
York YCAS and YCWS Series to BITZER CSH Series

**Competitive
Replacement
Guidelines**

XR-0023-03 December 2017



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

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Scope of Standard Delivery (as supplied by Manufacturer)	Bitzer CSH	York DXS
Capacity control system : 4-Steps or Infinite Continuous (See Below)	No Modification Req	2 Step
25% to 100% Capacity Control	●	●
Conversion Kit Stepped to Stepless Control	Not Required	No
4 Step Capacity Control	●	No
Infinite Capacity Control	●	●
Solenoid coils for capacity control	●	Δ
Volume ratio Vi, Option Vi=2.2, 2.6, 3.0, 3.5	Built In	Built In
Discharge Check Valve	● Internal	● Internal
Suction Coupling tube and/or Flange	N/A	●
Discharge Coupling tube and/or Flange	N/A	●
Suction Service Valve	●	Δ
Discharge Service Valve	●	Δ
Suction service valve location	Top	End
Discharge service valve location	Top	End
Oil Charge	●	N/A
Electronic Module (Rotation)	●	External
Electronic Module (Temperature)	●	External
PTC100 type temperature sensor	N/A	N/A
PTC120 type temperature sensor	●	N/A
PT100 type motor temperature sensor	PTC Sensors	N/A
PTC110 type temperature sensor	N/A	N/A
Screw in Discharge temperature sensor	● (251F)	Thermistor
IP-54 Terminal box	●	
Crankcase oil heater	●	●
Compress chamber (Middle side) liquid inject port	●	N/A
Motor side (Low side) liquid inject port	Not Required	●
Economizer port	●	●
Oil cooling connection	●	N/A
Liquid injection oil cooling port	●	●
Oil drain valve	●	N/A
Oil level switch	Δ	N/A
Oil filter different pressure (ΔP) protector switch	Not Required	N/A
Liquid injection expansion valve	N/A	N/A
Liquid injection solenoid valve	N/A	N/A
Safety Valve	● Internal	N/A
Position sensor (Capacity control)	N/A	N/A
Slide fit motor	●	●
Starting type PWS	●	No
Starting type Start Delta	Δ	●
Jumper bars for DOL starting	●	
Rubber mounting pads	●	No
Oil Separator	Intregal	Δ Requires External
● (Standard) Δ (Option) N/A Not Applicable		

YCAS AIR COOLED CHILLERS

York Millennium Air Cooled Liquid Chillers (Style F)				
80 - 420 TONS				
Chiller	Cir 1	Cir 2	Cir 3	Cir 4
0090EC	112	112		
0100EC	112	112		
0110EC	124	112		
0120EC	124	112		
0130EC	124	124		
0140EC	124	124		
0150EC	136	124		
0160EC	136	136		
0170EC	136	136		
0180EC	136	136		
0200EC	145	145		
0210EC	145	145		
0230EC	145	145		
0250EC	136	136	136	
0270EC	136	136	145	
0300EC	145	145	145	
0330EC	145	145	145	
0360EC	145	145	136	136
0400EC	145	145	145	145
0440EC	145	145	145	145

Compressor	Standard	ECO
DXS112	42	45/46
DXS124	62	68
DXS136	78	85
DXS145	95	105

YORK COMPRESSOR	TONS	CSH (AIR COOLED)	TONS	CSW (WATER COOLED)	TONS
DXS112	42	CSH6563-60	45		
		CSH7553-70	51	CSW6583-50	52
DXS124	62	CSH7563-80	60	CSW6593-60	59
		CSH7573-90	70	CSW7573-70	72
DXS136	78			CSW7583-80	81
		CSH8553-110	85		
DXS145	95	CSH8563-125	98	CSW7593-90	93
		CSH8573-140	115	CSW8573-110	117

CS' COMPRESSOR RATINGS ARE MATCHED TO YORK DATA BY USING BITZER SOFTWARE AND THE FOLLOWING INPUTS:
R22 AT 36°F SST / 122°F SDT / 5°F SUBCOOLING / 10°F COMPRESSOR SUPERHEAT

YCWS WATER COOLED CHILLERS

Chiller	Cir	Cir 2	Cir 1 Tons	Cir 2 Tons
0100SC	112	112	46	46
0120SC	124	112	66	46
0140SC	124	124	66	66
0180SC	124	136	66	92
0200SC	136	136	92	92
0220SC	136	145	92	108
0240SC	145	145	108	108

Compressor	Standard
DXS112	46
DXS124	66
DXS136	92
DXS145	108

YORK COMPRESSOR	TONS	CSH Model	TONS	CSW Model	TONS
DXS112	46	CSH6553-50	42		
DXS124	66	CSH7553-70	62	CSW6583-50	65
DXS136	92	CSH7573-90	86	CSW7573-70	89
DXS145	108	CSH7593-110	108	CSW7593-90	115

CS Compressor Ratings Are Matched to York Data by Using BITZER Software and Inputs:
R22 at 39°F SST / 105°F SDT / 5°F Subcooling / 10°F Compressor Superheat

Service Valve Connection Sizes

	Suction	Discharge
DXS112	2-5/8"	1-3/8"
DXS124	2-5/8"	2-1/8"
DXS136	3-5/8"	2-5/8"
DXS145	3-5/8"	2-5/8"

	Suction	Discharge
CSH6553-50	2-1/8"	1-5/8"
CSH6563-60	2-1/8"	1-5/8"
CSH7553-70	3-1/8"	2-1/8"
CSH7563-80	3-1/8"	2-1/8"
CSH7573-90	3-1/8"	2-1/8"
CSW6583-50	2-5/8"	2-1/8"
CSW6593-60	2-5/8"	2-1/8"
CSW7573-70	3-1/8"	2-1/8"

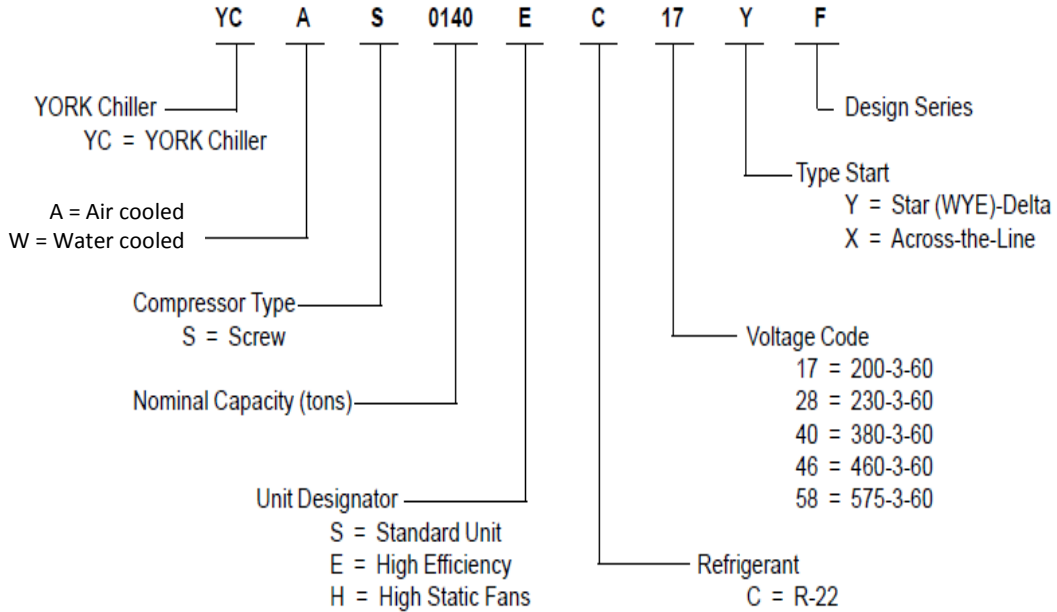
Compressor Weights

DXS112	760	CSH6553-50	717
DXS124	1175	CSH6563-60	717
DXS136	1250	CSH7553-70	1147
DXS145	1310	CSH7563-80	1147
		CSH7573-90	1169
		CSW6583-50	805
		CSW6593-60	805
		CSW7573-70	1147

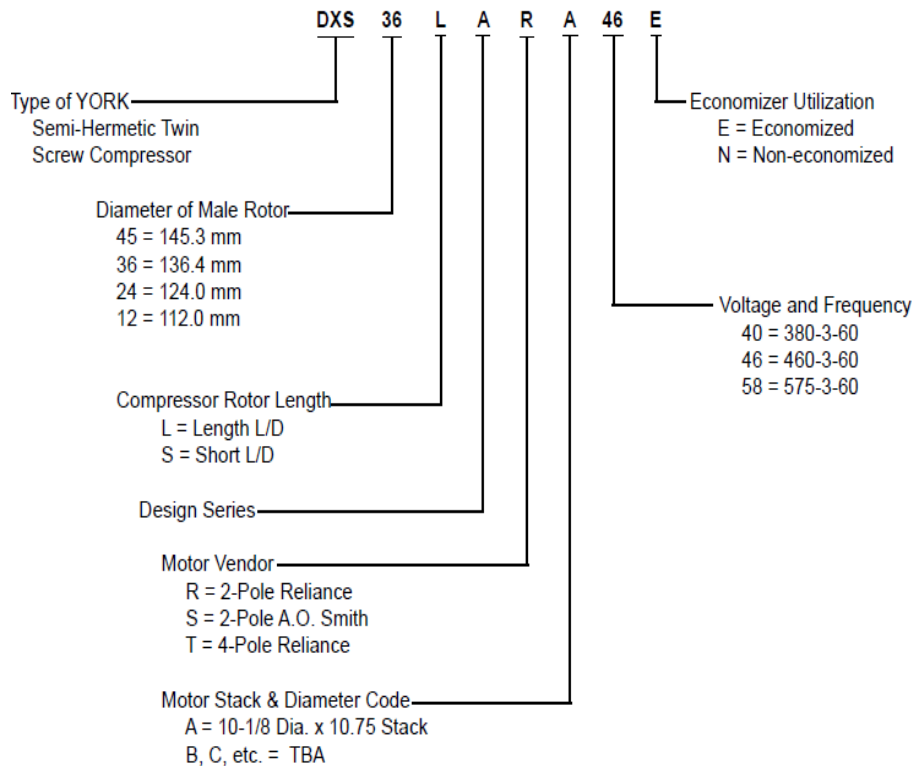
York Chiller / Compressor Nomenclature

NOMENCLATURE

The Model Number denotes the following characteristics of the unit:

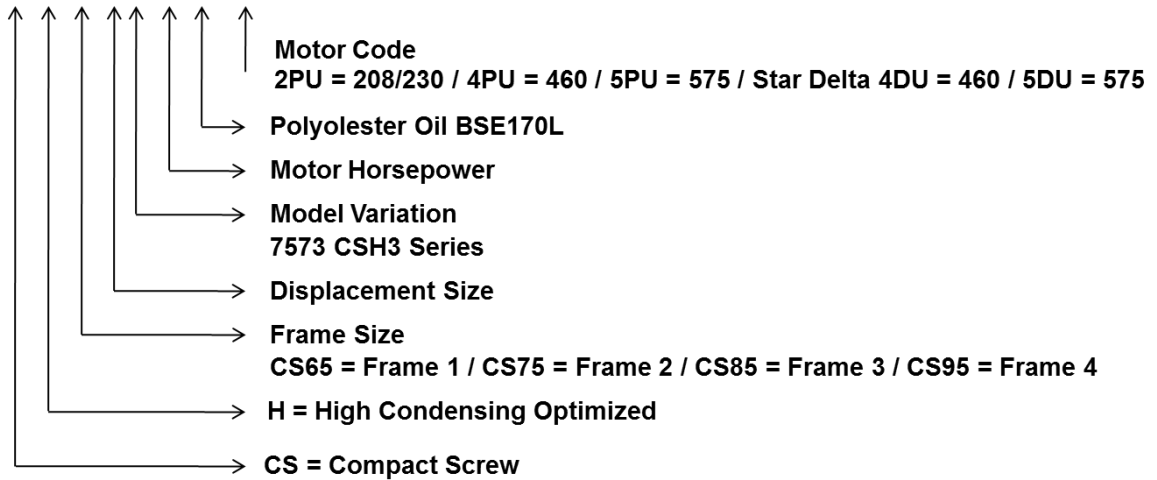


COMPRESSOR MODEL NOMENCLATURE



BITZER CSH and CSW Nomenclature

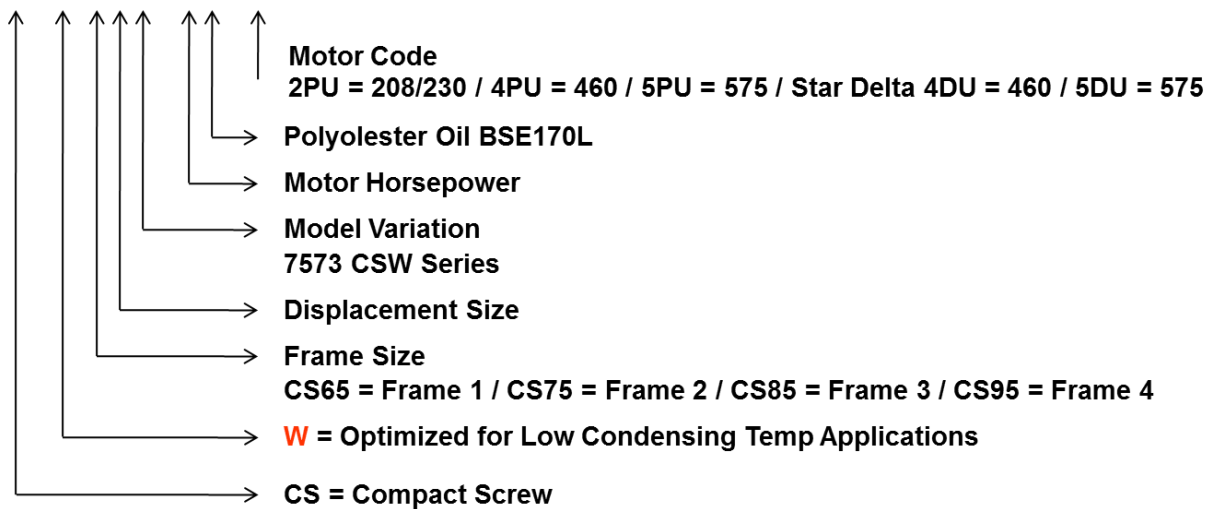
CSH7573-70Y-4PU



“Y” after the 11th Digit is Oil Type (when required)

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

CSW7573-70Y-4PU



York YCAS and YCWS to BITZER CS Overview

To aid in the conversion from a York DXS Horizontal Screw Compressor used on the YCAS and YCWS Chillers to a BITZER CS Screw Compressor the following information has been assembled.

Due to the various vintages with these 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 York screw compressor and install a BITZER screw compressor.

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

York YCAS and YCWS Chiller model numbers with respective compressor sizes can be found on pages 4 thru 6.

The suction and discharge connections are different between the DXS series and the BITZER compressors. The York screw has the valves located on the ends of the compressor for both the suction and 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 external 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.

York DXS series compressors require two identical external oil separators which will also be required to be removed. BITZER CS series compressors feature an integral flanged on oil separator.

York YCAS and YCWS chillers may also have economizer circuits on each compressor. Depending on the required capacity required, when selecting the BITZER replacement compressor, these economizer circuits including the heat exchangers can also be removed.

Capacity control slightly differs between the two compressors as the York DXS compressors feature a 3 way proportional capacity control valve regulated via pressure control while the BITZER has (4) flanged solenoid coils for capacity control.

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 York DXS compressors feature a motor protection module which provides temperature protection as well as phase to phase current imbalance, overcurrent, under current and phase rotation. The module is mounted in the control panel.

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 SE-E1 electronic module is already installed inside of the terminal box is pre-wired. Module power and control circuit will need to be hooked into the module.

The last thing that needs to be checked is starting. In applications where reduced voltage starting is used the York chillers 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

York Dimensions			
Model	Length	Height	Width
DXS112			
DXS124			
DXS136			
DXS145			
Without Service Valves			

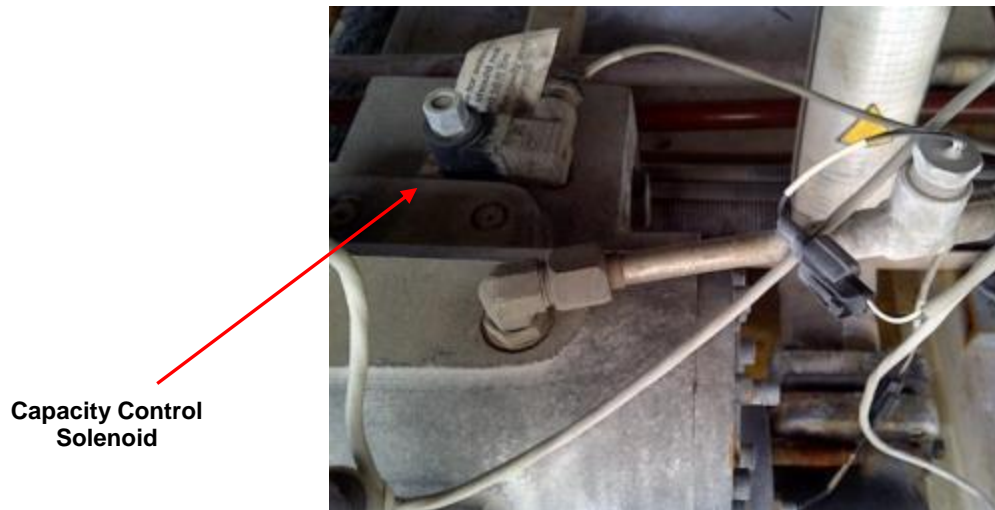
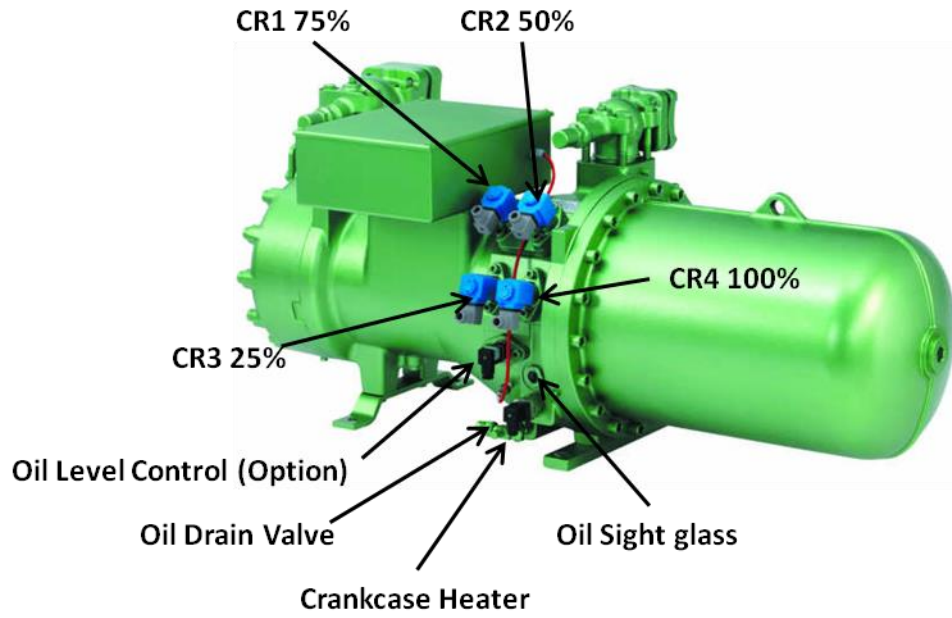
Bitzer CSH Dimensions			
Model	Length	Height	Width
CSH7563-80	53"	23"	22"
CSH7573-90	53"	23"	22"
CSH8553-110	60"	28"	27"
CSH8563-125	60"	28"	27"
With Service Valves			

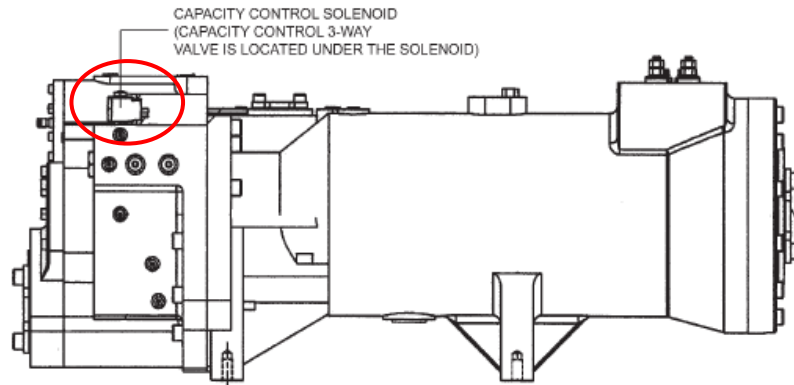
York Model	Oil Charge (Separators)	Oil Type R22
DXS112		York "L" POE Oil
DXS124		
DXS136		
DXS145		

CSH / CSW Model	Oil Charge (Gallons)	Oil Type R22
CSH6553-50	2.51	CPI 4214-320 or B320SH
CSH6563-60	2.51	
CSH7553-70	3.96	
CSH7563-80	3.96	
CSH7573-90	3.96	
CSW6583-50	2.64	
CSW6593-60	2.64	
CSW7573-70	3.96	

Capacity Control

Bitzer Screw Compressors Frame 2 Shown



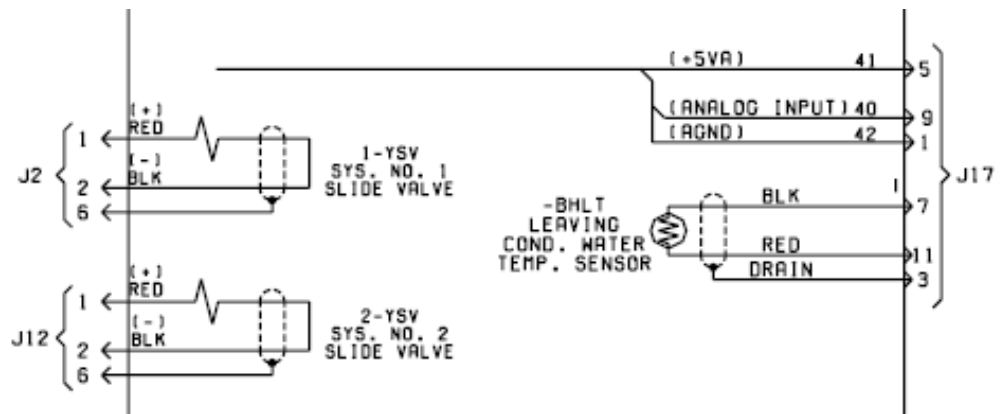


An option for capacity control would be to install a “stand alone” controller. See BITZER Technical Bulletin TB-0039 for further details.

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

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

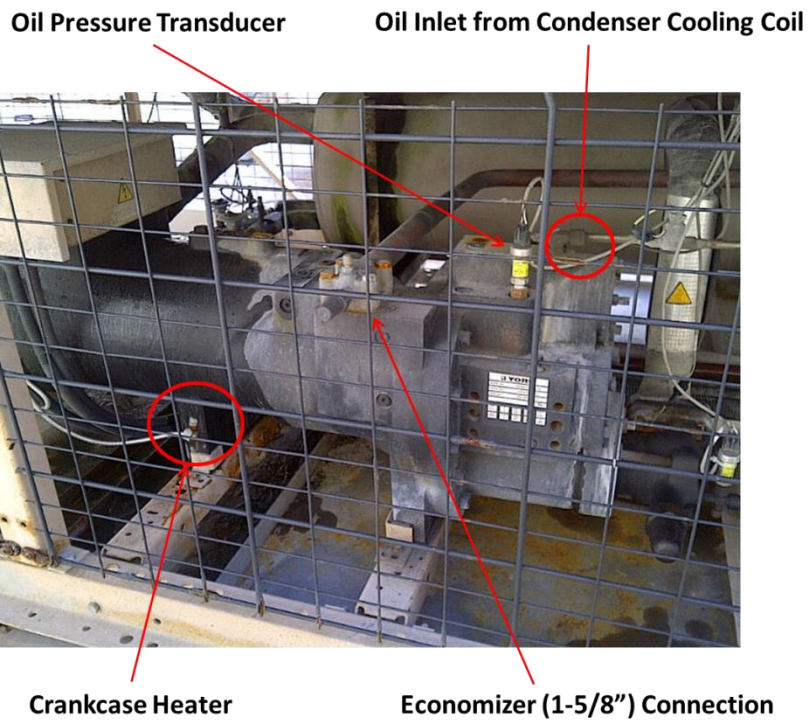
Below is a standard diagram of the wiring for the York DXS capacity control.

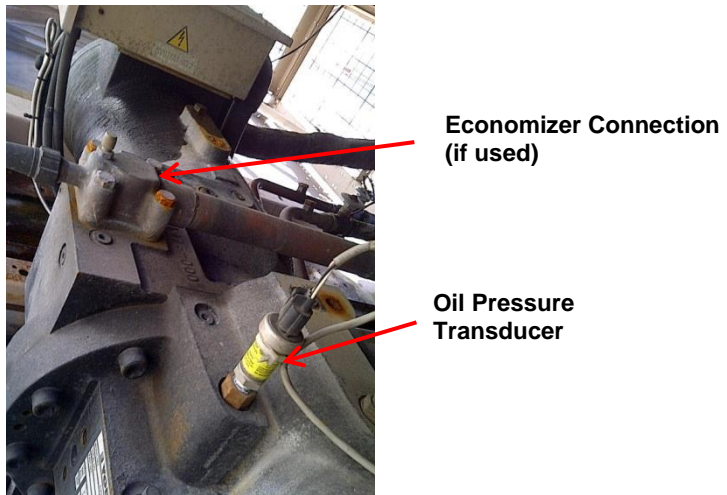
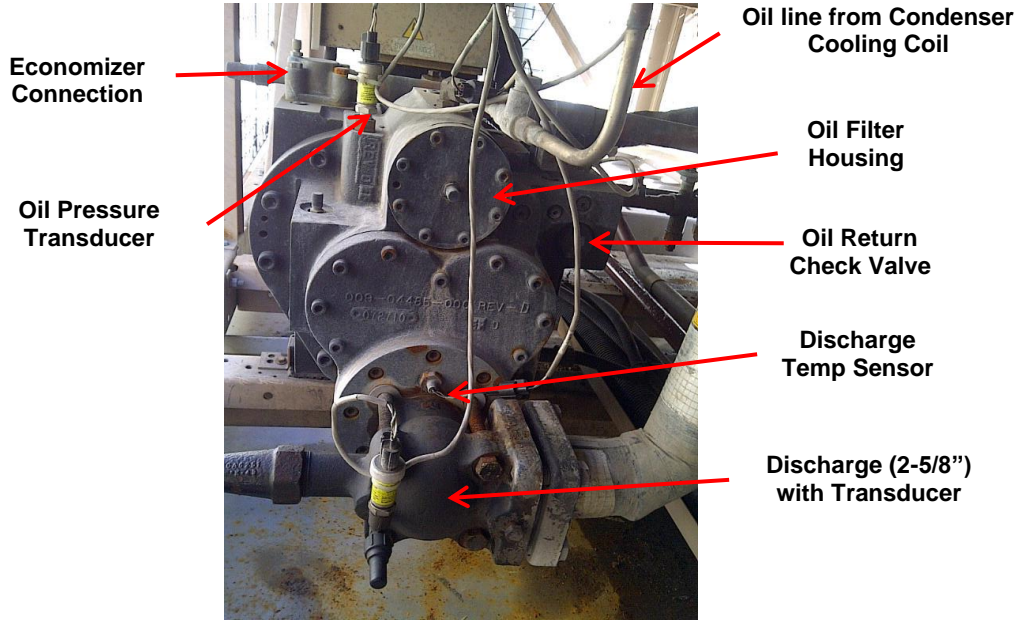


For Infinite Capacity control on the BITZER CS compressor, 2 solenoids will be used. #4 solenoid is for 100% while #3 is for minimum or 25%, however, depending on actual operating conditions, the BITZER CS screw compressor may be limited to 50% capacity where #2 coil would be used as the minimum capacity.

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

Component Pictures and Layout

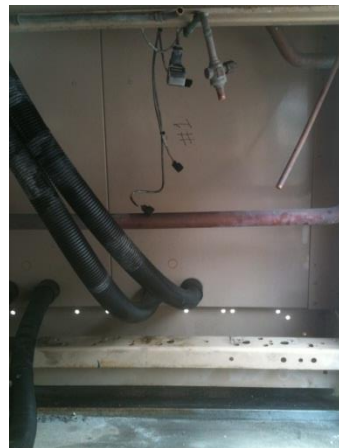




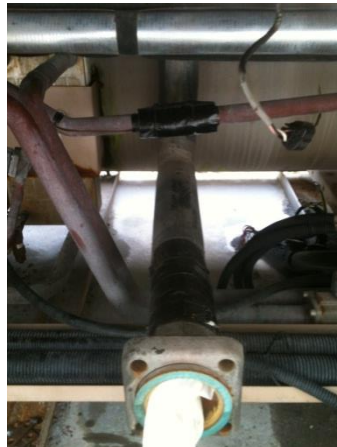
Preparing for Removal



**Preparing for External Oil Separator Removal
Including removal of the oil line piping and
ball valves**



Oil Separators Removed



**DXS45 compressors removed with
existing suction and discharge
piping shown**



**Economizer Heat Exchanger,
Thermal Expansion
and Solenoid Valve Removal**



Base Frame cleaned and prepped for installation of BITZER CSH screws

BITZER Installation



Added "U" Channel for Mounting of the CSH Bitzer Screw Compressor

BITZER Terminal Box with SE-E1 Electronic Module

Connector strip can be used to connect the crankcase heater as well as other connections.

SE-E1 Standard Electronic Module
(110/220 volt Standard)

Oil Temperature Sensor

T1 Motor Sensor
(brown wire)

- L1

- L2

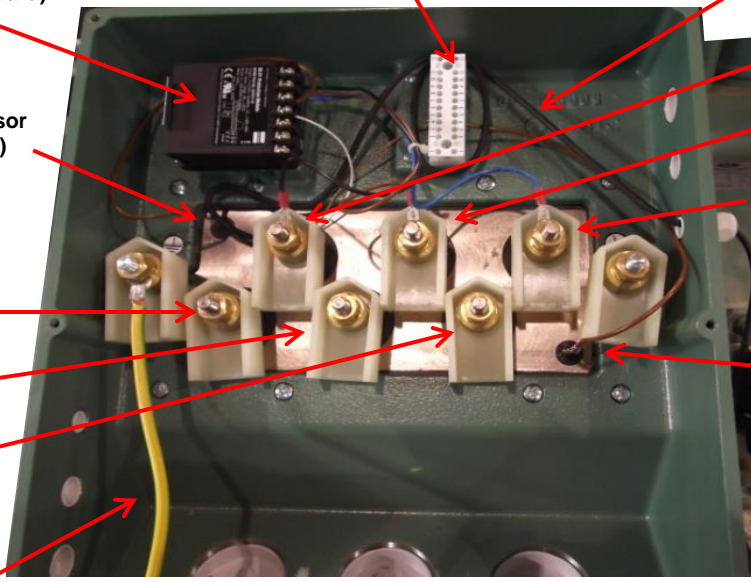
- L3

- L7

- L8

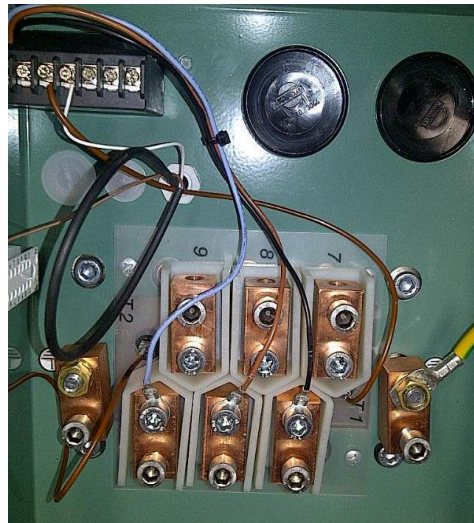
- L9

T2 Motor Sensor
(brown wire)



Terminal Box Cover Ground Strap

The SE-E1 electronic module is pre-wired inside the terminal box as shown above. Module power is connected to L and N, Control circuit is wired to 11 and 14. Motor PTC sensors T1 and T2 are already connected as well as the oil temperature sensor. Phase connection leads from the module are connected to L1 (black), L2 (brown) and L3 (blue)

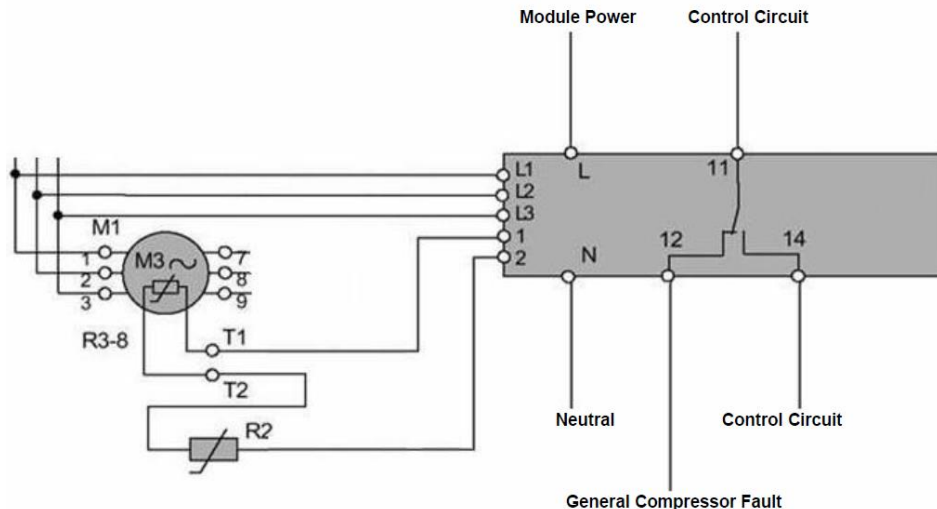


CS75 Series Terminal Box Shown



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".

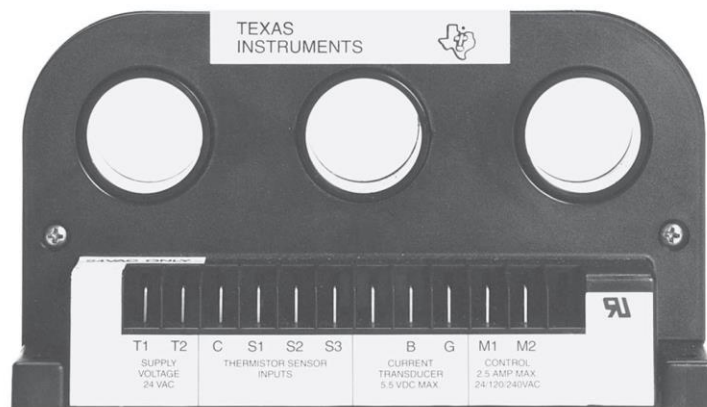
Power connections are "L and N".

The existing York protection module was removed.

T1, T2, M1 and M2 were used to connect the BITZER SE-E1 electronic module.

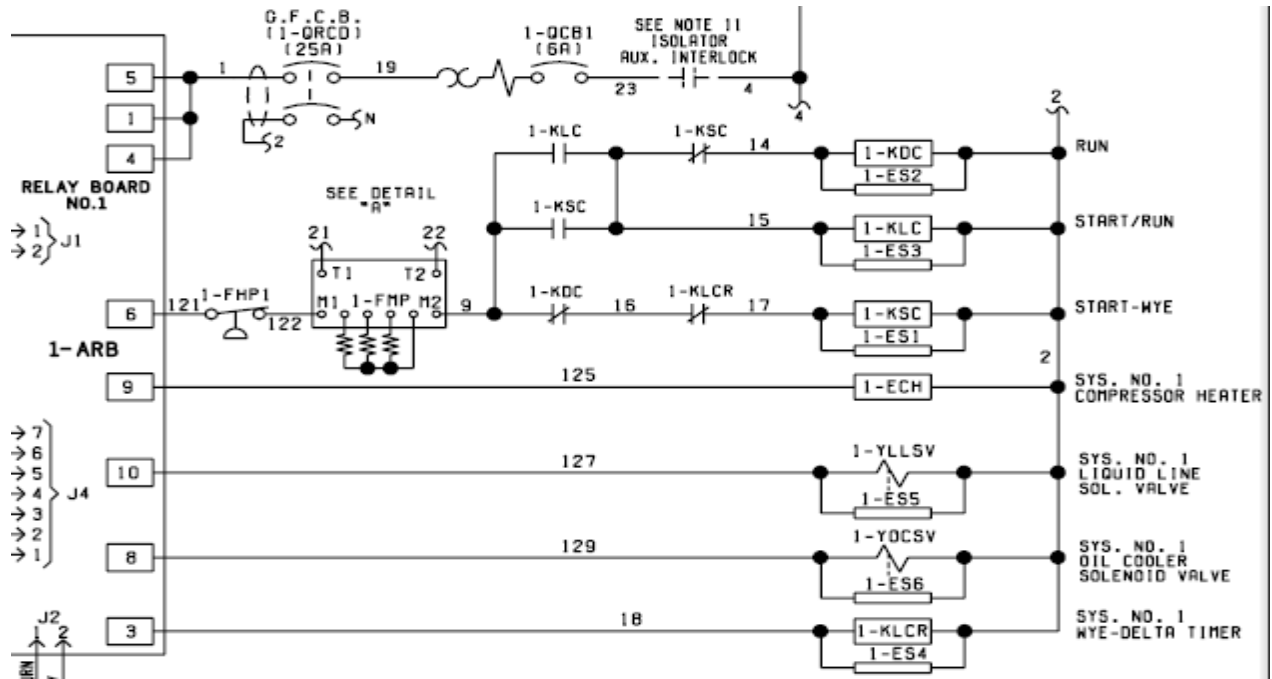
The normal wiring to the York DXS crankcase heater was re-used to connect the BITZER 110 volt crankcase heater. The connection point was identified as #1 on the relay board.

Typical York 2ACE Module

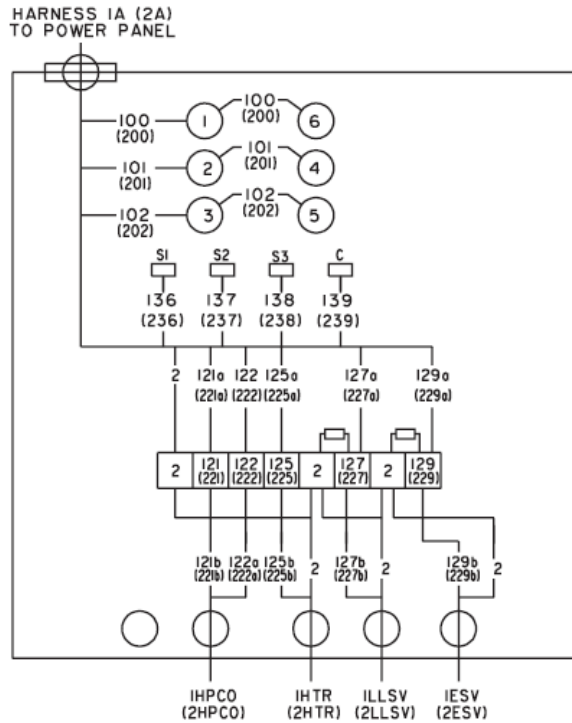


- T1 / T2 = Supply Voltage 24 VAC
- C / S1 / S2 / S3 = Thermistor Sensor Inputs
- B / G = Current Transducer 5.5 VDC Max
- M1 / M2 = Control

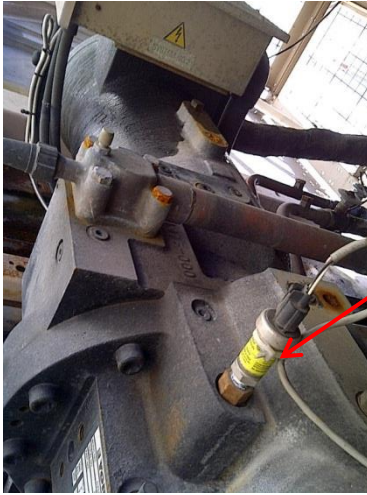
Typical Wye-Delta Start Set-up on a York DXS Compressor



SYSTEM 1 & 2 ACROSS THE LINE
1 POWER HARNESS UNITS



Oil pressure safety is monitored as the difference between suction and discharge pressures.



Oil Pressure Transducer



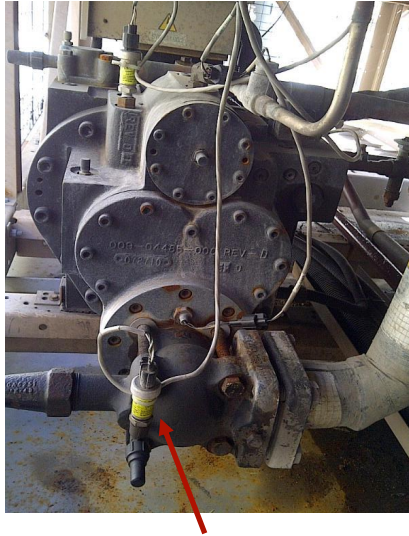
The existing oil pressure transducer was installed into the CS discharge pressure port. This transducer is connected to "J13" on the microprocessor board.

The existing discharge gas temperature sensor was attached to the BITZER discharge piping. The sensor is connected to "J8".



Discharge Temp Sensor

The existing suction and discharge pressure transducers were re-used on the BITZER compressor. These are connected to "J13 and J15".



Discharge Pressure Transducer



Suction Pressure Transducer

Piping

After the York 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.

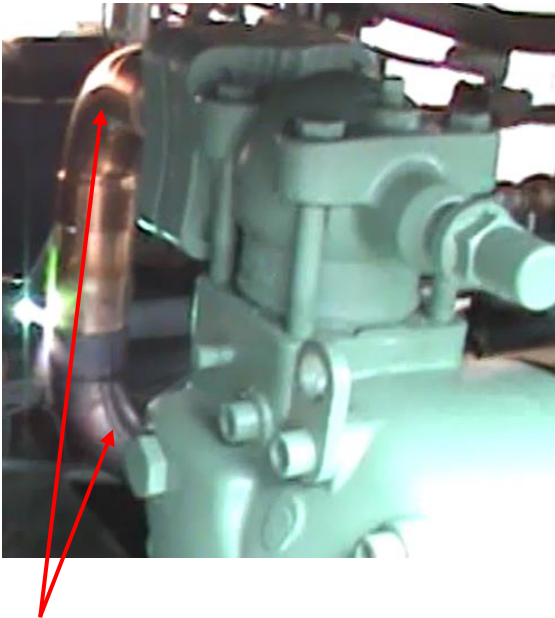
There will actually be less piping resulting in lower possibility of refrigerant leakage once the BITZER is installed and piped in.

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) 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.

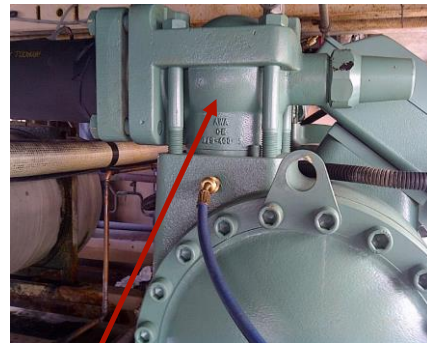
The following pictures show a replacement. Note, not all applications may require the same type of mounting and piping layout.

Added "U" Channel for Mounting of the CSH Bitzer Screw Compressor

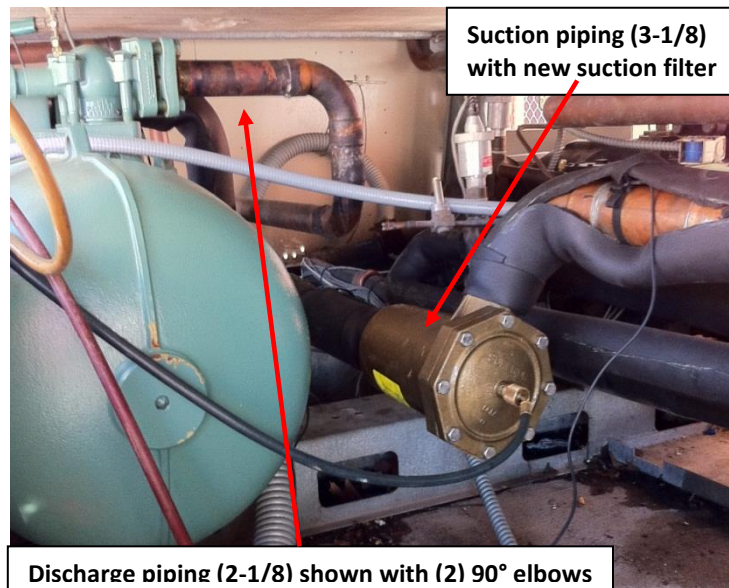


Suction connection shown with two new elbows.

Discharge connection similar to suction.



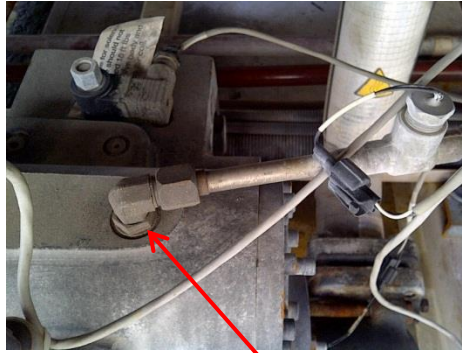
Suction Service Valve located on Top of Compressor



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.

Oil Cooling

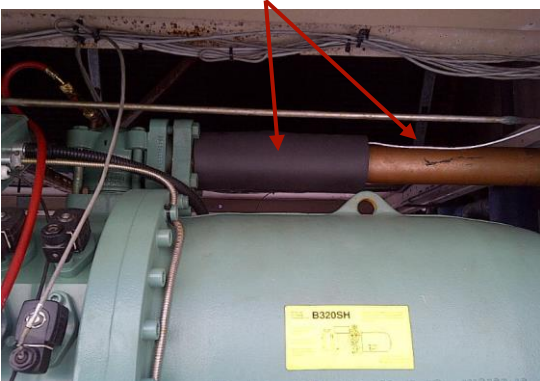
The York DXS compressors have oil cooling which is provided by routing oil from the oil separator through several of the top rows of the condenser coils back to the compressor.



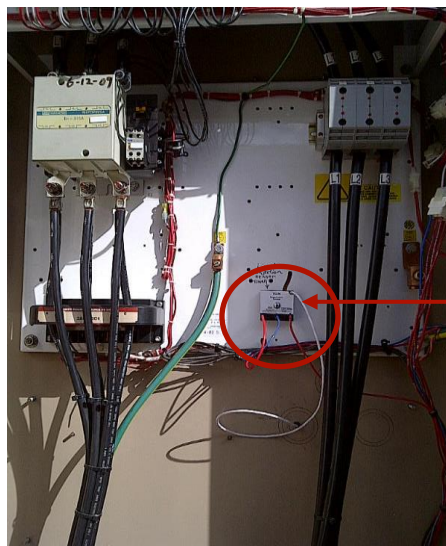
Oil Inlet from Condenser Cooling Coil

If oil cooling is required on the BITZER CS series screw compressors, most applications will apply liquid injection oil cooling. Consult BITZER Application Engineering guidelines to determine if any additional cooling will be required.

CSH Liquid Injection Controller Sensor Mounted on Discharge Piping



Existing Liquid Injection Supply Piping Re-used



CSH Liquid Injection Controller Mounted in Control Panel

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

Contact Application Engineering for assistance concerning the capacity control

B320SH Polyolester Oil	
Unit of Measurement	Part #
1 gallon	793-3320-01
5 gallon	793-3320-34

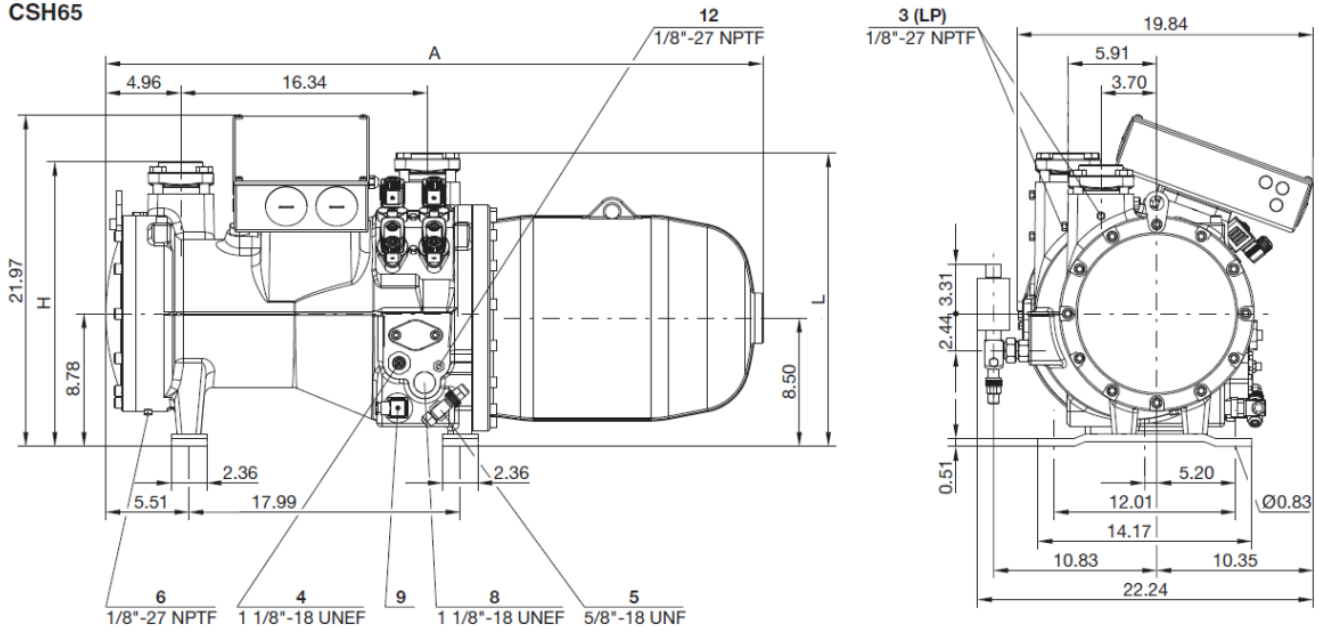
BSE 170 Polyolester Oil	
Unit of Measurement	Part #
1 gallon	793-1170-34
5 gallon	793-3170-34

BSE 170 L Polyolester Oil	
	Part #
1 liter	915118-06
5 liter	915118-01
10 liter	915118-02

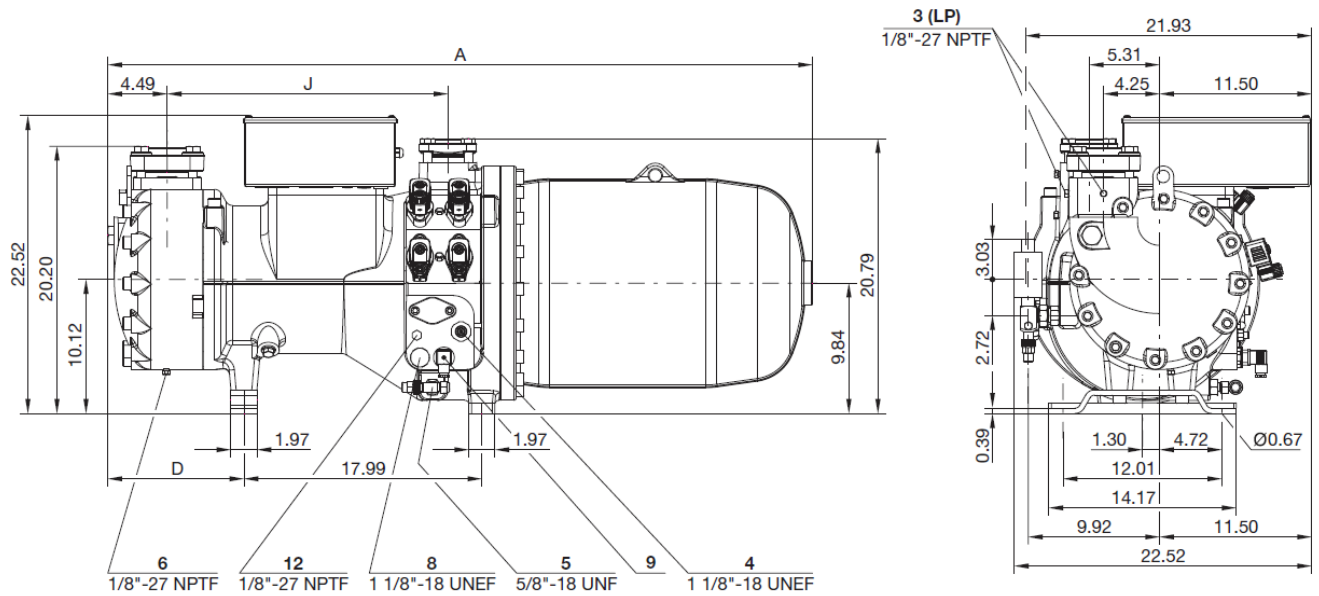
BITZER Oils for CS Series		
Model	Refrigerant	Oil
CSH	R22	B320SH
	R134a/R407C/R404A/R507A	BSE170
CSW	R22	B320SH
	R134a	BSE170L

BITZER CSH Screw Compressor Dimensional Data

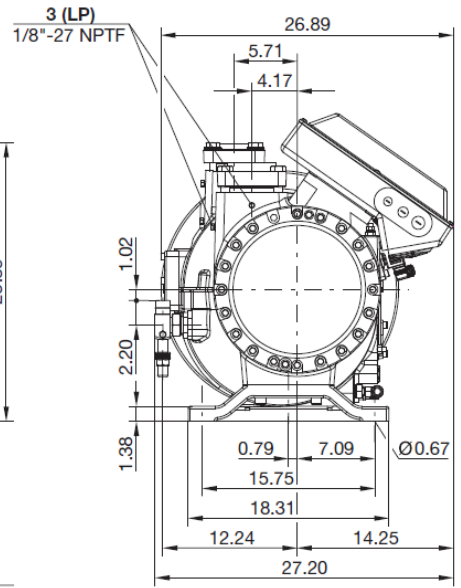
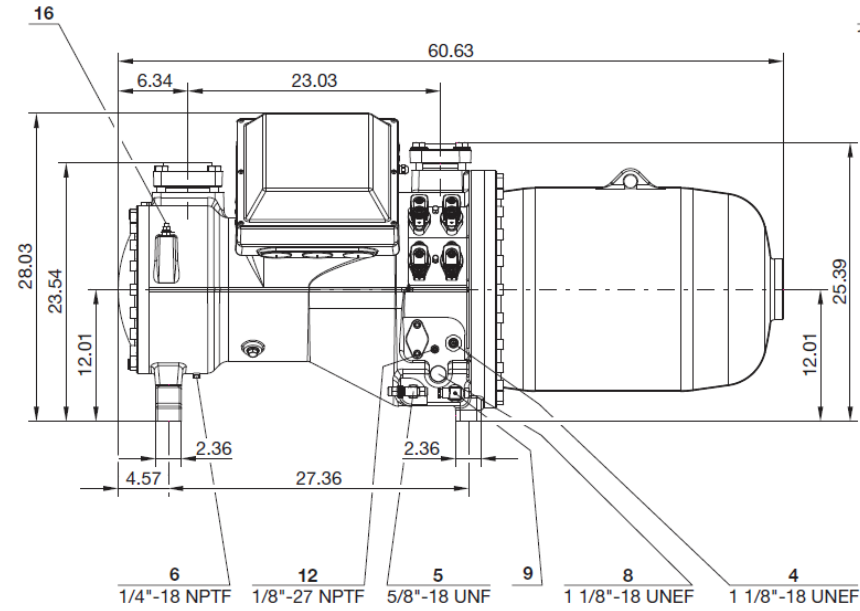
CSH65



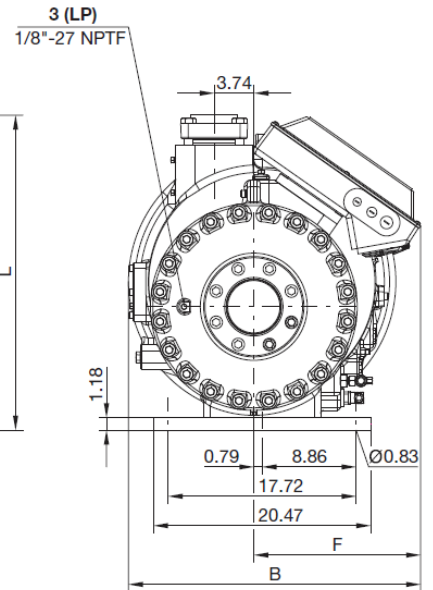
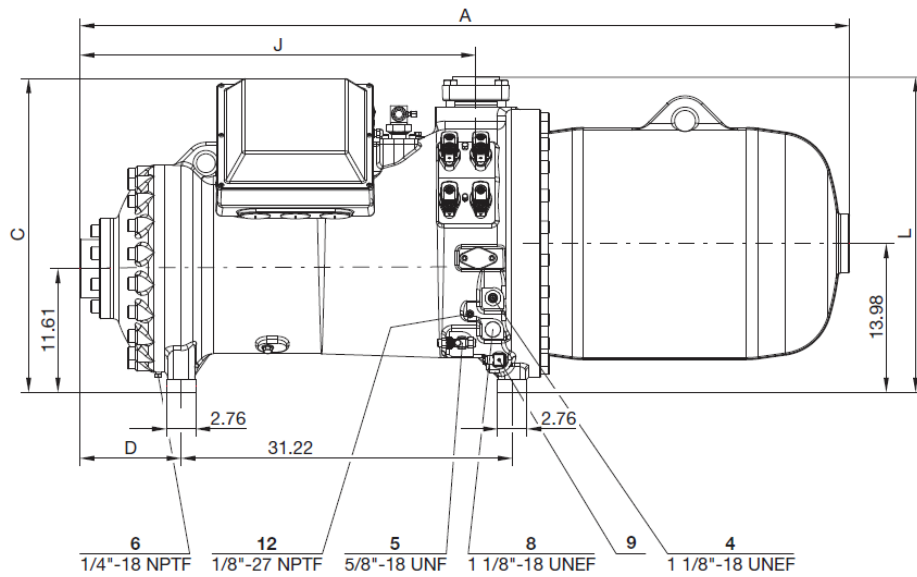
CSH75



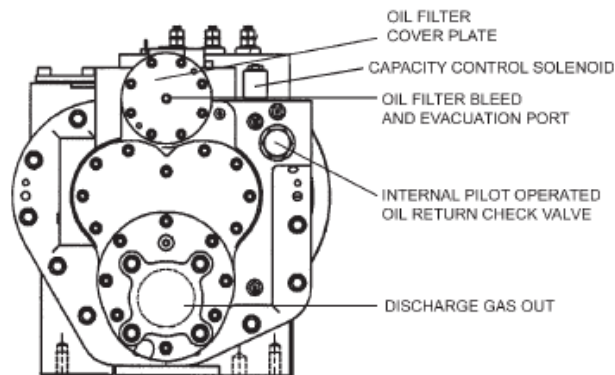
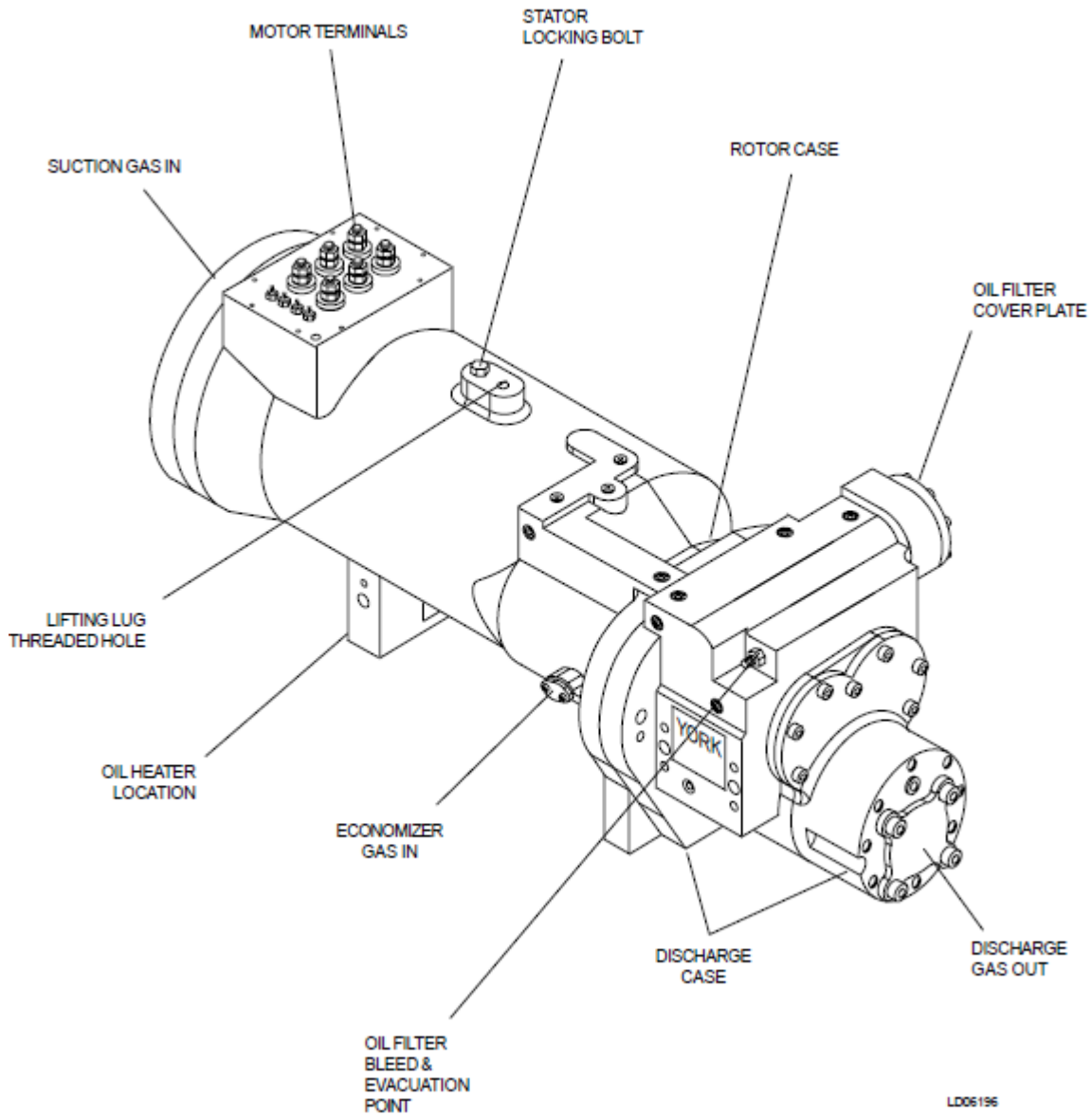
CSH85



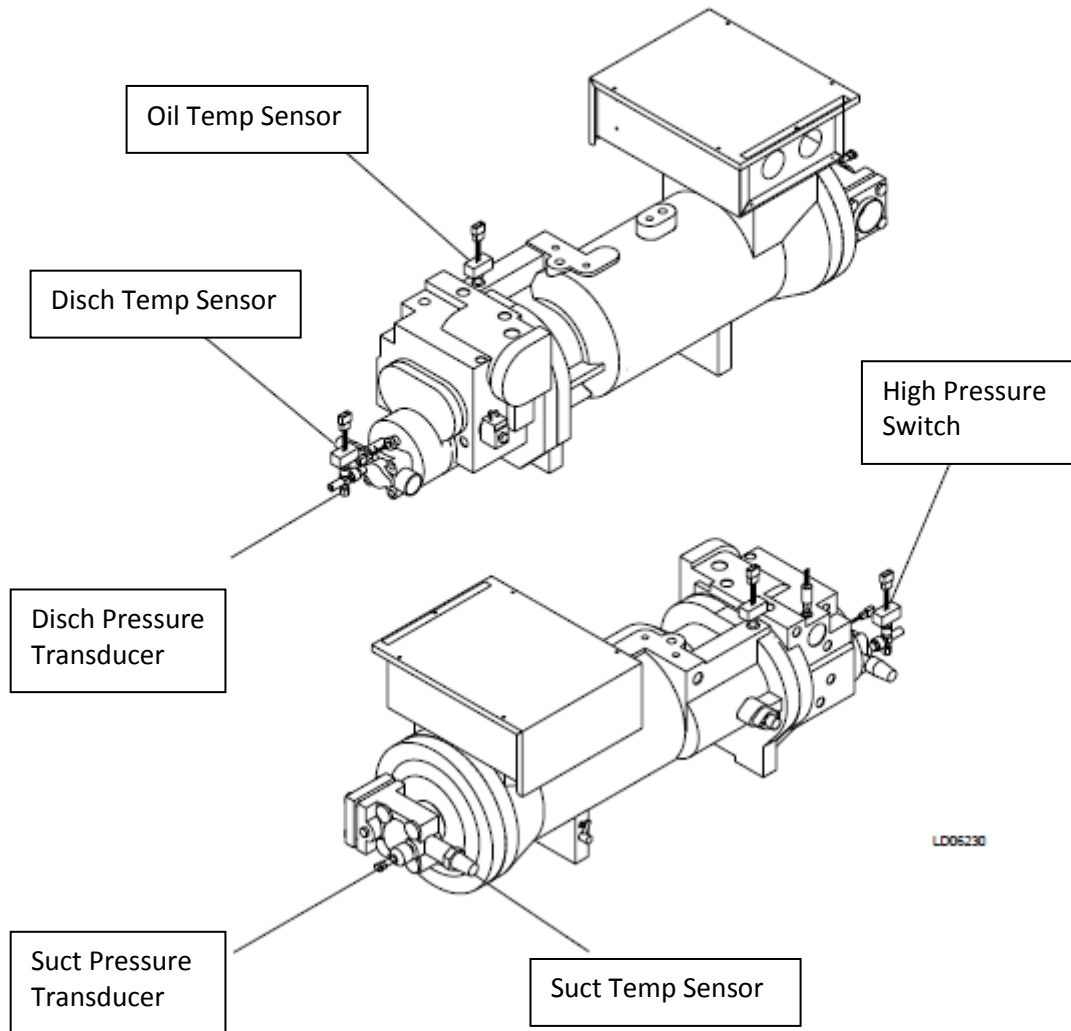
CSH95



York Basic Component Data



TRANSDUCERS AND TEMPERATURE SENSORS (CONT'D)



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: _____
