STAP – NPT threads

Differential pressure controllers

DN 15-50, adjustable set-point and shut-off function

STAP – NPT threads

STAP is a high-performing differential pressure controller that keeps the differential pressure over the load constant. This delivers accurate and stable modulating control, ensures less risk of noise from control valves, and results in easy balancing and commissioning. STAP's unrivalled accuracy and compact size make it particularly suitable for use on the secondary side of heating and cooling systems.

Key features

> **Pressure relief cone**
Ensures accurate differential pressure control.

> **Adjustable set-point and shut-off function**
Delivers desired differential pressure ensuring accurate balancing. Shut-off function makes maintenance easy and straightforward.

> **Measuring points with drain option**
Simplifies the balancing procedure, and increases its accuracy.

Technical description

Application:
Heating and cooling systems.

Functions:
Differential pressure control
Adjustable Δp
Measuring point
Shut-off
Draining (accessory)

Dimensions:
DN 15-50

Pressure class:
PN 16

Max. differential pressure (ΔpV):
250 kPa

Setting range:
DN 15 - 20: 5* - 25 kPa
DN 32 - 40: 10* - 40 kPa
DN 15 - 25: 10* - 60 kPa
DN 32 - 50: 20* - 80 kPa
*) Delivery setting

Temperature:
Max. working temperature: 120°C
Min. working temperature: -20°C

Media:
Water or neutral fluids, water-glycol mixtures (0-57%).

Material:
Valve body: AMETAL®
Bonnet: AMETAL®
Cone: AMETAL®
Spindles: AMETAL®
O-rings: EDPM rubber
Membrane: HNBR rubber
Spring: Stainless steel
Spring support: AMETAL® and reinforced PPS
Handwheel: Polyamide

AMETAL® is the dezincification resistant alloy of IMI Hydronic Engineering.

Marking:
Body: IMI or TA, PN 16/150, DN, inch size and flow direction arrow.
Bonnet: STAP, Δp_L range in Ft H_2O and PSI.

Connection:
Pipe threads NPT according to ANSI/ASME B1.20.1-1983.
Complete thread according to ANSI B16.15-1985.

Operating instruction

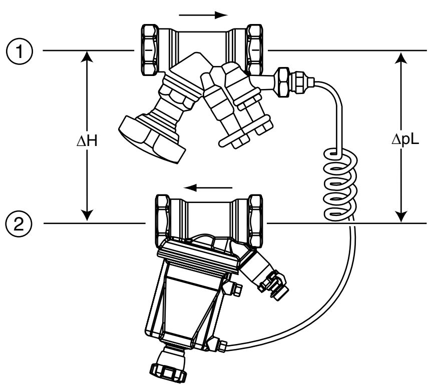
1. Setting ΔpL (3 mm allen key)
2. Shut-off
3. Connection capillary pipe
   Venting
   Connection measuring point STAP
4. Measuring point
5. Connection draining kit (accessory)

Measuring point
Remove the cover and then insert the probe through the self-sealing nipple.
Measuring point STAP (accessory) can be connected to the venting if the STAD valve is out of reach for measuring of differential pressure.

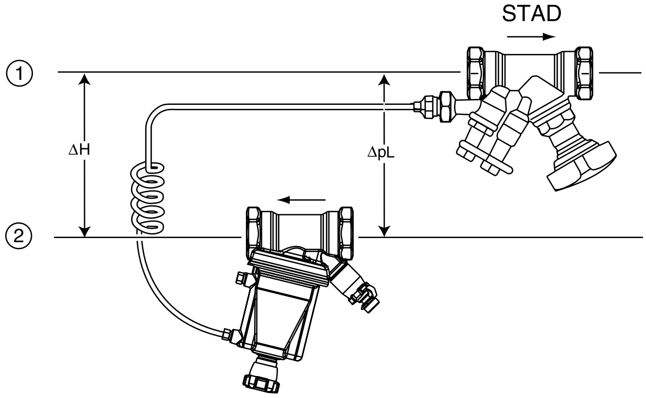
Drain
Draining kit available as accessory. Can be connected during operation.

Installation

With ΔpV STAD **excluded** from the load.
(Best suited for Application examples 1, 3, 4 and 5)



With ΔpV STAD **included** in the load.
(Best suited for Application example 2)



1. Inlet
2. Return

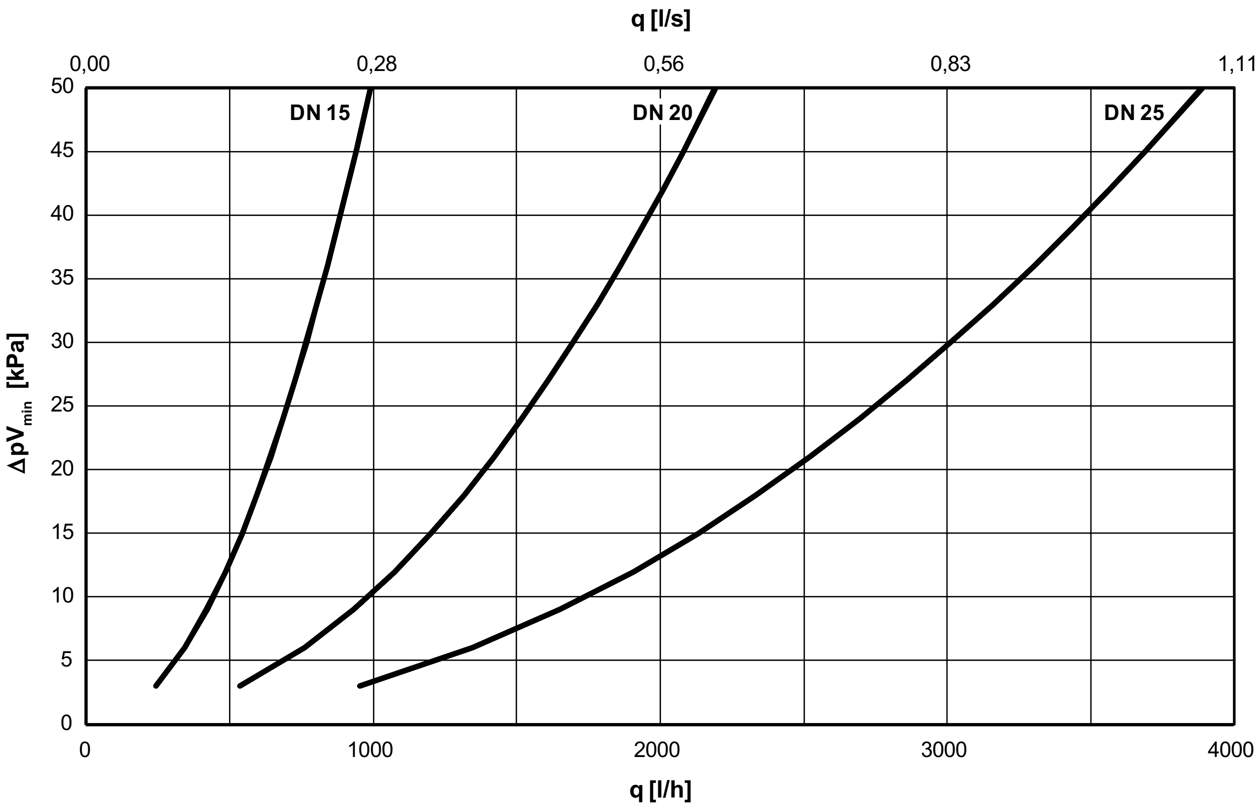
Note! The STAP must be placed in the return pipe and with correct flow direction.
To simplify installations in tight spaces, the bonnet can be detached.

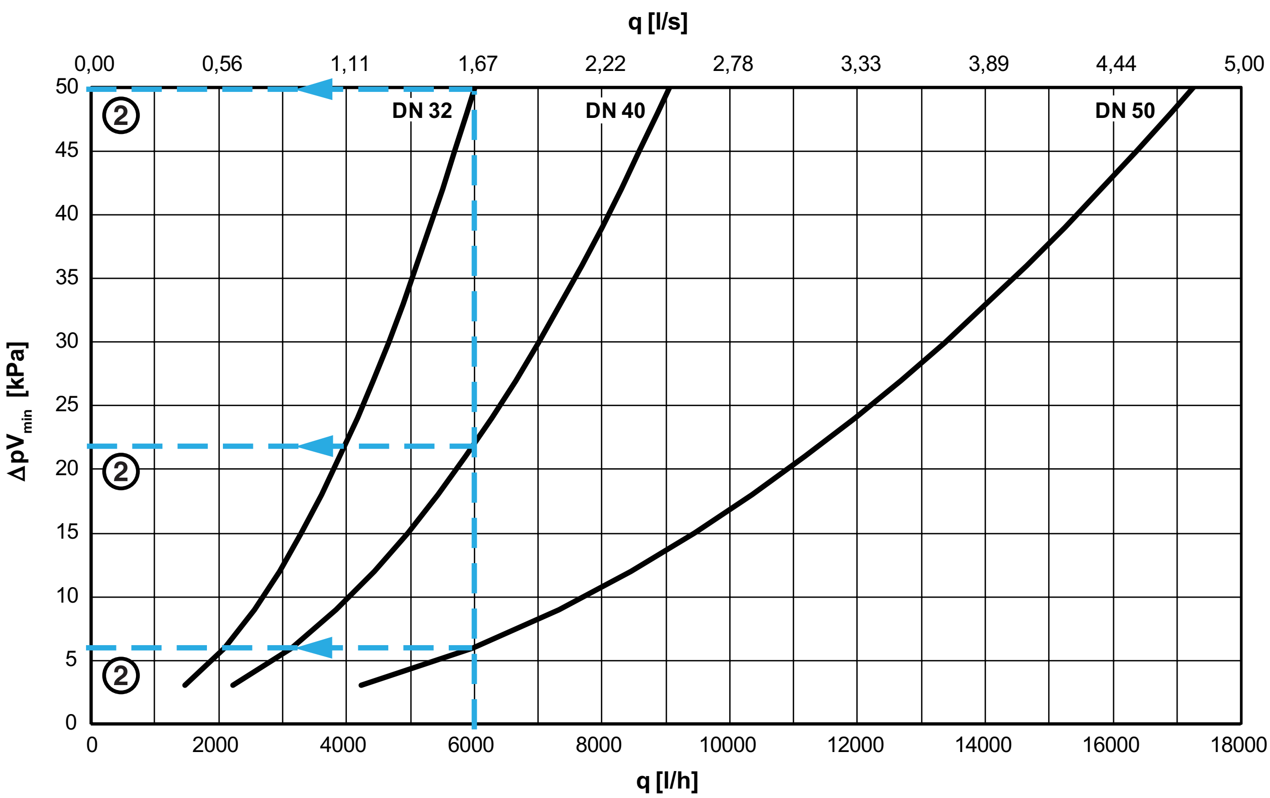
When extending the capillary pipe, use e.g. 6 mm copper pipe and extension kit (accessory). **Note!** The supplied capillary pipe must be included.

For further installation examples, see Handbook No 4 - Hydronic balancing with differential pressure controllers.
STAD – see catalogue leaflet “STAD” with NPT threads.

Sizing

The diagram shows the lowest pressure drop required for the STAP valve to be within its working range at different flows.





Example:
Design flow 6 000 l/h, ΔpL = 23 kPa and available differential pressure ΔH = 60 kPa.

1. Design flow (q) 6 000 l/h.

2. Read the pressure drop ΔpV_{min} from the diagram.

DN 32 ΔpV_{min} = 50 kPa
DN 40 ΔpV_{min} = 22 kPa
DN 50 ΔpV_{min} = 6 kPa

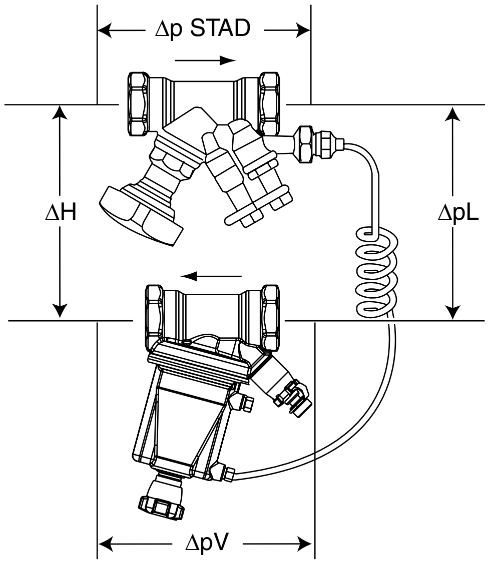
3. Check that the ΔpL is within the setting range for these sizes.

4. Calculate required available differential pressure ΔH_{min}.
At 6 000 l/h and fully open STAD the pressure drop is,
DN 32 = 18 kPa, DN 40 = 10 kPa and DN 50 = 3 kPa.

$$\Delta H_{min} = \Delta pV_{STAD} + \Delta pL + \Delta pV_{min}$$

DN 32: ΔH_{min} = 18 + 23 + 50 = 91 kPa
DN 40: ΔH_{min} = 10 + 23 + 22 = 55 kPa
DN 50: ΔH_{min} = 3 + 23 + 6 = 32 kPa

5. In order to optimise the control function of the STAP select the smallest possible valve, in this case DN 40.
(DN 32 is not suitable since ΔH_{min} = 91 kPa and available differential pressure 60 kPa only).



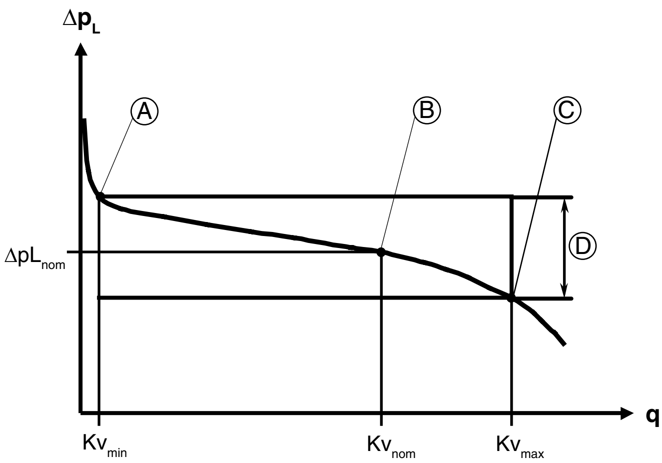
$$\Delta H = \Delta pV_{STAD} + \Delta pL + \Delta pV$$

IMI Hydronic Engineering recommends the software HySelect for calculating the STAP size. HySelect can be downloaded from www.imi-hydronic.com.

Working range

	Kv_{min}	Kv_{nom}	Kv_m	q_{max} [m³/h]
DN 15	0,07	1,0	1,4	1,0
DN 20	0,16	2,2	3,1	2,2
DN 25	0,28	3,8	5,5	3,9
DN 32	0,42	6,0	8,5	6,0
DN 40	0,64	9,0	12,8	9,1
DN 50	1,2	17,0	24,4	17,3

Kv_{min} = m³/h at a pressure drop of 1 bar and minimum opening corresponding to the p-band (+20% respectively +25%).
Kv_{nom} = m³/h at a pressure drop of 1 bar and opening corresponding to the middle of the p-band (ΔpL_{nom}).
Kv_m = m³/h at a pressure drop of 1 bar and maximum opening corresponding to the p-band (-20% respectively -25%).



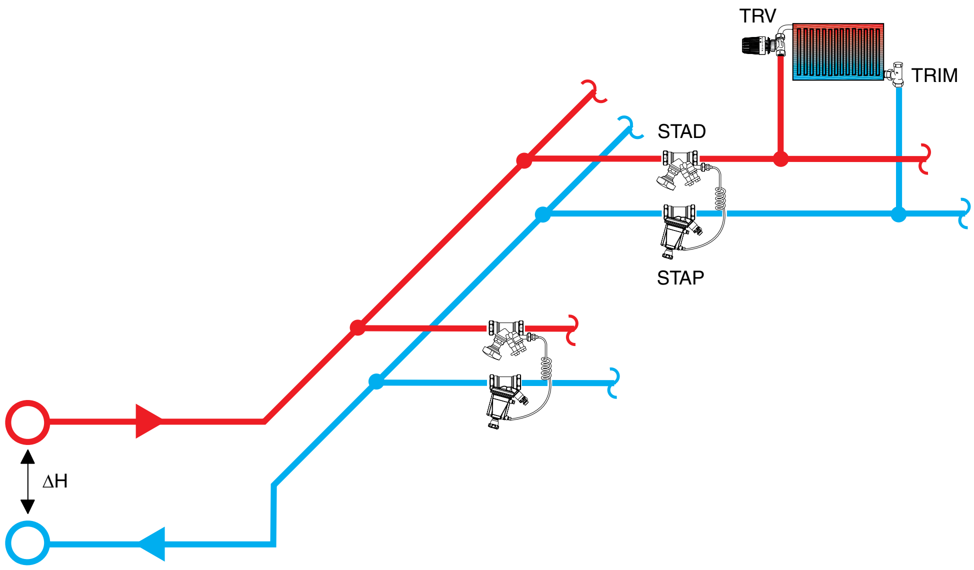
A. Kv_{min}
B. Kv_{nom} (Delivery setting)
C. Kv_m
D. Working range ΔpL_{nom} ±20%. STAP 5-25 and 10-40 kPa ±25%.

Note! The flow in the circuit is determined by its resistance, i.e. Kv_C:

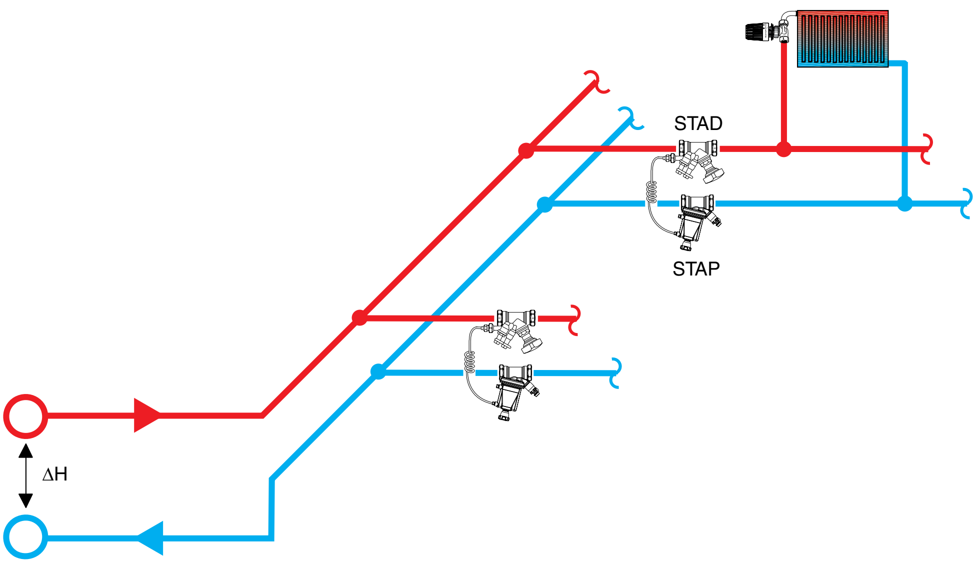
$$q_C = Kv_C \sqrt{\Delta pl}$$

Application examples

1. Stabilising the differential pressure across a circuit with presettable radiator valves
In plants equipped with presettable radiator valves (TRV), it is easy to get a good result. The presetting of the radiator valves limit the flow so that overflows do not occur. STAP limits the differential pressure and prevents noise.
- STAP stabilises ΔpL.
- The preset Kv-value of TRV limits the flow in each radiator.
- STAD is used for flow measuring, shut-off and connection of the capillary pipe.

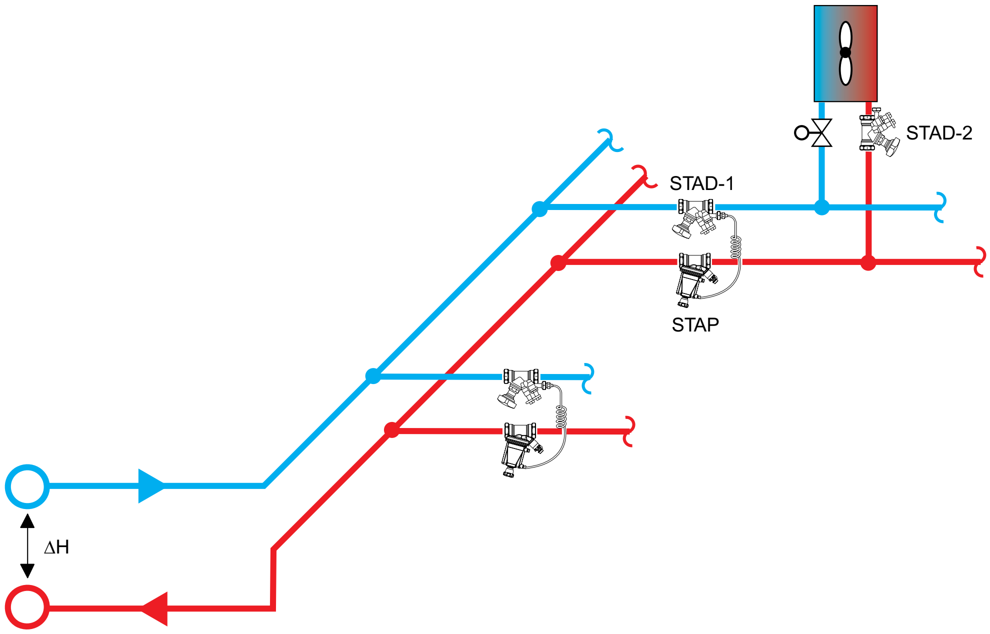


2. Stabilising the differential pressure across a circuit with non-presettable radiator valves
In plants equipped with non-presettable radiator valves it is not so easy to get an optimal result. Such radiator valves are common in older plants and will not limit the flow, which can be significantly too high in one or several circuits. Consequently, it is not enough that STAP limits the differential pressure across each circuit.
Letting STAP work together with STAD will solve the problem. STAD limits the flow to design value (using our balancing instrument to find the correct value). The correct distribution of the total flow between the radiators is however not achieved, but this solution can significantly improve a plant equipped with non-presettable radiator valves.
- STAP stabilises ΔpL.
- There is no presettable Kv-value on the radiator valve in order to limit the flow in each radiator.
- STAD limits the total flow in the circuit.



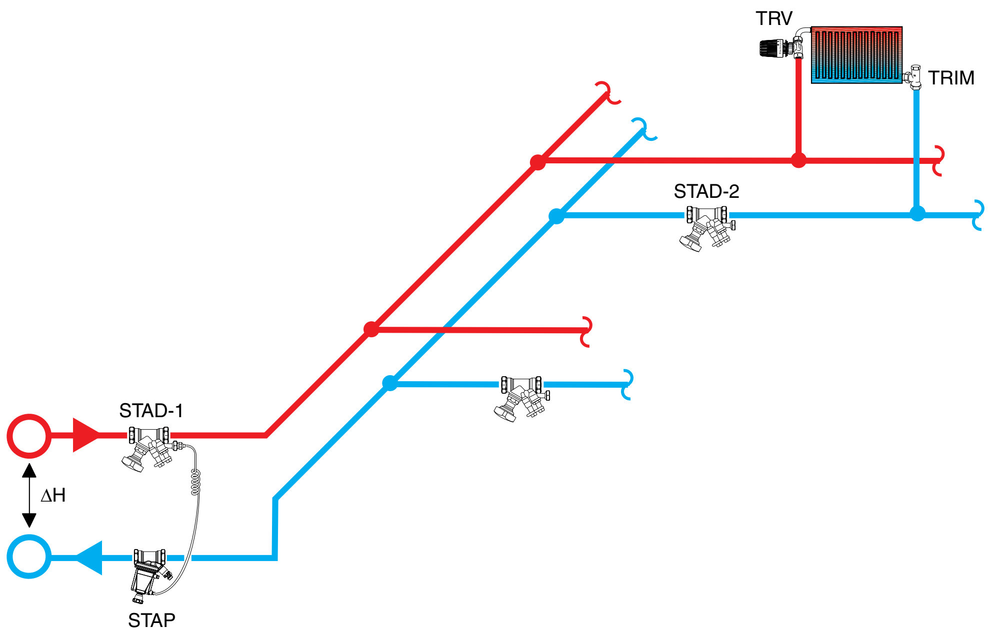
3. Stabilising the differential pressure across a circuit with control and balancing valves
When several small terminal units are close to one another, the differential pressure can be stabilised by using STAP in combination with STAD-1 across each circuit. STAD-2 for each terminal unit limits the flow and STAD-1 is used to measure the flow.

- STAP stabilises ΔpL.
- The set Kv-value in STAD-2 limits the flow in each terminal unit.
- STAD-1 is used for flow measuring, shut-off and connection of the capillary pipe.



4. Stabilising the differential pressure across a riser with balancing valves ("Modular valve method")
The "Modular valve method" is suitable when a plant is put into operation phase. Install one differential pressure controller on every riser, so that each STAP controls one module.
STAP keeps the differential pressure from the main pipe at a stable value out to the risers and circuits. STAD-2 downstream on the circuits guarantees that overflows do not occur. With STAP working as a modular valve, the whole plant does not need to be re-balanced when a new module is taken into operation. There is no need for balancing valves on the main pipes (except for diagnostic purposes), since the modular valves distribute the pressure out to the risers.

- STAP reduces a big and variable ΔH to a suitable and stable ΔpL.
- The set Kv-value in STAD-2 limits the flow in each circuit.
- STAD-1 is used for flow measuring, shut-off and connection of the capillary pipe.

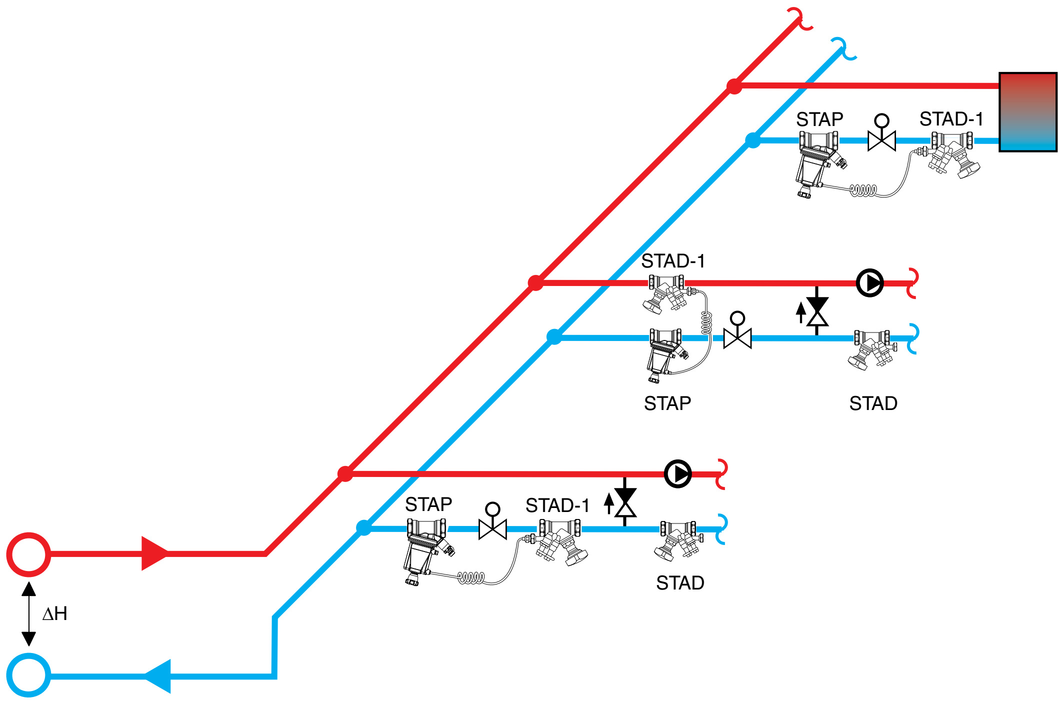


5. Keeping the differential pressure across a control valve constant

Depending of the design of the plant, the available differential pressure across some circuits can vary significantly with the load. To keep the correct control valve characteristic in such a case, the differential pressure across the control valves can be kept almost constant by a STAP connected directly across each control valve. The control valve will not be over-sized and the authority is and will remain close to 1.

If all control valves are combined with STAP, there is no need for other balancing valves, except for diagnostic purposes.

- STAP keeps Δp across the control valve constant, giving a valve authority ~ 1.
- The Kvs of the control valve and the chosen Δp gives the design flow.
- STAD-1 is used for flow measuring, shut-off and connection of the capillary pipe.

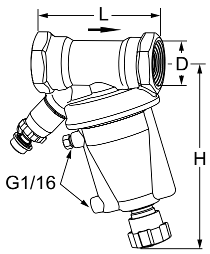


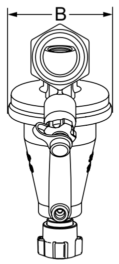
Sizing the control valve

A control valve should give a flow of 1000 l/h at a ΔH varying between 55 and 160 kPa.

- With a differential pressure of 10 kPa over the control valve, the Kvs will be 3,16.
- Control valves are normally available with Kvs-values according to the series 0,25 – 0,4 – 0,63 – 1,0 – 1,6 – 2,5 – 4,0 – 6,3 ……...
- Choose Kvs=2,5, which will give a Δp of 16 kPa. Since the STAP guarantees a high control valve authority, a low pressure drop over the control can be chosen. Therefore, choose the biggest Kvs value that gives a Δp above the minimum set point of STAP (i.e. 5, 10 or 20 kPa depending on size and type).
- Adjust STAP to give ΔpL = 16 kPa. Check the flow with TA balancing instrument over STAD-1 and with the control valve fully open.

Articles





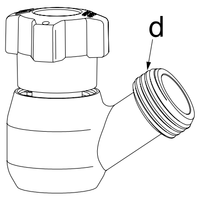
Female NPT threads
1 m capillary pipe and transition nipples UNS 1 1/16”x11,5 are included.

DN	(Size)	D	L	H	B	Kv_m	q_{max} [m³/h]	Kg	EAN	Article No
10-60 kPa										
15	1/2”	1/2-14 NPT	84	137	72	1,4	1,0	1,1	7318793957603	52 266-015
20	3/4”	3/4-14 NPT	91	139	72	3,1	2,2	1,2	7318793957702	52 266-020
25	1”	1-11.5 NPT	93	141	72	5,5	3,9	1,3	7318793957801	52 266-025
20-80 kPa										
32	1 1/4”	1 1/4-11.5 NPT	133	179	110	8,5	6,0	2,6	7318793957900	52 266-032
40	1 1/2”	1 1/2-11.5 NPT	135	181	110	12,8	9,1	2,9	7318793958006	52 266-040
50	2”	2-11.5 NPT	137	187	110	24,4	17,3	3,5	7318793958105	52 266-050

→ = Flow direction

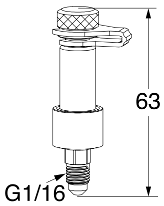
Kv_m = m³/h at a pressure drop of 1 bar and maximum opening corresponding to the p-band (-20% respectively -25%).

Accessories



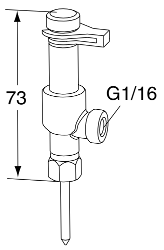
Draining kit STAP

d	EAN	Article No
G1/2	7318793660404	52 265-201
G3/4	7318793660503	52 265-202
UNS 1 1/16”x11.5	7318793959102	52 266-202



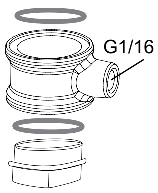
Measuring point STAP

EAN	Article No
7318793660602	52 265-205



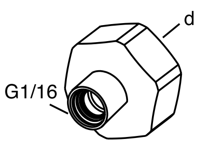
Measuring point, two-way
For connection of capillary pipe while permitting simultaneous use of our balancing instrument.

EAN	Article No
7318793784100	52 179-200



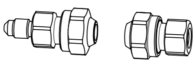
Connection sleeve kit for capillary pipe
For use on STAD or STS. Replacement of existing draining.

EAN	Article No
7318794027800	52 265-216



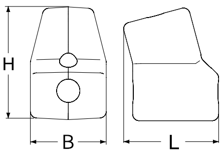
Transition nipple
For capillary pipe with G1/16 connection.

d	EAN	Article No
G1/2	7318793660206	52 179-981
G3/4	7318793660305	52 179-986



Extension kit for capillary pipe
Complete with connections for 6 mm pipe.

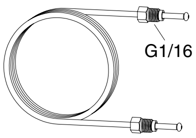
	EAN	Article No
6 mm	7318793781505	52 265-212



Insulation STAP
For heating/cooling

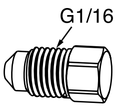
For DN	L	H	B	EAN	Article No
15-25	145	172	116	7318793658906	52 265-225
32-50	191	234	154	7318793659002	52 265-250

Spare parts



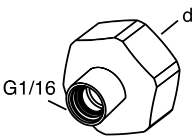
Capillary pipe

L	EAN	Article No
1 m	7318793661500	52 265-301



Plug
Venting

	EAN	Article No
	7318793661609	52 265-302



Transition nipple
For capillary pipe with G1/16 connection.

d	EAN	Article No
UNS 1 1/16x11.5	7318793959300	52 179-987