HANSEN

Bulletin R629g
AUG 2011

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.

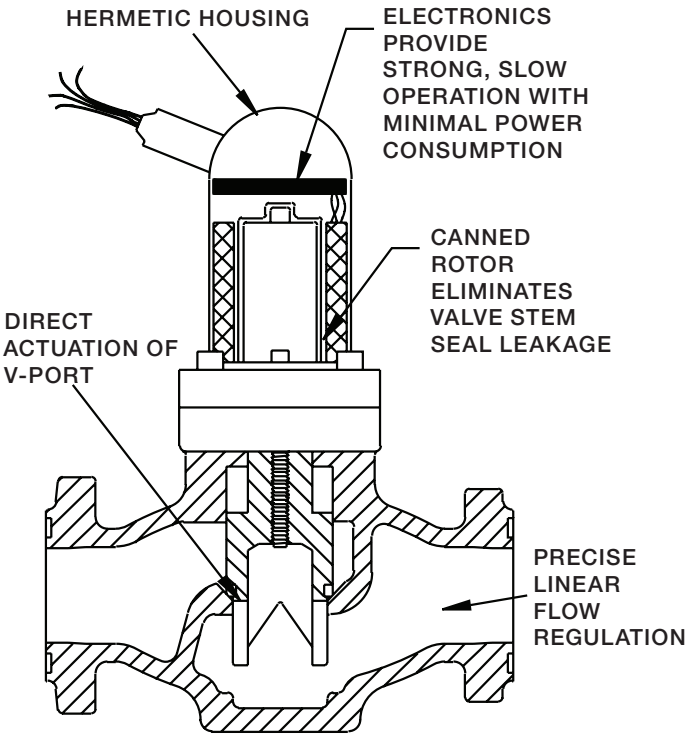
APPLICATIONS

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.
- Available with weld-in connections.

KEY FEATURES



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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 +125°F (–50°C to +50°C)
Corrosion Protection: Zinc plating is standard up to 1-1/4″. 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 HMMR valve series is also suitable for suction line, liquid line and hot gas line where reduced capacities more closely match the expected operating conditions.

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 capacitor storage 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. Pressure drop across the valve dramatically increases the capacity of the valve. A valve with 8 psi pressure drop has twice the capacity of a valve with a 2 psi pressure drop. Ideally, valves should operate between 15% and 85% open for optimum trouble-free control. Refer to the capacity tables on pages 6–14.

LIQUID MAKE-UP APPLICATIONS

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. It is recommended that dual Sealed Motor Valves in parallel be used when the low load (weekend load) is less than 15% of the full load capacity properly sized for the application. Also, for applications requiring a valve size over 2″ port size, it is strongly recommended that two liquid make-up valves in parallel be used. This valve arrangement could be two Sealed Motor Valves or one solenoid valve with hand expansion valve and one Sealed Motor Valve to be used as a “trim” valve under low load conditions.

LIQUID LINE SIZING

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

TABLE 1

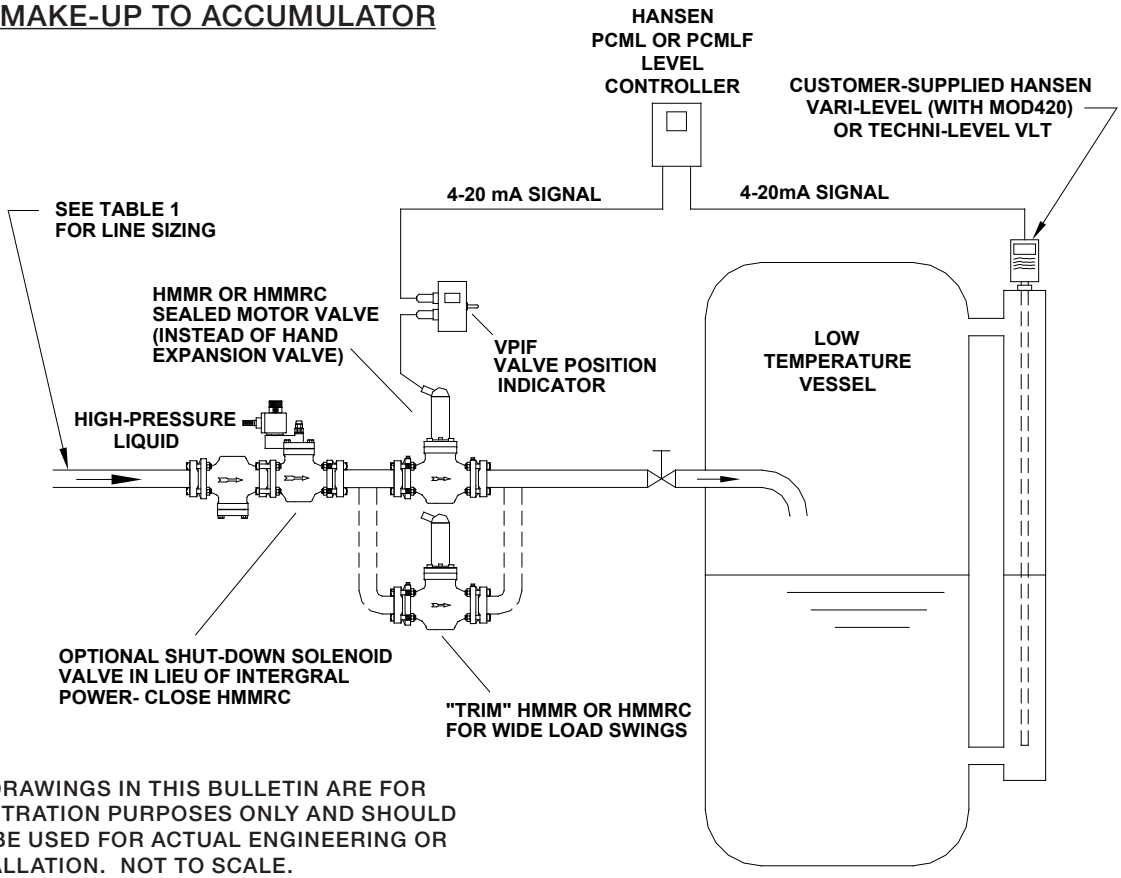
LINE SIZE	MAXIMUM CAPACITY AMMONIA		MAXIMUM CAPACITY R22	
1/2″	32 Tons	112 kW	8 Tons	27 kW
3/4″	58 Tons	208 kW	14 Tons	49 kW
1″	97 Tons	340 kW	24 Tons	82 kW
1-1/4″	179 Tons	625 kW	42 Tons	147 kW
1-1/2″	254 Tons	890 kW	58 Tons	202 kW
2″	496 Tons	1740 kW	110 Tons	384 kW
2-1/2″	729 Tons	2550 kW	155 Tons	543 kW
3″	1160 Tons	4060 kW	241 Tons	845 kW
4″	2040 Tons	7140 kW	416 Tons	1457 kW
5″	3300 Tons	11606 kW	654 Tons	2289 kW
6″	4890 Tons	17198 kW	946 Tons	3309 kW

NH3 capacities are based on IIAR Refrigeration Piping Handbook tables.

R22 capacities based on 3 ft/s liquid velocity. For R134a, use 94% of R22 capacity; R404 80%; R507 60%.

TYPICAL APPLICATIONS - SEALED MOTOR VALVE

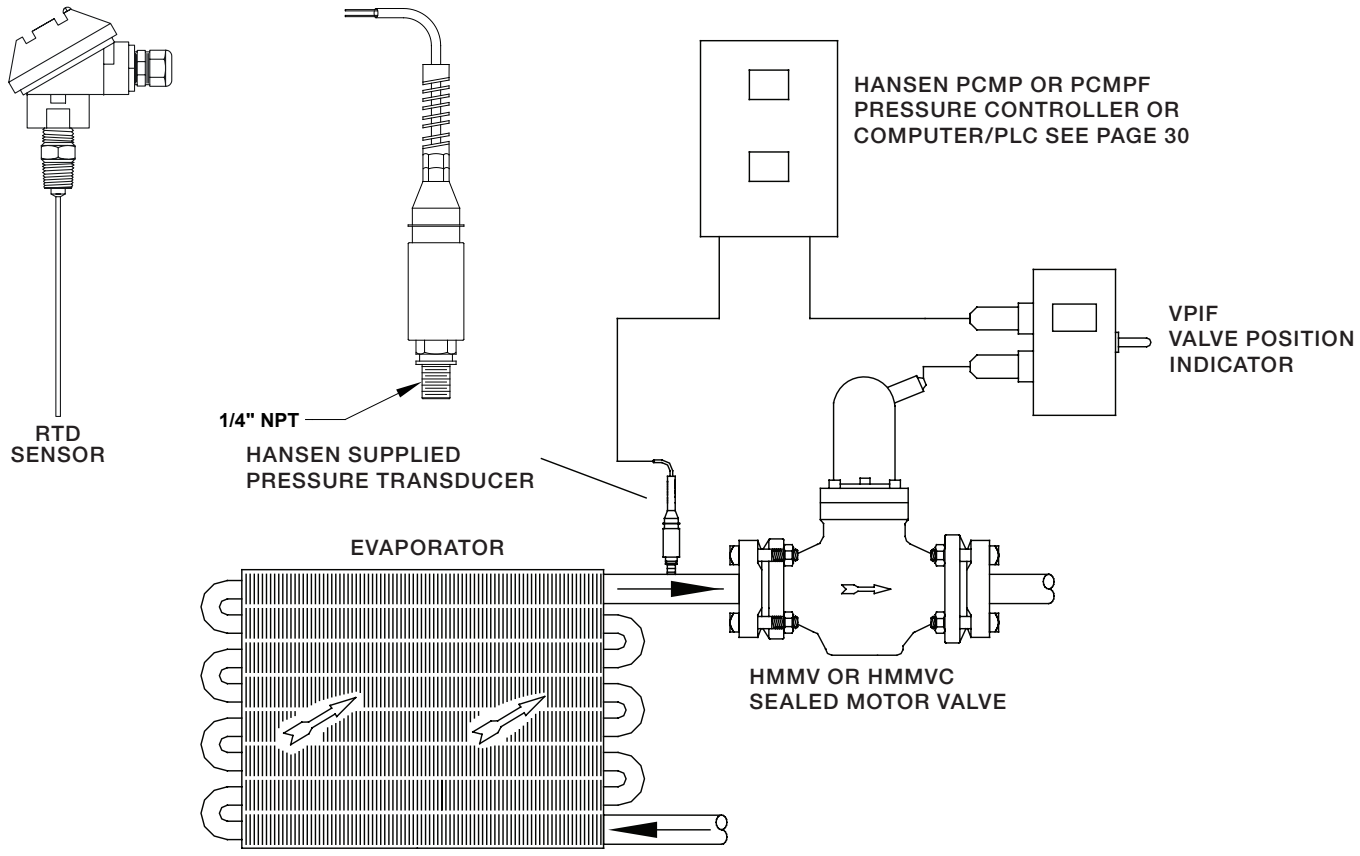
LIQUID MAKE-UP TO ACCUMULATOR



THE DRAWINGS IN THIS BULLETIN ARE FOR ILLUSTRATION PURPOSES ONLY AND SHOULD NOT BE USED FOR ACTUAL ENGINEERING OR INSTALLATION. NOT TO SCALE.

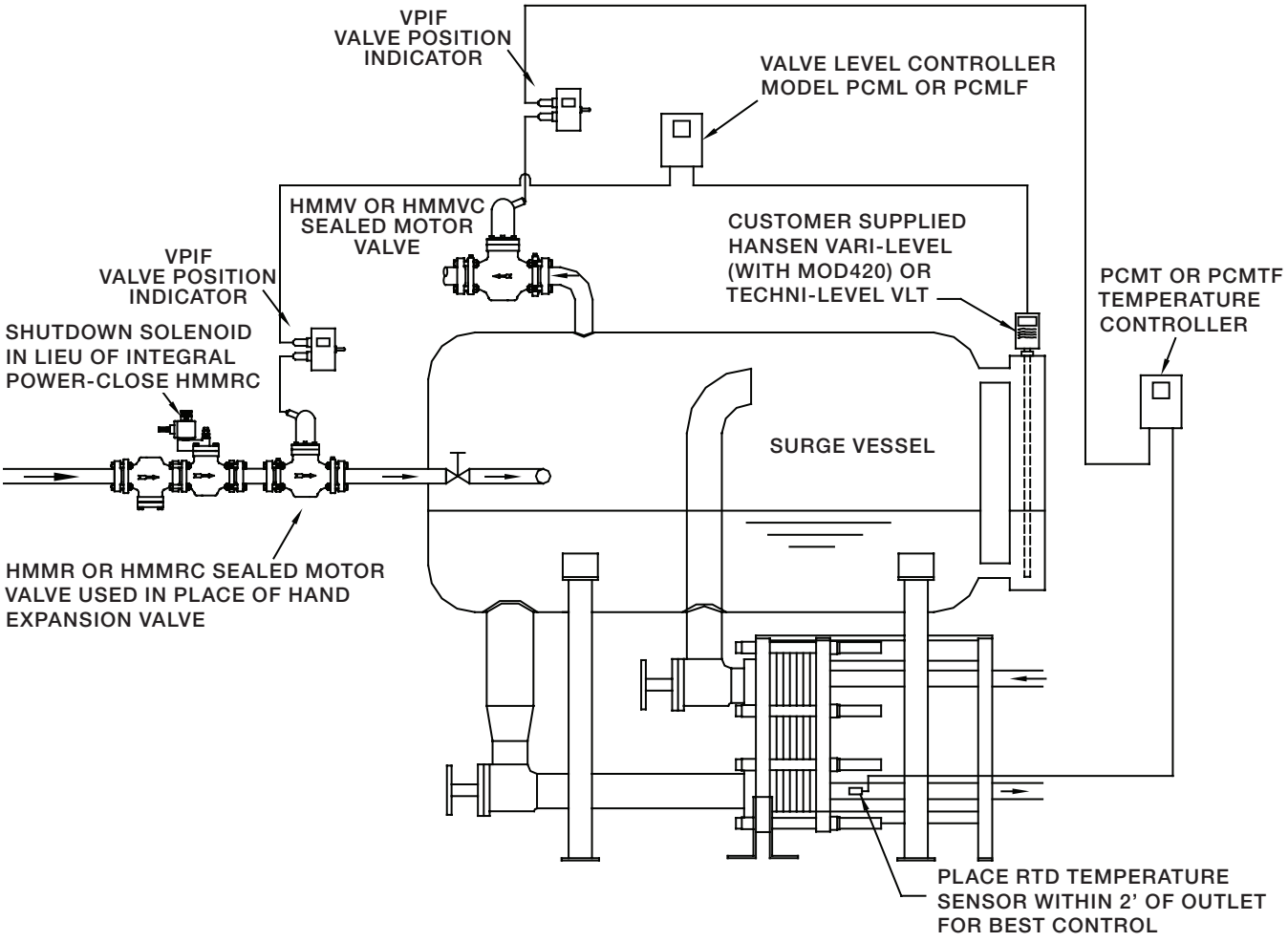
ROOM TEMPERATURE OR EVAPORATOR PRESSURE CONTROL

(Shown with Pressure Transducer)

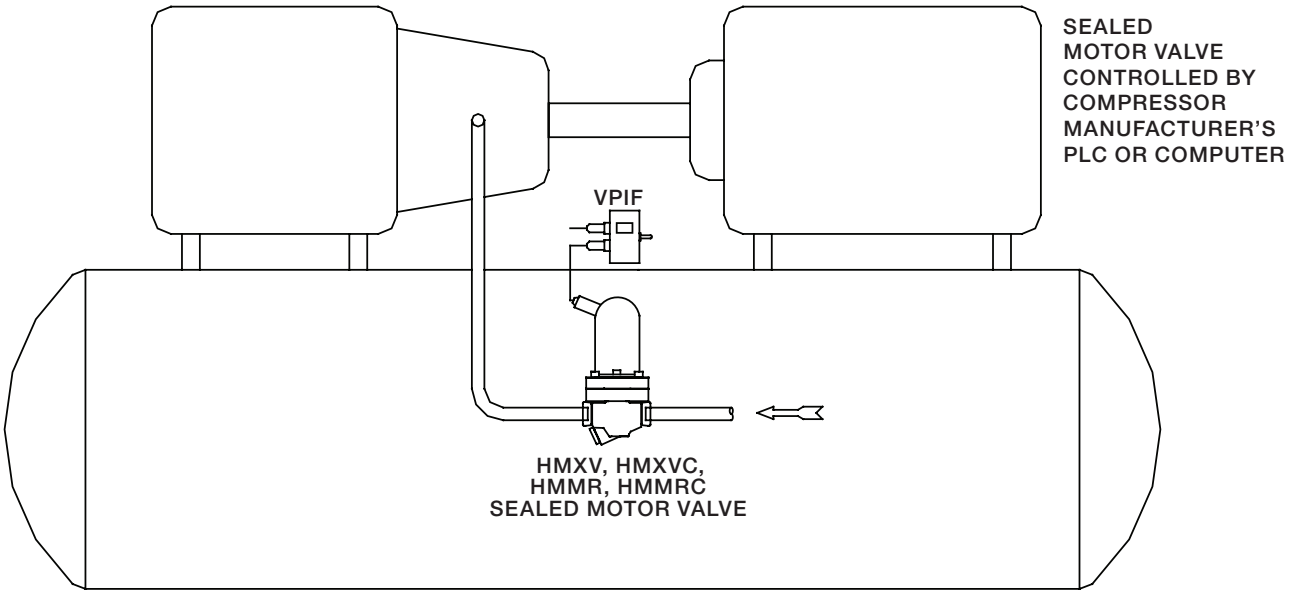


TYPICAL APPLICATIONS - HMSV, HMSVC SEALED MOTOR VALVE

TYPICAL CHILLER APPLICATIONS

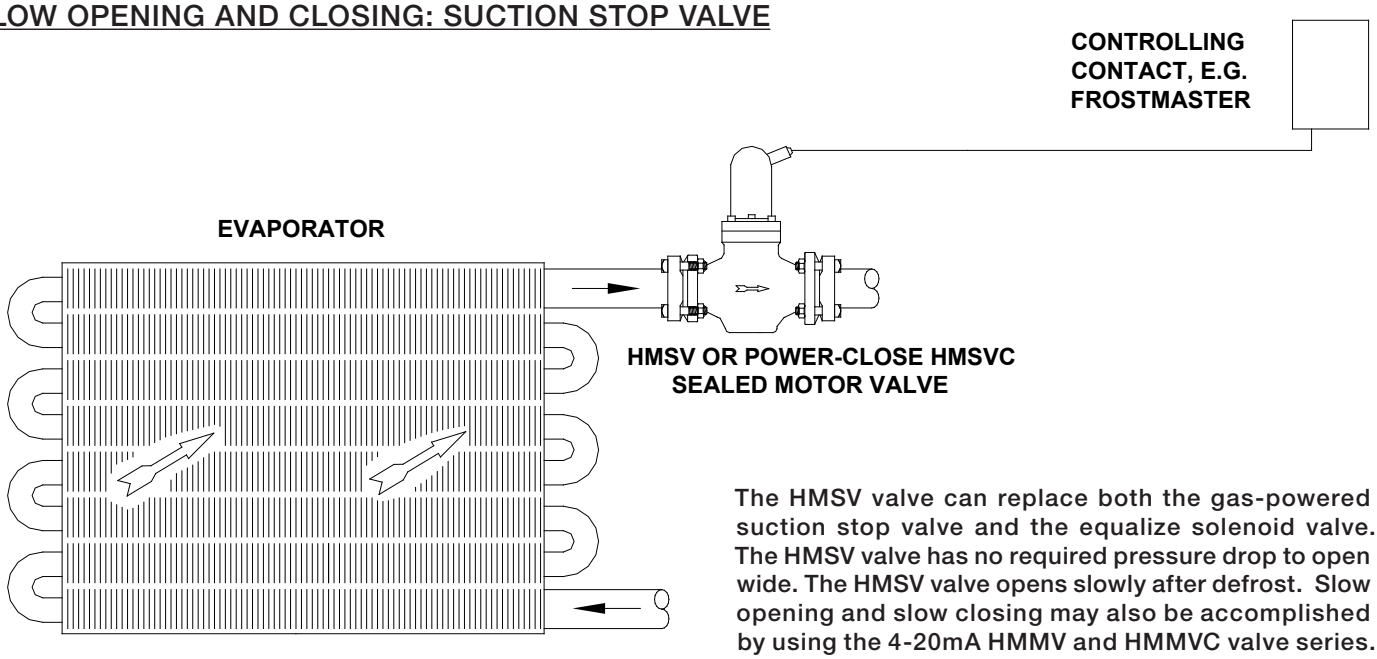


TYPICAL LIQUID INJECTION COOLING FOR SCREW COMPRESSOR APPLICATION



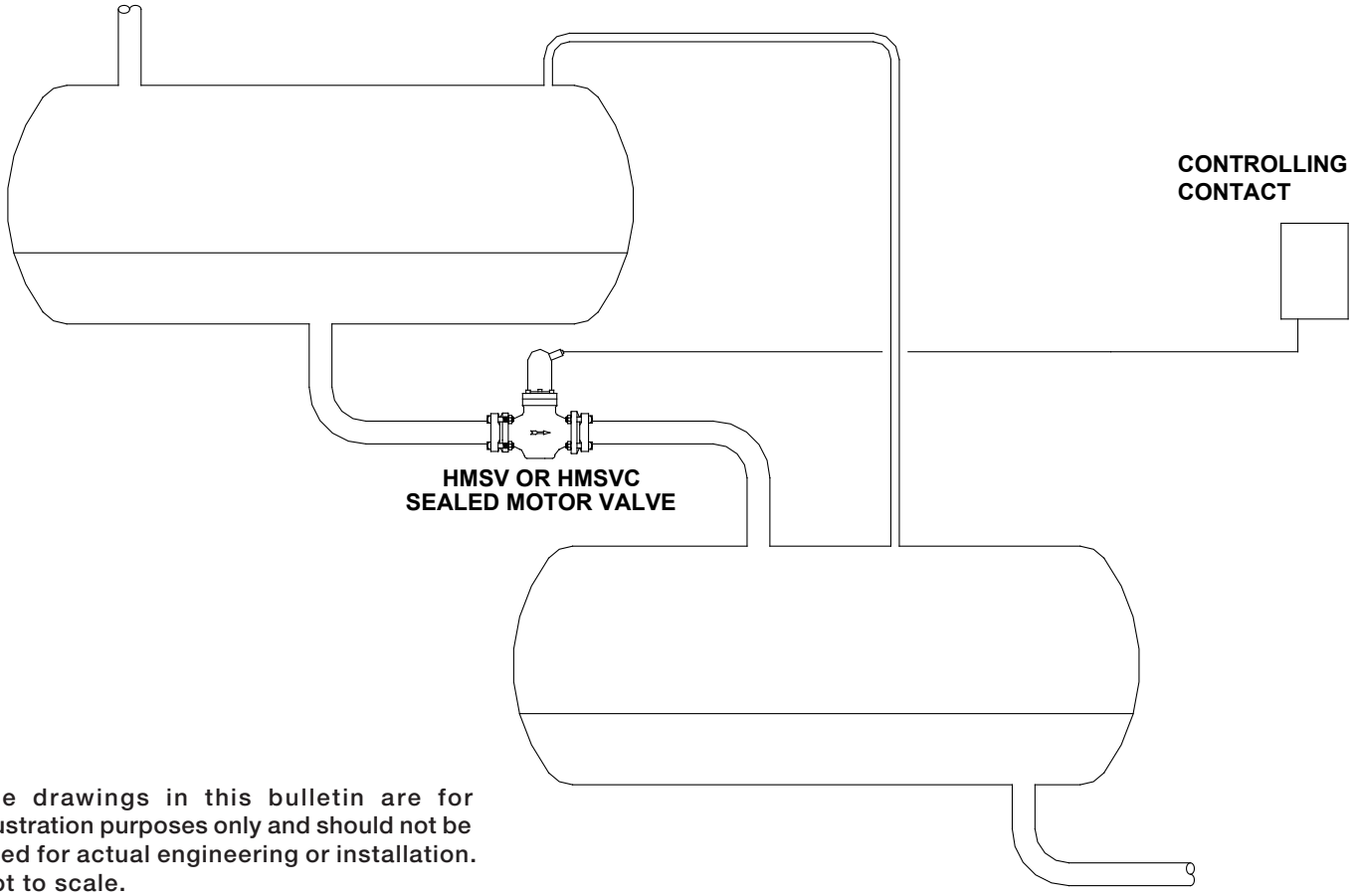
TYPICAL APPLICATIONS - HMSV, HMSVC SEALED MOTOR VALVE

SLOW OPENING AND CLOSING: SUCTION STOP VALVE



The HMSV valve can replace both the gas-powered suction stop valve and the equalize solenoid valve. The HMSV valve has no required pressure drop to open wide. The HMSV valve opens slowly after defrost. Slow opening and slow closing may also be accomplished by using the 4-20mA HMMV and HMMVC valve series.

NO PRESSURE DROP REQUIRED: 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

US

AMMONIA SUCTION VAPOR CAPACITIES, TONS

Evap. Temp.	Pressure Drop	3/4″		1″		1-1/4″		1-1/2″		2″		3″			4″		
°F	(psi)	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
40	.25	1.5	4.2	2.7	8.0	3.7	11	8.2	24	11	32	24	45	71	32	75	113
	.50	2.1	6.0	3.7	11	5.4	16	12	34	15	45	34	63	100	45	106	160
	1.0	2.9	8.5	5.3	16	7.4	22	16	48	22	64	47	89	141	64	150	226
	2.0	4.1	12.0	7.3	22	10	31	23	67	31	90	67	126	199	90	210	317
	5	6.5	19	12	35	16	49	36	106	48	142	106	200	315	142	332	501
	10	9.2	27	16	49	23	69	51	150	69	201	150	282	445	201	470	709
	15	11.3	33	20	60	28	85	63	183	84	246	183	–	–	246	–	–
	20	13.0	38	23	70	33	98	73	212	97	285	212	–	–	284	–	–
0	.25	1.0	2.8	1.7	5.1	2.4	7.1	5.1	15	6.8	20	15	29	45	20	48	72
	.50	1.3	3.9	2.4	7.1	3.4	10	7.2	21	9.9	29	21	40	63	29	67	101
	1.0	1.9	5.5	3.3	10	4.7	14	10	30	14	40	30	56	89	40	94	142
	2.0	2.6	7.6	4.7	14	6.7	20	14	42	19	56	42	79	124	56	131	197
	5	4.1	12	7.4	22	11	32	23	66	30	89	66	124	196	88	206	311
	10	5.8	17	10	31	15	45	32	94	43	125	93	176	277	125	292	441
-40	.25	0.7	1.9	1.1	3.4	1.6	4.7	3.4	10	4.8	14	10	19	30	14	32	48
	.50	0.9	2.6	1.6	4.7	2.2	6.6	4.8	14	6.5	19	14	27	42	19	44	67
	1.0	1.2	3.6	2.2	6.5	3.1	9.2	6.9	20	8.9	26	20	37	58	26	62	93
	2.0	1.7	4.8	2.9	8.8	4.0	12	8.9	26	12	36	27	50	79	35	83	125
Cv		2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	66	104	47	110	166

METRIC

AMMONIA SUCTION VAPOR CAPACITIES, KILOWATTS

Evap. Temp.	Pressure Drop	20 MM		25 MM		32 MM		40 MM		50 MM		80 MM			100 MM		
°C	(bar)	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
5	.02	5.4	16	10	30	14	42	30	90	41	123	91	183	271	125	275	433
	.04	7.6	23	14	42	20	59	43	128	58	175	129	258	383	177	388	613
	.08	11	33	20	60	28	84	60	180	82	247	183	365	542	250	549	867
	.15	15	45	27	82	39	115	82	247	112	338	250	500	742	343	752	1,187
	.4	24	73	44	134	63	188	134	403	184	552	408	817	1,212	560	1,229	1,938
	.6	29	90	54	164	77	230	165	494	225	676	500	1,000	1,484	685	1,505	2,374
	1.0	38	116	70	212	100	297	213	638	290	873	646	–	–	885	–	–
	1.4	45	137	83	251	118	351	252	755	343	1,033	764	–	–	1,047	–	–
-20	.02	3.1	9.5	5.8	18	8.2	24	18	53	23	70	53	105	156	72	158	249
	.04	4.4	13	8.2	25	12	35	25	74	33	99	75	149	221	102	223	352
	.08	6.2	19	12	35	16	49	35	105	47	140	105	211	313	144	316	498
	.15	8.5	26	16	48	22	67	48	144	64	192	144	289	428	197	432	682
	.4	13.9	42	26	78	37	109	78	235	104	314	236	471	699	322	706	1,114
	.6	17.0	52	32	96	45	134	96	288	128	384	289	577	856	394	865	1,364
-40	.02	2.2	7	3.9	12	5.5	16	11	34	16	47	35	71	105	48	106	168
	.04	3.0	9	5.5	17	8	23	16	49	22	67	50	100	149	69	151	238
	.08	4.3	13	8	23	11	33	23	69	32	95	71	142	210	97	213	336
	.15	5.9	18	11	32	15	45	31	94	43	130	97	194	288	133	292	460
Kv		1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	60	89	40	90	142

Reduced Capacity V-Ports shown in gray.

For best control and modulation, size the SMV valve for both the full load capacity and the minimum load capacity (weekend load). The minimum load capacity should be at least 15% of the full load capacity. The capacity tables are conservative, so it is not necessary to add a safety factor for capacity.

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-22 SUCTION VAPOR CAPACITIES, TONS

Evap. Temp.	Pressure Drop	3/4″		1″		1-1/4″		1-1/2″		2″		3″			4″		
°F	(psi)	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
40	.25	0.5	1.6	1.0	2.9	1.4	4.2	3.0	8.8	4.0	12	8.7	16	26	12	27	41
	.50	0.8	2.3	1.4	4.1	2.0	6.0	4.3	13	5.6	17	12	23	37	17	39	59
	1.0	1.1	3.2	1.9	5.8	2.8	8.5	6.1	18	7.9	23	17	33	52	23	55	83
	2.0	1.5	4.5	2.7	8.2	4.0	12	8.6	25	11	33	25	46	73	33	78	117
	5	2.4	7.1	4.3	13	6.4	19	14	40	18	52	39	73	115	52	123	185
	10	3.5	10	6.1	18	9.0	27	19	56	25	74	55	104	163	74	173	262
	15	4.2	12	7.5	22	11	33	23	68	31	90	67	–	–	91	–	–
	20	4.9	14	8.6	26	13	38	27	79	36	104	78	–	–	105	–	–
0	.25	0.3	1.0	0.6	1.8	0.9	2.6	1.8	5.3	2.5	7.4	5.5	10	16	7.3	17	26
	.50	0.5	1.4	0.9	2.6	1.2	3.7	2.6	7.5	3.6	11	7.7	15	23	10	24	37
	1.0	0.7	2.0	1.2	3.7	1.7	5.2	3.6	11	5.1	15	11	21	33	15	34	52
	2.0	1.0	2.8	1.7	5.2	2.4	7.3	5.1	15	7.1	21	15	29	46	21	48	73
	5	1.5	4.4	2.7	8.2	3.9	12	8.1	24	11	33	24	46	73	33	76	115
	10	2.2	6.3	3.9	12	5.5	16	11	34	16	47	35	65	103	46	108	163
-40	.25	0.3	0.8	0.5	1.4	0.7	2.0	1.5	4.2	1.9	5.7	4	8	12	6	13	20
	.50	0.4	1.1	0.7	2.0	0.9	2.8	2.1	6.0	2.7	8.0	6	11	18	8	19	29
	1.0	0.5	1.6	0.9	2.8	1.3	4.0	2.9	8.5	3.9	11	8	16	25	11	27	40
	2.0	0.8	2.2	1.3	4.0	1.9	5.6	4.1	12	5.4	16	12	22	35	16	38	57
Cv		2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	66	104	47	110	166

US

R-22 SUCTION VAPOR CAPACITIES, KILOWATTS

Evap. Temp.	Pressure Drop	20 MM		25 MM		32 MM		40 MM		50 MM		80 MM			100 MM		
°C	(bar)	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
5	.02	2.2	7	4	12	6	17	11	34	16	49	36	72	107	49	109	171
	.04	3.0	9	6	17	8	24	16	48	23	69	51	102	151	70	154	242
	.08	4	13	8	24	11	34	22	67	33	98	72	144	214	99	217	343
	.15	6	18	11	33	15	46	31	92	45	134	99	198	293	135	297	469
	.4	10	29	18	54	25	75	50	150	73	219	161	323	478	221	485	766
	.6	12	36	22	66	31	92	61	184	89	268	198	395	586	271	595	938
	1.0	15	46	28	85	40	119	79	238	115	346	255	–	–	350	–	–
	1.4	18	55	33	101	47	141	94	281	136	409	302	–	–	414	–	–
-20	.02	1.3	4.0	2.3	7	3.3	10	7	21	10	29	22	43	64	30	65	102
	.04	1.9	6	3.2	10	5	14	10	30	14	41	30	61	90	42	92	145
	.08	2.6	8	5	14	7	20	14	42	19	58	43	86	128	59	130	204
	.15	3.6	11	6	19	9	27	19	58	27	80	59	118	175	81	177	280
	.4	5.9	18	10	31	15	44	32	95	43	131	96	193	286	132	290	457
	.6	7.2	22	13	38	18	54	39	116	53	160	118	236	350	162	355	560
-40	.02	1.0	3	1.8	5	2.6	8	5	16	7.0	22	16	33	49	22	49	78
	.04	1.4	4	2.6	8	4	11	8	23	10	32	23	46	69	32	70	110
	.08	1.9	6	4	11	5	15	11	32	15	45	33	65	97	45	99	156
	.15	2.6	8	5	15	7	21	15	44	20	61	45	90	133	62	135	213
Kv		1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	60	89	40	90	142

METRIC

Reduced Capacity V-Ports shown in gray.

For best control and modulation, size the SMV valve for both the full load capacity and the minimum load capacity (weekend load). The minimum load capacity should be at least 15% of the full load capacity. The capacity tables are conservative, so it is not necessary to add a safety factor for capacity.

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

US

R-134a SUCTION VAPOR CAPACITIES, TONS

Evap. Temp.	Pressure Drop	3/4″		1″		1-1/4″		1-1/2″		2″		3″			4″		
°F	(psi)	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
40	.25	0.4	1.3	0.8	2.3	1.1	3.2	2.3	6.7	3.1	9.2	6.9	13	21	9	22	33
	.50	0.6	1.8	1.1	3.3	1.5	4.6	3.3	10	4.4	13	10	18	29	13	30	46
	1.0	0.9	2.5	1.5	4.6	2.2	6.4	4.6	13	6.3	18	14	26	41	18	43	65
	2.0	1.2	3.6	2.2	6.5	3.1	9.1	6.5	19	8.9	26	20	37	58	26	61	92
	5	2.0	5.7	3.4	10	4.8	14	10	30	14	41	31	58	92	41	96	145
	10	2.8	8.0	4.8	15	6.8	20	15	42	20	58	44	82	130	58	136	206
	15	3.4	10	5.9	18	8.4	25	18	52	24	71	53	–	–	71	–	–
	20	3.9	11	6.9	21	10	29	21	60	28	82	62	–	–	82	–	–
0	.25	0.3	0.7	0.4	1.3	0.6	1.9	1.3	3.9	1.8	5.3	4.0	7.6	12	5.4	13	19
	.50	0.4	1.1	0.6	1.9	0.9	2.7	1.9	5.5	2.6	7.5	5.7	11	17	7.6	18	27
	1.0	0.5	1.5	0.9	2.7	1.3	3.7	2.7	7.8	3.6	11	8.1	15	24	11	25	38
	2.0	0.7	2.1	1.3	3.8	1.8	5.3	3.8	11	5.1	15	11	22	34	15	36	54
	5	1.1	3.3	2.0	6.0	2.8	8.4	6.0	17	8.1	24	18	34	54	24	57	85
	10	1.6	4.7	2.8	8.5	4.0	12	8.4	25	11	34	26	48	76	34	80	121
-40	.25	0.1	0.4	0.2	0.7	0.3	0.9	0.7	2.0	0.9	2.7	2.0	3.8	6.0	2.7	6.3	10
	.50	0.2	0.5	0.3	1.0	0.4	1.3	1.0	2.9	1.3	3.8	2.9	5.4	8.5	3.8	8.9	14
	1.0	0.2	0.7	0.4	1.3	0.6	1.8	1.4	4.0	1.8	5.4	4.0	7.6	12	5.4	13	19
	2.0	0.3	1.0	0.6	1.9	0.9	2.6	2.0	5.7	2.6	7.6	5.7	11	17	7.6	18	27
Cv		2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	66	104	47	110	166

METRIC

R-134a SUCTION VAPOR CAPACITIES, KILOWATTS

Evap. Temp.	Pressure Drop	20 MM		25 MM		32 MM		40 MM		50 MM		80 MM			100 MM		
°C	(bar)	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
5	.02	1.7	5	3	9	4	13	9	27	13	38	28	56	83	38	84	132
	.04	2.4	7	4	13	6	18	13	39	18	53	39	79	117	54	118	187
	.08	3	10	6	18	9	26	18	55	25	75	56	111	165	76	168	264
	.15	5	14	8	25	12	35	25	75	34	103	76	152	226	105	229	362
	.4	7	23	13	41	19	57	41	122	56	168	124	249	369	171	375	591
	.6	9	28	17	50	24	70	50	150	68	206	152	305	452	209	459	724
	1.0	12	36	21	65	30	90	65	194	88	266	197	–	–	270	–	–
	1.4	14	43	25	76	36	107	76	229	105	315	233	–	–	319	–	–
-20	.02	0.9	2.7	1.7	5	2.3	7	5	15	7	20	15	30	45	21	45	71
	.04	1.3	4	2.4	7	3	10	7	21	10	29	21	42	63	29	64	101
	.08	1.8	5	3	10	5	14	10	30	14	41	30	60	89	41	90	142
	.15	2.5	7.5	5	14	6	19	14	41	19	56	41	82	122	56	124	195
	.4	4.0	12	8	23	10	31	22	67	30	91	67	134	199	92	202	318
	.6	4.9	15	9	28	13	38	27	82	37	112	82	164	244	113	247	390
-40	.02	0.5	1	0.8	3	1.2	4	3	8	4	11	8	16	24	11	24	38
	.04	0.7	2	1.2	4	2	5	4	11	5	15	11	23	34	16	34	54
	.08	1.0	3	2	5	2	7	5	16	7	22	16	32	47	22	48	76
	.15	1.3	4	2	7	3	10	7	22	10	30	22	44	65	30	66	104
Kv		1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	60	89	40	90	142

Reduced Capacity V-Ports shown in gray.

For best control and modulation, size the SMV valve for both the full load capacity and the minimum load capacity (weekend load). The minimum load capacity should be at least 15% of the full load capacity. The capacity tables are conservative, so it is not necessary to add a safety factor for capacity.

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-404 SUCTION VAPOR CAPACITIES, TONS

Evap. Temp.	Pressure Drop	3/4″		1″		1-1/4″		1-1/2″		2″		3″			4″		
°F	(psi)	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
40	.25	0.5	1.4	0.8	2.5	1.2	3.5	2.5	7.4	3.4	9.9	7.5	14	22	10	23	35
	.50	0.7	2.0	1.2	3.6	1.7	5.0	3.6	11	4.8	14	11	20	32	14	33	50
	1.0	0.9	2.8	1.7	5.0	2.4	7.1	5.1	15	6.7	20	15	28	45	20	47	71
	2.0	1.3	3.9	2.4	7.1	3.4	10	7.2	21	9.5	28	21	40	63	28	66	100
	5	2.1	6.2	3.7	11	5.3	16	11	33	15	44	34	63	100	45	105	158
	10	3.0	8.7	5.3	16	7.5	22	16	47	21	63	47	89	141	63	148	224
	15	3.7	11	6.5	19	9.2	27	20	58	26	77	58	–	–	78	–	–
	20	4.2	12	7.5	22	11	32	23	66	30	89	67	–	–	90	–	–
0	.25	0.3	0.8	0.5	1.4	0.7	2.1	1.5	4.2	2.0	6.0	4.4	8.3	13	5.9	14	21
	.50	0.4	1.2	0.7	2.1	1.0	2.9	2.1	6.0	2.9	8.5	6.2	12	19	8.4	20	30
	1.0	0.6	1.6	1.0	2.9	1.4	4.1	2.9	8.5	4.1	12	8.8	17	26	12	28	42
	2.0	0.8	2.3	1.4	4.1	1.9	5.8	4.1	12	5.8	17	12	23	37	17	39	59
	5	1.3	3.6	2.2	6.5	3.1	9.2	6.5	19	9.2	27	20	37	59	26	62	93
	10	1.8	5.1	3.1	9.2	4.3	13	9.2	27	13	38	28	53	83	37	87	132
-40	.25	0.1	0.4	0.3	0.8	0.4	1.1	0.8	2.3	1.1	3.1	2.4	4.5	7.1	3.1	7.3	11
	.50	0.2	0.6	0.4	1.1	0.5	1.6	1.1	3.3	1.5	4.5	3.4	6.3	10	4.4	10	16
	1.0	0.3	0.8	0.5	1.6	0.7	2.2	1.6	4.7	2.1	6.3	4.8	9.0	14	6.2	15	22
	2.0	0.4	1.2	0.7	2.2	1.0	3.1	2.3	6.6	3.0	8.9	6.7	13	20	9	21	31
Cv		2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	66	104	47	110	166

US

R-404 SUCTION VAPOR CAPACITIES, KILOWATTS

Evap. Temp.	Pressure Drop	20 MM		25 MM		32 MM		40 MM		50 MM		80 MM			100 MM		
°C	(bar)	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
5	.02	1.8	5.5	3.4	10	4.8	14	10	31	14	42	31	62	92	42	93	146
	.04	2.5	7.7	4.8	14	6.8	20	14	43	20	59	44	87	130	60	131	207
	.08	3.6	11	6.7	20	9.6	28	20	61	28	83	62	124	183	85	186	293
	.15	4.9	15	9.2	28	13	39	28	84	38	114	85	169	251	116	254	401
	.4	8.0	24	15	46	21	64	46	137	62	186	138	276	410	189	415	655
	.6	9.8	30	18	56	26	78	56	168	76	228	169	338	502	232	508	802
	1.0	13	39	24	72	34	101	72	217	98	294	218	–	–	299	–	–
	1.4	15	46	28	86	40	119	86	257	116	348	258	–	–	354	–	–
-20	.02	1.0	3.1	1.8	5.5	2.6	7.7	5.6	17	7.6	23	17	34	50	23	51	81
	.04	1.4	4.3	2.6	7.7	3.6	11	7.9	24	11	33	24	48	71	33	72	114
	.08	2.0	6.1	3.6	11	5.1	15	11	34	15	46	34	68	101	47	102	161
	.15	2.7	8.4	5.0	15	7.1	21	15	46	21	63	47	93	138	64	140	221
	.4	4.5	14	8.1	24	12	34	25	75	34	103	76	152	225	104	229	361
	.6	5.5	17	10	30	14	42	31	92	42	126	93	186	276	128	280	442
-40	.02	0.6	1.8	1.0	3.2	1.5	4.4	3.2	9.5	4.4	13	9.6	19	28	13	29	45.6
	.04	0.8	2.5	1.5	4.5	2.1	6.2	4.5	13	6.2	19	14	27	40	19	41	64.5
	.08	1.1	3.5	2	6.4	2.9	8.8	6.3	19	8.7	26	19	38	57	26	58	91.3
	.15	1.6	4.8	3	8.7	4.0	12	8.7	26	12	36	26	53	78	36	79	125
Kv		1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	60	89	40	90	142

METRIC

Reduced Capacity V-Ports shown in gray.

For best control and modulation, size the SMV valve for both the full load capacity and the minimum load capacity (weekend load). The minimum load capacity should be at least 15% of the full load capacity. The capacity tables are conservative, so it is not necessary to add a safety factor for capacity.

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

US

R-507 SUCTION VAPOR CAPACITIES, TONS

Evap. Temp.	Pressure Drop	3/4″		1″		1-1/4″		1-1/2″		2″		3″			4″		
°F	(psi)	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
40	.25	0.5	1.4	0.9	2.6	1.2	3.5	2.7	7.8	3.5	10	7.7	15	23	10	24	37
	.50	0.7	2.0	1.2	3.7	1.7	5.0	3.8	11	4.9	15	11	21	33	15	34	52
	1.0	1.0	2.8	1.7	5.2	2.4	7.1	5.3	16	7.0	21	15	29	46	21	49	74
	2.0	1.4	4.0	2.4	7.3	3.4	10	7.5	22	9.9	29	22	41	65	29	69	104
	5	2.2	6.3	3.8	12	5.3	16	12	35	16	46	35	65	103	47	109	164
	10	3.1	8.9	5.4	16	7.5	22	17	49	22	65	49	92	145	66	154	233
	15	3.8	11	6.7	20	9.2	27	21	60	27	79	60	_	–	81	–	–
	20	4.3	13	7.7	23	11	32	24	70	31	92	69	–	–	93	–	–
0	.25	0.3	0.8	0.5	1.6	0.7	2.2	1.6	4.6	2.2	6.4	4.6	8.8	14	6.2	15	22
	.50	0.4	1.2	0.7	2.2	1.0	3.1	2.2	6.5	3.1	9.0	6.6	12	20	9	21	31
	1.0	0.6	1.7	1.0	3.1	1.4	4.3	3.2	9.2	4.3	13	9.3	18	28	12	29	44
	2.0	0.8	2.4	1.5	4.4	2.0	6.1	4.5	13	6.1	18	13	25	39	18	41	62
	5	1.3	3.8	2.3	7.0	3.2	9.6	7.0	21	9.7	28	21	39	62	28	65	98
	10	1.8	5.4	3.3	9.8	4.6	14	10	29	14	40	29	55	87	39	92	139
-40	.25	0.2	0.5	0.3	0.8	0.4	1.2	0.9	2.5	1.1	3.4	2.5	4.7	7.4	3.3	7.7	12
	.50	0.2	0.7	0.4	1.2	0.6	1.7	1.2	3.6	1.6	4.8	3.5	6.7	11	4.7	11	17
	1.0	0.3	0.9	0.6	1.7	0.8	2.3	1.7	5.0	2.3	6.7	5.0	9.4	15	6.6	15	23
	2.0	0.4	1.3	0.8	2.4	1.1	3.3	2.4	7.1	3.2	9.5	7.1	13	21	9	22	33
Cv		2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	66	104	47	110	166

METRIC

R-507 SUCTION VAPOR CAPACITIES, KILOWATTS

Evap. Temp.	Pressure Drop	20 MM		25 MM		32 MM		40 MM		50 MM		80 MM			100 MM		
°C	(bar)	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
5	.02	1.9	5.8	3.5	11	4.9	15	11	32	14	43	32	64	95	44	96	152
	.04	2.7	8.3	4.9	15	6.9	21	15	45	20	61	45	91	134	62	136	215
	.08	3.8	12	7.0	21	9.8	29	21	64	29	87	64	128	190	88	193	304
	.15	5.2	16	9.6	29	13	40	29	87	40	119	88	175	260	120	264	416
	.4	8.6	26	16	47	22	65	47	142	65	194	143	286	425	196	431	679
	.6	10	32	19	58	27	80	58	174	79	238	175	351	520	240	527	832
	1.0	14	41	25	75	35	103	75	225	102	307	226	–	–	310	–	–
	1.4	16	49	29	89	41	122	89	266	121	364	268	–	–	367	–	–
-20	.02	1.1	3.2	1.9	5.8	2.8	8.4	6.0	18	8.0	24	18	36	53	25	54	85
	.04	1.5	4.6	2.7	8.3	4.0	12	8.4	25	11	34	25	51	75	35	76	120
	.08	2.1	6.5	3.9	12	5.6	17	12	36	16	48	36	72	107	49	108	170
	.15	2.9	8.9	5.3	16	7.7	23	16	49	22	66	49	98	146	67	148	233
	.4	4.8	15	8.6	26	13	38	27	80	36	108	80	161	238	110	241	380
	.6	5.8	18	11	32	15	46	33	98	44	132	98	197	292	135	295	466
-40	.02	0.6	1.9	1.1	3.4	1.6	4.7	3.4	10	4.6	14	10	21	31	14	31	49
	.04	0.9	2.6	1.6	4.8	2.3	6.7	4.8	14	6.5	20	15	29	43	20	44	69
	.08	1.2	3.7	2.2	6.8	3.2	9.5	6.8	20	9.2	28	21	41	61	28	62	98
	.15	1.7	5.1	3.1	9.3	4.4	13	9.3	28	13	38	28	57	84	39	85	134
Kv		1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	60	89	40	90	142

Reduced Capacity V-Ports shown in gray.

For best control and modulation, size the SMV valve for both the full load capacity and the minimum load capacity (weekend load). The minimum load capacity should be at least 15% of the full load capacity. The capacity tables are conservative, so it is not necessary to add a safety factor for capacity.

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 AND DIRECT EXPANSION CAPACITIES

US TONS

Port Size (IN)	Model No.	Recommended Minimum Line Size (inches)		Cv	Capacity Range, Tons									
					Ammonia		R-22		R-134a		R-404		R-507	
		Ammonia	Halocarbon		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
3/16″	HMXV/A	3/4″	3/4″	0.6	73	42	15	10	11	8	11	8	10	8
1/4″	HMXV/B	1″	1″	1.1	133	77	27	18	21	14	19	15	19	15
3/4″	HMMR	1-1/2″	1-1/2″	2.2	266	155	54	37	41	28	39	31	38	30
1″	HMMR	2″	2″	3.9	472	274	97	65	73	49	68	55	67	53
1-1/4″	HMMR	2-1/2″	2-1/2″	5.5	666	387	136	92	104	69	97	77	95	74
1-1/2″	HMMRB	2-1/2″	3″	6.0	726	422	149	100	113	76	105	84	104	81
1-1/2″	HMMR	4″	4″	12	1,453	844	297	200	226	151	211	168	207	163
2″	HMMR	4″	4″	16	1,937	1,125	396	267	301	202	281	224	277	217
3″	HMMR16	4″	4″	16	1,937	1,125	396	267	301	202	281	224	277	217
3″	HMMR35	6″	6″	35	4,237	2,461	867	583	659	441	614	490	605	474
4″	HMMR27	5″	6″	27	3,268	1,898	669	450	508	340	474	378	467	366
4″	HMMR47	6″	8″	47	5,689	3,304	1,164	783	885	592	825	658	812	637

US

METRIC KILOWATTS

Port Size (mm)	Model No.	Recommended Minimum Line Size (mm)		Kv	Capacity Range, kW									
					Ammonia		R-22		R-134a		R-404		R-507	
		Ammonia	Halocarbon		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
5	HMXV/A	20	20	0.5	257	148	53	35	39	28	39	28	35	28
7	HMXV/B	25	25	0.9	468	271	95	63	74	49	67	53	67	53
20	HMMR	40	40	1.8	936	545	190	130	144	98	137	109	134	106
25	HMMR	50	50	3.3	1660	964	341	229	257	172	239	193	236	186
32	HMMR	65	65	4.7	2342	1361	478	324	366	243	341	271	334	260
40	HMMRB	65	75	5.0	2553	1484	524	352	397	267	369	295	366	285
40	HMMR	100	100	10.0	5110	2968	1045	703	795	531	742	591	728	573
50	HMMR	100	100	13.3	6812	3957	1393	939	1059	710	988	788	974	763
80	HMMR16	100	100	13.3	6812	3957	1393	939	1059	710	988	788	974	763
80	HMMR35	150	150	30	14902	8655	3049	2050	2318	1551	2159	1723	2128	1667
100	HMMR27	125	150	23	11494	6676	2253	1583	1787	1196	1667	1329	1642	1287
100	HMMR47	150	200	40	20008	11620	4094	2754	3113	2082	2902	2314	2856	2240

METRIC

Ammonia line size capacities are based on IIAR Refrigeration Piping Handbook tables. Halocarbon line size capaciites are based on a nominal 3 ft/sec 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.

Ammonia, R-22 and R134a capacities are based on +86°F (+30°C) saturated liquid and +20°F(-10°C) evaporating temperature, and intermediate to low capacity based on +20°F (-10°C) saturation temperature and -20°F (-30°C) evaporating temperature. Capacities are with ±20% from -40°F (-40°C) to -0°F (-18°C). R404 and R507 capacities based on +95° F (+35°C) condensing temperature.

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

AMMONIA HIGH PRESSURE LIQUID LINE CAPACITIES, TONS

Pressure Drop psi	Nominal Size (INCHES)															
	3/4″		1″		1-1/4″		1-1/2″		2″		3″			4″		
	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
1.0	34	98	60	180	85	254	185	539	246	723	539	1,016	1,601	724	1,693	2,555
2.0	48	139	85	255	120	359	261	762	348	1,023	762	1,437	2,264	1,023	2,395	3,614
Cv	2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	66	104	47	110	166

AMMONIA HIGH PRESSURE LIQUID LINE CAPACITIES, KILOWATTS

Pressure Drop bar	Nominal Size (MM)															
	20		25		32		40		50		80			100		
	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
0.10	139	425	255	773	363	1,082	773	2,318	1,053	3,168	2,344	5,156	6,953	3,212	7,051	11,125
0.20	197	601	361	1,093	514	1,530	1,093	3,278	1,490	4,480	3,314	7,292	9,833	4,543	9,972	15,733
kv	1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	66	89	40	90	142

R-22 HIGH PRESSURE LIQUID LINE CAPACITIES, TONS

Pressure Drop psi	Nominal Size (INCHES)															
	3/4″		1″		1-1/4″		1-1/2″		2″		3″			4″		
	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
1.0	7.0	21	12	37	18	53	39	113	52	151	113	213	336	152	355	535
2.0	10	29	18	53	25	75	55	160	73	214	160	301	475	214	502	757
Cv	2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	66	104	47	110	166

R-22 HIGH PRESSURE LIQUID LINE CAPACITIES, KILOWATTS

Pressure Drop bar	Nominal Size (MM)															
	20		25		32		40		50		80			100		
	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
0.10	30	91	54	164	77	230	164	493	218	657	493	1,080	1,460	673	1,480	2,330
0.20	42	128	77	232	109	325	232	697	309	929	697	1,540	2,070	952	2,090	3300
kv	1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	66	89	40	90	142

Ammonia, R-22, and R-134a capacities based on +86°F(30°C) saturated liquid, and +20°F (-10°C) evaporator, and no flashing through the valve. R-404 and R-507 based on 95°F(35°C) saturated liquid temperatures.

Refer to page 2 for Liquid Line Sizing. Liquid line based on IIAR Piping Handbook Line Size Capacities.

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

R-134a HIGH PRESSURE LIQUID LINE CAPACITIES, TONS

Pressure Drop psi	Nominal Size (INCHES)															
	3/4″		1″		1-1/4″		1-1/2″		2″		3″			4″		
	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
1.0	7.0	19	12	35	16	49	36	104	47	139	104	196	309	140	327	493
2.0	9.0	27	16	49	23	69	50	147	67	197	147	277	437	197	462	697
Cv	2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	66	104	47	110	166

R-134a HIGH PRESSURE LIQUID LINE CAPACITIES, KILOWATTS

Pressure Drop bar	Nominal Size (MM)															
	20		25		32		40		50		80			100		
	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
0.10	27	83	50	152	71	213	152	456	202	607	456	1,000	1,350	623	1,370	2,160
0.20	39	118	71	215	101	301	215	645	286	859	644	1,418	1,912	881	1,934	3,051
kv	1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	66	89	40	90	142

R-404 HIGH PRESSURE LIQUID LINE CAPACITIES, TONS

Pressure Drop psi	Nominal Size (INCHES)															
	3/4″		1″		1-1/4″		1-1/2″		2″		3″			4″		
	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
1.0	4.0	13	8.0	23	11	33	24	69	32	93	69	130	204	92	216	326
2.0	6.0	18	11	33	15	46	33	97	45	131	97	183	289	131	305	461
Cv	2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	66	104	47	110	166

R-404 HIGH PRESSURE LIQUID LINE CAPACITIES, KILOWATTS

Pressure Drop bar	Nominal Size (MM)															
	20		25		32		40		50		80			100		
	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
0.10	19	57	34	103	48	144	103	310	141	423	313	688	928	431	942	1,490
0.20	26	80	48	146	68	204	146	438	199	598	443	974	1,320	610	1,340	2,110
kv	1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	66	89	40	90	142

R-507 HIGH PRESSURE LIQUID LINE CAPACITIES, TONS

Pressure Drop psi	Nominal Size (INCHES)															
	3/4″		1″		1-1/4″		1-1/2″		2″		3″			4″		
	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
1.0	4.0	13	8.0	23	11	33	24	69	32	93	69	130	205	92	216	327
2.0	6.0	18	11	33	15	46	33	97	45	131	98	184	290	131	306	462
Cv	2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	66	104	47	110	166

R-507 HIGH PRESSURE LIQUID LINE CAPACITIES, KILOWATTS

Pressure Drop bar	Nominal Size (MM)															
	20		25		32		40		50		80			100		
	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR	HMMV	HMMR35	HMMVB	HMMV	HMMR47	HMMVB	HMMV
0.10	19	57	34	104	49	145	104	311	142	426	313	688	928	429	941	1,490
0.20	27	81	49	147	69	205	147	440	200	602	443	974	1,310	607	1,330	2,100
kv	1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	66	89	40	90	142

Ammonia, R-22, and R-134a capacities based on +86°F(30°C) saturated liquid, and +20°F (-10°C) evaporator, and no flashing through the valve. R-404 and R-507 based on 95°F(35°C) saturated liquid temperatures.

Refer to page 2 for Liquid Line Sizing. Liquid line based on IIAR Piping Handbook Line Size Capacities.

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 capacitor storage 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 powerhead 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.

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.

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

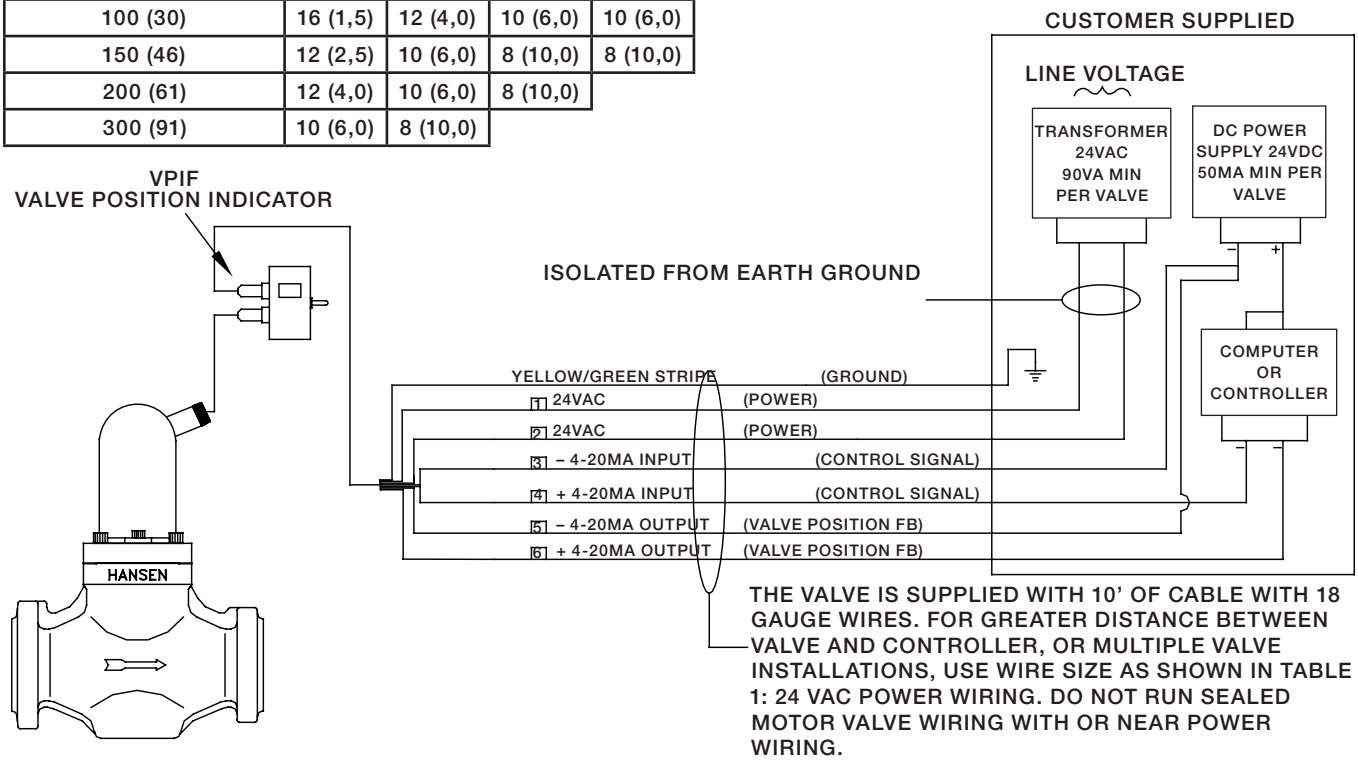
CUSTOMER SUPPLIED POWER SUPPLY AND CONTROLLER

(Modulating Control with Position Feedback)

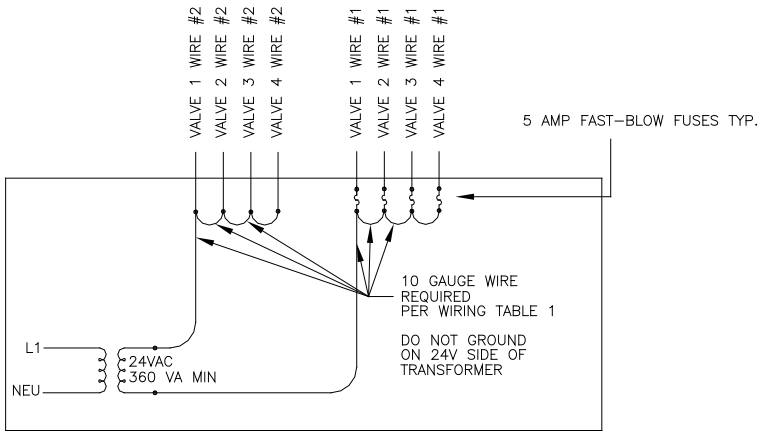
The valve is supplied with 10 feet of cable with 18 gauge wires. For greater distance between valve and controller use wire size as shown in Table 1: 24VAC Power Wiring. Do not run Sealed Motor Valve wiring with or near high voltage power wiring or VFD Controls (Variable Frequency Drives). Do not earth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

TABLE 1: 24VAC POWER WIRING

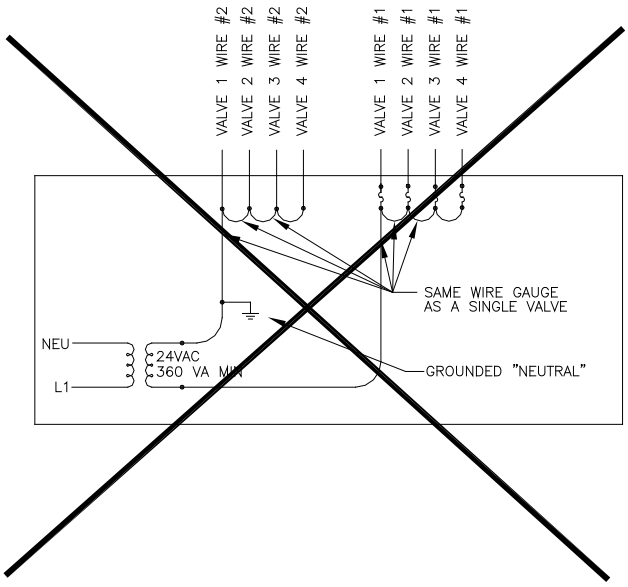
24VAC POWER WIRING (WIRES NO. 1 AND 2) (90VA PER VALVE REQUIRED)	AWG WIRE GAUGE (MM^2) NUMBER OF VALVES POWERED			
CABLE LENGTH, FT(M)	1	2	3	4
50 (15)	18 (1,0)	16 (1,5)	14 (2,5)	12 (4,0)
100 (30)	16 (1,5)	12 (4,0)	10 (6,0)	10 (6,0)
150 (46)	12 (2,5)	10 (6,0)	8 (10,0)	8 (10,0)
200 (61)	12 (4,0)	10 (6,0)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



APPLICATION EXAMPLE: CORRECT
4 VALVES POWERED BY ONE TRANSFORMER
(100 Feet Between Transformer & Valves)



APPLICATION EXAMPLE: INCORRECT
4 VALVES POWERED BY ONE TRANSFORMER
(Wire Size Too Small – Grounded Neutral)



HMSV AND HMSVC WIRING DIAGRAM

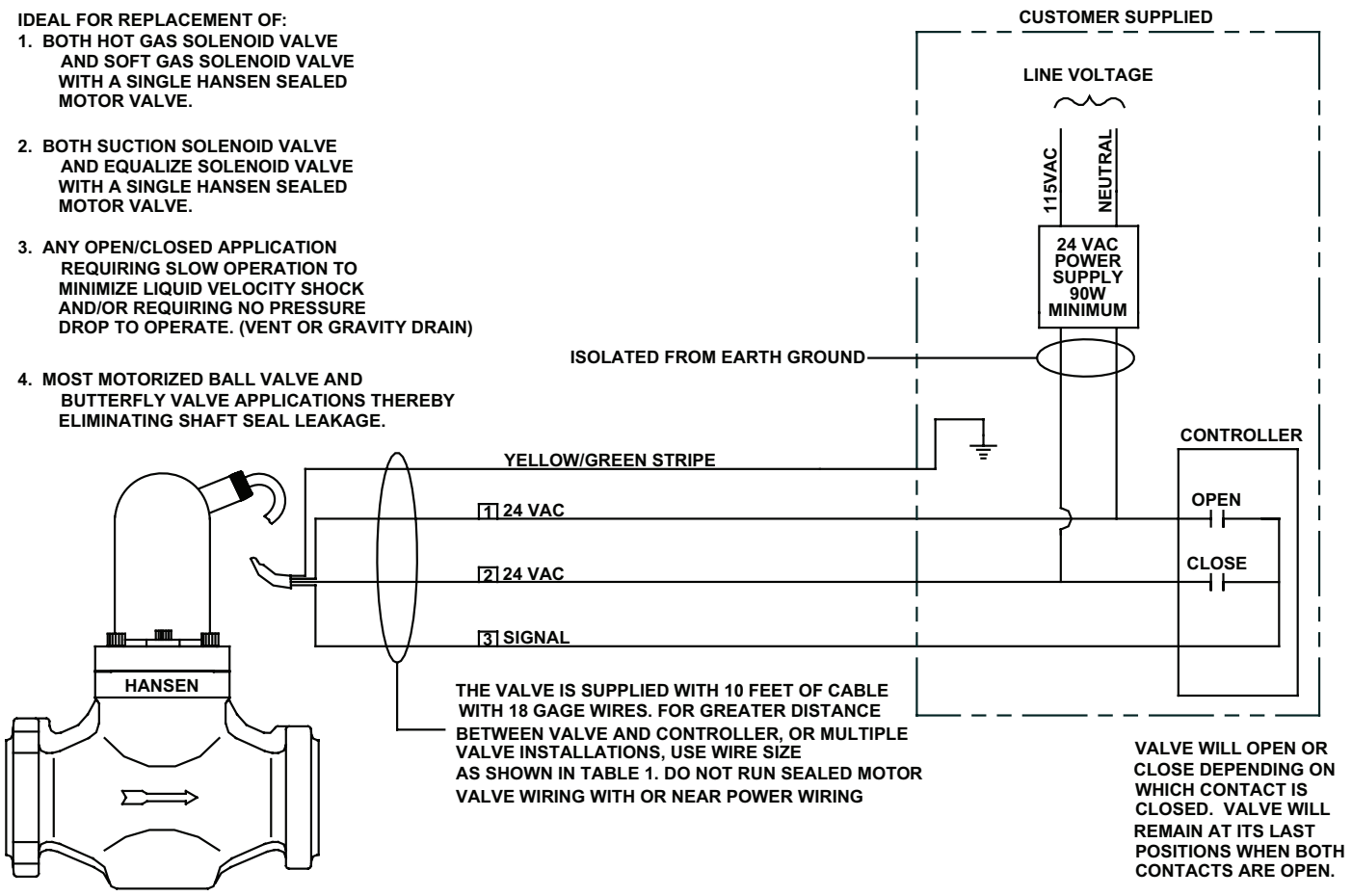
CUSTOMER SUPPLIED POWER SUPPLY AND CONTROLLER

(Slow Opening and Closing Applications)

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.**



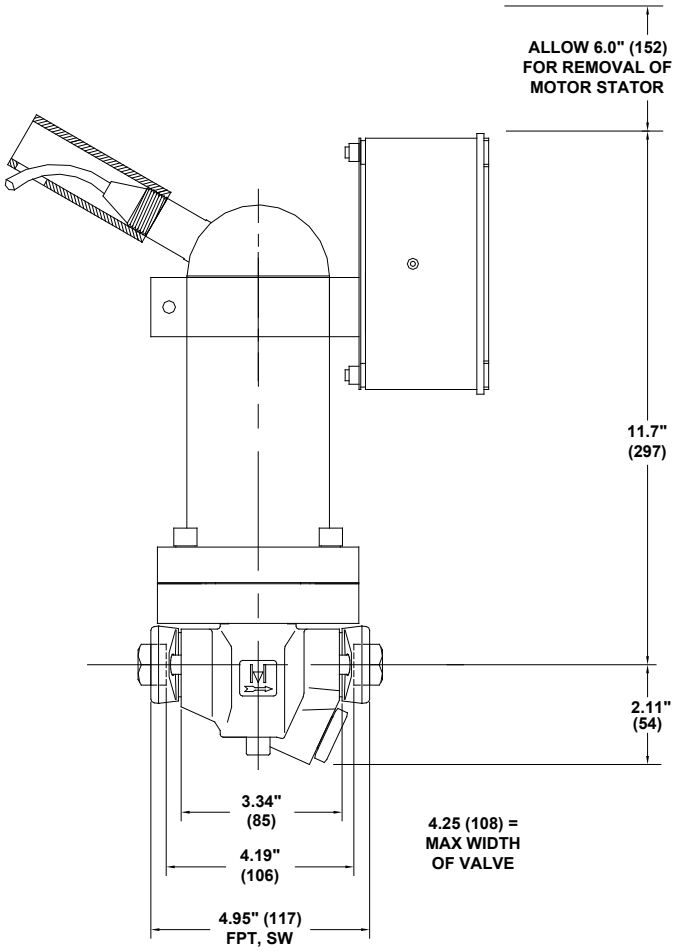
HANSEN SEALED MOTOR VALVE HMSV/HMSVC

TABLE 1: 24VAC POWER WIRING

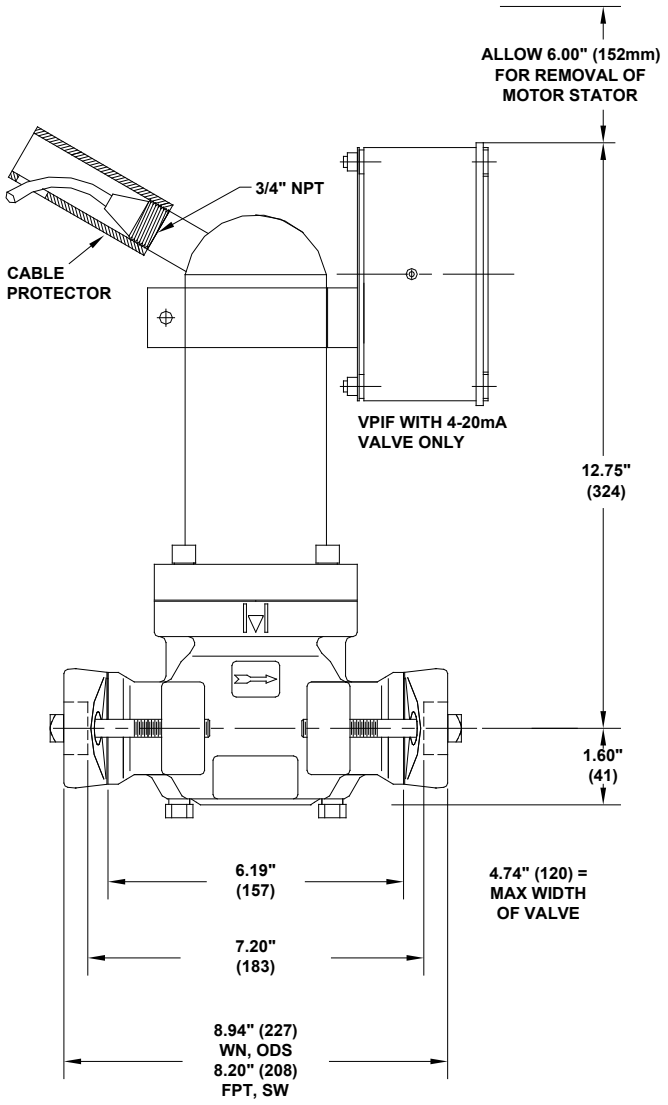
24VAC POWER WIRING (WIRES NO. 1 AND 2) (90VA PER VALVE REQUIRED)	AWG WIRE GAUGE (MM^2) NUMBER OF VALVES POWERED			
CABLE LENGTH, FT(M)	1	2	3	4
50 (15)	18 (1,0)	16 (1,5)	14 (2,5)	12 (4,0)
100 (30)	16 (1,5)	12 (4,0)	10 (6,0)	10 (6,0)
150 (46)	12 (2,5)	10 (6,0)	8 (10,0)	8 (10,0)
200 (61)	12 (4,0)	10 (6,0)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

INSTALLATION DIMENSIONS, INCHES (MM)

HMXV, HMXVC MOTORIZED EXPANSION VALVE



3/4″ (20mm) THRU 1-1/4″ (32mm) SMV



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.

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.

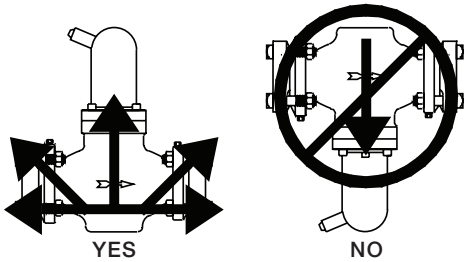
Please note: Sealed Motor Valves 2″ and smaller will operate and seal with flow in either direction. 3″ and 4″ pressure assisted Sealed Motor Valves will only operate and seal with inlet equal to or greater than outlet pressure. Where pressure reversals are expected, a check valve at the outlet of the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

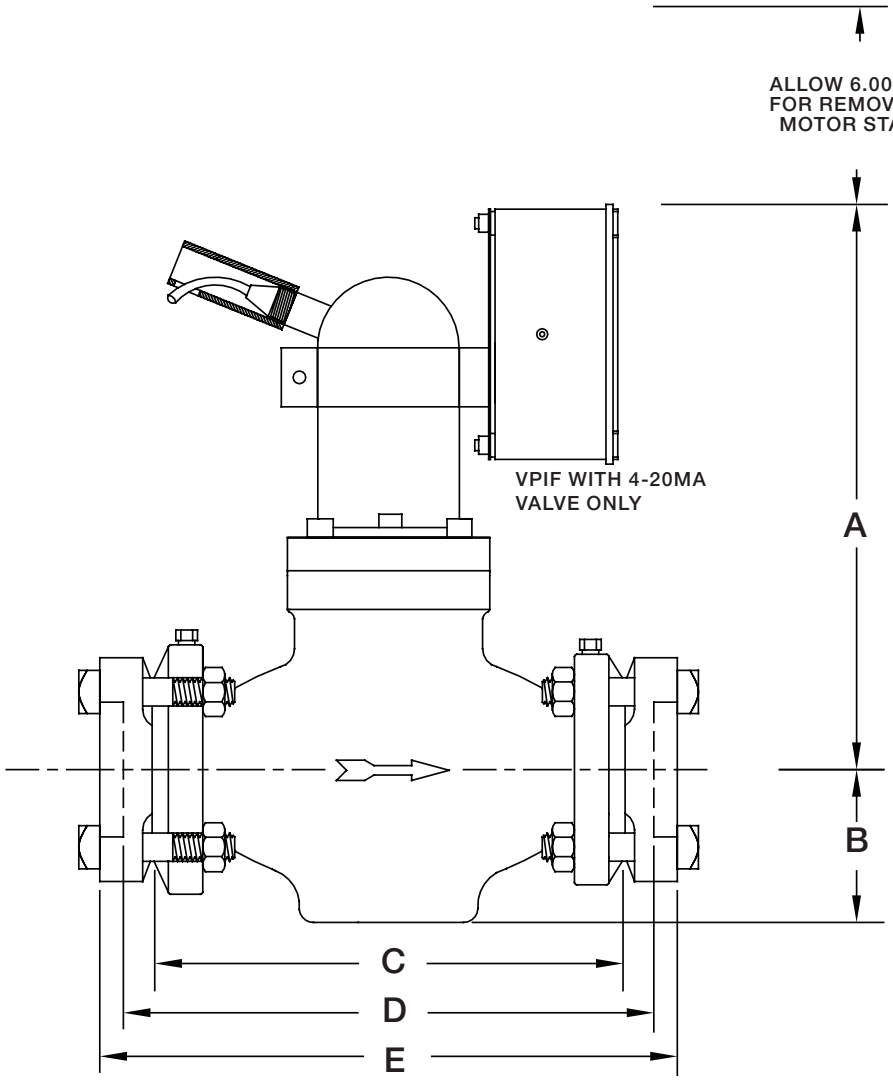
Protect cable during installation.

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″ – 2″ (40 – 50)	3″ (80)	4″ (100)
A	HMMV HMMR HMSV	12.00 (305)	13.38 (340)	14.00 (356)
	HMMVC HMMRC	14.00 (356)	15.38 (391)	16.00 (406)
B		3.00 (76)	4.00 (102)	4.75 (121)
C		9.88 (251)	12.25 (311)	14.12 (359)
D		10.89 (277)	13.38 (340)	15.01 (381)
E SW		12.39 (315)	15.38 (391)	17.01 (432)
E WN, ODS		13.39 (340)	16.40 (417)	20.51 (521)
E WELD-IN-LINE		10.38 (264)	12.25 (311)	14.12 (359)
MAX WIDTH		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 MOVT (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 MOVT 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 MOVT over can. Manually operate the valve open or closed by turning the MOVT 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.

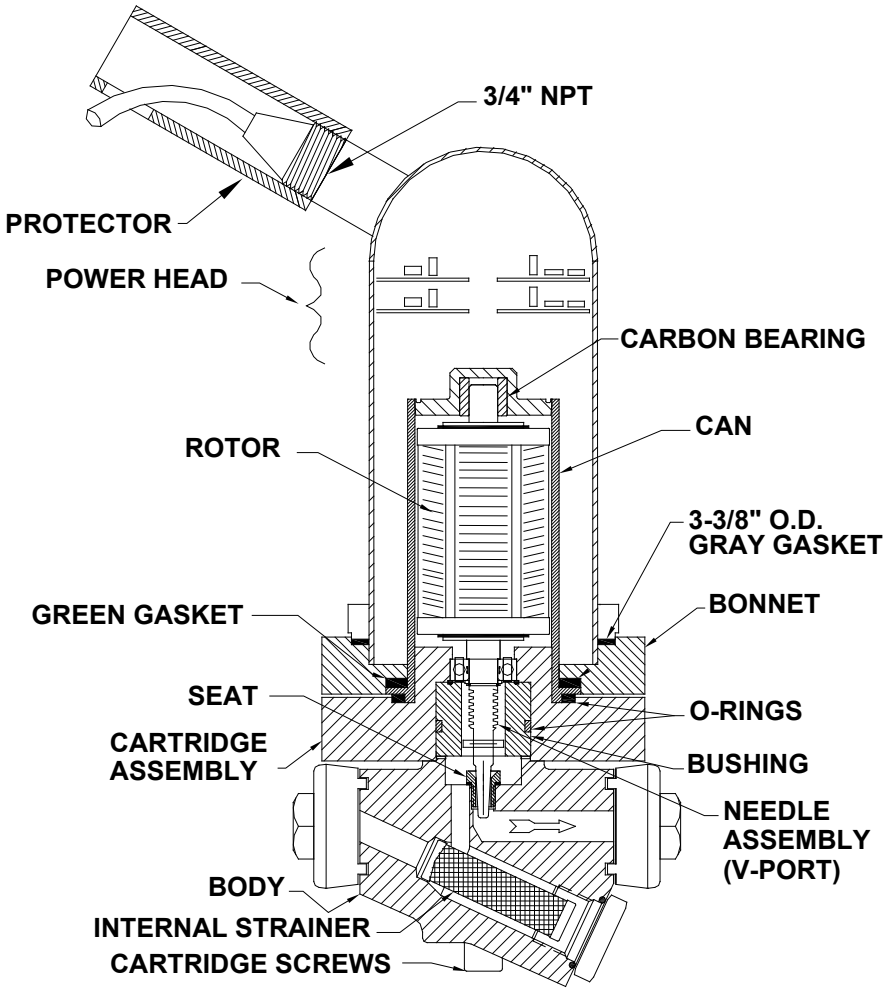
NOTE:

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)	NUMBER OF TURNS
7/32″	(5)	6
9/32″	(7)	6
3/4″- 1-1/4″	(20 - 32)	7
1-1/2″- 2″	(40 - 50)	12
3″	(80)	18
4″	(100)	20

HMXV SEALED MOTOR VALVE



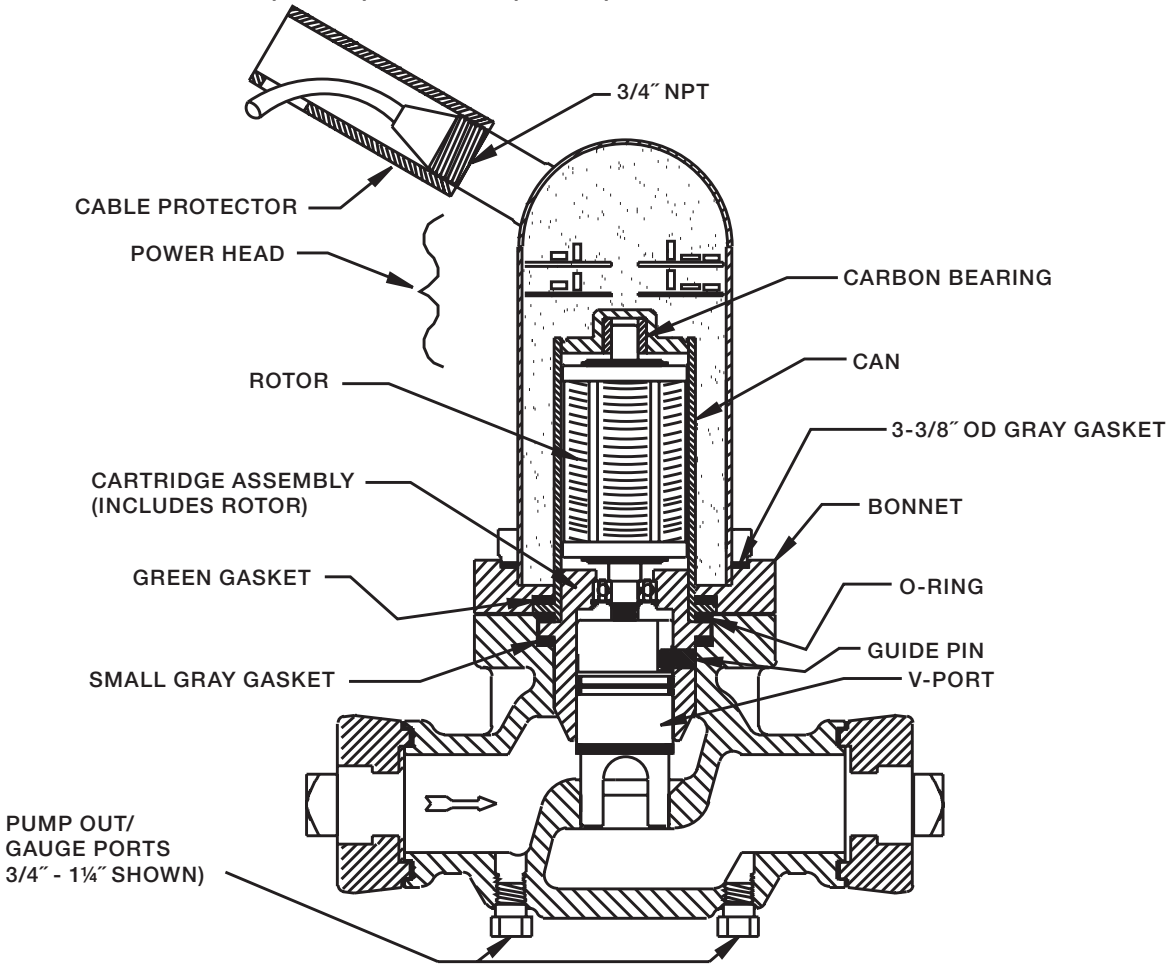
HMXV DISASSEMBLY

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.

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



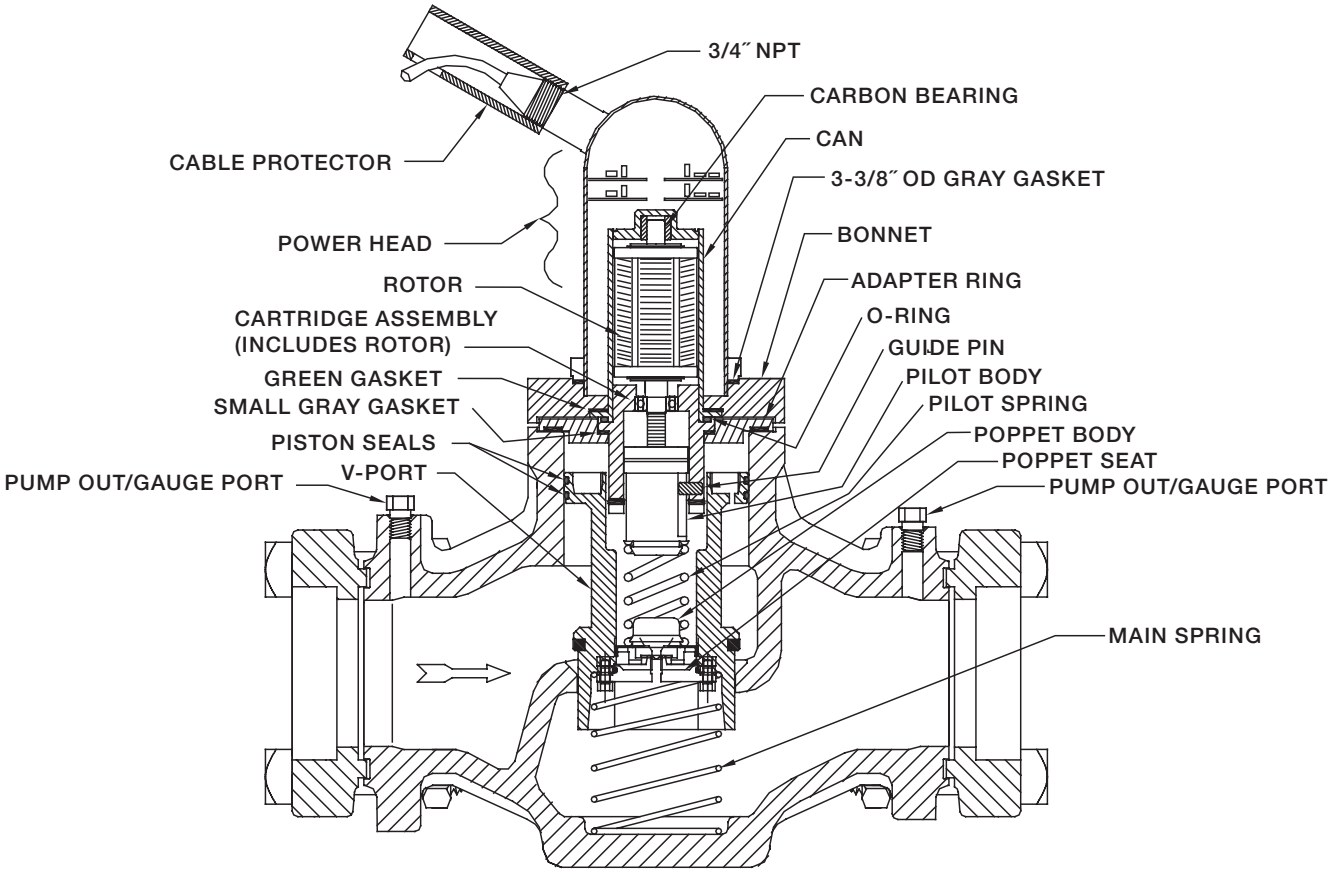
VALVE DISASSEMBLY 3/4˝ THRU 2˝

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 MOVT).
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 MOVT) 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.

3″ (80mm) & 4″ (100mm) HMMV SHOCK RESISTANT SEALED MOTOR VALVE FOR SUCTION LINE APPLICATIONS*



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″

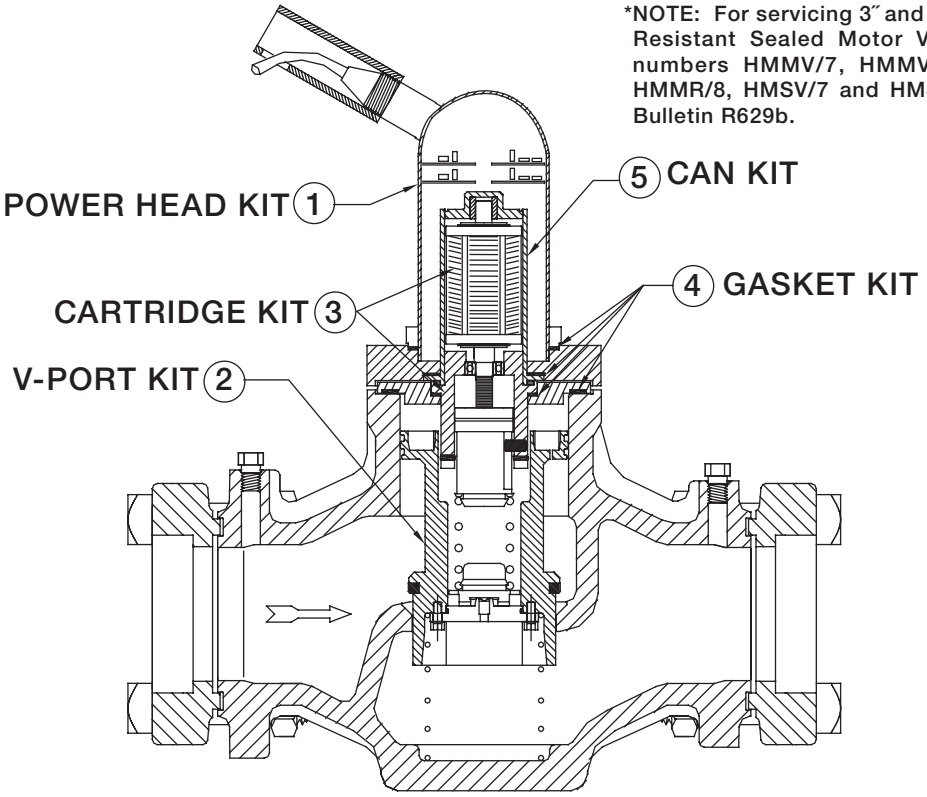
1. Install main spring into body.
2. Inspect all V-port seals for damage. Install V-port assembly into body using care not to damage piston seals. Main spring fits over pilot seat flange on bottom face of V-port. Place large gasket, then adapter plate onto body. Push down and hold adapter plate in position.
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: Models identified as HMMV/7A and HMMV/8A. For servicing 3″ and 4″ Non-Shock Resistant Sealed Motor Valves (model numbers HMMV/7, HMMV/8, HMMR/7, HMMR/8, HMSV/7 and HMSV/8) refer to Bulletin R629b.

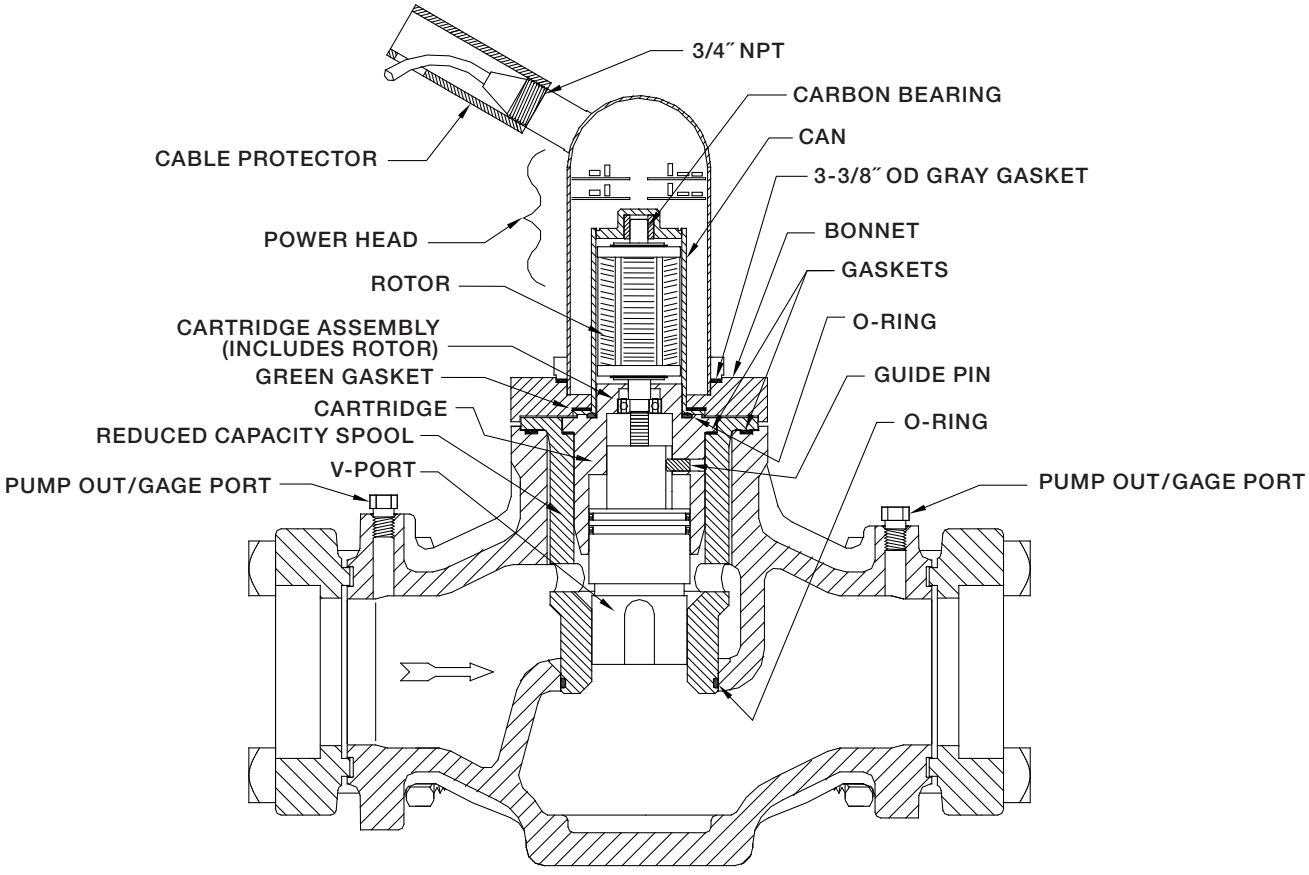
SEALED MOTOR VALVE PARTS LIST

3˝ (80mm) & 4˝ (100mm) HMMV, HMMVB & HMSV SHOCK RESISTANT SEALED MOTOR VALVE*

*NOTE: For servicing 3˝ and 4˝ Non-Shock Resistant Sealed Motor Valves (model numbers HMMV/7, HMMV/8, HMMR/7, HMMR/8, HMSV/7 and HMSV/8) refer to Bulletin R629b.

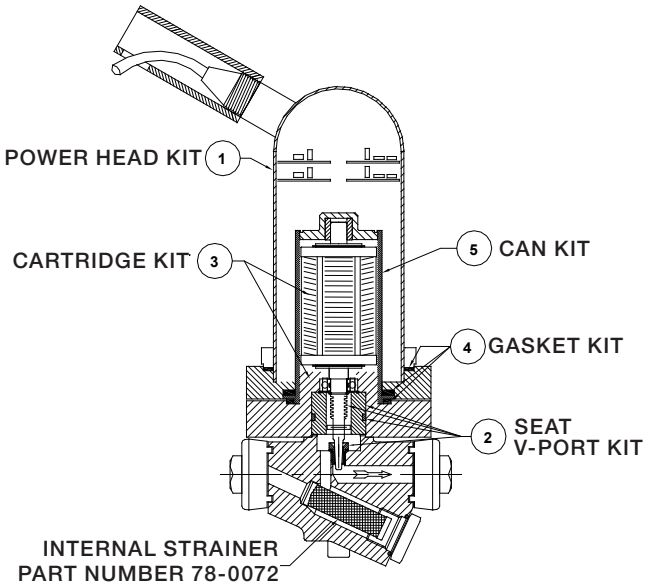


3˝ (80mm) & 4˝ (100mm) HMMR SEALED MOTOR VALVE FOR HIGH PRESSURE DROP APPLICATIONS

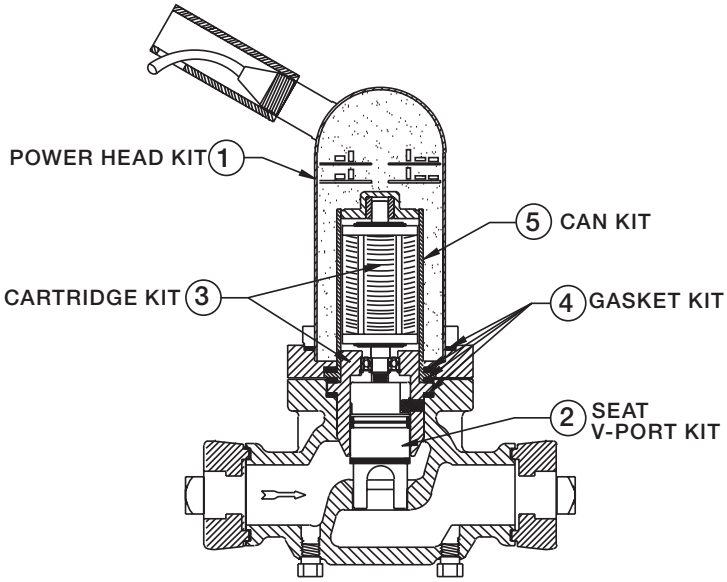


SEALED MOTOR VALVE PARTS LIST

HMXV SEALED MOTOR VALVE



3/4˝(20mm) - 2˝(50mm) HMMV, HMMR & HMSV SEALED MOTOR VALVE



VALVE TYPE	NOMINAL SIZE INCH	(MM)	1 POWER HEAD KIT STANDARD	1 POWER HEAD KIT POWER-CLOSE	2 SEAT/V-PORT* ASSEMBLY KIT P/N	Cv	3 CARTRIDGE* ASSEMBLY KIT	4 CAN KIT*	5 GASKET KIT
HMXV	7/32˝	(5)	For Valves with VPIF order:	For Valves with VPIF order:	75-1176	-	75-1178	75-1177	75-1180
	9/32˝	(7)			75-1179	-			
HMMV	3/4˝	(20)			75-1154	6.4	75-1167	75-2922	75-1148
	1˝	(25)			75-1155	11.7			
	1 1/4˝	(32)			75-1156	16.4			
	1 1/2˝	(40)	75-1209 Power Head with 2´ cable and connector	75-1212 Power Head with 2´ cable and connector	75-1157	35	75-1168		75-1150
	2˝	(50)			75-1166	47			
HMMV	3˝	(80)			75-1197	104	75-1200		75-1151
HMMVB	3˝	(80)			75-1223	66			
HMMV	4˝	(100)			75-1199	166	75-1201		75-1152
HMMVB	4˝	(100)			75-1224	110			
HMMR	3/4˝	(20)	For valves without VPIF order:	For valves without VPIF order:	75-1160	2.2	75-1167	75-2922	75-1148
	1˝	(25)			75-1161	3.9			
	1 1/4˝	(32)			75-1154	5.5			
HMMRB	1 1/2˝	(40)			75-1230	6.0	75-1168		75-1150
HMMR	1 1/2˝	(40)			75-1162	12			
	2˝	(50)			75-1163	16			
HMMR16	3˝	(80)	75-1171 Power Head with 10´ cable includes connector	75-1183 Power Head with 10´ cable includes connector	75-1268	16	75-1168		75-1272
HMMR35	3˝	(80)			75-1267	35			
HMMR27	4˝	(100)			75-1270	35			
HMMR47	4˝	(100)			75-1271	47			
HMSV	3/4˝	(20)	75-1187	75-1184	75-1154	-	75-1167	75-2922	75-1148
	1˝	(25)			75-1155	-			
	1 1/4˝	(32)			75-1156	-			
	1 1/2˝	(40)			75-1157	-	75-1168		75-1150
	2˝	(50)			75-1166	-			
	3˝	(80)			75-1197	-	75-1200		75-1151
	4˝	(100)			75-1199	-	75-1201		75-1152

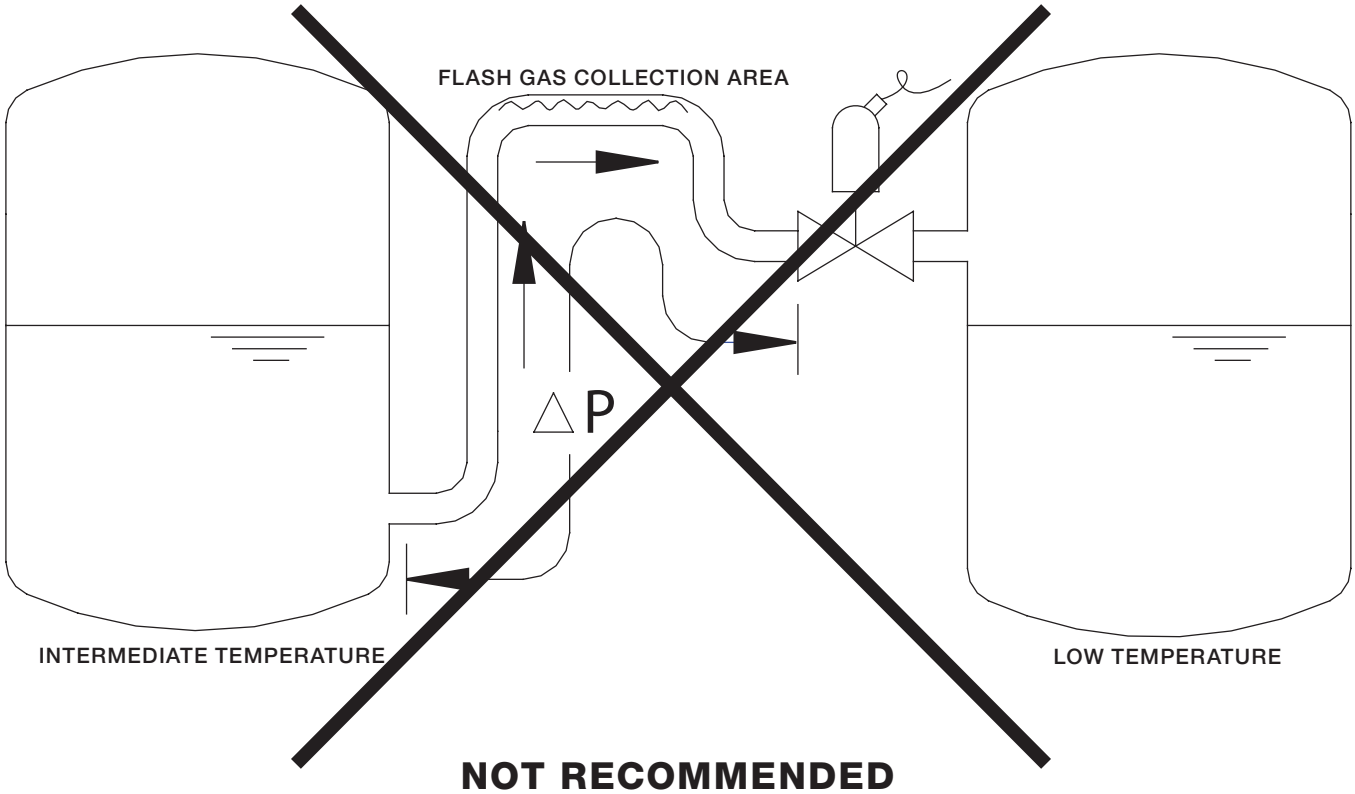
* CARTRIDGE ASSEMBLY KIT, CAN KIT AND SEAT/V-PORT KIT INCLUDE GASKET KIT (Column 5)
NOTE: For 3˝(80mm) and 4˝(100mm) with model numbers HMMV/7, HMMR/7, HMMV/8, HMMR/8 both V-Port Cartridge Kit and Cartridge Kit must be replaced together with Shock Resistant components listed above.
** POWER HEAD KITS INCLUDE REPLACEMENT GASKET AND SCREWS

POWER HEAD KIT - CONDUIT

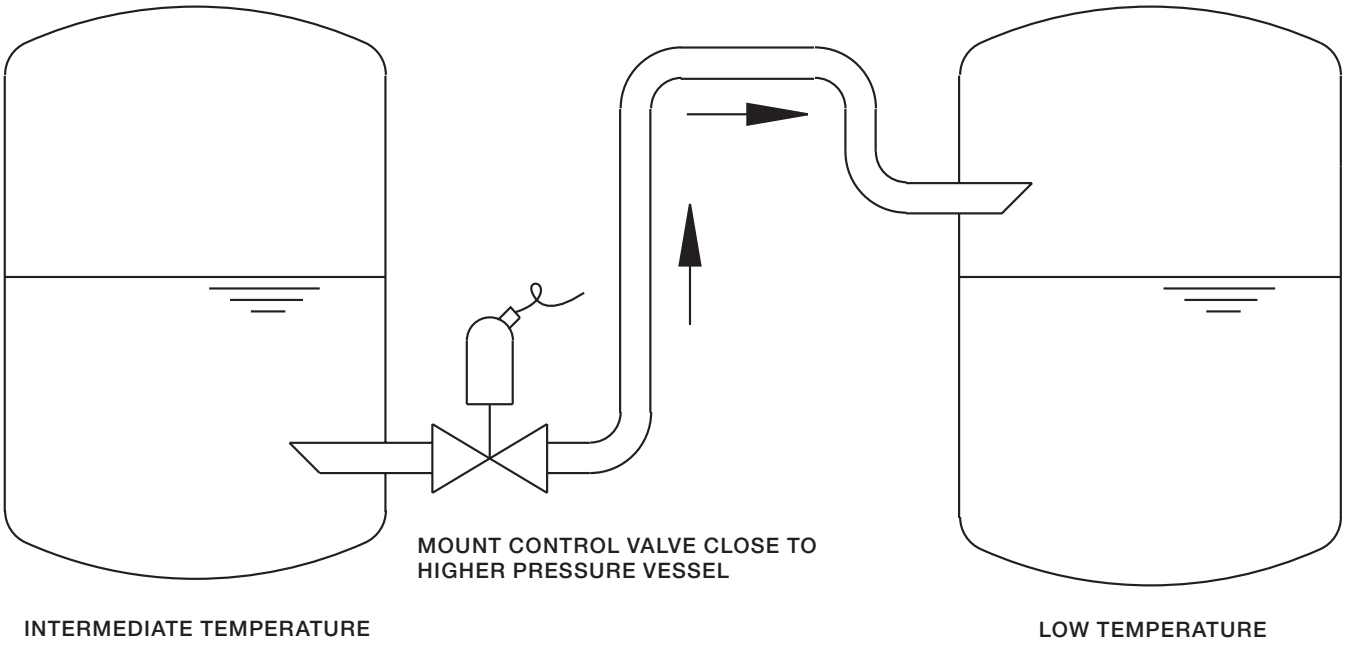
When Power Head cable is installed in conduit, order Standard Power Head Kit 75-1215, cable length is 10´ (3 meters).

SEALED MOTOR VALVE RECOMMENDED PIPING

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



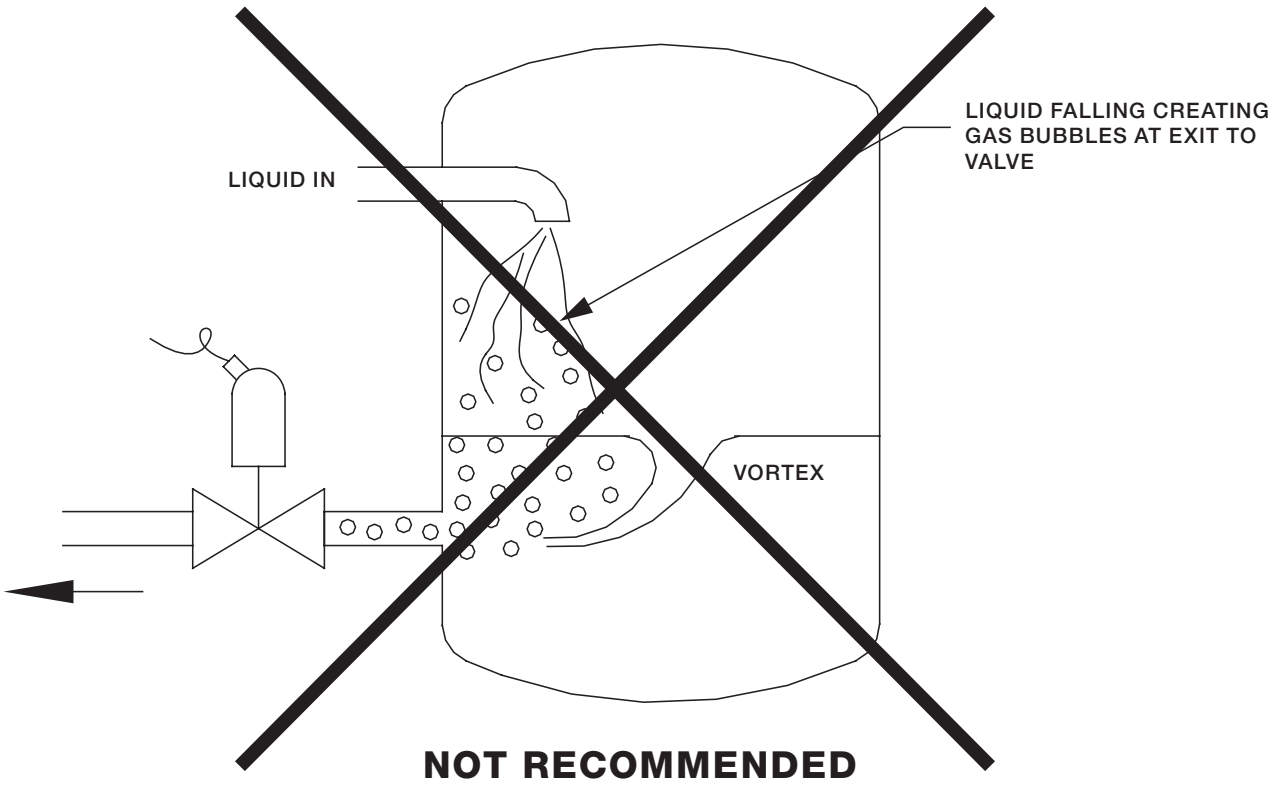
NOT RECOMMENDED



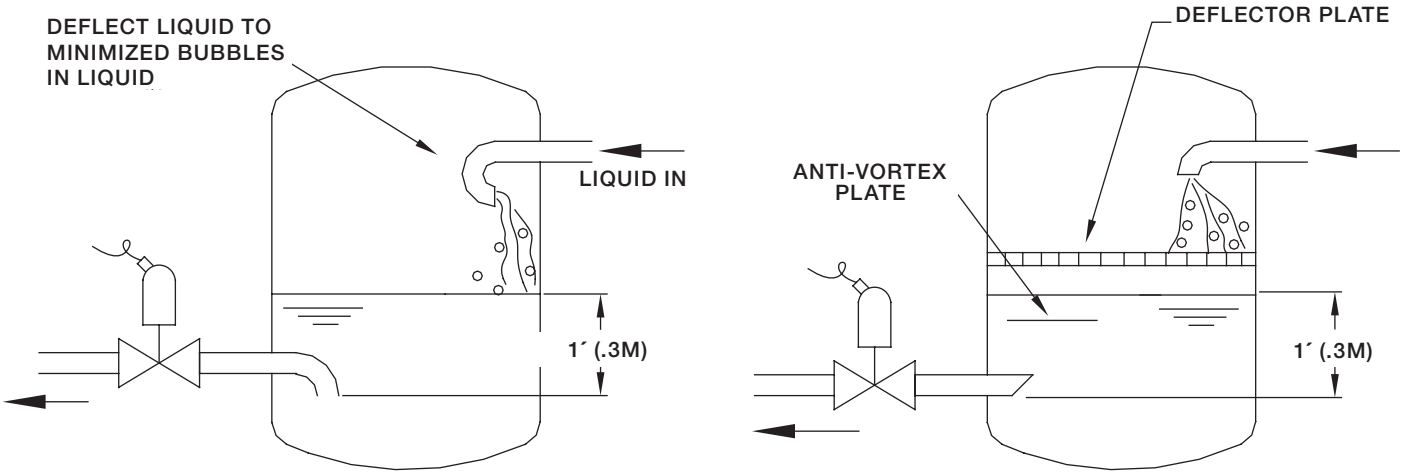
RECOMMENDED

SEALED MOTOR VALVE RECOMMENDED PIPING

FIGURE 2: PIPING RECOMMENDATIONS



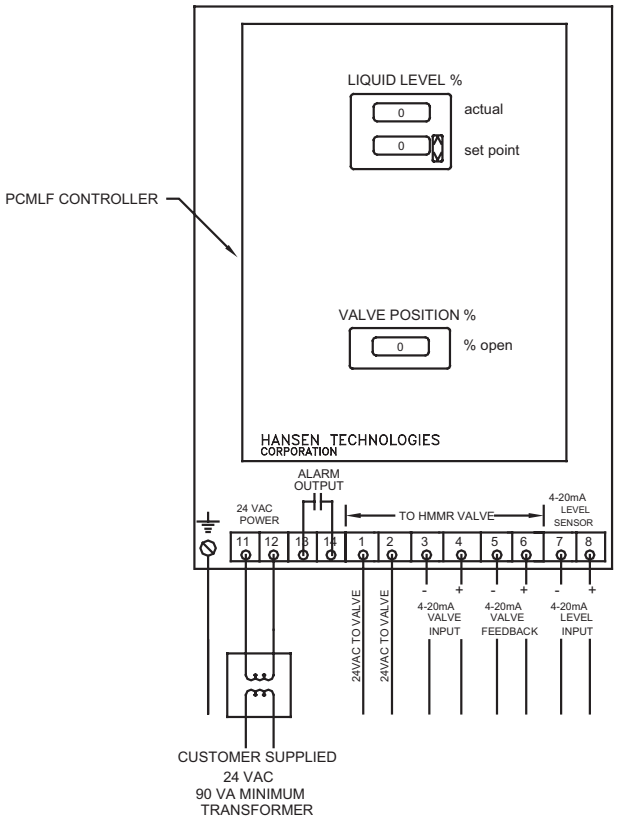
NOT RECOMMENDED



RECOMMENDED

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 AUTO/MAN 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 AUTO/MAN key again.

CONTROLLER SPECIFICATIONS

Input: 24 VAC, 90VA minimum

Enclosure: watertight, NEMA 4x

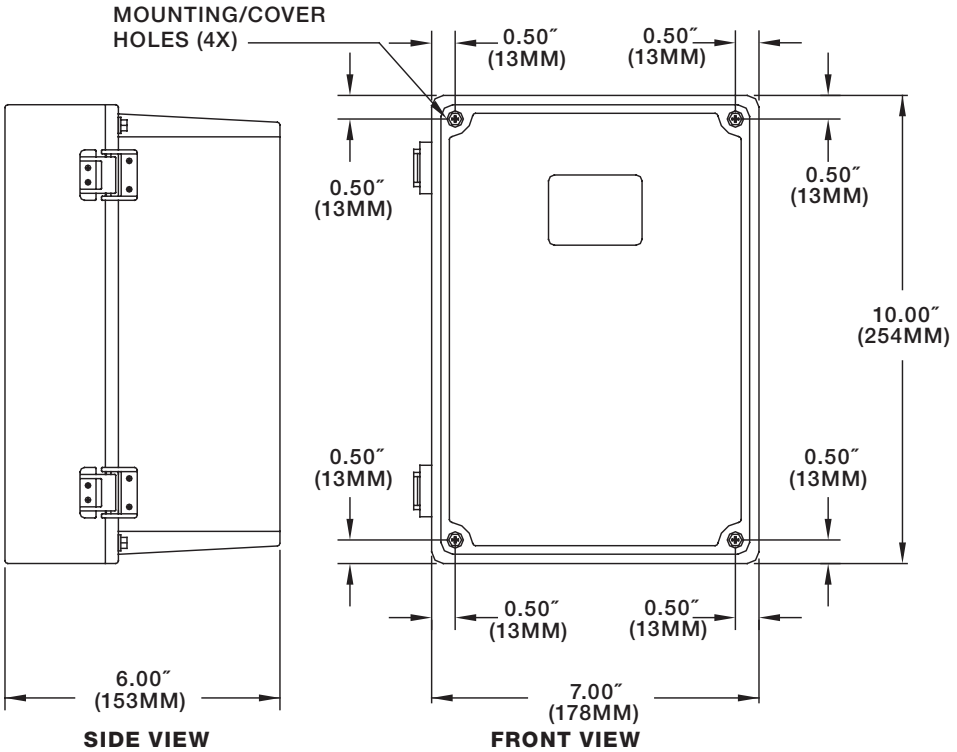
Alarm: Normally open

Alarm Relay: 2 Amps

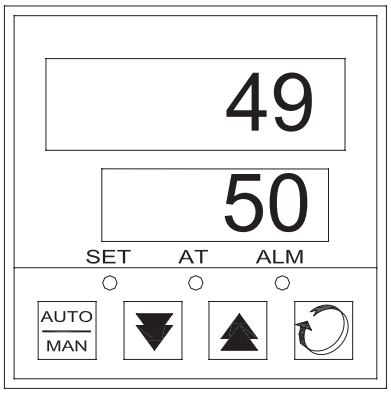
CAUTION

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

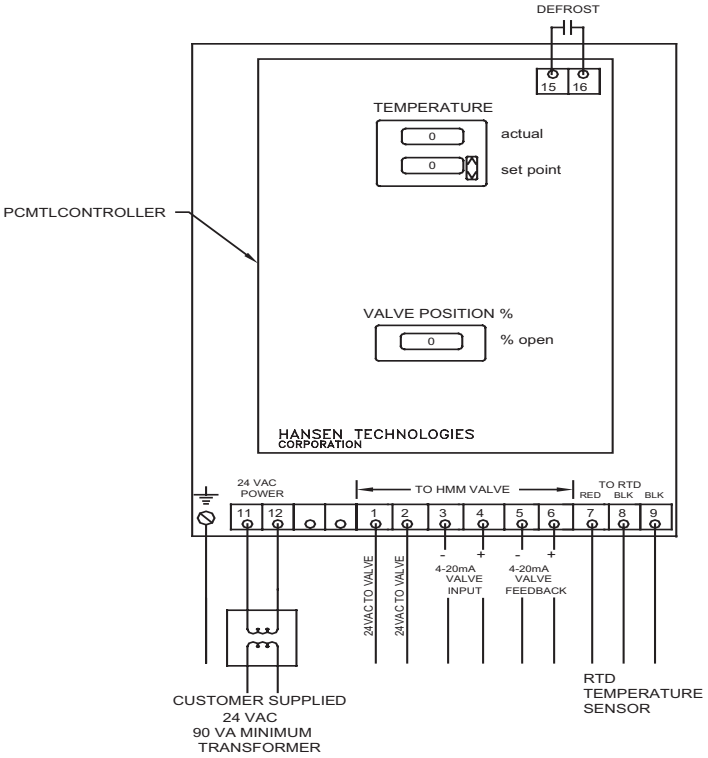


CONTROLLER FACEPLATE

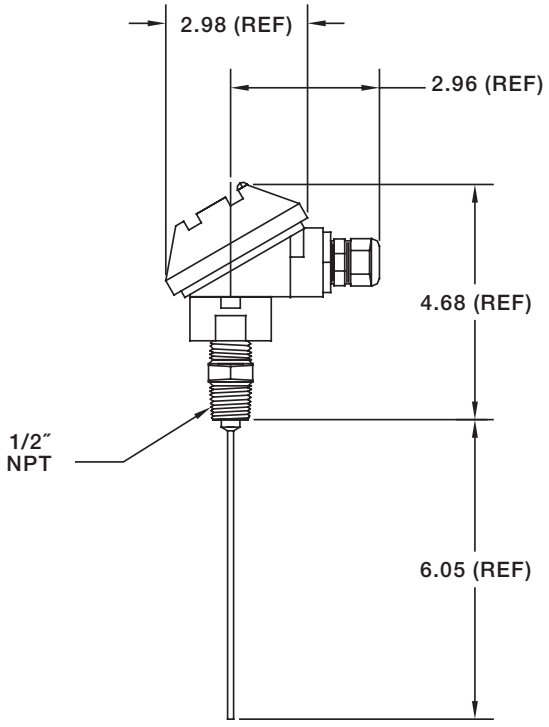


PCMT, PCMTF

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.**



RTD TEMPERATURE SENSOR (SUPPLIED WITH CONTROLLER)



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 AUTO/MAN 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 AUTO/MAN key again.

AUTO / MAN

CONTROLLER SPECIFICATIONS

Input: 24 VAC, 90VA minimum

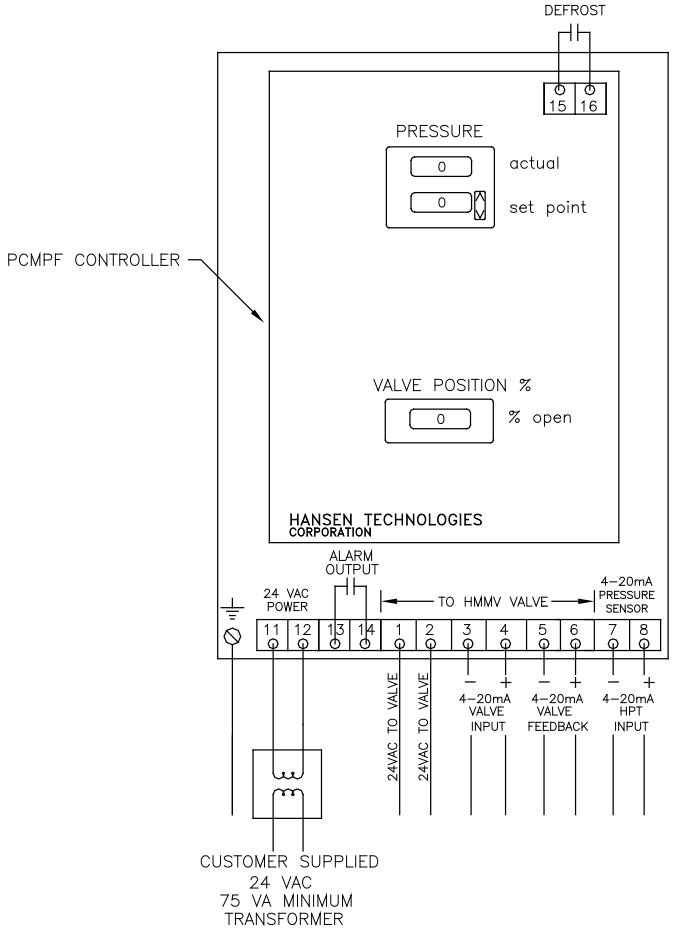
Enclosure: watertight, NEMA 4X

CAUTION

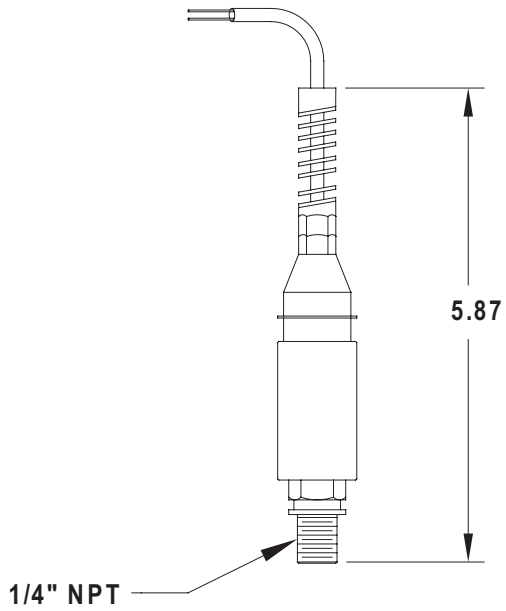
The Hansen PCMT/PCMTF has built-in multiple control capabilities for other industries. Hansen has programmed the controller for the particular use described in this bulletin. Do not attempt to penetrate barriers to other programming.

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.**



PRESSURE TRANSDUCER



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 AUTO/MAN 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 AUTO/MAN key again.

CONTROLLER SPECIFICATIONS

Input: 24 VAC, 90VA minimum

Enclosure: watertight, NEMA 4X

Alarm: Normally open

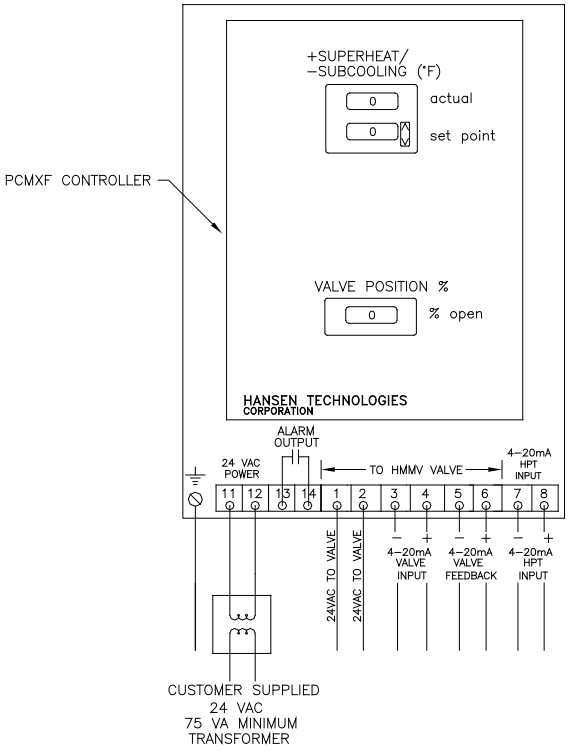
Alarm Relay: 2 amps

CAUTION

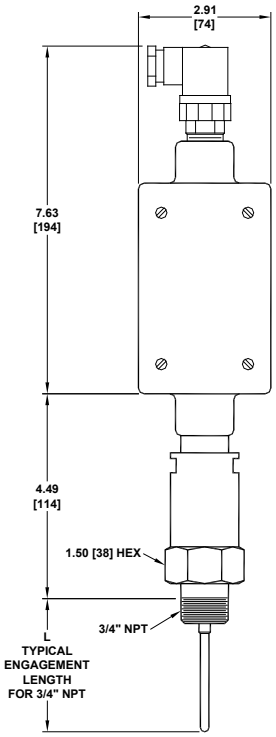
The Hansen PCMP/PCMPF has built-in multiple control capabilities for other industries. Hansen has programmed the controller for the particular use described in this bulletin. Do not attempt to penetrate barriers to other programming.

PCMX, PCMXF

Hansen stand-alone pressure/temperature (superheat/subcooling) 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 4-20mA valve input and valve position feedback loops. PCMX and PCMXF controllers require a pressure/temperature transducer (HPT) not included. Refer to application examples on page 4. **No external 24V DC power supplies are required.**



PRESSURE/TEMPERATURE (HPT) TRANSDUCER



SETTING THE CONTROLLER

1. In automatic mode, the actual superheat or subcooling temperature is displayed in the uppermost display, of the controller, with the active setpoint just below it.
2. The 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 AUTO/MAN 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. PCMF 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 AUTO/MAN key again.

CONTROLLER SPECIFICATIONS

Input: 24 VAC, 90VA minimum

Enclosure: watertight, NEMA 4X

Alarm: Normally open

Alarm Relay: 2 amps

CAUTION

The Hansen PCMX/PCMXF 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.

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. Before troubleshooting begins,it is often useful to complete the descriptions on page 35. 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 MOVT 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

PROBLEM	OBSERVATION	CAUSE	SOLUTION
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 MOVT. 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.
		Liquid shock caused by chronic or occasional loss of feed liquid in an intermediate-to-low liquid feed application.	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 MOVT. 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 MOVT.	Insufficient power	Refer to Valve Power Elements troubleshooting in next section.

2. VALVE POWER 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			
CABLE LENGTH, FT(M)	1	2	3	4
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 (6,0)
150 (46)	12 (2,5)	10 (6,0)	8 (10,0)	8 (10,0)
200 (61)	12 (4,0)	10 (6,0)	8 (10,0)	
300 (91)	10 (6,0)	8 (10,0)		

TROUBLESHOOTING WIRING SYSTEM

PROBLEM	OBSERVATION	CAUSE	SOLUTION
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 "nuetral", 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 24 VAC 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).

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 close position. If valve respond properly, the problem is in control wiring to the valve.

TROUBLESHOOTING CONTROL SYSTEM

PROBLEM	SYMPTOM	CAUSE	CHECK/DO
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 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.

VALVE DESCRIPTION

Catalog Number: _____
(from nameplate on valve bonnet)

Port Size:_____

Serial Number: _____

Valve Tag: _____

INSTALLATION DESCRIPTION

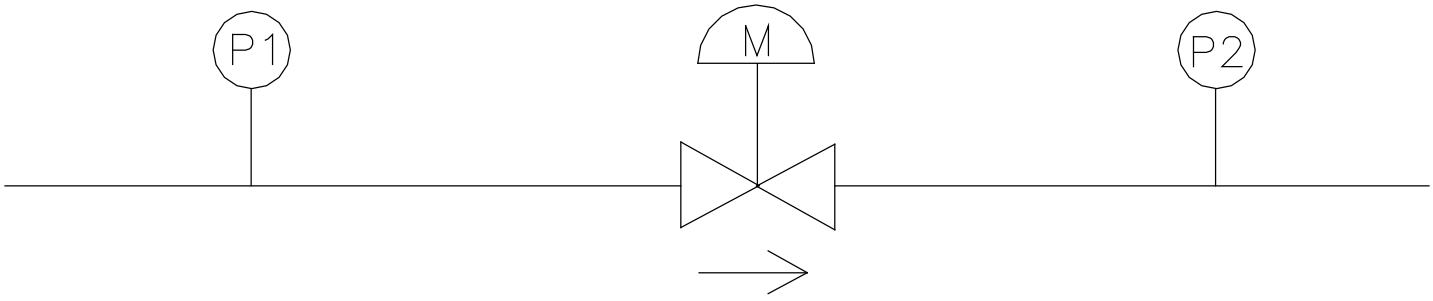
Location Description:_____
(e.g. Evaporator #6, suction valve, outdoors)

Installation Location (facility name, city, state):

_____

_____

APPLICATION DESCRIPTION



Inlet Pipe Size: _____

Outlet Pipe Size:_____

Inlet Temperature: _____

Outlet Temperature: _____

Inlet Pressure (P1): _____

Outlet Pressure (P2): _____

Pressure Drop (P1–P2): _____

Refrigerant: _____

Service Type (Dry or Wet Suction, liquid make-up, hot gas, liquid feed, etc.): _____

Rated Capacity of Valve (per capacity tables based on Pressure Drop above): _____

Application High Load Capacity:_____ Percent of Rated Capacity of Valve _____ %

Application Low Load Capacity: _____ Percent of Rated Capacity of Valve _____ %

Typical valve position (based on VPIF or PLC trending): _____ %

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.

ORDERING INFORMATION

FPT only available up to and 1¼″ port size.

NOMINAL PORT SIZE		FLANGE CONNECTION STYLES AND SIZES		
		FPT, SW, WN		ODS
INCH	(MM)	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″

TO ORDER:

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

Add C for Power-Close Model Number.

(Example: HMMVC)

Sealed motor valves with weld-in connections available (3/4″ thru 4″), contact factory.

OPTIONAL CONTROLLERS

CAT NO	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.
PCMX	Direct expansion or super heat controller for fully modulating applications.
RDR	Remote digital readout displays valve position.
TR92	115VAC/230VAC:24VAC 92VA transformer for HMMV/HMMR controller power.
SEALED MOTOR VALVE TOOLS	
MOVT	Manual Opening Valve Tool
75-1185	Calibration Key

VPIF VALVE POSITION INDICATOR KITS	
CAT NO	DESCRIPTION
75-1208	Power Head Upgrade Kit includes Power Head, VPIF, VPIF bracket, gasket and cables
75-1213	Power-Close Power Head Upgrade Kit includes Power-Close Power Head, VPIF, VPIF bracket, gasket and cables
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
VPIF	Valve Position Indicator (VPIF) Monitor for SMV Models with 4-20mA (less cables & bracket)
VPIEC	8′ Extension Cable

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