AQUASNAP® 30RA010-055 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.

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

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. 2 for unit weights. See Fig. 3 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.

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. 3. 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.

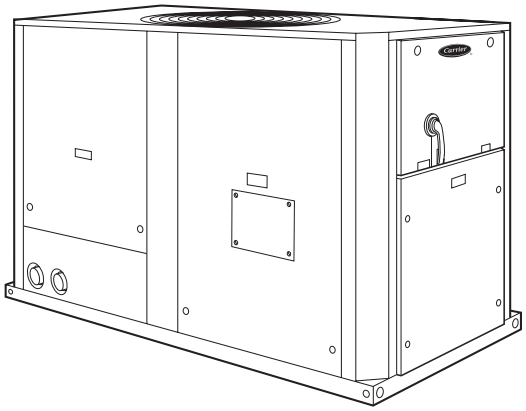


Fig. 1 — Typical 30RA Unit (010-018 Shown)

STANDARD UNITS (without hydronic package)

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

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

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

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

SINGLE PUMP UNITS

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

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

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

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

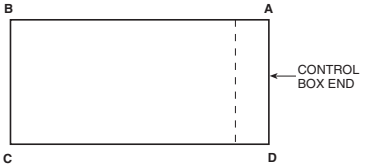
DUAL PUMP UNITS

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

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

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

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



LEGEND

Aluminum — Aluminum Condenser Coil Fins
Copper — Copper Condenser Coil Fins

Fig. 2 — Unit Operating Weights

Step 2 — Check Compressor Mounting —

As shipped, each compressor is held down by 4 bolts. After unit is installed, verify mounting bolt torque 12 to14 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

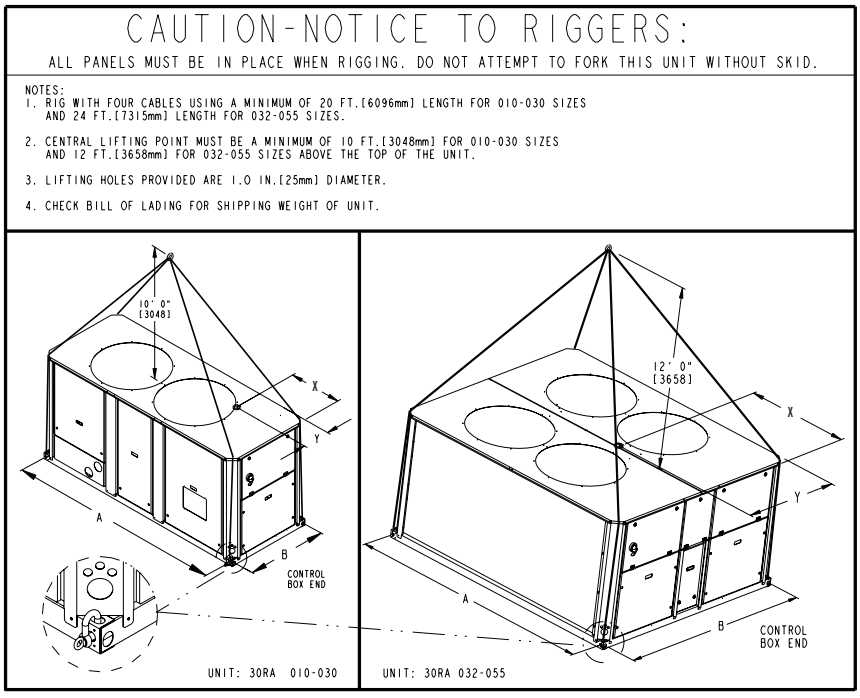
Do not circulate water through unit without strainer in place. Failure to use the strainer represents abuse and may impair or otherwise negatively affect the Carrier product warranty.

Piping connections are located on the left side 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 055. See Fig. 4-9, depending on model.

All sizes have FPT 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 or brass FPT. Any connecting pipe to the 30RA 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.



UNIT	MAXIMUM SHIPPING WEIGHT WITHOUT PACKAGING		MAXIMUM SHIPPING WEIGHT WITH PACKAGING		LIFTING HOLES				CENTER OF GRAVITY			
					A		B		X		Y	
	Lb	Kg	Lb	Kg	in.	mm	in.	mm	in.	mm	in.	mm
30RA010 30RA010 C*	937 1016	425 461	1000 1079	454 489	78.80	2001	40.00	1016	33.75	857	22.00	559
30RA015 30RA015 C*	1055 1186	479 538	1118 1249	507 567	78.80	2001	40.00	1016	34.00	864	21.50	546
30RA018 30RA018 C*	1193 1322	541 600	1256 1385	570 628	78.80	2001	40.00	1016	32.12	816	20.12	511
30RA022 30RA022 C*	1503 1693	682 768	1591 1781	722 808	105.44	2678	40.00	1016	42.25	1073	19.75	502
30RA025 30RA025 C*	1565 1756	710 797	1653 1844	750 836	105.44	2678	40.00	1016	42.25	1073	19.75	502
30RA030 30RA030 C*	1677 1902	761 863	1765 1990	801 903	105.44	2678	40.00	1016	42.25	1073	19.75	502
30RA035 30RA035 C*	2796 3176	1268 1441	2970 3350	1347 1520	105.44	2678	87.00	2210	43.87	1114	46.00	1168
30RA040 30RA040 C*	2856 3236	1295 1468	3030 3410	1374 1547	105.44	2678	87.00	2210	43.87	1114	46.00	1168
30RA045 30RA045 C*	3163 3544	1435 1608	3337 3718	1514 1686	105.44	2678	87.00	2210	43.75	1111	45.00	1143
30RA050 30RA050 C*	3251 3631	1475 1647	3425 3805	1554 1726	105.44	2678	87.00	2210	43.75	1111	45.00	1143
30RA055 30RA055 C*	3444 3895	1562 1767	3618 4069	1641 1846	105.44	2678	87.00	2210	43.75	1111	45.00	1143

* Copper fin coil.

Fig. 3 — Unit Rigging Label Detail

Table 1A — Physical Data, 30RA — English

UNIT 30RA	010	015	018	022	025	030	035	040	045	050	055
REFRIGERANT TYPE	R-22, TXV Controlled System										
Refrigerant Charge (lb) Ckt A/Ckt B	16/—	24/—	31/—	40/—	45/—	55/—	44/30	45/30	44/44	45/45	55/55
COMPRESSORS	Scroll, Hermetic										
Quantity	1	1	2	2	2	2	3	3	4	4	4
Speed (Rpm)	3500										
(Qty) Ckt A	(1) SM125	(1) SM185	(2) SM110	(1) SM115, (1) SM160	(2) SM160	(2) SM185	(1) SM115, (1) SM160	(2) SM160	(1) SM125, (1) SM160	(2) SM160	(2) SM185
(Qty) Ckt B	—	—	—	—	—	—	(1) SM185	(1) SM185	(1) SM125, (1) SM160	(2) SM160	(2) SM185
Oil Charge (Compressor/Pt)	SM110/5.7, SM115/6.7, SM125/6.7, SM160/7.0, SM185/11.6										
No. Capacity Steps											
Standard	1	1	2	2	2	2	3	3	4	4	4
Optional (Maximum)	2	2	3	3	3	3	4	4	5	5	5
Minimum Capacity Step (%)											
Standard	100	100	50	42	50	50	25	32	22	25	25
Optional	69	79	32	27	38	39	16	24	15	19	20
COOLER	Welded, Direct-Expansion Plate Heat Exchanger										
Net Fluid Volume (gal)	1.12	1.61	1.86	2.41	2.84	3.40	6.30	7.00	6.55	7.44	8.56
Maximum Refrigerant Pressure (psig)	450	450	450	450	450	450	450	450	450	450	450
Maximum Fluid Side Pressure Without Pump(s) (psig)	150	150	150	150	150	150	150	150	150	150	150
Maximum Fluid Side Pressure With Pump(s) (psig)	150	150	150	150	150	150	150	150	150	150	150
FLUID CONNECTIONS (in.)											
Inlet and Outlet, FPT	2	2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
Drain (NPT)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
CONDENSER FANS											
Standard Low Noise Type											
Fan Speed (Rpm) Standard/Low Noise	1140/570	1140/570	1140/570	—/850	—/850	—/850	—/850	—/850	—/850	—/850	—/850
No. Blades...Diameter (in.) Ckt A/Ckt B	15...30/—	15...30/—	15...30/—	11...30/—	11...30/—	11...30/—	11...30/ 11...30	11...30/ 11...30	11...30/ 11...30	11...30/ 11...30	11...30/ 11...30
No. Fans...Total kW	1...1.8	1...1.8	1...1.8	2...2.0	2...2.0	2...2.0	2...2.0 (A), 1...1.8 (B)	2...2.0 (A), 1...1.8 (B)	4...4.0	4...4.0	4...4.0
Total Airflow (Cfm)	10,500	10,500	10,500	13,600	13,600	14,500	21,000	21,000	27,300	27,300	29,000
CONDENSER COILS											
Quantity...No. Rows	1...2	1...3	1...3	1...3	1...3	1...3	2...3	2...3	2...3	2...3	2...3
Total Face Area (sq ft)	23	23	23	32	32	40	55	55	64	64	80
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, Close-Coupled Centrifugal Pump(s), 3500 Rpm										
Expansion Tank Volume (gal) Total/Acceptance	5.0/2.9						10.0/5.5				

Table 1B — Physical Data, 30RA — SI

UNIT 30RA	010	015	018	022	025	030	035	040	045	050	055
REFRIGERANT TYPE	R-22, TXV Controlled System										
Refrigerant Charge (kg) Ckt A/Ckt B	7.3/—	10.9/—	14.1/—	18.2/—	20.5/—	22.7/—	20.0/13.6	20.4/13.6	20.0/20.0	20.4/20.4	25.0/25.0
COMPRESSORS	Scroll, Hermetic										
Quantity	1	1	2	2	2	2	3	3	4	4	4
Speed (r/s)	58.3										
(Qty) Ckt A	(1) SM125	(1) SM185	(2) SM110	(1) SM115, (1) SM160	(2) SM160	(2) SM185	(1) SM115, (1) SM160	(2) SM160	(1) SM125, (1) SM160	(2) SM160	(2) SM185
(Qty) Ckt B	—	—	—	—	—	—	(1) SM185	(1) SM185	(1) SM125, (1) SM160	(2) SM160	(2) SM185
Oil Charge (Compressor/L)	SM110/2.7, SM115/3.2, SM125/3.2, SM160/3.3, SM185/5.5										
No. Capacity Steps											
Standard	1	1	2	2	2	2	3	3	4	4	4
Optional (Maximum)	2	2	3	3	3	3	4	4	5	5	5
Minimum Capacity Step (%)											
Standard	100	100	50	42	50	50	25	32	22	25	25
Optional	69	79	32	27	38	39	16	24	15	19	20
COOLER	Welded, Direct-Expansion Plate Heat Exchanger										
Net Fluid Volume (L)	4.22	6.08	7.03	9.12	10.75	12.84	23.84	26.49	24.79	28.12	32.34
Maximum Refrigerant Pressure (kPa)	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103
Maximum Fluid Side Pressure Without Pump(s) (kPa)	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034
Maximum Fluid Side Pressure With Pump(s) (kPa)	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034	1034
FLUID CONNECTIONS (in.)											
Inlet and Outlet, FPT	2	2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2
Drain (NPT)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
CONDENSER FANS											
Standard Low Noise Type											
Fan Speed (r/s) Standard/Low Noise	19/9.5	19/9.5	19/9.5	—/14.2	—/14.2	—/14.2	—/14.2	—/14.2	—/14.2	—/14.2	—/14.2
No. Blades...Diameter (mm) Ckt A/Ckt B	15...762/—	15...762/—	15...762/—	11...762/—	11...762/—	11...762/—	11...762/ 15...762	11...762/ 15...762	11...762/ 11...762	11...762/ 11...762	11...762/ 11...762
No. Fans...Total kW	1...1.8	1...1.8	1...1.8	2...2.0	2...2.0	2...2.0	2...2.0 (A), 1...1.8 (B)	2...2.0 (A), 1...1.8 (B)	4...4.0	4...4.0	4...4.0
Total Airflow (L/s)	4,955	4,955	4,955	6,419	6,419	6,843	9,595	9,595	12,884	12,884	13,687
CONDENSER COILS											
Quantity...No. Rows	1...2	1...3	1...3	1...3	1...3	1...3	2...3	2...3	2...3	2...3	2...3
Total Face Area (sq m)	2.14	2.14	2.14	2.97	2.97	3.72	5.11	5.11	5.95	5.95	7.43
HYDRONIC MODULE (Optional)*	Pump(s), Strainer with Blowdown Valve, Expansion Tank, Pressure Taps, Drain and Vent Plugs, Flow Switch, and Balance Valve										
Pump	Single or Dual, Close-Coupled Centrifugal Pump(s), 58.3 r/s										
Expansion Tank Volume (L) Total/Acceptance	18.9/11.0						37.9/20.8				

LEGEND

TXV — Thermostatic Expansion Valve

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

NOTE: Nominal input Hp for compressors:

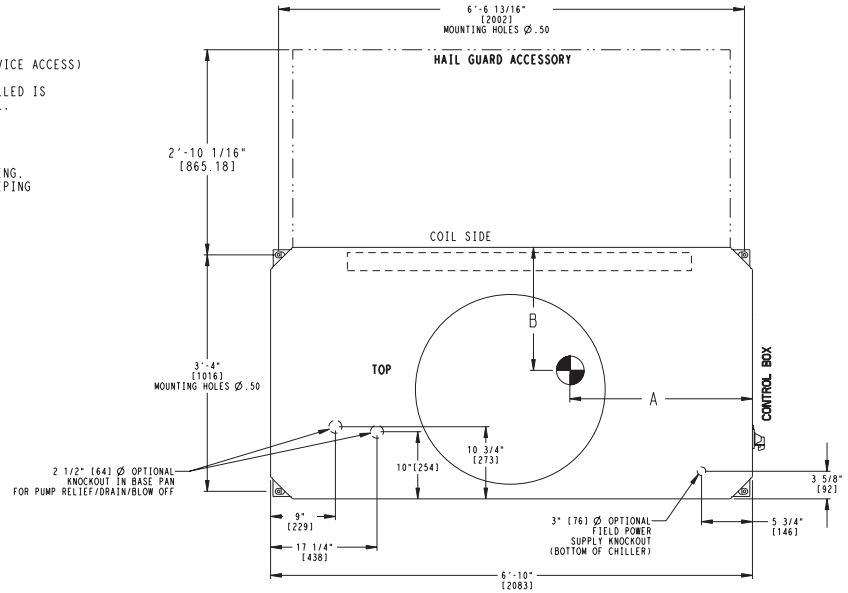
COMPRESSOR	HP
SM110	12.5
SM115	13.5
SM125	14.7
SM160	19.1
SM185	21.8

NOTES:
1. UNIT MUST HAVE CLEARANCES FOR AIRFLOW AS FOLLOWS:
   TOP-DO NOT RESTRICT IN ANY WAY
   COIL SIDE- 3 1/2 FT.[1067mm] FROM SOLID SURFACE
   SIDE, ENDS-3FT.[914mm] FROM SOLID SURFACE (FOR SERVICE ACCESS)

2. COIL SIDE CLEARANCE WITH ACCESSORY HAIL GUARD INSTALLED IS 3 FT.[914mm] TO OUTSIDE EDGE OF HAIL GUARD TOP PANEL.

3. COIL SIDE CLEARANCE FOR MULTIPLE CHILLER INSTALLATION IS 6 FT.[1981mm].

4. STRAINER IS FACTORY INSTALLED IN ENTERING FLUID PIPING. FLOW SWITCH IS FACTORY INSTALLED IN LEAVING FLUID PIPING



UNIT	DIM. A	DIM. B	DIM. C
30RA010-60Hz	33.75 [857]	22.00 [559]	21.00 [533]
30RA015-60Hz	34.00 [864]	21.50 [546]	21.00 [533]
30RA018-60Hz	32.12 [816]	20.12 [511]	21.00 [533]

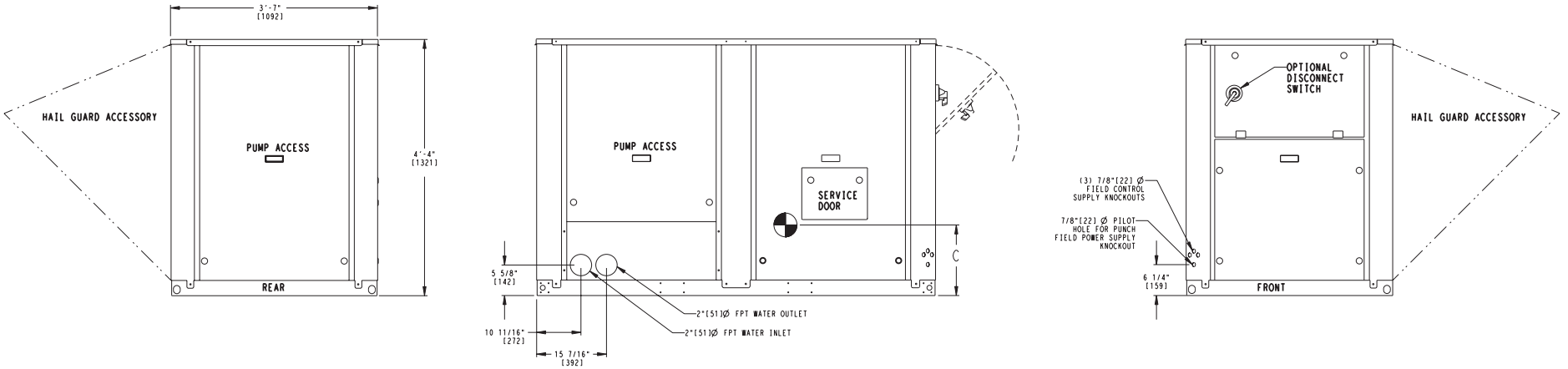


Fig. 4 — Dimensions — 30RA010,015,018 Units

NOTES:
1. UNIT MUST HAVE CLEARANCES FOR AIRFLOW AS FOLLOWS:
   TOP-DO NOT RESTRICT IN ANY WAY
   COIL SIDE- 3 1/2 FT.[1067mm] FROM SOLID SURFACE
   SIDE, ENDS-3FT.[914mm] FROM SOLID SURFACE (FOR SERVICE ACCESS)

2. COIL SIDE CLEARANCE WITH ACCESSORY HAIL GUARD INSTALLED IS 3 FT.[914mm] TO OUTSIDE EDGE OF HAIL GUARD TOP PANEL.

3. COIL SIDE CLEARANCE FOR MULTIPLE CHILLER INSTALLATION IS 6 FT.[1981mm].

4. STRAINER IS FACTORY INSTALLED IN ENTERING FLUID PIPING. FLOW SWITCH IS FACTORY INSTALLED IN LEAVING FLUID PIPING

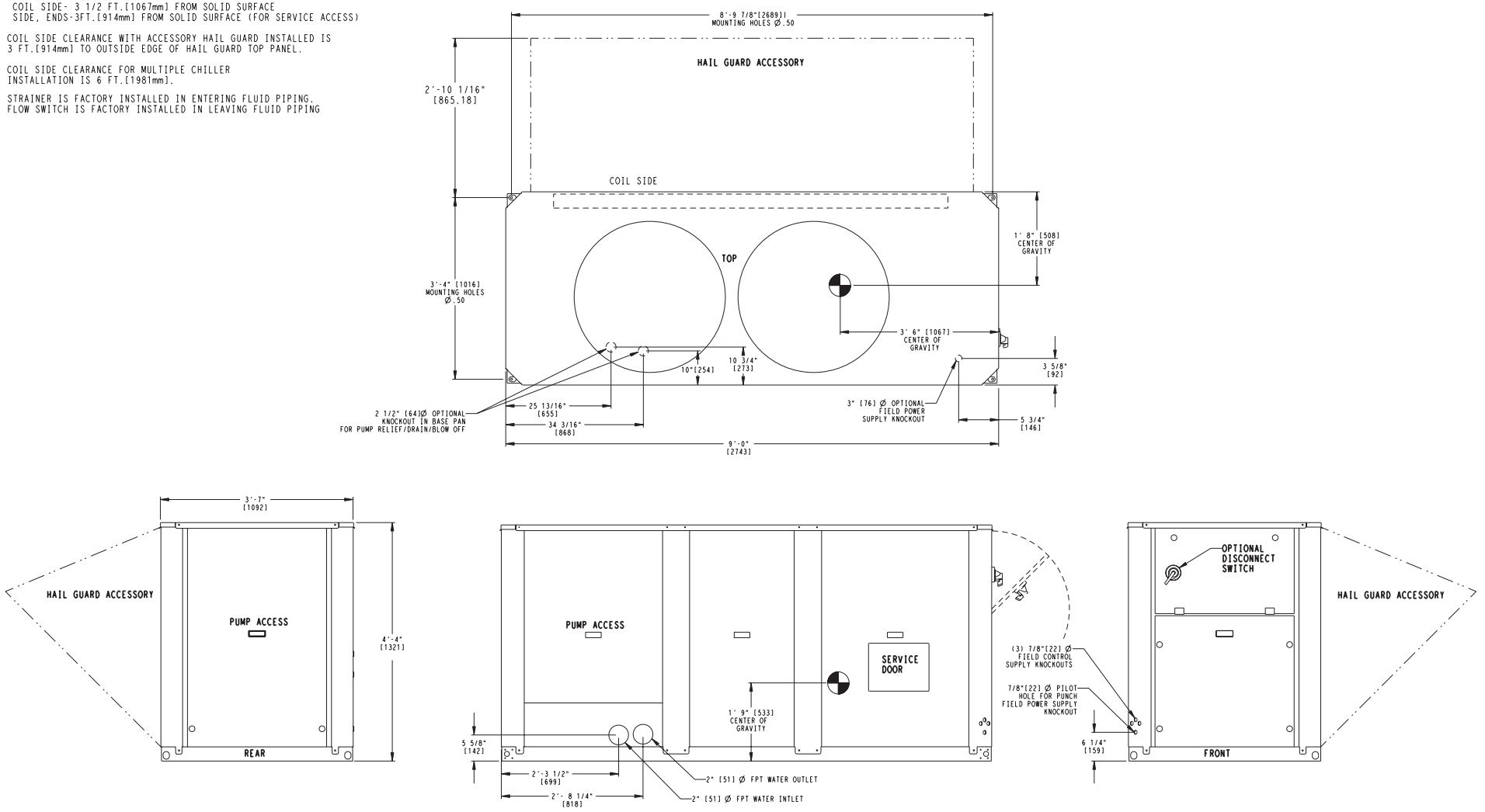


Fig. 5 — Dimensions — 30RA022,025 Units

NOTES:
1. UNIT MUST HAVE CLEARANCES FOR AIRFLOW AS FOLLOWS:
   TOP-DO NOT RESTRICT IN ANY WAY
   COIL SIDE- 3 1/2 FT.[1067mm] FROM SOLID SURFACE
   SIDE, ENDS-3FT.[914mm] FROM SOLID SURFACE (FOR SERVICE ACCESS)

2. COIL SIDE CLEARANCE WITH ACCESSORY HAIL GUARD INSTALLED IS 3 FT.[914mm] TO OUTSIDE EDGE OF HAIL GUARD TOP PANEL.

3. COIL SIDE CLEARANCE FOR MULTIPLE CHILLER INSTALLATION IS 6 FT.[1981mm].

4. STRAINER IS FACTORY INSTALLED IN ENTERING FLUID PIPING. FLOW SWITCH IS FACTORY INSTALLED IN LEAVING FLUID PIPING

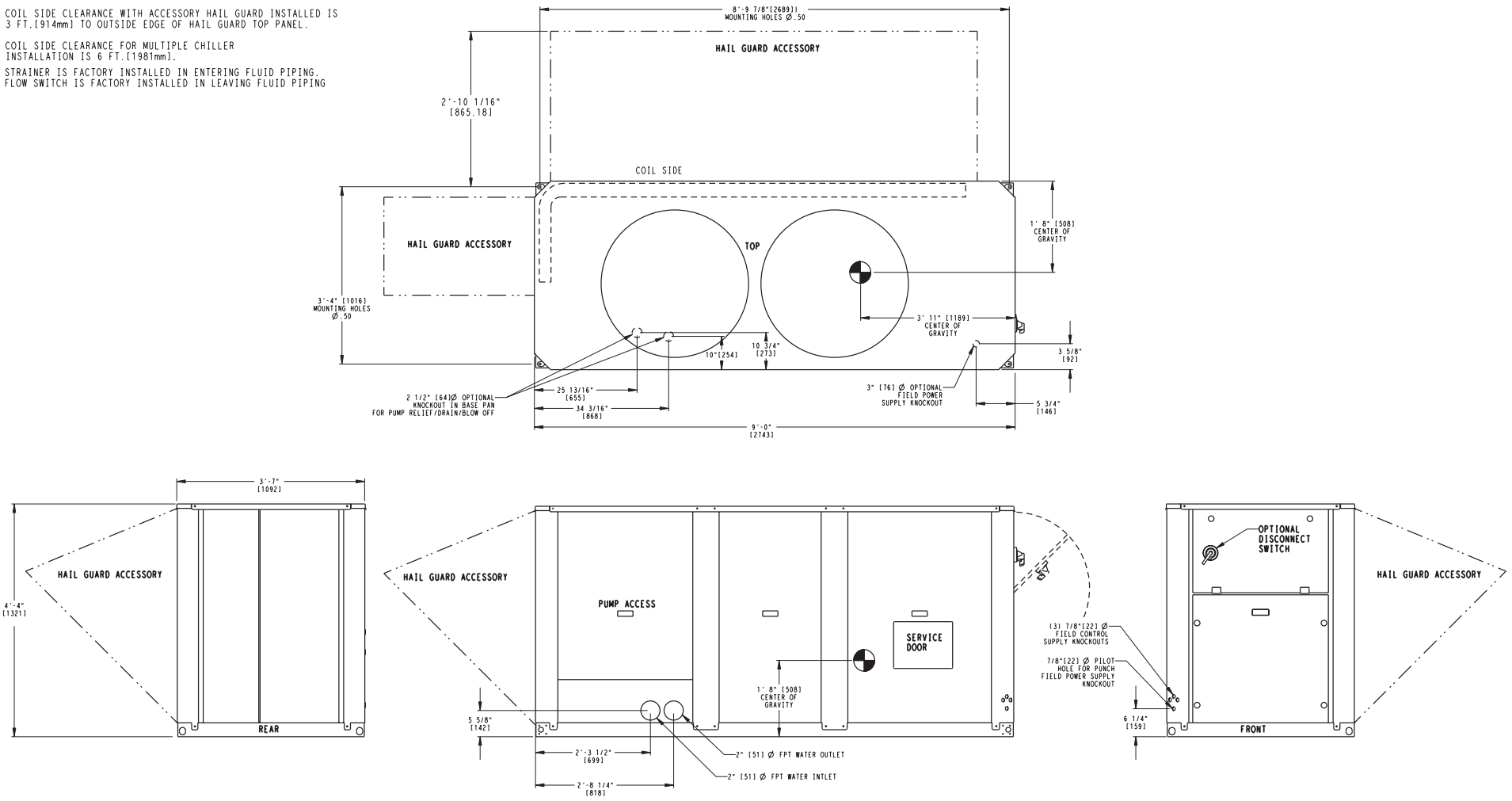


Fig. 6 — Dimensions — 30RA030 Units

NOTES:
1. UNIT MUST HAVE CLEARANCES FOR AIRFLOW AS FOLLOWS:
   TOP-DO NOT RESTRICT IN ANY WAY
   COIL SIDE- 3 1/2 FT.[1067mm] FROM SOLID SURFACE
   SIDE, ENDS-3FT.[914mm] FROM SOLID SURFACE (FOR SERVICE ACCESS)

2. COIL SIDE CLEARANCE WITH ACCESSORY HAIL GUARD INSTALLED IS 3 FT.[914mm] TO OUTSIDE EDGE OF HAIL GUARD TOP PANEL.

3. COILSIDE CLEARANCE FOR MULTIPLE CHILLER INSTALLATION IS 6 FT.[1981mm].

4. STRAINER IS FACTORY INSTALLED IN ENTERING FLUID PIPING. FLOW SWITCH IS FACTORY INSTALLED IN LEAVING FLUID PIPING

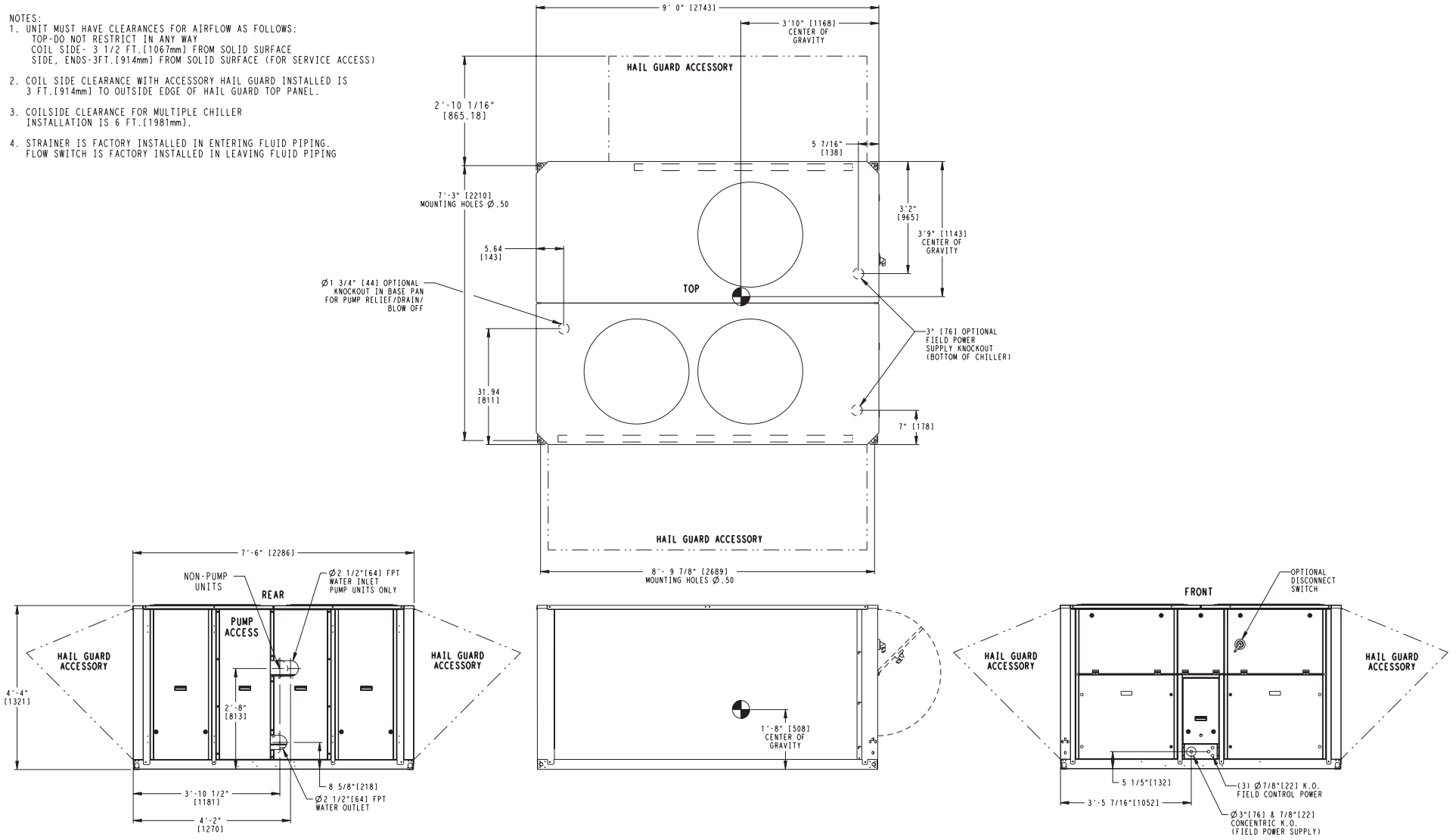


Fig. 7 — Dimensions — 30RA035-040 Units

NOTES:
1. UNIT MUST HAVE CLEARANCES FOR AIRFLOW AS FOLLOWS:
   TOP-DO NOT RESTRICT IN ANY WAY
   COIL SIDE- 3 1/2 FT.[1067mm] FROM SOLID SURFACE
   SIDE, ENDS-3FT.[914mm] FROM SOLID SURFACE (FOR SERVICE ACCESS)

2. COIL SIDE CLEARANCE WITH ACCESSORY HAIL GUARD INSTALLED IS 3 FT.[914mm] TO OUTSIDE EDGE OF HAIL GUARD TOP PANEL.

3. COIL SIDE CLEARANCE FOR MULTIPLE CHILLER INSTALLATION IS 6 FT.[1981mm].

4. STRAINER IS FACTORY INSTALLED IN ENTERING FLUID PIPING. FLOW SWITCH IS FACTORY INSTALLED IN LEAVING FLUID PIPING.

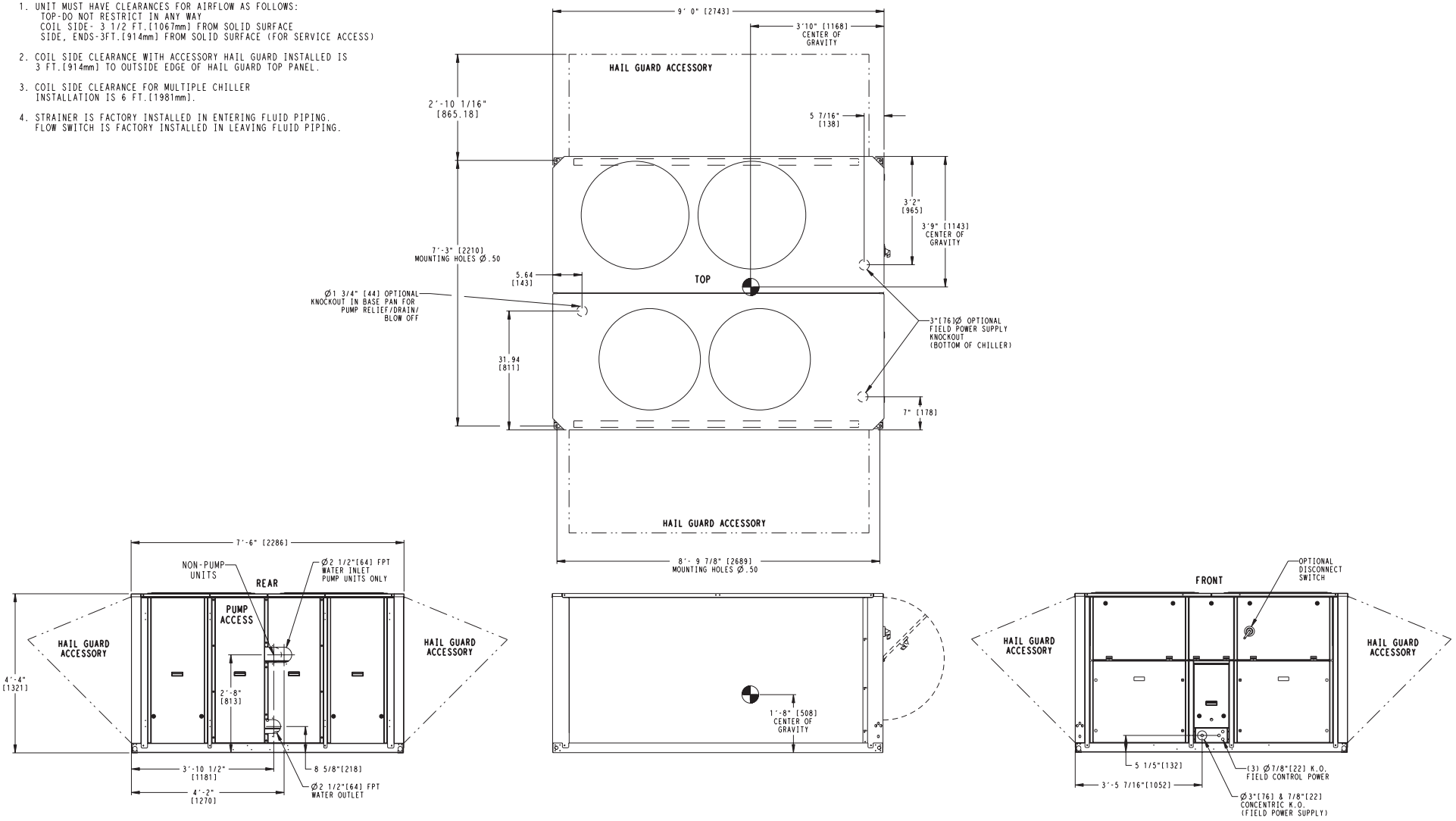


Fig. 8 — Dimensions — 30RA045-050 Units

NOTES:
1. UNIT MUST HAVE CLEARANCES FOR AIRFLOW AS FOLLOWS:
   TOP-DO NOT RESTRICT IN ANY WAY
   COIL SIDE- 3 1/2 FT.[1067mm] FROM SOLID SURFACE
   SIDE, ENDS-3FT.[914mm] FROM SOLID SURFACE (FOR SERVICE ACCESS)

2. COIL SIDE CLEARANCE WITH ACCESSORY HAIL GUARD INSTALLED IS 3 FT.[914mm] TO OUTSIDE EDGE OF HAIL GUARD TOP PANEL.

3. COIL SIDE CLEARANCE FOR MULTIPLE CHILLER INSTALLATION IS 6 FT.[1981mm].

4. STRAINER IS FACTORY INSTALLED IN ENTERING FLUID PIPING. FLOW SWITCH IS FACTORY INSTALLED IN LEAVING FLUID PIPING.

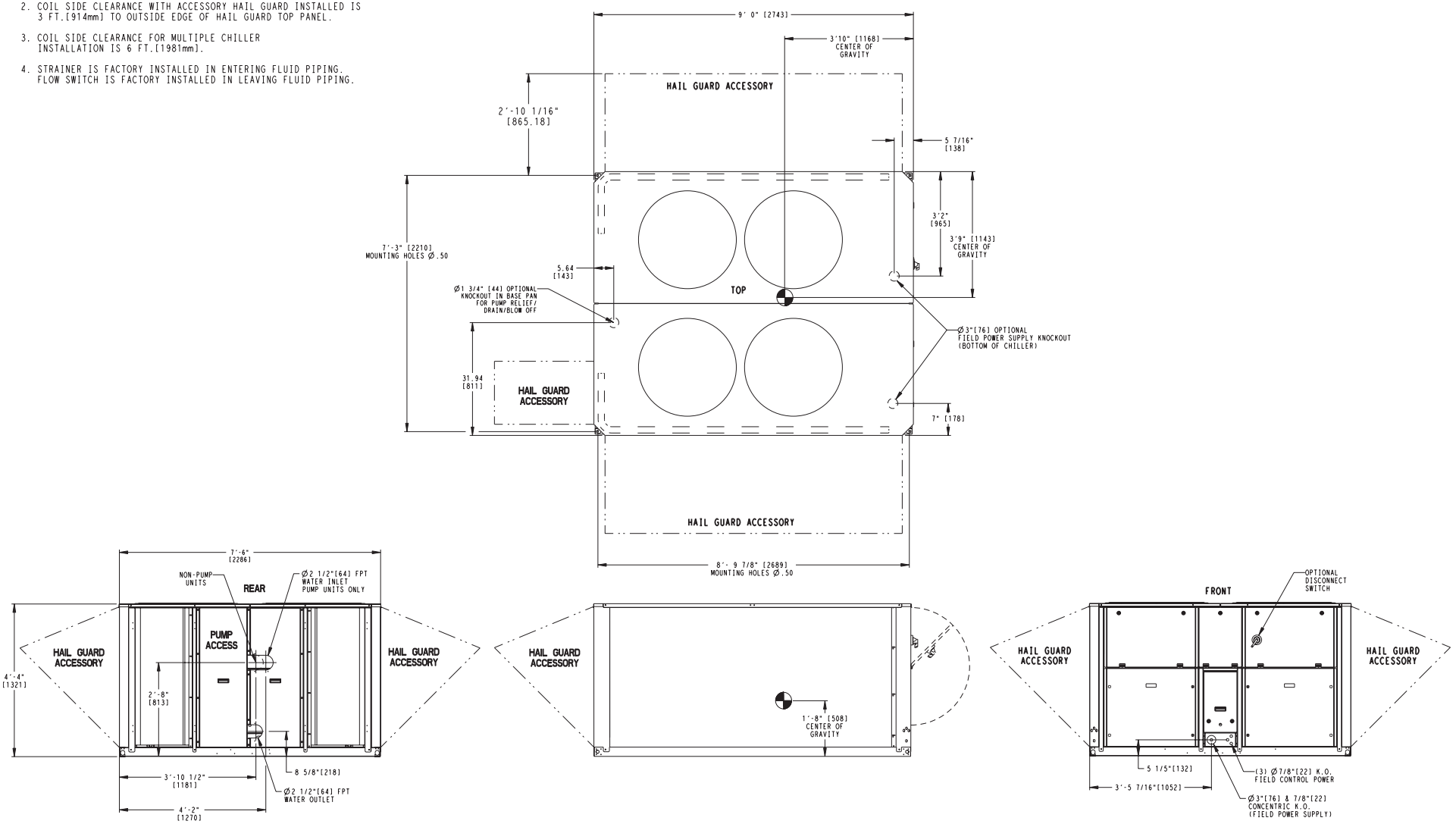


Fig. 9 — Dimensions — 30RA055 Units

Follow the steps below when connecting pipe to the unit water connections:

1. Remove side panel(s) of unit to access the piping area.
2. Remove access covers of pump box.
3. Use a backup wrench on internal water connections to prevent twisting of internal piping, using a good sealant that will also allow for disconnecting the pipes if needed.
4. After connection is made, replace access covers of pump box and side panels of unit.

UNITS WITH FACTORY-INSTALLED HYDRONIC PACKAGES — The 30RA 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. The factory-installed system includes all of the components within the dashed lines in Fig. 10.

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. Figure 10 shows a typical installation with components that might be installed with the hydronic package of the 30RA unit. Figure 11 illustrates a typical dual pump package for the 010-030 size models.

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

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. If the 30RA unit with expansion tank is the high point in the system, tank pre-charge pressure of 40 psig will be adequate. If the 30RA 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")

For example, assuming a system containing a 20% concentration of ethylene glycol and 50 feet 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

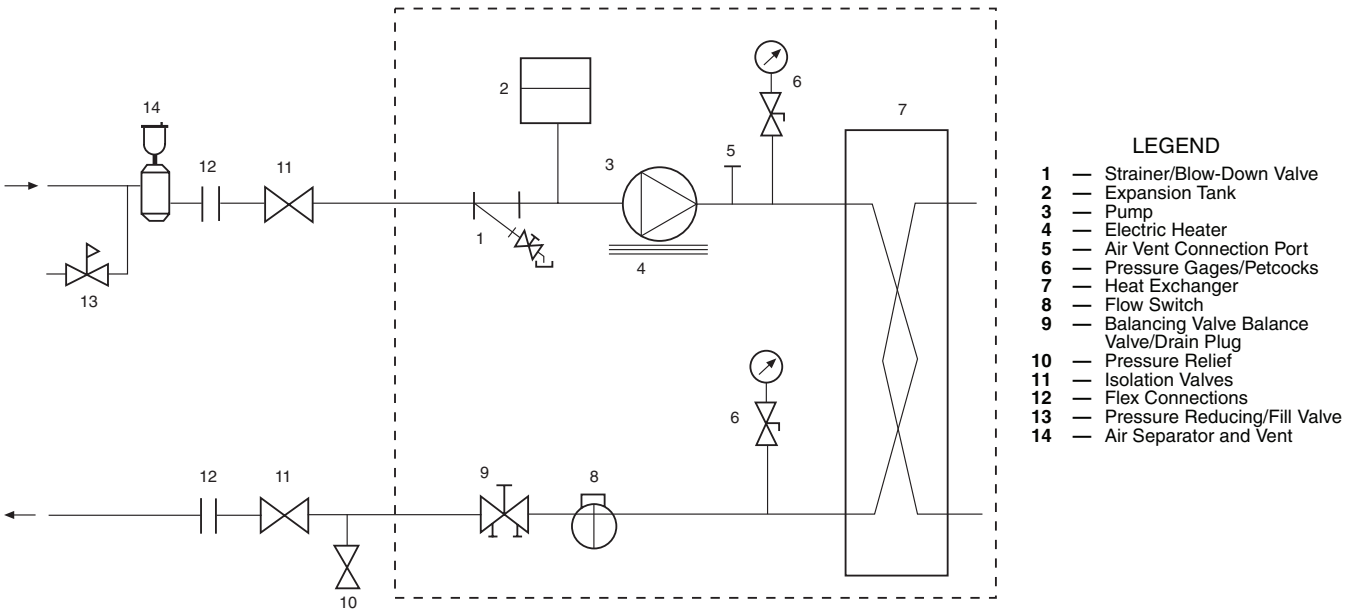


Fig. 10 — Typical Piping Diagram on 30RA Units With Hydronic Package

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, 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 30RA 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 30RA 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 30RA 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.

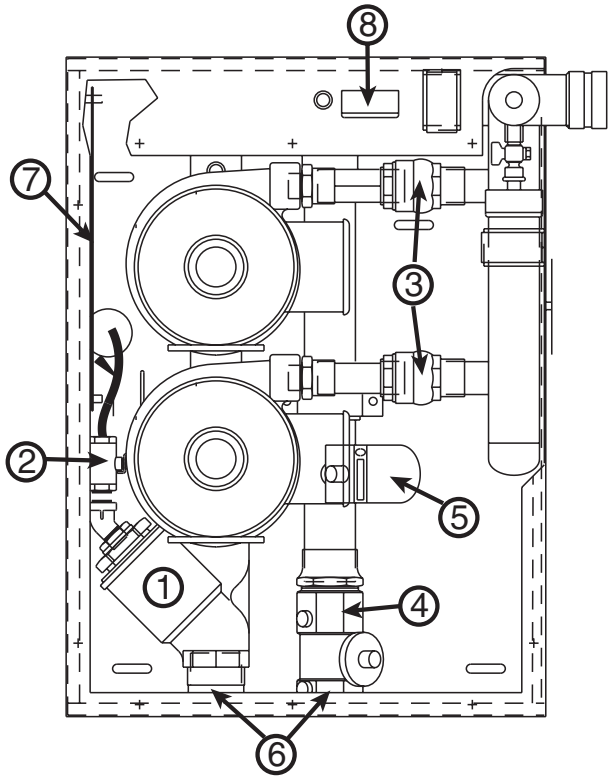
If the application involves two or more chillers in a primary/secondary system, a common place for mounting the expansion tank is in the chilled water return line, just before the decoupler. See Fig. 12 for placement of expansion tank in primary/secondary systems.

The expansion tank included in the 30RA 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.

Step 4 — Fill the Chilled Water Loop

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.



LEGEND

1 — Strainer
2 — Blow-Down Valve
3 — Discharge Check Valve (Dual Pumps Only)
4 — Balancing Valve with Drain Plug
5 — Flow Switch
6 — Field Connections
7 — Heater
8 — Pressure Gage

Fig. 11 — Typical Dual Pump Package

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 30RA 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. 12). 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.

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.

⚠ 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 13.)
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. 14) 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.

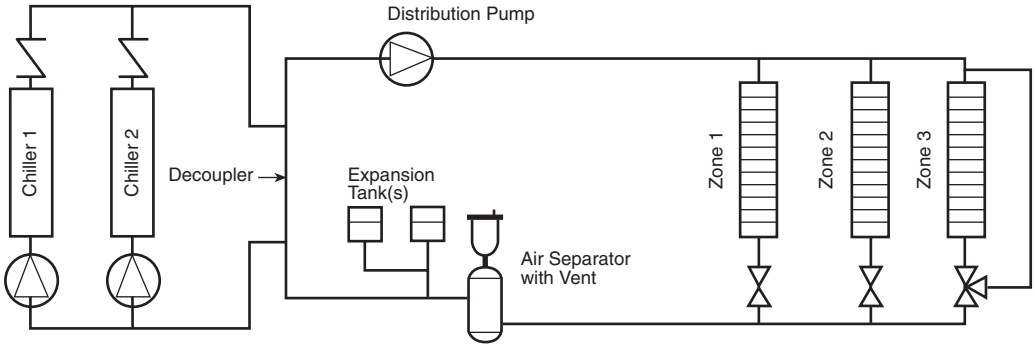
†Dissolved carbon dioxide can either be calculated from the pH and total alkalinity values, shown below, or measured on the site using a test kit. Dissolved Carbon Dioxide, PPM = TA x $2^{[(6.3-pH)/0.3]}$ where TA = Total Alkalinity, PPM as $CaCO_3$.

A strainer with a blow-down valve is standard on all 30RA 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.

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).



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

Fig. 12 — Typical Air Separator and Expansion Tank Location on Primary-Secondary Systems

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 anti-freeze 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 4 and 5 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 psi, multiply psi by 2.31 to convert to feet of water before using Tables 4 and 5.
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 30RA 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 30RA heat exchanger. Figures 15A-16B 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.

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. 17.

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

Available volumes are as follows:

- 30RA010-018 110 gallons
- 30RA022-030 152 gallons
- 30RA035-055 305 gallons

Maximum Loop Volume — 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.

	30RA010-030	30RA035-055
Volume gal	4.4	10.3
Acceptance Volume gal	3.2	10.3

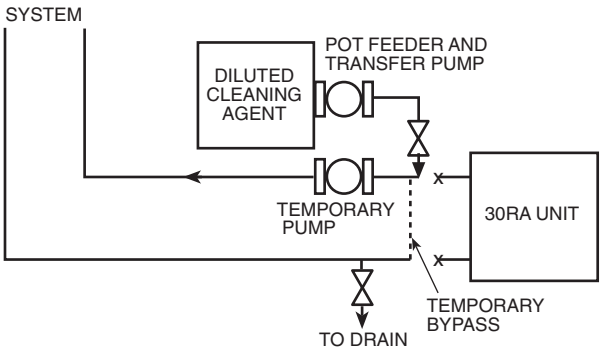


Fig. 13 — Typical Set Up for Cleaning Process

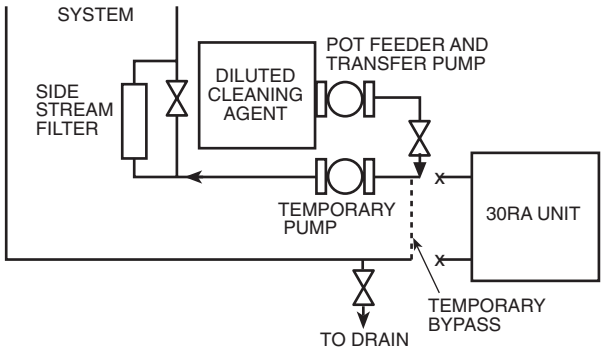


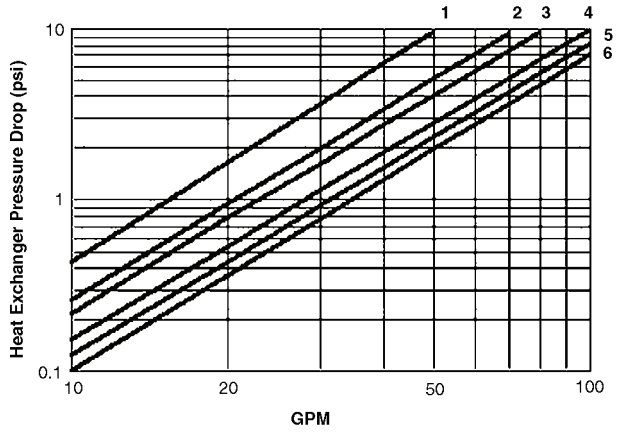
Fig. 14 — Cleaning Using a Side Stream Filter

Table 4 — Head (Ft Water) as Read on Balancing Valve for 30RA010-030

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 5 — Head (Ft Water) as Read on Balancing Valve for 30RA032-055

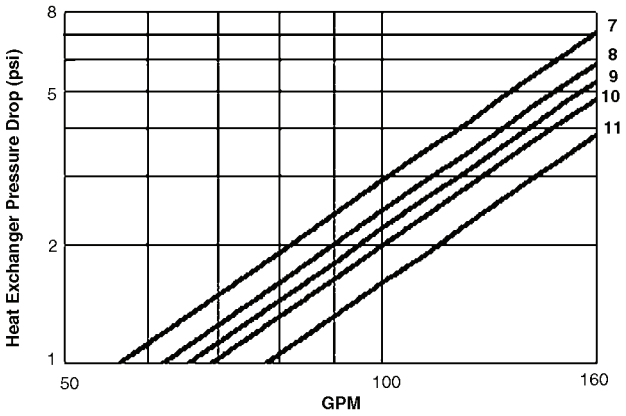
SETTING	GPM																	
	40	50	60	70	80	85	90	95	100	105	110	115	120	125	130	135	140
0	0.9	1.4	2	2.7	3.5	4	4.4	4.9	5.5	6	6.6	7.2	7.9	8.5	9.2	10	10.7
10	1.6	2.5	3.6	5	6.5	7.3	8.2	9.1	10.1	11.2	12.3	13.4	14.6	15.8	17.1	18.5	19.9
20	3.4	5.3	7.6	10.4	13.6	15.3	17.2	19.1	21.2	23.4	25.7	28.1	30.5	33.1	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



LEGEND

1 — 30RA010
2 — 30RA015
3 — 30RA018
4 — 30RA022
5 — 30RA025
6 — 30RA030

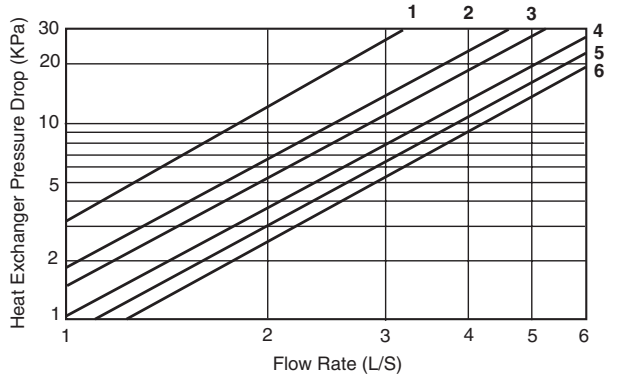
Fig. 15A — Heat Exchanger Pressure Drop — 30RA010-030 (English)



LEGEND

7 — 30RA035
8 — 30RA040
9 — 30RA045
10 — 30RA050
11 — 30RA055

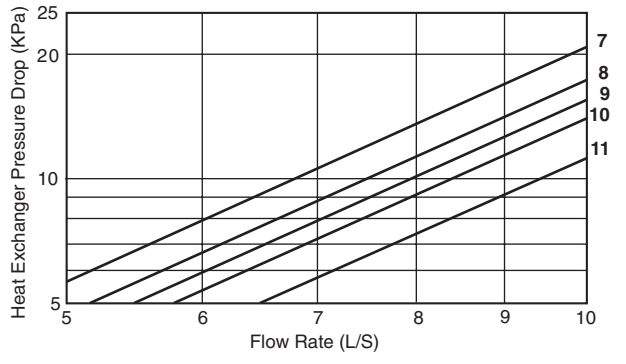
Fig. 16A — Heat Exchanger Pressure Drop — 30RA032-055 (English)



LEGEND

1 — 30RA010
2 — 30RA015
3 — 30RA018
4 — 30RA022
5 — 30RA025
6 — 30RA030

Fig. 15B — Heat Exchanger Pressure Drop — 30RA010-030 (SI)



LEGEND

7 — 30RA035
8 — 30RA040
9 — 30RA045
10 — 30RA050
11 — 30RA055

Fig. 16B — Heat Exchanger Pressure Drop — 30RA032-055 (SI)

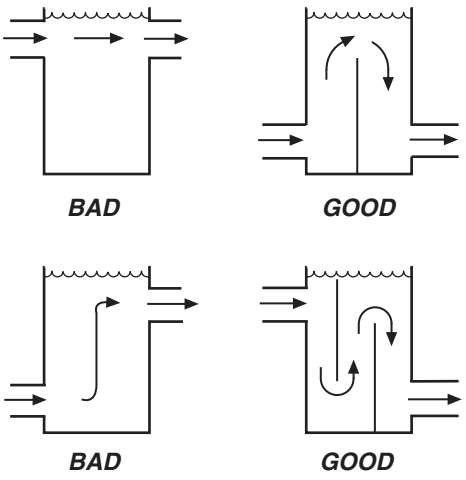


Fig. 17 — Tank Baffling

Table 6 — Minimum Fluid Volume In Circulation

UNIT	NORMAL AIR CONDITIONING APPLICATION	PROCESS COOLING OR LOW AMBIENT OPERATION APPLICATION
30RA010-015	12 gal/ton (13 L per kW)	12 gal/ton (26 L per kW)
30RA018-030	6 gal/ton (6.5 L per kW)	10 gal/ton (13 L per kW)
30RA035-040	4 gal/ton (4.3 L per kW)	8 gal/ton (8.7 L per kW)
30RA045-055	3 gal/ton (3.3 L per kW)	6 gal/ton (6.5 L per kW)

Table 7 — Maximum Loop Volume Limits

MAX LOOP VOLUME IN GALLONS (LITERS)		
% Ethylene Glycol	**30RA010-030**	**30RA035-055**
0 (Pure Water)	310 (1173)	725 (2744)
10	180 (681)	425 (1609)
20	175 (662)	410 (1552)
30	155 (587)	370 (1400)
40	150 (568)	350 (1325)
50	145 (549)	340 (1287)
% Propylene Glycol	**30RA010-030**	**30RA035-055**
10	175 (662)	410 (1552)
20	150 (568)	350 (1325)
30	128 (484)	300 (1136)
40	118 (447)	275 (1041)

NOTE: Max loop volume is based on typical system of 12 psi and 30 psi of min/max pressures, and 100 F mean temperature. If the volume in the system is greater than the limits listed, 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 30RA 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.

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 anti-freeze 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 (7.2 C) for 30RA010-018 units or 32 F (0.0° C) for 30RA022-050 units. Field-fabricated and field-installed wind baffles are required 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 035-055 require two baffles. See Fig. 18 and 19 for the sizes and details of brackets and baffles required.

Use 14-gage galvanized sheet metal or similar corrosion-resistant material for the brackets and 20-gage for the baffles. Use field-supplied screws to attach baffles and brackets to unit. Screws should be $^1/_4$ in. (6.3 mm) diameter or larger. Drill required screw holes for mounting brackets and baffles.

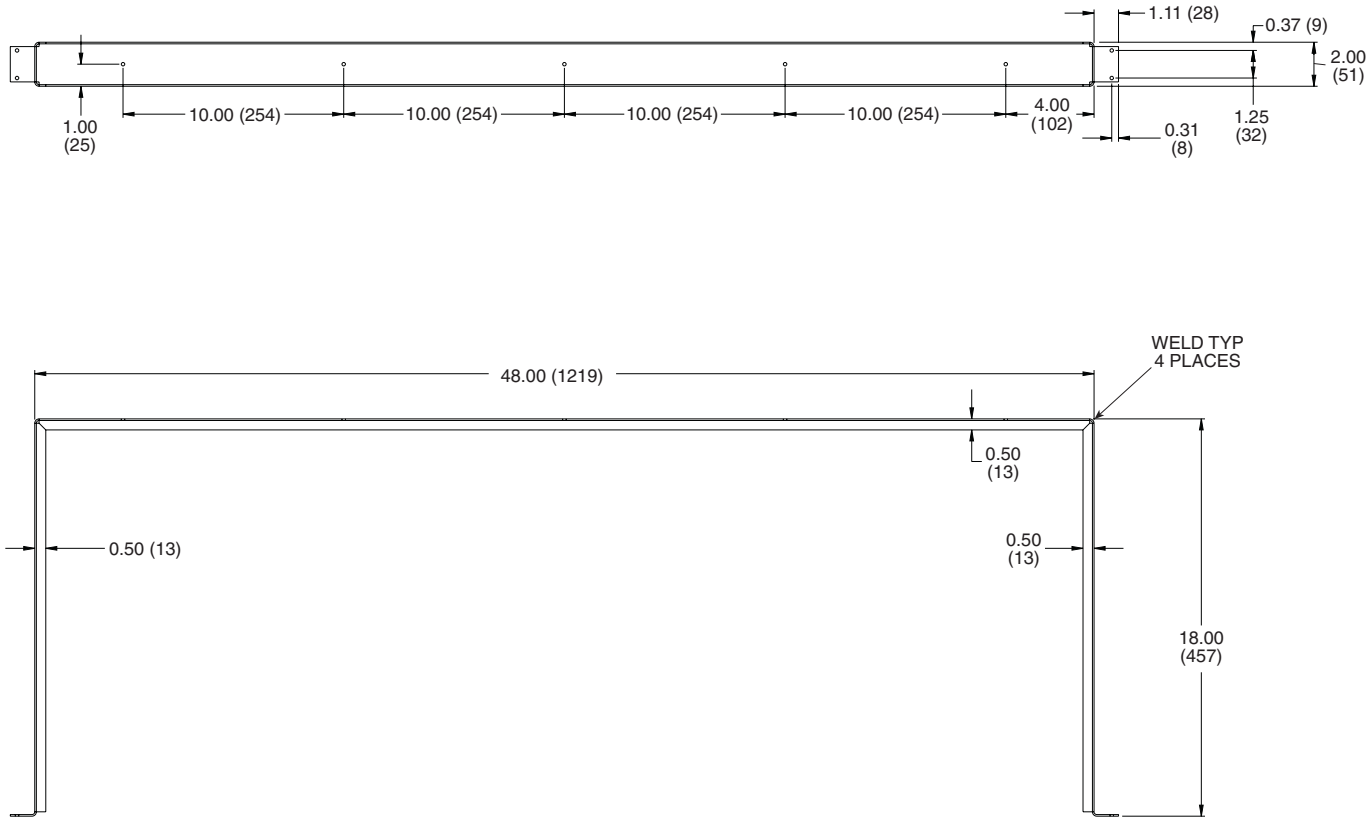
⚠ CAUTION

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

FREEZE PROTECTION — The 30RA 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 (paddle-type) 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.

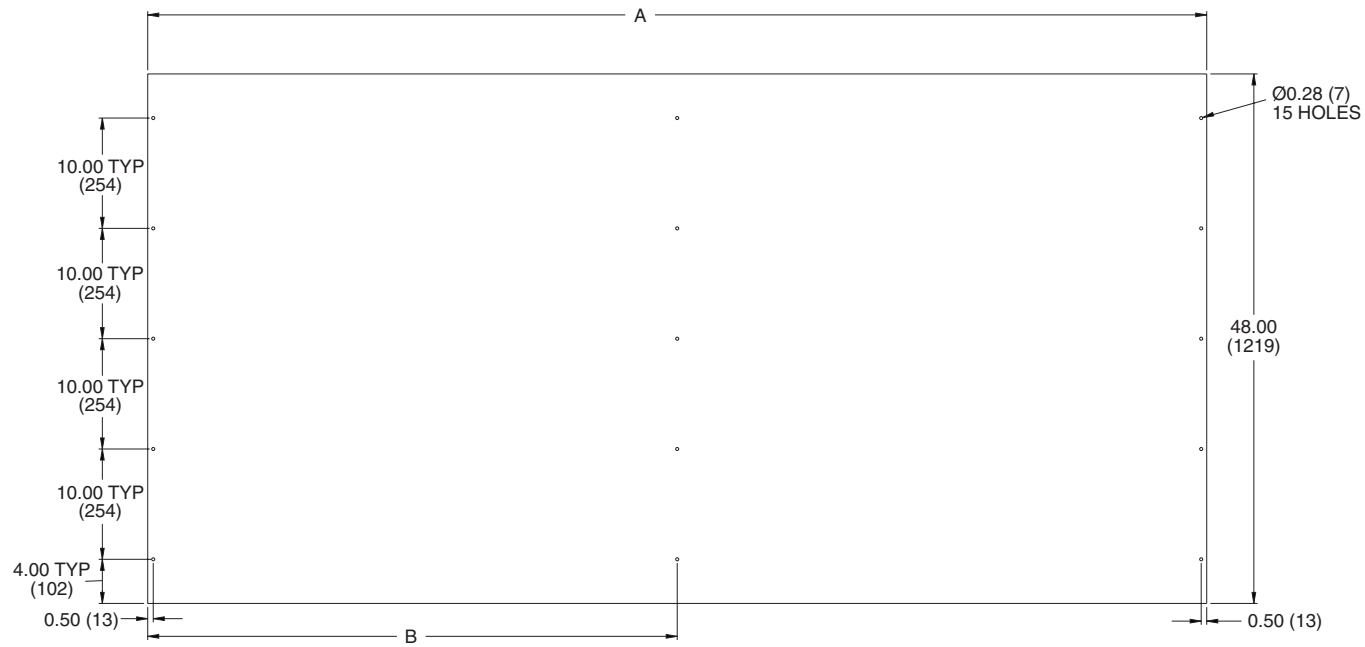
⚠ CAUTION

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.



NOTE: Dimensions are in inches (mm).

Fig. 18 — Bracket Dimensions



NOTE: Dimensions are in inches (mm).

UNIT SIZE	DIM A	DIM B
30RA010-018, 30RA035-040 (circuit B side)	68.92 (1751)	34.46 (875)
30RA022-030, 30RA035-040 (circuit A side) 30RA045-055 (circuit A and B side)	96.00 (2438)	48.00 (1291)

Fig. 19 — Baffle Dimensions

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. Drains are located on the balancing valves for units with hydronic kits. Units without hydronic kits have a drain mounted on the piping leaving the heat exchanger. Drain knockouts 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 also 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

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

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 Tables 8 and 9. See Tables 10-13 for component electrical data.

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

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. Up to two terminal blocks are 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 one end only.
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.

Table 8 — Maximum Field Wiring Sizes

CONNECTION TYPE	MAX WIRE SIZE	UNIT SIZE AND VOLTAGE
TERMINAL BLOCK	#2/0 AWG	30RA010-030 (all voltages)
	350 kcmil	30RA035-055 (all voltages)
60/100 AMP NON-FUSED DISCONNECT	#1 AWG	30RA010-055 (575-3-60)
		30RA010-030 (380-3-60, 460-3-60)
		30RA010-018 (230-3-60, 208/230-3-60)
250 AMP NON-FUSED DISCONNECT	350 kcmil	30RA035-055 (380-3-60, 460-3-60)
		30RA022-055 (230-3-60, 208/230-3-60)

AWG — American Wire Gage

FIELD CONNECTIONS

Main Power — Bring wires from the fused disconnect switch through hole in bottom of left front corner post (010-030 sizes) or through hole in bottom center panel (035-055 sizes) of unit to bottom of control box and connect to terminals on terminal block or non-fused disconnect. To comply with NEC Article 440-14, the disconnect must be located within sight from and readily accessible from unit. Refer to Fig. 20 and 21.

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.

Table 9 — Electrical Data

UNIT 30RA	UNIT VOLTAGE			POWER SUPPLY QTY REQD.	NO HYDRONIC PACKAGE				1.5/1.0 HP PUMP Pump Options 'A' or 'F'			2.0/1.5 HP (STD) PUMP Pump Options 'B' or 'G'			2.0/1.5 HP (ALT) PUMP Pump Options 'C' or 'H'			3.0/2.0 HP PUMP Pump Options 'D' or 'J'			5.0/3.0 HP PUMP Pump Options 'E' or 'K'		
	V-Hz (3 Ph)	Supplied			MCA	MOCP	ICF	Rec Fuse Size	MCA	MOCP	Rec Fuse Size	MCA	MOCP	Rec Fuse Size	MCA	MOCP	Rec Fuse Size	MCA	MOCP	Rec Fuse Size	MCA	MOCP	Rec Fuse Size
		Min	Max		XL	XL	XL		XL	XL		XL	XL		XL	XL		XL	XL		XL	XL	
010	230-60	207	253	1	46.2	70	272.6	60	50.2	80	60	51.4	80	60	51.4	80	60	53.6	80	70	—	—	—
	208/230-60	187	253	1	51.3	80	273.4	60	55.7	90	70	57.0	90	70	57.0	90	70	59.5	90	70	—	—	—
	460-60	414	506	1	23.8	35	123.8	30	25.8	40	30	26.4	40	35	26.4	40	35	27.5	40	35	—	—	—
	575-60	518	633	1	19.2	30	83.0	25	20.8	30	25	21.2	30	25	21.2	30	25	22.1	35	30	—	—	—
	380-60	342	418	1	29.9	50	159.6	35	32.3	50	40	33.0	50	40	33.0	50	40	34.3	50	40	—	—	—
015	230-60	207	253	1	62.4	100	387.6	80	66.4	110	80	67.6	110	80	67.6	110	80	69.8	110	90	—	—	—
	208/230-60	187	253	1	69.3	110	388.4	90	73.7	110	90	75.0	110	90	75.0	110	90	77.5	125	90	—	—	—
	460-60	414	506	1	33.6	50	178.8	40	35.6	50	45	36.2	50	45	36.2	50	45	37.3	60	45	—	—	—
	575-60	518	633	1	26.7	45	143.0	35	28.3	45	35	28.7	45	35	28.7	45	35	29.6	45	35	—	—	—
	380-60	342	418	1	42.2	70	239.6	50	44.6	70	60	45.4	70	50	45.4	70	50	46.7	70	60	—	—	—
018	230-60	207	253	1	67.3	90	271.2	80	71.3	90	80	72.5	90	80	72.5	90	80	74.7	100	90	—	—	—
	208/230-60	187	253	1	74.8	100	274.9	90	79.2	100	90	80.5	110	90	80.5	110	90	83.0	110	100	—	—	—
	460-60	414	506	1	35.5	45	147.9	40	37.5	50	45	38.1	50	45	38.1	50	45	39.2	50	45	—	—	—
	575-60	518	633	1	28.5	35	99.3	35	30.1	40	35	30.5	40	35	30.5	40	35	31.4	40	35	—	—	—
	380-60	342	418	1	44.0	60	182.1	50	46.4	60	60	47.1	60	60	47.1	60	60	48.5	60	60	—	—	—
022	230-60	207	253	1	84.9	110	311.3	100	88.9	125	100	90.1	125	100	90.1	125	100	92.3	125	110	—	—	—
	208/230-60	187	253	1	94.3	125	316.4	110	98.7	125	110	100.1	125	125	100.1	125	125	102.5	125	125	—	—	—
	460-60	414	506	1	44.7	60	154.4	50	46.7	60	60	47.3	60	60	47.3	60	60	48.4	60	60	—	—	—
	575-60	518	633	1	36.8	50	136.0	45	38.4	50	45	38.9	50	45	38.9	50	45	39.8	50	45	—	—	—
	380-60	342	418	1	57.7	80	194.7	70	60.1	80	70	60.9	80	70	60.9	80	70	62.2	80	70	—	—	—
025	230-60	207	253	1	92.2	125	311.3	110	96.2	125	110	97.4	125	110	97.4	125	110	99.6	125	110	—	—	—
	208/230-60	187	253	1	102.4	125	316.4	125	106.8	125	125	108.2	125	125	108.2	125	125	110.6	150	125	—	—	—
	460-60	414	506	1	50.3	70	160.0	60	52.3	70	60	52.9	70	60	52.9	70	60	54.0	70	60	—	—	—
	575-60	518	633	1	41.2	50	140.4	50	42.8	50	50	43.3	50	50	43.3	50	50	44.2	60	50	—	—	—
	380-60	342	418	1	65.2	90	202.2	80	67.6	90	80	68.4	90	80	68.5	90	80	69.7	90	80	—	—	—
030	230-60	207	253	1	108.2	150	433.4	125	112.2	150	125	113.4	150	125	113.4	150	125	115.6	150	150	—	—	—
	208/230-60	187	253	1	120.2	150	439.3	150	124.6	150	150	125.9	150	150	125.9	150	150	128.4	175	150	—	—	—
	460-60	414	506	1	58.4	80	203.6	70	60.4	80	70	61.0	80	70	61.0	80	70	62.1	80	70	—	—	—
	575-60	518	633	1	46.4	60	162.7	60	48.0	60	60	48.4	60	60	48.4	60	60	49.3	60	60	—	—	—
	380-60	342	418	1	73.5	100	270.9	90	76.0	100	90	76.7	100	90	76.7	100	90	78.0	100	90	—	—	—
035	230-60	207	253	1	138.1	175	463.4	150	—	—	—	143.3	175	175	—	—	—	145.5	175	175	150.7	175	175
	208/230-60	187	253	1	153.4	200	472.5	175	—	—	—	159.1	200	175	—	—	—	161.6	200	175	167.3	200	200
	460-60	414	506	1	73.2	90	218.4	80	—	—	—	75.8	90	90	—	—	—	76.9	100	90	79.5	100	90
	575-60	518	633	1	59.3	70	175.7	70	—	—	—	61.4	80	70	—	—	—	62.3	80	70	64.3	80	70
	380-60	342	418	1	93.3	110	290.7	110	—	—	—	96.5	125	110	—	—	—	97.8	125	110	101.0	125	110
040	230-60	207	253	1	145.4	175	470.6	175	—	—	—	150.6	175	175	—	—	—	152.8	175	175	158.0	200	175
	208/230-60	187	253	1	161.5	200	480.6	175	—	—	—	167.2	200	200	—	—	—	169.7	200	200	175.4	200	200
	460-60	414	506	1	78.8	100	224.0	90	—	—	—	81.4	100	90	—	—	—	82.5	100	90	85.1	100	90
	575-60	518	633	1	63.7	80	180.1	70	—	—	—	65.8	80	80	—	—	—	66.7	80	80	68.7	80	70
	380-60	342	418	1	100.8	125	298.2	110	—	—	—	104.0	125	125	—	—	—	105.3	125	125	108.5	125	110
045	230-60	207	253	1	162.1	200	382.7	175	—	—	—	167.3	200	200	—	—	—	169.5	200	200	174.7	200	175
	208/230-60	187	253	1	180.0	200	395.6	200	—	—	—	185.8	225	200	—	—	—	188.2	225	225	193.9	225	200
	460-60	414	506	1	86.0	100	196.8	100	—	—	—	88.6	100	100	—	—	—	89.7	110	100	92.3	110	90
	575-60	518	633	1	69.9	80	170.1	80	—	—	—	72.0	80	80	—	—	—	72.9	90	80	74.9	90	70
	380-60	342	418	1	109.9	125	248.4	125	—	—	—	113.0	125	125	—	—	—	114.4	125	125	117.5	125	110
050	230-60	207	253	1	175.3	200	394.4	200	—	—	—	180.5	200	200	—	—	—	182.7	200	200	187.9	200	175
	208/230-60	187	253	1	194.6	225	408.6	225	—	—	—	200.4	225	225	—	—	—	202.8	225	225	208.6	225	200
	460-60	414	506	1	95.5	110	205.2	110	—	—	—	98.1	110	110	—	—	—	99.2	110	110	101.8	110	90
	575-60	518	633	1	78.2	90	177.5	90	—	—	—	80.3	90	90	—	—	—	81.2	90	90	83.3	90	70
	380-60	342	418	1	123.8	150	260.8	150	—	—	—	127.0	150	150	—	—	—	128.3	150	150	131.4	150	110
055	230-60	207	253	1	205.5	225	530.7	225	—	—	—	210.7	250	225	—	—	—	212.9	250	225	218.1	250	175
	208/230-60	187	253	1	228.2	250	547.3	250	—	—	—	234.0	250	250	—	—	—	236.4	250	250	242.1	250	300
	460-60	414	506	1	110.8	125	256.0	125	—	—	—	113.4	125	125	—	—	—	114.5	125	125	117.1	125	90
	575-60	518	633	1	88.0	100	204.4	100	—	—	—	90.1	100	100	—	—	—	91.0	100	100	93.0	110	70
	380-60	342	418	1	139.5	150	336.9	150	—	—	—	142.7	150	150	—	—	—	144.0	150	150	147.2	175	110

LEGEND

ICF — Instantaneous Current Flow
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
XL — Across-the-Line Start

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 have single point primary power connection. The unit control circuit power (24 v, single-phase) is supplied from the main power and does not require a separate power source.
3. Hydronic package and cooler heaters are wired into the control circuit so they are always operable as long as the power supply disconnect is on, even if any safety device is open, and the unit ON/OFF switch is in the OFF position.
4. Power draw control circuits include cooler heaters (where used).

Table 10 — Fan Electrical Data

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

LEGEND
FLA — Full Load Amps

Table 11 — Pump Electrical Data

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

LEGEND
FLA — Full Load Amps
LRA — Locked Rotor 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 have single point primary power connection. (Each unit 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 and compressor circuit breakers are on, even if any safety device is open, and the unit ON/OFF switch is in the OFF position.
5. Incoming wire size ranges are shown below:
   a. Size 010-030 terminal block no. 8 - no. 2/0 AWG (American Wire Gage)
   b. Size 035-055 terminal block no. 6 - 350 kcmil
   c. 60 and 100 amp non-fused disconnect option no. 6 - no. 1 AWG
   d. 250 amp non-fused disconnect option no. 6 AWG - 350 kcmil

Table 12 — Accessory Tank Electrical Data

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

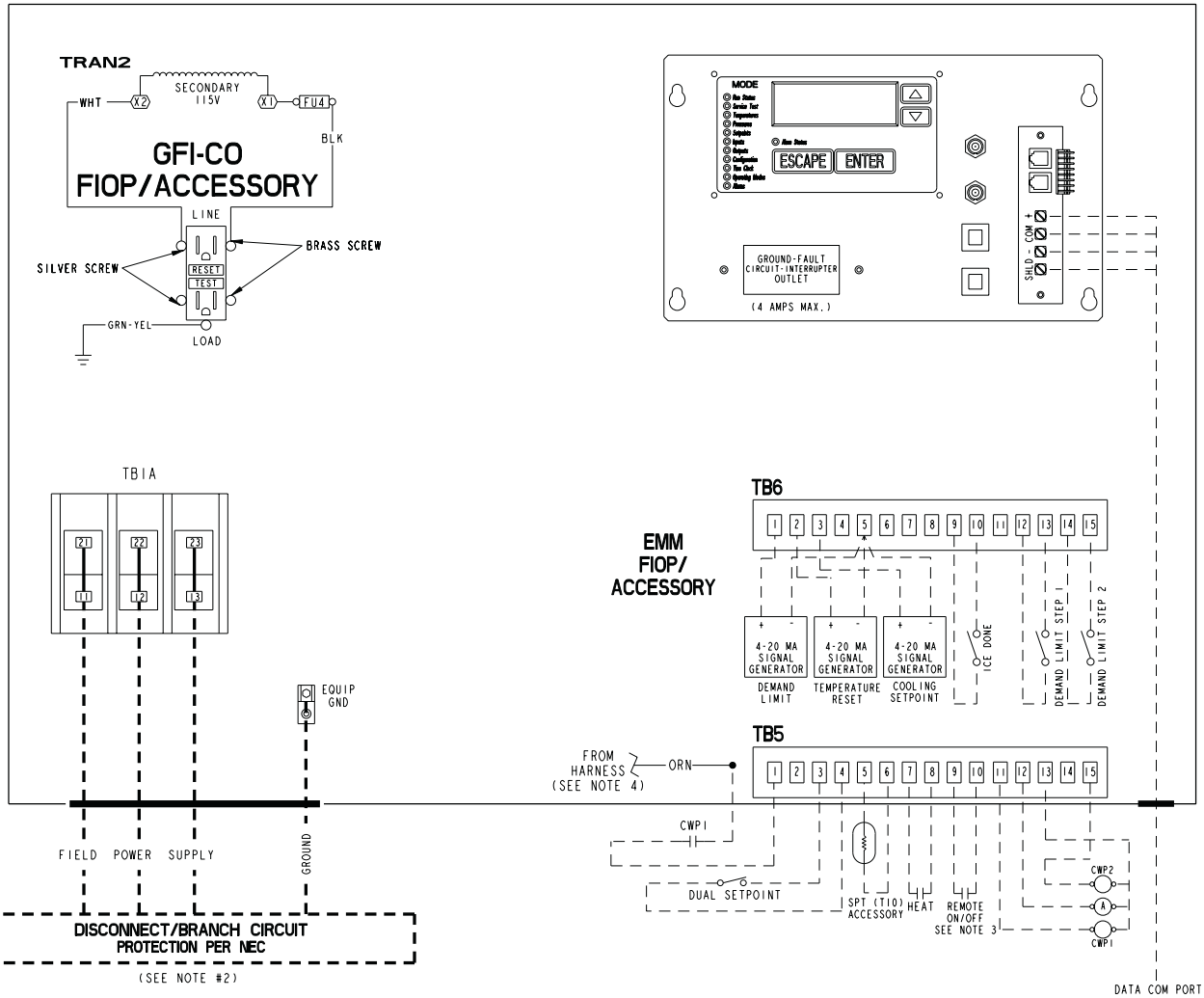
LEGEND
FLA — Full Load Amps

Table 13 — Compressor Electrical Data

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

LEGEND

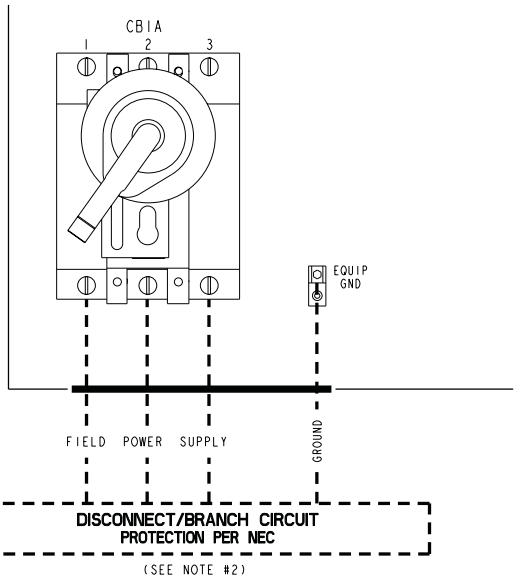
LRA — Locked Rotor Amps
RLA — Rated Load Amps



STANDARD POWER

NOTES:

1. FACTORY WIRING IS IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC). FIELD MODIFICATIONS OR ADDITIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.
2. WIRING FOR MAIN FIELD SUPPLY MUST BE RATED 75C MINIMUM. USE COPPER FOR ALL UNITS.
   MAXIMUM INCOMING WIRE SIZE FOR THE TERMINAL BLOCK IS #2/0 AWG.
   MAXIMUM INCOMING WIRE SIZE FOR 60 AND 100 AMP NON-FUSED DISCONNECT IS #1 AWG.
   MAXIMUM INCOMING WIRE SIZE FOR 250 AMP NON-FUSED DISCONNECT IS 350 KCMIL.
3. TERMINALS 9 AND 10 OF TB5 ARE FOR FIELD EXTERNAL CONNECTIONS FOR REMOTE ON-OFF. THE CONTACTS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 MA.
4. TERMINALS 1 AND 2 OF TB5 ARE CONNECTED TO THE FACTORY INSTALLED CHILLED WATER FLOW SWITCH (CWFS). TO ADD CHILLED WATER PUMP INTERLOCK CONTACTS, REMOVE THE ORANGE HARNESS WIRE FROM TB5-1 AND WIRE CONTACTS IN SERIES AS SHOWN. THE CONTACTS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 MA.
5. TERMINALS 11 AND 13 OF TB5 ARE FOR CONTROL OF CHILLED WATER PUMP1 (CWP1) STARTER. TERMINALS 13 AND 15 OF TB5 ARE FOR CONTROL OF CHILLED WATER PUMP2 (CWP2) STARTER. THE MAXIMUM LOAD ALLOWED FOR THE CHILLED WATER PUMP RELAY IS 5 VA SEALED, 10 VA INRUSH AT 24V. FIELD POWER SUPPLY IS NOT REQUIRED.
6. TERMINALS 12 AND 13 OF TB5 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 TB6 AS SHOWN FOR ENERGY MANAGEMENT BOARD OPTIONS. THE CONTACTS FOR DEMAND LIMIT AND ICE DONE OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 MA.



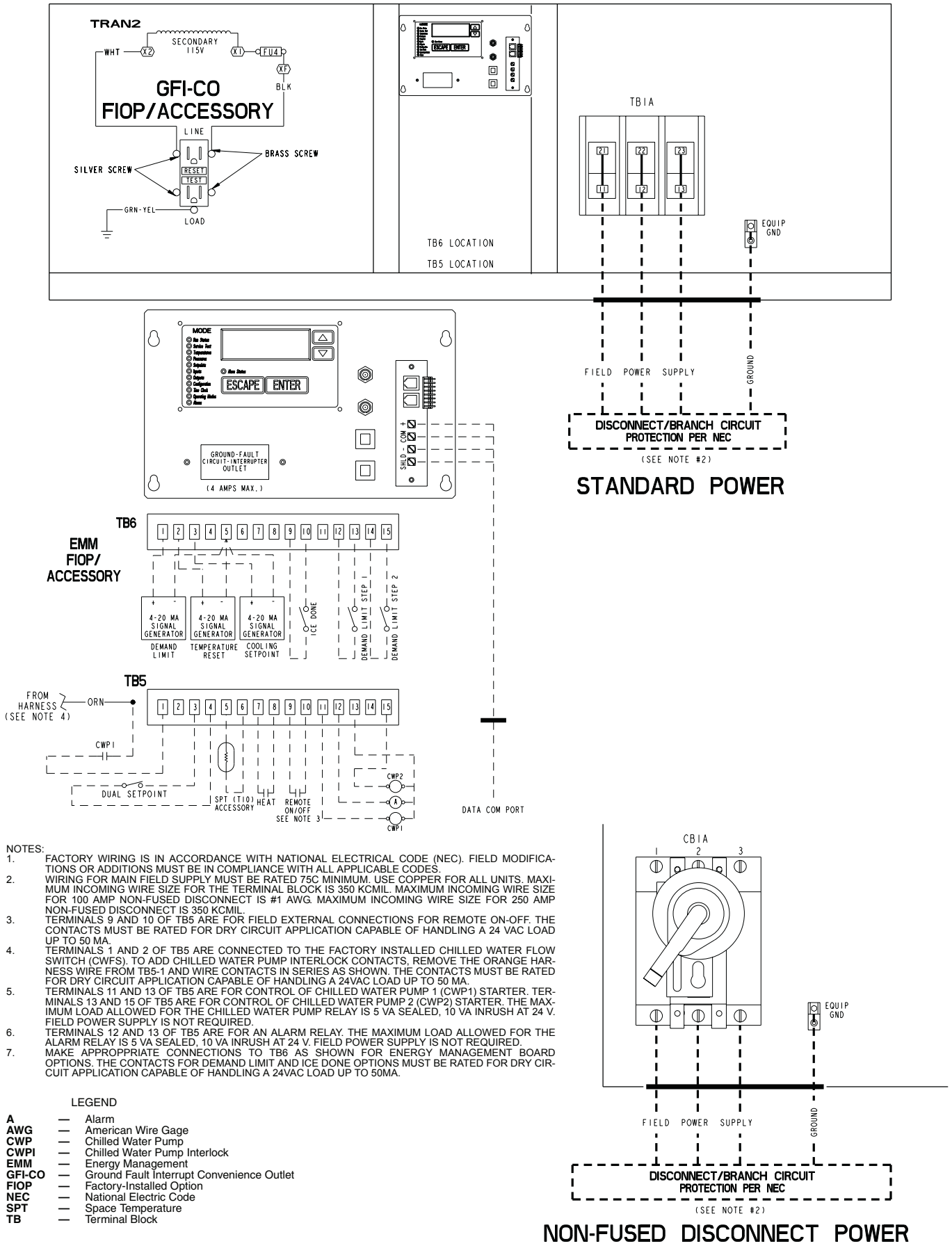
NON-FUSED DISCONNECT POWER

LEGEND

A	—	Alarm
AWG	—	American Wire Gage
CWP	—	Chilled Water Pump
CWPI	—	Chilled Water Pump Interlock
EMM	—	Energy Management
GFI-CO	—	Ground Fault Interrupt Convenience Outlet
FIOP	—	Factory-Installed Option
NEC	—	National Electric Code
SPT	—	Space Temperature
TB	—	Terminal Block

- - - FIELD POWER WIRING
— — — FIELD CONTROL WIRING
——— FACTORY INSTALLED WIRING

Fig. 20 — Main Power and Control Connections — 30RA010-030 Without Hydronic Package



NOTES:
1. FACTORY WIRING IS IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC). FIELD MODIFICATIONS OR ADDITIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.
2. WIRING FOR MAIN FIELD SUPPLY MUST BE RATED 75C MINIMUM. USE COPPER FOR ALL UNITS. MAXIMUM INCOMING WIRE SIZE FOR THE TERMINAL BLOCK IS 350 KCMIL. MAXIMUM INCOMING WIRE SIZE FOR 100 AMP NON-FUSED DISCONNECT IS #1 AWG. MAXIMUM INCOMING WIRE SIZE FOR 250 AMP NON-FUSED DISCONNECT IS 350 KCMIL.
3. TERMINALS 9 AND 10 OF TB5 ARE FOR FIELD EXTERNAL CONNECTIONS FOR REMOTE ON-OFF. THE CONTACTS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24 VAC LOAD UP TO 50 MA.
4. TERMINALS 1 AND 2 OF TB5 ARE CONNECTED TO THE FACTORY INSTALLED CHILLED WATER FLOW SWITCH (CWFS). TO ADD CHILLED WATER PUMP INTERLOCK CONTACTS, REMOVE THE ORANGE HARNESS WIRE FROM TB5-1 AND WIRE CONTACTS IN SERIES AS SHOWN. THE CONTACTS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 MA.
5. TERMINALS 11 AND 13 OF TB5 ARE FOR CONTROL OF CHILLED WATER PUMP 1 (CWP1) STARTER. TERMINALS 13 AND 15 OF TB5 ARE FOR CONTROL OF CHILLED WATER PUMP 2 (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 12 AND 13 OF TB5 ARE FOR AN ALARM RELAY. THE MAXIMUM LOAD ALLOWED FOR THE ALARM RELAY IS 5 VA SEALED, 10 VA INRUSH AT 24 V. FIELD POWER SUPPLY IS NOT REQUIRED.
7. MAKE APPROPPRIATE CONNECTIONS TO TB6 AS SHOWN FOR ENERGY MANAGEMENT BOARD OPTIONS. THE CONTACTS FOR DEMAND LIMIT AND ICE DONE OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50MA.

LEGEND

A	—	Alarm
AWG	—	American Wire Gage
CWP	—	Chilled Water Pump
CWPI	—	Chilled Water Pump Interlock
EMM	—	Energy Management
GFI-CO	—	Ground Fault Interrupt Convenience Outlet
FIOP	—	Factory-Installed Option
NEC	—	National Electric Code
SPT	—	Space Temperature
TB	—	Terminal Block

FIELD POWER WIRING
FIELD CONTROL WIRING
FACTORY INSTALLED WIRING

Fig. 21 — Main Power and Control Connections — 30RA035-055 Without Hydronic Package

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 (7.2 C) for 30RA010-018 units and 32 F (0.0° C) for 30RA022-055 units are expected, refer to separate installation instructions for low-ambient operation using accessory Motormaster® V control.

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: coil hail guard, external vibration, enhanced display, temperature reset, condenser coil grilles, storage tank 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-22 (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. Compressor oil equalization line fittings use O-ring face seal fittings. If a leak is detected at these fittings, tighten fitting $^1/_4$ turn. If leak persists, open system and inspect the O-ring surface for foreign material or damage. Do not reuse O-rings. 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 ahead of filter drier in each circuit is a $^1/_4$-in. Schrader connection for charging liquid refrigerant.

⚠ 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 with higher cooling fluid consumption, possible compressor damage, and higher power consumption.

If unit is equipped with a Motormaster® V control, the pressure transducer has to be removed from the liquid line Schrader connection to allow for gage access.

The compressors 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. 22.

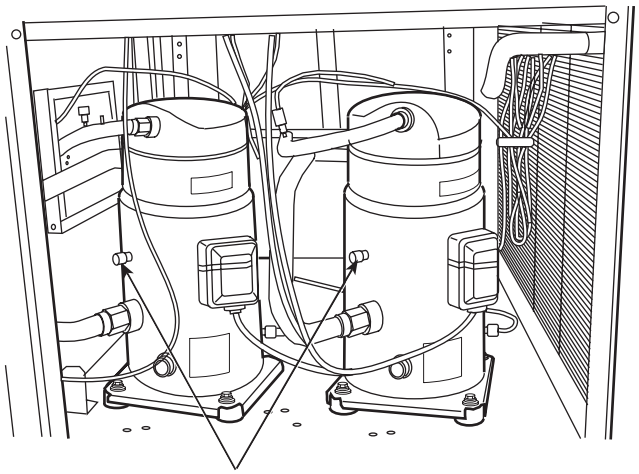
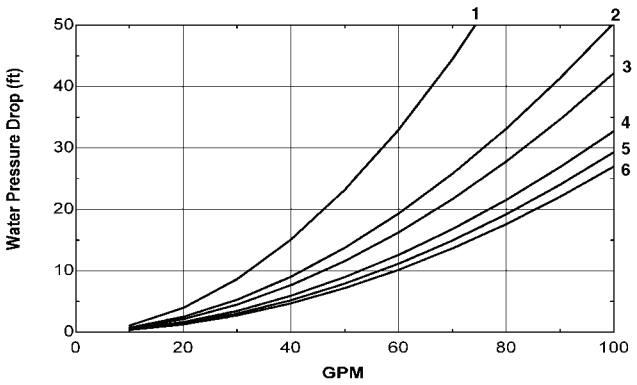


Fig. 22 — Suction Access Port

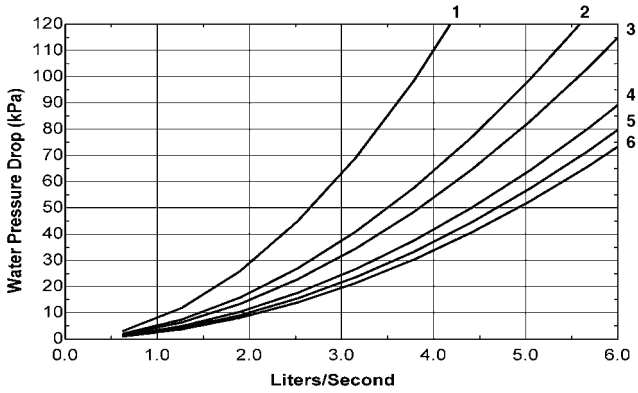
APPENDIX A

Pressure Drop Curves, 30RA010-055

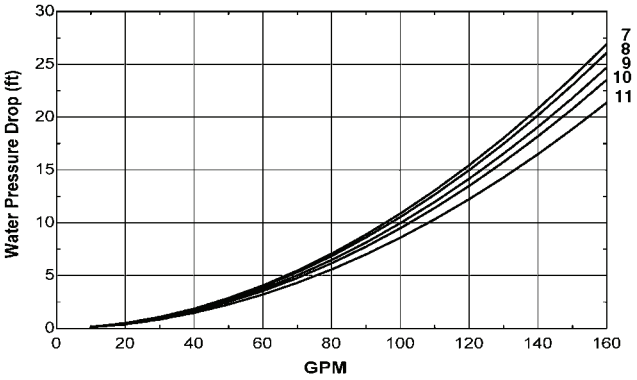
PRESSURE DROP, WITHOUT PUMP UNITS, 30RA010-030



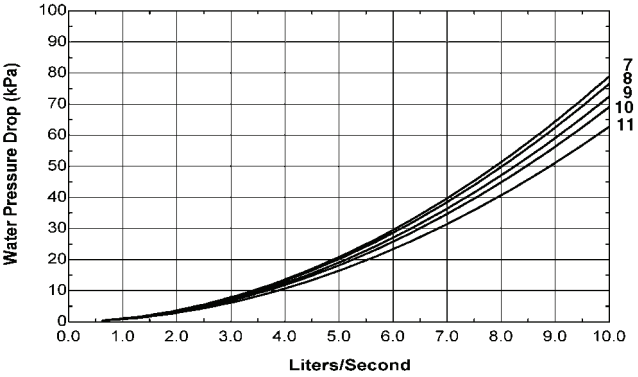
PRESSURE DROP, WITHOUT PUMP UNITS, 30RA010-030



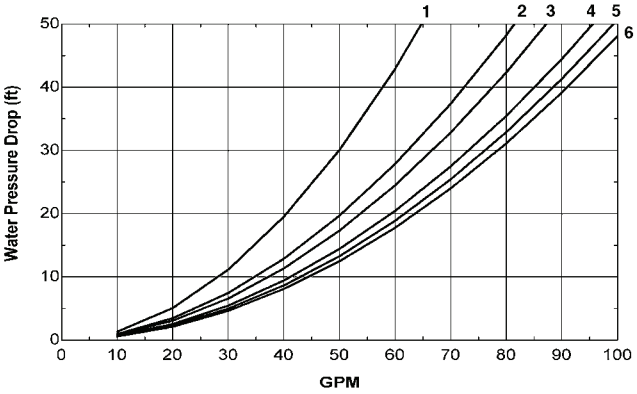
PRESSURE DROP, WITHOUT PUMP UNITS, 30RA035-055



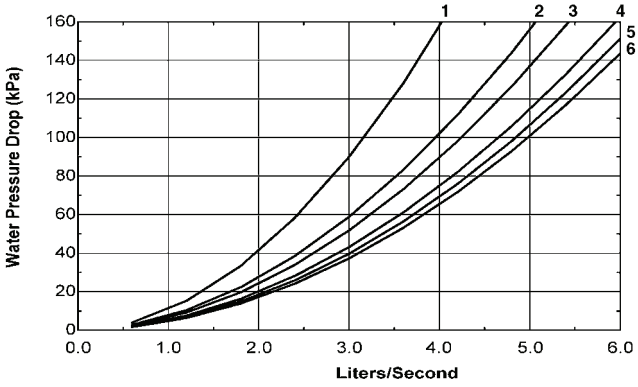
PRESSURE DROP, WITHOUT PUMP UNITS, 30RA035-055



PRESSURE DROP, SINGLE PUMP UNITS, 30RA010-030



PRESSURE DROP, SINGLE PUMP UNITS, 30RA010-030



Use the following formula to convert feet of water to psi:
ft of water (.4335) = psi

Use the following formula to convert psi to feet of water:
Psi (2.306) = ft of water

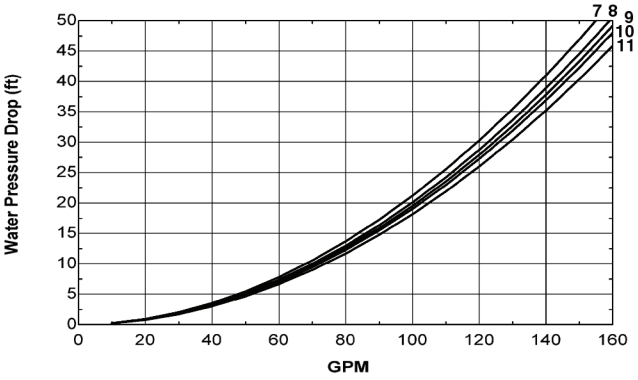
LEGEND

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

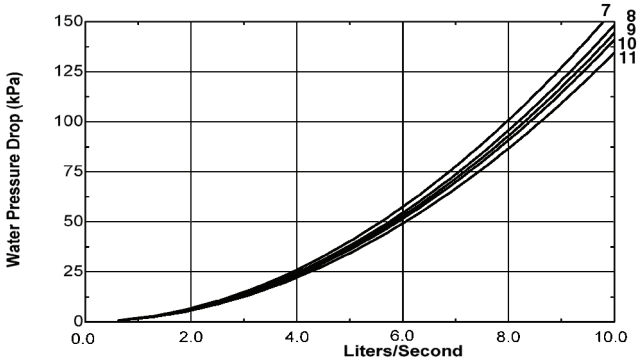
APPENDIX A (cont)

Pressure Drop Curves, 30RA010-055 (cont)

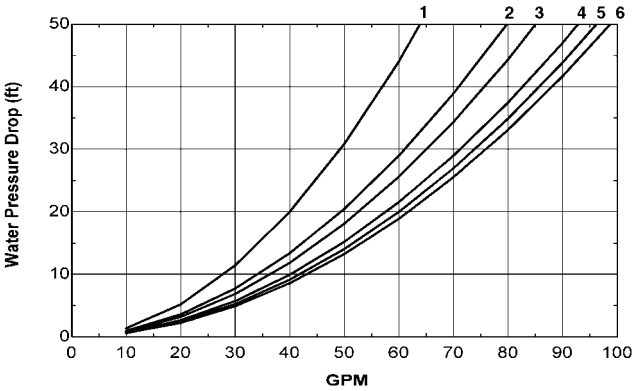
PRESSURE DROP, SINGLE PUMP UNITS, 30RA035-055



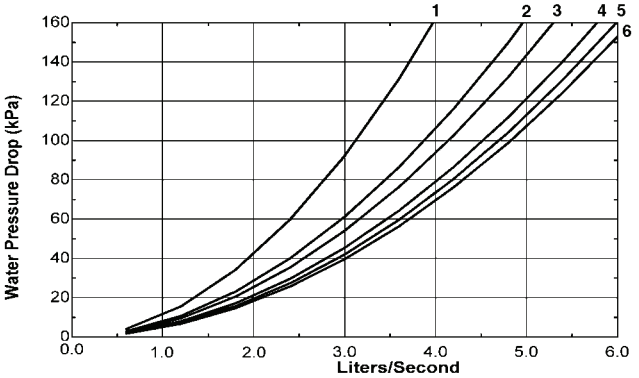
PRESSURE DROP, SINGLE PUMP UNITS, 30RA035-055



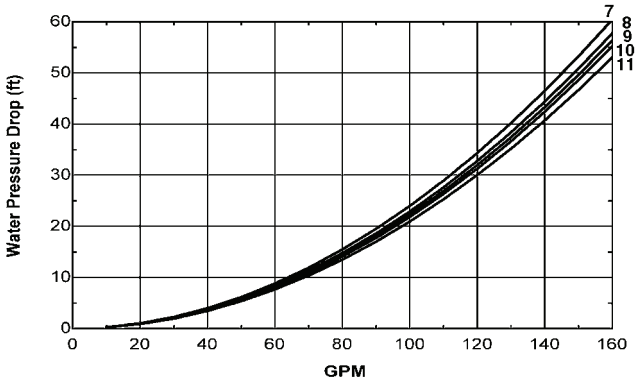
PRESSURE DROP, DUAL PUMP UNITS, SIZES 30RA010-030



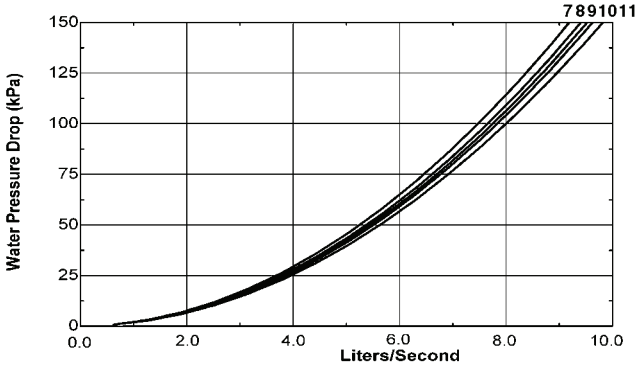
PRESSURE DROP, DUAL PUMP UNITS, SIZES 30RA010-030



PRESSURE DROP, DUAL PUMP UNITS, SIZES 30RA035-055



PRESSURE DROP, DUAL PUMP UNITS, SIZES 30RA035-055



Use the following formula to convert feet of water to psi:
ft of water (.4335) = psi

Use the following formula to convert psi to feet of water:
Psi (2.306) = ft of water

LEGEND

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

APPENDIX A (cont)

Pressure Drop Curves, Accessory Storage Tanks