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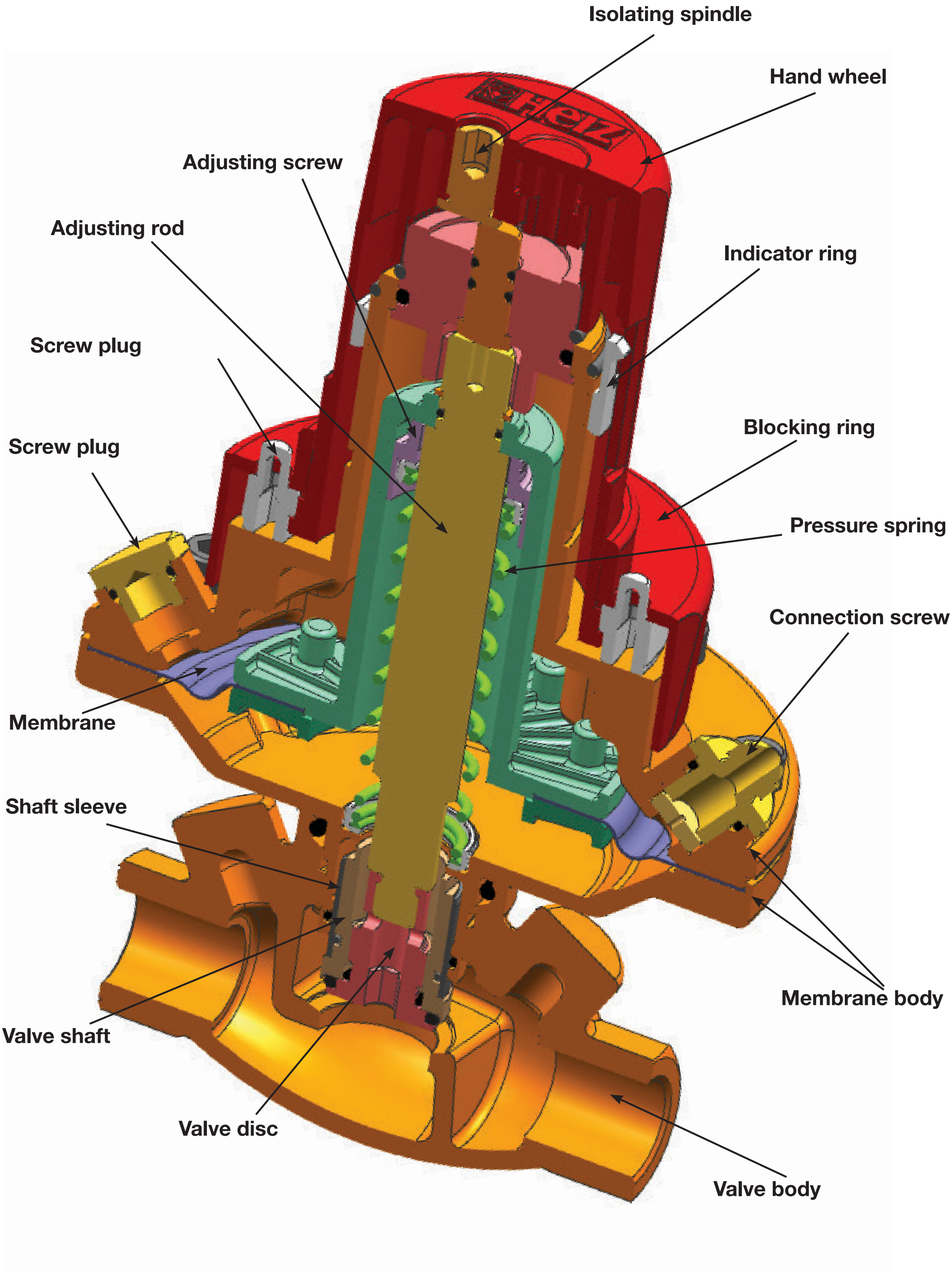
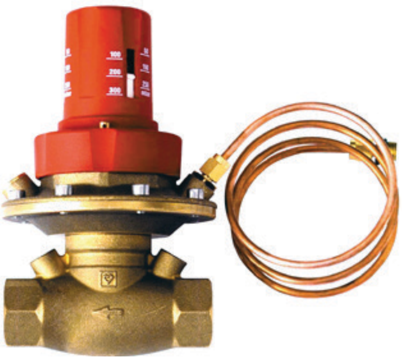
HERZ®

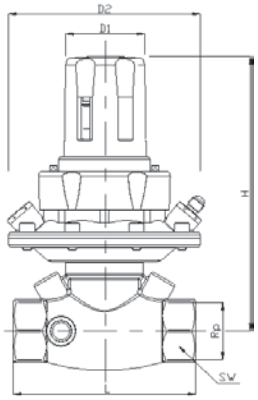
Differential Pressure Controllers

Dynamic control for hydraulic balancing

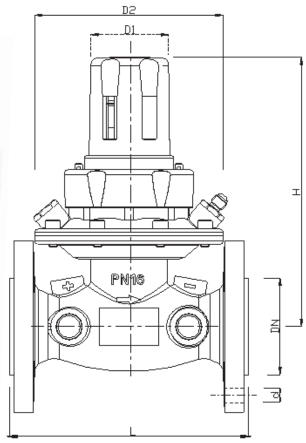

Isolating spindle
Hand wheel
Adjusting screw
Adjusting rod
Indicator ring
Screw plug
Screw plug
Blocking ring
Pressure spring
Connection screw
Membrane
Shaft sleeve
Membrane body
Valve shaft
Valve disc
Valve body

TECHNICAL DATA





4007



4007 F

Order number 4007	DN	Rp	L	SW	H	D1	D2
1 **4007** 01	15	1/2	100	27	170	50	125
1 **4007** 02	20	3/4	100	32	170	50	125
1 **4007** 03	25	1	120	41	180	50	125
1 **4007** 04	32	1¼	140	50	185	50	125
1 **4007** 05	40	1½	150	55	185	50	125
1 **4007** 06	50	2	165	70	196	50	125
1 **4007** 07	65	2½	190	85	203	50	125
1 **4007** 08	80	3	210	100	205	50	125

Order number 4007 F	DN	L	H	D1	D2	d
1 **4007** 13	25	160	180	50	125	14
1 **4007** 14	32	180	185	50	125	19
1 **4007** 15	40	200	185	50	125	19
1 **4007** 16	50	230	196	50	125	19
1 **4007** 17	65	290	206	50	125	19
1 **4007** 18	80	310	207	50	125	19

Data:

- Max. operating pressure 16 bar
- Test pressure 24 bar
- Max. differential pressure at the membrane 2 bar
- Max. operating temperature DN15 - DN32 130°C
- Max. operating temperature DN40 - DN80 110°C
- Flange according to EN 1092

Materials:

- Valve body of dezincification-resistant brass (4007) or
- Valve body of grey cast iron (4007 F)
- Membrane and O-Rings of EPDM
- Water quality according to ÖNORM H5195 and VDI 2035

Optimised heat supply

HERZ-Measuring Computer **8900**

The aim of designing heating systems is to create a comfortable room temperature, optimise energy costs and avoid malfunctions. The sophisticated design of HERZ products facilitates perfect hydraulic balancing, whilst control is made easy.
Through the hydraulic balancing of heating systems, all system components are supplied with the requisite volume of water at the right time. In this way the required warmth is generated at all times. Heat emission takes place under normal conditions - i.e. under design conditions.

This balance is achieved by adjusting the theoretical maximum volume of water required in every section and part of the supply circuit (pipe network). Adjustments are implemented using regulating valves, e.g. HERZ STRÖMAX 4017, 4217 or 4218.

In order to document the setting values it is necessary to include commissioning valves with test points, because structural changes can often arise between planning and execution, as well as changes in the space utilisation and the pipe material used.

Presetting water volumes

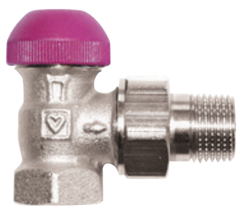
In heating systems and partly in systems where the lowest possible return temperature is required (district heating systems, condensing boilers), specially tailored solutions are essential.
The installation of pre-settable thermostatic valves (HERZ-TS 90 V, TS 98 V, TS-FV) or thermostatic valves with a defined flow rate (fixed flow coefficient) sized to the radiators is therefore recommended. This measure results in lower return temperatures and controlled water volumes. The water volumes are preset at the thermostatic valves and the radiators are regulated in this way.
The basic hydraulic conditions required for adjusting commissioning valves are thereby established for the full case load.

Quiet system operation with differential pressure control

Heating systems are only operated at full load for around 20% of their time in operation. Planning and installation therefore incorporate the use of Differential Pressure Controllers and partnering valves for the predominant time in operation under partial loads. A partial load range arises if the outside temperature is higher than the normal outside temperature assumed during design.

An additional influential factor is the effect of external energy - for example solar radiation, heat emitted by persons and devices, etc. - on the thermostatic head. These influences reduce the quantity of heat required.

This results in an increase in the differential pressure with a constant supply pressure. If high differential pressures exceed the maximum permissible value for the thermostatic valves of 200 mbar (0.2 bar), unpleasant noise can arise.
This unfortunately common typical operating state is now also avoided in technical specifications through the mandatory installation of automatic commissioning valves and Differential Pressure Controllers.



Fine adjustment valve
TS-99-FV

Corrective measures are rendered superfluous

With Differential Pressure Controllers utilised, an optimum hydraulic balance and optimum control condition for thermostatic valves is achieved in every operating state, whilst the operating costs for heating systems are reduced through the avoidance of “corrective measures”. Moving the heating start time forwards has now made the over-sizing of recirculation pumps or the over-supply of system components a thing of the past!

Renovation made easy

Retrofitting with Differential Pressure Controllers in combination with pre-settable thermostatic valves is recommended not only in new builds, but also in the renovation of old systems. If thermostatic valves have already been installed without presetting then it is possible to control the water volume using HERZ Return Valves. If multiple components are being upgraded over an extended period of time then it is only necessary to establish regulation for the newly added sections each time. The system components that have already been renovated and equipped with regulation remain unchanged.

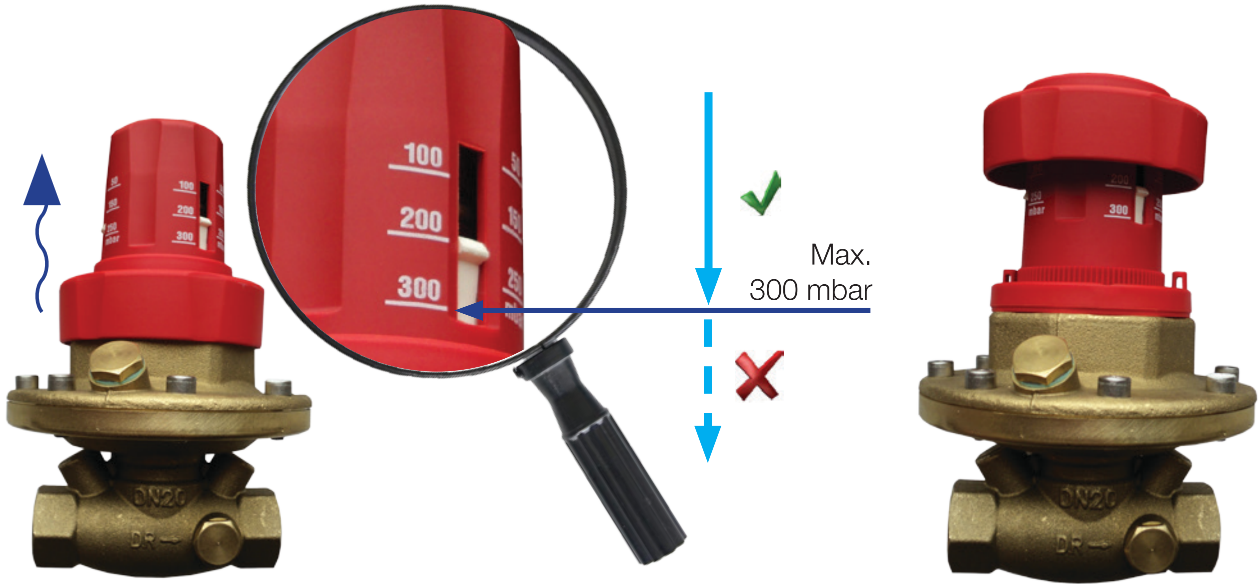
Multifaceted field of application

HERZ Differential Pressure Controllers 4007 are suitable for installation in heating, cooling, radiant ceiling heating systems and underfloor heating systems.

Connections to the supply

It is possible to fit a range of HERZ products in the supply:

- HERZ Commissioning Valves with measuring valves: STRÖMAX 4017, STRÖMAX 4217
- HERZ Isolating Valves: STRÖMAX 4115, STRÖMAX 4125
- HERZ Commissioning Valves STRÖMAX 4217 can be retrofitted by replacing the upper part on a Differential Pressure Controller 4007.



The differential pressure setpoint value is realised by lifting the red safety cap cover and turning the adjusting cap. The setpoint value setting required can be read off on the scale. Afterwards the safety cap cover is slid back towards the body. This fixes the setpoint value. It is also possible to fit a wire seal at the guide pins of the safety cap cover.

Accessories and replacement parts

2662	HERZ-Strainer
4111	HERZ-Strainer
4111 F	HERZ-Strainer with flanged collection, cast iron body

FUNCTION

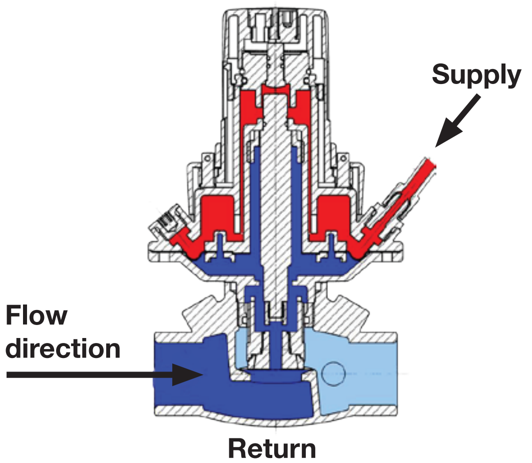
The HERZ Differential Pressure Controller 4007 is a proportional controller in straight format, which operates without auxiliary energy. The maintenance of constant pressure within a technical control range, with minimal influence of external pressure fluctuations and changes in water volumes, is implemented with a membrane, spindle and spring. Varying pressures on the upper and lower side of the membrane, which are exerted via the capillary or the flow rate in the valve, act to move the valve cone. If the differential pressure in the system rises then the valve cone is pressed by the capillary - which is connected with the outer membrane chamber - in the closing direction against the preset spring.

If the differential pressure drops then the valve cone is moved by the spring force in the opening direction. The excess differential pressure is relieved in the Differential Pressure Controller and only the set differential pressure remains in the pipe system subject to regulation. The desired differential pressure (setpoint between 50 and 300 mbar) is steplessly preset via a spring.

Using the Differential Pressure Controller it is also possible to lock the system against use - e.g. during maintenance work.

It is possible to unscrew the upper part in case of tight spatial conditions or to ease the installation process.

Installation in the return



Presetting via the cap - read off, block and seal externally

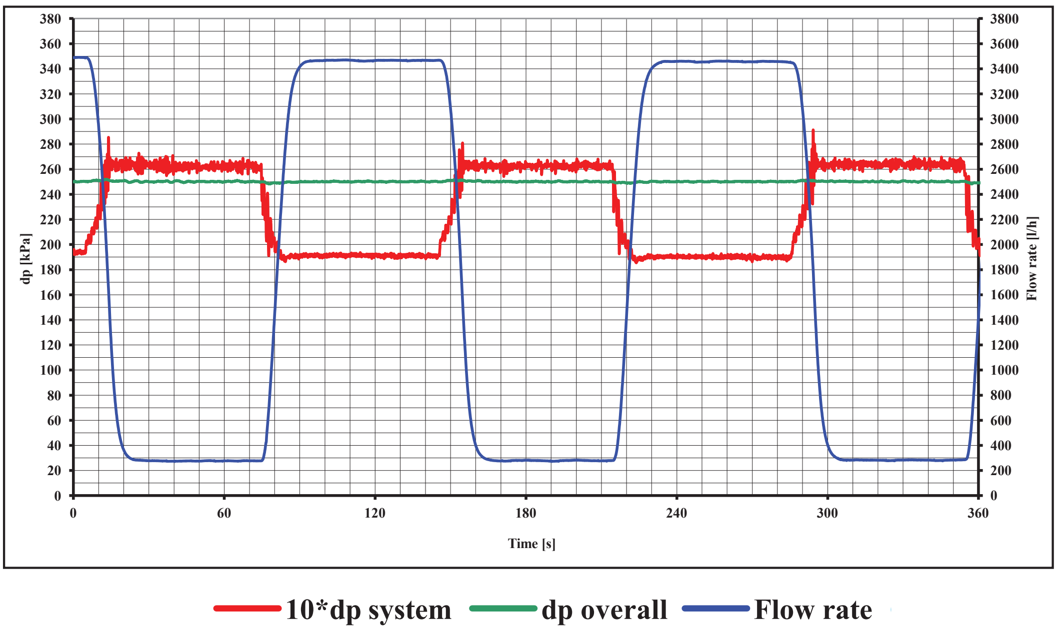
The selected presetting position is safeguarded against turning by a cap. The preset value can be read out, blocked and sealed at any time from outside. The setpoint is set to the minimum in the factory and the blocking ring is latched in the top position. The setpoint value required (spring presetting) is set by lifting the blocking ring and turning the hand wheel. Using the blocking ring the hand wheel is then secured against turning.

Installation in the return

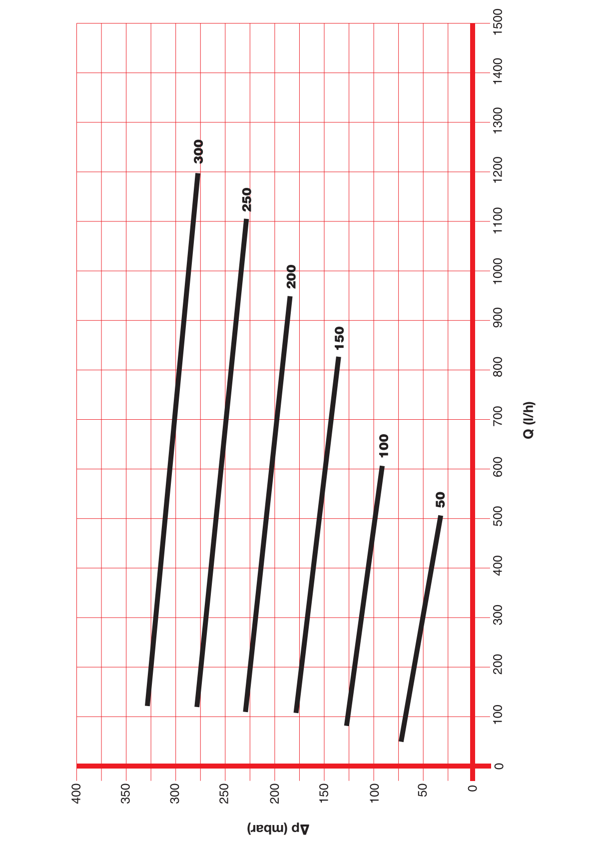
Installation takes place in the return, the controller is connected with the supply via a capillary. The capillary should not be connected from below, in order to avoid blockages due particles of dirt.

Measurement log 1 4007 04

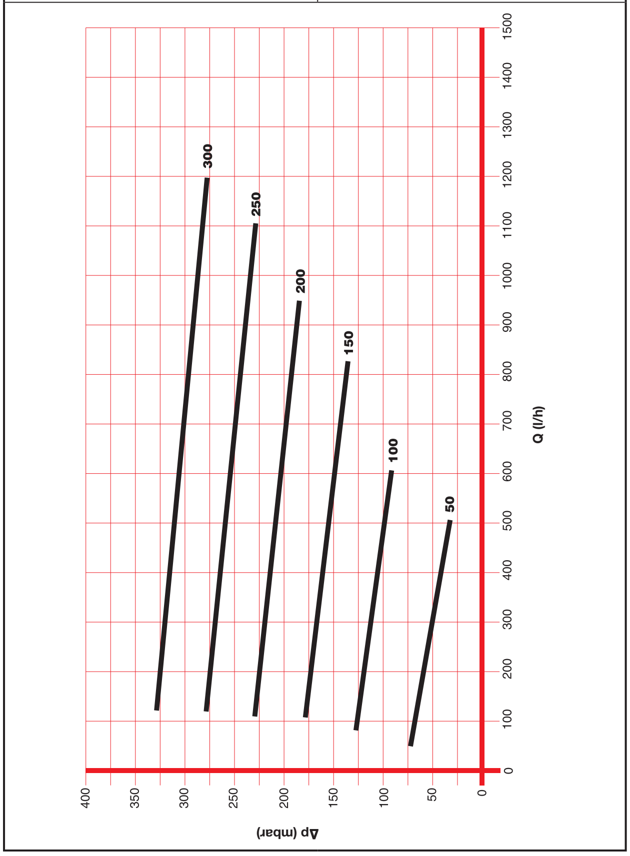
The diagram illustrates the rapid reaction behaviour of the constant pressure maintenance with a change in flow rate (relevant to use in district heating systems):



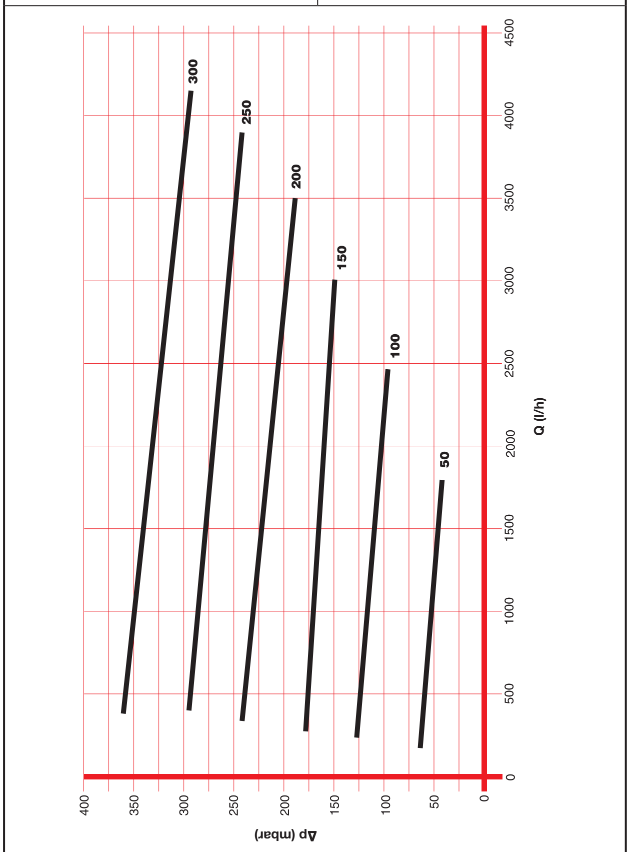
HERZ-Standard Diagramm	Differential Pressure Controller
Order no. **4007**	Dim. DN 15



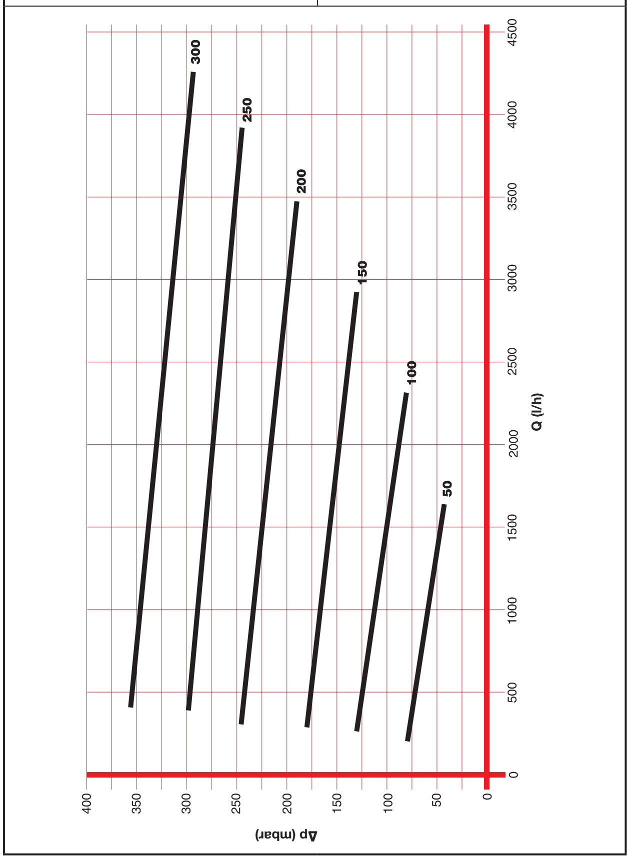
HERZ-Standard Diagramm	Differential Pressure Controller
Order no. **4007**	Dim. DN 20



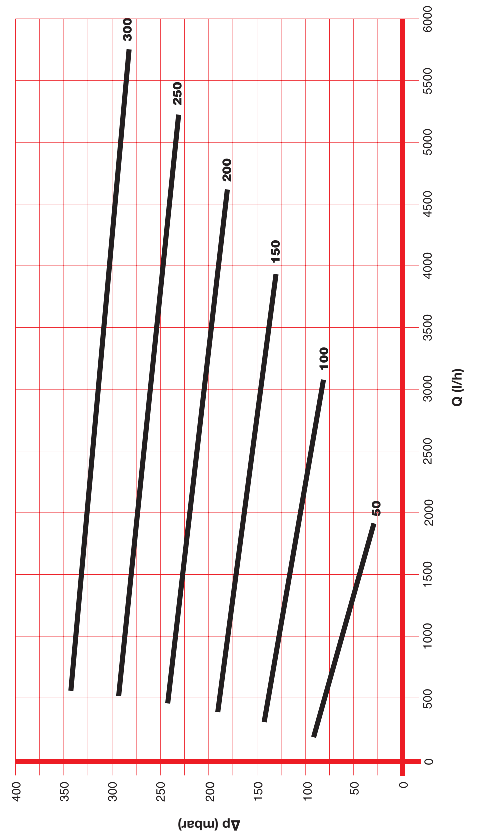
HERZ-Standard Diagramm	Differential Pressure Controller
Order no. **4007 • 4007F**	Dim. DN 25



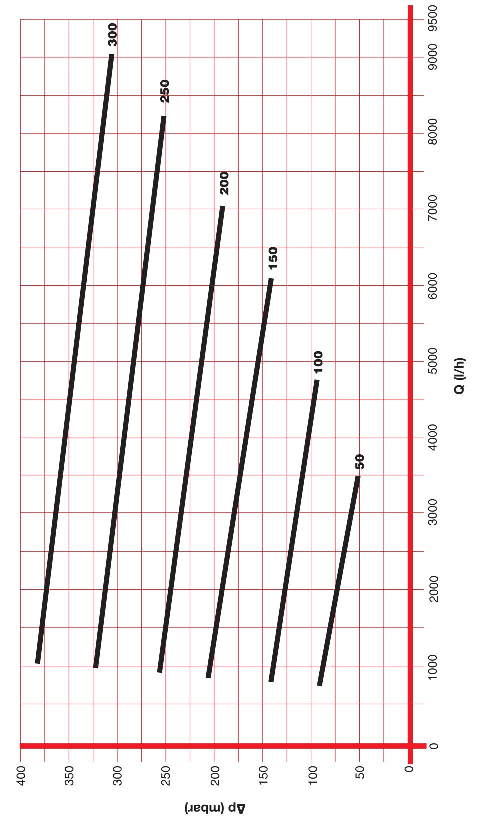
HERZ-Standard Diagramm	Differential Pressure Controller
Order no. **4007 • 4007F**	Dim. DN 32



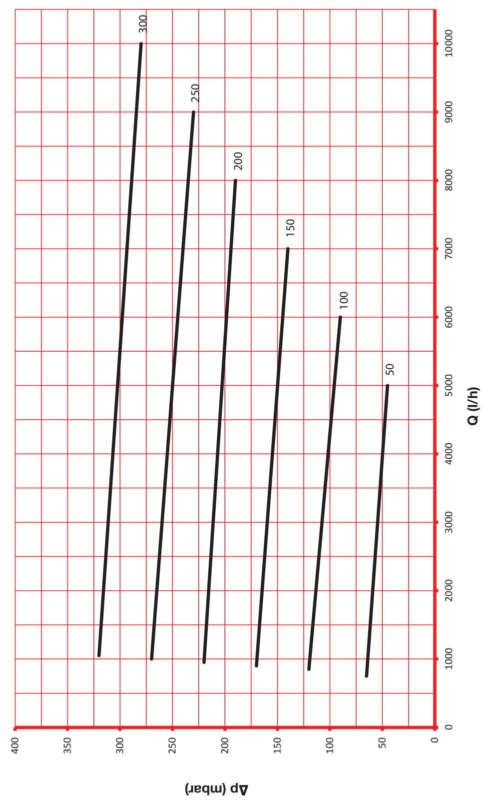
HERZ-Standard Diagramm	Differential Pressure Controller
Order no. **4007 • 4007F**	Dim. DN 40



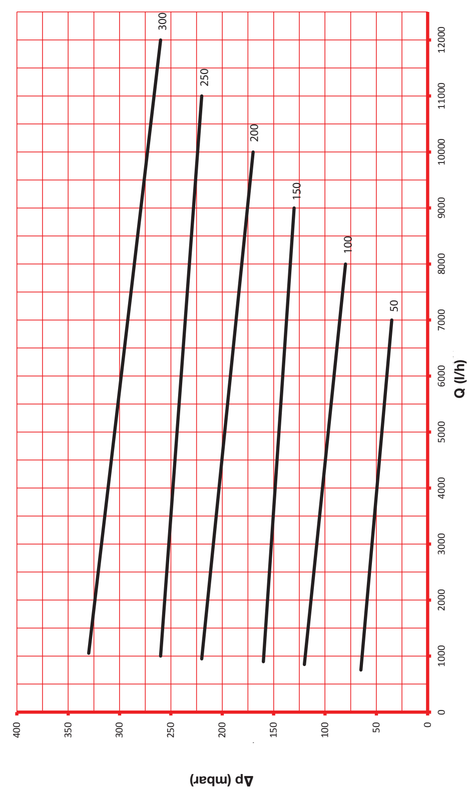
HERZ-Standard Diagramm	Differential Pressure Controller
Order no. **4007 • 4007F**	Dim. DN 50



HERZ-Standard Diagramm	Differential Pressure Controller
Order no. **4007 • 4007F**	Dim. DN 65



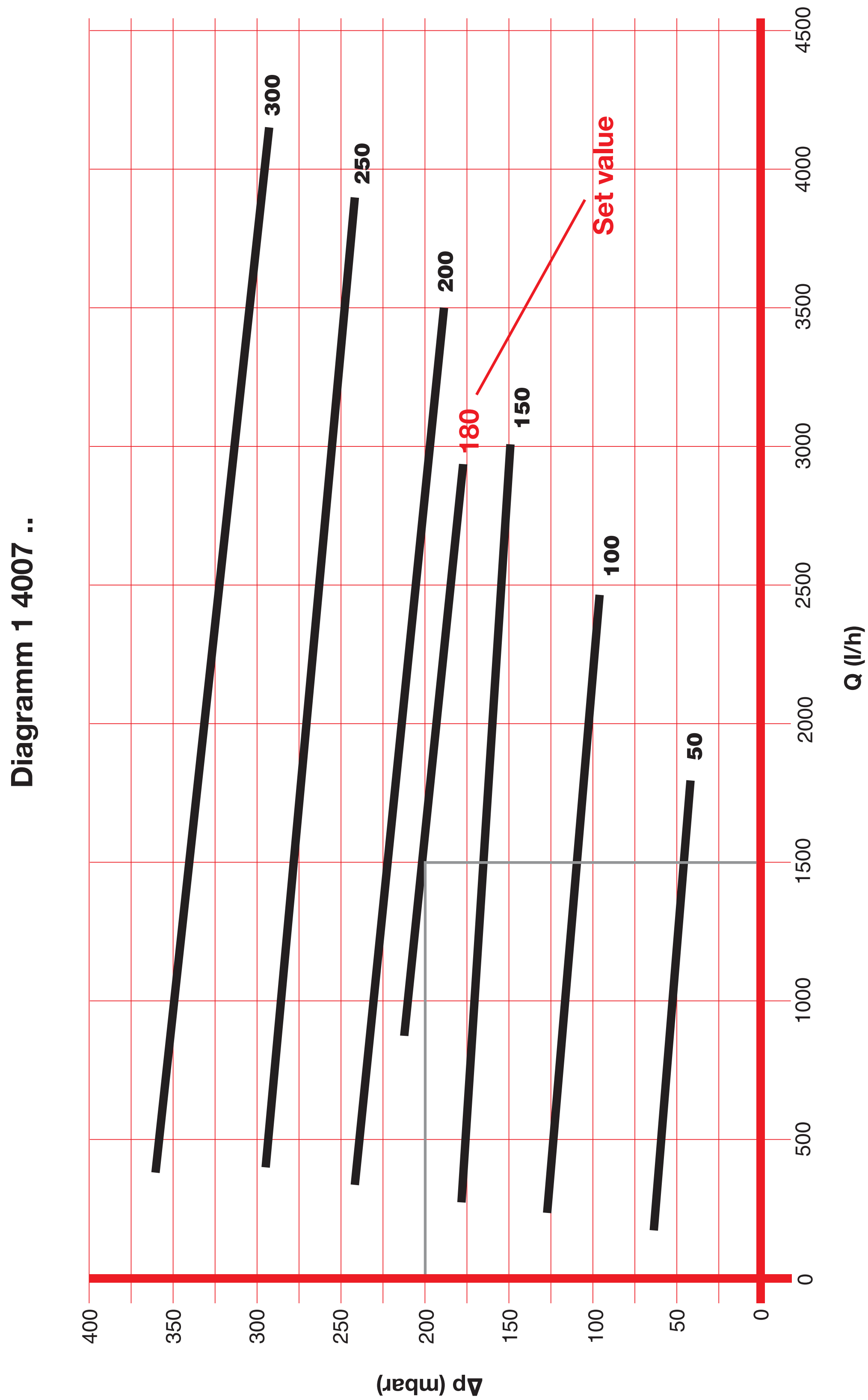
HERZ-Standard Diagramm	Differential Pressure Controller
Order no. **4007 • 4007F**	Dim. DN 80



Example: Desired differential pressure 200 mbar
Flow rate 1500 l/h

------> Adjustment value on scale **180**

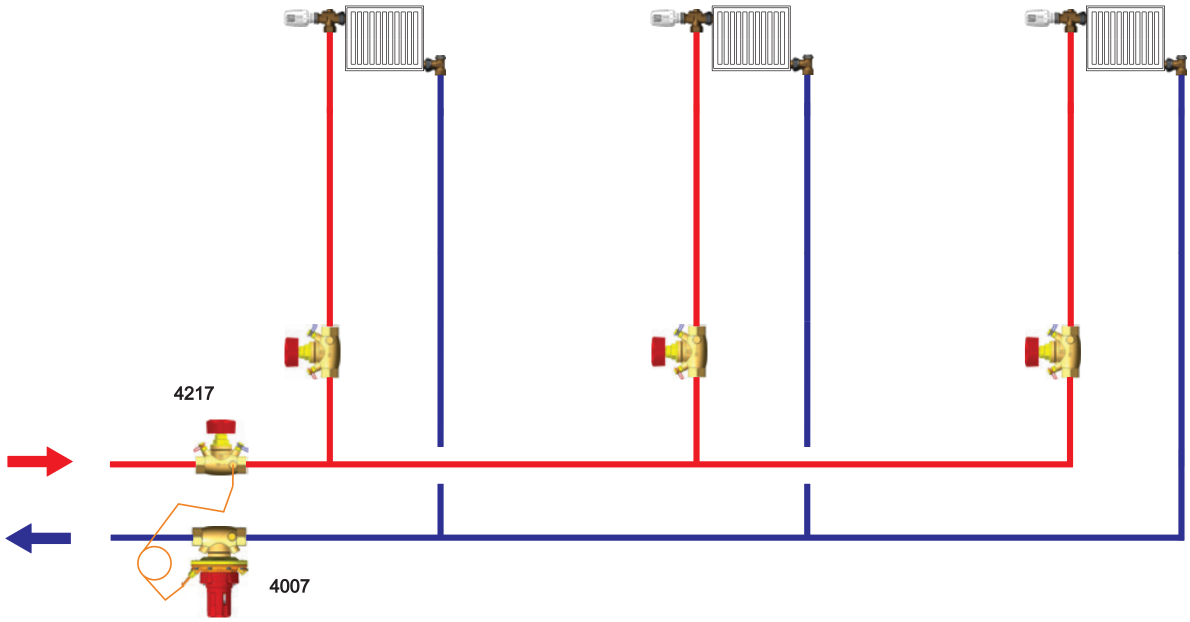
Adjustment value of the scale and equipment differential pressure are congruent for an amount of water..



Example applications

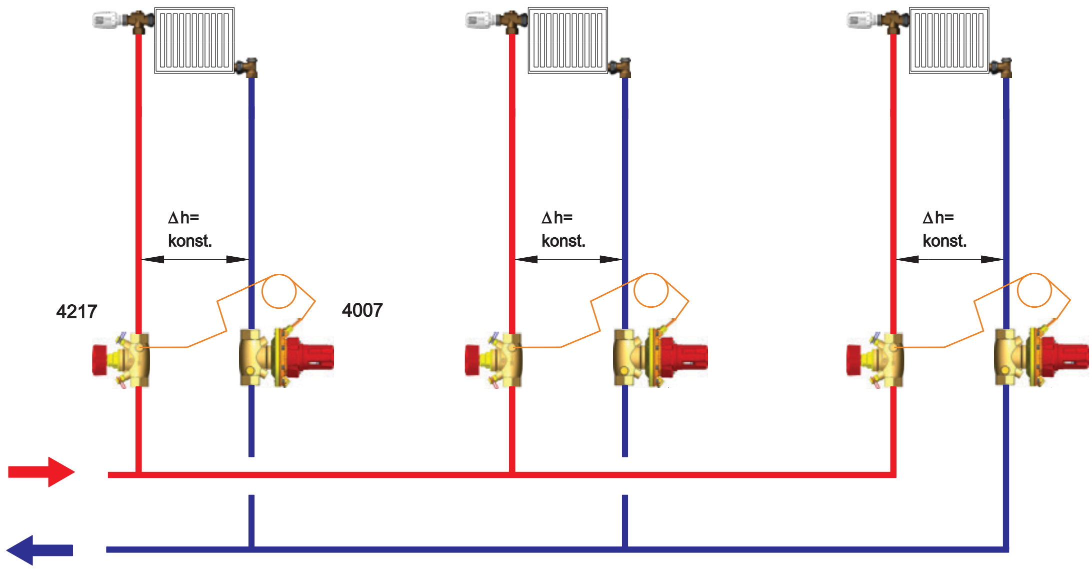
Example 1: Constant maintenance of the differential pressure in the main line

The Differential Pressure Controller **4007** keeps the differential pressure constant in the supply line for the consumers. Through the use of Commissioning Valves **4217** (or **4017**) in the consumer supply lines, the flow rate is limited and the water volumes can be regulated and measured.



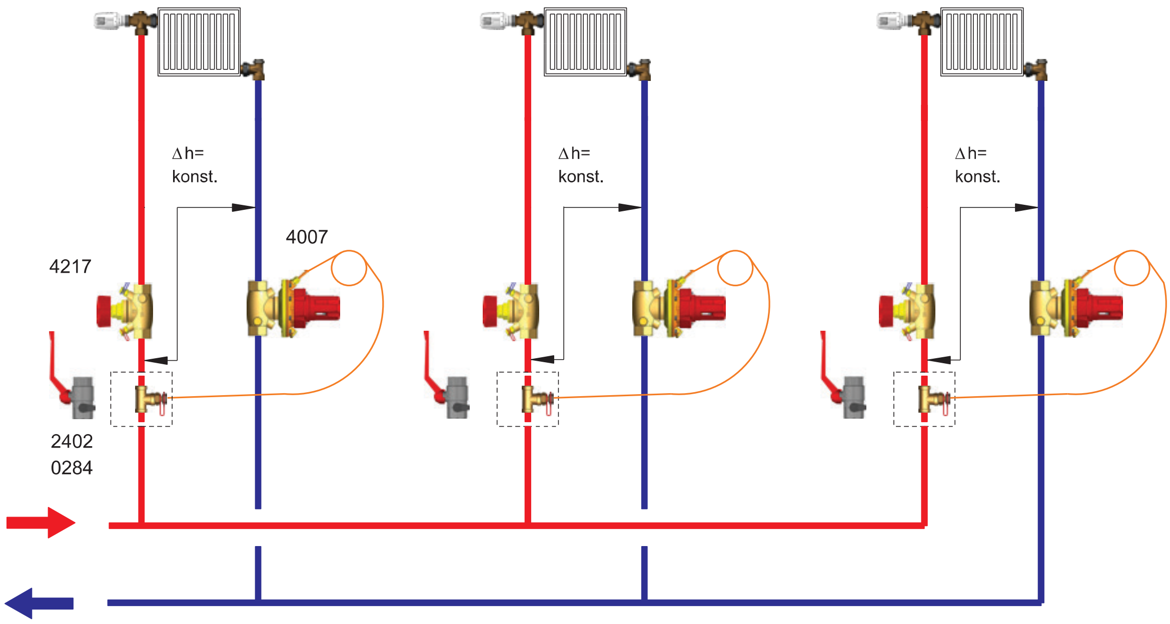
Example 2: Constant maintenance of the differential pressure in the supply line

In systems with pre-settable (thermostatic) valves the differential pressure is kept constant despite changing mass flows, due to an opening and closing of the regulating valves. The use of Commissioning Valves **4217** (or **4017**) serves to facilitate the installation of the sensor line and the execution of measurements on the branch.



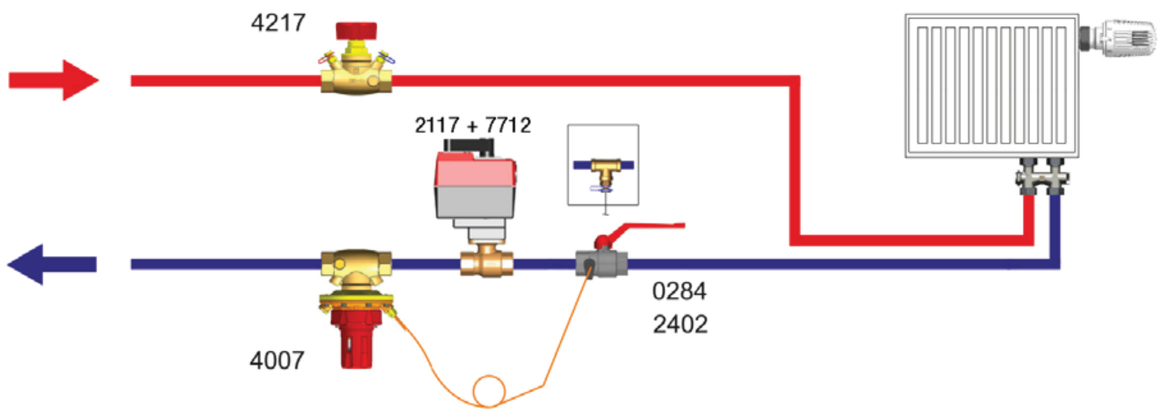
Example 2a: Application with systems with unbalanced consumers

In the case of systems that are not preset, the supply flow is set with the Commissioning Valve **4217** (or **4017**) and measured with the Measuring Computer **8904** (or **8900**). The differential pressure is kept constantly within the indicated range. This switching has no influence on the water distribution between the individual consumers. The measurement line is fitted to a Measuring Valve **(0284**) installed for this purpose, or to the drainage hole of a Ball Valve (**2402**).



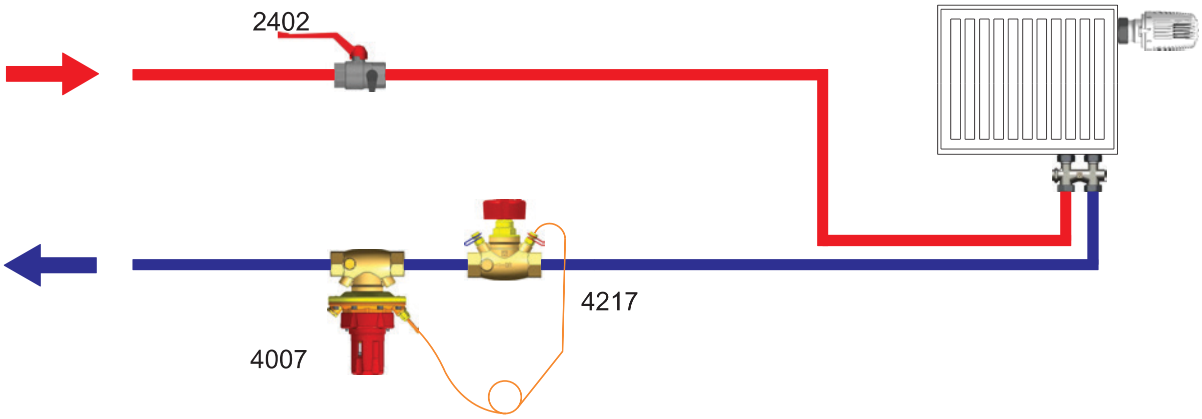
Example 3: Constant maintenance of the differential pressure via a control valve

In the case of systems with large load fluctuations, this switching via the control valve can act to keep the differential pressure constant. This facilitates achieving a valve authority of approx. 1. The nominal flow is derived from the pressure drop in the control valve and the differential pressure setting. Using the Measuring Computer **8904** it is possible to take measurements via the Commissioning Valve **4217** (or **4017**). The measurement line is fitted to a Measuring Valve (**0284**) installed for this purpose, or to the drainage hole of a Ball Valve (**2402**).



Example 4: Constant maintenance of the flow rate

In the case of systems in which a constant flow rate is desired, the Differential Pressure Controller **4007** can be combined with a Commissioning Valve **4217** (or **4017**). A defined pressure drop arises via the valve, which the controller attempts to keep constant.



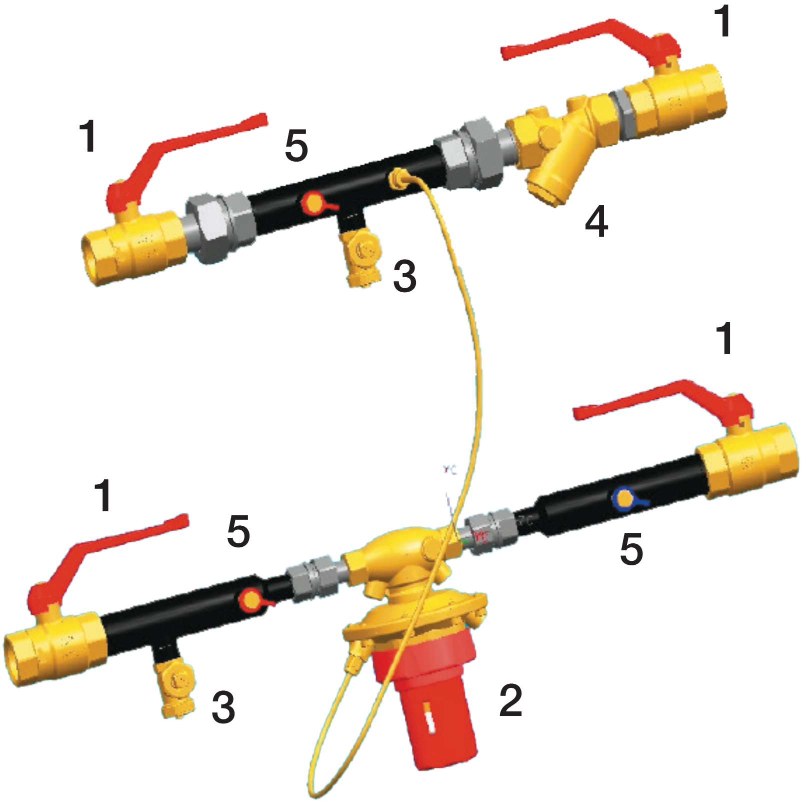
Note: All schematics are purely symbolic in nature and do not claim to be complete!!

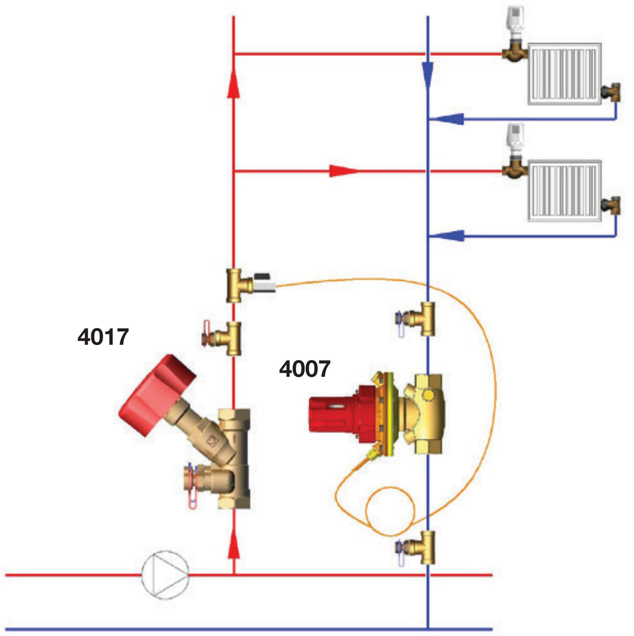
Remark:

It is also possible to use complete branch modules for the branch connection. These are pre-assembled and encompass isolating and drainage valves, measuring nipples and Differential Pressure Controllers.

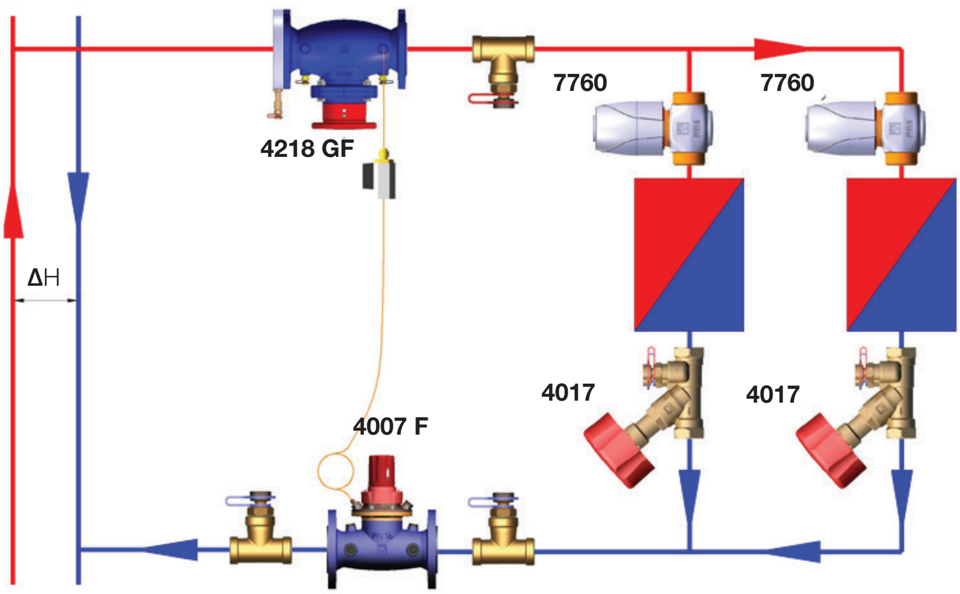
1 **4500** 13	DN 25
1 **4500** 15	DN 40
1 **4500** 16	DN 50

Nr.	Description
1	Ball Valve
2	DP Controller
3	Drain
4	Strainer
5	Test points

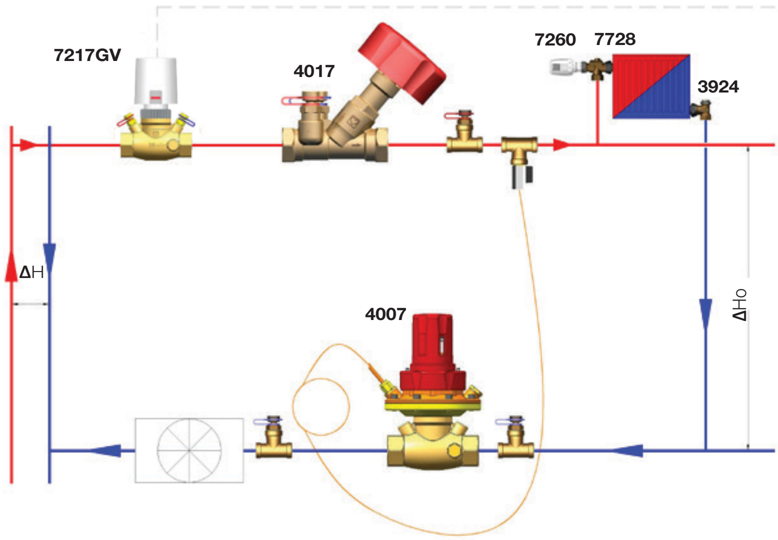




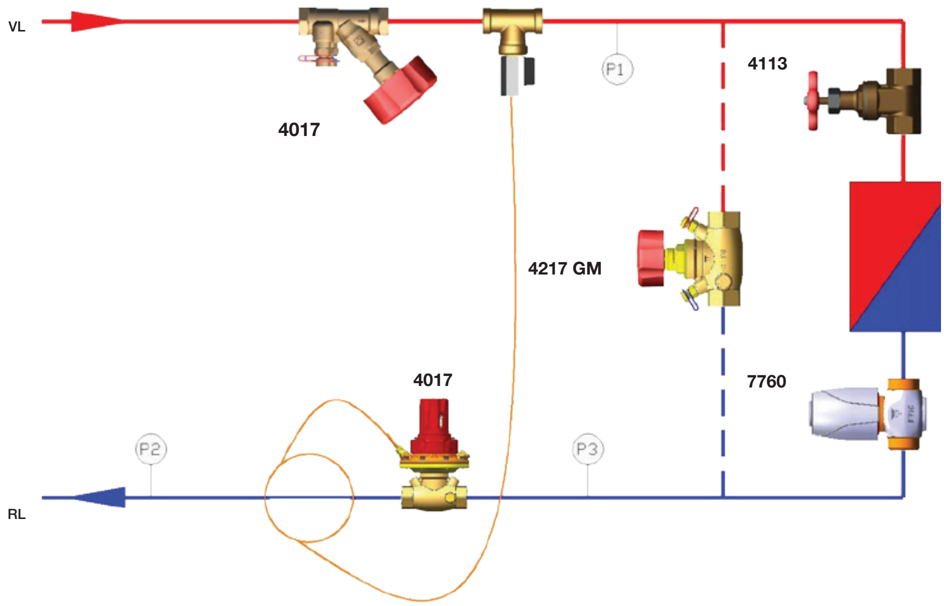
Schematic 1: Differential Pressure Controller in the return
If the riser has been designed for a heating circuit then the Differential Pressure Controller should be installed at the end of the return, in order to ensure that a differential pressure of 30 kPa is not exceeded in the pipe network.



Schematic 2: Differential Pressure Controller in the branch for the underfloor heating
It is assumed that the differential pressure in the riser is 100 kPa and that the supply circuit requires 30 kPa. By positioning the Differential Pressure Controller at the start of the branch, the pressure drop at the control valve is just 7.5 kPa, which equates to an authority of 0.25.



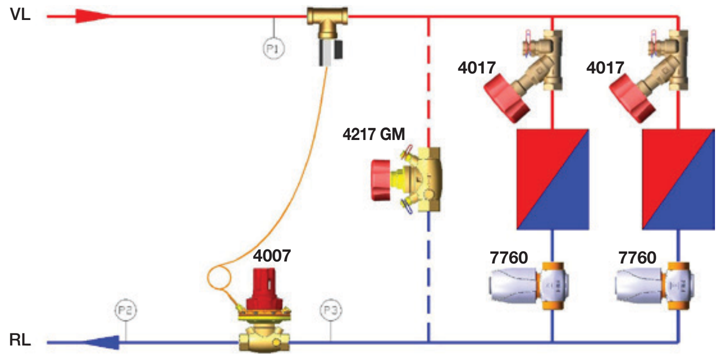
Schematic 3: Control Valve in branch with Differential Pressure Controller
Schematic 3 shows a zone valve with a Differential Pressure Controller. It is important that the control valve and the meter are not located in the same section of the circuit as the Differential Pressure Controller.
By defining the pressure drop, with the control valve and the meter in the secondary circuit, it is possible to maintain a lower differential pressure in the secondary circuit. This facilitates a higher authority of the control valve in the secondary circuit, or smaller dimensioning of the control valves.



Schematic 4: Commissioning the Differential Pressure Controller in an individual circuit
It is necessary to ensure that the capillaries of the Differential Pressure Controller are connected in the supply and return. The individual valves in the system have pre-integrated measuring points. However, it is desirable to install the test points P1, P2, P3 for the pressure measurement, as illustrated in schematic 6.

Observe the following procedure:

- Connect a measuring computer to a measurement point, open the motorised control valve fully and adjust the Differential Pressure Controller until the desired flow rate has been attained. The Differential Pressure Controller is now preset.
- In order to check that the Differential Pressure Controller has been correctly set, measure the differential pressure at points P1-P3 and examine how it changes when the motorised valve has been moved.

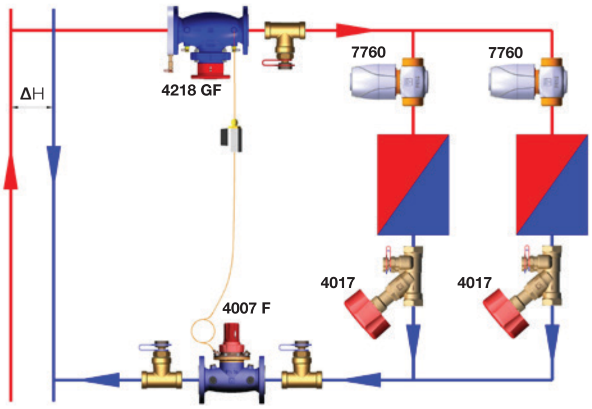


Schematic 5: Commissioning a Differential Pressure Controller with multiple consumers in a secondary circuit

If a Differential Pressure Controller controls multiple consumers in a system, it is not possible to control the differential pressure in the motorised valves alone. It is therefore necessary to control the pressure drop in the motorised valves, the consumers and the commissioning valves. It is not possible to assign 100% authority to the valves and authority of 30-50% is therefore issued. The differential pressure must be aligned with the highest value required in the secondary circuit. Example: 25 kPa available and the consumer, the 2-Way Valve of which requires a minimum pressure drop of 40 kPa. The Differential Pressure Controller must now be set such that it is able to control a difference of 40 kPa, the pressure drop in the pipes and at the measuring orifice valve. A typical value here would be 50 kPa. If the available pressure in a constant circuit is too high for a 2-Way Valve then it is necessary to connect an inverted action Differential Pressure Controller between points P2 & P3.

Hydraulic example:

- Set the control valves using the proportionality method.
- Repeat the last step with all other connections and set the commissioning valve to 100% of the calculated flow rate.
- In order to set the Differential Pressure Controller all control valves within a branch must be closed. The flow rate must be measured at the commissioning valve and the differential pressure valve must be regulated until the calculated flow rate is measured in the commissioning valve. The process must be carried out at all connections.
- The Differential Pressure Controller now ensures a constant flow rate in the main circuit and a constant differential pressure between points P2 & P3.



Schematic 6: Secondary circuit with variable flow rate and variable main circuit

The aim of the connection is to maintain a constant differential pressure in a branch, in order to secure the stable function of the control valves at the same time.

Hydraulic balancing

- First open all connected commissioning valves and regulating valves fully and measure the flow rate in the commissioning valve. If necessary, set the Differential Pressure Controller to 110% of the calculated flow rate.
- Balance all connected valves using the proportionality method.
- Once the balancing process is complete, it is necessary to set the Differential Pressure Controller to 100% of the calculated flow rate. The calculated differential pressure and the flow rate in the circuit are now balanced with the Differential Pressure Controller, in order to guarantee a constant flow rate.

If the control valves now close, the Differential Pressure Controller ensures constant pressure throughout the entire line and the valves.

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