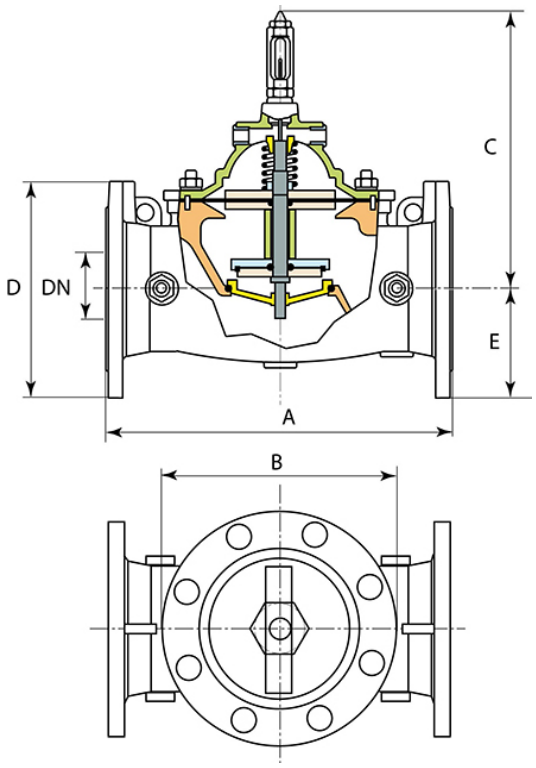
09/06/2026
VPPCV21SPD500

Pressure reducer and flow control valve type E2114-02



Flanges in conformity with ISO 7005-2.

PN10-16

DN	A	B	C	D	E
mm	mm	mm	mm	mm	mm
50	230	148	246	165	85
60	290	148	246	185	95
65	290	148	246	185	95
80	310	148	246	200	100
100	350	206	272	220	110
125	400	267	330	250	125
150	480	267	330	285	145
200	600	356	402	340	170

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DN	A	B	C	D	E
mm	mm	mm	mm	mm	mm
250	730	445	569	400	200
300	850	597	649	455	230
350	980	597	649	520	255
400	1100	750	786	565	285
500	1250	842	840	670	335
600	1450	905	956	780	390
700	1650	1110	1080	910	460

PN25

DN	A	B	C	D	E
mm	mm	mm	mm	mm	mm
50	230	148	246	165	85
60	290	148	246	185	95
65	290	148	246	185	95
80	310	148	246	200	100
100	350	206	272	220	110
125	400	267	330	250	125
150	480	267	330	285	145
200	600	356	402	340	170
250	730	445	569	400	200
300	850	597	649	455	230
350	980	597	649	520	255
400	1100	750	786	565	285
500	1250	842	840	670	335
600	1450	905	956	780	390
700	1650	1110	1080	910	460

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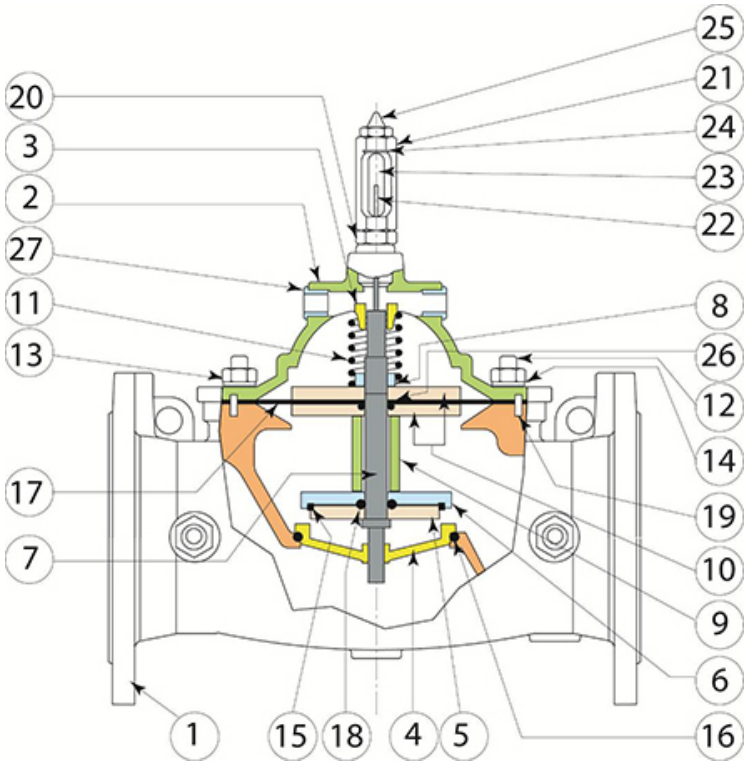
Material and coating



Item	Quantity	Description	Material
01	01	Body	FGS 400-15 (coating BFE epoxy 250µm mini)
02	01	Cover	FGS 400-15 (coating BFE epoxy 250µm mini)
03	01	Cover bearing	Bronze
04	01	Seat	AISI 316
05	01	Quad-ring retainer plate	AISI 316
06	01	Quad-ring retainer size 50-200	AISI 316
07	01	Stem	AISI 303
08	02	Stem nuts	AISI 303
09	01	Spacer	AISI 303
10	02	Diaphragm washers epoxy coated	Steel
11	01	Spring	AISI 302
12	*	Stud	AISI 303
13	*	Nut	AISI 303

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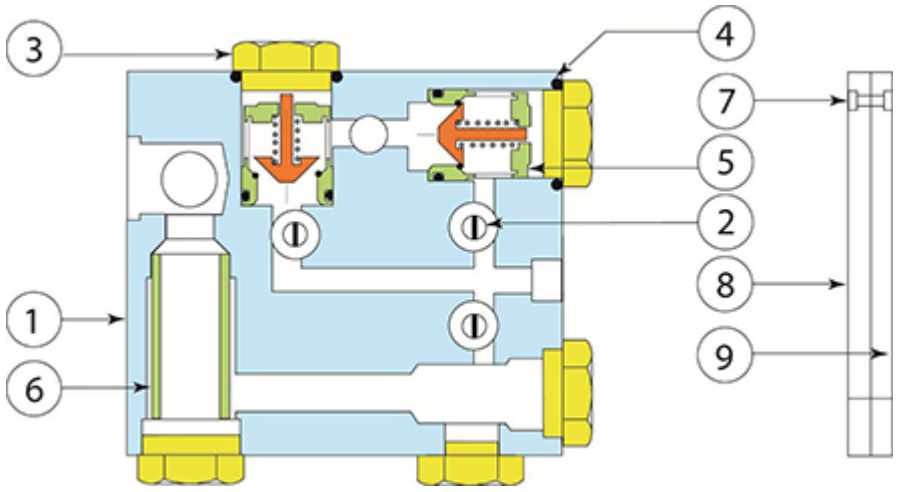
Item	Quantity	Description	Material
14	*	Washer	AISI 303
15	01	Quad-ring	NBR (KTW-WRC)
16	01	Seat O-ring	Viton
17	01	Diaphragm	NBR nylon reinforced (KTW-WRC)
18	01	O-ring	NBR
19	02	Centring taper pin	AISI 303
20	01	Base position indicator	Brass Ni-plated
21	01	Position indicator housing	Brass Ni-plated
22	01	Position indicator stem	AISI 303
23	01	Position indicator	Glass
24	02	O-ring	NBR
25	01	Brass Ni-plated	Brass Ni-plated
26	01	O-ring	NBR
27	01	Reduction	AISI 304

Central Control Unit TUP 93



Item	Quantity	Description	Material (type)
01	01	Body	AISI 303
02	03	Cock	AISI 303
03	03	Plug	AISI 303

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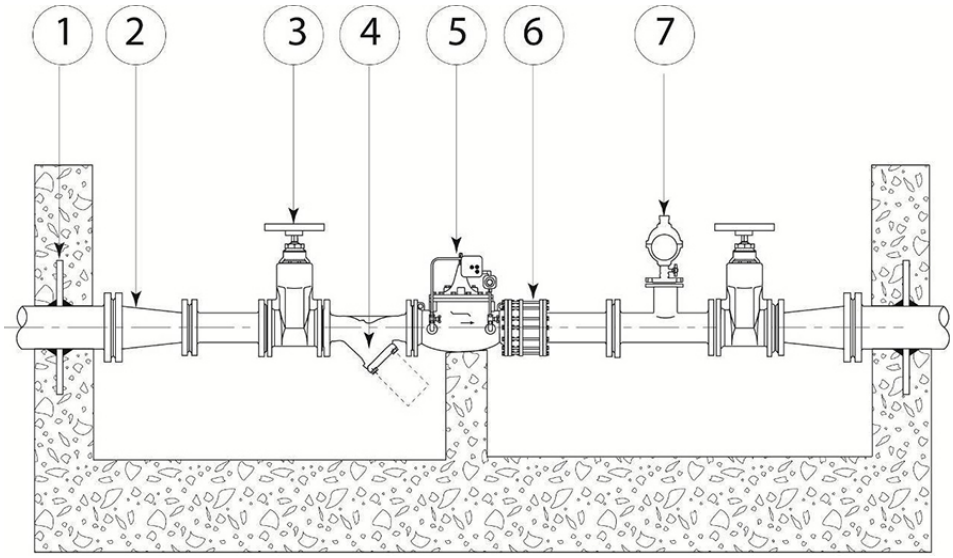
Item	Quantity	Description	Material (type)
04	03	O-ring	NBR
05	02	Non return valve (WRC)	
06	01	Screen	AISI 316
07	01	Rivet	Brass
08	01	Bottom label	Polycarbonate makrolon
09	01	Top label	Polycarbonate makrolon

Mounting scheme (I)



Item	Quantity	Description
01	2	Attachment flange
02	2	Flanged taper
03	3	Isolating valve
04	1	Strainer with drain cock
05	1	Automatic control valve E2001
06	1	Dismantling joint
07	1	Air release / vacuum breaker valve

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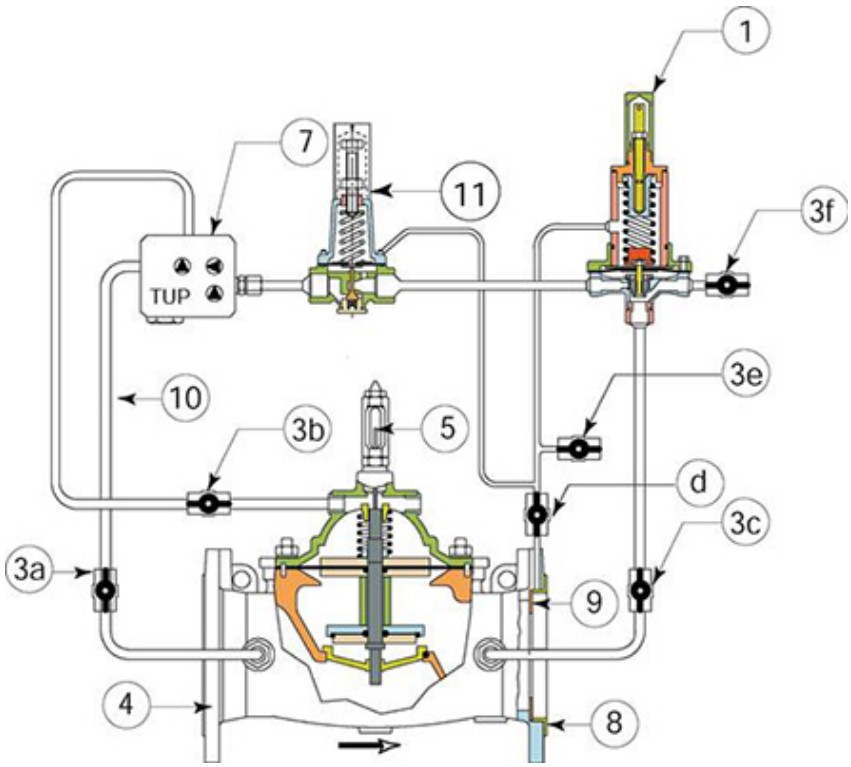
Hydraulic scheme



Item	Description	Material
1	Rate of flow control pilot	IS14
3a-3b-3c	Ball valve	Brass Ni-plated
3d	Ball valve	Brass Ni-plated
3e-3f	Ball valve (differential manometer)	Brass Ni-plated
4	Main valve	E2001
5	Position indicator with manual venting cock	E50
7	Centralized control unit	TUP 93
8	Clamping ring	Bronze
9	Calibrated orifice plate	Inox AISI 304
10	Tube	Inox AISI 304
11	Pressure reducer pilot	SS 263 RS

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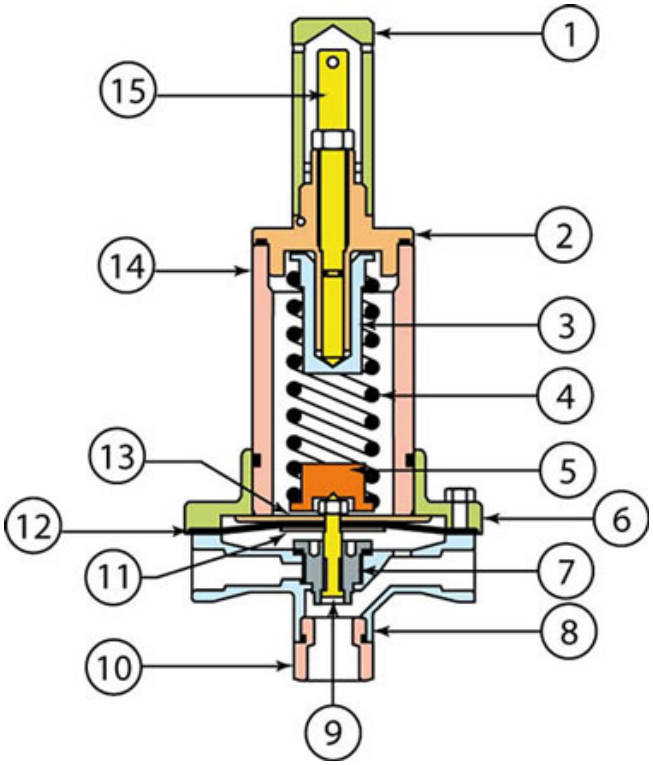
Pilot IS 14



Item	Description	Material
1	Cap	PVC
2	Top cover	Brass Ni-plated
3	Top spring guide	Brass Ni-plated
4	Spring	Inox AISI 302
5	Bottom spring guide	Brass Ni-plated
6	Bottom cover	Bronze + Ni-plated
7	Obturator bushing	Delrin
8	Main body	Bronze + Ni-plated
9	Obturator	Inox AISI-303
10	Adaptor	Brass Ni-plated
11	Bottom diaphragm washer	Inox AISI-304
12	Diaphragm	NBR nylon reinforced
13	Top diaphragm washer	Inox AISI-304

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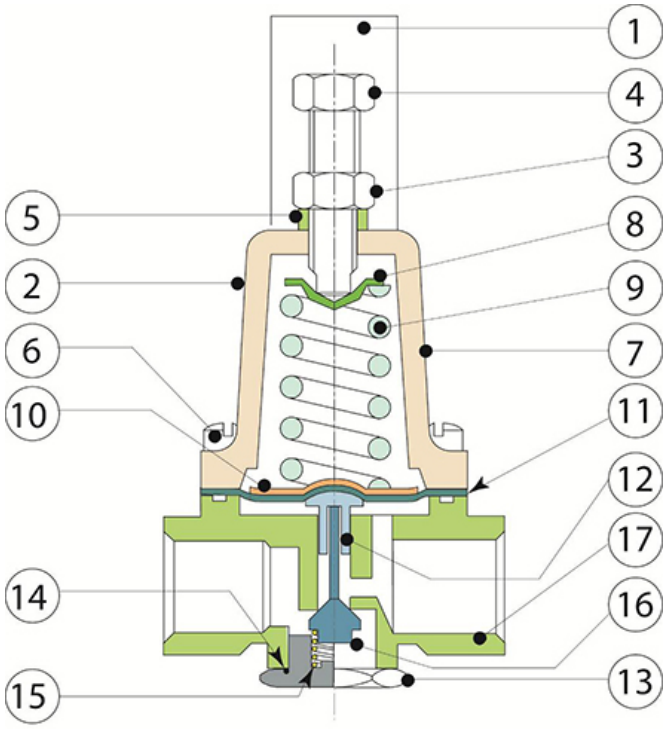
Item	Description	Material
14	Pilot extension	Bronze + Ni-plated
15	Setting screw with counter nut	Inox AISI-304

Pilot 263 SS



Item	Number	Description	Material
01	01	Protection cap (lockable)	PVC
02	01	Plastic label (identity card)	
03	01	Nut-adj-screw	AISI 302
04	01	Setting screw	AISI 302
05	01	Cap adaptor	Brass
06	04	Cover screw	AISI 302
07	01	Pilot cover	AISI 303
08	01	Top spring guide	AISI 303
09	01	Spring	AISI 302

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Item	Number	Description	Material
10	01	Diaphragm washer	AISI 304
11	01	Diaphragm	NBR nylon reinforced
12	01	Diaphragm button	AISI 303
13	01	Bottom obturator plug	AISI 303
14	01	O'ring	NBR
15	01	Obturator - spring - button	AISI 302
16	01	Obturator (Y-poppet)	AISI 303
17	01	Body	AISI 303

Installation

Packing and storage

The valves are packed in special cardboard boxes. Outside the carton are clearly pointed out:

- The arrow indicating the position of the valve
- The name of the customer
- The code of the valve
- The number of order confirmation

The valve is protected by two hardening foam cushions, carefully coated by a thermal plate.
This kind of packing if properly stored avoids all the damages originated from transport, unloading, and handling before installation. Avoid storing it under the rain for more than 24 hours!
Open the upper side of the carton and remove the upper cushion. Do not lift the valve by utilizing the pilot, the pilot circuit, or the position indicator.
For any kind of handling we recommend to utilize proper eyebolts.

Installation

The mounting scheme of an automatic control valve must follow the indications. The choice of the proper "by-pass" alternative must be taken considering the following points:
a- Could alimentation line be put out of service for several hours (corresponding to the time requested for valve maintenance) without creating pipeline utilization problems? In particular must be considered that putting back in service an empty pipeline needs several days before air total and perfect evacuation.
b- Could the downstream plant part be exposed to overpressures in case of sudden reductions of consumption at lower values than the one limited by the valve ?
With the purpose to obtain a perfect working of control valve, the prescribed flow rate must be contained within the setting range of pilot IS14 (1). Setting range it is usually included between a minimum value corresponding to a flow speed of 1 m/s and a maximum value of 2.5 m/s (flow speed measured on flow rate control valve inlet section). If flow rate it is out of this range, measure diaphragm (9) must be replaced!!
Should installation require the main valve stem to be horizontal (cover pointed sideways), manufacturer should be consulted concerning valves of DN200 mm and larger.
Note: All sizes on request are available with an additional venting cover device (venting cock installed at the top of the cover) to permit a simple escaping of air during the first commissioning.

- Before control valve assembly, make sure that pipeline it is free from foreign matters or any other obstacle. (note: pipeline must be cleaned, possibly, before assembly. For an ideal pipeline cleaning we suggest a 1.5 m/sec speed during several hours!).

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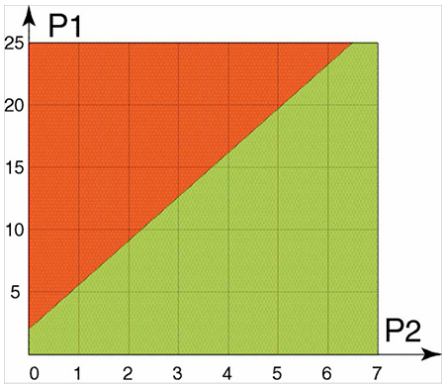
- In presence of foreign matters into the fluid it is indispensable to adopt a strainer on valve upstream side.
- Keep free around the valve space enough for operations as maintenance and calibration.
- Set up the valve according to main valve cast arrow indicating flow sense.
- Install the valve so that the FLOW ARROW marked on the valve body matches flow through the line: UPSTREAM → DOWNSTREAM
- Regulate control unit TUP - 93 (Q5 14 02 06, ref. 3) as follows:
- a- Valve reaction speed [RS] is normally realized in factory during assembling and testing. Reaction speed adjusting screw must be positioned on value 2,5;
- b- Opening speed adjusting [OS]: 2; c) Closing speed adjusting [CS]: 4.
- c- b) and c) values must be verified and eventually modified on plant with the purpose to optimize valve working.
- Close main valve (4) upstream and downstream side isolating valves.
- Open isolating ball valve (3) of valve control circuit excepted the ones, (3E) and (3F), utilized as pressure drive; non cocks opening can create troubles to the valve.

For a correct start-up of the valve it is indispensable to have on plant a flow rate meter adjusting needed flow rate. If not available it is possible to replace it by a differential manometer linked as follows:

- Manometer upstream side [HP] on pilot (1) cock (3F);
- Manometer downstream side [LP] on cock (3E) of the flange containing measure diaphragm (9).

THE START-UP OF AN AUTOMATIC VALVE REQUIRES THAT PROPER PROCEDURES BE FOLLOWED. TIME MUST ALLOW AFTER EACH SETTING, FOR THE VALVE TO REACT TO ADJUSTEMENT AND THE SYSTEM STABILIZE. THE PURPOSE IS TO BRING THE VALVE INTO SERVICE IN A CONTROLLED MANNER.



Operational limits

Cavitation diagram: it's the admissible differential pressure normally used in the regulating valve

P1 = Maximum inlet pressure of the valve
P2 = Minimum outlet pressure before danger of cavitation occurs

Green area: no danger of cavitation (and therefore no significant wear on the valve)

Red area: notable danger of cavitation (with accelerate wear and damage of the valve)

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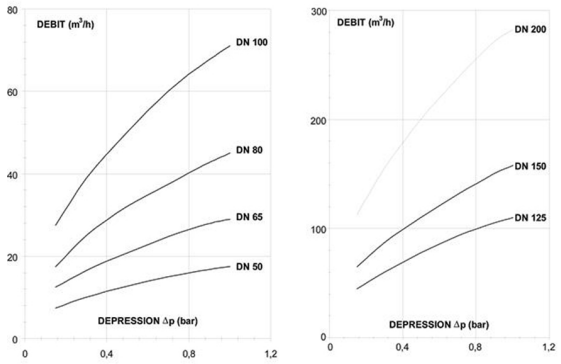

Flow rate/depression - diagram (measured on the office ref.9)

Functioning (see hydraulic scheme)

The automatic control valve E2114-02 is controlled by a two ways pilot (1) operated by a diaphragm, submitted on a side by a spring and on the other side by a differential of pressure ([HP] - [LP]) obtained by a measured calibrated diaphragm (9). When the hydraulic power created by the differential of pressure balances mechanic force given to the spring regulated in function of required flow rate, the pilot starts regulating giving flow rate value.

The differential of pressure represents the difference between inlet [HP] and outlet [LP] of calibrated diaphragm. This is the quadratic function of flow rate passing through measure diaphragm (9). The pressure [HP] works directly under the membrane of flow rate control pilot (1) while reduced pressure comes into the pilot upper chamber through a sensing line and it operates on the diaphragm upper surface. In this way the pilot membrane it is submitted to differential of pressure given by calibrated diaphragm (9), contrasted by spring action working on the membrane. Pilot setting range permits to regulate the flow rate passing through the main valve (4) in the ratio of 1:2,5 if the system consents to have higher flow rates than this value.

When flow rate increases over the value regulated on the pilot (1), the membrane sets against the spring action closing partially the pilot, reducing flow rate and straining the circuit into main valve control chamber (4) that shuts controlling flow rate. Main valve closing speed (4) can be changed by control unit TUP - 93 (7) from value 1 (minimum speed) up to value 6 (maximum speed).

When flow rate decreases below regulated value on pilot (1), the membrane helps spring action that makes pilot open, increasing passing flow rate and discharging circuit pressure from main valve control chamber (4), increasing flow rate. Main valve closing speed (4) can be changed by control unit TUP - 93 from value 1 (minimum speed) up to value 6 (maximum speed).

Acting on the adjusting screw of pressure reducing pilot (11) is possible to control the downstream pressure. The pressure reducing pilot (11) controls downstream pressure and avoids that downstream pressure value exceeds the one regulated by the adjusting screw.

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When downstream pressure increases, due to the lower flow, the pilot (11) makes main valve (4) toward closed position. In the opposite case the pilot (11) makes main valve (4) opening. In this way it is insured the regulated pressure value.

Recommended flow rate range

Differential pressure to be done or available headloss

	≤ 2 bars	≥ 2 bars	<1 bar	> 1 bar	
			Fluid velocity in the inlet section valve		
			2,3 m/s	3,4 m/s	4,3 m/s
DN	Flow Q mini		Flow Q maxi		
			Advisable		Max. cont.
mm	m³ / h	m³ / h	m³ / h	m³ / h	m³ / h
50	1,25	3,85	15	25	29
65	1,25	3,85	28	40	50
80	1,25	3,85	43	61	79
100	1,90	5,85	65	97	122
125	3,00	9,20	101	151	191
150	3,00	9,20	148	216	274
200	5,85	18,00	259	385	486
250	9,20	28,25	407	601	760
300	13,50	41,50	583	864	1094
350	13,50	41,50	796	1177	1487
400	19,00	58,50	1040	1537	1944
500	26,50	81,50	1624	2401	3038
600	36,00	110,50	2340	3460	4374
700	60,00	190,00	3186	4710	5957

Initial set up

Open isolating cocks 3 A-B-D and maintain closed the 3C, of control circuit

1. **Rate of flow pilot (1)**: remove pilot valve protection unscrewing it, turn counter clockwise (OUT) adjusting screw up to be completely screwed out (on feeling mechanic resistance do not force movement in a view to avoid screw lock pin damages). This operation is the simulation of minimum value setting. It must rescind from this value to reach the needed one. **Pressure reducer pilot (11)**: On pressure reducing pilot (11), loose lock nut and turn the setting screw counter clockwise (OUT), until the screw is

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practically unloaded. This is the simulation of the lowest setting value of the range, from which the commissioner has to gradually increase the pressure, up to the prescribed one.
2. Check TUP - 93 (7) as above described. Open slowly (one or two turns) upstream isolating valve allowing controlled filling of the main valve (4) that starts closing. Venting air inside the valve by venting valve placed above the position indicator (5).
3. Open completely upstream isolating valve. Check downstream pressure gauge. If the main chamber with air wasn't able to close very fast, the downstream pressure could be the same that inlet. Take out the downstream pressure (through the manometer gauge holder ball valve until to reach the 0 value. Turn the reducing control adjusting screw (11) CLOCKWISE (IN) to increase the pressure at the prescribed value. Slowly 180° degree for time and wait the pressure stabilized on the new value step by step.
4. Open completely the upstream isolating valve and open downstream isolating valve (one or two turns) in a view to permit valve downstream side part filling and consequent pilot valve (1) air release. At the beginning of this operation main valve (4) is closed; it will appear a small flow rate through pilot circuit. Screw clockwise pilot (1) adjusting screw up to when main valve (4) starts opening and puts in pressure pipeline downstream part.
5. To reach needed flow rate keep on turning adjusting screw of pilot (1) clockwise half turn each time with pauses of 30 seconds after each adjusting up to reach the needed flow rate. After each variation check reached value by flow rate meter or by differential manometer. If the downstream pipeline results empty, we recommend to execute adjusting slowly and gradually so to avoid overpressures caused by air presence into the pipeline. Air must be ejected by drain devices positioned either on control valve downstream side or along the main pipeline.
6. After adjusting, wait system stabilization and then open completely isolating valve on downstream side.
7. Adjusting of control unit TUP - 93: **Adjusting of opening speed** determines a reduction of flow rate in exit from main valve control chamber (4). If flow rate restoring it is too slow (regulator pre-adjusting value = 3), when there is a raising demand on downstream side, let increase adjusting value up to 4 and so on up to reaching sufficient value. In case of restoring too speed let decrease adjusting value of 1 as maximum. **Adjusting of closing speed** determines a reduction of incoming flow rate on main valve control chamber (4). If closing speed it is so high to cause overpressures on upstream side, pre-adjusting value = 3 it must be weakened so to attenuate this fact.

(*) During flow rate adjusting of a base valve calibrated diaphragm (9) drop pressure with minimum flow rate (1 m/s) corresponds to 1,6mHW. So to minimum and maximum flow rate correspond respectively a minimum speed (v1) and a maximum one (v2). The drop pressure measured on the differential manometer permit to calculate the flow rate as follow: with Q= flow rate [m3/h], Δp = drop pressure [mWh], D = nominal diameter valve [m]

Maintenance

Recommended spare parts:

- Full set of gaskets for E2001
- Full set of gaskets for IS14
- Full set of gaskets for 263AP in nickel plated brass or 263 SS in stainless steel (specify which model is concerned).

The quality of the material used in the manufacture of our valves should produce no wear of the internal components.

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However we are recommending:

After 6 months of service:

- Control and clean eventually the TUP - 93 screen

Note: an obstructed screen due progressively the valve out of order.

After 12/18 months of service:

- Control and clean the TUP - 93screen.
- Take the main valve apart, by removing first the complete pilot circuit.
- Unscrew the stud nuts and remove the cover and internal diaphragm assembly.
- Check for any eventual damage of the QUAD-RING and the diaphragm.
- Clean thoroughly the internal part of the valve, grease slightly the stem at both guided locations (water grease, non-toxic!!).
- Assemble the main valve and the pilot circuit.
- Put the valve back into service.

This control should then allow to determine the cycle of the requested maintenance, since it is taking into consideration the true service conditions of the valve.

For any further information contact our Customer Service, indicating all data as per plastic label on main valve body. Give full detailed information's about working conditions, the type of problem, and report the adjusting values (OS-CS-RS).

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