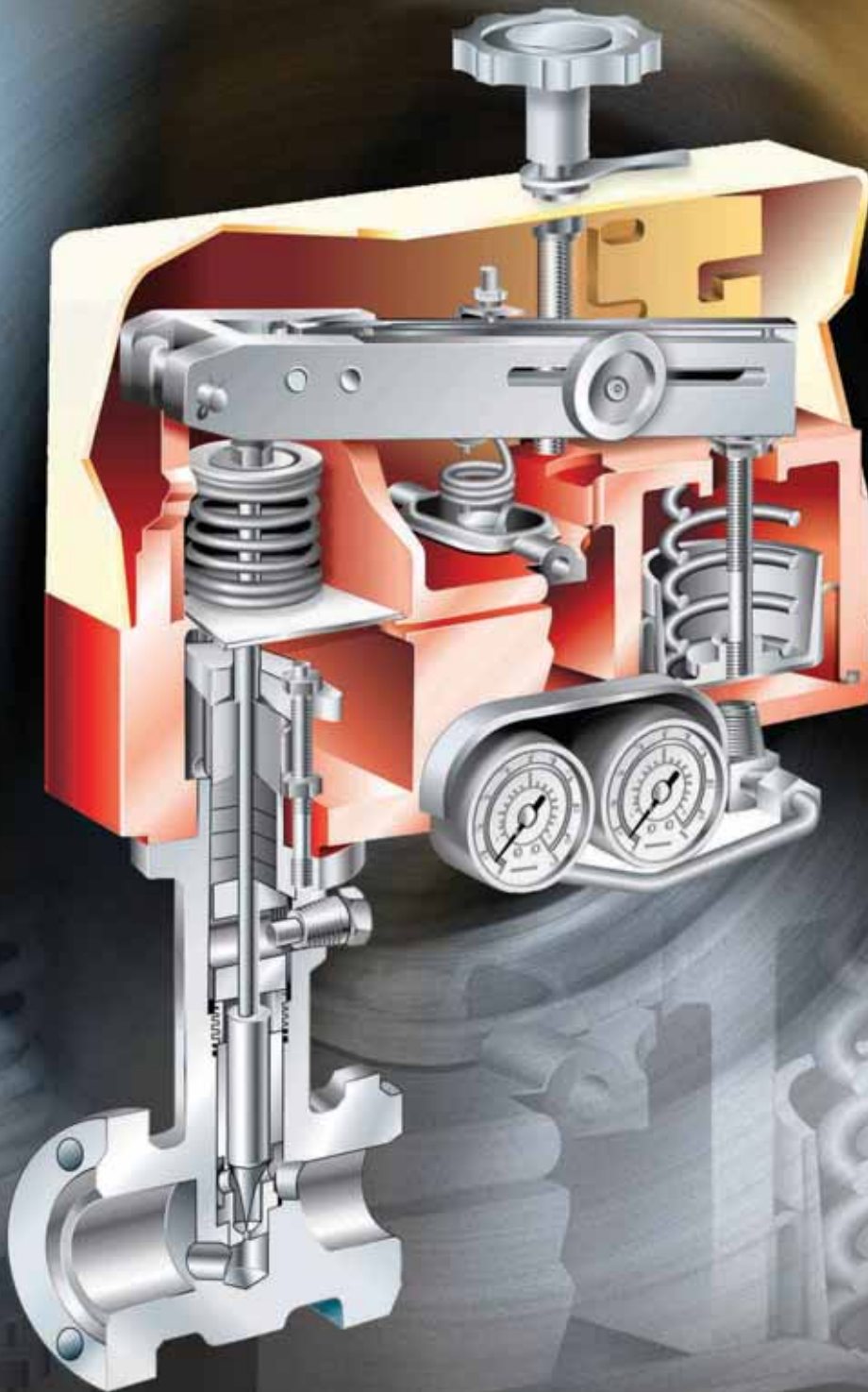


**MIL 29000**  
***MicroPak***  
**CONTROL VALVES**

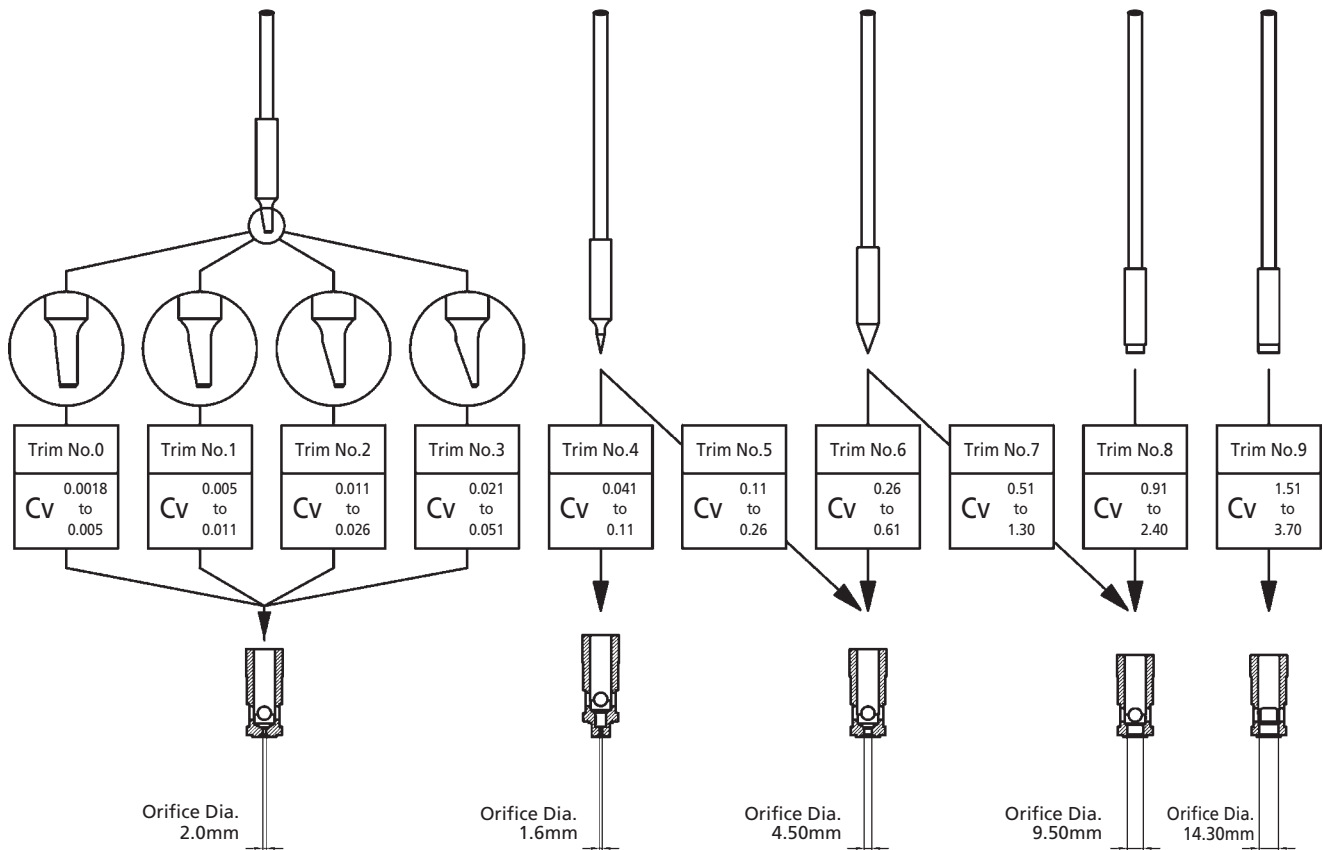


**MIL Controls Limited**  
A KSB Company

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## PLUG & SEAT COMBINATIONS IN MIL 29000 SERIES



**FOREWORD**

MIL 29000 series Modified Micropak Control Valves provides control of high pressure fluids with excellent throttling control and wide range of options.

adaption to actual field conditions. The actuator action can be easily reversed at site by just relocating the pivot pins.

**FEATURES**

**Unmatched Performance**

MIL 29000 series valves provide enhanced controllability due to an inherent rangeability of 500:1. This also makes the valve competent to handle wide variations in flow compared to conventional microflow valves. Fully guided Plug design ensures excellent plug stability and fine control under high pressure drop conditions.

**Standard High Performance Material**

29000 Modified Micropak is manufactured using Forged Stainless Steel body, Solid Stellite Plug and hardened 17- 4 PH SS Seat, to ensure longevity.

**Easy Maintenance**

Micropak’s simple top entry Trims, integral Cage & Seat and reduced components enable easy maintenance. The body made of superior material ensures long and trouble-free operation. The construction has an integral bonnet with lesser soft parts, which helps to prevent leakage.

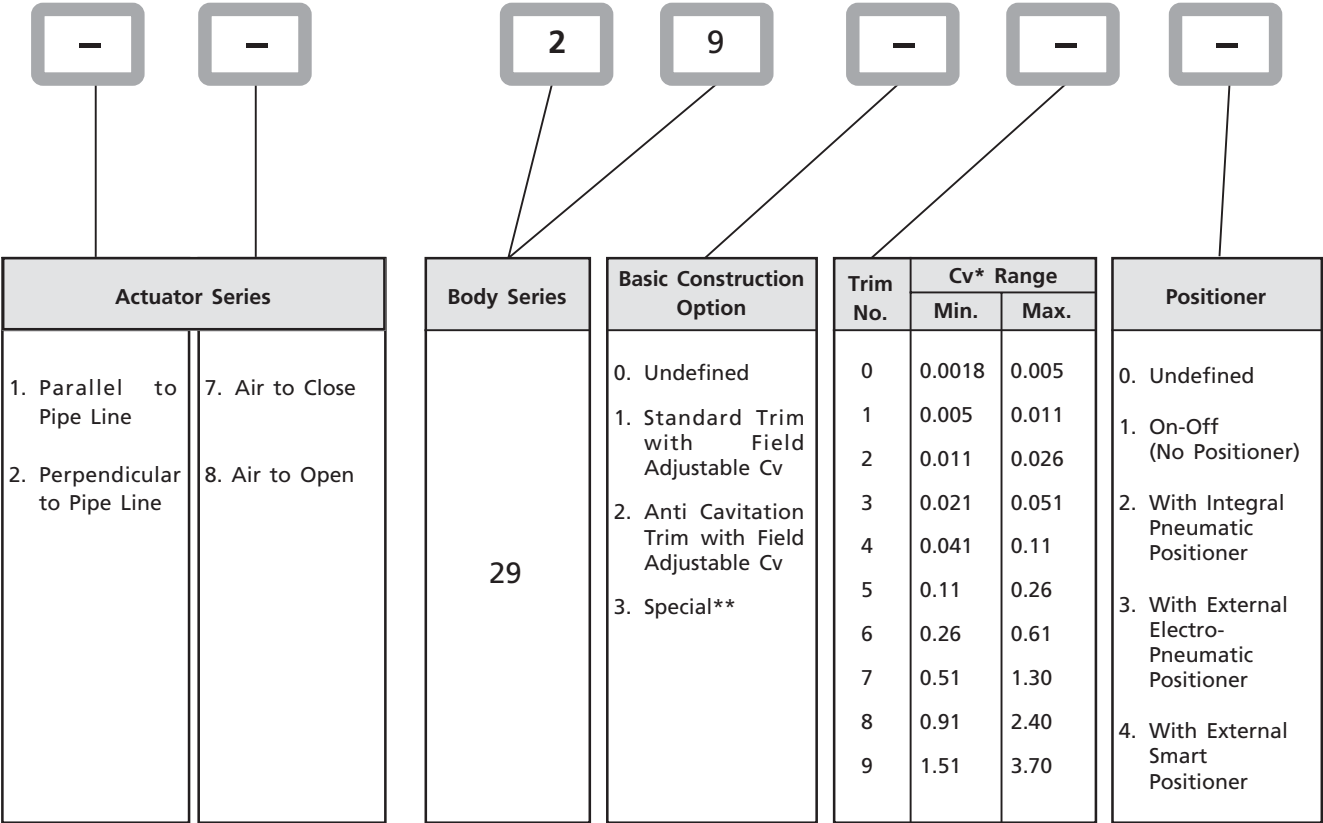
**Innovative Design with Field Adjustable Cv**

The compact construction with integral Rolling Diaphragm type actuator (which employs Force Amplifying Actuator technology) has a modular option for Pneumatic Positioner. 29000 series valves also have Cv adjustment feature, which facilitates fine tuning at site and helps easy

**Optional Design**

The optional designs include Bellows Sealed Trims, Cryogenic construction and Multi-stage, Axial flow, Anti-Cavitation Trim for severe service.

**NUMBERING SYSTEM FOR MODIFIED MICROPAK VALVE**



\* For selected discrete Cv values please refer Page 5.

\*\* Available on request - Bellows Sealed, Cryogenic versions etc.



**GENERAL INFORMATION**

**BODY**

Type : Globe  
 Sizes : Standard : 1"  
 Option : 0.5" & 0.75"  
 Material : Standard : Forged F316L  
 Option : Monel, Hastelloy C, Alloy 20 etc.

Characteristics : Linear (Trim No.4 to 9)  
 : Modified Linear (Trim No. 0 to 3)  
 Flow direction : Flow to Open

**TRIM**

Plug type : Contoured, Fully guided  
 Option : Multi-stage Anti-cavitation  
 Seat type : Clamped & Integral with Cage  
 Cv Ratio : 500:1 at max.Cv  
 : 200:1 at min. Cv

**ACTUATOR**

Type : Spring opposed Rolling Diaphragm  
 Action : Direct/Reverse, easily selectable without additional parts  
 Cv adjustment : Adjustable Knob/Lever  
 Handwheel : Top Mounted  
 Air Connection : ¼" NPT

**TEMPERATURE RANGE / LEAKAGE CLASS**

VALVE TYPE	TEMPERATURE*	SEAT LEAKAGE CLASS (as per ANSI/FCI 70.2)	
Standard Valves	-100° C to + 343° C	IV (Standard)	V (Optional)
Anti-Cavitation Valves	-29° C to + 343° C		

\*Please consult MIL for applications outside the temperature range

**RATING / END CONNECTIONS**

VALVE SIZE (Inch)	MAX. Cv	ANSI CLASS 150# to 1500#				
		Raised Flangeless	Threaded NPT	SW	BW	Flanged
0.5	2.4	*	*	*		*
0.75	2.4	*	*	*		*
1	3.7	*	*	*	*	*

\* Available

**ALLOWABLE PRESSURE DROPS, SPRING RANGES AND SUPPLY PRESSURES** (Seat Leakage Class: IV & V as per FCI 70.2)

TRIM No.	RATED Cv RANGE	ALLOWABLE PRESSURE DROP (Kg / cm <sup>2</sup> g)	SPRING RANGE (psig)	AIR SUPPLY (psig)
0	0.0018 to 0.005	220	3-15	18
1	0.005 to 0.011			
2	0.011 to 0.026			
3	0.021 to 0.051			
4	0.041 to 0.11			
5	0.11 to 0.26	100	6-24	30
6	0.26 to 0.61			
7	0.51 to 1.3			
8	0.91 to 2.4*			
9	1.51 to 3.7	40		

\*For Air to Close Actuators in Cv Range 0.91 to 2.4, allowable pressure drop is 40kg/cm<sup>2</sup>g only.



**FLOW COEFFICIENTS (RATED Cv)**

MIL 29000 series valves are far superior to conventional micro-flow valves that it provides the user with a very wide range of nominal Cv ranges from 0.0018 to 3.70, using only eight plugs and five seats.

VALVE SIZE (Inch)			TRIM No.	FLOW COEFFICIENT (Cv) (With Adjustable Cv Function)							CRITICAL FLOW FACTOR $C_f$
0.5"	0.75"	1"		Min.			Mid Setting**			Max.	
*	*	*	0	0.0018	0.002	0.0026	0.0030	0.0033	0.0037	0.005	0.85
*	*	*	1	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.85
*	*	*	2	0.011	0.014	0.017	0.020	0.022	0.024	0.026	0.85
*	*	*	3	0.021	0.026	0.031	0.036	0.041	0.046	0.051	0.85
*	*	*	4	0.041	0.06	0.05	0.065	0.085	0.10	0.11	0.85
*	*	*	5	0.11	0.14	0.17	0.20	0.22	0.24	0.26	0.90
*	*	*	6	0.26	0.31	0.36	0.41	0.46	0.56	0.61	0.90
*	*	*	7	0.51	0.61	0.71	0.81	0.91	1.2	1.3	0.92
*	*	*	8	0.91	1.11	1.31	1.51	1.71	2.2	2.4	0.92
		*	9	1.51	1.91	2.31	2.61	2.91	3.4	3.7	0.92

\* Available.

\*\* The Mid Setting allows for easy valve capacity adjustments in the field to meet changing service conditions.

**SPECIAL MULTI-STAGE, ANTI-CAVITATION TRIM DESIGN (OPTIONAL)**

The 29000 Multi-stage Trim design provides unmatched Anti-cavitation performance in low flow applications. It minimizes erosion and vibration, which typically leads to failure in conventional microflow valves. This specially engineered trim option is available with all standard Modified Micropak body designs.

**SPECIFIC CHARACTERISTICS**

Rated Cv Range : 0.051 to 0.61  
(Trim No.3 to 6)

Critical Flow Factor  $C_f$  : >0.98

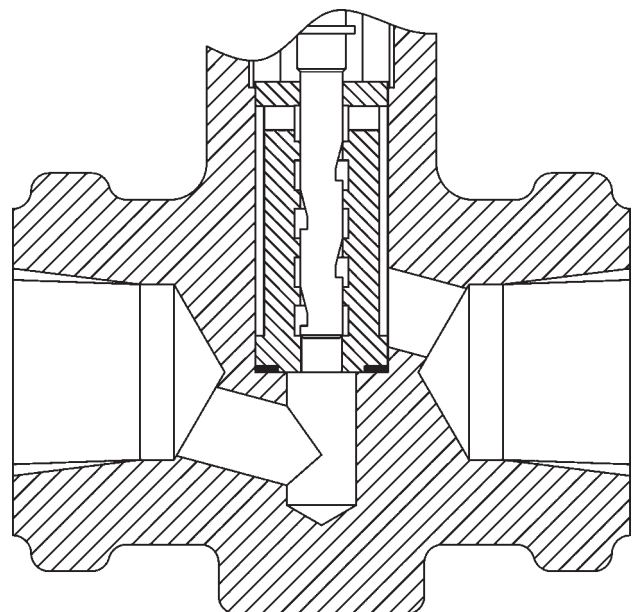
Temperature Range : -29°C to +343°C

**MATERIAL**

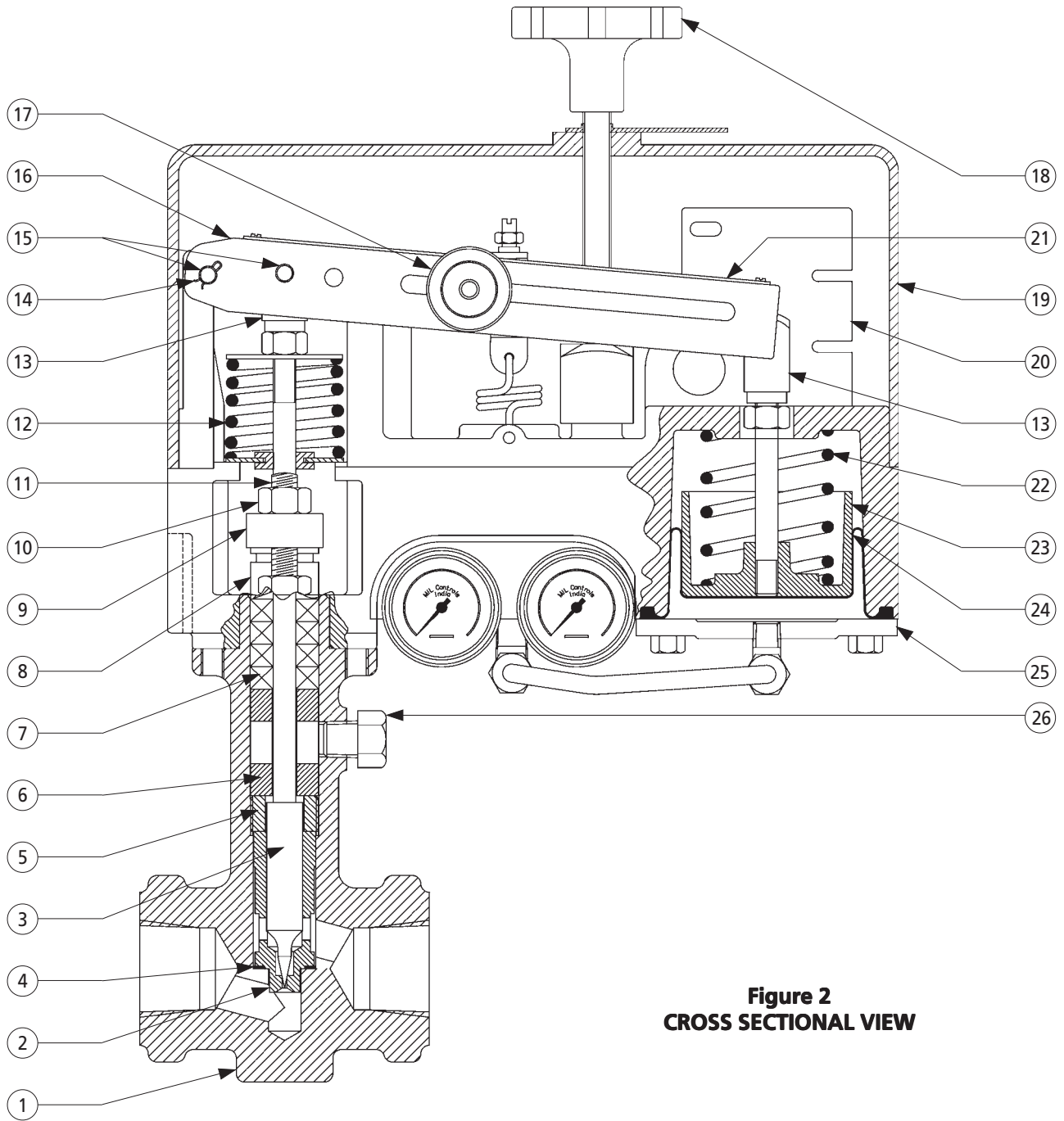
Seat : 17-4 PH SS  
(ASTM A 564 Gr. 630 H900)

Plug : Solid Stellite No. 12  
or ASTM A276 type 440 C

Other Parts : As per standard construction



**Figure 1**  
**MULTI-STAGE ANTI-CAVITATION TRIM**



**Figure 2**  
**CROSS SECTIONAL VIEW**

## MATERIAL OF CONSTRUCTION

	TEMPERATURE RANGE		-100°C	180°C	343°C
REF. NO.	PART NAME	STANDARD AND OPTIONAL MATERIAL			
1	Body	ASTM A 182 Gr F316L (FORGING)			
		Option : Monel, Hastelloy C, Alloy 20 etc.			
2	Seat	Trim No. 4 to 9	17-4 PH SS (ASTM A 564 Gr 630 Condition H900)		
		Trim No. 0 to 3	Solid Stellite No. 6		
		Option : Monel, Hastelloy C, Alloy 20 etc.			
3	Plug	Trim No. 4 to 9	Solid Stellite No. 6		
		Trim No. 0 to 3	Solid Stellite No. 12		
		Option : Monel, Hastelloy C, Alloy 20 etc.			
4	Seat Ring Gasket	SS 316 L + Graphite (spiral wound)			
5	Seat Ring Retainer	17-4 PH SS			
6	Packing Spacer	SS 316			
7	Packing	PTFE	Graphite Special		
8	Packing Follower	SS 304			
9	Packing Flange	SS 304			
10	Packing Nut	SS 304			
11	Packing Stud	SS 304			
12	Conical Spring	Spring Steel			
13	Clevis	C20 Cadmium Plated			
14	Retainer Clip	SS 304			
15	Pivot Pins	17-4 PH			
16	Lever No.1	ASTM B211 AL 2024 T4			
17	Cv Adjusting Knob	SS 304			
18	Hand Wheel	Bakelite			
19	Cover	Polycarbonate			
20	Actuator Bracket	Aluminium			
21	Scale	Aluminium			
22	Actuator Spring	Spring Steel			
23	Piston	Aluminium			
24	Rolling Diaphragm	Buna N			
25	Diaphragm Cover	A36 Cadmium Plated			
26	Locking Screw	SS 316			

(\*) : Other Material suitable for corrosive fluids and NACE Specification are available on request.

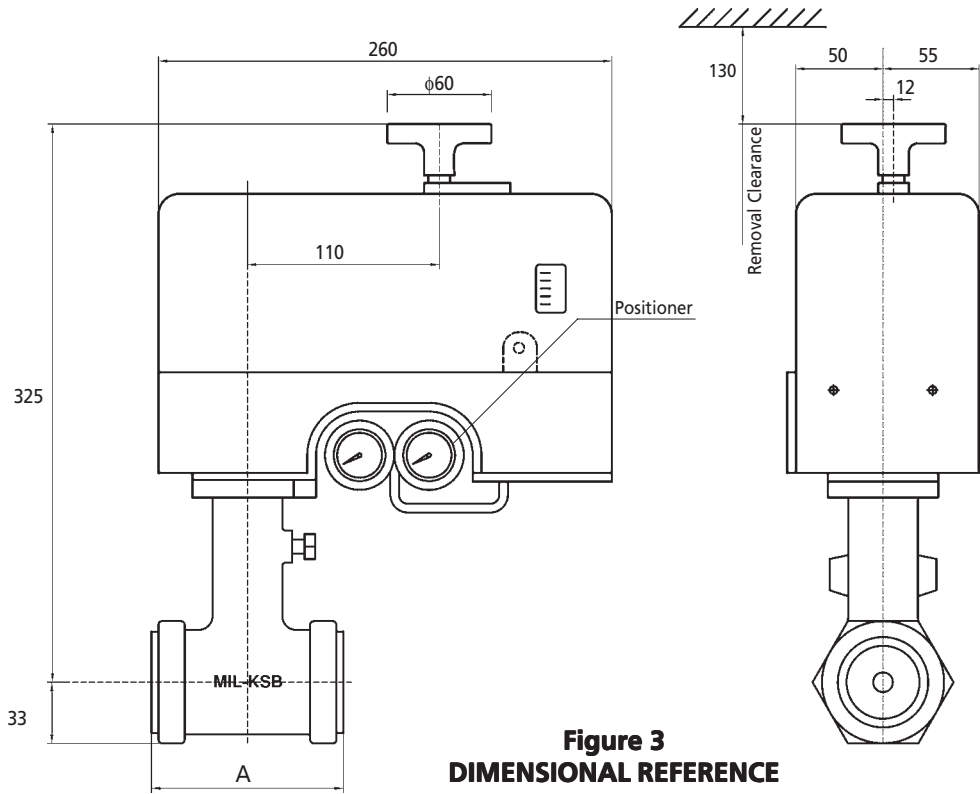
(\*\*) : Material noted throughout text is for reference only. MIL-KSB reserves the right to supply trade name material or equivalent.

**APPROXIMATE DIMENSIONS AND WEIGHTS**

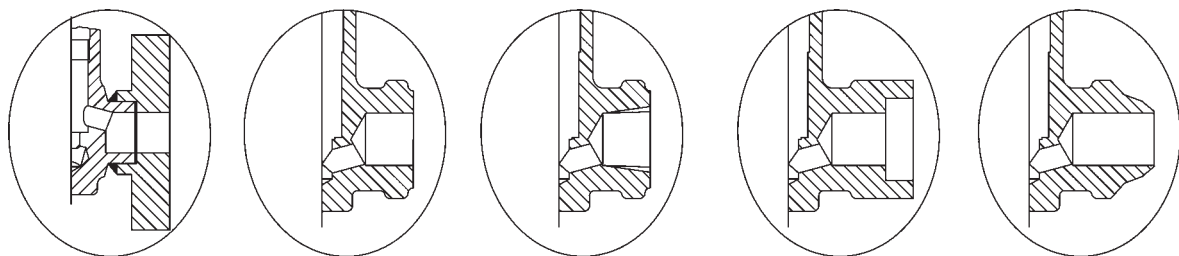
Modified Micropak valve is widely used in all industries. This can be attributed to the overall compactness, simplicity and the wide application range of the stainless steel body design.

Type	ANSI Class	Face to face distance A (mm)	Unpacked Weight (Kg)	End Drawing
Flanged	150#-600#	128	8 to 10	3A
	900#-1500#	168	10 to 12	
Raised Flangeless	150#-1500#	108	7.5	3B
Threaded (NPT)	150#-1500#	108	7.5	3C
Socket Weld	150#-1500#	120	7.5	3D
Butt Weld	150#-1500#	120	7.5	3E

Note: All dimensions are in mm.



**Figure 3  
DIMENSIONAL REFERENCE**



**Figure 3A  
Flanged**

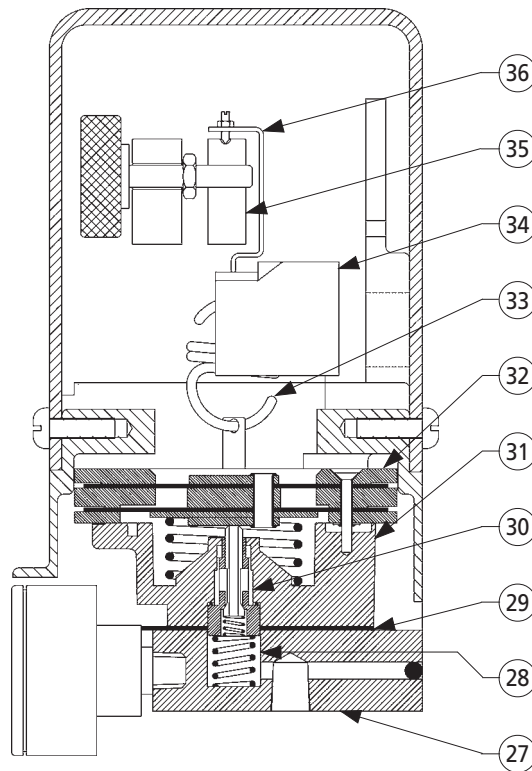
**Figure 3B  
Raised Flangeless**

**Figure 3C  
Threaded (NPT)**

**Figure 3D  
Socket Weld**

**Figure 3E  
Butt Weld**

**POSITIONER SUB ASSEMBLY**



**Figure 4**

REF. No.	PART NAME	STANDARD MATERIAL	REF. No.	PART NAME	STANDARD MATERIAL
27	Manifold Block	Aluminium	32	Diaphragm S/A	-
28	Spring	Spring Steel	33	Force Balancing Spring	Spring steel
29	Gasket S/A	-	34	Lever Arm Stop	SS 304
30	Pilot S/A	-	35	Lever No.2	SS 304
31	Positioner Block	Aluminium	36	Spring Clamp	SS 304



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