



SECTION 6a

Bronze Commissioning Valves

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Introduction

Bronze Commissioning Valves

This publication describes the Hattersley range of products available for the manual balancing of water distribution systems.

The British Standard BS7350 relates to double regulating globe valves (DRV) and flow measurement devices for heating and chilled water systems. It includes one valve and two valve commissioning products and the table overleaf relates Hattersley products to the types and definitions given in BS7350.

Accuracy

BS7350 details the accuracy to which each device must conform and Hattersley products conform to these limits of accuracy.

BSI Kitemark

Many Hattersley products bear the Kitemark approval and this is shown on the relevant data pages.

Commissioning Sets

metering station and a close coupled double regulating valve. It is normally fitted in the return line of the system, however, it will perform equally well in the flow section of pipework.

The metering station, containing an orifice, is fitted with test points so that the pressure drop across the orifice can be measured. This pressure drop is relative to a flow which has been determined by practical testing.

Commissioning sets, which are the number one choice, provide a $\pm 5\%$ accuracy and should be installed in straight pipe with a minimum of 5 diameters uninterrupted upstream length.

Variable Orifice Double Regulating Valves (VODRV's)

An alternative to one valve commissioning sets is the use of VODRV's which are double regulating valves fitted with test points.

The VODRV is an economic choice where an accuracy of $\pm 10\%$ or higher is acceptable.

Compression Ended Products

In the following pages, products suitable for use with 15mm copper pipe are shown. Care must be taken to use the flow charts for compression ended products when commissioning with these valves.

Flow Charts

All Hattersley commissioning products have been extensively flow tested and flow charts are readily available.

Valve Sizing

The correct sizing of valves cannot be over emphasised if balancing of water distribution systems is to be successfully achieved.

With valve sizing, consideration must be given not only to flow rate, but imbalance to be removed. The move towards smaller fan coil units and low flow rates in 15mm pipework requires a commissioning set capable of measuring and controlling these low flow rates whilst keeping the valve at least 25% open.*

The Hattersley range is specifically designed to handle low flow rates in 15mm copper pipework.

See: 1732LC
1832LC
2432LC

Water Regulations

Many Hattersley Commissioning Products are Water Regulations Advisory Scheme (WRAS) Approved.

Warning

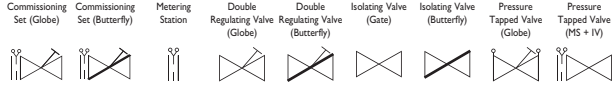
Balancing a system requires the connection of manometer probes to live pressure test points.

Under no circumstances must a LTHW, MTHW or HTHW system be commissioned at operating temperature because of the danger of serious injury.

*This recommendation is given by CIBSE in their commissioning "Code W".

Figure Number Identification

Bronze Commissioning Valves



One Valve System (Measurement and regulation at one point)

Commissioning Set Components

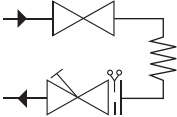


Service	Commissioning Set (CS) Fig No	Metering Station (MS) Fig No	Double Regulating Valve (DRV) Fig No	End Connections	Size Range	Body Material
Chilled Water	2432	1000	1432	Screwed	1/2 - 2in	Bronze/DZR
LTHW, MTHW	2432C	1000	1432C	Compression	15mm	Bronze/DZR
	1732 + 1832					
	1732C + 1832C					
	1732L + 1832L			Screwed	1/2in	Bronze/DZR
	1732LC + 1832LC			Compression	15mm	Bronze/DZR
	1732M + 1832M			Screwed	1/2in	Bronze/DZR
	1732MC + 1832MC			Compression	15mm	Bronze/DZR
HTHW	5200	4000	1200DR	Flanged	15-50mm	Bronze
						Stainless Steel

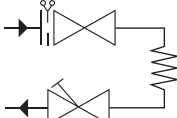
Variable Orifice Double Regulating Valves (VODRV's)

Service	FODRV/ VODRV Fig No	Isolating Valve Fig No	End Connections	Size Range	Body Material
Chilled Water	1732	30	Screwed	1/2-2in	DZR
	1832				
LTHW MTHW	M737	M541	Flanged	50-300mm	Cast Iron
HTHW	1200DRZ	1200	Flanged	15-50mm	Bronze

Preferred Arrangement



Alternative Arrangement



VODRV Arrangement

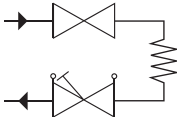


Fig 631, 632 and 633

for Pressure and Temperature Measurement Hattersley Test Points

BS7350

When fitted to measuring devices and strainers, test points are supplied with cap retainers in red and blue for upstream and downstream port identification. This meets the requirements of BS7350.



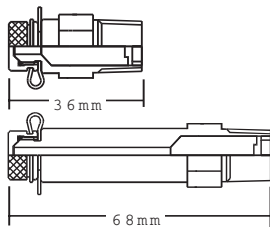
Test points are fitted with green cap retainers when supplied in convenient blister packs:-

Figure 631 - 10 test points per pack
Figure 633 - 5 test points per pack

Test Probes

The application of a silicone lubricant to the probe shaft prior to insertion is recommended.

Test points are available in either standard length, figure 631, or extended length, figure 633, both threaded 1/4 BSP (Tr). The extended length test point requires special test probe available from Hattersley.



Hattersley Fig 631 Test Points are WRAS Approved Products and are listed in the Water Fittings and Materials Directory.

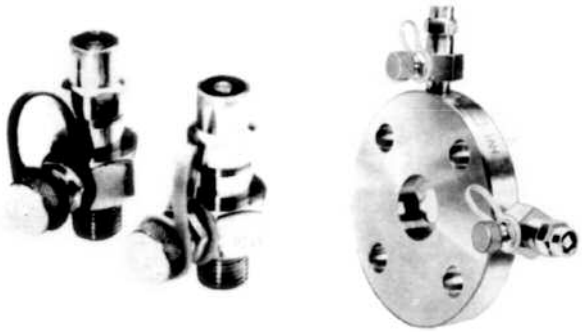


Strategically placed test points allow access to live fluid systems for pressure and temperature measurements. Maximum temperature is 120°C and maximum pressure is 3450kPa. Suitable for Chilled Water, LTHW and MTHW.

The single piece DZR copper alloy body houses a uniquely designed elastomeric core providing excellent sealing performance and wear resistance.

Double sealing on the cap is provided by precision metal to metal jointing backed up by a resilient "O" ring, allowing convenient, positive finger tightening.



Fig 750**Hattersley Valve Controlled
Test Points**

Suitable for 40 bar pressure up to 180°C including HTHW service

Features

- Double isolating
- Uses standard air vent key
- Fitted with cap retainers in red and blue for upstream and downstream port identification. When used in pairs on measuring devices this meets the requirements of BS7350.
- Recommended by Hattersley and fitted as standard to Hattersley M3000 and 4000 metering stations
- Copper alloy construction
- Accepts commercially available probes
- Threaded 1/4 ISO 7 (Tr)

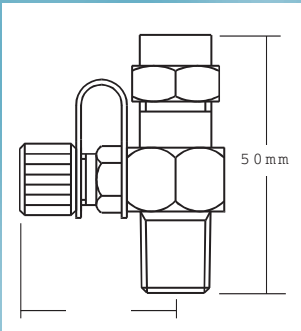
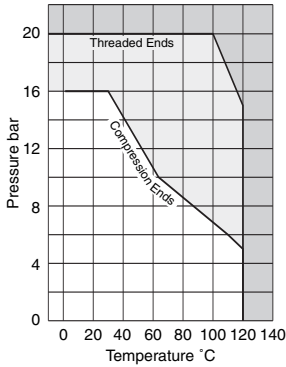


Fig. 1000 - 1000C

Bronze Metering Stations
PN20 - Series B (Threaded): PN16 (Compression)



Pressure/Temperature Rating
Threaded Ends

PN20 Series B
 15 bar at 120°C
 20 bar from -10 to 100°C

Compression Ends

5 bar at 120°C
 6 bar at 110°C
 10 bar at 65°C
 16 bar from 2 to 30°C

Test Pressures (Hydraulic)

Shell: 30 bar

Specification

Kitemarked to BS7350
 WRAS Approved Product
 Supplied fitted with two Fig 631 test points.
 Figure 1000 end connections threaded to BS21 (ISO7) Taper female with the exception of the 1/2in inlet which is parallel.
 Figure 1000C suitable for use with 15mm copper pipe

Material Specification

Component	Material	Specification	
		BS EN	ASTM
Metering Station	Bronze	12165 CW602N	B62
Test Point	Fig 631		

Dimensions

Nominal Size	in						
	1/2	3/4	1	1 1/4	1 1/2	2	
A (threaded)	57	58	66	72	72	82	
A ¹ (compression)	66						
B	55	61	65	71	73	79	
Weight	kg	0.29	0.30	0.40	0.50	0.54	0.77



Use figure 1000 with figure 1432 to make Commissioning Set 2432. (see page 9)

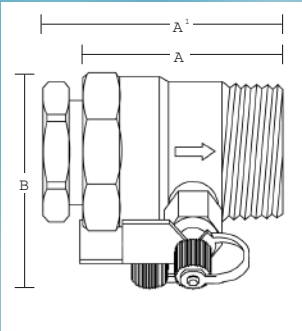


Fig. 100L - 100LC - 100M - 100MC

Bronze Low & Medium Flow Metering Stations
 PN20 - Series B (Threaded): PN16 (Compression)



Pressure/Temperature Rating

Threaded Ends

PN20 Series B
 15 bar at 120°C
 20 bar from -10 to 100°C

Compression Ends

5 bar at 120°C
 6 bar at 110°C
 10 bar at 65°C
 16 bar from 2 to 30°C

Test Pressures (Hydraulic)

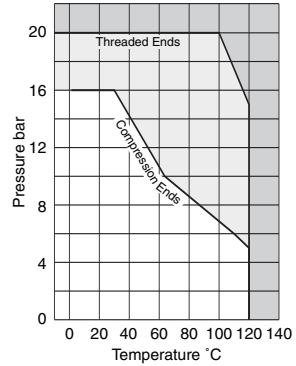
Shell: 30 bar

Specification

Generally in accordance with BS7350
 WRAS Approved Product
 Supplied fitted with two Fig 631
 test points
 Outlet connection screwed BS21
 (ISO7-1) taper.
 Inlet connection screwed BS2779
 (ISO 228) parallel
 Suitable for use with flow rates down
 to 0.01l/s.



Use fig. 1000L and 1000M with fig.
 1432L to make Commissioning Set;
 2432LL and 2432LM respectively.



Material Specification

Component	Material	Specification	
		BS EN	ASTM
Metering Station	Bronze	12165 CW602N	B62-C83600
Test Point	Fig 631		

Dimensions

Nominal Size	in	1/2
	mm	15
A (threaded)	mm	57
A ¹ (compression)	mm	66
B	mm	55
Weight	kg	0.29

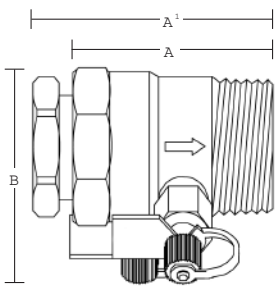
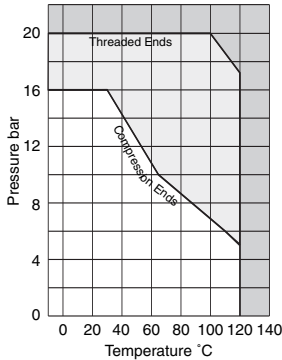


Fig. I432 - I432L - I432C - I432LC

**Bronze Double Regulating Valve
PN20 (Threaded): PN16 (Compression)**



Pressure/Temperature Rating
Threaded Ends
BS 5154 PN20 Series B – restricted
17.2 bar at 120°C
20 bar at -10 to 100°C

Compressions Ends
5 bar at 120°C
6 bar at 110°C
10 bar at 65°C
16 bar from 2 to 30°C

Test Pressure – Hydraulic
Body: 30 bar
Seat: 22 bar

Specification
Kitemarked to BS7350
Handwheel operated
Numerical indicator
Inside screw non rising handwheel
Characterised regulating disk
Flow charts available
End connections threaded
Sizes 1” to 2” to ISO 7 parallel
Sizes 1/2” & 3/4” to ISO 228 parallel
Sizes DN15 & DN20 when used with
compression adaptors suitable for
copper pipe to BS EN 1057 R250
(half hard)
WRAS Approved Product

Application
Fig I432 can be used with Hattersley
metering stations for commissioning
- I432 + 1000 = 2432
- I432L + 1000M = 2432LM
- I432L + 1000L = 2432LL

Material Specification

Component	Material	BS EN Specification
Handwheel	Plastic	
Stem	DZR copper alloy	I2165 CW602N
Stem seals	EPDM	
Disk	DZR copper alloy	I2165 CW602N
Disk Seal (1”-2”)	PTFE	
Bonnet	DZR copper alloy	I2165 CW602N
Body	Bronze	I982 CC491K

Dimensions

Nominal Size	in	1/2L	1/2	3/4	1	1 1/4	1 1/2	2
A	mm	87	87	96	100	114	125	146
A compression	mm	105	105	118				
B	mm	110	110	111	132	133	148	149
Weight	kg	0.54	0.54	0.58	0.88	1.05	1.43	1.88

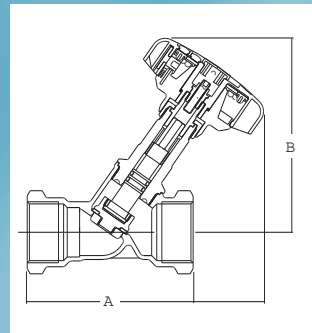
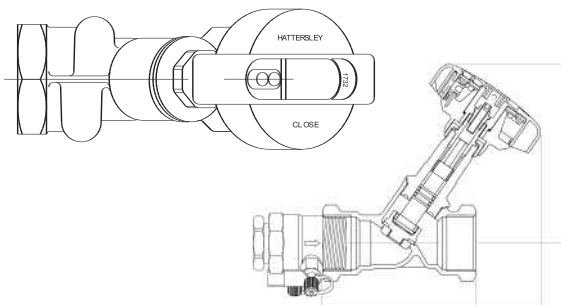


Fig. 1732, 1732M - 1732L - 1732C - 1732MC & 1732LC

Bronze Fixed Orifice Double Regulating Valve (FODRV) PN20 (Threaded): PN16 (Compression)



Pressure/Temperature Rating

Threaded Ends

BS 5154 PN20 Series B - restricted
17.2 bar at 120°C
20 bar at -10 to 100°C

Compressions Ends

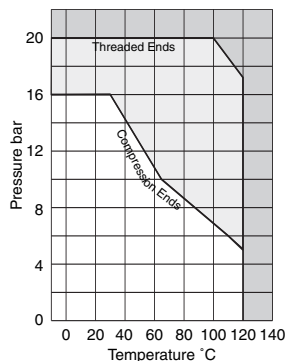
5 bar at 120°C
6 bar at 110°C
10 bar at 65°C
16 bar from 2 to 30°C

Test Pressure – Hydraulic

Body: 30 bar
Seat: 22 bar

Specification

Kitemarked to BS7350
Handwheel operated
Numerical indicator
Inside screw non rising handwheel
Characterised regulating disk
Integral fixed orifice
Supplied with 2 Fig 631 test points
Flow charts available
End connections threaded
Sizes 1" to 2" to ISO 7 parallel
Sizes 1/2" & 3/4" to ISO 228 parallel
Sizes DN15 & DN20 when used with
compression adaptors suitable for
copper pipe to BS EN 1057 R250
(half hard)
WRAS Approved Product



Material Specification

Component	Material	Specification BS EN Specification
Handwheel	Plastic	
Stem	DZR copper alloy	12165 CW602N
Stem seals	EPDM	
Disk	DZR copper alloy	12165 CW602N
Disk Seal (1"-2")	PTFE	
Bonnet	DZR copper alloy	12165 CW602N
Body	Bronze	1982 CC491K
Orifice insert	DZR copper alloy	12165 CW602N
Fig. 631 Test valve	DZR copper alloy	12165 CW602N

Dimensions

Nominal Size	in	1/2L	1/2M	1/2	3/4	1	1 1/4	1 1/2	2
A	mm	87	87	87	96	100	114	125	146
A compression	mm	105	105	105	118				
B	mm	110	110	110	111	132	133	148	149
Weight	kg	0.61	0.61	0.61	0.65	0.95	1.13	1.52	1.98

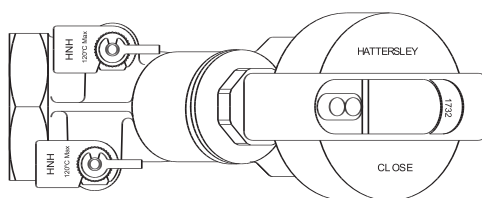
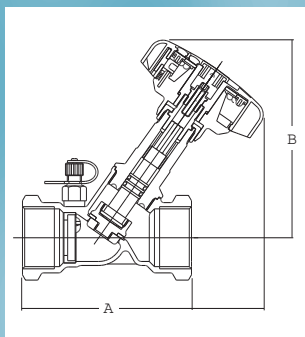
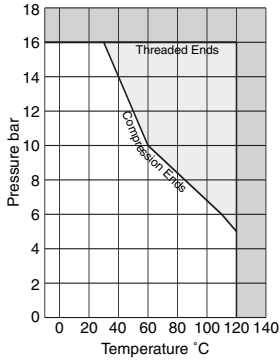


Fig. I832, I832M - I832L - I832C - I832MC - I832LC

**Bronze Motorised Fixed Orifice Double Regulating Valve
(Motorised FODRV) PN16 (Threaded): PN16 (Compression)**



**Pressure/Temperature Rating
Threaded Ends**

BS 5154 PN20 Series B – restricted
17.2 bar at 120°C
20 bar at -10 to 100°C

Compressions Ends

5 bar at 120°C
6 bar at 110°C
10 bar at 65°C
16 bar from 2 to 30°C

Test Pressure – Hydraulic

Body: 30 bar
Seat: 22 bar

Specification

Actuator operated for on/off or modulating control
Double regulating device allows flow to be balanced
Integral fixed orifice
Supplied with 2 Fig 631 test points
Flow charts available
End connections threaded
Sizes 1/2" & 3/4" to ISO 228 parallel
Sizes DN15 & DN20 when used with compression adaptors suitable for copper pipe to BS EN 1057 R250 (half hard)

The I832 Motorised FODRV is designed for installations in circuits where combined functions of actuated regulation and flow measurement are required.

Accuracy of flow measurement is + 5% across all driving settings.

I832: 1/2" has a flow range of 0.061 to 0.132 l/s
3/4" has a flow range of 0.131 to 0.289 l/s

I832M: 1/2" medium flow version is suitable for flow applications in the range of 0.03 to 0.07 l/s

I832L: 1/2" low flow version is suitable for flow applications in the range of 0.01 to 0.03 l/s

Material Specification

Component	Material	BS EN Specification
Stem	DZR copper alloy	12165 CW602N
Stem seals	EPDM	
Disk	EPDM	
Bonnet	DZR copper alloy	12165 CW602N
Body	Bronze	1982 CC491K
Orifice insert	DZR copper alloy	12165 CW602N
Fig. 631 Test valve	DZR copper alloy	12165 CW602N

Dimensions

Nominal Size	in	1/2L	1/2M	1/2	3/4
A	mm	87	87	87	96
A compression	mm	105	105	105	118
B - Height	mm	50	50	50	51
Weight	kg	0.41	0.41	0.41	0.45

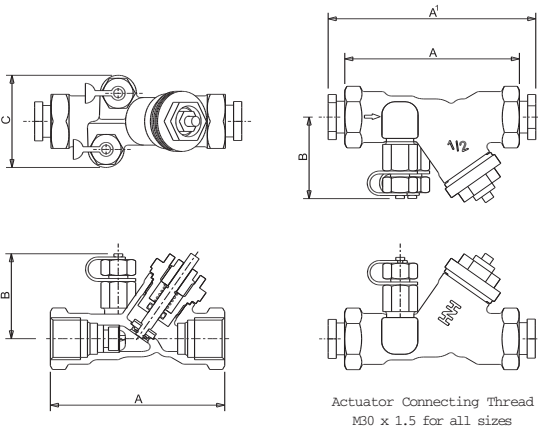


Fig. I 200DR

**Bronze Double Regulating Valves
PN40**



Pressure/Temperature Rating

BS5154 PN40 Series A
34 bar at 180°C
40 bar from -10 to 120°C

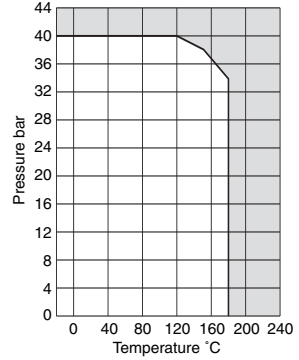
Note: The Valve Controlled Test Point figure 750 has a maximum working temperature of 180°C. If other test points are fitted the maximum operating temperature should be obtained from the test point manufacturer

Test Pressures (Hydraulic)

Shell: 60 bar
Seat: 44 bar

Specification

Conforms to BS7350.
Rising stem.
Screwed bonnet.
Flanged to BS4504 PN40.
Fitted with parabolic regulating disk in Stainless Steel, double regulating device and indicator
Valves can be fitted with padlock and chain as an optional extra.
Flow charts available.



Material Specification

Component	Material	Specification	
		BS EN	ASTM
Stem	Manganese Bronze	2874-CZ116	-
Gland Packing	Asbestos Free		
Bonnet	Bronze	1400 LG2	B62
Swivel Nut	Manganese Bronze	2874-CZ116	-
Disk	Stainless Steel		
Seat	Stainless Steel		
Body	Bronze	1400 LG2	B62
Extension Sleeve	Bronze	1400 LG2	B62
Test Point	Fig 750		

Dimensions

Nominal Size	mm	15	20	25	32	40	50
A	mm	133	146	162	184	200	238
B (open)	mm	168	187	213	238	267	306
D	mm	95	105	115	140	150	165
E (open)	mm	64	79	92	98	117	121
Weight	kg	2.5	3.5	4.9	7.5	10	14

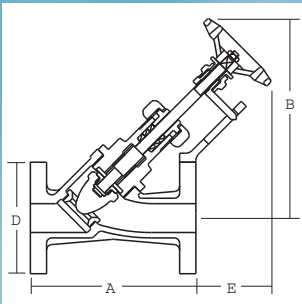
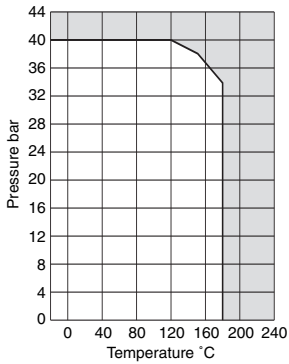


Fig. 4000
**Stainless Steel Metering Stations
PN40**

Pressure/Temperature Rating

PN40 Series A

34 bar at 180°C

40 bar from -10 to 120°C

Note: The Valve Controlled Test Point fig no 750 has a maximum working temperature of 180°C. If other test points are fitted the maximum operating temperature should be obtained from the test point manufacturer

Test Pressures (Hydraulic)

Shell: 60 bar

Specification

Conforms to BS7350

One piece full flange diameter

Integral orifice plate

Flange dimensions to BS4504 PN40

Supplied complete with 2 gaskets,

flange bolts, nuts and fig no 750

test points.

Flow charts available

Can also be used with figure

1200PN40 isolating valve to form an

orifice valve (PTV).



Use with figure 1200DR to make
Commissioning Set 5200.

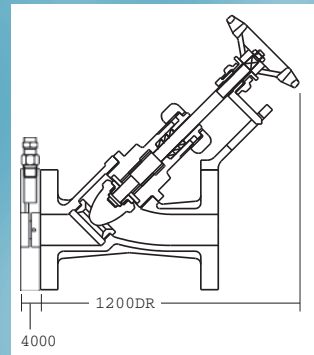
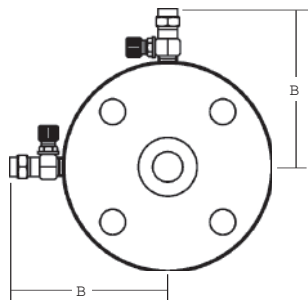
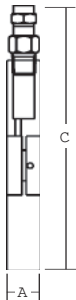
Material Specification

Component	Material	Specification	
		BS EN	ASTM
Metering Station	Stainless Steel	10088-1 X2CrNiMo 17-12-2	AISI 31617
Valve Controlled Test Point	Fig 750		

Dimensions

Nominal Size	mm	15	20	25	32	40	50
A	mm	18	18	18	18	18	18
B	mm	95	100	105	115	120	130
C	mm	140	150	160	185	195	210
Weight	kg	1.4	1.6	1.8	2.5	2.9	3.5

Weights shown above include test points and gaskets



Bronze Commissioning Valves Coefficients

Headloss Factor %

The head loss across a metering station is less than the differential pressure (ΔP) signal indicated at the pressure tappings as shown on the metering station flow charts. The value of head loss for the metering station is shown as a percentage of the signal in the tables above.

The head loss of the DRV is obtained from the graph at the fully open position at the particular design flow rate. The total head loss of the metering station and DRV (commissioning set), when directly coupled or independently located, is the summation of the two separate values.

Fig. 1000

Nominal Size	mm	15	22	28	32	40	50
Flow Kv		2.244	5.4	9.63	21.68	34.38	71.1
Headloss Factor		0.75	0.6	0.6	0.5	0.45	0.45
Kvs		1.943	4.181	7.46	15.33	23.06	47.7

Fig. 1000C

Nominal Size	mm	15
Flow Kv		2.354
Headloss Factor		0.75
Kvs		2.039

Fig. 1000M

Nominal Size	mm	15
Flow Kv		1.101
Headloss Factor		0.83
Kvs		1.003

Fig. 1000L

Nominal Size	mm	15
Flow Kv		0.533
Headloss Factor		0.9
Kvs		0.506

Fig. 1000MC

Nominal Size	mm	15
Flow Kv		1.129
Headloss Factor		0.83
Kvs		1.029

Fig. 1000LC

Nominal Size	mm	15
Flow Kv		0.539
Headloss Factor		0.9
Kvs		0.511

Fig. 1432 - 1432L - 1432C - 1432LC

Nominal Size	in	1/2L	1/2	3/4	1	1 1/4	1 1/2	2
1432 Flow Kv (fully open)		2.26	2.14	3.6	6.37	12.3	21.3	31.3
1432L Flow Kv			2.26					
1432C Flow Kv			2.14	3.6				
1432LC Flow Kv			2.26					

Fig. 2432 - 2432LM - 2432LL

Nominal Size	in	1/2	3/4	1	1 1/4	1 1/2	2
2432 Flow Kv		1.549	2.995	5.31	10.7	18.11	28.65
2432LM Flow Kv		0.99					
2432LL Flow Kv		0.519					

Bronze Commissioning Valves Coefficients

Fig. 1732 - 1732M - 1732L - 1732C - 1732MC - 1732LC

Nominal Size	in	1/2L	1/2M	1/2	3/4	1	1 1/4	1 1/2	2
1732 Flow Kv				1.87	3.14	5.59	10.8	18.1	29.1
1732 Kvs				1.943	4.181	7.46	15.33	23.06	47.7
1732M Flow Kv				1.06					
1732M Kvs				1.003					
1732L Flow Kv				0.57					
1732L Kvs				0.506					
1732C Flow Kv				1.87	3.14				
1732C Kvs				2.037	4.457				
1732MC Flow Kv				1.06					
1732MC Kvs				1.029					
1732LC Flow Kv				0.57					
1732LC Kvs				0.511					

Fig. 1832 - 1832M - 1832L - 1832C - 1832MC - 1832LC

Nominal Size	in	1/2	3/4
1832 Flow Kv		1.703	2.973
1832 Kvs		1.943	4.181
1832M Flow Kv		1.056	
1832M Kvs		1.003	
1832L Flow Kv		0.532	
1832L Kvs		0.506	
1832C Flow Kv		1.703	2.973
1832C Kvs		2.037	4.457
1832MC Flow Kv		1.056	
1832MC Kvs		1.029	
1832LC Flow Kv		0.532	
1832LC Kvs		0.511	

Fig. 1200DR

Nominal Size	mm	15	20	25	32	40	50
Flow Kv		4.74	9.96	18.46	26.71	42.15	70.95

Fig. 4000

Nominal Size	mm	15	20	25	32	40	50
Flow Kv		2.293	5.331	9.506	22.15	36.36	70.91
Headloss Factor		0.75	0.6	0.6	0.5	0.45	0.45
Kvs		1.986	4.129	7.363	15.66	24.39	47.57