

Pilot-operated Universal Regulators

Pressure, differential pressure, flow, temperature
or combined regulators, optionally with additional electric actuator



Type 2334

Application

Pilot-operated pressure, differential pressure, flow, temperature, or combined regulators, optionally with electric actuator · Main valve nominal size DN 65 to DN 250¹⁾ · Nominal pressure PN 16 to PN 40 · Flange end connections · For heating and cooling plants · Suitable for liquids from 5 °C to 150 °C and non-flammable gases up to 80 °C

The universal regulators consist of a large globe valve acting as the main valve and a maximum of three pilot valves connected in parallel in a bypass pipe.

The pressure drop across the regulator is used to operate the valve, whereby a Venturi nozzle in the bypass pipe amplifies the pressure drop as the flow rate increases, operating the main valve. Depending on the flow rate, the controlled variables (pressure, differential pressure, flow rate and temperature) can be controlled within a certain range. Electric signals from an electric actuator can also be used to operate the valve, influencing the control loop, too.

Special features

- Single-seated globe valve with flanged end connections
- Suitable for district heating plants conforming to DIN 4747-1 (requirements stipulated by AGFW (German District Heating Association) concerning components in house substations)
- Low-maintenance P-regulators requiring no auxiliary energy
- Wide control range and high useable rangeability at low pressure loss
- Pilot-operated by the medium, with a maximum of three pilot valves
- Excellent stability and control accuracy even when the pressures fluctuate considerably
- Smooth opening and closing of the main valve
- Wide set point range and convenient set point adjustment at the pilot valve
- Numerous control functions and the possibility to combine several functions

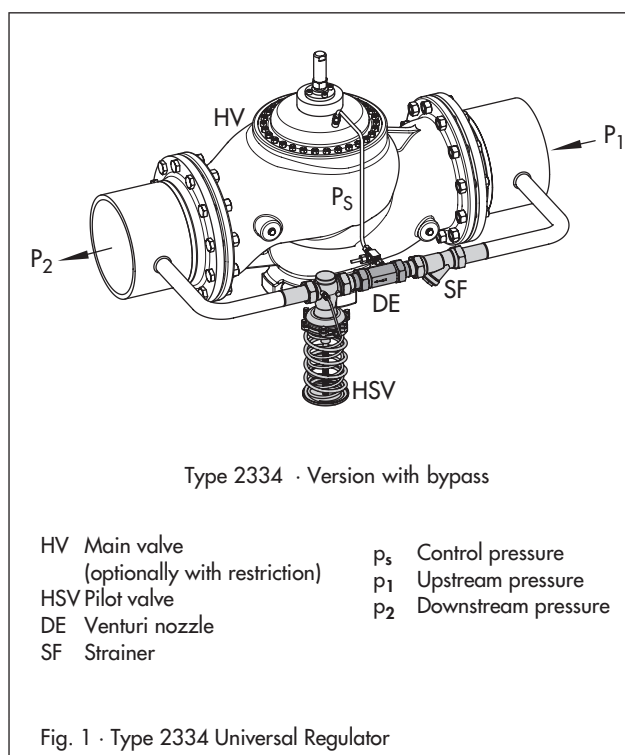
Versions

Type 2423 Valve (with integrated restriction) or **Type 2422** Valve (without restriction)

DN 65 to DN 100: With balancing bellows and external Type 2420 Closing Actuator

DN 125 to DN 250: With balancing diaphragm and internal closing spring, also available with balancing bellows (optional with Type 2420 Closing Actuator) · Pilot valve depending on application

¹⁾ DN 300/400 on request



Basic version · Main valve DN 65 to DN 250 and bypass pipe with strainer, Venturi nozzle and pilot valve, ready-mounted · Bypass pipe made of stainless steel with strainer and pilot valve depending on application

Version with bypass · Main valve DN 65 to DN 250 · Bypass pipe DN 25/40 with strainer, Venturi nozzle and pilot valve · Assembly on site of installation

Special versions

DN 60 to 125: Reduced K_{V5} coefficient · For high temperatures · ANSI and JIS versions · With flow divider for noise reduction · Oil-resistant version · Free of non-ferrous metals · Pilot valves connected in parallel (instead of in line) · Pressure balancing by a bellows · Free of graphite for deionized water · With external orifice

Type 2334 · Flow and Differential Pressure Regulator for installation in the return pipe - Functioning as a closing valve

Principle of operation

The regulator consists of a Type 2423 Globe Valve (1), acting as the main valve, with adjustable restriction (1.1) and operating diaphragm (5) as well as the bypass pipe with strainer (10), Venturi nozzle (11) and a pilot valve for flow rate (7) and a pilot valve for differential pressure (8).

The pilot valves (7/8) are used to regulate the flow rate and differential pressure to their adjusted set points. The main valve (1) closes when either the flow rate or differential pressure exceed their set point.

The medium flows through the main valve in the direction indicated by the arrow. The areas released by the plug (3) and the restriction (1.1) determine the flow rate and differential pressure. The forces are compared arising, on the one side, from the upstream pressure p_1 acting on the plug surface and, on the other side, the control pressure p_s acting on the operating diaphragm as well as from the positioning spring (6).

The control pressure p_s is determined by the Venturi nozzle (11) depending on how far the pilot valves are open. If the medium is at a standstill in the bypass pipe, the control pressure p_s is equal to the upstream pressure p_1 . The main valve is closed by the force of the positioning springs (6).

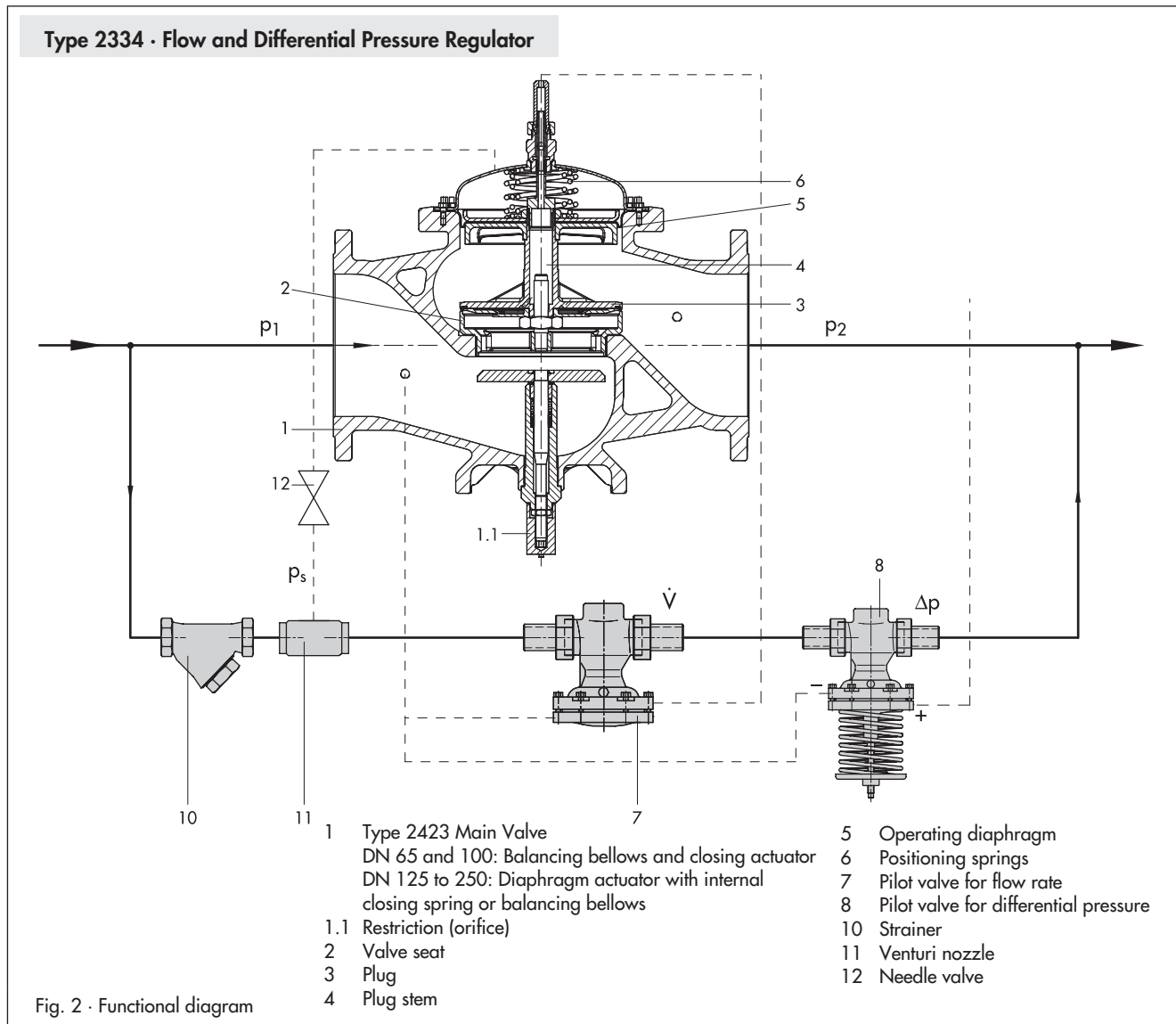
When the differential pressure falls below the set point, the pilot valve (8) responsible for differential pressure control opens and the control pressure p_s drops. The plug (3) opens until the adjusted set point is reached.

When the flow rate or differential pressure rise above the set point, their associated pilot valve (7/8) closes. This results in a rise in control pressure p_s across the Venturi nozzle (11), which causes the plug stem (4) together with the plug (3) to move in the closing direction until a new state of equilibrium is reached.

If the flow rate or differential pressure start to drop, the described procedure is reversed. The pilot valve opens further, causing the control pressure p_s to drop. The valve plug in the main valve opens until the set point is reached.

The largest signal (either flow rate or differential pressure) determines how much medium flows through the bypass pipe and how high the resulting control pressure p_s is.

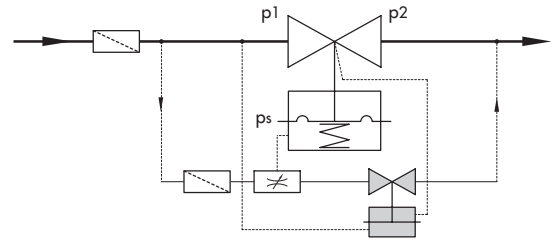
The higher the control pressure p_s , the smaller the area released between the seat and plug in the main valve.



Versions

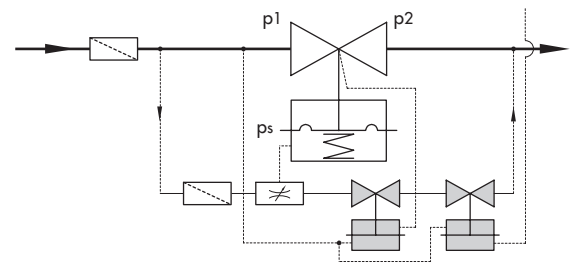
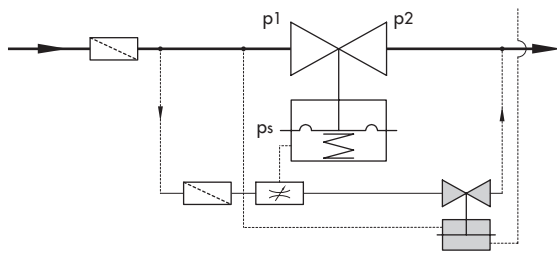
The **Type 2334 Universal Regulators** consist of a Type 2422 or Type 2423 Globe Valve (acting as the main valve) and a bypass pipe with a strainer, Venturi nozzle and a maximum of three special pilot valves.

The following schematic diagrams show the principle setup of a Type 2334 Universal Regulator and its possible functions.



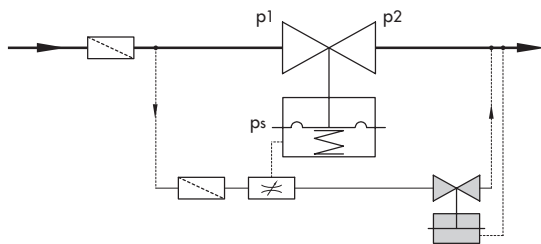
Flow regulator

Type 2423 Main Valve (modified) · Type 45-1 Pilot Valve (modified) · Installation in flow pipe or return pipe



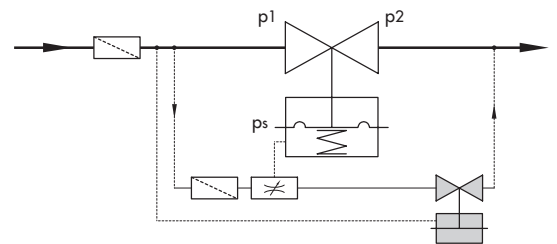
Differential pressure regulator

Type 2422 Main Valve (modified) · Type 45-2 Pilot Valve for installation in the flow pipe or Type 45-4 Pilot Valve for installation in the return pipe (control lines drawn for installation in return pipe)



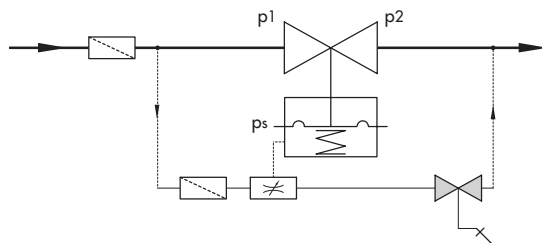
Flow and differential pressure regulator

Type 2423 Main Valve (modified) · Type 45-1 and Type 45-2 Pilot Valves for installation in the flow pipe or Type 45-1 and Type 45-4 Pilot Valves for installation in the return pipe (control lines drawn for installation in return pipe)



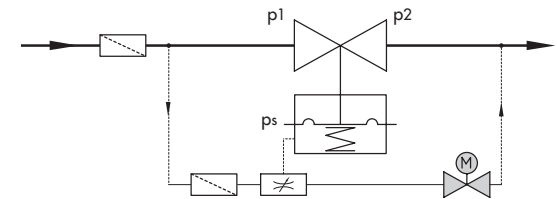
Pressure reducing valve

Type 2422 Main Valve (modified) · Pilot valve on request



Excess pressure valve

Type 2422 Main Valve · Pilot valve on request



Temperature regulator

Type 2422 Main Valve (modified) · Pilot valve on request

Regulator with additional electric actuator, controlled by a binary signal

Type 2422 Main Valve · Pilot valve on request

Fig. 3 · Various versions of the regulator in schematic diagrams

Type 2422 · Type 2423 Main Valve

Pressure-balanced valve · Functioning as a closing valve or opening valve · Type 2423 with integrated restriction (orifice) to adjust the flow rate set point

Table 1 · Technical data

Nominal pressure		PN 16 to 40						
Nominal size	DN	65	80	100	125	150	200	250
K_{VS} coefficient		50	80	125	250	380	650	800
z value		0.4		0.35		0.3		
Type 2422 · Min. diff. pressure Δp_{min} in bar		0.5 ^{1), 2)}			0.45 ^{1), 5)}	0.45 ^{1), 3), 5)}		0.4 ^{1), 3), 5)}
Type 2423 · Min. diff. pressure Δp_{min} in bar ⁷⁾		–			0.65 ¹⁾		0.6 ¹⁾	
Max. perm. diff. pressure Δp_{max} in bar		20		16	12 ⁴⁾		10	
Actuator		Positioning bellows with closing spring and Type 2420 Diaphragm Actuator			Diaphragm actuator with closing spring (valve balanced by a bellows with Type 2420 Diaphragm Actuator or valve with integrated diaphragm actuator and closing spring)			
Leakage rate		≤ 0.05 % of K_{VS} coefficient						
Max. perm. temperature		150 °C						
Set point range in bar, continuously adjustable at the pilot valve		Depending on the pilot valve						
Pilot Valve Type ...		Depending on the application						
Type 2334 · Basic version	Nominal size	DN 15						
Type 2334 · Version with bypass	Nominal size	DN 25			DN 40			
Type 2334 · With Type 2420 Closing Actuator	Actuator size	320 cm ²			640 cm ² ⁶⁾			

¹⁾ In basic version · ²⁾ With bypass DN 25: 0.4 bar · ³⁾ With bypass DN 40: 0.2 bar · ⁴⁾ DN 125 with metal bellows: 16 bar

⁵⁾ For valves balanced by a diaphragm · ⁶⁾ As option for main valves balanced by a bellows · ⁷⁾ With an upper differential pressure of 0.2 bar

Table 2 · Materials · Material number acc. to DIN EN

Type 2422 and Type 2423 Main Valve

Nominal pressure	PN 16	PN 16/25	PN 16/25/40
Nominal size	DN 65 to 250	DN 65 to 150	DN 65 to 250
Valve body	Cast iron EN-JL 1040	Spheroidal graphite iron EN-JS 1049	Cast steel 1.0619
Valve seat	Red brass CC491K ¹⁾ or stainless steel 1.4006 ²⁾		
Plug	Red brass CC491K ¹⁾ or stainless steel 1.4301 ²⁾		
Standard version	With EPDM soft sealing · Max. 150 °C		
Plug stem/valve spring	Stainless steel 1.4301/1.4310		
Metal bellows	Stainless steel 1.4571		
Bottom section	Steel 1.0566		
Body gasket	Graphite with metal core ³⁾		
Operating diaphragm	EPDM with fabric insert		

¹⁾ Valve balanced by a diaphragm

²⁾ Valve balanced by a bellows

³⁾ Not required in a version with operating diaphragm

Pilot valve

Various SAMSON valves may be used as pilot valves (see regulator versions). The valve materials are listed on the corresponding data sheet.

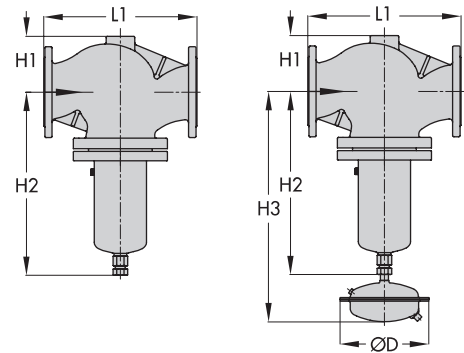
Dimensions in mm

Type 2422 · Balanced by a bellows

Type 2422 Main Valve · Balanced by a bellows

DN	65	80	100	125	150	200	250
L1	290	310	350	400	480	600	730
H1	100	100	120	145	175	270	
H2	300	300	355	460	590	730	
H3	605	605	635	685 ¹⁾	815 ¹⁾	925 ¹⁾	
ØD	285	285	380				

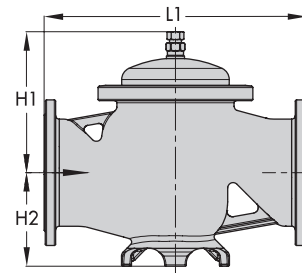
¹⁾ Type 2420 Actuator optional



Type 2422 · Balanced by a diaphragm

Type 2422 Main Valve · Balanced by a diaphragm

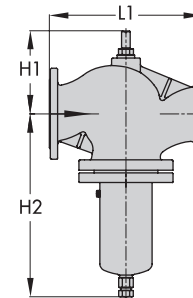
DN	65	80	100	125	150	200	250
L1	-	-	-	400	480	600	730
H1	-	-	-	285	310	380	
H2	-	-	-	145	175	260	



Type 2423 · Balanced by a bellows

Type 2423 Main Valve · Balanced by a bellows

DN	65	80	100	125	150	200	250
L1	290	310	350	400	480	600	730
H1	195	195	220	265	295	400	
H2	300	300	355	460	590	730	



Type 2423 · Balanced by a diaphragm

Type 2423 Main Valve · Balanced by a diaphragm

DN	65	80	100	125	150	200	250
L1	-	-	-	400	480	600	730
H1	-	-	-	370	395	465	
H2	-	-	-	295	325	345	375

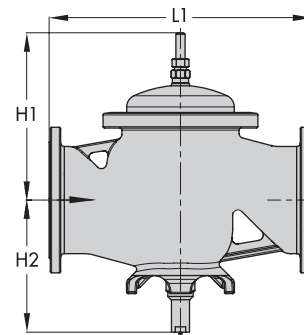


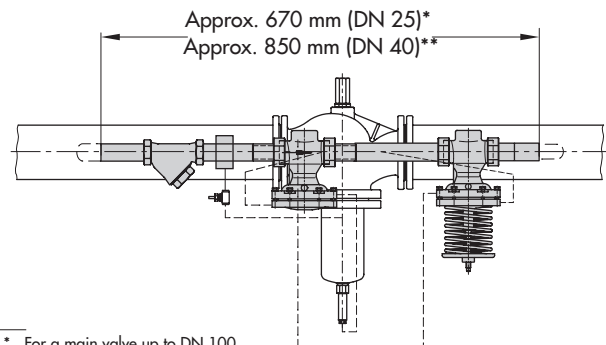
Fig. 4 · Dimensions

Installation dimensions

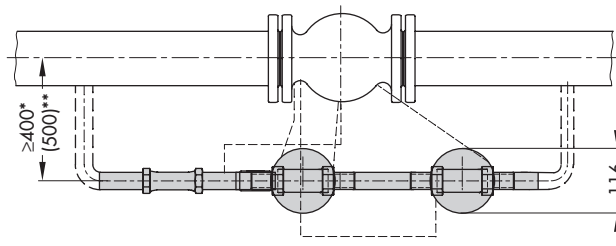
The example on the right has two pilot valves mounted in the bypass pipe.

The pipe length is reduced when just one pilot valve is used, while the pipeline is correspondingly longer when three pilot valves are used.

The dimensions are intended as guidelines. In particular cases, the overall dimensions vary depending on the installed regulators and the conditions on site.



- * For a main valve up to DN 100
- ** For a main valve in DN 125 and larger



All dimensions in mm

Fig. 5 · Installation dimensions

Installation

Install the regulator in such a way that it remains accessible after the plant has been completed to allow any maintenance or up-grading work to be performed.

The following also applies:

- Installation in horizontal pipes,
- Main valve DN 65 to DN 100 (Type 2422/Type 2423): Positioning bellows and Type 2420 Actuator installed to face downwards · Main valve DN 125 to DN 250 (balanced by a bellows): Positioning bellows installed to face downwards · Main valve DN 125 to DN 400: Balancing diaphragm installed to face upwards
- The medium must flow through the valve in the direction indicated by the arrow on the valve body.

Ordering text

Pilot-operated Regulator Type 2334

Main valve DN ...

Material: Cast iron EN-JL 1040 · Spheroidal graphite iron EN-JS 1049 · Cast steel 1.0619

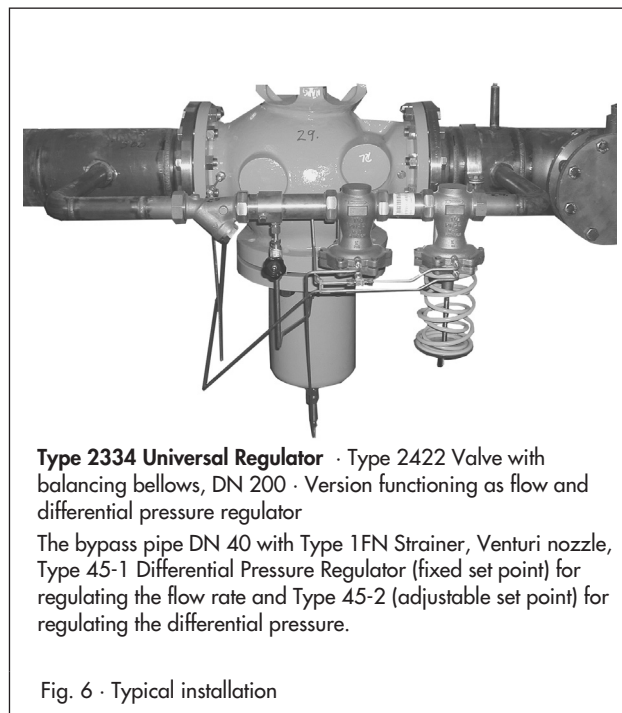
Nominal pressure PN ...

Version functioning as differential pressure regulator/flow regulator, etc.

Pilot Valve Type ..., set point range/control range ...

Optionally, special version ...

Specifications subject to change without notice.



Type 2334 Universal Regulator · Type 2422 Valve with balancing bellows, DN 200 · Version functioning as flow and differential pressure regulator

The bypass pipe DN 40 with Type 1FN Strainer, Venturi nozzle, Type 45-1 Differential Pressure Regulator (fixed set point) for regulating the flow rate and Type 45-2 (adjustable set point) for regulating the differential pressure.

Fig. 6 · Typical installation

