HANSEN TECHNOLOGIES

Bulletin R649c
September 2018

Specifications, Applications, Service Instructions & Parts

MOTORIZED CONTROL VALVE & CONTROLLERS

Port size 1/16" thru 4"
2mm thru 100mm
Motor Operated Valve

Model MCV

CE CRN Canadian Registration

INTRODUCTION

The Hansen Motorized Control Valve is a truly unique motor operated valve which eliminates the most common concern of other motor operated valves—valve stem seal leakage. The Motorized Control Valve has no valve stem seal because the non-electric rotor is enclosed in a stainless steel cartridge which contains the fluid pressure.

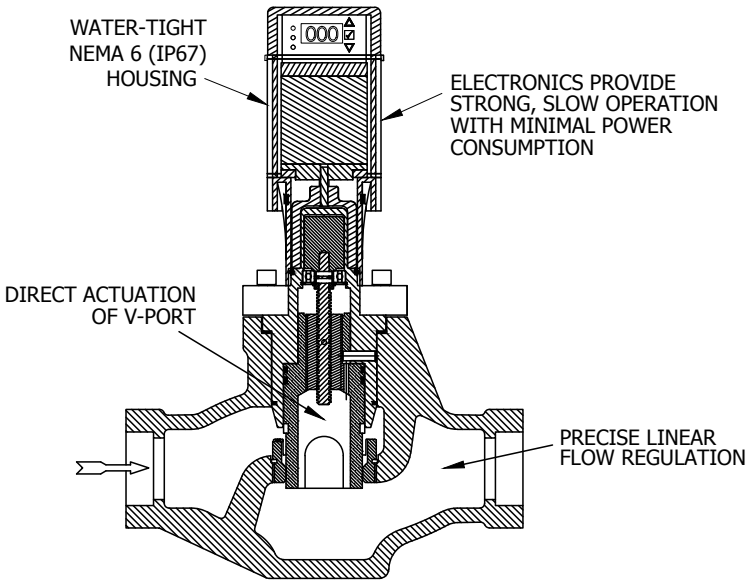
APPLICATIONS

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
Modulating or Slow Open/Close Solenoid Operation

ADDITIONAL FEATURES

- Self Calibrating
- Relay, current, or voltage input 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, "liquid 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 800 psi welded) glycol, water, brines, and other approved refrigerants.
- Available with optional Power-Backup feature.
- Valve position indicator display included.
- Available with weld-in connections.

KEY FEATURES



ALL VALVES AVAILABLE WITH ACT™ SOLUTION

TABLE OF CONTENTS

MATERIAL SPECIFICATIONS

Mechanical
Maximum Safe Working Pressure:
400 psig (28 bar) flanged, 800 psig (55 bar) welded
Maximum Opening Pressure Differential:
400 psig (28 bar) flanged, 800 psi (55 bar) all sizes
Ambient Operating Temperature:
-40˚F to 122˚F (-40˚C to 50˚C)
Refrigerant Operating Temperature:
-75˚F to 240˚F (-60˚C to 115˚C)
IP67 Rating (NEMA 6)
Electrical:
Supply Voltage: 24VAC or 24VDC via NEC Class 2 Source
Power Draw: 20W per valve
Input Control Signal Types: 4-20mA, 0-20mA, 0-5VDC, 0-10VDC, 1-6VDC, relay closed contact
Output Feedback Signal Types: 0-20mA, 4-20mA
Material Specifications
Body: Ductile iron, ASTM A536
Bonnet Plate: Steel, zinc plated with yellow chromate
V-port Seal: Teflon
Cartridge Assembly: Stainless Steel
Cartridge O-ring: Neoprene
Actuator Housing: Aluminum
Corrosion Protection: Zinc plating is standard on bodies up to 1-1/4", ACT™ available on all valves

APPLICATIONS

The Hansen Motorized Control 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 motor is isolated from the refrigerant. 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 **MCV** valve series is for computer controlled operations using 4-20 mA signals. The MCV is ideal for precise temperature and pressure control, hot gas defrost, and other applications where accurate process control is required. The MCV valves series is also for applications requiring open/close operation only.

The **MCR** valve with expansion plug is for high pressure drop applications such as liquid makeup and liquid injection. The MCR 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 **MCXV** valve series is best suited for liquid injection of screw compressors and direct expansion evaporators.

Refer to pages 3-5 for typical applications.

ADVANTAGES

The Motorized Control 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). 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.

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

The Motorized Control Valve does not require stem shaft heaters like other open motorized valves.

The Motorized Control Valve is slow opening and closing (ranging from 13 to 45 seconds) depending on valve size and speed settings which minimizes the potential for liquid velocity shock or "water hammer" often experienced with quick opening and closing solenoid valves.

POWER BACKUP FEATURE

The Motorized Control Valve is available with an optional power backup system that will control the valve to a user defined location upon a loss of the incoming voltage. This system can be used in place of an upstream solenoid to the valve. Refer to pages 25 – 26 for details and wiring.

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 8–16 or the Hansen sizing program found at www.hantech.com.

LIQUID MAKE-UP APPLICATIONS

For applications with a large pressure drop across the Motorized Control Valve, attention must be paid to proper outlet line sizing to accommodate flash gas. It is recommended that dual Motorized Control Valves in parallel be used when the low load (weekend load) is less than 15% of the properly sized full load capacity 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 Motorized Control Valves or one solenoid valve with hand expansion valve and one Motorized Control 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 IIAR recommended capacities for liquid lines. R22 capacities based on 3 ft/s liquid velocity. For R134a, use 94% of R22 capacity; R404 80%; R507 60%.

TABLE 1

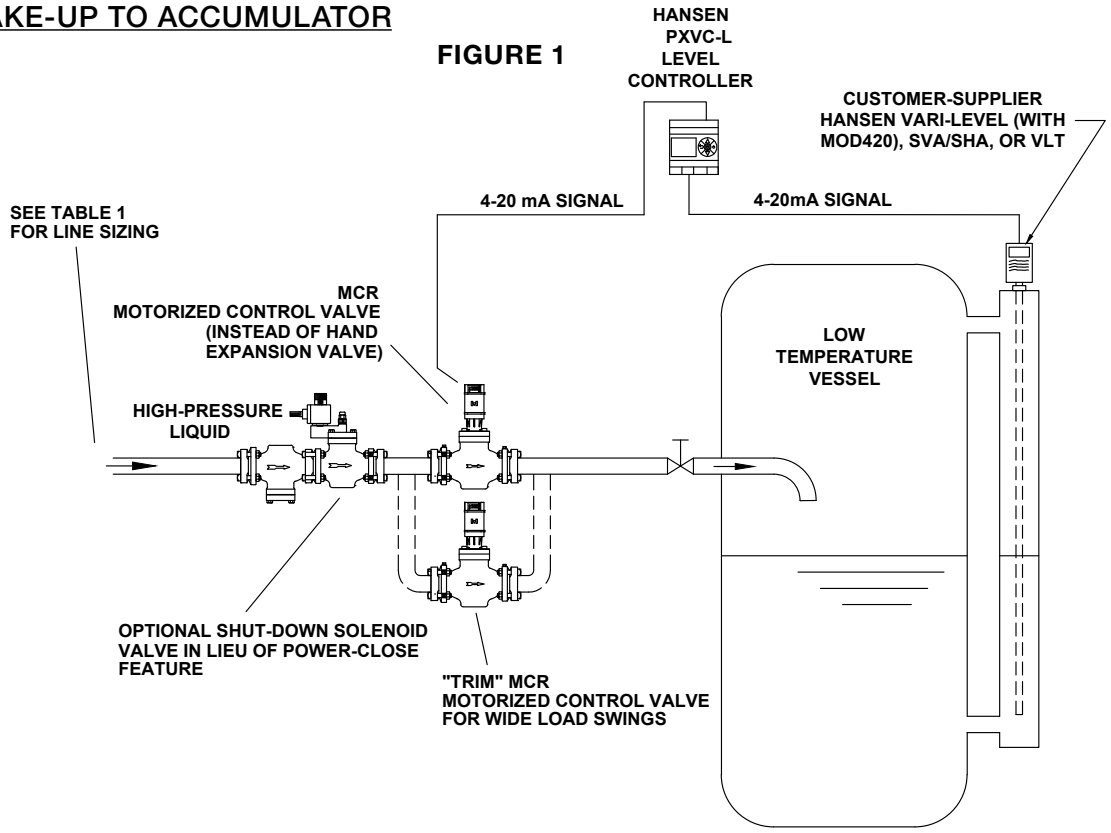
LINE SIZE	MAXIMUM CAPACITY AMMONIA		MAXIMUM CAPACITY R22	
1/2˝	32 Tons	112 kW	8 Tons	27 kW
3/4˝	58 Tons	208 kW	14 Tons	49 kW
1˝	97 Tons	340 kW	24 Tons	82 kW
1-1/4˝	179 Tons	625 kW	42 Tons	147 kW
1-1/2˝	254 Tons	890 kW	58 Tons	202 kW
2˝	496 Tons	1740 kW	110 Tons	384 kW
2-1/2˝	729 Tons	2550 kW	155 Tons	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.

MCV MOTORIZED CONTROL VALVE

LIQUID MAKE-UP TO ACCUMULATOR

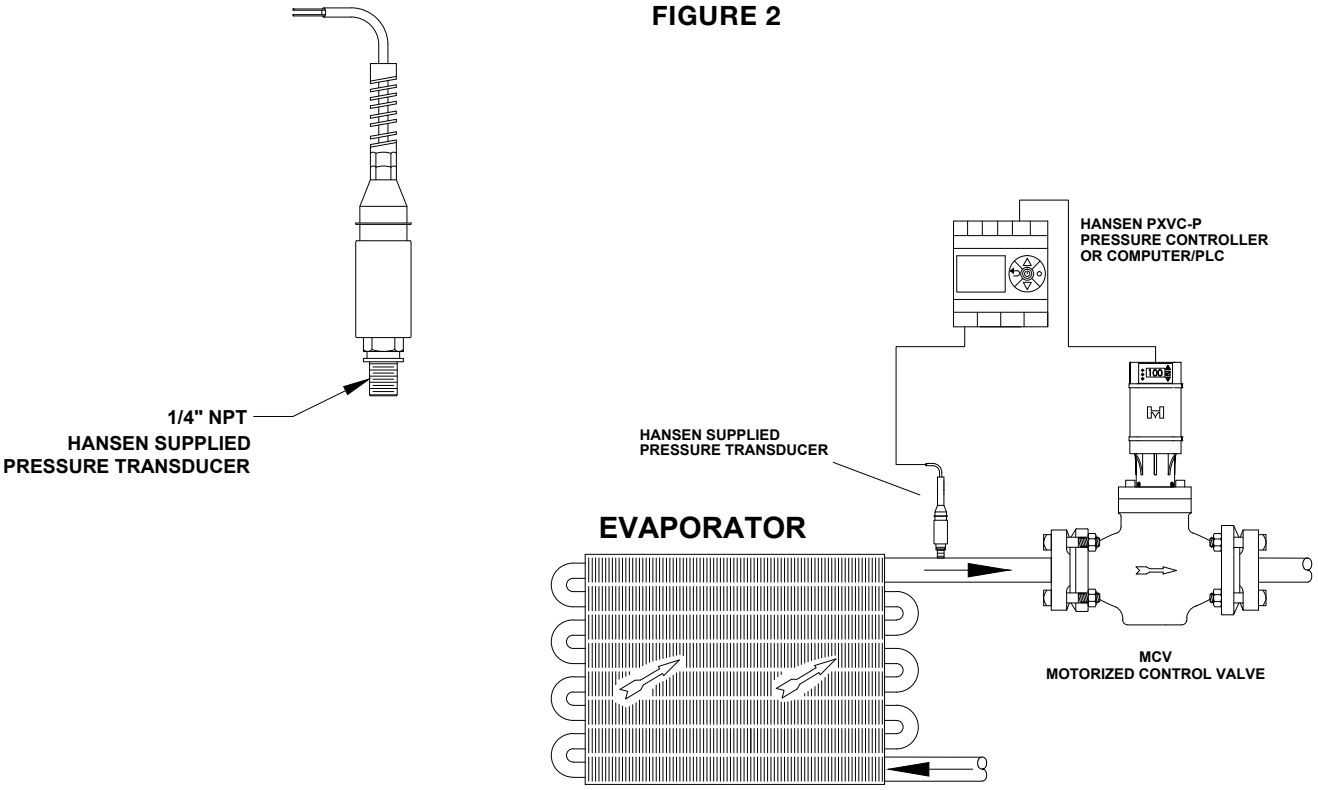
FIGURE 1



ROOM TEMPERATURE OR EVAPORATOR PRESSURE CONTROL

(Shown with Pressure Transducer)

FIGURE 2

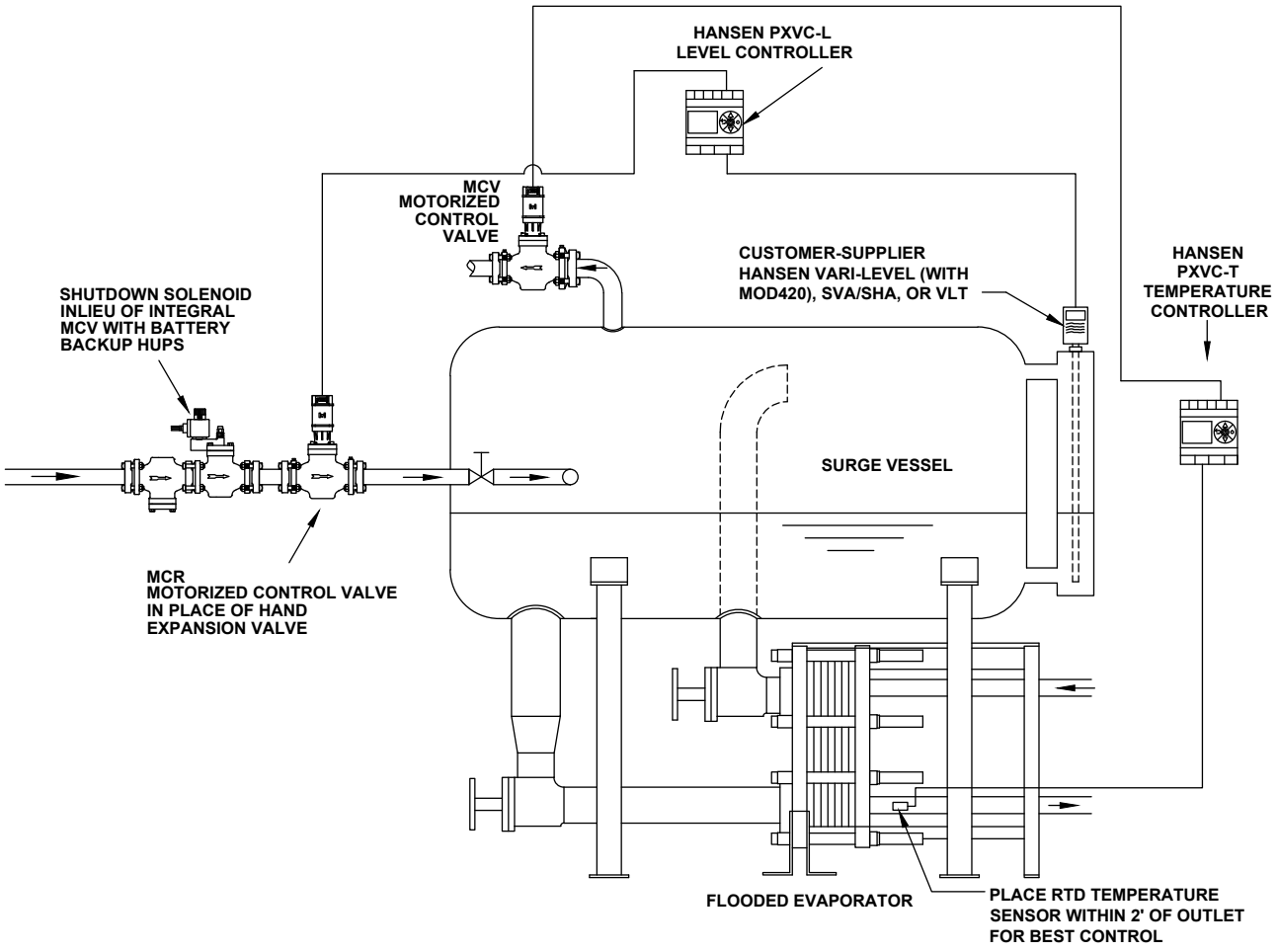


The drawings in this bulletin are for illustration purposes only and should not be used for actual engineering or installation. Not to scale.

MCV, MCXV MOTORIZED CONTROL VALVE

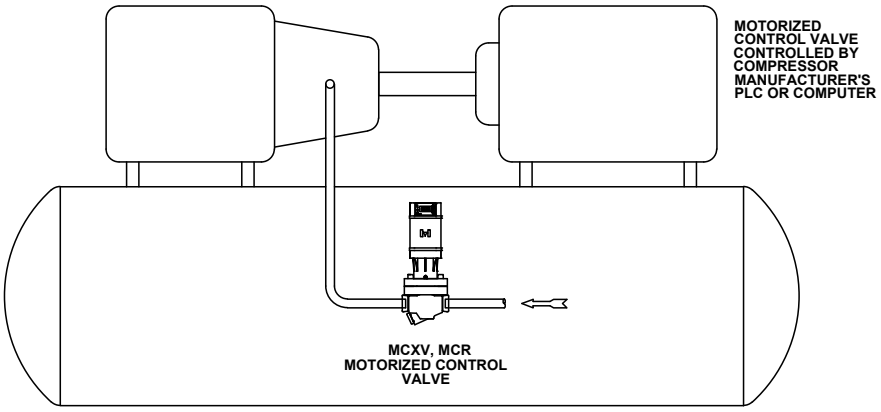
TYPICAL CHILLER APPLICATIONS

FIGURE 3



TYPICAL LIQUID INJECTION COOLING FOR SCREW COMPRESSOR APPLICATION

FIGURE 4



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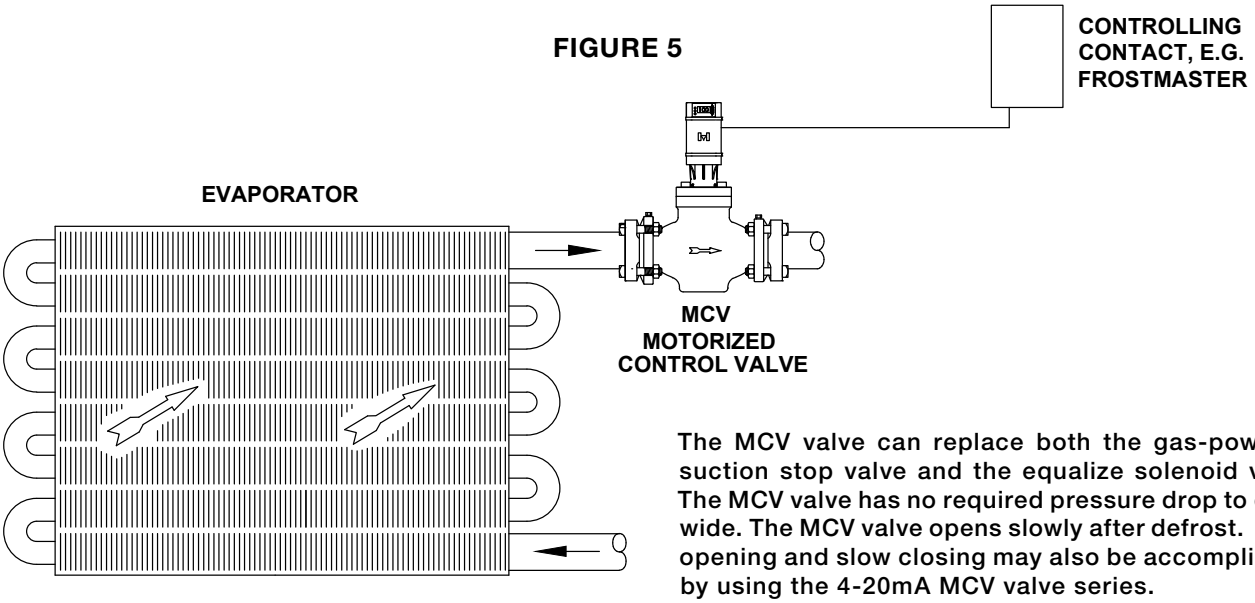
MCV MOTORIZED CONTROL VALVE-SLOW OPENING AND CLOSING

SLOW OPENING AND CLOSING: SUCTION STOP VALVE

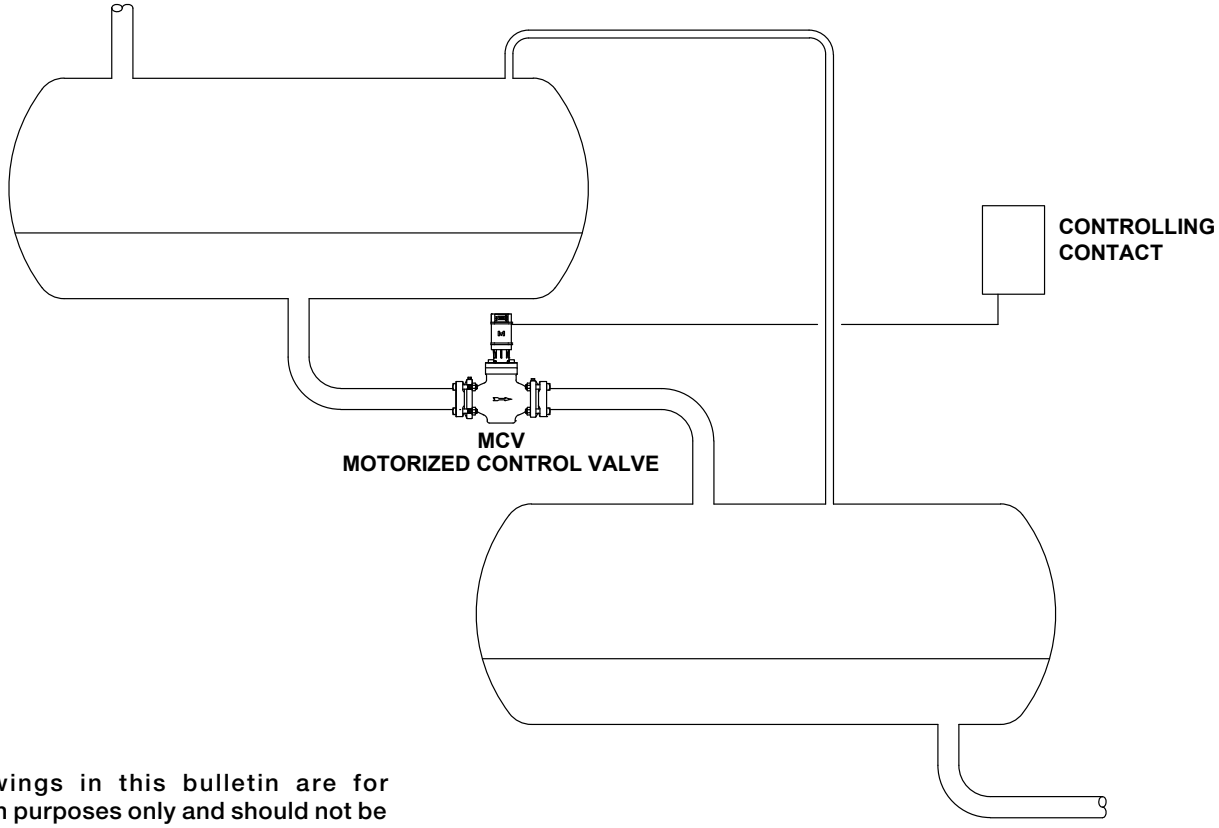
FIGURE 5



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

NO PRESSURE DROP REQUIRED: GRAVITY DRAIN

FIGURE 6



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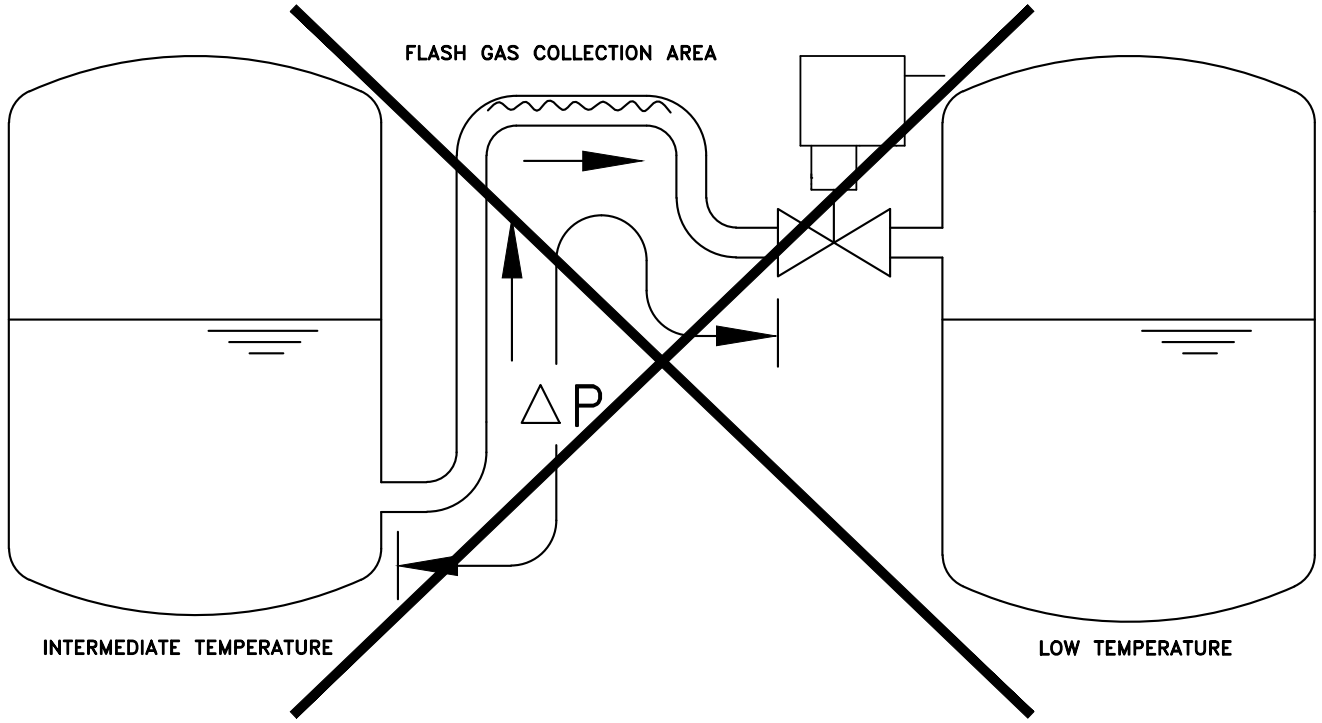
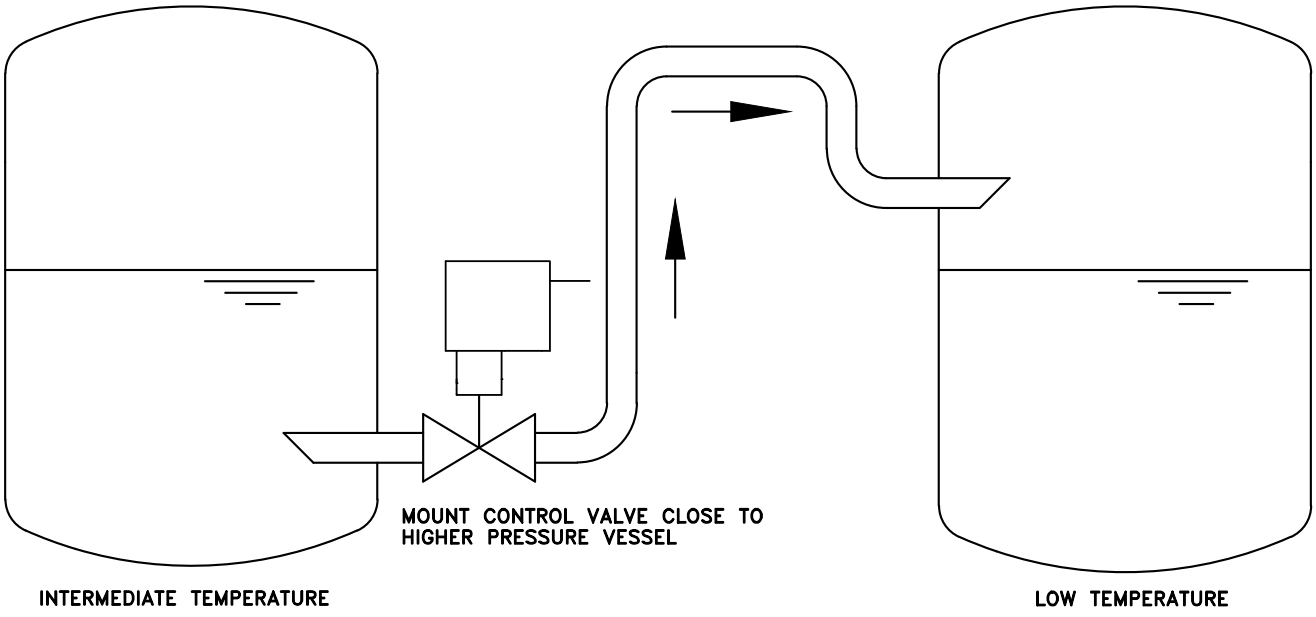
Applications shown use Hansen supplied controllers, however, the Hansen MCV valve series can be integrated into most customer control systems.

LIQUID FEED VALVE FROM INTERMEDIATE TO LOW TEMPERATURE VESSEL

FIGURE 7

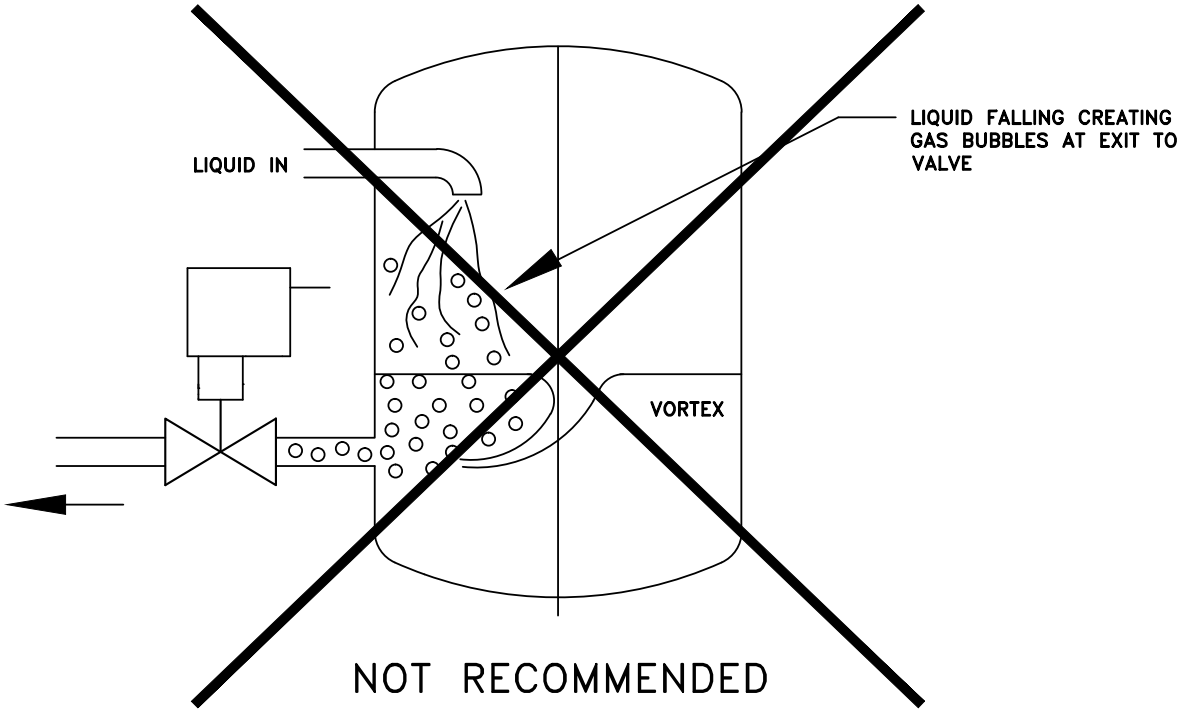


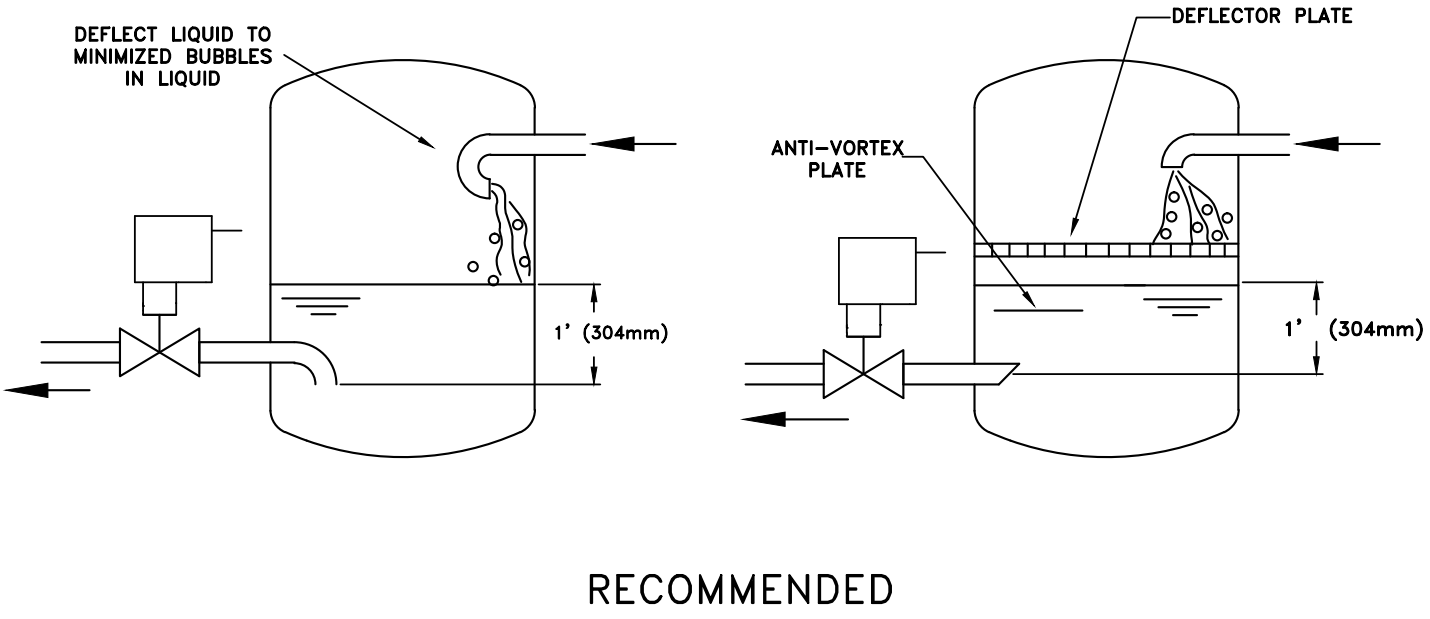
NOT RECOMMENDED



RECOMMENDED

FIGURE 8


LIQUID IN
LIQUID FALLING CREATING GAS BUBBLES AT EXIT TO VALVE
VORTEX
NOT RECOMMENDED


DEFLECT LIQUID TO MINIMIZED BUBBLES IN LIQUID
1' (304mm)
DEFLECTOR PLATE
ANTI-VORTEX PLATE
1' (304mm)
RECOMMENDED

AMMONIA SUCTION VAPOR CAPACITIES, TONS

TABLE 2

Evap. Temp.	Pressure Drop	3/4″		1″		1-1/4″		1-1/2″		2″		3″		4″	
°F	(psi)	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
40	.25	1.5	4.2	2.7	8.0	3.7	11	8.2	24	11	32	24	71	32	113
	.50	2.1	6.0	3.7	11	5.4	16	12	34	15	45	34	100	45	160
	1.0	2.9	8.5	5.3	16	7.4	22	16	48	22	64	47	141	64	226
	2.0	4.1	12.0	7.3	22	10	31	23	67	31	90	67	199	90	317
	5	6.5	19	12	35	16	49	36	106	48	142	106	315	142	501
	10	9.2	27	16	49	23	69	51	150	69	201	150	445	201	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	45	20	72
	.50	1.3	3.9	2.4	7.1	3.4	10	7.2	21	9.9	29	21	63	29	101
	1.0	1.9	5.5	3.3	10	4.7	14	10	30	14	40	30	89	40	142
	2.0	2.6	7.6	4.7	14	6.7	20	14	42	19	56	42	142	56	197
	5	4.1	12	7.4	22	11	32	23	66	30	89	66	196	88	311
	10	5.8	17	10	31	15	45	32	94	43	125	93	277	125	441
-40	.25	0.7	1.9	1.1	3.4	1.6	4.7	3.4	10	4.8	14	10	30	14	48
	.50	0.9	2.6	1.6	4.7	2.2	6.6	4.8	14	6.5	19	14	42	19	67
	1.0	1.2	3.6	2.2	6.5	3.1	9.2	6.9	20	8.9	26	20	58	26	93
	2.0	1.7	4.8	2.9	8.8	4.0	12	8.9	26	12	36	27	79	35	125
Cv		2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	104	47	166

AMMONIA SUCTION VAPOR CAPACITIES, KILOWATTS

TABLE 3

Evap. Temp.	Pressure Drop	20 MM		25 MM		32 MM		40 MM		50 MM		80 MM		100 MM	
°C	(bar)	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
5	.02	5.4	16	10	30	14	42	30	90	41	123	91	271	125	433
	.04	7.6	23	14	42	20	59	43	128	58	175	129	383	177	613
	.08	11	33	20	60	28	84	60	180	82	247	183	542	250	867
	.15	15	45	27	82	39	115	82	247	112	338	250	742	343	1,187
	.4	24	73	44	134	63	188	134	403	184	552	408	1,212	560	1,938
	.6	29	90	54	164	77	230	165	494	225	676	500	1,484	685	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	156	72	249
	.04	4.4	13	8.2	25	12	35	25	74	33	99	75	221	102	352
	.08	6.2	19	12	35	16	49	35	105	47	140	105	313	144	498
	.15	8.5	26	16	48	22	67	48	144	64	192	144	428	197	682
	.4	13.9	42	26	78	37	109	78	235	104	314	236	699	322	1,114
	.6	17.0	52	32	96	45	134	96	288	128	384	289	856	394	1,364
-40	.02	2.2	7	3.9	12	5.5	16	11	34	16	47	35	105	48	168
	.04	3.0	9	5.5	17	8	23	16	49	22	67	50	149	69	238
	.08	4.3	13	8	23	11	33	23	69	32	95	71	210	97	336
	.15	5.9	18	11	32	15	45	31	94	43	130	97	288	133	460
Kv		1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	89	40	142

Reduced Capacity V-Ports shown in gray.

For best control and modulation, size the MCV 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.

R-22 SUCTION VAPOR CAPACITIES, TONS

TABLE 4

Evap. Temp.	Pressure Drop	3/4″		1″		1-1/4″		1-1/2″		2″		3″		4″	
°F	(psi)	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
40	.25	0.5	1.6	1.0	2.9	1.4	4.2	3.0	8.8	4.0	12	8.7	26	12	41
	.50	0.8	2.3	1.4	4.1	2.0	6.0	4.3	13	5.6	17	12	37	17	59
	1.0	1.1	3.2	1.9	5.8	2.8	8.5	6.1	18	7.9	23	17	52	23	83
	2.0	1.5	4.5	2.7	8.2	4.0	12	8.6	25	11	33	25	73	33	117
	5	2.4	7.1	4.3	13	6.4	19	14	40	18	52	39	115	52	185
	10	3.5	10	6.1	18	9.0	27	19	56	25	74	55	163	74	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	16	7.3	26
	.50	0.5	1.4	0.9	2.6	1.2	3.7	2.6	7.5	3.6	11	7.7	23	10	37
	1.0	0.7	2.0	1.2	3.7	1.7	5.2	3.6	11	5.1	15	11	33	15	52
	2.0	1.0	2.8	1.7	5.2	2.4	7.3	5.1	15	7.1	21	15	46	21	73
	5	1.5	4.4	2.7	8.2	3.9	12	8.1	24	11	33	24	73	33	115
	10	2.2	6.3	3.9	12	5.5	16	11	34	16	47	35	103	46	163
-40	.25	0.3	0.8	0.5	1.4	0.7	2.0	1.5	4.2	1.9	5.7	4	12	6	20
	.50	0.4	1.1	0.7	2.0	0.9	2.8	2.1	6.0	2.7	8.0	6	18	8	29
	1.0	0.5	1.6	0.9	2.8	1.3	4.0	2.9	8.5	3.9	11	8	25	11	40
	2.0	0.8	2.2	1.3	4.0	1.9	5.6	4.1	12	5.4	16	12	35	16	57
Cv		2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	104	47	166

R-22 SUCTION VAPOR CAPACITIES, KILOWATTS

TABLE 5

Evap. Temp.	Pressure Drop	20 MM		25 MM		32 MM		40 MM		50 MM		80 MM		100 MM	
°C	(bar)	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
5	.02	2.2	7	4	12	6	17	11	34	16	49	36	107	49	171
	.04	3.0	9	6	17	8	24	16	48	23	69	51	151	70	242
	.08	4	13	8	24	11	34	22	67	33	98	72	214	99	343
	.15	6	18	11	33	15	46	31	92	45	134	99	293	135	469
	.4	10	29	18	54	25	75	50	150	73	219	161	478	221	766
	.6	12	36	22	66	31	92	61	184	89	268	198	586	271	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	64	30	102
	.04	1.9	6	3.2	10	5	14	10	30	14	41	30	90	42	145
	.08	2.6	8	5	14	7	20	14	42	19	58	43	128	59	204
	.15	3.6	11	6	19	9	27	19	58	27	80	59	175	81	280
	.4	5.9	18	10	31	15	44	32	95	43	131	96	286	132	457
	.6	7.2	22	13	38	18	54	39	116	53	160	118	350	162	560
-40	.02	1.0	3	1.8	5	2.6	8	5	16	7.0	22	16	49	22	78
	.04	1.4	4	2.6	8	4	11	8	23	10	32	23	69	32	110
	.08	1.9	6	4	11	5	15	11	32	15	45	33	97	45	156
	.15	2.6	8	5	15	7	21	15	44	20	61	45	133	62	213
Kv		1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	89	40	142

Reduced Capacity V-Ports shown in gray.

For best control and modulation, size the MCV 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.

R-134a SUCTION VAPOR CAPACITIES, TONS

TABLE 6

Evap. Temp.	Pressure Drop	3/4″		1″		1-1/4″		1-1/2″		2″		3″		4″	
°F	(psi)	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
40	.25	0.4	1.3	0.8	2.3	1.1	3.2	2.3	6.7	3.1	9.2	6.9	21	9	33
	.50	0.6	1.8	1.1	3.3	1.5	4.6	3.3	10	4.4	13	10	29	13	46
	1.0	0.9	2.5	1.5	4.6	2.2	6.4	4.6	13	6.3	18	14	41	18	65
	2.0	1.2	3.6	2.2	6.5	3.1	9.1	6.5	19	8.9	26	20	58	26	92
	5	2.0	5.7	3.4	10	4.8	14	10	30	14	41	31	92	41	145
	10	2.8	8.0	4.8	15	6.8	20	15	42	20	58	44	130	58	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	12	5.4	19
	.50	0.4	1.1	0.6	1.9	0.9	2.7	1.9	5.5	2.6	7.5	5.7	17	7.6	27
	1.0	0.5	1.5	0.9	2.7	1.3	3.7	2.7	7.8	3.6	11	8.1	24	11	38
	2.0	0.7	2.1	1.3	3.8	1.8	5.3	3.8	11	5.1	15	11	34	15	54
	5	1.1	3.3	2.0	6.0	2.8	8.4	6.0	17	8.1	24	18	54	24	85
	10	1.6	4.7	2.8	8.5	4.0	12	8.4	25	11	34	26	76	34	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	6.0	2.7	10
	.50	0.2	0.5	0.3	1.0	0.4	1.3	1.0	2.9	1.3	3.8	2.9	8.5	3.8	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	12	5.4	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	17	7.6	27
Cv		2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	104	47	166

R-134a SUCTION VAPOR CAPACITIES, KILOWATTS

TABLE 7

Evap. Temp.	Pressure Drop	20 MM		25 MM		32 MM		40 MM		50 MM		80 MM		100 MM	
°C	(bar)	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
5	.02	1.7	5	3	9	4	13	9	27	13	38	28	83	38	132
	.04	2.4	7	4	13	6	18	13	39	18	53	39	117	54	187
	.08	3	10	6	18	9	26	18	55	25	75	56	165	76	264
	.15	5	14	8	25	12	35	25	75	34	103	76	226	105	362
	.4	7	23	13	41	19	57	41	122	56	168	124	369	171	591
	.6	9	28	17	50	24	70	50	150	68	206	152	452	209	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	45	21	71
	.04	1.3	4	2.4	7	3	10	7	21	10	29	21	63	29	101
	.08	1.8	5	3	10	5	14	10	30	14	41	30	89	41	142
	.15	2.5	7.5	5	14	6	19	14	41	19	56	41	122	56	195
	.4	4.0	12	8	23	10	31	22	67	30	91	67	199	92	318
	.6	4.9	15	9	28	13	38	27	82	37	112	82	244	113	390
-40	.02	0.5	1	0.8	3	1.2	4	3	8	4	11	8	24	11	38
	.04	0.7	2	1.2	4	2	5	4	11	5	15	11	34	16	54
	.08	1.0	3	2	5	2	7	5	16	7	22	16	47	22	76
	.15	1.3	4	2	7	3	10	7	22	10	30	22	65	30	104
Kv		1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	89	40	142

Reduced Capacity V-Ports shown in gray.

For best control and modulation, size the MCV 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.

R-404 SUCTION VAPOR CAPACITIES, TONS

TABLE 8

Evap. Temp.	Pressure Drop	3/4″		1″		1-1/4″		1-1/2″		2″		3″		4″	
°F	(psi)	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
40	.25	0.5	1.4	0.8	2.5	1.2	3.5	2.5	7.4	3.4	9.9	7.5	22	10	35
	.50	0.7	2.0	1.2	3.6	1.7	5.0	3.6	11	4.8	14	11	32	14	50
	1.0	0.9	2.8	1.7	5.0	2.4	7.1	5.1	15	6.7	20	15	45	20	71
	2.0	1.3	3.9	2.4	7.1	3.4	10	7.2	21	9.5	28	21	63	28	100
	5	2.1	6.2	3.7	11	5.3	16	11	33	15	44	34	100	45	158
	10	3.0	8.7	5.3	16	7.5	22	16	47	21	63	47	141	63	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	13	5.9	21
	.50	0.4	1.2	0.7	2.1	1.0	2.9	2.1	6.0	2.9	8.5	6.2	19	8.4	30
	1.0	0.6	1.6	1.0	2.9	1.4	4.1	2.9	8.5	4.1	12	8.8	26	12	42
	2.0	0.8	2.3	1.4	4.1	1.9	5.8	4.1	12	5.8	17	12	37	17	59
	5	1.3	3.6	2.2	6.5	3.1	9.2	6.5	19	9.2	27	20	59	26	93
	10	1.8	5.1	3.1	9.2	4.3	13	9.2	27	13	38	28	83	37	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	7.1	3.1	11
	.50	0.2	0.6	0.4	1.1	0.5	1.6	1.1	3.3	1.5	4.5	3.4	10	4.4	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	14	6.2	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	20	9	31
Cv		2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	104	47	166

R-404 SUCTION VAPOR CAPACITIES, KILOWATTS

TABLE 9

Evap. Temp.	Pressure Drop	20 MM		25 MM		32 MM		40 MM		50 MM		80 MM		100 MM	
°C	(bar)	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
5	.02	1.8	5.5	3.4	10	4.8	14	10	31	14	42	31	92	42	146
	.04	2.5	7.7	4.8	14	6.8	20	14	43	20	59	44	130	60	207
	.08	3.6	11	6.7	20	9.6	28	20	61	28	83	62	183	85	293
	.15	4.9	15	9.2	28	13	39	28	84	38	114	85	251	116	401
	.4	8.0	24	15	46	21	64	46	137	62	186	138	410	189	655
	.6	9.8	30	18	56	26	78	56	168	76	228	169	502	232	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	50	23	81
	.04	1.4	4.3	2.6	7.7	3.6	11	7.9	24	11	33	24	71	33	114
	.08	2.0	6.1	3.6	11	5.1	15	11	34	15	46	34	101	47	161
	.15	2.7	8.4	5.0	15	7.1	21	15	46	21	63	47	138	64	221
	.4	4.5	14	8.1	24	12	34	25	75	34	103	76	225	104	361
	.6	5.5	17	10	30	14	42	31	92	42	126	93	276	128	442
-40	.02	0.6	1.8	1.0	3.2	1.5	4.4	3.2	9.5	4.4	13	9.6	28	13	45.6
	.04	0.8	2.5	1.5	4.5	2.1	6.2	4.5	13	6.2	19	14	40	19	64.5
	.08	1.1	3.5	2	6.4	2.9	8.8	6.3	19	8.7	26	19	57	26	91.3
	.15	1.6	4.8	3	8.7	4.0	12	8.7	26	12	36	26	78	36	125
Kv		1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	89	40	142

Reduced Capacity V-Ports shown in gray.

For best control and modulation, size the MCV 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.

R-507 SUCTION VAPOR CAPACITIES, TONS

TABLE 10

Evap. Temp.	Pressure Drop	3/4″		1″		1-1/4″		1-1/2″		2″		3″		4″	
°F	(psi)	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
40	.25	0.5	1.4	0.9	2.6	1.2	3.5	2.7	7.8	3.5	10	7.7	23	10	37
	.50	0.7	2.0	1.2	3.7	1.7	5.0	3.8	11	4.9	15	11	33	15	52
	1.0	1.0	2.8	1.7	5.2	2.4	7.1	5.3	16	7.0	21	15	46	21	74
	2.0	1.4	4.0	2.4	7.3	3.4	10	7.5	22	9.9	29	22	65	29	104
	5	2.2	6.3	3.8	12	5.3	16	12	35	16	46	35	103	47	164
	10	3.1	8.9	5.4	16	7.5	22	17	49	22	65	49	145	66	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	14	6.2	22
	.50	0.4	1.2	0.7	2.2	1.0	3.1	2.2	6.5	3.1	9.0	6.6	20	9	31
	1.0	0.6	1.7	1.0	3.1	1.4	4.3	3.2	9.2	4.3	13	9.3	28	12	44
	2.0	0.8	2.4	1.5	4.4	2.0	6.1	4.5	13	6.1	18	13	39	18	62
	5	1.3	3.8	2.3	7.0	3.2	9.6	7.0	21	9.7	28	21	62	28	98
	10	1.8	5.4	3.3	9.8	4.6	14	10	29	14	40	29	87	39	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	7.4	3.3	12
	.50	0.2	0.7	0.4	1.2	0.6	1.7	1.2	3.6	1.6	4.8	3.5	11	4.7	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	15	6.6	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	21	9	33
Cv		2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	104	47	166

R-507 SUCTION VAPOR CAPACITIES, KILOWATTS

TABLE 11

Evap. Temp.	Pressure Drop	20 MM		25 MM		32 MM		40 MM		50 MM		80 MM		100 MM	
°C	(bar)	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
5	.02	1.9	5.8	3.5	11	4.9	15	11	32	14	43	32	95	44	152
	.04	2.7	8.3	4.9	15	6.9	21	15	45	20	61	45	134	62	215
	.08	3.8	12	7.0	21	9.8	29	21	64	29	87	64	190	88	304
	.15	5.2	16	9.6	29	13	40	29	87	40	119	88	260	120	416
	.4	8.6	26	16	47	22	65	47	142	65	194	143	425	196	679
	.6	10	32	19	58	27	80	58	174	79	238	175	520	240	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	53	25	85
	.04	1.5	4.6	2.7	8.3	4.0	12	8.4	25	11	34	25	75	35	120
	.08	2.1	6.5	3.9	12	5.6	17	12	36	16	48	36	107	49	170
	.15	2.9	8.9	5.3	16	7.7	23	16	49	22	66	49	146	67	233
	.4	4.8	15	8.6	26	13	38	27	80	36	108	80	238	110	380
	.6	5.8	18	11	32	15	46	33	98	44	132	98	292	135	466
-40	.02	0.6	1.9	1.1	3.4	1.6	4.7	3.4	10	4.6	14	10	31	14	49
	.04	0.9	2.6	1.6	4.8	2.3	6.7	4.8	14	6.5	20	15	43	20	69
	.08	1.2	3.7	2.2	6.8	3.2	9.5	6.8	20	9.2	28	21	61	28	98
	.15	1.7	5.1	3.1	9.3	4.4	13	9.3	28	13	38	28	84	39	134
Kv		1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	89	40	142

Reduced Capacity V-Ports shown in gray.

For best control and modulation, size the MCV 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.

MCR AND MCXV LIQUID MAKE-UP AND DIRECT EXPANSION CAPACITIES, TONS

TABLE 12

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
1/16″	MCXV/C	3/4″	3/4″	0.2	24	14	5	3	4	3	4	3	3	3
7/32″	MCXV/A	3/4″	3/4″	0.6	73	42	15	10	11	8	11	9	10	8
9/32″	MCXV/B	1″	1″	1.1	133	77	27	18	21	14	19	15	19	15
3/4″	MCR	1-1/2″	1-1/2″	2.2	266	155	54	37	41	28	39	31	38	30
1″	MCR	2″	2″	3.9	472	274	97	65	73	49	68	55	67	53
1-1/4″	MCR	2-1/2″	2-1/2″	5.5	666	387	136	92	104	69	97	77	95	74
1-1/2″	MCR	4″	4″	12	1,453	844	297	200	226	151	211	168	207	163
2″	MCR	4″	4″	16	1,937	1,125	396	267	301	202	281	224	277	217
3″	MCR	6″	6″	35	4,237	2,461	867	553	659	441	614	490	605	474
4″	MCR	6″	8″	47	5,689	3,304	1,164	783	885	592	825	658	812	637

MCR AND MCXV LIQUID MAKE-UP AND DIRECT EXPANSION CAPACITIES, KILOWATTS

TABLE 13

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
2	MCXV/C	20	20	0.16	86	49	18	12	13	9	13	9	12	9
5	MCXV/A	20	20	0.5	257	148	53	35	39	28	39	28	35	28
7	MCXV/B	25	25	0.9	468	271	95	63	74	49	67	53	67	53
20	MCR	40	40	1.8	936	545	190	130	144	98	137	109	134	106
25	MCR	50	50	3.3	1660	964	341	229	257	172	239	193	236	186
32	MCR	65	65	4.7	2342	1361	478	324	366	243	341	271	334	260
40	MCR	100	100	10.0	5110	2968	1045	703	795	531	742	591	728	573
50	MCR	100	100	13.3	6812	3957	1393	939	1059	710	988	788	974	763
80	MCR	150	150	30	14902	8655	3049	2050	2318	1551	988	2159	2128	1667
100	MCR	150	200	40	20008	11620	4094	2754	3113	2082	988	2902	2856	2240

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 Motorized Control 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.

AMMONIA HIGH PRESSURE LIQUID LINE CAPACITIES, TONS

TABLE 14

Pressure Drop psi	3/4″		1″		1-1/4″		1-1/2″		2″		3″		4″	
	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
1.0	34	98	60	180	85	254	185	539	246	723	539	1,601	724	2,555
2.0	48	139	85	255	120	359	261	762	348	1,023	762	2,264	1,023	3,614
Cv	2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	104	47	166

AMMONIA HIGH PRESSURE LIQUID LINE CAPACITIES, KILOWATTS

TABLE 15

Pressure Drop bar	20mm		25mm		32mm		40mm		50mm		80mm		100mm	
	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
0.10	139	425	255	773	363	1,082	773	2,318	1,053	3,168	2,344	6,953	3,212	11,125
0.20	197	601	361	1,093	514	1,530	1,093	3,278	1,490	4,480	3,314	9,833	4,543	15,733
kv	1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	89	40	142

R-22 HIGH PRESSURE LIQUID LINE CAPACITIES, TONS

TABLE 16

Pressure Drop psi	3/4″		1″		1-1/4″		1-1/2″		2″		3″		4″	
	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
1.0	7.0	21	12	37	18	53	39	113	52	151	113	336	152	535
2.0	10	29	18	53	25	75	55	160	73	214	160	475	214	757
Cv	2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	104	47	166

R-22 HIGH PRESSURE LIQUID LINE CAPACITIES, KILOWATTS

TABLE 17

Pressure Drop bar	20mm		25mm		32mm		40mm		50mm		80mm		100mm	
	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
0.10	30	91	54	164	77	230	164	493	218	657	493	1,460	673	2,330
0.20	42	128	77	232	109	325	232	697	309	929	697	2,070	952	3,300
kv	1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	89	40	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.

R-134a HIGH PRESSURE LIQUID LINE CAPACITIES, TONS

TABLE 18

Pressure Drop psi	3/4″		1″		1-1/4″		1-1/2″		2″		3″		4″	
	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
1.0	7.0	19	12	35	16	49	36	104	47	139	104	309	140	493
2.0	9.0	27	16	49	23	69	50	147	67	197	147	437	197	697
Cv	2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	104	47	166

R-134a HIGH PRESSURE LIQUID LINE CAPACITIES, KILOWATTS

TABLE 19

Pressure Drop bar	20		25		32		40		50		80		100	
	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
0.10	27	83	50	152	71	213	152	456	202	607	456	1,350	623	2,160
0.20	39	118	71	215	101	301	215	645	286	859	644	1,912	881	3,051
kv	1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	89	40	142

R-404 HIGH PRESSURE LIQUID LINE CAPACITIES, TONS

TABLE 20

Pressure Drop psi	3/4″		1″		1-1/4″		1-1/2″		2″		3″		4″	
	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
1.0	4.0	13	8.0	23	11	33	24	69	32	93	69	204	92	326
2.0	6.0	18	11	33	15	46	33	97	45	131	97	289	131	461
Cv	2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	104	47	166

R-404 HIGH PRESSURE LIQUID LINE CAPACITIES, KILOWATTS

TABLE 21

Pressure Drop bar	20		25		32		40		50		80		100	
	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
0.10	19	57	34	103	48	144	103	310	141	423	313	928	431	1,490
0.20	26	80	48	146	68	204	146	438	199	598	443	1,320	610	2,110
kv	1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	89	40	142

R-507 HIGH PRESSURE LIQUID LINE CAPACITIES, TONS

TABLE 22

Pressure Drop psi	3/4″		1″		1-1/4″		1-1/2″		2″		3″		4″	
	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
1.0	4.0	13	8.0	23	11	33	24	69	32	93	69	205	92	327
2.0	6.0	18	11	33	15	46	33	97	45	131	98	290	131	462
Cv	2.2	6.4	3.9	11.7	5.5	16.4	12	35	16	47	35	104	47	166

R-507 HIGH PRESSURE LIQUID LINE CAPACITIES, KILOWATTS

TABLE 23

Pressure Drop bar	20		25		32		40		50		80		100	
	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV	MCR	MCV
0.10	19	57	34	104	49	145	104	311	142	426	313	928	429	1,490
0.20	27	81	49	147	69	205	147	440	200	602	443	1,310	607	2,100
kv	1.8	5.5	3.3	10	4.7	14	10	30	13.3	40	30	89	40	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.

MCR AND MCV HOT GAS SOLENOID DEFROST CAPACITIES

EVAPORTATOR SIZE TONS

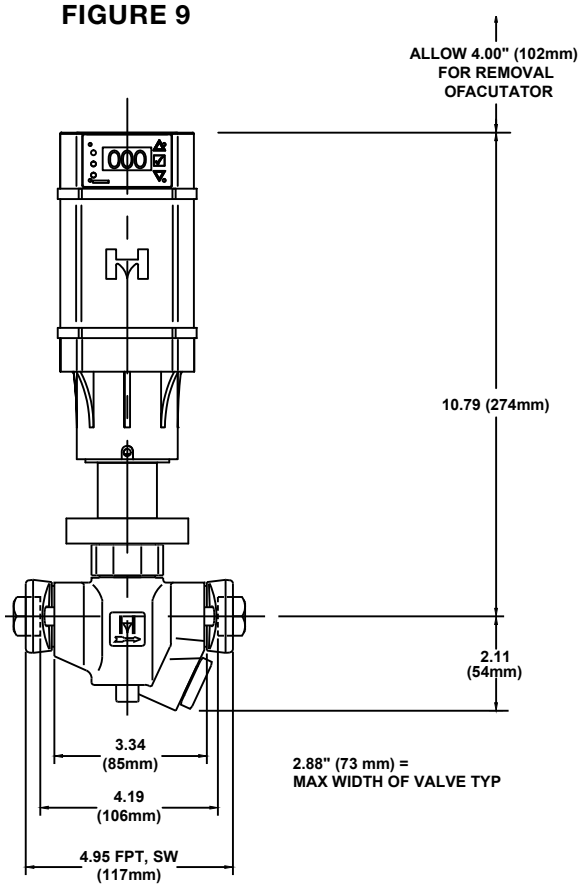
TABLE 24

Refrigerant	Port 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.

MCXV MOTORIZED CONTROL VALVE

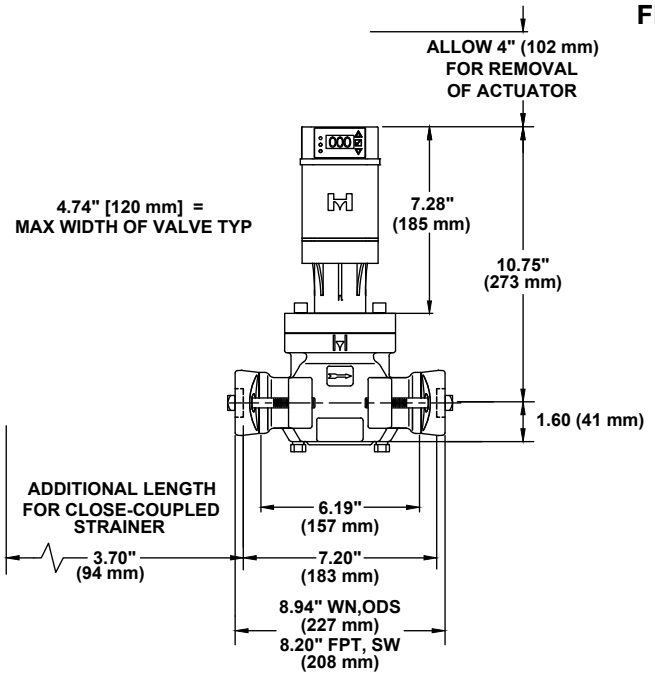
FIGURE 9



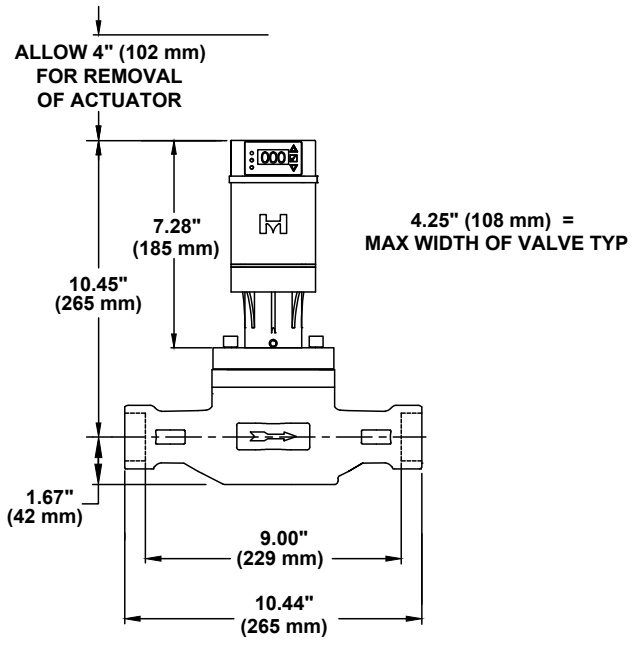
FLANGED VALVE ONLY

3/4” THRU 1-1/4” MOTORIZED CONTROL VALVE

FIGURE 10



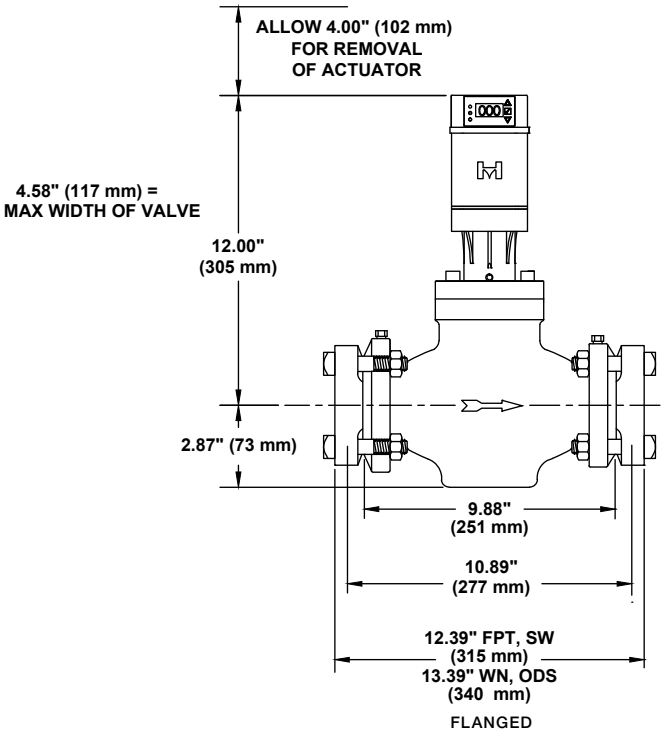
FLANGED

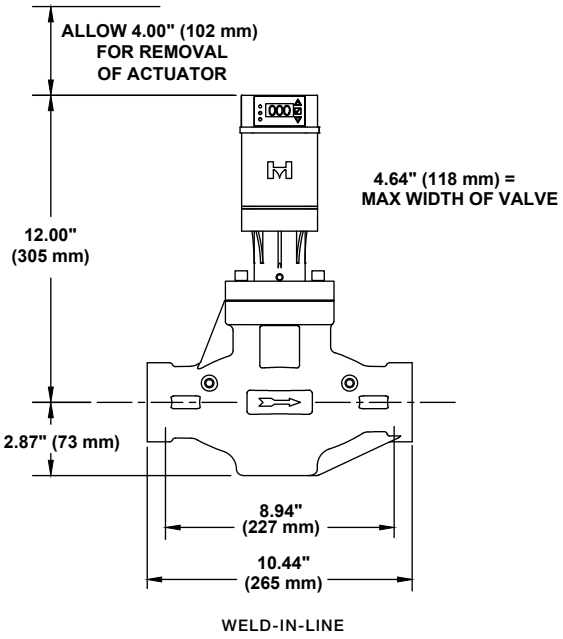


WELD-IN-LINE

1-1/2” THRU 2” MOTORIZED CONTROL VALVE

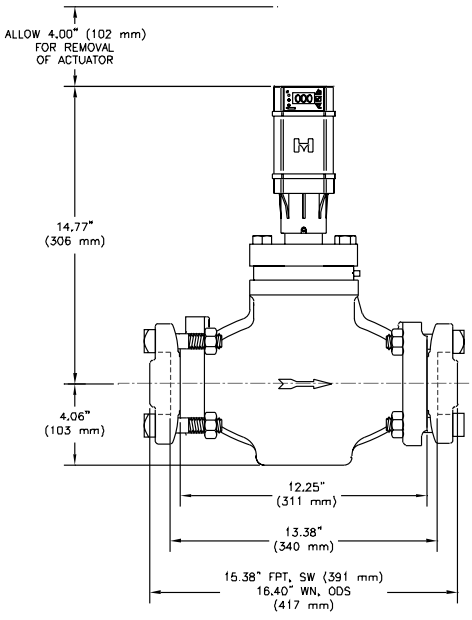
FIGURE 11

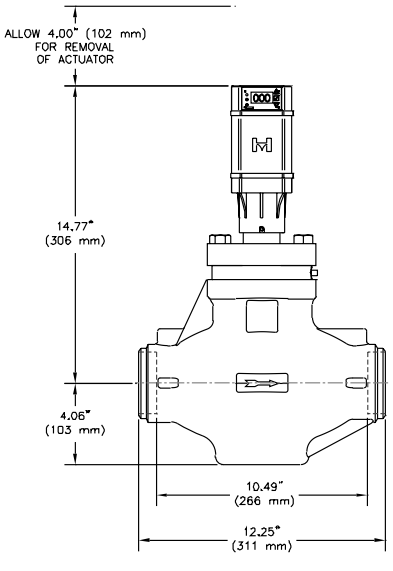




3” MOTORIZED CONTROL VALVE

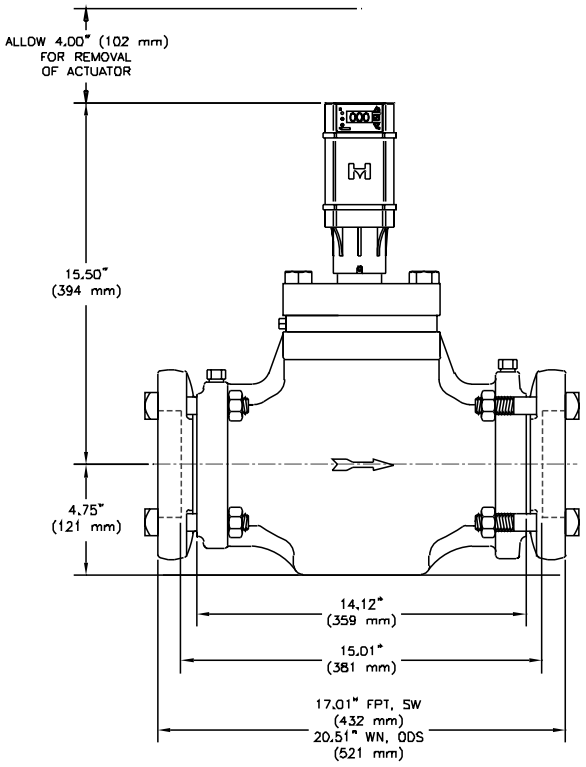
FIGURE 12



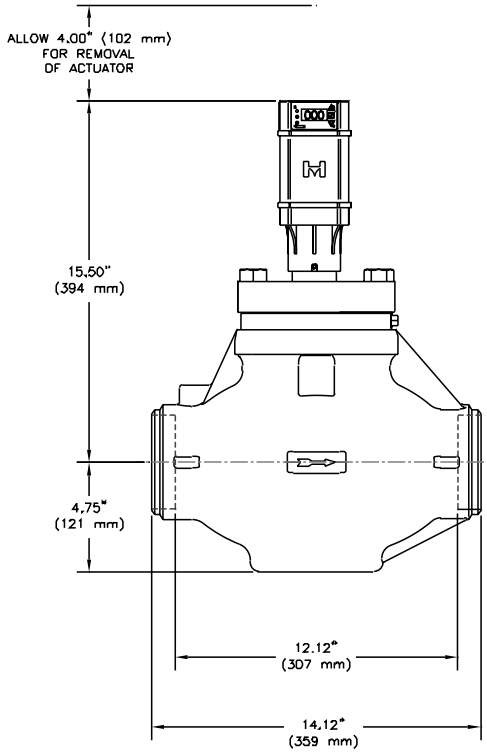


4" MOTORIZED CONTROL VALVE

FIGURE 13



FLANGED



WELD-IN-LINE

INSTALLATION OVERVIEW

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. 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 2˝ Motorized Control Valves.*

Please note: Valve will not backflow if in closed position. *Do not install check valves upstream of the Motorized Control Valve without hydrostatic pressure relief.* Do not close the hand valve on inlet or outlet without making sure valve is in the open position.

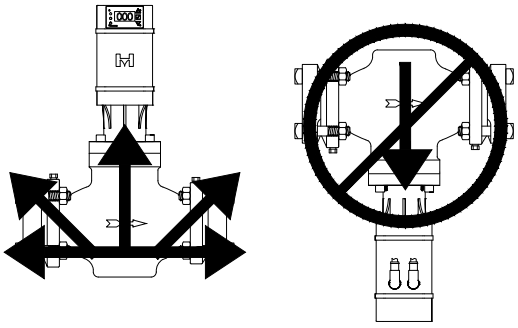
1/4˝ NPT Gauge/Purge port connections are provided on the inlet and outlet of the 3/4˝ thru 2˝ valves standard.

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 should be lubricated with an anti-seize and must be tightened evenly.

Protect cables 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.



MANUAL CONTROL TOOL (MCT)

The V-port can be manually actuated by using the Manual Control Tool (MCT), see Figure 14. To utilize the MCT, the actuator would need to be removed from the valve. This can be done by first removing the cables plugged into the actuator, power (red) cable followed by the signal (green) cable. The valve v-port will remain in the same position it was at when cable was unplugged. Remove the actuator by loosening the three set screws at the base. DO NOT REMOVE THE BONNET. Place the MCT over the cartridge and turn the MCT clockwise to open or counterclockwise to close. Before re-installing rotate the MCT counterclockwise until the V-port is closed. Refer to TABLE 25 for the number of turns to fully actuate the valve. MCT is required to install V-port fully onto cartridge or remove V-port from cartridge (this includes during converting from SMV to MCV).

To reinstall the actuator, follow the instructions on page 21.

FIGURE 14

TABLE 25

NUMBER OF TURNS TO ACTUATE VALVE	
VALVE PORT SIZE INCH (MM)	**NUMBER OF TURNS**
1/16" THRU 9/32" (2 THRU 7)	6
3/4" THRU 1-1/4" (20 THRU 32)	7
1-1/2" THRU 2" (40 THRU 50)	12
3" (80)	18
4" (100)	20

INSTALLATION INSTRUCTIONS NEW COMPLETE VALVE

NOTE: Do not power on actuator until it is mounted to the valve and the set screws are properly torqued.

1. Remove valve, actuator, and remaining contents from box.
2. For flanged valves, align valve with arrow pointing in direction of flow and mount per install protocol. For weld in line valves, it is recommended to remove the cartridge/V-port assembly during welding by loosening bolts and removing bonnet. Replace cartridge/V-port assembly after valve body is installed and ensure o-ring in installed onto cartridge.
3. Install bonnet onto cartridge assembly and tighten four bonnet bolts.
4. Place Manual Control Tool (MCT) onto the top of magnetic cartridge assembly. Continue to rotate the tool counterclockwise until the valve is closed and the V-port will no longer move.
5. Grease exterior of cartridge above the O-ring with supplied low temp, high load, low RPM grease such as Lubriplate Aero or similar.
6. Check the base of the actuator to ensure that the set screws are not protruding past the ID of the threaded ring. If necessary back the set screws out to prevent interference during installation.
7. Install actuator onto cartridge. Press firmly down on the top of the actuator to ensure it fully seats. The gap between the base of the actuator and bonnet should be less than 1/16".
8. Rotate actuator to orient in desired position and torque the 3 set screws at base to 4 in-lb using 3/32" hex key.
9. Wire the flying lead ends of the cable to power and the desired input signal and feedback loop per wiring diagram.
10. Connect the red and green cables to the actuator
11. Upon power-up, the valve will automatically calibrate.
12. Actuator is programmed for 4-20mA input signal. See page 40 to change if other signal is used.

CONVERSION FROM SMV TO MCV

NOTE: Do not power on actuator until it is mounted to the valve and the set screws are torqued.

1. Isolate and pump down existing valve per PSMs.
2. Disconnect existing powerhead connections.
3. Unscrew the powerhead screws and remove the powerhead.
4. Unscrew bonnet bolts and remove the bonnet.
5. Remove existing can and cartridge assembly. Ensure old gasket is removed from counter bore on top face of valve.
6. Remove new actuator and remaining contents from box.
7. Install new cartridge gasket to counter bore on top face of valve.
8. Install V-port into cartridge while fully supporting the V-port and cartridge and 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. Using the MCT, fully thread the V-port into the cartridge, screwing the V-port fully into the cartridge by turning the rotor clockwise.
9. Install new rotor cartridge/V-port assembly into valve.
10. Install new bonnet over cartridge assembly and tighten bonnet bolts.
11. Ensure O-ring is installed onto cartridge assembly.
12. Place Manual Control Tool (MCT) onto the top of magnetic cartridge assembly. Continue to rotate the tool counterclockwise until the valve is closed and the V-port will no longer move.
13. Grease exterior of cartridge above the O-ring with supplied low temp, high load, low RPM grease such as Lubriplate Aero or similar.
14. Check the base of the actuator to ensure that the set screws are not protruding past the ID of the threaded ring. If necessary back the set screws out to prevent interference during installation.
15. Install new actuator onto cartridge. Press firmly down on the top of the actuator to ensure it fully seats. The gap between the base of the actuator and bonnet/ cartridge should be less than 1/16".
16. Rotate actuator to orient in desired position and torque the 3 set screws at base to 4 in-lb using 3/32" hex key.
17. For HMMR/HMMV conversion, connect the black 7 pin dongle connector to the existing connection already wired in place. The VPIF can be left in place if desired.

NOTE: For HMSV conversion cut off black 7 pin dongle connector to power and input/output, per wiring diagram. It is important to remove the 24VAC to the pink and yellow relay signal wires. Voltage to this line will cause damage as the input should only be a closed contact switched to ground.

18. Connect the red and green cables to the actuator.
19. Upon power-up, the valve will automatically calibrate.
20. Confirm actuator is programmed for valve size and input signal through the keypad display. See page 40.

NOTE: Gaskets and O-rings should be replaced with new if they are removed from valve. Recommend to lubricate new gaskets/O-rings with oil prior to installing. Bolts should have anti-seize applied.

CUSTOMER SUPPLIED POWER SUPPLY AND CONTROLLER
(Current Input Modulating Control with Position Feedback)

The valve is supplied with 6.5 feet of cable with 22 and 24 gauge wires. For greater distance between valve and controller use wire size as shown in Table 1: 24VAC/DC Power Wiring. Do not run Motorized Control Valve wiring with or near high voltage power wiring or VFD Controls (Variable Frequency Drives). Do not earth or ground 24 VAC wiring.

FIGURE 15

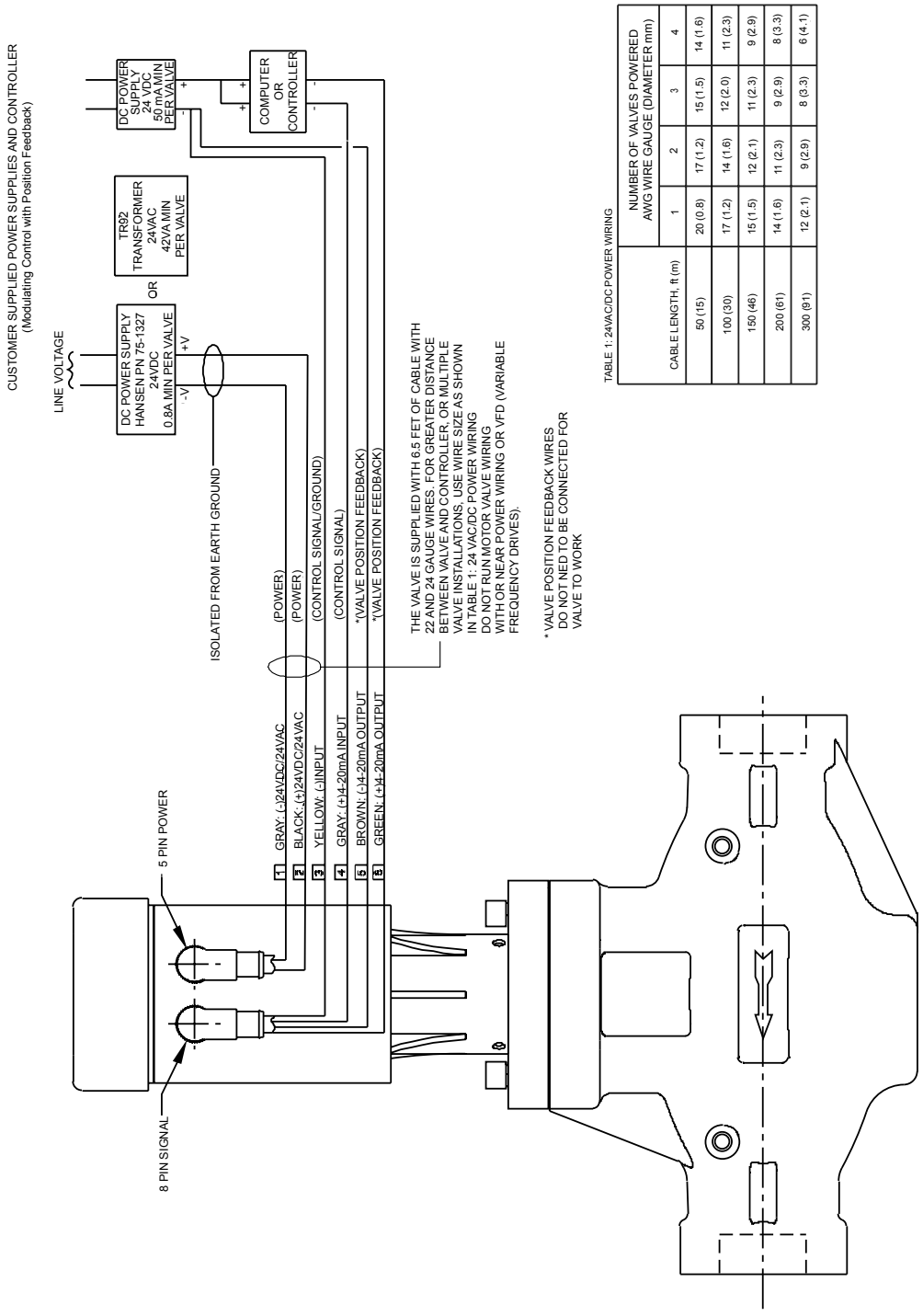


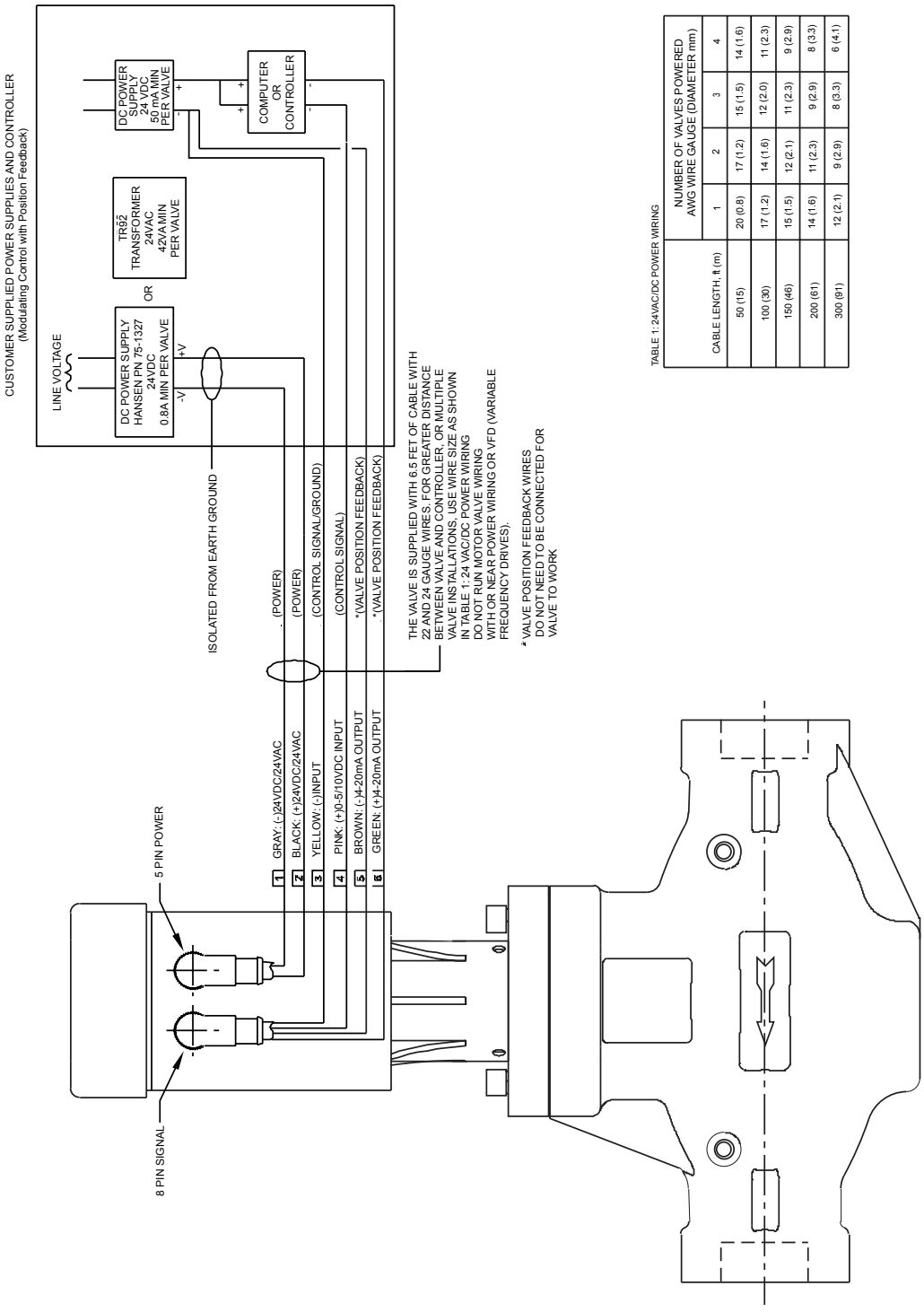
TABLE 1: 24VAC/DC POWER WIRING

CABLE LENGTH, ft (m)	NUMBER OF VALVES POWERED AWG WIRE GAUGE (DIAMETER mm)			
	1	2	3	4
50 (15)	20 (0.8)	17 (1.2)	15 (1.5)	14 (1.6)
100 (30)	17 (1.2)	14 (1.6)	12 (2.0)	11 (2.3)
150 (46)	15 (1.5)	12 (2.1)	11 (2.3)	9 (2.9)
200 (61)	14 (1.6)	11 (2.3)	9 (2.9)	8 (3.3)
300 (91)	12 (2.1)	9 (2.9)	8 (3.3)	6 (4.1)

CUSTOMER SUPPLIED POWER SUPPLY AND CONTROLLER
(Voltage Input Modulating Control with Position Feedback)

The valve is supplied with 6.5 feet of cable with 22 and 24 gauge wires. For greater distance between valve and controller use wire size as shown in Table 1: 24VAC/DC Power Wiring. Do not run Motorized Control Valve wiring with or near high voltage power wiring or VFD Controls (Variable Frequency Drives). Do not earth or ground 24 VAC wiring.

FIGURE 16



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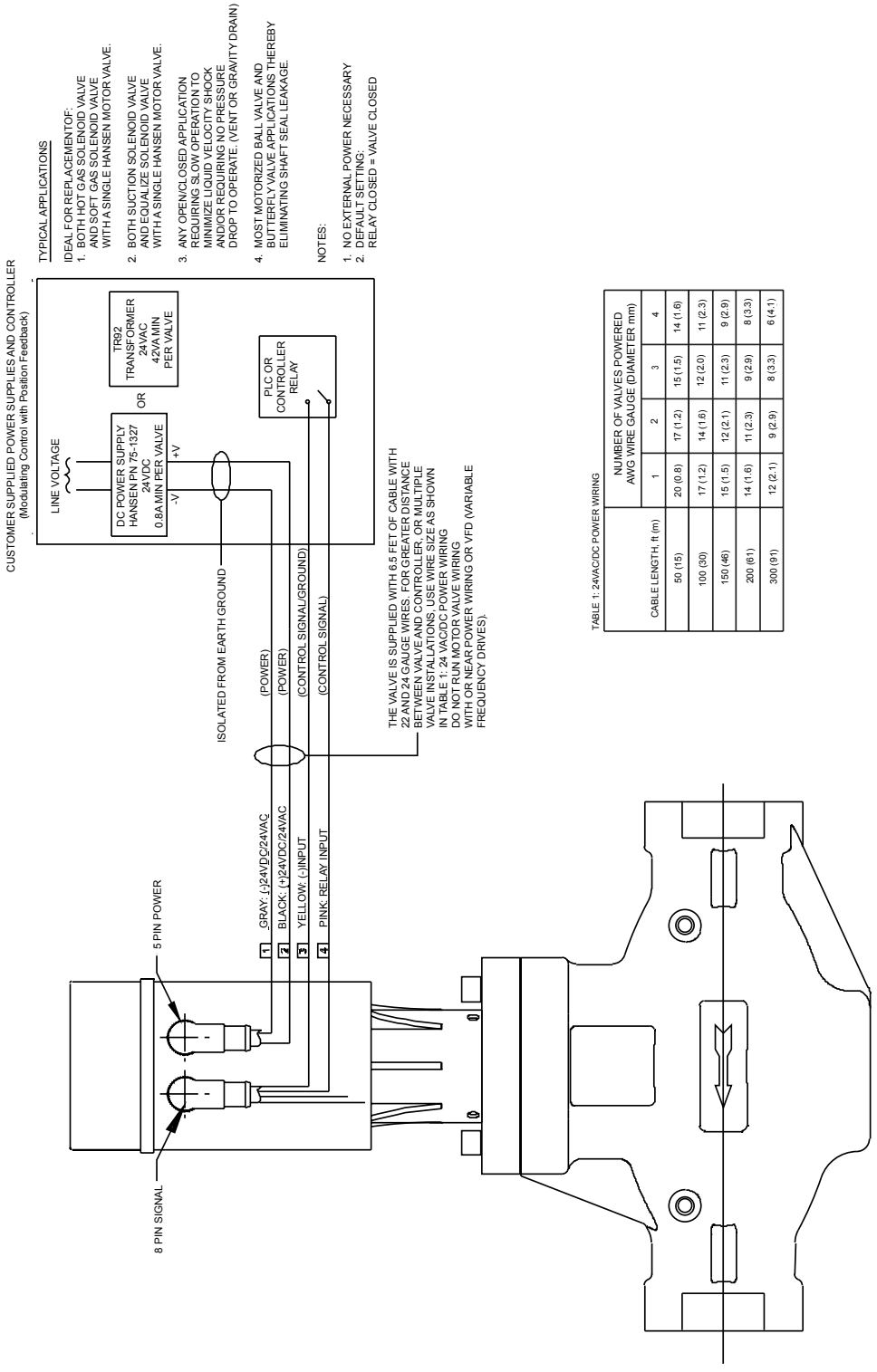
200 (61)	14 (1.6)	11 (2.3)	9 (2.9)	8 (3.3)
300 (91)	12 (2.1)	9 (2.9)	8 (3.3)	6 (4.1)

CUSTOMER SUPPLIED POWER SUPPLY AND CONTROLLER
(Relay Input Slow Open/Close Solenoid Control)

The valve is supplied with 6.5 feet of cable with 22 and 24 gauge wires. For greater distance between valve and controller use wire size as shown in Table 1: 24VAC/DC Power Wiring. Do not run Motorized Control Valve wiring with or near high voltage power wiring or VFD Controls (Variable Frequency Drives). Do not earth or ground 24 VAC wiring.

NOTE: Do not connect voltage to pink or yellow wires as it will damage the actuator board.

FIGURE 17



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200 (61)	14 (1.6)	11 (2.3)	9 (2.9)	8 (3.3)
300 (91)	12 (2.1)	9 (2.9)	8 (3.3)	6 (4.1)

HUPS POWER BACKUP SYSTEM

The Motorized Control Valve can be wired to an optional power backup system that will control the valve to a user defined location upon a loss of the incoming voltage. These locations of fully open, fully closed, or another open position can all be programmed through the user interface display. During power loss feedback signal will not be available and input signal to valve will not be utilized. The Uninterruptable Power Supply (HUPS) consists of a voltage monitoring system as well as an integrated battery.

The optional HUPS when combined with an appropriately sized DC power supply can run up to three Motorized Control Valves. If the incoming line voltage drops below 19 volts and the power backup system is active, the system will switch over to use the battery power. This UPS mode is indicated by a slow flashing green LED as seen on the diagram below. The RED will illuminate when there is an issue or the battery needs to be replaced. Once the incoming voltage level is restored, the valve will automatically return to normal control mode.

HUPS LED Mode Indicator – Green LED

HUPS LED Alarm Indicator – Red LED

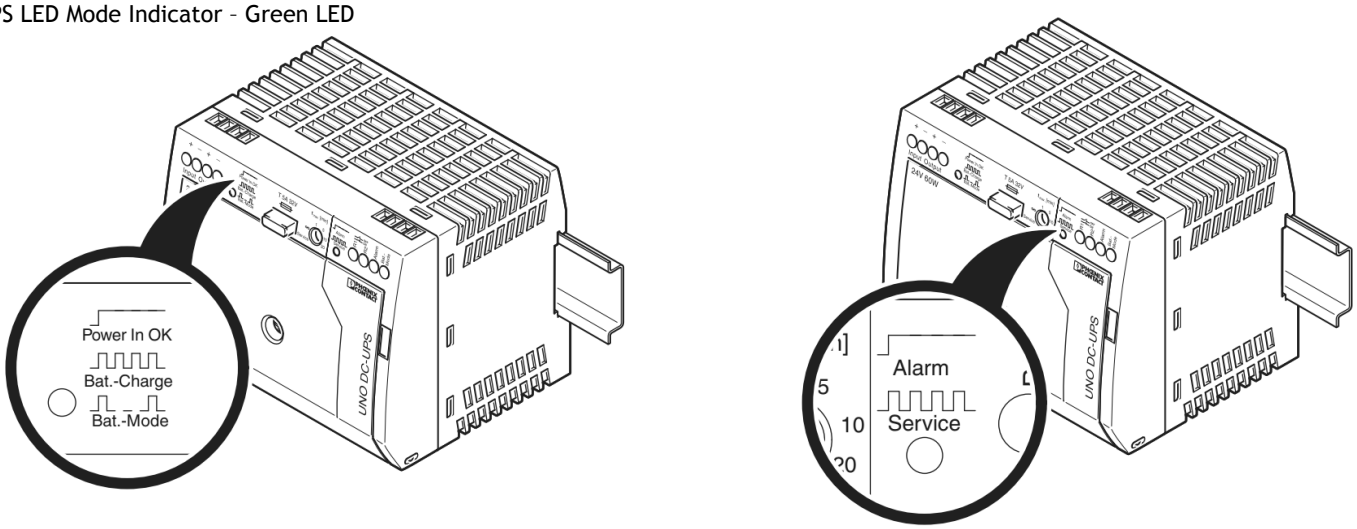
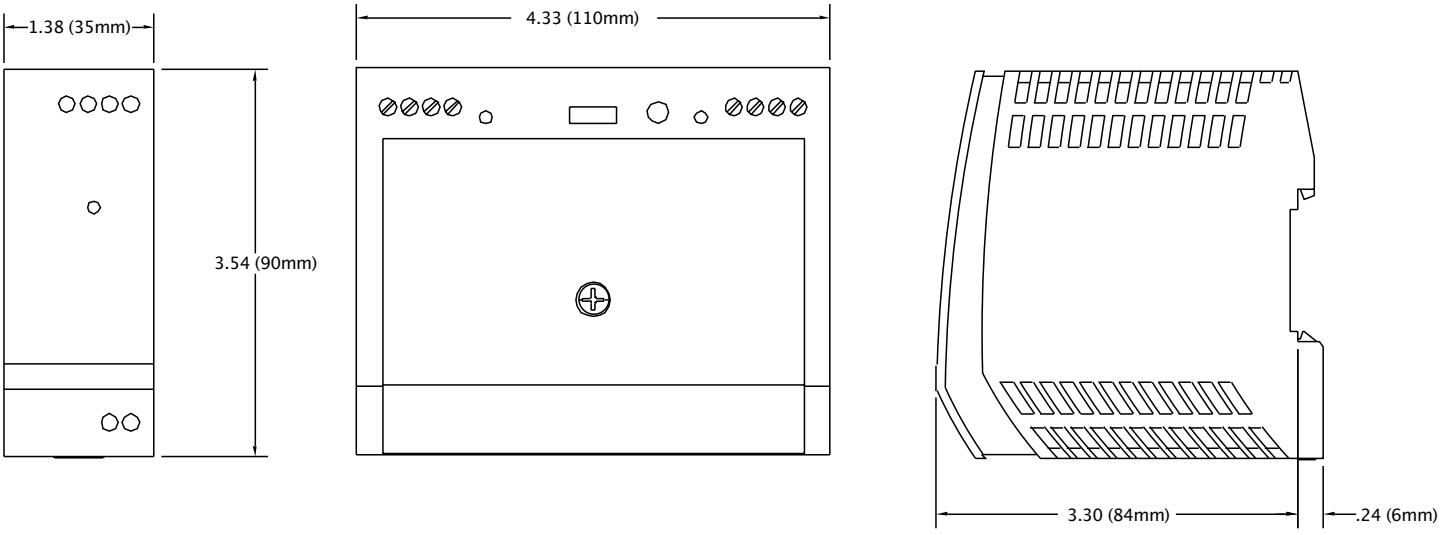
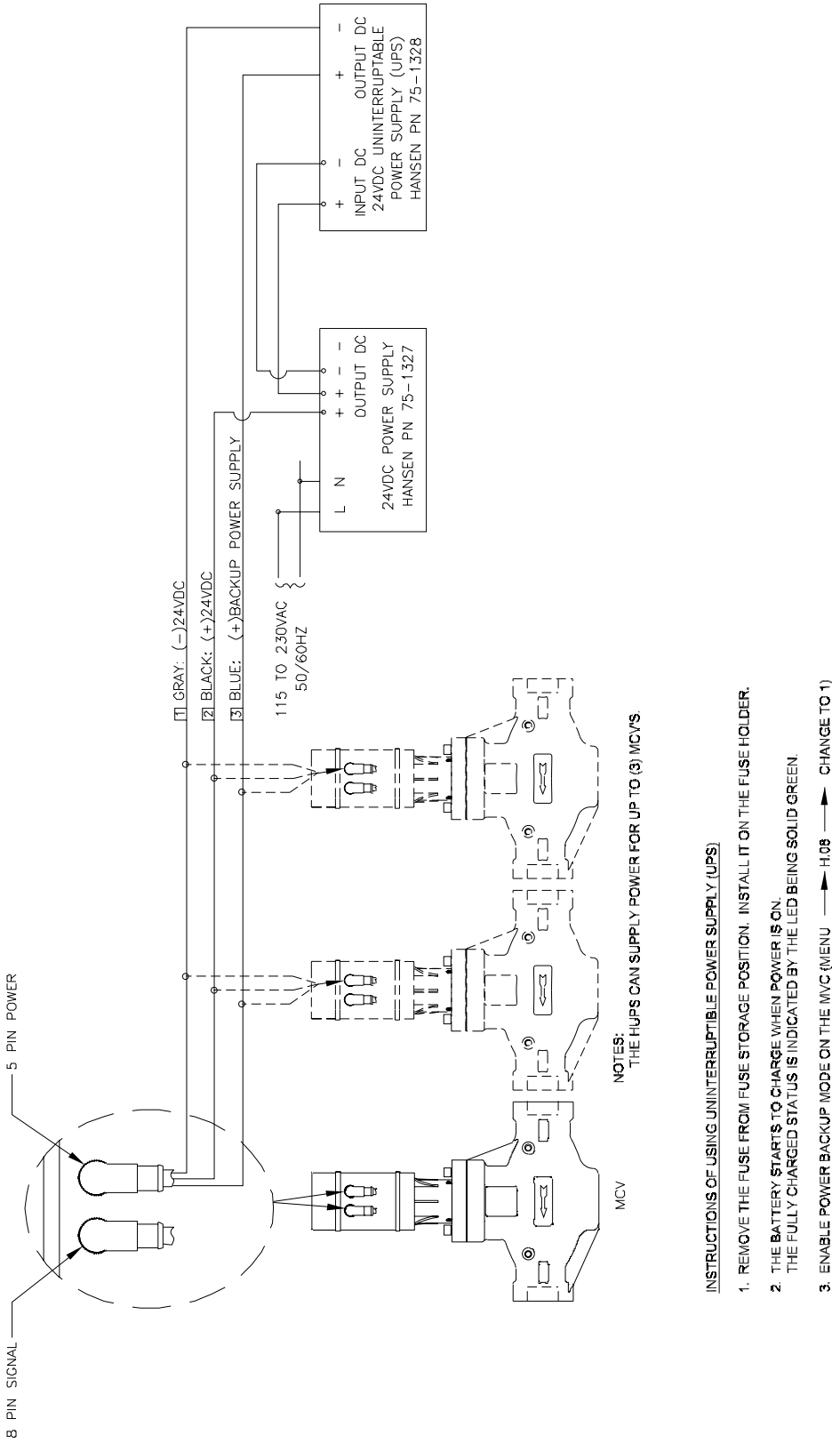


FIGURE 18



The valve is supplied with 6.5 feet of cable with 22 and 24 gauge wires. For greater distance between valve and controller use wire size as shown in Table 1: 24VAC/DC Power Wiring. Do not run Motorized Control Valve wiring with or near high voltage power wiring or VFD Controls (Variable Frequency Drives).

FIGURE 19



HANSEN PXVC CONTROLLERS

The PXVC Intelligent, single loop, PID controller is a standalone cabinet mounted electronic universal controller. The Hansen PXVC controller can be configured for several different applications. The controller, with factory defaults, will give reasonably good control. If control difficulties occur during startup, it is recommended first to thoroughly check system and components for proper installation, operation, and sensor location before attempting to tune the PXVC controller. Field alteration of the controller configuration is not recommended. Controller tuning of the P-I-D is performed in the “parameters” section and are the only parameters the user may need to optimize.

See the PXVC Universal Controller Bulletin found at www.hantech.com for more information.

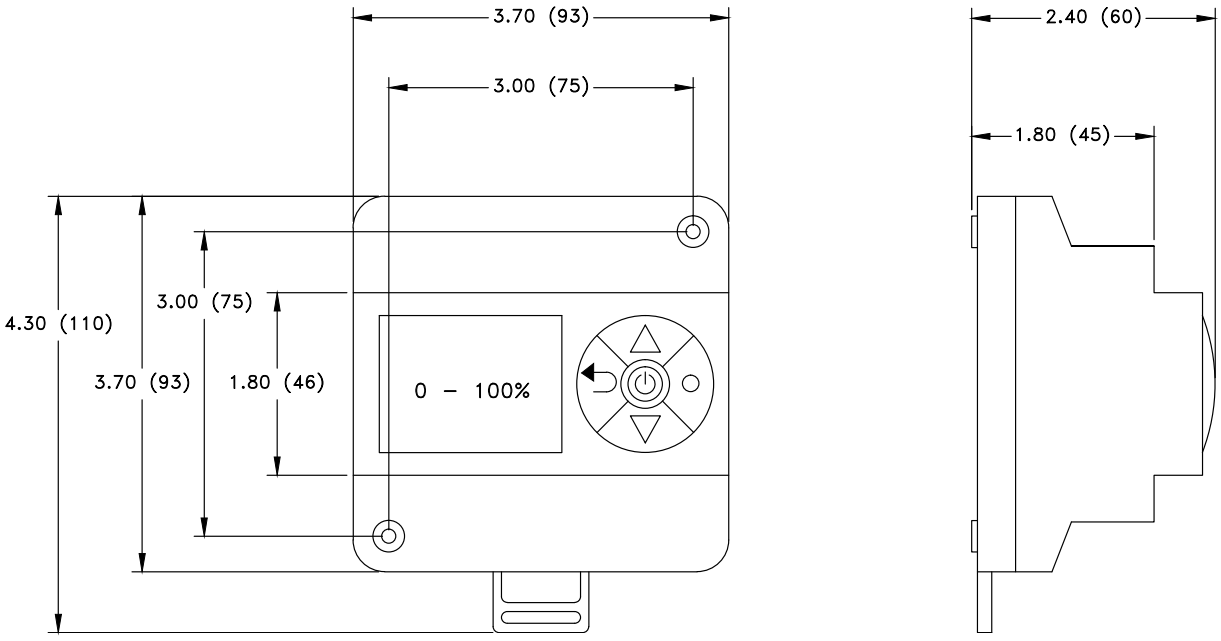
TECHNICAL SPECIFICATIONS
TABLE 26

		PXVC-PT	PXVC-P, PXVC-T, PXVC-L, PVXC-DX
POWER SUPPLY	Operating Voltage	24V AC, 50/60 Hz ±10% (OR) 24VDC	
	Power Consumption	Max. 3 VA	
	Electrical Connection	Terminal Connectors, Removable AWG 24...12	
SIGNAL INPUTS	Input #1	Pressure Transducer	Model Dependent, See Wiring Diagram
	Input #2	Temperature Sensor	Dry Contact Closure
	Input #3	Dry Contact Closure	Not Available
SIGNAL OUTPUTS	Output #1	N/A	
	Output #2	Alarm, 24...250VAC, 1A max, TRIAC	
	Output #3	4-20 mA @ 24VDC	
ENVIRONMENT	Temperature	32...122°F (0...50°C)	
	Humidity	< 95% r.H. non-condensing	
STANDARDS	conform according to EMC Standard 89/336/EEC EMEI Standard 73/23/EEC	EN 61 000-6-1/EN 61 000-6-3	
	Degree of Protection	NEMA1, IP30	
	Safety Class	I1 (IEC 60536)	
	Cover, back part	Fire proof ABS plastic (UL94 class V-O)	
	Weight (including package)	8.5 oz (240 g)	

▲Optional IP65 Enclosure available, See page 44

DIMENSIONS (IN, MM)

FIGURE 20

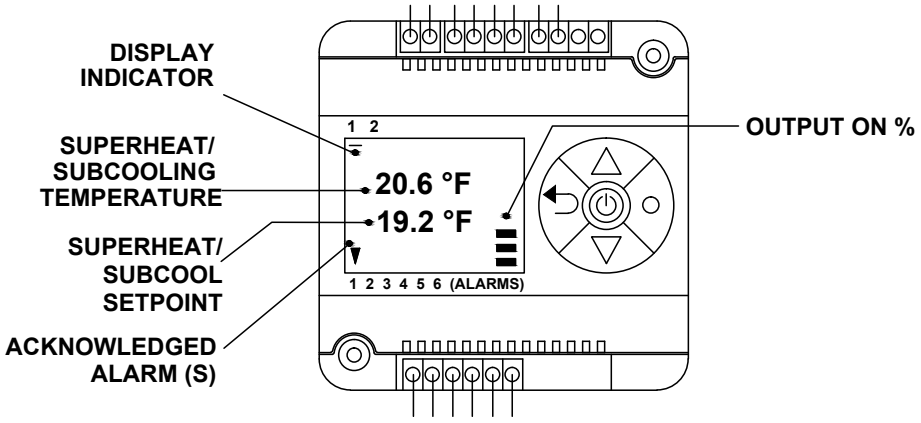


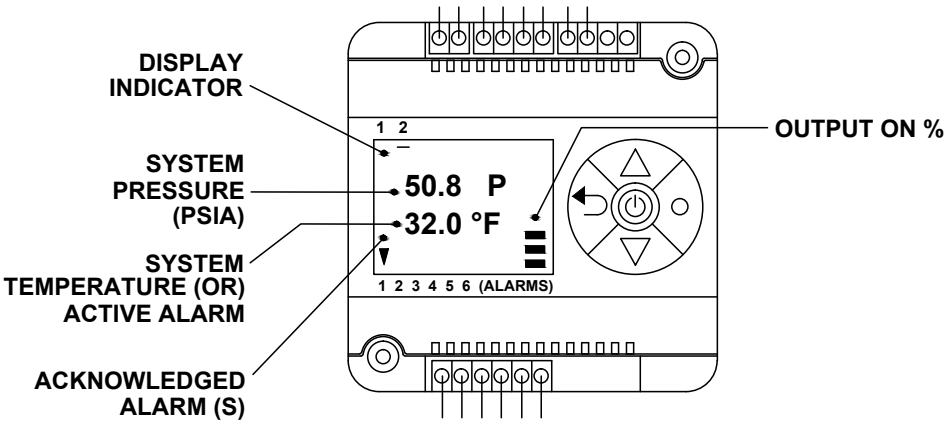
PXVC-PT (PRESSURE TEMPERATURE) SUPERHEAT/SUBCOOLING CONTROL OVERVIEW

The PXVC-PT controller is used in applications where the system temperatures are not less than -20°F (-28.9°C). It is factory programmed to provide precise control of the Hansen Motorized Control Valve for direct expansion evaporators. The two inputs, pressure transducer and temperature probe, are used to determine the amount of Superheat or Subcooling in a controlled refrigeration system. The PXVC-PT controls the Motorized Control Valve to modulate the refrigerant flow necessary to maintain a set for superheated gas leaving the evaporator.

FIGURE 21

DISPLAY AND KEYBOARD OPERATION



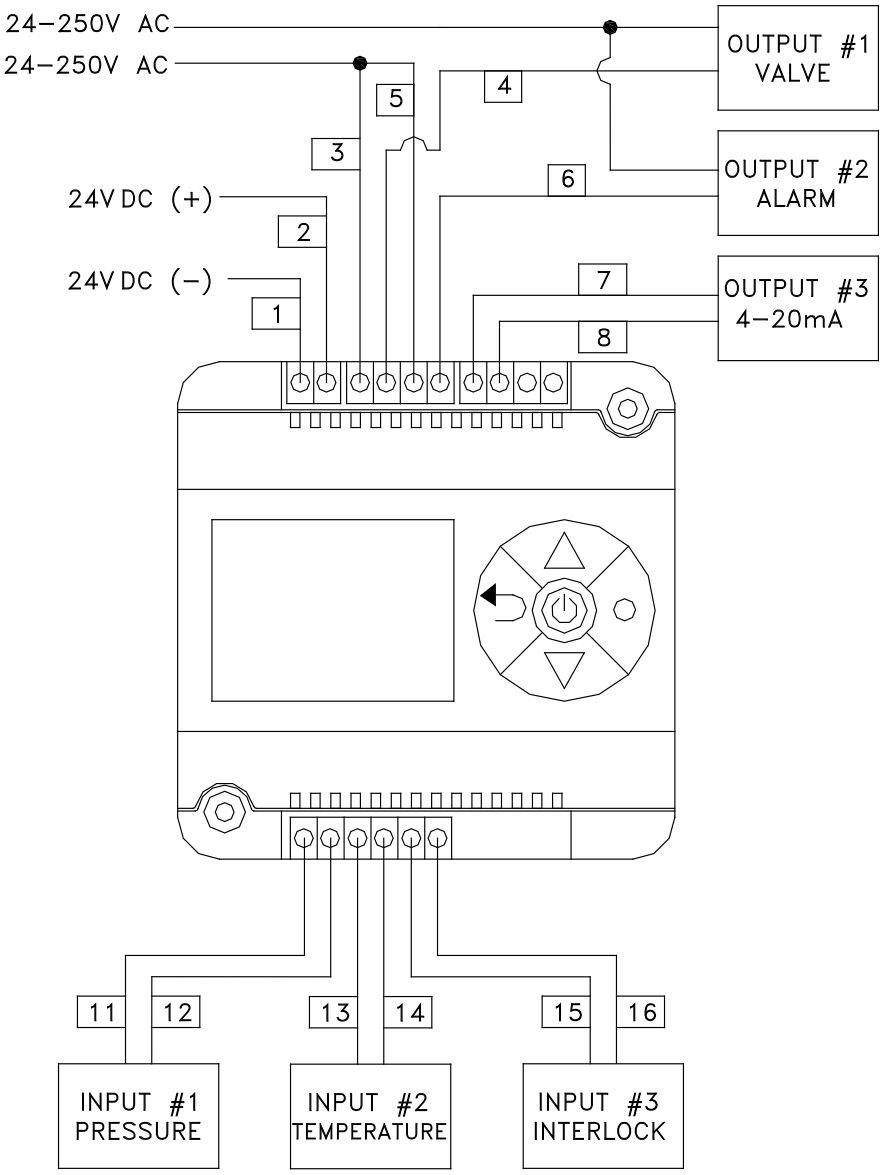


PXVC-PT FUNCTION KEYS

- Center (POWER) Key: > 2 seconds to TURN OFF the controller; Remote Interlock must be disabled. Parameter Setting: ENTER to select menu option and ACCEPT parameter change.
- UP Key: Increase SETPOINT. Parameter Setting: SCROLL menu options and parameters.
- Right (OPTIONS) Key: Acknowledge alarm conditions. Alarm message disabled for 15 seconds, priority 1-6. Parameter Settings: Enter to select menu options, and ACCEPT parameter change.
- Left (ESC) Key: Toggle between screens 1 and 2. Parameter Setting: Escape, menu option, discard parameter setting.

PXVC-PT INPUTS/OUTPUTS

FIGURE 22



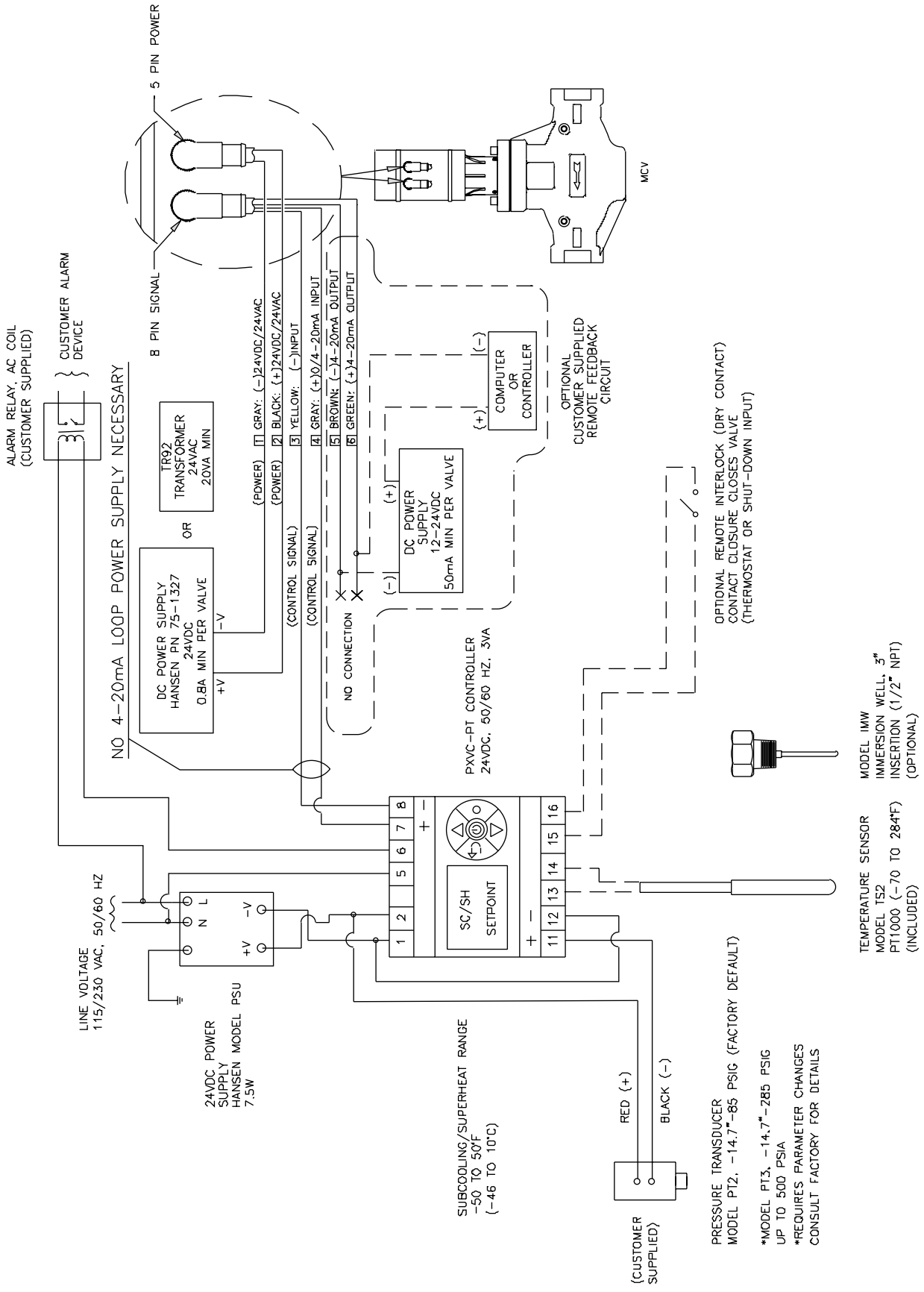
PXVC-PT TERMINAL DESCRIPTIONS

Terminal 1	Power Supply	24V DC (-)
Terminal 2	Power Supply	24V DC (+)
Terminal 11, 12	Input 1:	Hansen PT2 (-14.7 to 85 psig/6.8 bar) *Default* OR Hansen PT3 (-14.7 to 285 psig/20.6 bar) (+24VDC Loop Power Source needed)
Terminal 13, 14	Input 2:	Temperature Probe, Hansen TS2 (PT1000 included)
Terminal 15, 16	Input 3:	Remote Interlock, Dry Contact
Terminal 3, 4	*Output 1, Triac:	Pulse Voltage Output
Terminal 5, 6	*Output 2, Triac:	Alarm(s)
Terminal 7, 8	Output 3:	4-20mA Output for Hansen Motorized Control Valve (No Loop Power Supply Needed)

* INTERNAL SNUBBERS

PXVC-PT WIRING DIAGRAM, 115V/230V

FIGURE 23



PXVC-T (TEMPERATURE) CONTROL

The Hansen PXVC-T Controller is factory programmed to provide precise control of temperature in applications such as Liquid Injection of screw compressors. A temperature sensor, included, provides an input to the Hansen PXVC-T controller which controls the Hansen Motorized Control Valve. The valve modulates the refrigerant flow necessary to maintain a set for discharge gas temperature.

PXVC-L (LEVEL) CONTROL OF FLOODED EVAPORATORS

The Hansen PXVC-L Controller is factory programmed to provide precise control of liquid level in flooded evaporators, small liquid recirculators, and other refrigerant level vessels. A 4-20 mA input signal from the Hansen VLT level probe, Hansen Vari-Level with 4-20 mA, or other liquid level device to the Hansen PXVC-L controller which controls the Hansen Motorized Control Valve. The valve modulates the refrigerant flow necessary to maintain a set-for liquid level in the vessel.

PXVC-DX CONTROL OF EVAPORATOR

The Hansen PXVC-DX Controller is used with system temperatures less than -20°F (-28.9°C). It is factor programmed to provide precise control of the Hansen Motorized Control Valve for direct expansion evaporators. A 4-20mA input signal from the Hansen HPT superheat sensor or computer output of superheat to the PXVC-DX controller which controls the Hansen Motorized Control Valve. The valve modulates the refrigerant flow necessary to maintain a set superheat setpoint.

PXVC-P (PRESSURE) CONTROL

The Hansen PXVC-P Controller is factory programmed to provide precise control of pressure in applications such as hot gas bypass to suction of a compressor. A pressure transducer, available from Hansen, provides an input to the Hansen PXVC-P controller which controls the Hansen Motorized Control Valve. The valve modulates the refrigerant flow necessary to maintain a set for pressure.

SELECTION OF SENSORS

Temperature Probe (Included)

- TS1, temperature sensor, NTC10K, length 2 inches with 6.5 feet cable
- IMW, temperature probe immersion well, length 4"

Pressure Transducer (Available)

- PT2, pressure transducer, -14.7–85 psig, 24VDC, 4-20mA output
- PT3 pressure transducer, -14.7–285 psig, 24VDC, 4-20mA output (Factory Default)

Subheat/Subcooling

- Hansen HPT

Level Control

- Hansen VLT probe or similar

SELECTION OF CONTROL VALVES

Motorized Valves

- Hansen MCR, MCV, MCXV

POWER FAILURE

Upon power-interruption, all parameters and set-points are memorized in non-volatile memory, and therefore do not have to be re-entered

ERROR MESSAGES

Err1: Temperature sensor faulty or missing.

Err3: Parameter error; check the input parameter settings.

Err4: Failure of an internal component required for operation. Product must be replaced.

ELECTRICAL CONNECTIONS

In an extremely impaired EMC environment use only shielded cables for input/output connections.

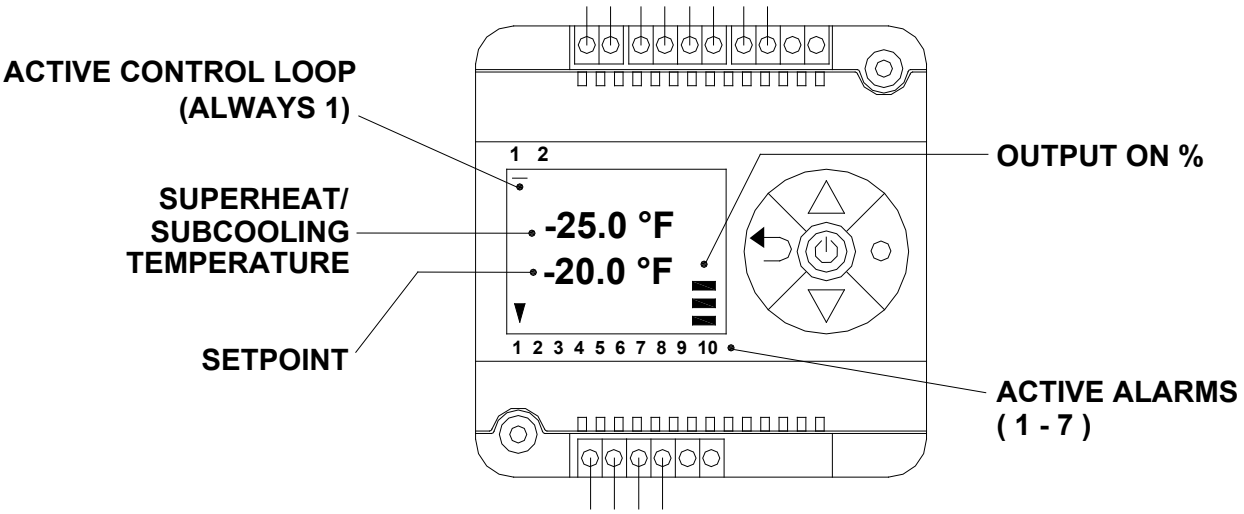
Use safety insulating transformers with double insulation; they must be designed for 100% ON-time.

RAMP UP DELAY

Ramp up delay provides a soft start control at startup. The active state is shown by the clock symbol on the display. At power-up or going from closed to open contacts on the INTERLOCK input, the controller will operate in “RAMP UP DELAY” mode for 2 minutes (default) or a predefined time (IL27 not equal to zero). During the countdown, the P-band is doubled and the KI-bands are halved resulting in a ***slower*** control response.

PXVC-T, PXVC-L, PXVC-P, PXVC-DX DISPLAY AND KEYPAD OPERATION

FIGURE 24

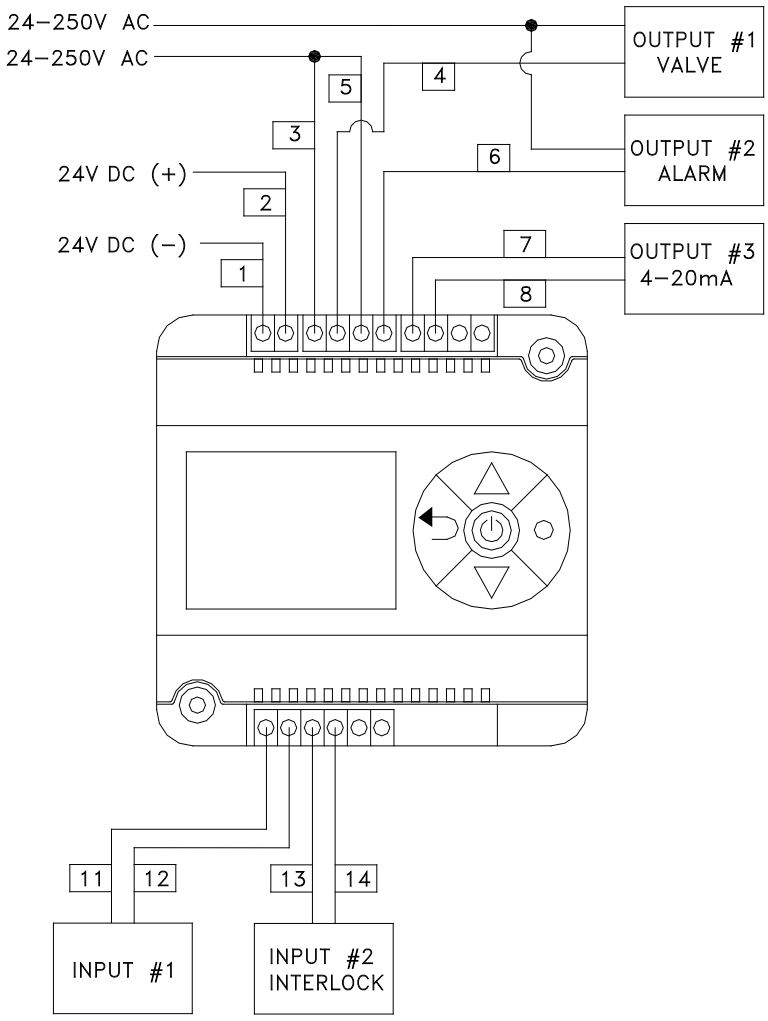


PXVC FUNCTION KEYS

- Center button (POWER): Pressing the button for more than 2 seconds switches the unit off — with Remote Interlock disabled.
- Up button: Increment set points and parameters, select menu options.
- Down button: Decrement set points and parameters, select menu options.
- Right button: Access for different control modes. Advance setting.
- Left button: Access for different control modes. Acts as escape to leave menu levels or discard parameters.

PXVC-T, PXVC-L, PXVC-P, PXVC-DX INPUTS/OUTPUTS

FIGURE 25



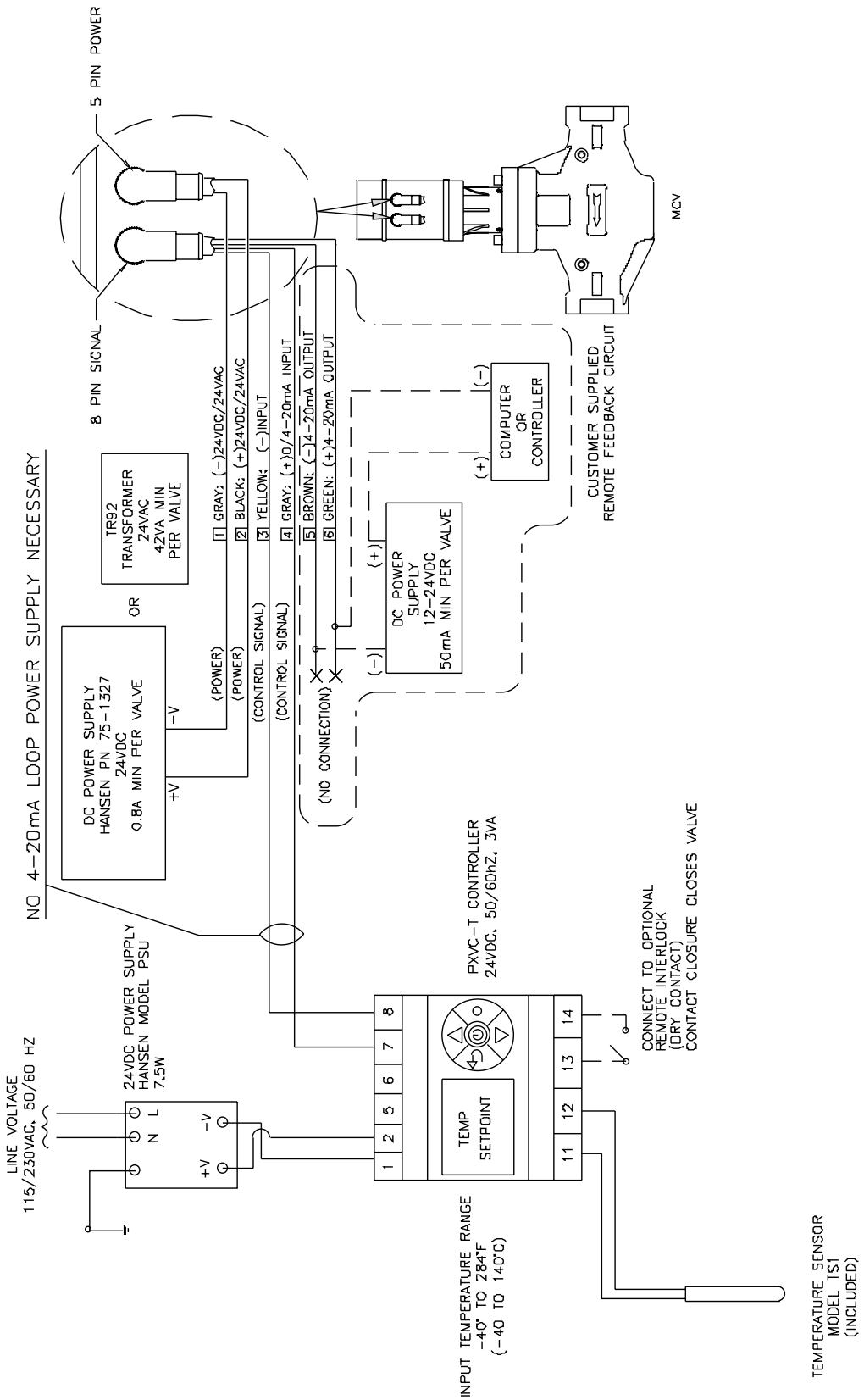
PXVC TERMINAL DESCRIPTIONS

Terminal 1	Power Supply	24V DC (-)
Terminal 2	Power Supply	24V DC (+)
Terminal 11, 12	Input 1:	– P: Hansen PT2 (-14.7 to 85 psig/6.8 bar) OR Hansen PT3 (-14.7 to 285 psig/20.6 bar) *Default* Loop Power Source needed (+24VDC)
		– T: Temperature, Hansen TS1 Sensor (Included) Hansen IMW, 4˝ Immersion Well (Purchase Separately)
		– DX: Hansen HPT717 (+24VDC Loop Power Source needed)
		– L: Hansen VLT or Similar (+24VDC Loop Power Source needed)
Terminal 13, 14	Input 2:	Optional Remote Interlock, Dry Contact
Terminal 3, 4	*Output 1, Triac:	Pulse Voltage Valve Output
Terminal 5, 6	*Output 2, Triac:	Alarm(s)
Terminal 7, 8	Output 3:	4-20m Output for Hansen Motorized Control Valve (No Loop Power Source needed)

* INTERNAL SNUBBERS

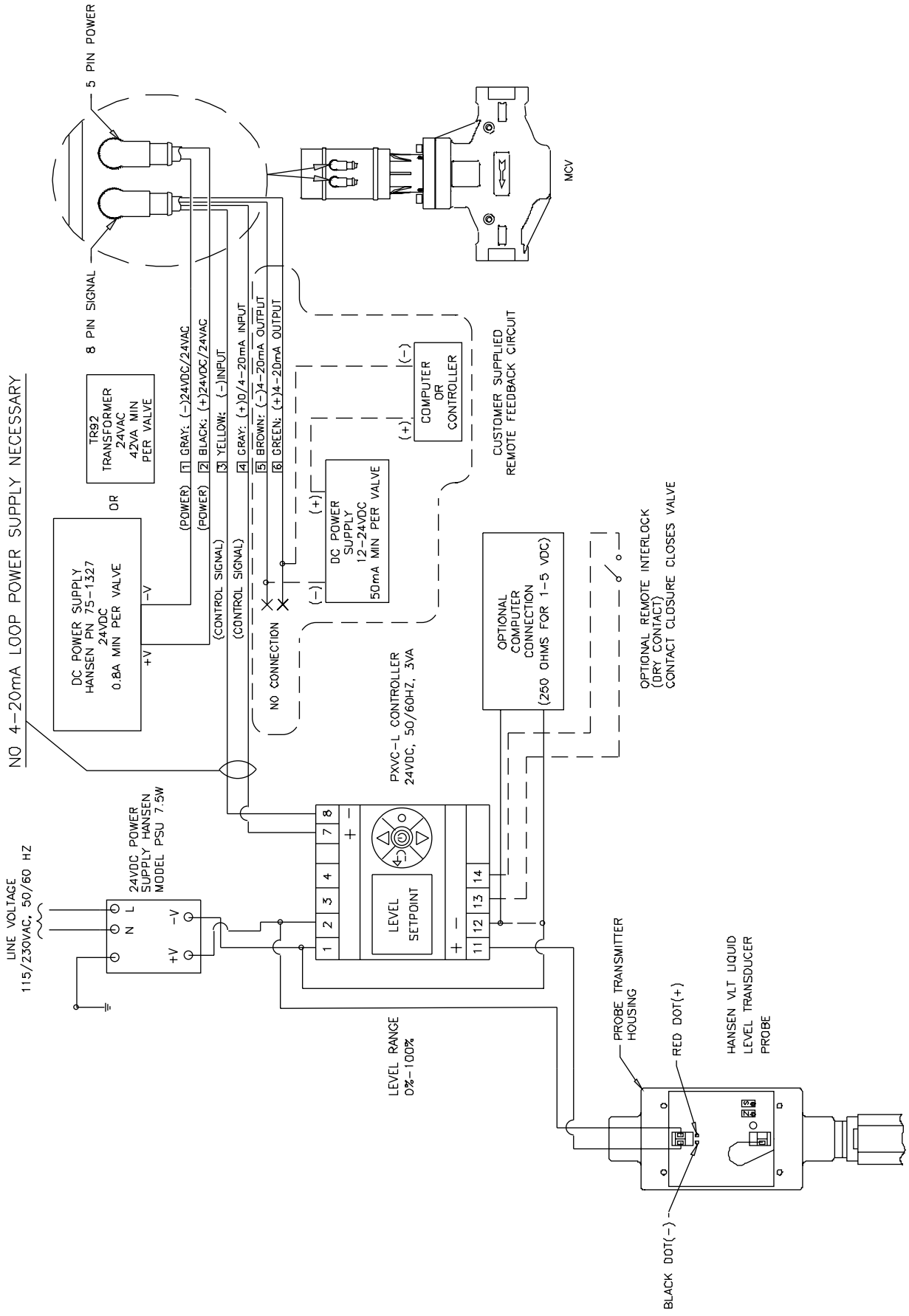
PXVC-T (TEMPERATURE) WIRING DIAGRAM, 115V/230V

FIGURE 26



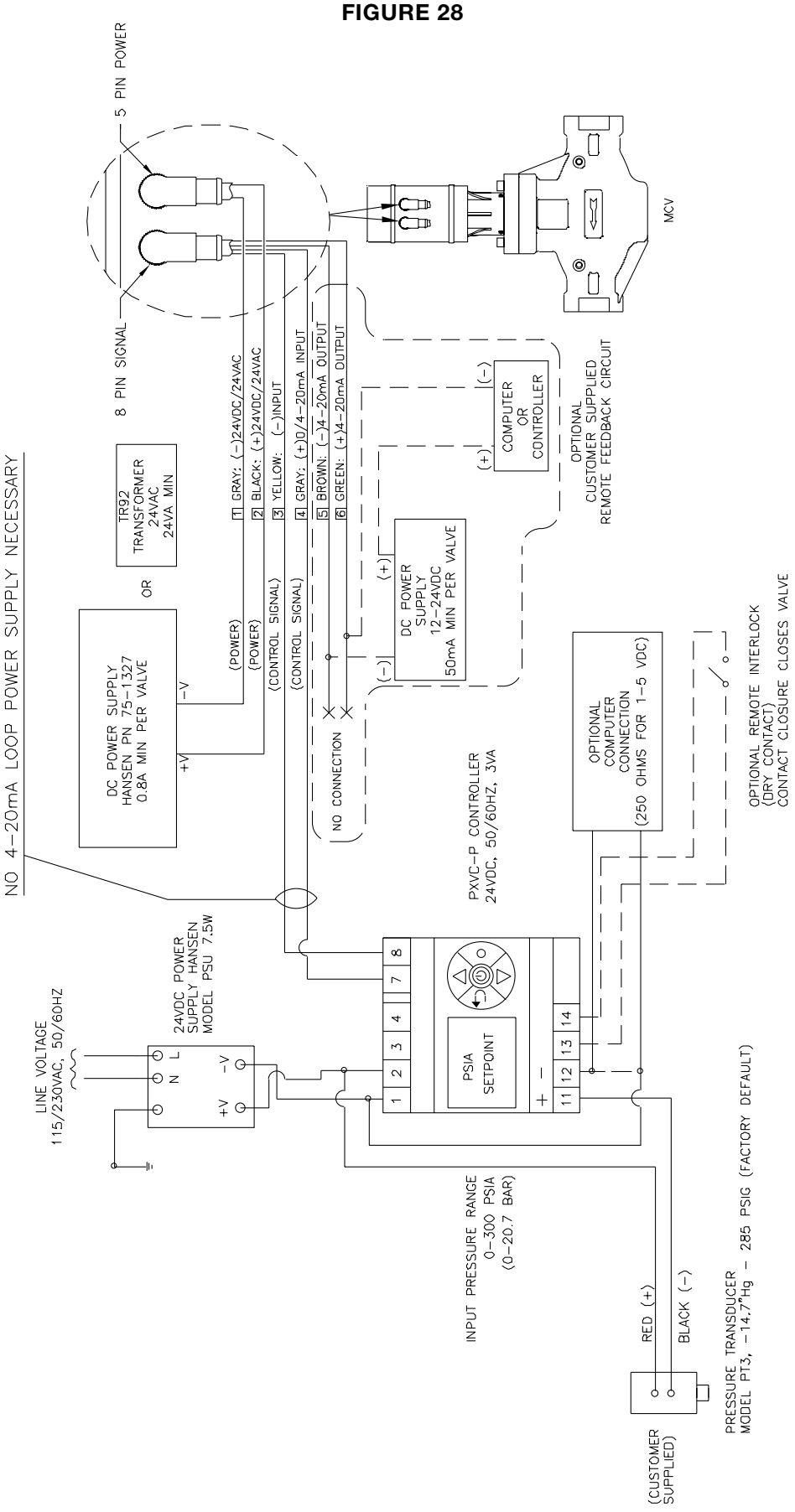
PXVC-L (LIQUID LEVEL) WIRING DIAGRAM, 115V/230V

FIGURE 27



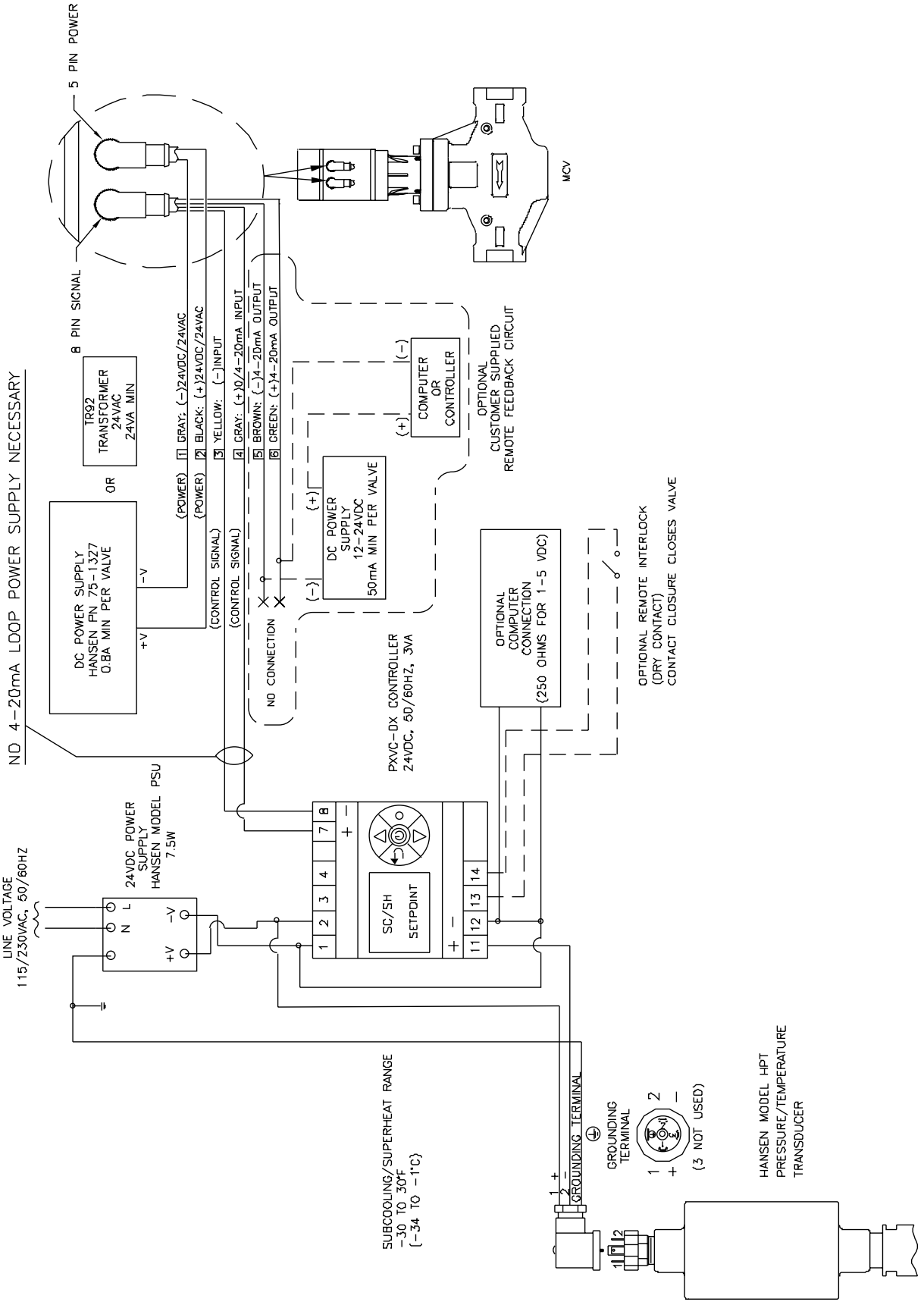
PXVC-P (PRESSURE) WIRING DIAGRAM, 115V/230V

FIGURE 28



PXVC-DX (SUPERHEAT) WIRING DIAGRAM, 115V/230V

FIGURE 29



INSTALLATION PARAMETERS FOR THE MOTORIZED CONTROL VALVE

VALVE DESCRIPTION

Catalog Number: _____
(from nameplate on valve bonnet)

Port Size:_____

Serial Number: _____

Valve Tag: _____

INSTALLATION DESCRIPTION

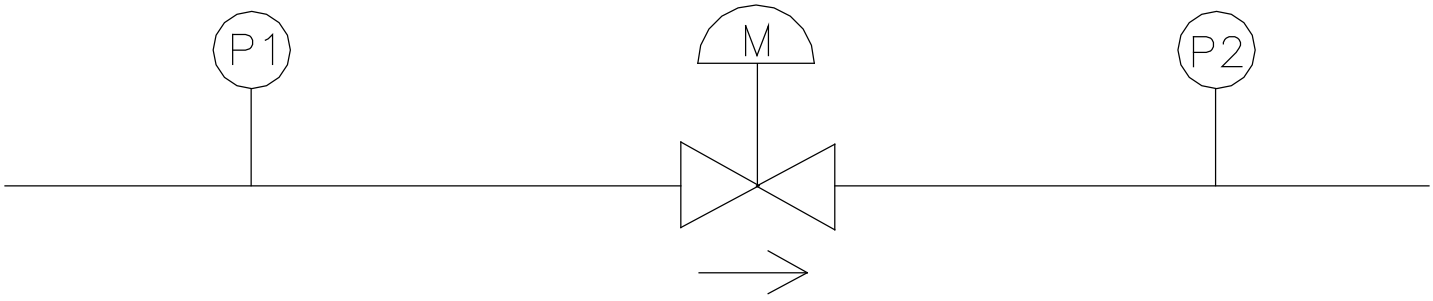
Location Description:_____
(e.g. Evaporator #6, suction valve, outdoors)

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 Display or PLC trending):_____ %

OPERATION

The valve is driven by a motor and electronics that are placed inside of an IP67 watertight rated housing. Upon receiving an input signal, the motor shaft rotates and transfers the force via a magnetic coupling to a threaded stem. This cartridge stem directly drives the valve V-port to open or closed based on the incoming signal.

The actuator can run on incoming voltage of either 24VAC or 24VDC. This is provided via two wires on the 5 pin connector. Upon power-up the valve will run through a self-calibration process. The actuator can be configured into 1 of 2 operational modes: modulating or slow/open close based on the wiring of the 8 pin connector along with the menu selection. There are 2 additional wires on the 8 pin connector that provide 0/4-20mA feedback of the valve V-port position. The feedback does not have to be connected to operate the valve.

To operate in the modulating mode, a milliamp or voltage input control signal must always be maintained to keep the V-port in position. A loss of signal or a signal out of range will drive the valve closed and display an error code. When the signal is present, the V-port will move and stay at that location until the input signal changes. If loss of input power occurs, the valve remains in its current position, unless the valve is equipped with HUPS (Hansen power backup system).

To operate in the slow open/close solenoid mode, a relay contact is required as a means of an input signal to fully open or close the valve. No external voltage is needed to power the relay signal. As a default, when the relay is closed the valve is closed. A loss of signal will drive the valve closed. If loss of input power occurs, the valve remains in its current position, unless the valve is equipped with HUPS.

ELECTRICAL INFORMATION & WIRING

The Motorized Control Valve will take either a 24VAC or 24VDC input voltage from an NEC Class 2 source and either a voltage, current, or relay input control signal. It is recommended to use a separate power supply from the main supply for the current and voltage input signal to maintain signal integrity. A dedicated incoming voltage supply must be sized properly to deliver the proper amount of voltage and current to actuator. A transformer rated at 24VA per valve or a power supply rated at .8A per valve will be sufficient.

The incoming control signal can be wired and configured as any of the following: 4-20mA, 0-20mA, 0-5VDC, 0-10VDC, 1-6VDC, and a relay closed contact. The output feedback signal of the valve position can be configured as 4-20mA or 0-20mA.

ELECTRICAL MAINTENANCE

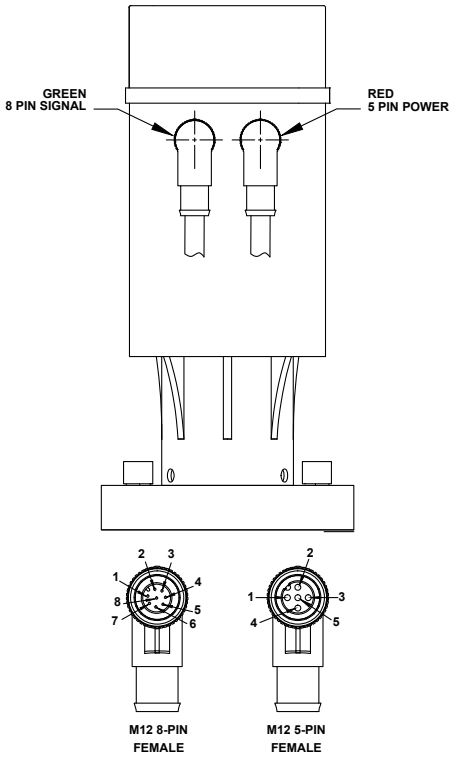
Check calibration and HUPS function on a routine basis. Check controller and controller wiring for corrosion and proper connection.

CABLE CONNECTIONS

There are 2 distinct connection points that reside on the MCV actuator. Both are M12 male connectors. The power input consists of a 5 pin keyed connector and the control signal consists of an 8 pin keyed connector.

The MCV comes standard with 6.5ft (2m) long cables with M12 female heads. The power input cable consists of a 5 pin head and 22AWG wires. The control signal consists of an 8 pin head and 24AWG wires. The standard cables come with flying leads. When an SMV to MCV conversion kit is purchased for a modulating valve, the cable dongle will come equipped a connection that will plug into to existing wiring.

FIGURE 30



Power Connector - 5 Pin Red Cable

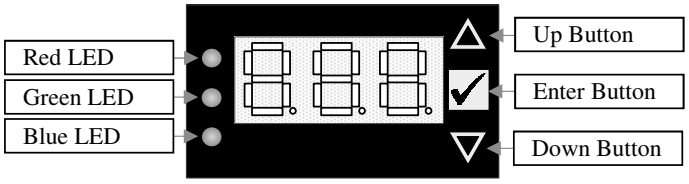
Pin #	Wire Color	Description
1	Brown	Not Used
2	White	Not Used
3	Blue	(+) Backup Power Supply
4	Black	(+) 24VDC/24VAC
5	Gray	(-) 24VDC/24VAC

Signal Connector - 8 Pin Green Cable

Pin #	Wire Color	Description
1	White	Not Used
2	Brown	(-) 4-20mA Feedback Signal
3	Green	(+) 4-20mA Feedback Signal
4	Yellow	(-) Input Signal/Ground
5	Gray	(+) 0/4-20mA Input Signal
6	Pink	(+) 0-5/10VDC & Relay Input Signal
7	Blue	Not Used
8	Red	Not Used

USER INTERFACE MENU AND INSTRUCTION GUIDE

The user interface is a located on the front of the valve and when in normal operation will display the % open of the valve V-port. The setup menu can be entered to automatically calibrate, adjust the control parameters, and view current settings. All displays in this menu start with the letter "H.". The keypad and display are shown below



All LEDs will be on for couple seconds on power-up. After that the Red and Blue LED should not turn on. The Green LED indicates valve is in manual mode (H.02).

To enter and navigate the menu, follow the steps below:

1. Press and hold the UP and DOWN arrow buttons on the keypad for 3 seconds
2. Upon entering, H.01 will be shown on the display.
3. Use the UP and DOWN arrow buttons to navigate through the list below.
4. To display and/or modify a value for that description, press the ENTER button.
5. Use the UP and DOWN arrow buttons to change the value.
6. Press the ENTER button to save the value. The display will return to the setup menu
7. Repeat steps 3-6 for all desired changes.
8. Exit the menu at any time by pressing and holding the ENTER button on the keypad for 3 seconds.

NOTE: Exiting the menu will NOT save the value to the valve .

NOTE: Valve can stay in Manual Mode (H.02) for an infinite amount of time.

If E.01 or E.02 become active, the valve will drive to zero and close until the signal issue has been rectified. Once the input signal is within the proper limits, the actuator will return to normal operation.

TABLE 27

Setup Parameters

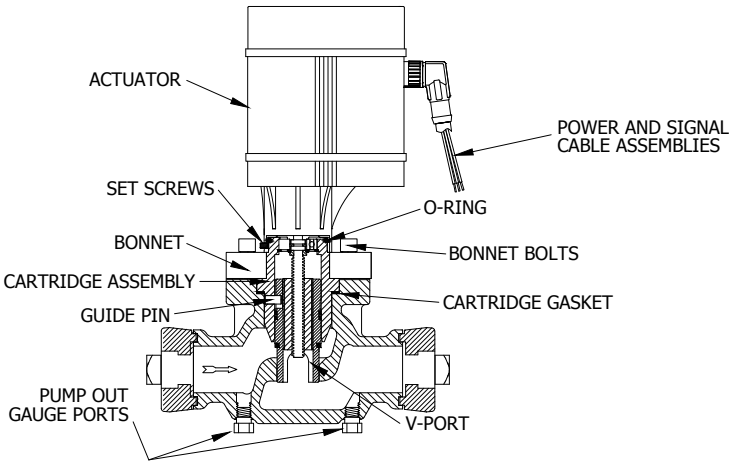
Display (Menu #)	Mode Description	Min Value	Max Value	Factory Setting	Comments
-	Normal Operation	0	100	-	Valve % Open
H.01	Re-Zero Calibration	0	1	0	0 = No Action 1 = Force motor to recalibrate zero Display will show CAL
H.02	Automated/Manual Mode	0	100	0	Mode becomes Manual when entered. Green LED will illuminate. Range: 0 - 100% when Enter is pressed
H.03	Valve Size	0	9	0	00 = 3/4" 02 = 1" 03 = 1-1/4" 04 = 1-1/2" 05 = 2" 07 = 3" 08 = 4" 09 = 1/16", 7/32", 9/32" Valve will automatically calibrate after selection is made by pressing Enter
H.04	Input Signal Type	0	5	0	0 = 4-20mA 1 = 0-20mA 2 = 0-5Vdc 3 = 0-10Vdc 4 = 1-6Vdc 5 = Relay input
H.05	Output Signal Type	0	1	0	0 = 4-20mA 1 = 0-20mA
H.06	Operation Type	0	3	0	0 = Modulating (Direct) (input signal increase → % open increase) 1 = Modulating (Reverse) (input signal increase → % open decrease) 2 = Open/Close (Direct) (Closed relay → fully closed valve) 3 = Open/Close (Reverse) (Closed relay → fully open valve)
H.07	Speed	25	100	50	Motor speed adjustment Increments of 25%
H.08	Power Backup Supply Status	0	1	0	0 = Disabled 1 = Enabled
H.09	Power Backup Fail Safe Position upon power loss	0	2	0	Define motor position on power loss 0 = close 1 = open 2 = user defined position @ H. 10
H.10	Fail Safe Position when H.09 = 2	0	100	0	Number between 0 – 100 Increments of 10
H.11	Alarm Log	0	9	-	A0 = Active alarm A1 → A9 = logged alarm. A9 oldest
H. 12	Max. Open Limit	30	100	100	Max. Open must be greater than Min. Close increments of 10
H. 13	Min. Close Limit	0	40	0	Min. Close Limit must be less than Max. Open Limit in increments of 10
H. 14	Input Dampening	1	5	-	
H. 20	Password protected	0	999	-	
H. 21	Measuring interval	1	50	-	
H. 34	Factory Reset			-	Input value of 1 will reset all parameters to factory defaults
H. 99	Software Version			-	Displays Software Version

Error Codes

Error #	Description	Notes
E.01	Input signal present on the 4-20mA Control Input greater than expected.	The 4-20mA signal present on the Control Input is greater than 22mA
E.02	Input signal present on the 4-20mA Control Input less than expected.	The 4-20mA signal present on the Control Input is less than 3mA
PF	Power Failure when the incoming voltage is less than expected.	The incoming voltage is less than 19V.

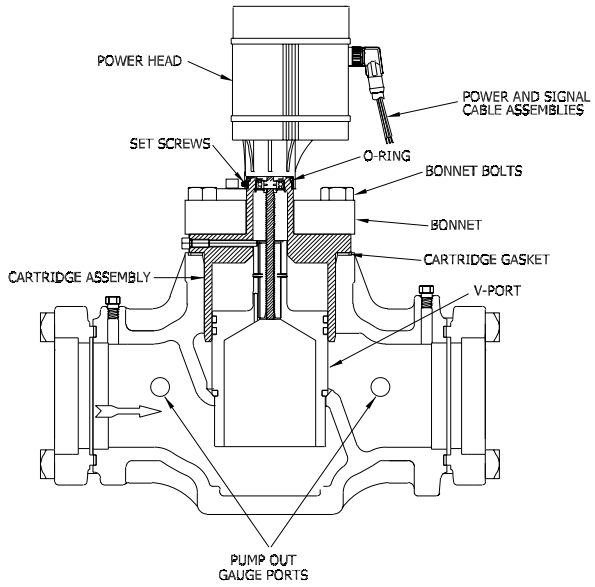
3/4" THRU 2" MOTORIZED CONTROL VALVE

FIGURE 31



3" THRU 4" MOTORIZED CONTROL VALVE

FIGURE 32



MCV DISASSEMBLY

1. Isolate the valve from the refrigerant pressure and evacuate the refrigerant.

   NOTE: Always use caution when removing the actuator and entering the valve cavity.

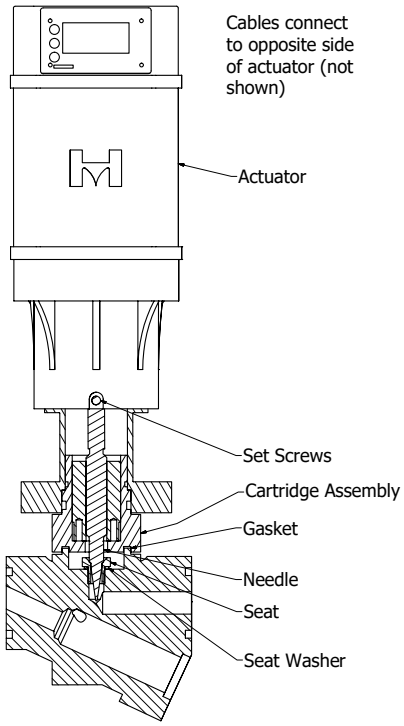
2. Disconnect the red and green cables from the actuator.
3. Remove the actuator by loosening but not removing the set screws.
4. To enter the valve cavity, carefully loosen and remove the larger bonnet bolts and then the bonnet.
5. Grasp the top of the cartridge and while lifting out squarely, remove the cartridge assembly, taking care not to bend the shaft. If cartridge removal is difficult, remove by placing the MCT on the cartridge and rotating counterclockwise and the cartridge will press out. WARNING: Don't bend shaft.
6. Remove the V-port from the cartridge assembly by unscrewing the rotor counterclockwise.

MCV ASSEMBLY

1. Install new cartridge gasket to counter bore on top face of valve.
2. Ensure V-port is installed into new rotor cartridge. To 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.
3. Install new rotor cartridge/V-port assembly into valve.
4. Install new bonnet over cartridge assembly and torque bolts to 35 ft-lbs.
5. Install O-ring onto cartridge.
6. Place Manual Control Tool (MCT) onto the top of magnetic cartridge assembly. Continue to rotate the tool counterclockwise until the valve is closed and the V-port will no longer move.
7. Grease exterior of cartridge above the O-ring with supplied low temp, high load, low RPM grease such as Mobilith SHC PM 460 or similar.
8. Check the base of the actuator to ensure that the set screws are not protruding past the ID of the threaded ring. If necessary back the set screws out to prevent interference during installation.
9. Install new actuator onto cartridge. Press firmly down on the top of the actuator to ensure it fully seats. The gap between the base of the actuator and bonnet should be less than 1/16".
10. Rotate actuator to orient in desire position and torque the 3 set screws at base to 4 in-lb using 3/32" hex key.
11. Connect the red and green cables to the actuator.
12. Upon power-up, the valve will automatically calibrate.

MCXV MOTORIZED CONTROL VALVE

FIGURE 33



MCXV DISASSEMBLY

1. Isolate the valve from the refrigerant pressure and evacuate the refrigerant.

NOTE: Always use caution when removing the cartridge and entering the valve cavity.

2. Disconnect the red and green cables from the actuator.
3. Loosen but do not remove the set screws and lift the actuator off the cartridge.
4. To enter the valve capacity, carefully loosen and remove the larger bonnet bolts from bottom of valve and then the bonnet.
5. Grasp the top of the cartridge and remove the cartridge assembly by lifting it out squarely taking care not to bend the shaft. If the cartridge removal is difficult, remove it by placing the MCT on the cartridge and rotating counterclockwise and the cartridge will press out. CAUTION: Do not bend shaft.
6. Using a 7/16 inch socket or wrench remove the seat (P/N 75-3118) and washer (P/N 75-3119)
7. Rotate needle clockwise and remove. This is the lowest level disassembly intended for the operator to complete

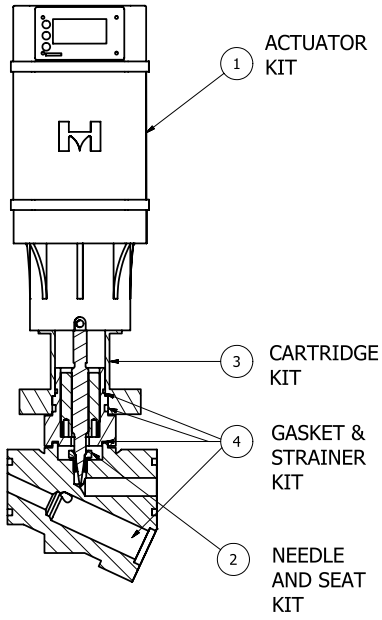
MCXV ASSEMBLY

1. Install new seat washer (P/N 75-3119) onto seat (P/N 75-3118) and apply refrigerant suitable thread locker to seat threads
2. Install assembled seat into body and torque to 5 ft.-lbs.
3. Thread modulating needle into cartridge assembly counterclockwise (This is a left hand thread).
4. Using MCT, rotate the magnet while threading the modulating needle into the cartridge and ensure the needle engages the drive mechanism.

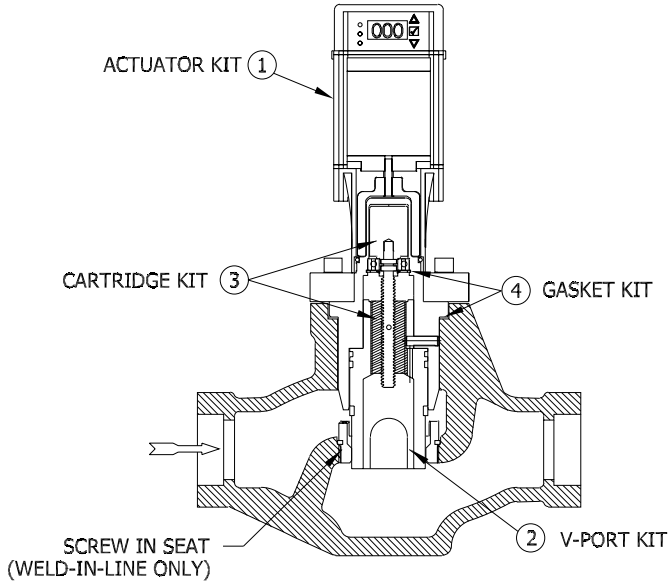
NOTE: If the needle bottoms out (protrudes more than ½"), the needle is not engaged into the drive mechanism. If this happens loosen the needle slightly and rotate the magnet a fraction of a turn until the needle is able to be properly threaded into the cartridge.

5. Lubricate gasket with refrigeration oil and install onto the body ensuring it lies concentric with the raised surface
6. Install cartridge assembly onto body
7. Install O-ring onto cartridge
8. Place MCT onto the top of the cartridge assembly and rotate counterclockwise until the valve is closed and the V-port will no longer move.
9. Grease exterior of cartridge above O-ring with supplied low temp, high load, low RPM grease such as Mobilith SHC PM 460 or similar.
10. Check the base of the actuator to ensure the set screws are not protruding past the I.D. of the threaded ring. If necessary, back the set screws out to prevent interference during installation.
11. Install new actuator onto cartridge. Press down firmly on the top of the actuator to ensure it fully seats. The gap between the base of the actuator and bonnet/ cartridge should be less than 1/16".
12. Rotate actuator to orient display in desired position and torque the 3 set screws at base to 4 in-lb using 3/32" hex key.
13. Connect the red and green cables to the actuator.
14. Upon power-up the valve will automatically calibrate.

1/16˝(2mm) THRU 9/32˝(7mm) MCXV



3/4˝(20mm) THRU 4˝ MCV/MCR



Valve Type		1		2		3	4	SMV Conversion Kits	
	Port Size	Actuator Kit		Needle/V-port Assembly Kit (includes gasket kit)		Cartridge Assembly Kit (gasket kit, cartridge, grease)	Gasket Kit	SMV to MCV Conversion Kit** (Actuator, Dongle Cable, Bonnet, Bolts, Cartridge Gasket, Bonnet O-ring, Grease)	SMV Power Close to MCV Power Backup Conversion Kit**
	Inch (mm)	Standard	Power Backup	P/N	Cv				
MCXV/A	7/32" (5)	75-1331	75-1331 with HUPS	75-1360	0.6	75-1358	75-1357*	75-1363	75-1363 with HUPS
MCXV/B	9/32" (7)			75-1361	1.1			75-1364	75-1364 with HUPS
MCXV/C	1/16" (2)			75-1359	0.2			75-1362	75-1362 with HUPS
MCV	3/4" (20)	75-1332	75-1332 with HUPS	75-1381	6.4	75-1325	75-1322	75-1318	75-1318 with HUPS
	1" (25)			75-1382	11.7				
	1-1/4" (32)			75-1383	16.4				
	1-1/2" (40)	75-1333	75-1333 with HUPS	75-1384	35	75-1326	75-1323	75-1319	75-1319 with HUPS
	2" (50)			75-1385	47				
	3" (80)	75-1334	75-1334 with HUPS	75-1396	104	75-1349	75-1351	75-1347***	75-1347 with HUPS***
	4" (100)	75-1392	75-1392 with HUPS	75-1400	166	75-1350	75-1352	75-1348***	75-1348 with HUPS***
MCR	3/4" (20)	75-1332	75-1332 with HUPS	75-1386	2.2	75-1325	75-1322	75-1318	75-1318 with HUPS
	1" (25)			75-1387	3.9				
	1-1/4" (32)			75-1381	6.4				
	1-1/2" (40)	75-1333	75-1333 with HUPS	75-1388	12	75-1326	75-1323	75-1319	75-1319 with HUPS
	2" (50)			75-1389	16				
	3" (80)	75-1334	75-1334 with HUPS	75-1394	35	75-1349	75-1351	75-1347***	75-1347 with HUPS***
	4" (100)	75-1392	75-1392 with HUPS	75-1398	47	75-1350	75-1352	75-1348***	75-1348 with HUPS***

NOTE: Gaskets and O-rings should be replaced with new if they are removed from valve. Recommend to lubricate new gaskets/O-rings with oil prior to installing. Bolts should have anti-seize applied.

* Includes strainer

**All SMV to MCV conversion kits REQUIRE MCT to be available for conversion

*** All 3” and 4” SMV to MCV conversion kits REQUIRE a V-port kit to be requested separately

TO ORDER:

Specify valve type (MCV, MCXV, MCR), port size, flange connection style and size.

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

ORDERING INFORMATION

FPT only available up to and including 1¼″ port size.

PORT SIZE		FLANGE CONNECTION STYLES AND SIZES		
		FPT, SW, WN		ODS
INCH	(MM)	STANDARD	ALSO	STANDARD
1/16″	(2)	1/2″	3/4″	7/8″
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″

OPTIONAL CONTROLLERS

MOTORIZED CONTROL VALVE OPTIONAL CONTROLLERS	
CAT NO	DESCRIPTION
PXVC-T	Temperature controller with temperature sensor for fully modulating temperature control.
PXVC-L	Level controller for fully modulating applications. Level sensor not included.
PXVC-P	Pressure controller with pressure transducer for fully modulating pressure control.
PXVC-PT	Direct expansion or super heat controller for fully modulating applications.
PXVC-DX	Direct expansion or super heat controller for fully modulating applications.
RDR	Remote digital readout displays valve position
WTE	Watertight Enclosure (NEMA4 for above controller)
PSU2	Compact Power Supply (100-240VAC: 24VDC) for above enclosure

NOTE: For PXVC product bulletin see www.HANTECH.com

OPTIONAL EQUIPMENT	
MCT	Manual Control Tool
HUPS	Power Backup System: Uninterruptable Power Supply and DC power supply for up to 3 valves
75-1321	Cable set 2m long
75-1329	Cable set 5m long
75-3517	MCV Dongle Conversion Cable

ACT™

Hansen's advance corrosion protection system ACT™, Anti-Corrosion Technology, is available for all Hansen valves. ACT™ provides 3x to 5x the corrosion protection of standard zinc plating and offers lower acquisition and life cost when compared to other corrosion protection methods. ACT™ protected valves follow all standard and control valve installation processes.

MVP

The Hansen Technologies Multi-Valve Platform (MVP) is a rugged, compact refrigerant control station. The MVP ships pre-tested and assembled for quick and easy installation, requiring only two welds to complete most valve station applications. MVP control functions include Motorized Control Valves (positions 3 and 4), solenoid valves, two-step solenoid valves, and all common Hansen pressure regulator functions. MVP utilizes many of the same pilot modules and internal components as the standard Hansen pressure regulator and solenoid valves

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.

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