Compact automatic flow rate regulator with polymer cartridge

127 series

AutoFlow®

BS EN ISO 9001:2000 Cert. n° FM 21654

UNI EN ISO 9001:2000 Cert. n° 0003

01166/09 GB

Function

The AUTOFLOW® devices are automatic flow rate stabilizers capable of maintaining a constant flow rate of the medium as the operating conditions of the hydraulic system change. They are used to automatically balance the hydraulic system, guaranteeing the design flow rate to each terminal.
This series of devices is fitted with an interchangeable flow rate regulator, made of high resistance, scale resistant and low noise polymer, for specific use in air-conditioning, hydraulic and domestic water systems.

This special AUTOFLOW® series is also supplied with a compact, reduced size valve body for easy installation on individual terminals or system zones.

Patent application no. MI2004A001549

ACS

Product range

127 series Compact automatic flow rate regulator, with polymer cartridge ..... sizes 1/2" and 3/4"

Technical specifications

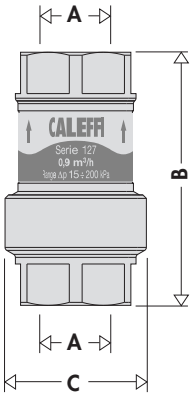
Materials

Body:	brass EN 12164 CW614N
Autoflow cartridge:	high resistance polymer
Spring:	stainless steel
Seals:	EPDM

Performance

Medium:	water, glycol solutions
Max. percentage of glycol:	50%
Max. working pressure:	16 bar
Working temperature range:	0–100°C
Δp range:	15–200 kPa
Flow rates:	0,12–1,6 m³/h
Accuracy:	±10%
Connections:	1/2" and 3/4" F

Dimensions



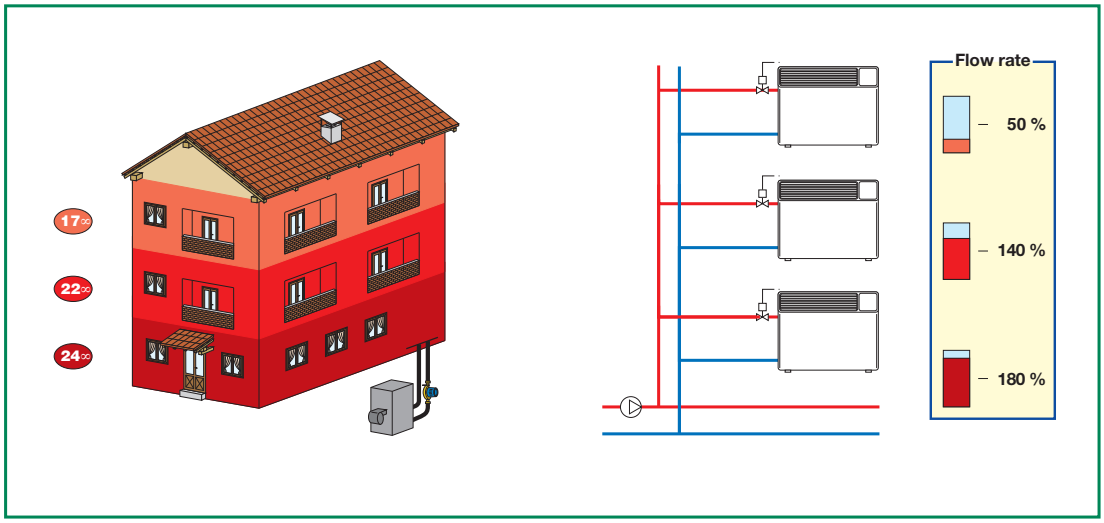
Code	A	B	C	Weight (kg)
127141	1/2"	74	41	0,24
127151	3/4"	74	41	0,25

Circuit balancing

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

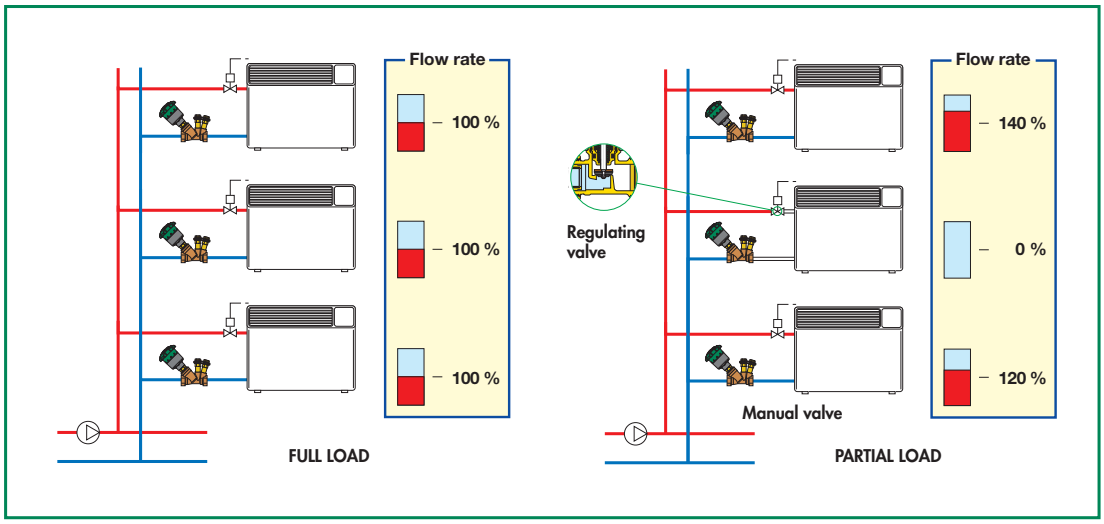
Unbalanced circuits

In case of an unbalanced circuit, the hydraulic umbalance between emitters creates areas with temperatures which are not uniform, and, as a consequence, problems with thermal comfort and higher energy consumption.



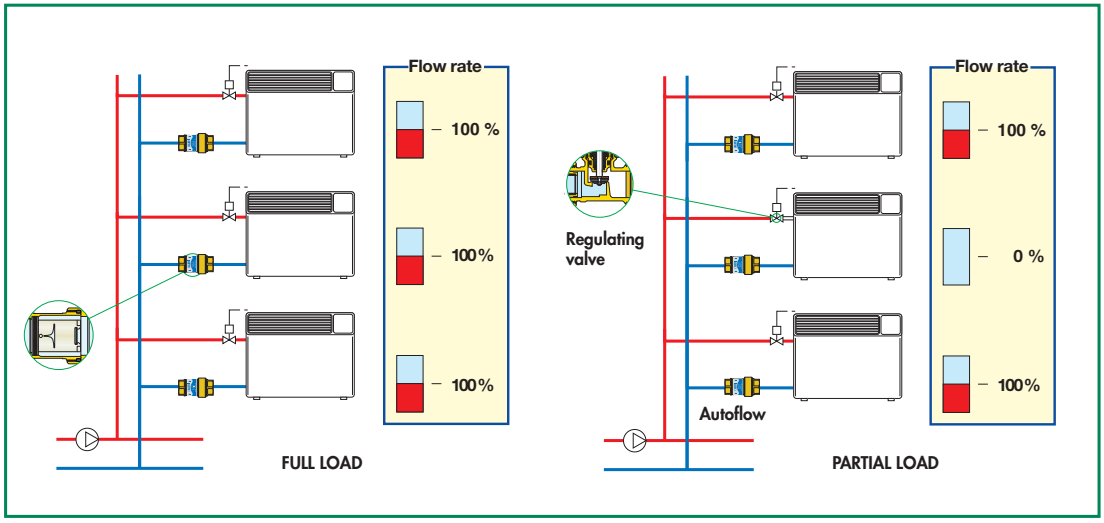
Circuits balanced with manual valves

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 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, by ensuring to each terminal emitter the design flow rate.
Even in 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.

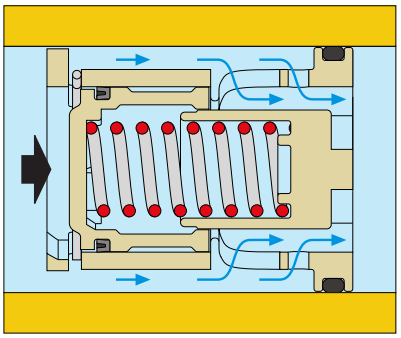


AUTOFLOW® devices

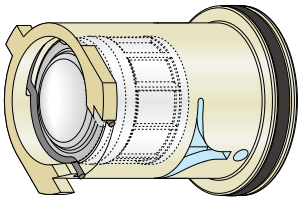
Function
The AUTOFLOW® device has to guarantee a constant flow rate when its upstream/downstream pressure differential varies.
It is therefore necessary to refer to the Δp - flow rate diagram and to a basic diagram illustrating the operation methods and the relevant variable effects.

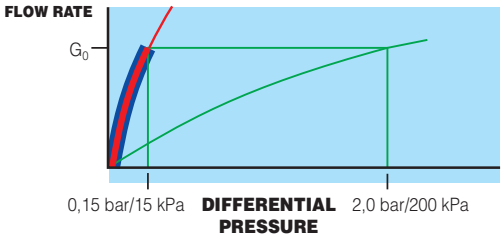
Operating principle
The regulating element of these devices is composed of a cilinder and a piston with side fixed and variable geometry orifices, through which the fluid flows. These orifices are governed by the piston movement, pushed by the medium thrust. A specially calibrated spring counteracts this movement.
Autoflows are high performance automatic regulators. They regulate selected flow rates within a very tight tolerance (approx. 10%) and offer a wide range of operation.

Below the control range



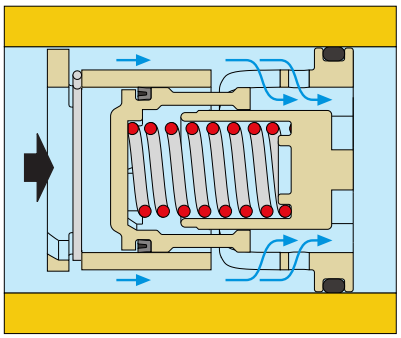
In this case, the regulating piston remains in equilibrium without compressing the spring and gives the fluid the maximum free flow area. In practice, the piston acts as a fixed regulator and thus the flow rate through the AUTOFLOW® depends solely on the differential pressure.



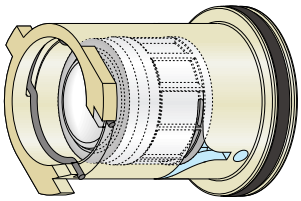


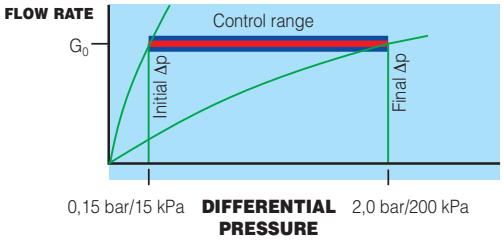
$Kv_{0,01} = 0,258 \cdot G_0$ range Δp 15–200 kPa *where G_0 = nominal flow rate*

Within the control range

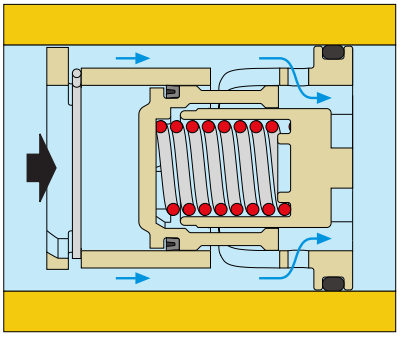


If the differential pressure is contained within the control range, the piston compresses the spring and gives the medium a free flow area to permit regular flow at the **nominal rate** for which the AUTOFLOW® is set up.

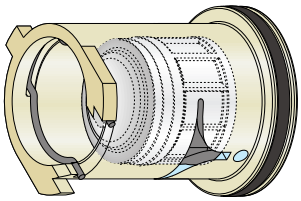


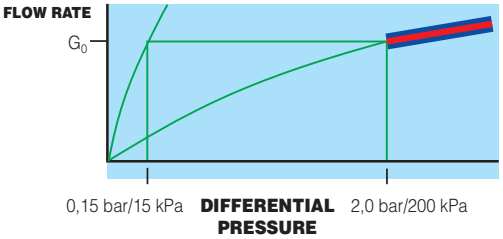


Above the control range



In this case, the piston fully compresses the spring and leaves only 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.



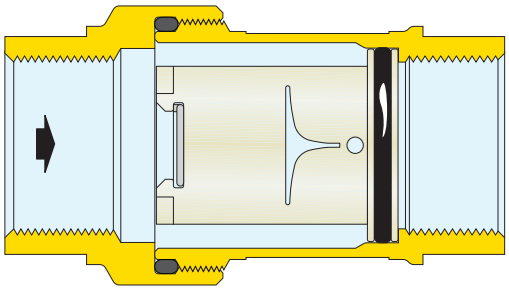


$Kv_{0,01} = 0,070 \cdot G_0$ range Δp 15–200 kPa *where G_0 = nominal flow rate*

Construction details

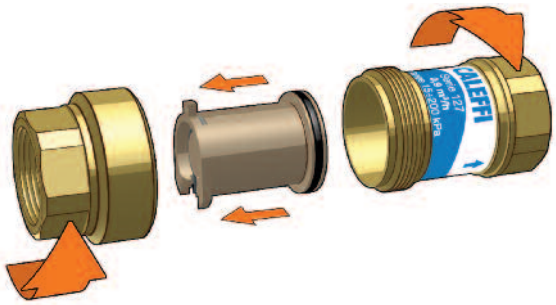
New polymer regulator
The flow rate regulator is made entirely of high resistance polymer, specially chosen for use in air-conditioning and hydraulic systems.
Its mechanical behaviour is excellent in a wide range of working temperatures, it features high resistance to the abrasion caused by continuous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

Exclusive design
With its exclusive design, the new regulator is able to accurately regulate the flow rate in a wide range of operating pressures. A special internal chamber acts as a damper for beating and vibrations triggered by the medium flow, allowing low noise operating conditions to the device.
For these reasons it can be used in systems both on zone branch circuits and directly at the terminals.



Cartridge removal
The device is easy to remove for inspection or manual replacement of the regulator, by unscrewing the cartridge locking nut from the valve body.

Compact valve body with reduced dimensions
This special series of devices is also supplied with a compact, simplified valve body for easy fitting on pipes and more cost-efficient installations.

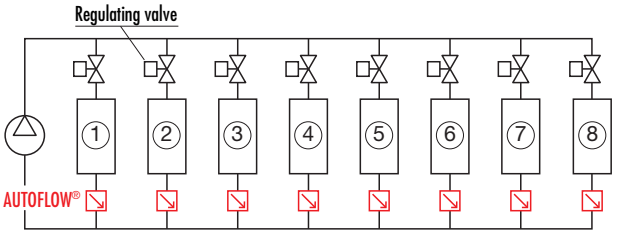


Sizing the circuit with AUTOFLOW®

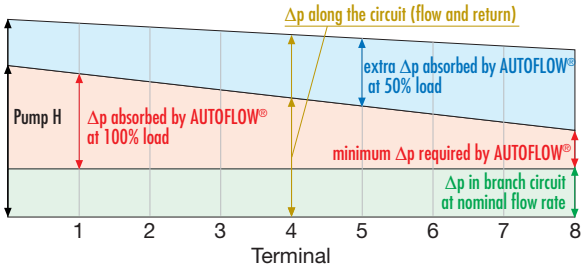
Sizing the circuit containing AUTOFLOW® valves is particularly easy to accomplish. As illustrated alongside by the example diagrams, calculation of the loss of head in order to choose the pump is made by referring to the hydraulically most unfavourable circuit and by adding this value to the minimum 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 table

Code	Size	Minimum working Δp (kPa)	Δp range (kPa)	Flow rates (m^3/h)
127141 •••	1/2	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
127151 •••	3/4	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; 1,4; 1,6

Minimum differential pressure required
Equal to the minimum working Δp of the AUTOFLOW® cartridge (15 kPa).

Example
AUTOFLOW® 127 series size 3/4", with flow rate G_0 = 1,200 l/h and Δp range 15–200 kPa:
$\Delta p_{required} = \Delta p_{AUTOFLOW®}$ = 15 kPa Pump head H = $\Delta p_{circuit} + \Delta p_{required}$

Method of coding for AUTOFLOW® 127 series

For proper identification of the device, fill in the form indicating: size, flow rate and Δp range.

Complete code:

1th	2th	3th	4th	5th	6th	7th	8th	9th
1	2	7	1		1			
SERIES				SIZE		FLOW RATE AND Δp RANGE		

SERIES 1th 2th 3th

The first three digits indicate the series:

127	AUTOFLOW® regulators

SIZE 5th

The fifth digit indicates the size:

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

FLOW RATE AND Δp RANGE 7th 8th 9th

The last three digits indicate the available flow rate values.

with Δp range 15÷200 kPa

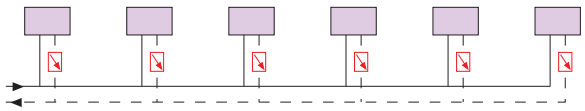
m³/h	digit	m³/h	digit	m³/h	digit	m³/h	digit
0,12	M12	0,35	M35	0,80	M80	1,60	1M6
0,15	M15	0,40	M40	0,90	M90		
0,20	M20	0,50	M50	1,00	1M0		
0,25	M25	0,60	M60	1,20	1M2		
0,30	M30	0,70	M70	1,40	1M4		

Applications of AUTOFLOW® (↗)

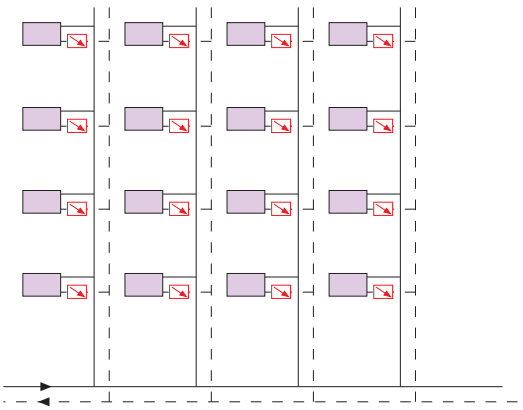
Installation of AUTOFLOW®

In air-conditioning systems, AUTOFLOW® devices should preferably be installed on the circuit return pipe.

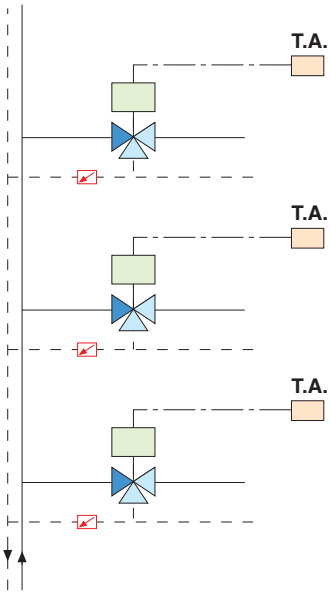
Some typical installation examples are given below.



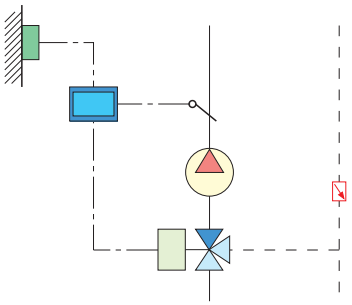
For use in line with various types of heat emitter: radiators, convectors, fan convectors, thermal strips, etc.



To ensure constant flow rates to each emitter.

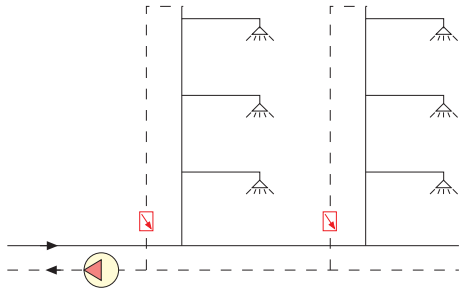


To guarantee the design flow rates (with open or closed valve) to the various zones of a system.

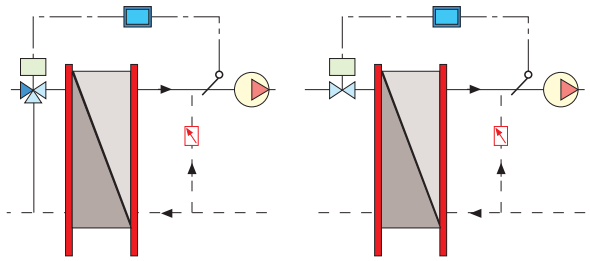


To ensure constant flow rates (in any valve position) in circuits with traditional temperature control.

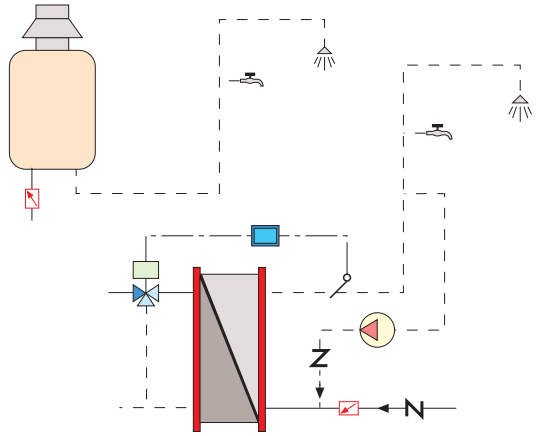
Applications of AUTOFLOW® ( )



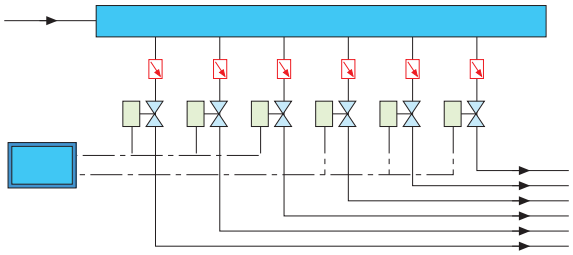
To balance sanitary water distribution circuits.



To create heat exchanger flow balancing by-passes



To limit the hot water flow rate delivered in systems with instantaneous production or limited capacity.



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

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

SPECIFICATION SUMMARIES

127 series

Compact automatic flow rate regulator, AUTOFLOW®. Connections 1/2" (3/4") F x F. Brass body. High resistance polymer cartridge. Stainless steel spring. EPDM seals. Medium water and glycol solutions. Maximum percentage of glycol 50%. Maximum working pressure 16 bar. Working temperature range 0–100°C. Δp range 15–200 kPa. Range of available flow rates 0,12–1,6 m³/h. Accuracy ±10%.

CALEFFI

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