Carrier

ComfortLink™

AquaSnap Service Manual

30RB Air-Cooled Chillers
Series A

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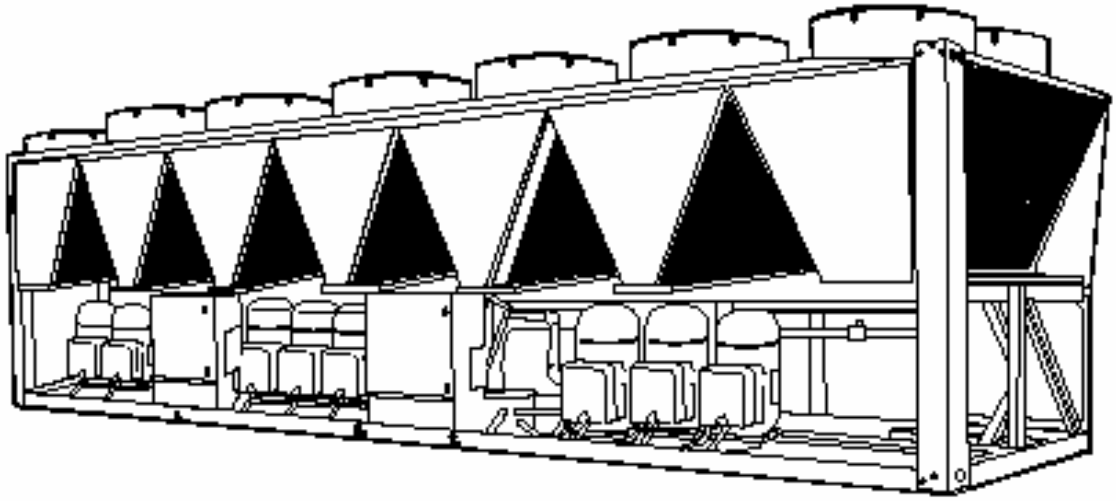

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SAFETY CONSIDERATIONS

Installing, starting up, and servicing this equipment can be hazardous due to system pressures, electrical components, and equipment location (roof, elevated structures, etc.). Only trained, qualified installers and service mechanics should install, start-up, and service this equipment.

When working on this equipment, observe precautions in the literature, and on tags, stickers, and labels attached to the equipment and any other safety precautions that apply. Follow all safety codes. Wear safety glasses and work gloves. Use care in handling, rigging, and setting this equipment, an in handling all electrical components.

WARNING

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

WARNING

This unit uses a microprocessor-based electronic control system. Do not use jumpers or other tools to short out components or to bypass or otherwise depart from recommended procedures. Any short-to-ground of the control board or accompanying wiring may destroy the electronic modules or electrical components.

WARNING

To prevent potential damage to heat exchanger tubes always run fluid through heat exchangers when adding or removing refrigerant charge. Use appropriate brine solutions in cooler and condenser fluid loops to prevent the freezing of heat exchangers when the equipment is exposed to temperatures below 32 °F (0 °C).

DO NOT VENT refrigerant valves within a building. Outlet from relief valves must be vented outdoors in accordance with the latest edition of ANSI/ASHRAE (American National Standards Institute/American Society of Heating, Refrigeration and Air Conditioning Engineers) 15 (Safety Code for Mechanical Refrigeration). The accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation. Provide adequate ventilation in enclosed or low overhead areas. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness or death. Misuse can be fatal. Vapor is heavier than air and reduces the amount of oxygen available for breathing. Product causes eye and skin irritation. Decomposition products are hazardous.

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WARNING

DO NOT attempt to unbraze factory joints when servicing this equipment. Compressor oil is flammable and there is no way to detect how much oil may be in any of the refrigerant lines. Cut lines with a tubing cutter as required when performing service. Use a pan to catch any oil that may come out of the lines and as a gage for how much oil to add to the system. DO NOT re-use compressor oil. DO NOT leave refrigerant system open to air any longer than necessary. Seal circuits being serviced and charge with dry nitrogen to prevent oil contamination when timely repairs cannot be completed.

CAUTION

This system uses R-410a, which has higher pressures than R-22 and other refrigerants. No other refrigerant may be used in this system. Gage set, hoses and recovery systems must be designed to handle R-410a refrigerant. If unsure about equipment, consult the equipment manufacturer.

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INTRODUCTION

This information should be used with the Installation Instructions, and the Controls, Start-Up, Operation, Service and Troubleshooting book for these machines. Follow all safety precautions and procedures.

This chiller is a ASHRAE 90.1 compliant machine, utilizing a direct-expansion cooler, scroll compression technology and R-410a.

Production of this family of the machines started with serial numbers beginning with ??04Q.

Model Number Significance

The following chart is a model number breakdown for the 30RB AquaSnap Chiller.

Position	1-4	5	6-8	9	10	11	12	13	14	15	16
Description	**30RB**	**A**	**110**	**6**	**-**	**8**	**0**	**-**	**-**	**-**	**3**

Air-Cooled AquaSnap Chiller

Design Series

Nominal Capacity

060	110	170	275	360
070	120	190	300	390
080	130	210	315	
090	150	225	330	
100	160	250	345	

Voltage Options

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

Condenser Coil/Sound Options

- = Al/Cu Coil
0 = Cu/Cu Coil
1 = Pre-Coat Al/Cu Coil
2 = E-Coat Al/Cu Coil
3 = E-coat Cu/Cu Coil
4 = Al/Cu Coil, Low Sound
5 = Cu/Cu Coil, Low Sound
6 = Pre-Coat Al/Cu Coil, Low Sound
7 = E-Coat Al/Cu Coil, Low Sound
8 = E-coat Cu/Cu Coil, Low Sound

Hydronic Pump Package Options

- = No Pump
0 = Single 3 Hp Pump
1 = Single 5 Hp Pump
2 = Single 7.5 Hp Pump
3 = Single 10 Hp Pump
4 = Single 15 Hp Pump
6 = Dual 3 Hp Pump
7 = Dual 5 Hp Pump
8 = Dual 7.5 Hp Pump (Low Head)
9 = Dual 7.5 Hp Pump (High Head)
B = Dual 10 Hp Pump
C = Dual 15 Hp Pump
Z = Special Order Machine (See Note 1)

Cooler / Brine Options

- = No Options
0 = Cooler Heater
1 = Remote Cooler
9 = Brine Option
B = Cooler Heater, Brine Option
C = Remote Cooler, Brine Option
M = Non-replaceable Filter Drier
N = Cooler Heater, Non-replaceable Filter Drier
P = Remote Cooler, Non-replaceable Filter Drier

Refrigeration Circuit Options

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Position	1-4	5	6-8	9	10	11	12	13	14	15	16
Description	**30RB**	**A**	**110**	**6**	**-**	**8**	**0**	**-**	**-**	**-**	**3**
- = No Options 0 = Suction Line Insulation (SLI) 1 = Suction Service Valve (SSV) 2 = Low Ambient Head Pressure Control (LAHPC) 3 = SLI, SSV 4 = SLI, LAHPC 5 = SSV, LAHPC 6 = SLI, SSV, LAHPC 7 = Minimum Load Control (MLC) 8 = SLI, MLC 9 = SSV, MLC B = LAHPC, MLC C = SLI, SSV, MLC D = SLI, LAHPC, MLC F = SSV, LAHPC, MLC G = SLI, SSV, LAHPC, MLC											
Electrical Options - = Across-the-Line Start (XL), Single Point Power 3 = XL, Dual Point Power 7 = XL, Single Point Power, Non-Fused Disconnect (NFD) C = XL, Dual Power											
Controls / Communication Options											
Packaging / Security Options											

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Notes: 1. "Z" in Position 11 indicates the machine is a Special Order machine, with non-standard options. Characters in Positions 12 through 16 following the "Z" are a sequential order number and will not correspond to any of the options identified in the table above.

APPLICATION

Compressors

Motor Horsepower Rating

Compressor	Rated Tonnage (R-410a)	Motor Horsepower
SH240	20	25
SH300	25	33

Power Factor

All the three phase compressors have a minimum nominal voltage power factor of 0.83 when operating at ARI conditions.

Power factor correction may be accomplished by the addition of capacitors with the following considerations.

1. The capacitor should be selected carefully, starting with one whose reactance is not less than the impedance of the motor running at no load, rated voltage. The impedance is equal to the phase voltage divided by the current.

2. If in some cases the above selected capacitor is not large enough, a larger one may be used, provided that it's reactance is not less than the impedance of the motor running at no load and design over-voltage.

3. Calculations should insure that the motor will not have a leading power factor (PF > 1.0) throughout the operating range. A motor with a leading power factor could be subject to damaging voltage transient when disconnected from the line.

Condenser Coils

Condenser Coil Material Options
Several options for condenser coils materials are offered. They are listed below. The choice of material depends on the environment for the machine. See “Selection Guide: Environmental Corrosion Protection”, Catalog Number 811-20062, for information on which material is correct for the installation.

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Aluminum Fin/Copper Tube
Aluminum Fin/Copper Tube is the standard condenser coil material.

E-coat Aluminum Fin/Copper Tube
This option was released with the introduction of the product.

Pre-coat Aluminum Fin/Copper Tube
This option was released with the introduction of the product, with one change. The material color of the compound changed from black to gold. There is no difference in performance, efficiency or corrosion for the color change. It is the same compound originally used for earlier chiller families.

Bulletins pertaining to this option:
Bulletins pertaining to this issue:
- 111-05-09 – 30RB Pre-Coat Coil Option Color Change
  This bulletin announced the change to the gold color of the fin when ordering the Pre-coat fin option.
- 111-05-02-E – 30RB Pre-Coat Coil Option Color Change
  This bulletin announced the change to the gold color of the fin when ordering the Pre-coat fin option.

Copper Fin/Copper Tube
This option is not released for production.

E-coat Copper Fin/Copper Tube
This option is not released for production.

Condenser Fan System

Condenser Fan Motor
Two special fan motors are used with this fan system, due to mounting requirements.

Fan Motor Information

Frame Size	
Type	
Insulation Class	F
Speed, RPM (r/s)	1140 (19)
NEC Rated Horsepower	3.4
Bearings	Permanently Lubricated

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

For chillers that must operate during cold weather conditions, the use of antifreeze is highly recommended. Two conditions that must be considered when determining antifreeze concentration are leaving water set point and ambient freeze conditions. These two conditions determine the recommended concentration level. After comparing these conditions, the condition indicating the use of a higher concentration level must be used to adequately protect the machine.

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

Medium Temperature Brine Applications, 15 to 39.9 ºF (-9.4 to 4.4 ºC)
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 (8.3º C) below the leaving water temperature set point.

Low Ambient Protection
If the chiller refrigerant or fluid lines are in an area where ambient conditions fall below 34º F (1º C), it is recommended that an antifreeze solution be added to protect the unit

and fluid piping to a temperature of 15º F (8.3º C) below the lowest anticipated ambient temperature.

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

IMPORTANT: Adding antifreeze solution is the only certain means of protecting the unit from freeze-up if the cooler heater fails or electrical service is interrupted during low ambient temperatures.

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Duplex Chillers
The 30RB060-300 chillers are produced in a single chassis. Larger sizes, 30RB315-390 are produced in 2 modules and field assembled. Below is a chart that indicates which base model is used as the modular combinations.

Size 30RB	Consists of 30RB	
	Module A	Module B
315	160	160
330	170	160
345	170	170
360	190	170
390	190	190

Electrical Information
All field wiring is to be made with copper conductors only.

Power Options
Original units were not released with two power connection options, terminal block or non-fused disconnects. With the 30RB060-120 Dual Point with non-fused disconnect option is not offered. The non-fused disconnect's size is too large to fit into the power box.

Terminal Block

Non-Fused Disconnects

Non-Fused Disconnects are supplied with pressure lug connectors. Physical data of the lugs are listed below:

Lug Kit Part Number	No. of Cables per Lug	Wire Size Range (75 ºC Wire)	
		Cu	Al *
TA2J6500	2	3/0 to 500 kcmil	4/0 to 500 kcmil

Note: * - Al wiring is not recommended for these machines.

Power Supply Options (Single and Dual Point)
Single and Dual Point power connections are offered with the 30RB units. Both options are available with either terminal blocks or non-fused disconnects, except 30RB060-120 Dual Point with Non-Fused Disconnects. The Non-Fused Disconnect size is too large to fit into the power box.

The table below depicts the options available. Boxes that are shaded are those that were part of the original release.

Not for Distribution

Voltage	Power Connection	30RB				
		060-120	130-190	210-225	250-300	315-390*
208/230	Single	Standard	Option	N/A	N/A	Option
	Dual	Option †	Standard	Standard	Standard	Standard
380	Single	Standard	Standard	Standard	Option	Standard
	Dual	Option †	Option	Option	Standard	Option
460	Single	Standard	Standard	Standard	Option	Standard
	Dual	Option †	Option	Option	Standard	Option
575	Single	Standard	Standard	Standard	Option	Standard
	Dual	Option †	Option	Option	Standard	Option

Notes: * - Power supply listed is per module. If Single Point is ordered, the A and B module will require Single Point Power Connections to EACH module.
† - Not Available with Non-Fused Disconnects
N/A - Not Available

Bulletins pertaining to this issue:
- 111-05-16 - 30RB Power Connection Options Release
  This bulletin described the power connection options available on the 30RB machines.

Below is a connection chart for the 30RB machines for both Single and Dual Point Power Connections. Initial releases of the Product Data (30RB-1PD), Installation Instructions (30RB-1SI), Submittal Bulletin (30RB-1SB and 30RB-2SB), and the Packaged Chiller Builder (Version 3.11 and earlier) are all incorrect.

30RB	Voltage 3 ph, 60 Hz	Single Point Power Connection			Dual Point Power Connection		
		COMBI	PEB1	PEB2	COMBI	PEB1	PEB2

060-120	208/230 †	Circuit 1			Circuit 1 Circuit 2		
	380 †	Circuit 1			Circuit 1 Circuit 2		
	460 †	Circuit 1			Circuit 1 Circuit 2		
	575 †	Circuit 1			Circuit 1 Circuit 2		
130-190, 315-390* w/ NFD	208/230	Circuit 1			Circuit 1	Circuit 2	
	380		Circuit 1		Circuit 2	Circuit 1	
	460		Circuit 1		Circuit 2	Circuit 1	
	575		Circuit 1		Circuit 2	Circuit 1	
130-190, 315-390* w/o NFD	208/230	Circuit 1			Circuit 1	Circuit 2	
	380		Circuit 1			Circuit 1 Circuit 2	
	460		Circuit 1			Circuit 1 Circuit 2	
	575		Circuit 1			Circuit 1 Circuit 2	
210, 225 w/ NFD	208/230	N/A			Circuit 1		Circuit 2
	380		Circuit 1			Circuit 1	Circuit 2
	460		Circuit 1		Circuit 2	Circuit 1	
	575		Circuit 1		Circuit 2	Circuit 1	
210, 225 w/o NFD	208/230	N/A			Circuit 1		Circuit 2
	380		Circuit 1			Circuit 1	Circuit 2
	460		Circuit 1			Circuit 1 Circuit 2	
	575		Circuit 1			Circuit 1 Circuit 2	
250-300	208/230	N/A			Circuit 1		Circuit 2
	380		Circuit 1			Circuit 1	Circuit 2
	460		Circuit 1			Circuit 1	Circuit 2
	575		Circuit 1			Circuit 1	Circuit 2

Notes:

* - Power supply listed is per module. If Single Point is ordered, the A and B module will require Single Point Power Connections to EACH module. If Dual Point is ordered, the A and B module will require Dual Point Power Connections to EACH module.

† - Not Available with Dual Point Power Connections and Non-Fused Disconnects

N/A - Not Available

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Dual Point Load Connection
The following tables indicate which load is connected to which terminal block for the Dual Point Option.

Unit 30RB	Connected Loads		
	TB-1A / NFD-1A	TB-1B / NFD-1B	TB-1C / NFD-1C
225	Compressors A1, A2, A3, B1, B2, and B3, Control Transformer		Compressors C1, C2, and C3, Fan Motors 1-18
300			

Conduit Connections
There are several power boxes used on the 30RB product line. The use of each box depends on the size of the machine and the voltage.

Pilot holes are provided in the COMBI (Combination) and PEB (Power Electrical Box) for field conduit connection. The pilot holes are ¾" diameter (19 mm). There is approximately 6.5 in (165 mm) of vertical clearance between the door and the base rail to accommodate the conduit. This will allow for up to a 5" conduit without modification.

Not for Distribution

Early product information in 30RB-1PD, 30RB-1SI, 30RB-1SB and 30RB-2SB was incorrect in depicting power entrance locations. The power connection location was corrected in 30RB-2PD and 30RB-8SI.

Bulletins pertaining to this issue:

Energy Management Module
This module, offered as both a factory-installed option and as an accessory, allows for many Energy Management Functions to be incorporated into the controls of the unit. These controls include:

Early versions of the Packaged Chiller Builder incorrectly listed the accessory part number for this option. The correct part number is 00EFN900000300A. This was corrected in Packaged Chiller Builder, Version 3.04.

Bulletins pertaining to this option:

- 111-05-03 – 30RB EMM Correction
  This bulletin noted the correct part number for the accessory Energy Management Module.

Ground Fault Interrupter Convenience Outlet
Offered on this product family is a Ground Fault Interrupter Convenience Outlet both from the factory as a Factory Installed Option included with the "Service Option" and as an Accessory. It is only available in 115 volt, 60 Hz. It is not compatible with 380-3-60 units.

30RB	Voltage 3-Ph, 60 Hz	Quantity	Ground Fault Interrupter – Convenience Outlet Part Number
060-300	208/230, 460	1	00EFN900001700A
315-390		2*	
060-300	575	1	00EFN900002100A
315-390		2*	

Note: * - 30RB315-390 are modular machines. A maximum of 2 convenience outlets, 1 per module can be installed.

The Packaged Chiller Builder Version 3.03 and earlier, incorrectly listed the Accessory Convenience Outlet Accessory Part Number as one part number for 208/230, 460 and 575 volts. The correct part numbers are shown above.

Not for Distribution

Hail Guards
The inherent "V" coil design provides most of the hail damage protection. Hail Guards are offered for the ends of the machine only.

Hail Guards are louvered panel doors hinged on the outside installed on both ends of the machine only. This Factory Installed Option and Accessory are to protect the end condenser coils from hail and flying debris.

Early Accessories were oversized and required special installations. See the

Head Pressure Control
Units will start and operate down to 32 F (0° C) as standard. Operation to –20 F (–29 C) requires optional Head Pressure Control as well as wind baffles, if necessary. If the unit is equipped with Head Pressure Control, field fabricated and installed wind baffles are required if the wind velocity is anticipated to be greater than 5 mph (8 km/h). Two different baffles are required, one for the control box end, one for the opposite control box end. Wind baffles should be constructed with minimum 18-gage galvanized sheet metal or other suitable corrosion-resistance material with cross breaks for strength. Use field-supplied screws to attach baffles to the corner posts of the machine. Be sure to hem or turn a flange on all edges to eliminate sharp edges on the baffles.

AquaSnap offers both factory-installed as well as field installed accessory head pressure control. The controller is a Variable Frequency Drive for the lead condenser fans in the circuit.

Below is the accessory usage table.

Unit	Size	Voltage	No. of Circuits	Accessory Kit No.	Qty Req'd
30RB	060,070,080	208/230-3-60	2	00EFN900000600A	1
		380-3-60	2	00EFN900000400A	1
		460-3-60	2	00EFN900000400A	1
		575-3-60	2	00EFN900001800A	1
	090,100,110, 120,130,150, 160,170,190	208/230-3-60	2	00EFN900000700A	2
		380-3-60	2	00EFN900000500A	2
		460-3-60	2	00EFN900000500A	2
		575-3-60	2	00EFN900001900A	2
	210,225,250, 275,300	208/230-3-60	3	00EFN900000700A	3
		380-3-60	3	00EFN900000500A	3
		460-3-60	3	00EFN900000500A	3
		575-3-60	3	00EFN900001900A	3
	315,330,345, 360,390	208/230-3-60	4	00EFN900000700A	4
		380-3-60	4	00EFN900000500A	4
		460-3-60	4	00EFN900000500A	4
		575-3-60	4	00EFN900001900A	4

Not for Distribution

Machines produced without Factory Installed Head Pressure Control will not have the appropriate Fan Board installed for proper control of the Head Pressure Control device. Three circuit machines, 30RB210-300, utilize the correct Fan Board for Circuit C. Circuit C's Fan Board will not need to be replaced. As part of the accessory, the correct Fan Board is included. Due to the number of boards required and the configuration of the controls, some machine will have extra Fan Boards once installed. The configuration is noted below:

30RB	No. of Fan Boards Required	No. of Fan Boards Supplied with the Accessory	Extra? (Quantity)
060,070,080	1	1	No
090,100,110,120,130,150	1	2	Yes (1)
160,170,190	2	2	No
210,225,250 *	2	3	Yes (2)
275,300 *	3	3	Yes (1)
315,330,345,360,390	4	4	No

Note: * - Circuit C Fan Board supplied by the factory is the correct Fan Board for Head Pressure Control Accessory.

Hydronic Package
AquaSnap offers several options for a hydronic package. The machines are limited to no greater than a 20 Hp pump based on a size constraint.

Freeze Protection consisting of heater tapes and insulation is standard on all hydronic pump packages.

Pump Motor Specifications

	3 Hp	5 Hp	7.5 Hp	10 Hp	15 Hp
Motor Type	TEFC				

Sound Option
The 30RB units have a factory-installed option for a sound enclosure, which consists of a sheet metal enclosure for the compressor section.

Although released with the initial production release, the option was not installed in the factory until units starting with serial numbers beginning with 3405Q. For units ordered with bout not produced with the sound enclosure, a package was created for the field installation of this option.

Not for Distribution

CONTROLS

Capacity Control
The control system cycles compressors, and minimum load valve solenoids (if equipped) to maintain the user-configured leaving chilled fluid temperature set point. Entering fluid temperature is used by the Main Base Board (MBB) to determine the temperature drop across the cooler and is used in determining the optimum time to add or subtract capacity stages. Return fluid temperature, space, or outdoor-air temperature reset features can automatically reset the chilled fluid temperature set point. It can also be reset from an external 4 to 20-mA signal (requires Energy Management Module FIOP or accessory).

The control has an automatic lead-lag feature built in for circuit and compressor starts. If enabled, the control will determine which circuit **Configuration/OPTN/LLCS=0** and compressor to start to even the wear. The compressor wear factor (combination of starts and run hours) is used to determine which compressor starts.

$$Compressor\ Wear\ Factor = (Compressor\ Starts) + 0.1(Compressor\ Run\ Hours)$$

In this case, the circuit with the lowest average compressor wear factor (the average of all available compressor's wear factor in the circuit) is the circuit that starts first. The compressor within the circuit with the lowest wear factor is the first to start. If the automatic lead-lag function for the circuit is not enabled **Configuration/OPTN/LLCS=1** (Circuit A leads), **2** (Circuit B leads), **3** (Circuit C leads), the selected circuit will be the first to start. Again, the compressor with the lowest wear factor within the circuit will be the first to start. Minimum Load Control is enabled **Configuration/UNIT/HGBP=1**, the valve will be operational only during the first stage of cooling.

Once the lead compressor has been started, the lag compressors will be determined by the wear factor and loading sequence selected. If equal loading is selected, **Configuration/OPTN/LOAD=0**, the circuit with the lowest average wear factor for the available compressors will start next, with the compressor with the lowest wear factor starting. The control will attempt to keep all circuits at approximately the same number of compressors ON. For this option to function properly, all circuits must have the same number of compressors available. If a circuit compressor is not available due to an alarm condition or demand limit, the capacity staging will change to staged. If staged loading is selected, **Configuration/OPTN/LOAD=1**, the started circuit will continue to turn on compressors according to the lowest wear factor until all are on, then start the next circuit with the lowest average wear factor. If Minimum Load Control is enabled for close control **Configuration/UNIT/HGBP=2**, the valve will be available at all stages for better temperature control. If Minimum Load Control is enabled for high ambient control **Configuration/UNIT/HGBP=3**, the valve will be used only when a high pressure override is active for that circuit.

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The Electronic Expansion Valves provide a controlled start-up. During startup, the low pressure logic in the lead circuit will be ignored for 5 minutes to allow for the transient changes during start-up. As additional stages of compression are required, the processor control will add them. The following example is based on a 30RB225 machine, which has three 25-ton compressors in each circuit.

Each compressor has the following starts and run hours.

Compressor	Starts	Run Hours	Wear Factor	Circuit Average Wear Factor
A1	25	249	49.9	44.8
A2	22	237	45.7	
A3	26	128	38.8	
B1	41	453	86.3	67.6
B2	38	138	51.8	
B3	35	297	64.7	
C1	93	103	103.3	80.3
C2	57	98	66.8	
C3	61	99	70.9	

Each scenario below has different configurations and is intended to illustrate the loading sequences possible for normal operation.

In the following example, assume the following configurations:

Configuration/UNIT/HGBP=1 Minimum Load Control installed and enabled for Start-Up Only
Configuration/OPTN/LOAD=0 Equal Circuit Loading
Configuration/OPTN/LLCS=0 Automatic Circuit Select

Since Circuit A has the lowest average wear factor, it will be the lead circuit. Within the circuit, compressor A3 has the lowest wear factor and will start first with Minimum Load Control ON. The next stage will turn OFF the minimum load control. Stage 3 will start another circuit because of the Equal Circuit Loading configuration. The next circuit with the lowest wear factor is Circuit B, and the compressor with the lowest wear factor is B2. The next stage will be a circuit C compressor. The process continues until all compressors are ON.

Stage	Total Cap.	Circuit A					Circuit B					Circuit C				
		Cir. Cap	MLC	A1	A2	A3	Cir. Cap	MLC	B1	B2	B3	Cir. Cap	MLC	C1	C2	C3
0	0	0					0					0				
1	8	8	X			X	0					0				
2	11	11				X	0					0				
3	22	11				X	11			X		0				
4	33	11				X	11			X		11			X	
5	44	22			X	X	11			X		11			X	
6	55	22			X	X	22			X	X	11			X	
7	66	22			X	X	22			X	X	22			X	X
8	77	33		X	X	X	22			X	X	22			X	X
9	88	33		X	X	X	33		X	X	X	22			X	X
10	100	33		X	X	X	33		X	X	X	33		X	X	X

Note: Total Cap. (Total Unit Capacity) and Cir. Cap. (Circuit Capacity) are approximate percentage values.

In the following example, assume the compressor starts and run hours are the same as in the previous example and the following configurations:

Configuration/UNIT/HGBP=1 Minimum Load Control installed and enabled for Start-Up Only
Configuration/OPTN/LOAD=1 Staged Circuit Loading
Configuration/OPTN/LLCS=0 Automatic Circuit Select

Since Circuit A has the lowest average wear factor, it will be the lead circuit. Within the circuit, compressor A3 has the lowest wear factor and will start first with Minimum Load Control ON. The next stage will turn OFF the minimum load control. Stage 3 will start a compressor in the same circuit because of the Staged Circuit Loading configuration. Compressor A2 has the next lowest wear factor and will be started next. Compressor A3 will be next to start. Since all compressors in Circuit A are ON, the next stage will start another circuit. Of the remaining circuits, Circuit B has the lowest wear factor, and

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the compressor with the lowest wear factor is B2. All of the Circuit B compressors will be started in the same manner as Circuit A. Once all Circuit B compressors are ON, then Circuit C will be started. The process continues until all compressors are ON.

Stage	Total Cap.	Circuit A					Circuit B					Circuit C				
		Cir. Cap	MLC	A1	A2	A3	Cir. Cap	MLC	B1	B2	B3	Cir. Cap	MLC	C1	C2	C3
0	0	0					0					0				
1	8	8	X			X	0					0				
2	11	11				X	0					0				
3	22	22			X	X	0					0				
4	33	33		X	X	X	0					0				
5	44	33		X	X	X	11			X		0				
6	55	33		X	X	X	22			X	X	0				
7	66	33		X	X	X	33		X	X	X	0				
8	77	33		X	X	X	33		X	X	X	11				X
9	88	33		X	X	X	33		X	X	X	22			X	X
10	100	33		X	X	X	33		X	X	X	33		X	X	X

Note: Total Cap. (Total Unit Capacity) and Cir. Cap. (Circuit Capacity) are approximate percentage values.

In the following example, assume the following configurations:
Configuration/UNIT/HGBP=1 Minimum Load Control installed and enabled for Start-Up Only
Configuration/OPTN/LOAD=0 Equal Circuit Loading
Configuration/OPTN/LLCS=2 Circuit B Leads

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Since Circuit B has been selected, it will be the lead circuit. Within the circuit, compressor B2 has the lowest wear factor and will start first with Minimum Load Control ON. The next stage will turn OFF the minimum load control. Stage 3 will start another circuit because of the Equal Circuit Loading configuration. Comparing Circuit A and C, the circuit with the lowest average wear factor is Circuit A, and the compressor with the lowest wear factor is A3. The next stage will be a circuit C compressor. The process continues until all compressors are ON.

Stage	Total Cap.	Circuit A					Circuit B					Circuit C				
		Cir. Cap	MLC	A1	A2	A3	Cir. Cap	MLC	B1	B2	B3	Cir. Cap	MLC	C1	C2	C3
0	0	0					0					0				
1	8	8					0	X		X		0				
2	11	11					0			X		0				
3	22	11				X	11			X		0				
4	33	11				X	11			X		11			X	
5	44	11				X	11			X	X	11			X	
6	55	22			X	X	22			X	X	11			X	
7	66	22			X	X	22			X	X	22			X	X
8	77	22			X	X	33		X	X	X	22			X	X
9	88	33		X	X	X	33		X	X	X	22			X	X
10	100	33		X	X	X	33		X	X	X	33		X	X	X

Note: Total Cap. (Total Unit Capacity) and Cir. Cap. (Circuit Capacity) are approximate percentage values.

In the following example, assume the compressor starts and run hours are the same as in the first example and the following configurations:

Configuration/UNIT/HGBP=1 Minimum Load Control installed and enabled for Start-Up Only
Configuration/OPTN/LOAD=1 Staged Circuit Loading
Configuration/OPTN/LLCS=3 Circuit C Leads

Since Circuit C has been selected, it will be the lead circuit. Within the circuit, compressor C2 has the lowest wear factor and will start first with Minimum Load Control ON. The next stage will turn OFF the minimum load control. Stage 3 will start a compressor in the same circuit because of the Staged Circuit Loading configuration. Compressor C3 has the next lowest wear factor and will be started next. Compressor C1 will be next to start. Since all compressors in Circuit C are ON, the next stage will start another circuit. Of the remaining circuits, Circuit A has the lowest wear factor, and the compressor with the lowest wear factor is A3. All of the Circuit A compressors will be started in the same manner as Circuit C. Once all Circuit A compressors are ON, then Circuit B will be started. The process continues until all compressors are ON.

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Stage	Total Cap.	Circuit A					Circuit B					Circuit C				
		Cir. Cap	MLC	A1	A2	A3	Cir. Cap	MLC	B1	B2	B3	Cir. Cap	MLC	C1	C2	C3
0	0	0					0					0				
1	8	0					0					8	X			X
2	11	0					0					11				X
3	22	0					0					22			X	X
4	33	0					0					33		X	X	X
5	44	11				X	0					33		X	X	X
6	55	22			X	X	0					33		X	X	X
7	66	33		X	X	X	0					33		X	X	X
8	77	33		X	X	X	11			X		33		X	X	X
9	88	33		X	X	X	22			X	X	33		X	X	X
10	100	33		X	X	X	33		X	X	X	33		X	X	X

Note: Total Cap. (Total Unit Capacity) and Cir. Cap. (Circuit Capacity) are approximate percentage values.

If the circuit capacity is to be reduced, the compressor with the lowest wear factor will be shut off first in most cases. With Equal Circuit Loading, stages will be removed from each circuit, essentially in the opposite to the loading sequence shown above, the compressor with the highest wear factor will be removed first. When Staged Circuit Loading is selected, the capacity from the last lag circuit will be removed first.

The capacity control algorithm runs every 30 seconds. The algorithm attempts to maintain the Control Point at the desired set point. Each time it runs, the control reads the entering and leaving fluid temperatures. The control determines the rate at which conditions are changing and calculates 2 variables based on these conditions. Next, a

capacity ratio is calculated using the 2 variables to determine whether or not to make any changes to the current stages of capacity. This ratio value ranges from –100 to +100%. If the next stage of capacity is a compressor, the control starts (stops) a compressor when the ratio reaches +100% (–100%). If the next stage of capacity is the Minimum Load Control, the control energizes (de-energizes) the Minimum Load Control when the ratio reaches +60% (–60%). If installed, the minimum load valve solenoid will be energized with the first stage of capacity. Minimum load valve value is a fixed 30% in the total capacity calculation. The control will also use the minimum load valve solenoid as the last stage of capacity before turning off the last compressor. If the close control feature ***Configuration→UNIT→HGBP=2*** is enabled the control will use the minimum load valve solenoid whenever possible to fine tune leaving fluid temperature control. A delay of 90 seconds occurs after each capacity step change with Minimum Load Control. A delay of 3 minutes occurs after each compressor capacity step change.

Capacity Control Overrides
The following overrides will modify the normal operation routine. If any of the following override conditions listed below are satisfied, it shall determine the capacity change instead of the normal control. Overrides are listed by priority order.

Not for Distribution

Override #1: Cooler Freeze Protection
This override attempts to avoid the freeze protection alarm. If the Leaving Water Temperature is less than Brine Freeze Set Point ***Configuration→SERV→LOSP*** + 2.0 °F (1.1 ºC) then remove a stage of capacity.

Override #2: Circuit A Low Saturated Suction Temperature in Cooling
Override #3: Circuit B Low Saturated Suction Temperature in Cooling
Override #4: Circuit C Low Saturated Suction Temperature in Cooling
These overrides attempt to avoid the low suction temperature alarms. This override is active only when more than one compressor in a circuit is ON. If the Saturated Suction Temperature is less than Brine Freeze Set Point ***Configuration→SERV→LOSP*** - 18.0 °F (-10 ºC) for 90 seconds, or The Saturated Suction Temperature is less than –4 ºF (-20 ºC), a compressor in the affected circuit will be turned off.

Override #5: Low Temperature Cooling and High Temperature Heating
This override removes one stage of capacity when the difference between the Control Point ***Run Status→VIEW→CTPT*** and the Leaving Water Temperature ***Run Status→VIEW→LWT*** reaches a predetermined limit and the rate of change of the water is 0 or still decreasing.

Override #6: Low Temperature Cooling and High Temperature Heating
This override removes two stages of capacity when the Entering Water Temperature ***Run Status→VIEW→EWT*** is less than the Control Point ***Run Status→VIEW→CTPT***.

Override #7: Ramp Loading
If the unit is configured for ramp loading ***Configuration→OPTN→RL.S=ENBL*** and if the difference between the Leaving Water Temperature and the Control Point is greater than 4 ºF (2.2 ºC) and the rate of change of the leaving water is greater than the Cool Ramp Loading Rate ***Setpoints→COOL→CRMP*** then no capacity stage increase will be made.

Override #8: Service Manual Test Override
The manual test consists in adding a stage of capacity every 30 seconds, until the control enables all of the requested compressors and Minimum Load Control selected in the Comfortlink Display service test menu. All safeties and higher priority overrides are monitored and acted upon.

Override #9: Demand Limit
This override mode is active when a command to limit the capacity is received. If the current unit capacity is greater than the active capacity limit value, a stage is removed. If the current capacity is lower than the capacity limit value, the control will not add a stage that will result in the new capacity being greater then the capacity limit value.

Override #10: Cooler Interlock Override
This override prohibits compressor operation until the cooler interlock ***Inputs→GEN.I→LOCK*** is closed.

Not for Distribution

Override #11: High Temperature Cooling and Low Temperature Heating
This override algorithm runs once when the unit is switched to ON. If the difference between the Leaving Water Temperature ***Run Status→VIEW→LWT*** and the Control Point ***Run Status→VIEW→CTPT*** exceeds a calculated value and the rate of change of the water temperature is greater than -0.1ºF/min, a stage will be added.

Override #12: High Temperature Cooling and Low Temperature Heating
This override runs only when Minimum Load Control is Enabled, ***Configuration→UNIT→HGBP*** is ***1***, ***2*** or ***3***. This override will add a stage of capacity if the next stage is Minimum Load Control, when the difference between the Leaving Water Temperature ***Run Status→VIEW→LWT*** and the Control Point ***Run Status→VIEW→CTPT*** exceeds a calculated value and the rate of change of the water temperature is greater than a fixed value.

Override #13: Minimum On/Off and Off/On Time Delay
Whenever a capacity step change has been made, either with Minimum Load Control or a compressor, the control will remain at this capacity stage for the next 90 seconds. During this time, no capacity control algorithm calculations will be made. If the capacity step is a compressor, an additional 90-second delay is added to the previous hold time (See Override #22). This override allows for the system to stabilize before another capacity stage is added or removed. If the unit encounters a condition of a higher priority override, the higher priority override will take precedence.

Override #14: Slow Change Override
This override prevents compressor stage changes when the leaving temperature is close to the control point and slowly moving towards the control point.

Override #15: System Manager Capacity Control
If a Chillervisor is controlling the unit and the Chillervisor is controlling multiple chillers, the unit will add a stage to attempt to load to the demand limited value.

Override #37: Circuit A Low Superheat
Override #38: Circuit B Low Superheat
Override #39: Circuit C Low Superheat
This override attempts to avoid liquid slugging for the running compressors. No capacity steps will be added to the affected circuit until a superheat greater than 5 ºF (2.8 ºC) is established. If the capacity of the machine must be increased, the control will look to another circuit for additional capacity.

Override #16: Circuit A High Pressure Override
Override #17: Circuit B High Pressure Override
Override #18: Circuit C High Pressure Override
This override attempts to avoid a high pressure failure. The algorithm is run every 4 seconds. At least one compressor must be on in the circuit. If the Saturated Condensing Temperature for the circuit is above the High Pressure Threshold ***Configuration→SERV→HP.TH*** then a compressor for that circuit will be removed. If Minimum Load Control was enabled for High Ambient ***Configuration→UNIT→HGBP=3***, then the Minimum Control Valve will be energized.

Not for Distribution

Override #19: Standby Mode
This override algorithm will not allow a compressor to run if the unit is in Stand-by Mode, ***Run Status→VIEW→HC.ST=2.***

Override #22: Minimum On Time Delay
In addition to Override #13 Minimum On/Off and Off/On Time Delay, for compressor capacity changes, an additional 90-second delay will be added to the delay. No compressor will be de-energized until 3 minutes have elapsed since the last compressor has been turned ON. When this override is active, the capacity control algorithm calculations will be performed, but no capacity reduction will be made until the timer has expired. However, control shall not take care of this 3 minutes minimum On/Off time in case of overrides with highest precedence.

Override #23: Circuit A Low Saturated Suction Temperature in Cooling
Override #24: Circuit B Low Saturated Suction Temperature in Cooling
Override #25: Circuit C Low Saturated Suction Temperature in Cooling
If the circuit is operating in an area close to the operational limit of the compressor, the circuit capacity will remain at the same point or unload to raise the saturated suction temperature. This algorithm will be active if, at least 1 compressor in the circuit is on and one of the following conditions is true:

1. Saturated Suction Temperature is less than Brine Freeze ***Configuration→SERV→LOSP*** – 6 ºF (3.3 ºC)
2. Saturated Suction Temperature is less than Brine Freeze ***Configuration→SERV→LOSP*** with the circuit approach (Leaving Water Temperature – Saturated Suction Temperature) is greater than 15 ºF (8.3 ºC) and the Circuit Superheat (Return Gas Temperature – Saturated Suction Temperature) is greater than 15 ºF (8.3 ºC).

If any of these conditions are met, the appropriate Operating Mode, 21 (Circuit A), 22 (Circuit B) or 23 (Circuit C) will be enabled.

Override #34: Circuit A Low Refrigerant Charge
Override #35: Circuit B Low Refrigerant Charge
Override #36: Circuit C Low Refrigerant Charge
The capacity override attempts to protect the compressor from starting with no refrigerant in the circuit. This algorithm runs only when the circuit is not operational, no compressors ON. There are several criteria that will enable this mode.

1. The Saturated Suction Temperature or Saturated Discharge Temperature is less than –13 ºF (-25 ºC)
2. All of these conditions must be true:
    a. The Saturated Suction Temperature or Saturated Discharge Temperature is less than Leaving Water Temperature by more than 5.4 ºF (3.0 ºC)
    b. Saturated Suction Temperature or Saturated Discharge Temperature is less than 41 ºF (5 ºC)
    c. Outdoor Air Temperature is less than 32 ºF (0 ºC)
    d. Saturated Suction Temperature or Saturated Discharge Temperature is less than the Outdoor Air Temperature by more than 5.4 ºF (3.0 ºC)
3. All of these conditions must be true:
    a. The Saturated Suction Temperature or Saturated Discharge Temperature is less than Leaving Water Temperature by more than 5.4 ºF (3.0 ºC)
    b. Saturated Suction Temperature or Saturated Discharge Temperature is less than 41 ºF (5 ºC)
    c. Saturated Suction Temperature or Saturated Discharge Temperature is less than the Brine Freeze Point ***Configuration→SERV→LOSP*** by more than 6 ºF (3.3 ºC)
4. All of these conditions must be true:
    a. The Saturated Suction Temperature or Saturated Discharge Temperature is less than Leaving Water Temperature by more than 5.4 ºF (3.0 ºC)
    b. Saturated Suction Temperature or Saturated Discharge Temperature is less than 41 ºF (5 ºC)
    c. Saturated Suction Temperature or Saturated Discharge Temperature is less than the Outdoor Air Temperature by more than 9 ºF (5 ºC)

If any of these conditions 1, 2, 3 or 4 are met, the appropriate Operating Mode, 21 (Circuit A), 22 (Circuit B) or 23 (Circuit C) will be enabled.

Not for Distribution

Chilled Water Pump Control

The 30RB chillers can be configured for cooler pump control. Cooler Pumps Sequence, ***Configuration→OPTN→PUMP*** is the variable that must be confirmed in the field. Proper configuration of the cooler pump control is required to provide reliable chiller operation. The factory default setting for cooler pump control is ***PUMP=0*** No Pump for units without the factory-installed hydronic kit option. For units with the hydronic package, the factory default setting for cooler pump control is **PUMP=1** for single pump units, or ***PUMP=2*** for dual pump units. For dual pump hydronic option units, three control options exist. If the Cooler Pumps Sequence ***PUMP=2***, the control will start the pumps and automatically alternate the operation of the pumps to even the wear of the pumps. If a flow failure is detected, the other pump will attempt to start. Two manual control options also exist. ***PUMP=3*** will operate Pump 1 always. ***PUMP=4*** will operate Pump 2 always.

It is recommended for all chillers that the cooler pump control be utilized unless the chilled water pump runs continuously or the chilled water system contains a suitable concentration of antifreeze solution. When the cooler pump control is configured, the cooler pump relay will be energized when the chiller enters an "ON" mode. The cooler pump relay is also energized when certain alarms are generated. The cooler pump relay should be used as an override to the external pump control if cooler pump control is not utilized.

Not for Distribution

If cooler pump control is configured "OFF" or "ON" and the chilled water flow switch/interlock does not close within the Delay Timer ***Configuration→OPTN→DELY*** after the unit is enabled and in an "ON" mode, alarm P.14 will be generated. Other alarm criterion include:

- Cooler pump interlock is open for at least 30 seconds during chiller operation.
- Lag chiller in Master/Slave Control pump interlock does not close after 1 minute of the pump start command.
- Cooler pump control is turned enabled and the chilled water flow switch/interlock is closed for more than 2 minutes following a command to shutdown the pump.

The last alarm criteria can be disabled. If Flow Checked if Pump is Off ***Configuration→OPTN→P.LOC=NO***, the control will ignore the pump interlock input if the pump is OFF.

Another feature available with the ComfortLink Controls is the ability to periodically start the pumps to maintain the bearing lubrication and seal integrity. If Periodic Pump Start ***Configuration→OPTN→PM.PS=YES*** is configured and the unit is off at 2:00 PM, the pump will be started once each day for 2 seconds. If the unit has 2 pumps, Pump 1 will be started on even days; Pump 2 will be started on odd days.

Dual Chiller Control
All 30RB machines are equipped with software for Dual Chiller control. Factory standard Duplex chillers are shipped with the additional thermistors and wells required for operation under dual chillers control. For Factory Standard Duplex Models, see Duplex Chillers on page 14. If two machines are to be connected and operated under Dual Chiller control, 2 additional thermistors and wells, one for each machine, must be field supplied.

Part Number	Quantity	Description
00PPG000008000	2	Well 1/4 in. NPT x 1-1/2 in. insertion
00PPG000008105	2	Thermistor 10m cable length
HY06AM016	2	IDC connector for connection to MBB

Minimum Load Control
This option, either factory or field installed reduces the capacity of the 30RB chiller below the lowest capacity step. This capacity step reduction provides more precise control of the leaving water temperature.

Hot Gas Bypass Control ***Configuration→UNIT→HGBP*** can be configured in three different ways. If Minimum Load Control is not used, ***HGBP=0***. If ***HGBP=1***, the control will activate the minimum load control valve when the machine is started only. This will be the first of capacity. If ***HGBP=2***, all stages of capacity can utilize the minimum load control valve. If ***HGBP=3***, the minimum load control valve will be used only when the circuit has a high pressure override active. This will reduce the capacity of the circuit.

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Minutes Off Time
Minutes Off Time ***Configuration→OPTN→DELY*** is a field configurable item that is a time delay added to the start when the machine is commanded ON. This is a field configurable item from 1 to 15 minutes. The factory default is 1 minute. This feature is useful when multiple units are installed. Staggering the start will reduce the inrush potential.

Status Relays
The AquaSnap control platform allows for the addition of field supplied and wired relay outputs for various status displays. All outputs can control a relay with a maximum power rating of 10 VA sealed, 25 VA inrush at 24 volts. Below is a description of the items and the required hardware.

Status Point	Description/Activation	Energy Management Module Required	Connection Point
ALM-R	Alarm Relay – This output is energized when an alarm is generated causing the whole machine to shutdown.	No	TB5-12 TB5-13
ALT-R	Alert Relay - This output is energized when an alarm is generated causing a circuit of the machine to shutdown.	No	MBB-J3-CH25 TB5-13
RDY-R	Ready Relay -	No	MBB-J3-CH26 TB5-13
RUN-R	Run Status Relay – This output is energized when a compressor is ON.	Yes	EMM-J3-CH25 ”-“ TB5-13
SHD-R	Shutdown Relay -	Yes	EMM-J3-CH24 “-“ TB5-13

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Ramp Loading
Ramp Loading ***Configuration→OPTN→RL.S.*** limits the rate of change of leaving fluid temperature. If the unit is in a Cooling mode and configured for Ramp Loading, the control makes 2 comparisons before deciding to change stages of capacity. The control calculates a temperature difference between the control point and leaving fluid temperature. If the difference is greater than 4° F (2.2° C) and the rate of change (°F or °C per minute) is more than the configured Cool Ramp Loading ***Setpoints→COOL→CRMP***, the control does not allow any changes to the current stage of capacity.

Remote Alarm and Alert Relays
The 30RB chiller can be equipped with a remote alert and remote alarm annunciator contacts. Both relays connected to these contacts must be rated for a maximum power draw of 10 VA sealed, 25 VA Inrush at 24 Volts. The alarm relay, indicating that the complete unit has been shutdown can be connected to TB5-12 and TB5-13. For an Alert Relay, indicating that at least 1 circuit was off due to the alert, a field supplied and installed relay, must be connected between MBB-J3-CH25-3 and TB5-13.

LITERATURE
Below is a list of literature for the 30RB AquaSnap machines. Shaded literature is obsolete literature.

Form Number	Catalog Number	Title	Print Date	Reprint Date	Superceded By
Product Data					

Form Number	Catalog Number	Title	Print Date	Reprint Date	Superceded By
30RB-1PD	523-077	AquaSnap 30RB060-390, Air-cooled Chillers, 60-390 Nominal Tons	09/2004		
	808-336	Lon Works Carrier Translator			
	808-355	BACnet/MODBUS			
Selection Software					
		Packaged Chiller Builder Version 3.00	10/14/04		Version 3.01
		Packaged Chiller Builder Version 3.01	11/05/04		Version 3.02
		Packaged Chiller Builder Version 3.02	12/03/04		Version 3.03
		Packaged Chiller Builder Version 3.03	01/07/05		Version 3.04
		Packaged Chiller Builder Version 3.04	03/18/05		Version 3.05
		Packaged Chiller Builder Version 3.05	03/28/05		Version 3.06
		Packaged Chiller Builder Version 3.06	04/15/05		Version 3.10
		Packaged Chiller Builder Version 3.10	05/23/05		Version 3.11
		Packaged Chiller Builder Version 3.11	06/08/05		Version 3.12
		Packaged Chiller Builder Version 3.12	07/29/05		Version 3.13
		Packaged Chiller Builder Version 3.13	08/26/05		Version 3.14
		Packaged Chiller Builder Version 3.14	9/30/05		Version 3.15
		Packaged Chiller Builder Version 3.15	10/28/05		Version 3.16
		Packaged Chiller Builder Version 3.16	12/02/05		Version 3.17
		Packaged Chiller Builder, Version 3.17	01/06/06		Version 3.18
		Packaged Chiller Builder, Version 3.18	01/27/06		Version 3.19
		Packaged Chiller Builder, Version 3.19	02/24/06		
Application Information					
	811-20062	Selection Guide: Environmental Corrosion Protection.	10/2004		
	TIP133	30RB/XA Base Rail Dimensions	06/10/05		
White Papers					
	811-20065	Scroll Compressors High Efficiency Compressors for Commercial and Industrial Applications	10/2004		
	811-20066	Puron Refrigerant R-410A, An Environmentally Sound, High Efficiency Refrigerant to Replace R-22 in New Commercial Air Conditioning Equipment	10/2004		
Product Bulletin					
111-04-56		30RB AquaSnap Introduction	10/06/04		
111-04-56		30RB AquaSnap Introduction	10/13/04		
111-04-57		Air-Cooled Chiller Product Offering	10/06/04		111-04-68
111-04-57		Air-Cooled Chiller Product Offering	10/13/04		111-04-68
111-04-68		Air-Cooled Chiller Product Offering	11/19/04		111-04-71
111-04-71		30GT Phase-out	12/07/04		
111-05-03		30RB Accessory Energy Management Module Part Number Correction	01/19/05		
111-05-08		30RB Selection & Pricing	02/02/05		
111-05-01-E		30RB Selection & Pricing	02/02/05		
111-05-09		30RB Pre-Coat Coil Option Color Change	02/04/05		
111-05-02-E		30RB Pre-Coat Coil Option Color Change	02/04/05		
111-05-13		30RB 575 Volt Convenience Outlet Part Number Correction	02/25/05		
111-05-15		30RB BACnet/MODBUS Translator Factory Option Release	03/21/05		
111-05-16		30RB Power Connections Option Release	03/21/05		
111-05-25		Air-Cooled Chiller Product Offering	04/29/05		111-05-39
111-05-05-E		Air-Cooled Chiller Product Offering	04/29/05		
111-05-27		30GX Transition Guide	04/26/05		
111-05-39		Air-Cooled Product Offering	05/27/05		

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Form Number	Catalog Number	Title	Print Date	Reprint Date	Superceded By
111-05-51		30RB Dimensional Print Update	07/22/05		
111-05-56		30RB Accessory Grilles	07/27/05		
111-05-57		30RB/XA Condenser Coil Trim Panels	07/27/05		
111-05-58		30RB060-100 Hydronic Kit Dimensional Changes	08/05/05		
111-05-60		NACO Chiller Builder Report Error	08/12/05		
111-05-69		30RB Extended Application Rating Release	09/30/05		
111-06-01		30RB/XA Cu/Cu Condenser Coil Options Release	01/06/06		
111-05-05		Packaged Chiller Builder "What's This" Feature	02/03/06		
111-06-07		Competitive Alert – YCAV	02/24/06		
111-06-11		30RB Power Connection	03/03/06		
Press Release					
		Carrier North America Commercial wins two ACHR News Dealer Design Awards	7/15/05		
Promotional Information					
	830-090	AquaSnap Air-Cooled Chillers	10/2004		04-830090-25
	04-830090-25	Aqua Series Air-Cooled Chillers	05/2005		
Vol. 1, Issue 10		HVAClips – AquaSnap Air-Cooled Chillers with Puron Refrigerant	12/2004		
	04-81110204-01	Case Study: Rice University	02/2006		
Product Presentation					
		30XA AquaForce and 30RB AquaSnap Lunch & Learn	05/27/05		
Submittal Bulletin					
30RB-1SB	513-00004	30RB060-390 Air-Cooled Liquid Chillers with ComfortLink Controls, 60 Hz	02/2005		30RB-2SB
30RB-2SB	04-51300001-01	30RB060-390 Air-Cooled Liquid Chillers with ComfortLink Controls, 60 Hz	05/2005		
33CN-1SB	513-359	33CNTRANLON LonWorks Carrier Translator	08/2003		
33CN-2SB	513-360				
Installation Instructions					
30RB-1SI	533-00061	AquaSnap 30RB060-390 Air Cooled Chillers, 60 Hz	12/2004		
Controls, Start-Up, Operation, Service and Troubleshooting					
30RB-1T	533-00062	30RB060-390 Air-Cooled Liquid Chillers, 60 Hz	05/2005		
	808-335	LonWorks Carrier Translator, Overview and Configuration Manual	12/2003		
	808-356	BACnet/MODBUS Carrier Translator, Overview and Configuration Manual			
Accessory Installation Instructions					
30-2SI	533-00071	30RB060-390, 30XA080-500 Low Ambient Temperature Head Pressure Control Accessory, 60 Hz	1/06		
30-3SI	04-53300002-01	30RB060-390, 30XA080-500 Condenser Coil Trim Panel Accessory	7/05		
30RB-3SI	533-00072	30RB060-390 Energy Management Module Accessory	6/05		
30RB-4SI	533-00073	30RB060-390 Minimum Load Control Accessory	6/05		

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Form Number	Catalog Number	Title	Print Date	Reprint Date	Superceded By
30RB-7SI	533-00076	30RB060-390 Ground-Fault Interrupter Convenience Outlet Accessory	6/05		
	997-030010-1	LonWorks Carrier Translator Installation Instructions		02/04	
	997-050010-1	BACnet/MODBUS Carrier Translator Installation Instructions	01/05		
Wiring Diagrams					
30RB-1W	533-00063	30RB060-390 Air-Cooled Liquid Chillers with ComfortLink Controls, 60 Hz.	10/05		
Technical Training					
TDP-622C	796-054	Technical Development Program – Air-Cooled Chillers	10/04		

SERVICE

Troubleshooting

The following is an abbreviated list of symptoms, probable causes and potential remedies:

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Symptom	Possible Cause	Possible Remedy
Unit does not run	Check for power to unit	• Check Overcurrent Protection Device • Check Non-Fused Disconnect (if equipped) • Restore Power to unit
	Wrong/Incorrect unit configuration	• Check Unit Configuration
	Active Alarm	• Check Alarm status. See separate Alarm and follow troubleshooting instructions
	Active Operating Mode	• Check for Operating Modes. See Operating Modes and follow troubleshooting instructions
	Wong/Failed Switch Position	• Check Run Status→VIEW→OCC, should be 'YES'. • Check Inputs→GEN.I→ONOF, should be 'CLSE'. If not check SW1 wiring, shorted remote contact wiring.
Unit operates too long or continuously	Low refrigerant charge	• Check for leak and add refrigerant.
	Compressor or control contacts welded	• Replace contactor or relay.
	Air in Chilled Water Loop	• Purge water loop
	Non-condensibles in Refrigerant circuit.	• Remove refrigerant and recharge.

Symptom	Possible Cause	Possible Remedy
	Inoperative EXV	• Check EXV, clean or replace. • Check EXV Cable, replace if necessary. • Check EXV Board for output signal.
Circuit does not run	Active Alarm	• Check Alarm status. See separate Alarm and follow troubleshooting instructions
	Active Operating Mode	• Check for Operating Modes. See Operating Modes and follow troubleshooting instructions
Circuit does not load	Active Alarm	• Check Alarm status. See separate Alarm and follow troubleshooting instructions
	Active Operating Mode	• Check for Operating Modes. See Operating Modes and follow troubleshooting instructions
	Low Saturated Suction Temperature	• See Operating Modes 21, 22 and 23.
	High Circuit Suction Superheat	• The circuit capacity is not allowed increase if circuit superheat is greater than 36 F (20 C). See Alarms P.08, P.09 and P.10 for potential causes.
	Low Suction Superheat	• The circuit capacity is not allowed to increase if the circuit superheat is less than 5 F (2.8 C). See Alarms P.11, P.12 and P.13 for potential causes.
Compressor does not run	Active Alarm	• Check Alarm status. See separate Alarm and follow troubleshooting instructions
	Active Operating Mode	• Check for Operating Modes. See Operating Modes and follow troubleshooting instructions
	Inoperative Compressor Contactor	• Check control wiring • Check Scroll Protection Module • Check Contactor Operation, replace if necessary.
Chilled Water Pump is ON, but the machine is OFF	Cooler Freeze Protection	•

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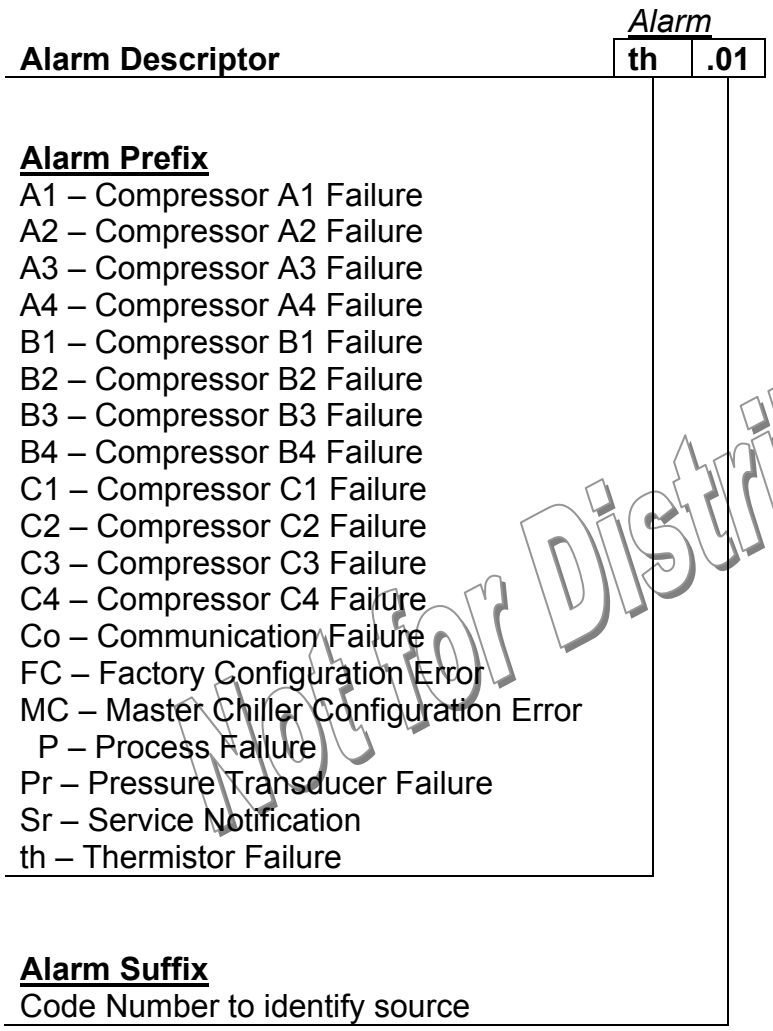
Alarms

These are warnings of abnormal or fault conditions, and may cause either one circuit (Alert) or the whole unit (Alarm) to shut down. They are assigned codes as described in Table ? (Alarm Mode Table). The alarm/alert indicator LED on the Scrolling Marquee or Navigator is illuminated when any alarm or alert condition is present. If an Alert is active, the Alarm Indicator LED will blink. If an Alarm is active, the Alarm Indicator LED will remain on constant. Currently active Alerts and Alarms can be found ***Alarms→ALRM→ALM1*** to ***ALM5***.

Each alarm is described by a three or four-digit code. The first one or two digits indicate the alarm source and are listed below. The last two digits pinpoint the problem.

An alarm example is shown below:



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Resetting Alarms

The controller generates two types of alarms. Automatic reset alarms will reset without any intervention if the condition that caused the alarm corrects itself. Manual reset alarms require the service technician to check for the alarm cause and reset the alarm.

Before resetting any alarm, first determine the cause of the alarm and correct it. Enter the Alarms mode indicated by the LED on the side of the Scrolling Marquee Display. Press [ENTER] and sub-mode ***Alarm→R.ALM*** Reset All Current Alarms is displayed. Press [ENTER]. The control will prompt the user for a password, by displaying PASS and WORD. Press [ENTER] to display the default password, 0111. Press [ENTER] for each character. If the password has been changed, use the arrow keys to

change each individual character before pressing [ENTER]. Use the up or down arrow keys to toggle the display to ***YES*** and press [ENTER]. The alarms will be reset. Indicator light will be turned off when switched correctly. Do not reset the chiller at random without first investigating and correcting the cause(s) of the failure.

Alarm History

Alarm History buffer ***Alarms→H.ALM*** holds up to 30 alarms. Each alarm is time and date stamped. Pressing [ENTER] and [ESCAPE] will expand each alarm code display.

Not for Distribution

Prefix Code	Suffix Code	Description	Reason for Alarm	Action Taken by Control	Reset Type	Probable Cause
A1 A2 A3 A4 B1 B2 B3 B4 C1 C2 C3 C4	.01	Compressor nn Motor Temperature Too High	Compressor Motor Sensor PTC resistance is greater than 4.5 kΩ	Circuit shutdown or not allowed to start-up	Manual	Compressor failure, wiring error, operation outside of limits, improper refrigerant charge
	.02	Compressor nn Crankcase Heater Failure	Crankcase heater current not detected when required or detected when not required.	Circuit shutdown or not allowed to start-up	Manual	Wiring error, failed Crankcase heater, failed SPM.
	.03	Compressor nn High Pressure Switch	High Pressure Switch open.	Circuit shutdown or not allowed to start-up	Manual	Wiring error, closed/restricted discharge valve, improper refrigerant charge, dirty condenser coils, failed outdoor fan motor, discharge pressure transducer inaccuracy
	.04	Compressor nn Motor Sensor PTC Out of Range	Compressor Motor Sensor PTC resistance is less than 50 Ω or greater than 17k Ω.	Circuit shutdown or not allowed to start-up	Manual	Wiring error, operation outside of limits, compressor failure, improper refrigerant charge
Co	.A1	Loss of Communication with Compressor Board A1	No communication with SPM	Affected compressor is shutdown	Automatic	Wrong SPM address, wrong unit configuration, wiring error, power loss to SPM.
	.A2	Loss of Communication with Compressor Board A2				
	.A3	Loss of Communication with Compressor Board A3				
	.A4	Loss of Communication with Compressor Board A4				
	.B1	Loss of Communication with Compressor Board B1				
	.B2	Loss of Communication with Compressor Board B2				
	.B3	Loss of Communication with Compressor Board B3				
	.B4	Loss of Communication with Compressor Board B4				
	.C1	Loss of Communication with Compressor Board C1				
	.C2	Loss of Communication with Compressor Board C2				
	.C3	Loss of Communication with Compressor Board C3				
	.C4	Loss of Communication with Compressor Board C4				

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Prefix Code	Suffix Code	Description	Reason for Alarm	Action Taken by Control	Reset Type	Probable Cause
Co	.E1	Loss of Communication with EXV Board Number 1	No communication with EXV1	Circuit A & B shutdown or not allowed to start	Automatic	Wrong module address, wrong unit configuration, wiring error, power loss to module
	.E2	Loss of Communication with EXV Board Number 2	No communication with EXV2	Circuit C shutdown or not allowed to start		
Co	.F1	Loss of Communication with Fan Board Number 1	No communication with Fan Board 1	Circuit A & B shutdown or not allowed to start (060-150, 210-250) Circuit A shutdown or not allowed to start (160-190, 275-300)	Automatic	Wrong module address, wrong unit configuration, wiring error, power loss to module
	.F2	Loss of Communication with Fan Board Number 2	No communication with Fan Board 2	Circuit B shutdown or not allowed to start (160-190,275-300)		
	.F3	Loss of Communication with Fan Board Number 3	No communication with Fan Board 3	Circuit C shutdown or not allowed to start (210-300)		
Co	.O1	Loss of Communication with Free Cooling Board	No communication with Free Cooling Board	None	Automatic	Wrong configuration
Co	.O2	Loss of Communication with Electrical Heaters Board	No communication with Electrical Heaters Board			
Co	.O3	Loss of Communication with Energy Management Board	No communication with Energy Management Board	Disable or not allow EMM Functions (3-Step and 4-20 mA Demand Limit, 4-20 mA and Space Temperature Reset, Occupancy Override, and Ice Build)	Automatic	Wrong module address, wrong unit configuration, wiring error, power loss to module
Co	.O4	Loss of Communication with Heat Reclaim Board	No communication with Heat Reclaim Board	None	Automatic	Wrong configuration
FC	.n0	Initial Factory Configuration Required	No configuration	Unit not allowed to start	Automatic	Missing configuration
	.nn	Illegal Configuration	Wrong or incompatible configuration data	Unit not allowed to start	Automatic	Incorrect configuration
MC	.nn	Master Chiller Configuration Error	Wrong or incompatible configuration data	Unit not allowed to start in Master-Slave Control	Automatic	Incorrect configuration

Not for distribution

Prefix Code	Suffix Code	Description	Reason for Alarm	Action Taken by Control	Reset Type	Probable Cause
P	.01	Water Exchanger Freeze Protection	Entering or Leaving Thermistor sensed a temperature at or below freeze point.	Unit shutdown or not allowed to start. Chilled Water Pump will be started	Automatic, first occurrence in 24 hours, Manual, if multiple alarms within 24 hours	Faulty thermistor, faulty wiring, low water flow rate, low loop volume, or freeze conditions.
P	.05	Circuit A Low Suction Temperature	Low Saturated Suction Temperatures sensed for a period of time.	Circuit shutdown	Automatic, first occurrence in 24 hours, Manual, if multiple alarms within 24 hours	Faulty transducer, faulty wiring, low water flow rate, low loop volume, fouled cooler, or freeze conditions.
	.06	Circuit B Low Suction Temperature				
	.07	Circuit C Low Suction Temperature				
P	.08	Circuit A High Superheat	EXV>98%, Suction Superheat >54 F (30.0 C) and SST<MOP for more than 5 minutes	Circuit shutdown	Manual	Faulty transducer, faulty thermistor, faulty wiring, faulty EXV, low refrigerant charge, plugged or restricted liquid line.
	.09	Circuit B High Superheat				
	.10	Circuit C High Superheat				
P	.11	Circuit A Low Superheat	EXV≤5% and Suction Superheat is less than the superheat setting by at least 5 F (2.8 C) or SST>Maximum Operating Pressure for more than 5 minutes	Circuit shutdown	Automatic, first occurrence in 24 hours, Manual, if multiple alarms within 24 hours	Faulty transducer, faulty thermistor, faulty wiring, faulty EXV, or incorrect configuration.
	.12	Circuit B Low Superheat				
	.13	Circuit C Low Superheat				
P	.14	Cooler Interlock Failure	Cooler Pump Interlock circuit opens	Unit shutdown or not allowed to start	Automatic if stage=0, Manual if stage>0.	Low Water Flow, faulty wiring or contacts, faulty water flow switch, or chilled water pump problem.
P	.15	Condenser Flow Switch Failure		None	Manual	Wrong configuration

Not for Distribution

Prefix Code	Suffix Code	Description	Reason for Alarm	Action Taken by Control	Reset Type	Probable Cause
P	.16	Compressor A1 Not Started or Pressure not Established	Compressor differential (Discharge-Suction) did not increase by 10 psig (69 kPa) in 2 minutes	Circuit shutdown	Manual	No power to the compressor, faulty compressor contactor, low control voltage, faulty discharge or suction pressure transducers, wiring error, improper electrical phasing.
	.17	Compressor A2 Not Started or Pressure not Established				
	.18	Compressor A3 Not Started or Pressure not Established				
	.19	Compressor A4 Not Started or Pressure not Established				
	.20	Compressor B1 Not Started or Pressure not Established				
	.21	Compressor B2 Not Started or Pressure not Established				
	.22	Compressor B3 Not Started or Pressure not Established				
	.23	Compressor B4 Not Started or Pressure not Established				
	.24	Compressor C1 Not Started or Pressure not Established				
	.25	Compressor C2 Not Started or Pressure not Established				
	.26	Compressor C3 Not Started or Pressure not Established				
	.27	Compressor C4 Not Started or Pressure not Established				
P	.28	Electrical Box Thermostat / Power Reversal Phase Detection	Improper phasing detected by the reverse rotation board	Unit not allowed to start	Automatic	Check power phasing, improper wiring, or faulty detection board.
P	.29	Loss of Communication with System Manager	Loss of communication with an external control device for more than 2 minutes	Unit changes to stand alone operation	Automatic	Faulty communication wiring, no power supply to the external controller.
P	.30	Master/Slave Communication Failure	Communication between the master and slave machines has been lost.	Units operate as stand alone machines	Automatic	Faulty communication wiring, no power or control power to the main base board to either module.
P	.31	Unit is in Emergency Stop	Emergency Stop command has been received.	Unit shuts down or not allowed to start.	Automatic	Carrier Comfort Network Emergency Stop Command received.
P	.32	Cooler Pump 1 Fault	Pump Interlock status does not match pump status.	Unit shuts down. If available, another pump will start.	Manual	Faulty contacts, wiring error, or low control voltage.
	.33	Cooler Pump 2 Fault				
P	.34	Circuit A Reclaim Operation Failure		None	Manual	Wrong configuration
	.35	Circuit B Reclaim Operation Failure				

Not for Distribution

Prefix Code	Suffix Code	Description	Reason for Alarm	Action Taken by Control	Reset Type	Probable Cause
P	.37	Circuit A Repeated High Discharge Gas Overrides	Multiple capacity overrides due to high saturated discharge temperatures	Circuit shut down	Automatic	Condenser air recirculation, dirty or plugged condenser coils, inaccurate discharge transducer, faulty condenser fan,
	.38	Circuit B Repeated High Discharge Gas Overrides				
	.39	Circuit C Repeated High Discharge Gas Overrides				
P	.40	Circuit A Repeated Low Suction Temperature Override in Heating	Not Supported in Software Versions prior to 1.09			
	.41	Circuit B Repeated Low Suction Temperature Override in Heating				
	.42	Circuit C Repeated Low Suction Temperature Override in Heating				
P	.40	Circuit A Repeated Low Suction Temperature Override	(Added in Software Version 1.09.) More than 6 capacity reductions due to low saturated suction temperature without 30 minutes elapsing between each reduction.	Circuit shut down	Manual	Inaccurate transducer or thermistor, liquid line restriction, plugged filter drier, fouled cooler, low water flow or temperature.
	.41	Circuit B Repeated Low Suction Temperature Override				
	.42	Circuit C Repeated Low Suction Temperature Override				
Pr	.01	Circuit A Discharge Transducer	Measured voltage is 0 vdc	Circuit shutdown or not allowed to start.	Automatic	Faulty transducer, wiring error, failed Main Base Board or Fan Board 3.
	.02	Circuit B Discharge Transducer				
	.03	Circuit C Discharge Transducer				
	.04	Circuit A Suction Transducer				
	.05	Circuit B Suction Transducer				
	.06	Circuit C Suction Transducer				
Pr	.07	Circuit A Reclaim Pumpdown Pressure Transducer		None		Wrong configuration
	.08	Circuit B Reclaim Pumpdown Pressure Transducer				
Sr	nn	Service Maintenance Alert	Field programmed elapsed time has expired for maintenance item	None	Manual	Maintenance required
th	.01	Water Exchanger Entering Fluid Thermistor Failure	Temperature measured by the controller is less than -40 F (-40 C) or greater than 240 F (115.6 C)	Unit will be shutdown or not allowed to start.	Automatic	Faulty thermistor, wiring error, failed Main Base Board or EXV Board
	.02	Water exchanger entering fluid thermistor failure				
th	.03	Circuit A Defrost Thermistor Failure		None		Wrong configuration
	.04	Circuit B Defrost Thermistor Failure				
	.08	Reclaim Condenser Entering Thermistor				
	.09	Reclaim Condenser Leaving Thermistor				

Not for Distribution

Prefix Code	Suffix Code	Description	Reason for Alarm	Action Taken by Control	Reset Type	Probable Cause
th	.10	OAT Thermistor Failure		Unit is shutdown or not allowed to start. Cooler/Pump heaters are energized		
th	.11	Master/Slave Common Fluid Thermistor		Dual Chiller deactivated. Master and Slave machines operate in stand alone mode		Faulty thermistor, wiring error, failed Main Base Board or EXV Board
th	.12	Circuit A Suction Gas Thermistor		Circuit shutdown		
	.13	Circuit B Suction Gas Thermistor		Circuit shutdown		
	.14	Circuit C Suction Gas Thermistor		Circuit shutdown		
th	.17	Circuit A Condenser Subcooling Liquid Thermistor		None		Wrong configuration
	.18	Circuit B Condenser Subcooling Liquid Thermistor				
th	.21	Space Temperature Sensor Failure		Temperature Reset based on Space Temperature disabled		Faulty thermistor, wiring error, failed Main Base Board or EXV Board

Not for Distribution

The following is a detailed description of each alarm code and possible cause.

Alarm Code – Alarm Description
A1.01 – Compressor A1 Motor Temperature Too High
A2.01 – Compressor A2 Motor Temperature Too High
A3.01 – Compressor A3 Motor Temperature Too High
A4.01 – Compressor A4 Motor Temperature Too High
B1.01 – Compressor B1 Motor Temperature Too High
B2.01 – Compressor B2 Motor Temperature Too High
B3.01 – Compressor B3 Motor Temperature Too High
B4.01 – Compressor B4 Motor Temperature Too High
C1.01 – Compressor C1 Motor Temperature Too High
C2.01 – Compressor C2 Motor Temperature Too High
C3.01 – Compressor C3 Motor Temperature Too High
C4.01 – Compressor C4 Motor Temperature Too High

Criteria for Trip: The alarm criterion is checked when the compressor is ON or OFF. This alarm will be generated if the Scroll Protection Module (SPM) detects a compressor motor PTC resistance greater than 4.5 kΩ, indicating that the motor temperature is too high.

Action to be taken: The circuit shuts down immediately or is not allowed to start.

Reset Method: Manual

Possible Causes: If this condition is encountered, check the following items:

- Check for a PTC Thermistor Failure.
- Check for a compressor motor failure.
- Check for a wiring error.
- Check wiring terminations for corrosion.
- Check for operation outside of the limits.
- Check for condenser air recirculation.
- Check the circuit for proper charge.
- Check the EXV for proper operation.
- Check the EXV input devices, pressure transducer and temperature for accuracy.
- Check the liquid line filter drier for a restriction.

Not for Distribution

Alarm Code – Alarm Description
A1.02 – Compressor A1 Crankcase Heater Failure
A2.02 – Compressor A2 Crankcase Heater Failure
A3.02 – Compressor A3 Crankcase Heater Failure
A4.02 – Compressor A4 Crankcase Heater Failure
B1.02 – Compressor B1 Crankcase Heater Failure

B2.02 – Compressor B2 Crankcase Heater Failure
B3.02 – Compressor B3 Crankcase Heater Failure
B4.02 – Compressor B4 Crankcase Heater Failure
C1.02 – Compressor C1 Crankcase Heater Failure
C2.02 – Compressor C2 Crankcase Heater Failure
C3.02 – Compressor C3 Crankcase Heater Failure
C4.02 – Compressor C4 Crankcase Heater Failure

Criteria for Trip: The alarm criteria are checked when the compressor is ON or OFF. The Scroll Protection Module (SPM) monitors crankcase heater current draw. This family of alarms is generated if one of the following criteria is detected:

1. The SPM fails to detect a crankcase current draw of at least 0.5 amps while the crankcase heater is ON.
2. The SPM detects a crankcase current draw of at least 0.5 amps while the crankcase heater is OFF. The current is sensed internally on the SPM.

Action to be taken: If a fault is detected, the affected compressor will be shutdown or not allowed to start.

Reset Method: Manual

Possible Causes: If this condition is encountered, check the following items:

- Check the wiring to the Crankcase Heater.
- Check the Crankcase Heater for operation.
- Check the SPM Crankcase Heater output operation.
- Confirm unit configuration.
- Check the Scroll Protection Module Current Transformer wiring. Early production boards had a problem with the connection of the current transformer to the board. See SMB05-0036.

Not for Distribution

Service Bulletins pertaining to this condition:

- SMB05-0036 – 30RB Scroll Protection Module Failures
  This bulletin was described the problem with the crankcase heater current transformer connection to the board.

Alarm Code – Alarm Description
A1.03 – Compressor A1 High Pressure Switch
A2.03 – Compressor A2 High Pressure Switch
A3.03 – Compressor A3 High Pressure Switch
A4.03 – Compressor A4 High Pressure Switch
B1.03 – Compressor B1 High Pressure Switch
B2.03 – Compressor B2 High Pressure Switch

B3.03 – Compressor B3 High Pressure Switch
B4.03 – Compressor B4 High Pressure Switch
C1.03 – Compressor C1 High Pressure Switch
C2.03 – Compressor C2 High Pressure Switch
C3.03 – Compressor C3 High Pressure Switch
C4.03 – Compressor C4 High Pressure Switch

Criteria for Trip: The alarm criterion is checked when the circuit is ON or OFF. This alarm will be generated if the circuit High Pressure Switch (HPS) opens. The Scroll Protection Module (SPM) monitors the HPS. The 30RB units employ one HPS for each circuit. The HPS signal is connected to all of the SPM modules of the circuit.

Action to be taken: The circuit shuts down immediately or is not allowed to start.

Reset Method: Manual

Possible Causes: If this condition is encountered, check the following items:

- Check the wiring of the High Pressure Switch circuit. Be sure the HPS is connected to all of the SPM boards in the circuit.
- Check the High Pressure Threshold ***Configuration→UNIT→HP.TH*** for the proper setting. The default setting is 609 psi (4198 kPa).
- Check for non-condensibles in the refrigerant circuit.
- Check for condenser air re-circulation.
- Check for the proper refrigerant charge (overcharged).
- Check for operation beyond the limit of the machine.
- Check the condenser coils for debris or restriction.
- Check the condenser fans and motors for proper rotation and operation.
- Check the discharge service valve to be sure that it is open. A closed or restricted valve is a potential high pressure trip.
- Check the Discharge Pressure Transducer for accuracy.
- Confirm unit configuration.

Not for Distribution

Alarm Code – Alarm Description
A1.04 – Compressor A1 Motor Sensor PTC Out of Range
A2.04 – Compressor A2 Motor Sensor PTC Out of Range
A3.04 – Compressor A3 Motor Sensor PTC Out of Range
A4.04 – Compressor A4 Motor Sensor PTC Out of Range
B1.04 – Compressor B1 Motor Sensor PTC Out of Range
B2.04 – Compressor B2 Motor Sensor PTC Out of Range
B3.04 – Compressor B3 Motor Sensor PTC Out of Range
B4.04 – Compressor B4 Motor Sensor PTC Out of Range
C1.04 – Compressor C1 Motor Sensor PTC Out of Range

C2.04 – Compressor C2 Motor Sensor PTC Out of Range
C3.04 – Compressor C3 Motor Sensor PTC Out of Range
C4.04 – Compressor C4 Motor Sensor PTC Out of Range

Criteria for Trip: The alarm criterion is checked when the circuit is ON or OFF. The Scroll Protection Module (SPM) monitors the compressor motor temperature. This alarm will be generated if the Motor Sensor PTC in the compressor resistance is less than 50 Ω or greater than 17k Ω.

Action to be taken: The circuit shuts down immediately or not allowed to start.

Reset Method: Manual

Possible Causes: If this condition is encountered, check the following items:

- Check the sensor wiring to the Scroll Compressor Protection Module (SPM).
- Check for a faulty SPM.
- Check for a compressor failure.
- Check for non-condensibles in the refrigerant circuit.
- Check for condenser air re-circulation.
- Check for the proper refrigerant charge (overcharged).
- Check for operation beyond the limit of the machine.
- Check the condenser coils for debris or restriction.
- Check the condenser fans and motors for proper rotation and operation.
- Check the discharge service valve to be sure that it is open.
- Check the Discharge Pressure Transducer for accuracy.
- Confirm unit configuration.

Not for Distribution

Alarm Code – Alarm Description
Co.A1 – Loss of Communication with Compressor Board A1
Co.A2 – Loss of Communication with Compressor Board A2
Co.A3 – Loss of Communication with Compressor Board A3
Co.A4 – Loss of Communication with Compressor Board A4
Co.B1 – Loss of Communication with Compressor Board B1
Co.B2 – Loss of Communication with Compressor Board B2
Co.B3 – Loss of Communication with Compressor Board B3
Co.B4 – Loss of Communication with Compressor Board B4
Co.C1 – Loss of Communication with Compressor Board C1
Co.C2 – Loss of Communication with Compressor Board C2
Co.C3 – Loss of Communication with Compressor Board C3
Co.C4 – Loss of Communication with Compressor Board C4

Criteria for Trip: The alarm criterion is tested when the unit is ON or OFF. If communication with the Scroll Protection Module (SPM) is lost for a period of 10 seconds, the alarm will be generated.

Action to be taken: The affected compressor will be shutdown.

Reset Method: Automatic, if communication is established, the compressor, if called for will start normally.

Possible Causes: If this condition is encountered, check the following items:
- Check the power supply to the affected SPM.
- Check the address of the SPM to be sure that it is correct.
- Check the Local Equipment Network (LEN) wiring to be sure that it is connected properly.
- Confirm unit configuration.

Alarm Code – Alarm Description
Co.E1 – Loss of Communication with EXV Board Number 1

Criteria for Trip: The alarm criterion is tested when the unit is ON or OFF. If communication with EXV1 is lost for a period of 10 seconds, the alarm will be triggered.

Action to be taken: If running, Circuit A and B will shutdown normally. If Circuit A or Circuit B is not operating, it will not be allowed to start.

Reset Method: Automatic, if communication is established, the unit will start normally.

Possible Causes: If this condition is encountered, check the following items:
- Check the power supply to EXV1.
- Check the address of the EXV1 to be sure that it is correct.
- Check the Local Equipment Network (LEN) wiring to be sure that it is connected properly.
- Confirm unit configuration.

Alarm Code – Alarm Description
Co.E2 – Loss of Communication with EXV Board Number 2

Criteria for Trip: The alarm criterion is tested when the unit is ON or OFF, on 30RB210-290 units only.

Action to be taken: If communication with EXV Board 2 is lost for a period of 10 seconds, the alarm will be triggered. If running, Circuit C will

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shutdown normally. If Circuit C is not running, it will not be allowed to start.

Reset Method: Automatic, if communication is established, the unit will start normally.

Possible Causes: If this condition is encountered, check the following items:
- Check the power supply to EXV Board 2.
- Check the address of the EXV Board 2 to be sure that it is correct.
- Check the Local Equipment Network (LEN) wiring to be sure that it is connected properly.
- Confirm unit configuration.

Alarm Code – Alarm Description
Co.F1 – Loss of Communication with Fan Board Number 1

Criteria for Trip: The criterion is tested when the unit is ON or OFF. If communication with Fan Board 1 is lost for a period of 10 seconds, the alarm will be triggered.

Action to be taken: For 30RB060-150 and 30RB210-250, Circuit A and B will shutdown normally if they are running. For 30RB160-190 and 30RB275-300, Circuit A will shutdown normally if it is running. If the circuit or circuits controlled by the board are not running, then they will not be allowed to start.

Not for Distribution

Reset Method: Automatic, if communication is established, the unit will start normally.

Possible Causes: If this condition is encountered, check the following items:
- Check the power supply to Fan Board 1.
- Check the address of the Fan Board 1 to be sure that it is correct.
- Check the Local Equipment Network (LEN) wiring to be sure that it is connected properly.
- Confirm unit configuration.

Alarm Code – Alarm Description
Co.F2 – Loss of Communication with Fan Board Number 2

Criteria for Trip: The criterion is tested when the unit is ON or OFF and on 30RB160-190, 275, and 300 only.

Action to be taken: If communication with Fan Board 2 is lost for a period of 10 seconds, the alarm will be triggered. If running, Circuit B will shutdown normally for 30RB160-190, 275 and 300. If Circuit B is not running for 30RB160-190, 275 and 300, then it will not be allowed to start.

Reset Method: Automatic, if communication is established, the unit will start normally.

Possible Causes: If this condition is encountered, check the following items:

- Check the power supply to Fan Board 2.
- Check the address of the Fan Board 2 to be sure that it is correct.
- Check the Local Equipment Network (LEN) wiring to be sure that it is connected properly.
- Confirm unit configuration.

Alarm Code – Alarm Description
Co.F3 – Loss of Communication with Fan Board Number 3

Criteria for Trip: The criterion is tested when the unit is ON or OFF, and on 30RB210-300 machines only. If communication with Fan Board 3 is lost for a period of 10 seconds, the alarm will be triggered.

Action to be taken: If running, Circuit C will shutdown normally for 30RB210-300. If the circuit is not running for 30RB210-300, then it will not be allowed to start.

Reset Method: Automatic, if communication is established, the unit will start normally.

Possible Causes: If this condition is encountered, check the following items:

- Check the power supply to Fan Board 3.
- Check the address of the Fan Board 3 to be sure that it is correct.
- Check the Local Equipment Network (LEN) wiring to be sure that it is connected properly.
- Confirm unit configuration.

Alarm Code – Alarm Description
Co.O1 – Loss of Communication with Free Cooling Board

Criteria for Trip: This alarm is for a free cooling machine only. This feature is not supported for a cooling only machine.

Not for Distribution

Action to be taken: None

Reset Method: Automatic

Possible Causes: If this condition is encountered, check the following items:
- Confirm unit configuration.

Alarm Code – Alarm Description
Co.O2 – Loss of Communication with Electrical Heaters Board

Criteria for Trip: This alarm is for a heat pump machines only. This feature is not supported for a cooling only machine.

Action to be taken: None

Reset Method: Automatic

Possible Causes: If this condition is encountered, check the following items:
- Confirm unit configuration.

Alarm Code – Alarm Description
Co.O3 – Loss of Communication with Energy Management Board

Criteria for Trip: The criterion is tested when the unit is ON or OFF and when a function that requires the Energy Management Module (EMM) is configured. If communication with the EMM is lost for a period of 10 seconds, the alarm will be triggered.

Action to be taken: If any function controlled by the EMM (3-Step and 4-20 mA Demand Limit, 4-20 mA and Space Temperature Reset, Occupancy Override, and Ice Build) is active, that function will be terminated. If an EMM function is programmed, and communication is lost, the function will not be allowed to start.

Reset Method: Automatic, if communication is established, the functions will be enabled.

Possible Causes: If this condition is encountered, check the following items:
- Check configuration to see if the EMM is installed, ***Configuration→UNIT→EMM***. If ***EMM=YES***, check for a control option that requires the EMM that may be enabled. Correct configuration if not correct.
- Check the power supply to EMM.

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- Check the address of the EMM to be sure that it is correct. Early Accessory kits were not addressed correctly.
- Check the Local Equipment Network (LEN) wiring to be sure that it is connected properly.
- Check unit configuration to be sure that no options that require the EMM are enabled.

Alarm Code – Alarm Description
Co.O4 – Loss of Communication with Heat Reclaim Board

Criteria for Trip: This alarm is for a heat reclaim machine. This feature is not supported for a cooling only machine.

Action to be taken: None

Reset Method: Automatic

Possible Causes: If this condition is encountered, check the following items:
- Confirm the unit configuration.

Not for Distribution

Alarm Code – Alarm Description
FC.n0 – Initial Factory Configuration Required

Criteria for Trip: The criterion is tested whether the unit is ON or OFF. The alarm will be generated if the ***Configuration→UNIT→TONS=0***

Action to be taken: The unit is not allowed to start.

Reset Method: Automatic after factory configuration is complete. The configuration must be manually completed. Use the Factory Configuration Password Code of 0113 to configure the unit.

Possible Causes: If this condition is encountered, check the following items:
- Confirm the unit configuration.

Alarm Code – Alarm Description
FC.nn – Illegal Configuration

Criteria for Trip: The criterion is tested whether the unit is ON or OFF. The alarm will be generated if the one of the following configuration errors is detected by the control. The “nn” refers to the error code listed below.

Illegal Configuration Alarm Code	
Error code	**Description**
01	Unit size is unknown
02	Reclaim option selected for Heat Pump machine
03	Hot Gas Bypass configured for a Heat Pump machine.
04	Number of Fans controlled by MotorMaster is greater than expected.

Action to be taken: The unit is not allowed to start.

Reset Method: Automatic after factory reconfiguration is completed.

Possible Causes: If this condition is encountered, check the following items:
- Confirm the unit configuration.

Alarm Code – Alarm Description
MC.nn – Master Chiller Configuration Error

Criteria for Trip: The criterion is tested whether the unit is ON or OFF. The units must be configured as a Master and Slave machine, ***Configuration→RSET→MSSL=1*** and ***Configuration→RSET→MSSL=2***, and one of the following configuration errors has been found. The "nn" refers to the error code listed below.

Not for Distribution

Master/Slave Alarm Code			
Error code	**Master**	**Slave**	**Description**
01	X	X	The master or slave water pump is not configured while the control of the lag unit pump is required (lag_pump = 1)
02	X		Master and slave units have the same network address.
03	X		There is no slave configured at the slave address
04	X		Slave pump_seq incorrect configuration
05	X		There is a conflict between the master and the slave lwt option: the master is configured for ewt control while the slave is configured for lwt control.
06	X		There is a conflict between the master and the slave lwt option: the master is configured for lwt control while the slave is configured for ewt control.
07	X		There is a conflict between the master and the slave pump option: the master is configured for lag pump control while the slave is not configured for lag pump control.
08	X		There is a conflict between the master and the slave pump option: the master is not configured for lag pump control while the slave is configured for lag pump control.
09	X	X	The slave chiller is in local or remote control (chilstat = 3)
10	X	X	The slave chiller is down due to fault (chilstat = 5)
11	X		The master chiller operating type is not Master: master_oper_typ □ master
12	X	X	No communication with slave.

13	X		master and slave heatcool status are not the same.

Action to be taken: Unit not allowed to start in Master Slave control.

Reset Method: Automatic

Possible Causes: If this condition is encountered, check the following items:
- Confirm proper configuration.

Alarm Code – Alarm Description
P.01 – Water Exchanger Freeze Protection

Criteria for Trip: The alarm criteria are checked whether the unit is ON or OFF. If the Entering or Leaving Water Thermistor senses a temperature at the freeze point or less, the alarm will be generated. For a fresh water system ***Configuration→SERV→FLUD=1***, the freeze point is 34 F (1.1 C). For medium temperature brine systems, ***Configuration→SERV→FLUD=2***, the freeze point is Brine Freeze Set Point ***Configuration→SERV→LOSP***.

Action to be taken: Unit shutdown or not allowed to start. Chilled water pump will be started.

Reset Method: Automatic, first occurrence in 24 hours. Manual, if more than one occurrence in 24 hours.

Possible Causes: If this condition is encountered, check the following items:
- Check the Entering and Leaving Fluid Thermistors for accuracy.
- Check the water flow rate.
- Check loop volume. Low loop volume at nominal flow rates can in extreme cases bypass cold water to the cooler.
- Check for freezing conditions.
- Check heater tape and other freeze protection items for proper operation.
- Check glycol concentration and adjust LOSP accordingly.
- If the Leaving Water Set Point is above 40 F (4.4 C) and there is glycol in the loop, consider using the Medium Temperature Brine option, ***FLUD=2*** to utilize the brine freeze point instead of 34 F (1.1 C).

Alarm Code – Alarm Description

Not for Distribution

P.05 – Circuit A Low Suction Temperature
P.06 – Circuit B Low Suction Temperature
P.07 – Circuit C Low Suction Temperature

Criteria for Trip: The criteria are tested when the circuit is ON. This alarm is generated if one of the following criteria is met:

1. If the circuit Saturated Suction Temperature is below –13 F (-25 C) for more than 30 seconds.
2. If the circuit Saturated Suction Temperature is below –22 F (-30 C) for more than 8 seconds.
3. If the circuit Saturated Suction Temperature is below –40 F (-40 C) for more than 3 seconds.

Action to be taken: The circuit is shutdown immediately.

Prior to the alarm trip, the control will take action to avoid the alarm. See Operating Modes 21, 22 and 23 on page **Error! Bookmark not defined.**.

Reset Method: Automatic, first occurrence in 24 hours. Manual, if more than one occurrence in 24 hours.

Possible Causes: If this condition is encountered, check the following items:

- Check the sensor wiring to Main Base Board (P.05 and P.06) or Fan Board 3 (P.07).
- Check the board for a faulty channel.
- Check for a faulty transducer.
- Check cooler water flow.
- Check loop volume.
- Check EXV operation.
- Check for a liquid line refrigerant restriction, filter drier, service valve, etc.
- Check the refrigerant charge.
- If the Leaving Water Set Point is above 40 F (4.4 C) and there is glycol in the loop, consider using the Medium Temperature Brine option, ***Configuration→SERV→FLUD=2*** to utilize the brine freeze point instead of 34 F (1.1 C).

Not for Distribution

Alarm Code – Alarm Description
P.08 – Circuit A High Superheat
P.09 – Circuit B High Superheat
P.10 – Circuit C High Superheat

Criteria for Trip: The criteria are tested when the circuit is ON. This alarm is generated if all of the following criteria are met:

1. The EXV position is equal to or greater than 98%.
2. The circuit's Suction Superheat (Suction Gas Temperature – Saturated Suction Temperature) is greater than 54 F (30.0 C).
3. The circuit's Saturated Suction Temperature is less than Maximum Operating Pressure (MOP) set point ***Configuration→SERV→MOP*** for more than 5 minutes.

Action to be taken: The circuit is shutdown normally.

Reset Method: Manual.

Possible Causes: If this condition is encountered, check the following items:

- Check the suction pressure transducer wiring to Main Base Board (P.08 and P.09) or Fan Board 3 (P.10).
- Check the board for a faulty channel.
- Check for a faulty transducer.
- Check the suction gas thermistor wiring to EXV Board 1 (P.08 and P.09) or to EXV Board 2 (P.10)
- Check the suction gas thermistor sensor for accuracy.
- Check for EXV Board 1 (P.08 and P.09) or EXV Board 2 (P.10) faulty channel.
- Check EXV operation.
- Check for a liquid line refrigerant restriction, filter drier, service valve, etc.
- Check the refrigerant charge.

Not for Distribution

Alarm Code – Alarm Description
P.11 – Circuit A Low Superheat
P.12 – Circuit B Low Superheat
P.13 – Circuit C Low Superheat

Criteria for Trip: The criteria are tested when the circuit is ON. This alarm is generated if the following criterion is met:

The EXV position is equal to or less than 5% and the circuit's Suction Superheat (Suction Gas Temperature –Saturated Suction Temperature) is less than the Suction Superheat Set Point ***Configuration→SERV→SHP.A***, ***Configuration→SERV→SHP.B***, or ***Configuration→SERV→SHP.C*** by at least 5 F (2.8 C) or the circuit Saturated Suction Temperature is greater than Maximum Operating Pressure (MOP) set point ***Configuration→SERV→MOP*** for more than 5 minutes.

Action to be taken: The circuit is shutdown normally.

Reset Method: Automatic, first occurrence in 24 hours. Manual, if more than one occurrence in 24 hours.

Possible Causes: If this condition is encountered, check the following items:

- Check the suction pressure transducer wiring to Main Base Board (P.08 and P.09) or Fan Board 3 (P.10).
- Check the board for a faulty channel.
- Check for a faulty transducer.
- Check the suction gas thermistor wiring to EXV Board 1 (P.08 and P.09) or to EXV Board 2 (P.10)
- Check the suction gas thermistor sensor for accuracy.
- Check for EXV Board 1 (P.08 and P.09) or EXV Board 2 (P.10) faulty channel.
- Check EXV operation.
- Confirm Maximum Operating Pressure Set Point.
- Check the refrigerant charge.

Not for Distribution

Alarm Code – Alarm Description
P.14 – Cooler Interlock Failure

Criteria for Trip: The criteria are tested when the unit is ON or OFF. This algorithm monitors the cooler flow switch circuit, which may include field installed cooler pump interlock contacts. This alarm is generated if one following criteria is met:

1. The interlock circuit fails to close within the OFF to ON delay ***Configuration→OPTN→DELY***.
2. If the unit is the lag chiller under Master/Slave Control and the cooler interlock circuit fails to close within 1 minute after it's pump is commanded ON.
3. The cooler interlock circuit opens while the machine is ON.
4. If the Remote Interlock Switch is CLOSED while the machine is ON.
5. The remote customer interlock is CLOSED during normal operation.
6. If the machine is configured for Cooler Pump Control and the cooler interlock circuit does not open within 2 minutes.
7. The interlock circuit fails to close within the OFF to ON delay ***DELY*** when the cooler pump has been commanded ON for freeze protection.

8. If the unit is equipped with an Energy Management Module, there must be a jumper installed across the Remote Lockout Switch, TB6-5 and TB6-6.

Action to be taken: The unit is shutdown immediately, or not allowed to start.

Reset Method: Automatic, if the alarm occurs while the machine is at Stage 0 (no compressors ON). Manual reset if machine was at Stage1 or greater.

Possible Causes: If this condition is encountered, check the following items:

- Check the Chilled Water Flow Switch operation.
- Check for water flow. Be sure all water isolation valves are open. Check the water strainer for a restriction.
- Check the interlock wiring circuit.
- Check for a power supply to the pump.
- Check for a control signal to the pump controller.
- Check the chilled water pump operation.
- Check the cooler pump contactor for proper operation
- Check for voltages greater than 24 vac on the Chilled Water Flow Switch circuit. This circuit includes the Auxiliary Contact field connection also.
- Check for a resistor in series with the Chilled Water Flow Switch. A resistor was added beginning with units with serial numbers 4505Q.
- If the unit is equipped with an Energy Management Module, there must be a jumper installed across the Remote Lockout Switch, TB6-5 and TB6-6.

Not for Distribution

Alarm Code – Alarm Description

P.15 – Condenser Flow Switch Failure

Criteria for Trip: This alarm is for a heat reclaim machine only. This feature is not supported for a cooling only machine.

Action to be taken: None.

Reset Method: Manual.

Possible Causes: If this condition is encountered, check the following items:

- Check unit configuration.

Alarm Code – Alarm Description

P.16 – Compressor A1 Not Started or Pressure not Established
P.17 – Compressor A2 Not Started or Pressure not Established
P.18 – Compressor A3 Not Started or Pressure not Established
P.19 – Compressor A4 Not Started or Pressure not Established
P.20 – Compressor B1 Not Started or Pressure not Established
P.21 – Compressor B2 Not Started or Pressure not Established
P.22 – Compressor B3 Not Started or Pressure not Established
P.23 – Compressor B4 Not Started or Pressure not Established
P.24 – Compressor B1 Not Started or Pressure not Established
P.25 – Compressor B2 Not Started or Pressure not Established
P.26 – Compressor B3 Not Started or Pressure not Established
P.27 – Compressor B4 Not Started or Pressure not Established

Criteria for Trip: The criteria are tested when the unit is ON or in Service Test. This algorithm monitors the pressure differential across the compressor to prove proper rotation of the compressor.

During normal operation with the start of a compressor, the discharge pressure for the circuit or the compressor differential (Discharge Pressure – Suction Pressure must increase 10 psig (69 kPa) after 2 minutes. If this criterion is not met, the alarm is generated.

Action to be taken: The circuit is shutdown immediately.

Reset Method: Manual

Possible Causes: If this condition is encountered, check the following items:

- Check for power to the compressor.
- Check control voltage to the compressor contactor. On 208-volt systems, be sure the proper tap on TRAN1 is utilized.
- Check for proper electrical phasing of the unit power supply.
- Check the compressor contactor operation.
- Check the discharge and suction pressure transducers for accuracy.
- Check the wiring and location of the discharge and suction pressure transducers.

Not for Distribution

Alarm Code – Alarm Description
P.28 – Electrical Box Thermostat / Power Reversal Phase Detection

Criteria for Trip: The criterion is tested when the unit is ON. This alarm is generated if the signal is open.

Action to be taken: The unit is not allowed to start.

Reset Method: Automatic, once the phasing is corrected.

Possible Causes: If this condition is encountered, check the following items:

- Check the power wiring for proper phasing.
- Check the sensor wiring to Reverse Rotation Protection Board.
- Check the fan circuit breaker to be sure that it has not opened. Original production, through ??05Q, were shipped with undersized fan circuit breakers.
- If the fan circuit breaker has opened, check to be sure that the circuit breakers are correctly sized. Check for a shorted condenser fan motor or wiring.

Alarm Code – Alarm Description
P.29 – Loss of Communication with System Manager

Criteria for Trip: The criterion is tested when the unit is ON or OFF. This alarm is generated if the System Manager had established communications with the machine and is lost for more than 2 minutes.

Action to be taken: The action to be taken by the control depends on the configuration. If Auto Start when SM lost is enabled, ***Configuration→SERV→AU.SM=YES***, then the unit will force the CCN Chiller Start Stop, ***Run Status→VIEW→CH.S.S*** to ***ENBL*** and clear all forced points from the System Manager. The unit will revert to stand-alone operation.

Not for Distribution

Reset Method: Automatic, communication is re-established.

Possible Causes: If this condition is encountered, check the following items:

- Check communication wiring.
- Check the power supply to the System Manager and unit controls.

Alarm Code – Alarm Description
P.30 – Master/Slave Communication Failure

Criteria for Trip: The criterion is tested whether the units are ON or OFF and a Master and Slave machine has been configured, ***Configuration→RSET→MSSL=1*** and ***Configuration→RSET→MSSL=2***. If communication is lost for more than 3 minutes (?2 minutes), this alarm is generated.

Action to be taken: Dual Chiller control will be disabled and each unit will operate in Stand-Alone mode.

Reset Method: Automatic, once communication is re-established

Possible Causes: If this condition is encountered, check the following items:
- Check the CCN wiring.
- Check for control power to each Main Base Board, Master and Slave.
- Confirm correct configuration.

Alarm Code – Alarm Description
P.31 – Unit is in Emergency Stop

Criteria for Trip: The criterion is tested whether the units are ON or OFF and the machine receives a Carrier Comfort Network (CCN) command for an Emergency Stop.

Action to be taken: Unit will stop, or not allowed to start.

Reset Method: Automatic, once a return to normal command is received.

Possible Causes: If this condition is encountered, check the following items:
- Check for CCN Emergency Stop command.

Not for Distribution

Alarm Code – Alarm Description
P.32 – Cooler Pump 1 Fault
P.33 – Cooler Pump 2 Fault

Criteria for Trip: The criterion is tested whether the units are ON or OFF. This alarm will be generated if the cooler pump interlock opens. When starting the pump, the control must read an open circuit for 3 consecutive reads. If the pump is operating and the circuit opens, the alarm will be generated immediately.

Action to be taken: The pump and machine will be shutdown. If there is another pump available, the control will start that pump, restart the machine and clear the alarm. If no other pump is available, the unit will remain OFF.

Reset Method: Manual.

Possible Causes: If this condition is encountered, check the following items:
- Check the interlock wiring circuit.

- Check for a control signal to the pump controller.
- Check the cooler pump contactor for proper operation.
- Check control voltage for proper voltage. On 208-volt systems, be sure the proper tap on TRAN1 is utilized.

Alarm Code – Alarm Description
P.34 – Circuit A Reclaim Operation Failure
P.35 – Circuit B Reclaim Operation Failure

Criteria for Trip: This alarm is for a heat reclaim machine only. This feature is not supported for a cooling only machine.

Action to be taken: None.

Reset Method: Manual.

Possible Causes: If this condition is encountered, check the following items:
- Check unit configuration.

Not for Distribution

Alarm Code – Alarm Description
P.37 – Circuit A Repeated High Discharge Gas Overrides
P.38 – Circuit B Repeated High Discharge Gas Overrides
P.39 – Circuit C Repeated High Discharge Gas Overrides

Criteria for Trip: The criterion is tested when the circuit is ON. This alarm will be tripped if the circuit capacity is reduced more than 8 times in 30 minutes due to high discharge gas temperatures. If no override occurs in a 30 minute period, the counter is reset.

Action to be taken: The affected circuit will be shutdown.

Reset Method: Automatic, after 30 minutes. If the alarm is cleared via the Manual method, the counter will be reset to zero.

Possible Causes: If this condition is encountered, check the following items:
- Check the High Pressure Threshold ***Configuration→UNIT→HP.TH*** for the proper setting. The factory default setting is 609 psi (4198 kPa).
- Check for non-condensibles in the refrigerant circuit.
- Check for condenser air re-circulation.
- Check for the proper refrigerant charge (overcharged).
- Check for operation beyond the limit of the machine.
- Check the condenser coils for debris or restriction.

- Check the condenser fans and motors for proper rotation and operation.
- Check the discharge service valve to be sure that it is open. Check the Discharge Pressure Transducer for accuracy.
- Confirm unit configuration.

Alarm Code – Alarm Description
P.40 – Circuit A Repeated Low Suction Temperature Override In Heating
P.41 – Circuit B Repeated Low Suction Temperature Override In Heating
P.42 – Circuit C Repeated Low Suction Temperature Override In Heating

Criteria for Trip: This alarm is for a Heat Pump machine only. This feature is not supported for a cooling only machine. This alarm is in software versions prior to 1.09.

Action to be taken: None

Reset Method: Automatic

Possible Causes: If this condition is encountered, check the following items:
- Confirm unit configuration.

Not for Distribution

Alarm Code – Alarm Description
P.40 – Circuit A Repeated Low Suction Temperature Override
P.41 – Circuit B Repeated Low Suction Temperature Override
P.42 – Circuit C Repeated Low Suction Temperature Override

Criteria for Trip: This alarm was added in Software Version 1.09. The criterion is active when circuit is ON. If the circuit's capacity is reduced more than 6 times by the Capacity Override 23 (Circuit A), 24 (Circuit B), or 25 (Circuit C) for the respective circuit, without at least 30 minutes elapsing between the capacity reductions the alarm is triggered. If at least 30 minutes elapses without a reduction in capacity, the counter is reset to zero.

Action to be taken: Circuit shutdown

Reset Method: Manual

Possible Causes: If this condition is encountered, check the following items:
- Confirm unit configuration.
- Check EXV operation
- Check for a liquid line refrigerant restriction, service valve partially closed, filter drier with excessive pressure drop.

- Check the refrigerant charge
- Check Suction Pressure Transducer accuracy
- Check Return Gas Thermistor accuracy
- Check Circuit Superheat Set Point, ***Configuration→SERV→SHP.A, SHP.B,*** or ***SHP.C***.
- Check Brine Freeze Set Point, ***Configuration→SERV→LOSP*** if an antifreeze solution is used
- Check fluid flow rate
- Check strainer for a restriction, clean if necessary
- Check for cooler fouling

Alarm Code – Alarm Description
Pr.01 – Circuit A Discharge Transducer
Pr.02 – Circuit B Discharge Transducer
Pr.03 – Circuit C Discharge Transducer

Not for Distribution

Criteria for Trip: The criterion is tested when the circuit is ON or OFF. This alarm is generated if the voltage as sensed by the MBB or FB3 is 0 vdc.

Action to be taken: The circuit is shutdown normally, or not allowed to start.

Reset Method: Automatic, once the transducer voltage is greater than 0 vdc.

Possible Causes: If this condition is encountered, check the following items:

- Check the sensor wiring to Main Base Board (Pr.01 and Pr.02).
- Check the sensor wiring to Fan Board 3 (Pr.03).
- Check the board for a faulty channel.
- Check for a faulty transducer.
- Confirm unit configuration.

Alarm Code – Alarm Description
Pr.04 – Circuit A Suction Transducer
Pr.05 – Circuit B Suction Transducer
Pr.06 – Circuit C Suction Transducer

Criteria for Trip: The criteria are tested when the circuit is ON or OFF. The alarm is generated if one of the following criteria is met:

1. This alarm is generated if the voltage as sensed by the MBB or FB3 is 0 vdc.
2. The circuit is ON in cooling mode and the Saturated Suction Temperature for the circuit is greater than the Leaving Water Temperature for more than 30 seconds.

Action to be taken: The circuit is shutdown immediately, or not allowed to start.

Reset Method:
1. Automatic, once the transducer voltage is greater than 0 vdc.
2. Automatic once the circuit's saturated suction temperature is lower than the Leaving Water Temperature by 3 F (1.6 C). If this criterion trips the alarm 3 times within a 24 hour period, the alarm changes to a manual reset.

Possible Causes: If this condition is encountered, check the following items:
- Check the sensor wiring to Main Base Board (Pr.04 and Pr.05).
- Check the sensor wiring to Fan Board 3 (Pr.06).
- Check the board for a faulty channel.
- Check for a faulty transducer.
- Check for a faulty Leaving Water Temperature Sensor.
- Confirm unit configuration.

Alarm Code – Alarm Description
Pr.07 – Circuit A Reclaim Pumpdown Pressure Transducer
Pr.08 – Circuit B Reclaim Pumpdown Pressure Transducer

Criteria for Trip: This alarm is for a heat reclaim machine only. This feature is not supported for a cooling only machine.

Action to be taken: None.

Reset Method: Automatic

Possible Causes: If this condition is encountered, check the following items:
- Confirm the machine's configuration.

Not for Distribution

Alarm Code – Alarm Description
Sr.nn – Service Maintenance Alert

Criteria for Trip: This alert is tested whether the unit is ON or OFF and the Servicing Alert decisions listed under **Time Clock/MCFG** have been enabled. The alarm will be generated if the one of the following configuration errors is detected by the control. The "nn" refers to the error code listed below.

Service Maintenance Alert Codes	
Code	**Description**
01	Circuit A Loss of Refrigerant Charge
02	Circuit B Loss of Refrigerant Charge
03	Circuit C Loss of Refrigerant Charge
04	Water Loop Size Warning

05	Air Exchanger Cleanliness Warning
06	Pump 1 Servicing Required
07	Pump 2 Servicing Required
08	Reclaim Pump Servicing Required
09	Water Filter Servicing Required

Action to be taken: None.

Reset Method: Manual, after the service has been completed and ***Time Clock→MCFG→RS.SV*** is reset for the alert.

?Need clarification on how to reset the this alert. Control spec is not clear.

Possible Causes: If this condition is encountered, check the following items:

- Confirm the machine's configuration.

Not for Distribution

Alarm Code – Alarm Description

th.01 – Water Exchanger Entering Fluid Thermistor Failure

th.02 – Water Exchanger Leaving Fluid Thermistor Failure

Criteria for Trip: If the temperature as measured by the themistor is outside of the range –40 F (-40 C) and 240 F (115.6 C).

Action to be taken: The unit shuts down normally, or is not allowed to start.

Reset Method: Automatic, the alarm will reset once the thermistor reading is within the expected range.

Possible Causes: If this condition is encountered, check the following items:

- Check the sensor wiring to the Main Base Board.
- Check the sensor for accuracy.

For thermistor descriptions, identifiers and connections, see Thermistors on page .

Alarm Code – Alarm Description

th.03 – Circuit A Defrost Thermistor Failure

th.04 – Circuit B Defrost Thermistor Failure

Criteria for Trip: This alarm is for a heat pump machine only. This feature is not supported for a cooling only machine.

Action to be taken: None

Reset Method: Automatic

Possible Causes: If this condition is encountered, check the following items:

- Confirm the machine's configuration.

Alarm Code – Alarm Description
th.08 – Condenser Reclaim Entering Thermistor
th.09 – Condenser Reclaim Leaving Thermistor

Criteria for Trip: This alarm is for a heat reclaim machine only. This feature is not supported for a cooling only machine.

Action to be taken: None

Reset Method: Automatic

Possible Causes: If this condition is encountered, check the following items:
- Confirm the machine's configuration.

Alarm Code – Alarm Description
th.10 – OAT Thermistor Failure

Criteria for Trip: If the outdoor air temperature as measured by the thermistor is outside of the range –40 F (-40 C) and 240 F (115.6 C).

Action to be taken: Unit shuts down under normal conditions or is not allowed to start. Temperature Reset based on Outdoor Air Temperature will be disabled.

The OAT sensor controls the cooler heaters. If this sensor fails, the cooler heaters will be energized when the machine stages to 0.

Reset Method: Automatic, the alarm will reset once the thermistor reading is within the expected range and Temperature Reset based on Outdoor Air Temperature will be enabled.

Possible Causes: If this condition is encountered, check the following items:
- Check the sensor wiring to the Main Base Board.
- Check for a faulty thermistor.

For thermistor descriptions, identifiers and connections, see Thermistors on page 99.

Alarm Code – Alarm Description
th.11 – Master/Slave Common Fluid Thermistor

Not for Distribution

Criteria for Trip: This alarm criterion is checked whether the unit is ON or OFF and has been configured for Dual Chiller Control. The alarm will be triggered if the Dual Chiller Common Fluid temperature as measured by the thermistor is outside of the range –40 F (-40 C) and 240 F (115.6 C).

Action to be taken: Dual Chiller Control disabled. Units operate as a Stand Alone machine.

Reset Method: Automatic, once the thermistor reading is within the expected range. The Dual Chiller algorithm will resume once the alarm is cleared.

Possible Causes: If this condition is encountered, check the following items:
- Check the sensor wiring to the Main Base Board.
- Check for a faulty thermistor.

For thermistor descriptions, identifiers and connections, see Thermistors on page 99.

Alarm Code – Alarm Description
th.12 –Circuit A Suction Gas Thermistor
th.13 –Circuit B Suction Gas Thermistor
th.14 –Circuit C Suction Gas Thermistor

Not for Distribution

Criteria for Trip: This alarm criterion is checked whether the unit is ON or OFF. If the suction gas temperature as measured by the thermistor is outside of the range -40 F (-40 C) and 240 F (115.6 C), the alarm will be triggered.

Action to be taken: The affected circuit shuts down normally.

Reset Method: Automatic, once the thermistor reading is within the expected range. The affected circuit will restart once the alarm has cleared.

Possible Causes: If this condition is encountered, check the following items:
- Check the sensor wiring to the EXV Board.
- Check the board for a faulty channel.
- Check for a faulty thermistor.

For thermistor descriptions, identifiers and connections, see Thermistors on page 99.

Alarm Code – Alarm Description

th.17 – Circuit A Condenser Subcooling Liquid Thermistor
th.18 – Circuit B Condenser Subcooling Liquid Thermistor

Criteria for Trip: This alarm is for a heat reclaim machine only. This feature is not supported for a cooling only machine.

Action to be taken: None

Reset Method: Automatic

Possible Causes: If this condition is encountered, check the following items:
- Confirm the machine's configuration.

Alarm Code – Alarm Description
th.21 – Space Temperature Sensor Failure

Criteria for Trip: This alarm criterion is checked whether the unit is ON or OFF and if Space Temperature Reset has been enabled. If the outdoor air temperature as measured by the thermistor is outside of the range –40 F (-40 C) and 240 F (115.6 C)

Action to be taken: Unit operates under normal control. Temperature Reset based on Space Temperature is disabled.

Reset Method: Automatic, once the thermistor reading is within the expected range. The Space Temperature Reset will resume once the alarm has cleared.

Possible Causes: If this condition is encountered, check the following items:
- Check the sensor wiring to the Energy Management Module.
- Check the board for a faulty channel.
- Check for a faulty thermistor.

For thermistor descriptions, identifiers and connections, see Thermistors on page 99.

Chilled Water Flow Switch
This machine uses a thermal dispersion-type flow switch. There are no indicating LEDs on this device.

Due to failures of the Chilled Water Flow Switch from more than 24 volts being applied to the flow switch input, and the potential for damage to the Main Base Board of the Main Base Board, a 560 +/- 28 ohms, 1 watt resistor was added in series with the flow switch starting with production serial numbers 4505Q. The Chilled Water Flow Switch

Not for Distribution

includes the Factory Installed Chilled Water Flow Switch and the Auxiliary Contact circuit for field installed flow devices.

ComfortLink Control Boards

Interface Devices

Scrolling Marquee Display

Troubleshooting:

Communications
The following table has the design resistance in ohms as measured between the pins of the connector listed. Values to as little as half of the listed resistance can be expected to perform without any problems. All measurements are to be made with power removed from the board and no connections to either the LEN or CCN ports.

Table 1 - Scrolling Marquee LEN Resistance Chart

Part Number			Serial Number	(LEN) Resistance between Pins / Connector		
With Software	Without Software	Vendor		Pins 1 to 3	Pins 1 to 2	Pins 2 to 3
HK50AA031	HK50AA030	CEPL130847-01	Prior to 4802N	40K Ω J1	20K Ω J1	20K Ω J1
			Starting 4802N	287K Ω J1	7.25M Ω J1	5.9M Ω J1

Not for Distribution

If the arrow, [ENTER], or [ESCAPE] keys do not respond when pushed, check the seating of the printed circuit board into the casing of the scrolling marquee. If the board is not seated, the keys will not respond when pushed.

Service Bulletins pertaining to this condition:

- SMB02-0070 – ComfortLink Scrolling Marquee Failures
  This bulletin addressed erratic operation of the keys and described the proper seating of the display to the circuit board for proper operation.

Navigator

Cleaning
The Navigator can be cleaned with a mild detergent. Isopropyl alcohol or a glass cleaner can be used on all Navigator surfaces.

Connection Cord/Plug Assembly Replacement
If the RJ14 plug is damaged, it can be replaced. If it is replaced, the wiring to the plug must be as shown below:

	Pin					
	1	2	3	4	5	6
Wire Color	Black	Green	Blue	Yellow	Red	White

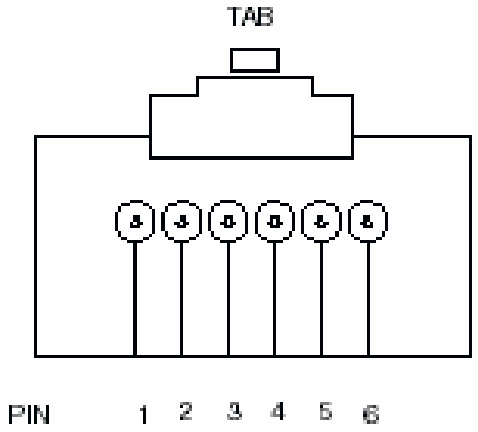


Figure 1 - Navigator Connection Diagram

Not for Distribution

The connection cable can be replaced if damaged. Replacement cables are available from Replacement Components Division. Remove the Navigator from the LEN connection before proceeding.

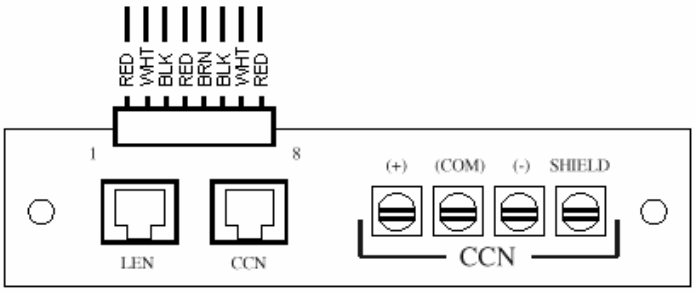
1. Remove the 6 screws from the back of the case to gain access to the internal plug for the device, and keep them for installation later.
2. The back cover is connected to the touch pad by a ribbon cable. The ribbon cable is not long enough to allow the two halves to be completely separated. To be able to access the plug connection, slightly offset the back cover. Be careful not to damage the ribbon cable.
3. Unplug the damaged cable.
4. Plug in the new cable.
5. Insert the rubber grommet (included with new cable assembly) into the cable entrance hole.
6. Realign the two halves of the Navigator. Be sure that the grommet is properly seated in the cable entrance hole.
7. Reinstall the 6 screws previously removed.

NOTE: Failure to properly seal the Navigator with the screws and grommet will compromise the watertight integrity of the device.

Troubleshooting:

Communications

The following table has the design resistance in ohms as measured between the pins of the connector listed. Values to as little as half of the listed resistance can be expected to perform without any problems. All measurements are to be made with power off and no connections to either the LEN or CCN ports. Due to the difficultly in accessing the RJ14 connection, it is recommended the LEN resistance be measured at TB3. With the Navigator plugged into the TB3 RJ14 Port use the TB3 board connector pins after the internal harness has been disconnected to find the resistance.



TB3

Figure 2 - TB3 Field Connections - LEN/CCN

Not for Distribution

Table 2 - Navigator LEN Resistance Chart

Part Number			Serial Number	(LEN) Resistance between Pins / Connector		
With Software	Without Software	Vendor		Pins 1 to 3	Pins 1 to 2	Pins 2 to 3
HK50AA033		CEPL130435-01	All	220 Ω TB3	1000 Ω TB3	1000 Ω TB3

Loss of Communication
This failure is identified by a “Communication Failure” on the Navigator and a “COMM FAIL” on the Scrolling Marquee Display.

The Navigator to be very sensitive to the polarity of the 24 vac power connection. If the polarity of the power source is not correct, a Communication Failure will occur. Additionally, check the ground wire at TB3. This wire is a shielded wire and is not connected to the terminal block. It should be trimmed and insulated. If this wire comes in contact with the 24 vac power connection, the same problem can result.

If this condition is encountered, check the following items:

- Check the wiring from the MBB to TB3.
- Check for the proper polarity of the power supply.
- Check the ground wire at TB3. It should be insulated.
- Check the resistance of the Navigator.

- Disconnect all of the remaining Boards from the LEN connection. This will allow for a check of the communication chips of the other control boards. With the Navigator plugged in, check to see if the alarm disappears. If it does, reconnect the devices individually to see which board is suspect.
- Disconnect all inputs to the MBB. A grounded input to the MBB can also cause a communication alarm.

Service Bulletins pertaining to this condition:

- SMB00-0067 – Navigator Failures
  This bulletin described the potential wiring problems that can lead to a Communication Failure.

Energy Management Module

The EMM is available as a factory-installed option or as a field-installed accessory. The EMM receives 4 to 20 mA or 2 to 10 vdc input for the temperature reset, cooling set point reset and demand limit functions. The EMM also receives the switch inputs for the field-installed second stage demand limit, ice done and Space temperature reset functions.

The EMM has outputs for a 0-10 vdc signal for total capacity, an output for a Run and Shutdown Status relay.

The EMM communicates the status of all inputs with the MBB, and the MBB adjusts the control point, capacity limit, and other functions according to the inputs received.

Not for Distribution

Energy Management Module				
Address				
Used on: 30RB060-390				
Input	**Description**	**I/O Type**	**I/O Point Name**	**Connection Point**
4-20 mA or 2-10 vac Demand Limit	4-20 mA Demand Limit	4-20 ma or 2-10 vdc		EMM-J7B-CH6
4-20 mA or 2-10 vac Temperature Reset	4-20 mA Temperature Reset	4-20 ma or 2-10 vdc		EMM-J7A-CH5
Demand Limit SW2	Demand Limit Step 2	Switch Input		EMM-J4-CH9
Ice Done	Ice Done Switch	Switch Input		EMM-J4-CH11A
Occupancy Override	Occupied Schedule Override	Switch Input		EMM-J4-CH8
Remote Lockout Switch	?	Switch Input		EMM-J4-CH10
SPT	Space Temperature Thermistor	10k Thermistor		EMM-J6-CH2
Output	**Description**	**I/O Type**	**I/O Point Name**	**Connection Point**
% Total Capacity		0-10 vdc		EMM-J8-CH7
RUN R	Run Relay	Relay		EMM-J3-CH24
SHD R	Shutdown Relay	Relay		EMM-J3-CH25

Not for Distribution

Addressing
The EMM board is addressed by software at 0,9. There are no DIP Switches to be set.

Early Energy Management Module Accessory Kits (00EFN900000300A) were improperly loaded with software, resulting in an incorrect address being installed. This error caused a Loss of Communication Alarm. To correct this the module must be reloaded with new software. It must be disconnected from the LEN in order to accomplish this.

Troubleshooting:

Communications
The following table has the design resistance in ohms as measured between the pins of the connector listed. Values to as little as half of the listed resistance can be expected to perform without any problems. All measurements are to be made with power removed from the board and no connections to either the LEN ports.

Table 3 - Energy Management Board LEN Resistance Chart

Part Number	(LEN) Resistance between Pins / Connector

With Software	Without Software	Vendor	Pins 1 to 3	Pins 1 to 2	Pins 2 to 3
00PSN500038300	Not Available	CEPL130355-02	5.0K Ω J9A	4.0K Ω J9A	1.0K Ω J9A

EXV Board (EXV)

Troubleshooting:

Communications
The following table has the design resistance in ohms as measured between the pins of the connector listed. Values to as little as half of the listed resistance can be expected to perform without any problems. All measurements are to be made with power removed from the board and no connections to either the LEN ports.

Table 4 – EXV LEN Resistance Chart

Part Number			(LEN) Resistance between Pins / Connector		
With Software	Without Software	Vendor	Pins 1 to 3	Pins 1 to 2	Pins 2 to 3
00PSN500038200	Not Available	CEPL130415-02	40K Ω J3 & J4	20K Ω J3 & J4	20K Ω J3 & J4

Not for Distribution

Fan Board (FB)
There are two types of Fan Boards used in the AquaSnap 30RB machines.

Troubleshooting:

Communications
The following table has the design resistance in ohms as measured between the pins of the connector listed. Values to as little as half of the listed resistance can be expected to perform without any problems. All measurements are to be made with power removed from the board and no connections to either the LEN ports.

Table 5 – Fan Board (Aux 1) LEN Resistance Chart

Part Number			(LEN) Resistance between Pins / Connector		
With Software	Without Software	Vendor	Pins 1 to 3	Pins 1 to 2	Pins 2 to 3
32GB500442E	Not Available	CEPL130567-02	29K Ω J9	16K Ω J9	13.5K Ω J9

Table 6 – Fan Board (Aux 2) LEN Resistance Chart

Part Number			(LEN) Resistance between Pins / Connector		
With Software	**Without Software**	**Vendor**	**Pins 1 to 3**	**Pins 1 to 2**	**Pins 2 to 3**
32GB500432E	Not Available	CEPL130568-02	29K Ω J9	16K Ω J9	13.5K Ω J9

Main Base Board (MBB)

Machines starting with Serial Numbers 4505Q, began using a resistor is added in series at the Main Base Board plug for the Chilled Water Flow Switch and at the Reverse Rotation Board output signal. See the individual devices for additional details.

Troubleshooting:

- If a failure of the Main Base Board was found, check the inputs for the Chilled Water Flow Switch and Reverse Rotation circuits for excessive voltage. The Chilled Water Flow Switch circuit includes the external contacts for an auxiliary pump contact or any other field installed flow device. These circuits are designed for 24 vac only.

Communications
The following table has the design resistance in ohms as measured between the pins of the connector listed. Values to as little as half of the listed resistance can be expected to perform without any problems. All measurements are to be made with power removed from the board and no connections to either the LEN ports.

Not for Distribution

Table 7 – Main Base Board LEN Resistance Chart

Part Number			(LEN) Resistance between Pins / Connector		
With Software	**Without Software**	**Vendor**	**Pins 1 to 3**	**Pins 1 to 2**	**Pins 2 to 3**
00PSN500038100	Not Available	CEPL130346-01	5.0K Ω J3, J4, & J5	4.0K Ω J3, J4, & J5	1.0K Ω J3, J4, & J5

Reverse Rotation Board

The Reverse Rotation Board will monitor the three-phase electrical system to provide phase reversal and phase loss protection. Initial production of the Reverse Rotation Board is HK35AC003.

PHASE REVERSAL PROTECTION — If the control senses an incorrect phase relationship, the relay (K1) on the board will be de-energized (opening its contact). If the phase relationship is correct, the relay will be energized. The control has a self-bypass function after a pre-set time. If the control determines that the three phases stay in a correct relationship for 10 consecutive minutes, the relay will stay energized regardless

of the phase sequence of three inputs as long as 24-vac control voltage is applied. This self-bypass function will be reset if all three phases are restored in a phase loss event.

PHASE LOSS PROTECTION— If the reverse rotation board senses any one of the three phase inputs has no AC voltage, the relay will be de-energized (opening its contact). This protection is always active as long as 24-vac control voltage is applied, and is not affected by the self by-pass function of the phase sequence monitoring function. However, in the event of phase loss, the relay will be re-energized only if all three phases are restored and the three phases are in the correct sequence. A red LED is provided to indicate the function of the board. See the table below.

LED STATUS	FUNCTION
On continuously	Relay contact closed (normal operation)
Blinking	Relay contact open (phase loss or phase reversal has occurred)
Off	24 vac control power not present (off)

NOTE: Normal operation of the reverse rotation board (for example, no faults are detected) results in 24 vac being returned to the MBB (terminal J5A-16B) through the closed K1 relay contact.

Not for Distribution

Troubleshooting:

LED Off
Check the following items:

- Check for 24 volts to the device.

LED Blinking
Check the following items:

- Check the phasing of the incoming power. Reverse two leads to try to correct the problem. If reversing the 2 leads does not correct the problem, check the power supply. It has been noted on Corner-Grounded Delta Power Distribution Systems that this device erroneously reports a reverse phase condition. Corner-Grounded Delta Systems can be determined by measuring each leg's voltage to ground. One leg will have 0 potential. In this case, there are two options.
  1. Consider disabling the device. DO NOT start the unit until the phasing has been checked by an alternate method. Check the rotation of a non-VFD (Head Pressure Controller) fan motor.
  2. Consider replacing the device with an alternate power monitoring device, such as P251-0030 or P251-0091 available from RCD.

Scroll Protection Module (SPM)
There is one SPM per compressor and it is responsible for controlling that compressor. The device controls the compressor contactor and the compressor crankcase heater. The SPM module also monitors the compressor motor temperature, and circuit high

pressure switch. The SPM responds to commands from the MBB (Main Base Board) and sends the MBB the results of the channels it monitors via the LEN (Local Equipment Network). See below for SPM board address information. See the table for SPM inputs and outputs.

Scroll Protection Module									
	Comp.	DIP Switch Position							
		1	2	3	4	5	6	7	8
Address	**A1**	On	Off	Off	Off	On	Off	Off	Off
	A2	Off	On	Off	Off	On	Off	Off	Off
	A3	Off	Off	On	Off	On	Off	Off	Off
	A4	Off	Off	Off	On	On	Off	Off	Off
	B1	On	Off	Off	Off	Off	On	Off	Off
	B2	Off	On	Off	Off	Off	On	Off	Off
	B3	Off	Off	On	Off	Off	On	Off	Off
	B4	Off	Off	Off	On	Off	On	Off	Off
	C1	On	Off	Off	Off	Off	Off	On	Off
	C2	Off	On	Off	Off	Off	Off	On	Off
	C3	Off	Off	On	Off	Off	Off	On	Off
	C4	Off	Off	Off	On	Off	Off	On	Off

Used on:
A1 (30RB060-390)
A2 (30RB060-390)
A3 (30RB130-390)
A4 (30RB160-190, 275-300, 315-390)
B1 (30RB060-390)
B2 (30RB080-390)
B3 (30RB110-390)
B4 (30RB190, 275-300, 360A, 390)
C1 (30RB210-300)
C2 (30RB210-300)
C3 (30RB210-300)
C4 (30RB250, 300)

Not for Distribution

		Connection Point	
		Pin	**Notation**
Power	24 vac supply	SPM-xn-J1	
		QC1	
		QC2	

		Connection Point	
		Pin	**Notation**
Local Equipment Network		SPM-xn-JP1	
		1	
		2	
		3	
		SPM-xn-JP2	
		2	
		3	
		4	

Input	Description	I/O Type	Scrolling Marquee Point Name	Connection Point	
				Pin	Notation
HPS-x	Circuit x High Pressure Switch	Switch		SPM-xn-JP3	
				1	
				2	
MTR-xn	Compressor xn Motor Temperature	PTC Thermistor		SPM-xn-JP4	
				1	
				2	
Output	**Description**	**I/O Type**	Scrolling Marquee **Point Name**	**Connection Point**	
				Pin	**Notation**
Cxn	Compressor xn Contactor	Contactor		SPM-xn-JP5	
				1	
				2	
CCH	Crankcase Heater			SPM-xn-JP6	
				1	
				2	
HPS-x	Circuit x High Pressure Switch	Switch		SPM-xn-JP2	
				1	

Note: In the table above "x" denotes the circuit, A, B or C. "n" denotes the compressor number, 1, 2, 3, or 4.

Not for Distribution

Troubleshooting:

Communications
The following table has the design resistance in ohms as measured between the pins of the connector listed. Values to as little as half of the listed resistance can be expected to perform without any problems. All measurements are to be made with power removed from the board and no connections to either the LEN ports.

Table 8 – Scroll Protection Board LEN Resistance Chart

Part Number			(LEN) Resistance between Pins / Connector		
With Software	**Without Software**	**Vendor**	**Pins 1 to 3**	**Pins 1 to 2**	**Pins 2 to 3**
32GB500362E	Not Available	CEPL130537-02	70K Ω JP1	40K Ω JP1	40K Ω JP1

Compressors
The 30RB units employ Scroll Compressors for a compression technology.

The identification of the compressors relative to the condenser fans and control boxes are shown in the component arrangement. However, there have been a number of inquires for a simpler view. This was addressed in SMB05-0053.

Service Bulletins pertaining to this issue
- SMB05-0053 – 30RB Compressor and Fan Locations

This bulletin introduced a simplified component arrangement for the compressors and fans.

Compressor Model Number Significance

The table below depicts the Danfoss-Maneurop Compressor Model Number structure.

Position	1,2	3-5	6	7	8	9	10
	SH	300	A	3	A	C	A
Danfoss-Manerop Scroll Compressor							
Capacity 240 – 20 nominal tons 300 – 25 nominal tons							
Voltage 3 – 208/230-3-60 4 – 460/3/60 7 – 575-3-60 9 – 380-360							

Not for Distribution

Compressor Covers

30RB chillers have black plastic covers mounted on the side of each compressor. These enclose and provide a weather seal to protect a compressor control platform on which is mounted the start contactor, the scroll protection module (SPM) circuit board, compressor motor temperature sensor wiring, and compressor crankcase heater wiring.

Figure 3 - Typical 30RB Compressor Control Cover

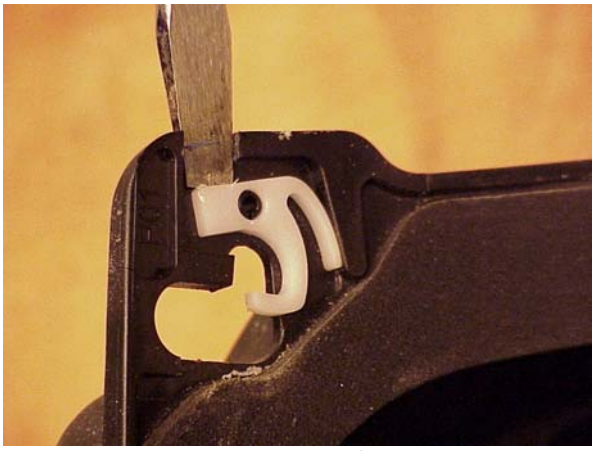


Figure 4 – Latching Mechanism

Not for Distribution

The initial design of these covers used plastic latches to secure the upper portion of the control cover. The covers or their associated latches may break if removal is attempted using improper technique.

Original Cover Latch Operation. The following applies to units and compressor covers shipped with serial numbers prior to 2705Q. Figure 3 above shows the cover. Note the collared studs (attached to the compressor, with metric M6 thread) in the upper corners at which the cover is latched. To remove the cover, push *straight down* with a screwdriver blade in the slot opening above either top corner. This will rotate the latch behind the cover. See Figure 4. Do *NOT* "pry" outwards or use excessive force when pushing, or the cover or latch may break. As Figure 4 shows, an arm of the plastic latch provides the spring action for its rotation. While the latch is being held in this position, firmly tap the same side of the cover upward approximately ½ inch. Repeat with the other side. Now simply pull the released cover away from the compressor to remove. This procedure is also shown in Figure 5, which is a copy of a label located on the side of the cover.

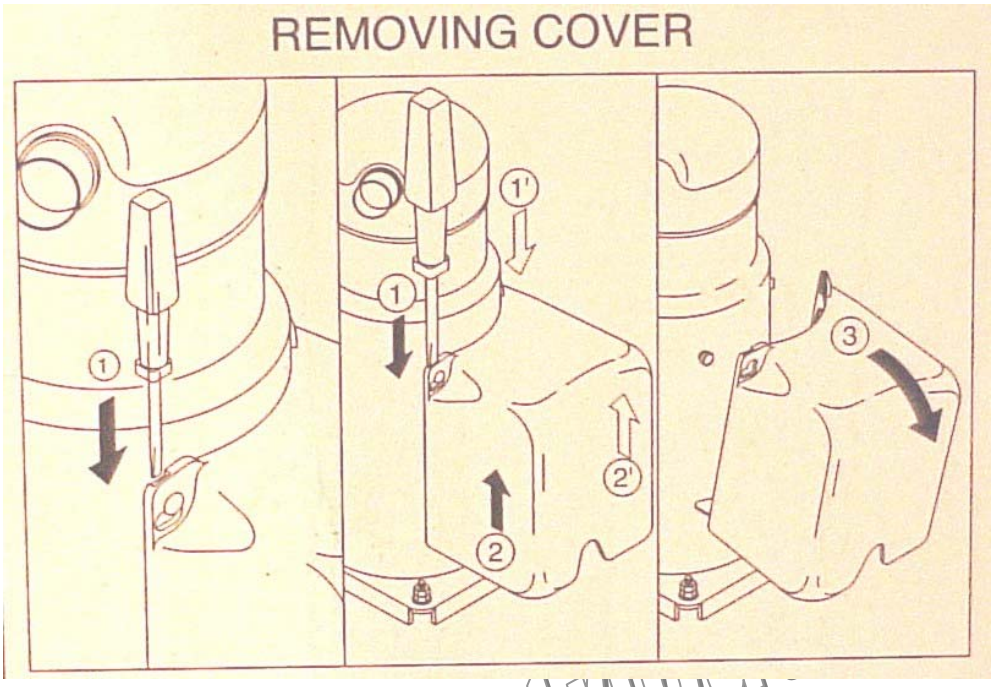


Figure 5 - Cover Removal Label

To replace the cover, place it with the large holes of its upper corners over the studs attached to the compressor. Then push downward such the studs slide up into the narrower slots. As the plastic latches snap into place under the studs, a clicking noise is heard. The inside bottom edge of the cover should slide behind the controls platform, and the gasket should form a seal against water and dust intrusion. This procedure is also shown in Figure 6, which is a copy of another label located on the side of the cover.

Not for Distribution

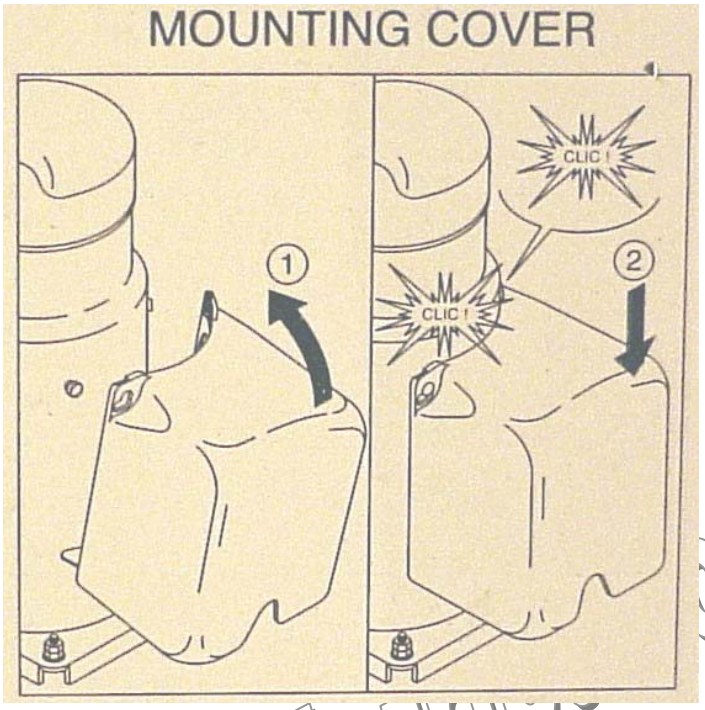


Figure 6 - Cover Replacement Label

Not for Distribution

Revised Cover Attachment. Compressor control covers on machines starting with serial numbers 2705Q have been modified to improve the cover fastening method. These are distinguished by (a) no collars on the studs, (b) a stainless steel washer (1" diameter) over the plastic, (c) a stainless steel M6 elastic stopnut holding the washer against the "ear" of the cover, at each corner. See Figure 7 and Figure 8. In addition, the cover latch pivots have been changed from plastic stubs to metal screws. See Figure 9.

Figure 7 - Stud with Washer

Figure 8 - Washer with Stopnut

Figure 9 - Latch with Metal Pivot

Revised Cover Mounting A design change to the compressors was implemented on units starting with Serial Number 1106Q. On the inside area, the locking tab and screw are gone and the mold has been changed to reinforce this area.

Figure 10 - New Cover Design

Figure 11 - Locking Tab Reverse View

Not for Distribution

It has been determined that the cover *will* crack if it comes in contact with compressor oil or coil fin die lubricant.

If it has not already been done, the condenser coils should be thoroughly washed and cleansed of any residual coil fin die lubricant. The intent is to eliminate the potential for any of this lubricant to drip onto original or replacement covers.

Every effort should be made to avoid contact of covers with oil of any kind.

Covers with cracked corners or broken cover latches may be temporarily fastened (prior to replacement) as follows:

1. Remove cover as directed.
2. Unscrew and discard the collars from each of the two studs. Refer to Figure 12.

Figure 12 - Collar on Stud

3. Reinstall the cover over the studs in the prescribed manner.
4. Install a stainless steel washer (1" or 25 mm diameter) and M6 elastic stopnut on each stud. Refer to Figure 7 and Figure 8 on page 83.

5. Tighten stopnut until washer cannot rotate, or until 2 or 3 threads of the stud are exposed beyond the nut. (Do not overtighten.)

Service Bulletins pertaining to this item:

- SMB05-0029 – 30RB Upgrade Program
  This bulletin was superceded by SMB05-0029A.
- SMB05-0029A – 30RB Upgrade Program
  This bulletin was superceded by SMB05-0029B.
- SMB05-0029B – 30RB Upgrade Program
  This bulletin described the factory sponsored upgrades to the 30RB early production units. These upgrades included: Compressor Control Box Covers breaking, Incorrect 208/230 volt circuit breakers and wire sizing, Improperly inserted wires into the fan contactors, Oil Equalizer Line poor braze joints, missing wiring diagrams, Missing transducer harness gaskets and dielectric grease, and a software upgrade.
- SMB05-0032 – 30RB Compressor Controls Cover Removal
  This bulletin was superceded by SMB05-0032A.
- SMB05-0032A – 30RB Compressor Controls Cover Removal
  This bulletin was superceded by SMB05-0032B.
- SMB05-0032B – 30RB Compressor Controls Cover Removal
  This bulletin advised of the multiple control box designs and the removal and a temporary repair procedure for a cracked cover.

Not for Distribution

Compressor Mounting

30RB units are shipped with hold-down bolts securing the compressor rail assembly to the unit base frame. These bolts are located between the compressors in the front and rear of the compressor rail assembly. These bolts and hold down assemblies must be removed for the vibration isolation system to operate properly. Loosen and remove the bolt, and collar assembly as shown below.

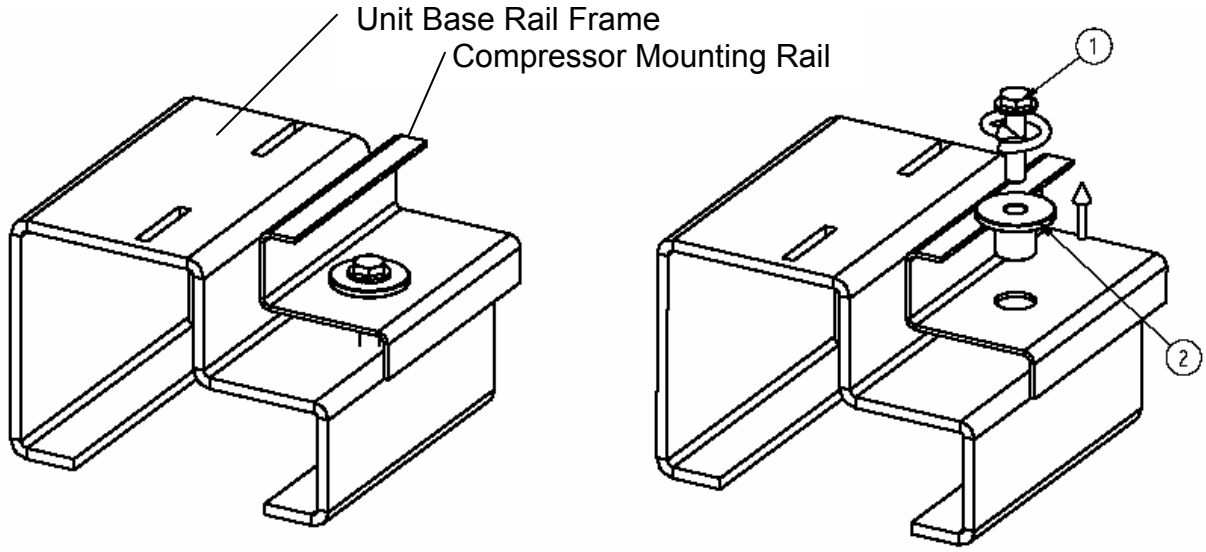


Figure 13 - Compressor Skid Hold Down Bolt Assembly

The number of hold-down assemblies is shown in the table below.

Unit 30RB	Circuit A	Circuit B	Circuit C
060-070	4		-
080-100	4		-
110-120	2	4	-
130-190	4	4	-
210-300	4	4	4

Isolation mounts for the compressor rail assembly are located directly in front of and behind each compressor. Do not loosen or remove the isolation mounts, only the shipping bolts. There are 4 bolts that hold down each compressor. Do not loosen these bolts.

Service Bulletins pertaining to this item:

- SMB05-0029 – 30RB Compressor Hold Down Bolts
  This bulletin was superceded by SMB05-0021A.
- SMB05-0021A – 30RB Compressor Hold Down Bolts
  This bulletin advised of the hold down compressor skid bolts that must be removed before start-up.

Not for Distribution

Compressor Changeout Sequence

Compressor service requires the following metric tools:

8 mm socket
10 mm socket
13 mm socket

Additional required material:

Oil catch pan
1-5/8” – Coupling (suction line)
1-1/8” – Coupling (discharge line)

Change the compressor according to the following procedure:

1. Close the liquid line of the affected circuit.
2. If the optional suction service valve is installed. Close the suction and discharge service valves. Remove any remaining refrigerant from the compressor section using proper reclaiming techniques.

   If the optional suction service valve is not installed and no additional compressors are available, or the compressor failure is a burn-out, close the liquid and discharge valves. Remove the refrigerant from the low side using proper reclaiming techniques.

If additional compressors are available, use the Service Test procedure to pumpdown the low side of the system. Put the Enable/Off/Remote Contact switch in the Off position. Using the Scrolling Marquee, enter the Service Test mode and change **Service Test/TEST/T.REQ** from **OFF** to **ON**. A password may be required. Switch the EOR switch to the Enable position. Under the COMP sub-mode, enable the one of the compressors (**Service Test/TEST/CP.xn**) for the circuit. Let compressor run until gage on suction pressure port reads 10 psig. Press [ENTER], [↓] and [ENTER] to turn the compressor off. The compressor will turn off. Immediately after the compressor shuts off, close the discharge valve. Remove any remaining refrigerant from the system low side using proper reclaiming techniques.

Important: Chilled water pumps must be energized when removing or adding refrigerant. Fluid must be flowing through the heat exchanger, or serious damage to the cooler may result.

3. Turn off the line voltage power supply to the unit. Lock and tag all disconnects.
4. Remove the compressor control box cover.
5. Be sure that the compressor power leads are marked. If not, mark with the appropriate terminal designation. Remove the power connection from the compressor. Save the hardware for installation later. The conduit connection does not need to be removed. The compressor crankcase heater wiring must be disconnected at the Scroll Protection Board. The communication cable to the adjacent compressor control box will need to be removed.
6. Loosen the nuts that secure the bottom platform of the compressor control box from the shell of the compressor. Save the hardware, as it will be required for the installation of the new compressor.
7. Remove the oil from the compressor until the level is below the sightglass. An oil dip tube is provided in the compressor. Loosen the oil equalizer line connection. The equalizer line is used on multiple compressor circuits. Use the catch pan to collect any oil that may remain. Dispose of the oil properly. Do not reuse the oil. Seal the oil equalizer connection port.
8. Cut the suction line with a tubing cutter. Cut the line close to the manifold. Close to the compressor connection is an orifice in the piping that must be reused in the installation of the new compressor.
9. Cut the discharge line, downstream of the reverse flow check valve.
10. Loosen the 8 mm bolts that hold the compressor in place on the compressor skid assembly. Save the hardware, as it will be required for the installation of the new compressor.
11. Slide the compressors toward the side of the machine for removal.
12. Once the compressor has been removed, loosen the nuts and remove the compressor mounting spacers. Save the hardware, as it will be required for the installation of the new compressor. Wrap the reverse rotation check valve with a wet rag wrap or use a heat sink to prevent damage to the reverse flow check valve. Unsweat the suction and discharge lines from the failed compressor. Save the lines for installation later.
13. Add the couplings to the suction and discharge lines on the chiller.

Not for Distribution

14. On the new compressor install the compressor mounting spacers. Tighten the nut to 40 ft-lbs.
15. Slide the new compressor onto the skid. Remove the oil equalizer cap installed on the new compressor by the factory. Move the compressor into place. Do not secure the compressor to the mounting skid.
16. Connect the oil equalizer to the compressor first. Tighten the Roto-lock fitting to 75 ft-lbs.
17. Secure the compressor to the mounting skid with the 8 mm bolts. Tighten the bolts to 12 ft-lbs.
18. Using the suction and discharge lines from the old compressor, braze the connections. Be sure to use a wet rag wrap or heat sink to prevent damage to the reverse flow check valve.
19. Leak check the assembly using standard refrigeration techniques.
20. Evacuate the compressor section (or compressor-cooler section) by attaching a vacuum pump to the fitting provided ahead of the discharge service valve.
21. Check the oil level in the compressor. Add oil if necessary.
22. Re-install the control box bottom platform. Tighten the nuts to 8 ft-lbs. Reconnect the power to the compressor. Reconnect the communication and crankcase heater wiring. Re-install the control box cover.
23. Restore power to the unit and check the operation and refrigerant charge. Obtain an oil sample for quality evaluation.

Not for Distribution

Compressor Motor Resistance

The table below lists the line-to-line motor resistances of the Scroll compressors.

Compressor	Voltage	Resistance, ohms (+/- 7%)
SH240 (20 ton)	200/230	0.116
	380	0.357
	460	0.547
	575	0.877
SH300 (25 ton)	200/230	0.099
	380	0.288
	460	0.426
	575	0.673

Weights

The following table lists the individual compressor weights. The RCD Replacement Part Number is for reference only.

Compressor	Carrier Part Number	Voltage	RCD Replacement Part Number	Approx. Weight, lbs. (kg)
SM240				250 (113)
SM300				352 (160)

Not for Distribution

Condenser Coils

Several condenser coil options are offered for corrosion protection. Position 10 in the model number indicates the coil option. The following coils are offered: Standard Aluminum Fin/Copper Tube Coil, Copper Fin/Copper Tube Coil, Aluminum Fin/Copper Tube Coil with E-Coat, Copper Fin/Copper Tube Coil with E-Coat, Aluminum Pre-coast Fin/Copper Tube.

With the introduction of the 30RB chiller, the pre-coat fin color changed to gold.

Bulletins pertaining to this issue:

- 111-05-09 – 30RB Pre-Coat Coil Option Color Change
  This bulletin announced the change to the gold color of the fin when ordering the Pre-coat fin option.
- 111-05-02-E – 30RB Pre-Coat Coil Option Color Change
  This bulletin announced the change to the gold color of the fin when ordering the Pre-coat fin option.
- 111-06-01 – 30RB/XA Cu/Cu Condenser Coil Option Release
  This bulletin announced the release of the Copper Fin/Copper Tube Condenser Coil Option.

Condenser Coil Physical Data

Condenser Coil Material	Fins/Inch	Approximate Weight, lbs (kg)
Standard Aluminum Fin/Copper Tube Coil	19	140 (64)
Copper Fin/Copper Tube Coil	17	260 (118)
Aluminum Fin/Copper Tube Coil with E-Coat	17	140 (64)
Copper Fin/Copper Tube Coil with E-Coat	17	260 (118)
Aluminum Pre-coast Fin/Copper Tube	19	140 (64)

Non-E-coat Coil Cleaning
For standard aluminum, copper and pre-coated aluminum fin coils, clean the coils with a vacuum cleaner, fresh water, compressed air, or a bristle brush (not wire). Units installed in corrosive environments should have coil cleaning as part of a planned maintenance schedule. In this type of application, all accumulations of dirt should be cleaned off the coil.

CAUTION
Do not use high-pressure water or air to clean coils — fin damage may result.

E-Coat Coil Cleaning
Follow the outlined procedure below for proper care, cleaning and maintenance of E-coated aluminum or copper fin coils:

Coil Maintenance and Cleaning Recommendations — Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit.

Remove Surface Loaded Fibers — Surface loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, a soft brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges bent over) if the tool is applied across the fins. NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.

Not for Distribution

Periodic Clean Water Rinse — A periodic clean water rinse is very beneficial for coils that are applied in coastal or industrial environments. However, it is very important that the water rinse is made with very low velocity water stream to avoid damaging the fin edges. Monthly cleaning as described below is recommended.

Routine Cleaning of Coil Surfaces — Monthly cleaning with Environmentally Sound Coil Cleaner is essential to extend the life of coils. It is recommended that all coils, including standard aluminum, pre-coated, copper/copper or E-coated coils are cleaned with the Environmentally Sound Coil Cleaner as described below. Coil cleaning should be part of the units regularly scheduled maintenance procedures to ensure long life of the coil. Failure to clean the coils may result in reduced durability in the environment. Environmentally Sound Coil Cleaner is non-flammable, hypo allergenic, non-bacterial, USDA accepted biodegradable and 100% ecologically safe agent that will not harm the coil or surrounding components such as electrical wiring, painted metal surfaces or insulation. Use of non-recommended coil cleaners is strongly discouraged since coil and unit durability could be affected.

Environmentally Sound Coil Cleaner Application Equipment
- 2-1/2 Gallon Garden Sprayer
- Water Rinse with Low Velocity Spray Nozzle

Environmentally Sound Coil Cleaner Application Instructions:
- Although Environmentally Sound Coil Cleaner is harmless to humans, animals, and marine life, proper eye protection such as safety glasses is recommended during mixing and application.
- Remove all surface loaded fibers and dirt with a vacuum cleaner as described above.
- Thoroughly wet finned surfaces with clean water and a low velocity garden hose being careful not to bend fins.
- Mix Environmentally Sound Coil Cleaner in a 2-1/2 gallon garden sprayer according to the instructions included with the Enzyme Cleaner. The optimum solution temperature is 100 ºF (38 ºC). NOTE: DO NOT USE water in excess of 130 ºF (55 ºC) as the enzymatic activity will be destroyed.
- Thoroughly apply Environmentally Sound Coil Cleaner solution to all coil surfaces including finned area, tube sheets and coil headers.
- Hold garden sprayer nozzle close to finned areas and apply cleaner with a vertical, up-and-down motion.
- Avoid spraying in horizontal pattern to minimize potential for fin damage.
- Ensure cleaner thoroughly penetrates deep into finned areas.
- Interior and exterior finned areas must be thoroughly cleaned.
- Finned surfaces should remain wet with cleaning solution for 10 minutes.
- Ensure surfaces are not allowed to dry before rinsing. Reapply cleaner as needed to ensure 10-minute saturation is achieved.
- Thoroughly rinse all surfaces with low velocity clean water using downward rinsing motion of water spray nozzle. Protect fins from damage from the spray nozzle.

Not for Distribution

CAUTION

Harsh Chemical and Acid Cleaners — Harsh chemical, household bleach or acid cleaners should not be used to clean outdoor or indoors coils of any kind. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface where dissimilar materials are in contact. If there is dirt below the surface of the coil, use the Environmentally Sound Coil Cleaner as described above.

High Velocity Water or Compressed Air — High velocity water from a pressure washer, garden hose or compressed air should never be used to clean a coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop. Reduced unit performance or nuisance unit shutdown may occur.

Condenser Fan System

The 30RB uses the next generation Aeroacoustic Fan with a specially designed motor mount.

The locations of the condenser fans relative to the compressors and control boxes are shown in the component arrangement. However, there have been a number of inquires for a simpler view. This was addressed in SMB05-0053.

Service Bulletins pertaining to this issue

- SMB05-0053 – 30RB Compressor and Fan Locations
  This bulletin introduced a simplified component arrangement for the compressors and fans.

Condenser Fan Controls

Electrical Component Usage							
30RB	Voltage	Circuit A		Circuit B		Circuit C	
		Contactor	Circuit Breaker	Contactor	Circuit Breaker	Contactor	Circuit Breaker
250	208/230		CQD360		CQD360		CQD3100

Condenser Fan Circuit Breaker

Condenser Fan Contactor

Siemens manufactures the condenser fan motor contactors. The contactors utilize a spring-loaded terminal arrangement. This arrangement requires that wire end to be fully inserted and be pinched between the spring loaded portion and the stop.

Not for Distribution

The following information was taken from a Siemens publication

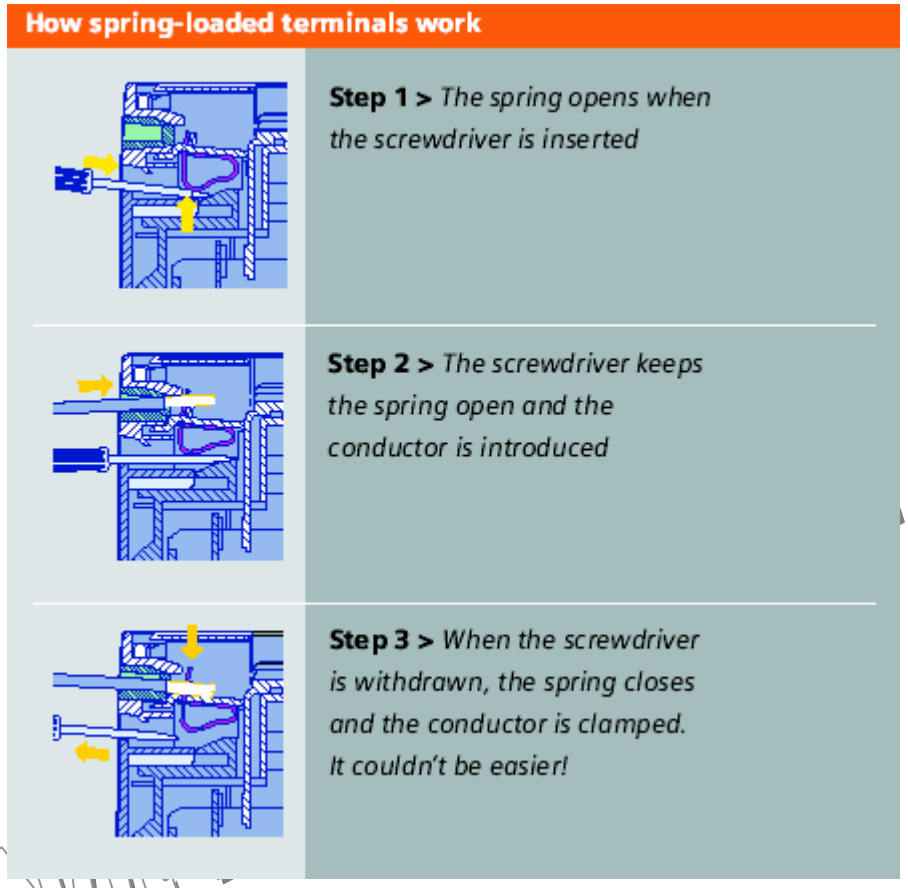


Figure 14 - Fan Contactor Spring Loaded Terminal Operation

Early production units may have been improperly assembled or secured wires, resulting in a premature contactor failure. Units produced beginning with Serial Numbers 1805Q and later should not have this problem.

Troubleshooting:

Circuit Breaker Trips

- Check for a faulty motor
- Check for the proper circuit breaker. Early 208/230 voltage machines, prior to Serial Numbers starting with 2405Q may have had incorrect fan circuit breakers supplied with the machine.

Hot/Melting Power Supply Wires

- Check the crimp connection of the wires.
- Check the wire connections in the contactor to be sure that it was seated properly. Early production units, prior to Serial Numbers starting with 1805Q, may have not been seated properly.
- Check for the appropriate size wires. Early 208/230 voltage machines, prior to Serial Numbers starting with 2405Q may have had improperly sized wires for the fan motors.

Service Bulletins pertaining to this issue

- SMB05-0029 – 30RB Upgrade Program
  This bulletin was superceded by SMB05-0029A.
- SMB05-0029A – 30RB Upgrade Program
  This bulletin was superceded by SMB05-0029B.
- SMB05-0029B – 30RB Upgrade Program
  This bulletin described the factory sponsored upgrades to the 30RB early production units. These upgrades included: Compressor Control Box Covers breaking, Incorrect 208/230 volt circuit breakers and wire sizing, Improperly inserted wires into the fan contactors, Oil Equalizer Line poor braze joints, missing wiring diagrams, Missing transducer harness gaskets and dielectric grease, and a software upgrade.

Not for Distribution

Cooler

The 30RB cooler is a direct expansion cooler. This cooler is a shell and tube heat exchanger with water on the shell side.

Cooler Heater

AquaSnap uses a line voltage heater of 825 (+5%/-10%) watts. There are 2 types of heaters, based on voltage. The number of heaters depends on the size of the machine

Table 9 - Cooler Heater Resistance

Heater	Voltage	Resistance (ohms) @ 75 ºF
00PPN800000101A	208/230	64.1 ± 3.2
	380, 460	256.6 ± 12.8
00PPN800000102A	575	400 ± 20.0

Table 10 - Cooler Heater Quantity

Unit	Heater Quantity
30RB080-190	2
30RB210-300	
30RB315-390	1 per module, 2 total

Cooler Physical Data

30RB060-300 Cooler									
30RB	No. of Baffles	Heater Voltage	Cooler Part No. (00PSN80000)	Water Nozzle Size (Victaulic)	Weight, approximate lbs. (kg)		Shell OD/ Wall Thick. (In.)	Tube P/N (00PSG000000) OD…Tube Length (in.)	No. of Tubes
					Empty	Filled †			
060 070		None	0801A	4”	715 (325)	950 (432)			
		208/230 380 460	0806A						
		575	0811A						
080 090 100		None	0802A	4”	856 (389)	1170 (532)		308A 0.375…131.9	576
		208/230 380 460	0807A						
		575	0812A						
110 120 130	9	None	0803A	6”	970 (441)	1352 (615)	14/ 0.134	307A 0.375…101.9	420
		208/230 380 460	0808A						
		575	0813A						
150 160 170 190	7	None	0804A	6”	1518 (690)	2130 (968)	16/ 0.188	308A 0.375…131.9	576
		208/230 380 460	0809A						
		575	0814A						
210 225 250 275 300	5	None		6”	2382 (1082)		18/ 0.188	308A 0.375…131.9	828
		208/230 380 460	1002A						
		575							

Note: † - Approximate cooler weight when filled with water or brine.

Not for Distribution

Hail Guards

Early production Accessory Hail Guards were larger than the later production and required mounting on the outer section of the corner post.

IF YOU HAVE THE LARGER GRILLES: The package requires that the hail guard door flanges be attached to the outside surface of the corner posts. It easier for this version of the design to use a 4x4 with a 2x4 stacked on top to set the two doors up against the chiller and aligned them so they latch correctly. Then mark the outside edges and using the self-drilling screws, secure to the corner posts.

Figure 15 - Lower Left Side Hail Guard Mounting

Figure 16 - Upper Left Side Hail Guard Mounting

Not for Distribution

Hydronic Kit

Single Pump Options

Unit 30RB	Model Designation (Position 11)	Manufacturer's Part Number	Pump Hp	Motor rpm	Impeller Trim In. (mm)
060, 070	0	4380 3X3X8	3	1800	6.5 (16.1)
	1		5	1800	7.3 (185.5)
	2		7.5	1800	8.15 (207.0)
	3	4380 3X3X6	10	3600	5.4 (137.2)
080, 090, 100, 110, 120, 130	1	4380 3X3X8	5	1800	7.3 (185.4)
	2		7.5	1800	8.15 (207.0)
	3	4380 3X3X6	10	3600	5.4 (137.2)
	4		15	3600	6.1 (154.9)
150, 160, 170, 190	1	4380 4X4X8	5	1800	6.5 (165.1)
	2	4380 4X4X6	7.5	3600	4.6 (116.8)
	3		10	3600	5.0 (127.0)
	4		15	3600	5.5 (139.7)

Dual Pump Options

Unit 30RB	Model Designation (Position 11)	Manufacturer's Part Number	Pump Hp	Motor rpm	Impeller Trim In. (mm)
060, 070	6	4382 4X4X8	3	1800	6.5 (165.1)
	7		5	1800	7.3 (185.4)
	8		7.5	1800	8.15 (207.1)
	9	4382 3X3X6	7.5	3600	5.25 (133.4)
	B		10	3600	5.9 (149.9)
080, 090, 100, 110, 120, 130	7	4382 4X4X8	5	1800	7.3 (185.4)
	8		7.5	1800	8.15 (207.1)
	B	4382 4X4X6	10	3600	5.4 (137.2)
	C		15	3600	6.1 (154.9)
150, 160, 170, 190	8	4382 6X6X6	7.5	3600	4.5 (114.3)
	B		10	3600	5.0 (127.0)
	C		15	3600	5.5 (139.7)

Not for Distribution

Combination Valve

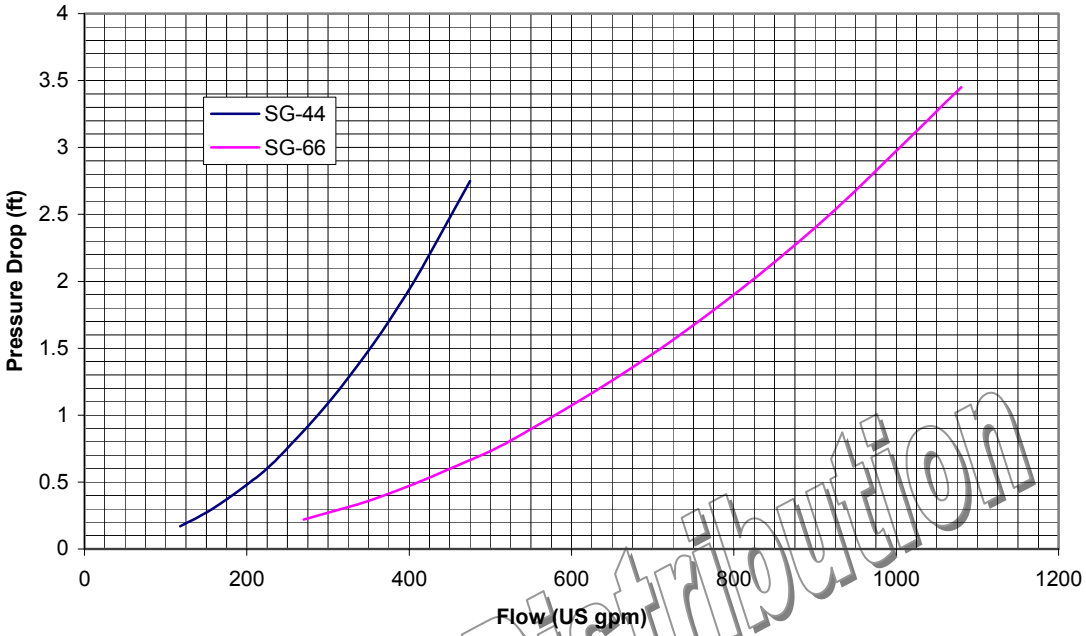
Suction Guide/Strainer

Included with the Hydronic Kit is a Suction Guide with an integral strainer. It is shipped from the factory with a fine mesh, clean-out strainer, which must be removed within 24 hours of run time.

Suction Guide/Strainer		
Unit Size	**Pump Size (Hp)**	**Suction Guide**

Below are the pressure drop charts for the suction strainers at various flow rates.

Suction Guide Pressure Drop (English)



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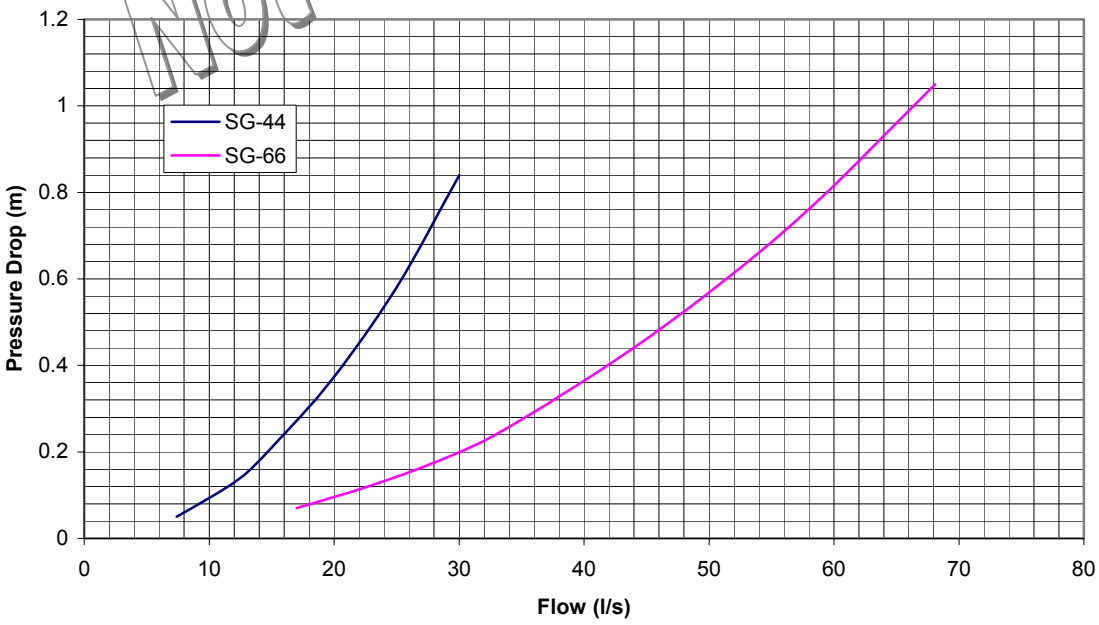
Suction Guide Pressure Drop (SI)



Paint
All chillers are painted in American Sterling Grey. RCD stocks a touch-up can of paint for this color under the part number, 313974-751.

Pressure Transducers

Starting with Serial Numbers 5005Q, the suction and discharge pressure transducers used on 30RB chillers changed.

The connection type has been changed from Molex to Packard.

Transducer	Serial Number	Part Number	Housing Color
Suction	PSN 5005Q	00PPG000002000A	Brown
	SSN 5005Q	00PPG000030700A	Green
Discharge	PSN 5005Q	00PPG000003000A	Black
	SSN 5005Q	00PPG000030600A	Black

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Liquid Line Filter Drier
Two options are offered for liquid line filter-driers, Non-removable core or serviceable. The Non-removable core filter-drier is offered on the 30RB060-100 only, and cannot specified with the medium temperature brine option.

Removable Core Filter Drier
The cover includes a service access port and a fusible plug.

With the initial release of the parts, the filter drier cover included a bushing for the service port access. The original drilled and tapped cover was sized for 3/8" NPT. The service access port was ¼" NPT. As a result, the first 500 covers were included with a 3/8" to ¼" NPT bushing.

Reverse Rotation Board
This machine uses a board to sense phase sequencing.

Due to potential failures of the Main Base Board from more than 24 volts being applied to the Reverse Rotation Board input of the Main Base Board, a 560 +/- 28 ohms, 1 watt resistor was added in series with the flow switch starting with production serial numbers 4505Q.

Thermistors
Thermistors that are monitoring the chiller's operation include: Cooler Entering Water, Cooler Leaving Water, Dual Chiller Leaving Water, Compressor Suction Gas

Temperature, and Outside Air Thermistors. These thermistors are 5 kΩ at 77 F (25 C) and are identical in temperature versus resistance and voltage drop performance. The Space Temperature Thermistor is 10 kΩ at 77 F (25 C) and has a different temperature vs. resistance and voltage drop performance.

COOLER LEAVING FLUID SENSOR — On all sizes, this thermistor is installed in a friction fit well in the leaving water nozzle of the cooler.
COOLER ENTERING FLUID SENSOR — On all sizes, this thermistor is factory-installed in a friction fit well in the entering water nozzle of the cooler.
DUAL CHILLER LWT – On duplex chillers, 30RB315-390, a factory-supplied, field-installed friction fit well and thermistor in the common supply water header of the two modules.
COMPRESSOR RETURN GAS TEMPERATURE — This thermistor is factory-installed in a friction fit well located in the common suction line for the circuit. There is one thermistor for each circuit.
OUTDOOR AIR TEMPERATURE — This sensor is factory-installed.
REMOTE SPACE TEMPERATURE – This sensor (part no. 33ZCT55SPT) is a field-installed accessory mounted in the indoor space and is used for water temperature reset. The sensor should be installed as a wall-mounted thermostat (in the conditioned space where it will not be subjected to either a cooling or heating source or direct exposure to sunlight, and 4 to 5 ft above the floor).

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Space temperature sensor wires are to be connected to terminals in the unit main control box. The space temperature sensor includes a terminal block (SEN) and a RJ11 female connector. The RJ11 connector is used access into the Carrier Comfort Network (CCN) at the sensor.

To connect the space temperature sensor:
1. Using a 20 AWG twisted pair conductor cable rated for the application, connect 1 wire of the twisted pair to one SEN terminal and connect the other wire to the other SEN terminal located under the cover of the space temperature sensor.
2. Connect the other ends of the wires to terminals 5 and 6 on TB5 located in the unit control box.

Units on the CCN can be monitored from the space at the sensor through the RJ11 connector, if desired. To wire the RJ11 connector into the CCN (Fig. 10):
1. Cut the CCN wire and strip ends of the red (+), white (ground), and black (–) conductors. (If another wire color scheme is used, strip ends of appropriate wires.)
2. Insert and secure the red (+) wire to terminal 5 of the space temperature sensor terminal block.
3. Insert and secure the white (ground) wire to terminal 4 of the space temperature sensor.
4. Insert and secure the black (–) wire to terminal 2 of the space temperature sensor.

IMPORTANT: The cable selected for the RJ11 connector wiring MUST be identical to the CCN communication bus wire used for the entire network. Refer to Table 5 for

acceptable wiring.

5. Connect the other end of the communication bus cable to the remainder of the CCN communication bus.

Thermistor ID	Description	Resistance at 77 F (25 C)	Connection Point
EWT	Entering Water Thermistor	5k Ω	MBB-J6-CH2
LWT	Leaving Water Thermistor	5k Ω	MBB-J6-CH1
OAT	Outdoor Air Thermistor	5k Ω	MBB-J6-CH4
SGTA	Circuit A Suction Gas Thermistor	5k Ω	EXV1-J3-A, -TH
SGTB	Circuit B Suction Gas Thermistor	5k Ω	EXV1-J3-B, -TH
DUAL	Dual Chiller LWT Thermistor	5k Ω	MBB-J6-CH3
SGTC	Circuit C Suction Gas Thermistor	5k Ω	EXV2-J3-A, -TH
SPT	Space Temperature Thermistor	10k Ω	EMM-J6-CH2

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Transducers

Service Bulletins pertaining to this issue

- SMB05-0029 – 30RB Upgrade Program
  This bulletin was superceded by SMB05-0029A.
- SMB05-0029A – 30RB Upgrade Program
  This bulletin described the required upgrades to the 30RB early production units. These upgrades included: Compressor Control Box Covers breaking, Incorrect 208/230 volt circuit breakers and wire sizing, Improperly inserted wires into the fan contactors, Oil Equalizer Line poor braze joints, Missing wiring diagrams, Missing transducer harness gaskets and dielectric grease, and a software upgrade.

MAINTENANCE

Recommended Maintenance Schedule

The following are only recommended guidelines. Jobsite conditions may dictate that maintenance schedule is performed more often than recommended.

Routine:

For machines with E-coat Condenser Coils:

- Check condenser coils for debris, clean as necessary with Carrier approved coil cleaner.
- Periodic clean water rinse, especially in coastal and industrial applications.

Every month:
- Check condenser coils for debris, clean as necessary with Carrier approved coil cleaner.
- Check moisture indicating sight glass for possible refrigerant loss and presence of moisture.

Every 3 months (for all machines):
- Check refrigerant charge.
- Check all refrigerant joints and valves for refrigerant leaks, repair as necessary.
- Check chilled water flow switch operation.
- Check condenser coils for debris, clean as necessary with Carrier approved coil cleaner.
- Check Sightglass Dry-eye for moisture.
- Check all condenser fans for proper operation.
- Check compressor oil level.
- Check crankcase heater operation.
- Inspect pump seal, if equipped with a pump package.

Every 12 months (for all machines):
- Check all electrical connections, tighten as necessary.
- Inspect all contactors and relays, replace as necessary.
- Check accuracy of thermistors, replace if greater than ± 2° F (1.2° C) variance from calibrated thermometer.
- Check accuracy of transducers, replace if greater than ± psi (kPa) variance.
- Obtain and test an oil sample. Change oil only if necessary.
- Check to be sure that the proper concentration of antifreeze is present in the chilled water loop, if applicable.
- Verify that the chilled water loop is properly treated.
- Check refrigerant filter driers for excessive pressure drop, replace as necessary.
- Check chilled water strainers, clean as necessary.
- Check cooler heater operation, if equipped.
- Check condition of condenser fan blades and that they are securely fastened to the motor shaft.
- Perform Service Test to confirm operation of all components.
- Check for excessive cooler approach (Leaving Chilled Water Temperature - Saturated Suction Temperature), which may indicate fouling. Clean cooler vessel if necessary.

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RECOMMENDED SPARE PARTS LIST

The following recommended spare parts list is divided into critical and recommended replacement parts. Critical parts are components that, if they fail, will cause the equipment to stop functioning, or otherwise fail to deliver the required cooling capacity. Without these parts, the machine cannot be made operational. Recommended parts

are components that, if they fail, could cause deterioration of the system performance. If a recommended part fails, the system can be usually made somewhat functional, even if only partial operation, until the correct part can be obtained. If the deterioration of the system performance is not acceptable by the customer, then the recommended, should be treated as critical parts.

Refer to RCD's EPIC 2000 for the appropriate part number and quantity of parts for each machine.

This list was compiled and revised on January 20, 2006.

In the Comments Section the following abbreviations are used:
PSN – Prior Serial Number
SSN – Starting Serial Number

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30RB Series A Spare Parts List
Serial Number Range: 4004Q

30RB Series A - Critical Parts		
Part Number	**Description**	**Comments**
00PPG000003100A	Chilled Water Flow Switch	
	Control Transformer	TRAN1 and TRAN2. See EPIC 2000 for appropriate Part Numbers.
00PSN500038200	EXV Board w/Software	32GB500422-E w/o Software
32GB500442-E	Fan Board	This board replaces the AUX2 board, 32GB500432-E (Critical 060-150)
	Fuse, Control Transformer	See EPIC 2000 for appropriate Part Numbers.
00PSN500038100	Main Base Board w/Software	32GB500382-E w/o Software
	Pump Contactor	If equipped with a Pump. See EPIC 2000 for appropriate Part Numbers.
	Pump Contactor Aux. Contacts	If equipped with a Pump. See EPIC 2000 for appropriate Part Numbers.
	Pump Manual Starter	If equipped with a Pump. See EPIC 2000 for appropriate Part Numbers.
	Pump Motor	If equipped with a Pump. See EPIC 2000 for appropriate Part Numbers.
HK50AA031	Scrolling Marquee Display	(Required to reset Alarms)
00PPG000008105	Thermistors	Entering Water Temperature, Leaving Water Temperature, and Outdoor Ambient Temperature
HH83ZB001	Transformer, Circuit Breaker (3.2 Amps)	
853103-312	Tube Plug, Brass Pin	Do not plug any more than 10% of the total number of tubes, or more than 10% of the tubes in a pass.
853002-333	Tube Plug, Brass Ring	Do not plug any more than 10% of the total number of tubes, or more than 10% of the tubes in a pass.

30RB Series A - Recommended Parts		
Part Number	**Description**	**Comments**
PP680003	Compressor Oil	1 gallon
	Compressors	See EPIC 2000 for appropriate Part Numbers.
	Compressor Circuit Breaker	See EPIC 2000 for appropriate Part Numbers.
	Compressor Contactor	See EPIC 2000 for appropriate Part Numbers.
30RB660004	Crankcase Heater Kit	
HK30ZZ001	EXV Stepper Motor	
32GB500442-E	Fan Board	This board replaces the AUX2 board, 32GB500432-E (Recommended 160-390)
00PSG000000101A	Fan Prop	
	Fan Circuit Breaker	See EPIC 2000 for appropriate Part Numbers.
	Fan Motor	See EPIC 2000 for appropriate Part Numbers.
	Fan Motor Contactor	See EPIC 2000 for appropriate Part Numbers.
	Filter Drier/Filter Drier Core	See EPIC 2000 for appropriate part numbers.
EK41JK168	Fusible Plug	(1) per circuit
00PPG000008203A	High Pressure Switch	(1) per circuit
	Low Ambient Head Pressure Controller	See EPIC 2000 for appropriate Part Numbers.
00PPG000003000A	Pressure Transducer, High	(1) per circuit
00PPG000002000A	Pressure Transducer, Low	(1) per circuit
	Pump Seal Kit	If equipped with a Pump. See EPIC 2000 for appropriate Part Numbers.
HK35AC003	Reverse Rotation Board	
32GB500362-E	Scroll Protection Board	(1) board per compressor
	Strainer	If equipped with a Pump. See EPIC 2000 for appropriate Part Numbers.
00PPG000008105	Thermistors	Suction Gas Thermistor

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The following Recommended Tools List is for Service Offices only. This is not intended for all sites.

30RB Recommended Tools:		
Part Number	**Description**	**Comments**
30GX680016	Direct Download Cable	Cable Connection for bench top software downloads using SmartLoader.
30GX680005	ComfortLink Power Cube	Power Cube with Connection for bench top software downloads using SmartLoader.

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