Product

Data

AEROSnap

30RAN055-180

Air-Cooled Liquid Scroll Chillers

55 to 180 Nominal Tons

(193 to 633 Nominal KW)

AEROSNAP

SarmaAfarin AeroSnap 30RAN **series** have compatible design to meet the efficiency demands of today and the future by providing premium air-cooled chiller packages for contractors, consulting engineers and building owners.

30RAN Features:

- Positive displacement, scroll compressor.
- Chlorine free R-134a HFC Refrigerant so compatible with R-407C
- Easy to use *Comfort* Link controls and monitor.
- Foot print most efficient air cooled models.
- Full load ESEER up to ~11 and COP up to 3.2 so that might exceeds the EN energy requirement as ***A+.***
- The *AeroSnap* 30RAN chillers deliver superior efficiency through the entire operating range to keep costs and demand charges down.

ISO 9001 CISQ IMQ IQNet

Certificate No.: 9190.C308

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Features and Benefits

30RAN liquid chillers are the best solution for commercial and industrial applications where installers, engineering and design departments and building owners require reduced installation costs, optimal performance and the highest quality. 30RAN's innovative chiller design provides savings at initial purchase, at installation, and for years afterward.

The 30RAN liquid chillers are designed to meet current and future requirements in terms of energy efficiency and operating sound levels. They use the best technologies available today.

- Ultra-quiet, high efficiency ZR Copeland Scroll compressors
- Low pressure drop brazed plate heat exchangers
- Low noise generation fans
- PLC based control system
- Electronic expansion valve enabling operation at a lower condensing pressure and improved use of the evaporator heat exchange surface

Compressor

Scroll compressors are now the most used compression technology replacing reciprocating and screw compressors due to its undeniable superiority. Several, fully Copeland qualified; multiple compressor assemblies (tandem and trio) are available to allow the use of scroll compressors into large capacity systems. SSI uses Copeland ZR250 to 380 Series. Some of the benefits of this model are mentioned.

- Copeland Scroll axial and radial compliance for superior Reliability and efficiency
- Wide scroll line-up for R407C and R134a
- Low TEWI (Total Equivalent Warming Impact)
- Low sound and vibration level
- Low oil circulation rate
- Copeland qualified tandem and trio configurations for
- Superior seasonal efficiency (ESEER)

Brazed plate evaporator

The compact, high efficiency Brazed Plate Heat Exchanger (BPHE) is used. It offers excellent heat transfer performance with a compact size and low weight, reducing structural steel requirements on the job site. The heat exchanger is manufactured in a precisely controlled vacuum-brazing process that allows the filler material to form a brazed joint at every contact point between the plates, creating complex channels. It is important to note that the strainer is required for all brazed plate heat exchangers; therefore, not considering it from the beginning may lead to the selection of the incorrect pump for the system and an incorrect evaluation of the overall installation cost. So strainer should use to provide protection at the evaporator inlet, particularly at system start-up when construction debris may be present in the piping system.

Flow switch is included with the cooler. the switch is factory installed and tested and contains no moving parts for high reliability.

Condenser

Efficient air cooled condenser with large coil surface area maximize the heat transfer. Additionally, the internally enhanced seamless copper tubes arranged in a staggered row pattern mechanically expanded into SSI wavy aluminum condenser fins makes the condenser too efficient to redundant the heat.

Condenser coils is mounted in V-shape with an open angle, allows quieter air flow across the coil.

The low-noise axial fans rotating at 880 rpm employed to move large volume of air at exceptionally low sound levels with virtually vibration-free operation. May the sound diffuser be applied.

Environmental Care

- R407c & R134a are safe, efficient, and environmentally balanced refrigerant and also responsible choice for protecting the earth's ozone layer.
- Leak-tight refrigerant circuit
  - Reduction of leaks as no refrigerant connection is made at site.
  - Verification of pressure transducers and temperature sensors without transferring refrigerant charge
  - Discharge shut-off valve and liquid line service valve for simplified maintenance

PLC based Control

PLC Controller is an advanced numeric control system that combines intelligence with great operating simplicity. The control constantly monitors all machine parameters and precisely manages the operation of

compressors, electronic expansion devices, fans and evaporator water pump for optimum energy efficiency

- Energy management
  - Leaving or entering cooler water temperature controls chiller on/off.
  - Continuously control compressor capacity to match required load
  - Chiller PLC system can be integrated with building management system (BMS)
- Ease-of-use
  - User interface with large screen for intuitive access to the operating parameters. The information is in clear text

Electronic expansion valve (EXV)

The EXV controls refrigerant flow to the cooler for different operating conditions by moving an orifice to increase or decrease the flow area through the valve based on microprocessor input. The orifice is positioned by a stepper motor and is monitored every 3 seconds. The EXV maintains approximately 14.4°F (8°C) refrigerant superheat entering the compressor.

Model number nomenclature

30 RAN 55 – Z415 C 1 A

Products Series
Chiller

Chiller Type
RAN: Air Cooled Scroll

Nominal Capacity
55 to 180 Ton

Style A: BPHE Evaporator Size
Z415
Style B: Shell & Tube Evaporator size
70
120

Compressor Brand
C: Copeland
D: Danfoss

Refrigerant Type
1: R-134a
4: R-407c

Fin material
A: Al
C: Cu

AHRI CAPACITY RATING (English and SI UNITS)

UNIT 30RAN (BPHE Cooler) R-134A Refrigerant	Capacity		Power	Full Capacity	
	kWR	TONS	kW	COP	EER
55-415	106.0	30.1	25.7	4.12	14.05
80-415	142.4	40.5	39.6	3.61	12.31
100-415	178.0	50.6	51.2	3.5	11.94
120-415	208.2	59.2	65.1	3.2	10.91
150-415	252.0	71.6	85.5	3	10.23
180-415	316.2	89.9	97.2	3.25	11.08

LEGEND
COP - Coefficient of Performance kWR - kilowatt of Refrigeration
EER - Energy Efficiency Ratio

1. Rated in accordance with AHRI Standard 550/590 at standard rating conditions.
2. Standard rating conditions are as follows:

Chilled Water Entering Temperature: 54°F, Leaving Temperature: 44°F
Condenser Entering Air Dry Bulb Temperature in standard series: 95°F (35°C)
Fouling Factor: 0.00010 hr×ft2°F/Btu (0.000018 m2×°C/W)

AHRI CAPACITY RATING (English and SI UNITS)

UNIT 30RAN (BPHE Cooler) R-407C Refrigerant	Capacity		Power	Full Capacity	
	kWR	TONS	kW	COP	EER
55-415	157.7	44.8	40	3.94	13.44
80-415	208.8	59.4	63	3.32	11.32
100-415	253.2	72.0	84.4	3.0	10.23
120-415	313.8	89.2	94.5	3.33	11.36
150-415	375.6	106.8	126	2.99	10.2
180-415	466.8	132.7	148.2	3.15	10.74

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EER - Energy Efficiency Ratio

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Condenser Entering Air Dry Bulb Temperature in standard series: 95°F (35°C)
Fouling Factor: 0.00010 hr×ft2°F/Btu (0.000018 m2×°C/W)

AHRI CAPACITY RATING (English and SI UNITS)

UNIT 30RAN (Shell & Tube Cooler) R-134A Refrigerant	Capacity		Power	Full Capacity	
	kWR	TONS	kW	COP	EER
80-70	154.0	43.8	40.2	3.83	13.06
100-70	183.2	52.1	51.4	3.56	12.14
120-70	210.0	59.7	65.1	3.23	11.01
150-120	261.0	74.2	86.4	3.02	10.3
180-120	321.6	91.4	97.5	3.3	11.25

LEGEND
COP - Coefficient of Performance kWR - kilowatt of Refrigeration
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Fouling Factor: 0.00010 hr×ft2°F/Btu (0.000018 m2×°C/W)

AHRI CAPACITY RATING (English and SI UNITS)

UNIT 30RAN (Shell & Tube Cooler) R-407C Refrigerant	Capacity		Power	Full Capacity	
	kWR	TONS	kW	COP	EER
80-70	211.2	60.0	63.6	3.32	11.32
100-70	243.6	69.3	84	2.9	9.89
120-70	298.8	85.0	93.9	3.18	10.84
150-120	367.2	104.4	126	2.91	9.92
180-120	445.2	126.6	147	3.03	10.33

LEGEND
COP - Coefficient of Performance kWR - kilowatt of Refrigeration
EER - Energy Efficiency Ratio

1. Rated in accordance with AHRI Standard 550/590 at standard rating conditions.
2. Standard rating conditions are as follows:

Chilled Water Entering Temperature: 54°F, Leaving Temperature: 44°F
Condenser Entering Air Dry Bulb Temperature in standard series: 95°F (35°C)
Fouling Factor: 0.00010 hr×ft2°F/Btu (0.000018 m2×°C/W

PHYSICAL DATA

UNIT 30RAN			Style A	55_415	80_415	100_415	120_415	150_415	180_415
			Style B	_	80_70	100_70	120_70	150_120	180_120
Weight (lb)*		Al coil	Style A	2912	3402	3766	4198	4611	5738
			Style B	_	4188	4463	4894	5778	6904
		Cu Coil	Style A	3047	3537	3901	4332	4746	5939
			Style B	_	4320	4596	5028	5913	7107
Refrigerant				R-134a					
Compressor	Copeland			ZR-Series					
	No. Compressors			2	4	4	6	6	6
	Total Oil Chg (gal)			3.46	4.93	7.18	7.40	10.78	9.98
	Danfoss			SZ-Series					
	%CAP Circuit 1			54	50	50	50	50	50
	%CAP Circuit 2			46	50	50	50	50	50
	No. Control Steps			2	4	4	6	6	6
Cooler	Style A			Brazed Plate Heat Exchanger					
	Style A Working Pressure (Psig)			435					
	Style A Total Volume (gal)			6.67		11.05		16.29	
	Style A (Z415 No.)			62		102		150	
	Style A Water Connection (in)			2				2.5	
	Style B (optional)			Shell & Tube					
	Style B Working Pressure (Psig)			Refrigerant Side=235				Water Side=150	
	Style B Shell, Net Volume (gal)			–	22.19			40.15	
	Style B (10 HA ...)			–	70			120	
	Style B Water Connection (in)			–	4.5				
Condenser	Type			Fin and Enhanced Inner Grooved Tube, V-Type					
	Condenser Fan			Axial 800 mm diameter, Vertical discharge					
	Quantity			4	4	4	4	4	6
	Total Airflow (CFM)			43600	43600	43600	43600	43600	65400
	Power/Fan			1.94					
	Fan RPM			910					
	Row/FPI			4/14					
	Total face area (Sq. Ft)			94.16	94.16	94.16	94.16	94.16	141.24
Dimension*	Length(in.)			106.3	106.3	106.3	106.3	106.3	153.5
	Width(in.)			91					
	Height(in.)			104					

*The weight and dimensions of units are approximate and may be subjective to change.

PHYSICAL DATA

UNIT 30RAN	Style A		55_415	80_415	100_415	120_415	150_415	180_415
	Style B		_	80_70	100_70	120_70	150_120	180_120
Weight (lb)*	Al coil	Style A	2912	3402	3766	5053	5457	6592
		Style B	_	4188	4463	5751	6625	7761
	Cu Coil	Style A	3047	3537	3901	5255	5659	6862
		Style B	_	4320	4596	5952	6836	8031
Refrigerant			R-407c					
Compressor	Copeland		ZR-Series					
	No. Compressors		2	4	4	6	6	6
	Total Oil Chg (gal)		3.46	4.93	7.18	7.40	10.78	9.98
	Danfoss		SZ-Series					
	%CAP Circuit 1		54	50	50	50	50	50
	%CAP Circuit 2		46	50	50	50	50	50
	No. Control Steps		2	4	4	6	6	6
Cooler	Style A		Brazed Plate Heat Exchanger					
	Style A Working Pressure (Psig)		435					
	Style A Total Volume (gal)		6.67		11.05		16.29	
	Style A (Z415 No.)		62		102		150	
	Style A Water Connection (in)		2				2.5	
	Style B (optional)		Shell & Tube					
	Style B Working Pressure (Psig)		Refrigerant Side=235				Water Side=150	
	Style B Shell, Net Volume (gal)		–	22.19			40.15	
	Style B (10 HA ...)		–	070			120	
	Style B Water Connection (in)		–	4.5				
Condenser	Type		Fin and Enhanced Inner Grooved Tube, V-Type					
	Condenser Fan		Axial 800 mm diameter, Vertical discharge					
	Quantity		4	4	4	6	6	8
	Total Airflow (CFM)		43600	43600	43600	65400	65400	87200
	Power/Fan		1.94					
	Fan RPM		910					
	Row/FPI		4/14					
	Total face area (Sq. Ft)		94.16	94.16	94.16	141.24	141.24	188.3
Dimension*	Length(in.)		94.5	94.5	94.5	141.7	141.7	189.0
	Width(in.)		91					
	Height(in.)		104					

*The weight and dimensions of units are approximate and may be subjective to change.

PHYSICAL DATA

Style A Cooler Model	BPHE	62* Z415	102* Z415	150* Z415
Thickness	in	6.51	10.19	14.72
Weight (without connections)	lb	176.21	252.94	345.0
Total Heat Transfer Area	ft^2	133.95	223.24	330.34
Total Volume	gal	6.67	11.05	16.29
Heat Transfer Area/Plate	ft^2	2.23		
Horizontal Port Centers Distance	in	8.90		
Vertical Port Centers Distance	in	25.83		
Compressed Plate Pitch	in	0.094		
Plate Width	in	12.64		
Max. Working Pressure	psig	435.11		

Style B Cooler Model	10HA	70	120
Shell Net. Vol. ↑	gal	22.19	40.15
Shell OD	inch	12.75	16
Shell Length *	inch	2094	2094
Refrigerant Ckts.	No.	2	2
Max. Design Working Pressure	psig	235	
Water Inlet & Outlet Connection	inch	4.5	4.5
Cooler Drain Connection	inch	2	2

↑Includes nozzles.
*Between tube sheets.

LCWT: 44 F	30RAN																	
R134a	CONDENSER ENTERING AIR TEMPRATURE (F)																	
MODEL 30RAN (Style A)	85			95			105			115			120			125		
	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM
55-415	31.4	22.9	75.5	30.1	25.7	72.3	28.9	28.7	69.34	27.4	32.2	65.8	26.6	34.1	63.9	25.9	36.2	62.2
80-415	42.3	35.4	101.5	40.5	39.6	97.2	38.5	44.4	92.5	36.5	49.8	87.6	35.4	52.6	84.9	34.2	55.8	82.1
100-415	53.1	45.8	127.5	50.6	51.2	121.5	48.0	57.4	115.2	45.1	64.6	108.4	43.7	68.6	104.8	42.1	73	101.0
120-415	61.9	58.0	148.6	59.2	65.1	142.1	56.1	72.9	134.7	52.9	81.6	126.9	51.2	86.7	122.8	49.5	91.8	118.7
150-415	75.2	76.2	180.5	71.6	85.5	172.0	67.7	96	162.5	63.3	108.6	151.9	61.1	115.5	146.6	58.7	123	140.8
180-415	94.2	86.7	226.0	90.0	97.2	215.8	85.5	108.9	205.1	80.7	121.8	193.6	78.5	129	188.3	75.9	136.2	182.2

LCWT: 44 F	30RAN											
R407C	CONDENSER ENTERING AIR TEMPRATURE (F)											
MODEL 30RAN (Style A)	85			95			105			115		
	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM
40-415	47.3	35.5	113.4	44.8	40	107.6	42.3	45.3	101.5	39.3	51.5	94.2
80-415	62.7	55.6	150.5	59.4	63	142.5	56.0	71.6	134.3	52.2	82	125.3
100-415	76.8	74.4	184.2	72.0	84.4	172.8	66.9	96	160.5	61.7	110	148.2
120-415	94.2	83.4	226.0	89.2	94.5	214.1	83.9	107.4	201.4	78.1	123	187.5
150-415	114.1	111	273.9	106.8	126	256.3	99.5	143.4	238.7	91.8	163.8	220.3
180-415	139.7	131.4	335.3	132.7	148.2	318.5	123.3	169.2	296.0	113.6	192.6	272.7

LCWT: 44 F	30RAN																	
R134a	CONDENSER ENTERING AIR TEMPRATURE (F)																	
MODEL 30RAN (Style B)	85			95			105			115			120			125		
	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM
80-70	45.9	36.0	110.3	43.8	40.2	105.1	41.6	45	99.9	39.2	50.4	94.2	37.9	53.4	91.0	36.7	56.6	88.2
100-70	54.5	46	130.7	52.1	51.4	125.0	49.5	57.8	118.7	46.4	65	111.4	44.9	69	107.8	43.3	73.4	104.0
120-70	62.6	58.1	150.2	59.7	65.1	143.3	56.5	72.9	135.5	53.2	81.9	127.7	51.5	86.7	123.6	49.6	91.8	119.1
150-120	78.1	77.1	187.5	74.2	86.4	178.1	69.8	97.2	167.4	64.8	109.8	155.6	62.6	117	150.3	59.9	124.8	143.7
180-120	96.2	87	230.9	91.4	97.5	219.4	87	109.5	208.8	81.9	122.4	196.5	79.7	129.6	191.2	76.9	136.8	184.6

PERFORMANCE DATA

LCWT: 44 F	30RAN											
R407C	CONDENSER ENTERING AIR TEMPRATURE (F)											
MODEL 30RAN (Style B)	85			95			105			115		
	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM	CAP	PI	GPM
80-70	63.3	56.2	152.0	60.0	63.6	144.1	56.4	72.4	135.4	52.3	82.8	125.5
100-70	74.1	73.8	178.0	69.3	84	166.2	64.7	95.6	155.3	59.8	109.6	143.6
120-70	90.1	82.8	216.2	85.0	93.9	203.9	79.7	106.8	191.2	74.2	121.8	178.1
150-120	111.7	111	268.2	104.4	126	250.6	96.9	143.4	232.6	89.7	164.4	215.3
180-120	134.4	129.6	322.6	126.6	147	303.8	117.7	166.8	282.5	107.8	190.2	258.8

LEGEND

LCWT - Leaving chilled water temperature
CAP. - Capacity, tons of refrigeration
kW - Compressor motor Input at rated voltage (kW)
*Cooler water temperature rise of 10F

30RAN (Style A) MODELS With R134a (380V-PW/Y/Δ-50Hz)

UNIT 30RAN	UNIT 30RAN	
	POWER(KW)	FLA(Amps)
55~415	43.96	81.52
80~415	63.56	125.12
100~415	80.76	148.44
120~415	99.56	199.08
150~415	130.76	230.04
180~415	147.84	254.16

30RAN (Style A) MODELS With R407c (380V-PW/Y/Δ-50Hz)

UNIT 30RAN	UNIT 30RAN	
	POWER(KW)	FLA(Amps)
55~415	59.26	102.65
80~415	89.76	149.92
100~415	118.16	195.68
120~415	134.64	224.88
150~415	176.04	292.32
180~415	208.12	353.22

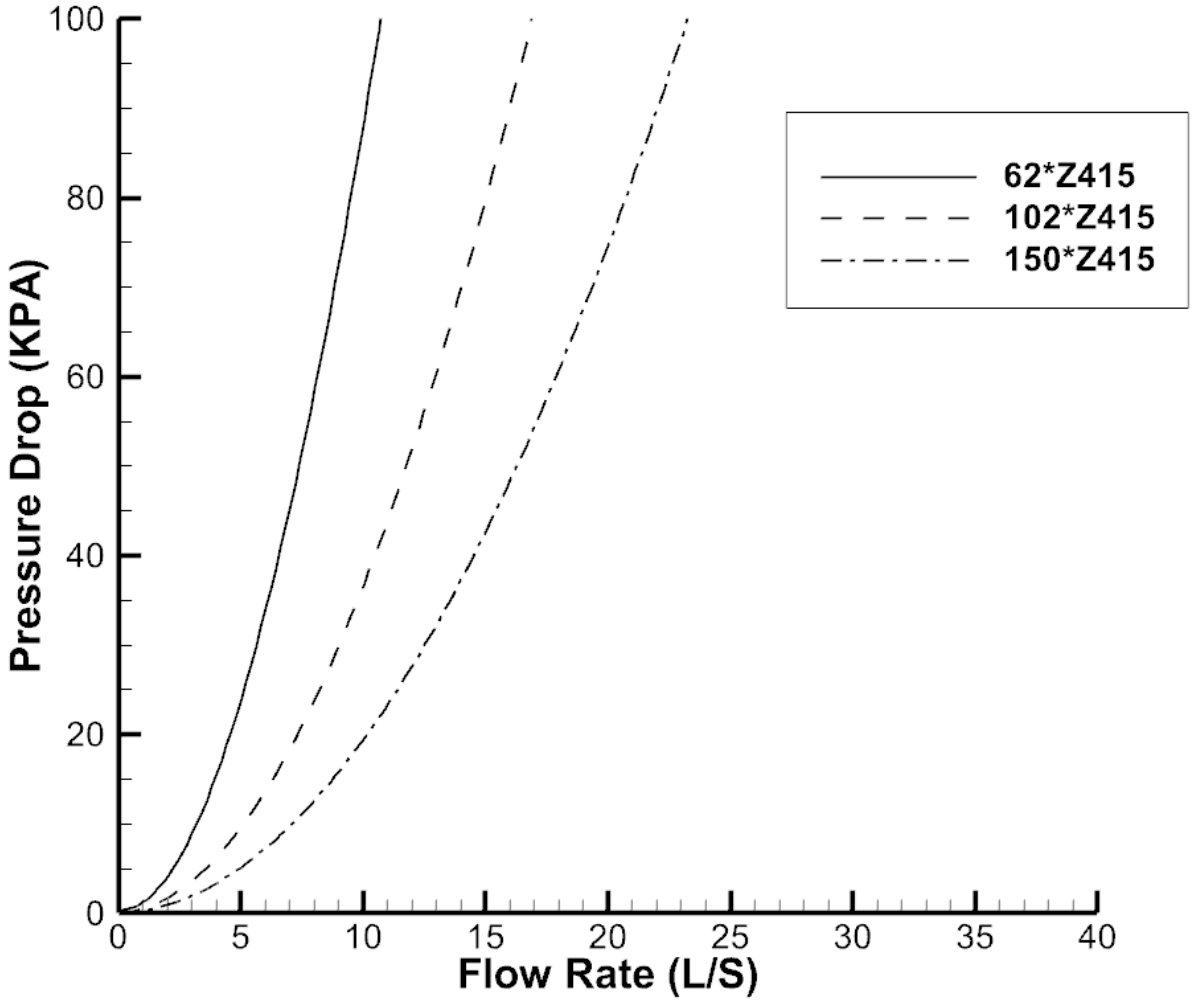
30RAN (Style B) MODELS With R134a (380V-PW/Y/Δ-50Hz)

UNIT 30RAN	UNIT 30RAN	
	POWER(KW)	FLA(Amps)
80~70	64.36	128.68
100~70	81.16	149.2
120~70	99.56	199.26
150~120	132.56	231.96
180~120	148.44	255.18

30RAN (Style B) MODELS With R407c (380V-PW/Y/Δ-50Hz)

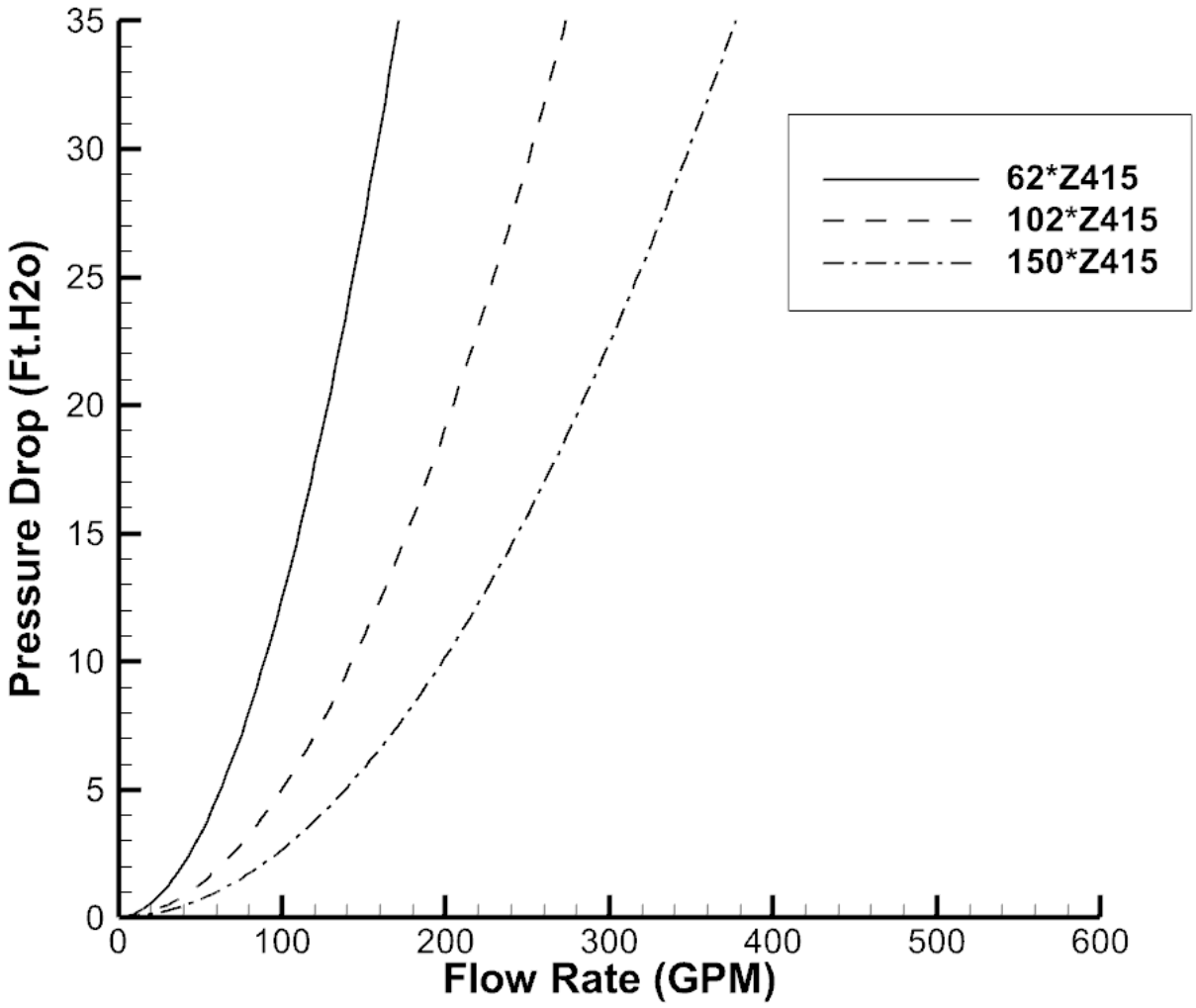
UNIT 30RAN	UNIT 30RAN	
	POWER(KW)	FLA(Amps)
80~70	90.56	151.08
100~70	117.36	194.48
120~70	133.44	223.8
150~120	176.04	292.02
180~120	205.72	349.38

CHARTS



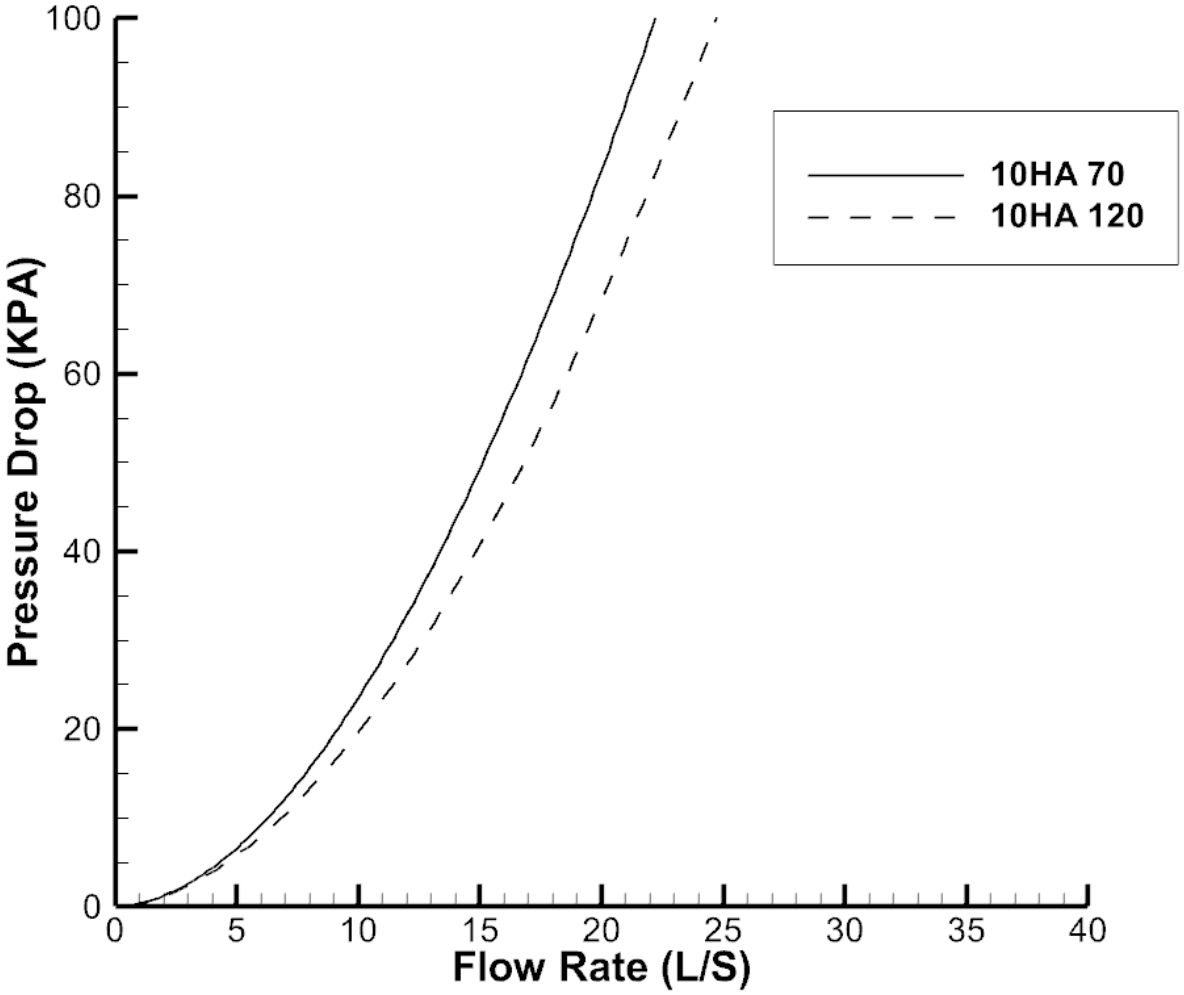
Style (A) Pressure Drop Chart

CHARTS

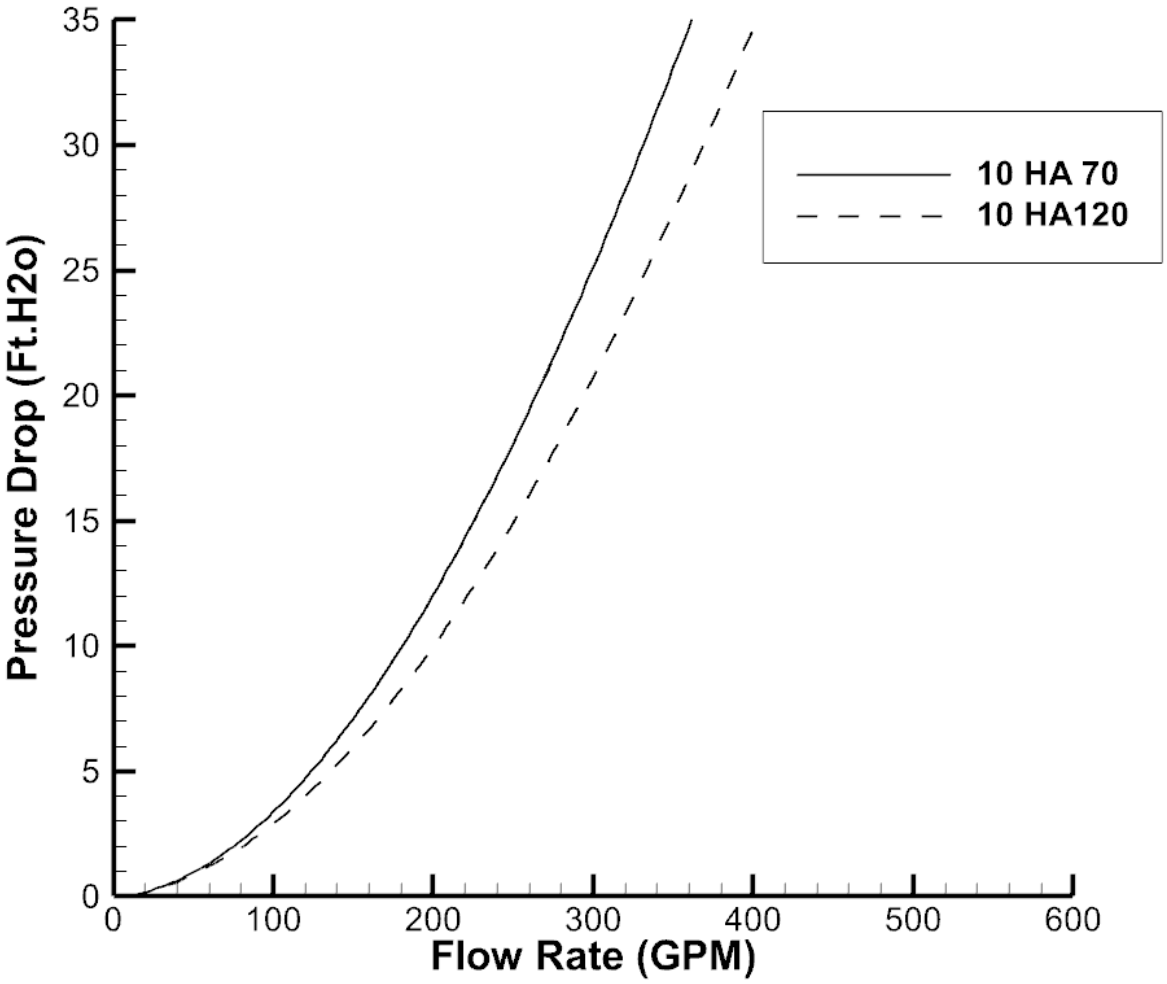


Style (A) Pressure Drop Chart

CHARTS



Style (B) Pressure Drop Chart



Style (B) Pressure Drop Chart

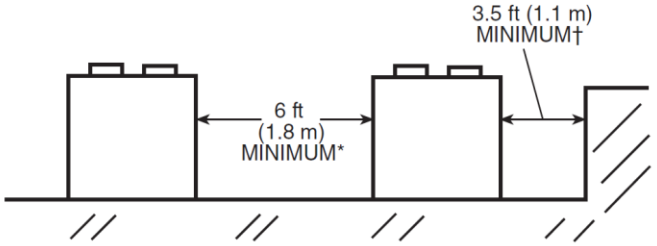
Chiller location and clearances

The 30RAN unit must be installed outdoors.

Do not locate near sound-sensitive areas without proper acoustic consideration. For applications requiring mounting a chiller on a building rooftop, consideration should be given to using rubber-in-shear or spring isolators to minimize structure borne transmission. Unit must be level when installed to ensure proper oil return to the compressors. Clearances must be provided around chillers for airflow, service and local code requirements. See dimensional drawings for specific unit clearance requirements. Ensure adequate clearance between adjacent chillers is maintained.

When chillers are arranged in parallel, a minimum of 10 ft (3048 mm) between chillers is recommended. Acceptable clearance on the cooler connection side or end opposite the control box of the unit can be reduced to 3 ft (1 m) without sacrificing performance as long as the remaining three sides are unrestricted. Acceptable clearance on the side with a control box can be reduced to 4 ft (1.3 m).without sacrificing performance as long as the remaining three sides are unrestricted. Clearances between chillers in dual chiller applications may be reduced to 6 ft (1.8 m) without sacrificing performance provided the remaining sides are unrestricted.

30RAN MULTIPLE UNIT SEPARATION



Multiple chillers

Where chiller capacities greater than can be supplied by a single 30RAN chiller are required, or where standby capability is desired, chillers may be installed in parallel. Units may be of the same or different sizes with this piping arrangement.

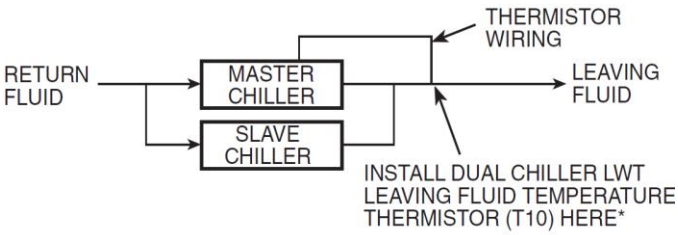
However, cooler flow rates must be balanced to ensure proper flow to each chiller.

Unit software is capable of controlling two parallel units as a single plant by making use of the dual chiller control feature.

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

Parallel chiller control with dedicated pumps is recommended. The chiller must start and stop its own water pump located in its own piping. Check valves are required at the discharge of each pump. If pumps are not dedicated for each chiller, then isolation valves are required. Each chiller must open and close its own isolation valve through the unit control (the valve must be connected to the pump outputs).

PARALLEL CHILLER INSTALLATION



*Depending on piping sizes, use either:
- HH79NZ014 sensor/10HB50106801 well (3-in. sensor/well)
- HH79NZ029 sensor/10HB50106802 well (4-in. sensor/well)

Series chillers

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

Cooler water temperature

1. Maximum leaving chilled water (fluid) temperature (LCWT) for the unit is 50°F (10°C). It is recommended that entering-fluid temperature not exceed 70°F (21.1°C).

2. Minimum LCWT for fresh water applications is 41°F (5°C). For leaving fluid temperatures below 41 F (5°C) an inhibited antifreeze solution in the fluid loop is required.

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

Cooler flow/range

Ratings and performance data in this publication are for a cooling temperature rise of 9°F (5°C). The 30RAN chillers may be operated at a different temperature rise, providing flow limits are not exceeded and corrections to system guidelines are made. A high flow rate is generally limited by the maximum pressure drop that can be tolerated by the unit. The 30RAN chillers are designed for temperature rise of 5° to 20°F (2.8° to 11.1°C). To obtain the rating if a temperature rise other than 9° F (5°) is used consult with SARMAAFARIN.

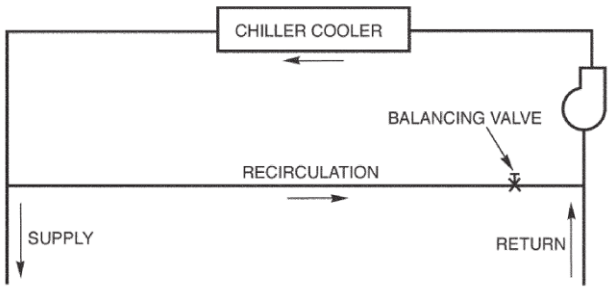
Minimum cooler flow (maximum cooler temperature rise) The minimum cooler flow for standard units is shown in Minimum and Maximum Cooler Fluid Flow Rates table. When system design conditions require a lower flow (or higher rise) than the minimum allowable cooler flow, follow the recommendations below.

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

• Cooler fluid may be recirculated to raise the flow rate to the chiller. The mixed temperature entering the cooler must be maintained to a minimum of at least 5°F (2.8°C) above the LCWT and to a maximum of no more than 20°F (11.1°C) above the LCWT.

NOTE: Recirculation flow is shown below.

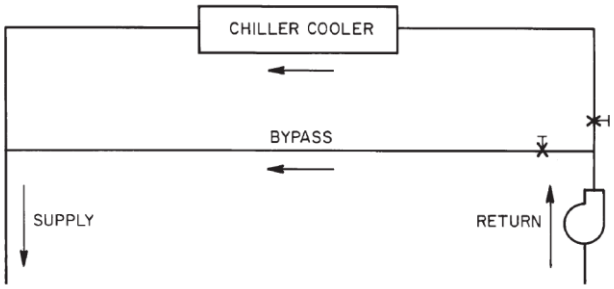
RECIRCULATION FLOW



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

Return fluid may bypass the cooler to keep the pressure drop through the cooler within acceptable limits. This permits a higher delta T with lower fluid flow through cooler and mixing after the cooler.

BYPASS FLOW



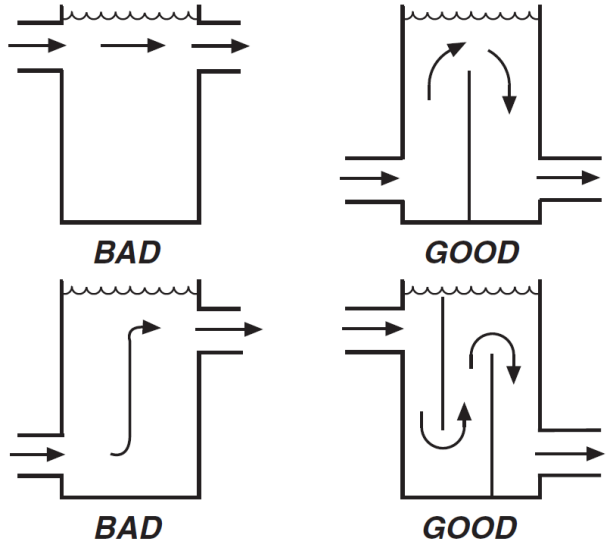
Variable cooler flow rates

Variable flow rates may be applied to a standard chiller. The unit will, however, attempt to maintain a constant leaving chilled water temperature. In such cases, minimum flow must be in excess of minimum flow given in the Minimum and Maximum Cooler Fluid Flow Rates table, and minimum fluid volume in circulation must be in excess of 3 gallons per ton (3.2 L per KW). Flow rate must change in steps of less than 10% per minute. Apply a minimum of 6 gal per ton (6.5 L per kW) water loop volume if flow rate changes more rapidly.

Tank installation

It is often necessary to install a tank in the loop. The tank should be baffled to ensure there is no stratification and that water (or brine) entering the tank is adequately mixed with liquid in the tank. A fluid storage tank is available as an accessory. The piping between the chiller and the accessory tank can be done to allow the tank to be on the return side of the chiller (tank piped to chiller inlet) or the supply side of the chiller (tank piped to the chiller outlet). However, it is recommended that the tank be piped to the return side of the chiller to buffer any changes in load to allow more stable chiller operation.

TANK INSTALLATION



Cooler freeze protection

Freeze protection for the cooler is standard on all 30RAN air-cooled chillers. Use cooler heater if require. Since power is sometimes lost for extended periods during winter storms, freeze protection provided by heater tapes will be effective only if a back-up power supply can be assured for the unit's control circuit, heater and cooler pump. If not protected with an antifreeze solution, draining the cooler and outdoor piping is recommended if the system will not be used during freezing weather conditions.

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

Higher concentration must be used to adequately protect the machine.

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

For applications in which the leaving water temperature set point is less than 40°F (4.4°C), a suitable inhibited antifreeze solution must be used. The solution concentration must be sufficient to protect the chilled water loop to a freeze protection (first crystals) concentration of at least 15°F (8.3ºC) below the leaving water temperature set point. If the chiller refrigerant or fluid lines are in an area where ambient conditions fall below 34°F (1ºC), it is required that an antifreeze solution be added to protect the unit and fluid piping to a temperature of 15ºF (8.3ºC) below the lowest anticipated ambient temperature.

High ambient temperature operation

High outdoor ambient chiller start-up and operation is possible for standard 30RAN chillers with R134a refrigerant at ambient temperatures up to 125°F (51.7°C) at nominal voltage and also for 30RAN chillers with R407c refrigerant at ambient temperatures up to 115°F (46.1°C) at nominal voltage.

Low ambient temperature operation

Units will start and operate down to 32°F (0°C) as standard.

Start-up and operation down to as low as –20°F (–29°C) ambient temperature for sizes require the inclusion of either low ambient head pressure control. Wind baffles are also required for such low-temperature applications.

Inhibited propylene glycol or other suitable corrosion-resistant anti-freeze solution must be field supplied and installed in all units for unit operation below 32°F (0°C). Solution must be added to fluid loop to protect loop down to 15°F (8.3 °C) below minimum operating ambient temperature.

Concentration should be based on expected minimum temperature and either "Burst" or "Freeze" protection levels. At least 6 gal per ton (6.5 L per kW) of fluid volume is the recommended minimum for a moderate system load.

Water system cleaning

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

1. Install a temporary bypass around the chiller to avoid circulating dirty water and particulates into the pump and chiller during the flush. Use a temporary circulating pump during the cleaning process. Also, be sure that there is capability to drain the system fully after cleaning.
2. Be sure to use a cleaning agent that is compatible with all system materials. Be especially careful if the system contains any galvanized or aluminum components.

Both detergent-dispersant and alkaline dispersant cleaning agents are available.

3. It is a good idea to fill the system through a water meter. This provides a reference point for the future for loop volume readings, but it also establishes the correct quantity of cleaner needed in order to get the required concentration.
4. Use a feeder/transfer pump to mix the solution and fill the system. Circulate the cleaning system for the length of time recommended by the cleaning agent manufacturer.

a. After cleaning, drain the cleaning fluid and flush the system with fresh water.

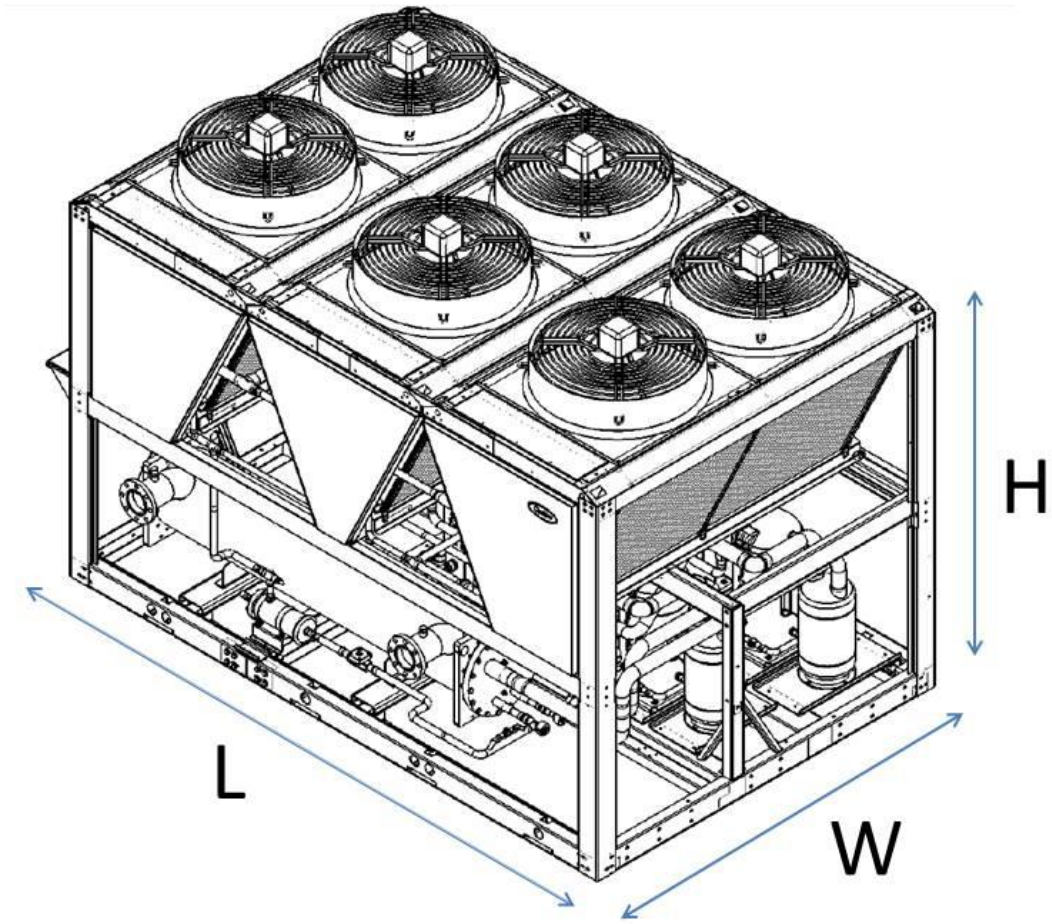
b. A slight amount of cleaning residue in the system can help keep the desired, slightly alkaline, water pH of 8 to 9. Avoid a pH greater than 10, since this will adversely affect pump seal components.

c. A side stream filter is recommended during the cleaning process. Filter side flow rate should be enough to filter the entire water volume every 3 to 4 hours. Change filters as often as necessary during the cleaning process.

d. Remove temporary bypass when cleaning is complete.

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

Dimensions (SI Unit)



UNIT 30RAN (R134a)	Style A	55_415	80_415	100_415	120_415	150_415	180_415
	Style B	_	80_70	100_70	120_70	150_120	180_120
Length(mm)		2700	2700	2700	2700	2700	3900
Width(mm)		2311					
Height(mm)		2640					

UNIT 30RAN (R407c)	Style A	55_415	80_415	100_415	120_415	150_415	180_415
	Style B	_	80_70	100_70	120_70	150_120	180_120
Length(mm)		2700	2700	2700	3900	3900	5100
Width(mm)		2311					
Height(mm)		2640					

Weight (SI Unit)

UNIT 30RAN (R134a)	Style A		55_415	80_415	100_415	120_415	150_415	180_415
	Style B		_	80_70	100_70	120_70	150_120	180_120
Weight (KG)	Al coil	Style A	1321	1543	1708	1904	2092	2603
		Style B	_	1900	2024	2220	2621	3131
	Cu Coil	Style A	1382	1604	1769	1965	2153	2694
		Style B	_	1959	2085	2281	2682	3224

UNIT 30RAN (R407c)	Style A		55_415	80_415	100_415	120_415	150_415	180_415
	Style B		_	80_70	100_70	120_70	150_120	180_120
Weight (KG)	Al coil	Style A	1321	1543	1708	2292	2475	2990
		Style B	_	1900	2024	2609	3005	3520
	Cu Coil	Style A	1382	1604	1769	2384	2567	3112
		Style B	_	1959	2085	2700	3101	3643