

---

# McQuay ALS Series to BITZER CSH Series

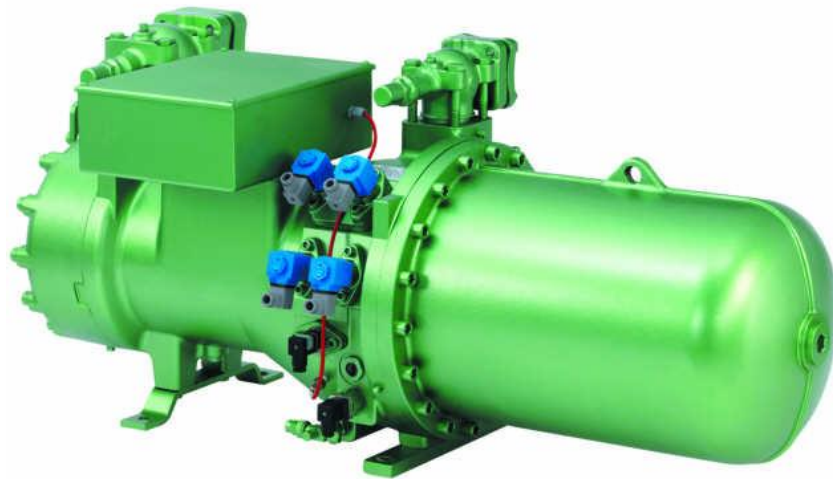
---

Competitive  
Replacement  
Guidelines

---

XR-0022-01 01/13

---



**BITZER Screw Compressors CS High Temp Series**

The intention of this document is to serve as general guidelines. The information contained is not intended to replace specific equipment and/or system manufacturer's information or guidelines. BITZER implies no liability for the information contained. It is BITZER's implicit intention that nothing contained in this guide replaces any past, present or future warranty policy of BITZER and/or any other manufacturer's equipment

These guidelines are supplied as a recommended procedure for troubleshooting the CS screw compressor

These guidelines are not a replacement for information specific to that of the manufacturer or the manufacturer's system technical product information.

Each system may vary in design, usage and specifications. This document is intended for use specific to the compressor only and not intended to be a "catch all" for any and every possible application of the compressor.

BITZER's intention is that only qualified and certified (where applicable) individuals specific to the refrigeration industry use the information contained and all standard refrigeration handling and safety practices must be followed at all times.

BITZER's intention is that all electric work is performed by qualified and certified (where applicable) individuals and all standard electrical safety practices must be followed at all times.



**WARNING**

This icon indicates instructions to avoid personal injury and material damage



**CAUTION**

This icon indicates instructions to avoid property damage and possible personal injury



**HIGH VOLTAGE**

This icon indicates operations with a danger of electric shock

## **Table of Contents**

<b>Scope of Standard Delivery BITZER CS and McQuay</b>	<b>2</b>
<b>Compressor Part Numbers and Cross Reference</b>	<b>3</b>
<b>ALS Chiller Part Numbers</b>	<b>4-6</b>
<b>Overview</b>	<b>7</b>
<b>Dimensions, Connection Sizes and Oil Types</b>	<b>8</b>
<b>Capacity Control</b>	<b>9-11</b>
<b>Oil Separator and Components Removal</b>	<b>12</b>
<b>Existing High Pressure Control</b>	<b>13</b>
<b>Preparation and Installation of BITZER CS</b>	<b>14</b>
<b>Piping</b>	<b>15-18</b>
<b>Electrical and Modules</b>	<b>19-22</b>
<b>Model Number Nomenclature</b>	<b>23</b>
<b>CS Accessories</b>	<b>24</b>
<b>CS Oil Part Numbers</b>	<b>25</b>
<b>CSH Drawings</b>	<b>26-27</b>
<b>McQuay Compressor Outline</b>	<b>28</b>
<b>Competitive Replacement Request Form</b>	<b>30</b>

Scope of Standard Delivery (as supplied by Manufacturer)	Bitzer CSH	McQuay ALS Series
Capacity control system : 4-Steps or Infinite Continuous (See Below)	No Modification Required	Δ 3 Step
25% to 100% Capacity Control	•	•
4 Step Capacity Control	•	N/A
Infinite Capacity Control	•	N/A
Solenoid coils for capacity control	•	•
Discharge Check Valve	• Internal	• External
Suction Coupling tube and/or Flange	N/A	N/A
Discharge Coupling tube and/or Flange	N/A	N/A
Suction Service Valve	•	Sys •
Discharge Service Valve	•	Sys •
Suction service valve location	Top	Top
Discharge service valve location	Top	End on Side
Oil Charge	•	Sep •
Electronic Module (Rotation)	•	Δ
Electronic Module (Temperature)	•	•
PTC100 type temperature sensor	N/A	N/A
PTC120 type temperature sensor	•	•
PT100 type motor temperature sensor	PTC Sensors	N/A
PTC110 type temperature sensor	N/A	•
Screw in Discharge temperature sensor	• (251F)	
IP-54 Terminal box	•	•
Crankcase oil heater	•	Sep •
Compress chamber (Middle side) liquid inject port	•	
Motor side (Low side) liquid inject port	Not Required	•
Economizer port	•	•
Oil cooling connection	•	
Liquid injection oil cooling port	•	
Oil drain valve	•	Sep •
Oil level switch	Δ	Sep •
Oil filter different pressure (ΔP) protector switch	Not Required	Sys •
Liquid injection expansion valve	N/A	Sys •
Liquid injection solenoid valve	N/A	Sys •
Safety Valve	• Internal	Sys •
Slide fit motor	•	No
Starting type PWS	•	Δ
Starting type Start Delta	Δ	Δ
Jumper bars for DOL starting	•	N/A
Rubber mounting pads	•	Sys •
Oil Separator	Integral	External

• (Standard)    Δ (Option)    N/A Not Applicable    Sys • (System Supplied)    Sep • (Separator Supplied)

McQuay Compressor Part Numbers				
Description	Volt	Part No #1	Part No #2	Part No #3
Size 155	208/230	74166501	74165501	MR350310516
Size 155	460	74166503	74165503	MR350310517
Size 155	575	74166504	74165504	MR350310519
Size 167	208/230	74166601	74165601	MR350310623
Size 167	460	74166603	74165603	MR350310624
Size 167	575	74166604	74165604	MR350310626
Size 175	208/230	74166701	74165701	MR350310730
Size 175	460	74166703	74165703	MR350310731
Size 175	575	74166704	74165704	MR350310733

Recommended CS Replacement			
36°sst 122°cdt 10°sh 15°sc R22			
Compressor	Tons	Compressor	Tons
Size 155	65	CSH7563-80	62
Size 167	80	CSH7573-90	75
Size 175	95	CSH8553-110	88
Size 175	95	CSH8563-125	100

Recommended CS Replacement			
36°sst 122°cdt 10°sh Economized R22			
Compressor	Tons	Compressor	Tons(ECO)
Size 155	65	CSH7563-80	65
Size 167	80	CSH7573-90	78
Size 175	95	CSH8553-110	97

Compressor	Tons	**Option**	Tons
Size 155	65	CSW6593-60	62
Size 167	80	CSW7573-70	75
Size 175	95	CSW7593-90	98

\*\* Minimum Capacity is 50% at 122°cdt.  
 \*\* CSW is at the upper CDT limits of 122°  
 \*\* CSW Optional for Lower CDT's\*\*  
 \*\* Consult Software\*\*

## McQuay ALS Chillers Vintage "A"

Unit Model No.	Comp 1	Comp 2	Comp 3	Comp 4
----------------	--------	--------	--------	--------

ALS070A	Size 155			
ALS080A	Size 167			
ALS090A	Size 175			
ALS100A	Size 175			
ALS125A	Size 155	Size 155		
ALS140A	Size 155	Size 167		
ALS141A	Size 155	Size 155		
ALS150A	Size 155	Size 167		
ALS155A	Size 167	Size 167		
ALS170A	Size 167	Size 175		
ALS171A	Size 167	Size 167		
ALS175A	Size 167	Size 175		
ALS185A	Size 175	Size 175		
ALS186A	Size 167	Size 175		
ALS190A	Size 167	Size 175		
ALS195A	Size 175	Size 175		
ALS204A	Size 175	Size 175		
ALS205A	Size 155	Size 155	Size 167	
ALS206A	Size 175	Size 175		
ALS218A	Size 175	Size 175		
ALS220A	Size 155	Size 167	Size 167	
ALS235A	Size 167	Size 167	Size 167	
ALS250A	Size 167	Size 167	Size 167	
ALS265A	Size 167	Size 175	Size 175	
ALS280A	Size 175	Size 175	Size 175	
ALS300A	Size 155	Size 155	Size 167	Size 167
ALS315A	Size 155	Size 167	Size 167	Size 167
ALS330A	Size 167	Size 167	Size 167	Size 167
ALS340A	Size 167	Size 167	Size 167	Size 175
ALS360A	Size 167	Size 167	Size 175	Size 175
ALS370A	Size 167	Size 175	Size 175	Size 175
ALS380A	Size 175	Size 175	Size 175	Size 175
ALS425A	Size 175	Size 175	Size 175	Size 175

## McQuay ALS Chillers Vintage "B"

<b>Unit Model No.</b>	<b>Comp 1</b>	<b>Comp 2</b>	<b>Comp 3</b>	<b>Comp 4</b>
ALS125B	Size 155	Size 155		
ALS140B	Size 155	Size 167		
ALS155B	Size 167	Size 167		
ALS170B	Size 167	Size 175		
ALS175B	Size 167	Size 175		
ALS185B	Size 175	Size 175		
ALS195B	Size 175	Size 175		
ALS204B	Size 175	Size 175		
ALS220B	Size 155	Size 167	Size 167	
ALS235B	Size 167	Size 167	Size 167	
ALS250B	Size 167	Size 167	Size 175	
ALS265B	Size 167	Size 175	Size 175	
ALS280B	Size 175	Size 175	Size 175	
ALS300B	Size 155	Size 155	Size 167	Size 167
ALS315B	Size 155	Size 167	Size 167	Size 167
ALS330B	Size 167	Size 167	Size 167	Size 167
ALS340B	Size 167	Size 167	Size 167	Size 175
ALS360B	Size 167	Size 167	Size 175	Size 175
ALS370B	Size 167	Size 175	Size 175	Size 175
ALS380B	Size 175	Size 175	Size 175	Size 175
ALS425B	Size 175	Size 175	Size 175	Size 175

**McQuay ALS Chillers Vintage “C”**

Unit Model No.	Comp 1	Comp 2	Comp 3	Comp 4
ALS141C	Size 155	Size 155		
ALS150C	Size 155	Size 167		
ALS171C	Size 167	Size 167		
ALS186C	Size 167	Size 175		
ALS190C	Size 167	Size 175		
ALS200C	Size 175	Size 175		
ALS206C	Size 175	Size 175		
ALS218C	Size 175	Size 175		
ALS245C	Size 155	Size 167	Size 167	
ALS260C	Size 167	Size 167	Size 167	
ALS270C	Size 167	Size 167	Size 175	
ALS275C	Size 167	Size 175	Size 175	
ALS295C	Size 175	Size 175	Size 175	
ALS325C	Size 155	Size 155	Size 167	Size 167
ALS335C	Size 155	Size 167	Size 167	Size 167
ALS350C	Size 167	Size 167	Size 167	Size 167
ALS365C	Size 167	Size 167	Size 167	Size 175
ALS375C	Size 167	Size 167	Size 175	Size 175
ALS385C	Size 167	Size 175	Size 175	Size 175
ALS400C	Size 175	Size 175	Size 175	Size 175
ALS420C	Size 175	Size 175	Size 175	Size 175

### McQuay PFS Chillers

Unit Model No.	Comp 1	Comp 2
PFS150B	Size 155	Size 155
PFS170B	Size 155	Size 167
PFS180B	Size 155	Size 175
PFS190B	Size 167	Size 167
PFS200B	Size 167	Size 175
PFS215B	Size 175	Size 175
PFS155C	Size 155	Size 155
PFS170C	Size 155	Size 167
PFS180C	Size 155	Size 175
PFS190C	Size 167	Size 167
PFS200C	Size 167	Size 175
PFS210C	Size 175	Size 175

**McQuay**



To aid in the conversion from a McQuay Horizontal Screw Compressor used on the ALS Chillers to a BITZER CS Screw Compressor the following information has been assembled. Due to the various vintages with the ALS or PFS chillers, not all chillers may be the same. The below guidelines serve a general recommendation of what may have to be accomplished to remove a McQuay screw compressor and install a BITZER screw compressor.

For replacement compressor selection a capacity comparison of each compressor is given on page #3.

ALS Chiller model numbers with respective compressor sizes can be found on pages 4 thru 6.

The suction and discharge connections are different between the McQuay and the BITZER compressors. The McQuay screw has the valves located on the top for the suction and on the side for the discharge. The BITZER screw compressors have the valves located on the top for the CS65 thru CS85. The suction valve connection is located on the end for the CS95.

The suction and discharge isolation valves as well as the discharge check valve can be removed from the existing piping, the BITZER compressors are supplied with suction and discharge service valves and an internal check valve.

It is recommended that a suction core drier be installed.

A small amount of new piping and various elbows will be required when converting to the BITZER compressor.

McQuay compressors utilized liquid motor cooling whereas the BITZER compressors do not. The liquid circuit piping which supplies motor cooling can be removed.

McQuay compressors also require an external oil separator, oil filter, solenoid valve, etc. BITZER compressors do not as the oil separator is integral to the compressor. The existing oil separator and all associated components can be removed.

Capacity control slightly differs between the two compressors as the McQuay has (3) solenoids for capacity control while the BITZER has (4). Depending on the type or degree of capacity control required, the BITZER screw compressor can be controlled for 4 Step capacity control, 3 Step capacity control or infinite capacity control where only (2) of the solenoids are used. The different means of capacity control can be achieved without any modification to the compressor required.

The control wiring for these compressors also has some differences.

The McQuay has a "safety chain" which is controlled by the PLC.

The BITZER screw compressor features the SE-E1 electronic module which provides oil-discharge gas temperature protection, motor winding temperature protection as well as phase protection.

This module must be incorporated into the safety chain.

There is an additional connection on the protection module at terminal 12. This can be used to indicate a general compressor failure.

The external reverse phase protection that was used for the McQuay must be removed as this function is incorporated into the BITZER screw protection module.

The last thing that needs to be checked is starting. In applications where reduced voltage starting is used the McQuay will have a Star Delta starter which is different than the BITZER screw compressor, which uses part winding starting for the CS65, 75 and 85 series. The CS95 series utilize Star Delta reduced voltage starting. Full voltage or direct on line starting is the same for both compressors. The overload relay and the contactors must be checked for proper sizing.

## Dimensions and Oil Data

McQuay Dimensions			
Model	Length	Height	Width
Size 155	33"	21"	23"
Size 167	33"	21"	23"
Size 175	33"	21"	23"
Without Service Valves			

Bitzer CSH Dimensions			
Model	Length	Height	Width
CSH7563-80	53"	23"	22"
CSH7573-90	53"	23"	22"
CSH8553-110	60"	28"	27"
CSH8563-125	60"	28"	27"
With Service Valves			

McQuay Model	Suction Connection	Discharge Connection
Size 155	2-5/8"	
Size 167	2-5/8"	
Size 175	2-5/8"	

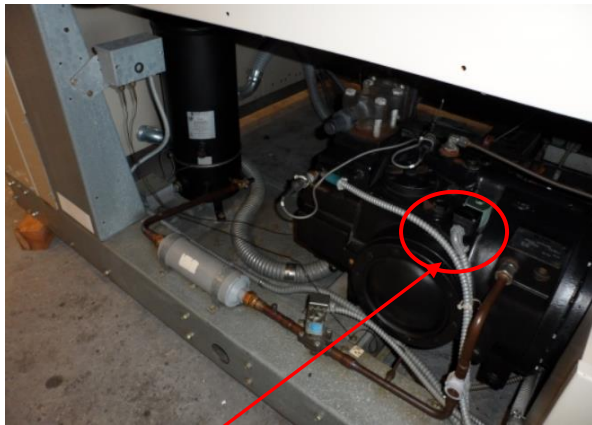
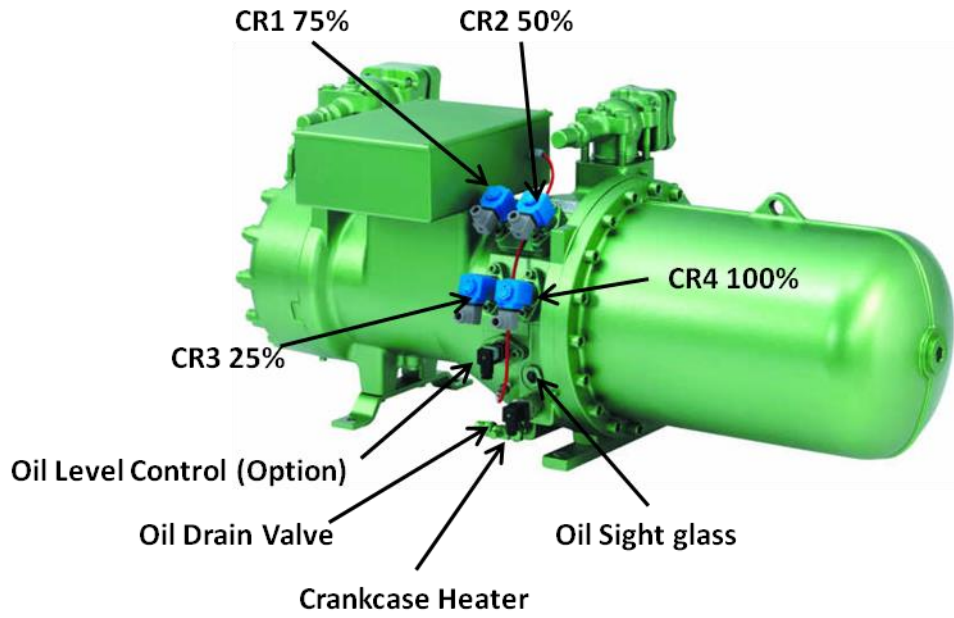
CSH Model	Suction Valve	Discharge Valve
7563-80	3-1/8"	2-1/8"
7573-90	3-1/8"	2-1/8"
8553-110	4-1/8"	3-1/8"
8563-125	4-1/8"	3-1/8"

McQuay Model	Oil Charge (Separator)	Oil Type R22
Size 155		Planetelf ACD68AW or ICI RL68
Size 167		
Size 175		

CSH Model	Oil Charge (Gallons)	Oil Type R22
7563-80	3.96	CPI4214-320
7573-90	3.96	
8553-110	5.8	
8563-125	5.8	

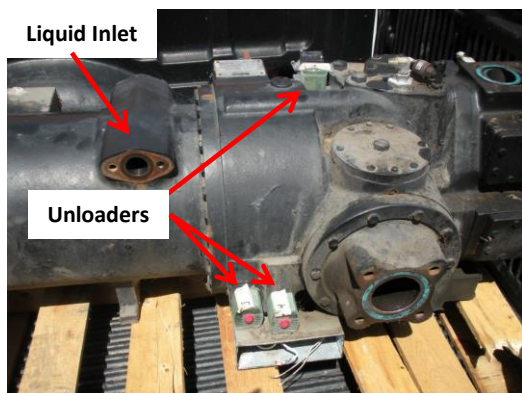
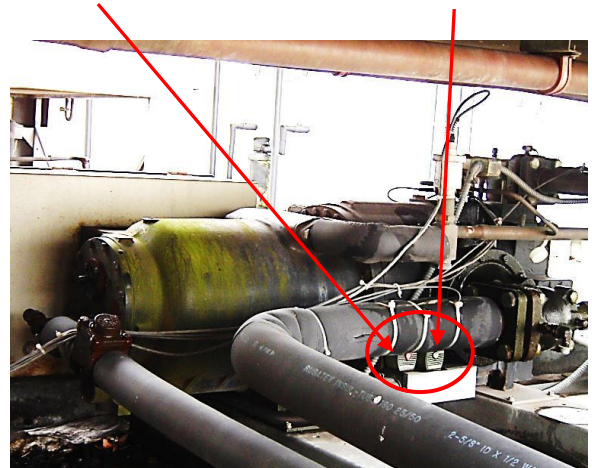
# Capacity Control

Bitzer Screw Compressors Frame 2 Shown



Top Solenoid = Feed

Bottom Rear Solenoid = Vent      Bottom Front Solenoid = Vent



COMPRESSOR LOADING %	COMPRESSOR UNLOADING SOLENOID STATUS		
	Top Solenoid	Bottom Front Solenoid	Bottom Rear Solenoid
100%	Energized	Off	Energized
75%	Energized	Energized	Off
50%	Off	Off	Energized
25%	Off	Energized	Off

### Compressor Solenoids:

The ALS unit screw compressors are equipped with 3 solenoids to control compressor unloading. The solenoids are controlled by MicroTech outputs. See unit wiring diagrams. The solenoids are energized at various compressor load conditions as indicated in the table below.

### Location of the solenoids is as follows:

The top solenoid is on top of the compressor near the discharge end.

The bottom solenoids are on the lower side of the compressor on the opposite side from the terminal box.

The bottom front solenoid is the one closest to the discharge end of the compressor.

The bottom rear solenoid is the one closest to the motor end of the compressor.

If the compressor is not loading properly check the solenoids to see if they are energized per the above chart.

For the Bitzer Screw Compressor-4-Step Capacity Control				
Operation	Solenoid 1	Solenoid 2	Solenoid 3	Solenoid 4
<b>Start/stop</b>	De-energized	De-energized	Energized	De-energized
<b>Capacity 25%</b>	De-energized	De-energized	Energized	De-energized
<b>Capacity 50%</b>	De-energized	Energized	De-energized	De-energized
<b>Capacity 75%</b>	Energized	De-energized	De-energized	De-energized
<b>Capacity 100%</b>	De-energized	De-energized	De-energized	Energized

For the Bitzer Screw Compressor-Infinite Capacity Control 25-100%		
Operation	Solenoid 3	Solenoid 4
<b>Start/stop</b>	Energized	De-energized
<b>Loading</b>	De-energized	Energized
<b>Unloading</b>	Energized	De-energized
<b>Constant Load</b>	Pulsing	Pulsing

## Unloading Coils

The #4 unloading coil was connected to wires 183 and 184. (Fully load the compressor)

The #1 unloading coil was connected to wires 185 and 143. (Load compressor to 75%)

The wire identifications may change depending on vintage.

Typically, the McQuay unloaded two coils at a time while the Bitzer only needs one.

## With the new wiring:

When the McQuay needs 100% it will energize #4 only and fully load the Bitzer.

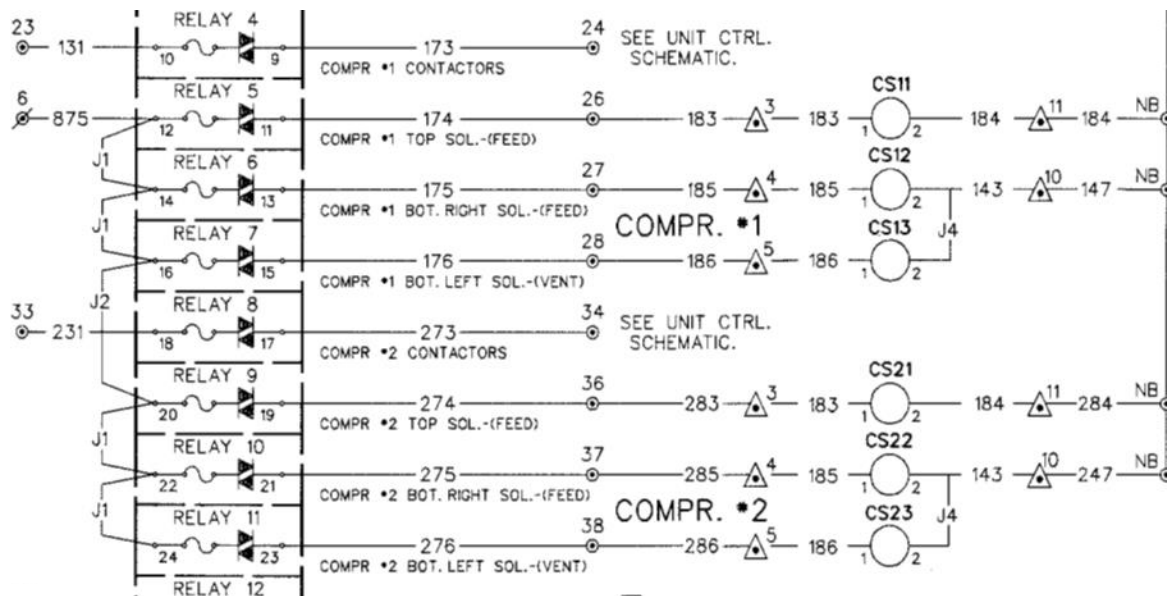
When the McQuay needs 75%, it will energize #4 and #1 which will actually keep Bitzer at the same part load it was at.

When the McQuay needs 50%, neither of the coils will energize and the compressor will slowly unload itself.

When the McQuay needs 25%, #1 will energize which will energize #1 and the compressor will slowly unload itself.

An option for capacity control would be to install a "stand alone" controller. See BITZER Technical Bulletin TB-0039 for further details.

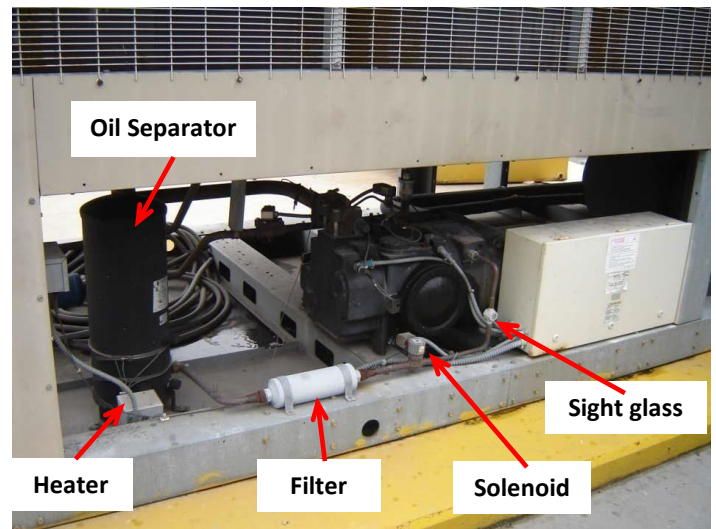
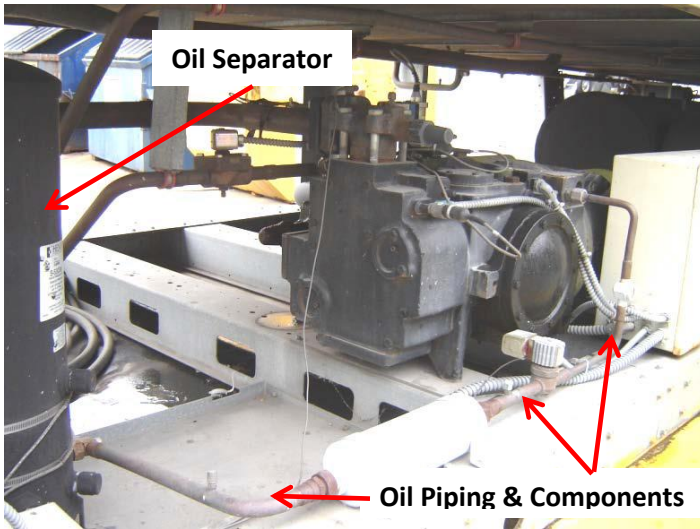
Below is a standard diagram of the wiring for McQuay capacity control.



For Infinite Capacity control on the BITZER CS compressor, 2 solenoids will be used. #4 solenoid is for 100% while #3 is for minimum or 25%, however, depending on actual operating conditions, the BITZER CS screw compressor may be limited to 50% capacity where #2 coil would be used as the minimum capacity.

Consult Application Engineering or the BITZER software to determine the minimum capacity at the desired operating parameters.

## Oil Separator and Piping Components



The oil separator and components used on the McQuay compressor can be removed and discarded. BITZER CS series screw compressors feature the integral flanged on oil separator. By removing the external oil separator and components, frees up space for the installation of the BITZER.

After removal, the wires used for the oil solenoid, oil pressure and oil sensor (OLS) can be jumped together. Wire terminals 807, 808 and 839.

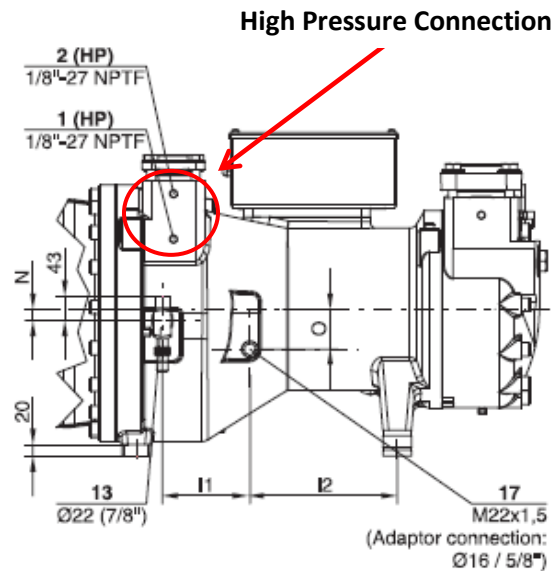
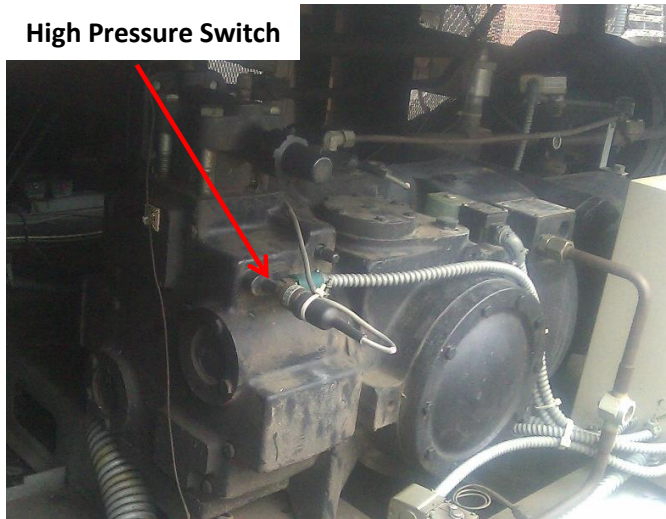
The existing crankcase heater wires can be used to power the BITZER crankcase heater.

## High Pressure Switch

The existing high pressure switch on the McQuay compressor can be installed onto the BITZER CS compressor.

There are (2) HP connections on the compressor. The top is "system" pressure while the bottom is compressor pressure.

The internal discharge check valve is between these two ports.



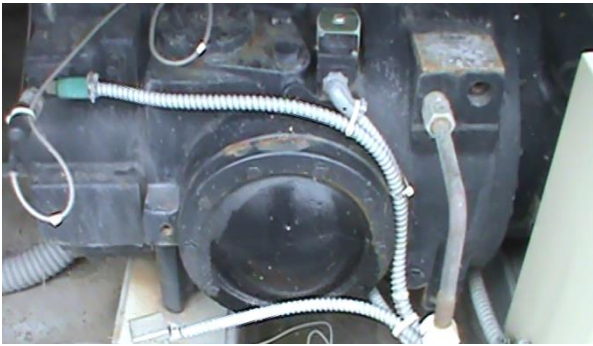
### Existing Controls

The wiring used for the oil solenoid, oil pressure, and oil sensor was removed. These wires were jumpered together. On this existing retrofit, these wires were identified as 807, 808 and 839.

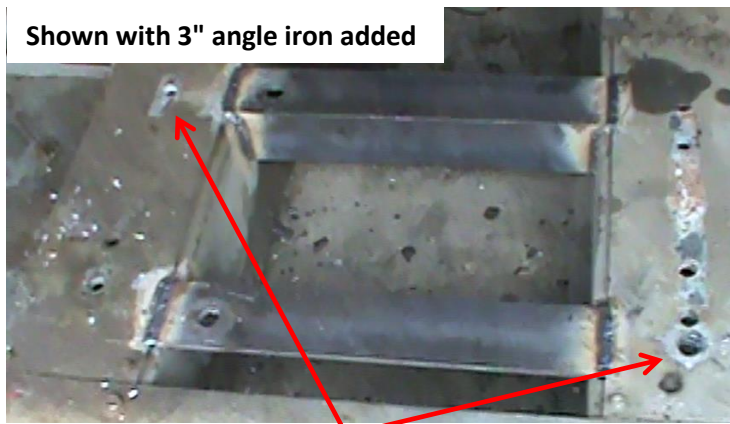
### Old Existing Overload

A resistor of 2,000 Ohms was added between the thermistor / overload wires that were used with the McQuay to simulate that the compressor was still there and ok. The new SE-E1 module will replace the safety relay that the McQuay PLC was performing in terms of functionality.

# Installation



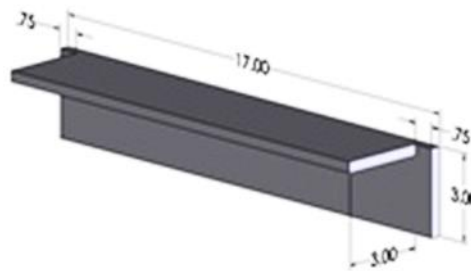
Shown with McQuay Size 155 removed



Shown with 3" angle iron added

Existing mounting holes from McQuay

Re-used (2) existing mounting holes from McQuay and (2) New



Shown with CSH





## Piping:

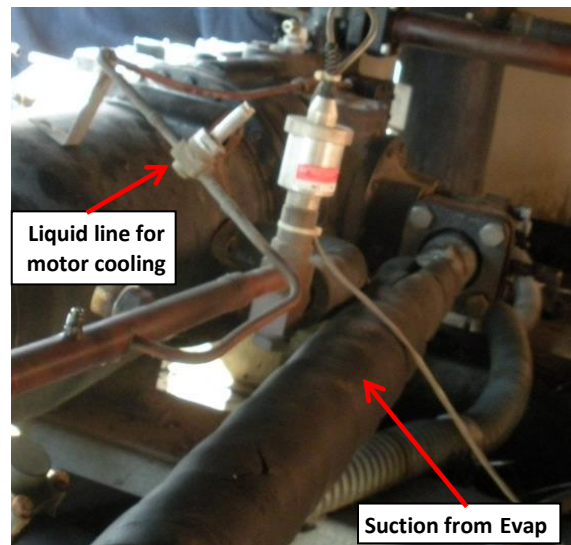
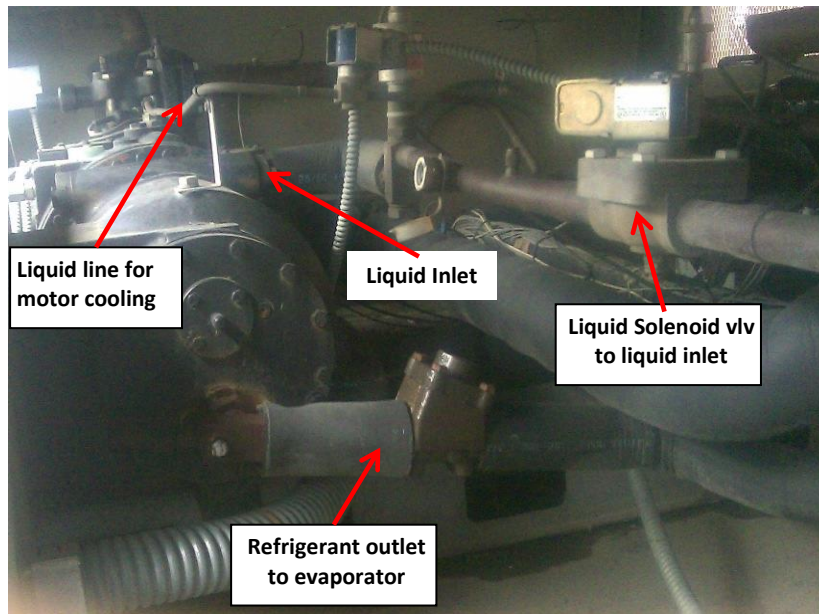
After the McQuay compressor, oil separator and components have been removed and additional supports have been added to mount the BITZER compressor, piping modifications will have to be accomplished.

There will actually be less piping resulting in lower possibility of refrigerant leakage once the BITZER is installed and piped in.

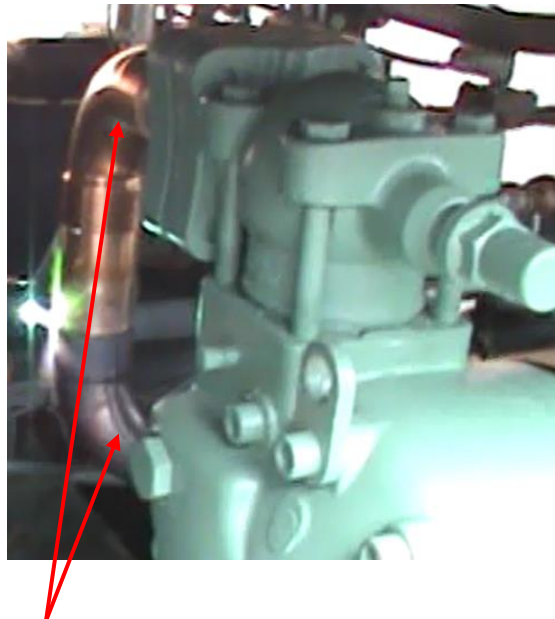
The suction piping needed (2) elbows to come up from the evaporator outlet piping that was already in place and a suction core filter drier was installed into the piping which required an additional elbow.

The discharge piping needed (2) elbows before it then led slightly down as it came towards the condenser inlet. (2) more elbows were required to pipe into the condenser inlet which was originally the oil separator outlet which had been removed. This was accomplished so that any condensed refrigerant in the discharge line would be trapped rather than be allowed to migrate back to the compressor.

The following pictures show a replacement. Note, not all applications may require the same type of mounting and piping layout.

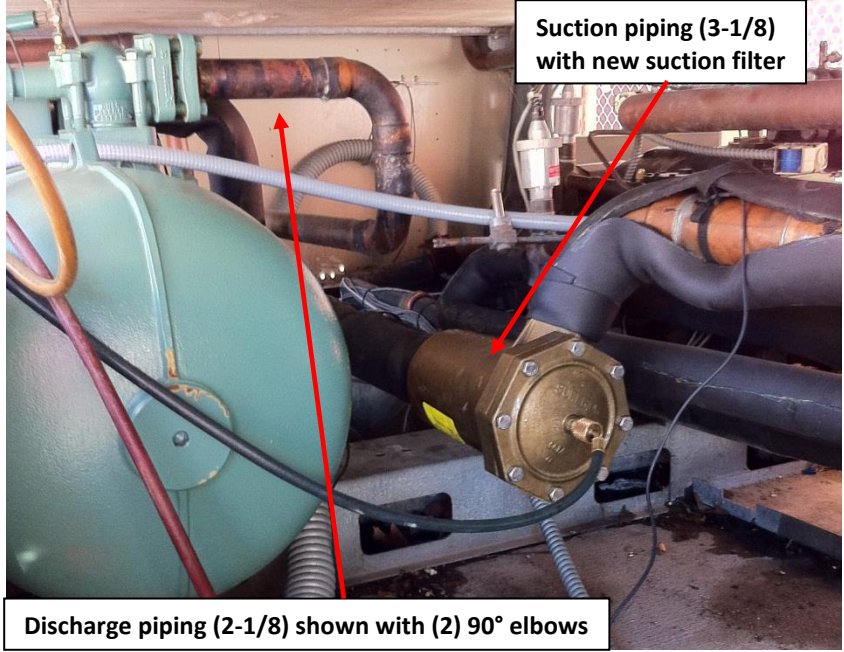


Because the BITZER compressor does not require liquid injection motor cooling, the liquid line and TXV were reconnected before setting the new compressor in place by brazing two elbows together and a straight run into the evaporator.



Suction connection shown with two new elbows

Discharge connection similar to suction



Suction piping (3-1/8)  
with new suction filter

Discharge piping (2-1/8) shown with (2) 90° elbows

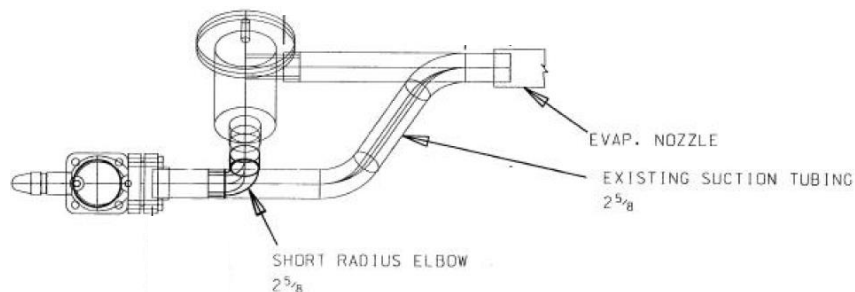
If the existing has had a check valve installed in the piping to prevent liquid refrigerant from draining back to the compressor due to a power issue, the check valve can be removed.

The purpose of this check valve is to prevent liquid back flow to the compressor motor in the event of a power failure. Units without this check valve on a power failure will fill the motor and compressor with liquid refrigerant as the compressor is below the evaporator level.

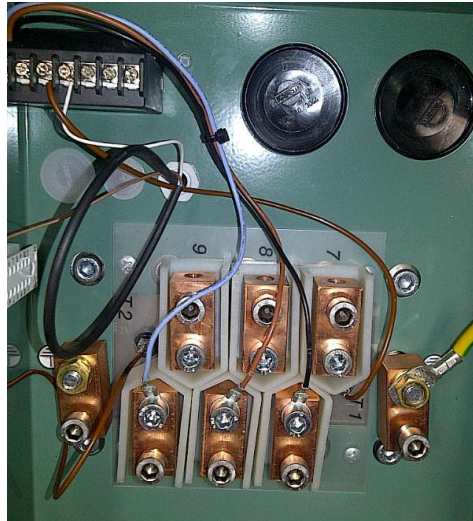


If the existing ALS chiller has had gate failures, the possibility exists that some of the broken pieces may end up in the evaporator on the suction baffle in a PFS unit and in the suction line and possibly the suction end of the evaporator on an ALS unit. On the ALS units, as a minimum, the suction pipe must be removed and cleaned before installing a new compressor. (This can be accomplished very easily.) In addition, if there was ever a motor failure, seizure or gate failure, a suction core filter housing was required to be installed.

It is recommended to install a suction core filter drier or to re-use an existing drier when installing a BITZER CS compressor which aids in cleaning a circuit and also preventing system debris from entering the new compressor.



## Electrical

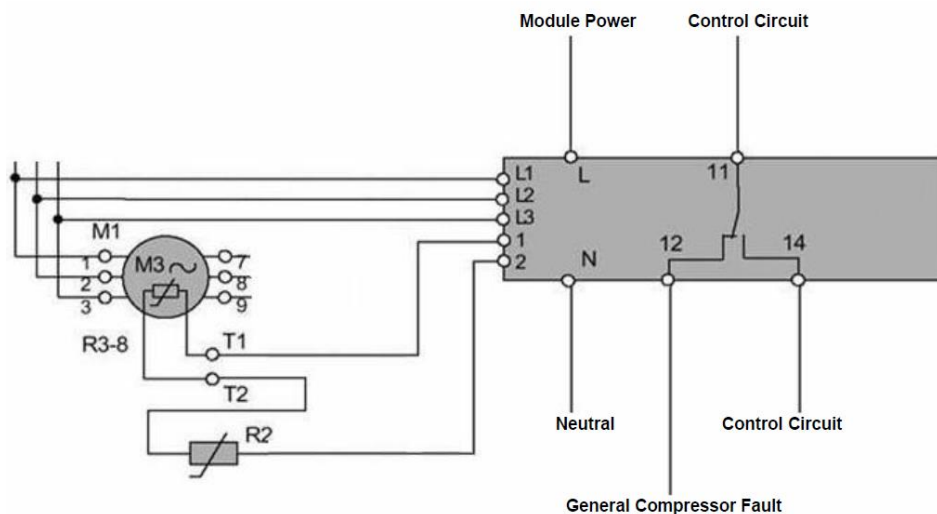


**CS75 Series Terminal Box Shown**

BITZER CS series screw compressors utilize Standard Part Winding or Direct On Line starting on 35 thru 140 horsepower compressors which is the same as the McQuay screw compressors. BITZER 160 thru 320 horsepower utilize Star Delta type starting.



**SE-E1 Electronic Module**



**Basic Module Wiring Inside Terminal Box**

The SE-E1 is a dual voltage 115V / 230V or 24V AC module (optional).  
The module will sense what voltage is being supplied.

Each module is pre-wired inside the terminal box. The module monitors discharge gas / oil temperature via a PTC sensor. The module also monitors motor winding temperature via the motor sensors embedded into the motor windings which are wired in series and connected to the module. Phase sequence control for direction of rotation is also monitored.

As mentioned above, each module is pre-wired inside the terminal box. The following connections should be checked for tightness.

Voltage / Phase Connections:

L-1 (black) connected to L-1 spade connection on the terminal plate.

L-2 (brown) connected to L-2 spade connection on the terminal plate.

L-3 (blue) connected to L-3 spade connection on the terminal plate.

Note: Each lead is identified at the plug connector with number markings and can also be found laser etched on the front of the module.

Motor Winding Temperature Connections:

T-1 (brown) connected to number 1 on the module.

T-2 (brown) connected to position 5 on the connector strip.

Discharge Gas / Oil Temperature Sensor PTC120:

The blue wire is connected to the opposite side of position 5 with the T-2 connection.

The brown wire connected to number 2 on the module.

Compressor Control Circuit is wired through terminal 11 and 14.

Terminal 12 can be utilized as a general compressor fault output. It will be powered whenever the module trips.

Module power supply connected to terminals L and N.

### **Wiring the SE-E1 Electronic Module.**

The BITZER SE-E1 will be wired in series with the existing high pressure switch.

One side will be connected to terminal 11 and the opposite wire will be connected to terminal 14 on the SE-E1 module.

A separate power supply from the control voltage (115 volt) was brought to "L and N" for module power.

The existing CT's were reused and installed on "T1, T2 and T3".

**Note:** The SE-E1 is prewired inside of the terminal box:

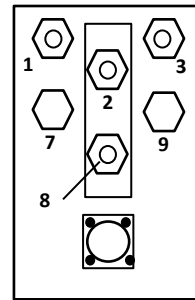
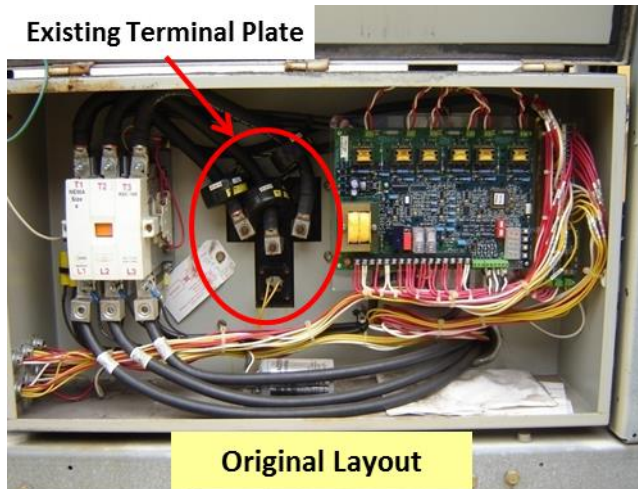
T1 and T2 for motor winding temperature.

Oil-discharge gas temperature sensor.

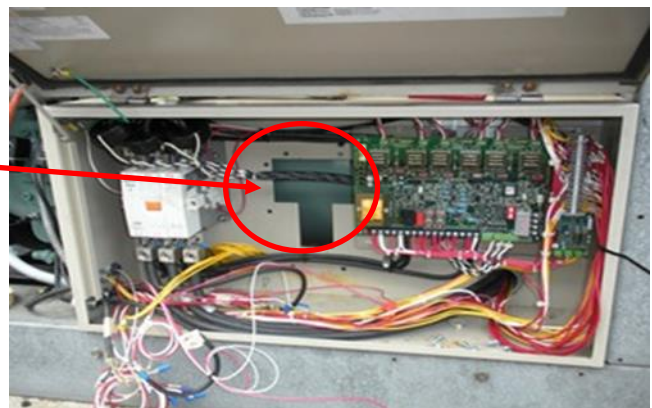
L1, L2 and L3 phase protection.

Control circuit connections are "11 and 14".

Power connections are "L and N".



A 7" x 9" mounting plate with gasket was used To cover over the existing access in the Terminal box when the McQuay compressor Was removed.



**Power Leads**

The power wire was run through the conduit up to the terminal box using #4 Gage wire. (6) cables were used, (2) for each leg so thicker cable was not used.

### **Compressor motor protection**

The McQuay compressors are supplied with two types of motor protection. Solid state electronic overloads mounted in the control box sense motor current within 2% of the operating amps. The Must Trip amps are equal to 140% of the unit nameplate compressor RLA. The MOST HOLD amps are equal to 125% of the unit nameplate RLA. A trip of these overloads can result from the unit operating outside of normal conditions. Repeat overloads are manual reset and must be reset at the overload as well as through the Micro Tech.

The compressors also have a solid state Guardisterâ circuit that provides motor over temperature protection. This circuit has an automatic reset but must also be reset through the Micro Tech.

### **Compressor short cycling protection**

MicroTech contains logic to prevent rapid compressor restarting. Excessive compressor starts can be hard on starting components and create excessive motor winding temperatures. The anti-cycle timers are set for a 5 minute stop to start cycle and a 15 minute start to start cycle. Both of these parameters are adjustable through Micro Tech however, BITZER CS screw compressors are recommended with the same type of timing.

### **Electronic Expansion Valve**

The electronic expansion valve is located adjacent to the compressor. The refrigerant is piped to first pass through the electronic expansion valve, then through the motor housing cooling the motor before going into the evaporator. Refer to the Figure 32, ALS Piping Schematic.

All ALS chillers are factory set between 8°F (4.5°C) and 12°F (6.6°C) superheat at 75% to 100% load and between 6°F (3.3°C) and 10°F (5.6°C) below 75% load. The superheat is controlled by the microprocessor and is not adjustable.

A feature of the electronic expansion valve is a maximum operating pressure setting (MOP). This setting limits the load on the compressor during start-up periods where high return evaporator water temperatures may be present. The valve will limit the maximum suction pressure at start-up to approximately 85 psig (586 kPa). The valve will close to a point necessary to maintain the 85 psig (586 kPa). During this time the superheat will rise above 12°F (6.6°C) and not drop below 12°F (6.6°C) until the suction pressure drops below 85 psig (586 kPa). The valve will maintain evaporator pressure close to 85 psig (586 kPa) until the evaporator water temperature decreases to approximately 55°F to 60°F (12.7°C to 15.6°C).

When the circuit starts the valve opens as soon as the evaporator pressure decreases to 40 psig (275 kPa). At the end of the cooling cycle the valve closes causing the system to pump down. The valve closes at the rate of approximately 55 steps per second, or from full open to full closed in approximately 14 seconds. The valve closing during pumpdown will occur in approximately 20-30 seconds after the pumpdown switch is moved to the "Pumpdown and Stop" position.



## ALS380A

A = Air Cooled

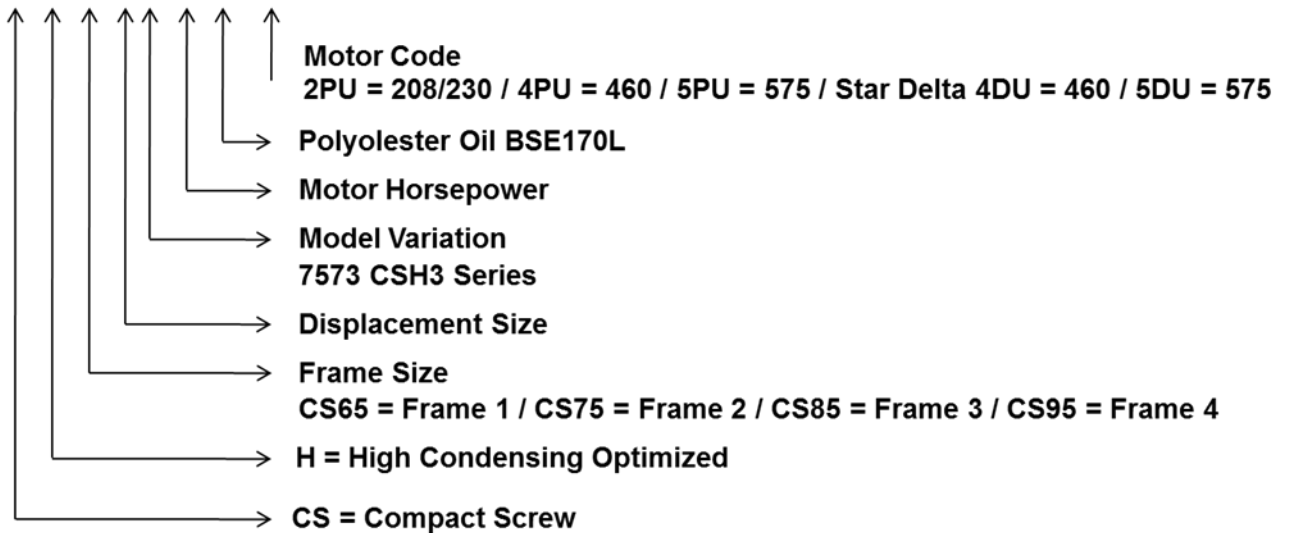
L = Liquid Oil Injected

S = Rotary Screw Compressor

380 = Nominal Tons

A = Design Vintage

## CSH7573-70Y-4PU



“Y” after the 11<sup>th</sup> Digit is Oil Type (when required)

“Y” = BSE170 for HFC’s / If no “Y” in Model Number = B320SH for R22

## CSH / CSW Screw Accessories

### Crankcase Heater - Special Voltage Heater

Part # (Voltage)	Model
343213-07 (230V)(200W)	(CS65 - CS75)
343213-02 (230V)(300W)	(CS85 - CS95)

### Oil Level Control - Mechanical (CSH Series)

Part #	Model
347403-05	(CSH 65)
347403-03	(CSH 75 - CSH 85)
347403-06	(CSH 95)

### Oil Level Control - Electronic (CSW Series)

Part #	Voltage
347962-02	115V
347962-01	230V
347962-03	24VAC

### Liquid Injection Adapter Kit

#### Part #

361332-10

### Liquid Injection Controller

#### Part #

085-0164-17

### Economizer Adapter

Model:	Part #
CS65	361329-16
CS75	361329-16
CS85	361330-05

### Pressure Controller with 1/4" NPT Transducer Sensor

#### Kit Part #

999-0005-01

### Temperature - Strap On Sensor with Capacity Controller

#### Kit Part #

999-0003-01

### Temperature - 1/4" NPT Insert Sensor with Capacity Controller

#### Kit Part #

999-0004-01

**B320SH Polyolester Oil**

Unit of Measurement	Part #
1 gallon	793-3320-01
5 gallon	793-3320-34

**BSE 170 Polyolester Oil**

Unit of Measurement	Part #
1 gallon	793-1170-34
5 gallon	793-3170-34

**BSE 170 L Polyolester Oil**

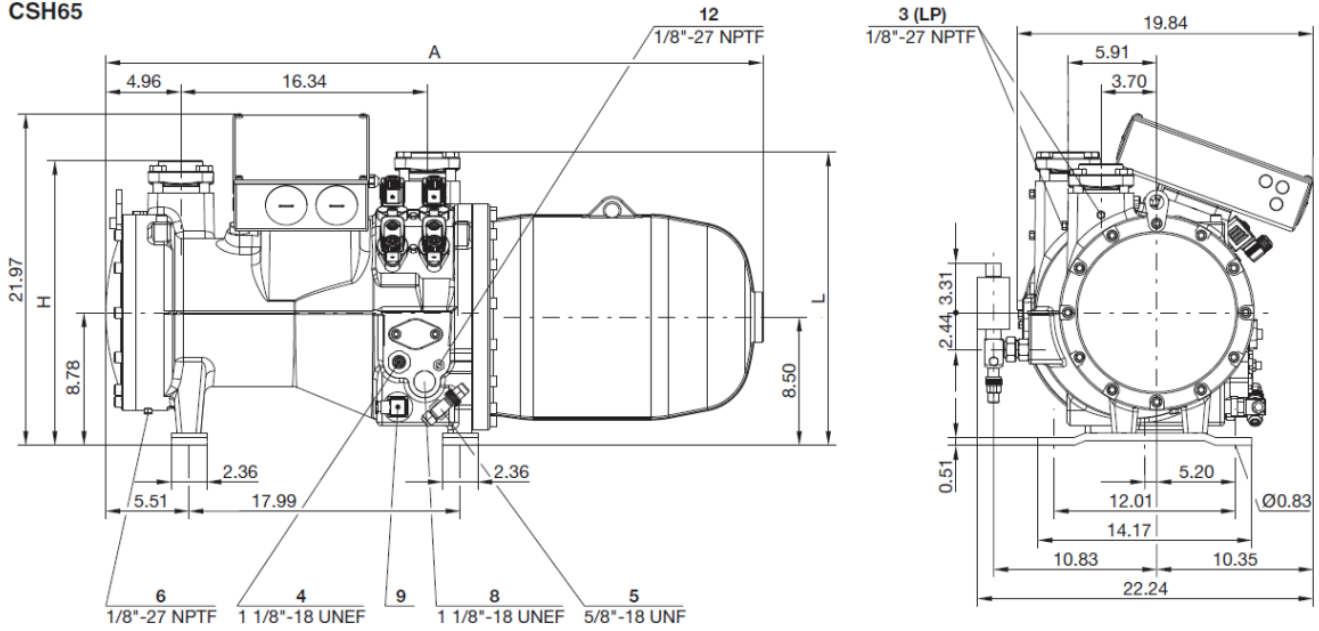
	Part #
1 liter	915118-06
5 liter	915118-01
10 liter	915118-02

**BITZER Oils for CS Series**

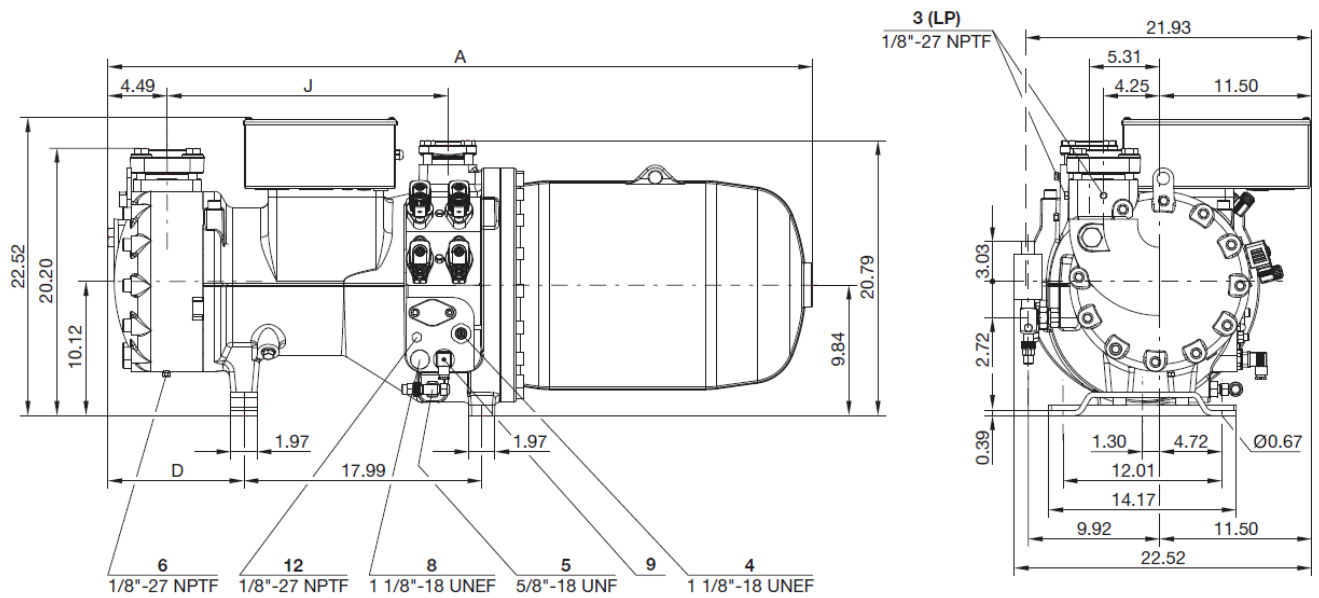
Model	Refrigerant	Oil
CSH	R22	B320SH
	R134a/R407C/R404A/R507A	BSE170
CSW	R22	B320SH
	R134a	BSE170L

# BITZER CSH Screw Compressor Dimensional Data

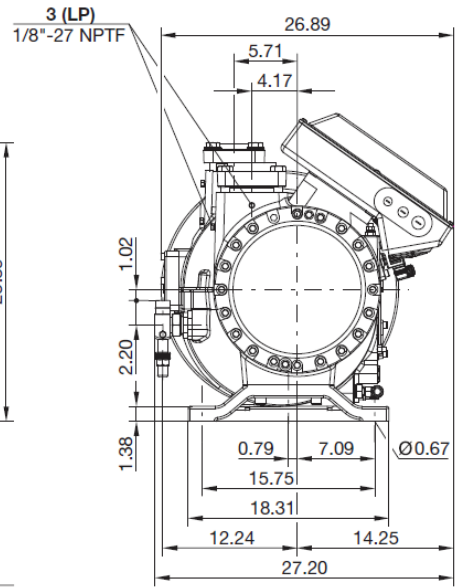
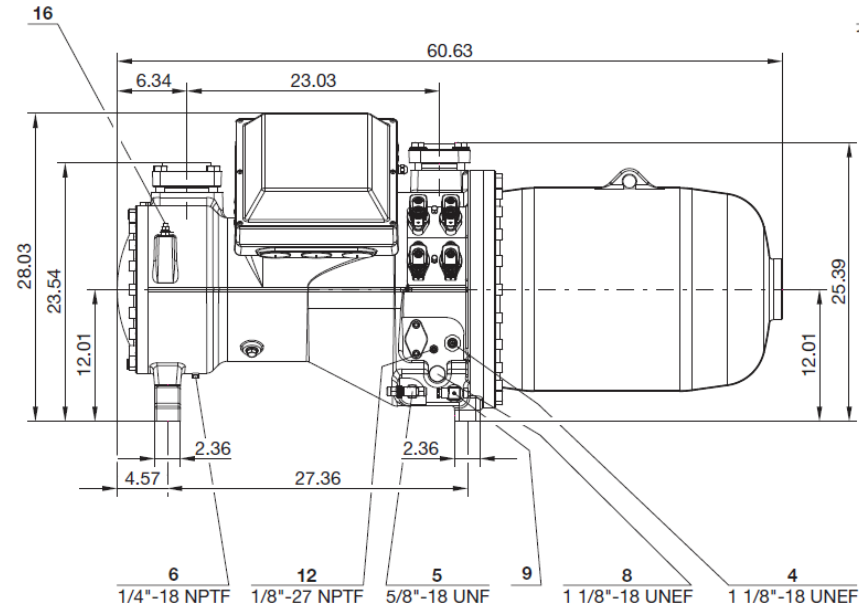
**CSH65**



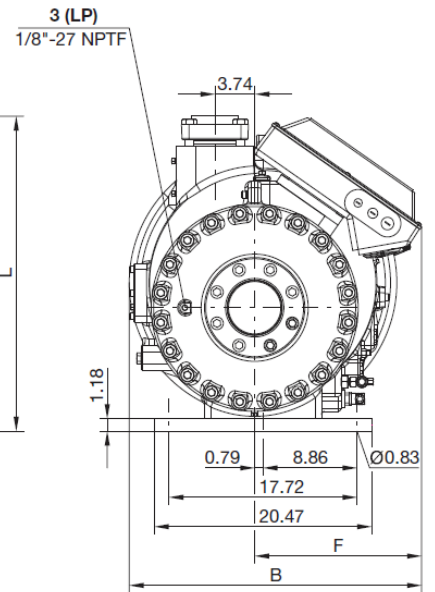
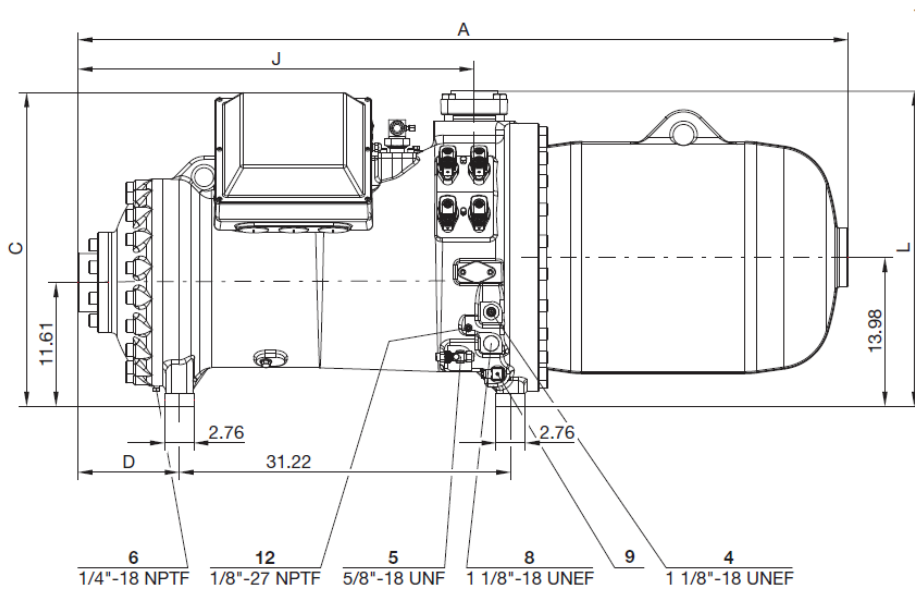
**CSH75**



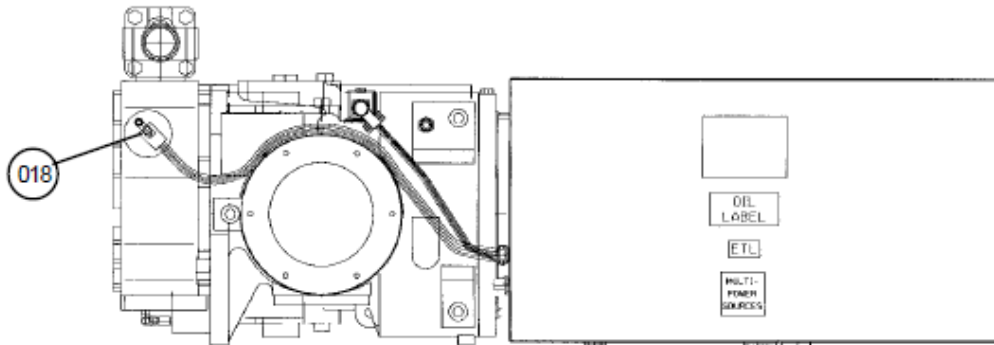
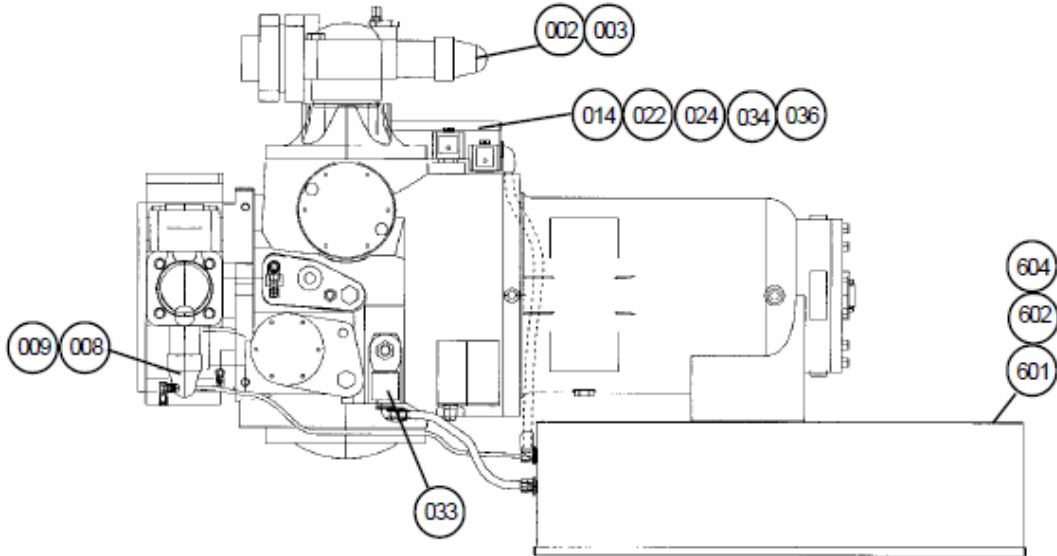
**CSH85**



**CSH95**



# Compressors



Ref#	Description
002	Shut-off Valve, OSD Suction
003	Gasket, Head, Suction
008	Shut-off Valve, Discharge
009	Gasket, Head, Discharge
014	Crankcase Heater
018	Switch, Pressure, High 300 close/400 open
022	Junction Box
024	Cover, Junction Box
033	Solenoid Coil with Electrical Box
034	Solenoid Coil with Flag Connection (CS12, CS13)
036	Gasket, J. Box
601	Starter, Solid State, SSK (208/230V)
601	Starter, Solid State, SSK (380, 460, 575V)
602	Gasket, Starter Box
604	Gasket

## **NOTES**

**Please Note:**

**The advice given herein and/or any conclusions made by BITZER US, Inc. represent BITZER US, Inc's best advice and judgment under the circumstances, but such advice and/or conclusions made or results obtained shall be deemed used at your sole risk. For further assistance, please contact our application engineering department using the contact information on the back page of this booklet.**



# BITZER Competitive Replacement Inquiry

Date: \_\_\_\_\_

Name	
Company Name	
Address	
City, State, Zip	
Phone	
Cell Phone	
Email	
Customer's Name	
Address	

Brand of the compressor you are replacing: \_\_\_\_\_

Compressor Model No.: \_\_\_\_\_ Serial No.: \_\_\_\_\_

System Manufacturer (OEM) and Unit Model #: \_\_\_\_\_

Please specify single circuit or compressor is in parallel: \_\_\_\_\_

Type of refrigerant used: \_\_\_\_\_ Tonnage requirement: \_\_\_\_\_

Operating condition: Evaporating: \_\_\_\_\_

Condensing: \_\_\_\_\_

Suction superheat: \_\_\_\_\_

Subcooling: \_\_\_\_\_

Voltage: \_\_\_\_\_

Reason for replacement: \_\_\_\_\_

How many compressors are you looking to replace?: \_\_\_\_\_

Please provide any additional comments: \_\_\_\_\_

\_\_\_\_\_