



# Modulating 3-Way Valve

Types MTW-9 and MTW-17

SPORLAN

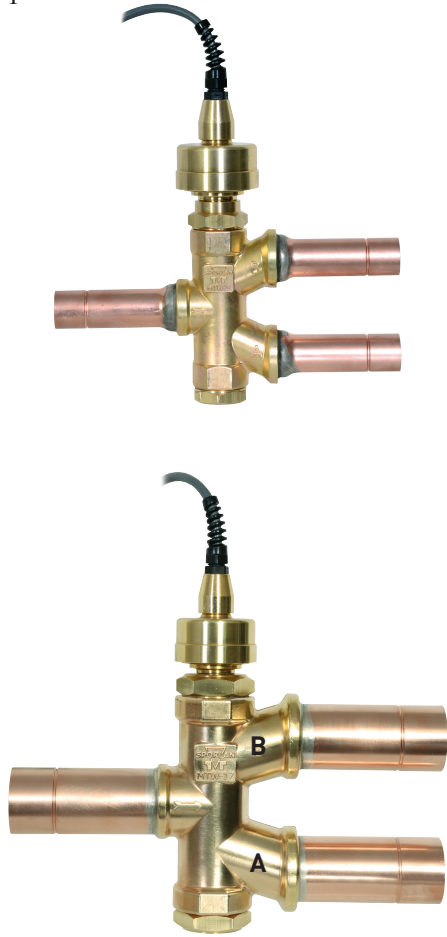


(Patent Pending)



ENGINEERING YOUR SUCCESS.

Figure 1



## Modulating 3-Way Valve

Types MTW-9 and MTW-17

### FEATURES AND BENEFITS

- Improved performance from modulated control
- Reduction in number of modulation valves required per system
  - Simplified system piping enables piping material cost reduction
  - Reduced install time enables labor cost reduction
  - Single actuator reduces control and wiring complexity
- Utilizes standard 42mm stepper motor
  - 6,386 steps of resolution
  - 75  $\Omega$  bipolar stepper motor
  - 160 mA per winding
- Bi-sealing piston assembly

### DESCRIPTION

The Modulating 3-Way (MTW) valve allows control of refrigerant flow through two outlet ports. Two valve pistons are attached to a connecting rod and also to the stepper motor. As the MTW valve modulates one port opens and the other port closes. The movement of the valve pistons relative to the two ports is inversely proportional.

### APPLICATION

The MTW valve is typically located in the discharge line for dehumidification, reheat and heat reclaim applications. Sporlan recommends piping Outlet A to the normal condenser and Outlet B to the reclaim/reheat condenser. Outlet connections A and B are designated on the valve body. See Figure 1.

The MTW valve is a sealed design. The valve should not be disassembled for installation or service. Disassembly will damage the valve.

See capacity tables beginning on page 3. For additional refrigerant capacities and other applications, please contact Sporlan Division technical support.

### COMPATIBLE CONTROLLERS

The Sporlan Kelvin II Series valve controllers are compatible with the the MTW valves. The temperature and pressure controls allow precise stand-alone control of air temperature and pressure. See Bulletin 100-50-5 for more information about the Kelvin II Series valve controllers.

## SPECIFICATIONS

<b>Motor Type</b>	Permanent magnet bipolar internal (wet) motor
<b>Compatible Refrigerant</b>	All common HCFC & HFC refrigerants, including R-410A
<b>Compatible Oil</b>	All common mineral, polyolester and alkylbenzene oils
<b>Supply Voltage (unless current limited)</b>	12 volts DC $\pm 10\%$
<b>Cable</b>	Hermetic (20' standard)
<b>Phase Resistance</b>	75 ohms $\pm 10\%$
<b>Stepping Current</b>	160 mA/winding
<b>Holding Current</b>	Not recommended
<b>Number of Full Steps</b>	6,386 full steps
<b>Step Rate</b>	200 steps / second (PPS)
<b>Initialization</b>	7,500 steps closing
<b>Overdriving</b>	Recommended one 10% overdrive closed per day maximum
<b>MRP/MAP/MWP</b>	700 psig (48.3 bar)
<b>MOPD</b>	700 psid (48.3 bar)
<b>Max Internal Leakage</b>	400 cc/min. at 100 psid (6.9 bar) dry air
<b>Max External Leakage</b>	0.10 oz./yr. at 300 psig (2.8 gram/yr. at 20 bar)
<b>Max Fluid Temperature Range</b>	-40°F to 240°F (-40°C to 116°C)
<b>Ambient Temperature Range</b>	-40°F to 140°F (-40°C to 60°C)
<b>Installation Maximum Temperature</b>	240°F (116°C) for 15 minutes (wet rag required for brazing)
<b>Relative Humidity</b>	0-100% (condensing)
<b>Mounting Orientation</b>	Motor assembly above horizontal
<b>Flow Direction</b>	Forward flow only
<b>Certification</b>	UL File: SA5460; CCN: SFJQ2/SFJQ8

## NOMENCLATURE

MTW	-9	-9 ODF	-20'	-S
Modulating 3-Way Valve	Valve Model	Fitting Size and Type	Cable Length	Stripped and Tinned Cable Ends

## FLOW CAPACITY – DISCHARGE (TONS)

Valve Model	Evaporator Temp (°F)	Refrigerant																			
		R-134a					R-22					R-407A					R-407C				
		Pressure Drop Across Valve (psid)																			
		0.5	1	3	5	10	0.5	1	3	5	10	0.5	1	3	5	10	0.5	1	3	5	10
MTW-9	40	4.29	6.04	10.4	13.5	19.3	5.00	7.03	12.1	15.6	22.2	5.03	7.08	12.2	15.7	22.4	5.09	7.16	12.3	15.9	22.6
	20	4.12	5.80	10.0	13.0	18.5	4.83	6.79	11.7	15.1	21.4	4.84	6.82	11.7	15.2	21.5	4.90	6.90	11.9	15.3	21.8
	0	3.94	5.55	9.58	12.4	17.7	4.64	6.54	11.3	14.5	20.6	4.64	6.53	11.2	14.5	20.6	4.70	6.62	11.4	14.7	20.9
	-20	3.75	5.28	9.12	11.8	16.9	4.45	6.26	10.8	13.9	19.8	4.42	6.22	10.7	13.8	19.6	4.49	6.31	10.9	14.0	19.9
	-40	3.56	5.01	8.65	11.2	16.0	4.25	5.97	10.3	13.3	18.9	4.19	5.90	10.2	13.1	18.6	4.26	6.00	10.3	13.3	18.9
MTW-17	40	8.15	11.4	19.3	24.8	35.0	9.45	13.2	22.3	28.6	40.2	9.50	13.2	22.4	28.7	40.4	9.63	13.4	22.7	29.1	40.9
	20	7.82	10.9	18.5	23.8	33.6	9.13	12.7	21.6	27.6	38.8	9.15	12.7	21.6	27.7	38.9	9.27	12.9	21.9	28.1	39.5
	0	7.48	10.4	17.7	22.8	32.2	8.79	12.2	20.8	26.6	37.4	8.76	12.2	20.7	26.5	37.2	8.90	12.4	21.0	26.9	37.8
	-20	7.12	9.93	16.9	21.7	30.6	8.43	11.7	19.9	25.5	35.8	8.36	11.6	19.7	25.3	35.5	8.49	11.8	20.1	25.7	36.1
	-40	6.75	9.41	16.0	20.5	29.0	8.05	11.2	19.0	24.3	34.2	7.93	11.0	18.7	24.0	33.7	8.07	11.2	19.1	24.4	34.3

Valve Model	Evaporator Temp (°F)	Refrigerant																			
		R-407F					R-404A					R-507					R-410A				
		Pressure Drop Across Valve (psid)																			
		0.5	1	3	5	10	0.5	1	3	5	10	0.5	1	3	5	10	0.5	1	3	5	10
MTW-9	40	5.36	7.54	13.0	16.7	23.8	4.70	6.61	11.4	14.7	20.8	4.69	6.60	11.4	14.7	20.8	6.19	8.71	15.0	19.3	27.3
	20	5.17	7.27	12.5	16.2	22.9	4.50	6.34	10.9	14.1	20.0	4.49	6.32	10.9	14.0	19.9	6.01	8.45	14.5	18.7	26.5
	0	4.96	6.98	12.0	15.5	22.0	4.29	6.04	10.4	13.4	19.1	4.28	6.03	10.4	13.4	19.0	5.80	8.15	14.0	18.1	25.6
	-20	4.74	6.67	11.5	14.8	21.0	4.07	5.73	9.86	12.7	18.1	4.06	5.71	9.84	12.7	18.0	5.57	7.83	13.5	17.4	24.6
	-40	4.51	6.34	10.9	14.1	20.0	3.84	5.40	9.29	12.0	17.0	3.82	5.38	9.26	11.9	17.0	5.32	7.48	12.9	16.6	23.5
MTW-17	40	10.1	14.1	23.9	30.6	43.0	8.84	12.3	20.9	26.7	37.5	8.8	12.3	20.8	26.6	37.4	11.7	16.2	27.5	35.1	49.2
	20	9.77	13.6	23.1	29.5	41.5	8.47	11.8	20.0	25.6	36.0	8.4	11.8	19.9	25.5	35.9	11.3	15.8	26.7	34.1	47.8
	0	9.38	13.1	22.1	28.3	39.8	8.08	11.3	19.1	24.4	34.3	8.1	11.2	19.0	24.3	34.2	10.9	15.2	25.7	32.9	46.1
	-20	8.97	12.5	21.2	27.1	38.1	7.66	10.7	18.1	23.2	32.5	7.6	10.6	18.0	23.1	32.4	10.5	14.6	24.7	31.6	44.3
	-40	8.53	11.9	20.1	25.8	36.2	7.22	10.1	17.0	21.8	30.6	7.2	10.0	17.0	21.7	30.5	10.0	14.0	23.6	30.2	42.3

Capacities based upon 100°F condensing temperature, 60°F liquid entering expansion valve, isentropic compression plus 50°F, evaporator temperature as shown plus 25°F superheated suction gas. Reference the table below for liquid correction factors.

## CORRECTION FACTORS - DISCHARGE APPLICATION (°F)

REFRIGERANT	Liquid Temperature Entering Expansion Valve (°F)										
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°
	Correction Factor, CF Liquid Temperature										
R-134a	1.27	1.22	1.18	1.14	1.09	1.05	1.0	0.95	0.91	0.86	0.81
R-22	1.22	1.18	1.15	1.11	1.07	1.04	1.0	0.96	0.92	0.88	0.84
R-407A	1.28	1.23	1.19	1.14	1.10	1.05	1.0	0.95	0.90	0.85	0.79
R-407C	1.26	1.22	1.18	1.13	1.09	1.05	1.0	0.95	0.91	0.86	0.81
R-407F	1.26	1.22	1.18	1.13	1.09	1.05	1.0	0.95	0.91	0.86	0.81
R-404A	1.34	1.29	1.23	1.17	1.12	1.06	1.0	0.94	0.88	0.81	0.74
R-507A	1.35	1.29	1.24	1.18	1.12	1.06	1.0	0.94	0.87	0.81	0.74
R-410A	1.26	1.22	1.18	1.13	1.09	1.05	1.0	0.95	0.90	0.85	0.80

## FLOW CAPACITY – DISCHARGE (kW)

Valve Model	Evaporator Temp (°C)	Refrigerant																			
		R-134a					R-22					R-407A					R-407C				
		Pressure Drop Across Valve (bar)																			
		0.03	0.06	0.2	0.4	0.7	0.03	0.06	0.2	0.4	0.7	0.03	0.06	0.2	0.4	0.7	0.03	0.06	0.2	0.4	0.7
MTW-9	5	12.8	18.0	32.7	46.4	62.0	14.9	21.0	38.1	53.9	71.7	14.9	21.0	38.1	53.9	71.7	15.1	21.3	38.6	54.7	72.7
	-5	12.3	17.3	31.6	44.8	59.9	14.5	20.4	37.0	52.4	69.6	14.5	20.3	36.9	52.2	69.4	14.6	20.6	37.4	52.9	70.4
	-15	11.8	16.7	30.4	43.1	57.6	14.0	19.8	35.9	50.7	67.4	13.9	19.6	35.6	50.3	66.9	14.1	19.9	36.1	51.1	67.9
	-25	11.4	16.0	29.1	41.3	55.2	13.6	19.1	34.6	49.0	65.1	13.4	18.8	34.2	48.4	64.3	13.6	19.1	34.7	49.1	65.3
	-35	10.9	15.3	27.8	39.5	52.8	13.0	18.3	33.3	47.1	62.6	12.8	18.0	32.7	46.3	61.5	13.0	18.3	33.3	47.1	62.6
MTW-17	5	24.3	33.9	60.6	85.2	113	28.4	39.5	70.5	98.7	130	28.3	39.5	70.4	98.5	130	28.7	40.0	71.4	100	132
	-5	23.5	32.7	58.5	82.3	109	27.6	38.4	68.5	95.9	126	27.4	38.2	68.1	95.4	126	27.9	38.8	69.2	96.9	128
	-15	22.6	31.5	56.3	79.2	105	26.7	37.2	66.4	92.9	122	26.5	36.9	65.7	92.0	121	26.9	37.5	66.8	93.5	123
	-25	21.7	30.2	54.0	75.9	101	25.8	35.9	64.1	89.7	118	25.4	35.4	63.1	88.4	116	25.9	36.0	64.2	90.0	119
	-35	20.7	28.9	51.6	72.5	96.1	24.8	34.6	61.6	86.3	114	24.3	33.9	60.4	84.6	111	24.8	34.5	61.6	86.2	114

Valve Model	Evaporator Temp (°C)	Refrigerant																			
		R-407F					R-404A					R-507					R-410A				
		Pressure Drop Across Valve (bar)																			
		0.03	0.06	0.2	0.4	0.7	0.03	0.06	0.2	0.4	0.7	0.03	0.06	0.2	0.4	0.7	0.03	0.06	0.2	0.4	0.7
MTW-9	5	15.9	22.4	40.6	57.4	76.3	13.9	19.5	35.4	50.0	66.4	13.8	19.4	35.3	49.9	66.2	18.3	25.8	46.7	66.0	87.4
	-5	15.4	21.7	39.4	55.7	74.0	13.4	18.8	34.1	48.2	64.0	13.3	18.8	34.0	48.1	63.8	17.9	25.2	45.6	64.4	85.3
	-15	14.9	21.0	38.1	53.9	71.5	12.8	18.1	32.7	46.3	61.5	12.8	18.0	32.6	46.1	61.3	17.4	24.5	44.3	62.6	82.9
	-25	14.4	20.2	36.7	51.9	68.9	12.3	17.3	31.3	44.2	58.7	12.2	17.2	31.2	44.1	58.5	16.8	23.7	42.9	60.6	80.2
	-35	13.8	19.4	35.2	49.7	66.1	11.7	16.4	29.8	42.1	55.9	11.6	16.3	29.6	41.9	55.6	16.2	22.8	41.4	58.4	77.3
MTW-17	5	30.2	42.1	75.0	105	138	26.2	36.5	65.1	91.0	120	26.1	36.4	64.8	90.7	119	34.7	48.3	86.0	120	158
	-5	29.3	40.8	72.8	102	134	25.3	35.2	62.7	87.8	116	25.2	35.1	62.5	87.5	115	33.9	47.2	84.0	117	154
	-15	28.4	39.5	70.4	98.5	130	24.3	33.8	60.2	84.3	111	24.2	33.7	60.0	84.0	111	32.9	45.9	81.7	114	150
	-25	27.3	38.0	67.8	94.9	125	23.2	32.3	57.6	80.6	106	23.1	32.2	57.3	80.2	106	31.9	44.4	79.1	110	145
	-35	26.2	36.5	65.0	91.0	120	22.1	30.7	54.8	76.6	101	22.0	30.6	54.5	76.3	100	30.8	42.8	76.2	106	140

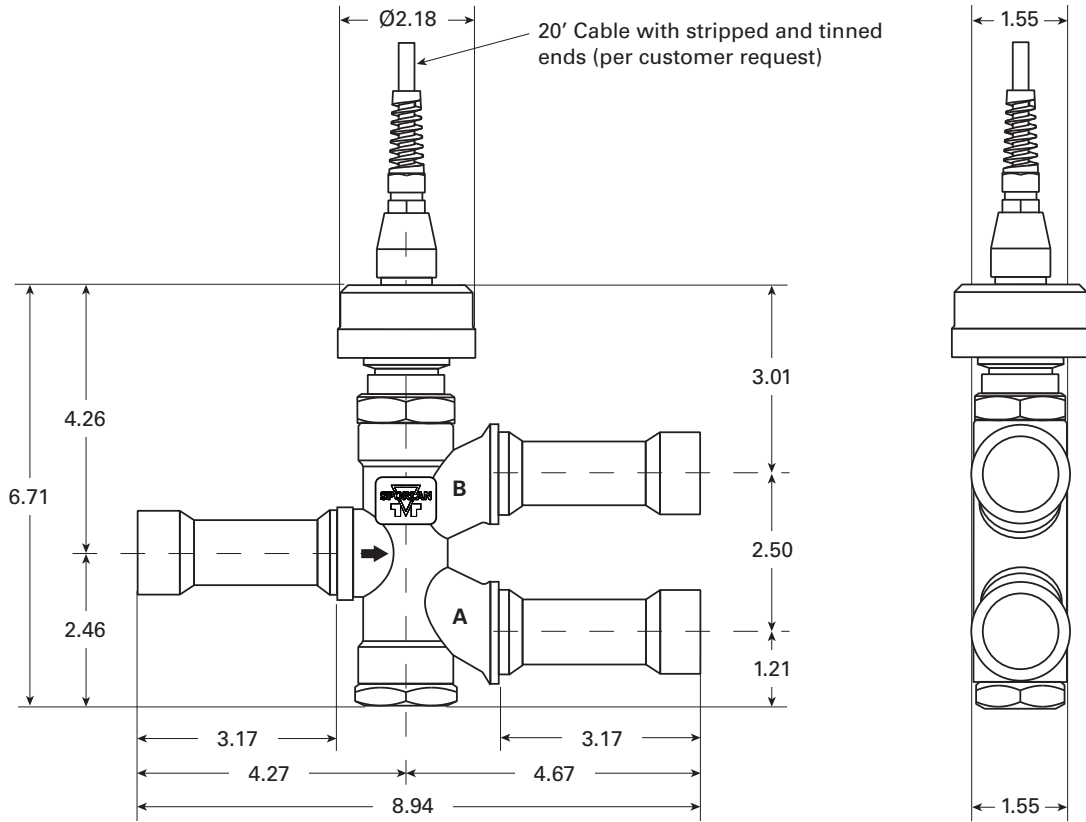
Capacities based upon 35°C condensing temperature, 15°C liquid entering expansion valve, isentropic compression plus 30°C, evaporator temperature as shown plus 15°C superheated suction gas. Reference the table below for liquid correction factors.

## CORRECTION FACTORS - DISCHARGE APPLICATION (°C)

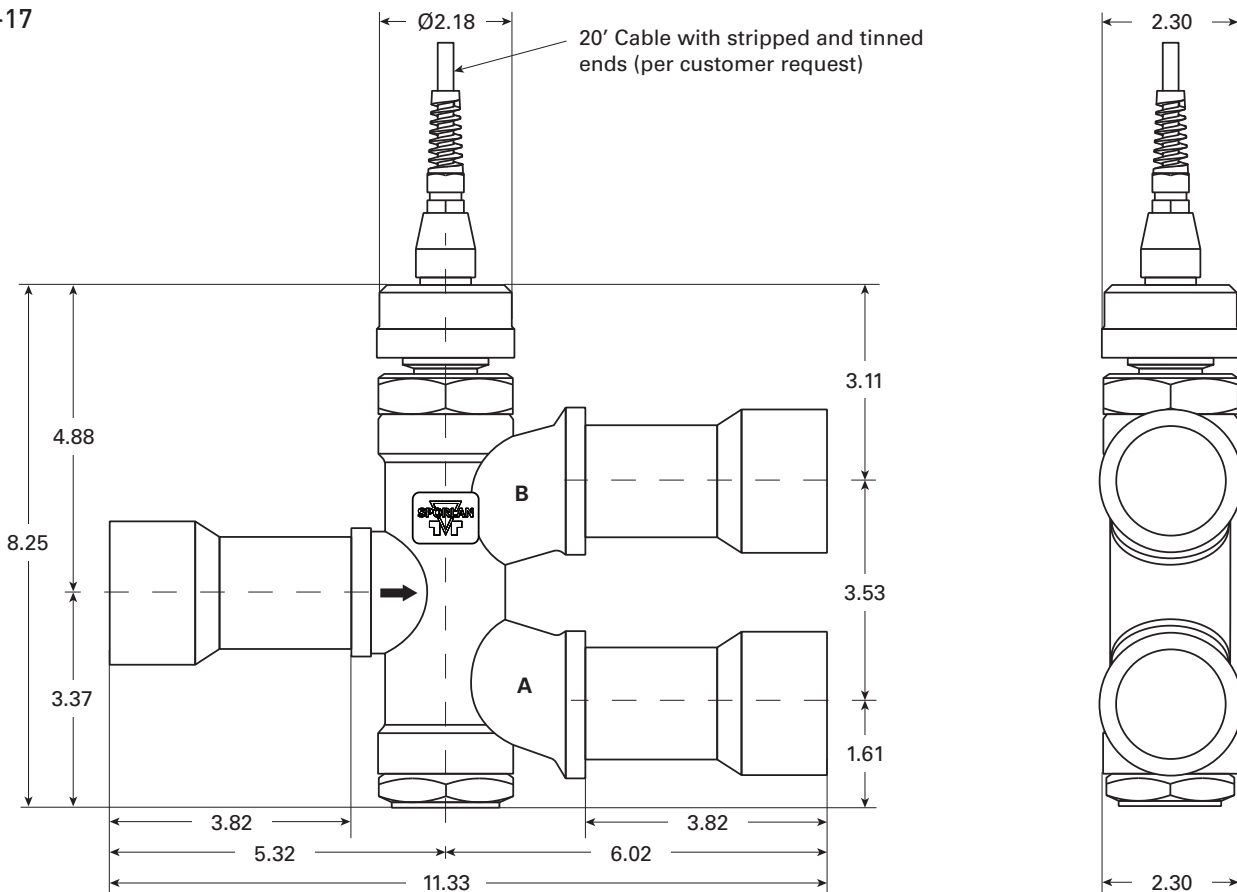
REFRIGERANT	Liquid Temperature Entering Expansion Valve (°C)										
	-15°	-10°	-5°	0°	5°	10°	15°	20°	25°	30°	35°
	Correction Factor, CF Liquid Temperature										
R-134a	1.24	1.20	1.16	1.12	1.08	1.04	1.0	0.96	0.92	0.87	0.83
R-22	1.19	1.16	1.13	1.10	1.07	1.03	1.0	0.97	0.93	0.90	0.86
R-407A	1.25	1.21	1.17	1.13	1.09	1.04	1.0	0.96	0.91	0.87	0.82
R-407C	1.23	1.20	1.16	1.12	1.08	1.04	1.0	0.96	0.92	0.87	0.83
R-407F	1.24	1.20	1.16	1.12	1.09	1.05	1.0	0.96	0.92	0.88	0.83
R-404A	1.30	1.25	1.20	1.15	1.10	1.05	1.0	0.95	0.89	0.83	0.77
R-507A	1.31	1.26	1.21	1.16	1.11	1.05	1.0	0.94	0.89	0.83	0.77
R-410A	1.23	1.20	1.16	1.12	1.08	1.04	1.0	0.96	0.92	0.87	0.83

# DIMENSIONS

MTW-9



MTW-17





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**⚠ WARNING – USER RESPONSIBILITY**

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