Automatic flow regulator with high-resistance polymer cartridge

121 - 126 series

AutoFlow®

cert. n° 0003 ISO 9001

01141/06 GB

Function

The Autoflow devices are automatic flow regulators capable of maintaining a constant flow rate of the medium as the operating conditions of the hydronic circuit change. They automatically balance the hydronic circuit and ensure the design flow rate at each terminal emitter.
In this particular series, the devices are equipped with an innovative and exclusive regulator element made of high-resistance polymer, selected for use in air-conditioning and plumbing systems.
With this new regulator, the devices provide silent operation, accuracy in control, insensitivity to scale and a long service life.

The devices are available in both the version as a flow regulator and in the version completed with a shut-off ball valve.

Patent application No. MI2004A001549

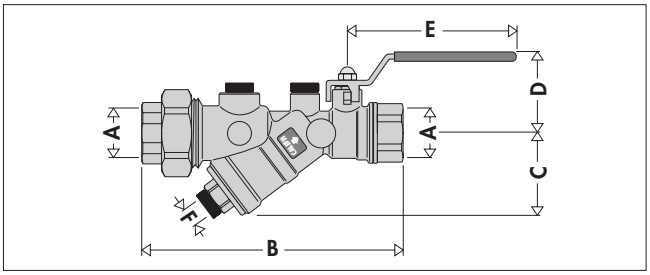
Product range

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

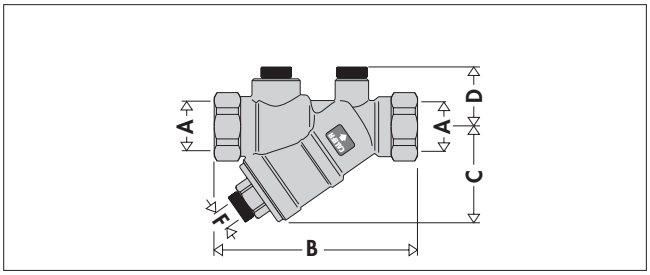
Technical specifications

series ⇨	121	126
Materials		
Body:	brass EN 12165 CW617N	brass EN 12165 CW617N
Autoflow cartridge:	high-resistance polymer	high-resistance polymer
Spring:	stainless steel	stainless steel
Seals:	EPDM	EPDM
Ball:	brass EN 12165 CW614N, chrome-plated	-
Ball seat:	PTFE	-
Control stem seal:	PTFE	-
Lever:	special zinc-plated steel	special zinc-plated steel
Pressure port plugs:	POM	POM
Performance		
Medium:	water, glycol solutions	water, glycol solutions
Maximum percentage of glycol:	50%	50%
Maximum working pressure:	16 bar	16 bar
Working temperature range:	0–100°C	0–100°C
Δp Range:	15–200 kPa	15–200 kPa
Flow rates:	0,12–2,0 m³/h	0,12–2,0 m³/h
Accuracy:	±10%	±10%
Connections	1/2"–1 1/4" F with union x F	1/2"–1 1/4" F
Pressure ports connections	1/4" F	1/4" F

Dimensions



Code	A	B	C	D	E	F	Weight (kg)
121141 ...	1/2"	156,5	50	50	100	1/4"	1,00
121151 ...	3/4"	159,5	50	50	100	1/4"	1,00
121161 ...	1"	218,5	96	66	120	1/2"	1,85
121171 ...	1 1/4"	220,5	96	66	120	1/2"	1,87



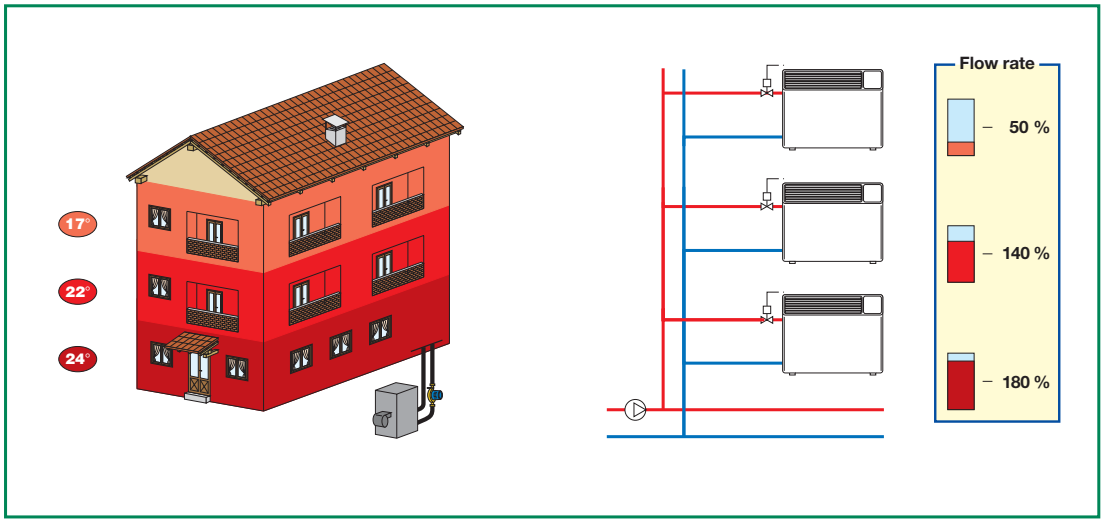
Code	A	B	C	F	Weight (kg)
126141 ...	1/2"	101	50	1/4"	0,45
126151 ...	3/4"	106	50	1/4"	0,48
126161 ...	1"	140	96	1/2"	1,36
126171 ...	1 1/4"	148	96	1/2"	1,24

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 terminal emitters with the correct design flow rates, to produce balanced hydraulic circuits.

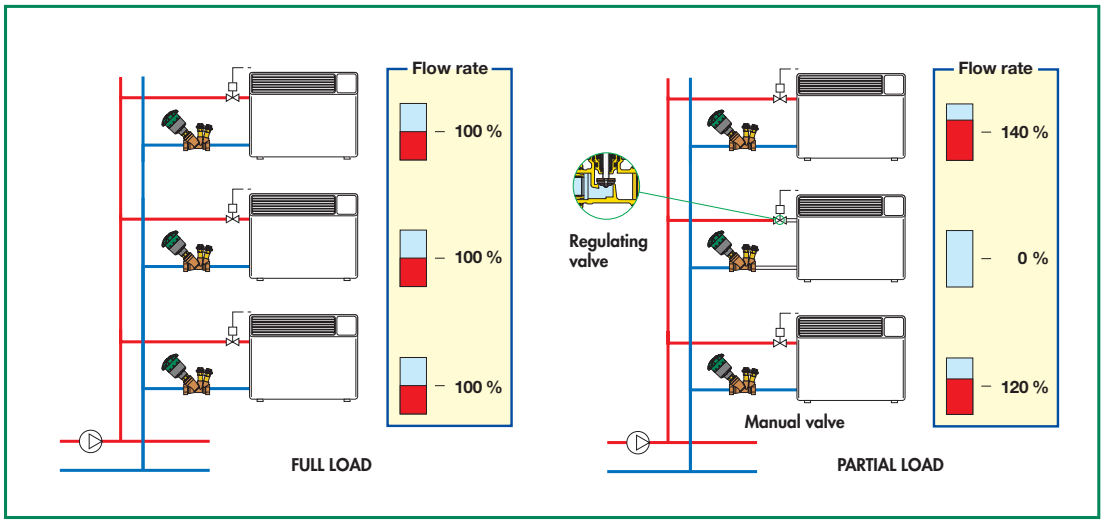
Unbalanced circuits

If a circuit is not balanced, the hydraulic imbalance between emitters creates areas with temperatures which are not uniform, problems with thermal comfort, and higher energy consumption.



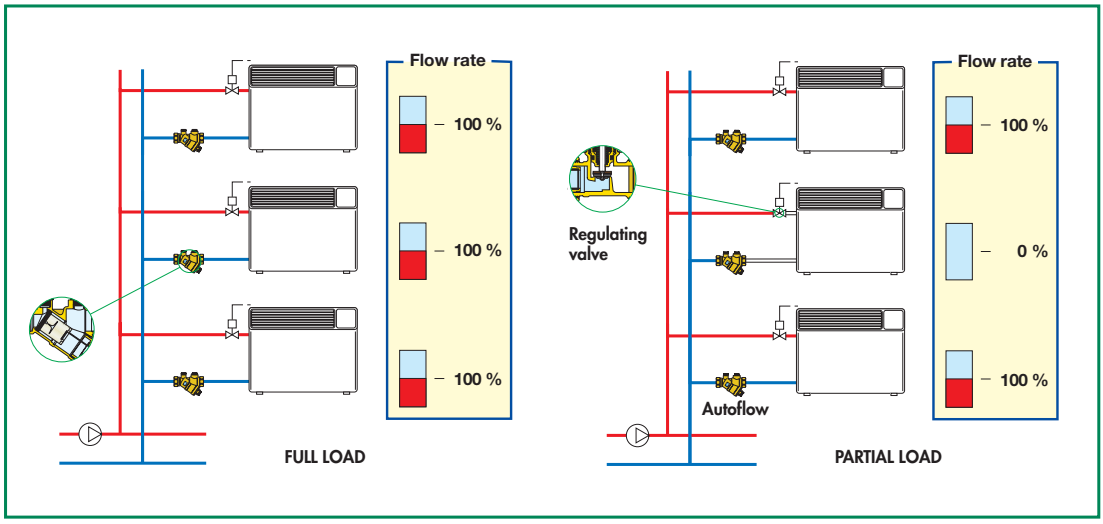
Circuits balanced with manual valves

Traditionally, hydraulic circuits are balanced using manual calibration valves.
With these static-type devices, such circuits are difficult to balance perfectly and have operating limitations in the case of partial closure by means of the regulating valves.
The flow rate in the open circuits **does not remain constant at the nominal value**.



Circuits balanced with Autoflow

Autoflow balances the hydraulic circuit automatically, ensuring that each terminal emitter receives the design flow rate.
Even in the case of partial circuit closure by means of the regulating valves, 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 has to guarantee a constant flow rate when its upstream/downstream pressure differential varies.

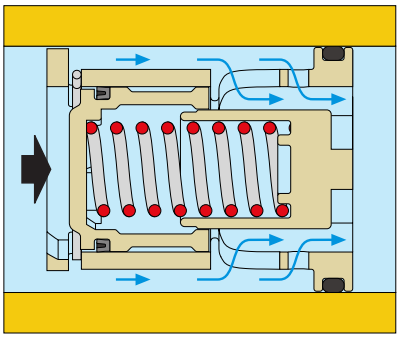
It is therefore necessary to refer to the Δp - flow rate diagram and a basic diagram illustrating the methods of operation and the effects of the relevant variables.

Principle of operation

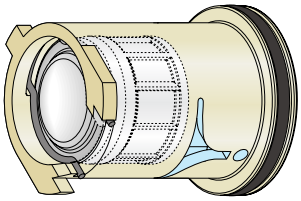
The regulating element of these devices is a piston and a cylinder that has side apertures, of fixed and variable geometry, through which the medium flows. These apertures are governed by the movement of the piston on which the thrust of the medium acts. A specially calibrated spring counteracts this movement.

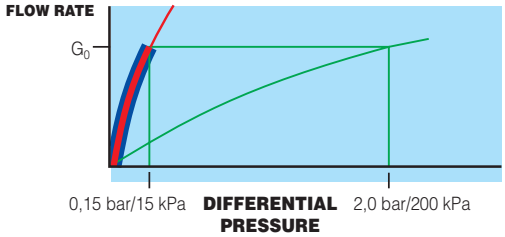
Autoflows are high performance automatic regulators. They regulate the flow rates selected within a very tight tolerance (approx. 10%) and offer a wide range of operation.

Below the control range



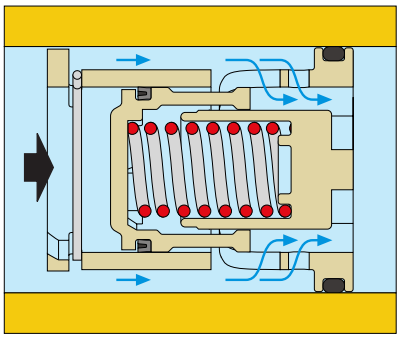
In this case, the regulating piston remains in equilibrium without compressing the spring and gives the medium the maximum free flow area. In practice, the piston acts as a fixed regulator and thus the flow through the AUTOFLOW depends solely on the differential pressure.



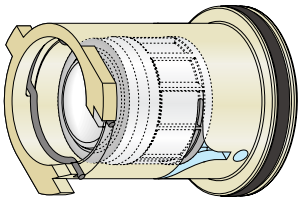


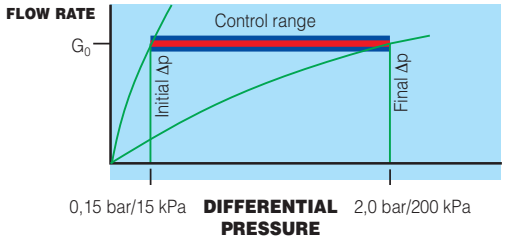
$Kv_{0,01} = 0,258 \cdot G_0$ Range Δp 15–200 kPa *where G_0 = nominal flow rate*

Within the control range

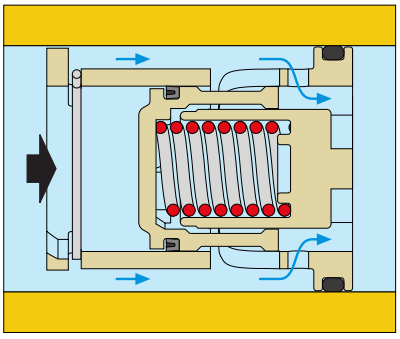


If the differential pressure is contained within the control range, the piston compresses the spring and gives the medium a free flow area to permit regular flow at the nominal rate for which the AUTOFLOW is set up.



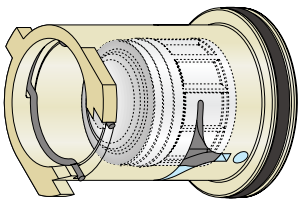


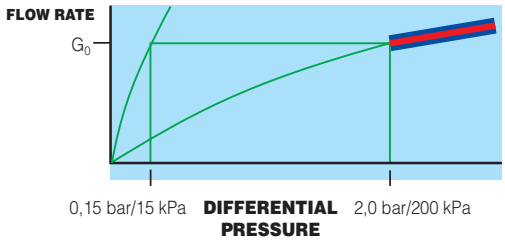
Above the control range



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 thus 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

New polymer regulator

The flow-rate regulator element is made entirely of high-resistance polymer, specially chosen for use in air-conditioning and plumbing systems.
Its mechanical behaviour is excellent in a wide range of working temperatures, it features high resistance to abrasion due to the medium flowing continuously, it is insensitive to the deposit of scale and is fully compatible with the glycols and additives used in circuits.

Exclusive design

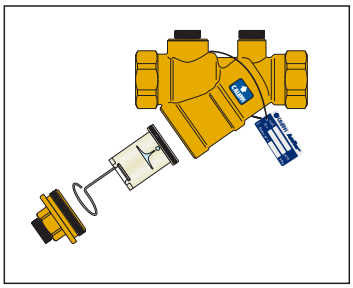
The new regulator, thanks to its exclusive design, is able to accurately regulate the flow rate in a wide range of operating pressures. A special internal chamber acts as a damper for the beating and vibration triggered by the flow of the medium, making sure the device works quietly.
For these reasons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

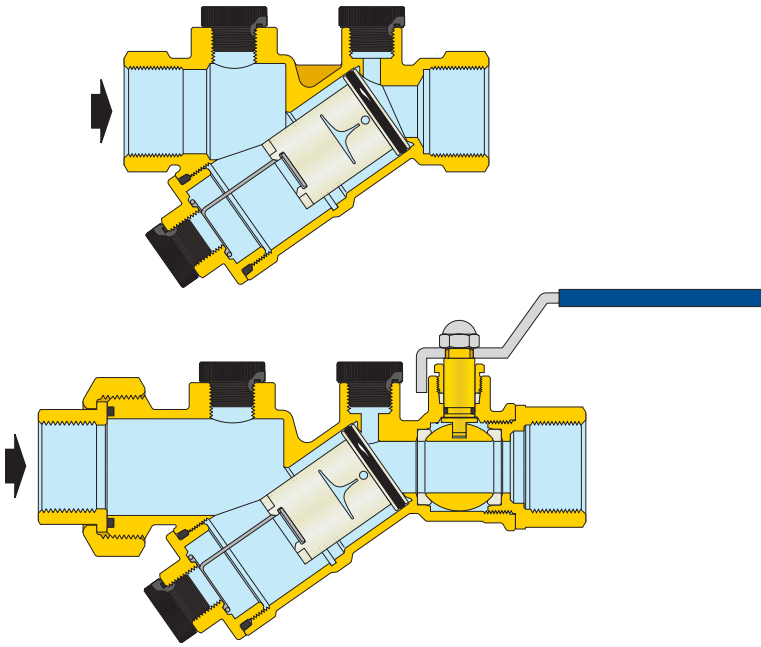
Ball valve

The control stem of the ball valve has a blowout-proof stem and the reversible closing lever is covered with vinyl. If there are any insulated pipes, it can be changed with the extended lever series 117.

Replaceable cartridge

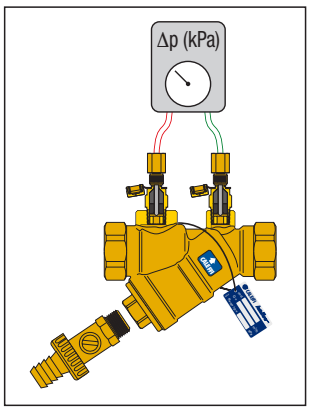
The internal regulator is assembled in the form of a self contained cartridge so as to permit easy removal from the body for inspection or replacement. It is equipped with a special automatic fixing system with wire and an operating ring for fast and safe positioning without using tools.





Connecting the device

The body of the Autoflow device is fitted with connections for the pressure ports, which is useful when checking operation in the working range. In addition, the cartridge plug contains a connection to be able to use a circuit drain valve.

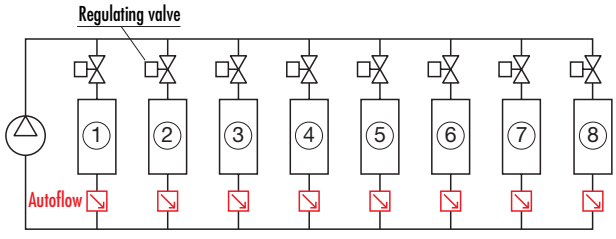


Sizing the circuit with Autoflow

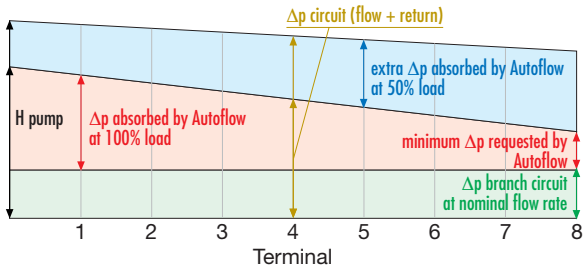
Sizing the circuit containing Autoflow is particularly easy to accomplish. As illustrated by the diagrams, shown alongside by way of example, the calculation of the loss of head for choosing the pump is made by referring to the hydraulically most unfavourable circuit and adding this value to the minimum differential pressure required by the Autoflow. In the example the circuits have the same nominal flow rate.

The Autoflow devices, located on intermediate circuits, 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).

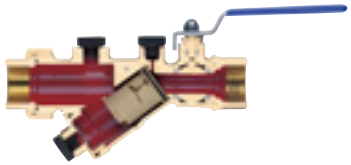
For more detailed information on sizing a system with Autoflow, please refer to the 2nd volume of the Caleffi Handbooks and the technical report “Dynamic balancing of hydronic circuits”. They give theoretical calculations, numerical examples and notes on the application of the above-mentioned devices in circuits.



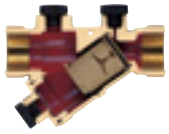
Differential pressures (Δp)



Flow-rate tables



Code	$kv_{0,01}$ (l/h)	Minimum working Δp (kPa)	Δp Range (kPa)	Flow rates (m³/h)
121141 ●●●	690	15	15–200	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	0,12; 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
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
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



Code	$kv_{0,01}$ (l/h)	Minimum working Δp (kPa)	Δp Range (kPa)	Flow rates (m³/h)
126141 ●●●	669	15	15–200	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	0,12; 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
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
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

Minimum differential pressure required
Given by the sum of two values:
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 calculated according to the values of $kv_{0,01}$ stated above and referring to the valve body only

Example
Autoflow 126 series dimension 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 $H = \Delta p_{circuit} + \Delta p_{required}$

Method of coding for Autoflow series 121 - 126

For correct identification of the device, fill in the form giving series No., size, flow rate and Δp.

Complete code

1st	2nd	3rd	4th	5th	6th	7th	8th	9th
			1		1			
SERIES				SIZE		FLOW RATE - Δp RANGE		

SERIES — 1st 2nd 3rd

The first three digits indicate the series:

121	Autoflow regulator and ball valve
126	Autoflow regulator

SIZE — 5th

The fifth digit indicates the size:

Size	1/2"	3/4"	1"	1 1/4"
Digit	4	5	6	7

FLOW RATE AND Δp RANGE — 7th 8th 9th

The last three digits indicate the flow rates available.

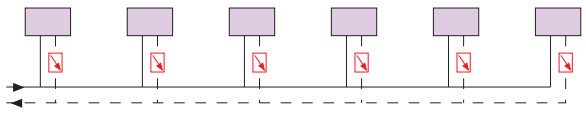
with Δp Range 15–200 kPa

m³/h	digit	m³/h	digit	m³/h	digit	m³/h	digit	m³/h	digit	m³/h	digit
0,12	M12	0,25	M25	0,40	M40	0,70	M70	1,00	1M0	1,60	1M6
0,15	M15	0,30	M30	0,50	M50	0,80	M80	1,20	1M2	1,80	1M8
0,20	M20	0,35	M35	0,60	M60	0,90	M90	1,40	1M4	2,00	2M0

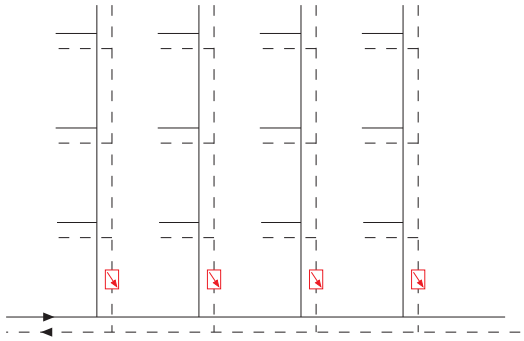
Applications of Autoflow ( )

Installation of Autoflow

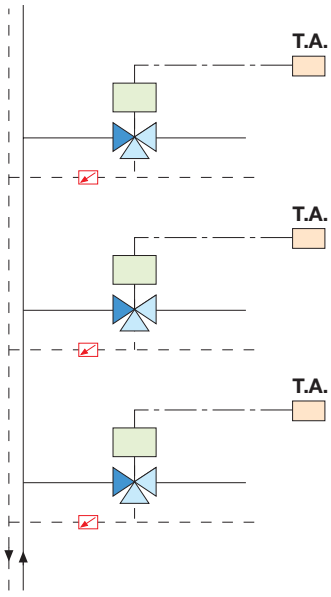
In air-conditioning systems, AUTOFLOW devices must preferably be installed on the circuit return pipe.
Some typical installation examples are given below.



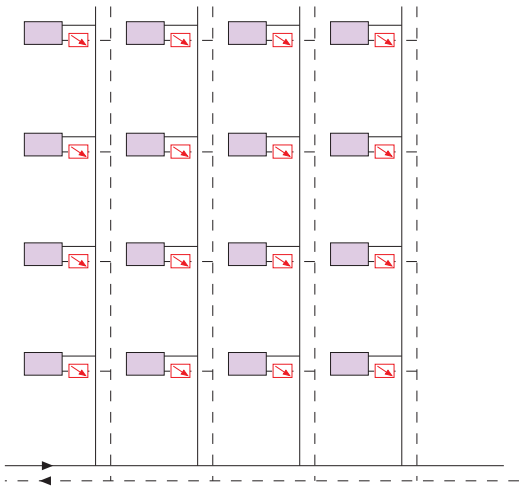
For use in line with various types of heat emitter: radiators, convectors, fan convectors, thermal strips, etc.



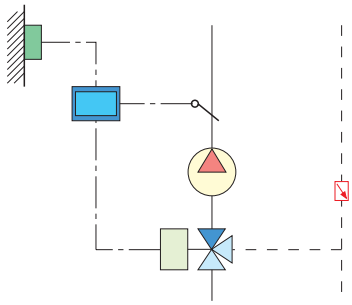
To regulate the flow rate in each riser or secondary branch of a system.



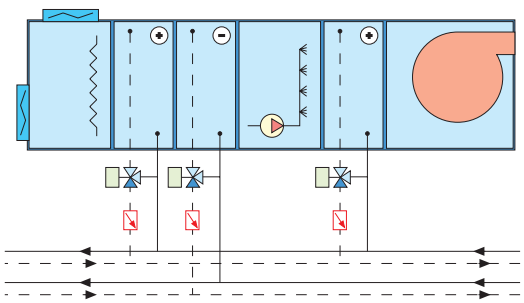
To guarantee the design flow rate (with valves open or closed) to the various zones of a system.



To ensure constant flow rates to each emitter.

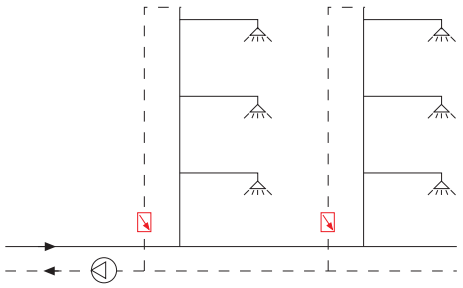


To ensure constant flow rates (in any valve position) in circuits with traditional temperature control.

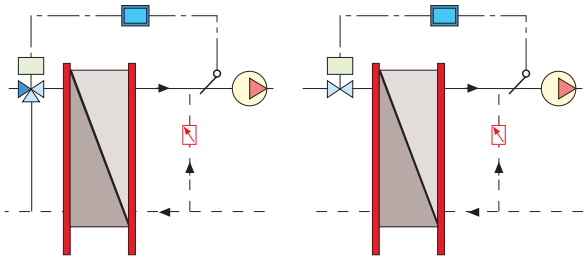


To balance circuits used in air conditioning units.

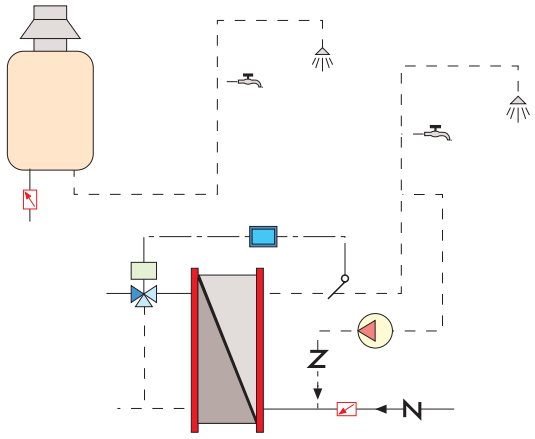
Applications of Autoflow ( )



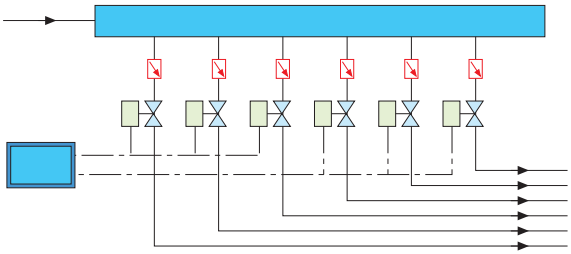
To balance circuits for hot water distribution



To create heat exchanger flow balancing by-passes



To limit the flow rate of hot water which can be delivered in systems with instantaneous production or limited capacity



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

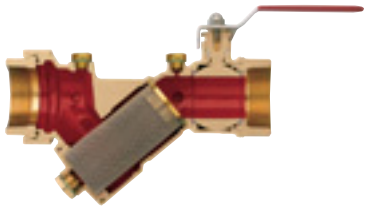
For further details, consult Applications Sheets Nos. 04301, 04302, 04303 and the technical report "Dynamic Balancing of Hydronic Systems".

Accessories

120 FILTER Version

tech. broch. 01041

Combination of filter and ball valve.



Brass body.
Stainless steel filter cartridge.
Maximum working pressure: 25 bar
Temperature range: 0–110°C
Filter mesh Ø: 1/2"-1 1/4": 0,87 mm
Fitted for connecting pressure ports and drain valve.

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

Head losses

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

125 FILTER Version

tech. broch. 01041

Y-filter.

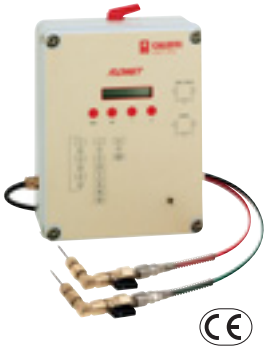
Brass body.
Stainless steel filter cartridge.
Maximum working pressure: 25 bar
Temperature range: -20–110°C
Filter mesh Ø: 1/2"-1 1/4": 0,87 mm

Fitted for connecting pressure ports and drain valve.

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

Head losses

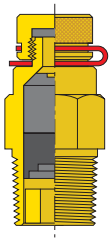
- The stated values of $kv_{0,01}$ refer to the body of the device with filter.



130 FLOMET

Electronic flow rate and differential pressure measuring station.
Supplied complete with hoses and connection fittings.
Can be used for checking the correct operation of Autoflow devices.
It can also be used for measuring the flow rate of balancing valves series 131, 135 and of the flow metering device 683 series.
Transducer range: 0,05–200 kPa.
Max. differential pressure: 200 kPa.

Code	
130000	supply 230 V
130001	battery operated



100

tech. broch. 01041

Fast-plug pressure/temperature test ports for automatic flow regulators.
Their special construction permits making rapid and accurate measurements while ensuring leaktightness.
Can be used for:
- checking the operation of Autoflow device;
- checking the degree of strainers clogging;
- checking the heat output of the emitter terminals.

Cap cover facing available in:
- **Red** for upstream pressure
- **Green** for downstream pressure.

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

Code	
100000	1/4”

117

Dual-purpose ball valve control handle:
- valve open/close control possible, even when insulation is fitted thanks to extended lever;
- memory stop position by means of mechanically-locking selector.

Useful if you want to create a certain loss of head in the user circuit and you want to keep it even after subsequently closing and reopening the valve.

Code	Use
117000	120, 121 series 1/2”, 3/4”
117001	120, 121 series 1”, 1 1/4”

100

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

Code	
100010	1/4”

538

Drain cock
with hose connection.

Code	
538201	1/4”
538401	1/2”

SPECIFICATION SUMMARIES

121 series

Automatic flow regulator and ball valve, Autoflow. Brass body. High-resistance polymer cartridge. Stainless steel spring. EPDM seals. Chrome-plated brass ball. PTFE ball seat and stem seal. Zinc-plated steel lever. POM pressure port plugs. Medium: water and glycol solutions. Maximum percentage of glycol 50%. Maximum working pressure 16 bar. Temperature range 0–100°C. Accuracy ± 10%. Δp Range 15–200 kPa. Range of available flow rates: 0,12–2,0 m^3/h. Connections 1/2” (3/4”, 1” and 1 1/4”) F with union x F.

126 series

Automatic flow regulator, Autoflow. Brass body. High-resistance polymer cartridge. Stainless steel spring. EPDM seals. POM pressure port plugs. Medium: water and glycol solutions. Maximum percentage of glycol 50%. Maximum working pressure 16 bar. Temperature range 0–100°C. Accuracy ± 10%. Δp Range 15–200 kPa. Range of available flow rates: 0,12–2,0 m^3/h. Connections 1/2” (3/4”, 1” and 1 1/4”) F x F.

CALEFFI

CALEFFI S.P.A. · I · 28010 FONTANETO D’AGOGNA (NO) · S.R. 229, N.25 · TEL.INT. +39 0322 8491 R.A. · FAX +39 0322 863723
· Http://www.caleffi.com · E-mail: info@caleffi.it ·