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Innovation + Quality

Valves, controls + systems

Flow, pressure and temperature balancing

Product range









Content Page

Why balance?

Hydronic balancing of heating and cooling systems is necessary to avoid the following problems:

- some rooms almost never achieve the desired room temperature or are not cooled sufficiently. This problem especially arises in case of influence of other heat sources
- after changing over from low temperature to heating operation, parts of the system are only heated after a long time
- fluctuating room temperatures especially arising during low demand periods
- high energy consumption although the required room temperature regulator is installed

Distribution of flow

The main reason for these problems is that incorrect flows are available in the various circuits. If this is the case, the problem may be solved by installing double regulating and commissioning valves, differential pressure regulators or flow regulators in the corresponding pipes. The course of pressure in a circuit makes clear why this occurs.

The illustration shows that the pump has to produce a differential pressure of at least Δp_{total} to guarantee a sufficient supply to appliance 4. This will, however, inevitably result in an excessive differential pressure at the appliances 1 to 3. This too high a differential pressure will cause an increased flow at these appliances and thus to an increased energy consumption. To remedy this, double regulating and commissioning valves are installed. The excessive differential pressure is now absorbed by the double regulating and commissioning valves. The desired flow rate may be controlled and set. To be able to control appliance 4 as well, it is recommended to install a double regulating and commissioning valve here, too. The correct supply of each appliance is now guaranteed.

Energy saving

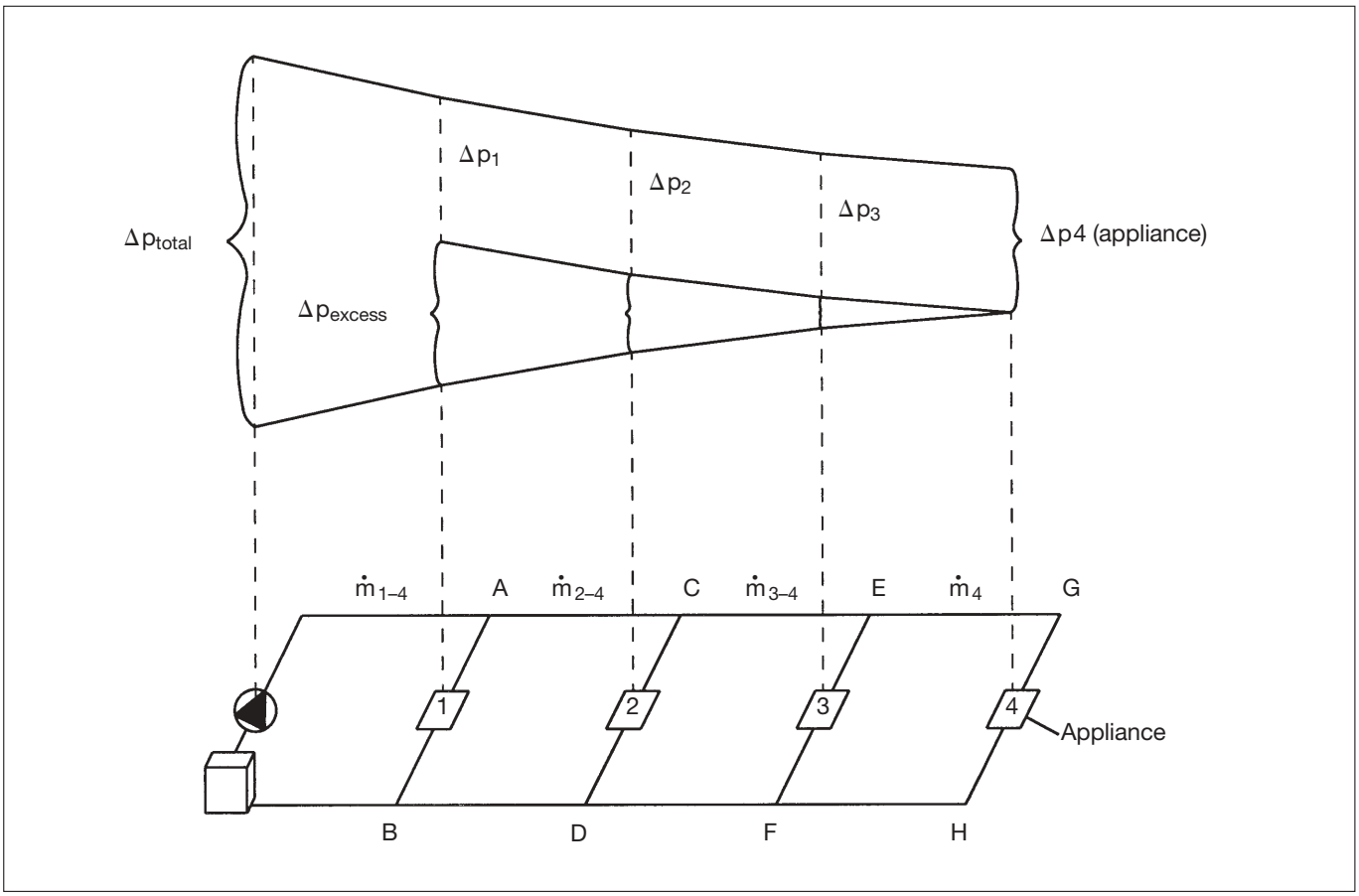
Wrong flow rates in the various circuits lead to an increased energy consumption. On the one hand, a higher pump capacity must be provided to guarantee a sufficient supply of each appliance and on the other hand appliances being installed at a favorable hydronic position are then over-supplied. This will result in an increased room temperature or, in cooling systems, in too low a room temperature. If the average temperature in a building exceeds the nominal value by 1°C, the energy consumption is increased by 6–10 %.

In cooling systems, temperatures being 1°C too low will result in an increase in energy consumption of about 15 %.

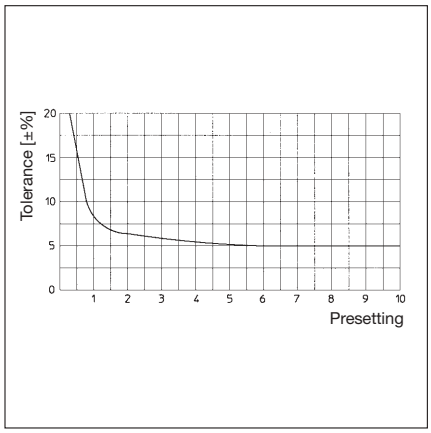
Installations in which the hydronic balancing was not carried out, have to start the heating operation earlier in order to achieve the desired temperature in time.

How to avoid noises at the TRVs

If the installation is a two pipe installation, not only the design demand but also the periods of low demand have to be considered. The differential pressure at the TRVs has to be limited to approximately 200 mbar. If this value is not exceeded, the thermostatic radiator valves normally do not produce any flow or whistling noises. This condition is met by installing differential pressure regulators in the corresponding circuits.



Course of pressure in a circuit



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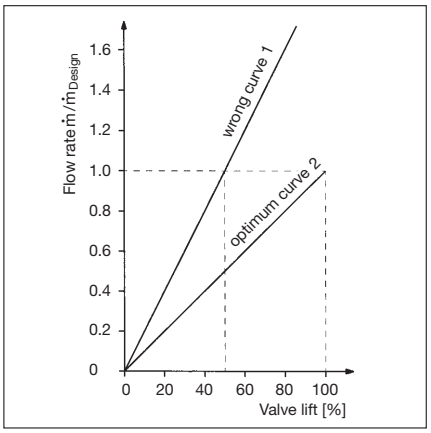

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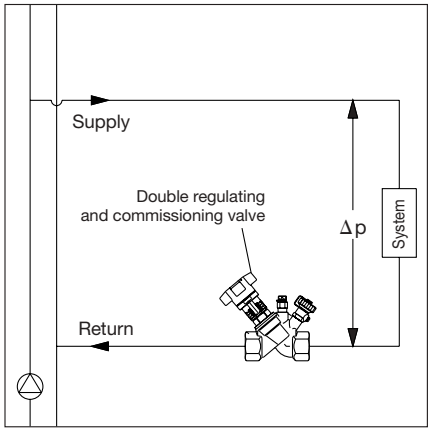

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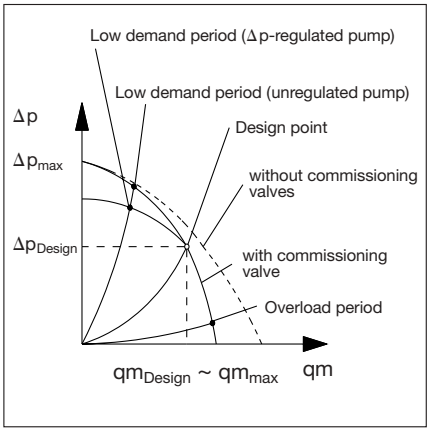

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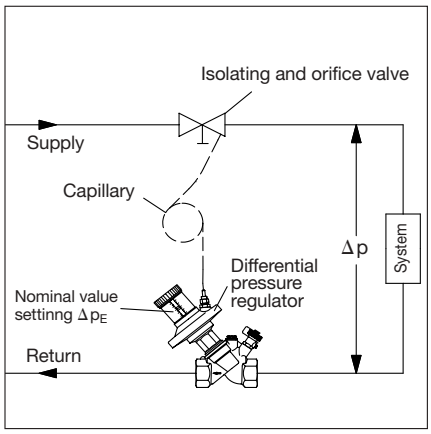

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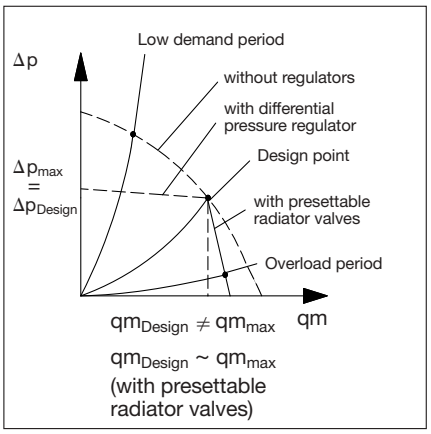


6

Theoretical view

In order to explain the influence of double regulating and commissioning valves, flow and differential pressure regulators on the hydronic conditions in the corresponding circuits, their mode of operation in principal is illustrated on this page, only with the valves required to this.

1 Design of double regulating and commissioning valves

In order to regulate flow as accurately as possible, the correct design is very important. If the presetting values are too low, the flow tolerances will be high. The quality of regulation falls off and the energy consumption increases. The chart makes clear that low presetting values (< 1 for “Hydrocontrol”) will result in high tolerances and should therefore be avoided (see example 1 page 10).

2 Design of flow and differential pressure regulators

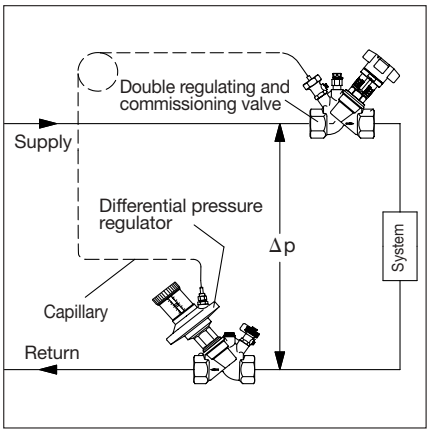
Curve 1 shows a regulating valve being sized incorrectly. Only 50 % of the valve lift is used. Curve 2, however, shows a regulating valve which is designed the best possible. The desired flow is achieved at the maximum valve lift. Stability of the regulating circuit and regulation are improved. The valves thus have to be chosen with care. If the chosen dimensions are too small, the flow rates are not reached and if the chosen dimensions are too high, the results of balancing will be ineffective.

3 and 4 Double regulating and commissioning valves

The characteristic lines of a circuit with and without double regulating and commissioning valve as well as the shifting of the characteristic lines caused by the influence of a differential pressure regulated pump are illlustrated here. It can be seen that in the design the flow in the circuit is reduced by using double regulating and commissioning valves, i.e. the flow in each circuit can be regulated by carrying out presetting. If the installation is overloaded, e. g. by completely opened radiator valves, the differential pressure in the circuit is only increased slightly. The supply of the other circuits is still guaranteed ($qm_{Design} \sim qm_{max}$). During periods of low demand, i.e. with Δp increasing via the installation, the double regulating and commissioning valve only has a slight effect on the characteristic line of the circuit.

5 and 6 Differential pressure regulators

The characteristic lines of a circuit with and without differential pressure regulator are illustrated here. It becomes clear that the differential pressure may only slightly exceed the design value during periods of low demand, i. e. thermostatic radiator valves are protected against an inadmissible increase of differential pressure even during periods of low demand, provided that the design value does not exceed 200 mbar. In case of overload, the differential pressure regulators only have a slight impact on the course of the characteristic line ($qm_{Design} \neq qm_{max}$). When using presettable radiator valves, the flow in the circuit is limited in case of overload ($qm_{Design} \sim qm_{max}$) (see example 2 page 14).



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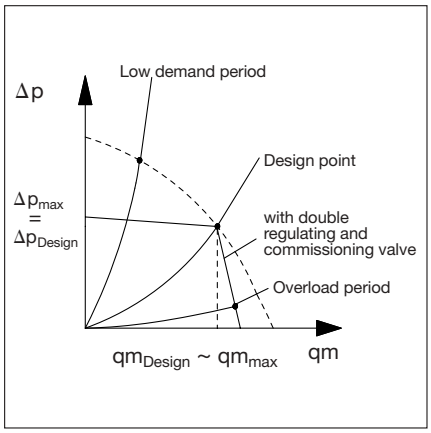

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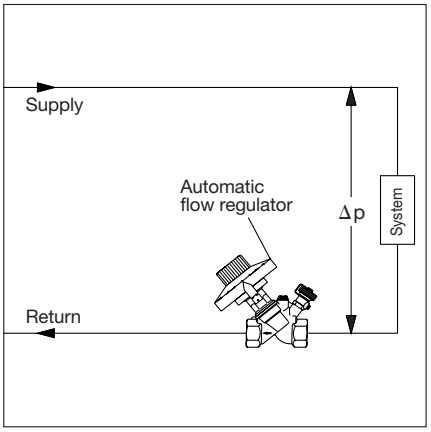

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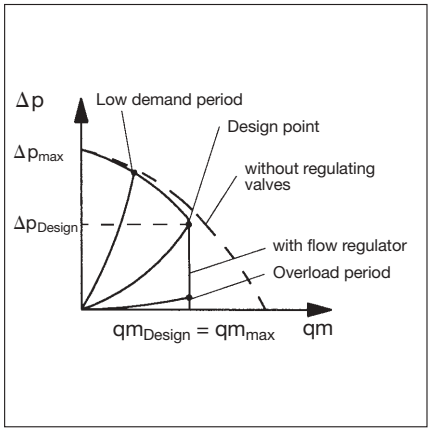

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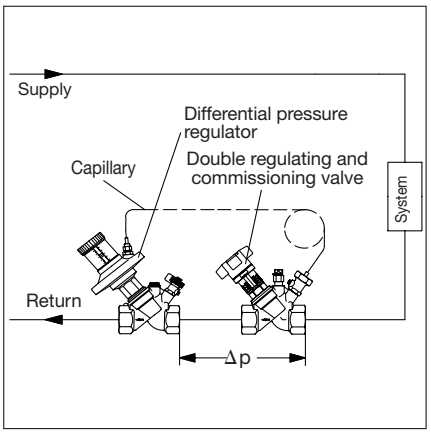

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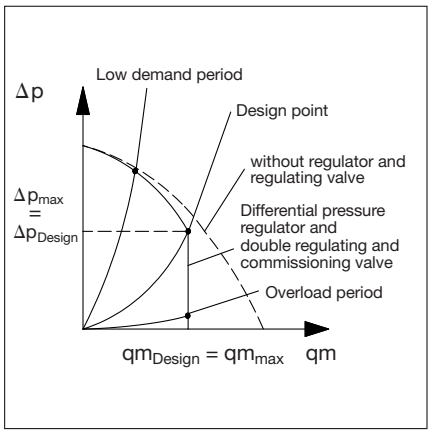

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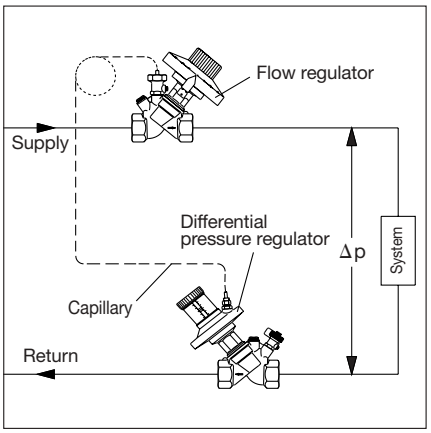

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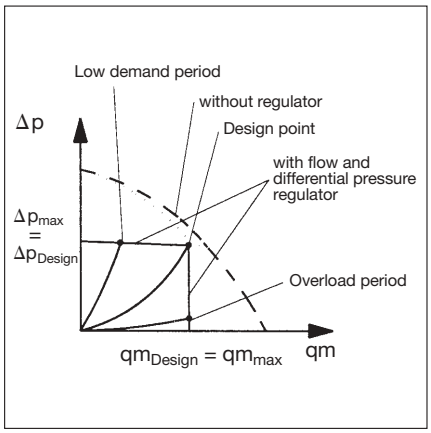


14

7 and 8 Combination differential pressure regulator and double regulating and commissioning valve

The characteristic line of a circuit with differential pressure regulator and double regulating and commissioning valve is illustrated here. During periods of low demand, the differential pressure only slightly exceeds the design value. By using the double regulating and commissioning valve in installations without presettable radiator valves, the flow in the circuit is only increased slightly during low demand periods and the supply of all other circuits is thus guaranteed ($qm_{Design} \sim qm_{max}$) (see example 3 page 14).

9 and 10 Flow regulators

The characteristic of a circuit with and without flow regulator are illustrated here. In case of overload, the flow rate only slightly exceeds the design value ($qm_{Design} = qm_{max}$) (see example 4 page 15).

11 and 12 Combination differential pressure regulator and double regulating and commissioning valve for flow control

Here, the characteristic lines of a circuit with differential pressure regulator and double regulating and commissioning valve are illustrated. In case of overload, the flow in the circuit remains almost constant ($qm_{Design} = qm_{max}$). Same mode of operation as flow regulator. The flow rate is adjusted by setting the nominal value at the differential pressure regulator first and then at the double regulating and commissioning valve. In this application the “Hydrocontrol” and “Hydromat DP” must be installed in the return pipe (also see example 5 page 15). As for the “Hycocon” valves, the differential pressure regulator “Hycocon DP” or, alternatively, the double regulating and commissioning valve “Hycocon V” (also see page 11) may be installed separately in the supply and the return pipe.

13 and 14 Combination flow and differential pressure regulator

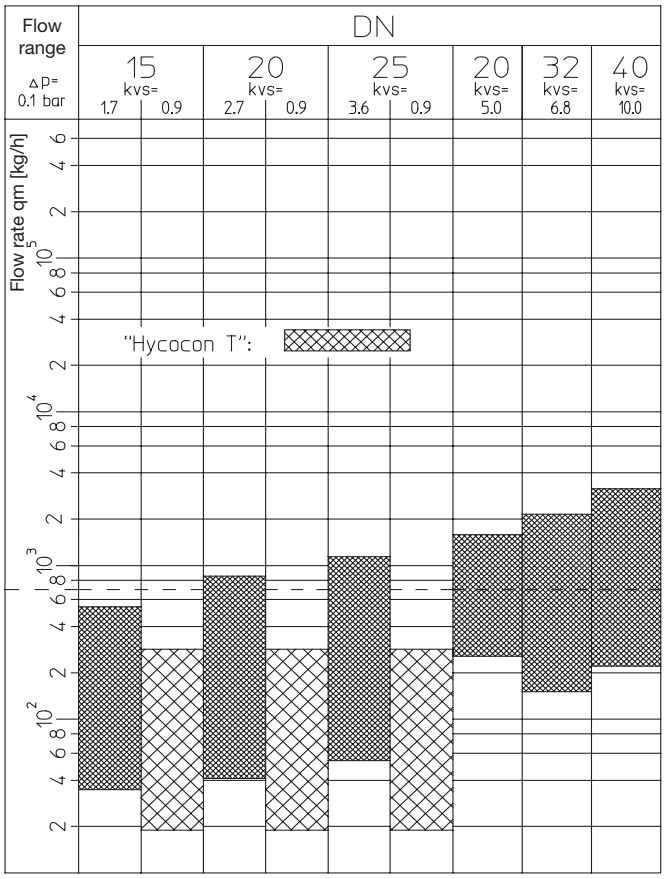
The characteristic line of a circuit with differential pressure and flow regulator is illustrated here. By installing these two regulators, the flow is limited to the design value in case of overload. During periods of low demand, the differential pressure is limited to the design value, too ($qm_{Design} = qm_{max}$, $\Delta p_{Design} = \Delta p_{max}$).

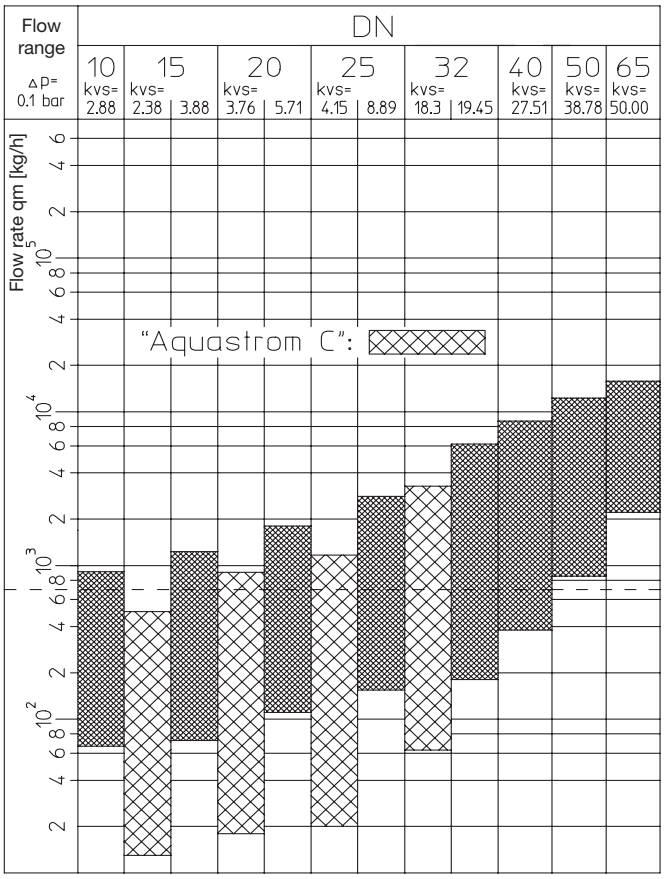
The ciruit is hydronically balanced at any point of operation. The supply of the circuits is always guaranteed (see example 6 page 15).

Flow balancing via double regulating and commissioning valves
Regulation according to pipework calculation or by using a Δp measuring gauge

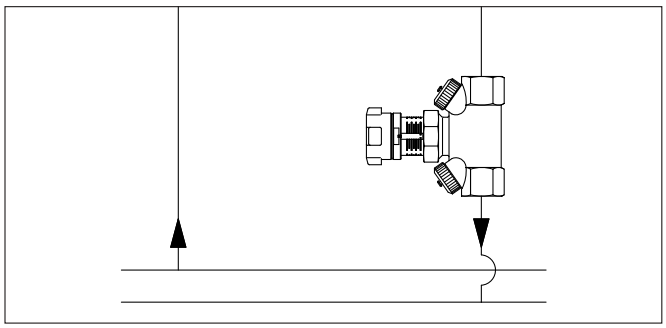
"Hycocon A/V/T/TM"

"Hydrocontrol R/A"

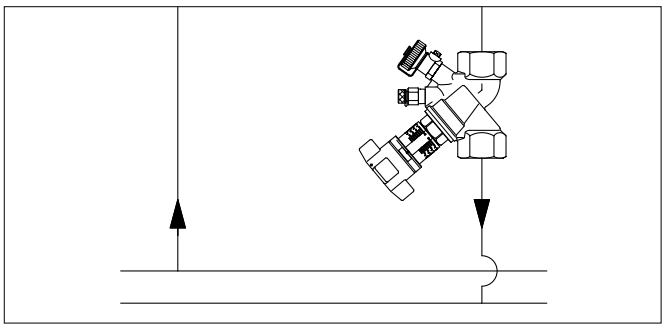




Flow ranges between lowest and highest presetting with Δp = 0.1 bar via the double regulating and commissioning valve.
The below examples only show the valves which are really required for hydronic balancing.



Example: Two pipe heating system for low to medium flow rates.



Example: Two pipe heating system for medium to high flow rates.

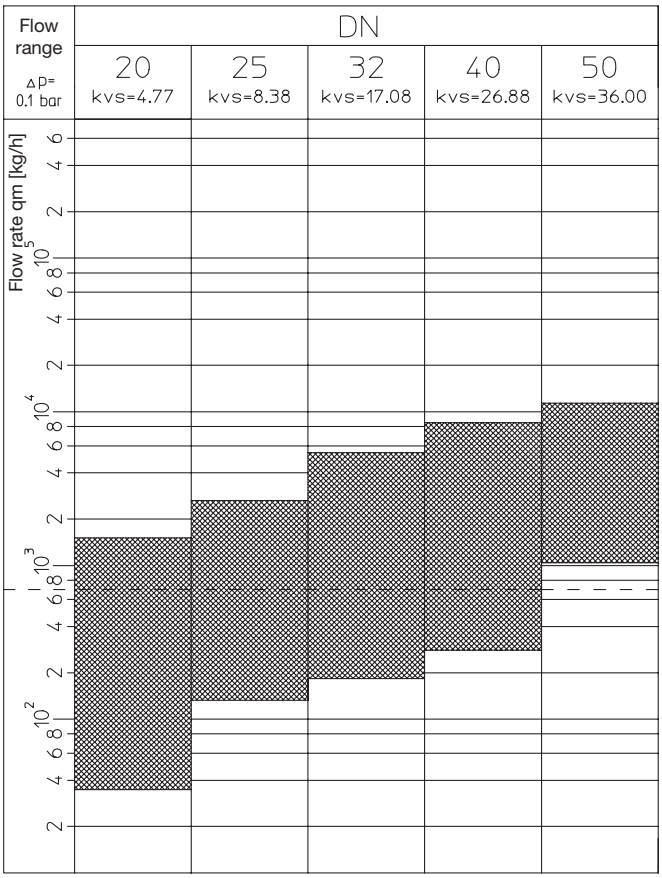
Conversion of the flow and differential pressure values from a design calculation on the flow rates with Δp = 0.1 bar illustrated here:

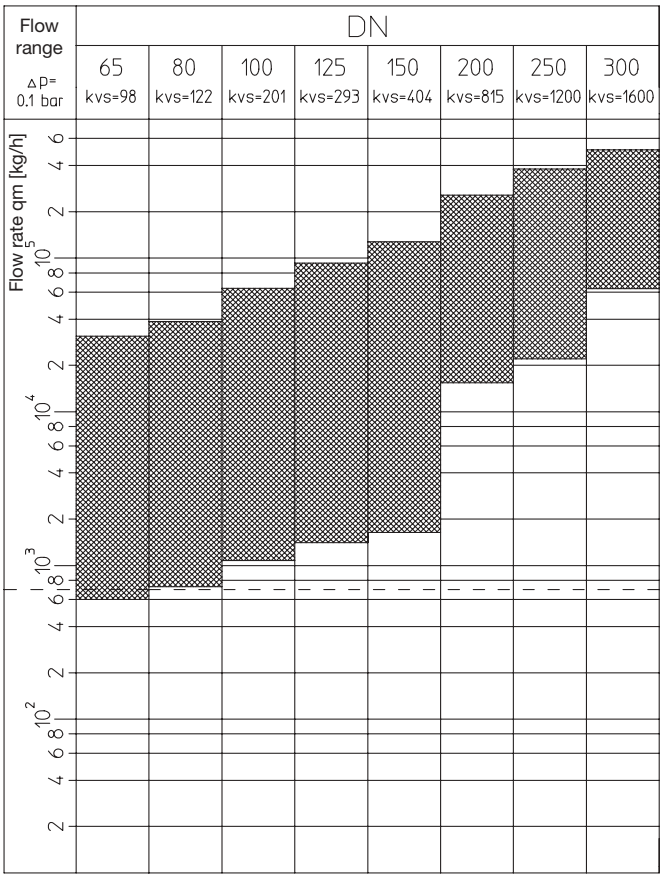
Design calculation: Δp_A, $\dot{V}_A$

Conversion: $\dot{V}_{0.1\,bar} = \dot{V}_A \cdot \sqrt{\frac{0.1\,bar}{\Delta p_A}}$

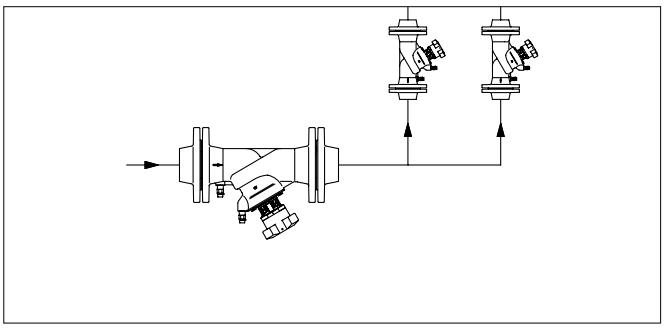
"Hydrocontrol F"

"Hydrocontrol F/FR/G"

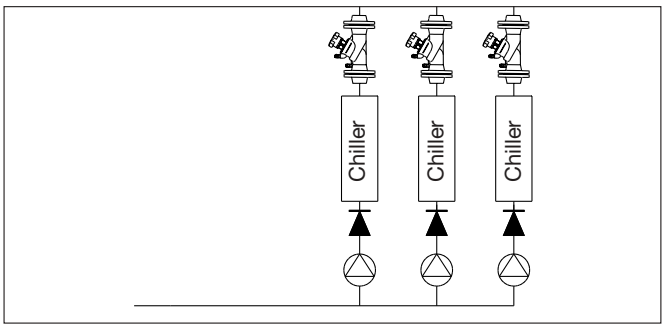




Flow ranges between lowest and highest value of presetting with $\Delta p = 0.1$ bar via the double regulating and commissioning valve.
The below examples only show the valves which are really required for hydronic balancing.



Example: Central heating system with flanged connections.



Example: Cooling system with flanged connections.

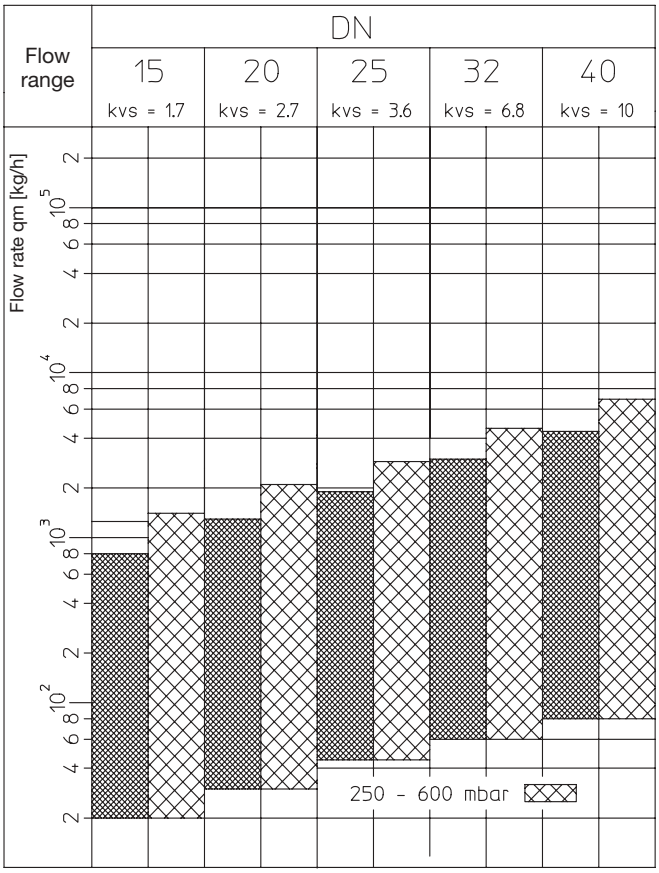
Example: Δp_A = 0.15 bar, $\dot{V}_A$ = 850 kg/h

$$\dot{V}_{0.1\,bar} = \dot{V}_A \cdot \sqrt{\frac{0.1\,bar}{0.15\,bar}} = 694\ kg/h$$

With the help of the value $\dot{V}_{0.1bar}$ a preselection, e.g. "Hydrocontrol R", DN 20, can be made (see broken line).

Differential pressure regulation

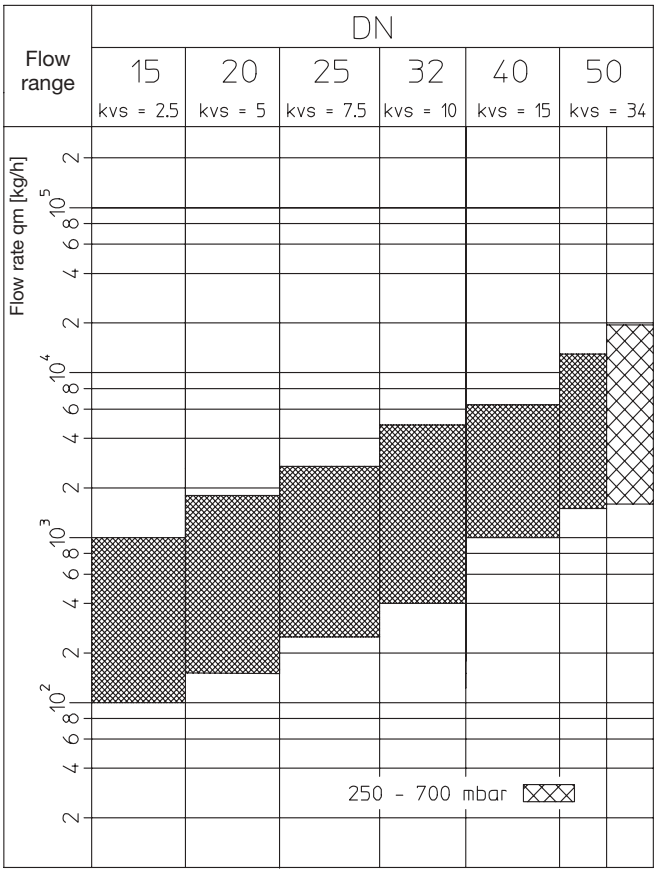
"Hycocon DP" (50–300 mbar) "Hycocon DP" (250–600 mbar)



Flow ranges of the differential pressure regulator "Hycocon DP" for adjustable differential pressures in the circuits 50–300 mbar or 250–600 mbar

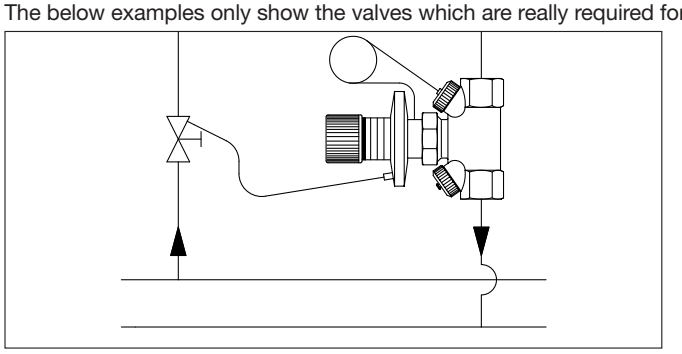
Differential pressure regulation

"Hydromat DP" (50–300 mbar) "Hydromat DP" (250–700 mbar)

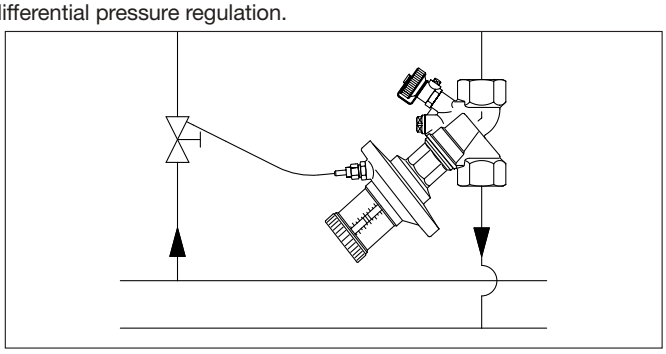


Flow ranges of the differential pressure regulator "Hydromat DP" for adjustable differential pressures in the circuits 50–300 mbar or 250–700 mbar

The below examples only show the valves which are really required for differential pressure regulation.



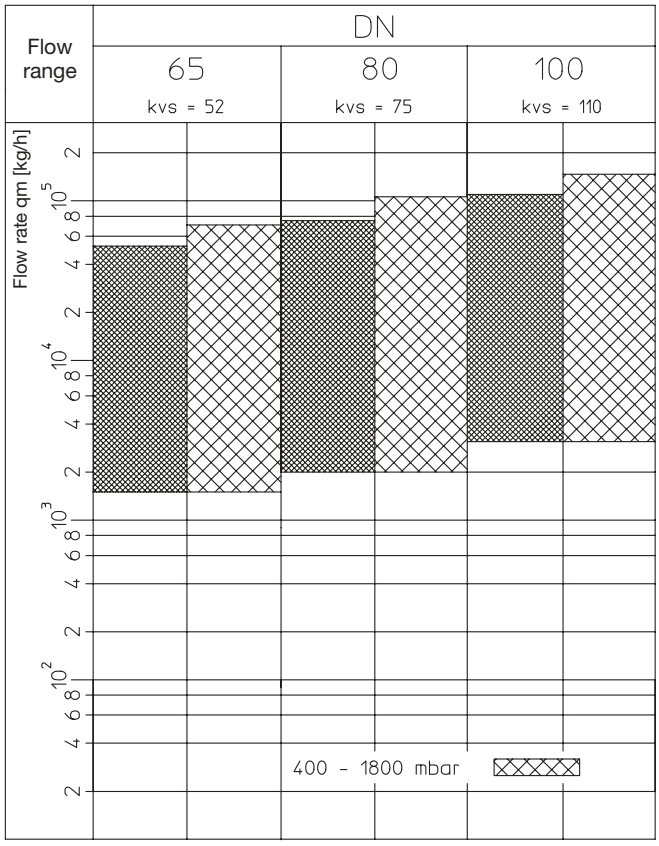
Example: Differential pressure regulation in installations with presettable thermostatic radiator valves (circuits with low to medium flow rate).



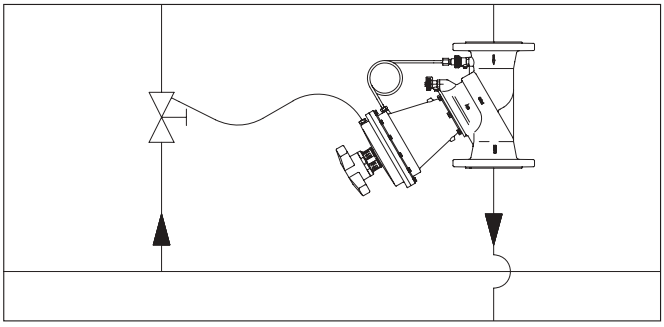
Example: Differential pressure regulation in installations with presettable thermostatic radiator valves (circuits with medium to high flow rate).

Differential pressure regulation

"Hydromat DP" (200–1000 mbar)
"Hydromat DP" (400–1800 mbar)



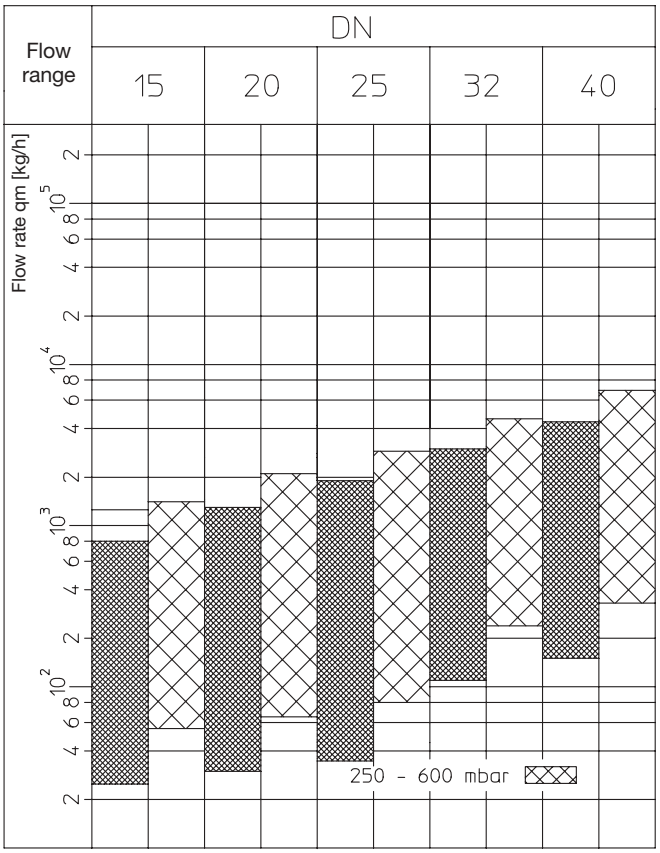
Flow ranges of the differential pressure regulator "Hydromat DP" for adjustable differential pressures in the circuits 200–1000 mbar or 400–1800 mbar



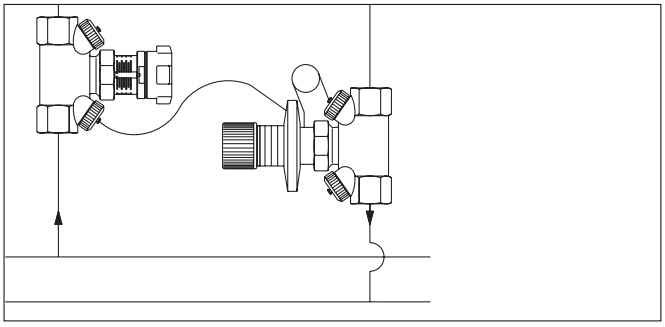
Example: Differential pressure regulation in installations with flanged connections.

Differential pressure regulation with flow limitation

"Hydromat DP" (50–300 mbar)/"Hycocon V"
"Hydromat DP" (250–600 mbar)/"Hycocon V"



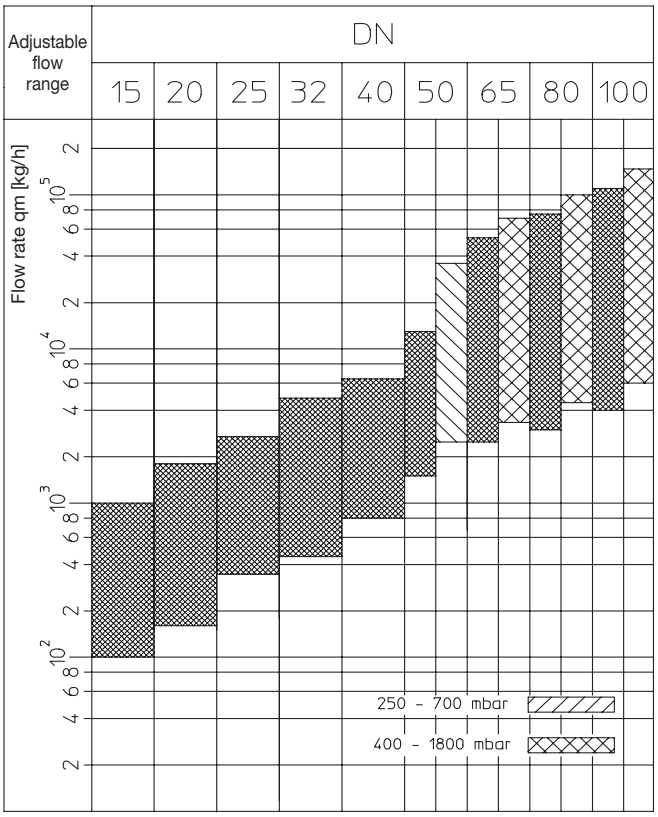
Flow ranges of the differential pressure regulator "Hycocon DP" for adjustable differential pressures in the circuits 50–300 mbar or 250–600 mbar and additional flow limitation at the double regulating and commissioning valve "Hycocon V"



Example: Differential pressure regulation with flow limitation in installations with non presettable thermostatic radiator valves.

Differential pressure regulation with flow limitation

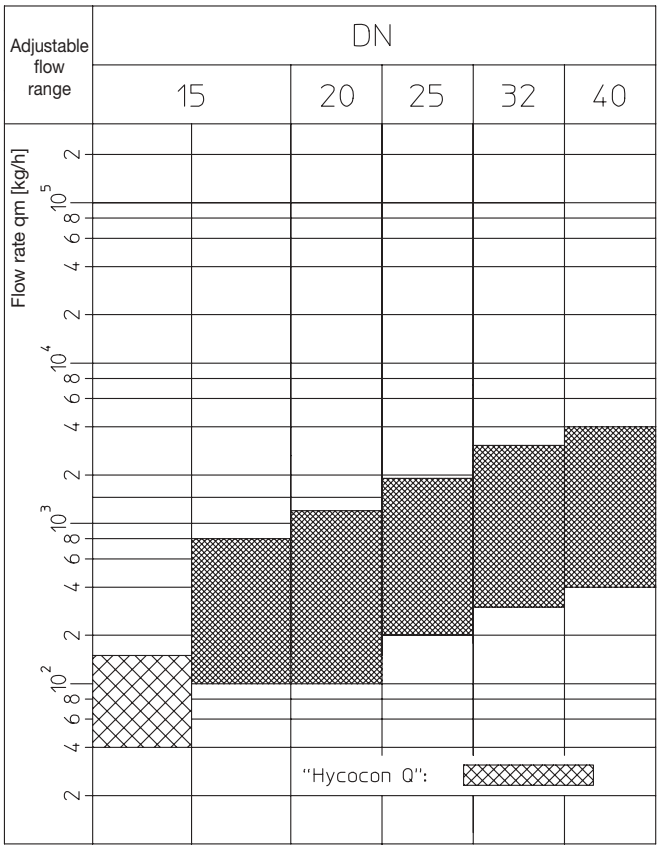
"Hydromat DP"/"Hydrocontrol R"
"Hydromat DP"/"Hydrocontrol R"
"Hydromat DP"/"Hydrocontrol F"



Flow ranges of the differential pressure regulator "Hydromat DP" for adjustable differential pressures in the circuits 50–300 mbar, 250–700 mbar, 200–1000 mbar or 400–1800 mbar and additional flow limitation at the double regulating and commissioning valve "Hydrocontrol R/F"

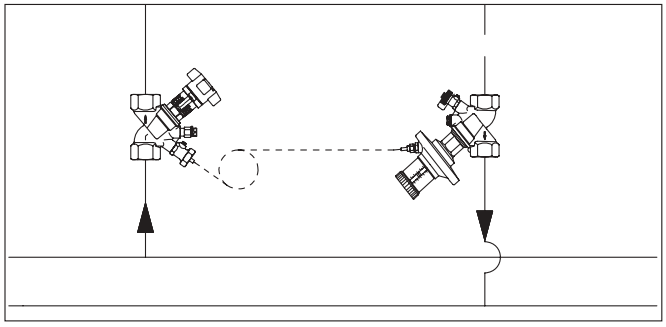
Flow regulation

"Hydromat Q" ("Hycocon Q")

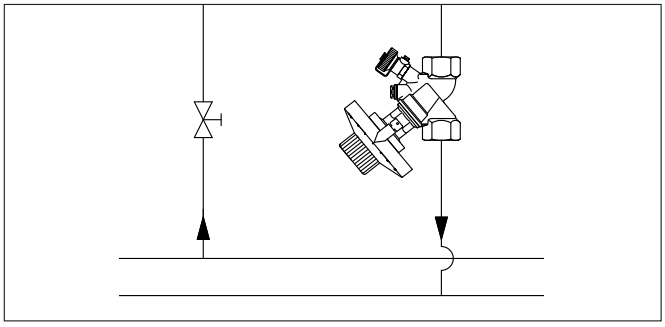


Adjustable flow values at "Hydromat Q" and "Hycocon Q".
Flow regulation for an application range between 40 kg/h and 4000 kg/h

The below examples only show the valves which are really required for regulation.



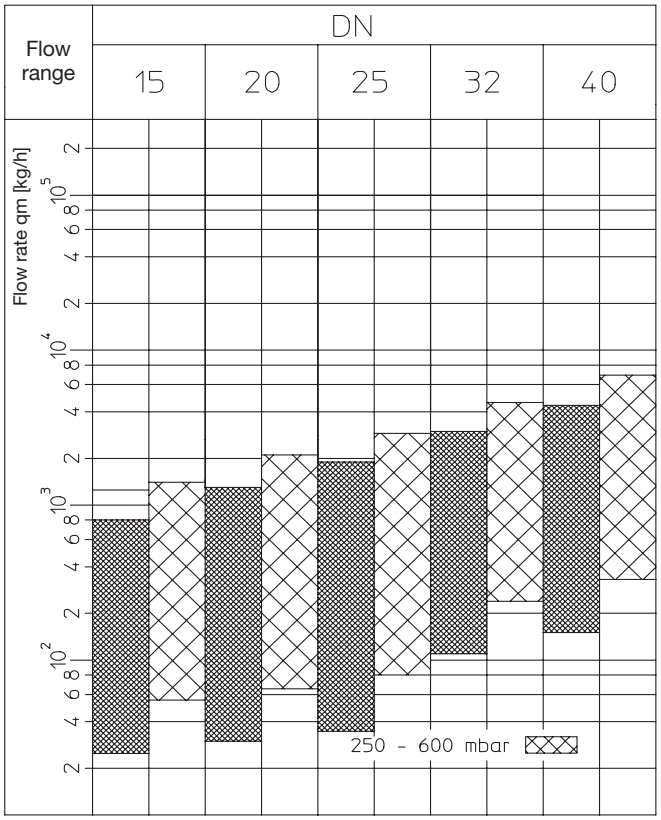
Example: Differential pressure regulation with flow limitation in installations with non presettable thermostatic radiator valves.



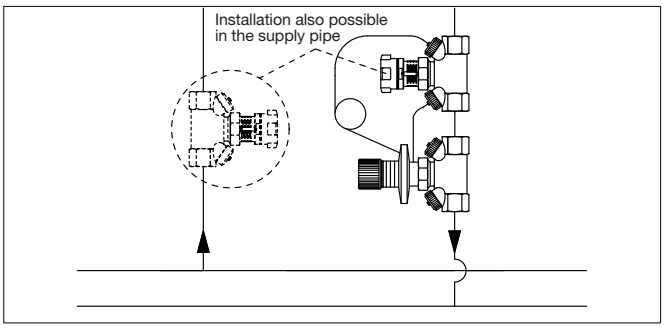
Example: Flow regulation e.g. in cooling systems. Presetting can be set at regulator and is visible from the outside.

Flow regulation

“Hycocon DP”/“Hycocon V”



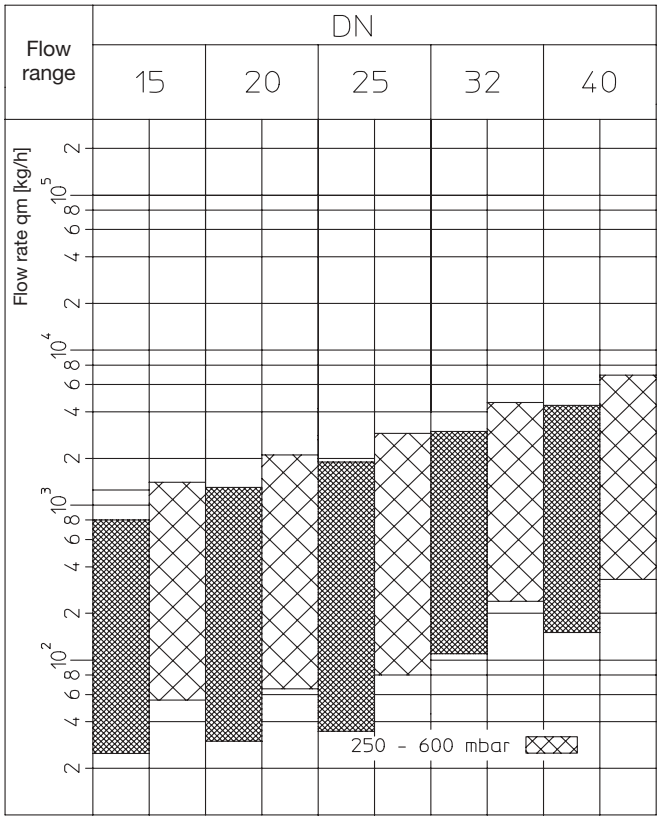
Adjustable flow values for regulation with combination:
Set differential pressure at “Hycocon DP” between 50 and 600 mbar (pressure is taken at “Hycocon V”). With the help of the pressure loss chart (see data sheet “Hycocon V”, design as example 5, page 15) determine the presetting value for “Hycocon V” for the required flow rate and set at the handwheel.



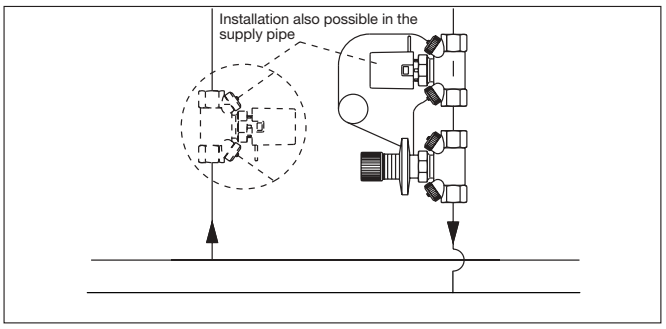
Example: Flow regulation with the help of the combination differential pressure regulator “Hycocon DP” and double regulating and commissioning valve “Hycocon V”.

Flow regulation

“Hycocon DP”/“Hycocon TM” with actuator



Adjustable flow values for regulation with combination:
Set differential pressure at “Hycocon DP” between 50 and 600 mbar (pressure is taken at “Hycocon TM”). With the help of the pressure loss chart (see data sheet “Hycocon TM”) determine the presetting value for “Hycocon TM” for the required flow rate and set at the insert of the “Hycocon TM”. Moreover, the flow rate may be reduced or isolated with the help of actuators at “Hycocon TM”.



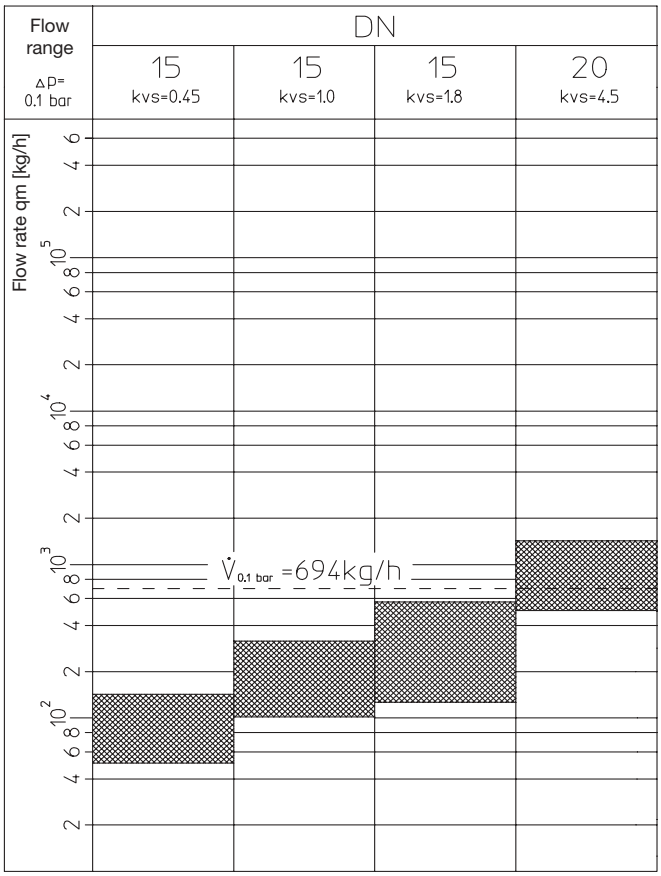
Example: Flow regulation with the help of the combination differential pressure regulator “Hycocon DP” and regulating valve “Hycocon TM”.

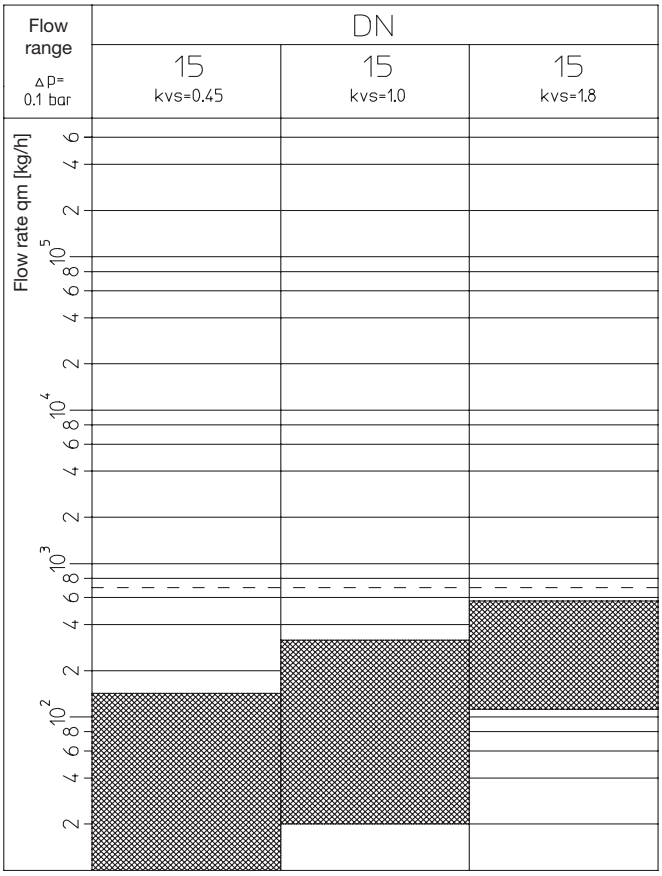
Oventrop regulating valves with integrated metering station
Ranges of control and performance

Flow and temperature balancing by use of regulating valves
Regulation according to pipework calculation or by using a Δp measuring gauge

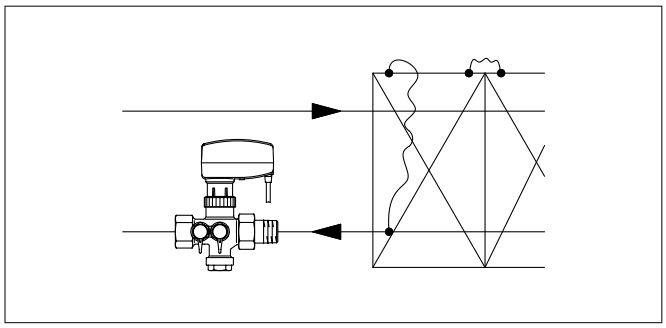
Regulating valve “Cocon” with integrated metering station

Four-port regulating valve “Cocon 4” with integrated metering station



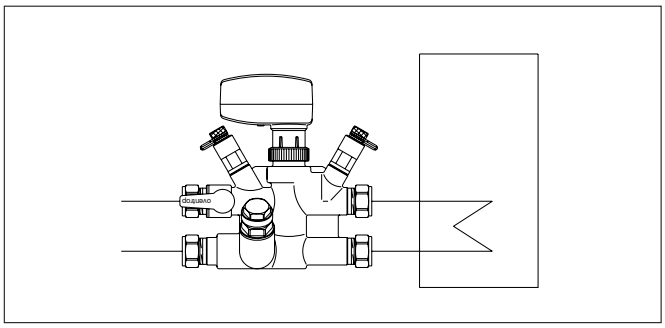


Flow ranges between lowest and highest presetting with Δp= 0.1 bar via the regulating valve.
The below examples only show the valves which are really required for balancing.



Example: Installation with chilled ceiling system to reduce the room temperature.

Conversion of the flow and differential pressure values from a design calculation on the flow rates with Δp = 0.1 bar illustrated here:



Example: Regulation of the installation with only one four-port regulating valve “Cocon 4”.

Design calculation: Δp_A, $\dot{V}_A$

Conversion: $\dot{V}_{0.1\ bar} = \dot{V}_A \cdot \sqrt{\frac{0.1\ bar}{\Delta p_A}}$

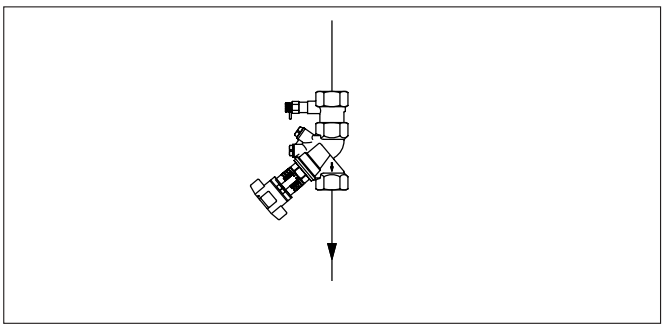
Flow balancing by use of metering stations
Regulation according to pipework calculation or by using a Δp measuring gauge

Metering station DN 15 – DN 50
Flow values with Δp = 1 bar via the metering station

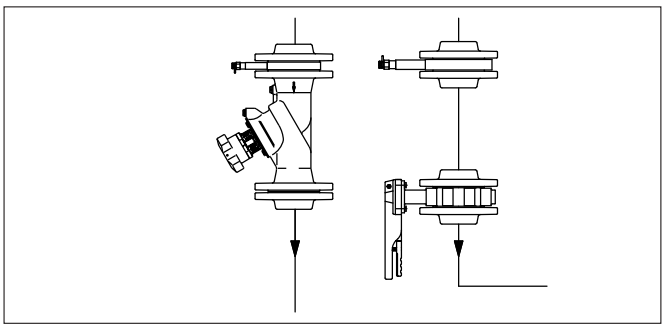
Metering station DN 65 – DN 900
Flow values with Δp = 1 bar via the metering station

DN	kvs		
	Brass resistant to dezincification		
	LF	MF	Standard
15	0.55	1.20	2.20
20			4.25
25			8.60
32			15.90
40			23.70
50			48.00

DN	kvs	
	Cast iron	Stainless steel
65	93	102
80	126	120
100	244	234
125	415	335
150	540	522
200	1010	780
250	1450	1197
300	2400	1810
350		2050
400		2650
450		3400
500		4200
600		6250
700		10690
800		14000
900		17577



Example: Central heating system with female threaded connections.



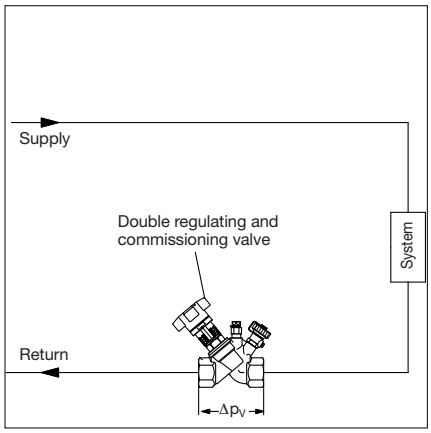
Example: Central heating system with flanged connections.

Example: Δp_A = 0.15 bar, $\dot{V}_A$ = 850 kg/h

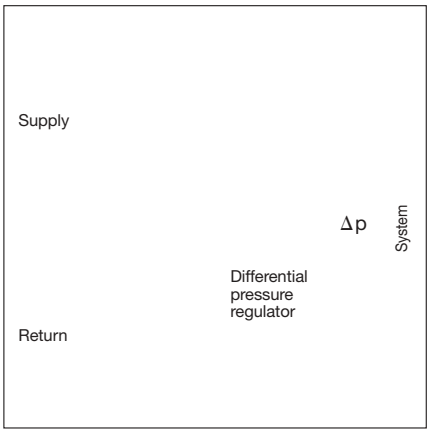
$$\dot{V}_{0,1\,bar} = \dot{V}_A \cdot \sqrt{\frac{0.1\,bar}{0.15\,bar}} = 694\ kg/h$$

With the help of the value $\dot{V}_{0,1\,bar}$ a preselection, e.g. “Hydrocontrol R”, DN 20, can be made (see broken line).

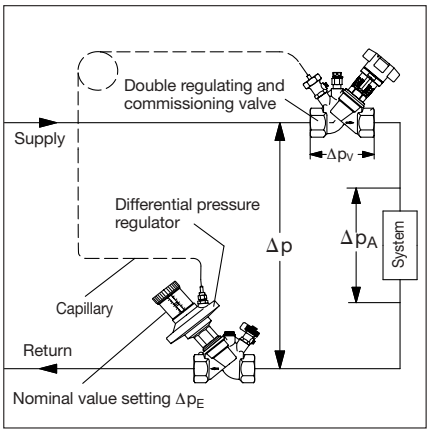
Double regulating and commissioning valve



Differential pressure regulator



Differential pressure regulator and flow limitation with double regulating and commissioning valve



Example 1:

Required:
Presetting "Hydrocontrol R"

Given:
Flow rate circuit qm = 2000 kg/h
Differential pressure valve ΔpV = 100 mbar
Valve size DN 25

Solution:
Presetting 5.0
(taken from chart 106 01 08)

Example 2:

Required:
Size "Hydromat DP"

Given:
Flow rate circuit qm = 30000 kg/h
Differential pressure system Δp = 800 mbar
(corresponds to the nominal value setting at the "Hydromat DP")

Solution:
Size "Hydromat DP" DN 65.
30000 kg/h is smaller than the max permissible flow rate qm_{max}.

Example 3:

Required:
Presetting double regulating and commissioning valve

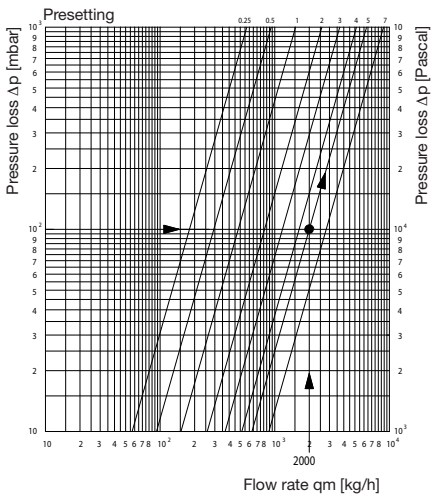
Given:
Differential pressure system Δp_A = 50 mbar
Flow rate circuit qm = 2400 kg/h

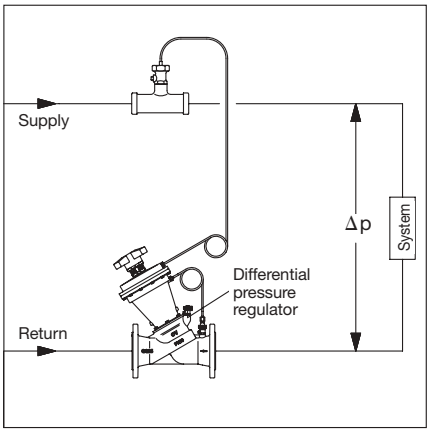
Differential pressure system
(at "Hydromat DP")
Δp_E = Δp = 200 mbar
Size of pipe DN 32

Solution:
Presetting 3.0
(taken from chart 106 01 10)

Differential pressure of double regulating and commissioning valve
Δp_V = Δp−Δp_A
= 200−50 mbar
Δp_V = 150 mbar

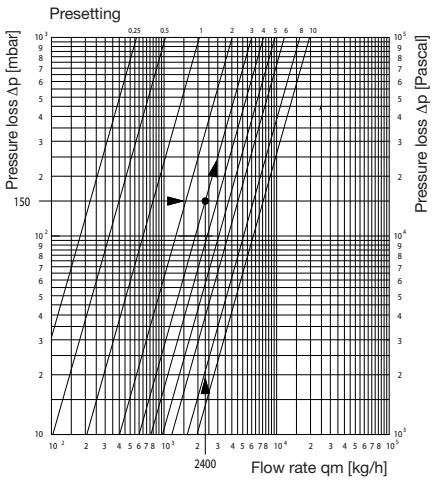
Bronze double regulating and commissioning valve 106 01 08





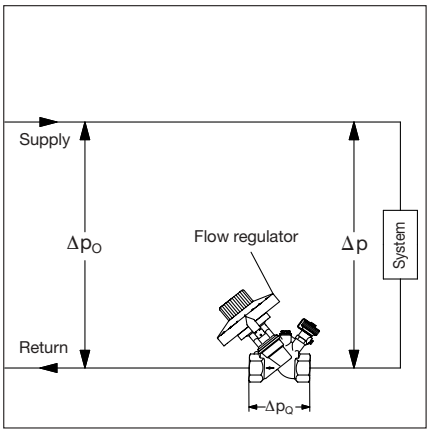
Note:
Differential pressure system = pressure loss radiator valves and lockshield valves + pressure loss radiator + pressure loss pipework

Bronze double regulating and commissioning valve 106 01 10



* The illustrated examples only take those valves into consideration which are required for balancing.

Automatic flow regulator



Example 4:

Required:
Size “Hydromat Q” + differential pressure of regulator Δp_Q

Given:

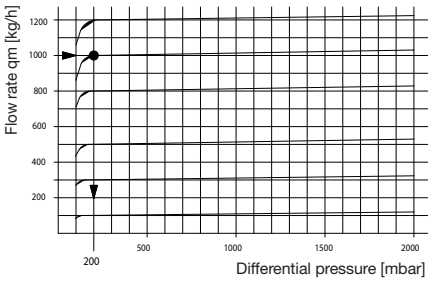
Flow rate circuit	qm	= 1000 kg/h
Existing differential pressure of circuit	Δp_O	= 300 mbar
Differential pressure of system	Δp	= 100 mbar

Solution:
Size “Hydromat Q” DN 20
(taken from pressure loss charts DN 15 – DN 40)

According to the charts, the minimum regulator size is chosen for qm = 1000 kg/h.

The flow regulator has to be set to 1000 kg/h.

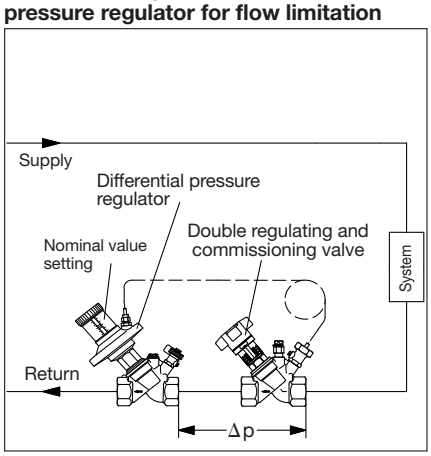
Differential pressure of regulator
$\Delta p_Q = \Delta p_O - \Delta p$
$= 300 - 100$ mbar
$\Delta p_Q = 200$ mbar



Note:
The excessive differential pressure which has to be produced by the regulator, amounts to $\Delta p_Q = 200$ mbar.

This is the minimum Δp required to ensure accuracy.

Combination of double regulating and commissioning valve and differential pressure regulator for flow limitation



Example 5:

Required:
Presetting “Hydrocontrol R”

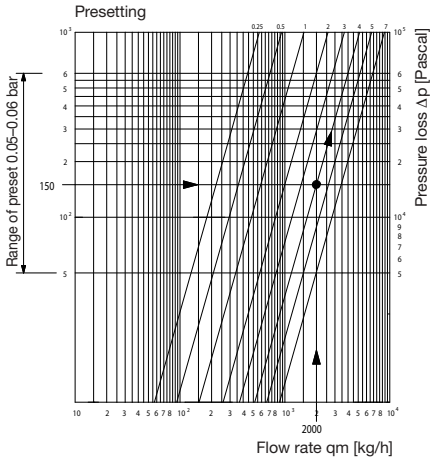
Given:

Flow rate circuit	qm = 2000 kg/h
Differential pressure regulator	DN 25
Double regulating and commissioning valve	DN 25

Solution:
Chosen differential pressure at differential pressure regulator $\Delta p = 150$ mbar
(taken from pressure loss chart 106 01 08)

The double regulating and commissioning valve has to be preset at 4.0.

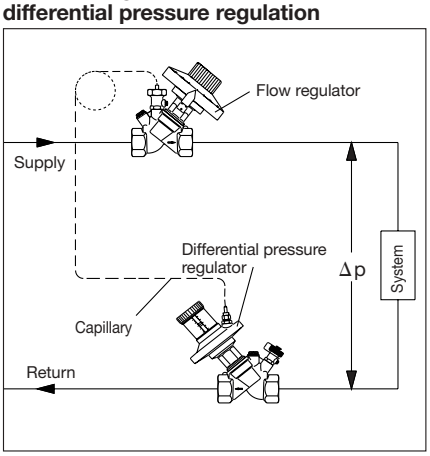
Bronze double regulating and commissioning valve 106 01 08



Note:
The differential pressure can be set to
0.05–0.3 bar or
0.25–0.7 bar (DN 50)
at “Hydromat DP”
and
0.05–0.3 bar or
0.25–0.6 bar
at “Hycocon DP”.

Suitable for larger flow rates.

Combination of flow and differential pressure regulator for flow and differential pressure regulation

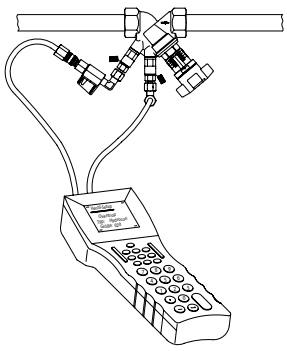


Example 6:

The differential pressure and the flow regulator are designed according to examples 2 and 4.

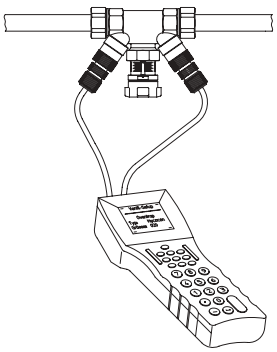
"OV-DMC 2"

Measuring technic "classic"



Regulation at double regulating and commissioning valve "Hydrocontrol R"

Measuring technic "eco"



Regulation at double regulating and commissioning valve "Hycocon V"

In order to guarantee an optimum operation of a heating or cooling system, i.e. an energy supply to those sections of the system which are located far away from the pump and those located near the pump, even if the installed system deviates from the planned system or parts of the system were modified, a subsequent hydronic balance may become necessary.

For this purpose, Oventrop offers the flow meter "OV-DMC 2" which was especially conceived for the regulation of heating and cooling systems. It includes the required measuring needles for the measuring technics "classic" and "eco".

The valve characteristic lines stored in the "OV-DMC 2" can be used for the measurement.

Measuring technic "classic":

Function:
– Differential pressure measurement

The pressure test points are separate components which may be screwed into the valve body.

Measuring technic "eco":

Function:
– Differential pressure measurement
– Draining
– Filling
– Bleeding
– Measuring channel may be flushed in case of dirt deposits

The pressure test points are integrated in the valve body.

Measuring methods:

Apart from the computer method, balanced pressure method and kv-value method, the OV-Balance method is especially suitable for the regulation of existing two pipe heating systems.
For the pressure loss determination, e.g. between supply and return, the differential pressure measurement is available.

Computer method:

Using the computer method, the Oventrop flow meter "OV-DMC 2" calculates the presetting of the double regulating and commissioning valve which is required for the desired flow rate.

To do so, the flow rate is measured at two different presettings after having entered the valve type. Now the valve is set at the new value which was calculated by the "OV-DMC 2".

Balanced pressure method:

Measuring like computer method, but the flow rate is measured at only one presetting.

Especially suitable for the control of flow rates.

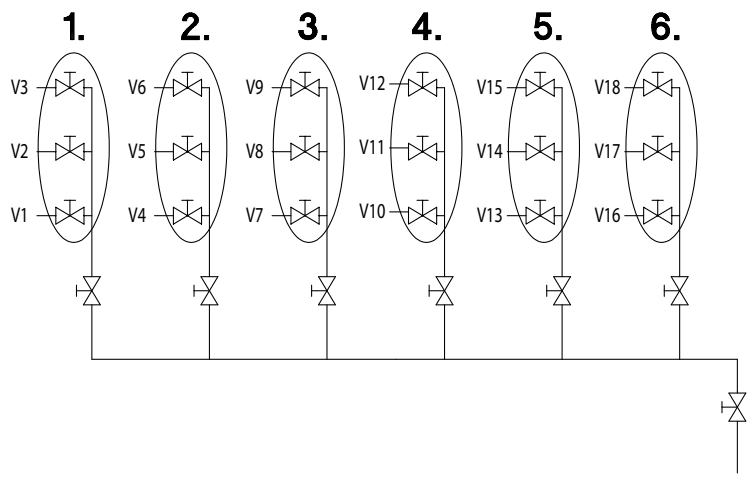
kv-value method:

Is used for the measurement of flow rates of any valves and metering stations with known kv-values.

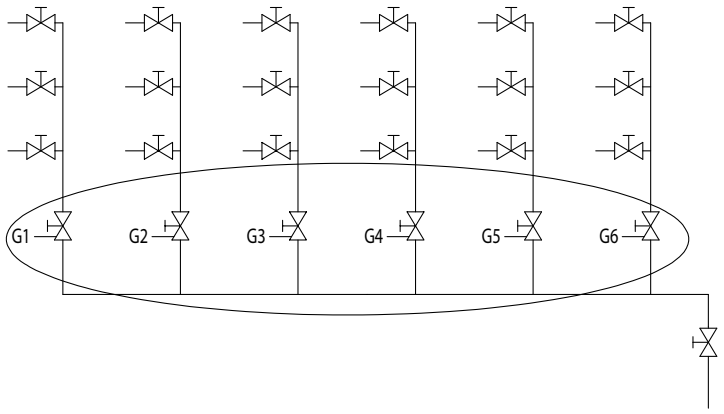
Differential pressure measurement:

Is used for differential pressure measurement of sections of the system.

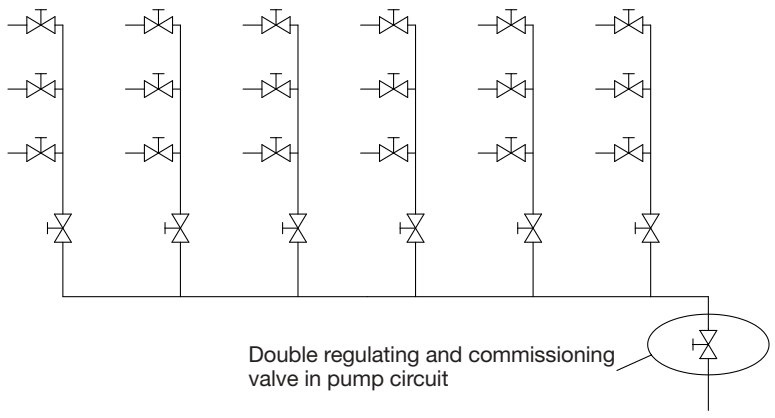
Regulating groups 1–6



Group valves



Double regulating and commissioning valve in pump circuit



Example: OV-Balance method

OV-Balance method:

The main advantage of this method is that the values of presetting for the double regulating and commissioning valves may be calculated on site with the help of the Oventrop flow meter “OV-DMC 2” and that the complete system may be regulated by only one person. The time required for the hydronic balance is reduced considerably provided that the installation is structured clearly.

Before carrying out the regulation, all isolating valves within the circuit of appliance have to be opened. Moreover, the installation has to correspond to the design state, e. g. thermostatic valves preset and thermostats removed.

Sequence of regulation:

Description of the sequence of regulation of a two pipe heating system.
All double regulating and commissioning valves have to be assigned to regulating groups first.
Now proceed as follows:

1. Number all valves of the regulating groups and the groups valves all the way through.
2. Set all valves of the regulating groups “1” to “6” as well as the group valves to position “half opened”.
3. Measure each valve of the regulating group “1” in position “half opened” and position “closed” with the help of the flow meter. Then return to “half open”.
4. Measurement of the group valve “G 1” of the last regulated group in position “closed”.
5. Calculation of presetting values of the valves of the regulating group “1” without group valve by using the flow meter.
6. Set the valves of the regulating group “1” according to the presetting values calculated by the flow meter. Should further regulating groups exist, here the regulating groups “2” to “6”, proceed according to the above mentioned steps 3 to 6 again.
7. Measure each group valve in position “half opened” and “closed”. Then return to “half open”.
8. Measurement of the double regulating and commissioning valve in the pump circuit in position “closed”.
9. Calculation of presetting values for the group valves by the flow meter.
10. Set group valves accordingly.
11. Regulation of the double regulating and commissioning valve in the pump circuit by setting the value of presetting calculated by the flow meter “OV-DMC 2”. This value is calculated using the computer method.

In principle, correctly sized chilled or heating surfaces, pipes, double regulating and commissioning valves and pumps guarantee an optimum hydronic balance of heating and cooling systems. To minimise deviations of the differential pressure from the design state, the use of regulating valves and regulated pumps may be recommendable.

During planning new heating or cooling systems, heat demand and pipework calculations are used taking the demands of the new decree for energy saving into consideration, including the control and performance ranges of the valves for hydronic balance as well as the losses caused by the resistance of pipes.

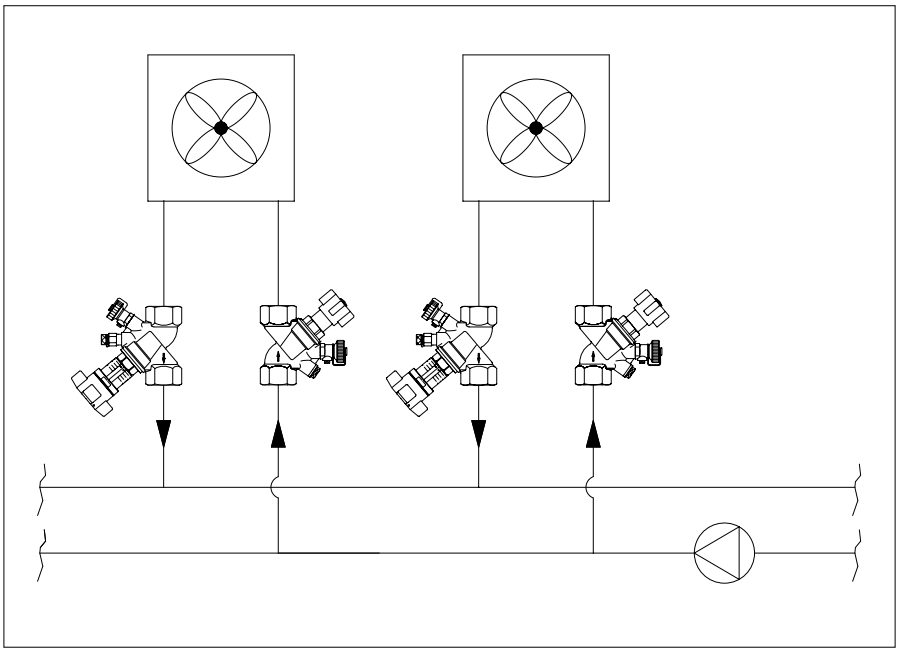
To calculate the hydronic of the pipework:

1. the heat demand or the cooling load are determined first,
2. the heating and chilled surfaces as well as their flow rates are calculated with the given temperature differences being taken into consideration,
3. the sizing of the pipework for the flow rates which are to be circulated is carried out. Here, the differential pressure between the circuits, e.g. in heating systems, should be between 100 and 200 mbar,
4. the double regulating and commissioning valves, differential pressure and flow regulators are selected and their values of presetting are determined,
5. the value of presetting (if assigned) is also determined for each appliance,
6. the pump head of the pump is determined.

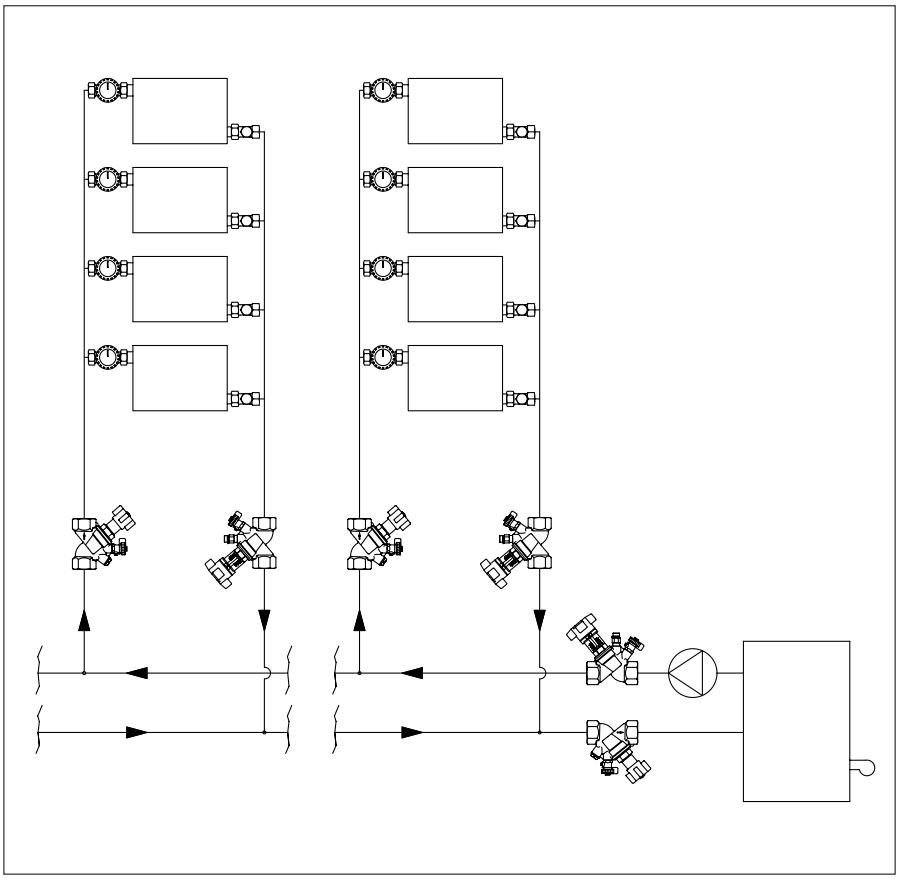
During the installation phase which is now following, the system is already balanced if the valves for hydronic balance are installed with their values of presetting calculated before. An additional balance is not required.

Examples of application of the procedures described above are illustrated opposite.

Note: It is important to install the regulating valve at fully open. Once the system has been cleaned and flushed, the valves can be set to their designed presettings.

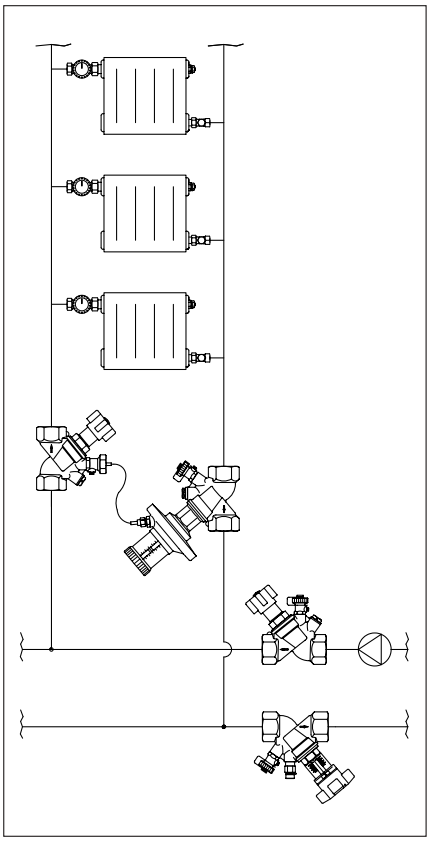


Example:
Scheme of an air heating installation in which the flow rate is almost constant.
After cleaning and flushing the system, preset double regulating and commissioning valves provide a static hydronic balancing. Instead of the isolating and orifice valves in the supply pipe, isolating ball valves (item no. 107 71 . .) may alternatively be installed.



Example:
Scheme of a two pipe heating system which has to be regulated to a pre-calculated design point by the use of commissioning valves. Instead of the isolating and orifice valves in the supply pipe, isolating ball valves (item no. 107 71 . .) may alternatively be installed.

Regulation:
Via a directly presettable double regulating and commissioning valve.



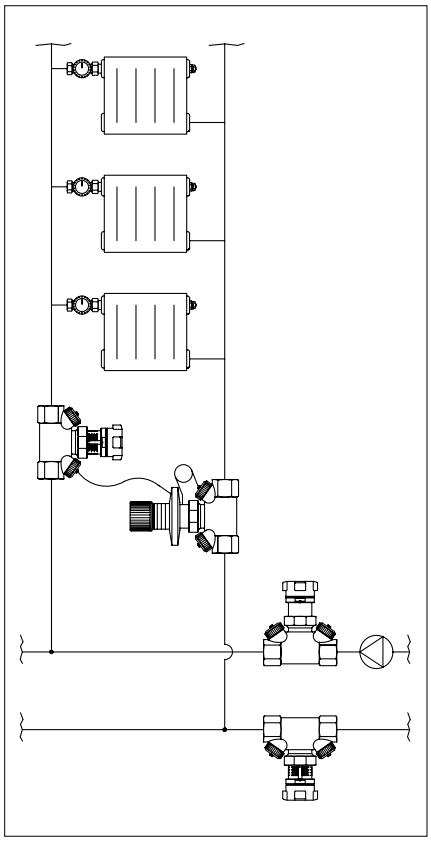
Example:
Scheme of a two pipe heating system in which the flow rate is distributed depending on the demand but in which the differential pressure shall not exceed maximum values (limitation of differential pressure).

The values of presetting for presettable thermostatic valves resulting from the pipework calculation represent the optimum flow rate distribution in the design state. A sufficient supply is guaranteed.

The additional application of a differential pressure regulator is useful if the demand is varying, e.g. if a major part of the appliances is closed and the differential pressure of an appliance increases considerably (e.g. more than 200 mbar).

The value of presetting for the differential pressure regulator may also be calculated during the planning stage.

The differential pressure regulators guarantee a permanent control of the differential pressure to the value of presetting within the circuits.

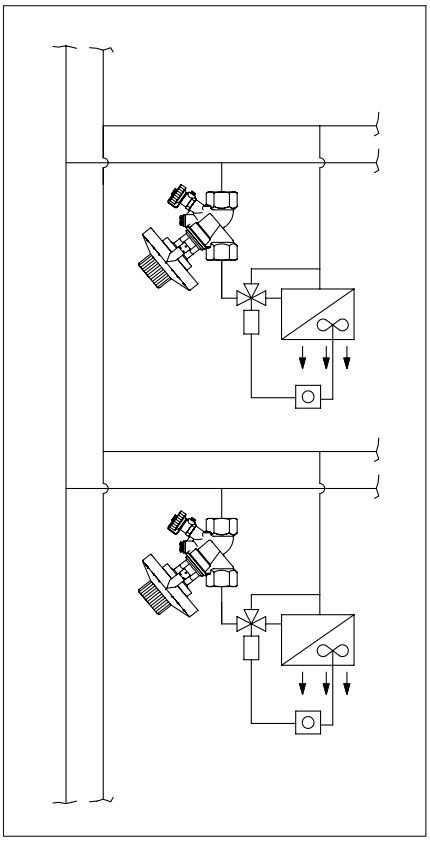


Example:
Scheme of a two pipe heating systems with non-presettable thermostatic valves or radiator lockshield valves in which the flow rate is distributed up to a higher constant value depending on the heat demand but in which the differential pressure within a circuit shall not exceed a given maximum value.

This combination of volume and differential pressure limitation is rendered possible by the installation of a double regulating and commissioning valve in the supply pipe and a differential pressure regulator in the return pipe.

Here, the values of presetting for the double regulating and commissioning valve and the differential pressure regulator for the optimum design point also result from the planning stage and the hydronic balance is established automatically.

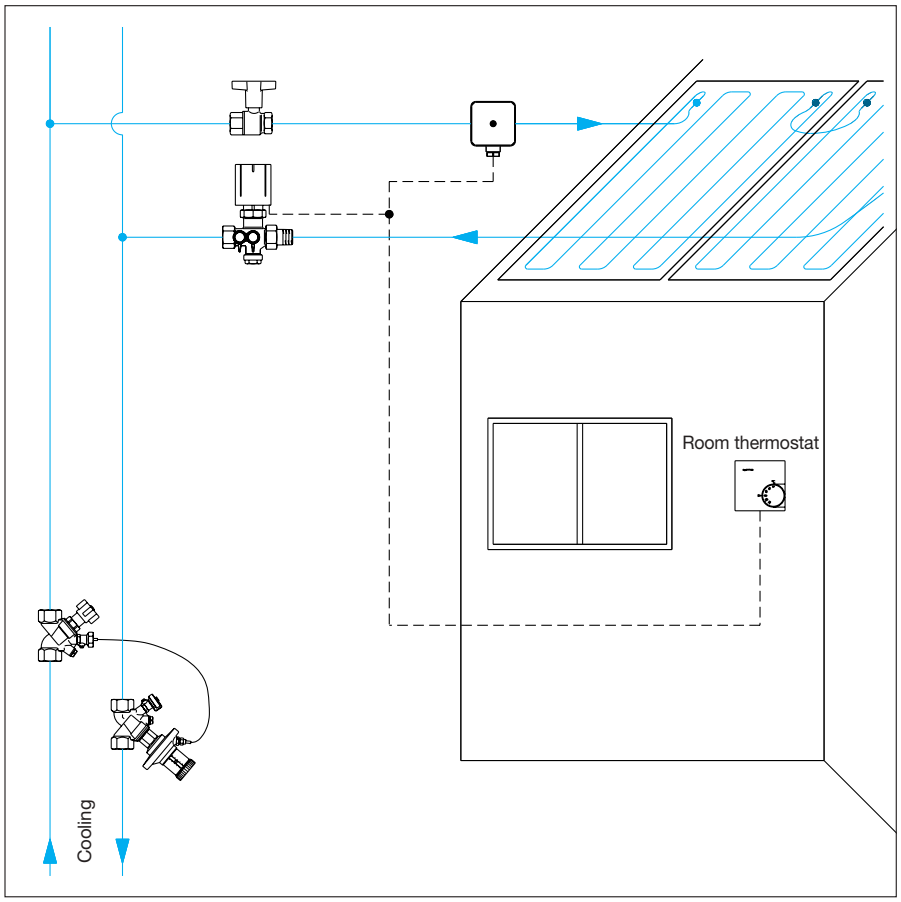
The differential pressure regulator in combination with the double regulating and commissioning valve then takes over the limitation with the flow rate rising (thermostatic valves open) and the differential pressure rising (thermostatic valves close).



Example:
Scheme of a cooling system in which the flow rate towards the chillers shall remain constant and independent of the demands within the other sections of the system (limitation of the flow rates).

For such installations, the distribution of the flow rate for the circuits results from calculation programs. The values may be set directly at the flow regulators.

In case of varying demand, the automatic flow regulator guarantees an automatic adaptation of the flow rate to the set value within the cicuits.



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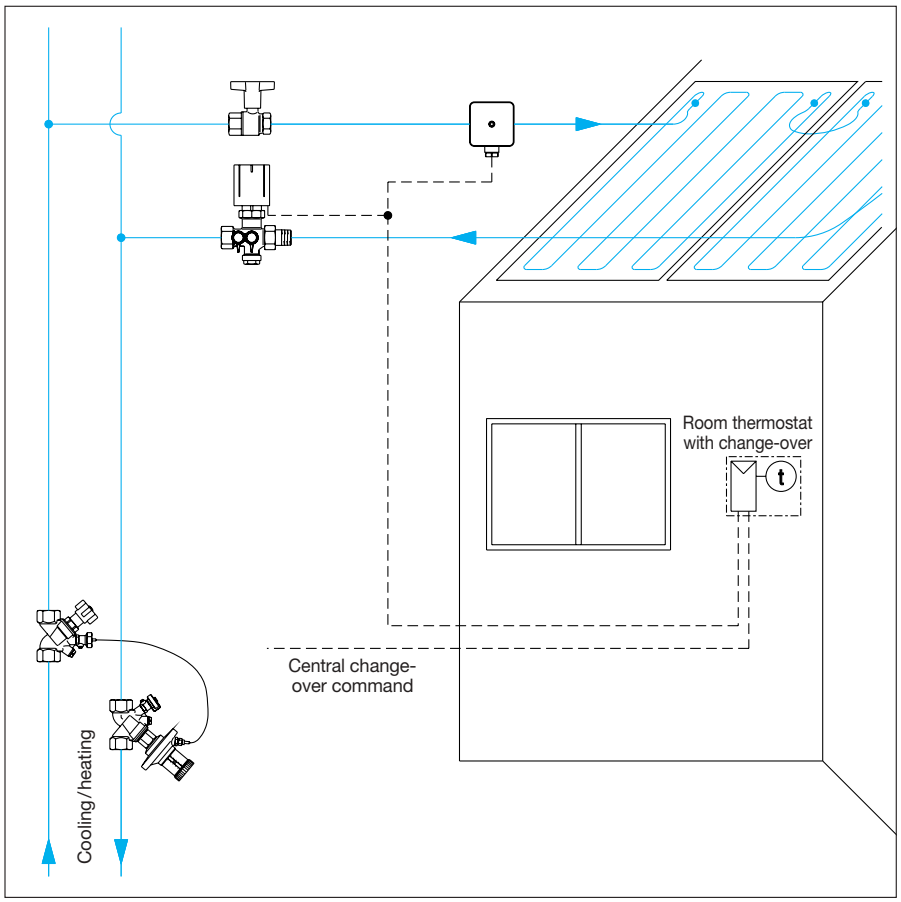


2

1 Two pipe cooling system

The simplest method to reduce the room temperature by using a chilled ceiling system is illustrated by the two pipe system.

For this purpose, Oventrop offers the following products:

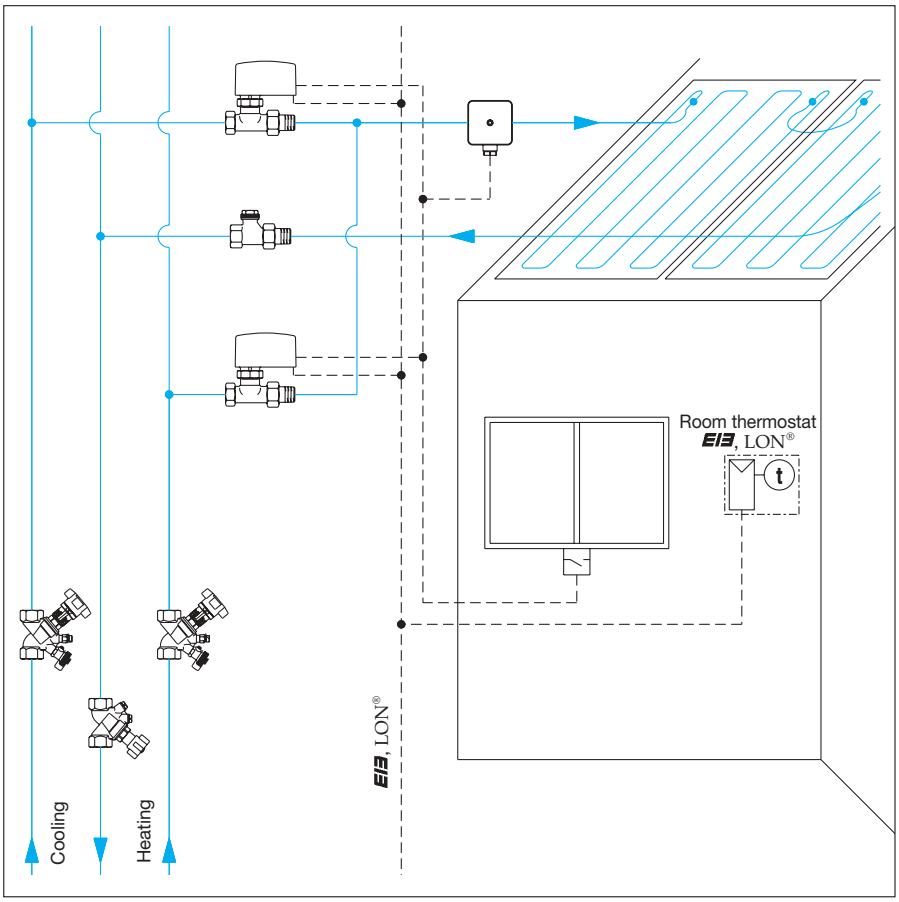
– the presettable valve “Cocon” is installed in the return pipe of the chilled ceiling for the regulation of the chilled water flow
– an electric actuator receiving control commands from a room thermostat is mounted on the valve
– a ball valve is installed in the supply pipe of the chilled ceiling to shut off the chilled water flow. A dew point control which shuts off the flow of chilled water in case of condensation is installed in the supply pipe
– larger systems with several chilled ceiling circuits are additionally equipped with valves for hydronic balancing as e.g. double regulating and commissioning valves and differential pressure regulators

2 Two pipe cooling/heating system

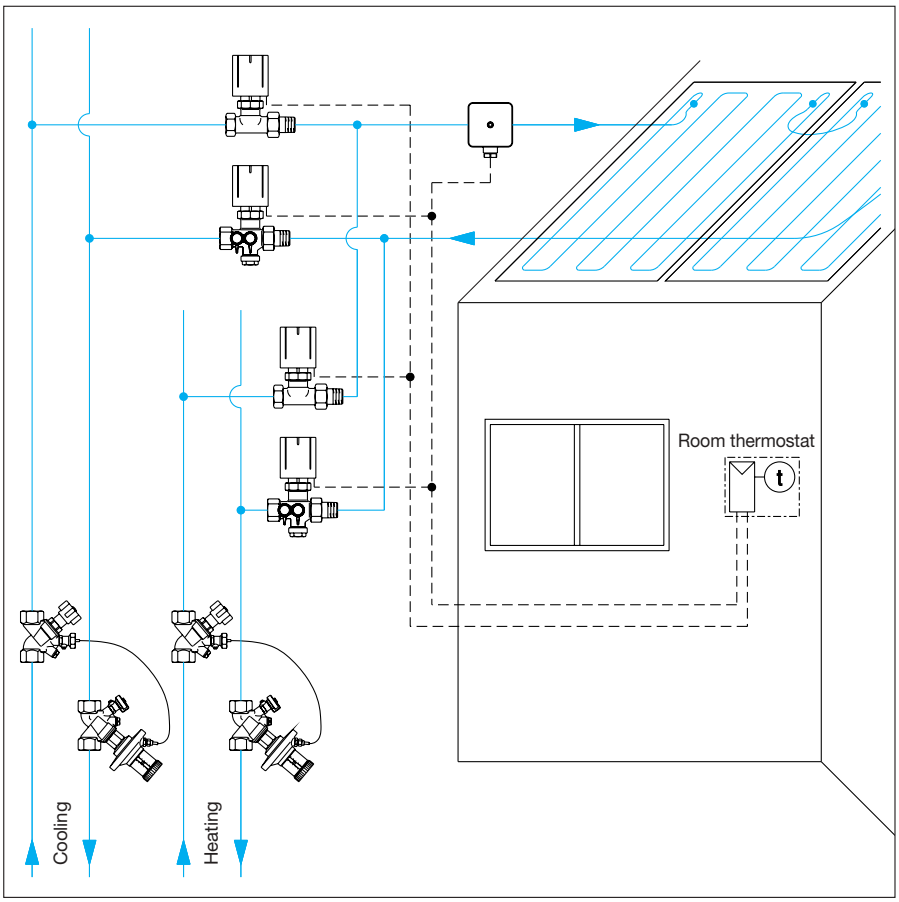
If a two pipe system is also used for heating, the following products could be used:

– valve “Cocon” with electric actuator
– dew point control
– double regulating and commissioning valve
– differential pressure regulator

Here, a central changeover of the supply and return pipe from cooling to heating operation takes place and vice versa. During cooling operation, the valve “Cocon” is opened via a room thermostat in case of rising room temperature. During heating operation, the “Cocon” valve is closed via a room thermostat with the room temperature rising.



1



2

1 Three pipe cooling/heating system

A three pipe system is used if the fluid for cooling operation and the fluid for heating operation are transported in separate supply pipes and if they are fed back to the cooler or the heat producer in a common pipe.
During cooling operation, the actuator “Uni EIB” which is controlled by the EIB system, ensures, with the valve of the “Series P”, the supply to the chilled or radiant ceiling element. Moreover, the binary entry of the actuator “Uni EIB” allows the connection of a dew point control device and/or a window contact. The supply of the heating fluid is controlled the same way.
The mass flow is regulated by use of the common radiator lockshield valve “Combi 3” also allowing filling and draining. To control the flow rate, metering stations may additionally be installed in front of the double regulating and commissioning valves.

2 Four pipe heating/cooling system

A four pipe system is used if the fluid leaving the chilled or radiant ceiling is fed back to the cooler or the heat producer in separate return pipes, too. The heating or chilled water flows are adjusted or shut off by the regulating valve “Cocon” with mounted electrothermal actuator installed in the return pipework. When heating or cooling are not called for, the associated “Series AZ” with electrothermal actuator, mounted in the supply pipework, will also close to prevent back flow. To avoid condensation, the dew point control closes the chilled water return valves.
To control the flow rate, metering stations may additionally be installed in front of the double regulating and commissioning valves.

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Chilled ceiling systems make up a growing share in the cooling sector for office buildings. With due consideration to some basic rules, these systems may also be used for heating.

The correct choice of the most suitable hydronic system is of major importance.

Oventrop are able to offer products required for the correct design of the hydronic system for these applications including regulators, actuators and “Cocon” regulating valves. These valves have the facility for flow regulation and measurement to allow a hydronic balance of the system to be carried out. The valves also have integrated isolating, filling and draining facilities.

A full range of actuators are available to allow the most suitable control of the valve for its application. For proportional control the valve operates with a linear characteristic line (linear flow depending on the piston stroke).

Examples in practice:

1 Oventrop regulating valve “Cocon” with actuator installed in a chilled ceiling

2 Regulation of a regulating valve “Cocon” by use of the flow-meter “OV-DMC 2”

3 Control of a regulated valve “Cocon” via an electrothermal actuator

Examples of installation in Fan-Coil units

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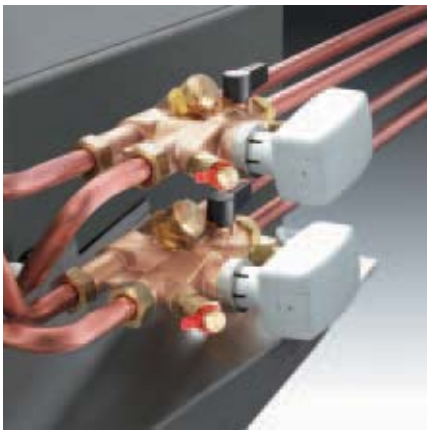

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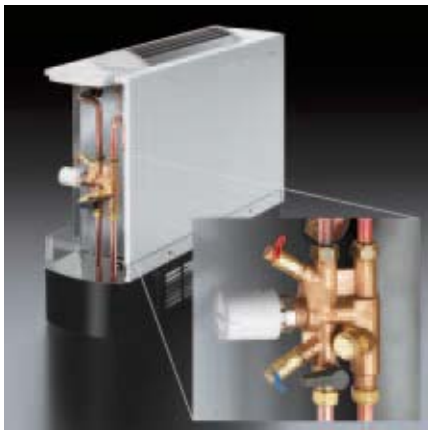

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1 Suspended Fan-Coil unit with valve group consisting of two four-port regulating valves “Cocon 4” for heating and cooling circuit with electrothermal actuators.

2 Detailed view of suspended Fan-Coil unit with valve group consisting of two four-port regulating valves “Cocon 4” and electromotive (proportional 0–10 V) actuators.

3 Vertical Fan-Coil unit with valve group consisting of one four-port regulating valve “Cocon 4” and electrothermal actuator.

4 Four-port regulating valve “Cocon 4” with actuators.

– electrothermal actuator (two point)
– proportional electromotive actuator
– electromotive actuator system EIB or LON®

5 Four-port regulating valve “Cocon 4” with flow-meter “OV-DMC 2”. The flow rate may be directly read off the flow-meter.

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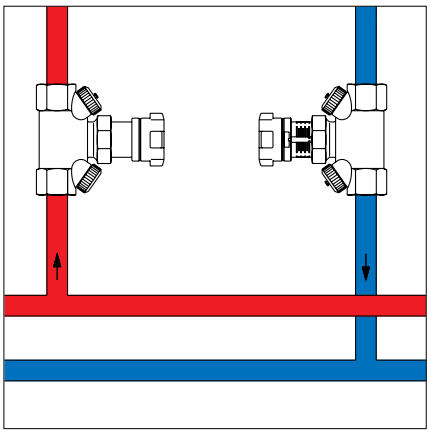

3

The Oventrop series “Hycocon” made of DZR brass comprises new, small, compact valves for use in heating, cooling and air conditioning systems PN 16 between –10 °C and +120 °C.

The series “Hycocon” consists of the following components:

“Hycocon V”:	Double regulating and commissioning valve
“Hycocon A”:	Isolating and orifice valve
“Hycocon T”:	Regulating valve with AV6 insert for thermostats or actuators
“Hycocon TM”:	Regulating valve with special insert for high flow rates and for thermostats and actuators
“Hycocon B”:	Basic body for different inserts
“Hycocon DP”:	Differential pressure regulator
“Hycocon Q”:	Flow regulator (DN 15)

Connection thread M 30x1.5

The sizes DN 15, DN 20, DN 25, DN 32 and DN 40 are available and the valves may be supplied with female or male threaded connection. Installation is possible in the supply and the return pipe.

The valves “Hycocon V” and “Hycocon A” are supplied with insulation shell (suitable up to 80 °C). The new valve insert of the “Hycocon” valves allows the replacement of the hand-wheels or the bonnets for isolation, regulation and differential pressure regulation without draining the system (DN 15, DN 20, DN 25 with the help of the “Demo-Bloc” (except for “Hycocon Q”). Combined with a thermostat, temperature controller or electrothermal or electromotive actuator, the “Hycocon T/TM” valves may be used as a dynamic regulating valve. When fitted with an electromotive actuator EIB or LON®, it may even be used as an intelligent regulating valve. With these universal connection possibilities, Oventrop offers a practical and effective solution for any automatic and manual hydronic balancing in the Building Services Industry.

1 Basic body with bonnets
– double regulating and commissioning valve
– differential pressure regulator
– isolating and orifice valve

2 “Hycocon TM” with thermostat, electrothermal or electromotive actuator

3 System illustration
Isolating and orifice valve “Hycocon A” and double regulating and commissioning valve “Hycocon V” in a heating riser

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Oventrop double regulating and commissioning valves “Hycocon V” are installed in hot water central heating and cooling systems and serve to achieve a hydronic balance between the various circuits of the system.

Precise balancing can be achieved due to an infinitely adjustable presetting with memory position which is lockable and lead sealable. Sizes DN 15 to DN 25 with six and sizes DN 32 and DN 40 even with eight major graduation values divided into steps of $^{1}/_{10}$th (i. e. 60 or 80 presetting values) guarantee a high resolution with small flow tolerances.

Installation is possible in either the supply or the return pipe.

Advantages:
- supplied with insulation shell (suitable up to 80 °C)
- the location of all functioning components on one level allows a simple assembly and easy operation
- only one valve for 5 functions:
  presetting
  measuring
  isolating
  filling
  draining
- supplied with mounted pressure test point and drain valve (measuring technic “eco”)
- easy filling and draining by fitting a separate tool (accessory) to one of the pressure test points
- infinitely adjustable presetting, exact measurement of pressure loss and flow with the help of the pressure test points
- thread according to EN 10226 (BS 21) suitable for Oventrop compression fittings (one edge olive) for copper pipes with a max. diameter of 22 mm as well as Oventrop composition pipe “Copipe” 14 and 16 mm

Models available: both ports female or male thread.
Dimensions and flow capacities:
DN 15 k_{VS} = 1.7
DN 20 k_{VS} = 2.7
DN 25 k_{VS} = 3.6
DN 32 k_{VS} = 6.8
DN 40 k_{VS} = 10.0

1 Double regulating and commissioning valve “Hycocon V”

Model: both ports female thread according to EN 10226 (BS 21)

Awards:

ISH Frankfurt
“Design Plus”

Design Award Switzerland

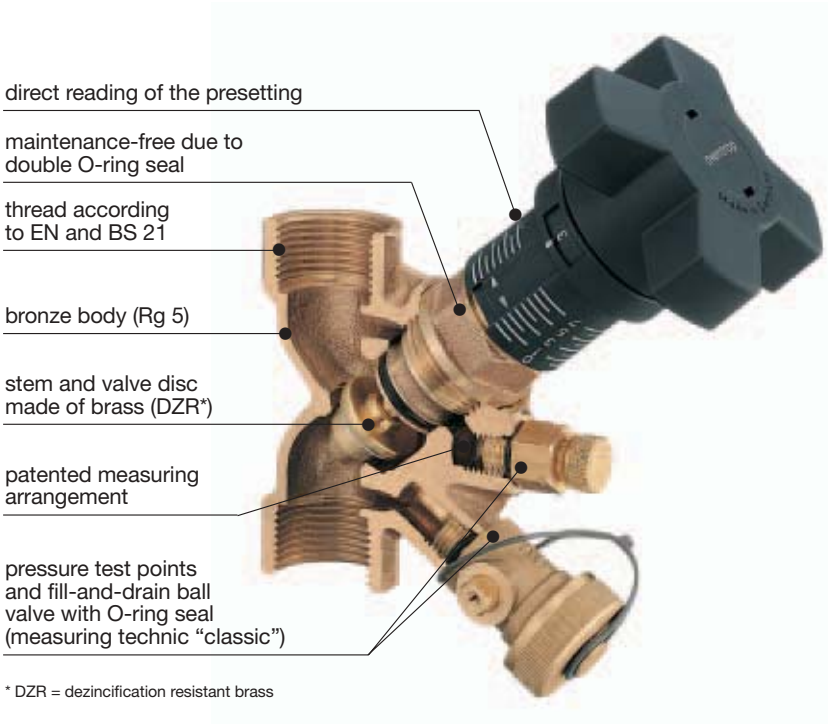
International Forum
Design Hanover
iF design award

2 Double regulating and commissioning valve “Hycocon V” combined with flow-meter “OV-DMC 2”

3 Presetting
Basic and fine setting scale

4 Pressure test points for use with flow-meter “OV-DMC 2”

Double regulating and commissioning valve “Hydrocontrol”



* DZR = dezincification resistant brass

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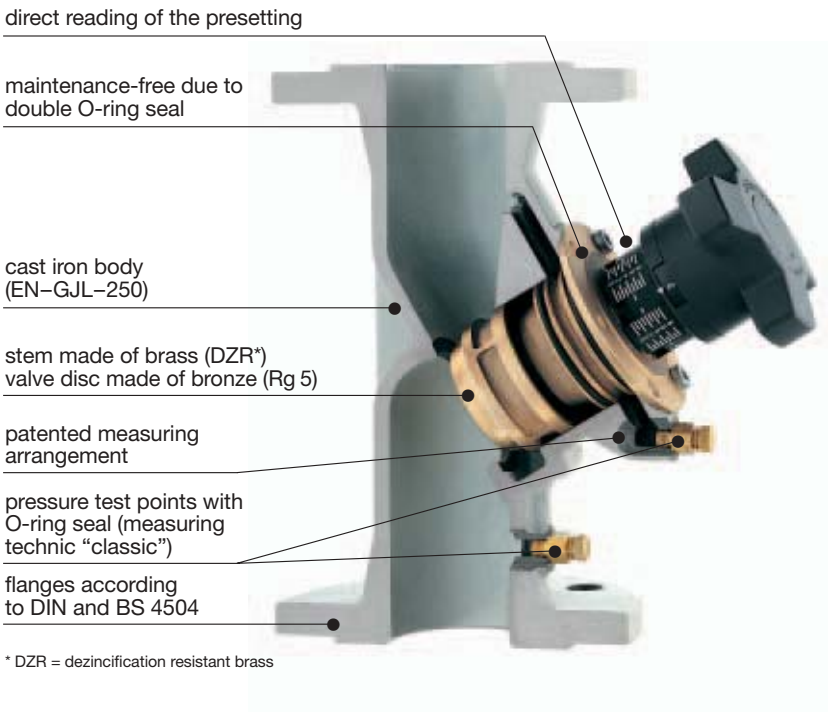

* DZR = dezincification resistant brass

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With their balancing systems, Oventrop offers the installer all the valves and valve combinations necessary to achieve the hydronic balance of heating and cooling systems. The products can be delivered separately or as a system. Thus the appropriate valves and valve combinations are available for any possible demand.

The bronze double regulating and commissioning valves “Hydrocontrol R”/ “Hydrocontrol FR” are installed in hot water central heating systems (“Hydrocontrol R”: PN 25/150 °C,“Hydrocontrol FR”: PN 16/ 150 °C) and cooling systems in order to provide a hydronic balance between the various circuits of the system. The bronze double regulating and commissioning valves “Hydrocontrol FR” are also suitable for cold salt water (38 °C max.) and domestic water. The calculated flow rate or pressure loss can be preset for each individual circuit, thus making the hydronic balance easy to achieve.

They can be installed in either the supply or the return pipe.

Advantages:

- the location of functioning components on one level allows a simple assembly and easy operation
- only one valve for 5 functions:
  - presetting
  - measuring
  - isolating
  - filling
  - draining
- low pressure loss (oblique pattern)
- infinitely adjustable presetting, exact measurement of pressure loss and flow by using the pressure test points (measuring technic “classic”)
- thread of “Hydrocontrol R” according to EN 10226 (BS 21), suitable for Oventrop compression fittings (one edge olive) for copper pipes with a max. diameter of 22 mm
- flanges of “Hydrocontrol F”, “Hydrocontrol FS” and “Hydrocontrol FR”: round flanges according to DIN EN 1092-2 (BS 4504), lenghts according to DIN EN 558-1 (BS 7350), basic series 1
- groove connections for couplings of “Hydrocontrol G” suitable for couplings of the systems Victaulic and Grinnell
- fill and drain ball valve with internal stop and pressure test point with O-ring seal between valve body and test point (no additional seals required)
- patented measuring channel led around the stem assembly to the test points ensures the best possible accuracy between the differential pressure measured at the pressure test points and the actual differential pressure of the valve.

1 Sectioned double regulating and commissioning valve “Hydrocontrol R”

Awards:

International Design Award Baden-Württemberg

Good Design Award Japan

International Forum Design Hanover Award iF

2 Sectioned double regulating and commissioning valve “Hydrocontrol F”

Award:

Pragotherm Prague
Diploma for the best exhibit

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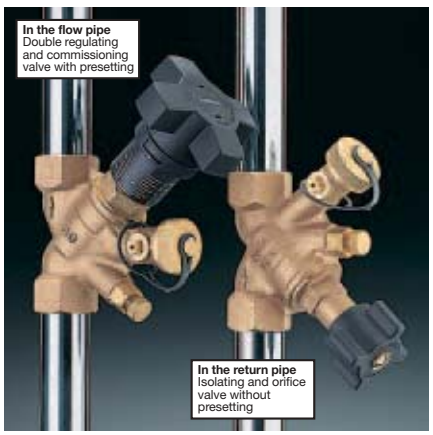

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1 Double regulating and commissioning valve “Hydrocontrol R”
both ports female thread according to EN 10226 and BS 21, sizes DN 10 – DN 65
both ports male thread with collar nuts, sizes DN 10 – DN 50.
Complies with BS 7350 and BS 5154.
Body and bonnet made of bronze Rg5, valve disc with PTFE seal, stem and valve disc made of dezincification resistant brass. DVGW, SVGW and WRAS approval for DN 15 – DN 32.
The valves “Hydrocontrol R” in the supply respectively return pipe can be clearly marked by use of the replaceable colour rings.

2 Possible connections for the model “Hydrocontrol R” with both ports male thread:
– weldable tailpipes
– solder tailpipes
– male screwed tailpipes
– female screwed tailpipes
– connection piece for all pipes

3 Double regulating and commissioning valve “Hydrocontrol F” PN 16
both ports flanged, sizes DN 20 – DN 300.
Body made of cast iron EN-GJL-250 DIN EN 1561, valve disc with PTFE seal, bronze bonnet (D 200-DN 300 made of nodular cast iron), stem and valve disc made of dezincification resistant brass, sizes DN 65 and above bronze valve disc.
Round flanges according to DIN EN 1092-2
Lengths according to DIN EN 558-1, basic series 1 and BS 7350
Also available with hole circle according to ANSI-Class 150

4 Double regulating and commissioning valves “Hydrocontrol FR” – PN 16/” Hydrocontrol FS” – PN 25
– Double regulating and commissioning valve “Hydrocontrol FR” – PN 16
both ports flanged, sized DN 50 – DN 200.
Body, bonnet and disc made of bronze, stem made of stainless steel. Dimensions of flanges identical with “Hydrocontrol F”.
Round flanges according to DIN EN 1092-2
Lengths according to DIN EN 558-1 basic series 1 and BS 4504
– Double regulating and commissioning valve “Hydrocontrol FS” – PN 25
both ports flanged, sized DN 65 – DN 300.
Body made of nodular cast iron EN-GJS-500.
Round flanges according to DIN EN 1092-2
Lengths according to DIN EN 558-1 basic series 1 and BS 4504

5 Lead seal for “Hydrocontrol F, FR, FS, G”
Sizes DN 65-DN 300 (delivered with each valve)

6 Double regulating and commissioning valve “Hydrocontrol G”
both ports groove connection for couplings, DN 65 – DN 300.
Suitable for couplings of the systems Victaulic and Grinell.
Body made of cast iron EN-GJL-250 DIN EN 1561, disc with PTFE seal, bonnet (DN 200 – DN 300 made of nodular cast iron) and valve disc made of bronze, stem made of brass resistant to dezincification.

7 Insulation shells for “Hydrocontrol R”
Stem extension for “Hydrocontrol R, F, FR, G”
Insulation shells for a perfect isolation of the double regulating and commissioning valves (also available for “Hydrocontrol F” and “Hydrocontrol FR”).
Stem extension for the subsequent isolation with standard insulation material (DN 10-DN 150).

8 Valves for supply and return pipe
The valve for the return pipe has the same functions as the double regulating and commissioning valve “Hydrocontrol R” except for the presetting.

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1 Differential pressure regulator “Hycocon DP”
The differential pressure regulator is a proportional regulator working without auxiliary energy. It is designed for use in heating and cooling systems to maintain a constant differential pressure within a necessary proportional band.

The nominal value is infinitely adjustable between 50 mbar and 300 mbar or 250 mbar and 600 mbar.
PN 16, 120°C

- high flow capacity
- nominal value can be locked
- very good optical display of the nominal value at any time
- installation in the supply or return pipe
- with isolating facility
- supplied with drain valve
- easy filling and draining by screwing separate tool (accessory) onto one of the pressure test points (possibility to connect a flexible hose)
- pressure balanced valve disc
- all functioning components on one level
- thread according to EN 10226 (BS 21) suitable for Oventrop compression fittings (one edge olive) for copper pipes with a max. diameter of 22 mm as well as Oventrop composition pipe “Copipe” 14 and 16 mm
- female and male thread

2 Differential pressure regulator “Hydromat DP”
The differential pressure regulator is a proportional regulator working without auxiliary energy. It is installed in heating and cooling systems of existing and new buildings for a decentral or central regulation of the differential pressure.
The regulators maintain a constant differential pressure within a necessary proportional band.
The sizes DN 15 to DN 50 are infinitely adjustable between 50 mbar and 300 mbar and size DN 50 additionally between 250 mbar and 700 mbar.
The sizes DN 65 to DN 100 are infinitely adjustable between 200 mbar and 1000 mbar or 400 mbar and 1800 mbar.

Additional technical information:
PN 16, -10°C up to 120°C
Connections DN 15 to DN 50:
- both ports female thread according to EN/BS
- both ports male thread with collar nut

Connections DN 65 to DN 100:
- both ports flanged according to DIN EN 1092-2, PN 16 (corresponds to ISO 7005-2, PN 16)
  Lengths according to DIN EN 558-1, basic series 1 (corresponds to ISO 5752 series 1)

Advantages:
- high flow capacity
- nominal value can be locked
- very good optical display of nominal value at any time
- installation in the return pipe (DN 15 to DN 50)
- installation in the supply or the return pipe (DN 65 to DN 100)
- with isolating facility
- with ball valve for filling and draining
- pressure balanced valve disc
- existing double regulating and commissioning valves can be converted to differential pressure regulators (identical bodies)
- all functioning components on one level

This item is protected by patent.

Awards:
Industrial Forum Design Hanover Award iF
Pragotherm, Prague, Grand Prix

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The flow regulators “Hycocon Q” and “Hydromat Q” are proportional regulators working without auxiliary energy. They are designed for use in heating and cooling systems to maintain a constant flow within a necessary proportional band.

Additional technical information:

1 “Hycocon Q”:
PN 16 between –10°C and +120°C
Control range 0.15 -1.5 bar
Adjustable nominal control range 40-150 l/h
Connections DN 15:
Both ports female thread offering the possibility of compression connection;
Valve body and bonnet made of brass resistant to dezincification;
Presetting of the flow rate before initial operation.

Advantages:
– reduced dimensions
– two integrated pressure test points and drain valves
– all functioning components on one level
– hidden, infinitely adjustable presetting
– installation in the supply or return pipe

2 “Hydromat Q”:
PN 16 up to 120°C
Connections alternatively
both ports female thread according to EN
both ports male thread and collar nuts
Corrosion resistant due to bronze material
DN 15 – DN 40

Advantages:
– control range 0.2 – 2 bar
– high flow capacity
– installation in the supply or return pipe
– with isolating facility
– with ball valve for filling and draining
– pressure balanced valve disc
– very good optical display of nominal values at the handwheel
– nominal value lockable and lead sealable
– existing double regulating and commissioning valves can be converted to flow regulators (identical bodies)
– all functioning components on one level
– no need to exchange regulation inserts to modify nominal values

This item is protected by patent.

Awards:

Industrial Forum Design Hanover Award iF

Aquatherm Prague

Interclima Paris
Trophée du Design

Design Award Switzerland

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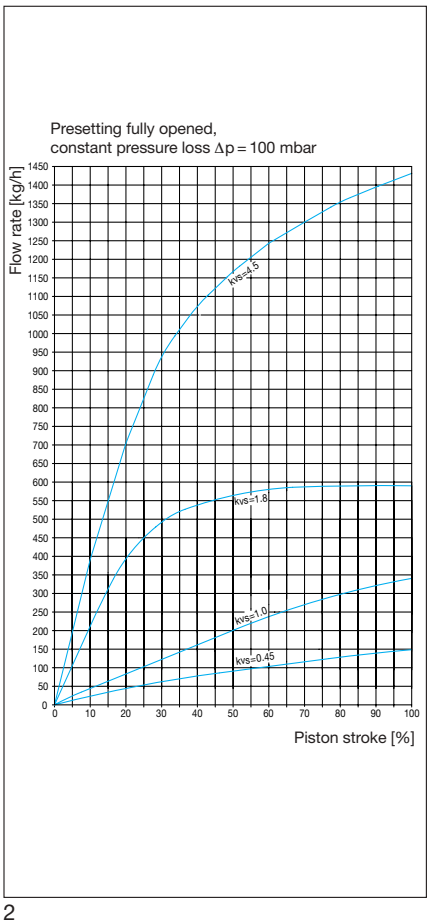

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1 Regulating valve “Cocon”
for chilled and radiant ceilings
(illustr. with measuring technic “classic”)

The calculated flow rate for a given differential pressure is set at the regulating valve “Cocon”. Moreover, it serves to regulate the room temperature with the help of an electrothermal or electromotive actuator by an adapted linear characteristic line (not for kv_S = 1.8 and 4.5).

The valve is installed in heating and cooling systems and is especially suitable for the installation in the return pipe of chilled ceiling modules. The flow rate is determined by measuring the differential pressure via the integrated metering station by use of the flow-meter “OV-DMC 2”. The flow rate to be regulated can be read off the flow-meter. To carry out the hydronic balance, a flow rate deviation can immediately be readjusted by modification of the adjustment screw.

When actuating the presetting screw, the flow rate to be regulated can be read off the flow-meter if connected to the pressure test points of the regulating valve “Cocon”. For isolation, the setting screw can be completely screwed in. When opening until stop, the value of presetting is restored.

Four different models of the regulating valve “Cocon” are available:
– size ½", kv_{value} = 0.45
– size ½", kv_{value} = 1.0
– size ½", kv_{value} = 1.8
– size ¾", kv_{value} = 4.5

General information:

To guarantee a permanent functional efficiency of the regulation and control components as well as a permanent availability of the complete cooling system, preparatory measures should be taken for the protection of the system.

On the one hand, these measures are related to possible damages caused by corrosion, especially in installations with pairings of system components of different materials (copper, steel and plastic) and on the other hand to the choice and settings of the control parameters (e.g. avoiding of energy losses in combined heating/cooling systems).

2 Flow rate depending on the piston stroke of the valve

The chart shows the linear characteristic lines of the regulating valves “Cocon” size ½", kv_S = 0.45, 1.0 and 1.8 and size ¾", kv_S = 4.5.

3 Regulating valves “Cocon” for chilled and radiant ceilings
(illustr. with measuring technic “eco”)

Due to the connection thread M 30 x 1.5 the valve can be used in combination with:
– Oventrop electrothermal actuators with two point control
– Oventrop electrothermal actuators (0–10 V)
– Oventrop electromotive actuators as proportional (0–10 V) or three point control
– Oventrop electromotive actuators EIB or LON®

4 Measuring device for a quick regulation of the “Cocon” valves with measuring technic “eco”.

Four-port regulating valve “Cocon 4”

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The four-port regulating valve “Cocon 4” was specially constructed for heating and cooling systems as well as for the regulation of suspended or vertical Fan-Coil units. With the help of actuators, the valve controls the room temperature by changing the flow rate in the terminal unit (appliances as e.g. Fan-Coil installations, chilled ceiling modules or fan convectors). The flow volume in the distribution circuit remains almost constant.

The regulation of the flow volumes is carried out by use of the integrated, hidden, lateral, infinitely adjustable and reproducible presetting. The flow rate can be directly read off the flow-meter “OV-DMC 2” when connected to the two pressure test points.

The terminal unit may be isolated and the system may be drained, filled, bled and flushed with the help of the service tool (available separately).

The four-port regulating valve “Cocon 4” has a bronze body and EPDM or PTFE seals. The bonnet is made of brass resistant to dezincification and the stainless steel valve stems are equipped with a double O-ring seal.

The special advantage of this valve is that several individual components were combined in one group.

Further advantages:
– exact regulation of the flow volumes
– measurement of differential pressure and temperature of the terminal unit
– isolation and flushing of the terminal unit
– filling, draining and bleeding

For flow/bypass control, the valve with connection thread M 30 x 1.5 may be equipped with electrothermal or electromotive actuators.

The four-port regulating valve “Cocon 4” is available with three different kvs values:
– 0.45
– 1.0
– 1.8

Technical data:
Max. working pressure: 10 bar
Working temperature range: –10°C to +120°C
Max. differential pressure: 1 bar
Fluids: Water, ethylene glycol water mixtures and propylene glycol water mixtures (max. 50%)
ph value 6.5 to 10

1 Four-port regulating valve “Cocon 4” with measuring technic “classic”, male thread ½" with 15 mm compression fittings, both ports with mounted pressure test points and electrothermal actuator.

2 Four-port regulating valve “Cocon 4” with measuring technic “eco”, both ports with mounted pressure test points and drain valves, male thread ¾" for universal pipe connection.

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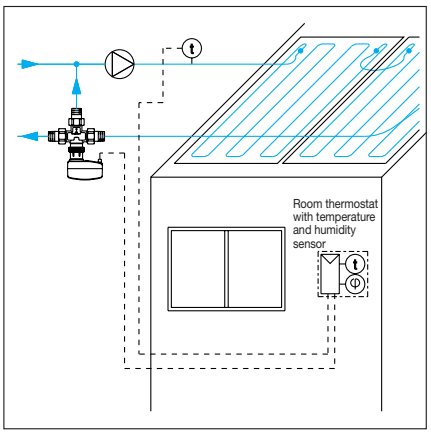

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1 Three-way diverting valve “Tri-D”, brass
Brass valve DN 15 with connection thread M 30 x 1.5 for use in heating and cooling systems, 3 x ¾" male threaded connection “Euro” cone for different pipes:

– threaded tailpipe
– solder tailpipe
– plug-in tailpipe
– compression fittings for copper, plastic and composition pipes

The valve is installed in the return pipe of chilled ceilings for the regulation of the flow temperature depending on the dew point temperature of the room. Adaptation of the flow temperature of the chilled ceiling without interrupting cooling operation. The installation not only of a temperature sensor in the supply pipe of the chilled ceiling but also of a sensor detecting the humidity of the room is required.

2 Three-way diverting valve “Tri-D plus” with T-piece DN 15 with connection thread M 30 x 1.5 for thermostats and actuators. Male threaded connection 4 x ¾" to the pipe for different tailpipes and compression fittings.

Application:

– chilled ceilings
– Fan-Coil units
– heating systems
– for mass flow distribution with additional possibility for room temperature control or dew point control e.g.

3 Three-way diverting valve “Tri-D”, bronze
Three-way mixing valve “Tri-M”, bronze
Flat sealing bronze valves sized DN 20, 25, 40 with connection thread M 30 x 1.5 for thermostats or actuators.

The valves are used in heating or cooling systems in which the volumes of flow are to be diverted, mixed or changed-over. They are frequently used for storage charging connections or in heating systems with two heat producers.

4 System illustration
Three-way diverting valve in a chilled ceiling e.g. with electromotive actuator with temperature sensor in the supply pipe.

5 Four-port mixing valve “Tri-M plus”
Regulating valve for heating and cooling systems as well as for the regulation of suspended and vertical Fan-Coil units.

Brass valve DN 15 with connection thread M 30 x 1.5 for thermostats and actuators. Flat sealing male threaded connection 4 x ½".
Technical data:
Max. working pressure: 10 bar
Max. differential pressure: 1 bar
Working temperature range: –10°C to +120°C
kvs values: 0.45/1.0/1.8

Regulating valve with reversed closing function

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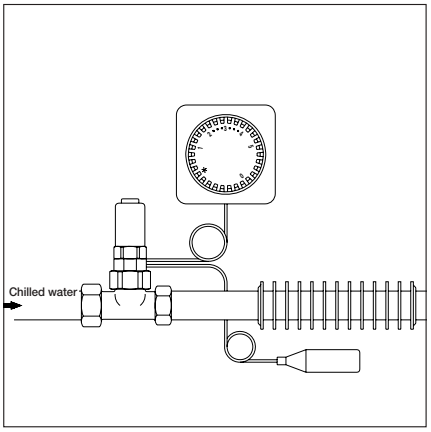

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1 “Series KT”

Valves for the regulation of Fan-Coil units and induction-coil appliances.

Oventrop thermostatic radiator valves for use in chilled water circuits are proportional regulators working without auxiliary energy. The room temperature is regulated by varying the chilled water flow. The valve opens with the temperature at the sensor rising.

Angle and straight pattern valves: DN 15 to DN 25

2 Thermostats

The thermostats with remote control “Uni LH” or the Oventrop remote control with additional remote sensor are used as regulators.

3 Example: Two pipe cooling system

Chilled water valves “Series KT” and thermostat with remote control “Uni LH” with additional remote sensor.

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1 Electrothermal actuators
with connection thread M 30 x 1.5

For room temperature control combined with two point controls, connection cable 1 m long.

Models:
– closed with current off 230 V
– closed with current off 24 V
– closed with current off 230 V with auxiliary switch
– 0–10 V

2 Electromotive actuators
with connection thread M 30 x 1.5

For room temperature combined with proportional (0–10 V) or three point controls. Installation in radiant and chilled ceiling systems as well as induction coil appliances.

Models:
– 24 V proportional actuator (0–10 V) with anti-blocking function
– 24 V three point actuator without anti-blocking function

3 Electromotive actuators with connection thread M 30 x 1.5 systems EIB and LON® with integrated bus coupling

The electromotive actuators are suitable for a direct connection to the European Installation Bus control system and the LonWorks® networks. The power absorption is extremely low, so that a separate power supply is not needed.

4 Room thermostat – clock 230 V and room thermostat 230 V and 24 V

Room temperature control and timed temperature setback by use of the room thermostat-clock or the room thermostat (via an external time switch) in combination with electrothermal actuators.

5 Electronic room thermostat 24 V

Is required when combined with an electromotive, proportional actuator for individual room temperature control. With one analogue outlet 0–10 V each for heating and cooling as well as adjustable neutral zone (0.5–7.5 K).

6 Dew point control 24 V

Is required in combination with room thermostats to protect the chilled ceilings against condensation.

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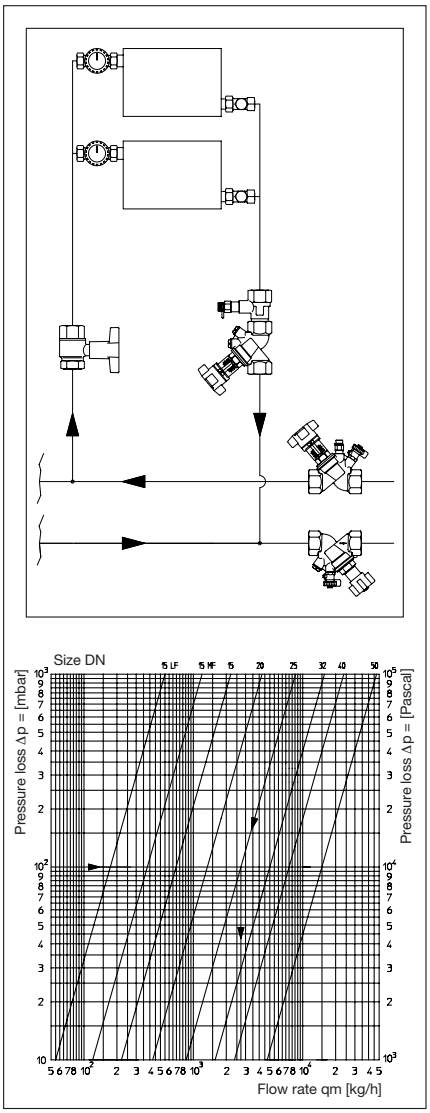

Design example

Required:	Flow value at the metering station
Given:	Differential pressure via the metering station = 100 mbar Size DN 25
Solution:	Flow value = 2750 kg/h (taken from chart for bronze metering station)

The measurement of the flow values and the hydronic regulation of parts of the system may also be carried out with the help of the metering stations. They are installed in the direction of flow in front of the “Hycocon”, "Hydrocontrol” or “Hydromat”.

Unlike the measuring technic at the double regulating and commissioning valves (“Hydrocontrol”), the pressure differences for the registration of the flow values are measured at invariable flow cross sections.

The metering stations use the same test point connection system as the “Hydrocontrol” valves.

When using the Oventrop flow-meter “OV-DMC 2”, in which the flow characteristic lines of the metering stations are stored, the simultaneous indication of the flow value on the display is possible when modifying the throttle cross section at the valve.

Flow values for Oventrop metering stations at 1 bar differential pressure are indicated on page 13.

1 Commissioning set “Hydroset”
Double regulating and commissioning valve with bronze metering station.
Sizes: DN 15–DN 50

2 Stainless steel or cast iron metering station for installation between flanges
Sizes: DN 65–DN 600

3 Commissioning set “Hydroset F”
Double regulating and commissioning valve with intermediate flange

4 Butterfly valve
With metering station for installation between flanges
Sizes: DN 32–DN 600

Further information can be found in the Oventrop catalogue “Products”, in the technical data sheets as well as on the internet, product ranges 3 and 5.

Subject to technical modification without notice.

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