



0086

BS EN ISO 9001



FM 00707



Worcester Controls

18/19 Series

Modular Multi-Way Ball Valves

THE MODULAR APPROACH TO FLEXIBILITY

As part of Worcester's policy of continuous product development, the **modular** Series 18/19 multi-way valve has been introduced to satisfy the need for diverting media through a number of flow paths.

Currently used extensively on a variety of chemical and food processes, the potential applications for this valve are extensive. When compared with a plug valve for example, the Series 18/19 offers numerous advantages, including bubble tight shut-off, long sealing life, extended temperature range, ease of maintenance, material range, no need for sealant etc.

The Series 18/19 is primarily of a firesafe design, complying with BS 5351 and is offered in both full and reduced bore, and with its four seat design, provides straight-through flow capability to minimise pressure drop.

This new, unique valve design is based on a modular principle which offers almost unlimited flow permutations. In addition, the Series 18/19 is offered as either a high integrity valve for toxic media, or with retro-fitting steam jackets.

SIZE RANGE

The Series 18/19 is available in 17 sizes ranging from 15mm (½") to 150mm (6") full and reduced bore.

BODY PORTING

The body is designed to allow for a maximum of 5 ports. An example of one such application is where the bottom entry port is used as the inlet, allowing the side entry ports to fill up to four separate tanks.

The design incorporates interchangeable inserts which allow the valve to be easily re-configured to suit customer requirements.

APPLICATIONS

Applications vary from road tankers, heat exchangers and pulp grinding machines to remote undersea vehicles and ships' ballast systems. The Series 18/19 can also be used for pig loading, as a compact 90° corner valve and for by-pass operations.

Typical media include chemicals, filtrates, fuel oil, hot water, air, fats, gasoline, chocolate mass, toothpaste, sugar, tobacco, photographic emulsion and others.

FLOW INDICATION

The valve is designed with a stem assembly incorporating foolproof orientation of ball to stem and stem to indicator, thus providing external indication of ball position to verify correct operating sequence whether manual or actuated.

PIPE CONNECTIONS

Flanges

Another example of the modular flexibility of the Series 18/19 is the use of slip flanges which can accommodate ANSI/DIN and other standards up to and including Class 300 pressure rating. Furthermore, during installation, these flanges facilitate alignment of the valve in the pipework.

Face to Face Lengths

The screwed insert design allows for most ANSI/DIN face to face lengths, as well as longer non-standard dimensions.

Screwed and Weld Ends

As a variation on the above, the Series 18/19 can be supplied with either female screwed ends (NPT and BSP variants), socket weld or butt weld ends to suit schedule pipe to BS 1600.

For further information, consult Worcester Controls.

BALLS

The parallel-ported ball is available in a variety of flow path configurations, for example 'L' port, 'T' port, double 'L' port or other designs. The problem of cross-contamination on diverter valves can be addressed by using a bottom-entry, three-flanged valve with an L-ported ball operated through 180° (see below).

SEATS

A range of seat materials can be supplied to accommodate various media and pressure/temperature conditions. Worcester is probably unique in the British valve industry in manufacturing all its own soft seats, thereby retaining full control over quality.

MATERIALS OF CONSTRUCTION

While standard materials of construction are stainless steel or carbon steel, this valve can be manufactured in potentially any available wrought material to allow full compatibility with the pipework/process conditions.

ACTUATION

The introduction of Norbro's 180° Series 40R pneumatic actuator now allows two or three position capability between 0 and 180°. This can also be achieved with Norbro's Series 75 electric actuator. Together with the ISO mounting platform on the valve, this provides for an easily assembled, yet fully integrated multi-way valve system.

APPLICATION LIMITATIONS

CROSS CONTAMINATION

Due to the compact design of this valve, during its operation all three or four side ports will be open and therefore mixing of media between these ports will occur. Alternative designs are available to suit applications where cross contamination cannot be tolerated.

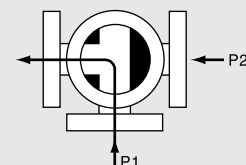
UPSTREAM SEALING

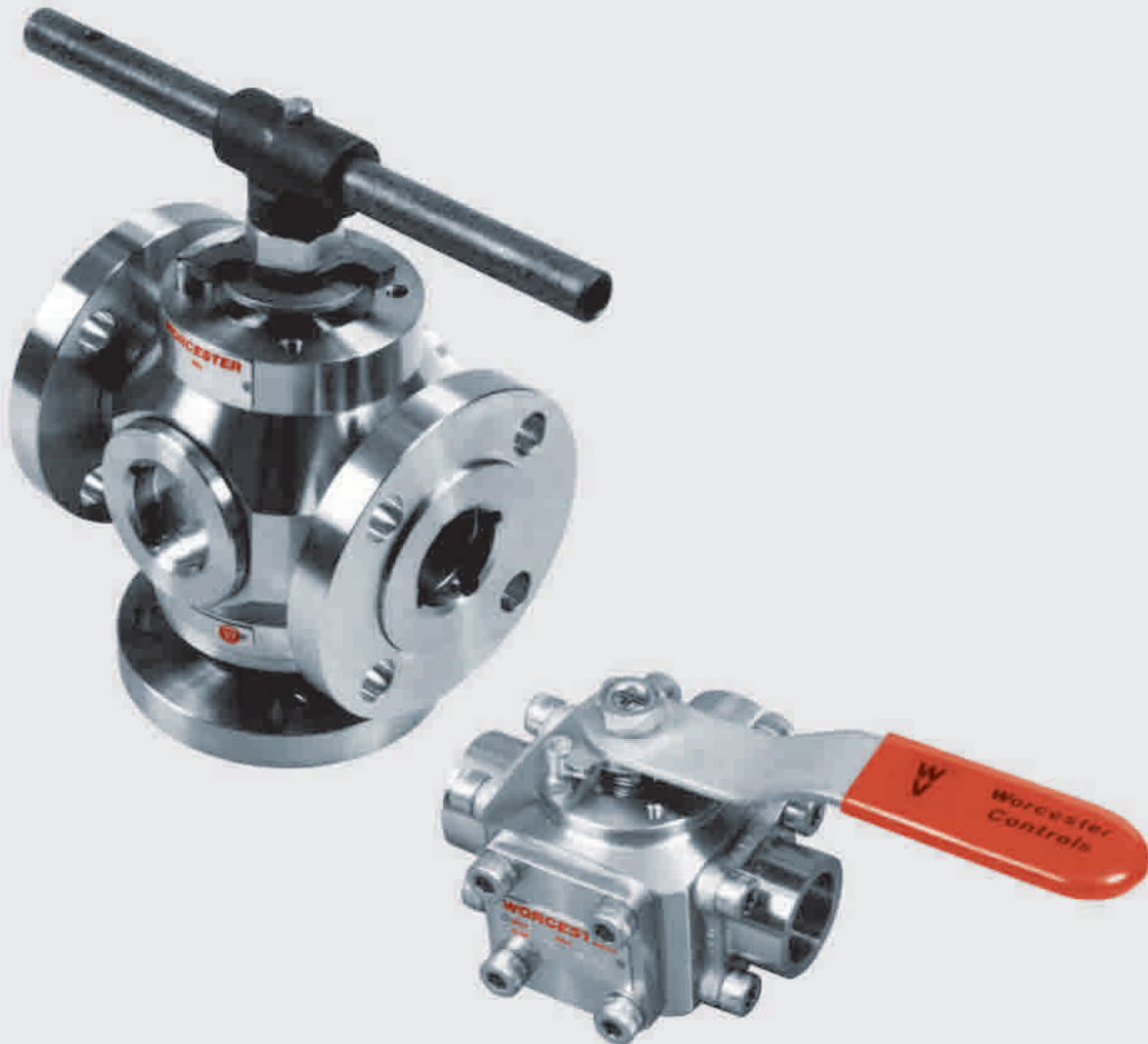
There is a limitation to the differential pressure between the communicating ports P1 and the port which is closed to the flow P2 (see diagram) where $P2 > P1$. This differential

pressure is based upon the seat material and the operating temperature of the valve. If differential pressures and temperatures in direction P2 exceed the limits of the upstream sealing graphs on page 11, media can pass the closed port and mix with P1.

These applications should be referred to Worcester Controls.

Upstream Sealing
(TA1 configuration shown)



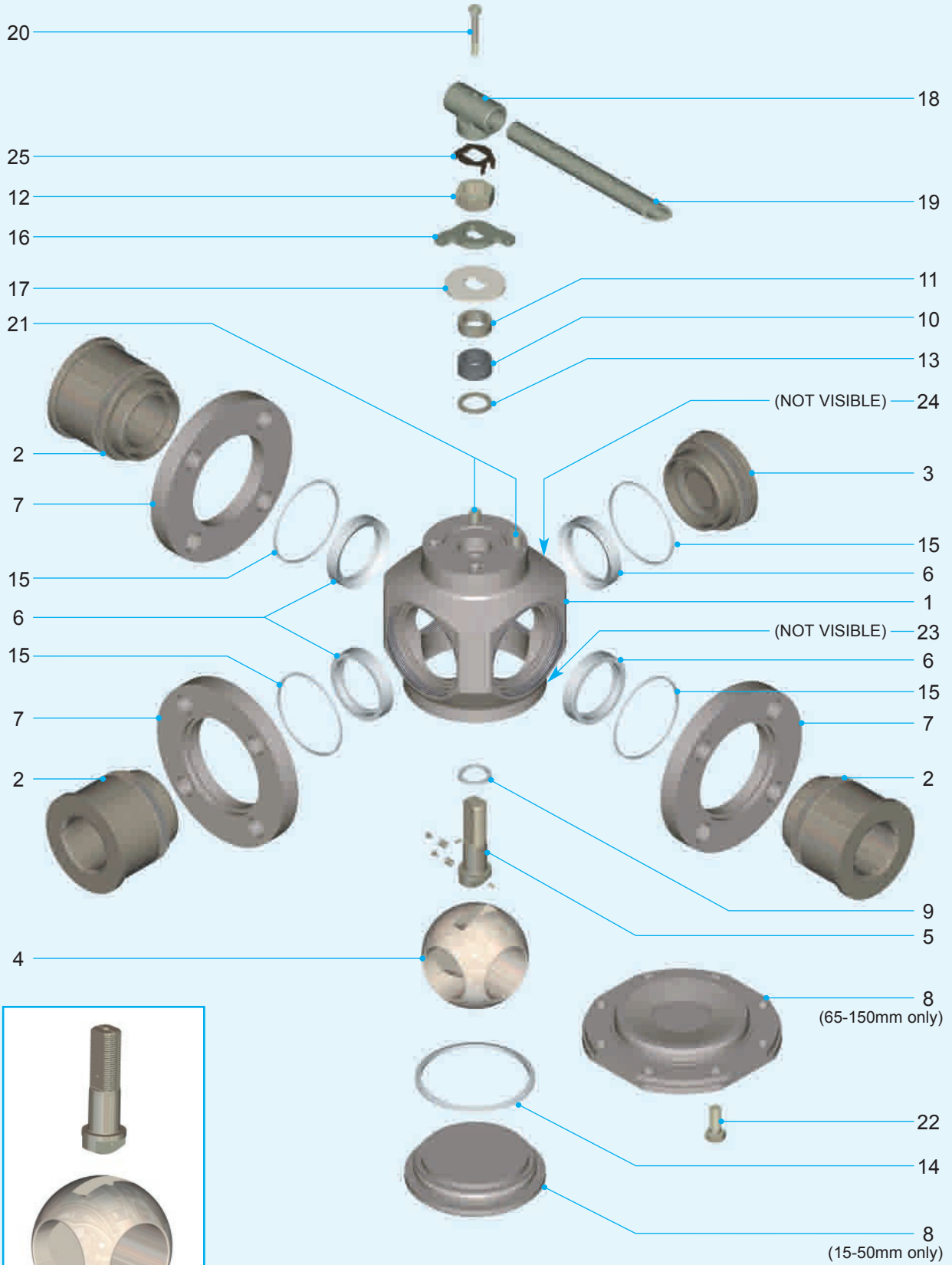


FEATURES

- Foolproof stem assembly to ball
- Slip flanges
- Compact size
- Ball/port variations
- User-interchangeable flange/ends
- Screwed insert design
- Range of seat materials
- Wrought body material options
- Full bore porting
- ISO mounting platform

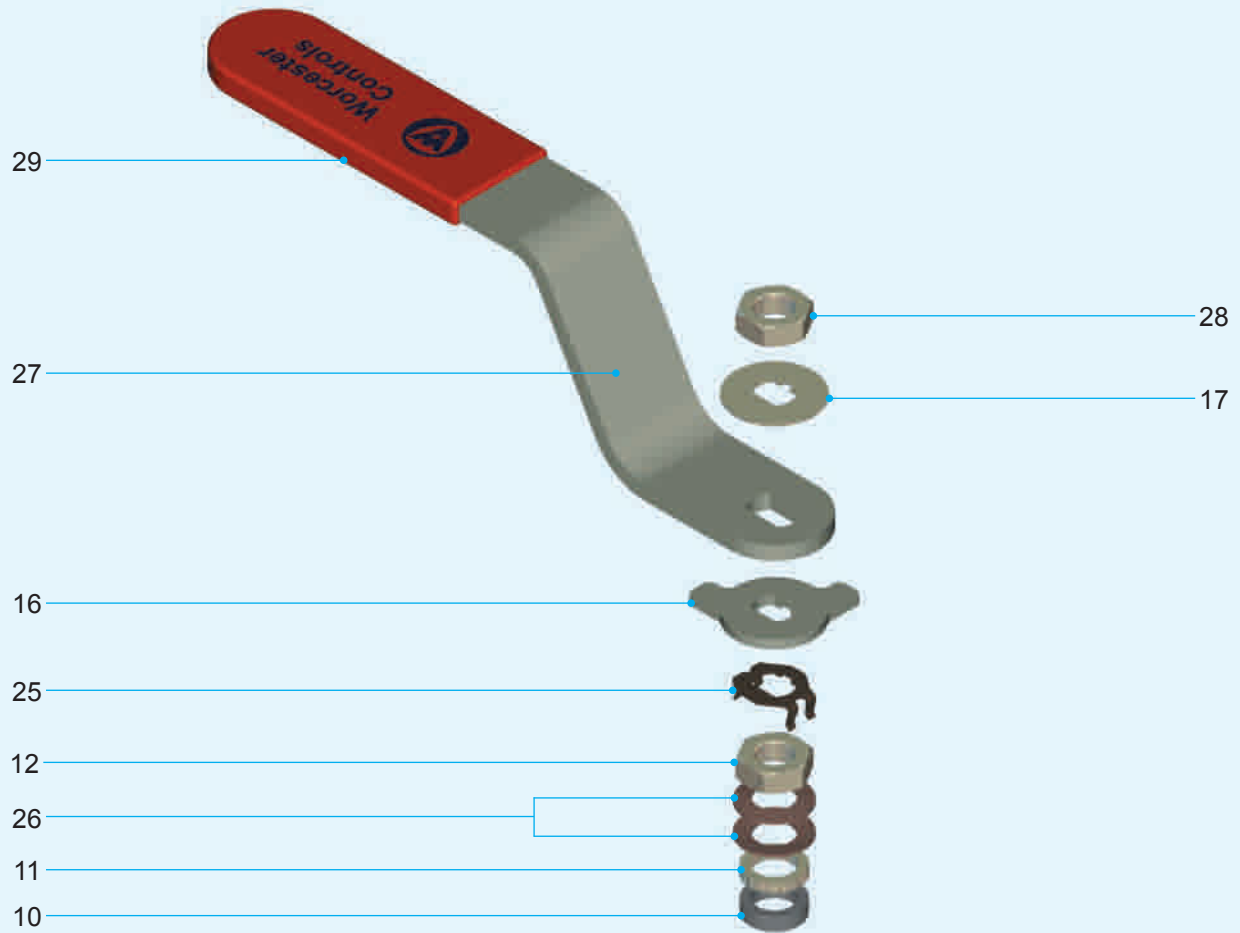
BENEFITS

- External indication of flow
- To simplify installation
- For space and weight saving
- Maximum flow permutations
- To meet different system requirements
- For variable face-to-face lengths
- For varying media/systems conditions
- To optimise system compatibility
- Greater flow efficiency
- For ease of automation



Detail showing stem location pin for correct orientation of ball to stem

15-25mm WRENCH/STEM ASSEMBLY



PARTS/MATERIALS LIST

ITEM	DESCRIPTION	MATERIAL	ITEM	DESCRIPTION	MATERIAL
1.	Body	Stainless Steel 316 Carbon Steel BS 970 070M20	15.*	Flange Port Insert Seal	Flexible Graphite
2.	Flange Port Insert	Stainless Steel 316 Carbon Steel BS 970 070M20	16.	Stop Plate	Stainless Steel 304 Carbon Steel BS 1449 CS4
3.	Blank Port Insert	Stainless Steel 316 Carbon Steel BS 970 070M20	17.	Flow Indicator	Stainless Steel 321
4.	Ball	Stainless Steel 316	18.	Wrench Head	Malleable Iron Rustproofed
5.	Stem	Stainless Steel 316	19.	Wrench Tube	Carbon Steel Rustproofed
6.*	Seat Ring	PTFE Virgin (T) Fluorofill	20.	Wrench Bolt	Stainless Steel BS 6105 A4-80
7.	Slip Flange	Stainless Steel 316 Carbon Steel BS 970 070M20	21.	Stop Pin	Stainless Steel 316 Carbon Steel BS 970 220M07
8.	Ball Assembly Plate	Stainless Steel 316 Carbon Steel BS 970 070M20	22.	Hex Head Screw (80-150mm only)	Stainless Steel BS 6105 A4-80 Carbon Steel BS 3692 GR 8.8
9.*	Stem Thrust Seal	PTFE 25% Glass Filled	23.	Identification Plate	Stainless Steel 304
10.*	Gland Packing (See Notes)	Flexible Graphite	24.	Body Plate	Stainless Steel 304
11.	Gland	Stainless Steel 316	25.	Gland Nut Locking Clip	Spring Steel
12.*	Gland Nut	Stainless Steel 316 Carbon Steel BS 970 070M20	26.*	Disc Springs	Stainless Steel 302
13.	Stem Location Ring (80-150mm only)	Stainless Steel 316	27.	Wrench	Carbon Steel Rustproofed
14.*	Ball Assembly Plate Seal	Flexible Graphite	28.	Wrench Nut	Stainless Steel 316
			29.	Wrench Sleeve	Vinyl Plasticsol

* Items marked thus denote component supplied in repair kit
Notes: For 15-50mm valves, one gland packing is used.
For 65-150mm valves, two are used.

18 SERIES MULTI-WAY SIDE ENTRY (PLAN VIEW)

90° Options				
'L' Port	'T' Port			
LA1	TA1	TA2	TA3	TA4

180° Options				
'L' Port	'T' Port			
LB1	TB1	TB2	TB3	TB4

90° Options		180° Options		
'T' Port	'X' Port	'L' Port	'T' Port	'L' Port 90°
TA5	XA1	LB2	TB5	LA2

19 SERIES MULTI-WAY BOTTOM ENTRY (PLAN VIEW)

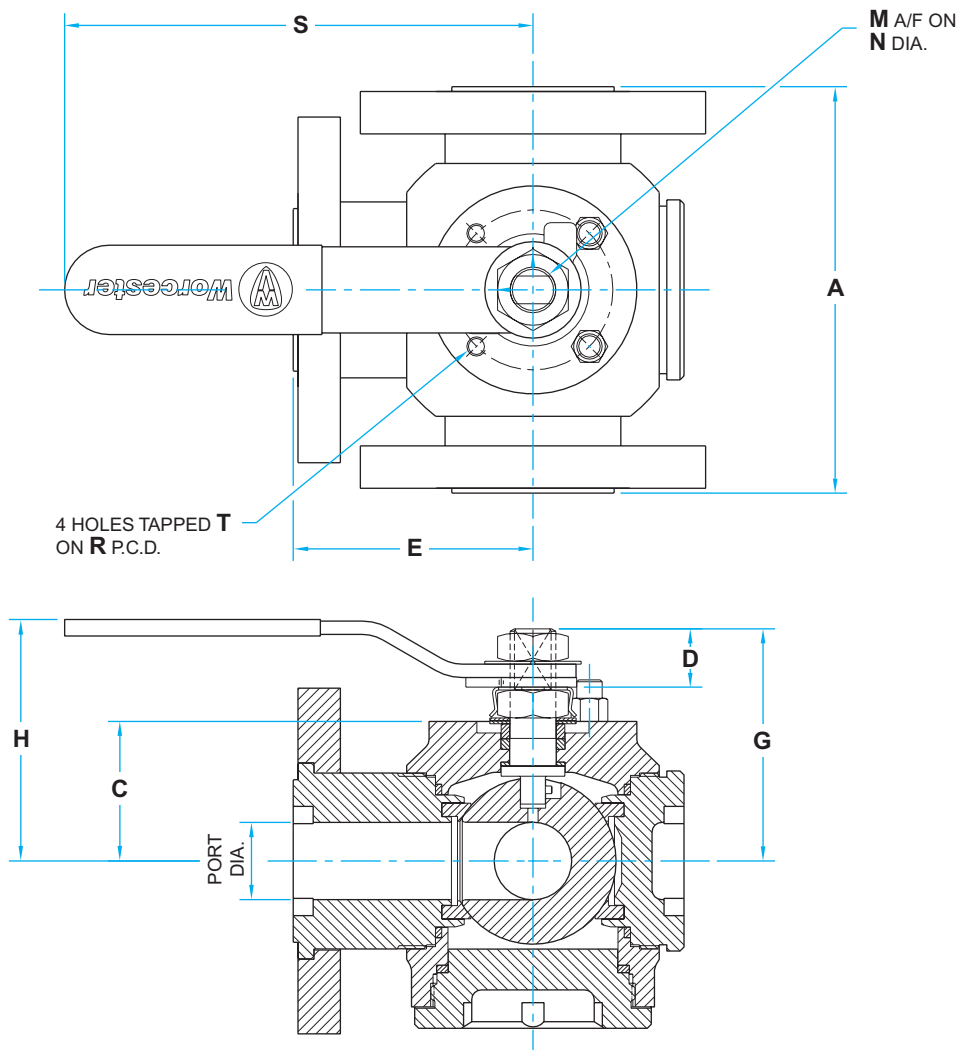
90° Options			
'L' Port		'T' Port	
LA1	LA1	TA1	TA2

180° Options			
'T' Port			
TB1	TB2	TB3	TB4

180° Options		
'L' Port		
LB1	LB2	LB3

360° Options	
'L' Port	
LD1	LD2
Each Port in Sequence	Each Port in Sequence

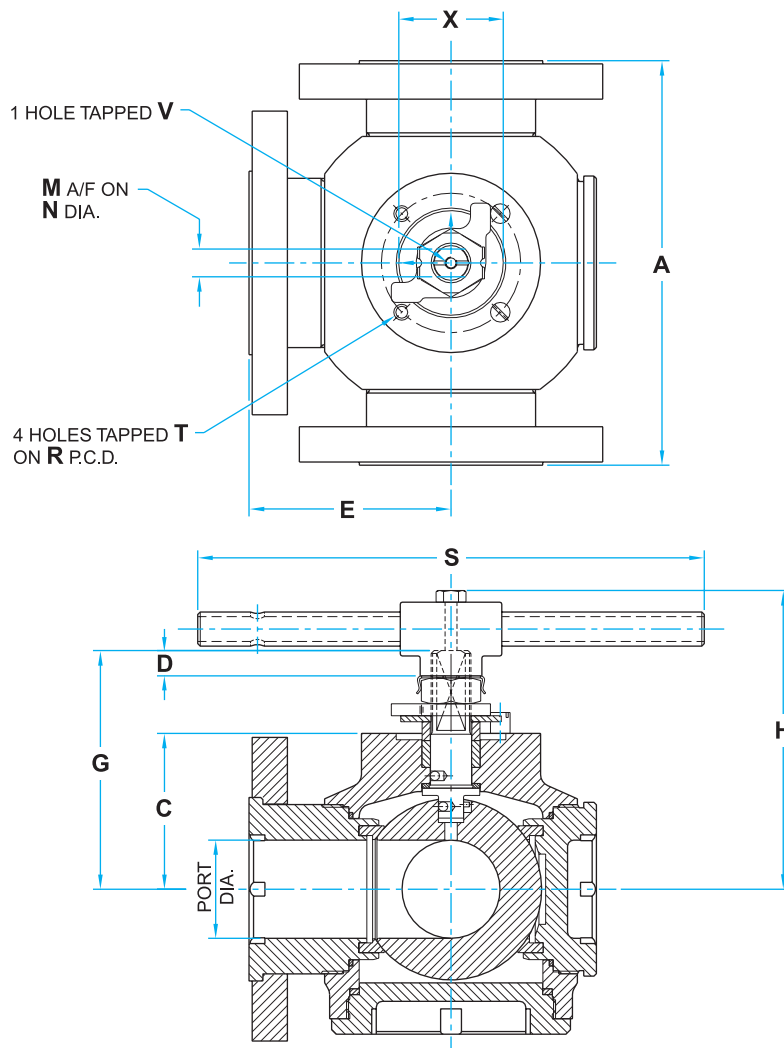
SERIES B18 (SIDE ENTRY)
15-25mm



VALVE DIMENSIONS (FULL BORE)

Valve Size (mm)	Port Dia.	A			C	D Min.	E			G	H	M Max.	N	R P.C.D.	S	T	Approx. Weight (kg)
		ANSI Cl.150	ANSI Cl.300	DIN			ANSI Cl.150	ANSI Cl.300	DIN								
15	12.5	108.0	140.0	130.0	29.7	15.0	70.0	70.0	65.0	53.0	112.0	7.54	11.1	42.0	167.0	M5x 7.5DP	5.0
20	17.0	117.0	152.0	150.0	34.2	15.0	58.5	76.0	75.0	57.5	116.5	7.54	11.1	42.0	167.0	M5x 7.5DP	6.0
25	24.0	127.0*	165.0	160.0	43.6	18.2	75.0	82.5	80.0	72.6	117.9	8.71	14.3	50.0	193.0	M6x 8.7DP	7.0

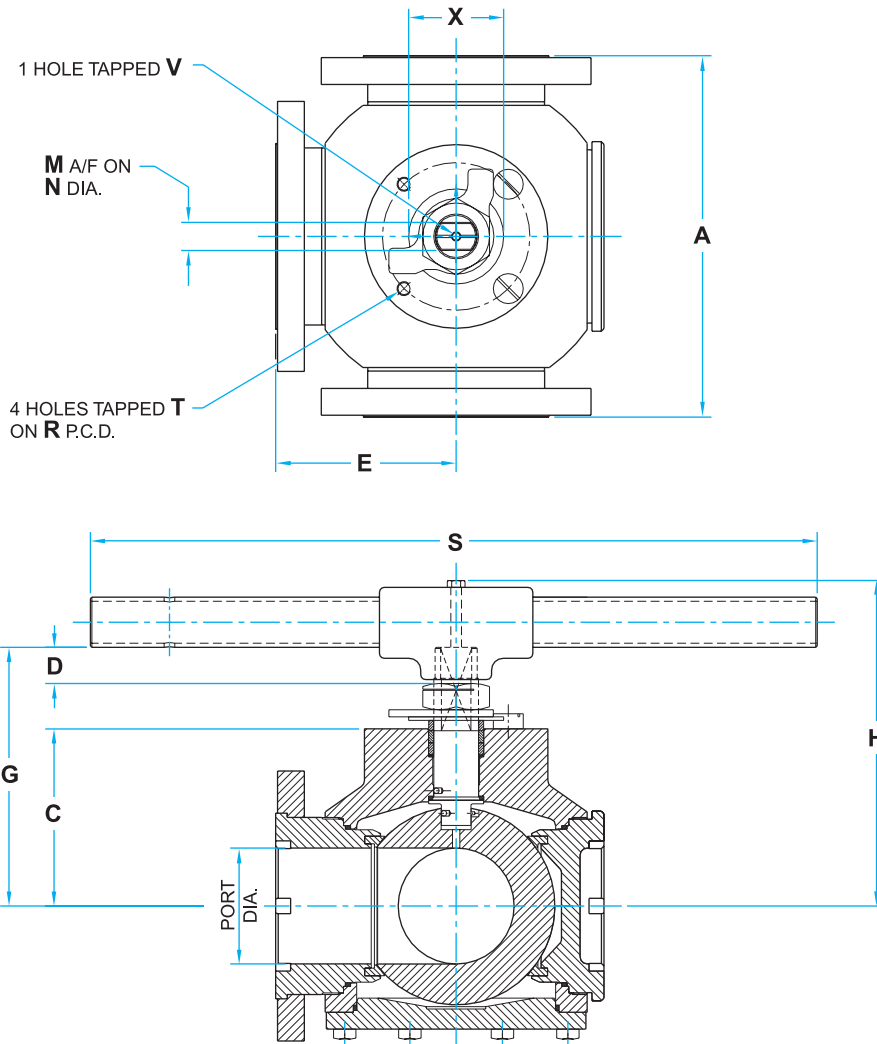
**SERIES B18 (SIDE ENTRY)
40-50mm**



VALVE DIMENSIONS (FULL BORE)

Valve Size (mm)	Port Dia.	A			C	D Min.	E			G	H	M Max.	N	R P.C.D.	S	T	V	X	Approx. Weight (kg) Cl.150
		ANSI Cl.150	ANSI Cl.300	DIN			ANSI Cl.150	ANSI Cl.300	DIN										
40	37.0	165.0	190.0	200.0	69.2	11.1	82.5	105.0	100.0	110.9	138.8	14.0	20.0	70.0	256.0	M8x14DP	M6x10DP	52.5	12.0
50	49.0	203.0	216.0	230.0	78.2	11.1	101.5	108.0	115.0	119.8	147.7	14.0	20.0	70.0	256.0	M8x14DP	M6x10DP	52.5	19.0

SERIES B18 (SIDE ENTRY)
65-150mm

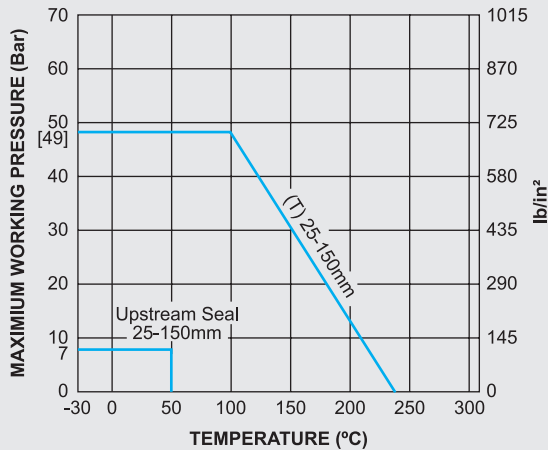


VALVE DIMENSIONS (FULL BORE)

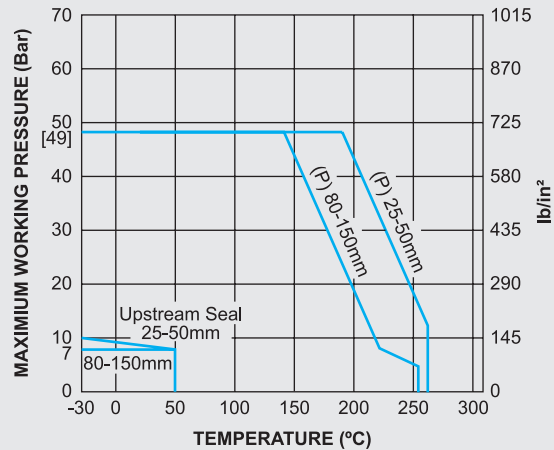
Valve Size (mm)	Port Dia.	A		C	D Min.	E		G	H	M Max.	N	R P.C.D.	S	T	V	X	Approx. Weight (kg) Cl.150	
		ANSI Cl.150	ANSI Cl.300			ANSI Cl.150	ANSI Cl.300											DIN
65	64.0	222.0*	241.0*	290.0	102.9	120.0	130.0	145.0	149.6	190.0	15.82	23.0	102.0	400.0	M10x 16DP	M6x 9DP	67.0	30.0
80	75.0	241.0*	283.0	310.0	112.9	120.5	141.5	155.0	159.6	200.0	15.82	23.0	102.0	400.0	M10x 16DP	M6x 9DP	67.0	47.0
100	98.0	305.0	305.0*	350.0	150.0	152.5	175.0	175.0	219.0	275.0	23.75	36.0	125.0	916.0	M12x 20DP	M8x 11DP	81.0	84.0
150	148.0	394.0	403.0*	480.0	187.0	197.0	201.5	240.0	256.0	312.0	23.75	36.0	125.0	916.0	M12x 20DP	M8x 11DP	81.0	160.0

PRESSURE TEMPERATURE RATINGS

Virgin PTFE (T)



Fluorofill (P)



NOTES

- Limiting stem input torque figures are based on random practical laboratory tests. For critical applications where a guaranteed figure is essential, consult Worcester Controls.
- Both 90° and 180° can be actuated pneumatically or electrically.
- Alternative seat/seal materials are available.
- Installation, Operating and Maintenance Instructions are available on request.
- Some flanges have tapped bolt holes.
- If required, dissimilar flange materials to body can be supplied.
- Non preferred face to face dimensions can be accommodated.
- All sizes shown are for full bore B18/19 Series valves. For reduced bore use one size down, i.e. 1" reduced bore use ¾" dimensions.

NOTE:

Stainless steel valves are CE Marked in accordance with the Pressure Equipment Directive 97/23/EC, conformity assessment Module H and are classified in Category III. Carbon steel valves are classified as SEP (Sound Engineering Practice) and, in accordance with the Pressure Equipment Directive, are not CE Marked. These valves may be used within the limitations defined in Annex II of the Directive.

STANDARDS OF COMPLIANCE

Testing	Valves are tested to the requirements of BS 6755 Part 1 in the downstream sealing mode only and are firesafe to the external leakage requirement only of BS 6755 Part 2
Face to Face Dimensions (of 2 opposing flanges on a 3-way valve) (See Note 7)	BS 2080 - Table 19 ISO 5752 - Table 6 ANSI B16.10 - Tables 1 and 2 AFI 6D - Table 4.3 DIN 3202 - Table 5.1
Flange Dimensions (See Note 5)	BS 1560 Class 150/Class 300 BS 4504 PN 10/16/25/40

LIMITING STEM INPUT TORQUE

Valve Size (Full Bore) mm	Limiting Stem Input Torque (See Note 1)	
	Nm	lbf/in
25	48.6	430
40	192	1700
50	192	1700
80	452	4000
100	1254	11100
150	3023	26751

FLOW COEFFICIENTS

Valve Size (Full Bore) mm	Straight Through Flow		90° Branch		Double 'L'	
	Cv	Kv	Cv	Kv	Cv	Kv
25	44	38	25	22	16	14
40	104	90	60	52	38	33
50	194	169	112	97	71	62
80	449	390	259	196	160	139
100	820	713	474	412	280	243
150	1965	1708	1135	986	658	571

Cv - Flow in US GPM (Pressure - psi)
Kv - Flow in m³/hr (Pressure - bar)

THE SERIES 18/19



Butt Weld Ends

In addition to slip flanges, the Series 18/19 can be supplied with a variety of end connections including socket weld and butt weld to suit customer requirements, screwed ends threaded to BSP and NPT, as well as tri-clamp ends and others.

This configuration incorporates Worcester's unique dual sealing 'Enviro-Safe' stem assembly specifically designed for use on toxic, polluting and expensive media.



High Integrity Option



Size Range

Shown here is the 150mm (6") full bore multi-way valve compared with the 20mm ($\frac{3}{4}$ ") size.

The flexibility of this product is further enhanced by the variety of materials of construction which, amongst others, includes Aluminium Bronze (shown opposite), Hastelloy, Titanium, Duplex etc.



Aluminium Bronze



Special Adaptions

Special variants of the product, such as a bleed valve to facilitate draining, can be fitted to the valve. Other adaptations can be readily accommodated.

To complement the Series 18/19 range, Norbro offer pneumatic and electric actuators which can provide both 90° and 180° operation as standard with other options available.



Actuated Multi-Way



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