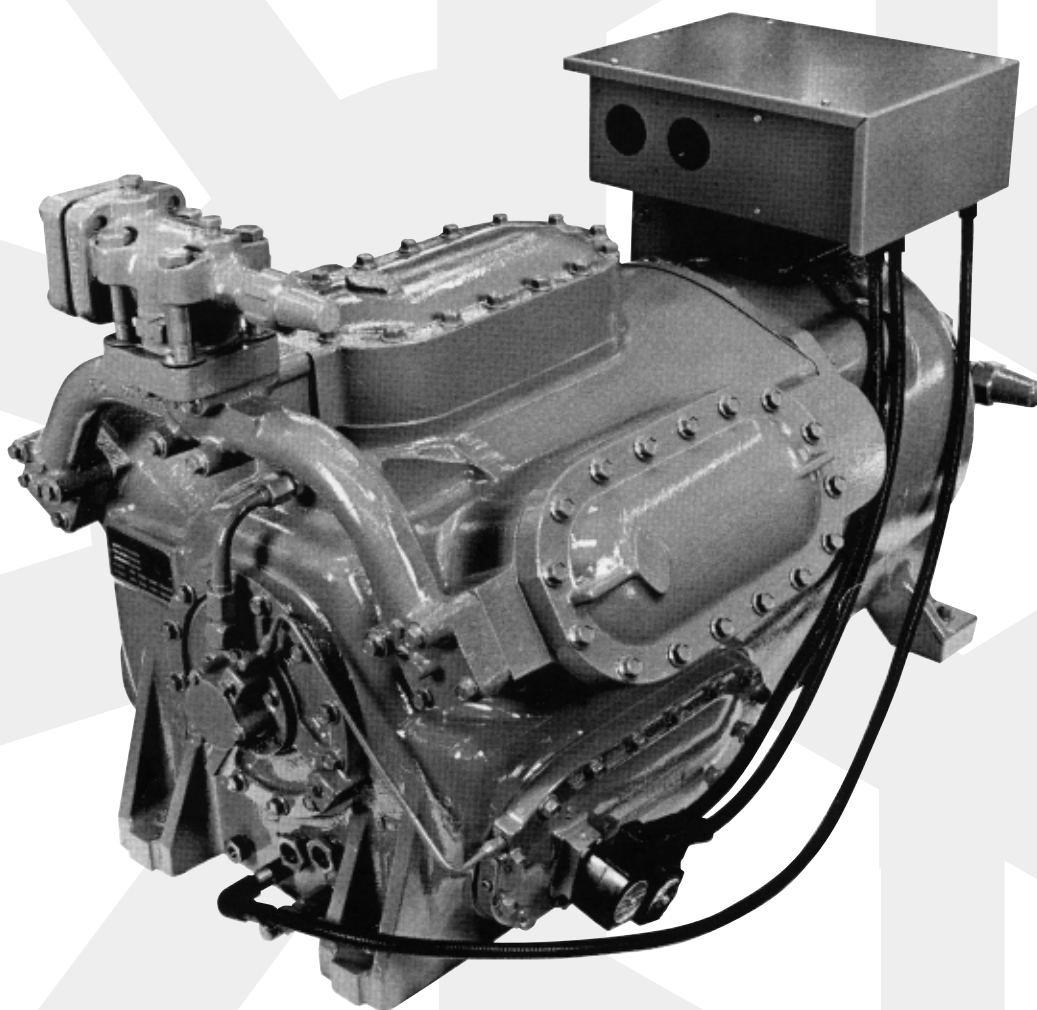


PC

SEMI-HERMETIC COMPRESSORS

MAINTENANCE



MODELS

PC 43, PC 63, PC 83 (SHORT STROKE)

PC 44, PC 64, PC 84 (LONG STROKE)

 **YORK**[®]

INTERNATIONAL

CE

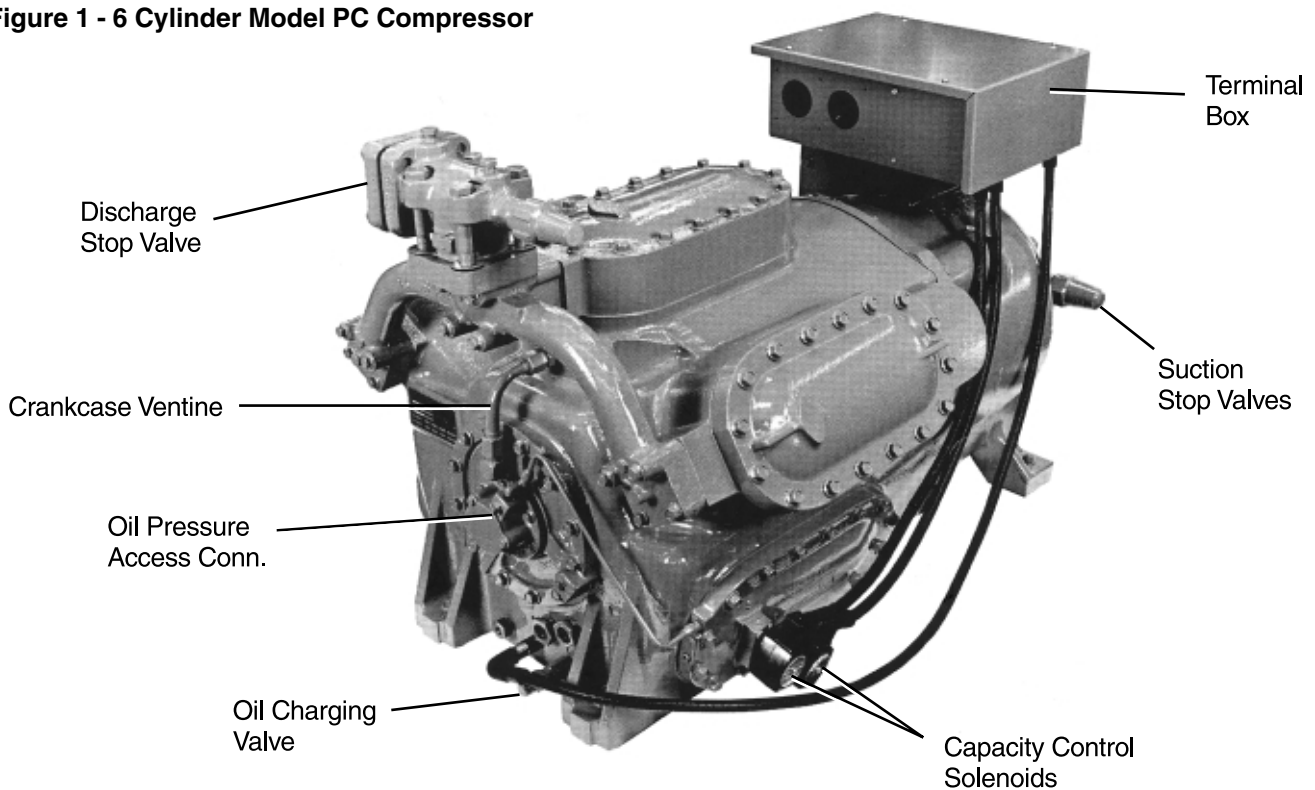
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Figure 1 - 6 Cylinder Model PC Compressor



1 GENERAL

1.1 General Description

YORK Model PC Semi-Hermetic Compressors are designed to meet air conditioning requirements using R22, R134a or R407C. They are available in 4, 6 and 8 cylinder models, each in "short stroke" or "long stroke" versions (see Nomenclature)

Varying steps of capacity control are available utilising solenoid valves. (Control of solenoid valves must be by external device.) Nominal compressor speeds are 1460 ("short stroke") or 1440 ("long stroke") RPM (50 Hz), and 1750 RPM (60 Hz).

1.2 Nomenclature

Compressor Identification

Each compressor is identified by nomenclature as shown below. The nomenclature is stamped on a data plate which is located next to the oil pump as shown in Figure 2. When contacting the factory or ordering renewal parts include the complete Nomenclature, Serial Number and date Code as illustrated. Be sure these numbers are copied accurately.

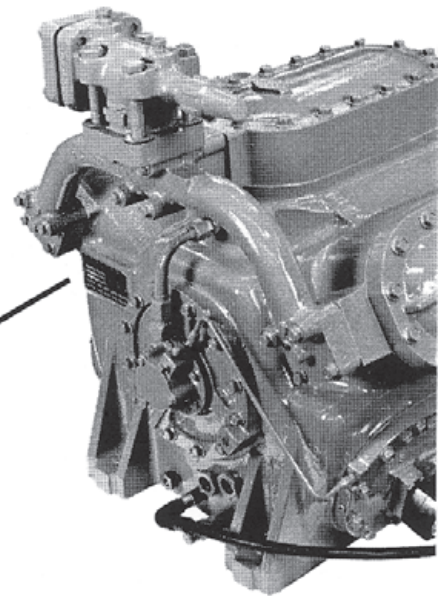
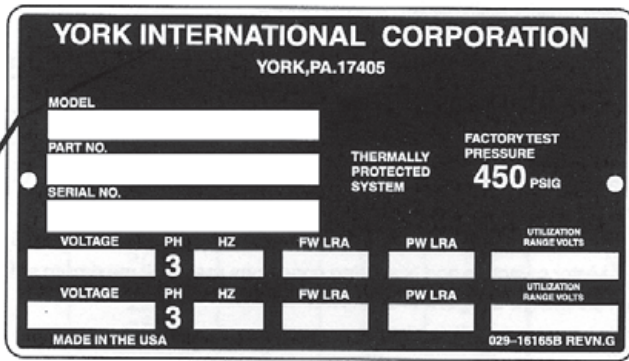
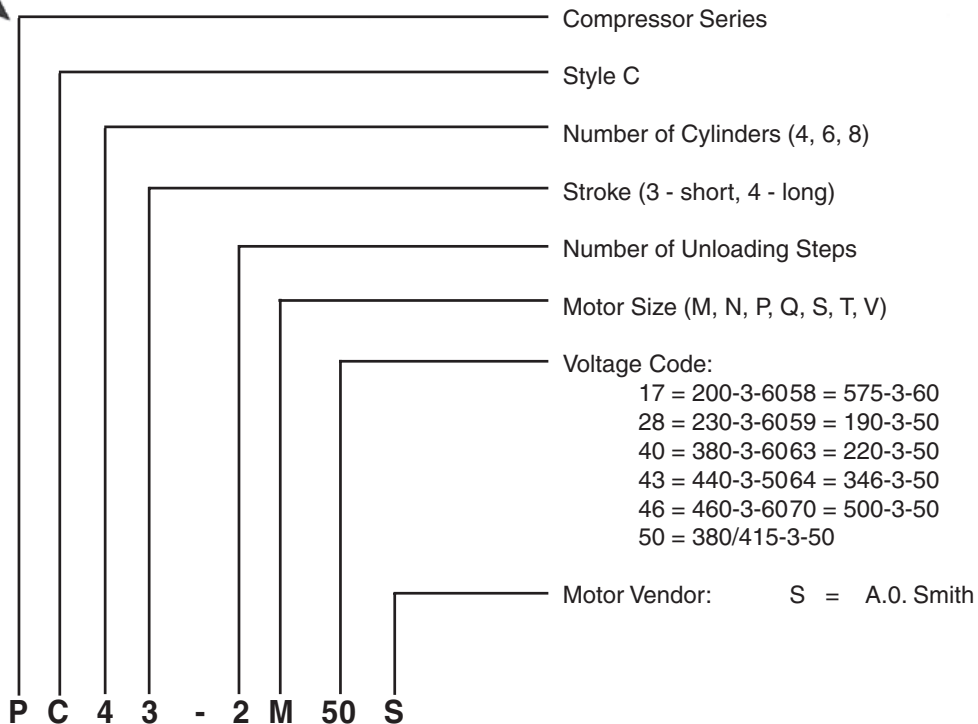


Figure 2 - Compressor Data Plate



1.2 Physical Data

COMPRESSOR MODEL		PC 43	PC 44	PC 63	PC 64	PC 83	PC 84
Number of Cylinders		4	4	6	6	8	8
Nominal Displacement	60 Hz m ³ /h	243	289	342	411	472	562
	50 Hz m ³ /h	202	238	285	338	394	464
Cylinder Bore	mm	95.25	95.25	95.25	95.25	95.25	95.25
Cylinder Stroke	mm	81.28	96.52	76.20	91.44	78.74	93.98
Suction Connection (OD female)	inch	3 1/8	3 1/8	3 1/8	3 1/8	3 5/8	3 5/8
Discharge Connection (OD female)	inch	2 5/8	2 5/8	2 5/8	2 5/8	3 1/8	3 1/8
Oil Charge	ltr.	11	11	11	11	11	11
Weight including drive motor (avg.)	kg	655	655	740	740	875	875

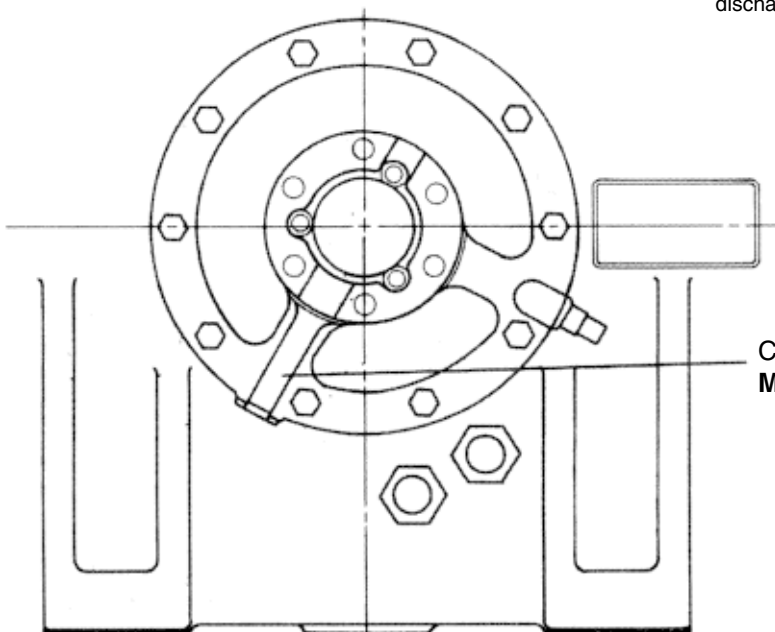
1.3 Limitations

1.3.1 Voltage Limitations

The following voltage limitations are absolute and operation beyond these limits may cause serious damage to the compressor or motor.

Nameplate Voltage	Minimum Voltage	Maximum Voltage
190-3-50	171	208
220-3-50	198	242
346-3-50	311	381
380/415 5-3-50	342	440
440-3-50	396	484
500-3-50	450	550
200-3-60	180	220
230-3-60	207	253
380-3-60	355	415
460-3-60	414	506
575-3-60	517	633

Figure 3 - Checking Oil Temperature



1.3.2 Compressor Operating Limitations

Maximum Compression Ratio	9.5:1
Maximum Operating Differential	22.4 bar
Maximum Suction Pressure	6.55 bar
Maximum Discharge Temperature	135 °C
Superheat (Nominal at compressor)	11 °C
Min. Oil Pressure (above suction pressure)	2.75 bar
Maximum Oil Temperature ¹	71 °C
Maximum Sat. Discharge Temperature ²	65.5 °C
Maximum Ambient Temperature	55 °C
Minimum Ambient Temperature	-18 °C

¹ Measured externally on pump suction boss as shown in Figure 3.

² Motor selection and operating conditions may limit maximum saturated discharge temperature to lower values.

Check oil temperature externally at this point.
Maximum allowable temperature is 71 °C

1.4 Electrical Data

Motor Size Code ²	Voltage	Phase	Hertz	Rated Amps	Locked Rotor Amps		Maximum Duel Fuse Size ¹	Minimum Circuit Ampacity	Disconnect Switch Size (Amps) ³
					A/L	PW			
M	190	3	50	177	764	585	225	221	400
	220	3	50	157	731	560	200	196	200
	346	3	50	98	465	343	125	123	200
	380/415	3	50	87	392	290	110	109	200
	500	3	50	68	322	238	90	85	100
	200	3	60	202	913	731	250	253	400
	230	3	60	174	794	636	225	218	400
	380	3	60	105	480	385	125	131	200
	460	3	60	87	397	318	110	109	200
	575	3	60	70	318	254	90	88	100
N	190	3	50	214	895	712	250	268	400
	220	3	50	183	856	635	225	229	400
	346	3	50	115	544	400	150	144	200
	380/415	3	50	104	459	358	125	130	200
	500	3	50	84	377	277	110	105	200
	200	3	60	238	1099	865	300	298	400
	230	3	60	207	956	752	250	259	400
	380	3	60	124	579	412	150	155	200
	460	3	60	104	478	376	125	130	200
	575	3	60	83	382	300	100	104	100
P	190	3	50	251	930	776	300	314	400
	220	3	50	217	876	709	250	271	400
	346	3	50	133	557	412	175	166	200
	380/415	3	50	121	488	400	150	151	200
	500	3	50	97	386	310	125	121	200
	200	3	60	280	1203	950	350	350	400
	230	3	60	244	1046	826	300	305	400
	380	3	60	144	633	467	175	180	200
	460	3	60	122	523	413	150	153	200
	575	3	60	97	418	330	125	121	200
Q	190	3	50	282	1241	964	350	353	400
	220	3	50	244	1187	876	300	305	400
	346	3	50	155	755	557	200	194	200
	380/415	3	50	139	637	470	175	174	200
	500	3	50	108	522	386	125	135	200
	200	3	60	318	1541	1101	400	398	400
	230	3	60	275	1340	976	350	344	400
	380	3	60	166	806	591	200	208	200
	460	3	60	137	670	488	175	171	200
	575	3	60	110	536	390	150	138	200
S	190	3	50	343	1484	1098	400	429	400
	220	3	50	298	1420	1051	400	373	400
	346	3	50	189	903	668	250	236	400
	380/415	3	50	167	761	570	225	205	400
	440	3	50	148	710	526	200	185	200
	500	3	50	131	625	462	175	164	200
	200	3	60	387	1746	1322	500	484	600
	230	3	60	336	1518	1150	450	420	600
	380	3	60	204	919	696	250	255	400
	460	3	60	168	759	575	225	210	400
575	3	60	134	607	460	175	168	200	
T	346	3	50	234	1110	838	300	293	400
	380/415	3	50	207	975	741	250	259	400
	440	3	50	184	873	659	225	230	400
	500	3	50	163	768	580	200	204	200
	380	3	60	247	1143	862	300	309	400
	460	3	60	210	960	724	250	263	400
	575	3	60	168	768	579	200	210	200
V	346	3	50	269	1210	948	350	336	400
	380/415	3	50	243	1077	853	300	304	400
	440	3	50	213	950	721	250	266	400
	500	3	50	191	836	656	250	239	400
	380	3	60	280	1271	997	350	350	400
	460	3	60	238	1050	830	300	298	400
575	3	60	190	840	664	250	238	400	

1. When optional external overloads are used, fuse sizes should be increased to approx. 175% of nameplate amps.

2. Sixth character in compressor model designation. (See NOMENCLATURE)

3. Based on National Electric Code (NEC). Switch is rated for isolating duty only - Do Not Open Under Load.

1.5 Threaded Fastener Torques and Sequence

When assembling a compressor or compressor parts, it is essential to tighten all threaded fasteners to their proper torque, using an accurate torque wrench. Table 1 gives the recommended torque settings for this compressor.

All threads should be LIGHTLY oiled with York 'C' oil or York 'H' oil as appropriate, except where intended for use with a sealing compound.

When tightening the screws on the top heads, hand hole covers, oil pump bearing head, motor cover, and terminal block, it is important that the screws be tightened in the proper sequence. This is essential to eliminate leaks and/or damage to the parts or gaskets. Insert all cap screws or bolts and tighten them lightly. Then, using a torque wrench, tighten each gradually to its proper torque setting following the recommended tightening sequence shown in Figure 4.

It is advisable to "double-check" the torque on all screws before starting the compressor.

Figure 4 - Screw Tightening Sequence

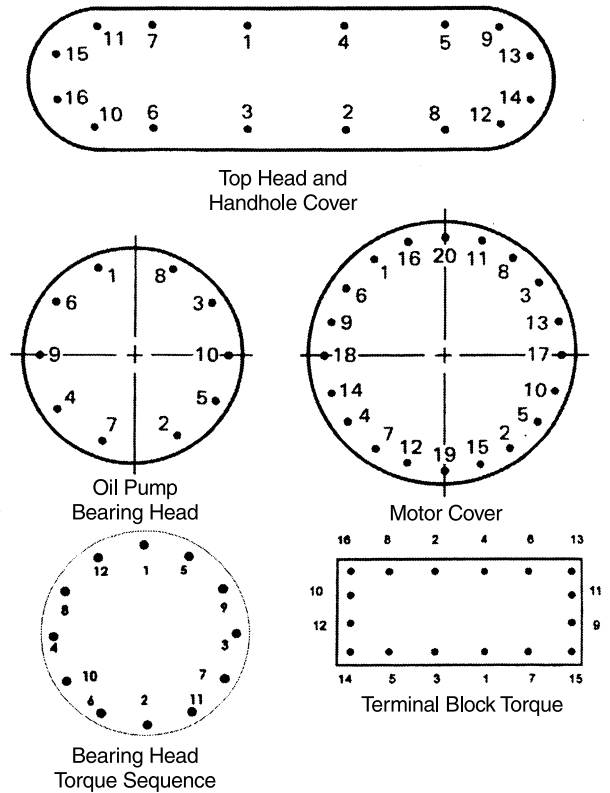
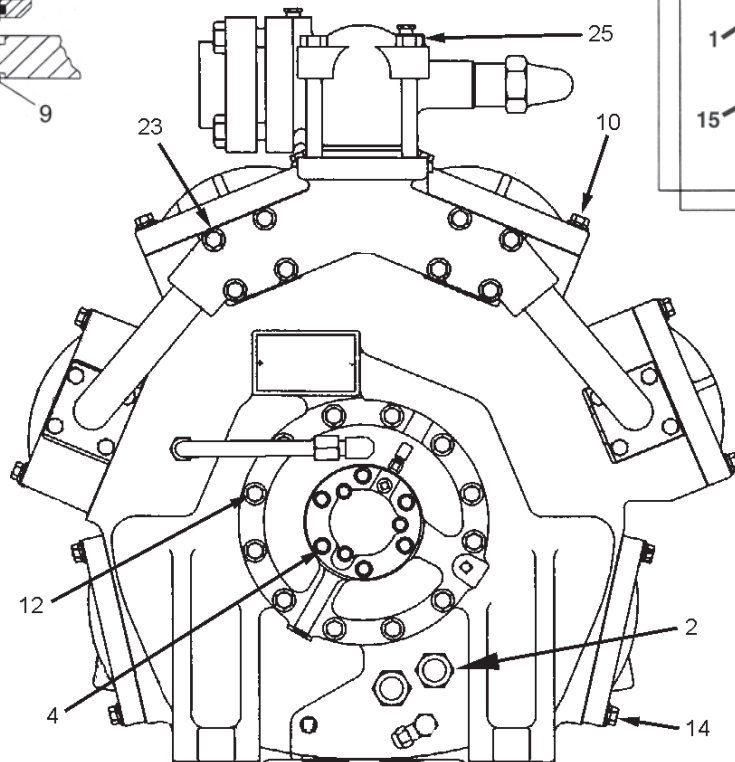
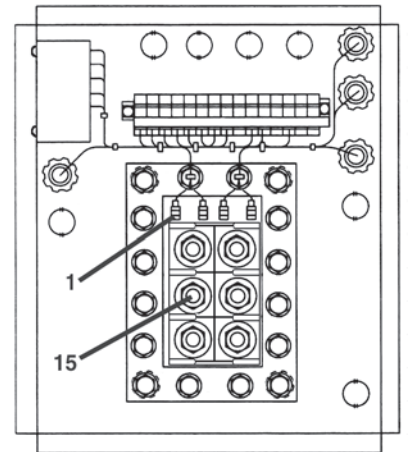
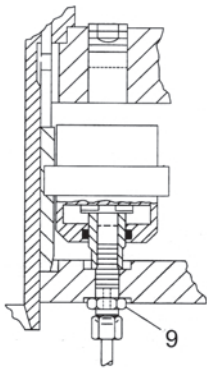
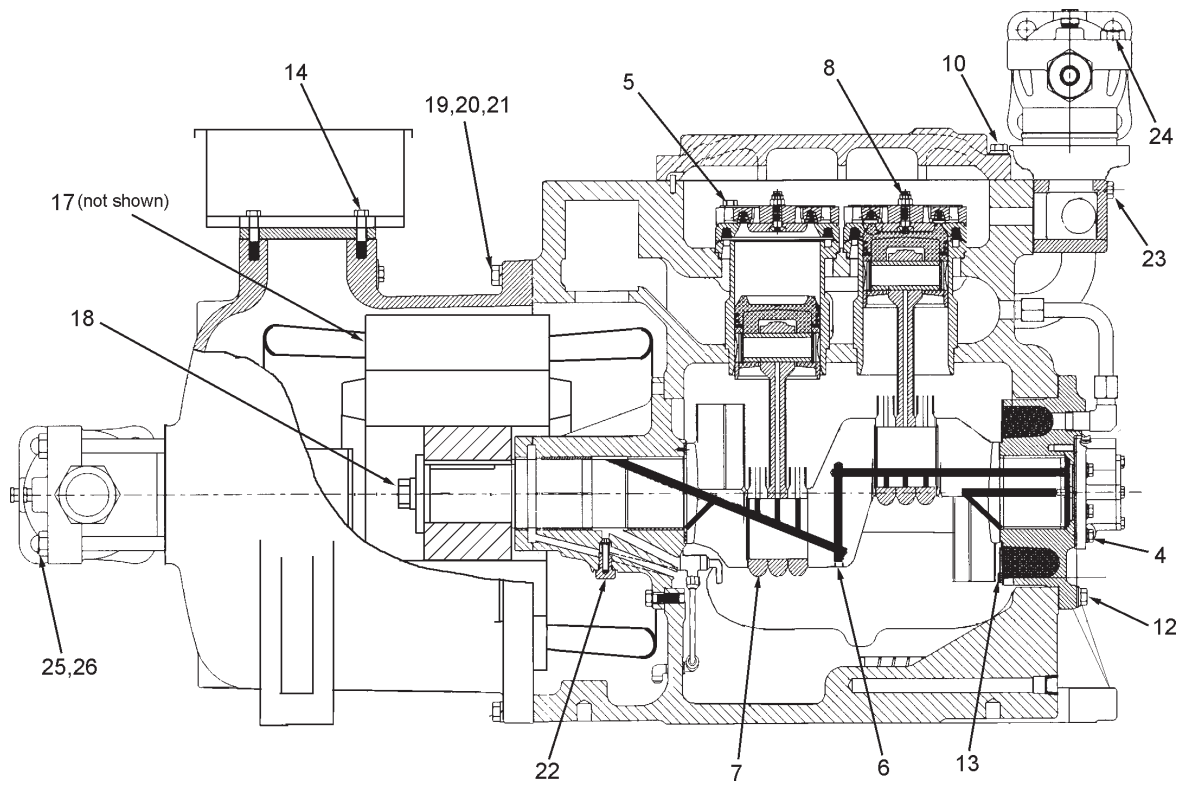


Table 1 - Thread Fastener Torques

ITEM REF.	LOCATION	THREAD	GRADE	RECOMMENDED TORQUE		
				lb-in	lb-ft	Nm
1	Motor Protector Terminal Nut*	No. 8-32 UNC	-	30	-	3.4
2	Sight Glass	1-1/2" NPT	-	-	95-100	129-136
3	Solenoid Valve (on hand hole cover)	1/4" -20 UNC	5	112-129	-	12.6-14.6
4	Oil Pump	3/8" -18 UNC	8	-	27-32	37-44
5	Discharge Valve Assy. Mounting *	3/8 -16 UNC	5	-	30	41
6	Crankshaft Set Screw	3/8 -16 UNC	-	-	12-15	16-20
7	Connecting Rod Screw *	5/16 -18 UNC	5	260	-	29.5
8	Discharge Valve Cage Assembly Nut *	3/8 -24 UNF	-	-	45-48	61-65
9	Unloader Power Assembly.	3/8 -24 UNF	-	-	15	20
10	Access Cover / Top Head	7/16 -14 UNC	8	-	78-90	106-122
11	Motor End Bearing Head	7/16 -14 UNC	5	-	55-64	75-87
12	Pump End Bearing Head	7/16 -14 UNC	8	-	78-90	106-122
13	Precipitator Cover	1/4" -20 UNC	2	73-83	-	8.3-9.4
14	Hand Hole Cover	7/16 -14 UNC	8	-	78-90	106-123
15	Terminal Block	3/8 -16 UNC	5	-	34-40	46-54
16	Terminal Stud Nut	7/16 -20 UNC	-	-	19-22	26-30
17	Stator Mounting Bolt	7/16 -14 UNC	5	-	55-64	75-87
18	Rotor	5/8 -11 UNC	2	-	107-123	146-167
19	Motor Cover Set Screw	1/2 -13 UNC	8	-	119-138	162-188
20	Motor Cover Stud	1/2 -13 UNC	8	-	119-138	162-88
21	Motor Cover Nut	1/2 -13 UNC	5	-	96-110	130-150
22	Oil Pressure Relief Cap	9/16 -18 UNF	-	-	30	41
23	Discharge Manifold	7/16 -14 UNC	5	-	34-40	46-54
24	Discharge Shut-off Valve	5/8-11 UNC	2	-	107-123	145-167
25	Suction Shut-off Valve - bolts up to 6" (150mm)	5/8-11 UNC	2	-	107-123	145-167
26	Suction Shut-off Valve - bolts over 6" (150mm)	5/8-11 UNC	2	-	68-78	92-106

* Critical Items - Torque Only As Specified.

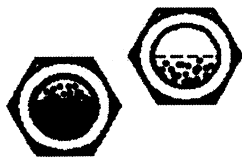


For. Key
Refer to Table 1

LUBRICATION, CYLINDER WALLS, CONNECTING ROD AND PISTON BEARINGS - Oil under pressure is conducted through drilled oil ways in the crankshaft to the crank pins. Radially drilled holes in the crank pins then supply oil individually to each connecting rod bearing. A drilled oilway up through the centre of each connecting rod supplies oil to the small end bearings.

Lubrication of the cylinder walls and small end piston bearings is accomplished by oil spray from the spaces between the connecting rod small and big end bearings as pressurized oil leaves these bearings.

OIL LEVEL - The compressor oil supply is contained in the crankcase which is provided with two oil sight glasses (8) to permit a visual check of the oil level. It is extremely important that the oil level in the compressor is within the range between the middle of the lower and middle of the upper sight glasses. Overfilling, especially, may cause oil pick-up by the crankcase breather system leading to excessive oil pumping and possible valve damage. When filling or topping up with oil it is still recommended that the compressor is run on full load for a few minutes before adjusting the oil level. If this is not possible, however, DO NOT add 'a bit extra just in case' as the improved oil management within the compressor significantly reduces oil level variation during operation.



Maximum Acceptable Operating Oil Levels



Minimum Acceptable Operating Oil Levels

The compressor oil level must be maintained between the middle of the upper and middle of the lower sight glass at all operating conditions. At part load operating conditions, it is not abnormal for the oil level to be in the lower sight glass.

CAPACITY CONTROL OIL PRESSURE - In addition to supplying oil pressure to the compressor lubrication system as described above, the compressor oil pump also provides oil pressure to operate the compressor Capacity Control System.

An oil passage in the oil pump housing connects to an external line which in turn supplies oil pressure to the compressor hand hole cover on which the capacity control solenoid valves are mounted. (Also see following section on CAPACITY CONTROL SYSTEM).

OIL COOLING - Four cylinder compressors which can be unloaded to single cylinder operation and six/eight cylinder compressors which can be unloaded to two cylinder operation are equipped with liquid injection oil cooling. This prevents overheating of the oil during prolonged operation at minimum load step. Liquid refrigerant is taken from the main liquid line via a solenoid valve, filter and isolation valve sub-assembly (9) mounted externally on the compressor. The liquid is then injected via a 1.2 mm orifice into the suction plenum of each bank of unloaded cylinders at the oil pump end of the compressor. The solenoid valve is controlled to maintain oil temperature between 55 °C and 60 °C.

CRANKCASE VENTILATION - To prevent build up of refrigerant, the crankcase is vented to the suction plenum of the permanently loaded pair of cylinders. Ventilation is via a hole on the bottom of the oil pump end bearing housing (10), through the housing and then through an external connection. A wire mesh within the housing minimises oil carry over.

Figure 6 - Compressor Oil System

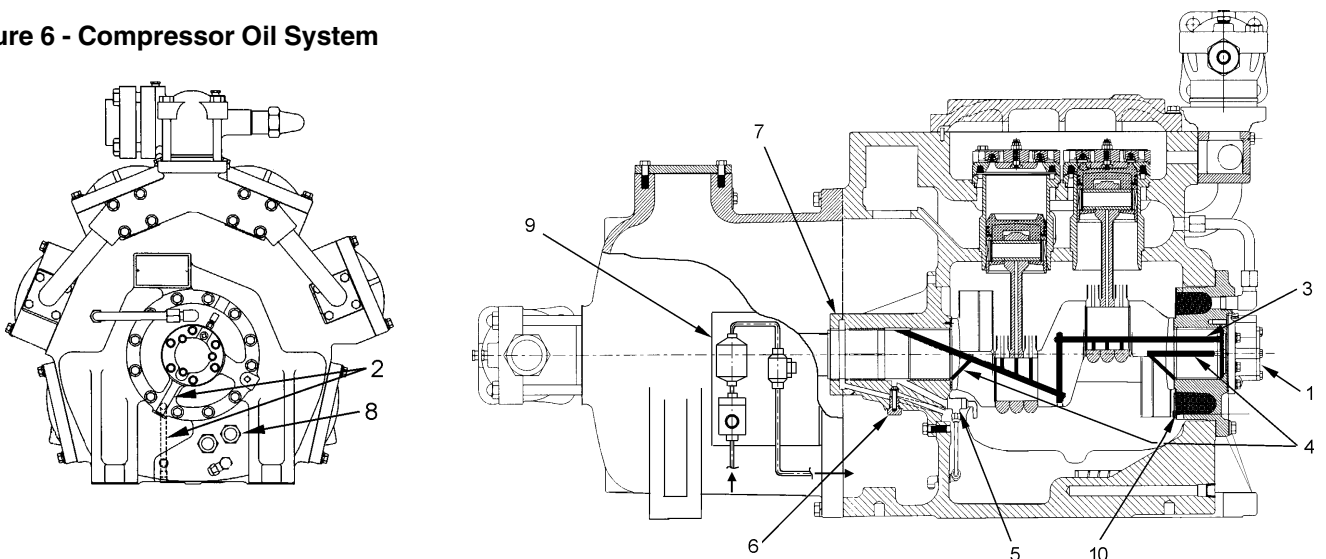
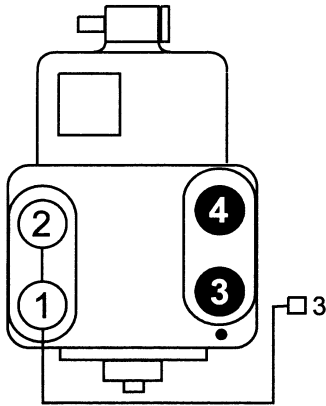
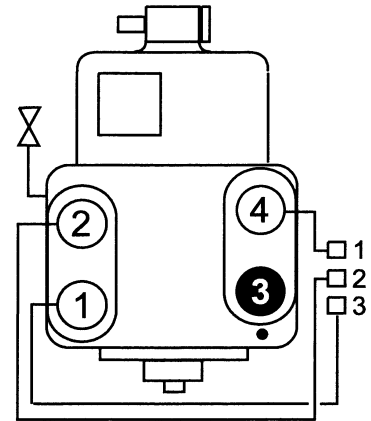


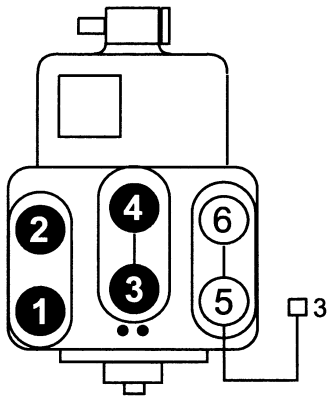
Figure 8 - Cylinder Unloading Steps



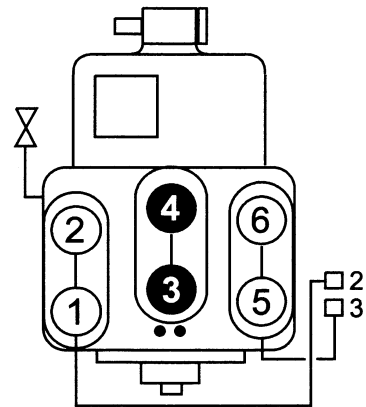
4 Cylinder - 1 Step Unloading
(100%, 50%)



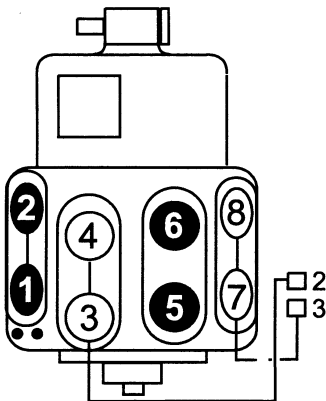
4 Cylinder - 3 Step Unloading



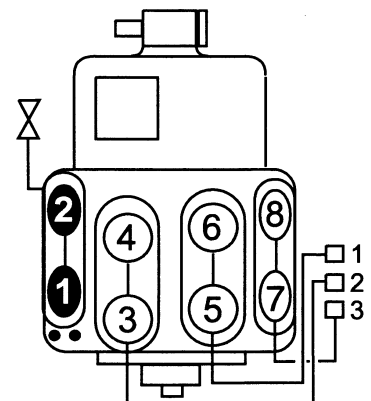
6 Cylinder - 1 Step Unloading
(100%, 66%)



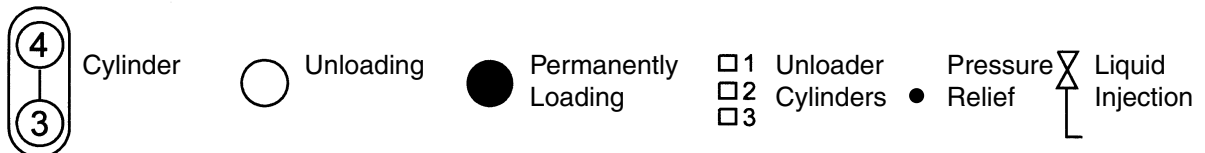
6 Cylinder - 2 Step Unloading



8 Cylinder - 2 Step Unloading
(100%, 75%, 50%)



8 Cylinder - 3 Step Unloading

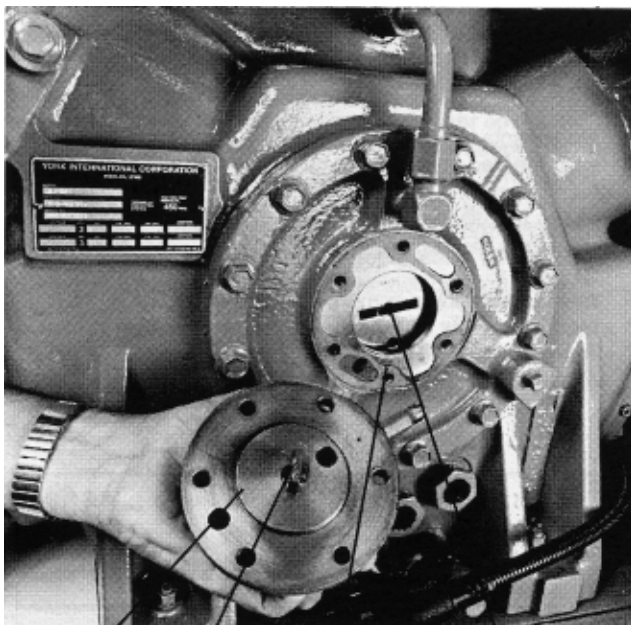


2.6 Replacing Oil Pump

If it becomes necessary to replace the oil pump, a complete new pump assembly should be installed. To replace the oil pump, refer to Figure 9 and proceed as follows:

1. Remove the oil pump cover cap screws and pull the pump assembly out of the bearing head.
2. Install the new oil pump assembly using a new gasket. Be sure that the flat end of the pump drive shaft engages the slot in the end of the compressor crankshaft and the word "TOP" is at the top.
3. Tighten the pump cover cap screws evenly by drawing down opposite and alternate pairs.

Figure 9 - Compressor Oil Pump



Oil Pump
Gasket
Pump Drive Shaft
Slot for Pump Drive

2.7 Capacity Control Solenoids

Normally, the coil is the only part of the solenoid valve that requires replacement. To replace the coil, proceed as follows:

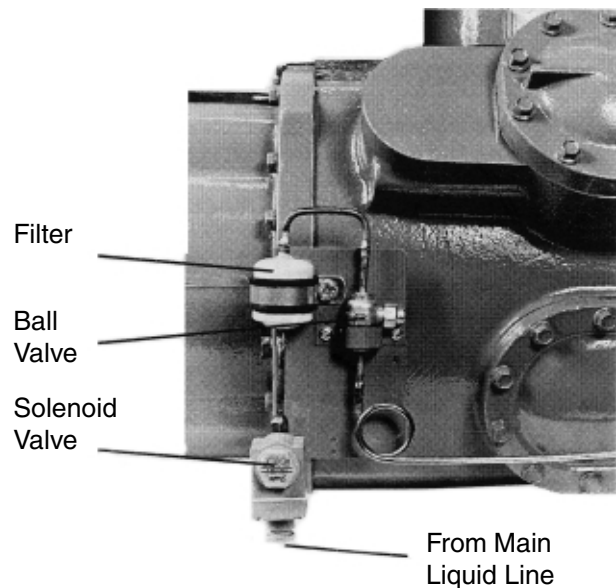
1. Remove the conduit and the wires from the solenoid valve.
2. Remove the screw from the top centre of the valve and remove the coil.
3. Install the new coil. Use caution when reconnecting the conduit to avoid placing stress on the valve. Stress on the valve may deform the stem and cause the valve to malfunction. Reconnect the wires.

If the solenoid valve must be replaced, proceed as follows:

1. Remove the solenoid coil as described above.
2. Place a suitable container below the solenoid valve to catch any oil which may leak out then remove the bolts holding the valve to the hand hole cover plate.
3. Replace the valve.
4. Reinstall the solenoid coil and reconnect the wires and conduit.

2.8 Injection Cooling System

Some versions of the Model PC compressor are fitted with liquid injection oil cooling - see pages 9 and 11.



Liquid is injected via an orifice in the suction plenum of the unloading cylinder bank(s). If the orifice needs to be replaced proceed as follows :

1. Disconnect the external injection line from the injection orifice and carefully ease the pipe away.
2. Remove the orifice.
3. Clean threads thoroughly. Fit new orifice using LOCTITE 270 thread-lock taking care to avoid any contamination of the orifice hole.

