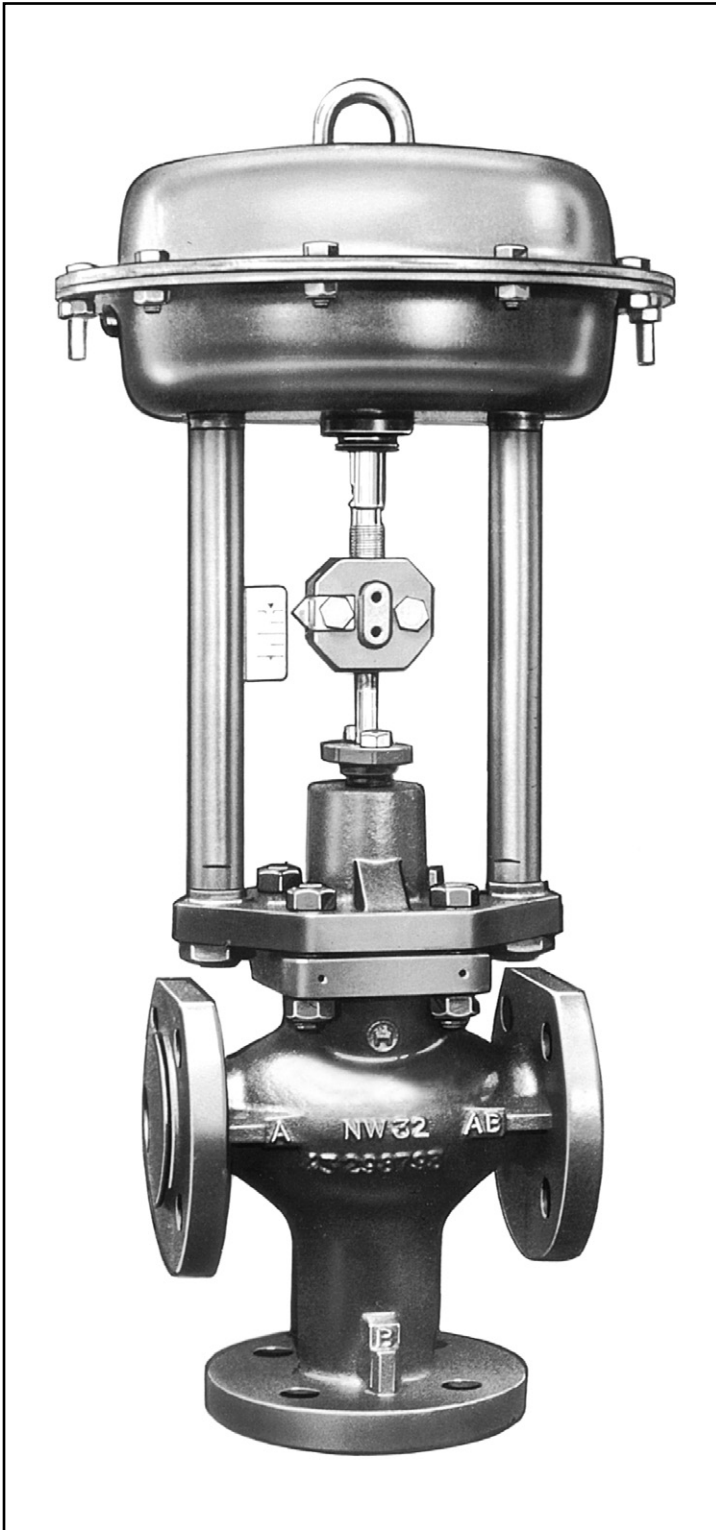




# Series 2003 / 2013

## Three-way control valve

### SPECIFICATION



The Series 2003 / 2013 comprises a range of skirt guided Three-way mixing (2003) and diverting valves (2013).

Available in a variety of sizes, they are applicable to most industrial processes.

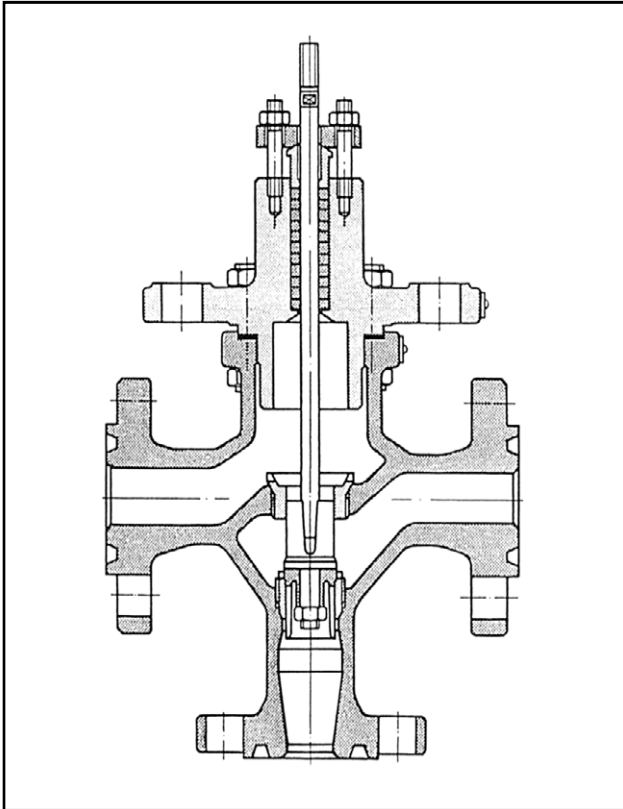
### FEATURES

- Rugged construction
- ANSI and DIN body patterns
- Convertible arrangements of plugs for mixing and diverting service
- Full accessory range

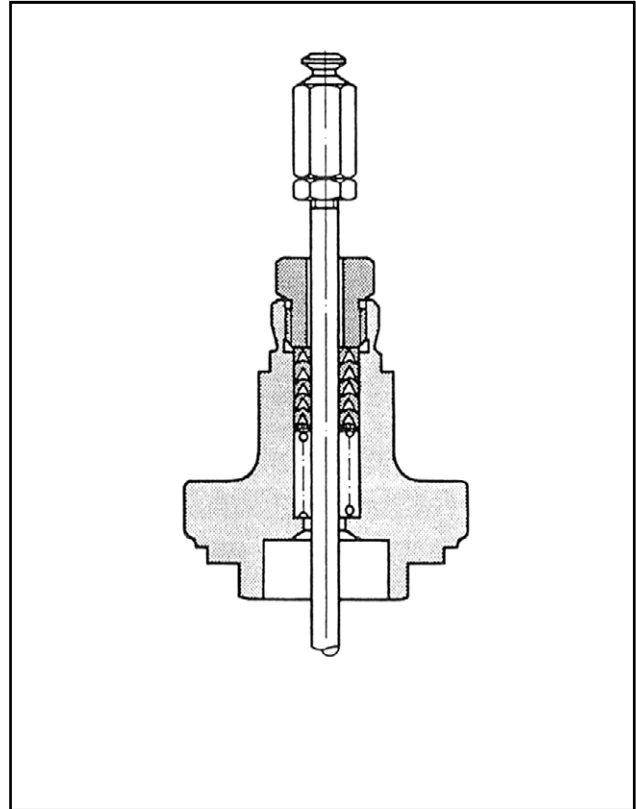


# Specifications

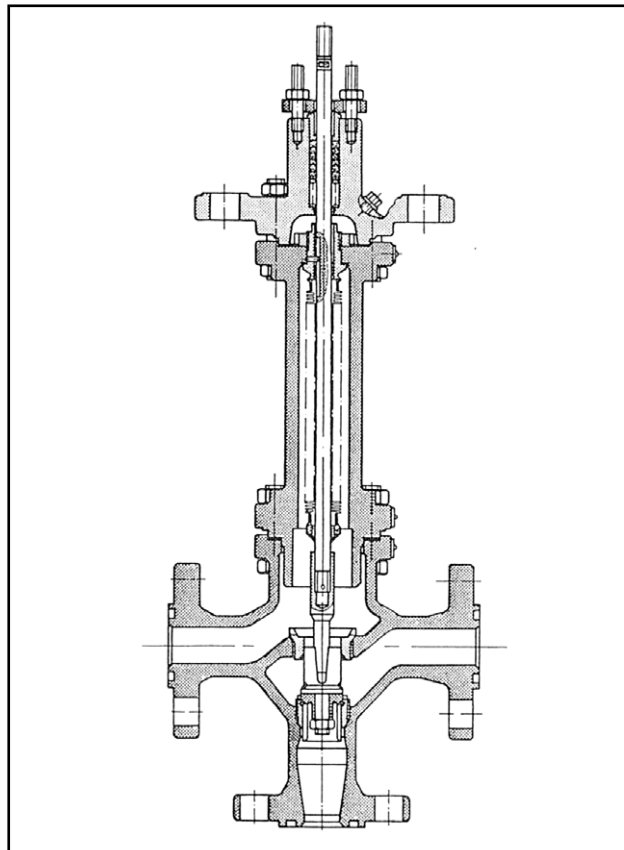
<b>Style</b>	Top entry, Three-way mixing or diverting service													
<b>Size</b>	ANSI inch	1/2	3/4	1		1 1/2	2	2 1/2	3	4		6		
	DIN-DN mm	15	20	25	32	40	50	65	80	100	125	150		
<b>Pressure ratings</b>	Cast iron : PN 16													
	Steel : ANSI 300 ; PN 40													
<b>End connections</b>	<i>cast iron flanged</i>	DIN-raised face												
	<i>Steel flanged</i>	ANSI-small groove												
		ANSI-ring type joint												
		DIN-raised face												
DIN-2512 groove														
<b>Bonnet and packing</b>	<i>Bonnet type for pneumatic actuators</i>	<i>Packing type</i>	<i>Process temperature</i>											
			<i>Degrees C</i>										<i>Degrees F</i>	
			Standard											
			PFTE-V-ring										-10... + 250	+15... + 480
	PFTE silk										-10... + 280	+15... + 536		
	Graphite										+200... + 450	+390... + 840		
	<i>Extension and bellows seal</i>	PTE-V-ring										-60... + 350	-75... + 660	
		PTFE silk										-60... + 350	-75... + 660	
Graphite										+200... + 450	+390... + 840			
Linear for all valve sizes														
<b>Characteristic</b>	<i>Linear for all valve sizes</i>													
	<b>Flow coefficients</b>	Valve size	ANSI inch	1/2	3/4	1		1 1/2	2	2 1/2	3	4		6
			DIN mm	15	20	25	32	40	50	65	80	100	125	150
	Seat diameter	inch	.984	0.984	0.984	1.26	1.57	2.09	2.56	3.54	3.54	5.51	5.51	
		mm	25	25	25	32	40	53	65	90	90	140	140	
Cv values	Full capacity	4.7	7.4	12	19	29	47	74	120	190	290	420		
	1st reduction		4.7	7.4					120			290		
	2nd reduction			4.7										
<b>Valve factor F<sub>L</sub> and X<sub>T</sub></b>	<i>Trim style</i>	<i>Flow direction</i>	<i>F<sub>L</sub></i>						<i>X<sub>T</sub></i>					
			<i>Full Cv</i>						<i>Reduced Cv</i>					
	V-Port for all valve sizes	<i>Flow to open</i>	0.90						0.92					
<b>Rangeability</b>	50 : 1													
<b>Leakage rate</b>	<i>Trim description</i>	<i>Leakage class in accordance with ANSI B 16.104</i>				<i>Approximate percentage of rated Cv</i>								
	Metal seat (standard)	III				0.1 %								
<b>Trim type</b>	V-Port for all valve sizes													
<b>Pneum. actuators</b>	Series 2000 - see specification sheet 62-86-03-10													
<b>Electric std. motors</b>	On request													
<b>Manual actuators and handwheels</b>	Details on request													



**Fig. 1: Three way valve DN 25 ring type joint standard bonnet, mixing service**



**Fig. 2: Modified standard and extension bonnet for electric standard motors**



**Fig. 3: Three way valve DN 25 small groove bellows seal bonnet mixing service**

# Materials of construction \*

Body and bonnet material and temperature limits	Materials		Available material	Equivalent ASTM	Temperature limit		
			no acc. to DIN 17007	specification	Degrees C	Degrees F	
	Cast iron		0.6025	A-126 B	-10 to +250	+15 to +480	
	Carbon steel		1.0619	A-216 WCB	-10 to +450	+15 to +840	
Low temperature carbon steel		1.1138	A-352 LCB	-50 to +340	-58 to +640		
Stainless steel		1.4581	A-351 CF8M	-100 to +450	-150 to +840		
Trim material* and recommended temperature limits	Trim type		Plugs (7)	Seat rings (5,6)	Stem (14)	Process temperature	
						Degrees C	Degrees F
	V-Port for all valves		410	410	316	-100 to +450	-150 to +840
			316	316			
			316 HFS	316 HFS			
			316 HSO	316 HSO			
Other parts*	Part description		Part number	Body and bonnet material			
				CI and CS	LT CS	SS	
	Bonnet studs		19	Steel	B 7	316	
	Bonnet nuts		20	Steel ZP	B 7	316	
	Packing studs		13	Steel	Steel	316	
	Packing nuts		12	Steel ZP	Steel ZP	316	
	Packing follower		10	316	316	316	
	Packing flange		11	Steel ZP	Steel ZP	Steel ZP	
	Washer		17	316	316	316	
	Spring <sup>1)</sup>		18	316	316	316	
	Stem		14	316	316	316	
	Bellows		14	321	321	321	
	Lock nut		31	316	316	316	
	Gasket		21	Sil C 4400	Sil C 4400	1.4401+ Graphite	
Nameplate		23	302	302	302		
Flow direction indicator		33	302	302	302		
Traverse <sup>2)</sup>		3	Steel ZP	Steel ZP	Steel ZP		

<sup>1)</sup> Used only with PTFE-V-rings

<sup>2)</sup> Used on SS bonnet ON 15-32

For detailed information see Parts list 64-85-14-16

## References

\*NB : All valve parts are made from materials which comply with DIN (German) standards. However for clarity the materials shown are closest equivalents in accordance with ASTM / AISI (American) standards.

- HFS = Hard faced seats
- HSO = Hard surfacing overlay
- ZP = Zinc plated
- CI = Cast iron
- CS = Cast steel
- SS = Stainless steel
- LT = Low temperature
- HT = High temperature

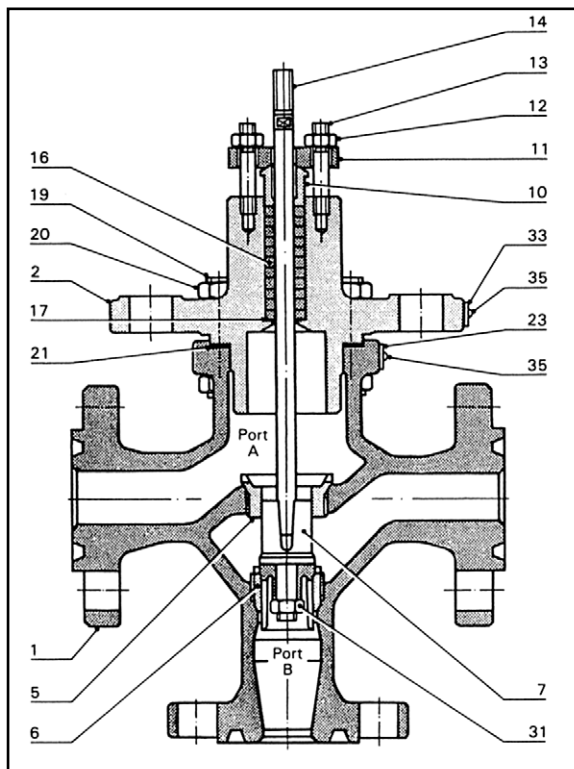


Fig.4: Valve assembly DN 25 three way

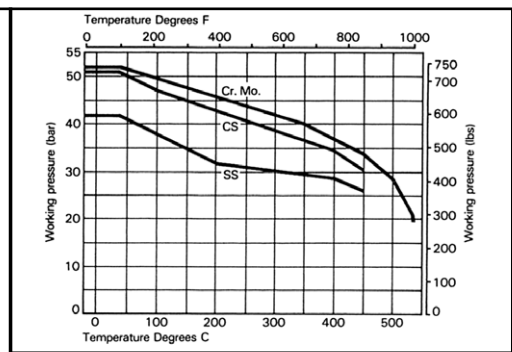


Fig.5: Pressure vs temperature (ANSI 300)

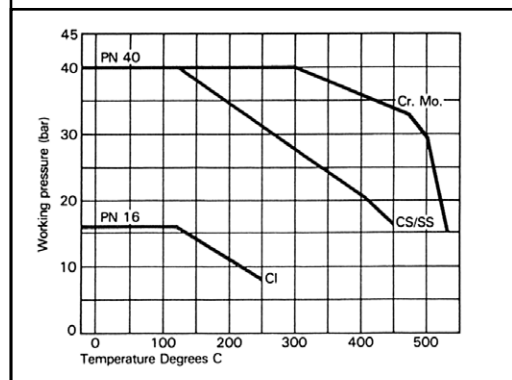
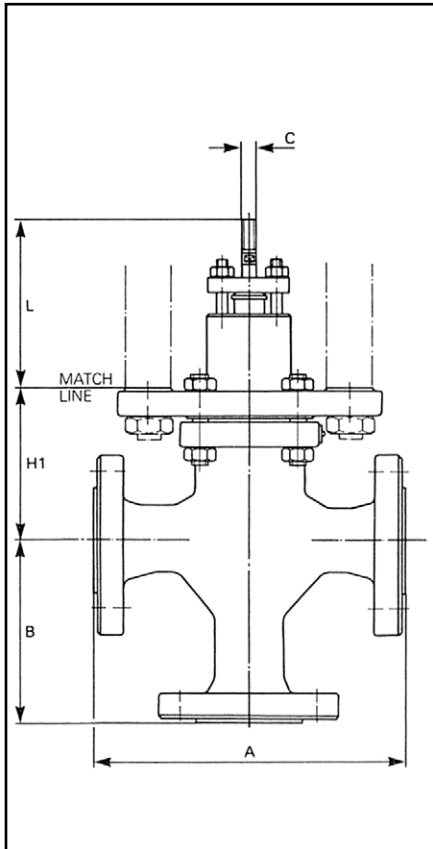


Fig.6: Pressure vs temperature (PN 16/40)

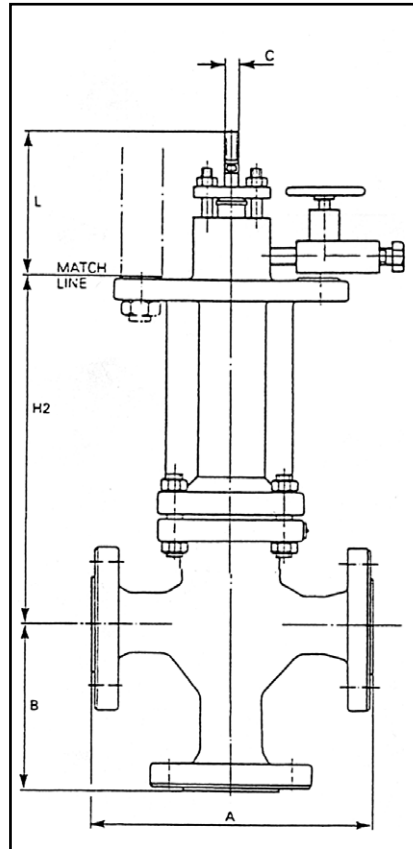
# Pressure drop limitations (bar) $P_2 = 0$

Valve body size	Cv-values	Kv-values	Seat diameter	Actuator size/type	Direct acting		Reverse acting	
					Mixing	Port A closed without pressure	Mixing	Port B closed without pressure
			inch mm		Port A closed with pressure	Port A closed without pressure	Port B closed with pressure	Port B closed without pressure
					Diverting	Diverting	Diverting	Diverting
					Port A closed with pressure	Port B closed without pressure	Port A closed with pressure	Port A closed without pressure
					Spring range	Spring range	Spring range	Spring range
					3-15 psi	3-15 7-25 11-31 3-15 psi	3-15 7-19 <sup>(1)</sup> 7-25 11-31 3-15 psi	3-15 7-19 7-25 11-31
					0.2-1.0 bar	0.2- 0.5- 0.8- 1.0 1.3 1.7 2.2	0.2- 0.5- 0.8- 1.0 1.3 1.7 2.2	0.2- 0.5- 0.8- 1.0 1.3 1.7 2.2
					Supply pressure	Supply pressure	Supply pressure	Supply pressure
					17 psi 34 50 86 0 0 0 0	17 psi 34 41 50 64 86 0 0 0 0	17 psi 34 41 50 64 86 0 0 0 0	
					1.2 bar 2.4 3.5 6.0 0 0 0 0	1.2 bar 2.4 2.9 <sup>(2)</sup> 3.5 <sup>(4)</sup> 4.5 <sup>(6)</sup> 6.0 <sup>(10)</sup>	1.2 bar 2.4 2.9 <sup>(2)</sup> 3.5 <sup>(4)</sup> 4.5 <sup>(6)</sup> 6.0 <sup>(10)</sup>	1.2 bar 2.4 2.9 <sup>(2)</sup> 3.5 <sup>(4)</sup> 4.5 <sup>(6)</sup> 6.0 <sup>(10)</sup>
$\frac{1}{2}$ <sup>(10)</sup>	4.7	4	.984 25	2109	1 51 51 51 3 23	43 1 51 51 51	43 1 51 51 51	3 23 43
$\frac{3}{4}$ <sup>(10)</sup>	4.7 to 7.4	4 to 6.3		2112	45 <sup>(1)</sup> 51 <sup>(1)</sup> 51 <sup>(1)</sup> 15 <sup>(1)</sup> 51	51 <sup>(3)</sup> 51 <sup>(3)</sup> 13 <sup>(2)</sup> 51 <sup>(2)</sup> 51 <sup>(2)</sup>	51 <sup>(3)</sup> 51 <sup>(3)</sup> 13 <sup>(2)</sup> 51 <sup>(2)</sup> 51 <sup>(2)</sup>	50 <sup>(2)</sup> 51 51 <sup>(4)</sup>
1	4.7 to 12	4 to 10		2109	0 43 51 51 0 12	25 0 43 51 51	25 0 43 51 51	0 12 25
	19	16	1.26 32	2112	26 <sup>(1)</sup> 51 <sup>(1)</sup> 51 <sup>(1)</sup> 8 <sup>(1)</sup> 31	51 <sup>(3)</sup> 6 <sup>(2)</sup> 51 <sup>(3)</sup> 51 <sup>(2)</sup>	51 <sup>(3)</sup> 6 <sup>(2)</sup> 51 <sup>(3)</sup> 51 <sup>(2)</sup>	29 <sup>(2)</sup> 31 51 <sup>(4)</sup>
1½	29	25	1.57 40	2112	3 51 51 51 4 19	34 3 51 51	34 3 51 51	4 19 34
	47	40	2.09 53	2112T	12 51 51 14 44	51 12 51	51 12 51	14 44 51
2	47	40	2.09 53	2112	0 32 51 51 1 10	18 0 32 42	18 0 32 42	1 10 18
	74	63	2.56 65	2112T	6 51 51 7 24	41 6 51	41 6 51	7 24 41
				2112	0 20 39 51 0 6	11 0 20 29	11 0 20 29	0 6 11
				2112T	3 45 51 4 15	27 3 45	27 3 45	4 15 27
3	120	100	3.54 90	2112-50	0 10 20 42 0 2	0 10 14	0 10 14	0 2
4	120 to 190	100 to 160		2112-50I	1 22 42 1 7	1 22	1 22	1 7
				2016-50	9 <sup>(9)</sup> 34 <sup>(5)</sup> 51 <sup>(5)</sup> 1 <sup>(5)</sup>	15 <sup>(7)</sup> 1 <sup>(6)</sup> 25 <sup>(9)</sup> 34 <sup>(6)</sup> 43 <sup>(6)</sup> 51 <sup>(6)</sup> 51 <sup>(6)</sup> 9 <sup>(6)</sup>	15 <sup>(7)</sup> 1 <sup>(6)</sup> 25 <sup>(9)</sup> 34 <sup>(6)</sup> 43 <sup>(6)</sup> 51 <sup>(6)</sup> 51 <sup>(6)</sup> 9 <sup>(6)</sup>	27 <sup>(8)</sup>
				2016T-50	22 <sup>(8)</sup> 51 <sup>(5)</sup> 51 <sup>(5)</sup> 6 <sup>(5)</sup>	32 <sup>(7)</sup> 5 <sup>(6)</sup> 51 <sup>(6)</sup> 51 <sup>(6)</sup> 21 <sup>(6)</sup>	32 <sup>(7)</sup> 5 <sup>(6)</sup> 51 <sup>(6)</sup> 51 <sup>(6)</sup> 21 <sup>(6)</sup>	51 <sup>(8)</sup>
				2112-50	0 3 7 17 0 0	0 3 5	0 3 5	0 0
6	290 to 420	250 to 360	5.51 140	2112-50I	0 9 17 0 2	0 9	0 9	0 2
				2016-50	3 <sup>(5)</sup> 13 <sup>(5)</sup> 23 <sup>(5)</sup> 44 <sup>(5)</sup> 0 <sup>(5)</sup>	5 <sup>(7)</sup> 0 <sup>(6)</sup> 10 <sup>(6)</sup> 14 <sup>(6)</sup> 19 <sup>(6)</sup> 28 <sup>(8)</sup> 41 <sup>(6)</sup> 4 <sup>(6)</sup>	5 <sup>(7)</sup> 0 <sup>(6)</sup> 10 <sup>(6)</sup> 14 <sup>(6)</sup> 19 <sup>(6)</sup> 28 <sup>(8)</sup> 41 <sup>(6)</sup> 4 <sup>(6)</sup>	12 <sup>(8)</sup>
				2016T-50	8 <sup>(8)</sup> 29 <sup>(5)</sup> 47 <sup>(5)</sup> 2 <sup>(5)</sup>	13 <sup>(7)</sup> 1 <sup>(6)</sup> 22 <sup>(6)</sup> 30 <sup>(6)</sup> 41 <sup>(6)</sup> 9 <sup>(6)</sup>	13 <sup>(7)</sup> 1 <sup>(6)</sup> 22 <sup>(6)</sup> 30 <sup>(6)</sup> 41 <sup>(6)</sup> 9 <sup>(6)</sup>	25 <sup>(8)</sup>

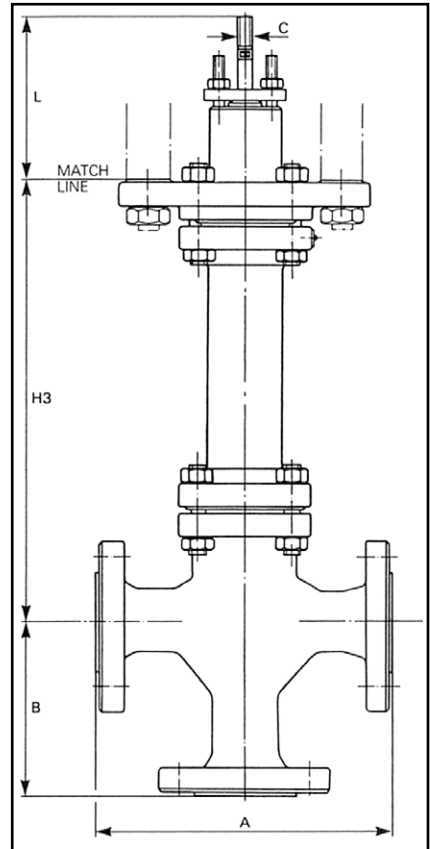
Notes :  
 Differential pressures > 40 bar for ANSI 300 only  
 Effective spring range  
<sup>1)</sup> 3 to 11 psi, 0.2 to 0.73 bar ; <sup>2)</sup> 7 to 15 psi, 0.47 to 1.0 bar ; <sup>3)</sup> 11 to 25 psi, 0.8 to 1.73 bar ; <sup>4)</sup> 18 to 31 psi, 1.27 to 2.2 bar ; <sup>5)</sup> 3 to 9 psi, 0.2 to 0.6 bar ; <sup>6)</sup> 9 to 15 psi, 0.6 to 1.0 bar ; <sup>7)</sup> 11 to 22 psi, 0.8 to 1.5 bar ; <sup>8)</sup> 22 to 31 psi, 1.5 to 2.2 bar ;  
<sup>9)</sup> Limited supply pressure at reverse acting actuators ; <sup>10)</sup> Same plug arrangement for mixing and diverting service in sizes ½ and ¾ inch ; <sup>11)</sup> Maximum preloaded spring range



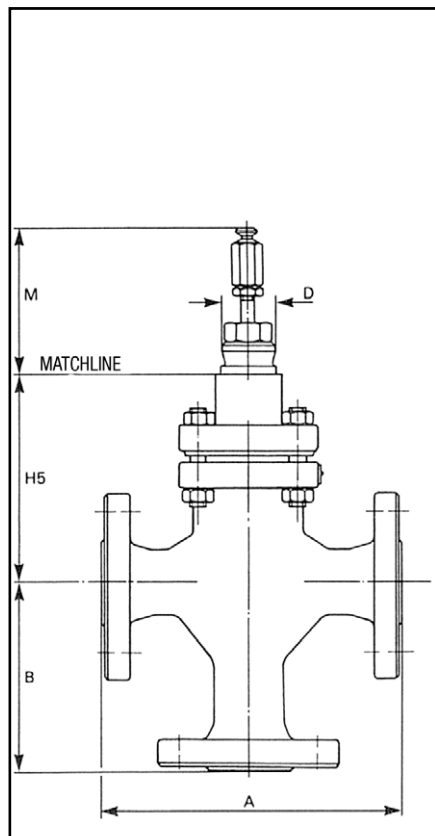
**Fig.7: Three way valve with standard bonnet**



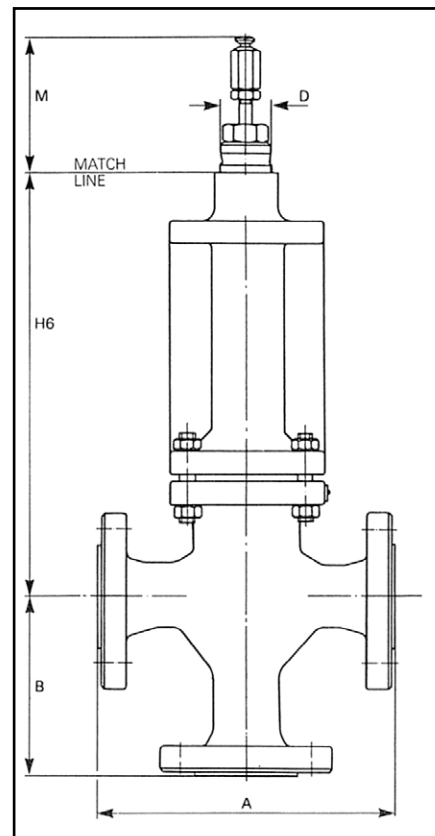
**Fig.8: Three way valve with extension bonnet**



**Fig.9: Three way valve with bellows seal bonnet**



**Fig.10: Three way valve with standard bonnet for electric standard motors**



**Fig.11: Three way valve with extension bonnet for electric standard motors**



**Dimensions**

ANSI			DIN								
Valve size	A	B	Valve size	A	B						
inch	RF	small RTJ	mm	PN 10 to PN 40 flanged							
	groove	groove									
1/2	191	200	202	120	125	126	15	130	120		
3/4	194	203	207	120	125	126	20	150	120		
1	197	206	210	120	125	126	25	160	120		
							32	180	135		
1 1/2	235	244	248	140	145	146	40	200	140		
2	267	276	283	150	155	158	50	230	150		
2 1/2	292	301	308	165	170	173	65	290	165		
3	318	327	334	220	225	228	80	310	220		
4	368	377	384	220	225	228	100	350	220		
							125	400	245		
6	473	482	489	270	275	278	150	480	270		
Valve size	C	D	H1	H2	H3	H5	H6	L	M	Valve	
ANSI	DIN	Thread	Diameter	Standard bonnet	Extension bonnet	Bellows seal bonnet	Standard bonnet for electric motors	Extension bonnet for electric motors	Closed position Port B : Mixing Port A : Diverting	stroke	
inch	mm										
1/2	15	M10x1	34.85	96	238	303	125	268	96	89	20
3/4	20	M10x1	34.85	96	238	303	125	268	96	89	20
1	25	M10x1	34.85	96	238	303	125	268	96	89	20
	32	M10x1	34.85	96	238	303	125	268	96	89	20
1 1/2	40	M12x1	47.6	136	303	372	152	317	109	130	30
2	50	M12x1	47.6	136	303	372	152	317	109	130	30
2 1/2	65	M12x1	47.6	136	303	372	152	317	109	130	30
3	80	M16x1.5	47.6	238	533	548	240	535	104	128	50
4	100	M16x1.5	47.6	238	533	548	240	535	104	128	50
	125	M16x1.5	47.6	267	562	582	269	564	104	128	50
6	150	M16x1.5	47.6	267	562	582	269	564	104	128	50

**Shipping weights  
Kg  
(body assembly only)**

Valve size	Standard bonnet	Extension bonnet	Bellows seal bonnet
ANSI	DIN		
inch	mm		
1/2	15	9	12
3/4	20	10	13
1	25	12	15
	32	13	16
1 1/2	40	24	30
2	50	28	34
2 1/2	65	33	39
3	80	62	68
4	100	74	80
	125	130	148
6	150	148	166

Dimensions and weights for Series 2000 actuators, see specification sheet 62-86-03-10.



**Ordering check list**

Specification	Items to check
Service	On-off throttling, etc.
Line size / schedule number	Valve size, pressure rating
Type of operation	Mixing or diverting service
Body size	Specify nominal pipe size unless others are requested
Guiding	Specify appropriate trim type
End connections	Specify raised face (RF), ring joint (RTJ) etc.
Pressure ratings	Pressure vs. temperature relationship
Body material	Specify as required
Lubricator	Specify as required
Bonnet type and characteristics	Standard, HFS, HFO, etc.
Trim material	Specify as required
Required seat tightness	Specify leakage class according to ANSI B 16 104
Bellows seal	Indicate only when required
Maximum allowable SPL (dB, A)	Calculate SPL to make sure that specification is metric

Before specifying the correct model number check items above to make sure that the appropriate valve is selected.

**See model selection guide**

Valve type (Series 2003 / 2013)

Body type and service action (direct or reverse)

Valve body size

Pressure rating

Body / bonnet material

End connections

Single seat

Trim type

Cv and characteristic

Trim material

Bonnet type

Packing

Actuator type / spring range

Actuator size

Heat jacket / flushing connection

Pneumatic or electro-pneumatic positioner

Pressure regulator / booster

Stroke trans. / limit switches

Solenoid valve

**A**

Distributor:



INDUSTRIAL VALVES

www.viragovalves.eu



A. Hock MSR- und Electronic Service GmbH  
Dr.- Konrad - Wiegandstr.13  
63939 Wörth a. Main

Tel.: +49 (0) 9372 / 94756 – 12

Fax: +49 (0) 9372 / 94756 – 22

Mail: valve@ahock.com

I-Net: www.ahock.com