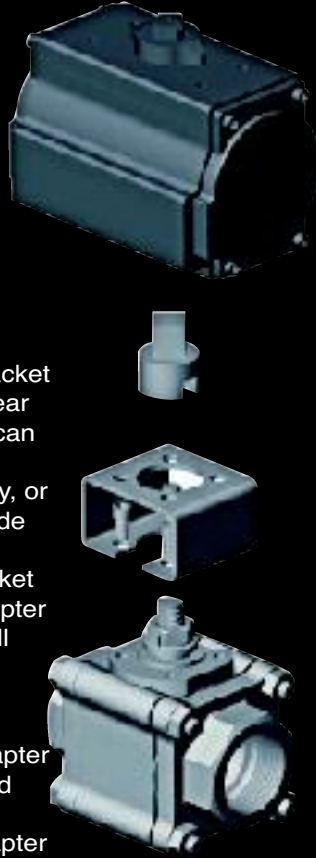




# DO YOU STILL USE CONVENTIONAL ACTUATOR MOUNTING?

Conventional mounting method is to use a bracket and adapter between ball valve and actuator, however, the bracket and adapter can often be the source of failure for valve / actuator packages:

- A simple misalignment of the bracket and adapter can cause excessive wear and high torque than expected, this can result in stem leakage or valve stall.
- A warped bracket, however slightly, or the bolt drillings lose center, stem side loading can occur.
- If the adapter is too long and bracket bolts are drawn down tightly, the adapter can jam the valve stem into valve ball resulting in higher torque than the actuator provided.
- The bracket and adapter leave exposed moving parts, when the adapter turns it can become a pinch point and injury may occur.
- The connections between the adapter and the valve stem and the adapter and the actuator drive can create a slope, known as hysteresis, the looseness of the connecting surface can cause the valve to not fully open or fully close.



**MARS DIRECT MOUNT BALL VALVE SETS A NEW STANDARD FOR BALL VALVE / ACTUATOR MOUNTING, ENHANCES FUNCTIONAL PERFORMANCE WITH EASY INSTALLATION AND LOWER MAINTENANCE COSTS.**



The new way of mounting actuator is the Direct Mount Configuration, it is designed to overcome the problems of conventional actuator mounting. This design allows an actuator bolted directly to the top of ball valves for greater reliability, easy installation and improved cycling life.



**No bracket and adapter are required, the valve stem is an integral part of the actuator drive. The direct valve stem coupling to actuator shaft ensures correct alignment of the valve to the actuator, minimizes stem side loading and backlash during operation, increased service life and performance.**

#### **Modular design and simplicity**

No confusion as to how to select brackets and adapters.

#### **Low cost and easy automation**

Direct mount eliminates the need for additional brackets and adapters, time and labor saving too. In the event maintenance is needed, Mars Direct Mount ball valves facilitate fast, easy breakdown and assembly of ball valve and actuator package, the result is reduced maintenance time and the lowest overall cost of ownership.

#### **Compact and Space-Saving**

The close coupling of the actuator to the valve makes the total package as compact as possible.

#### **Safety**

There are no External Moving Parts, No Pinch Points.

#### **Direct Valve Stem / Actuator Drive Connection**

Less chance for Hysteresis.

## Patented Direct Mount Design

The U.S., Germany, and China Patent and Trademark Offices Have awarded Mars Valve Patent Protection for the Direct Mount Design.



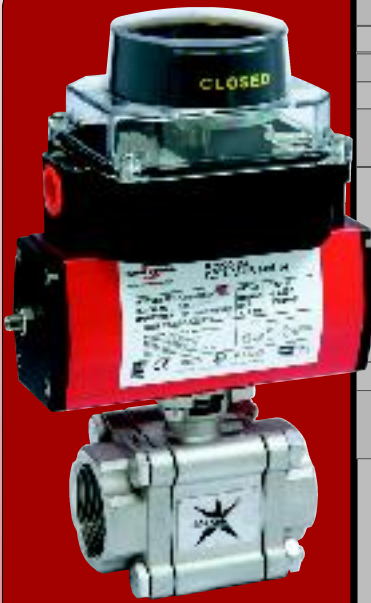
U.S. Patent 5,954,088

Germany Patent 299.02.532.2

China Patent ZL 98 2 09161.3



# SERIES 88 Direct Mount Three-Piece Ball Valves



Mars Patented Direct Mount Ball Valves  
Making Automation Easy

Construction:	3-Piece In-Line Swing Out Design, Full Port or Reduced Port
Size Range:	Full Port: 1/4" to 4" (DN 8 to DN 100) Reduced Port: 1/2" to 4" (DN 15 to DN 100)
Pressure Rating:	3000 PSI Max.
Valve Material:	Standard: ASTM A351 Gr. CF8M / DIN 1.4408 Options: WCB, 316L S/S, Titanium, Duplex, Hastelloy C...etc.
Seat Material:	Standard: R-PTFE Options: TFM 1600, PEEK, Carbon filled PTFE, Delrin, UHMWPE, 50/50 S/S filled PTFE, Metal Seats...and others
Inspection and Test:	API 598, BS6755 Part 1
Compliance Standards:	ANSI B16.34, ANSI B16.25, ANSI B1.20, API 6D, API 598, API 607 ISO 5209, ISO 5211, ISO 5752
Material Certificate:	EN 10204 - 3.1
Quality System:	ISO 9001
Options:	NACE MR-0175 Standard valve is non-fire safe design, fire safe valve is optional

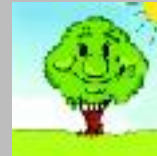
## APPROVALS:



Fire safe tested  
API 607 Rev. 4



0035  
PED/97/23/EC  
Category III  
Module H



TA-Luft



II 2 GD  
ATEX 94/9/EC

## Mars Unique SealMax® Triple-Sealing Stem Packing System Live Loaded - Maintenance Free - Extra Long Cycle Life -TA-Luft Approved

### 1. Pyramidal Stem with Stem Seal

First stage of defense against leakage. The 45° slope of the stem accompany the stem seal effectively blocks all leak path during rotation.

### 2. O-Ring Stem Packing

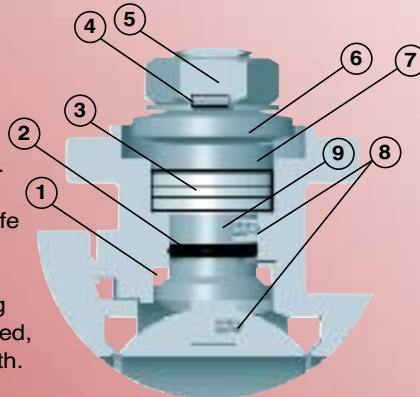
Second stage of defense against leakage. Enhances stem seal and maintains stem alignment, provides extra longer service life

### 3. V-Ring Stem Packing

Third stage of defense against leakage. Multiple layers of V-Ring Chevron Packing expands side way as it is being compressed, blocking all air pockets to prevent leak path.

### 4. Lock Saddle

Stabilizes the entire stem nut to keep it from loosening during operation.



### 5. Stem Nut

Compress the entire stem system to enable blocking of leakage.

### 6. Belleville Washers

Automatically compress the seals to adjust for wear, pressure, and temperature fluctuations.

### 7. Gland

Made of stainless steel, equally distributes the compressive force on the packing and seal.

### 8. Anti-Static Device

Stem-to-Ball and Stem-to-Body as standard.

### 9. Super Smooth Stem Finish

Reduces seal friction and operating torque, prolongs service life.

## AVAILABLE END CONNECTIONS



FIG. 88-10  
Threaded



FIG. 88-20  
Socket Weld



FIG. 88-30  
Butt Weld



FIG. 88-50  
Flanged  
PN 25/40

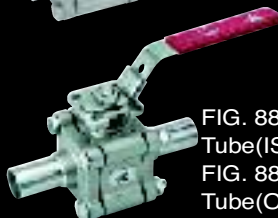


FIG. 88-70  
Tube(ISO), Butt Weld  
FIG. 88SN-20  
Tube(OD), Butt Weld



88SN-10  
Clamp Ends



Series 88  
Instrumentation  
ball valve

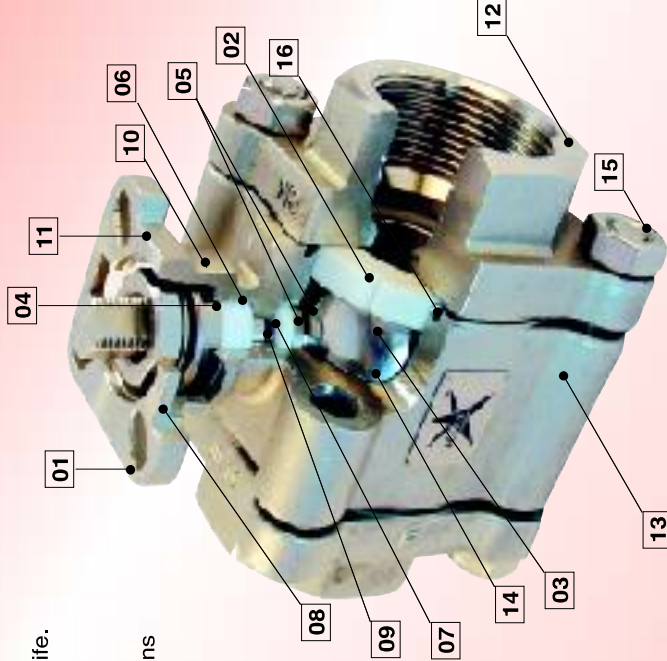


Sampling Ends

# MARS SERIES 88 DIRECT MOUNT BALL VALVES OFFER ADVANTAGE WELL BEYOND FOLLOWERS

1. **DUAL PATTERN ISO 5211 Mounting Pad With Square Shaft**  
No bracket and adapter are required for actuator mounting, provides easy and low cost actuation with improved cycle life.
2. **Seats**  
\*Features with relief slots to relieve pressure in upstream, reducing seat wear and valve torque  
\*Wide range of materials available to suit various applications
3. **Ball**  
\*Precisely machined, mirror polished solid ball for bubble tight shutoff with less operating torque  
\*A relief hole in stem slot to balance the pressure in the body cavity ensures tight shutoff and long service life
4. **Blow-Out Proof Stem**  
Prevents stem from blowing out, for maximum safety
5. **Anti-Static Device**  
Spring loaded Stem to ball and stem to body anti-static device as standard
6. **Super Smooth Stem Surface**  
Reduces seal friction and operating torque, prolongs service life.
7. **MARS SealMax<sup>®</sup> Stem Design**  
Provides optimum stem seal and extremely high cycle life

## Fire-Safe Certified to API 607 4th Edition



8. **Patented Leak-Watching Window**  
Standard on Mars Direct Mount Ball Valves, for an early warning of stem leak, prevents accident and business disruption costs.
9. **O-Ring Stem Seal**  
Enhances stem wear and maintains stem alignment, provides extra longer service life
10. **Extended Valve Neck**  
Gives sufficient room between mounting pad and valve body, allows easy access for mounting actuator without interference with pipeline
11. **Locking Device Standard**
12. **Stainless Steel Welded Ends in 316L Standard**  
Reduces inter-granular corrosion in welding.
13. **3-Piece Swing-Out Design**  
Fast and simple inline maintenance
14. **Floating Ball**  
Provides pressure assisted sealing plus temperature and wear compensation, for positive shutoff
15. **Encapsulated Body Bolts (up to 2")**  
Enhance environment protection essential for API 607 Fire-Safe qualification
16. **Fully Contained Body Seals**  
Allows in line welding without disassembly, maintains sealing integrity from high vacuum to high pressure and temperature application.

### STANDARD HANDLE:

S.S. handle with vinyl sleeves(1/4" to 2")



S.S T-handle 2 1/2" to 4"

### HANDLE OPTIONS:

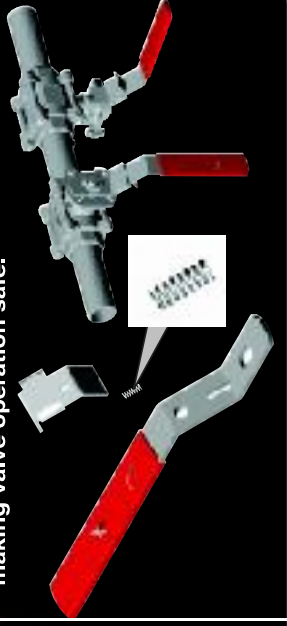
S.S. investment cast handle(1/4" to 2")



Oval handle (1/4" to 2")

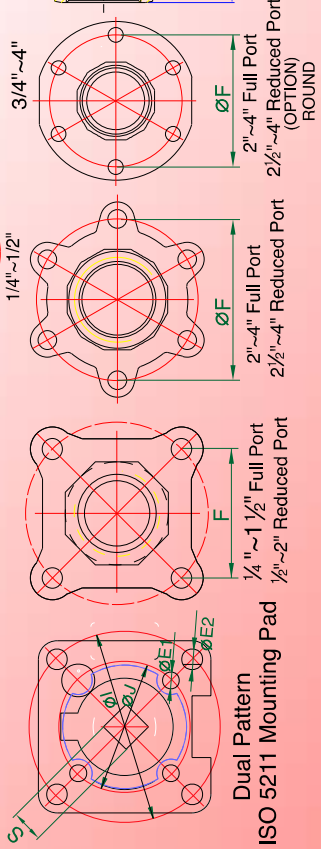
### SPRING RETURN SLIDING LOCK HANDLE:

No matter the orientation of the ball valves, the SRSL handle always secures handle in position, making valve operation safe.





# DIMENSIONS (mm)



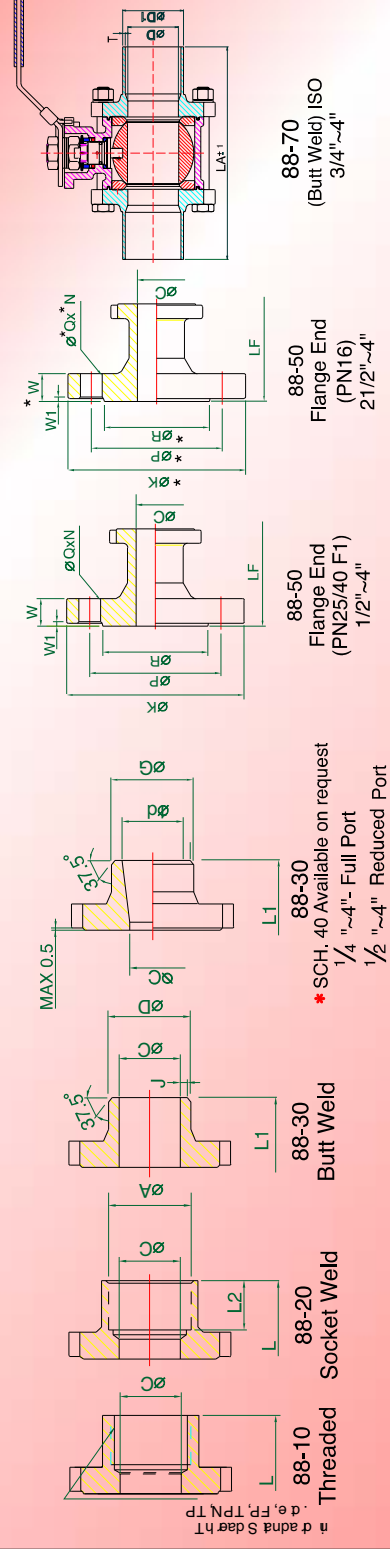
Dual Pattern  
ISO 5211 Mounting Pad

1/4" ~ 1/2" Full Port  
1/2" ~ 2" Reduced Port

2" ~ 4" Full Port  
2 1/2" ~ 4" Reduced Port (OPTION)  
ROUND

3/4" ~ 4" Full Port  
2 1/2" ~ 4" Reduced Port (OPTION)  
ROUND

# END CAP OPTIONS

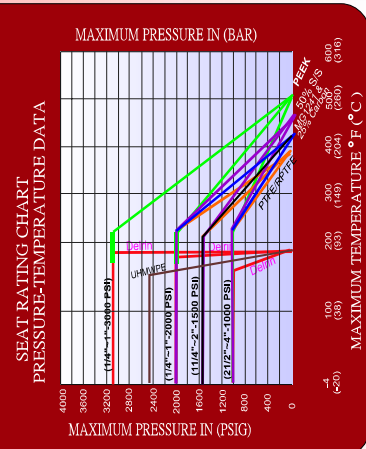
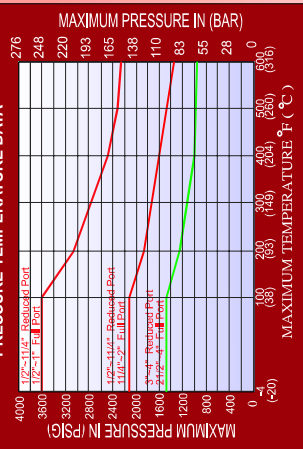


\* SCH. 40 Available on request  
1/4" ~ 4" Full Port  
1/2" ~ 4" Reduced Port

**BREAKAWAY TORQUE AND Cv (G.P.M.)**

Valve Size	Break Away Torque (Nm)	Cv (G.P.M.)
Inches	Full Bore	Red Bore
1/4	8	8
3/8	10	8
1/2	15	8
3/4	20	10
1	25	16
1 1/4	32	23
1 1/2	40	33
2	50	47
2 1/2	65	62
3	80	101
4	100	114
		101
		1020
		560

-30% Safety factor. Included.



# H, B1 DIMENSIONS ±0.5MM

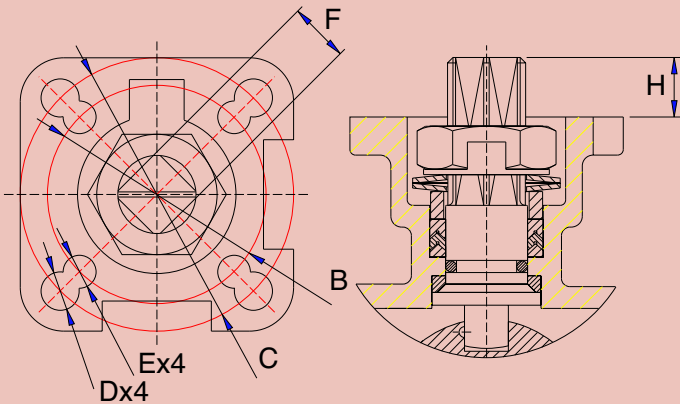
SIZE	ØA	F	R	B1	B2	ØC	ØD1	ØD	E	S	ØG	H	J	L	L1	L2	ØL	ØM	ØN	ØP	ØR	ØQ	N	W	WI	ØK	ØP	ØR	ØQ	N	W	LF	ØD1	T	LA	ISO5211	F	F	F	R	F	R	Wt. (Kg)							
1/4"	14.3	6.4	42.6	11.5	11.5	9.24	13.7	21.7	139	9	21.7	77	77	60	75	10	36	42	6	6	7/16"-20UNF	24.5	38.2	24.5	38.2	24.5	38.2	24.5	38.2	95	65	45	14	4	16	2	12.6	17.2	2.1	120	F03 F04 F03 F04	F	F	F	F	F	F	0.89		
3/8"	17.6	6.4	42.6	12.5	12.5	12.53	17.5	21.7	139	9	21.7	77	77	60	75	10	36	42	6	6	7/16"-20UNF	24.5	38.2	24.5	38.2	24.5	38.2	24.5	38.2	95	65	45	14	4	16	2	15.2	21.1	140	F03 F04 F03 F04	F	F	F	F	F	F	0.88			
1/2"	21.9	6.4	42.6	15	15	15.76	21.7	21.7	139	9	21.7	77	77	60	75	10	36	42	6	6	7/16"-20UNF	24.5	38.2	24.5	38.2	24.5	38.2	24.5	38.2	95	65	45	14	4	16	2	18.8	26.1	140	F03 F04 F03 F04	F	F	F	F	F	F	0.82			
3/4"	27.3	8.6	46.89	42.6	20	20	27.2	27.2	139	9	27.2	82	82	80	90	74.8	13	36	36	42	6	6	7/16"-20UNF	31.4	44.3	31.4	44.3	31.4	44.3	31.4	44.3	115	85	68	14	4	18	2	20.9	28.9	140	F03 F04 F03 F04	F	F	F	F	F	F	0.84	
1"	33.9	10.4	51.346	25	25	28.64	34	34	165	11	34	98.5	82	110	108	108	13	36	36	42	6	6	7/16"-20UNF	41.3	50	41.3	50	41.3	50	41.3	50	140	100	78	18	4	18	2	33.7	45.2	152	F03 F04 F03 F04	F	F	F	F	F	F	0.82	
1 1/4"	42.8	10.4	62.6	59.3	32	25	35.08	35.08	139	11	42.7	127	127	125	110	115	109.4	13	36	36	42	6	6	7/16"-20UNF	48.4	57.2	48.4	57.2	48.4	57.2	48.4	57.2	140	100	78	18	4	18	2	42.4	57.2	152	F03 F04 F03 F04	F	F	F	F	F	F	0.84
1 1/2"	48.9	13.4	79	62.6	38	32	40.94	40.94	139	14	48.6	145	145	144	130	134	114.4	13	36	36	42	6	6	7/16"-20UNF	56.3	66.3	56.3	66.3	56.3	66.3	56.3	66.3	150	110	88	18	4	18	3	48.3	66.3	152	F03 F04 F03 F04	F	F	F	F	F	F	0.88
2"	61.3	13.4	87.7	79.0	50	38	52.5	52.5	139	14	60.5	160.5	160.5	159	140	150	142.8	13	36	36	42	6	6	7/16"-20UNF	71.4	81.4	71.4	81.4	71.4	81.4	71.4	81.4	150	110	88	18	4	18	3	60.3	81.4	152	F03 F04 F03 F04	F	F	F	F	F	F	0.88
2 1/2"	76.8	16.8	117.7	108.7	80	65	80	80	139	14	76.3	167	167	167	142	150	145	16	36	36	42	6	6	7/16"-20UNF	99	109	99	109	99	109	99	109	160	120	90	18	4	18	3	76.3	109	152	F03 F04 F03 F04	F	F	F	F	F	F	1.01
3"	90	17.8	133.4	124.4	102	85	95	95	139	14	90	176	176	176	152	160	152	16	36	36	42	6	6	7/16"-20UNF	114	124	114	124	114	124	114	124	160	120	90	18	4	18	3	90	124	152	F03 F04 F03 F04	F	F	F	F	F	F	1.01
4"	115	16.8	158.4	151.4	114	102	102	102	139	14	115	192	192	192	168	176	168	16	36	36	42	6	6	7/16"-20UNF	127	137	127	137	127	137	127	137	160	120	90	18	4	18	3	115	137	152	F03 F04 F03 F04	F	F	F	F	F	F	1.01

\* L - Dimension for DIN 3202-M3 Length  
Size 3/4" ISO 5211 standard configuration is F03/F04, F03/F04/F05 & F05/F07 as option.  
\* L1 - Dimension for S13 Length

\* Dimension For Round End Cap  
H, B1 DIMENSIONS ±0.5mm  
# Dimension For SCH.40

\* Dimension For Round End Cap  
H, B1 DIMENSIONS ±0.5mm  
# Dimension For SCH.40

# MARS TOP WORKS MAKE AUTOMATION AS EASY AS IT GETS



SIZE	ISO5211 DIN 3337	B Inner Holes PCD	C Outer Holes PCD	D Outer Holes DIA (Clearance)	E Inner Holes DIA (Clearance)	F Stem Square Across Flats	H Square H/T Above plate
1/4" ~ 1/2"	F03/F04 * F03/F04/F05 * F04/F05	36	42	6	6	9	6.4
3/4"	F03/F04 * F03/F04/F05 * F05/F07	36	42	6	6	9	8.6
1"	F04/F05 * F05/F07	42	50	7	6	11	10.4
1-1/4"	F04/F05 * F05/F07	42	50	7	6	11	10.4
1-1/2"	F05/F07	50	70	9	7.5	14	13.4
2"	F05/F07	50	70	9	7.5	14	13.4
2-1/2"	F07/F10	70	102	12	10	17	16.8
3"	F07/F10	70	102	12	10	17	17.8
4"	F07/F10	70	102	12	10	17	16.8

\* Size 1/4" to 1/2" ISO 5211 standard configuration is F03/F04, F03/F04/F05 & F04/F05 as option.  
 \* Size 3/4" ISO 5211 standard configuration is F03/F04, F03/F04/F05 & F05/F07 as option.  
 \* Size 1" to 1 1/4" ISO 5211 standard configuration is F04/F05, F05/F07 as option.

## MATERIALS LIST



NO.	PART NAME	MATERIAL	Q'TY
1	Body	ASTM A351 Gr. CF8M	1
2	End Cap	ASTM A351 Gr. CF8M	2
3	Ball	SUS316	1
4	Stem	SUS316	1
5	Stem Nut	SUS 304	2
6	Belleville Washer	SUS 301	2
7	Handle	SUS 304	1
8	Seat	RPTFE	2
9	Gland	SUS 304	1
10	Gland Packing	PTFE	♦
11	Stem Seal	RPTFE	1
12	Stop Washer	SUS 304	1
13	Joint Gasket	PTFE	2
14	Bolt	SUS 304	*
15	Stop Pin	SUS 304	1
16	Handle Sleeve	Vinyl	1
17	Bolt Nut	SUS 304	f
18	Stem Washer	SUS 304	1
19	Gland Packing	#	1
20	Locking Device	SUS 304	1
21	Pin Nut	SUS 304	1
22	Washer	SUS 304	1
23	Antistatic - Device	SUS 304	@
24	O-RING	VITON	1

♦ Socket weld and butt weld uses CF3M material  
 ♦ For 1/4"-2"-2pcs, 2 1/2"-4"-3pcs.  
 \* For 1/4" to 1" - 4pcs ; For 2"-4" - 6pcs  
 f For 1/4" to 1 1/2" - 4pcs ; For 2" - 6pcs, For 2 1/2" - 4" - 12pcs  
 # 25% Glass Fiber Filled + PTFE  
 @ 1/4"-1/2" - 1pcs, 3/4"-4" - 2pcs.

## HOW TO ORDER ■ 88-10F05STX

88-10 VALVE	F PORT TYPE	05 SIZE	S BODY MATERIAL	T SEAT MATERIAL	X HANDLE STYLE
<input checked="" type="checkbox"/> 88-10 <input type="checkbox"/> 88-20 <input type="checkbox"/> 88-30 <input type="checkbox"/> 88-50 <input type="checkbox"/> 88-70	<input checked="" type="checkbox"/> F <input type="checkbox"/> R	<input type="checkbox"/> 01) 1/4" <input type="checkbox"/> 02) 3/8" <input type="checkbox"/> 03) 1/2" <input type="checkbox"/> 04) 3/4" <input checked="" type="checkbox"/> 05) 1" <input type="checkbox"/> 06) 1 1/4" <input type="checkbox"/> 07) 1 1/2" <input type="checkbox"/> 08) 2" <input type="checkbox"/> 09) 2 1/2" <input type="checkbox"/> 10) 3" <input type="checkbox"/> 11) 4"	<input checked="" type="checkbox"/> S - CF8M <input type="checkbox"/> W - WCB <input type="checkbox"/> L - 316L <input type="checkbox"/> D - Duplex <input type="checkbox"/> T - Titanium <input type="checkbox"/> A - Alloy 20	<input type="checkbox"/> P PTFE <input type="checkbox"/> R R-TFE <input checked="" type="checkbox"/> T TFM1600 <input type="checkbox"/> S 50/50 S.S.+PTFE <input type="checkbox"/> M MG1241 <input type="checkbox"/> C Carbon filled PTFE <input type="checkbox"/> U UHMWPE <input type="checkbox"/> K Peek <input type="checkbox"/> D Delrin <input type="checkbox"/> A Metal	<input type="checkbox"/> A - Std. handle <input type="checkbox"/> I - Investment Cast <input type="checkbox"/> O - Oval handle <input type="checkbox"/> L - SRSL handle <input type="checkbox"/> S - SRS handle <input checked="" type="checkbox"/> X - Bare shaft

# MARS OPTIONAL VALVE ACCESSORIES INCREASE PRODUCTIVITY AND GIVE YOU MORE CONTROL OVER YOUR INDUSTRIAL PROCESS

## SERIES 88 V-Control Ball

Mars V-Control Ball valves match the control performance of globe valve, excellent for modulating service, but Mars V-Control ball valves are more compact, lighter weight, and much less expensive than globe valves.



30 ° V      60 ° V      90 ° V

30°V, 60°V, and 90°V are standard, others on request

## SERIES 88 BALL VALVES With Heating Jacket

Jacket ball valve prevents solidification and blockage in use of hot water, steam, or other appropriate heating or cooling medium.

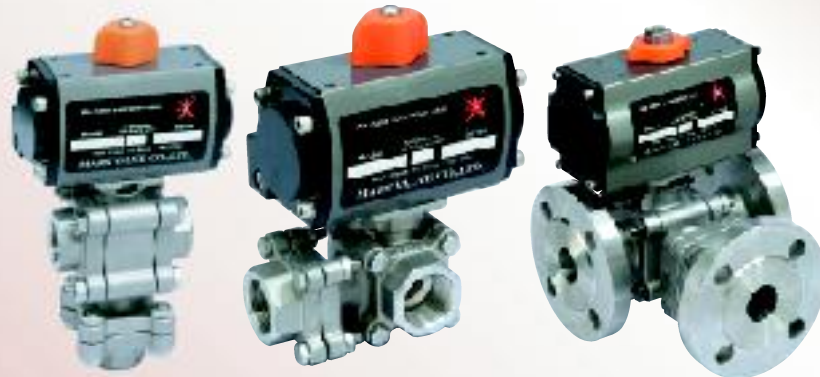


## SERIES 88 3-Way Diverter Ball Valves

For Diversion, Mixing, and Blending applications

Side Entry: T-Port, L-Port

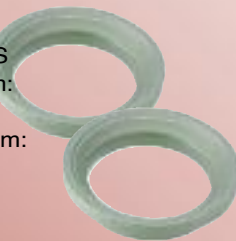
Bottom Entry: T-Port, L-Port, LL-Port



## SERIES 88 Metal Seats

Bubble Tight Shut-Off

- Ball and Seat material: 316 S/S
- Chrome Carbide Ball and Stem: Hardness 63 to 65 Rc
- Tungsten Carbide Ball and Stem: Hardness 70 to 74 Rc



## SERIES 88 Titanium BALL VALVES

Light weight, Excellent for Corrosion Resistance



Other special alloy available on request

- Monel
- Hastelloy C
- Alloy 20
- Duplex

## SERIES 88 With (SRS) Spring Return Safety Handle

The SRS Handle is a spring energized handle, the ball valve will return to pre-determined closed (or open) position when an operator disengages from handle, provides safe and positive fail close or open operation, creating a reliable sampling, filling, dispensing, and pressure relief valve. Full S.S. construction provides excellent corrosion resistance for extended service life.



## SERIES 88 With Mars "TSM" Unit Adds Extra Safety and Long Service Life

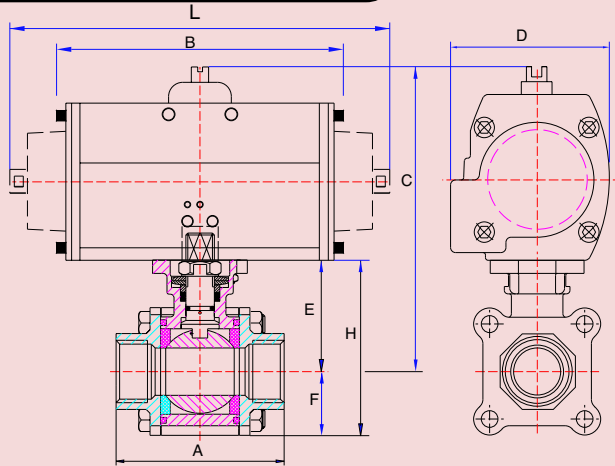
- The TSM unit designed for possible fugitive emission to meet TA-Luft requirements for a safe and clean environment, provides a secondary stem seal for the valve stem, prolongs service life.
- The TSM unit can also function as stem extension for insulation.



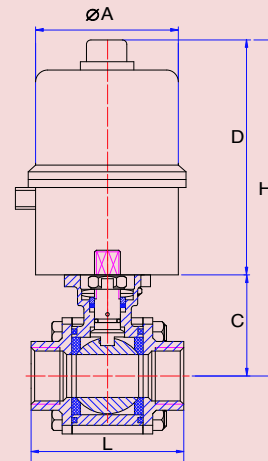


# Mars Valve offers single-reliable-source for a complete line of ball valves, actuators, and accessories to meet your automation requirements.

## Series 88 Ball Valves with AirMars Pneumatic Actuators



## Series 88 Ball Valves with PowerMars Electric Actuators



### Double-Acting

Valve Size	A	B	C	D	E	F	H	Actuator	Wt	
									Lbs.	Kg.
1/4"	75	120	126.6	62.2	42.6	25.6	68.2	A-125	3.95	1.79
3/8"	75	120	126.6	62.2	42.6	25.6	68.2	A-125	3.95	1.79
1/2"	72.5	120	126.6	62.2	42.6	25.6	68.2	A-125	3.95	1.79
3/4"	85.4	120	130.9	62.2	46.9	30.7	77.6	A-125	4.98	2.26
1"	105.3	144.3	158.3	81.4	59.3	33.8	93.1	A-250	7.85	3.56
1 1/4"	111	144.3	161.6	81.4	62.6	38.6	101.2	A-250	9.28	4.21
1 1/2"	127.3	149.2	197	95	79	43.3	122.3	A-450	13.51	6.13
2"	145	183	228.7	119	87.7	64.5	149.1	A-1000	20.01	9.07
2 1/2"	185	183	249.7	119	108.7	73.2	181.9	A-1000	30.80	13.97
3"	205	183	258.7	119	117.7	84.3	202	A-1000	38.22	17.33
4"	240	259.6	294.7	140.5	133.7	99	232.7	A-2250	66.78	30.27

\* Round end cap

VALVE SIZE	Electric Actuator	Flange Type	◆	Ø A	C	D	H	L	◆	STEM	ISO 5211	Lbs.	Kg
1/4"	OM-1	F03/F05	14	114	42.6	155	197.6	75	9	F03/F04	6.16	2.79	
3/8"	OM-1	F03/F05	14	114	42.6	155	197.6	75	9	F03/F04	6.16	2.79	
1/2"	OM-1	F03/F05	14	114	42.6	155	197.6	72.5	9	F03/F04	6.16	2.79	
3/4"	OM-1	F03/F05	14	114	46.9	155	201.9	85.4	9	F03/F04	7.19	3.26	
1"	OM-1	F03/F05	14	114	59.3	155	214.3	105.3	11	F04/F05	8.74	3.96	
1 1/4"	OM-1	F03/F05	14	114	62.6	155	217.6	111	11	F04/F05	10.17	4.61	
1 1/2"	OM-A	F07	17	114	79	203	282	127.3	14	F05/F07	15.29	6.93	
2"	OM-2	F07	22	180	87.7	255	342.7	145	14	F05/F07	35.12	16.37	
2 1/2"	OM-2	F07	22	180	108.7	255	363.7	185	17	F07/F10	46.93	21.27	
3"	OM-3	F07	22	180	117.7	255	372.7	205	17	F07/F10	58.70	26.70	
4"	OM-3	F07	22	180	133.7	255	388.7	240	17	F07/F10	74.51	33.77	

\* Round end cap

### Spring-Return

Valve Size	A	L	C	D	E	F	H	Actuator	Wt	
									Lbs.	Kg.
1/4"	75	194.6	141.6	81.4	42.6	25.6	68.2	A-250SR4	5.93	2.69
3/8"	75	194.6	141.6	81.4	42.6	25.6	68.2	A-250SR4	5.93	2.69
1/2"	72.5	194.6	141.6	81.4	42.6	25.6	68.2	A-250SR4	5.93	2.69
3/4"	85.4	194.6	145.9	81.4	46.9	30.7	77.6	A-250SR4	6.97	3.16
1"	105.3	205.6	177.3	95	59.3	33.8	93.1	A-450SR4	10.71	4.86
1 1/4"	111	205.6	180.6	95	62.6	38.6	101.2	A-450SR4	12.15	5.51
1 1/2"	127.3	250.0	220	119	79	43.3	122.3	A-1000SR4	20.13	9.13
2"	145	355.0	248.7	140.5	87.7	64.5	149.1	A-2250SR4	33.91	15.37
2 1/2"	185	355.0	269.7	140.5	108.7	73.2	181.9	A-2250SR4	44.69	20.27
3"	205	355.0	278.7	140.5	117.7	84.3	202	A-2250SR4	47.47	21.53
4"	240	422	329.7	185.2	133.7	99	232.7	A-3650SR4	89.95	40.77

\* Round end cap



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