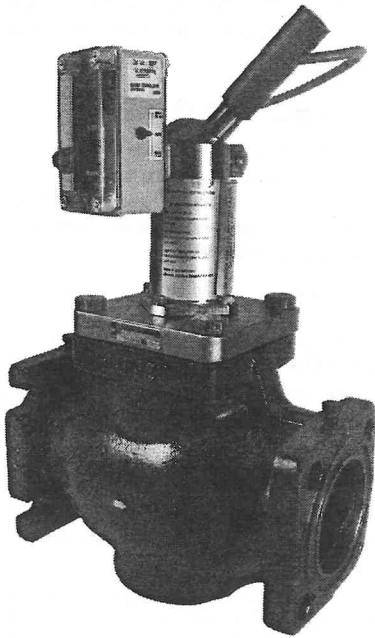


7/20/06

HANSEN

Bulletin R629c
JUL 2006



Sealed Motor Valve Model HMMV with VPIF

Specifications, Applications,
Service Instructions & Parts

SEALED MOTOR VALVE & CONTROLLERS

7/32" thru 4"
(5 mm thru 100 mm)
Motor Operated Valve

US Patent 6,460,567 B1

CE CRN
Canadian Registration

INTRODUCTION

The Hansen Sealed Motor Valve is a truly unique motor operated valve which eliminates the most common concern of other motor operated valves—valve stem seal leakage. The Sealed Motor Valve has no valve stem seal because the non-electric rotor is enclosed in a stainless steel can which contains the fluid pressure. The electric stator is outside the stainless steel can, and is isolated from the fluid in the valve.

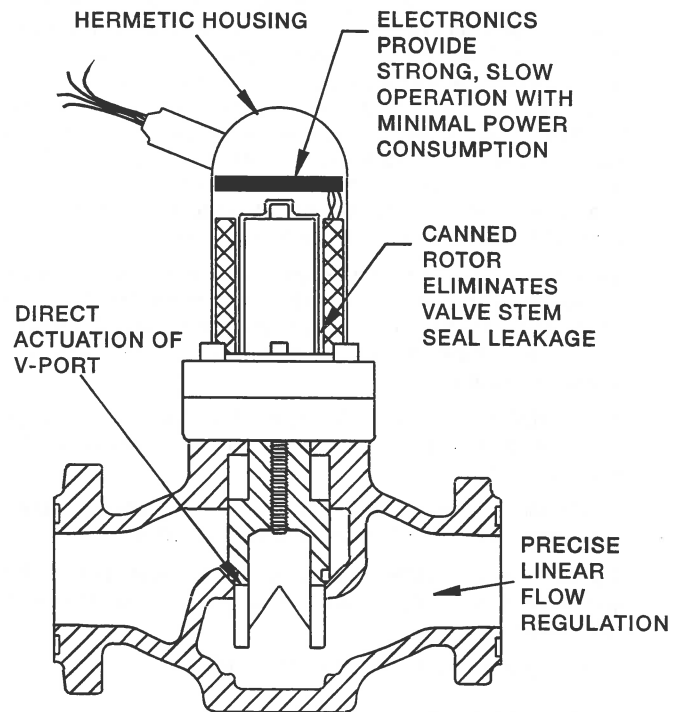
APPLICATIONS

- Liquid Make-up to Accumulator
- Liquid Injection to Compressors
- DX Evaporators
- Temperature or Pressure Control
- Low or High Side Level Control
- Slow Opening and Closing: Suction Stop Valve
- No Pressure Drop: Gravity Drain
- 4-20 mA or Floating Point Control

ADDITIONAL FEATURES

- Relay input or 4-20mA for direct connection to plant PLC or computer.
- All moving parts are sealed so that frost will not affect operation.
- Tight closing Teflon seat.
- Canned rotor eliminates valve stem seal leakage.
- Controlled opening and closing minimizes liquid velocity shock, "water hammer."
- Valve is more compact and light weight than other motor operated valves.
- Same flanges and spacing as Hansen HA4A/HS4A pressure regulators and solenoid valves.
- Suitable for use with ammonia, R22, R134a, CO2 (up to 400 psi only) glycol, water, brines, and other approved refrigerants.
- Available with optional Power-Close feature.
- Valve or remote mounted VPIF Valve Position Indicator included for 4-20mA controlled valves.

KEY FEATURES



MATERIAL SPECIFICATIONS

Mechanical

Body: ductile iron, ASTM A536
 Bonnet Plate: steel, zinc plated with yellow chromate
 V-port Seat: Teflon
 Rotor Can: stainless steel
 Rotor Can O-ring: neoprene
 Stator Housing: stainless steel
 Safe Working Pressure: 400 psig (27 bar)
 Operating Temperature: -60°F to +240°F (-50°C to +115°C)
 Corrosion Protection: Zinc plating is standard up to 1¼". Acrylic enamel paint on larger sizes.

Electrical: HMMV, HMMVC, HMMR, HMMRC, HMXV, HMXVC

Power: 24 VAC, 90 W peak, 10 W average running
 Enclosure: watertight, NEMA 4X (IP65)
 Cable: 7 wire, 18 AWG, with liquid tight connectors
 mA loop impedance: 350 ohm

Electrical: HMSV, HMSVC

Power: 24 VAC, 90 W peak, 10 W average running
 Enclosure: watertight, NEMA 4X (IP65)
 Cable: 4 wire, 18 AWG, length 10 feet (3 m)

APPLICATIONS

The patented Hansen Sealed Motor Valve is ideal for applications where external leakage is intolerable. The valve is suitable for use with a variety of fluids, including those that are incompatible with copper, such as ammonia, because the copper windings of the motor stator are isolated from the fluid in the valve. Typical uses include slow opening solenoid valve, temperature controlled evaporator regulator, liquid injection to screw compressors, pressure control, liquid level control of pump accumulators, high side receivers or low side flooded chillers, or as a gravity drain valve.

The full ported **HMMV** valve series is best suited for computer controlled operations using 4-20 mA signals. The HMMV is ideal for precise temperature and pressure control, hot gas defrost, and other applications where accurate process control is required.

Model **HMMR** valve with expansion plug is for high pressure drop applications such as liquid makeup and liquid injection.

The **HMXV** valve series is suitable for liquid injection of screw compressors or direct expansion evaporators.

The full ported **HMSV** valve series is best suited for applications requiring open/close operation only. (Floating Point Control)

Refer to pages 3-5 for typical applications.

ADVANTAGES

No pressure drop is required to operate, unlike most pressure regulators and solenoid valves which require a minimum 2 psi pressure drop to keep the valve fully open. The Sealed Motor Valve can be used for applications which require a very low pressure drop (e.g. suction lines), or no pressure drop (e.g. equalizing or drain lines).

Valves are drop-in replacement for Hansen and other select solenoid and pressure regulating valves.

The Sealed Motor Valve does not require stem shaft heaters like other open motorized valves.

The Sealed Motor Valve is slow opening and closing (about 15 to 45) seconds depending on valve size, which minimizes the potential for liquid velocity shock or "water hammer" often experienced with quick opening and closing solenoid valves.

POWER-CLOSE FEATURE

The Sealed Motor Valve is available with an optional Power-Close feature, an integral battery to close the valve in the event of either 24 VAC power failure or 4-20mA control signal failure. Power-Close motors are installed on HMMVC, HMMRC, HMXVC and HMSVC.

VALVE SIZING

Proper valve sizing is important for smooth operation and long, trouble-free life of the valve. Therefore, capacity at both the maximum and minimum flow and Pressure Drop should be analyzed. Refer to the capacity tables on pages 6-9.

LIQUID MAKEUP LINE SIZING

Liquid lines should be adequately sized for the capacity of the valve. Listed below are the recommended capacities for liquid lines.

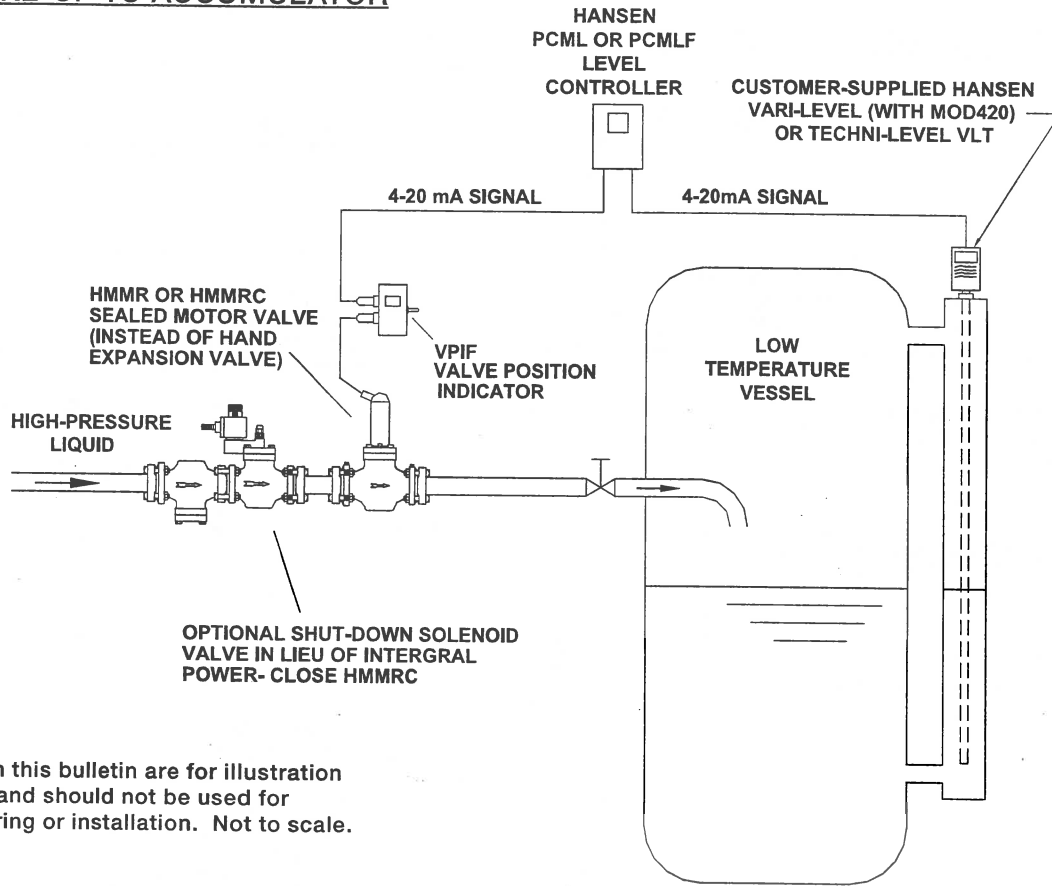
Line Size	Maximum Capacity Ammonia		Maximum Capacity R22	
	Tons	kW	Tons	kW
1/2"	32 Tons	112 kW	3.0 Tons	11 kW
3/4"	58 Tons	208 kW	5.0 Tons	18 kW
1"	97 Tons	340 kW	9.0 Tons	32 kW
1 1/4"	179 Tons	625 kW	20 Tons	70 kW
1 1/2"	254 Tons	890 kW	31 Tons	110 kW
2"	496 Tons	1740 kW	72 Tons	250 kW
2 1/2"	729 Tons	2550 kW	114 Tons	400 kW
3"	1160 Tons	4060 kW	200 Tons	400 kW
4"	2040 Tons	7140 kW	360 Tons	1260 kW
5"	3300 Tons	11606 kW	580 Tons	2042 kW
6"	4890 Tons	17198 kW	860 Tons	3024 kW

NH3 capacities are based on IIR Refrigeration Piping Handbook tables. R22 capacities based on 3 ft/s liquid velocity.

For applications with a large pressure drop across the Sealed Motor Valve, attention must be paid to proper outlet line sizing to accommodate flash gas.

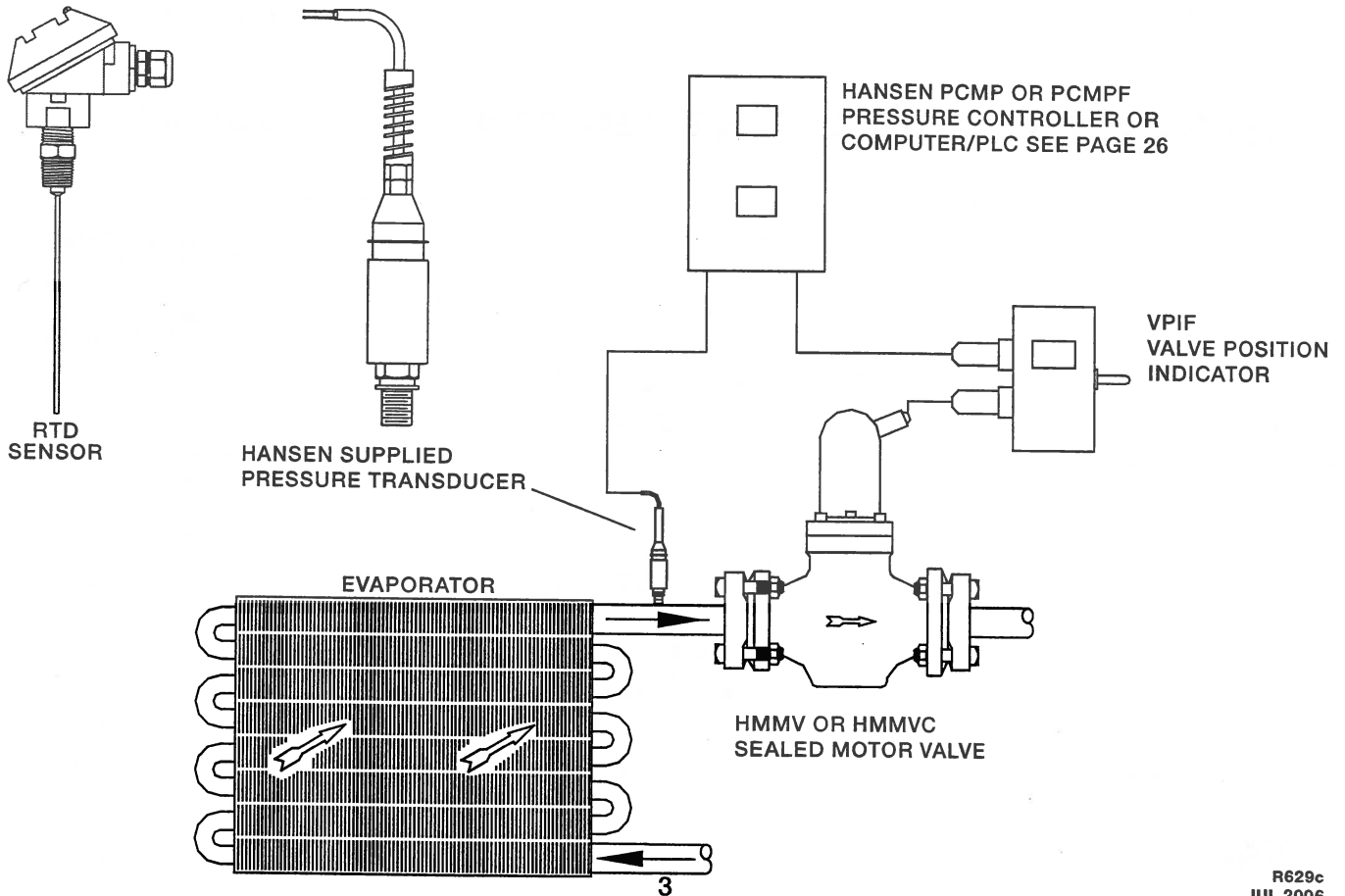
TYPICAL APPLICATIONS - SEALED MOTOR VALVE

LIQUID MAKE-UP TO ACCUMULATOR



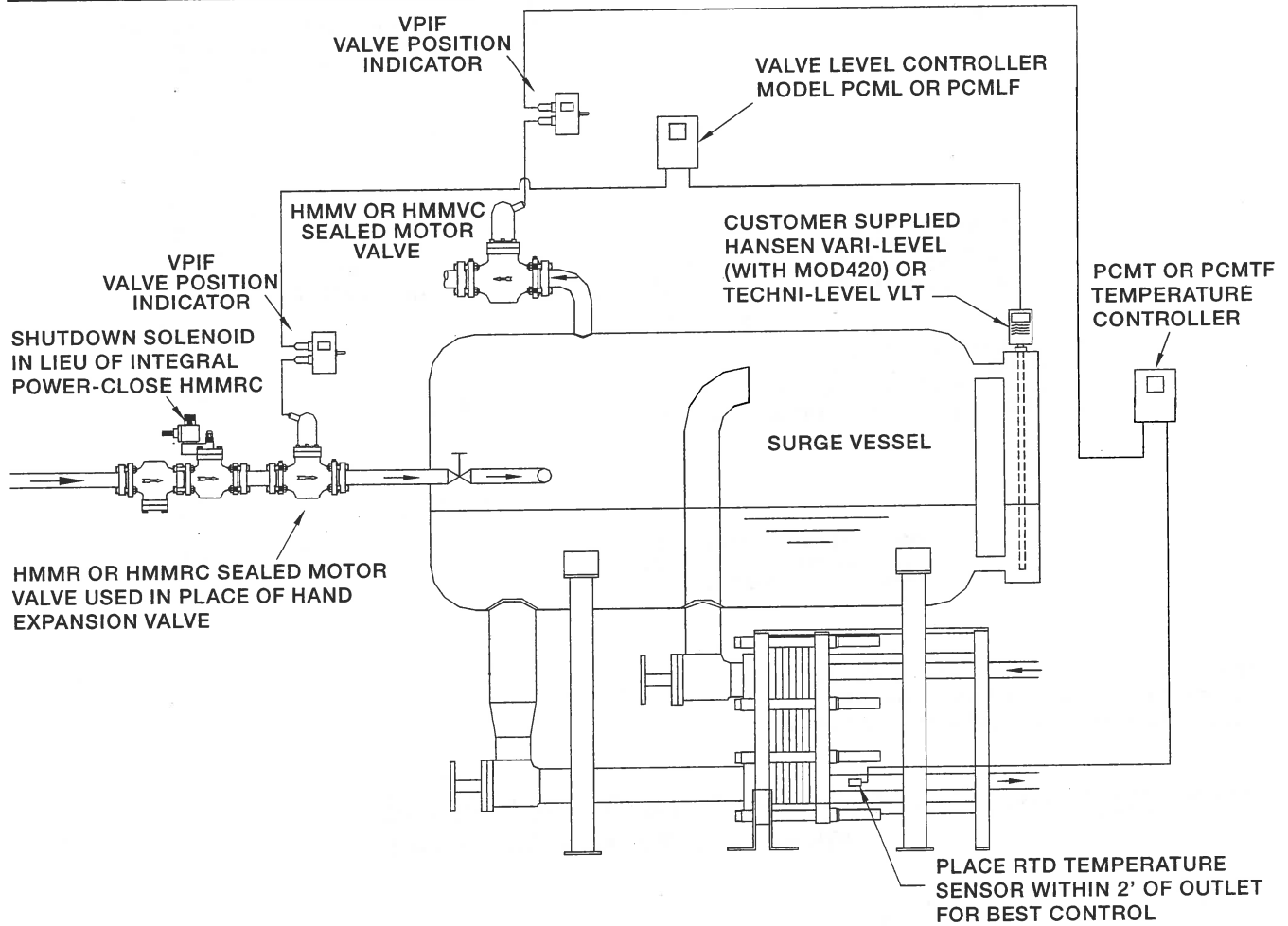
The drawings in this bulletin are for illustration purposes only and should not be used for actual engineering or installation. Not to scale.

ROOM TEMPERATURE OR EVAPORATOR PRESSURE CONTROL (Shown with Pressure Transducer)

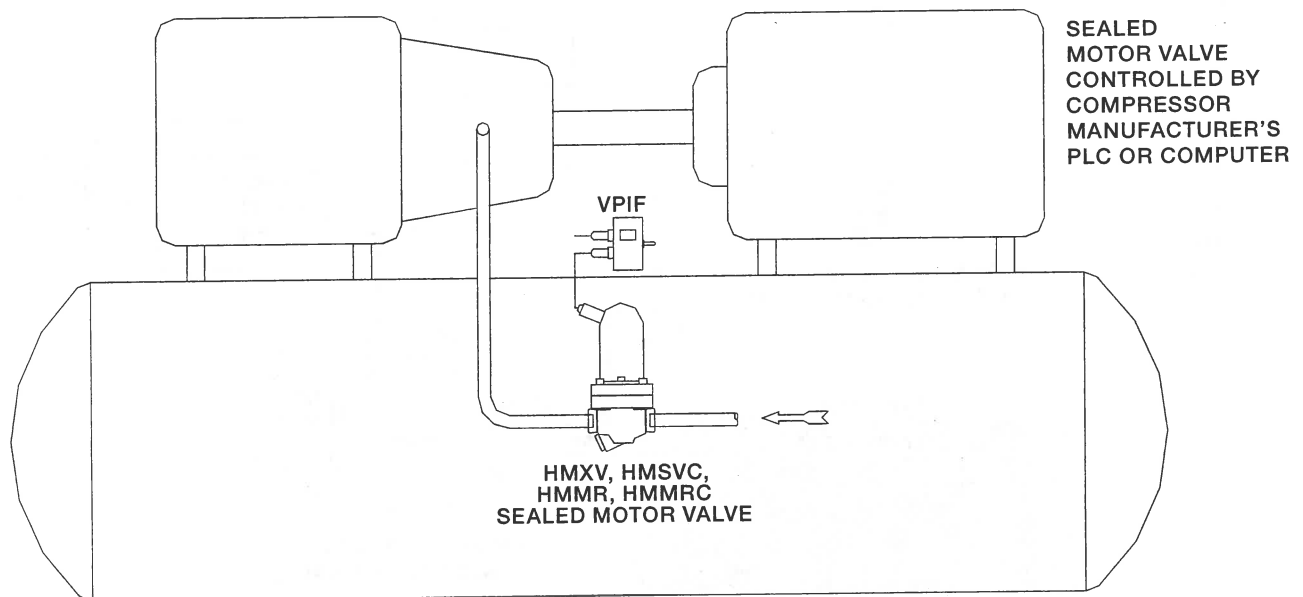


TYPICAL APPLICATIONS - SEALED MOTOR VALVE

TYPICAL CHILLER APPLICATIONS

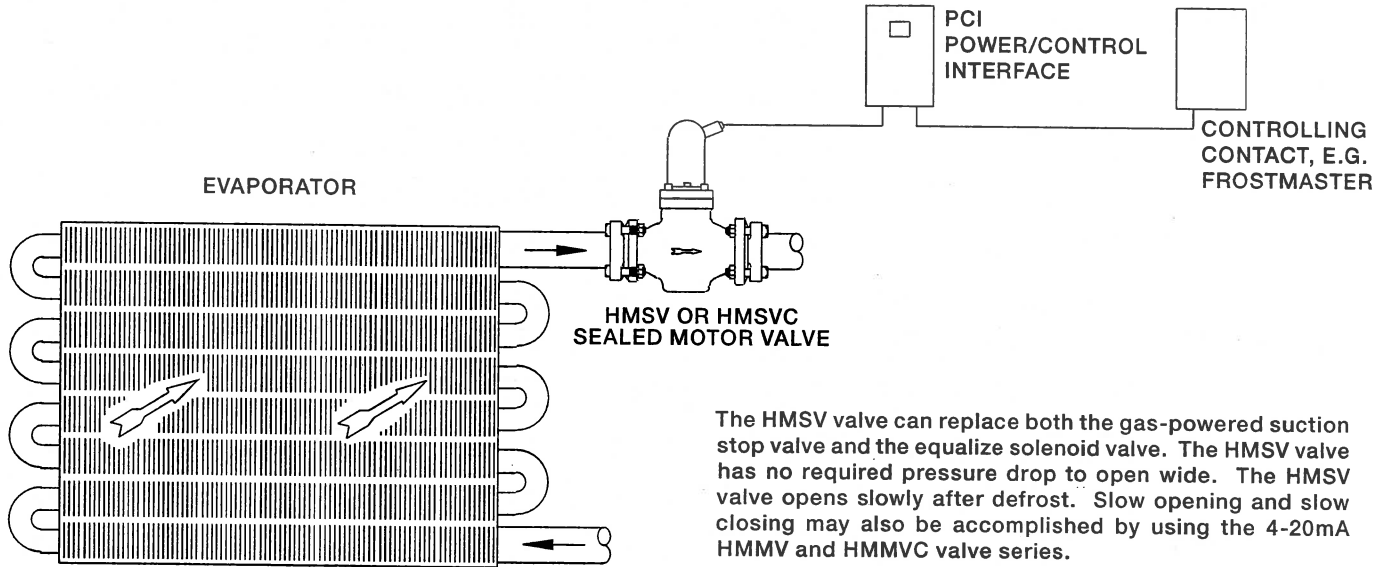


TYPICAL LIQUID INJECTION COOLING FOR SCREW COMPRESSOR APPLICATION

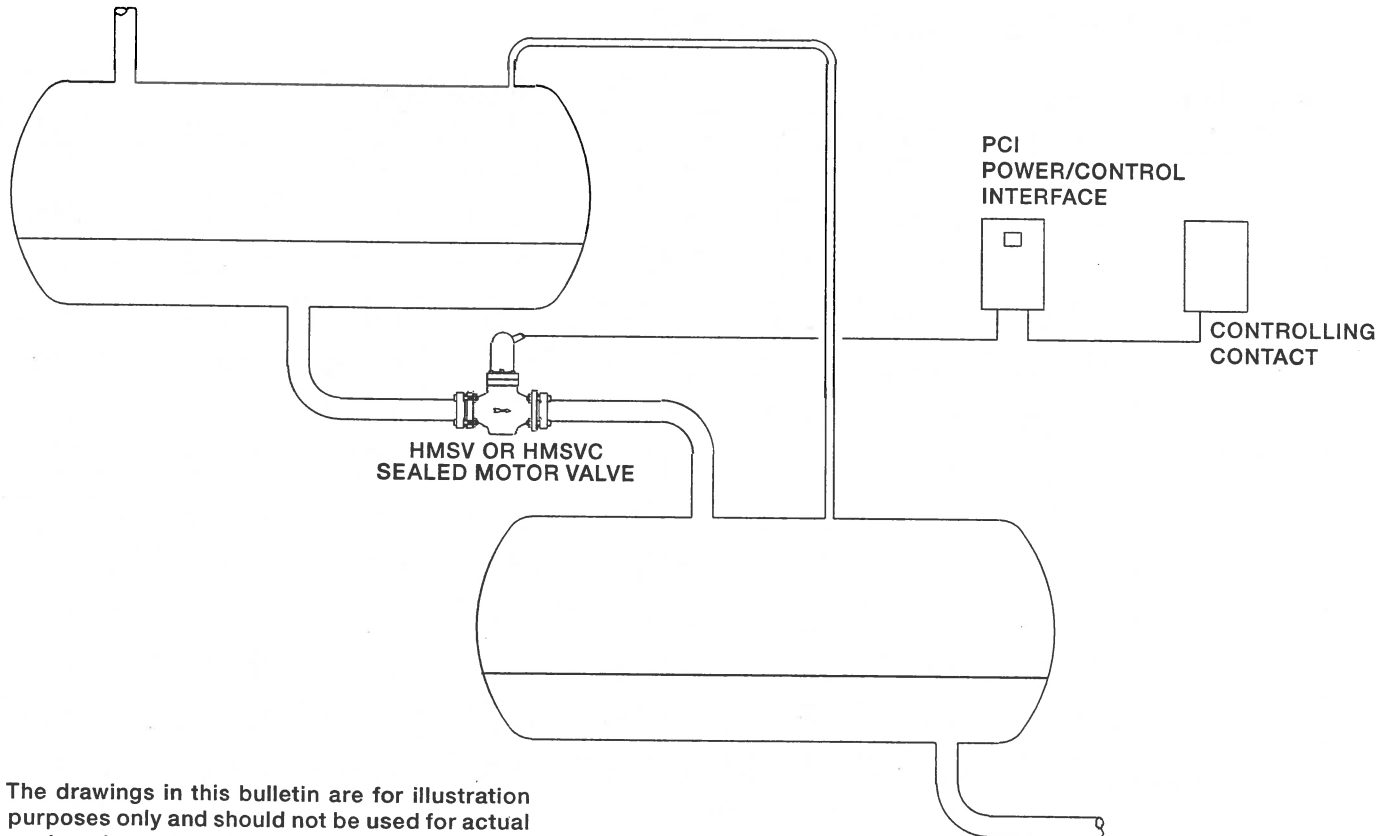


**TYPICAL APPLICATIONS - HMSV, HMSVC SEALED MOTOR VALVE
SLOW OPENING AND CLOSING VALVE**

SLOW OPENING AND CLOSING: SUCTION STOP VALVE



NO PRESSURE DROP: GRAVITY DRAIN



The drawings in this bulletin are for illustration purposes only and should not be used for actual engineering or installation. Not to scale.

Applications shown use Hansen supplied controllers, however, the Hansen HMMV, HMMR, HMXV, HMSV valve series can be integrated into most customer control systems.

HMMV/HMMVC AND HMSV/HMSVC SUCTION VAPOR CAPACITIES

AMMONIA SUCTION VAPOR CAPACITIES, TONS (kW)

Evap. Temp. °F (°C)	Pressure Drop	Nominal Size (mm)						
		3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)	3" (80)	4" (100)
40 (5)	.25 (.02)	4.4 (17)	8.0 (31)	11 (44)	24 (93)	32 (124)	71 (277)	113 (442)
	.50 (.04)	6.2 (24)	11 (44)	16 (61)	34 (132)	45 (176)	100 (391)	160 (624)
	1.00 (.08)	8.7 (34)	16 (62)	22 (87)	48 (186)	64 (248)	141 (551)	226 (879)
	2.00 (.15)	12 (46)	22 (84)	31 (118)	67 (253)	90 (337)	199 (749)	317 (1196)
0 (-20)	.25 (.02)	2.8 (10)	5.1 (19)	7.1 (26)	15 (56)	20 (74)	45 (165)	72 (263)
	.50 (.04)	3.9 (14)	7.1 (26)	10 (36)	21 (78)	29 (104)	63 (232)	101 (370)
	1.00 (.08)	5.5 (20)	10 (36)	14 (51)	30 (109)	40 (146)	89 (325)	142 (518)
	2.00 (.15)	7.6 (22)	14 (41)	20 (57)	42 (122)	56 (162)	124 (361)	197 (577)
-40 (-40)	.25 (.02)	1.9 (7.0)	3.4 (13)	4.7 (18)	10 (39)	14 (52)	30 (115)	48 (183)
	.50 (.04)	2.6 (10)	4.7 (18)	6.6 (25)	14 (54)	19 (72)	42 (160)	67 (256)
	1.00 (.08)	3.6 (14)	6.5 (25)	9.2 (35)	20 (75)	26 (100)	58 (221)	93 (353)
	2.00 (.15)	4.8 (18)	8.8 (32)	12 (45)	26 (97)	36 (129)	79 (288)	125 (460)
Cv (Kv)		6.4 (5.5)	11.7 (10)	16.4 (14)	35 (30)	47 (40)	104 (89)	166 (142)

R-22 SUCTION VAPOR CAPACITIES, TONS (kW)

Evap. Temp. °F (°C)	Pressure Drop	Nominal Size (mm)						
		3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)	3" (80)	4" (100)
40 (5)	.25 (.02)	1.6 (7)	2.9 (12)	4.1 (17)	8.8 (36)	12 (49)	26 (108)	42 (173)
	.50 (.04)	2.3 (9)	4.1 (17)	5.8 (24)	12 (51)	17 (70)	37 (153)	59 (244)
	1.00 (.08)	3.2 (13)	5.8 (24)	8.2 (34)	17 (72)	23 (98)	52 (215)	83 (345)
	2.00 (.15)	4.5 (18)	8.2 (33)	12 (46)	25 (46)	33 (134)	73 (293)	117 (469)
0 (-20)	.25 (.02)	1.0 (4)	1.9 (7)	2.6 (10)	5.6 (22)	7.5 (30)	17 (65)	27 (105)
	.50 (.04)	1.4 (6)	2.6 (10)	3.7 (14)	7.9 (31)	11 (42)	23 (92)	37 (147)
	1.00 (.08)	2.0 (8)	3.7 (14)	5.2 (20)	11 (43)	15 (59)	33 (129)	53 (207)
	2.00 (.15)	2.8 (11)	5.2 (19)	7.3 (27)	15 (58)	21 (80)	46 (175)	73 (280)
-40 (-40)	.25 (.02)	0.8 (3)	1.5 (6)	2.1 (8)	4.5 (17)	6.0 (24)	13 (52)	21 (83)
	.50 (.04)	1.1 (4)	2.1 (8)	2.9 (11)	6.3 (24)	8.4 (33)	19 (72)	30 (116)
	1.00 (.08)	1.6 (6)	2.9 (11)	4.1 (16)	8.7 (34)	12 (46)	26 (101)	41 (161)
	2.00 (.15)	2.2 (8)	4.0 (15)	5.6 (21)	12 (44)	16 (61)	35 (133)	57 (213)
Cv (Kv)		6.4 (5.5)	11.7 (10)	16.4 (14)	35 (30)	47 (40)	104 (89)	166 (142)

Ammonia, R-22 and R-134a capacities assume 86°F (30°C) condensing, except -40°F (-40°C) assumes +20°F (-7°C) liquid (e.g. two stage). R-404 and R-507 assume 95°F (35°C) condensing. For overfeed evaporator suction, add 20% to the evaporator load or use next larger size valve to accommodate liquid volume.

HMMV/HMMVC AND HMSV/HMSVC SUCTION VAPOR CAPACITIES

R-134a SUCTION VAPOR CAPACITIES, TONS (kW)

Evap. Temp. °F (°C)	Pressure Drop psi (bar)	Nominal Size (mm)						
		3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)	3" (80)	4" (100)
40 (5)	.25 (.02)	1.3 (5.1)	2.3 (9.3)	3.3 (13)	7.0 (28)	9.4 (38)	21 (84)	33 (134)
	.50 (.04)	1.8 (7.2)	3.3 (13)	4.6 (18)	9.9 (40)	13 (54)	29 (119)	47 (190)
	1.00 (.08)	2.5 (10)	4.6 (19)	6.5 (26)	14 (56)	19 (76)	41 (167)	66 (267)
	2.00 (.15)	3.6 (14)	6.5 (25)	9.1 (35)	19 (75)	26 (103)	58 (226)	92 (362)
0 (-20)	.25 (.02)	0.8 (2.9)	1.4 (5.2)	1.9 (7.3)	4.1 (16)	5.6 (21)	12 (47)	20 (75)
	.50 (.04)	1.1 (4.0)	1.9 (7.3)	2.7 (10)	5.8 (22)	7.8 (30)	17 (66)	28 (105)
	1.00 (.08)	1.5 (5.6)	2.7 (10)	3.8 (14)	8.2 (30)	11 (42)	24 (91)	39 (146)
	2.00 (.15)	2.1 (7.5)	3.8 (14)	5.3 (19)	11 (41)	15 (56)	34 (122)	54 (195)
-40 (-40)	.25 (.02)	0.4 (1.6)	0.7 (3.0)	1.0 (4.2)	2.2 (8.9)	3.0 (12)	6.7 (27)	11 (43)
	.50 (.04)	0.6 (2.3)	1.0 (4.1)	1.5 (5.8)	3.1 (12)	4.2 (17)	9.3 (37)	15 (59)
	1.00 (.08)	0.8 (3.1)	1.4 (5.6)	2.0 (7.9)	4.3 (17)	5.7 (23)	13 (51)	20 (81)
	2.00 (.15)	1.0 (4.0)	1.9 (7)	2.6 (10)	5.7 (22)	7.6 (30)	17 (65)	27 (104)
Cv (Kv)		6.4 (5.5)	11.7 (10)	16.4 (14)	35 (30)	47 (40)	104 (89)	166 (142)

R-404 SUCTION VAPOR CAPACITIES, TONS (kW)

Evap. Temp. °F (°C)	Pressure Drop psi (bar)	Nominal Size (mm)						
		3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)	3" (80)	4" (100)
40 (5)	.25 (.02)	1.4 (5.5)	2.5 (10)	3.5 (14)	7.5 (31)	10 (42)	22 (92)	36 (148)
	.50 (.04)	1.9 (8.0)	3.6 (14)	5.0 (20)	11 (43)	14 (59)	32 (130)	50 (209)
	1.00 (.08)	2.7 (11)	5.0 (20)	7.0 (29)	15 (61)	20 (84)	45 (184)	71 (294)
	2.00 (.15)	3.9 (15)	7.1 (28)	10 (39)	21 (84)	28 (114)	63 (251)	100 (401)
0 (-20)	.25 (.02)	0.8 (3.1)	1.5 (5.7)	2.1 (8.0)	4.5 (17)	6.0 (23)	13 (51)	21 (82)
	.50 (.04)	1.2 (4.4)	2.1 (8.1)	2.9 (11)	6.3 (24)	8.4 (33)	19 (72)	30 (116)
	1.00 (.08)	1.6 (6.2)	3.0 (11)	4.1 (16)	8.9 (34)	12 (46)	26 (102)	42 (163)
	2.00 (.15)	2.3 (8.4)	4.1 (15)	5.8 (21)	12 (46)	17 (63)	37 (138)	59 (221)
-40 (-40)	.25 (.02)	0.4 (1.8)	0.8 (3.3)	1.1 (4.6)	2.4 (10)	3.3 (14)	7.2 (30)	12 (48)
	.50 (.04)	0.6 (2.6)	1.1 (4.7)	1.6 (6.5)	3.4 (14)	4.6 (19)	10 (42)	16 (67)
	1.00 (.08)	0.9 (3.6)	1.6 (6.5)	2.2 (9.1)	4.8 (20)	6.4 (27)	14 (59)	23 (94)
	2.00 (.15)	1.2 (4.8)	2.2 (8.7)	3.1 (12)	6.6 (26)	8.9 (36)	20 (78)	31 (125)
Cv (Kv)		6.4 (5.5)	11.7 (10)	16.4 (14)	35 (30)	47 (40)	104 (89)	166 (142)

Ammonia, R-22 and R-134a capacities assume 86°F (30°C) condensing, except -40°F (-40°C) assumes +20°F (-7°C) liquid (e.g. two stage). R-404 and R-507 assume 95°F (35°C) condensing. For overfeed evaporator suction, add 20% to the evaporator load or use next larger size valve to accommodate liquid volume.

HMMV/HMMVC AND HMSV/HMSVC SUCTION VAPOR CAPACITIES

R-507 SUCTION VAPOR CAPACITIES, TONS (kW)

Evap. Temp. °F (°C)	Pressure Drop psi (bar)	Nominal Size (mm)						
		3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)	3" (80)	4" (100)
40 (5)	.25 (.02)	1.4 (5.9)	2.6 (11)	3.7 (15)	7.8 (32)	10 (44)	23 (96)	37 (153)
	.50 (.04)	2.0 (8.3)	3.7 (15)	5.2 (21)	11 (45)	15 (62)	33 (135)	52 (216)
	1.00 (.08)	2.8 (12)	5.2 (21)	7.3 (30)	16 (64)	21 (87)	46 (191)	74 (305)
	2.00 (.15)	4.0 (16)	7.3 (29)	10 (40)	22 (87)	29 (119)	65 (260)	104 (416)
0 (-20)	.25 (.02)	0.9 (3.3)	1.6 (6.0)	2.2 (6.4)	4.7 (18)	6.3 (25)	14 (54)	22 (87)
	.50 (.04)	1.2 (4.7)	2.2 (8.5)	3.1 (12)	8.6 (25)	8.9 (35)	20 (76)	31 (122)
	1.00 (.08)	1.7 (6.6)	3.1 (12)	4.4 (17)	9.3 (36)	13 (49)	28 (108)	44 (172)
	2.00 (.15)	2.4 (8.9)	4.4 (16)	6.1 (23)	13 (49)	18 (66)	39 (146)	62 (233)
-40 (-40)	.25 (.02)	0.5 (2.0)	0.9 (3.5)	1.2 (5.0)	2.6 (11)	3.5 (15)	7.7 (32)	12 (51)
	.50 (.04)	0.7 (2.7)	1.2 (5.0)	1.7 (7.0)	3.7 (15)	4.9 (20)	11 (45)	17 (72)
	1.00 (.08)	0.9 (3.8)	1.7 (7.0)	2.4 (9.7)	5.1 (21)	6.9 (29)	15 (63)	24 (100)
	2.00 (.15)	1.3 (5.1)	2.4 (9.3)	3.3 (13)	7.1 (28)	9.5 (38)	21 (84)	33 (134)
Cv (Kv)		6.4 (5.5)	11.7 (10)	16.4 (14)	35 (30)	47 (40)	104 (89)	166 (142)

Ammonia, R-22 and R-134a capacities assume 86°F (30°C) condensing, except -40°F (-40°C) assumes +20°F (-7°C) liquid (e.g. two stage). R-404 and R-507 assume 95°F (35°C) condensing. For overfeed evaporator suction, add 20% to the evaporator load or use next larger size valve to accommodate liquid volume.

HMMR/HMMRC AND HMXV/HMXVC LIQUID MAKE-UP CAPACITIES

Size (mm)	Cv (Kv)	Capacity Range, Tons (kW)									
		Ammonia		R-22		R-134a		R-404		R-507	
		High to Intermediate	Intermediate to Low	High to Intermediate	Intermediate to Low	High to Intermediate	Intermediate to Low	High to Intermediate	Intermediate to Low	High to Intermediate	Intermediate to Low
HMXV/A (5)	.6 (.5)	45 (157)	30 (101)	9 (32)	8 (25)	8 (27)	5 (19)	6 (24)	5 (20)	8 (28)	6 (20)
HMXV/B (7)	1.1 (.9)	83 (290)	55 (188)	17 (60)	15 (47)	15 (50)	10 (35)	12 (44)	10 (37)	15 (52)	11 (37)
3/4" (20)	2.2 (1.8)	166 (584)	110 (377)	35 (120)	30 (95)	30 (100)	20 (70)	25 (88)	20 (74)	30 (105)	22 (75)
1" (25)	3.9 (3.3)	294 (1035)	190 (665)	60 (210)	50 (165)	50 (185)	40 (125)	45 (155)	40 (130)	50 (185)	40 (140)
1 1/4" (32)	5.5 (4.7)	415 (1460)	270 (940)	85 (300)	70 (235)	70 (256)	50 (180)	60 (220)	50 (185)	75 (265)	55 (195)
1 1/2" (40)	12 (10)	910 (3190)	580 (2050)	190 (655)	150 (515)	160 (650)	110 (390)	135 (475)	110 (400)	165 (580)	120 (430)
2" (50)	16 (13.3)	1210 (4250)	780 (2740)	250 (875)	200 (685)	210 (750)	150 (520)	180 (640)	150 (530)	220 (770)	160 (575)
3" (80)	35 (30)	2640 (9290)	1700 (5990)	540 (1910)	430 (1500)	460 (1630)	320 (1135)	395 (1390)	330 (1160)	480 (1690)	356 (1260)
4" (100)	55 (47)	4150 (14600)	2670 (9400)	850 (3000)	670 (2360)	730 (2560)	510 (1780)	620 (2180)	520 (1820)	755 (2660)	560 (1960)

Ammonia, R-22 and R-134a capacities assume 86°F (30°C) condensing, except -40°F (-40°C) assumes +20°F (-7°C) liquid (e.g. two stage). R-404 and R-507 assume 95°F (35°C) condensing. For overfeed evaporator suction, add 20% to the evaporator load or use next larger size valve to accommodate liquid volume.

HMMV/HMMVC AND HMSV/HMSVC HIGH PRESSURE LIQUID LINE CAPACITIES

AMMONIA HIGH PRESSURE LIQUID LINE CAPACITIES, TONS (kW)

Pressure Drop psi (bar)	Nominal Size (mm)						
	3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)	3" (80)	4" (100)
2 (0.2)	139 (601)	255 (1093)	357 (1530)	762 (3278)	1023 (4480)	2264 (9833)	3614 (15,733)
3 (0.3)	171 (736)	312 (1338)	437 (1873)	933 (4014)	1253 (5486)	2773 (12,043)	4426 (19,269)
5 (0.4)	220 (850)	403 (1545)	564 (2163)	1205 (4635)	1618 (6335)	3580 (13,906)	5714 (22,250)

R-22 HIGH PRESSURE LIQUID LINE CAPACITIES, TONS (kW)

Pressure Drop psi (bar)	Nominal Size (mm)						
	3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)	3" (80)	4" (100)
2 (0.2)	29 (128)	53 (232)	75 (325)	160 (697)	214 (929)	425 (2067)	757 (3298)
3 (0.3)	36 (156)	65 (284)	92 (398)	196 (853)	263 (1138)	581 (2531)	928 (4039)
5 (0.4)	46 (181)	84 (328)	118 (460)	252 (985)	339 (1314)	750 (2923)	1198 (4664)

R-134a HIGH PRESSURE LIQUID LINE CAPACITIES, TONS (kW)

Pressure Drop psi (bar)	Nominal Size (mm)						
	3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)	3" (80)	4" (100)
2 (0.2)	27 (118)	49 (215)	69 (301)	147 (645)	197 (859)	437 (1912)	697 (3051)
3 (0.3)	33 (145)	60 (263)	84 (368)	180 (789)	242 (1053)	535 (2342)	854 (3737)
5 (0.4)	43 (167)	78 (304)	109 (425)	232 (912)	312 (1215)	691 (2704)	1103 (4315)

R-404 HIGH PRESSURE LIQUID LINE CAPACITIES, TONS (kW)

Pressure Drop psi (bar)	Nominal Size (mm)						
	3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)	3" (80)	4" (100)
2 (0.2)	18 (81)	33 (147)	46 (205)	97 (440)	131 (602)	289 (1321)	461 (2113)
3 (0.3)	22 (99)	40 (180)	56 (252)	119 (539)	160 (737)	354 (1618)	565 (2588)
5 (0.4)	28 (114)	51 (208)	72 (291)	154 (623)	207 (851)	457 (1868)	730 (2989)

R-507 HIGH PRESSURE LIQUID LINE CAPACITIES, TONS (kW)

Pressure Drop psi (bar)	Nominal Size (mm)						
	3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)	3" (80)	4" (100)
2 (0.2)	18 (80)	33 (146)	46 (204)	97 (438)	131 (598)	290 (1313)	462 (2101)
3 (0.3)	22 (98)	40 (179)	56 (250)	119 (536)	160 (733)	355 (1608)	566 (2573)
5 (0.4)	29 (113)	52 (206)	72 (289)	154 (619)	207 (846)	458 (1857)	731 (2971)

Ammonia, R-22 and R-134a capacities assume 86°F (30°C) condensing, except -40°F (-40°C) assumes +20°F (-7°C) liquid (e.g. two stage). R-404 and R-507 assume 95°F (35°C) condensing. For overfeed evaporator suction, add 20% to the evaporator load or use next larger size valve to accommodate liquid volume.

HMMV/HMMVC AND HMSV/HMSVC HOT GAS SOLENOID DEFROST CAPACITIES EVAPORATOR SIZE IN TONS (kW)

Refrigerant	Nominal Size (mm)				
	3/4" (20)	1" (25)	1 1/4" (32)	1 1/2" (40)	2" (50)
Ammonia	9-15 (32-53)	15-28 (53-99)	28-39 (99-137)	39-73 (137-256)	73-106 (256-373)
R-22	6-8 (21-28)	8-15 (28-53)	15-20 (53-70)	20-32 (70-113)	32-47 (113-165)
R-134a	1-4 (4-14)	4-8 (14-28)	8-12 (28-42)	12-20 (42-70)	20-38 (70-134)
R-404	3-6 (11-22)	6-10 (22-35)	10-18 (35-63)	18-30 (63-106)	30-44 (106-155)
R-507	1-4 (4-14)	4-8 (14-28)	8-12 (28-42)	12-20 (42-70)	20-38 (70-134)

Evaporator tons at 10°F temperature differential, valve capacities are conservative.

OPERATION: HMMV AND HMMR

The motor shaft is coupled to a threaded stem which directly drives the valve V-port open or closed. The valve is driven by motor windings and electronics placed outside of a hermetic can and hermetically sealed in a liquid tight housing. Inside the can is a motor rotor which drives the motor shaft.

Please note that Sealed Motor Valves 2" and smaller will operate and seal with flow in either direction. 3" and 4" pressure assisted Sealed Motor Valves will only operate and seal with inlet equal to or greater than outlet pressure. Where pressure reversals are expected, a check valve at the outlet of the 3" and 4" SMV is recommended.

The HMMV and HMMR valve are electronically operated by 7 wires. Two wires provide 24 VAC to power the motor. Two wires provide a 4-20 mA input to control the opening and closing of the valve. Two additional wires provide 4-20 mA feedback of actual valve V-port position. The feedback does not have to be connected to operate the valve. The 7th wire is a ground wire.

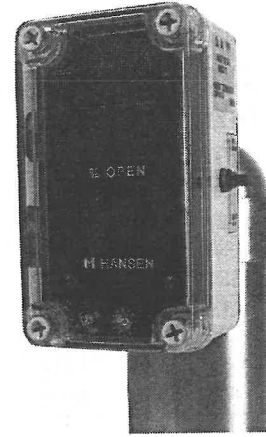
A 4-20 mA control signal must always be maintained to keep the V-port in position. Loss of 4-20mA signal will drive the valve closed. When driven fully closed or fully open the motor will shut off. Likewise, the motor will shut off when the V-port has reached the position indicated by the 4-20mA input signal. If loss of 24 VAC power occurs, the valve remains in its current position, unless the valve is equipped with Power-Close.

The valve is programmed to close when the signal is less than 4.8 mA (Less than 5% flow). This is to minimize seat erosion during low load conditions.

POWER-CLOSE OPTIONS

Models HMMVC, HMMRC, HMXVC, and HMSVC have an integral battery to power the valve closed in the event of loss of 24 VAC power.

VPIF VALVE POSITION INDICATOR



The Valve Position Indicator, model VPIF is a digital monitoring module added to the standard Sealed Motor Valve (SMV) product line. The VPIF monitors the valve position during normal operation and is used to recalibrate the valve after service work is performed.

The large LED display allows for viewing of the valve position (in percent) during normal operation. The VPIF contains an internal independent 4 mA and 20 mA current source, which is switch selectable for recalibration at the valve 0% 4 mA (closed) position and 100% 20 mA (full open) position.

The VPIF can be mounted on or near the valve for ease of use and visibility of the display. Often, valves are mounted high in the air or in obstructive areas where the technician cannot easily reach. The VPIF can be mounted up to 10 feet (3 meters) in any direction from the valve. VPIEC Extension Cables are available where more length is required.

ADVANTAGES OF VPIF WITH SMV

In the normal operating mode the VPIF passes the 4 to 20 mA current loop signals and 24V AC to and from the SMV without signal degradation. When used for recalibration, the VPIF will output either 4 mA (fully closed) or 20 mA (fully open). A waterproof 3-position switch on the outside of the VPIF enclosure is used for recalibration of the SMV. The switch in the up position produces 20 mA; the switch in the down position produces a 4 mA signal to the valve. The calibration key must be attached to the designated location on the side of the SMV motor in order for the valve to recalibrate. After recalibration, return the switch to the middle position (automatic) and remove calibration key.

The VPIF valve position feedback can alert operators to valves controlled by an unstable control scheme. This feature is very important to the proper operation of the refrigeration system and the life of the Sealed Motor Valve. The VPIF is compact and reliable at very low temperatures. Waterproof quick disconnect connectors allow for easy removal of the SMV power head for service.

See Bulletin VPIF for complete details on the Valve Position Indicator.

HMMV/HMMVC, HMXV/HMXVC, AND HMMR/HMMRC WIRING DIAGRAM

CUSTOMER SUPPLIED POWER SUPPLY AND CONTROLLER

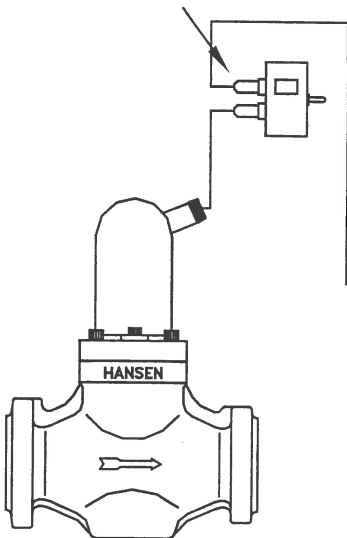
(Modulating Control with Position Feedback)

The valve is supplied with 10 feet of cable with 18 gage wires. For greater distance between valve and controller use wire size as shown in Table 1: 24VAC Power Wiring. Do not run Sealed Motor Valve wiring with or near high voltage power wiring or VFD Controls (Variable Frequency Drives). Do not earth or ground 24 VAC wiring.

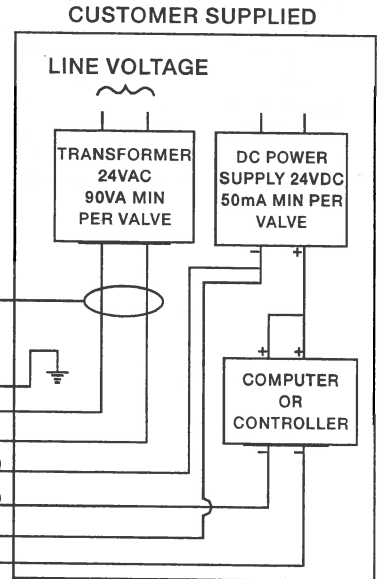
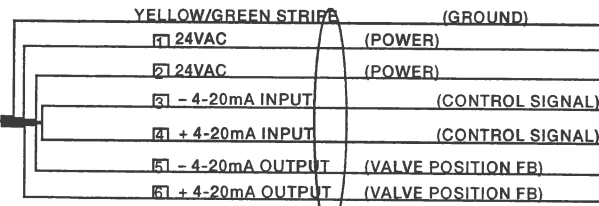
Table 1: 24VAC POWER WIRING

24VAC POWER WIRING (WIRES NO. 1 AND 2) (90VA PER VALVE REQUIRED)	AWG WIRE GAUGE (mm ²) NUMBER OF VALVES POWERED			
	1	2	3	4
CABLE LENGTH, ft(m)				
50 (15)	18 (1,0)	16 (1,5)	14 (2,5)	12 (4,0)
100 (30)	16 (1,5)	12 (4,0)	10 (6,0)	10 (5,5)
150 (46)	12 (2,5)	10 (6,0)	8 (8,5)	8 (8,5)
200 (61)	12 (4,0)	10 (6,0)	8 (8,5)	
300 (91)	10 (6,0)	8 (8,5)		

VPIF
VALVE POSITION INDICATOR

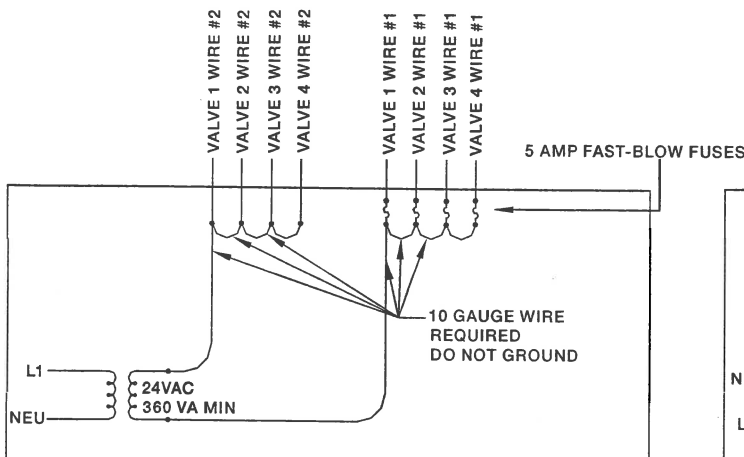


ISOLATED FROM EARTH GROUND

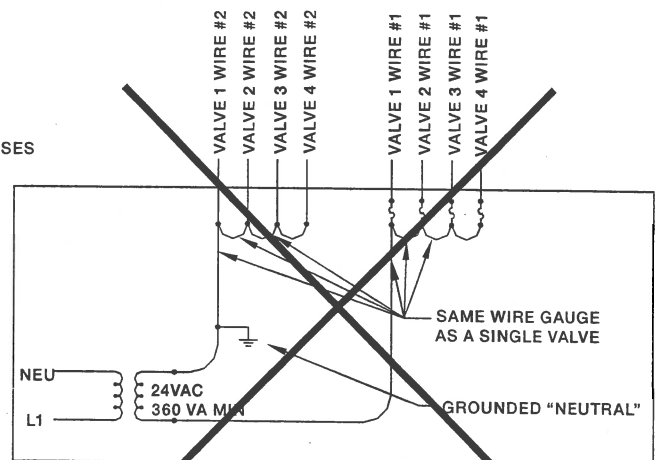


THE VALVE IS SUPPLIED WITH 10' OF CABLE WITH 18 GAUGE WIRES. FOR GREATER DISTANCE BETWEEN VALVE AND CONTROLLER, OR MULTIPLE VALVE INSTALLATIONS, USE WIRE SIZE AS SHOWN IN TABLE 1: 24 VAC POWER WIRING. DO NOT RUN SEALED MOTOR VALVE WIRING WITH OR NEAR POWER WIRING.

APPLICATION EXAMPLE: CORRECT 4 VALVES POWERED BY ONE TRANSFORMER



APPLICATION EXAMPLE: INCORRECT 4 VALVES POWERED BY ONE TRANSFORMER



OPERATION: HMSV

The HMSV motor operates on 24 VAC. (Valves built before January 1, 2005 use 28 VDC power supply.) Electronics inside the stator housing pulse power to the motor to provide strong, slow opening and closing operation with minimal wattage.

The HMSV valve is electrically operated by three wires plus ground. Two wires provide 24 VAC input, and a third is signal, which commands the valve to either open or close. Electrically connecting the signal wire (3) to 24 VAC input wire (1) will drive the valve open. Electrically connecting the signal wire (3) to 24 VAC input wire (2) will drive the valve closed. If the signal wire (3) is not connected to either 24 VAC signal wires, the valve will remain in its last position. (Also, on loss of power the valve will remain at its last position.) If Power-Close is required, specify model HMSVC.

The locked rotor amperage is not significantly higher than the running amperage; therefore, continuing to supply power to the motor after it has fully opened or closed (stalled) is acceptable and typical for the HMSV valve. The power supply and wiring must be sized for a 90 W peak pulsed load. However, average power consumed is 10 W. Since the motor consumes minimal wattage, electrical costs and overheating are not concerns.

HMSV AND HMSVC WIRING DIAGRAM

CUSTOMER SUPPLIED POWER SUPPLY AND CONTROLLER

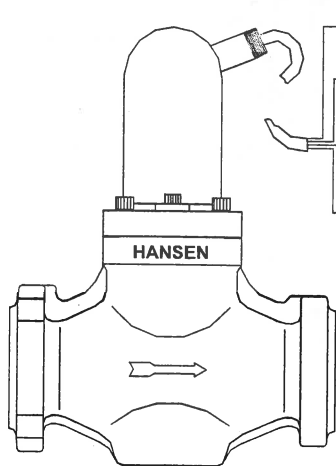
(Slow Opening and Closing Applications)

See page 32 for PCI Controllers

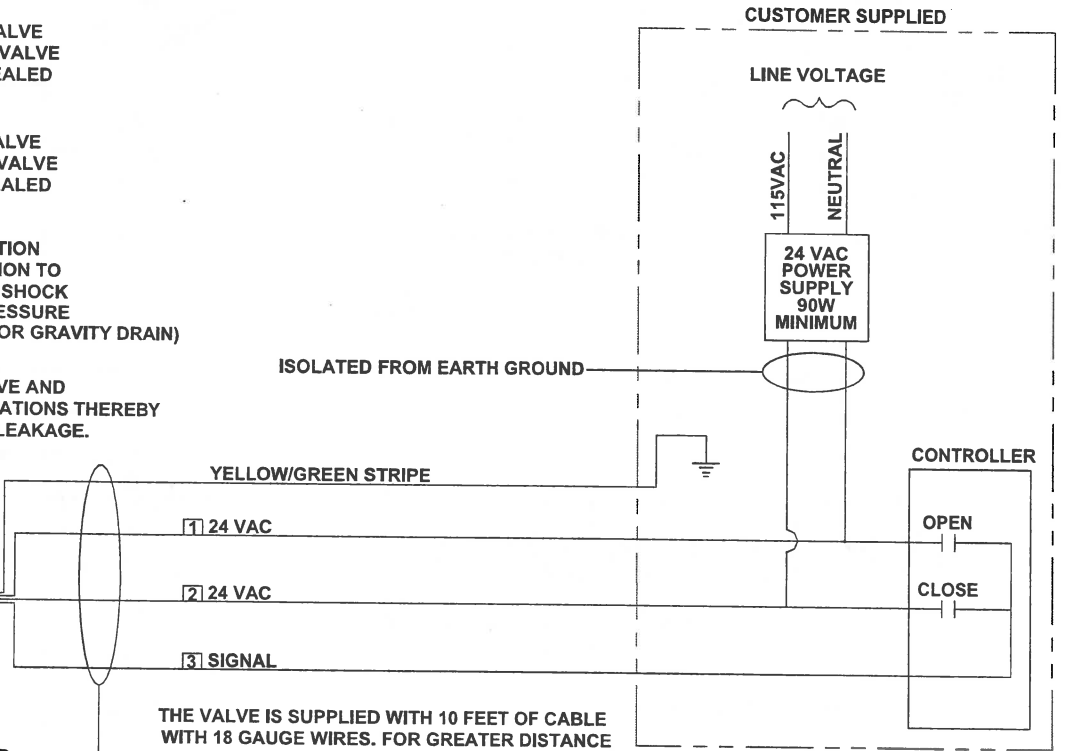
TYPICAL APPLICATIONS

IDEAL FOR REPLACEMENT OF:

1. BOTH HOT GAS SOLENOID VALVE AND SOFT GAS SOLENOID VALVE WITH A SINGLE HANSEN SEALED MOTOR VALVE.
2. BOTH SUCTION SOLENOID VALVE AND EQUALIZE SOLENOID VALVE WITH A SINGLE HANSEN SEALED MOTOR VALVE.
3. ANY OPEN/CLOSED APPLICATION REQUIRING SLOW OPERATION TO MINIMIZE LIQUID VELOCITY SHOCK AND/OR REQUIRING NO PRESSURE DROP TO OPERATE. (VENT OR GRAVITY DRAIN)
4. MOST MOTORIZED BALL VALVE AND BUTTERFLY VALVE APPLICATIONS THEREBY ELIMINATING SHAFT SEAL LEAKAGE.



HANSEN SEALED MOTOR VALVE
HMSV/HMSVC



THE VALVE IS SUPPLIED WITH 10 FEET OF CABLE WITH 18 GAUGE WIRES. FOR GREATER DISTANCE BETWEEN VALVE AND CONTROLLER, OR MULTIPLE VALVE INSTALLATIONS, USE WIRE SIZE AS SHOWN IN TABLE 1. DO NOT RUN SEALED MOTOR VALVE WIRING WITH OR NEAR POWER WIRING

VALVE WILL OPEN OR CLOSE DEPENDING ON WHICH CONTACT IS CLOSED. VALVE WILL REMAIN AT ITS LAST POSITIONS WHEN BOTH CONTACTS ARE OPEN.

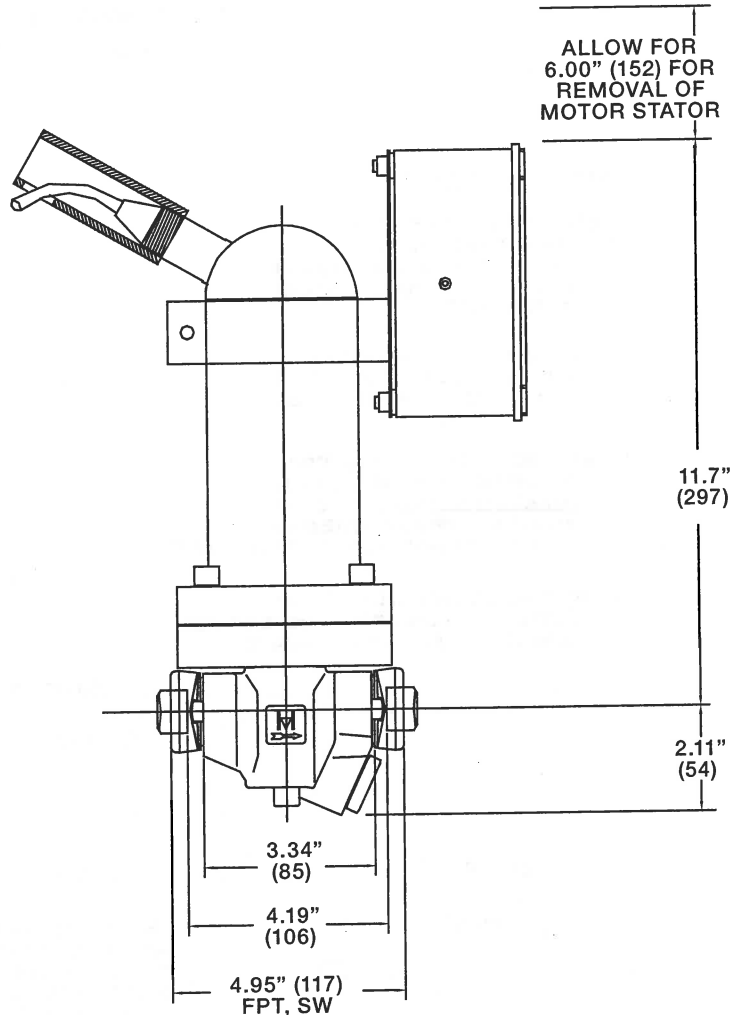
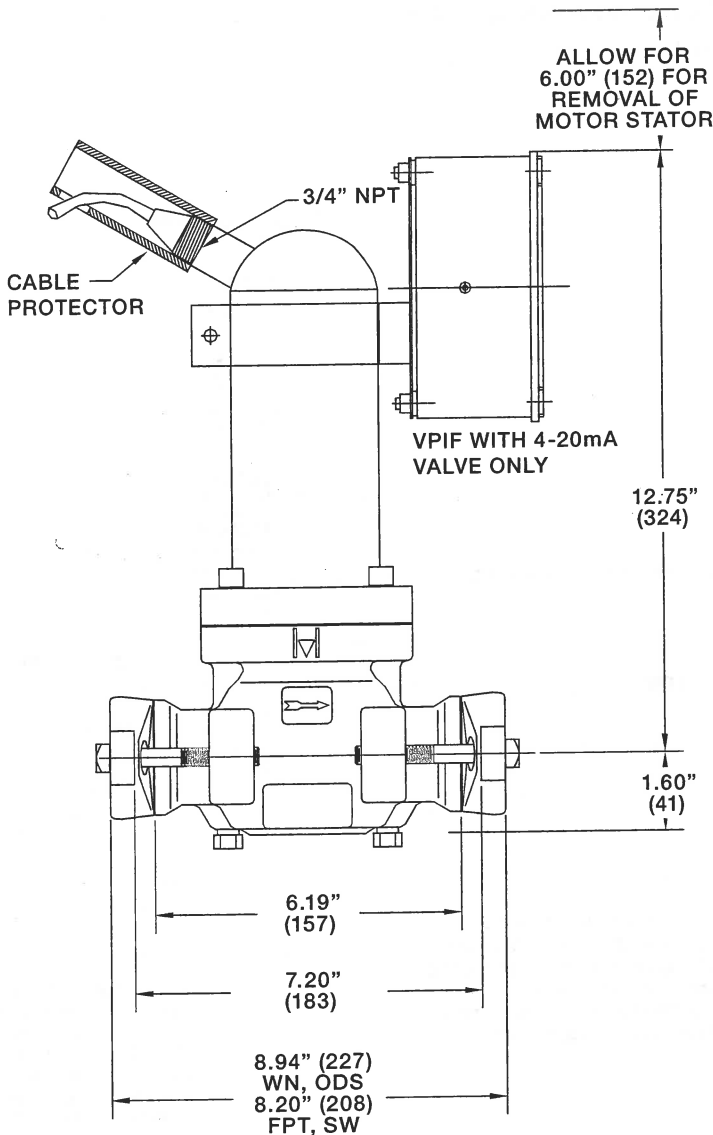
Table 1: 24VAC POWER WIRING

24VAC POWER WIRING (WIRES NO. 1 AND 2) (90VA PER VALVE REQUIRED)	AWG WIRE GAUGE (mm ²) NUMBER OF VALVES POWERED			
	1	2	3	4
CABLE LENGTH, ft(m)				
50 (15)	18 (1,0)	16 (1,5)	14 (2,5)	12 (4,0)
100 (30)	16 (1,5)	12 (4,0)	10 (6,0)	10 (5,5)
150 (46)	12 (2,5)	10 (6,0)	8 (8,5)	8 (8,5)
200 (61)	12 (4,0)	10 (6,0)	8 (8,5)	
300 (91)	10 (6,0)	8 (8,5)		

INSTALLATION DIMENSIONS, INCHES (MM)

3/4" (20mm) THRU 1-1/4" (32mm) SMV

HMXV, HMXVC MOTORIZED EXPANSION VALVE



INSTALLATION

Protect the interior of valve from dirt and moisture during storage and installation. Valve should be installed so that the arrow on the valve body is in direction of normal refrigerant flow. Reverse valve below 32°F or colder on 3/4" to 2". Do not reverse valve on 3" and 4".

Please note: valve will not backflow if in closed position. Do not install check valves upstream of the Sealed Motor Valve without hydrostatic pressure relief. Do not close the hand valve on inlet or outlet without making sure valve is in the open position. System should be free from dirt, weld slag and rust particles. A 60 mesh, close-coupled strainer is available for installation at inlet of valve for 3/4", 1" and 1 1/4". Do not close-couple strainers to 1 1/2" through 4" Sealed Motor Valves.

1/4" NPT Gauge/Purge port connections are provided on the inlet and outlet of the 3/4" thru 4" valves.

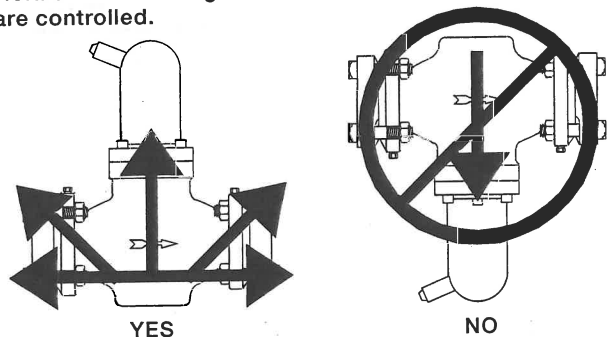
Please note that Sealed Motor Valves 2" and smaller will operate and seal with flow in either direction. 3" and 4" pressure assisted Sealed Motor Valves will only operate and seal with inlet equal to or greater than outlet pressure. Where pressure reversals are expected, a check valve at the outlet of the 3" and 4" SMV is recommended.

Pipe sizing, valve placement, rating, anchoring, and similar prudent precautions should be taken to ensure "liquid hammer" will not occur when valves open or close.

For proper flange gasket sealing, care must be taken when threading or welding to assure flanges are parallel to each other and perpendicular to pipe. Also, gaskets should be lightly oiled and all bolts must be tightened evenly.

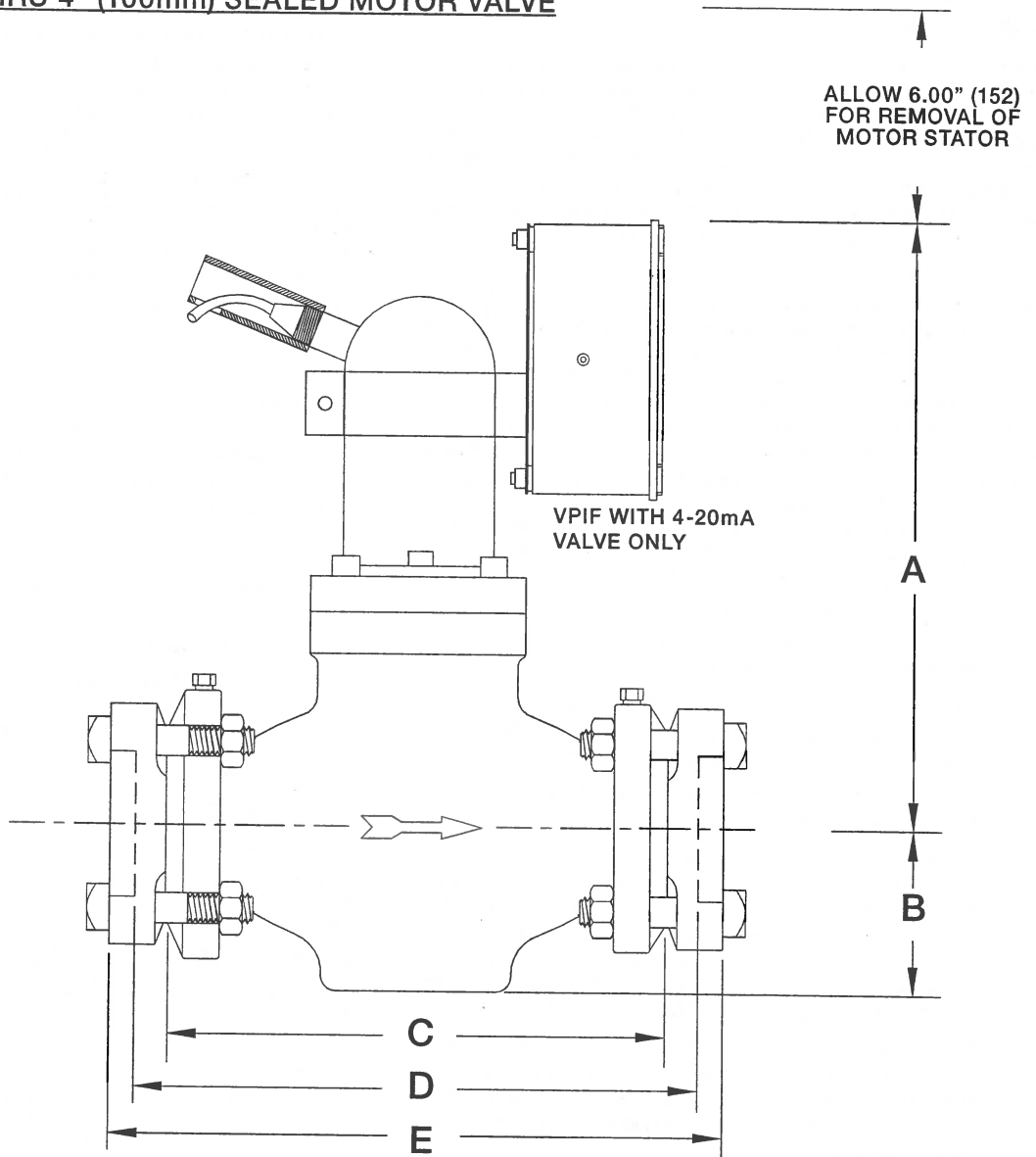
Protect cable during installation.

Do **not** mount the valve with the motor in the down position. The valve will **only** operate properly if the motor is mounted in a horizontal or upright position. Refer to diagrams below. Horizontal mounting of motor is satisfactory if oil and dirt are controlled.



INSTALLATION DIMENSIONS, INCHES (MM)

1-1/2" (40mm) THRU 4" (100mm) SEALED MOTOR VALVE



SIZE (mm)		1 1/2" (40)	2" (50)	3" (80)	4" (100)
A	HMMV HMMR HMSV	12.00 (305)	12.00 (305)	13.38 (340)	14.00 (356)
	HMMVC HMMRC	14.00 (356)	14.00 (356)	15.38 (391)	16.00 (406)
B		3.00 (76)	3.00 (76)	4.00 (102)	4.75 (121)
C		9.88 (251)	9.88 (251)	12.25 (311)	14.12 (359)
D		10.89 (277)	10.89 (277)	13.38 (340)	15.01 (381)
E FPT, SW		12.39 (315)	12.39 (315)	15.38 (391)	17.01 (432)
E WN, ODS		13.39 (340)	13.39 (340)	16.40 (417)	20.51 (521)
MAX WIDTH		4.58 (117)	4.58 (117)	6.50 (166)	8.06 (205)

RE-CALIBRATION INSTRUCTIONS FOR HMMV, HMMR, HMXV, HMMVC, HMMRC, AND HMXVC*

Hansen Sealed Motor Valves are factory calibrated, and hold their calibration during shipment, power outages, etc. Valve disassembly or manual opening with the MOVТ (Manual Operation Valve Tool) does require subsequent recalibration, therefore after removing or replacing the 4-20 mA motor of a Sealed Motor Valve, recalibrate the valve. Recalibration synchronizes the control input with the valve position; that means, for example, a 12 mA input (50%) would result in the valve moving to the half-open position.

Recalibration requires the ability to control the 4-20 mA control input to the motor between four and twenty milliamps, and requires the ability to allow the valve to stroke fully open and closed. For valves shipped after July 4, 2006, or retrofitted valves with VPIF, the 4 mA and 20 mA signal to calibrate the valve is part of the function of the VPIF. If the valve is not equipped with a VPIF, then the 4 mA and 20 mA to calibrate must come from the computer or separate signal generator. Only qualified refrigeration service personnel should perform this procedure, and proper precautions taken to prevent a hazardous or undesirable occurrence resulting from operating the valve from open and closed.

1. Secure the refrigeration system to allow the valve to open and close fully without causing undesirable system problems to occur.
2. Mount and secure the motor on the sealed motor valve. Connect electrical wiring in accordance to the valve and controller manufacturers specifications.
3. Install "Calibration Key" over 'X' on side of motor and secure with strap.
4. Increase the control input to 20 mA or slightly greater. Move VPIF switch to up position. Maintain at least 20 mA for at least two minutes. This will give the valve time to move to the wide open position and calibrate its position. Note: some computer control systems have lag times before the control input is sent to the valve. (Using "System Feedback Mode").
5. Decrease the control input to 4 mA or less. Move VPIF switch to down position. Maintain 4 mA or less for at least two minutes. This will give the valve time to move to the completely closed position and calibrate its zero point.
6. Again increase the control input to at least 20 mA. Move VPIF switch to up position. Maintain at least 20 mA for at least two minutes. This will give the valve time to move to the wide open position and set its span.
7. The valve should now be calibrated and in the wide open position.
8. Remove "Calibration Key" and store. The valve will operate satisfactorily if the "Calibration Key" remains over the "X", but the valve will recalibrate each time the control input is at 4 mA or 20 mA for more than the two minutes.
9. Return control system to automatic operation. Place VPIF switch in middle position.

ELECTRICAL MAINTENANCE

Check calibration and Power-Close function on a routine basis. Check controller and controller wiring for corrosion. Check controller function.

MANUAL OPERATION VALVE TOOL

Use of the MOVТ requires the removal of the power head. Do not remove the bonnet. Use extreme caution when loosening the power head screws, as the motor may contain refrigerant under pressure if a breach of the motor can has occurred (even after system evacuation). Wear protective gear and look/listen for escaping refrigerant while carefully loosening housing screws, and breaking the pressure seal.

Remove housing and place MOVТ over can. Manually operate the valve open or closed by turning the MOVТ in the directions indicated on the top of the tool. Refer to *Table 2: Number of Turns to Actuate Valve* for number of turns to fully actuate valve. Upon re-installing the power head, recalibrate according to instructions.

**The HMSV series do not require recalibration.*

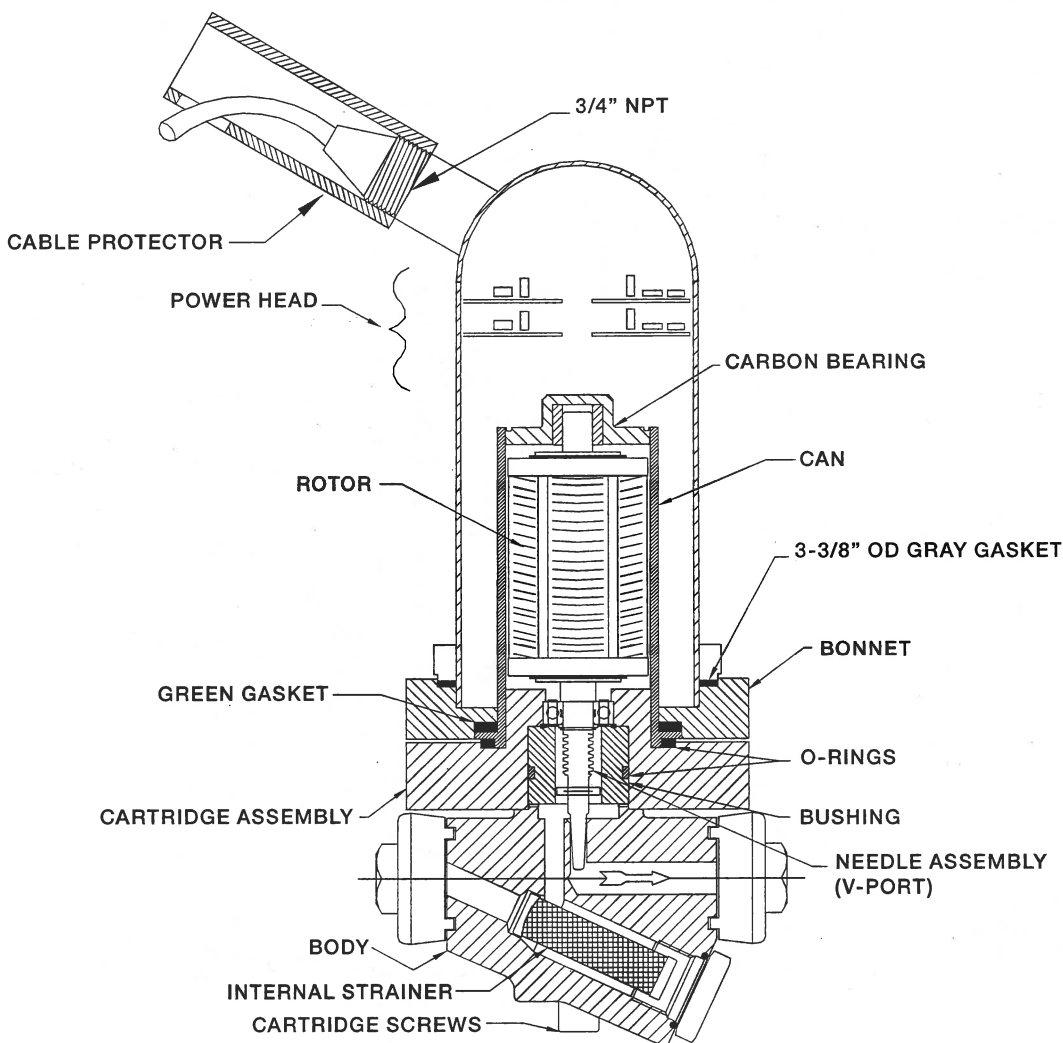
NOTE:

Powerhead must be sealed and torqued to 15 foot lbs to prevent moisture from damaging electronics. Care must be taken not to damage or dent the can. This will make the motor inoperative.

Table 2: Number of Turns to Actuate Valve

NOMINAL SIZE INCH (mm)	# OF TURNS
7/32" (5)	6
9/32" (7)	6
3/4" thru 1-1/4" (20) thru (32)	7
1-1/2" & 2" (40) & (50)	12
3" (80)	18
4" (100)	20

HMXV SEALED MOTOR VALVE



HMXV DISASSEMBLY

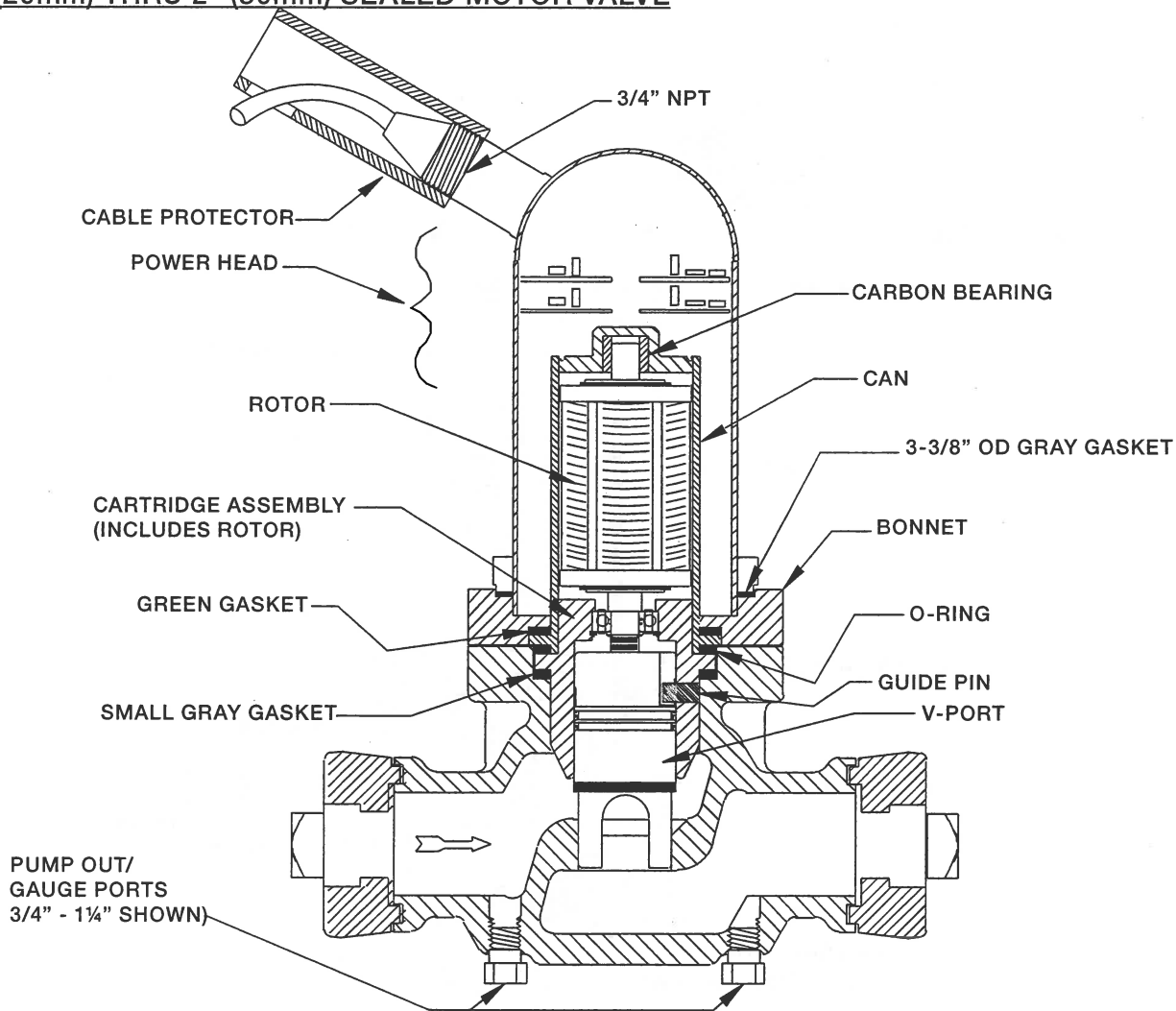
1. Isolate the valve from the refrigerant pressure and evacuate the refrigerant.
2. During normal circumstances the Power Head (1) is isolated from the refrigerant pressure. If abnormal conditions cause a breach in the isolating Can (5), refrigerant pressure will enter and be contained by the power head, possibly even after the valve has been isolated and evacuated of refrigerant. Always use caution when loosening the Power Head (1). Carefully loosen but do not remove the small power head screws and break the pressure seal. Observe for signs of internal pressure. After confirming no internal pressure is present, remove the bolts and the housing.
3. Carefully loosen the larger bonnet bolts, break gasket seal, and if no pressure is present remove the bolts and bonnet. To prevent damage to the can, reinstall Power Head (or MOVT).
4. Remove the isolating can (5).
5. Remove the two cartridge screws on underside of body. Lift off cartridge assembly from body.
6. Remove needle assembly by rotating rotor counterclockwise.

HMXV REASSEMBLY

1. Install needle assembly by aligning with rotor and turning rotor clockwise. Align pin of needle assembly with grooves in keyway bushing.
2. Replace gasket into groove in cartridge.
3. Replace cartridge assembly with care not to mar the body seat with end of needle. Replace two cartridge screws and torque to 35 ft-lbf (47 N-m).
4. Install o-ring onto face groove of cartridge. Check carbon bearing inside can and install can over rotor. Place green gasket over can (Important that o-ring is below can flange and seated properly in groove, and green gasket is above can flange to seal between can and bonnet).
5. Install bonnet over can. Before torquing large bonnet bolts, install 3 3/8" OD gray gasket, loosely install motor housing to prevent wrenching damage to can. Install large bonnet bolts and torque evenly to 35 ft-lbf (47 N-m). Install small motor housing screws and torque evenly to 15 ft-lbf (20 N-m).
6. Failure to seal Power Head may result in motor failure due to moisture damage.

SERVICE AND MAINTENANCE

3/4" (20mm) THRU 2" (50mm) SEALED MOTOR VALVE



VALVE DISASSEMBLY 3/4" THRU 2"

1. Isolate the valve from the refrigerant pressure and evacuate the refrigerant.
2. During normal circumstances the Power Head (1) is isolated from the refrigerant pressure. If abnormal conditions cause a breach in the isolating Can (5), refrigerant pressure will enter and be contained by the power head, possibly even after the valve has been isolated and evacuated of refrigerant. Always use caution when loosening the Power Head (1). Carefully loosen but do not remove the small power head screws and break the pressure seal. Observe for signs of internal pressure. After confirming no internal pressure is present, remove the bolts and the housing.
3. Carefully loosen the larger bonnet bolts, break gasket seal, and if no pressure is present remove the bolts and bonnet. To prevent damage to the can, reinstall Power Head (or MOVVT).
4. Remove the isolating Can (5).
5. Grasp the Rotor Magnets (3) and while lifting out squarely, remove the cartridge assembly, taking care not to bend the rotor shaft. If cartridge removal is difficult, remove by screwing the rotor counterclockwise and the cartridge will press out. **WARNING:** Don't bend shaft.

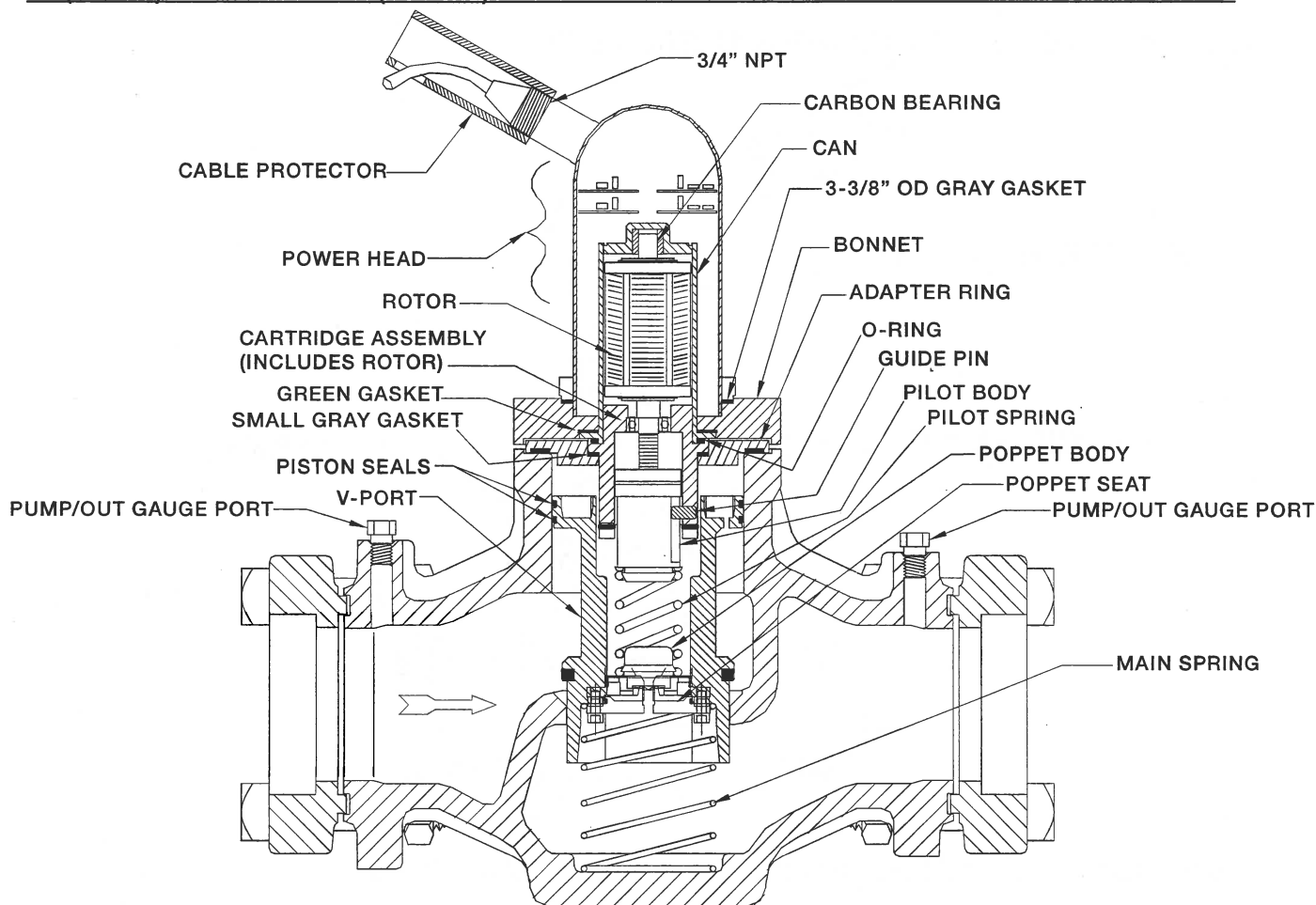
6. Remove the V-port (2) from the cartridge assembly by unscrewing the rotor counterclockwise.

VALVE REASSEMBLY 3/4" THRU 2"

1. Inspect all V-port seals for damage. Install V-port into cartridge fully supporting the v-port and cartridge while carefully aligning the threaded shaft of cartridge with the low friction nut of V-port. Carefully thread together 6-8 turns, and align the anti-rotation slot on the V-port with the anti-rotation pin of the cartridge. Fully thread the V-port into the cartridge, screwing the V-port fully into the cartridge by turning the rotor clockwise.
2. Place smaller gray gasket, then cartridge into the body. Install o-ring onto face groove of cartridge. Check carbon bearing inside can and install can over rotor. Place green gasket over can (Important that o-ring is below can flange and seated properly in groove, and green gasket is above can flange to seal between can and bonnet).
3. Install bonnet over can. Before torquing large bonnet bolts, install 3 3/8" OD gray gasket, loosely install motor housing (or MOVVT) to prevent wrenching damage to can. Install large bonnet bolts and torque evenly to 35 ft-lbf (47 N-m). Install small motor housing screws and torque evenly to 15 ft-lbf (20 N-m).
4. Failure to seal Power Head may result in motor failure due to moisture damage.

SERVICE AND MAINTENANCE

3" (80mm) HMMV/7A & 4" (100mm) HMMV/8A SHOCK RESISTANT SEALED MOTOR VALVE



VALVE DISASSEMBLY 3" THRU 4"

1. Isolate the valve from the refrigerant pressure and evacuate the refrigerant.
2. During normal circumstances the power head (1) is isolated from the refrigerant pressure. If abnormal conditions cause a breach in the isolating Can (5), refrigerant pressure will enter and be contained by the Power Head, possibly even after the valve has been isolated and evacuated of refrigerant. Always use caution when loosening the Power Head (1). Carefully loosen but do not remove the small power head screws and break the pressure seal. Observe for signs of internal pressure. After confirming no internal pressure is present, remove the bolts and the power head.
3. Carefully loosen the larger bonnet bolts, break gasket seal, and if no pressure is present remove the bolts and bonnet. To prevent damage to the can, reinstall Power Head (or MOVt).
4. Remove the isolating Can (5).
5. Grasp the Rotor Magnets (3) and remove the cartridge assembly by lifting the cartridge assembly from the valve. Unscrewing the rotor counter-clockwise will aid removal if removal is difficult.
6. Remove the adapter plate. Plate can be pried off with slip joint pliers or wrench inserted into center hole.
7. Remove the V-port (2) from the body. The bonnet bolts can be screwed into the top of the V-port to aid V-port removal or installation.
8. Remove main spring from body.

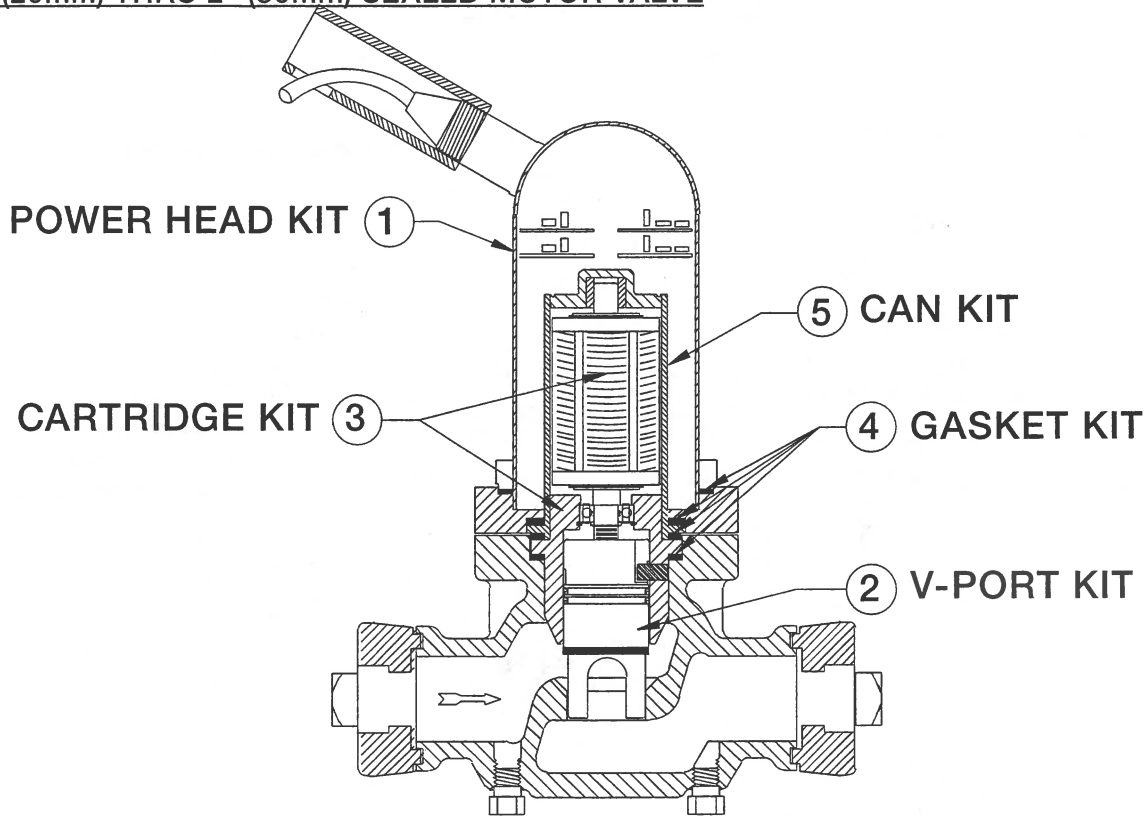
VALVE REASSEMBLY 3" THRU 4"

1. Install main spring into body.
2. Inspect all V-port seals for damage. Install V-port assembly into body using care not to damage piston seals. Main spring fits over pilot seat flange on bottom face of V-port. Place large gasket, then adapter plate into position. Push down and hold adapter plate in position.
3. Place smaller gray gasket into counterbore of adapter plate. Install cartridge into body atop the adapter plate.
4. Install o-ring onto face groove of cartridge. Check carbon bearing inside can and install can over rotor. Place green gasket over can (Important that o-ring is below can flange and seated properly in groove, and green gasket is above can flange to seal between can and bonnet).
5. Install bonnet over can. Before torquing large bonnet bolts, install 3-3/8" OD gray gasket, loosely install motor housing (or MOVt) to prevent wrenching damage to can. Install large bonnet bolts and torque evenly to 175 ft-lbf (237 N-m). Install small motor housing screws and torque evenly to 15 ft-lbf (20 N-m).

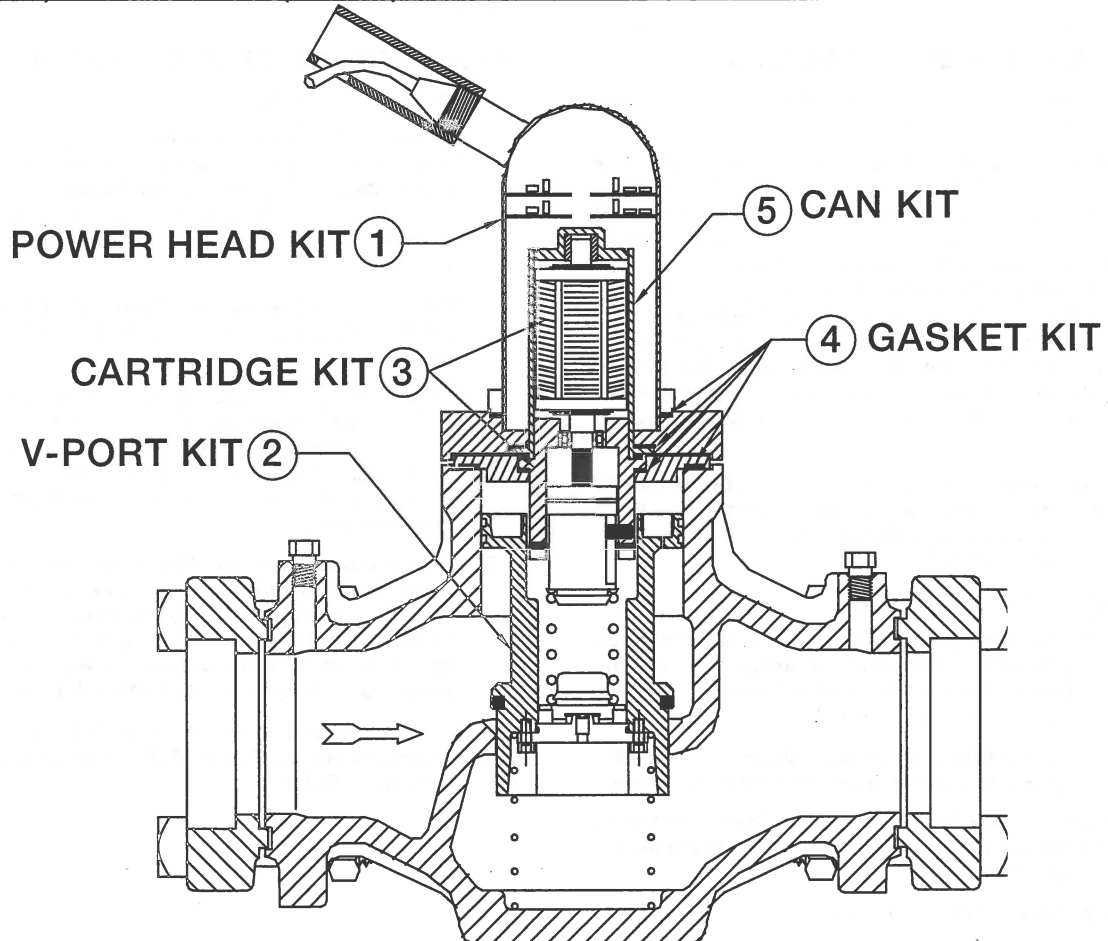
NOTE: For servicing 3" and 4" Sealed Motor Valves with model numbers HMMV/7, HMMV/8, HMMR/7 and HMMR/8, refer to Bulletin R629b.

SEALED MOTOR VALVE PARTS LIST

3/4" (20mm) THRU 2" (50mm) SEALED MOTOR VALVE

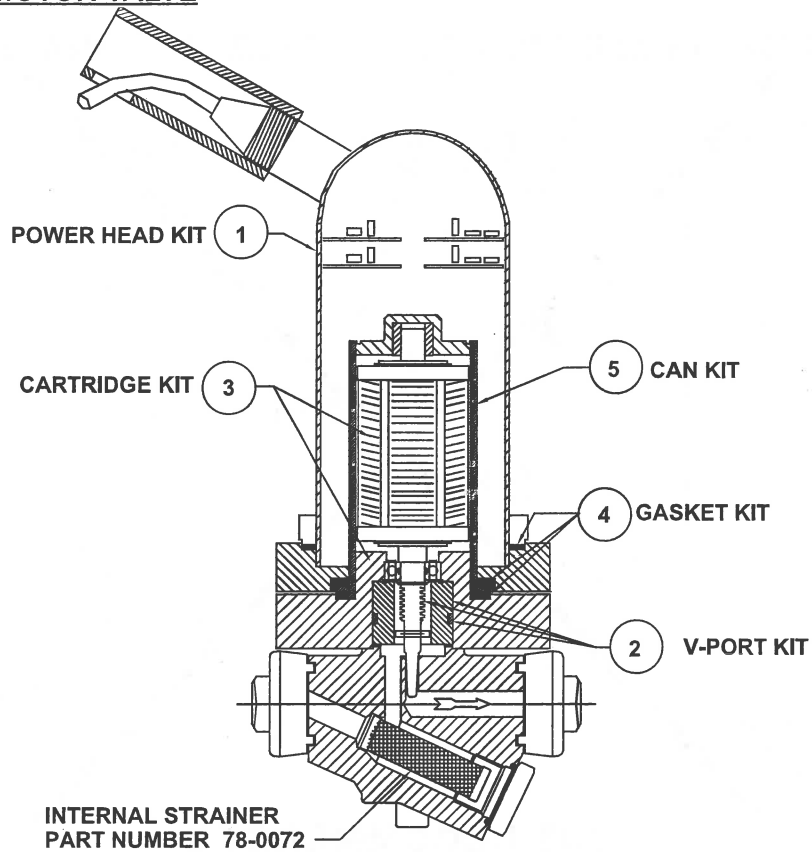


3" (80mm) HMMV/7A & 4" (100mm) HMMV/8A SEALED MOTOR VALVE



SEALED MOTOR VALVE PARTS LIST

HMV SEALED MOTOR VALVE



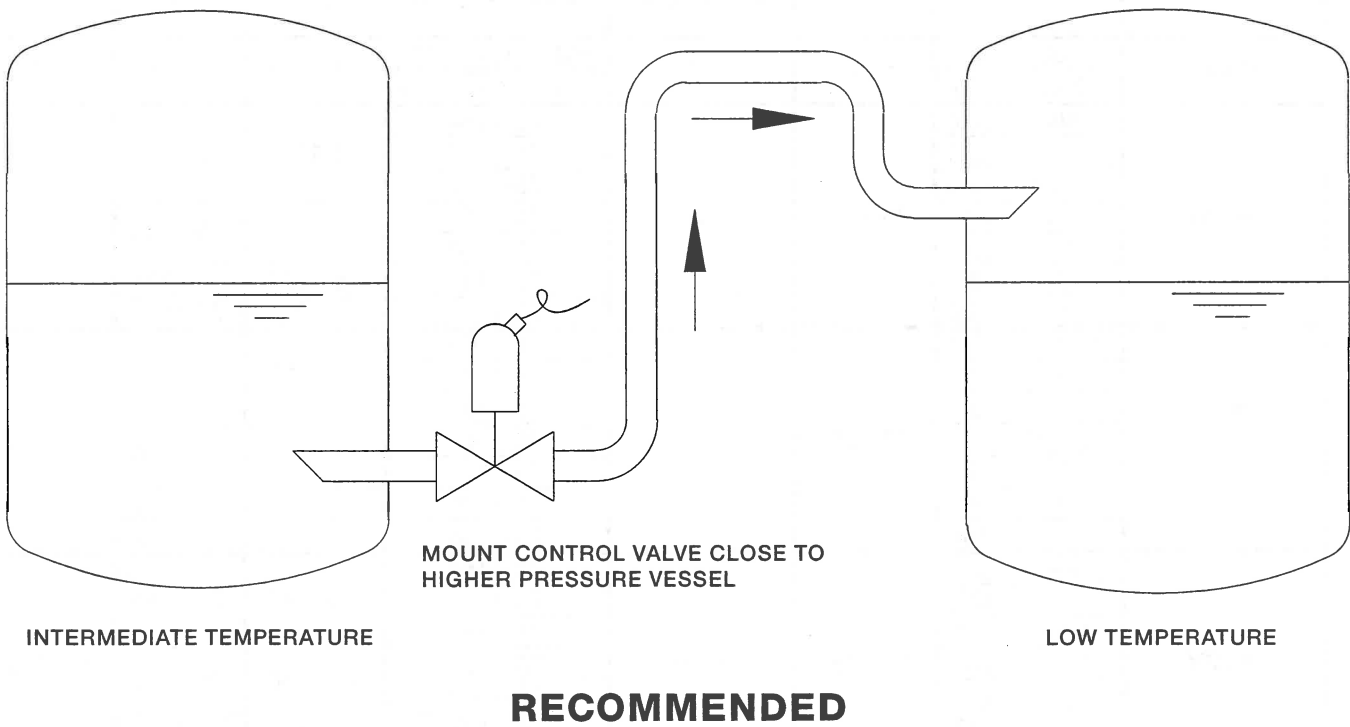
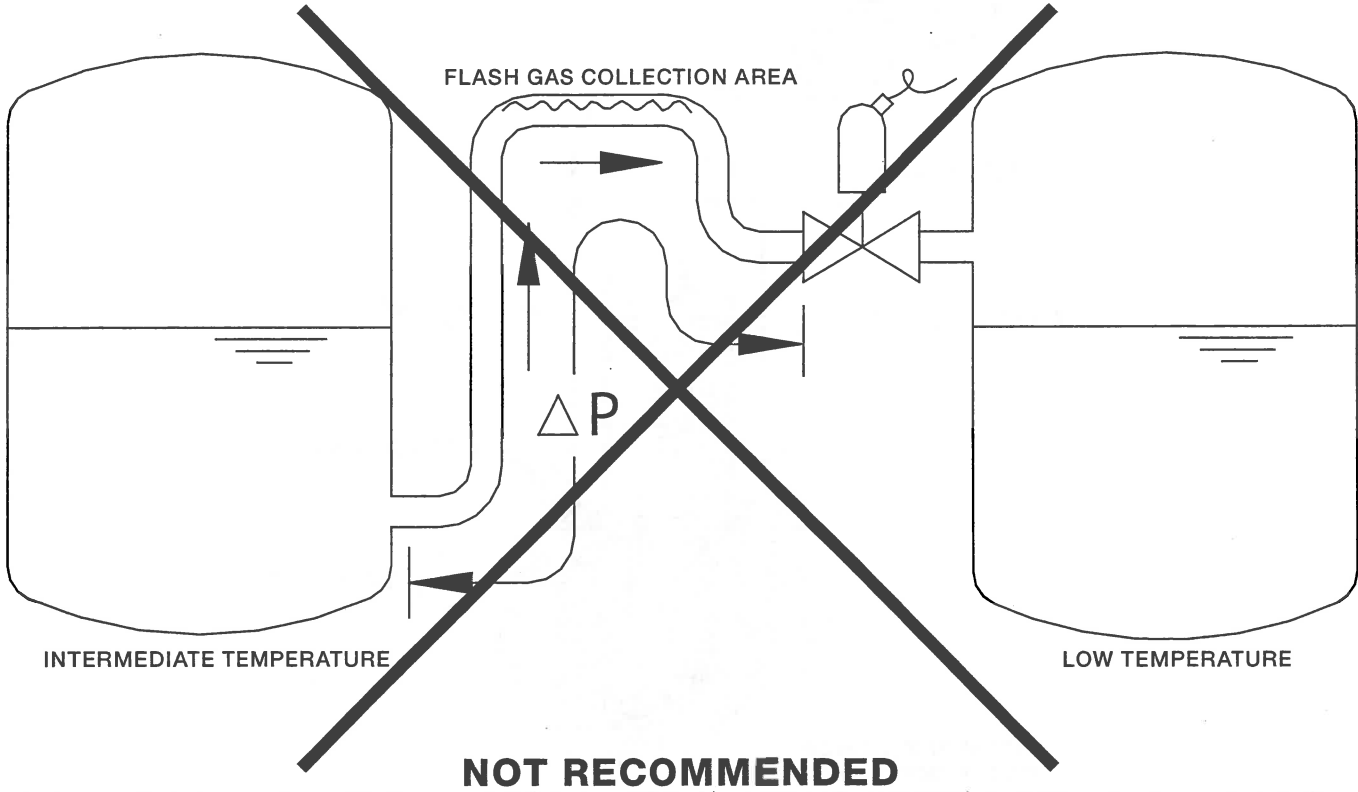
Valve Type	Nominal Size Inch (mm)	1		2	3	4	5
		Power Head Kit		V-Port* Assembly Kit	Cartridge* Assembly Kit	Gasket Kit	Can Kit*
		STD	POWER-CLOSE				
HMV	7/32" (5)	75-3017	75-3031	HMV/A 75-1176	75-1178	75-1180	75-1177
	9/32" (7)			HMV/B 75-1179			
HMMV	3/4" (20)	75-3017	75-3031	75-1154	75-1167	75-1148	75-2922
	1" (25)			75-1155			
	1 1/4" (32)			75-1156	75-1168	75-1150	
	1 1/2" (40)			75-1157			
	2" (50)			75-1166			
	3" (80)			75-1197			
4" (100)	75-1199	75-1200	75-1151				
HMMR	3/4" (20)	75-3017	75-3031	75-1160	75-1167	75-1148	75-2922
	1" (25)			75-1161			
	1 1/4" (32)			75-1154	75-1168	75-1150	
	1 1/2" (40)			75-1162			
	2" (50)			75-1163			
	3" (80)			75-1196			
4" (100)	75-1198	75-1200	75-1151				
HMSV	3/4" (20)	75-1187	75-1184	75-1154	75-1167	75-1148	75-2922
	1" (25)			75-1155			
	1 1/4" (32)			75-1156	75-1168	75-1150	
	1 1/2" (40)			75-1157			
	2" (50)			75-1166			
	3" (80)			75-1197			
4" (100)	75-1199	75-1200	75-1151				

* KITS INCLUDE GASKET KIT

NOTE: For 3" (80mm) and 4" (100mm) with model numbers HMMV/7, HMMR/7, HMMV/8, HMMR/8 both V-Port Cartridge Kit and Cartridge Kit must be replaced together.

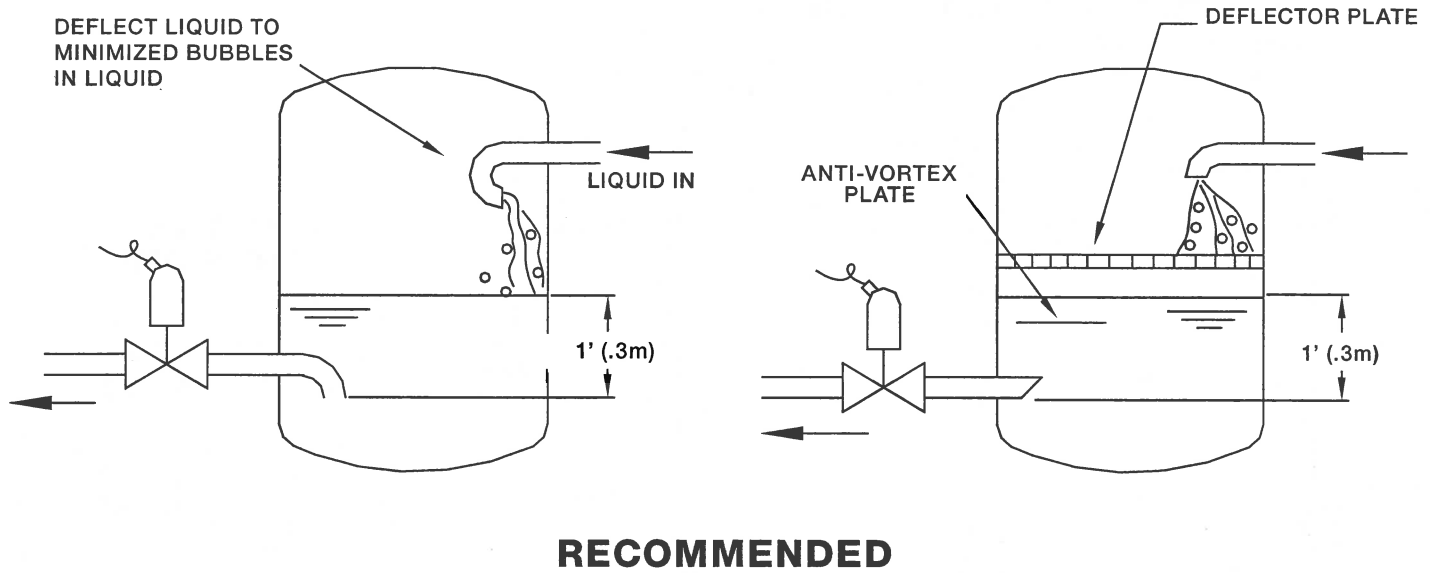
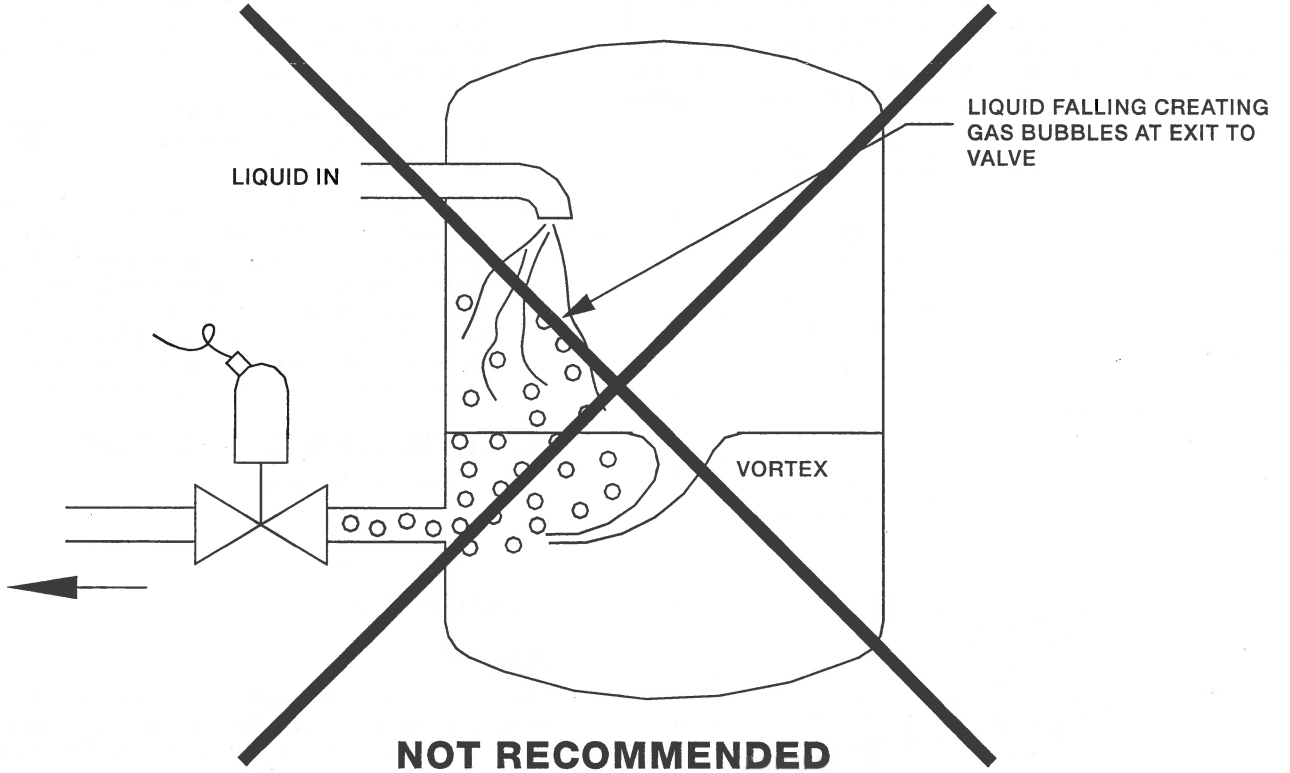
SEALED MOTOR VALVE RECOMMENDED PIPING

FIGURE 1: LIQUID FEED VALVE FROM INTERMEDIATE TO LOW TEMPERATURE VESSEL



SEALED MOTOR VALVE RECOMMENDED PIPING

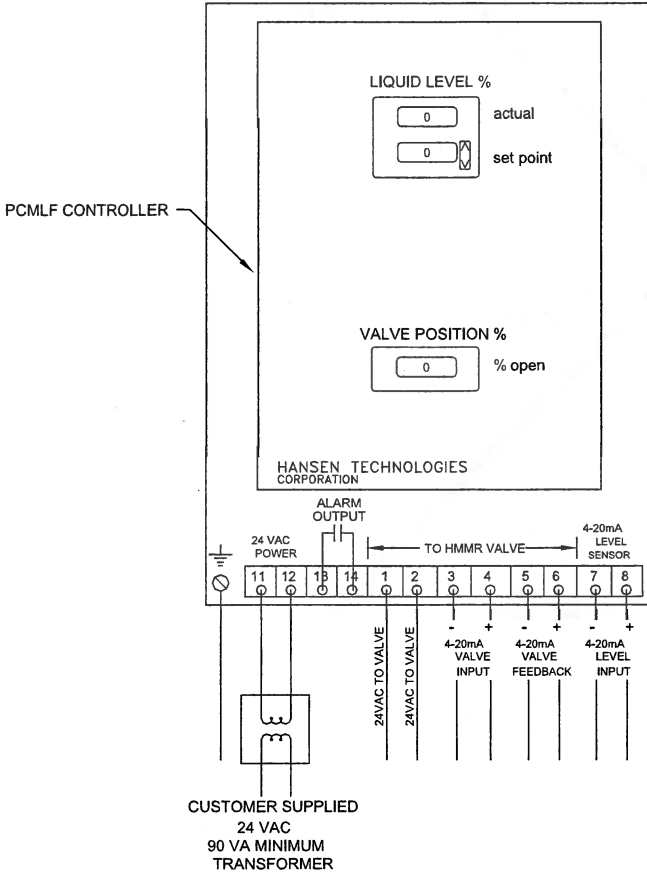
FIGURE 2: PIPING RECOMMENDATIONS







HANSEN CONTROLLERS

PCML, PCMLF

Hansen stand-alone liquid level controllers are suitable for applications where computer control is either not desired or not available. Both controllers have built-in 24v DC power supply for the 4-20 mA valve position feedback loop and the 4-20 mA level control loop. Refer to application examples on page 3. **No external 24V DC power supplies are required.**



SETTING THE CONTROLLER

1. In automatic mode, the actual liquid level is displayed in the upper most display, of the controller, with the liquid level setpoint just below it. For controllers with valve position feedback, the valve position is shown on the bottom display.
2. The liquid level setpoint can be adjusted by depressing the up or down arrow keys of the controller.  
3. MANUAL OPERATION of the Sealed Motor Valve may be performed at the controller by depressing the manual (hand symbol) key. When in manual, the set point display will show valve position setpoint. The valve will remain at the position setpoint until the setpoint is altered, or returned to automatic operation. To return to automatic operation, depress the manual key again.  

CONTROLLER SPECIFICATIONS

Input: 24 VAC, 90VA minimum

Enclosure: watertight, NEMA 4x

Alarm: Normally open

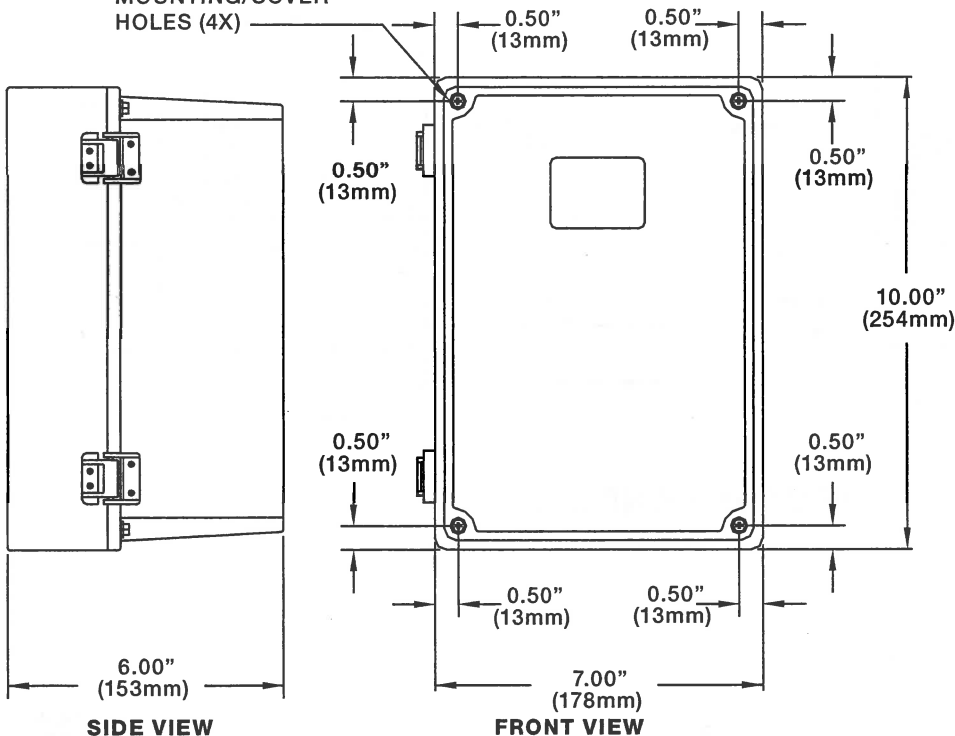
Alarm Relay: 2 Amps

CAUTION

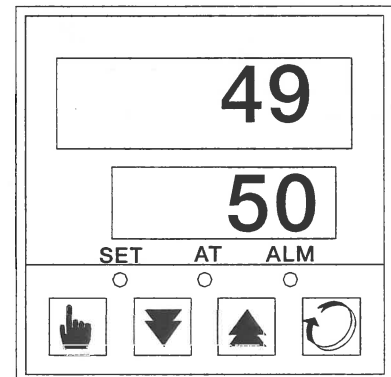
The Hansen PCML/PCMLF has built-in multiple control capabilities for other industries. Hansen has programmed the controller for the particular use described in this bulletin. Do not attempt to penetrate barriers to other programming.

ENCLOSURE FOR CONTROLLER

MOUNTING/COVER HOLES (4X)



CONTROLLER FACEPLATE



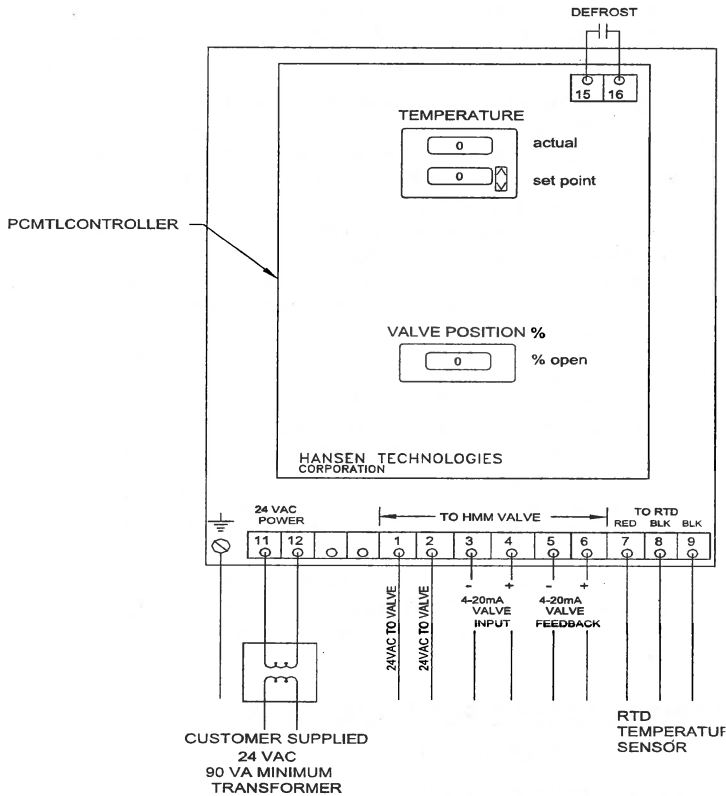
HANSEN CONTROLLERS

PCMT, PCMTF

Hansen stand-alone temperature controllers are suitable for applications where computer control is either not desired or not available. Both controllers have built-in 24v DC power supply for the 4-20 mA valve position feedback loop. PCMT and PCMTF controllers include RTD temperature sensor. Refer to application examples on page 4. **No external 24V DC power supplies are required.**

SETTING THE CONTROLLER

1. In automatic mode, the actual temperature is displayed in the uppermost display, of the controller, with the active setpoint (setpoint one or setpoint two) just below it.
2. The active setpoint can be adjusted by depressing the up or down arrow keys of the controller. The active and secondary setpoint may be viewed or adjusted by depressing the scroll key.
3. The secondary setpoint may be used to close the HMMV valve during defrost. **NOTE: A separate defrost relief regulator is required.** Set the secondary temperature setpoint at a high enough value to keep the valve closed during defrost. Connecting the defrost terminals (located at the top of the controller package) to the appropriate defrost control contacts to enable activation of the secondary setpoint during defrost. A closed contact between terminals 15 and 16 will activate the secondary setpoint.
4. **MANUAL OPERATION** of the Sealed Motor Valve may be performed at the controller by depressing the manual (hand symbol) key. When in manual, the setpoint display will show valve position setpoint command. The manual setpoint may be changed using the up and down arrow keys. PCMTF controllers will see the valve position change on the bottom display. The valve will remain at the position setpoint until the setpoint is altered, or returned to automatic operation. To return to automatic operation, depress the manual key again.



CONTROLLER SPECIFICATIONS

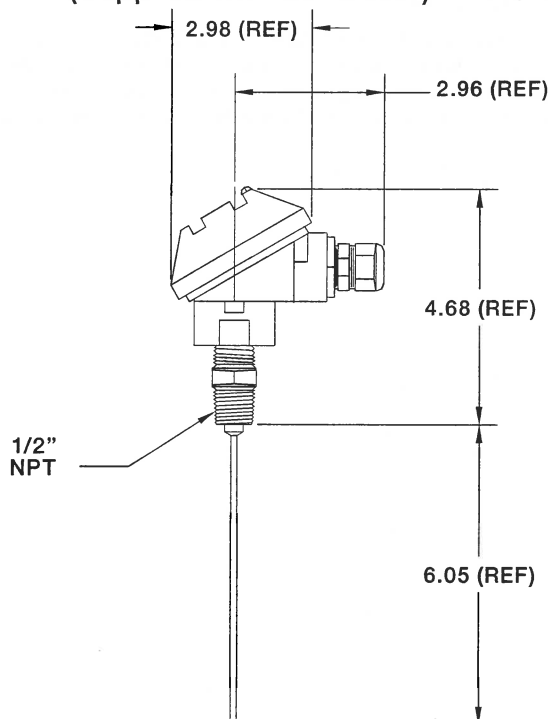
Input: 24 VAC, 90VA minimum

Enclosure: watertight, NEMA 4X

CAUTION

The Hansen PCMT/PCMTF has built-in multiple control capabilities for other industries. Hansen has programmed the controller for the particular use described in this bulletin. Do not attempt to penetrate barriers to other programming.

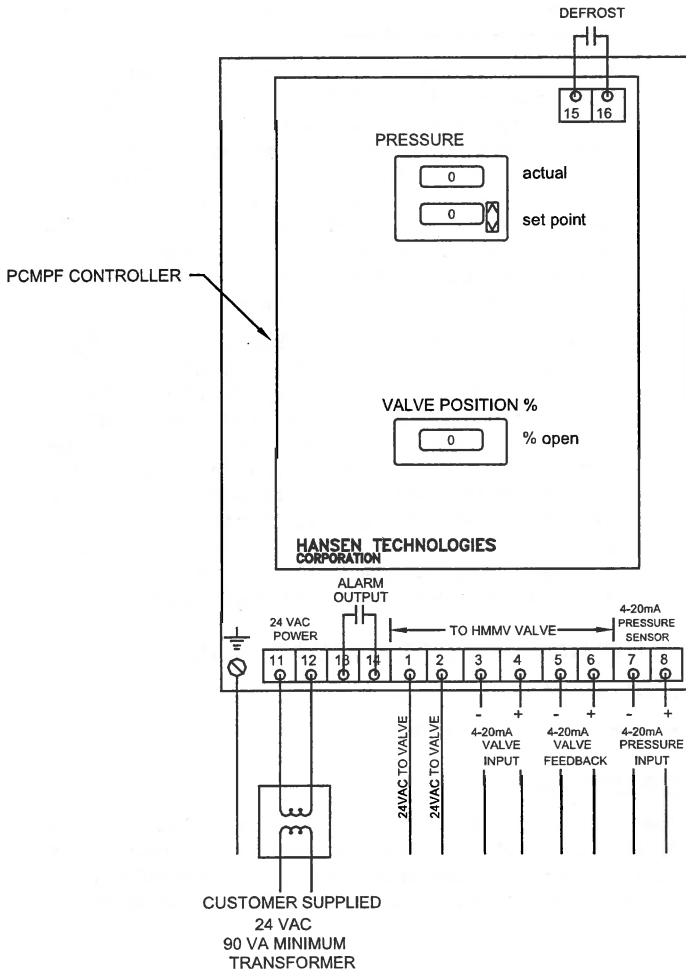
RTD TEMPERATURE SENSOR (Supplied with Controller)



HANSEN CONTROLLERS

PCMP, PCMPF

Hansen stand-alone pressure controllers are suitable for applications where computer control is either not desired or not available. Both controllers have built-in 24V DC power supply for the 4-20 mA valve position feedback loop. PCMP and PCMPF controllers include pressure transducer. Refer to application examples on page 3. **No external 24V DC power supplies are required.**



SETTING THE CONTROLLER

1. In automatic mode, the actual pressure is displayed in the uppermost display, of the controller, with the active setpoint (setpoint one or setpoint two) just below it.
2. The active setpoint can be adjusted by depressing the up or down arrow keys of the controller. The active and secondary setpoint may be viewed or adjusted by depressing the scroll key.
3. The secondary setpoint may be used to close the HMMV valve during defrost. **NOTE: A separate defrost relief regulator is required.** Set the secondary pressure setpoint at a high enough value to keep the valve closed during defrost. Connecting the defrost terminals (located at the top of the controller package) to the appropriate defrost control contacts to enable activation of the secondary setpoint during defrost. A closed contact between terminals 15 and 16 will activate the secondary setpoint.
4. **MANUAL OPERATION** of the Sealed Motor Valve may be performed at the controller by depressing the manual (hand symbol) key. When in manual, the setpoint display will show valve position setpoint command. The manual setpoint may be changed using the up and down arrow keys. PCMPF controllers will see the valve position change on the bottom display. The valve will remain at the position setpoint until the setpoint is altered, or returned to automatic operation. To return to automatic operation, depress the manual key again.

CONTROLLER SPECIFICATIONS

Input: 24 VAC, 90VA minimum

Enclosure: watertight, NEMA 4X

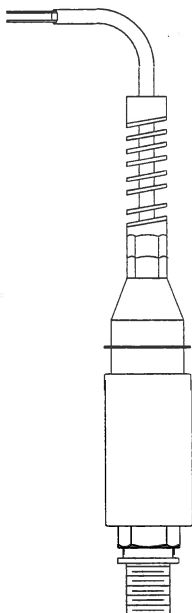
Alarm: Normally open

Alarm Relay: 2 amps

CAUTION

The Hansen PCMP/PCMPF has built-in multiple control capabilities for other industries. Hansen has programmed the controller for the particular use described in this bulletin. Do not attempt to penetrate barriers to other programming.

PRESSURE TRANSDUCER



SEALED MOTOR VALVE WIRING DIAGRAM FOR SOLENOID VALVE REPLACEMENT

(Slow Opening, Slow Closing)

Models HMSV, HMSVC

TYPICAL APPLICATIONS

- IDEAL FOR REPLACEMENT OF:
1. BOTH HOT GAS SOLENOID VALVE AND SOFT GAS SOLENOID VALVE WITH A SINGLE HANSEN SEALED MOTOR VALVE.
 2. BOTH SUCTION SOLENOID VALVE AND EQUALIZE SOLENOID VALVE WITH A SINGLE HANSEN SEALED MOTOR VALVE.
 3. ANY OPEN/CLOSED APPLICATION REQUIRING SLOW OPERATION TO MINIMIZE LIQUID VELOCITY SHOCK AND/OR REQUIRING NO PRESSURE DROP TO OPERATE. (VENT OR GRAVITY DRAIN)
 4. MOST MOTORIZED BALL VALVE AND BUTTERFLY VALVE APPLICATIONS THEREBY ELIMINATING SHAFT SEAL LEAKAGE.

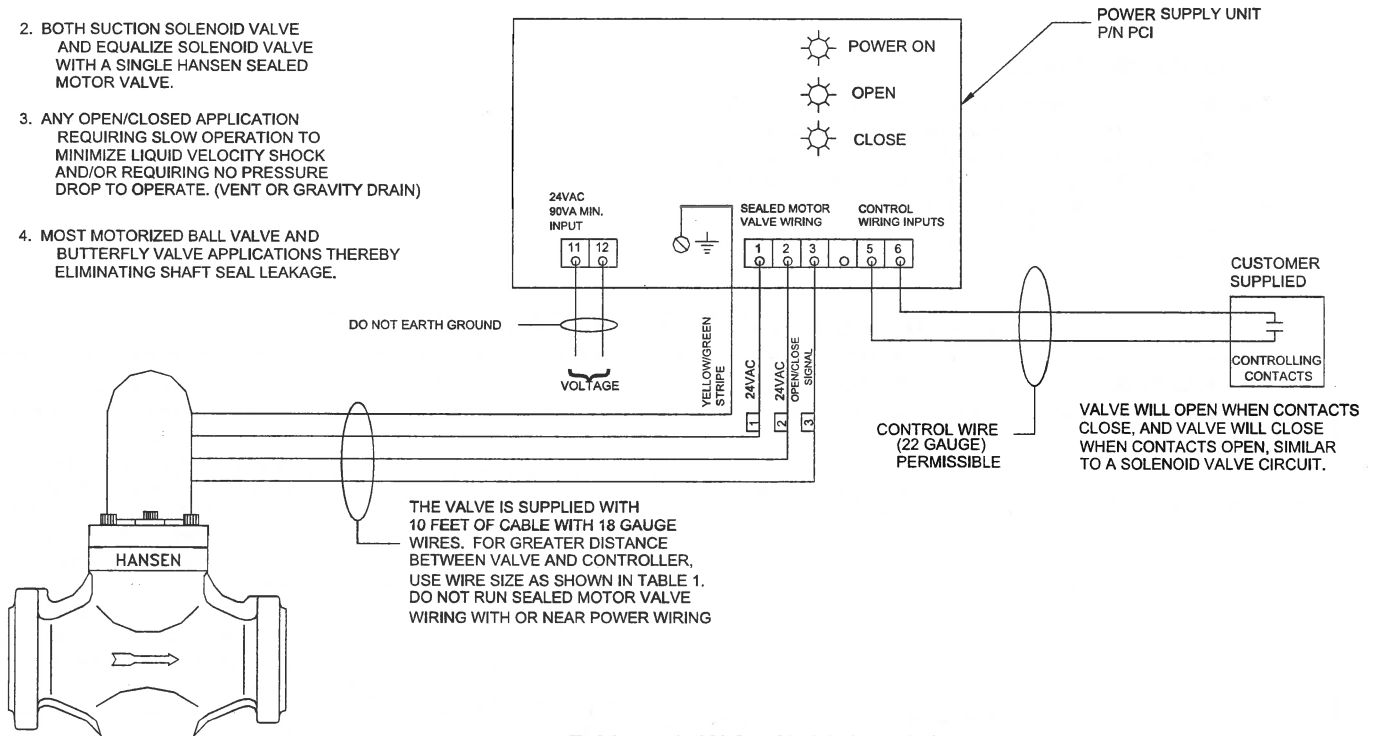


Table 1: 24VAC POWER WIRING

24VAC POWER WIRING (WIRES NO. 1 AND 2) (90VA PER VALVE REQUIRED)	AWG WIRE GAUGE (mm ²) NUMBER OF VALVES POWERED			
	1	2	3	4
CABLE LENGTH, ft(m)				
50 (15)	18 (1,0)	16 (1,5)	14 (2,5)	12 (4,0)
100 (30)	16 (1,5)	12 (4,0)	10 (6,0)	10 (5,5)
150 (46)	12 (2,5)	10 (6,0)	8 (8,5)	8 (8,5)
200 (61)	12 (4,0)	10 (6,0)	8 (8,5)	
300 (91)	10 (6,0)	8 (8,5)		

TROUBLESHOOTING THE SEALED MOTOR VALVE

If control or startup problems are being experienced, our recommended systematic approach is generally the fastest and most effective method to identify and remedy the cause of the problem. There are three major areas to investigate:

- 1) The mechanical state of the valve, refrigerant conditions, and piping design
- 2) The state of the valve power and power wiring components
- 3) The state of the process control equipment, control wiring, and control tuning

1. VALVE MECHANICAL STATE

The first check should be to check the mechanical state of the valve. Carefully remove the powerhead and operate the valve with a MOVТ manual operation valve tool. The valve should move from wide open to closed, and should stop firmly at each end, and should release from the ends without stickiness or grabbing.

TROUBLESHOOTING MECHANICAL SYSTEM

<i>PROBLEM</i>	<i>OBSERVATION</i>	<i>CAUSE</i>	<i>SOLUTION</i>
Noisy or chattering valve	Noisy piping, especially 3" or 4" valves at low loads	Valve oversized, creating rapid accelerations of refrigerant.	Install smaller valve or reduced capacity v-ports (available from factory)
			Move liquid valve as close as possible to feed-vessel
Intermittent Sticking	Valve shows signs of sticking or grabbing at end-stops of travel during manual operation using MOVТ. Disassembly of valve shows damage (components broken, bent, or stripped)	High velocity liquid slugs, liquid hammer.	Re-tune temperature control of wet-suction line (soften response and ramp slowly between setpoints).
			Lower liquid level in evaporator/chiller. Review effect of liquid-feed solenoid.
			Change control to close valve when intermediate feed vessel gets below safe levels.
Intermittent Sticking	Valve shows signs of sticking or grabbing at end-stops of travel during manual operation using MOVТ. Disassembly of valve shows no obvious signs of damage to rotor, drive thread, or drive nut	Dirt and/or especially improper oil (rancid or improper pour-point) in system for the application.	Replace cartridge and v-port (2" and smaller) or pilot body (3" and above). Increase oil management and removal from system.
Intermittent Sticking 3" and 4" valves	Reverse-pressure is sometimes present	Lack of outlet check-valve.	Install check valve downstream of valve.
Intermittent Sticking	No signs of mechanical sticking when operated manually using MOVТ.	Insufficient power	Refer to Valve Power Elements troubleshooting in next section.

TROUBLESHOOTING THE SEALED MOTOR VALVE

2. VALVE POWER WIRING ELEMENTS

If no mechanical or system problems are found, check the power wiring (to the #1 and #2 wires on valve). Most incidences of sticking and feedback problems have been traced to insufficient power reaching the valve. 24 Volt A.C. transformer(s) must have as a minimum 90VA for each valve powered. 24 Volt A.C. power is very sensitive to line losses due to insufficient wire size. This power loss may not show as a voltage loss when using a common multi-meter (due to the fast pulse of current required by the valve). As more power heads are placed in an individual circuit, the wire size must go up (refer to our wire sizing table below).

A common wiring installation error occurs between the transformer secondary and the terminal strips leading to multiple valves; these typically short wire runs must be sized for the total current of the combined load of all of the valves; larger or multiple wires are needed here to prevent power losses.

A second common but more grievous error results when one of the two 24 Volt A.C. secondary lines is incorrectly wired as if it were a "neutral". Undesirable but common results may occur: often the "neutral" wire size is grossly insufficient to carry the combined amperage of multiple valves, resulting in power losses to the valves; and secondly, this "neutral" is often incorrectly earthed or grounded, leading to potentially high stray voltages which may damage the electronics of the valve. Thirdly, incidents of combining higher voltage devices such as solenoid coils to this 24 Volt A.C. secondary "neutral" have also occurred. Proper wiring calls for both 24 Volt A.C. secondary wires be isolated from earthed or grounded neutrals, and have sufficient wire diameter in each segment to carry the combined amperage of the loads (minimum 90 watt, 3 Amp for each Sealed Motor Valve; 5 amp fast-blow fuses recommended). Refer to our wire sizing table below:

Table 1: 24VAC POWER WIRING

24VAC POWER WIRING (WIRES NO. 1 AND 2) (90VA PER VALVE REQUIRED)	AWG WIRE GAUGE (mm ²) NUMBER OF VALVES POWERED			
	1	2	3	4
CABLE LENGTH, ft(m)				
50 (15)	18 (1,0)	16 (1,5)	14 (2,5)	12 (4,0)
100 (30)	16 (1,5)	12 (4,0)	10 (6,0)	10 (5,5)
150 (46)	12 (2,5)	10 (6,0)	8 (8,5)	8 (8,5)
200 (61)	12 (4,0)	10 (6,0)	8 (8,5)	
300 (91)	10 (6,0)	8 (8,5)		

TROUBLESHOOTING THE SEALED MOTOR VALVE

TROUBLESHOOTING WIRING SYSTEM

<i>PROBLEM</i>	<i>OBSERVATION</i>	<i>CAUSE</i>	<i>SOLUTION</i>
Intermittent sticking	24 Volts A.C. measured at valve, but transformer not 90VA times # of valves on circuit.	Insufficient power	Use a larger transformer or split load between multiple transformers.
Intermittent sticking	24 Volts A.C. measured at valve, but #2 wire is wired as a "neutral", and combined with other valves and loads.	Insufficient power	Remove earthing or ground, remove other devices, and provide sufficient wire size for combined amperage of all valves on circuit (individual circuit-pairs are recommended).
Intermittent sticking	24 Volts A.C. measured at valve, but a single insufficiently-sized wire pair exists between the transformer and fuse block (#1 wire) or terminal block (#2 wire).	Insufficient power	Increase wire size and/or number of conductors between transformer and terminal blocks
No feedback or loss of calibration, or intermittent sticking	24 Volts A.C. measured at valve, but insufficient transformer size or wiring size for long wiring run.	Insufficient power	Use a larger transformer or split load between multiple transformers. Run larger wire diameter or more wire-pairs to valves. Consider running higher voltage to valve site and install 24VAC transformer near valve.
Blown or dead power heads	Valve will not move, or no feedback. Earthed or grounded 24 Volt A.C. transformer secondary.	Transient or stray voltages	Remove other devices from valve power circuit; remove earthing or grounding from transformer secondary.
Blown or dead power heads	Loose or missing powerhead screws, or rust inside of power heads.	Moisture damage to electronics	Replace power head. In some cases, dead power heads will revive after several weeks in a warm, dry environment. Maintain pressure-tight joint by torquing powerhead screws to 15 ft-lbf (20 N-m).

TROUBLESHOOTING THE SEALED MOTOR VALVE

3. PROCESS CONTROL ELEMENTS

Determine if valve responds to control input. If not, check control wiring in accordance to installation diagrams. Check for proper voltage and polarity of 24 Volt D.C. power supply in signal loop. Determine what other devices are connected to the control supply, and analyze for the possibility of ground loop errors. Verify proper milliamps using a milliamp meter.

Using VPIF, move valve to the open and closed position. If valve responds properly, the problem is in control wiring to the valve.

TROUBLESHOOTING THE CONTROL SYSTEM

<i>PROBLEM</i>	<i>SYMPTOM</i>	<i>CAUSE</i>	<i>CHECK/DO</i>
Valve does not maintain level- Model HMMR on liquid feed application	Erratic readout, level too high or too low	Level sensing probe incorrect	Recalibrate liquid level probe.
		4-20 mA loop erratic	Install independent properly grounded 24VDC power supply.
Valve Hunts	Does not maintain constant level or pressure	PID constants not set properly	Set I and D to zero, increase P to minimize valve position swings. Add I if valve is too "lazy".
	Does not maintain constant temperature	PID constants not set properly	Speed up temperature response by moving temperature sensor closer or into the vessel. If sensor is in a well, speed up sensor response time by adding thermal oil into well.
Valve position feedback does not work (customer supplied controller)	Readout is zero	Power supply is missing	Install 24 VDC power supply.
	Readout is incorrect	Disturbance from other devices on 4-20 mA supply	Install independent 24VDC power supply.
	Readout is above 100% or below 0% and does not change	Power head was removed and reinstalled	Recalibrate valve. See instructions.
Valve does not operate	Motor does not pulse when milliamp signal is changing	Mis-wired	Double check numbers printed on power head wires versus wiring diagram
		4-20 mA wires reversed	Follow wiring diagram to be sure wire goes from positive on one side of terminal to negative terminal around the 4-20 mA loop.
		No 4-20 mA signal to valve	Check milliamp signal to valve on either wires 3 or 4. Install milliamp meter in series with 4-20 mA signal to power head to confirm proper signal.

CAUTION

Hansen valves are for refrigeration and other Hansen approved systems only. These instructions and related safety precautions must be read completely and understood before selecting, using, or servicing these valves. Only knowledgeable, trained refrigeration technicians should install, operate, or service these valves. Stated temperature and pressure limits should not be exceeded. Bonnets should not be removed from these valves unless the system has been evacuated to zero pressure. See also Safety Precautions in current List Price Bulletin and Safety Precautions Sheet supplied with product. Escaping refrigerant can cause injury, especially to the eyes and lungs.

WARRANTY

Hansen electrical and electronic parts are guaranteed against defective materials and workmanship for 90 days F.O.B. our plant. All other components are guaranteed for one year F.O.B. our plant. No consequential damages or field labor is included.

TYPICAL SPECIFICATIONS

Motor operated control valves shall feature direct actuation of the main valve seat by the motor shaft, a canned motor to eliminate valve stem seal leakage, a ductile iron body, and be suitable for a safe working pressure of 400 psig (27 bar), as manufactured by Hansen Technologies Corporation, or approved equal.

NOMINAL PORT SIZE INCH (mm)	FLANGE CONNECTION STYLES AND SIZES		
	SW, WN		ODS
	STANDARD	ALSO	STANDARD
7/32 (5)	1/2	3/4	7/8
9/32 (7)	1/2	3/4	7/8
3/4 (20)	3/4	1, 1 1/4	7/8
1 (25)	1	3/4, 1 1/4	1 1/8
1 1/4 (32)	1 1/4	3/4, 1	1 3/8
1 1/2 (40)	1 1/2	2	1 5/8
2 (50)	2	1 1/2	2 1/8
3 (80)	3	-	3 1/8
4 (100)	4	-	4 1/8

ORDERING INFORMATION

FPT only available 3/4", 1" and 1 1/4" port size.

TO ORDER:

Specify valve type (HMMV, HMMR, HMSV, HMXV), nominal port size, flange connection style and size.

Add C for Power-Close Model Number.

(Example: HMMVC)

OPTIONAL CONTROLLERS

CATALOG NUMBER	DESCRIPTION
HMMV/HMMR OPTIONAL CONTROLLERS	
PCMT	Temperature controller with temperature sensor for fully modulating temperature control.
PCMTF	Temperature controller with sensor and valve position display for fully modulating temperature control.
PCML	Level controller for fully modulating applications. Level sensor not included.
PCMLF	Level controller with valve position display for fully modulating applications. Level sensor not included.
PCMP	Pressure controller with pressure transducer for fully modulating pressure control.
PCMPF	Pressure controller with pressure transducer and valve position display for fully modulating pressure control.
RDR	Remote digital readout displays valve position.
TR92	115VAC/230VAC:24VAC 92VA transformer for HMMV/HMMR controller power.
HMSV OPTIONAL CONTROLLER	
PCI	Power Control Interface for open/close applications.
SEALED MOTOR VALVE TOOLS	
MOVT	Manual Opening Valve Tool
75-1185	Calibration Key

VPIF VALVE POSITION INDICATOR	
CATALOG NUMBER	DESCRIPTION
VPIF	Valve Position Indicator (VPIF) Monitor for SMV Models with 4-20mA (less cables & bracket)
VPIEC	8' Extension Cable
75-1210	VPIF Retro-fit Kit includes VPIF, 2 cables and junction box
75-1211	VPIF Retro-fit Kit includes VPIF, cable and solder quick disconnect cable connector

HANSEN

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