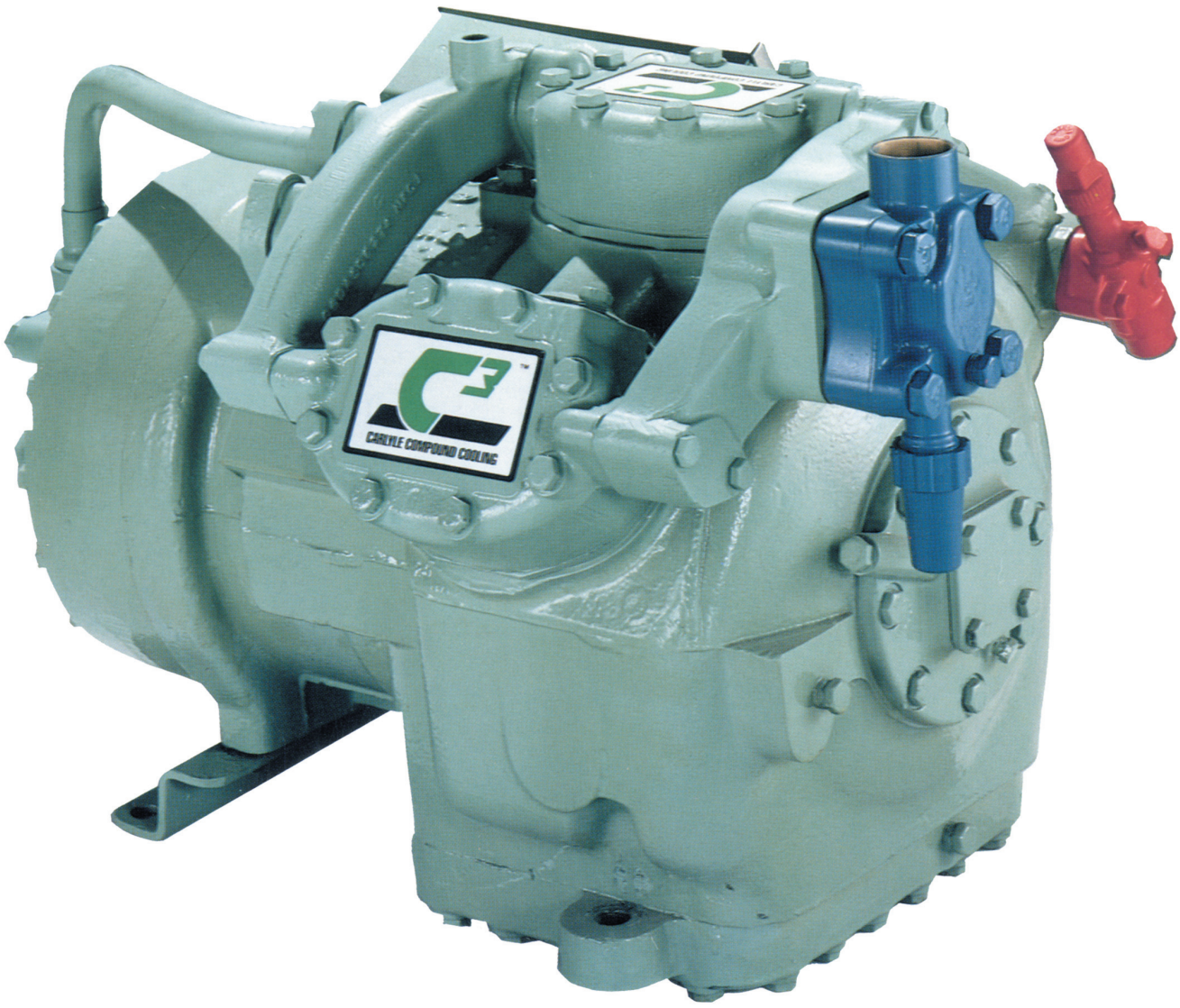


06CC CARLYLE® COMPOUND COOLING COMPRESSOR APPLICATION GUIDE

Carlyle™

Contents

Introduction

This manual is for the application of the Carlyle® Compound Cooling 06CC compressor. The operational limits, required accessories, and operational guidelines are contained in this manual and must be complied with to stay within the compressor warranty guidelines.

The Carlyle Compound Cooling compressor offers the highest energy efficiency available for low temperature refrigeration when using a single compressor. A single Carlyle Compound Cooling compressor provides the capacity and efficiency equal to a two-compressor booster system.

The Carlyle Compound Cooling compressor is designed with two compression stages in a single body and utilizes subcooling from a simple plate to plate heat exchanger that is the system subcooler. Figure 1 shows a simple single compressor system.

Features and Benefits

- Very high capacities and efficiencies when compared to a single-stage, low-temperature compressor
- Very low compression ratios for low temperature refrigeration
- Two-stage booster performance in a single-compressor body
- Subcooling allows for smaller system refrigerant lines and therefore a smaller refrigerant charge
- Simple application of subcooling
- Eliminates compressor short cycling as capacity remains stable over a wide range of head pressures
- Can be used with R-22, R-404A, R-407A, and R-507
- No separate subcooling rack or compressor needed

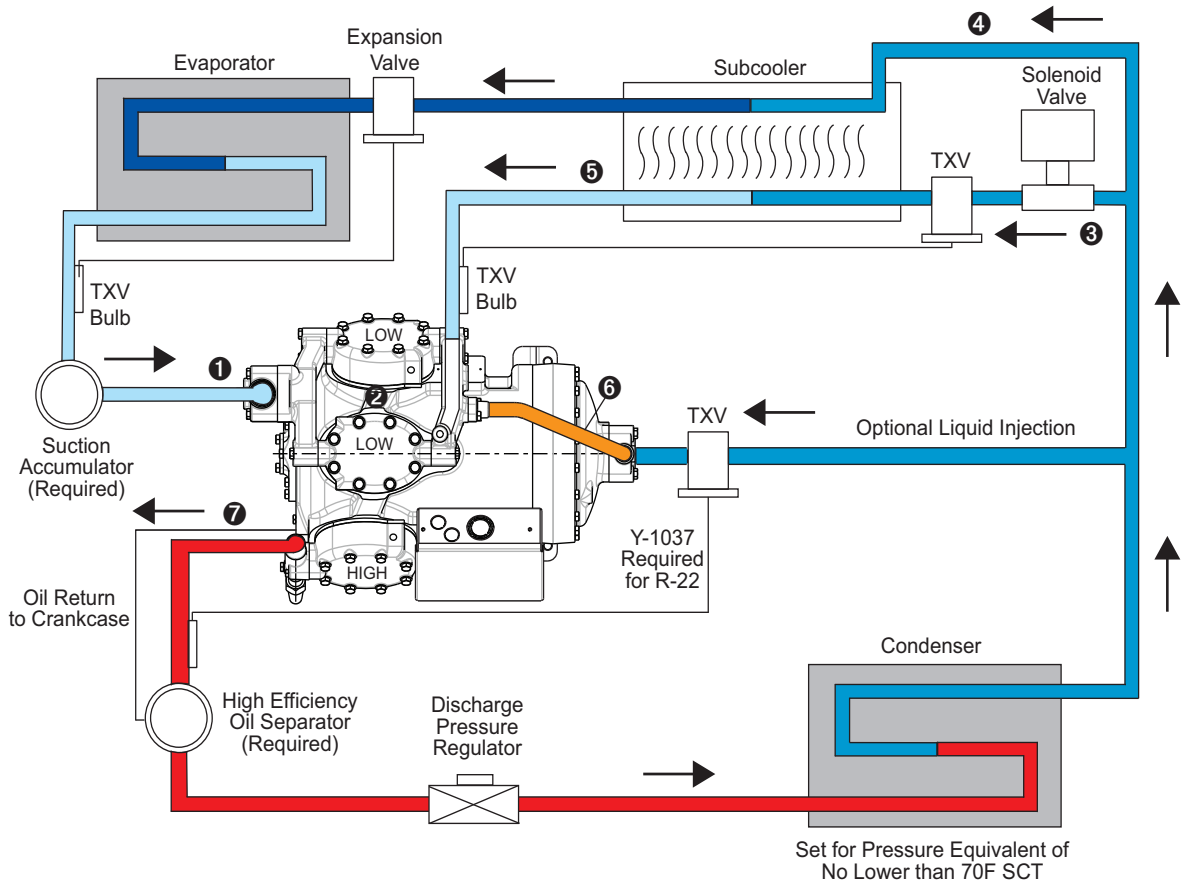
How Compound Cooling Works

A variation of the two-stage booster system, the internally compounded compressor has both the high and low stages built into one compressor body. In this arrangement, compression is accomplished in two stages, safely and economically.

All eight 06CC models have six cylinders. Four cylinders act as the low stage and “boost” the suction pressure from the refrigeration load to the intermediate pressure. The remaining two cylinders, acting as the high stage, complete the compression to normal condensing temperatures. The result is lower internal losses and a compressor that delivers more capacity in the same displacement. The lower losses increase operating efficiencies. See Fig. 1, Single Compressor System diagram, for review of system operation.

Obsolete Compressors

Model 06CC016, 06CC018, and 06CC124 compound compressors are not manufactured at this time. Information on these sizes is included in this manual as a reference for existing systems.

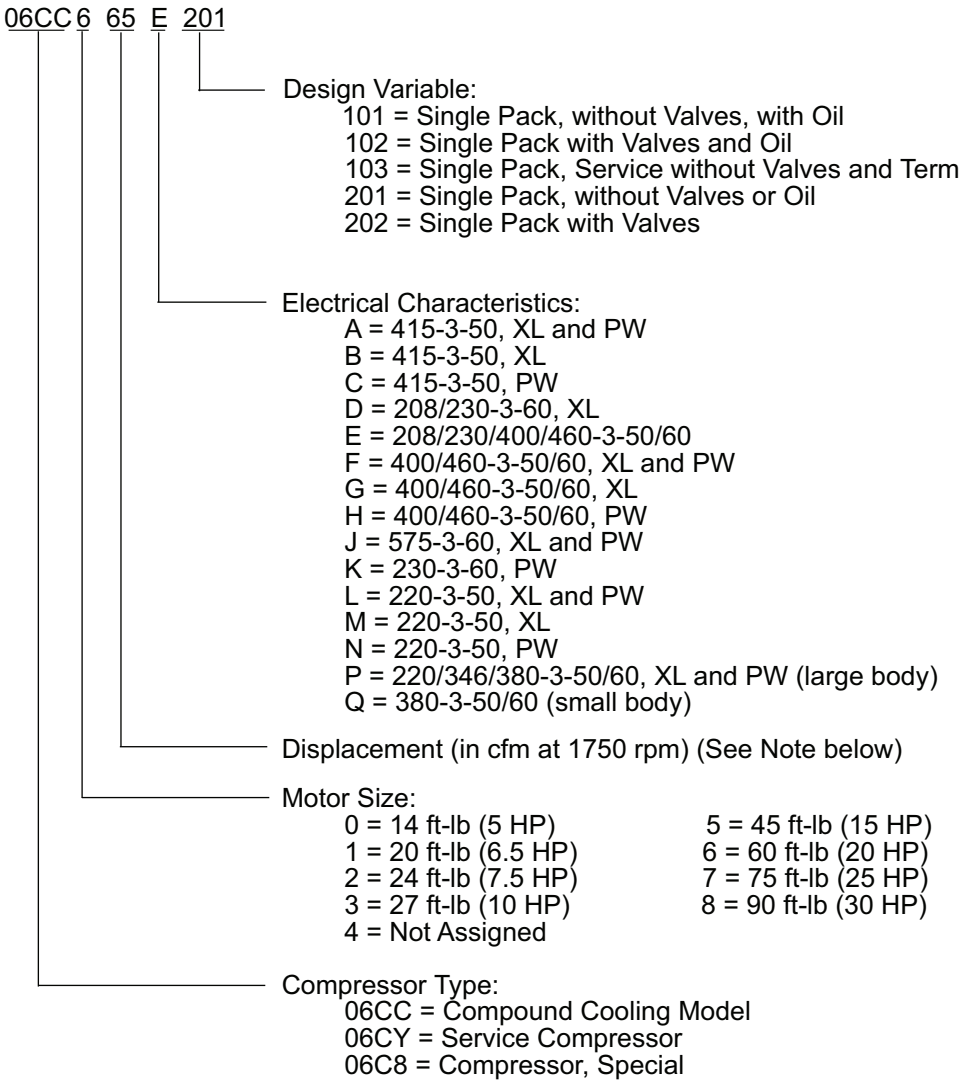


System Operation:

1. Suction gas from evaporator enters compressor suction manifold.
2. The two low stage cylinder banks compress refrigerant to intermediate pressure and flow to the intermediate manifold.
3. A tap off the main liquid line directly expands refrigerant at condensing pressure to interstage pressure in the subcooler.
4. Liquid on the way to the evaporator passes through the heat exchanger and is subcooled.
5. Cool suction gas at interstage pressure flows from the heat exchanger to the intermediate manifold (economizer port) where it is mixed with the refrigerant leaving the low stage cylinders. This mixing desuperheats the intermediate stage refrigerant.
6. Desuperheated refrigerant (at intermediate pressure) flows to motor compartment and then through internal passages to high stage cylinder block.
7. High stage cylinder compresses refrigerant and discharge to condenser.

Fig. 1 — Single Compressor System

06CC Model Number Significance



NOTE: USE OF “cfm” AS MODEL SIZE DESIGNATION

Carlyle uses the “cfm” designation in the model number to identify the compressor size. The cfm values are the sixth and seventh digits of the model number. See example above.

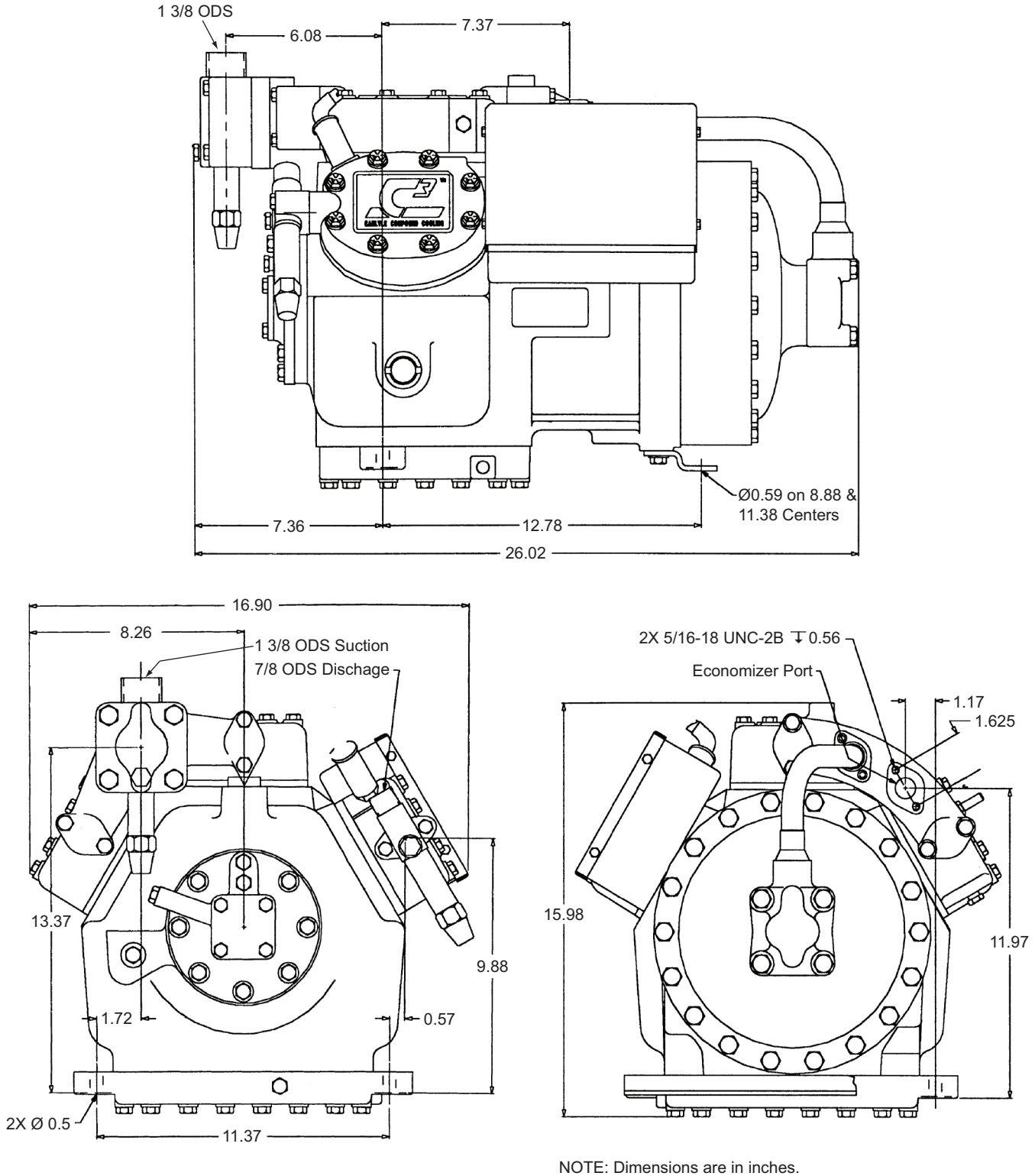
Carlyle offers two series of compressors based on body size. The smaller compressors, from 8 to 37 cfm, are referred to as “D” size units (model number “06D”). The larger compressors, from 50 to 99 cfm, are referred to as “E” size units (model number “06E”).

The 06CC, or Carlyle® Compound Cooling compressors, are made in 16 to 37 cfm and 50 to 99 cfm sizes. The 16 to 37 cfm compressors use “D” size bodies. The 50 to 99 cfm compressors use “E” size bodies.

NOTE: METRIC MEASUREMENTS

The compressors are built using English units: inches, foot-pounds, pints, etc. A corresponding metric measurement has been added to all the English units in this guide. These metric measures are a guide only, having been rounded to the nearest whole number, and therefore are not meant to be an exact mathematical conversion.

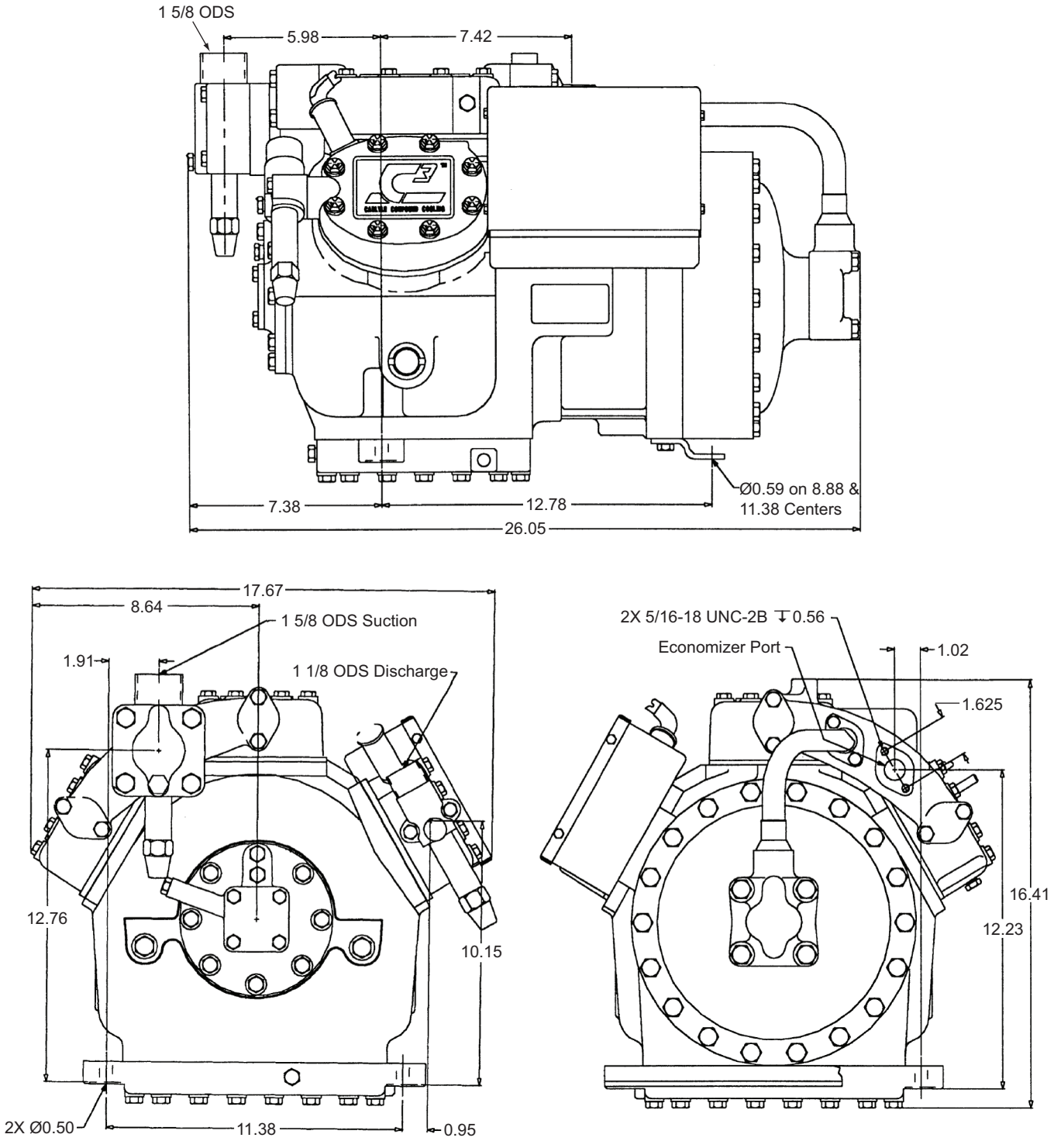
Compressor Physical Dimensions



NOTE: Dimensions are in inches.

Fig. 2 — 06CC016, 018, 124 Models

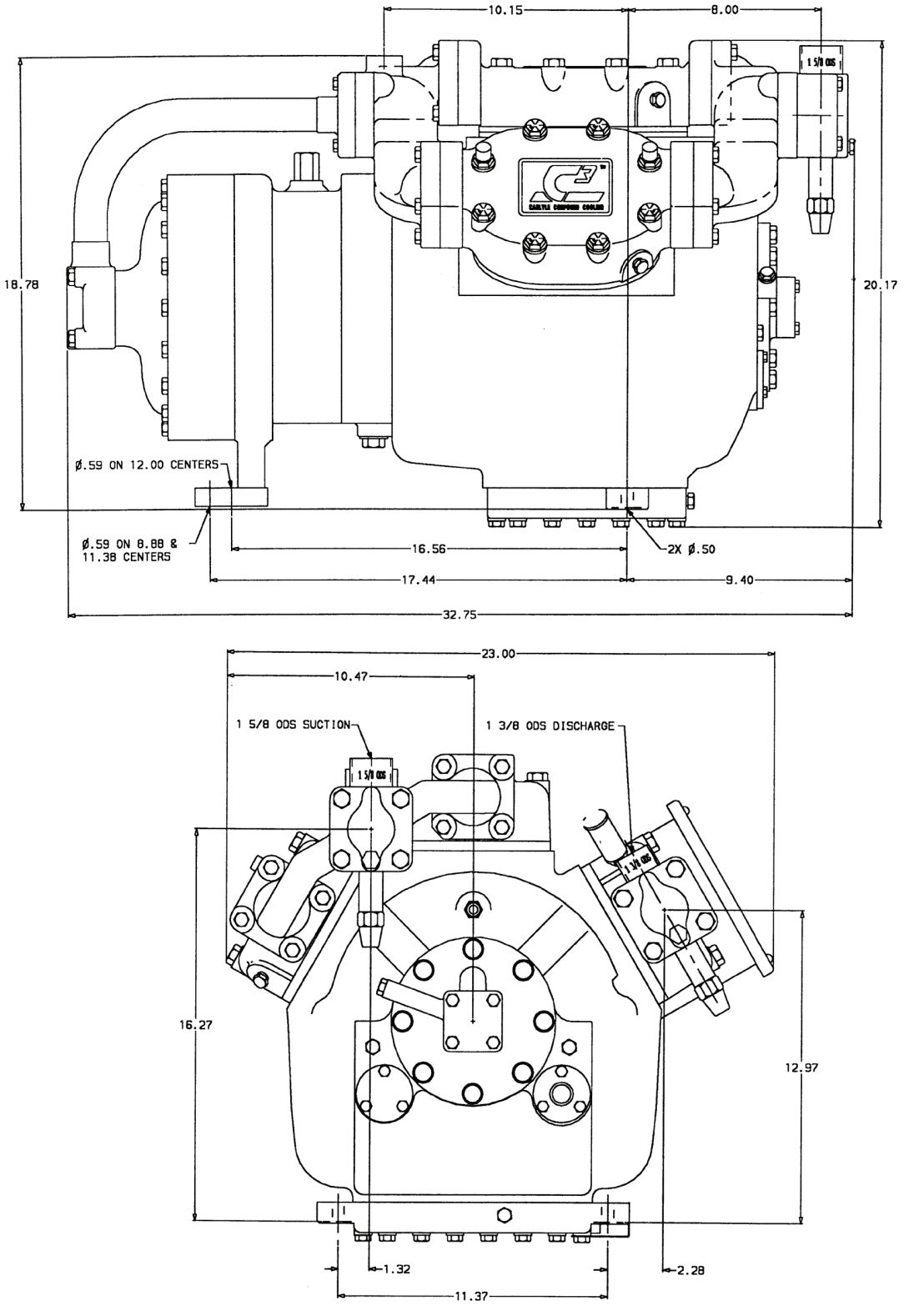
Compressor Physical Dimensions (cont)



NOTE: Dimensions are in inches.

Fig. 3 — 06CC017, 025, 228, 337 Models

Compressor Physical Dimensions (cont)



NOTE: Dimensions are in inches.

Fig. 4 — 06CC550, 665, 675, 899 Models

06CC Compressor (16 to 37 cfm)

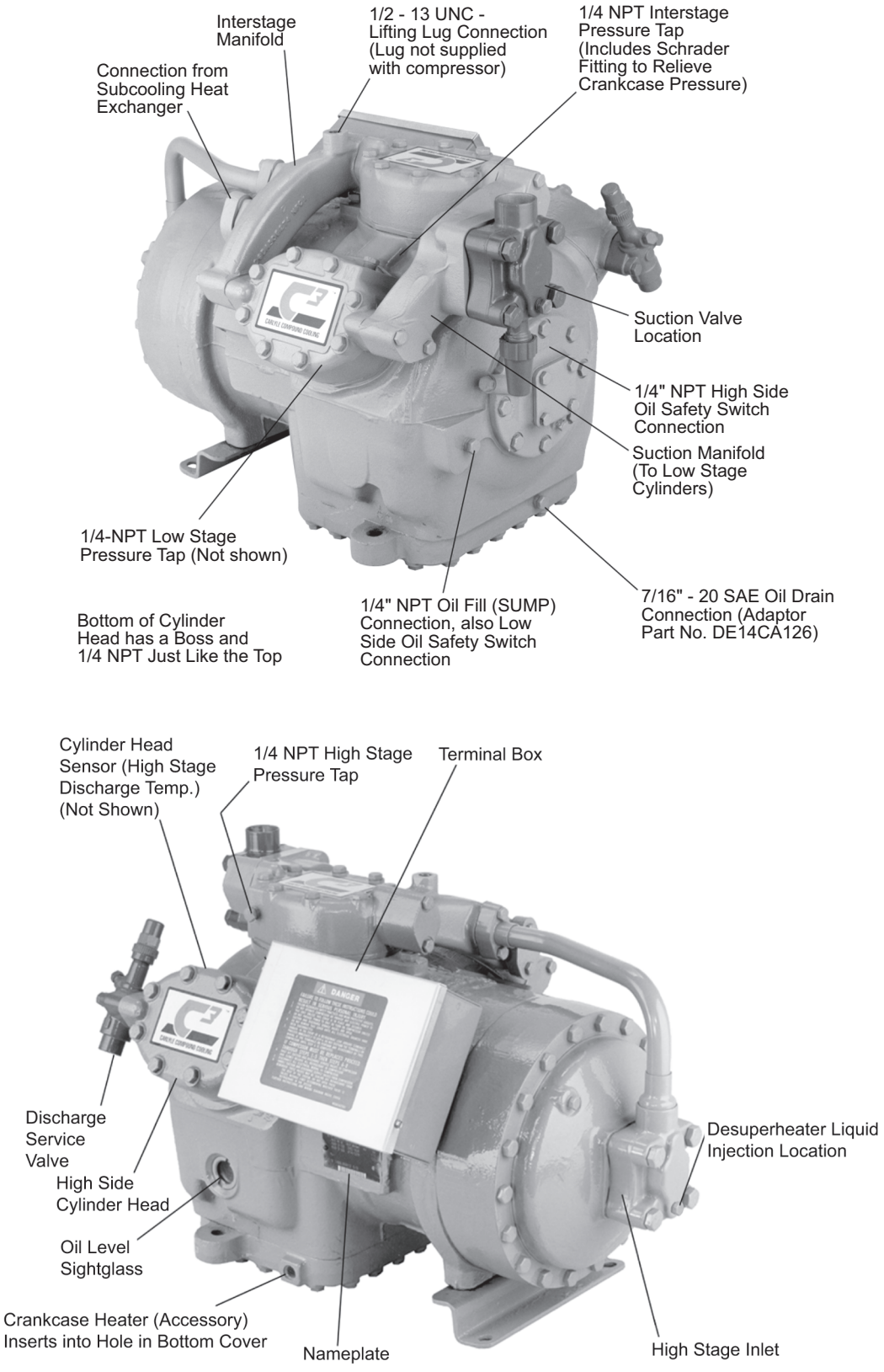


Fig. 5 — 06CC Compressor (16 to 37 cfm)

06CC Compressor (50 to 99 cfm)

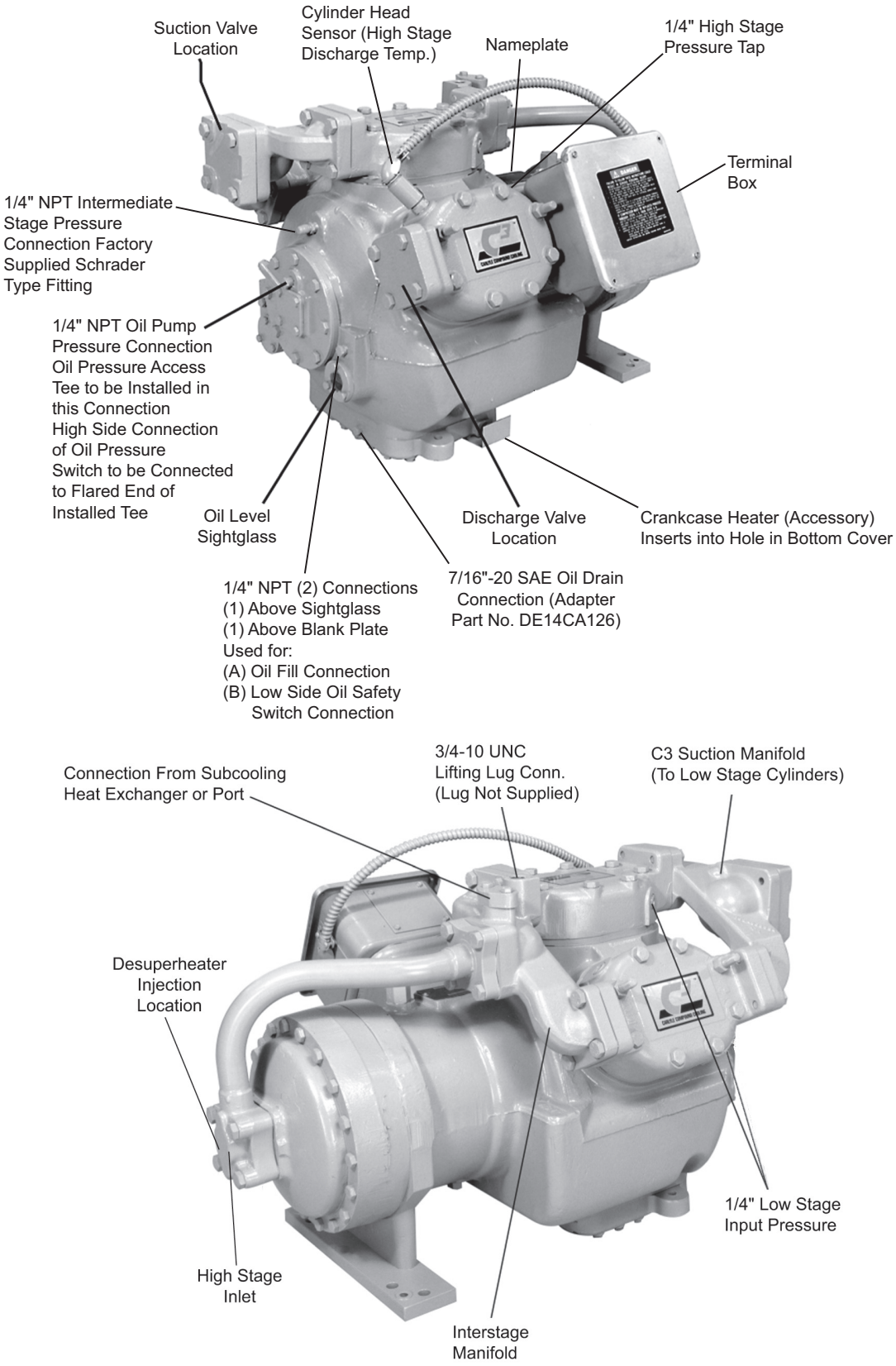


Fig. 6 — 06CC Compressor (50 to 99 cfm)

1.0 System Design Considerations

1.1 Performance Data

Performance data for Carlyle's 06CC models assumes that there is de-superheating liquid injection when needed. The performance data also assumes that there is an applied subcooler with leaving liquid refrigerant temperatures of 40 F. At certain operating conditions, the intermediate-stage pressures are too high to achieve 40 F liquid refrigerant leaving the subcooler and entering the TXV (thermal expansion valve). In these instances, the performance data assumes that the liquid refrigerant temperature is equal to the Saturated Interstage Temperature (SIT) plus 10 F. The published performance data includes all subcooling and de-superheating loads. The published mass flow rates are evaporator mass flow rates.

Performance data is available for both 50 Hz and 60 Hz applications. As with all reciprocating compressors, a 'run-in' period of 50 to 100 hours may be required to obtain the published performance.

To aid designers, Carlyle has provided interstage pressure tables for R-22, R-407A, R-404A and R-507. Further, Carlyle's 'Solutions' software is capable of calculating the 06CC model performance with varying liquid temperatures. The AHRI coefficients are available for Carlyle's 06CC models upon request from Carlyle's Applications Engineering department.

R-22 Approximate Interstage Pressure ± 10 psig (0.7 bar) with Subcooler

SATURATED SUCTION TEMP	SUCTION PRESSURE PSIG (BARS)	SATURATED CONDENSING TEMPERATURE							
		60 F (16 C)	70 F (21 C)	80 F (27 C)	90 F (32 C)	100 F (38 C)	110 F (43 C)	120 F (49 C)	130 F (54 C)
		CONDENSING PRESSURE, psig (bars)							
		101.6 (7.01)	121.4 (8.37)	143.6 (9.90)	168.4 (11.61)	195.9 (13.51)	226.4 (15.61)	259.9 (17.92)	296.8 (20.40)
-60 F (-51 C)	11.9* (0.610)†	-	-	-	183.1	210.6	241.1	274.6	311.5
-55 F (-48 C)	9.2* (0.795)†	17 (1.17)	20 (1.38)	23 (1.59)	26 (1.79)	28 (1.93)	31 (2.14)	35 (2.41)	38 (2.62)
-50 F (-45 C)	6.1* (0.886)†	20 (1.38)	23 (1.59)	25 (1.72)	29 (2.0)	32 (2.21)	35 (2.41)	38 (2.62)	42 (2.89)
-45 F (-43 C)	2.7* (0.924)†	22 (1.52)	25 (1.72)	28 (1.93)	32 (2.21)	35 (2.41)	38 (2.62)	42 (2.89)	46 (3.17)
-40 F (-40 C)	0.5 (0.034)	25 (1.72)	28 (1.93)	31 (2.14)	35 (2.41)	38 (2.62)	42 (2.89)	46 (3.17)	50 (3.44)
-35 F (-37 C)	2.6 (0.179)	27 (1.86)	31 (2.14)	34 (2.34)	38 (2.62)	42 (2.89)	46 (3.17)	50 (3.44)	54 (3.72)
-30 F (-34 C)	4.9 (0.338)	30 (2.07)	34 (2.34)	38 (2.62)	42 (2.89)	46 (3.17)	50 (3.44)	54 (3.72)	59 (4.07)
-25 F (-32 C)	7.4 (0.510)	33 (2.28)	37 (2.55)	38 (2.62)	42 (2.89)	46 (3.17)	50 (3.44)	54 (3.72)	59 (4.07)
-20 F (-29 C)	10.1 (0.697)	36 (2.48)	40 (2.76)	44 (3.03)	49 (3.38)	54 (3.72)	58 (4.0)	63 (4.34)	68 (4.69)
-15 F (-26 C)	13.2 (0.910)	39 (2.69)	43 (2.97)	48 (3.31)	53 (3.66)	58 (4.0)	63 (4.34)	68 (4.69)	73 (5.03)
-10 F (-23 C)	6.5 (1.138)	42 (2.90)	47 (3.24)	52 (3.59)	57 (3.93)	62 (4.28)	67 (4.62)	73 (5.03)	79 (5.45)

* Indicates vacuum.

† Absolute pressure where 1 bar = ATM (Atmospheric) Pressure.

R-507/R-404A Approximate Interstage Pressure ± 10 psig (0.7 bar) with Subcooler

SATURATED SUCTION TEMP	SUCTION PRESSURE PSIG (BARS)	SATURATED CONDENSING TEMPERATURE						
		60 F (16 C)	70 F (21 C)	80 F (27 C)	90 F (32 C)	100 F (38 C)	110 F (43 C)	120 F (49 C)
		Condensing Pressure, psig (bars)						
		129.7 (9.96)	153.6 (11.61)	180.3 (13.45)	210.2 (15.51)	243.5 (17.81)	280.6 (20.37)	321.9 (23.21)
-60 F (-51 C)	5.9* (0.814)†	26 (2.81)	30 (3.08)	33 (3.29)	37 (3.57)	40 (3.77)	44 (4.05)	48 (4.32)
-55 F (-48 C)	2.3* (0.929)†	29 (3.01)	33 (3.29)	37 (2.57)	40 (3.77)	44 (4.05)	48 (4.32)	53 (4.67)
-50 F (-45 C)	0.9* (1.08)†	33 (3.29)	37 (3.57)	40 (3.77)	45 (4.19)	49 (4.39)	53 (4.67)	58 (5.01)
-45 F (-43 C)	3.1 (1.23)	35 (3.43)	39 (3.70)	44 (4.05)	48 (4.32)	53 (4.67)	57 (4.94)	62 (5.29)
-40 F (-40 C)	5.5 (1.39)	39 (3.70)	44 (4.05)	48 (4.32)	53 (4.67)	58 (5.01)	63 (5.36)	68 (5.70)
-35 F (-37 C)	8.2 (1.58)	43 (3.98)	47 (4.26)	52 (4.60)	57 (4.94)	62 (5.29)	68 (5.70)	73 (6.05)
-30 F (-34 C)	11.1 (1.78)	46 (4.19)	51 (4.53)	56 (4.88)	61 (5.22)	67 (5.63)	73 (6.05)	78 (6.39)
-25 F (-32 C)	14.3 (2.00)	50 (4.46)	55 (4.81)	60 (5.15)	66 (5.57)	72 (5.98)	78 (6.39)	84 (6.81)
-20°F (-29°C)	17.8 (2.24)	54 (4.74)	59 (5.08)	65 (5.50)	71 (5.91)	77 (6.32)	83 (6.74)	90 (7.22)
-15 F (-26 C)	21.7 (2.51)	58 (5.01)	64 (5.43)	70 (5.84)	76 (6.26)	82 (6.67)	89 (7.15)	96 (7.63)
-10 F (-23 C)	25.8 (2.79)	62 (5.29)	68 (5.70)	74 (6.12)	81 (6.60)	88 (7.08)	95 (7.57)	102 (8.05)

* Indicates vacuum.

† Absolute pressure where 1 bar = ATM (Atmospheric) Pressure.

R-407A Approximate Interstage Pressure ± 10 psig (0.7 bar) with Subcooler

SATURATED SUCTION TEMP	SUCTION PRESSURE PSIG (BAR)	SATURATED CONDENSING TEMPERATURE							
		60 F (16 C)	70 F (21 C)	80 F (27 C)	90 F (32 C)	100 F (38 C)	110 F (43 C)	120 F (49 C)	130 F (54 C)
		Condensing Pressure, psig (bars)							
		125.2 (8.63)	148.8 (10.26)	175.3 (12.09)	204.8 (14.12)	237.6 (16.38)	273.9 (18.88)	314.0 (21.65)	357.9 (24.68)
-60 F (-51 C)	14.5* (0.52)†	8 (1.5)	10 (1.7)	11 (1.8)	12 (1.8)	13 (1.9)	15 (2.0)	19 (2.3)	36 (2.8)
-55 F (-48 C)	11.9* (0.61)†	10 (1.7)	13 (1.9)	14 (2.0)	15 (2.1)	17 (2.2)	20 (2.4)	24 (2.7)	41 (3.1)
-50 F (-45 C)	8.9* (0.71)†	12 (1.9)	15 (2.1)	18 (2.2)	19 (2.3)	21 (2.5)	24 (2.7)	29 (3.0)	46 (3.5)
-45 F (-43 C)	5.6* (0.82)†	15 (2.0)	19 (2.3)	21 (2.5)	23 (2.6)	26 (2.8)	29 (3.0)	34 (3.3)	51 (3.8)
-40 F (-40 C)	2.1* (0.94)†	18 (2.2)	22 (2.5)	25 (2.7)	27 (2.9)	30 (3.1)	34 (3.3)	39 (3.7)	56 (4.2)
-35 F (-37 C)	1.0 (1.08)	21 (2.4)	26 (2.8)	29 (3.0)	32 (3.2)	35 (3.4)	39 (3.7)	44 (4.0)	62 (4.5)
-30 F (-34 C)	3.3 (1.24)	25 (2.7)	30 (3.1)	34 (3.4)	37 (3.6)	40 (3.8)	44 (4.1)	49 (4.4)	67 (4.9)
-25 F (-32 C)	5.7 (1.41)	29 (3.0)	35 (3.4)	39 (3.7)	43 (3.9)	46 (4.2)	50 (4.5)	55 (4.8)	73 (5.4)
-20 F (-29 C)	8.5 (1.60)	34 (3.4)	40 (3.8)	45 (4.1)	49 (4.4)	52 (4.6)	56 (4.9)	62 (5.3)	80 (5.8)
-15 F (-26 C)	11.5 (1.81)	40 (3.7)	46 (4.2)	51 (4.6)	55 (4.8)	59 (5.1)	63 (5.4)	69 (5.8)	87 (6.3)
-10 F (-23 C)	14.9 (2.04)	46 (4.2)	53 (4.7)	59 (5.1)	63 (5.4)	67 (5.6)	71 (5.9)	77 (6.3)	94 (6.8)

* Indicates vacuum.

† Absolute pressure where 1 bar = ATM (Atmospheric) Pressure.

1.2 Physical Data

CARRIER / CARLYLE MODEL NUMBER	STANDARD SERVICE REPLACEMENT MODEL	SUCTION TEMPERATURE RANGE ...(See Note 1)					
		R-404A/R-507		R-134a		R-22 and R-407A	
		F (See Note 3)	C (See Note 3)	F	C	F	C
06CC016...(See Note 2)	06CY016...	-40 to -10	-40 to -23	(See Note 4)		-40 to -10	-40 to -23
06CC017...	06CY017...	-40 to -10	-40 to -23			-40 to -10	-40 to -23
06CC018...(See Note 2)	06CY018...	-40 to -10	-40 to -23			-40 to -10	-40 to -23
06CC124...	06CY124...	-60 to -10	-51 to -23			-40 to -10	-40 to -23
06CC125...	06CY125...	-60 to -10	-51 to -23			-40 to -10	-40 to -23
06CC228...	06CY228...	-60 to -10	-51 to -23			-40 to -10	-40 to -23
06CC337...	06CY337...	-60 to -10	-51 to -23			-40 to -10	-40 to -23
06CC550...(See Note 2)	06CY550...	-40 to -10	-40 to -23			-40 to -10	-40 to -23
06CC665...	06CY665...	-60 to -10	-51 to -23			-40 to -10	-40 to -23
06CC675...	06CY675...	-60 to -10	-51 to -23			-40 to -10	-40 to -23
06CC899...	06CY899...	-60 to -10	-51 to -23			-40 to -10	-40 to -23

CARRIER / CARLYLE MODEL NUMBER	MOTOR SIZE		DISPLACEMENT AT 1750 RPM				NO. OF CYL	BORE		STROKE		OIL CHARGE		NET WEIGHT		BODY SIZE
	HP	kW	CFM	L/M	CFH	L/H (1,000)		in.	mm	in.	mm	Pints	Liters	lb	kg	
06CC016... (See Note 2)	5	3.7	15.9	450	954	27.01	6	2	50.8	1 1/4	31.8	9.5	4.5	330	150	D
06CC017...	5	3.7	15.9	450	954	27.01	6	2	50.8	1 1/4	31.7	9.5	4.5	330	150	D
06CC018... (See Note 2)	5	3.7	18.3	518	1100	31.09	6	2	50.8	1 15/32	37.3	9.5	4.5	325	147	D
06CC124...	6 1/2	4.9	23.9	677	1435	40.60	6	2	50.8	1 1/4	31.8	9.5	4.5	335	152	D
06CC125...	6 1/2	4.9	23.9	677	1435	40.60	6	2	50.8	1 1/4	31.8	9.5	4.5	330	150	D
06CC228...	7 1/2	5.6	28	793	1680	47.57	6	2	50.8	1 15/32	37.3	9.5	4.5	340	154	D
06CC337...	10	7.5	37.1	1050	2225	63.03	6	2	50.8	1 15/16	49.2	9.5	4.5	345	156	D
06CC550... (See Note 2)	15	11.2	50.3	1424	3016	85.45	6	2 11/16	68.3	1 63/64	50.4	19	9.0	545	247	E
06CC665...	20	14.9	68.3	1934	4096	116.0	6	2 11/16	68.3	1 63/64	50.4	19	9.0	555	252	E
06CC675...	20	14.9	75.4	2135	4524	128.1	6	2 11/16	68.3	2 3/16	55.6	19	9.0	555	252	E
06CC899...	30	22.4	99.0	2803	5940	168.2	6	2 11/16	68.3	2 7/8	73.0	19	9.0	580	263	E

LEGEND

CFM — Cubic Feet Per Minute
L/H — Liters Per Hour
L/M — Liters Per Minute

NOTES:

1. Approximate condensing temperature ranges. CHECK ACTUAL PERFORMANCE DATA FOR ANY NEW APPLICATION ESPECIALLY AT OR NEAR UPPER OR LOWER LIMIT: L.T. =70 to 130 F (21 to 55 C).
2. To provide a 6-cylinder body needed for Carlyle® Compound Cooling compressor, the normal 4-cycle model 16, 18 and 50 cfm compressors were built using the 24 and 65 cfm 6-cylinder bodies, respectively. The actual cfm reduction is achieved by modifying the running gear.
3. R404A/R-507 CANNOT be used in the small “D” body size Compound Cooling compressors (16 to 37 cfm), manufactured prior to Serlal No. 2099J. See Section 1.5.
4. R-134a and R-12 CANNOT be used in any Compound Cooling compressor.

1.3 Agency Approvals

All Carlyle 06CC models are UL (Underwriters Laboratories) and CSA (Canadian Standards Association) approved with R-22, R-407A, R-404A and R-507. The 50 to 99 cfm, 06CC models are supplied without included motor protection. The 50 to 99 cfm, 06CC models require the use of Carlyle-approved motor protection to maintain UL approval. Approved motor protection devices / accessories are shown in the Circuit Breaker Selection Table.

The use of alternate overcurrent protection devices must be approved by the Carlyle Applications Engineering department. The application of alternate overcurrent devices without Carlyle's approval will VOID warranty.

UL File No. SA4936

All Carlyle 06CC models meet CE requirements for the Low-Voltage and Machinery Directive.

1.4 Circuit Breaker Selection Table

06CC (50 to 99 cfm) 3 Phase Electrical Specifications

COMPRESSOR INFORMATION							RECOMMENDED CIRCUIT BREAKERS									OVERLOAD INFORMATION	
06CC Models	Voltage	HP	See Note 1		See Note 2		Recom. Part No.	Must Hold Amps	Must Trip Amps	LRA	See Note 3 Recom. RLA	Alternate Part No.	Must Hold Amps	Must Trip Amps	LRA	Part Number	Req. Dial Setting
			Max. Must Trip Amps	Max. RLA	LRA XL	LRA PW 1st Winding											
06CC550J	575	15	27	22	98	59	HH83XB438*	23	27	86	19.3	HH83XB689	23	27	86	06EA907185	24
06CC550F	400/460		32	26	142	85	HH83XB414*	27	32	145	22.9	HH83XB698	27	32	145	06EA907185	28
06CC550E	208/230		68	54	283	170	HH83XB455*	59	68	245	45.6	HH83XB697	59	68	245	06EA907186	60
06CC550E	460		32	26	142	85	HH83XB414*	27	32	145	22.9	HH83XB698	27	32	145	06EA907185	28
06CC665J	575	20	38	30	120	72	HH83XA461*	33	38	124	27.1	—	—	—	—	06EA907185	33
06CC665F	400/460		50	40	173	104	HH83XB437*	43	50	176	35.7	HH83XB606	43	49	173	06EA907186	44
06CC665E	208/230		100	80	345	207	HH83XB376*	73	85	333	60.7	—	—	—	—	06EA907186	89
06CC665E	460		50	40	173	104	HH83XB437*	43	50	176	35.7	HH83XB606	43	49	173	06EA907186	44
06CC675J	575	20	38	30	120	72	HH83X461	33	38	124	27.1	—	—	—	—	06EA907185	33
06CC675F	400/460		50	40	173	104	HH83XB437*	43	50	176	35.7	HH83XB606	43	49	173	06EA907186	44
06CC675E	208/230		100	80	345	207	HH83XB378*	77	89	365	63.6	—	—	—	—	06EA907186	89
06CC675E	460		50	40	173	104	HH83XB437*	43	50	176	35.7	HH83XB606	43	49	173	06EA907186	44
06CC899J	575	30	46	46	176	106	HH83XA430	50	58	168	41.4	HH83XA469	46	53	164	06EA907186	51
06CC899F	400/460		58	58	253	152	HH83XB432*	63	73	240	52.1	HH83XB604	63	73	240	06EA907186	65
06CC899E	208/230		113	113	506	304	HH83XC406	122	141	464	100.7	—	—	—	—	06EA907187	125
06CC899E	460		58	58	253	152	HH83XB432*	63	73	240	52.1	HH83XB604	63	73	240	06EA907186	65

LEGEND

LRA — Locked Rotor Amps
MH — Must Hold Amps
MT — Must Trip Amps
PW — Part-Winding Start
RLA — Rated Load Amps
XL — Across the Line Start

* Circuit breaker that requires “ring” terminal connection.

NOTES:

1. Compressor must-trip (MT) amps and RLA values are maximum figures.
2. LRA values for PW second winding = 1/2 the LRA XL value.
3. 3-Pole XL circuit breakers shown, other 3-Pole XL alternatives and 6-Pole PW breakers available. Terminal lugs for circuit breakers available in package 06EA660152.
4. Recommended RLA value shown is determined by: circuit breaker must trip value ÷ 1.40. Use this recommended (and minimum) RLA value to determine name plate stamping, minimum contactor sizing and wire sizing. RECOMMENDED RLA FOR 06CC COMPRESSORS EQUALS: MUST-TRIP (MT) OF CARLYLE APPROVED OVERCURRENT DEVICE BEING USED ÷ 1.40.
5. Compressor operating amps at any specific condition can only be determined from a performance curve.
6. Ohm values for resistance are approximate and shown for reference purposes only. Motors from different vendors and motors of different efficiencies can differ up to 15% from data shown.

Allowable Operating Ranges

NOMINAL VOLTAGE	MAXIMUM	MINIMUM
208/230	254	187
460	529	414
575	661	518
400 (50 Hz)	460	342
200 (50 Hz)	230	180

1.5 Refrigerants

All 06CC compressors built after 2099J are approved for R-22, R-404A, R-407A, and R-507 except compressors in the 16 to 37 cfm range. Compressors in this size range cannot be used with R-404A, R-407A and R-507 prior to serial number 2099J- - - - without installing a retrofit compressor valve plate (part number 06CY660-002) kit.

1.6 Electrical Data Table

COMPRESSOR MOTOR DATA									
			Electrical Data						
Compressor Model	Max kW	HP	Volts	MCC	RLA	LRA	Motor Winding Resistance (Ohms)	Overload Carlyle Part No.	Part No. T.I. No.
06CC016J101			575	10.8	6.9	40	3.3	HN69GZ032	8347A23-42
D101	6.25	5	208/230	27.0	17.3	100	0.54	HN69GZ024	8347A23-63
G101			460	13.5	8.7	50	2.1	HN69GZ014	8347A23-53
06CC017J101			575	10.8	6.9	40	3.3	HN69GZ032	8347A23-42
D101	6.25	5	208/230	27.0	17.3	100	0.54	HN69GZ024	8347A23-63
G101			460	13.5	8.7	50	2.3	HN69GZ014	8347A23-53
06CC018J101			575	10.8	6.9	40	3.3	HN69GZ032	8347A23-42
D101	6.25	5	208/230	27.0	17.3	100	0.54	HN69GZ024	8347A23-63
G101			460	13.5	8.7	50	2.1	HN69GZ014	8347A23-53
06CC124J101			575	13.2	8.5	64	2.6	HN69GZ037	8347A23-40
D101	9.18	6.5	208/230	33.0	21.2	160	0.42	HN69GZ214	8348A23-9
G101			460	16.5	10.6	80	1.7	HN69GZ038	8347A23-18
06CC125J101			575	13.2	8.5	64	2.6	HN69GZ037	8347A23-40
D101	9.18	6.5	208/230	33.0	21.2	160	0.42	HN69GZ214	8348A23-9
G101			460	16.5	10.6	80	1.7	HN69GZ038	8347A23-18
06CC228J101			575	16.7	10.2	79	2.0	HN69GZ004	8347A23-19
D101	12.8	7.5	208/230	41.6	26.7	198	0.31	HN69GZ306	8347B23-13
G101			460	20.9	13.4	99	1.3	HN69GZ010	8347A23-29
06CC337J101			575	18.8	12.1	91	1.7	HN69GZ025	8347A23-31
D101	16.5	10	208/230	46.5	29.8	228	0.26	HN69GZ309	8347B23-11
G101			460	23.3	14.9	114	1.0	HN69GZ024	8347A23-63

LEGEND

LRA — Locked Rotor Amps
MCC — Maximum Continuous Current
RLA — Rated Load Amps
TI — Texas Instruments

NOTES:

1. RLA (rated load amps) value shown for new high-efficiency models is MCC ÷ 1.56 = RLA. Use this recommended (and minimum) RLA value to determine nameplate stamping, minimum contactor sizing and wire sizing.
2. Compressor operating amps at any specific condition can only be determined from a performance curve.
3. RLA values for 06D compressor protected by calibrated circuit breaker will depend must-trip value of circuit breaker.
4. Ohm values shown for resistance are approximate and shown for reference only. Motors from different vendors and motors of different efficiencies can differ up to 15% from data shown.

Allowable Operating Range

NOMINAL VOLTAGE	MAXIMUM VOLTAGE	MINIMUM VOLTAGE
206/230	254	187
575	661	518
400 (50 Hz)	460	342
200 (50 Hz)	230	180

1.7 Subcoolers

The subcooler in these systems is controlled through the use of a single TXV (thermal expansion valve) that is fed from a 'branch' off of the main liquid line. A small amount of liquid refrigerant is expanded through the TXV (into the subcooler / economizer) to cool the remaining liquid refrigerant. The suction gas from that work is typically superheated ~ 25°F (TXV adjustment) then flows from the subcooler into the interstage section of the 06CC model compressor, providing some (or all) of the de-superheating needed for the refrigerant gas entering the motor compartment. A normally closed liquid line solenoid valve must be installed prior to the subcooler TXV. The solenoid valve must be controlled to close when all of the compressors are OFF.

The subcooler must be connected in a 'parallel-flow' configuration to reduce the potential for excessively superheated suction gas returning from the subcooler to the interstage connection of the compressor. Highly superheated gas entering the interstage can cause TXVs to operate in an unstable manner. Variation in condensing pressures (as seen in air-cooled systems) will affect interstage pressures in the system and may result in varying liquid temperatures leaving the subcooler.

1.8 Subcooler Selection

Two-stage systems have the inherent benefit of being able to utilize interstage subcooling and de-superheating through the use of a subcooler. The application of a liquid subcooler is strongly recommended for all Carlyle® Compound Cooling 06CC models. Providing liquid subcooling from a second compressor group is not needed and not recommended with 06CC model compressors. Shown in Fig. 7 is a diagram of a subcooler cycle. The liquid refrigerant exiting the condenser is routed to the subcooler and sub-cooled for use in the evaporator(s). To accomplish this task, a small quantity of the same liquid refrigerant is taken from the main liquid line (prior to entering the subcooler). This liquid is expanded into the subcooler to reduce the overall liquid temperature of the system. This subcooling method allows for the work to be performed at the higher interstage pressure, which is more efficient, resulting in increased compressor capacity and EER (energy efficiency ratio). A tap off the main liquid line is directly expanded across the subcooler from condensing pressure to interstage pressure. The subcooling is done at interstage pressure where the refrigerant can be compressed more efficiently, therefore increasing the compressor capacity and energy efficiency ratio.

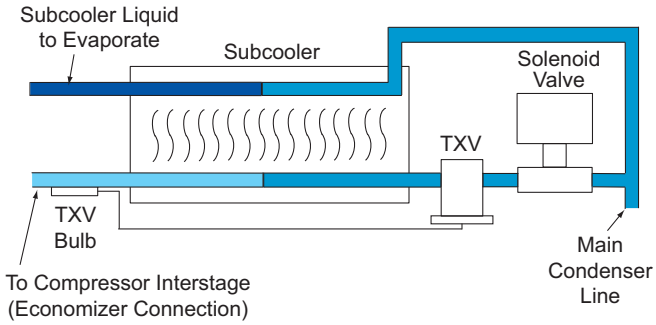


Fig. 7 — Subcooler Cycle

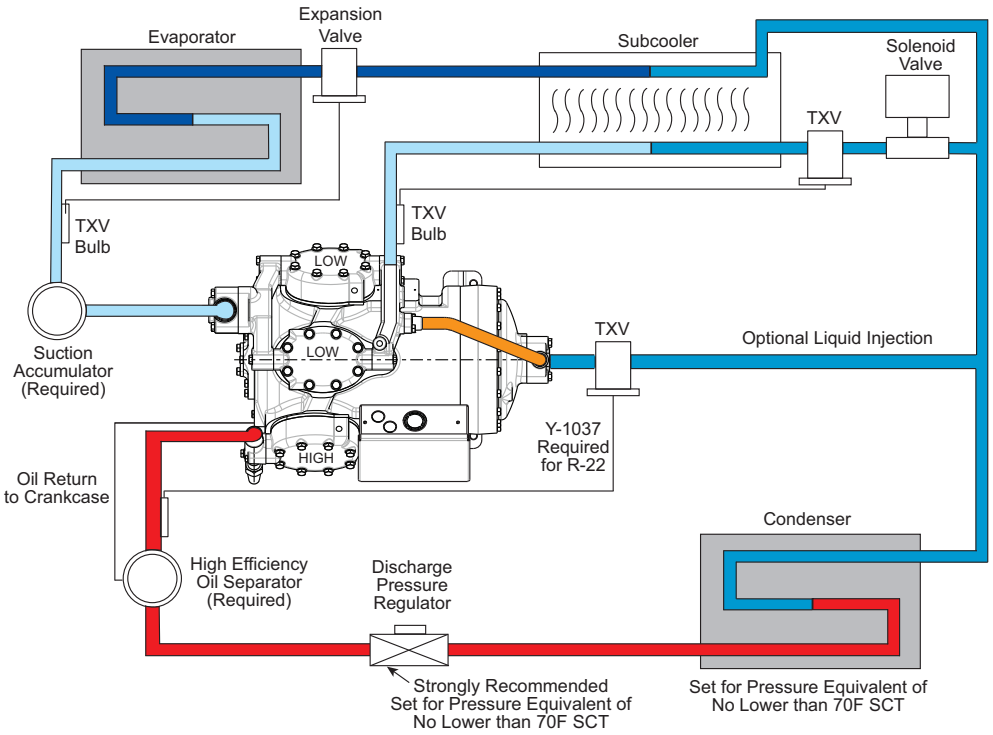


Fig. 8 — Single Compressor Carlyle® Compound Cooling System Piping

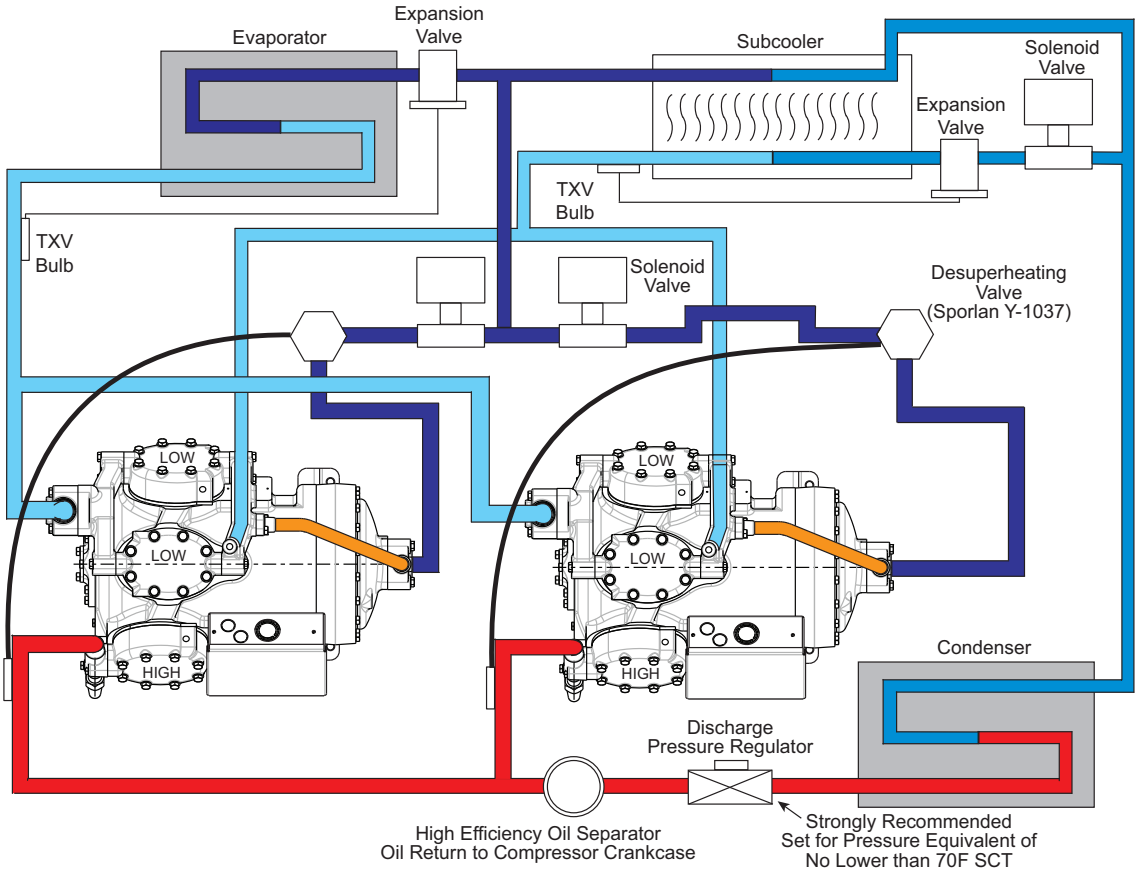


Fig. 9 — Carlyle Compound Cooling System Piping Multiple Compressor Systems

1.9 Subcooling Correction

Performance rating tables for the 06CC models are developed assuming that the liquid temperature is at 40 F (4 C). If the design liquid temperature is other than 40 F (4 C), corrections of the estimated performance may be accomplished by the following methods:

1. For R-22 and R-407A, decrease compressor capacity (as shown in the published performance data) by 3% for each 10°F (12°C) increase in liquid refrigerant temperature (measured entering the expansion valve).
2. For R-404A/R-507, decrease compressor capacity (as shown in the published performance data) by 6% for each 10°F (12°C) increase in liquid refrigerant temperature (measured entering the expansion valve).
3. Calculate the change in refrigerant enthalpy at the new liquid temperatures and multiply that by the mass flow rate (as shown in the published performance data). Mass flow rates in the 06CC models have very small fluctuations based on liquid temperatures because they operate near their maximum volumetric efficiency.

Important!

Carlyle published 06CC Model Performance Data assumes that the liquid temperature is at 40 F or at the Saturated Interstage Temperature (SIT) + 10°F, whichever is higher. These assumptions are based on the fact that the subcooler cannot operate at saturated temperatures lower than the suction of the compressor interstage. The suction of the subcooler is connected to the interstage pressure port of the 06CC models which acts to limit the temperatures that are achievable in the subcooler. For more detailed information, see the Interstage Pressure Tables on pages 11-13.

1.10 Subcooler Load

Carlyle offers brazed-plate heat exchangers for use on single and multiple compressor systems. These heat exchangers should be sized based on the estimated subcooling load. A listing of the available heat exchangers is provided in the “6.0 Compressor Accessories” section of this document. The subcooler load may be estimated by any of the following methods:

1. The subcooling load for R-22 and R-407A systems is approximately equal to 25 to 30 percent of the compressor capacity for the given condition. The subcooling load for R-404A/R-507 systems is approximately equal to 35 to 40 percent of the compressor capacity for the given condition.
2. The actual subcooling load may be calculated by multiplying the compressor mass flow rate by the change in liquid enthalpy (between entering and leaving liquid temperature) across the subcooler.
3. Carlyle’s Solutions Software calculates the subcooler load for the system designer.

1.11 Discharge Pressure Limits

Two-stage 06CC models may be applied in systems that utilize air-cooled condensers. Carlyle limits the maximum design saturated discharge temperature in these systems to 130 F and the minimum design saturation discharge temperature to 70 F. Allowing saturated discharge temperatures to fall below 70 F does not significantly affect energy usage, is not recommended, and may lead to increased valve stresses and potential valve failure.

1.12 Compressor Discharge Pressure Control

Stable control of the discharge pressure in the 06CC models has been shown to significantly increase compressor reliability. Carlyle strongly recommends the use of a discharge pressure regulators for all R-22 applications that utilize multiple 06CC models. Carlyle requires the use of discharge pressure regulators for all R-407A, R-404A, and R507 applications that utilize multiple 06CC models. All single 06CC compressor applications require the use of a discharge pressure regulator. The pressure regulator must be installed so that the discharge pressure of the compressor will not fall below the 70 F saturated discharge temperatures noted in “1.11 Discharge Pressure Limits” section. All systems that apply Hot Gas Defrost designs require the use of a discharge pressure regulator.

1.13 Variation in Capacity and Power

All 06CC model compressors have relatively small variations in compressor capacity across the full range of acceptable saturated discharge temperatures (SDT). Compressor capacity varies approximately 6% between the maximum and minimum allowable saturated discharge temperatures (130 F SDT and 70 F SDT, respectively). This small variation in compressor capacity results in significantly reducing ON/OFF compressor cycling, when compared to similarly designed single-stage compressor applications, while still maintaining very high EERs.

1.14 Superheat Correction

The published 06CC Model Performance tables for Carlyle’s 06CC models are generated assuming a return gas temperature (RGT) of 65 F. Designs that have

significantly cooler RGTs will have a slight decrease in compressor capacity when compared to the published 06CC Model Performance tables.

1.15 Suction Line Accumulators

The design of Carlyle's 06CC model compressors draw suction gas directly into the low-stage cylinders. Laboratory testing has shown that the valves are tolerant to liquid flooding; however, extreme flooding and liquid "slugs" may cause damage to the compressor. All 06CC models must be protected from liquid refrigerant and oil "slugs."

1.16 Single Compressors and Multiple Compressor System

All single 06CC compressor systems require the application of a suction line accumulator. All multiple 06CC compressor systems require the use of a suction line accumulator or functionally equivalent protection such as an over-sized suction line manifold. Carlyle recommends that a suction line accumulator is applied.

1.17 Control Scheme

Properly designed control systems are important to ensure reliable and efficient 06CC compressor operation. Please review the following control scheme designs:

Single-Compressor Systems (Fig. 8)

Carlyle requires that single, 06CC compressor systems are applied with a discharge pressure regulating valve. Discharge pressure regulating valves prevent the discharge pressure of the compressor from falling below the required minimum pressures (70 SDT equivalent) in systems that do not utilize condenser fan controls.

Multiple-Compressor Systems (Fig. 9)

Carlyle strongly recommends that R-22 systems utilizing multiple / parallel 06CC compressors are applied with a discharge pressure regulating valve. Carlyle requires that all HFC / POE systems utilizing multiple / parallel 06CC compressors, are applied with a discharge pressure regulating valve (or functional equivalent such as condenser fan controls). The application of these discharge pressure controls prevents the discharge pressure of the compressor from falling below the required minimum pressures (70 SDT equivalent).

1.18 De-Superheating Expansion Valves

Liquid injection is required for some applications to control discharge gas temperatures. Liquid injection is accomplished through the use of Carlyle recommended de-superheating expansion valves. These valves are designed to operate only when the suction gas from the subcooler cannot absorb enough heat to control the compressor's leaving discharge gas temperatures between 200 F and 230 F. See Section 6.0.

If a de-superheating valve is applied, a normally closed liquid line solenoid valve must be installed prior to the de-superheating valve (with the sensing bulb attached to the discharge tubing approximately 6 inches from the discharge service valve). This solenoid valve must be controlled to close whenever the associated compressor is OFF. De-superheating valves are directly connected to the 4-bolt flange at the motor end cover of the compressor.

1.19 Interstage Check Valves

Interstage check valves are no longer required with Carlyle's 06CC model compressors.

1.20 Capacity Control

Suction cut-off unloading is not available with Carlyle's 06CC models. Variable frequency motor drives may be applied with Carlyle's 06CC models to provide some system capacity modulation. The approved speed range for 06CC models applied with variable frequency drives is between 30 Hz and 60 Hz. Operating at speeds less than 30 Hz is not recommended due to the potential for lower net oil pressure and nuisance 'trips' of the oil pressure safety switch.

1.21 Low-Stage Discharge Gas Temperatures

The gas compressed in the low-stage heads is typically superheated and the temperatures will generally be between 100 F and 200 F. This superheated gas mixes with the suction gas from the subcooler and with injected liquid (when high-stage discharge gas temperatures exceed 230 F) and is ported to the high-stage suction passages. The high-stage gas temperatures are controlled by liquid injection valves (discussed earlier).

1.22 Cylinder Head Cooling Fans

The use of cylinder head cooling fans is recommended for all R-22 and R-407A applications. These fans are effective at de-superheating the interstage and reduce (or eliminate) the need for supplementary liquid injection.

1.23 External De-Superheating

The use of external de-superheating (other than the recommended head cooling fan) is not recommended or allowed.

2.0 Compressor Lubrication System

2.1 Oil Separator and Oil Return

All 06CC model compressors have lower oil circulation rates than single-stage compressor models however; these systems do circulate some oil in mixture with refrigerant. It is important to properly size oil separators to efficiently remove oil from the discharge refrigerant flow. Incorrectly sized oil separators can result in higher percentages of oil bypassing the oil separator, leading to oil 'logging' in the system and oil 'slugs' being returned to the compressors. This condition is undesirable for all compressor types and must be avoided for the two-stage, 06CC models. Oil 'slugs' that return in the suction line enter the low-stage cylinders of the 06CC models and have a higher potential for causing damage. Carlyle requires the use of a high-efficiency oil separator in all 06CC model applications. Preferable oil separator designs provide increased efficiency as mass flow rates decline. For HFC refrigerant applications, Carlyle recommends oversized (125% to 150% of design loads), coalescing or impingement type oil separator designs.

Important!

The crankcase of the two-stage, 06CC models is at an intermediate pressure. The oil reservoir must be vented (a 20 lb check valve is recommended) to the interstage manifold, NOT to the suction manifold as is typical with single-stage compressors. Oil return to the 06CC model compressors must be done at the crankcase of the compressor, NOT to the suction line.

2.2 Oil Equalization

The 06CC model compressor types must not be applied with motor barrel equalization or crankcase equalization (through the floats). This requirement applies to the two-stage, 06CC model compressors only, not the 06D/E single-stage models.

2.3 Oil Pressure Safety Switch

All Carlyle 06CC models are provided with connections for oil pressure safety switches. All 06CC model compressors are provided with connections for low oil pressure protection. Low oil pressure protection is required as a condition of warranty for all 06CC model compressors. Low oil pressure protection can help to prevent compressor failures due to loss of lubrication or insufficient oil level within the compressor. Normal oil pressure for the 06CC models is between 18 psig and 34 psig above the interstage pressure. Oil pressure safety switches (OPSS) must be of the manual-reset type. For HFC / POE applications, Carlyle recommends the use of oil pressure safety switches that have time-delay of 120 seconds.

2.4 Oil

Carlyle's 06CC model compressors are shipped without oil. When applying 06CC model compressors, Carlyle approved oils must be applied. The list below details the Carlyle approved oils for use in 06CC model applications.

For CFC Refrigerants:

Witco - Suniso 3GS
IGI Petroleum IND - Cryol 150
Shrieve Chemical - Zerol 150
Texaco Capella - WFI-32-150
Totaline - P903-2001

For HFC Refrigerants:

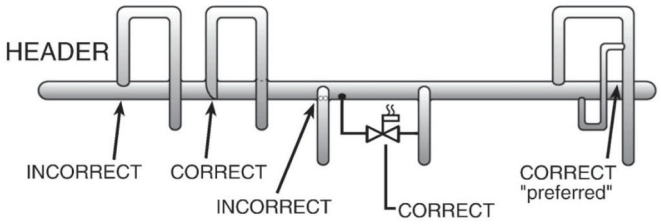
CPI - Solest 68
ICI - Emkarate RL68H
Castrol - E68
Totaline - P903-1701

3.0 Refrigerant Control

3.1 Suction and Interstage Piping

To avoid problems related to refrigerant and/or oil control, piping design is crucial. Carlyle requires suction and mid-stage header designs that do not allow free draining of refrigerant or oil into an off compressor. This avoids liquid refrigerant and oil accumulation in off compressors or suction line traps (see Fig. 10 for piping recommendations.) For that reason, suction and mid-stage manifolds are recommended to be located below their respective compressor inlet locations. However, this lower location does not eliminate the need to avoid refrigerant and especially oil from accumulating in large quantities in these manifolds. Unless this is avoided, large slugs of liquid refrigerant and especially oil can be drawn into running compressors. To avoid this, piping must be configured as shown in the figure below. If suction or interstage piping is to be located above the compressor the recommendations in the figure below also apply.

Suction and Midstage Header Above Compressors



Suction and Midstage Header Below Compressors

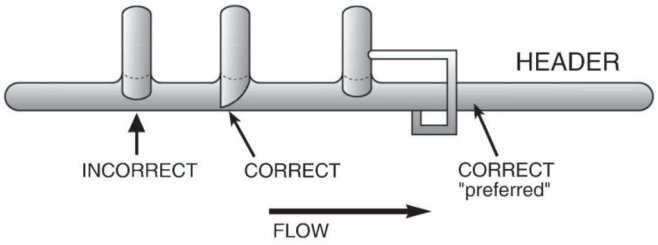


Fig. 10 — Piping Recommendations

Interstage manifolds are commonly applied with parallel 06CC rack designs and are frequently used to provide a point of connection for the suction side of the subcooler or economizer. The cool suction gas exiting the subcooler is used to provide additional motor cooling in 06CC models. This design reduces the amount of liquid injection required for motor cooling. These manifolds act to efficiently distribute cool refrigerant gas to the interstage connection points of all applied 06CC model compressors. To prevent uneven distribution of the cool refrigerant gas, the suction line of the subcooler must be connected to the interstage manifold near the center of the manifold. This design allows for reduced liquid injection at the peripheral compressor models due to more even refrigerant gas flow. End feeding the interstage manifold results in poor liquid distribution to the compressors if flooding occurs. The individual line to each compressor from the common interstage manifold should be piped from the top of the manifold for best liquid distribution if flooding occurs.

To help prevent liquid refrigerant floodback and oil slugging into the suction inlet of the Carlyle® Compound Cooling compressors, a suction accumulator should be used in conjunction with a properly designed suction manifold, although use of a well designed and sufficiently oversized suction manifold may also suffice. In multiple compressor applications, one large accumulator manifolded to individual compressors is recommended rather than smaller individual accumulators on each compressor.

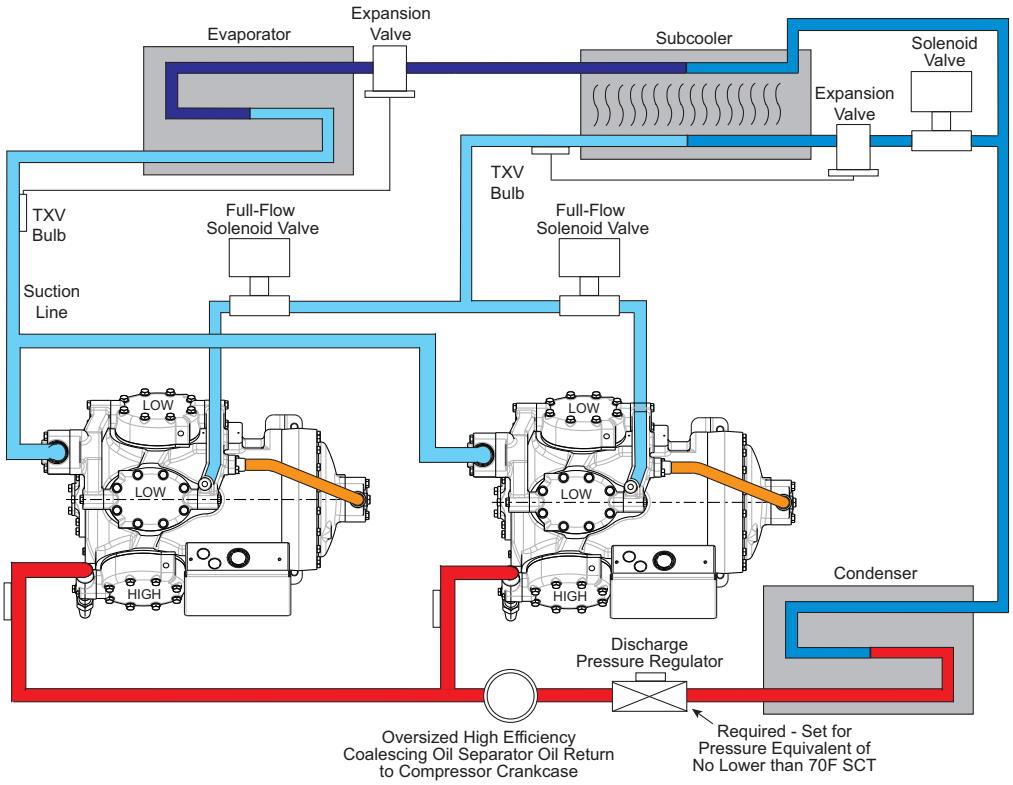


Fig. 11 — Compound Cooling System Piping / HFC Multiple Compressor Systems

3.2 Suction Line Sizing

Suction lines and suction risers must be sized to ensure adequate velocity for oil return, taking into account the reduction in mass flow associated with the use of a mechanical subcooler. The lack of proper line sizing may result in premature compressor failure due to oil slugging. Improper suction line sizing may cause oil “logging” which can lead to compressor failures.

3.3 Suction Pressure Range

Carlyle® Compound Cooling compressors are specifically designed for today’s low temperature applications. The added advantages are its capability to also use HFC refrigerants. The designed operating range is from -60 F (-51.1 C) to -10 F (-24 C) saturated suction temperature.

3.4 Intermediate Pressure Range

The intermediate pressure may be calculated using the equation in this section or the tables provided in this guide. The intermediate pressure of the Carlyle Compound Cooling compressors will vary based on suction and discharge pressure as well as the amount of interstage flow due to subcooling and de-superheating.

When subcooling and de-superheating are employed, the approximate intermediate pressure may be calculated by taking the square root of the product of the suction and discharge pressure, plus or minus ten psi.

P1 = Suction Pressure (PSIA)

P2 = Discharge Pressure (PSIA)

AIP = Approximate Interstage Pressure

$$AIP = \sqrt{P1 \times P2}$$

If a subcooler is not used, the intermediate pressure may be up to 30 psi (2.07 bars) lower than the AIP. In addition, shown in tables “R-22 Approximate Interstage Pressure ± 10 psig with Subcooler” and “R-507/R-404A Approximate Interstage Pressure ± 10 psig with Subcooler” are approximate interstage pressures for R-22, R-404A, R-407A, and R-507.

3.5 Discharge Pressure Range

Carlyle Compound Cooling compressors are designed to handle discharge pressures as high as 130 F (54 C) saturated condensing temperature with R-22, R-507 and R-404A. Low discharge pressure limit for R-22, R-507, R-407A, and R-404A is 70 F saturated condensing temperature.

3.6 High-Low Pressure Switches

The use of high pressure and low pressure safety switches are required for all 06CC applications. These switches should be adjusted based on the application and compressor operating envelope.

Important!

Low pressure switches must be connected to the low pressure port. The crankcase of all 06CC models operates at intermediate pressure.

NOTE: A high pressure safety switch is no longer required for the interstage of the 06CC model compressors. Carlyle has implemented a design change that eliminates the need for these switches. The 06CC models do not require this additional safety switch as noted in the following:

06CC, 16 to 37 cfm - Manufactured after Serial No. 0395J01327

06CC, 50 to 99 cfm - Manufactured after Serial No. 5194J00703

4.0 Compressor Features

4.1 Overtemperature Protection

All Carlyle® Compound Cooling 06CC models are supplied with a discharge temperature sensor located in the high-stage cylinder head of the compressor. This sensor is designed to open at 295 F (±5 F) and to close at 235 F. The discharge temperature sensor operates as an automatic reset device; however, Carlyle recommends that it is wired into the control scheme in a manner to function as a manual reset device.

NOTE: The 16 to 37 cfm models also have an internal thermostat embedded in the motor windings. This internal thermostat has a set of contacts which are rated for 240 VA and are intended to open the compressor contactor circuit in the event of an overtemperature condition.

4.2 Overcurrent Protection

The 16 to 37 cfm model versions are supplied with motor overloads located inside the compressor terminal box intended for overcurrent protection. The 50 to 99 cfm model versions require the application of a Carlyle approved calibrated circuit breaker or a solid-state overload relay.

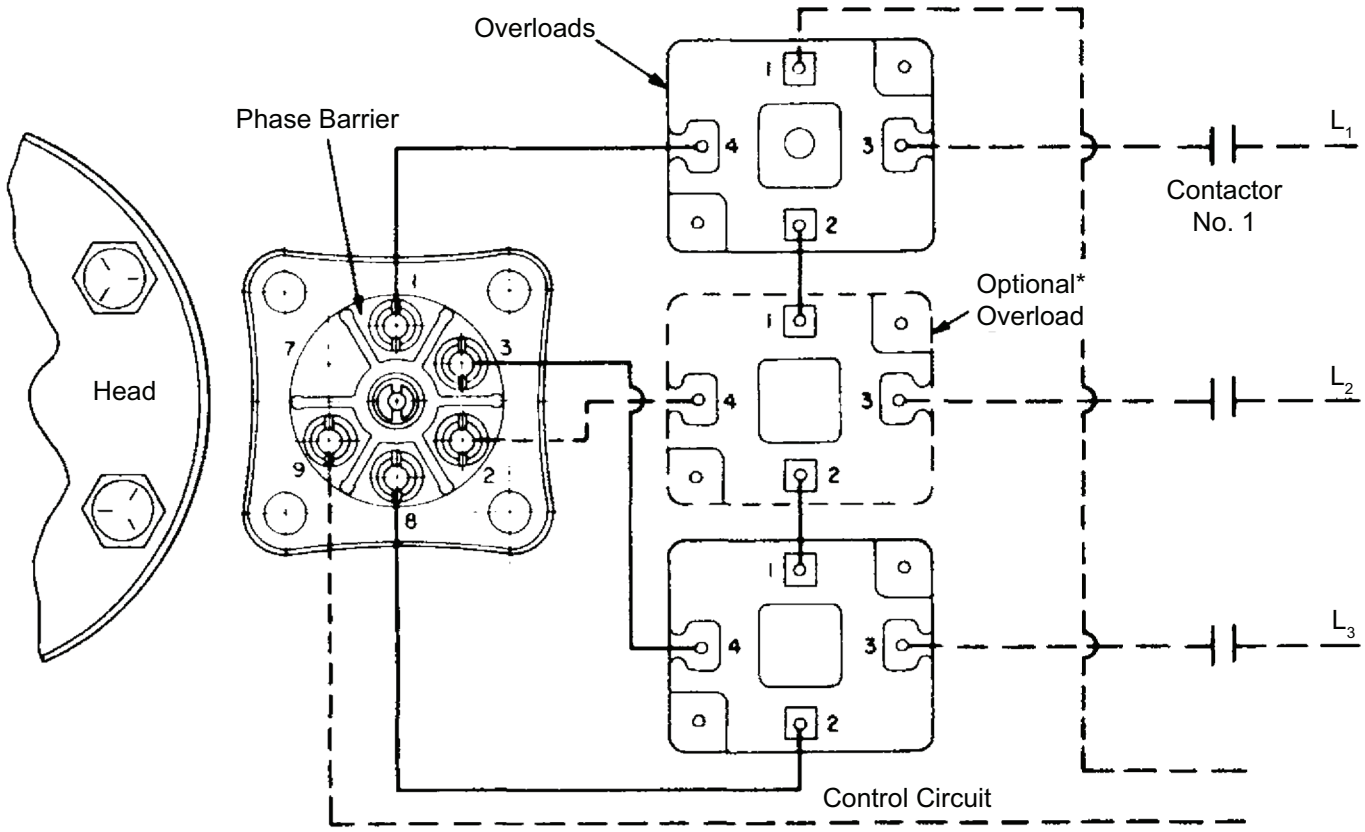
The specific calibrated circuit breaker or overload relay for each model is shown in sections 1.4 and 1.6 of this document.

4.3 Internal Pressure Relief Valves

Carlyle 06CC models between 50 and 99 cfm utilize internal pressure relief valves to comply with agency safety requirements. One of these pressure relief valves is located on the low-stage valve plate and relieves pressure from the intermediate-stage to the low-stage in the event of an over-pressure condition. The second relief valve is located in the body of the compressor underneath the center head valve plate and is intended to relieve pressure from the high-stage to the intermediate-pressure stage. These pressure relief valves are safety devices and are not intended to reset with full function after opening. These pressure relief valves are field replaceable.

5.0 Compressor Wiring

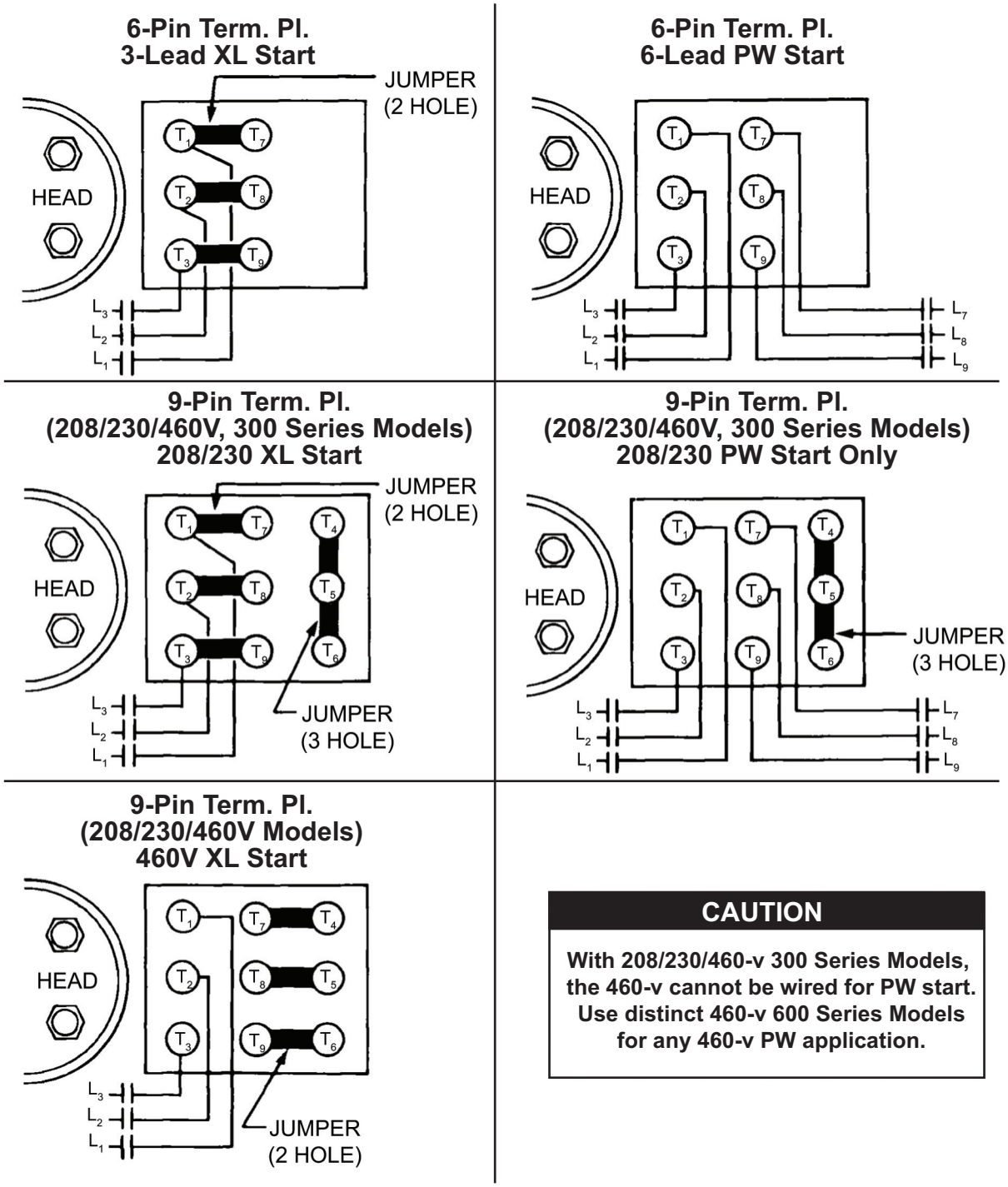
Typical 06CC 16 to 37 cfm Installation Wiring



(Customer wiring shown dotted)
* Third overload required on some compressions.

Fig. 12 — Typical 06CC 16 to 37 cfm Installation Wiring

Typical 06CC 50 to 99 cfm Installation Wiring



CAUTION

With 208/230/460-v 300 Series Models, the 460-v cannot be wired for PW start. Use distinct 460-v 600 Series Models for any 460-v PW application.

Fig. 13 — Typical 06CC 50 to 99 cfm Installation Wiring

6.0 Compressor Accessories

Solid-State Oil Pressure Switch

PACKAGE NO.	QTY	CONN	VOLTAGE
06DAA660115	1	ELEC	120/240

Mechanical Oil Pressure Switch

PACKAGE NO.	QTY	CONN	VOLTAGE
P529-2410	1	36" Lg Cap 1/4" SAE FL Nut	115/230
P529-2430	1	1/4" Male Flare	115/230

NOTE: All oil pressure switches have a 120-second time delay, manual reset and have a switch differential setting of 8 to 11 psi cut-in (0.55 to 0.76 bar) and 4 to 8 psi (0.28 to 0.55 bar) cutout.

Crankcase Heaters

PACKAGE NO.	QTY	VOLTAGE	WATTS
06DA660076	1	125	460
06EA660167	1	115	180
06EA660168	1	230	180

Cylinder Head Cooling Fans

PACKAGE NO.	QTY	V-Ph-Hz	USAGE
06DR660014	1	208/230-1-60	16-37 cfm
06ER660011	1	208/230-1-60	50-99 cfm

NOTE: Fan package includes motor, fan, and fan guard assembly.

Compressor Spring Mounting Packages

PACKAGE NO.	QTY	USAGE
06DA660057	1	16-37 cfm
06EA660089	1	50-99 cfm

Compressor Solid Mounting Package

PACKAGE NO.	QTY	USAGE
30HR070-1071	1	All Carlyle Compound Cooling Compressors

NOTE: 1-1/8 OD x 1" high 1/2" diameter thru hole, use to solid mount any Calyle® Compound Cooling compressor (4 spacers per compressor).

Baffle Plates

PACKAGE NO.	QTY	USAGE
06DA660105	1	16-37 cfm
06EA660145	1	50-99 cfm

NOTES:

1. The correct baffle plate must be selected for the application or excessive pressure drop may result.
2. Two gaskets are included in each package.
3. Baffle plate is installed between compressor and discharge service valve.

Economizer Adapter Flange

PACKAGE NO.	USAGE
06EA660156	All Carlyle Compound Cooling Compressors
06DA660061 (7/8" ODS Serv. Vlv.)	50-99 cfm Only

Muffler Packages

PACKAGE NO.	QTY	USAGE	INLET/OUTLET INCHES
06DA605594	1	16 cfm	5/8" ODF
06DA605604	1	17-25 cfm	7/8" ODF
06DA605614	1	28-37 cfm	1-1/8" ODF
06EA500302	1	50 cfm	1-3/8" ODF
LM10HH100	1	65-75 cfm	1-3/8" ODF
06EA500712	1	99 cfm	1-5/8" ODF

NOTE: Mufflers can be mounted vertically or horizontally.

Power Terminal Parts Connections for HH83XB Breakers

PACKAGE NO.	USAGE
06EA660152	No. 1 and No. 2 Wire
06EA660153	No. 4 Wire

NOTE: XB series breakers currently require customer-supplied power wire connections at breaker. These packages contain ring terminals, cap screws, and lock washers.

Terminal Parts Package

PACKAGE NO.	QTY	USE WITH	USAGE
06EA900132	1	No. 6 Wire	50-99 cfm
06EA900102	1	No. 4 Wire	50-99 cfm
06EA900112	1	No. 2 Wire	50-99 cfm
06EA900122	1	No. 1/0 Wire	50-99 cfm

NOTE: Package contains 6 ring terminals to connect power wiring to compressor terminal studs, plus 3 spare 2-hole jumper bars.

Subcoolers with R-22

Counter Flow Applications

MODEL NUMBER	CAPACITY (Btuh)	MASS FLOW (lb/hr)
B8X10X7/8S	12,000	540
B8X20X7/8S	24,000	1080
B8X30X7/8S	36,000	1619
B8X40X7/8S	48,000	2159
B15X30X7/8S	60,000	2699
B25X30X1-1/8S	90,000	4048

Parallel Flow Applications

MODEL NUMBER	CAPACITY (Btuh)	MASS FLOW (lb/hr)
B15X10X7/8S	12,000	540
B15X20X7/8S	24,000	1080
B15X30X7/8S	36,000	1619
B15X40X7/8S	48,000	2159
B25X50X1-1/8S	60,000	2699

Subcoolers with R-404A/R-507

Counter Flow Applications

MODEL NUMBER	CAPACITY (Btuh)	MASS FLOW (lb/hr)
B8X10X7/8S	11,400	543
B8X20X7/8S	15,200	602
B8X30X7/8S	25,400	972
B15X30X7/8S	44,300	1695
B25X30X1-1/8S	66,100	2530

Parallel Flow Applications

MODEL NUMBER	CAPACITY (Btuh)	MASS FLOW (lb/hr)
B8X10X7/8S	10,300	543
B8X20X7/8S	13,700	602
B8X30X7/8S	22,100	972
B15X30X7/8S	38,600	1695
B25X30X1-1/8S	57,600	2530

NOTES:

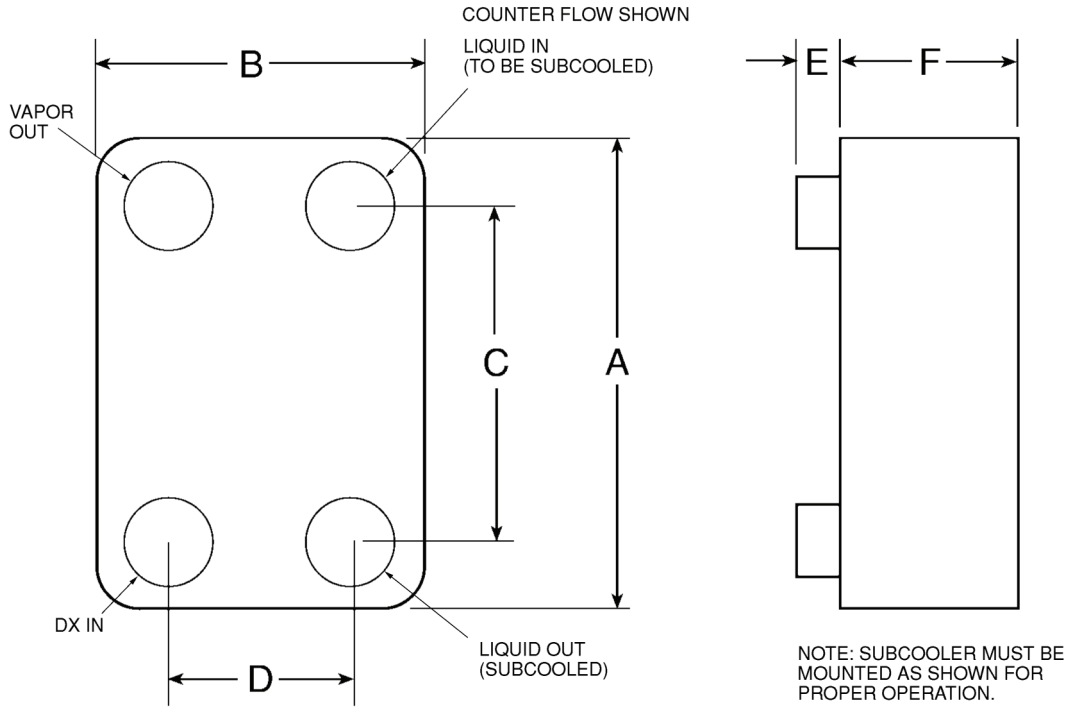
1. Capacities are based on 25 F SST/110 F SDT with a 35 F liquid for R-22 and R-404A / R507 for parallel and counter flow applications.
2. Subcooler selections are based on R-22, with an entering liquid temperature of 110 F (43 C) direct expanding to 25 F (-4 C) SIT and 7 F (-14 C) superheat on side, 1 and 110 F (43 C) liquid temperature entering and 35 F (2 C) leaving on side 2.

   Please contact Carlyle for proper sizing of subcoolers with HFC refrigerants.

De-Superheating Expansion Valves

COMPRESSOR	TONNAGE	PART NO.
06CC016	1/2	EA11ZC011
06CC017	1/2	EA11ZC011
06CC018	1/2	EA11ZC011
06CC124	1/2	EA11ZC011
06CC125	1/2	EA11ZC011
06CC228	1/2	EA11ZC011
06CC337	1/2	EA11ZC011
06CC550	1	EA11ZC022
06CC665	1	EA11ZC022
06CC675	1	EA11ZC022
06CC899	1-1/2	EA11ZC030

Subcooler Dimensions



TYPE	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)
B8X10	12.28	2.83	10.94	1.57	0.79	1.04
B8X20	12.28	2.83	10.94	1.57	0.79	1.92
B8X30	12.28	2.83	10.94	1.57	0.79	2.80
B8X40	12.28	2.83	17.01	1.57	0.79	3.69
B15X10	18.35	2.83	17.01	1.57	0.79	1.21
B15X20	18.35	2.83	17.01	1.57	0.79	2.09
B15X30	18.35	2.83	17.01	1.57	0.79	2.97
B15X40	18.35	2.83	17.01	1.57	0.79	3.85
B25X30	22.20	6.81	18.86	2.83	2.13	5.61
B25X50	22.20	6.81	18.86	2.83	2.13	7.46

Appendix

1. Compressors are shipped without service valves (unless specially ordered) and have blank-off pads bolted over the service valve openings. The suction and discharge service valves and the economizer adapter must be ordered for each compressor.
2. Compressor part number on the nameplate will be the same as the package ordering number, EXCEPT the last digit of the part number on the compressor will be a zero (0) instead of a one to five (1 to 5).
3. All Carlyle® Compound Cooling compressor (16 to 37 cfm) are wired for XL (across the line) start only.
4. All Carlyle Compound Cooling compressor (50 to 99 cfm) are suitable for XL (across the line) or PW (part winding) start EXCEPT the 460-v in the 208/230/460 triple voltage compressors. The distinct 460-v model must be used for any 460-v part winding applications. Customer is required to hook up terminal plate for applicable voltage. Wiring hook up diagrams are included in the compressor terminal box. Also a typical 230-v wiring schematic is included with this guide on page 27.
   NOTE: These compressors will also operate at 50 Hz.
5. Carlyle Compound Cooling compressors:
   a. have an oil sight glass
   b. are dehydrated and have dry air holding charge (5 to 15 psi)
   c. 16 to 37 cfm compressors oil level is 1/2 of a sight glass
   d. 50 to 99 cfm compressors oil level is 1/8 to 3/8 of a sight glass
   e. refer to Carlyle Compound Cooling compressor model numbers for oil or oil-less compressors
   f. have pressure connections for oil protection
6. Carlyle recommends but does not require cylinder head cooling fans for all Carlyle Compound Cooling compressor R-22 applications.
7. All Carlyle Compound Cooling compressors (16 to 37 cfm) are provided with complete motor overcurrent and overtemperature protection, which complies with UL and NEC requirements for inherent motor protection. Primary motor protection is provided by current sensitive relays located inside the compressor terminal box. Thermal protection is provided by an internal thermostat embedded in the motor windings. All Carlyle Compound Cooling compressor (16 to 37 cfm) models are UL and CSA approved with R-22, R-404A, and R-507 refrigerants.
8. The 50 to 99 cfm Carlyle Compound Cooling compressor models are provided WITHOUT motor overcurrent protection, which MUST be supplied by the customer. Calibrated circuit breakers and Furnas solid-state overload relays specifically selected for each motor and voltage are available and recommended.
9. See circuit breaker accessory selection. If OEM customer selects alternate overcurrent protection, it must be approved by Carlyle Application Engineering Department. The use of authorized overcurrent protection is part of the basis of UL recognition. Selection of alternate overcurrent protection without Carlyle's approval will VOID warranty.
10. All nine Carlyle Compound Cooling compressor models have a well in the cast iron bottom plate in which a crankcase heater can be inserted. A crankcase heater is recommended for use with all Carlyle Compound Cooling compressor models. All 180 watt insertion type crankcase heaters are required to use thermal grease provided in the accessory package (grease part number 38AQ680001).
11. All Carlyle Compound Cooling compressor models are provided with a temperature sensor installed in the high stage cylinder head to monitor the temperature of the discharge gas. If the discharge gas temperature in the head exceeds the trip setting of 295 F (146.1 C), the sensor will open the control circuit and shut off the compressor.
12. All Carlyle Compound Cooling compressor models are now being shipped without oil.

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