



SOLENOID VALVES

TYPE MRASV 3 TO 40 AND DMRASV 10 TO 20

INTRODUCTION

MRASV solenoid valve is of two types:

1. Direct operated
2. Pilot operated.

It can be used for ammonia as well as other fluorinated refrigerants in suction, liquid and hot gas lines.

There is another variant which is DMRASV. It has an assisted lift mechanism which is specifically designed to open and keep the valve open even when the differential pressure across the valve is "ZERO" bar. The DMRASV can be used for similar refrigerants as MRASV.

Both the MRASV and DMRASV can be ordered as a complete valve assembly or as different components viz. valve body, coil and flanges can be ordered separately.

DMRASV is available in sizes 10, 15 & 20mm port sizes.

TECHNICAL INFORMATION

1. These valves can be used for the following refrigerants:
R717, R22, R134A, R404A, R410A, R744, R502 etc.
2. The recommended temperature of the medium is between -40°C to +105°C.
The maximum temperature can go upto 130°C during hot gas defrosting.

Temperature of medium : - 45°C → 110°C • Max. working pressure PB : 44 bar

Type		MRASV 3	MRASV 10	DMRASV 10	MRASV 15	DMRASV 15	MRASV 20	DMRASV 20	MRASV 25	MRASV 32	MRASV 40	
Opening differential pressure with standard coil (Δp bar)	Min.	0.00	0.05	0.00	0.05	0.00	0.05	0.00	0.20	0.20	0.20	
	Max. (=MOPD) liquid ²⁾	10 W a.c.	21	21	14	21	14	21	14	21	21	21
		17.5 W a.c.	25	25	21	25	21	25	21	25	25	25
		20 W a.c.	14	18	16	18	16	13	13	14	14	14
kv-value ¹⁾ m ³ /h		0.25	1.6	1.6	2.9	2.9	4.8	4.8	10.2	16.3	25.4	

1) The K_v value is the water flow in m³/h at a pressure drop across valve of 1 bar, $\rho = 1000 \text{ kg/m}^3$.

2) MOPD for media in gas form is approx. 1 bar greater.

Type		MRASV 3	MRASV 10 / DMRASV 10	MRASV 15 / DMRASV 15	MRASV 20 / DMRASV 20	MRASV 25	MRASV 32	DMRASV 40	
Rated capacity) [kW]	Liquid	R717	21.146	137.74	248.32	413.22	918.59	1469.55	2296.96
		R22	4.416	28.992	52.224	86.976	192.96	309.12	482.88
		R134a	4.128	26.688	48.096	80.16	178.56	285.12	445.44
		R404A	2.976	19.623	35.34	58.869	131.13	209.25	326.43
	Suction vapour	R717	0	8.73	15.617	26.093	57.909	92.635	144.53
		R22	0	3.264	5.952	9.888	21.888	35.04	54.72
		R134a	6.24	2.4	4.224	7.008	15.648	25.056	39.168
		R404A	1.953	2.883	5.115	8.556	18.972	30.318	47.43
	Hot gas	R717	1.632	40.896	73.632	122.88	272.64	435.84	681.6
		R22	1.649	13.483	24.153	40.255	89.531	143.56	224.07
		R134a	0	10.78	19.404	32.242	71.736	114.66	179.34
		R404A	0	10.509	18.879	31.527	70.029	111.6	174.84

1) Rated liquid and suction vapour capacity is based on evaporating temperature $t_e = -10^\circ\text{C}$, liquid temperature ahead of valve $t_l = +20^\circ\text{C}$, and pressure drop across valve $\Delta p = 0.15 \text{ bar}$.

Rated hot gas capacity is based on condensing temperature $t_c = -20^\circ\text{C}$, $t_h = +40^\circ\text{C}$, pressure drop across valve $\Delta p = 0.8 \text{ bar}$, hot gas temperature $t_h = +65^\circ\text{C}$, and subcooling of refrigerant $\Delta t_{\text{sub}} = 4 \text{ K}$.

Liquid capacity Q_L kW

R 717 (NH3)

Type		MRASV 20/ DMRASV 20	MRASV 25	MRASV 32	MRASV 40
Liquid capacity Q_L kW at pressure drop across valve Δp bar	0.1	337.56	749.81	1199.89	1875.01
	0.2	477.24	1060.21	1696.53	2651.98
	0.3	584.91	1299.8	2079.68	3248.53
	0.4	675.12	1500.59	2400.75	3750.99
	0.5	754.66	1677.13	2683.02	4192.34

R 22

Type		MRASV 3	MRASV 10/ DMRASV10	MRASV 15/ DMRASV 15	MRASV 20/ DMRASV 20	MRASV 25	MRASV 32	MRASV 40
Liquid capacity Q_L kW at pressure drop across valve Δp bar	0.1	3.648	23.712	42.624	70.944	158.4	252.48	394.56
	0.2	5.088	33.504	60.288	100.8	222.72	357.12	557.76
	0.3	6.336	40.992	73.824	122.88	273.6	436.8	683.52
	0.4	7.296	47.328	85.248	142.08	315.84	504.96	789.12
	0.5	8.16	52.896	95.232	158.4	353.28	564.48	882.24

Capacities are based on liquid temperature $t_l = +20^\circ\text{C}$ ahead of valve, evaporating temperature $t_e = -10^\circ\text{C}$, and superheat 0 K.

Correction factors

When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature t_l ahead of valve/evaporator. When the corrected capacity is known, the selection can be made from the table.

t_e °C	-10	0	+10	+20	+25	+30	+40	+50
R 717 (Nh3)	0.84	0.88	0.92	0.97	1.0	1.03	1.09	1.16
R 22, R134a	0.76	0.81	0.88	0.96	1.0	1.05	1.16	1.31
R 404A	0.70	0.76	0.84	0.94	1.0	1.07	1.24	1.47

R 717 (NH₃)

Type	Pressure drop across valve Δp bar	Suction vapour capacity Q_e kW at evaporating temperature t_e °C					
		-40	-30	-20	-10	0	+10
MRASV 10 / DMRASV 10	0.1	3.298	4.365	5.723	7.081	8.633	10.282
	0.15	3.88	5.238	6.79	8.73	10.573	12.61
	0.2	4.365	5.917	7.663	9.7	12.222	14.55
MRASV 15 / DMRASV 15	0.1	5.917	7.857	10.379	12.804	15.52	18.527
	0.15	6.984	9.409	12.125	15.617	19.012	22.698
	0.2	7.76	10.67	13.774	17.46	21.922	26.19
MRASV 20 / DMRASV 20	0.1	9.894	13.095	17.266	21.243	25.802	30.943
	0.15	11.737	15.617	20.273	26.093	31.622	37.83
	0.2	12.998	17.751	22.989	29.003	36.569	43.747
MRASV 25	0.1	21.922	29.1	38.315	47.239	57.424	68.676
	0.15	25.899	34.823	44.911	57.909	70.325	84.099
	0.2	28.906	39.285	51.119	64.408	81.189	97
MRASV 32	0.1	35.114	46.366	61.304	75.563	91.859	109.61
	0.15	41.419	55.678	71.877	92.635	112.52	134.83
	0.2	46.269	62.856	81.771	102.82	129.98	155.2
MRASV 40	0.1	54.805	72.556	95.836	118.34	143.56	171.69
	0.15	64.796	87.106	112.52	144.53	175.57	210.49
	0.2	72.265	97.97	128.04	161.02	202.73	243.47

R 22

MRASV 10 / DMRASV 10	0.1	1.344	1.728	2.208	2.688	3.264	3.84
	0.15	1.536	2.016	2.592	3.264	3.936	4.704
	0.2	1.728	2.304	2.976	3.648	4.608	5.376
MRASV 15 DMRASV 15	0.1	2.4	3.072	3.936	4.8	5.856	6.912
	0.15	2.784	3.648	4.608	5.952	7.104	8.448
	0.2	3.168	4.128	5.28	6.528	8.256	9.792
MRASV 20 / DMRASV 20	0.1	3.936	5.088	6.528	8.064	9.696	11.52
	0.15	4.704	6.144	7.776	9.888	11.808	14.112
	0.2	5.28	6.912	8.832	10.944	13.728	16.224
MRASV 25	0.1	8.736	11.328	14.592	17.856	21.504	25.536
	0.15	10.464	13.632	17.184	21.888	26.304	31.296
	0.2	11.712	15.456	19.584	24.288	30.432	36.096
MRASV 32	0.1	14.016	18.144	23.328	28.608	34.368	40.896
	0.15	16.704	21.792	27.648	35.04	42.048	50.112
	0.2	18.816	24.672	31.296	38.88	48.672	57.792
MRASV 40	0.1	21.888	28.32	36.576	44.64	53.76	63.84
	0.15	26.112	33.984	43.2	54.72	65.856	78.24
	0.2	29.28	38.592	48.96	60.768	76.032	90.24

Capacities are based on liquid temperature $t_l = +20^\circ\text{C}$ ahead of evaporator.

The table values refer to the evaporator capacity and are given as a function of evaporating temperature t_e and pressure drop Δp across valve.

Capacities are based on dry, saturated vapour ahead of valve.

During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

Correction factors

When sizing valves, the evaporator capacity must be multiplied by a correction factor depending on liquid temperature t_l ahead of expansion valve. When the corrected capacity is known, the selection can be made from the table.

t_l °C	-10	0	+10	+20	+25	+30	+40	+50
R 717 (NH ₃)	0.84	0.8	80.9	20.9	71.0	1.0	31.0	91.16
R 22	0.7	60.8	10.8	80.9	61.0	1.0	51.16	1.31

Capacity

Hot gas capacity Q_h kW

R 717 (NH₃)

Type	Pressure drop across valve Δp bar	Hot gas capacity Q_h kW				
		Evaporating temp. $t_e = -20^\circ\text{C}$. Hot gas temp $t_h = t_c + 25^\circ\text{C}$. Subcooling $\Delta t_{\text{sub}} = 4\text{K}$				
		Condensing temperature t_c °C				
		+20	+30	+40	+50	+60
MRASV 3	0.1	1.728	2.016	2.208	2.4	2.496
	0.2	2.496	2.784	3.072	3.36	3.552
	0.4	3.648	4.032	4.416	4.704	5.088
	0.8	4.896	5.76	6.24	6.816	7.296
	1.6	7.104	7.968	8.736	9.504	10.464
MRASV 10 / DMRASV 10	0.1	11.52	12.864	14.112	15.36	16.512
	0.2	16.416	18.24	20.064	21.792	23.424
	0.4	23.52	26.016	28.512	30.912	33.312
	0.8	32.64	37.44	40.896	44.256	47.52
	1.6	46.56	51.648	56.736	61.728	68.448
MRASV 15 / DMRASV 15	0.1	20.832	23.136	25.344	27.648	29.76
	0.2	29.568	32.832	36	39.168	42.24
	0.4	42.336	46.848	51.36	55.68	59.904
	0.8	58.752	67.488	73.632	79.68	85.536
	1.6	83.904	93.024	101.76	111.36	122.88
MRASV 20 / DMRASV 20	0.1	34.656	38.496	42.24	46.08	49.632
	0.2	49.344	54.72	60.096	65.28	70.272
	0.4	70.56	78.048	85.536	92.832	99.84
	0.8	97.92	112.32	122.88	132.48	142.08
	1.6	140.16	154.56	169.92	185.28	205.44
MRASV 25	0.1	76.992	85.536	94.08	102.72	110.4
	0.2	109.44	121.92	133.44	144.96	156.48
	0.4	156.48	173.76	190.08	206.4	221.76
	0.8	217.92	249.6192	80.64	294.72	316.8
	1.6	311.04	343.68	378.24	411.84	456
MRASV 32	0.1	122.88	137.28	150.72	164.16	176.64
	0.2	175.68	194.88	214.08	232.32	249.6
	0.4	250.56	277.44	304.32	330.24	355.2
	0.8	347.52	399.36	436.8	472.32	506.88
	1.6	497.28	551.04	605.76	660.48	730.56
MRASV 40	0.1	192.96	214.08	234.24	256.32	275.52
	0.2	274.56	304.32	334.08	362.88	390.72
	0.4	391.68	433.92	475.2	515.52	554.88
	0.8	543.36	624	681.6	738.24	792
	1.6	776.64	861.12	946.56	1031.04	1140.48

An increase in hot gas temperature t_h of 10 K, based on $t_h = t_c + 25^\circ\text{C}$, reduces valve capacity approx. 2% and vice versa.

A change in evaporating temperature t_e changes valve capacity; see correction factor table below.

Correction factor

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature t_e .

t_e °C	-40	-30	-20	-10	0	+10
R 717 (NH ₃)	0.89	0.91	0.96	1.0	1.06	1.10

Capacity

Hot gas capacity Q_h kW

R 22

Type	Pressure drop across valve Δp bar	Hot gas capacity Q_h kW				
		Evaporating temp. $t_e = -20^\circ\text{C}$. Hot gas temp $t_h = t_c + 25^\circ\text{C}$. Subcooling $\Delta t_{\text{sub}} = 4\text{K}$				
		Condensing temperature t_c °C				
		+20	+30	+40	+50	+60
MRASV 3	0.1	0.6596	0.6984	0.7372	0.7566	0.7663
	0.2	0.9409	0.97	1.067	1.067	1.067
	0.4	1.358	1.455	1.455	1.552	1.552
	0.8	1.843	1.94	2.037	2.231	2.231
	1.6	2.619	2.813	2.91	3.007	3.104
MRASV 10 / DMRASV 10	0.1	4.268	4.559	4.753	4.947	5.044
	0.2	6.111	6.499	6.79	6.984	7.081
	0.4	8.73	9.312	9.7	9.991	10.088
	0.8	12.028	12.804	13.483	14.259	14.453
	1.6	16.975	18.042	19.012	19.594	19.885
MRASV 15 / DMRASV 15	0.1	7.76	8.245	8.633	8.924	9.021
	0.2	11.058	11.737	12.222	12.61	12.804
	0.4	15.811	16.684	17.46	17.945	18.139
	0.8	21.631	22.407	24.153	25.705	25.996
	1.6	30.555	32.495	34.144	35.308	35.793
MRASV 20 DMRASV 20	0.1	12.901	13.677	14.356	14.841	15.035
	0.2	18.43	19.497	20.37	21.049	21.34
	0.4	26.287	27.839	29.1	29.973	30.264
	0.8	35.987	37.248	40.255	42.874	43.262
	1.6	50.925	54.223	56.842	58.782	59.655
MRASV 25	0.1	28.712	30.458	31.913	32.98	33.368
	0.2	40.837	43.262	45.299	46.754	47.336
	0.4	58.394	61.886	64.602	66.542	67.318
	0.8	80.025	85.263	89.531	95.254	96.224
	1.6	113.49	120.28	126.1	130.95	132.89
MRASV 32	0.1	45.978	48.694	51.022	52.768	53.35
	0.2	65.378	69.258	72.459	74.787	75.757
	0.4	93.411	98.94	103.79	106.7	107.67
	0.8	128.04	135.8	143.56	152.29	154.23
	1.6	181.39	193.03	202.73	209.52	212.43
MRASV 40	0.1	71.78	76.145	79.831	82.45	83.42
	0.2	101.85	108.64	113.49	117.37	118.34
	0.4	146.47	154.23	161.99	166.84	168.78
	0.8	199.82	215.34	224.07	238.62	240.56
	1.6	282.27	300.7	316.22	326.89	331.74

An increase in hot gas temperature t_h of 10 K, based on $t_h = t_c + 25^\circ\text{C}$, reduces valve capacity approx. 2% and vice versa. A change in evaporating temperature t_e changes valve capacity; see correction factor table below.

Correction factor

When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature. t_e

t_e °C	-40	-30	-20	-10	0	+10
R 22	0.90	0.94	0.97	1.0	1.03	1.05

Hot gas capacity Q_h kW

Type	Hot gas temperature t_h °C	Condensing temperature t_k °C	Hot gas capacity G_h kg/s at pressure drop across valve Δp bar							
			0.5	1	2	3	4	5	6	7

R 717 (NH₃)

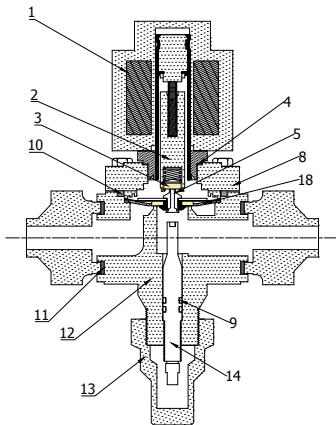
Type	Hot gas temperature t_h °C	Condensing temperature t_k °C	Hot gas capacity G_h kg/s at pressure drop across valve Δp bar								
			0.5	1	2	3	4	5	6	7	8
MRASV 3	+110	+25	0.00288	0.00576	0.00672	0.00672	0.00672	0.00672	0.00672	0.00672	0.0027648
		+35	0.00384	0.00672	0.00864	0.00864	0.0096	0.0096	0.0096	0.0096	0.0036864
		+45	0.0048	0.00864	0.0096	0.01056	0.01152	0.01248	0.01248	0.01248	0.004608
MRASV 10 / DMRASV 10	+110	+25	0.02112	0.0384	0.0432	0.04608	0.04608	0.04608	0.04608	0.04608	0.0202752
		+35	0.02496	0.04608	0.05376	0.05856	0.06144	0.0624	0.0624	0.0624	0.0239616
		+45	0.0288	0.05376	0.06336	0.07104	0.07584	0.07968	0.0816	0.08256	0.027648
MRASV 15 / DMRASV 15	+110	+25	0.0384	0.06912	0.07776	0.08256	0.08352	0.08352	0.08352	0.08352	0.036864
		+35	0.04416	0.08256	0.096	0.10464	0.1104	0.11232	0.11232	0.11232	0.0423936
		+45	0.05088	0.09696	0.1152	0.12768	0.13632	0.14304	0.14688	0.1488	0.0488448
MRASV 20 / DMRASV 20	+110	+25	0.06336	0.1152	0.1152	0.13824	0.1392	0.1392	0.1392	0.1392	0.0608256
		+35	0.07392	0.13824	0.16032	0.17472	0.18336	0.1872	0.1872	0.1872	0.0709632
		+45	0.08544	0.16224	0.19104	0.20256	0.22752	0.23808	0.2448	0.24768	0.0820224
MRASV 25	+110	+25	0.13728	0.2496	0.28416	0.30048	0.30336	0.30336	0.30336	0.30336	0.1317888
		+35	0.16128	0.30048	0.34944	0.38112	0.40032	0.408	0.408	0.408	0.1548288
		+45	0.18624	0.35328	0.41664	0.46272	0.49536	1.4784	0.5328	0.53856	0.1787904
MRASV 32	+110	+25	0.22368	0.40704	0.46368	0.49056	0.49536	0	0	0	0.2147328
		+35	0.26304	0.49056	0.57024	0.62208	0.65376	0.66624	0	0	0.2525184
		+45	0.30336	0.57696	0.68064	0.75552	0.80832	0.84672	0.86976	0.87936	0.2912256
MRASV 40	+110	+25	0.34752	0.63648	0.7248	0.76608	0.77376	0	0	0	0.3336192
		+35	0.41184	0.76608	0.89184	0.97248	1.02144	1.04064	0	0	0.3953664
		+45	0.4752	0.90144	1.06272	1.1808	1.26336	1.32288	1.35936	1.37376	0.456192

R 22

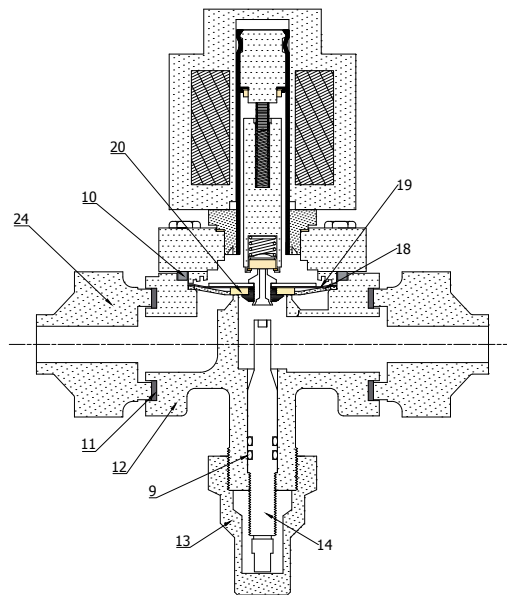
Type	Hot gas temperature t_h °C	Condensing temperature t_k °C	Hot gas capacity G_h kg/s at pressure drop across valve Δp bar								
			0.5	1	2	3	4	5	6	7	8
MRASV 3	90	25	0.00768	0.01344	0.01536	0.01632	0.01632	0.01632	0.01632	0.01632	
		35	0.00864	0.01632	0.01824	0.02016	0.02112	0.02112	0.02112	0.02112	
		45	0.0096	0.01824	0.02112	0.024	0.02496	0.02592	0.02688	0.02688	
MRASV 10 / DMRASV 10	90	25	0.04896	0.08832	0.09984	0.10464	0.10656	0.10656	0.10656	0.10656	
		35	0.05568	0.10368	0.12	0.13056	0.13632	0.13824	0.13824	0.13824	
		45	0.06336	0.12	0.14016	0.15552	0.16512	0.17184	0.17568	0.17568	
MRASV 15 / DMRASV 15	90	25	0.08736	0.1584	0.17952	0.18912	0.19104	0.19104	0.19104	0.19104	
		35	0.1008	0.18624	0.216	0.23424	0.24576	0.24768	0.24768	0.24768	
		45	0.11424	0.21504	0.25248	0.27936	0.2976	0.30912	0.31584	0.3168	
MRASV 20 / DMRASV 20	90	25	0.14592	0.264	0.29856	0.31488	0.31872	0.31872	0.31872	0.31872	
		35	0.16704	0.31008	0.36	0.39072	0.408	0.41376	0.41376	0.41376	
		45	0.18528	0.35904	0.42144	0.4656	0.49536	0.51552	0.52608	0.528	
MRASV 25	90	25	0.31776	0.57504	0.64992	0.6864	0.69312	0.69312	0.69312	0.69312	
		35	0.3648	0.67584	0.78336	0.85056	0.888	0.90048	0.90048	0.90048	
		45	0.41376	0.78144	0.91776	1.01376	1.08	1.12224	1.14432	1.14912	
MRASV 32	90	25	0.51744	0.93696	1.06176	1.12128	1.13184	0	0	0	
		35	0.59424	1.104	1.27776	1.38816	1.44864	1.46976	0	0	
		45	0.67584	1.27584	1.49952	1.65408	1.76352	1.83264	1.86912	1.8768	
MRASV 40	90	25	0.80928	1.464	1.65888	1.752	1.76928	0	0	0	
		35	0.92928	1.72608	1.9968	2.1696	2.26368	2.29728	0	0	
		45	1.056	1.99488	2.3424	2.58528	2.7552	2.28768	2.92128	2.9328	

An increase in hot gas temperature t_h of 10°C reduces valve capacity approx. 2% and vice versa.

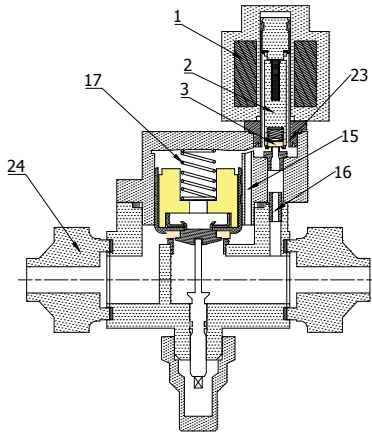
DESIGN / PART LIST



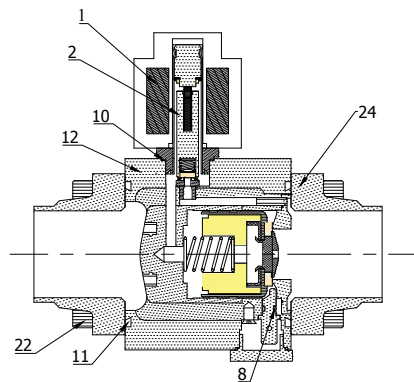
MRASV/DMRASV 10-25



MRASV/DMRASV 20



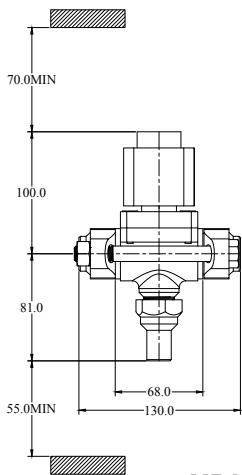
MRASV 25



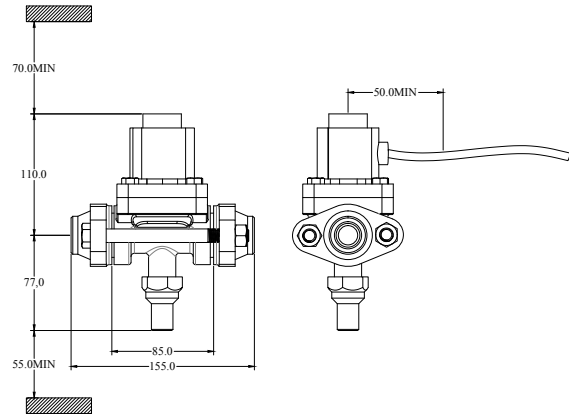
MRASV 32-40

SR. NO.	PART NAME	MATERIAL	EN GRADE
1	COIL		
2	PLUNGER	STEEL	X14CRMOS17
3	PTFE SEAT	PTFE (TEFLON)	
4	ALUMINIUM WASHER	ALUMINIUM	AL99.5
5	PILOT ORIFICE	STAINLESS STEEL	X2CRNIMO17-12-2
6	O-RING	RUBBER	NEOPRENE
7	PISTON RING		
8	VALVE COVER	SG IRON	GJS-400-18LT
9	O-RING	RUBBER	NEOPRENE
10	VALVE COVER GASKET	ASBESTOS FREE	
11	FLANGE GASKET	ASBESTOS FREE	
12	VALVE BODY	SG IRON	GJS-400-18LT
13	SEAL CAP	STEEL	11SMNPB30
14	MANUAL SPINDLE	STAINLESS STEEL	X5CRNIMO17-12-2
15	EQUALIZATION PORT		
16	PILOT CHANNEL	SPRING STEEL	
17	COMPRESSION SPRING	SPRING STEEL	
18	DIAPHRAGM		
19	SUPPORT WASHER	STAINLESS STEEL	X5CRNI18-10
20	PTFE VALVE PLATE	PTFE (TEFLON)	
21	COVER BOLTS	STAINLESS STEEL	A2-70
22	FLANGE BOLTS	STAINLESS STEEL	A2-70
23	ENCLOSING TUBE	STAINLESS STEEL	X5CRNI18-10
24	FLANGE 25	STEEL	S235JRG2
	FLANGE 32/40	STEEL	P285QH

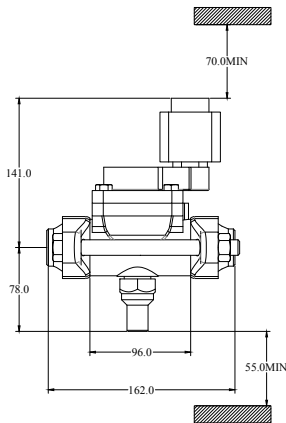
Dimensions and weights



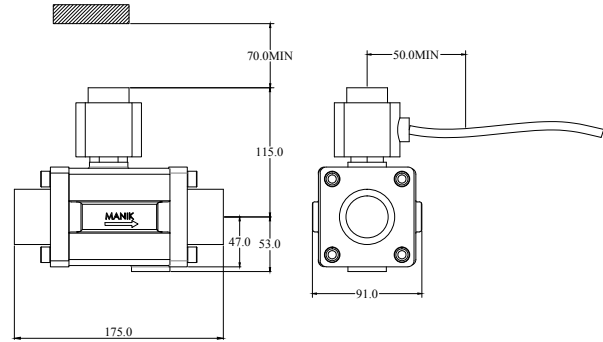
MRASV/DMRASV 10-15



MRASV/DMRASV 20



MRASV 25



MRASV/DMRASV 32-40

* ALL DIMENSIONS ARE IN MM

ORDERING INFORMATION

MODEL NOS.	Flanged Connection	Weight (kg)	
		With strainer	Without strainer
MRASV3	1/2" SW	3	2
MRASV10	1/2" SW	3.15	2.5
MRASV15	1/2" SW	3.6	2.5
	3/4" SW		
MRASV20	3/4" SW	5.74	3.8
MRASV25	1" SW	8	4.61
MRASV32	1-1/4" SW	12	5.58
MRASV40	1-1/2" SW	12	5.58

NOTE : These valves are available in various voltages - 230 VAC 50/60 Hz, 110 VAC 50/60 Hz, 24 VDC