

PRESSURE REDUCING VALVES

RP45

(Threaded)

DESCRIPTION

The ADCA RP45 series of pressure reducing valves are single seated, bellows sealed controllers that operate without auxiliary energy. Designed for use with steam, compressed air, and other gases compatible with the construction.

These valves are particularly suitable for reducing steam pressure in all energy and process systems where pressures must be kept under control.

MAIN FEATURES

Specially designed high durability bellows, providing pressure balancing and frictionless plug stem.

Robust construction (fit-and-forget).

Suitable for use with high pressure turndowns.

Interchangeable actuators and adjustment springs.

OPTIONS: Soft sealing in PTFE/GR for use with steam.
Soft sealing in nitrile rubber for use with air and gases.
Sensing line connection on body.

USE: Steam, compressed air and other gases compatible with the construction. Limited use with liquids. Consult manufacturer before installing the valve with liquids.

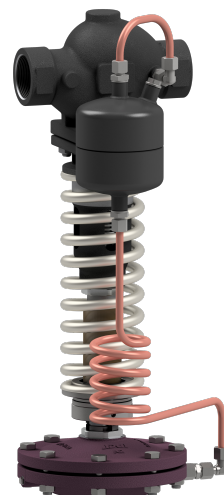
AVAILABLE MODELS: RP45S – carbon steel.
RP45i – stainless steel.

SIZES: 1/2" to 2".

CONNECTIONS: Female threaded ISO 7 Rp or NPT.
Socket weld (SW) ASME B16.11.
Butt weld (BW) ASME B16.25 on request.

AVAILABLE ACTUATORS: A1, A10, A11, A12, A3, A4 – carbon steel.
A2, A21, B2 and B21 – SG iron or carbon steel.
A1i, A10i, A11i, A12i, A2i, A21i, A3i and A4i – stainless steel.

INSTALLATION: See IMI – Installation and maintenance instructions.
In steam applications, a "Y" strainer, humidity separator, and steam trap should be installed upstream of the valve.



CE MARKING – GROUP 2 (PED – European Directive)	
PN 40	Category
1/2" to 1"	SEP
1 1/2" and 2"	1 (CE marked)

LIMITING CONDITIONS – VALVE

MODEL	RP45S and RP45i
Body design conditions	PN 40
Maximum upstream pressure	25 bar
Maximum downstream pressure	18 bar
Minimum downstream pressure	0,15 bar
Maximum operating temperature *	250 °C
Maximum reducing ratio *	25:1
Rangeability	10:1
Maximum hydraulic factory valve body test	60 bar

* See "Ordering Codes" table for restrictions.

LIMITING CONDITIONS – ACTUATOR

ACTUATOR MODEL	A1 A1i	A10 A10i	A11 A11i	A12 A12i	A2 A2i	A21 A21i	A3 A3i	A4 A4i
Maximum operating pressure (bar)	25	25	25	25	12	18	2,5	1,5
Maximum operating temperature	90 °C *							

* See "Sensing Line Connection Options" table.

FLOW RATE COEFFICIENTS (m³/h)

SIZE	1/2"	3/4"	1"	1 1/2"	2"
Kvs	4,8	6,9	9,1	14,4	26,5

SATURATED STEAM CAPACITY TABLE (kg/h)

INLET (barg)	SIZE				
	1/2"	3/4"	1"	1 1/2"	2"
0,5	51	68	90	186	300
0,75	63	84	112	230	360
1	75	100	133	280	430
1,5	100	133	175	360	590
2	126	170	230	450	730
2,5	150	200	260	550	880
3	175	240	310	640	1010
4	220	290	390	800	1300
5	260	350	480	1000	1600
6	330	440	580	1220	1930
7	400	520	700	1430	2300
8	450	600	800	1670	2700
9	500	670	880	1800	2900
10	560	750	980	2000	3200
12	680	900	1180	2500	4000
14	800	1050	1400	2900	4700
16	920	1230	1630	3400	5500
18	1040	1400	1860	3800	6200
20	1170	1540	2100	4200	7000
22	1330	1780	2350	4900	7800
24	1500	2000	2600	5400	8700
25	1600	2150	2800	5700	9200

Remark: For pressure ratios where $P_2 > 0,7 P_1$ and/or when the operating medium is superheated steam, a correction factor must be applied. See next page.

CORRECTION FACTORS

Pressure ratio:

The capacities given in the "Saturated steam capacity table" are applicable in scenarios where $P_2 < 0,7 P_1$.

In the remaining scenarios a correction factor must be applied.

PRESSURE RATIO * P_2 / P_1	CORRECTION FACTOR f
$\geq 0,7$	1,25
$\geq 0,8$	1,6
$\geq 0,9$	2,25

* Pressure ratio in bar abs (barg + 1)

Example

Required saturated steam capacity: 300 kg/h; Upstream pressure: 3 bar; Required downstream pressure: 2 bar.

Solution:

First determine the correction factor for pressure ratio: $(2+1) / (3+1) = 0,75 \rightarrow f = 1,25$

Then multiply by the given capacity: $300 \times 1,25 = 375 \text{ kg/h}$

Afterwards, refer to the cell with the number "3" in the column "INLET" of the saturated steam capacity table. In that line, the values for selection of the pressure reducing valve size can be found. In this particular scenario, a value equal to or higher than 375 kg/h is required, and the right selection would be a 1 1/2", with a capacity of 640 kg/h.

In the actuator and spring selection table, for a downstream pressure of 2 bar, the recommended actuator is the A2, with a regulating spring No. 60.

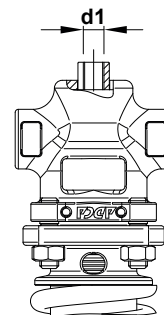
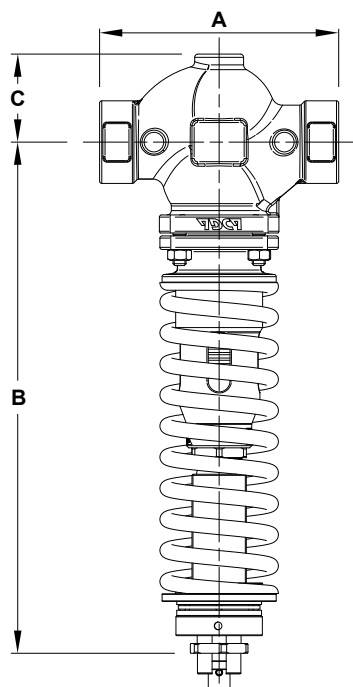
Superheated steam:

When the medium is superheated steam, instead of saturated steam, a correction factor must be applied. The required mass flow must be multiplied by the following factor:

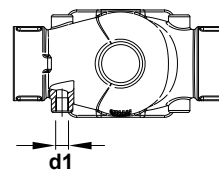
$$\frac{V_h}{V_s}, \text{ where } V_h = \text{specific volume of superheated steam, and} \\ V_s = \text{specific volume of saturated steam.}$$

ACTUATOR AND SPRING SELECTION TABLE

SIZE		A4 A4i		A3 A3i	A2 A2i	A21 A21i	A1 A1i	A10 A10i	A11 A11i	A12 A12i
1/2"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1 to 1,6	1,7 to 3,8	3,9 to 5,5	5,6 to 8,2	—	8,3 to 13	10 to 18
	Spring No.	66	60	60	60	60	60	—	60	60.1
3/4"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1 to 1,6	1,7 to 3,8	3,9 to 5,5	5,6 to 8,2	—	8,3 to 13	10 to 18
	Spring No.	66	60	60	60	60	60	—	60	60.1
1"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1 to 1,6	1,7 to 3,8	3,9 to 5,5	5,6 to 8,2	—	8,3 to 13	10 to 18
	Spring No.	66	60	60	60	60	60	—	60	60.1
1 1/2"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1 to 1,6	1,7 to 3,8	3,9 to 5,5	5,6 to 8,2	—	8,3 to 13	10 to 18
	Spring No.	66	60	60	60	60	60	—	60	60.1
2"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1 to 1,9	2 to 4,2	4,3 to 6,9	7 to 8,5	10 to 18	8,6 to 13	—
	Spring No.	67	61	61	61	61	64	61	64	—



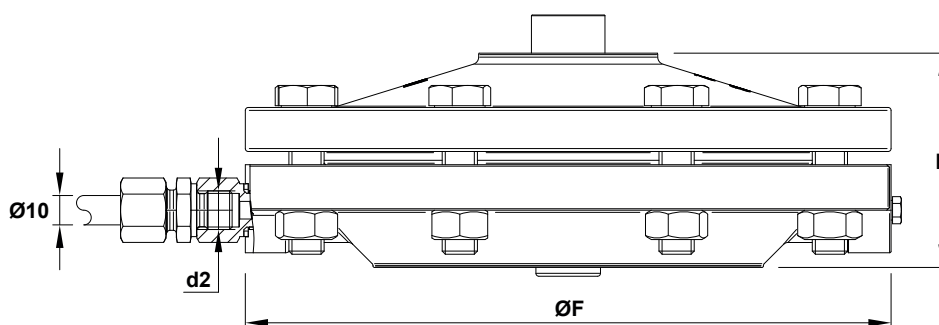
Optional sensing line connection on body
(1/2" to 1")



Optional sensing line connection on body
(1 1/2" and 2")

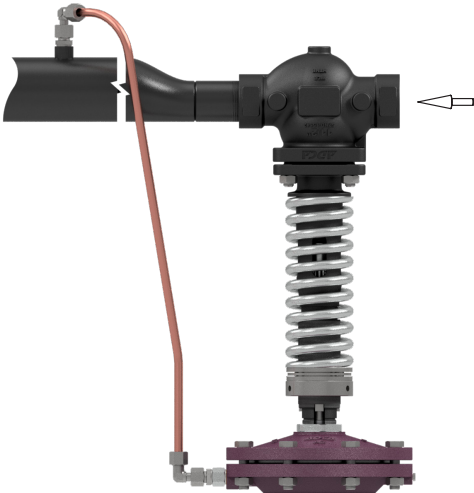
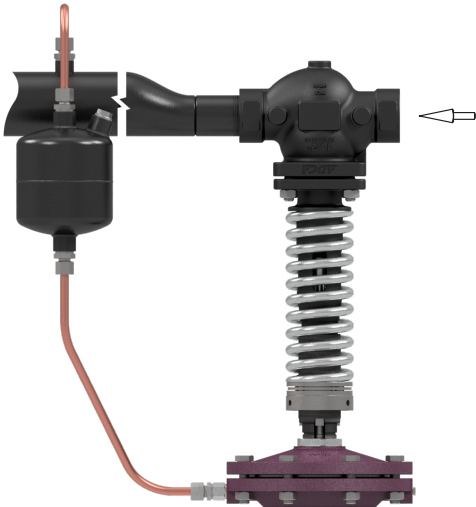
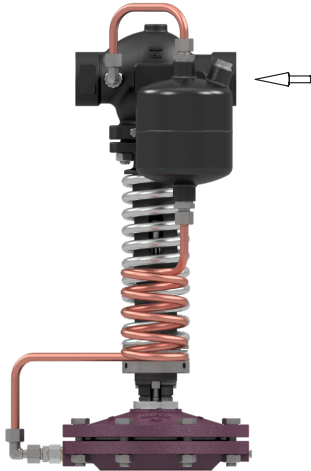
DIMENSIONS – VALVE (mm)

DIMENSION	SIZE				
	1/2"	3/4"	1"	1 1/2"	2"
A	100	100	100	190	220
B	364	364	364	384	470
C	38	38	38	65	81
d1	3/8"	3/8"	3/8"	1/4"	1/4"
WEIGHT (kg)	7,9	7,9	7,9	12,3	17,4



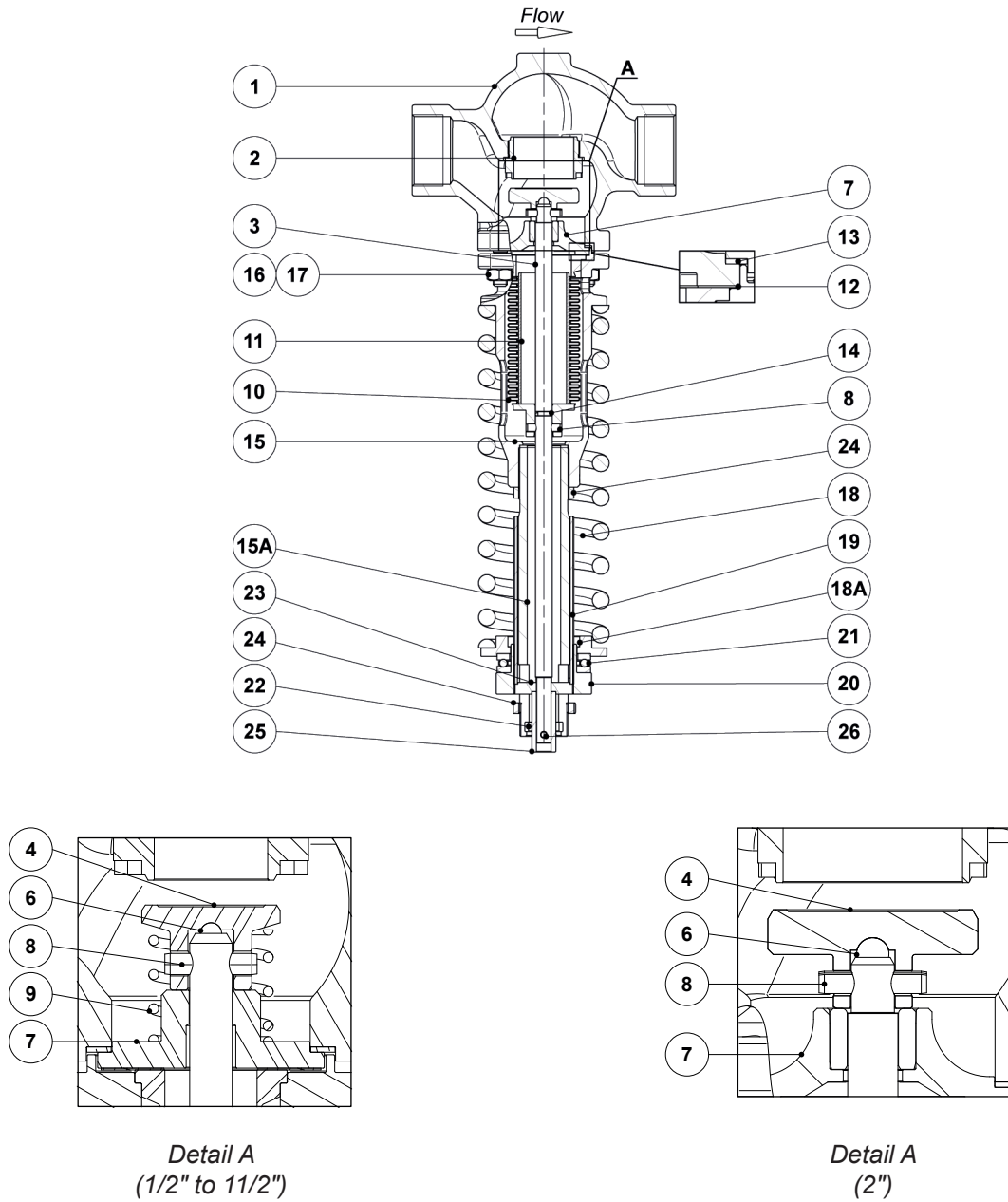
DIMENSIONS – ACTUATOR (mm)

DIMENSION	A1 A1i	A10 A10i	A11 A11i	A12 A12i	A2 A2i	A21 A21i	A3 A3i	A4 A4i
d2	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"
E	67	67	67	67	74	74	71	81
ØF	172	172	172	172	220	220	282	340
WEIGHT (kg)	4,3	4,3	4,3	4,3	7,3	7,3	11,3	16,3

SENSING LINE CONNECTION OPTIONS	
EXTERNAL SENSING LINE  For use with gases below 90 °C. For gases between 90 °C and 130 °C, please consult the manufacturer. Installation with the actuator oriented upwards is also acceptable. The sensing line should be connected at least 1 meter downstream of the valve outlet.	EXTERNAL SENSING LINE WITH POT *  Applicable for steam. The sensing tube and seal POT are ordered and supplied separately. Installation must be carried out with the actuator oriented downward. The sensing line should be connected at least 1 meter downstream of the valve outlet.
SENSING LINE CONNECTION ON BODY  For use with gases below 90 °C. For gases between 90 °C and 130 °C, please consult the manufacturer. Installation with the actuator oriented upwards is also acceptable. The valve can be supplied with the sensing tube factory-installed. If not supplied installed, the connection at the body is delivered closed with a plug. The image shows the connection and sensing tube positioned on the left side relative to the flow direction. If installation constraints require, the connection may also be made on the right side. For valves up to DN 25, the sensing connection is located at the cast boss on the bottom of the valve body.	SENSING LINE CONNECTION ON BODY WITH POT *  Applicable for steam. Installation must be carried out with the actuator oriented downward. The valve can be supplied with the sensing tube and seal POT factory-installed. If these components are not supplied installed, the connection at the body is delivered closed with a plug. The image shows the connection, sensing tube, and POT positioned on the left side relative to the flow direction. If installation constraints require, the connection may also be made on the right side. For valves up to DN 25, the sensing connection is located at the cast boss on the bottom of the valve body.

* For more information, please consult IS POT.010 – Water seal pots.

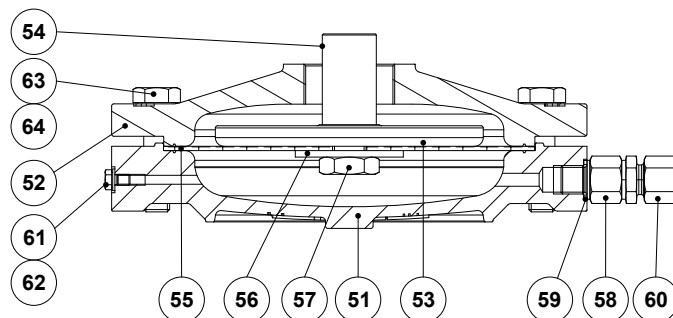
MATERIALS



MATERIALS – VALVE

POS. No.	DESIGNATION	MATERIAL
1	Valve body (RP45S)	A216 WCB / 1.0619
	Valve body (RP45i)	A351 CF8M / 1.4408
2	* Seat	AISI 316 / 4.4401
3	* Stem	AISI 304 / 1.4301
4	* Valve plug	AISI 420 / 1.4021
6	* Ball	AISI 440C / 1.4125
7	Stem guide	AISI 304 / 1.4301
8	* Pin	AISI 301 / 1.4310
9	Compensating spring	AISI 302 / 1.4300
10	* Bellows	AISI 316Ti / 1.4571
11	Guide tube	CuZn39Pb3
12	* Bellows gasket	Stainless steel / Graphite
13	* Body gasket	Stainless steel / Graphite
14	* O-ring	** EPDM
15	Piston body (RP45G and RP45S)	A216 WCB / 1.0619
	Piston body (RP45i)	A351 CF8M / 1.4408
15A	Piston body extension (RP45G and RP45S)	P355T1 / 1.0421
	Piston body extension (RP45i)	AISI 304 / 1.4301
16	Stud (RP45G and RP45S)	Steel 8.8; EN 10269 steel
	Stud (RP45i)	Stainless steel A2-70
17	Nut (RP45G and RP45S)	Steel 8.8; EN 10269 steel
	Nut (RP45i)	Stainless steel A2-70
18	* Adjustment spring	Spring steel
18A	Lower spring plate (RP45G and RP45S)	C45E / 1.1191
	Lower spring plate (RP45i)	AISI 304 / 1.4301
19	Threaded tube	CuZn39Pb3
20	Spring adjusting nut	AISI 304 / 1.4301
21	Ball bearing	Zinc plated steel
22	Spacer (RP45G and RP45S)	S355JR / 1.0045
	Spacer (RP45i)	AISI 304 / 1.4301
23	Pressure star (RP45G and RP45S)	S235JR / 1.0038
	Pressure star (RP45i)	AISI 304 / 1.4301
24	Lock nut	AISI 303 / 1.4305
25	Pressure tube (RP45G and RP45S)	C45E / 1.1191
	Pressure tube (RP45i)	AISI 304 / 1.4301
26	Pin	AISI 303 / 1.4305

* Available spare parts. ** Others on request.



A series actuators

MATERIALS – ACTUATOR				
POS. No.	DESIGNATION	A1, A10, A11, A12, A3 and A4	A2 and A21	A1i, A10i, A11i, A12i, A2i, A21i, A3i and A4i
51	Lower diaphragm chamber	A216 WCB / 1.0619	GJS-400-15 / 0.7040; A216 WCB / 1.0619	A351 CF8M / 1.4408
52	Upper diaphragm chamber	A216 WCB / 1.0619	GJS-400-15 / 0.7040; A216 WCB / 1.0619	A351 CF8M / 1.4408
53	Pressure plate	A216 WCB / 1.0619	GJS-400-15 / 0.7040	A351 CF8M / 1.4408; AISI 304 / 1.4301
54	Diaphragm plate spindle	A216 WCB / 1.0619	GJS-400-15 / 0.7040	A351 CF8M / 1.4408; AISI 304 / 1.4301
55	* Diaphragm	Neoprene reinforced polyamide	Neoprene reinforced polyamide	Neoprene reinforced polyamide
56	Washer	Copper	Copper	AISI 304 / 1.4301
57	Hex nut	CuZn39Pb3	CuZn39Pb3	AISI 304 / 1.4301
58	Flow restrictor	AISI 303 / 1.4305	AISI 303 / 1.4305	AISI 303 / 1.4305
59	Gasket	Copper	Copper	Copper
60	Compression fitting	AISI 316Ti / 1.4571	AISI 316Ti / 1.4571	AISI 316Ti / 1.4571
61	Vent screw	Zinc plated steel	Zinc plated steel	AISI 304 / 1.4301
62	Washer	Copper	Copper	AISI 304 / 1.4301
63	Bolt	Zinc plated steel	Zinc plated steel	AISI 304 / 1.4301
64	Nut	Zinc plated steel	Zinc plated steel	AISI 304 / 1.4301

* Available spare parts.

ORDERING CODES RP45

VALVE MODEL	RP45	1	S	60	M	0	XX	X	A	15
RP45 – Pressure reducing valve	RP45									
VALVE SERIES										
Series 1		1								
BODY MATERIAL										
A216 WCB / 1.0619 carbon steel			S							
A351 CF8M / 1.4408 stainless steel			I							
SPRING No.										
60 (1/2" to 11/2")				60						
60.1 (1/2" to 11/2")				6A						
61 (2")				61						
64 (2")				64						
66 (1/2" to 11/2")				66						
67 (2")				67						
VALVE SEALING										
Metal to metal					M					
Soft sealed with PTFE/GR – Tmax 200 °C					G					
Soft sealed with NBR – Tmax 80 °C; Maximum reducing ratio 10:1					N					
SENSING LINE CONNECTION ON BODY (a)										
Without sensing line connection on body						0				
Threaded connection on the bottom (1/2" to 1") – ISO 228						1				
Threaded connection on the left side, relative to flow direction (11/2" and 2") – ISO 228						4				
Threaded connection on the right side, relative to flow direction (11/2" and 2"; non-standard construction) – ISO 228						3				
Threaded connection on both sides (11/2" and 2"; non-standard construction) – ISO 228						2				
Threaded connection on the bottom (1/2" to 1") – NPT						V				
Threaded connection on the left side, relative to flow direction (11/2" and 2") – NPT						W				
Threaded connection on the right side, relative to flow direction (11/2" and 2"; non-standard construction) – NPT						Y				
Threaded connection on both sides (11/2" and 2"; non-standard construction) – NPT						Z				
OPTIONS										
Standard valve							XX			
Valve with carbon steel piston body (only for RP45i)							XS			
SPECIAL FEATURES										
None								X		
PIPE CONNECTIONS										
Female threaded ISO 7 Rp									A	
Female threaded NPT ASME B1.20.1									C	
Socket weld (SW) ASME B16.11									H	
SIZE										
1/2"										15
3/4"										20
...										
SPECIAL CONSTRUCTION / ADDITIONAL OPTIONS										
Full description or additional codes have to be added in case of non-standard combination										E

(a) Connections are closed with plugs in case the valve is not supplied with the tube pre-assembled from factory.

HOW TO ORDER

Indicate the complete valve ordering code together with the required actuator size. If the valve is to be supplied with factory-installed sensing tube, it must be stated in the order. In that case, also specify whether a seal POT is to be installed.
Example: RP451S60MWXXXXA40 fitted with A2 actuator and sensing line connection on body with POT-4S.