



TA-Smart Bringing data to life



Building optimization just got a lot smarter with TA-Smart. **Discover more**

TA-Smart

TA-Smart is a balancing and control valve designed for heating and cooling applications **constructed around 3 key principles:**



CONTROL

Versatility of valve control modes operating according to flow, power and valve position with outstanding controllability. A ΔT limitation function can be added to any of the control type, even in part-load system conditions.



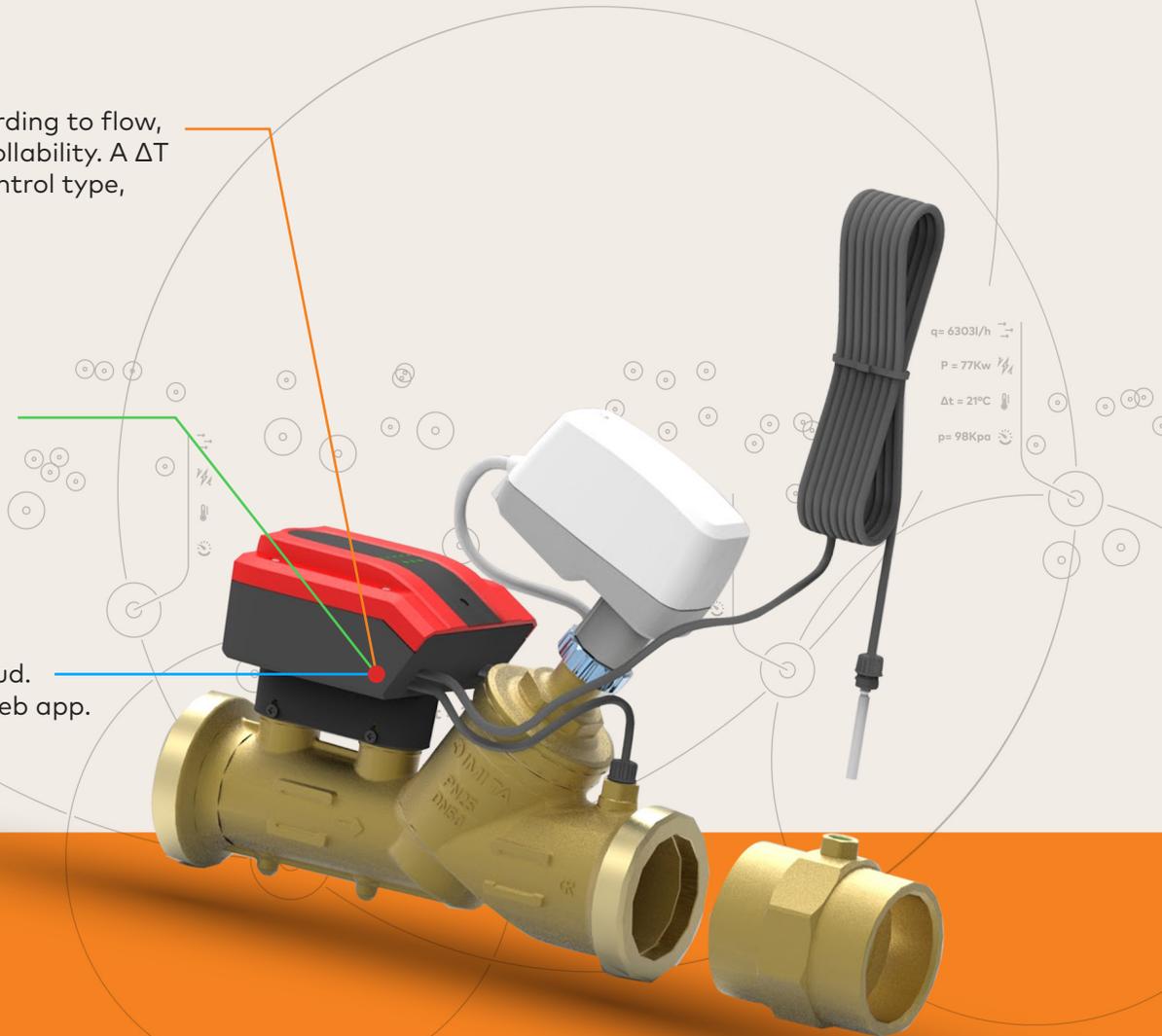
MEASUREMENT

Continuous measurement of flow, valve position, return/supply temperatures, temperature difference, power and energy.



COMMUNICATION

Communicates and stores: BLE, bus, Analog, Cloud.
Fully digitally configurable: Hytune mobile app, web app.



Why use TA-Smart?

To comply with European Regulations



The EU has set binding targets of at least 32.5% reduction in energy by 2030. The Energy Performance of Building Directives (EPBD) holds the new rules agreed by the EU to help address the burden of buildings in energy consumption and has as key objectives to decarbonize buildings, encourage more automation and smart control systems to improve building efficiency and measure the buildings' ability to adapt real system conditions.

The most notable provisions of the new EPBD include:

1. By 2025, Non-residential buildings with output greater than 290kW require **mandatory installation** (or retrofit) **than capable of:**
 - **Monitoring**, logging, analysis and allowing for adjustment of energy usage
 - **Detecting losses in efficiency** and informing opportunities for energetic improvements
 - Allowing for **communication** with connected building systems
2. Buildings equipped with BACS and **electronic monitoring** are exempted from inspections of HVAC systems.

For Green Certification Labels



BREEAM®



The number of new buildings certified is rising rapidly, since 1990, 550k buildings were certified, while today there are 2 million buildings in the pipeline for certification.

This peek means it is becoming absolutely expected for high-end buildings to hold a certification label. Most fortune 500 companies, tech giants and financial institutions will not rent spaces that are not certified.

The growing demands from tenants has an impact on the rest real estate. In fact, holding a building certification label allows building owners to increase their **rental fee by 18%** and seize better loan and investment opportunities from banks. In addition, certified buildings can **expect 21% premium on sales** transactions.

3 of the most known certification bodies, LEED, BREAM, HQE, request the installation of energy and power measurement points in the HVAC system as part of the certification criteria. These bodies claim that following such criteria helps decrease by 10-20% energy consumption while improving indoor comfort.

✓ TA-Smart supports EPBD measurement requirements without the need to install supports components. It seamlessly integrates circuit data for transparent monitoring and optimization of performance.

✓ TA-Smart fulfills measurement and energy monitoring requirements from certification labels without the need to install additional components.

Why use TA-Smart?

For HVAC monitoring



Buildings are responsible for 40% of the world's energy consumption and 36% of CO2 emissions. **HVAC systems account for 50%** of a building's energy usage, so **20% of the world's energy** consumption. So, optimizing the hydronic distribution is the most cost-efficient way to generate immediate and substantial savings; on average up to 30%.

Managing active system pressures and flow control are critical in achieving high quality indoor temperature, comfort and energy efficiencies in the system.

However, to apply such actions and ensure the optimal flow and power is being delivered to where is really needed, one must be able to measure how the system is actually behaving in order to reach conclusions that can provide tangible optimizations.

For precise indoor temperature that autonomously adapts



System control is critical for the delivery of indoor comfort and energy efficiency of the system. By correctly controlling the flow to a terminal unit we can control the right amount of power is delivered to ensure the right amount the heat/cooling transfer without wastage to ensure energy efficiency.

One of the challenges of good system control is ensuring the valve can control at low flows and when the system pressures are varying. Today's heating and cooling systems rarely operate under design conditions. In fact, in most European countries, systems operate under 20% of flow (50% of power) approximately 80% of the time. This highlights the importance of good valve control in low flow conditions, otherwise during most of the heating season your system won't be able to deliver the desired levels of power and therefore, temperature.

In addition, even minor deviations from set-point, as low as +/- 1°C, can affect the operation of critical applications. Therefore, precise temperature control is not a "nice to have", it is a must-have.

✓ TA-Smart offers continuous and highly accurate measurement of key circuit parameters: flow, difference in temperatures and power. All available on your smartphone at any moment, remotely to the reach of the bluetooth range, for transparent insights on how that part of the system is really operating. Performances, which can be compared to design conditions, and if needed fine-tuned with confidence.

✓ TA-Smart has an internal control feedback. It measures the flow that goes through it and the difference of temperatures to understand what power it is actually delivering, and communicates it to its own actuator, so it can adapt the power delivered to the room according to the input signal in a short time – full smart autonomous control! In addition, TA-Smart can control down to low flow to enable superior control of the system year round.

Valve Construction

SmartBox:
Analyzes flow and temperature measurement data into control signal for the actuator

Actuator:
Dynamically positions the Control-Part of the valve to maintain the desired flow/power or position

Secondary temperature sensor:
Measures the temperature of the media at the opposite side to TA-Smart (for ΔT calculation)

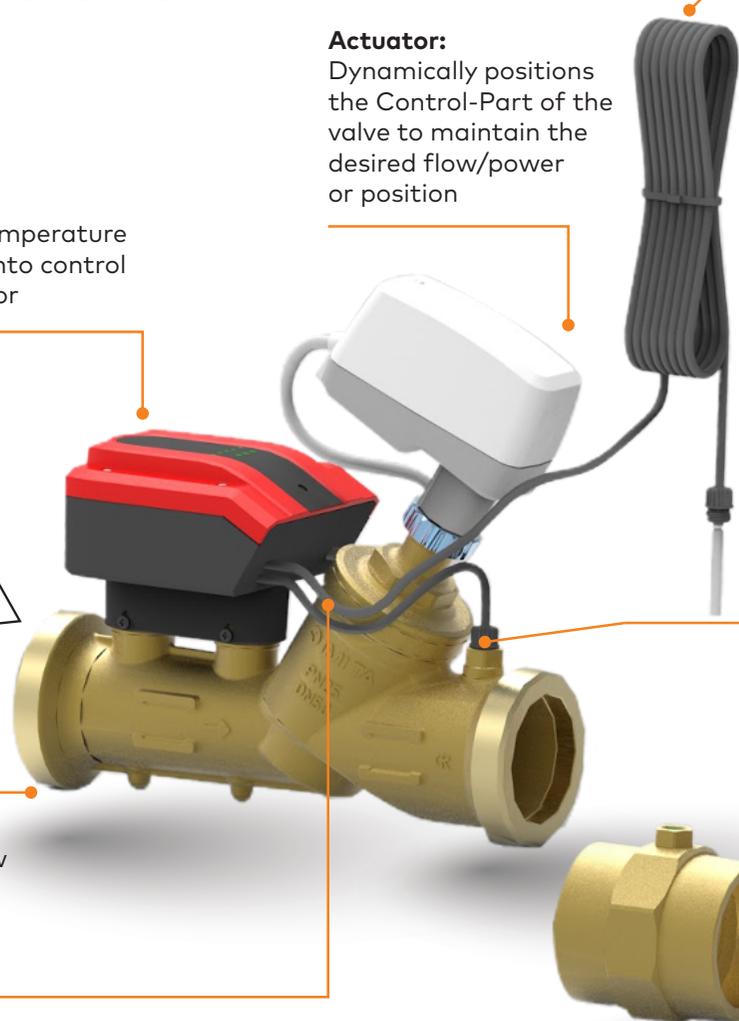
Primary temperature sensor:
Measures the temperature of the media inside the valve

DN32-50

Measuring section:
Contains the accurate flow measurement technology

Control-Part: High-rangeability equal-percentage plug & seat mechanism to variate the valve's Kv

External temperature housing:
Housing for secondary temperature sensor

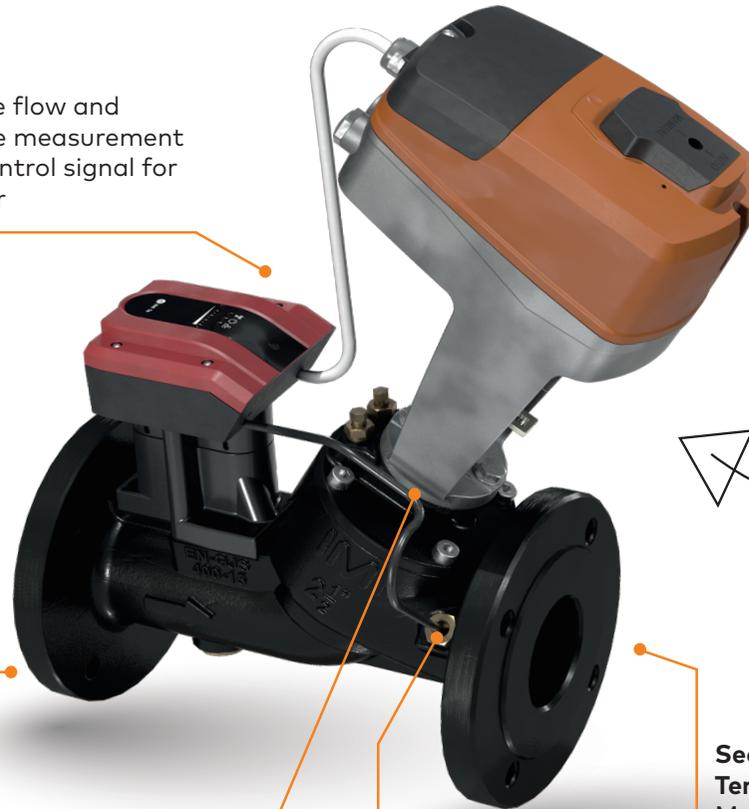


Valve Construction



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Contains the accurate flow measurement technology

Control-Part: High-rangeability equal-percentage plug and seat mechanism to variate the valve's Kv

Primary temperature sensor:
Measures the media temperature inside the valve

Secondary Temperature sensor
Measures the temperature of the media at the opposite side to TA-Smart (for ΔT calculation)

DN65-80

Key Features



5 YEAR
WARRANTY

- ✓ **Versatility of Control Modes**
Operating according to flow, power and valve position. A ΔT limitation can be added to any of the control modes.
- ✓ **Flow, Power, Energy and temperature measurement**
Highly accurate measurement of key circuit data
- ✓ **Wireless commissioning**
Valve configuration done via Smartphone app without cables or adaptors
- ✓ **High Controllability & Rangeability**
Best in class flow control and rangeability
- ✓ **Fast response time**
Accurate and fast response to input changes to achieve the desired set point
- ✓ **Reduced size & weight**
Compact size allows for seamless mounting capabilities, even in retrofit applications
- ✓ **Great installation flexibility & IP54**
Only 2 components required to be installed with minimal diameters required before the valve

3 Control Modes

Did you know?
 HVAC systems operate **80% of the time** at less than **50% of their design load**, representing less than **20% of flow**. TA-Smart's great control and measurement capabilities at low flow regimes allow you to achieve optimal indoor comfort all year round!

Bus or 0(2)-10VDC/0(4)-20mA

1

Flow control

2

Power control

3

Position control

* a ΔT limitation function can be added to any of the 3 control modes

Max. Flows

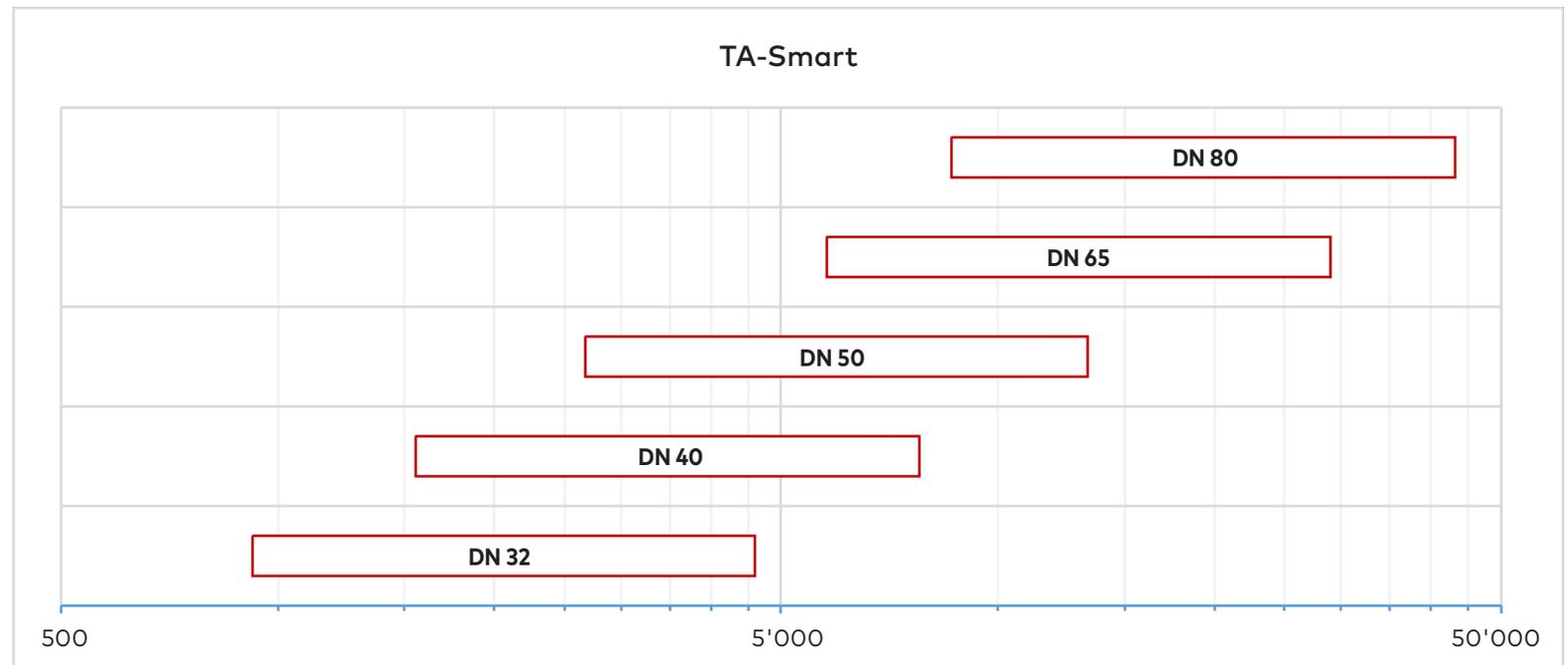
The maximum flows can be settable through lift limitation of the control valve. This corresponds to 20% of q_{nom}

Flow bar diagram



$q_{set.min}$

q_{nom}



Measuring & Logging

Functions:

- ▶ **Control** (flow, power, position)
- ▶ **Pre-setting** (max/min flow, max power, max/min position)
- ▶ **Reading** (flow, power, energy, return/supply temperature, ΔT , position)

Logging time-frame options:

- ▶ **Xtra Long Logging** (13 months, every 1 hour)
- ▶ **Long Logging** (31 days, every 1 minute)
- ▶ **Fast Logging** (7 days, every 15 seconds)
- ▶ **Xtra Fast Logging** (12 hours, every 5 seconds)

Measures:

ΔT , power & energy

Measures:

q, position and T_1

Measures:

T_2

BMS

BUS Comms

Analog Signal

MQTT

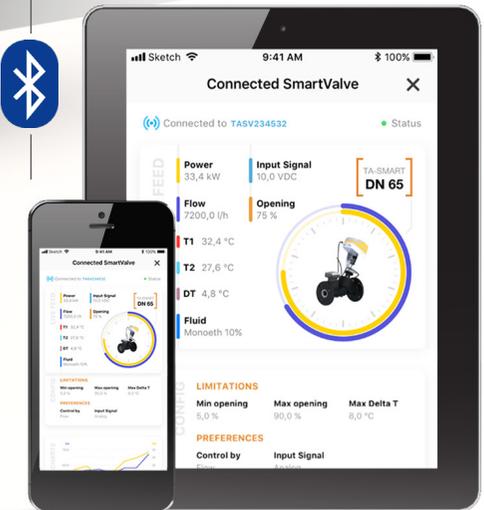
Stores:
q, p, ΔT & % Energy



GET IT ON
Google play

Available on the
App Store

HyTune app is available
on AppStore or GooglePlay





HyTune app is available on AppStore or GooglePlay



Communication & Configuration Modes



BLE 5.0 (BLE 4)

to smartphones and tablets (Android and iOS).
No laptop, no cable, no dongle needed



Analog

0(2)-10VDC/0(4)-20mA



Bus comms



BACnet MS/TP
Modbus RTU
BACnet IP
Modbus TCP
from/to BMS



MQTT

to and from Cloud



Thread wireless comm.

Between TA-Smart valves



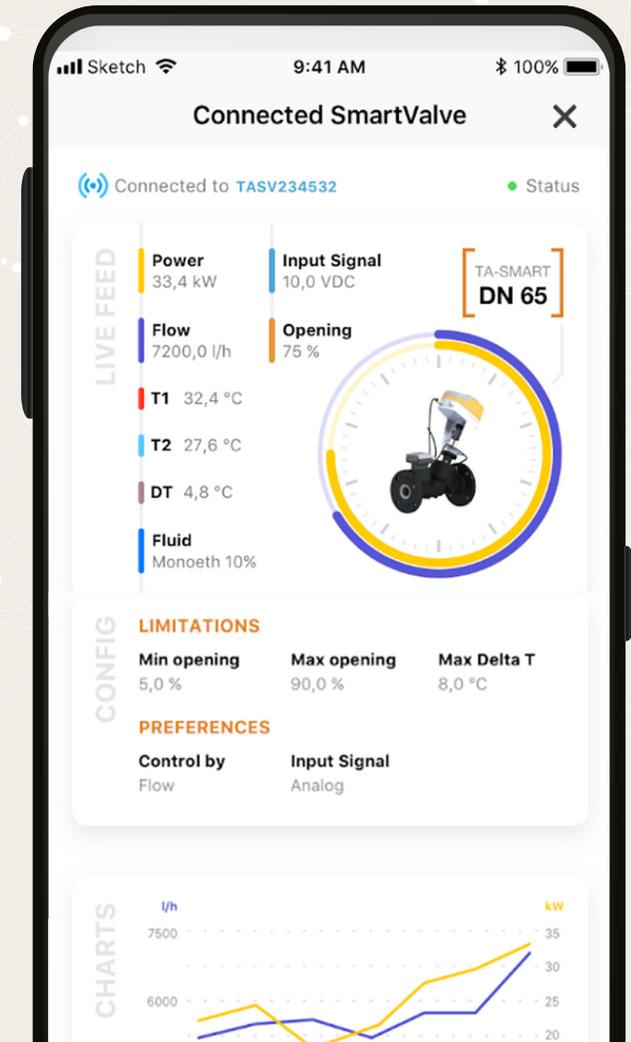
No requirements of additional hardware (cables or adaptors) for valve configuration increases flexibility and reduces commissioning & troubleshooting time.



Over the air upgrades for firmware, no cables necessary.



TA-Smart can be **integrated in all types of system**, and the thread wireless communication enables TA-Smart valves to interact with each other to improve the system.

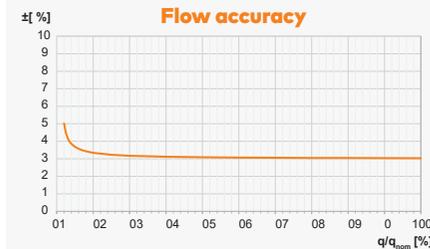


Measurement Accuracy

$$P = k * q * \Delta T$$

Flow measurement

TA-Smart uses Ultrasonic Flow measurement technology to guarantee **high accuracy of flow measurement** for all regimes at any temperature covering water-glycol mixtures up to 57%.



Accuracy measurement operates under the following flow conditions:
+/- 3% at the majority of the flow range

These accuracies are subject to the respect of required upstream straight pipe lengths (OD for TA-Smart DN 32-50 and 5D for TA-Smart DN 65-80)

Temperature measurement

TA-Smart uses **2 Pt1000 EN 60751** class AA **temperature sensors** which are pair-calibrated to provide improved accuracy even at low ΔT .

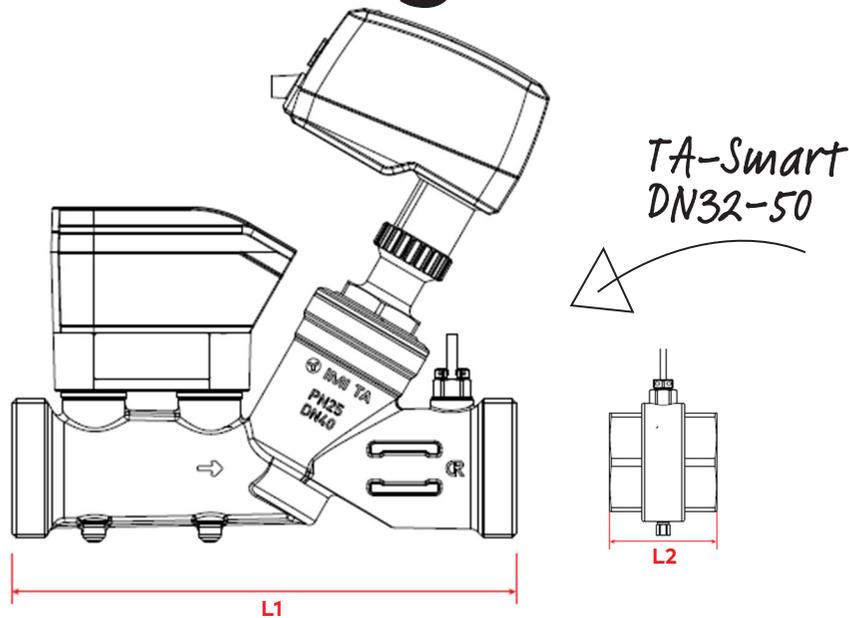
Temp. regime			TA-Smart	
Supply Temp. [°C]	Return Temp. [°C]	ΔT [K]	Accuracy [K]	Accuracy [%]
6	12	6	±0.06	1.1%
15	18	3	±0.03	1.2%
40	30	10	±0.08	0.8%
70	50	20	±0.17	0.9%

Power measurement

Leveraging accurate flow and temperature measurement, TA-Smart provides accurate power measurement in both heating and cooling applications.

Temp. regime			TA-Smart		
Supply Temp. [°C]	Return Temp. [°C]	ΔT [K]	Flow accuracy [%]	ΔT accuracy [%]	Power accuracy [%]
6	12	6	±3.0	±1.1	±4.1
15	18	3	±3.0	±1.2	±4.2
40	30	10	±3.0	±0.8	±3.8
70	50	20	±3.0	±0.9	±3.9

Reduced Size & Weight



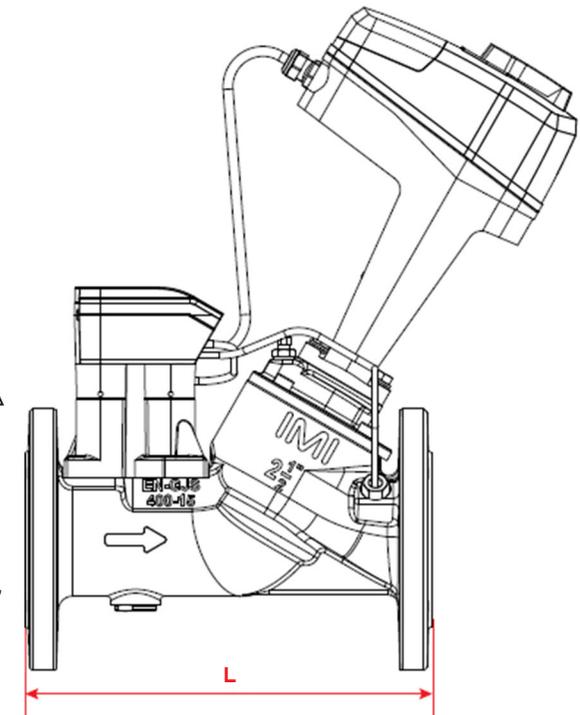
- Super compact size, the smallest of its kind
- Two bodies (only 4 fittings to achieve)
- OD requirement upstream

DN	D	L1 [mm]	L2 [mm]	H [mm]	W [mm]
32	G1 1/2	226	70	223	97
40	G2	232	70	227	97
50	G2 1/2	245	78	235	97

Very compact (80% smaller than competitors' product)

TA-Smart
DN65-80

- Ultra compact F1 length (Face-to-face length EN-558-1)
- Remote temperature sensor to be fitted separately



DN	D [mm]	No of bolts	L [mm]	H [mm]
65	185	4	290	377
80	200	8	310	380

Compact F1 length (31% smaller than competitor's product)

TA-Smart Applications

Types of Buildings

Where Certifications are requested

"I want a BREEAM/LEED certified building"

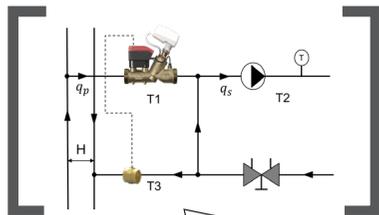
Where Energy Cost is paramount

"I want to know where the energy is going"

Where reliability is paramount

"Failure is not an option. I need to solve any problems quickly and effectively"

Application Types



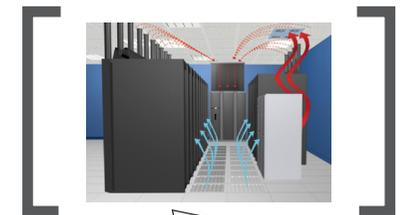
Secondary / Tertiary Circuit Control



Air Handling units



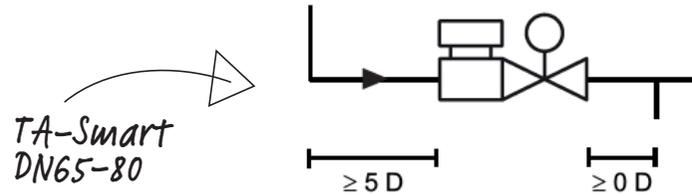
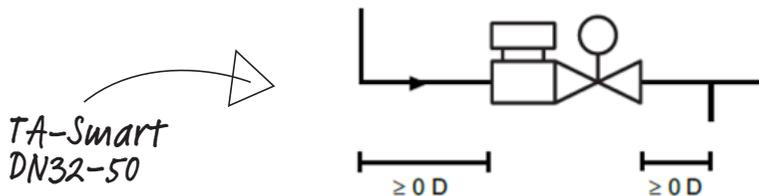
Heat Exchangers



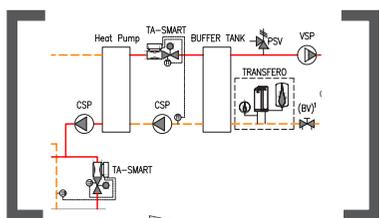
CRAC units

TA-Smart Applications

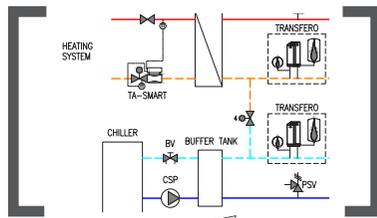
Installation Requirements



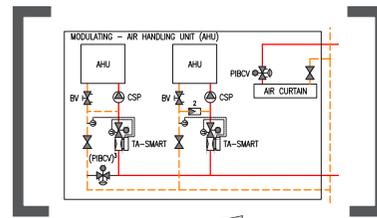
Application Types



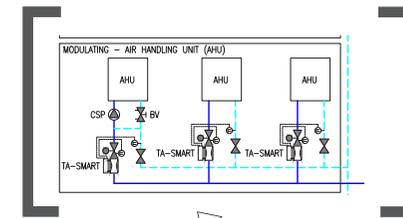
Heat Pumps



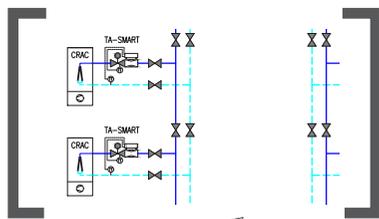
4-pipe system - variable flow



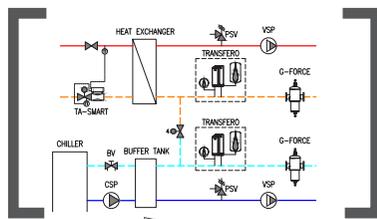
Heating system - variable flow



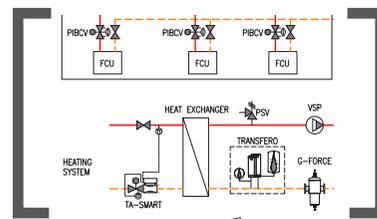
Cooling system - variable flow



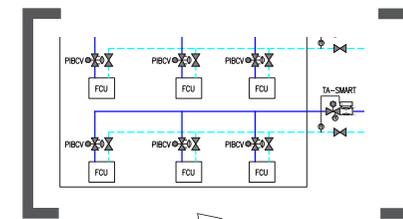
CRAC unit - variable flow



4-pipe system - zone valve



Heating system - zone valve



Cooling system - zone valve

Heat Pumps

Legend:

BV – Balancing valve

G-FORCE – Microbubble and dirt separator with Cyclonic technology

CSP – Constant speed pump

GGL – Geothermal ground loop

PIBCV – Pressure independent balancing and control valve

PSV – Safety valve

VSP – Variable speed pump

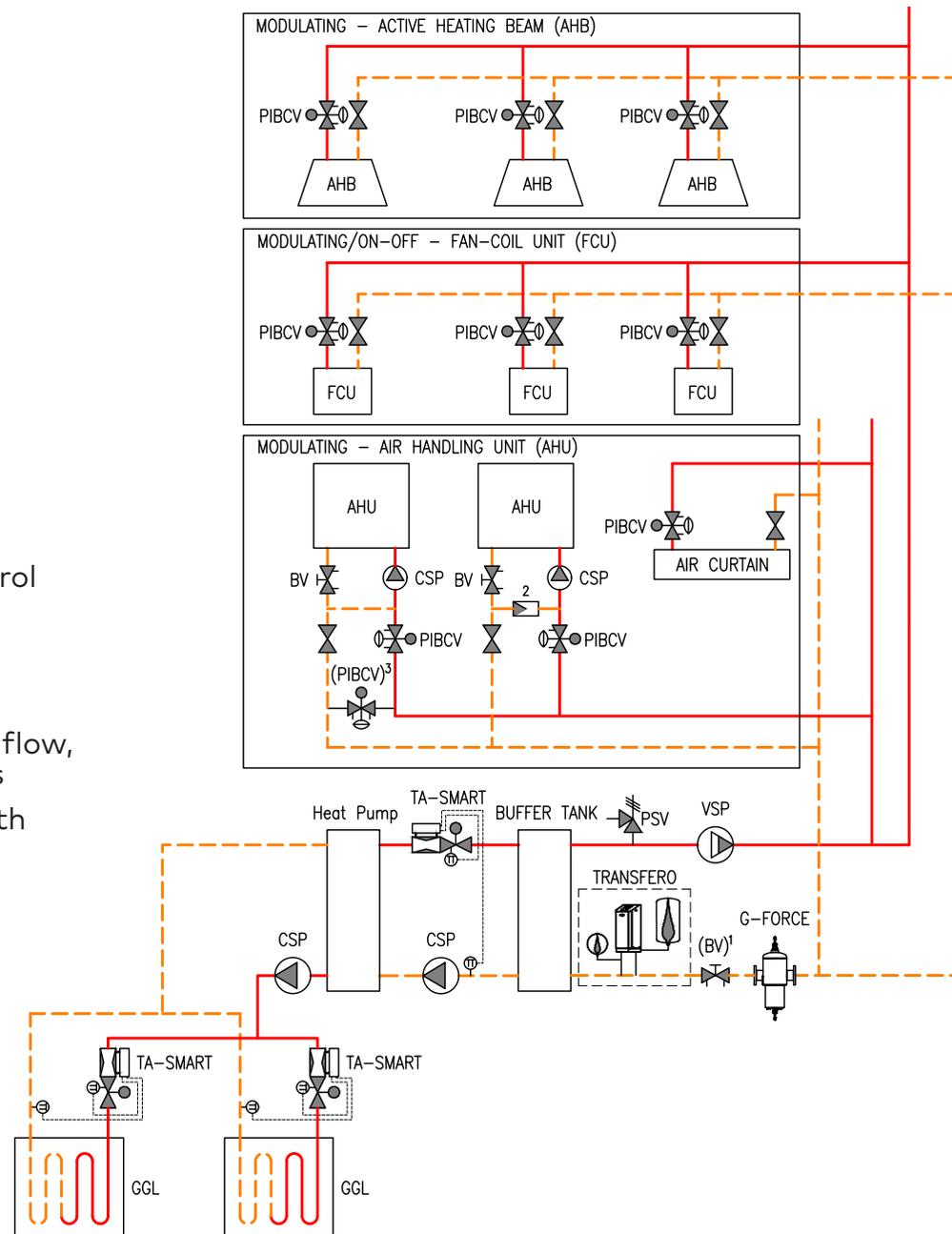
TA-SMART – 2-way balancing & control valve with flow, temperature and power measurement capabilities

TRANSFERO – Pump based pressurization unit with water make-up and vacuum degassing

1 Optional/recommended for flow measuring and system diagnostics.

2 Check valve is recommended to protect AHU against freezing up if secondary pump fails.

3 Optional/recommended for maintaining hot water in the supply pipe (without or with actuator that is opening when AHU control valve is fully closed).



4-pipe system - variable flow

Pressure independent balancing and control valves and 6-way valve

Legend:

BV – Balancing valve

G-FORCE – Microbubble and dirt separator with Cyclonic technology

CSP – Constant speed pump

PIBCV – Pressure independent balancing and control valve

PSV – Safety valve

6-WAY VALVE – Special valve to switch between heating and cooling

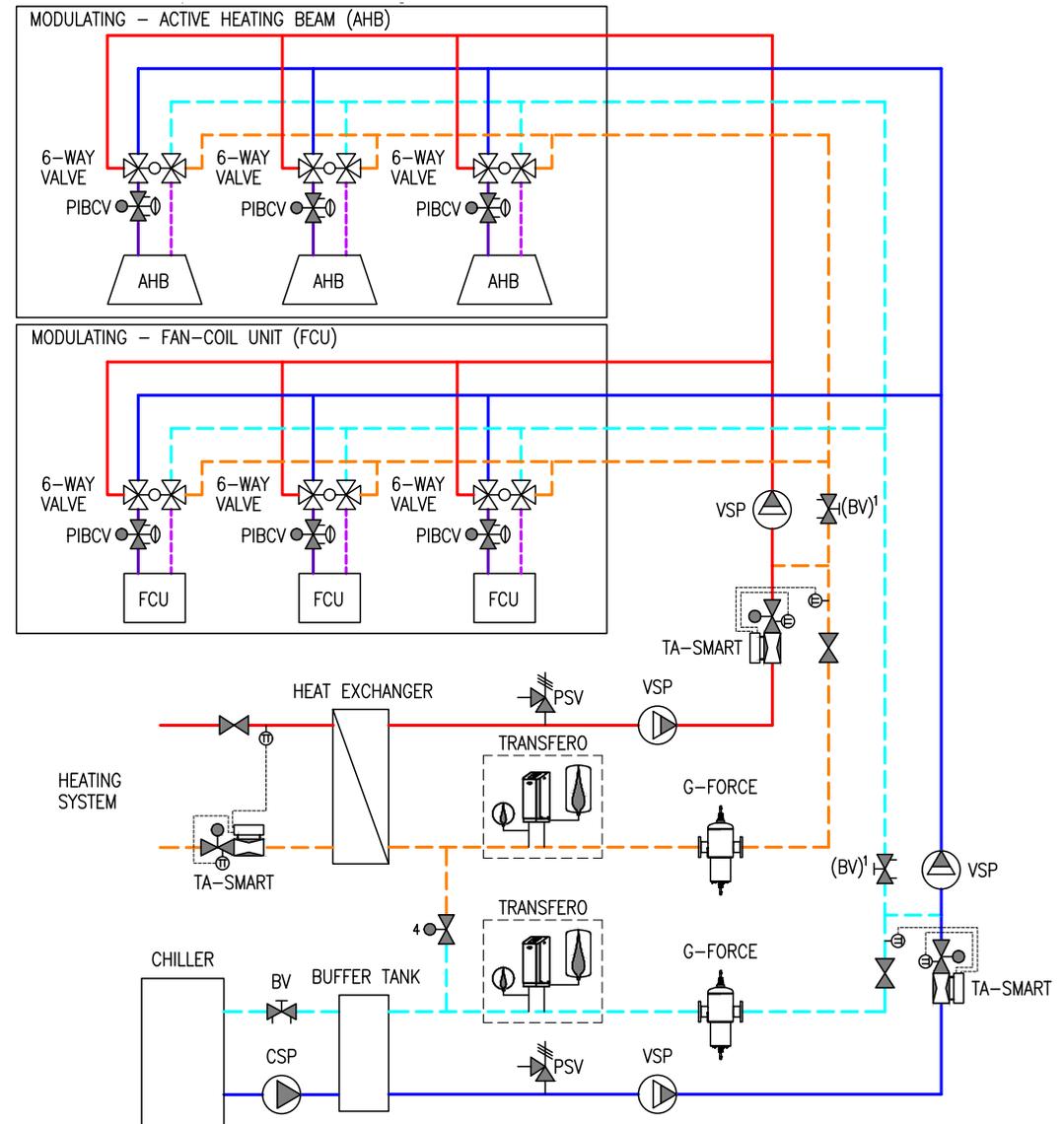
VSP – Variable speed pump

TA-SMART – 2-way balancing & control valve with flow, temperature and power measurement capabilities

TRANSFERO – Pump based pressurization unit with water make-up and vacuum degassing

1 Optional/recommended for flow measuring and system diagnostics.

4 System connection valve to compensate for volume. This ensures System connection valve to compensate for volume. This ensures automatic and economic volume compensation because of the naturally and inevitably volume transfer during the operation of changeover systems. Transfero Connect in heating and cooling system is recommended to operate the pressurisation units in Master Slave IO (isolated operation).



4-pipe system - with Zone measuring

Pressure independent balancing and control valves and 6-way valves with optional zone valve installation per circuit.

Legend:

BV – Balancing valve

G-FORCE – Microbubble and dirt separator with Cyclonic technology

CSP – Constant speed pump

PIBCV – Pressure independent balancing and control valve

PSV – Safety valve

6-WAY VALVE – Special valve to switch between heating and cooling

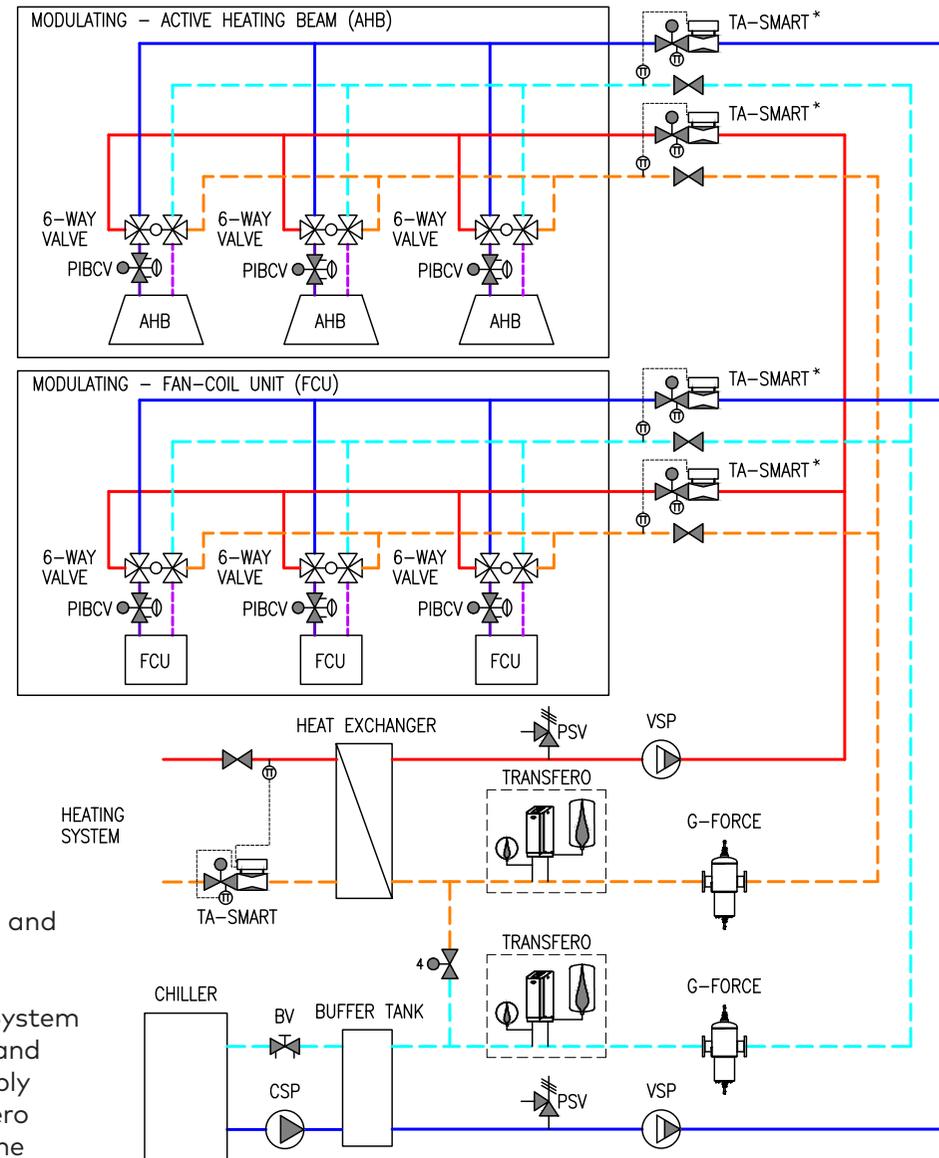
VSP – Variable speed pump

TA-SMART – 2-way balancing & control valve with flow, temperature and power measurement capabilities

TRANSFERO – Pump based pressurization unit with water make-up and vacuum degassing

* Optional use of TA-SMART providing additional isolation of a zone and providing metering opportunities for power and flow.

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Heating system - variable flow

Pressure independent balancing and control valves

Legend:

BV – Balancing valve

G-FORCE – Microbubble and dirt separator with Cyclonic technology

PIBCV – Pressure independent balancing and control valve

PSV – Safety valve

VSP – Variable speed pump

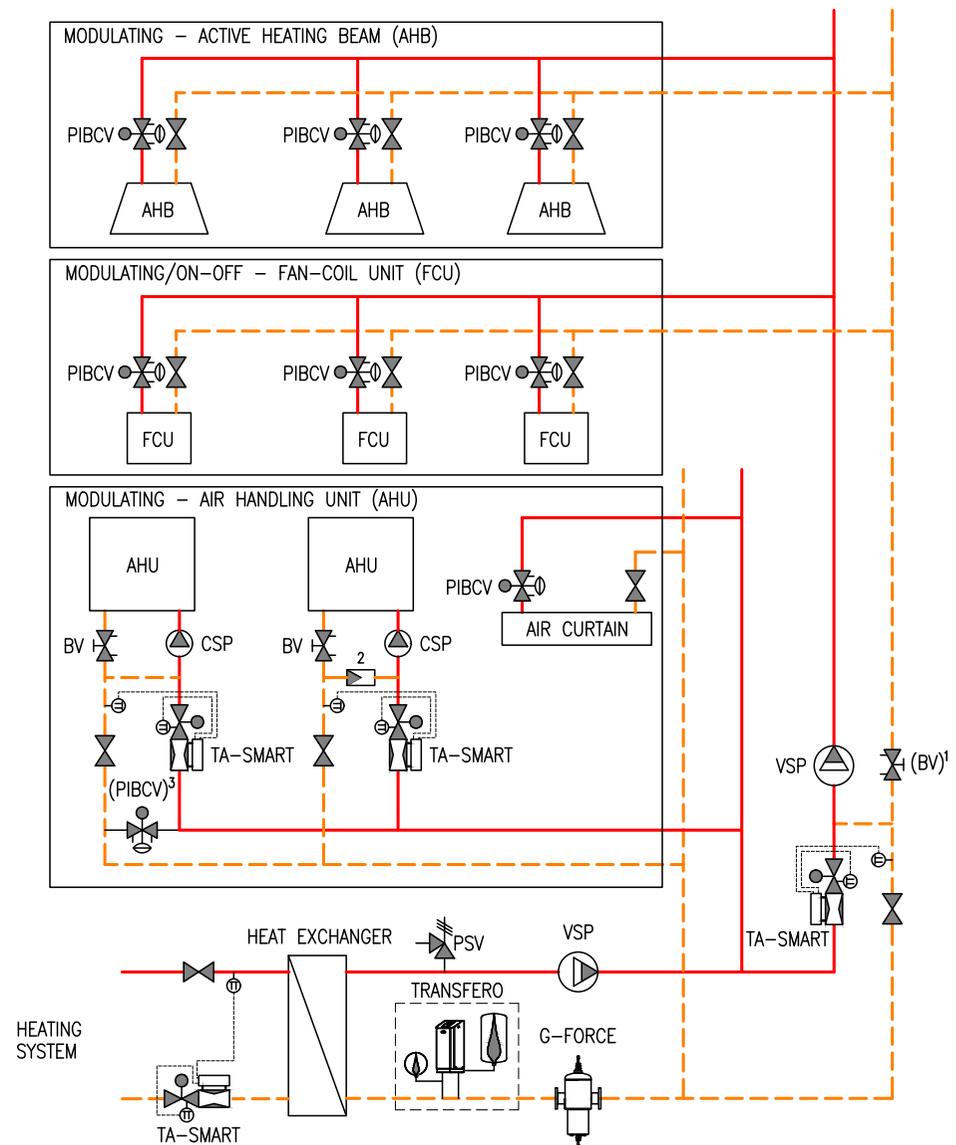
TA-SMART – 2-way balancing & control valve with flow, temperature and power measurement capabilities

TRANSFERO – Pump based pressurization unit with water make-up and vacuum degassing

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2 Check valve is recommended to protect AHU against freezing up if secondary pump fails.

3 Optional/recommended for maintaining hot water in the supply pipe. (without or with actuator that opens when AHU control valve is fully closed)



Heating system - with Zone measuring

Pressure independent balancing and control valves with optional zone valve installation per circuit.

Legend:

G-FORCE – Microbubble and dirt separator with Cyclonic technology

PIBCV – Pressure independent balancing and control valve

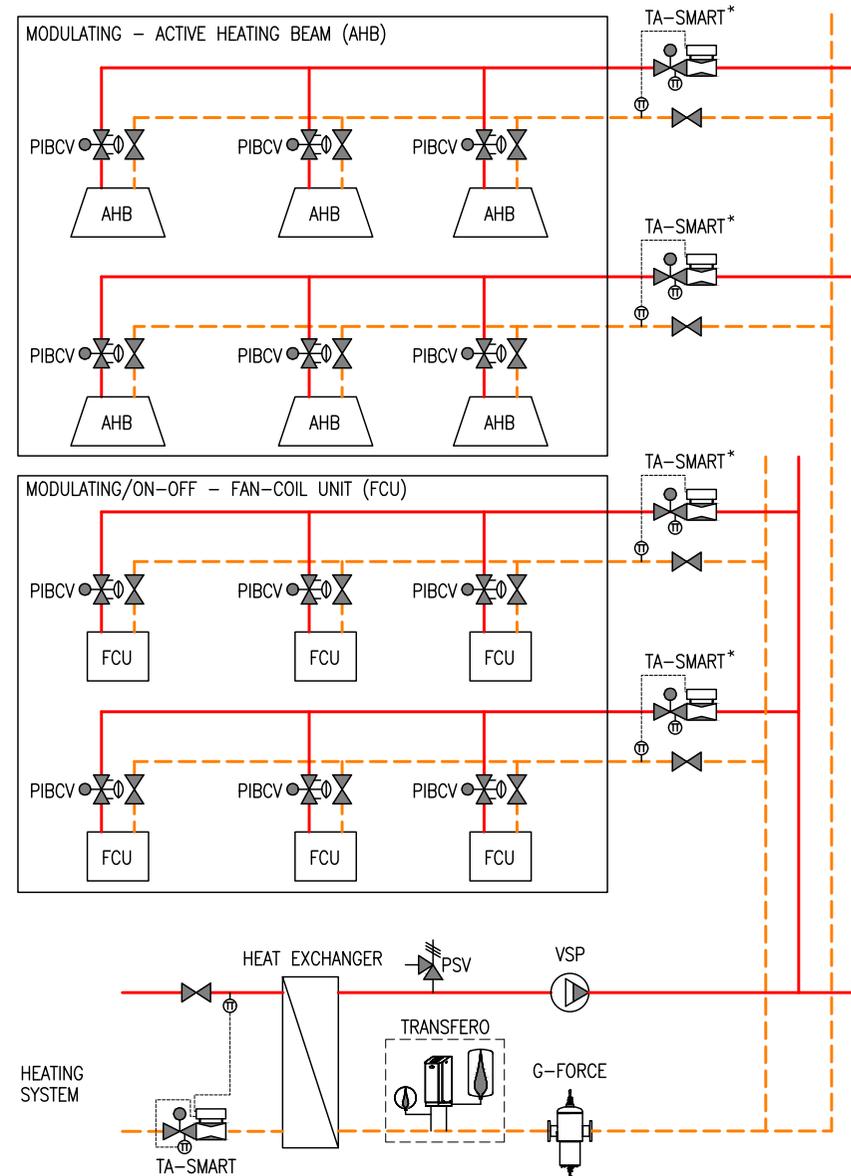
PSV – Safety valve

VSP – Variable speed pump

TA-SMART – 2-way balancing & control valve with flow, temperature and power measurement capabilities

TRANSFERO – Pump based pressurization unit with water make-up and vacuum degassing

* Optional use of TA-SMART providing additional isolation of a zone and providing metering opportunities for power and flow.



Cooling system - variable flow

Pressure independent balancing and control valves

Legend:

BV – Balancing valve

G-FORCE – Microbubble and dirt separator with Cyclonic technology

CSP – Constant speed pump

PIBCV – Pressure independent balancing and control valve

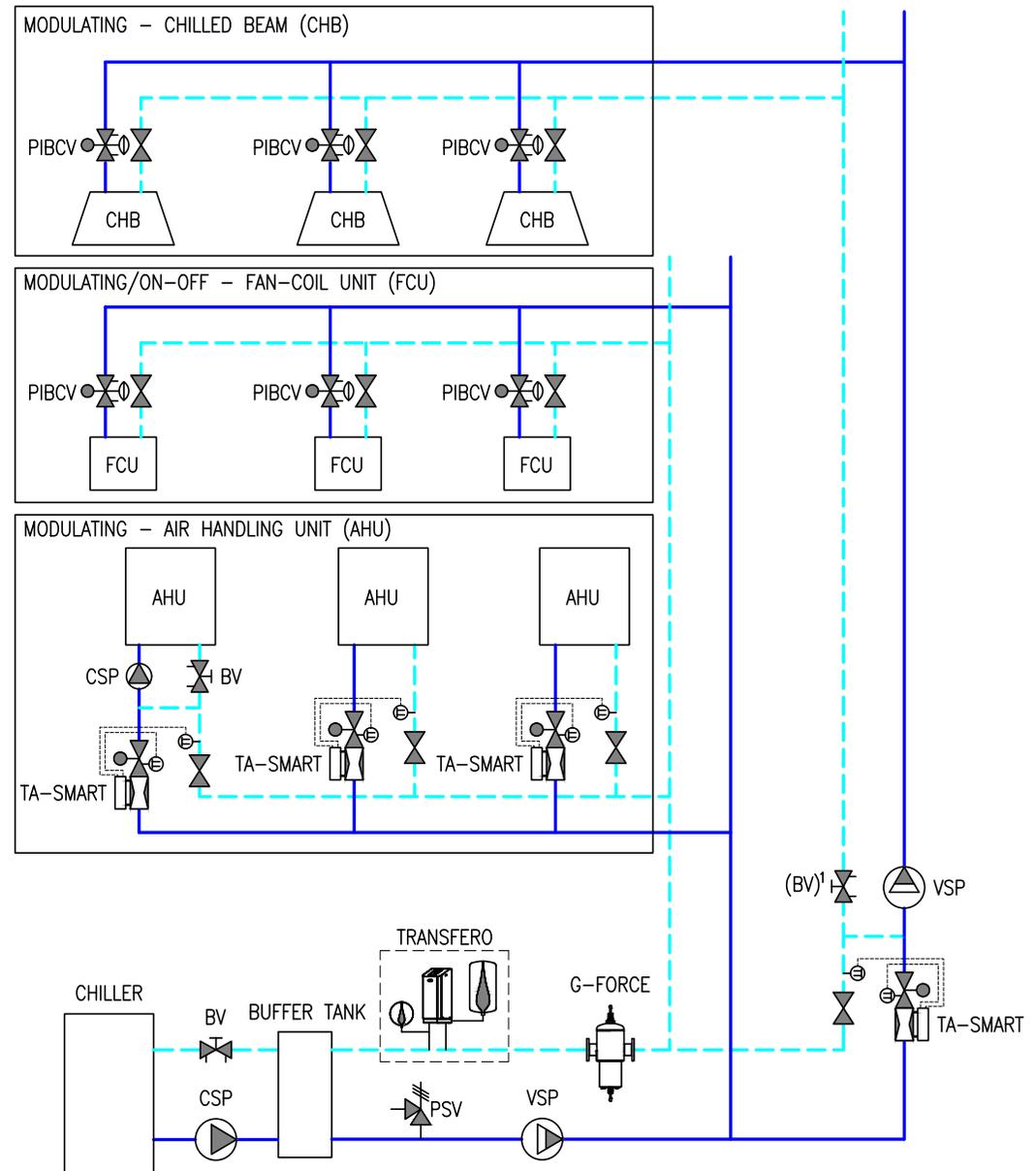
PSV – Safety valve

VSP – Variable speed pump

TA-SMART – 2-way balancing & control valve with flow, temperature and power measurement capabilities

TRANSFERO – Pump based pressurization unit with water make-up and vacuum degassing

1 Optional/recommended for flow measuring and system diagnostics.



Cooling system - with Zone measuring

Pressure independent balancing and control valves with optional zone valve installation per circuit.

Legend:

BV – Balancing valve

CSP – Constant speed pump

G-FORCE – Microbubble and dirt separator with Cyclonic technology

PIBCV – Pressure independent balancing and control valve

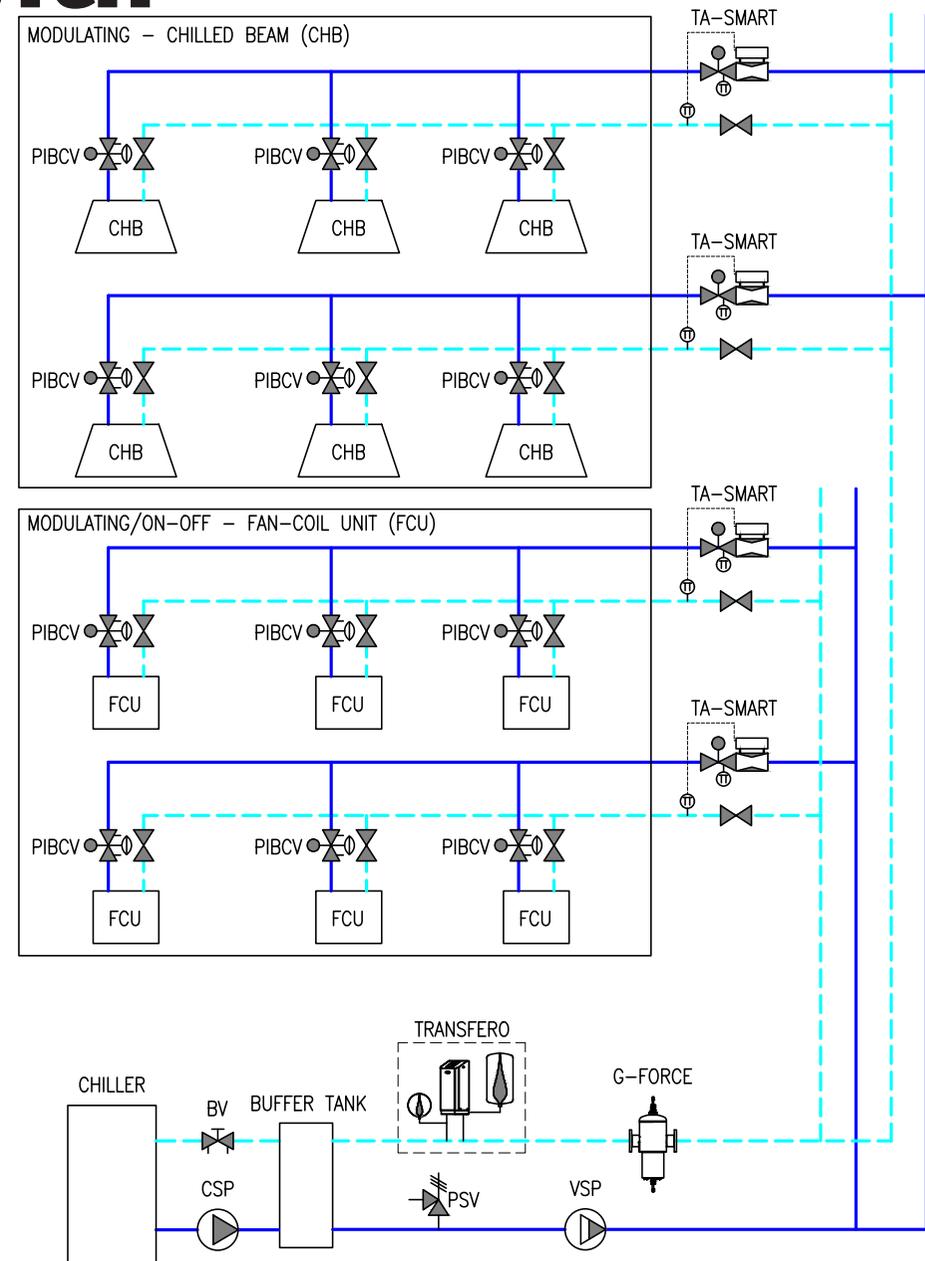
PSV – Safety valve

VSP – Variable speed pump

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TRANSFERO – Pump based pressurization unit with water make-up and vacuum degassing

* Optional use of TA-SMART providing additional isolation of a zone and providing metering opportunities for power and flow.



CRAC unit - variable flow

Balancing and control valves with flow measuring capabilities

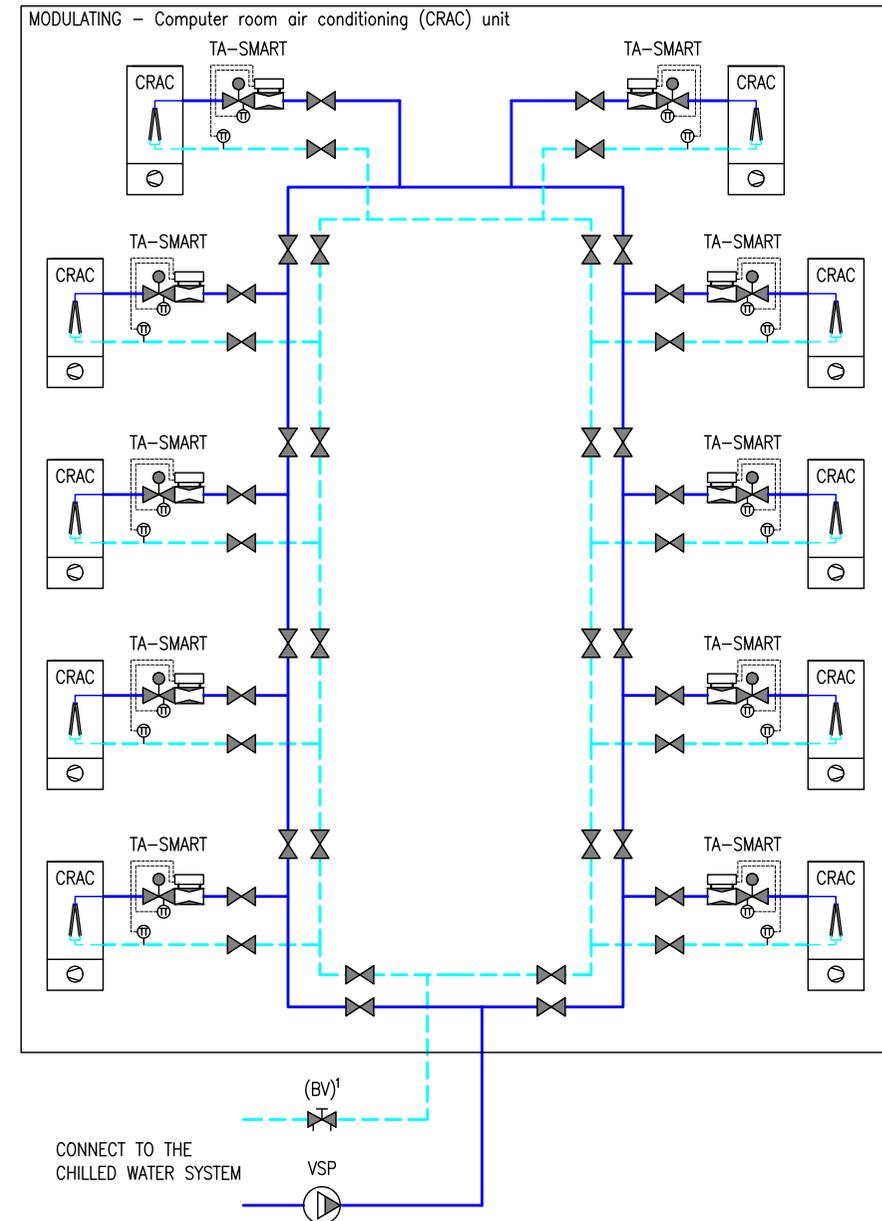
Legend:

BV – Balancing valve

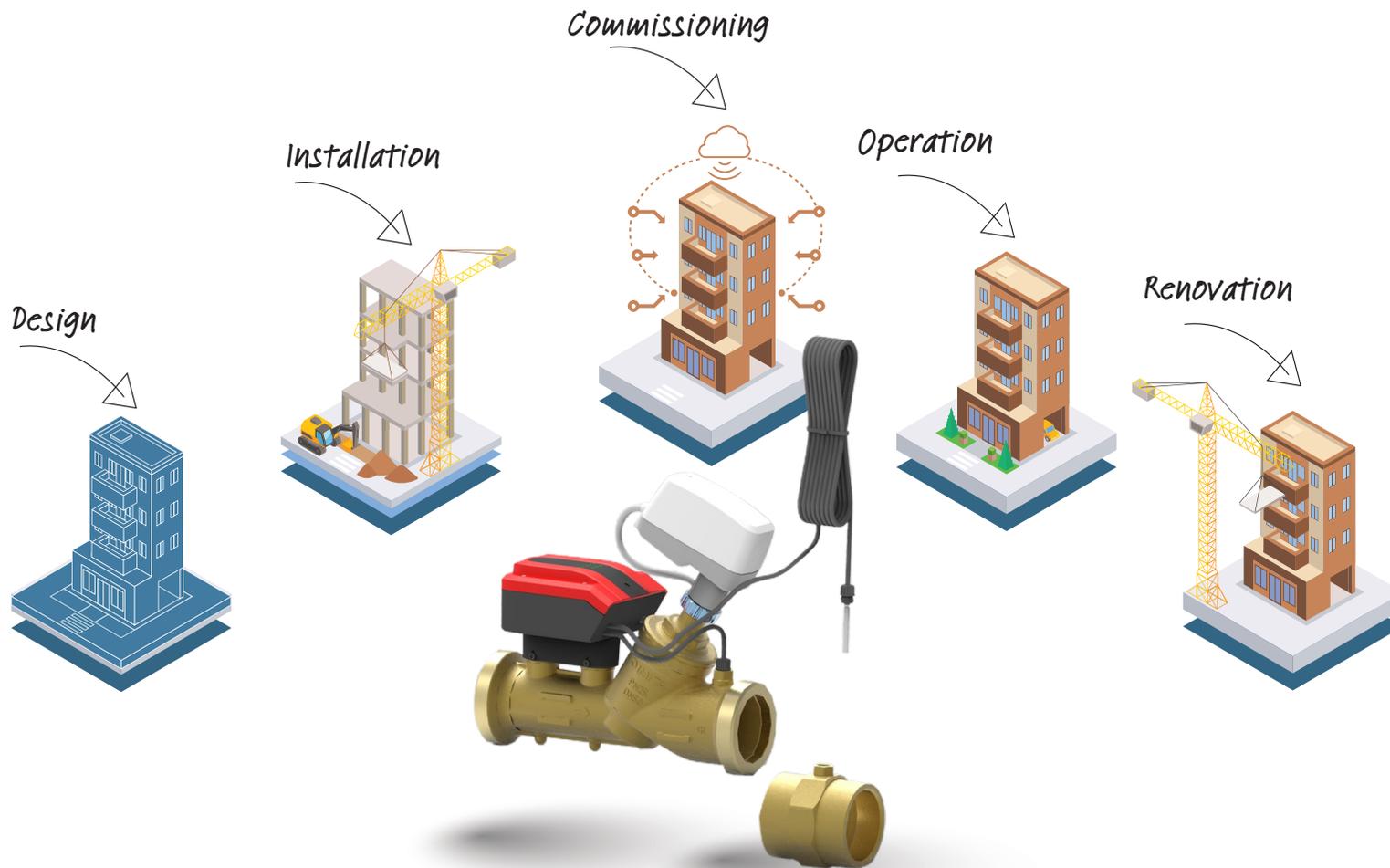
VSP – Variable speed pump

TA-SMART – 2-way balancing & control valve with flow, temperature and power measurement capabilities

1 Optional/recommended for flow measuring and system diagnostics.



Benefits at every stage



-  Time savings
-  Certifications
-  Peace of mind
-  Energy efficiency
-  Flexibility of use
-  Comfort

Design

Feature	Benefit
Compact Size	<ul style="list-style-type: none"> Fits into space restrictive spaces  <p>Time savings</p>
High Controllability & Rangeability	<ul style="list-style-type: none"> Great control function no matter the existing flow regime delivering comfort under all circumstances Energy savings (terminal units' efficiency, boilers' efficiencies, pump head optimization)  <p>Energy efficiency</p>  <p>Comfort</p>
Smart Control	<ul style="list-style-type: none"> Versatility of control modes, operating according to q, P and ΔT TA-Smart continuously measures the flow rate electronically and balances fluctuations in available differential pressure, with no need for time-consuming calculations The Dynamic balancing system is very energy efficient and ensures great indoor comfort, even under part-load conditions.  <p>Peace of mind</p>  <p>Energy efficiency</p>  <p>Comfort</p>  <p>Flexibility of use</p>
Integrated Control & Measuring function in 1 valve	<ul style="list-style-type: none"> No need to install additional components than a valve to meet both functions Helps meet green certification / regulation requirements for monitoring  <p>Time savings</p>  <p>Certifications</p>
Digital access to valve data	<ul style="list-style-type: none"> Full transparency of the valve settings and easy adjustments can be done at any time via remote access Fact-based analysis with verifiable hydronic performance at the end of the project, including energy-efficient operation Easy to identify and to correct potential system problems  <p>Peace of mind</p>  <p>Energy efficiency</p>

Installation

Feature	Benefit	
Compact Size	<ul style="list-style-type: none"> Fits into space restrictive spaces 	 <p>Time savings</p>
Integrated Control & Measuring function in 1 valve	<ul style="list-style-type: none"> No need to install additional components to a control valve to meet both functions 	 <p>Time savings</p>  <p>Flexibility of use</p>
Smart Control	<ul style="list-style-type: none"> Rely on automatic hydronic balancing as you would with a PIBCV. This self-optimizing dynamic valve balances fluctuations in available differential pressure and automatically balances the system without the need for complex calculation and or flow regulating valves 	 <p>Peace of mind</p>  <p>Energy efficiency</p>  <p>Comfort</p>
Valve construction	<ul style="list-style-type: none"> Only 2 components needed for installation. Valve and actuator comes pre-assembled. TA-Smart has been specially designed to be the easiest in the installation in the market Limited space needed before and after the valve No need to install union components to connect to the pipe 	 <p>Time savings</p>  <p>Flexibility of use</p>

Commissioning

Feature	Benefit
Smart Control	<ul style="list-style-type: none"> Rely on automatic hydronic balancing as you would with a PIBCV. This self-optimizing dynamic valve balances fluctuations in available differential pressure and automatically balances the system without the need for complex calculation and or flow regulating valves <div style="display: flex; justify-content: space-around; align-items: center;">  Peace of mind  Energy efficiency  Comfort  Flexibility of use </div>
Digital Configuration	<ul style="list-style-type: none"> No need of any additional device (laptop, dongle), cables or adaptors for commissioning, only your smartphone Ease & speed of commissioning, automatic mesh in between TA-Smarts <div style="display: flex; justify-content: space-around; align-items: center;">  Time savings  Peace of mind </div>
Versatility of communication	<ul style="list-style-type: none"> Flexibility and variability of communication protocols and free choice of control (BACnet, Modbus, Analog signal) <div style="display: flex; justify-content: space-around; align-items: center;">  Time savings  Flexibility of use </div>
System Insights on the cloud	<ul style="list-style-type: none"> All circuit data is available directly on your Smartphone app or seamlessly forwarded to the cloud to allow for full system transparency and data-based analysis. This lets you check and verify values at any time even remotely <div style="display: flex; justify-content: space-around; align-items: center;">  Peace of mind  Energy efficiency </div>

Operation

Feature	Benefit
Dynamic Operation	<ul style="list-style-type: none"> The valve dynamically compensates for available differential pressure fluctuations –for optimum room comfort as well as high energy and cost efficiency. Static valves cause pressure fluctuations resulting inconstant room temperatures. TA-Smart is a dynamic valve it balances pressure fluctuations and stabilizes the indoor climate. This is highly efficient and leads to significant reduction in energy use <div style="display: flex; justify-content: space-around; align-items: center;">  Peace of mind  Energy efficiency  Comfort  Flexibility of use </div>
Integrated Control & Measuring function in 1 valve	<ul style="list-style-type: none"> No need to install additional components than a valve to meet both functions <div style="display: flex; justify-content: space-around; align-items: center;">  Time savings  Certifications </div>
Transparent system insights	<ul style="list-style-type: none"> Digital access to valve data allows for full transparency on hydronic performance and fact-based analysis to easily verify hydronic performance, including energy-efficient operation and identify potential system problems Solve problems before they occur. TA-Smart continuously monitors values and records data. In case of irregularities, you can simply check where the problem is and correct it immediately. Even changes in building use or plant expansions are not a problem This is how you can guarantee smooth operation – consistently and in the long term <div style="display: flex; justify-content: space-around; align-items: center;">  Peace of mind  Energy efficiency </div>

Renovation

Feature	Benefit	
Compact Size & valve construction	<ul style="list-style-type: none"> • Ability to retrofit without requiring additional piping work • Fits into space restrictive spaces • No need to install union components to connect to the pipe 	 <p>Time savings</p>
Great controllability	<ul style="list-style-type: none"> • Great control function no matter the existing flow regime, even in low flow conditions • Fast response time and best in class adaptability to the existing system conditions to deliver precise indoor comfort 	 <p>Energy efficiency</p>
Integrated Control & Measuring function in 1 valve	<ul style="list-style-type: none"> • No need to install additional components to a control valve to meet both functions • Helps meet green certification / regulation requirements for energy monitoring 	 <p>Flexibility of use</p>  <p>Certifications</p>

Breakthrough Engineering

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 **IMI TA**

 **IMI HEIMEIER**