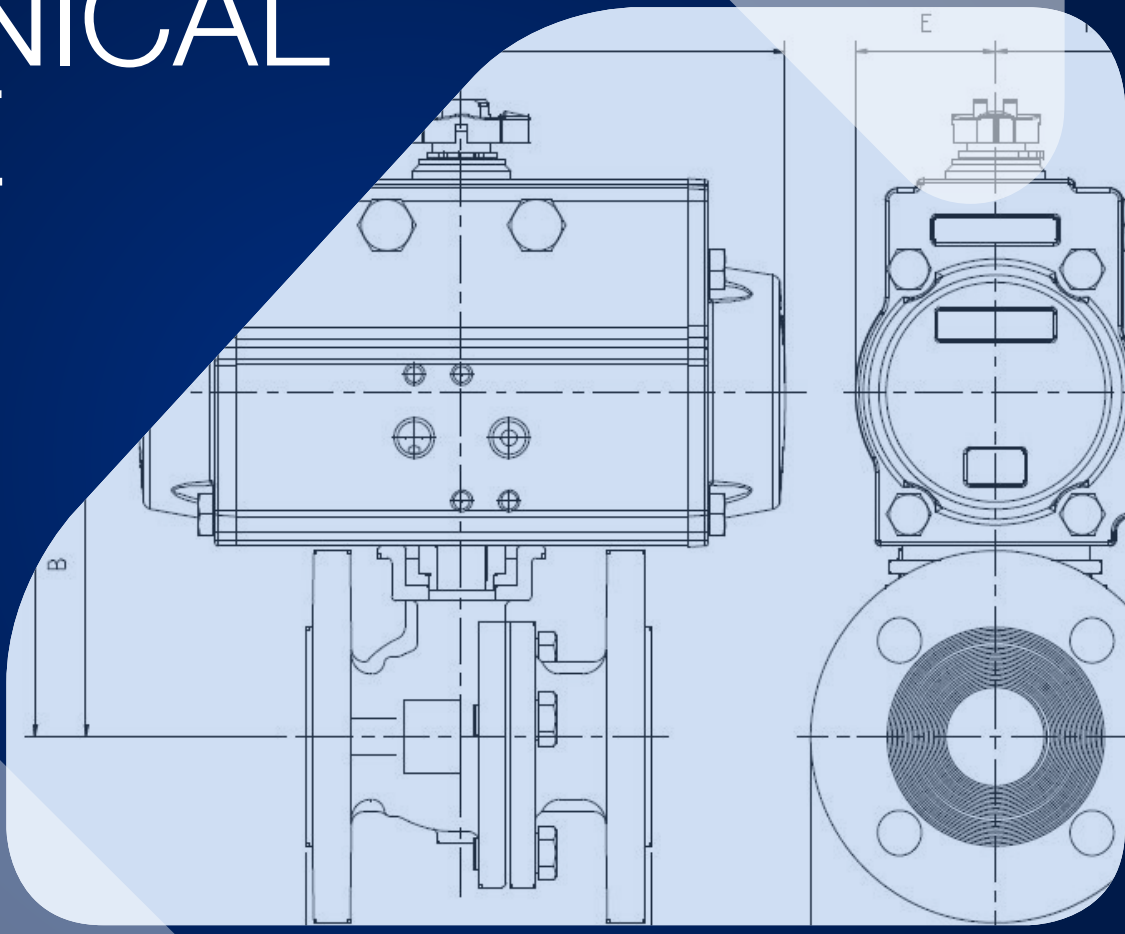
BSS

Pipeline & Heating Solutions

BOSS™

VALVE & ACTUATOR TECHNICAL GUIDE



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BOSS™

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- Order BOSS™ actuated packages by 4pm for next day delivery
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- Extensive range of products and accessories available
- Safety valve setting to customer requirements
- Technical product application advice and expertise available

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- Place your order by 4pm and it will be available for delivery or collection from 7am*
- Over 60,000 parts from hundreds of leading manufacturers - available when you need them
- The largest range of valves in the UK including over 13,000 BOSS™ products
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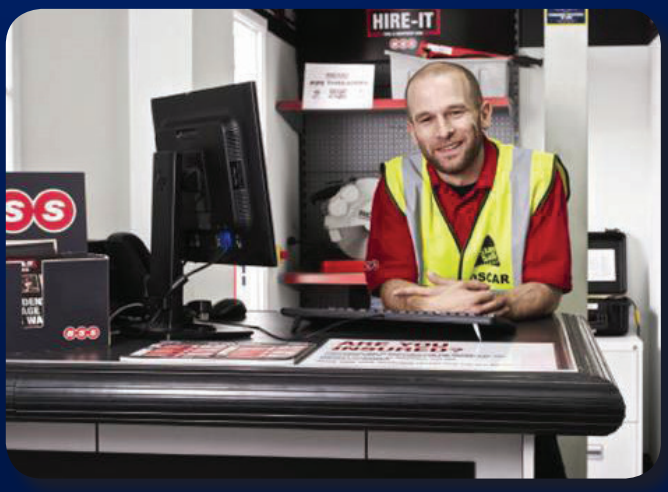
- National network of tool hire branches for all your tool hire needs

BOSS™

Exclusively from BSS, backed with our full technical support

HIRE-IT TOOL & EQUIPMENT HIRE

We'll get the right tool delivered to you



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*Subject to stock availability and branch opening times

Contents

Contents

BSS offer over **60,000 product lines** giving all our customers access to a wide range of equipment for all types of industry sectors and applications.

Introduction to BSS

This brochure is designed to give the user a comprehensive guide to our BOSS™ range of valves, actuators, actuated packages & accessories.

In BSS, our world class BOSS™ range is backed with full technical and application support and complements the extensive ranges available from leading partner suppliers.

Our network is backed by a 140,000 sq. ft. national distribution centre, a specialist tube distribution centre and over 60 branches nationwide. With a fast and friendly service, BSS can offer access to an unrivalled range of products - available same day or next day - delivered to site or collected from our trade counters.

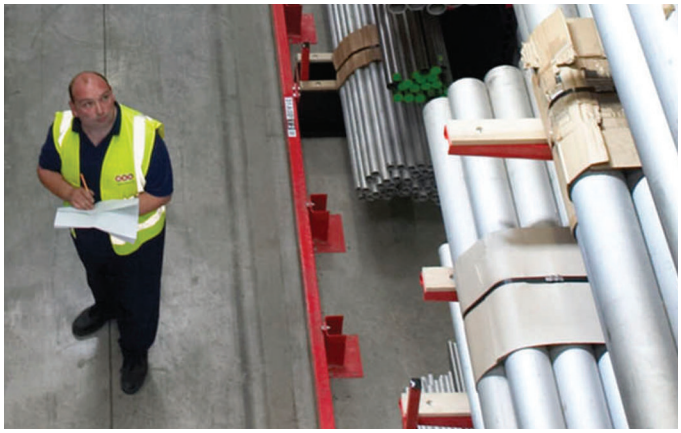
Every BSS branch now offers our Hire-It service - built around the needs of the plumbing and heating trade. You can be sure of a huge choice of well maintained, top name equipment that meets all the safety standards as well as expert advice and excellent service to accompany each and every hire.

Our in-house Engineering & Actuation team can provide actuated valve packages, pre-set safety valves, heat exchangers, bespoke flange modifications and more. With a fast and friendly service, BSS can also offer application advice, product sizing, commissioning and a range of bespoke engineering solutions.

The BOSS™ valve range maintains the highest standards of quality and reliability with products manufactured in accordance with industry recognised standards and approvals (including EN331 Fire Safe & WRAS where stated). This ensures commitment of product quality can be passed on to the customer. The latest additions to this best-selling range include:

- Pressure Independent Control Valves
- Differential Pressure Control Valves
- Modular Valve Systems
- Stainless Steel Ball Valves
- Pneumatic & Electric Actuators
- Actuated Valve Packages

To find out more about our latest special offers or to get a quote for your next job, just call your nearest branch on 0330 123 3521.



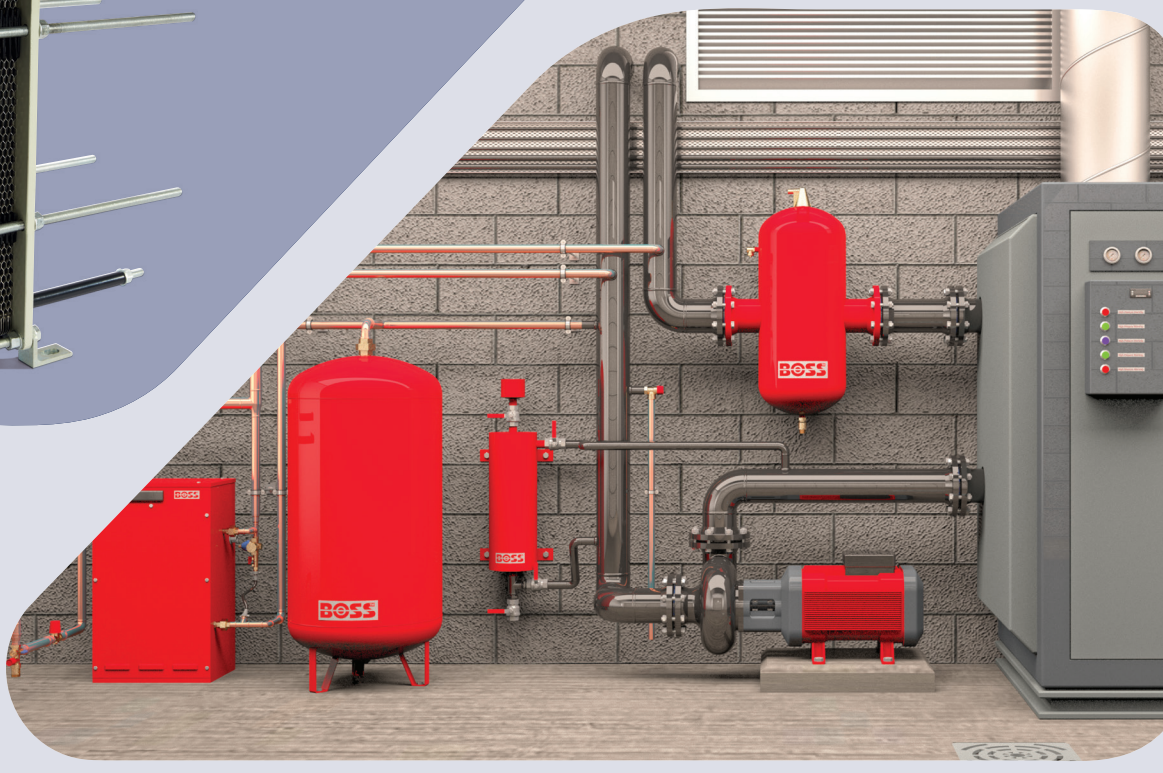
BOSS™ delivers heating, plumbing and pipeline system products for professionals who demand guaranteed quality and service.

The brand is built on a proud 100-year history and a solid reputation. We want our customers to recognise us as PROUD, DECISIVE, RESPECTED, CONFIDENT and EXPERT and we want to be an aspirational choice for the professionals in our industry.

We work hard to meet and exceed our customers' expectations every time they buy from us. We value the relationships we build and know that each and every one of them is based on trust. Our business has a long and proud history - dating back over a century - and we see an equally positive future.

Any tradesperson, whether they're a domestic installer or an industrial contractor, wants to use reliable products they know are up to the job. With our wide range and reputation for quality, BOSS™ appeals to every type of customer.

BOSS™ is a premium product offered alongside other market leading brands.



What is Stress Corrosion Cracking (SCC)?

When subjected to the combined effects of stress and corrosion, many alloys can develop cracks over a period of time and specifically copper-zinc alloys such as brass can be sensitive to stress corrosion attack, particularly in the presence of moisture through condensation.

However, SCC occurs only in the presence of a sufficiently high tensile stress and a specific corrosive environment. For brasses, the environment involved is usually one containing ammonia or closely related substances such as amines. The presence of ammonia or related substances could typically arise from the insulation material or from various sources of chemicals used on an installation and may even be airborne.

Since all brasses are susceptible to stress corrosion cracking it is important to avoid the combination of high stress and unfavourable environment that may cause stress corrosion.

Stress corrosion cracking of joints can occur with quite low concentrations of ammonia and may be accompanied by black staining of the surrounding surface. SCC is usually localised with the cracks running roughly perpendicular to the direction of the tensile.

Condensation and Insulation

Condensation of water vapour will occur on a surface that is at a temperature below the atmospheric dew point temperature due to the water vapour being drawn towards the cold surface as a result of a difference in partial vapour pressure between the air at ambient temperature and that at the temperature of the cold surface. Without adequate vapour sealing, moisture can be deposited through condensation within the insulating material and on the insulated metal surface.

Precautions must be taken to exclude moisture (condensation) from the system, therefore an effective vapour barrier is required. The purpose of the vapour barrier is to reduce, and if possible to prevent, the ingress of water vapour into the insulating material and it must be applied before the water in the pipe is cooled. Any joints in the insulating material must be fully sealed to ensure vapour permeance maintained continuously. Particular care must be taken at termination points to ensure that the integrity of the insulation and vapour barrier is maintained.

Only dry insulation material should be used and it should be kept dry until after the vapour barrier has been applied. Unsealed joints, badly fitting insulation and inadequate vapour sealing of termination points such as valve headworks and stems and test points can provide an easy passage for water vapour and subsequent condensation. Pipe supports should not be attached directly to the pipe because it is difficult to seal the insulation surface where the support projects through, therefore the pipe support brackets should be clamped over the exterior of the insulation where possible.

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Systems

Copper alloy valves and fittings are widely used throughout HVAC systems on hot water heating, chilled water and domestic hot and cold water. It is reasonable to assume that fitting practices are the same throughout all the systems but failure due to stress corrosion cracking (SCC) is almost invariably encountered with brass products in chilled water systems. Nickel plating of products does not provide protection against SCC.

Products manufactured in bronze are not susceptible to SCC and DZR brass products are also less susceptible.

Installation

Joints must be made in accordance with our installation instructions. Correctly fitting tools such as spanners must be used to avoid causing damage and localised stressing to the component. 'Stilson' type wrenches must not be used. Excessive use of jointing material combined with high tightening forces can generate high hoop stresses in female threaded components.

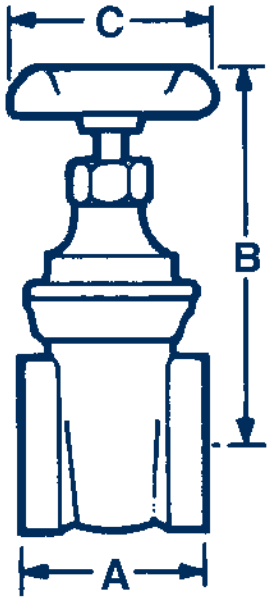
Where failure does occur as a result of SCC, the stresses involved will almost always have been generated during installation.

Reduce the Risk of SCC

- Preferably install products manufactured in bronze or DZR brass material. If DZR brass is installed, the use of compression ended components is not recommended.
- Ensure that ball valves are supplied with extensions.
- All insulation and vapour barriers must comply with BS5970:2001 and BS5422:2009.

Gate Valves
Bronze – FIG 25SM BS 5154/B PN20

Dimensions



Nominal size		A	B	C	Weight	Product
in	mm	mm	mm	mm	kg	Code
½	15	50	80	50	0.3	22065430
¾	20	52	90	63	0.43	22065441
1	25	65	120	66	0.66	22065452
1¼	32	66	120	76	0.98	22065463
1½	40	68	130	88	1.12	22065474
2	50	80	170	100	1.93	22065485
2½	65	102	210	117	3.75	22065496
3	80	110	223	127	4.95	22065504

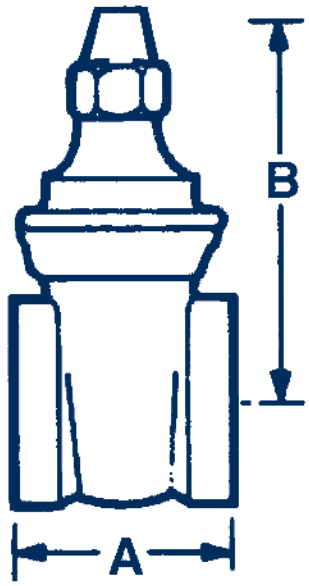
Technical Specification		
Connections		Screwed BSPT Female
Pressure rating	Saturated steam	9bar @ 180ºC
		20bar @ -10 to 100ºC

Materials of Construction	
Body	Bronze BS EN 1982 CC491K
Bonnet	Bronze BS EN 1982 CC491K
Disc	Bronze BS EN 1982 CC491K
Stem	Brass BS EN 12164 CW614N
Gland	Brass BS EN 12164 CW614N
Lock nut	Brass BS EN 12164 CW614N
Gland packing	Graphite
Packing nut	Brass BS EN 12164 CW614N
Handwheel	Cast Iron
Handle nut	Steel
Nameplate	Aluminium

Gate Valves

Bronze – FIG 25SMLS Lockshield Pattern BS 5154/B PN20

Dimensions



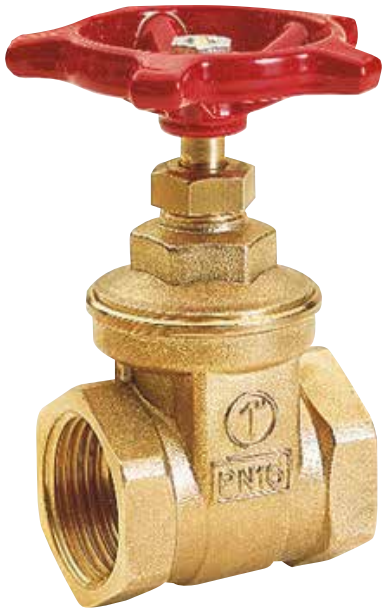
Nominal Size in	Nominal Size mm	A mm	B mm	Weight kg	Product Code
½	15	50	63	0.33	22065515
¾	20	54	74	0.43	22065526
1	25	62	87	0.61	22065537
1¼	32	68.5	100	0.85	22065548
1½	40	72.5	115	1.11	22065559
2	50	87	135	1.82	22065570

Technical Specification		
Connections		Screwed BSPT Female
Pressure rating	Saturated steam	9bar @ 180°C
		20bar @ -10 to 100°C

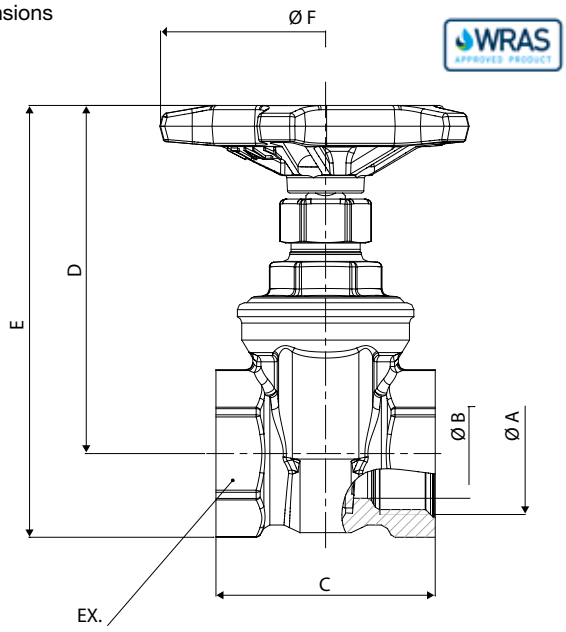
Materials of Construction	
Body	Bronze BS EN 1982 CC491K
Bonnet	Bronze BS EN 1982 CC491K
Disc	Bronze BS EN 1982 CC491K
Stem	Brass BS EN 12164 CW614N
Gland	Brass BS EN 12164 CW614N
Lock nut	Brass BS EN 12164 CW614N
Lockshield	Brass BS EN 12164 CW614N
Gland packing	Graphite

Optional Extras	Product Code
Set of lockshield keys	25017415

Gate Valves
Brass-FIG R55 BS 5154/B PN16



Dimensions



Nominal size in	Nominal size mm	C mm	D mm	EX mm	E mm	øF mm	Weight kg	Product Code
½	15	43	64	26	79	59	0.209	22072707
¾	20	48	76	32	94	72	0.323	22072718
1	25	54	87	39	109	72	0.441	22072729
1¼	32	62	96	49	130	84	0.767	22072740
1½	40	64	116	55	147	95	0.93	22072751
2	50	76	140	68	178	108	1.45	22072762
*2½	65	80	186	84	233	145	2.807	22072773
*3	80	84	198	99	256	145	3.558	22072784

* Sizes 2½ and 3 are PN10 and are BSPP female connections

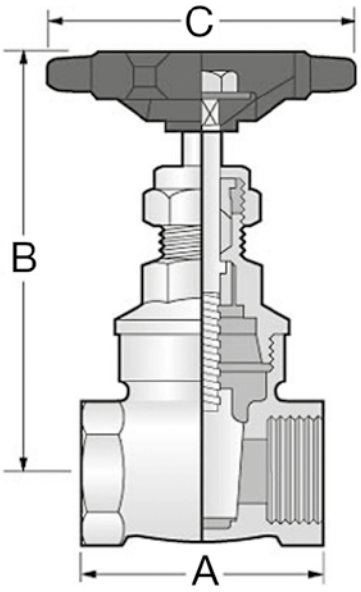
Technical Specification	
BS Specification	BS 5154/B
Connections	Screwed BSPT Female
Pressure rating	16bar / 232 psi @ 23°C 10bar / 145 psi @ 95°C
Temperature rating	0ºC - 110°C

Materials of Construction	
Body	CW 617N - UNI EN 12165
Particulars in forged brass	CW 617N - UNI EN 12165
Particulars machined from bar	CW 614N - UNI EN 12164
Handwheel	Aluminium
Handwheel fixing nut	Zinc Plated Steel

Gate Valves

FIG 1068 Brass Wheelhead Gate Valve PN20

Dimensions



Nominal size in	Nominal size mm	A mm	B mm	C mm	Weight kg	Product Code
¼	8	43	85	60	0.22	22072987
⅜	10	43	85	60	0.22	22072998
½	15	52	85	60	0.27	22073004
¾	20	56	95	60	0.37	22073015
1	25	65	110	60	0.64	22073026
1¼	32	73	125	70	0.99	22073037
1½	40	76	145	95	1.28	22073048
2	50	90	170	105	2	22073059
2½	65	102	205	120	3.19	22073070
3	80	114	240	155	4.63	22073081

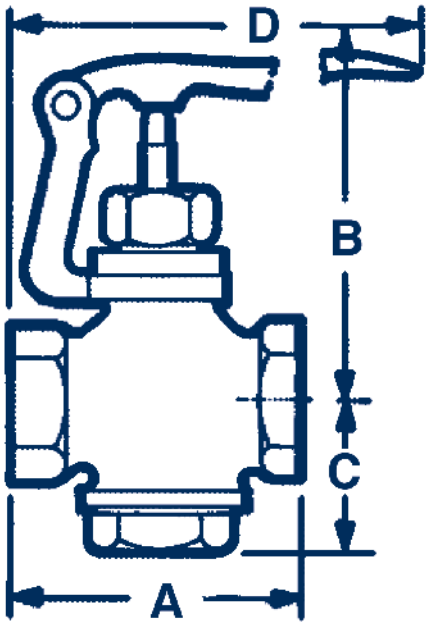
Technical Specification	
Maximum pressures	20bar @ 100ºC
	9bar @ 180ºC
Connections	Screwed BSPT Female

Materials of Construction		
Body	¼ to 2in	Forged Brass
	2½ & 3in	Gravity Die Cast Brass
Bonnet		Forged Brass
Wedge	½ to 2½in	Forged Brass
	3in	Gravity Die Cast Brass
Stem		Brass
Stem ring		Brass
Gland		Brass
Gland nut	¼ to 1in	Brass
	1¼ to 3in	Forged Brass
Handwheel		Aluminium
Handwheel nut		Brass
Gland packing		Graphited non-asbestos
Rating disc		Aluminium

Rapid Action Valves

Bronze – FIG 80S Rapid Action – Self-Closing Type

Dimensions



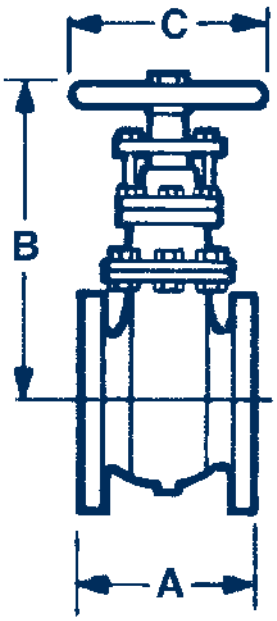
Nominal Size in	Nominal Size mm	A mm	B mm	C mm	D mm	Weight kg	Product Code
½	15	70	89	38	89	1.00	22015208
¾	20	79	143	41	89	1.25	22015219
1	25	89	95	48	89	1.75	22015230
1¼	32	111	114	51	89	2.16	22015241
1½	40	121	127	60	102	3.25	22015252
2	50	127	130	70	102	3.75	22015263

Technical Specification	
Connections	Screwed BSPT Female
Pressure rating	Body PN16
Cold services	10bar (150lbf/in²)
Steam	4.7bar (68lbf/in²)
	For steam duties up to 10bar (150lbf/in²) Viton discs can be supplied to order
Maximum temperature	149°C (300°F)

Materials of Construction	
Body	Bronze BS1400 LG2
Lever	Bronze BS1400 LG2
Spring	Stainless Steel
Disc	EPDM as standard

Gate Valves
Ductile Iron – FIG 7XS PN16

Dimensions



Nominal size in	Nominal size mm	A mm	B mm	C mm	Weight kg	Product Code
2	50	178	350	180	20	32020001
2½	65	190	369	180	26	32020012
3	80	203	409	200	30	32020023
4	100	229	458	250	47	32020034
5	125	254	516	280	65	32020045
6	150	267	570	300	81	32020056
8	200	292	753	360	141	32020067

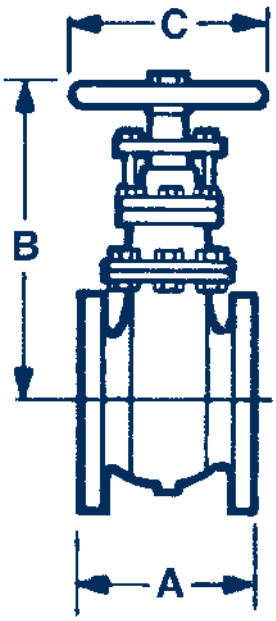
Technical Specification	
BS Specification	BS 5150
Connections	Flanged BS 4504 PN16
Pressure/Temp	16bar @ -10 to +120ºC 12.8bar @ 200ºC

Inside screw, non-rising stem, hydrostatically tested to BS 5150

Materials of Construction	
Body & bonnet	Ductile Iron
Disc	Ductile Iron with Bronze Facings
Disc nut	Bronze
Body seat rings	Bronze
Stem	Brass
Bonnet gasket	Graphite
Packing	Graphite

Gate Valves
Ductile Iron – FIG 7XS PN6

Dimensions



Nominal size in	Nominal size mm	A mm	B mm	C mm	Weight kg	Product Code
2	50	150	350	160	15	32020108
2½	65	170	369	160	19	32020119
3	80	180	409	180	27	32020130
4	100	190	458	200	36	32020141
5	125	200	516	250	50	32020152
6	150	210	570	300	66	32020163
8	200	230	640	360	102	32020174

Technical Specification	
BS Specification	BS 5150
Connections	Flanged BS 4504 PN6
Pressure/Temp	5.4bar @ 150ºC
	6bar from -10 to +120ºC

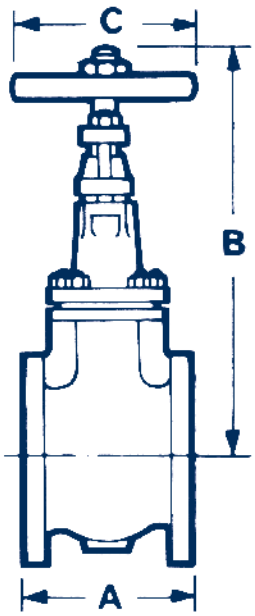
Inside screw, non-rising stem, bronze trim

Materials of Construction	
Body & bonnet	Ductile Iron
Disc	Ductile Iron with Bronze Facings
Disc nut	Bronze
Body seat rings	Bronze
Stem	Brass
Bonnet gasket	Graphite
Packing	Graphite

Gate Valves

Ductile Iron – FIG 7XSE BS 3464

Dimensions



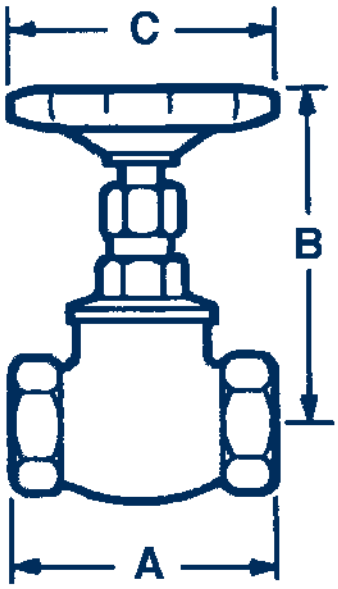
Nominal Size in	Nominal Size mm	A mm	B mm	C mm	Weight kg	Product Code
2	50	146	290	180	15	32020204
2½	65	159	312	180	19	32020215
3	80	165	409	200	26	32020226
4	100	171	458	200	38	32020237
5	125	191	516	280	50	32020259
6	150	210	570	280	71	32020270
8	200	241	570	360	110	32020281

Technical Specification		
Connections		Flanged BS 10 Table E
	4in only	Available in BST D
Pressure/Temp		6.9bar @ -17.8 to +121ºC
		3.5bar steam @ -17.8 to 221ºC
Inside screw, non-rising stem, bronze trim		

Materials of Construction	
Body & bonnet	Ductile Iron
Disc	Ductile Iron with Bronze Facings
Disc nut	Bronze
Body seat rings	Bronze
Stem	Brass
Bonnet gasket	Graphite
Packing	Graphite

Globe Valves
Bronze – FIG 62S BS 5154B PN32

Dimensions



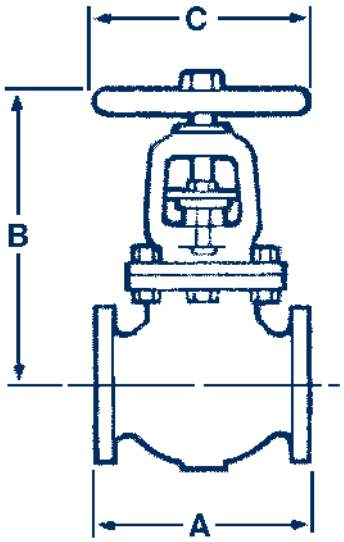
Nominal Size in	Nominal Size mm	A mm	B (open) mm	C mm	Weight kg	Product Code
½	15	59	92	65	0.42	22065600
¾	20	73	108	65	0.6	22065611
1	25	82	118	70	0.82	22065622
1¼	32	96	137	83	1.23	22065633
1½	40	109	162	93	1.78	22065644
2	50	130	166	112	3.02	22065655

Technical Specification	
Connections	Screwed BSPT Female
Pressure/Temp	14bar @ 198ºC 32bar from -10 to +100ºC
Rising stem, screwed bonnet, renewable disc	

Materials of Construction	
Body	Bronze BS EN 1982 CC491K
Stem	Brass BS EN 12164 CW614N
Gland packing	PTFE
Bonnet	Bronze BS EN 1982 CC491K
Disc holder	Forged Brass BS EN 12165 CW617N
Disc nut	½ to 1in Brass BS EN 12164 CW614N ½ to 1in Forged Brass BS EN 12165 CW617N
Handwheel	Cast Iron

Globe Valves
Ductile Iron – FIG 9XS PN16

Dimensions



Nominal Size in	Nominal Size mm	A mm	B mm	C mm	Weight kg	Product Code
2	50	203	318	200	20	32020407
2½	65	216	339	200	26	32020418
3	80	241	366	200	30	32020429
4	100	292	390	250	47	32020440
5	125	330	437	300	65	32020451
6	150	356	477	300	81	32020462
8	200	495	542	360	141	32020473

Technical Specification	
BS Specification	BS5152
Connections	Flanged BS 4504 PN16
Pressure/Temp	16bar @ -10 to +120°C 14.4bar @ 200°C

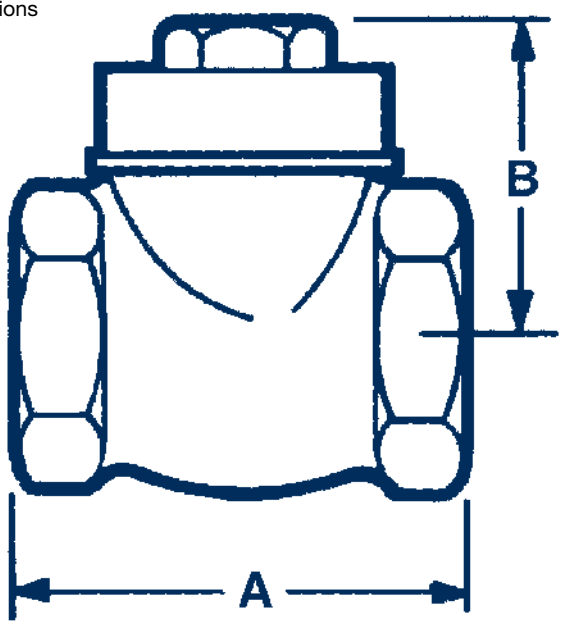
Outside screw and yoke, rising stem, hydrostatically tested to BS 5150

Materials of Construction	
Disc	Ductile Iron Bronze Facing
Disc seat ring	Bronze
Body seat rings	Bronze
Stem	Brass
Body	Ductile Iron
Packing	Graphite

Check Valves

Bronze – FIG 113S BS 5154 PN25 – Swing Check Pattern

Dimensions



Nominal Size in	Nominal Size mm	A mm	B mm	Weight kg	Product Code
½	15	66	45	0.33	22066004
¾	20	70	49	0.37	22066015
1	25	83	58	0.63	22066026
1¼	32	96	65	0.96	22066037
1½	40	108	73	1.16	22066048
2	50	128	89	2.12	22066059
2½	65	160	108	3.42	22066070
3	80	180	123	4.61	22066081

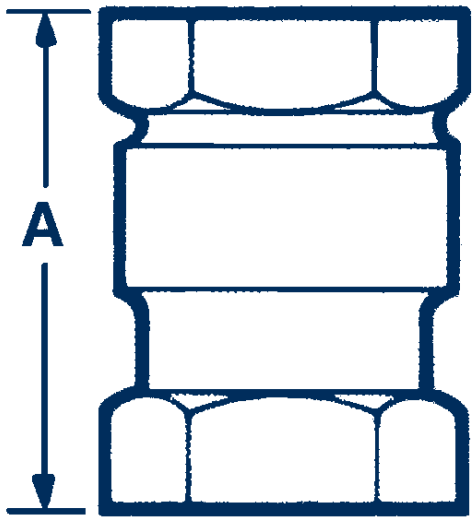
Technical Specification	
Connections	Screwed BSPT Female
Pressure rating	25bar @ -10 to 100°C 10.5bar @ 186°C

Materials of Construction	
Body	Bronze BS EN 1982 CC491K
Cap	Bronze BS EN 1982 CC491K
Hinge	Bronze BS EN 1982 CC491K
Disc	Bronze BS EN 1982 CC491K
Packing	Asbestos-free Graphite

Check Valves

Bronze – FIG 103S BS 5154 PN25
Vertical Check Valve Spring Loaded

Dimensions



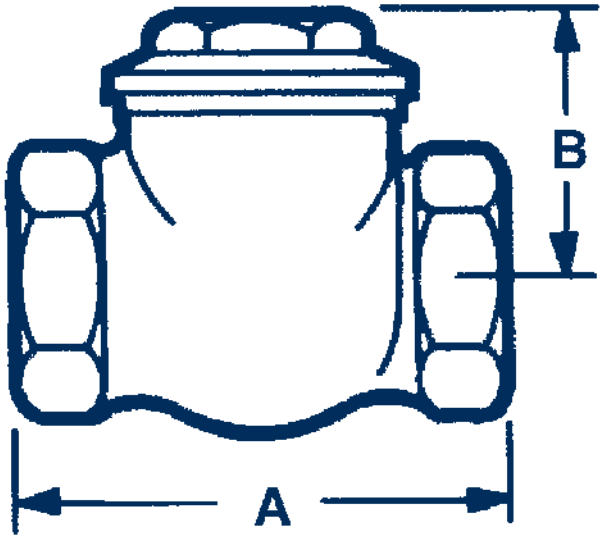
Nominal Size in	Nominal Size mm	A mm	Weight kg	Product Code
½	15	53	0.17	22065910
¾	20	59	0.26	22065921
1	25	68	0.43	22065932
1¼	32	79	0.63	22065943
1½	40	88	0.92	22065954
2	50	98	1.39	22065965

Technical Specification		
Connections		Screwed BSPT Female
Pressure rating		25bar @ -10 to +66°C 10.5bar @ 186°C
Spring		7psi/0.483 bar

Materials of Construction		
Body		Bronze BS EN CC491K
Body end		Bronze BS EN CC491K
Disc	⅛in – 1¼in	Forged Brass B124 C37700
	1½in – 2in	Bronze BS EN CC491K
Disc washer		PTFE
Cover plate		Brass Rod B124 C67500
Nut		Brass Rod B124 C67500
Spring		Stainless Steel

Check Valves
Bronze – FIG 99S BS 5154 PN32
Horizontal Lift Pattern Check Valve

Dimensions



Nominal Size in	Nominal Size mm	A mm	B mm	Weight kg	Product Code
½	15	59	39	0.20	22065803
¾	20	73	43	0.36	22065814
1	25	82	51	0.57	22065825
1¼	32	96	58	0.83	22065836
1½	40	109	64	1.16	22065847
2	50	130	70	1.93	22065858

Technical Specification	
Connections	Screwed BSPT Female
Pressure rating	32bar @ 100ºC (460lbf/in² @ 212ºC)
	14bar @ 198ºC (245lbf/in² @ 388ºF)
Metal-to-metal seat	

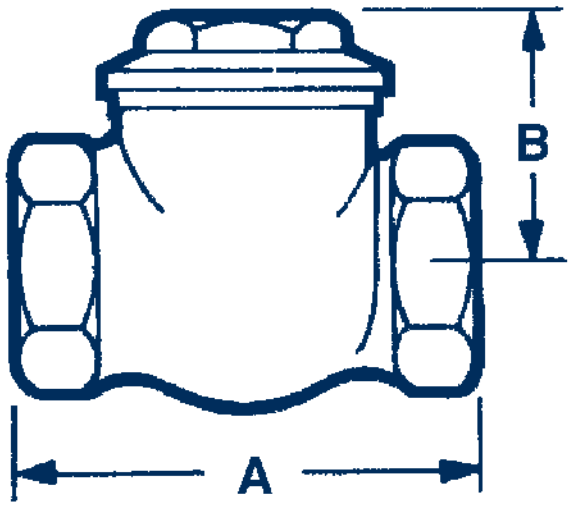
Materials of Construction	
Body	Bronze BS EN 1982 CC491K
Cap	Bronze BS EN 1982 CC491K
Disc	Bronze BS EN 1982 CC491K

Check Valves

Bronze – FIG 96S BS 5154 PN32

Horizontal Lift Pattern Spring-Loaded Check Valve

Dimensions



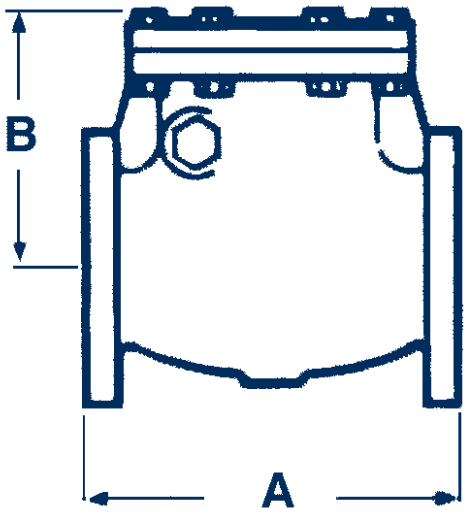
Nominal Size		A	B	Weight	Product
in	mm	mm	mm	kg	Code
½	15	59	39	0.3	22065707
¾	20	73	43	0.5	22065718
1	25	82	51	0.66	22065729
1¼	32	96	58	1.0	22065740
1½	40	109	64	1.4	22065751
2	50	130	70	2.32	22065762

Technical Specification	
Connections	Screwed BSPT Female
Pressure rating	32bar @ -10 to 100ºC 14bar @ 198ºC
Spring loading	5lbf/in² throughout

Materials of Construction	
Body	Bronze BS EN 1982 CC491K
Cap	Bronze BS EN 1982 CC491K
Disc holder	Bronze BS EN 1982 CC491K
Disc cap	Brass BS EN 12165 CW6MN
Disc	PTFE
Spring	Stainless Steel SS314

Check Valves
Ductile Iron – FIG 8XS PN16

Dimensions



Nominal Size		A	B	Weight	Product
in	mm	mm	mm	kg	Code
2	50	203	153	18	32020300
2½	65	216	162	21	32020311
3	80	241	176	28	32020322
4	100	292	220	40	32020333
5	125	330	226	51	32020344
6	150	356	307	68	32020355
8	200	495	325	128	32020366

Technical Specification	
BS Specification	BS5153
Connections	Flanged BS4504 PN16
Pressure rating	16bar @ -10 to + 120ºC 14.4bar @ 200ºC

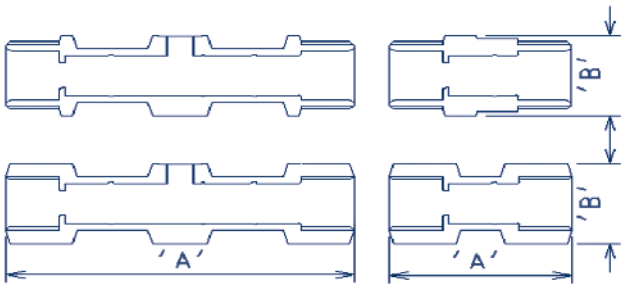
Swing pattern, metal faced disc, hydrostatically tested to BS 5153

Materials of Construction	
Disc	Ductile Iron Bronze Facing
Body seat ring	Bronze
Hinge pin	Stainless Steel
Hinge pin bushes	Malleable Iron
Body	Ductile Iron

Check Valves

FIG 101SC/101S Single Check Valves

Dimensions



101SC Single Check Valves Compression Ends (DZR)				
Size mm	**Length A mm**	**A/F Hex 'B' mm**	**Weight kg**	**Product Code**
15	40.7	22	0.11	32210006
22	44	28	0.24	32210017
28	47.5	38	0.34	32210028

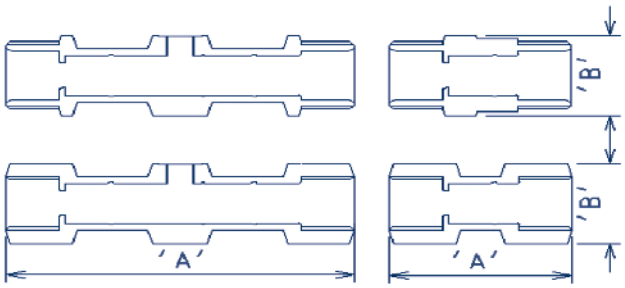
101S Single Check Valves Female BSP (DZR)				
Size mm/in	**Length A mm**	**A/F Hex 'B' mm**	**Weight kg**	**Product Code**
½	45	25	0.09	32210209
¾	54	30.5	0.13	32210220
1	63.5	38	0.23	32210231
1¼	70	47	0.34	32210242
1½	76	52	0.41	32210253
2	88	65	0.71	32210264

Technical Specification	
Compression Ends	BS EN 1254 Part2
Female BSP	BS 21 Parallel
Max Temperature	100ºC
Min Temperature	1ºC
Max Pressure	16 bar
Working Pressure	PN10
Testing Pressure	1600kPa
Closing Pressure	10cm wc

Materials of Construction	
Main body	CZ132 DZR
Test plug (DCV)	CZ132 DZR
Test plug O ring (DCV)	Nitrile 70
Circlip (DCV)	302 Stainless Steel
Backup Ring (DCV)	CZ132 DZR
Non return insert	Watts IN range
Compression nuts	Brass
Olives	Brass
Spring	Stainless Steel

Check Valves
FIG 102SC/102S Double Check Valves

Dimensions



102SC Double Check Valves Compression Ends (DZR & Chrome Plated)					
Size mm	**Length A mm**	**A/F Hex 'B' mm**	**Weight kg**	**Product Code DZR**	**Product Code Crome**
15	66	25	0.18	32210102	32210135
22	75.2	27	0.23	32210113	32210146
28	88.6	38	0.49	32210124	32210157

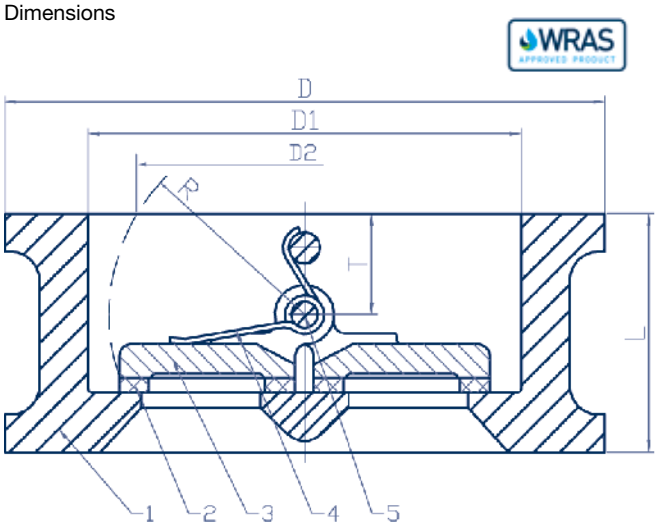
102S Double Check Valves Female BSP (DZR)				
Size in	**Length A mm**	**A/F Hex 'B' mm**	**Weight kg**	**Product Code**
½	70.2	25	0.15	32210305
¾	87	30.5	0.23	32210316
1	106	38	0.38	32210327
1¼	122	46	0.6	32210338
1½	135	52	0.82	32210349
2	173	65	1.52	32210360

Technical Specification	
Compression Ends	BS EN 1254 Part2
Female BSP	BS 21 Parallel
Max Temperature	100ºC
Min Temperature	1ºC
Max Pressure	16 bar
Working Pressure	PN10
Testing Pressure	1600kPa
Closing Pressure	10cm wc

Materials of Construction	
Main body	CZ132 DZR
Test plug (DCV)	CZ132 DZR
Test plug O ring (DCV)	Nitrile 70
Circlip (DCV)	302 Stainless Steel
Backup Ring (DCV)	CZ132 DZR
Non return insert	Watts IN range
Compression nuts	Brass
Olives	Brass
Spring	Stainless Steel

Non-Return Valves
FIG 10XS

Dimensions



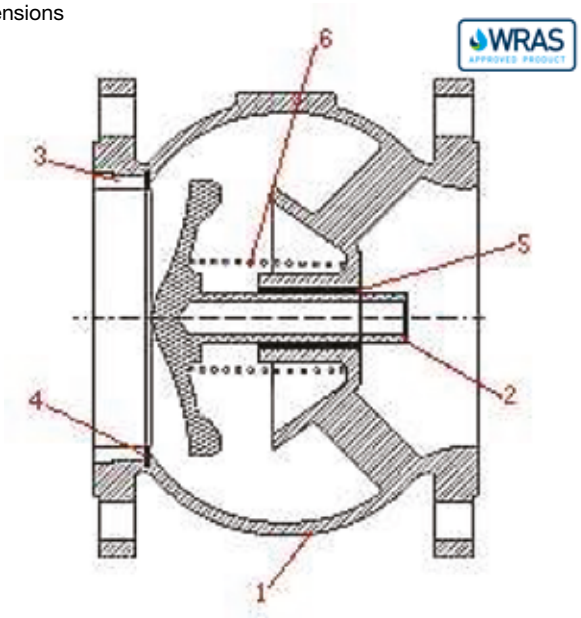
10XS Non-Return Valve									
Size		D	D1	D2	L	R	T	Weight	Product
in	mm	mm	mm	mm	mm	mm	mm	kg	Code
2	DN50	107	65	43.3	43	28.8	19	1.5	23210209
2½	DN65	127	80	60.2	46	36.1	20	2.4	23210220
3	DN80	142	94	66.4	64	43.4	28	3.6	23210231
4	DN100	162	117	90.8	64	52.8	27	5.7	23210242
5	DN125	192	145	116.9	70	65.7	30	7.3	23210253
6	DN150	218	170	144.6	76	78.6	31	9	23210264
8	DN200	273	224	198.2	89	104.4	33	17	23210275
10	DN250	328	265	233.7	114	127.0	50	26	23210286
12	DN300	378	310	283.9	114	148.3	43	42	23210297

Technical Specification	
Wafer design to fit between flanges	BS EN 1092-1:94 and BS EN 1092-2:97 PN16 ANSI B16.5 class 125 and 150 and BS10 Table D/E
Nominal Diameter	DN50-DN300
Nominal Pressure	16bar
Sealing Service Pressure	17.6bar
Shell Service Pressure	24bar
Minimum Operating Pressure	0.5bar
Minimum Temperature	0ºC
Maximum Temperature	85ºC

Materials of Construction	
Long Bushing	416SS
Short Bushing	416SS
Stem	ASTM A276, G316
Spring	302SS
Body	ASTM A536, 65-45-12
Seat	WRC-EPDM
Disc	ASTM A351, CF8M

Non-Return Valves
FIG 11XS Single Non-Return Valve

Dimensions



11XS Single Non-Return Valve				
Size DN	**Length mm**	**Diameter mm**	**Weight kg**	**Product Code**
50	100	165	5.6	36700011
65	120	185	7.3	36700022
80	130	200	10	36700033
100	155	220	11.75	36700044
125	200	250	20	36700055
150	230	285	26.5	36700066
200	280	340	50	36700077
250	344	405	94	36700088

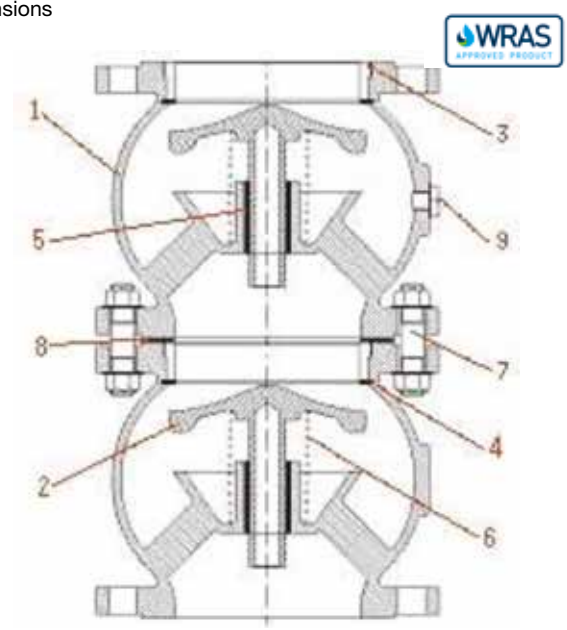
Technical Specification	
Maximum Pressure	16 bar
Maximum Temperature	95ºC
Minimum Temperature	0ºC
Flange Drilling	PN16/16

Materials of Construction	
1. Body	SG Iron 420/12
2. Plunger	Acetal Head with DZR Brass Shaft
3. Ring	Acetal
4. Seal	EPDM
5. Guide	Gun Metal Grade LG2
6. Spring	Stainless Steel 304 S26

Non-Return Valves

FIG 11XS Double Non-Return Valve

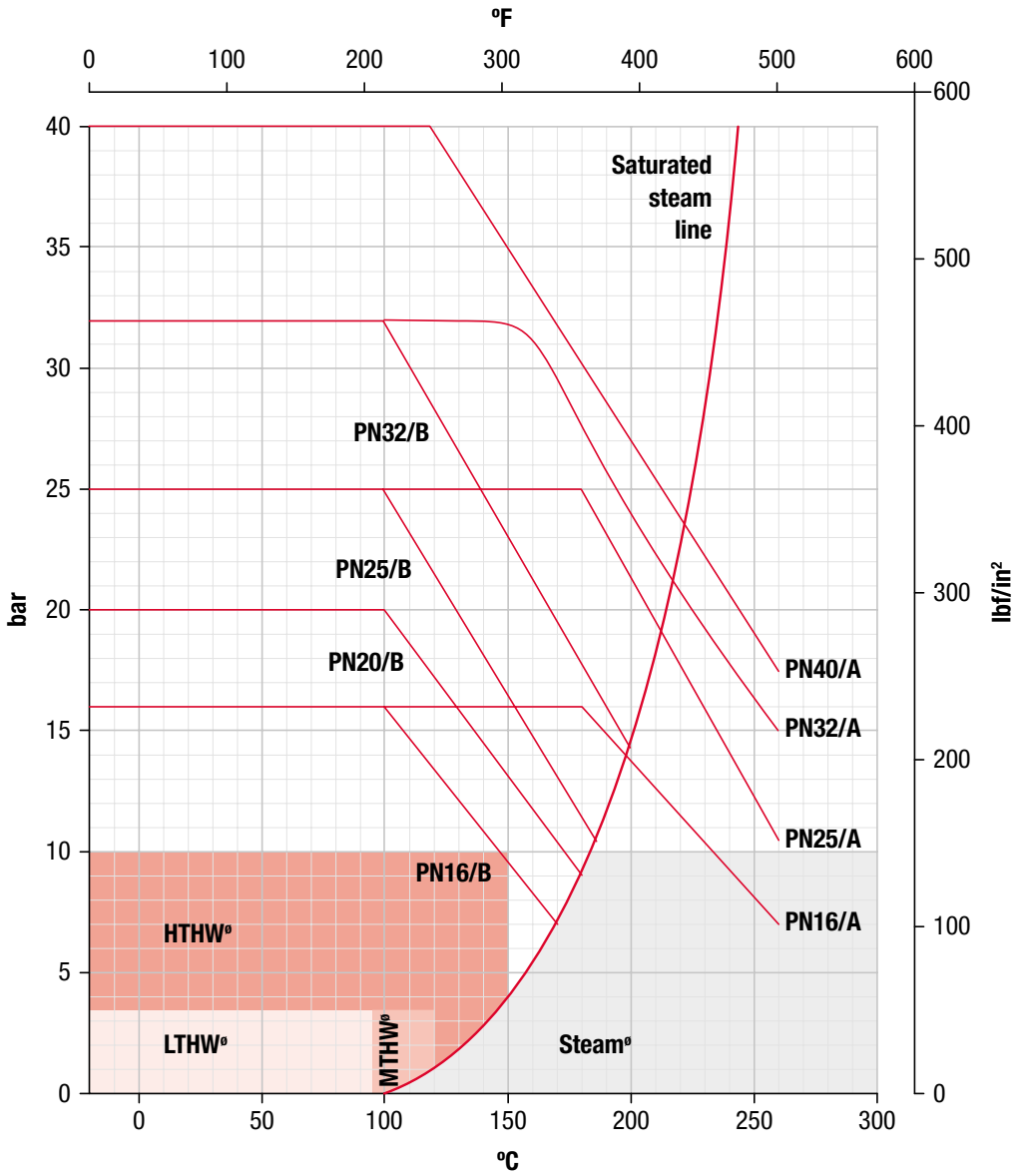
Dimensions



11XS Double Non-Return Valve				
Size DN	**Length mm**	**Diameter mm**	**Weight kg**	**Product Code**
50	205	165	12	36700203
65	245	185	15	36700214
80	265	200	20.5	36700225
100	315	220	24	36700236
125	405	250	40.5	36700247
150	465	285	51	36700258
200	565	340	100	36700269
250	693	405	188	36700280

Technical Specification	
Maximum Pressure	16 bar
Maximum Temperature	95ºC
Minimum Temperature	0ºC
Flange Drilling	PN16/16

Materials of Construction	
1. Body	SG Iron 420/12
2. Plunger	Acetal Head with DZR Brass Shaft
3. Ring	Acetal
4. Seal	EPDM
5. Guide	Gun Metal Grade LG2
6. Spring	Stainless Steel 304 S26
7. Studs	Mild Steel (Plated)
8. Gasket	EPDM



PN Designated valves, threaded or flanged

Ratings are taken from BS5154-1991 copper alloy globe, globe stop and check, check and gate valves.

–/A Series A ratings **–/B** Series B ratings

LTHW Low temperature hot water, pressure ⩽3.5bar, temperature ⩽95ºC

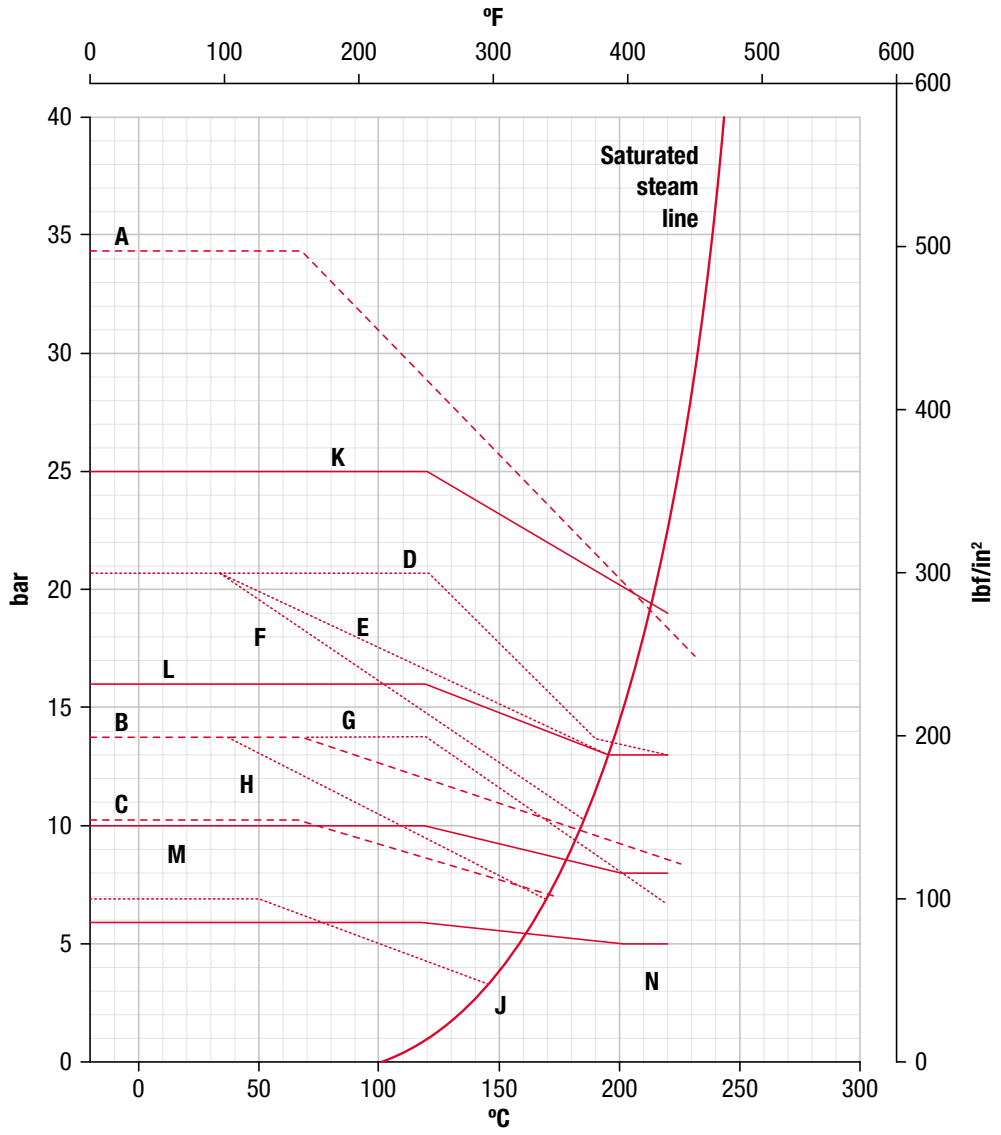
MTHW Medium temperature hot water, pressure ⩽3.5bar, temperature ⩽120ºC

HTHW High temperature hot water, pressure ⩽10bar, temperature ⩽150ºC

Steam Steam, pressure ⩽10bar

⁹ As defined in DOE/PSA standard specification (M&E) No3-1986

Pressure/Temperature Ratings for Ductile Iron, Gate, Globe and Check Valves

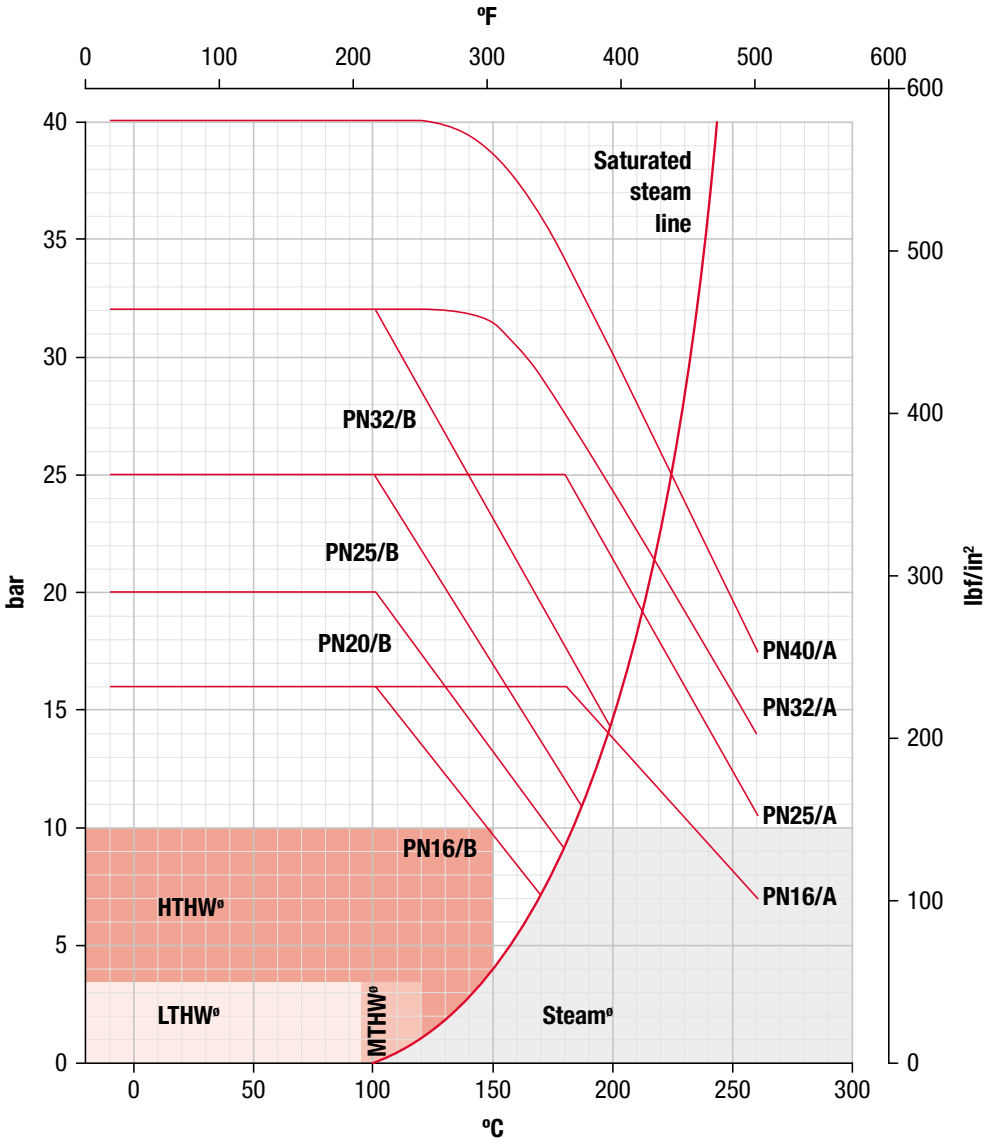


A	ANSI CLASS 250	**D**	CLASS 190/A°	**K**	PN25
B	ANSI CLASS 125 (2in to 12in)	**E**	CLASS 190/B†	**L**	PN16*
C	ANSI CLASS 125 (14in to 24in)	**F**	CLASS 150/B§	**M**	PN10*
		G	CLASS 100/A°	**N**	PN6*
		H	CLASS 100/B§		
		J	CLASS 50/B^		

–/A Series A Ratings	° BS3961 & BS4090 (sizes 12 and below)	§	BS3464 & BS3961
–/B Series B Ratings	† BS3464 (sizes 12 and below)	^	BS 3464
	* BS5150 Gate Valves are limited to max temp of PN16 200°C, PN10 180°C, PN6 150°C		

Cast iron, gate, globe and check valves:

— BS5150, BS5152 & BS5153 ····· BS3464, BS3961 & BS4090 - - - MSS SP-70, SP-71 & SP-85



Copper Alloy PN designated valves, threaded or flanged BS 4504
Ratings are taken from BS5154-1991 copper alloy globe, globe stop and check, check and gate valves.
–/A Series A ratings **–/B** Series B ratings

LTHW A system which operates at temperatures up to 95ºC but which is not part of an MTHW or HTHW injection system

MTHW A pressurised system, either open or closed to the atmosphere, which operates at temperatures above 95ºC and up to 120ºC

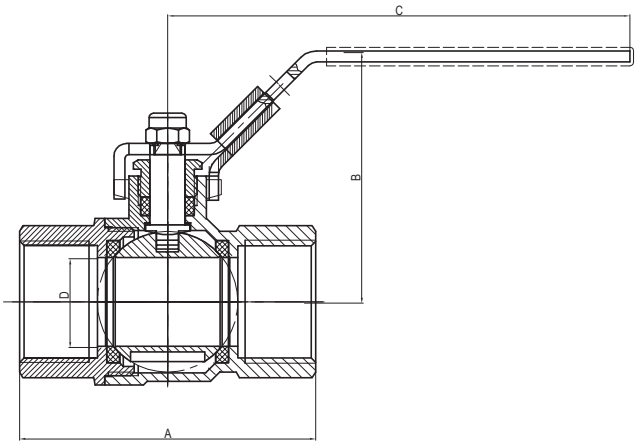
HTHW A pressurised system closed to the atmosphere which operates at temperatures above 120ºC and up to 150ºC

Steam Steam heating and/or distribution systems with working gauge pressure up to a maximum of 10bar

⁹ As defined in DOE/PSA standard specification (M&E) No3

Ball Valves - Manual and Actuated
Brass Full Bore – FIG 966SRL and 966SBL WRAS

Dimensions



Lockable lever as standard

Nominal size in	A mm	B mm	C mm	D mm	Weight kg	966SRL Red Lever Product Code	966SBL Blue Lever Product Code
¼	43.4	44.7	90	8	0.17	37184204	37184108
⅜	45.4	47.8	90	10	0.16	37184215	37184119
½	56.6	52.6	100	15	0.25	37184226	37184130
¾	65.4	56.3	100	19	0.34	37184237	37184141
1	80	67.8	125	24	0.57	37184248	37184152
1¼	90	79.5	140	32	0.82	37184259	37184163
1½	97.6	85	140	40	1.16	37184270	37184174
2	121.2	93.5	160	50	1.93	37184281	37184185

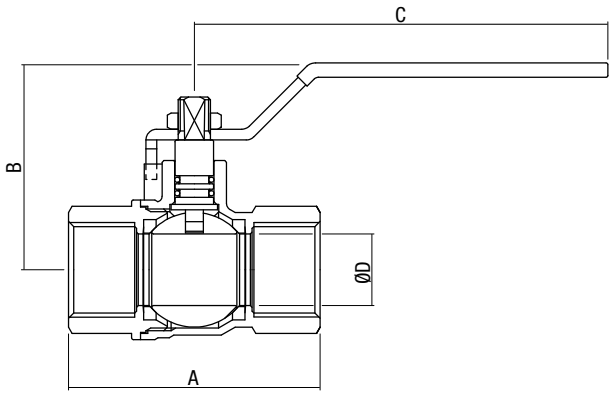
Technical Specification		
Connections		Screwed BSPT Female to BS EN 10226-2:ISO 7-1 Rc
Non-Shock Temperature Range		-10°C to 120°C
Pressure Rating	¼" to 1"	40 bar
	1¼" to 2"	32 bar
Maximum Temperature at 10 bar		180°C
Conforms to BS EN 13547		
WRAS Approved		
PED directive classification Group 1 and 2		

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12420 CW617N
End Connector	Brass (Nickel plated) BS EN 12420 CW617N
Ball	Brass (Chrome plated) BS EN 12420 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	PTFE
Lever	Steel (Zinc plated) Red / Blue PVC Sleeve

Ball Valves - Manual and Actuated

Brass Full Bore – FIG 966SYL (BS EN 331:1998 +A1:2010)

Dimensions



Nominal size in	A mm	B mm	C mm	D* mm	Weight kg	966SYL Yellow Lever Product Code
¼	48	42	90	10	0.19	37182008
⅜	48	42.5	90	12	0.17	37182019
½	62	44	90	15	0.24	37182030
¾	70	52.5	115	20	0.38	37182041
1	82	57	115	25	0.60	37182052
1¼	98	66	115	32	1.05	37182063
1½	109	73.5	115	40	1.38	37182074
2	125	84	150	50	2.13	37182085

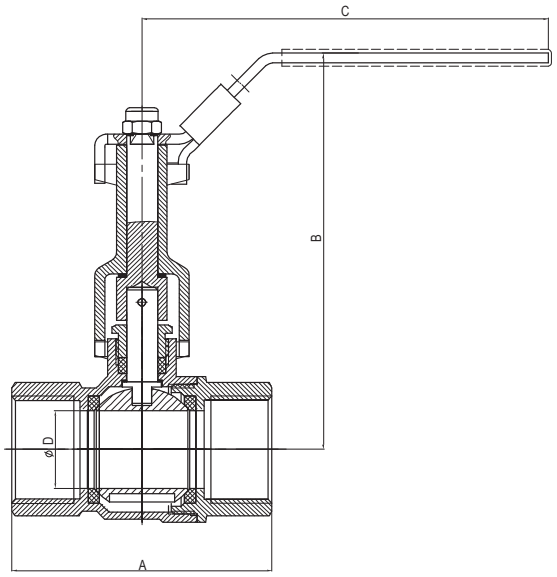
* exceeds the full bore diameter circle specified in BS EN 13547

Technical Specification	
Connections	Screwed BSPP Female to BS EN 10226-2:ISO7
Maximum Temperature	120°C
Minimum Temperature	-20°C
Maximum Operating Pressure for BS EN331	5 bar
Temperature class for BS EN331	-20°C to 60°C
Conforms to BS EN 13547	
Approved to BS EN 331:1998 +A1:2010	
PED directive classification Group 1 Gas SEP	
Approved for Gas Families 1, 2 and 3	

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12165 CW617N
End Connector	Brass (Nickel plated) BS EN 12165 CW617N
Ball	Brass (Chrome plated) BS EN 12165 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	Viton rubber
Lever	Aluminium Yellow PVC Sleeve

Ball Valves - Manual and Actuated
Brass Full Bore – FIG 966EXT WRAS

Dimensions



Lockable lever as standard

Nominal size in	A mm	B mm	C mm	D mm	Weight kg	966EXT Extended Lever Product Code
½	56.6	107.1	100	14.8	0.39	37184407
¾	65.4	110.8	100	19	0.48	37184418
1	80	122	125	24	0.75	37184429
1¼	90	129	140	32	1.01	37184440
1½	97.6	137	140	40	1.46	37184451
2	121.2	147.5	142	50	2.23	37184462

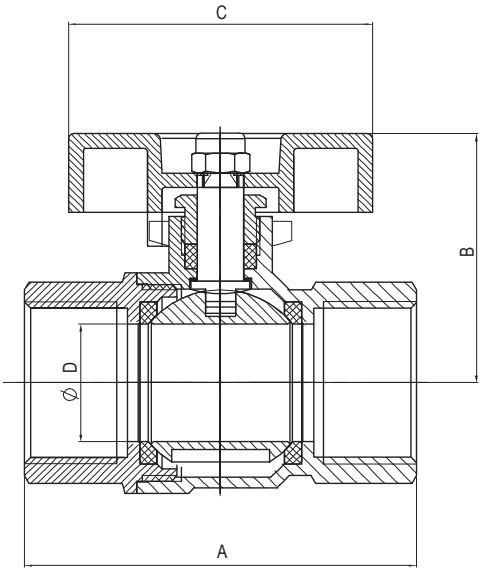
Technical Specification		
Connections		Screwed BSPT Female to BS EN 10226-2:ISO 7-1 Rc
Non-Shock Temperature Range		-10°C to 100°C
Pressure Rating	¼" to 1"	40 bar
	1¼" to 2"	32 bar
Maximum Temperature at 10 bar		180°C
Conforms to BS EN 13547		
WRAS Approved		
PED directive classification Group 1 and 2		

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12420 CW617N
End Connector	Brass (Nickel plated) BS EN 12420 CW617N
Ball	Brass (Chrome plated) BS EN 12420 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	PTFE
Lever	Steel (Zinc plated) Red PVC Sleeve

Ball Valves - Manual and Actuated

Brass Full Bore – FIG 966T WRAS

Dimensions



Nominal size in	A mm	B mm	C mm	D mm	Weight kg	966T Red T Handle Product Code
¼	43.4	30.2	44	8	0.14	37184300
⅜	45.4	33.3	44	10	0.13	37184311
½	56.6	40.1	50	14.8	0.22	37184322
¾	65.4	43.8	50	19	0.30	37184333
1	80	50.8	62	24	0.51	37184344
1¼	90	61.5	80	32	0.76	37184355

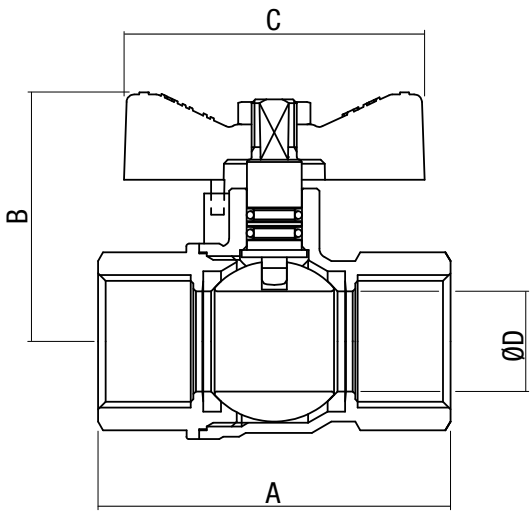
Technical Specification		
Connections		Screwed BSPT Female to BS EN 10226-2:ISO 7-1 Rc
Non-Shock Temperature Range		-10°C to 100°C
Pressure Rating	¼" to 1"	40 bar
	1¼" to 2"	32 bar
Maximum Temperature at 10 bar		180°C
Conforms to BS EN 13547		
WRAS Approved		
PED directive classification Group 1 and 2		

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12420 CW617N
End Connector	Brass (Nickel plated) BS EN 12420 CW617N
Ball	Brass (Chrome plated) BS EN 12420 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	PTFE
T Handle	Red Aluminium

Ball Valves - Manual and Actuated

Brass Full Bore – FIG 966SYT (BS EN 331:1998 +A1:2010)

Dimensions



Nominal size in	A mm	B mm	C mm	D* mm	Weight kg	966SYT Yellow T Handle Product Code
¼	48	36	50	10	0.16	37181006
⅜	48	38	50	12	0.14	37181017
½	62	39	50	15	0.21	37181028
¾	70	49	60	20	0.34	37181039
1	82	53	60	25	0.57	37181050
1¼	98	60	65	32	1.01	37181061

* exceeds the full bore diameter circle specified in BS EN 13547

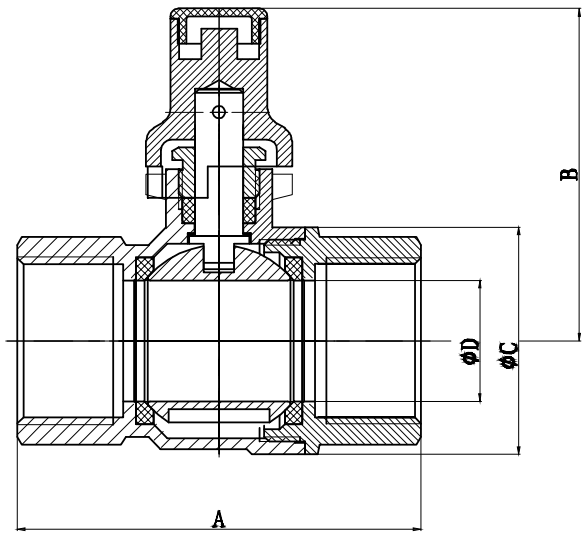
Technical Specification	
Connections	Screwed BSPP Female to BS EN 10226-2:ISO7
Maximum Pressure	25 bar
Maximum Temperature	120°C
Minimum Temperature	-20°C
Maximum Operating Pressure for BS EN331	5 bar
Temperature class for BS EN331	-20°C to 60°C
Conforms to BS EN 13547	
Approved to BS EN 331:1998 +A1:2010	
PED directive classification Group 1 Gas SEP	
Approved for Gas Families 1, 2 and 3	

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12165 CW617N
End Connector	Brass (Nickel plated) BS EN 12165 CW617N
Ball	Brass (Chrome plated) BS EN 12165 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	Viton rubber
T Handle	Aluminium

Ball Valves - Manual and Actuated

Brass Full Bore – FIG 966LS Lockshield WRAS

Dimensions



Nominal size in	A mm	B mm	C mm	D mm	Weight kg	966LS Lockshield Product Code
½	56.6	53.8	31.3	15	0.25	37184503
¾	65.4	57.5	37.7	19	0.32	37184514
1	80	65.8	45	24	0.56	37184525
1¼	90	78.5	56	32	0.80	37184536
1½	97.6	87.8	69.5	40	1.15	37184547
2	121.2	94.5	85.5	50	1.95	37184558

Operating Key	Code
Set of lockshield keys	25017415

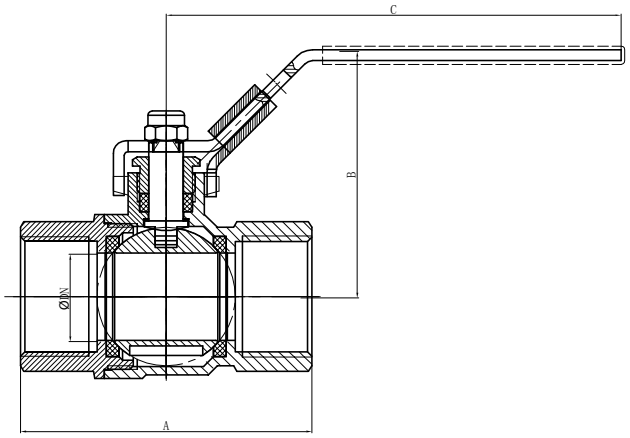
Technical Specification		
Connections		Screwed BSPT Female to BS EN 10226-2:ISO 7-1 Rc
Non-Shock Temperature Range		-10°C to 100°C
Pressure Rating	½" to 1"	40 bar
	1¼" to 2"	32 bar
Maximum Temperature at 10 bar		180°C
Conforms to BS EN 13547		
WRAS Approved		
PED directive classification Group 1 and 2		

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12420 CW617N
End Connector	Brass (Nickel plated) BS EN 12420 CW617N
Ball	Brass (Chrome plated) BS EN 12420 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	PTFE
Operating Key	Bronze

Ball Valves - Manual and Actuated

Brass Full Bore – FIG 967SRL and 967SBL WRAS

Dimensions



Lockable lever as standard

Nominal size in	A mm	B mm	C mm	D mm	Weight kg	967SRL Red Lever Product Code	967SBL Blue Lever Product Code
2½	149.2	122	230	64	3.70	37184706	37184643
3	172.8	130.5	230	77	5.15	37184717	37184654
4	203.6	149	250	99	8.46	37184728	37184665

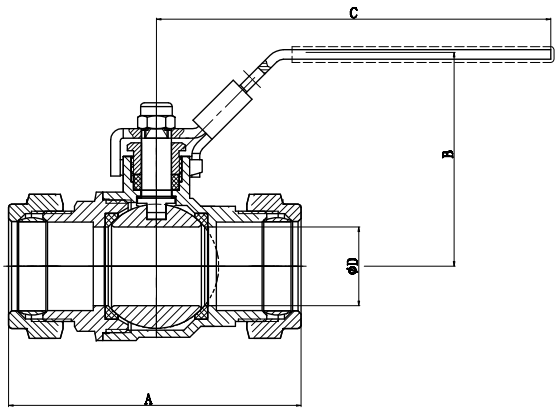
Technical Specification		
Connections		Screwed BSPT Female to BS EN 10226-2:ISO 7-1 Rc
Non-Shock Temperature Range		-10°C to 120°C
Pressure Rating	2½" to 3"	25 bar
	4"	20 bar
Maximum Temperature at 10 bar	2½" to 3"	180°C
Maximum Temperature at 10 bar	4"	170°C
Conforms to BS EN 13547		
WRAS Approved		
PED directive classification Group 1 and 2		

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12420 CW617N
End Connector	Brass (Nickel plated) BS EN 12420 CW617N
Ball	Brass (Chrome plated) BS EN 12420 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	PTFE
Lever	Steel (Zinc plated) Red / Blue PVC Sleeve

Ball Valves - Manual and Actuated

Brass Full Bore – FIG 968SRL and 968SBL WRAS

Dimensions



Lockable lever as standard

Nominal size	A	B	C	D	Weight	968SRL Red Lever	968SBL Blue Lever
15	70.2	50	100	12.7	0.28	37184942	37184835
22	83.75	57	100	20	0.47	37184953	37184846
28	92.75	67.8	125	25	0.69	37184964	37184857
35	109.7	79.5	140	32	0.95	37185003	37184909
42	120.7	85	140	39.8	1.41	37185014	37184920
54	146.5	93	160	50	2.34	37185025	37184931

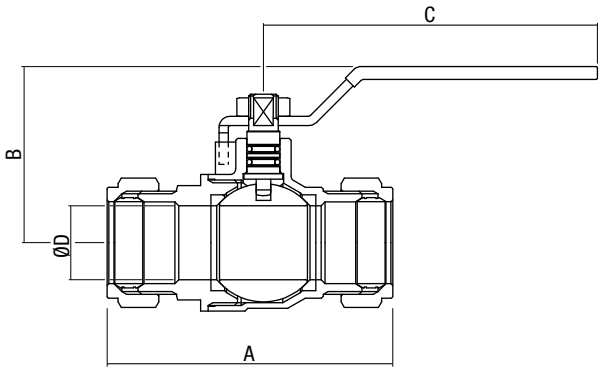
Technical Specification	
Connections	Type A Compression Ends to BS 1254-2
Non-Shock Temperature Range	-10°C to 30°C
Pressure Rating	16 bar
Maximum Temperature at 5 bar	120°C
Conforms to BS EN 13547	
WRAS Approved	
PED directive classification Group 1 and 2	

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12420 CW617N
End Connector	Brass (Nickel plated) BS EN 12420 CW617N
Ball	Brass (Chrome plated) BS EN 12420 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	PTFE
Olive	Brass GB/T5231-2001 H62
Lever	Steel (Zinc plated) Red / Blue PVC Sleeve

Ball Valves - Manual and Actuated

Brass Full Bore – FIG 968SYL (BS EN 331:1998 +A1:2010)

Dimensions



Nominal size in	A mm	B mm	C mm	D* mm	Weight kg	968SYL Yellow Lever Product Code
15	68	44	90	15	0.22	37182104
22	77.5	48	90	20	0.33	37182115
28	91	61.5	115	25	0.58	37182126
35	103.7	70.5	130	32	0.93	37182137
42	115.7	77	130	40	1.29	37182148
54	136.7	85	150	50	2.17	37182159

* exceeds the full bore diameter circle specified in BS EN 13547

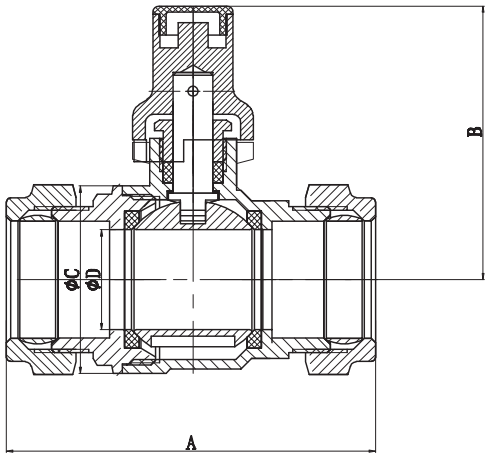
Technical Specification	
Connections	Type A Compression Ends to BS 1254
Maximum Temperature at 16 bar	30°C
Maximum Temperature at 10 bar	65°C
Maximum Temperature at 6 bar	110°C
Maximum Temperature at 5 Bar	120°C
Maximum Operating Pressure for BS EN331	5 bar
Temperature class for BS EN331	-20°C to 60°C
Conforms to BS EN 13547	
Approved to BS EN 331:1998 +A1:2010	
PED directive classification Group 1 Gas SEP	
Pressure / Temperature Rating to BS EN 1254-2	
Approved for Gas Families 1, 2 and 3	

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12165 CW617N
End Connector	Brass (Nickel plated) BS EN 12165 CW617N
Ball	Brass (Chrome plated) BS EN 12165 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	Viton rubber
Olive	Brass BS EN 12449 CW508L
Lever	Aluminium Yellow PVC Sleeve

Ball Valves - Manual and Actuated

Brass Full Bore – FIG 968LS WRAS

Dimensions



Nominal size in	A mm	B mm	C mm	D mm	Weight kg	968LS Lockshield Product Code
15	70.2	51.7	28.5	12.7	0.27	37185036
22	83.75	57.5	38.7	20	0.45	37185047
28	92.75	65.8	47	25	0.68	37185058
35	109.7	78.5	57.5	32	0.94	37185110
42	120.7	87.8	69.7	39.8	1.39	37185121
54	146.5	94.5	85.5	50	2.35	37185132

Operating Key	Code
Set of lockshield keys	25017415

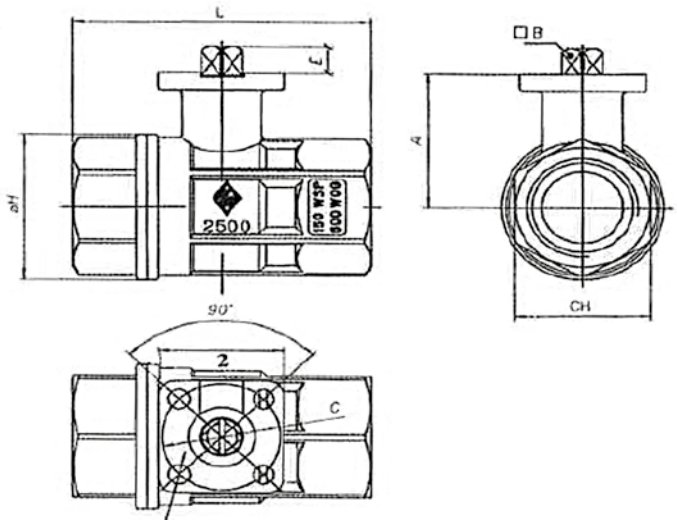
Technical Specification	
Connections	Type A Compression Ends to BS 1254-2
Non-Shock Temperature Range	-10°C to 30°C
Pressure Rating	16 bar
Maximum Temperature at 5 bar	120°C
Conforms to BS EN 13547	
WRAS Approved	
PED directive classification Group 1 and 2	

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12420 CW617N
End Connector	Brass (Nickel plated) BS EN 12420 CW617N
Ball	Brass (Chrome plated) BS EN 12420 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	PTFE
Olive	Brass GB/T5231-2001 H62
Operating Key	Bronze

Ball Valves - Manual and Actuated

Nickel Plated Brass Full Bore - FIG 2500 2 Piece Screwed with ISO 5211 Mount

Dimensions



Nickel Plated Brass Valve

Nominal Size in	Nominal Size mm	ISO 5211	2 mm	A mm	B mm	C mm	E mm	H mm	L mm	Weight kg	Product Code
¼	8	F03	38	32.5	9	36	9	33.5	67	0.37	29410006
⅜	10	F03	38	32.5	9	36	9	33.5	67	0.35	29410017
½	15	F03	38	32.5	9	36	9	33.5	67	0.31	29410028
¾	20	F03	38	34.5	9	36	9	40	76	0.4	29410039
1	25	F03	38	45.5	9	36	9	49	90	0.72	29410050
1¼	32	F03	38	49	9	36	9	58.5	102	1.06	29410061
1½	40	F05	50	64	11	50	11	73	114	1.73	29410072
2	50	F05	50	73.25	11	50	11	91.5	138	2.94	29410083
2½	65	F10	70	88.5	14	70	15	114.5	165	4.06	29410094
3	80	F10	70	98	14	70	15	136	188	6.41	29410102

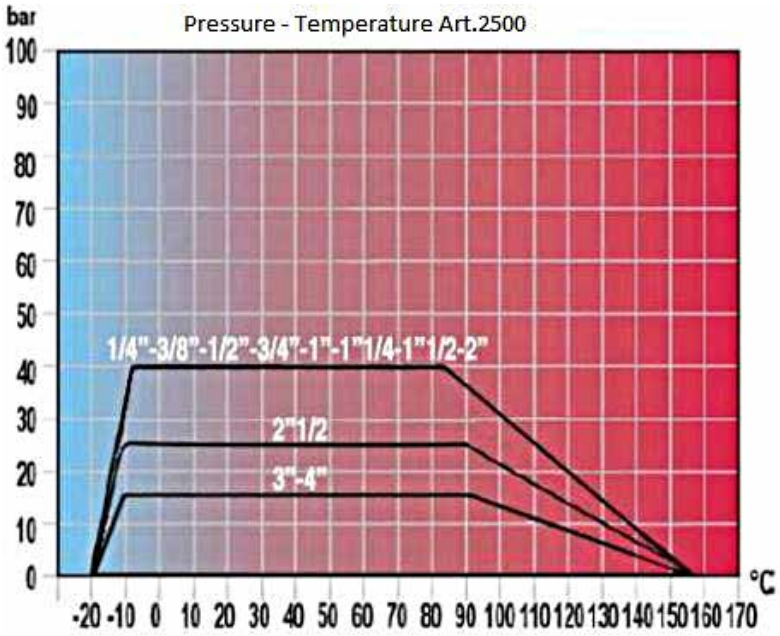
Technical Specification	
Connections	ISO 7/1 - UNI EN 10226/1 -Rp
Max Pressure	
¼" - 2"	PN40
2½"	PN25
3" -4"	PN16
Temperature	-20°C - +160°C
ISO 5211 Mounting Pad for actuation only (no lever)	

Materials of Construction	
Body	Brass CW617N, Nickel Plated
Ends	Brass CW617N, Nickel Plated
Ball	Brass CW617N, Chrome Nickel Plated
Stem	Brass CW614N, Nickel Plated
Seat	PTFE
Thrust Washer	PTFE
O-ring	Viton
O-ring	EPDM

Ball Valves - Manual and Actuated

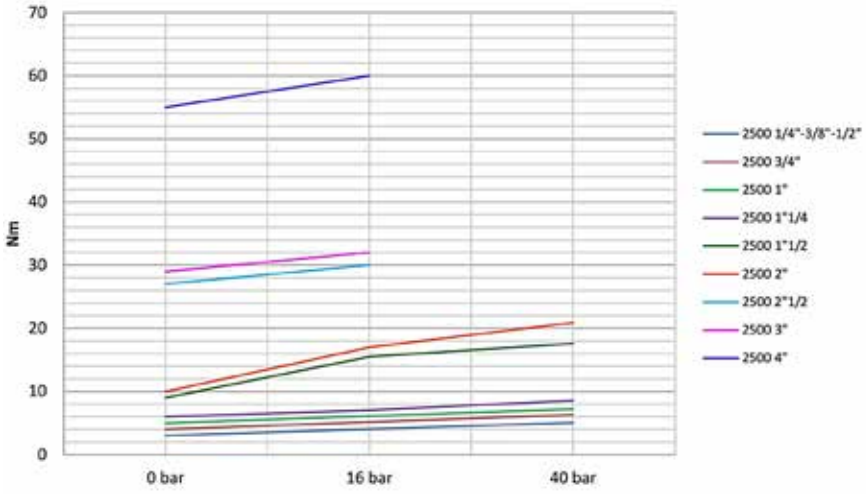
Nickel Plated Brass Full Bore - FIG 2500 2 Piece Screwed with ISO 5211 Mount

Pressure / Temperature ratings for FIG 2500



Torque Rating BOSS™ 2500 Ball Valves

Size in	Torque Rating (NM) at 0 bar	Torque Rating (NM) at Max Pressure	Leakage Rating (Out of box) (EN 12266)
¼	3	5	B
⅜	3	5	B
½	3	5	B
¾	4	6	B
1	5	7	B
1¼	6	9	B
1½	9	18	B
2	10	21	B
2½	27	30	B
3	29	32	B

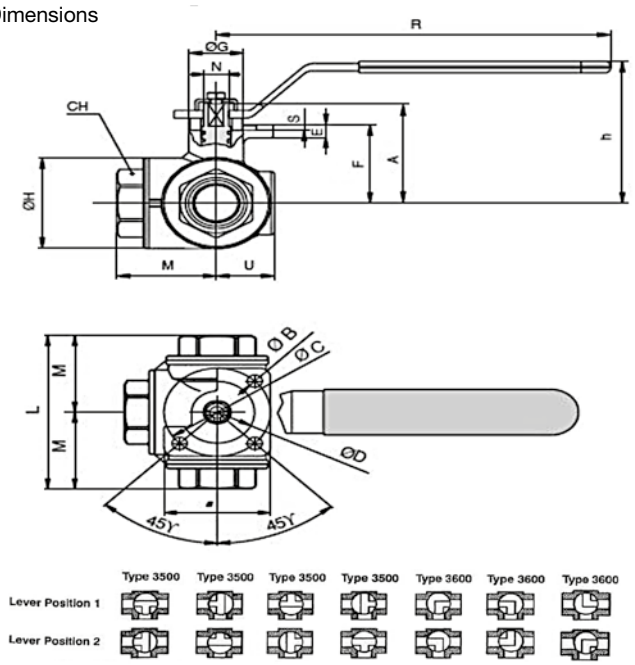


Torque values are taken in laboratory tests under the following conditions: 18 ÷ 25°C / Fluid: Water
The torque values may change according to the fluid, temperature and pressure

Ball Valves - Manual and Actuated

Nickel Plated Brass Full Bore - FIG 3600L / 3500T 3-Way L & T Port with ISO 5211 Mount

Dimensions



Nickel Plated Brass Valve

Nominal Size in	Nominal Size mm	ISO 5211	A mm	F mm	H mm	R mm	M mm	U mm	L mm	ØB mm	N mm	Weight kg	Product Code L Port 3600L	Product Code T Port 3500T
½	15	F03	41.5	32.5	64	120	38.5	22	77	6	9	0.66	29410146	29410242
¾	20	F05	52.5	41.5	75	170	43.5	24.5	87	7	11	1.13	29410157	29410253
1	25	F05	58	47	80.5	170	52.5	31	105	7	11	1.86	29410168	29410264
1¼	32	F05	70.5	59.5	93	170	61.2	38	122.5	7	11	2.93	29410179	29410275
1½	40	F07	89	74	111	230	69.2	44.5	138.5	9	14	4.91	29410190	29410286
2	50	F07	100	85	122	230	83	56	166	9	14	8.75	29410209	29410297

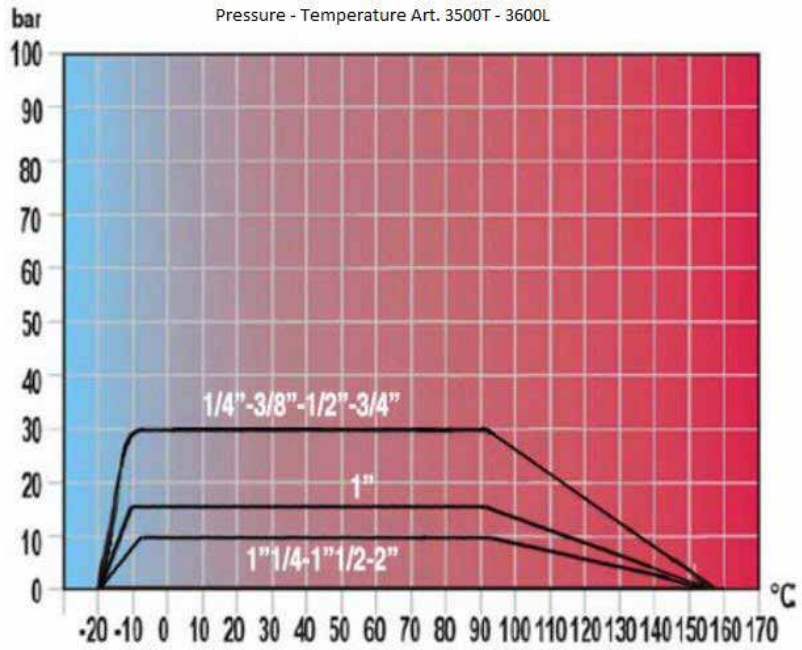
Technical Specification	
Connections	ISO 7/1 - UNI EN 10226/1 -Rp
Max Pressure	
½" - ¾"	PN30
1"	PN16
1¼" -2"	PN10
Temperature	-20°C - +160°C
ISO 5211 Mounting Pad	

Materials of Construction	
Body	Brass CW617N, Nickel Plated
Ends	Brass CW617N, Nickel Plated
Ball	Brass CW614N, Chrome Nickel Plated
Stem	Brass CW614N, Nickel Plated
Bush	Brass CW614N, Nickel Plated
Handle	Steel, Zinc Plated, Plastic Coated
Seat	PTFE
Thrust Washer	PTFE
O-ring	Viton
O-ring	EPDM
Screw	STEEL
Washer	PA6

Ball Valves - Manual and Actuated

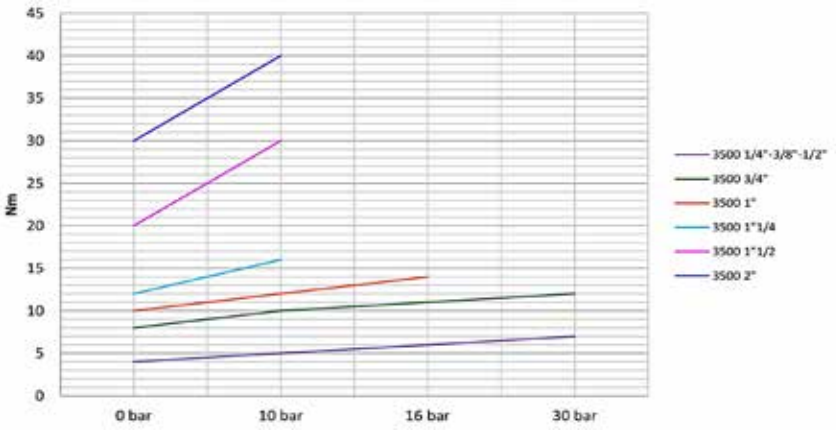
Nickel Plated Brass Full Bore - FIG 3600L / 3500T 3-Way L & T Port with ISO 5211 Mount

Pressure / Temperature ratings for FIG 3600L / 3500T



Torque / Pressure Ratings for 3600L/3500T

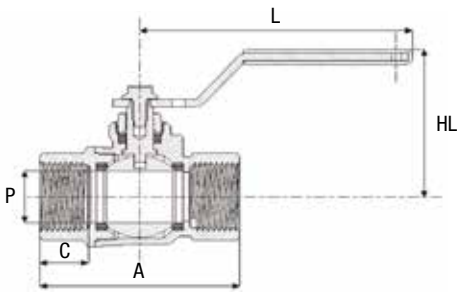
Size in	Torque Rating (NM) at 0 bar	Torque Rating (NM) at Max Pressure	Leakage Rating (Out of box) (EN 12266)
½	4	7	B
¾	8	12	B
1	10	14	B
1¼	12	16	B
1½	20	30	B
2	30	40	B



Torque values are taken in laboratory tests under the following conditions: 18 ÷ 25°C / Fluid: Water
The torque values may change according to the fluid, temperature and pressure

Ball Valves - Manual and Actuated
Bronze – FIG 965S Full Bore

Dimensions



Nominal Size DN	mm	A mm	C mm	P mm	HL	L	Kv	Weight kg	Product Code
10	⅜	46	12.5	10	39.4	81	5.8	0.14	37171000
15	½	57	15.5	15	54	91.5	15.7	0.25	37171011
20	¾	67	16.5	20	57.5	91.5	30.8	0.35	37171022
25	1	77	19.5	25	65	126.5	49.3	0.58	37171033
32	1¼	91	21.5	32	71	126.5	79	0.91	37171044
40	1½	103	21.5	40	83.3	141.5	125.3	1.42	37171055
50	2	122	25	50	91	141.5	224.2	2.15	37171066
65	2½	53	30	65	119.3	281.3	330.2	4.53	37171077
80	3	179	34	80	130.8	281.3	419.4	6.49	37171088

Technical Specification	
Connections	Threaded female x female (ISO 228/1)
Design according to	MSS-SP110
Air testing according to	EN12266-1
Max Pressure rating PN40 for DN<50	40bar up to 95°C / 10bar @ 185°C
Max pressure Rating PN25 for DN>65	25bar up to 95°C / 10bar @ 185°C
Temperature rating	Water: 0°C to +185°C Air: -10°C to +185°C

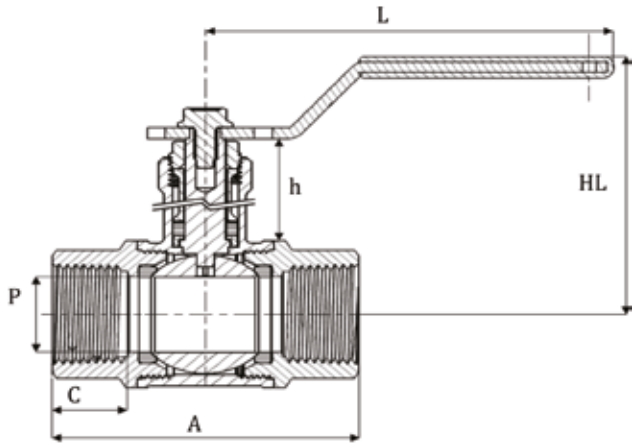
Materials of Construction	
Fixed end	Bronze EN1982 CB491K
Stem	Brass EN12164 CW617N
Ball	Chromium pl. Brass EN12165 CW617N
Seat	PTFE
Body CB1491K	Bronze EN1982
Packing Ring	PTFE
Packing Nut	Brass EN12164 CW617N
Screw	Geomet Steel EN10025 Fe42
Handle	Geomet Steel EN10025 Fe P11*

*With Red PVC cover

Ball Valves - Manual and Actuated

FIG 965NREXT Full Bore Bronze Ball Valve ½" to 2" (DN15 to DN50)

Dimensions



'The BOSS™ 965NREXT with non rotating extension stem has been specifically designed for use in chilled water applications. The valve is full bore with female BSP Parallel threads'

Technical Specification ½" to 2" DN15 - DN50											
Size/DN	Maximum Pressure	Maximum Pressure	A mm	HL mm	h mm	L mm	P mm	C mm	Kvs m³/h	Weight kg	Product Code
	<95ºC	>95ºC									
½ DN15	PN25	PN16	57.0	98.2	59.0	91.5	15.0	15.5	15.7	0.35	37171107
¾ DN20	PN25	PN16	69.0	101.7	59.0	91.5	20.0	16.5	30.8	0.45	37171118
1 DN25	PN25	PN16	77.0	110.6	64.0	126.5	25.0	19.5	49.3	0.71	37171129
1¼ DN32	PN25	PN16	90.0	116.0	64.0	126.5	32.0	21.5	79.0	1.07	37171140
1½ DN40	PN25	PN16	103.0	132.3	72.0	141.5	40.0	21.5	125.3	1.69	37171151
2 DN50	PN25	PN16	123.0	140.0	72.0	141.5	50.0	25.0	224.2	2.49	37171162

Materials of Construction		
Description	Material	Specification
Fixed End	Bronze	EN1982 CB491K
Ball	Brass (Chromium Plated)	EN12165 CW617N
Seat	PTFE	
Valve Body	Bronze	EN1982 CB491K
Stem	Brass	EN12164 CW617N
Anti Friction Ring	Brass	EN12164 CW617N
Packing Ring	PFTE	
Packing Nut Extension	Brass	EN12164 CW617N
Packing Nut	Brass	EN12164 CW617N
Screw	Steel	EN10025 Fe42
Handle	Steel[1]	EN10025 Fe11

[1] With Blue PVC Sleeve with White Markings

Applications	
Air	-10ºC to +150ºC
Water	0ºC to +150ºC

Technical Specification - Reduced bore	
Maximum operating pressure	10bar (150lbft/in²)
Maximum operating temperature	100ºC (212ºF)
Approved by the Water Research Council	

Material	
Body	Brass or Enkotal Alloy
Seal	EPDM
Stem 'O' Rings	EPDM
Finish	Raw, Chrome-plated or Nickel-plated

Applications

Hot and cold water services, chilled water

Note 1

The use of female parallel threaded valves on chilled water applications is not recommended. Male threaded or compression type valves should be used.

Note 2

The standard valve is not suitable for gas or oil applications but valves can be supplied on an ex-works delivery with alternative seals to suit these duties.

Copper x Copper Compression Connections

Material	Finish	Size	Weight kg	Face to Face Dim mm	Code
DZR/Enkotal	Chrome Plated	15mm	0.14	41	86310102
		22mm	0.22	57	86310113
		28mm	0.54	65	86310124
	Raw	15mm	0.14	41	86314527
		22mm	0.22	57	86314538
		28mm	0.54	65	86314549

Female x Female Screwed Connections

Material	Finish	Size	Weight kg	Face to Face Dim mm	Code
DZR/Enkotal	Chrome Plated	½in	0.11	47	86310039
		¾in	0.23	56	86310050
		1in	0.42	75	86310681
	Raw	½in	0.11	47	86314228
		¾in	0.23	56	86314239

Male x Female Screwed Connections

Material	Finish	Size	Weight kg	Face to Face Dim mm	Code
DZR	Chrome Plated	½in	0.10	44	86310829
		¾in	0.10	44	86310840

Screwed Female x Copper Connections

Material	Finish	Size	Weight kg	Face to Face Dim mm	Code
DZR/Enkotal	Chrome Plated	½in x 15mm	0.13	51	86310168
		¾in x 22mm	0.13	51	86310179

Straight Swivel Female Union x Copper Compression Connections

Material	Finish	Size	Weight kg	Face to Face Dim mm	Code
Enkotal	Chrome Plated	15mm x ½in	0.15	41	86316103

Ball Valves - Manual and Actuated
Mini Ball Valves

Plastic Handles

Material	Finish	Size	Code
Plastic	Black	10-15mm	86310574
	Red	10-15mm	86310585
	Blue	10-15mm	86310596
	Black	20-28mm	86310604

Angle Swivel Female Union x Copper Compression Connections

Material	Finish	Size	Weight kg	Face to Face Dim mm	Code
Enkotal	Chrome Plated	15mm x ½in	0.13	23	86316114

Mini Ball Radiator Valves

Straight Radiator Valve

Material	Finish	Size	Weight kg	Face to Face Dim mm	Code
Brass	Nickel Plated	½in	0.37	82	86315839
Brass	Nickel Plated	¾in	0.65	82	86315850

Angled Drain Valve

Material	Finish	Size	Weight kg	Face to Face Dim mm	Code
Brass	Nickel Plated	½in	0.08	31	86310209

Mini Ball Filter Ball Valves

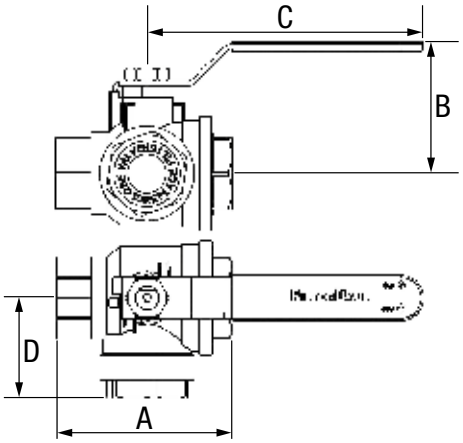
The BOSS™ Mini Ball Filter Ball Valve is designed so that the filter element can be easily cleaned or replaced. The ball is turned clockwise to the closed position and the side plug can then be removed. This allows easier access to the filter with no loss or leakage of the liquid. The flow direction is marked on the body.

Material	Finish	Screen	Size	Weight kg	Face to Face Dim mm	Code
DZR Body	Nickel Plated	Stainless Steel	15mm	0.16	45	86310925

WRAS APPROVED PRODUCT

Ball Valves - Manual and Actuated
Filter Ball Valve with Integral Filter

Dimensions



Size in	A mm	B mm	C mm	D mm	Weight kg	BSS Code
½	69	50	95	37	0.40	37130073
¾	69	50	95	37	0.50	37130084
1	95	66	120	51	1.20	37130029
1¼	111	82	150	60	1.90	37130040
1½	127	89	150	74	3.00	37130051
2	154	120	200	90	5.00	37130062

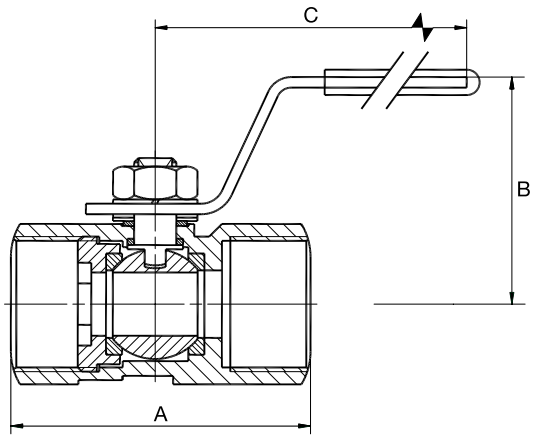
Technical Specification	
Connections	Screwed BSPP Female
Pressure/Temperature	½ to 1" 16bar @ -10 to 120°C 1¼ to 2" 20bar @ -10 to 120°C

Materials of Construction	
Body/Ball	DZR Copper Alloy CZ132BS2872
Stem	DZR Copper Alloy CZ132BS2874
Seat	PTFE
Screen/Filter	28 Mesh Stainless Steel
Stem seal	Viton
Lever handle	Pressed Steel

Ball Valves - Manual and Actuated

Reduced Bore – FIG LN190 1 pce 1000WO

Dimensions



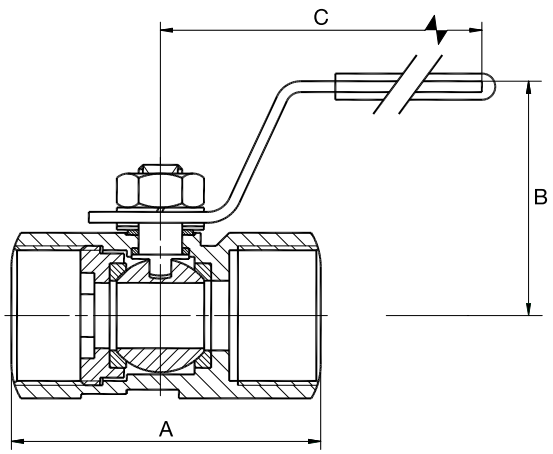
Carbon Steel Valve						
Size	Bore Dia	A	B	C	Weight	Product
in	mm	mm	mm	mm	kg	Code
¼	4.5	39.8	35.5	61	0.068	36420204
⅜	6.5	44	36.2	61.5	0.092	36420215
½	9.1	57	47	89	0.192	36420226
¾	12.5	58.3	53.2	90.5	0.274	36420237
1	16	71.4	52.4	94	0.436	36420248
1¼	20	78.2	63.2	96	0.676	36420259
1½	25	82.8	71.1	133	0.864	36420270
2	32	100.9	79.7	131.5	1.492	36420281

Technical Specification	
Connections	Screwed BSPT Female
Pressure/Temperature	10.5bar @ 180ºC
	70bar @ -10 to +40ºC

Materials of Construction	
Body	ASTMA216-WCB
Retainer	ASTM A216-WCB/A/A108
Ball	ASTM A351-CF8/304
Seat	PTFE
Thrust washer	PTFE
Gasket	PTFE
Stem packing	PTFE
Belleville washer	AISI301
Stem	ASTM A276-304
Handle washer	AISI304
Handle nut	Zinc Plated Steel
Handle	AISI304
Handle cover	PVC

Ball Valves - Manual and Actuated
Reduced Bore – FIG LN190 1 pce 1000WO

Dimensions



Stainless Steel Valve						
Size in	Bore Dia mm	A mm	B mm	C mm	Weight kg	Product Code
¼	4.5	39.8	35.5	61	0.068	36420300
⅜	6.5	44	36.2	61.5	0.092	36420311
½	9.1	57	47	89	0.19	36420322
¾	12.5	58.3	53.2	90.5	0.27	36420333
1	16	71.4	52.4	94	0.436	36420344
1¼	20	78.2	63.2	96	0.664	36420355
1½	25	82.8	71.1	133	0.864	36420366
2	32	100.9	79.7	131.5	1.492	36420377

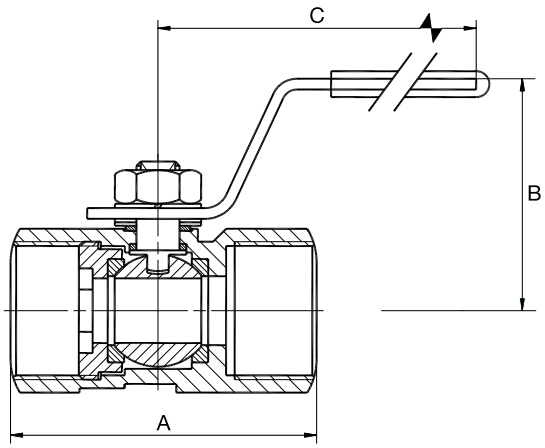
Technical Specification	
Connections	Screwed BSPT Female
Pressure/Temperature	10.5bar @ 180ºC
	70bar @ -10 to +40ºC

Materials of Construction	
Body	ASTMA351-CF8M
Retainer	ASTM A351-CF8M/316
Ball	ASTM A351-CF8M/316
Seat	PTFE
Thrust washer	PTFE
Gasket	PTFE
Stem packing	PTFE
Belleville washer	AISI301
Stem	ASTM A276-316
Handle washer	AISI304
Handle nut	AISI304
Handle	AISI304
Handle cover	PVC

Ball Valves - Manual and Actuated

Reduced Bore – FIG LN240 2 pce 1000WO

Dimensions



Carbon Steel Valve							
Nominal Size		Bore Dia	A	B	C	Weight	Product
in	mm	mm	mm	mm	mm	kg	Code
¼	8	11	51.5	53.3	103.5	0.264	36420108
⅜	10	12.5	51.5	53.3	103.5	0.252	36420119
½	15	15	63.2	58.5	123.6	0.378	36420130
¾	20	20	75.9	60.6	123.6	0.53	36420141
1	25	25.4	78.6	71.8	159	0.87	36420152
1¼	32	32	101.5	75.2	159.3	1.382	36420163
1½	40	38	108.6	92.5	149.9	2.21	36420174
2	50	50	122.5	101	190.7	3.35	36420185

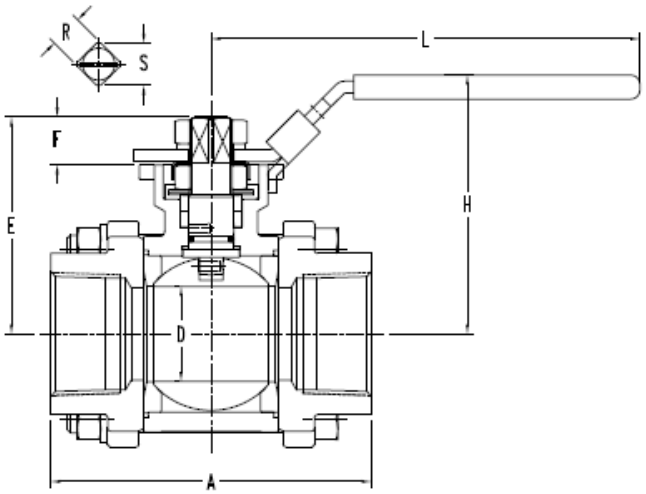
Technical Specification	
Connections	Screwed BSPT Female
Pressure/Temperature	10.5bar @ 180ºC
	70bar at -10 to +40ºC

Materials of Construction	
Body	ASTM A216-WCB
End cap	ASTM A216-WCB
Seat	PTFE
Gasket	PTFE
Ball	ASTM A351- CF8/304
Thrust washer	PTFE
Stem	ASTM A276-304
Stem packing	PTFE
Gland	AISI304
Handle	Zinc Plated Steel
Handle washer	AISI304
Handle nut	AISI304
Handle cover	PVC

Ball Valves - Manual and Actuated

Stainless Steel Full Bore - FIG B380DD / B380DX 3 Piece 1000WOG Non Firesafe with ISO 5211 Mount

Dimensions



Stainless Steel Valve

Nominal Size in	Nominal Size mm	ISO 5211	A mm	D mm	E mm	F mm	H mm	L mm	S mm	R mm	Weight kg	Screwed B380DD Product Code	Screwed D380DX Product Code
½	15	F03	70.2	14.2	45.8	10.3	63.0	122.0	11.1	9	0.90	30910102	30910209
¾	20	F03	76.9	20.5	51.2	11.7	67.0	122.0	11.1	9	1.00	30910113	30910220
1	25	F04/F05	92.2	25.4	62.6	15.9	79.2	138.0	14.2	11	1.72	30910124	30910231
1¼	32	F04/F05	105.2	31.8	72.1	15.5	89.4	138.0	14.2	11	2.35	30910135	30910242
1 ½	40	F04/F05	120.2	38.1	81.3	15.8	98.2	138.0	14.2	11	3.94	30910146	30910253
2	50	F05/F07	138.0	50.0	95.6	18.8	113.5	175.0	19.0	14	5.22	30910157	30910264

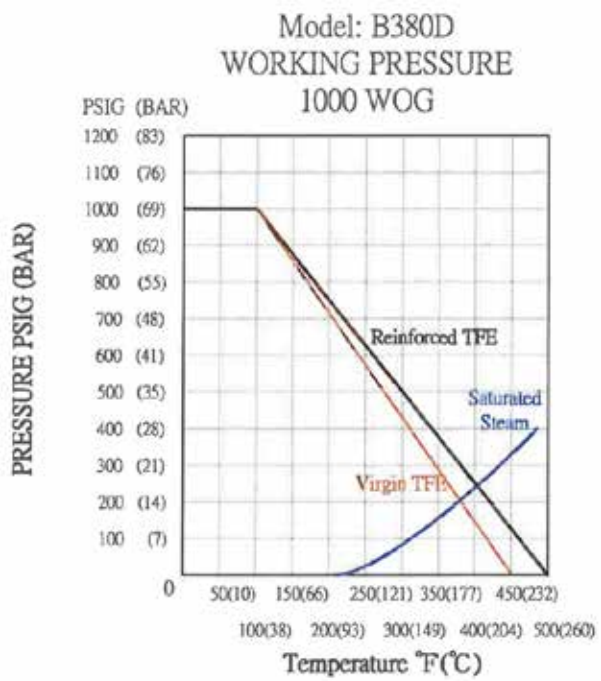
Technical Specification	
Connections available	BSPT and Socket Weld
Max Pressure	1000 WOG
Temperature	10 bar at -10°C-+160°C
3 Piece swing-out design	
Anti static device	
With ISO 5211 mounting pad	Square Stem

Materials of Construction	
Body	Stainless Steel A351 CF8M
Body Cap	Stainless Steel A351 CF8M
Ball	ASTM A351 CF8M
Blow Out Proof Stem	SS316
Seat	RTFE
Stem Seal	RTFE
Body Seal	RTFE
Stem Packing	PTFE
Lockable Lever	SS304

Ball Valves - Manual and Actuated

Stainless Steel Full Bore - FIG B380DD / B380DX 3 Piece 1000WOG Non Firesafe with ISO 5211 Mount

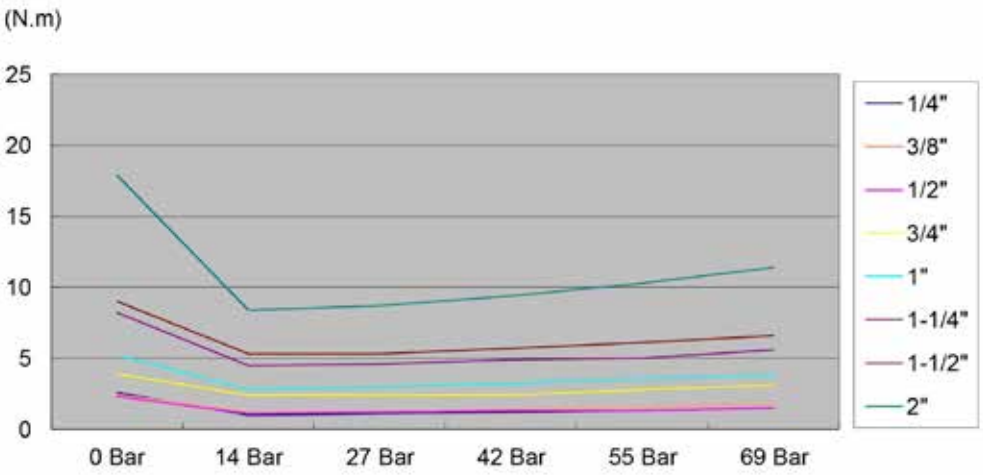
Pressure / Temperature ratings for FIG B380DD / B380DX



Torque / Pressure ratings for FIG B380DD / B380DX

Differential Pressure torque test with water:

Size in	0 bar	14 bar	27 bar	42 bar	55 bar	69 bar
½	2.3	1.1	1.2	1.3	1.3	1.5
¾	3.9	2.4	2.4	2.4	2.8	3.1
1	5.2	2.8	3.0	3.2	3.6	3.8
1¼	8.2	4.5	4.6	4.9	5.0	5.6
1½	9.0	5.3	5.3	5.7	6.1	6.6
2	17.9	8.4	8.7	9.4	10.3	11.4

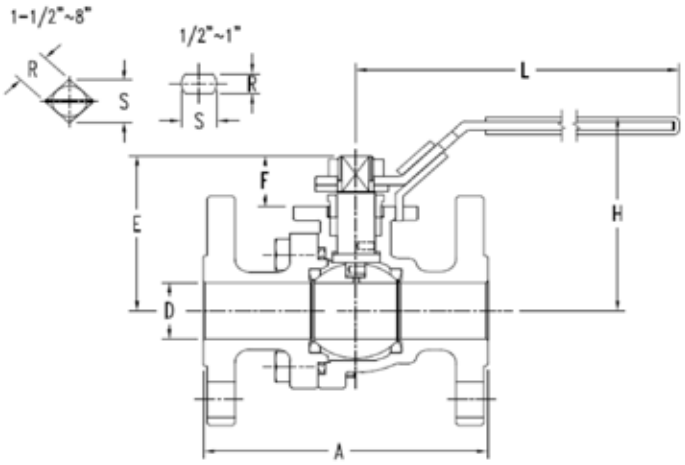


The torque values may change according to the fluid, temperature and pressure

Ball Valves - Manual and Actuated

Stainless Steel Full Bore - FIG 203B 2 Piece Flanged CLASS 150 Firesafe Design with ISO 5211 Mount

Dimensions



Stainless Steel Valve

Nominal Size		ISO	A	D	E	F	H	L	S	R	Weight	Product Code
in	mm	5211	mm	mm	mm	mm	mm	mm	mm	mm	kg	
½	15	F04	108	15.0	49.0	15.0	70.5	131.4	7.9	5.0	1.74	30910305
¾	20	F04	117	20.6	60.0	21.0	78.0	177.0	11.1	7.0	2.32	30910316
1	25	F05	127	25.0	70.1	23.1	87.6	197.0	14.4	9.0	3.26	30910327
1½	40	F07	165	38.1	98.4	20.4	117.4	250.0	18.8	14.0	7.00	30910338
2	50	F07	178	50.0	111.2	20.2	130.2	250.0	18.8	14.0	10.00	30910349
2½	65	F07	190	65.0	134.2	23.0	149.7	405.0	22.5	17.0	16.70	30910360
3	80	F07	203	76.0	142.4	22.7	158.2	405.0	22.5	17.0	21.75	30910371
4	100	F10	229	101.6	170.3	22.0	185.8	460.0	22.5	17.0	38.00	30910382
6	150	F10/F12	394	152.0	220.0	30.0	242.5	610.0	29.0	22.0	85.50	30910393
8	200	F14	457	203.2	316.3	50.8	316.3	230.0	48.0	36.0	193.75	30910401

Technical Specification

Maximum Pressure	Class 150
Max Pressure at Temp	19.0 bar at -29ºC 13.7 bar at 200ºC
Anti static device	
ISO 5211 Mounting Pad	
½" - 1"	Double D Stem
1½" - 8"	Square Stem
Firesafe Approved to 1"	

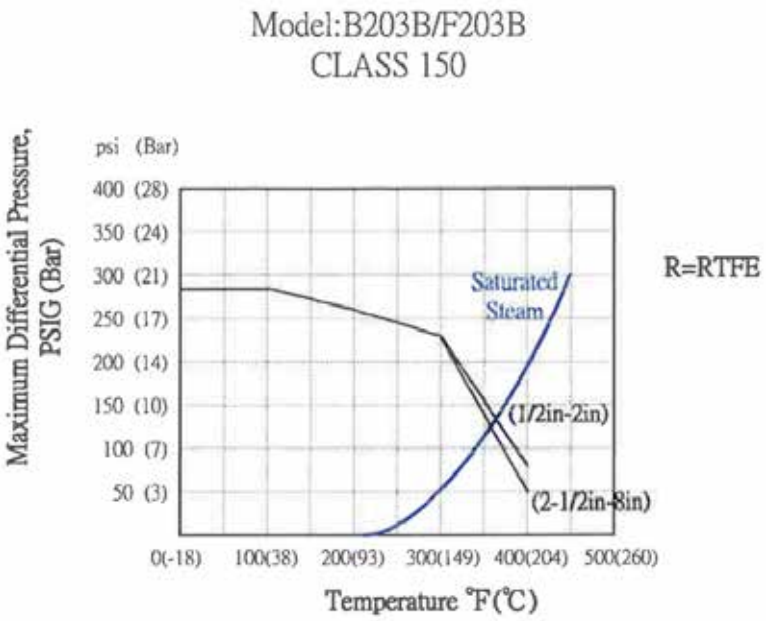
Materials of Construction

Body	Stainless Steel ASTM A351 CF8M
Body Cap	Stainless Steel ASTM A351 CF8M
Ball	Stainless Steel ASTM A351 CF8M
Blow Out Proof Stem	Stainless Steel ASTM A276 SS316
Seat	RTFE
Stem Seal	RTFE
Body Seal	SS304+Graphite
Stem Packing	Graphite
Lever / Gear	
½" - 1"	Stainless Steel SS304 with PVC Lever Cover
1½" - 2"	Stainless Steel ASTM A351 CF8M Cast Handle
2½" - 6"	Stainless Steel ASTM A351 CF8M Cast Handle and A53 Pipe
8"	c/w Gear Box and handwheel

Ball Valves - Manual and Actuated

Stainless Steel Full Bore - FIG 203B 2 Piece Flanged CLASS 150 Firesafe Design with ISO 5211 Mount

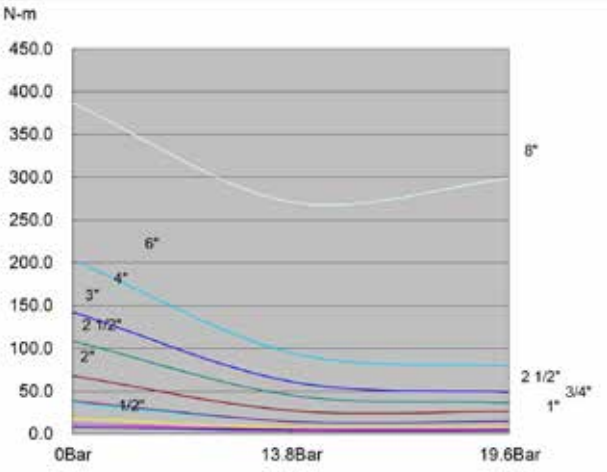
Pressure / Temperature ratings for FIG 203B



Torque / Pressure ratings for FIG 203B

Differential Pressure torque test with water:

Size in	Seat Compression	0 bar	13.8 bar	19.6 bar
½	0.590	7.9	4.0	4.0
¾	0.625	11.3	5.4	5.4
1	0.610	18.1	7.6	7.3
1½	0.620	35.0	14.7	14.7
2	0.580	38.4	14.4	14.7
2½	0.590	67.8	27.1	26.0
3	0.630	108.5	45.2	36.2
4	0.575	142.4	61.0	48.6
6	0.640	203.4	94.9	79.1
8	0.650	386.4	271.2	298.3

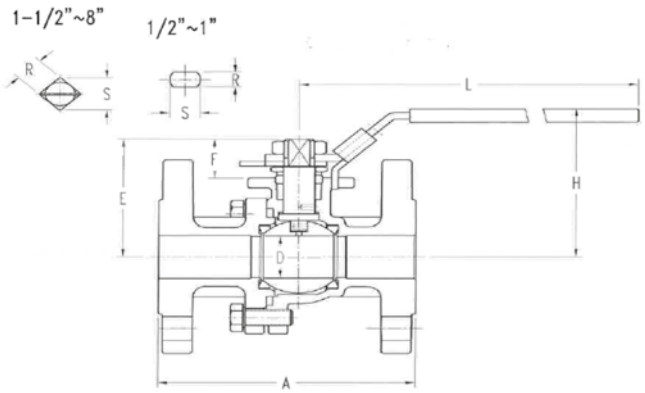


The torque values may change according to the fluid, temperature and pressure

Ball Valves - Manual and Actuated

Stainless Steel Full Bore - FIG 203H 2 Piece Flanged PN16 Firesafe Approved with ISO 5211 Mount

Dimensions



Nominal Size in	Nominal Size mm	ISO 5211	A mm	D mm	E mm	F mm	H mm	L mm	S mm	R mm	Weight kg	Product Code
½	15	F04	115	15.0	49.0	14.5	70.5	131.4	7.9	5.0	2.11	30910456
¾	20	F04	120	20.6	60.0	21.0	78.0	177.0	11.1	7.0	2.95	30910467
1	25	F05	125	25.0	70.1	23.1	87.8	197.0	14.4	9.0	3.88	30910478
1½	40	F07	140	38.1	97.5	19.5	117.4	250.0	18.8	14.0	7.20	30910489
2	50	F07	150	50.0	110.5	19.5	130.2	250.0	18.8	14.0	10.00	30910508
2½	65	F07	170	65.0	134.2	23.0	149.7	405.0	22.5	17.0	15.15	30910519
3	80	F07	180	76.0	142.7	23.0	158.2	405.0	22.5	17.0	20.00	30910530
4	100	F10	190	101.6	171.3	23.0	185.8	460.0	22.5	17.0	30.00	30910541
6	150	F10/F12	350	152.0	220.0	30.0	242.5	610.0	29.0	22.0	67.40	30910552
8	200	F14	400	203.2	316.3	50.8	316.3	230.0	48.0	36.0	185.35	30910563

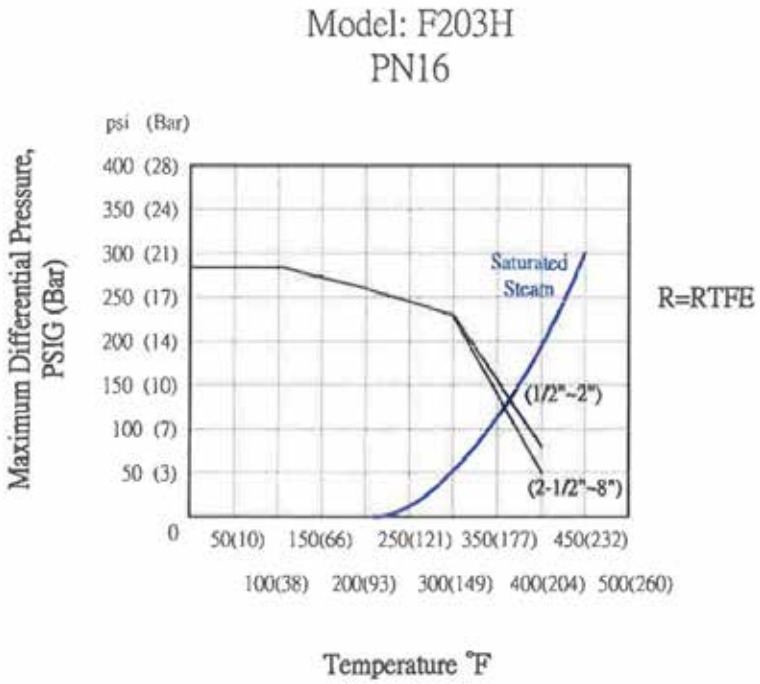
Technical Specification	
Maximum Pressure	PN16
Max Pressure at Temp	16.0 bar at -10ºC 12.1 bar at 200ºC
Anti static device	
ISO 5211 Mounting Pad	
½" - 1"	Double D stem
1½" - 8"	Square Stem

Materials of Construction	
Body	Stainless Steel BS EN-1.4408
Body Cap	Stainless Steel BS EN-1.4408
Ball	Stainless Steel ASTM A351 CF8M
Blow Out Proof Stem	Stainless Steel ASTM A276 Gr SS316
Seat	RTFE
Stem Seal	RTFE
Body Seal	SS304+Graphite
Stem Packing	Graphite
Lever / Gear	
½" - 1"	Stainless Steel SS304 with PVC Lever Cover
1½" - 2"	Stainless Steel ASTM A351 CF8M Cast Handle
2½" - 6"	Stainless Steel ASTM A351 CF8M Cast Handle and A53 Pipe
8"	c/w Gear Box and handwheel

Ball Valves - Manual and Actuated

Stainless Steel Full Bore - FIG 203H 2 Piece Flanged PN16 Firesafe Approved with ISO 5211 Mount

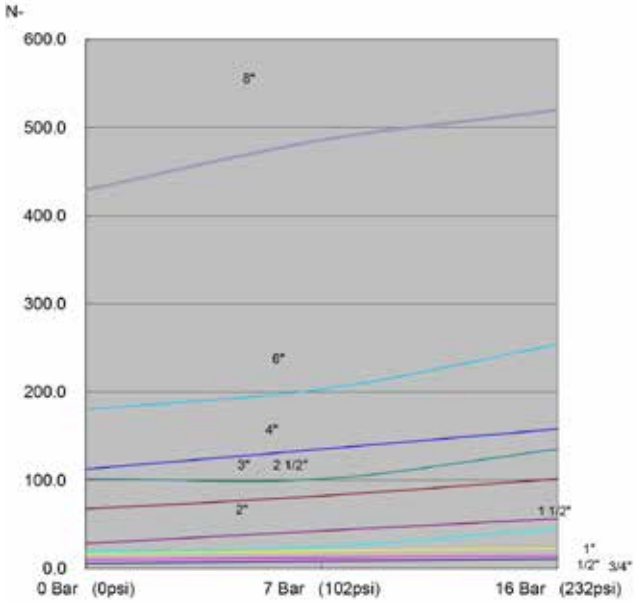
Pressure / Temperature ratings for FIG 203H



Torque / Pressure ratings for FIG 203H

Differential Pressure torque test with water:
Unit: Nm

Size in	Seat Compression	0 bar (0psi)	7 bar (102psi)	16 bar (232psi)
½	0.50	5.6	8.5	11.3
¾	0.50	10.2	12.4	14.7
1	0.50	16.9	20.3	22.6
1½	0.58	19.2	24.9	45.2
2	0.61	28.2	42.9	56.5
2½	0.60	67.8	82.5	101.7
3	0.58	101.7	101.7	135.6
4	0.60	113.0	135.6	158.2
6	0.52	180.8	203.4	254.2
8	0.45	429.4	485.9	519.8

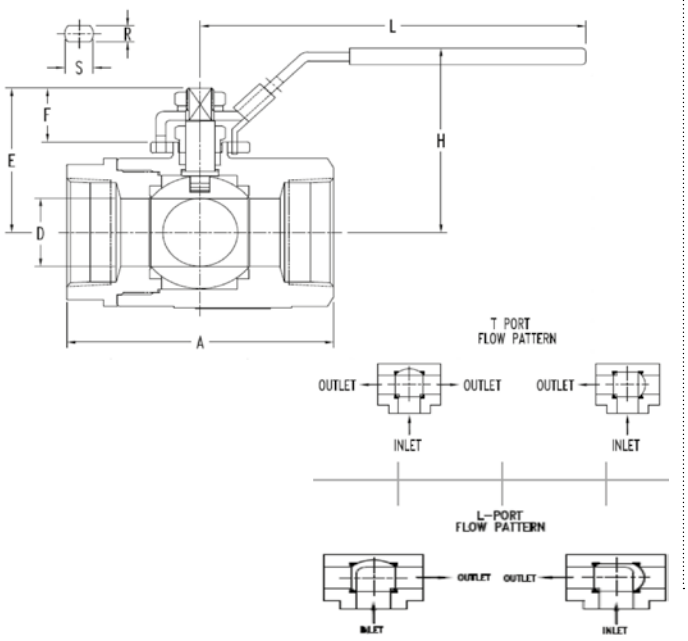


The torque values may change according to the fluid, temperature and pressure

Ball Valves - Manual and Actuated

Stainless Steel - FIG B230L / B230T 3-Way L & T Port 2000WOG Non Firesafe with ISO 5211 Mount

Dimensions



Stainless Steel Valve

Nominal Size		ISO	A	D	E	F	H	L	S	R	Weight	Product Code	
in	mm	5211	mm	mm	mm	mm	mm	mm	mm	mm	kg	L Port B230L	T Port B230T
½	15	F03	67.0	11.0	38.8	18.9	56.3	128.0	7.9	5.0	0.56	30910700	30910604
¾	20	F04	78.3	15.0	52.3	26.1	67.0	142.0	11.1	7.0	0.93	30910711	30910615
1	25	F04	90.0	20.6	59.1	25.2	76.1	142.0	11.1	7.0	1.29	30910722	30910626
1¼	32	F05	101.6	25.0	70.2	29.3	93.2	184.0	14.2	9.0	2.18	30910733	30910637
1½	40	F05	108.6	31.8	75.7	29.3	98.7	197.0	14.2	9.0	2.72	30910744	30910648
2	50	F05	135.5	38.1	80.7	30.0	103.0	197.0	14.2	9.0	4.55	30910755	30910659

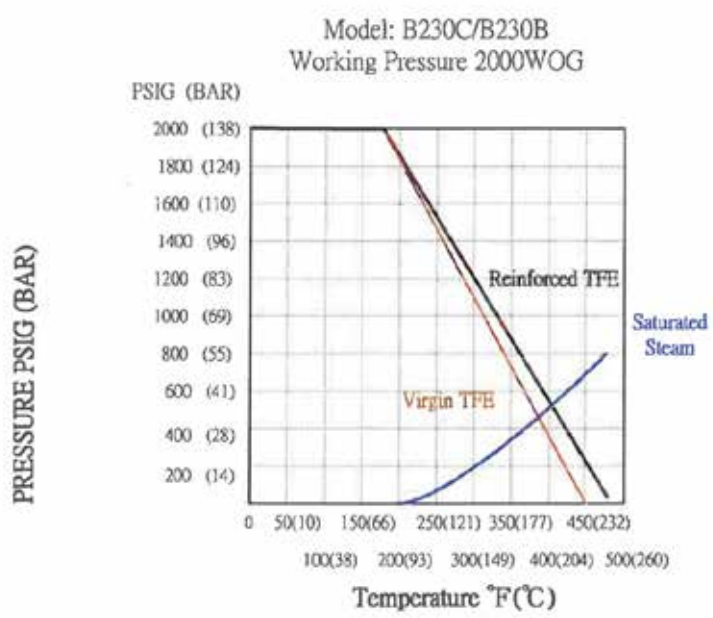
Technical Specification	
Connections	BSPT
Max Pressure	2000 WOG
Temperature	10 bar at -10°C - + 160°C
Standard Port	L Port and T Port options
ISO 5211 Mounting Pad	Double D Stem
Anti static device	
2 Piece Ball Valve, Two Seats Design (Diverter valve)	

Materials of Construction	
Body	Stainless Steel ASTM A351 CF8M
Body Cap	Stainless Steel ASTM A351 CF8M
Ball	ASTM A351 CF8M
Blow Out Proof Stem	Stainless Steel ASTM 276 Gr SS316
Seat	RTFE
Stem Seal	RTFE
Body Seal	Graphite
Stem Packing	Graphite
Lockable Lever	SS304

Ball Valves - Manual and Actuated

Stainless Steel - FIG B230L / B230T 3-Way L & T Port 2000WOG Non Firesafe with ISO 5211 Mount

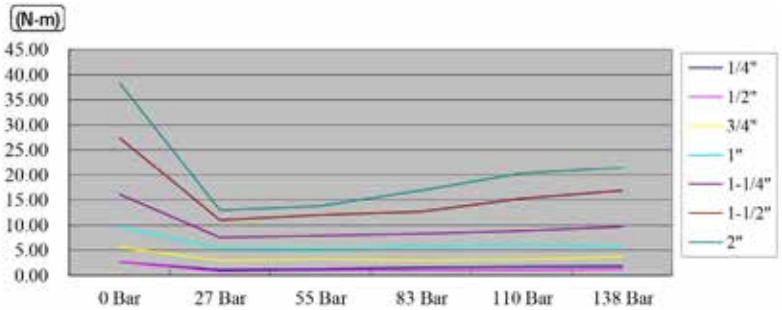
Pressure / Temperature ratings for FIG B230L / FIG B230T



Torque / Pressure ratings for FIG B230L

Differential Pressure torque test with water:
Unit: Nm

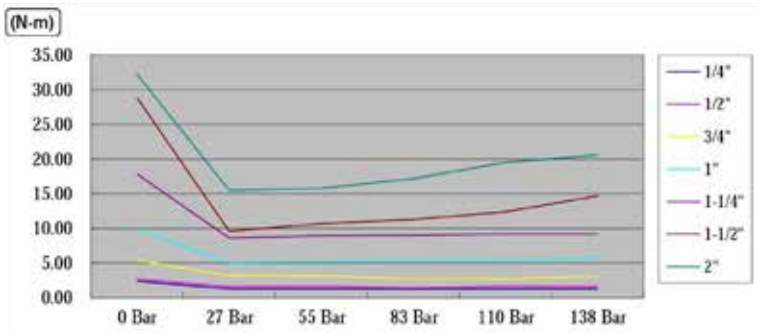
Size in	0 bar	27 bar	55 bar	83 bar	110 bar	138 bar
	BREAKING	BREAKING	BREAKING	BREAKING	BREAKING	BREAKING
½	2.70	0.80	1.00	1.00	1.10	1.30
¾	5.60	3.00	3.20	3.00	3.10	3.70
1	9.60	5.40	5.20	5.80	6.10	5.80
1-¼	16.10	7.50	7.90	8.30	8.80	9.70
1-½	27.40	11.00	12.00	12.70	15.30	16.90
2	38.40	13.00	13.80	16.90	20.30	21.50



Torque / Pressure ratings for FIG B230T

Differential Pressure torque test with water:
Unit: Nm

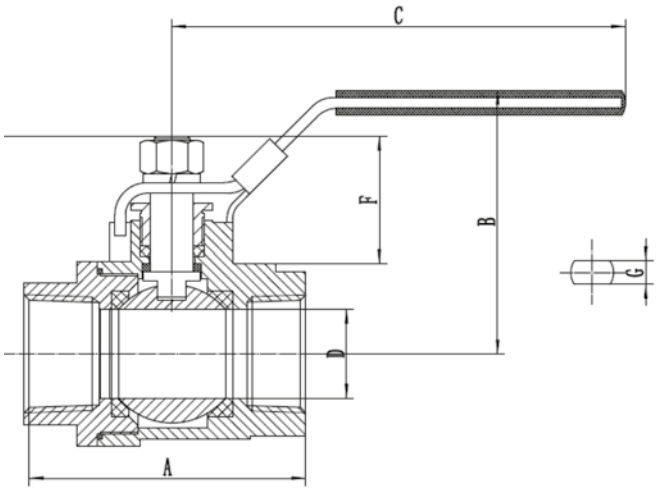
Size in	0 bar	27 bar	55 bar	83 bar	110 bar	138 bar
	BREAKING	BREAKING	BREAKING	BREAKING	BREAKING	BREAKING
½	2.70	1.60	1.70	1.40	1.70	1.60
¾	5.40	3.20	3.20	2.70	2.70	3.10
1	9.90	5.10	5.20	5.40	5.40	5.80
1¼	17.80	8.60	8.90	9.00	9.20	9.20
1½	28.80	9.60	10.70	11.30	12.40	14.70
2	32.20	15.50	15.80	17.20	19.50	20.60



Ball Valves - Manual and Actuated

Stainless Steel Full Bore - FIG LN240 2 Piece Screwed 1000WOG with Mounting Pad

Dimensions



Stainless Steel Valve

Nominal Size in	Nominal Size mm	A mm	B mm	C mm	D mm	E mm	F mm	G mm	Weight kg	Product Code
¼	8	52	53	83	11.5	38.8	22	5	0.26	36420001
⅜	10	52	53	83	12.5	38.8	22	5	0.23	36420012
½	15	64	60	103	15	47	29	6.5	0.38	36420023
¾	20	75.5	62	103	20	49	29	6.5	0.53	36420034
1	25	79	77	151	25	60	35	8	0.86	36420045
1¼	32	101	81	151	32	64	35	8	1.36	36420056
1½	40	109	91	194	38	77	38	8.5	2.15	36420067
2	50	123	103	194	50	88.5	40	8.5	3.39	36420078

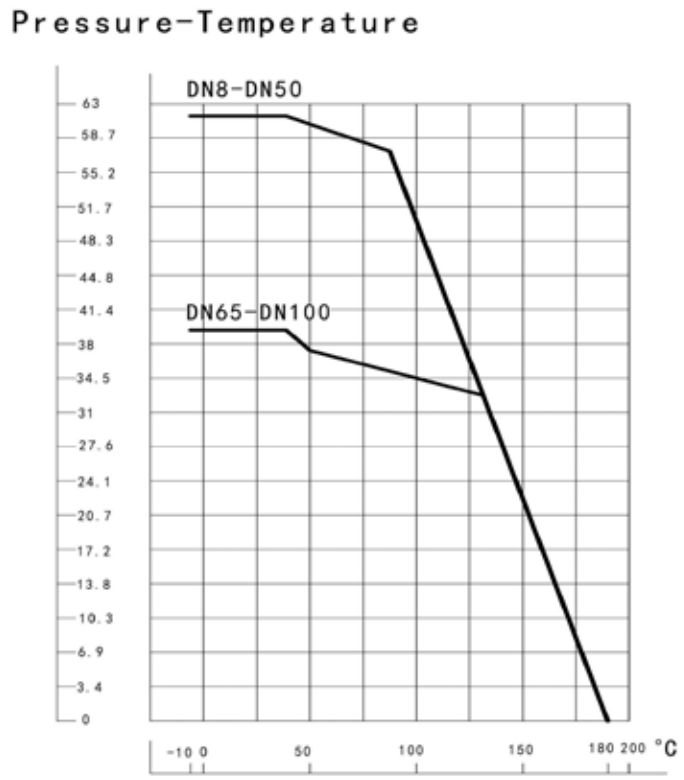
Technical Specification	
Connections	Screwed BSPT Female to BS EN 10226-2:ISO 7-1 Rc
Pressure/Temperature	10.5 bar at 180°C 70 bar at -10°C to +40°C
Mounting Pad	2 Hole Mounting Pad for Actuation

Materials of Construction	
Body	ASTM A351-CF8M
End Cap	ASTM A351-CF8M
Seat	PTFE
Gasket	PTFE
Ball	ASTMA351-CF8M/316
Thrust Washer	PTFE
Stem	ASTM A276-316
Stem Packing	PTFE
Gland	AISI304
Handle	AISI304
Handle Washer	AISI304
Handle Nut	AISI304
Handle Cover	PVC

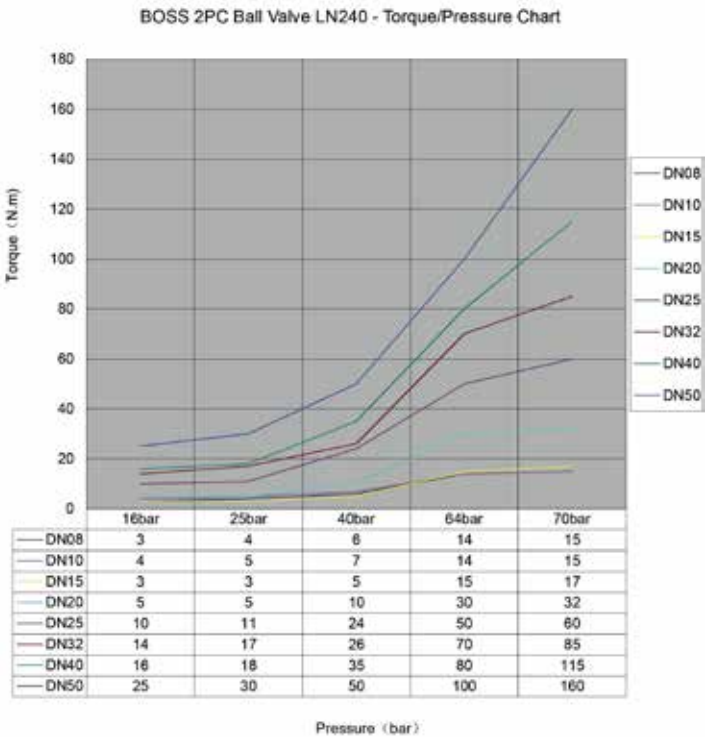
Ball Valves - Manual and Actuated

Stainless Steel Full Bore - FIG LN240 2 Piece Screwed 1000WOG with Mounting Pad

Pressure / Temperature ratings for FIG LN240



Torque / Pressure ratings for FIG LN240



	16bar	25bar	40bar	64bar	70bar
DN08	3	4	6	14	15
DN10	4	5	7	14	15
DN15	3	3	5	15	17
DN20	5	5	10	30	32
DN25	10	11	24	50	60
DN32	14	17	26	70	85
DN40	16	18	35	80	115
DN50	25	30	50	100	160

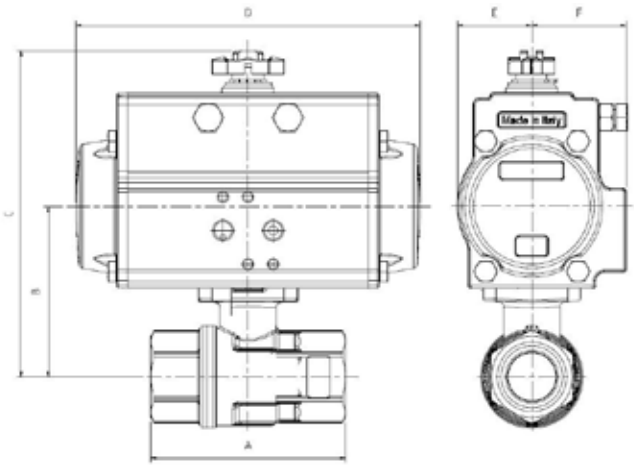
The torque values may change according to the fluid, temperature and pressure

Ball Valves - Manual and Actuated

Nickel Plated Brass 2 Piece Screwed with SR / DA Pneumatic Actuator

FIG 250-SR with Spring Return Actuator
FIG 250-DA with Double Acting Actuator

Dimensions



2 Piece Screwed with SR Actuator								
Nominal Valve Size		Spring Return	A	B	C	D	E	F
in	mm	Actuator	mm	mm	mm	mm	mm	mm
¼	8	SR52	67	59	134	141	30	41
⅜	10	SR52	67	59	134	141	30	41
½	15	SR52	67	59	134	141	30	41
¾	20	SR52	76	61	136	141	30	41
1	25	SR52	90	72	147	141	30	41
1¼	32	SR52	102	75	150	141	30	41
1½	40	SR75	114	99	195	210	42	52
2	50	SR75	138	108	204	210	42	52
2½	65	SR100	165	138	246	275	55	68
3	80	SR100	188	148	256	275	55	68

2 Piece Screwed with DA Actuator								
Nominal Valve Size		Double Acting	A	B	C	D	E	F
in	mm	Actuator	mm	mm	mm	mm	mm	mm
¼	8	DA32	67	55	97	110	22	22
⅜	10	DA32	67	55	97	110	22	22
½	15	DA32	67	55	97	110	22	22
¾	20	DA32	76	57	99	110	22	22
1	25	DA32	90	68	110	110	22	22
1¼	32	DA32	102	71	114	110	22	22
1½	40	DA52	114	90	165	141	30	41
2	50	DA52	138	100	175	141	30	41
2½	65	DA63	165	122	207	164	35	45
3	80	DA63	188	131	117	164	35	45

For valve and actuator specifications refer to: FIG 2500 (2 Piece Screwed) and FIG 82 (Pneumatic Actuators)
Actuated packages are supplied fully assembled and tested. Actuator sizing based on 5.5 bar air supply
FIG 250-SR supplied with Fail Open and Fail Closed options
For additional options (silencers, switchboxes and solenoids) refer to our Accessories section
FIG 250-DA supplied Stay Put as standard, with switchbox available
Media - For any application with media suitable to material of construction

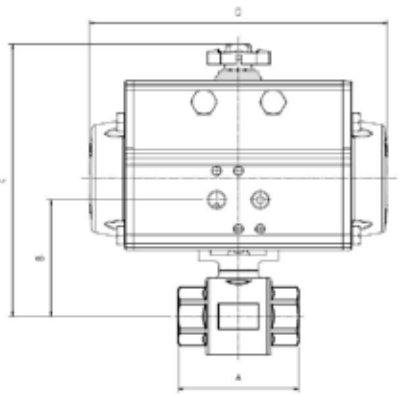
Ball Valves - Manual and Actuated

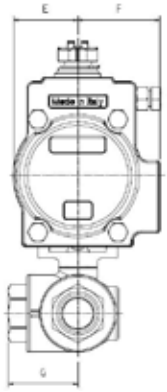
Nickel Plated Brass 3-Way L & T Port with SR / DA Pneumatic Actuator

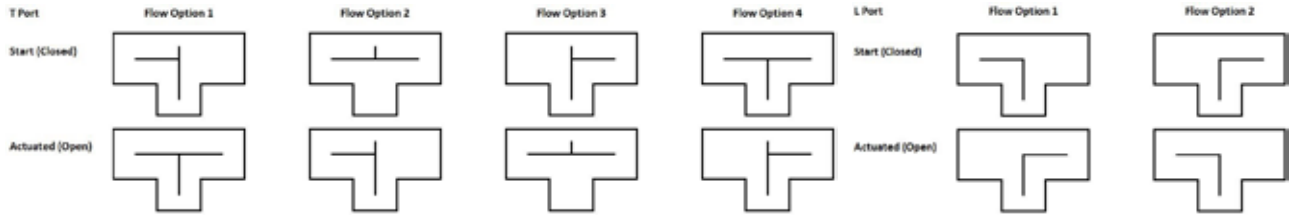
FIG 360L-SR / 350T-SR with Spring Return Actuator

FIG 360L-DA / 350T-DA with Double Acting Actuator

Dimensions







3-Way L Port with SR Actuator 3-Way T Port with SR Actuator									
Nominal Valve Size		Spring Return	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	SR52	77	59	134	141	30	41	38
¾	20	SR75	87	76	172	210	42	52	43
1	25	SR75	105	82	178	210	42	52	52
1¼	32	SR75	122	94	190	210	42	52	61
1½	40	SR100	138	124	232	275	55	68	69
2	50	SR100	166	135	243	275	55	68	83
3-Way L Port with DA Actuator **3-Way T Port with DA Actuator**									
Nominal Valve Size		Double Acting	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	DA32	77	55	97	110	22	41	38
¾	20	DA52	87	68	143	141	30	41	43
1	25	DA52	105	73	148	141	30	41	52
1¼	32	DA52	122	86	161	141	30	41	62
1½	40	DA63	138	101	187	164	35	41	69
2	50	DA75	166	112	198	164	35	41	83

For valve and actuator specifications refer to: FIG 3600L (L Port), FIG 3500T (T Port) and FIG 82 (Pneumatic Actuators)

Actuated packages are supplied fully assembled and tested. Actuator sizing based on 5.5 bar air supply

FIG 360L-SR and FIG B360L-DA offered with Flow Options 1 & 2

FIG 350T-SR and FIG 350T-DA offered with Flow Options 1, 2, 3 & 4

For additional options (silencers and solenoids) refer to our Accessories section

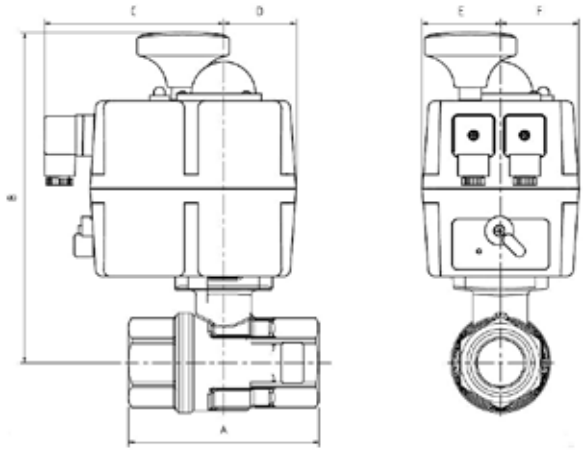
Media - For any application with media suitable to material of construction

Ball Valves - Manual and Actuated

Nickel Plated Brass 2 Piece Screwed with Electric Actuator

FIG 250-EA - with Electric Actuator

Dimensions



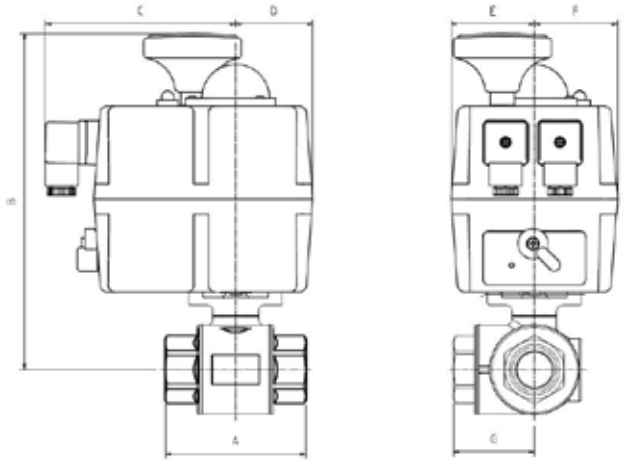
2 Piece Screwed with Electric Actuator With 110-240V AC/DC and 12-24V AC/DC options								
Nominal Valve Size		Electric	A	B	C	D	E	F
in	mm	Actuator	mm	mm	mm	mm	mm	mm
¼	8	Model 20	67	203	126	51	55	55
⅜	10	Model 20	67	203	126	51	55	55
½	15	Model 20	67	203	126	51	55	55
¾	20	Model 20	76	205	126	51	55	55
1	25	Model 20	90	216	126	51	55	55
1¼	32	Model 20	102	220	126	51	55	55
1½	40	Model 20	114	235	126	51	55	55
2	50	Model 20	138	244	126	51	55	55
2½	65	Model 35	165	259	126	51	55	55
3	80	Model 35	188	269	126	51	55	55

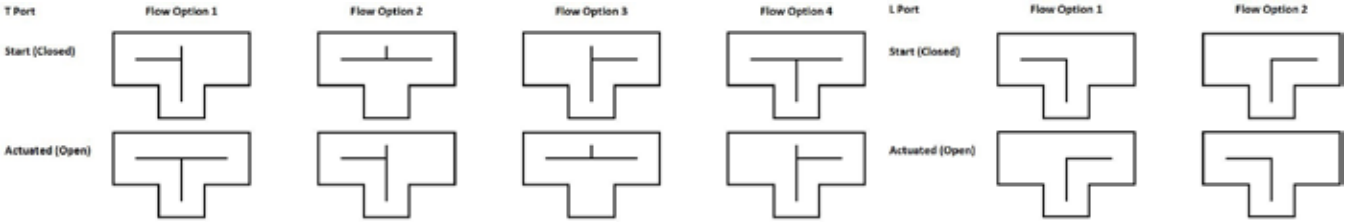
For valve and actuator specifications refer to: FIG 2500 (2 Piece Screwed) and BOSS EA218 (Electric Actuators)
The BOSS 250-EA is supplied fully assembled and tested
Can be supplied failsafe (fail open or closed), or modulating (0-10V or 4-20mA). See our plug and play conversion kits (EA218 section)

Ball Valves - Manual and Actuated

Nickel Plated Brass 3-Way L & T Port with Electric Actuator
FIG 360L-EA / 350T-EA with Electric Actuator

Dimensions



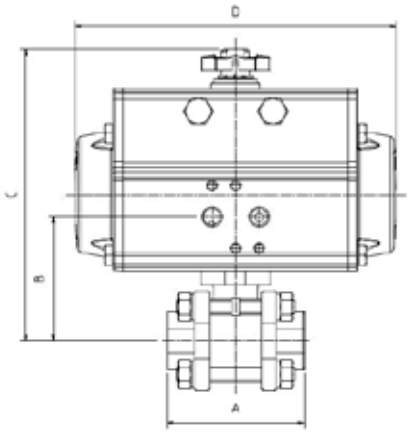


3-Way L Port with Electric Actuator
3-Way T Port with Electric Actuator
With 110-240V AC/DC and 12-24V AC/DC options

Nominal Valve Size		Electric	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	Model 20	77	140	126	51	55	55	38
¾	20	Model 20	87	212	126	51	55	55	43
1	25	Model 20	105	218	126	51	55	55	52
1¼	32	Model 20	122	230	126	51	55	55	61
1½	40	Model 35	138	245	126	51	55	55	69
2	50	Model 55	166	281	126	51	55	55	83

For valve and actuator specifications refer to: FIG 3600L (L Port), FIG 3500T (T Port) and BOSS EA218 (Electric Actuators)
The BOSS 360L-EA and BOSS 350T-EA are supplied fully assembled and tested
FIG 360L-EA offered with Flow Options 1 & 2
FIG 350T-EA offered with Flow Options 1, 2, 3 & 4
Can be supplied failsafe (fail open or closed). See our plug and play conversion kits (EA218 section)

Dimensions



3 Piece Screwed with SR Actuator 3 Piece Socket Weld with SR Actuator								
Nominal Valve Size		Spring Return	A	B	C	D	E	F
in	mm	Actuator	mm	mm	mm	mm	mm	mm
½	15	SR63	70	68	153	164	35	45
¾	20	SR75	77	79	175	210	42	52
1	25	SR75	92	82	178	210	42	52
1¼	32	SR85	105	99	202	240	47	58
1½	40	SR85	120	107	210	240	47	58
2	50	SR100	138	127	235	275	55	68

FIG B380DD 3 Piece Screwed with FIG 82 DA Actuator FIG B380DX 3 Piece Socket Weld with FIG 82 DA Actuator								
Nominal Valve Size		Double Acting	A	B	C	D	E	F
in	mm	Actuator	mm	mm	mm	mm	mm	mm
½	15	DA52	70	67	142	141	30	41
¾	20	DA52	77	71	146	141	30	41
1	25	DA52	92	76	151	164	30	41
1¼	32	DA63	105	84	170	164	35	45
1½	40	DA63	120	93	178	164	35	45
2	50	DA75	138	112	208	210	42	52

For valve and actuator specifications refer to: FIG B380DD (Screwed), FIG B380DX (Socket Weld) and FIG 82 (Pneumatic Actuators)
Actuated packages are supplied fully assembled and tested. Actuator sizing based on 5.5 bar air supply
FIG 381-SR and FIG 382-SR supplied with Fail Open and Fail Closed options
For additional options (silencers, switchboxes and solenoids) refer to our Accessories section
FIG 381-DA and FIG 382-DA are supplied Stay Put as standard, with switchbox available
Media - For any application with media suitable to material of construction

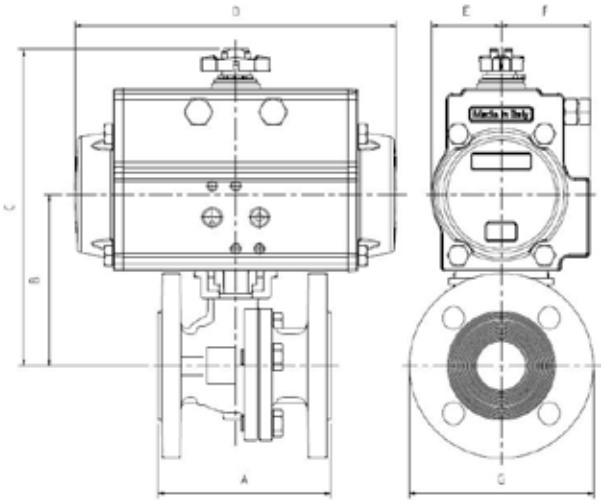
Ball Valves - Manual and Actuated

Stainless Steel 2 Piece Flanged CLASS 150 with SR / DA Pneumatic Actuator

FIG 204-SR with Spring Return Actuator

FIG 204-DA with Double Acting Actuator

Dimensions



2 Piece Flanged CLASS 150 with SR Actuator									
Nominal Valve Size		Spring Return	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	SR63	108	101	187	164	35	45	90
¾	20	SR75	117	114	210	210	42	52	100
1	25	SR85	127	129	232	240	47	58	110
1½	40	SR100	165	122	230	275	55	68	125
2	50	SR115	178	135	192	333	64	73	150
2½	65	SR125	190	166	309	372	68	80	180
3	80	SR140	203	187	343	435	76	87	190
4	100	SR160	229	210	381	500	87	99	230
6	150	SR180	394	254	438	493	98	115	280
8	200	SR230	457	457	720	690	124	124	345

2 Piece Flanged CLASS 150 with DA Actuator									
Nominal Valve Size		Double Acting	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	DA52	108	100	175	141	30	41	90
¾	20	DA52	117	105	180	141	30	41	100
1	25	DA63	127	114	200	164	35	45	110
1½	40	DA63	165	106	191	164	35	45	125
2	50	DA75	178	126	222	210	42	52	150
2½	65	DA85	190	153	256	240	47	58	180
3	80	DA100	203	160	158	275	55	68	190
4	100	DA115	229	180	322	333	64	73	280
6	150	DA115	394	213	355	333	64	73	280
8	200	DA160	457	445	616	500	87	99	345

For valve and actuator specifications refer to: FIG 203B (2 Piece CLASS 150) and FIG 82 (Pneumatic Actuators)

Actuated packages are supplied fully assembled and tested. Actuator sizing based on 5.5 bar air supply

FIG 204-SR supplied with Fail Open and Fail Closed options

For additional options (silencers, switchboxes and soleniods) refer to our Accessories section

FIG 204-DA supplied Stay Put as standard, with switchbox available

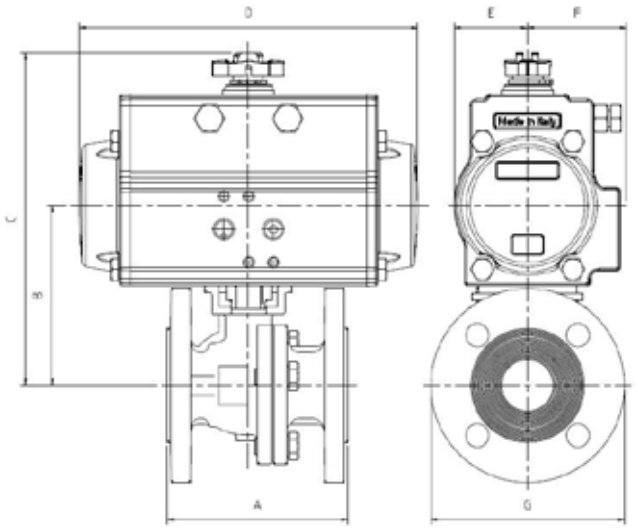
Media - For any application with media suitable to material of construction

Ball Valves - Manual and Actuated

Stainless Steel 2 Piece Flanged PN16 with SR / DA Pneumatic Actuator

FIG 205-SR with Spring Return Actuator
FIG 205-DA with Double Acting Actuator

Dimensions



2 Piece Flanged PN16 with SR Actuator									
Nominal Valve Size		Spring Return	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	SR63	115	101	187	164	35	45	95
¾	20	SR75	120	114	210	210	42	52	105
1	25	SR85	125	129	232	240	47	58	115
1½	40	SR100	140	127	235	275	55	68	150
2	50	SR115	150	147	205	333	64	73	165
2½	65	SR125	170	168	312	372	68	80	185
3	80	SR140	180	194	350	435	76	87	200
4	100	SR160	190	205	376	500	87	99	220
6	150	SR180	350	256	440	493	98	115	285
8	200	SR230	400	457	720	690	124	124	340

2 Piece Flanged PN16 with DA Actuator									
Nominal Valve Size		Double Acting	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	DA52	115	100	175	141	30	41	95
¾	20	DA52	120	105	180	141	30	41	105
1	25	DA63	125	114	200	164	35	45	115
1½	40	DA63	140	123	209	164	35	45	150
2	50	DA75	150	123	219	210	42	52	165
2½	65	DA85	170	155	258	140	47	58	185
3	80	DA100	180	115	223	275	55	68	200
4	100	DA115	160	205	302	333	64	73	220
6	150	DA115	350	215	358	333	64	73	285
8	200	DA160	400	445	616	500	87	99	340

For valve and actuator specifications refer to: FIG 203H (2 Piece PN16) and FIG 82 (Pneumatic Actuators)
Actuated packages are supplied fully assembled and tested. Actuator sizing based on 5.5 bar air supply
FIG 205-SR supplied with Fail Open and Fail Closed options
For additional options (silencers, switchboxes and solenoids) refer to our Accessories section
FIG 205-DA supplied Stay Put as standard, with switchbox available
Media - For any application with media suitable to material of construction

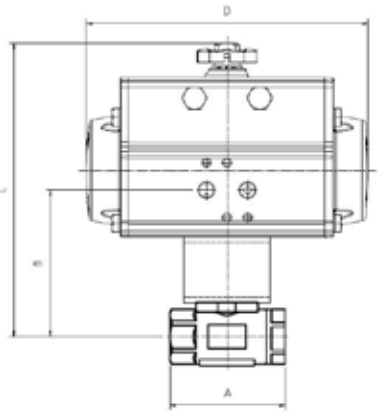
Ball Valves - Manual and Actuated

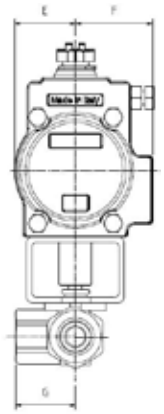
Stainless Steel 3-Way L & T Port with SR / DA Pneumatic Actuator

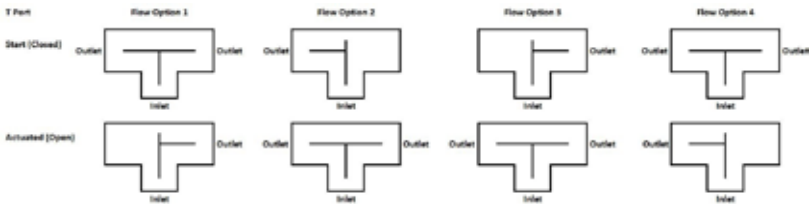
FIG B231L-SR / B232T-SR with Spring Return Actuator

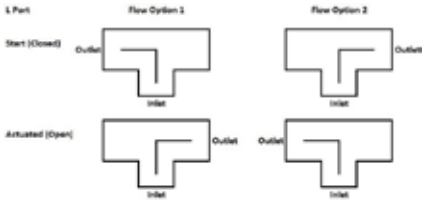
FIG B231L-DA / B232T-DA with Double Acting Actuator

Dimensions









3-Way L Port with SR Actuator
3-Way T Port with SR Actuator

Nominal Valve Size		Spring Return	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	SR63	67	88	174	164	35	45	35
¾	20	SR85	78	108	211	240	47	58	39
1	25	SR85	90	116	219	240	47	58	45
1¼	32	SR100	102	130	238	275	55	68	51
1½	40	SR100	109	135	243	275	55	68	54
2	50	SR115	135	140	278	333	64	73	55

3-Way L Port with DA Actuator
3-Way T Port with DA Actuator

Nominal Valve Size		Double Acting	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	DA52	67	87	162	141	30	41	35
¾	20	DA52	78	92	167	141	30	41	39
1	25	DA63	90	99	185	164	35	45	45
1¼	32	DA63	102	107	193	164	35	45	51
1½	40	DA75	109	120	216	210	42	52	54
2	50	DA75	135	125	221	210	42	52	55

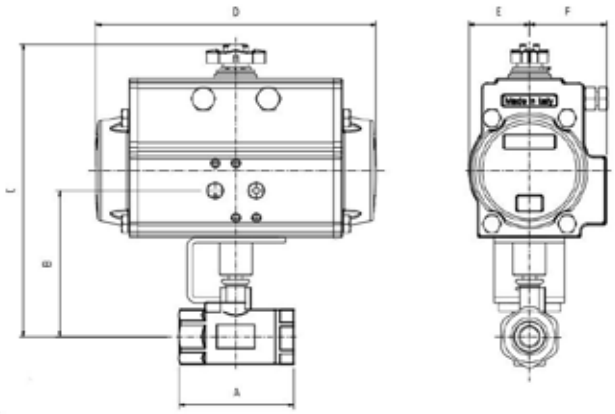
For valve and actuator specifications refer to: FIG B230L (L Port), FIG B230T (T Port) and FIG 82 (Pneumatic Actuators)
Actuated packages are supplied fully assembled and tested. Actuator sizing based on 5.5 bar air supply
FIG B231L-SR and FIG B231L-DA offered with Flow Options 1 & 2
FIG B232T-SR and FIG B232T-DA offered with Flow Options 1, 2, 3 & 4
For additional options (silencers and solenoids) refer to our Accessories section
Media - For any application with media suitable to material of construction

Ball Valves - Manual and Actuated

Stainless Steel 2 Piece Screwed with SR / DA Pneumatic Actuator

FIG 241-SR with Spring Return Actuator
FIG 241-DA with Double Acting Actuator

Dimensions



2 Piece Screwed with SR Actuator								
Nominal Valve Size		Spring Return	A	B	C	D	E	F
in	mm	Actuator	mm	mm	mm	mm	mm	mm
¼	8	SR52	52	73	148	141	30	41
⅜	10	SR52	52	73	148	141	30	41
½	15	SR52	64	84	159	141	30	41
¾	20	SR52	76	91	166	141	30	41
1	25	SR52	79	101	176	141	30	41
1¼	32	SR75	101	117	213	210	42	52
1½	40	SR75	109	134	230	210	42	52
2	50	SR85	123	159	253	240	47	58

2 Piece Screwed with DA Actuator								
Nominal Valve Size		Double Acting	A	B	C	D	E	F
in	mm	Actuator	mm	mm	mm	mm	mm	mm
¼	8	DA32	52	69	112	110	22	22
⅜	10	DA32	52	69	112	110	22	22
½	15	DA32	64	80	123	110	22	22
¾	20	DA32	75	87	130	110	22	22
1	25	DA32	79	97	140	110	22	22
1¼	32	DA52	101	115	190	141	30	41
1½	40	DA52	109	125	200	141	30	41
2	50	DA63	123	136	221	164	35	45

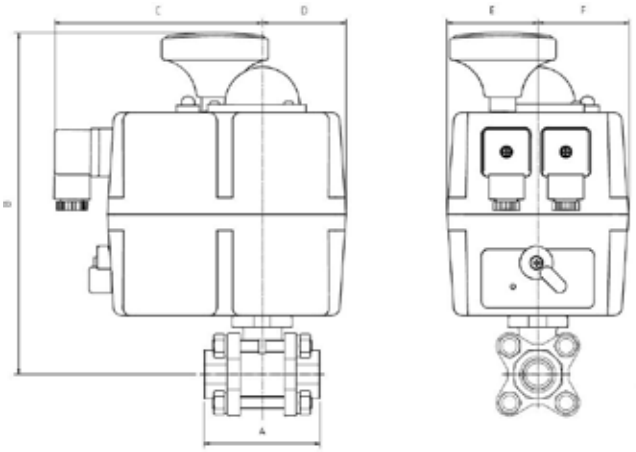
For valve and actuator specifications refer to: FIG LN240 (2 Piece Screwed) and FIG 82 (Pneumatic Actuators)
Actuated packages are supplied fully assembled and tested. Actuator sizing based on 5.5 bar air supply
FIG 241-SR supplied with Fail Open and Fail Closed options
For additional options (silencers, switchboxes and solenoids) refer to our Accessories section
FIG 241-DA supplied Stay Put as standard, with switchbox available
Media - For any application with media suitable to material of construction

Ball Valves - Manual and Actuated

Stainless Steel 3 Piece with Electric Actuator

FIG B381-EA / B382-EA - Screwed / Socket Weld with Electric Actuator

Dimensions



Screwed Ball Valve with Electric Actuator
Socket Weld Ball Valve with Electric Actuator
With 110-240V AC/DC and 12-24V AC/DC options

Nominal Valve Size		Electric	A	B	C	D	E	F
in	mm	Actuator	mm	mm	mm	mm	mm	mm
½	15	Model 20	70	206	126	51	55	55
¾	20	Model 20	77	210	126	51	55	55
1	25	Model 20	92	218	126	51	55	55
1¼	32	Model 20	105	228	126	51	55	55
1½	40	Model 35	120	236	126	51	55	55
2	50	Model 55	138	273	126	51	55	55

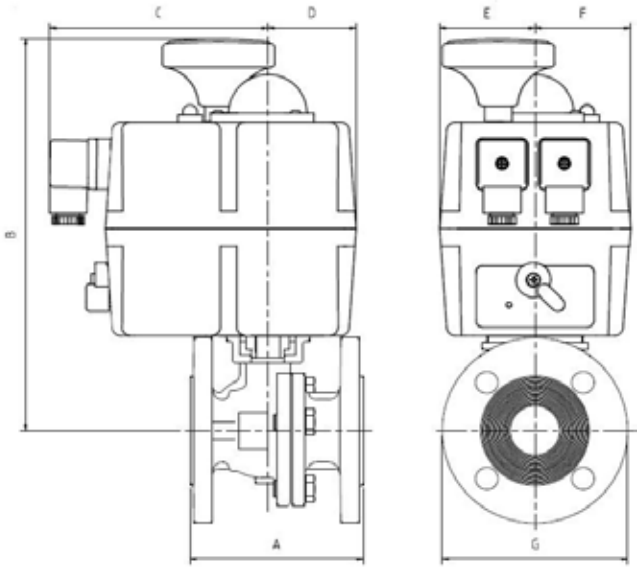
For valve and actuator specifications refer to: FIG 380DD (Screwed), FIG 380DX (Socket Weld) and BOSS EA218 (Electric Actuators)
The BOSS 381-EA and BOSS 382-EA are supplied fully assembled and tested
Can be supplied failsafe (fail open or closed), or modulating (0-10V or 4-20mA). See our plug and play conversion kits (EA218 section)

Ball Valves - Manual and Actuated

Stainless Steel 2 Piece Flanged CLASS 150 with Electric Actuator

FIG 204-EA - with Electric Actuator

Dimensions



2 Piece Flanged CLASS 150 with Electric Actuator
With 110-240V AC/DC and 12-24V AC/DC options (Low voltage for Models 140 & 300 is 24V AC/DC)

Nominal Valve Size		Electric	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	Model 20	108	245	126	51	55	55	90
¾	20	Model 20	117	250	126	51	55	55	100
1	25	Model 20	127	258	126	51	55	55	110
1½	40	Model 35	165	249	126	51	55	55	125
2	50	Model 55	178	287	126	51	55	55	150
2½	65	Model 85	190	302	126	51	55	55	180
3	80	Model 140	203	364	128	107	107	107	190
4	100	Model 140	229	384	128	107	107	107	230
6	150	Model 300	394	417	128	107	107	107	280

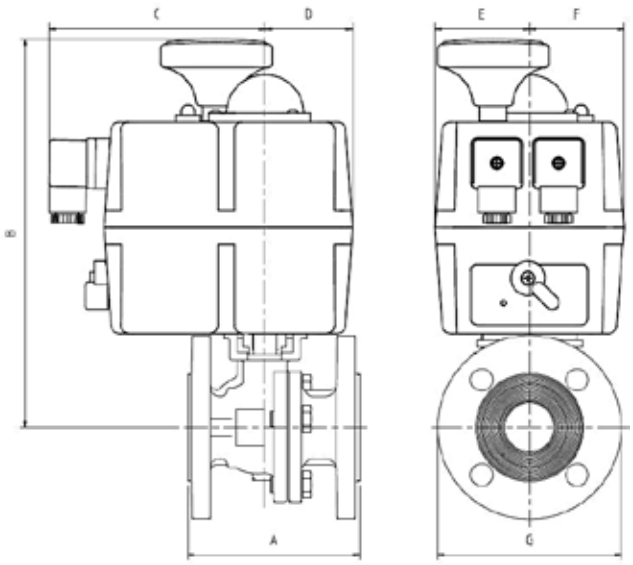
For valve and actuator specifications refer to: FIG 203B (2 Piece CLASS 150) and BOSS EA218 (Electric Actuators)
The BOSS 204-EA is supplied fully assembled and tested
Can be supplied failsafe (fail open or closed), or modulating (0-10V or 4-20mA). See our plug and play conversion kits (EA218 section)

Ball Valves - Manual and Actuated

Stainless Steel 2 Piece Flanged PN16 with Electric Actuator

FIG 205-EA - with Electric Actuator

Dimensions



2 Piece Flanged PN16 with Electric Actuator
With 110-240V AC/DC and 12-24V AC/DC options (Low voltage for Models 140 & 300 is 24V AC/DC)

Nominal Valve Size		Spring Return	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	Model 20	115	245	126	51	55	55	95
¾	20	Model 20	120	250	126	51	55	55	105
1	25	Model 20	125	258	126	51	55	55	115
1½	40	Model 35	140	249	126	51	55	55	150
2	50	Model 55	150	287	126	51	55	55	165
2½	65	Model 85	170	302	126	51	55	55	185
3	80	Model 140	180	364	128	107	107	107	200
4	100	Model 140	190	384	128	107	107	107	220
6	150	Model 300	350	417	128	107	107	107	285

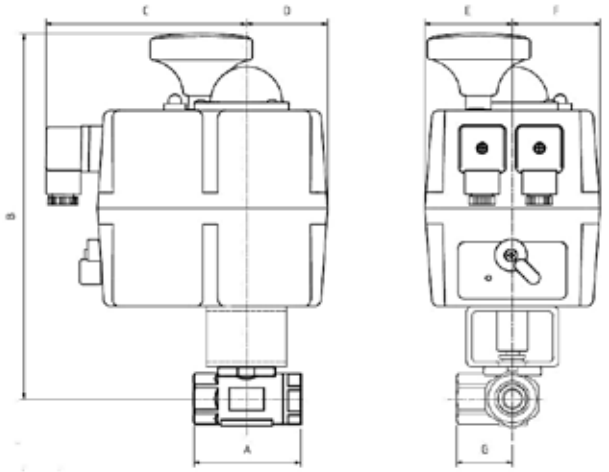
For valve and actuator specifications refer to: FIG 203H (2 Piece PN16) and BOSS™ EA218 (Electric Actuators)
The BOSS™ 205-EA is supplied fully assembled and tested
Can be supplied failsafe (fail open or closed), or modulating (0-10V or 4-20mA). See our plug and play conversion kits (EA218 section)

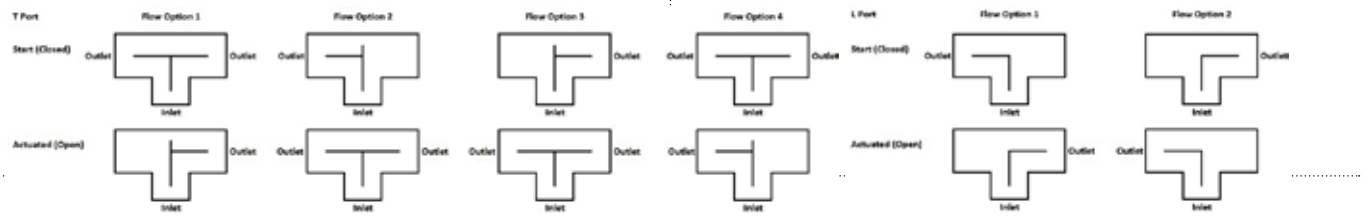
Ball Valves - Manual and Actuated

Stainless Steel 3-Way L & T Port with Electric Actuator

FIG B231L-EA / B232T-EA with Electric Actuator

Dimensions





3-Way L Port with Electric Actuator 3-Way T Port with Electric Actuator With 110-240V AC/DC and 12-24V AC/DC options									
Nominal Valve Size		Electric	A	B	C	D	E	F	G
in	mm	Actuator	mm	mm	mm	mm	mm	mm	mm
½	15	Model 20	67	231	126	51	55	55	35
¾	20	Model 20	78	236	126	51	55	55	39
1	25	Model 20	90	243	126	51	55	55	45
1¼	32	Model 35	102	251	126	51	55	55	51
1½	40	Model 35	109	281	126	51	55	55	54
2	50	Model 55	135	286	126	51	55	55	55

For valve and actuator specifications refer to: FIG B230L (L Port), FIG B230T (T Port) and BOSS EA218 (Electric Actuators)

The BOSS B231L-EA and BOSS B232T-EA are supplied fully assembled and tested

FIG B231L-EA offered with Flow Options 1 & 2

FIG B232T-EA offered with Flow Options 1, 2, 3 & 4

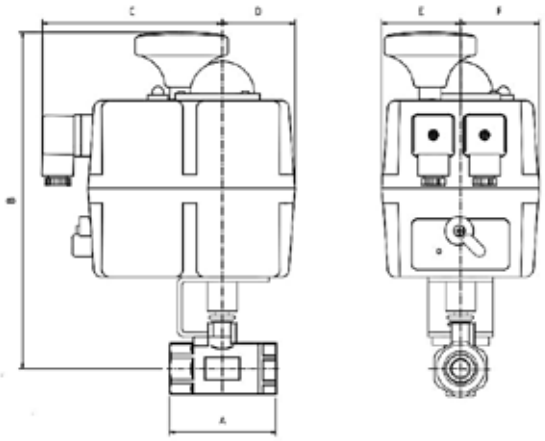
Can be supplied failsafe (fail open or closed). See our plug and play conversion kits (EA218 section)

Ball Valves - Manual and Actuated

Stainless Steel 2 Piece Screwed with Electric Actuator

FIG 241-EA - with Electric Actuator

Dimensions



2 Piece Screwed with Electric Actuator
With 110-240V AC/DC and 12-24V AC/DC options

Nominal Valve Size		Electric	A	B	C	D	E	F
in	mm	Actuator	mm	mm	mm	mm	mm	mm
¼	8	Model 20	52	228	126	51	55	55
⅜	10	Model 20	52	228	126	51	55	55
½	15	Model 20	64	229	126	51	55	55
¾	20	Model 20	75	231	126	51	55	55
1	25	Model 20	79	236	126	51	55	55
1¼	32	Model 20	101	240	126	51	55	55
1½	40	Model 20	109	250	126	51	55	55
2	50	Model 20	123	259	126	51	55	55

For valve and actuator specifications refer to: FIG LN240 (2 Piece Screwed) and BOSS EA218 (Electric Actuators)
The BOSS 241-EA is supplied fully assembled and tested
Can be supplied failsafe (fail open or closed), or modulating (0-10V or 4-20mA). See our plug and play conversion kits (EA218 section)

PN16 Fully Lugged		
	Ductile Iron Body	Extended Neck
Disc	DI Nickel Plated	316SS
Liner	NBR, EPDM	Bonded
Size	50mm-200mm lever 250mm-300mm gear	

With lever

PN16 Semi-lugged		
	Ductile Iron Body	Extended Neck
Disc	DI Nickel Plated	316SS
Liner	NBR, EPDM	Bonded
Size	50mm-200mm lever 250mm-300mm gear	

With lever

With gear

With gear

Butterfly Valves
Ductile Iron Butterfly Valves

Resilient Liner Materials

EPDM

EPDM is a terpolymer elastomer made from ethylene-propylene diene monomer. EPDM has good abrasion and tear resistance and offers excellent chemical resistance to a variety of acids and alkalis. It is susceptible to attack by oil and is not recommended for applications involving petroleum oils, strong acids, or strong alkalis. It should not be used for compressed air lines. It has exceptionally good weather ageing and ozone resistance and has fairly good resistance to ketones and alcohols.

BUNA-N (Nitrile) (NBR)

Buna-N is a general-purpose oil resistant polymer known as Nitrile rubber. It is a copolymer of butadiene and acrylonitrile. It has good resistance to hydraulic fluid, oil, water, and solvents. It shows good tensile strength and abrasion resistance while displaying good compression set. It is not recommended for highly polar solvents such as acetone and methyl ethyl ketone nor in chlorinated hydrocarbons, ozone or nitro hydrocarbons.

Liner Material Temperature Range

Liner Material	Temperature
EPDM	-20 to +120ºC*
BUNA-N (Nitrile)	0 to +70ºC

**Continuous service temperature range 0 to +90ºC*

BOSS™ designs utilise proprietary compound formulas for each elastomer. They provide the right combination of seat compression, abrasion and chemical resistance to match a broad range of applications.

Note: Elastomeric seat materials are not suitable for steam service

Specifications

BOSS™ Butterfly valves are designed and manufactured to provide maximum performance on recommended service applications at the lowest possible initial and life cycle cost. They meet or exceed the following standards developed through research, laboratory tests and years of experience.

Manufacturing Specifications

- Industrial Butterfly Valves — BSEN 593 : 2009 (Old Standard BS5155)
- Face-to-Face — BSEN 558 : 2008
- Flanges — BSEN 1092 - 2 : 1999

WRAS Approval

All EPDM seat BOSS™ butterfly valves with stainless steel discs have WRAS approval for sizes 2in (50mm) through to 12in (300mm) inclusive.

General Index - BOSS™ Ductile Iron Butterfly Valves

Size	LUGGED		SEMI-LUGGED	
	BOSS™ Code	BSS Code	BOSS™ Code	BSS Code
50mm	16LNB	36530509	16SNB	36530103
65mm	16LNB	36530520	16SNB	36530114
80mm	16LNB	36530531	16SNB	36530125
100mm	16LNB	36530542	16SNB	36530136
125mm	16LNB	36530553	16SNB	36530147
150mm	16LNB	36530564	16SNB	36530158
200mm	16LNB	36530575	16SNB	36530169
200mm	G16LNB	36532107	G16SNB	36532118
250mm	G16LNB	36530586	G16SNB	36532129
300mm	G16LNB	36530597	G16SNB	36532140
50mm	16LNBY	36531201	–	–
65mm	16LNBY	36531212	–	–
80mm	16LNBY	36531223	–	–
100mm	16LNBY	36531234	–	–
125mm	16LNBY	36531245	–	–
150mm	16LNBY	36531256	–	–
200mm	16LNBY	36531267	–	–
200mm	G16LNBY	36532151	–	–
250mm	G16LNBY	36532162	–	–
300mm	G16LNBY	36532173	–	–
50mm	16LSB	36530701	16SSB	36530306
65mm	16LSB	36530712	16SSB	36530317
80mm	16LSB	36530723	16SSB	36530328
100mm	16LSB	36530734	16SSB	36530339
125mm	16LSB	36530745	16SSB	36530350
150mm	16LSB	36530756	16SSB	36530361
200mm	16LSB	36530767	16SSB	36530372
200mm	G16LSB	36532214	G16SSB	36532184
250mm	G16LSB	36530778	G16SSB	36532195
300mm	G16LSB	36530789	G16SSB	36532203
50mm	16LSE	36530605	16SSE	36530210
65mm	16LSE	36530616	16SSE	36530221
80mm	16LSE	36530627	16SSE	36530232
100mm	16LSE	36530638	16SSE	36530243
125mm	16LSE	36530649	16SSE	36530254
150mm	16LSE	36530660	16SSE	36530265
200mm	16LSE	36530671	16SSE	36530276
200mm	G16LSE	36532258	G16SSE	36532225
250mm	G16LSE	36530682	G16SSE	36532236
300mm	G16LSE	36530693	G16SSE	36532247

Code Number System

1	2	3	4	5	6
	16	L	S	E	

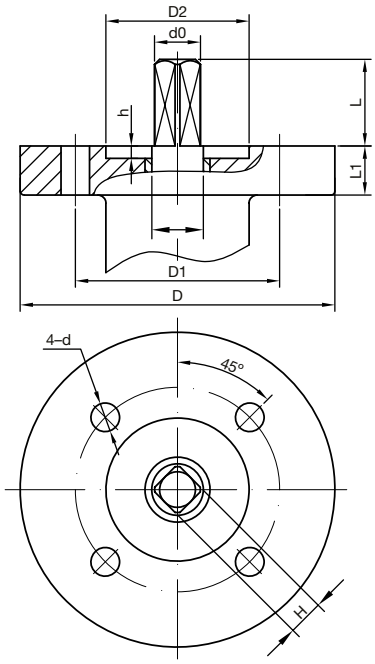
		Code
1	**Operator**	
	Lever	None
	Gear	G
2	**Pressure**	
	16 bar	16
3	**Series Style**	
	Lugged	L
	Semi-lugged	S
4	**Disc/Stem**	
	Nickel Plated	N
	316 Stainless Steel	S
5	**Liner**	
	BUNA	B
	EPDM	E
6	**Lever Colour**	
	Blue	None
	Yellow	Y

Butterfly Valves
Ductile Iron Butterfly Valves

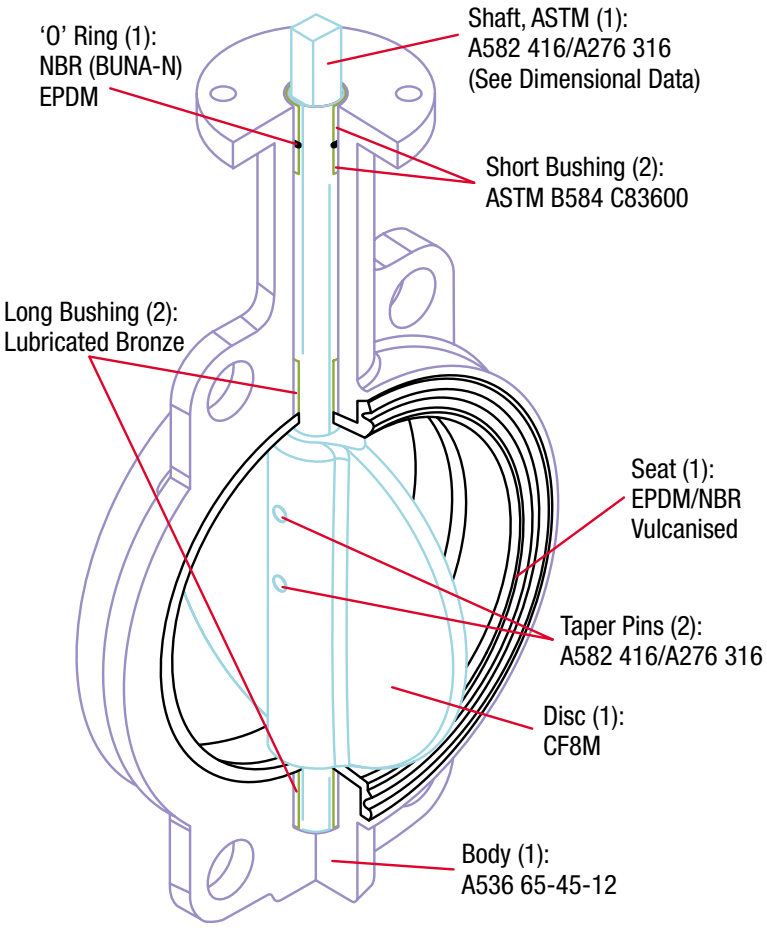
Chemical Resistance Guide				
Fluid/Material	**Disc**		**Seat**	
	Ductile	**316**	**NBR**	**EPDM**
Acetic Acid (10%)	Poor	Excellent	Very Poor	Good
Air	Excellent	Excellent	Excellent	Excellent
Ammonia (anhydrous liquid)	Good	Excellent	Poor	Good
Ammonia (solution)	Very Poor	Excellent	Good	Good
Ammonium Sulphate	Very Poor	Good	Good	Good
Animal Oil	Excellent	Excellent	Excellent	Good
Calcium Carbonate	Poor	Excellent	Good	Good
Carbonic Acid	Poor	Excellent	Good	Good
Chlorinated Water <3500 ppm	Very Poor	Excellent	Poor	Poor
Deionised Water	Very Poor	Excellent	Good	Good
Ethane	Good	Good	Excellent	Very Poor
Ethyl Alcohol (Ethanol)	Good	Excellent	Good	Good
Freon 12	Good	Excellent	Good	Good
Gasoline (refined/unleaded)	Good	Excellent	Poor	Very Poor
Glycols	Excellent	Excellent	Excellent	Excellent
Hydrochloric Acid	Very Poor	Very Poor	Poor	Poor
Hydrogen Gas (cold)	Excellent	Excellent	Good	Good
Lubricating Oil (petroleum based)	Excellent	Excellent	Excellent	Very Poor
Methyl Alcohol (Methanol)	Good	Excellent	Good	Excellent
Mineral Oil	Good	Excellent	Excellent	Very Poor
Natural Gas	Excellent	Excellent	Good	Very Poor
Oxygen Gas (cold)	Good	Excellent	Poor	–
Petroleum Oil (refined)	Good	Good	Good	Very Poor
Propane Gas	Good	Excellent	Excellent	Very Poor
Sea Water	Very Poor	Good	Excellent	Excellent
Sodium Hypochlorite	Very Poor	Very Poor	Very Poor	Very Poor
Soybean Oil	Poor	Excellent	Excellent	Poor
Sulphuric Acid <30%	Very Poor	Good	Poor	Good
Sulphuric Acid (50%)	Very Poor	Poor	Very Poor	Poor
Sulphuric Acid (70%)	Very Poor	Poor	Very Poor	Poor
Sulphurus Acic Sat'd	Very Poor	Good	Very Poor	Very Poor
Steam Low and Med. Pressure	Excellent	Excellent	Very Poor	Very Poor
Vegetable Oil	Very Poor	Excellent	Good	Very Poor
Water (hot 100ºC)	Poor	Excellent	Very Poor	Good

These performance data have been developed from testing, customer field reports and/or in-house testing. Properties/applications shown are typical. Your specific application should not be undertaken without independent study and evaluation for suitability. While the utmost care has been used in compiling this data, we assume no responsibility for error.

BOSS™ Butterfly Valves PN16



Size 50mm~300mm



Semi-lugged Style

Bare Stem Dimensional Data for Actuation

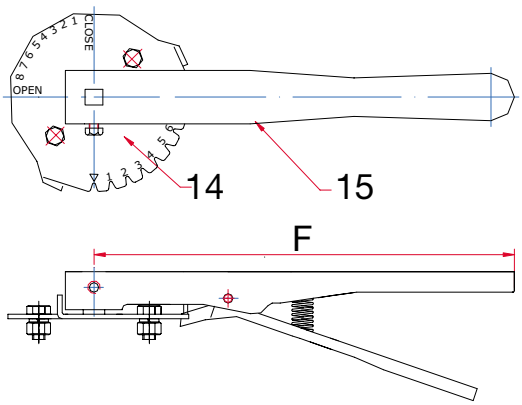
Dimensions 50mm-300mm

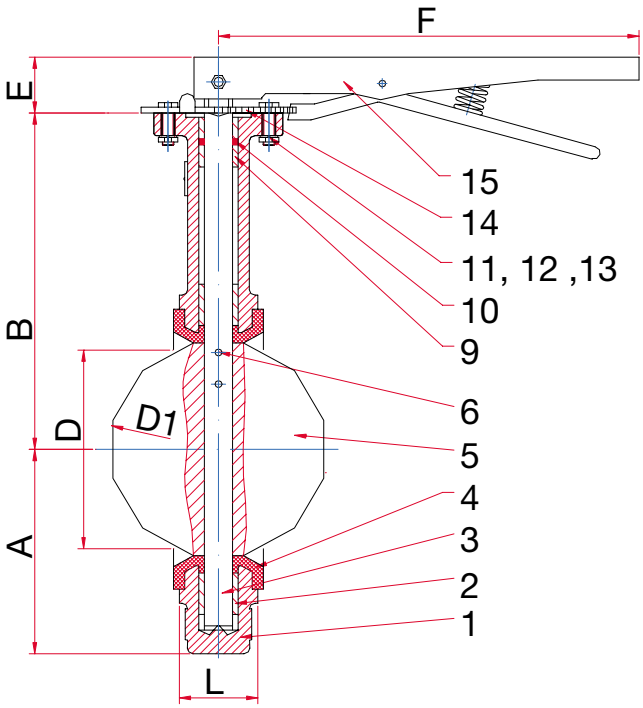
Mounting	Size		D	D1	D2	d0	H	L	L1	h	d	Bolt
	DN	in										
F05	50	2	65	50	35	12.1	9	32	12	4	7	M6
	65	2½	65	50	35	12.1	9	32	13	4	7	
	80	3	65	50	35	12.1	9	32	14	4	7	
F07	100	4	90	70	55	14.1	11	32	16	4	10	M8
	125	5	90	70	55	18.1	14	32	14	4	10	
	150	6	90	70	55	18.1	14	32	14	4	10	
F10	200	8	125	102	70	22.2	17	45	14	4	12	M10
	250	10	125	102	70	28.2	22	45	16	4	12	
F12	300	12	150	125	85	28.2	22	45	20	4	14	M12

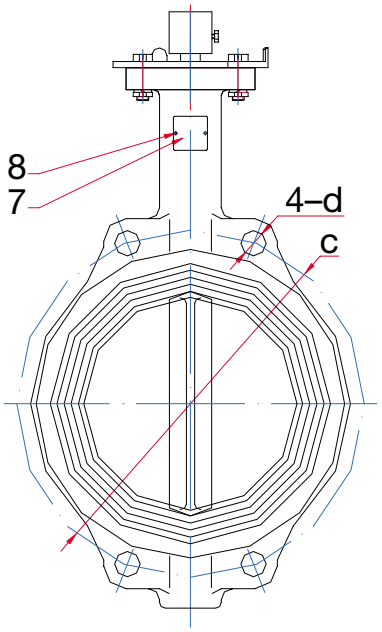
Butterfly Valves
Ductile Iron Butterfly Valves

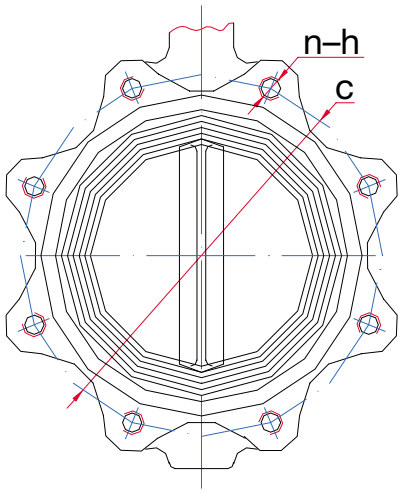
BOSS™ PN16 Butterfly Valves – Exploded View

Ductile iron body, extended neck, ISO mounting pad, bonded seatline, lever operated, 50-200mm lugged or semi-lugged.









Dimensions mm							
Size	A	D1	E	B	F	L	D
50	80	52.88	32	161	267	43	32.3
65	89	64.49	32	175	267	46	46.1
80	95	78.84	32	181	267	46	64.4
100	114	104.04	32	200	267	52	86.3
125	127	123.32	32	213	267	56	110.6
150	139	155.58	32	226	267	56	134.8
200	175	202.46	45	260	359	60	192.4

Flange Bolting Data/Weights									
Size mm	c	d	h	n	Semi-lugged length	Lug length	Stud bolt length	Lug kg	Semi lug kg
50	125	19	M16	4	110	40	130	4.6	3.9
65	145	19	M16	4	120	45	140	5.9	4.7
80	160	19	M16	8	120	45	140	6.1	5.1
100	180	19	M16	8	130	50	150	10	6.9
125	210	19	M16	8	130	50	150	12.6	9.7
150	240	23	M20	8	140	50	165	16.1	11
200	295	23	M20	12	150	55	175	25	19.5

Note
BOSS™ fully lugged style butterfly valves are rated for deadend service to full working pressure of the valve with the downstream flange removed. In deadend service exceeding 96 hours, a downstream flange is recommended.

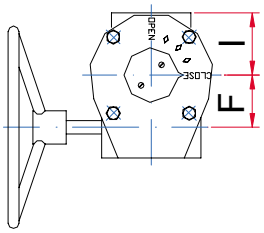
Material List		
Item	Part Name	Specification
1	Body	Ductile Iron (A536Gr.65-45-12)
2	Long Bushing	ASTM B584 C83600
3	Stem	ASTM A582 416/A276 316
4	Seat	EPDM/NBR, vulcanised
5	Disc	ASTM A351 CF8M
6	Taper Pin	ASTM A582 416/A276 316
7	Nameplate	Aluminium
8	Rivet	Aluminium
9	Short Bushing	ASTM B584 C83600
10	'O' Ring	NBR
11	Bolts	Steel
12	Nuts	Steel
13	Spacer	AISI1566
14	Latchplate	Steel
15	Handle	Ductile Iron

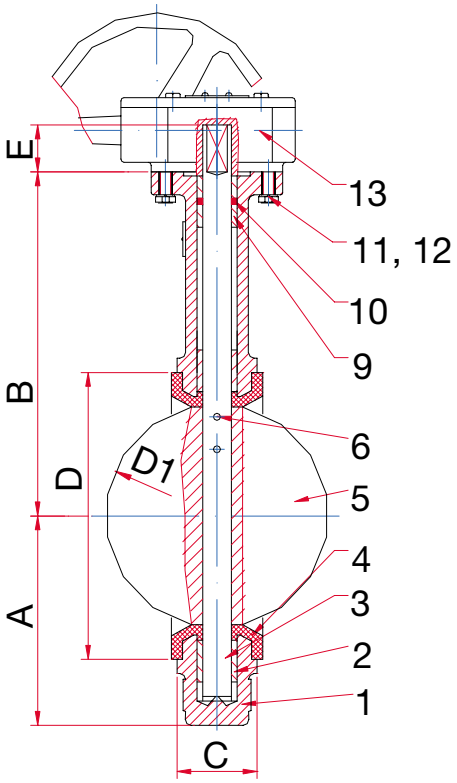
The rubber of seat is vulcanised to the body

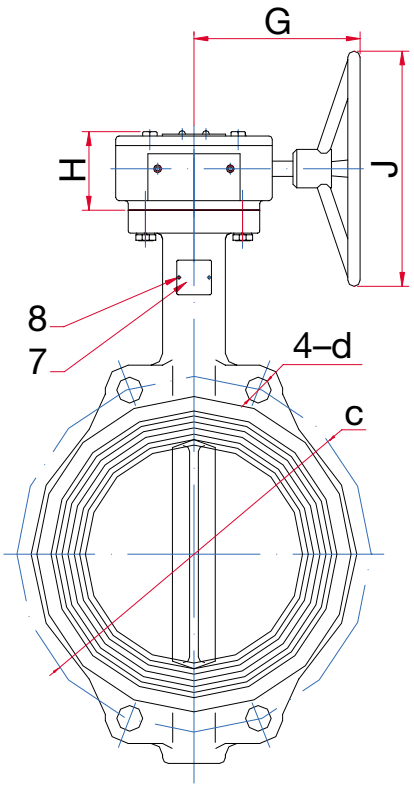
Butterfly Valves
Ductile Iron Butterfly Valves

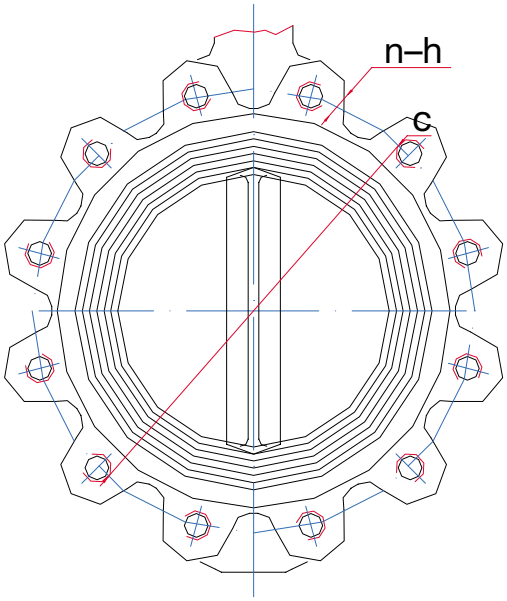
BOSS™ PN16 Butterfly Valves – Exploded View

Ductile iron body, extended neck, ISO mounting pad, bonded seatline, lever operated, 200-200mm lugged or semi-lugged.









Dimensions (mm)											
Size	**A**	**B**	**C**	**D**	**D1**	**E**	**F**	**G**	**H**	**I**	**J**
200	175	260	60	192.4	202.46	45	90	238	85	87	300
250	203	292	68	241.7	250.47	45	90	238	85	87	300
300	242	337	78	291.8	311.55	45	116	227	86	82	300

Flange Bolting Data/Weights									
Size mm	**c**	**d**	**h**	**n**	**Semi-lugged length**	**Lug length**	**Stud bolt length**	**Lug kg**	**Semi lug kg**
200	295	22.1	M20	12	150	55	175	44.9	37.6
250	355	28.2	M24	12	160	60	185	44.9	37.6
300	410	28.2	M24	12	170	65	200	61.5	50.7

Note
BOSS™ fully lugged style butterfly valves are rated for deadend service to full working pressure of the valve with the downstream flange removed. In deadend service exceeding 96 hours, a downstream flange is recommended.

Material List		
Item	**Part Name**	**Specification**
1	Body	Ductile Iron (A536Gr.65-45-12)
2	Long Bushing	ASTM B584 C83600
3	Stem	ASTM A582 416/A276 316
4	Seat	EPDM/NBR, vulcanised
5	Disc	ASTM A351 CF8M
6	Taper Pin	ASTM A582 416/A276 316
7	Nameplate	Aluminium
8	Rivet	Aluminium
9	Short Bushing	ASTM B584 C83600
10	'O' Ring	NBR
11	Bolts	Steel
12	Nuts	Steel
13	Spacer	AISI1566
14	Latchplate	Steel
15	Handle	Ductile Iron

The rubber of seat is vulcanised to the body

Butterfly Valves
Ductile Iron Butterfly Valves

Flow Data - Cv Values for BOSS™ Butterfly Valves

TEDA – Standard Butterfly Valve Flow Rate Cv* Values

Size		Cv value when valve at different opening angle								
inch	mm	10º	20º	30º	40º	50º	60º	70º	80º	90º
2	50	0.4	18.9	45.4	90.8	170.3	242.3	340.7	473.2	511.0
2½	65	0.8	30.3	75.7	140.1	246.1	371.0	545.1	772.2	832.8
3	80	1.1	45.4	83.3	147.6	265.0	439.1	692.7	1041.0	1143.2
4	100	1.9	64.4	136.3	295.3	526.2	870.6	1377.9	2066.8	2271.2
5	125	3.0	109.8	230.9	503.5	897.1	1483.9	2347.0	3520.4	3868.7
6	150	7.6	170.3	359.6	776.0	1385.5	2290.2	3626.4	5439.6	6045.3
8	200	11.4	336.9	711.7	1544.4	2752.0	4550.1	7203.6	10803.6	11871.0
10	250	15.1	571.6	1211.3	2627.1	4682.6	7748.7	12264.7	18393.3	20214.1
12	300	18.9	885.8	1873.8	4058.0	7233.9	11969.5	18946.0	28417.1	31229.6

Note:
1. The volume calculated by adjacent Cv data is litres per minute
2. The calculation for adjacent Cv value is based on the following unit:
   Pressure Difference between inlet and outlet of the valve in psi

Flow Coefficiency of Butterfly Valve: Cv Value
Cv Value is calculated and defined as follows:

$$Cv = Q\sqrt{\frac{G}{\Delta P}}$$

Where:
- Q = fluid volume that passes through the valve per minute (litres/min)
- ΔP = pressure difference between import and export of the valve (psi)
- G = density of fluid.

With the above expression, you may calculate the flow volume that passes through the valve or pressure loss between the two ends of the valve.

Example 1
A 6in butterfly valve at 70% opening with a fluid density of 0.8 passing through the valve and a volume of 4542.8 litres/min, gives a pressure loss between the two ends of

$$\Delta P = \frac{GQ^2}{Cv^2} = \frac{0.8 \times 4542.8^2}{3626.4^2} = 1.26\text{psi}$$

Example 2
A 10º butterfly valve at 90% opening, with a pressure loss of 0.6psi between the two ends of the valve, and with a fluid of 0.8 density, the flow volume passing through the valve would be

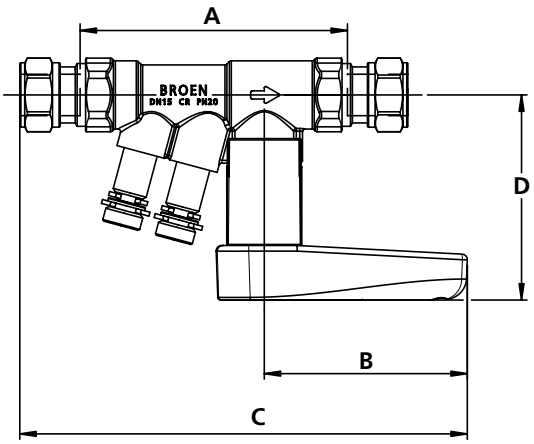
$$Q = Cv\sqrt{\frac{\Delta P}{G}} = 20214.1 \times \sqrt{\frac{0.6}{0.8}} = 20214.1 \times 0.866 = 17505.41 \text{ litres}$$

Balancing Valves

FIG 900SC Venturi Commissioning Valve (FODRV) Cu x Cu Compression DN15-DN50

BOSS™ 900SC Venturi FODRV DN15-50

Dimensions



BOSS™ 900SC

Weights & Dimensions – FODRV Cu x Cu Compression							
Size DN	Nominal Size	A mm	B mm	C mm	D mm	Weight kg	Product Code
15L	15mm	99	75	164	76	0.541	22073295
15S	15mm	99	75	164	76	0.541	22073303
15H	15mm	99	75	164	76	0.541	22073443
20L	22mm	105	75	170	79	0.717	22073369
20S	22mm	105	75	170	79	0.717	22073314
20H	22mm	105	75	170	79	0.717	22073454
25S	28mm	118	75	177	73	0.998	22073325
25H	28mm	118	75	177	83	0.998	22073465
32H	35mm	135	122	241	109	1.806	22073336
40H	42mm	149	122	253	113	2.508	22073347
50H	54mm	167	122	265	120	3.818	22073358

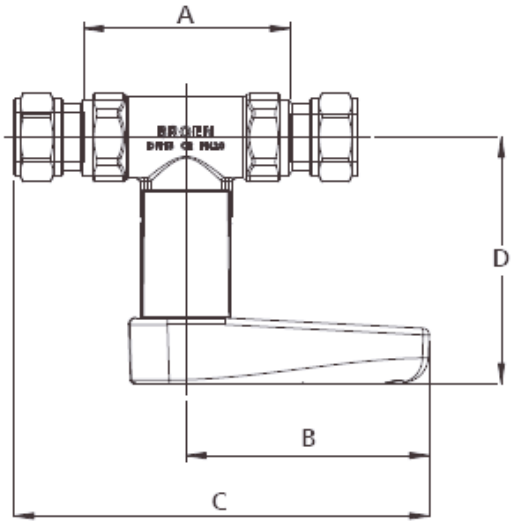
Specification

The commissioning station and DRV incorporates a characterised regulating needle combined with an isolating ball valve. The double regulating feature allows the valve to be isolated without movement of the set regulation point. The needle is regulated using an allen key. The valve is suitable for mounting in any orientation.

The flow rate is measured using a fixed orifice Venturi cartridge with double seal test points inserted into the valve body. These functions are incorporated into a single fitting which contains any up and down stream lengths required for laminar flow conditions except when installed in close proximity to a pump. The commissioning valve should produce a signal of between 10 – 60kPa except on the ultra low flow valves where the signal should be between 1 – 4.7kPa. The valve is suitable for mounting with the test points pointing down. The commissioning station has an accuracy of +/-3%.

Balancing Valves
FIG 901SC Venturi (DRV)
Cu x Cu Compression DN15-DN50

Dimensions



BOSS™ 901SC

BOSS™ 901SC Venturi DRV DN15-50

Weights & Dimensions – DRV Cu x Cu Compression							
Size DN	Nominal Size	A mm	B mm	C mm	D mm	Weight kg	Product Code
15L	15mm	62	75	128	76	0.366	22074168
15S	15mm	62	75	128	76	0.366	22074209
20L	22mm	67	75	132	79	0.512	22074190
20S	22mm	67	75	132	79	0.512	22074220
25S	28mm	81	75	140	83	0.798	22074231
32S	35mm	93	122	199	109	1.546	22074242
40S	42mm	107	122	211	113	2.118	22074253
50S	54mm	126	122	224	120	3.248	22074264

Flow Measurement

Flow measurements are via the Venturi nozzle. The BOSS™ Venturi has two test points (P/T plugs). The high pressure test point is identified by the RED retaining clip and the low pressure test point is identified by the BLUE retaining clip. The pressure differential measured between these test points can be used to calculate the actual flow through the Venturi. This differential can be measured using a flow meter or other measuring device. This is converted into a flow rate of litres per second (l/s) or metres cubed per hour (m^3/h) either electronically or using a calculation formula.

Valve Sizing

Sizing disc available on request via your local BSS branch or the BOSS™ Technical Team on 0116 245 5940.

Balancing Valves

Technical Specification – Cu x Cu Compression		
	FODRV	DRV
Pressure & Temperature Classification		
Temperature Max (Max)	120ºC	135ºC
Pressure (Max)	5 bar	5 bar
Materials of Construction		
Valve body	DZR Brass CW602N CuZn36Pb2As	
Spindle	DZR Brass CW602N CuZn36Pb2As	
Ball & adjusting screw	DZR Brass CW602N CuZn36Pb2As Chromium Plated	
Gaskets	PTFE	
O-rings (seals)	EPDM	
Handle	Polyamide P6.6 30% Glass Reinforced	
Measuring P/T plug	DZR Brass CW602N CuZn36Pb2As	
Rubber in P/T plug	EPDM	
Markings on Valves		
Valve Body (Compression & Female)	DN & PN20	DN & PN20
Valve Body (Pressfit)	DN & PN25	DN & PN25
Handle	DN & Kvs Value	DN
Connection		
Compression	EN1254-2	
Pressure Test According to	ISO5208:1993E	

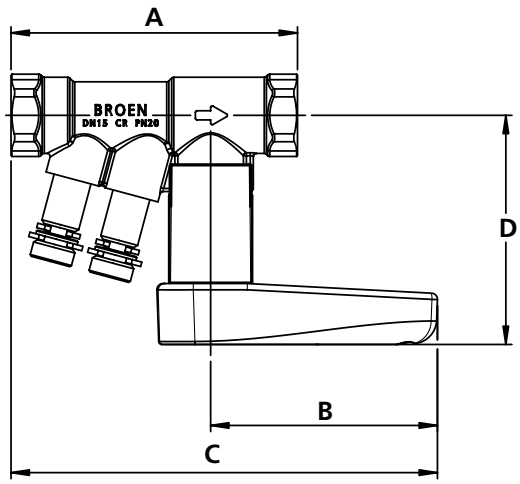
Flow Range – Cu x Cu Compression Connections								
			FODRV				DRV	
Valve Size		Kvs	Flow Rates*	Signal	Head Loss Kvs	Loss Factor	Valve Size	Kvs
DN	Description	m^3h	l/s	kPa	m^3h		DN	m^3h
15	Ultra Low Flow	0.163	0.0076 to 0.035	1.2 to 59.8	0.226	0.52	–	–
	Low Flow	0.359	0.0172 to 0.074	1 to 55	0.629	0.33	15L	1.62
	Standard Flow	0.746	0.036 to 0.148	9 to 51	1.62	0.21	15S	2.11
	High Flow	1.56	0.074 to 0.325	10 to 56	2.49	0.39	–	–
20	Low Flow	0.746	0.036 to 0.148	9 to 51	1.43	0.27	20L	4.26
	Standard Flow	1.56	0.074 to 0.325	10 to 56	2.82	0.31	20S	4.81
	High Flow	2.95	0.142 to 0.603	10 to 54	5.72	0.27	–	–
25	Standard Flow	2.95	0.142 to 0.603	10 to 54	7.54	0.15	25S	9.94
	High Flow	6.01	0.29 to 1.25	10 to 56	12.10	0.25	–	–
32	High Flow	6.01	0.29 to 1.25	10 to 56	13.20	0.21	32S	13.30
40	High Flow	9.2	0.44 to 1.88	10 to 54	22.00	0.17	40S	23.30
50	High Flow	17.1	0.82 to 3.51	10 to 55	36.00	0.23	50S	35.30

** The flow rates given in the table are for water flow in steel pipes which provide a pressure loss of 100 to 500 Pa per metre of pipe.*

Balancing Valves

FIG 900S Venturi Commissioning Station (FODRV) Female x Female DN15-DN50

Dimensions



BOSS™ 900S

BOSS™ 900S Venturi FODRV DN15-50

Specification

The commissioning station and DRV incorporates a characterised regulating needle combined with an isolating ball valve. The double regulating feature allows the valve to be isolated without movement of the set regulation point. The needle is regulated using an allen key. The valve is suitable for mounting in any orientation.

The flow rate is measured using a fixed orifice Venturi cartridge with double seal test points inserted into the valve body. These functions are incorporated into a single fitting which contains any up and down stream lengths required for laminar flow conditions except when installed in close proximity to a pump. The commissioning valve should produce a signal of between 10 – 60kPa except on the ultra low flow valves where the signal should be between 1 – 4.7kPa. The valve is suitable for mounting with the test points pointing down. The commissioning station has an accuracy of +/-3%.

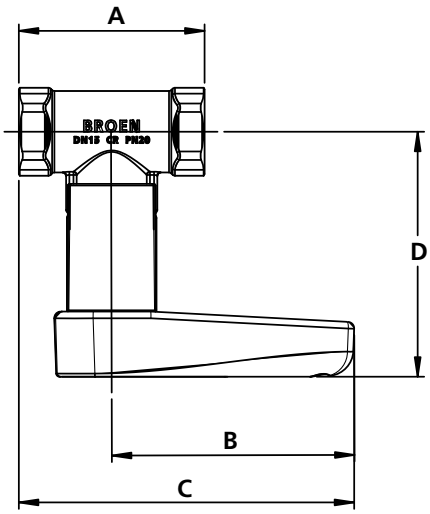
Weights & Dimensions – FODRV Female x Female

Size DN	Nominal Size	A mm	B mm	C mm	D mm	Weight kg	Product Code
15UL	½in	94	75	144	76	0.405	22073188
15L	½in	94	75	140	76	0.405	22073199
15S	½in	94	75	140	76	0.495	22073207
15H	½in	94	75	140	76	0.495	22073410
20L	¾in	100	75	144	79	0.405	22073273
20S	¾in	100	75	144	79	0.495	22073218
20H	¾in	100	75	144	79	0.495	22073421
25S	1in	112	75	150	83	0.67	22073229
25H	1in	112	75	150	83	0.67	22073432
32H	1¼in	130	122	208	109	1.27	22073240
40H	1½in	140	122	213	113	1.66	22073251
50H	2in	156	122	221	120	2.37	22073262

Balancing Valves
FIG 901S Venturi (DRV)
Female x Female DN15-DN50

BOSS™ 901S Venturi DRV DN15-50

Dimensions



BOSS™ 901S

Weights & Dimensions – DRV Female x Female							
Size DN	Nominal Size	A mm	B mm	C mm	D mm	Weight kg	Product Code
15L	½in	57	75	104	76	0.23	22073967
15S	½in	57	75	104	76	0.23	22074006
20L	¾in	62	75	106	79	0.29	22073989
20S	¾in	62	75	106	79	0.29	22074017
25S	1in	75	75	113	83	0.47	22074028
32S	1¼in	88	122	166	109	1.01	22074039
40S	1½in	122	171	113	113	1.24	22074050
50S	2in	115	122	180	120	1.80	22074061

Flow Measurement

Flow measurements are via the Venturi nozzle. The BOSS™ Venturi has two test points (P/T plugs). The high pressure test point is identified by the RED retaining clip and the low pressure test point is identified by the BLUE retaining clip. The pressure differential measured between these test points can be used to calculate the actual flow through the Venturi. This differential can be measured using a flow meter or other measuring device. This is converted into a flow rate of litres per second (l/s) or metres cubed per hour (m^3/h) either electronically or using a calculation formula.

Valve Sizing

Sizing disc available on request via your local BSS branch or the BOSS™ Technical Team on 0116 245 5940.

Balancing Valves

Balancing Valves

Technical Specification – Female x Female		
	FODRV	DRV
Pressure & Temperature Classification		
Temperature Max (Max)	120ºC	135ºC
Pressure (Max)	25 bar	25 bar
Materials of Construction		
Valve body	DZR Brass CW602N CuZn36Pb2As	
Spindle	DZR Brass CW602N CuZn36Pb2As	
Ball & adjusting screw	DZR Brass CW602N CuZn36Pb2As Chromium Plated	
Gaskets	PTFE	
O-rings (seals)	EPDM	
Handle	Polyamide P6.6 30% Glass Reinforced	
Measuring P/T plug	DZR Brass CW602N CuZn36Pb2As	
Rubber in P/T plug	EPDM	
Markings on Valves		
Valve Body (Compression & Female)	DN & PN20	DN & PN20
Valve Body (Pressfit)	DN & PN25	DN & PN25
Handle	DN & Kvs Value	DN
Connection		
Female thread	ISO 7/1 Parallel	
Pressure Test According to	ISO5208:1993E	

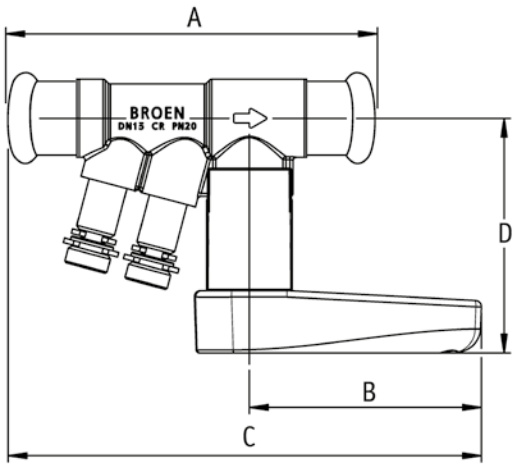
Flow Range – Female x Female Connections								
			FODRV				DRV	
Valve Size		Kvs	Flow Rates*	Signal Kvs	HeadLoss Factor	Loss Size	Valve	Kvs
DN	Description	m^3h	l/s	kPa	m^3h		DN	m^3h
15	Ultra Low Flow	0.163	0.0072 - 0.0035	1.2-59.8	0.226	0.52	–	–
	Low Flow	0.359	0.01 - 0.074	1 - 55	0.629	0.33	15L	1.62
	Standard flow	0.746	0.062 - 0.148	9 - 51	1.62	0.21	15S	2.11
	High Flow	1.56	0.138 - 0.325	10 - 56	2.49	0.39	–	–
20	Low Flow	0.746	0.062 - 0.148	9 - 51	1.43	0.27	20L	4.26
	Standard flow	1.56	0.138 - 0.325	10 - 56	2.82	0.31	20S	4.81
	High Flow	2.95	0.258 - 0.603	10 - 54	5.72	0.27	–	–
25	Standard flow	2.95	0.258 - 0.603	10 - 54	7.54	0.15	25S	9.94
	High Flow	6.01	0.54 - 1.25	10 - 56	12.10	0.25	–	–
32	High flow	6.01	0.54 - 1.25	10 - 56	13.20	0.21	32S	13.30
40	High flow	9.2	0.81 - 1.88	10 - 54	22.00	0.17	40S	23.30
50	High flow	17.1	1.52 - 3.51	10 - 55	36.00	0.23	50S	35.30

** The flow rates given in the table are for water flow in steel pipes which provide a pressure loss of 100 to 500 Pa per metre of pipe.*

Balancing Valves
FIG PS900S Venturi Commissioning Station (FODRV)
Pressfit Connections DN15-DN50

BOSS™ PS900S Venturi FODRV DN15-50

Dimensions



BOSS™ PS900S

Weights & Dimensions – FODRV Pressfit Connections							
Size DN	Nominal Size	A mm	B mm	C mm	D mm	Weight kg	Product Code
15/15UL	15	138	75	162	76	0.49	22073731
15/15L	15	138	75	162	76	0.49	22073506
15/15S	15	138	75	162	76	0.49	22073517
15/15H	15	138	75	162	76	0.49	22073528
15/18UL	15	138	75	162	76	0.49	22073742
15/18L	15	138	75	162	76	0.49	22073539
15/18S	15	138	75	162	76	0.49	22073550
15/18H	15	138	75	162	76	0.49	22073561
20/15L	20	143	75	166	79	0.51	22073572
20/15S	20	143	75	166	79	0.51	22073583
20/15H	20	143	75	166	79	0.51	22073594
20/18L	20	143	75	166	79	0.51	22073602
20/18S	20	143	75	166	79	0.51	22073613
20/18H	20	143	75	166	79	0.51	22073624
20/22L	20	147	75	166	79	0.52	22073635
20/22S	20	147	75	166	79	0.52	22073646
20/22H	20	147	75	166	79	0.52	22073657
25/28S	25	165	75	177	83	0.88	22073668
25/28H	25	165	75	177	83	0.88	22073679
32/35H	32	188	122	237	109	1.62	22073690
40/42H	40	194	122	240	113	2.18	22073709
50/54H	50	233	122	265	120	3.38	22073720

Specification

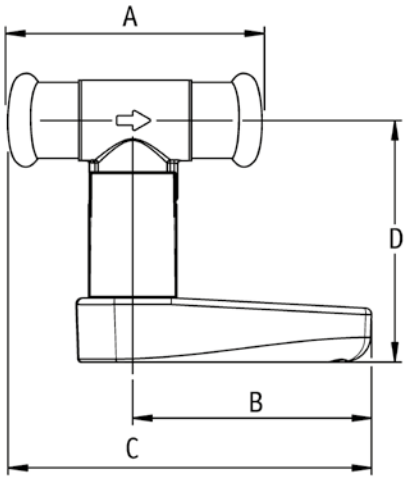
The commissioning station and DRV incorporates a characterised regulating needle combined with an isolating ball valve. The double regulating feature allows the valve to be isolated without movement of the set regulation point. The needle is regulated using an allen key. The valve is suitable for mounting in any orientation.

The flow rate is measured using a fixed orifice Venturi cartridge with double seal test points inserted into the valve body. These functions are incorporated into a single fitting which contains any up and down stream lengths required for laminar flow conditions except when installed in close proximity to a pump. The commissioning valve should produce a signal of between 10 – 60kPa except on the ultra low flow valves where the signal should be between 1 – 4.7kPa. The valve is suitable for mounting with the test points pointing down. The commissioning station has an accuracy of +/-3%.

Balancing Valves

FIG PS901S Venturi Commissioning Valve (DRV)
Pressfit Connections DN15-DN50

Dimensions



BOSS™ PS901S

BOSS™ PS901S Venturi DRV DN15-50

Weights & Dimensions – DRV Pressfit Connections							
Size DN	Nominal Size	A mm	B mm	C mm	D mm	Weight kg	Product Code
15/15L	15	101	75	126	76	0.31	22074305
15/15S	15	101	75	126	76	0.31	22074316
15/18L	15	101	75	126	76	0.31	22074327
15/18S	15	101	75	126	76	0.32	22074338
20/15L	15	105	75	128	79	0.39	22074349
20/15S	15	105	75	128	79	0.39	22074360
20/18L	15	105	75	128	79	0.39	22074371
20/18S	15	105	75	128	79	0.39	22074382
20/22L	20	109	75	128	79	0.4	22074393
20/22S	20	109	75	128	79	0.4	22074401
25/28S	25	128	75	140	83	0.68	22074412
32/35H	32	146	122	195	109	1.35	22074423
40/42H	40	172	122	198	113	1.77	22074434
50/54H	50	202	122	198	113	2.81	22074445

Flow Measurement

Flow measurements are via the Venturi nozzle. The BOSS™ Venturi has two test points (P/T plugs). The high pressure test point is identified by the RED retaining clip and the low pressure test point is identified by the BLUE retaining clip. The pressure differential measured between these test points can be used to calculate the actual flow through the Venturi. This differential can be measured using a flow meter or other measuring device. This is converted into a flow rate of litres per second (l/s) or metres cubed per hour (m^3/h) either electronically or using a calculation formula.

Valve Sizing

Sizing disc available on request via your local BSS branch or the BOSS™ Technical Team on 0116 245 5940.

Technical Specification – Pressfit Connections		
	FODRV	DRV
Pressure & Temperature Classification		
Temperature Max (Max)	110ºC	110ºC
Pressure Female (Max)	16 bar	16 bar
Materials of Construction		
Valve body	DZR Brass CW602N CuZn36Pb2As	
Spindle	DZR Brass CW602N CuZn36Pb2As	
Ball & adjusting screw	DZR Brass CW602N CuZn36Pb2As Chromium Plated	
Gaskets	PTFE	
O-rings (seals)	EPDM	
Handle	Polyamide P6.6 30% Glass Reinforced	
Measuring P/T plug	DZR Brass CW602N CuZn36Pb2As	
Rubber in P/T plug	EPDM	
Markings on Valves		
Valve Body (Compression & Female)	DN & PN20	DN & PN20
Valve Body (Pressfit)	DN & PN25	DN & PN25
Handle	DN & Kvs Value	DN
Connection		
Pressfit (bronze)	BS8537:2010	
Pressure Test According to	ISO5208:1993E	

Flow Range – Pressfit Connections

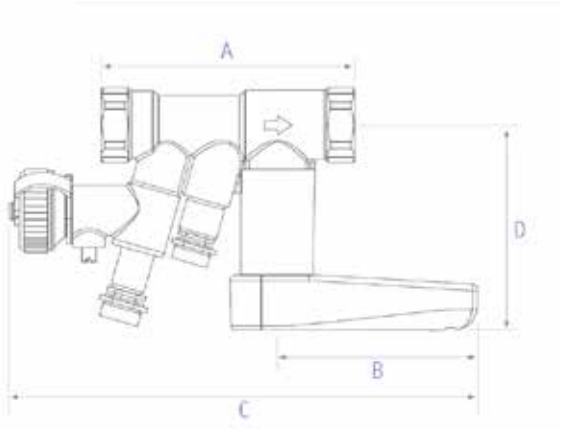
Valve Size		Kvs	FODRV Flow Rates*	Signal Kvs	HeadLoss Factor	Loss Size	DRV Valve	DRV Kvs
DN	Description	m^3h	l/s	kPa	m^3h		DN	m^3h
15	Ultra Low Flow	0.163	0.0072 - 0.035	3.0 - 59.8	0.226	0.52	–	–
	Low Flow	0.359	0.01 - 0.074	3.0 - 55	0.629	0.33	15L	1.62
	Standard flow	0.746	0.062 - 0.148	3.0 - 51	1.62	0.21	15S	2.11
	High Flow	1.56	0.138 - 0.325	3.0 - 56.5	2.49	0.39	–	–
15/18	Ultra Low Flow	0.163	0.0072 -0.035	3.0 - 59.8	0.229	0.52	–	–
	Low Flow	0.359	0.01 - 0.074	3.0 - 55	0.629	0.33	15/18L	1.62
	Standard Flow	0.746	0.062 - 0.148	3.0 - 51	1.620	0.210	15/18S	2.10
	High Flow	1.56	0.138 - 0.325	3.0 - 56.5	2.49	0.39	–	–
20	Low Flow	0.746	0.062 - 0.148	3.0 - 51	1.43	0.27	20/15L	4.26
	Standard flow	1.56	0.138 - 0.325	3.0 - 56.5	2.82	0.31	20/15S	4.79
	High Flow	2.95	0.258 - 0.603	3.0 - 54	5.72	0.27	–	–
20/18	Low Flow	0.746	0.062 - 0.148	3.0 - 51	1.43	0.27	20/18L	4.26
	Standard flow	1.56	0.138 - 0.325	3.0 - 56.5	2.82	0.31	20/18S	4.79
	High Flow	2.95	0.258 - 0.603	3.0 - 54	5.72	0.27	–	–
20/22	Low Flow	0.746	0.062 - 0.148	3.0 - 51	1.43	0.27	20/22L	4.26
	Standard flow	1.56	0.138 - 0.325	3.0 - 56.5	2.82	0.31	20/22S	4.81
	High Flow	2.95	0.258 - 0.603	3.0 - 54	5.72	0.27	–	–
25/28	Standard flow	2.95	0.258 - 0.603	3.0 - 54	7.54	0.15	25/28S	12.80
	High Flow	6.01	0.54 - 1.25	3.0 - 56	12.10	0.25	–	–
32/35	High flow	6.01	0.54 - 1.25	3.0 - 56	13.20	0.21	32/35S	13.28
40/42	High flow	9.2	0.81 - 1.88	3.0 - 54	22.00	0.17	40/42S	23.30
50/54	High flow	17.1	1.52 - 3.51	3.0 - 55	36.00	0.23	50/54S	35.30

* The flow rates given in the table are for water flow in steel pipes which provide a pressure loss of 100 to 500 Pa per metre of pipe.

Balancing Valves

FIG 903 Venturi Commissioning Valve with Drain

Dimensions



BOSS™ 903 Venturi

BOSS™ 903 Venturi

Specification

The commissioning station and DRV incorporates a characterised regulating needle combined with an isolating ball valve. The double regulating feature allows the valve to be isolated without movement of the set regulation point. The needle is regulated using an allen key. The valve is suitable for mounting in any orientation.

The flow rate is measured using a fixed orifice Venturi cartridge with double seal test points inserted into the valve body. These functions are incorporated into a single fitting which contains any up and down stream lengths required for laminar flow conditions except when installed in close proximity to a pump. The commissioning valve should produce a signal of between 10 – 60kPa except on the ultra low flow valves where the signal should be between 1 – 4.7kPa. The valve is suitable for mounting with the test points pointing down. The commissioning station has an accuracy of +/-3%.

Technical Specification – Female x Female / Pressfit Connection	
Pressure & Temperature Classification	
Max Temperature	120ºC
Min Temperature	-20ºC
Max Pressure	25 bar (Pressfit to 16 bar)
Materials of Construction	
Valve Body	DZR Brass CW602N
Ball and Needle	DZR Brass CW602N (chrome plated)
Valve Handle	Polyamide (PA6.6 30%GF)
Sealings	
O-rings	EPDM
Gaskets	PTFE
Test Point Sealings	Test Point Sealings EPDM
Markings on Valve	
Valve Body	DN, PN, Flow Direction
KV Measuring	(KV-Measuring)
Handle	DN, Flow Version

Weights & Dimensions – Female x Female

Size DN	Nominal Size	A mm	B mm	C mm	D mm	Weight kg	Product Code
15UL	15mm	94	75	174	76	0.55	22074508
15L	15mm	94	75	174	76	0.55	22074519
15S	15mm	94	75	174	76	0.55	22074530
15H	15mm	94	75	174	76	0.55	22074541
20L	20mm	100	75	174	79	0.65	22074552
20S	20mm	100	75	174	79	0.65	22074563
20H	20mm	100	75	174	79	0.65	22074574
25S	25mm	112	75	175	83	0.8	22074585
25H	25mm	112	75	175	83	0.8	22074596
32H	32mm	130	112	228	109	1.5	22074604
40H	40mm	140	122	234	113	1.7	22074615
50H	50mm	156	122	238	120	2.4	22074626

Balancing Valves

Flow Range – Female x Female / Pressfit Connections

Valve Size		Kvs	FODRV Flow Rates*	Signal Kvs	HeadLoss Factor	Loss Size	DRV Valve	DRV Kvs
DN	Description	m³h	l/s	kPa	m³h		DN	m³h
15	Ultra Low Flow	0.163	0.0076 - 0.035	3.0 - 59.8	0.226	0.52	–	–
	Low Flow	0.359	0.0172 - 0.074	3.0 - 55	0.629	0.33	15L	1.62
	Standard flow	0.746	0.036 - 0.148	3.0 - 51	1.62	0.21	15S	2.11
	High Flow	1.56	0.074 - 0.325	3.0 - 56.5	2.49	0.39	–	–
15/18	Ultra Low Flow	0.163	0.0076 -0.035	3.0 - 59.8	0.229	0.52	–	–
	Low Flow	0.359	0.0172 - 0.074	3.0 - 55	0.629	0.33	15/18L	1.62
	Standard Flow	0.746	0.036 - 0.148	3.0 - 51	1.620	0.210	15/18S	2.10
	High Flow	1.56	0.074 - 0.325	3.0 - 56.5	2.49	0.39	–	–
20	Low Flow	0.746	0.036 - 0.148	3.0 - 51	1.43	0.27	20/15L	4.26
	Standard flow	1.56	0.074 - 0.325	3.0 - 56.5	2.82	0.31	20/15S	4.79
	High Flow	2.95	0.142 - 0.603	3.0 - 54	5.72	0.27	–	–
20/18	Low Flow	0.746	0.036 - 0.148	3.0 - 51	1.43	0.27	20/18L	4.26
	Standard flow	1.56	0.074 - 0.325	3.0 - 56.5	2.82	0.31	20/18S	4.79
	High Flow	2.95	0.142 - 0.603	3.0 - 54	5.72	0.27	–	–
20/22	Low Flow	0.746	0.036 - 0.148	3.0 - 51	1.43	0.27	20/22L	4.26
	Standard flow	1.56	0.074 - 0.325	3.0 - 56.5	2.82	0.31	20/22S	4.81
	High Flow	2.95	0.142 - 0.603	3.0 - 54	5.72	0.27	–	–
25/28	Standard flow	2.95	0.142 - 0.603	3.0 - 54	7.54	0.15	25/28S	12.80
	High Flow	6.01	0.29 - 1.25	3.0 - 56	12.10	0.25	–	–
32/35	High flow	6.01	0.29 - 1.25	3.0 - 56	13.20	0.21	32/35S	13.28
40/42	High flow	9.2	0.44 - 1.88	3.0 - 54	22.00	0.17	40/42S	23.30
50/54	High flow	17.1	0.82 - 3.51	3.0 - 55	36.00	0.23	50/54S	35.30

* The flow rates given in the table are for water flow in steel pipes which provide a pressure loss of 100 to 500 kPa per metre of pipe.

Weights & Dimensions – Pressfit Connections

Size DN	Nominal Size	A mm	B mm	C mm	D mm	Weight kg	Product Code
15UL	15 x 15mm	145	75	174	76	0.63	22074637
15L	15 x 15mm	145	75	174	76	0.63	22074648
15S	15 x 15mm	145	75	174	76	0.63	22074659
15H	15 x 15mm	145	75	174	76	0.63	22074670
15UL	15 x 18mm	147	75	174	76	0.64	22074681
15L	15 x 18mm	147	75	174	76	0.64	22074692
15S	15 x 18mm	147	75	174	76	0.64	22074700
15H	15 x 18mm	147	75	174	76	0.64	22074711
20L	20 x 15mm	154	75	174	79	0.76	22074722
20S	20 x 15mm	154	75	174	79	0.76	22074733
20H	20 x 15mm	154	75	174	79	0.76	22074744
20L	20 x 18mm	151	75	174	79	0.76	22074755
20S	20 x 18mm	151	75	174	79	0.76	22074766
20H	20 x 18mm	151	75	174	79	0.76	22074777
20L	20 x 22mm	161	75	174	79	0.77	22074788
20S	20 x 22mm	161	75	174	79	0.77	22074799
20H	20 x 22mm	161	75	174	79	0.77	22074807
25S	25 x 28mm	187	75	175	83	1	22074818
25H	25 x 28mm	187	75	175	83	1	22074829
32H	32 x 35mm	251	112	228	109	1.78	22074840
40H	40 x 42mm	277	122	234	113	2.08	22074851
50H	50 x 54mm	313	122	238	120	3.07	22074862

Flow Measurement

Flow measurements are via the Venturi nozzle. The BOSS™ Venturi has two test points (P/T plugs). The high pressure test point is identified by the RED retaining clip and the low pressure test point is identified by the BLUE retaining clip. The pressure differential measured between these test points can be used to calculate the actual flow through the Venturi. This differential can be measured using a flow meter or other measuring device. This is converted into a flow rate of litres per second (l/s) or metres cubed per hour (m³/h) either electronically or using a calculation formula.

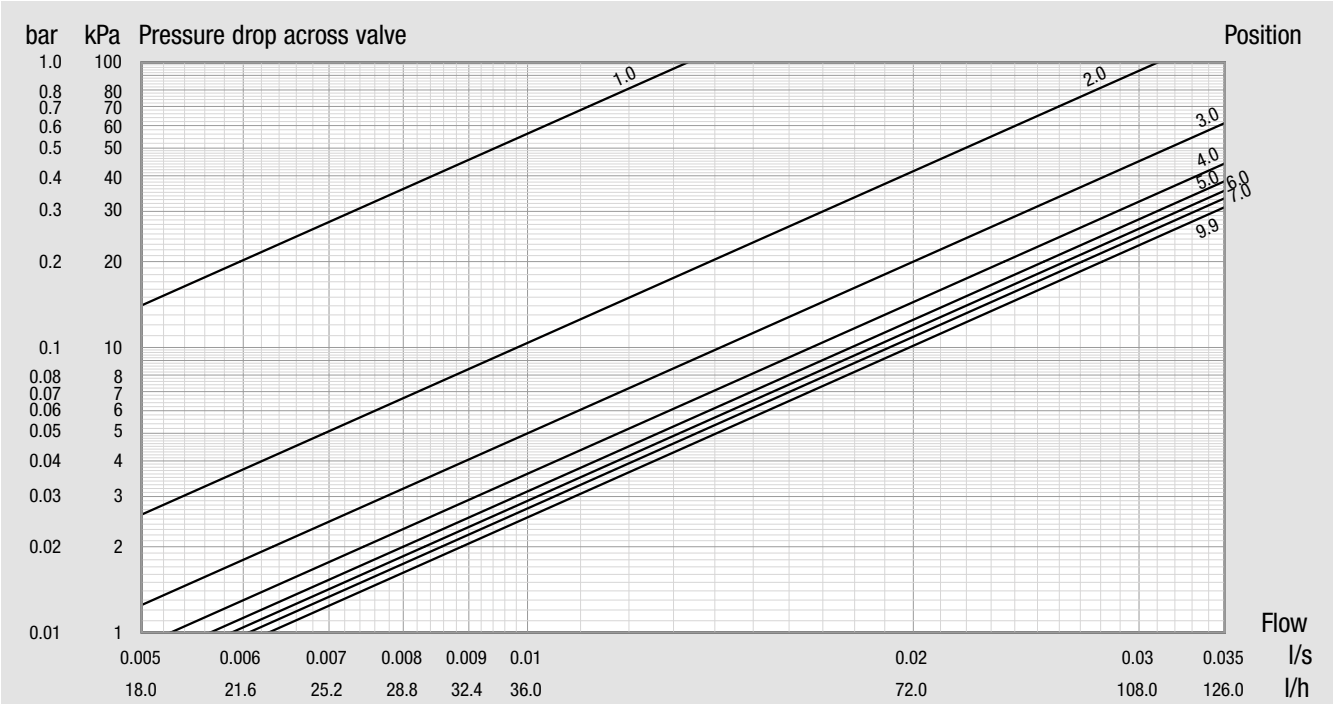
Valve Sizing

Sizing disc available on request via your local BSS branch or the BOSS™ Technical Team on 0116 245 5940.

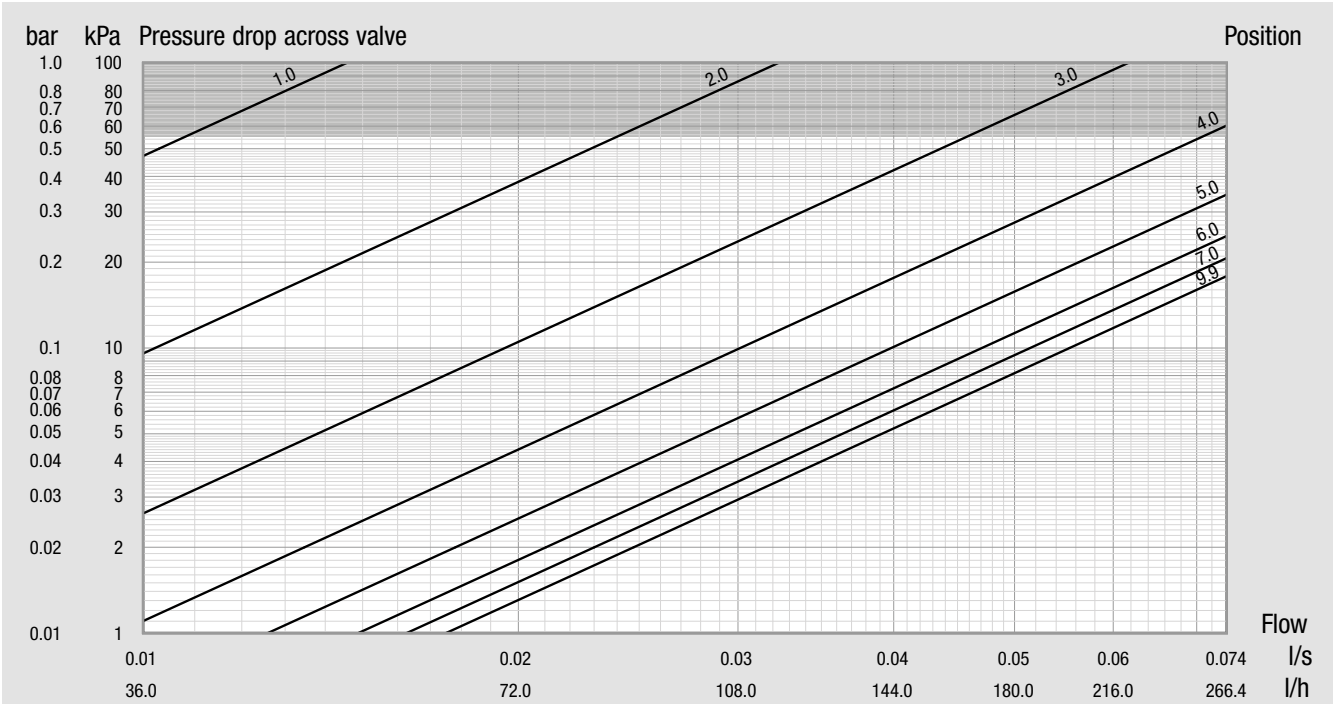
FIG 900S, 900SC, 901S & 903
DN 15 – Flow diagrams

For calculation of flow rate formula see page 4.17

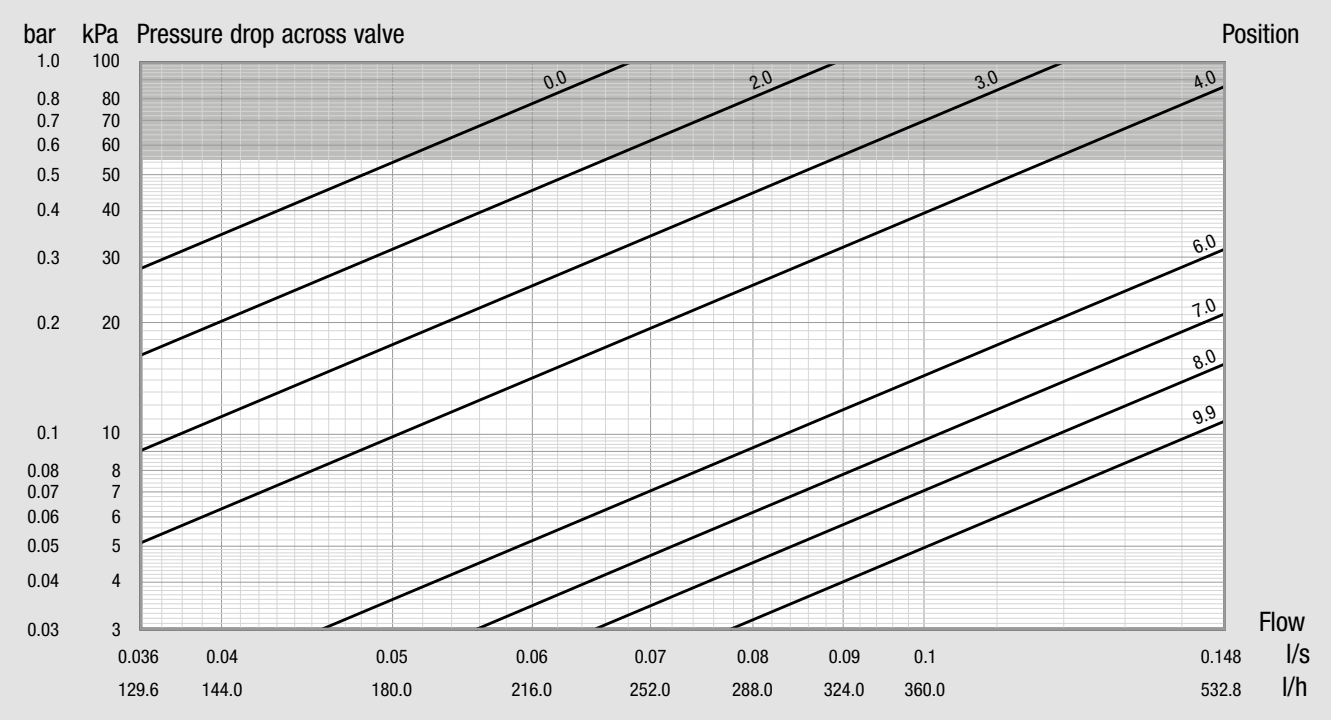
DN 15UL - Ultra low flow



DN 15L - Low flow



DN 15S - Standard flow



DN 15H - High flow

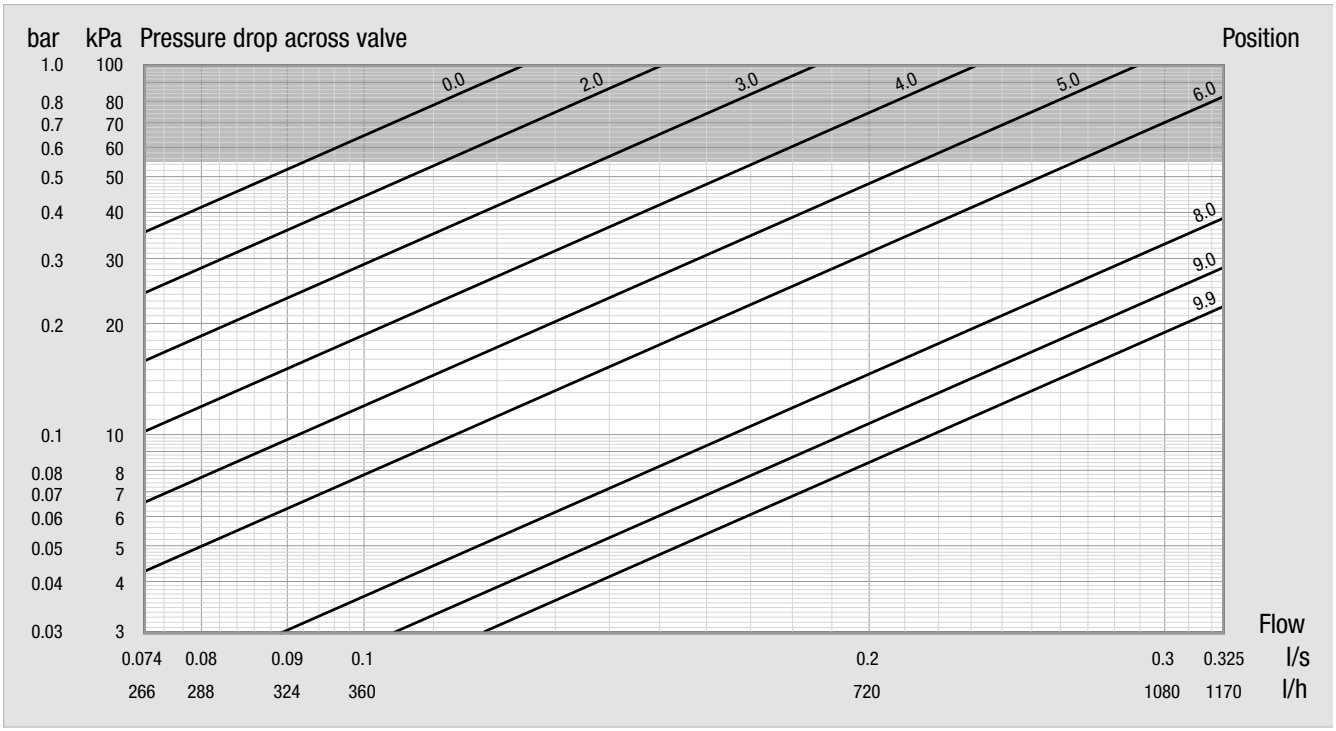
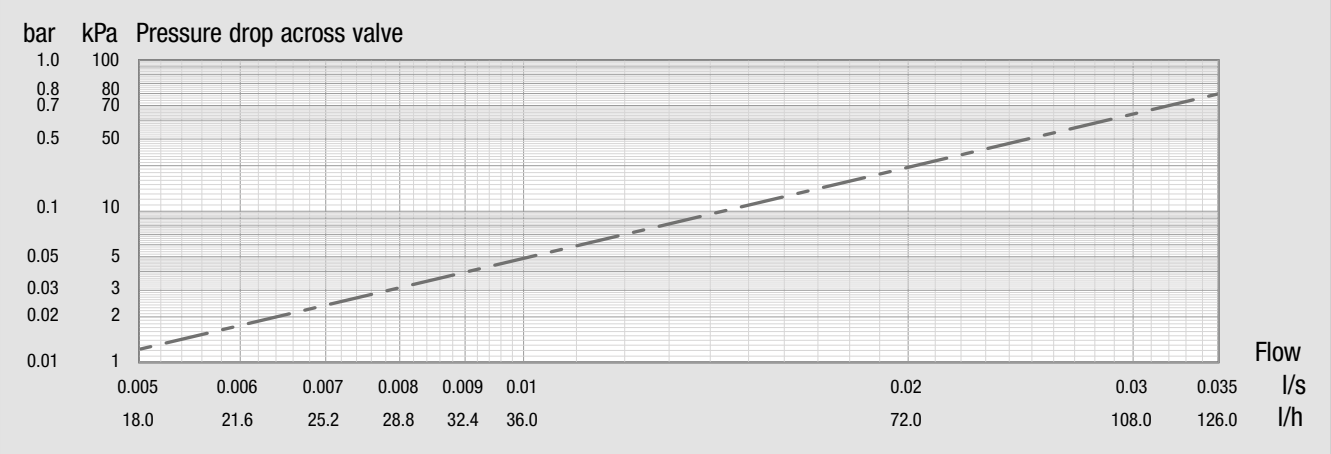


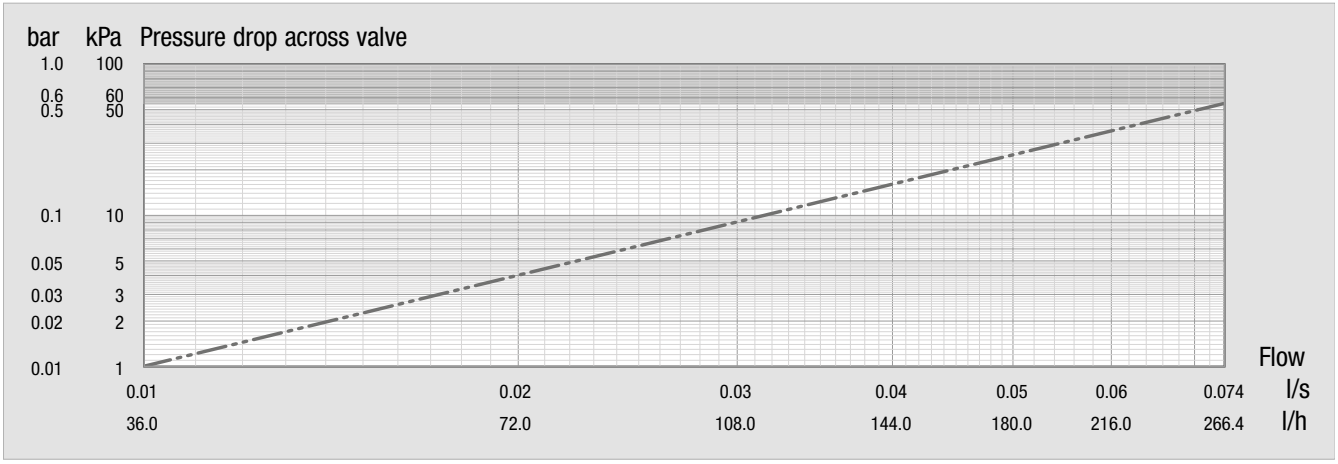
FIG 900S, 900SC, 901 & 903
DN 15 – Measuring signal diagrams

For calculation of flow rate formula see page 4.17

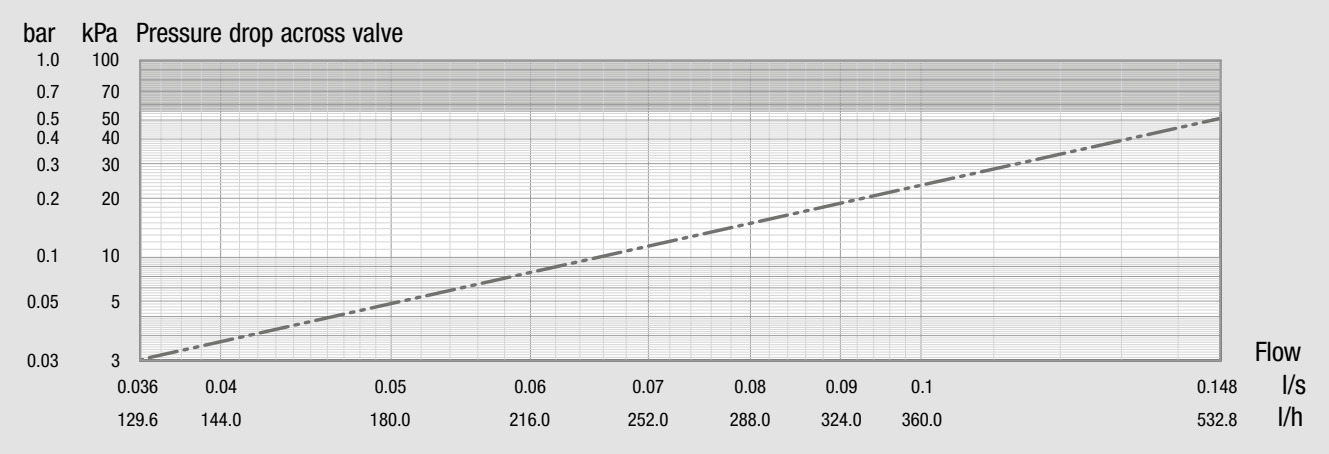
DN 15UL - Ultra low flow



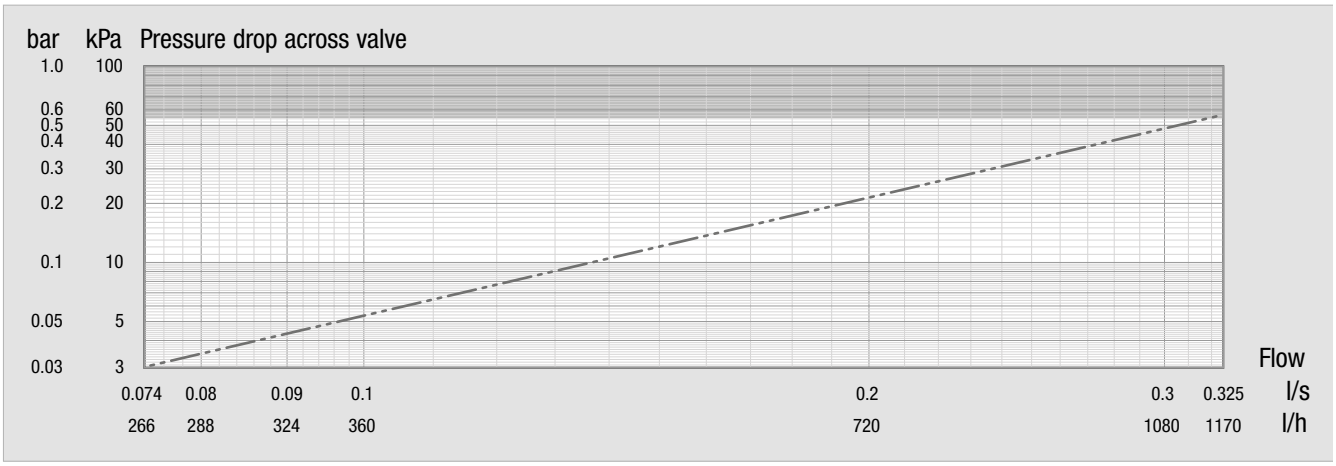
DN 15L - Low flow



DN 15S - Standard flow



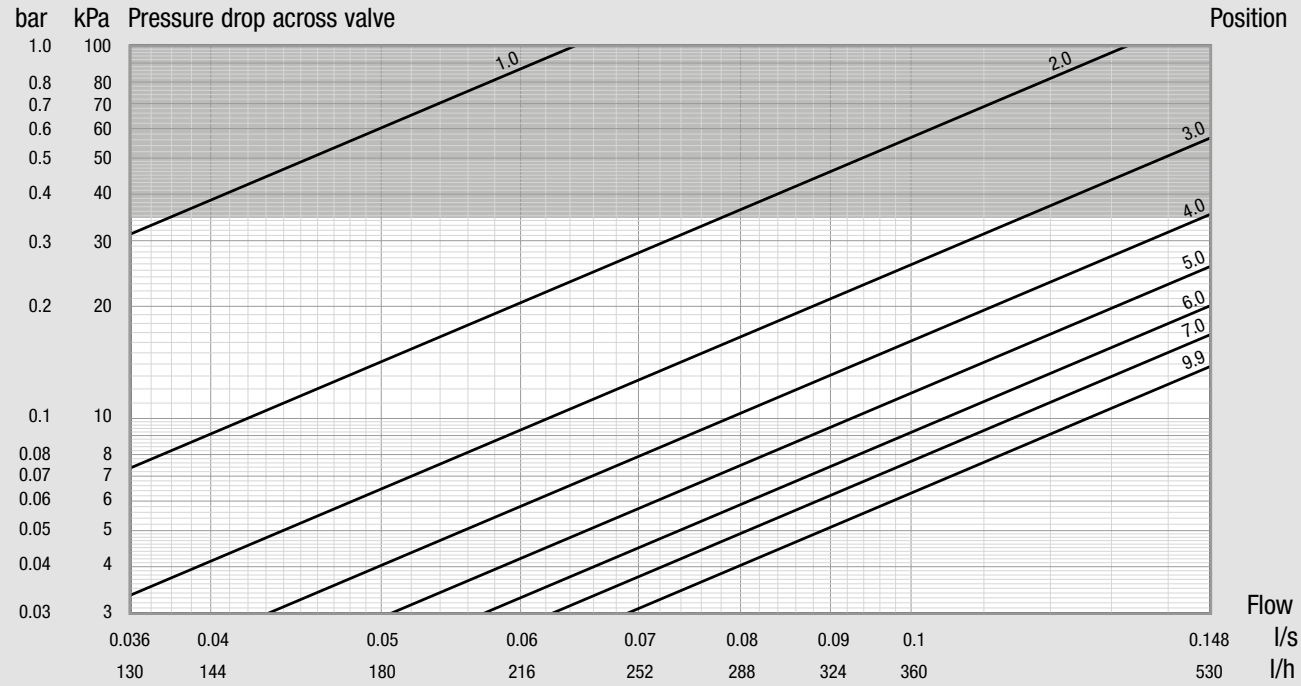
DN 15H - High flow



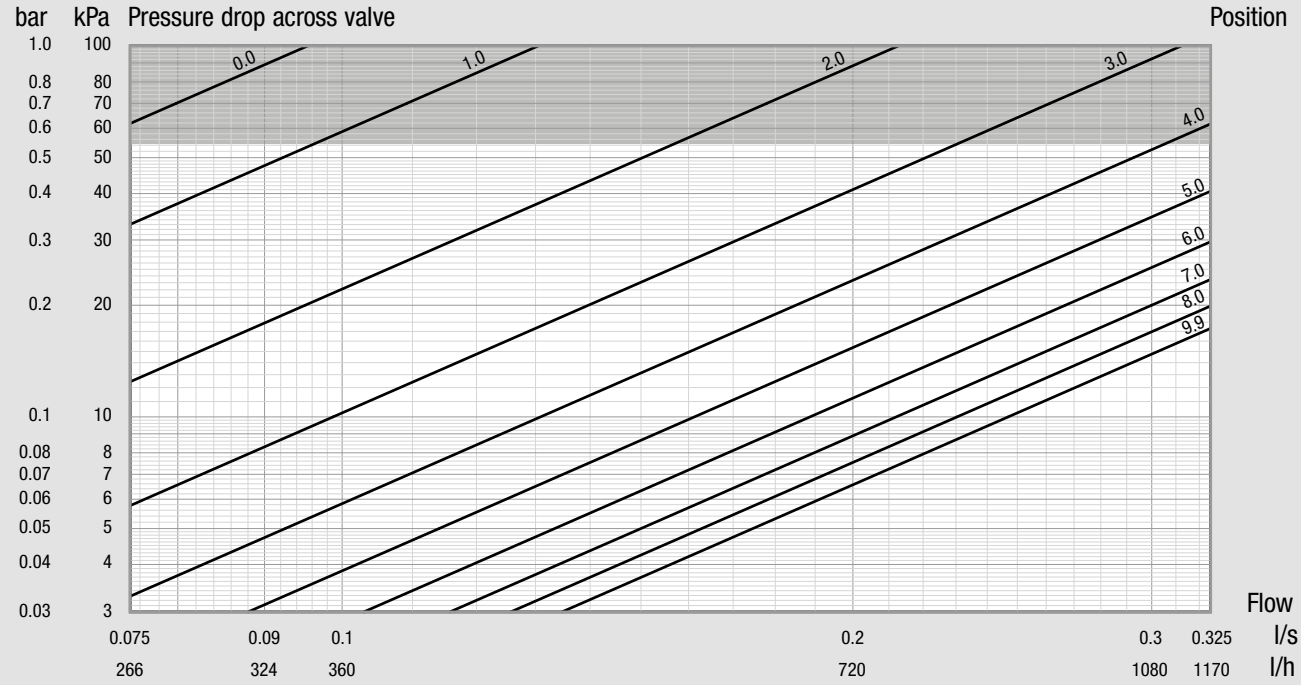
Balancing Valves
DN 20 – Flow diagrams

For calculation of flow rate formula see page 4.17

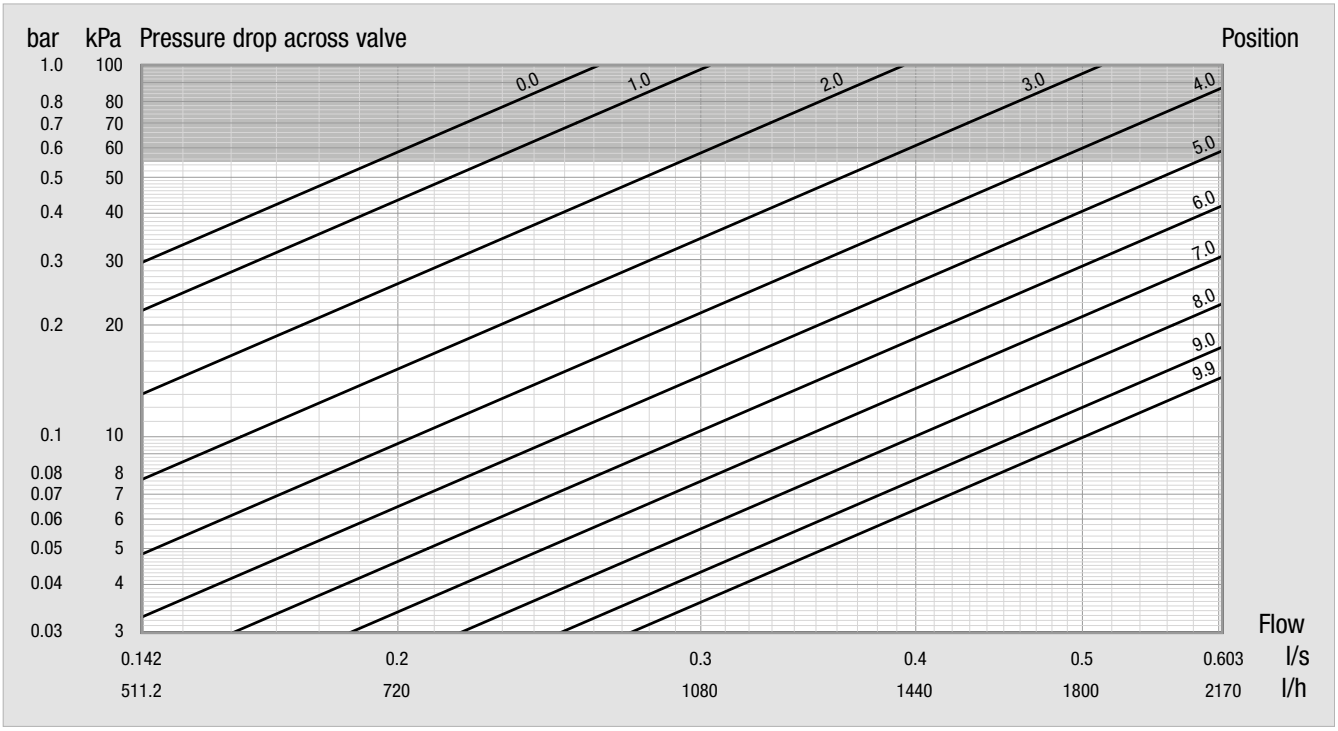
DN 20L - Low flow



DN 20S - Standard flow



DN 20H - High flow



Calculation of flow rate

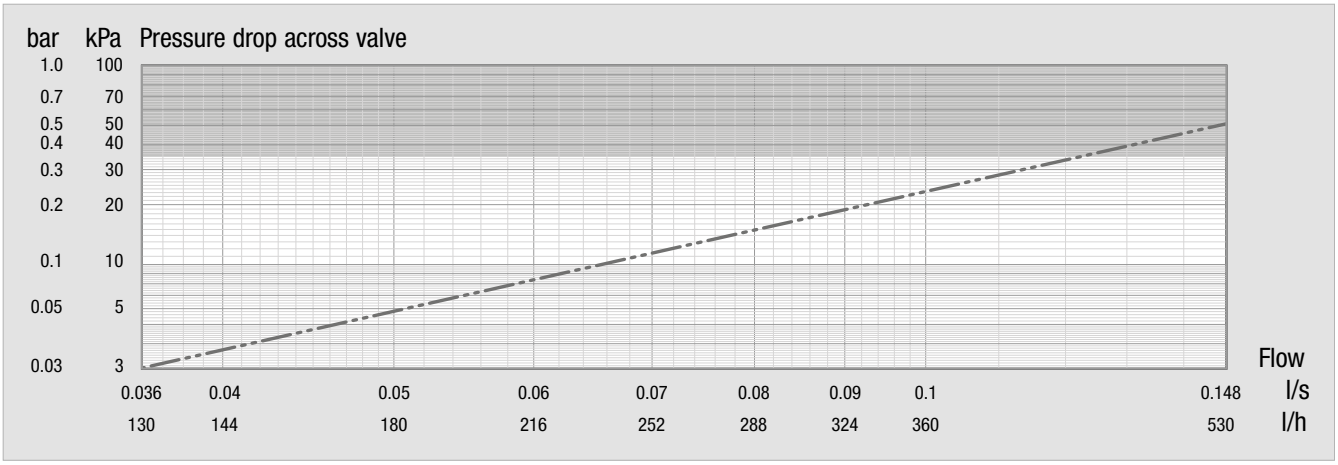
$$Q = \frac{Kvs\sqrt{\Delta P}}{36}$$

where
Q = flow rate (l/s)
ΔP = Signal (kPa)
Kvs = Signal coefficient

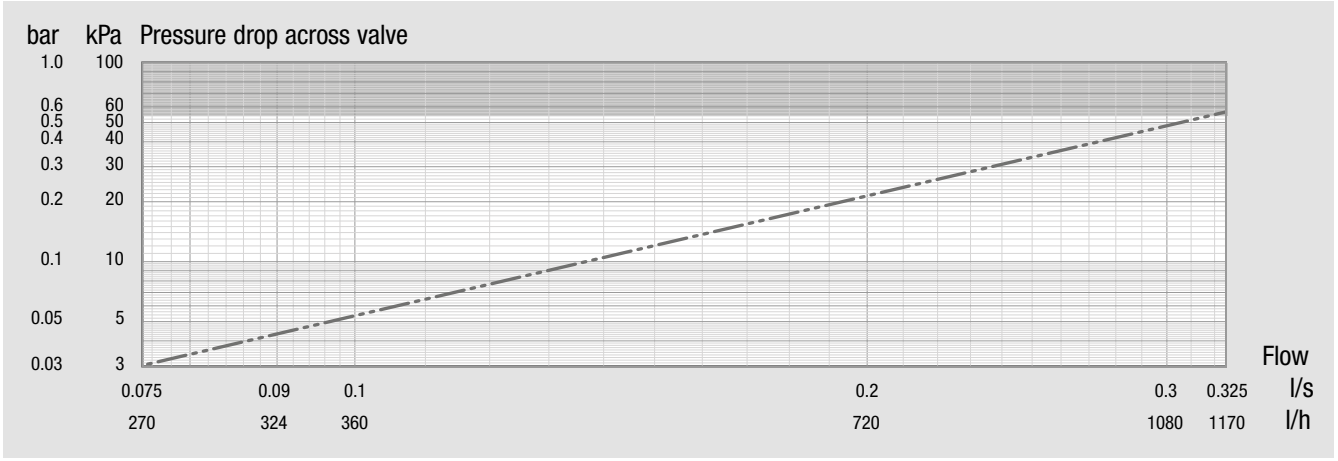
FIG 900S, 900SC, 901 & 903
DN 20 – Measuring Signal Diagrams

For calculation of flow rate formula see page 4.17

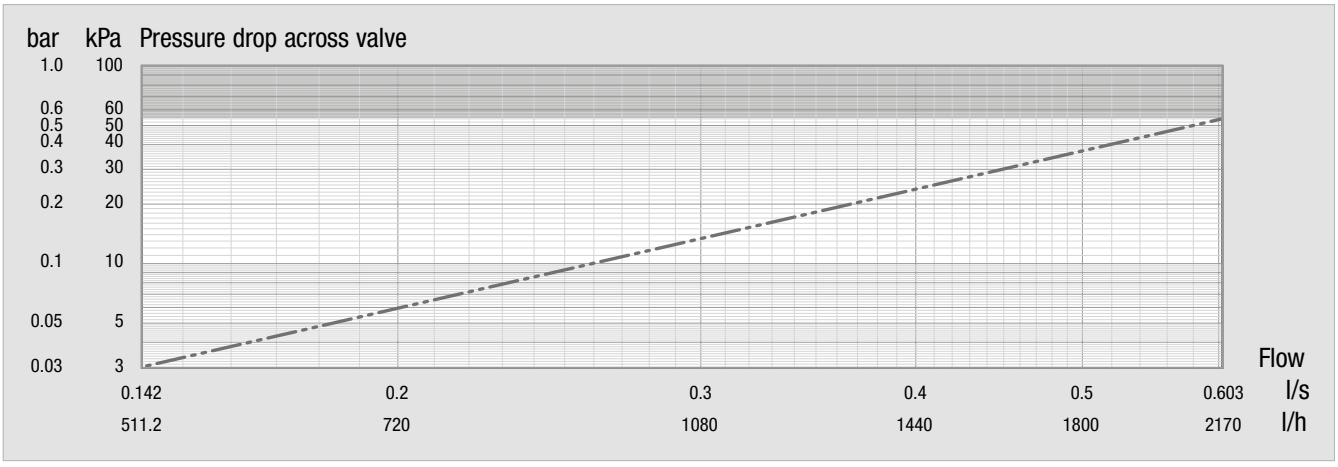
DN 20L - Low flow



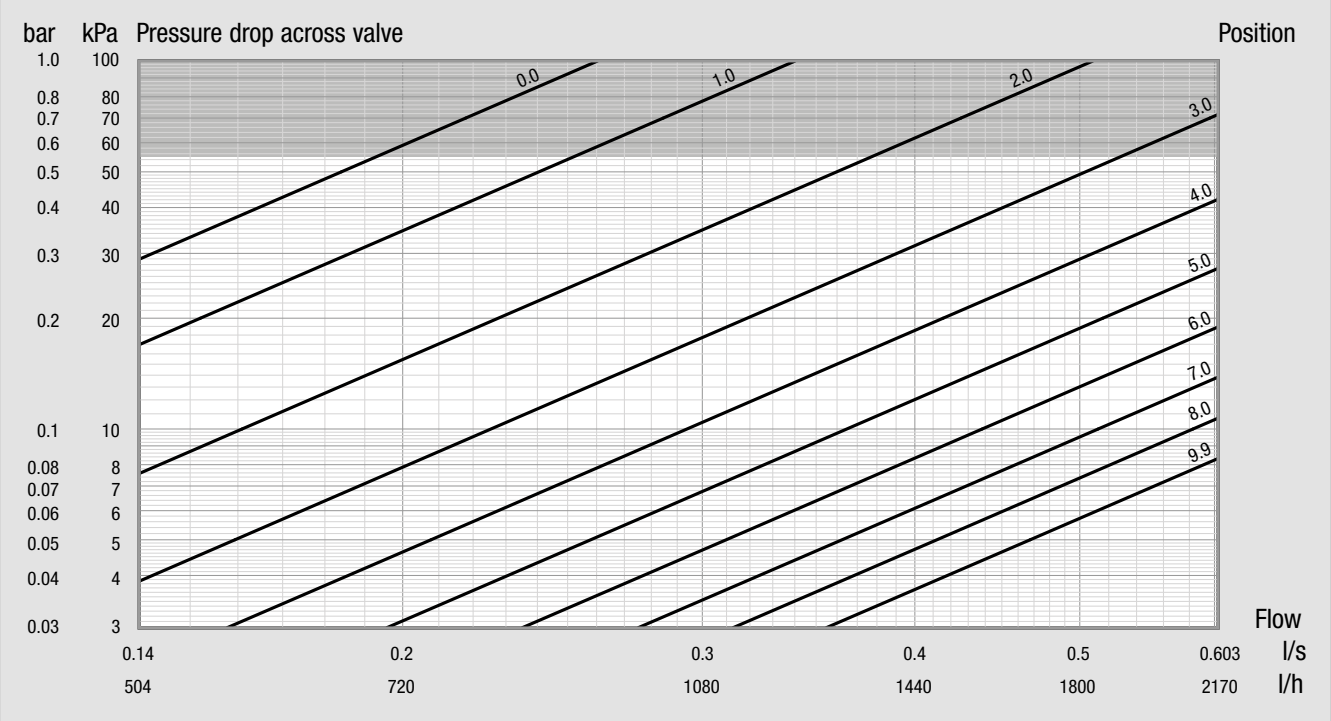
DN 20S - Standard flow



DN 20H - High flow



DN 25S - Standard flow



DN 25H - High flow

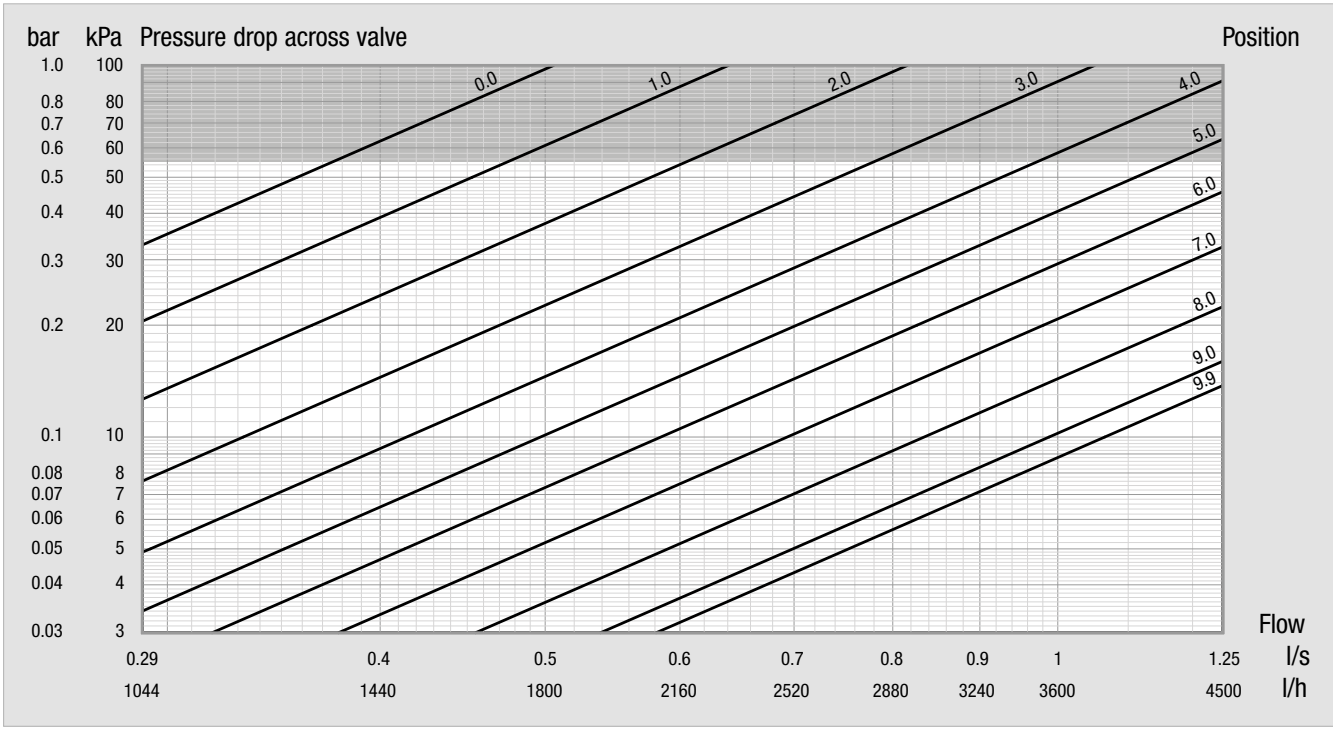
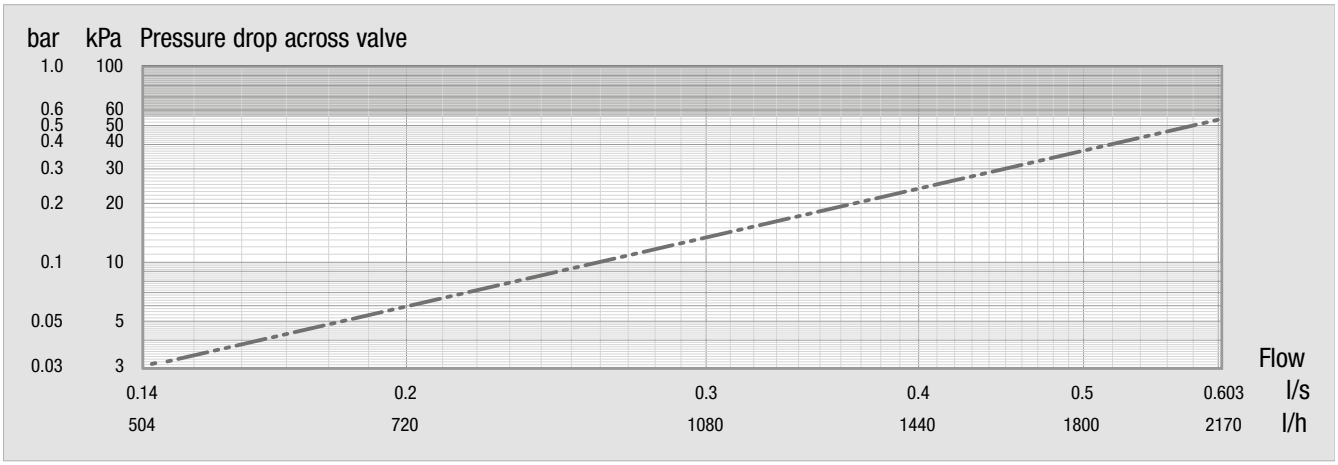


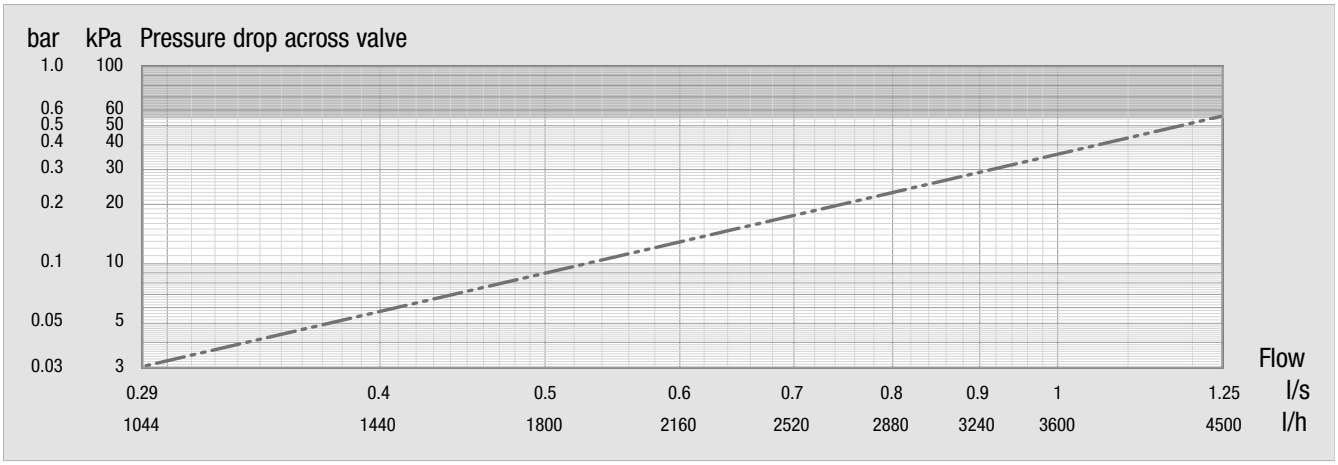
FIG 900S, 900SC, 901 & 903
DN 25 – Measuring signal diagrams

For calculation of flow rate formula see page 4.17

DN 25S - Standard flow

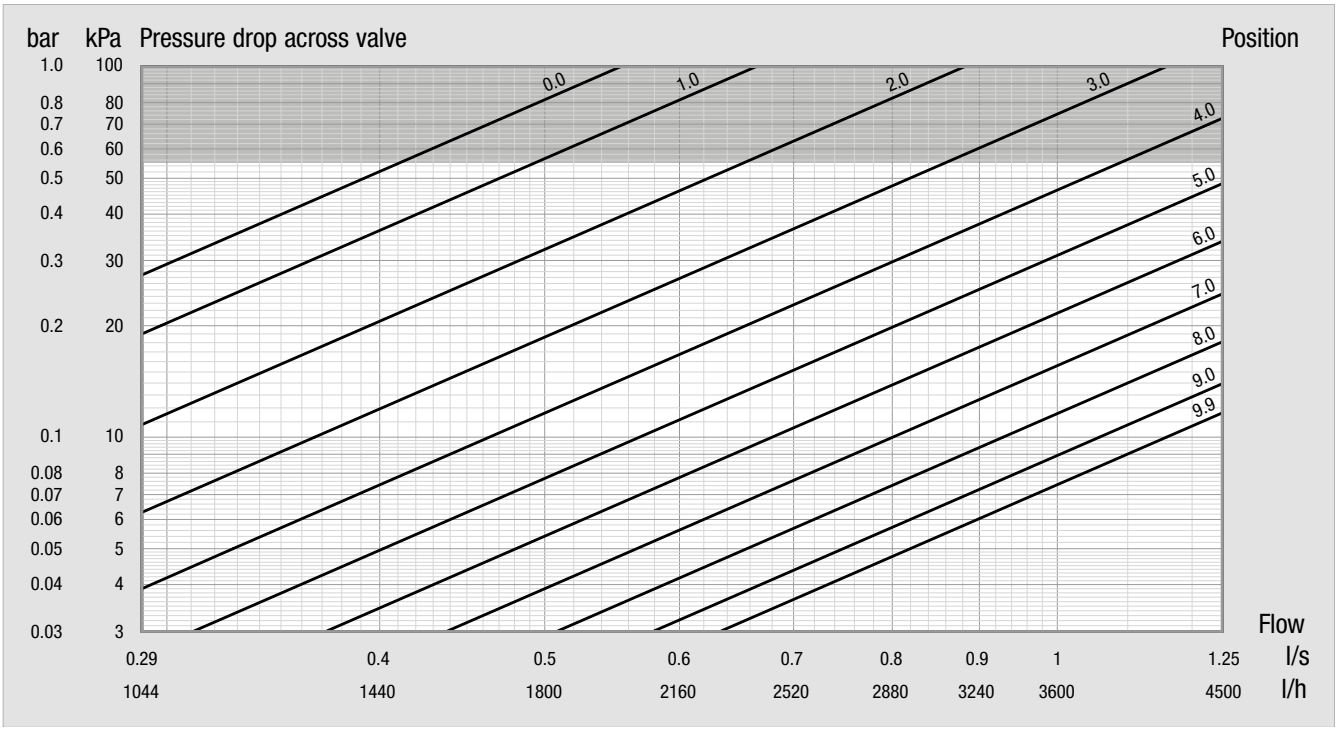


DN 25H - High flow



DN 32 – Flow diagram / DN 32 – Measuring signal diagram

DN 32H - High flow - Flow diagram



DN 32H - High flow - Measuring signal diagram

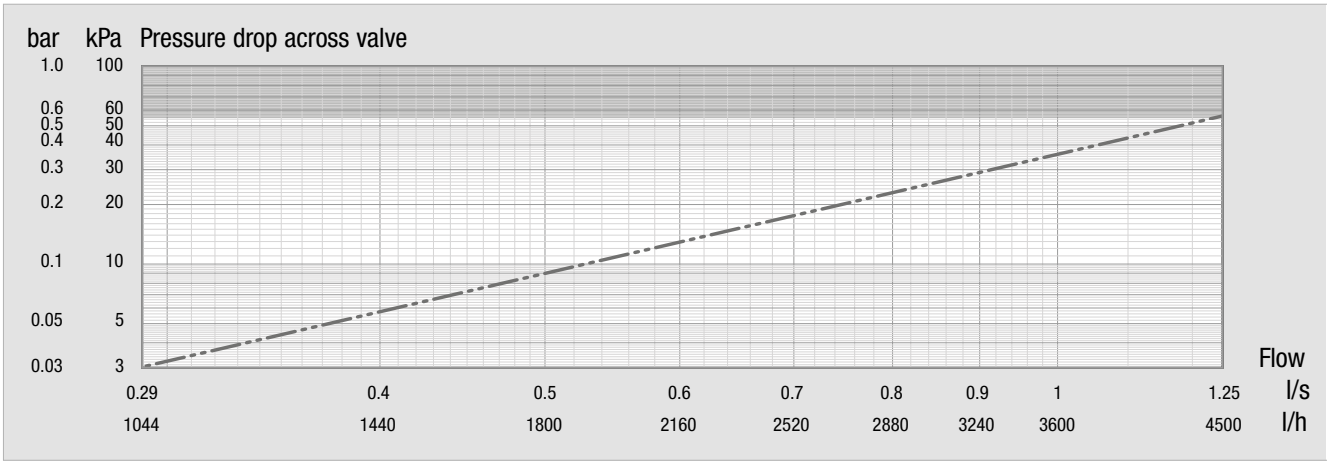
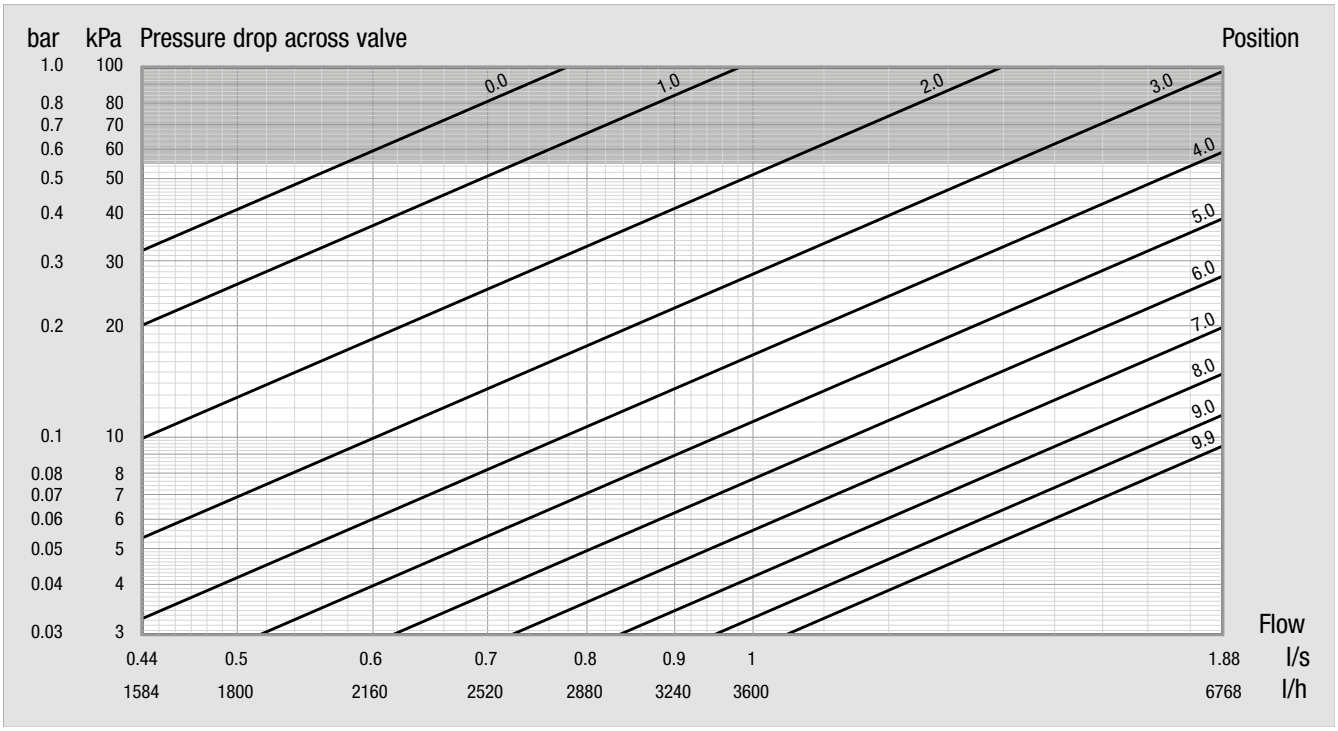


FIG 900S, 900SC, 901 & 903

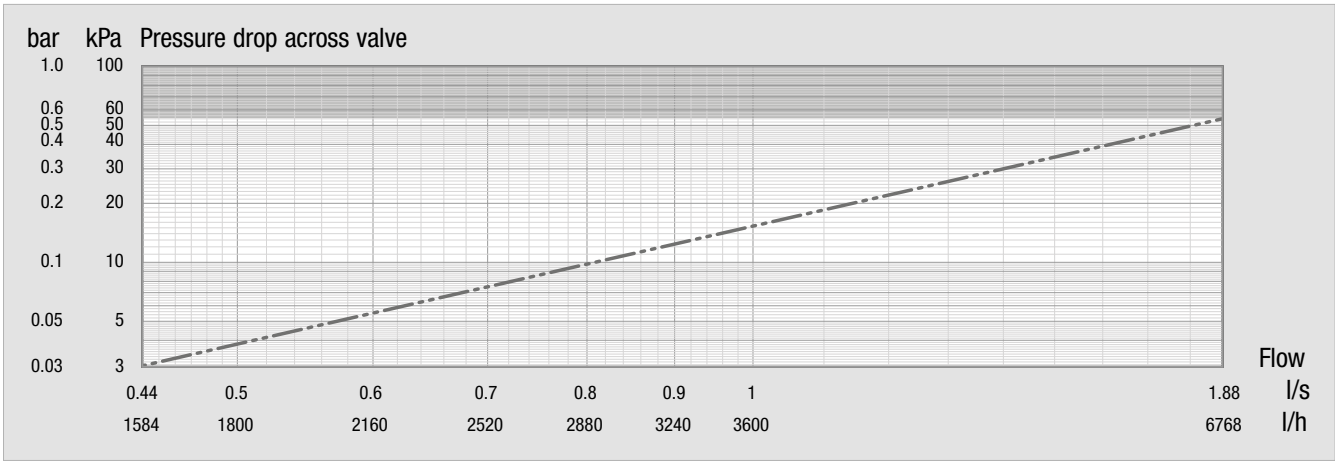
DN 40 – Flow diagram / DN 40 – Measuring signal diagram

For calculation of flow rate formula see page 4.17

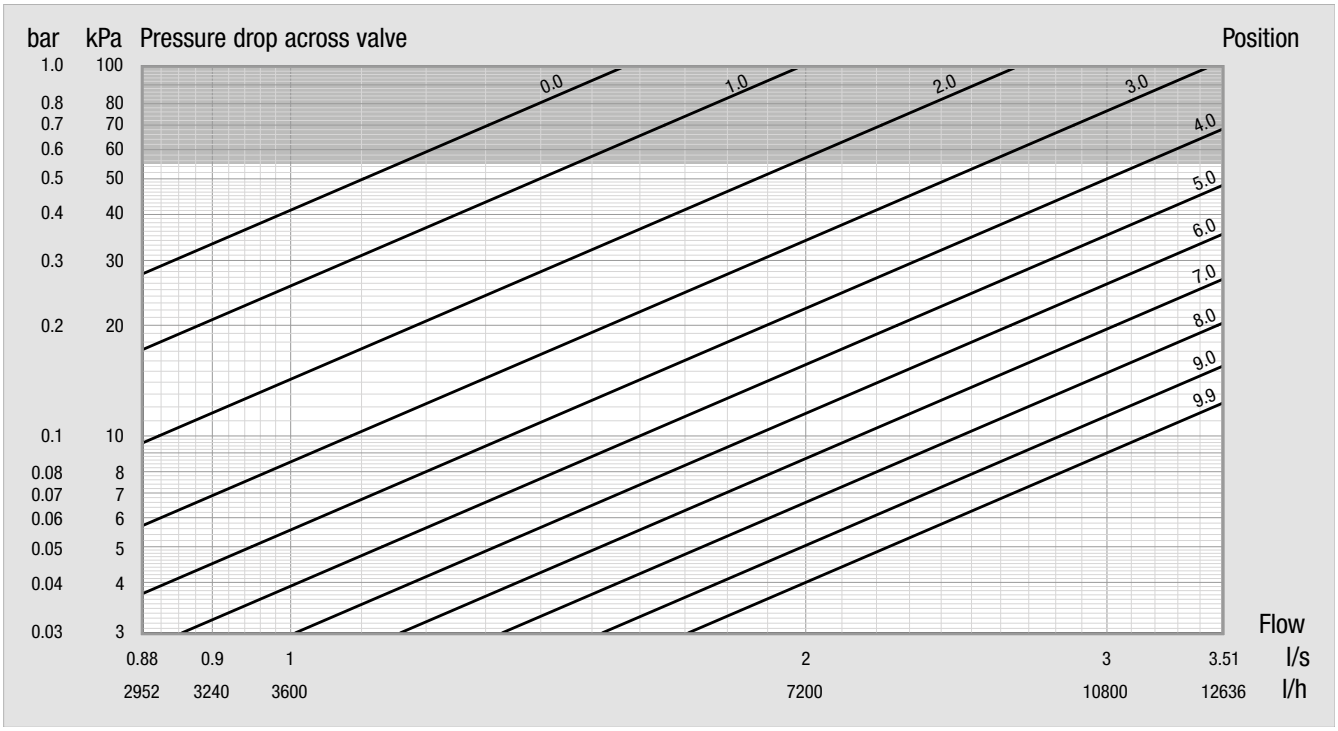
DN 40H - High flow - Flow diagram



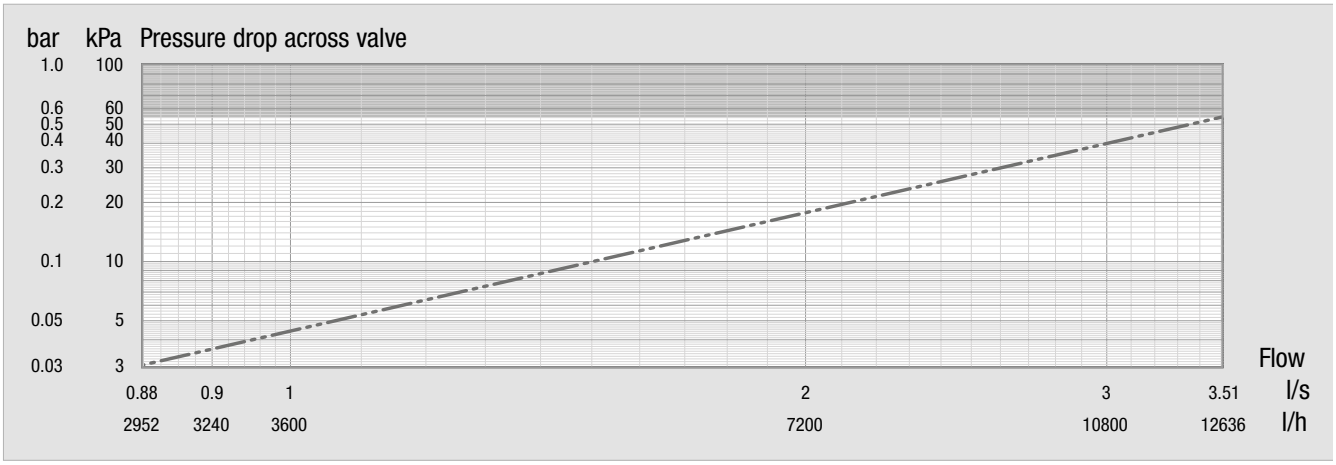
DN 40H - High flow - Measuring signal diagram



DN 50H - High flow - Flow diagram



DN 50H - High flow - Measuring signal diagram



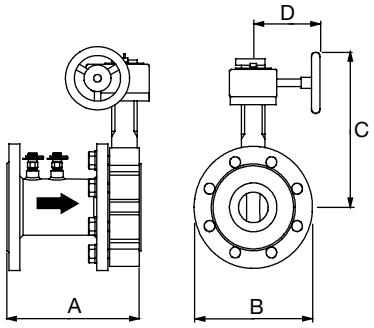
Balancing Valves

FIG 900XSS and 901XS Butterfly Venturi Commissioning Valve FODRV & DRV 65mm-300mm (PN16)

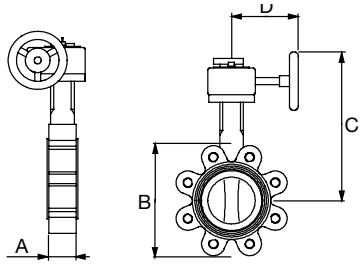
BOSS™ 900XSS
Venturi FODRV DN65-300

BOSS™ 901XS
Venturi DRV DN65-300

Dimensions



BOSS™ 900XSS



BOSS™ 901XS

Weights & Dimensions

Standard Butterfly FODRV Venturi DN65 – 300

Size DN	Nominal Size in	A mm	B mm	C mm	D mm	Number of bolts	Weight kg	Product Code
65	2½	182	185	285	100	4	13.3	32014110
80	3	249	200	295	100	8	16.2	32014121
100	4	325	220	310	160	8	23	32014132
125	5	341	250	325	160	8	30	32014143
150	6	354	285	340	160	8	36	32014154
200	8	378	340	430	200	12	55	32014165
250	10	411	405	465	200	12	78	32014176
300	12	465	460	535	250	12	105	32014187

Standard Butterfly DRV DN65 - 300

Size DN	Nominal Size in	A mm	B mm	C mm	D mm	Number of bolts	Weight kg	Product Code
65	2½	45	185	285	100	4	6.1	32014601
80	3	46	200	295	100	8	6.3	32014612
100	4	52	220	310	160	8	10.6	32014623
125	5	55	250	325	160	8	12.6	32014634
150	6	56	285	340	160	8	14.1	32014645
200	8	60	340	430	200	12	14.1	32014656
250	10	68	405	465	200	12	33.7	32014667
300	12	78	460	535	250	12	48.7	32014678

The larger sizes of the BOSS™ Venturi consist of a gear operated cast iron butterfly valve fitted with a double regulation feature mounted on a carbon steel tube fitted with the Venturi device.

These Venturi valves are available with flanged connections in a long or short pattern. The range covers sizes from 65mm (2½in) to 300mm (12in). This range of valves complement the DZR brass offering of Venturi valves and the long pattern version includes, within the valve, the upstream lengths which are required for accurate commissioning (5 times the valve diameter).

The flow is calculated based on the pressure differential across the nozzle. The measurement accuracy is better that +/-3% and this accuracy is maintained over the entire measuring range from 1kPa to 100kPa.

The BOSS™ Venturi is available in two variations:

- FODRV: Includes regulation, isolation and a flow measurement unit.
- DRV: Includes regulation and isolation unit.

Benefits

- Regulation, Isolation and flow measurement in one single unit
- Measurement across a nozzle
- Flow measurement better than +/-3%
- Same measuring accuracy across the entire measuring area from 1kPa – 100kPa
- Regulation setting remains unchanged when isolated

Specification

The commissioning station incorporates a characterised regulation butterfly valve close coupled to a fixed orifice Venturi flow measuring device with double seal test points. The double regulating feature allows the disc setting to be locked in position using an allen key and return to the exact position after isolation.

Butterfly Venturi DN65 - 300		
	FODRV	**DRV**
Pressure & Temperature Classification		
Temperature Max (Max)	105ºC	105ºC
Pressure Flanged Connection (Max)	16 bar	16 bar
Materials of Construction		
Venturi pipe	Carbon Steel ST37	
Measuring P/T plug	DZR Brass CW602N CuZn36Pb2As	
Rubber in P/T plug	EPDM	
Butterfly Valve body	Cast Iron, Fully Lugged ASTM A126KL.B	
Disc	Stainless Steel ASTM A351	
Shaft	Stainless Steel ASTM A276	
Backing ring	EPDM	
Drive pin	Stainless Steel ASTM A276 Gr316	
Shaft seal	NBR 1	
Bearing	Lubricated Bronze ASTM B62	
Markings on Valves		
Venturi pipe	PN16, 105ºC, St37	
Butterfly valve	Valve Type, DN & Kvs Value	
Connection		
Flanged	BS4504 PN16	
Compression	EN1254-2	
Pressure Test According to:	ISO5208:1993E	

Balancing Valves

Flow Range – Butterfly FODRV & DRV DN65 - 300								
		FODRV					DRV	
Valve Size		Kvs	Flow Rates*	Signal	Head Loss Kvs	Loss Factor	Valve Size	Kvs
DN	Description	m³h	l/s	kPa	m³h		DN	m³h
65	Standard	37.40	3.00 - 7.00	8 - 45	78.20	0.24	65	148
80	Standard	72.90	6.00 - 15.00	9 - 55	169.00	0.19	80	237
100	Standard	129.00	11.00 - 26.00	9 - 53	360.00	0.13	100	603
125	Standard	190.00	17.00 - 40.00	10 - 57	502.00	0.14	125	888
150	Standard	348.00	24.00 - 57.00	6 - 35	1010.00	0.12	150	2341
200	Standard	586.00	42.00 - 100.00	7 - 38	1910.00	0.09	200	2845
250	Standard	861.00	67.00 - 157.00	8 - 43	2540.00	0.11	250	4549
300	Standard	1513.00	94.00 - 226.00	5 - 29	4850.00	0.10	300	7761

** The flow rates given in the table are for water flow in steel pipes which provide a pressure loss of 100 to 500 Pa per metre of pipe.*

Regulation/Operation

The valve is adjusted by rotating the hand wheel on the gearbox. The water flow increases when the hand wheel is turned anti-clockwise and reduces when turned clockwise. By using a flow meter or other measuring device the flow rate through the BOSS™ Venturi can be measured and adjusted to meet the specific requirements of the system. The gearbox can be locked against the memory stop when the desired setting is achieved. Once locked the valve can be isolated and when re-opened cannot travel past the memory stop.

Isolation

The valve is isolated by turning the hand wheel clockwise up to the “S” position stamped on the gearbox. After isolation the valve is re-opened to the pre-set position when the indicator cam reaches the memory stop.

Flow Measurement

Flow measurements are via the Venturi nozzle. The BOSS™ Venturi has two test points (P/T plugs). The high pressure test point is identified by the RED retaining clip and the low pressure test point is identified by the BLUE retaining clip. The pressure differential measured between these test points can be used to calculate the actual flow through the Venturi. This differential can be measured using a flow meter or other measuring device. This is converted into a flow rate of litres per second (l/s) or metres cubed per hour (m³/h) either electronically or using a calculation formula.

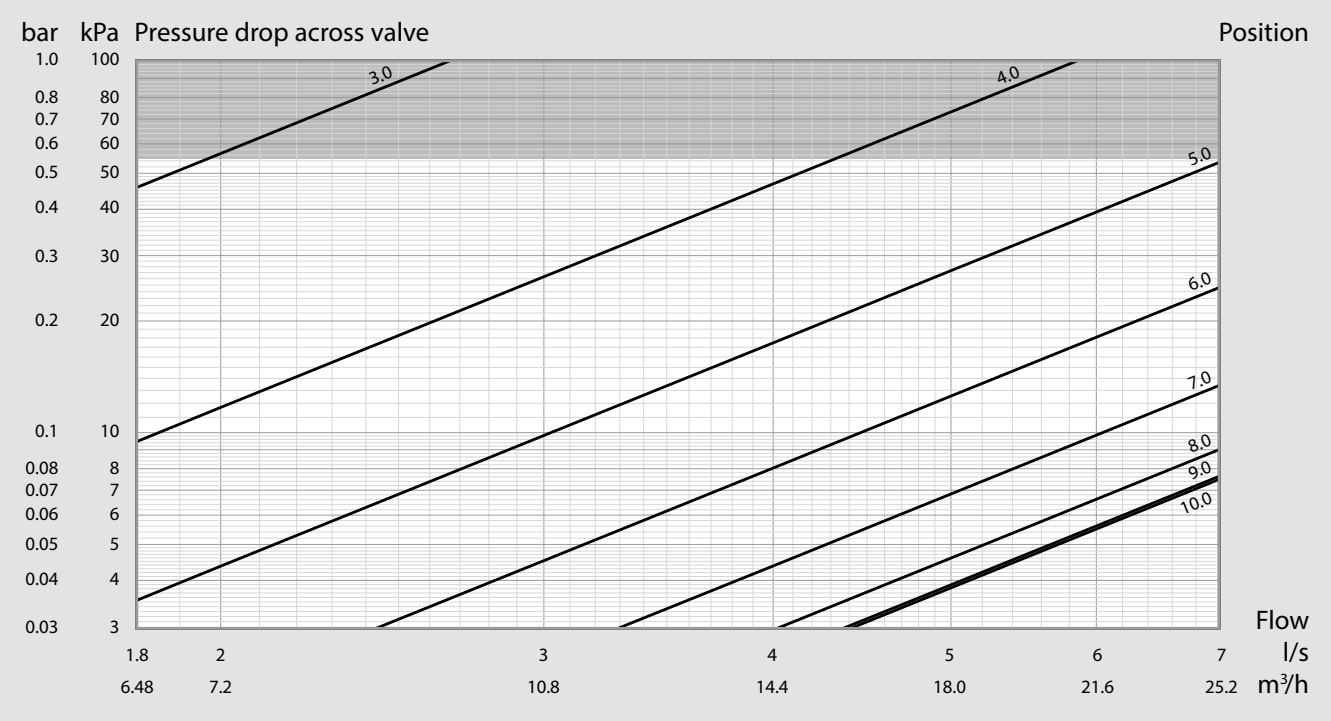
Valve Sizing

Sizing disc available on request via your local BSS branch or the BOSS™ Technical Team on 0116 245 5940.

FIG 900XSS & 900XSL FODRV Venturi Valve

DN 65 flange/flange – Flow diagram / Measuring signal diagram

DN 65 flange/flange - Flow diagram



DN 65 flange/flange - Measuring signal diagram

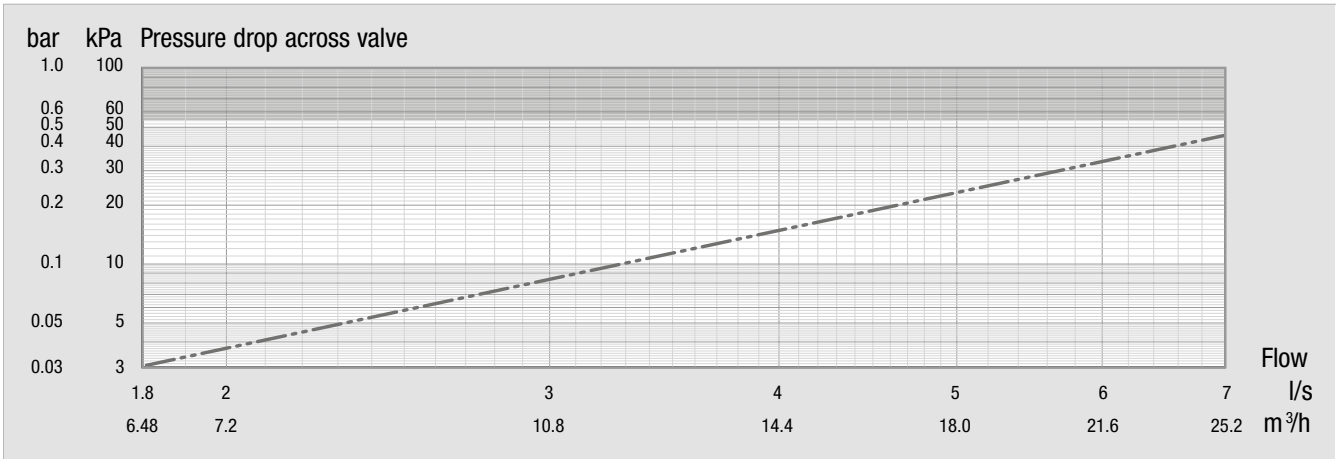
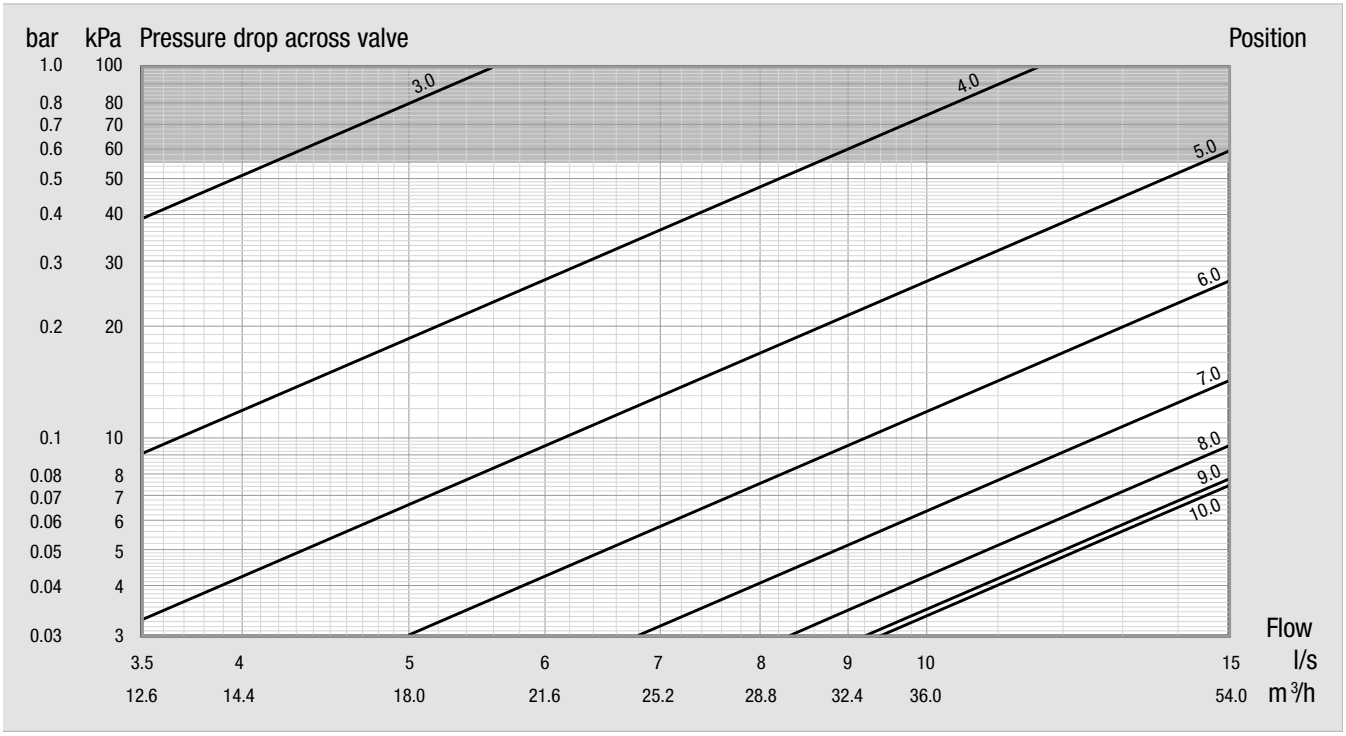


FIG 900XSS & 900XSL FODRV Venturi Valve

DN 80 flange/flange – Flow diagram / Measuring signal diagram

DN 80 flange/flange - Flow diagram



DN 80 flange/flange - Measuring signal diagram

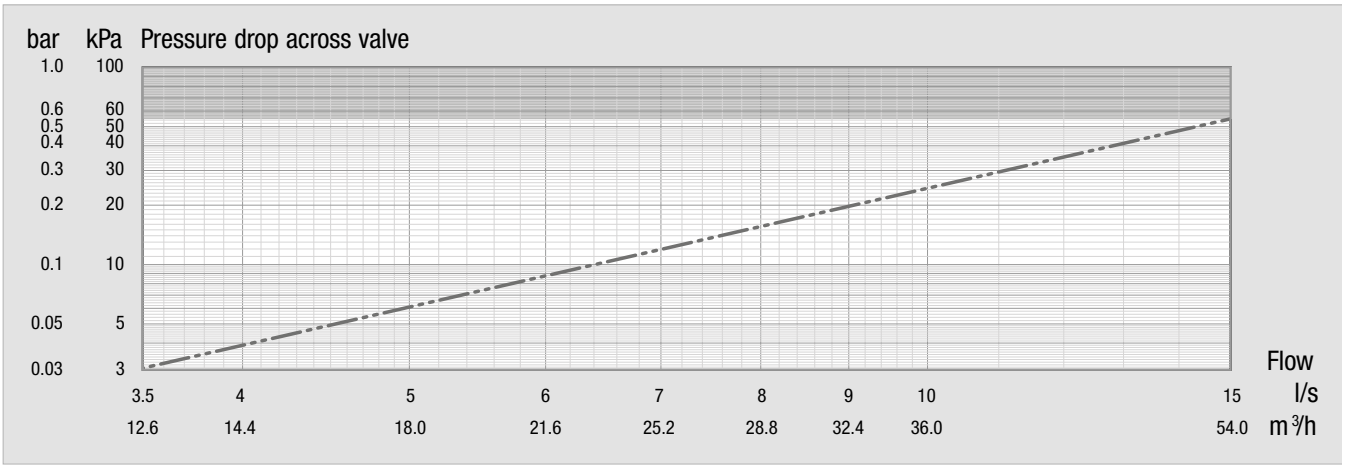
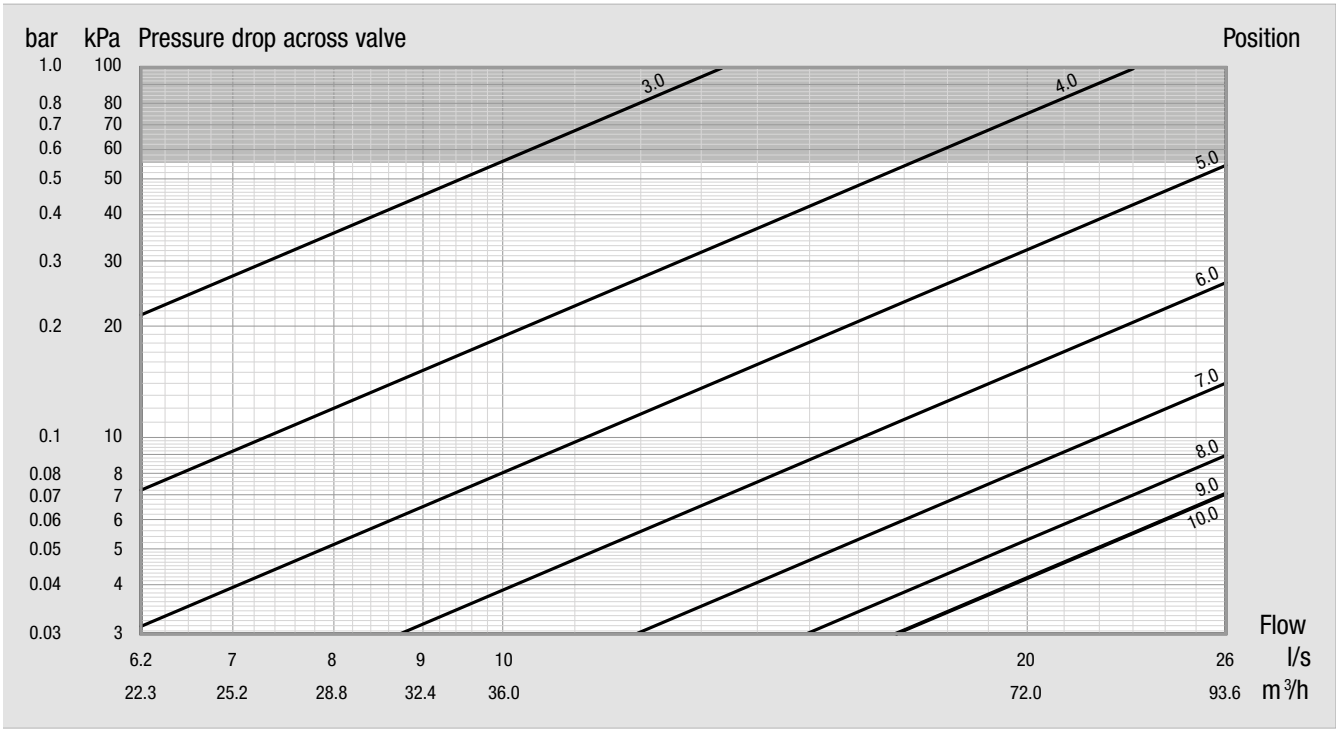


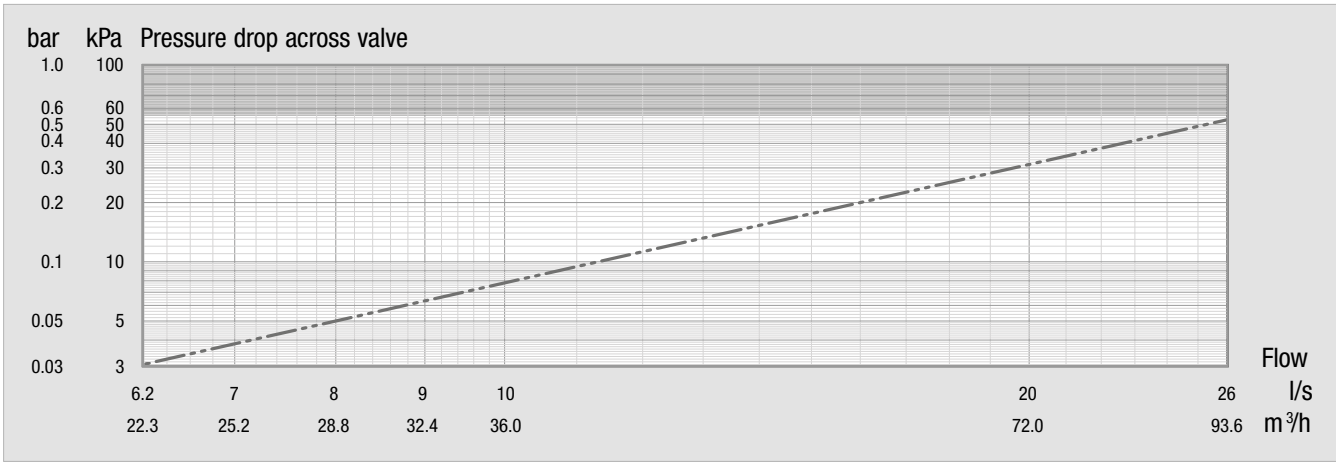
FIG 900XSS & 900XSL FODRV Venturi Valve

DN 100 flange/flange – Flow diagram / Measuring signal diagram

DN 100 flange/flange - Flow diagram



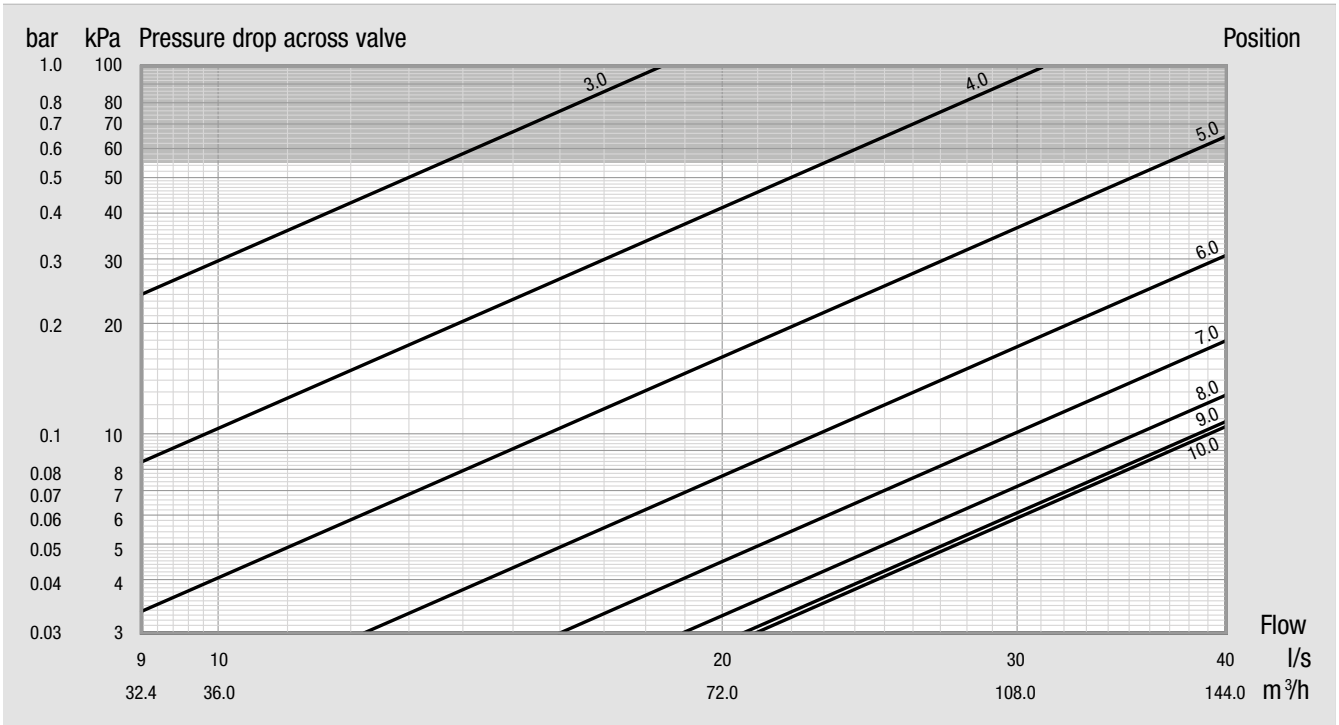
DN 100 flange/flange - Measuring signal diagram



Balancing Valves

DN 125 flange/flange – Flow diagram / Measuring signal diagram

DN 125 flange/flange - Flow diagram



DN 125 flange/flange - Measuring signal diagram

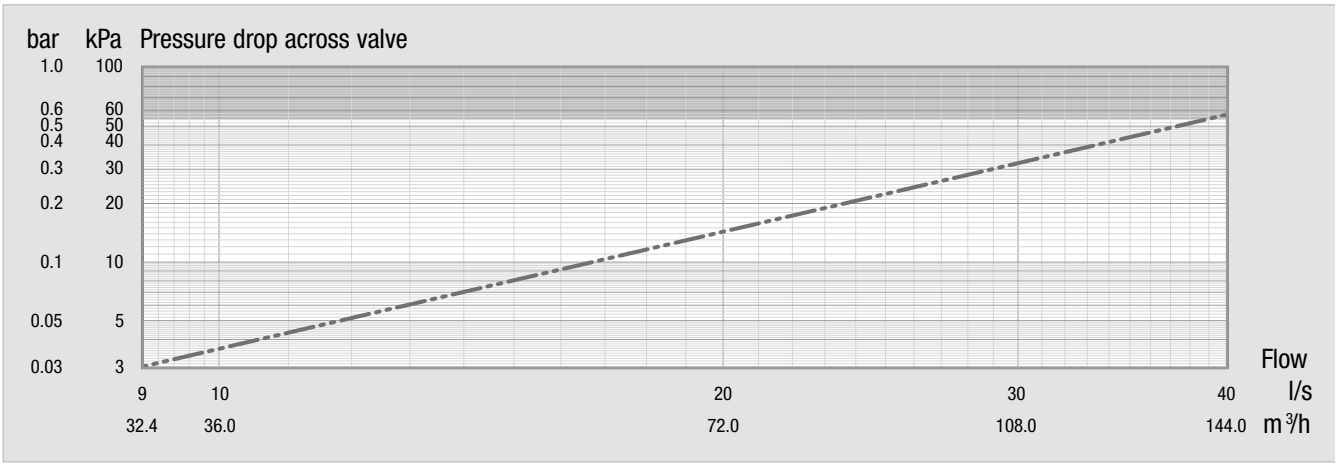
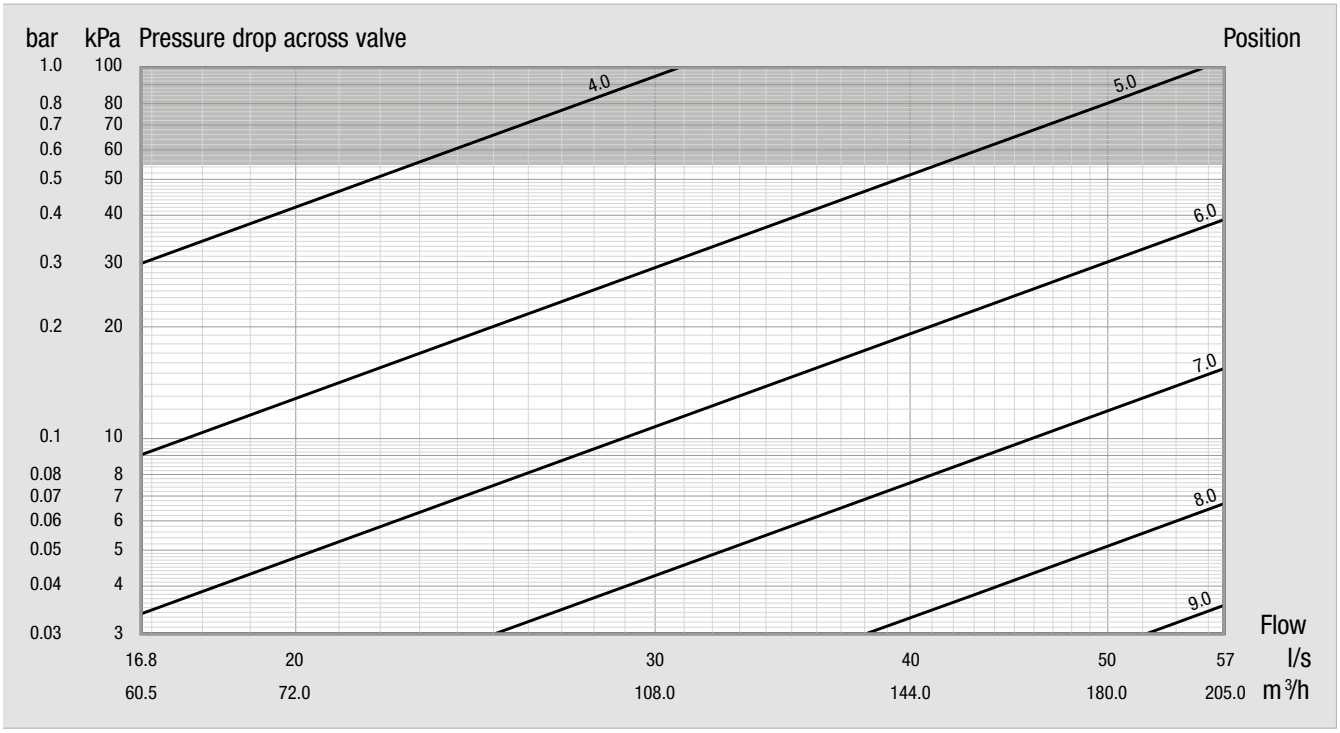


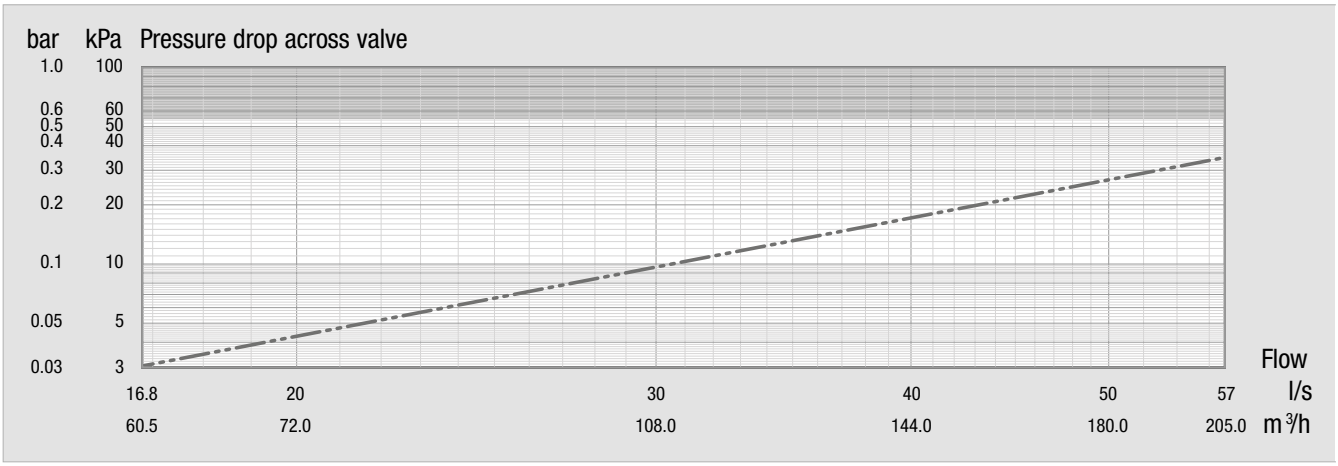
FIG 900XSS & 900XSL FODRV Venturi Valve

DN 150 flange/flange – Flow diagram / DN 150 flange/flange – Measuring signal diagram

DN 150 flange/flange - Flow diagram



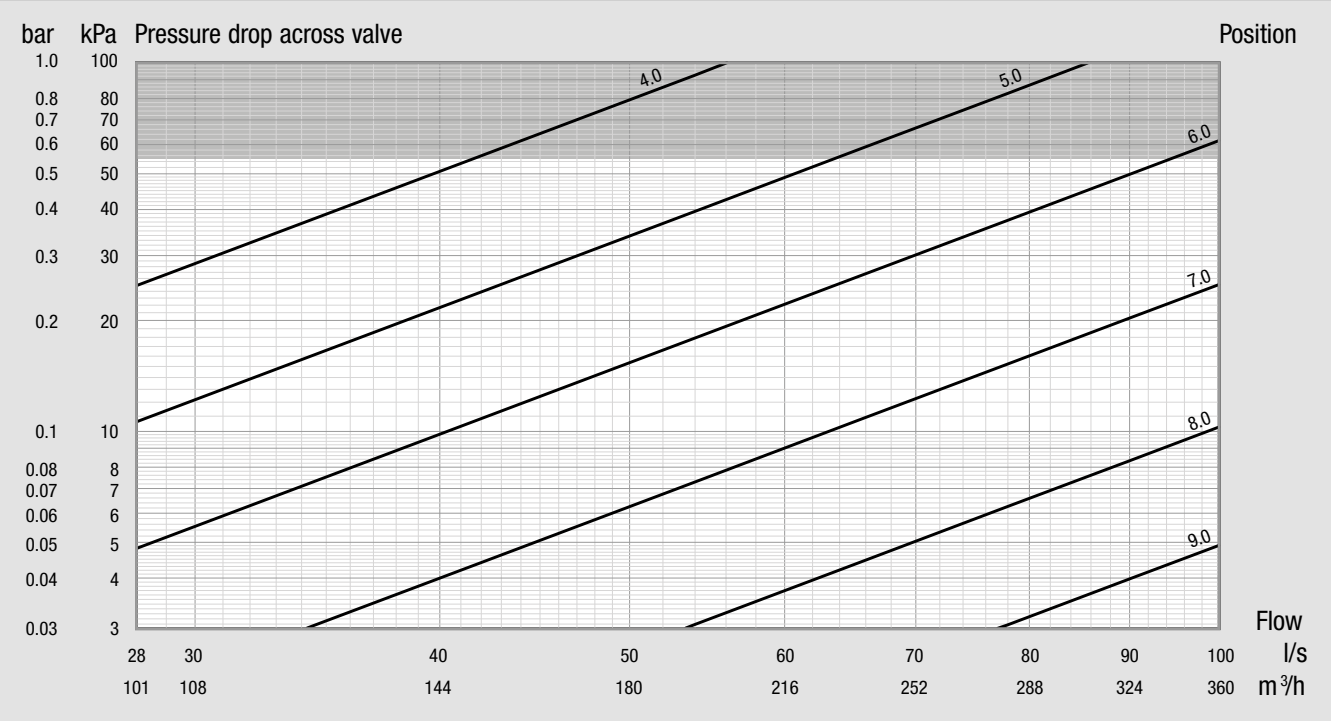
DN 150 flange/flange - Measuring signal diagram



Balancing Valves

DN 200 flange/flange – Flow diagram DN 200 flange/flange – Measuring signal diagram

DN 200 flange/flange - Flow diagram



DN 200 flange/flange - Measuring signal diagram

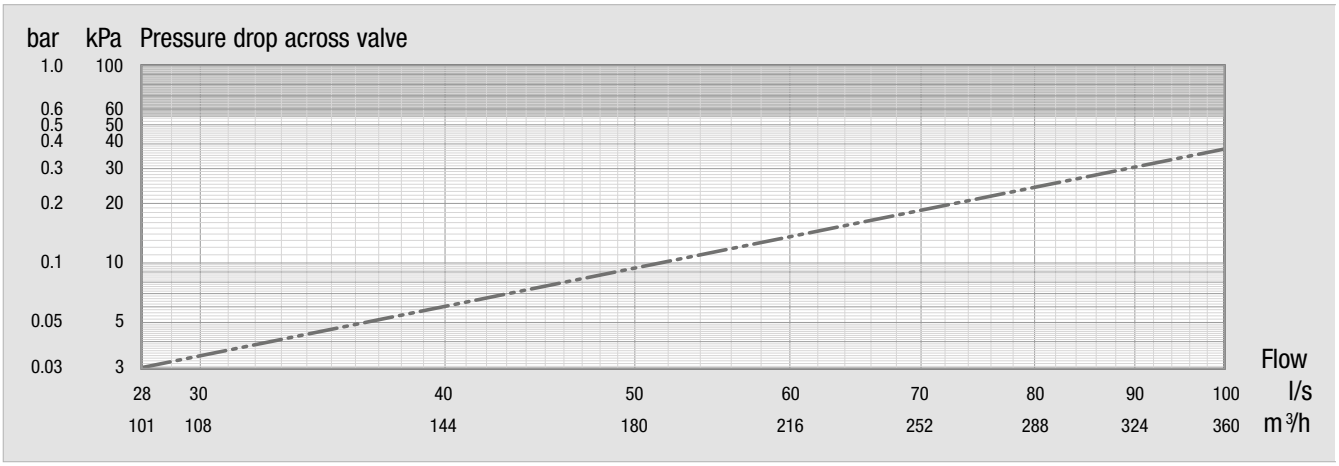
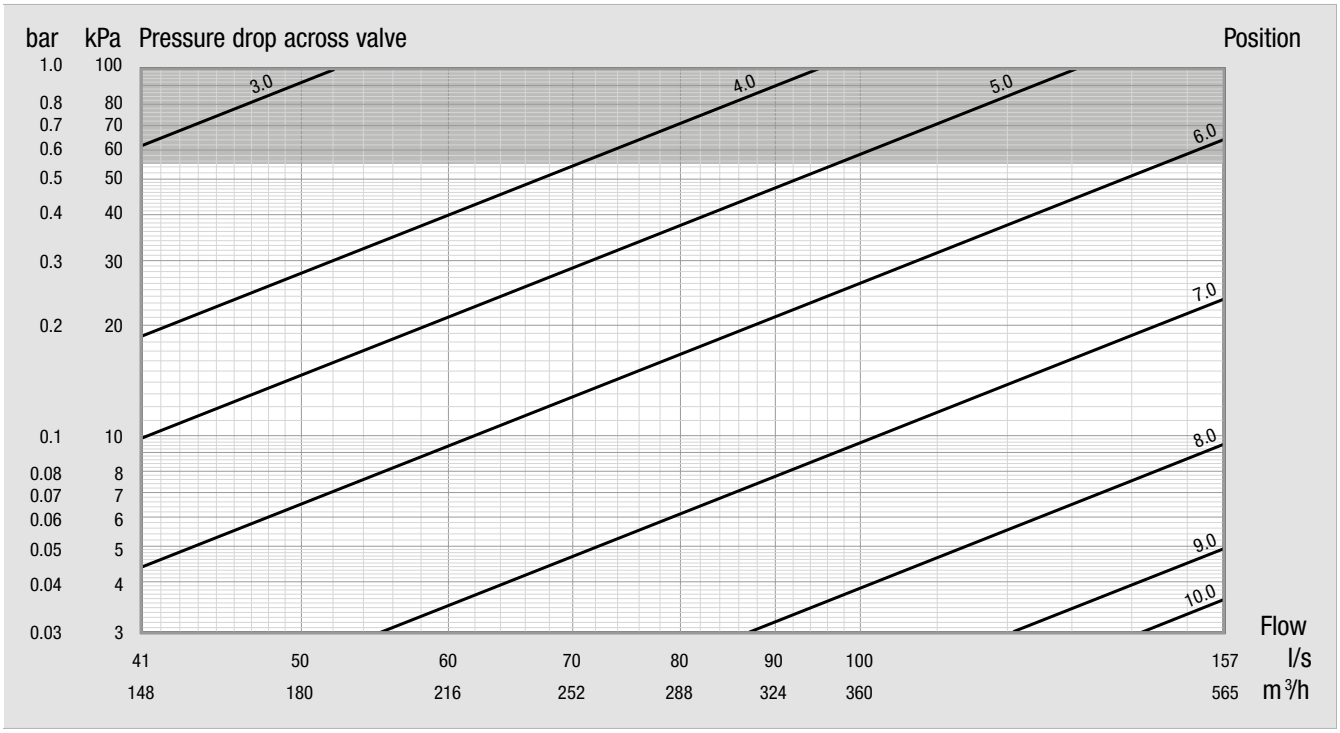


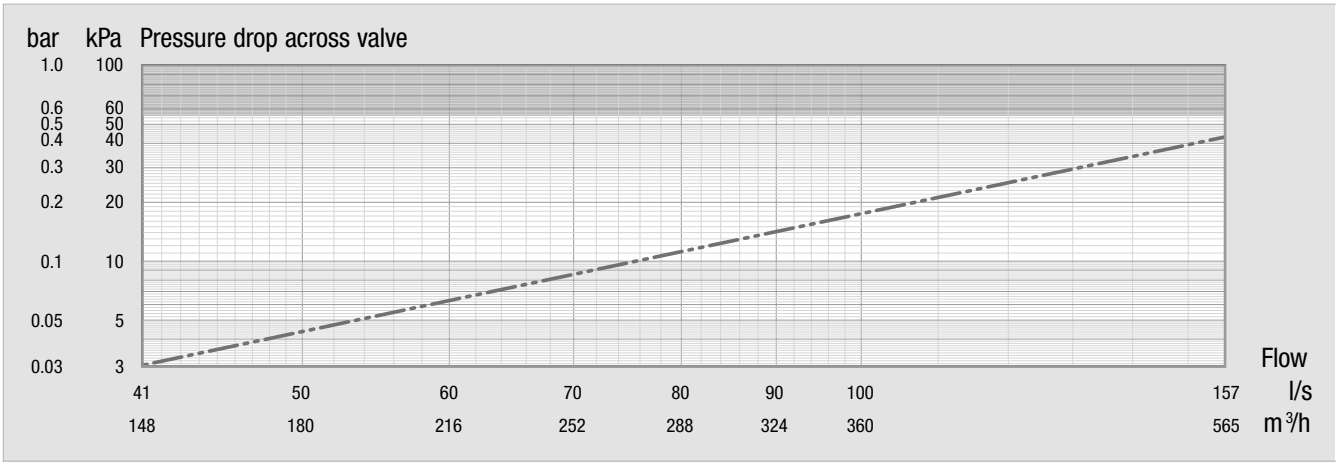
FIG 900XSS & 900XSL FODRV Venturi Valve

DN 250 flange/flange – Flow diagram / DN 250 flange/flange – Measuring signal diagram

DN 250 flange/flange - Flow diagram



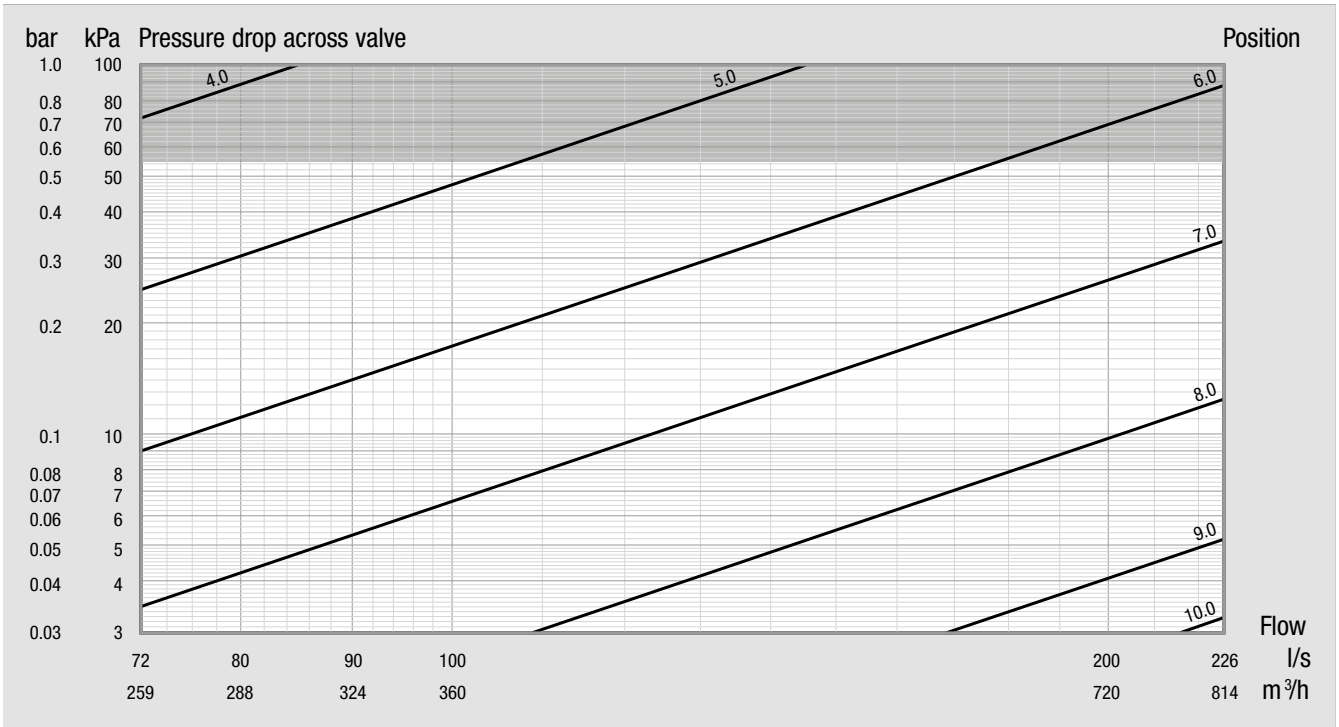
DN 250 flange/flange - Measuring signal diagram



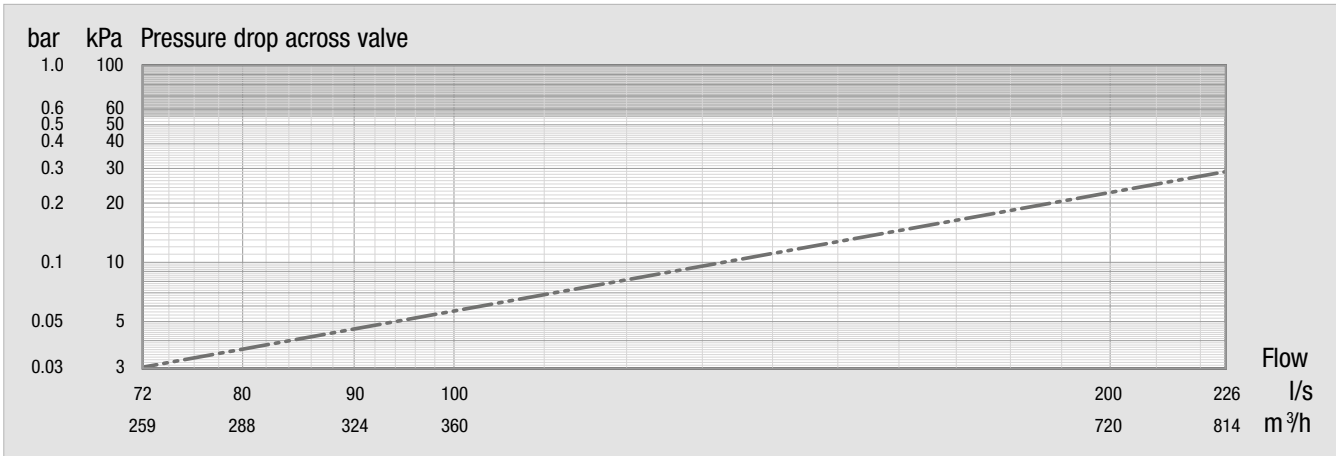
Balancing Valves

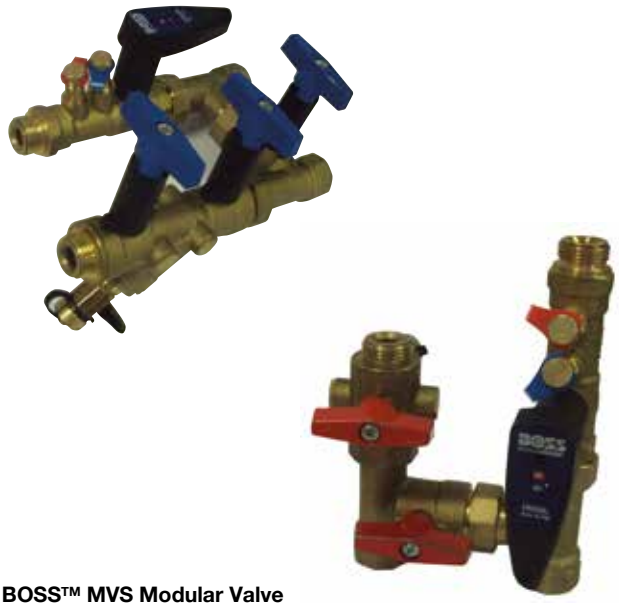
DN 300 flange/flange – Flow diagram / DN 300 flange/flange – Measuring signal diagram

DN 300 flange/flange - Flow diagram



DN 300 flange/flange - Measuring signal diagram





BOSS™ MVS Modular Valve

Red Handles - For Heating Applications		
Size	**Ball Valve Version**	**Strainer Version**
DN15UL	22910179	22910190
DN15L	22910006	22910094
DN15S	22910017	22910102
DN20L	22910028	22910113
DN20S	22910039	22910124
DN20H	22910201	22910223

Extended Blue Handles - For Chilled Water Applications		
Size	**Ball Valve Version**	**Strainer Version**
DN15L	22910050	22910135
DN15S	22910061	22910146
DN20L	22910072	22910157
DN20S	22910083	22910168
DN20H	22910212	22910234

The MVS is a complete flushing bypass system incorporating the BOSS™ Venturi Commissioning Valve Range. It features a variety of interlinked valves and components which are assembled into a system allowing connection, isolation, flushing and draining. Pipe connections are made via Female BSP and terminal connections via flat face male, however pressfit or compression joints are also available.

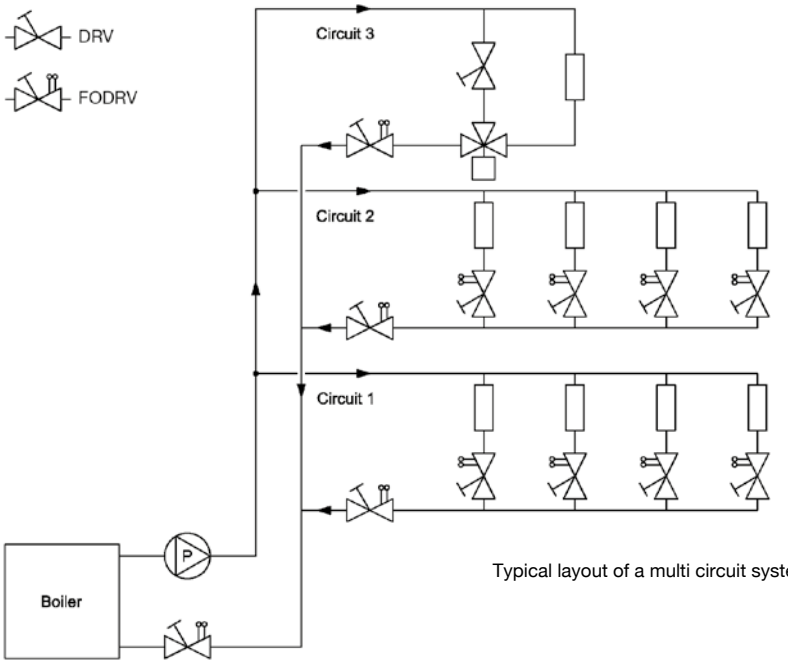
- Fully assembled units are tested to BSEN 12266: 2003
- Prefabricated assemblies for Chilled Water and Heating terminal Units
- Supports a wide range of configurations
- Available with connections to most piping systems
- Flow rates can be adjusted and set through the BOSS™ Venturi Commissioning Range
- Can be manufactured to include the BOSS™ PICV
- Test points can be included in the strainer to enable the coil pressure drop to be checked
- Strainer and Drain Cock are combined in a single unit, as is the ball valve
- Different components can be selected to attach to the body, depending on site specs
- The MVS reduces ‘On Site’ time & labour costs
- 99mm Centres

Balancing Valves

Technical Specification	
Maximum Pressure	16bar
Maximum Temperature	110ºC at 6bar
Minimum Temperature	-40ºC at 6bar
Body Material	Bronze/DZR Brass

Flow Rates	
Size	**Flow Rate (l/s)**
DN15UL	0.005 to 0.035
DN15L	0.01 to 0.074
DN15S	0.062 to 0.148
DN15H	0.074 to 0.325
DN20L	0.062 to 0.148
DN20S	0.138 to 0.325
DN20H	0.26 to 0.6

For more information on the BOSS™ MVS please contact your local BSS branch or the BOSS™ Technical Team on 0116 245 5940.



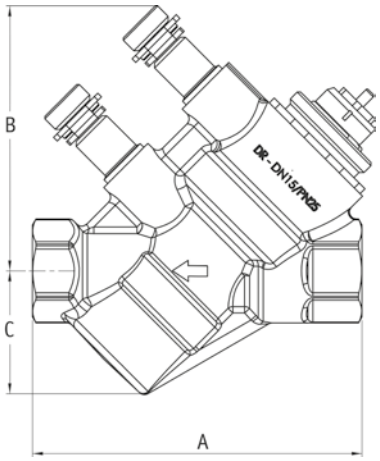
Typical layout of a multi circuit system

Note
This sketch is only intended to show possible locations of the commissioning valves, the designer should consider the need for isolating valve for the servicing of pumps, boilers, chillers etc.

FIG 902 Dynamic PICV (Pressure Independent Control Valve)

BOSS™ 902 Dynamic PICV

Dimensions



BOSS™ 902

Dynamic PICV 902 Dimensions

Size	Flow Description	Kvs	Flow Range l/s	A mm	B mm	C mm	Weight kg	Product Code
DN15	Low Flow	0.23	0.011 - 0.033	95	76	35	0.55	21910006
DN15	Standard Flow	0.78	0.025 - 0.125	95	76	35	0.55	21910017
DN15	High Flow	2.5	0.083 - 0.39	95	76	35	0.55	21910028
DN20	Standard Flow	1.9	0.089 - 0.245	120	76	35	0.876	21910039
DN20	High Flow	4.7	0.232 - 0.617	120	76	35	0.876	21910050
DN25	Standard Flow	4.98	0.240-0.65	127	81	56	1.3	21910061
DN25	High Flow	8.5	0.486-0.925	127	81	56	1.3	21910072
DN32	High Flow	8.3	0.530-1.222	127	81	56	1.77	21910083
DN40	Standard Flow	17.5*	0.7-2.08	189.5	115	85	3.65	21910094
DN50	High Flow	29.5*	1.06-3.47	195	115	85	4.15	21910102

* Refers to the Kvm instead of the Kvs valve as this can fluctuate.

Technical Specification

Material	DZR Brass CW602N
Maximum Temperature	120ºC
Minimum Temperature	Minus 20ºC
Maximum Pressure	25Bar
Operating Pressure	30 - 400kPa (0.3 - 4Bar)
Connections	Female Thread to ISO7/1 Parallel
Seals	EPDM
Membrane	Reinforced EPDM
Cartridge	PPS

The BOSS™ Dynamic PICV 902 is a system balancing valve that combines a fixed orifice Venturi and a differential pressure control valve in one body. It is available with or without electrical actuation and has accurate flow measurement and direct flow measuring.

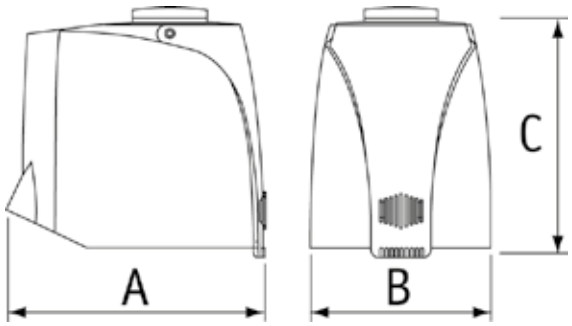
When an electrical actuator is installed the PICV incorporates two port valve functionality.

The actuators are available in 24VAC/DC On/Off, 230VAC On/Off and 24VDC Modulating Control.

Features & Benefits: Direct flow measuring, built in pressure regulator which corrects pressure fluctuations. Full valve authority gives good thermal comfort (when used with a modulating actuator). Can be installed in any position, as long as flow direction is respected. No up/downstream pipe lengths required.

Balancing Valves
Dynamic Thermotecnic Actuator
(For use on Valve Body sizes DN15-DN32)

Dimensions



Dynamic Thermotecnic Actuator

Dynamic Thermotecnic Actuator

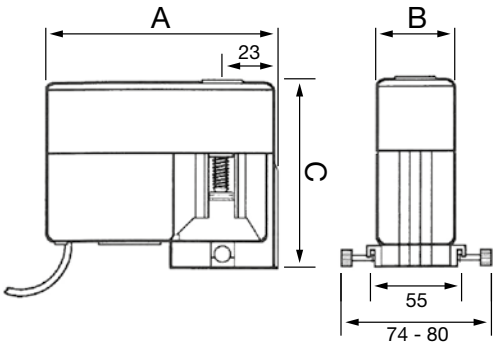
Actuator Type						
Type	**Description**	**A mm**	**B mm**	**C mm**	**Weight kg**	**Product Code**
BOSS™ 902	24VAC/DC On/Off	58	44	47	0.14	21910135
AT01	230VAC On/Off	58	44	47	0.118	21910146
AE01	24VAC Modulating	60	44	64	0.138	21910157

Actuator Specification			
	Product Code 21910135 BOSS™ 902	**Product Code 21910146 AT01**	**Product Code 21910157 AE01**
Operating Voltage	24 VAC/DC 0-60Hz	230VAC 50-60Hz	24VAC 50-60Hz
Operating Power	1.8W	1.8W	2W
Base Position	Normally Closed	Normally Closed	Normally Closed
Closing & Opening Time	3 mins (approx.)	3 mins (approx.)	–
Control Voltage	–	–	0-10VDC
Acting Force	100Nm +/-5%	100Nm +/-5%	100Nm +/-5%
Ambient Temperature	0 - +60ºC	0 - +60ºC	0 - +60ºC
Protection Class	IP54	IP54	IP54
CE Conformity	EN60730	EN60730	EN60730
Cable	Grey (1 metre)	Grey (1 metre)	White (1 metre)

Balancing Valves
Dynamic Electromechanical Actuator
(For use on Valve Actuator Body sizes DN40 & DN50)

Dynamic Electromechanical Actuator

Dimensions



Dynamic Electromechanical Actuator

Actuator Type

Type	Description	A mm	B mm	C mm	Weight kg	Product Code
AVUE	24VAC Modulating	101	50	76	0.405	21910231
AVUX	24VAC On/Off	101	50	76	0.405	21910253
AVUM	230VAC/DC On/Off	101	50	76	0.405	21910242

Actuator Specification

	Product Code 21910231 AVUE	Product Code 21910253 AVUX	Product Code 21910242 AVUM
Operating Voltage	24VAC	24VAC	230VAC
Operating Power	3.1 VA	2.3 VA	3.6 VA
Acting Force	220N	220N	220N
Ambient Temperature			
Operating	0-50ºC	0-50ºC	0-50ºC
Storage	-40-70ºC	-40-70ºC	-40-70ºC
Protection Class	IP40	IP40	IP40
CE Conformity	EN 60730-1	EN 60730-1	EN 60730-1
Cable	Colour-coded fly lead 1.5m long, 3 core Moulded plastic housing Cable colour: White	Colour-coded fly lead 1.5m long, 3 core Moulded plastic housing Cable colour: White	Colour-coded fly lead 1.5m long, 3 core Moulded plastic housing Cable colour: White

BOSS™ FIG 902 Dynamic PICV
(Pressure Independent Control Valve)

Product finder

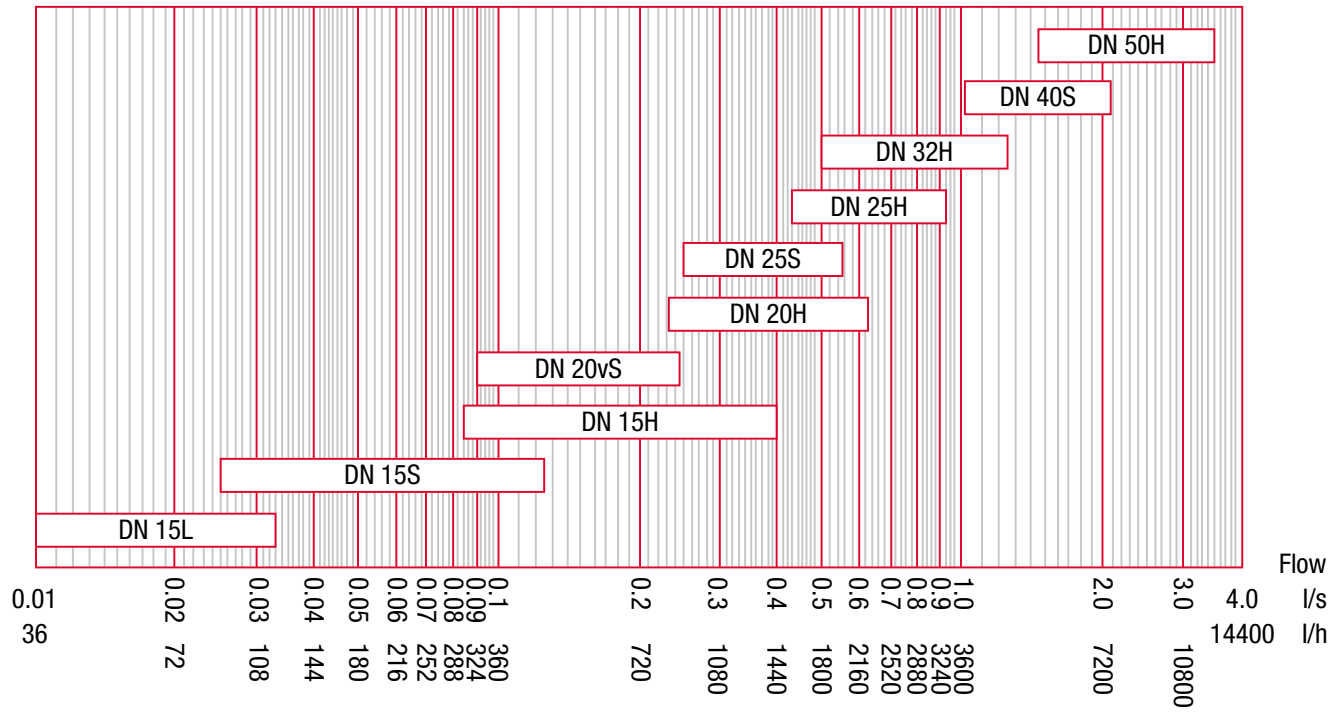
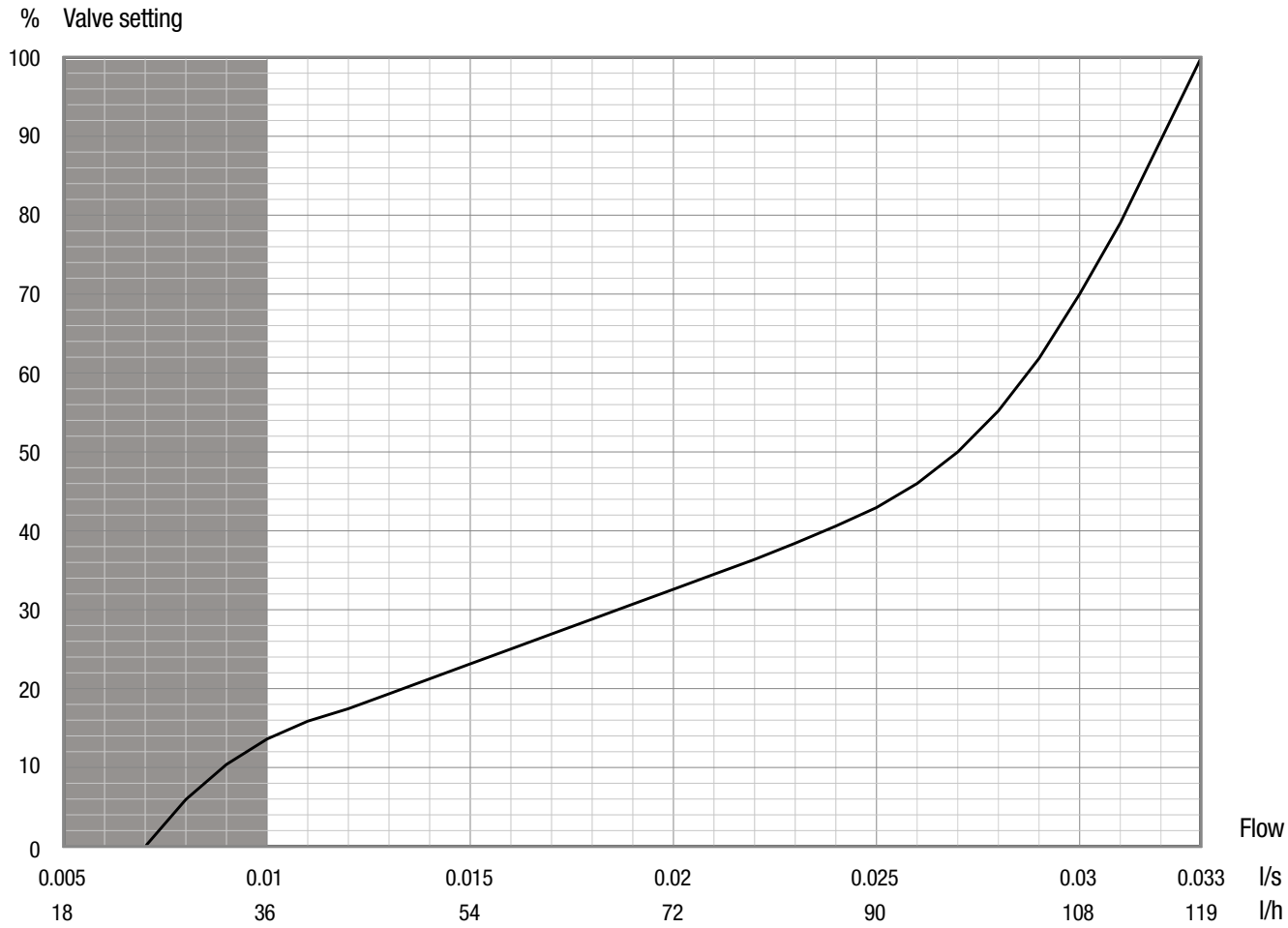
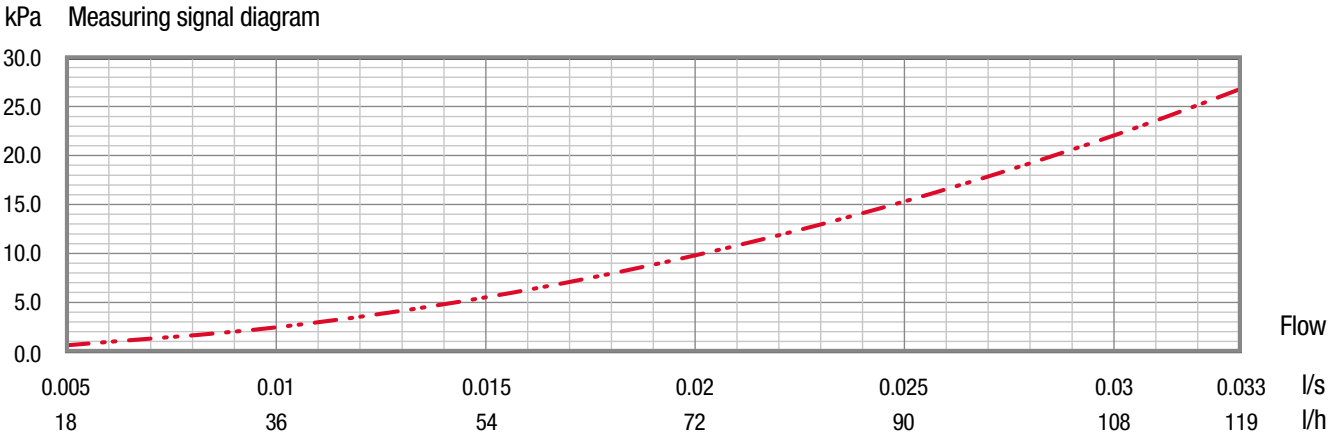


FIG 902 Dynamic PICV (Pressure Independent Control Valve)
DN 15L female/female – Flow diagram/Measuring signal diagram

DN 15L female/female - Flow diagram

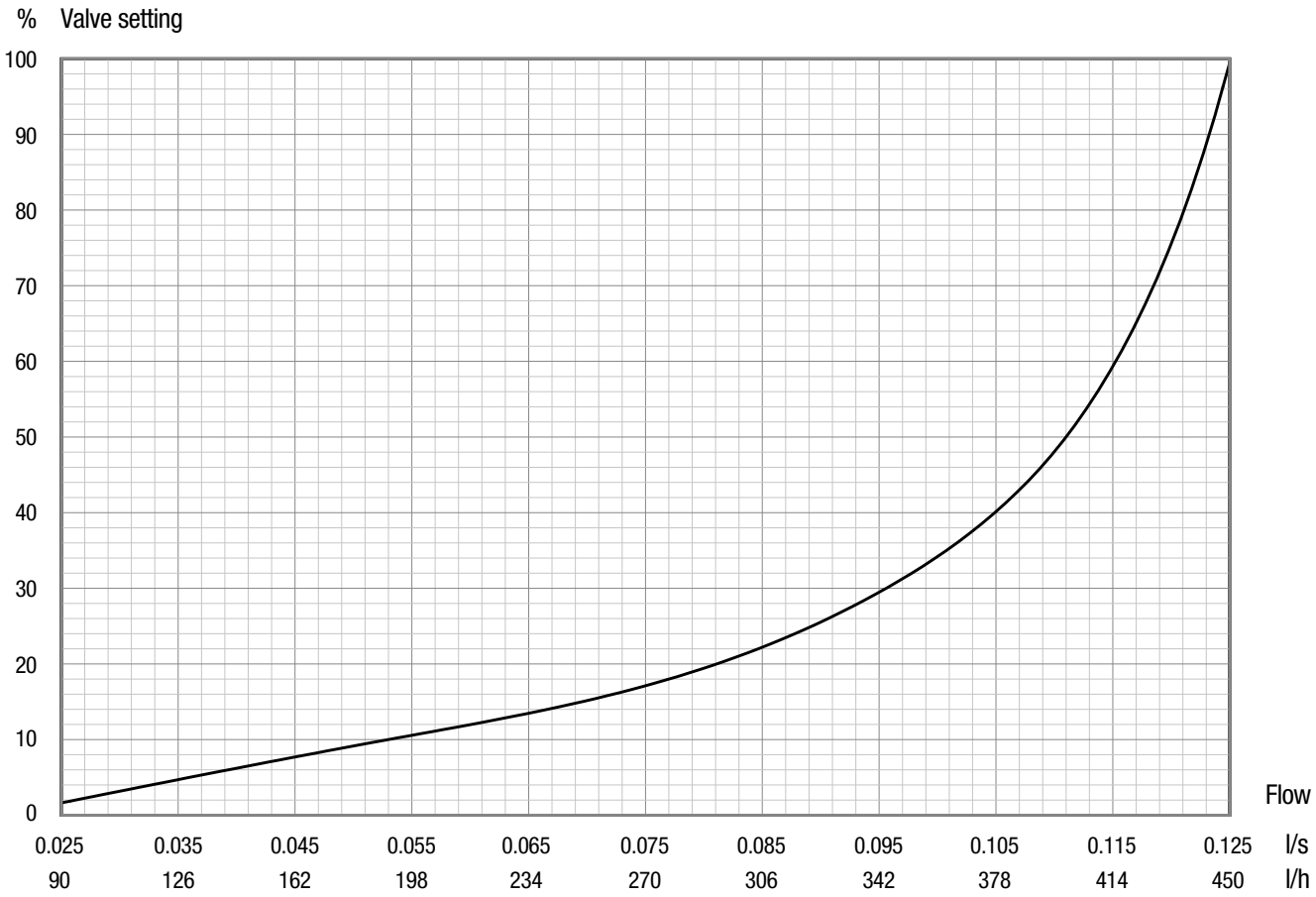


DN 15L female/female - Measuring signal diagram



DN 15S female/female
Flow diagram/Measuring signal diagram

DN 15S female/female - Flow diagram



DN 15S female/female - Measuring signal diagram

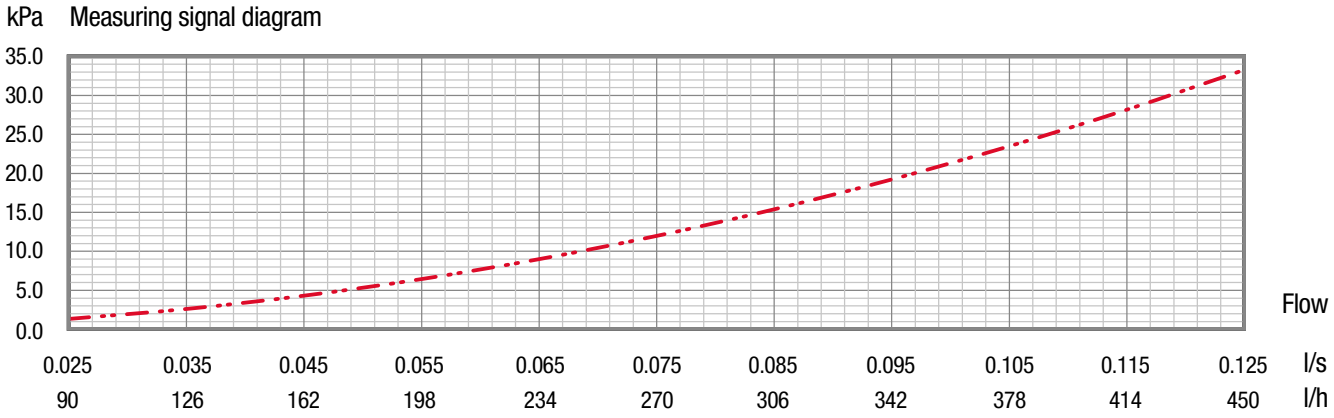
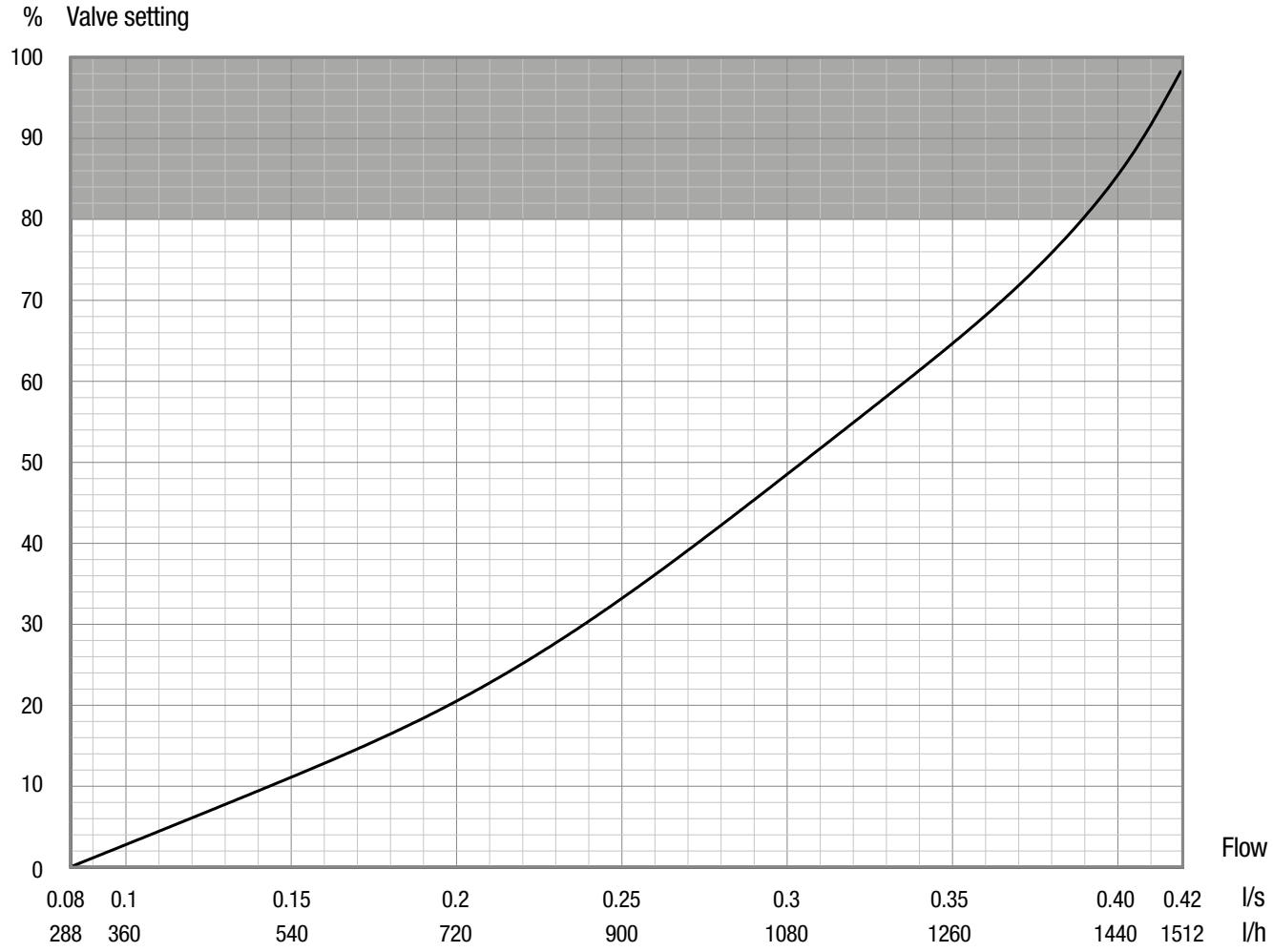


FIG 902 Dynamic PICV (Pressure Independent Control Valve)
DN 15H female/female – Flow diagram/Measuring signal diagram

DN 15H female/female - Flow diagram



DN 15H female/female - Measuring signal diagram

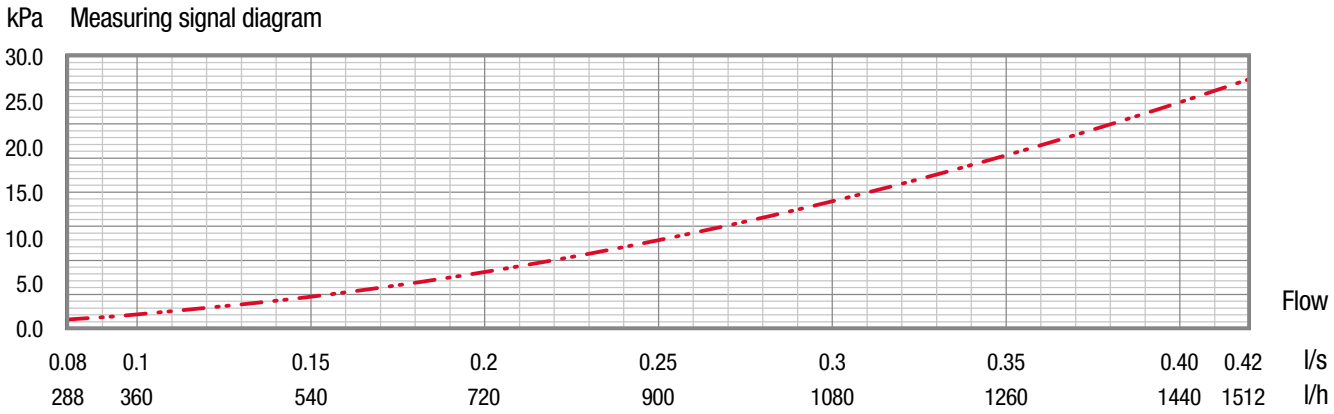
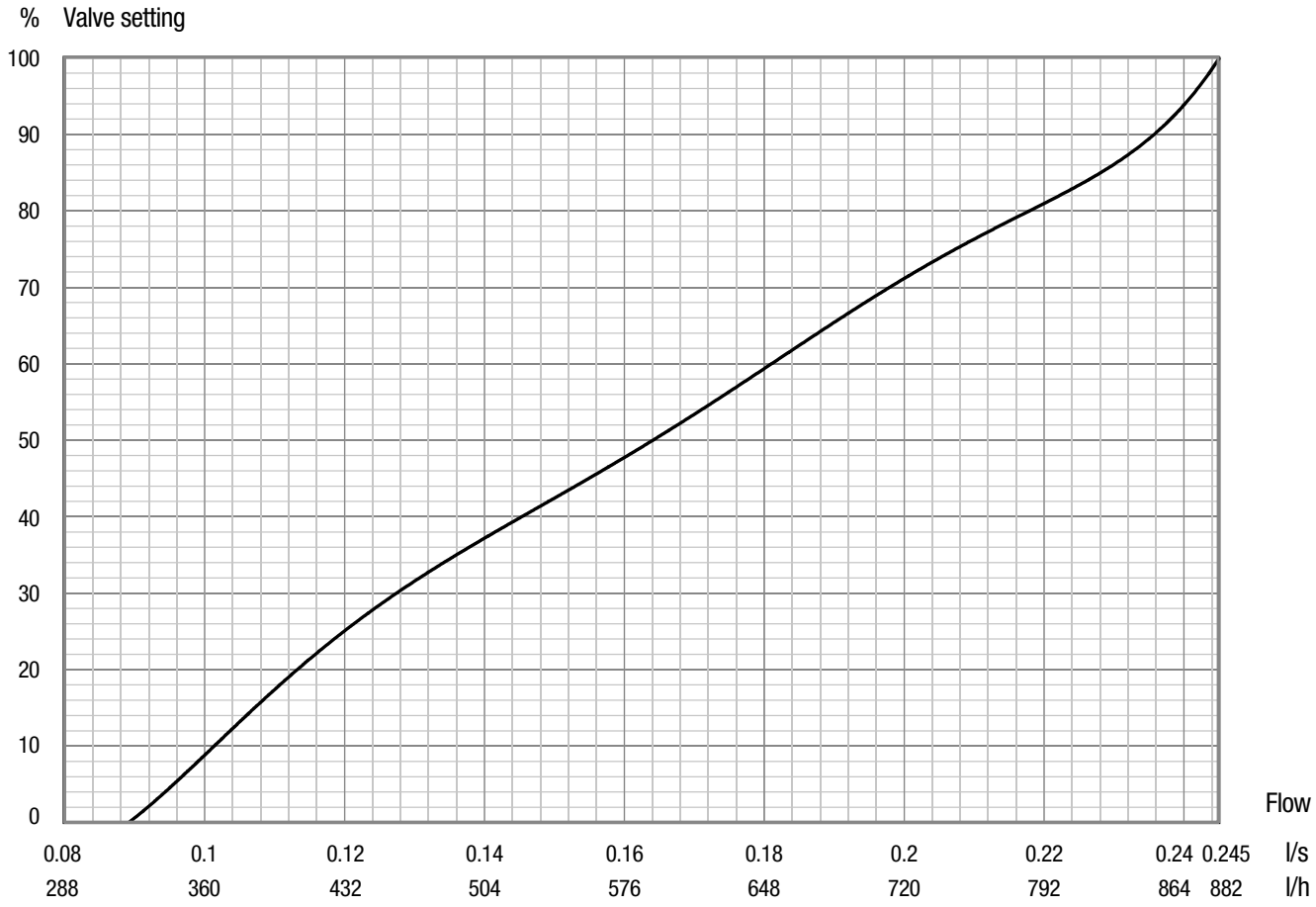


FIG 902 Dynamic PICV (Pressure Independent Control Valve)

DN 20S female/female – Flow diagram/Measuring signal diagram

DN 20S female/female - Flow diagram



DN 20S female/female - Measuring signal diagram

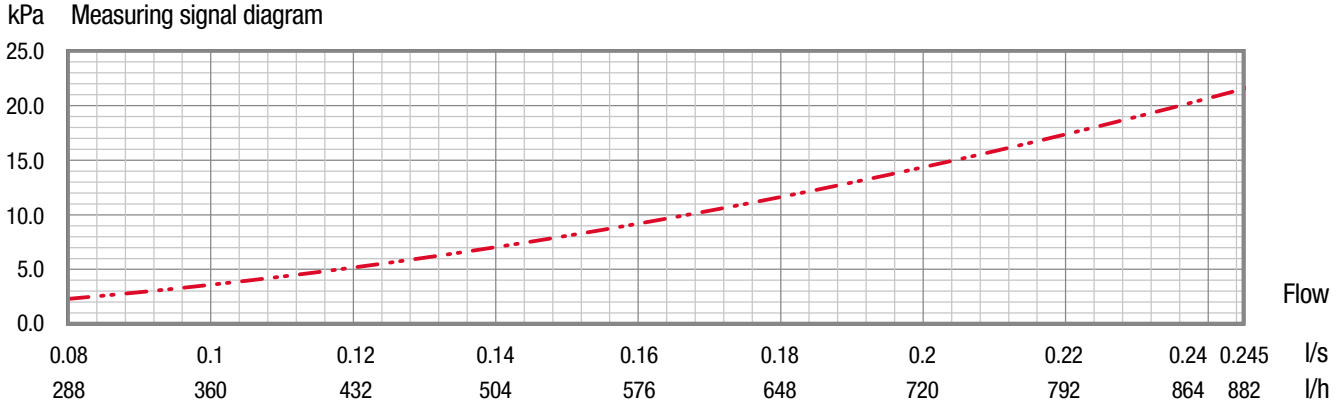
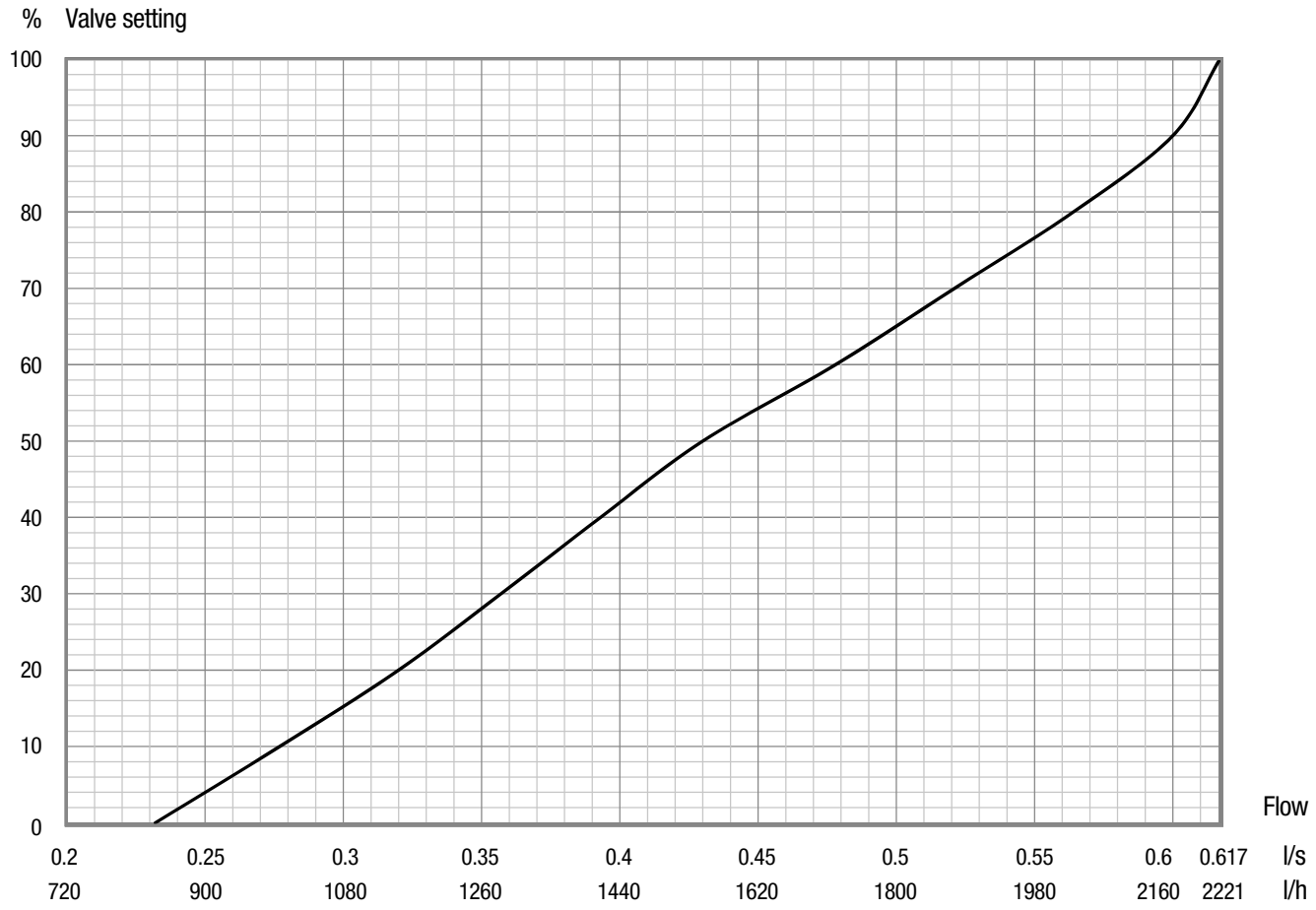


FIG 902 Dynamic PICV (Pressure Independent Control Valve)
DN 20H female/female – Flow diagram/Measuring signal diagram

DN 20H female/female - Flow diagram



DN 20H female/female - Measuring signal diagram

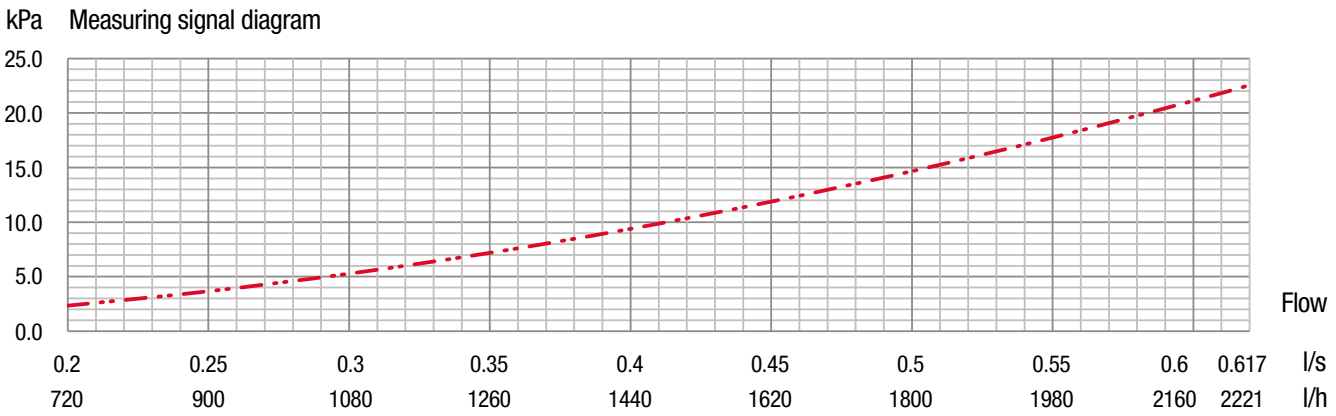
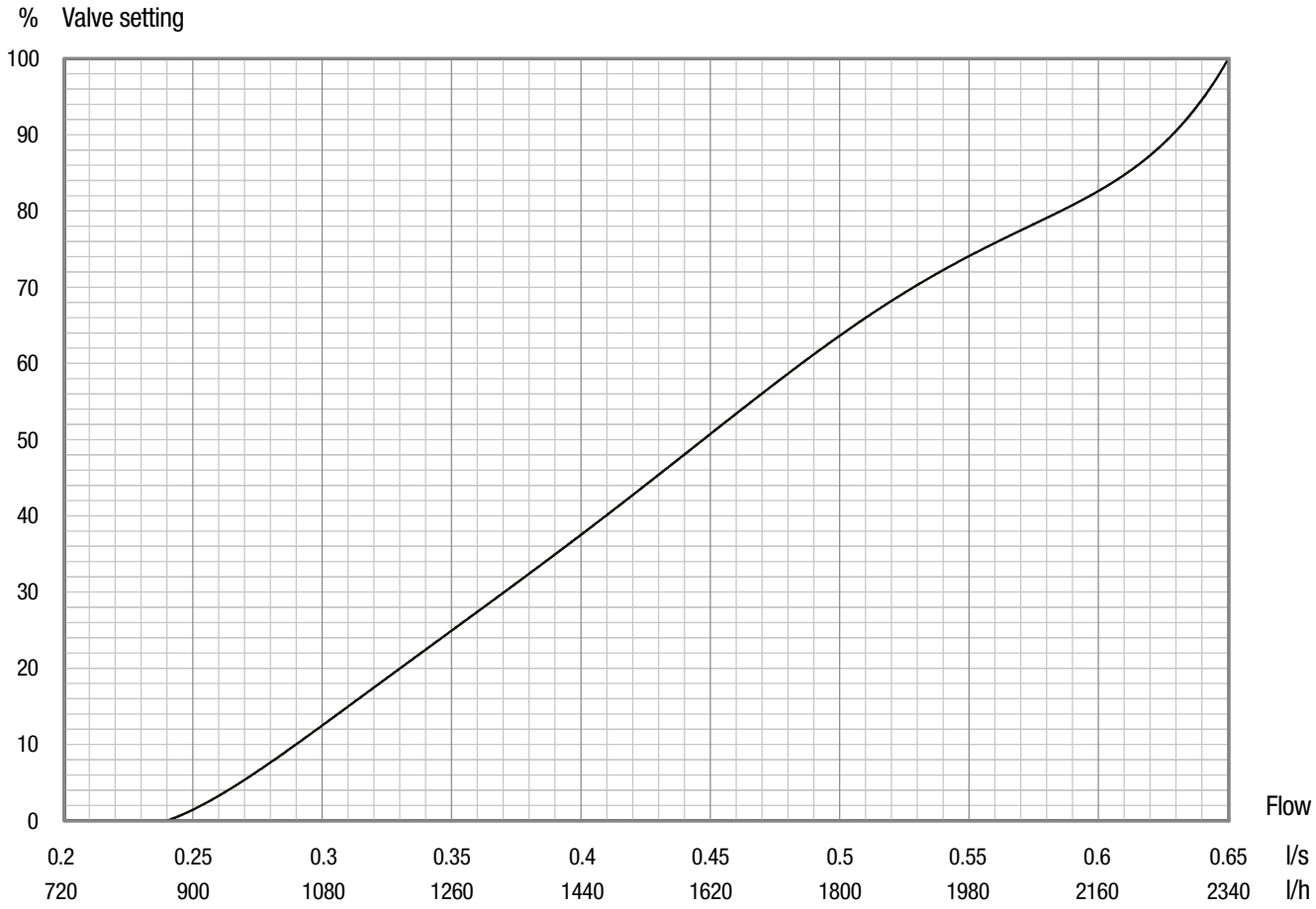


FIG 902 Dynamic PICV (Pressure Independent Control Valve)

DN 25S female/female – Flow diagram/Measuring signal diagram

DN 25S female/female - Flow diagram



DN 25S female/female - Measuring signal diagram

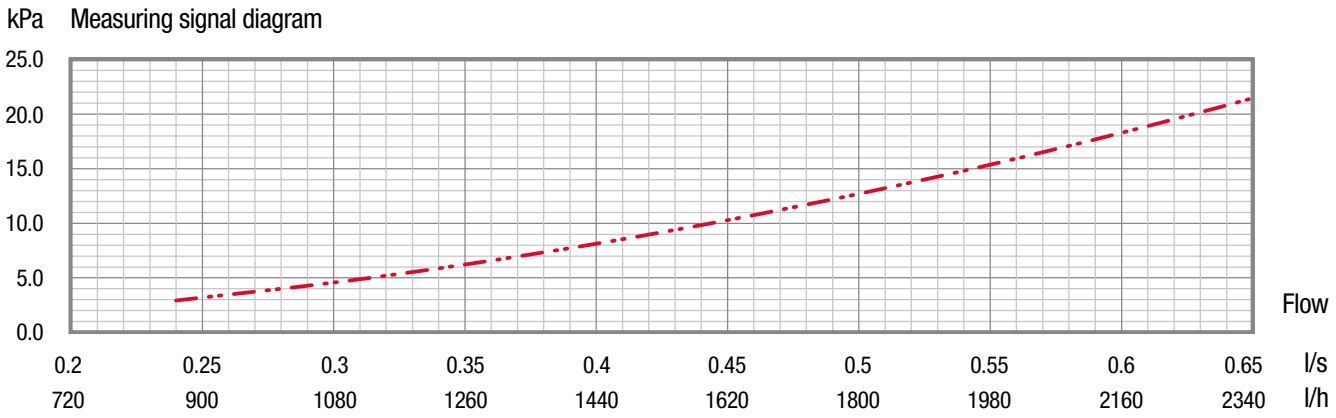
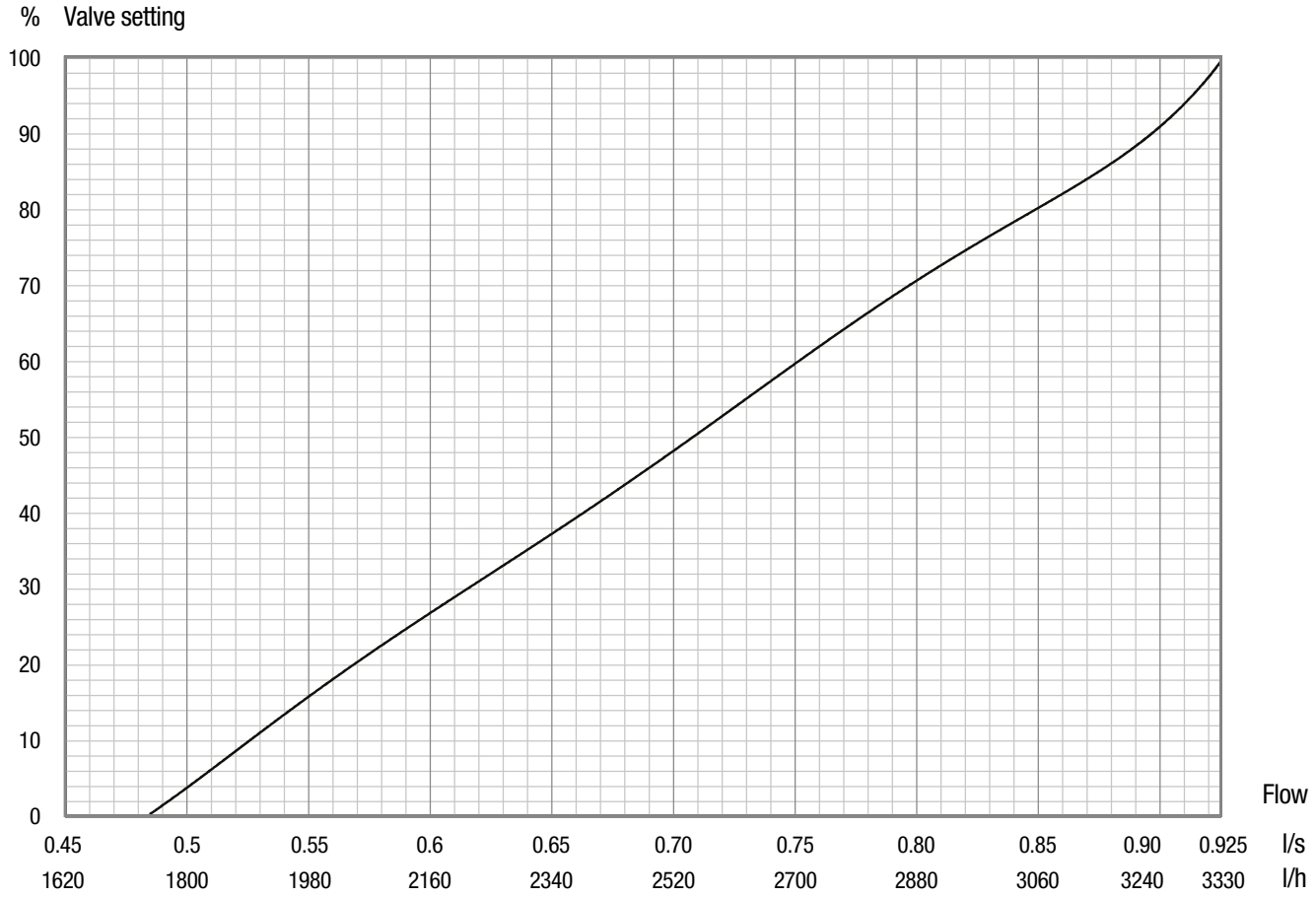


FIG 902 Dynamic PICV (Pressure Independent Control Valve)
DN 25H female/female – Flow diagram/Measuring signal diagram

DN 25H female/female - Flow diagram



DN 25H female/female - Measuring signal diagram

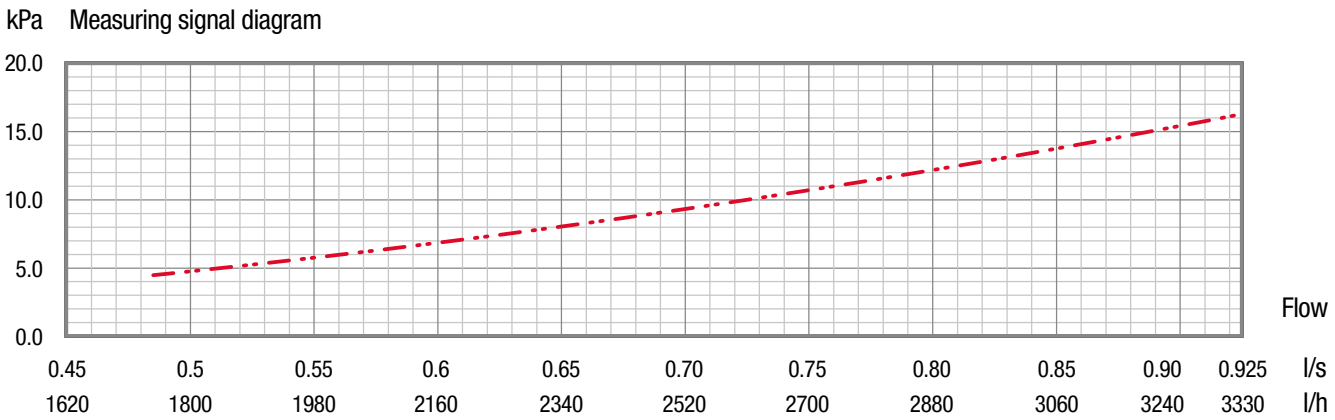
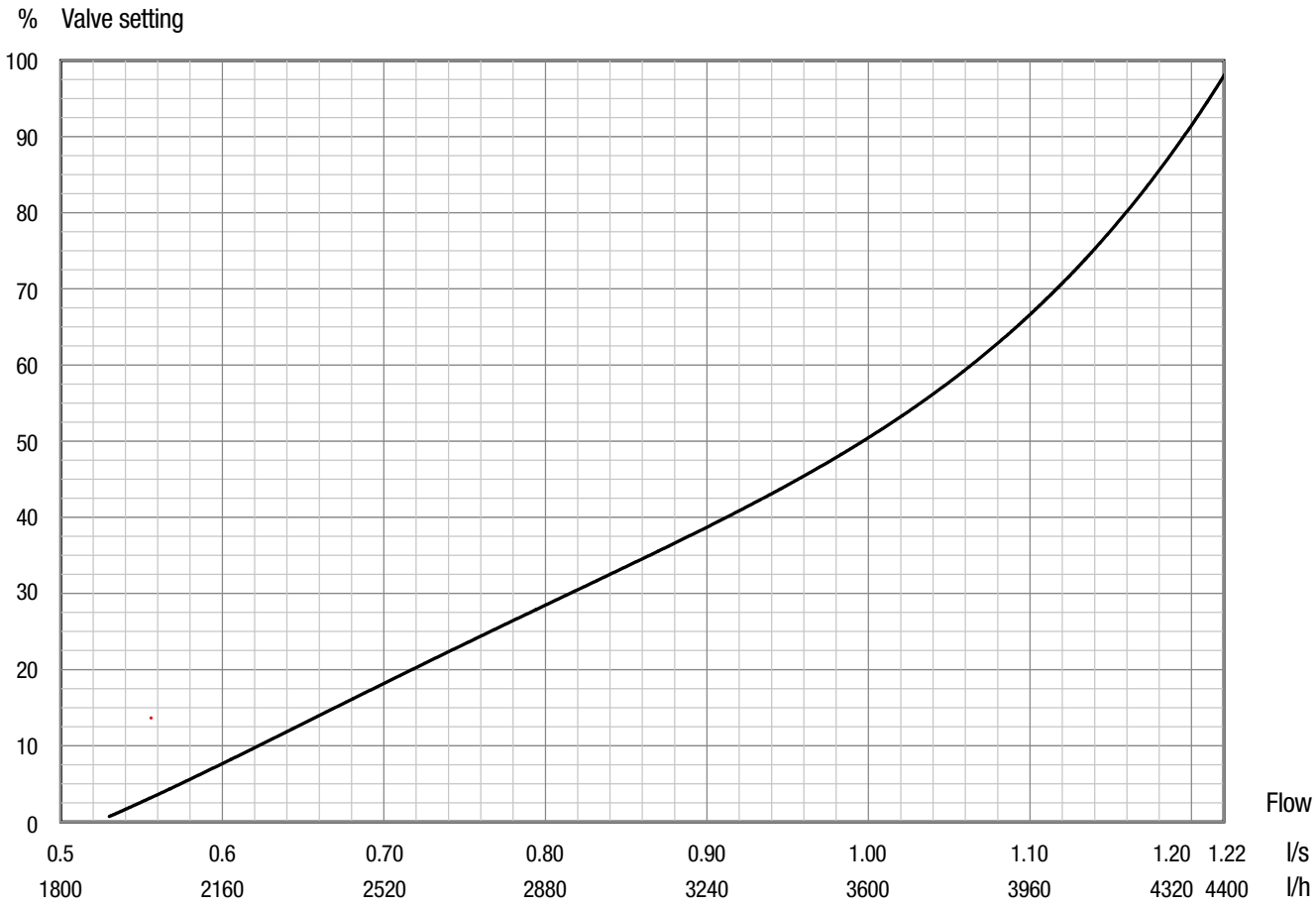


FIG 902 Dynamic PICV (Pressure Independent Control Valve)

DN 32H female/female – Flow diagram/Measuring signal diagram

DN 32H female/female - Flow diagram



DN 32H female/female - Measuring signal diagram

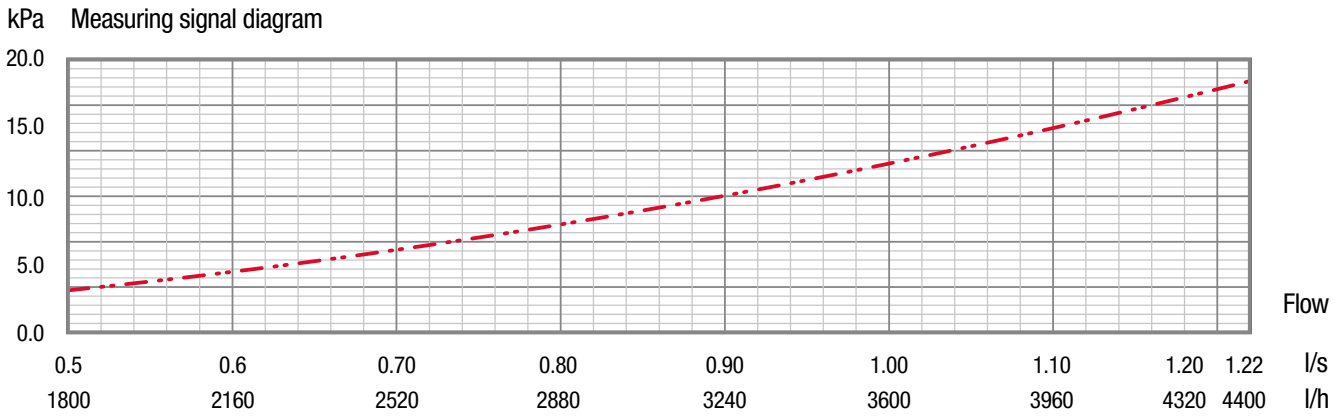
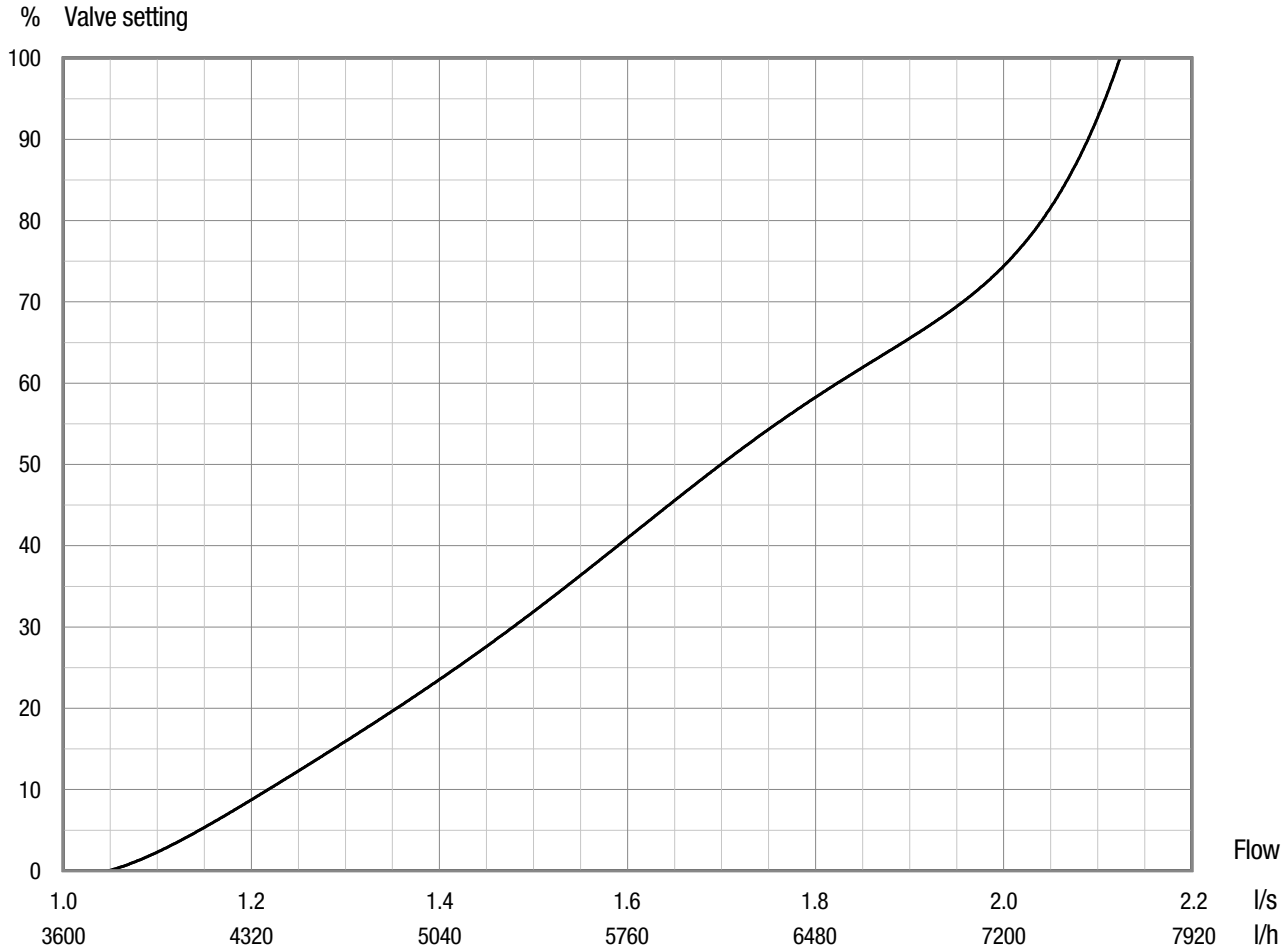


FIG 902 Dynamic PICV (Pressure Independent Control Valve)
DN 40S female/female – Flow diagram/Measuring signal diagram

DN 40S female/female - Flow diagram



DN 40S female/female - Measuring signal diagram

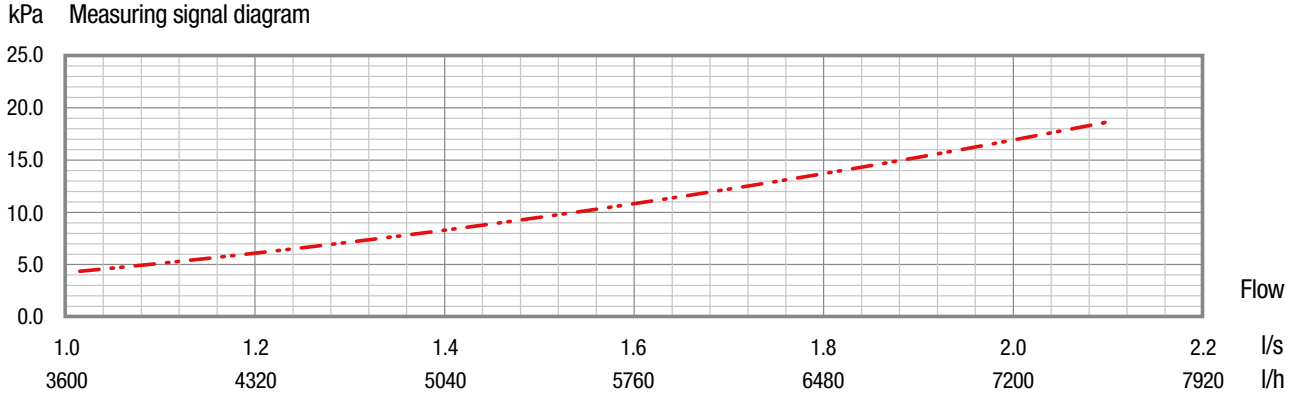
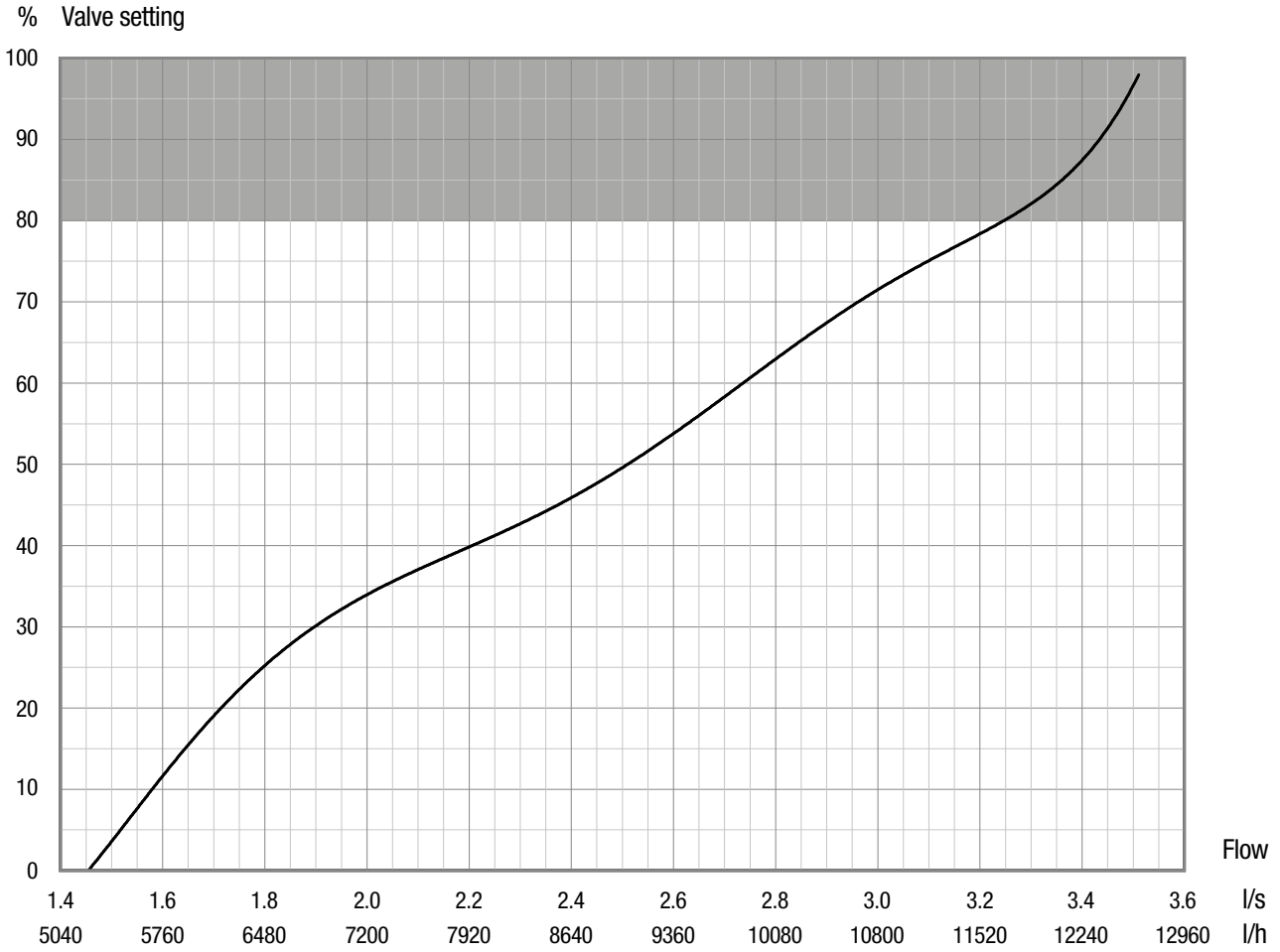


FIG 902 Dynamic PICV (Pressure Independent Control Valve)

DN 50H female/female – Flow diagram/Measuring signal diagram

DN 50H female/female - Flow diagram



DN 50H female/female - Measuring signal diagram

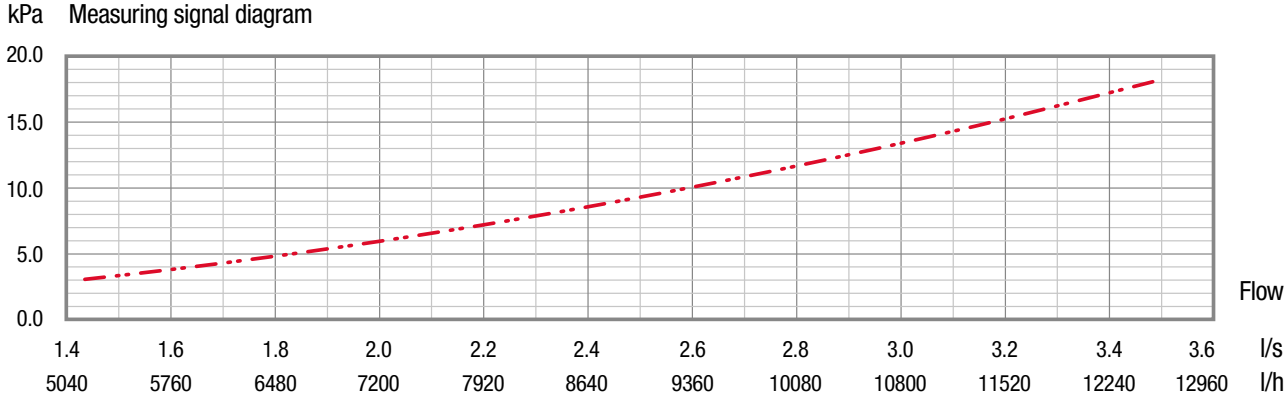
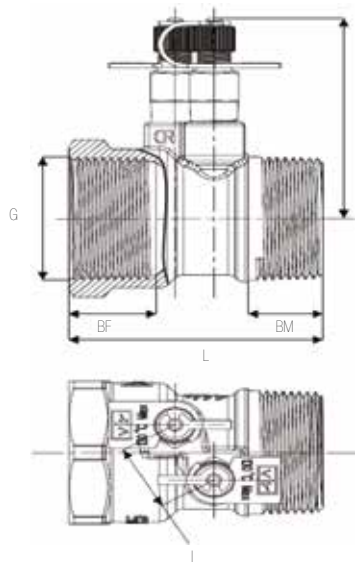


FIG 9400 DZR Brass Metering Station

Dimensions



Description

DZR brass metering station
Threaded M/F ISO7/1 Rp (F side threaded ISO 228/1 on DN15 and DN20)
Design according BS7350
Tolerance on nominal K_{vs} ±3% (test according BS7350)

PN25 (Max 25bar up to 110°C, max 20bar at 120°C)

Working Conditions

Water: -10°C to +120°C
below 0°C only for water with added antifreezing fluids
over 100°C only for water with added anti-boiling fluids

Materials of Construction

N.	Part	Material	Norm
1	Body	DZR Brass	EN12164 CW602N
2	Venturi insert	DZR Brass	EN12165 CW602N
3	Test point	DZR Brass[1]	EN12164 CW602N

[2]Test points with EPDM gaskets and polypropylene ties

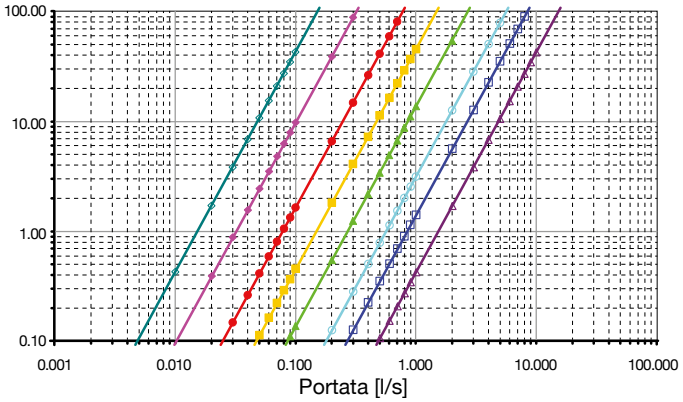
Dimensions and Flow Data

DN	G[1]	H mm	L mm	BF mm	BM mm	I mm	Weight kg	Flow l/s	Product Code
015$_{ULF}$	½"	57.2	60.0	17.5	15.2	22	0.219	0.017-0.045	37000184
015$_{LF}$	½"	57.2	60.0	17.5	15.2	22	0.217	0.031-0.074	37000195
015	½"	57.2	60.0	17.5	15.2	22	0.213	0.062-0.148[2]	37000203
020	¾"	60.0	62.0	19.0	16.5	22	0.254	0.138-0.325[2]	37000214
025	1"	63.5	67.6	22.5	19.1	22	0.353	0.258-0.603[2]	37000225
032	1¼"	69.0	72.4	24.8	21.4	22	0.463	0.540-1.250[2]	37000236
040	1½"	72.0	72.4	24.8	21.4	22	0.531	0.810-1.880[2]	37000247
050	2"	78.0	82.0	29.2	25.7	22	0.755	1.520-3.510[2]	37000258

[1]ISO7/1 Rp (F side threaded ISO 228/1 on DN15 and DN20)
[2]Suggested flow range applicability (BS7350).

If used with measuring manometers different from those proposed by BSS please verify that sensibility of the measuring device is compatible with indicated minimum flow (see flow measurement paragraph)

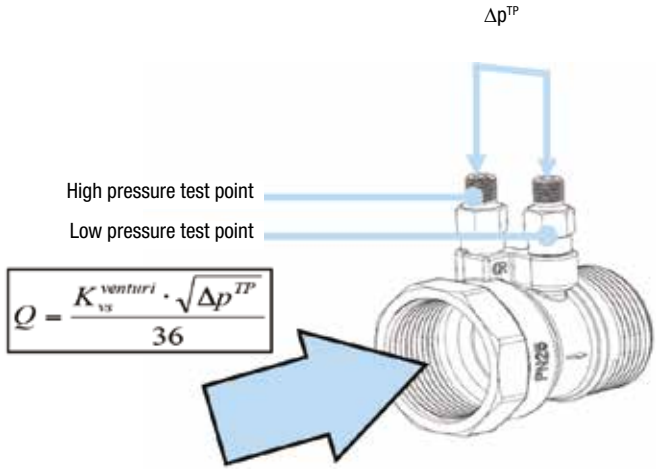
FIG 9400 DZR Metering Station
Flow Measurement



Formula linking flow Q (in l/s) and Δp measured at test points (in kPa).

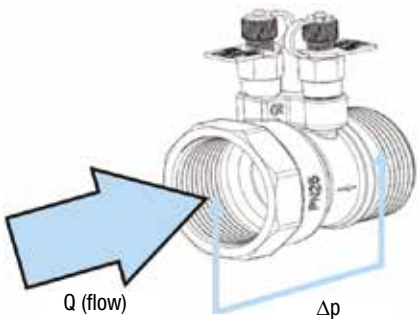
Minimum flow that can be measured for each diameter may be calculated by using the minimum Δp in the formula that can be measured by the manometer used.

Valves are designed for best performance when used on the range suggested above and as indicated by BS7350.



Headloss Calculation

DN	K_v m³/h
015ULF	0.61
015LF	1.23
015	3.63
020	7.56
025	13.61
032	30.78
040	48.10
050	85.51



Formula linking flow Q (in l/s) and theoretical valve headloss Δp (in kPa).

$$\Delta p = \left(\frac{36 \cdot Q}{K_v}\right)^2$$

Installation

To obtain the best performance the valve must be installed on a pipe with the same nominal size preceded and followed by straight pipe lengths as per figure indications.

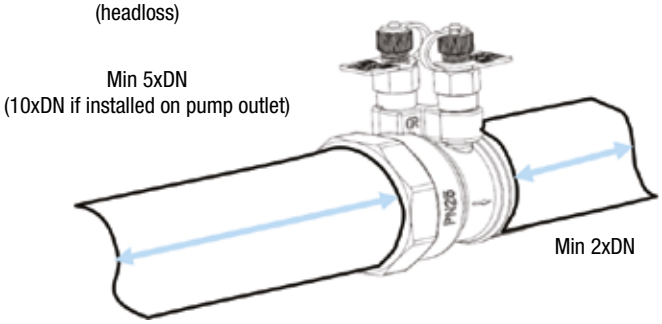
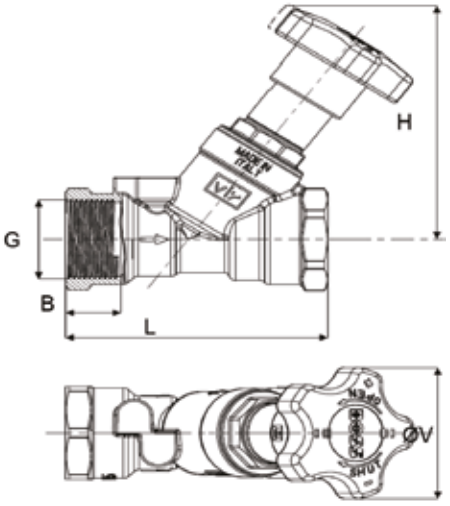


FIG 9510 DZR Double Regulating Valve

Dimensions



Description

DZR brass double regulating valve
Threaded F/F (ISO 228/1 for DN15 and DN20, ISO7/1 RP above)
Design according BS7350

PN25 (Max 25bar up to 110°C, max 20bar at 120°C)

Working Conditions

Water: -10°C to +120°C
below 0°C only for water with added antifreezingfluids over 100°C only for water with added anti-boiling fluids

Materials of Construction

N.	Part	Material	Norm
1	Body	DZR Brass	EN12165 CW602N
2	Balancing cone	DZR Brass	EN12164 CW602N
3	Gasket disc	PTFE	–
4	Disc[1]	DZR Brass	EN12164 CW602N
5	Disc O-ring[1]	EPDM Perox	–
6	Disc stem	DZR Brass	EN12164 CW602N
7	Stem O-ring	EPDM Perox	–
8	Union[1]	DZR Brass	EN12165 CW602N
9	Stem	Brass	EN12164 CW617N
10	Bonnet	DZR Brass	EN12164 CW602N
11	Stop spring ring	Spring steel	–
12	Screw	Steel	–
13	Handwheel	ABS (blue)	–
14	Nut	Zinc plated steel	EN10025 Fe42

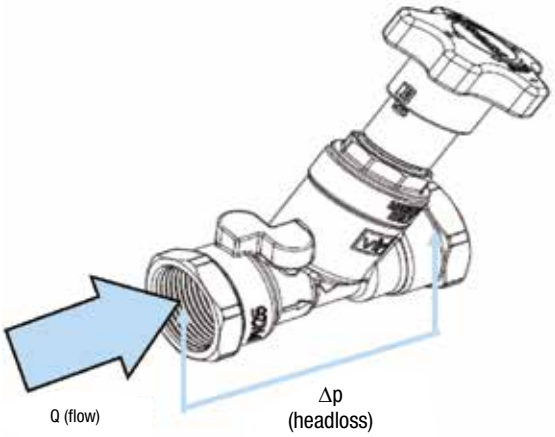
[1]Only on DN32, DN40 and DN50

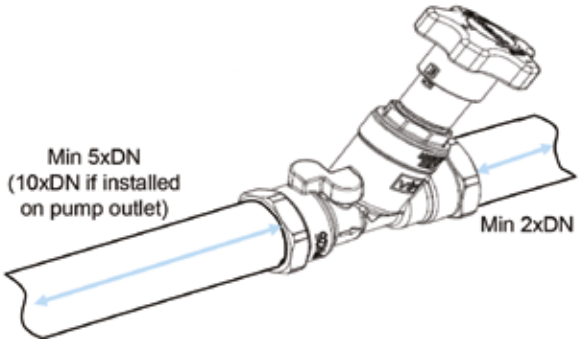
Dimensions and Flow Data

DN	G[1]	H mm	L mm	B mm	ØV mm	Wgt kg	Flow range l/s	Product Codes
015$_{LF}$	½"	103.0	87.8	17.5	70	0.532	0.017-0.074	37000107
015	½"	103.0	87.8	17.5	70	0.527	0.062-0.148[2]	37000118
020	¾"	103.0	95.9	19.0	70	0.576	0.138-0.325[2]	37000129
025	1"	103.0	100.0	22.5	70	0.700	0.258-0.603[2]	37000140
032	1¼"	123.3	117.5	24.8	70	1.154	0.540-1.250[2]	37000151
040	1½"	125.4	127.0	24.8	70	1.446	0.810-1.880[2]	37000162
050	2"	135.6	145.3	29.2	70	2.027	1.520-3.510[2]	37000173

[1]ISO 228/1 for DN15 and DN20, ISO7/1 Rp above
[2]Suggested flow range applicability (BS7350).

FIG 9510 DZR Double Regulating Valve



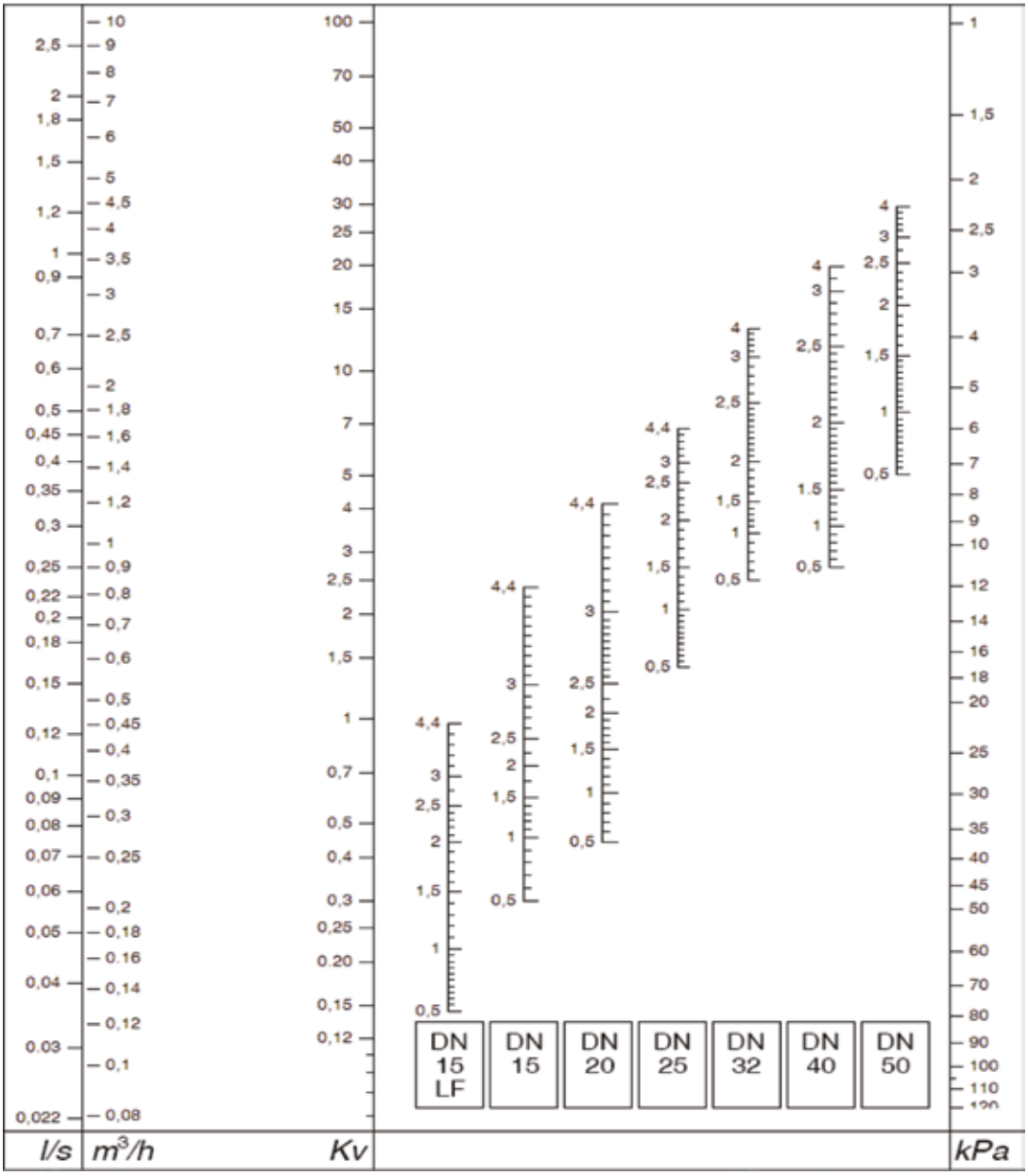


Headloss Calculation

Handwheel position	Kv (m3/h @ 1bar)						
	015_{LF}	015	020	025	032	040	050
0.5	0.143	0.296	0.437	1.41	2.48	2.69	4.99
0.7	0.154	0.355	0.512	1.66	2.90	3.07	5.97
1.0	0.216	0.443	0.615	2.04	3.44	3.58	7.44
1.3	0.279	0.531	0.722	2.40	3.92	4.16	9.28
1.5	0.318	0.587	0.805	2.68	4.23	4.57	10.86
1.7	0.365	0.644	0.887	3.02	4.57	5.27	12.55
2.0	0.435	0.723	1.02	3.66	5.40	7.03	15.33
2.3	0.509	0.801	1.14	4.35	6.79	9.81	18.39
2.5	0.559	0.860	1.25	4.70	8.08	11.71	20.21
2.7	0.607	0.953	1.48	4.93	9.32	13.74	21.84
3.0	0.679	1.25	2.02	5.34	10.92	16.55	23.98
3.3	0.741	1.64	2.70	5.75	11.90	18.14	25.92
3.5	0.783	1.93	3.16	5.99	12.31	18.80	27.14
3.7	0.832	2.14	3.57	6.20	12.67	19.10	28.40
4.0	0.906	2.30	3.93	6.50	13.18	19.75	29.67
4.4	0.951	2.36	4.09	6.74	–	–	–

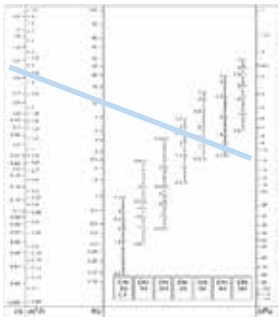
Installation

To obtain the best performances valve must be installed on a pipe with its same nominal size preceded and followed by straight pipe lengths as per figure indications.



By using diagram above is possible to esteem the presetting position of the valve with given design flowrate and headloss:

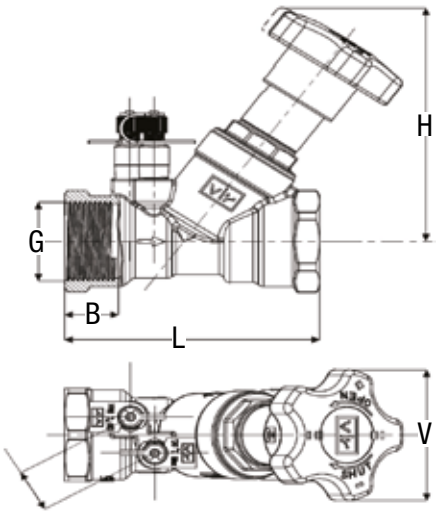
1) draw a straight line joining design flowrate and design headloss;
2) determine design Kv value as intersection of drawn line and Kv axis;
3) draw a straight horizontal line from intersection previously identified and the specific valve DN Axis;
4) intersection determines handwheel position to use for presetting.



In the example for a design flowrate of 2,5m3/h and design Δp 35kPa handwheel position of 1,5 is determined for a DN32 valve

FIG 9515 Fixed Orifice DZR Brass Commissioning Set

Dimensions



Description

Fixed orifice DZR brass commissioning set
Threaded F/F (ISO 228/1 for DN15 and DN20, ISO7/1 Rp above)
Design according BS7350
Tolerance on nominal K_{VS} ±3% (test according BS7350)

PN25 (Max 25bar up to 110°C, max 20bar at 120°C)

Working Conditions

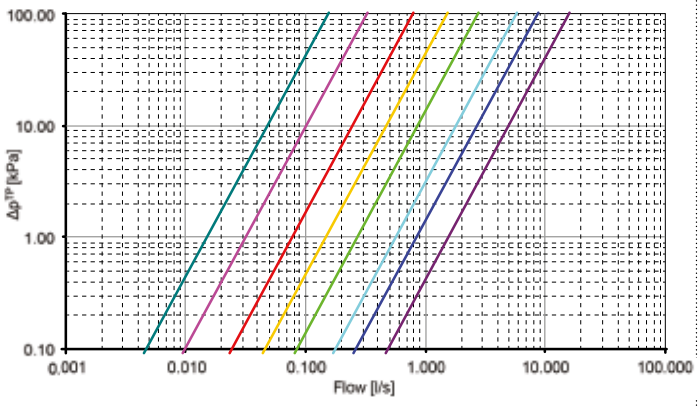
Water: -10°C to +120°C
below 0°C only for water with added antifreezing fluids
over 100°C only for water with added anti-boiling fluids

Materials of Construction

N.	Part	Material	Norm
1	Venturi insert	DZR Brass	EN12164 CW602N
2	Body	DZR Brass	EN12165 CW602N
3	Balancing cone	DZR Brass	EN12164 CW602N
4	Gasket disc	PTFE	–
5	Disc[1]	DZR Brass	EN12164 CW602N
6	Disc O-ring[1]	EPDM Perox	–
7	Disc stem	DZR Brass	EN12164 CW602N
8	Stem O-ring	EPDM Perox	–
9	Union[1]	DZR Brass	EN12165 CW602N
10	Stem	Brass	EN12164 CW617N
11	Bonnet	DZR Brass	EN12164 CW602N
12	Stop spring ring	Spring steel	–
13	Screw	Steel	–
14	Handwheel	ABS (blue)	–
15	Nut	Zinc plated steel	EN10025 Fe42
16	Test point	DZR Brass[2]	EN12164 CW602N

[1]Only on DN32, DN40 and DN50
[2]Test points with EPDM gaskets and polypropylene ties

Flow Measurement



Formula linking flow Q (in l/s) and Δp measured at test points (in kPa).

Minimum flow that can be measured for each diameter may be calculated by using in the formula minimum Δp that can be measured by used manometer.

Valves are anyway designed for best performances when used on range previously suggested and as indicated by BS7350.

- DN15 $_{UL.F}$ K_{VS} venturi 0.55
- DN15 $_{L.F}$ K_{VS} venturi 1.15
- DN15, K_{VS} venturi 2.80
- DN20, K_{VS} venturi 5.33
- DN25, K_{VS} venturi 9.72
- DN32, K_{VS} venturi 20.25
- DN40, K_{VS} venturi 30.23
- DN50, K_{VS} venturi 55.07

Dimensions and Flow Data

	G[1]	H mm	L mm	B mm	ØV mm	I mm	Wgt kg	Flow range l/s	Product Codes
015$_{ULF}$	½"	103.0	87.8	17.5	70	22	0.558	0.017-0.045	37000011
015$_{LF}$	½"	103.0	87.8	17.5	70	22	0.556	0.031-0.074	37000022
015	½"	103.0	87.8	17.5	70	22	0.550	0.062-0.148[2]	37000033
020	¾"	103.0	95.9	19.0	70	22	0.620	0.138-0.325[2]	37000044
025	1"	103.0	100.0	22.5	70	22	0.751	0.258-0.603[2]	37000055
032	1¼"	123.3	117.5	24.8	70	22	1.191	0.540-1.250[2]	37000066
040	1½"	125.4	127.0	24.8	70	22	1.446	0.810-1.880[2]	37000077
050	2"	135.6	145.3	29.2	70	22	2.064	1.520-3.510[2]	37000088

[1]ISO 228/1 for DN15 and DN20, ISO7/1 Rp above
[2]Suggested flow range applicability (BS7350).

If used with measuring manometers different from those proposed by BSS please verify that sensibility of the measuring device is compatible with indicated minimum flow (see flow measurement paragraph)

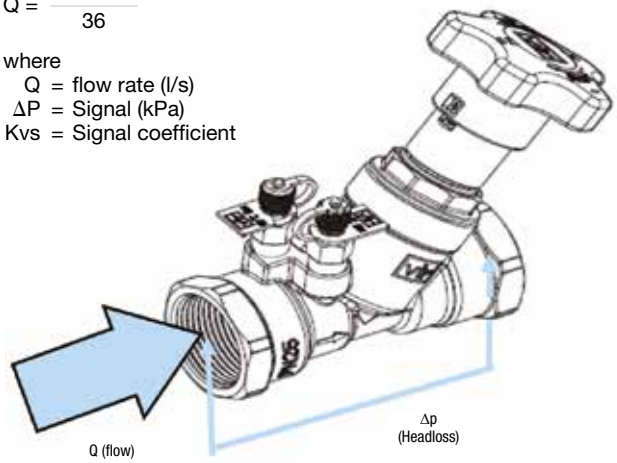
FIG 9515 Fixed Orifice DZR Brass Commissioning Set

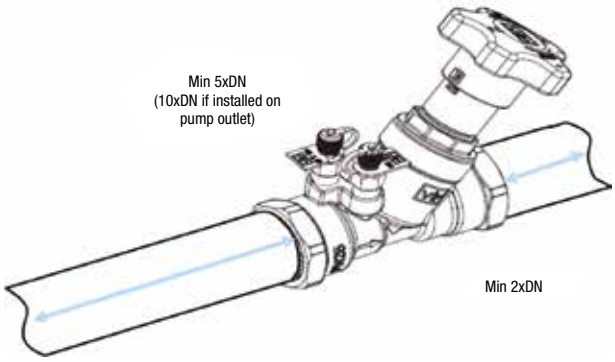
Dimensions

Calculation of flow rate

$$Q = \frac{Kvs\sqrt{\Delta P}}{36}$$

where
Q = flow rate (l/s)
ΔP = Signal (kPa)
Kvs = Signal coefficient



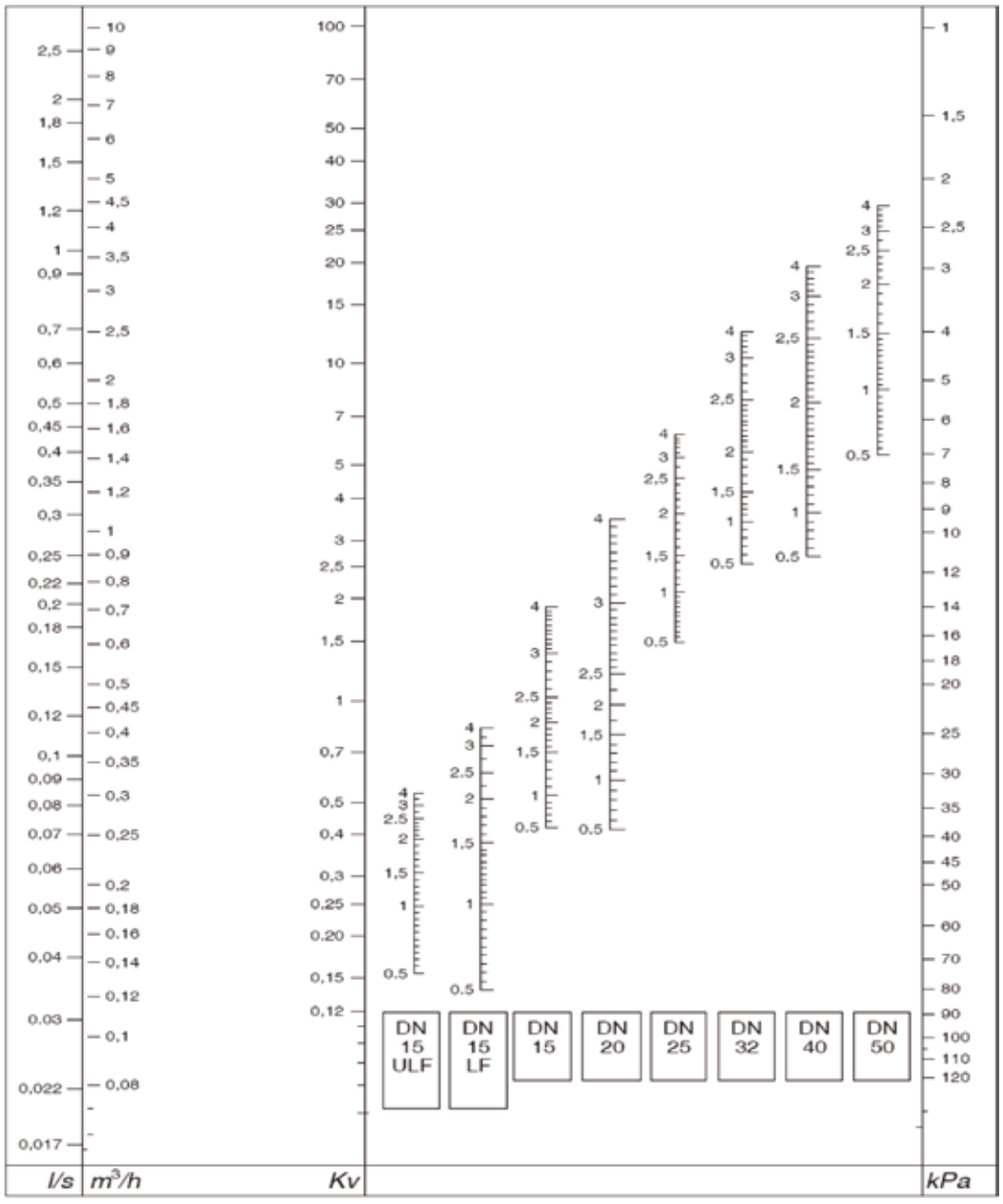


Installation

To obtain the best performance, valves must be installed on a pipe with the same nominal size preceded and followed by straight pipe lengths as per figure indications.

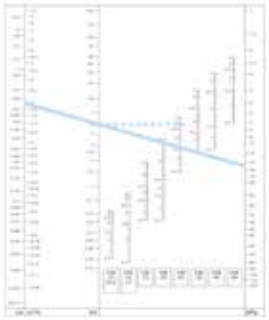
Headloss Calculation

Handwheel position	Kv (m3/h @ 1bar)							
	015_{ULF}	015_{LF}	015	020	025	032	040	050
0.5	0.153	0.138	0.41	0.41	1.47	2.56	2.72	5.36
0.7	0.178	0.161	0.41	0.47	1.73	2.92	3.12	6.54
1.0	0.245	0.248	0.53	0.58	2.09	3.42	3.69	8.35
1.3	0.286	0.341	0.62	0.70	2.44	3.88	4.29	10.54
1.5	0.307	0.381	0.70	0.78	2.70	4.18	4.82	12.37
1.7	0.335	0.433	0.78	0.86	3.01	4.54	5.71	14.39
2.0	0.385	0.507	0.86	0.97	3.57	5.42	7.78	17.45
2.3	0.442	0.579	0.95	1.08	4.18	6.76	10.45	20.20
2.5	0.447	0.602	1.02	1.20	4.57	7.92	12.29	21.73
2.7	0.456	0.643	1.14	1.40	4.87	9.05	14.13	23.06
3.0	0.487	0.716	1.38	1.94	5.27	10.56	16.34	24.84
3.3	0.500	0.747	1.63	2.54	5.61	11.58	17.88	26.44
3.5	0.514	0.771	1.76	2.93	5.74	12.06	18.63	27.44
3.7	0.515	0.800	1.83	3.24	5.88	12.40	19.17	28.42
4.0	0.522	0.824	1.89	3.51	6.14	12.54	19.59	29.72
4.4	0.523	0.852	1.92	3.67	6.24	–	–	–



By using diagram above is possible to esteem the presetting position of the valve with given design flowrate and headloss:

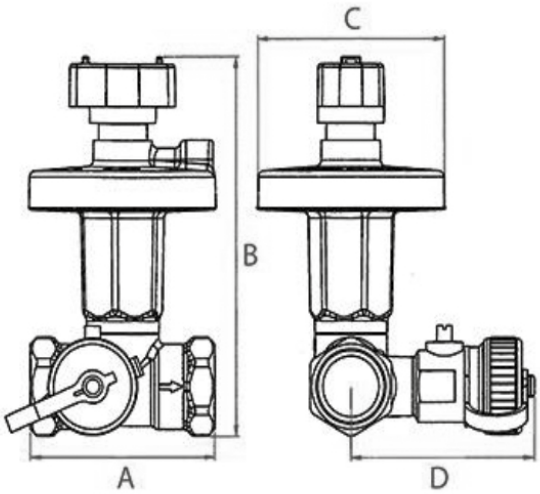
1) draw a straight line joining design flowrate and design headloss;
2) determine design Kv value as intersection of drawn line and Kv axis;
3) draw a straight horizontal line from intersection previously identified and the specific valve DN Axis;
4) intersection determines handwheel position to use for presetting.



In the example for a design flowrate of 2m3/h and design Δp 15kPa handwheel position of 2,9 is determined for a DN25 valve

Differential Pressure Control Valves
FIG 904 DPCV

Dimensions



Dimensions and Flow Data

Size DN	Differential Pressure Range kPa	Kv Value	A mm	B mm	C mm	D mm	Weight kg	Product Code
15	20-65	1.6	61	101	62	61	1.0	89720001
20	20-65	2.5	71	105	62	62	1.0	89720012
25	20-65	4	84	146	96	65	2.0	89720023
32	20-65	6.3	96	148	96	69	2.0	89720034
40	20-40	10.0	100	220	138	73	3.0	89720045
40	35-75	10	100	220	138	73	3.0	89720056
50	20-40	20	135	232	138	77	4.0	89720067
50	35-75	20	135	232	138	77	4.0	89720078
50	60-100	20	135	232	138	77	4.0	89720089

Technical Specification	
Connections	Screwed Female ISO 7/1 Parallel
Maximum Pressure	25 Bar
Maximum Temperature	120°C
Minimum Temperature	-20°C

Materials of Construction	
Valve Body	DZR Brass CW602N
Seat	DZR Brass CW602N
Spring	Stainless Steel
Sealings & Diaghragm	EPDM
Isolation Knob	PPS (Polyphenylene Sulfide)

For Partner Valve - use BOSS™ 903

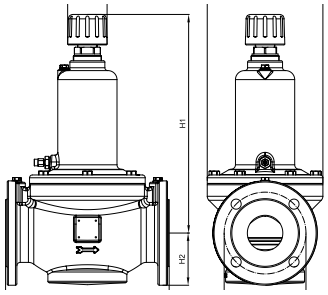
Differential Pressure Control Valves

Differential Pressure Control Valves 2½" to 4" (DN65 to DNPN16)

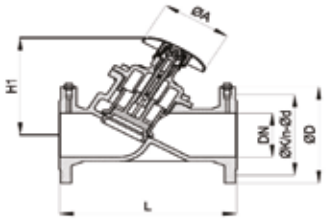
BOSS™ Differential Pressure Control Valve

BOSS™ Partner Valve

Dimensions



BOSS™ Differential Pressure Control Valve



BOSS™ Partner Valve

Pressures & Temperatures	
Maximum Working Pressure	16Bar
Maximum Flow Temperature	120ºC

Application		
Pressure Range kPa	**Pressure Range bar**	
20 - 40	0.2 - 0.4	Radiator, Fan Coil, Chilled Beam & Flat Stations
35 - 75	0.35 - 0.75	Fan Coil, Chilled Beam & Flat Stations
60 - 100	0.6 - 1	Large Terminal Units i.e Air Handling Units, Fan Coils etc

BOSS™ Differential Pressure Control Valves are used to maintain differential pressure. They are available in a number of pressure ranges and sizes depending on the specific requirements of the system. The 2½" to 4" valves are flanged PN16. The DPCV is mounted on the RETURN whilst the Partner Valve is mounted on the FLOW.

Features

- Protects two port valve authority
- Maintains circuit loads
- Partner valve available to connect the impulse tube between flow and return providing isolation, measuring and regulating functions
- Offers three different differential pressure ranges
- Shut off function
- Constant performance
- Low noise emission

Technical Specification 2½" to 4" (DN65 to DN100) DPCV

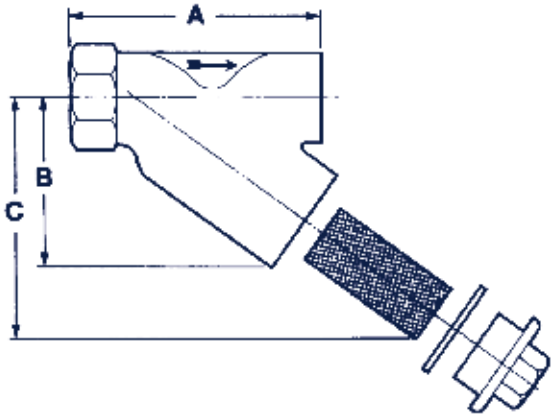
Size DN	Differential Pressure Range (bar)	Kv Value	Flanged	L1 mm	H1 mm	H2 mm	D1 mm	D2 mm	D3 mm	Weight Kg	Product Code
2½" DN65	0.2-0.4	30	PN16	290	385	93	68	205	145	42.00	89710305
3" DN80	0.2-0.4	48	PN16	310	390	100	68	218	160	48.00	89710316
4" DN100	0.2-0.4	76	PN16	347	446	112	68	248	180	64.44	89710327
2½" DN65	0.35 - 0.75	30	PN16	290	385	93	68	205	145	42.00	89710338
3" DN80	0.35 - 0.75	48	PN16	310	390	100	68	218	160	48.25	89710349
4" DN100	0.35 - 0.75	76	PN16	347	446	112	68	248	180	63.00	89710360
2½" DN65	0.6 - 1	30	PN16	290	385	93	68	205	145	41.50	89710371
3" DN80	0.6 - 1	48	PN16	310	390	100	68	218	160	48.00	89710382
4" DN100	0.6 - 1	76	PN16	347	446	112	68	248	180	65.00	89710393

Technical Specification BOSS™ Adjustment/Partner Valve

Size DN	Differential Pressure Range (bar)	Kv Value	Flanged	L1 mm	H1 mm	H2 mm	OD mm	O mm	Weight Kg	n-Od	Product Code
2½" DN65	n/a	93.4	PN16	290	187	n/a	185	145	4 x 19	17.11	89710401
3" DN80	n/a	122.3	PN16	310	205	n/a	200	160	8 x 19	21.06	89710412
4" DN100	n/a	200	PN16	350	222	n.a	220	180	8 x 19	32.50	89710423

Strainers
Bronze – FIG 47N

Dimensions



Size mm	A mm	B mm	C mm	Weight kg	Product Code
15	67	39	61	0.3	23010604
20	74	46	73	0.4	23010615
25	92	55	88	0.6	23010626
32	106	55	102	1.2	23010637
40	114	76	119	1.4	23010648
50	147	99	153	2	23010659
65	226	150	230	9.5	23010670
80	226	150	230	9.5	23010681

C = Strainer withdrawal clearance

Technical Specification		
Connections (15 – 50mm)		Screwed BSPT Female
Connections (65 – 80mm)		Screwed BSPP Female
Pressure	Steam	13.8bar at 200ºC
	Cold (non-shock)	32bar

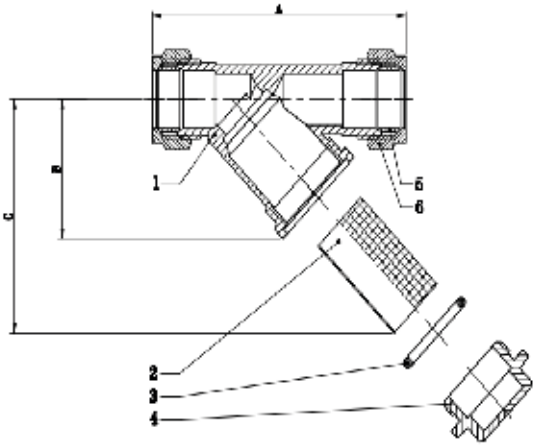
Strainers of 25mm and above may be tapped and drilled

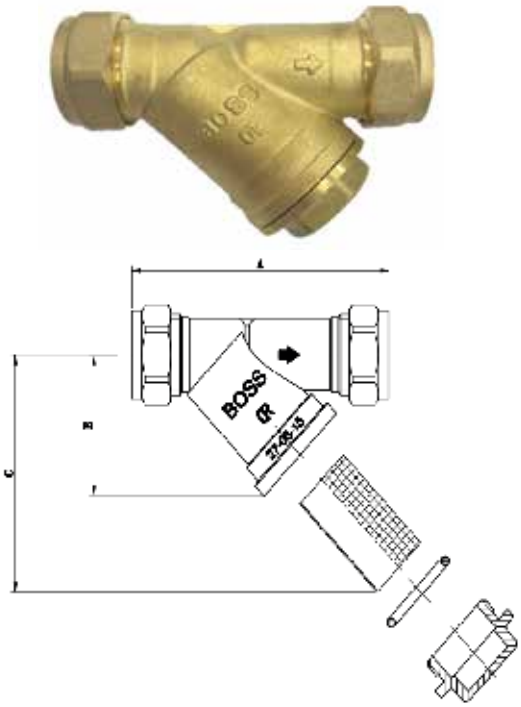
Materials of Constructions	
Body	Bronze
Plug	DZR brass
Screen	20 Mesh Stainless Steel as standard

Other screens available on request

Compression 'Y'-Type Strainers
DZR Brass - FIG 46CW

Dimensions





Size mm	A mm	B mm	C mm	Weight kg	Product Code
15	75.0	36.5	61.0	0.15	10460110
22	84.4	42.0	71.9	0.24	10460121

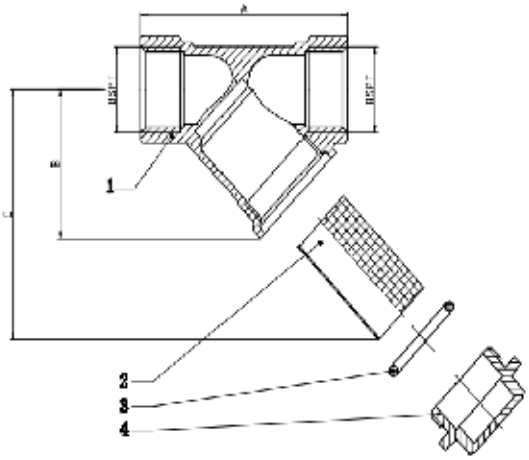
C = Strainer withdrawal clearance

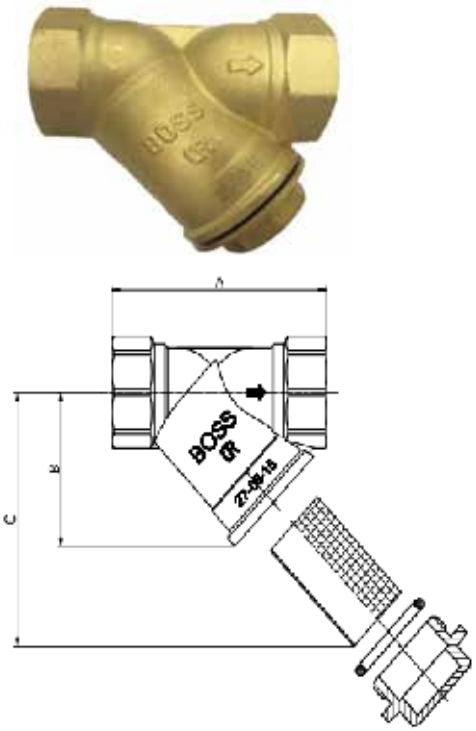
Technical Specification	
Maximum Working Pressure:	16bar
Minimum Temperature:	-10ºC
Maximum Temperature:	85ºC
Connection end:	Compression (BS EN: 1254-2)
WRAS approved product	

Materials of Constructions		
1	Body	DZR Brass CW602N
2	Filter	SS304 20mesh
3	Washer	EPDM
4	Plug	DZR Brass CW602N
5	Olive	Copper
6	Compression nut	Brass CW617N

Screwed 'Y'-Type Strainers
DZR Brass - FIG 46W

Dimensions





Size mm	A mm	B mm	C mm	Weight kg	Product Code
15	58	36.8	61.0	0.137	10460003
20	70	44.0	71.9	0.204	10460014
25	87	52.7	87.0	0.376	10460025
32	96	62.2	98.6	0.554	10460036
40	106	70.7	114.0	0.801	10460047
50	126	85.5	145.0	1.094	10460058

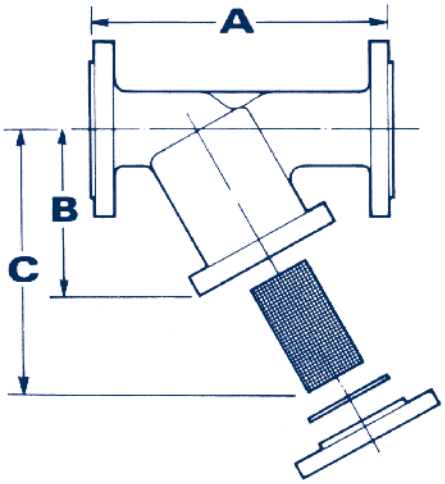
C = Strainer withdrawal clearance

Technical Specification	
Maximum Working Pressure:	20bar
Minimum Temperature:	-10ºC
Maximum Temperature:	85ºC
Connection end:	BSPT (BS21: 1985 Taper)
WRAS approved product	

Materials of Constructions		
1	Body	DZR Brass CW602N
2	Filter	SS304 20mesh
3	Washer	EPDM
4	Plug	DZR Brass CW602N

Strainers
Bronze – FIG 47XN

Dimensions



Size mm	A mm	B mm	C mm	Weight kg	Product Code
15	115	60	102	3.5	23013108
20	115	60	102	4	23013119
25	150	100	145	5.5	23013130
32	200	120	170	9	23013141
40	200	120	170	9	23013152
50	230	130	180	12	23013163
65	230	130	180	13	23012973
80	310	195	290	20	23012984
100	350	255	400	28	23012995

C = Strainer withdrawal clearance

Technical Specification		
Pressure	Steam	10.3bar at 260ºC
	Cold (Non-shock)	(150lbf/in² 500ºF)
24bar		(365lbf/in²)

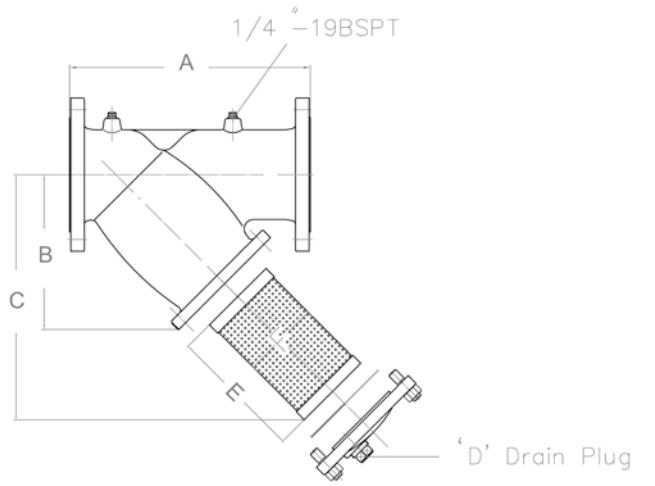
Materials of Construction		
Body		Bronze BS1400 LG2
Plug		15 to 65mm DZR Brass 80 to 150mm Gunmetal
Cap		
Flanges	15 & 20mm	BS4504 PN16
	25 to 50mm	BS4504 PN16/40
	65 to 100mm	BS4504 PN16
Screen		1/16 in Stainless Steel as standard

Other screens available on request

Strainers

Cast Iron – FIG 52XN Flanged to BSEN 1092-2 PN16

Dimensions



Size mm	A mm	B mm	C mm	D BSPT	E mm	F mm	Weight kg	Product Code
50	220	158.5	250	½	140	56.8	11.5	33045108
65	270	159	240	¾	133	70	14	33045119
80	290	177	260	1	146	82	20	33045130
100	350	220	335	1¼	186	108	30	33045141
125	390	271	435	1¼	240	134	43	33045152
150	440	293	445	1½	238	158	58	33045163
200	540	375.5	570	1½	306	210	106	33045174
250	660	457	690	2	369	260	174	33045185
300	720	532.5	820	2	442	312	276	33045196
350	949	624	960	2	523	362	421	33045204
400	1079	730	1160	2	635	412	605	33045215
450	1150	812	1360	2	816	450	740	33045226
500	1275	805	1260	2	673	500	770	33045237

C = Strainer withdrawal clearance for Cleaning

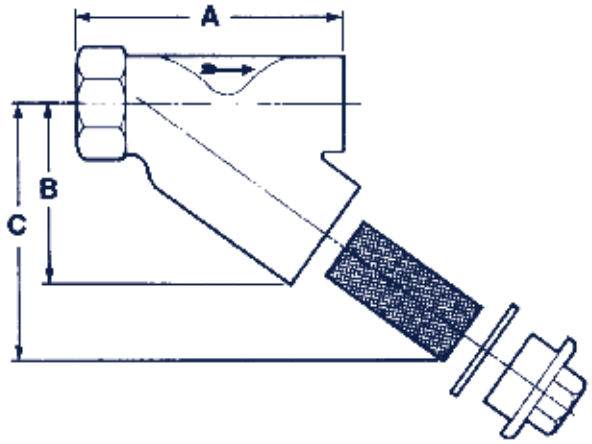
Technical Specification		
End Connections		Flanged BSEN 1092-2 PN16
Pressure Rating	Cold (non-shock)	16 bar
Working Temperature/Pressure		-10°C to 120°C (MAX) @ 16 bar
		-10°C to 200°C (MAX) @ 12.8 bar
Testing Specification		BSEN 12266-1

Materials of Construction		
Body and Cap		Cast Iron BSEN 1561 GJL-250
Drain Plugs		Malleable Iron BSEN 1562 GJMB-300-6
Gasket		Soft Steel + Graphite
Perforated Screen		304SS BSEN 10088-2, 1.4301
	50~150mm	1.5mm dia.holes
	200~450mm	2.0mm dia.holes
	500mm	3.2mm dia.holes

Other screens available on request

Strainers
Bronze 'Y'-Type – FIG 87NG

Dimensions



Nominal Size in	Nominal Size mm	A mm	B mm	C mm	Length of Screens	Diameter of Screens	Plug BSP	Weight kg	Product Code
½	15	76	50	76	43	23	⅞in	0.33	23014003
¾	20	89	64	90	57	23	⅞in	0.43	23014014

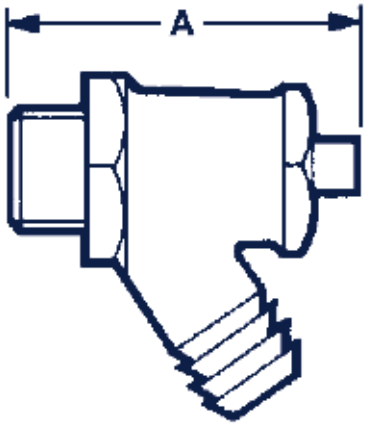
C = Strainer withdrawal clearance

Technical Specification	
Connections	Screwed BSPT Female
Pressure/Temp	25bar non-shock

Materials of Construction	
Body	Bronze BS1400 LG2
Plug	Brass BS2872-CZ-122
Seal	Nitrile 'O' ring BS LC6
Screen	300 mesh

Drain Cocks & Taps
Bronze Drain Tap – FIG 370 BS 2879-2

Dimensions



Nominal Size in	Nominal Size mm	A	Weight kg	Product Code
½	15	54	0.22	22066100
¾	20	74.2	0.33	22066111
1	25	82	0.44	22066122

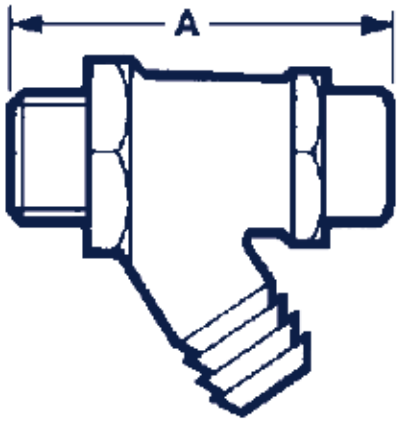
Technical Specification	
Connections	Screwed BSPT Male
Maximum pressure	10bar at 110ºC

Materials of Construction	
Body	Bronze
Cap, stem & disc holder	Brass
Disc & 'O' rings	Rubber

Drain Cocks & Taps

Bronze Drain Tap – FIG 371LS BS 2879-2 Hose Union, Lockshield Pattern

Dimensions



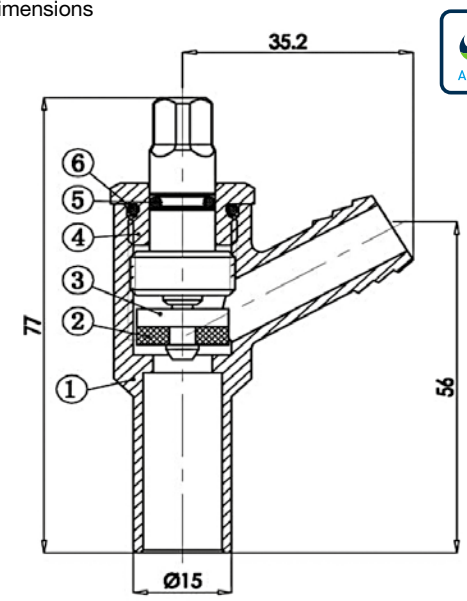
Nominal Size		A	Weight kg	Product Code
in	mm			
½	15	54	0.22	22066133
¾	20	75.5	0.33	22066144
1	25	82.5	0.44	22066155

Technical Specification	
Connections	Screwed BSPT Male
Maximum pressure	10bar at 110ºC
Spindle & square for operation by a loose key	

Materials of Construction	
Body	Bronze
Cap, stem & disc holder	Brass
Disc & 'O' rings	Rubber

Extended Drain Cock
DZR Brass Drain Tap – FIG 372 BS 2879-2

Dimensions



Size DN	Length mm	Height mm	Weight kg	Product Code
15	77	46	0.12	27200107

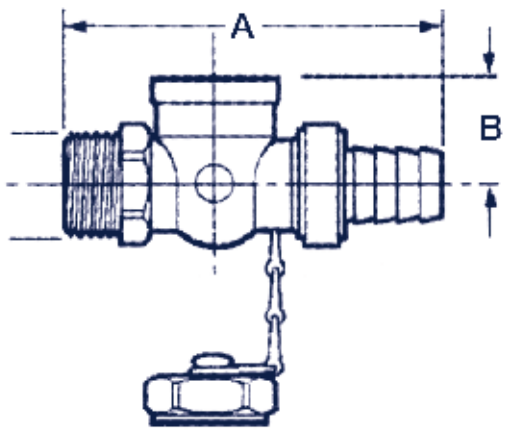
Technical Specification	
Connection	DZR Brass Extended Capillary Male end for insertion into fitting
Temperature/Pressure rating	-15ºC @ 16bar 30ºC @ 16bar 65ºC @ 10bar 85ºC @ 6bar

Materials of Construction		
1	Body	Brass DZR CW602N
2	Washer	Rubber NBR
3	Spindle	Brass
4	Gland Nut	Brass
5	O' Ring	Rubber NBR
6	O' Ring	Rubber NBR

Strainers

Brass Draw Off Ball Valve – FIG 22S

Dimensions



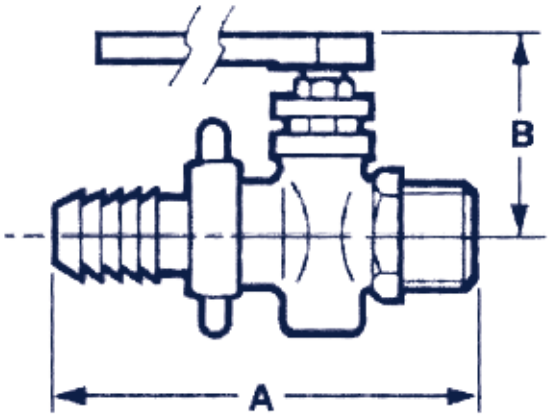
Nominal Size in	Nominal Size mm	A	B	Weight kg	Product Code
½	15	76	22	0.188	22083501

Technical Specification	
Connections	Screwed BSPT Male
Maximum temperature	100ºC (212ºF)
Maximum pressure	7bar (100lbf/in²)
The upstand on cap can be used to operate valve	

Materials of Construction	
Body	Brass OT58 UNI 5705-65
Ball	Brass OT58 UNI 5705-65 Chrome Plated
Seat	Buna-N

Strainers
Bronze Gland Cock – FIG 81HU
Hose Union Pattern

Dimensions



Nominal Size in	Nominal Size mm	A mm	B mm	Wrench 140S No	Weight kg	Product Code
½	15	96.5	48.1	3	0.38	20016649
¾	20	129	54.1	3½	0.67	20016660
1	25	157.5	66.5	5	1.2	20016671

Technical Specification	
Connections	Screwed BSPT Male
Max pressure	10bar at 120°C (150lbf/in²)
Suitable for water or oil	

Materials of Construction	
Body	Bronze BS1400 LG2
Gland	Brass
Cap/Tail	Brass
Packing	PTFE

Introduction

The BOSSMIX™ TMV2/3 range has been designed and manufactured to meet the rigorous requirements of current TMV standards. All the valves offered are approved and designated TMV3 and TMV2 valves, as defined in the NHS Estates Guidance document (D08), BS EN 7942, BS EN 1111 & BS EN 1287.

Consisting of a choice of two valves - 15mm and 22mm, combined with a choice of two types of connections - straight or angled (15mm or 22mm), the BOSSMIX™ TMV2/3 range, provides effective solutions for all your TMV2 and 3 installation requirements and is fully supported by a dedicated BOSSMIX™ Technical Service Helpline and an on site call out facility.

Features & Benefits

- BOSSMIX™ Technical Helpline: 0116 245 5940
- TMV2 and TMV3 accredited
- WRAS and BuildCert approved
- Suitable for single application installations
- 15mm and 22mm Compression Fittings
- Straight or Angled Connection Options
- Standard Connection valves supplied with NRVs and Strainers
- Angled Connection Valves supplied with NRVs, Strainers and Isolating Valves
- Flat faced unions between valve body and NRVs for ease of maintenance
- Accurate Temperature Control
- Failsafe Cold Water Failure Device
- Tamper Proof Head c/w locking nut
- BOSSMIX™ Cap can be used to adjust temperature
- Full Service Kits Available
- Suitable to meet Part G of Building Regulations
- NHS D08 compliant

Thermostatic & Regulating Valves
Schematics and Typical Installations

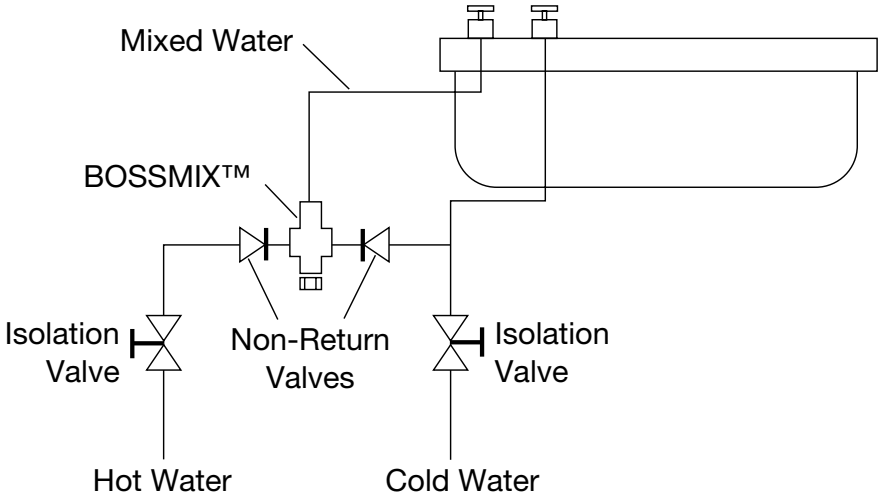
Installation Guidance

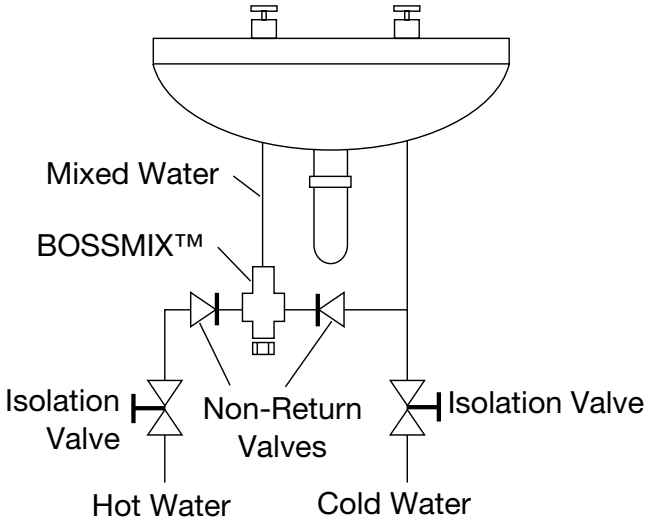
The following information is to act as a general guide and in no way supersedes the guidelines laid down by the current TMV2 and TMV3 installation requirements and the Installation and Commissioning Instructions supplied with each valve.

- The BOSSMIX™ TMV range is suitable for single outlet applications only.
- We recommend that isolation valves be fitted as part of all TMV3 installations to aid in commissioning and maintenance (supplied as standard with the BOSSMIX™ TMV Angled Connection option). The BOSSMIX™ TMV range is designed to be installed in any orientation as long as the temperature setting device is accessible for commissioning and maintenance purposes.
- A back flow prevention device (non-return valve) MUST be fitted to prevent cross contamination of water supplies. Supplied as standard with all BOSSMIX™ TMV valves.
- Where excessive pressure is present, from one or both water supplies, pressure reducing valves should be used to reduce pressures to within the specified limits. Systems should be clean and free from debris. In older systems, which may be subject to debris, we recommend the use of isolating ball valves complete with internal strainers.

Commissioning & Maintenance

Commissioning and maintenance must be carried out in strict adherence to the instructions included with each valve and as laid down by Health and Safety Regulations. Failure to do so could result in serious injury or even death.


Mixed Water
BOSSMIX™
Isolation Valve
Non-Return Valves
Isolation Valve
Hot Water
Cold Water


Mixed Water
BOSSMIX™
Isolation Valve
Non-Return Valves
Isolation Valve
Hot Water
Cold Water

Thermostatic & Regulating Valves
BOSSMIX™ TMV2/3

Approvals TMV2/3

- WRAS approval Number: 0809070

- BuildCert Approved:

TMV2 Approval Number:
BC1086/1212

- BS EN 1111:1999 TMVs (High Pressure)
- BS EN 1287:1999 TMVs (Low Pressure)

TMV3 Approval Number:
BC1087/1212

- NHS Model Engineering Specification D08 TMVs (Healthcare Premises)
- BS EN 7942

Typical Installations

Designed to control single outlet applications

Both TMV2 and TMV3 applications:

15mm & 22mm Standard & Angled Connections:

- Wash hand basin - high pressure (HP-W)
- Wash hand basin - low pressure (LP-W)
- Showers - high pressure (HP-S)
- Showers - low pressure (LP-S)
- Bidets - high pressure (HP-B)
- Bidets - low pressure (LP-B)

22mm Only Standard and Angled Connections:

- Baths - high pressure, fill temperature 44°C (HPT-44)
- Baths - high pressure, fill temperature 46°C (HPT-46)

Technical Specification	TMV2	TMV3
Maximum Working Pressure:	10 bar (Static)	10 bar (Static)
Minimum Working Pressure:	0.1 bar (Dynamic)	0.2 bar (Dynamic)
Maximum Pressure Ratio:	5:1 (in favour of either supply)	5:1 (in favour of either supply)
Operating Pressure Range		
Low Pressure:	0.1 - 1.0 bar	0.2 - 1.0 bar
High Pressure:	0.5 - 5.0 bar	1.0 - 5.0 bar
Maximum Incoming Temperature		
Hot	85°C (D08-65°C)	85°C (D08-65°C)
Cold	5-20°C	5-20°C
Adjustable Temperature Range:	30 - 48°C	30 - 50°C
Minimum Differential Temperature:	10°C (Between Hot & Mixed Water)	10°C (Between Hot & Mixed Water)
Stability:	-/+ 2°C	-/+ 2°C

Range Options

Product Code	BOSSMIX™ Description
86345001	15mm BOSSMIX™ TMV2 / 3 T'Static Mixing Valve incl NRV & STRNRS
86345012	22mm BOSSMIX™ TMV2 / 3 T'Static Mixing Valve incl NRV & STRNRS
86345023	15mm BOSSMIX™ TMV2 / 3 AC T'Static Mixing VVE+STRNRS NRVS ISOL VV
86345034	22mm BOSSMIX™ TMV2 / 3 AC T'Static Mixing VVE+STRNRS NRVS ISOL VV

Spares

86330007	15mm CHECK VVE Kit for TMV15 T Pattern (2 Check Valves)
86330018	22mm CHECK VVE Kit for TMV22 T Pattern (2 Check Valves)
86330062	BOSSMIX™ TMV15AC Check VVE KIT-15mm (2 Check Valves & STRNRS)
86330073	BOSSMIX™ TMV22AC Check VVE KIT-22mm (2 Check Valves & STRNRS)
86330051	BOSSMIX™ TMV2/3 Internals 15mm & 22mm Standard & Angled Version

Standard

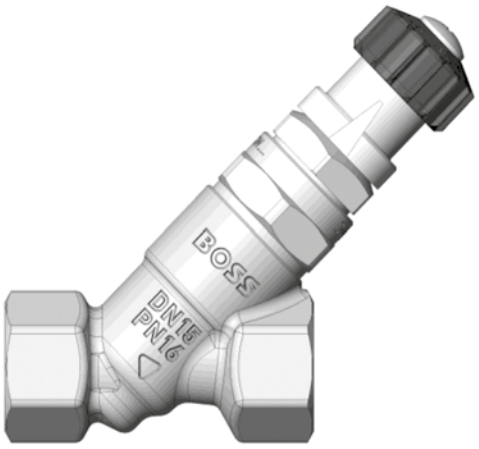
Angled

A mm	B mm	C mm	D mm	E mm	Weight kg	Product Code
Standard connection						
135	67.5	105	49	56	0.5	86345001
150	75	106	49	57	0.6	86345012
Angled connection						
128	64	105	49	56	0.65	86345023
132	66	106	49	57	0.75	86345034

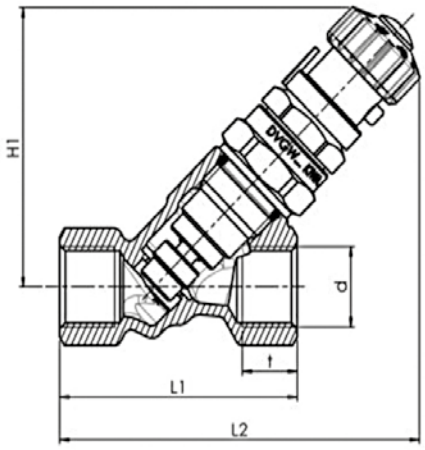
Materials of Construction	
Body	DZR Chrome Plated
Springs	Stainless Steel
Seals	EPDM

Scan this code with your smart phone to visit the BOSSMIX™ website.

Thermal Balancing Valve
FIG 205 TBV



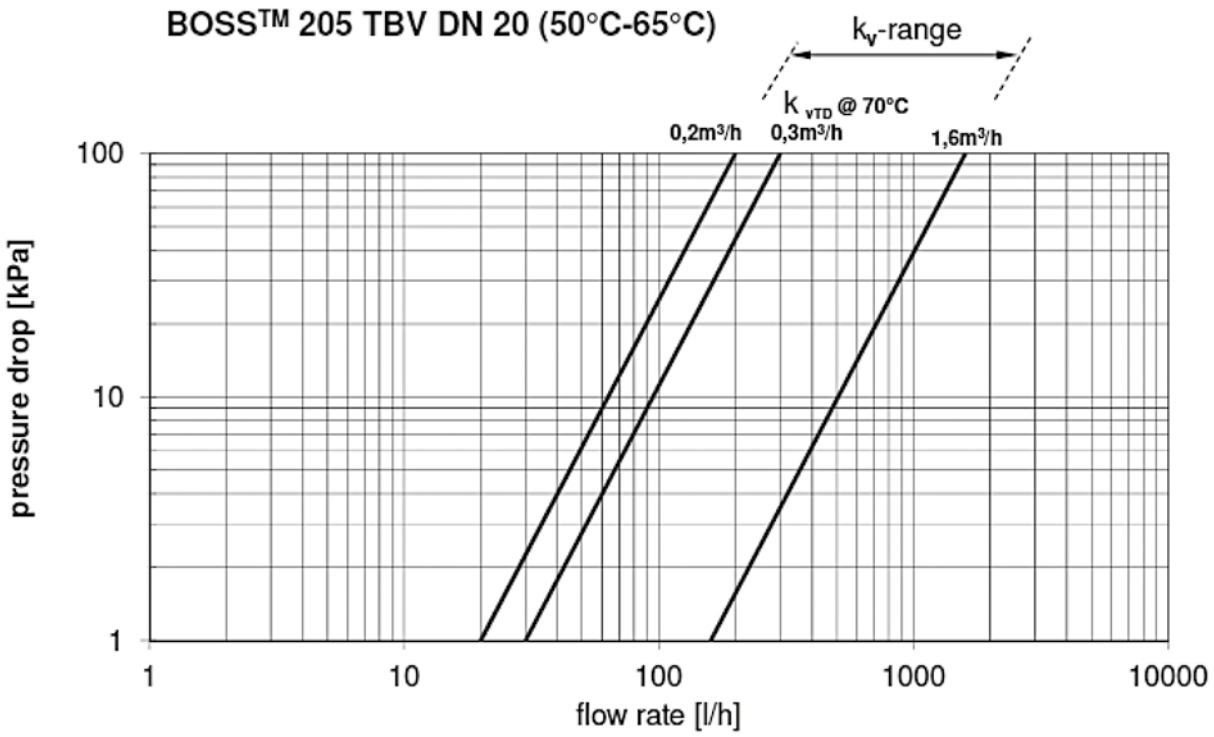
Dimensions

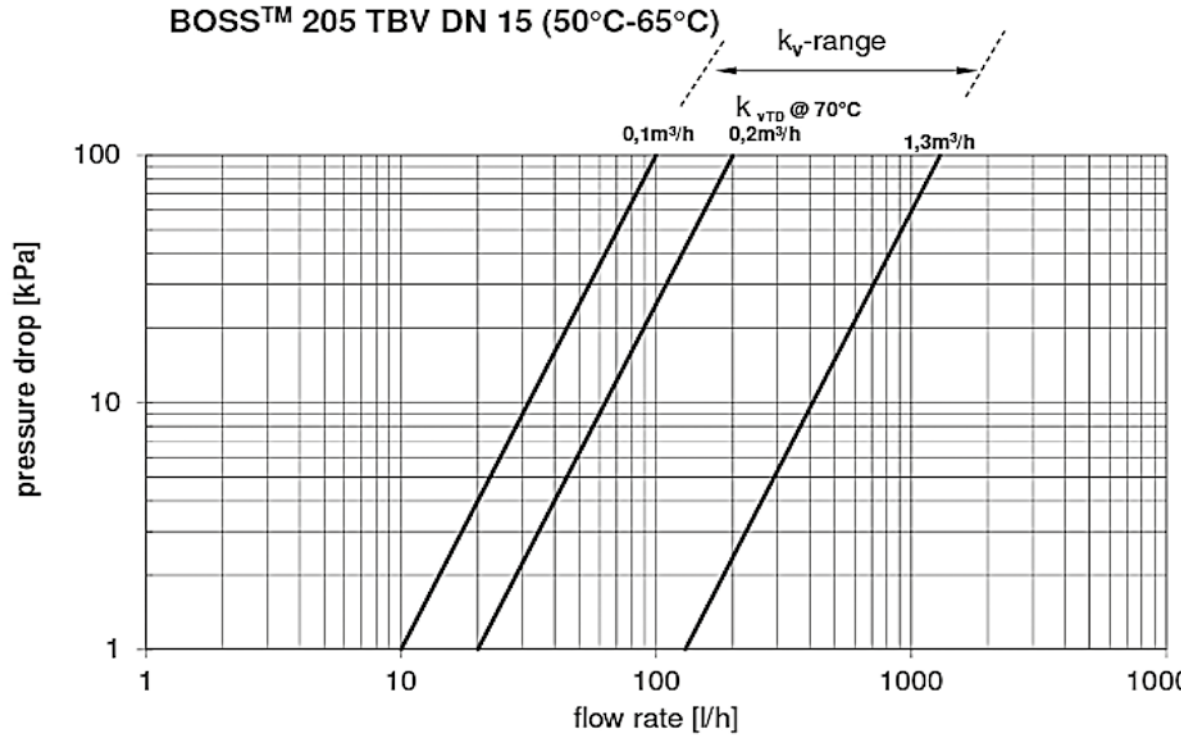


Size DN	H1 mm	L1 mm	L2 mm	t mm	d	Weight kg	Product Code
15	73	65	98	15	Rp ½	0.36	20510102
20	80	75	106	16.5	Rp ¾	0.52	20510113

Technical Specification	
Pressure Rating	PN16
Minimum Temperature	90ºC
Regulating Range adjustable between	50ºC-65ºC
Factory Setting	58ºC
Thermal Disinfection starts at	70ºC
Connection	BSPT Female EN 10226-1
Wetted parts made of red brass, No stagnant inside the valve, resistant to aggressive water	

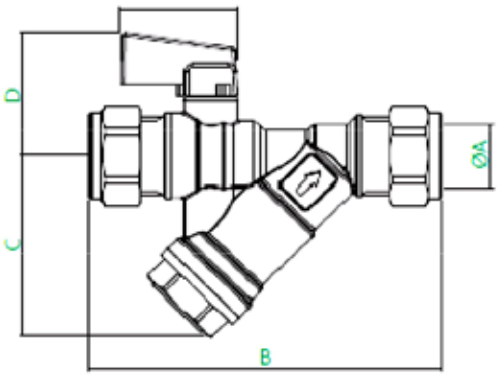
Materials of Constructions	
Body	Red Brass BS EN 1982 CC499K
Bonnet (wetted parts)	Red Brass BS EN 1982 CC499K
Cone	Red Brass BS EN 1982 CC499K
O-Ring	EPDM


BOSS™ 205 TBV DN 20 (50°C-65°C)
kv-range
k vTD @ 70°C
0,2m³/h
0,3m³/h
1,6m³/h
100
10
1
pressure drop [kPa]
1
10
100
1000
10000
flow rate [l/h]


BOSS™ 205 TBV DN 15 (50°C-65°C)
kv-range
k vTD @ 70°C
0,1m³/h
0,2m³/h
1,3m³/h
100
10
1
pressure drop [kPa]
1
10
100
1000
flow rate [l/h]

Flow Regulating Ball Valve
282CF Calflow Plus

Dimensions



282CF Calflow Plus					
A mm	B mm	C mm	D mm	E mm	Weight kg
15	90	47	33	30	0.21

282CF Calflow Plus Applications			
Flow Rate l/m	Catridge Colour	Typical Application	Product Code
4	Grey	Basin tap, pillar or mixer	28200011
6	Black	Basin tap timed or electronic	28200022
8	White	Timed shower	28200033
10	Blue	Thermostatic shower	28200044
12	Red	Shower, bidet, kitchen tap	28200055
15	Green	Shower, kitchen tap	28200066
18	Grey	Bath G3/4, kitchen tap	28200077

Technical Specification	
Connections	Compression
Maximum Static Pressure	15 Bar
Maximum Inlet Pressure	2 Bar
Maximum Working Temperature	85°C
Differential Pressure Rage	15-200 kPa

Materials of Construction	
Body	Brass
Ball	Hard Chrome Plated Brass
Cartridge	High Resistance Polymer
Strainer	40 Mesh Stainless Steel
O Ring	Nitrile Rubber

Manual Radiator Valves

Features and benefits

The valves have a chrome plated finish making them hard wearing, attractive and stylish. With a dual 15mm x ½in connection, they suit both copper and iron pipework. The matching lock shield complements the wheel head and TRV design. The concealed lock shield cap requires an Allen key to adjust flow, preventing accidental tampering.

The upper O-ring seal can be changed without draining down, which minimises down-time thus saving cost on site.

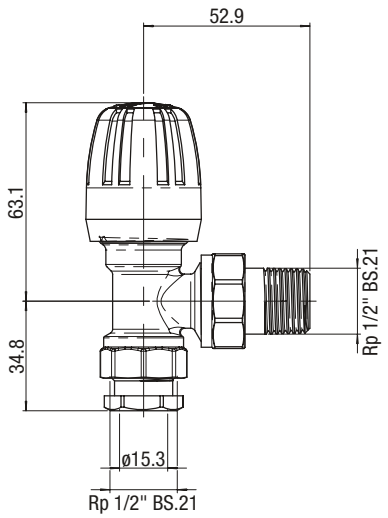
Approved to BS2767-10; guaranteed internal dimensions, minimising resistance to ensure maximum flow. Valves are suited for both open vented and sealed systems.

Manuals	Angle valve product code	Angle concealed product code	Straight concealed product code
CPWH	49341004		
CPLS	49341015	49341026	49341037

Maximum pressure	10 bar at 65ºC
Maximum temperature	120ºC at 5bar

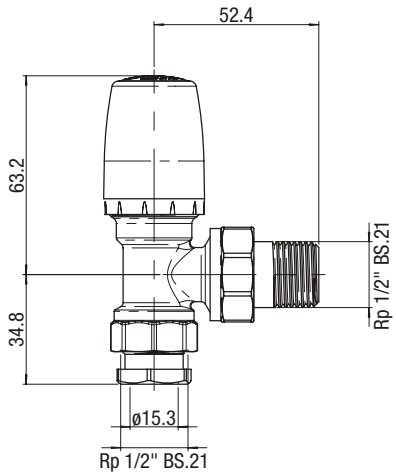
Radiator Valves and TRVs
Manual Radiator Valves

Product Code
49341004



Chrome plated wheel head angle valve

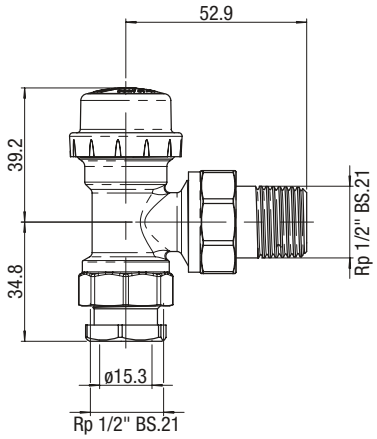
Product Code
49341015



Chrome plated lock shield angle valve

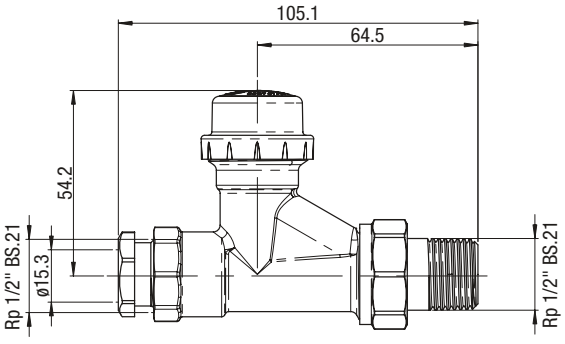
Chrome plated angled lock shield valve concealed adjustment

Product Code
49341026



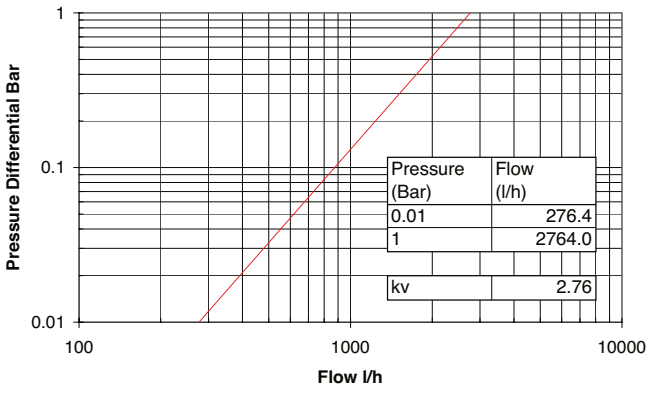
Chrome plated straight lock shield valve concealed adjustment

Product Code
49341037

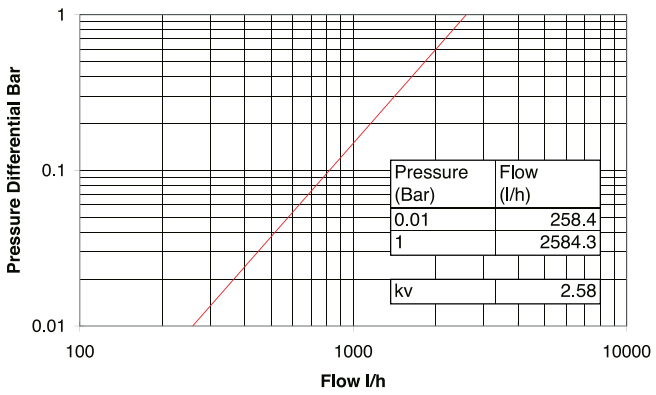


Radiator Valves and TRVs
Flow data

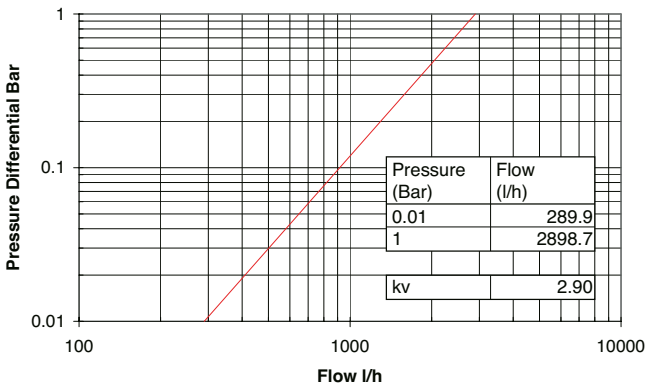
Manual Handwheel and Lockshield Angle Pattern Forward Flow



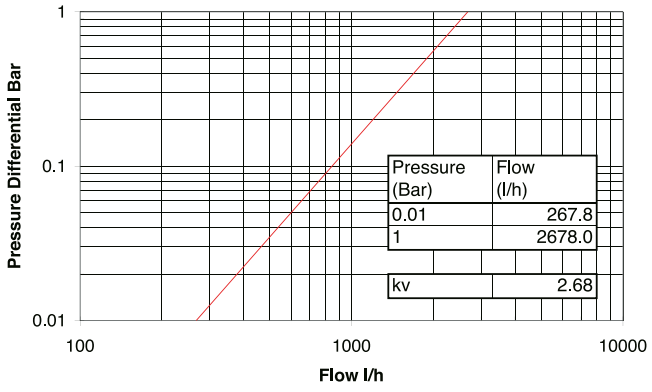
Manual Handwheel and Lockshield Angle Pattern Reverse Flow



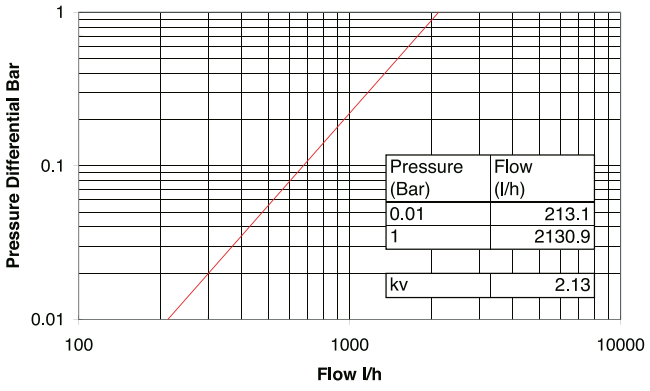
Concealed Lockshield Angle Pattern Forward Flow



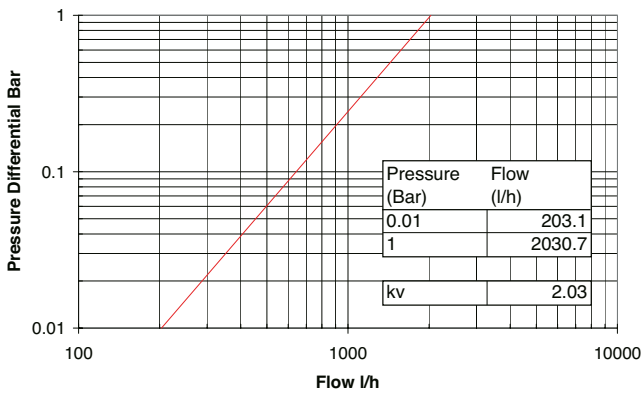
Concealed Lockshield Angle Pattern Reverse Flow



Concealed Lockshield Straight Pattern Forward Flow



Concealed Lockshield Straight Pattern Reverse Flow



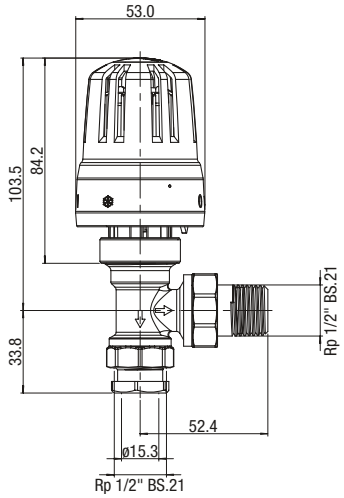
Features and Benefits

With a control range of 11 to 29°C, this allows flexibility in setting comfort levels and optimises energy efficiency. The valve has a frost setting, opening automatically around 7°C to prevent the system freezing. Positive shut off allows the heat emitter to be isolated for maintenance. The range limiting and locking prevents over or under heating in public areas and optimises energy efficiency, whilst the limiting and locking pins allow the user to customise temperature settings. The built in tamper proof key operated setting is simple to lock and secure with an easy to use release tool. The lift and lock operation prevents accidental adjustment. The TRV has a liquid-filled head and can be mounted on the flow or return.

Thermostatic	Horizontal TRV	Vertical TRV
Radiator Valves	**Product Code**	**Product Code**
½in to 15mm	49341048	49341059

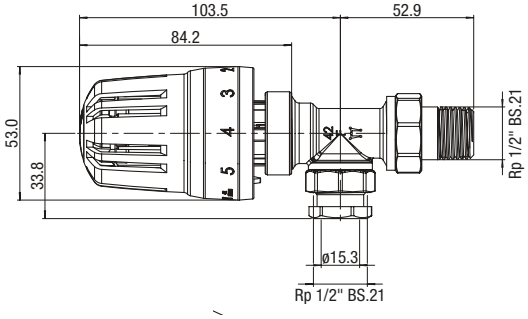
Radiator Valves and TRVs
Thermostatic Radiator Valves

Product Code
49341059



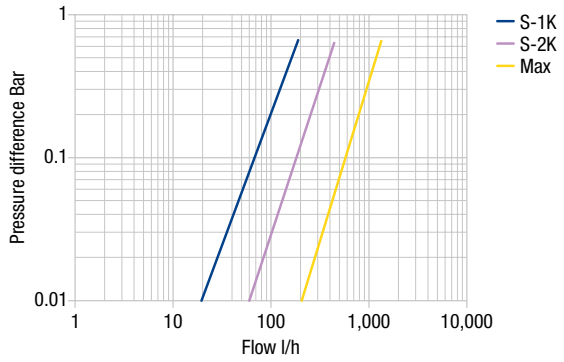
TRV Vertical

Product Code
49341048



TRV Horizontal

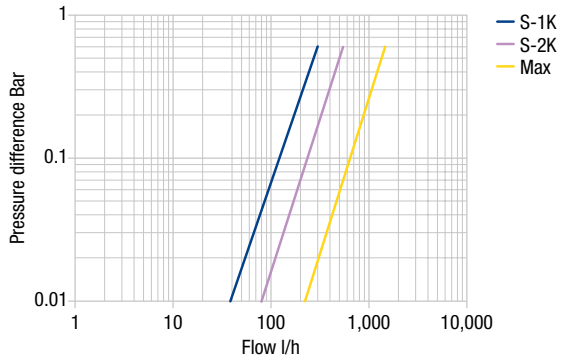
Angle/reverse angle/straight pattern forward flow



Angle/reverse angle/straight pattern – forward flow			
Nominal flow kg/h	**ΔP1 Bar**	**ΔP2 Bar**	**Seat authority a**
206	0.1	0.01	0.9

Kv, angle/reverse angle/straight pattern – forward flow	
	Kv
S-1K	0.23
S-2K	0.52
Max	1.74

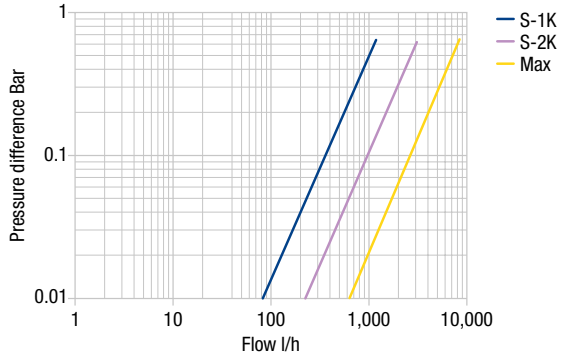
Angle/reverse angle pattern reverse flow



Angle/reverse angle – reverse flow			
Nominal flow kg/h	**ΔP1 Bar**	**ΔP2 Bar**	**Seat authority a**
220	0.1	0.01	0.9

Kv, angle/reverse angle – reverse flow	
	Kv
S-1K	0.38
S-2K	0.74
Max	1.94

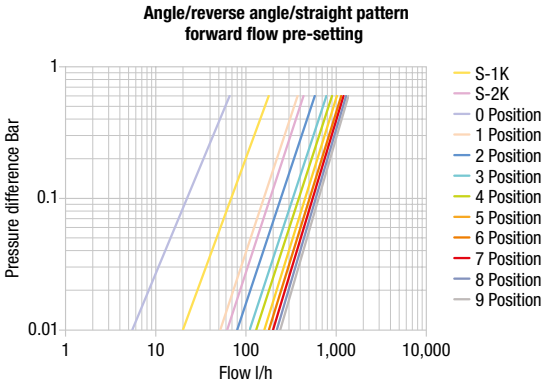
Straight pattern forward flow

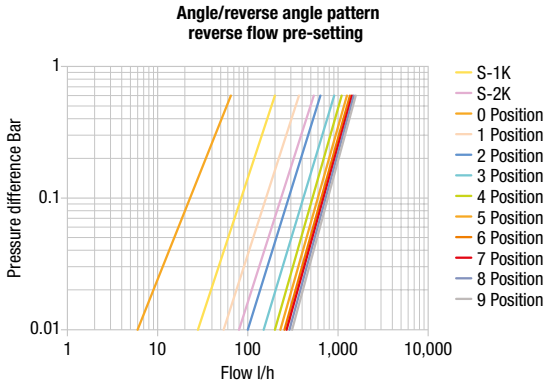


Straight pattern – reverse flow			
Nominal flow kg/h	**ΔP1 Bar**	**ΔP2 Bar**	**Seat authority a**
184	0.1	0.02	0.8

Kv, straight pattern – reverse flow	
	Kv
S-1K	0.25
S-2K	0.54
Max	1.13

Radiator Valves and TRVs
Thermostatic Valves – Presetting



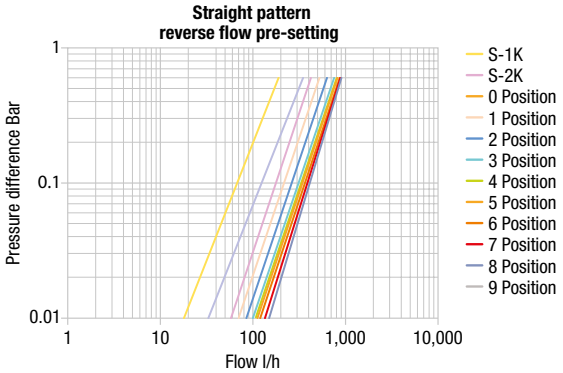


Angle/reverse angle/straight pattern – forward flow – pre-setting				
Setting	**Nominal/ characteristic flow kg/h**	**ΔP1 Bar**	**ΔP2 Bar**	**Seat authority a**
0	44	0.1	0.1	0
1	151	0.1	0.1	0
2	206	0.1	0.068	0.32
3	206	0.1	0.037	0.63
4	206	0.1	0.027	0.73
5	206	0.1	0.02	0.8
6	206	0.1	0.015	0.85
7	206	0.1	0.011	0.89
8	206	0.1	0.009	0.91
9	206	0.1	0.006	0.94

Kv, angle/reverse angle/straight pattern – forward flow – pre-setting			
	Kv		**Kv**
S-1K	0.23	4	1.16
S-2K	0.56	5	1.32
0	0.09	6	1.47
1	0.48	7	1.56
2	0.75	8	1.67
3	1.01	9	1.77

Angle/reverse angle pattern – reverse flow – pre-setting				
Setting	**Nominal/ characteristic flow kg/h**	**ΔP1 Bar**	**ΔP2 Bar**	**Seat authority a**
0	45	0.1	0.1	0
1	164	0.1	0.1	0
2	220	0.1	0.062	0.38
3	220	0.1	0.032	0.68
4	220	0.1	0.019	0.81
5	220	0.1	0.0125	0.875
6	220	0.1	0.009	0.91
7	220	0.1	0.0065	0.935
8	220	0.1	0.005	0.95
9	220	0.1	0.004	0.96

Kv, angle/reverse angle pattern – reverse flow – pre-setting			
	Kv		**Kv**
S-1K	0.26	4	1.42
S-2K	0.7	5	1.63
0	0.08	6	1.76
1	0.48	7	1.85
2	0.83	8	1.94
3	1.17	90	2.03



Straight pattern – reverse flow – pre-setting				
Setting	**Nominal/ characteristic flow kg/h**	**ΔP1 Bar**	**ΔP2 Bar**	**Seat authority a**
0	30	0.1	0.1	0
1	120	0.1	0.1	0
2	184	0.1	0.0765	0.235
3	184	0.1	0.0464	0.536
4	184	0.1	0.036	0.64
5	184	0.1	0.0275	0.725
6	184	0.1	0.022	0.78
7	184	0.1	0.0215	0.785
8	184	0.1	0.0188	0.812
9	184	0.1	0.018	0.82

Kv, straight pattern – reverse flow – pre-setting			
	Kv		**Kv**
S-1K	0.25	4	1.04
S-2K	0.55	5	1.06
0	0.45	6	1.12
1	0.68	7	1.14
2	0.82	8	1.17
3	0.98	9	1.2

Radiator Valves and TRVs
Thermal Head Options

Features and benefits

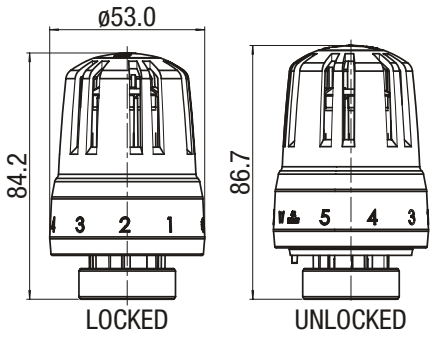
With a control range of 11 to 29ºC, this allows flexibility in setting comfort levels and optimises energy efficiency. The valve has a frost setting, opening automatically around 7ºC to prevent the system freezing. Positive shut off allows the heat emitter to be isolated for maintenance. The range limiting and locking prevents over or under heating in public areas and optimises energy efficiency, whilst the limiting and locking pins allow the user to customise temperature settings. The built in tamper proof key operated setting is simple to lock and secure with an easy to use release tool. The lift and lock operation prevents accidental adjustment.

Thermal heads	Thermal Head Product Code	Remote Sensor / Adjuster Product Code
Thermal head 0 position	49341070	
2m remote sensor		49341081
8m remote sensor		49341229
2m remote adjuster		49341092
8m remote adjuster		49341100

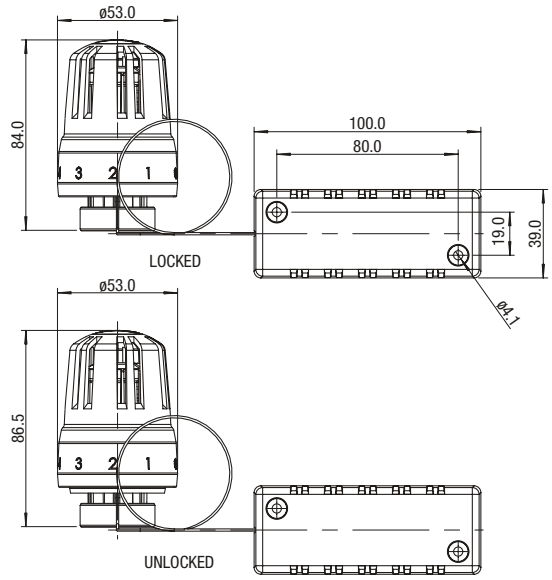
Thermal head with 0 position

0	*	1	2	3	4	5
shut off	7ºC	11-13ºC	15-17ºC	19-21ºC	22-25ºC	27-29ºC

Product Code
49341070



Head with 2 or 8m remote sensor



Sensor length	Product Code
2m	49341081
8m	49341229

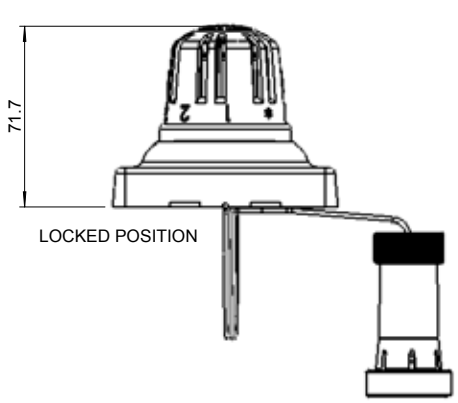
Remote sensing prevents curtains or office equipment interfering with thermal head.

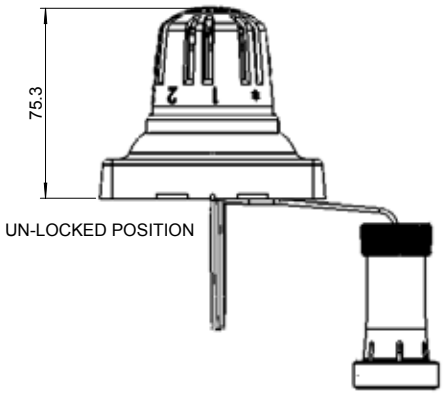
Sensor can be placed 2 or 8m away from head.

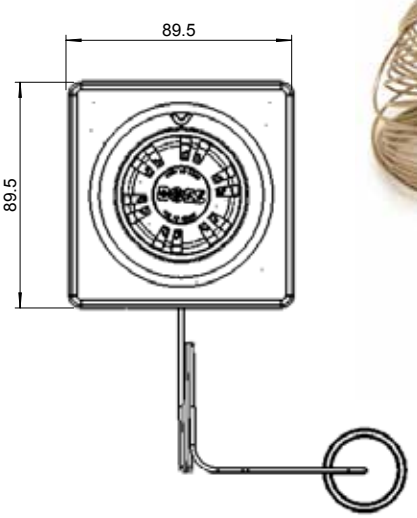
Also suitable for LST radiators.

Radiator Valves and TRVs
Thermal Head Options

Head with 2m or 8m remote adjuster







Remote adjuster provides temperature control.

Sensor can be placed 2m and 8m away from head.

Sensor length	Product Code
2m	49341092
8m	49341100

Features and benefits

The valves have a chrome plated finish making them hard wearing, attractive and stylish. They are approved to EN215 guaranteeing thermal and hydraulic performance. The double O-ring seal offers double seal protection. The gland removal tool accessory allows the gland to be changed without draining down the system. With a dual 15mm x ½in connection, they suit both copper and iron pipe work. The preset valves have pre-setting mechanism that enables the user to adjust the maximum flow accurately from a chart provided.

The two way operation provides reverse flow operation capability and operates quietly whatever the flow direction.

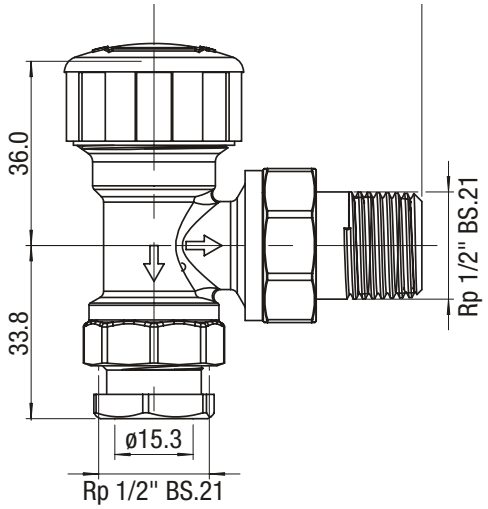
A comprehensive range of heads enables the customer to meet a wide variety of installation applications.

Valve Body	Angle horizontal Product Code	Angle vertical Product Code	Straight Product Code
½in-15mm	49341111	49341122	49341133
Preset	–	49341144	49341155

Maximum pressure	10 bar at 65ºC
Maximum temperature	120ºC at 5bar

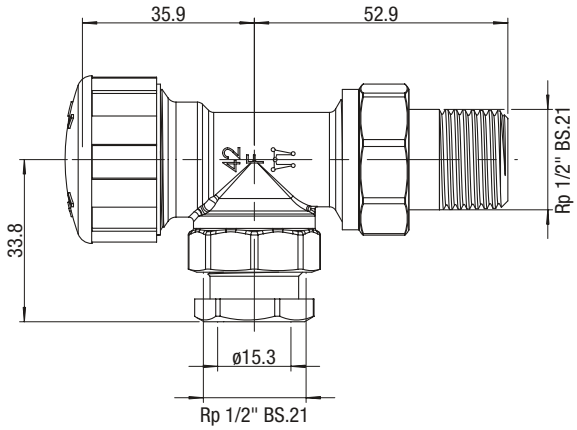
Radiator Valves and TRVs
Thermal Body Options

Chrome plated TRV body angle vertical



Product Code
49341122

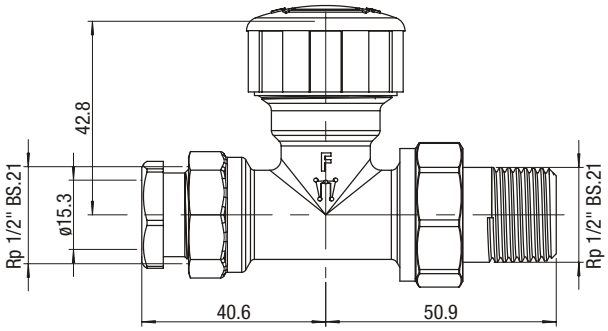
Chrome plated TRV body reverse angle



Product Code
49341111

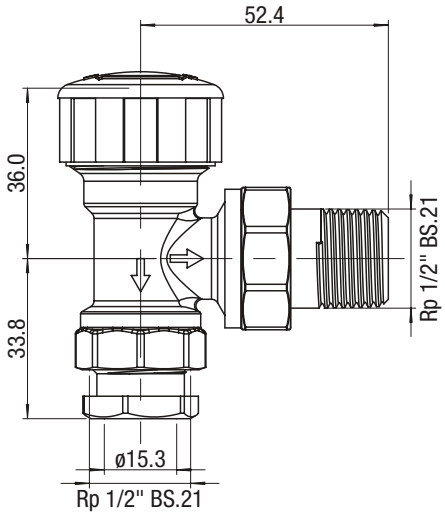
Chrome plated TRV body straight

Product Code
49341133



TRV body preset angle vertical

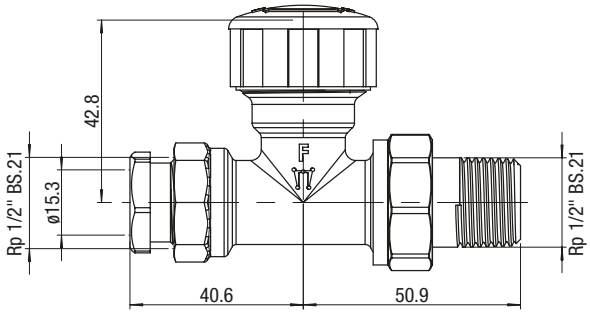
Product Code
49341144



Radiator Valves and TRVs

TRV body preset straight

TRV body preset straight



Product Code
49341155

Radiator Valves and TRVs
Manual Radiator Valves

Dimensions

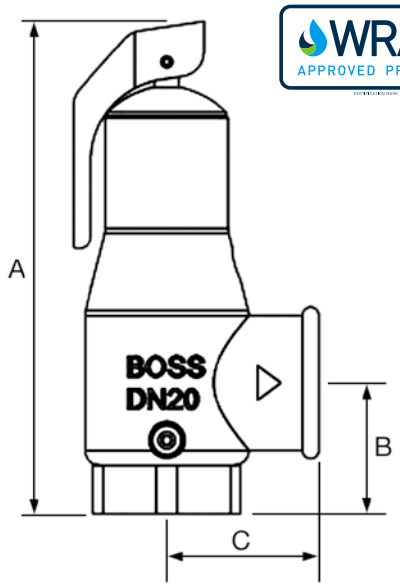
Straight Radiator Valve			
Size	**Material**	**Finish**	**Code**
½in	Brass	Nickel Plated	86315839
¾in	Brass	Nickel Plated	86315850

Angled Drain Valve			
Size	**Material**	**Finish**	**Code**
½in	Brass	Nickel Plated	86310209

Relief Valves

Safety Relief Valve WRAS Listed – FIG 960

Dimensions



WRAS APPROVED PRODUCT

Nominal Size		A	B	C	Weight
in	mm	mm	mm	mm	kg
½	15	100	33	26	0.48
¾	20	115	37	32	0.66
1	25	136	42	37	0.94
1¼	32	160	50	42	1.44
1½	40	203	59	50	2.64
2	50	230	69	59	4.66

For springs see page 8.3

Technical Specification	
Connections	Screwed BSPT Female
Materials	Bronze
Pressure range	0.3bar to 10bar (5psi-152psi)
Maximum temperature	200ºC

Materials of Construction	
Body	Gunmetal BS EN 1982 CB491K
Seat adaptor	Gunmetal BS EN 1982 CC491K
Seat seal holder	Gunmetal BS EN 1982 CC491K
Seat seal	PTFE
Spindle	Brass BS EN CW721R
Spring	Chrome Vanadium BS2803:750:A50:HS
Adjusting screw	Brass BS EN 12164 CW614N
Dome	Plastic
Lever	Gunmetal BS EN 1982 CB491K
'O' Ring seal	EPDM

Relief Valves

Safety Relief Valve WRAS Listed – FIG 960

Set Pressure Range							
Nominal Size		10psig	15psig	19psig	20psig	23psig	25psig
in	mm						
½	15	27620089	27620108	27620119	27620130	27620141	27620152
¾	20	27620344	27620355	27620366	27620377	27620388	27620399
1	25	27620621	27620632		27620643	27620654	27620665
1¼	32	27620868		27620879	27620890	27620909	27620920
1½	40	27621080	27621091	27621110	27621121	27621132	27621143
2	50	27621313	27621324	27621335	27621346	27621357	27621368

Nominal Size		28psig	29psig	30psig	32psig	35psig	36psig
in	mm						
½	15	27620163		27620174		27620185	27620196
¾	20	27620407		27620418	27620429	27620440	27620451
1	25	27620676		27620687	27620698	27620706	27620717
1¼	32	27620931		27620942	27620953		
1½	40	27621154		27621165	27621176		27621187
2	50		27621379	27621390	27621409		27621420

Nominal Size		40psig	41psig	45psig	49psig	50psig	60psig
in	mm						
½	15	27620204	27620215	27620226	27620237	27620248	
¾	20	27620462	27620473	27620484	27620495	27620503	27620514
1	25	27620728	27620739	27620750	27620761	27620772	
1¼	32		27620964	27620975	27620986		
1½	40		27621198	27621206	27621217		
2	50		27621431	27621442	27621453		

Unset Pressure Range					
Nominal Size		4-7psig	8-15psig	16-31psig	32-47psig
in	mm				
½	15	27620001	27620012	27620023	27620034
¾	20	27620259	27620270	27620281	27620292
1	25	27620525	27620536	27620547	27620558
1¼	32	27620783	27620794	27620802	27620813
1½	40	27620997	27621003	27621014	27621025
2	50	27621228	27621239	27621250	27621261

Nominal Size		48-71psig	72-95psig	96-119psig	120-148psig
in	mm				
½	15	27620045	27620056	27620067	27620078
¾	20	27620300	27620311	27620322	27620333
1	25	27620569	27620580	27620591	27620610
1¼	32	27620824	27620835	27620846	27620857
1½	40	27621036	27621047	27621058	27621069
2	50	27621272	27621283	27621294	27621302

Springs for BOSS™ 960									
Sping Colour		White	Red	Yellow	Green	Brown	Blue	Purple	Black
Nominal Size		4-7	8-15	16-31	32-47	48-71	72-95	96-119	120-152
in	mm	psi	psi	psi	psi	psi	psi	psi	psi
½	15	22071107	22071173	22071236	22071310	22071376	22071439	22071502	22071568
¾	20	22071118	22071184	22071247	22071321	22071387	22071450	22071513	22071579
1	25	22071129	22071195	22071258	22071332	22071398	22071461	22071524	22071590
1¼	32	22071140	22071203	22071269	22071343	22071406	22071472	22071535	22071609
1½	40	22071151	22071214	22071280	22071354	22071417	22071483	22071546	22071620
2	50	22071162	22071225	22071291	22071365	22071428	22071494	22071557	22071631

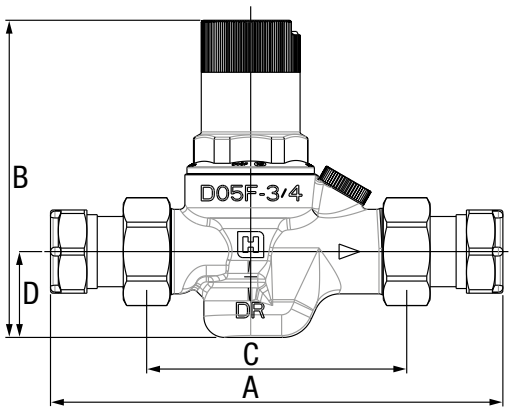
Pressure Reducing Valves

Pressure Reducing Valve

Dimensions

Suitable for use with gauges 80010072, 80010094 and 80010113

D05 Dimensions



WRAS APPROVED PRODUCT

Nominal Size in	Nominal Size mm	A mm	B mm	C mm	D mm	E mm	Weight kg	Product Code
–	15	150	122	90	33	–	0.65	28110006
–	22	168	122	100	33	–	0.82	28110017

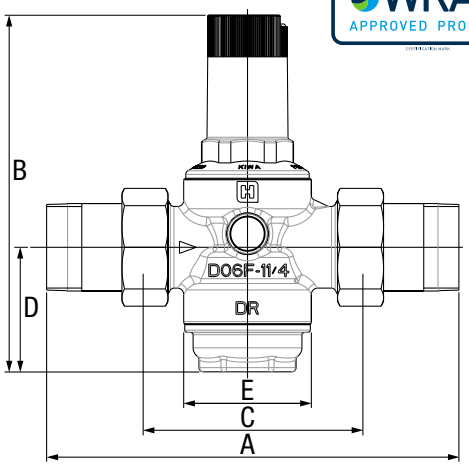
Technical Specification		
Connections	15 & 22mm	Compression
	1in to 2in	MBSP
Max Inlet Pressure		25bar
Outlet Pressure		1½ to 6bar (Adjustable)
Max Temperature		70ºC

Materials of Construction	
Body	DZR Brass Body
Filter Mesh	Stainless Steel

Applications: water to 70ºC, compressed air, inert gases, non-aggressive liquids

Pressure Reducing Valve

Dimensions



Suitable for use with gauges 53218000 and 53218011

D06 Dimensions

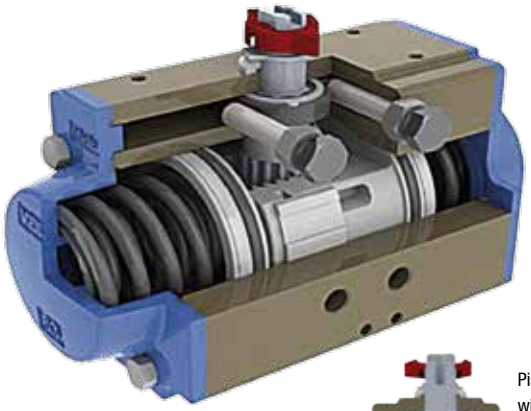
Nominal Size in	Nominal Size mm	A mm	B mm	C mm	D mm	E mm	Weight kg	Product Code
1	–	186	122	107	33	–	1.35	28110028
1¼	–	200	175	105	64	61	2	28110039
1½	–	225	299	130	126	82	3.3	28110050
2	–	255	299	140	126	82	4.5	28110061

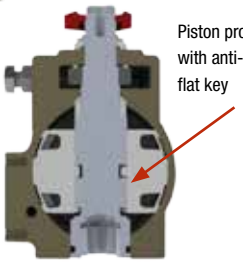
Technical Specification		
Connections	15 & 22mm	Compression
	1in to 2in	MBSP
Max Inlet Pressure		25bar
Outlet Pressure		1½ to 6bar (Adjustable)
Max Temperature		70ºC

Materials of Construction	
Body	DZR Brass Body
Filter Mesh	Stainless Steel

Applications: water to 70ºC, compressed air, inert gases, non-aggressive liquids

Pneumatic Actuators - FIG 82 Spring Return and Double Acting





Piston provided with anti-blowout flat key

Anti-Blowout System

Features and Benefits

BODY MANUFACTURED FROM EXTRUDED ALUMINIUM UNI 6060:
Hard-coat anodized as standard finish 45-50 micron
Good wear resistance
High corrosion resistance
Bore finished to high standard to ensure low friction and long life

CONCENTRIC SPRING SETS
Standard coating painted
High resistance and reliability
Spring sets to suit different air pressure / torque requirements
Long securing screws to allow safe dismantling for maintenance
Same body dimensions for DA/SR versions

DIE CAST ALUMINIUM END CAPS
Standard polyester powder coated

ASSEMBLING SCREW
Stainless steel as standard

EXTERNAL CONNECTION
Top of pinion according to Namur norm
Solenoid valve connection according to Namur norm
Bottom of pinion according to ISO 5211-DIN 3337

NOMINAL VALUES
Pressure rating max 8 bar
Temperature range:
- Standard (-20°C - +85°C)
Pre-lubricated for life of actuator on assembly
Fully tested on manufacture 100%

PINION MADE IN STEEL
Nickel plated for standard version against internal and external corrosion
Anti-blowout design

CAM FOR LIMIT POSITION ADJUSTMENT 0°-90°
Stainless Steel
Adjustment for open and close position +/- 5°

0°-90° ADJUSTMENT SCREWS
Stainless steel

PISTON GUIDES IN POM
Large contact area
Low friction for self lubricating material
Long life

PISTONS MADE FROM DIE CAST ALUMINIUM

SEALS
NBR standard version

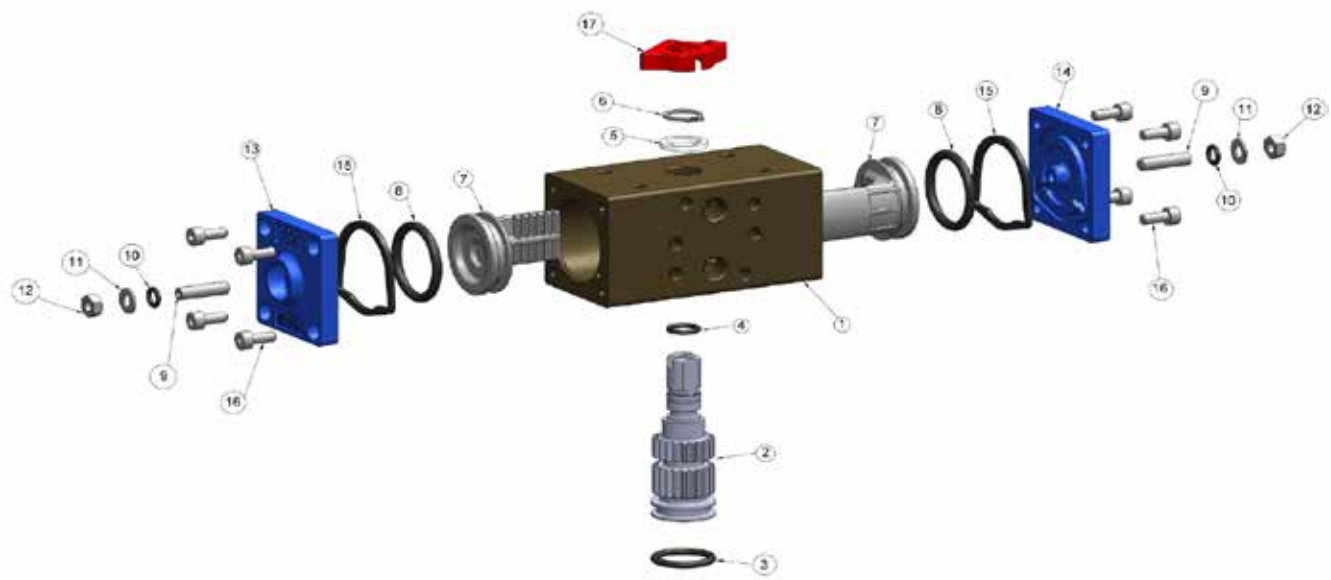
TWIN RACK AND PINION DESIGN
Constant torque output
Compact design
Balanced internal forces
Robust design to ensure long life

The pneumatic actuator has a patented solution for the cam and the double adjustment stop bolts chamber. This area is separated from the pistons chamber, and it is not subject to pressure. This solution reduces leakage and it enables better performance and long-term reliability of our actuators.

Actuators and Ancillaries

Pneumatic Actuators - FIG 82 Spring Return and Double Acting

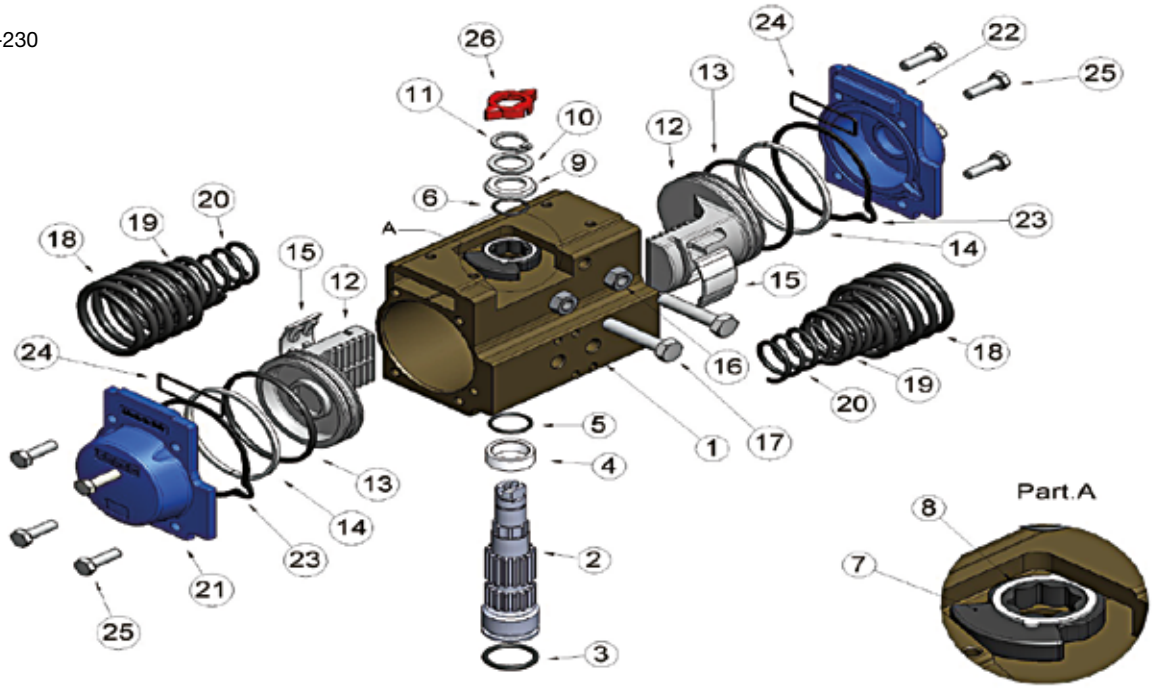
Model 32 (Double Acting)



Materials of Construction			
Item	**Description**	**Material**	**Treatment**
1	Body	Extruded aluminium	Hard anodized
2	Anti-blowout pinion	Steel	Nickel plated
3*	O-ring	NBR	
4*	O-ring	NBR	
5*	Spacer ring	POM	
6	Snap ring	Steel	Nickel plated
7	Piston	Die cast aluminium	
8*	O-ring	NBR	
9	Stop bolt	Stainless steel	
10*	O-ring	NBR	
11	Washer	Stainless steel	
12	Stop bolt retaining nut	Stainless steel	
13	Left end cap	Die cast aluminium	Painted
14	Right end cap	Die cast aluminium	Painted
15	End cap seats	NBR	
16	End cap fixing screw	Stainless steel	
17	Position indicator	Thermoplastic rubber TPE	

* Parts subject to wear

Models 52-230



Materials of Construction

Item	Description	Material	Treatment
1	Body	Extruded aluminium	Hard anodized
2	Anti-blowout pinion	Steel	Nickel plated
3*	O-ring	NBR	
4*	Spacer Ring	POM	
5*	O-ring	NBR	
6*	O-ring	NBR	
7	Cam	Stainless steel	
8	Spacer	POM	
9*	Spacer	POM	
10	Washer	Stainless steel	
11**	Snap ring	Steel	Nickel plated
12	Piston	Die cast aluminium	
13*	O-ring	NBR	
14*	Antifriction ring	POM	
15*	Thrust block	POM	
16	Stop bolt retaining nut	Stainless steel	
17	Stop bolt	Stainless steel	
18	External spring	Steel	Painted
19***	Central spring	Steel	Painted
20	Internal spring	Steel	Painted
21	Left end cap	Die cast aluminium	Painted
22	Right end cap	Die cast aluminium	Painted
23	End cap seats	NBR	
24	O-ring	NBR	
25	End cap fixing screw	Stainless steel	
26	Position indicator	Thermoplastic rubber TPE	

* Parts subject to wear

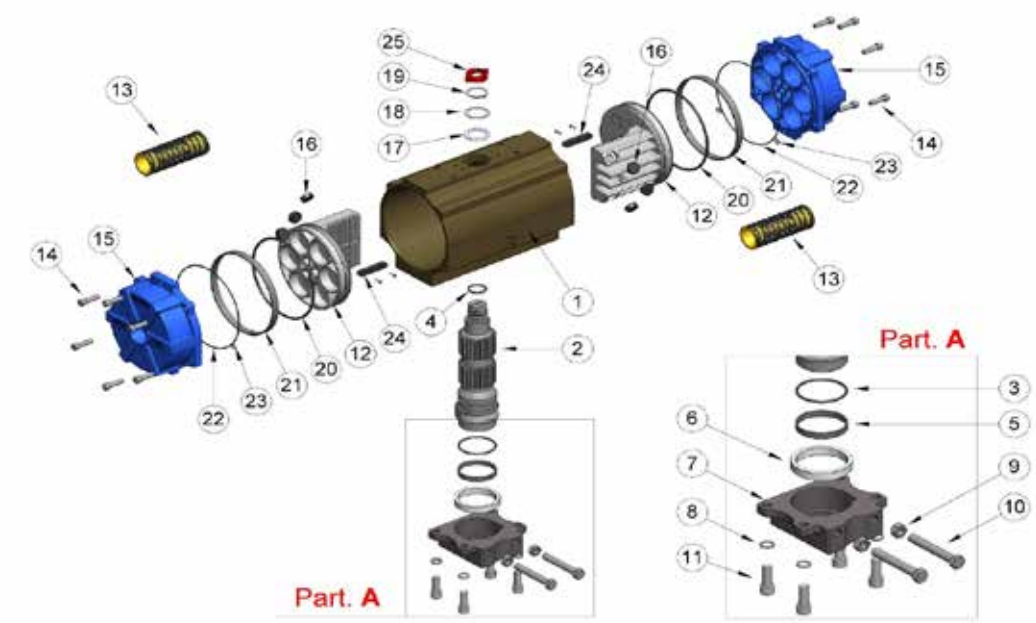
** Reinforced series DIN 471 - UNI 7436 (excludes model 32)

*** Only for models 160-180-200

Actuators and Ancillaries

Pneumatic Actuators - FIG 82 Spring Return and Double Acting

Models 270-330

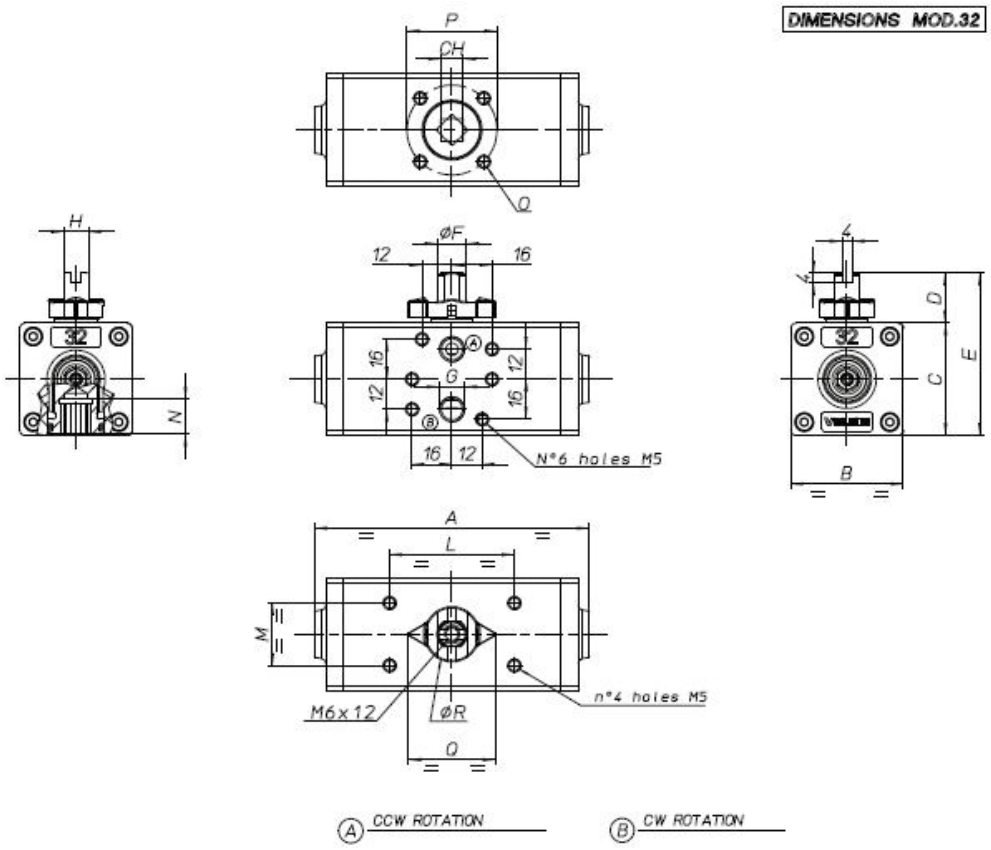


Materials of Construction

Item	Description	Material	Treatment
1	Body	Extruded aluminium	Hard anodized
2	Anti-blowout pinion	Steel	Nickel plated
3	O-ring	NBR	
4	O-ring	NBR	
5	Anti friction ring	PTFE 15% graphite	
6	Anti friction ring	PTFE	
7	Plate	mmod.330 C45	Painted
8	Washer	Stainless steel	
9	Stop bolt retaining nut	Stainless steel	
10	Stop screw	Steel	Zinc plated
11	Fixing screws	Stainless steel	
12	Piston	Die cast aluminium	
13	Precompressed spring	Steel	Painted
14	End cap fixing screw	Stainless steel	
15	End cap	Die cast aluminium	Painted
16	Thrust block	POM	
17	Spacer ring	POM	
18	Pinion washer	Stainless steel	
19	Snap ring	Steel	Nickel plated
20	O-ring	NBR	
21	Anti friction ring	PTFE 15% graphite	
22	O-ring	NBR	
23	O-ring	NBR	
24	Anti blowout key	POM	
25	Position indicator	Thermoplastic rubber TPE	

* Parts subject to wear

Dimensions for Model 32 (Double Acting)

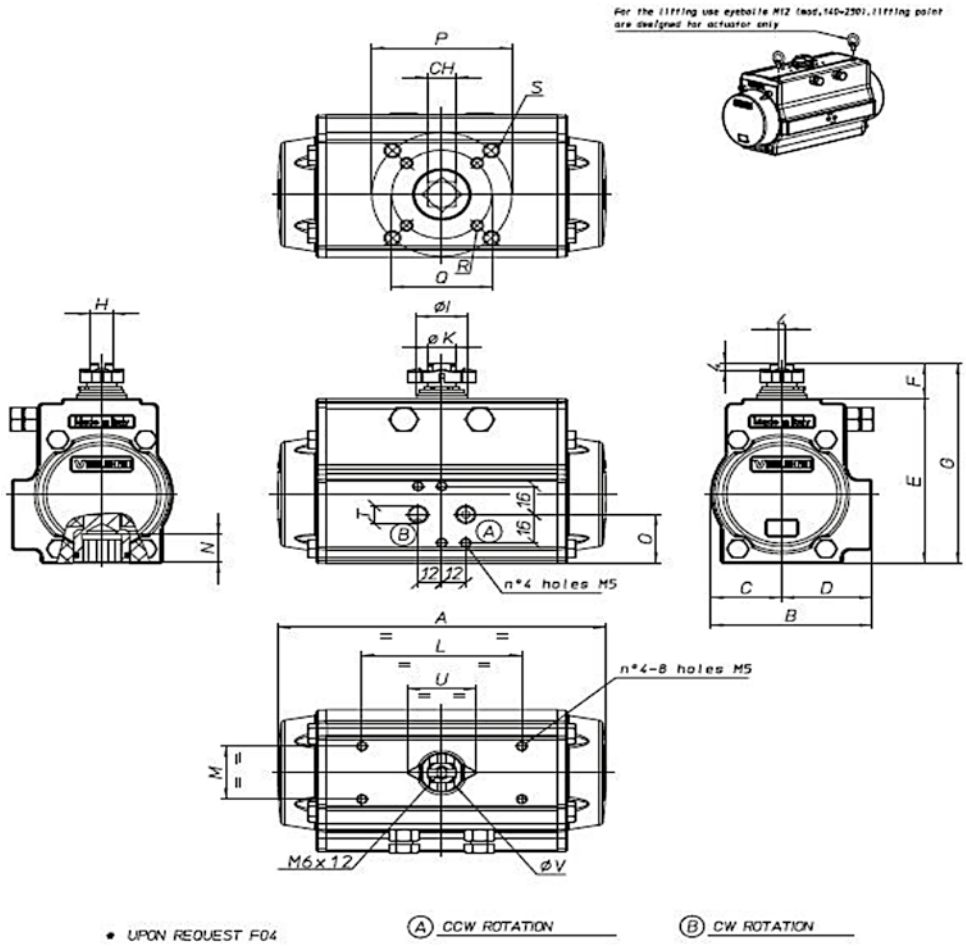


Model	SR Product Code	DA Product Code	Flange ISO 5211	CH	A	B	C	D	E	ØF	G ISO 7/1	H	L	M	N	M	O	P	Q	R
32	n/a	61502155	F03	9	110	45	45	20	65	11.8	⅛	10	50	25	12	25	M5X7.5	36	34.5	22

Actuators and Ancillaries

Pneumatic Actuators - FIG 82 Spring Return and Double Acting

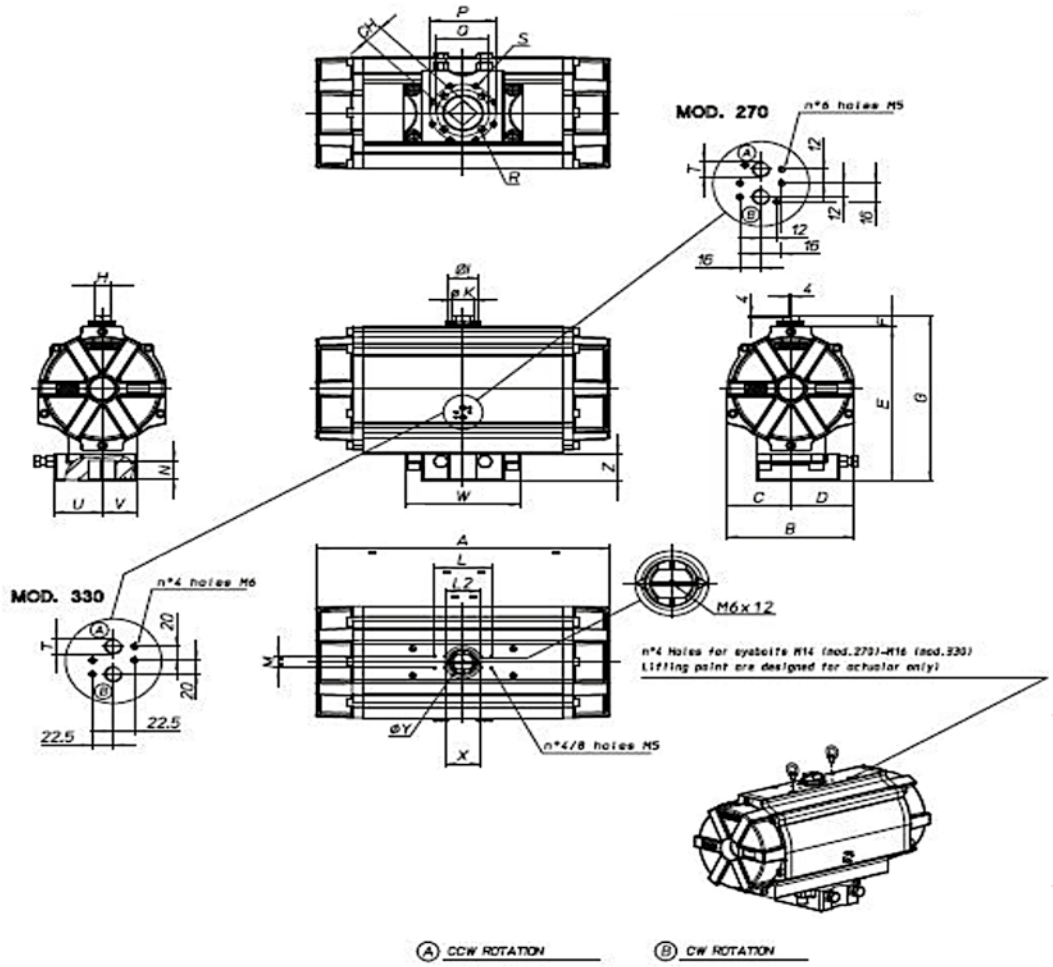
Dimensions for Models 52-230



Model	SR Product Code	DA Product Code	Flange ISO 5211	CH	A	B	C	D	E	F	G	H	ØI	ØK	L	M	N	O	P	Q	R	S	T ISO 7/1	U	ØV
52	61502004	61502166	F03-F05*	11	141	71	30	41	81.5	20	101.5	10	21	12	80	30	12	26.5	50	36	M5x7.5	M6x9	⅛"	34.5	22
63	61502015	61502177	F05-F07	14	164	80.5	35.5	45	93	20	113	11	25	15	80	30	16	27.5	70	50	M6x8	M8x12	⅛"	34.5	22
75	61502026	61502188	F05-F07	17	210	94.5	42	52.5	111.1	20	131	13	29	19	80	30	19	35	70	50	M6x8	M8x12	⅛"	42	29
85	61502037	61502199	F05-F07	17	240.5	106	47.5	58.5	125	20	145	15	35	22	80	30	19	42	70	50	M6x8	M8x12	⅛"	42	29
100	61502048	61502207	F07-F10	17	275	123	55	68	137.8	20	157.8	15	35	22	80	30	20.5	50	102	70	M8x8	M10x14	¼"	42	29
115	61502059	61502218	F07-F10	22	333	137	64	73	162.4	30	192.4	22	49	32	80/130	30	24	50	102	70	M8x12	M10x15	¼"	64	44
125	61502070	61502229	F07-F10	22	372	148	68	80	174.4	30	204.4	22	49	32	80/130	30	24	61	102	70	M8x12	M10x15	¼"	64	44
140	61502081	61502240	F10-F12	27	435	164	76.5	87.5	197	30	227	24	49	35	80/130	30	29	71	125	102	M10x15	M12x18	¼"	64	44
160	61502092	61502251	F10-F12	27	500	186	87	99	221	30	251	30	57	40	80/130	30	32	80	125	102	M10x14	M12x17	¼"	80.5	60
180	61502100	61502262	F10-F14	36	493	213	98	115	253	30	283	36	62	45	80/130	30	43	99	140	102	M10x15	M16x25	¼"	80.5	60
200	61502111	61502273	F14	36	578.5	217	108	109	278	30	308	36	67	50	80/130	30	37	78	140	/	/	M16x24	¼"	80.5	60
230	61502122	61502284	F16	46**	690	248.5	124	124.5	325	30	355	36	67	50	80/130	30	50	92	165	/	/	M20x29	¼"	80.8	60

**Only square connection at 45°
*Upon request F04

Dimensions for Models 270-330



Model	SR Product Code	DA Product Code	Flange ISO 5211	CH	A	B	C	D	E	F	G	H	ØI	ØK	L	L2	M	N	P
270	61502133	61502295	F16	46**	672	290	145	145	399	30	429	36	70	50	130	80	30	50	/
330	61502144	61502303	F16-F25	55**	881	402	201	201	505	50	555	36	109	50	130	/	30	62	254

Model	SR Product Code	DA Product Code	Flange ISO 5211	Q	R	S	T ISO 7/1	U	V	W	Z	X	ØY
270	61502133	61502295	F16	165	M20x30	/	1/4"	111	79	230	68	80.5	60
330	61502144	61502303	F16-F25	165	M20x30	M16x26	1/2"	129	135	297	95	80.5	60

** Only square connection at 45°

Actuators and Ancillaries

Pneumatic Actuators - FIG 82 Spring Return and Double Acting

Product Codes and Weights - FIG 82 Spring Return and Double Acting

	Spring Return		Double Acting	
Model	Product Code	Weight (kg)	Product Code	Weight (kg)
32	n/a	0.50	61502155	0.49
52	61502004	1.30	61502166	1.12
63	61502015	1.97	61502177	1.66
75	61502026	3.39	61502188	2.78
85	61502037	4.80	61502199	3.90
100	61502048	7.00	61502207	5.50
115	61502059	11.45	61502218	8.85
125	61502070	14.08	61502229	10.80
140	61502081	21.80	61502240	16.30
160	61502092	29.50	61502251	21.75
180	61502100	39.90	61502262	29.00
200	61502111	55.00	61502273	37.00
230	61502122	71.00	61502284	58.50
270	61502133	100.27	61502295	82.67
330	61502144	209.00	61502303	168.00

Double Acting Actuators - FIG 82 Torque Outputs (Nm)

	Air Supply Pressure (bar)							
Model	2.5	3	4	5	5.5	6	7	8
DA32	3.5	4.2	6	7.5	8	9	10	11.5
DA52	9	11	14.5	18.5	20	22	26	30
DA63	15.5	19	26	33	36	39.5	46.5	53.5
DA75	29	35	47.5	60	66	72	84.5	97
DA85	41.5	50.5	68.5	87	96	105	123	141
DA100	66	80	108	136	150	164.5	193	221
DA115	109	132	179	226	249	272	319	366
DA125	143.5	174	235	297	327	358	419	481
DA140	205	246	328	410	451	493	575	657
DA160	287	344	458	573	630	688	802	917
DA180	395	474	632	789	868	947	1105	1263
DA200	532	638	851	1063	1170	1276	1489	1701

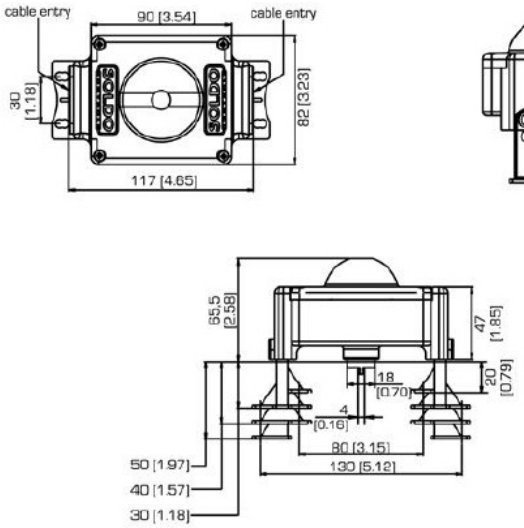
Spring Return Actuators - FIG 82 Torque Outputs (Nm)

Model	SET	Spring Torque (Nm)		Air Supply Pressure bar															
				2.5		3		4		5		5.5		6		7		8	
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°
SR52	01	3.6	4.9	4.5	1.6	6.4	3.5	10.2	7.4	0	0	0	0	0	0	0	0	0	0
	02	4.8	6.7	0	0	5.2	1.7	9	5.6	12.8	9.4	0	0	0	0	0	0	0	0
	03	5.2	7.5	0	0	0	0	8.6	4.8	12.4	8.6	14.3	10.5	16.2	12.4	0	0	0	0
	04	6.5	9.3	0	0	0	0	7.3	3	11.2	6.8	13.1	8.7	15	10.6	18.8	14.5	0	0
	05	8.1	11.9	0	0	0	0	0	0	9.5	4.3	11.4	6.2	13.3	8.1	17.1	11.9	20.9	15.7
SR63	01	5	9.6	8.6	2.6	12	6	18.9	12.8	0	0	0	0	0	0	0	0	0	0
	02	6.6	12.3	0	0	10.5	3.2	17.4	10.1	24.2	17	0	0	0	0	0	0	0	0
	03	8	14.5	0	0	0	0	15.9	7.9	22.8	14.8	26.2	18.2	29.6	21.7	0	0	0	0
	04	9.6	17.2	0	0	0	0	14.4	5.2	21.2	12	24.6	15.5	28.1	18.9	34.9	25.8	0	0
	05	12.5	22.1	0	0	0	0	0	0	18.2	7.1	21.7	10.6	25.1	14	31.9	20.9	38.8	27.7
SR75	01	10.1	19.5	15.8	3.9	22	10.1	34.4	22.5	0	0	0	0	0	0	0	0	0	0
	02	13.3	25.6	0	0	18.8	4	31.2	16.4	43.5	28.7	0	0	0	0	0	0	0	0
	03	15.1	28.2	0	0	0	0	29.4	13.8	41.8	26.1	48	32.3	54.1	38.5	0	0	0	0
	04	18.3	34.3	0	0	0	0	26.2	7.7	38.6	20	44.8	26.2	50.9	32.4	63.3	44.8	0	0
	05	23.2	43	0	0	0	0	0	0	33.6	11.3	39.8	17.5	46	23.7	58.3	36.1	70.7	48.4
SR85	01	16.1	27.3	22.2	7.6	31.3	16.6	49.5	34.8	0	0	0	0	0	0	0	0	0	0
	02	19.9	33.7	0	0	27.6	10.3	45.7	28.4	63.9	46.6	0	0	0	0	0	0	0	0
	03	24.3	40.8	0	0	0	0	41.3	21.3	59.4	39.5	68.5	48.6	77.6	57.6	0	0	0	0
	04	28.1	47.1	0	0	0	0	37.5	15	55.7	33.1	64.8	42.2	73.8	51.3	92	69.4	0	0
	05	36.3	60.6	0	0	0	0	0	0	47.5	19.6	56.6	28.7	65.6	37.8	83.8	55.9	101.9	74.1
SR100	01	24.6	44.6	36	10.1	50.2	24.2	78.4	52.5	0	0	0	0	0	0	0	0	0	0
	02	32.6	58.9	0	0	42.2	9.9	70.5	38.1	98.7	66.4	0	0	0	0	0	0	0	0
	03	35.9	63.7	0	0	0	0	67.1	33.3	95.4	61.6	109.5	75.7	123.6	89.9	0	0	0	0
	04	43.9	78	0	0	0	0	59.1	19	87.4	47.3	101.5	61.4	115.7	75.5	143.9	103.8	0	0
	05	55.2	97.2	0	0	0	0	0	0	76.1	28.1	90.2	42.3	104.3	56.4	132.6	84.7	160.8	112.9
SR115	01	41	74.4	61.3	18.4	84.7	41.8	131.4	88.5	0	0	0	0	0	0	0	0	0	0
	02	50.7	94.4	0	0	74.9	21.8	121.6	68.5	168.3	115.2	0	0	0	0	0	0	0	0
	03	60.8	108.1	0	0	0	0	111.6	54.7	158.3	101.5	181.6	124.8	205	148.2	0	0	0	0
	04	70.6	128.1	0	0	0	0	101.8	34.8	148.5	81.5	171.9	104.9	195.2	128.2	241.9	174.9	0	0
	05	90.4	161.8	0	0	0	0	0	0	128.7	47.8	152	71.1	175.4	94.5	222.1	141.2	268.8	187.9
SR125	01	53.1	99.1	80.2	21.2	110.9	51.9	172.2	113.2	0	0	0	0	0	0	0	0	0	0
	02	63.3	117.5	0	0	100.7	33.5	162.1	94.8	223.4	156.1	0	0	0	0	0	0	0	0
	03	81.1	148.4	0	0	0	0	144.2	63.9	205.5	125.2	236.2	155.9	266.8	186.5	0	0	0	0
	04	91.3	166.9	0	0	0	0	134.1	45.5	195.4	106.8	226.1	137.5	256.7	168.1	318	229.4	0	0
	05	119.2	216.2	0	0	0	0	0	0	167.4	57.5	198.1	88.1	228.7	118.8	290.1	180.1	351.4	241.4
SR140	01	82	152	119	36	160	77	242	159	0	0	0	0	0	0	0	0	0	0
	02	92	172	0	0	149	56	231	138	313	220	0	0	0	0	0	0	0	0
	03	117	221	0	0	0	0	205	86	287	168	328	209	369	250	0	0	0	0
	04	128	240	0	0	0	0	193	64	275	146	316	187	358	229	440	311	0	0
	05	164	308	0	0	0	0	0	0	238	72	279	114	320	155	402	237	484	319
SR160	01	83	131	199	148	256	205	0	0	0	0	0	0	0	0	0	0	0	0
	02	119	188	0	0	218	145	332	259	0	0	0	0	0	0	0	0	0	0
	03	143	225	0	0	193	105	307	219	422	334	0	0	0	0	0	0	0	0
	04	185	292	0	0	0	0	262	148	377	263	434	320	0	0	0	0	0	0
	05	202	319	0	0	0	0	0	0	358	235	415	292	473	350	0	0	0	0
	06	268	423	0	0	0	0	0	0	0	0	346	181	404	239	518	353	633	468
SR180	01	102	168	287	217	366	296	0	0	0	0	0	0	0	0	0	0	0	0
	02	160	252	0	0	304	206	462	364	0	0	0	0	0	0	0	0	0	0
	03	182	294	0	0	281	162	439	320	596	477	0	0	0	0	0	0	0	0
	04	262	414	0	0	0	0	354	196	511	353	590	432	0	0	0	0	0	0
	05	262	420	0	0	0	0	0	0	511	343	590	422	669	501	0	0	0	0
	06	364	582	0	0	0	0	0	0	0	0	482	254	561	333	719	491	877	649
SR200	01	169	251	353	269	459	375	0	0	0	0	0	0	0	0	0	0	0	0
	02	237	353	0	0	381	262	594	475	0	0	0	0	0	0	0	0	0	0
	03	288	428	0	0	330	188	543	401	755	613	0	0	0	0	0	0	0	0
	04	338	522	0	0	0	0	483	295	695	507	802	614	0	0	0	0	0	0
	05	406	604	0	0	0	0	0	0	626	425	733	532	839	638	0	0	0	0
	06	507	773	0	0	0	0	0	0	0	0	622	352	728	458	941	671	1153	883
SR230	01	389	666	466	172	642	348	993	699	0	0	0	0	0	0	0	0	0	0
	02	466	799	0	0	560	206	911	557	0	0	0	0	0	0	0	0	0	0
	03	544	933	0	0	0	0	828	416	1180	768	0	0	0	0	0	0	0	0
	04	622	1066	0	0	0	0	746	274	1098	626	1274	802	0	0	0	0	0	0
	05	700	1199	0	0	0	0	663	133	1015	485	1191	661	1366	836	0	0	0	0
	06	777	1332	0	0	0	0	0	0	933	343	1109	519	1284	694	1636	1046	1987	1397
SR270	01	506	791	780	490	1044	754	1572	1282	0	0	0	0	0	0	0	0	0	0
	02	607	949	672	324	936	588	1464	1116	0	0	0	0	0	0	0	0	0	0
	03	708	1107	564	158	828	422	1356	950	1884	1478	0	0	0	0	0	0	0	0
	04	810	1265	0	0	721	257	1249	785	1777	1313	2041	1577	0	0	0	0	0	0
	05	911	1423	0	0	0	0	1141	619	1669	1147	1933	1411	2197	1675	0	0	0	0
	06	1012	1581	0	0	0	0	1033	453	1561	981	1825	1245	2089	1509	0	0	0	0
	07	1113	1740	0	0	0	0	925	287	1453	815	1717	1079	1981	1343	2508	1870	0	0
	08	1214	1898	0	0	0	0	817	121	1345	649	1609	913	1873	1177	2400	1704	2928	2232
SR330	01	884	1372	1361	842	1821	1302	2741	2222	0	0	0	0	0	0	0	0	0	0
	02	1060	1647	1173	550	1633	1010	2553	1930	0	0	0	0	0	0	0	0	0	0
	03	1237	1921	985	259	1445	719	2365	1639	3285	2559	0	0	0	0	0	0	0	0
	04	1414	2196	0	0	1258	427	2178	1347	3098	2267	3558	2727	0	0	0	0	0	0
	05	1591	2470	0	0	0	0	1990	1056	2910	1976	3370	2436	3830	2896	0	0	0	0
	06	1767	2745	0	0	0	0	1802	764	2722	1684	3182	2144	3642	2604	0	0	0	0
	07	1944	3019	0	0	0	0	1615	473	2535	1393	2995	1853	3455	2313	4374	3232	0	0
	08	2121	3294	0	0	0	0	0	0	2347	1101	2807	1561	3267	2021	4186	2940	5106	3860

Actuators and Ancillaries

Pneumatic Actuator Accessories - Switchbox and Silencer

Dimensions

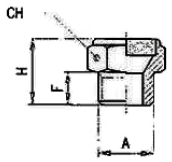


BOSS™ Actuated valves with BOSS™ 82 DA32 Double Acting actuator may require a mounting bracket

Product Code 68520407	
Technical Specification	
SP series namur switchbox complete with 2 x SPDT Silver Plated Switches	
To suit 20,30,40 & 50 namur pinion	
Suitable for use in IP65 weatherproof applications	
3D Position indicator	
Tool free adjustable high resolution splined cams	
Standard ambient temperature range	-15˚C to +180˚C
Cable entry with 15mm (1/2") thickness thread to prevent housing damage	
Materials of Construction	
UV resistant and VO polycarbonate cover	
VO reinforced PPE body	
Resin construction ideal for use in hostile environments	

Pneumatic Actuator Accessories - Silencer

Dimensions



dB = noise level in (dB) at 6 bar

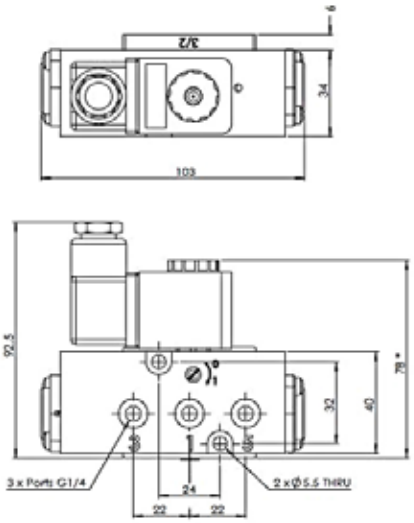
Silencer

A	F	H	CH	dB	Product Code
¼	7	17	16	74	69631193

Technical Specification	
Connection size	¼"
Max pressure	12 bar
Min temperature	-10˚C
Max temperature	+80˚C
Filtration threshold	100 µm

Materials of Construction

Brass and sintered bronze



Maximum height with plug connector rotated through 90 degrees

Solenoids	
Product Codes	
69631097	24V DC
69631116	110V AC
69631127	240V AC

Solenoids Technical Specification
Namur standard fixing dimensions
Top face air connection
Screwdriver override as standard
Integrated exhaust to spring (ETS) feature in 3/2 position
Built in 3/2 to 5/2 function conversion facility for spring return and double acting actuators

Valve Specification	
Port connection size	¼" BSP
Working pressure	3 to 10 bar
Cv factor	1
Flow Rate (at 6 bar with 1 bar pressure drop)	1000 l/min
Max ambient temperature	+80˚C
Min working temperature	-20˚C

Coil Specification	
Coil Type	MC 30 plug and socket
Area Class	Safe
Area Category	N/A
Ingress Protection	IP65
Cable Entry	PG.9
Ambient Temperature	-20°C to +80˚C
Magnetic Wire Class	H
Power Consumption Nominal	2.0 Watts (DC)
	Pull in - 9VA, Holding 5VA (AC)

Solenoids Materials of Construction	
Body	Black anodised aluminium (Dural)
Spool	Hard anodised aluminium PTFE impregnated
Spacers	Glass filled acetal
Seals	Nitrile
Spring	Music wire
Mounting Screws	Stainless steel
Change over plate and end caps	Nylon 66 30% glass filled
Gasket	Nitrile

Actuators and Ancillaries

Electric Actuators - FIG EA218 Electric Actuators

BOSS™ Feature rich multi-voltage, multi-function smart electric actuator with LED status light

EA218 Series of quarter turn electric actuators

Ideally suited to ball and butterfly valves, the BOSS EA218 electric actuator has 6 models offering a range of break away torques from 25 to 350Nm.
The totally user friendly EA218 electric valve actuator is designed with installers and users in mind. For installers it is quick and easy because there is no need to remove the cover to connect as all electrical connections are external via supplied 3 pin Din plugs. There are no internal terminal strips to work out.

For users it provides continuous operational status feedback via a highly visible light which flashes if, for example, the actuator has been left in 'manual' mode, or if the valve is blocked. The sequence of the flashing light indicates the likely cause.

Functional flexibility across the entire range

Functional flexibility makes the EA218 stand out. With its unique range of plug and play function conversion kits, the standard on-off EA218 can quickly be converted to a failsafe, a modulating, or a failsafe modulating actuator, from stock.
Failsafe offers the security of the EA218 being set in a pre-determined 'safe' position on loss of external power, this can be either fail close, or fail open.

A modulating actuator offers proportional control whereby the actuator's opening angle is set proportional to an input control signal. The EA218 typically uses the industry standard 4-20mA or 0-1V signals, and offers a feedback signal as standard. Failsafe modulating offers both failsafe, and modulating functionality.

How the EA218 electric 1/4 turn valve actuator works (on-off)

Electrically operated valves are driven by an electric actuator containing a motor and gearbox. On receipt of a continuous voltage signal (not pulse) the motor runs and, via a gearbox in the electric actuator, rotates the valve stem. The motor stops at the desired position (usually 0° or 90°) by an internal cam striking a micro-switch. The valve actuator remains in this position, with the voltage still applied continuously, until switched and a continuous voltage reversing signal (not pulse) is applied, which runs the motor in the opposite direction, reversing the rotation until a separate internal cam strikes a separate micro-switch and stops the motor.

Main features:

- IP67 Weatherproof, UV protected, corrosion resistant plastic housing.
- LED light gives user continuous visual actuator status feedback - if the LED is flashing, there's a problem!
- Many protective features as standard - such as over-torque and anti-condensation.
- Multi-voltage capable, automatically sensed.
- Very user friendly and easy to install - all the electrical connections are external.
- Available as standard with power open - power close (on-off) function. Stays put on loss of external power.
- Available with FAILSAFE function. Set in predetermined FAILSAFE position on loss of external power.
- Available with MODULATING, and FAILSAFE MODULATING function. Actuator movement controlled by input signal, typically 4-20mA or 0-10V. Suitable for BMS systems.

Main features of the EA218 smart electric actuator

IP67 Weatherproof, UV protected, corrosion resistant Polyamide housing.	**IP67 allows the EA218 electric actuator to be submerged, the international standard IEC60529 states:** Test duration is 30 minutes. Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1m of submersion). The lowest point of enclosures with a height less than 850mm is located 1000mm below the surface of the water, the highest point of enclosures with a height equal to or greater than 850mm is located 150mm below the surface of the water. **The EA218 complies and is therefore fully weatherproof.**
LED light gives user continuous visual actuator status feedback - if the LED is flashing, there's a problem!	The LED light provides a continuous highly visible indication of the EA218 electric actuator's operational status. If all is well, the LED is solidly lit. If it is blinking there is a problem and will not respond to remote commands - the sequence gives an indication of the likely cause. The 2 most common are: ✲✲✲✲ = Torque limiter has engaged (valve jammed?) ✲✲✲✲ = Actuator is in 'manual' mode
Many protective features as standard - such as over-torque and anti-condensation.	Over-torque protection is electronic, the EA218 constantly measures the current being drawn and compares it with pre-set parameters, if the current draw exceeds the parameter, the power is cut preventing mechanical damage to the actuator. An internal thermostatic heater, energised from the external power supplied to the power DIN connector, ensures the EA218's internal temperature remains above that at which condensation could form.
Multi-voltage capable, automatically sensed	The EA218 actuator automatically senses the external power being applied and can accept any external voltage between 85V and 220V AC or DC in the 'H' version, and 24V AC or DC in the 'L' version. In models 20 to 85, 12VDC can also be used.
Very user friendly and easy to install - all electrical connections are external.	The EA218 mounting options conform to ISO5211 F03, with a female star drive. Electrical connections are made using external DIN plugs supplied with the EA218 actuator eliminating the need to remove the actuators cover to connect.
Unique plug & play function conversion kits create FAILSAFE & MODULATING function from a standard on-off electric actuator.	Uniquely, the EA218 electric actuator can have its standard on-off functionality changed by installing of very user friendly plug and play function conversion kits. See the following page for more details. Whilst these can be retro-fitted, most BOSS EA218 actuators will be supplied with these kits fitted and tested when originally supplied.
Manufactured in the EU.	The BOSS EA218 electric valve actuators are designed and manufactured in the EU by an ISO9001 manufacturing partner that have been innovative leaders in the design and manufacturing of electric actuators for over 25 years. There is a wealth of experience in every BOSS EA218 electric actuator.

Actuators and Ancillaries

Electric Actuators - FIG EA218 Electric Actuators

Function options:

EA218 ON-OFF ELECTRIC ACTUATOR

Standard function

Power open, power close. Stays put on loss of external power. Power remains on at all times.

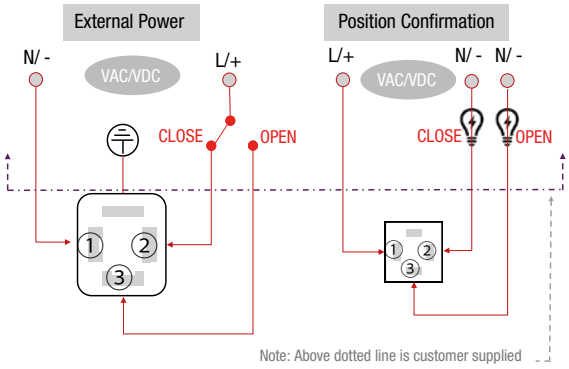
EA218 FAILSAFE ELECTRIC ACTUATOR

Fails to pre-set position on loss of external power
Power open, power close, fails to pre-set 'safe' position on loss of external power using internal industrial trickle charged rechargeable NiCad battery. Can be set to fail close (NC or Nominally closed) or fail open (NO or Nominally open) on loss of external power. The failsafe electric actuator moves to the position command applied at the time external power is restored.

Electrical Connections

In EA218 electric actuators all electrical connections are made externally using the external DIN plugs supplied with the actuator. There is no need to remove the valve actuator's cover to connect electrically. There are no terminals internally to connect to.

ON -OFF & FAILSAFE WIRING (Same connection for either)



EA218 MODULATING ELECTRIC ACTUATOR

Movement proportional to input signal

Power is applied continuously. Movement of valve actuator is then controlled by an internally fitted digital positioner and is proportional to changes supplied in an input control signal. This input signal is typically 0-10VDC, or 4-20mA. An output signal is supplied as standard providing closed loop control. Fails closed on loss of control signal (or see configuration options below), stays put on loss of external power.

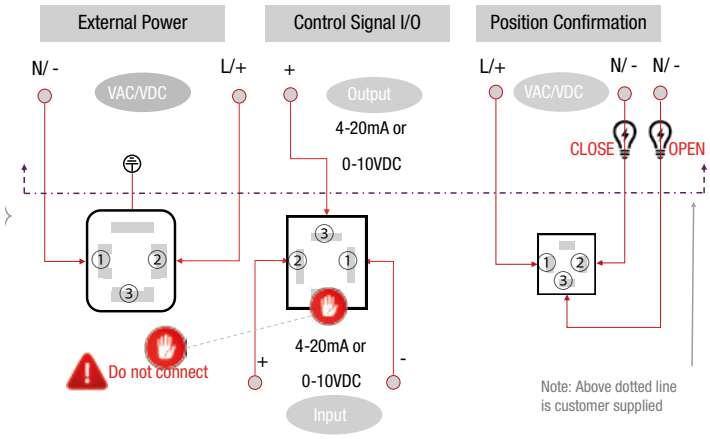
Configuration options:

1) Closes on loss of control signal

2) Opens on loss of control signal

3) Stays put on loss of control signal

MODULATING WIRING



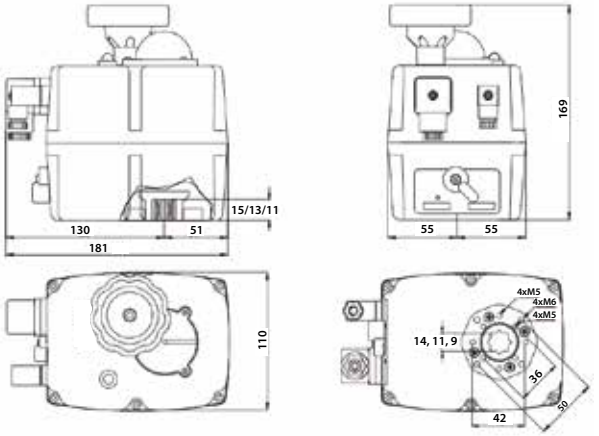
EA218 FAILSAFE MODULATING ACTUATOR

Combination of failsafe & modulating kits above:
Uses battery failsafe system and digital positioner plug and play function conversion kits to provide fail to safe position function on loss of external power in a modulating application.

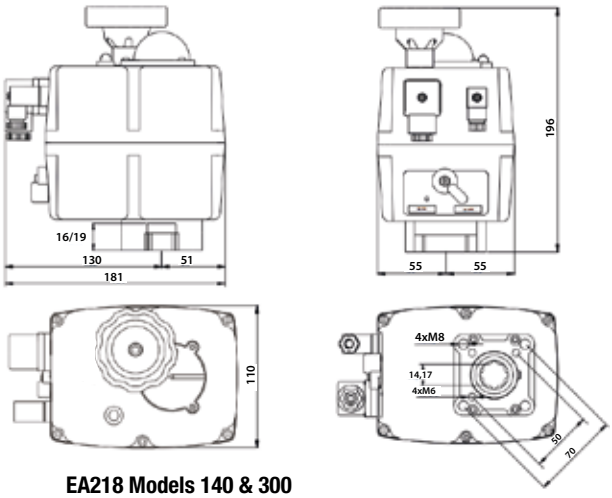
NOTE ON POWER SUPPLIES

It is imperative that the power supply has sufficient capacity to drive the EA218 electric actuator. Ensure that safety factor of 3 is used to cover inrush current draw on start-up, and for increased draw over time as the brushed DC motor wears.

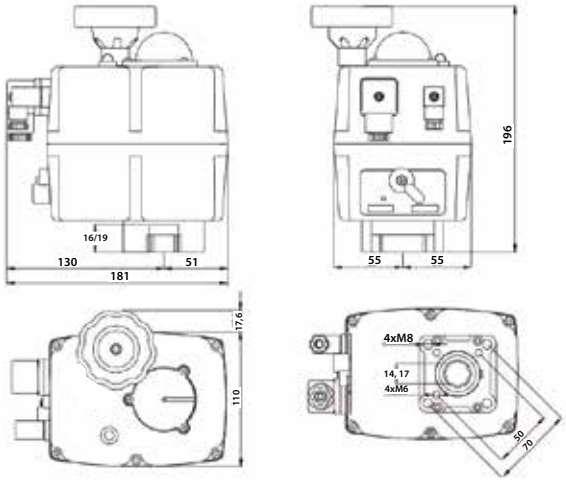
EA218 Models 20 & 35



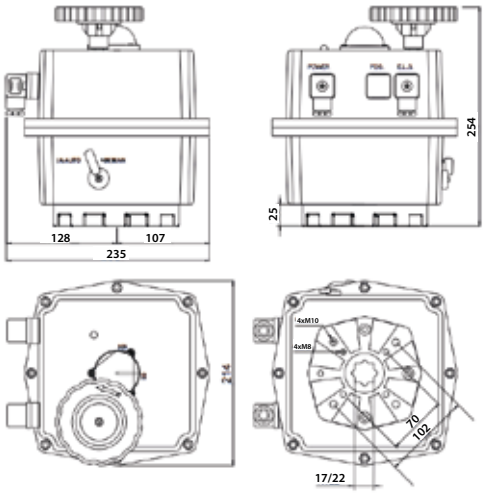
EA218 Model 55



EA218 Model 85



EA218 Models 140 & 300



Part Nos. & Specifications:	EA218 Model 20	EA218 Model 35	EA218 Model 55	EA218 Model 85	EA218 Model 140	EA218 Model 300
Product Code (High Voltage)	21800077	21800088	21800099	21800107	21800118	21800129
Product Code (Low Voltage)	21800011	21800022	21800033	21800044	21800055	21800066
Product Code (Failsafe conversion kit)	21800140	21800140	21800140	21800140	21800162	21800162
Product Code (Modulating conv. kit)	21800151	21800151	21800151	21800151	21800173	21800173
Max break-out torque Nm	25	38	60	90	170	350
Run/reseat torque Nm	20	35	55	85	140	300
Mounting (ISO5211)	F03/04/05	F03/04/05	F05/07	F05/07	F07/10	F07/10
Output drive (female star) mm	14	14	17	17	22	22
0-90° Run time Hi Volt sec+10%	10	10	14	30	34	58
0-90° Run time Low Volt sec+10%	10	10	13	30	34	58
Duty rating	75	75	75	75	75	75
Anti-condensation heater	3.5W	3.5W	3.5W	3.5W	3.5W	3.5W
Electrical connectors (DIN plugs)	DIN 43650 ISO440	DIN 43650 ISO440	DIN 43650 ISO440	DIN 43650 ISO440	DIN 43650 ISO440	DIN 43650 ISO440
End of travel confirmation	2 x SPDT micro	2 x SPDT micro	2 x SPDT micro	2 x SPDT micro	2 x SPDT micro	2 x SPDT micro
IP Rating (IEC 30529)	IP67	IP67	IP67	IP67	IP67	IP67
Ambient temperature range °C	-20 to +70	-20 to +70	-20 to +70	-20 to +70	-20 to +70	-20 to +70
Weight Kg	1.8	1.9	2.4	3.0	5.2	5.2

Actuators and Ancillaries
Test Plugs

15mm Extended Plug

EX15
25028637

EX15SS
25028541

8mm Extended Plug

EX8
25028626

EX8SS
25028530

15mm Test Plug

ST15
25028615

ST15SS
25028519

8mm Test Plug

ST8
25028604

ST8SS
25028508

Thread	O/A Length (inc. Cap)		Max Probe (dia)	Product Types
	Standard	Extended		
8mm (¼in) BSPT	38mm	75mm	4mm	ST8, ST8SS, EX8, EX8SS
15mm (½in) BSPT	41mm	77mm	4mm	ST15, ST15SS, EX15, EX15SS

- The extended plugs give approximately an extra 38mm (1½in) for insulation.
- Other lengths available to order. Add to type number in mm.
- Standard Construction Types ST8, EX8, ST15, EX15.
- Stainless Steel Construction Types ST8SS, EX8SS, ST15SS, EX15SS.

Technical Specification	
Maximum Pressure	35bar, 500PSI.
Temp range	-8 to +135°C (18 to 275°F).

Suitable for low temperature hot water, chilled water and low pressure steam.

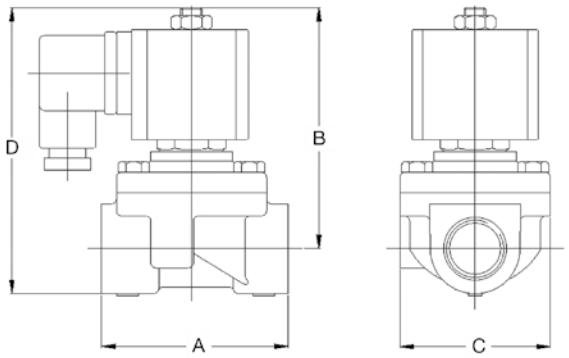
Materials of Construction	
Body, cap and retaining ring	Brass
Cap seal	Neoprene Rubber
Retaining strap	Ethylene Propylene Rubber
Core	Ethylene Propylene Rubber

Safety

Test Plugs and accessories are not recommended to be used on medium or high temperature hot water systems. Ethylene Propylene rubber is suitable for temperatures up to 135°C however if Plugs are used with hazardous liquids or gases, protective clothing i.e. long sleeved gloves, face and eye protection should be worn.

Actuators and Ancillaries
Pilot Operated Solenoid Valves – FIG DCA
Air, Light Oil, Water, 230Vac

Dimensions



Nominal Size in	Nominal Size mm	A mm	B mm	C mm	D mm	Weight kg	Product Code
½	15	69.5	80	75	97	0.9	20812106
¾	20	69.5	80	75	97	0.9	20812117
1	25	85	80	75	126	1.2	20812128
1¼	32	137	103	120	136	3	20812139
1½	40	137	103	120	136	3	20812150
2	50	137	103	120	136	3.2	20812161

Technical Specification	
Working voltage	Standard 230Vac (Others available)
Connections	BS21 BSPP Female
Maximum static pressure	50bar
Media temperature	-10 to +80ºC
Ambient temperature	-10 to +50ºC
Duty cycle	100% Continuously Rated
Protection class	IP65 with Plug to DIN43650 (Supplied)
Viscosity	Light Oil 100sec Redwood
Coil insulation	Class H

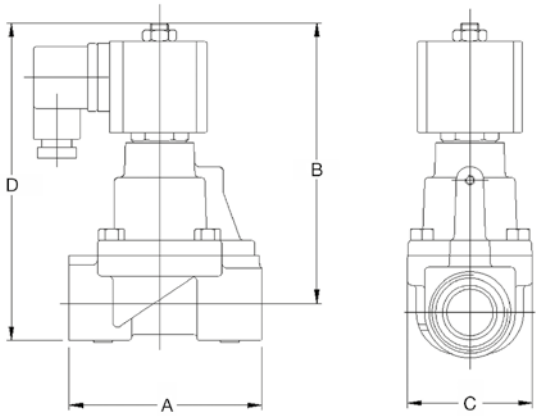
Materials of Construction		
Body		Brass/Bronze
Internals		Stainless Steel
Seals	Standard	Nitrile
	Options	EPDM & Viton

Size in	Orifice mm	KV M³/Hr	MOPD Bar AC	Media Temp	Seal Material	Type	Product Code
½	16	4.2	0-14.0			DCA4	20812106
¾	16	4.7	0-14.0	-10ºC		DCA6	20812117
1	20	7.1	0-10.3	to	Nitrile	DCA7	20812128
1¼	40	23.2	0-4.0	+80ºC		DCA8	20812139
1½	40	23.2	0-4.0			DCA9	20812150
2	40	25.8	0-4.0			DCA10	20812161

Actuators and Ancillaries

Pilot Operated Solenoid Valves – FIG PCAX
Steam, 230Vac

Dimensions



Size in	A mm	B mm	C mm	D mm	Weight kg	Product Code
½	68.5	105	65	122	1.2	20812172
¾	68.5	105	65	122	1.5	20812183
1	85	125	78	146	1.5	20812194
1½	117	133	73	179	3.1	20812770
2	146	145	95	209	5.2	20812781

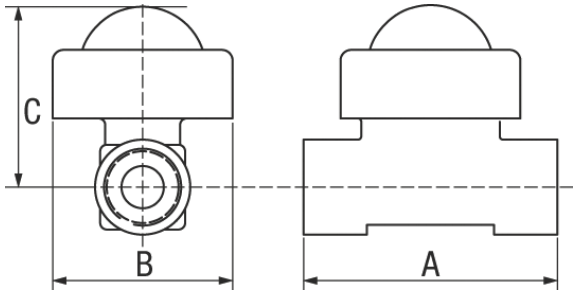
Technical Specification	
Working voltage	Standard 230Vac (Others available)
Electrical connection	PG9
Connections	BS21 BSPP Female
Maximum static pressure	20Bar
Media temperature	180ºC Max
Ambient temperature	-10 to +50ºC
Duty cycle	100% Continuously Rated
Protection class	IP65 with Plug to DIN43650 (Supplied)

Materials of Construction	
Body	Brass/Bronze
Internals	Stainless Steel/Copper Alloy
Seals	PTFE

Size in	Orifice mm	KV M^3/Hr	Minimum OPD Bar	Maximum OPD AC	Maximum OPD DC	Maximum Media Temp	Seal Material	Type	Product Codes
½	16	4.2	0.3	8.6	4.8	180ºC	PTFE	PCA4X	20812172
¾	16	5.4	0.3	8.6	4.8	180ºC	PTFE	PCA6X	20812183
1	20	12.6	0.3	8.6	4.8	180ºC	PTFE	PCA7X	20812194
1½	30	18.0	0.3	8.6	4.8	180ºC	PTFE	PCA9X	20812770
2	32	21.0	0.3	8.6	4.8	180ºC	PTFE	PCA10X	20812781

Sight Flow Indicator

Dimensions



Size		A	B	C	Weight	Spinner
in	mm	mm	mm	mm	kg	Product Code
½	15	76	60	54	0.6	26110017
¾	20	83	60	54	0.6	26110028
1	25	89	60	70	1.1	26110039

Technical Specification	
Connections	FBSPT
Max Pressure	7Bar
Temperature	100ºC

Materials of Construction	
Body	Gunmetal BSEN1928 CB419K
Cover Ring	Gunmetal BSEN1928 CB419K
Glass	Soda Lime BS3463
Gaskets	Nitrile 'O' Ring BS128
Spinner	Glass Filled Nitrile
Ball	PTFE

Applications: oil, water

Introduction

These notes have been prepared to assist in the selection and installation of Pressure Gauges for the purpose of ensuring, as far as possible they give a satisfactory service on the application for which they were intended and to ensure the highest possible level of safety.

For further information, reference should be made to relevant British Standards on which these notes are largely based. All dial instruments included within this literature are available with contractors' motifs printed onto the dials.

Materials

The most usual wetted parts used in the construction of these gauges are made from brass and bronze and similar non ferrous materials. Such gauges are suitable for use on oil, water and other non-corrosive fluids. For corrosive fluids, alternative materials e.g. stainless steel should be specified. For special applications e.g. when the pressure medium may solidify in the tube or may contain solids in suspension, alternative designs of pressure gauges such as diaphragm or a chemical seal type should be used.

Environmental conditions should be taken into account when considering suitable materials for construction parts other than for wetted parts.

Safety on Gas and Steam Pressure Measurement

For certain gas applications, safety pattern gauges MUST be used and these must incorporate a solid baffle between dial and pressure element, a splinter-proof or clear plastic window and blow-out release.

Surface mounting gauges with a blow-out release at the back, MUST be mounted at least 20mm away from the surface panel by means of distance pieces.

For oxygen, safety pattern gauges MUST be used, they MUST be supplied, degreased and kept free from oil contamination.

For Acetylene, safety pattern gauges MUST be used.

For Steam and Gases, other than oxygen and acetylene, gauges of normal construction with a diameter of less than 100mm may be used for pressure ranges up to 25bar. For gauges 100mm diameter and greater the gauge must have a blow-out device. For higher pressure ranges, safety patterns must be used.

Maximum Working Pressure

While gauges will withstand the full scale pressure, the working pressure should not exceed 75% of the full scale range for fluctuating pressures.

Pulsation etc.

If pressures are expected to pulsate violently, oscillate with high frequency or occur with sudden shock, the manufacturer should be consulted.

Pressure Gauges

Gauges on this page comply with BS EN 837-1

Mechanical Vibration

Gauges should be mounted away from vibration and connected by means of flexible piping. If this is not possible the manufacturer should be consulted. Where liquid filled case gauges are used, a safety release MUST be incorporated in the case.

Temperature

If used on steam or other hot gases or liquids, gauges MUST be protected by the use of an effective syphon or by other means. A gauge is unduly hot if it cannot be grasped by hand without discomfort. It should also be remembered that gauges used on water may burst if exposed to frost. Working fluids at a temperature exceeding 60°C* should not enter the bourdon tube or other wetted parts.

Mounting

All gauges should be mounted in a vertical position unless otherwise agreed with the manufacturer.

Cocks and Valves

Gauges should normally be fitted with either a cock or valve. This enables the gauge to be removed at any time for checking or any other purpose. These cocks or valves MUST be opened or closed slowly to avoid sudden changes of pressure on the gauge.

*According to BS:EN837-1:1998

Pressure Gauges
FIG 408 DM – Black Steel Case
Gauges on this page comply with BS EN 837-1

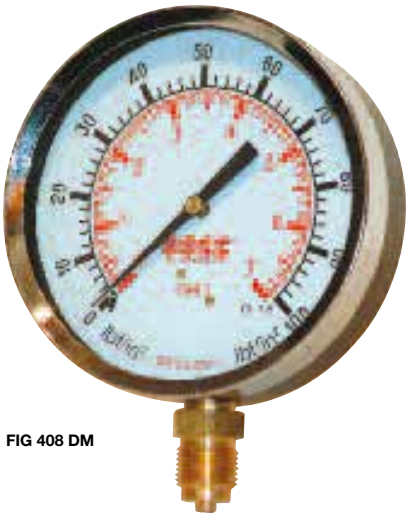


FIG 408 DM

Direct Mounting
Bezel: 2" and 2½" have black plastic case with acrylic window. 4" and 6" black steel case with bright bezel and glass window.
Connection Sizes: ¼" BSP for 2" and 2½" models.
⅜" BSP for 4" and 6" models - Also incorporates blow out device.

Dual Scale reading
408DMP 100mm also available as Class 1 and this option should be selected if surface mounting back flange or Perspex windows are required.

Other Gauges Available
Other pressure ranges available on request for FIG 408DM and 407DM.
Gauges available with stainless steel cases, bezels and/or stainless steel wetted parts.
Also available with back entry connection.

Pressure Range Bar	Pressure Range lbf/in²	2" (50mm) Dial	2½" (63mm) Dial	4" (100mm) Dial	4" (100mm) Perspex Dial 408DMP	6" (150mm) Dial
		BSS Code	BSS Code	BSS Code	BSS Code	BSS Code
0-1	15	80010017	80010209	80011820	–	80012224
0-1.6	20	–	–	80011831	–	–
0-2	30	80010050	80010242	80011842	–	80012246
0-4	60	80010072	80010275	80011875	80011757	80012257
0-7	100	80010094	80010297	80011897	80011768	80012268
0-10	150	80010113	80010316	80011916	80011779	80012279
0-14	200	80010124	80010327	80011949	80011790	80012290
0-21	300	80010146	80010349	80011971	–	80012309
0-42	600	–	–	*80012010	–	*80012320
0-70	1000	–	–	*80012032	–	*80012331
0-140	2000	–	–	*80012043	–	–

Pressure Gauges
FIG 410 DM, 407 DM & 409S

Gauges on this page comply with BS EN 837-1

FIG 410 DM – All Stainless Steel Gauge

All wetted parts in 316 stainless steel. Bezel: 304, acrylic window. Direct mounting. Dual Scale reading. Glycerine fillable. Connection Size: ½" BSP

Pressure Range Bar	Pressure Range lbf/in²	4" (100mm) Dial BSS Code	6" (150mm) Dial BSS Code
0-2	30	80110006	80110102
0-4	60	80110017	80110113
0-7	100	80110028	80110124
0-10	150	80110039	80110135
0-14	200	80110050	–
0-21	300	80110061	80110157

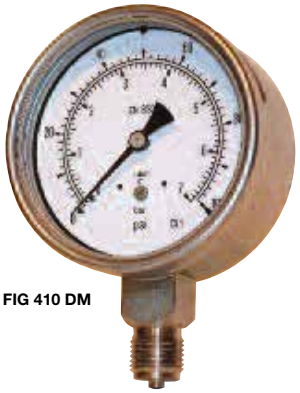


FIG 410 DM

FIG 407 DM – Brass Case

Direct Mounting. Bezel: Brass. Connection Sizes: ¼" BSP for 3" models. ⅜" BSP for 4" and 6" models – Also incorporates blow out device. Dual scale reading.

Pressure Range Bar	Pressure Range lbf/in²	3" (80mm) Dial BSS Code	4" (100mm) Dial BSS Code	6" (150mm) Dial BSS Code
0-1	15	80010401	80010818	–
0-1.6	20	–	–	–
0-2	30	80010445	80010851	80011148
0-4	60	80010478	80010895	80011181
0-7	100	80010508	80010903	80011200
0-10	150	80010530	80010925	80011222
0-14	200	80010541	80010958	80011244
0-21	300	80010563	80010980	80011266
0-42	600	*80010596	*80011019	*80011299
0-70	1000	*80010637	*80011041	*80011329
0-140	2000	–	*80011052	–

*These gauges are full safety pattern and comply with the safety requirements of BS EN 837-1

FIG 407 DM

FIG 409S – Sprinkler Gauge

Direct Mounting. Bezel: Stainless Steel Connection Size: ⅜" BSP

Pressure Range Bar	Pressure Range lbf/in²	4" (100mm) Dial BSS Code
0-10	150	80046516
0-16	230	80046505

FIG 409S DM

Pressure Gauges
FIG 223 DM & 342 DM

Gauges on this page comply with BS EN 837-1

FIG 223 DM

FIG 223 DM – Low Pressure Capsule Gauge Polished Brass Case

Direct Mounting.
Bezel: Brass.
Connection Size: ⅜" BSP.

Pressure Range mbar	Pressure Range w.g.	4" (100mm) Dial BSS Code
0-60	0-25	80046003
0-100	0-40	80046014
1-160	0-40	80046025
0-250	0-100	80046036

FIG 342 DM

FIG 342 DM – Liquid Filled Stainless Steel Case

Direct Mounting. Bezel: Stainless Steel. Connection Sizes: ¼" BSP for 2½" models, ⅜" BSP for 4" models. Weatherproof construction. Dual Scale Reading. 2½" dia are glycerine filled, 4" dia are silicone oil filled.

Pressure Range Bar	Pressure Range lbf/in²	2½" (63mm) Dial BSS Code	4" (100mm) Dial BSS Code
0-4	60	80046110	80046206
0-7	100	80046121	80046198
0-10	140	80046132	80046217
0-14	200	80046143	–
0-16	230	–	80046228
0-21	300	–	80046239

Vacuum Gauges / Compound Gauges
FIG 412 DM, 411 DM, 420 DM & 421 DM

Gauges on this page comply with BS EN 837-1 and -3

FIG 412 DM Vacuum Gauge – Black Steel Case

Direct Mounting. Bezel: Chrome Plated. Connection Size: ⅜" BSP.
Dual Scale Reading.

FIG 411 DM Vacuum Gauge– Brass Case

Direct Mounting. Bezel: Brass.
Connection Size: ¼" BSP for 3" models and ¾" BSP for 4" and 6" models.
Dual Scale Reading.

			3" (80mm) Dial	4" (100mm) Dial	6" (150mm) Dial
Model	Range In Hg	Bar	BSS Code	BSS Code	BSS Code
FIG 412 DM	0-30	0 to -1	–	80013023	–
FIG 411 DM	0-30	0 to -1	80012918	80012929	80012940

FIG 412 DM

FIG 420 DM Compound Gauge – Brass Case

Direct Mounting. Bezel: Brass.
Connection Size: ¼" BSP for 3" models and ⅜" BSP for 4" and 6" models.
Dual Scale Reading.

FIG 421 DM Compound Gauge – Black Steel Case

Direct Mounting Bezel: Chrome Plated. Connection Size: ⅜" BSP.
Dual Scale Reading.

			3" (80mm) Dial	4" (100mm) Dial	6" (150mm) Dial
Model	In Hg lbf/1n²	Bar	BSS Code	BSS Code	BSS Code
	-30 to 30	-1 to +2	80014206	80014217	80014335
FIG 420 DM	-30 to 60	-1 to +4	–	80014228	–
	-30 to 100	-1 to +7	–	80014239	–
FIG 421 DM	-30 to 30	-1 to +2	–	80014390	–

FIG 420/21 DM

Altitude Gauges
FIG 415 DM, 416 DM & 417 DM

Gauges on this page comply with BS EN 837-1 class 1

FIG 416 DM

FIG 416 DM – Black Steel Case

Direct Mounting. Bezel: Chrome Plated. Connection Size: ⅜" BSP
Dual Scale Reading.

FIG 416 DM – Black Steel Case

Direct Mounting. Bezel: Brass. Connection Size: ⅜" BSP
Dual Scale Reading.

Description	Range Feet	Range Metres	4" (100mm) Dial BSS Code	6" (150mm) Dial BSS Code
FIG 416 DM Black Steel Case	0 to 30	0-10	80013366	80013503
	0 to 50	0-16	80013377	80013514
	0 to 80	0-25	80013388	80013525
	0 to 130	0-40	80013399	80013536
	0 to 200	0-60	80013407	80013547
FIG 415 DM Brass Case	0 to 30	0-10	80013204	80013300
	0 to 50	0-16	80013226	80013311
	0 to 80	0-25	80013248	80013322
	0 to 130	0-40	80013270	80013333
	0 to 200	0-60	80013281	80013344

Description	Range Bar	Range Metres	4" (100mm) Dial BSS Code	6" (150mm) Dial BSS Code
FIG 416 DM Black Steel Case	0-1	0-10	80013879	80013942
	0-1.6	0-16	80013890	80013953
	0-25	0-25	80013909	80013964
	0-4	0-40	80013920	80013975
	0-6	0-60	80013931	80013986
FIG 417 DM Brass Case	0-1	0-10	80013997	80014110
	0-1.6	0-16	80014003	80014121
	0-25	0-25	80014025	80014132
	0-4	0-40	80014047	80014165
	0-6	0-60	80014069	80014176

Pressure Gauges

Filterstar Differential Pressure Gauges / Ancillary Equipment For Gauges

Filterstar Differential Pressure Gauges - Black Steel Case.
Surface mounting (option to flush mounting with rear connections).
Bezel: Stainless Steel.
Connections: twin push on connections for 6mm ID hose at the side.
Suitable for air or other non-corrosive gases at pressures not exceeding 1 bar.

Range			4" (100mm) Dial
w.g.	mmH20	Pa	BSS Code
0-2	50	–	80083010
0-4	100	–	80083021
0-6	150	–	80083032
0-8	200		80083043
0-10	250	0-250	80083054
–	–	0-500	80083076
–	–	0-750	80083087

Flanged Backplates
Two self-tapping screws are fitted on the back of certain models of the 3", 4", and 6" (80mm, 100mm and 150mm) gauges offered.

For direct mounting applications these screws should remain untouched but for the surface mounting installations the screws must be removed and a flanged backplate should be fixed to the back of the gauge with these two screws. Backplates are available in steel or brass to match the gauge cases.

For use with Class 1 gauges only

	3" (80mm) Dial	4" (100mm) Dial	6" (150mm) Dial
Description	BSS Code	BSS Code	BSS Code
Flanged Backplate – Steel	–	80014505	80014516
Flanged Backplate – Brass	80014601	80014612	80014623

Pressure Gauges
Gauge Cocks
FIG 393S, 394S, 396S & 395S

FIG 393S

Three-way gauge cock to allow inspectors gauge cock to be fitted when checking existing gauge. ⅜" BSP Female connection. Working pressure 150lbf/in.sq. water.

FIG 394S

Brass gauge cock with polypropylene handle. ¼", ⅜" and ½" BSP female connection. Working pressure 150lbf/in.sq. water.

FIG 396S

Brass gauge cock with polypropylene handle. Union and tail pipe screwed ⅛", ¼", ⅜" and ½" BSP connections. Working pressure 150lbf/in.sq. water.

FIG 395S

Brass gauge cock with brass handle. ¼", ⅜", and ⅛" BSP female connections. Working pressure 150lbf/in.sq. water.

	¼" (8mm) Dial	⅜" (10mm) Dial	½" (15mm) Dial
Description	BSS Code	BSS Code	BSS Code
FIG 393S Gauge Cock	–	22030317	–
FIG 394S Gauge Cock (Brass)	22030402	22030413	22030424
FIG 395S Gauge Cock (Chrome Plated)	–	22030457	–
FIG 395S Gauge Cock	–	22030520	–
FIG 396S Gauge Cock	–	22030616	–

	¼" (8mm) Dial	⅜" (10mm) Dial	½" (15mm) Dial
Description	BSS Code	BSS Code	BSS Code
Brass High Pressure Gauge Valves M/F	80080805	80080816	80080827
Stainless Steel Gauge Valve M/F	–	–	80110305

Note: Gauges and gauge cocks used on steam applications should be protected from live steam by a syphon, filled with water, before the gauge and gauge cock are put into service. Please ensure that working pressures of cocks, syphons etc. are suitable for installation requirements.

Pressure Gauges - Ancillary Equipment For Gauges
"U" Pattern Syphons / "Ring" Pattern Syphons / Snubbers
FIG 398S, 401S, 399S, 400S, 403S, 402S & 432S

"U" Pattern Syphons
FIG 398S – Polished Brass

Max. Working Pressure: 100lbf/in. sq. Sizes: ¼" BSP, ⅜" BSP and ½" BSP.

FIG 401S – Mild Steel

BMax. Working Pressure: Water: 42 bar. Steam: 21 bar – 260ºC.
Sizes: ¼" BSP, ⅜" BSP and ½" BSP.

FIG 399S – Stainless Steel 316L

Max. Working Pressure: Water: 42 bar. Steam: 21 bar – 260ºC. Size: ½" BSP.

"Ring" Pattern Syphons
FIG 400S – Polished Brass

Max. Working Pressure: 100lbf/in. sq. Sizes: ¼" BSP, ⅜" BSP and ½" BSP.

FIG 403S – Mild Steel

Max. Working Pressure: Water: 42 bar. Steam: 21 bar – 260ºC.
Sizes: ¼" BSP, ⅜" BSP and ½" BSP.

FIG 402S – Stainless Steel

Max. Working Pressure: Water: 42 bar. Steam: 21 bar – 260ºC. Size: ½" BSP.

Snubbers
FIG 432S – Brass (also available in stainless steel)

Adjustable snubbers to eliminate surge and pressure pulsation to pressure gauges.
¼" maximum working pressure 125 bar @ 120ºC.
⅜" and ½" maximum working pressure 250 bar @ 120º C.

	¼" (8mm) Dial	⅜" (10mm) Dial	½" (15mm) Dial
Description	BSS Code	BSS Code	BSS Code
FIG 398S "U" Syphon – Brass	–	80018214	–
FIG 400S "Ring" Syphon – Brass	–	80018321	–
FIG 401S "U" Syphon – Mild Steel	80018406	80018417	80018428
FIG 403S "Ring" Syphon – Mild Steel	80018450	80018461	80018472
FIG 399S "U" Syphon – Stainless Steel	–	–	80120001
FIG 402S "Ring" Syphon – Stainless Steel	–	–	80120130
FIG 432S Snubbers	80017308	80017319	80017330

Introduction

These notes have been prepared to assist in the selection and installation of Thermometers for the purpose of ensuring, as far as possible they give a satisfactory service on the application for which they were intended and to ensure the highest possible level of safety.

For further information, reference should be made to relevant British Standards on which these notes are largely based. All dial instruments included within this catalogue are available with contractors motifs printed onto the dials.

Location of Bulb

The bulb of the instrument at the base of the stem, should be located where it is subject to the true temperature of the heated medium. Temperature gradients within the medium must be allowed for, and with instruments allowing variable depth of immersion (compression gland type) the bulb position should be varied experimentally until the optimum position is found. The full length of the sensitive portion of the bulb must at all times be immersed in the medium but direct contact with the source of heat to the medium should be avoided.

When securing the bulb on its location by means of the gland screw(s) care must be taken not to twist or distort the neck of the bulb. Where a pocket has been supplied this should be securely installed before the bulb is inserted. It may be found that the rate of the response of a pocketed bulb is improved by filling the intervening space with oil or copper (depending on the materials and operating temperatures).

Location Tubing

The tube between the bulb and the instrument should be routed so that it is not subjected to large temperature changes, and should be supported in cleats. Bends should not be less than 1inch radius and under no circumstances must the tubing be cut. Where the tubing is likely to be exposed to corrosive atmosphere the exterior should be treated with an anti-corrosive paint and, in any case, should be inspected periodically for any signs of damage.

The capillary tubing between the bulb and the indicator is coiled for despatch purposes. This tubing must be uncoiled carefully in order to avoid twisting or kinking which would affect the accuracy of the system.

Maintenance

Where there is a risk of corrosion, the bulb should be inspected periodically. If corrosion is evident it should be removed if possible by non-abrasive treatment. Any contamination on the bulb should be removed. Where a pocket is fitted this should be removed and inspected and treated similarly. If severe corrosion is evident the pocket should be replaced. It is advisable to inspect the capillary tubing periodically for corrosion or mechanical damage. An occasional temperature check should be carried out.

Maximum Working Temperature

The working temperature should not exceed 60% of the full scale reading.

Certification

Test Certificates and Calibration Certificates are available for all 80, 100 and 150mm dia pressure gauges shown in this price list. They are also available for vapour pressure and mercury-in-steel thermometers – Price on application.

Test and Calibration Certificates show the instrument serial number which is also printed on the dial and for this reason it is necessary to order these prior to manufacture.

As an alternative to test certificates all BSS branches are able to provide Quality Statements that conform to all the test details shown on a test certificate but do not bear serial numbers.

Calibration certificates are more detailed and are more generally supplied with instruments used specifically for test purposes.

Thermometers

Vapour Pressure Thermometers
FIG 438S, 439S, 440S, 448S, 449S & 450S

FIG 438S – Black Steel Case – Straight Stem

Dual Size: 4" and 6" (100mm and 150mm). Bezel: Chrome plated.
Connection Size: ½" BSP. Dual Scale Reading. Complete with pocket.
100mm Immersion length.

FIG 439S – Black Steel Case – Angle Stem

Dual Size: 4" and 6" (100mm and 150mm). Bezel: Chrome plated.
Connection Size: ½" BSP. Dual Scale Reading. Complete with pocket.
100mm Immersion length.

FIG 440S – Black Steel Case – Surface Mounting

Dual Size: 4" and 6" (100mm and 150mm). Bezel: Chrome plated.
Connection Size: ½" BSP. Dual Scale Reading. Complete with 2m Capillary.
100mm Immersion length.

FIG 448S – Brass Case – Straight Stem

Dual Size: 4" and 6" (100mm and 150mm). Bezel: Chrome plated.
Connection Size: ½" BSP. Dual Scale Reading. Complete with pocket.
100mm Immersion length

FIG 449S – Brass Case – Angle Stem

Dual Size: 4" and 6" (100mm and 150mm). Bezel: Chrome plated.
Connection Size: ½" BSP. Dual Scale Reading. Complete with pocket.
100mm Immersion length.

FIG 450S – Brass Case – Surface Mounting

Dual Size: 4" and 6" (100mm and 150mm). Bezel: Chrome plated.
Connection Size: ½" BSP. Dual Scale Reading. Complete with 2m Capillary.
100mm Immersion length.

			4" (100mm) Dial	6" (150mm) Dial
Description	Temp. Tange °F	°C	BSS Code	BSS Code
FIG 438S Straight Stem	60-250	20-120	80014708	80014719
FIG 438S Straight Stem	0-100	-20 to +40	80014763	–
FIG 439S Angle Stem	60-250	20-120	80015005	80015016
FIG 439S Bottom Back Entry	0-100	-20 to +40	80014774	–
FIG 440S Surface Mounting	60-250	20-120	80015071	–
FIG 448S Straight Stem	60-250	20-120	80014634	80014645
FIG 449S Angle Stem	60-250	20-120	80014656	80014667
FIG 450S Surface Mounting	60-250	20-120	80014678	80014689

Thermometers - Altitherm Combined Altitude and Thermometer / Bi-Metal Thermometers – Dial Thermometers FIG EG100, 428S & 429S

Altitherm Combined Altitude and Thermometer FIG EG100 – Black Steel Case

Dial Size: 3" (80mm).
Bezel: Chrome.
Connection Size: ½" BSP.
Dual Scale Reading.

Description	°F	°C	Feet	Metres	BSS Code
FIG EG100	32-250	0-120	0-80	0-25	80015101
Altitherm	32-250	0-120	0-130	0-40	80015112

Bi-Metal Thermometers – Dial Thermometers- FIG 428S AND FIG 429S – Black Steel Case

Dual Size: 4" and 6" (100mm and 150mm).
Bezel: Chrome plated.
Connection Size: ½" BSP.
Immersion Length: 63mm or 100mm.
Complete with pocket. Dual Scale Reading.
Accurate to +/-1% FSD.

		4" (100mm) Dial		6" (150mm) Dial	
Temp. Range		Immersion Length		Immersion Length	
		63mm	100mm	63mm	100mm
°F	°C	BSS Code	BSS Code	BSS Code	BSS Code
FIG 428S Vertical Immersion Type					
-20 to +120	-30 to +50	80015400	80015529	80015710	80015776
30 - 250	0-120	80015411	80015540	80015721	80015787
40 - 480	0-250	80015422	80015551	80015732	80015798
FIG 429S Centre Back Immersion Type					
-20 to +120	-30 to +50	80015444	80015562	80015743	80015806
30 - 250	0-120	80015455	80015573	80015754	80015817
40 - 480	0-250	80015466	80015584	80015765	80015828

Thermometers

Thermometer Pockets / Bi-Metal Thermometers FIG 465S, 461S, 463S, & 464S

Thermometer Pockets
FIG 465S

Pocket, 100mm long in steel, brass or stainless steel suitable for vapour pressure and mercury-in-steel thermometers. Also available 63mm long.

	½" BSP	½" BSP (63mm Long)	¾" BSP
Description	BSS Code	BSS Code	BSS Code
Brass Pocket	80017020	80017009	80017031
Steel Pocket	80017042	–	–
Stainless Steel Pocket	80017064	–	–

Bi-Metal Thermometers
FIG 461S Black Steel Case

Surface Contact Type
Dial Size: 2½" (63mm).
Bezel: Chrome plated.
Dual Scale Reading.

Attaches to pipe by a spring band
* These thermometers show only the surface temperature of the pipe and are not recommended where a good degree of accuracy is required.

FIG 463S Black Steel Case

Centre Back Immersion Type
Dial Size: 2½" (63mm).
Bezel: Chrome plated.
Connection Size: ½" BSP.
Dual Scale Reading.
Stem Immersion Length: 45mm.
Complete with pocket.

FIG 464S Black Steel Case

Vertical Immersion Type
Dial Size: 2½" (63mm).
Bezel: Chrome plated.
Connection Size: ½" BSP.
Dual Scale Reading.
Stem Immersion Length: 45mm.
Complete with pocket.

Description	Temp. Range °F	Temp. Range °C	BSS Code
FIG 461S Surface Contact Thermometer – Spring Fixing	30-250	0-120	80016605
FIG 463S Centre Back Immersion Thermometer	30-250-20 to +120	0-120-30 to +50	80016701 80016712
FIG 464S Vertical Immersion Thermometer	30-250-20 to +120	0-120-30 to +50	80016819 80016830

Ancillary Equipment for Thermometers
Pressure Test Points

MECHSEAL MKII TEST POINT

BOSS™ pressure / temp test plugs in 316 s/steel available on request within 7-10 days in ¼" and ½" standard or ¼" and ½" extended type supplied E.P.D.M. as standard.
Viton – price on application.

Description	BSS Code
Mechseal Pressure Gauge Adaptor	25028124
Mechseal Manometer Adaptor	25028113
Mechseal Pressure Test Point	25028102
Mechseal MkII Test Point	25028135

For Test Plugs see section 9.

Technical Information
Useful Conversions

Imperial to Metric

Length
ft x 0.305 = m
in x 25.4 = mm
Volume
ft^3 x 0.028 = m^3
UK Gal x 4.546 = litres
Weight
lb x 0.45 = kg
Pressure
psi x 0.069 = Bar
psi x 6.89 = kPa 9kN/m^2)
Bar x 100 = kPa (kN/m^2)
ft.hd. x 2.98 = kPa (kN/m^2)
in.w.g. x 0.249 = kPa (kN/m^2)
Heat and Energy
BTU/hr x 0.00029 = kW
BTU/hr x 0.252 = kCal/hr
BTU/hr/ft^2°F x 5.68 = w/m^2°C
H.P. x 746 = W
BTU/lb x 2.326 = kJ/kg
Temperature
(°F – 32) x 0.555 = °C
Velocity/Flow Rate
GMP x 0.076 = l/s
lbs/hr x 0.000126 = kg/s
ft^3/min x 0.000472 = m^3/s
ft^2/min x 1.7 = m^3/hr
ft/min x 0.0051 = m/s
ft/s x 0.305 = m/s

Metric to Imperial

Length
m x 3.28 = ft
mm x 0.039 = in
Volume
m^3 x 35.31 = ft^3
litres x 0.22 = UK Gall
Weight
kg x 2.2 = lb
Pressure
Bar x 14.5 = psi
kPa (kN/m^2) x 0.145 = psi
kPa (kN/m^2) x 0.01 = Bar
kPa (kN/m^2) x 0.33 = ft.hd.
kPa (kN/m^2) x 4 = In.w.g.
Heat and Energy
kW x 3412 = BTU/hr
kCal/hr x 3.97 = BTU/hr
w/m^2°C x 0.176 = BTU/hr/ft^2°F
W x 0.0013 = H.P.
kJ/kg x 0.43 = BTU/lb
Temperature
(°C x 1.8) + 32 = °F
Velocity/Flow Rate
l/s x 13.2 = GPM
kg/s x 7937 = lbs/hr
m^3/s x 2119 = ft^3/min
m^3/hr x 0.588 = ft^3/min
m/s x 197 = ft/min
m/s x 3.28 = ft/s

Decimal Multiples and Sub-Multiples

Although the SI units are preferred it will not be practical for everyday use to limit usage to these and therefore their decimal multiples and sub-multiples will also be used.
These are formed by using the following prefixes:

Factor by which the unit is multiplied	Prefix	Symbol
10^{12}	ter	T
10^{9}	giga	G
10^{6}	mega	M
10^{3}	kilo	k
10^{2}	hecto	h
10	deca	da
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	µ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a

Conversions to SI Units

Standard Gas Conditions and Modular Volumes		
Normal (eg nft^3) – European and scientific work	= 0°C and 1.0133 bar	Molar Volume 22.412 m^3/kg mol
Standard (eg std ft^3) – British Gas Industry	= 15.55°C and 1.016 bar	Molar Volume 24.112 m^3/kg mol
Standard (scf) – USA	= 15.55°C and 1.0133 bar	Molar Volume 23.681 m^3/kg mol

Pressure and Liquid Head

① Bar	Kilogram Force per square centimetre ② kgf/cm^2	Pound Force per square inch ③ lbf/in^2	④ atm	Foot of water ⑤ ft H_2O	Inch of water in H_2O	Metre of water m H_2O	Centimetre of mercury cm Hg	Inch of mercury in Hg	Millimetre of mercury ⑥ mm Hg
1	1.0197	14.5038	0.9869	33.4553	401.463	10.1972	75.0062	29.530	750.062
0.9807	1	14.2233	0.9878	32.8084	393.701	10	73.556	28.959	735.559
0.0689	0.0703	1	0.0609	2.3067	27.68	0.7031	5.1715	2.036	51.715
1.0133	1.0332	14.6959	1	33.889	406.782	10.3323	76.0	29.9213	760
0.0299	0.0305	0.4335	0.0295	1	12	0.3048	2.242	0.8827	22.4198
0.0025	0.0025	0.0361	0.0025	0.0833	1	0.0254	0.1868	0.0734	1.8683
0.0981	0.10000	1.422	0.0968	3.2808	39.3701	1	7.3556	2.896	73.356
0.0133	0.0136	0.1934	0.0132	0.4461	5.3524	0.136	1	0.3937	10
0.0339	0.0345	0.4911	0.0334	1.133	13.5951	0.3453	2.54	1	25.4
0.0013	0.0014	0.0193	0.0013	0.446	0.5352	0.0136	0.1	0.0394	1

① 1 bar = 10^5N/m^2
② Often denoted non-technically as psi
③ At density 1g/cm^3
④ Technical (metric) atmosphere (at)
⑤ International standard atmosphere
⑥ Also known as torr

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Conversions to SI Units

Pressure Standards		
International standard atmosphere	(1 atm)	= 1.0133 bar = 1.0332 kgf/cm² = 14.6959 lbf/in²
Metric atmosphere	(1 at)	= 0.9807 bar = 1 kgf/cm² = 14.2233 lbf/in²
	ata	= at absolutew
	atu	= at gauge
Standard conditions – s.t.p. or NTP		= 1.0133 bar 0°C = 14.6959 lbf/in² at 0°C

Density

Gram per millilitre g/ml	Kilogram per cubic metre kg/m³	Pound per cubic foot lb/ft³	Pound per cubic inch lb/in³
1	1000	62.428	0.0361
0.001	1	0.0624	0.000036
0.016	16.02	1	0.00058
27.6807	27679.9	1728	1

Heat Flow Rate

Watts W	Calorie per second cal/s	Kilocalorie per hour Kcal/h	British Thermal unit per hour Btu/h
1	0.2388	0.8598	3.4121
4.1868	1	3.6	14.286
1.163	0.2778	1	3.9683
0.231	0.07	0.252	1

Force

Kilonewton kN	Kilogram force kgf	Pound force kgf	Poundal pdl
1	101.972	224.809	7233.01
0.00981	1	2.2046	70.9316
0.0044	0.4536	1	32.1740
0.000138	0.0141	0.0311	1

Power

Watt W	Kilogram force metre per second kgf m/s	Metric horse power	Foot pound force per second Ft lbf/s	Horse power hp
1	0.102	0.00136	0.7376	0.00134
9.8067	1	0.01333	7.2330	0.01315
735.499	75	1	542.476	0.98632
1.3558	0.1383	0.00184	1	0.00182
745.70	76.0402	0.0139	550.0	1

Mass/Volumetric Rate of Flow Formulae

Gases

$ft^3/h\ (std) = \frac{lb/h \times 379}{M}$	$m^3/h\ (norm) = \frac{kg/h \times 22.40}{M}$
$ft^3/h\ (std) = \frac{lb/h}{p1}$	$m^3/h\ (norm) = \frac{kg/h}{p2}$
$ft^3/h\ (std) = \frac{lb/h \times 13.1}{G1}$	$m^3/h\ (norm) = \frac{kg/h \times 0.82}{G2}$

Liquids

$US\ gal/min = \frac{lb/h}{50 \times SG}$	$m^3/h = \frac{.001\ kg/h}{SG2}$

Torque

Newton metre Nm	Kilogram force metre kgf m	Pound force metre kgf m	Pound force inch lbf in
1	0.102	.7376	8.8508
9.8067	1	7.2330	86.7962
1.3558	0.1383	1	12
0.113	0.0115	0.0833	1

Where: (std) is at 14.7 lbf/in² (abs) and 60°F
(norm) is at 760 mm Hg and 0°C
SG 1 Water = 1 at 60°F

SG2 Water = 1 at 4°C
M = Molecular Weight
p1 = Density lb/ft³ (std)

p2 = Density kg/cm³ (norm)
G1 = sp.gr. Air = 1 (std)
G2 = sp.gr. Air = 1 (norm)

Technical Information
Useful Conversions

Conversions to SI Units

Specific Gravity and Molecular Weight of Gases			
	Symbol	Specific Gravity	Molecular weights
Air		1.000	28.97
Ammonia	NH3	0.5963	17.03
Carbon Dioxide	CO2	1.5290	44.00
Carbon Monoxide	CO	0.9670	28.00
Chlorine	Cl2	2.486	70.91
Ethylene	C2H4	0.9749	28.03
Helium	He	0.1380	4.00
Hydrogen	H2	0.0695	2.016
Hydrogen Sulphide	H2S	1.1900	34.08
Methane	CH4	0.5544	16.03
Methyl Chloride	CH3Cl	1.7848	50.48
Nitrogen	N2	0.9672	28.02
Nitrous Oxide	N2O	1.530	44.02
Oxygen	O2	1.105	32.00
Sulphur Dioxide	SO2	2.264	64.06
Natural Gas (typical)		0.60	

Specific Gravity of Liquids	
Water	1.0
Sea water	1.025
Kerosene	0.80
Sulphuric Acid 100%	1.83
Hydrochloric Acid 45%	1.48
Sodium Hydroxide 25%	1.27
Carbon Tetrachloride	1.60
Petrol (Gasoline)	0.65-0.80
Benzene	0.88
Turpentine	1.1-1.2

Conversion Table for Specific Enthalpy						
	kJ/kg = J/g	kJ/kg = cal/g	Btu/lb	kgf m/kg	ft lbf/lb	kWh/kg = Wh/g
1 kJ/kg	*1	0.238 846	0.429 923	101.972	334.553	2.777 78 x 10 - 4
1 kcal/kg	*4.186 8	*1	*1.8	426.935	1400.70	*1.163 x 10 - 3
1 Btu/lb	*2.326	0.555 556	*1	237.186	778.169	6.461 11 x 10 - 4
1 kgf m/kg	*9.806 65 x 10 - 3	2.342 28 x 10 - 3	4.216 10 x 10 - 3	*1	3.280 84	2.724 07 x 10 - 6
1 ft lbf/lb	2.989 07 x 10 - 3	7.139 26 x 10 - 4	1.285 07 x 10 - 3	*0.304 8	*1	0.830 296 x 10 - 6
1 kWh/kg	*3600	859.845	1547.72	3.670 98 x 105	1.204 39 x 106	*1

*Factors are exact

Combined Imperial and SI Steam Tables

Gauge Pressure		Absolute Pressure		Saturation Temperature ts		Specific Enthalpy				Specific Volume Steam vg	
bar g	lbf/in²g	bar a	lb/in²a	°C	°F	Water Sensible heat (hf) kJ/kg	Evaporation Latent heat (hfg) kJ/kg	Water Sensible heat (hf) Btu/lb	Evaporation Latent heat (hfg) Btu/lb	m³/kg	ft³/lb
-0.96	28.4	0.05	0.725	32.9	91	138	2423	59	1042	28.2	452
-0.91	27.0	0.1	1.45	45.8	114	192	2392	82	1029	14.7	236
-0.86	25.5	0.15	2.18	54.0	129	226	2373	97	1020	10.0	160
-0.81	24.0	0.2	2.90	60.1	140	251	2358	108	1014	7.65	123
-0.76	22.5	0.25	3.63	65.0	149	272	2346	117	1009	6.20	99.3
-0.71	21.1	0.3	4.35	69.1	156	289	2336	124	1004	5.23	83.8
-0.66	19.6	0.35	5.08	72.7	163	304	2327	131	1000	4.53	72.6
-0.61	18.1	0.4	5.80	75.9	169	318	2319	137	997	3.99	63.9
-0.56	16.6	0.45	6.53	78.7	174	330	2312	142	994	3.58	57.3
-0.51	15.1	0.5	7.25	81.3	178	341	2305	147	991	3.24	51.9
-0.46	13.7	0.55	7.98	83.7	183	351	2299	151	988	2.96	47.4
-0.41	12.2	0.6	8.70	85.9	187	360	2294	155	986	2.73	43.7
-0.36	10.7	0.65	9.43	88.0	190	369	2288	159	984	2.54	40.7
-0.31	9.24	0.7	10.2	90.0	194	377	2283	162	982	2.37	38.0
-0.26	7.77	0.75	10.9	91.8	197	384	2279	165	980	2.22	35.6
-0.21	6.29	0.8	11.6	93.5	200	392	2274	169	978	2.09	33.5
-0.16	4.81	0.85	12.3	95.1	203	399	2270	172	976	1.97	31.6
-0.11	3.34	0.9	13.1	96.7	206	405	2266	174	974	1.87	30.1
-0.06	1.86	0.95	13.8	98.2	209	411	2262	177	972	1.78	28.5
-0.01	0.38	1.0	14.5	99.6	211	418	2258	179	971	1.69	27.1

Continued >>

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Combined Imperial and SI Steam Tables (Continued)

Gauge Pressure		Absolute Pressure		Saturation Temperature ts		Specific Enthalpy				Specific Volume Steam vg	
bar g	lbf/in²g	bar a	lb/in²a	°C	°F	Water Sensible heat (hf) kJ/kg	Evaporation Latent heat (hfg) kJ/kg	Water Sensible heat (hf) Btu/lb	Evaporation Latent heat (hfg) Btu/lb	m³/kg	ft³/lb
0	0	1.013	14.696	100	212	419	2257	180	970	1.67	26.8
.1	1.45	1.11	16.1	103	217	430	2250	185	967	1.53	24.5
.2	2.90	1.21	17.5	105	221	441	2243	190	964	1.41	22.6
.3	4.35	1.31	19.0	107	225	450	2237	194	962	1.31	21.0
.4	5.80	1.41	20.5	110	230	460	2231	198	959	1.23	19.7
.5	7.25	1.51	21.9	112	234	468	2226	201	957	1.15	18.4
.6	8.70	1.61	23.4	114	237	476	2220	205	954	1.08	17.3
.7	10.2	1.71	24.8	115	239	484	2215	208	952	1.02	16.3
.8	11.6	1.81	26.3	117	243	492	2211	212	951	0.971	15.6
.9	13.1	1.91	27.7	119	246	499	2206	215	948	0.923	14.8
1.0	14.5	2.01	29.2	120	248	506	2201	218	946	0.881	14.1
1.1	16.0	2.11	30.6	122	252	512	2197	220	945	0.841	13.5
1.2	17.4	2.21	32.1	123	253	519	2193	223	943	0.806	12.9
1.3	18.9	2.31	33.5	125	257	525	2189	226	941	0.773	12.4
1.4	20.3	2.41	35.0	126	259	531	2185	228	939	0.743	11.9
1.5	21.8	2.51	36.4	128	262	536	2181	230	938	0.714	11.4
1.6	23.2	2.61	37.9	129	264	542	2177	233	936	0.689	11.0
1.7	24.7	2.71	39.3	130	266	547	2174	235	935	0.665	10.7
1.8	26.1	2.81	40.8	131	268	552	2170	237	933	0.643	10.3
1.9	27.6	2.91	42.2	133	271	557	2167	240	932	0.622	9.96
2.0	29.0	3.01	43.7	134	273	562	2163	242	930	0.603	9.66
2.2	31.9	3.21	46.6	136	277	572	2157	246	927	0.568	9.10
2.4	34.8	3.41	49.5	138	280	581	2151	250	925	0.536	8.59
2.6	37.7	3.61	52.4	140	284	589	2145	253	922	0.509	8.15
2.8	40.6	3.81	55.3	142	288	597	2139	257	920	0.483	7.74
3.0	43.5	4.01	58.2	144	289	605	2133	260	917	0.461	7.38
3.2	46.4	4.21	61.1	146	293	613	2128	264	915	0.440	7.05
3.4	49.3	4.41	64.0	147	297	620	2123	267	913	0.422	6.76
3.6	52.2	4.61	66.9	149	298	627	2118	270	911	0.405	6.49
3.8	55.1	4.81	69.8	150	302	634	2113	273	908	0.389	6.23
4.0	58.0	5.01	72.7	152	304	641	2108	276	906	0.374	5.99
4.2	60.9	5.21	75.6	153	307	647	2104	278	905	0.361	5.78
4.4	63.8	5.41	78.5	155	309	653	2099	281	902	0.348	5.57
4.6	66.7	5.61	81.4	156	313	659	2095	283	901	0.336	5.38
4.8	69.6	5.81	84.3	158	315	665	2090	286	899	0.325	5.21
5.0	72.5	6.01	87.2	159	316	671	2086	289	897	0.315	5.01
5.5	79.8	6.51	94.4	162	324	685	2076	295	893	0.292	4.68
6.0	87.0	7.01	102	165	329	698	2066	300	888	0.272	4.36
6.5	94.3	7.51	109	168	333	710	2057	305	884	0.255	4.09
7.0	102	8.01	116	171	338	721	2048	310	880	0.240	3.84
7.5	109	8.51	123	173	343	733	2039	315	877	0.227	3.64
8.0	116	9.01	131	175	347	743	2031	319	873	0.215	3.44
8.5	123	9.51	138	178	351	753	2023	324	870	0.204	3.27
9.0	131	10.0	145	180	354	763	2015	328	866	0.194	3.11
9.5	138	10.5	152	182	360	773	2008	332	863	0.185	2.96
10.0	145	11.0	160	184	363	782	2000	336	860	0.177	2.84
10.5	152	11.5	167	186	367	790	1993	340	857	0.171	2.74
11.0	160	12.0	174	188	370	798	1986	344	854	0.163	2.61
11.5	167	12.5	181	190	374	807	1979	347	851	0.157	2.51
12.0	174	13.0	189	192	376	815	1973	350	848	0.151	2.42
12.5	181	13.5	196	193	379	823	1966	354	845	0.146	2.34
13.0	189	14.0	203	195	383	830	1960	357	843	0.141	2.26
13.5	196	14.5	210	197	385	838	1953	360	840	0.136	2.18
14.0	203	15.0	218	198	388	845	1947	363	837	0.132	2.11
14.5	210	15.5	225	200	392	852	1941	366	834	0.128	2.05
15.0	218	16.0	232	202	394	859	1935	369	832	0.124	1.99

Technical Information
Materials Selection Chart

Section	Material	Typical Applications	Size Range	Pressure Rating	Temperature Rating	Jointing Technique	Key Product Features
Industrial	PVC-U	Acids and Alkalis; Effluents; Potable Water; Chemical Processing	12 to 315mm (Metric) ⅜" to 12" (Imperial)	Metric: PN16 20 to 63mm pipe; PN16 12 to 160mm; PN10 20 to 315mm; Imperial: ½" to 6" pipe Class E; ⅜" to 12" fittings Class E	5ºC to 60ºC	Solvent weld	Lightweight; Easy to install; Corrosion resistant
	ABS	Chilled Water; Air Conditioning; Boosted Cold Water; Vacuum Systems; Waste Water; De-Mineralised Water	16 to 315mm (Metric) ⅜" to 12" (Imperial)	Metric: PN10 16 to 250mm; PN8 315mm Imperial: Up to 4" Class E; Up to 8" Class C; 10" and 12" Class B	-40ºC to 70ºC	Two step solvent weld	Lightweight; Easy to install; Wide temperature range; Tough and durable; Corrosion resistant
	PVC-C	Acids and Alkalis; Demineralised Water; Industrial Waste Treatments; Chemical Processing; Soaps Paper & Pulps; Effluents	16 to 160mm	PN16 16mm to 110mm PN10 160mm	5ºC to 95ºC	Solvent weld	Excellent chemical resistance; Lightweight; Wide temperature range; Easy to install; High temperature acids and alkalis
	Polypropylene	Acids and Alkalis; Chemical Processing; Industrial Waste Treatments; Pharmaceuticals; Effluents	20 to 100mm ½" to 4"	Metric: PN10; Imperial: ⅜" to ¾" Class E; 1" to 2" Class D; 3" to 4" Class C	0ºC to 100ºC	Fusion welded using socket butt	Lightweight; Excellent chemical resistance; Multiple jointing options
	PVDF	Pharmaceutical grade purified water (PW) and DI water, using hot water, steam chemical or ozone sanitisation. Chemical process industry microelectronics life science	16 to 315mm	16 to 225mm PN16. 90 to 315mm PN10	-20ºC to +140ºC	Fusion welded using socket &/or butt	Outstanding mechanical properties, even at high temperatures. Long service life, even under intensely corrosive conditions. Very pure material. Secure jointing. Smooth inner surface
Building Services	BOSS PVC-C	Domestic Hot & Cold Water	16 to 225mm	PN10 75 to 225mm; PN16 16 to 160mm	0ºC to 80ºC	Solvent Weld	Excellent chemical resistance; Lightweight; Wide temperature range; Easy to install; High temperature acids and alkalis
	Aquasystem	Hot and cold water supply, Heating systems, Chilled, Compressed air lines.	20 to 125mm		0ºC to 80ºC	Electrofusion, socket fusion	Lightweight; Limescale and corrosion free; Fully WRAS approved
	Friatherm	Hospitals; Schools; Commercial Buildings; Hotels; Sports Stadiums; Residential Buildings	16 to 160mm	PN25 Up to 63mm; PN16 75mm and 160mm	0ºC to 95ºC	One step solvent weld	Lightweight; Limescale and corrosion free; Minimum 50 years service life; No power or hot works required; Fully WRAS approved
	Geberit Mepla	Hot and cold water supply (mains and risers) Industrial applications Fire sprinkler systems Air supply	16 to 63mm	10 Bar operating pressure. 16 Bar test pressure	0ºC to 95ºC	Crimp compression	Lightweight High stability High temperature resistance Expansion resistance Hygienic Corrosion resistant
	Polypress	Potable water, Hot and cold plumbing and heating systems	16 to 63mm	10 bar	0ºC to 95ºC	Crimp compression	Lightweight Optimum Flow charictistics High temperature resistance Expansion resistance Corrosion resistant
	John Guest	Potable water, Hot and cold plumbing and heating systems	10 to 28mm	12 Bar	0ºC to 105ºC	Twist & lock fittings, Pushfit connection	Demountable, lightweight, flexible, corrosion free.

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Section	Material	Typical Applications	Size Range	Pressure Rating	Temperature Rating	Jointing Technique	Key Product Features
Drainage	Soil & Waste	Above and below ground: residential (Apartments), industrial, commercial drainage	32 to 160mm	N/A	N/A	Solvent weld range and ring seal push fit	Integrated soil, waste and trap system.
	HDPE - Geberit	Above and below ground: residential (Apartments), industrial, commercial drainage	32 to 315mm	N/A	N/A	Butt weld or Electro weld fittings	Lightweight, chemical, abrasion and impact resistant.
	HDPE - Terrain	Above and below ground: residential (Apartments), industrial, commercial drainage	40 to 315mm	N/A	N/A	Electrofusion, mechanical coupling and butt welding	Lightweight, chemical, abrasion and impact resistant.
	Acoustic Drainage - Geberit db20	Acoustic drainage requirements for Multiple dwellings, Libraries, Public buildings, Restaurants, Cinemas, Hospitals, Hotels and Offices	56 to 160mm	N/A	N/A	Butt weld or Electro weld fittings	Acoustic drainage
	Acoustic Drainage - Terrain db12	Acoustic drainage requirements for Multiple dwellings, Libraries, Public buildings, Restaurants, Cinemas, Hospitals, Hotels and Offices	40 to 160mm	N/A	N/A	Push Fit	Acoustic drainage
	Acoustic Drainage - Friaphon	Acoustic drainage requirements for Multiple dwellings, Libraries, Public buildings, Restaurants, Cinemas, Hospitals, Hotels and Offices	110to 160mm	N/A	N/A	Push Fit	Superb sound insulation; Lower cost alternative to cast iron; No lagging required; Lower cost alternative to lagged plastic; Push fit assembly; High impact and temperature resistant
	Vulcathene	Laboratories in: Schools; Universities and Colleges; Hospitals and Clinics; Pharmaceutical Companies; Research Organisations	38 to 152mm	N/A	-20°C to 100°C (only intermittent at 100°C)	Mechanical compression & endfusion techniques	Purpose designed for chemical drainage. Two easy jointing methods. Fully BBA approved
Utilities	Polyethylene	Gas and water utilities industrial water applications, cooling, irrigation, industrial effulents	20 to 1000mm	20 to 63mm 12.5 Bar 90 to 710mm 16 Bar 90 to 1000mm 10 Bar	0°C to 60°C	Butt fusion and Electro fusion fittings	Lightweight, chemical, abrasion and impact resistant.

When considering applications, pressure and temperature please refer to the manufacturers data for precise detail of operating details and product suitability as manufacturers material blends will differ and may affect the suitability.

Technical Information
Flanges

Nominal Size 25mm (1")

BS EN 1092	Diameter of flange	Bolt circle diameter	No of bolts	Diameter of bolts	Diameter of holes	Diameter of raised face[3] iron	Diameter of raised face[3] steel	Height of raised face[3] iron	Height of raised face[3] steel	Thickness of flange: Grey cast iron	Thickness of flange: Copper alloy	Thickness of flange: Cast & forged steel	Thickness of flange: Ductile cast iron
PN6	100	75	4	M10	11	58	60	3	2	14 [1]	-	14	-
PN10	115	85	4	M12	14	65	68	3	2	16 [1]	-	18	16
PN16	115	85	4	M12	14	65	68	3	2	16 [1]	8 [2]	18	16
PN25	115	85	4	M12	14	65	68	3	2	18 [1]	9 [2]	18	16
PN40	115	85	4	M12	14	65	68	3	2	-	11 [2]	18	18
PN64	140	100	4	M16	18	-	68	-	2	-	-	24	-
PN100	140	100	4	M16	18	-	68	-	2	-	-	24	-
ANSI													
Class125/150	4¼ (108)	318 (79)	4	½ (13)	⅝ (16)	-	2 (51)	-	1/16 (2)	7/16 (11)	⅜ (10)	7/16 (11)	9/16 (14)
Class 300	4⅞ (124)	3½ (89)	4	⅝ (16)	¾ (19)	-	2 (51)	-	1/16 (2)	-	19/20 (15)	1 1/16 (17)	-
Class 600	4⅞ (124)	3½ (89)	4	⅝ (16)	¾ (19)	-	2 (51)	-	¼ (6)	-	-	1 1/16 (17)	-
Class 900	5⅞ (149)	4 (102)	4	⅞ (22)	1 (25)	-	2 (51)	-	¼ (6)	-	-	1⅛ (29)	-
Class 1500	5⅞ (149)	4 (102)	4	⅞ (22)	1 (25)	-	2 (51)	-	¼ (6)	-	-	1⅛ (29)	-
BS 10													
Table A	4½ (114)	3¼ (83)	4	½ (13)	9/16 (14)	-	-	-	-	½ (13)	5/16 (8)	-	-
Table D	4½ (114)	3¼ (83)	4	½ (13)	9/16 (14)	-	-	-	-	½ (13)	5/16 (8)	⅜ (10)	-
Table E	4½ (114)	3¼ (83)	4	½ (13)	9/16 (14)	-	-	-	-	½ (13)	5/16 (8)	⅜ (10)	-
Table F	4¾ (121)	3 7/16 (87)	4	⅝ (16)	1 1/16 (17)	-	-	-	-	½ (13)	⅜ (10)	⅜ (10)	-
Table H	4¾ (121)	3 7/16 (87)	4	⅝ (16)	1 1/16 (17)	-	2½ (64)	-	1/16 (2)	¾ (19)	7/16 (11)	9/16 (14)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 450
[3] Copper alloy flanges are always flat-faced

Nominal Size 32mm (1¼")

BS EN 1092	Diameter of flange	Bolt circle diameter	No of bolts	Diameter of bolts	Diameter of holes iron	Diameter of holes steel	Diameter of raised face[3] iron	Diameter of raised face[3] steel	Height of raised face[3] iron	Height of raised face[3] steel	Thickness of flange: Grey cast iron	Thickness of flange: Copper alloy	Thickness of flange: Cast & forged steel	Thickness of flange: Ductile cast iron
PN6	120	90	4	M12	14	14	69	70	3	2	16 [1]	-	14	-
PN10	140	100	4	M16	19	18	76	78	3	2	18 [1]	-	18	18
PN16	140	100	4	M16	19	18	76	78	3	2	18 [1]	8 [2]	18	18
PN25	140	100	4	M16	19	18	76	78	3	2	20 [1]	9 [2]	18	18
PN40	140	100	4	M16	19	18	76	78	3	2	-	11 [2]	18	20
PN64	155	110	4	M20	-	22	-	78	-	2	-	-	26	-
PN100	155	110	4	M20	-	22	-	78	-	2	-	-	26	-
ANSI														
Class 125/150	4⅝ (117)	3½ (89)	4	½ (13)	⅝ (16)	⅝ (16)	-	2½ (64)	-	1/16 (2)	½ (13)	13/32 (10)	½ (13)	⅝ (16)
Class 300	5¼ (133)	3⅞ (98)	4	⅝ (16)	-	¾ (19)	-	2½ (64)	-	1/16 (2)	-	⅝ (16)	¾ (19)	-
Class 600	5¼ (133)	3⅞ (98)	4	⅝ (16)	-	¾ (19)	-	2½ (64)	-	¼ (6)	-	-	1 3/16 (21)	-
Class 900	6¼ (159)	4⅜ (111)	4	⅞ (22)	-	1 (25)	-	2½ (64)	-	¼ (6)	-	-	1⅛ (29)	-
Class 1500	6¼ (159)	4⅜ (111)	4	⅞ (22)	-	1 (25)	-	2½ (64)	-	¼ (6)	-	-	1⅛ (29)	-
BS 10														
Table A	4¾ (121)	3 7/16 (87)	4	½ (13)	9/16 (14)	9/16 (14)	-	-	-	-	⅝ (16)	5/16 (8)	-	-
Table D	4¾ (121)	3 7/16 (87)	4	½ (13)	9/16 (14)	9/16 (14)	-	-	-	-	⅝ (16)	5/16 (8)	½ (13)	-
Table E	4¾ (121)	3 7/16 (87)	4	½ (13)	9/16 (14)	9/16 (14)	-	-	-	-	⅝ (16)	5/16 (8)	½ (13)	-
Table F	5¼ (133)	3⅞ (98)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	⅝ (16)	⅜ (10)	½ (13)	-
Table H	5¼ (133)	3⅞ (98)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	3 (76)	-	1/16 (2)	⅞ (22)	7/16 (11)	1 1/16 (17)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 450
[3] Copper alloy flanges are always flat-faced

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Nominal Size 40mm (1½")

BS EN 1092	Diameter of flange	Bolt circle diameter	No of bolts	Diameter of bolts	Diameter of holes iron	Diameter of holes steel	Diameter of raised face[3] iron	Diameter of raised face[3] steel	Height of raised face[3] iron	Height of raised face[3] steel	Thickness of flange: Grey cast iron	Thickness of flange: Copper alloy	Thickness of flange: Cast & forged steel	Thickness of flange: Ductile cast iron
PN6	130	100	4	M12	14	14	78	80	3	2	16 [1]	-	14	-
PN10	150	110	4	M16	19	18	84	88	3	2	18 [1]	-	18	19
PN16	150	110	4	M16	19	18	84	88	3	2	18 [1]	9 [2]	18	19
PN25	150	110	4	M16	19	18	84	88	3	2	20 [1]	11 [2]	18	19
PN40	150	110	4	M16	19	18	84	88	3	2	-	13 [2]	18	19
PN64	170	125	4	M20	-	22	-	88	-	2	-	-	28	-
PN100	170	125	4	M20	-	22	-	88	-	2	-	-	28	-
ANSI														
Class 125/150	5 (127)	3⅞ (98)	4	½ (13)	⅝ (16)	⅝ (16)	-	2⅞ (73)	-	1/16 (2)	9/16 (14)	7/16 (11)	9/16 (14)	1 1/16 (17)
Class 300	6⅛ (156)	4½ (114)	4	¾ (19)	-	⅞ (22)	-	2⅞ (73)	-	1/16 (2)	-	1 1/16 (17)	1 3/16 (21)	-
Class 600	6⅛ (156)	4½ (114)	4	¾ (19)	-	⅞ (22)	-	2⅞ (73)	-	¼ (6)	-	-	⅞ (22)	-
Class 900	7 (178)	4⅞ (124)	4	1 (25)	-	1⅛ (29)	-	2⅞ (73)	-	¼ (6)	-	-	1¼ (32)	-
Class 1500	7 (178)	4⅞ (124)	4	1 (25)	-	1⅛ (29)	-	2⅞ (73)	-	¼ (6)	-	-	1¼ (32)	-
BS 10														
Table A	5¼ (133)	3⅞ (98)	4	½ (13)	9/16 (14)	9/16 (14)	-	-	-	-	⅝ (16)	⅜ (10)	-	-
Table D	5¼ (133)	3⅞ (98)	4	½ (13)	9/16 (14)	9/16 (14)	-	-	-	-	⅝ (16)	⅜ (10)	½ (13)	-
Table E	5¼ (133)	3⅞ (98)	4	½ (13)	9/16 (14)	9/16 (14)	-	-	-	-	⅝ (16)	⅜ (10)	½ (13)	-
Table F	5½ (140)	4⅛ (105)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	⅝ (16)	7/16 (11)	½ (13)	-
Table H	5½ (140)	4⅛ (105)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	3¼ (83)	-	1/16 (2)	⅞ (22)	½ (13)	1 1/16 (17)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 450
[3] Copper alloy flanges are always flat-faced

Nominal Size 50mm (2")

BS EN 1092	Diameter of flange	Bolt circle diameter	No of bolts	Diameter of bolts	Diameter of holes iron	Diameter of holes steel	Diameter of raised face[3] iron	Diameter of raised face[3] steel	Height of raised face[3] iron	Height of raised face[3] steel	Thickness of flange: Grey cast iron	Thickness of flange: Copper alloy	Thickness of flange: Cast & forged steel	Thickness of flange: Ductile cast iron
PN6	140	110	4	M12	14	14	88	90	3	2	16 [1]	-	14	-
PN10	165	125	4	M16	19	18	99	102	3	2	20 [1]	-	18	19
PN16	165	125	4	M16	19	18	99	102	3	2	20 [1]	11 [2]	18	19
PN25	165	125	4	M16	19	18	99	102	3	2	22 [1]	11 [2]	20	19
PN40	165	125	4	M16	19	18	99	102	3	2	-	13 [2]	20	19
PN64	180	135	4	M20	-	22	-	102	-	2	-	-	26	-
PN100	195	145	4	M24	-	26	-	102	-	2	-	-	30	-
ANSI														
Class 125/150	6 152)	4¾ (121)	4	⅝ (16)	¾ (19)	¾ (19)	-	3⅝ (92)	-	1/16 (2)	⅝ (16)	½ (13)	⅝ (16)	-
Class 300	6½ (165)	5 (127)	8	⅝ (16)	-	¾ (19)	-	3⅝ (92)	-	1/16 (2)	-	¾ (19)	⅞ (22)	-
Class 600	6½ (165)	5 (127)	8	⅝ (16)	-	¾ (19)	-	3⅝ (92)	-	¼ (6)	-	-	1 (25)	-
Class 900	8½ (216)	6½ (165)	8	⅞ (22)	-	1 (25)	-	3⅝ (92)	-	¼ (6)	-	-	1½ (38)	-
Class 1500	8½ (216)	6½ (165)	8	⅞ (22)	-	1 (25)	-	3⅝ (92)	-	¼ (6)	-	-	1½ (38)	-
BS 10														
Table A	6 152)	4½ (114)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	⅝ (16)	⅜ (10)	-	-
Table D	6 152)	4½ (114)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	1 1/16 (17)	⅜ (10)	9/16 (14)	-
Table E	6 152)	4½ (114)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	¾ (19)	⅜ (10)	9/16 (14)	-
Table F	6½ (165)	5 (127)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	¾ (19)	7/16 (11)	⅝ (16)	-
Table H	6½ (165)	5 (127)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	4 (102)	-	1/16 (2)	1 (25)	½ (13)	¾ (19)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 450
[3] Copper alloy flanges are always flat-faced

Technical Information
Flanges

Nominal Size 65mm (2½")

											Thickness of flange			
BS EN 1092	**Diameter of flange**	**Bolt circle diameter**	**No of bolts**	**Diameter of bolts**	**Diameter of holes iron**	**Diameter of holes steel**	**Diameter of raised face[3] iron**	**Diameter of raised face[3] steel**	**Height of raised face[3] iron**	**Height of raised face[3] steel**	**Grey cast iron**	**Copper alloy**	**Cast & forged steel**	**Ductile cast iron**
PN6	160	130	4	M12	14	14	108	110	3	2	16 [1]	-	14	-
PN10	185	145	4 [2]	M16	19	18	118	122	3	2	20 [1]	-	18	19
PN16	185	145	4 [2]	M16	19	18	118	122	3	2	20 [1]	13	18	19
PN25	185	145	8	M16	19	18	118	122	3	2	24 [1]	13	22	19
PN40	185	145	8	M16	19	18	118	122	3	2	-	14	22	19
PN64	205	160	8	M20	-	22	-	122	-	2	-	-	26	-
PN100	220	170	8	M24	-	26	-	122	-	2	-	-	34	-
ANSI														
Class 125/150	7 (178)	5½ (140)	4	⅝ (16)	¾ (19)	¾ (19)	-	4⅛ (105)	-	1/16 (2)	1 1/16 (17)	9/16 (14)	1 1/16 (17)	-
Class 300	7½ (191)	5⅞ (149)	8	¾ (19)	-	⅞ (22)	-	4⅛ (105)	-	1/16 (2)	-	1 3/16 (21)	1 (25)	-
Class 600	7½ (191)	5⅞ (149)	8	¾ (19)	-	⅞ (22)	-	4⅛ (105)	-	¼ (6)	-	-	1⅛ (29)	-
Class 900	9⅝ (244)	7½ (191)	8	1 (25)	-	1⅛ (29)	-	4⅛ (105)	-	¼ (6)	-	-	1⅝ (41)	-
Class 1500	9⅝ (244)	7½ (191)	8	1 (25)	-	1⅛ (29)	-	4⅛ (105)	-	¼ (6)	-	-	1⅝ (41)	-
BS 10														
Table A	6½ (165)	5 (127)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	1 1/16 (17)	7/16 (11)	-	-
Table D	6½ (165)	5 (127)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	1 1/16 (17)	7/16 (11)	9/16 (14)	-
Table E	6½ (165)	5 (127)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	¾ (19)	7/16 (11)	9/16 (14)	-
Table F	7¼ (184)	5¾ (146)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	¾ (19)	½ (13)	⅝ (16)	-
Table H	7¼ (184)	5¾ (146)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	4½ (114)	-	1/16 (2)	1 (25)	9/16 (14)	¾ (19)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Steel flanges in this DN and PN may be supplied with 8 holes. For compliance with these, equivalent cast iron flanges may be supplied with 8 holes as special order and after agreement between manufacturer and customer. Flange thicknesses for copper alloy are from BS 4504
[3] Copper alloy flanges are always flat-faced

Nominal Size 80mm (3")

											Thickness of flange			
BS EN 1092	**Diameter of flange**	**Bolt circle diameter**	**No of bolts**	**Diameter of bolts**	**Diameter of holes iron**	**Diameter of holes steel**	**Diameter of raised face[3] iron**	**Diameter of raised face[3] steel**	**Height of raised face[3] iron**	**Height of raised face[3] steel**	**Grey cast iron**	**Copper alloy**	**Cast & forged steel**	**Ductile cast iron**
PN6	190	150	4	M16	19	18	124	128	3	2	18 [1]	-	16	-
PN10	200	160	8	M16	19	18	132	138	3	2	22 [1]	-	20	19
PN16	200	160	8	M16	19	18	132	138	3	2	22 [1]	13 [2]	20	19
PN25	200	160	8	M16	19	18	132	138	3	2	26 [1]	14 [2]	24	19
PN40	200	160	8	M16	19	18	132	138	3	2	-	16 [2]	24	19
PN64	215	170	8	M20	-	22	-	138	-	2	-	-	28	-
PN100	230	180	8	M24	-	26	-	138	-	2	-	-	36	-
ANSI														
Class 125/150	7½ (191)	6 152)	4	⅝ (16)	¾ (19)	¾ (19)	-	5 (127)	-	1/16 (2)	¾ (19)	⅝ (16)	¾ (19)	-
Class 300	8¼ (210)	6⅝ (168)	8	¾ (19)	-	⅞ (22)	-	5 (127)	-	1/16 (2)	-	29/32 (23)	1⅛ (29)	-
Class 600	8¼ (210)	6⅝ (168)	8	¾ (19)	-	⅞ (22)	-	5 (127)	-	¼ (6)	-	-	1¼ (32)	-
Class 900	9½ (241)	7½ (191)	8	⅞ (22)	-	1 (25)	-	5 (127)	-	¼ (6)	-	-	1½ (38)	-
Class 1500	10½ (267)	8 (203)	8	1⅛ (29)	-	1¼ (32)	-	5 (127)	-	¼ (6)	-	-	1⅞ (48)	-
BS 10														
Table A	7¼ (184)	5¾ (146)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	1 1/16 (17)	½ (13)	-	-
Table D	7¼ (184)	5¾ (146)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	¾ (19)	½ (13)	9/16 (14)	-
Table E	7¼ (184)	5¾ (146)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	¾ (19)	½ (13)	9/16 (14)	-
Table F	8 (203)	6½ (165)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	¾ (19)	9/16 (14)	⅝ (16)	-
Table H	8 (203)	6½ (165)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	5 (127)	-	1/16 (2)	1⅛ (29)	⅝ (16)	⅞ (22)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 450
[3] Copper alloy flanges are always flat-faced

Tel: 0330 123 3521

Nominal Size 100mm (4")

BS EN 1092	Diameter of flange	Bolt circle diameter	No of bolts	Diameter of bolts	Diameter of holes iron	Diameter of holes steel	Diameter of raised face[3] iron	Diameter of raised face[3] steel	Height of raised face[3] iron	Height of raised face[3] steel	Thickness of flange: Grey cast iron	Thickness of flange: Copper alloy	Thickness of flange: Cast & forged steel	Thickness of flange: Ductile cast iron
PN6	210	170	4	M16	19	18	144	148	3	2	18 [1]	-	16	-
PN10	220	180	8	M16	19	18	156	158	3	2	24 [1]	-	20	19
PN16	220	180	8	M16	19	18	156	158	3	2	24 [1]	16 [2]	20	19
PN25	235	190	8	M20	23	22	156	162	3	2	28 [1]	17 [2]	24	19
PN40	235	190	8	M20	23	22	156	162	3	2	-	19 [2]	24	19
PN64	250	200	8	M24	-	26	-	162	-	2	-	-	30	-
PN100	265	210	8	M27	-	30	-	162	-	2	-	-	40	-
ANSI														
Class 125/150	9 (229)	7½ (191)	8	⅝ (16)	¾ (19)	¾ (19)	-	6⅜ (157)	-	1/16 (2)	1 5/16 (24)	1 1/16 (17)	1 5/16 (24)	-
Class 300	10 (254)	7⅞ (200)	8	¾ (19)	-	⅞ (22)	-	6⅜ (157)	-	1/16 (2)	-	1 1/16 (27)	1¼ (32)	-
Class 600	10¾ (273)	8½ (216)	8	⅞ (22)	-	1 (25)	-	6⅜ (157)	-	¼ (6)	-	-	1½ (38)	-
Class 900	11½ (292)	9¼ (235)	8	1⅛ (29)	-	1¼ (32)	-	6⅜ (157)	-	¼ (6)	-	-	1¾ (44)	-
Class 1500	12¼ (311)	9½ (241)	8	1¼ (32)	-	1⅜ (35)	-	6⅜ (157)	-	¼ (6)	-	-	2⅛ (54)	-
BS 10														
Table A	8½ (216)	7 (178)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	¾ (19)	⅝ (16)	-	-
Table D	8½ (216)	7 (178)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	¾ (19)	⅝ (16)	1 1/16 (17)	-
Table E	8½ (216)	7 (178)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	⅞ (22)	⅝ (16)	1 1/16 (17)	-
Table F	9 (229)	7½ (191)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	⅞ (22)	1 1/16 (17)	¾ (19)	-
Table H	9 (229)	7½ (191)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	6 (152)	-	1/16 (2)	1¼ (32)	¾ (19)	1 (25)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 450
[3] Copper alloy flanges are always flat-faced

Nominal Size 125mm (5")

BS EN 1092	Diameter of flange	Bolt circle diameter	No of bolts	Diameter of bolts	Diameter of holes iron	Diameter of holes steel	Diameter of raised face[3] iron	Diameter of raised face[3] steel	Height of raised face[3] iron	Height of raised face[3] steel	Thickness of flange: Grey cast iron	Thickness of flange: Copper alloy	Thickness of flange: Cast & forged steel	Thickness of flange: Ductile cast iron
PN6	240	200	8	M16	19	18	174	178	3	2	20 [1]	-	18	-
PN10	250	210	8	M16	19	18	184	188	3	2	26 [1]	-	22	19
PN16	250	210	8	M16	19	18	184	188	3	2	26 [1]	-	22	19
PN25	270	220	8	M24	28	26	184	188	3	2	30 [1]	-	26	19
PN40	270	220	8	M24	28	26	184	188	3	2	-	-	26	23.5
PN64	295	240	8	M27	-	30	-	188	-	2	-	-	34	-
PN100	315	250	8	M30	-	33	-	188	-	2	-	-	40	-
ANSI														
Class 125/150	10 (254)	8½ (216)	8	¾ (19)	⅞ (22)	⅞ (22)	-	7 5/16 (186)	-	1/16 (2)	1 5/16 (24)	¾ (19)	1 5/16 (24)	-
Class 300	11 (279)	9¼ (235)	8	¾ (19)	-	⅞ (22)	-	7 5/16 (186)	-	1/16 (2)	-	1⅛ (29)	1⅜ (35)	-
Class 600	13 (330)	10½ (267)	8	1 (25)	-	1⅛ (29)	-	7 5/16 (186)	-	¼ (6)	-	-	1¾ (44)	-
Class 900	13¾ (349)	11 (279)	8	1¼ (32)	-	1⅜ (35)	-	7 5/16 (186)	-	¼ (6)	-	-	2 (51)	-
Class 1500	14¾ (375)	11½ (292)	8	1½ (38)	-	1⅝ (41)	-	7 5/16 (186)	-	¼ (6)	-	-	2⅞ (73)	-
BS 10														
Table A	10 (254)	8¼ (210)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	¾ (19)	1 1/16 (17)	-	-
Table D	10 (254)	8¼ (210)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	1 3/16 (21)	1 1/16 (17)	1 1/16 (17)	-
Table E	10 (254)	8¼ (210)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	⅞ (22)	1 1/16 (17)	1 1/16 (17)	-
Table F	11 (279)	9¼ (235)	8	¾ (19)	⅞ (22)	⅞ (22)	-	-	-	-	1 (25)	¾ (19)	⅞ (22)	-
Table H	11 (279)	9¼ (235)	8	¾ (19)	⅞ (22)	⅞ (22)	-	7 (178)	-	1/16 (2)	1⅜ (35)	⅞ (22)	1⅛ (29)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 450
[3] Copper alloy flanges are always flat-faced

Technical Information
Flanges

Nominal Size 150mm (6")

											Thickness of flange			
BS EN 1092	**Diameter of flange**	**Bolt circle diameter**	**No of bolts**	**Diameter of bolts**	**Diameter of holes iron**	**Diameter of holes steel**	**Diameter of raised face[3] iron**	**Diameter of raised face[3] steel**	**Height of raised face[3] iron**	**Height of raised face[3] steel**	**Grey cast iron**	**Copper alloy**	**Cast & forged steel**	**Ductile cast iron**
PN6	265	225	8	M16	19	18	199	202	3	2	20 [1]	-	18	-
PN10	285	240	8	M20	23	22	211	212	3	2	26 [1]	-	22	19
PN16	285	240	8	M20	23	22	211	212	3	2	26 [1]	-	22	19
PN25	300	250	8	M24	28	26	211	218	3	2	34 [1]	-	28	20
PN40	300	250	8	M24	28	26	211	218	3	2	-	-	28	26
PN64	345	280	8	M30	-	33	-	218	-	2	-	-	36	-
PN100	355	290	12	M30	-	33	-	218	-	2	-	-	44	-
ANSI														
Class 125/150	11 (279)	9½ (241)	8	¾ (19)	⅞ (22)	⅞ (22)	-	8½ (216)	-	1/16 (2)	1 (25)	1 3/16 (21)	1 (25)	-
Class 300	12½ (318)	10⅝ (270)	12	¾ (19)	-	⅞ (22)	-	8½ (216)	-	1/16 (2)	-	1 3/16 (30)	1 1/16 (37)	-
Class 600	14 (356)	11½ (292)	12	1 (25)	-	1⅛ (29)	-	8½ (216)	-	¼ (6)	-	-	1⅞ (48)	-
Class 900	15 (381)	12½ (318)	12	1⅛ (29)	-	1¼ (32)	-	8½ (216)	-	¼ (6)	-	-	2 3/16 (56)	-
Class 1500	15½ (394)	12½ (318)	12	1⅜ (35)	-	1½ (38)	-	8½ (216)	-	¼ (6)	-	-	3¼ (83)	-
BS 10														
Table A	11 (279)	9¼ (235)	4	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	1 3/16 (21)	1 1/16 (17)	-	-
Table D	11 (279)	9¼ (235)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	1 3/16 (21)	1 1/16 (17)	1 1/16 (17)	-
Table E	11 (279)	9¼ (235)	8	¾ (19)	⅞ (22)	⅞ (22)	-	-	-	-	⅞ (22)	1 1/16 (17)	1 1/16 (17)	-
Table F	12 (305)	10¼ (260)	12	¾ (19)	⅞ (22)	⅞ (22)	-	-	-	-	1 (25)	⅞ (22)	⅞ (22)	-
Table H	12 (305)	10¼ (260)	12	¾ (19)	⅞ (22)	⅞ (22)	-	8¼ (210)	-	1/16 (2)	1⅜ (35)	1 (25)	1⅛ (29)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 450
[3] Copper alloy flanges are always flat-faced

Nominal Size 200mm (8")

											Thickness of flange			
BS EN 1092	**Diameter of flange**	**Bolt circle diameter**	**No of bolts**	**Diameter of bolts**	**Diameter of holes iron**	**Diameter of holes steel**	**Diameter of raised face[3] iron**	**Diameter of raised face[3] steel**	**Height of raised face[3] iron**	**Height of raised face[3] steel**	**Grey cast iron**	**Copper alloy**	**Cast & forged steel**	**Ductile cast iron**
PN6	320	280	8	M16	19	18	254	258	3	2	20 [1]	-	20	-
PN10	340	295	8	M20	23	22	266	268	3	2	26 [1]	-	24	20
PN16	240	295	12	M20	23	22	266	268	3	2	30 [1]	-	24	20
PN25	360	310	12	M24	28	26	274	278	3	2	34 [1]	-	30	22
PN40	375	320	12	M27	31	30	284	285	3	2	-	-	34	30
PN64	415	345	12	M33	-	36	-	285	-	2	-	-	42	-
PN100	430	360	12	M33	-	36	-	285	-	2	-	-	52	-
ANSI														
Class 125/150	13½ (343)	11¾ (298)	8	¾ (19)	⅞ (22)	⅞ (22)	-	10⅝ (270)	-	1/16 (2)	1⅛ (29)	1 5/16 (24)	1⅛ (29)	-
Class 300	15 (381)	13 (330)	12	⅞ (22)	-	1 (25)	-	10⅝ (270)	-	1/16 (2)	-	1⅜ (35)	1⅝ (41)	-
Class 600	16½ (419)	13¾ (349)	12	1⅛ (29)	-	1¼ (32)	-	10⅝ (270)	-	¼ (6)	-	-	2 3/16 (56)	-
Class 900	18½ (470)	15½ (394)	12	1⅜ (35)	-	1½ (38)	-	10⅝ (270)	-	¼ (6)	-	-	2½ (64)	-
Class 1500	19 (483)	15½ (394)	12	1⅝ (41)	-	1¾ (44)	-	10⅝ (270)	-	¼ (6)	-	-	3⅝ (92)	-
BS 10														
Table A	13¼ (337)	11½ (292)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	⅞ (22)	¾ (19)	½ (13)	-
Table D	13¼ (337)	11½ (292)	8	⅝ (16)	1 1/16 (17)	1 1/16 (17)	-	-	-	-	⅞ (22)	¾ (19)	¾ (19)	-
Table E	13¼ (337)	11½ (292)	8	¾ (19)	⅞ (22)	⅞ (22)	-	-	-	-	1 (25)	¾ (19)	¾ (19)	-
Table F	14½ (368)	12¾ (324)	12	¾ (19)	⅞ (22)	⅞ (22)	-	-	-	-	1⅛ (29)	1 (25)	1 (25)	-
Table H	14½ (368)	12¾ (324)	12	¾ (19)	⅞ (22)	⅞ (22)	-	10¼ (260)	-	1/16 (2)	1½ (38)	1¼ (32)	1¼ (32)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 450
[3] Copper alloy flanges are always flat-faced

Tel: 0330 123 3521

Nominal Size 250mm (10")

BS EN 1092	Diameter of flange	Bolt circle diameter	No of bolts	Diameter of bolts	Diameter of holes iron	Diameter of holes steel	Diameter of raised face[3] iron	Diameter of raised face[3] steel	Height of raised face[3] iron	Height of raised face[3] steel	Thickness of flange			
											Grey cast iron	Copper alloy	Cast & forged steel	Ductile cast iron
PN6	375	335	12	M16	19	18	309	312	3	2	24 [1]	-	22	-
PN10	395 [2]	350	12	M20	23	22	319	320	3	2	28 [1]	-	26	22
PN16	405 [2]	355	12	M24	28	26	319	320	3	2	32 [1]	-	26	22
PN25	425	370	12	M27	31	30	330	335	3	2	-	-	32	24.5
PN40	450	385	12	M30	34	33	345	345	3	2	-	-	38	34.5
PN64	470	400	12	M33	-	36	-	345	-	2	-	-	46	-
PN100	505	430	12	M36	-	39	-	345	-	2	-	-	60	-
ANSI														
Class 125/150	16 (406)	14¼ (362)	12	⅞ (22)	1 (25)	1 (25)	-	12¾ (324)	-	1/16 (2)	1 3/16 (30)	1 (25)	1 3/16 (30)	-
Class 300	17½ (445)	15¼ (387)	16	1 (25)	-	1⅛ (29)	-	12¾ (324)	-	1/16 (2)	-	-	1⅝ (41)	-
Class 600	20 (508)	17 (432)	16	1¼ (32)	-	1⅜ (35)	-	12¾ (324)	-	¼ (6)	-	-	2½ (64)	-
Class 900	21½ (546)	18½ (470)	16	1⅜ (35)	-	1½ (38)	-	12¾ (324)	-	¼ (6)	-	-	2¾ (70)	-
Class 1500	23 (584)	19 (483)	12	1⅝ (41)	-	2 (51)	-	12¾ (324)	-	¼ (6)	-	-	4¼ (108)	-
BS 10														
Table A	16 (406)	14 (356)	8	¾ (19)	⅞ (22)	⅞ (22)	-	-	-	-	1 5/16 (24)	¾ (19)	-	-
Table D	16 (406)	14 (356)	8	¾ (19)	⅞ (22)	⅞ (22)	-	-	-	-	1 (25)	¾ (19)	¾ (19)	-
Table E	16 (406)	14 (356)	12	¾ (19)	⅞ (22)	⅞ (22)	-	-	-	-	1 (25)	⅞ (22)	⅞ (22)	-
Table F	17 (432)	15 (381)	12	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1⅛ (29)	1 (25)	1 (25)	-
Table H	17 (432)	15 (381)	12	⅞ (22)	1 (25)	1 (25)	-	12¼ (311)	-	1/16 (2)	1⅝ (41)	1⅜ (35)	1⅜ (35)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] For ductile iron pipes and fittings the outside diameters shall be: for PN10, D = 400mm, for PN16, D = 400mm
[3] Copper alloy flanges are always flat-faced

Nominal Size 300mm (12")

BS EN 1092	Diameter of flange	Bolt circle diameter	No of bolts	Diameter of bolts	Diameter of holes iron	Diameter of holes steel	Diameter of raised face[3] iron	Diameter of raised face[3] steel	Height of raised face[3] iron	Height of raised face[3] steel	Thickness of flange			
											Grey cast iron	Copper alloy	Cast & forged steel	Ductile cast iron
PN6	440	395	12	M20	23	22	363	365	4	2	24 [1]	-	22	-
PN10	445 [2]	400	12	M20	23	22	370	370	4	2	28 [1]	-	26	24.5
PN16	460 [2]	410	12	M24	28	26	370	378	4	2	32 [1]	-	28	24.5
PN25	485	430	16	M27	31	30	389	395	4	2	40 [1]	-	34	27.5
PN40	515	450	16	M30	34	33	409	410	4	2	-	-	42	39.5
PN64	530	460	16	M33	-	36	-	410	-	2	-	-	52	-
PN100	585	500	16	M39	-	42	-	410	-	2	-	-	68	-
ANSI														
Class 125/150	19 (483)	17 (432)	12	⅞ (22)	1 (25)	1 (25)	-	15 (381)	-	1/16 (2)	1¼ (32)	1 1/16 (27)	1¼ (32)	-
Class 300	20½ (521)	17¾ (451)	16	1⅛ (29)	-	1¼ (32)	-	15 (381)	-	1/16 (2)	-	-	2 (51)	-
Class 600	22 (559)	19¼ (489)	20	1¼ (32)	-	1⅜ (35)	-	15 (381)	-	¼ (6)	-	-	2⅝ (67)	-
Class 900	24 (610)	21 (533)	20	1⅜ (35)	-	1½ (38)	-	15 (381)	-	¼ (6)	-	-	3⅛ (79)	-
Class 1500	26½ (673)	22½ (571)	16	2 (51)	-	2⅛ (54)	-	15 (381)	-	¼ (6)	-	-	4⅞ (124)	-
BS 10														
Table A	18 (457)	16 (406)	8	¾ (19)	⅞ (22)	⅞ (22)	-	-	-	-	1 5/16 (24)	⅞ (22)	-	-
Table D	18 (457)	16 (406)	12	¾ (19)	⅞ (22)	⅞ (22)	-	-	-	-	1 (25)	⅞ (22)	⅞ (22)	-
Table E	18 (457)	16 (406)	12	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1⅛ (29)	1 (25)	1 (25)	-
Table F	19¼ (489)	17¼ (438)	16	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1¼ (32)	1⅛ (29)	1⅛ (29)	-
Table H	19¼ (489)	17¼ (438)	16	⅞ (22)	1 (25)	1 (25)	-	14¼ (362)	-	1/16 (2)	1¾ (44)	1½ (38)	1½ (38)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] For ductile iron pipes and fittings the outside diameters shall be: for PN10, D = 400mm, for PN16, D = 400mm
[3] Copper alloy flanges are always flat-faced

Technical Information
Flanges

Nominal Size 350mm (14")

											Thickness of flange			
BS EN 1092	**Diameter of flange**	**Bolt circle diameter**	**No of bolts**	**Diameter of bolts**	**Diameter of holes iron**	**Diameter of holes steel**	**Diameter of raised face[3] iron**	**Diameter of raised face[3] steel**	**Height of raised face[3] iron**	**Height of raised face[3] steel**	**Grey cast iron**	**Copper alloy**	**Cast & forged steel**	**Ductile cast iron**
PN6	490	445	12	M20	23	22	413	415	4	2	26 [1]	-	22	-
PN10	505	460	16	M20	23	22	429	430	4	2	30 [1]	-	26	24.5
PN16	520	470	16	M24	28	26	429	438	4	2	36 [1]	-	30	26.5
PN25	555	490	16	M30	34	33	448	450	4	2	44 [1]	-	38	30
PN40	580	510	16	M33	37	36	465	465	4	2	-	-	46	44
PN64	600	525	16	M36	-	39	-	465	-	2	-	-	56	-
PN100	655	560	16	M45	-	48	-	465	-	2	-	-	74	-
ANSI														
Class 125/150	21 (533)	18¾ (476)	12	1 (25)	1⅛ (29)	1⅛ (29)	-	16¼ (413)	-	1/16 (2)	1⅜ (35)	-	1⅜ (35)	-
Class 300	23 (584)	20¼ (514)	20	1⅛ (29)	-	1¼ (32)	-	16¼ (413)	-	1/16 (2)	-	-	2⅛ (54)	-
Class 600	23¾ (603)	20¾ (527)	20	1⅜ (35)	-	1½ (38)	-	16¼ (413)	-	¼ (6)	-	-	2¾ (70)	-
Class 900	25¼ (641)	22 (559)	20	1½ (38)	-	1⅝ (41)	-	16¼ (413)	-	¼ (6)	-	-	3⅜ (86)	-
Class 1500	29½ (749)	25 (635)	16	2¼(57)	-	2⅜ (60)	-	16¼ (413)	-	¼ (6)	-	-	5¼ (133)	-
BS 10														
Table A	20¾ (527)	18½ (470)	8	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1 (25)	1 (25)	-	-
Table D	20¾ (527)	18½ (470)	12	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1⅛ (29)	1 (25)	1 (25)	-
Table E	20¾ (527)	18½ (470)	12	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1¼ (32)	1 (25)	1 (25)	-
Table F	21¾ (552)	19½ (495)	16	1 (25)	1⅛ (29)	1⅛ (29)	-	-	-	-	1⅜ (35)	1¼ (32)	1¼ (32)	-
Table H	21¾ (552)	19½ (495)	16	1 (25)	1⅛ (29)	1⅛ (29)	-	16½ (419)	-	1/16 (2)	1⅛ (48)	1⅝ (41)	1⅝ (41)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 4504
[3] Copper alloy flanges are always flat-faced

Nominal Size 400mm (16")

											Thickness of flange			
BS EN 1092	**Diameter of flange**	**Bolt circle diameter**	**No of bolts**	**Diameter of bolts**	**Diameter of holes iron**	**Diameter of holes steel**	**Diameter of raised face[3] iron**	**Diameter of raised face[3] steel**	**Height of raised face[3] iron**	**Height of raised face[3] steel**	**Grey cast iron**	**Copper alloy**	**Cast & forged steel**	**Ductile cast iron**
PN6	540	495	16	M20	23	22	463	465	4	2	28 [1]	-	22	-
PN10	565	515	16	M24	28	26	480	482	4	2	32 [1]	-	26	24.5
PN16	580	525	16	M27	31	30	480	490	4	2	38 [1]	-	32	28
PN25	620	550	16	M33	37	36	503	505	4	2	48 [1]	-	40	32
PN40	660	585	16	M36	41	39	535	535	4	2	-	-	50	48
PN64	670	585	16	M39	-	42	-	535	-	2	-	-	60	-
PN100	715	620	16	M45	-	48	-	535	-	2	-	-	78	-
ANSI														
Class 125/150	23½ (597)	21¼ (540)	16	1 (25)	1⅛ (29)	1⅛ (29)	-	18½ (470)	-	1/16 (2)	1 1/16 (37)	-	1 1/16 (37)	-
Class 300	25½ (648)	22½ (571)	20	1¼ (32)	-	1⅜ (35)	-	18½ (470)	-	1/16 (2)	-	-	2¼ (57)	-
Class 600	27 (686)	23¾ (603)	20	1½ (38)	-	1⅝ (41)	-	18½ (470)	-	¼ (6)	-	-	3 (76)	-
Class 900	27¾ (705)	24¼ (616)	20	1⅝ (41)	-	1¾ (44)	-	18½ (470)	-	¼ (6)	-	-	3½ (89)	-
Class 1500	32½ (826)	27¾ (705)	16	2½ (64)	-	2⅜ (67)	-	18½ (470)	-	¼ (6)	-	-	5¾ (146)	-
BS 10														
Table A	22¾ (578)	20½ (521)	12	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1 1/16 (27)	1 (25)	-	-
Table D	22¾ (578)	20½ (521)	12	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1⅛ (29)	1 (25)	1 (25)	-
Table E	22¾ (578)	20½ (521)	12	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1¼ (32)	1 (25)	1 (25)	-
Table F	24 (610)	21¾ (552)	20	1 (25)	1⅛ (29)	1⅛ (29)	-	-	-	-	1⅜ (35)	1¼ (32)	1¼ (32)	-
Table H	24 (610)	21¾ (552)	20	1 (25)	1⅛ (29)	1⅛ (29)	-	19 (483)	-	1/16 (2)	2 (51)	1¾ (44)	1¾ (44)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] For ductile iron pipes and fittings the outside diameters shall be: for PN10, D = 455mm, for PN16, D = 455mm
[3] Copper alloy flanges are always flat-faced

Tel: 0330 123 3521

Nominal Size 450mm (18")

BS EN 1092	Diameter of flange	Bolt circle diameter	No of bolts	Diameter of bolts	Diameter of holes iron	Diameter of holes steel	Diameter of raised face[3] iron	Diameter of raised face[3] steel	Height of raised face[3] iron	Height of raised face[3] steel	Thickness of flange: Grey cast iron	Thickness of flange: Copper alloy	Thickness of flange: Cast & forged steel	Thickness of flange: Ductile cast iron
PN6	595	550	16	M20	23	22	518	520	4	2	28 [1]	-	22	-
PN10	615	565	20	M24	28	26	530	532	4	2	32 [1]	-	28	25.5
PN16	640	585	20	M27	31	30	548	550	4	2	40 [1]	-	40	30
PN25	670	600	20	M33	37	36	548	555	4	2	50 [1]	-	46	34.5
PN40	685	610	20	M36	41	39	560	560	4	2	-	-	57	49
PN64	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PN100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANSI														
Class 125/150	25 (635)	22¾ (578)	16	1⅛ (29)	1¼ (32)	1¼ (32)	-	21 (533)	-	1/16 (2)	1 9/16 (40)	-	1 9/16 (40)	-
Class 300	28 (711)	24¾ (629)	24	1¼ (32)	-	1⅜ (35)	-	21 (533)	-	1/16 (2)	-	-	2⅜ (60)	-
Class 600	29¼ (743)	25¾ (654)	20	1⅝ (41)	-	1¾ (44)	-	21 (533)	-	¼ (6)	-	-	3¼ (83)	-
Class 900	31 (787)	27 (686)	20	1⅞ (48)	-	2 (51)	-	21 (533)	-	¼ (6)	-	-	4 (102)	-
Class 1500	36 (914)	30½ (775)	16	2¾ (70)	-	2⅞ (73)	-	21 (533)	-	¼ (6)	-	-	6⅜ (162)	-
BS 10														
Table A	25¼ (641)	23 (584)	12	⅞ (22)	-	1 (25)	-	-	-	-	1 1/16 (27)	1 1/16 (27)	-	-
Table D	25¼ (641)	23 (584)	12	⅞ (22)	-	1 (25)	-	-	-	-	1¼ (32)	1⅛ (29)	1⅛ (29)	-
Table E	25¼ (641)	23 (584)	16	⅞ (22)	-	1 (25)	-	-	-	-	1⅜ (35)	1⅛ (29)	1⅛ (29)	-
Table F	26½ (673)	24 (610)	20	1⅛ (29)	-	1¼ (32)	-	-	-	-	1½ (38)	1⅜ (35)	1⅜ (35)	-
Table H	26½ (673)	24 (610)	20	1⅛ (29)	-	1¼ (32)	-	21 (533)	-	1/16 (2)	2⅛ (54)	1⅛ (48)	1⅛ (48)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] Flange thicknesses for copper alloy are from BS 4504
[3] Copper alloy flanges are always flat-faced

Nominal Size 500mm (20")

BS EN 1092	Diameter of flange	Bolt circle diameter	No of bolts	Diameter of bolts	Diameter of holes iron	Diameter of holes steel	Diameter of raised face[3] iron	Diameter of raised face[3] steel	Height of raised face[3] iron	Height of raised face[3] steel	Thickness of flange: Grey cast iron	Thickness of flange: Copper alloy	Thickness of flange: Cast & forged steel	Thickness of flange: Ductile cast iron
PN6	645	600	20	M20	23	22	568	570	4	2	30 [1]	-	24 [2]	-
PN10	670	620	20	M24	28	26	582	585	4	2	34 [1]	-	28 [2]	26.5
PN16	715	650	20	M30	34	33	609	610	4	2	42 [1]	-	44 [2]	31.5
PN25	730	660	20	M33	37	36	609	615	4	2	52 [1]	-	48 [2]	36.5
PN40	755	670	20	M39	44	42	615	615	4	2	-	-	57 [2]	52
PN64	800	705	20	M45	-	48	-	615	-	2	-	-	68 [2]	-
PN100	870	760	20	M52	-	56	-	615	-	2	-	-	94 [2]	-
ANSI														
Class 125/150	27½ (699)	25 (635)	20	1⅛ (29)	1¼ (32)	1¼ (32)	-	23 (584)	-	1/16 (2)	11 1/16 (43)	-	11 1/16 (43)	-
Class 300	30½ (775)	27 (686)	24	1¼ (32)	-	1⅜ (35)	-	23 (584)	-	1/16 (2)	-	-	2½ (64)	-
Class 600	32 (813)	28½ (724)	24	1⅝ (41)	-	1¾ (44)	-	23 (584)	-	¼ (6)	-	-	3½ (89)	-
Class 900	33¾ (857)	29½ (749)	20	2 (51)	-	2⅛ (54)	-	23 (584)	-	¼ (6)	-	-	4¼ (108)	-
Class 1500	38¾ (984)	32¾ (832)	16	3 (76)	-	3⅛ (79)	-	23 (584)	-	¼ (6)	-	-	7 (178)	-
BS 10														
Table A	27¾ (705)	25¼ (641)	12	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1⅛ (29)	1⅛ (29)	-	-
Table D	27¾ (705)	25¼ (641)	16	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1¼ (32)	1¼ (32)	-	-
Table E	27¾ (705)	25¼ (641)	16	⅞ (22)	1 (25)	1 (25)	-	-	-	-	1½ (38)	1¼ (32)	1¼ (32)	-
Table F	29 (737)	26½ (673)	24	1⅛ (29)	1¼ (32)	1¼ (32)	-	-	-	-	1⅝ (41)	1½ (38)	1½ (38)	-
Table H	29 (737)	26½ (673)	24	1⅛ (29)	1¼ (32)	1¼ (32)	-	23½ (597)	-	1/16 (2)	2¼(57)	2 (51)	2 (51)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] These flange thicknesses are changed substantially as a result of the flange calculation method used in BS EN 1092-1
[3] Copper alloy flanges are always flat-faced

Technical Information
Flanges

Nominal Size 600mm (24")

											Thickness of flange			
BS EN 1092	**Diameter of flange**	**Bolt circle diameter**	**No of bolts**	**Diameter of bolts**	**Diameter of holes iron**	**Diameter of holes steel**	**Diameter of raised face[3] iron**	**Diameter of raised face[3] steel**	**Height of raised face[3] iron**	**Height of raised face[3] steel**	**Grey cast iron**	**Copper alloy**	**Cast & forged steel**	**Ductile cast iron**
PN6	755	705	20	M24	28	26	667	670	5	2	30 [1]	-	30	-
PN10	780	725	20	M27	31	30	682	685	5	2	36 [1]	-	34	30
PN16	840	770	20	M33	37	36	720	720	5	2	48 [1]	-	54	36
PN25	845	770	20	M36	41	39	720	725	5	2	-	-	58	42
PN40	890	795	20	M45	50	48	735	735	5	2	-	-	72	58
PN64	930	820	20	M52	-	56	-	735	-	2	-	-	76	-
ANSI														
Class 125/150	32 (813)	29½ (749)	20	1¼ (32)	1⅜ (35)	1⅜ (35)	-	27¼ (692)	-	1/16 (2)	1⅞ (48)	-	1⅞ (48)	-
Class 300	36 (914)	32 (813)	24	1½ (38)	-	1⅝ (41)	-	27¼ (692)	-	1/16 (2)	-	-	2¾ (70)	-
Class 600	37 (940)	33 (838)	24	1⅞ (48)	-	2 (51)	-	27¼ (692)	-	¼ (6)	-	-	4 (102)	-
Class 900	41 (1041)	35½ (902)	20	2½ (64)	-	2⅝ (67)	-	27¼ (692)	-	¼ (6)	-	-	5½ (140)	-
Class 1500	46 (1168)	39 (991)	16	3½ (89)	-	3⅝ (92)	-	27¼ (692)	-	¼ (6)	-	-	8 (203)	-
BS 10														
Table A	32½ (826)	29¾ (756)	12	1 (25)	1⅛ (29)	1⅛ (29)	-	-	-	-	1 3/16 (30)	1 3/16 (30)	-	-
Table D	32½ (826)	29¾ (756)	16	1 (25)	1⅛ (29)	1⅛ (29)	-	-	-	-	1⅜ (35)	1⅜ (35)	1⅜ (35)	-
Table E	32½ (826)	29¾ (756)	16	1⅛ (29)	1¼ (32)	1¼ (32)	-	-	-	-	1⅝ (41)	1½ (38)	1½ (38)	-
Table F	33½ (851)	30¾ (781)	24	1¼ (32)	1¼ (32)	1⅜ (35)	-	-	-	-	1¾ (44)	1⅝ (41)	1⅝ (41)	-
Table H	33½ (851)	30¾ (781)	24	1¼ (32)	1⅜ (35)	1⅜ (35)	-	27½ (699)	-	1/16 (2)	2½ (64)	2¼(57)	2¼(57)	-

[1] These flange thicknesses are also valid for ductile iron flanges type 21-2
[2] These flange thicknesses are changed substantially as a result of the flange calculation method used in BS EN 1092-1
[3] Copper alloy flanges are always flat-faced

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