

O6D/E APPLICATION GUIDE

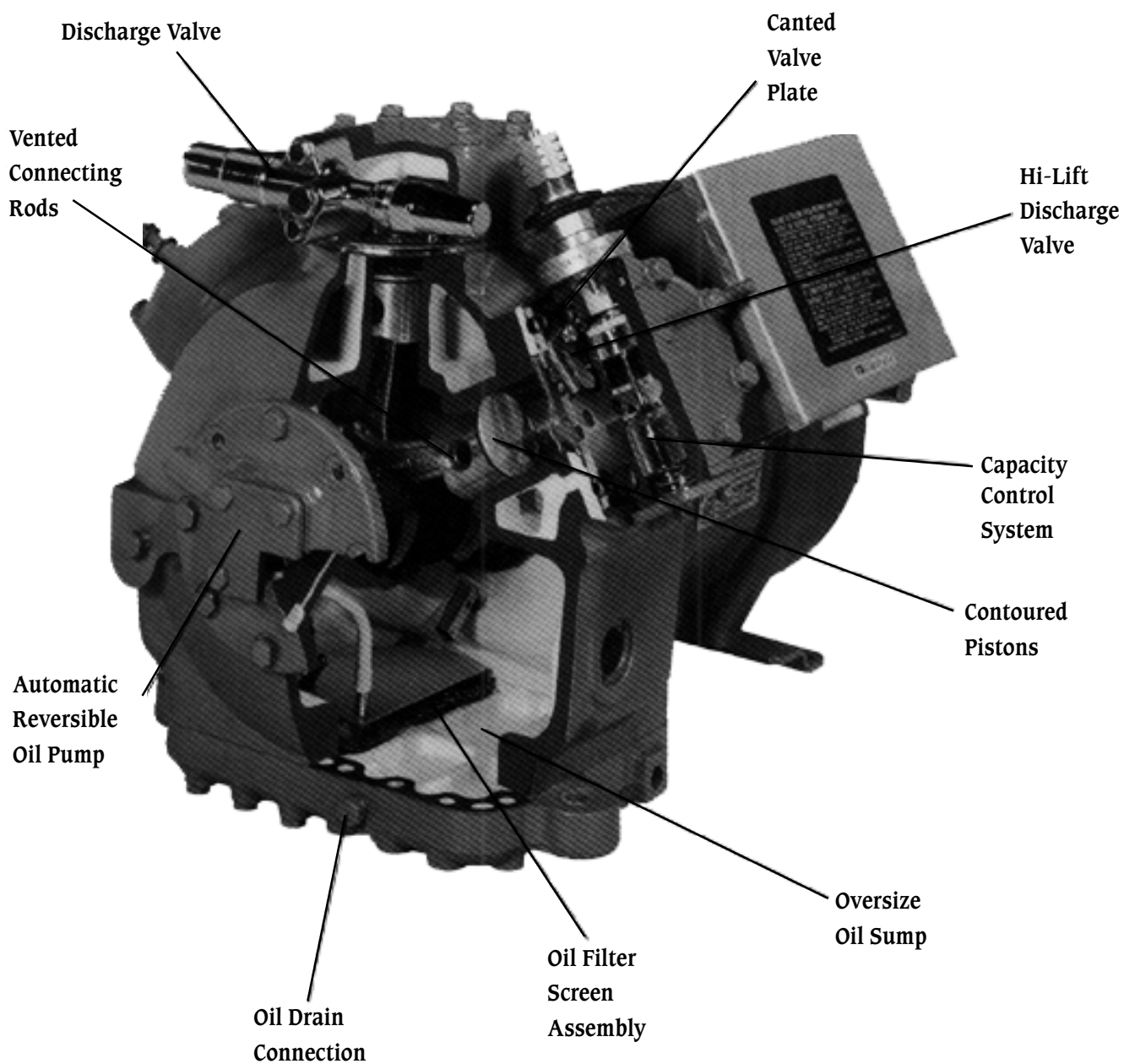


TABLE OF CONTENTS

General Information	2	4.0 Compressor Features and Accessories	36
Features of Carlyle 06D/E Compressors	2	4.1 06D Compressor Motor Protection	36
06D/E Model Number Significance	4	4.2 06E Compressor Motor Protection	37
06D/E Compressor Specification Tables	5	4.3 Rated Load Amperes (RLA) and Maximum Continuous Current (MCC)	41
06D/E Refrigeration Compressor Specifications	5	4.4 06D Compressor MCC Values	42
06D/E Compressor Specifications (60 Hz Units)	6	4.5 06E Compressor MCC Values	42
06D/E Compressor Specifications (50 Hz Units)	7	4.6 06D Compressor Contactor Selection	42
06D/E Compressor Specification Drawings	8	4.7 06D Compressors: Wire Sizing	42
06D Medium/High Temperature Compressors	8	4.8 06E Compressors: Contactor Selection and Wire Sizing	43
06D Low Temperature Compressors	11	4.9 Compressor Nameplate Data	43
06E Medium/High Temperature Compressors	14		
06E Low Temperature Compressors	15	5.0 Compressor Features and Accessories	44
1.0 System Design Considerations	17	5.1 Safety Relief Valves	44
1.1 General Application Information	17	5.2 Suction Strainers	44
1.2 Compressor Rating Notes	17	5.3 Oil Safety Switch	44
1.3 Refrigerant Piping	19	5.4 Crankcase Heaters	45
1.4 Vibration Isolation	20	5.5 Mufflers	45
1.5 Refrigerant Migration and Floodback	20	5.6 Baffle Plates	46
1.6 Clean and Dry System	21	5.7 Discharge Line Check Valves	46
1.7 Prevent Excessive Discharge Temperatures	21	5.8 Suction Cut-Off Capacity Control	46
1.8 Compressor Interconnection	21	5.9 Cylinder Head Cooling Fans	46
1.9 Motor-Compressor Selection	24	5.10 Spring Mounting	47
1.10 Outdoor Use	24	5.11 Solid Mounting	47
1.11 Code Approvals	24	5.12 Electrical Terminal Parts	47
2.0 Compressor Lubrication System	25	5.13 Conduit Adapter Plates	47
2.1 Compressor Lubrication	25	5.14 SAE Adapter Fitting	47
2.2 The Oil Pump	27	5.15 Service Valves	48
2.3 Recommended Oils	27		
2.4 06D/E Oil Pressure History	27		
3.0 Capacity Control	29		
3.1 Suction Cut-Off Capacity Control	29		
3.2 Design for Proper Oil Return	29		
3.3 Capacity Control Application Ranges	29		
3.4 Pump-Down Control	30		
3.5 Unloader Differential Setting	30		
3.6 Part Load Performance Factors	31		
3.7 Location and Size of Capacity Control Head Assembly	31		
3.8 Pressure Differential Required to Load Compressor	32		
3.9 Electric Solenoid Capacity Control Operation	32		
3.10 Suction Pressure Capacity Control Operation	33		
3.11 Pressure Actuated Capacity Control Adjustment	34		
3.12 Variable Frequency Drives	35		

General Information

Features of Carlyle 06D/E Compressors



Carlyle 06D/E semi-hermetic compressors are ideally suited for commercial refrigeration, air conditioning, process cooling, and environmental chambers. They are extremely flexible and may be used with many of the new HFC refrigerants such as R-507, R-404A, and R-134a, in addition to the conventional refrigerants (R-12, R-22, and R-502). The compressors may be operated at 50 or 60 hertz and are UL (Underwriters' Laboratories), CSA (Canadian Standards Association), and ISO 9002 approved. Many of the prominent features of the 06D/E compressors are listed below.

High Efficiency Valving System

The valving system utilizes low lift valves and high flow ports to reduce valve losses, maximize efficiency, and reduce valve stress. Carlyle's valves are made of Swedish steel, the finest material available for this application.

Contoured Pistons and Vented Connecting Rods

The pistons are contoured allowing the suction valves to mate up with the recess in the pistons, resulting in reduced clearances which increases both capacity and efficiency. The connecting rods are also vented to provide premium bearing lubrication and longer life.

Automatic Reversible High Flow Oil Pump

The positive displacement vane type oil pump is extremely durable and produces a high volume of oil flow. With the new HFC refrigerants and POE (polyolester) oils (which are more soluble), the 06D/E oil pump will produce oil pressure quickly, reducing the potential for nuisance oil pressure trips.

Oversize Oil Sump

On start-up, oil level can temporarily drop too low, causing unnecessary wear in other compressor designs because on shutdown, the oil is diluted by refrigerant. The Carlyle oversize oil sump holds extra oil in crankcase to prevent normal oil migration from dropping the oil level below the safe lubrication range.

High Efficiency Heavy Duty Motors

These motors have the latest insulation systems which helps to prevent motor burnouts, especially during hot weather periods, when operating pressures, temperatures, and currents (amps) are high.

Suction Inlet Screen

The suction inlet screen prevents installation scale or abrasives from entering the compressor and shortening the life of the motor and compressor.

Oversize Suction Gas Passages

The oversize suction gas passages generate less turbulence, lower pressure drops and more efficient motor cooling by suction gas, thereby producing a cooler motor that has a more economical operation and longer life.

Main Bearings and Running Surface Steel Backed Aluminum or Tin Based Babbitt

Aluminum or tin based babbitt material is used on bearing surfaces to provide greater load carrying ability than other types of materials and are also less susceptible to damage from overheating or liquid refrigerant.

Crankcase Oil Heater

This optional accessory warms crankcase oil to reduce refrigerant migration which occurs during shutdown periods.

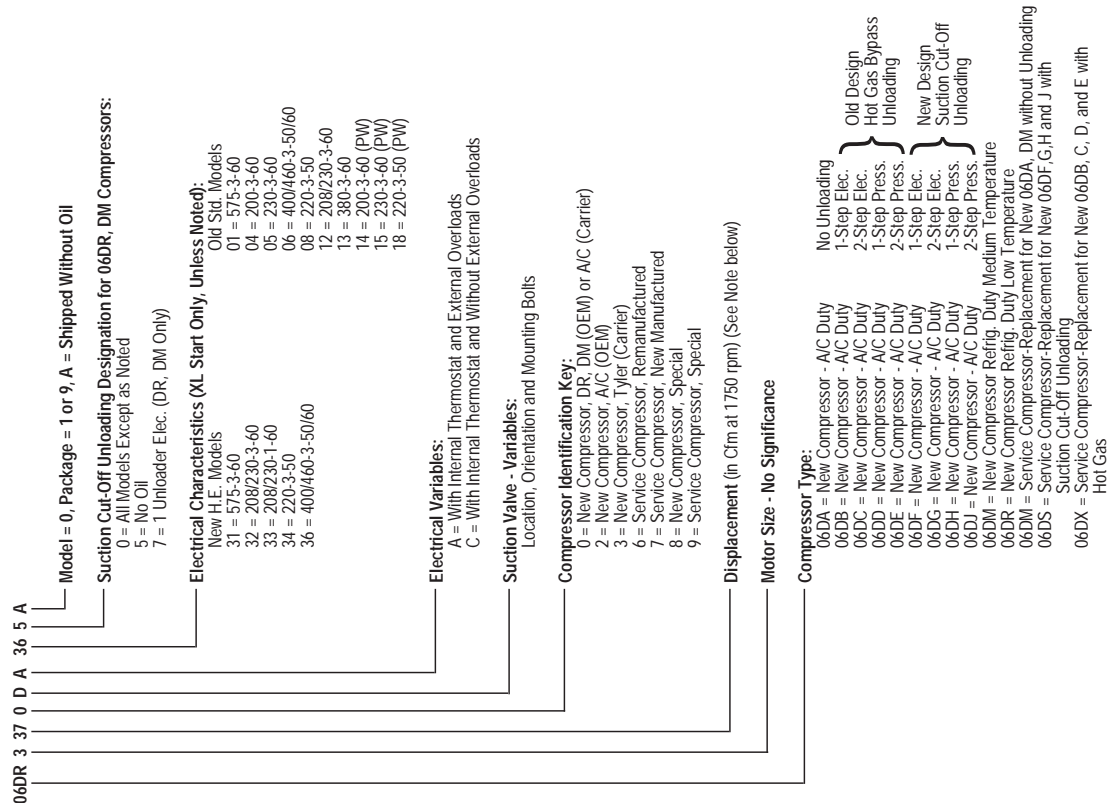
Capacity Control System

Suction cut-off unloading is an option on all four and six cylinder Carlyle 06D/E compressors. Suction cut-off unloading is an efficient method of capacity control that literally blocks off the suction of two cylinders at a time. This method is not only efficient, but results in much cooler operating temperatures than hot gas bypass style designs.

ISO 9002 Registration

Carlyle Compressor has ISO 9002 Registration by Underwriters' Laboratories, Inc. to manufacture 06D/E semi-hermetic reciprocating compressors ranging in size from 2 to 40 tons of refrigeration capacity. That means we have a top quality system in place and will be continually working to improve it. So you can be assured you will always be getting the highest quality compressors with Carlyle.

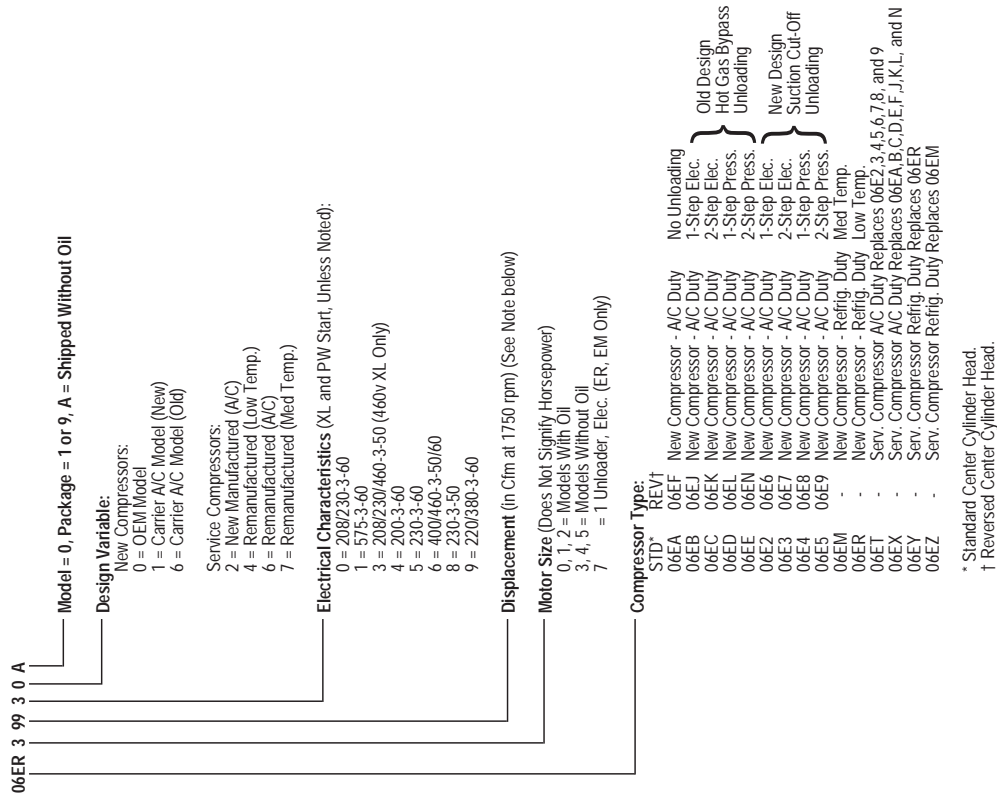
06D Compressor Model Number Significance



LEGEND

A/C - Air Conditioning
OEM - Original Equipment Manufacturer
PW - Part Wind
XL - Across-The-Line

06E Compressor Model Number Significance



* Standard Center Cylinder Head.

† Reversed Center Cylinder Head.

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").

LEGEND

A/C - Air Conditioning
OEM - Original Equipment Manufacturer
PW - Part Wind
XL - Across-The-Line

06D/E Compressor Specification Tables

06D/E Refrigeration Compressor Specifications

MODEL NUMBER	DIMENSIONS INCHES (CM)				MOUNTING CENTERS	SERVICE VALVES ²		ELECTRICAL DATA ¹					
	LENGTH		WIDTH			HEIGHT		SUCTION CONN. (IN) SWEAT	DISCH. CONN. (IN) SWEAT	208/230-3-60		400-3-50, 460-3-60	
										*RLA	LRA	*RLA	LRA
06DM808	18.53 (47.07)	10.00 (25.40)	15.00 (38.10)	8.88 x 12.88 (22.55 x 32.71)	7/8	5/8	12.4	71	6.2	35.5			
06DR109	18.53 (47.07)	10.00 (25.40)	15.00 (38.10)	8.88 x 12.88 (22.55 x 32.71)	7/8	5/8	8.6	53.3	3.9	26.3			
06DM313	22.17 (56.31)	14.78 (37.54)	15.10 (38.35)	8.88 x 12.88 (22.55 x 32.71)	7/8	5/8	19.3	100	9.6	50			
06DR013	22.17 (56.31)	14.78 (37.54)	15.10 (38.35)	8.88 x 12.88 (22.55 x 32.71)	1-1/8	5/8	12.4	71	6.2	35.5			
06DM316	22.17 (56.31)	14.78 (37.54)	15.10 (38.35)	8.88 x 12.88 (22.55 x 32.71)	1-1/8	5/8	19.3	100	9.6	50			
06DR316	22.17 (56.31)	14.78 (37.54)	15.10 (38.35)	8.88 x 12.88 (22.55 x 32.71)	1-1/8	5/8	19.3	100	9.6	50			
06DA818	22.17 (56.31)	14.78 (37.54)	15.10 (38.35)	8.25 x 13.88 (20.96 x 35.26)	1-1/8	7/8	31.4	160	15.7	80			
06DR718	23.62 (59.99)	14.78 (37.54)	16.72 (42.47)	8.25 x 13.88 (20.96 x 35.26)	1-3/8	5/8	31.4	160	15.7	80			
06DR820	23.62 (59.99)	14.78 (37.54)	16.72 (42.47)	8.88/11.38 x 12.78 (22.5/28.90 x 32.46)	1-3/8	1-1/8	39.6	198	19.8	99			
06DA824	23.60 (59.94)	16.46 (41.81)	15.49 (39.34)	8.88/11.38 x 12.78 (22.5/28.90 x 32.46)	1-3/8	7/8	31.4	160	15.7	80			
06DR724	23.60 (59.94)	16.46 (41.81)	15.49 (39.34)	8.88/11.38 x 12.78 (22.5/28.90 x 32.46)	1-5/8	7/8	39.6	198	19.8	99			
06DA328	24.30 (61.72)	17.50 (44.45)	16.08 (40.84)	8.88/11.38 x 12.78 (22.5/28.90 x 32.46)	1-5/8	1-1/8	63.6	266	28.6	120			
06DA228	24.30 (61.72)	17.50 (44.45)	16.08 (40.84)	8.88/11.38 x 12.78 (22.5/28.90 x 32.46)	1-3/8	1-1/8	44.3	228	22.1	114			
06DA537	24.30 (61.72)	17.50 (44.45)	16.08 (40.84)	8.88/11.38 x 12.78 (22.5/28.90 x 32.46)	1-3/8	7/8	44.3	228	22.1	114			
06DM337	24.30 (61.72)	17.50 (44.45)	16.08 (40.84)	8.88/11.38 x 12.78 (22.5/28.90 x 32.46)	1-5/8	1-1/8	87.0	345	44.0	173			
06DR337	24.30 (61.72)	17.50 (44.45)	16.08 (40.84)	8.88/11.38 x 15.31 (22.5/28.9 x 38.88)	2-1/8	1-1/8	76.0	283	38.0	142			
06EA250	31.22 (79.30)	21.49 (54.58)	21.14 (53.70)	8.88/11.38 x 15.31 (22.5/28.9 x 38.88)	2-1/8	1-1/8	76.0	283	38.0	142			
06EM150	31.22 (79.30)	21.49 (54.58)	21.14 (53.70)	8.88/11.38 x 15.31 (22.5/28.9 x 38.88)	1-5/8	1-3/8	112.0	446	56.0	223			
06EA265	33.38 (84.79)	23.68 (60.15)	20.32 (51.61)	8.88/11.38 x 17.38 (22.5/28.9 x 44.15)	2-1/8	1-3/8	90.0	345	45.0	173			
06ER165	33.38 (84.79)	23.68 (60.15)	20.32 (51.61)	8.88/11.38 x 17.38 (22.5/28.9 x 44.15)	2-1/8	1-3/8	135.0	506	68	253			
06EA275	33.38 (84.79)	23.68 (60.15)	20.32 (51.61)	8.88/11.38 x 17.38 (22.5/28.9 x 44.15)	2-1/8	1-3/8	114.0	446	57.0	223			
06EM175	33.38 (84.79)	23.68 (60.15)	20.32 (51.61)	8.88/11.38 x 17.38 (22.5/28.9 x 44.15)	2-1/8	1-3/8	90.0	345	45.0	173			
06ER175	33.38 (84.79)	23.68 (60.15)	20.32 (51.61)	8.88/11.38 x 17.38 (22.5/28.9 x 44.15)	2-1/8	1-5/8	189.0	690	95.0	345			
06EA299	33.38 (84.79)	23.68 (60.15)	20.32 (51.61)	8.88/11.38 x 17.38 (22.5/28.9 x 44.15)	2-1/8	1-5/8	163.0	610	82.0	305			
06EM199	33.38 (84.79)	23.68 (60.15)	20.32 (51.61)	8.88/11.38 x 17.38 (22.5/28.9 x 44.15)	2-1/8	1-3/8	130.0	506	65.0	253			
06ER099	33.38 (84.79)	23.68 (60.15)	20.32 (51.61)										

¹Electrical Characteristics:

Models listed are available for the following power supplies: 208/230-3-60, 460/400-3-60/50, 575-3-60

* RLA based on MCC ÷ 1.40 for 06D

* RLA based on Max. Must Trip Allowance of motor ÷ 1.40 for 06E

LEGEND
LRA - Locked Rotor Amps
RLA - Rated Load Amps

²Alternate service valve model available in most cases.

06D/E Compressor Specifications (60 Hz Units)

MODEL NUMBER	HP	CFM @ 1750 RPM	SUCTION TEMPERATURE RANGE (DEGREES F)										NUMBER OF CYLINDERS	BORE (INCHES)	STROKE (INCHES)	OIL CHARGE (PINTS)	NET WEIGHT (LBS)
			R-502, 404A/507		R-12, R-134a				R-22								
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX							
06DR109	2.0	8.70	-40	0	-10	50	-35	10			2	2.00	1-3/8	3.00	160		
06DM808	3.0	8.00	0	40	-10	50	0	45			2	2.00	1-1/4	3.00	160		
06DR013	3.0	13.10	-40	0	-10	50	-35	10			4	2.00	1	4.50	230		
06DM313	5.0	13.10	0	25	-10	50	0	45			4	2.00	1	4.50	235		
06DR316	5.0	15.90	-40	25	-10	50	-35	10			4	2.00	1-1/4	4.50	235		
06DM316	5.0	15.90	0	40	-10	50	0	45			4	2.00	1-1/4	4.50	235		
06DR718	5.0	18.30	-40	0	-10	50	-35	10			4	2.00	1-7/16	5.50	250		
06DA818	6.5	18.30	0	45	-10	50	0	50			4	2.00	1-7/16	5.50	250		
06DR820	6.5	20.00	-40	40	-10	50	-35	45			4	2.00	1-9/16	5.50	260		
06DR724	6.5	23.90	-40	25	-10	50	-35	45			6	2.00	1-1/4	8.00	310		
06DA824	7.5	23.90	0	45	-10	50	0	50			6	2.00	1-1/4	8.00	310		
06DR228	7.5	28.00	-40	30	-10	50	-35	45			6	2.00	1-15/32	8.00	315		
06DA328	10.0	28.00	0	45	-10	50	0	50			6	2.00	1-15/32	8.00	315		
06DR337	10.0	37.10	-40	25	-10	50	-35	45			6	2.00	1-15/16	8.00	325		
06DM337	10.0	37.10	0	25	-10	50	0	45			6	2.00	1-15/16	8.00	325		
06DA537	15.0	37.10	0	45	-10	50	0	50			6	2.00	1-15/16	8.00	325		
06ER150	15.0	50.30	-40	0	-10	50	-35	0			4	2-11/16	2-3/16	14.00	430		
06EM150	15.0	50.30	0	30	-10	50	0	45			4	2-11/16	2-3/16	14.00	430		
06EA250	20.0	50.30	0	45	-10	50	0	50			4	2-11/16	2-3/16	14.00	430		
06ER165	20.0	68.30	-40	0	-10	50	-35	0			6	2-11/16	1-63/64	19.00	480		
06EA265	25.0	68.30	0	45	-10	50	0	50			6	2-11/16	1-63/64	19.00	485		
06ER175	20.0	75.40	-40	0	-10	50	-35	0			6	2-11/16	2-3/16	19.00	490		
06EM175	25.0	75.40	0	35	-10	50	0	45			6	2-11/16	2-3/16	19.00	490		
06EA275	30.0	75.40	0	45	-10	50	0	50			6	2-11/16	2-3/16	19.00	490		
06ER099	30.0	99.00	-40	0	-10	50	-35	0			6	2-11/16	2-7/8	19.00	500		
06EM199	35.0	99.00	0	35	-10	50	0	45			6	2-11/16	2-7/8	19.00	505		
06EA299	40.0	99.00	0	45	-10	50	0	50			6	2-11/16	2-7/8	19.00	520		

Notes:

1. The cylinder head cooling fan section of this application guide details where this accessory is required.
2. The compressor performance tables reflect the operational envelope limitations for each model by refrigerant.

06D/E Compressor Specifications (50 Hz Units)

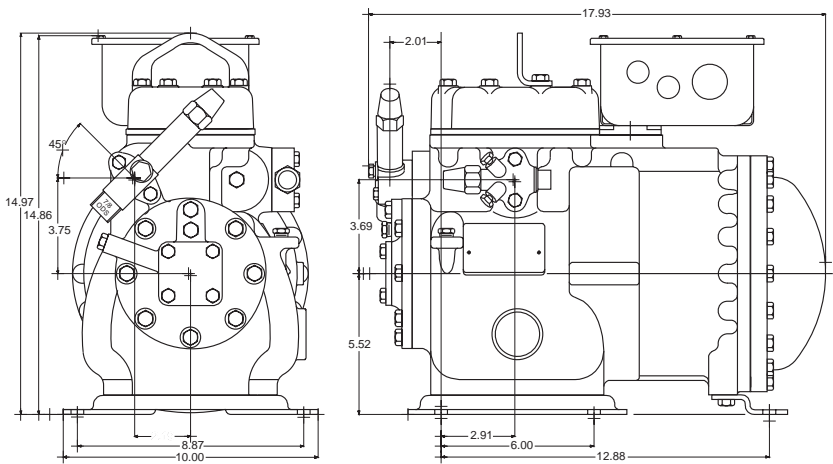
MODEL NUMBER	HP	CMM @ 1450 RPM	SUCTION TEMPERATURE RANGE (DEGREES C)										NUMBER OF CYLINDERS	BORE (CM)	STROKE (CM)	OIL CHARGE (LITERS)	NET WEIGHT (KG)
			R-502, 404A/507		R-12, R-134a		R-22										
			MIN	MAX	MIN	MAX	MIN	MAX									
06DR109	2.0	0.21	-40	-18	-23	10	-37	-12			2	5.08	3.49	1.42	73		
06DM808	3.0	0.19	-18	4	-23	10	-18	7			2	5.08	3.18	1.42	73		
06DR013	3.0	0.31	-40	-18	-23	10	-37	-12			4	5.08	2.54	2.13	104		
06DM313	5.0	0.31	-18	-4	-23	10	-18	7			4	5.08	2.54	2.13	107		
06DR316	5.0	0.38	-40	-4	-23	10	-37	-12			4	5.08	3.18	2.13	107		
06DM316	5.0	0.38	-18	4	-23	10	-18	7			4	5.08	3.18	2.13	107		
06DR718	5.0	0.43	-40	-18	-23	10	-37	-12			4	5.08	3.65	2.60	113		
06DA818	6.5	0.43	-18	7	-23	10	-18	10			4	5.08	3.65	2.60	113		
06DR820	6.5	0.47	-40	4	-23	10	-37	7			4	5.08	3.97	2.60	118		
06DR724	6.5	0.56	-40	-4	-23	10	-37	7			6	5.08	3.18	3.79	141		
06DA824	7.5	0.56	-18	7	-23	10	-18	10			6	5.08	3.18	3.79	141		
06DR228	7.5	0.66	-40	-1	-23	10	-37	7			6	5.08	3.73	3.79	143		
06DA328	10.0	0.66	-18	7	-23	10	-18	10			6	5.08	3.73	3.79	143		
06DR337	10.0	0.88	-40	-4	-23	10	-18	7			6	5.08	4.92	3.79	147		
06DM337	10.0	0.88	-18	-4	-23	10	-18	7			6	5.08	4.92	3.79	147		
06DA537	15.0	0.88	-18	7	-23	10	-18	10			6	5.08	4.92	3.79	147		
06ER150	15.0	1.19	-40	-18	-23	10	-37	-18			4	6.83	5.56	6.62	195		
06EM150	15.0	1.19	-18	-1	-23	10	-18	7			4	6.83	5.56	6.62	195		
06EA250	20.0	1.19	-18	7	-23	10	-18	10			4	6.83	5.56	6.62	195		
06ER165	20.0	1.61	-40	-18	-23	10	-37	-18			6	6.83	5.04	8.99	218		
06EA265	25.0	1.61	-18	7	-23	10	-18	10			6	6.83	5.04	8.99	220		
06ER175	20.0	1.78	-40	-18	-23	10	-37	-18			6	6.83	5.56	8.99	222		
06EM175	25.0	1.78	-18	2	-23	10	-18	7			6	6.83	5.56	8.99	222		
06EA275	30.0	1.78	-18	7	-23	10	-18	10			6	6.83	5.56	8.99	222		
06ER099	30.0	2.34	-40	-18	-23	10	-37	-18			6	6.83	7.30	8.99	227		
06EM199	35.0	2.34	-18	2	-23	10	-18	7			6	6.83	7.30	8.99	229		
06EA299	40.0	2.34	-18	7	-23	10	-18	10			6	6.83	7.30	8.99	236		

Notes:

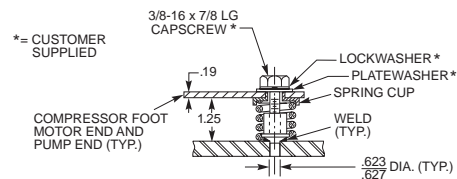
1. The cylinder head cooling fan section of this application guide details where this accessory is required.
2. The compressor performance tables reflect the operational envelope limitations for each model by refrigerant.

06D/E Compressor Specification Drawings

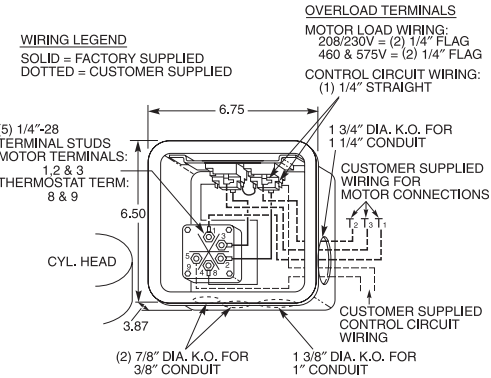
06D Medium/High Temperature Compressors



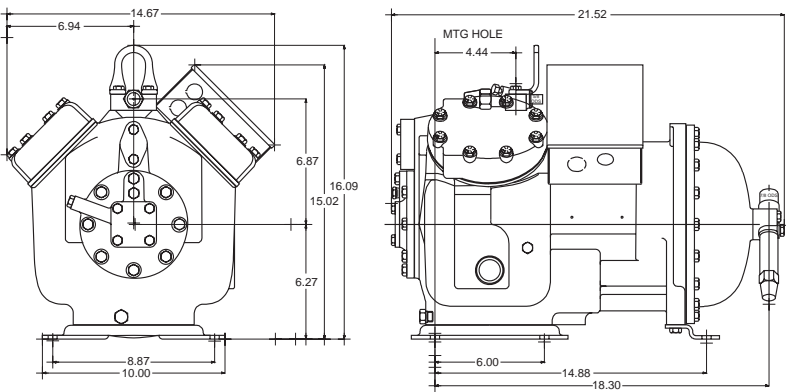
CYLINDERS: 2
CFM: 8
MODELS: 06DA808
06DM808
UNLOADING AVAIL: NO
STEPS: 0



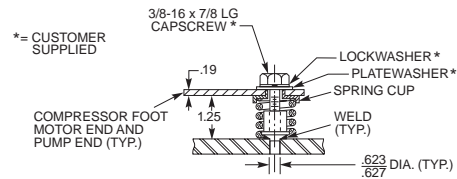
SPRING MOUNTING ARRANGEMENT



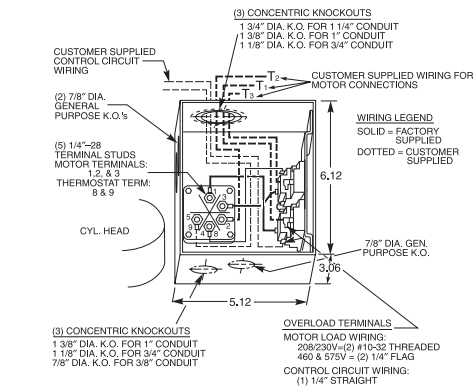
TERMINAL BOX DATA



CYLINDERS: 4
CFM: 13, 16
MODELS: 06DM313
06DM316
UNLOADING AVAIL.: YES
STEPS: 1



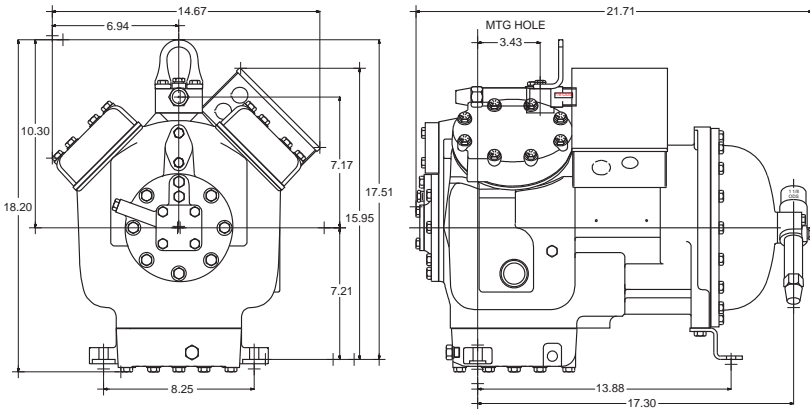
SPRING MOUNTING ARRANGEMENT



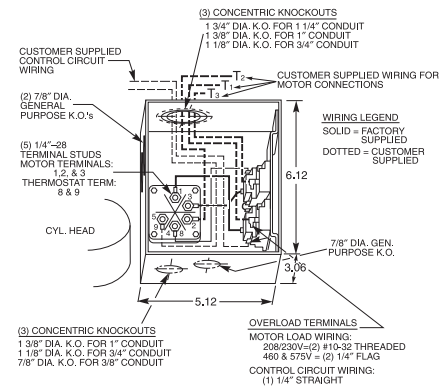
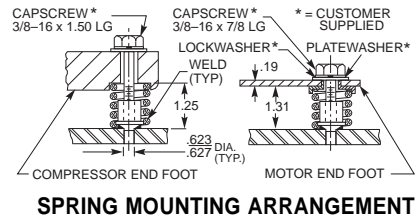
TERMINAL BOX DATA

NOTE: ALL DIMENSIONS ARE IN INCHES
Multiple service valve orientations are possible

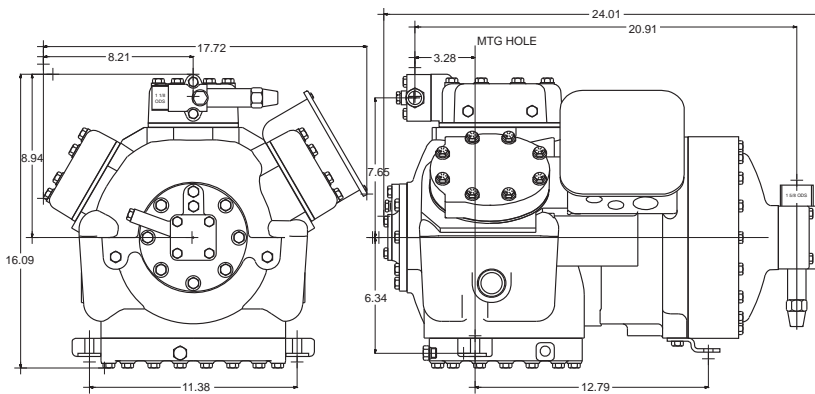
06D Medium/High Temperature Compressors (cont'd.)



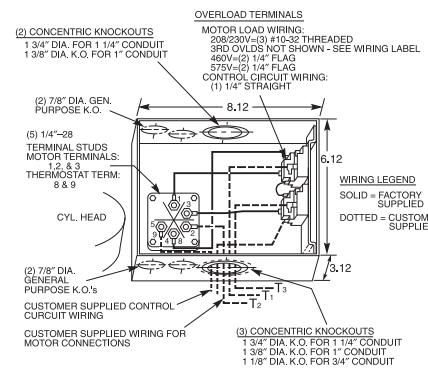
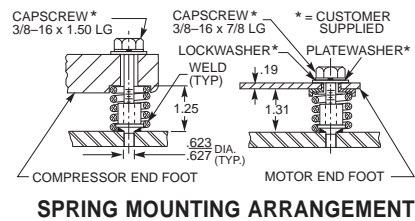
CYLINDERS: 4
CFM: 18
MODELS: 06DA818
UNLOADING AVAIL: YES
STEPS: 1



TERMINAL BOX DATA



CYLINDERS: 6
CFM: 28, 37
MODELS: 06DA328
06DA537
06DM337
06DR228
06DR337
UNLOADING AVAIL: YES
STEPS: 2

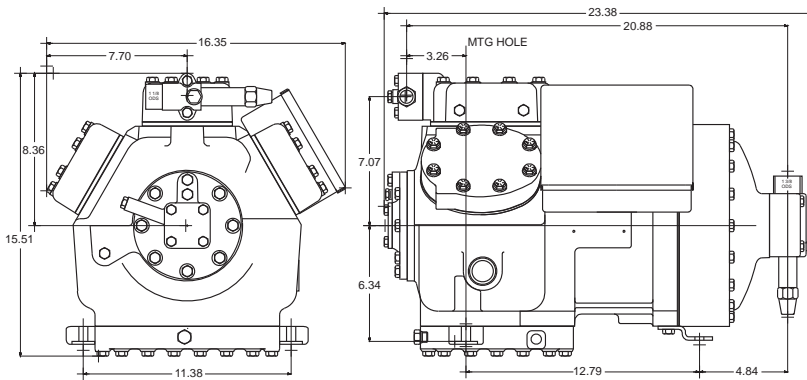


TERMINAL BOX DATA

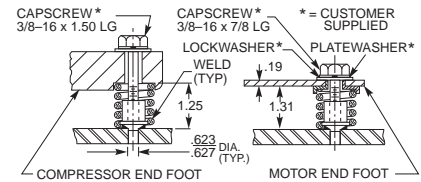
NOTE: ALL DIMENSIONS ARE IN INCHES
Multiple service valve orientations are possible

NOTE: 10 Hp, 208/230 v models use 3 overloads.

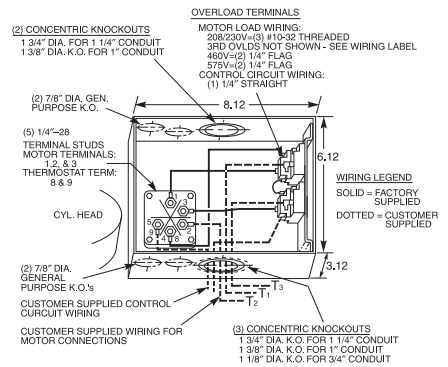
06D Medium/High Temperature Compressors (cont'd.)



CYLINDERS: 6
CFM: 24
MODELS: 06DA824
06DR724
UNLOADING AVAIL: YES
STEPS: 2



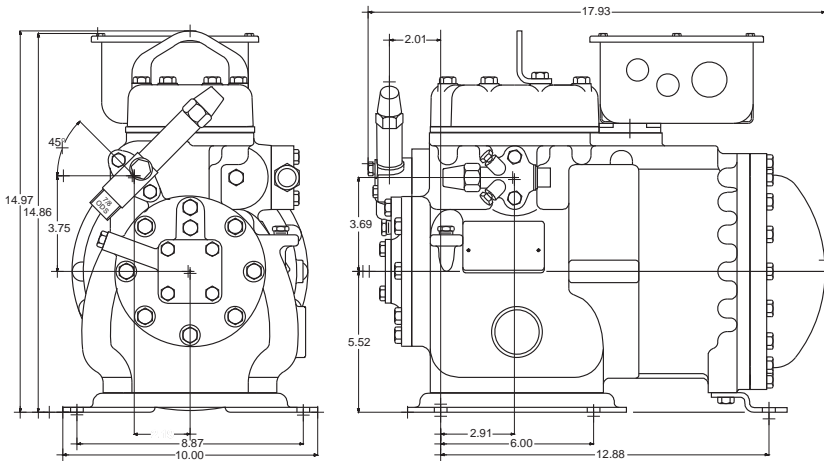
SPRING MOUNTING ARRANGEMENT



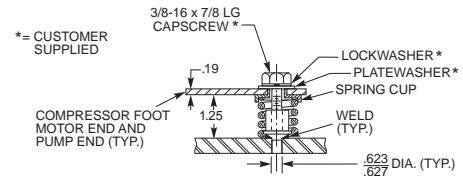
TERMINAL BOX DATA

NOTE: ALL DIMENSIONS ARE IN INCHES
Multiple service valve orientations are possible

06D Low Temperature Compressors



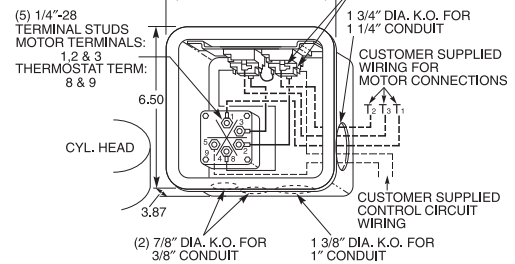
CYLINDERS: 2
CFM: 9
MODELS: 06DR109
UNLOADING AVAIL: NO
STEPS: 0



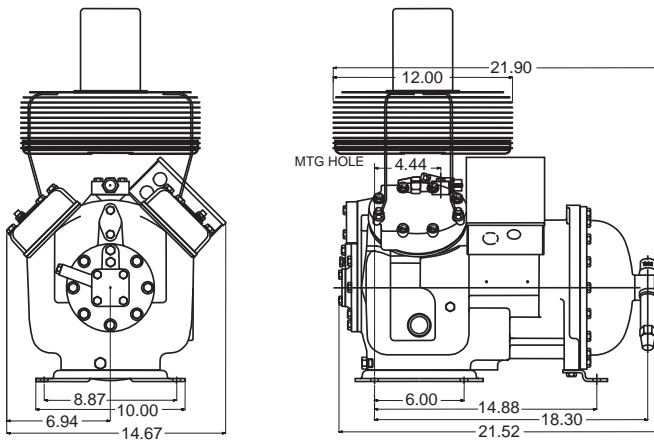
SPRING MOUNTING ARRANGEMENT

WIRING LEGEND
SOLID = FACTORY SUPPLIED
DOTTED = CUSTOMER SUPPLIED

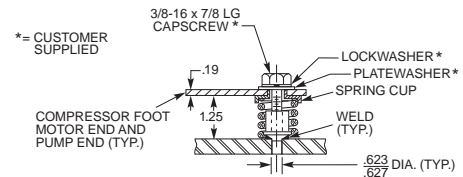
OVERLOAD TERMINALS
MOTOR LOAD WIRING:
208/230V = (2) 1/4" FLAG
460 & 575V = (2) 1/4" FLAG
CONTROL CIRCUIT WIRING:
(1) 1/4" STRAIGHT



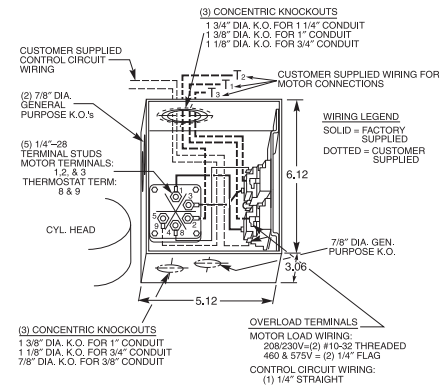
TERMINAL BOX DATA



CYLINDERS: 4
CFM: 13, 16
MODELS: 06DR013
06DR316
UNLOADING AVAIL: YES
STEPS: 1



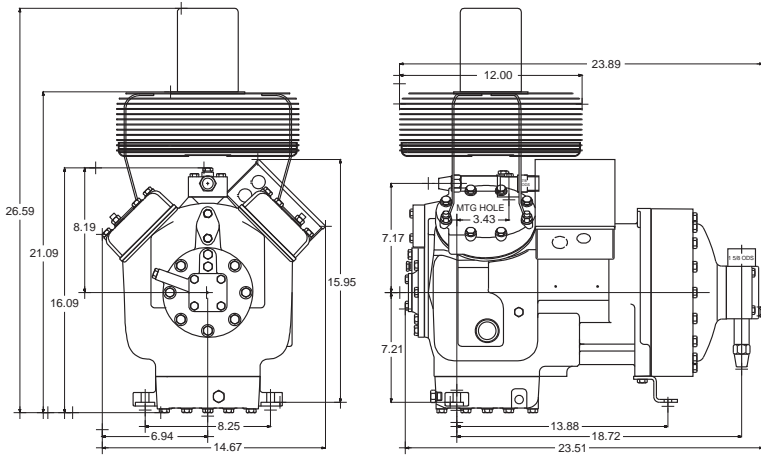
SPRING MOUNTING ARRANGEMENT



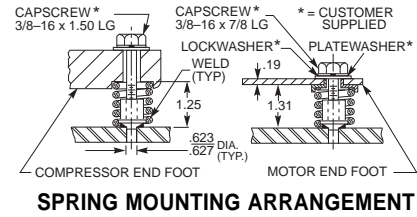
TERMINAL BOX DATA

NOTE: ALL DIMENSIONS ARE IN INCHES
Multiple service valve orientations are possible

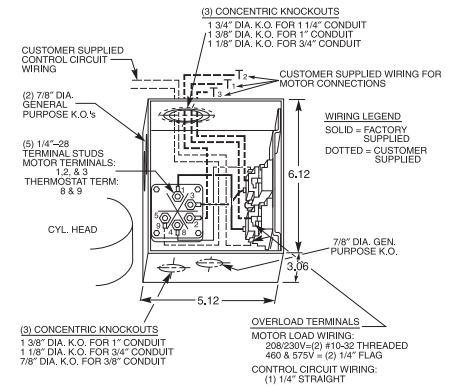
06D Low Temperature Compressors (cont'd.)



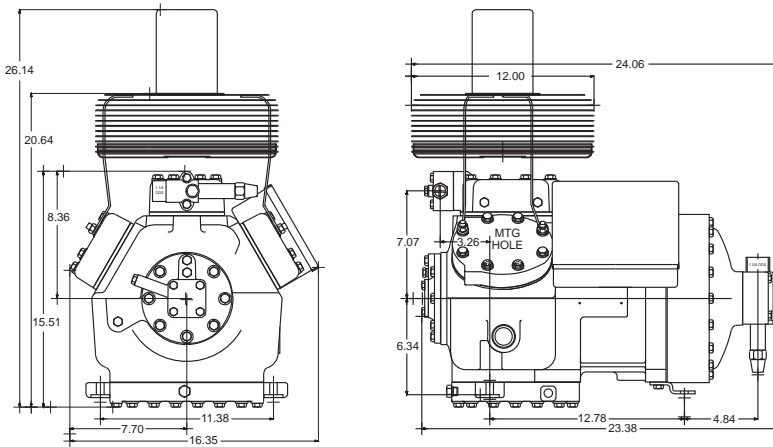
CYLINDERS: 4
CFM: 18, 20
MODELS: 06DR718
06DR820
UNLOADING AVAIL: YES
STEPS: 1



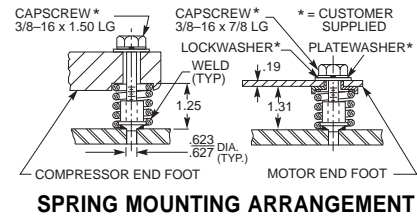
SPRING MOUNTING ARRANGEMENT



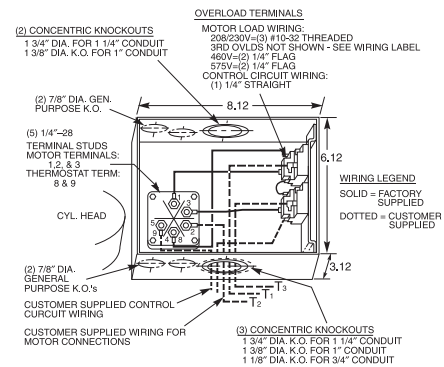
TERMINAL BOX DATA



CYLINDERS: 6
CFM: 24
MODELS: 06DR724
UNLOADING AVAIL: YES
STEPS: 2



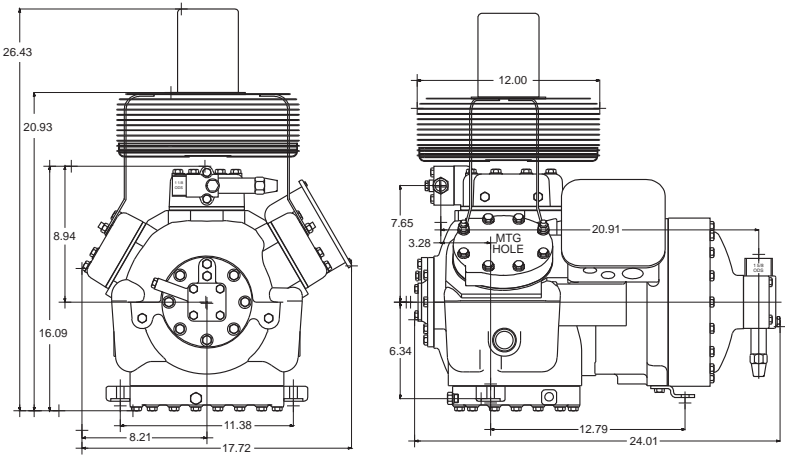
SPRING MOUNTING ARRANGEMENT



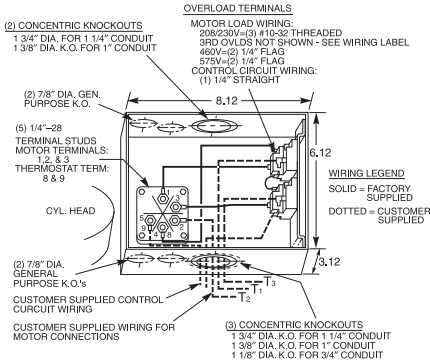
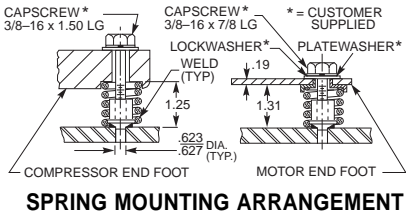
TERMINAL BOX DATA

NOTE: ALL DIMENSIONS ARE IN INCHES
Multiple service valve orientations are possible

06D Low Temperature Compressors (cont'd.)



CYLINDERS: 6
CFM: 28, 37
MODELS: 06DR228
06DR337
UNLOADING AVAIL: YES
STEPS: 2

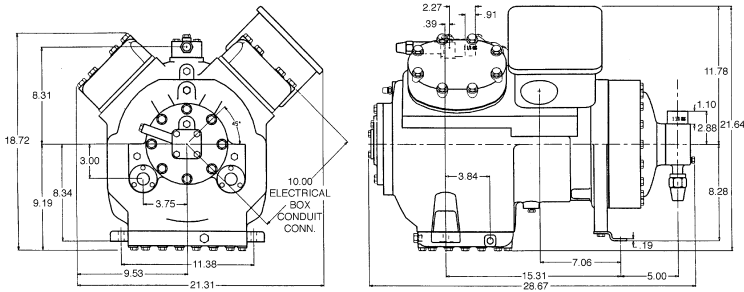


TERMINAL BOX DATA

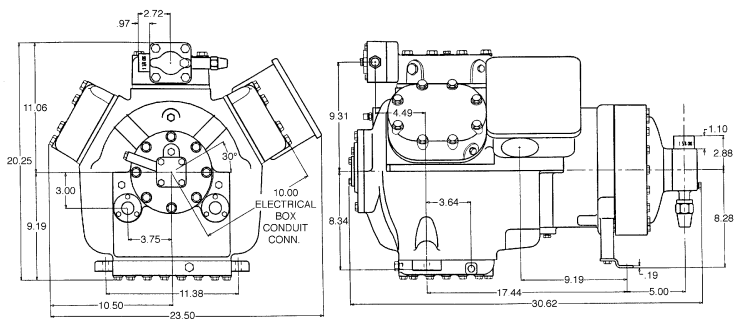
NOTE: 10 Hp, 208/230v models use 3 overloads.

NOTE: ALL DIMENSIONS ARE IN INCHES
Multiple service valve orientations are possible

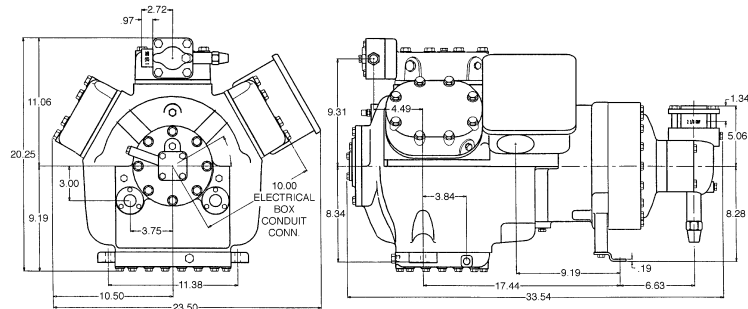
06E Medium/High Temperature Compressors*



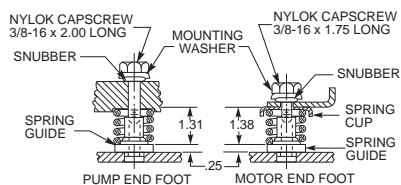
CYLINDERS: 4
CFM: 50
MODEL: 06EA250
UNLOADING AVAIL: YES
STEPS: 1



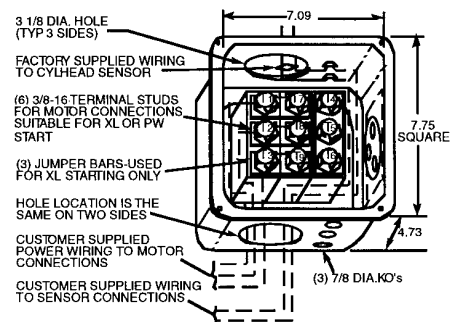
CYLINDERS: 6
CFM: 68
MODEL: 06EA265
UNLOADING AVAIL: YES
STEPS: 2



CYLINDERS: 6
CFM: 65, 75
MODELS: 06EA275
06EM175
UNLOADING AVAIL: YES
STEPS: 2



SPRING MOUNTING ARRANGEMENT



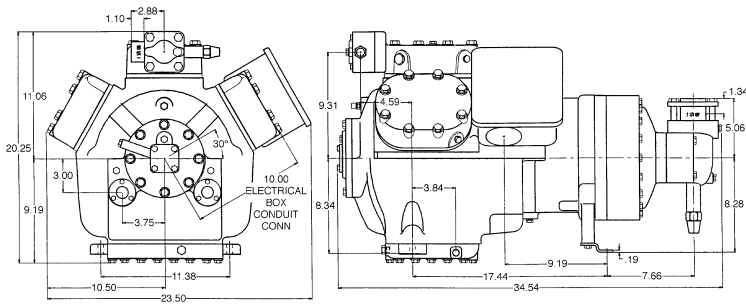
WIRING SHOWN IS FOR 208/230 XL
SEE OEM BULLETIN 13 FOR DETAILS OF OTHER ARRANGEMENTS

TERMINAL BOX DATA

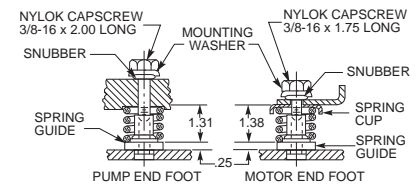
*All of the compressors pictured on this page use the same terminal box and mounting foot.

NOTE: ALL DIMENSIONS ARE IN INCHES

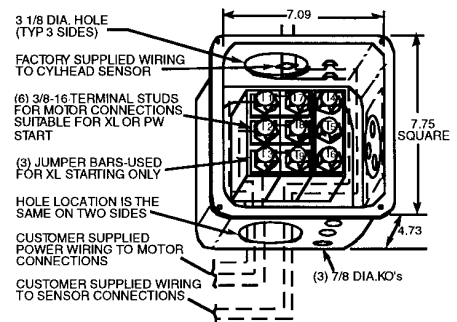
06E Medium/High Temperature Compressors*



CYLINDERS: 6
CFM: 99
MODELS: 06EA299
06EM199
UNLOADING AVAIL: YES
STEPS: 2



SPRING MOUNTING ARRANGEMENT

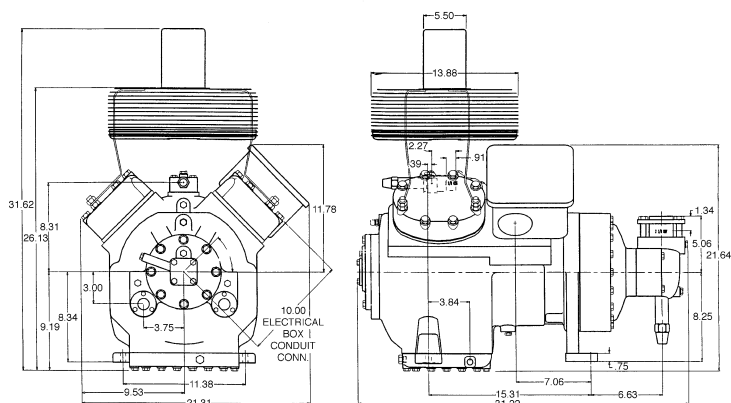


WIRING SHOWN IS FOR 208/230 XL
SEE OEM BULLETIN 13 FOR DETAILS OF OTHER ARRANGEMENTS

TERMINAL BOX DATA

*All of the compressors pictured on this page use the same terminal box and mounting foot.
NOTE: ALL DIMENSIONS ARE IN INCHES

06E Low Temperature Compressors*

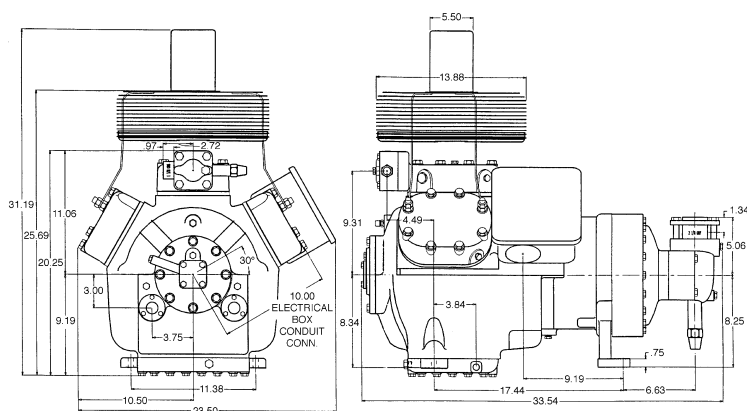


CYLINDERS: 4
CFM: 50
MODELS: 06ER150
06EM150*

UNLOADING AVAIL: YES

STEPS: 1

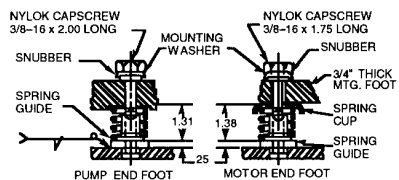
*The 06EM150 does not have head fan assembly.



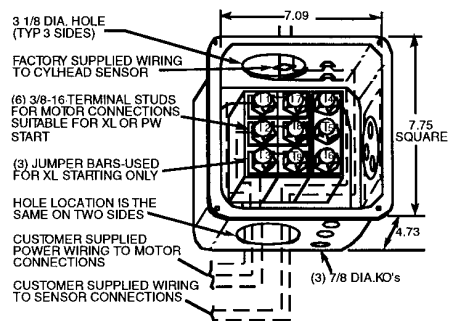
CYLINDERS: 6
CFM: 65, 75, 99
MODELS: 06ER165
06ER175
06ER099

UNLOADING AVAIL: YES

STEPS: 2



SPRING MOUNTING ARRANGEMENT



WIRING SHOWN IS FOR 208/230 XL
SEE OEM BULLETIN 13 FOR DETAILS OF OTHER ARRANGEMENTS

TERMINAL BOX DATA

*All of the compressors pictured on this page use the same terminal box and mounting foot.

NOTE: ALL DIMENSIONS ARE IN INCHES

1.0 – System Design Considerations

1.1 General Application Information

The 06D and 06E compressors are versatile in their application. Compressors are available for operation in low temperature R-502, medium temperature R-12, and air conditioning R-22 applications. Recent design modifications allow the use of HFC refrigerants R-134a, R-404A, R-407C, and R-507. This guide provides information and recommendations for the successful application of compressors in HVACR.

Maximum operating conditions of the compressor models are generally defined in the performance curves and will differ with each model. Operating conditions should be controlled so that the discharge gas does not exceed 275°F (135°C) at the discharge service valve and that oil temperature does not exceed 160°F (71°C). For HFC/POE applications the maximum recommended discharge temperature is 250° F (121° C).

1.2 Compressor Rating Notes

Performance for most standard conditions are plotted in tabular data or rating curves. For special requests, contact Carlyle Application Engineering. Carlyle also provides computer software data that allows system designers access to Carlyle compressor performance with IBM compatible PC computers.

The compressor capacity and power ratings found in the 06D/E refrigeration compressor specification sheets are based on the following conditions:

Compressor ratings are based on nominal voltage, 60 hertz (1750 rpm) operation and 50 hertz (1450 rpm) operation, with 0°F (0°C) subcooling.

Note: Some Carlyle air conditioning ratings are at ARI (Air Conditioning & Refrigeration Institution) rating conditions and with 15°F subcooling. Ratings may be interpolated but not extrapolated.

Liquid subcooling increases system capacity by approximately 1/2 of 1% for each degree Fahrenheit (.5°C) of subcooling for R-12, R-22, and R-502. With HFC refrigerants R-134a, R-404A, and R-507, the subcooling correction is higher and in most cases a correction of 6/10 of 1% for each degree Fahrenheit (.5°C) can be used. When correcting for subcooling, power input to the compressor motor does not change.

Refrigerant temperatures (suction and condensing) are saturation temperatures corresponding to pressures indicated at the compressor service valves. Actual gas temperatures are higher because of superheat.

Capacities are based on the actual suction gas temperatures to the compressor of 65°F (18°C) for refrigerants 12, 502, 134a, 404A, and 507. Superheating occurs in the evaporator and in the suction line within the refrigerated space, or in a liquid-suction heat exchanger so that all the superheat produces useful cooling. Superheating that occurs outside the refrigerated space is a loss, but is a compressor load. If increases in return gas temperatures are obtained outside of the refrigerated space or if the compressor is operated at a lower return gas temperature than 65°F (18°C), a capacity correction is required. Capacity corrections for R-12, 502, 134a, 404A, and 507 for other than rated suction gas temperatures may be obtained from Table 1 (Page 18). Due to the number of the variables involved in correcting for superheat, this table is only an estimate and should be used as a guide for the system designer. For R-22, ratings at 65°F (18°C) return gas temperature, the same adjustments as noted above with R-502 should apply. For R-22 ratings based on a suction gas superheat of 20°F (-11°C), it is assumed that all the superheat is useful and the capacity can be used without adjustment.

SAT. SUCT. TEMP. °F (°C)	RATED SUCT. GAS TEMP. °F (°C)	CAPACITY MULTIPLIERS R-502, R-404A, R-507, R-12, R-134a											
		ACTUAL SUCTION GAS TEMPERATURE TO COMPRESSOR °F (°C)											
		-40 (-40)	-30 (-34)	-20 (-29)	-10 (-23)	0 (-18)	10 (-12)	20 (-7)	30 (-1)	40 (4)	50 (10)	60 (16)	65 (18)
-40 (-40)	65 (18)	.790 -	.810 -	.830 -	.850 -	.870 -	.890 -	.910 -	.930 -	.950 -	.970 -	.990 -	1.000 -
-30 (-34)	65 (18)	- -	.810 -	.830 -	.850 -	.870 -	.890 -	.910 -	.930 -	.950 -	.970 -	.990 -	1.000 -
-20 (-29)	65 (18)	- -	- -	.830 -	.850 -	.870 -	.890 -	.910 -	.930 -	.950 -	.970 -	.990 -	1.000 -
-10 (-23)	65 (18)	- -	- -	- -	.850 0.930	.870 0.939	.890 0.949	.910 0.958	.930 0.967	.950 0.977	.970 0.986	.990 0.995	1.000 1.000
0 (-18)	65 (18)	- -	- -	- -	- -	.870 0.940	.890 0.949	.910 0.958	.930 0.968	.950 0.977	.970 0.986	.990 0.995	1.000 1.000
10 (-12)	65 (18)	- -	- -	- -	- -	- -	.890 0.950	.910 0.959	.930 0.968	.950 0.977	.970 0.986	.990 0.995	1.000 1.000
20 (-7)	65 (18)	- -	- -	- -	- -	- -	- -	.910 0.960	.930 0.969	.950 0.978	.970 0.987	.990 0.996	1.000 1.000
30 (-1)	65 (18)	- -	- -	- -	- -	- -	- -	- -	.930 0.970	.950 0.979	.970 0.987	.990 0.996	1.000 1.000
40 (4)	65 (18)	- -	- -	- -	- -	- -	- -	- -	- -	.950 0.987	.970 0.992	.990 0.997	1.000 1.000
50 (10)	65 (18)	- -	- -	- -	- -	- -	- -	- -	- -	- -	.970 0.997	.990 0.999	1.000 1.000

□ R-502, R-404A, R-507

■ R-12, R-134A

Table 1—Estimated Capacity Multipliers

All R-502 capacity ratings, except for the 06DR109 compressor, are based on the use of cylinder head cooling fans at saturated suction temperatures of -20°F (-29°C) or below, and -25°F (-32°C) or below for R-404A and R-507. All low temperature (-30°F to 0°F, -34°C to -18°C) R-22 capacity ratings are based on the use of a cylinder head cooling fan. When the compressor is operated at higher return gas temperatures (for example 65°F, 18°C), the use of an external desuperheating valve is also required to maintain discharge temperatures below 275°F (135°C) and 250°F (121°C) for HFC/POE applications.

Total heat of rejection (THR) in tons from the compressor equals adjusted compressor capacity (in tons) + .285 x kW input (of the compressor motor), or the THR in kilowatts equals the compressor's capacity in kilowatts + kW input (of the compressor motor). This heat rejection calculation gives the maximum value possible for condenser selection. Because of heat losses at the compressor (especially if a cooling fan is moving air across it) and at the discharge line, the actual heat of rejection will be lower.

Unless otherwise specified on the compressor specification and performance sheets, the 06D and 06E compressors are suitable for continuous operation within the following limits:

LOW TEMPERATURE*		
Refrigerant	Saturated Suction Temperature	Saturated Condensing Temperature
R-502, R-404A, R-507	-40 to 0°F (-40 to -18°C)	70 to 120°F (21 to 49°C)
R-22	-30 to 0°F (-34 to -18°C)	70 to 120°F (21 to 49°C)

**Minimum operating pressure ratio in these applications is limited to 2.25:1.*

MEDIUM TEMPERATURE		
Refrigerant	Saturated Suction Temperature	Saturated Condensing Temperature
R-502, R-404A, R-507	-10 to 40°F (-23 to 4°C)	70 to 120°F (21 to 49°C)
R-12*	-10 to 40°F (-23 to 4°C)	80 to 130°F (27 to 54°C)
R-134a*	-10 to 50°F (-23 to 10°C)	70 to 150°F (21 to 66°C)
R-22*	0 to 50°F (-18 to 10°C)	70 to 130°F (21 to 54°C)

**Minimum operating pressure ratio in these applications is limited to 2.25:1.*

HIGH TEMPERATURE*		
Refrigerant	Saturated Suction Temperature	Saturated Condensing Temperature
R-12	0 to 55°F (-18 to 13°C)	70 to 150°F (21 to 66°C)
R-134a	0 to 55°F (-18 to 13°C)	70 to 150°F (21 to 66°C)
R-22	-0 to 50°F (-18 to 10°C)	70 to 150°F (21 to 66°C)

**Minimum operating pressure ratio in these applications is limited to 2.25:1.*

Maximum operating conditions of the compressor models are generally defined in the performance curves and differ with each model. Operating

conditions should be controlled so that the discharge gas does not exceed 275°F (135°C) and oil temperature (in the sump) does not exceed 160°F (71°C). For HFC/POE applications the maximum recommended discharge temperature is 250°F (121°C). The motors are thermally protected so that unsafe winding temperatures are prevented. Oil pressure switches are available for system protection (see Accessories Section 5.3).

Requirements for Proper Compressor Operation

Semi-hermetic compressor application requires good system design for proper compressor performance to ensure against compressor damage.

1.3 Refrigerant Piping

Good system piping designs will minimize the possibility of lubrication failure, flooded starts, and refrigerant floodback problems. Refrigerant piping systems must therefore be designed to protect the compressor by:

1. Preventing excessive lubricating oil from being trapped in the system. Refrigerant piping must be sized for proper velocity, especially in suction lines, to return oil under all conditions. If capacity control is utilized, piping must be sized for full and part load conditions. With the increased use of mechanical subcooling in refrigeration conditions, the system designer must also consider the lower refrigerant mass flow that results in systems that are designed to operate with large amounts of subcooling (30°F to 70°F, 16°C to 39°C). With the new HFC refrigerants, this is especially important in low temperature applications using large amounts of subcooling (for example liquid subcooled from 110°F to 40°F, 43°C to 4°C). This can result in a 40% reduction in mass flow over a system without subcooling.
2. Minimizing the loss of lubricating oil from the compressor at all times.
3. Preventing liquid refrigerant from entering the compressor during operation and shut down.

To properly cover the subject of piping design would be too lengthy to treat here, especially since many excel-

lent guides to piping design are presently available. For complete details of good system piping practices, the Carrier System Design Manual (Part 3 Piping Design) is recommended.

1.4 Vibration Isolation

On installations where noise and vibration must be kept to a minimum, it is desirable to use vibration mounts under the compressor unit, even though the compressors may be spring mounted. Proper precautions must be taken to prevent the transmission of compressor vibration through the piping system. It is also recommended to design the suction line with sufficient "spring" so the suction service valve can be moved aside for access to the suction strainer. Many systems have been designed with compressors mounted to the bases. In these cases, it is important that the compressors be properly torqued to the base or the compressor may produce a "rattle" or transmit excessive vibration to the base.

For a more complete review of the system vibration and piping recommendations, see Carlyle OEM Bulletin #118.

1.5 Refrigerant Migration and Floodback

Liquid refrigerant, or even excessive amounts of entrained liquid particles in the suction gas, must be kept out of the compressor by proper system design and compressor control. Under running conditions, the presence of liquid refrigerant in the compressor tends to break down the oil film on the cylinder walls, resulting in increased wear to the cylinder walls and piston rings, and possible compressor damage. Furthermore, excessive liquid in the cylinders causes hydraulic compression, which can create cylinder pressures as high as 1500 psi (103 bar). This hydraulic loading can cause suction and discharge valve and gasket failures to occur while also subjecting the connecting rod, piston, and main bearings to excessive loading. Although laboratory testing of 06D and 06E compressors has shown that they can withstand substantial flooded starts and floodback, prolonged excessive flooding will eventually cause any compressor to fail.

Therefore, special care should be taken to ensure that liquid refrigerant is kept out of the compressor especially in systems where large quantities of refrigerants are often used. During compressor operation, the expansion valve must be properly adjusted to prevent liquid from entering the compressor.

During compressor shutdown, gravity, thermal action and refrigerant absorption will result in a refrigerant and oil mixture in the compressor crankcase. Gravity flow can be prevented by the use of recommended loops in the piping, but thermal action and the absorption of refrigerant by lubricating oil cannot be prevented by piping design. To minimize the absorption of refrigerant into the oil, the use of crankcase heaters is strongly recommended. Because oil dilution is more critical with HFC refrigerants and POE lubricants, Carlyle requires the use of crankcase heaters in these applications. It is important, however, to never energize the crankcase heater while the compressor is running because this may overheat the compressor oil. (See Accessory Section 5.4 for applicable heaters.) Carlyle's experience indicates that many compressor failures occur during the first several months of operation. Many of these failures occurred during the initial start-up of the unit, and inspection reports indicate flooding was the probable cause of failure in many of these compressor returns.

It is believed that many of these failures could have been avoided by using more care during the initial start-up of the compressors. Refer to the recommended start-up procedure in Carlyle's Refrigeration Compressor Service Guide (Lit. No. 020-611).

1.6 Clean and Dry System

Clean and dry systems are essential for long compressor and motor life, and satisfactory operation. This cannot be over-emphasized. It is even more critical with the introduction of new HFC refrigerants and POE lubricants. The new POE lubricants are excellent cleaning agents that will deposit system contaminants into the system or compressor filters and screens, causing excessive pressure drop or clogging, if the system is not kept clean.

Liquid line refrigerant filter-driers maintain low moisture content, and in the event of a motor burnout, prevent contamination of the evaporator and other parts of the refrigeration system. These filter-driers should be compatible with the new HFC refrigerants and POE oils if used.

Liquid line moisture indicators are recommended in all systems that use semi-hermetic compressors because they provide a continuous check on the system's moisture content. Excessive moisture in combination with a high operating temperature can lead to motor winding breakdown and burnout. When moisture is indicated, prompt corrective action, such as changing the filter-drier core or dehydrating the system, can prevent serious compressor damage.

1.7 Prevent Excessive Discharge Temperatures

The actual discharge gas temperature at the compressor discharge service valve must not exceed 275°F (135°C). For HFC/POE applications the maximum recommended discharge temperature is 250°F (121°C). For a given refrigerant, this discharge temperature depends upon the compression ratio as well as the temperature of the superheated suction gas. Since an increase in either the compression ratio or suction gas temperature causes the discharge temperature to increase, both must be kept within allowable limits.

1.8 Compressor Interconnection

All 06D and 06E compressors are suitable for interconnection on common refrigerant circuits. General suction and discharge line piping recommendations are shown in Figures 1 and 2 (Page 22), respectively. For a complete guide to system piping practices, the Carrier System Design Manual (Part 3 Piping Design) is again recommended.

When only two 06D or 06E compressors of the same size are to be connected in parallel, the oil equalization can be accomplished with a single oil equalization line. This line can equalize both oil and gas. This method of equalization is only recommended when there are two compressors of the same size and the oil equalization line is short (2 to 4 feet, .6 to 1.2 meters long). In this case, a single 1-1/8" line can be used. Since this line equalizes both oil and gas, it is important that it be level to permit the lower half to act as an oil equalizer and the upper half as a gas equalizer.

The 06E compressors have two sightglass connections, either of which may be removed for installation of the equalizer line. A small oil equalization check valve must also be added to those 06E compressors used in parallel. This check valve is part of the 06EA900101 compressor interconnection package and must be installed in the rotor locking bolt (torqued to 13-16 lb-ft, 1.8-2.2 kg-m) of each compressor (see Figure 3, Page 22). The 06E rotor bolt is accessible by removing the suction strainer from the motor end cover. Installation of the check valve is best accomplished just prior to mounting the suction service valve.

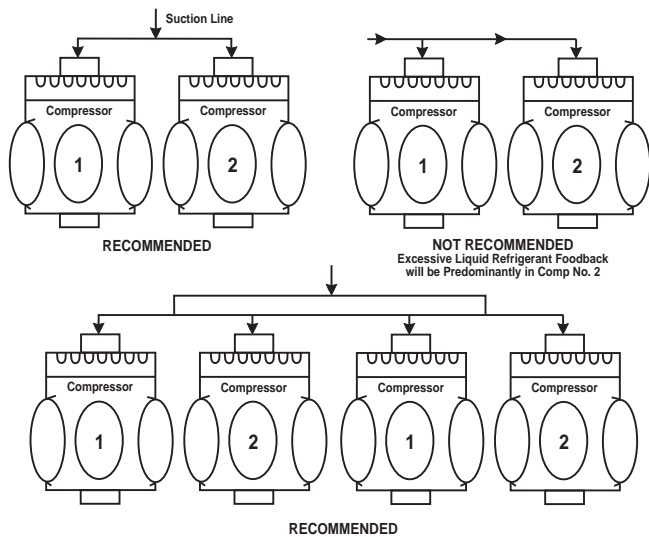


Figure 1—Suction Piping

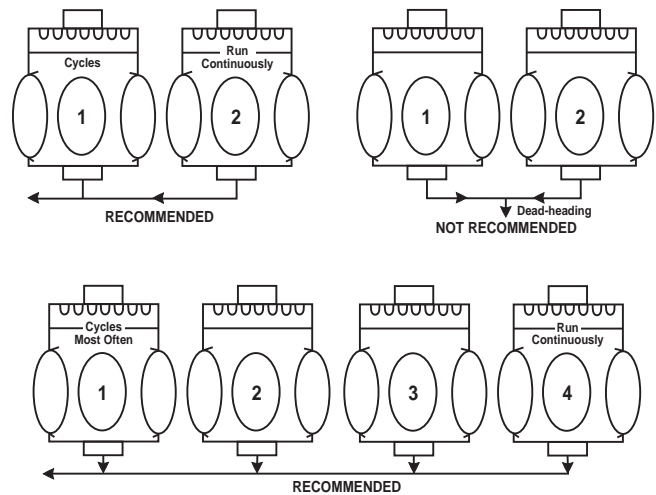


Figure 2—Discharge Piping

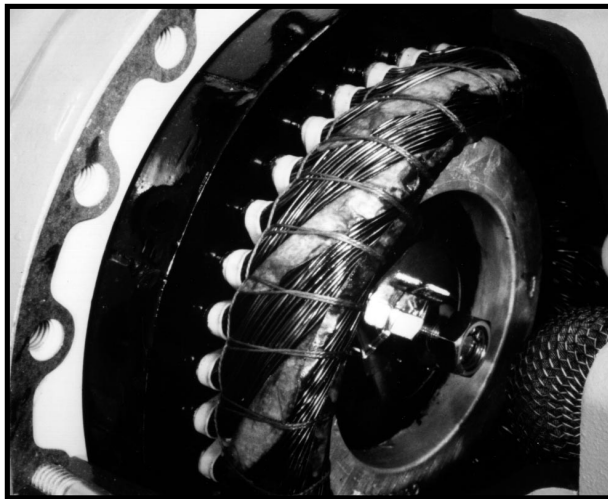


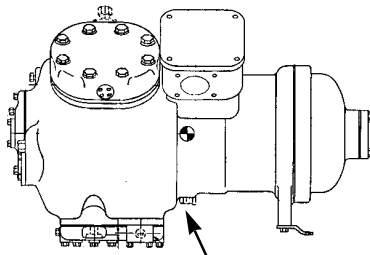
Figure 3—Rotor Locking Bolt

The O6D compressors have only one sightglass and provision must be made for a sightglass in the oil equalizer line when the O6D compressors are interconnected using an oil equalization line. The O6D oil equalizer interconnection package is O6DA900092. The O6D compressors do not utilize or require the check valve in the rotor lock bolt.

When more than two compressors are to be connected in parallel or if O6D/E compressors of different displacements are to be connected in parallel, an oil

control system utilizing an oil separator, oil reservoir, and floats is recommended. Several manufacturers supply this type of oil management system. It is important that floats are properly selected for Carlyle's O6D and O6E compressors. For the O6D compressor, a special adapter is required to connect the float. For the O6E compressor, the float should be able to control the oil level at 1/8 to 3/8 up the sightglass.

One of Carlyle's major concerns on multiple O6E compressor applications is to avoid accumulating large quantities of oil in "off" compressors. To minimize this potential problem, Carlyle recommends the oil levels be kept at a 1/8 to 3/8 sightglass level. Even with this recommendation, Carlyle has found that many system manifold piping arrangements can allow excessive oil to drain into the motor compartment of "off" O6E compressors. To avoid this potential problem, Carlyle recommends the motor barrels of O6E compressors be equalized as shown in Figures 4 and 5, Page 23. This motor barrel equalization is recommended in addition to either a float system or an oil compartment equalization line. Motor barrel equalization is recommended for O6E compressors only, the O6D compressors do not have this connection.



Remove existing 5/8-18 SAE oil plug at location indicated. Using same capscrew gasket, assemble adapter (Part No. 5F20-1311) and angle valve into crankcase as shown.

Figure 4—Compressor Equalization

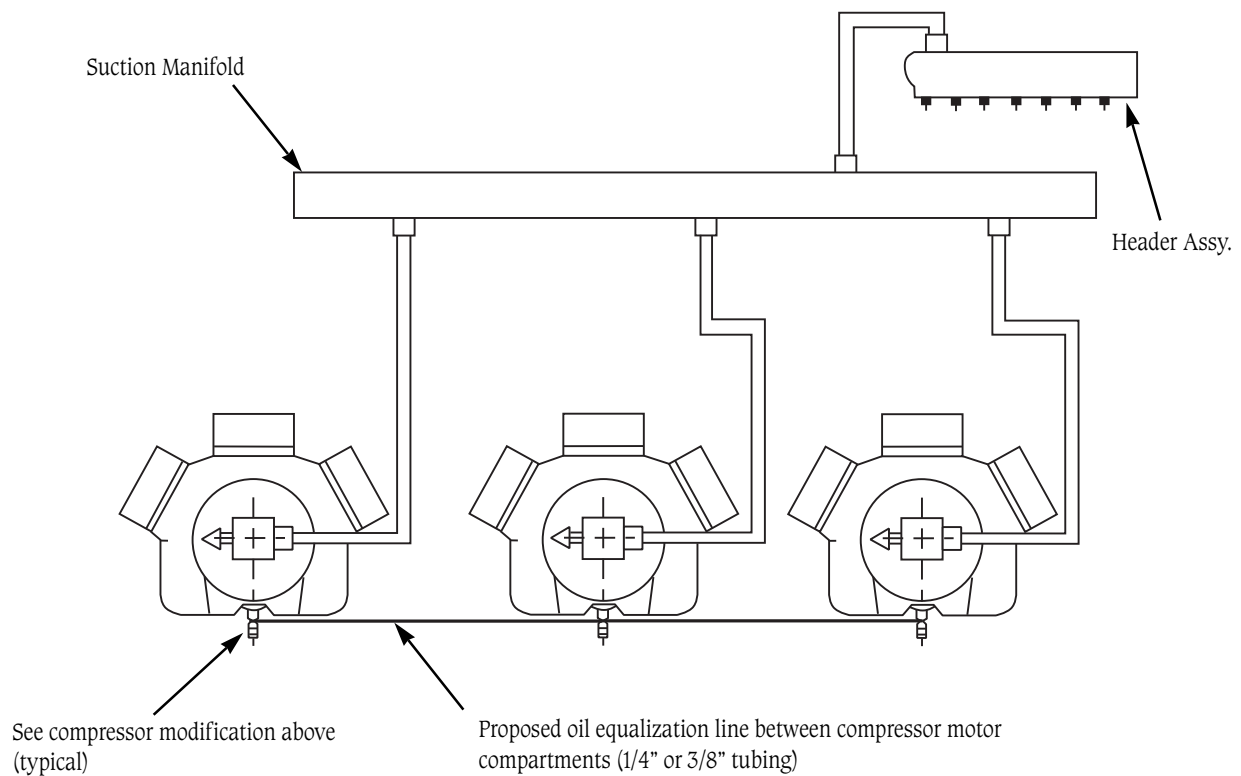


Figure 5—Oil Equalization Between Compressor Motor Compartments

1.9 Motor-Compressor Selection

When selecting any compressor, proper allowance should also be made for abnormal conditions that may result in motor overloading. These conditions might include high suction temperature during pull-down or low voltage at compressor motor terminals.

During pulldown, the compressor cannot be subjected to loading rates higher than the maximum kW shown in the electrical data tables for more than short periods of time. Where an extended pulldown period is expected, the suction pressure must be limited by some positive means.

1.10 Outdoor Use

All UL recognized 06D and 06E compressors have terminal enclosures with corrosion protection specified that is suitable for outdoor use equipment as a sole enclosure. The 06D drawn steel terminal boxes used on 2 cylinder 06D compressors do not require any caulking for sole outdoor use, and are UL recognized as "Equal Alternate" to all caulked boxes previously used. Drawn steel boxes are available only for units requiring zero to two overloads.

1.11 Code Approvals

The 06D/E, 60 hertz compressors are UL recognized and CSA approved. Both the UL recognition and the CSA approval are covered in the UL File shown below, due to harmonized codes between the United States and Canada. The compressor certification is under UL 984 in the U.S. and under CSA Standard C22.2 No. 140.2-96 in Canada. All 06D/E 50 and 60 hertz compressors manufactured in Syracuse are ISO 9002 registered. The 06D/E code approvals are shown in the following files:

UL File# - SA4936
CSA File# - SA4936
ISO 9002 Certificate #A2899

2.0 – Compressor Lubrication System

2.1 Compressor Lubrication

All refrigeration compressors must have adequate lubrication to ensure trouble-free operation and a long life. When starting up any new system, some oil will be lost to coat the inside of the piping, some oil will be lodged in low velocity areas of the system, and some will be kept in circulation. This loss must be made up by adding oil to the system after the initial start-up. Very low compressor oil levels can cause complete loss of lubrication and may result in an immediate compressor failure if not protected against.

The loss of oil can also be caused by flooded starts or refrigerant migrating into the oil during an off period and pulling the oil out of its sump during the sudden pressure drop of a start-up.

While it has always been apparent that very low oil levels can cause compressor damage, it has also become apparent that excessive oil charges can shorten the compressor's life. Oil levels above the center of the O6E compressor sightglass cause elevated crankcase and oil temperatures, increased power consumption, and possible valve plate gasket failures. This problem of excessive oil charges has been mainly evident on O6E multiple compressor applications but does not appear to have caused any difficulties with the application of O6D compressors.

The oil level should be observed in the sightglass immediately after the compressor shutdown, while it is still warm. The level observed when the compressor is not running for a long period may be a mixture of oil and refrigerant which would not be a true indication of the oil level when the compressor is running.

If the oil level in the sightglass of an O6E compressor is less than one-eighth ($1/8$) up from the bottom of the glass, this indicates a low oil level. If the oil level is up more than one-half ($1/2$) from the bottom, this indicates a high oil level. Therefore, the oil level should be $1/8$ to $1/2$ up the sightglass when the compressor is running for O6E compressors.

Figures 6, 7, and 8 show different oil levels when a single O6E compressor is running. The photos in each figure show the right and left sightglass of the same compressor (only one sightglass is factory supplied). If the level is not the same in each glass, consider the true oil level to be the lower level. The difference in levels is due to the rotation of the crankshaft. The crankshaft and running gear are producing the windage required to push the oil down on one side while raising it on the other. Reversing the direction of rotation of the motor will reverse this relationship.

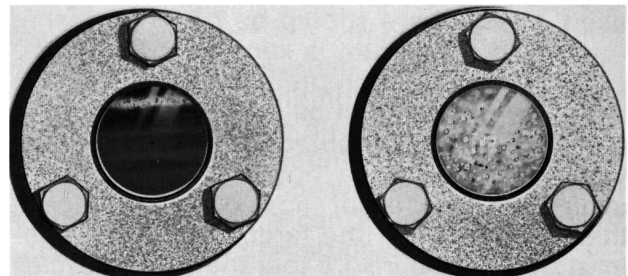


Figure 6—High Oil Level

The oil level in Figure 6 is at least $7/8$ of a sightglass. Note the high oil level in the left sightglass, and solid foam in the right sightglass. Whenever the glass is filled with foam, excessive oil is indicated and oil should be removed.

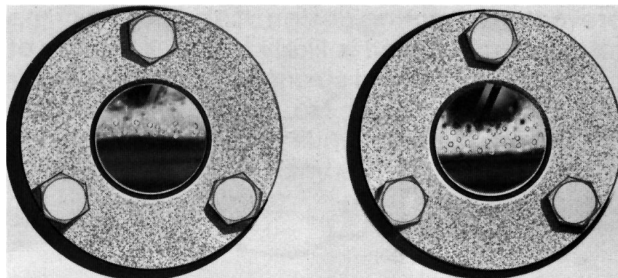


Figure 7—Better Running Oil Level

The oil level in Figure 7 is $3/8$ - $1/2$ of a sightglass. This is an acceptable oil level on a single compressor system, but does not always give a true indication of an excessive oil charge on multiple compressor systems.

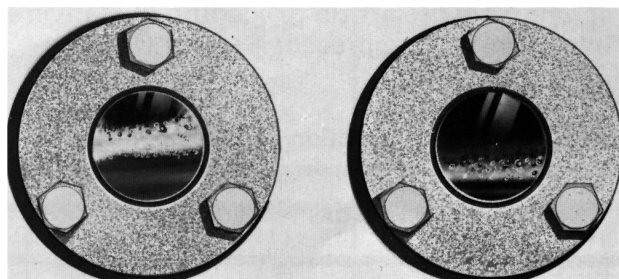


Figure 8—Preferred Running Oil Level

The oil level in Figure 8 is $1/8$ - $1/4$ of a sightglass. The sightglasses are showing a different level because of the crankshaft rotation. Note the amount of clear glass above the levels. These levels will ensure against the possibility of excessive oil in the system.

Another effect which has been noted, especially in multiple compressor systems, is the increased probability of blown valve plate gaskets when excessive oil is in the system. When the system is grossly overcharged (several gallons too much), the oil levels in the compressor sumps will only rise $1/2$ to $3/4$ level in the sightglass of 06E compressors. The remainder of the oil will be kept in circulation or will accumulate somewhere in the system. A likely point is in the suction manifold (depending on the method of returning oil), and in the compressor motor compartment. This is especially troublesome in an idle compressor in a multiple compressor system that has an opportunity to accumulate oil in the motor compartment; but excessive oil in the motor compartment at start-up will not alone fail gaskets. Some liquid refrigerant must also be present which will bring enough oil with it into the cylinders on a start-up to cause gasket failures. These circumstances have apparently occurred in a number of installations, and their relationship to gasket failures has been well confirmed by test.

To check for excessive system oil charges in 06E compressors, it is recommended that the oil levels of the compressors in the system be brought down to approximately 1/4 of the sightglass. If the system is overcharged, the oil levels will rise to a 1/2 sightglass level within a short time (usually within an hour). Continue removing oil until the oil level does not rise after removal. It is also recommended that the oil levels be kept at this 1/4 level, or between the levels shown in Figure 8. This is especially true if any compressors have experienced any repeated gasket failures. To summarize the advantages of keeping the oil at this level:

1. It ensures that excessive oil is not being lodged in the system. This will eliminate gasket, valve, and running gear failures.
2. The compressor, oil, and motor run cooler, approximately 20°F (11°C) or more in many cases.

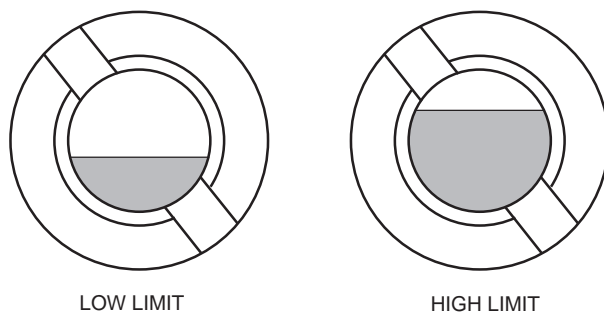


Figure 9—06D Oil Level Limits

As noted above, the oil level control in 06D compressors is less critical than 06E models. Motor barrel equalization is not required and oil level in the compressor sightglass should be controlled between 1/4 and 3/4 of the sightglass (See Figure 9). If the oil level in the sightglass is less than one-quarter (1/4) up from the bottom of the glass, this indicates a low oil level. If the oil level is up more than three-quarters (3/4) from the bottom, this indicates a high oil level. Again, the oil level should be checked immediately after the compressor is shut down.

2.2 The Oil Pump

The 06D and 06E oil pump is a positive displacement vane type that produces high volume oil flow at a low oil pressure. The compressor utilizes an internal pressure regulator valve to maintain oil pressure at a constant 12 to 36 psi (.83 to 2.5 bar) above suction pressure.

2.3 Recommended Oils

When additional oil or a complete oil change is required, use only the listed Carlyle approved oils. For CFC and HCFC refrigerants use:

MANUFACTURER	BRAND NAME
Totaline	150
Witco Suniso	3GS
Shrieve Chemical	Zerol 150*
Texaco Ind.	WFI-32-150
IGI Petroleum Ind.	Cryol-150

* Alkyl Benzene Oil.

Use of oil adhesives is not allowed without written approval from the Carlyle Engineering Department.

For application with HFC refrigerants R-134a, R-507, and R-404A, Carlyle recommends an ISO 68 cST viscosity polyolester oil. Shown below are POE-68 oils that are approved for use in Carlyle compressors.

MANUFACTURER	BRAND NAME
Castrol	E68
ICI EMKARATE	RL68H
CPI*	CP-2916S
CPI	Solest 68
BP Marine Enersyn	MP-S68
Mobil Artic†	EAL 68
Castrol†	SW 68

*CPI CP-2916S is also sold under BP Marine Enersyn MP-S68.

† Medium temperature applications only.

2.4 06D/E Oil Pressure History

All current 06D/E compressors are provided with the connections for an oil safety switch. The 06D/E compressors use the same basic oil pump design, however recent changes in the oil pressure regulator design have resulted in slightly different operating oil pressures. Shown below is a brief history of the 06D/E operating oil pressure.

	06D MODELS PSI (Bar)	06E MODELS PSI (Bar)
Before May 1984 (Prior S/N 2084J....)	12 to 18 (.83 to 1.24)	12 to 18 (.83 to 1.24)
May 1984 to March 1994 (Between S/N 2084J & 1094J)	16 to 22 (1.1 to 1.52)	16 to 22 (1.1 to 1.52)
Starting March 1994* (Starting S/N 1094J....)	18 to 26 (1.24 to 1.8)	18 to 34 (1.24 to 2.3)

*06D/E refrigeration duty service models started using new high flow oil pumps in June 1994 (starting S/N 2994M (D/E) 5315).

Table 2—Oil Pressure History

3.0 – Capacity Control

3.1 Suction Cut-Off Capacity Control

Carlyle's compressor suction cut-off capacity control system has been approved for R-502, R-404A, and R-507 applications down to -40°F (-40°C) suction and for R-12, R-134a, and R-22 medium and high temperature applications, but the system designer must carefully consider certain system design criteria when applying this new feature.

3.2 Design for Proper Oil Return to Compressor

When the 06D/E compressors are unloaded, the compressor and system capacity are reduced by 1/3, 1/2, or 2/3 of full load capacity. These capacity reductions result in the same large percent reduction in refrigerant flow rates through the system piping. Oil that is entrained and carried with refrigerant requires a certain gas velocity to properly return it back to the compressor and as this refrigerant flow drops, this may not be possible. This is especially true of the sizing of the suction line where oil return is most critical.

All system piping, but especially the suction line, must consider both full load and part load capacities and refrigerant velocities when being sized. For complete details of good system piping practices, the Carrier System Design Manual (Part 3 - Piping Design) or the ASHRAE Manual (Systems Volume) is recommended.

To protect the compressor against possible oil return problems, all 06D and 06E refrigeration duty compressors applied with capacity control must utilize oil safety switch protection. This requirement may be waived by Carlyle Application Engineering for certain high temperature, single compressor circuit applications (contact Carlyle Application Engineering for approval).

3.3 Capacity Control Application Ranges

Low temperature R-502, R-404A, and R-507 Application: -40°F to 0°F (-40°C to -18°C) Saturated Suction Temperatures.

Condensing temperature limits:

For all 4-cylinder 06D and 06E compressors -

See Figure 10. All 6-cylinder 06D and 06E

compressors can be unloaded at all condensing

temperatures below 120°F (49°C) with 1 bank of capacity control. Do not unload more than 1 bank on 6-cylinder 06D or 06E compressors in this low temperature application.

Note: In low temperature booster applications see differential pressure limits (ΔP) (Table 4, Page 31) for minimum condensing pressures required to load up.

Medium Temperature R-12, R-134a, R-404A, R-502, and R-507 Application: 0°F to 40°F (-18°C to 4°C) Saturated Suction Temperatures.

Unloading application limits at saturated condensing temperatures below 130°F (54°C): Can unload 1 bank on any 4-cylinder 06D or 06E compressor. Can unload 1 or 2 banks on any 6-cylinder 06D or 06E compressor.

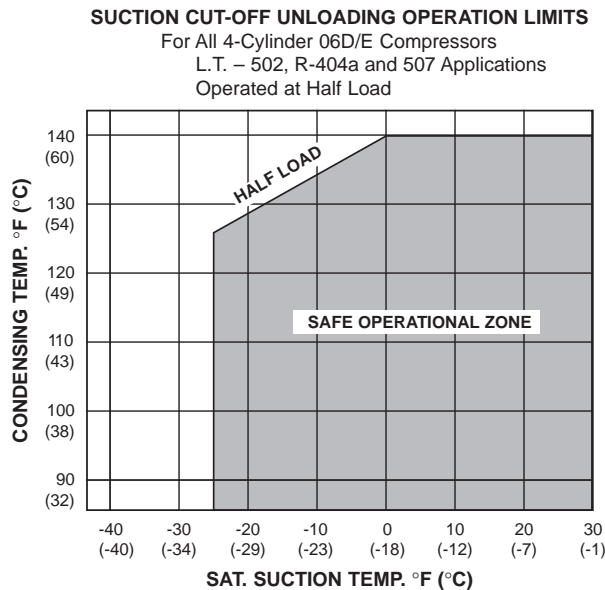
Note: With R-134a or R-12 see ΔP limits (Table 4, Page 31) for loading requirements.

Medium Temperature R-22 Applications: 0°F to 25°F (-18°C to -4°C) Saturated Suction Temperatures.

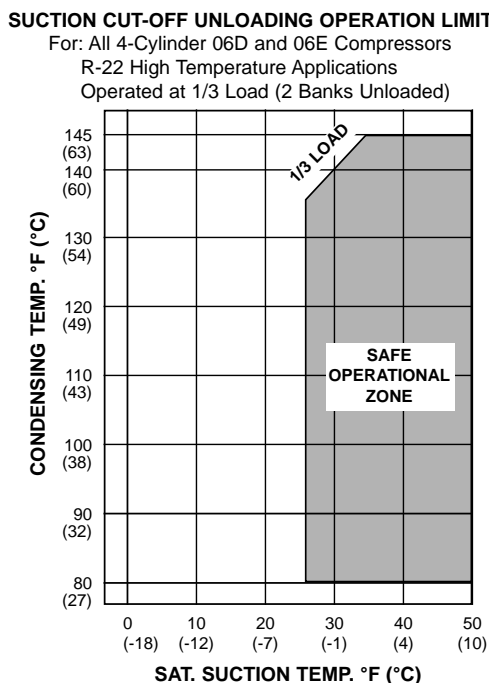
Unloading application limits at saturated condensing temperatures below 130°F (54°C): Can unload 1 bank on any 4 or 6-cylinder 06D or 06E compressor. Unloading more than 1 bank on any 6-cylinder 06D or 06E compressor in this medium temperature application is not recommended.

High Temperature R-22 Applications: 25°F to 55°F (-4°C to 13°C) Saturated Suction Temperatures.

Unloading application limits at SCT's below 145°F (63°C) and maximum superheat of 25°F (14°C). Can unload 1 bank on any 4-cylinder 06D or 06E compressor. Can unload 1 or 2 banks on any 6-cylinder 06D or 06E compressor per Figure 11.



**Figure 10—Suction Cut-Off Operation Limits
For 4-Cylinder 06D and 06E Compressors
with R-502, R-404A, R-507**



**Figure 11—Suction Cut-Off Operation Limits
For 6-Cylinder 06D and 06E Compressors
with R-22**

3.4 Pump-Down Control

Compressors with suction cut-off unloading have inherently greater internal leak paths than compressors without this capacity control feature installed on them. Compressors with the electric capacity control have been successfully applied with continuous or automatic pump-down control. To avoid compressor short-cycling, the system designer should avoid continuous pump-down control when the suction pressure cut-in and cut-out points are within 30 psi (2.1 bar) of each other. Because the pressure actuated unloaders have a small built-in high to low pressure path, short-cycling will occur if continuous or automatic pump-down control is applied. **Do not use continuous or automatic pump-down control on any compressor equipped with pressure actuated capacity control.** Use single pump-out or solenoid drop (minimum protection) control.

3.5 Unloader Differential Setting

The unloader differential setting is the suction pressure difference at which the controller loads and unloads the particular cylinder bank. A differential setting that is too low could cause the unloader mechanism to short cycle. For example, when an 06D or 06E compressor unloads, the suction pressure rises because the compressor capacity has decreased by one-third or one-half. If the differential setting is too close, this rise in suction pressure may be enough to load the compressor back-up. For this reason, Carlyle recommends a minimum differential setting of 6 to 10 psi (.4 to .7 bar). The final setting should be evaluated for the final application because many variables are involved:

- Single or multiple compressor application
- Low or medium temperature application
- Unloading 4 or 6 cylinder (1/2 vs. 1/3 load reduction)
- Refrigerant 12, 22, 502, 507, 404A, or 134a

3.6 Part Load Performance Factors

To estimate part load performance of 06D/E compressors, use Table 3 below. The factors can be applied to the full load published Carlyle capacity and power data for all refrigerants and conditions. The system designer should ensure the conditions are within the safe operating range of the compressor.

The table below shows multiplication factors that apply to the compressor ratings when operating with suction cutoff unloading.

For example: You have a 6-cylinder 06E compressor with full load capacity = 100,000 Btu/hr (29.3 kW), full load power = 10 kW, and full load efficiency = 10 Btu/wHr (COP = 2.92). To calculate the capacity, power and efficiency at 2/3 load (one bank unloaded) use the factors from the table as shown:

2/3 load capacity	= .67 x 100,000
	= (.67 x 29.3 kW)
Btu/Hr	= 67,000 Btu/Hr
	= (19.63 kW)
2/3 load power	= .73 x 10 kW
	= 7.3 kW
2/3 load efficiency	= .92 x 10.0 Btu/wHr
	= (.92 x 2.92)
Energy Efficiency Ratio	= 9.2 Btu/wHr
COP	= 2.7

3.7 Location and Size of Capacity Control Head Assembly

The capacity control head assembly cannot be installed and will not function on the center cylinder head of any 06D or 06E 6-cylinder compressor. This is also true of Carlyle's 2-cylinder 06D models.

Capacity control heads can be installed on either side bank of any 6-cylinder 06D or 06E compressor.

A capacity control head can be installed on either side bank of 4-cylinder 06E compressor.

Capacity control heads will unload either side bank of any 4-cylinder 06D compressor but installation on the side opposite the terminal box is recommended. This avoids possible interference between the suction and discharge pressure connections on the compressor and the unloader coil assembly.

The suction cut-off unloader assembly has a cylinder head which is slightly larger than a plain side cylinder head. This results in a compressor which may be unloaded that is slightly wider (approximately 1/2" (1.3 cm) on 06D models and 3/8" (.95 cm) on 06E models) than a compressor without unloading capability.

COMPRESSOR MODEL	MULTIPLICATION FACTOR FOR 1 BANK UNLOADED			MULTIPLICATION FACTOR FOR 2 BANK UNLOADED		
	CAPACITY	POWER	EER	CAPACITY	POWER	EER
ALL 4 CYLINDER MODELS	.49	.57	.86	-	-	-
ALL 6 CYLINDER MODELS	.67	.73	.92	.32	.46	.70

Table 3—Part Load Performance Multipliers

APPLICATION	SUCTION PRESSURE RANGE PSI (BAR)		ΔP REQUIRED-DISCHARGE MINUS SUCTION PRESSURE PSI (BAR)			
			06D		06E	
L.T. R-502, 404A, 507	10-25	(1.7-2.7)	30	(2.1)	30	(2.1)
M.T. R-502, 404A, 507	30-60	(3.1-5.2)	40	(2.8)	45	(3.1)
M.T. R-12, 134a	10-30	(1.7-3.1)	30	(2.1)	35	(2.4)
M.T. R-22 or H.T. R-22	30-90	(3.1-7.2)	50	(3.5)	55	(3.8)

Table 4—Required Differential Pressure for Unloader Operation

3.8 Pressure Differential (ΔP) Required to Load Compressor

A minimum ΔP between the discharge and suction pressure is required to compress the unloader valve spring to load up the cylinder bank. While this differential pressure is low, it should be evaluated for certain low head pressure applications such as R-12, R-134a, air conditioning applications or the low stage of booster applications. The discharge pressure must be higher than the suction pressure in Table 4 (Page 31) for the unloader assembly to load up.

Suction cut-off unloading is an option for all four and six cylinder Carlyle 06D/E compressors. The capacity control operation and application requirements are found in the System Design section (Section 1.0) of this manual and should be carefully reviewed.

3.9 Electric Solenoid Capacity Control Operation

The electrically operated control valve is actuated by remote signal to the electric solenoid coil. Each valve controls 2 cylinders (1 bank). No manual adjustments to the electric unloader valve are necessary. When the solenoid is “de-energized,” the passageways in the valve are aligned for “loaded” conditions. When the solenoid is “energized,” the valve passageways are aligned for unloading.

This capacity control valve is controlled by an electric solenoid. When the solenoid is de-energized, the valve loads the cylinder bank (2 cylinders) as shown in Figure 12.

When full capacity is desired, an external controller de-energizes the solenoid coil, allowing the discharge pressure to build-up behind the unloader piston assembly. This will compress the unloader valve spring, opening the unloader suction port. Suction gas can now be drawn into the cylinders, running the bank fully loaded.

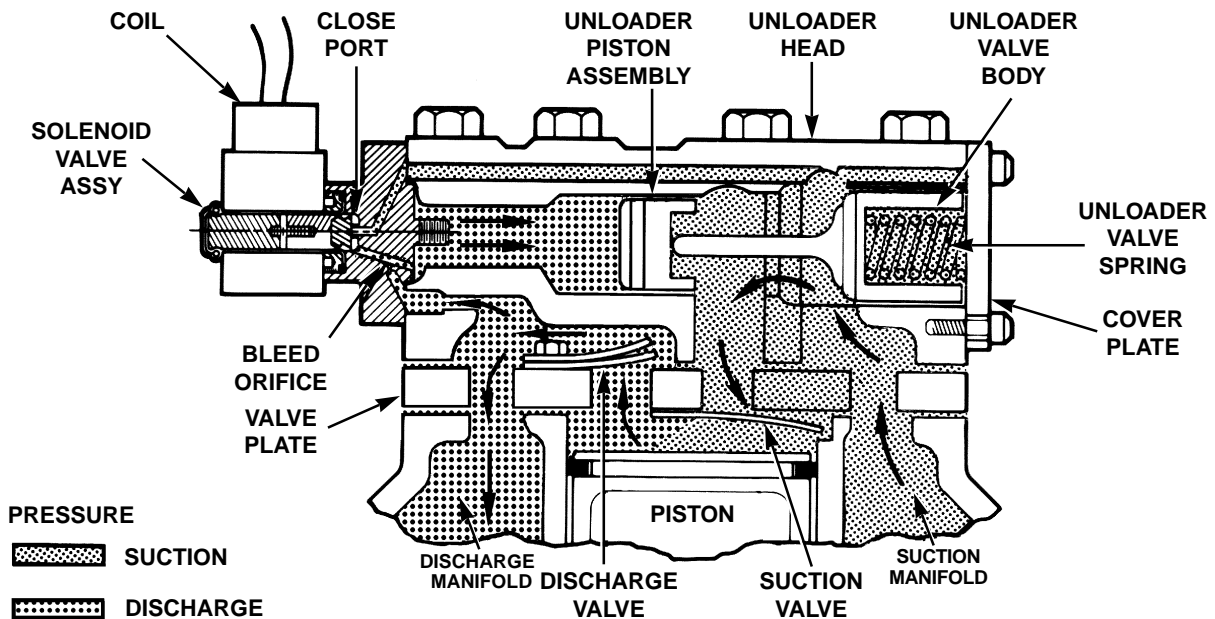


Figure 12—Electric Loaded Operation

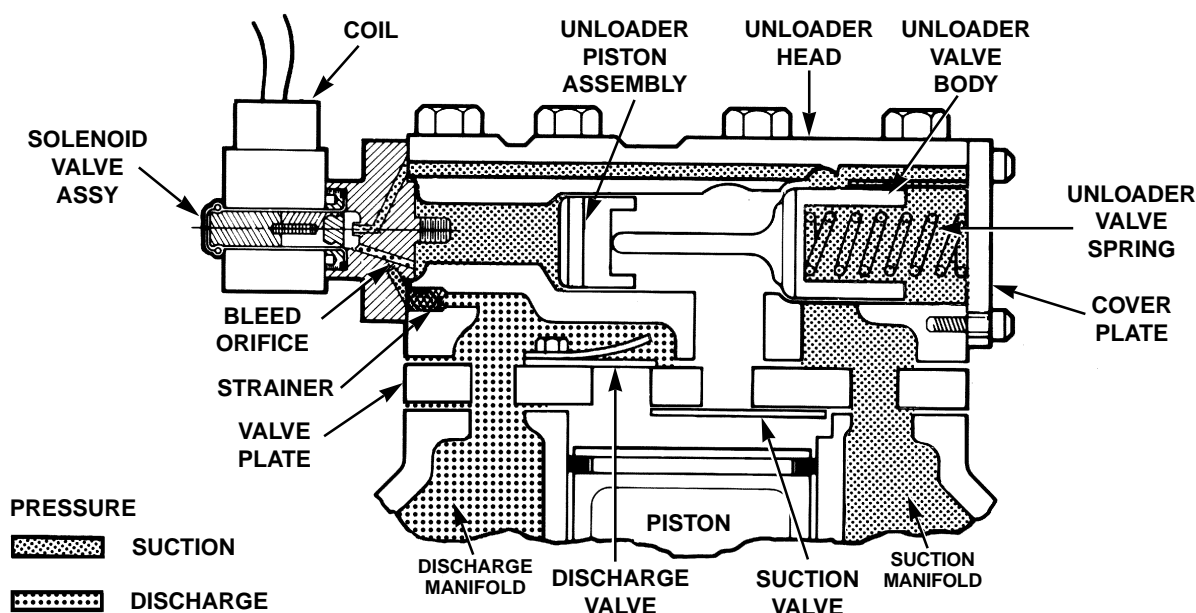


Figure 13—Electric Unloaded Operation

As reduced capacity is desired an external controller energizes the solenoid coil. This opens the capacity control valve port, allowing the discharge gas behind the unloader piston assembly to vent back to the suction side as shown in Figure 13. The unloader valve spring at this point can move the unloader valve body to the left, blocking the unloader suction port. The cylinder bank is now isolated from the compressor suction manifold, unloading these two cylinders. No refrigerant is allowed into the cylinders and no compression takes place.

3.10 Suction Pressure Capacity Control Operation

Pressure-operated control valve is controlled by suction pressure and actuated by discharge pressure. Each valve controls 2 cylinders (one bank). On start-up, controlled cylinders do not load up until the differential between suction and discharge pressures is approximately 25 psi (1.7 bar) for 06D compressors and 35 psi (2.4 bar) for 06E models.

When suction pressure rises high enough to overcome set point spring, the diaphragm snaps to the left and relieves pressure against the poppet valve. The drive

spring moves the poppet valve to the left and it seats in the closed position.

With the poppet valve closed, discharge gas is directed into the unloader piston chamber and pressure builds up against the piston. When pressure against the unloader piston is high enough to overcome the unloader valve spring, the piston moves the valve to the right, opening the suction port. Suction gas can now be drawn into the cylinders and the bank is running fully loaded (as shown in Figure 12A).

As suction pressure drops below the set point, the control spring expands, snapping the diaphragm to the right. This forces the poppet valve open and allows gas from the discharge manifold to vent through the base control valve to the suction side. Loss of full discharge pressure against the unloaded piston allows the unloader valve spring to move the valve left to the closed position. The suction port is blocked, isolating the cylinder bank from the suction manifold. The cylinder bank is now unloaded (as shown in Figure 13A).

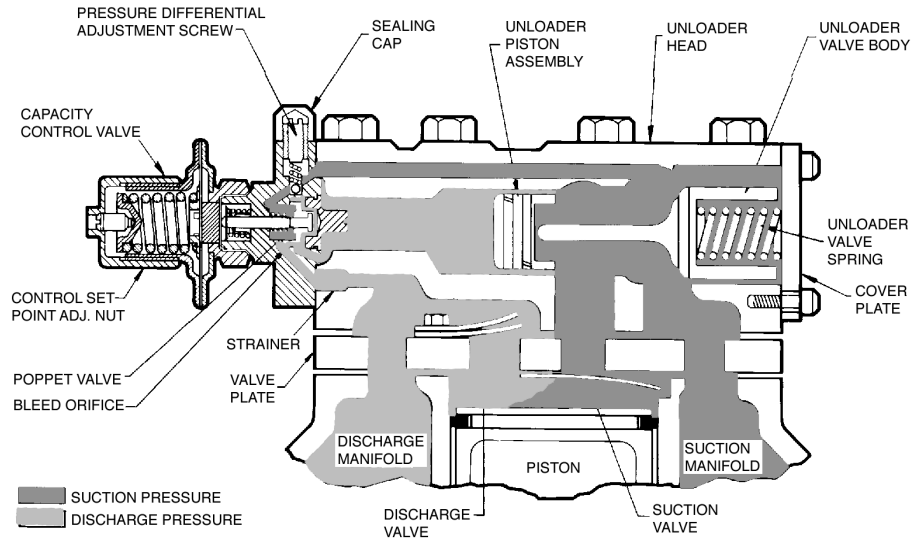


Figure 12A—Pressure Loaded Operation

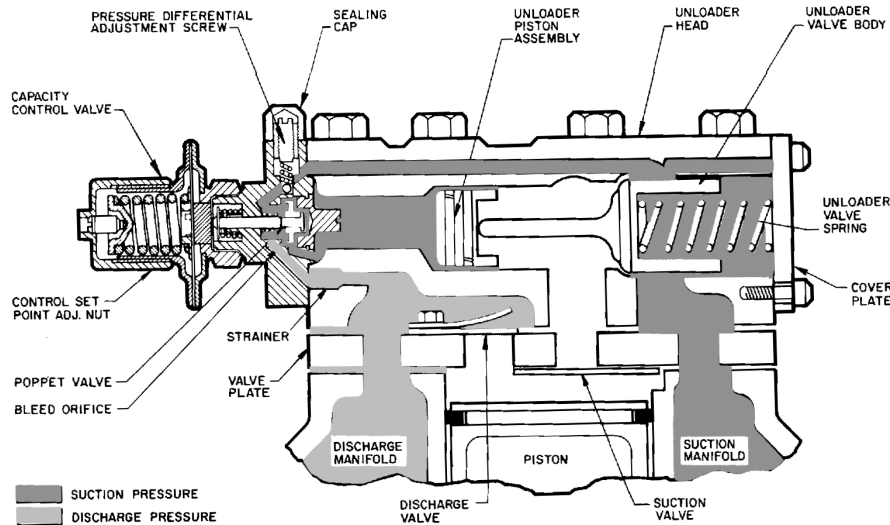


Figure 13A—Pressure Unloaded Operation

3.11 Pressure Actuated Capacity Control Adjustment

Control Set Point - The cylinder load-up point is adjustable from 0 psig to 86 psig (1 bar to 6.9 bar). Refer to Figure 14.

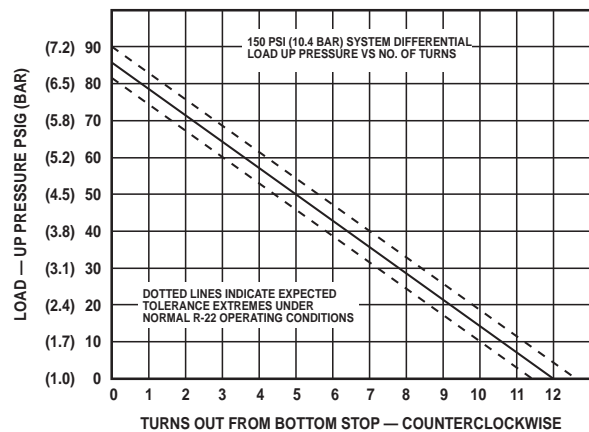
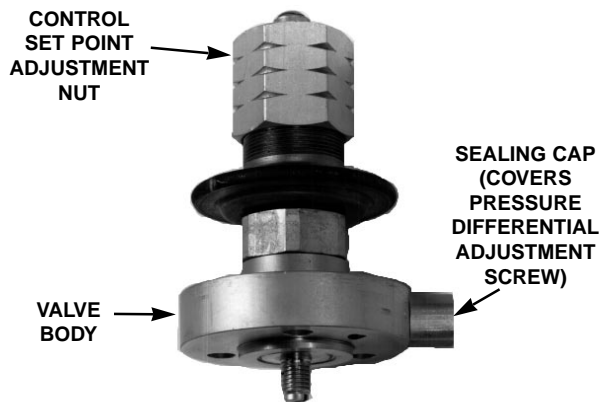


Figure 14—Control Set Point - Bypass & Suction Cut-Off



Pressure Actuated Unloader Valve

Turn the adjustment nut clockwise to the bottom stop. In this position, the cylinder load-up pressure is 86 psig (6.9 bar). Control set point is regulated to desired pressure by turning the adjustment nut counterclockwise. The number of turns can be determined from the curve in Figure 15. Each full turn counterclockwise decreases the load-up point by approximately 7.2 psi (.5 bar). Approximately 12 turns changes the pressure from 86 psig to 0 psig (6.9 bar to 1 bar). Pressure differential between cylinder load-up point and unload point is adjustable from 6 psi to 16 psi (.41 bar to 1.1 bar). Refer to Figure 15.

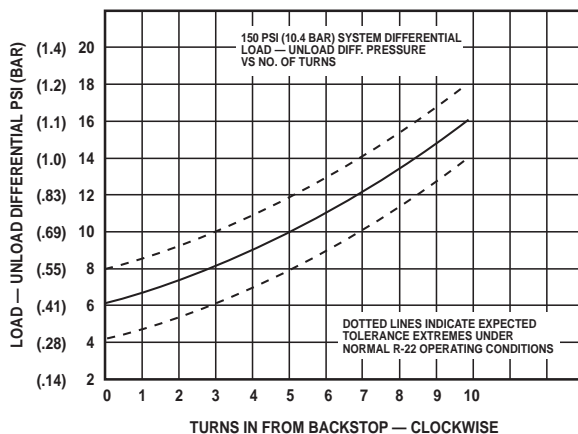


Figure 15—Differential Set Point

Turn the adjustment screw counterclockwise to the back-stop. In this position, the differential is 6 psi (.41 bar). Differential is set by turning the adjustment

screw clockwise. The number of turns to the desired differential can be determined from the curve. Each full turn clockwise increases the differential by approximately 0.8 psi (.06 bar). Approximately 5 turns changes the differential from 6 psi to 10 psi (.41 bar to .69 bar).

3.12 Variable Frequency Drives

Variable Frequency Drives (VFD's) may be used with Carlyle 06D/E refrigeration duty compressors and provide optimum capacity control while maximizing the compressor efficiency. Some of Carlyle's 06D air conditioning models may require modification of the internal bifurcation system to operate properly. Contact Carlyle Application Engineering if this is required. VFD's, when properly applied, provide very stable suction pressure control and minimize compressor cycling. Additionally, Carlyle reciprocating compressors attain their peak efficiency at approximately 900 - 1100 rpm. Therefore, the use of VFD's versus simply unloading or cycling compressors will typically result in significant energy savings. The limitations on the allowable speed ranges when using VFD's are 30 to 60 hertz. Application of Carlyle 06D/E compressors below 30 hertz may result in nuisance oil safety switch trips due to reduced oil pressure levels. Operation above 60 hertz may result in increased oil circulation rates and compressor valve failures.

Due to the low discharge gas pulsation frequency of reciprocating compressors (typically 30 to 180 hertz), after system start-up the operational frequency band should be swept to identify any high vibration areas due to the compressor exciting frequency matching a natural frequency of the piping or base. Any frequency bands that result in excessive vibration must be programmed to skip over.

Variable frequency drives should be selected based on the maximum kW of the compressor motor shown in Tables 6-9 on Pages 38 and 39.

4.0 – Compressor Features and Accessories

4.1 06D Compressor Motor Protection

The 06D compressors, when purchased with overloads installed in the compressor terminal box, are protected from motor overcurrent and overtemperature. The motor is completely protected against locked rotor, running overload, primary and secondary single phasing, and loss of refrigerant conditions. These compressors also comply with UL, CSA, and NEC (National Electrical Code) requirements for inherent motor protection.

Primary Motor Protection

Texas Instruments supplementary overloads are normally supplied with 06D compressors. These relays trip at or below the maximum continuous current (MCC) listed in the electrical data tables. These current sensitive, pilot duty relays are located inside the terminal box and will automatically reset after tripping (See Table 5). Load terminals of the overloads are 1/4 inch quick connect for ratings of 30 amps and below, and #10 screw terminals for ratings over 30 amps. Control circuit terminals are 1/4 inch quick connects.

COMPRESSOR MODEL	ELECTRICAL DATA					
	VOLT	HP	MAX. KW	MCC	RLA	LRA
06DR1090GA31*0	575	2	3.1	4.4	2.8	21.3
GA32*0	208/230			12.1	8.6	53.3
GA36*0	460			5.5	3.9	26.3
06DR0130CA31*0	575	3	4.3	7.0	5.0	28.4
CA32*0	208/230			17.4	12.4	71.0
CA32*0	208/230			17.4	12.4	71.0
CA36*0	460			8.7	6.2	35.5
06DR3160CA31*0	575	5	6.25	10.8	7.7	40.0
CA32*0	208/230			27.0	19.3	100.0
CA32*0	208/230			27.0	19.3	100.0
CA36*0	460			13.5	9.6	50.0
06DR7180DA31*0	575	5	6.25	10.8	7.7	40.0
DA32*0	208/230			27.0	19.3	100.0
DA32*0	208/230			27.0	19.3	100.0
DA36*0	460			13.5	9.6	50.0
06DR8200DA31*0	575	6.5	9.8	17.6	12.6	64.0
DA32*0	208/230			44.0	31.4	160.0
DA36*0	460			22.0	15.7	80.0
06DR7240DA31*0	575	6.5	9.8	17.6	12.6	64.0
DA32*0	208/230			44.0	31.4	160.0
DA36*0	460			22.0	15.7	80.0
06DR2280DA31*0	575	7.5	12.8	22.2	15.9	79.0
DA32*0	208/230			55.5	39.6	198.0
DA36*0	460			27.8	19.8	99.0
06DR3370DA31*0	575	10	16.5	25.0	17.9	91.0
DA32*0	208/230			62.0	44.3	228.0
DA36*0	460			31.0	22.1	114.0

* 0 or 5.

COMPRESSOR MODEL	ELECTRICAL DATA					
	VOLT	HP	MAX. KW	MCC	RLA	LRA
06DM8080GA31*0	575	3	4.1	7.0	5.0	28.4
GA32*0	208/230			17.4	12.4	71.0
GA32*0	208/230			17.4	12.4	71.0
GA36*0	460			8.7	6.2	35.5
06DM3130CA31*0	575	5	6.25	10.8	7.7	40.0
CA32*0	208/230			27.0	19.3	100.0
CA32*0	208/230			27.0	19.3	100.0
CA36*0	460			13.5	9.6	50.0
06DM3160CA31*0	575	5	6.25	10.8	7.7	40.0
CA32*0	208/230			27.0	19.3	100.0
CA32*0	208/230			27.0	19.3	100.0
CA36*0	460			13.5	9.6	50.0
06DM3370DA31*0	575	10	16.5	25.0	17.9	91.0
DA32*0	208/230			62.0	44.3	228.0
DA36*0	460			31.0	22.1	114.0
06DA8182AA31*0	575	6.5	9.78	17.6	12.6	64.0
AA32*0	208/230			44.0	31.4	160.0
AA36*0	460			22.0	15.7	80.0
06DA8242BA31*0	575	7.5	12.8	22.2	15.9	79.0
BA32*0	208/230			55.5	39.6	198.0
BA36*0	460			27.8	19.8	99.0
06DA3282BA31*0	575-3-60	10	16.5	25.0	17.9	91.0
BA32*0	208/230			62.0	44.3	228.0
BA36*0	460			31.0	22.1	114.0
06DA537BA01*0	575	15	20.7	32.0	22.9	96.0
BA12*0	208/230			89.0	63.6	266.0
BA06*0	460			40.0	28.6	120.0

* 0 or 5.

LEGEND

LRA – Locked Rotor Amps
MCC – Maximum Continuous Current
RLA – Rated Load Amps

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

Table 5—Electrical Specifications

In cases where an 06D compressor is applied without the supplementary overloads, the use of approved calibrated circuit breakers is required. These circuit breakers must trip at or under the maximum continuous current (MCC) level listed in Table 5 on Page 36, and under the locked rotor conditions within 2 to 6 seconds. Carlyle-approved circuit breakers can use the 140% or 156% factor to determine RLA values. When approved circuit breakers are used, the must trip ampere value of the circuit breaker becomes the MCC value of the compressor branch circuit. This can be used to determine the new compressor branch circuit RLA value.

Thermal Protection

Internal thermostats are also supplied with all 06D compressors with the only exception being part-winding start models. These thermostats are embedded in the motor windings with contacts rated at 240VA that open on temperature rise and close on temperature fall. Due to its small mass and the low temperature rise rate of the 06D motors, these thermostats follow motor temperatures closely and provide complete thermal protection. Thermostat connections are made at terminals #8 and #9 on the compressor terminal block in the terminal box. The thermostats are pilot duty, automatic reset devices.

Branch Circuit Protection

Branch circuit protection may be obtained by use of time delay fuses as noted in the electrical table or by circuit breakers selected at 110% to 125% of compressor motor overload trip current.

4.2 06E Compressor Motor Protection

The 06E compressors must be applied with properly sized calibrated circuit breakers to protect the motor against overcurrent fault conditions.

Primary Motor Protection

Calibrated circuit breakers must be provided for overcurrent protection. Approved circuit breaker selections are shown in Tables 6 – 9 (Page 38 and 39) for the 06EA, 06ER and 06EM compressors. Use of circuit breakers other than those shown in this Application Manual, or any other alternate overcurrent protection must be approved by Carlyle Application Engineering. For proper overcurrent protection, the must trip setting of the calibrated circuit breaker must not exceed the compressor Maximum Must Trip Amps shown in Tables 6 – 9. The selected compressor overcurrent device must trip in 2 to 6 seconds at the LRA value shown for the compressor.

The circuit breakers selected by Carlyle are manually reset and have been sized to protect the compressor against running overcurrent, locked rotor, primary and secondary single phasing. These circuit breakers also offer the additional advantage of protecting the compressor against malfunctions of the compressor contactor (which may not be possible with pilot duty motor protection).

Table 9 shows the part winding (PW) 6 pole circuit breakers selected for 208/230 volt, three phase, 60 hertz applications. The selected compressor overcurrent protection device for part winding must trip the first 3 legs in 2 to 6 seconds and the second 3 legs in 1 to 3 seconds. Carlyle recommends a 1 to 1.25 second time delay between energizing the first and second legs. These circuit breakers are stocked in limited quantities by Carlyle. Other 6 pole, part winding circuit breakers with different trip settings or for other voltages are also available but may require special order.

COMPRESSOR MOTOR DATA								CIRCUIT BREAKER DATA				
COMPRESSOR MODEL *	VOLT	HP	MAX. KW	MAX. MUST TRIP AMPS	MAX. RLA	LRA XL	LRA PW (1ST WINDING)	RECOMMENDED CIRCUIT BREAKER PART NO.	MUST HOLD AMPS	MUST TRIP AMPS	LRA	RECOMM. RLA
06ER(1/4)50000	208/230	15	22.0	90	72	283	170	HH83XB356/626	78	90	250	64.3
(1/4)50100	575			38	31	96	59	XA460	29	33.5	97	23.9
(1/4)50600	400/460			46	36	142	85	XA463	40	46	150	33.9
(1/4)50300	208/230/460			90/46	72/36	283/142	170/85	XB356/XA463	72/40	83/46	282/150	59.3/33.9
06ER(1/4)65000	208/230	20	25.3	108	87	345	207	HH83XB336	91	104	350	74.3
(1/4)65100	575			45	36	120	72	XA461	33	38	124	27.1
(1/4)65600	400/460			54	44	173	104	XA424	42	49	175	35.0
(1/4)65300	208/230/460			108/54	87/44	345/173	207/104	XB336/XA424	91/42	104/49	350/175	74.3/35.0
06ER(1/4)75000	208/230	20	25.3	108	87	345	207	HH83XB336	91	104	350	74.3
(1/4)75100	575			45	36	120	72	XA461	33	38	124	27.1
(1/4)75600	400/460			54	44	173	104	XA424	42	49	175	35.0
(1/4)75300	208/230/460			108/54	87/44	345/173	207/104	XB336/XA424	91/42	104/49	350/175	74.3/35.0
06ER(0/3)99000	208/230	30	39.1	168	135	506	304	HH83XC539	142	163	507	116.4
(0/3)99100	575			65	52	176	106	XA430	50	58	168	41.4
(0/3)99600	400/460			84	68	253	152	XA425	63	73	210	52.1
(0/3)99300	208/230/460			168/84	135/68	506/253	304/152	XB539/XA425	142/63	163/73	507/210	116.4/52.1

Table 6—Low Temperature - Across the Line Start

COMPRESSOR MOTOR DATA								CIRCUIT BREAKER DATA				
COMPRESSOR MODEL	VOLT	HP	MAX. KW	MAX. MUST TRIP AMPS	MAX. RLA	LRA XL	LRA PW (1ST WINDING)	RECOMMENDED CIRCUIT BREAKER PART NO.	MUST HOLD AMPS	MUST TRIP AMPS	LRA	RECOMM. RLA
06EM(1/4)150000	208/230	15	22.0	90	72	283	170	HH83XB356/626	78	90	250	64.3
(1/4)150100	575			38	31	98	59	XA460	29	33.5	97	23.9
(1/4)150600	400/460			46	36	142	85	XA463	40	46	150	33.9
(1/4)150300	208/230/460			90/46	72/36	283/142	170/85	XB356/XA463	78/40	90/46	250/150	64.3/33.9
06EA(2/5)65000	208/230	25	33.6	140	112	446	268	HH83XC509	110	127	420	90.7
(2/5)65100	575			57	46	164	98	XA469	46	53	164	37.9
(2/5)65600	400/460			70	56	223	134	XA426	55	64	210	45.7
(2/5)65300	208/230/460			140/70	112/56	446/223	268/134	XC509/XA426	110/55	127/64	420/210	90.7/45.7
06EM(1/4)175000	208/230	25	33.6	140	112	446		HH83XC509	110	127	420	90.7
(1/4)175100	575			57	46	164	98	XA469	46	53	164	37.9
(1/4)175600	400/460			70	56	223	134	XA426	55	64	210	45.7
(1/4)175300	208/230/460			140/70	112/56	446/223	268/134	XC509/XA426	110/55	127/64	420/210	90.7/45.7
06EM(1/4)199000	208/230	35	47.6	193	155	610	366	HH83XC532	158	182	590	130.0
(1/4)199100	575			77	62	212	127	XA453	68	78	236	55.7
(1/4)199600	400/460			96	77	305	183	XA547	77	88	283	62.9
(1/4)199300	208/230/460			193/96	155/77	610/305	366/183	XC532/XA547	158/77	182/88	590/283	130.0/62.9

Table 7—Medium Temperature - Across the Line Start

* The last two digits of the compressors model number may vary. See page 4. The fifth digit in () of the compressor model number represents models with or without oil. 0, 1, 2 signifies older models with oil; 3, 4, 5 signifies newer models without oil. See page 4.

LEGEND

LRA - Locked Rotor Amps

PW - Part Wind

RLA - Rated Load Amps

XL - Across-the-Line

COMPRESSOR MOTOR DATA								CIRCUIT BREAKER DATA				
COMPRESSOR MODEL*	VOLT	HP	MAX. KW	MAX. MUST TRIP AMPS	MAX. RLA	LRA XL	LRA PW (1ST WINDING)	RECOMMENDED CIRCUIT BREAKER PART NO.	MUST HOLD	MUST TRIP	LRA	RECOMM. RLA
06EA(2/5)50000 (2/5)50100 (2/5)50600 (2/5)50300	208/230 575 400/460 208/230/460	20	25.3	108 45 54 108/54	87 36 44 87/44	345 120 173 345/173	207 72 104 207/104	HH83XB336/625 XA461 XA424 XB338/KA424	91 33 42 91/42	104 38 49 104/49	350 124 175 350/175	74.3 27.1 35.0 74.3/35.0
06EA(2/5)65000 (2/5)65100 (2/5)65600 (2/5)65300	208/230 575 400/460 208/230/460	25	33.6	140 57 70 140/70	112 46 56 112/56	446 164 223 446/223	268 98 134 268/134	HH83XC509 XA489 XA426 XC509/XA426	110 48 55 110/55	127 53 64 127/64	420 164 210 420/210	90.7 37.8 45.7 90.7/45.7
06EA(2/5)75000 (2/5)75100 (2/5)75600 (2/5)75300	208/230 575 400/460 208/230/460	30	39.1	168 65 84 168/64	135 52 68 135/68	506 176 253 608/253	304 106 162 304/152	HH83XC539 XA430 XA425 XC638/XA426	142 50 63 142/63	163 56 73 163/73	507 188 210 507/210	116.4 41.4 52.1 116.4/52.1
06EA(2/5)99000 (2/5)99100 (2/5)99600 (2/5)99300	208/230 575 400/460 208/230/460	40	54.0	236 94 118 236/118	189 75 95 189/95	690 276 345 690/345	414 165 207 414/207	HH83XC537 XA551 XA550 XB537/XA550	187 74 92 187/92	215 85 106 215/106	636 236 295 636/295	153.6 60.7 75.7 153.6/75.7

* The last two digits of the compressors model number may vary. See page 4. The fifth digit in () of the compressor model number represents models with or without oil. 0, 1, 2 signifies older models with oil; 3, 4, 5 signifies newer models without oil. See page 4.

Table 8—High Temperature – Across-the-Line Start

COMPRESSOR MOTOR DATA								CIRCUIT BREAKER DATA					
COMPRESSOR MODEL*	FOR 3 PHASE, 60HZ VOLTAGE	HP	MAX. KW	MAX. MUST TRIP AMPS	MAX. RLA	LRA XL	LRA PW (1ST WINDING)	RECOMMENDED CIRCUIT BREAKER PART NO.	1/2 WINDING		LRA 1ST WIND	LRA 2ND WIND	RECOMM. RLA
									MUST HOLD AMPS	MUST TRIP AMPS			
06ER(1/4)50	208/230	15	22.0	90	72	283	170	HH83XE633	38	44	152	120	62.8
06ER(1/4)65	208/230	20	25.3	108	87	345	207	HH83XE622	46	53	212	171	75.8
06ER(1/4)75	208/230	20	25.3	108	87	345	207	HH83XE622	46	53	212	171	75.8
06ER(0/3)99	208/230	30	39.1	168	135	506	304	HH83XE652	69	80	332	243	114.2
06EM(1/4)50	208/230	15	22.0	90	72	283	170	HH83XE633	38	44	152	120	62.8
06EM(1/4)75	208/230	25	33.6	140	112	446	268	HH83XE621	55	64	255	205	91.4
06EM(1/4)99	208/230	35	47.6	193	155	610	366	HH83XE609	78	90	380	300	128.6
06EA(2/4)50	208/230	20	25.3	108	87	345	207	HH83XE622	46	53	212	171	75.8
06EA(2/4)65	208/230	25	33.6	140	112	446	268	HH83XE621	55	64	255	205	91.4
06EA(2/4)75	208/230	30	39.1	168	135	506	304	HH83XE652	69	80	332	243	114.2
06EA(2/4)99	208/230	40	54.0	236	189	690	414	HH83XE660	100	115	414	345	164.2

* The fifth digit in () of the compressor model number represents models with or without oil. 0, 1, 2 signifies older models with oil; 3, 4, 5 signifies newer models without oil. See page 4.

Table 9—Part Winding

Thermal Protection

A discharge gas thermostat is supplied to provide overtemperature protection. These sensors are supplied with low and medium temperature O6ER and O6EM compressors. The sensor is factory installed into one cylinder head to sense discharge gas temperature. The sensor will open on temperature rise and close on temperature fall. The thermostat pilot duty contacts are rated for a 125 sealed VA and for an inrush of 1250 VA. They are automatically resetting and provide complete thermal protection.



Figure 16—Discharge Temperature Sensor

Shown in Figure 16 is the discharge temperature sensor. Figures 17 and 18 show the discharge temperature sensor installed on a typical 4 and 6-cylinder O6E compressor. This control device is a temperature switch that opens on rising temperature and automatically closes with falling temperature.

06ER/EM* °F (°C)	06EA °F (°C)
OPENS 325° ±8° (163° ±4°)	295° ±5° (146° ±3°)
CLOSES 250° ±12° (121° ±7°)	235° Min. (113°) Min.

* Standardized in 1998 on O6EA sensor.

The sensor wire leads located in the compressor terminal box are to be connected in series with the unit control circuit wiring.



Figure 17—Typical Installation of Cylinder Head Sensor in 4 Cylinder O6E Compressor



Figure 18—Typical Installation of Cylinder Head Sensor in 6 Cylinder O6E Compressor

This discharge temperature sensor will operate as an automatic reset device. However, because the trip setting is at a high enough value, any trips should be investigated by service personnel. For that reason, Carlyle recommends the discharge temperature thermostat be wired into the control circuit in a manual reset mode. While a number of alternate wiring arrangements for manual reset are possible, one possible alternate is shown in Figure 19.

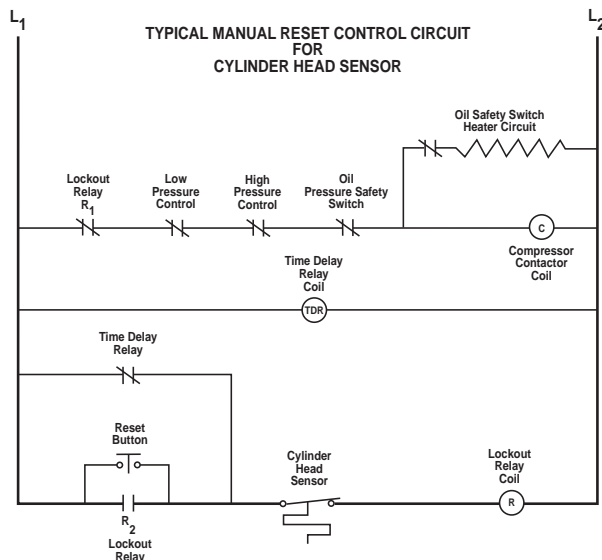


Figure 19—Alternate Wiring Diagram

Branch Circuit Protection

Branch circuit protection may be obtained by use of time delay fuses or by circuit breakers selected at 110% to 125% of compressor motor overload trip current.

4.3 Rated Load Amperes (RLA) and Maximum Continuous Current (MCC)

Rated Load Amperes or Rated Load Current is defined in Paragraph 440.3 of the National Electrical Code which states: "The rated-load current for a hermetic refrigerant motor-compressor is the current resulting when the motor-compressor is operated at the rated load, rated voltage and rated frequency of the equipment it serves." It is also stated that: "The Rated Load Current in amperes of the motor-compressor shall be marked by the equipment manufacturer on either or both the

motor-compressor nameplate and the nameplate of the equipment in which the motor-compressor is used." The relevant UL Standards also reflect this position.

The above RLA value is established by the equipment manufacturer at their standard rating condition or on a calorimeter test with the unit's compressor at or near the condition representative of unit operation. In unitary equipment, that condition has been defined as the ARI Standard Rating Condition for the class of product involved. These products require the tests be run with the complete unit: compressor, condenser and evaporator. In refrigeration systems that are not completely defined (i.e., compressor or condensing units that can be applied with various evaporators), the calorimeter conditions have been arbitrarily selected and appear in UL 303 in classes of high, medium or low suction pressure applications. In these refrigeration applications, UL will allow the equipment manufacturer to use the compressor manufacturer's determination of maximum continuous current (MCC) as the basis for calculating minimum RLA values.

As a compressor manufacturer, Carlyle does not publish certified RLA values. We publish a maximum continuous current value (MCC) which UL certifies. This is verified by operating a compressor at a specified condition with a specific refrigerant. The voltage is then lowered until the compressor's protection system trips. The amperage value just before the point at which the protection trips is considered the MCC value.

Determining RLA From MCC

The UL standards provide the equipment manufacturer with the option of using a motor-compressor Rated Load Amperage established by testing the equipment or determining the RLA value based on a certain percentage of the MCC value.

The percentage of the MCC value used is a function of the type of motor protection device, as outlined in Paragraph 440.52 of the National Electrical Code. Briefly, the National Electrical Code allows:

A separate overload relay that trips in response to motor-compressor current and selected to trip at not more than 140% of the marked motor-compressor Rated Load Current.

A thermal protector or protective system which will not permit a continuous current in excess of 156% of the marked Rated Load Current.

A fuse or inverse time circuit breaker response to motor-compressor current and rated at not more than 125% of the marked motor-compressor Rated Load Current.

4.4 06D Compressor MCC Values

Carlyle 06D compressors are provided with overcurrent and over-temperature protection that comply with UL and NEC definitions of inherent motor protection. The overcurrent protection for 06D compressors is provided by supplementary overloads and these compressors have now had MCC values approved by the appropriate Code organization (UL, CSA). The UL Standard allows the MCC testing to be done in five different suction temperature ranges (in addition to different refrigerants); from refrigeration conditions (-40°F to +10°F, -40°C to -12°C) to normal air conditioning evaporator ranges (+32°F to +53°F, 0°C to 12°C). While changes in suction ranges and refrigerants will result in slight changes in MCC values, Carlyle's policy is to certify with UL only the largest MCC value for each individual 06D compressor. Therefore, there is only one MCC value independent of the suction range or refrigerant used.

4.5 06E Compressor MCC Values

On larger 06E compressors, Carlyle requires that the system manufacturer utilize an approved and UL recognized overcurrent device to protect the 06E compressor against overcurrent conditions. These overcurrent devices may be magnetic overload relays or circuit breakers where the must trip setting is in effect, the maximum continuous current at which the compressor can operate. Since the overcurrent device can be

selected to match the load, this policy gives the systems manufacturer greater flexibility in selecting and sizing the overcurrent device and the associated electrical components. Since the overcurrent device can vary, there is no single MCC value which Carlyle lists with UL. Therefore, Carlyle will not be listing any MCC values with UL on any of the 06E compressors. Carlyle does specify the maximum must trip current which can be used with the 06E compressors and these values are shown on the 06E electrical tables (see Pages 38 and 39, Tables 6 – 9).

4.6 06D Compressor Contactor Selection

Because contactors are not tested to determine their life performance acceptability under the above 156% rule, Carlyle does not recommend that contactors be sized to this rule. Carlyle recommends that contactors be sized to a current determined by dividing the MCC by 1.40.

As an example, for the 06DR228, 208/230 volt model, the minimum contactor sizing amperage equals:

$$\text{MCC}/1.40 = 55.5/1.40 = 39.6 \text{ amps.}$$

It is obvious that using the 140% rule results in more conservative contactor selections, therefore enhancing contactor and compressor reliability.

The RLA value that is stamped on the compressor or unit nameplate is left to the system manufacturer's discretion. Carlyle does not stamp RLA values on their compressor nameplates, thus allowing the system manufacturer the greatest flexibility in optimizing contactor, branch circuit conductor (wire) and disconnect sizes. In the above example, the 208/230 volt 06DR228 compressor could be stamped with an RLA value of 34.6 amperes, providing you meet Carlyle's contactor sizing requirements shown above.

4.7 06D Compressors: Wire Sizing

The standard external overloads and internal thermostats currently supplied with all 06D compressors are considered a combination overcurrent and thermal protection system which complies with UL and NEC definitions of inherent thermal protection. Carlyle compressors that comply with this definition

have the statement “Thermally Protected” stamped or printed on their nameplates. This would allow a system manufacturer to use 156 as the specified percent to determine the compressor minimum rated load current. The minimum RLA can be computed by dividing the MCC by 156% or 1.56. For the same 06DR228, 208/230 volt model:

Min. RLA (to meet codes)

$$\text{MCC}/1.56 = 55.5/1.56 = 35.6 \text{ amps}$$

4.8 06E Compressors: Contactor Selection and Wire Sizing

On our larger 06E compressors, Carlyle requires that the equipment manufacturer utilize an approved and UL recognized overcurrent device to protect the 06E compressor. In this case, the must trip setting of the overcurrent device is equivalent to the MCC for the compressor.

For the 06E example, an 06ER175, 208/230 volt model, in combination with a Heinemann calibrated circuit breaker, HH83XB336 was selected. This circuit breaker has a must trip setting of 104 amperes and this ampere value now becomes equivalent to the MCC value for this compressor/protection combination.

This type of compressor protection combination is classified by UL as an overload relay and, therefore, the minimum RLA value can be determined by using the 140% rule. Therefore, the minimum allowable RLA for this 06ER175, 208/230 volt compressor application would be 104 divided by 1.40 or 74.3 amperes. This value would also be the minimum ampere value Carlyle would allow for contactor and wire sizing. This RLA value only applies to the 06ER175 compressor protected by the HH83XB336 circuit breaker. If other circuit breakers or overload protection devices are used, different MCC and RLA values would result as dictated by the must trip setting of the protection device used.

The compressor Must Trip Ampere value shown in Table 6 (108 amperes for the 06ER175, 208/230-3-60 volt model) is the maximum ampere value at which the 06ER175 (208/230 volt) compressor motor can be

operated, and the must trip setting of any circuit breaker or overload relay must be at or below 108 amperes. The 125% rule is used to determine a maximum compressor RLA value of 87 (108/1.25). (See Section 4.3 determining RLA from MCC for details.)

It is important to note though, that the listed maximum Must Trip Amps and maximum RLA values in Tables 6 – 9 on Pages 38 and 39 for 06E compressors are maximum motor ampere limits. The actual 06E RLA values can and are likely to be lower depending on the must trip settings of the overcurrent protection system actually used.

4.9 Compressor Nameplate Data

The compressor nameplate specifies voltage, phase, frequency, and locked rotor current. The rated load current shown in our specification charts may vary depending on the overcurrent device chosen, and for that reason is not typically printed in the space shown on the nameplate. If required, the OEM manufacturer can stamp the appropriate value. The locked rotor inrush current for the first step of part-winding start motors is shown in Tables 6 – 9 on Pages 38 and 39 for the 06E compressors. The 06D compressors are currently not available with part-winding start motors. The allowable voltage variation at the compressor terminals for all 06D and 06E compressors is typically within ± 10 of the nominal nameplate rating and is shown on Page 36.

5.0 – Compressor Features and Accessories

5.1 Safety Relief Valves

All 06E compressors are equipped with built-in safety relief valves that are factory set to relieve from the discharge to the suction side of the compressor at a pressure differential of 400 psi (27 bar). On the 4-cylinder 06E compressor, the relief valve is located below the discharge service valve in the compressor crankcase. On the 6-cylinder 06E compressors, it is located in the center bank (below the valve plate) of the crankcase. The 06D compressors do not have a relief valve, since they are only required in compressors greater than 50 cfm (1.42 m³/min).

5.2 Suction Strainers

Each 06D and 06E compressor is equipped with a suction strainer located in the suction manifold of the motor end bell (except on 2-cylinder models where it is located on the compressor side of the suction service valve).

5.3 Oil Safety Switch

Carlyle has approved the following oil safety switches for use with all 06D and 06E compressors:

1. Danfoss: (see Table 10 below)
2. Penn: P45-NCA-82(STD) or 45-NCB-14 with alarm circuit.
3. Johnson Controls: P445 (see Table 10 below)

Table 10 below shows the specifications for the Carlyle approved Danfoss Type series oil safety switches that are currently stocked by Carlyle.

The oil safety switch is designed to protect the compressor against loss of lubrication. The switch will close the control circuit at start-up (within the 120 second time delay), when the compressor operating oil pressure is at a maximum of 11 psi (.75 bar) above suction pressure. The switch will open the control circuit and shut the compressor off when the oil pressure drops to a minimum of 4 psi (.27 bar) above suction pressure and remains for the allotted 120 seconds. Carlyle's new higher flow oil pump has been found to improve lubrication during abuse conditions. As a result, for compressors built with the new higher flow oil pump (starting S/N1094J...), the allowable time delay has been increased from 45 to 120 seconds.

Carlyle Part No.	Danfoss Part No.	Time Delay	Connections	Pressure Diff. psi (bar)		Volts	Reset	Remote Alarm Circuit Capability
				Cut-In	Cut-Out			
P529-2430	060B2109	120 sec.	1/4" Male Flares	8-11 (.55-.76)	4-8 (.28-.55)	115/ 230	Manual	Yes
634-2050 OR P529-2100	060B2164		3/8" Lg. (91 CM) Cap. Tube 1/4" SAE Nuts					

Carlyle Part No.	Johnson Part No.	Time Delay	Connections	Pressure Diff. psi (bar)		Volts	Reset	Remote Alarm Circuit Capability
				Cut-In	Cut-Out			
06DA660115	P445-NCB-826	120 sec.	Electronic	8-11 (.55-.76)	4-8 (.28-.55)	115/ 230	Manual	Yes

Table 10—Oil Safety Switch Specifications

The use of an oil safety switch is recommended/required by Carlyle as noted below.

TYPE OF SYSTEM	USING 06D COMPRESSORS	USING 06E COMPRESSORS
Single Compressor without Unloading	Recommended	Required
Single Compressor with Unloading	Recommended	Required
Multiple Compressors without Unloading	Required	Required
Multiple Compressors with Unloading	Required	Required

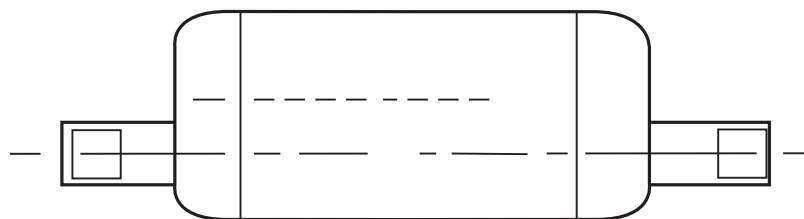
5.4 Crankcase Heaters

CRANKCASE HEATER PKG.	TYPE	HEATER NUMBER	VOLTAGE	WATTS	USAGE
06DA660091	Strap-on	HT33BK300	115	50	06D 2 & 4 Cyl. (Steel Bottom Covers)
06DA660092	Strap-on	HT33BK310	230	50	06D 2 & 4 Cyl. (Steel Bottom Covers)
06EA660148	Insertion	HT36FZ379	115	180	06D & 06E (4 & 6 Cyl.)
06EA660149	Insertion	HT36FZ479	230	180	06D & 06E (4 & 6 Cyl.)
06DA660076	Insertion	HT36DL480	480	125	06D & 06E (4 & 6 Cyl.)

5.5 Mufflers

PACKAGE NO.	QTY/ PKG	WEIGHT LBS. (KG)	USAGE	CONNECTION SIZES OUTLET	CONNECTION SIZES INLET
06DA605594	1	5 (2.3)	06D () 808, 109, 013, 313, 316	5/8" ODM	5/8" ODM
06DA605604	1	5 (2.3)	06D () 718, 818, 820, 724, 824	7/8" ODF	7/8" ODF
06DA605614	1	5 (2.3)	06D () 228, 328, 337, 537	1-1/8" ODF	1-1/8" ODF
06EA500302	1	10 (4.5)	06E () 150, 250	1-3/8" ODF	1 3/8" ODF
LM10HH100	1	6 (2.7)	06E () 165, 265, 175, 275, 099	1-3/8" ODF	1-3/8" ODF
06EA500712	1	7 (3.2)	06E () 199, 299	1-5/8" ODF	1-5/8" ODF

Mufflers can be mounted horizontally or vertically.



Typical Muffler

5.6 Baffle Plates

Baffle plates are an effective way to easily reduce gas pulsation; however, they have several limitations. They can result in a pressure drop that is too large when the suction pressure is too far above, or the discharge pressure is too far below, design conditions. Carlyle, therefore, recommends applying baffle plates in a manner that avoids high pressure drops. They are best used in service applications where occasionally excessive line vibration is found.

Carlyle Baffle Plate Recommendations — Low and Medium Temperature Applications

COMPRESSOR MODEL	SERVICE SHUT-OFF LOW TEMPERATURE R-22/404A/507			MEDIUM TEMPERATURE R-22/404A/507		
	Part No.	Orifice Diameter (in.)	No. of Orifice Holes	Part No.	Orifice Diameter (in.)	No. of Orifice Holes
06DR109	Not Set Up	3/16	2	N/A	—	—
06DR013	Not Set Up	3/16	2	N/A	—	—
06DR316	06DA660103	3/16	3	N/A	—	—
06DR718	06DA660103	3/16	3	N/A	—	—
06DR820	06DA660103	3/16	3	06DA660103	3/16	3
06DR724	06DA660104	3/16	4	06DA660105	3/16	6
06DR228	06DA660104	3/16	4	06DA660105	3/16	6
06DR337	06DA660104	3/16	4	06DA660105	3/16	6
06ER(1/4)50	06DA660105*	3/16	6	N/A	—	—
06ER(1/4)65	06EA660146	3/16	6	N/A	—	—
06ER(1/4)75	06EA660146	3/16	6	N/A	—	—
06ER(0/3)99	06EA660145*	3/16	9	N/A	—	—

*These selections have changed.

Carlyle Baffle Plate Recommendations — Medium and High Temperature Applications

COMPRESSOR MODEL	LOW TEMPERATURE R-22/404A/507			MEDIUM TEMPERATURE R-22/404A/507		
	Part No.	Orifice Diameter (in.)	No. of Orifice Holes	Part No.	Orifice Diameter (in.)	No. of Orifice Holes
06DM808	Not Set Up	3/16	2	Not Set Up	3/16	2
06DM313	Not Set Up	3/16	2	Not Set Up	3/16	2
06DM316	06DA660103	3/16	3	06DA660103	3/16	3
06DA818	06DA660103	3/16	3	06DA660103	3/16	3
06DR820	06DA660103	3/16	3	06DA660103	3/16	3
06DR724	06DA660105	3/16	6	06DA660105	3/16	6
06DA824	06DA660105	3/16	6	06DA660105	3/16	6
06DR228	06DA660105	3/16	6	06DA660105	3/16	6
06DA328	06DA660105	3/16	6	06DA660105	3/16	6
06DM337	06DA660105	3/16	6	06DA660105	3/16	6
06DA537	06DA660105	3/16	6	06DA660105	3/16	6
06EM(1/4)50	06DA660105	3/16	6	Not Set Up	7/16	3
06EA(2/5)50	06DA660105	3/16	6	Not Set Up	7/16	3
06EA265	06EA660145	3/16	9	Not Set Up	3/8	7
06EM(1/4)75	06EA660145	3/16	9	Not Set Up	3/8	7
06EA(2/5)75	06EA660145	3/16	9	Not Set Up	3/8	7
06EM(1/4)99	06EA660145	3/16	9	Not Set Up	3/8	7
06EA(2/5)99	06EA660145	3/16	9	Not Set Up	3/8	7

5.7 Discharge Line Check Valves

Under certain conditions a discharge line check valve is a valuable means for preventing condensed refrigerant from migrating into the cylinder heads of an idle compressor.

5.8 Suction Cut-Off Capacity Control

Suction cut-off unloading is an option for all four and six cylinder Carlyle 06D/E compressors. The capacity control operation and application requirements are found in the System Design Section (Section 1.0) of this manual and should be carefully reviewed. Shown below are the capacity control packages available.

5.9 Cylinder Head Cooling Fans

CYLINDER HEAD COOLING FAN PARTS		
	06D	06E
Complete fan package	06DR660014	06ER660011
Replacement motor (208/230-1-60)	HC27GB230	HC27GB230
CFM Air Flow (CMM Air Flow)	750 (21.24)	1000 (28.32)

Capacity Control Packages—Suction Cut-Off Unloading

PACKAGE NO.	TYPE	QTY/PKG	USAGE
06DA660089	Electric*	1	All 06D 4 & 6 Cylinder Models
06DA660090	Pressure	1	
06EA660138	Electric*	1	All 06E Compressors
06EA660139			

* Electric (Alco) coil is NOT included with 06DA660089 & 06EA660138 electric capacity control package – see coil packages below.

Capacity Control Coil Packages

PACKAGE NO.	QTY.	VOLTAGE	WEIGHT LBS. (KG)
EF19ZE120	1	120-1-50/60	1 (.9)
EF19ZE240	1	208/240-1-50/60	1 (.9)
EF19ZE024	1	24-1-50/60	1 (.9)

5.10 Spring Mounting

06D Spring Mounting Package

PACKAGE NO.	QTY/PKG	WEIGHT LBS. (KG)	USAGE
6D44-492*	12 Sets	7 (3.2)	All 06D 2 & 4 Cylinder
06DA660058†	1 Set	-	
6D63-492*	12 Sets	8 (3.6)	All 06D 6 Cylinder
06DA660057†	1 Set	-	

*-492 packages consist of springs, spring guide, and spring cups with quantities sufficient to mount 12 compressors.

†-058 & -057 packages consist of mounting spring, retainer, stud flange nut, lock nut, snubber, and snubber cup.

06E Spring Mounting Package

PACKAGE NO.	QTY/PKG	WEIGHT LBS. (KG)	USAGE
06EA660089*	1 Set	2 (0.9)	All 06E Compressors
06EA900023†	2 Sets	4 (1.8)	

*The 06EA660089 package includes mounting springs, retainer, stud flange nut, snubber, and snubber cap to mount 1 compressor.

†The 06EA900023 package includes springs, spring guides, and spring cups with quantities sufficient to mount 2 compressors.

5.11 Solid Mounting

All 06D/E compressors may be solid mounted. Carlyle offers the 30HR070-1071 solid spacer with four spacers required for each 06D or 06E compressor. The spacers are 1-1/8" O.D. x 1" high with a 1/2" diameter through the hole.

5.12 Electrical Terminal Parts

Special wire terminations are necessary for use with the 06E compressors and must be ordered separately for proper wire size. These crimp type connectors are available in the following sizes:

TERMINAL PARTS	WIRE SIZE
06EA900132	#6
06EA900102	#4
06EA900112	#2
06EA900122	#1/0

5.13 Conduit Adapter Plates

Electrical conduits are mounted to the 06E terminal box, by use of an adapter plate. Each compressor is supplied with conduit adapter plates for the appropriate size conduit based on the RLA of the particular compressor. Table 11 shows the conduit plate size provided with each compressor model.

COMPRESSOR MODEL	VOLTAGE	
	208/230/460	460/575
06ER150	1"	1"
06ER165	1"	1"
06ER175	1"	1"
06ER099	1" & 1-1/4"	1" & 1-1/4"
06EM150	1"	1"
06EM175	1" & 1-1/4"	1"
06EM199	1-1/4" & 1-1/2"	1-1/4" & 1-1/2"
06EA250	1-1/4" & 1-1/2"	
06EA265	1-1/4" & 1-1/2"	
06EA275	1-1/4" & 1-1/2"	
06EA299	1-1/4" & 1-1/2"	

Table 11—06E Conduit Sizes Supplied

5.14 SAE Adapter Fitting

PART NO.	WEIGHT LBS. (KG)	DESCRIPTION	USAGE
DE14CA126	1 (0.5)	To adapt compressor oil drain plugs from SAE fitting to 1/4" NPT	All 06D 4 and 6 cylinder and 06E compressors

5.15 Service Valves

06D - SERVICE SHUT-OFF VALVES					
COMPRESSOR	SUCTION VALVE	ODF (INCHES)	DISCHARGE VALVE	ODF (INCHES)	SELECTION
06DR109 (3ø only)	06DA660061	7/8	06DA660060	5/8	Standard
06DM808	06DA660060	5/8	06DA660061	7/8	Optional
06DR109 (1ø only)	06DA660062	7/8	06DA660060	5/8	Standard
06DM808	06DA660064	1-1/8	06DA660061	7/8	Optional
06DR013	06DA660064	1-1/8	06DA660060	5/8	Standard
06DR316	06DA660062	7/8	06DA660061	7/8	Optional
06DM316					
06DM313	06DA660062	7/8	06DA660060	5/8	Standard
	06DA660064	1-1/8	06DA660061	7/8	Optional
06DR718	06DA660065	1-3/8	06DA660061	7/8	Standard
06DR820	06EA660090	1-5/8	06DA660060	5/8	Optional
	06DA660063	1-1/8	–	–	Optional
06DA818	06DA660064	1-1/8	06DA660061	7/8	Standard
	06DA660062	7/8	06DA660060	5/8	Optional
06DR724	06DA660065	1-3/8	06DA660062	7/8	Standard
	06EA660090	1-5/8	06DA660064	1-1/8	Optional
	06DA660063	1-1/8	–	–	Optional
06DA824	06DA660065	1-3/8	06DA660064	1-1/8	Standard
06DA328	06EA660090	1-5/8	06DA660062	7/8	Optional
	06DA660063	1-1/8	–	–	Optional
06DR228	06EA660090	1-5/8	06DA660062	7/8	Standard
	06DA660065	1-3/8	06DA660064	1-1/8	Optional
	06DA660063	1-1/8	–	–	Optional
06DR337	06EA660090	1-5/8	06DA660064	1-1/8	Standard
06DM337	06DA660065	1-3/8	06DA660062	7/8	Optional
06DA537	06DA660063	1-1/8	–	–	Optional

06E - SERVICE SHUT-OFF VALVES					
COMPRESSOR	SUCTION VALVE	ODF (INCHES)	DISCHARGE VALVE	ODF (INCHES)	SELECTION
06ER150	06EA660091	2-1/8	06DA660064	1-1/8	Standard
06EM150	–	–	06DA660062	7/8	Optional
06EA250	06EA660090	1-5/8	06DA660064	1-1/8	Standard
	06DA660065	1-3/8	06DA660062	7/8	Optional
	06DA660063	1-1/8	–	–	Optional
06ERT65	06EA660091	2-1/8	06DA660065	1-3/8	Standard
06ER175	–	–	06EA660090	1-5/8	Optional
06ER099	–	–	06DA660063	1-1/8	Optional
06EM175					
06EA275					
06EA265	06EA660090	1-5/8	06DA660065	1-3/8	Standard
	06DA660065	1-3/8	06EA660090	1-5/8	Optional
	06DA660063	1-1/8	06DA660063	1-1/8	Optional
06EM199	06EA660091	2-1/8	06EA660090	1-5/8	Standard
06EA299	–	–	06DA660065	1-3/8	Optional
	–	–	06DA660063	1-1/8	Optional



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