
Carlyle 5H Series to BITZER CS Screw Compressors

**Competitive Replacement
Guideline**

XR-0025-01 04/13



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

Scope of Delivery BITZER CS and 5H Open Drive	2
Capacity Comparison	3
CFH and Motor Horsepower Comparison	4
Model Number Nomenclature	5,6
Overview	7
Capacity Control	9,10
BITZER CS Terminal Box Wiring and Module Wiring	11,12
Dimensions and Oil Types	13
Connection Comparisons and Weights	14
Oil Types	15
5H Series Assembly Drawings	16,17
CS Drawings	18,19
Competitive Replacement Request Form	21



Scope of Standard Delivery (as supplied by Manufacturer)	Bitzer CSH	5H Series
Capacity control system : 4-Steps or Infinite Continuous (See Below)	No Modification Req	Option
25% to 100% Capacity Control	●	●
Conversion Kit Stepped to Stepless Control	Not Required	N/A
4 Step Capacity Control	●	No
Infinite Capacity Control	●	N/A
Solenoid coils for capacity control	●	N/A
Volume ratio Vi, Option Vi=2.2, 2.6, 3.0, 3.5	Built In	N/A
Discharge Check Valve	● Internal	● Internal
Discharge Check Valve 5H120 and 5H126	N/A	Δ Required
Suction-Discharge Manifold to mount service valves (5H60-66/5H120-126)	Not Required	Δ Required
Suction Service Valve	●	Δ
Discharge Service Valve	●	Δ
Suction service valve location (*except 5H40-46 on end)	Top	*Top
Discharge service valve location	Top	Top
Oil Charge	●	Δ (6/98)
Electronic Module (Rotation)	●	N/A
Electronic Module (Temperature)	●	N/A
PTC120 type temperature sensor	●	N/A
Screw in Discharge temperature sensor	● (251F)	N/A
IP-54 Terminal box	●	N/A
Crankcase oil heater	●	Δ
Liquid injection oil cooling port	●	N/A
Economizer port	●	N/A
Oil cooling connection	●	●
Oil drain valve	●	N/A
Oil level switch	Δ	N/A
Lubrication Oil Control	Not Required	Δ
Oil filter different pressure (ΔP) protector switch	Not Required	Δ External
Oil Filter Package	Not Required	Δ
Safety Relief Valve (except 5H120-126 external)	● Internal	● Internal
Slide fit motor	●	No
Starting type PWS	●	N/A
Starting type Start Delta	Δ	N/A
Jumper bars for DOL starting	●	N/A
Rubber mounting pads	●	No
Oil Separator	Intregal	Δ Requires External
● (Standard) Δ (Option) N/A Not Applicable		

Carlyle 5H Series

Recommended Replacement Chart			
R22 Carlyle 5H to Bitzer CSH			
5H Model	60 Hz Tons @45/130	CSH Series	60 Hz Tons @45/130
5H40	39.7	6553-50	42
5H46	48.9	6563-60	53
5H60	59.3	7553-70	59
5H66	73.6	7563-80	68
5H80	79.0	7573-90	83
5H86	98.1	8553-110	99
5H120	118.6	8563-125	112
5H126	147.2	8573-140	135
Rated Capacity Based @45°sst/130°cdt/15°sh/15°sc			

Recommended Replacement Chart			
R22 Carlyle 5H to Bitzer CSH			
5H Model	60 Hz Tons @40/105	CSH Series	60 Hz Tons @40/105
5H40	42.7	6553-50	42
5H46	52.6	6563-60	52
5H60	63.7	7553-70	61
5H66	79.1	7563-80	71
5H80	84.9	7573-90	85
5H86	105.4	8553-110	102
5H120	127.5	8563-125	117
5H126	158.2	8573-140	137
Rated Capacity Based @40°sst/105°cdt/15°sh/0°sc			

Recommended Replacement Chart			
R22 Carlyle 5H to Bitzer CSH / CSW			
5H Model	60 Hz Tons @40/105	CSH/CSW	60 Hz Tons @40/105
5H40	42.7	CSH6553-50	42
5H46	52.6	CSH6563-60	52
5H60	63.7	CSW6583-50	64
5H66	79.1	CSW6593-60	72
5H80	84.9	CSW7573-70	88
5H86	105.4	CSW7583-80	101
5H120	127.5	CSW7593-90	115
5H126	158.2	CSW8583-125	156
Rated Capacity Based @40°sst/105°cdt/15°sh/0°sc			

Recommended Replacement Chart			
R407C Carlyle 5H to Bitzer CSH / CSW			
5H Model	60 Hz Tons @40/105	CSH/CSW	60 Hz Tons @40/105
5H40	38.4	CSH6553-50Y	42
5H46	47.5	CSH6563-60Y	52
5H60	57.6	CSW6583-50Y	59
5H66	71.4	CSW6593-60Y	71
5H80	76.8	CSW7573-70Y	83
5H86	95.3	CSW7583-80Y	94
5H120	115	CSW7593-90Y	107
5H126	143	CSW8583-125Y	148
Rated Capacity Based @40°sst/105°cdt/15°sh/0°sc			

5H Series Data						
5H Model	60Hz CFM @1750	60Hz CFH @1750	Nominal HP	Cyl	60 Hz Tons @40/105	60 Hz Tons @45/130
5H40	92.4	5544	40	4	42.7	39.7
5H46	115.5	6930	60	4	52.6	48.9
5H60	138.4	8304	60	6	63.7	59.3
5H66	173.0	10380	75	6	79.1	73.6
5H80	184.7	11082	75	8	84.9	79.0
5H86	231.0	13860	100	8	105.4	98.1
5H120	276.8	16608	125	12	127.5	118.6
5H126	346.0	20760	150	12	158.2	147.2

Rated Capacity Based @40°sst /105°cdt/15°sh/0°sc and 45°sst/130°cdt/15°sh/15°sc with R22

CSH Series	Nominal HP
CSH6553-50	50
CSH6563-60	60
CSH7553-70	70
CSH7563-80	80
CSH7573-90	90
CSH8553-110	110
CSH8563-125	125
CSH8573-140	140

CSW Series	Nominal HP
CSW6583-50Y	50
CSW6593-60Y	60
CSW7573-70Y	70
CSW7583-80Y	80
CSW7593-90Y	90
CSW8573-110Y	110
CSW8583-125Y	125

Model Number Nomenclature

5H120A219AA Nomenclature

5 = Open Drive Compressor

H = 3-1/4" Diameter Bore

12 = 12
Cylinder

8 = 8 Cylinder

6 = 6 Cylinder

4 = 4 Cylinder

0 = Original Design 2-3/4" Stroke

A = Service (reman) Cast Iron

B = Private Brand

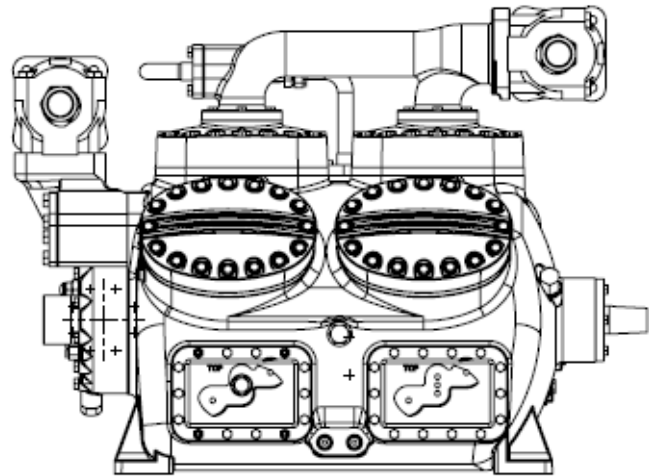
C = Standard
Model

S = Service (New)

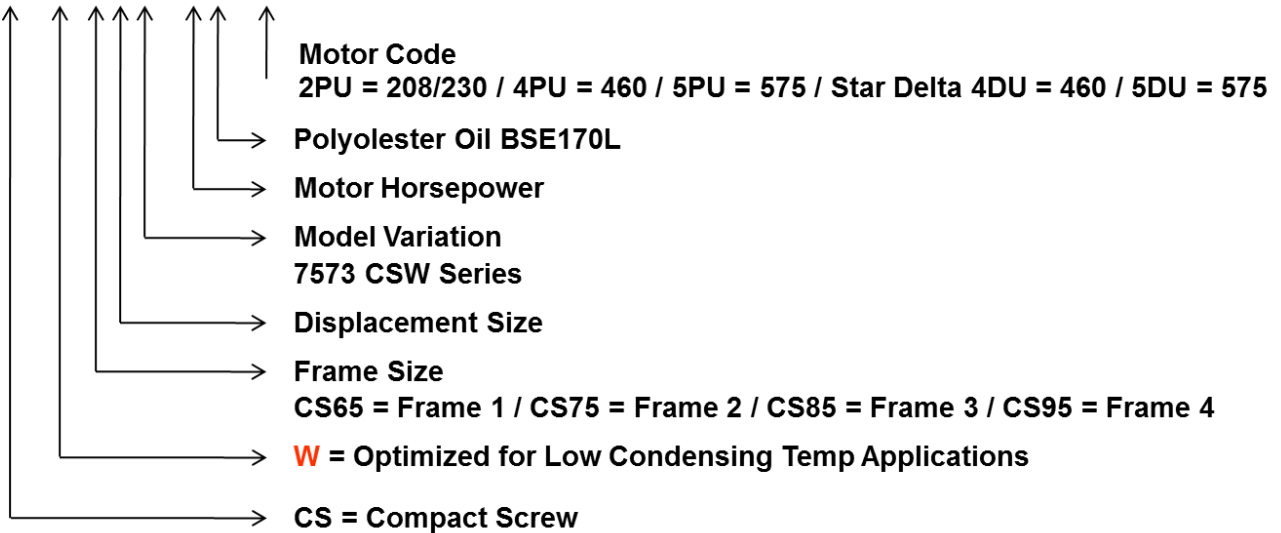
219 = Three Digits Sequential as Assigned

A = Service Models Only

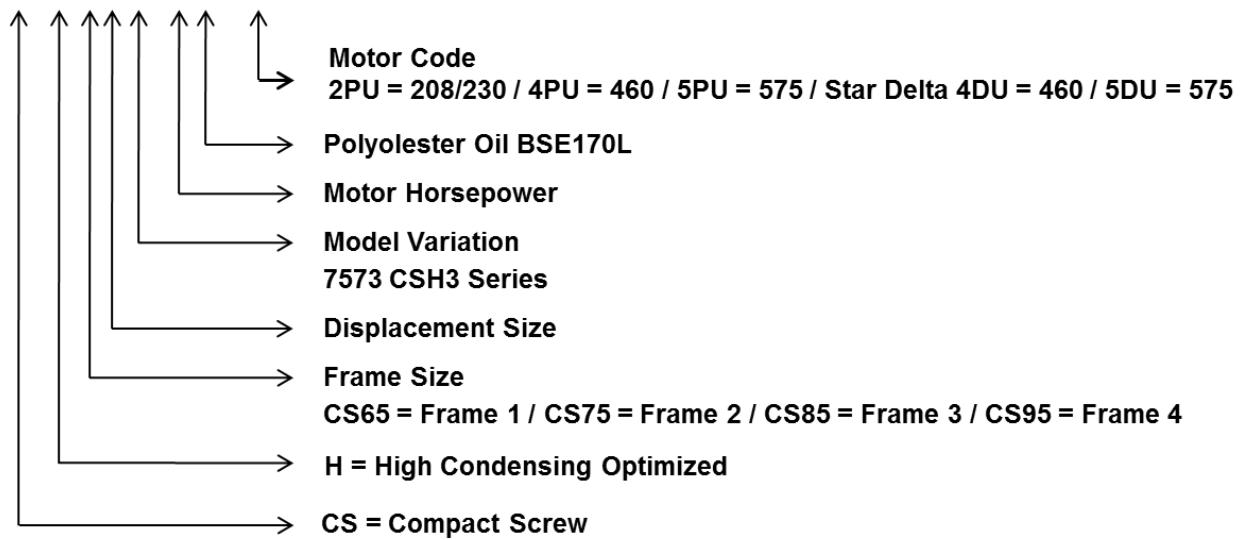
A = Service Models Only



CSW7573-70Y-4PU



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

Overview

To aid in the conversion from a Carlyle 5H Open Drive Reciprocating compressor to a BITZER CS Screw compressor the following information has been assembled.

For replacement compressor selection a capacity comparison of each compressor is given on page #3 for existing R22 and R407C systems and dimensional information is given on page #16-19.

The suction and discharge connection sizes are different between the Carlyle and the BITZER CS compressors.

Size information is given on page #14.

The Carlyle 5H series compressors have the suction and discharge connection located on the tops of the compressors with the exception of the 5H40 and 5H46 series where the suction connection is located on the pump end of the compressor.

The 5H120 and 5H126 have require a discharge manifold to mount the service valve onto the compressor.

The 5H60 and 5H66 require a suction valve adapter to mount the service valve.

The BITZER CS compressors have the service valves located on the top of the compressor for the CS65, 75 and 85 series.

The suction connection is located on the ends for the CSW9563-140Y and CSW9573-160Y.

The suction and discharge isolation valves (if used) can be removed from the existing piping on the Carlyle compressor. The BITZER CS compressors are supplied with suction and discharge service valves.

All BITZER CS compressors are supplied with discharge check valves located under the discharge service valve.

If external check valves are being utilized on the 5H compressors, these should be removed.

The weights of the compressors are listed on page #14.

The control wiring for these compressors also has some differences.

The Carlyle 5H series do not have “on board” electronic modules. Any protection devices which are optional devices on these compressors should be considered to verify if they can be re-used on the BITZER CS compressors. Low pressure, high pressure cutouts can be re-used providing they are in good working condition and adjusted per actual operating parameters.

The Carlyle 5H compressors may utilize an Automatic Pumpdown Control or a Single Pumpout Control which is used to minimize liquid refrigerant remaining in the compressor’s crankcase during idle periods. If the existing compressor is using an Automatic pumpdown control, this should not be used on the BITZER CS screw compressor.

If the existing compressor is using a Single Pumpout circuit, this can be re-used on the BITZER CS screw compressor providing the cut out set point is not in a vacuum.

All BITZER CS screw compressors are supplied with an electronic module pre-wired inside of the terminal box.

The BITZER electronic module provides oil temperature and motor winding temperature protection as well as phase rotation protection. The standard module is a dual voltage 110/220 volt power.

On the BITZER CS compressors the control circuit is wired through terminals 11 & 14 and module power is connected to L & N.

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

The capacity control differs between the Carlyle reciprocating and BITZER screw compressors. A very brief description is as follows:

Capacity Control

The Carlyle 5H series offers a pressure type cylinder unloading. The cylinder unloading mechanism is powered by a compressor force feed lubricating system.

The set point is controlled via an external adjusting stem which is set to the desired suction pressure. There are 3 major components associated with the capacity control; Capacity control valve, Power elements and Valve lifting mechanism.

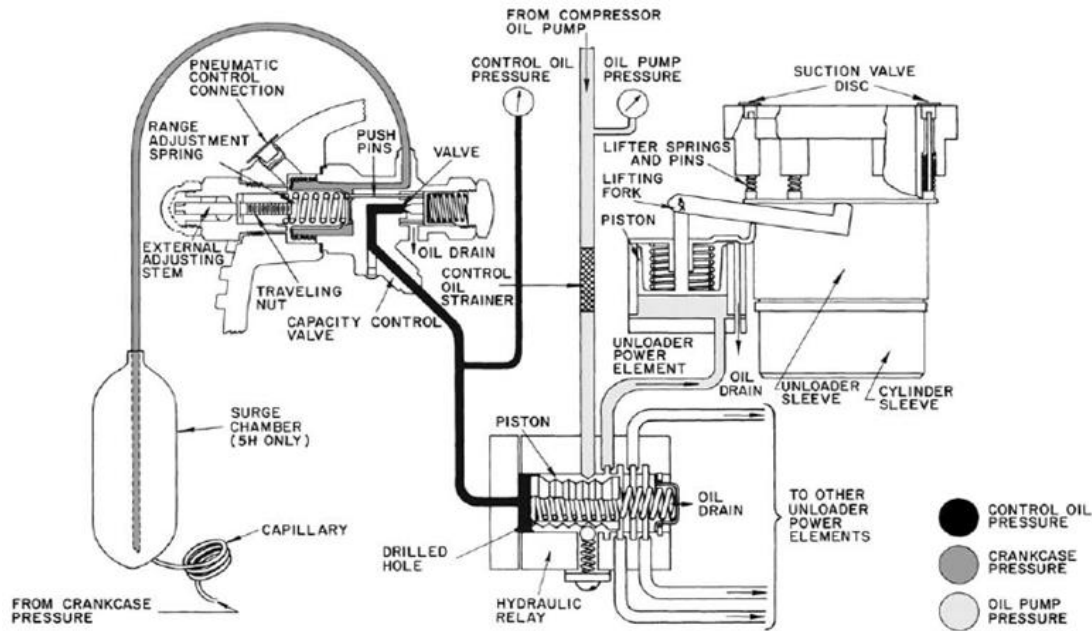


Fig. 7 — Capacity Control — 5F40, 60; 5H40, 46, 60, 66, 80 and 86

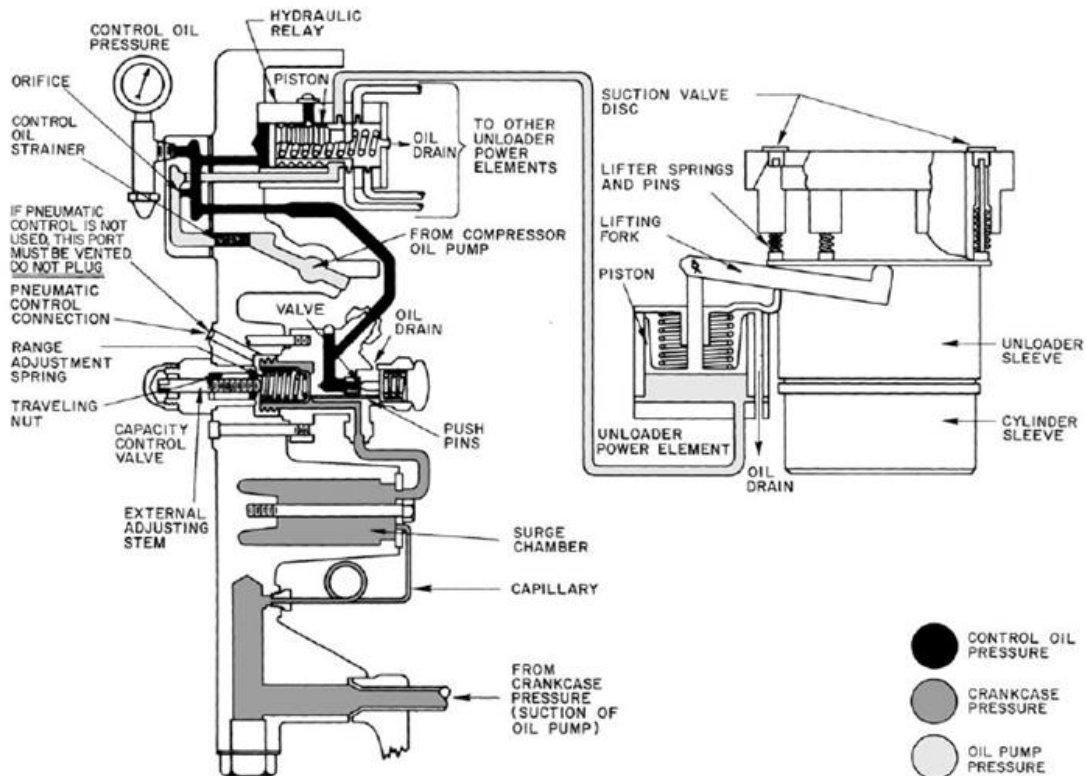


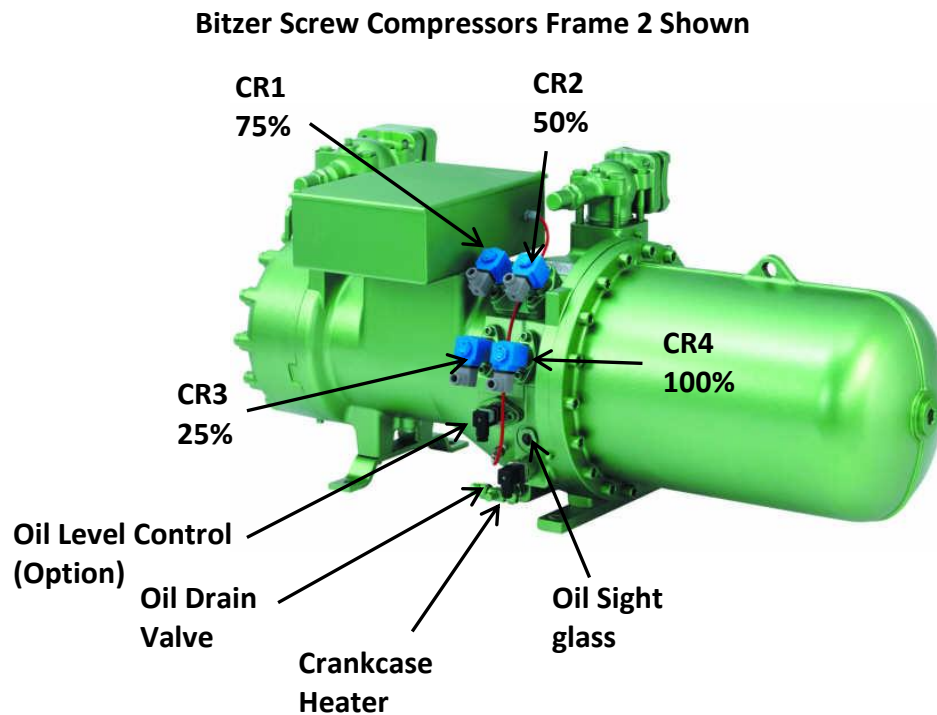
Fig. 8 — Capacity Control — 5H120, 5H126

Capacity Control

The Carlyle 5H series also has optional capacity control via an addition of “Pneumatic Compensation of compressor capacity control” and/or “Electric Solenoid valve capacity control”.

The BITZER CS Series offers Infinite Capacity Control or 4 Step Discreet Capacity Control via four solenoids provided on the compressor.

Either mode of capacity control can be achieved without any modification required when using the BITZER CS compressors.



Capacity Control

For the BITZER CS Compressor Infinite Capacity Control		
Operation	Solenoid 3	Solenoid 4
Start / Stop	Energized	De-energized
Loading	De-energized	Energized
Unloading	Energized	De-energized
Constant Load	De-energized	De-energized

For the BITZER CS Compressor Stepped Control				
Operation	Solenoid 1	Solenoid 2	Solenoid 3	Solenoid 4
100%	De-energized	De-energized	De-energized	Energized
75%	Energized	De-energized	De-energized	De-energized
50%	De-energized	Energized	De-energized	De-energized
25% (Start)	De-energized	De-energized	Energized	De-energized

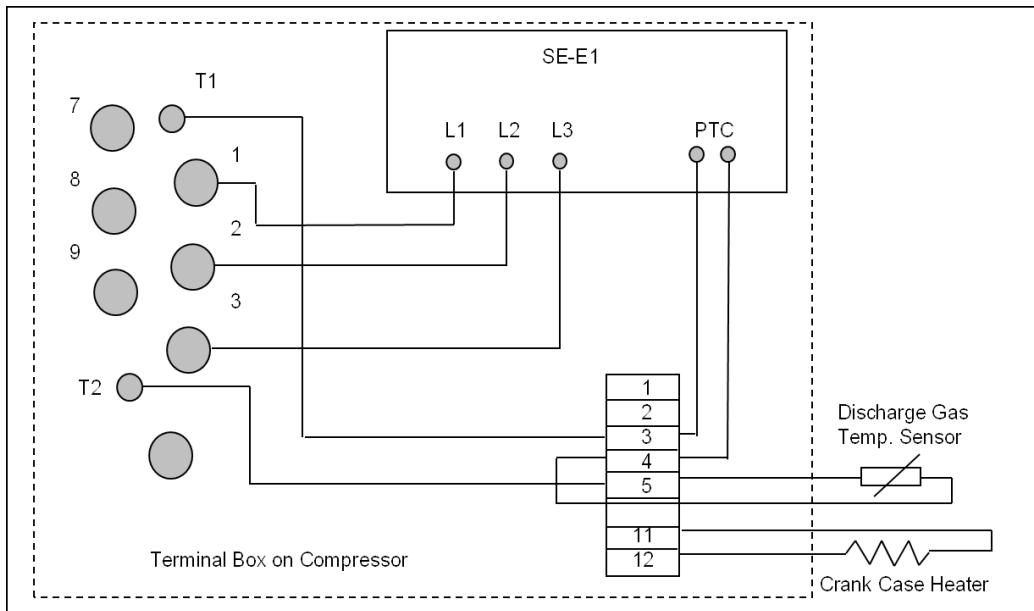
The last thing that needs to be checked is starting.

BITZER CS compressors utilize standard part winding motors on all compressors from 35 horsepower through 140 horsepower. The CS95 series utilize Star - Delta reduced voltage starting.

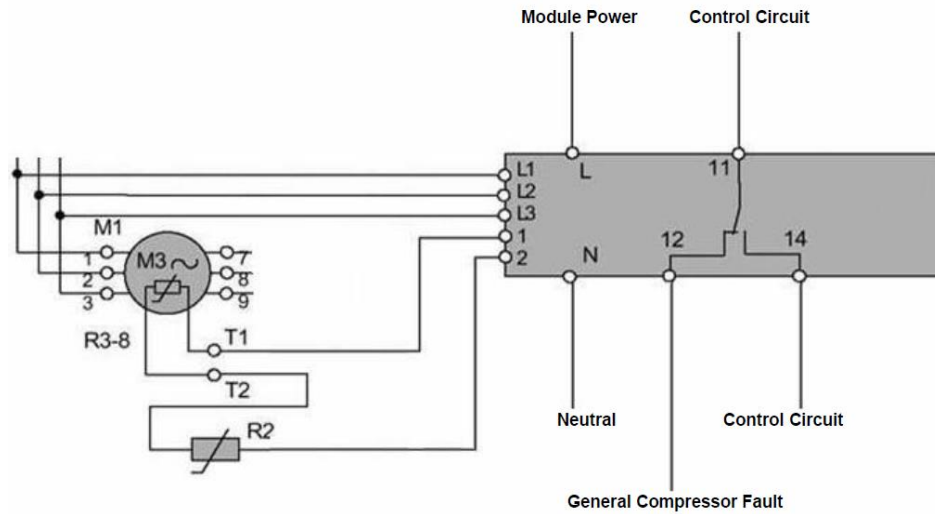
Jumper bars are included for direct on line starting.

The overload relay and the contactors must be checked for proper sizing.

CS Terminal Box Wiring



BITZER CS Electronic Control Module SE-E1



The SE-E1 is a dual voltage 115V / 230V which is supplied standard or 24V AC module as an option. 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 is connected to terminals L and N.

Dimensions and Oil Charges

5H	Length	Height	Width
5H40	30-1/2"	29"	24-1/2"
5H46	30-1/2"	29"	24-1/2"
5H60	31-1/2"	29-7/8"	27-1/4"
5H66	31-1/2"	29-7/8"	27-1/4"
5H80	43-7/8"	32"	24-1/2"
5H86	43-7/8"	32"	24-1/2"
5H120	47"	34-7/8"	27-3/8"
5H126	47"	34-7/8"	27-3/8"
Bare Compressor Only			

CSH	Length	Height	Width
6553-50	43.58	21.97	19.84
6563-60	43.58	21.97	19.84
7553-70	53.27	22.52	21.93
7563-80	53.27	22.52	21.93
7573-90	53.27	22.52	21.93
8553-110	60.63	28.03	26.89
8563-125	60.63	28.03	26.89
8573-140	60.63	28.03	26.89

CSW	Length	Height	Width
6583-50	43.58	21.97	19.84
6593-60	43.58	21.97	19.84
7573-70	53.27	22.52	21.93
7583-80	53.27	22.52	21.93
7593-90	53.27	22.52	21.93
8573-110	60.63	28.03	26.89
8583-125	60.63	28.03	26.89

5H	Oil Charge
5H40	2.3
5H46	2.3
5H60	2.6
5H66	2.6
5H80	5.13
5H86	5.13
5H120	7.63
5H126	7.63
(Gallons)	

CSW	Oil Charge
6583-50	2.64
6593-60	2.64
7573-70	3.96
7583-80	3.96
7593-90	3.96
8573-110	5.0
8583-125	5.0
(Gallons)	

CSH	Oil Charge
6553-50	2.51
6563-60	2.51
7553-70	3.96
7563-80	3.96
7573-90	3.96
8553-110	5.81
8563-125	5.81
8573-140	5.81
(Gallons)	

Compressor Weight Comparison

Bare Compressor Weights	
Model	LBS.
5H40	610
5H46	610
5H60	795
5H66	795
5H80	1115
5H86	1115
5H120	1580
5H126	1580

CSH	LBS.
6553-50	710
6563-60	710
7553-70	1136
7563-80	1147
7573-90	1169
8553-110	1852
8563-125	1874
8573-140	1896

CSW	LBS.
6583-50	805
6593-60	805
7573-70	1147
7583-80	1169
7593-90	1180
8573-110	1874
8583-125	1896

Connection Sizes

CSH Model	Suction Valve	Discharge Valve
6553-50	2-1/8"	1-5/8"
6563-60	2-1/8"	1-5/8"
7553-70	3-1/8"	2-1/8"
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"
8573-140	4-1/8"	3-1/8"

CSW Model	Suction Valve	Discharge Valve
6583-50	2-5/8"	2-1/8"
6593-60	2-5/8"	2-1/8"
7573-70	3-1/8"	2-1/8"
7583-80	3-1/8"	2-1/8"
7593-90	3-1/8"	2-1/8"
8573-110	4-1/8"	3-1/8"
8583-125	4-1/8"	3-1/8"

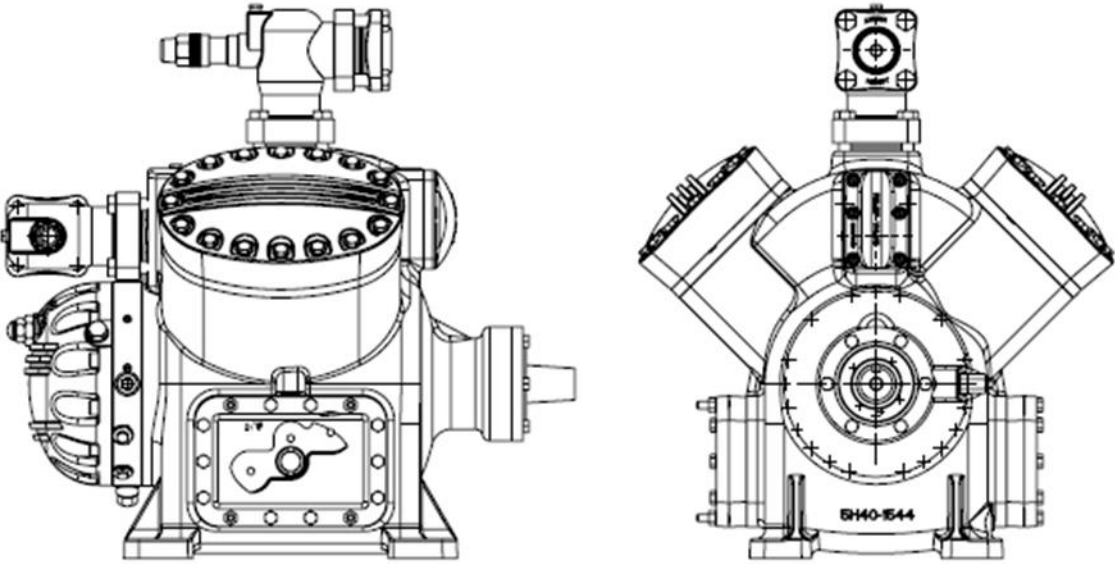
5H Model	Suction	Discharge
5H40	2-5/8"	2-1/8"
5H46	2-5/8"	2-1/8"
5H60	3-1/8"	3-1/8"
5H66	3-1/8"	3-1/8"
5H80	3-1/8"	3-1/8"
5H86	3-1/8"	3-1/8"
5H120	4-1/8"	4-1/8"
5H126	4-1/8"	4-1/8"

Compressor Oil Types

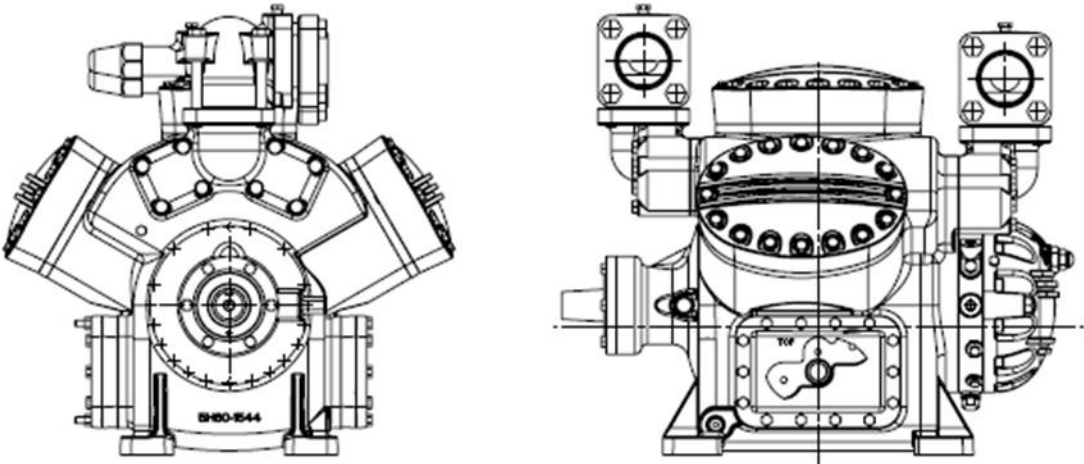
Carlyle 5H Oil Types
Cryol 150
Cryol 150 with oil additives
Suniso 3GS
Suniso 4GS
Texaco WF32-150
Zerol 150

BITZER CS Screw Compressor Oils	
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	
Unit of Measurement	Part #
1 liter	915118-06
5 liter	915118-01
10 liter	915118-02

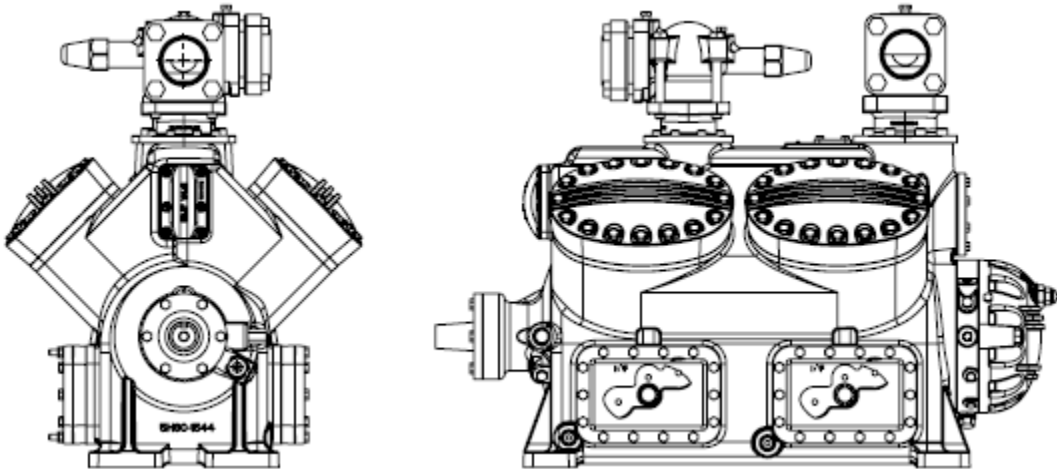
Carlyle 5H 40/46 Assemblies Drawing



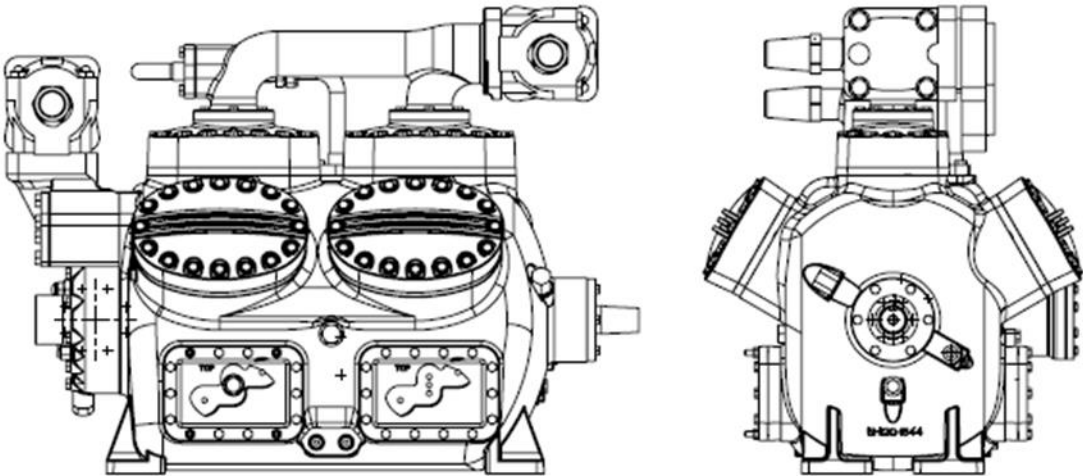
Carlyle 5H 60/66 Assemblies Drawing



Carlyle 5H 80/86 Assemblies Drawing

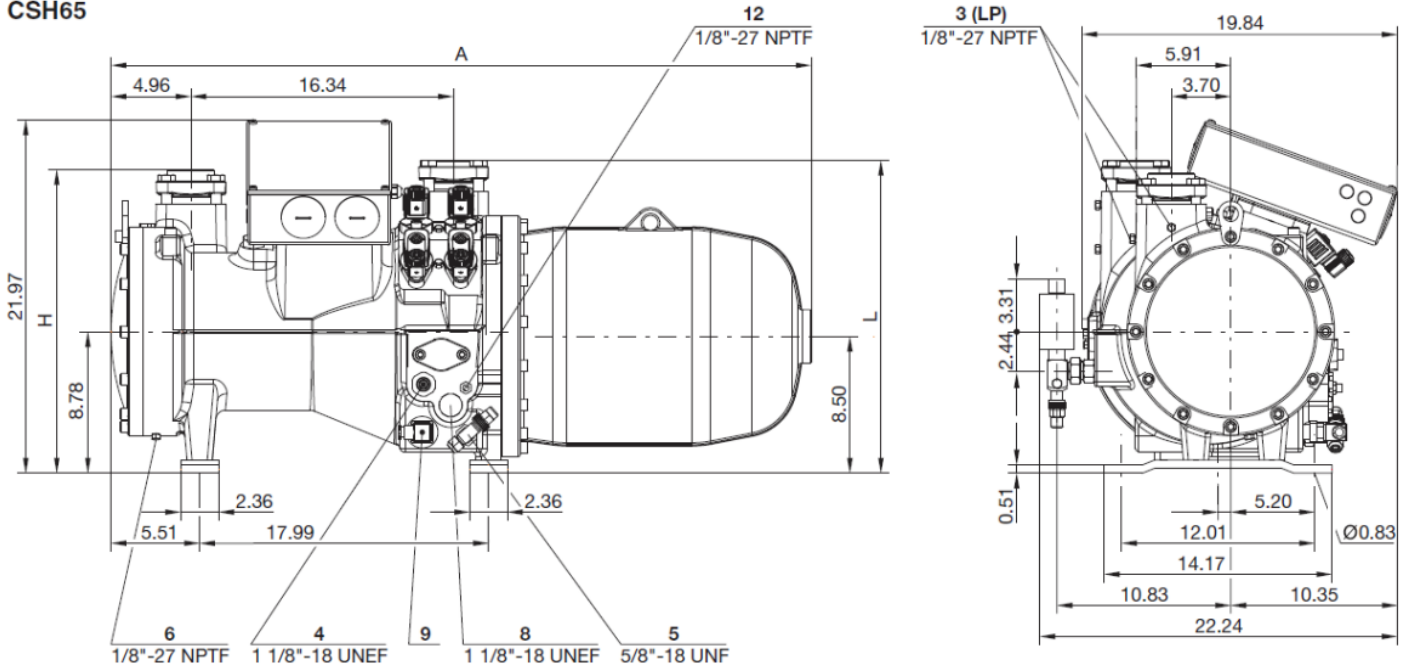


Carlyle 5H 120/126 Assemblies Drawing

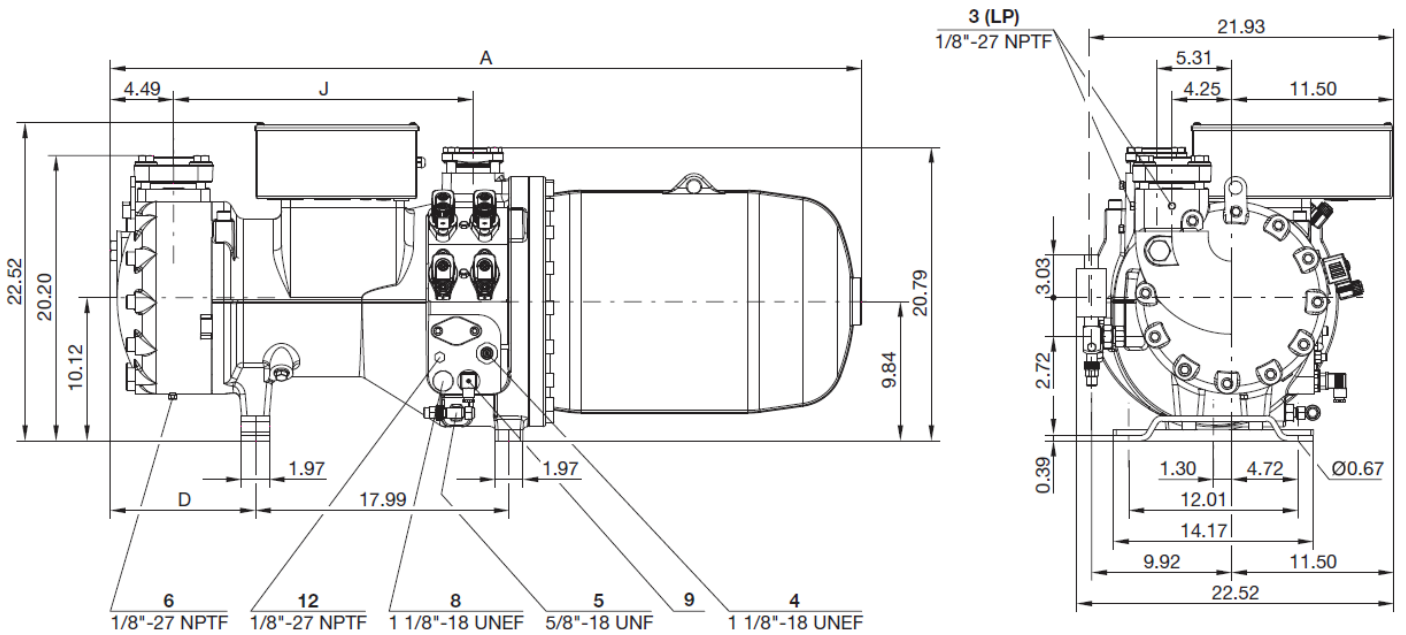


BITZER CSH Screw Compressor Dimensional Data

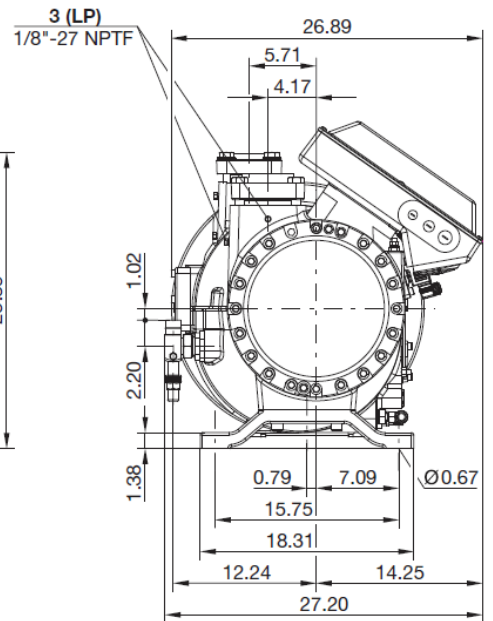
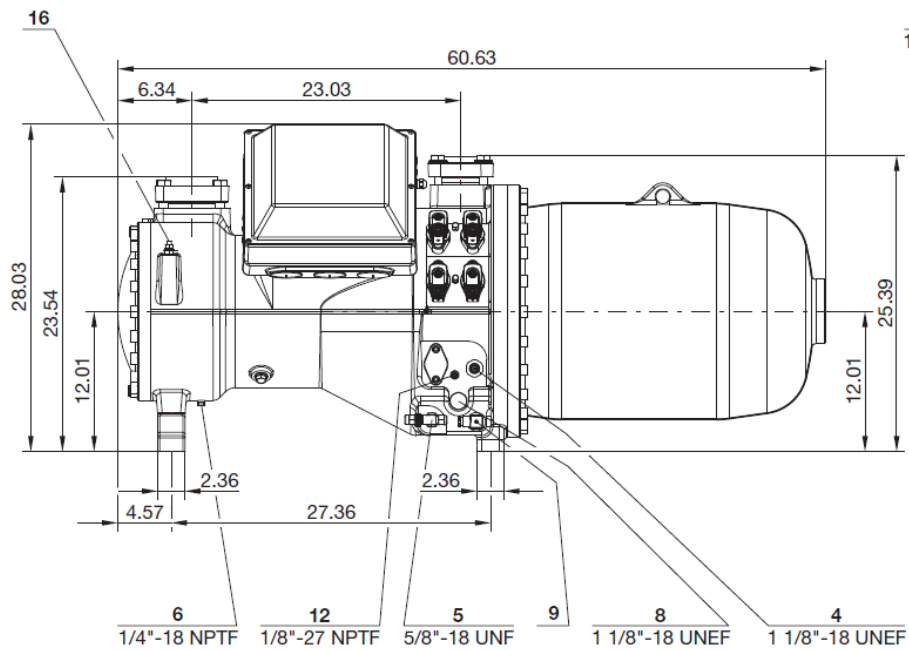
CSH65



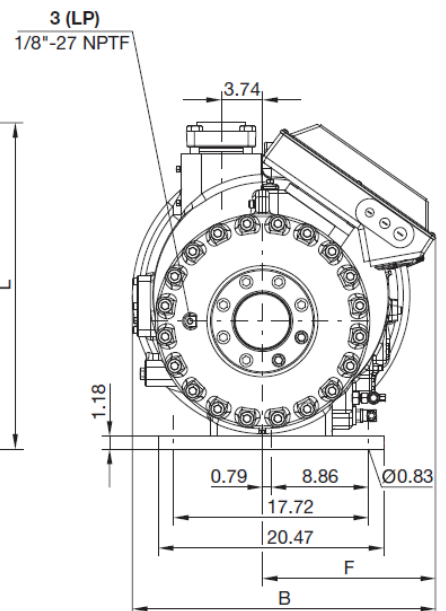
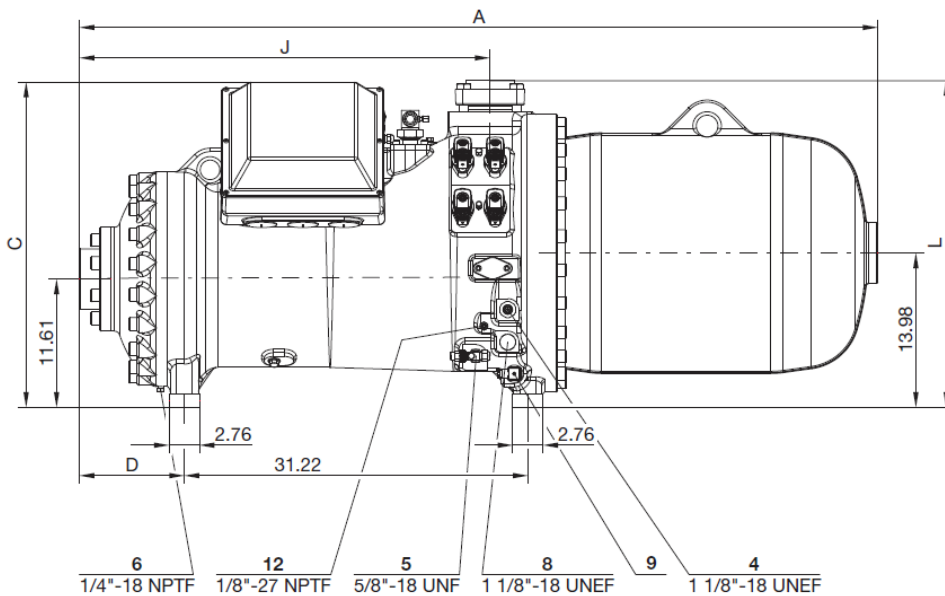
CSH75



CSH85



CSH95





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: _____
