Carlyle®

06D Semi-Hermetic Reciprocating Compressor

Installation Instructions

CONTENTS

GENERAL

1. Inspect compressor for shipping damage and file claim with shipping company if damaged or incomplete. See Table 1 for package contents.
2. Check compressor nameplate for correct model and voltage designation.
3. Before installation, review all Carlyle compressor application literature to ensure that the proper compressor has been selected and is being applied in a proper manner. The required application literature is available on the Carlyle website.

Scan QR code for link to Carlyle literature website, https://bit.ly/3J8liEP

4. To facilitate customer installation requirements, the parts shown in Table 1 are factory-supplied in a separate parts bag located in the compressor terminal box.

Table 1 — Package Contents

PART NUMBER	DESCRIPTION	QTY
5F201631	Gasket	1
AK92AT624	Threadcutting Screw	3
AS81VF056	Crankcase Heater Speed Clip	1
AU27AS131	Star Washer	3
AU51AS301	Spring Washer	3
574-067	Instruction Sheet	1

SAFETY CONSIDERATIONS

⚠ DANGER

Failure to follow these instructions will result in severe personal injury or death.

ELECTRIC SHOCK HAZARD. Do not operate compressor or provide electric power to it unless the compressor terminal box is installed and the terminal box cover is in place and secured.

DO NOT provide power to unit or turn on compressor unless suction and discharge service valves are open.

DO NOT remove the compressor terminal box cover until all electrical sources have been disconnected.

NEVER EXCEED specified test pressures. System strength/tightness test pressure may not exceed the compressor maximum test pressure on the nameplate.

Close shutoff valves to isolate the compressor if necessary.

DO NOT USE oxygen or other industrial gases for tightness/pressure testing. Use nitrogen or inert gas.

⚠ WARNING

Failure to follow these instructions may result in serious injury or death.

CONTENTS UNDER PRESSURE. Compressor contains oil and refrigerant under pressure. Pressure must be relieved before installation, servicing, or opening any connections.

HOT and COLD surface temperatures can occur during operation and can result in severe burns or frostbite.

USE ONLY approved refrigerants and refrigeration oils.

CHECK THE REFRIGERANT TYPE. Charge only with refrigerant that conforms to AHRI Standard 700.

Only qualified, authorized, and appropriately trained HVAC or refrigeration personnel should install, commission, and maintain this equipment.

Use appropriate personal safety equipment where required. Safety goggles, gloves, protective clothing, safety boots, and hardhats should be worn where necessary.

OPERATING LIMITS

Operating envelopes of the compressor models will differ with each model and refrigerant. These operating envelopes are provided in the CARWIN rating program. Variable speed applications may have additional speed limitations. See the Variable Speed Supplemental Instructions (574-087) on the Carlyle website for details.

Scan QR code for link to Carlyle literature website
http://bit.ly/47z3SP7

GENERAL INSTALLATION PROCEDURES

Holding Charge

The 06D compressor is factory-supplied with a 5 to 15 psig (1.4 to 2 bar) charge of dry air. This internal pressure must be relieved before attempting to remove any compressor fitting or part.

Relieve holding charge by removing the cap on the low-pressure connection fitting and depressing the internal disc. See Fig. 1-3 for applicable low-pressure connection fitting location.

System Cleanliness and Dehydration

Clean and dry systems are essential for long compressor and motor life and satisfactory operation. Compressor lubricants require special attention; excessive moisture, when combined with heat and refrigerant, can form damaging acids. The recommended limit for moisture is less than 50 ppm for compressors lubricated with mineral oil (MO) or alkylbenzene (AB) lubricants and 100 ppm for POE (Polyolester) lubricants.

Use only piping which is clean and dry inside, free from rust and process oils.

Suction Screen

All 06D compressors are equipped with a suction strainer, located on the compressor side of the suction service valve. Verify that the suction screen is installed. Do not operate the compressor without the suction strainer installed.

Service Valves

Remove valve pads and attach factory-supplied suction and discharge gaskets, and service valves to the compressor. Torque applicable service valve mounting bolts as noted in “Fastener Torque Specifications” on page 9.

When brazing piping to valve, disassemble valve or wrap in a wet cloth to prevent heat damage.

Cylinder head unloading may not be used in combination with variable speed. See Variable Speed supplement (574-087) for details.

Cylinder Head Unloaders

The 06D compressors are factory-supplied with blocked unloader cylinder heads. These cylinder heads will run in a continuously loaded state until either electric or pressure actuators are installed. Use kit no. 6ADB001154 to convert a cylinder head from blocked to electric unloading or use kit no. 6ADB001155 to convert to pressure unloading.

If equipped with electric capacity control solenoid valves, perform a functional test on the valves using a permanent magnet or a solenoid coil to activate each solenoid valve. There should be a distinctive “click” when the solenoid valve is energized and de-energized. The valve may have been damaged if there is no sound. Examine the valve stem enclosure tube to determine whether it is bent or damaged.

Pressure-actuated unloaders can only be checked during operation of the compressor.

Approved Refrigerants

The 06D compressors are approved for the following refrigerants; R-22, R-134a, R-404A, R-407A, R-407C, R-407F, R-448A, R-449A, R-507A, and R-513A.

Oil

1. Check to see that oil level is 1/4 to 3/4 of the way up on compressor sightglass before starting and after 15 to 20 minutes of operation. Compressors may be shipped with or without an oil charge based on model. All compressors must contain the specified oil charge prior to start-up as a condition of warranty. See Table 3 for sightglass specifications.
2. To add oil:
   Isolate crankcase and reclaim internal pressure, and add oil through the oil fill connection. See Fig. 1-3 for recommended oil charging port details.

⚠ CAUTION

Do not charge oil through the suction line or through the compressor suction access fittings. Adding oil into the suction side of the compressor can cause damage to the suction/discharge valves, pistons, and/or connecting rods.

   To remove excess oil:
   Reduce internal crankcase pressure to 2 psig (1.15 bar), isolate crankcase, then loosen the oil drain plug, allowing oil to seep out past the threads of the plug.

⚠ CAUTION

With the compressor crankcase under slight pressure, do not remove the oil drain plug, as the entire oil charge could be lost. Do not reuse drained oil or oil that has been exposed to the atmosphere.

3. When additional oil or a complete oil change is required, use only the listed Carlyle approved oils, as shown in Table 2.

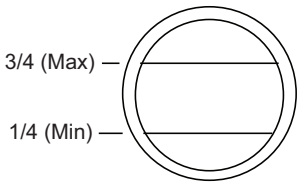
Table 2 — Recommended Oils

MANUFACTURER	OIL TYPE	BRAND NAME
For HFC Refrigerants		
Totaline	POE	P903-1701
Castrol	POE	E68
ICI Emkarate	POE	RL68H
Lubrizol Lubrikuhl	POE	2916S
Texaco Capella	POE	HFC 68NA
Totaline	POE	P903-1001[a]
Castrol	POE	SW68[a]
Mobil Arctic	POE	EAL68[a]
For HCFC and CFC Refrigerants		
Totaline	MO	P903-0101
Witco Suniso	MO	3GS
IGI Petroleum	MO	Cryol150
Texaco Capella	MO	WFI32-150
Totaline	AB	P903-2001
Shrieve Chemicals	AB	Zerol150

NOTE(S):
a. Do not use in low temperature applications.

LEGEND
AB — Alkybenzene Oil
MO — Mineral Oil
POE — Polyolester-Based Oil

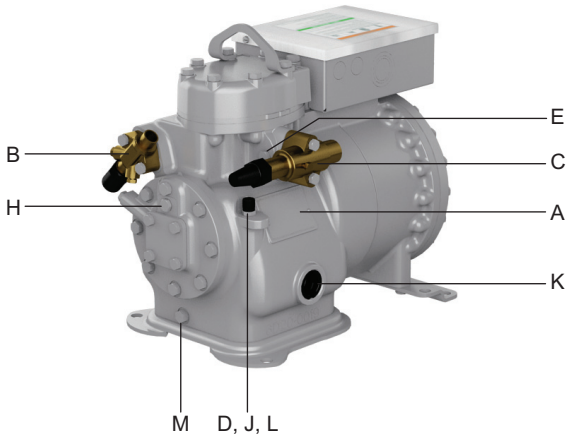
Table 3 — 06D Sightglass

06D OIL SIGHTGLASS LEVEL	NOMINAL OIL CHARGE		
	NEW SYSTEM (DRY PIPING) Pints (Liters)	COMPRESSOR	EXISTING SYSTEM (WET PIPING) Pints (Liters)
	3.5 (1.7)	8, 9 cfm	3.0 (1.4)
	5.0 (2.4)	13, 16 cfm	4.5 (2.1)
	6.0 (2.8)	18, 20 cfm	5.5 (2.6)
	9.5 (4.5)	25, 28, 37, 41 cfm	8.0 (3.8)

Connection Points

NOTE: Compressors are factory-supplied with blocked unloader cylinder heads. Figures 2 and 3 (four and six-cylinder) show electric actuators installed.

06D, 2-cylinder, 8-9 cfm

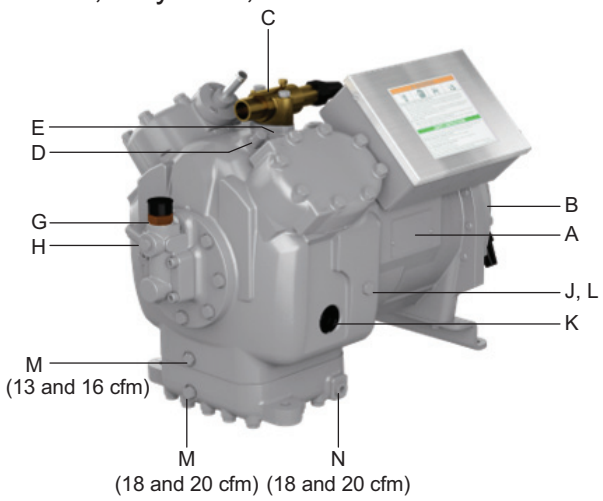


NOTE: Strap on crankcase heater attaches to stamped bottom cover.

LEGEND
A — Nameplate Locations
B — Suction Service Valve
C — Discharge Service Valve
D — Low Pressure Connection
E — High Pressure Connection
G — Oil Pressure Mechanical Sensor
H — Oil Pressure Connection
J — Low Side Oil Pressure Difference
K — Oil Level Sightglass
L — Oil Sump Fill Port
M — Oil Sump Drain Port
N — Crankcase Heater

Fig. 1 — 06D 2-Cylinder 8-9 cfm Compressor

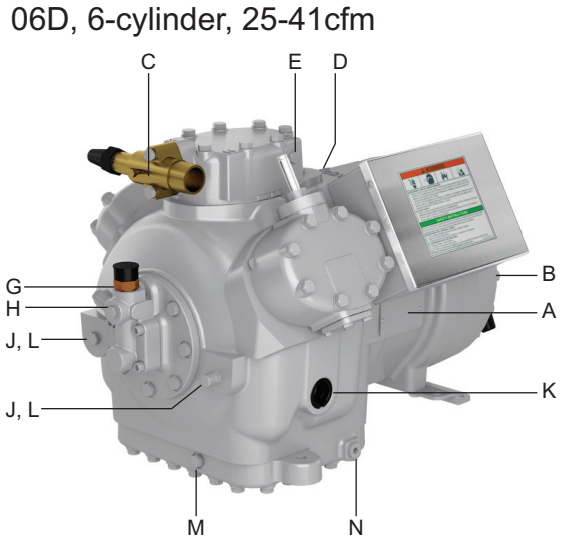
06D, 4-cylinder, 18-20 cfm



NOTE: Cast bottom cover shown for 18 and 20 cfm models. The 13 and 16 cfm models will have a stamped bottom cover with strap on crankcase heater.

LEGEND
A — Nameplate Locations
B — Suction Service Valve
C — Discharge Service Valve
D — Low Pressure Connection
E — High Pressure Connection
G — Oil Pressure Mechanical Sensor
H — Oil Pressure Connection
J — Low Side Oil Pressure Difference
K — Oil Level Sightglass
L — Oil Sump Fill Port
M — Oil Sump Drain Port
N — Crankcase Heater

Fig. 2 — 06D 4-Cylinder 18-20 cfm Compressors



LEGEND
A — Nameplate Locations
B — Suction Service Valve
C — Discharge Service Valve
D — Low Pressure Connection
E — High Pressure Connection
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H — Oil Pressure Connection
J — Low Side Oil Pressure Difference
K — Oil Level Sightglass
L — Oil Sump Fill Port
M — Oil Sump Drain Port
N — Crankcase Heater

Fig. 3 — 06D 6-Cylinder 25-41 cfm Compressors

ELECTRICAL

For proper wiring connections, consult the wiring diagram located inside the compressor terminal box cover, as well as terminal plate arrangement diagrams shown in this manual. See Fig. 4-9 and Table 4 for proper arrangement associated with the correct terminal plate and overloads.

IMPORTANT: Variable speed applications should refer to the Variable Speed Supplemental (574-087) for electrical details that are specific to variable speed applications. Refer to "OPERATING LIMITS" on page 2 for QR code and details.

Terminal Box

All UL recognized 06D compressors have terminal enclosures that are suitable for indoor use equipment as a sole enclosure.

Terminal Plate Arrangement

The compressor will have 1 of 3 terminal plate configurations: one is a 5-pin assembly and the remaining two are 6-pin assemblies. See Fig. 4-6 for details on each arrangement. To determine which terminal plate arrangement is used, refer to digit 10 of the nameplate model number and Table 4.

Each terminal plate assembly may be utilized with or without overloads. For compressors without overloads, please be sure adequate protection is supplied for all 3 phases of the motor in the form of a recognized circuit breaker or similar system. For compressors with overloads, see Table 5 and the referenced figures to ensure proper connection with the applicable overload system on the compressor.

IMPORTANT: Variable speed applications should refer to the Variable Speed Compressor Supplement (574-087) for electrical details that are specific to variable speed applications.

Table 4 — Terminal Plate Arrangement Identification

DIGIT 10 OF NAMEPLATE MODEL NUMBER	TERMINAL PLATE ARRANGEMENT	FIGURE
A, C, or G	5-Pin	4
0, 1, 2, or 3	6-Pin Universal	5
B or D	6-Pin Part Wind	6

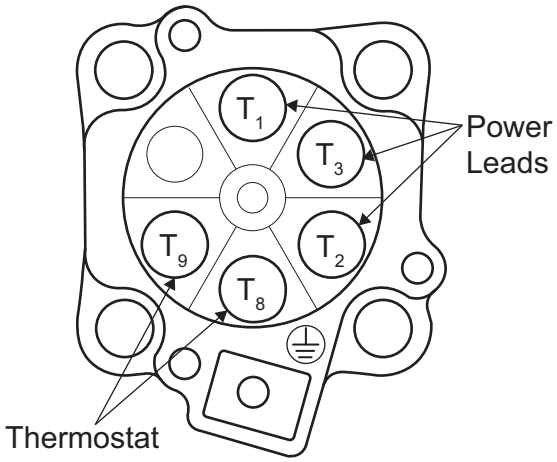
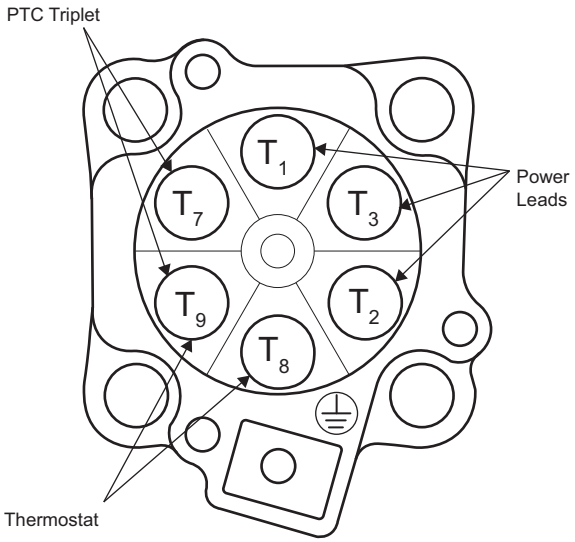


Fig. 4 — 5-Pin Terminal Plate Arrangement



LEGEND
PTC — Positive Temperature Coefficient Thermistor

Fig. 5 — 6-Pin Universal Terminal Plate Arrangement

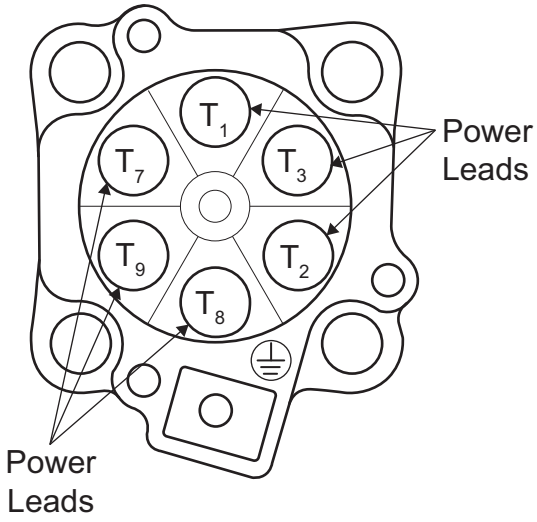


Fig. 6 — 6-Pin Part Wind Terminal Plate Arrangement

REPLACING ELECTRO-MECHANICAL RELAYS OR RETROFITTING ELECTRONIC MODULES ON 5-PIN TERMINAL PLATE ASSEMBLIES (A, C, OR G IN DIGIT 10) OR 6-PIN PART WIND TERMINAL PLATE ASSEMBLIES (B OR D IN DIGIT 10)

These overload instructions apply only to new compressors with 6-pin terminal plates utilizing the electronic overloads (0, 1, 2, or 3 in Digit 10). For instructions on connecting electromechanical overload relays or retrofitting electronic protection to compressors with 5-pin terminal plates (A, C, or G in digit 10) or part-wind 6-pin terminal plates (B or D in digit 10). Refer to Pocket Service Guide 020-611 and QR code and link in Table 5.

Table 5 — Overload Systems

TERMINAL PLATE ARRANGEMENT	OVERLOAD SYSTEM OPTIONS		
	Hybrid	Service Hybrid	Legacy Bi-Metal
5 Pin (Fig. 5) A, C or G in Digit 10	No	*Scan QR Code for link to 020-611 06D/E/CC Pocket Service Guide with instructions for these wiring configurations, https://bit.ly/36bz6ku*	
6 Pin (Fig. 6) 0[a], 1, 2 or 3 in Digit 10	Yes (Fig. 8)		
6 Pin (Fig. 7) B or D in Digit 10	No		

NOTE(S):
a. Compressors with "0" in Digit 10 of the model may be connected to either the electronic overload system (See Fig. 8) or the Legacy Bi-Metal overload systems (See Pocket Service Guide link).

INSTALLING ELECTRONIC PROTECTION MODULES ON 6-PIN ACROSS THE LINE TERMINAL PLATES

1. Connect 1 of the 2 control circuit leads to connection 14, located on top of the module. Connect the other control circuit lead to connection 11, located on top of the module. Use a fork terminal or stripped and tinned wire to prevent fraying. See "Hybrid Overload Wiring" on page 6 for circuit connection wiring. Torque module connections to 12 lb-in. (1.35 Nm) maximum.
2. Determine module power supply voltage by referring to the 6th digit in the part number located on the left side of the module (06DANB****). The supply voltages are 120/240 vac, 24 vac, and 24 vdc, corresponding to the 10th digit of the model number 1, 2, and 3, respectively. Connect 2 module power leads to module connections L and N using a fork terminal or stripped and tinned wire to prevent fraying. Refer to module front label for further power supply requirements. Torque module connections to 12 lb-in. (1.35 Nm) maximum.
3. Route one power lead (L3) through the current transformer (CT), as shown in Fig. 7 and 8.
4. Once power lead (L3) is routed through the CT, make terminal plate connections as shown in Fig. 8. Refer to "Terminal Plate Wiring" on page 6 for connection details.

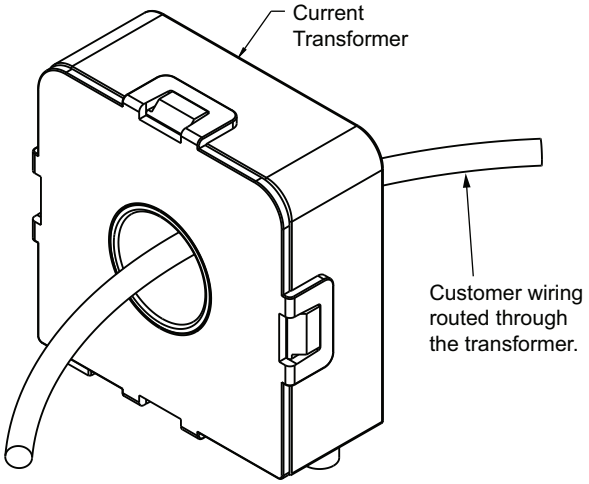


Fig. 7 — Routing Power Lead through Transformer

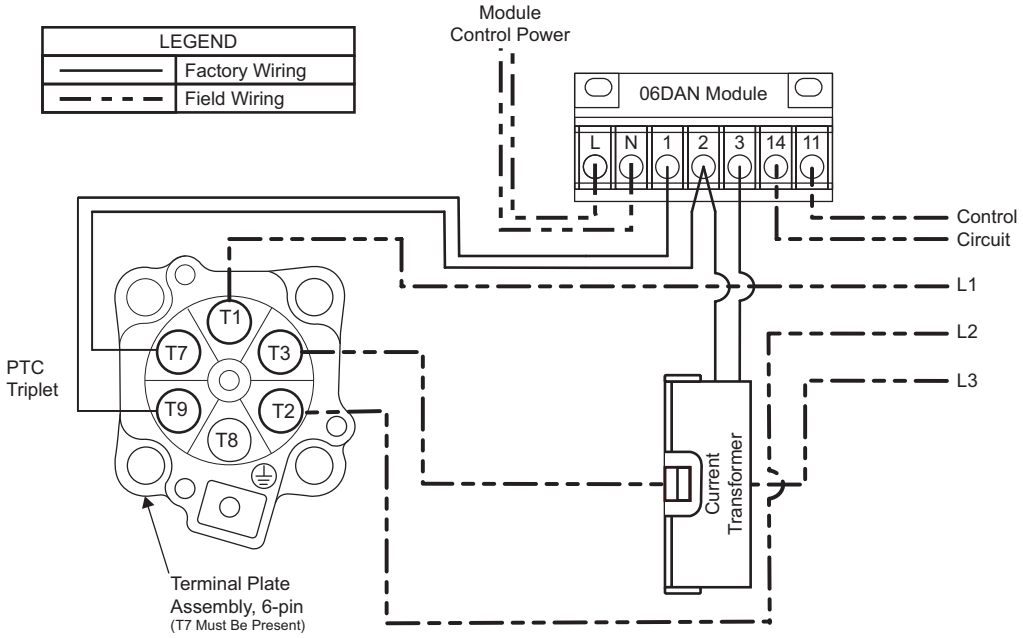


Fig. 8 — Hybrid Overload Wiring

Terminal Plate Wiring

1. Field-supplied ring terminals are required to accommodate the 1/4-28 terminal studs.
2. With screwdriver, remove terminal nut and star washer only on terminals needed to make connections applicable to installed overload system. Leave dished retainer in place. See Fig. 9 for component details and locations.
3. Apply all applicable power and control circuit leads to the terminal studs per associated overload wiring diagram. Reassemble star washers and extended slotted terminal nuts. See Fig. 9 for component details and locations.
4. Tighten extended terminal nuts to 30 lb-in. (3.4 Nm) maximum.

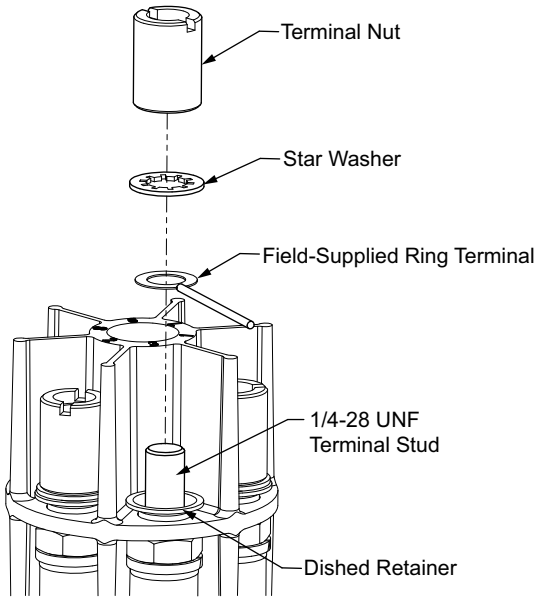


Fig. 9 — Terminal Plate Components

LUBRICATION SYSTEM

Oil Pressure Access Tee

1. For compressors without factory-installed electronic oil pressure protection, the oil pressure access tee (customer supplied) can be installed in the oil pump above the oil pump cover.

⚠ CAUTION

Bearing head material is aluminum. Torque oil pressure access tee to 20-25 lb-ft (27-33 Nm).

2. Attach the high-side connection of an electro-mechanical oil pressure safety switch to the opened flared end of the installed oil pressure access tee. Refer to Fig. 1-3 compressor connection points. The capped end of this tee contains a Schrader-type valve, which permits access to the oil pressure while the compressor is operating.

OIL PRESSURE SAFETY SWITCH

Differential oil pressure (oil minus suction pressure) is important to good compressor reliability. Carlyle recommends a 120 second time delay in the oil safety switch. The oil safety switch protects the compressor when lubrication is lost for more than 120 seconds. The switch closes the control circuit at start-up, allowing the compressor to run for 120 seconds. Operating oil pressure must reach the minimum required start pressure above suction pressure within 120 seconds for the switch to remain closed, which allows the compressor to run. If the operating oil pressure falls below the minimum stop pressure above suction for longer than 120 seconds, the switch will open the control circuit, shutting down the compressor. Oil pressure protection devices must be a manual reset type.

Use of oil pressure protection is recommended for any fixed speed 06D compressor applications where there is only a single compressor in the circuit. Oil pressure protection is required for any fixed speed 06D compressor applications where more than one compressor operates in parallel with other compressors. Oil pressure protection is required for all 06D variable speed applications. Table 6 shows electro-mechanical oil pressure differential switches. Refer to Fig. 1-3 for pressure connection locations.

The 06D compressors are available with factory-installed oil pressure protection. This factory-installed sensor eliminates the need for any field piping connections. The electronic portion of this oil pressure protection is available as a separate accessory for integrating into the system controls. Table 7 shows the oil pressure differential electronic switch required to integrate the factory-installed sensor into the system controls. Compressors may be converted from electro-mechanical to electronic oil protection using Carlyle part number 06DA660115, which has the same characteristics as shown in Table 7.

Table 6 — Electro-Mechanical Oil Pressure Protection

CARLYLE PART NO.	TIME DELAY	PRESSURE CONNECTIONS	PRESSURE DIFFERENTIAL SETTING		VOLTS	RESET TYPE	REMOTE ALARM CIRCUIT
			Cut Out	Cut In			
060B210991	120 sec.	1/4 in. Male Flare	4-8 psid (0.28-0.55 bar)	8-11 psid (0.55-0.76 bar)	115/230-v	Manual	Yes

Table 7 — Electronic Oil Pressure Safety Switches

CARLYLE PART NO.	TIME DELAY	USAGE	PRESSURE DIFFERENTIAL SETTING		VOLTS	RESET TYPE	REMOTE ALARM CIRCUIT OPTION
			Cut Out	Cut In			
06DA509570	120 sec.	Electronic Switch for Factory-Installed Sensor	4-8 psid (0.28-0.55 bar)	8-11 psid (0.55-0.76 bar)	115/230-v	Manual	Yes
06DA660115		Field Conversion Kit					

COOLING FANS

Cylinder head cooling fans are required in any application where the discharge gas temperature exceeds 250°F (121°C). Applications where the compressor is located in an airstream with a consistent velocity of 8-10 fps (~3 m/s) do not require cylinder head fans.

MOUNTING

The 06D compressors may use either rigid mounts or spring mounts. See Fig. and 11 for mounting options and component locations. Variable speed applications using spring mounts should be carefully evaluated to ensure that there are no resonances across the entire speed range. See Table 8 for proper torque values.

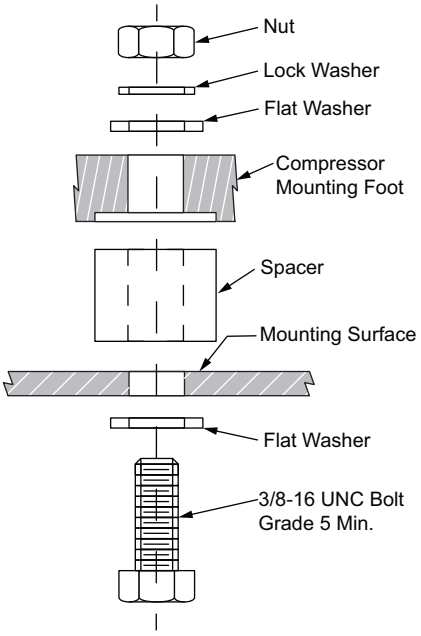


Fig. 10 — Rigid Mounting (Cast Foot with Spacer)

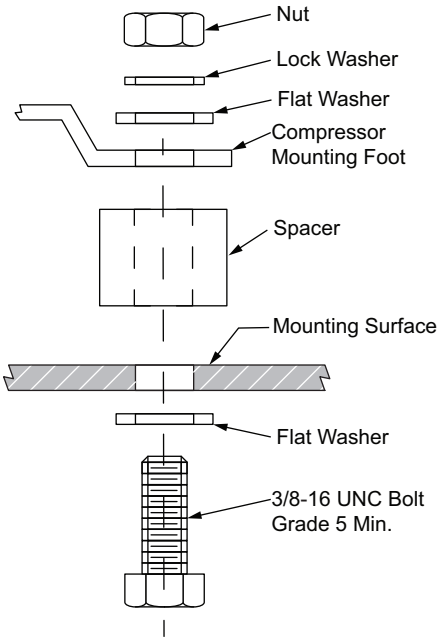


Fig. 11 — Rigid Mounting (Plate Foot with Spacer)

SERVICE AND TROUBLESHOOTING

Scan QR codes below for links to service and troubleshooting information for the 06D compressors.

020-611 06D/E/CC Pocket Service Guide
https://bit.ly/36bz6ku

574-018 Failure Modes and Troubleshooting Guide
https://bit.ly/3CBaDkM

06-008 06D Service Parts List
https://bit.ly/3vWtiGj

TORQUE SPECIFICATIONS

Table 8 — Fastener Torque Specifications

THREAD TYPE	THREAD SIZE	TORQUE RANGE	USAGE LOCATION
NPT	1/4 in. -18 NPT	20-30 ft-lb (27-41 Nm)	External Port Connections
SAE	7/16 in. -20 SAE	8-14 ft-lb (11-19 Nm)	Bottom Cover Oil Drain Plug
UNC (Coarse Thread)	No. 10-24	1-2 ft-lb (1.4-2.7 Nm)	Terminal Box Cover Screws
	1/4 in.-20	16-20 ft-lb (22-27 Nm)	– Oil Pump Cover Bolts – Terminal Plate Bolts
	5/16 in.-18	20-33 ft-lb (27-45 Nm)	– Discharge Service Valve Bolts – Suction Service Valve Bolts (2-bolt)
	3/8 in.-16	30-50 ft-lb (41-68 Nm)	– Bearing Head Bolts – Bottom Cover Bolts
		35-55 ft-lb (47-75 Nm)	– Mounting Bolts – Cylinder Head Bolts
	7/16 in.-14	50-70 ft-lb (68-95 Nm)	–Suction Service Valve Bolts (4-bolt) – Motor End Cover Bolts
	5/8 in.-11	25-40 ft-lb (34-54 Nm)	Oil Spinner Tube Assembly
UNF (Fine Thread)	No. 10-32	3-5 ft-lb (4-7 Nm)	– Terminal Box Mounting Screws – Ground Lug Mounting Screws
	1/4 in.-28	1.5-2.5 ft-lb (2-3.4 Nm)	Terminal Post Jam Nut
		8-18 ft-lb (1-24 Nm)	Unloader Valve
	3/4 in.-16	44-55 ft-lb (60-75 Nm)	OPPS Sensor
UNEF (Extra-Fine)	1-1/2 in. -18	35-50 ft-lb (47-68 Nm)	Oil Sightglass