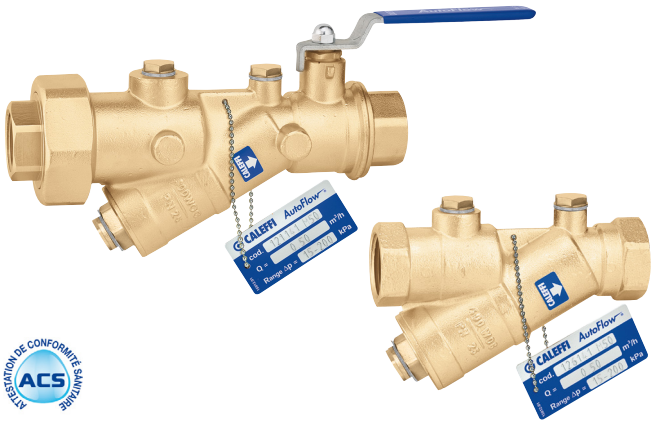
Automatic flow rate regulators with high-resistance polymer cartridge

121 – 126 series

01141/20 EN
replaces dp 01141/15 GB

AutoFlow®



Function

AUTOFLOW® devices are automatic flow rate regulators capable of keeping the medium flow rate constant as the operating conditions of the hydraulic circuit change. They are used to automatically balance the plumbing system, guaranteeing the design flow rate to each terminal.
In this particular series, the devices are equipped with an innovative and exclusive regulator element made of high-strength polymer, selected for use in air-conditioning and plumbing systems With this new regulator, the devices provide silent operation, accuracy in adjustments, insensitivity to scale and a long service life

The devices are available in both the flow rate regulator simple version and the ball shut-off valve equipped version.

PATENT

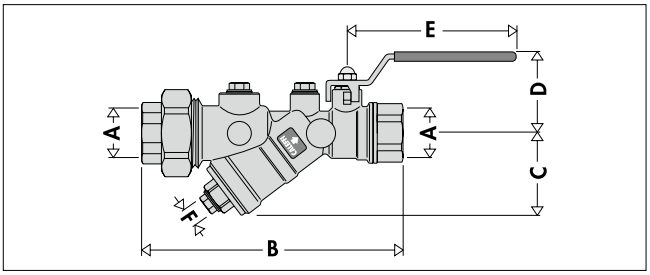
Product range

121 series Automatic flow rate regulator with polymer cartridge and ball valve ____ sizes 1/2" - 3/4" - 1" - 1 1/4" - 1 1/2" and 2"
126 series Automatic flow rate regulator with polymer cartridge ____ sizes 1/2" - 3/4" - 1" - 1 1/4" - 1 1/2" and 2"

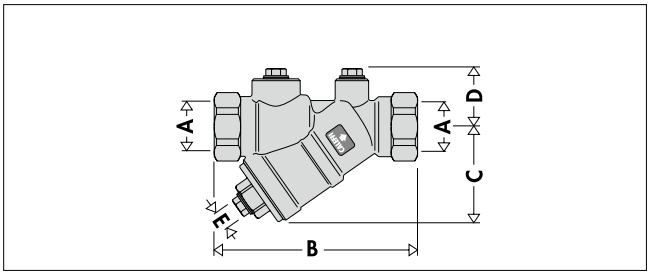
Technical specifications

series	121	126
Materials		
Body:	dezincification resistant alloy **CR** EN 12165 CW602N	dezincification resistant alloy **CR** EN 12165 CW602N
AUTOFLOW® cartridge: - 1/2"–1 1/4"	high-resistance polymer	high-resistance polymer
- 1 1/2" and 2"	stainless steel and high-resistance polymer	stainless steel and high-resistance polymer
Spring:	stainless steel	stainless steel
Hydraulic seals:	EPDM	EPDM
Ball:	brass EN 12165 CW614N, chrome plated	-
Ball seat	PTFE	-
Control stem hydraulic seal:	PTFE	-
Lever:	special galvanized steel	-
Pressure point plugs	dezincification resistant alloy **CR** EN 12165 CW602N	dezincification resistant alloy **CR** EN 12165 CW602N
Performance		
Medium:	water, glycol solutions	water, glycol solutions
Max. percentage of glycol:	50 %	50 %
Maximum working pressure:	25 bar	25 bar
Working temperature range:	-20–100 °C	-20–100 °C
Δp range:	15–200 kPa	15–200 kPa
Flow rates:	0,085–11,0 m³/h	0,085–11,0 m³/h
Accuracy:	±10 %	±10 %
Connections	1/2"–2" F with union x F	1/2"–2" F
Pressure test port connections	1/4" F	1/4" F

Dimensions



Code	A	B	C	D	E	F	Mass (kg)
121141 ...	1/2"	156,5	52,5	50	100	1/4"	1,00
121151 ...	3/4"	159,5	52,5	50	100	1/4"	1,00
121161 ...	1"	218,5	68	66	120	1/2"	1,85
121171 ...	1 1/4"	220,5	68	66	120	1/2"	1,87
121181 ...	1 1/2"	253	84	88	140	1/2"	4,60
121191 ...	2"	253	84	88	140	1/2"	4,60



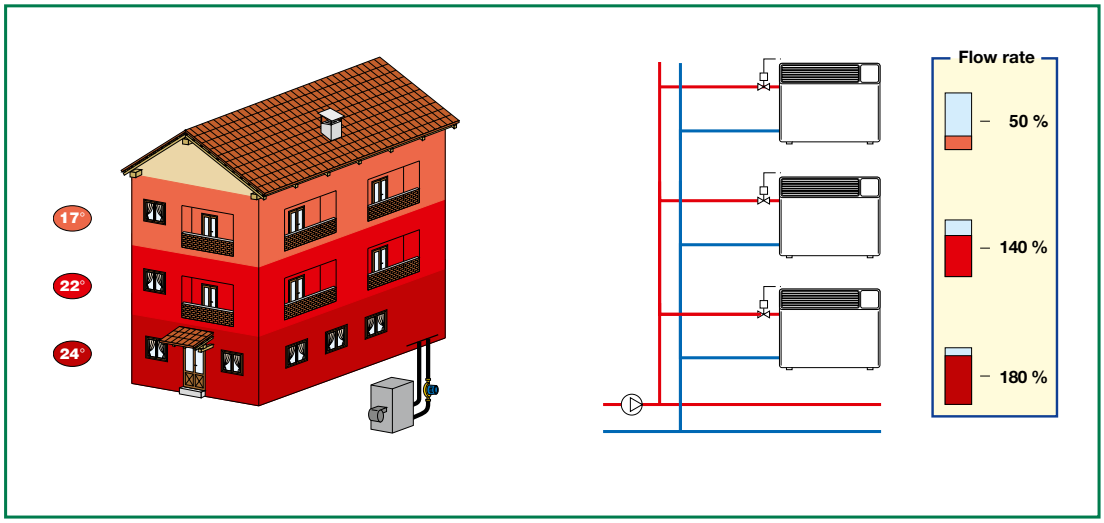
Code	A	B	C	D	E	Mass (kg)
126141 ...	1/2"	101	52,5	30	1/4"	0,45
126151 ...	3/4"	106	52,5	30	1/4"	0,48
126161 ...	1"	140,5	102	33,5	1/2"	1,36
126171 ...	1 1/4"	148	102	33,5	1/2"	1,24
126181 ...	1 1/2"	177	105	38,5	1/2"	2,25
126191 ...	2"	179	105	38,5	1/2"	2,45

Circuit balancing

Modern heating and air-conditioning systems have to guarantee a high level of thermal comfort with a low consumption of energy This means supplying the system terminals with the correct design flow rates, to produce balanced hydraulic circuits.

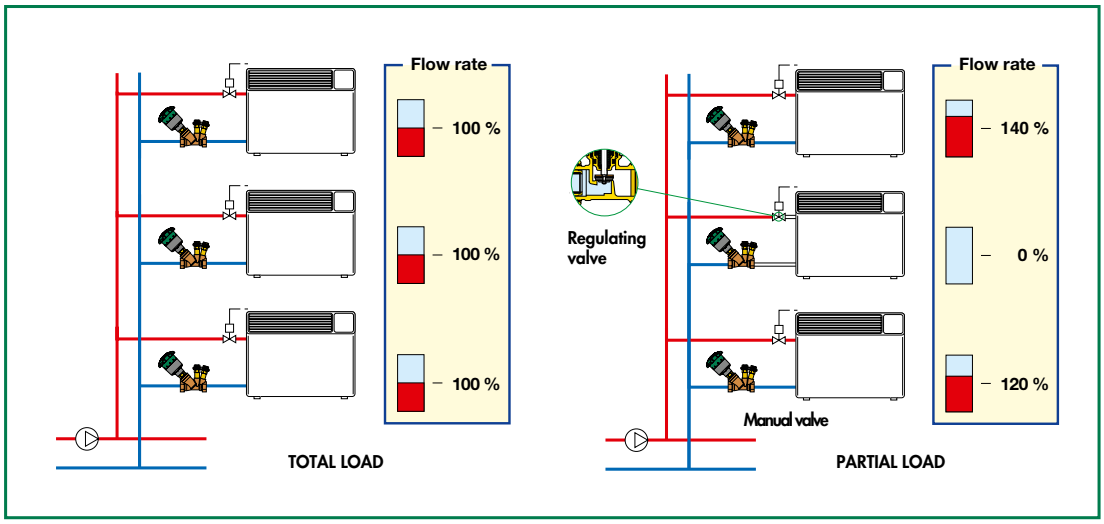
Unbalanced circuits

In unbalanced circuits, the hydraulic imbalance between terminals creates areas with non-uniform temperatures, resulting in problems with thermal comfort and higher energy consumption.



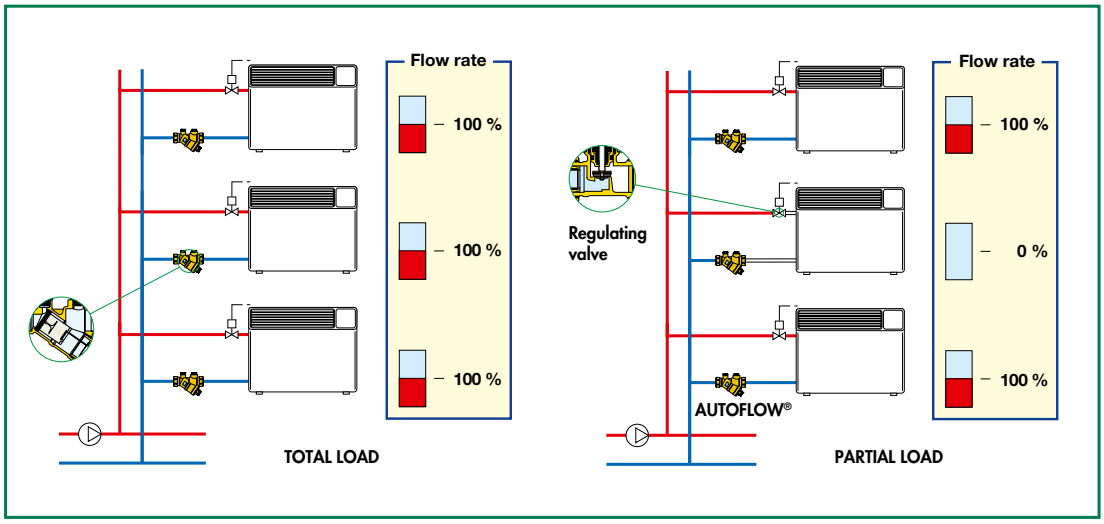
Circuits balanced with manual valves

Traditionally, hydraulic circuits are balanced using manual setting valves.
With these static devices, such circuits are difficult to balance perfectly and have operating limitations when the regulating valves are partially closed. The flow rate in the open circuits **does not remain constant at the nominal value**.



Circuit balanced with AUTOFLOW®

AUTOFLOW® devices balance the hydraulic circuit automatically, ensuring that each terminal receives the design flow rate.
Even when the regulating valves close the circuit partially, the flow rates in the open **circuits remain constant at the nominal value**. The system always guarantees the greatest comfort and the highest energy savings.



AUTOFLOW® devices

Function

The AUTOFLOW® device must guarantee a constant flow rate when the upstream/downstream differential pressure varies.

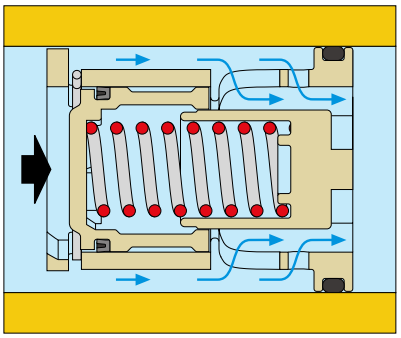
It is therefore necessary to refer to the Δp - flow rate diagram and a basic diagram illustrating the operating modes and effects of the relevant variables.

Operating principle

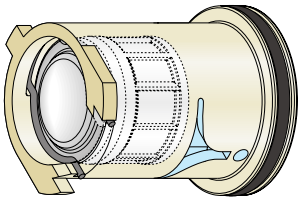
The regulating element of these devices is composed of a cylinder and a piston with fixed and variable geometry side open tubes through which the fluid flows. These apertures are governed by the piston movement actuated by the pressure of the medium. A specially calibrated spring counteracts this movement.

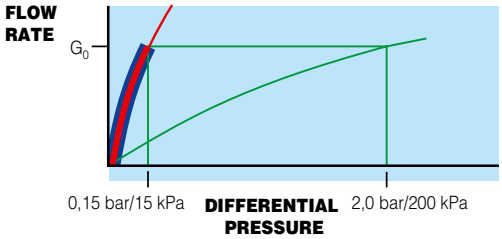
AUTOFLOW® devices are high-performance automatic regulators. They regulate the chosen flow rates within very tight tolerances (approximately 10 %) and offer an unusually wide working range.

Below the working range



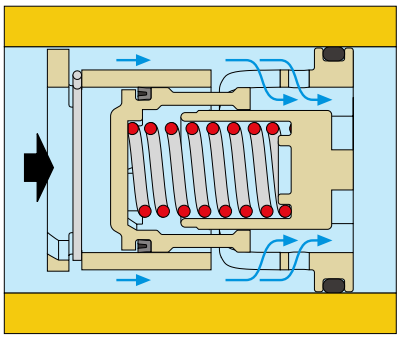
In this case, the regulating piston remains in equilibrium without compressing the spring and gives the fluid the maximum free flow area In practice, the piston acts as a fixed regulator, and so the flow through the AUTOFLOW® depends solely on the differential pressure.



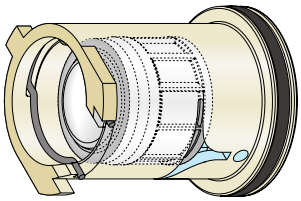


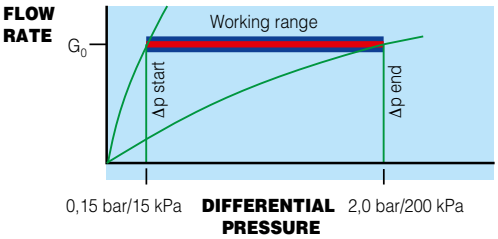
$Kv_{0,01} = 0,258 \cdot G_0$ Range Δp 15÷200 kPa *where G_0 = nominal flow rate*

Within the working range

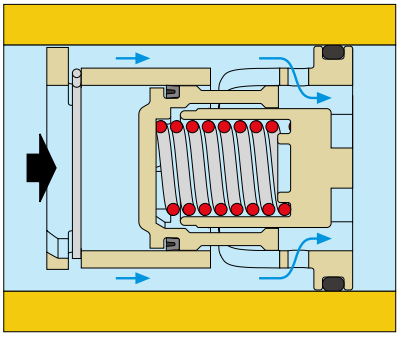


If the differential pressure is contained within the control range, the piston compresses the spring and gives the medium a free flow area to permit regular flow at the nominal rate for which theAUTOFLOW® is set up.



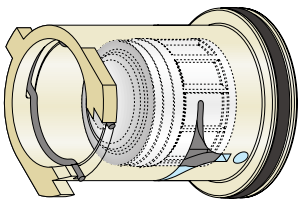


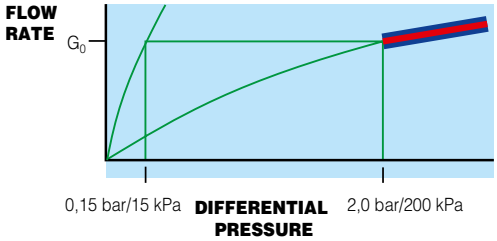
Above the working range



In this case, the piston compresses the spring fully and only leaves the fixed geometry aperture for the medium to pass through

As in the first case above, the piston acts as a fixed regulator The flow rate through the AUTOFLOW® therefore depends solely on the differential pressure.





$Kv_{0,01} = 0,070 \cdot G_0$ Range Δp 15–200 kPa *where G_0 = nominal flow rate*

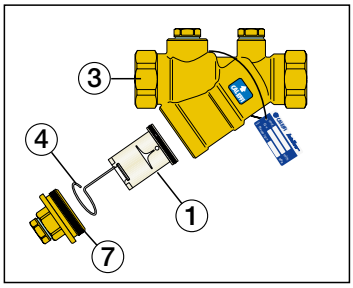
Construction details

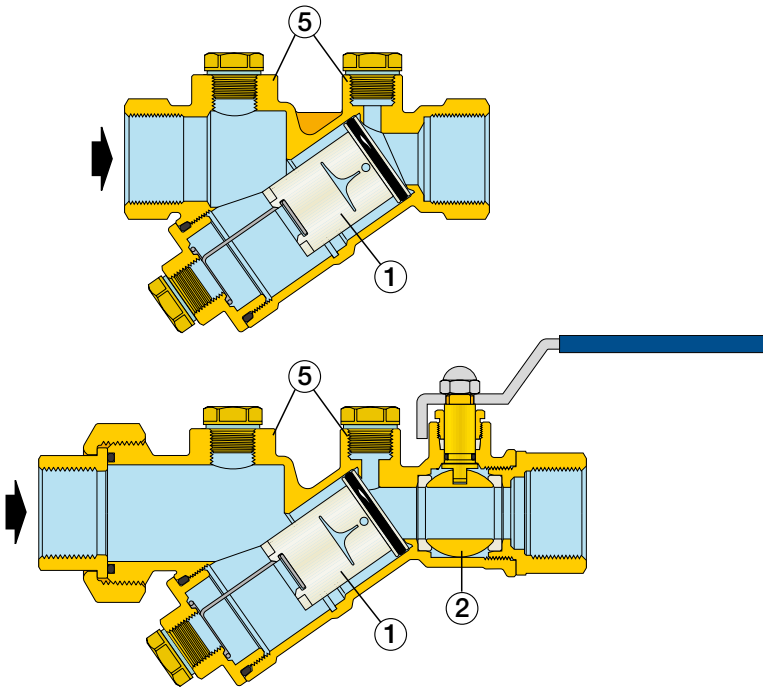
Polymer regulator
The flow rate regulator element (1) is made entirely of high-resistance polymer, specially chosen for use in heating, air conditioning and domestic water systems.
It offers excellent mechanical behaviour over a wide range of working temperatures, features high abrasion resistance because the medium flows continuously, is insensitive to limescale deposits and is fully compatible with the glycols and additives used in circuits.

Exclusive design
With its exclusive design, the regulator is able to accurately regulate the flow rate over a wide range of operating pressures. A special internal chamber acts as a damper for the beating and vibration triggered by the flow of the medium, making sure the device works quietly
For these reasons it can be used in system circuits on both zone outlets and directly at the terminal emitters.

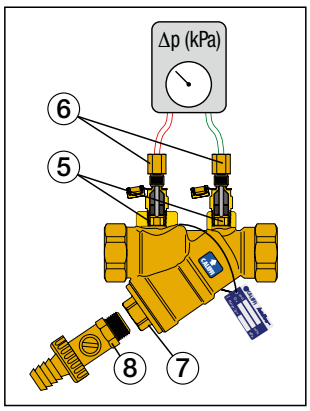
Ball valve
The ball valve (2) has a control stem with anti-slip device and a vinyl-covered reversible closing lever.

Replaceable cartridge
The internal regulator is assembled in the form of a self-contained cartridge (1) to permit easy removal from the body (3) for inspection or replacement. It is equipped with a special automatic fixing system with metal wire and an operating ring (4) for fast and safe positioning without the need for tools.





Connecting the device
The body of the AUTOFLOW® device has connections (5) for pressure test ports (6), which is useful when checking that it is operating in the working range. In addition, the cartridge plug (7) contains a connection to allow use of a circuit drain valve (8).

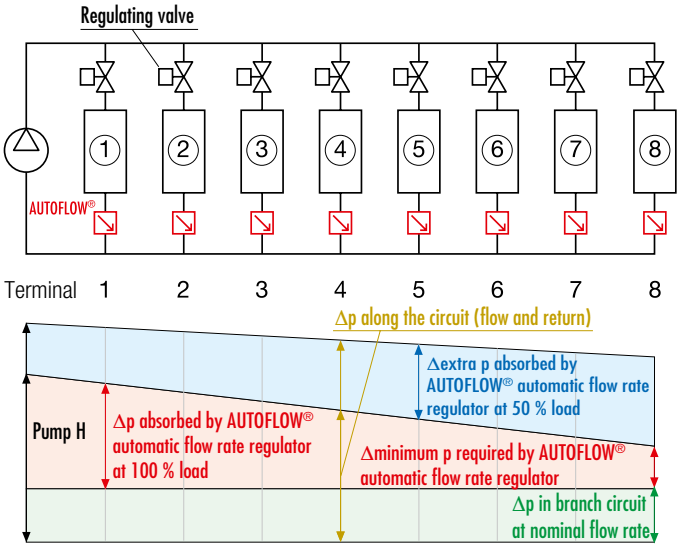


Dimensioning the circuit with AUTOFLOW®

It is particularly easy to dimension the circuit containing the AUTOFLOW®. As illustrated by the example diagrams shown alongside, for the chosen pump, the pressure drop is calculated by referring to the hydraulically most disadvantaged circuit and adding this value to the minimum differential pressure required by the AUTOFLOW®. In the example the circuits have the same nominal flow rate.

On intermediate circuits, the AUTOFLOW® devices automatically absorb the excess differential pressure to ensure the corresponding nominal flow rate.
As the regulating valves open or close, the AUTOFLOW® repositions itself dynamically to maintain the nominal flow rate (50 % load = circuits 3, 5, 7, 8 closed).

For more detailed information on dimensioning a system with AUTOFLOW®, refer to the 2nd volume of the Caleffi handbooks and the “Dynamic balancing in plumbing circuits” technical bulletin. They give theoretical calculations, numerical examples and notes on the application of the above-mentioned devices in circuits.



Differential pressures (Δp ran e

Flow-rate tables

Code	$Kv_{0,01}$ (l/h)	Minimum working Δp (kPa)	Δp range (kPa)	Flow rates (m^3/h)
121141 ●●●	690	15	15–200	0,085; 0,12; 0,15; 0,2; 0,25; 0,3; 0,35; 0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 1,0; 1,2
121151 ●●●	773	15	15–200	0,085; 0,12; 0,15; 0,2; 0,25; 0,3; 0,35; 0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 1,0; 1,2; 1,4; 1,6
121161 ●●●	1.800	15	15–200	0,5; 0,6; 0,7; 0,8; 0,9; 1,0; 1,2; 1,4; 1,6; 1,8; 2,0; 2,25; 2,5; 2,75; 3,0; 3,25; 3,5; 3,75; 4,0; 4,25; 4,5; 4,75; 5,00
121171 ●●●	1.850	15	15–200	0,5; 0,6; 0,7; 0,8; 0,9; 1,0; 1,2; 1,4; 1,6; 1,8; 2,0; 2,25; 2,5; 2,75; 3,0; 3,25; 3,5; 3,75; 4,0; 4,25; 4,5; 4,75; 5,00
121181 ●●●	4.724	15	15–200	5,5; 6,0; 6,5; 7,0; 7,5; 8,0; 8,5; 9,0; 9,5; 10,0; 11,0
121191 ●●●	4.889	15	15–200	5,5; 6,0; 6,5; 7,0; 7,5; 8,0; 8,5; 9,0; 9,5; 10,0; 11,0

Code	$Kv_{0,01}$ (l/h)	Minimum working Δp (kPa)	Δp range (kPa)	Flow rates (m^3/h)
126141 ●●●	669	15	15–200	0,085; 0,12; 0,15; 0,2; 0,25; 0,3; 0,35; 0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 1,0; 1,2
126151 ●●●	758	15	15–200	0,085; 0,12; 0,15; 0,2; 0,25; 0,3; 0,35; 0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 1,0; 1,2; 1,4; 1,6
126161 ●●●	1.400	15	15–200	0,5; 0,6; 0,7; 0,8; 0,9; 1,0; 1,2; 1,4; 1,6; 1,8; 2,0; 2,25; 2,5; 2,75; 3,0; 3,25; 3,5; 3,75; 4,0; 4,25; 4,5; 4,75; 5,00
126171 ●●●	1.450	15	15–200	0,5; 0,6; 0,7; 0,8; 0,9; 1,0; 1,2; 1,4; 1,6; 1,8; 2,0; 2,25; 2,5; 2,75; 3,0; 3,25; 3,5; 3,75; 4,0; 4,25; 4,5; 4,75; 5,00
126181 ●●●	3.472	15	15–200	5,5; 6,0; 6,5; 7,0; 7,5; 8,0; 8,5; 9,0; 9,5; 10,0; 11,0
126191 ●●●	3.738	15	15–200	5,5; 6,0; 6,5; 7,0; 7,5; 8,0; 8,5; 9,0; 9,5; 10,0; 11,0

Minimum differential pressure required
Given by the sum of two magnitudes:
1. The minimum working Δp of the AUTOFLOW® cartridge
2. The Δp required for the nominal flow rate to pass through the valve body.
   This value can be determined using the $Kv_{0,01}$ values specified above and with reference to the valve body alone

Example
AUTOFLOW® 126 series size 1" with flow rate G_0 = 1200 l/h and Δp range 15–200 kPa:

$\Delta p_{required} = \Delta p_{Autoflow} + \Delta p_{body} = 15 + (G_0 / Kv_{0,01})^2 = 15 + (1200 / 1400)^2 = 15,7$ kPa

Pump head $H = \Delta p_{circuit} + \Delta p_{required} = \Delta p_{circuit} + 15,7$ kPa

Coding method for 121 - 126 series AUTOFLOW®

For proper identification of the device, fill in the chart indicating: the series, the size, the flow rate and theΔp.

Complete code

1st	2nd	3rd	4th	5th	6th	7th	8th	9th
			1		**1**			
Series				SIZE		FLOW RATE AND RANGE Δp		

Series — 1st 2nd 3rd

The first three figures indicate the series

121	AUTOFLOW® automatic flow rate regulator and ball valve
126	AUTOFLOW® automatic flow rate regulator

SIZE — 5th

The fifth figure indicates the size:

Diameter	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
Digit	4	5	6	7	8	9

FLOW RATE AND RANGE Δp — 7th 8th 9th

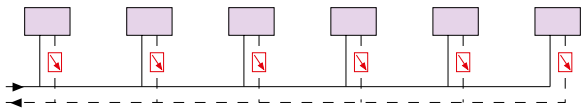
The last three figures indicate the available flow rate values with range

Δp 15–200 kPa

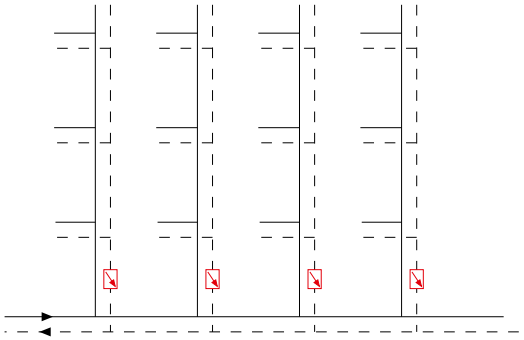
m^3/h	digit	m^3/h	digit	m^3/h	digit	m^3/h	digit	m^3/h	digit	m^3/h	digit
0,085	M08	0,40	M40	1,20	1M2	2,75	2M7	4,50	4M5	7,50	7M5
0,12	M12	0,50	M50	1,40	1M4	3,00	3M0	4,75	4M7	8,00	8M0
0,15	M15	0,60	M60	1,60	1M6	3,25	3M2	5,00	5M0	8,50	8M5
0,20	M20	0,70	M70	1,80	1M8	3,50	3M5	5,50	5M5	9,00	9M0
0,25	M25	0,80	M80	2,00	2M0	3,75	3M7	6,00	6M0	9,50	9M5
0,30	M30	0,90	M90	2,25	2M2	4,00	4M0	6,50	6M5	10,0	10M
0,35	M35	1,00	1M0	2,50	2M5	4,25	4M2	7,00	7M0	11,0	11M

AUTOFLOW® applications ( )

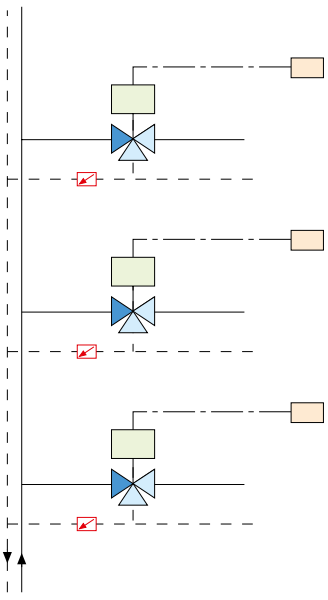
Installing AUTOFLOW®
In heating and air conditioning systems, AUTOFLOW® devices must preferably be installed on the circuit return pipe.
Some typical installation examples are given below.



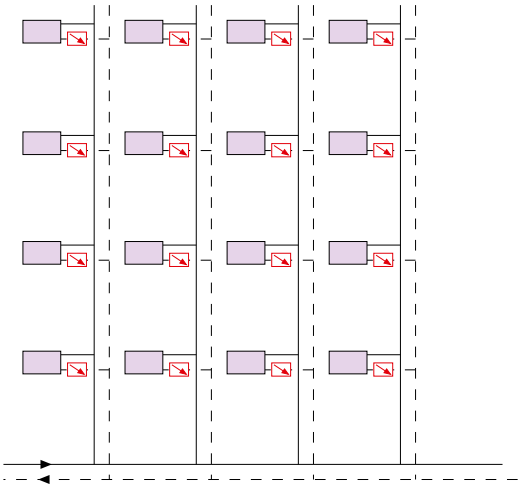
For use in line with various types of heaters: radiators, convectors, fan-coils, unit heaters, strips, etc.



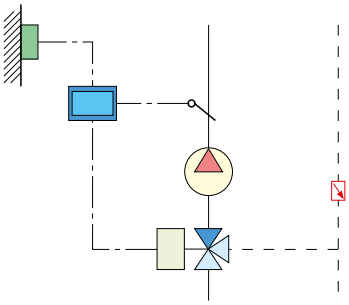
To adjust the flow rate in each column or in each secondary branch of a system.



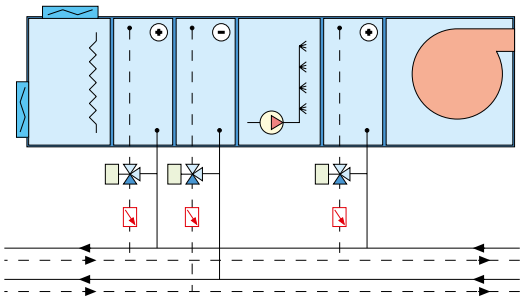
To guarantee the design flow rates (both with open or closed valve) to the various areas in the system.



To ensure that the required amount of medium flows through each terminal.

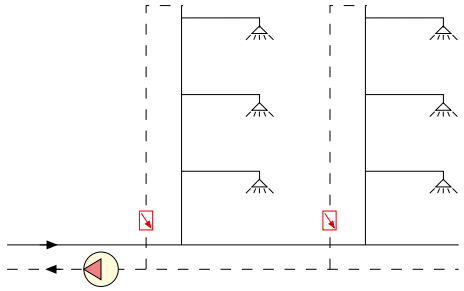


To allow constant flow rates (with the valve in any position) in circuits with traditional outside compensated temperature regulation.

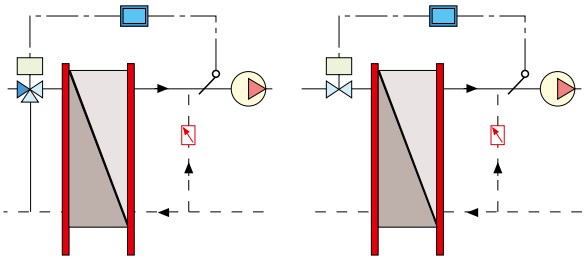


To balance sanitary water distribution circuits

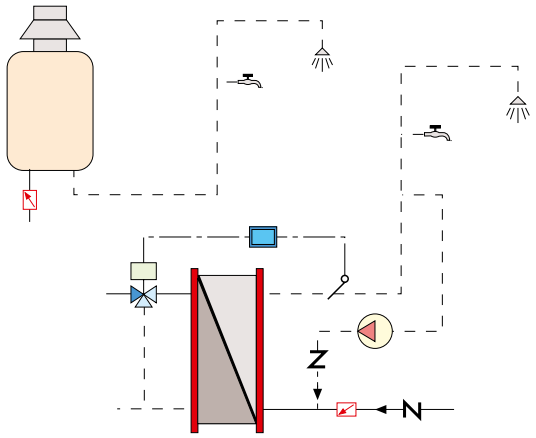
AUTOFLOW® applications ( )



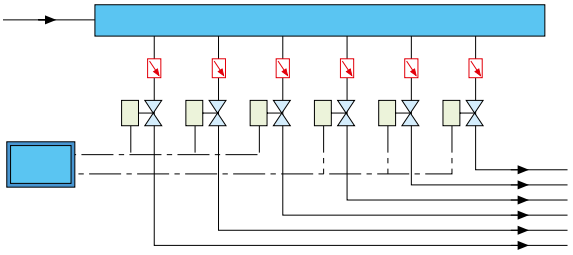
To balance sanitary water distribution circuits



To create flow rate balancing by-passes in heat exchangers



To restrict the hot water delivery flow rate in instantaneous or limited-capacity hot water production systems.



To check the amount of water delivered and balance the various circuits in irrigation systems

For further details, please consult Application Sheets Nos. 04301, 04302 and 04303 and the "Dynamic balancing in plumbing circuits" Technical Bulletin.

Accessories

120 FILTER version

Combination of filter and ball valve.

Dezincification resistant alloy body.

Stainless steel filter cartridge.

Maximum working pressure:	25 bar
Working temperature range:	0–110 °C
Strainer mesh size Ø:	1/2”–1 1/4”: 0.87 mm 1 1/2” and 2”: 0.73 mm

Designed for pressure point and drain valve connection.

Code		$Kv_{0,01}$ (l/h)
120141 000	1/2”	687
120151 000	3/4”	725
120161 000	1”	1.665
120171 000	1 1/4”	1.723
120181 000	1 1/2”	3.913
120191 000	2”	3.969

Head losses

-The specified $Kv_{0,01}$ values refer to the body of the device with filter.

125 FILTER version

Y-filter.

Dezincification resistant alloy body.

Stainless steel filter cartridge.

Maximum working pressure:	25 bar
Working temperature range:	-20–110 °C
Strainer mesh size Ø:	1/2”–1 1/4”: 0.87 mm 1 1/2” and 2”: 0.73 mm

Designed for pressure point and drain valve connection.

Code		$Kv_{0,01}$ (l/h)
125141 000	1/2”	688
125151 000	3/4”	705
125161 000	1”	1,410
125171 000	1 1/4”	1,494
125181 000	1 1/2”	3,227
125191 000	2”	3,621

Head losses

-The specified $Kv_{0,01}$ values refer to the body of the device with filter.

130

Electronic flow rate and differential pressure measuring station.
Supplied with shut-off valves and connection fittings.
It can also be used to measure the flow rate of series 130 and 142 balancing valves, and of the 683 series metering device.
Can be used for measuring Δp
for automatic flow rate regulators.
Battery electric supply.
Bluetooth® transmission between the Δp meter and remote control unit.
Versions complete with remote control unit with Android® application for Smartphones and Tablets.
Measurement range: 0–1000 kPa.
static Pmax: 1000 kPa.

Code

130006	complete with remote control unit, with Android® application
130005	without remote control unit, with Android® application

538

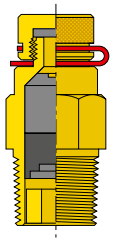
Drain cock with hose connection and cap.
Maximum working pressure: 10 bar.
Maximum working temperature: 110 °C.

Code

538201	1/4”
538400	1/2”

100

Couple of quick-fit pressure/temperature ports.
Their special construction allows rapid and accurate measurements ensuring a perfect hydraulic seal.
Can be used for
- checking the working range of the AUTOFLOW®;
- checking the degree of strainer clogging;
- quantifying the thermal efficiency of terminal units.



Cap clamp available in the following colours:

- **Red** for upstream pressure test port.
- **Green** for downstream pressure test port.

Brass body.
EPDM seals.
Working temperature range: -5–130 °C.
Maximum working pressure: 30 bar.

Code

100000	1/4”

100

Pair of fittings with fast-plug syringe for connection of pressure test ports to measuring instruments.
Female 1/4” threaded connection.
Maximum working pressure: 10 bar.
Maximum working temperature: 110 °C.

Code

100010	1/4”

SPECIFICATION SUMMARY

121 series
AUTOFLOW® combined automatic flow rate regulator and ball valve. Connections 1/2” (3/4”, 1”, 1 1/4”, 1 1/2” and 2”) F with union x F. Dezincification resistant alloy body. High-resistance polymer cartridge (1 1/2” and 2” high-resistance polymer and stainless steel). Stainless steel spring. EPDM seals. Chrome plated brass ball. PTFE ball seat and stem seal. Galvanized steel lever Dezincification resistant alloy pressure test port caps. Medium water and glycol solutions. Max. percentage of glycol 50 %. Maximum working pressure 25 bar. Working temperature range -20–100 °C. Accuracy ±10 %. Δp range 15–200 kPa. Range of available flow rates: 0,085–11,0 m^3/h.

126 series
AUTOFLOW® automatic flow rate regulator. Connections 1/2” (3/4”, 1”, 1 1/4”, 1 1/2” and 2”) F x F. Dezincification resistant alloy body. High-resistance polymer cartridge (1 1/2” and 2” high-resistance polymer and stainless steel). Stainless steel spring. EPDM seals. Dezincification resistant alloy pressure test port caps. Medium water and glycol solutions. Max. percentage of glycol 50 %. Maximum working pressure 25 bar. Working temperature range -20–100 °C. Accuracy ±10 %. Δp range 15–200 kPa. Range of available flow rates: 0,085–11,0 m^3/h.

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