – Digital Comp, High Interrupt, Suction Service Valve
L – Low Ambient, Std Comp, Std Interrupt, Suction Service Valves
M – Low Ambient, Hot Gas Bypass, Std Interrupt, Suction Service Valves
N – Low Ambient, Digital Comp, Std Interrupt, Suction Service Valves
P – Low Ambient, Std Comp, High Interrupt, Suction Service Valves
Q – Low Ambient, Hot Gas Bypass, High Interrupt, Suction Service Valves
R – Low Ambient, Digital Comp, High Interrupt, Suction Service Valves

LEGEND

EMM — Energy Management Module
GFI — Ground Fault Interrupting
MCHX — Microchannel Heat Exchanger
SCCR — Short Circuit Current Rating

Quality Assurance

Certified to ISO 9001



AHRI* capacity ratings



UNIT 30RAP	CAPACITY		COMPRESSOR POWER INPUT (kW)	FAN POWER (kW)	TOTAL POWER (kW)	FULL LOAD		IPLV		COOLER FLOW RATE		COOLER WATER PRESSURE DROP	
	Tons	kW				EER	COP	EER	COP	GPM	L/s	Ft wg	kPa
010	10.5	36.8	10.7	1.2	12.0	10.5	3.1	14.2	4.2	25.1	1.6	13.7	40.9
015	14.0	49.2	15.6	1.3	16.8	10.0	2.9	13.2	3.9	33.5	2.1	15.7	46.8
018	16.1	56.6	15.6	3.0	18.6	10.4	3.0	14.5	4.2	38.6	2.4	15.6	46.5
020	18.8	66.1	19.1	2.9	21.9	10.3	3.0	14.5	4.2	45.2	2.9	14.2	42.4
025	23.4	82.3	24.5	2.8	27.4	10.3	3.0	15.3	4.5	56.3	3.6	17.8	53.1
030	27.6	97.1	30.9	2.7	33.6	9.9	2.9	14.8	4.3	66.3	4.2	20.9	62.3
035	34.4	121.0	35.9	3.8	39.7	10.4	3.0	14.9	4.4	82.5	5.2	13.2	39.4
040	38.9	136.8	42.3	3.8	46.1	10.1	3.0	15.3	4.5	93.4	5.9	13.8	41.2
045	43.1	151.6	48.6	3.4	52.0	10.0	2.9	15.3	4.5	103.4	6.5	15.3	45.6
050	47.3	166.3	53.1	3.8	57.0	10.0	2.9	14.7	4.3	113.5	7.2	19.1	57.0
055	51.8	182.2	56.4	5.3	61.7	10.1	3.0	14.6	4.3	124.2	7.8	17.6	52.5
060	56.0	196.9	60.8	5.3	66.2	10.2	3.0	14.5	4.2	134.4	8.5	20.5	61.2
070	68.9	242.3	74.6	6.8	81.4	10.2	3.0	15.2	4.5	165.2	10.4	19.5	59.4
080	77.4	272.2	83.2	6.7	89.9	10.3	3.0	15.5	4.5	185.9	11.7	21.2	52.5
090	84.0	295.4	91.0	6.8	97.8	10.3	3.0	15.9	4.7	201.7	12.7	22.7	65.6

LEGEND

COP — Coefficient of Performance
EER — Energy Efficiency Ratio
IPLV — Integrated Part Load Value

* Air Conditioning, Heating, and Refrigeration Institute.
 NOTE: Based on AHRI-550/590 standard rating conditions. Ratings are for standard chillers only. Ratings do not include options.



Physical data



ENGLISH

UNIT 30RAP	010	015	018	020	025	030	035	040	045	050	055	060	070	080	090		
OPERATING WEIGHT (lb)																	
MCHX Condenser Coil, No Pump	704	718	1125	1133	1242	1283	2163	2185	2238	2263	2369	2375	3410	3641	3697		
MCHX Condenser Coil, Single Pump	866	880	1288	1296	1405	1446	2507	2529	2582	2606	2713	2719	3812	4035	4061		
MCHX Condenser Coil, Dual Pump	1029	1043	1450	1458	1567	1608	2850	2872	2925	2950	3056	3062	4092	4390	4411		
REFRIGERANT TYPE	R-410A, EXV Controlled System																
Total Refrigerant Charge (lb)	8.6	9.6	14.6	15.2	16.7	17.6	29.2	29.9	33.5	33.7	34.3	34.5	60.5	70.2	71.0		
Refrigerant Charge (lb) Ckt A/Ckt B	8.6/—	9.6/—	14.6/—	15.2/—	16.7/—	17.6/—	14.3/14.9	14.9/15.0	16.5/17.0	16.7/17.0	16.9/17.4	17.1/17.4	25.5/35	35.1/35.1	35.5/35.5		
COMPRESSORS	Scroll, Hermetic																
Quantity	1	1	2	2	2	2	4	4	4	4	4	4	5	6	6		
Speed (Rpm)	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500		
(Qty, Tons) Ckt A	(1) 11	(1) 15	(2) 9	(2) 10	(2) 13	(2) 15	(2) 10	(2) 11	(2) 13	(2) 13	(2) 13	(2) 15	(2) 15	(3) 13	(3) 15		
(Qty, Tons) Ckt B	—	—	—	—	—	—	(2) 9	(2) 11	(2) 13	(2) 13	(2) 15	(2) 15	(3) 15	(3) 15	(3) 15		
Oil Charge (Pt) Ckt A/Ckt B	6.9/—	6.9/—	13.8/—	13.8/—	13.8/—	13.8/—	13.8/13.8	13.8/13.8	13.8/13.8	13.8/13.8	13.8/13.8	13.8/13.8	20.6/20.6	20.6/20.6	20.6/20.6		
No. Capacity Steps																	
Standard	1	1	2	2	2	2	4	4	4	4	4	4	5	6	6		
With Hot Gas Bypass	—	—	3	3	3	3	5	5	5	5	5	5	6	7	7		
Digital Compressor Option	13	13	—	22	22	22	44	44	44	44	44	44	55	66	66		
Minimum Capacity Step (%)																	
Standard	100	100	50	50	50	50	23	23	24	25	23	25	20	15	17		
With Hot Gas Bypass	—	—	20	24	29	32	9	11	12	14	13	16	13	9	11		
Digital Compressor Option	20	20	—	15	15	15	8	8	8	8	8	8	6	5	5		
Capacity (%)																	
Circuit A	100	100	100	100	100	100	54	47	47	50	46	50	40	46	50		
Circuit B	—	—	—	—	—	—	46	53	53	50	54	50	60	54	50		
COOLER	Brazed, Direct-Expansion Plate Heat Exchanger																
Weight (lb) (empty)	22.4	27.5	31.8	40.3	46.3	80.6	99.4	117.9	125.3	137.5	160.4	160.4	197	228	245		
Net Fluid Volume (gal)	0.6	0.8	0.9	1.2	1.4	2.0	2.6	3.3	3.5	4.1	5.0	5.0	4.3	5.0	6.8		
Maximum Refrigerant Pressure (psig)	505	505	505	505	505	565	565	565	565	565	565	565	450	450	450		
Maximum Water-Side Pressure Without Pump(s) (psig)	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300		
Maximum Water-Side Pressure With Pump(s) (psig)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150		
CHILLER WATER CONNECTIONS (in.)																	
Inlet and Outlet, Victaulic (IPS Carbon Steel)*	2	2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3		
Drain (NPT)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2		
CONDENSER FANS	Standard Low-Sound AeroAcoustic™ Type																
Type	Plastic Type, Axial, Vertical Discharge																
Fan Speed (Rpm)	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850		
No. Blades...Diameter (in.)	9...30	9...30	9...30	9...30	9...30	9...30	9...30	9...30	9...30	9...30	9...30	9...30	9...30	9...30	9...30		
No. Fans	1	1	2	2	2	2	3	3	3	3	4	4	5	6	6		
Total Airflow (Cfm)	9400	9400	17,500	17,500	19,400	19,400	29,600	29,600	30,500	30,500	38,800	38,800	52,000	62,400	62,400		
Optional Value Sound Type	Propeller Type, Axial, Vertical Discharge																
Fan Speed (Rpm)	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140		
No. Blades...Diameter (in.)	4...30	4...30	4...30	4...30	4...30	4...30	4...30	4...30	4...30	4...30	4...30	4...30	4...30	4...30	4...30		
No. Fans	1	1	2	2	2	2	3	3	3	3	4	4	5	6	6		
Total Airflow (Cfm)	10,100	10,100	18,500	18,500	20,900	20,900	32,000	32,000	33,300	33,300	41,800	41,800	56,250	67,500	67,500		
CONDENSER COILS	Novation® MCHX Aluminum Tube, Aluminum Fin																
Quantity (Ckt A/Ckt B)	1/—	1/—	1/—	1/—	1/—	1/—	1/1	1/1	1/1	1/1	1/1	1/1	2/3	3/3	3/3		
Total Face Area (sq ft)	17	17	26	26	33	33	53	53	66	66	66	66	124.7	149.6	149.6		
Maximum Refrigerant Pressure (psig)	656	656	656	656	656	656	656	656	656	656	656	656	656	656	656		
HYDRONIC MODULE (Optional)†	Pump(s), Strainer with Blowdown Valve, Expansion Tank, Pressure Taps, Drain and Vent Plugs, Flow Switch, and Balance Valve																
Pump	Single or Dual, Centrifugal Monocell Pump(s), 3500 Rpm. Dual pumps with check valves and isolation valves.																
Expansion Tank Volume (gal)																	
Total/Acceptance	4.4/3.2							10.3/10.3							—	—	—
CHASSIS DIMENSIONS (ft - in.)																	
Length	5-7	5-7	7-5	7-5	7-5	7-5	7-5	7-5	7-5	7-5	7-5	7-5	12-7	12-7	12-7		
Width	3-5	3-5	3-5	3-5	3-5	3-5	3-5	7-9	7-9	7-9	7-9	7-9	7-4	7-4	7-4		
Height	5-6	5-6	5-6	5-6	6-6	6-6	5-6	5-6	6-6	6-6	6-6	6-6	6-6	6-6	6-6		

LEGEND

- EXV — Electronic Expansion Valve
- MCHX — Microchannel Heat Exchanger

*All units have Victaulic connections, sized for IPS Carbon Steel piping.

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



SI

UNIT 30RAP	010	015	018	020	025	030	035	040	045	050	055	060	070	080	090		
OPERATING WEIGHT (kg)																	
MCHX Condenser Coil, No Pump	319	326	510	514	564	582	981	991	1015	1026	1075	1077	1547	1652	1677		
MCHX Condenser Coil, Single Pump	393	399	584	588	637	656	1137	1147	1171	1182	1231	1233	1729	1830	1842		
MCHX Condenser Coil, Dual Pump	467	473	658	661	711	729	1293	1303	1327	1338	1386	1389	1856	1991	2001		
REFRIGERANT TYPE	R-410A, EXV Controlled System																
Total Refrigerant Charge (kg)	3.9	4.4	6.6	7.1	7.6	8.0	13.4	13.6	15.6	15.7	16.0	16.1	27.5	31.8	32.2		
Refrigerant Charge (kg) Ckt A/Ckt B	3.9/—	4.4/—	6.6/—	7.1/—	7.6/—	8.0/—	6.8/6.7	6.8/6.8	7.8/7.8	7.8/7.8	7.9/8.1	8.1/8.1	11.6/15.9	15.9/15.9	16.1/16.1		
COMPRESSORS	Scroll, Hermetic																
Quantity	1	1	2	2	2	2	4	4	4	4	4	4	5	6	6		
Speed (R/s)							58.3	4									
(Qty, kW) Ckt A	(1) 38	(1) 53	(2) 32	(2) 35	(2) 46	(2) 53	(2) 35	(2) 35	(2) 38	(2) 46	(2) 46	(2) 53	(2) 53	(3) 46	(3) 53		
(Qty, kW) Ckt B	—	—	—	—	—	—	(2) 32	(2) 38	(2) 46	(2) 46	(2) 53	(2) 53	(3) 53	(3) 53	(3) 53		
Oil Charge (L) Ckt A/Ckt B	3.3/—	3.3/—	6.5/—	6.5/—	6.5/—	6.5/—	6.5/6.5	6.5/6.5	6.5/6.5	6.5/6.5	6.5/6.5	6.5/6.5	6.5/9.7	9.7/9.7	9.7/9.7		
No. Capacity Steps																	
Standard	1	1	2	2	2	2	4	4	4	4	4	4	5	6	6		
With Hot Gas Bypass	—	—	3	3	3	3	5	5	5	5	5	5	6	7	7		
Digital Compressor Option	13	13	—	22	22	22	44	44	44	44	44	44	55	66	66		
Minimum Capacity Step (%)																	
Standard	100	100	50	50	50	50	23	23	24	25	23	25	20	15	17		
With Hot Gas Bypass	—	—	20	24	29	32	9	11	12	14	13	16	13	9	11		
Digital Compressor Option	20	20	—	15	15	15	8	8	8	8	8	8	6	5	5		
Capacity (%)																	
Circuit A	100	100	100	100	100	100	54	47	47	50	46	50	40	46	50		
Circuit B	—	—	—	—	—	—	46	53	53	50	54	50	60	54	50		
COOLER	Braze, Direct-Expansion Plate Heat Exchanger																
Weight (kg) (empty)	10.1	12.5	14.4	18.3	21.0	36.6	45.1	53.5	56.8	62.4	72.8	72.8	89.4	103.4	111.1		
Net Fluid Volume (L)	2.3	3.0	3.4	4.5	5.3	7.6	9.8	12.5	13.2	15.5	18.9	18.9	16.3	18.9	25.7		
Maximum Refrigerant Pressure (kPa)	3482	3482	3482	3482	3482	3896	3896	3896	3896	3896	3896	3896	3103	3103	3103		
Maximum Water-Side Pressure Without Pump(s) (kPa)	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068	2068		
Maximum Water-Side Pressure With Pump(s) (kPa)	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034		
CHILLER WATER CONNECTIONS (in.)																	
Inlet and Outlet, Victualic (IPS Carbon Steel)*	2	2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3		
Drain (NPT)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2		
CONDENSER FANS	Plastic Type, Axial, Vertical Discharge																
Standard Low-Sound AeroAcoustic™ Type																	
Fan Speed (R/s)	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2		
No. Blades...Diameter (mm)	9...762	9...762	9...762	9...762	9...762	9...762	9...762	9...762	9...762	9...762	9...762	9...762	9...762	9...762	9...762		
No. Fans	1	1	2	2	2	2	3	3	3	3	4	4	5	6	6		
Total Airflow (L/s)	4400	4400	8300	8300	9200	9200	14,000	14,000	14,400	14,400	18,300	18,300	24,541	29,450	29,450		
Optional Value Sound Type																	
Propeller Type, Axial, Vertical Discharge																	
Fan Speed (R/s)	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0		
No. Blades...Diameter (mm)	4...762	4...762	4...762	4...762	4...762	4...762	4...762	4...762	4...762	4...762	4...762	4...762	4...762	4...762	4...762		
No. Fans	1	1	2	2	2	2	3	3	3	3	4	4	5	6	6		
Total Airflow (L/s)	4800	4800	8700	8700	9900	9900	15,100	15,100	15,700	15,700	19,700	19,700	26,547	31,856	31,856		
CONDENSER COILS	Novation® MCHX Aluminum Tube, Aluminum Fin																
Quantity (Ckt A/Ckt B)	1/—	1/—	1/—	1/—	1/—	1/—	1/1	1/1	1/1	1/1	1/1	1/1	2/3	3/3	3/3		
Total Face Area (sq m)	1.6	1.6	2.4	2.4	3.1	3.1	4.9	4.9	6.1	6.1	6.1	6.1	11.6	13.9	13.9		
Maximum Refrigerant Pressure (kPa)	4523	4523	4523	4523	4523	4523	4523	4523	4523	4523	4523	4523	4523	4523	4523		
HYDRONIC MODULE (Optional)†	Pump(s), Strainer with Blowdown Valve, Expansion Tank, Pressure Taps, Drain and Vent Plugs, Flow Switch, and Balance Valve																
Pump	Single or Dual, Centrifugal Monocell Pump(s), 3500 Rpm. Dual pumps with check valves and isolation valves.																
Expansion Tank Volume (L)																	
Total/Acceptance	17.4/12.3							39.0/39.0							—	—	—
CHASSIS DIMENSIONS (mm)																	
Length	1689	1689	2242	2242	2242	2242	2248	2248	2248	2248	2248	2248	3826	3826	3826		
Width	1029	1029	1025	1025	1025	1025	2350	2350	2350	2350	2350	2350	2241	2241	2241		
Height	1689	1689	1689	1689	1994	1994	1689	1689	1994	1994	1994	1994	1976	1976	1976		

LEGEND

- EXV — Electronic Expansion Valve
- MCHX — Microchannel Heat Exchanger

*All units have Victaulic connections, sized for IPS Carbon Steel piping.

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

Physical data (cont)



UNIT WEIGHTS STANDARD UNITS

30RAP SIZE	POUNDS				
	A	B	C	D	Total Weight
010	188	209	161	146	704
015	193	213	163	149	718
018	363	264	209	288	1125
020	365	266	211	290	1133
025	393	290	237	321	1242
030	405	301	246	331	1283
035	652	730	413	369	2163
040	704	697	390	394	2185
045	675	758	425	379	2238
050	732	724	401	405	2263
055	744	762	437	427	2369
060	746	762	438	429	2375
070	930	984	727	770	3410
080	936	1038	791	877	3641
090	952	1057	800	888	3697

30RAP SIZE	KILOGRAMS				
	A	B	C	D	Total Weight
010	86	95	73	66	319
015	88	97	74	67	326
018	165	120	95	131	510
020	166	121	96	132	514
025	178	132	108	146	564
030	184	136	112	150	582
035	296	331	187	167	981
040	319	316	177	179	991
045	306	344	193	172	1015
050	332	328	182	184	1026
055	337	346	198	194	1075
060	338	346	199	195	1077
070	422	446	330	349	1547
080	425	471	359	398	1652
090	432	479	363	403	1677

SINGLE PUMP UNITS

30RAP SIZE	POUNDS				
	A	B	C	D	Total Weight
010	215	264	213	174	866
015	220	268	215	177	880
018	404	306	249	329	1288
020	406	308	251	331	1296
025	434	332	277	362	1405
030	446	342	286	372	1446
035	677	877	537	415	2507
040	728	846	513	441	2529
045	701	906	550	425	2582
050	756	873	524	453	2606
055	768	910	561	474	2713
060	771	910	562	476	2719
070	1036	1032	871	874	3812
080	1054	1070	963	948	4035
090	1063	1082	967	950	4061

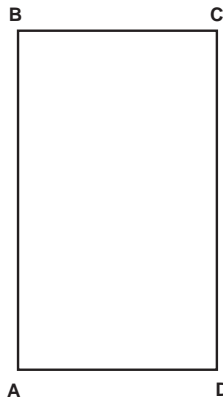
30RAP SIZE	KILOGRAMS				
	A	B	C	D	Total Weight
010	98	120	97	79	393
015	100	122	98	80	399
018	183	139	113	149	584
020	184	140	114	150	588
025	197	151	126	164	637
030	202	155	130	169	656
035	307	398	244	188	1137
040	330	384	233	200	1147
045	318	411	249	193	1171
050	343	396	238	206	1182
055	349	413	254	215	1231
060	350	413	255	216	1233
070	470	468	395	396	1729
080	478	485	437	430	1830
090	482	491	438	431	1842

DUAL PUMP UNITS

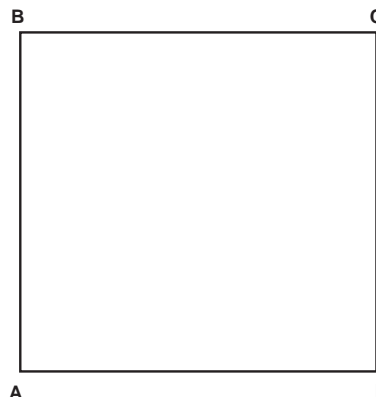
30RAP SIZE	POUNDS				
	A	B	C	D	Total Weight
010	242	319	266	202	1029
015	247	323	268	205	1043
018	445	347	288	370	1450
020	447	349	290	372	1458
025	475	373	316	403	1567
030	487	383	325	413	1608
035	705	1022	664	459	2850
040	755	992	639	486	2872
045	729	1051	677	469	2925
050	783	1019	649	499	2950
055	796	1055	687	518	3056
060	798	1056	688	520	3062
070	1123	1036	928	1005	4092
080	1159	1094	1038	1099	4390
090	1167	1104	1041	1099	4411

30RAP SIZE	KILOGRAMS				
	A	B	C	D	Total Weight
010	110	145	121	92	467
015	112	147	121	93	473
018	202	157	131	168	658
020	203	158	132	169	661
025	216	169	144	183	711
030	221	174	147	187	729
035	320	463	301	208	1293
040	343	450	290	221	1303
045	331	477	307	213	1327
050	355	462	295	226	1338
055	361	479	312	235	1386
060	362	479	312	236	1389
070	509	470	421	456	1856
080	526	496	471	499	1991
090	529	501	472	499	2001

30RAP010-030 UNITS



30RAP035-090 UNITS



NOTE: When the accessory storage tank is employed, the value for total weight increases (to be added to the weights shown above) by 1673 pounds (759 kg) on 30RAP010-015, by 2193 pounds (995 kg) on 30RAP018-030, and by 4361 pounds (1978 kg) on 30RAP035-060. Even with the storage tank, all 30RAP chillers require only 4-point support.

Options and accessories



ITEM	FACTORY-INSTALLED OPTION	FIELD-INSTALLED ACCESSORY
Condenser Coil and Sound Options		
MCHX E-Coat	X	
Low Sound Compressor Blankets		X
Value Sound Fans	X	
Ultra-Low Sound	X	
Controls/Communication Options		
BACnet Communications	X	
BACnet Translator Control		X
Chillervisor System Manager III Multi-Unit Control		X
Energy Management Module (EMM)	X	X
LON (Local Operating Network) Translator Control		X
Navigator™ Display		X
Remote Enhanced Display		X
Touch Pilot™ Display		X
Cooler Options		
Freeze Protection — Cooler Heaters	X	
Remote Cooler Kit		X
Electrical Options		
Unit-Mounted Main Disconnect, Non-Fused (not available with dual point power)	X	
GFI Convenience Outlet (115 v)	X	X
High SCCR (Short Circuit Current Rating)	X	
Hydronics Option		
Hydronic Pump Package	X	
Fluid Storage Tank (available on sizes 010-060)		X
Variable Frequency Drive (VFD) (available on sizes 070-090)	X	
Refrigeration Circuit Options		
Compression Suction Service Valves (available on sizes 070-090)	X	
Low Ambient Temperature Head Pressure Control	X	X
Hot Gas Bypass (not available on sizes 010 and 015)	X	X
Digital Compressor (not available on size 018)	X	
Security/Packaging Options		
Security Grilles/Hail Guards	X	X
Vibration Isolation		X
Wind Baffles		X

Factory-installed options

Novation® heat exchanger technology microchannel coil (aluminum fin/aluminum tube) e-coat condenser is available for optimum durability. Novation heat exchangers with microchannel coil technology are offered coated or uncoated to match coil protection to site conditions. The Carrier Electronic Catalog (E-Cat) can be used to determine whether or not corrosion protection is recommended for particular applications in coastal/marine environments. Following the input of the requested data, the E-Cat program output will advise the appropriate coil to be used. Other factors described in "Selection Guide: Environmental Corrosion Protection, Novation Heat Exchanger with Microchannel Coil Technology" catalog number 04-581042-01 must also be considered to determine if corrosion protection is required.

Value sound fans provide a metal, propeller-type fan system which is cost-effective when compared to the low-sound AeroAcoustic™ fan system. This factory-installed fan option is compatible with the Motormaster® V option.

Ultra-low sound provides a combination of low sound AeroAcoustic™ fans with sound blankets.

Digital compressor control allows incremental unloading for a closer match to building load. This option is not available on the 018 size unit.

High short circuit current rating provides a short circuit current rating protection for the unit up to 65,000 A on 460-v, 380-v, and 208/230-v units or 25,000 A on 575-v units.

Motormaster® V low-ambient control provides control of fan motor operation to maintain head pressure at low outdoor ambient temperatures down to -20 F (-29 C). This option also requires field-installed wind baffles. This option is also available as an accessory. This option is a standard feature on all 30RAP010 and 015 chillers.

Non-fused disconnect includes factory-installed non-fused disconnect capability for power and control located at the unit. This is not available on dual point power.

Energy management module (EMM) 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. The EMM is also available as an accessory.

Freeze protection with cooler heaters provides protection from cooler freeze-up to -20 F (-29 C).

GFI convenience outlet is a factory-installed convenience outlet that includes 4-amp GFI (ground fault

Options and accessories (cont)



interrupter) receptacle with independent fuse protection. Convenience outlet is 115-v female receptacle. This option is also available as an accessory.

Compressor suction service valve provides additional isolation of the compressor from the cooler vessel for service. This option is only available on sizes 070-090.

Hydronic pump package option adds circulating pumps, complete with controls, contactor, VFD compatible motors, and insulated expansion tank (expansion tank available on sizes 010-060 only). Available in single or dual (lead/lag controlled) cooler pump versions, with total dynamic head external to the chiller from approximately 15 to 160 ft (4.6 to 48.8 m). A VFD option is available on sizes 070-090.

Hot gas bypass option allows additional capacity reduction for unit operation down below the minimum standard step of capacity. This option is not available on units with the digital compressor option or on the 30RAP010 and 015 units. This option is also available as an accessory on all 30RAP units without digital compressors.

Security grilles/hail guards consist of louvered, sheet metal panels which securely fasten to the chiller and provide condenser coil protection against hail and physical damage. This option is also available as an accessory.

BACnet communication option — Provides factory installed communication capability with a BACnet MS/TP network. Allows integration with i-Vu® Open control system or a BACnet building automation system.

Field-installed accessories

BACnet translator control provides an interface between the unit and a BACnet Local Area Network (LAN, i.e., MS/TP EIA-485). Field programming is required.

Chillervisor System Manager III multi-unit control accessory allows sequencing of between two and eight chillers in parallel. Pump control is also provided.

Energy management 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. The EMM is also available as an option.

LON (local operating network) translator control provides an interface between the unit and a local operating network (i.e., LonWorks® FT-10A ANSI/EIA-709.1). Field programming is required.

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 (liquid crystal display) display provides clear language information in English, French, Spanish or Portuguese. The weatherproof enclosure and industrial grade extension cord make the Navigator module ideally suited for outdoor applications. Magnets located on the back of the module allow

attachment of any sheet metal component for hands free operation.

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

Touch Pilot™ display is a cost-effective, touch-screen, remote-mount device that can be used in lieu of the remote enhanced display.

Motormaster® V low-ambient control provides control of outdoor-fan motor operation to maintain head pressure at low outdoor ambient temperatures down to -20 F (-29 C). This accessory also requires field-installed wind baffles. This accessory is also available as a factory-installed option. This accessory is standard on 30RAP010 and 015 units.

Chilled water storage tank provides a minimum of 4 gallons per ton loop storage capacity. Includes insulated steel shell tank, Victaulic pipe connections, electric tank heaters, electric cables, vent, drain, and enclosure to allow tank to be installed under the chiller to protect to -20 F (-29 C). The power supply for the storage tank is obtained from the chiller, so no separate power source is required for this accessory. This is available with sizes 010-060 only.

Vibration isolation consists of field-installed 1/4-in. (0.64 cm) neoprene isolator pads (24-in. x 3-in.) (61.0 cm x 7.6 cm) that reduce vibration transmission from the compressor through the floor and into the conditioned space.

Low sound compressor blankets reduce unit sound levels by providing an acoustic blanket on each compressor.

Hot gas bypass accessory allows additional capacity reduction for unit operation below the minimum standard step of capacity. This accessory is not available on units which have the digital compressor option. This field-installed accessory is also available as a factory-installed option, but the factory option is not available with digital compressors or unit sizes of 010 or 015.

Remote cooler kit provides the additional hardware required to remotely mount the cooler from the unit. There are limits to total separation of the unit to the cooler as well as vertical separation limits, and these are delineated in the accessory installation instructions. Never bury refrigerant piping on these or any other applications.

GFI convenience outlet is a field-installed convenience outlet that includes a 4-amp GFI (ground fault interrupter) receptacle with independent fuse protection. The convenience outlet is a 115-v female receptacle. The GFI convenience outlet is also available as a factory-installed option.

Security grilles/hail guards consist of louvered, sheet metal panels which securely fasten to the chiller and provide condenser coil protection against hail and physical damage. Security grilles/hail guards are also available as a factory-installed option.

Wind baffles facilitate operation down to -20 F (-29 C) when used in conjunction with low ambient temperature head pressure control.

*Registered trademark of Echelon Corporation.

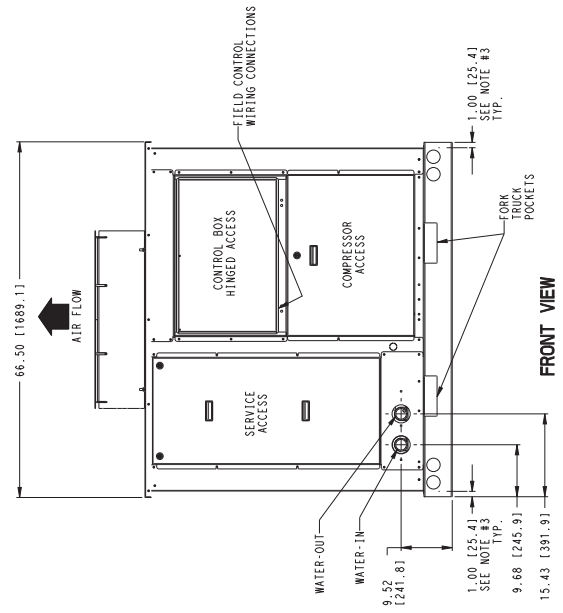
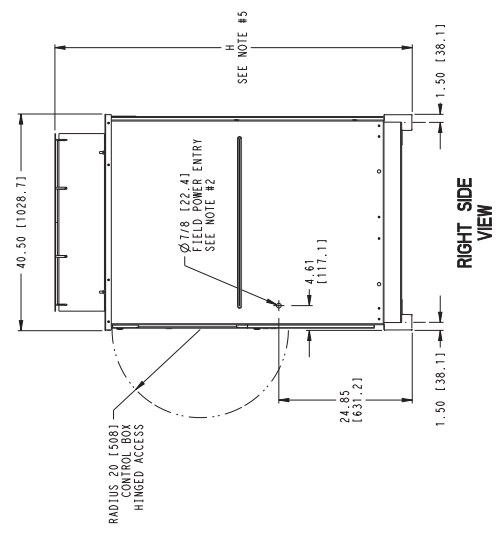
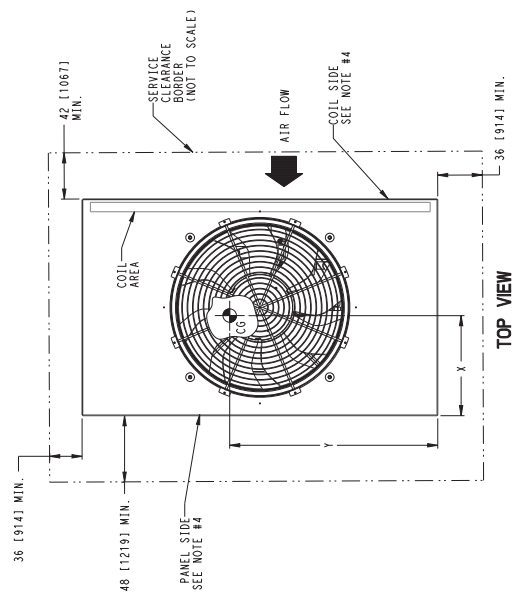
Base unit dimensions — 30RAP010,015



UNIT	CENTER OF GRAVITY		UNIT HEIGHT		VICTAULIC CONNECTIONS	
	X	Y	H (STANDARD)	H (VALUE SOUND)	WATER IN/OUT	WATER IN/OUT
30RAP010	18.40 [467.3]	37.80 [960.3]	66.5 [1689.1]	61.0 [1549.1]	2"	2"
30RAP015	18.35 [466.3]	37.69 [957.1]	66.5 [1689.1]	61.0 [1549.1]	2"	2"

NOTES:

- DO NOT CAP OR OTHERWISE OBSTRUCT THE LIQUID LINE TEMPERATURE RELIEF.
- Ø7/8 (22.4) BOLT HOLE PROVIDED FOR LOCATING FIELD POWER WIRING. ACTUAL HOLE REQUIRED DEPENDS ON FIELD WIRE SIZING.
- Ø0.437 (11.10) HOLE USED FOR MOUNTING UNIT.
- UNIT MUST HAVE CLEARANCES AS FOLLOWS:
TOP - DO NOT RESTRICT.
COIL SIDE - 42 (1067) FROM SOLID SURFACE.
PANEL SIDE - 48 (1219) PER REC.
- SEE TABLE COLUMN H; DIMENSION FOR STANDARD FAN OR VALUE SOUND FAN OPTION.
- CARRIER DOES NOT RECOMMEND INSTALLATION IN A PIT.
- UNIT CAN BE HANDLED USING THE FORK TRUCK LIFT POCKETS.
- WATER CONNECTIONS RECESSED 2-3/8 INCHES INSIDE UNIT.
- DIMENSIONS ARE IN INCHES; DIMENSIONS IN () ARE IN MILLIMETERS



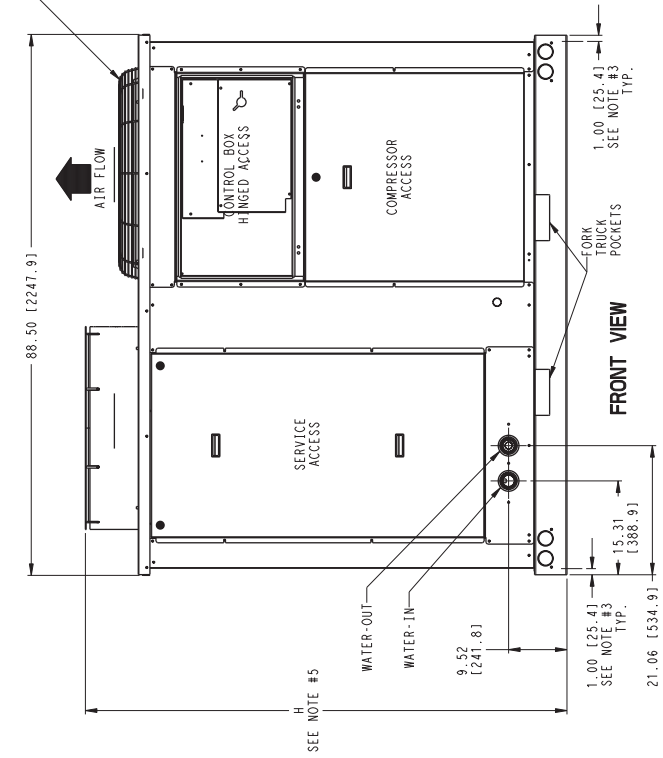
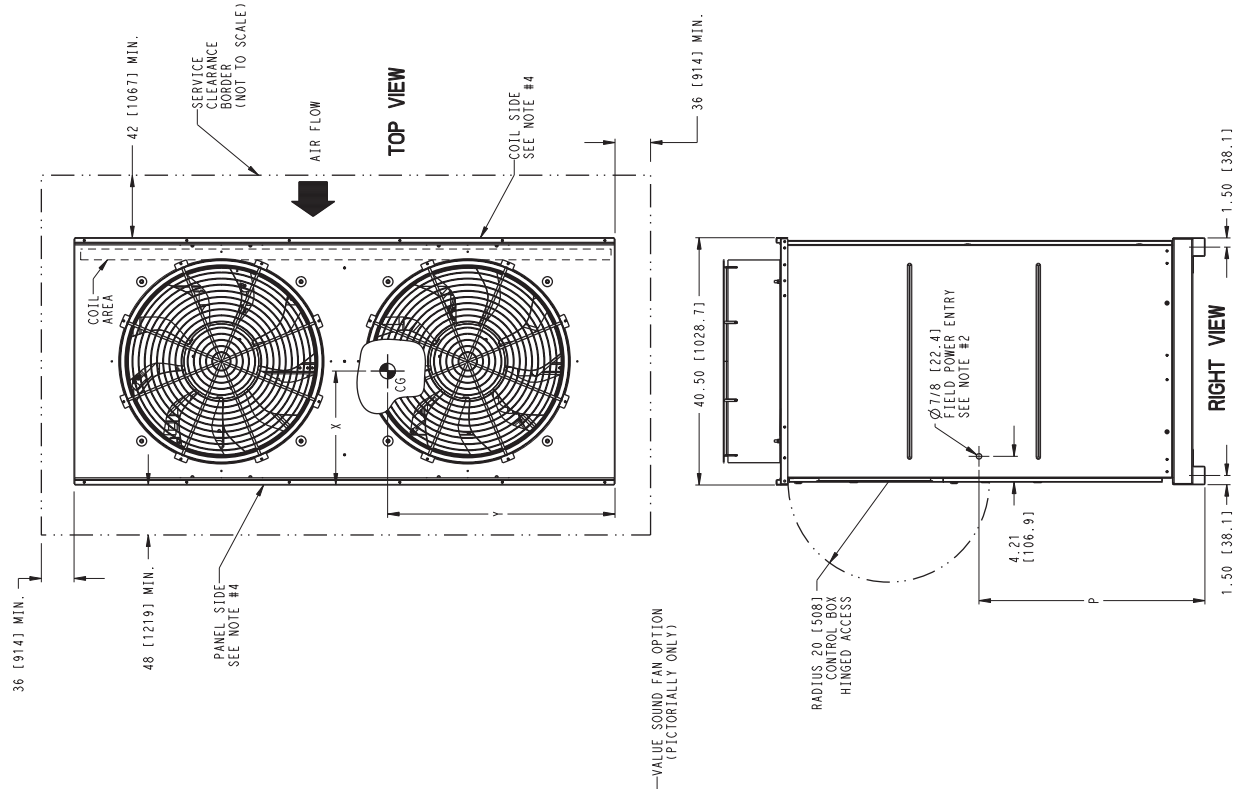
Base unit dimensions — 30RAP018-030



UNIT	CENTER OF GRAVITY		UNIT HEIGHT		POWER ENTRY P	VICTAULIC CONNECTIONS WATER IN/OUT
	X	Y	H (STANDARD)	H (VALUE SOUND)		
30RA018	18.37 [467]	38.77 [985]	66.5 [1689]	61.0 [1549]	24.9 [631]	2"
30RA020	18.38 [467]	38.79 [985]	66.5 [1689]	61.0 [1549]	24.9 [631]	2"
30RA025	18.58 [472]	38.93 [989]	78.5 [1994]	73.0 [1854]	36.9 [936]	2"
30RA030	18.59 [472]	38.98 [990]	78.5 [1994]	73.0 [1854]	36.9 [936]	2"

NOTES:

- DO NOT CAP OR OTHERWISE OBSTRUCT THE LIQUID LINE TEMPERATURE RELIEF.
- Ø 7/8 [22.4] PILOT HOLE PROVIDED FOR LOCATING FIELD POWER WIRING. ACTUAL HOLE REQUIRED DEPENDS ON FIELD WIRE SIZING.
- Ø 0.437 [11.40] HOLE USED FOR MOUNTING UNIT.
- UNIT MUST HAVE CLEARANCES AS FOLLOWS:
TOP - DO NOT RESTRICT.
COIL SIDE - 42 [1067] FROM SOLID SURFACE.
PANEL SIDE - 48 [1219] PER NEC.
- SEE TABLE COLUMN H; DIMENSION FOR STANDARD FAN OR VALUE SOUND FAN OPTION.
- CARRIER DOES NOT RECOMMEND INSTALLATION IN A PIT.
- UNIT CAN BE HANDLED USING THE FORK TRUCK LIFT POCKETS.
- WATER CONNECTIONS RECESSED 2-3/8 INCHES INSIDE UNIT.
- DIMENSIONS ARE IN INCHES. DIMENSIONS IN [] ARE IN MILLIMETERS



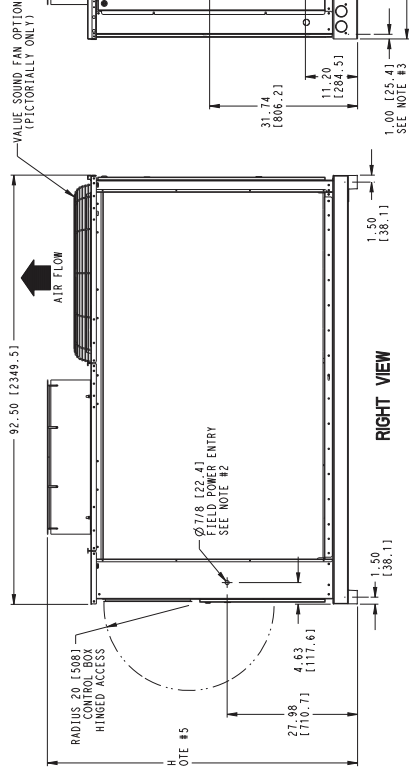
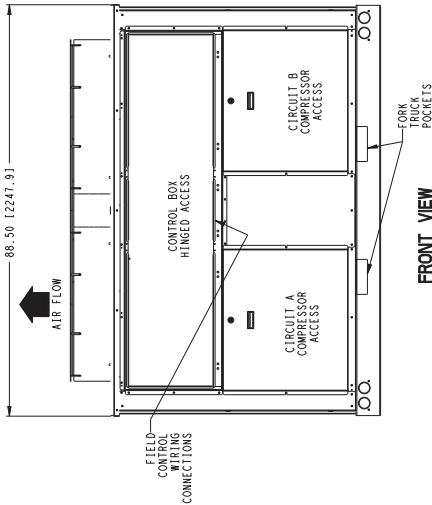
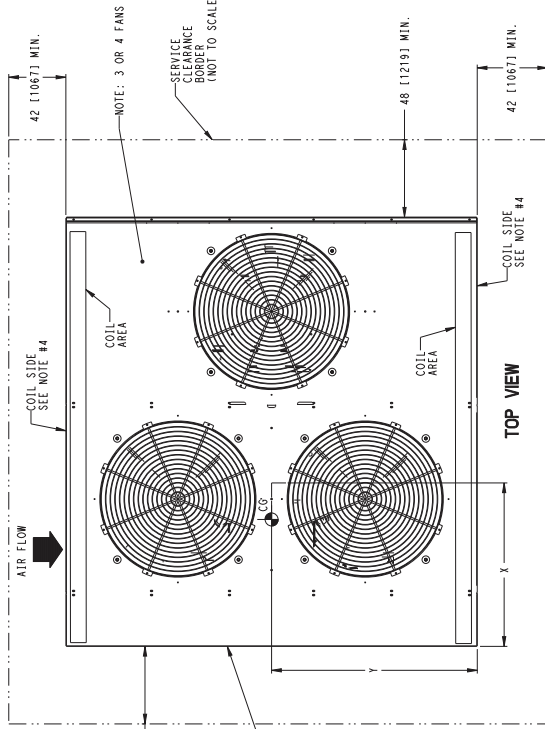
Base unit dimensions — 30RAP035-060



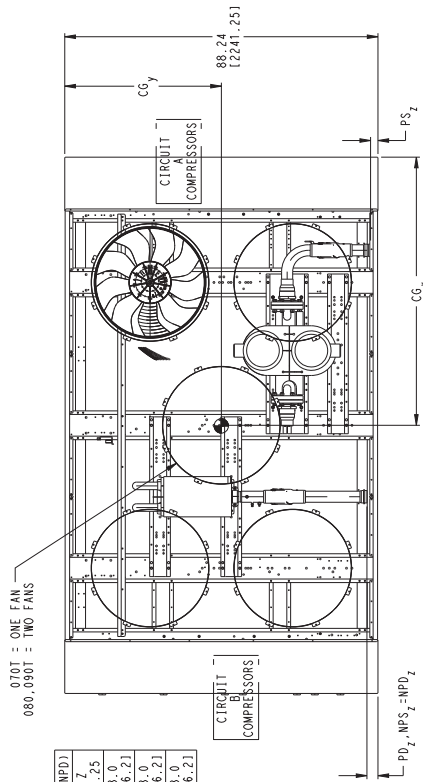
UNIT	CENTER OF GRAVITY		UNIT HEIGHT		VICIATILIC CONNECTIONS	
	X	Y	H (STANDARD)	H (VALUE SOUND)	WATER IN/OUT	WATER IN/OUT
30RA035	36.45 [926]	46.08 [1170]	66.5 [1689]	61.0 [1549]	2-1/2"	2-1/2"
30RA040	36.24 [921]	44.03 [1118]	66.5 [1689]	61.0 [1549]	2-1/2"	2-1/2"
30RA045	36.24 [921]	44.03 [1118]	66.5 [1689]	61.0 [1549]	2-1/2"	2-1/2"
30RA050	36.00 [914]	44.00 [1118]	78.5 [1994]	73.0 [1854]	2-1/2"	2-1/2"
30RA055	36.48 [927]	44.60 [1133]	78.5 [1994]	73.0 [1854]	2-1/2"	2-1/2"
30RA060	36.50 [927]	44.56 [1132]	78.5 [1994]	73.0 [1854]	2-1/2"	2-1/2"

NOTES:

- DO NOT CAP OR OTHERWISE OBSTRUCT THE LIQUID LINE TEMPERATURE RELIEF.
- Ø7/8 (22.4) PILOT HOLE PROVIDED FOR LOCATING FIELD POWER WIRING. ACTUAL HOLE REQUIRED DEPENDS ON FIELD WIRE SIZING.
- Ø0.437 (11.10) HOLE USED FOR MOUNTING UNIT.
- UNIT MUST HAVE CLEARANCES AS FOLLOWS:
COIL SIDE - 42 (1067) FROM SOLID SURFACE.
PANEL SIDE - 48 (1219) PER NEC.
- SEE TABLE COLUMN H: DIMENSION FOR STANDARD FAN OR VALUE SOUND FAN OPTION.
- CARRIER DOES NOT RECOMMEND INSTALLATION IN A PIT.
- UNIT CAN BE HANDLED USING THE FORK TRUCK LIFT POCKETS (MINIMUM OF 60" FORK LENGTH).
- WATER CONNECTIONS RECESSED 4-1/2 INCHES INSIDE UNIT.
- DIMENSIONS ARE IN INCHES. DIMENSIONS IN () ARE IN MILLIMETERS.

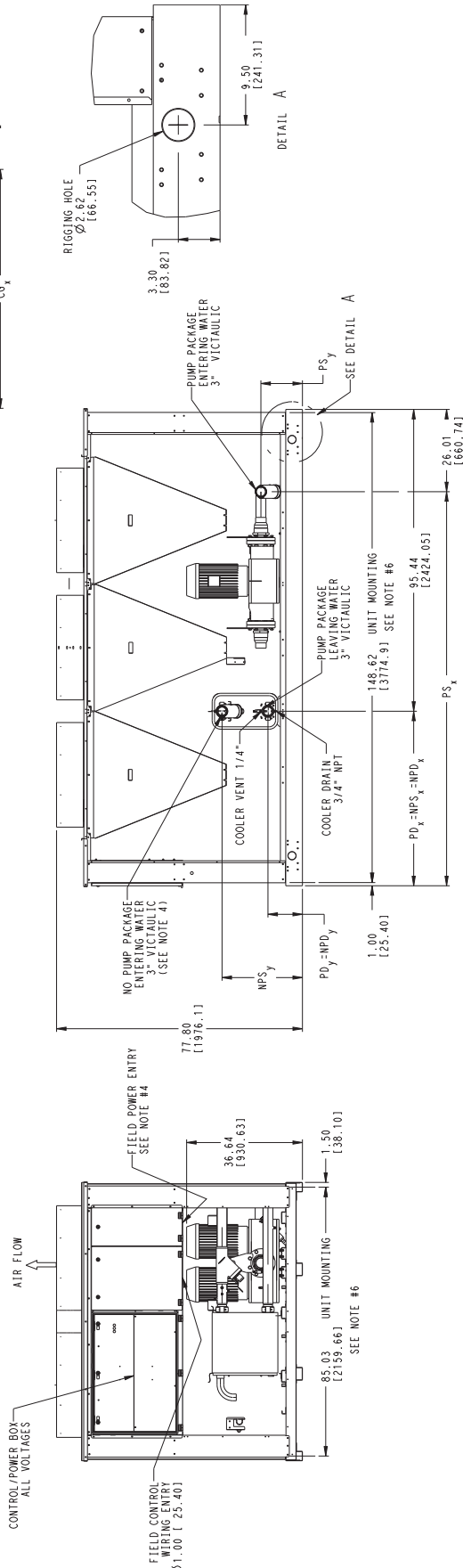


Base unit dimensions — 30RAP070-090



WEIGHT MAX	CENTER OF GRAVITY		PUMP SUCTION (PS)			PUMP DISCHARGE (PD)			NOPUMP SUCTION (NPS)			NOPUMP DISCHARGE (NPD)			
	MCHX lb/ft ³	INCH (MM)	CGx INCH (MM)	CGy INCH (MM)	X ±.25	Y ±.25	Z ±.25	X ±.25	Y ±.25	Z ±.25	X ±.25	Y ±.25	Z ±.25		
30RAP-070	3356/ 1522	3891/ 1810	85 (2159)	41.5 (1054)	124.7 [3167.4]	13.1 [333.7]	2.0 [50.8]	55.2 [1401.7]	10.9 [277.1]	5.0 [127.0]	25.5 [647.7]	3.0 [76.2]	55.2 [1401.7]	10.9 [277.1]	3.0 [76.2]
30RAP-080	3579/ 1623	4289/ 1945	82.5 (2096)	41.5 (1054)	124.7 [3167.4]	13.1 [333.7]	2.0 [50.8]	55.2 [1401.7]	11.0 [279.4]	5.0 [127.0]	25.5 [647.7]	3.0 [76.2]	55.2 [1401.7]	11.0 [279.4]	3.0 [76.2]
30RAP-090	3605/ 1635	4310/ 1935	82.5 (2096)	41.5 (1054)	124.7 [3167.4]	13.1 [333.7]	2.0 [50.8]	55.2 [1401.7]	12.0 [305.6]	5.0 [127.0]	34.4 [873.6]	3.0 [76.2]	55.2 [1401.7]	12.0 [305.6]	3.0 [76.2]

- NOTES: 1. UNIT MUST HAVE CLEARANCES AS FOLLOWS:
 2. DRAIN REQUIRED FROM SOLID SURFACE FOR AIRFLOW
 3. SIDE 'B' REQUIRED FOR COIL SERVICE AREA.
 4. ALL PUMPS HAVE DRAINS LOCATED AT THE BOTTOM OF VOLUTE FOR DRAINING.
 5. TEMPERATURE RELIEF DEVICES LOCATED ON SUCTION LINE, LIQUID LINE AND
 6. FILTER DRIER OF EACH CIRCUIT AND HAVE 1/4" FLARE CONNECTION.
 7. TWO 7/8" (22.2) O.D. HOLES REQUIRED FOR LOCAL FIELD POWER WIRING.
 8. TWO 1/2" (12.7) O.D. HOLES REQUIRED FOR LOCAL FIELD POWER WIRING.
 9. DIMENSIONS ARE IN INCHES. DIMENSIONS IN [] ARE IN MILLIMETERS.
 10. Ø 0.524 (13.31) HOLE USED FOR MOUNTING UNITS.



Selection procedure



Carrier's electronic catalog chiller selection program provides quick, easy selection of Carrier chillers. The program considers specific temperature, fluid, flow requirements, system pressure drop (for proper pump selection, when

required), as well as other factors, such as fouling and altitude correction.

To select a 30RAP chiller, including optional pump package when required, use the NACO (North American Commercial Operation) Packaged Chiller Builder Program.

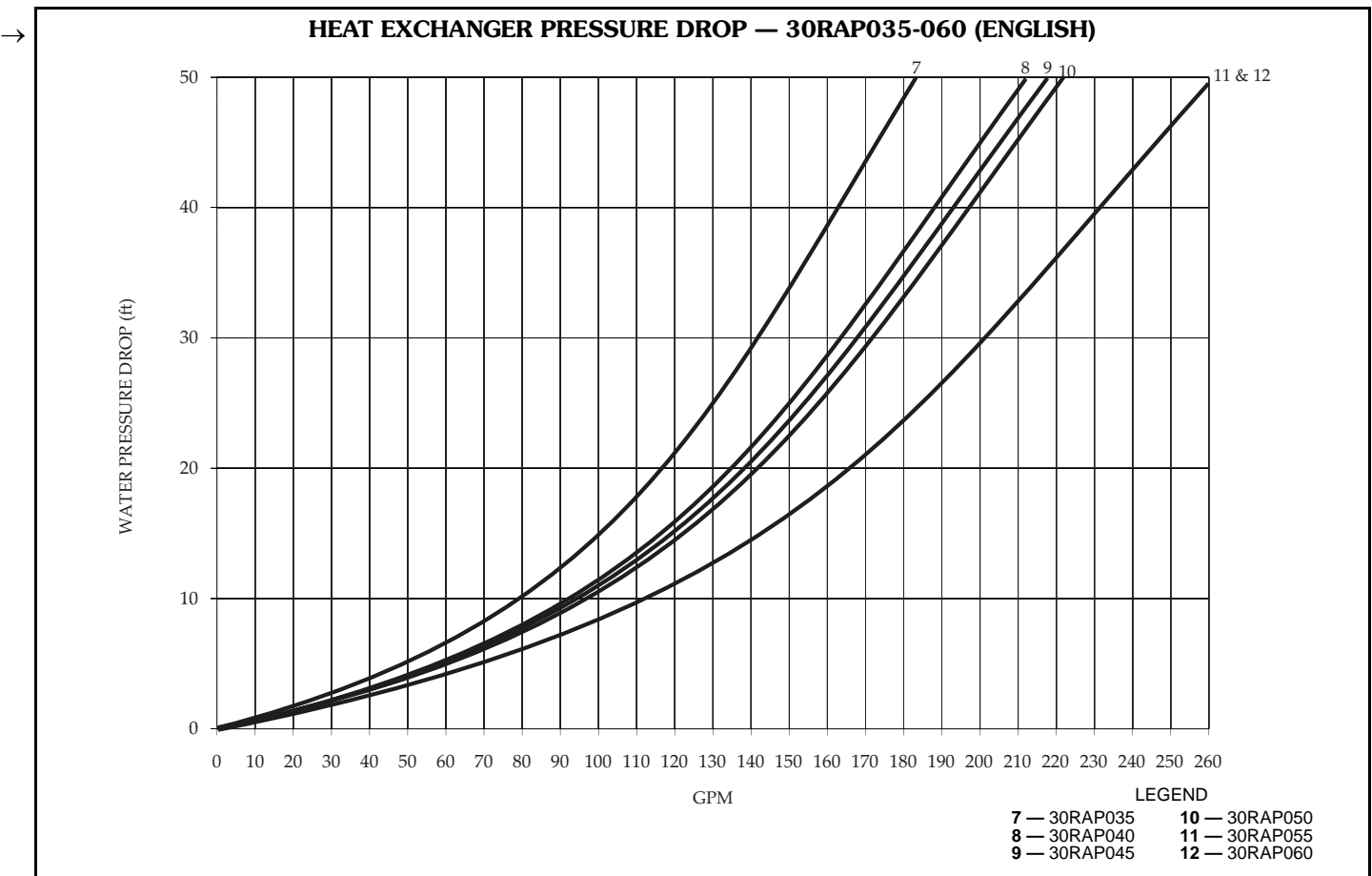
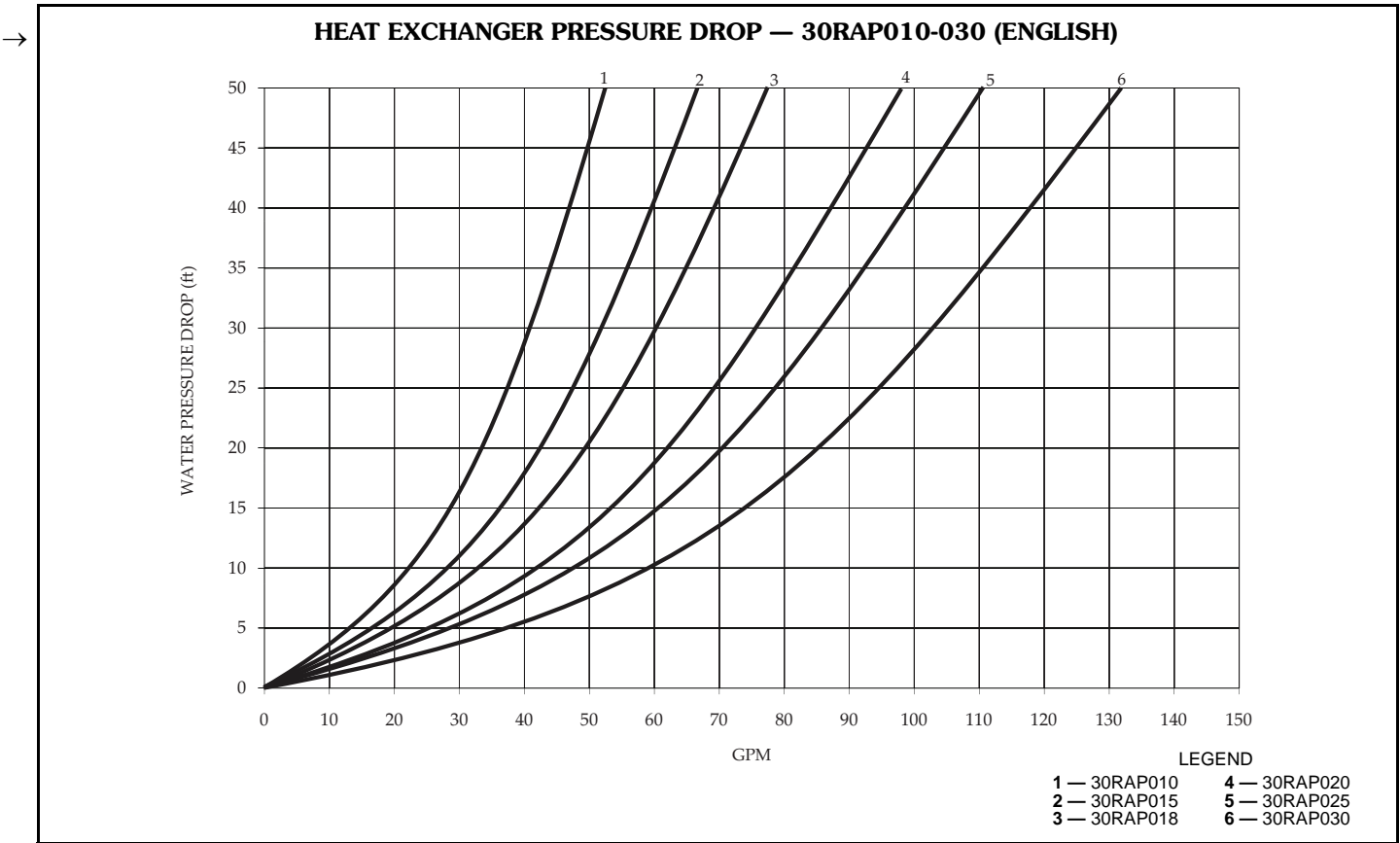
PUMP IMPELLER SIZES

UNIT 30RAP	PUMP Hp	SINGLE PUMP					DUAL PUMP				
		Option Code*		Rpm	Impeller Dia. (in.)	Pump Curve	Option Code*		Rpm	Impeller Dia. (in.)	Pump Curve
		non-VFD	VFD				non-VFD	VFD			
010-030	1.5	2	N/A	3500	4.25	I	9	N/A	3500	4.25	I
	3	3	N/A	3500	4.75	I	B	N/A	3500	4.75	I
	3 (high head)	4	N/A	3500	5.00	I	C	N/A	3500	5.00	I
	5	5	N/A	3500	5.50	II	D	N/A	3500	5.50	II
035-045	3	3	N/A	3500	4.75	I	B	N/A	3500	4.75	I
	3 (high head)	4	N/A	3500	5.25	I	C	N/A	3500	5.25	I
	5	5	N/A	3500	4.50	III	D	N/A	3500	4.50	III
	5 (high head)	6	N/A	3500	4.88	III	F	N/A	3500	4.88	III
	7.5	7	N/A	3500	5.50	IV	G	N/A	3500	5.50	IV
050-060	3 (high head)	4	N/A	3500	5.25	I	C	N/A	3500	5.25	I
	5	5	N/A	3500	4.50	III	D	N/A	3500	4.50	III
	5 (high head)	6	N/A	3500	4.88	III	F	N/A	3500	4.88	III
	7.5	7	N/A	3500	5.50	IV	G	N/A	3500	5.50	IV
	10	Z	N/A	3500	6.00	IV	H	N/A	3500	6.00	IV
070	3	1	C	3500	4.00	V	6	J	1750	6.50	VII
	5	2	D	3500	4.75	V	7	K	3500	4.50	VIII
	7.5	3	F	3500	5.25	VI	8	L	3500	5.25	IX
	10	4	G	3500	5.75	VI	9	M	3500	5.90	IX
080-090	5	2	D	3500	4.75	V	7	K	3500	4.50	VIII
	7.5	3	F	3500	5.25	VI	8	L	3500	5.00	VIII
	10	4	G	3500	5.75	VI	9	M	3500	5.40	VIII
	15	5	H	3500	6.50	VI	B	N	3500	6.10	VIII

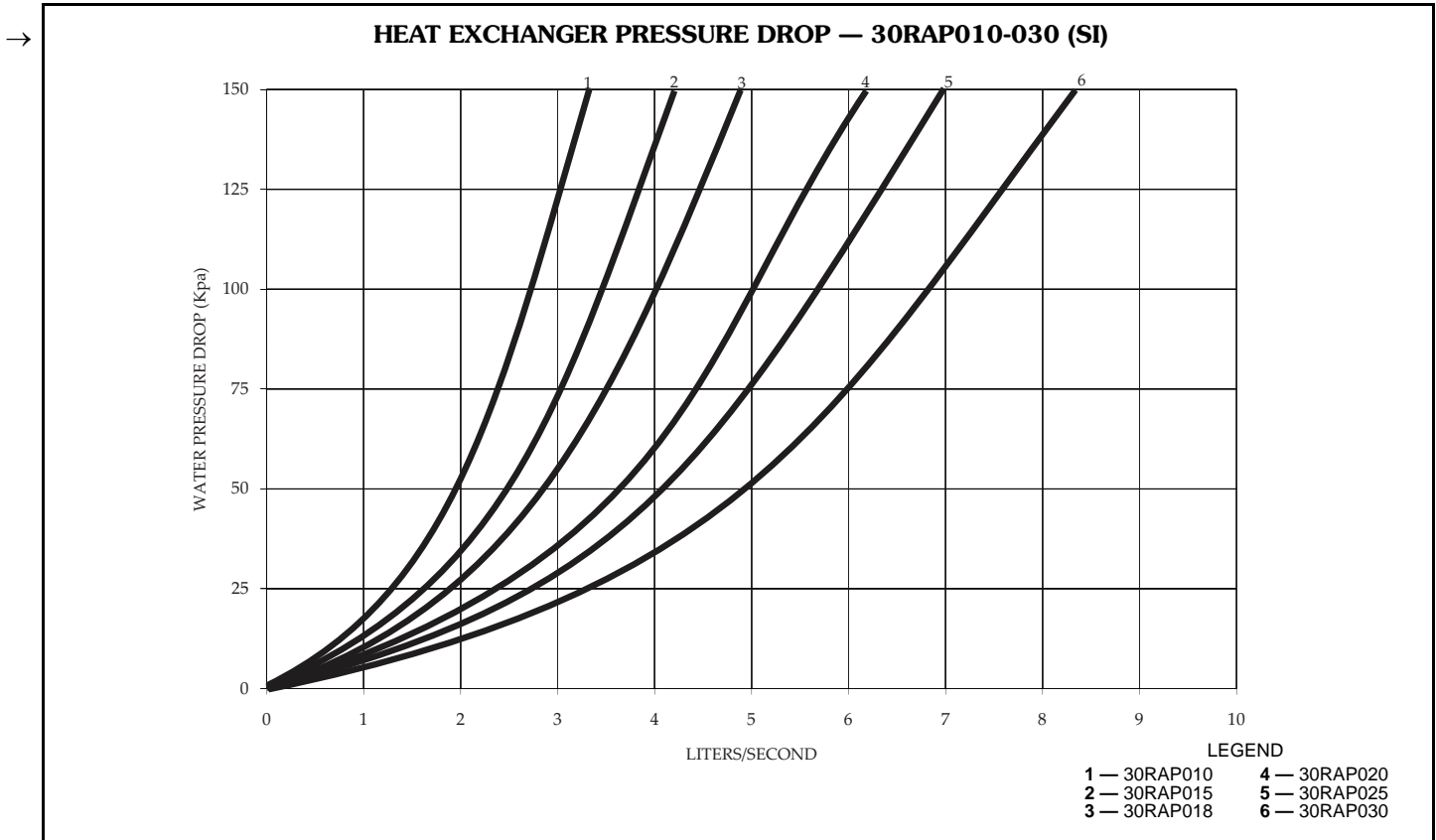
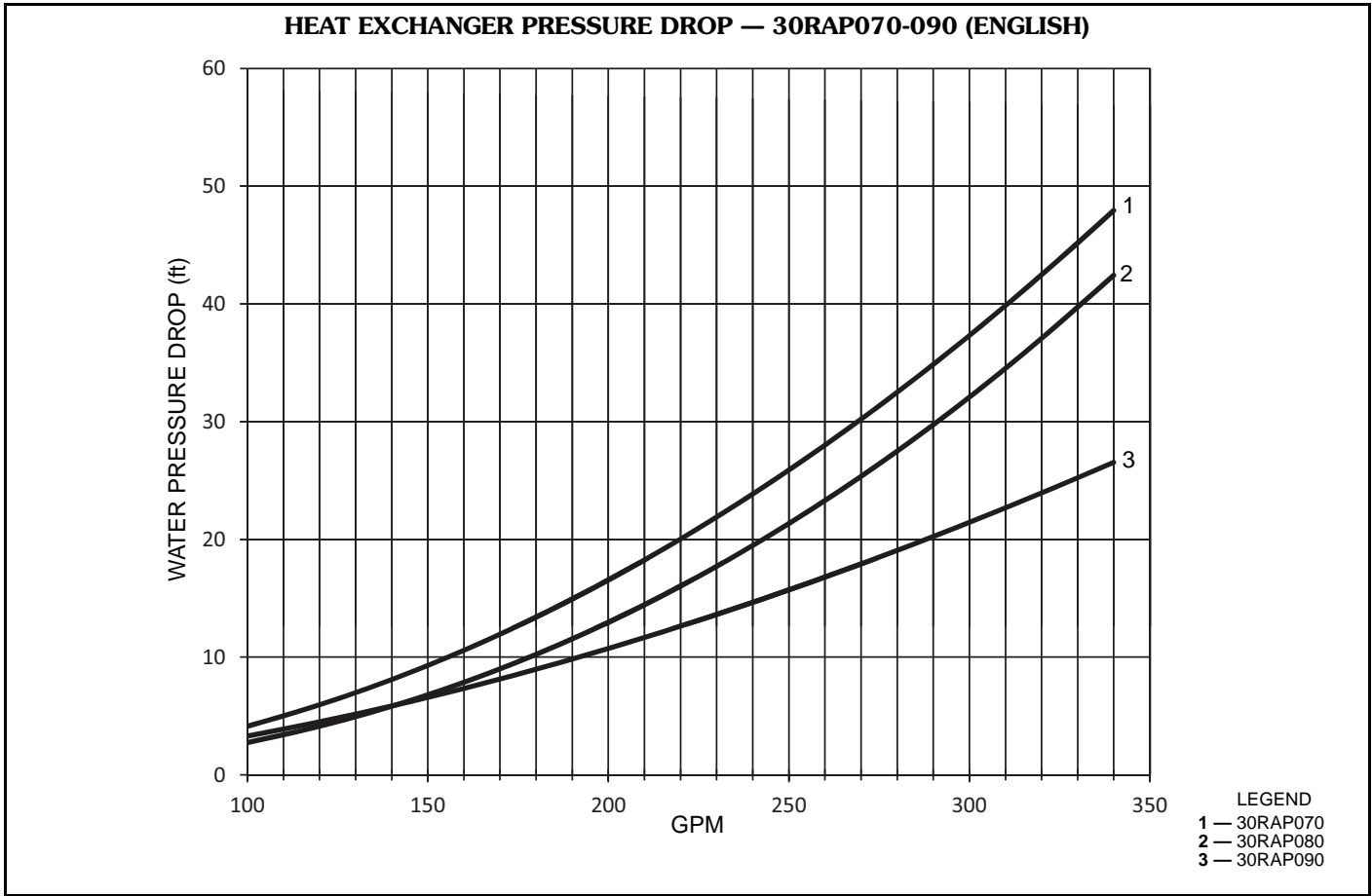
*Option Code refers to the Hydronics Option (position 12) in the model number. See the 30RAP nomenclature on page 4 for option identification.

NOTE: Pump selections are chiller size dependent. For example, option code 5 on a 30RAP010-030 chiller is not the same as option code 5 on a 30RAP035-045 chiller.

Performance data

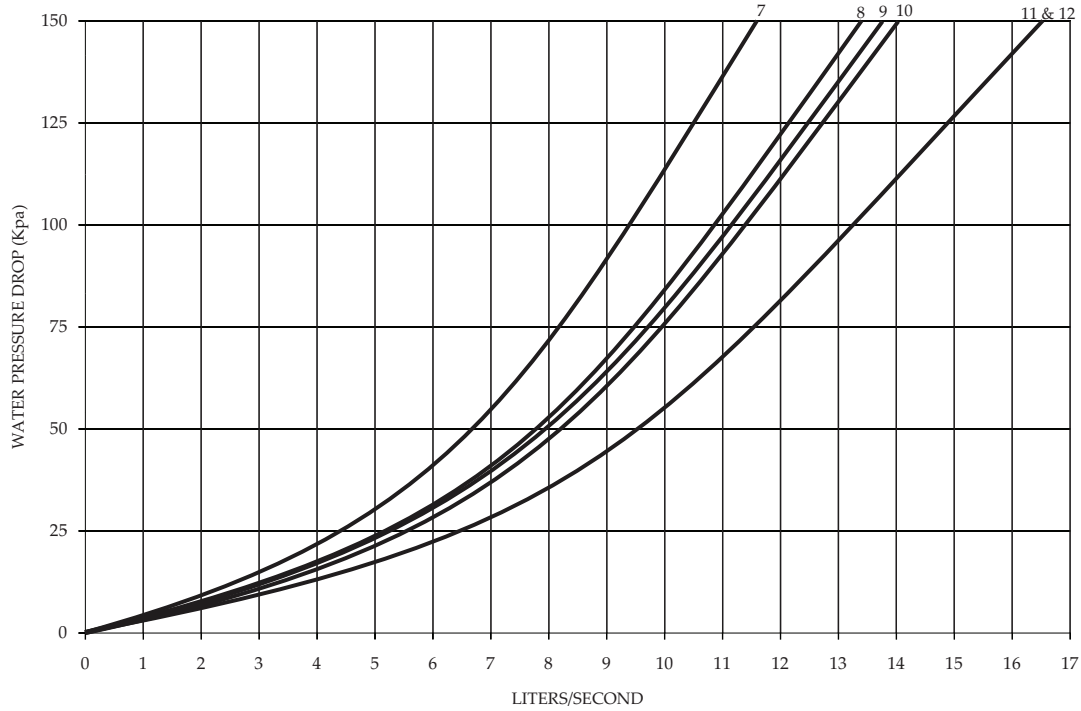


Performance data (cont)



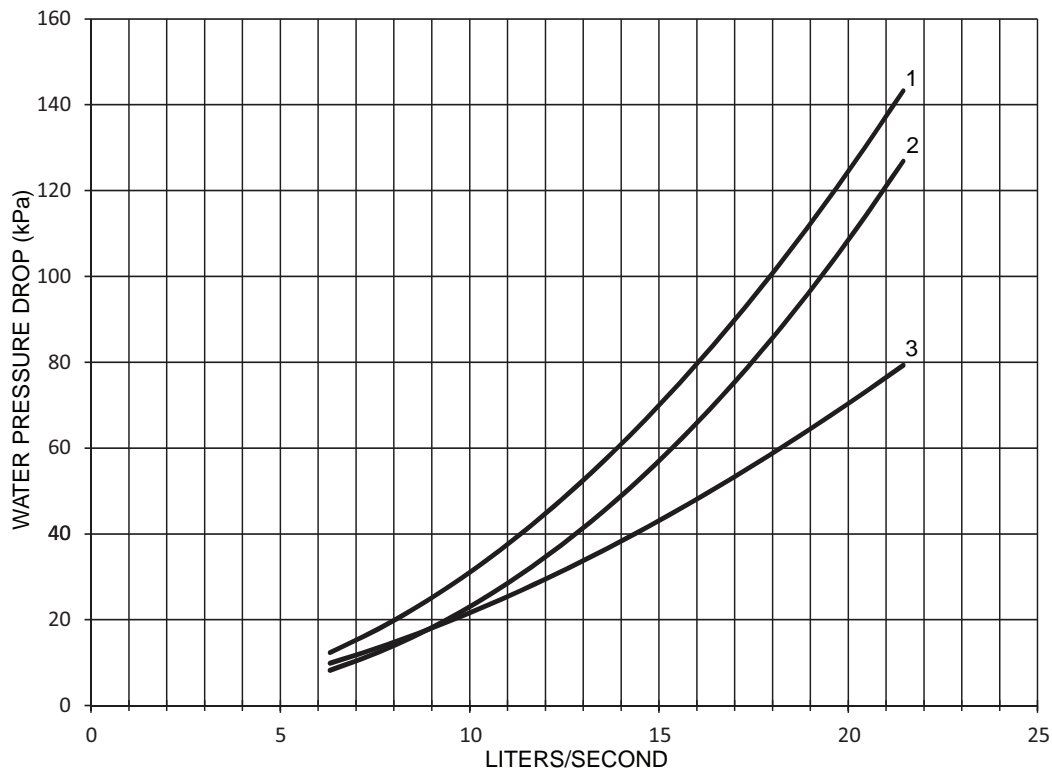


HEAT EXCHANGER PRESSURE DROP — 30RAP035-060 (SI)



- LEGEND**
- 7 — 30RAP035
 - 8 — 30RAP040
 - 9 — 30RAP045
 - 10 — 30RAP050
 - 11 — 30RAP055
 - 12 — 30RAP060

HEAT EXCHANGER PRESSURE DROP — 30RAP070-090 (SI)



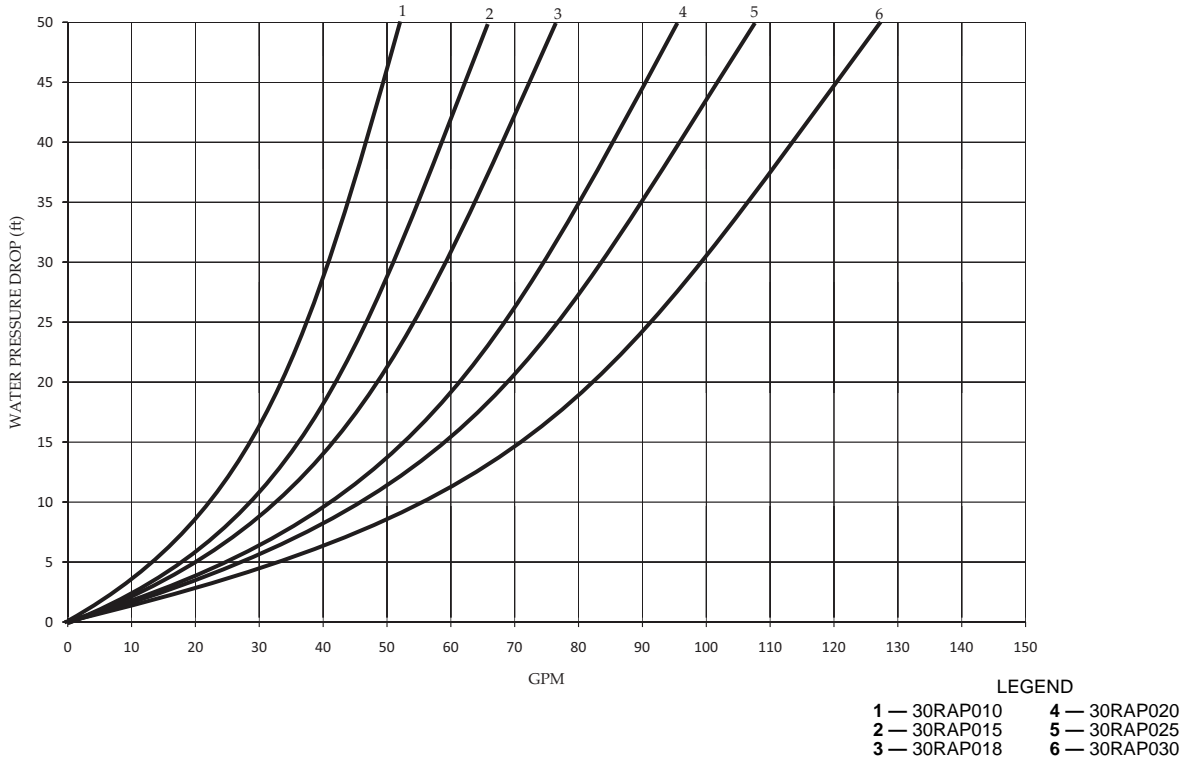
- LEGEND**
- 1 — 30RAP070
 - 2 — 30RAP080
 - 3 — 30RAP090

Performance data (cont)



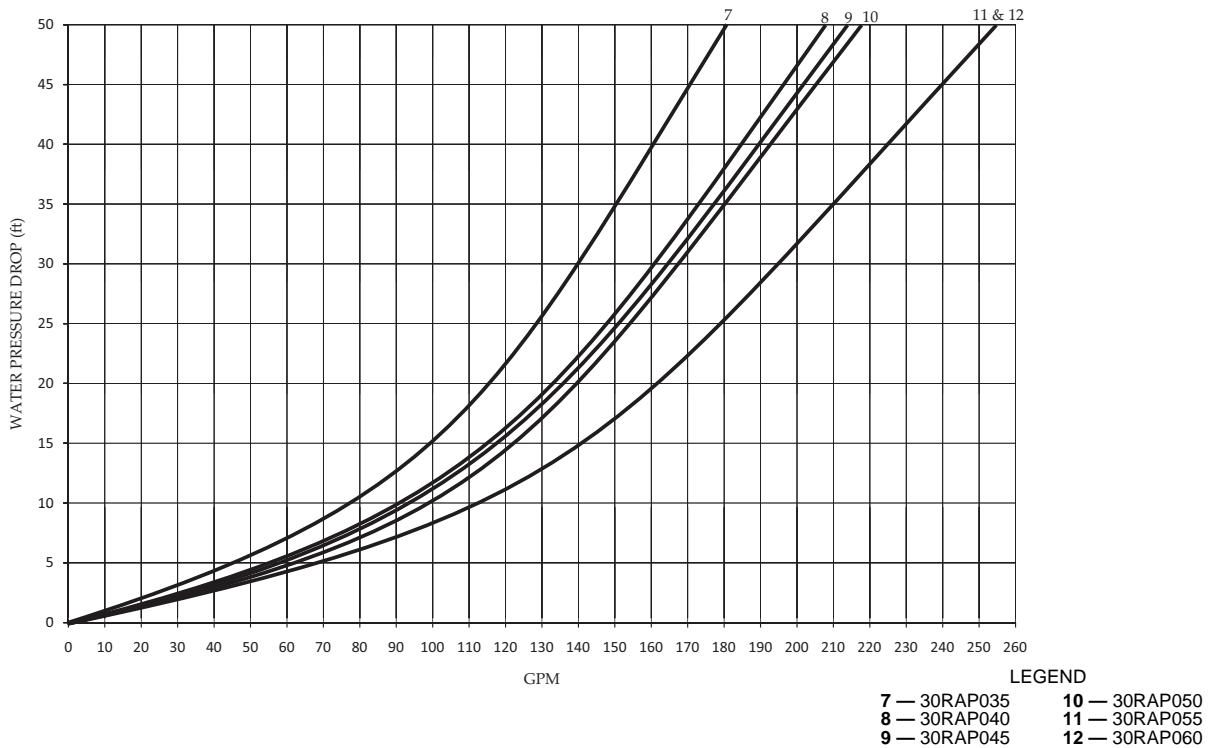
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UNIT PRESSURE DROP — NO HYDRONIC PACKAGE — 30RAP010-030 (ENGLISH)

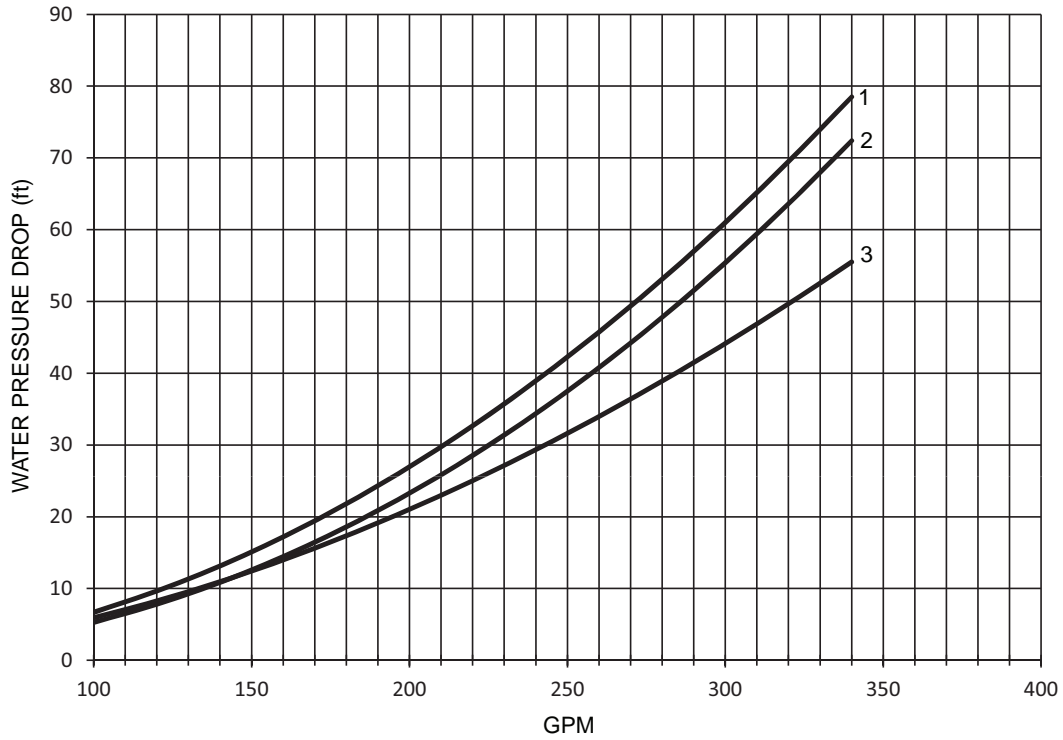


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UNIT PRESSURE DROP — NO HYDRONIC PACKAGE — 30RAP035-060 (ENGLISH)

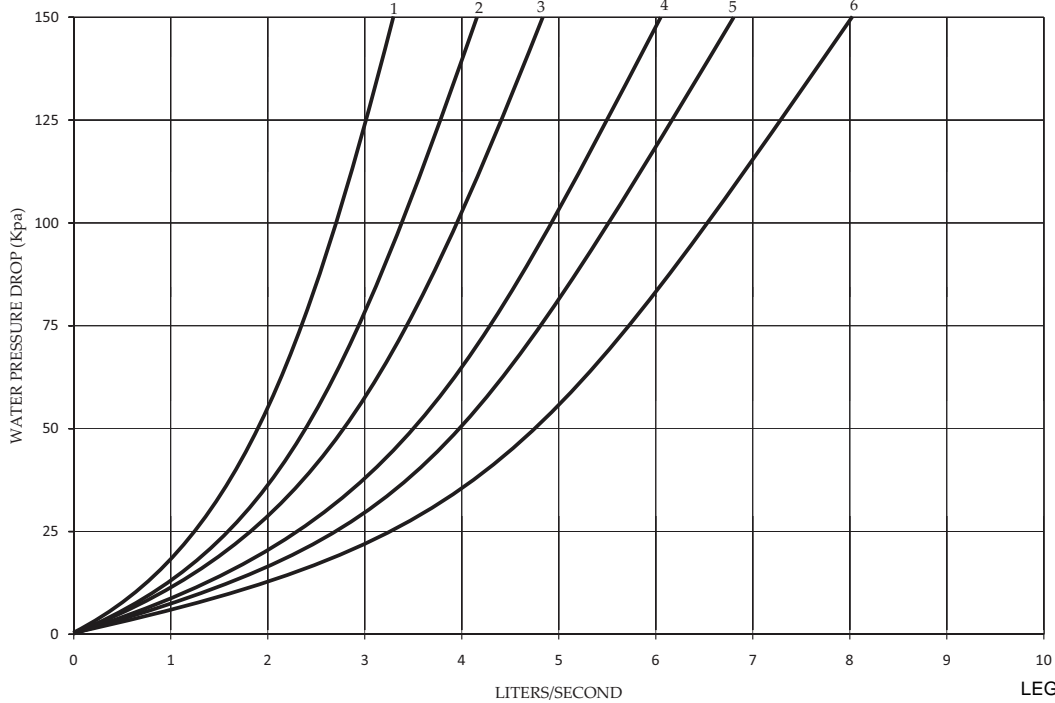


UNIT PRESSURE DROP — NO HYDRONIC PACKAGE — 30RAP070-090 (ENGLISH)



LEGEND
 1 — 30RAP070
 2 — 30RAP080
 3 — 30RAP090

→ **UNIT PRESSURE DROP — NO HYDRONIC PACKAGE — 30RAP010-030 (SI)**

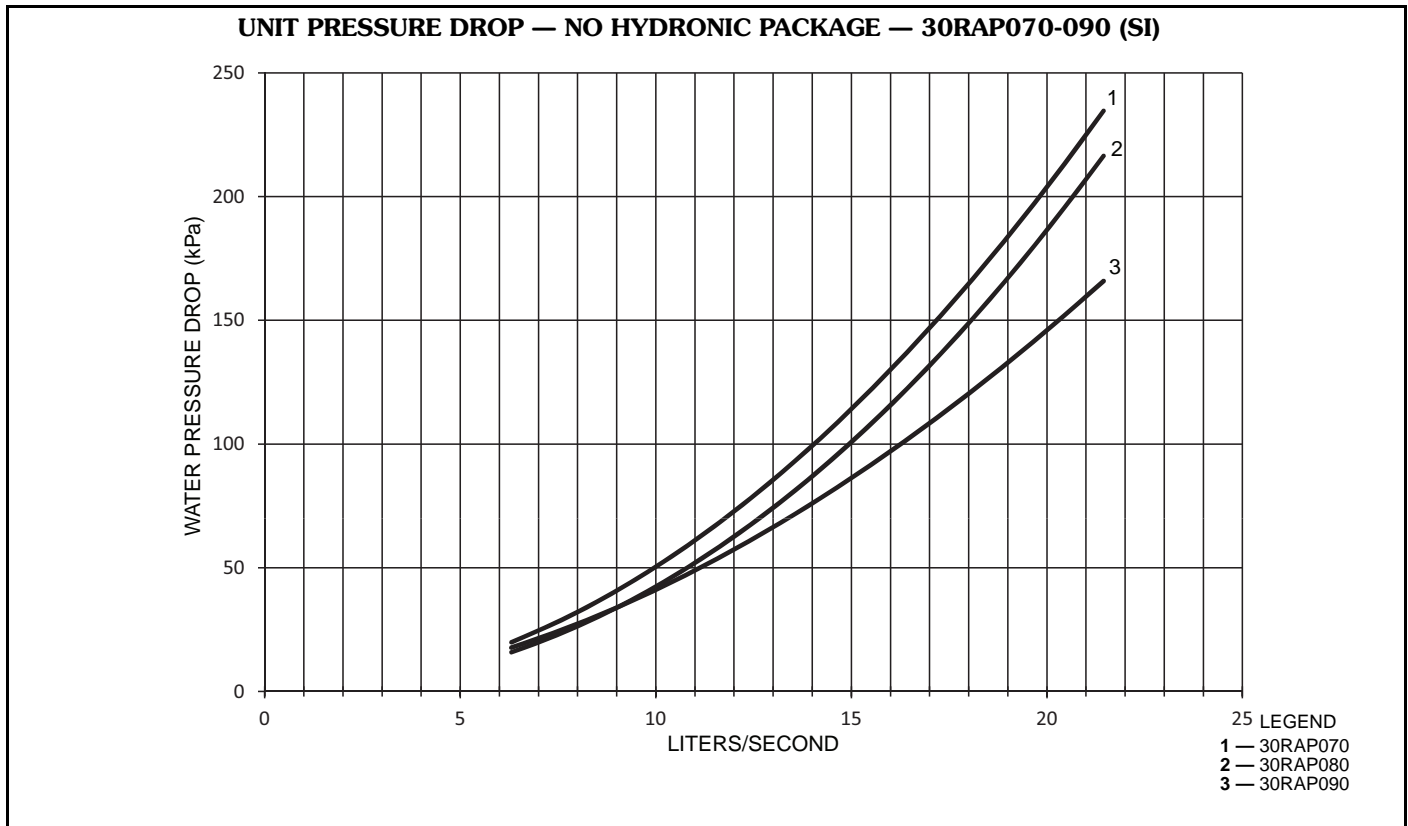
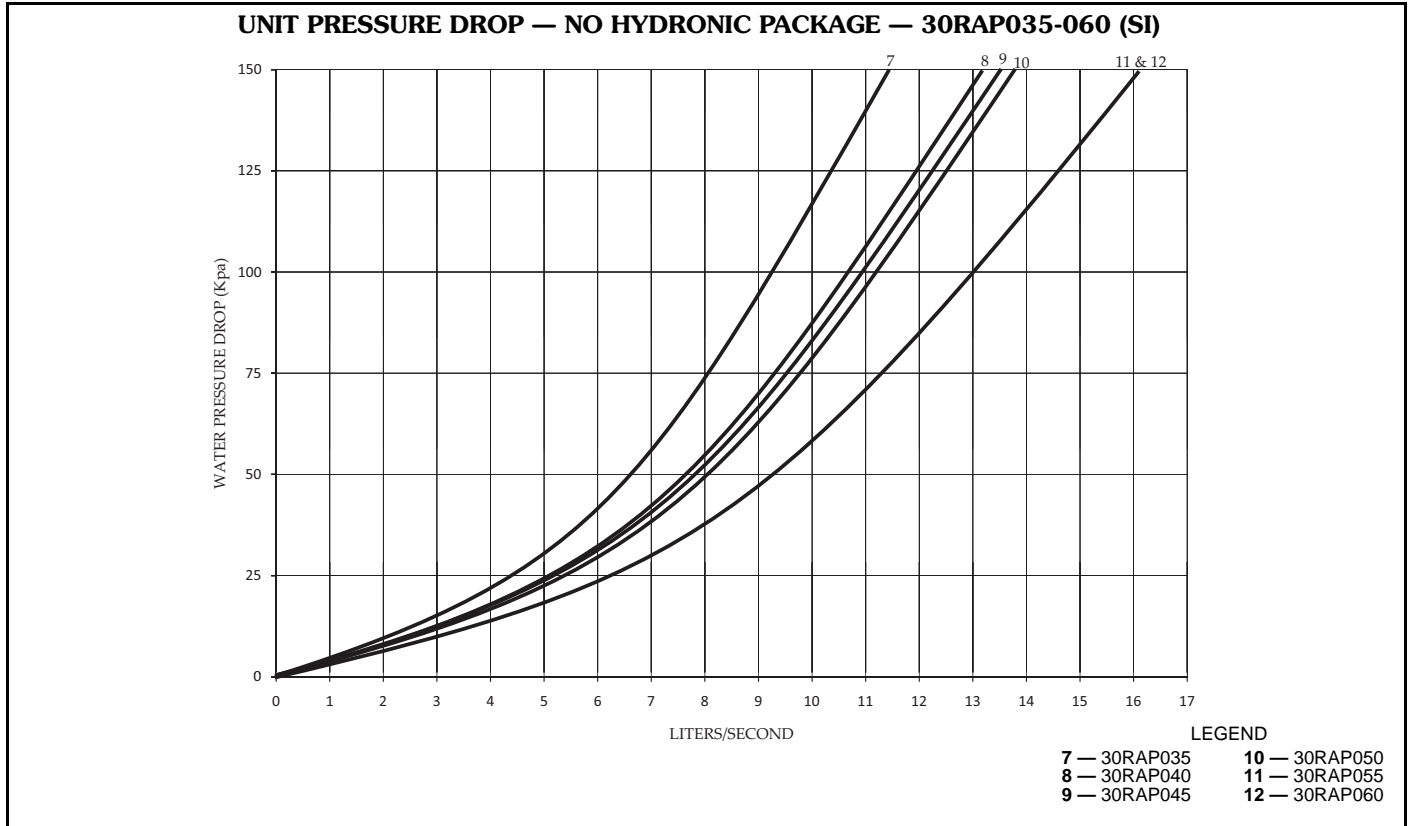


LEGEND
 1 — 30RAP010 4 — 30RAP020
 2 — 30RAP015 5 — 30RAP025
 3 — 30RAP018 6 — 30RAP030

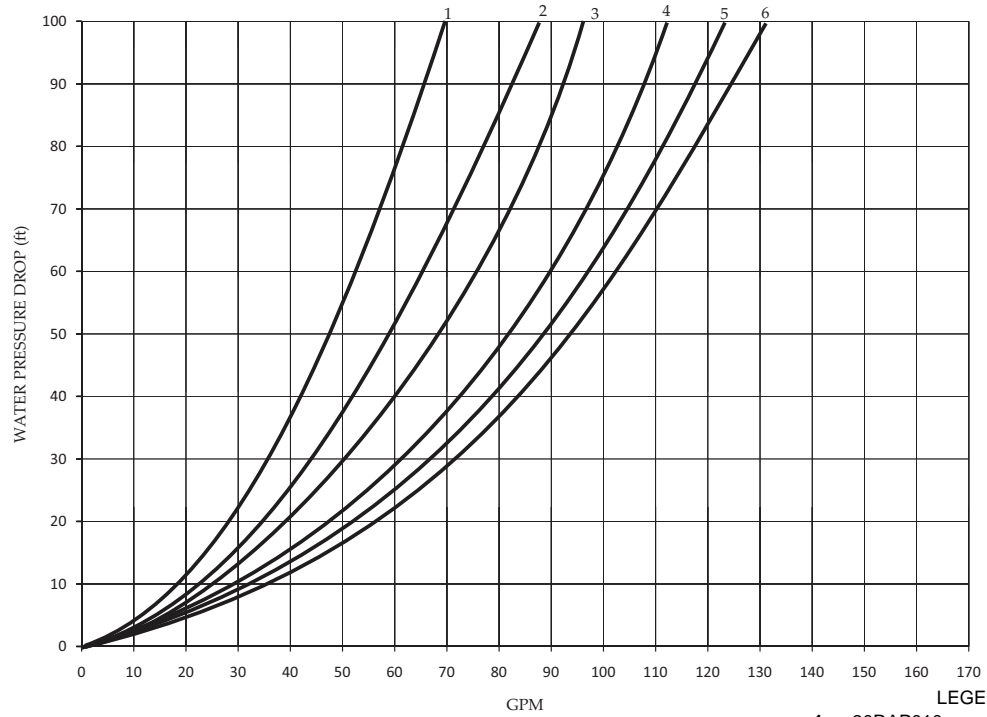
Performance data (cont)



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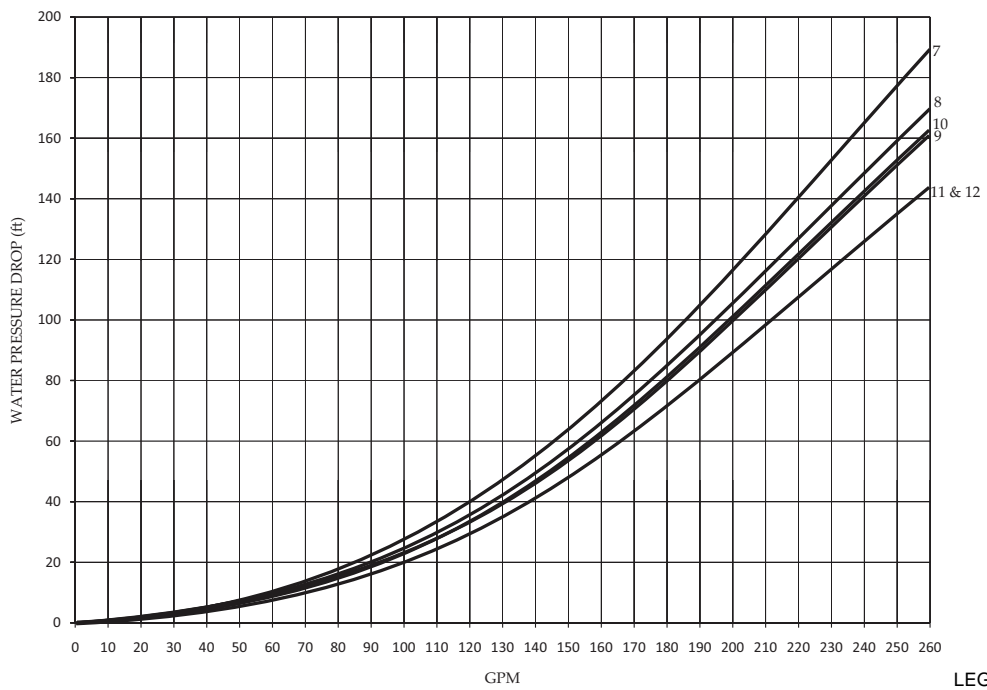


UNIT PRESSURE DROP — SINGLE PUMP HYDRONIC PACKAGE — 30RAP010-030 (ENGLISH)



- LEGEND
- 1 — 30RAP010
 - 2 — 30RAP015
 - 3 — 30RAP018
 - 4 — 30RAP020
 - 5 — 30RAP025
 - 6 — 30RAP030

UNIT PRESSURE DROP — SINGLE PUMP HYDRONIC PACKAGE — 30RAP035-060 (ENGLISH)

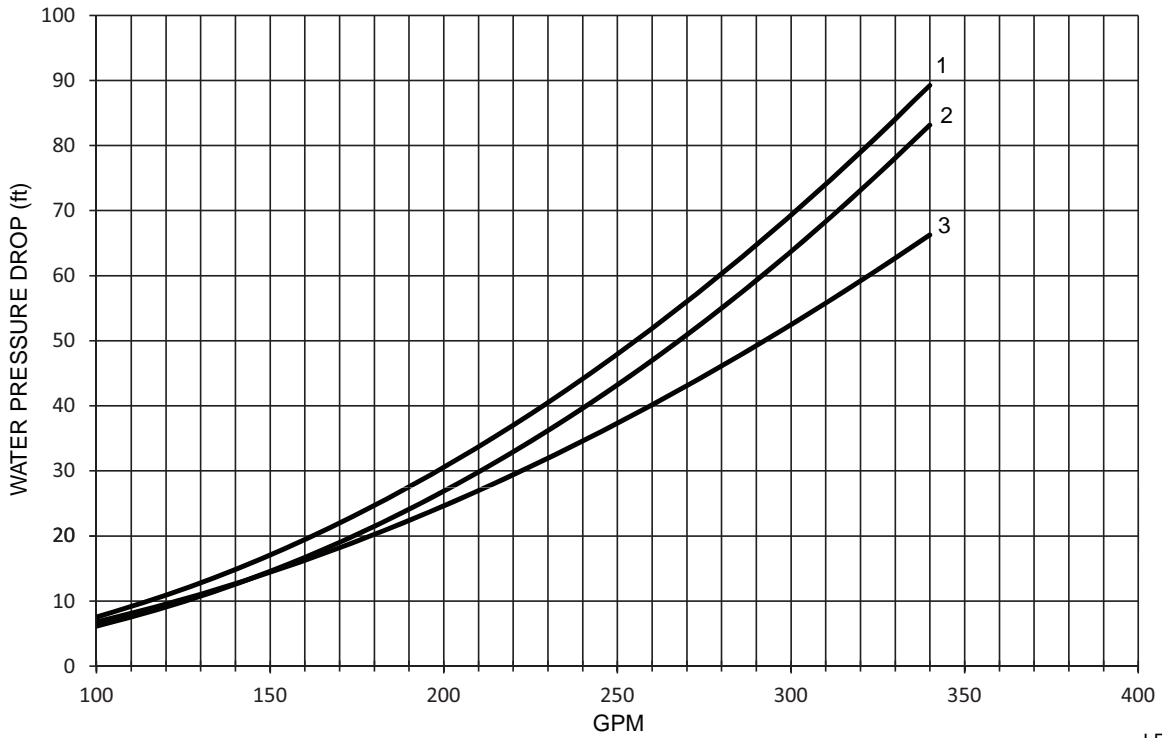


- LEGEND
- 7 — 30RAP035
 - 8 — 30RAP040
 - 9 — 30RAP045
 - 10 — 30RAP050
 - 11 — 30RAP055
 - 12 — 30RAP060

Performance data (cont)

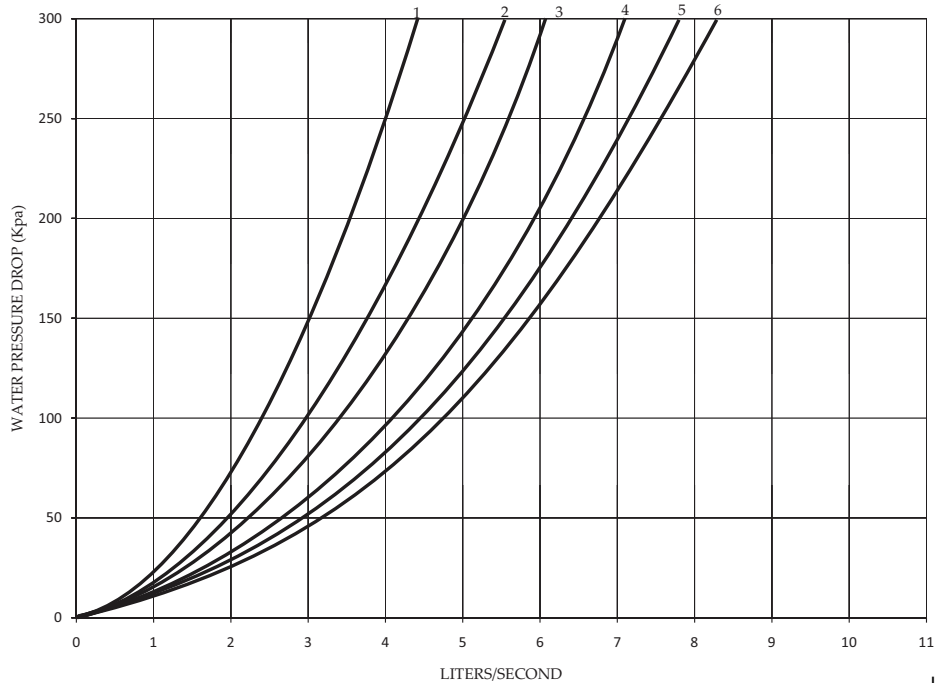


UNIT PRESSURE DROP — SINGLE PUMP HYDRONIC PACKAGE — 30RAP070-090 (ENGLISH)



LEGEND
 1 — 30RAP070
 2 — 30RAP080
 3 — 30RAP090

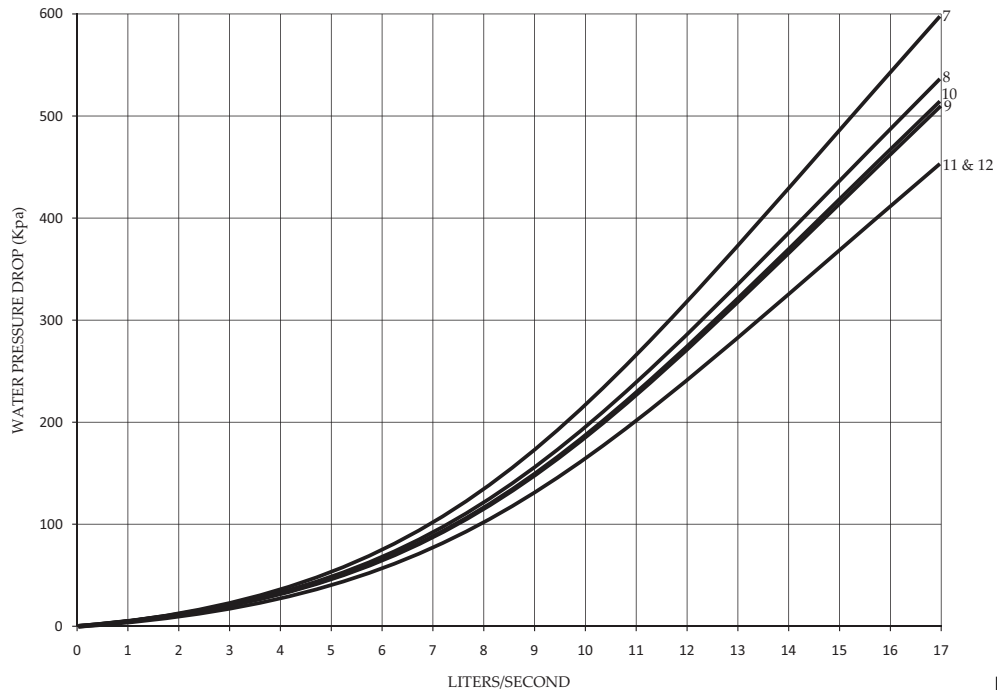
UNIT PRESSURE DROP — SINGLE PUMP HYDRONIC PACKAGE — 30RAP010-030 (SI)



LEGEND
 1 — 30RAP010 4 — 30RAP020
 2 — 30RAP015 5 — 30RAP025
 3 — 30RAP018 6 — 30RAP030

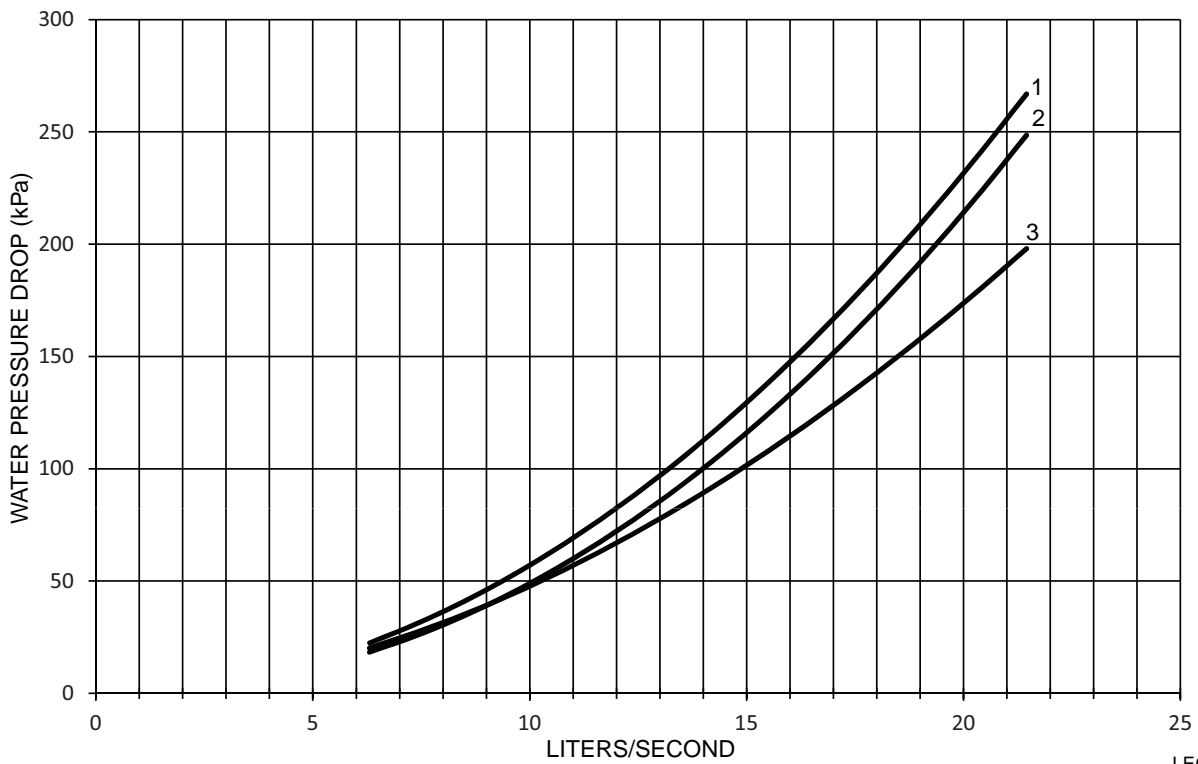


UNIT PRESSURE DROP — SINGLE PUMP HYDRONIC PACKAGE — 30RAP035-060 (SI)



- LEGEND**
- 7 — 30RAP035
 - 8 — 30RAP040
 - 9 — 30RAP045
 - 10 — 30RAP050
 - 11 — 30RAP055
 - 12 — 30RAP060

UNIT PRESSURE DROP — SINGLE PUMP HYDRONIC PACKAGE — 30RAP070-090 (SI)



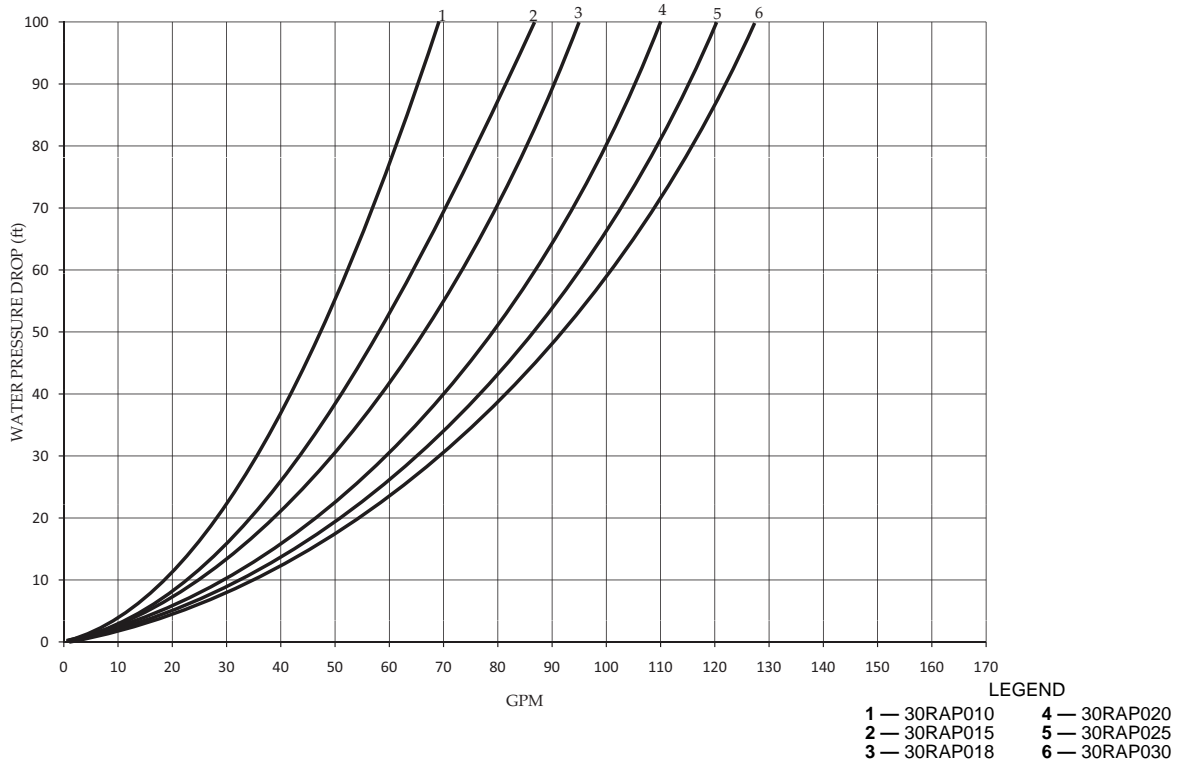
- LEGEND**
- 1 — 30RAP070
 - 2 — 30RAP080
 - 3 — 30RAP090

Performance data (cont)



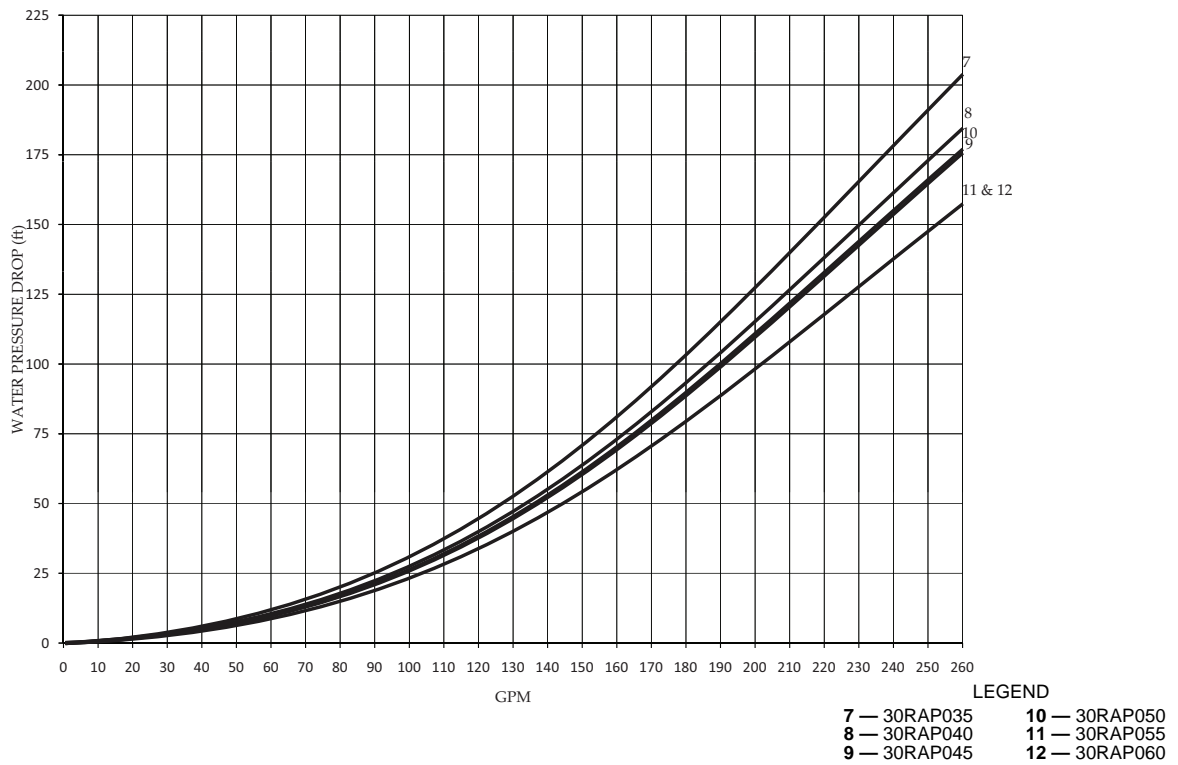
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UNIT PRESSURE DROP — DUAL PUMP HYDRONIC PACKAGE — 30RAP010-030 (ENGLISH)

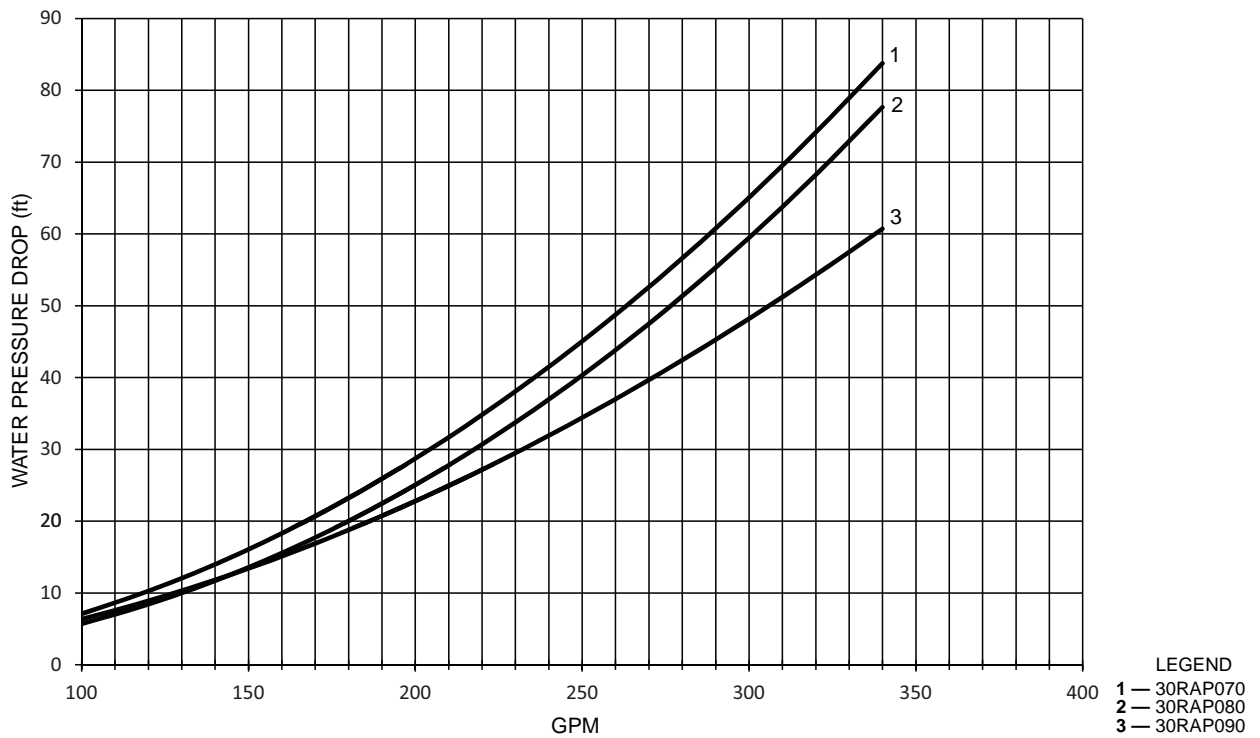


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UNIT PRESSURE DROP — DUAL PUMP HYDRONIC PACKAGE — 30RAP035-060 (ENGLISH)

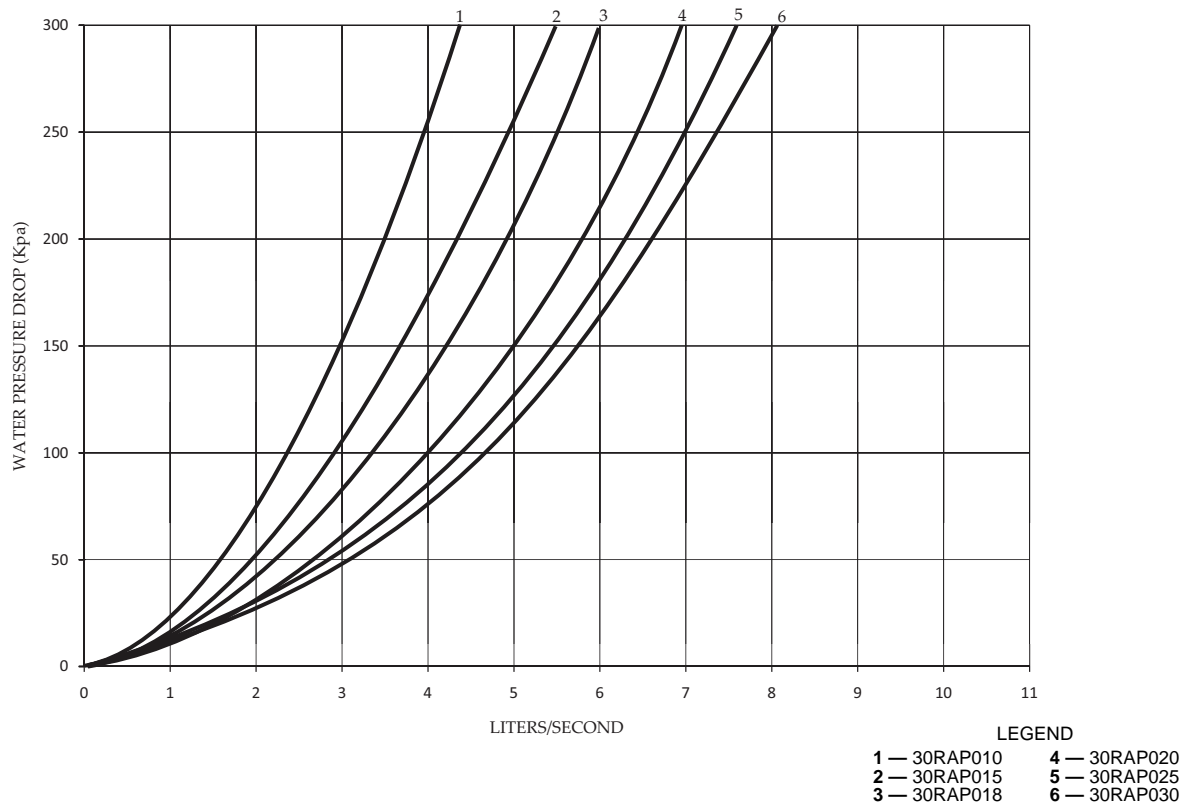


UNIT PRESSURE DROP — DUAL PUMP HYDRONIC PACKAGE — 30RAP070-090 (ENGLISH)

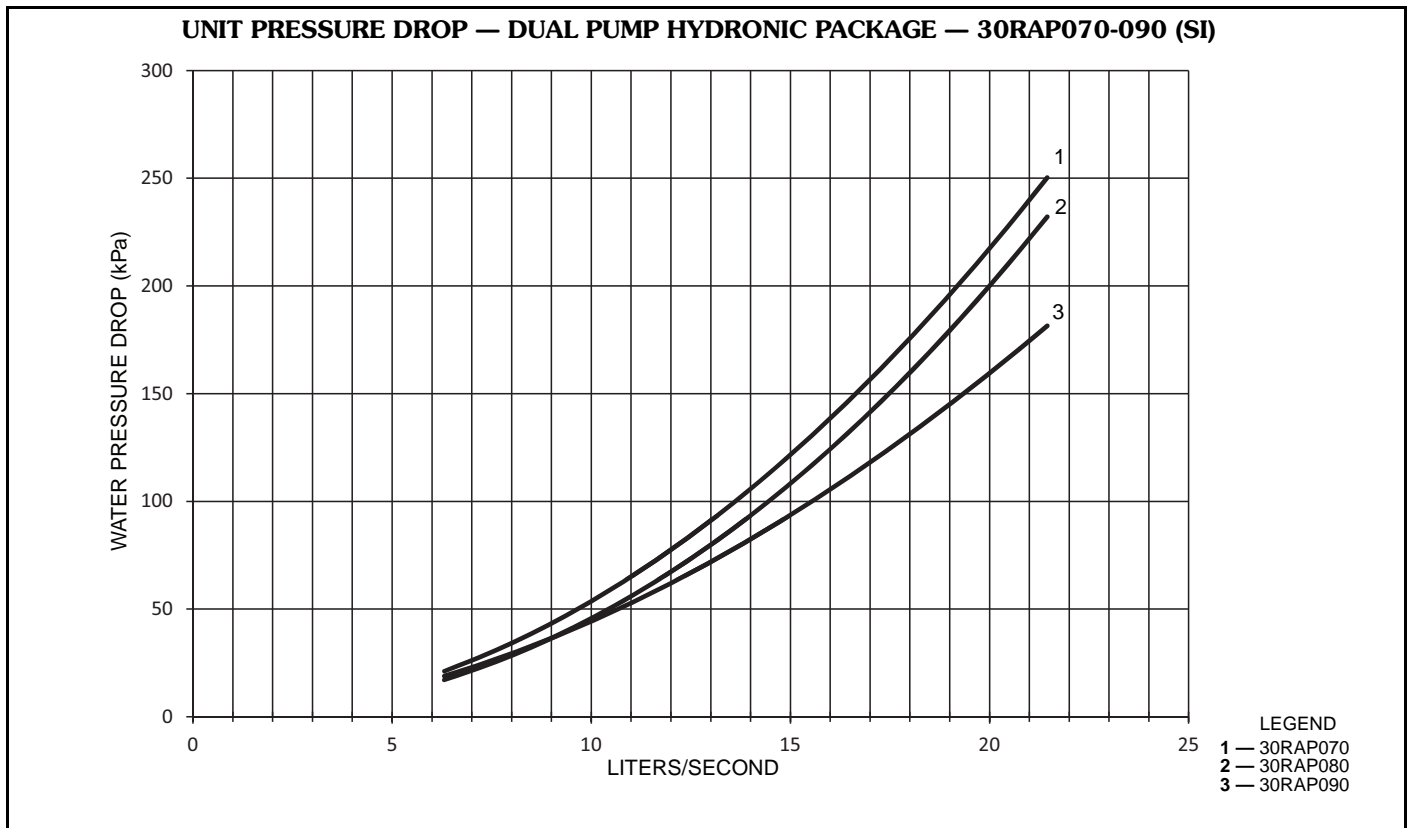
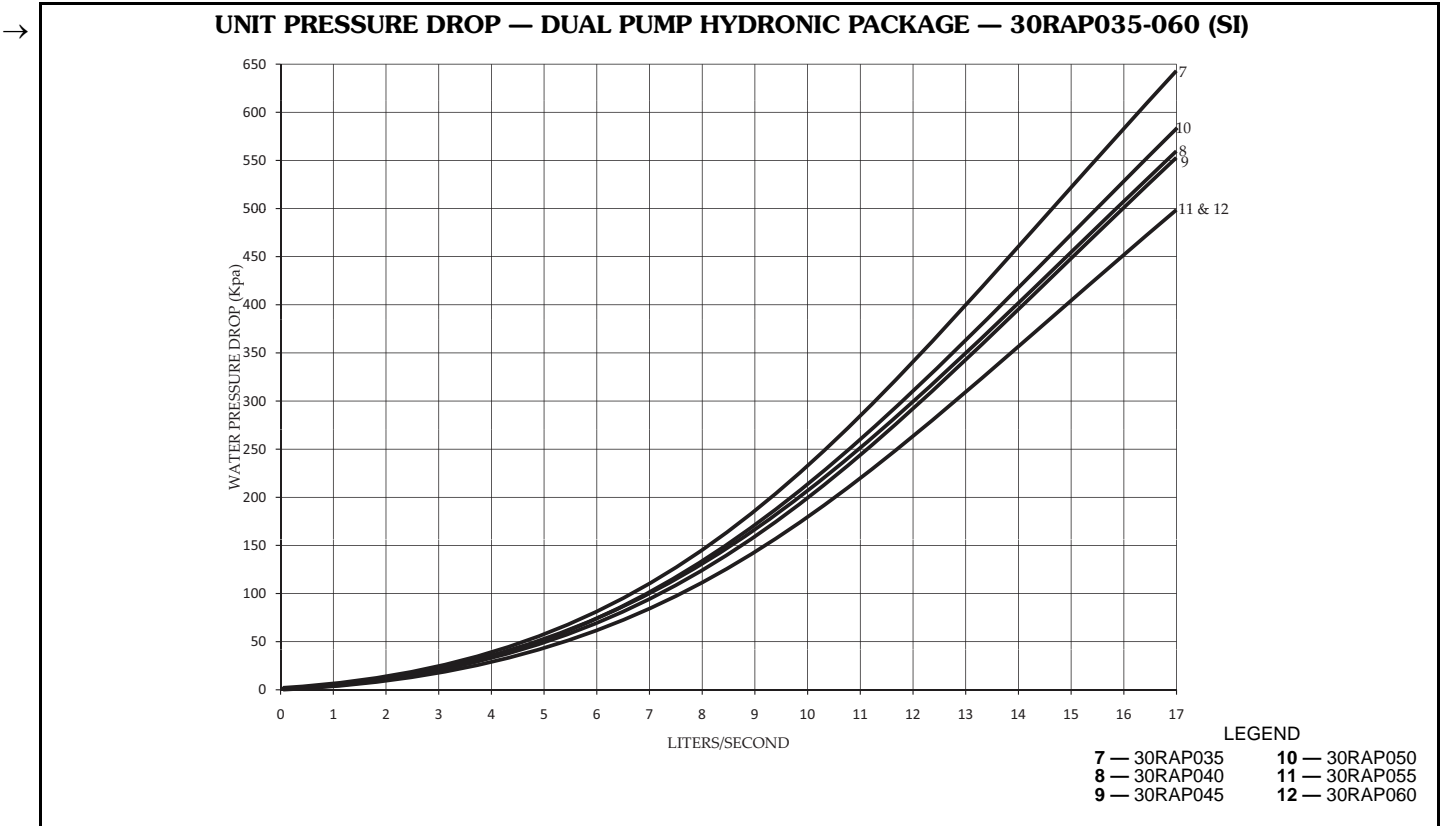


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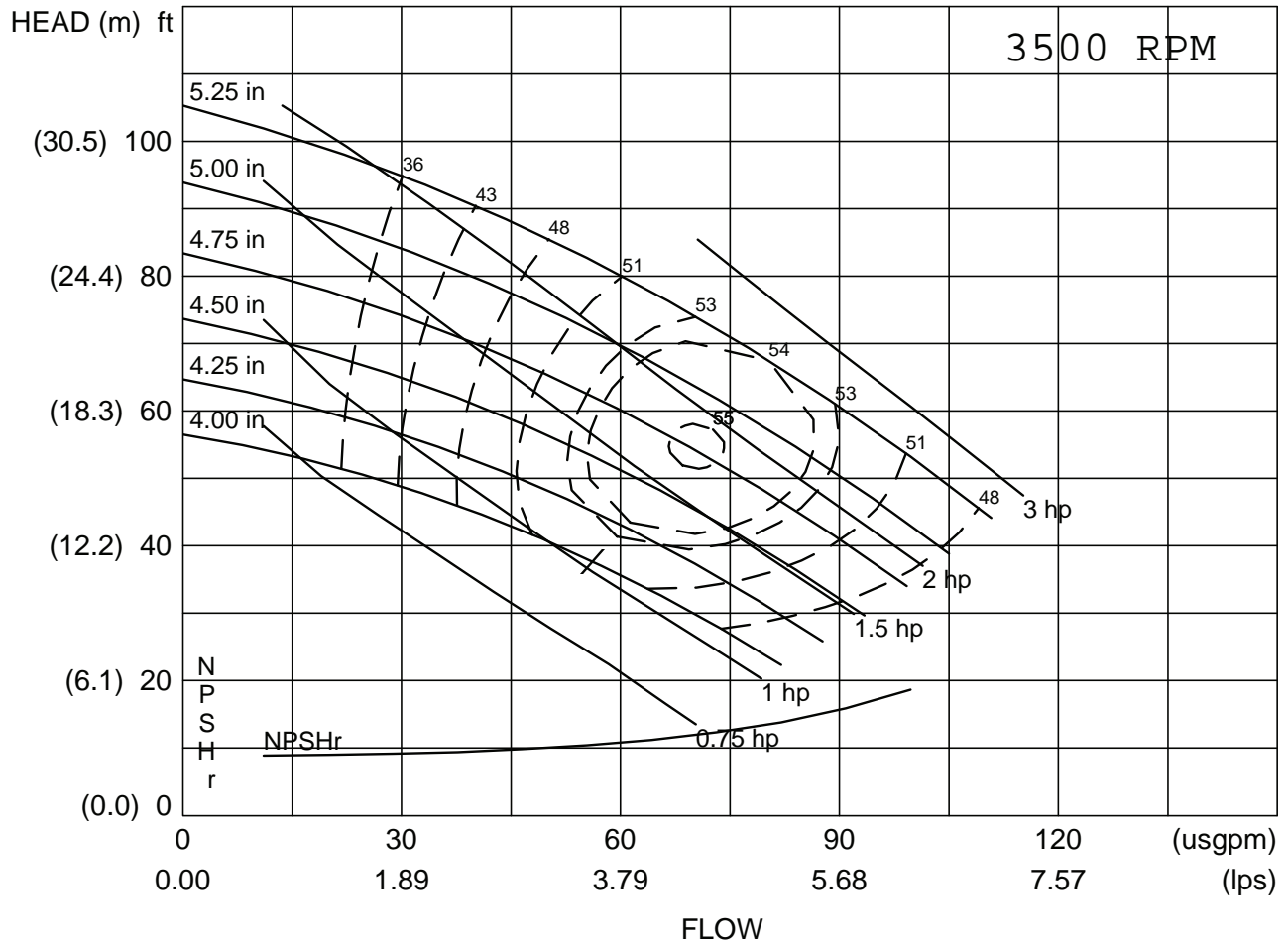
UNIT PRESSURE DROP — DUAL PUMP HYDRONIC PACKAGE — 30RAP010-030 (SI)



Performance data (cont)



**PUMP CURVE I FOR HYDRONIC PACKAGE — SINGLE PUMP 1.5 Hp, DUAL PUMP 1.5 Hp,
SINGLE PUMP 3.0 Hp, DUAL PUMP 3.0 Hp, SINGLE PUMP HIGH HEAD 3.0 Hp,
DUAL PUMP HIGH HEAD 3.0 Hp**



LEGEND

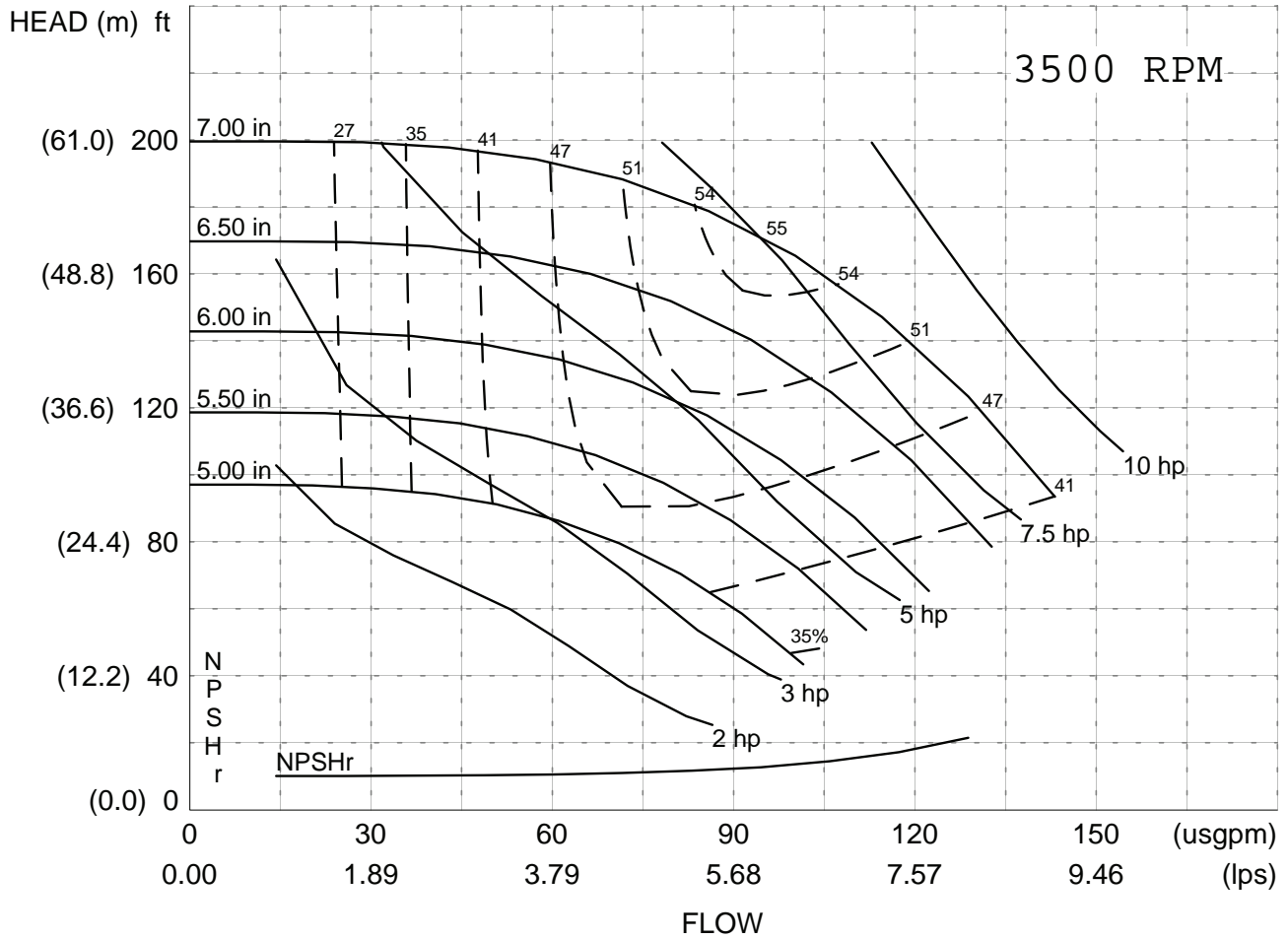
NPSHr — Net Pump Suction Head Required

NOTE: Refer to the Pump Impeller Sizes chart on page 18 for proper unit size matching as well as the determination of the impeller diameter.

Performance data (cont)



**PUMP CURVE II FOR HYDRONIC PACKAGE — SINGLE PUMP 5.0 Hp,
DUAL PUMP 5.0 Hp — 30RAP010-030 UNITS**

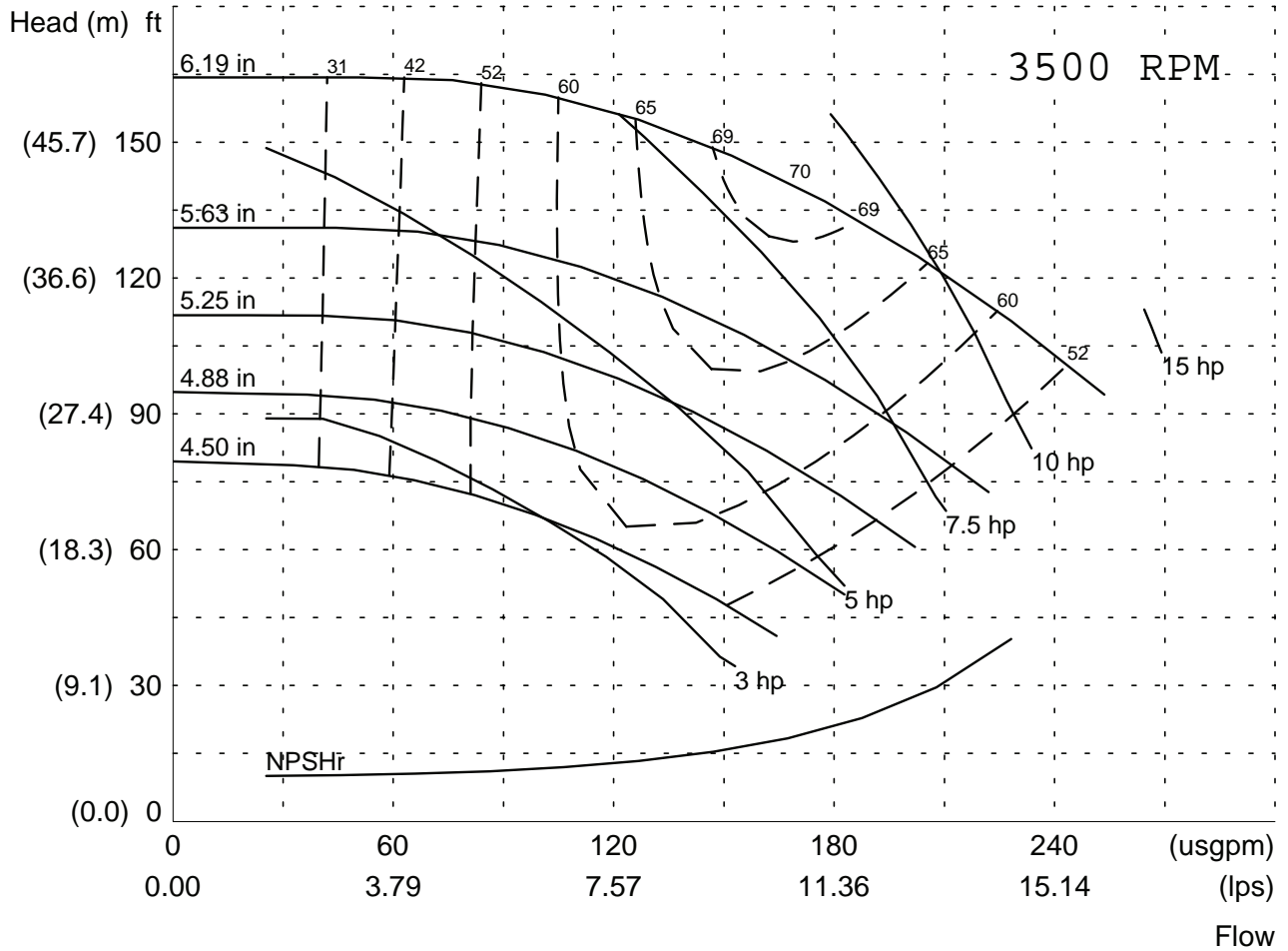


LEGEND

NPSHr — Net Pump Suction Head Required

NOTE: Refer to the Pump Impeller Sizes chart on page 18 for proper unit size matching as well as the determination of the impeller diameter.

**PUMP CURVE III FOR HYDRONIC PACKAGE — SINGLE PUMP 5.0 Hp, DUAL PUMP 5.0 Hp,
SINGLE PUMP HIGH HEAD 5.0 Hp, DUAL PUMP HIGH HEAD 5.0 Hp — 30RAP035-060 UNITS**



LEGEND

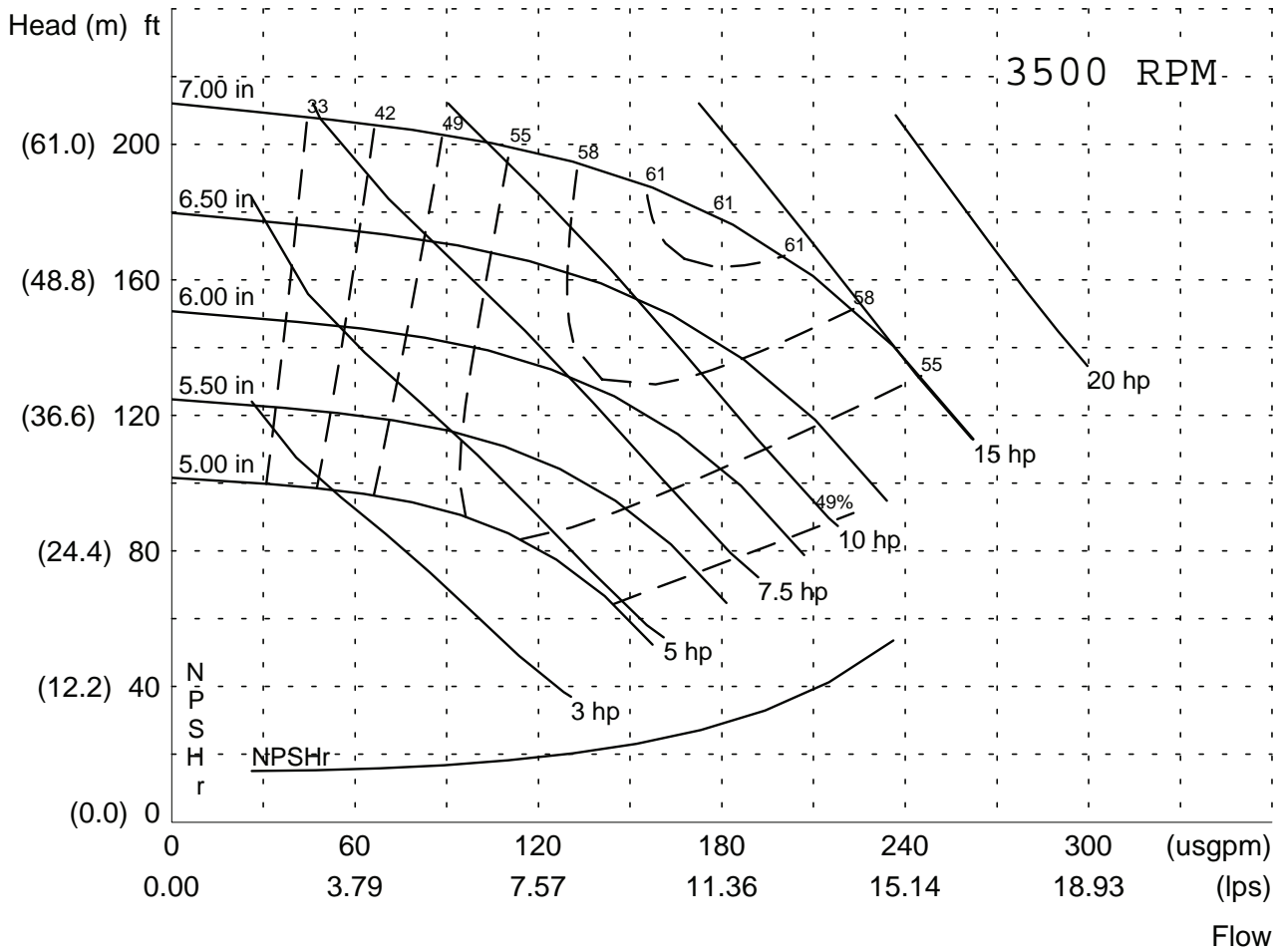
NPSHr — Net Pump Suction Head Required

NOTE: Refer to the Pump Impeller Sizes chart on page 18 for proper unit size matching as well as the determination of the impeller diameter.

Performance data (cont)



**PUMP CURVE IV FOR HYDRONIC PACKAGE — SINGLE PUMP 7.5 Hp, DUAL PUMP 7.5 Hp,
SINGLE PUMP 10.0 Hp, DUAL PUMP 10.0 Hp**



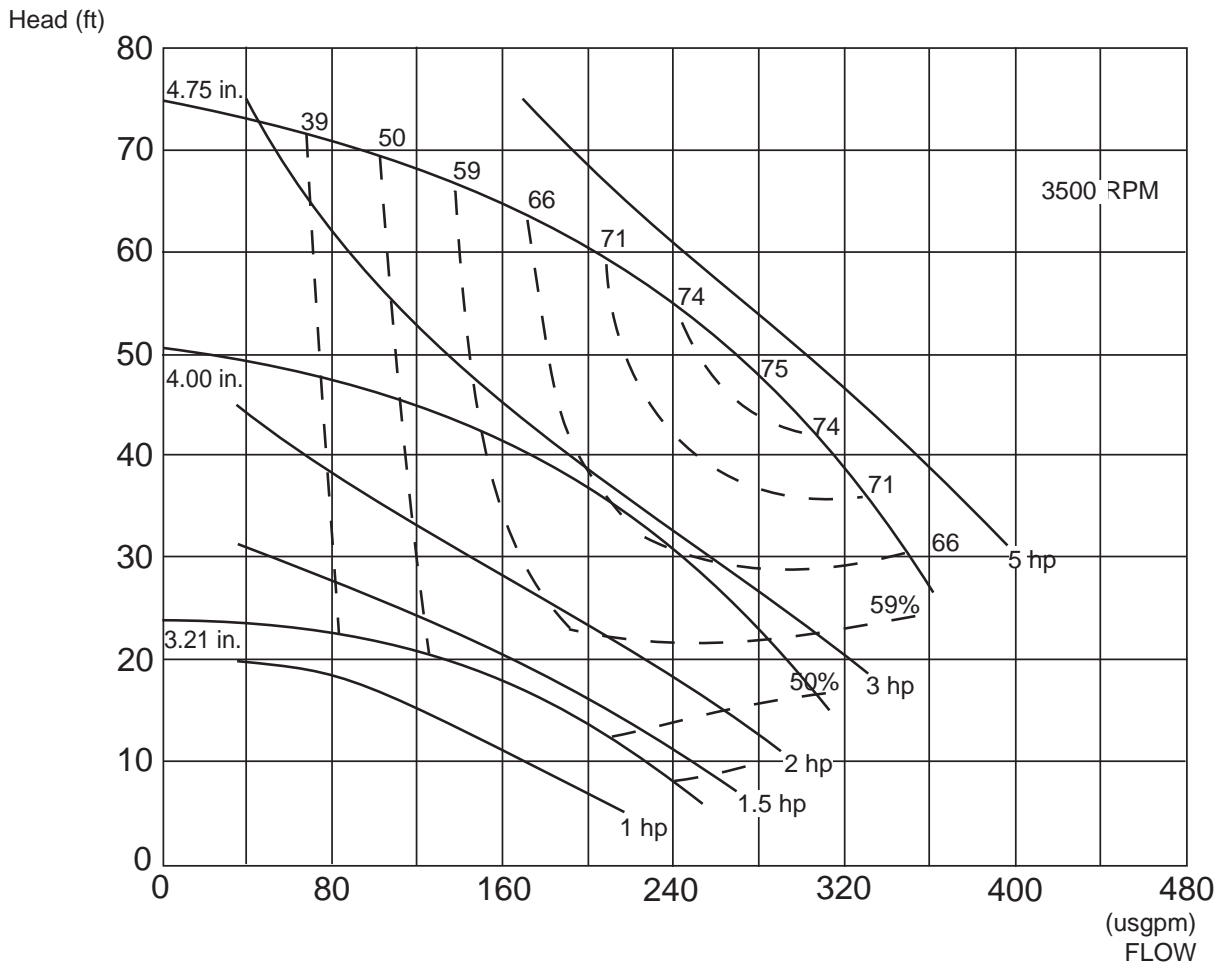
LEGEND

NPSHr — Net Pump Suction Head Required

NOTE: Refer to the Pump Impeller Sizes chart on page 18 for proper unit size matching as well as the determination of the impeller diameter.



PUMP CURVE V FOR HYDRONIC PACKAGE — SINGLE PUMP 3 Hp, SINGLE PUMP 5 Hp — UNIT SIZES 070-090

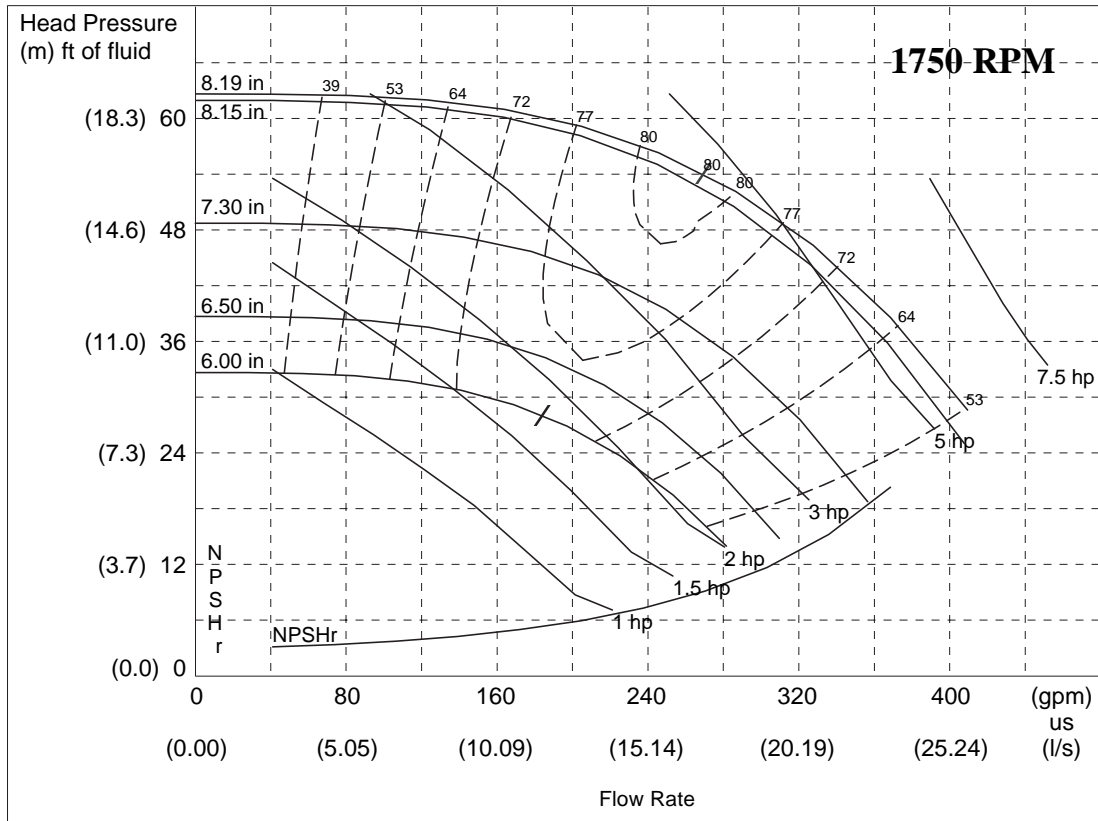


LEGEND

NPSHr — Net Pump Suction Head Required

NOTE: Refer to the Pump Impeller Sizes chart on page 18 for proper unit size matching as well as the determination of the impeller diameter.

PUMP CURVE VII FOR HYDRONIC PACKAGE — DUAL PUMP 3 Hp



LEGEND

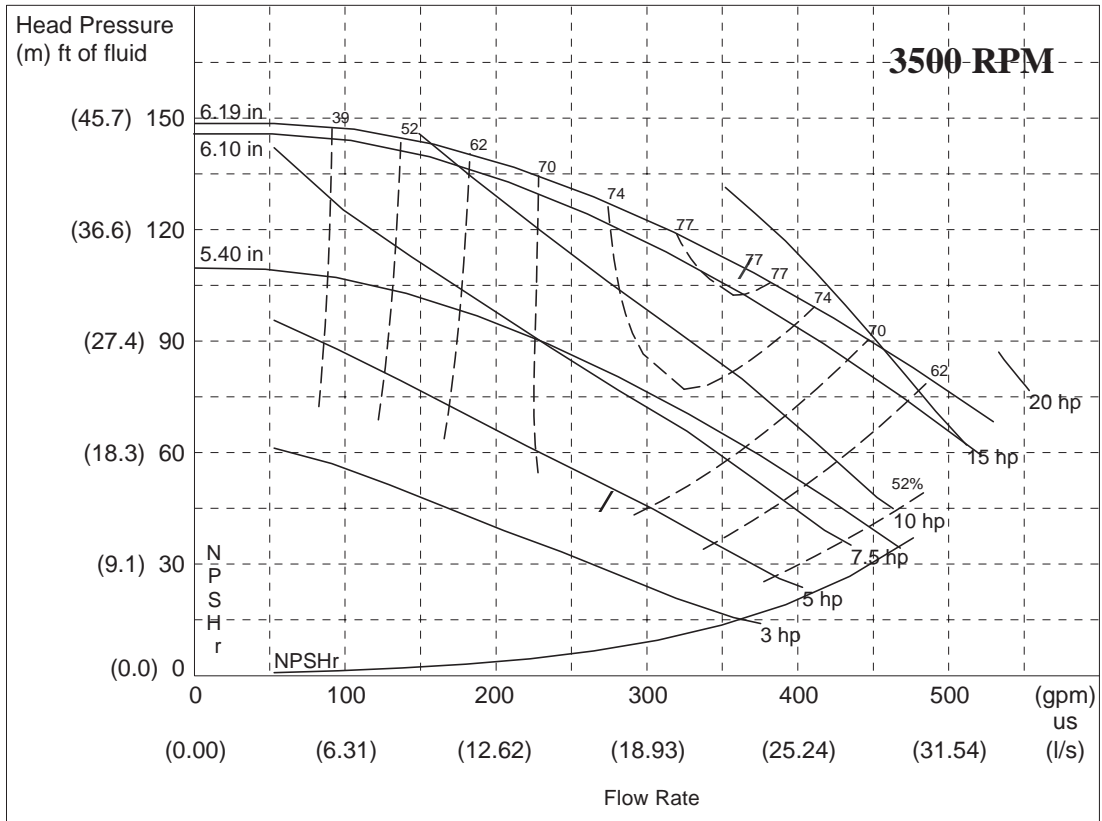
NPSHr — Net Pump Suction Head Required

NOTE: Refer to the Pump Impeller Sizes chart on page 18 for proper unit size matching as well as the determination of the impeller diameter.

Performance data (cont)



PUMP CURVE VIII FOR HYDRONIC PACKAGE — DUAL PUMP 5 Hp, DUAL PUMP 7.5 Hp, DUAL PUMP 10 Hp, DUAL PUMP 15 Hp

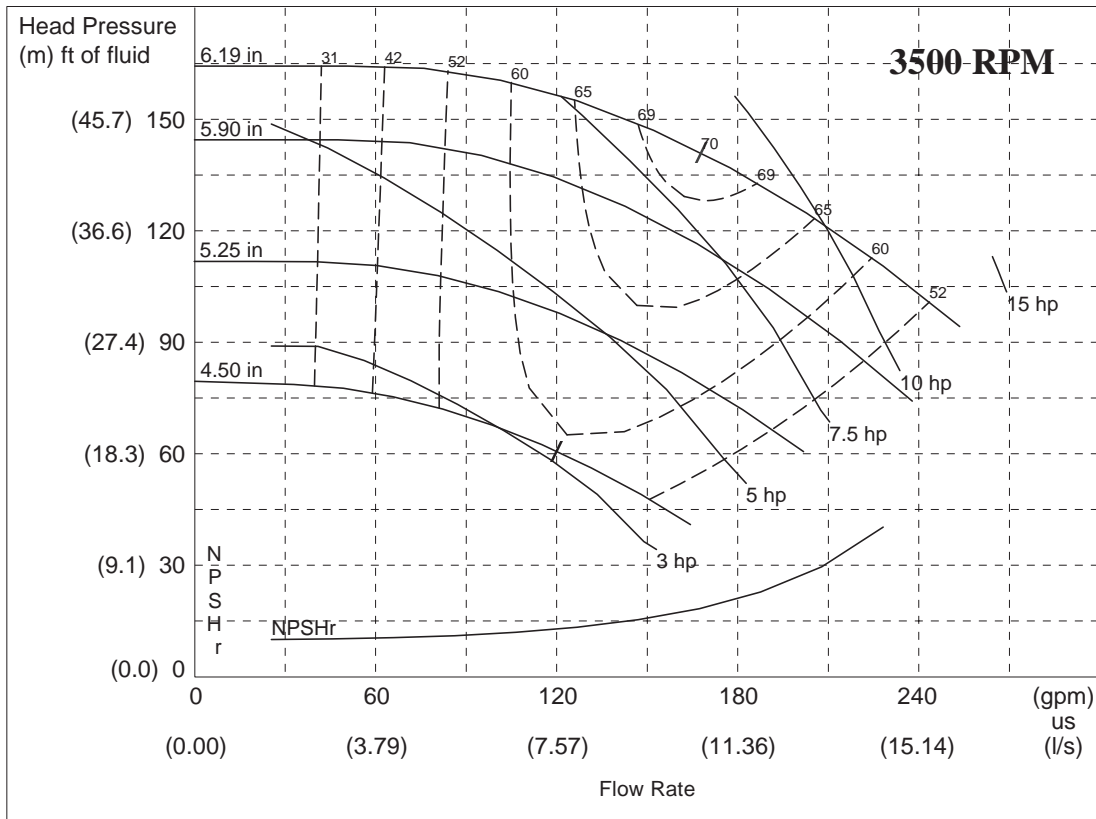


LEGEND

NPSHr — Net Pump Suction Head Required

NOTE: Refer to the Pump Impeller Sizes chart on page 18 for proper unit size matching as well as the determination of the impeller diameter.

**PUMP CURVE IX FOR HYDRONIC PACKAGE — DUAL PUMP 7.5 Hp,
DUAL PUMP 10 Hp**



LEGEND

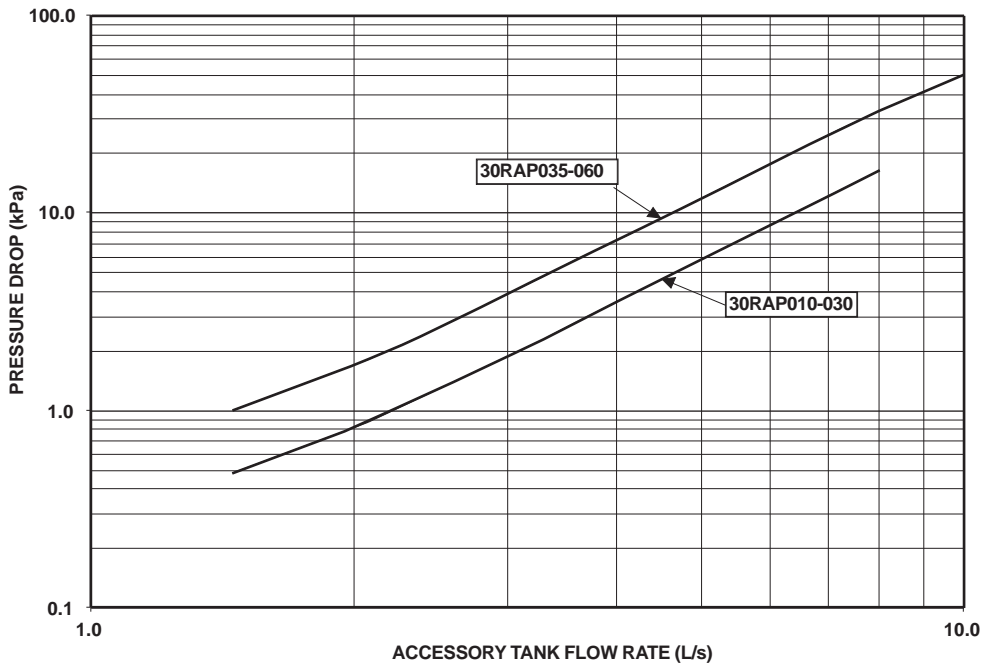
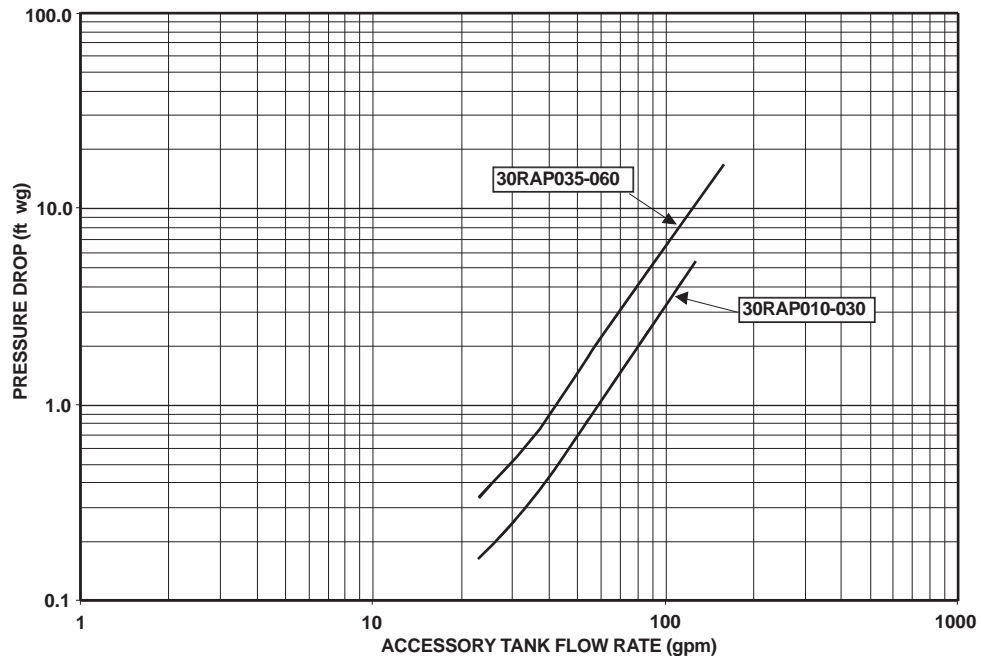
NPSHr — Net Pump Suction Head Required

NOTE: Refer to the Pump Impeller Sizes chart on page 18 for proper unit size matching as well as the determination of the impeller diameter.

Performance data (cont)



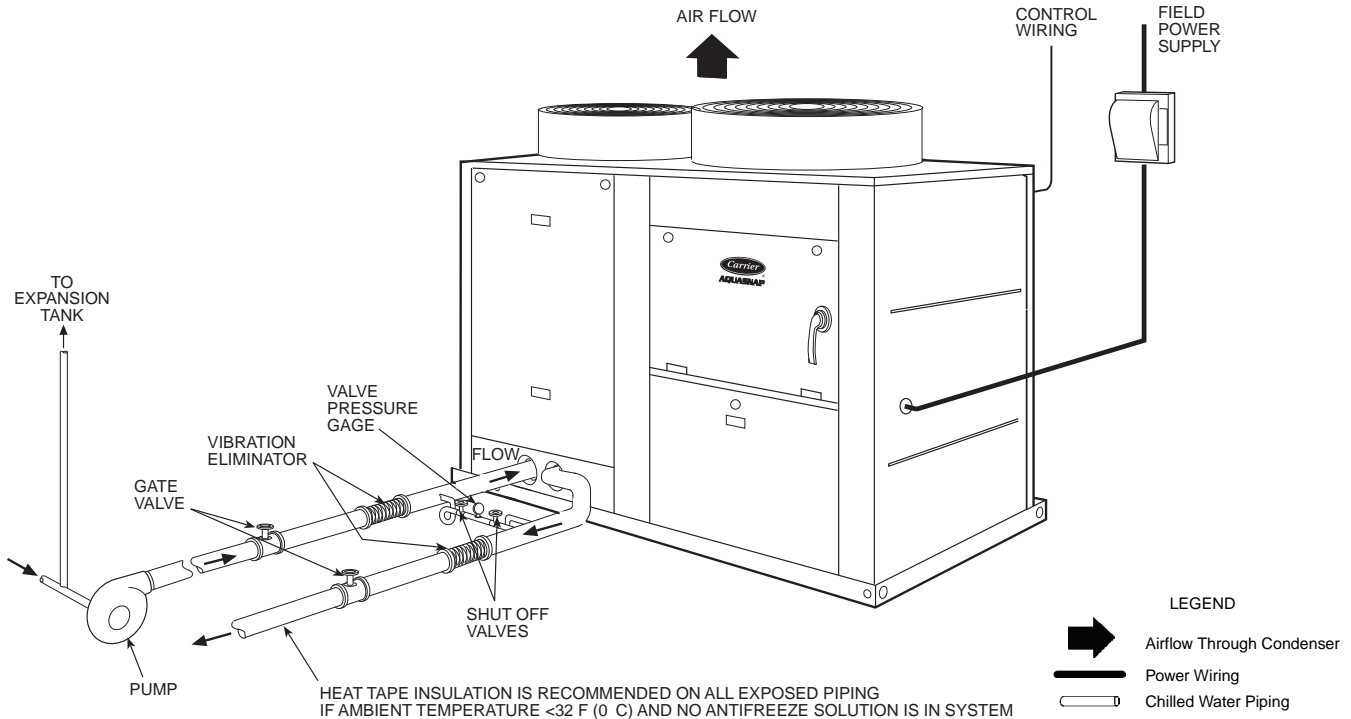
STORAGE TANK PRESSURE DROP CURVES



Typical piping and wiring



30RAP UNITS WITHOUT HYDRONIC PACKAGE (SIZE 030 SHOWN)

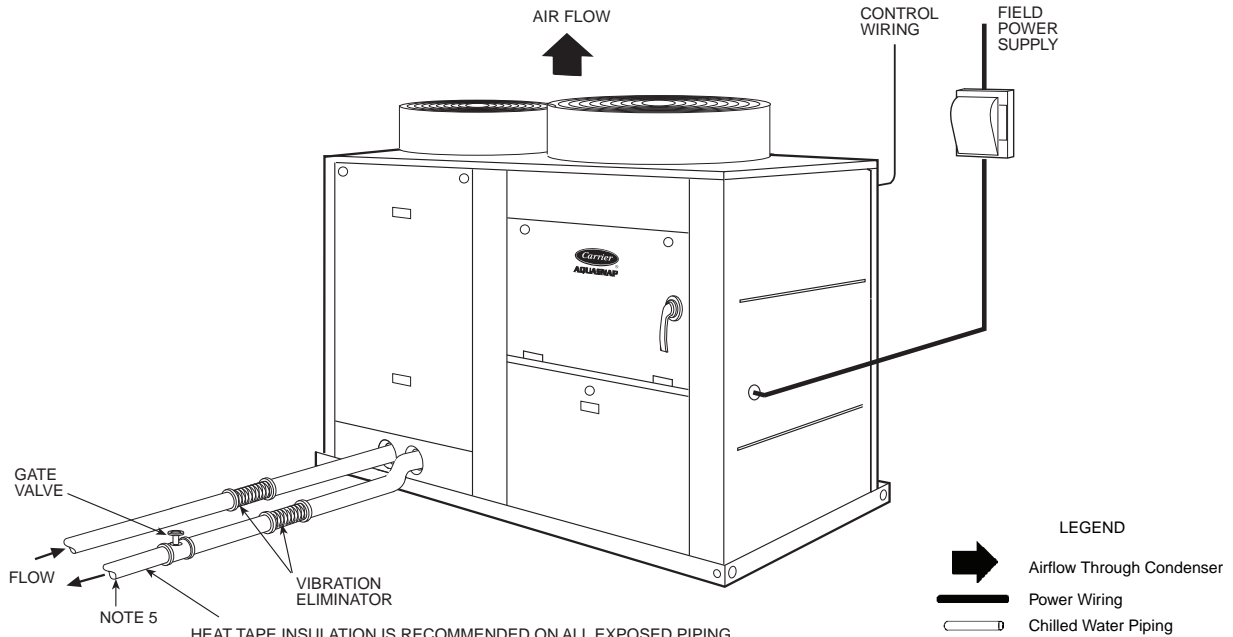


HEAT TAPE INSULATION IS RECOMMENDED ON ALL EXPOSED PIPING
IF AMBIENT TEMPERATURE <32 F (0 C) AND NO ANTIFREEZE SOLUTION IS IN SYSTEM

NOTES:

1. Chiller must be installed level to within 1/8 in. per foot (10.4 mm per meter) to maintain proper compressor oil return and hydraulics.
2. Wiring and piping shown are general points-of-connection guides only and are not intended for a specific installation. Wiring and piping shown are for a quick overview of system and are not in accordance with recognized standards.
3. All wiring must comply with applicable local and national codes.
4. All piping must follow standard piping techniques. Refer to Carrier System Design Manual or appropriate ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) handbook for details.

30RAP UNITS WITH HYDRONIC PACKAGE (SIZE 030 SHOWN)



HEAT TAPE INSULATION IS RECOMMENDED ON ALL EXPOSED PIPING
IF AMBIENT TEMPERATURE <32 F (0 C) AND NO ANTIFREEZE SOLUTION IS IN SYSTEM

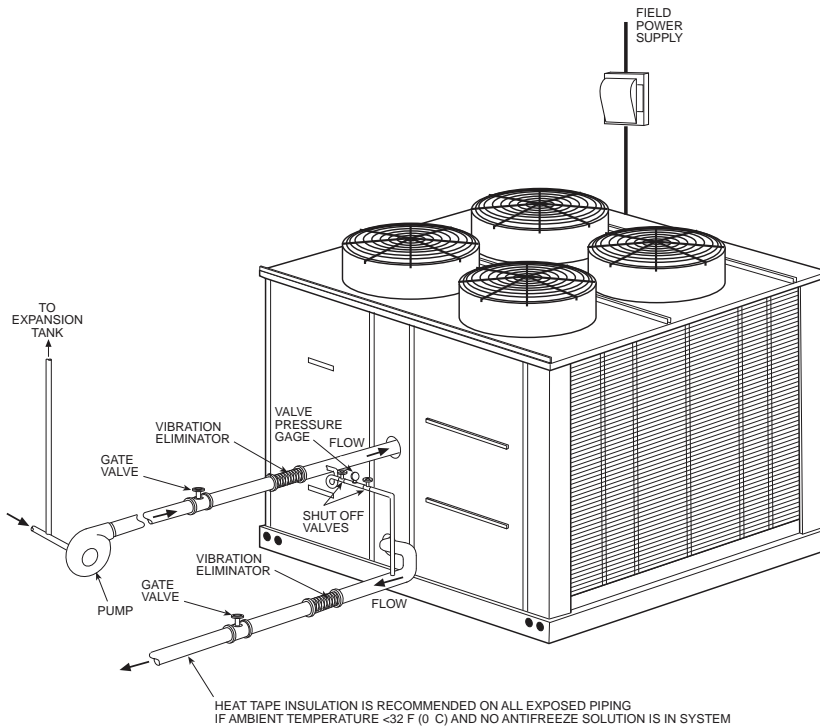
NOTES:

1. Chiller must be installed level to within 1/8 in. per foot (10.4 mm per meter) to maintain proper compressor oil return and hydraulics.
2. Wiring and piping shown are general points-of-connection guides only and are not intended for a specific installation. Wiring and piping shown are for a quick overview of system and are not in accordance with recognized standards.
3. All wiring must comply with applicable local and national codes.
4. All piping must follow standard piping techniques. Refer to Carrier System Design Manual or appropriate ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) handbook for details.
5. Air separator required as close to chiller as possible (except primary/secondary systems).

Typical piping and wiring (cont)



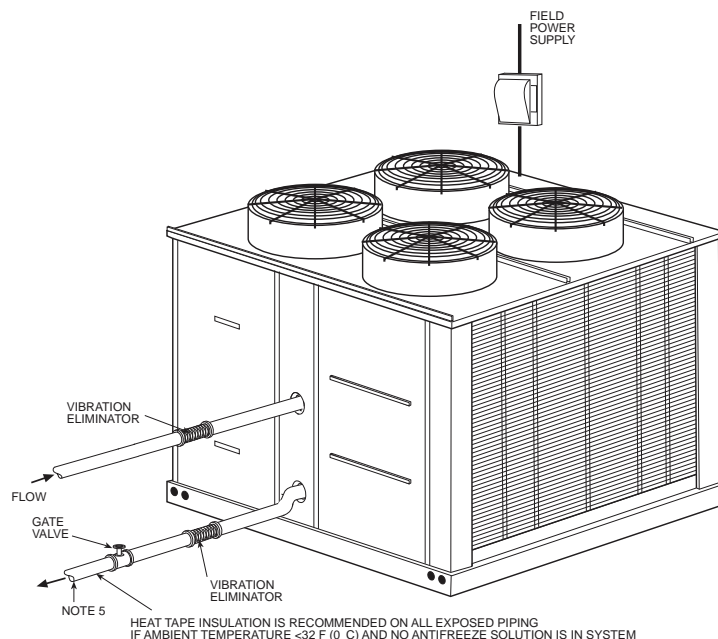
30RAP UNITS WITHOUT HYDRONIC PACKAGE (SIZE 060 SHOWN)



NOTES:

1. Chiller must be installed level to within $\frac{1}{8}$ in. per foot (10.4 mm per meter) to maintain proper compressor oil return and hydraulics.
2. Wiring and piping shown are general points-of-connection guides only and are not intended for a specific installation. Wiring and piping shown are for a quick overview of system and are not in accordance with recognized standards.
3. All wiring must comply with applicable local and national codes.
4. All piping must follow standard piping techniques. Refer to Carrier System Design Manual or appropriate ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) handbook for details.

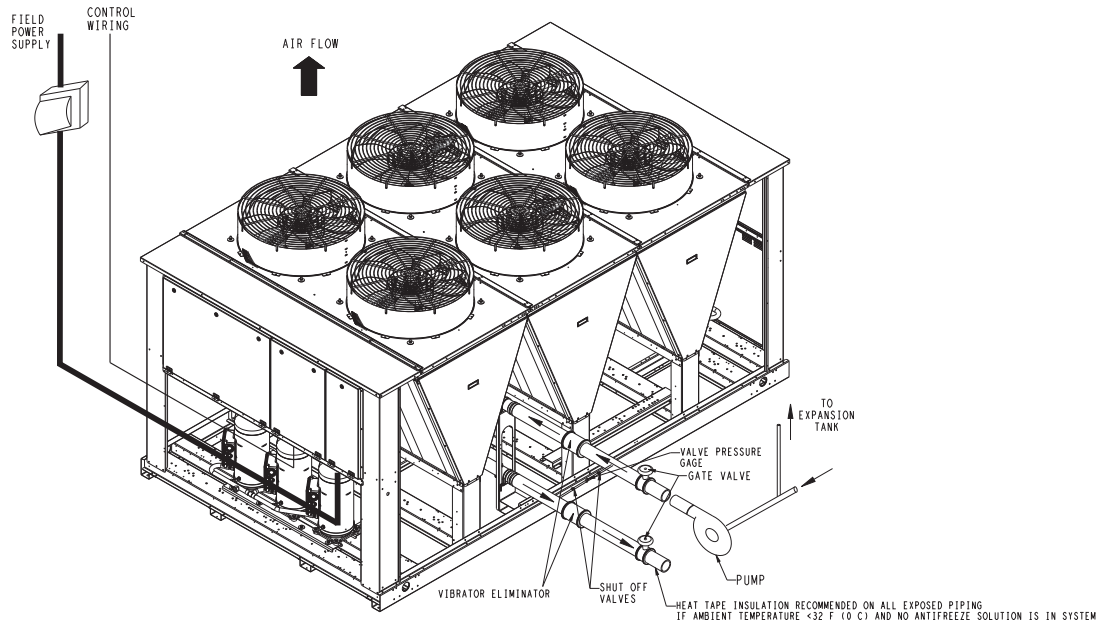
30RAP UNITS WITH HYDRONIC PACKAGE (SIZE 060 SHOWN)



NOTES:

1. Chiller must be installed level to within $\frac{1}{8}$ in. per foot (10.4 mm per meter) to maintain proper compressor oil return and hydraulics.
2. Wiring and piping shown are general points-of-connection guides only and are not intended for a specific installation. Wiring and piping shown are for a quick overview of system and are not in accordance with recognized standards.
3. All wiring must comply with applicable local and national codes.
4. All piping must follow standard piping techniques. Refer to Carrier System Design Manual or appropriate ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) handbook for details.
5. Air separator required as close to chiller as possible (except primary/secondary systems).

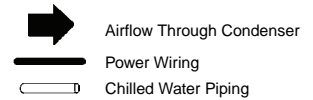
30RAP UNITS WITHOUT HYDRONIC PACKAGE (SIZE 070-090 SHOWN)



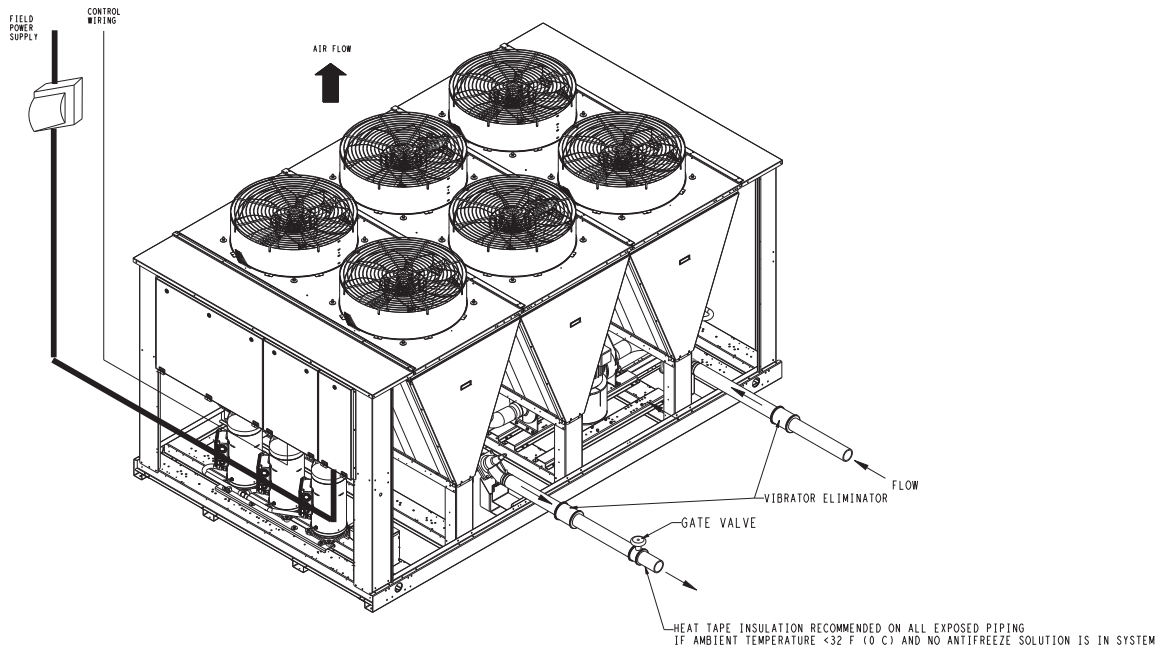
NOTES:

1. Chiller must be installed level to within 1/8 in. per foot (10.4 mm per meter) to maintain proper compressor oil return and hydraulics.
2. Wiring and piping shown are general points-of-connection guides only and are not intended for a specific installation. Wiring and piping shown are for a quick overview of system and are not in accordance with recognized standards.
3. All wiring must comply with applicable local and national codes.
4. All piping must follow standard piping techniques. Refer to Carrier System Design Manual or appropriate ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) handbook for details.
5. Air separator required as close to chiller as possible (except primary/secondary systems).

LEGEND



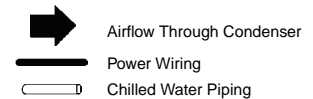
30RAP UNITS WITH HYDRONIC PACKAGE (SIZE 070-090 SHOWN)



NOTES:

1. Chiller must be installed level to within 1/8 in. per foot (10.4 mm per meter) to maintain proper compressor oil return and hydraulics.
2. Wiring and piping shown are general points-of-connection guides only and are not intended for a specific installation. Wiring and piping shown are for a quick overview of system and are not in accordance with recognized standards.
3. All wiring must comply with applicable local and national codes.
4. All piping must follow standard piping techniques. Refer to Carrier System Design Manual or appropriate ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) handbook for details.

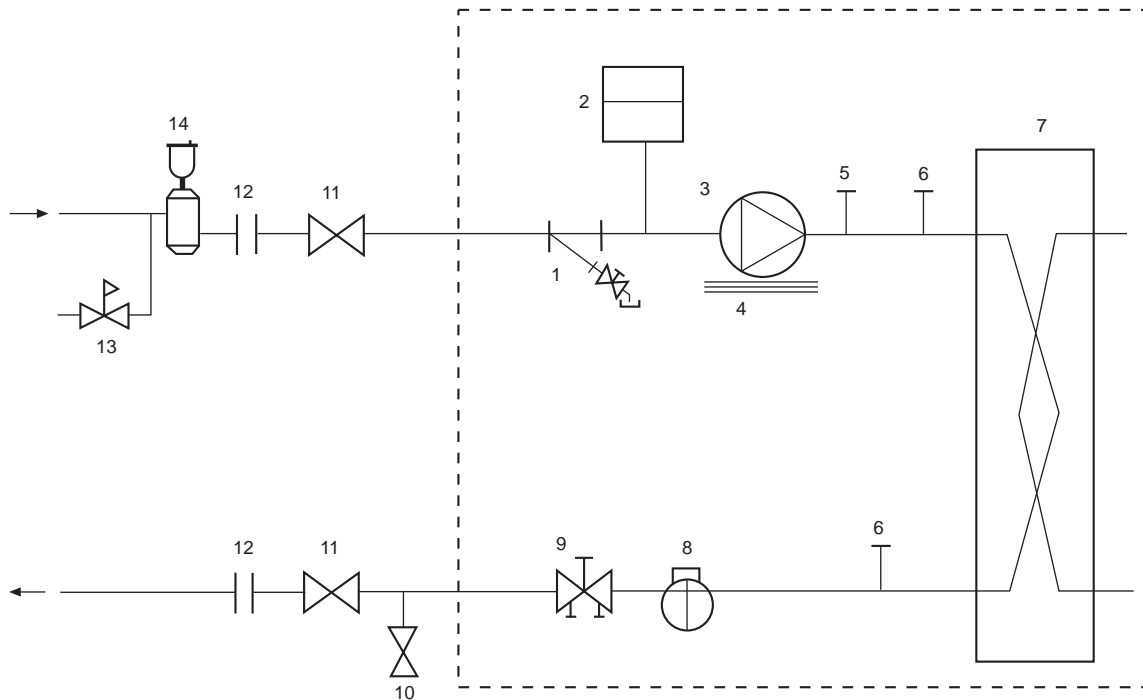
LEGEND



Typical piping and wiring (cont)



TYPICAL PIPING DIAGRAM ON 30RAP UNITS WITH HYDRONIC PACKAGE



LEGEND

- | | |
|---|-----------------------------------|
| 1 — Strainer/Blow-Down Valve | 8 — Flow Switch |
| 2 — Expansion Tank (sizes 010 - 060 only) | 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/Temperature Access Port | 13 — Pressure Reducing/Fill Valve |
| 7 — Heat Exchanger | 14 — Air Separator and Vent |
| --- | --- — Factory Supplied |

30RAP ELECTRICAL DATA SINGLE POINT NO HYDRONIC PACKAGE

UNIT 30RAP	UNIT VOLTAGE			POWER SUPPLY QTY REQD.	NO HYDRONIC PACKAGE STANDARD LOW-SOUND AEROACOUSTIC™ FAN				NO HYDRONIC PACKAGE OPTIONAL VALUE SOUND FANS			
	V-Hz (3 Ph)	Supplied			MCA	MOCP	ICF	Rec Fuse Size	MCA	MOCP	ICF	Rec Fuse Size
		Min	Max									
010	208/230-60	187	253	1	66.1	110	251.0	80	66.7	110	251.6	80
	380-60	342	418	1	33.5	50	148.9	40	33.5	50	148.9	40
	460-60	414	506	1	26.2	40	127.9	35	26.6	45	128.3	35
	575-60	518	633	1	20.8	35	102.4	25	21.0	35	102.6	25
015	208/230-60	187	253	1	75.8	125	346.0	90	76.4	125	346.6	100
	380-60	342	418	1	46.4	80	199.9	60	46.4	80	199.9	60
	460-60	414	506	1	36.5	60	181.9	45	36.9	60	182.3	45
	575-60	518	633	1	32.0	50	134.4	40	32.2	50	134.6	40
018	208/230-60	187	253	1	87.2	110	270.4	100	88.4	110	271.6	100
	380-60	342	418	1	51.1	70	167.0	60	51.1	70	167.0	60
	460-60	414	506	1	43.4	60	136.5	50	44.2	60	137.3	50
	575-60	518	633	1	34.9	45	98.2	40	35.3	45	98.6	40
020	208/230-60	187	253	1	92.6	125	286.8	110	93.8	125	288.0	110
	380-60	342	418	1	61.2	80	176.5	70	61.2	80	176.5	70
	460-60	414	506	1	46.1	60	148.7	60	46.9	60	149.5	60
	575-60	518	633	1	37.0	50	99.1	45	37.4	50	99.5	45
025	208/230-60	187	253	1	127.4	175	363.3	150	128.6	175	364.5	150
	380-60	342	418	1	68.3	90	173.7	80	68.3	90	173.7	80
	460-60	414	506	1	57.8	80	178.9	70	58.6	80	179.7	70
	575-60	518	633	1	49.6	60	133.7	60	50.0	60	134.1	60
030	208/230-60	187	253	1	137.6	175	407.8	175	138.8	175	409.0	175
	380-60	342	418	1	84.3	110	237.8	100	84.3	110	237.8	100
	460-60	414	506	1	66.3	90	211.7	80	67.1	90	212.5	80
	575-60	518	633	1	58.1	80	160.5	70	58.5	80	160.9	70
035	208/230-60	187	253	1	165.4	200	359.6	175	167.2	200	361.4	200
	380-60	342	418	1	103.5	125	218.9	110	103.5	125	218.9	110
	460-60	414	506	1	82.4	100	185.0	90	83.6	100	186.2	90
	575-60	518	633	1	66.1	80	128.2	70	66.7	80	128.8	80
040	208/230-60	187	253	1	197.8	225	395.0	225	199.6	225	396.8	225
	380-60	342	418	1	112.5	125	227.8	125	112.5	125	227.8	125
	460-60	414	506	1	86.4	100	188.8	100	87.6	100	190.0	100
	575-60	518	633	1	68.9	80	150.9	80	69.5	80	151.5	80
045	208/230-60	187	253	1	229.6	250	468.7	250	231.4	250	470.5	250
	380-60	342	418	1	119.6	125	228.2	125	119.6	125	228.8	125
	460-60	414	506	1	97.9	110	223.5	110	99.1	110	224.7	110
	575-60	518	633	1	81.4	100	170.7	90	82.0	100	171.3	90
050	208/230-60	187	253	1	236.0	250	471.9	250	237.8	250	473.7	250
	380-60	342	418	1	126.0	150	231.4	150	126.0	150	231.4	150
	460-60	414	506	1	106.9	125	228.0	125	108.1	125	229.2	125
	575-60	518	633	1	91.8	110	175.9	100	92.4	110	176.5	100
055	208/230-60	187	253	1	252.2	300	526.9	300	254.6	300	529.3	300
	380-60	342	418	1	145.9	175	306.5	175	145.9	175	306.5	175
	460-60	414	506	1	118.3	125	267.5	125	119.9	125	269.1	125
	575-60	518	633	1	102.7	125	208.9	110	103.5	125	209.7	110
060	208/230-60	187	253	1	261.2	300	531.4	300	263.6	300	533.8	300
	380-60	342	418	1	160.1	175	313.6	175	160.1	175	313.6	175
	460-60	414	506	1	125.9	150	271.3	150	127.5	150	272.9	150
	575-60	518	633	1	110.3	125	212.7	125	111.1	125	213.5	125
070	208/230-60	187	253	1	323.0	350	593.2	350	326.0	350	596.2	350
	380-60	342	418	1	198.0	225	351.5	225	198.0	225	351.5	225
	460-60	414	506	1	155.7	175	301.1	175	157.7	175	303.1	175
	575-60	518	633	1	136.4	150	238.8	150	137.4	150	239.8	150
080	208/230-60	187	253	1	371.3	400	641.5	400	374.9	400	645.1	400
	380-60	342	418	1	214.6	225	368.1	225	214.6	225	368.1	225
	460-60	414	506	1	174.1	200	319.5	200	176.5	200	321.9	200
	575-60	518	633	1	151.1	175	253.5	175	152.3	175	254.7	175
090	208/230-60	187	253	1	384.8	400	655.0	400	388.4	400	658.6	400
	380-60	342	418	1	235.9	250	389.4	250	235.9	250	389.4	250
	460-60	414	506	1	185.5	200	330.9	200	187.9	200	333.3	200
	575-60	518	633	1	162.5	175	264.9	175	163.7	175	266.1	175

LEGEND

- ICF — Instantaneous Current Flow
- MCA — Minimum Circuit Amps
- MOCP — Maximum Overcurrent Protection

NOTES:

1. 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%.
2. 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.
3. Cooler heater is wired into the control circuit so it is always operable as long as the power supply disconnect is on, even if any safety device is open.
4. Power draw control circuits include cooler heaters (where used).



Electrical data (cont)



30RAP ELECTRICAL DATA DUAL POINT LOW SOUND AEROACOUSTIC™ FAN NO HYDRONIC PACKAGE

UNIT 30RAP	UNIT VOLTAGE			CIRCUIT 1				CIRCUIT 2			
	V-Hz (3 Ph)	Supplied		MCA	MOCP	ICF	Rec Fuse Size	MCA	MOCP	ICF	Rec Fuse Size
		Min	Max								
070	208/230-3-60	187	254	155.6	200	425.8	175	181.4	225	451.6	200
	380-3-60	342	418	96.0	125	249.5	110	110.5	125	264.0	125
	460-3-60	414	506	75.0	100	220.4	90	87.4	110	232.8	100
	575-3-60	518	632	65.3	80	167.7	80	77.0	100	179.4	90
080	208/230-3-60	187	254	202.7	250	438.6	225	181.4	225	451.6	200
	380-3-60	342	418	110.8	125	216.2	125	110.5	125	264.0	125
	460-3-60	414	506	92.5	110	213.6	100	87.4	110	232.8	100
	575-3-60	518	632	79.1	90	163.2	90	77.0	100	179.4	90
090	208/230-3-60	187	254	217.4	250	487.6	250	181.4	225	451.6	200
	380-3-60	342	418	133.9	150	287.4	150	110.5	125	264.0	125
	460-3-60	414	506	104.8	125	250.2	125	87.4	110	232.8	100
	575-3-60	518	632	91.4	110	193.8	100	77.0	100	179.4	90

30RAP ELECTRICAL DATA DUAL POINT OPTIONAL VALUE SOUND FAN NO HYDRONIC PACKAGE

UNIT 30RAP	UNIT VOLTAGE			CIRCUIT 1				CIRCUIT 2			
	V-Hz (3 Ph)	Supplied		MCA	MOCP	ICF	Rec Fuse Size	MCA	MOCP	ICF	Rec Fuse Size
		Min	Max								
070	208/230-3-60	187	254	158.6	200	428.8	175	181.4	225	451.6	200
	380-3-60	342	418	96.0	125	249.5	110	110.5	125	264.0	125
	460-3-60	414	506	77.0	100	222.4	90	87.4	110	232.8	100
	575-3-60	518	632	66.3	90	168.7	80	77.0	100	179.4	90
080	208/230-3-60	187	254	206.3	250	442.2	225	181.4	225	451.6	200
	380-3-60	342	418	110.8	125	216.2	125	110.5	125	264.0	125
	460-3-60	414	506	94.9	110	216.0	110	87.4	110	232.8	100
	575-3-60	518	632	80.3	100	164.4	90	77.0	100	179.4	90
090	208/230-3-60	187	254	221.0	250	491.2	250	181.4	225	451.6	200
	380-3-60	342	418	133.9	150	287.4	150	110.5	125	264.0	125
	460-3-60	414	506	107.2	125	252.6	125	87.4	110	232.8	100
	575-3-60	518	632	92.6	110	195.0	100	77.0	100	179.4	90

LEGEND

- ICF** — Instantaneous Current Flow
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection

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 dual point primary power connection. (Each unit/module requires its own power supply.) Main power must be supplied from a field-supplied disconnect.
- Cooler heater is wired into the control circuit so it is always operable as long as the power supply disconnect is on, even if any safety device is open.
- Power draw control circuits include cooler heaters (where used).





30RAP ELECTRICAL DATA (cont)
SINGLE POINT HYDRONIC PACKAGE WITH STANDARD LOW-SOUND AEROACOUSTIC™ FAN

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 1.5 hp				PUMP SIZE 3.0 hp				PUMP SIZE 5.0 hp			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
010	208/230-60	70.4	110	255.3	90	74.0	110	258.9	90	78.7	125	263.6	100
	380-60	35.9	50	151.3	45	37.9	60	153.3	45	40.5	60	155.9	50
	460-60	28.3	45	130.0	35	29.9	45	131.6	35	32.0	50	133.7	40
	575-60	22.4	35	104.0	30	23.8	35	105.4	30	25.4	40	107.0	30
015	208/230-60	80.1	125	350.3	100	83.7	125	353.9	100	88.4	125	358.6	110
	380-60	48.8	80	202.3	60	50.8	80	204.3	60	53.4	80	206.9	70
	460-60	38.6	60	184.0	50	40.2	60	185.6	50	42.3	60	187.7	50
	575-60	33.6	50	136.0	40	35.0	50	137.4	45	36.6	60	139.0	45
018	208/230-60	91.5	110	274.7	100	95.1	125	278.3	110	99.8	125	283.0	110
	380-60	53.5	70	169.4	60	55.5	70	171.4	70	58.1	70	174.0	70
	460-60	45.5	60	138.6	50	47.1	60	140.2	60	49.2	60	142.3	60
	575-60	36.5	45	99.8	40	37.9	50	101.2	45	39.5	50	102.8	45
020	208/230-60	96.9	125	291.1	110	100.5	125	294.7	110	105.2	125	299.4	125
	380-60	63.6	80	178.9	70	65.6	80	180.9	80	68.2	90	183.5	80
	460-60	48.2	60	150.8	60	49.8	60	152.4	60	51.9	60	154.5	60
	575-60	38.6	50	100.7	45	40.0	50	102.1	45	41.6	50	103.7	50
025	208/230-60	131.7	175	367.6	150	135.3	175	371.2	150	140.0	175	375.9	175
	380-60	70.7	90	176.1	80	72.7	90	178.1	80	75.3	100	180.7	90
	460-60	59.9	80	181.0	70	61.5	80	182.6	70	63.6	80	184.7	70
	575-60	51.2	70	135.3	60	52.6	70	136.7	60	54.2	70	138.3	60
030	208/230-60	141.9	175	412.1	175	145.5	200	415.7	175	150.2	200	420.4	175
	380-60	86.7	110	240.2	100	88.7	110	242.2	100	91.3	125	244.8	100
	460-60	68.4	90	213.8	80	70.0	90	215.4	80	72.1	90	217.5	80
	575-60	59.7	80	162.1	70	61.1	80	163.5	70	62.7	80	165.1	70
035	208/230-60	—	—	—	—	173.3	200	367.5	200	178.0	200	372.2	200
	380-60	—	—	—	—	107.9	125	223.3	125	110.5	125	225.9	125
	460-60	—	—	—	—	86.1	100	188.7	100	88.2	100	190.8	100
	575-60	—	—	—	—	69.1	80	131.2	80	70.7	80	132.8	80
040	208/230-60	—	—	—	—	205.7	250	402.9	225	210.4	250	407.6	225
	380-60	—	—	—	—	116.9	125	232.2	125	119.5	125	234.8	125
	460-60	—	—	—	—	90.1	100	192.5	100	92.2	110	194.6	100
	575-60	—	—	—	—	71.9	80	153.9	80	73.5	80	155.5	80
045	208/230-60	—	—	—	—	237.5	250	476.6	250	242.2	250	481.3	250
	380-60	—	—	—	—	124.0	150	232.6	150	126.6	150	235.2	150
	460-60	—	—	—	—	101.6	110	227.2	110	103.7	125	229.3	110
	575-60	—	—	—	—	84.4	100	173.7	90	86.0	100	175.3	100
050	208/230-60	—	—	—	—	243.9	250	479.8	250	248.6	250	484.5	250
	380-60	—	—	—	—	130.4	150	235.8	150	133.0	150	238.4	150
	460-60	—	—	—	—	110.6	125	231.7	125	112.7	125	233.8	125
	575-60	—	—	—	—	94.8	110	178.9	100	96.4	110	180.5	110
055	208/230-60	—	—	—	—	260.1	300	534.8	300	264.8	300	539.5	300
	380-60	—	—	—	—	150.3	175	310.9	175	152.9	175	313.5	175
	460-60	—	—	—	—	122.0	125	271.2	125	124.1	150	273.3	150
	575-60	—	—	—	—	105.7	125	211.9	125	107.3	125	213.5	125
060	208/230-60	—	—	—	—	269.1	300	539.3	300	273.8	300	544.0	300
	380-60	—	—	—	—	164.5	175	318.0	175	167.1	200	320.6	200
	460-60	—	—	—	—	129.6	150	275.0	150	131.7	150	277.1	150
	575-60	—	—	—	—	113.3	125	215.7	125	114.9	125	217.3	125
070	208/230-60	—	—	—	—	333.8	350	604.0	350	340.7	350	610.9	350
	380-60	—	—	—	—	203.9	225	357.4	225	207.7	225	361.2	225
	460-60	—	—	—	—	160.6	175	306.0	175	163.7	175	309.1	175
	575-60	—	—	—	—	140.3	150	242.7	150	142.8	150	245.2	150
080	208/230-60	—	—	—	—	382.1	400	652.3	400	389.0	400	659.2	400
	380-60	—	—	—	—	220.5	250	374.0	250	224.3	250	377.8	250
	460-60	—	—	—	—	179.0	200	324.4	200	182.1	200	327.5	200
	575-60	—	—	—	—	155.0	175	257.4	175	157.5	175	259.9	175
090	208/230-60	—	—	—	—	395.6	450	665.8	450	402.5	450	672.7	450
	380-60	—	—	—	—	241.8	250	395.3	250	245.6	250	399.1	250
	460-60	—	—	—	—	190.4	200	335.8	200	193.5	200	338.9	200
	575-60	—	—	—	—	166.4	175	268.8	175	168.9	175	271.3	175

LEGEND

- ICF — Instantaneous Current Flow
- MCA — Minimum Circuit Amps
- MOCP — Maximum Overcurrent Protection

NOTES:

1. 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%.
2. 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.
3. Cooler heater is wired into the control circuit so it is always operable as long as the power supply disconnect is on, even if any safety device is open.
4. Power draw control circuits include cooler heaters (where used).



Electrical data (cont)



30RAP ELECTRICAL DATA (cont) SINGLE POINT HYDRONIC PACKAGE WITH STANDARD LOW-SOUND AEROACOUSTIC™ FAN (cont)

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 7.5 hp				PUMP SIZE 10.0 hp				PUMP SIZE 15.0 hp			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
010	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
015	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
018	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
020	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
025	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
030	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
035	208/230-60	183.9	200	378.1	200	—	—	—	—	—	—	—	—
	380-60	113.9	125	229.3	125	—	—	—	—	—	—	—	—
	460-60	91.1	100	193.7	100	—	—	—	—	—	—	—	—
	575-60	73.1	80	135.2	80	—	—	—	—	—	—	—	—
040	208/230-60	216.3	250	413.5	250	—	—	—	—	—	—	—	—
	380-60	122.9	125	238.2	125	—	—	—	—	—	—	—	—
	460-60	95.1	110	197.5	100	—	—	—	—	—	—	—	—
	575-60	75.9	90	157.9	80	—	—	—	—	—	—	—	—
045	208/230-60	248.1	250	487.2	250	—	—	—	—	—	—	—	—
	380-60	130.0	150	238.6	150	—	—	—	—	—	—	—	—
	460-60	106.6	125	232.2	125	—	—	—	—	—	—	—	—
	575-60	88.4	100	177.7	100	—	—	—	—	—	—	—	—
050	208/230-60	254.5	300	490.4	300	261.0	300	496.9	300	—	—	—	—
	380-60	136.4	150	241.8	150	140.0	150	245.4	150	—	—	—	—
	460-60	115.6	125	236.7	125	118.4	125	239.5	125	—	—	—	—
	575-60	98.8	110	182.9	110	101.0	110	185.1	110	—	—	—	—
055	208/230-60	270.7	300	545.4	300	277.2	300	551.9	300	—	—	—	—
	380-60	156.3	175	316.9	175	159.9	175	320.5	175	—	—	—	—
	460-60	127.0	150	276.2	150	129.8	150	279.0	150	—	—	—	—
	575-60	109.7	125	215.9	125	111.9	125	218.1	125	—	—	—	—
060	208/230-60	279.7	300	549.9	300	286.2	300	556.4	300	—	—	—	—
	380-60	170.5	200	324.0	200	174.1	200	327.6	200	—	—	—	—
	460-60	134.6	150	280.0	150	137.4	150	282.8	150	—	—	—	—
	575-60	117.3	125	219.7	125	119.5	125	221.9	125	—	—	—	—
070	208/230-60	348.7	400	618.9	400	356.6	400	626.8	400	—	—	—	—
	380-60	212.0	225	365.5	225	216.4	250	369.9	225	—	—	—	—
	460-60	167.3	175	312.7	175	170.9	175	316.3	175	—	—	—	—
	575-60	145.7	150	248.1	150	148.6	150	251.0	150	—	—	—	—
080	208/230-60	397.0	450	667.2	450	404.9	450	675.1	450	421.1	450	691.3	450
	380-60	228.6	250	382.1	250	233.0	250	386.5	250	241.8	250	395.3	250
	460-60	185.7	200	331.1	200	189.3	200	334.7	200	196.6	200	342.0	200
	575-60	160.4	175	262.8	175	163.3	175	265.7	175	169.1	175	271.5	175
090	208/230-60	410.5	450	680.7	450	418.4	450	688.6	450	434.6	450	704.8	450
	380-60	249.9	250	403.4	250	254.3	300	407.8	300	263.1	300	416.6	300
	460-60	197.1	200	342.5	200	200.7	225	346.1	225	208.0	225	353.4	225
	575-60	171.8	175	274.2	175	174.7	175	277.1	175	180.5	200	282.9	200

LEGEND

- ICF — Instantaneous Current Flow
- MCA — Minimum Circuit Amps
- MOCP — Maximum Overcurrent Protection

NOTES:

1. 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%.
2. 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.
3. Cooler heater is wired into the control circuit so it is always operable as long as the power supply disconnect is on, even if any safety device is open.
4. Power draw control circuits include cooler heaters (where used).





30RAP ELECTRICAL DATA (cont)
DUAL POINT HYDRONIC PACKAGE WITH STANDARD LOW-SOUND AEROACOUSTIC™ FAN

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 3.0 hp CIRCUIT 1				PUMP SIZE 3.0 hp CIRCUIT 2			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
070	208/230-3-60	155.6	200	425.8	175	192.2	225	462.4	225
	380-3-60	96.0	125	249.5	110	116.4	150	269.9	125
	460-3-60	75.0	100	220.4	90	92.3	110	237.7	100
	575-3-60	65.3	80	167.7	80	80.9	100	183.3	90
080	208/230-3-60	—	—	—	—	—	—	—	—
	380-3-60	—	—	—	—	—	—	—	—
	460-3-60	—	—	—	—	—	—	—	—
	575-3-60	—	—	—	—	—	—	—	—
090	208/230-3-60	—	—	—	—	—	—	—	—
	380-3-60	—	—	—	—	—	—	—	—
	460-3-60	—	—	—	—	—	—	—	—
	575-3-60	—	—	—	—	—	—	—	—

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 5.0 hp CIRCUIT 1				PUMP SIZE 5.0 hp CIRCUIT 2			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
070	208/230-3-60	155.6	200	425.8	175	199.1	250	469.3	225
	380-3-60	96.0	125	249.5	110	120.2	150	273.7	150
	460-3-60	75.0	100	220.4	90	95.4	110	240.8	110
	575-3-60	65.3	80	167.7	80	83.4	100	185.8	90
080	208/230-3-60	202.7	250	438.6	225	199.1	250	469.3	225
	380-3-60	110.8	125	216.2	125	120.2	150	273.7	150
	460-3-60	92.5	110	213.6	100	95.4	110	240.8	110
	575-3-60	79.1	90	163.2	90	83.4	100	185.8	90
090	208/230-3-60	217.4	250	487.6	250	199.1	250	469.3	225
	380-3-60	133.9	150	287.4	150	120.2	150	273.7	150
	460-3-60	104.8	125	250.2	125	95.4	110	240.8	110
	575-3-60	91.4	110	193.8	100	83.4	100	185.8	90

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 7.5 hp CIRCUIT 1				PUMP SIZE 7.5 hp CIRCUIT 2			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
070	208/230-3-60	155.6	200	425.8	175	207.1	250	477.3	225
	380-3-60	96.0	125	249.5	110	124.5	150	278.0	150
	460-3-60	75.0	100	220.4	90	99.0	110	244.4	110
	575-3-60	65.3	80	167.7	80	86.3	100	188.7	100
080	208/230-3-60	202.7	250	438.6	225	207.1	250	477.3	225
	380-3-60	110.8	125	216.2	125	124.5	150	278.0	150
	460-3-60	92.5	110	213.6	100	99.0	110	244.4	110
	575-3-60	79.1	90	163.2	90	86.3	100	188.7	100
090	208/230-3-60	217.4	250	487.6	250	207.1	250	477.3	225
	380-3-60	133.9	150	287.4	150	124.5	150	278.0	150
	460-3-60	104.8	125	250.2	125	99.0	110	244.4	110
	575-3-60	91.4	110	193.8	100	86.3	100	188.7	100

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 10.0 hp CIRCUIT 1				PUMP SIZE 10.0 hp CIRCUIT 2			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
070	208/230-3-60	155.6	200	425.8	175	215.0	250	485.2	250
	380-3-60	96.0	125	249.5	110	128.9	150	282.4	150
	460-3-60	75.0	100	220.4	90	102.6	110	248.0	110
	575-3-60	65.3	80	167.7	80	89.2	100	191.6	100
080	208/230-3-60	202.7	250	438.6	225	215.0	250	485.2	250
	380-3-60	110.8	125	216.2	125	128.9	150	282.4	150
	460-3-60	92.5	110	213.6	100	102.6	110	248.0	110
	575-3-60	79.1	90	163.2	90	89.2	100	191.6	100
090	208/230-3-60	217.4	250	487.6	250	215.0	250	485.2	250
	380-3-60	133.9	150	287.4	150	128.9	150	282.4	150
	460-3-60	104.8	125	250.2	125	102.6	110	248.0	110
	575-3-60	91.4	110	193.8	100	89.2	100	191.6	100

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 15.0 hp CIRCUIT 1				PUMP SIZE 15.0 hp CIRCUIT 2			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
070	208/230-3-60	—	—	—	—	—	—	—	—
	380-3-60	—	—	—	—	—	—	—	—
	460-3-60	—	—	—	—	—	—	—	—
	575-3-60	—	—	—	—	—	—	—	—
080	208/230-3-60	202.7	250	438.6	225	231.2	250	501.4	250
	380-3-60	110.8	125	216.2	125	137.7	150	291.2	150
	460-3-60	92.5	110	213.6	100	109.9	110	255.3	110
	575-3-60	79.1	90	163.2	90	95.0	100	197.4	100
090	208/230-3-60	217.4	250	487.6	250	231.2	250	501.4	250
	380-3-60	133.9	150	287.4	150	137.7	150	291.2	150
	460-3-60	104.8	125	250.2	125	109.9	110	255.3	110
	575-3-60	91.4	110	193.8	100	95.0	100	197.4	100

LEGEND

- ICF — Instantaneous Current Flow
- MCA — Minimum Circuit Amps
- MOCP — Maximum Overcurrent Protection

NOTES:

1. 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%.
2. All units/modules have dual point primary power connection. (Each unit/module requires its own power supply.) Main power must be supplied from a field-supplied disconnect.
3. Cooler heater is wired into the control circuit so it is always operable as long as the power supply disconnect is on, even if any safety device is open.
4. Power draw control circuits include cooler heaters (where used).



Electrical data (cont)



30RAP ELECTRICAL DATA (cont) SINGLE POINT HYDRONIC PACKAGE WITH OPTIONAL VALUE SOUND FANS

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 1.5 hp				PUMP SIZE 3.0 hp				PUMP SIZE 5.0 hp			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
010	208/230-60	71.0	110	255.9	90	74.6	110	259.5	90	79.3	125	264.2	100
	380-60	35.9	50	151.3	45	37.9	60	153.3	45	40.5	60	155.9	50
	460-60	28.7	45	130.4	35	30.3	45	132.0	35	32.4	50	134.1	40
	575-60	22.6	35	104.2	30	24.0	35	105.6	30	25.6	40	107.2	30
015	208/230-60	80.7	125	350.9	100	84.3	125	354.5	100	89.0	125	359.2	110
	380-60	48.8	80	202.3	60	50.8	80	204.3	60	53.4	80	206.9	70
	460-60	39.0	60	184.4	50	40.6	60	186.0	50	42.7	60	188.1	50
	575-60	33.8	50	136.2	40	35.2	50	137.6	45	36.8	60	139.2	45
018	208/230-60	92.7	125	275.9	110	96.3	125	279.5	110	101.0	125	284.2	110
	380-60	53.5	70	169.4	60	55.5	70	171.4	70	58.1	70	174.0	70
	460-60	46.3	60	139.4	60	47.9	60	141.0	60	50.0	60	143.1	60
	575-60	36.9	50	100.2	45	38.3	50	101.6	45	39.9	50	103.2	45
020	208/230-60	98.1	125	292.3	110	101.7	125	295.9	125	106.4	125	300.6	125
	380-60	63.6	80	178.9	70	65.6	80	180.9	80	68.2	90	183.5	80
	460-60	49.0	60	151.6	60	50.6	60	153.2	60	52.7	70	155.3	60
	575-60	39.0	50	101.1	45	40.4	50	102.5	45	42.0	50	104.1	50
025	208/230-60	132.9	175	368.8	150	136.5	175	372.4	150	141.2	175	377.1	175
	380-60	70.7	90	176.1	80	72.7	90	178.1	80	75.3	100	180.7	90
	460-60	60.7	80	181.8	70	62.3	80	183.4	70	64.4	80	185.5	80
	575-60	51.6	70	135.7	60	53.0	70	137.1	60	54.6	70	138.7	60
030	208/230-60	143.1	175	413.3	175	146.7	200	416.9	175	151.4	200	421.6	175
	380-60	86.7	110	240.2	100	88.7	110	242.2	100	91.3	125	244.8	100
	460-60	69.2	90	214.6	80	70.8	90	216.2	80	72.9	90	218.3	80
	575-60	60.1	80	162.5	70	61.5	80	163.9	70	63.1	80	165.5	70
035	208/230-60	—	—	—	—	175.1	200	369.3	200	179.8	200	374.0	200
	380-60	—	—	—	—	107.9	125	223.2	125	110.5	125	225.9	125
	460-60	—	—	—	—	87.3	100	189.9	100	89.4	100	192.0	100
	575-60	—	—	—	—	69.7	80	131.8	80	71.3	80	133.4	80
040	208/230-60	—	—	—	—	207.5	250	404.7	225	212.2	250	409.4	225
	380-60	—	—	—	—	116.9	125	232.2	125	119.5	125	234.8	125
	460-60	—	—	—	—	91.3	100	193.7	100	93.4	110	195.8	100
	575-60	—	—	—	—	72.5	80	154.5	80	74.1	80	156.1	80
045	208/230-60	—	—	—	—	239.3	250	478.4	250	244.0	250	483.1	250
	380-60	—	—	—	—	124.0	150	232.6	150	126.6	150	235.2	150
	460-60	—	—	—	—	102.8	125	228.4	110	104.9	125	230.5	125
	575-60	—	—	—	—	85.0	100	174.3	90	86.6	100	175.9	100
050	208/230-60	—	—	—	—	245.7	250	481.6	250	250.4	300	486.3	300
	380-60	—	—	—	—	130.4	150	235.8	150	133.0	150	238.4	150
	460-60	—	—	—	—	111.8	125	232.9	125	113.9	125	235.0	125
	575-60	—	—	—	—	95.4	110	179.5	110	97.0	110	181.1	110
055	208/230-60	—	—	—	—	262.5	300	537.2	300	267.2	300	541.9	300
	380-60	—	—	—	—	150.3	175	310.9	175	152.9	175	313.5	175
	460-60	—	—	—	—	123.6	150	272.8	150	125.7	150	274.9	150
	575-60	—	—	—	—	106.5	125	212.7	125	108.1	125	214.3	125
060	208/230-60	—	—	—	—	271.5	300	541.7	300	276.2	300	546.4	300
	380-60	—	—	—	—	164.5	175	318.0	175	167.1	200	320.6	200
	460-60	—	—	—	—	131.2	150	276.6	150	133.3	150	278.7	150
	575-60	—	—	—	—	114.1	125	216.5	125	115.7	125	218.1	125
070	208/230-60	—	—	—	—	336.8	350	607.0	350	343.7	350	613.9	350
	380-60	—	—	—	—	203.9	225	357.4	225	207.7	225	361.2	225
	460-60	—	—	—	—	162.6	175	308.0	175	165.7	175	311.1	175
	575-60	—	—	—	—	141.3	150	243.7	150	143.8	150	246.2	150
080	208/230-60	—	—	—	—	385.7	400	655.9	400	392.6	400	662.8	400
	380-60	—	—	—	—	220.5	250	374.0	250	224.3	250	377.8	250
	460-60	—	—	—	—	181.4	200	326.8	200	184.5	200	329.9	200
	575-60	—	—	—	—	156.2	175	258.6	175	158.7	175	261.1	175
090	208/230-60	—	—	—	—	399.2	450	669.4	450	406.1	450	676.3	450
	380-60	—	—	—	—	241.8	250	395.3	250	245.6	250	399.1	250
	460-60	—	—	—	—	192.8	200	338.2	200	195.9	200	341.3	200
	575-60	—	—	—	—	167.6	175	270.0	175	170.1	175	272.5	175

LEGEND

- ICF — Instantaneous Current Flow
- MCA — Minimum Circuit Amps
- MOCP — Maximum Overcurrent Protection

NOTES:

1. 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%.
2. 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.
3. Cooler heater is wired into the control circuit so it is always operable as long as the power supply disconnect is on, even if any safety device is open.
4. Power draw control circuits include cooler heaters (where used).





30RAP ELECTRICAL DATA (cont)
SINGLE POINT HYDRONIC PACKAGE WITH OPTIONAL VALUE SOUND FANS (cont)

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 7.5 hp				PUMP SIZE 10.0 hp				PUMP SIZE 15.0 hp			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
010	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
015	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
018	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
020	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
025	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
030	208/230-60	—	—	—	—	—	—	—	—	—	—	—	—
	380-60	—	—	—	—	—	—	—	—	—	—	—	—
	460-60	—	—	—	—	—	—	—	—	—	—	—	—
	575-60	—	—	—	—	—	—	—	—	—	—	—	—
035	208/230-60	185.7	200	379.9	200	—	—	—	—	—	—	—	—
	380-60	113.9	125	229.3	125	—	—	—	—	—	—	—	—
	460-60	92.3	110	194.9	100	—	—	—	—	—	—	—	—
	575-60	73.7	80	135.8	80	—	—	—	—	—	—	—	—
040	208/230-60	218.1	250	415.3	250	—	—	—	—	—	—	—	—
	380-60	122.9	125	238.2	125	—	—	—	—	—	—	—	—
	460-60	96.3	110	198.7	110	—	—	—	—	—	—	—	—
	575-60	76.5	90	158.5	90	—	—	—	—	—	—	—	—
045	208/230-60	249.9	300	489.0	300	—	—	—	—	—	—	—	—
	380-60	130.0	150	238.6	150	—	—	—	—	—	—	—	—
	460-60	107.8	125	233.4	125	—	—	—	—	—	—	—	—
	575-60	89.0	100	178.3	100	—	—	—	—	—	—	—	—
050	208/230-60	256.3	300	492.2	300	262.8	300	498.7	300	—	—	—	—
	380-60	136.4	150	241.8	150	140.0	150	245.4	150	—	—	—	—
	460-60	116.8	125	237.9	125	119.6	125	240.7	125	—	—	—	—
	575-60	99.4	110	183.5	110	101.6	110	185.7	110	—	—	—	—
055	208/230-60	273.1	300	547.8	300	279.6	300	554.3	300	—	—	—	—
	380-60	156.3	175	316.9	175	159.9	175	320.5	175	—	—	—	—
	460-60	128.6	150	277.8	150	131.4	150	280.6	150	—	—	—	—
	575-60	110.5	125	216.7	125	112.7	125	218.9	125	—	—	—	—
060	208/230-60	282.1	300	552.3	300	288.6	300	558.8	300	—	—	—	—
	380-60	170.5	200	324.0	200	174.1	200	327.6	200	—	—	—	—
	460-60	136.2	150	281.6	150	139.0	150	284.4	150	—	—	—	—
	575-60	118.1	125	220.5	125	120.3	125	222.7	125	—	—	—	—
070	208/230-60	351.7	400	621.9	400	359.6	400	629.8	400	—	—	—	—
	380-60	212.0	225	365.5	225	216.4	250	369.9	225	—	—	—	—
	460-60	169.3	175	314.7	175	172.9	175	318.3	175	—	—	—	—
	575-60	146.7	150	249.1	150	149.6	150	252.0	150	—	—	—	—
080	208/230-60	400.6	450	670.8	450	408.5	450	678.7	450	424.7	450	694.9	450
	380-60	228.6	250	382.1	250	233.0	250	386.5	250	241.8	250	395.3	250
	460-60	188.1	200	333.5	200	191.7	200	337.1	200	199.0	225	344.4	225
	575-60	161.6	175	264.0	175	164.5	175	266.9	175	170.3	175	272.7	175
090	208/230-60	414.1	450	684.3	450	422.0	450	692.2	450	438.2	450	708.4	450
	380-60	249.9	250	403.4	250	254.3	300	407.8	300	263.1	300	416.6	300
	460-60	199.5	225	344.9	225	203.1	225	348.5	225	210.4	225	355.8	225
	575-60	173.0	175	275.4	175	175.9	200	278.3	200	181.7	200	284.1	200

LEGEND

- ICF — Instantaneous Current Flow
- MCA — Minimum Circuit Amps
- MOCP — Maximum Overcurrent Protection

NOTES:

1. 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%.
2. 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.
3. Cooler heater is wired into the control circuit so it is always operable as long as the power supply disconnect is on, even if any safety device is open.
4. Power draw control circuits include cooler heaters (where used).



Electrical data (cont)



30RAP ELECTRICAL DATA (cont) DUAL POINT HYDRONIC PACKAGE WITH OPTIONAL VALUE SOUND FANS

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 3.0 hp CIRCUIT 1				PUMP SIZE 3.0 hp CIRCUIT 2			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
070	208/230-3-60	158.6	200	428.8	175	192.2	225	462.4	225
	380-3-60	96.0	125	249.5	110	116.4	150	269.9	125
	460-3-60	77.0	100	222.4	90	92.3	110	237.7	100
	575-3-60	66.3	90	168.7	80	80.9	100	183.3	90
080	208/230-3-60	—	—	—	—	—	—	—	—
	380-3-60	—	—	—	—	—	—	—	—
	460-3-60	—	—	—	—	—	—	—	—
	575-3-60	—	—	—	—	—	—	—	—
090	208/230-3-60	—	—	—	—	—	—	—	—
	380-3-60	—	—	—	—	—	—	—	—
	460-3-60	—	—	—	—	—	—	—	—
	575-3-60	—	—	—	—	—	—	—	—

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 5.0 hp CIRCUIT 1				PUMP SIZE 5.0 hp CIRCUIT 2			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
070	208/230-3-60	158.6	200	428.8	175	199.1	250	469.3	225
	380-3-60	96.0	125	249.5	110	120.2	150	273.7	150
	460-3-60	77.0	100	222.4	90	95.4	110	240.8	110
	575-3-60	66.3	90	168.7	80	83.4	100	185.8	90
080	208/230-3-60	206.3	250	442.2	225	199.1	250	469.3	225
	380-3-60	110.8	125	216.2	125	120.2	150	273.7	150
	460-3-60	94.9	110	216.0	110	95.4	110	240.8	110
	575-3-60	80.3	100	164.4	90	83.4	100	185.8	90
090	208/230-3-60	221.0	250	491.2	250	199.1	250	469.3	225
	380-3-60	133.9	150	287.4	150	120.2	150	273.7	150
	460-3-60	107.2	125	252.6	125	95.4	110	240.8	110
	575-3-60	92.6	110	195.0	100	83.4	100	185.8	90

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 7.5 hp CIRCUIT 1				PUMP SIZE 7.5 hp CIRCUIT 2			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
070	208/230-3-60	158.6	200	428.8	175	207.1	250	477.3	225
	380-3-60	96.0	125	249.5	110	124.5	150	278.0	150
	460-3-60	77.0	100	222.4	90	99.0	125	244.4	110
	575-3-60	66.3	90	168.7	80	86.3	110	188.7	100
080	208/230-3-60	206.3	250	442.2	225	207.1	250	477.3	225
	380-3-60	110.8	125	216.2	125	124.5	150	278.0	150
	460-3-60	94.9	110	216.0	110	99.0	125	244.4	110
	575-3-60	80.3	100	164.4	90	86.3	110	188.7	100
090	208/230-3-60	221.0	250	491.2	250	207.1	250	477.3	225
	380-3-60	133.9	150	287.4	150	124.5	150	278.0	150
	460-3-60	107.2	125	252.6	125	99.0	125	244.4	110
	575-3-60	92.6	110	195.0	100	86.3	110	188.7	100

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 10.0 hp CIRCUIT 1				PUMP SIZE 10.0 hp CIRCUIT 2			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
070	208/230-3-60	158.6	200	428.8	175	215.0	250	485.2	225
	380-3-60	96.0	125	249.5	110	128.9	150	282.4	150
	460-3-60	77.0	100	222.4	90	102.6	125	248.0	110
	575-3-60	66.3	90	168.7	80	89.2	110	191.6	100
080	208/230-3-60	206.3	250	442.2	225	215.0	250	485.2	225
	380-3-60	110.8	125	216.2	125	128.9	150	282.4	150
	460-3-60	94.9	110	216.0	110	102.6	125	248.0	110
	575-3-60	80.3	100	164.4	90	89.2	110	191.6	100
090	208/230-3-60	221.0	250	491.2	250	215.0	250	485.2	225
	380-3-60	133.9	150	287.4	150	128.9	150	282.4	150
	460-3-60	107.2	125	252.6	125	102.6	125	248.0	110
	575-3-60	92.6	110	195.0	100	89.2	110	191.6	100

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 15.0 hp CIRCUIT 1				PUMP SIZE 15.0 hp CIRCUIT 2			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
070	208/230-3-60	—	—	—	—	—	—	—	—
	380-3-60	—	—	—	—	—	—	—	—
	460-3-60	—	—	—	—	—	—	—	—
	575-3-60	—	—	—	—	—	—	—	—
080	208/230-3-60	206.3	250	442.2	225	231.2	250	501.4	225
	380-3-60	110.8	125	216.2	125	137.7	150	291.2	150
	460-3-60	94.9	110	216.0	110	109.9	125	255.3	110
	575-3-60	80.3	100	164.4	90	95.0	110	197.4	100
090	208/230-3-60	221.0	250	491.2	250	231.2	250	501.4	225
	380-3-60	133.9	150	287.4	150	137.7	150	291.2	150
	460-3-60	107.2	125	252.6	125	109.9	125	255.3	110
	575-3-60	92.6	110	195.0	100	95.0	110	197.4	100

LEGEND

- ICF — Instantaneous Current Flow
- MCA — Minimum Circuit Amps
- MOCP — Maximum Overcurrent Protection

NOTES:

1. 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%.
2. All units/modules have dual point primary power connection. (Each unit/module requires its own power supply.) Main power must be supplied from a field-supplied disconnect.
3. Cooler heater is wired into the control circuit so it is always operable as long as the power supply disconnect is on, even if any safety device is open.
4. Power draw control circuits include cooler heaters (where used).





FAN ELECTRICAL DATA
(Single Point Standard Low-Sound AeroAcoustic™ Fans)

UNIT 30RAP	UNIT VOLTAGE V-Hz (3 Ph)	STANDARD CONDENSER FANS	
		Quantity	FLA (each)
010	208/230-60	1	6.0
	380-60	1	3.9
	460-60	1	2.9
	575-60	1	2.4
015	208/230-60	1	6.0
	380-60	1	3.9
	460-60	1	2.9
	575-60	1	2.4
018	208/230-60	2	6.0
	380-60	2	3.9
	460-60	2	2.9
	575-60	2	2.4
020	208/230-60	2	6.0
	380-60	2	3.9
	460-60	2	2.9
	575-60	2	2.4
025	208/230-60	2	6.0
	380-60	2	3.9
	460-60	2	2.9
	575-60	2	2.4
030	208/230-60	2	6.0
	380-60	2	3.9
	460-60	2	2.9
	575-60	2	2.4
035	208/230-60	3	6.0
	380-60	3	3.9
	460-60	3	2.9
	575-60	3	2.4
040	208/230-60	3	6.0
	380-60	3	3.9
	460-60	3	2.9
	575-60	3	2.4
045	208/230-60	3	6.0
	380-60	3	3.9
	460-60	3	2.9
	575-60	3	2.4
050	208/230-60	3	6.0
	380-60	3	3.9
	460-60	3	2.9
	575-60	3	2.4
055	208/230-60	4	6.0
	380-60	4	3.9
	460-60	4	2.9
	575-60	4	2.4
060	208/230-60	4	6.0
	380-60	4	3.9
	460-60	4	2.9
	575-60	4	2.4
070	208/230-60	5	6.0
	380-60	5	3.9
	460-60	5	2.9
	575-60	5	2.4
080	208/230-60	6	6.0
	380-60	6	3.9
	460-60	6	2.9
	575-60	6	2.4
090	208/230-60	6	6.0
	380-60	6	3.9
	460-60	6	2.9
	575-60	6	2.4

FAN ELECTRICAL DATA
(Single Point Optional Value Sound Fans)

UNIT 30RAP	UNIT VOLTAGE V-Hz (3 Ph)	OPTIONAL CONDENSER FANS	
		Quantity	FLA (each)
010	208/230-60	1	6.6
	380-60	1	3.9
	460-60	1	3.3
	575-60	1	2.6
015	208/230-60	1	6.6
	380-60	1	3.9
	460-60	1	3.3
	575-60	1	2.6
018	208/230-60	2	6.6
	380-60	2	3.9
	460-60	2	3.3
	575-60	2	2.6
020	208/230-60	2	6.6
	380-60	2	3.9
	460-60	2	3.3
	575-60	2	2.6
025	208/230-60	2	6.6
	380-60	2	3.9
	460-60	2	3.3
	575-60	2	2.6
030	208/230-60	2	6.6
	380-60	2	3.9
	460-60	2	3.3
	575-60	2	2.6
035	208/230-60	3	6.6
	380-60	3	3.9
	460-60	3	3.3
	575-60	3	2.6
040	208/230-60	3	6.6
	380-60	3	3.9
	460-60	3	3.3
	575-60	3	2.6
045	208/230-60	3	6.6
	380-60	3	3.9
	460-60	3	3.3
	575-60	3	2.6
050	208/230-60	3	6.6
	380-60	3	3.9
	460-60	3	3.3
	575-60	3	2.6
055	208/230-60	4	6.6
	380-60	4	3.9
	460-60	4	3.3
	575-60	4	2.6
060	208/230-60	4	6.6
	380-60	4	3.9
	460-60	4	3.3
	575-60	4	2.6
070	208/230-60	5	6.6
	380-60	5	3.9
	460-60	5	3.3
	575-60	5	2.6
080	208/230-60	6	6.6
	380-60	6	3.9
	460-60	6	3.3
	575-60	6	2.6
090	208/230-60	6	6.6
	380-60	6	3.9
	460-60	6	3.3
	575-60	6	2.6

LEGEND

FLA — Full Load 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 main power circuit so they are always operable as long as the disconnect is on, even if any safety device is open, and the unit ON/OFF switch is in the OFF position.

Electrical data (cont)



FAN ELECTRICAL DATA (Dual Point Standard Low-Sound AeroAcoustic™ Fans)

UNIT 30RAP	UNIT VOLTAGE V-Hz (3 Ph)	STANDARD CONDENSER FANS	
		Quantity	FLA (each)
070	208/230-3-60	5	6.0
	380-3-60	5	3.9
	460-3-60	5	2.9
	575-3-60	5	2.4
080	208/230-3-60	6	6.0
	380-3-60	6	3.9
	460-3-60	6	2.9
	575-3-60	6	2.4
090	208/230-3-60	6	6.0
	380-3-60	6	3.9
	460-3-60	6	2.9
	575-3-60	6	2.4

LEGEND

FLA — Full Load 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%.

FAN ELECTRICAL DATA (Dual Point Optional Value Sound Fans)

UNIT 30RAP	UNIT VOLTAGE V-Hz (3 Ph)	OPTIONAL CONDENSER FANS	
		Quantity	FLA (each)
070	208/230-3-60	5	6.6
	380-3-60	5	3.9
	460-3-60	5	3.3
	575-3-60	5	2.6
080	208/230-3-60	6	6.6
	380-3-60	6	3.9
	460-3-60	6	3.3
	575-3-60	6	2.6
090	208/230-3-60	6	6.6
	380-3-60	6	3.9
	460-3-60	6	3.3
	575-3-60	6	2.6

- All units/modules have dual 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 main power circuit so they are always operable as long as the disconnect is on, even if any safety device is open, and the unit ON/OFF switch is in the OFF position.

PUMP ELECTRICAL DATA

30RAP SIZE	PUMP OPTION	PUMP SIZE	PUMP RPM	UNIT VOLTAGE V-Hz (3 Ph)	FLA (each)	
010-060	2, 9	1.5 HP	3500	208/230-60	4.3	
			3500	380-60	2.4	
			3500	460-60	2.1	
			3500	575-60	1.6	
	3, 4, B, C	3.0 HP	3500	208/230-60	7.9	
			3500	380-60	4.4	
			3500	460-60	3.7	
			3500	575-60	3.0	
	5, 6, D, F	5.0 HP	3500	208/230-60	12.6	
			3500	380-60	7.0	
			3500	460-60	5.8	
			3500	575-60	4.6	
	7, G	7.5 HP	3500	208/230-60	18.5	
			3500	380-60	10.4	
			3500	460-60	8.7	
			3500	575-60	7.0	
	Z, H	10.0 HP	3500	208/230-60	25.0	
			3500	380-60	14.0	
			3500	460-60	11.5	
			3500	575-60	9.2	
070-090	1, 6, C, J	3.0 HP	3500 (Single)	208/230-60	10.8	
			1750 (Dual)	380-60	5.9	
				460-60	4.9	
				575-60	3.9	
	2, 7, D, K	5.0 HP	3500	3500	208/230-60	17.7
					380-60	9.7
					460-60	8.0
					575-60	6.4
	3, 8, F, L	7.5 HP	3500	3500	208/230-60	25.7
					380-60	14.0
					460-60	11.6
					575-60	9.3
	4, 9, G, M	10.0 HP	3500	3500	208/230-60	33.6
					380-60	18.4
					460-60	15.2
					575-60	12.2
	5, B, H, N	15.0 HP	3500	3500	208/230-60	49.8
					380-60	27.2
					460-60	22.5
					575-60	18.0

LEGEND

FLA — Full Load 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/dual 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 main power circuit so they are always operable as long as the disconnect is on, even if any safety device is open, and the unit ON/OFF switch is in the OFF position.



MAXIMUM FIELD WIRING SIZES

CONNECTION TYPE	MCA RANGE	WIRE SIZE RANGE
TERMINAL BLOCK	MCA up to 175 Amps	14 AWG to 2/0 AWG
	MCA 176 to 760 Amps	2 AWG to 600 kcmil
NON-FUSED DISCONNECT	MCA up to 100 Amps	14 AWG to 1/0 AWG
	MCA 101 to 200 Amps	6 AWG to 350 kcmil
	MCA 200 to 600 Amps	3/0 AWG to 500 kcmil

LEGEND

AWG — American Wire Gage
MCA — Minimum Circuit Amps

UNIT INCOMING POWER OPTIONS

MOCP VALUE	UNIT INCOMING POWER OPTION						
	Standard Terminal Block Option		High SCCR Terminal Block Option			Standard and High SCCR Terminal Block Option	
	Max. Wire Size	Min. Wire Size	Max. Wire Size	Min. Wire Size	High SCCR Fuse type	Max. Wire Size	Min. Wire Size
100 A or Less	2/0	#14 AWG	2/0	#6 AWG	J, RK1, or RK5	1/0	#14 AWG
Greater than 100 A and Less than 200 A	2/0	#14 AWG	2/0	#6 AWG	J or RK1	350 kcmil	#6 AWG
Greater than 200 A	600 kcmil	#2 AWG	600 kcmil	3/0	J or RK1	500 kcmil (1) 500 kcmil (2)	3/0

LEGEND

AWG — American Wire Gage
kcmil — Thousand Circular Mills
MOCP — Maximum Overcurrent Protection
SCCR — Short Circuit Current Rating

NOTES:

1. Terminal block high SCCR option units must use approved fuses to meet high SCCR rating.
2. High disconnect SCCR option units can use either approved fuse or circuit breaker for incoming power protection.
3. Time delay fuse type required.

ACCESSORY TANK ELECTRICAL DATA FOR 30RAP010-060 ONLY

UNIT VOLTAGE (V-Hz)	ACCESSORY PART NO. 30RA-900---	FLA
208/230-60	050	11.3
	051	11.3
	052	22.6
460-60	050	5.7
	051	5.7
	052	11.3
575-60	050	7.1
	051	7.1
	052	14.1
380-60	050	4.7
	051	4.7
	052	9.3

LEGEND

FLA — Full Load Amps

NOTE: The storage tank obtains its power from the chiller. No separate power source is required.

Electrical data (cont)



COMPRESSOR ELECTRICAL DATA SINGLE/DUAL POINT

UNIT 30RAP	NUMBER OF COMPRESSORS PER REFRIGERANT CIRCUIT	UNIT VOLTAGE V-Hz (3 Ph)	REFRIGERANT CIRCUIT*			
			CIRCUIT A		CIRCUIT B	
			RLA	LRA	RLA	LRA
010	1	208/230-60	48.1	245	—	—
		380-60	23.7	145	—	—
		460-60	18.6	125	—	—
		575-60	14.7	100	—	—
015	1	208/230-60	55.8	340	—	—
		380-60	34.0	196	—	—
		460-60	26.9	179	—	—
		575-60	23.7	132	—	—
018	2	208/230-60	33.4	225	—	—
		380-60	19.2	140	—	—
		460-60	16.7	114	—	—
		575-60	13.4	80	—	—
020	2	208/230-60	35.8	239	—	—
		380-60	23.7	145	—	—
		460-60	17.9	125	—	—
		575-60	14.3	80	—	—
025	2	208/230-60	51.3	300	—	—
		380-60	26.9	139	—	—
		460-60	23.1	150	—	—
		575-60	19.9	109	—	—
030	2	208/230-60	55.8	340	—	—
		380-60	34.0	196	—	—
		460-60	26.9	179	—	—
		575-60	23.7	132	—	—
035	2	208/230-60	35.8	239	33.4	225
		380-60	23.7	145	19.2	140
		460-60	17.9	125	16.7	114
		575-60	14.3	80	13.4	80
040	2	208/230-60	35.8	239	48.1	245
		380-60	23.7	145	23.7	145
		460-60	17.9	125	18.6	125
		575-60	14.3	80	14.7	100
045	2	208/230-60	48.1	245	51.3	300
		380-60	23.7	145	23.7	145
		460-60	18.6	125	23.1	150
		575-60	14.7	100	19.9	109
050	2	208/230-60	51.3	300	51.3	300
		380-60	26.9	139	26.9	139
		460-60	23.1	150	23.1	150
		575-60	19.9	109	19.9	109
055	2	208/230-60	51.3	300	55.8	340
		380-60	26.9	139	34.0	196
		460-60	23.1	150	26.9	179
		575-60	19.9	109	23.7	132
060	2	208/230-60	55.8	340	55.8	340
		380-60	34.0	196	34.0	196
		460-60	26.9	179	26.9	179
		575-60	23.7	132	23.7	132
070	2/3	208/230-60	55.8	340	55.8	340
		380-60	34.0	196	34.0	196
		460-60	26.9	179	26.9	179
		575-60	23.7	132	23.7	132
080	3	208/230-60	51.3	300	55.8	340
		380-60	26.9	139	34.0	196
		460-60	23.1	150	26.9	179
		575-60	19.9	109	23.7	132
090	3	208/230-60	55.8	340	55.8	340
		380-60	34.0	196	34.0	196
		460-60	26.9	179	26.9	179
		575-60	23.7	132	23.7	132

LEGEND

LRA — Locked Rotor Amps
 RLA — Rated Load Amps

* All data is per individual compressor.

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, only one pump will be used at a time. The control will start the pump with the least number of operating hours. 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 compressors. 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 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 greater than the selected pulldown control rate. 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 — Thermistors are used for temperature-sensing inputs to microprocessor. Additional thermistor sensors may be used as remote temperature sensors for optional LCWT (leaving chilled fluid temperature) reset.

- Cooler leaving chilled fluid temperature
- Cooler entering fluid (return) temperature
- Outside air temperature
- Compressor suction temperature

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

- Saturated condensing temperature
- Cooler saturation temperature

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.

Hot gas bypass 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.

On units equipped with the digital compressor option, the control will integrate the modulation of the digital compressor into the capacity routine to match cooling load requirements. The digital compressor will modulate in 13 steps for sizes 010 and 015, 22 steps (11 per compressor) for sizes 020-030, 44 steps (11 per compressor) for sizes 035-060, 55 steps for size 070 and 66 steps for sizes 080-090.

The digital scroll option provides better capacity control by incrementally modulating capacity effectively, increasing the number of compression stages compared to chillers that are not equipped with this option. The digital scroll compressor is not a variable speed device, it modulates the capacity output by allowing the scroll sets to separate during operation, alternating between full capacity and zero capacity. Utilizing a fixed timeframe ratio, the percentage of time that the scroll set is engaged is the percentage capacity of that compressor.

There are 2 major advantages of this type of capacity control. First, there is closer capacity control operation with all the available capacity steps compared to the on/off cycling control of conventional scrolls. Second, there is much less wear factor on digital scrolls compared to standard scroll compressors because the digital scrolls are not subject to as many of the shutdown/restart cycles as conventional scrolls. Digital scrolls, rather than shutting off, tend to remain on as they vary to deliver the correct capacity step.

Controls (cont)



STANDARD CAPACITY CONTROL STEPS

UNIT 30RAP	STANDARD CAPACITY STEPS (%)
010	0, 100
015	0, 100
018	0, 50, 100
020	0, 50, 100
025	0, 50, 100
030	0, 50, 100
035	0, 23, 46, 73, 100
040	0, 23, 46, 73, 100
045	0, 24, 48, 74, 100
050	0, 25, 50, 75, 100
055	0, 23, 46, 73, 100
060	0, 25, 50, 75, 100
070	0, 20, 40, 60, 80, 100
080	0, 15, 31, 46, 64, 82, 100
090	0, 17, 33, 50, 67, 83, 100

Additional information — Detailed information on controls and operation is available in the Controls, Operation, and Troubleshooting literature included with each unit. Packaged service training programs are also available. Contact your Carrier representative for more information.

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

Dynamic *ComfortLink* controls — Dynamic *ComfortLink* controls keep the chiller on line during periods of extreme operating conditions. If the entering fluid temperature is 85 F (29 C) or higher and the saturated suction temperature is 60 F (16 C) or higher the maximum operating pressure (MOP) feature limits the suction to keep the chiller online. The control automatically starts the chiller in the unloaded state to eliminate the potential of compressor overload due to high head pressure or low suction pressure. The controller will equalize run time on each circuit through the lead/lag feature. If a circuit becomes disabled, the control will automatically set the active circuit to lead, keeping the chiller online at a reduced capacity.

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.

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

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 sensor board and the micro-processor.

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 650 psig (4482 kPa).

Compressor anti-cycling — This feature limits compressor cycling.

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

Sensor failures — Failures are detected by the microprocessor.

Temperature reset — The energy management module (EMM) is required for 4 to 20 mA reset of LCWT in constant fluid systems. Reset by return fluid, outdoor-air temperature, or space temperature does not require this option. Reset reduces compressor power usage at part load when design LCWT is not necessary. Humidity control should be considered since higher coil temperatures resulting from reset will reduce latent heat capacity. Three reset options are offered, based on the following:

Return-fluid temperature — Increases LCWT set point as return (or entering) fluid temperature decreases (indicating load decrease). Option may be used in any application where return fluid provides accurate load indication. Limitation of return fluid reset is that LCWT may only be reset to value of design return fluid temperature.

Outdoor-air temperature — Increases LCWT as outdoor ambient temperature decreases (indicating load decrease). This reset should be applied only where outdoor ambient temperature is an accurate indication of load.

Space temperature — Increases LCWT as space temperature decreases (indicating load decrease). This reset should be applied only where space temperature is an accurate indication of load. An accessory thermistor and the energy management module accessory is required.

For details on applying a reset option, refer to unit Controls, operation, and Troubleshooting literature. Obtain ordering part numbers for reset option from the Packaged Chiller Builder program or contact your local Carrier representative.

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 (factory-installed option)/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 for space temperature reset is required. 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, the demand limit function 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.

Electronic expansion valve (EXV) — The EXV controls refrigerant flow to the cooler for different operating conditions by moving an orifice to increase or decrease the flow area through the valve based on microprocessor input. The orifice is positioned by a stepper motor and is monitored every 3 seconds. The EXV maintains approximately 9° F (5° C) refrigerant superheat entering the compressor.

Diagnostics — The microprocessor may be put through a service test (see Controls, Operation, 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, 30RAP 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.

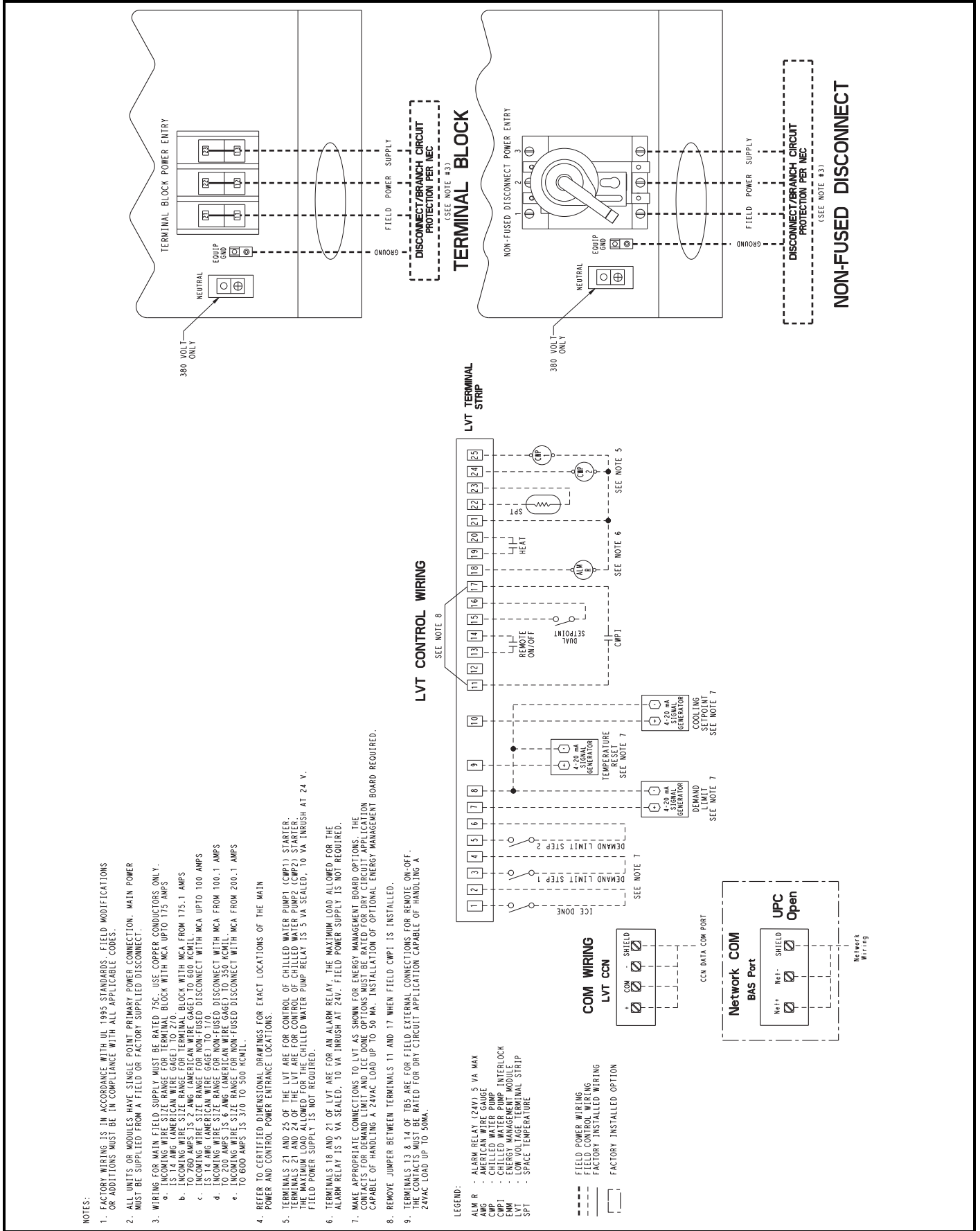
Date and time are set to U.S.A. Eastern Time zone and will need reconfiguring based on location and local time zone. If operation based on occupancy scheduling is desired, this will also need to be set during installation.

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. 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.

Typical control wiring schematic



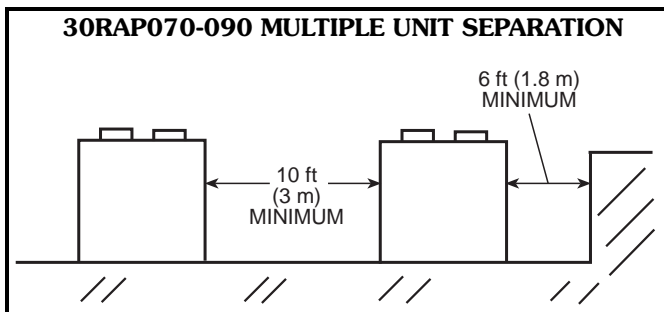
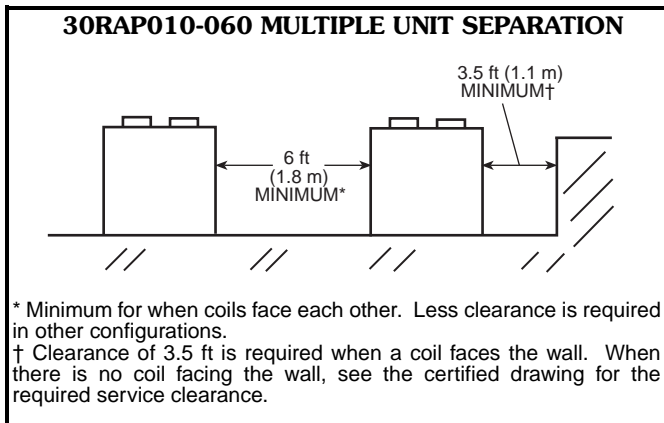
Application data



Chiller location and clearances

Do not locate near sound sensitive areas without proper acoustic consideration. For applications requiring mounting a chiller on a building rooftop, consideration should be given to using rubber-in-shear or spring isolators to minimize structure-borne transmission. Unit must be level 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. Ensure adequate clearance between adjacent chillers is maintained.

For 30RAP010-060: When parallel chillers are aligned such that coils face each other, a minimum of 6 ft (1829 mm) is recommended. When the parallel arrangement has only one coil drawing air from the space between chillers, a minimum of 3.5 ft (1067 mm) is recommended. When parallel chillers have no coils facing each other (a back-to-back arrangement), be sure to maintain the larger of the recommended service clearances associated with each chiller (see the certified drawings). Due to NEC (National Electric Code, U.S.A.) regulations, a minimum clearance of 4 ft (1219 mm) must be maintained on the side of the chiller that has an electrical box. Chiller fan discharge must be at least as high as adjacent solid walls. Installation in pits is not recommended.



For 30RAP070-090: When chillers are arranged in parallel, a minimum of 10 ft (3048 mm) between chillers is recommended. Acceptable clearance on the cooler connection side or end opposite the control box of the unit can be reduced to 3 ft (1 m) without sacrificing performance as long as the remaining three sides are

unrestricted. Acceptable clearance on the side with a control box can be reduced to 4 ft (1.3 m) due to NEC (National Electric Code) regulations, without sacrificing performance as long as the remaining three sides are unrestricted. Clearances between chillers in dual chiller applications may be reduced to 6 ft (1.8 m) without sacrificing performance provided the remaining sides are unrestricted. For acceptable clearance with layout involving more than 2 chillers, please contact application engineering.

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

Multiple chillers

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

When multiple 30RAP chillers are applied in parallel, and the chillers include the optional hydronic package which contain expansion tanks (sizes 010-060), the individual chiller expansion tanks must be disconnected and a single field-supplied expansion tank must be installed in the common header.

Unit software is capable of controlling two parallel units as a single plant by making use of the dual chiller control feature. Refer to the Controls, Start-up, Operation, Service and Troubleshooting guide for further details. The accessory Chillervisor System Manager can be used to ensure proper staging sequence of up to 8 chillers. Refer to the accessory Chillervisor System Manager installation instructions for further details.

If the dual chiller algorithm is used, and the machines are installed in parallel, one chiller must be configured as the master chiller and the other as the slave. With this configuration, an additional leaving fluid temperature thermistor must be installed as shown in the figure below.

Parallel chiller control with dedicated pumps is recommended. The chiller must start and stop its own water pump located in its own piping. Check valves are required at the discharge of each pump (*when the factory hydronic package option is chosen, and dual pumps are selected, the check valves are automatically supplied*). If pumps are not dedicated for each chiller, then isolation

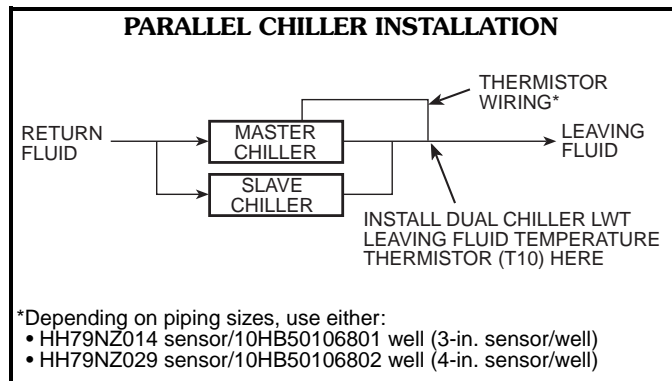
Application data



valves are required. Each chiller must open and close its own isolation valve through the unit control (the valve must be connected to the pump outputs).

If a series application is required, the master/slave control feature cannot be used. Hydronic pump packages may not be applied in series applications.

For 30RAP070-090 units, when chillers are arranged in parallel, a minimum of 10 ft (3048 mm) between chillers is recommended. Acceptable clearance on the cooler connection side or end opposite the control box of the unit can be reduced to 3 ft (1 m) without sacrificing performance as long as the remaining three sides are unrestricted. Acceptable clearance on the side with a control box can be reduced to 4 ft (1.3 m) due to NEC (National Electric Code) regulations, without sacrificing performance as long as the remaining three sides are unrestricted. Clearances between chillers in dual chiller applications may be reduced to 6 ft (1.8 m) without sacrificing performance provided the remaining sides are unrestricted. For acceptable clearance with layout involving more than 2 chillers, please contact application engineering.



Series chillers

Where a large temperature drop (greater than 20 F [11.1 C]) is desired or where chiller capacities greater than can be supplied by a single 30RAP chiller are required or where standby capability is required, chillers may be installed in series. The leaving fluid temperature sensors need not be relocated. However, the cooler minimum entering fluid temperature limitations should be considered for the chillers located downstream of other chillers. When chillers are operated in a series arrangement, the use of a Chillervisor System Manager is recommended.

Cooler water temperature

1. Maximum leaving chilled water temperature (LCWT) for the unit is 60 F (15.6 C). Unit can start and pull down with up to 95 F (35 C) entering-water temperature. It is recommended that entering-water temperature not exceed 70 F (21.1 C).
2. Minimum LCWT for fresh water applications is 40 F (4.4 C). For leaving-fluid temperatures between 14 and 39.9 F (-10.0 C and 4.4 C) an inhibited anti-freeze solution in the fluid loop is required, but no modification to the 30RAP chiller (accessory medium temperature brine, for example) is required.

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

NOTE: The 30RAP chiller does not require a medium temperature brine modification at any temperature within the chiller application range which is as low as 14 F (-10 C) leaving fluid temperature.

Strainers

A 40 mesh strainer is installed in the cooler fluid inlet line, just ahead of the cooler.

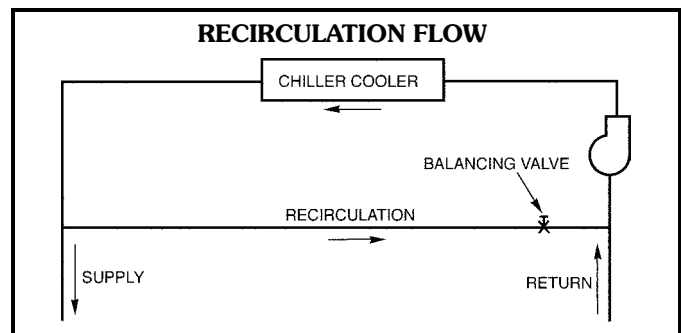
Cooler flow/range

Ratings and performance data in this publication are for a cooling temperature rise of 10° F (6° C). The 30RAP chillers may be operated at a different temperature rise, providing flow limits are not exceeded and corrections to system guidelines are made. For minimum and maximum cooler flow rates, see the Minimum and Maximum Cooler Flow Rates table. A high flow rate is generally limited by the maximum pressure drop that can be tolerated by the unit. The 30RAP chillers are designed for a full load temperature rise of 5° to 20° F (2.8° to 11.1° C). Use the Packaged Chiller Builder Program to obtain the rating if a temperature rise other than 10° F (6° C) is used.

Minimum cooler flow (maximum cooler temperature rise) — The minimum cooler flow for standard units is shown in Minimum and Maximum Cooler Fluid Flow Rates table. When system design conditions require a lower flow (or higher rise) than the minimum allowable cooler flow, follow the recommendations below.

- Multiple smaller chillers may be applied in series, each providing a portion of the design temperature rise.
- Cooler fluid may be recirculated to raise the flow rate to the chiller. The mixed temperature entering the cooler must be maintained to a minimum of at least 5° F (2.8° C) above the LCWT and to a maximum of no more than 20° F (11.1° C) above the LCWT.

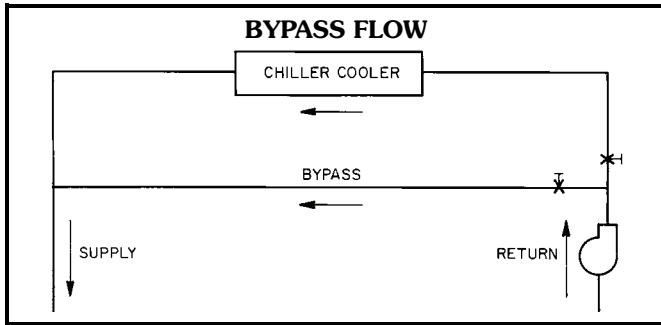
NOTE: Recirculation flow is shown below.



Maximum cooler flow — The maximum cooler flow (approximately 5° F [2.8° C] rise) results in a practical maximum pressure drop through cooler.

Return fluid may bypass the cooler to keep the pressure drop through the cooler within acceptable limits. This permits a higher delta T with lower fluid flow through cooler and mixing after the cooler. The mixed temperature entering the cooler must be maintained to a minimum of at least 5° F (2.8° C) above the LCWT and to a maximum of no more than 20° F (11.1° C) above the LCWT.

NOTE: Bypass flow is shown below.



Variable cooler flow rates

Variable flow rates may be applied to a standard chiller. The unit will, however, attempt to maintain a constant leaving chilled water temperature. In such cases, minimum flow must be in excess of minimum flow given in the Minimum and Maximum Cooler Fluid Flow Rates table on page 65, and minimum fluid volume in circulation must be in excess of those values shown for normal air-conditioning applications in the Minimum Fluid Volume in Circulation table. Flow rate must change in steps of less than 10% per minute. Apply 6 gal. or more per ton (6.5 L per kW) water loop volume minimum if flow rate changes more rapidly.

The 30RAP chiller is available without a hydronic pumping package, a constant-speed pumping package, or with a variable-speed drive pumping package on sizes 070-090. Traditional pumping systems incorporate constant speed drives and waste energy by relying upon throttling valves as the only means to control flow. A more energy-efficient approach to this issue is use a variable-speed drive. The 30RAP070-090 units are now available with an optional variable-speed hydronic package with sensorless technology to meet this market requirement.

The major cost of a pump over its lifetime will be energy consumption and maintenance, and both of these factors will be reduced using variable-speed pumping. Energy is saved by the combination of lowering the pump speed in conjunction with the resulting lowering of pumping system resistance when conditions permit. Maintenance benefits from the sensorless pumping system include the lack of the need to maintain remote sensors as well as the beneficial effects of lower speed/pressure on the pump and pump bearings.

Another advantage associated with variable-speed pumping is reduced system noise in part-load operation when the pump is running at lower speeds. The variable-speed pump package offered on the 30RAP is offered both in single and dual-pump designs. In the dual pump case, in which one pump is the back-up of the other, each pump connection is fitted with an isolation valve which allows one pump to be isolated for service with the other pump still operating.

As already mentioned, the 30RAP variable-speed hydronic package employs sensorless technology. The term "sensorless" means that no remote sensors are required for pump operation. The sensorless pump control monitors system requirements for pump speed and power. The hydronic unit is provided with a pre-defined

control curve to automatically adjust speed at all operating conditions. Pump performance and characteristic curves for multiple speeds are programmed into the speed-controller memory. The pre-programmed information includes power, pressure and flow throughout the entire range of the pump. During chiller operation, the power and speed of the pump are monitored. This enables the controller to establish the hydraulic performance, and to position the pump's head-flow characteristic. Although this curve is pre-defined, it is also fully field adjustable. The pump has a graphical user interface, and the graphic keypad can also be used to allow manual pump speed control.

This variable-speed pumping system easily connects to BMS (Building Management System) systems (BACnet is standard, and LON can be obtained via special order). The pumps may be controlled directly by the BMS system. The sensorless feature can also be switched off to allow the use of either a 0 to 10 VDC signal or a 0 to 20 mA signal.

For multiple chiller applications employing the variable-speed pumping package, such as chillers operated in a parallel arrangement, the drives must be connected by control wiring and set up to run the same speed. This is to prevent surging or hunting of the speed setpoint. One drive will act as the master while the other slave drive will run at the same speed. The master drive may be controlled by a 0 to 10 VDC signal, a 0 to 20 mA signal, or a BMS. The drive must be configured to not use the sensorless function in this arrangement.

A typical example of a chiller operating with a variable-speed pumping system would be the case when the user requires the chiller to operate with a constant fluid temperature difference as the load is reduced. This can be accomplished with the 30RAP variable-speed pumping package with the understanding that the minimum allowable flow for the chiller must be respected. Once that limit is reached, the flow cannot be further reduced. To accomplish this purpose, the minimum speed of the drive is pre-set based upon the chiller size that is being employed.

As a specific example, let us say the schedule calls for a 90-ton, fresh-water chiller, and it is desired to have a constant 10-degree temperature difference in part load operation (say 54 to 44 F). The schedule calls for 216 gpm at full load based upon the desired capacity and the fluid temperature difference. A constant temperature difference in part load operation is essentially the same as providing flow in direct proportion to chiller load. In the present example, this means that 100% load will run at the scheduled 216 gpm, 90% load will be 194 gpm, etc. down to the minimum allowable flow for this unit size, which, in the case of a 30RAP090 unit, is 107 gpm. The chiller in this example will therefore be able to run down to just under 50% load while approximately maintaining a constant 10 degree fluid temperature difference, and then the flow will be held constant for all lower loads. Throughout the range in which flow is reduced (down to minimum allowable flow), the pump speed is proportionally reduced, resulting in pump energy savings.

Fluid loop volume

The minimum volume of fluid required to be in circulation is a function of the number of compressors in the chiller,

Application data (cont)



the type of application, and whether or not a device providing additional unloading steps is employed. The minimum fluid in circulation must equal or exceed the values in the following table. Note that in process cooling applications, or for operation at ambient temperatures below 32 F (0° C) with low loading conditions, there should be more volume than is required for normal air-conditioning applications.

MINIMUM FLUID VOLUME IN CIRCULATION

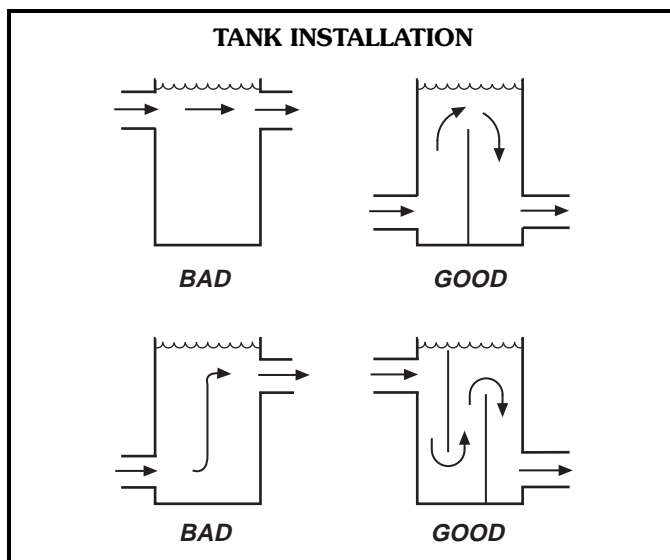
30RAP UNIT SIZE	NORMAL AIR CONDITIONING APPLICATION gal/ton (L per kW)			PROCESS COOLING OR LOW AMBIENT OPERATION APPLICATION gal/ton (L per kW)		
	Std Unit	HGBP	Digital	Std Unit	HGBP	Digital
010,015	12 (13)	N/A	3 (3.3)	12 (13)	N/A	6 (6.5)
018-030	6 (6.5)	4 (4.3)	3 (3.3)	10 (10.8)	10 (10.8)	6 (6.5)
035-090	3 (3.3)	3 (3.3)	3 (3.3)	6 (6.5)	6 (6.5)	6 (6.5)

LEGEND

HGBP — Hot Gas Bypass

To achieve this fluid volume, it is often necessary to install a tank in the loop. The tank should be baffled to ensure there is no stratification and that water (or brine) entering the tank is adequately mixed with liquid in the tank. A fluid storage tank is available as an accessory.

The piping between the chiller and the accessory tank can be done to allow the tank to be on the return side of the chiller (tank piped to chiller inlet) or the supply side of the chiller (tank piped to the chiller outlet). However, it is recommended that the tank be piped to the return side of the chiller to buffer any changes in load to allow more stable chiller operation.



Tank volume and weight

A properly baffled storage tank is available as an accessory on 30RAP010-060. These tanks are designed to

physically fit beneath the corresponding 30RAP unit, taking up the same footprint. Available volume is as follows:

30RAP010,015	83 gallons (314 liters)
30RAP018-030	119 gallons (450 liters)
30RAP035-060	241 gallons (912 liters)

Storage tank weight (water weight included) is as follows:

30RAP010,015	1673 lb (759 kg)
30RAP018-030	2193 lb (995 kg)
30RAP035-060	4361 lb (1978 kg)

NOTE: This tank will obtain power from the main unit. No separate power source is required.

NOTE: Units with storage tanks weigh considerably more than units without tanks.

Cooler fouling factor

The fouling factor used to calculate tabulated ratings is 0.00010 ft² · hr · °F/Btu (0.000018 m² · °C/W). As fouling factor is increased, unit capacity decreases and compressor power increases. Use the NACO (North American Commercial Operation) Packaged Chiller Builder for corrections to published ratings.

Cooler and hydronic system freeze protection

Freeze protection for down to -20 F (-28.9 C) for the cooler and hydronic package is available as a factory-installed option. Since power is sometimes lost for extended periods during winter storms, freeze protection provided by heater tapes will be effective only if a back-up power supply can be assured for the unit's control circuit, heater and cooler pump. If not protected with an antifreeze solution, draining the cooler and outdoor piping is recommended if the system will not be used during freezing weather conditions.

Two conditions that must be considered when determining antifreeze concentration are leaving water set point and ambient freeze conditions. Both of these parameters can help determine the recommended concentration level. Higher concentration must be used to adequately protect the machine.

NOTE: Use only antifreeze solutions approved for heat exchanger duty.

For applications in which the leaving water temperature set point is less than 40 F (4.4 C), a suitable inhibited antifreeze solution must be used. The solution concentration must be sufficient to protect the chilled water loop to a freeze protection (first crystals) concentration of at least 15° F (8.3° C) below the leaving water temperature set point.

If the chiller refrigerant or fluid lines are in an area where ambient conditions fall below 34 F (1° C), it is required that an antifreeze solution be added to protect the unit and fluid piping to a temperature of 15° F (8.3° C) below the lowest anticipated ambient temperature.



MINIMUM AND MAXIMUM COOLER FLOW RATES

30RAP SIZE	MINIMUM COOLER FLOW RATE (gpm)	MAXIMUM COOLER FLOW RATE (gpm)	MINIMUM COOLER FLOW RATE (l/s)	MAXIMUM COOLER FLOW RATE (l/s)
010	13	50	0.8	3.2
015	17	66	1.1	4.2
018	20	78	1.3	4.9
020	23	91	1.5	5.7
025	28	112	1.8	7.1
030	33	133	2.1	8.4
035	41	164	2.6	10.3
040	47	186	3.0	11.7
045	53	209	3.3	13.2
050	57	228	3.6	14.4
055	63	251	4.0	15.8
060	68	270	4.3	17.0
070	87	310	5.5	19.6
080	98	350	6.2	22.1
090	107	382	6.8	24.1

Select concentration based on either burst or freeze protection as dictated by the application. If the chiller does not operate during the winter, nor is a start-up expected, a burst protection concentration is recommended. This concentration may not be high enough to pump the fluid through the unit. Burst protection is typically a lower concentration that will provide better performance from the machine. If the chiller does operate during winter, a freeze protection concentration is recommended. This concentration will be high enough to keep the fluid in a condition that it can be pumped at low ambient conditions.

IMPORTANT: Glycol anti-freeze solutions are highly recommended since heater tapes provide no protection in the event of a power failure.

Consult glycol fluid manufacturers for burst protection recommendations and fluid specifications.

High ambient temperature operation

High outdoor ambient chiller start-up and operation is possible for standard 30RAP chillers at ambient temperatures up to 120 F (50 C) at nominal voltage. The unit will additionally be able to stay running at reduced capacity up to 125 F (52 C).

Low ambient temperature operation

Units will operate down to -20 F (-29 C) on size 010 and 015 units, 45 F (7 C) on size 018-030 units, and 32 F (0° C) on size 035-090 units as standard.

Operation to -20 F (-29 C) for size 018-090 units requires optional Motormaster® V condenser head pressure control (included as standard on size 010 and 015 units) as well as wind baffles and hot gas bypass or digital compressor option. 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.

NOTE: In order for a chiller to operate at -20 F (-29 C) ambient temperature, the minimum load on the chiller must be above the minimum step of unloading.

NOTE: As an alternative to requiring a glycol solution, the cooler may be remotely located. Burying refrigerant lines is never permitted.

Altitude correction factors

Correction factors must be applied to standard ratings at altitudes above 2000 ft (610 m). Use the NACO Packaged Chiller Builder to determine the altitude effect on performance.

Water system overview (closed loop systems only)

The 30RAP chillers are designed for use with closed systems, meaning that there is no more than one water-air interface in the water loop. Cooling tower loops, for example, have two water-air interfaces (sump and nozzles) and would thus be classified as open, whereas a correctly designed chilled water loop with the only water-air interface being in the expansion tank is closed. Since closed and open water systems behave very differently, the following assumes that the chilled water loop is closed. A system installed incorrectly such that air is not handled properly — pipe leaks, vent leaks, air in pipes, etc. — may behave as an open system and thus have unsatisfactory operation. Pump seal wear can also cause leaks that cause poor system operation.

Proper closed system design and installation procedures should be followed closely. The system must be constructed with pressure tight components and thoroughly tested for installation leaks. Factory-supplied hydronic systems are available with single or dual (for back-up) pumps. The factory-installed system includes all of the components within the dashed lines shown in the figure on page 44.

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

Application data (cont)



might be installed with the hydronic package of the 30RAP unit is shown on pages 41-43.

It is recommended that isolation (shutoff) valves be placed exterior to the unit to allow removal and service of the entire pump assembly, if necessary. Also, if the unit is isolated with valves, a properly sized pressure relief valve should be installed in the piping between the unit and the valves, following all applicable state and local codes.

Water system cleaning

Proper water system cleaning is of vital importance. Excessive particulates in the water system can cause excessive pump seal wear, reduce or stop flow, and cause damage of other components. Water quality should be maintained within the limits indicated in the Water Quality Characteristics and Limitations table.

1. Install a temporary bypass around the chiller to avoid circulating dirty water and particulates into the pump package and chiller during the flush. Use a temporary circulating pump during the cleaning process. Also, be sure that there is capability to fully drain the system after cleaning.
2. Be sure to use a cleaning agent that is compatible with all system materials. Be especially careful if the system contains any galvanized or aluminum components. Both detergent-dispersant and alkaline-dispersant cleaning agents are available.
3. It is a good idea to fill the system through a water meter. This provides a reference point for the future for loop volume readings, but it also establishes the correct quantity of cleaner needed in order to get the required concentration.
4. Use a feeder/transfer pump to mix the solution and fill the system. Circulate the cleaning system for the length of time recommended by the cleaning agent manufacturer.
 - a. After cleaning, drain the cleaning fluid and flush the system with fresh water.
 - b. A slight amount of cleaning residue in the system can help keep the desired, slightly alkaline, water pH of 8 to 9. Avoid a pH greater than 10, since this will adversely affect pump seal components.
 - c. A side stream filter is recommended during the cleaning process. Filter side flow rate should be enough to filter the entire water volume every 3 to 4 hours. Change filters as often as necessary during the cleaning process.
 - d. Remove temporary bypass when cleaning is complete.

A strainer with a blow-down valve is standard on all 30RAP units, both with and without hydronic packages. The blow-down valve allows removal of particulates caught in the strainer without complete removal of the screen. A female NPT connection is provided on the valve, allowing hose connection for drainage outside the unit.

The *ComfortLink*™ controls provided have a built-in feature to remind building owners or operators to clean the strainer by discharging the blow-down valve at a pre-set time interval. Properly installed and cleaned systems will

rarely need the strainer cleaned after the initial fill. This time interval is user-configurable.

WATER QUALITY CHARACTERISTICS AND LIMITATIONS

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

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

†Dissolved carbon dioxide can either be calculated from the pH and total alkalinity values, shown below, or measured on the site using a test kit. Dissolved Carbon Dioxide, PPM = TA x 2^[(6.3-pH)/0.3] where TA = Total Alkalinity, PPM as CaCO₃.

Condenser coil protection (*Enviro-Shield*™)

Refer to the environmental selection guides for more information. If the standard Novation® (microchannel) coil does not meet the corrosion requirements for a given application, an e-coated Novation coil option is available. For specific geographical recommendations, please refer to the NACO Packaged Chiller Builder program.

E-coated Novation® 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.

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 this page 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) system.

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.

NOTE: Optional hydronic system is available in constant-speed configuration on all models. It is also available in VFD configuration on sizes 070-090, as described in Variable Cooler Flow Rates section.

Pump flow can be reduced by using the factory-supplied triple-duty valve up to 10%. Beyond that, impeller trimming is recommended to reduce energy consumption. Follow local codes or ASHRAE 90.1 recommendations. Contact your Carrier representative for specific amount of trim required.

Expansion tank supplied (sizes 010-060 only) will allow loop expansion due to ambient fluctuations for loop volumes of up to the values in the table below. If loop volume exceeds the maximum loop volume, a larger expansion tank must be field supplied.

The supplied expansion tanks have the following specifications: 30RAP010-030 — 4.4 total gal. (17.0 L) and 3.2 gal. (12.4 L) acceptance volume, 30RAP035-060 — 10.3 total gal. (39.0 L) and 10.3 gal. (39.0 L) acceptance volume.

MAXIMUM LOOP VOLUME

CONCENTRATION	30RAP010-030		30RAP035-060	
	GAL.	L	GAL.	L
PURE WATER	412	1560	1356	5131
10% EG	239	906	795	3009
20% EG	233	880	767	2902
30% EG	206	781	692	2620
40% EG	200	755	655	2478
10% PG	233	880	767	2902
20% PG	200	755	655	2478
30% PG	170	645	561	2124
40% PG	157	595	514	1947

LEGEND

EG — Ethylene Glycol
PG — Propylene Glycol

Maximum loop volume is based on typical system pressure of 12 psig (83 kPa) and 30 psig (207 kPa) of minimum and maximum pressures, and 100 F (37.8 C) mean temperature.

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

For proper system operation, it is essential that water loops be installed with proper means to manage air in the system. This is typically done by the installing contractor. Free air in the system can cause noise, reduce terminal output, stop flow, or even cause pump failure due to pump cavitation. For closed systems, equipment should be provided to eliminate all air from the system.

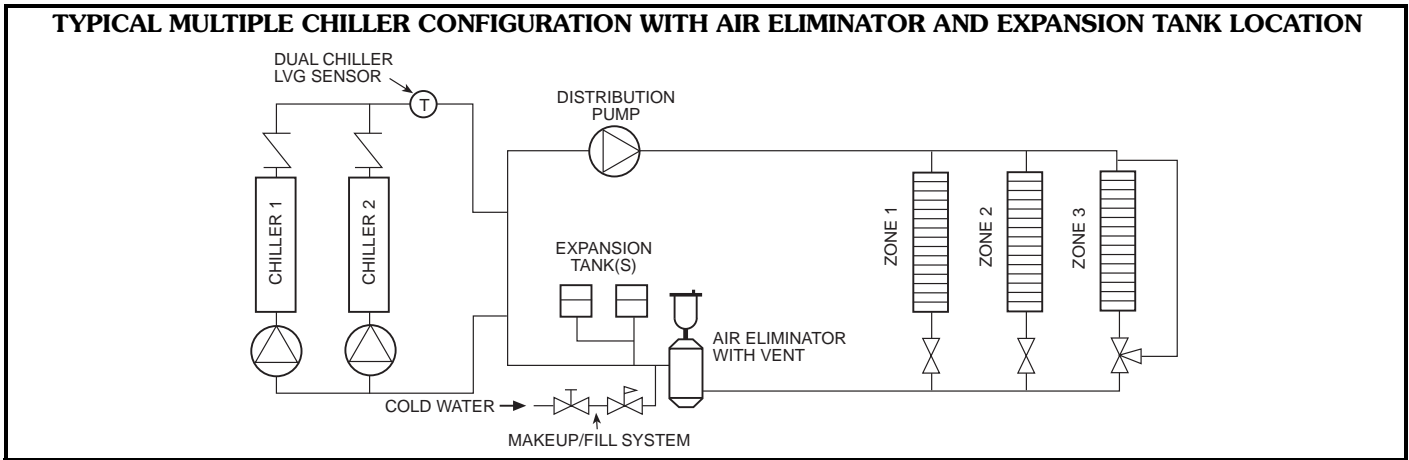
The amount of air that water can hold in solution depends on the pressure and temperature of the water/air mixture. Air is less soluble at higher temperatures and at lower pressures. Therefore, separation can best be done at the point of highest water temperature and lowest pressure. Typically, this point would be on the suction side of the pump as the water is returning from the system or terminals. Generally speaking, this is the best place to install an air separator, if possible.

1. Install automatic air vents at all high points in the system. (If the 30RAP unit is located at the high point of the system, a vent can be installed on the piping entering the heat exchanger on the ¼-in. NPT female port.)
2. Install an air separator in the water loop, at the place where the water is at higher temperatures and lower pressures — usually in the chilled water return piping. On a primary-secondary system, the highest temperature water is normally in the secondary loop, close to the decoupler. Preference should be given to that point on the system. In-line or centrifugal air separators are readily available in the field.

It may not be possible to install air separators at the place of lowest pressure and highest temperature. In such cases, preference should be given to the points of highest temperature. It is important that pipe be sized correctly so that free air can be moved to the point of separation. Generally, a water velocity of at least 2 ft per second (0.6 m per second) will keep free air entrained and prevent it from forming air pockets.

Automatic vents should be installed at all physically elevated points in the system so that air can be eliminated during system operation. Provision should also be made for manual venting during the water loop fill. It is important that the automatic vents be located in accessible locations for maintenance purposes, and that they be located where they can be prevented from freezing.

Application data (cont)



Guide specifications



Air-Cooled Liquid Chiller

HVAC Guide Specifications

Size Range: **10 to 90 Nominal Tons**
(35 to 316 Nominal kW)

Carrier Model Number: **30RAP**

Part 1 — General

1.01 SYSTEM DESCRIPTION

Microprocessor controlled, air-cooled liquid chiller utilizing scroll compressors, low sound fans, electronic expansion valve, optional hydronic pump system, and fluid storage tank (storage tank on models 010-060 only).

1.02 QUALITY ASSURANCE

- A. Unit shall be rated in accordance with AHRI Standard 550/590, latest edition (U.S.A.) and all units shall be ASHRAE 90.1 compliant.
- B. Unit construction shall comply with ASHRAE 15 Safety Code, UL latest edition, and ASME applicable codes (U.S.A. codes).
- C. Unit shall be manufactured in a facility registered to ISO 9001 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-410A), and special features required prior to field start-up.

B. Unit Cabinet:

1. Frame shall be of heavy-gage, galvanized steel.
2. Exterior panels shall be galvanized steel 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, 9-blade airfoil cross-section, reinforced polymer construction, shrouded-axial type, and shall be statically and dynamically balanced with inherent corrosion resistance.
2. 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 according to AHRI 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. Compressor/Compressor Assembly:

1. Fully hermetic, direct-drive, scroll type compressors.
2. Compressor motors shall be cooled by refrigerant gas passing through motor windings and shall have either internal line break thermal and current overload protection or external current overload modules with compressor temperature sensors.
3. Compressors shall be mounted on rubber in shear vibration isolators.
4. Staging of compressors shall provide unloading capability. Digital compressor unloading control shall be available as an option.

E. Cooler:

1. Cooler shall be rated for a refrigerant working-side pressure of 505 psig (3482 kPa) on sizes 010-025 and 565 psig (3896 kPa) on sizes 030-090 and shall be tested for a maximum water-side pressure of 300 psig (2068 kPa) or 150 psig (1034 kPa) when optional hydronic package is installed.
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 035 to 090; 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).
6. Unit shall be provided with a factory-installed flow switch.
7. All connections shall use standard Victaulic-type fittings.

F. Condenser:

1. Coil shall be air-cooled Novation[®] heat exchanger technology with microchannel (MCHX) coils and shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds. Coils shall consist of a two-pass arrangement. Coil construction shall consist of aluminum alloys for fins, tubes, and manifolds in combination with a corrosion-resistant coating.
2. Tubes shall be cleaned, dehydrated, and sealed.

Guide specifications (cont)



3. Assembled condenser coils shall be leak tested and pressure tested at 656 psig (4522 kPa).

G. Refrigeration Components:

Refrigerant circuit components shall include filter drier, moisture indicating sight glass, electronic expansion device, discharge and liquid service valves (sizes 070-090 only) and complete operating charge of sides both refrigerant R-410A and compressor oil.

H. Controls, Safeties, and Diagnostics:

1. Unit controls shall include the following minimum components:

- a. Microprocessor with non-volatile memory. Battery backup system shall not be accepted.
- b. Separate terminal block for power and controls.
- c. Control transformer to serve all controllers, relays, and control components.
- d. ON/OFF control switch.
- e. Replaceable solid-state controllers.
- f. Pressure sensors shall be installed to measure suction and discharge pressure for each circuit. Thermistors shall be installed to measure cooler entering and leaving fluid temperatures, outdoor ambient temperature, and suction temperature. 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. Hermetic scroll compressors are maintenance free and protected by an auto-adaptive control that minimizes compressor wear.
- c. 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).
- d. 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.
- e. Seven-day time schedule.
- f. Leaving chilled fluid temperature reset from return fluid and outside air temperature.
- g. Chilled water pump start/stop control and primary/standby sequencing to ensure equal pump run time.
- h. Dual chiller control for parallel chiller applications without addition of hardware modules and control panels (additional thermistors and wells are required).

- i. Timed maintenance scheduling to signal maintenance activities for pumps, condenser coil cleanings, 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.

- m. Single step demand limit control activated by remote contact closure.

- n. Nighttime sound mode to reduce the sound of the machine by a user-defined schedule.

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) Cooler set point.
- 6) Chilled water reset parameters.
- 7) Thermistor and transducer malfunction.
- 8) Entering and leaving-fluid temperature.
- 9) Compressor suction temperature.
- 10) Evaporator and condenser pressure.
- 11) System refrigerant temperatures.
- 12) Chiller run hours.
- 13) Compressor run hours.
- 14) Compressor number of starts.
- 15) Low superheat.
- 16) 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) system and access to 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. Factory pump motors shall have external overcurrent protection.

I. Operating Characteristics:

- 1. Unit shall be capable of operating down to -20 F (-29 C) on size 010 and 015 units, 45 F (7 C) on size 018-030 units, and 32 F (0° C) on size 035-090 units as standard.
- 2. Unit shall be capable of starting and running at outdoor ambient temperatures up to 120 F (50 C) for all sizes. Unit shall additionally be able to stay online when running with a 125 F (52 C) ambient temperature.
- 3. Unit shall be capable of starting up with 95 F (35 C) entering fluid temperature to the cooler.

J. Fan Motors:

- 1. Condenser fans shall be direct drive Aero-Acoustic™ type, discharging air vertically upward.
- 2. All condenser fan motors shall be totally enclosed 3-phase type with permanently lubricated ball bearings, class F insulation and internal, automatic reset thermal overload protection or manual reset calibrated circuit breakers.
- 3. Shafts shall have inherent corrosion resistance.
- 4. Fan blades shall be statically and dynamically balanced.
- 5. Condenser fan openings shall be equipped with PVC coated steel wire safety guards.

K. Electrical Requirements:

- 1. Unit/module primary electrical power supply shall enter the unit at a single electrical box (includes option for dual point connection on sizes 070-090).

- 2. Unit shall operate on 3-phase power at the voltage shown in the equipment schedule.
- 3. Control points shall be accessed through terminal block.
- 4. Unit shall be shipped with factory control and power wiring installed.

L. Chilled Water Circuit:

- 1. Chilled water circuit shall be rated for 300 psig (2068 kPa). Units with optional pump package are rated for 150 psig (1034 kPa) working pressure.
- 2. Solid-state flow monitor with integral relay shall be factory installed and wired.
- 3. Brass body strainer with 40 mesh screen and ball type blow down.
- 4. Optional hydronic package (Applies to all unit sizes except as noted, with or without the use of a VFD.):
 - a. Field pipe connections shall be copper Victaulic type.
 - b. Optional single or primary/stand-by operation pump systems. Dual pump systems shall have a pump discharge check valve.
 - c. Pumps shall be single stage design, capable of being serviced without disturbing piping connections.
 - 1) Pump casing shall be of class 30 cast iron.
 - 2) The impeller shall be of cast bronze, closed type, dynamically balanced, keyed to the shaft and secured by locking cap screw.
 - 3) The hydronic kit will be provided with a flush line connection to ensure lubrication at the seal face and allow for positive venting of the seal chamber.
 - 4) Pump shall be rated for 150 psig (1034 kPa) working pressure.
 - 5) The pump case shall have gage tappings at the suction and discharge nozzles and include drain ports.
 - 6) Motors shall totally enclosed 3-phase type with grease lubricated ball bearings.
 - 7) Each pump shall be factory tested per Hydraulic Institute Standards.
 - 8) Pump motors shall be VFD (variable frequency drive) compatible.
 - d. Fluid expansion tank (sizes 010-060) shall be factory installed within the chiller cabinet insulates, pre-charged and rated for a maximum working pressure of 150 psig (1034 kPa).
 - e. Water pressure taps (2) shall be factory installed across the cooler and rated for 150 psig (1034 kPa).
 - f. Balancing valve shall be factory installed to set flow gage ports shall be factory installed and rated for 300 psig (2068 kPa).

Guide specifications (cont)



- g. Hydronic assembly shall have factory supplied electric freeze protection to -20 F (-29 C) when optional heaters are used.
 - h. Piping shall be type-L seamless copper tubing.
5. With VFD (these comments are applicable in addition to the comments in section L.4 when the VFD hydronic package is employed (30RAP070-090 only):
- a. The drive shall be of the VVC-PWM (voltage vector control - pulse with modulation) type, providing near unity displacement power factor without the need for external power factor correction capacitors at all loads and speeds.
 - b. The drive and motor protection shall include; motor phase to ground fault, loss of supply phase, over voltage, under voltage, motor over temperature, inverter overload, and over current. Over current is not allowed, ensuring hydronic units will not overload the motor at any point in the operating range of the unit.
 - c. Sensorless control software shall be available in the hydronic unit to provide automatic speed control without the need for pump mounted (internal/external) or remotely mounted differential pressure system feedback sensors. Control mode setting and minimum/maximum head setpoints shall be set at the factory and be user adjustable via the programming interface.
 - d. The integrated control shall incorporate an integrated graphical user interface that shall provide running and diagnostic information and identify faults and status in clear English language. Faults shall be logged and/or recorded for review at a later date. It shall be possible to upload parameters from one drive into the non-volatile memory of a computer and download the parameters into other drives requiring the same settings. The keypad shall incorporate Hand-Off-Auto pushbuttons to enable switching between BMS and manual control. The drive shall incorporate a USB port for direct connection to a PC and an RS485 connection with Modbus RTU protocol. Optional protocols available should include BACnet and Lonworks.
 - e. The control shall have the following additional features: Sensorless override for BMS, manual pump control or closed loop PID control; programmable skip frequencies and adjustable switching frequency for noise/vibration control; auto alarm reset; motor pre-heat function; six programmable digital inputs; two analog inputs; one programmable analog/digital output; two volt-free contacts.
- f. The hydronic unit shall be capable of operating in any of the following control modes:
- 1) Duty pump and standby pumps with sensorless control.
 - 2) Duty pump and standby pumps with remote sensor or building system (BAS) control.
- 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:
- 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. Additional components shall be required and used in conjunction with the low ambient device. Components include field-installed wind baffles. If significant low-load operation is anticipated, then hot gas bypass is recommended. Motormaster® V control is standard on sizes 010 and 015.
- NOTE: The motors associated with Motormaster® V fan will be open type and shall have class B insulation.
2. Unit-Mounted Non-Fused Disconnect:
- Unit shall be supplied with factory-installed, non-fused electrical disconnect for main power supply. This is not available with dual-point power on sizes 070-090.
3. Optional E-Coated MCHX Condenser Coil:
- E-coated aluminum microchannel coils shall have a flexible epoxy polymer coating uniformly applied to all coil external surface areas without material bridging between fins or louvers. Coating process shall ensure complete coil encapsulation, including all exposed fin edges. E-coat thickness of 0.8 to 1.2 mil with top coat having a uniform dry film thickness from 1.0 to 2.0 mil on all external coil surface areas, including fin edges, shall be provided. E-coated coils shall have superior hardness characteristics of 2H per ASTM D3363-00 and cross-hatch adhesion of 4B-5B per ASTM D3359-02. E-coated products shall have superior impact resistance with no cracking, chipping or peeling per NSF/ANSI 51-2002 Method 10.2 (U.S.A. Standards).
4. Remote Enhanced Display:
- Unit shall be supplied with indoor-mounted, remote, 40-character per line, 16-line display panel for field installation.



5. Chillervisor System Manager III Multi-Unit Control:

Field-installed control shall sequence between 2 and 8 chillers in parallel in a single system. System shall control chilled water pumps.
6. Hot Gas Bypass:

Unit shall be equipped with factory or field-installed, microprocessor-controlled, hot gas bypass that shall permit unit operation down below the minimum standard step of capacity. Option not available on sizes 010 and 015. Option and accessory not available on units with the digital compressor option.
7. Energy Management 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 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.
8. Security Grilles/Hail Guards:

Unit shall be supplied with factory or field-installed, louvered, sheet metal panels which securely fasten to the chiller and provide condenser coil protection against hail and other physical damage.
9. 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.
10. Chilled Water Storage Tank (Sizes 010-060 only):
 - a. Fluid storage tank shall be rated for a maximum of 150 psig (1034 kPa).
 - b. Shall provide a minimum 4 gallon per ton (3.7 L per kW) 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 Victaulic connections.
 - 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).
11. BACnet Communication Option:

Shall provide factory-installed communication capability with a BACnet MS/TP network. Allows integration with i-Vu® Open control system or a BACnet building automation system.
12. BACnet Translator Control:

Unit shall be supplied with field-installed interface between the chiller and a BACnet Local Area Network (LAN, i.e., MS/TP EIA-485). Field programming shall be required.
13. LON Translator control:

Unit shall be supplied with field-installed interface between the chiller and a Local Operating Network (LON, i.e., LonWorks FT-10A ANSI/EIA-709.1). Field programming shall be required.
14. Navigator™ Hand Held Display:
 - a. Portable hand held display module with a minimum of 4 lines and 20 characters per line, of clear English, Spanish, Portuguese or French language.
 - b. Display menus shall provide clear language descriptions of all menu items, operating modes, configuration points and alarm diagnostics. Reference to factory codes shall not be accepted.
 - c. RJ-14 connection plug shall allow display module to be connected to factory-installed receptacle.
 - d. Industrial grade coiled extension cord shall allow the display module to be moved around the chiller.
 - e. Magnets shall hold the display module to any sheet metal panel to allow hands-free operation.
 - f. Display module shall have NEMA 4x housing suitable for use in outdoor environments.
 - g. Display shall have back light and contrast adjustment for easy viewing in bright sunlight or night conditions.
 - h. Raised surface buttons with positive tactile response.
15. Touch Pilot™ Display:

Unit shall be supplied with a remote mount touch screen display for network attachment to the chiller.
16. GFI Convenience Outlet:

Shall be factory or field installed to provide the chiller with a 4 amp GFI receptacle. The receptacle shall have independent fuse protection. The convenience outlet is a 115-v female receptacle.

Guide specifications (cont)



17. **Freeze Protection Cooler Heaters:**
Cooler heaters shall provide protection from cooler freeze-up to -20 F (-29 C).
18. **Value Sound Fans:**
Shall provide propeller-type fans for applications that are not highly sound-sensitive. These fans shall have Class F insulation and internal, automatic-reset thermal overload protection or manual reset calibrated circuit breakers.
19. **Ultra-Low Sound:**
Shall provide an acoustic enclosure around each compressor in conjunction with low-sound Aero-Acoustic™ fans to provide significant chiller sound reduction.
20. **High SCCR (Short Circuit Current Rating):**
The optional high SCCR (short circuit current rating) device shall allow the chiller to tolerate a 65 kA (208/230, 380 and 460-v units) or 25 kA (575-v units) short circuit current for a brief period of time while protecting downstream components. The high SCCR option shall provide a higher level of protection than the standard unit.
21. **Compressor Suction Service Valves (Sizes 070-090 only):**
Shall provide a suction service valve per circuit, which is in addition to the standard discharge service valve.
22. **Digital Compressor Option:**
Shall provide a factory-installed digital compressor to provide incremental steps for tighter temperature control (not available on size 018 units).
23. **Remote Cooler Kit:**
Field-installed remote cooler kit shall provide the additional hardware required to remotely mount the cooler from the unit. There are limits to total separation of the unit to the cooler as well as vertical separation limits, and these shall be delineated in the accessory installation instructions. Never bury refrigerant piping on these or any other applications.
24. **Wind Baffles:**
Wind baffles facilitate operation down to -20 F (-29 C) when used in conjunction with low ambient temperature head pressure control.
25. **Low Sound Compressor Blankets:**
Accessory low sound compressor blankets shall reduce unit sound levels by providing an acoustic blanket on each compressor.

