AQUASNAP® 30RAP010-060 Liquid Chillers with *COMFORT*LINK™ Controls

Installation Instructions

CONTENTS

SAFETY CONSIDERATIONS

Installing, starting up, and servicing air-conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location (roofs, elevated structures, etc.).

Only trained, qualified installers and service mechanics should install, start up, and service this equipment (Fig. 1).

Untrained personnel can perform basic maintenance functions such as cleaning coils. All other operations should be performed by trained service personnel.

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.

- Follow all safety codes.
- Wear safety glasses and work gloves.
- Keep quenching cloth and fire extinguisher nearby when brazing.
- Use care in handling, rigging, and setting bulky equipment.

These instructions cover installation of 30RAP010-060 air-cooled liquid chillers. Refer to Fig. 2 for model number to determine factory-installed options.

⚠ WARNING

Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

INSTALLATION

Step 1 — Rig and Place the Unit

RIGGING — Preferred method for rigging is with spreader bars from above the unit. Use hooks in lifting holes. Rig at a single point with 4 cables or use spreader bars. All panels must be in place when rigging. See rigging label on unit for details concerning shipping weights, distance between lifting holes, center of gravity, and lifting ring dimensions. See Tables 1A and 1B for physical data. Refer to Fig. 3 for unit weights. See Fig. 4 for rigging label.

If overhead rigging is not possible, place chiller on skid or pad for rolling or dragging. When rolling, use a minimum of 3 rollers. When dragging, pull the pad. *Do not apply force to the unit.* When in final position, raise from above to lift unit off pad.

⚠ CAUTION

All panels must be in place when rigging. Damage to unit could result.

PLACING UNIT — There must be at least 3 ft (0.9 m) for service and for unrestricted airflow on all non-coil sides of unit, and a minimum of 3.5 ft (1.1 m) clear air space on coil sides. For multiple units, allow 8 ft (2.48 m) separation between units for airflow and service.

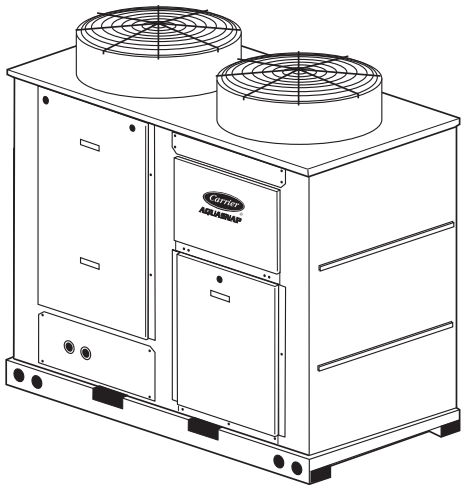


Fig. 1 — Typical 30RAP Unit (018-030 Shown)

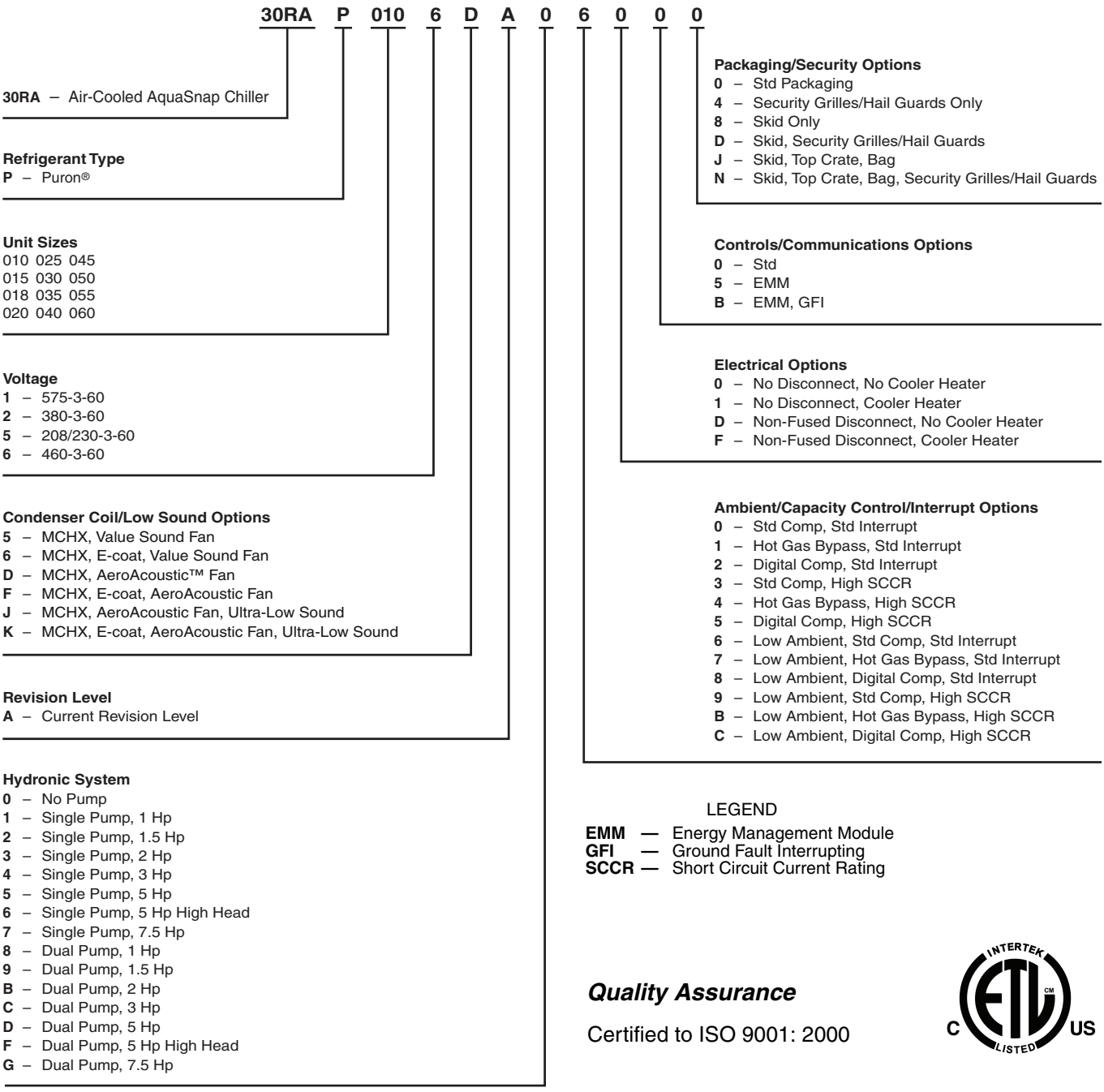


Fig. 2 — AQUASNAP® Chiller Model Number Designation

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

30RAP SIZE	KILOGRAMS				
	A	B	C	D	Total Weight
010	85.5	94.6	73.1	66.1	319.3
015	87.7	96.4	74.1	67.4	325.5
018	164.9	119.9	94.9	130.6	510.3
020	165.8	120.8	95.8	131.5	513.9
025	178.3	131.8	107.7	145.7	563.5
030	183.7	136.3	111.6	150.4	582.0
035	295.7	331.0	187.2	167.2	981.1
040	319.4	316.3	176.9	178.5	991.1
045	306.3	344.0	193.0	171.9	1015.1
050	332.2	328.4	181.8	183.9	1026.3
055	337.4	345.5	198.2	193.5	1074.6
060	338.4	345.8	198.6	194.5	1077.3

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	740	814	499	453	2507
040	791	783	475	480	2529
045	763	843	512	463	2582
050	819	810	486	491	2606
055	831	847	522	512	2713
060	833	848	523	514	2719

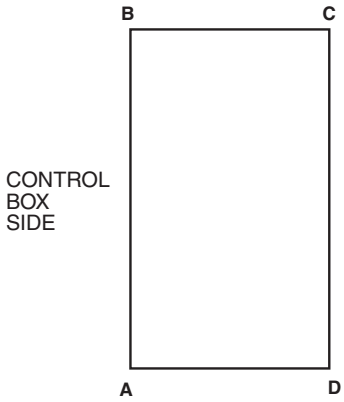
30RAP SIZE	KILOGRAMS				
	A	B	C	D	Total Weight
010	97.6	119.8	96.7	78.9	393.0
015	99.8	121.6	97.7	80.2	399.3
018	183.4	138.7	112.8	149.2	584.0
020	184.3	139.6	113.7	150.1	587.6
025	196.9	150.5	125.6	164.2	637.2
030	202.2	155.1	129.5	168.9	655.7
035	335.6	369.4	226.3	205.6	1137.0
040	358.8	355.3	215.4	217.5	1147.0
045	346.3	382.3	232.1	210.2	1171.0
050	371.6	367.4	220.4	222.9	1182.2
055	376.9	384.3	236.9	232.3	1230.5
060	378.0	384.6	237.3	233.3	1233.2

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	828	899	585	538	2850
040	878	869	560	565	2872
045	851	928	598	548	2925
050	906	896	571	577	2950
055	918	933	607	598	3056
060	920	933	608	600	3062

30RAP SIZE	KILOGRAMS				
	A	B	C	D	Total Weight
010	109.9	144.8	120.5	91.5	466.7
015	112.1	146.6	121.4	92.8	473.0
018	202.0	157.4	130.7	167.7	657.7
020	202.9	158.3	131.6	168.6	661.3
025	215.5	169.2	143.5	182.7	710.9
030	220.8	173.8	147.4	187.3	729.4
035	375.5	407.9	265.3	244.2	1292.9
040	398.2	394.2	254.0	256.5	1302.9
045	386.2	420.8	271.1	248.8	1326.9
050	411.0	406.4	258.9	261.8	1338.1
055	416.4	423.2	275.6	271.2	1386.3
060	417.5	423.4	276.0	272.1	1389.1

30RAP010-030 UNITS



30RAP035-060 UNITS

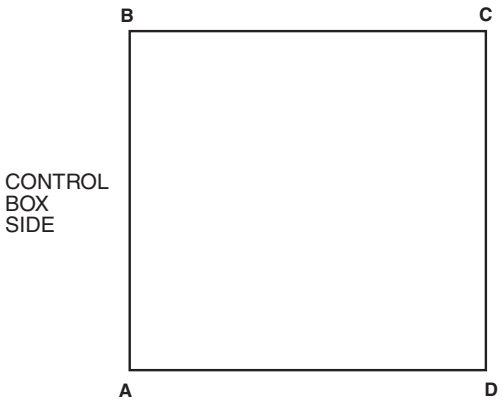


Fig. 3 — Unit Operating Weights

Table 1A — Physical Data, 30RAP — English

UNIT 30RAP	010	015	018	020	025	030	035	040	045	050	055	060
OPERATING WEIGHT (lb)												
MCHX Condenser Coil, No Pump	704	718	1125	1133	1242	1283	2163	2185	2238	2263	2369	2375
MCHX Condenser Coil, Single Pump	866	880	1288	1296	1405	1446	2507	2529	2582	2606	2713	2719
MCHX Condenser Coil, Dual Pump	1029	1043	1450	1458	1567	1608	2850	2872	2925	2950	3056	3062
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
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
COMPRESSORS	Scroll, Hermetic											
Quantity	1	1	2	2	2	2	4	4	4	4	4	4
Speed (Rpm)	3500											
(Qty, Tons) Ckt A	(1) 11	(1) 15	(2) 9	(2) 10	(2) 13	(2) 15	(2) 10	(2) 10	(2) 11	(2) 13	(2) 13	(2) 15
(Qty, Tons) Ckt B	—	—	—	—	—	—	(2) 9	(2) 11	(2) 13	(2) 13	(2) 15	(2) 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
No. Capacity Steps												
Standard	1	1	2	2	2	2	4	4	4	4	4	4
With Hot Gas Bypass	—	—	3	3	3	3	5	5	5	5	5	5
Digital Compressor Option	13	13	—	22	22	22	44	44	44	44	44	44
Minimum Capacity Step (%)												
Standard	100	100	50	50	50	50	23	23	24	25	23	25
With Hot Gas Bypass	—	—	20	24	29	32	10	12	14	14	15	16
Digital Compressor Option	20	20	—	15	15	15	8	8	8	8	8	8
Capacity (%)												
Circuit A	100	100	100	100	100	100	54	47	47	50	46	50
Circuit B	—	—	—	—	—	—	46	53	53	50	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
Net Fluid Volume (gal)	4.9	6.4	7.6	10.1	11.7	16.5	21.8	27.5	29.3	34.3	41.8	41.8
Maximum Refrigerant Pressure (psig)	505	505	505	505	505	565	565	565	565	565	565	565
Maximum Water-Side Pressure Without Pump(s) (psig)	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
CHILLER WATER CONNECTIONS (in.)												
Inlet and Outlet, Victualic	2	2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
Drain (NPT)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
CONDENSER FANS												
Standard Low-Sound AeroAcoustic™ Type	Plastic Type, Axial, Vertical Discharge											
Fan Speed (Rpm)	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
No. Fans	1	1	2	2	2	2	3	3	3	3	4	4
Total Airflow (Cfm)	9400	9400	17,500	17,500	19,400	19,400	29,600	29,500	29,300	30,500	38,800	38,800
Optional Value Sound Type	Propeller Type, Axial, Vertical Discharge											
Fan Speed (Rpm)	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
No. Fans	1	1	2	2	2	2	3	3	3	3	4	4
Total Airflow (Cfm)	12,600	12,600	23,400	23,400	26,000	26,000	39,800	39,600	39,300	41,000	52,100	52,100
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
Total Face Area (sq ft)	17	17	26	26	33	33	53	53	66	66	66	66
Maximum Refrigerant Pressure (psig)	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	5.0/2.9						10.0/5.5					
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
Width	3-5	3-5	3-5	3-5	3-5	3-5	7-9	7-9	7-9	7-9	7-9	7-9
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

LEGEND

EXV — Electronic Expansion Valve
MCHX — Microchannel Heat Exchanger

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

Table 1B — Physical Data, 30RAP — SI

UNIT 30RAP	010	015	018	020	025	030	035	040	045	050	055	060
OPERATING WEIGHT (kg)												
MCHX Condenser Coil, No Pump	319	326	510	514	564	582	981	991	1015	1026	1075	1077
MCHX Condenser Coil, Single Pump	393	399	584	588	637	656	1137	1147	1171	1182	1231	1233
MCHX Condenser Coil, Dual Pump	467	473	658	661	711	729	1293	1303	1327	1338	1386	1389
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
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
COMPRESSORS	Scroll, Hermetic											
Quantity	1	1	2	2	2	2	4	4	4	4	4	4
Speed (R/s)	58.3											
(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
(Qty, kW) Ckt B	—	—	—	—	—	—	(2) 32	(2) 38	(2) 46	(2) 46	(2) 53	(2) 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
No. Capacity Steps												
Standard	1	1	2	2	2	2	4	4	4	4	4	4
With Hot Gas Bypass	—	—	3	3	3	3	5	5	5	5	5	5
Digital Compressor Option	13	13	—	22	22	22	44	44	44	44	44	44
Minimum Capacity Step (%)												
Standard	100	100	50	50	50	50	23	23	24	25	23	25
With Hot Gas Bypass	—	—	20	24	29	32	10	12	14	14	15	16
Digital Compressor Option	20	20	—	15	15	15	8	8	8	8	8	8
Capacity (%)												
Circuit A	100	100	100	100	100	100	54	47	47	50	46	50
Circuit B	—	—	—	—	—	—	46	53	53	50	54	50
COOLER	Brazed, 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
Net Fluid Volume (L)	18.4	24.1	28.8	38.0	44.4	62.4	82.7	104.0	111.1	130.0	158.3	158.3
Maximum Refrigerant Pressure (kPa)	3482	3482	3482	3482	3482	3896	3896	3896	3896	3896	3896	3896
Maximum Water-Side Pressure Without Pump(s) (kPa)	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
CHILLER WATER CONNECTIONS (in.)												
Inlet and Outlet, Victualic	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
Drain (NPT)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
CONDENSER FANS												
Standard Low-Sound AeroAcoustic™ Type	Plastic Type, Axial, Vertical Discharge											
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
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
No. Fans	1	1	2	2	2	2	3	3	3	3	4	4
Total Airflow (L/s)	4400	4400	8300	8300	9200	9200	14,000	14,000	13,800	14,400	18,300	18,300
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
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
No. Fans	1	1	2	2	2	2	3	3	3	3	4	4
Total Airflow (L/s)	5900	5900	11,000	11,000	12,300	12,300	18,800	18,700	18,500	19,400	24,600	24,600
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
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
Maximum Refrigerant Pressure (kPa)	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	18.9/11.0						37.9/20.8					
CHASSIS DIMENSIONS (mm)												
Length	1689	1689	2242	2242	2242	2242	2248	2248	2248	2248	2248	2248
Width	1029	1029	1025	1025	1025	1025	2350	2350	2350	2350	2350	2350
Height	1689	1689	1689	1689	1994	1994	1689	1689	1994	1994	1994	1994

LEGEND

EXV — Electronic Expansion Valve
MCHX — Microchannel Heat Exchanger

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

MOUNTING UNIT — When unit is in proper location, use of mounting holes in base rails is recommended for securing unit to supporting structure, or for mounting unit on vibration isolators if required. See Fig. 4. Fasteners for mounting unit are field supplied. Be sure unit is level to within $^1/_8$ in. per foot for proper oil return to compressor.

Step 2 — Check Compressor Mounting — As shipped, units with single compressors are held down with 4 bolts through rubber grommets. All units with tandem compresors are held down with 6 bolts per pair through grommets. After unit is installed, verify mounting bolt torque 7 to10 ft-lb.

Step 3 — Cooler Fluid and Drain Piping Connections

ALL UNITS — These chillers are supplied with factory-installed strainer (including blow-down valve) in the entering fluid piping and flow switch in the leaving fluid piping. Flow switch wiring is factory installed. .

⚠ CAUTION

Do not circulate water through unit without strainer in place. Failure to use the strainer represents abuse and may impair or otherwise negatively affect the Carrier product warranty.

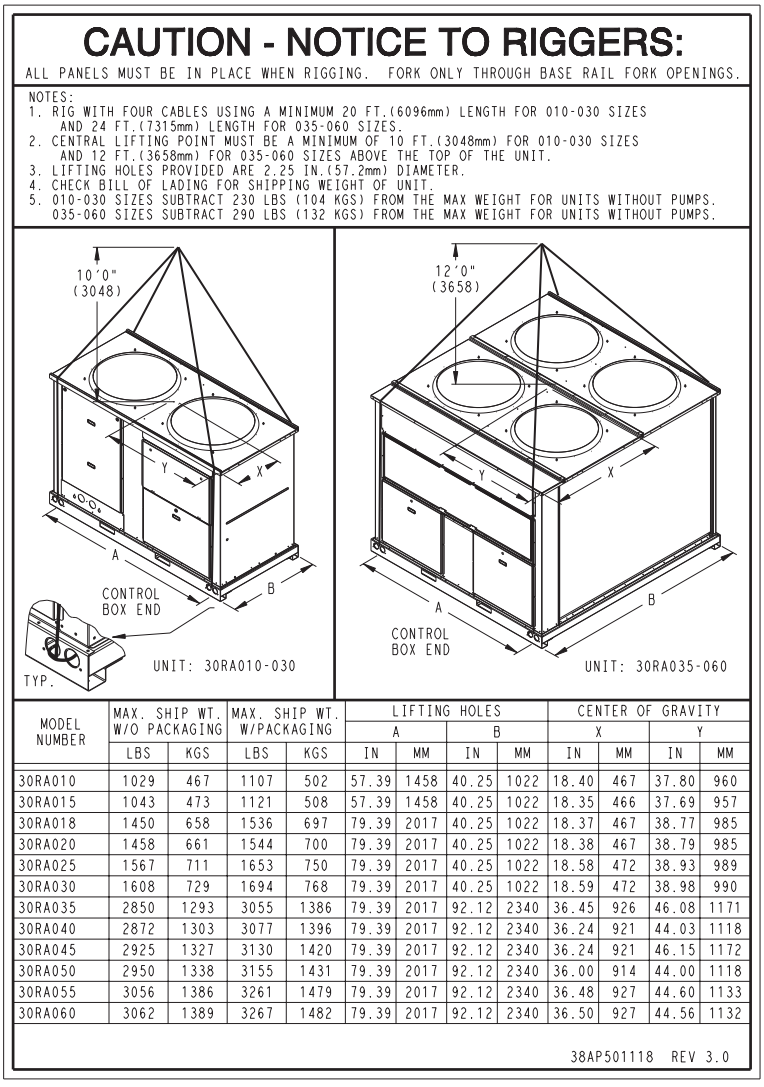
Piping connections are located on the front of the chiller when facing the control panel for sizes 010 to 030 and at the end opposite the control panel for sizes 035 to 060. See Fig. 5-10, depending on model.

All sizes have victaulic connections as shown in the physical data tables. Provide a means of venting air from the high point of the field-installed piping as required. Install field-supplied drains in both the entering and leaving fluid connections.

After field piping is complete, freeze-up protection is recommended using inhibited ethylene glycol or other suitable inhibited antifreeze solution and electric heat tapes in areas where piping is exposed to low ambient temperatures (34 F [1 °C] or below). Heat tapes should possess a rating for area ambients and be covered with a suitable thickness of closed-cell insulation. Route power for heating tapes from a separately fused disconnect. Identify disconnect as heat tape power source with a warning that power must not be turned off except when unit is being serviced.

The water connections are copper victaulic. Any connecting pipe to the 30RAP pump package must be of a material that will not cause any galvanic corrosion. For this reason, galvanized steel pipe or other dissimilar metals must not be used unless joined by a dielectric coupling.

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.



MODEL NUMBER	MAX. SHIP WT. W/O PACKAGING		MAX. SHIP WT. W/PACKAGING		LIFTING HOLES				CENTER OF GRAVITY			
					A		B		X		Y	
	LBS	KGS	LBS	KGS	IN	MM	IN	MM	IN	MM	IN	MM
30RA010	1029	467	1107	502	57.39	1458	40.25	1022	18.40	467	37.80	960
30RA015	1043	473	1121	508	57.39	1458	40.25	1022	18.35	466	37.69	957
30RA018	1450	658	1536	697	79.39	2017	40.25	1022	18.37	467	38.77	985
30RA020	1458	661	1544	700	79.39	2017	40.25	1022	18.38	467	38.79	985
30RA025	1567	711	1653	750	79.39	2017	40.25	1022	18.58	472	38.93	989
30RA030	1608	729	1694	768	79.39	2017	40.25	1022	18.59	472	38.98	990
30RA035	2850	1293	3055	1386	79.39	2017	92.12	2340	36.45	926	46.08	1171
30RA040	2872	1303	3077	1396	79.39	2017	92.12	2340	36.24	921	44.03	1118
30RA045	2925	1327	3130	1420	79.39	2017	92.12	2340	36.24	921	46.15	1172
30RA050	2950	1338	3155	1431	79.39	2017	92.12	2340	36.00	914	44.00	1118
30RA055	3056	1386	3261	1479	79.39	2017	92.12	2340	36.48	927	44.60	1133
30RA060	3062	1389	3267	1482	79.39	2017	92.12	2340	36.50	927	44.56	1132

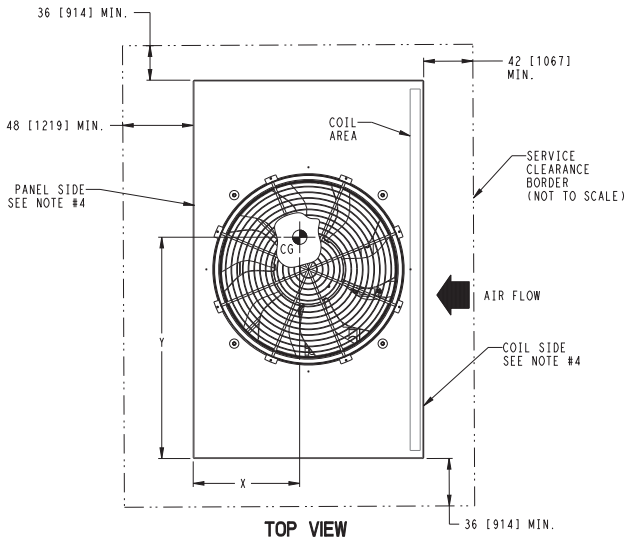
38AP501118 REV 3.0

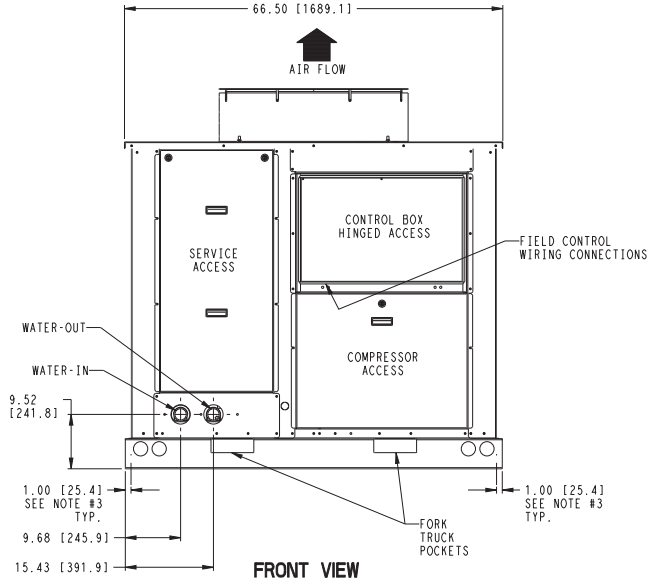
Fig. 4 — Unit Rigging Label Detail

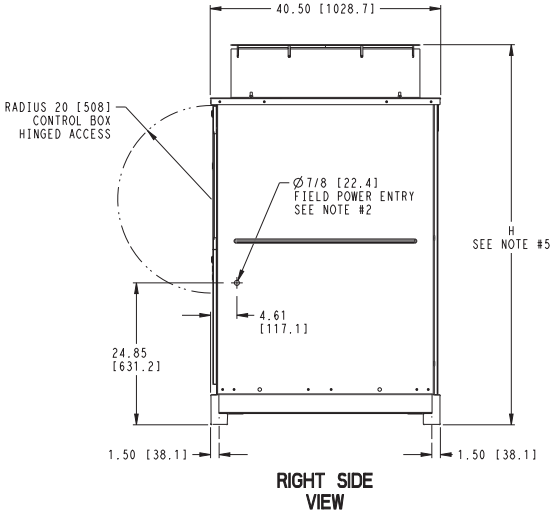
	UNIT	CENTER OF GRAVITY		UNIT HEIGHT		VICTAULIC CONNECTIONS
		X	Y	H (STANDARD)	H (VALUE SOUND)	WATER IN/OUT
STANDARD	30RAP010	18.40 [467]	37.80 [960]	66.5 [1689]	61.0 [1549]	2"
	30RAP015	18.35 [466]	37.69 [957]	66.5 [1689]	61.0 [1549]	2"

NOTES:

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







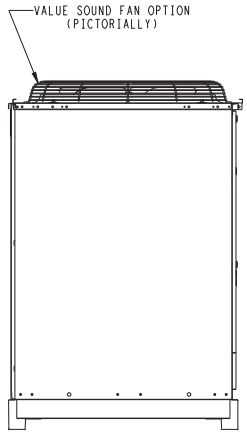
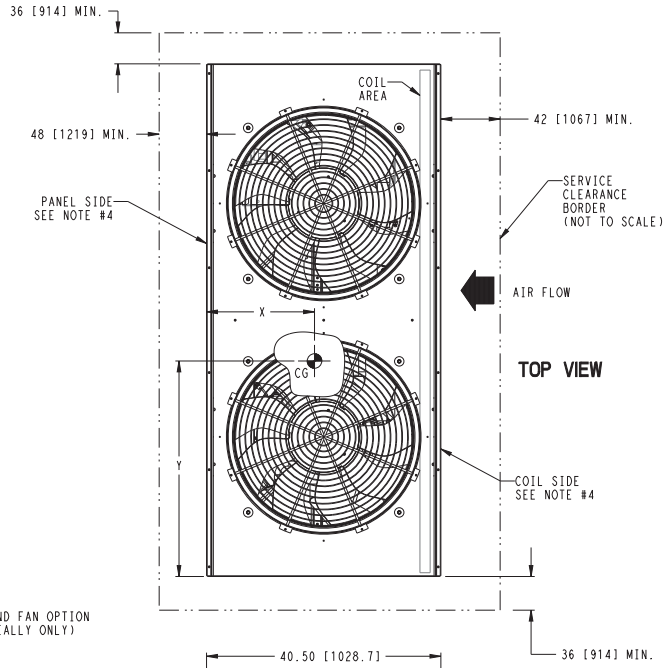


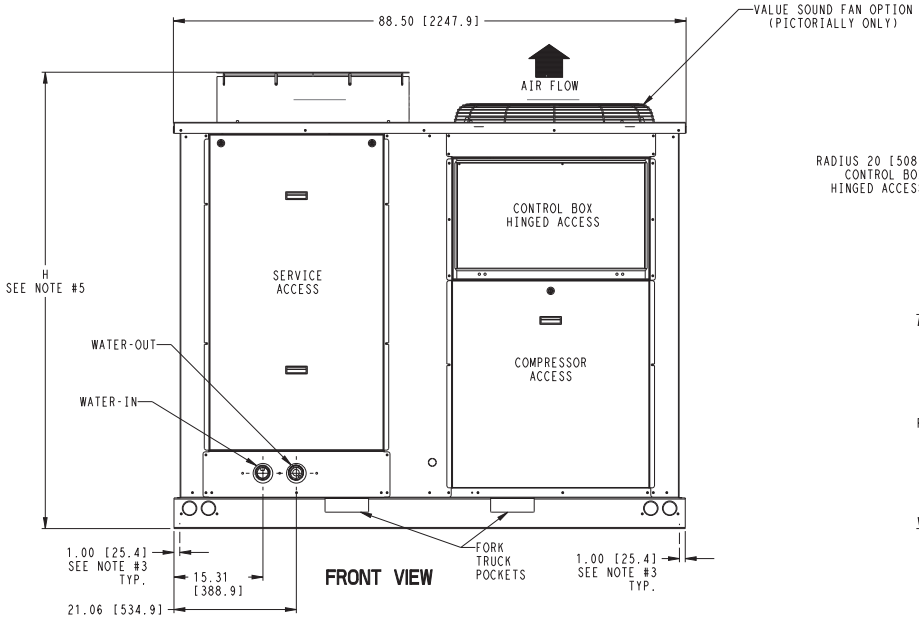
Fig. 5 — Dimensions — 30RAP010 and 015 Units

UNIT	CENTER OF GRAVITY		UNIT HEIGHT		POWER ENTRY	VICTAULIC CONNECTIONS
	X	Y	H (STANDARD)	H (VALUE SOUND)	P	WATER IN/OUT
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:

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





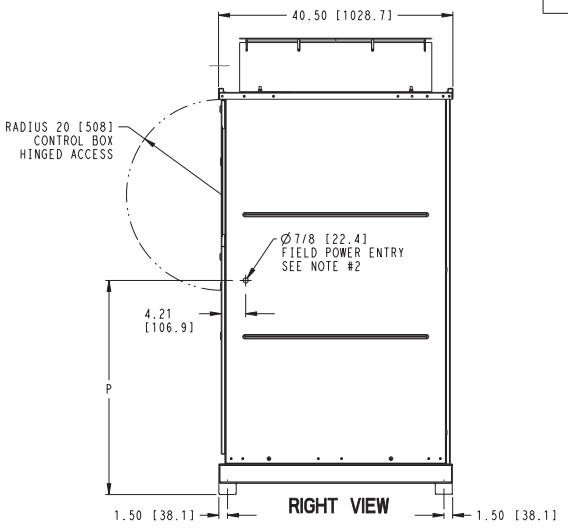


Fig. 6 — Dimensions — 30RAP018-030 Units

UNIT	CENTER OF GRAVITY		UNIT HEIGHT		VICTAULIC CONNECTIONS
	X	Y	H (STANDARD)	H (VALUE SOUND)	WATER IN/OUT
30RA035	36.45 [926]	46.08 [1170]	66.5 [1689]	61.0 [1549]	2-1/2"
30RA040	36.24 [921]	44.03 [1118]	66.5 [1689]	61.0 [1549]	2-1/2"
30RA045	36.24 [921]	46.15 [1172]	78.5 [1994]	73.0 [1854]	2-1/2"
30RA050	36.00 [914]	44.00 [1118]	78.5 [1994]	73.0 [1854]	2-1/2"
30RA055	36.48 [927]	44.60 [1133]	78.5 [1994]	73.0 [1854]	2-1/2"
30RA060	36.50 [927]	44.56 [1132]	78.5 [1994]	73.0 [1854]	2-1/2"

NOTES:

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

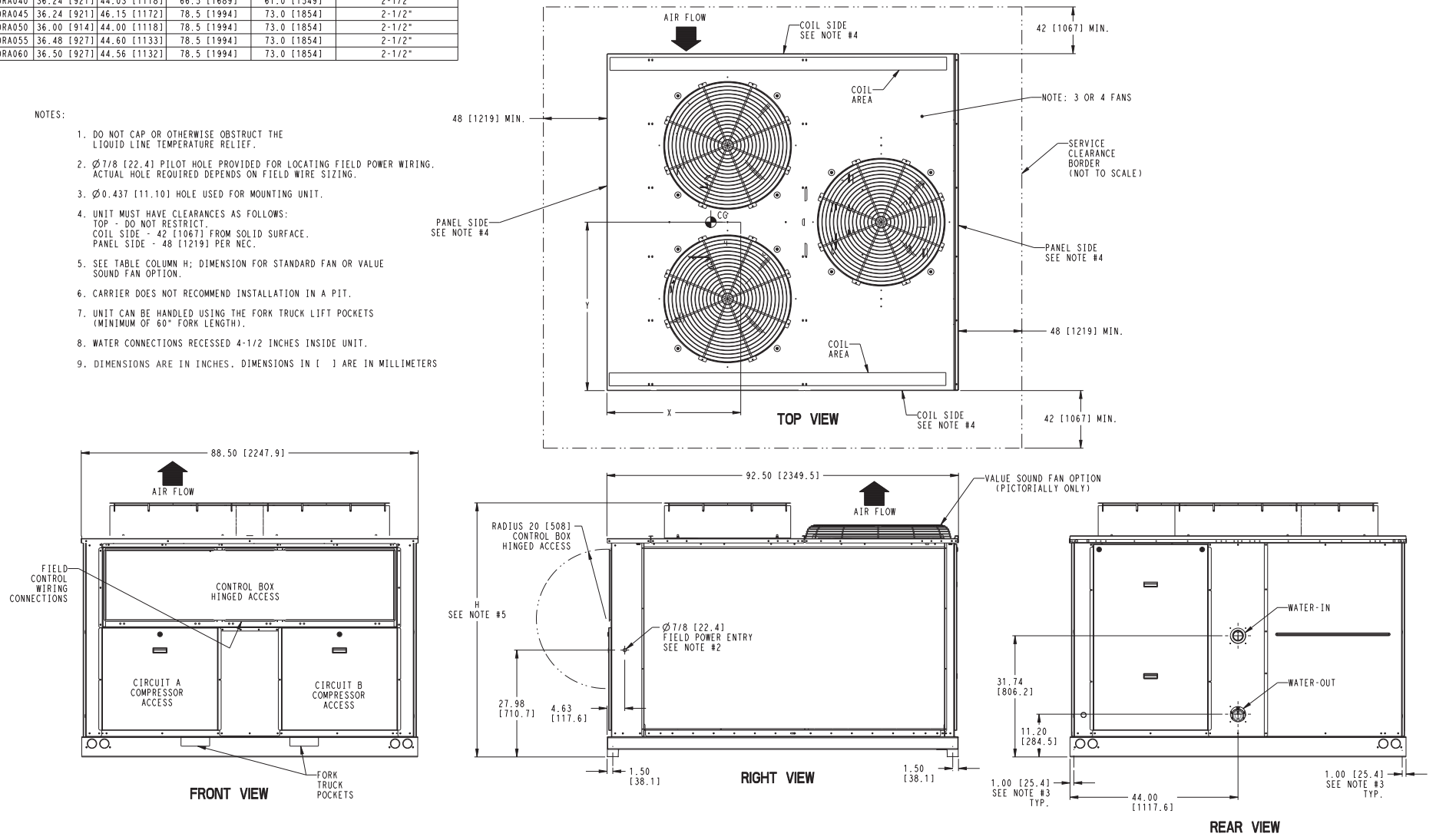


Fig. 7 — Dimensions — 30RAP035-060 Units

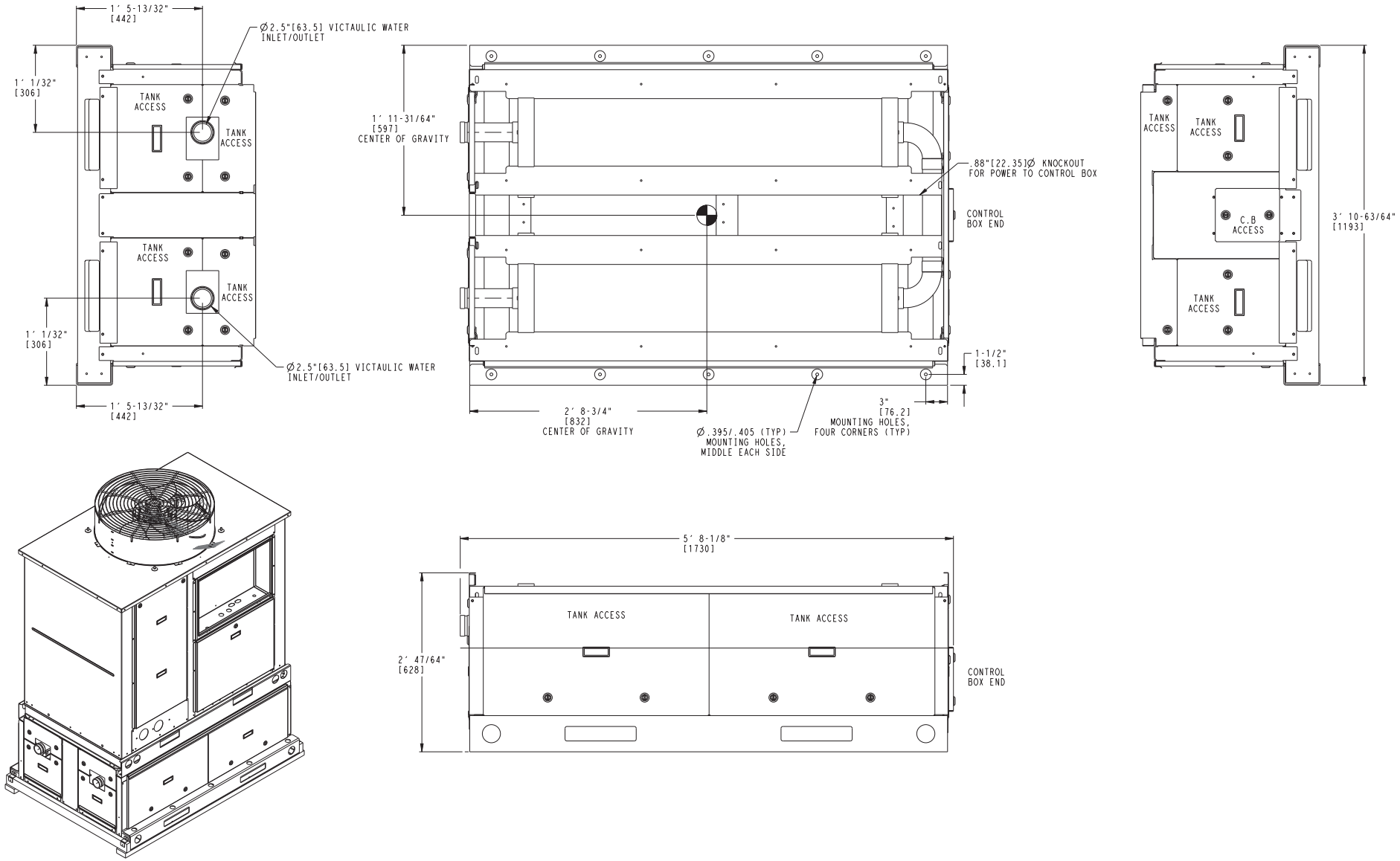


Fig. 8 — Accessory Storage Tank Dimensions — 30RAP010,015 Units

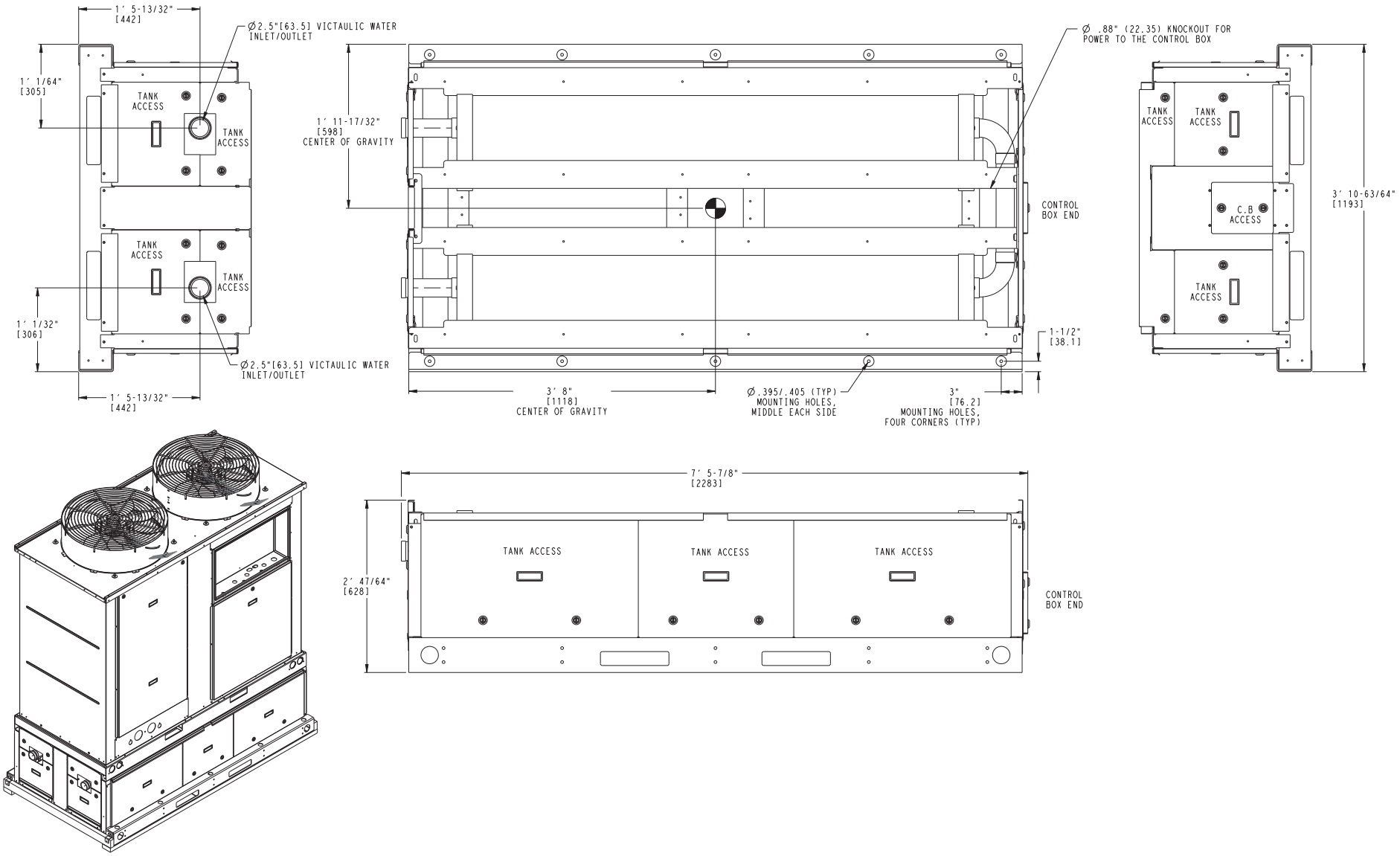


Fig. 9 — Accessory Storage Tank Dimensions — 30RAP018-030 Units

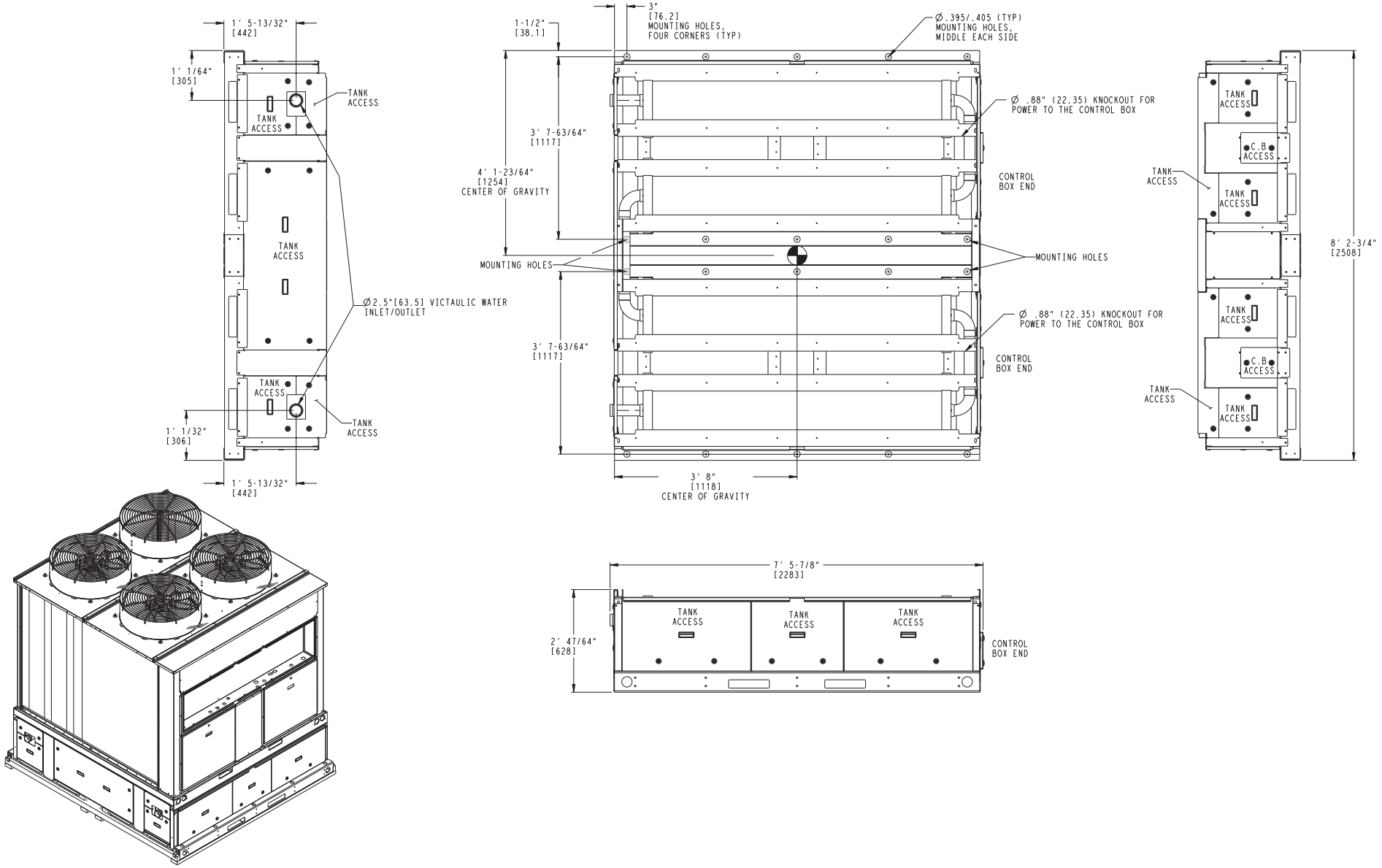


Fig. 10 — Accessory Storage Tank Dimensions — 30RAP035-060 Units

UNITS WITH FACTORY-INSTALLED HYDRONIC PACKAGES — The 30RAP chillers with factory-installed hydronic packages 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, these instructions assume 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.

Figure 11 shows a typical installation with components that might be installed with the hydronic package of the 30RAP unit. The factory-installed system includes all of the components within the dashed lines. Figure 12 illustrates a typical dual pump package for the 010-030 size models.

NOTE: For units with single pumps, 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. Units with dual pumps have pump isolation valves provided. 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.

System Pressurization — A proper initial cold fill pressure must be established before the filling of the unit. The initial cold fill pressure is the pressure applied at the filling point to fill a system to its highest point, plus a minimum pressure at the top of the system (4 psi minimum) to operate air vents and positively pressurize the system.

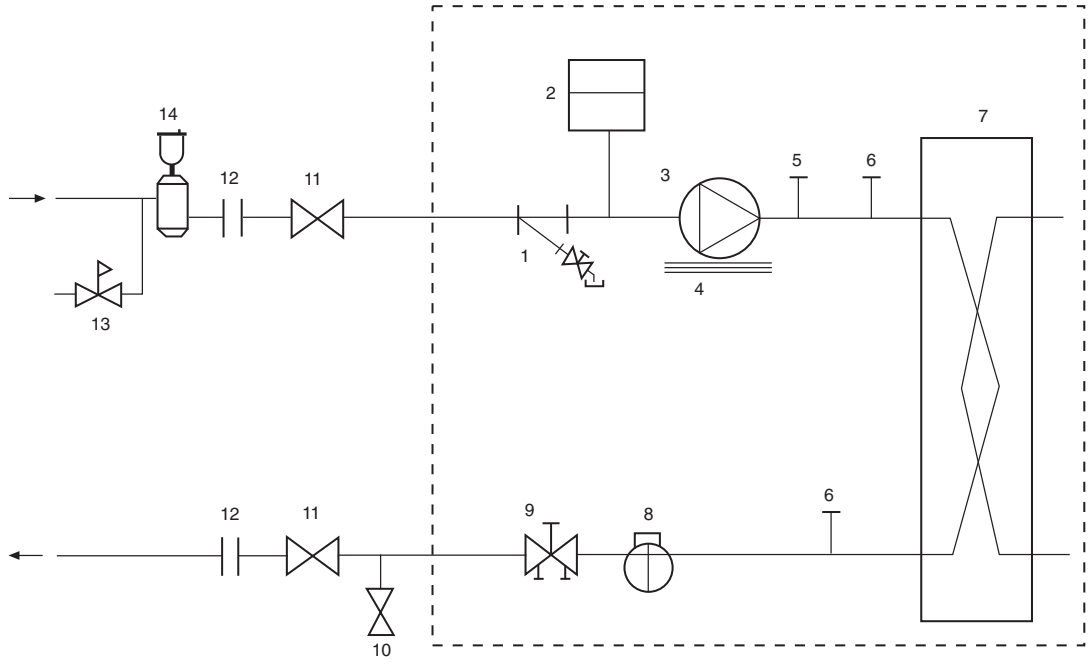
The compression tank (sometimes called expansion tank) is very important to system pressurization. The compression tank actually serves several purposes:

1. Provide net positive suction head required (NPSHR) for the pump to operate satisfactorily.
2. Set system pressure.
3. Accommodate expansion/contraction of water due to temperature changes.
4. Acts as a pressure reference for the pump.

The compression tank pressure must be set BEFORE the system is filled. The tanks are pre-charged at the factory to 40 psig (276 kPa). If the 30RAP unit with expansion tank is the high point in the system, tank pre-charge pressure of 40 psig (276 kPa) will be adequate. If the 30RAP unit with expansion tank is NOT at the high point in the system, then the minimum pre-charge pressure for the water system must be determined using Table 2 and the method below:

Tank Pressure = 4 + (height from tank to top of system in feet/"X")

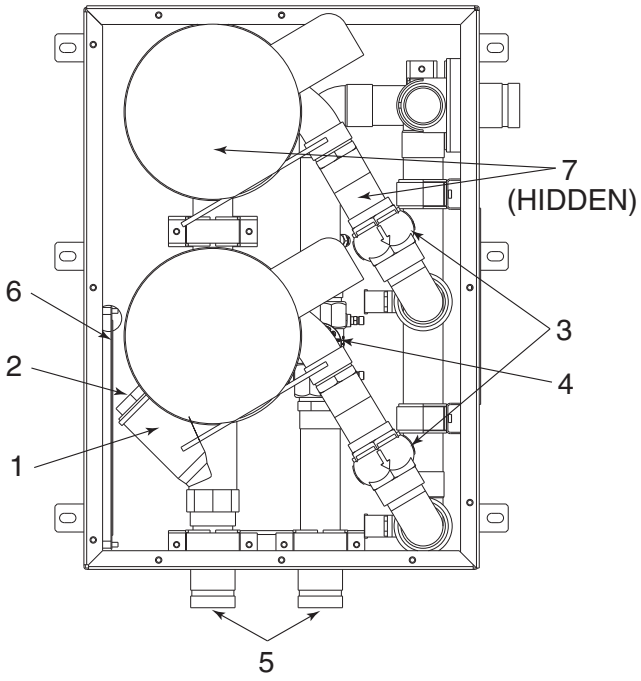
[27.6 + (height in m x 22.6/"X")]



LEGEND

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

Fig. 11 — Typical Piping Diagram — 30RAP Units with Hydronic Package



LEGEND

1	— Strainer	4	— Balancing Valve with Drain Plug
2	— Blow-Down Valve	5	— Field Connections
3	— Discharge Check Valve (Dual Pumps Only)	6	— Heater
		7	— Service Valves

Fig. 12 — Typical Dual Pump Package

For example, assuming a system containing a 20% concentration of ethylene glycol and 50 feet (15.2 m) in height from the top of the system to the expansion tank, the minimum tank pre-charge pressure would be:

Tank Pressure = 4 + (50 / 2.38) = 25.0 psig

= 27.6 + (15.2 x 22.6 / 2.38) = 171.9 kPa

Table 2 — "X" Factor for Setting Tank Pressure

% GLYCOL	ETHYLENE GLYCOL	PROPYLENE GLYCOL
0 (pure water)	2.31	2.31
10	2.36	2.33
20	2.38	2.36
30	2.40	2.38
40	2.43	2.38
50	2.47	2.40

NOTE: If expansion tanks are placed elsewhere in the system this method cannot be used since extra pressure drop between the tank and the pump must be accounted for.

NOTE: If the system requires a pre-charge greater than 40 psig (276 kPa), increase pressure as described below.

Expansion Tank Pre-Charge — To pre-charge the expansion tank, do the following steps:

1. Check the tank air pressure at the pre-charge connection with an accurate pressure gage. Adjust as needed.
2. If additional pressure is required, charge the tank with oil-free compressed air or nitrogen gas. Occasionally check the pressure as when filling a tire.
3. Check the air valve for leakage. If it leaks, relieve the pressure and replace the core with a Schrader type tire core. DO NOT depend on the valve cap to seal the leak.

Once the system is pressurized, the pressure at the connection point of the expansion tank to water piping will not change unless the water loop volume changes (either due to addition/subtraction of water or temperature expansion/contraction). The pressure at this point remains the same regardless of whether or not the pump is running.

Since the expansion tank acts as a reference point for the pump, there cannot be two reference points (two expansion tanks) in a system (unless manifolded together). If system volume or other design considerations warrant the placement of another expansion tank somewhere in the system, the expansion tank in the 30RAP hydronic package MUST be disconnected from its hose and the end of the hose securely plugged.

This is also true for applications where two or more 30RAP chillers are placed in parallel. There should not be more than one expansion tank in the system (unless manifolded together as seen in Fig. 12). The expansion tanks must be disconnected from the 30RAP hydronic package. It is permissible to install the expansion tank(s) in a portion of the return water line that is common to all pumps, providing that the tank is properly sized for combined system volume.

If the application involves two or more chillers in a primary/secondary system, a common place for mounting the expansion tank is in the chilled water return line, just before the decoupler. See Fig. 13 for placement of expansion tank in primary/secondary systems.

The expansion tank included in the 30RAP hydronic package is a diaphragm tank, meaning that a flexible diaphragm physically separates the water/air interface. With this type of expansion tank, it is undesirable to have any air in the water loop. See the section on air separation below for instructions on providing air separation equipment.

AIR SEPARATION — For proper system operation, it is essential that water loops be installed with proper means to manage air in the system. 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 (see Fig. 13). 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 feet 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.

Step 4 — Fill the Chilled Water Loop

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 Table 3. Failure to maintain proper water quality may result in heat exchanger failure.

⚠CAUTION

Failure to properly clean all piping and components of the chilled water system before unit start-up may result in plugging of the heat exchanger, which can lead to poor performance, nuisance alarms and damage from freezing. Freezing damage caused by an improperly cleaned system represents abuse and may impair or otherwise negatively affect the Carrier product warranty.

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. (See Fig 14.)
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 (see Fig. 15) 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.

Table 3 — Water Quality Characteristics and Limitations

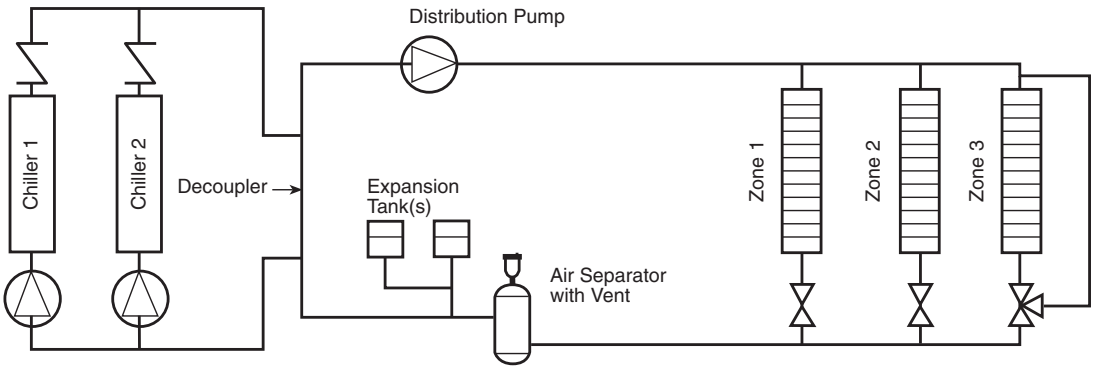
WATER CHARACTERISTIC	QUALITY LIMITATION
Alkalinity (HCO_3^-)	70 – 300 ppm
Sulfate (SO_4^{2-})	Less than 70 ppm
HCO_3^-/SO_4^{2-}	Greater than 1.0
Electrical Conductivity	10 – 500 μS/cm
pH	7.5 – 9.0
Ammonium (NH_3)	Less than 2 ppm
Chorides (Cl^-)	Less than 300 ppm
Free chlorine (Cl_2)	Less than 1 ppm
Hydrogen Sulfide (H_2S)*	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 $2^{[(6.3\text{-pH})/0.3]}$ where TA = Total Alkalinity, PPM as $CaCO_3$.

A 40-mesh 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 Carrier *Comfort*Link™ 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.



NOTE: Expansion tanks in the 30RAP hydronic kits must be disconnected for chillers placed parallel in the primary water loop.

Fig. 13 — Typical Air Separator and Expansion Tank Location on Primary-Secondary Systems

FILLING THE SYSTEM — The initial fill of the chilled water system must accomplish three purposes:

1. The entire piping system must be filled with water.
2. The pressure at the top of the system must be high enough to vent air from the system (usually 4 psig is adequate for most vents).
3. The pressure at all points in the system must be high enough to prevent flashing in the piping or cavitation in the pump.

The pressure created by an operating pump affects system pressure at all points except one — the connection of the compression tank to the system. This is the only location in the system where pump operation will not give erroneous pressure indications during the fill. Therefore, the best location to install the fill connection is close to the expansion tank. An air vent should be installed close by to help eliminate air that enters during the fill procedure.

Ensure the following when filling the system:

1. Remove temporary bypass piping and cleaning/flushing equipment.
2. Check to make sure all drain plugs are installed.
3. Open the blow-down valve to flush the strainer.

Normally, a closed system needs to be filled only once. The actual filling process is generally a fairly simple procedure. All air should be purged or vented from the system. Thorough venting at the high points and circulation at room temperature for several hours is recommended.

NOTE: Local codes concerning backflow devices and other protection of the city water system should be consulted and followed to prevent contamination of the public water supply. This is especially important when antifreeze is used in the system.

Set Water Flow Rate — Once the system is cleaned, pressurized, and filled, the flow rate through the chiller needs to be established. On units with the hydronic package, this can best be done using the balancing valve.

In order to adjust the balancing valve, put a differential pressure gage across the pressure taps on the valve. Make sure that all system isolation and control valves are open. Use Tables 4A-5B or a Bell & Gossett balancing valve calculator to determine gpm. To read Tables 4 and 5:

1. Measure the pressure drop across the balancing valve. If the pressure reading is in psig, multiply psig by 2.31 to convert to feet of water before using Tables 4A and 5A.
2. Go to the row in the chart corresponding to the setting on the valve, interpolating if necessary.
3. The gpm corresponding to the pressure drop measured is the flow through the balancing valve.

NOTE: Carrier recommends a differential pressure gage when measuring pressures across the pumps or balancing valves. This provides for greater accuracy and reduces error build-up that often occurs when subtracting pressures made by different gages.

On primary/secondary systems, it is advisable to set the 30RAP balancing valve to maintain design flow plus 10% through the chiller.

A rough estimate of water flow can also be obtained from the pressure gages across the 30RAP heat exchanger. Figures 16A-17B show the relationship between gpm and heat exchanger pressure drop. It should be noted that these curves are for "clean" heat exchangers; they do not apply to heat exchangers with fouling. To read the chart, subtract the readings of the two pressure gages on the hydronic kit. This number is the pressure drop across the heat exchanger. Adjust the factory-installed balancing valve or external balancing valve (units without hydronic package) until the correct pressure drop is obtained for the required gpm. Total unit pressure drop is found in Appendix A.

Minimum Loop Volume — The minimum volume of fluid required to be in circulation is a function of the number of compressors in the chiller as well as the type of application. The minimum fluid in circulation must equal or exceed the values in the following table. See Table 6.

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. See Fig. 18.

A properly baffled storage tank is available from the factory as an accessory. These tanks are designed to physically fit beneath the corresponding 30RAP unit, taking up the same footprint.

- 30RAP010-018 83 gallons (314 liters)
- 30RAP022-030 119 gallons (450 liters)
- 30RAP035-060 241 gallons (912 liters)

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

- 30RAP010-018 1673 lb (759 kg)
- 30RAP022-030 2193 lb (995 kg)
- 30RAP035-060 4361 lb (1978 kg)

Maximum Loop Volume (Units with Hydronic Package) — Since the minimum size of the expansion tank is dependent upon loop volume, units with the integrated hydronic kit must not exceed the maximum loop volume limits below (see Table 7). The limits are dependent on the maximum and minimum temperatures of the water, the maximum and minimum pressures seen by the expansion tank, and the heat transfer fluid. Expansion tank and maximum loop volume data is as follows.

	30RAP010-030	30RAP035-060
Volume gal (L)	5.0 (18.9)	10.0 (37.9)
Acceptance Volume gal (L)	2.9 (11.0)	5.5 (20.8)

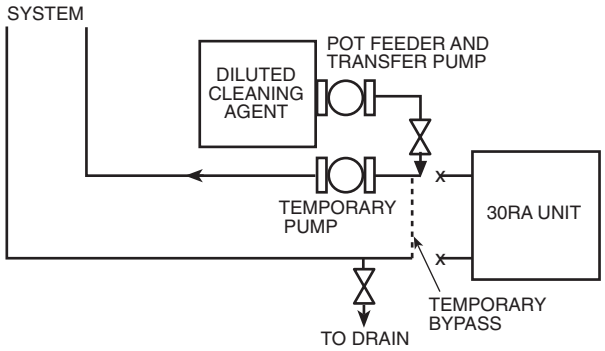


Fig. 14 — Typical Set Up for Cleaning Process

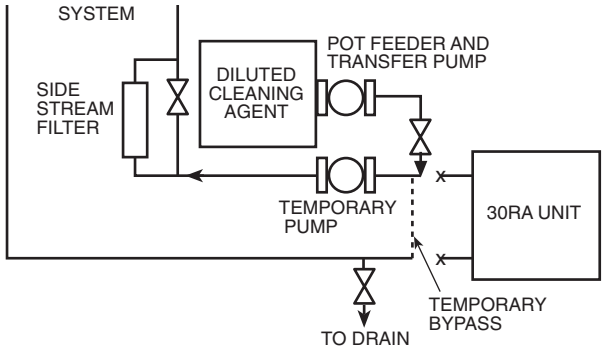


Fig. 15 — Cleaning Using a Side Stream Filter

Table 4A — Head (Ft Water) as Read on Balancing Valve for 30RAP010-030

SETTING	GPM																				
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
0	0	0	0.1	0.3	0.6	0.9	1.3	1.8	2.3	2.9	3.6	4.4	5.2	6.1	7.1	8.1	9.2	10.4	11.7	13	14.4
10	0	0.1	0.3	0.7	1.2	1.8	2.7	3.6	4.7	6	7.4	8.9	10.6	12.4	14.4	16.6	18.9	—	—	—	—
20	0	0.2	0.7	1.6	2.9	4.6	6.6	8.9	11.7	14.8	18.2	—	—	—	—	—	—	—	—	—	—
30	0	0.5	2	4.6	8.1	12.7	18.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40	0	1.6	6.2	14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50	0	4.1	16.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 4B — Head (kPa) as Read on Balancing Valve for 30RAP010-030

SETTING	GPM																				
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
0	0.0	0.0	0.3	0.9	1.8	2.7	3.9	5.4	6.9	8.7	10.8	13.2	15.5	18.2	21.2	24.2	27.5	31.1	35.0	38.9	43.0
10	0.0	0.3	0.9	2.1	3.6	5.4	8.1	10.8	14.0	17.9	22.1	26.6	31.7	37.1	43.0	49.6	56.5	—	—	—	—
20	0.0	0.6	1.1	4.8	8.7	13.8	19.7	26.6	35.0	44.2	54.4	—	—	—	—	—	—	—	—	—	—
30	0.0	1.5	6.0	13.7	24.2	38.0	54.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40	0.0	4.8	18.5	41.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50	0.0	12.3	48.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 5A — Head (Ft Water) as Read on Balancing Valve for 30RAP035-060

SETTING	GPM																
	40	50	60	70	80	85	90	95	100	105	110	115	120	125	130	135	140
0	0.9	1.4	2	2.7	3.5	4	4.4	4.9	5.5	6	6.6	7.2	7.9	8.5	9.2	10	10.7
10	1.6	2.5	3.6	5	6.5	7.3	8.2	9.1	10.1	11.2	12.3	13.4	14.6	15.8	17.1	18.5	19.9
20	3.4	5.3	7.6	10.4	13.6	15.3	17.2	19.1	21.2	23.4	25.7	28.1	30.5	33.1	35.8	38.7	41.6
30	8.5	13.3	19.2	26.2	34.2	38.6	43.2	48.2	53.4	58.9	64.6	70.6	76.9	83.4	90.2	97.3	104.7
40	23.7	37	53.2	72.4	94.6	106.8	119.8	133.4	147.8	163	178.9	195.5	212.9	231	249.8	269.4	289.8
50	54.6	85.3	122.8	167.2	218.3	246.5	276.3	307.9	341.1	376.1	412.8	451.1	491.2	533	576.5	621.7	668.6

Table 5B — Head (kPa) as Read on Balancing Valve for 30RAP035-060

SETTING	GPM																
	40	50	60	70	80	85	90	95	100	105	110	115	120	125	130	135	140
0	2.7	4.2	6.0	8.0	10.4	11.9	13.1	14.6	16.4	17.9	19.7	21.5	23.5	25.3	27.4	29.8	31.9
10	4.8	7.5	10.7	14.9	19.4	21.8	24.4	27.1	30.1	33.4	36.7	39.9	43.5	47.1	51.0	55.1	59.3
20	10.1	15.8	22.6	31.0	40.5	45.6	51.3	56.9	63.2	69.7	76.6	83.7	90.9	98.6	106.7	115.3	124.0
30	25.3	39.6	57.2	78.1	101.9	115.0	128.7	143.6	159.1	175.5	192.5	210.4	229.2	248.5	268.8	290.0	312.0
40	70.6	110.3	158.5	215.8	281.9	318.3	357.0	397.5	440.4	485.7	533.1	582.6	634.4	688.4	744.4	802.8	863.6
50	162.7	254.2	365.9	498.3	650.5	734.6	823.4	917.5	1016.5	1120.8	1230.1	1344.3	1463.8	1588.3	1718.0	1852.7	1992.4

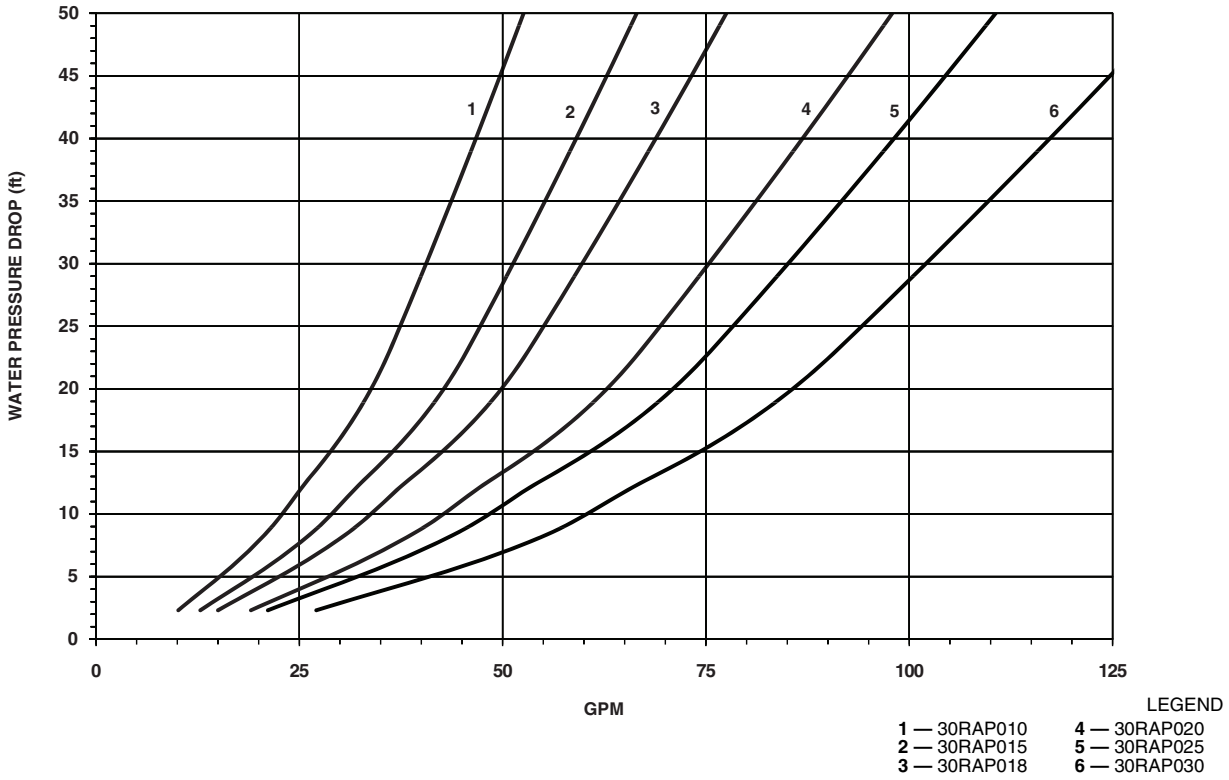


Fig. 16A — Heat Exchanger Pressure Drop — 30RAP010-030 (English)

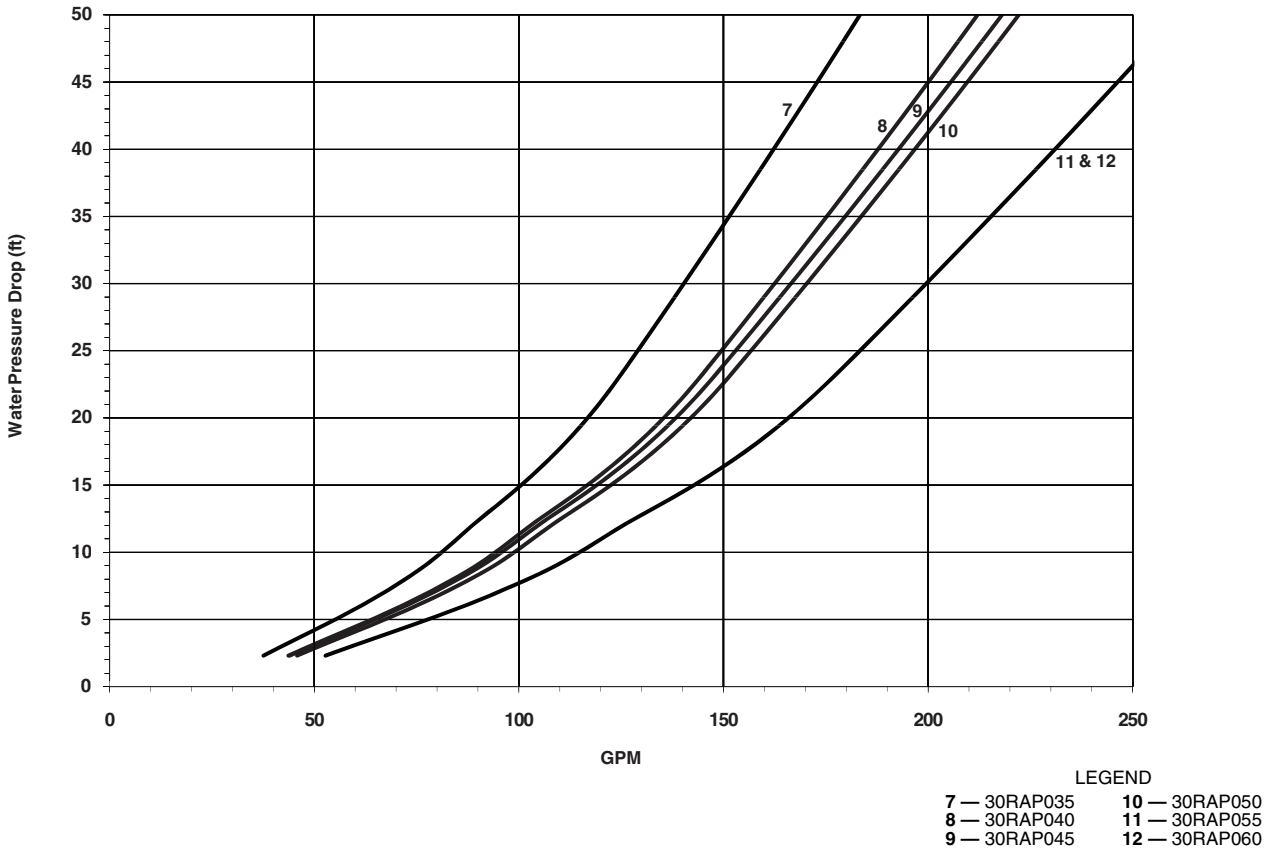


Fig. 16B — Heat Exchanger Pressure Drop — 30RAP035-060 (English)

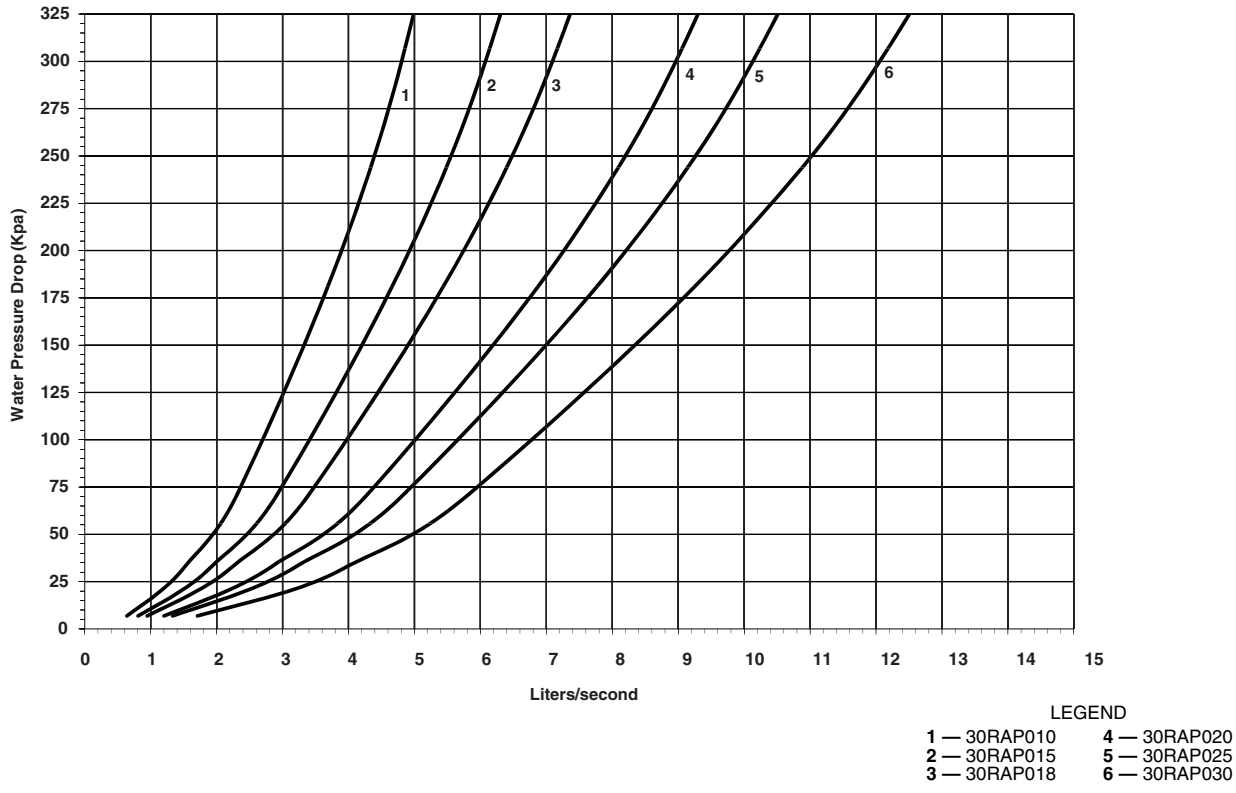


Fig. 17A — Heat Exchanger Pressure Drop — 30RAP010-030 (SI)

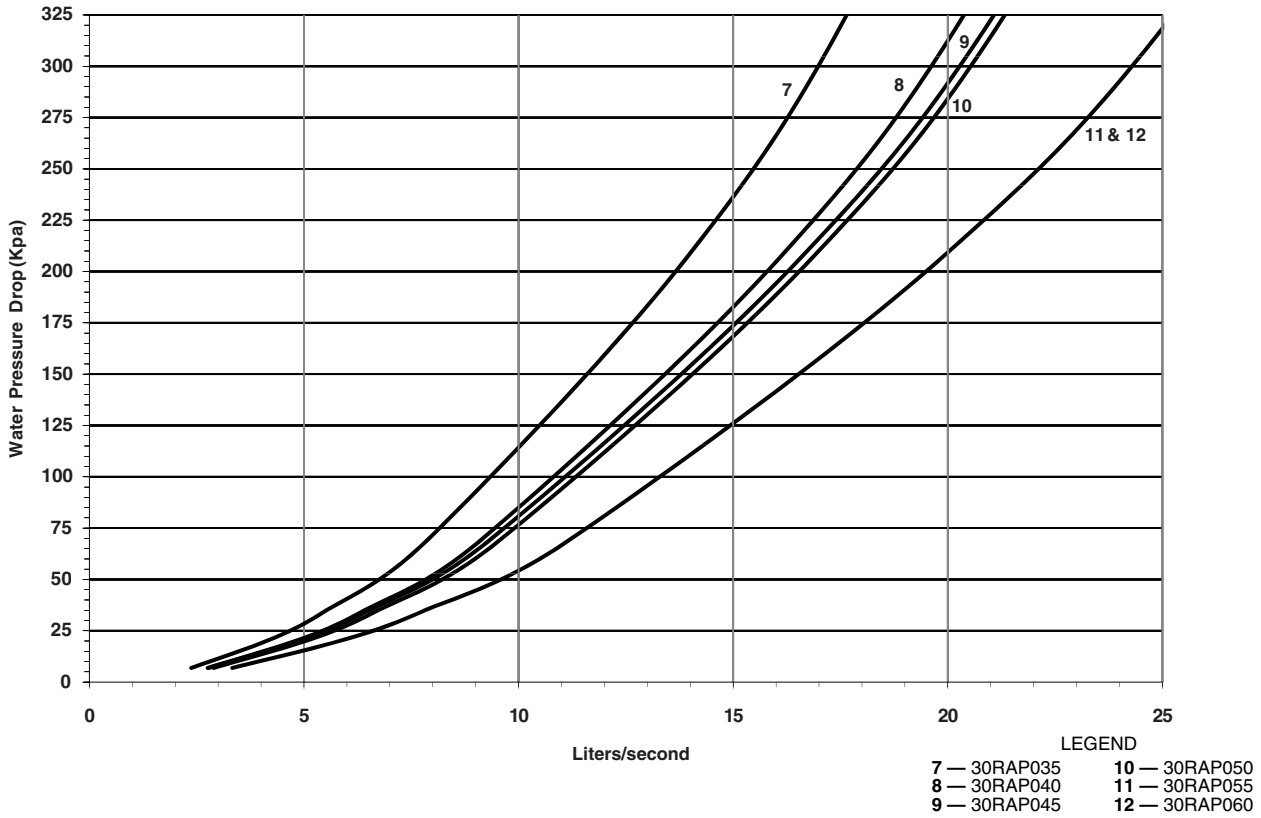


Fig. 17B — Heat Exchanger Pressure Drop — 30RAP035-060 (SI)

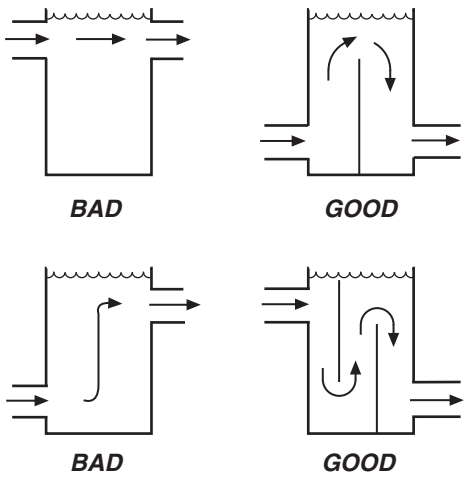


Fig. 18 — Tank Baffling

Table 6 — 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 (13.0)	N/A	3 (3.3)	12 (13.0)	N/A	3 (3.3)
018-030	6 (6.5)	4 (4.3)	3 (3.3)	10 (10.8)	7 (7.6)	3 (3.3)
035-060	3 (3.3)	3 (3.3)	3 (3.3)	6 (6.5)	5 (5.4)	3 (3.3)

LEGEND
HGBP — Hot Gas Bypass

Table 7 — Maximum Loop Volume Limits

CONCENTRATION	30RAP010-030		30RAP035-060	
	GAL	L	GAL	L
PURE WATER	310	1173	725	2744
10% EG	180	681	425	1609
20% EG	175	662	410	1552
30% EG	155	587	370	1401
40% EG	150	568	350	1325
10% PG	175	662	410	1552
20% PG	150	568	350	1325
30% PG	128	485	300	1136
40% PG	118	447	275	1041

LEGEND
EG — Ethlyene Glycol
PG — Propylene Glycol

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

Pump Modification/Trimming (Units with Factory-Installed Hydronic Package) — Since the pumps are constant speed, the only way to obtain greater flow with a given pump/impeller is to decrease system head. This will allow the pump to "ride" its curve to the right, resulting in increased flow. If greater flow is necessary, look at opening the balance valve. Also, verify that the strainer is clean, and that no unnecessary system resistance is present, such as partially closed isolation valves.

Increasing system resistance by closing the balancing valve will force the pump to "ride" its curve to the left, resulting in less flow. Although this does reduce power consumption slightly, it may not be the desirable method of reducing the flow, especially if a rather large reduction is needed.

The other method for reducing flow on a constant speed pump is impeller trimming. The impellers in the pumps provided in the 30RAP hydronic kit are easily removable for this purpose. Refer to the ITT literature packet supplied with the hydronic package information on Seal Replacement in the Service Section, and follow its instructions for impeller removal. Trimming should only be done by a qualified machine shop that has experience in this operation. Contact your local Carrier representative for a recommended machine shop. After trimming, the impeller MUST be balanced. Failure to balance trimmed impellers can result in excessive vibration, noise, and premature bearing failure.

Impeller trimming has the added benefit of maximum bhp savings. It is very possible for power savings to pay for the trimming cost very quickly. The 30RAP pump option may be applied with a field-supplied VFD. When applied with a VFD, the maximum length of wiring between the drive and the pump motor is 50 ft (15.2 m). The maximum allowable carrier frequency of the inverter is 12 kHz, with 3 kHz recommended.

PREPARATION FOR YEAR-ROUND OPERATION — If the unit is in operation year-round, add sufficient suitable inhibited antifreeze solution such as propylene or ethylene glycol to chilled water to prevent freezing under low-ambient temperature operating conditions. Consult a local water treatment specialist on characteristics of water and recommended inhibitor.

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

Motormaster® low ambient temperature head pressure control is required if ambient temperatures are below 45 F (7 C) on size 018-030 units, and 32 F (0° C) on size 035-060 units. Motormaster is standard on size 010 and 015 units,

Accessory wind baffles are required with Motormaster head pressure control if the wind velocity is anticipated to be greater than 5 mph (8 km/h). Unit sizes 010-030 require one baffle and unit sizes 035-060 require two baffles. See Table 8.

Table 8 — Wind Baffle Accessory Quantities

ACCESSORY PART NO. 30RA-900---	UNIT SIZE 30RAP				
	010,015	018,020	025,030	035,040	045-060
054	1	—	—	—	—
055	—	1	—	2	—
056	—	—	1	—	2

⚠ CAUTION

To avoid damage to refrigerant coils and electronic components, use extreme care when drilling screw holes and attaching fasteners.

FREEZE PROTECTION — The 30RAP units are provided with a water strainer and a flow switch to protect against freezing situations that occur from no water flow. While the flow switch (thermal dispersion) is helpful in preventing freezing during no-flow situations, it does not protect the chiller in case of power failure, or in other cases where water temperature falls below the freezing mark. Appropriate concentrations of inhibited ethylene glycol or other suitable inhibited antifreeze solution should be considered for chiller protection where ambient temperatures are expected to fall below 32 F (0.0° C). Consult local water treatment specialist on characteristics of the system water and add a recommended inhibitor to the chilled water.

⚠ CAUTION

Do not circulate water through unit without strainer in place. Failure to use the strainer represents abuse and may impair or otherwise negatively affect the Carrier product warranty.

1. If the pump will be subjected to freezing temperatures, steps must be taken to prevent freeze damage. If the pump will not be used during this time, it is recommended to drain the pump and hydronic package and these components back-flushed with inhibited glycol. Otherwise, a glycol-water solution should be considered as the heat transfer fluid. Units have a drain mounted on the piping leaving the heat exchanger. Drains are located on the sheet metal base of all units.

NOTE: Do not use automobile antifreeze, or any other fluid that is not approved for heat exchanger duty. Only use appropriately inhibited glycols, concentrated to provide adequate protection for the temperature considered.

2. Use an electric tape heater for the internal piping (excluding those within the pump box) if unit will be exposed to freezing temperature.
3. Ensure that power is available to the chiller at all times, even during the off-season, so that the pump and cooler heaters have power. Also make sure that the piping tape heaters have power.
4. On units with pump packages, a heater is supplied in the pump box that will protect this section from freezing in outdoor-air temperatures down to –20 F (–29 C), except in case of a power failure.
5. Cooler heaters that will protect down to –20 F (–29 C) can be installed as a factory option. It should be noted that these heaters will not protect the cooler from freezing in the event of a power failure.

PREPARATION FOR WINTER SHUTDOWN — Do not shut off power disconnect during off-season shutdown. At the end of the cooling season:

1. Drain water from system.
2. Replace drain plug(s) and add sufficient inhibited ethylene glycol (or other suitable inhibited antifreeze) to cooler, pump and piping to prevent freezing of residual water.
3. At the beginning of the next cooling season, refill cooler and add recommended inhibitor.

Step 5 — Make Electrical Connections

⚠ WARNING

Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

POWER SUPPLY — Electrical characteristics of available power supply must agree with unit nameplate rating. Field wiring size and supply voltage must be within limits shown in Table 9. See Tables 10-17 for component electrical data.

IMPORTANT: Operating unit on improper supply voltage or with excessive phase imbalance constitutes abuse and may affect Carrier warranty.

Table 9 — Maximum Field Wiring Sizes

CONNECTION TYPE	WIRE SIZE RANGE
TERMINAL BLOCK, MCA UP TO 175 AMPS	14 AWG to 2/0 AWG
TERMINAL BLOCK, MCA 175 TO 420 AMPS	2 AWG to 600 kcmil
NON-FUSED DISCONNECT, UP TO 100 AMPS	14 AWG to 1/0 AWG
NON-FUSED DISCONNECT, 100 TO 200 AMPS	6 AWG to 350 kcmil
NON-FUSED DISCONNECT, 200 TO 450 AMPS	3/0 AWG to 500 kcmil

AWG — American Wire Gage, kcmil
MCA — Minimum Circuit Amps

Table 10 — 30RAP Electrical Data — 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	49.8	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	341.6	175	167.2	200	341.6	200
	380-60	342	418	1	84.3	110	237.8	100	84.3	110	237.8	100
	460-60	414	506	1	82.4	100	176.3	90	83.6	100	176.3	90
	575-60	518	633	1	66.1	80	121.0	70	66.7	80	121.0	80
040	208/230-60	187	253	1	194.8	225	377.0	225	196.6	225	377.0	225
	380-60	342	418	1	112.5	125	216.1	125	112.5	125	216.1	125
	460-60	414	506	1	86.2	100	180.1	100	87.4	100	180.1	100
	575-60	518	633	1	68.8	80	143.7	80	69.4	80	143.7	80
045	208/230-60	187	253	1	229.6	250	450.7	250	231.4	250	450.7	250
	380-60	342	418	1	119.6	125	216.5	125	119.6	125	216.5	125
	460-60	414	506	1	97.9	110	214.8	110	99.1	110	214.8	110
	575-60	518	633	1	81.4	100	163.5	90	82.0	100	163.5	90
050	208/230-60	187	253	1	236.0	250	453.9	250	237.8	250	453.9	250
	380-60	342	418	1	126.0	150	219.7	150	126.0	150	219.7	150
	460-60	414	506	1	106.9	125	219.3	125	108.1	125	219.3	125
	575-60	518	633	1	91.8	110	168.7	100	92.4	110	168.7	100
055	208/230-60	187	253	1	252.2	300	502.9	300	254.6	300	502.9	300
	380-60	342	418	1	145.9	175	290.9	175	145.9	175	290.9	175
	460-60	414	506	1	118.3	125	255.9	125	119.9	125	255.9	125
	575-60	518	633	1	102.7	125	199.3	110	103.5	125	199.3	110
060	208/230-60	187	253	1	261.2	317	507.4	300	263.6	320	507.4	300
	380-60	342	418	1	160.1	175	298.0	175	160.1	175	298.0	175
	460-60	414	506	1	125.9	150	259.7	150	127.5	150	259.7	150
	575-60	518	633	1	110.3	125	203.1	125	111.1	125	203.1	125

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.

Table 11 — 30RAP Electrical Data — Hydronic Package with Standard Low-Sound AeroAcoustic™ Fan

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 1 hp PUMP OPTIONS "1" OR "8"				PUMP SIZE 1.5 hp PUMP OPTIONS "2" OR "9"				PUMP SIZE 2 hp PUMP OPTIONS "3" OR "B"			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
010	208/230-60	69.4	110	254.3	90	70.6	110	255.4	90	71.7	110	256.6	90
	380-60	35.5	50	253.0	45	36.2	50	151.6	45	60.5	60	152.2	45
	460-60	27.8	45	252.6	35	28.4	45	130.1	35	28.9	45	130.6	35
	575-60	22.1	35	252.3	30	22.6	35	104.2	30	22.9	35	104.5	30
015	208/230-60	79.0	125	349.3	100	80.2	125	350.4	100	81.4	125	351.6	100
	380-60	48.4	80	348.0	60	49.1	80	202.6	60	83.7	80	203.2	60
	460-60	38.2	60	347.6	45	38.7	60	184.1	50	39.2	60	184.6	50
	575-60	33.3	50	347.3	40	33.8	50	136.2	40	34.2	50	136.5	45
018	208/230-60	90.4	110	273.7	100	91.6	110	274.8	100	92.8	125	276.0	110
	380-60	53.0	70	272.4	60	53.8	70	169.7	60	73.6	70	170.3	60
	460-60	45.0	60	272.0	50	45.6	60	138.7	50	46.1	60	139.2	60
	575-60	36.2	45	271.7	40	36.7	50	100.0	45	37.0	50	100.3	45
020	208/230-60	95.8	125	290.1	110	97.0	125	291.2	110	98.2	125	292.4	110
	380-60	63.1	80	288.8	70	63.9	80	179.2	70	88.2	80	179.8	80
	460-60	47.7	60	288.4	60	48.3	60	150.9	60	48.8	60	151.4	60
	575-60	38.3	50	288.1	45	38.8	50	100.9	45	39.2	50	101.3	45
025	208/230-60	130.7	175	366.6	150	131.9	175	367.7	150	133.0	175	368.9	150
	380-60	70.3	90	365.3	80	71.0	90	176.4	80	98.5	90	177.0	80
	460-60	59.4	80	364.9	70	60.0	80	181.1	70	60.5	80	181.6	70
	575-60	50.9	70	364.6	60	51.4	70	135.5	60	51.7	70	135.8	60
030	208/230-60	140.8	175	411.1	175	142.0	175	412.2	175	143.2	175	413.4	175
	380-60	86.3	110	409.8	100	87.0	110	240.5	100	121.6	110	241.1	100
	460-60	68.0	90	409.4	80	68.5	90	213.9	80	69.0	90	214.4	80
	575-60	59.4	80	409.1	70	59.9	80	162.3	70	60.3	80	162.6	70
035	208/230-60	168.6	200	344.9	200	169.8	200	346.0	200	171.0	200	347.2	200
	380-60	105.5	125	343.6	125	106.2	125	209.9	125	130.5	125	210.5	125
	460-60	84.0	100	343.2	90	84.6	100	178.5	90	85.1	100	179.0	90
	575-60	67.5	80	342.9	80	67.9	80	122.8	80	68.3	80	123.2	80
040	208/230-60	198.0	225	380.3	225	199.2	225	381.4	225	200.4	225	382.6	225
	380-60	114.4	125	379.0	125	115.2	125	218.8	125	139.5	125	219.4	125
	460-60	87.8	100	378.6	100	88.4	100	182.3	100	88.9	100	182.8	100
	575-60	70.1	80	378.3	80	70.6	80	145.5	80	71.0	80	145.9	80
045	208/230-60	232.9	250	454.0	250	234.1	250	455.1	250	235.2	250	456.3	250
	380-60	121.6	125	452.7	125	122.3	125	219.2	125	149.8	125	219.8	125
	460-60	99.5	110	452.3	110	100.1	110	217.0	110	100.6	110	217.5	110
	575-60	82.7	100	452.0	90	83.2	100	165.3	90	83.5	100	165.6	90
050	208/230-60	239.3	250	457.2	250	240.5	250	458.3	250	241.6	250	459.5	250
	380-60	128.0	150	455.9	150	128.7	150	222.4	150	156.2	150	223.0	150
	460-60	108.5	125	455.5	125	109.1	125	221.5	125	109.6	125	222.0	125
	575-60	93.1	110	455.2	100	93.6	110	170.5	100	93.9	110	170.8	100
055	208/230-60	255.4	300	506.2	300	256.6	300	507.3	300	257.8	300	508.5	300
	380-60	147.9	175	504.9	175	148.6	175	293.6	175	183.2	175	294.2	175
	460-60	120.0	125	504.5	125	120.5	125	258.1	125	121.0	125	258.6	125
	575-60	104.0	125	504.2	110	104.5	125	201.1	125	104.9	125	201.4	125
060	208/230-60	264.4	300	510.7	300	265.6	300	511.8	300	266.8	300	513.0	300
	380-60	162.1	175	509.4	175	162.8	175	300.7	175	197.4	175	301.3	175
	460-60	127.6	150	509.0	150	128.1	150	261.9	150	128.6	150	262.4	150
	575-60	111.6	125	508.7	125	112.1	125	204.9	125	112.5	125	205.2	125

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.

Table 11 — 30RAP Electrical Data — Hydronic Package with Standard Low-Sound AeroAcoustic™ Fan (cont)

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 3 hp PUMP OPTIONS "4" OR "C"				PUMP SIZE 5 hp PUMP OPTIONS "5" OR "6" OR "D" OR "F"				PUMP SIZE 7.5 hp PUMP OPTIONS "7" OR "G"			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
010	208/230-60	74.7	110	259.6	90	79.5	125	264.4	100	86.1	125	271.0	100
	380-60	61.9	60	153.6	45	64.7	60	156.4	50	68.6	60	160.2	60
	460-60	30.1	45	131.8	35	32.4	50	134.1	40	35.5	50	137.3	45
	575-60	23.9	35	105.5	30	25.8	40	107.4	30	28.3	40	109.9	35
015	208/230-60	84.4	125	354.6	100	89.2	125	359.4	110	95.8	150	366.0	110
	380-60	85.1	80	204.6	60	87.9	80	207.4	70	91.7	90	211.2	70
	460-60	40.4	60	185.8	50	42.7	60	188.1	50	45.9	70	191.3	60
	575-60	35.1	50	137.5	45	37.0	60	139.4	45	39.5	60	141.9	50
018	208/230-60	95.8	125	279.0	110	100.6	125	283.8	110	107.2	125	290.4	125
	380-60	75.0	70	171.7	70	77.8	70	174.5	70	81.6	80	178.4	70
	460-60	47.3	60	140.4	60	49.6	60	142.7	60	52.7	60	145.9	60
	575-60	38.0	50	101.3	45	39.9	50	103.2	45	42.3	50	105.6	50
020	208/230-60	101.2	125	295.4	125	106.0	125	300.2	125	112.6	125	306.8	125
	380-60	89.6	80	181.2	80	92.4	90	184.0	80	96.2	90	187.9	80
	460-60	50.0	60	152.6	60	52.3	70	154.9	60	55.4	70	158.1	60
	575-60	40.1	50	102.2	45	42.0	50	104.1	50	44.5	50	106.6	50
025	208/230-60	136.0	175	371.9	150	140.8	175	376.7	175	147.4	175	383.3	175
	380-60	99.9	90	178.4	80	102.7	100	181.2	90	106.6	100	185.0	90
	460-60	61.7	80	182.8	70	64.0	80	185.1	70	67.1	90	188.3	80
	575-60	52.7	70	136.8	60	54.6	70	138.7	60	57.1	70	141.2	70
030	208/230-60	146.2	200	416.4	175	151.0	200	421.2	175	157.6	200	427.8	175
	380-60	123.0	110	242.5	100	125.8	125	245.3	110	129.6	125	249.1	110
	460-60	70.2	90	215.6	80	72.5	90	217.9	80	75.7	100	221.1	90
	575-60	61.2	80	163.6	70	63.1	80	165.5	70	65.6	80	168.0	80
035	208/230-60	174.0	200	350.2	200	178.8	200	355.0	200	185.4	200	361.6	200
	380-60	131.9	125	211.9	125	134.7	125	214.7	125	138.6	125	218.5	125
	460-60	86.3	100	180.2	100	88.6	100	182.5	100	91.7	100	185.7	100
	575-60	69.2	80	124.1	80	71.1	80	126.0	80	73.6	80	128.5	80
040	208/230-60	203.4	250	385.6	225	208.2	250	390.4	225	214.8	250	397.0	250
	380-60	140.9	125	220.8	125	143.7	125	223.6	125	147.5	125	227.5	125
	460-60	90.1	100	184.0	100	92.4	110	186.3	100	95.5	110	189.5	110
	575-60	71.9	80	146.8	80	73.8	80	148.7	80	76.3	90	151.2	80
045	208/230-60	238.2	250	459.3	250	243.0	250	464.1	250	249.6	300	470.7	300
	380-60	151.2	150	221.2	150	154.0	150	224.0	150	157.9	150	227.8	150
	460-60	101.8	110	218.7	110	104.1	125	221.0	110	107.2	125	224.2	125
	575-60	84.5	100	166.6	90	86.4	100	168.5	100	88.9	100	171.0	100
050	208/230-60	244.6	250	462.5	250	249.4	300	467.3	300	256.0	300	473.9	300
	380-60	157.6	150	224.4	150	160.4	150	227.2	150	164.3	150	231.0	150
	460-60	110.8	125	223.2	125	113.1	125	225.5	125	116.2	125	228.7	125
	575-60	94.9	110	171.8	100	96.8	110	173.7	110	99.3	110	176.2	110
055	208/230-60	260.8	300	511.5	300	265.6	300	516.3	300	272.2	300	522.9	300
	380-60	184.6	175	295.6	175	187.4	175	298.4	175	191.2	175	302.2	175
	460-60	122.2	125	259.8	125	124.5	150	262.1	150	127.7	150	265.3	150
	575-60	105.8	125	202.4	125	107.7	125	204.3	125	110.2	125	206.8	125
060	208/230-60	269.8	300	516.0	300	274.6	300	520.8	300	281.2	300	527.4	300
	380-60	198.8	175	302.7	175	201.6	200	305.5	200	205.4	200	309.3	200
	460-60	129.8	150	263.6	150	132.1	150	265.9	150	135.3	150	269.1	150
	575-60	113.4	125	206.2	125	115.3	125	208.1	125	117.8	125	210.6	125

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.

Table 12 — 30RAP Electrical Data — Hydronic Package with Optional Value Sound Fans

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 1 hp PUMP OPTIONS "1" OR "8"				PUMP SIZE 1.5 hp PUMP OPTIONS "2" OR "9"				PUMP SIZE 2 hp PUMP OPTIONS "3" OR "B"			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
010	208/230-60	70.0	110	254.9	90	71.2	110	256.0	90	72.3	110	257.2	90
	380-60	35.5	50	253.6	45	36.2	50	151.6	45	60.5	60	152.2	45
	460-60	28.2	45	253.2	35	28.8	45	130.5	35	29.3	45	131.0	35
	575-60	22.3	35	252.9	30	22.8	35	104.4	30	23.1	35	104.7	30
015	208/230-60	79.6	125	349.9	100	80.8	125	351.0	100	82.0	125	352.2	100
	380-60	48.4	80	348.6	60	49.1	80	202.6	60	83.7	80	203.2	60
	460-60	38.6	60	348.2	50	39.1	60	184.5	50	39.6	60	185.0	50
	575-60	33.5	50	347.9	40	34.0	50	136.4	40	34.4	50	136.7	45
018	208/230-60	91.6	125	274.9	100	92.8	125	276.0	110	94.0	125	277.2	110
	380-60	53.0	70	273.6	60	53.8	70	169.7	60	73.6	70	170.3	60
	460-60	45.8	60	273.2	50	46.4	60	139.5	60	46.9	60	140.0	60
	575-60	36.6	45	272.9	40	37.1	50	100.4	45	37.4	50	100.7	45
020	208/230-60	97.0	125	291.3	110	98.2	125	292.4	110	99.4	125	293.6	110
	380-60	63.1	80	290.0	70	63.9	80	179.2	70	88.2	80	179.8	80
	460-60	48.5	60	289.6	60	49.1	60	151.7	60	49.6	60	152.2	60
	575-60	38.7	50	289.3	45	39.2	50	101.3	45	39.6	50	101.7	45
025	208/230-60	131.9	175	367.8	150	133.1	175	368.9	150	134.2	175	370.1	150
	380-60	70.3	90	366.5	80	71.0	90	176.4	80	98.5	90	177.0	80
	460-60	60.2	80	366.1	70	60.8	80	181.9	70	61.3	80	182.4	70
	575-60	51.3	70	365.8	60	51.8	70	135.9	60	52.1	70	136.2	60
030	208/230-60	142.0	175	412.3	175	143.2	175	413.4	175	144.4	200	414.6	175
	380-60	86.3	110	411.0	100	87.0	110	240.5	100	121.6	110	241.1	100
	460-60	68.8	90	410.6	80	69.3	90	214.7	80	69.8	90	215.2	80
	575-60	59.8	80	410.3	70	60.3	80	162.7	70	60.7	80	163.0	70
035	208/230-60	170.4	200	344.9	200	171.6	200	346.0	200	172.8	200	347.2	200
	380-60	105.5	125	343.6	125	106.2	125	209.9	125	130.5	125	210.5	125
	460-60	85.2	100	343.2	90	85.8	100	178.5	100	86.3	100	179.0	100
	575-60	68.1	80	342.9	80	68.5	80	122.8	80	68.9	80	123.2	80
040	208/230-60	199.8	225	380.3	225	201.0	225	381.4	225	202.2	250	382.6	225
	380-60	114.4	125	379.0	125	115.2	125	218.8	125	139.5	125	219.4	125
	460-60	89.0	100	378.6	100	89.6	100	182.3	100	90.1	100	182.8	100
	575-60	70.7	80	378.3	80	71.2	80	145.5	80	71.6	80	145.9	80
045	208/230-60	234.7	250	454.0	250	235.9	250	455.1	250	237.0	250	456.3	250
	380-60	121.6	125	452.7	125	122.3	125	219.2	125	149.8	125	219.8	125
	460-60	100.7	110	452.3	110	101.3	110	217.0	110	101.8	110	217.5	110
	575-60	83.3	100	452.0	90	83.8	100	165.3	90	84.1	100	165.6	90
050	208/230-60	241.1	250	457.2	250	242.3	250	458.3	250	243.4	250	459.5	250
	380-60	128.0	150	455.9	150	128.7	150	222.4	150	156.2	150	223.0	150
	460-60	109.7	125	455.5	125	110.3	125	221.5	125	110.8	125	222.0	125
	575-60	93.7	110	455.2	100	94.2	110	170.5	100	94.5	110	170.8	100
055	208/230-60	257.8	300	506.2	300	259.0	300	507.3	300	260.2	300	508.5	300
	380-60	147.9	175	504.9	175	148.6	175	293.6	175	183.2	175	294.2	175
	460-60	121.6	125	504.5	125	122.1	125	258.1	125	122.6	125	258.6	125
	575-60	104.8	125	504.2	125	105.3	125	201.1	125	105.7	125	201.4	125
060	208/230-60	266.8	300	510.7	300	268.0	300	511.8	300	269.2	300	513.0	300
	380-60	162.1	175	509.4	175	162.8	175	300.7	175	197.4	175	301.3	175
	460-60	129.2	150	509.0	150	129.7	150	261.9	150	130.2	150	262.4	150
	575-60	112.4	125	508.7	125	112.9	125	204.9	125	113.3	125	205.2	125

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.

Table 12 — 30RAP Electrical Data — Hydronic Package with Optional Value Sound Fans (cont)

38RAP UNIT SIZE	VOLTAGE V-Hz (3 Ph)	PUMP SIZE 3 hp PUMP OPTIONS "4" OR "C"				PUMP SIZE 5 hp PUMP OPTIONS "5" OR "6" OR "D" OR "F"				PUMP SIZE 7.5 hp PUMP OPTIONS "7" OR "G"			
		MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE	MCA	MOCP	ICF	REC FUSE
010	208/230-60	75.3	110	260.2	90	80.1	125	265.0	100	86.7	125	271.6	100
	380-60	61.9	60	153.6	45	64.7	60	156.4	50	68.6	60	160.2	60
	460-60	30.5	45	132.2	40	32.8	50	134.5	40	35.9	50	137.7	45
	575-60	24.1	35	105.7	30	26.0	40	107.6	30	28.5	40	110.1	35
015	208/230-60	85.0	125	355.2	100	89.8	125	360.0	110	96.4	150	366.6	125
	380-60	85.1	80	204.6	60	87.9	80	207.4	70	91.7	90	211.2	70
	460-60	40.8	60	186.2	50	43.1	70	188.5	50	46.3	70	191.7	60
	575-60	35.3	50	137.7	45	37.2	60	139.6	45	39.7	60	142.1	50
018	208/230-60	97.0	125	280.2	110	101.8	125	285.0	125	108.4	125	291.6	125
	380-60	75.0	70	171.7	70	77.8	70	174.5	70	81.6	80	178.4	70
	460-60	48.1	60	141.2	60	50.4	60	143.5	60	53.5	70	146.7	60
	575-60	38.4	50	101.7	45	40.3	50	103.6	45	42.7	50	106.0	50
020	208/230-60	102.4	125	296.6	125	107.2	125	301.4	125	113.8	125	308.0	125
	380-60	89.6	80	181.2	80	92.4	90	184.0	80	96.2	90	187.9	80
	460-60	50.8	60	153.4	60	53.1	70	155.7	60	56.2	70	158.9	70
	575-60	40.5	50	102.6	45	42.4	50	104.5	50	44.9	50	107.0	50
025	208/230-60	137.2	175	373.1	175	142.0	175	377.9	175	148.6	175	384.5	175
	380-60	99.9	90	178.4	80	102.7	100	181.2	90	106.6	100	185.0	90
	460-60	62.5	80	183.6	70	64.8	80	185.9	80	67.9	90	189.1	80
	575-60	53.1	70	137.2	60	55.0	70	139.1	60	57.5	70	141.6	70
030	208/230-60	147.4	200	417.6	175	152.2	200	422.4	175	158.8	200	429.0	175
	380-60	123.0	110	242.5	100	125.8	125	245.3	110	129.6	125	249.1	110
	460-60	71.0	90	216.4	80	73.3	100	218.7	90	76.5	100	221.9	90
	575-60	61.6	80	164.0	70	63.5	80	165.9	70	66.0	80	168.4	80
035	208/230-60	175.8	200	350.2	200	180.6	200	355.0	200	187.2	200	361.6	200
	380-60	131.9	125	211.9	125	134.7	125	214.7	125	138.6	125	218.5	125
	460-60	87.5	100	180.2	100	89.8	100	182.5	100	92.9	110	185.7	100
	575-60	69.8	80	124.1	80	71.7	80	126.0	80	74.2	80	128.5	80
040	208/230-60	205.2	250	385.6	225	210.0	250	390.4	225	216.6	250	397.0	250
	380-60	140.9	125	220.8	125	143.7	125	223.6	125	147.5	125	227.5	125
	460-60	91.3	100	184.0	100	93.6	110	186.3	100	96.7	110	189.5	110
	575-60	72.5	80	146.8	80	74.4	80	148.7	80	76.9	90	151.2	90
045	208/230-60	240.0	250	459.3	250	244.8	250	464.1	250	251.4	300	470.7	300
	380-60	151.2	150	221.2	150	154.0	150	224.0	150	157.9	150	227.8	150
	460-60	103.0	125	218.7	110	105.3	125	221.0	125	108.4	125	224.2	125
	575-60	85.1	100	166.6	100	87.0	100	168.5	100	89.5	100	171.0	100
050	208/230-60	246.4	250	462.5	250	251.2	300	467.3	300	257.8	300	473.9	300
	380-60	157.6	150	224.4	150	160.4	150	227.2	150	164.3	150	231.0	150
	460-60	112.0	125	223.2	125	114.3	125	225.5	125	117.4	125	228.7	125
	575-60	95.5	110	171.8	110	97.4	110	173.7	110	99.9	110	176.2	110
055	208/230-60	263.2	300	511.5	300	268.0	300	516.3	300	274.6	300	522.9	300
	380-60	184.6	175	295.6	175	187.4	175	298.4	175	191.2	175	302.2	175
	460-60	123.8	150	259.8	150	126.1	150	262.1	150	129.3	150	265.3	150
	575-60	106.6	125	202.4	125	108.5	125	204.3	125	111.0	125	206.8	125
060	208/230-60	272.2	300	516.0	300	277.0	300	520.8	300	283.6	300	527.4	300
	380-60	198.8	175	302.7	175	201.6	200	305.5	200	205.4	200	309.3	200
	460-60	131.4	150	263.6	150	133.7	150	265.9	150	136.9	150	269.1	150
	575-60	114.2	125	206.2	125	116.1	125	208.1	125	118.6	125	210.6	125

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.

Table 13 — Fan Electrical Data — 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

LEGEND
FLA — Full Load Amps

Table 14 — Fan Electrical Data — 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

LEGEND
FLA — Full Load Amps

Table 15 — Pump Electrical Data

PUMP OPTION	PUMP SIZE	PUMP RPM	UNIT VOLTAGE V-Hz (3 Ph)	FLA (each)
1, 8	1.0 HP	3500 3500 3500 3500	208/230-60 380-60 460-60 575-60	3.3 2.0 1.6 1.3
2, 9	1.5 HP	3500 3500 3500 3500	208/230-60 380-60 460-60 575-60	4.4 2.7 2.2 1.8
3, B	2.0 HP	3500 3500 3500 3500	208/230-60 380-60 460-60 575-60	5.6 3.3 2.7 2.1
4, C	3.0 HP	3500 3500 3500 3500	208/230-60 380-60 460-60 575-60	8.6 4.7 3.9 3.1
5, 6, D, F	5.0 HP	3500 3500 3500 3500	208/230-60 380-60 460-60 575-60	13.4 7.5 6.2 5.0
7, G	7.5 HP	3500 3500 3500 3500	208/230-60 380-60 460-60 575-60	20.0 11.3 9.4 7.5

LEGEND

FLA — Full Load Amps

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. The unit control circuit power transformer (24 v, single-phase for all voltages) is factory supplied.
4. 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.

Table 16 — Accessory Tank Electrical Data

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**	4.5
	051	4.5
	052	9.1
380-60	**050**	6.8
	051	6.8
	052	13.7

LEGEND

FLA — Full Load Amps

Table 17 — Compressor Electrical Data

UNIT 30RAP	NUMBER OF COMPRESSORS PER CIRCUIT	UNIT VOLTAGE V-Hz (3 Ph)	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

LEGEND

LRA — Locked Rotor Amps
RLA — Rated Load Amps

* All data is per individual compressor.

POWER WIRING — All power wiring must comply with applicable local and national codes. Install field-supplied branch circuit fused disconnect per NEC (National Electric Code, U.S.A.) of a type can be locked OFF or ON. Disconnect must be within sight from and readily accessible from unit in compliance with NEC Article 440-14.

General Wiring Notes

1. The control circuit does NOT require a separate power source. Control circuit power is obtained by a step-down transformer from the main three-phase power supply. The LVT (low voltage terminal) strip is provided for field-wired control devices.
2. Cooler and pump heaters (if factory installed) are wired in the control circuit so they are operable as long as the main power supply to the unit is ON. A factory-installed and set overload device protects them.

NOTE: The field-supplied disconnect should never be off except when unit is being serviced or is to be down for a prolonged period, in which case cooler should be drained.

3. Power entry is at the right-hand side of the unit when facing the control box.
4. Maximum field wire sizes allowed by lugs on terminal block/non-fused disconnect are listed in Table 8.
5. Terminals for field power supply are suitable for copper conductors. Insulation must be rated 167 F (75 C) minimum.

FIELD CONNECTIONS

Main Power — Bring wires from the fused disconnect switch through hole in the middle of the right hand corner post to the bottom of the control box and connect to terminals on terminal block or non-fused disconnect. A $^{7}/_{8}$-in. hole is provided in the corner post to locate the center of the field power entry. To comply with NEC Article 440-14, the disconnect must be located within sight from and readily accessible from unit. Refer to Fig. 19.

IMPORTANT: To ensure power to the heaters, make sure auxiliary power to the unit and the compressor circuit breakers is always on (except for servicing or prolonged shutdown).

⚠ CAUTION

Proper rotation of condenser fan(s) MUST be verified before pumps or compressors are started. Consult the Controls, Start-Up and Operation manual provided with this chiller for correct procedure. Improper pump rotation can cause permanent damage to pump impeller and housing. If pump(s) have been removed for trimming, verify that wiring is reconnected in the original manner.

Control Power — Control power is obtained from the main power supply and does NOT require a separate source. A toggle switch (marked Emergency On-Off on the unit label diagram and by the switch) allows the control circuit to be manually disconnected when necessary. Cooler and pump heaters (if installed) are in an operable state when this switch is in the Off position.

Step 6 — Install Accessories

ELECTRICAL — A number of electrical accessories are available to provide the following optional features (for details, refer to the Controls, Start-Up, Operation, Service, and Troubleshooting book):

Energy Management Module (Used for any of the following types of temperature reset, demand limit and ice features):

- 4 to 20 mA leaving fluid temperature reset (requires field-supplied 4 to 20 mA generator)
- 4 to 20 mA cooling set point reset (requires field-supplied 4 to 20 mA generator)
- Discrete inputs for 2-step demand limit (requires field-supplied dry contacts)
- 4 to 20 mA demand limit (requires field-supplied 4 to 20 mA generator)
- Discrete input for Ice Done switch (requires field-supplied dry contacts)

Navigator™ Display — The device provides hand-held, mobile capability using an easy to read 4-line display. The keypad function is the same as the scrolling marquee module. A magnet is provided for 'hands free' service of components.

Low Ambient Operation — If outdoor ambient operating temperatures below 45 F (7 C) on size 018-030 units or 32 F (0° C) on size 035-060 units are expected, refer to separate installation instructions for low-ambient operation using accessory Motormaster® V control. Size 010 and 015 units have Motormaster V installed as standard.

Minimum Load Accessory — If minimum load accessory is required, refer to unit Price Pages or contact your local Carrier representative for more details. For installation details, refer to separate installation instructions supplied with the accessory package.

Miscellaneous Accessories — For applications requiring special accessories, the following packages are available: external vibration, remote enhanced display, temperature reset, condenser coil covers, storage tank, wind baffles, and remote cooler. For installation details, refer to separate installation instructions supplied with these accessory packages.

Step 7 — Check Refrigerant Circuit

LEAK TESTING — Units are shipped with complete operating charge of R-410A (refer to physical data tables) and should be under sufficient pressure to conduct a leak test. Perform a leak test to ensure that leaks have not developed during unit shipment. Dehydration of the system is not required unless the entire refrigerant charge has been lost. Repair any leak found using good refrigeration practice.

DEHYDRATION — Refer to Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants, Sections 6 and 7 for details. *Do not use compressor to evacuate system.*

REFRIGERANT CHARGE (Refer to Tables 1A and 1B) — Immediately after the condenser coil in each circuit is a $^{1}/_{4}$-in. Schrader connection for charging liquid refrigerant.

Utilization of Novation condenser coil technology enables the 30RAP chiller to have a very low refrigerant charge. Therefore, if field charging is required, accurately charging to the correct quantity is very important. It is necessary to ensure that the system is completely evacuated before charging and that the refrigerant charge is accurately weighed to within 1% of the nameplate quantity or the unit may not operate correctly.

⚠ CAUTION

When charging, circulate water through the cooler at all times to prevent freezing. Freezing damage is considered abuse and may impair or otherwise negatively affect the Carrier warranty.

⚠ CAUTION

DO NOT OVERCHARGE system. Overcharging results in higher discharge pressure, increased power consumption, and possible compressor damage.

The suction lines are provided with a $^{1}/_{4}$-in. Schrader fitting for connecting to low-side system pressure. The location of the suction access port is shown in Fig. 20.

NOTES:

1. FACTORY WIRING IS IN ACCORDANCE WITH UL 1995 STANDARDS. FIELD MODIFICATIONS OR ADDITIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.

2. ALL UNITS OR MODULES HAVE SINGLE POINT PRIMARY POWER CONNECTION. MAIN POWER MUST BE SUPPLIED FROM A FIELD OR FACTORY SUPPLIED DISCONNECT.

3. WIRING FOR MAIN FIELD SUPPLY MUST BE RATED 75C. USE COPPER CONDUCTORS ONLY.
   a. INCOMING WIRE SIZE RANGE FOR TERMINAL BLOCK WITH MCA UPTO 175 AMPS IS 14 AWG (AMERICAN WIRE GAGE) TO 2/0.
   b. INCOMING WIRE SIZE RANGE FOR TERMINAL BLOCK WITH MCA FROM 175.1 AMPS TO 420 AMPS IS 2 AWG (AMERICAN WIRE GAGE) TO 600 KCMIL.
   c. INCOMING WIRE SIZE RANGE FOR NON-FUSED DISCONNECT WITH MCA UPTO 100 AMPS IS 14 AWG (AMERICAN WIRE GAGE) TO 1/0.
   d. INCOMING WIRE SIZE RANGE FOR NON-FUSED DISCONNECT WITH MCA FROM 100.1 AMPS TO 200 AMPS IS 6 AWG (AMERICAN WIRE GAGE) TO 350 KCMIL.
   e. INCOMING WIRE SIZE RANGE FOR NON-FUSED DISCONNECT WITH MCA FROM 200.1 AMPS TO 450 AMPS IS 3/0 TO 500 KCMIL.

4. REFER TO CERTIFIED DIMENSIONAL DRAWINGS FOR EXACT LOCATIONS OF THE MAIN POWER AND CONTROL POWER ENTRANCE LOCATIONS.

5. TERMINALS 21 AND 25 OF LVT ARE FOR CONTROL OF CHILLED WATER PUMP1 (CWP1) STARTER. TERMINALS 21 AND 24 OF LVT ARE FOR CONTROL OF CHILLED WATER PUMP2 (CWP2) STARTER. THE MAXIMUM LOAD ALLOWED FOR THE CHILLED WATER PUMP RELAY IS 5 VA SEALED, 10 VA INRUSH AT 24 V. FIELD POWER SUPPLY IS NOT REQUIRED.

6. TERMINALS 18 AND 21 OF LVT ARE FOR A ALARM RELAY. THE MAXIMUM LOAD ALLOWED FOR THE ALARM RELAY IS 5 VA SEALED, 10 VA INRUSH AT 24V. FIELD POWER SUPPLY IS NOT REQUIRED.

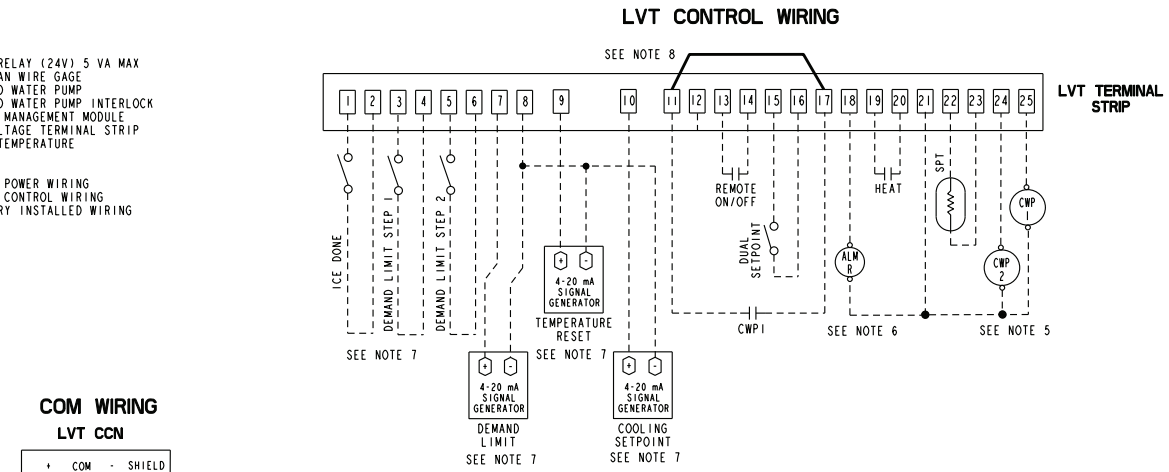
7. MAKE APPROPRIATE CONNECTIONS TO LVT AS SHOWN FOR ENERGY MANAGEMENT BOARD OPTIONS. THE CONTACTS FOR DEMAND LIMIT AND ICE DONE OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 MA. INSTALLATION OF OPTIONAL ENERGY MANAGEMENT BOARD REQUIRED.

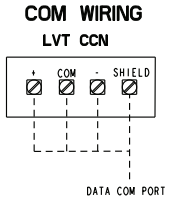
8. REMOVE JUMPER BETWEEN TERMINALS 11 AND 17 WHEN FIELD CWP1 IS INSTALLED.

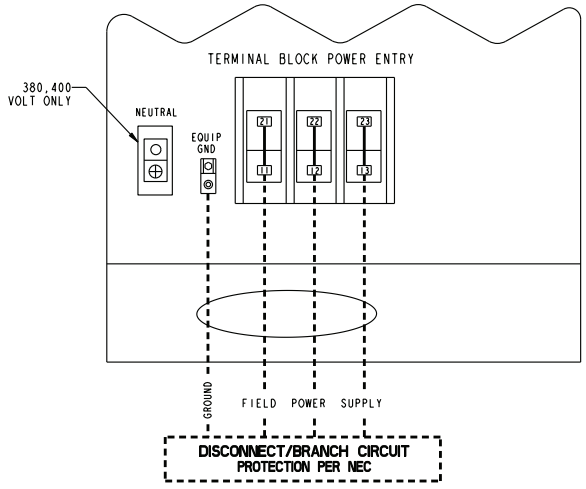
LEGEND:

ALM R - ALARM RELAY (24V) 5 VA MAX
AWG - AMERICAN WIRE GAGE
CWP - CHILLED WATER PUMP
CWP1 - CHILLED WATER PUMP INTERLOCK
EMM - ENERGY MANAGEMENT MODULE
LVT - LOW VOLTAGE TERMINAL STRIP
SPT - SPACE TEMPERATURE

FIELD POWER WIRING
FIELD CONTROL WIRING
FACTORY INSTALLED WIRING







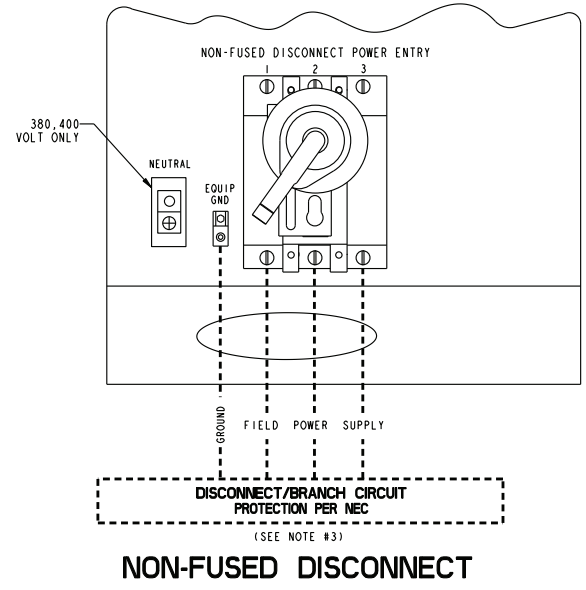


Fig. 19 — Typical Main Power and Control Connections

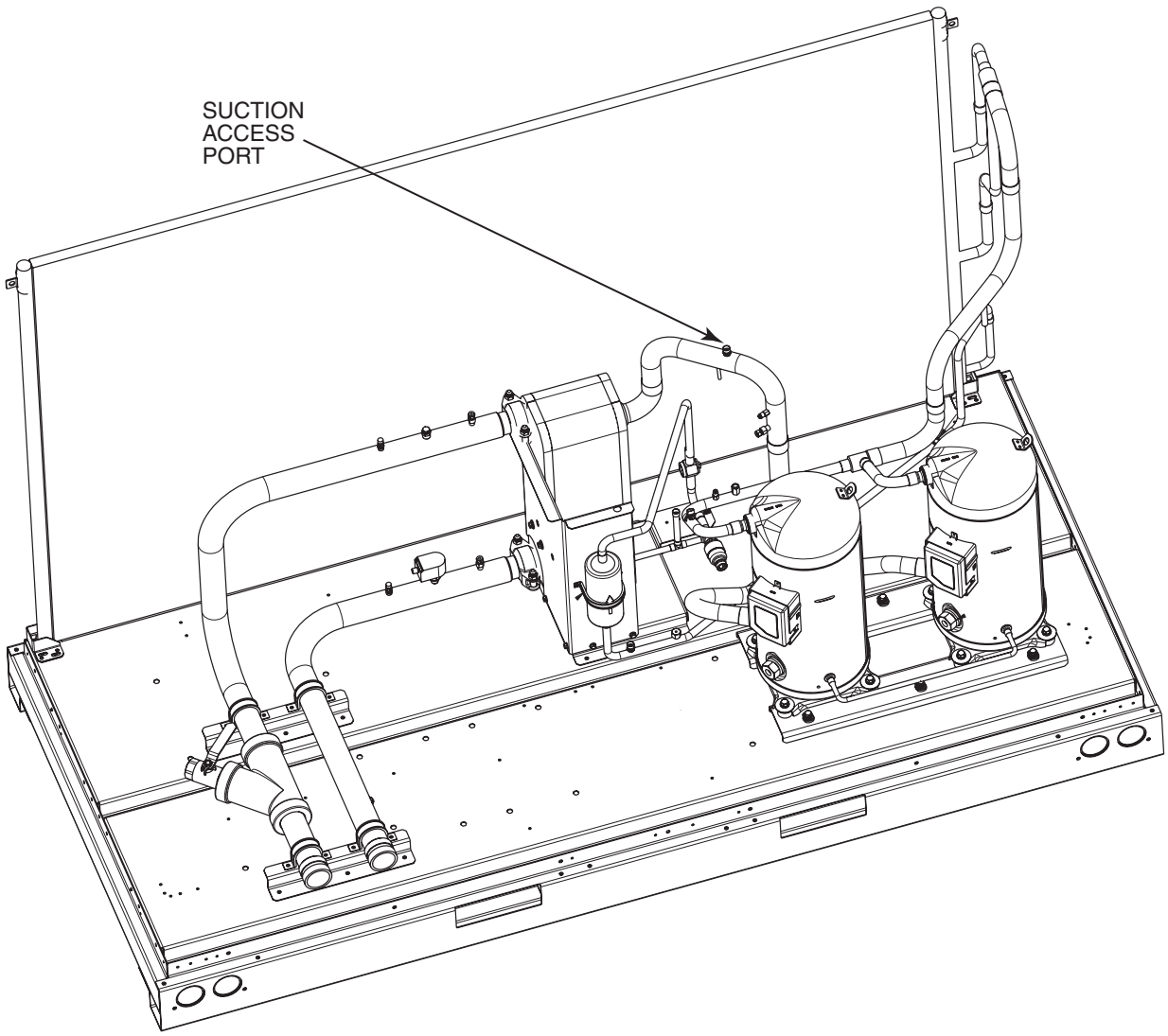
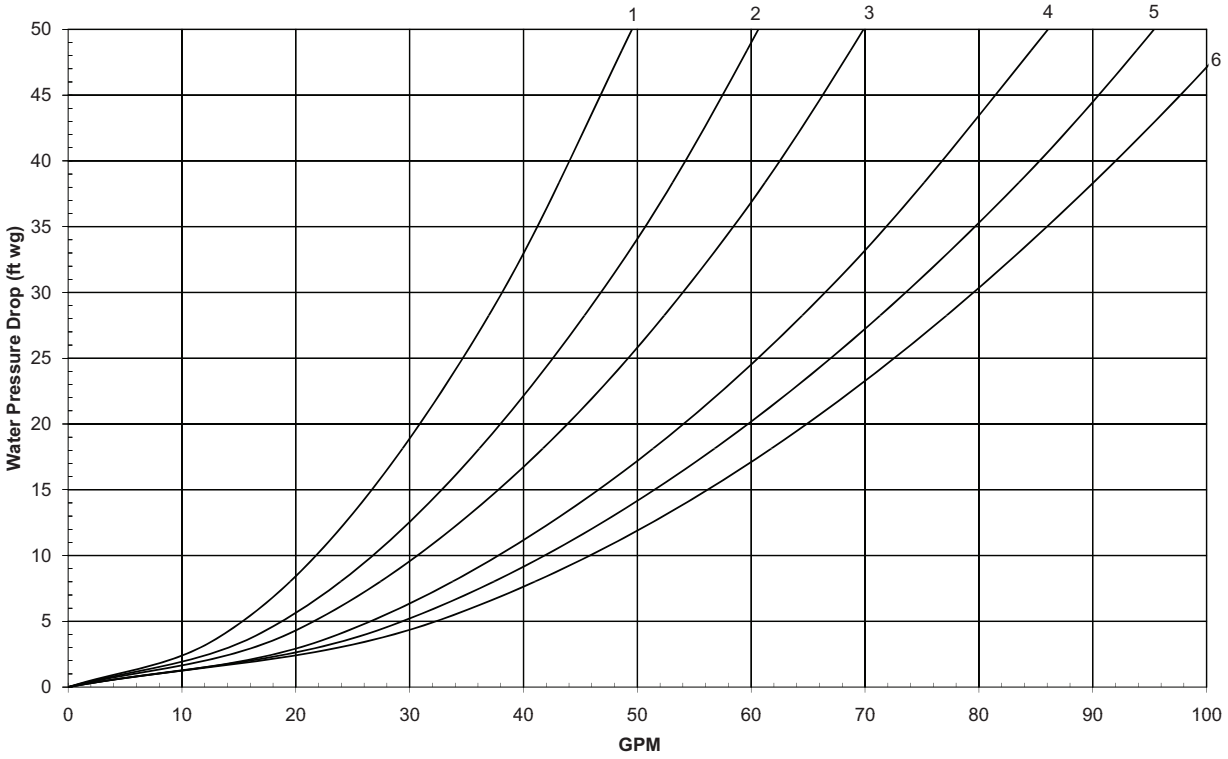
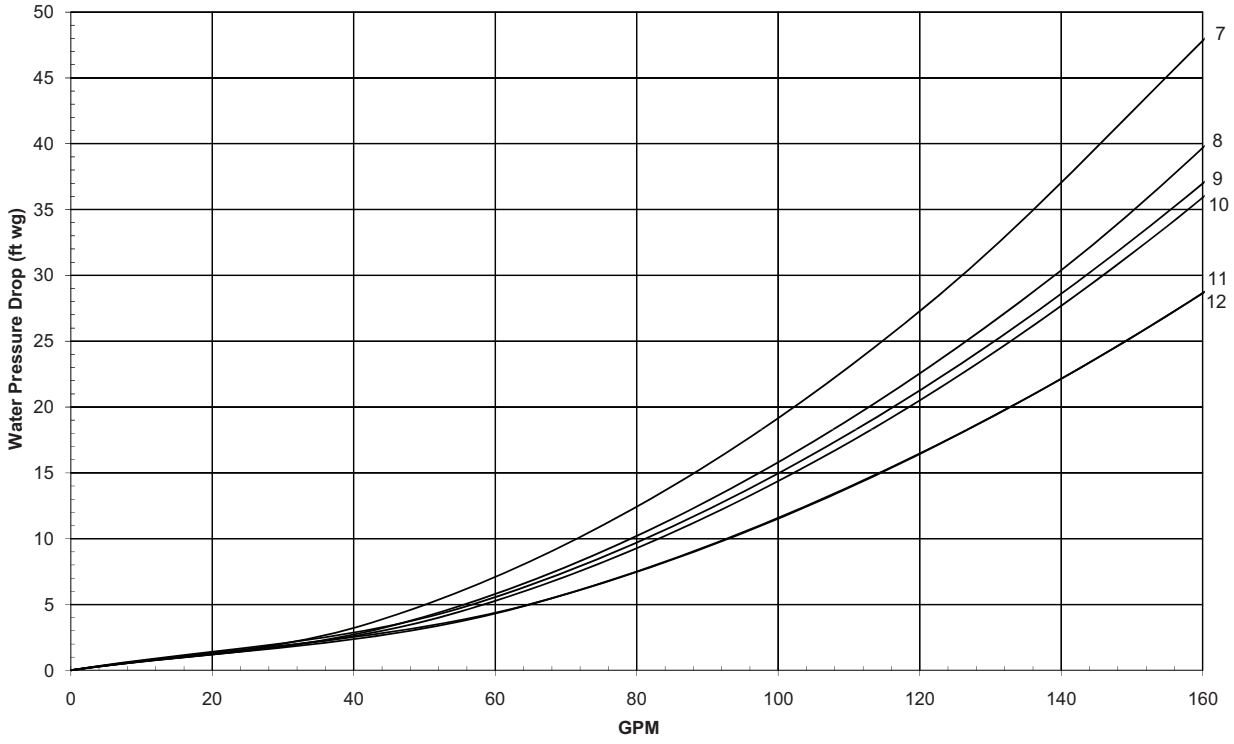


Fig. 20 — Suction Access Port (Sizes 018-030 Shown)

APPENDIX A
Unit Pressure Drop Curves, 30RAP010-060





NOTES:
1. Use the following formula to convert feet of water to psig:
   ft of water (.4335) = psig
2. Use the following formula to convert psig to feet of water:
   psig (2.306) = ft of water

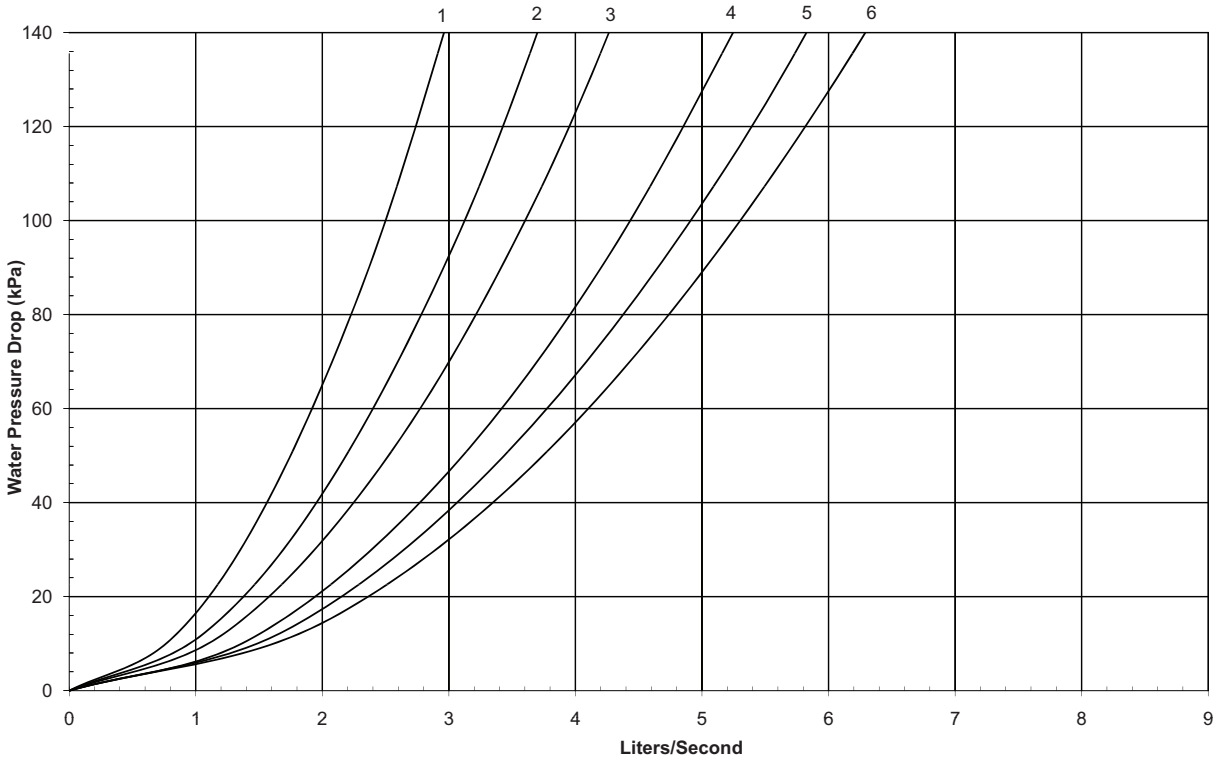
LEGEND

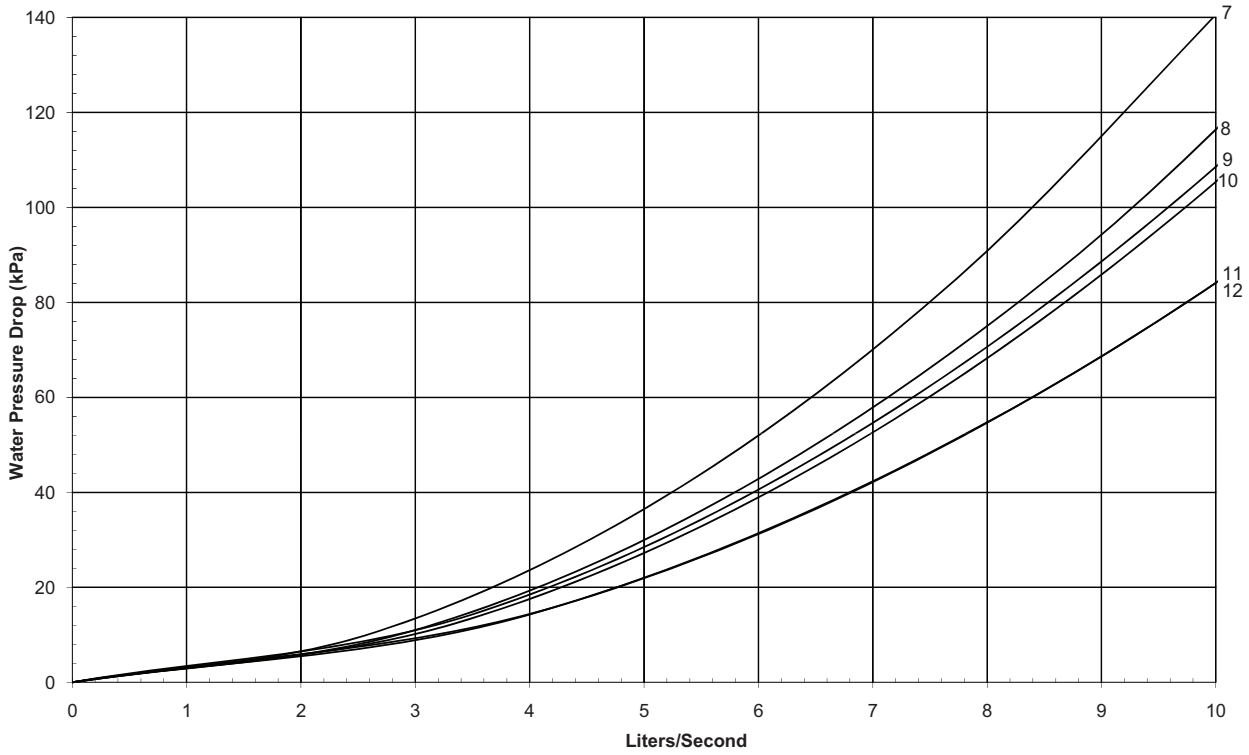
1 — 30RAP010	**4** — 30RAP020	**7** — 30RAP035	**10** — 30RAP050
2 — 30RAP015	**5** — 30RAP025	**8** — 30RAP040	**11** — 30RAP055
3 — 30RAP018	**6** — 30RAP030	**9** — 30RAP045	**12** — 30RAP060

UNITS WITHOUT HYDRONIC PACKAGE (English)

APPENDIX A (cont)

Unit Pressure Drop Curves, 30RAP010-060





NOTES:
1. Use the following formula to convert feet of water to psig:
   ft of water (.4335) = psig
2. Use the following formula to convert psig to feet of water:
   psig (2.306) = ft of water

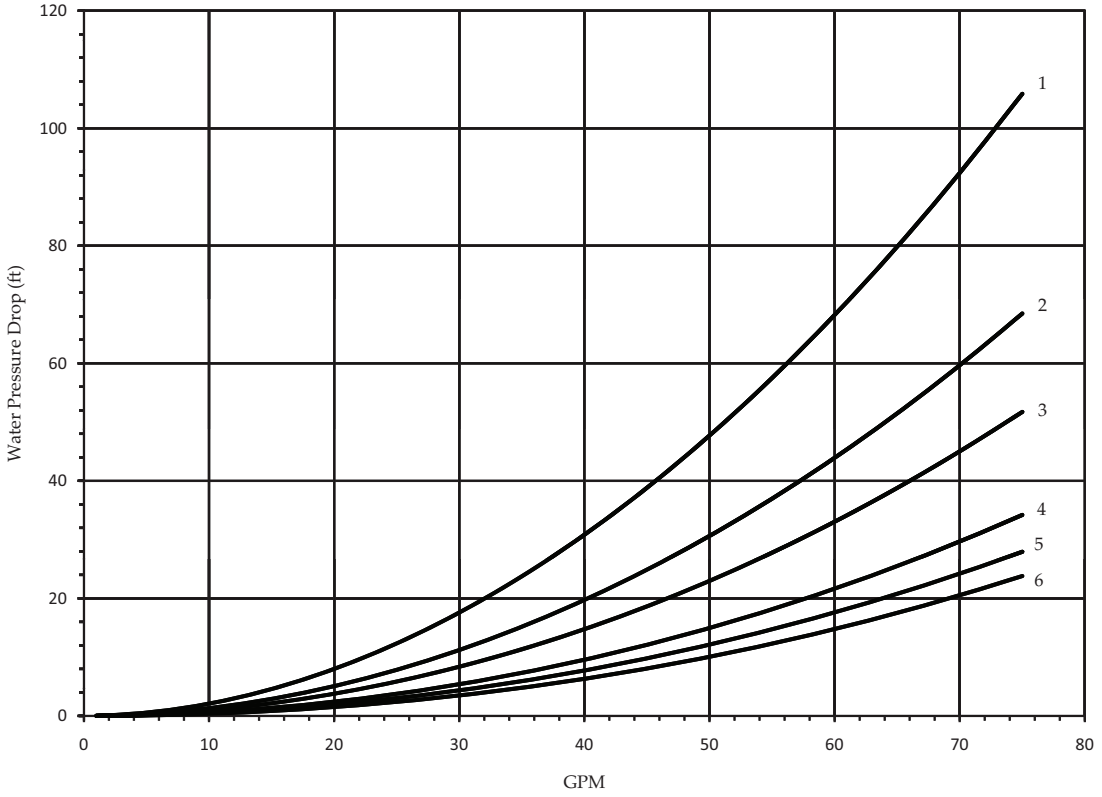
LEGEND

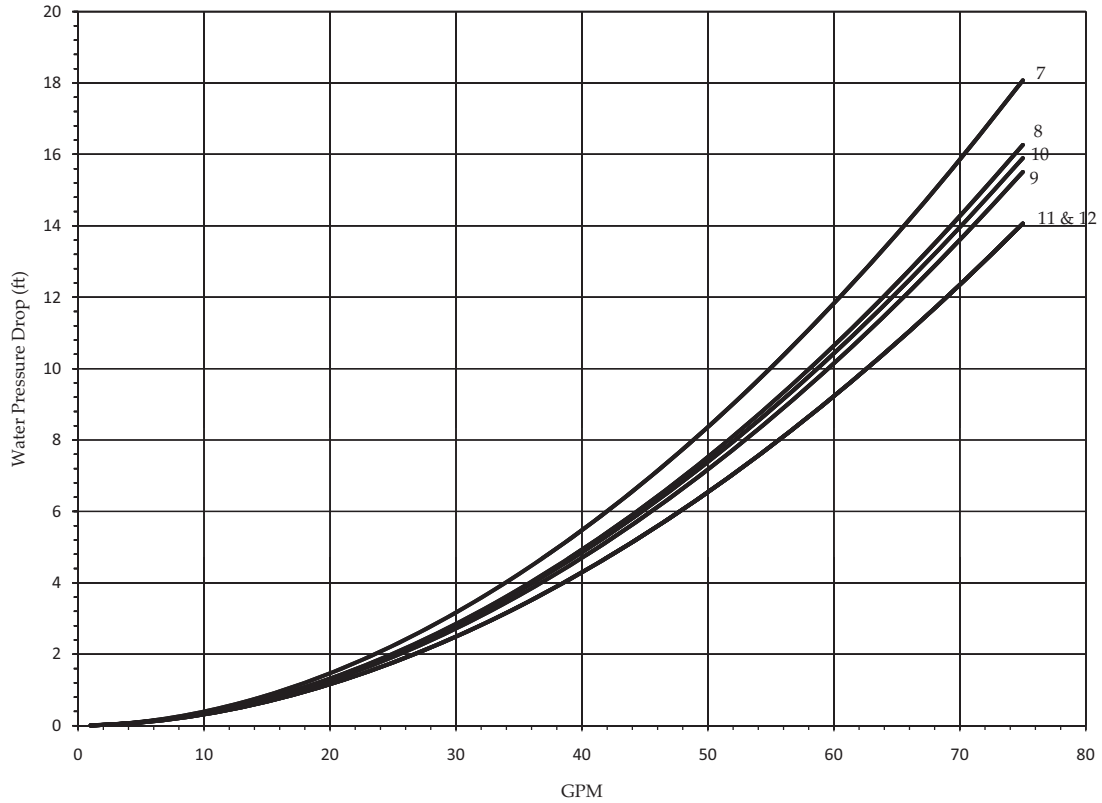
1 — 30RAP010	**4** — 30RAP020	**7** — 30RAP035	**10** — 30RAP050
2 — 30RAP015	**5** — 30RAP025	**8** — 30RAP040	**11** — 30RAP055
3 — 30RAP018	**6** — 30RAP030	**9** — 30RAP045	**12** — 30RAP060

UNITS WITHOUT HYDRONIC PACKAGE (SI)

APPENDIX A (cont)

Unit Pressure Drop Curves, 30RAP010-060





NOTES:
1. Use the following formula to convert feet of water to psig:
   ft of water (.4335) = psig
2. Use the following formula to convert psig to feet of water:
   psig (2.306) = ft of water

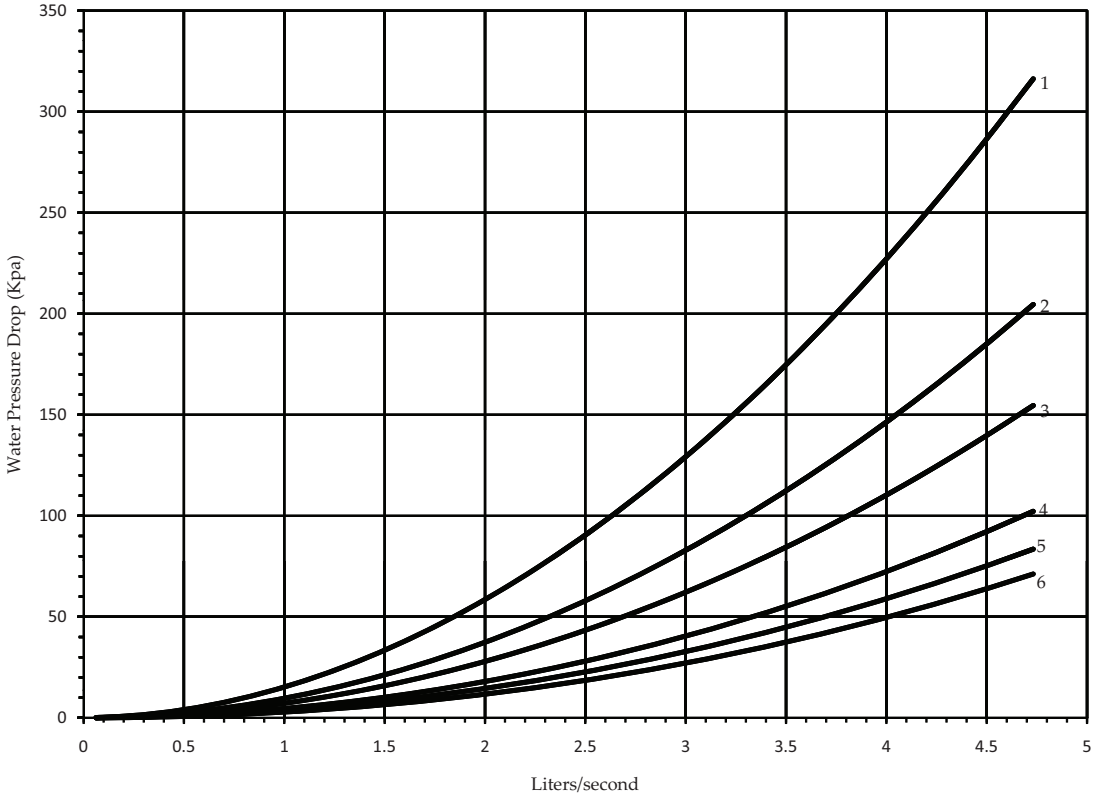
LEGEND

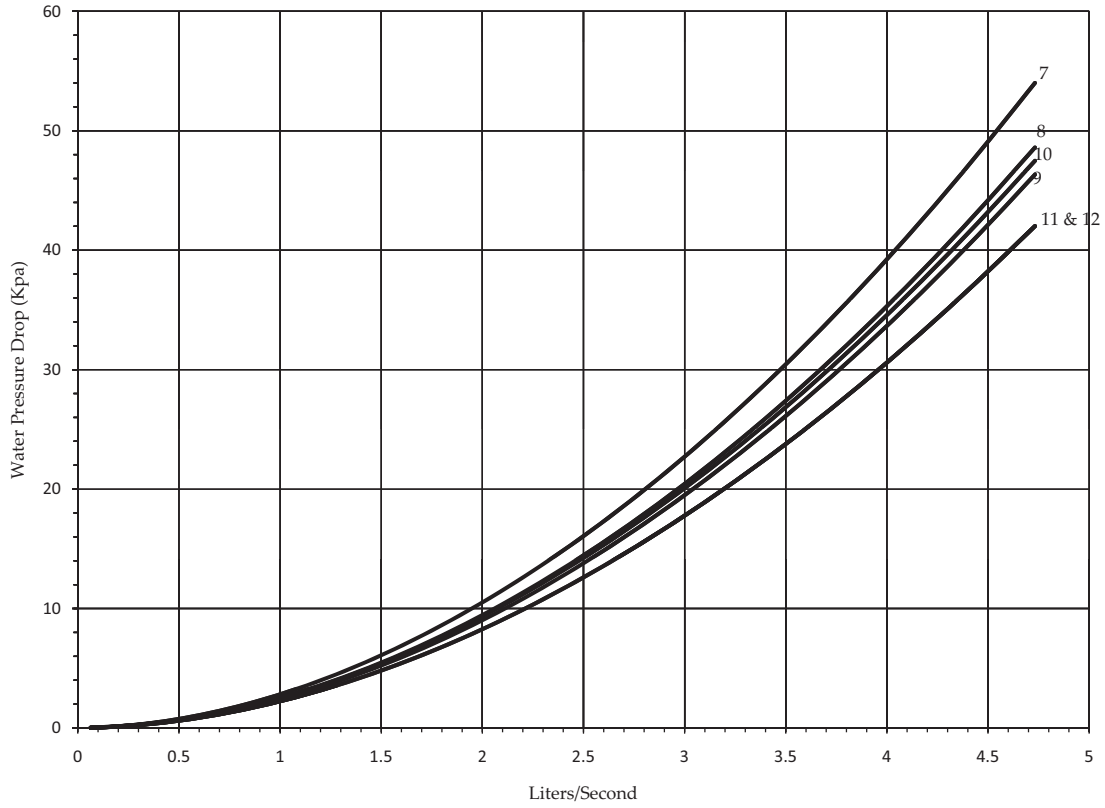
1 — 30RAP010	**4** — 30RAP020	**7** — 30RAP035	**10** — 30RAP050
2 — 30RAP015	**5** — 30RAP025	**8** — 30RAP040	**11** — 30RAP055
3 — 30RAP018	**6** — 30RAP030	**9** — 30RAP045	**12** — 30RAP060

UNITS WITH SINGLE PUMP HYDRONIC PACKAGE (English)

APPENDIX A (cont)

Unit Pressure Drop Curves, 30RAP010-060





NOTES:
1. Use the following formula to convert feet of water to psig:
   ft of water (.4335) = psig
2. Use the following formula to convert psig to feet of water:
   psig (2.306) = ft of water

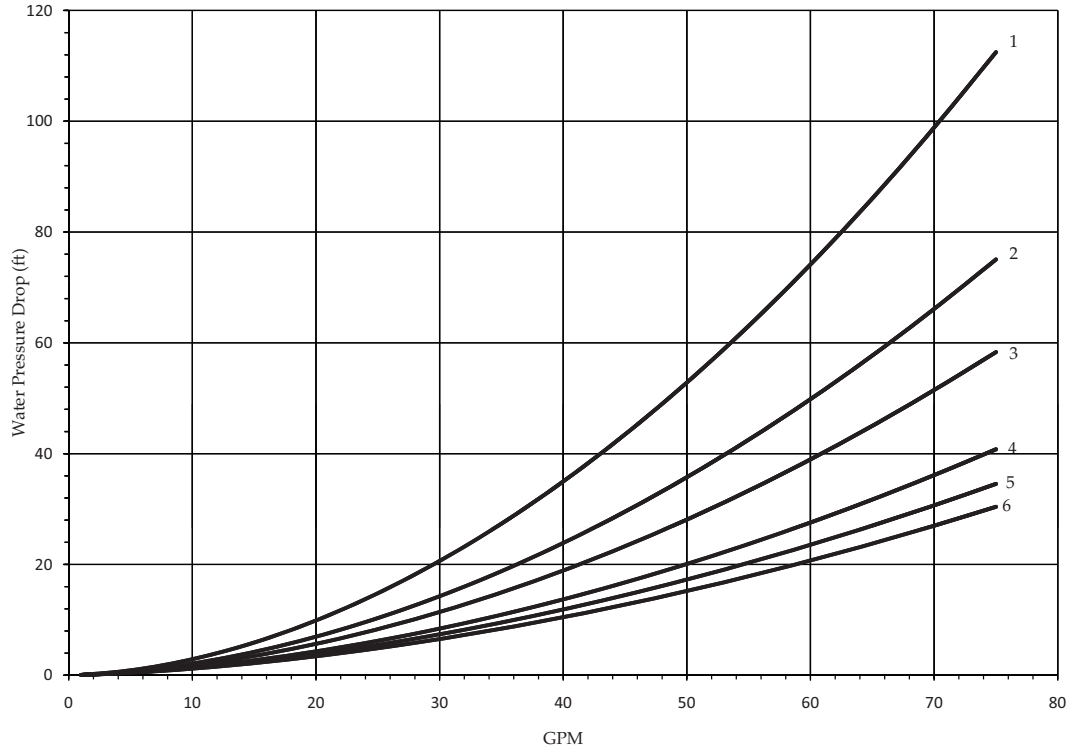
LEGEND

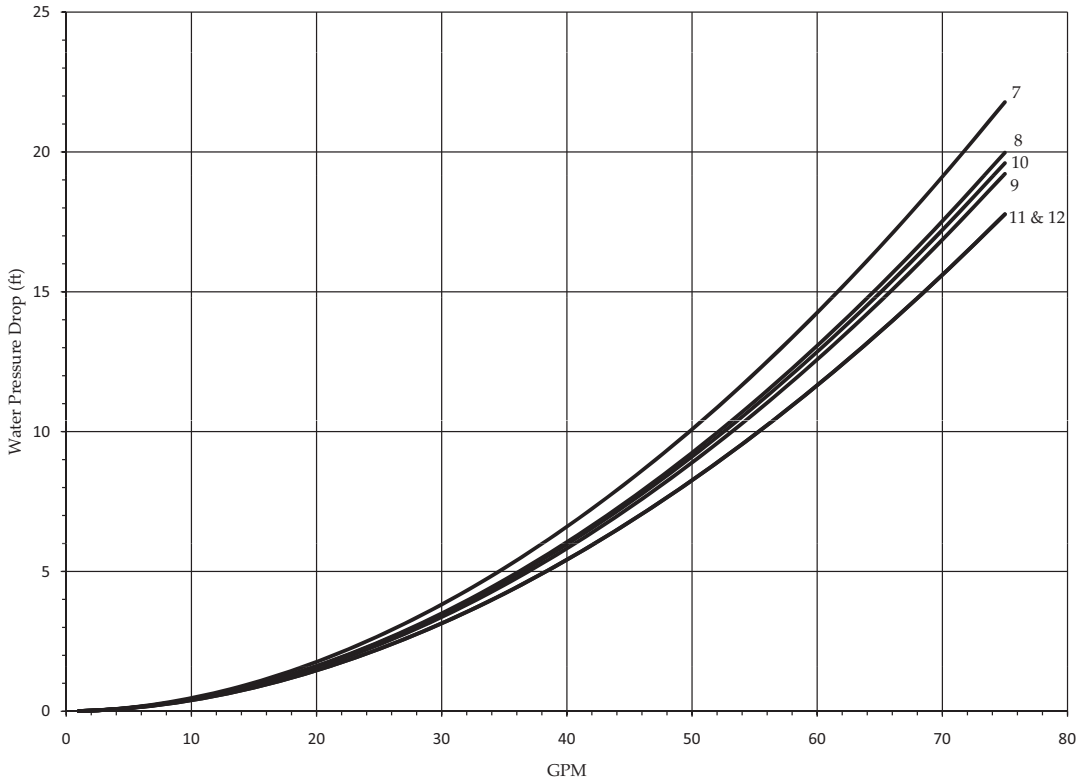
1 — 30RAP010	**4** — 30RAP020	**7** — 30RAP035	**10** — 30RAP050
2 — 30RAP015	**5** — 30RAP025	**8** — 30RAP040	**11** — 30RAP055
3 — 30RAP018	**6** — 30RAP030	**9** — 30RAP045	**12** — 30RAP060

UNITS WITH SINGLE PUMP HYDRONIC PACKAGE (SI)

APPENDIX A (cont)

Unit Pressure Drop Curves, 30RAP010-060





NOTES:
1. Use the following formula to convert feet of water to psig:
   ft of water (.4335) = psig
2. Use the following formula to convert psig to feet of water:
   psig (2.306) = ft of water

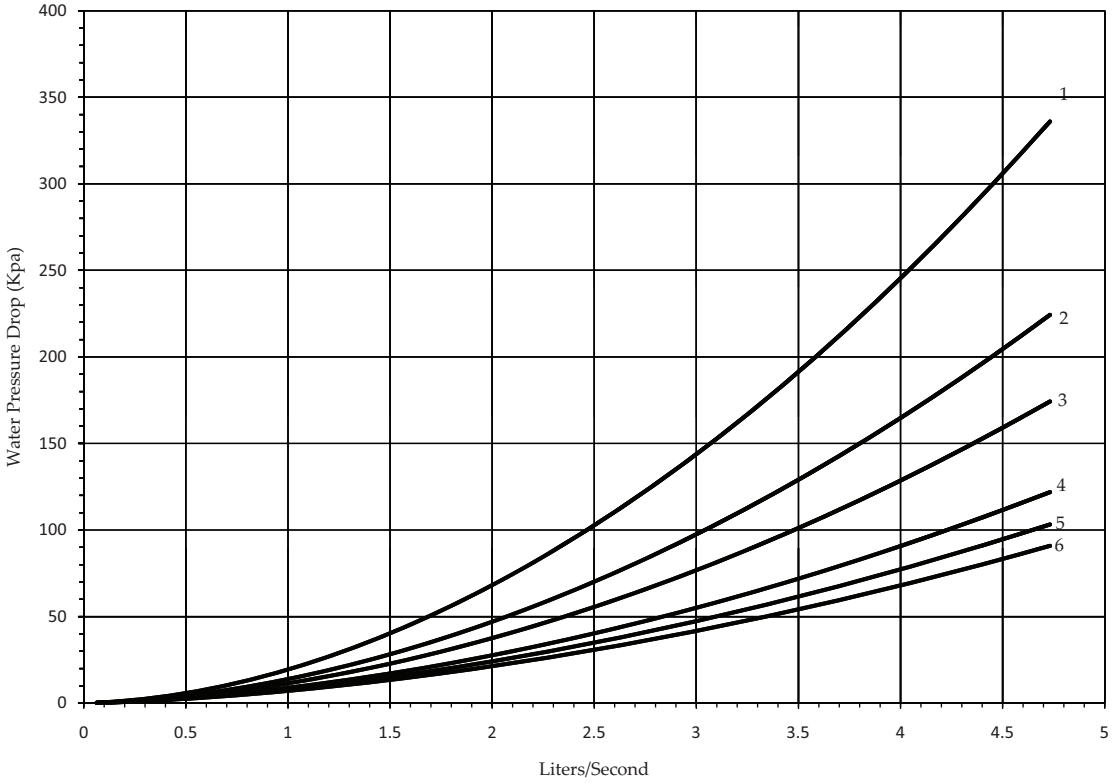
LEGEND

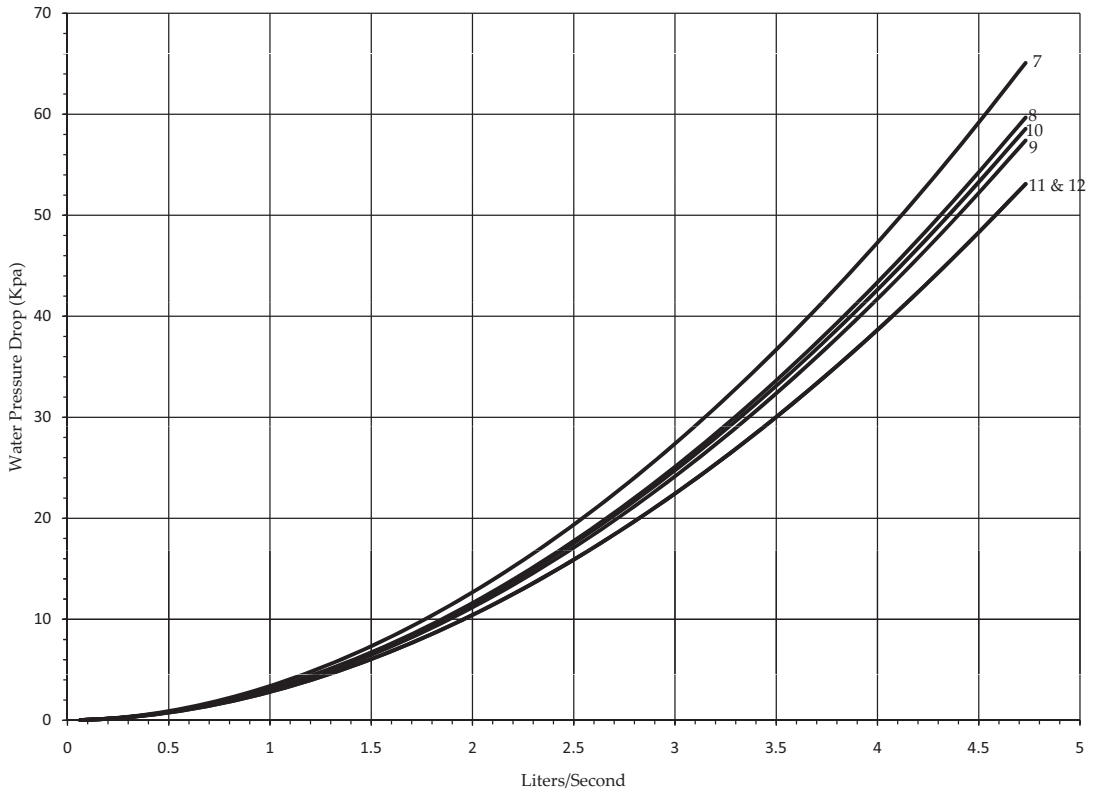
1 — 30RAP010	**4** — 30RAP020	**7** — 30RAP035	**10** — 30RAP050
2 — 30RAP015	**5** — 30RAP025	**8** — 30RAP040	**11** — 30RAP055
3 — 30RAP018	**6** — 30RAP030	**9** — 30RAP045	**12** — 30RAP060

UNITS WITH DUAL PUMP HYDRONIC PACKAGE (English)

APPENDIX A (cont)

Unit Pressure Drop Curves, 30RAP010-060





NOTES:
1. Use the following formula to convert feet of water to psig:
   ft of water (.4335) = psig
2. Use the following formula to convert psig to feet of water:
   psig (2.306) = ft of water

LEGEND

1 — 30RAP010	**4** — 30RAP020	**7** — 30RAP035	**10** — 30RAP050
2 — 30RAP015	**5** — 30RAP025	**8** — 30RAP040	**11** — 30RAP055
3 — 30RAP018	**6** — 30RAP030	**9** — 30RAP045	**12** — 30RAP060

UNITS WITH DUAL PUMP HYDRONIC PACKAGE (SI)

APPENDIX A (cont)

Pressure Drop Curves, Accessory Storage Tanks