

Belimo sensors and meters





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Sensors by Belimo. The perfect complement to actuators and valves.



The sensors and thermal energy meters from Belimo meet the highest quality and reliability requirements. Using innovative technology ensures easy installation and seamless compatibility with all essential building automation systems.

Belimo offers a full product range of sensors for measuring temperature, humidity, pressure, CO_2 , volatile organic compounds (VOC) and flow in pipe, duct and outdoor applications. The new room sensors, room operating units and energy meters are the perfect addition to the existing sensor product range. All products are backed by worldclass service and support.



Seamlessly integrated, reliable and intuitive.

Belimo sensors are the result of years of experience and HVAC expertise as well as our continuous focus on providing added value to our customers. The innovative design offers easy installation and seamless integration to ensure optimal system performance.



Seamless

Utilising innovative technology, sensors are designed to work with all major building automation systems ensuring optimised solutions in terms of performance and energy efficiency.



Reliable

The well-known high quality of Belimo guarantees reliable and accurate measured values over the complete life cycle of the building. The highly resistant sensors also carry a 5-year warranty and meet IP65/NEMA 4X requirements.



Intuitive

Installation and commissioning only take a few steps thanks to the well thought out design. The removable mounting plate also serves as a drilling template. Thanks to the specially designed snap-on cover and removable spring loaded terminal blocks, mounting is possible with hardly any tools. "We have been working together with Belimo for many years, because the quality of the products and the exceptional customer service have convinced us. In addition to the proven actuators and valves, Belimo also offers a well coordinated and continuously growing sensor product range."

Meinrad Oberholzer, Systems Integrator, Stesag AG

"The quality of the indoor air plays an ever-greater role in our health. The air quality sensors from Belimo offer us great added value in monitoring and regulating indoor air quality and humidity."

René Frick, Facility Manager, Liechtensteinische Landesbank AG

Simple installation combined with lean, timeless design.





A LED shows the air quality in the room based on the CO₂ concentration. The LED is not visible when the function is switched off.

The display can be individually configured. Depending on the application, a setpoint for the temperature or fan stage can be shown or the device can be used solely as a sensor with display.



Near Field Communication (NFC)

The Belimo Assistant App 2 enables simple commissioning of the active room sensors and their diagnosis with a smartphone via NFC. The sensors can be parameterised in a deenergised state.





Aesthetic, timeless design Extremely thin shape and simple design suitable for every environment.

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Tool-free mounting

Thanks to the snap-on cover and spring loaded terminal blocks, the room units can be installed with hardly any tools.



High accuracy

Precise measuring method and low-wall coupling factor reliably ensure a comfortable room climate.

Room units

Belimo's room devices impress with their aesthetic, timeless design with a shallow depth of between 13 and 23 mm. They can be seamlessly integrated into existing controllers and feature fast, tool-free mounting as well as high long-term stability and short response times. The Belimo Assistant App 2 also guarantees simple commissioning of the active room sensors and diagnostics via smartphone. Thanks to NFC, parametrisation is possible even when the room sensor is not connected to the power supply.

FEATURES

- Aesthetic, timeless design with ePaper touch display
- Fast installation thanks to spring-loaded terminal blocks and snap-on cover
- De-energised parametrisation via smartphone
- Wiring debugging function via smartphone
- Seamless integration, voltage and current output, MP-Bus, BACnet, Modbus at your choice
- Power adaptive temperature compensation algorithm for precise measurement
- Complies with California Title 24 for the CO₂ sensing requirement

Belimo Display App

With the intuitive Belimo Display App, the current room values can be displayed and setpoints can be changed. Access protection prevents input by unauthorised personnel. The app communicates with the room unit via near field communication.

- Display of all actual values of the active room sensors
- Adaptation of the temperature setpoint of the room operating unit without a display on the room unit
- Access protection from unauthorised changes

Room units at a glance.

	Type code	Type code Modbus/ BACnet Measured values								Measuring ranges				
			c02	Relative humidity	Absolute humidity	Temperature active	Temperature passive	CO ₂ (ppm)	Humidity	Temperature	ePaper display	Display App	NFC	
M. M	01RT						•	_	_	050 °C	-	-	_	
	P-01RT						•			050 °C		_	_	
	P-22RT-1800D-1							_		050 °C				
-150 +227 +38 *39 +39 +59 +59 +59 +59 +59 +59 +59 +59 +59 +5	P-22RTH-1800D-1			•	•			_	0100%	050 °C	•	•		
	P-22RTM-1800D-1			•	•	•		02000	0100%	050 °C	•	•	•	
	22RTH-5800D			•	•	•		_	0100%	050 °C	•	•	•	
	22RTM-5800D			•	•	•		02000	0100%	050 °C	•	•	•	
	P-22RTH-1U00D-2	•		•	•	•		02000	0100%	050 °C	•	•		
	P-22RTM-1U00D-2	•	•	•	•	•		02000	0100%	050 °C	•	•	•	
	P-22RT-18-1							_	_	050 °C	_		•	
	P-22RTH-18-1							_	0100%	050 °C	_		•	
22ª	P-22RTM-18-1							02000	0100%	050 °C	_		•	
n.€	22RTH-5800A							_	0100%	050 °C	_		•	
	22RTM-5800A							02000	0100%	050 °C	_		•	
	P-22RTH-1U00A-2	•		•	•	•		02000	0100%	050 °C	_	•	•	
	P-22RTM-1U00A-2	•						02000	0100%	050 °C				

Innovation for your peace of mind.



Snap-on cover

The first sensor housing on the market that offers protection according to IP65/ NEMA 4X and can be opened and closed without any tools. This makes the installation not only faster but also more reliable.

BACnet and Modbus communication protocols Provide direct access to the application data and allow for easy commissioning and configuration.



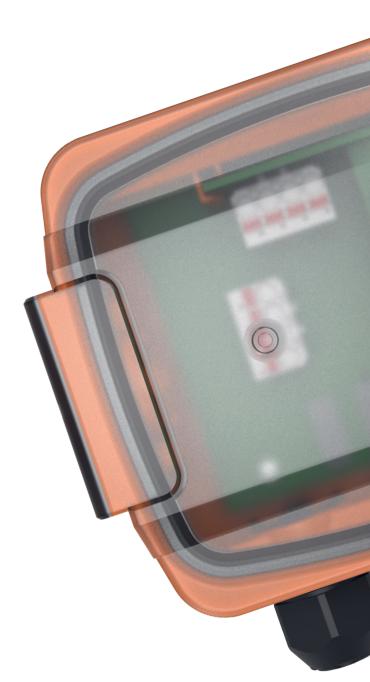
and configuration.



Detachable mounting plate Serves as a drill template for easy fastening and installation.



Conformity with IP65/NEMA 4X Belimo sensors with a snap-on cover are suitable for demanding outdoor and industrial applications. They are resistant to UV radiation, dirt, dust, humidity, condensation, rain and snow.





Housing in universal construction

Ensures a streamlined product range, which makes the product selection process and installation quick and easy. The uniform concept prevents errors during installation and reduces mounting time.



Modular cable glands Suitable for additional wiring options and mounting configurations.



Removable, push-in spring loaded terminal blocks

Enable tool-free, time-saving wiring when plugged or unplugged and the highest conductor pull-out force for maximum reliability. Thanks to reverse polarity protection, the electronics are fully protected against incorrect wiring.

The Belimo sensors have a unique, standardized housing and assembly concept. This means that they not only provide quick installation but are also fully compatible with all major building automation and control systems. This design blends seamlessly into the Belimo product range (actuators, valves and sensors). The newly developed housing fully meets the requirements of IP65/NEMA 4X.

Diff-Press. (Pa)

Flow (m/s) 1500

A comprehensive range of duct and pipe sensors.

With a complete product range of sensors, Belimo can offer all HVAC field devices from a single source. Actuators and valves are complemented by an extensive range of sensors for temperature, humidity, air quality and pressure.

Belimo offers standardised sensors, efficient ordering methods, on-time deliveries, easy installation, various cable gland options and fast commissioning. The attractive uniform design makes the sensors easy to install and ensures high reliability. In addition, thanks to the characteristic orange housing, the sensors can be immediately recognised as Belimo products, which is particularly useful during commissioning.



Temperature sensors

Accurate and reliable temperature readings are essential for optimal building comfort and energy efficiency. The outside air, duct and pipe temperature sensors are designed for precise and easy measurement and easy mounting.



FEATURES

- A variety of output signals, passive NTC and RTD, 0...5/10 V, 4...20 mA guarantees seamless connections to all major building automation systems
- Up to eight field-selectable measuring ranges to simplify logistics, reduce inventory and ensure more flexibility
- Sintered moisture protection coating on all duct, immersion and cable sensors protects against condensation, mechanical stress and vibrations

- Outside
- Duct mean value
- Duct/immersion
- Pipe contact
- Cable
- Frost protection

Humidity sensors

Monitoring air humidity is essential for ensuring optimal comfort in a building and is also important for protecting the building infrastructure, production processes, stored goods and works of art. The product range of long-term stable humidity sensors for ducts, outdoor air and condensation enables energy-optimised operation and ensures compatibility with all major building automation systems. High-quality and reliable sensors guarantee the accuracy and reproducibility of the measured sensor values. Combined sensors for temperature and humidity provide a flexible and cost-saving solution.



FEATURES

- Capacitive polymer sensor with an accuracy of $\pm 2\%$ relative humidity and a low long-term drift of $<\pm 0.3\%$
- Multi sensor with selectable output measurement values: relative humidity, absolute humidity, enthalpy and dew point
- Up to four field-selectable temperature measuring ranges offer flexibility during commissioning, simplify logistics and reduce inventory

- Outside
- Duct
- Condensation

Air quality sensors

Air quality sensors from Belimo, such as CO_2 and VOC sensors, guarantee optimal indoor air quality with increased comfort and maximised energy savings in buildings. Combined temperature and humidity sensors are also available.

FEATURES

- Dual-channel CO₂ sensor based on NDIR technology. The additional reference channel enables reliable compensation of long-term and temperature drifts and ensures maximum accuracy and longterm stability
- Wide range of combined multi sensors for CO₂, humidity, temperature and VOC offer reduced labour and material costs
- Dual-channel self-calibration technology enables the use of Belimo CO₂ sensors in all buildings and applications, even where the ABC (Automatic Background Calibration) method cannot be used

- $-CO_2$
 - CO₂ + Temperature
 - CO₂ + Humidity + Temperature
 - $-CO_2 + VOC$
 - $-CO_2 + VOC + Temperature$
 - CO₂ + VOC + Mix CO₂/VOC + Temperature



Pressure sensors

Precise pressure measurements are important for optimal HVAC system performance. Pressure sensors from Belimo cover a very large pressure range. They measure very low to very high pressures in air, water and water/glycol mixtures. Selectable measuring ranges provide enhanced flexibility in the application and reduce stockholding. The sensors measure pressure and differential pressure and calculate volumetric flow precisely for reliable control and monitoring. Optional displays on the sensors facilitate programming and enable permanent display of the measured values.





NEW

- Offset sensors for easy mounting
- Precision sensor elements in stainless steel
- Selectable output signal types on the sensor
- Manual zero-point adjustment
- Display for showing settings and the measured values

FEATURES DIFFERENTIAL PRESSURE SENSOR FOR AIR

- Eight field-selectable differential pressure measuring ranges
- Optional volume flow output: calculation formulas of the most important manufacturers are stored in the sensor
- Excellent zero point stability and high accuracy
- Auto-zero or manual-calibration option
- Optional LCD display
- Also available with two independent measurement systems

FEATURES DIFFERENTIAL PRESSURE SWITCH FOR AIR

- Durable pressure switch: over 10⁶ switching cycles
- Field-adjustable switching point

FEATURES DIFFERENTIAL PRESSURE SENSOR FOR WATER

- Highly stable resistance sensor element on ceramic substrate
- Robust stainless steel housing

FEATURES PRESSURE SENSOR FOR WATER

- Resistance sensor element on stainless steel membrane
- All wetted material made of stainless steel

- Differential pressure for air
- Differential pressure switch for air
- Differential pressure for water
- Relative water pressure

Flow sensors

Reliable flow measurement plays a crucial role in optimising the efficiency of HVAC systems. Belimo sensors utilise the ultrasonic time-of-flight technology to provide accurate flow measurements for water and water-glycol mixtures throughout the entire temperature range from -20 to 120 °C. The sensor is made of corrosion-resistant materials and is insensitive to dirt due to the ultrasonic measuring principle. This ensures reliable operation and a long service life.



FEATURES

- Multipoint wet calibration ensures high accuracy and reproducibility over the entire measuring range
- The patented logic for temperature and glycol compensation ensures accuracy over the entire temperature and concentration range
- ±2% accuracy of reading and ±0.5% reproducibility ensure accurate and precise flow measurement
- Ultra-compact size: with a short inlet section of 5 x DN and no outlet length requirements, the ultrasonic flow sensor from Belimo can also be installed in confined spaces

PRODUCT SERIES

Ultrasonic Flow

Convenient operation.

Belimo offers various apps for your smartphone to provide you with direct help while you are working. All apps are available for free download from Google Play and in the App Store.



Belimo Assistant App 2

For on-site operation of devices with built-in NFC interface. Complete transparency at all times regarding your Belimo HVAC actuator solution and the operation of your system. With the Belimo Assistant App 2 your smartphone or tablet provides wireless on-site operation for VAV, sensors, damper and valve actuators.

Belimo Display App

The Belimo Display App is the most innovative way to access Belimo room sensors and room operating units. With the intuitive end-customer app, the current room values can be displayed and setpoints can be adjusted.

Belimo RetroFIT App

With the Belimo RetroFIT app, you can specifically replace your obsolete or defective sensors and actuators from various suppliers with devices from Belimo.



Energy cost billing as simple as never before.





Certified metering, MID approval Meets all requirements of EN 1434, including type approval in accordance with the European Measuring Instruments Directive 2014/32/EU (MI-004).



Digitally supported processes

The Belimo Assistant App 2 guides you through the commissioning process.



IoT-based billing

When connected to the Belimo Cloud, owner-authorised 3rd parties are able to securely access consumption data and provide billing services.



Simple integration

Using BACnet/IP and MS/TP, as well as Modbus TCP and RTU, the thermal energy meter can be integrated directly in the building management system.



Connection between the old and the new world of thermal energy management With M-Bus via converter and parallel operation with BACnet IP or Modbus TCP for connection to the building automation.



Power over Ethernet (PoE)

The devices can be connected with one standard Ethernet cable for power supply and data transmission.





Embedded web server

Direct data access is possible via the integrated webserver and settings can be undertaken very easily.



Glycol measurement and compensation

Glycol measurement and compensation guarantee precise energy metering of standard devices at all times. With the MID version, a glycol alarm is triggered.



Sensor interface

Optionally, a passive resistance sensor, an active sensor or a switching contact can be connected. The analogue signal of the sensor is digitised with the thermal energy meter and transferred to the corresponding bus system.



Modular design for fast meter switching

The energy meter is comprised of a logic module and a sensor module. Once the calibration deadline has been reached, only the sensor module needs to be replaced. Significant savings in terms of both costs and time.



Multifunctional application

Designed as a multi-application device, it can be used as a heat meter, cooling meter or as a combined heat/cooling meter.

Simple interaction via NFC interface

Quick and simple data access on-site – commissioning and troubleshooting with the Belimo Assistant App 2 and a smartphone.

Reliable certified measurement and IoT-based billing.

High quality measurement

Belimo's thermal energy meters use ultrasonic time-of-flight technology, and as a result are dirt-resistant, wear-free, and precise in their measurements. The multipoint wet calibration of each individual meter in production ensures high accuracy over the entire flow measurement range.



Multipoint wet calibration

Multi-application device

Belimo's thermal energy meters are designed to be multi-application devices, i.e. they can be used as heat meters, cooling meters, or as combined heating/cooling meters.

Even greater accuracy thanks to automatic glycol compensation

Our thermal energy meters are also available without MID approval. They reliably measure energy even when there is glycol in the water. They automatically and continuously measure the glycol content in the fluid, compensate for it and, in doing so, ensure correct ultrasonic flow measurment. This results in precise determination of the thermal energy.



Modular design for fast meter switching

The thermal energy meter is comprised of a sensor module (lower part) with connected temperature sensors, in which arithmeticlogic unit and measurement system are housed. The bus and NFC communication interface is available in the Logic module (upper part), through which the thermal energy meter is connected to the power supply.

Thermal Energy Meter

Depending on the desired application, thermal energy meters that meet the requirements of EN1434 and have type approval according to the European Measuring Instruments Directive 2014/32/EU (MID) or devices with automatic glycol compensation are available. If the application requires a calibrated heat measurement, which can be used to settle the costs directly, the MID-approved thermal energy meters are used.

Thermal energy meters are also available without approval, for applications or regions that do not require it. This model should also be selected if you require automatic glycol compensation, e.g. with sub-zero applications.



FEATURES

- Accurate flow measurement based on ultrasonic time-of-flight technology
- Ready for IoT-based billing
- Simple setup and configuration with the Belimo Assistant App 2
- Analogue/digital signal conversion of additional passive and active sensors or switches
- Analogue output (e.g. DC 0...10 / 0.5...10
 / 2...10 V) is available and can output the flow rate or temperature of the fluid
- Seamless integration in the building management system via bus communication
- Device can be powered and data transmitted directly via Ethernet cable (PoE)

Duct and pipe sensors at a glance.

The following tables provide an overview of Belimo's wide range of sensors for each application and their technical specifications.

Temperature

Application		Type code	ut al		Measured range ¹⁾ Factory setting		Probe length [mm]	Application/comment				
			Passive	Active	Switch		Multirange (selectable)					
je.	Outside	01UT	•			-3550°C	_	-	– Outdoor temperature sensor – Temperature sensor with			
		22UT		-		-5050°C	8		 NEMA 4X / IP65 protection 			
-	Duct/ Immersion	01DT	•			Sensor- dependent	_	50, 100, 150, 200, 300, 450	 Duct temperature sensor Immersion temperature sensor, compression fitting or 			
		22DT •			0160°C	8	50, 100, 150, 200, 300, 450	thermowell required				
	Duct averaging	01MT	•			-3570°C	_	3000, 6000	Duct averaging temperature sensor for air-handling units or			
\mathbf{O}		22MT	_	•		-2080°C	8	-	larger ducts with stratification			
	Contact	01ST	•			-35100°C	_		Strap-on temperature sensors for heating systems and solar			
		01HT	•			-3590°C	_	_	collectors, passive (ST, without			
		22HT	-			0100°C	8		 housing) and passive or active (HT, with housing) 			
	Cable	01CT	•			-35100°C	_	2000	Cable temperature sensor passive (without housing) and			
		22CT				0160°C	8	2000	active (with housing)			



Belimo sensors feature:

Active: 0...5/10 V, 4...20 mA Passive: Pt100, Pt1000, Ni1000, NiTK5000, Ni891, NTC10K, NTC10K Precon, NTC20K Communication: Modbus RTU, BACnet MS/TP Supply voltage: DC 15...24 V, AC 24 V Protection: IP65/NEMA 4X (exceptions are 01APS and FM: IP54, MS: IP40)

Temperature

Application		Type code	Outp	out si	gnals	;	Measured range ¹⁾ Factory setting	Probe length [mm]	Application/comment				
			Passive	Active	Switch	Modulating valve control DC 010 V							
	Frost monitor	01ATS	-		•		-1015°C	3000, 6000	Frost detection for air handling units according to the heating coil				
		20DTS		•	•	•	110°C	2000, 6000	Protection against frost damage on air-conditioning systems, heat exchangers, heating coils, etc.				
	Temperature monitor TW	01HT-1A			•		3090°C	1000	Monitoring of heat generation systems, underfloor heating or other applications of HVAC technology				
	Safety temper- ature limiter STB	EXT-J- 0073464.			•		50130°C	1000	_				

1) The factory setting is specified for active sensors with several selectable temperature measuring ranges (multirange). For the other areas as well as the approved ambient and media temperature ranges see data sheet.

Humidity

Application	Type code							Outp	out si	gnals		Measuring ran	-		Application/comment	
			Rel. humidity	Temperature	Enthalpy	Dew point	Abs. humidity	Condensation	Active	Modbus RTU	BACnet MS/TP	Switch	Humidity	Temperature ¹⁾ Factory setting	Multirange (selectable)	
i <mark>c O</mark> ie	Outdoor	22UTH	•	•	•	•	•		•	•	•		0100% RH	-2080°C	4	 Outdoor sensor humidity/temperature Room sensor humidity/temperature with IP65/NEMA 4X protection Option: weather protection
.	Duct	01DH	•										1595% RH	_	_	Duct sensor humidity and humidity/temperature
		22DTH	•			•				•	•		0100 % RH	-2080°C	4	
,	Conden- sation	22HH						•				•	_	_	_	Condensation Sensor Option: external sensor

Air quality

Application	Type code	Meas	;		Outp	ut sig	nals	Measuring range	Application/comment				
		CO ₂	Temperature	Humidity	VOC	Mix C0 ₂ /VOC	Active	Modbus RTU	BACnet MS/TP	co2	Temperature	Humidity	
Duct	22DC	•					•			02000 ppm	-	-	Duct sensor CO2
	22DTC	•	•				•			02000 ppm	_	_	Duct sensor CO2, T
	22DTM	•	•	•					•	02000 ppm	050°C	0100% RH	Duct sensor CO2, H, T
	22DCV	•					•			02000 ppm		_	Duct sensor CO2, VOC, CO2/VOC, T
	22DCM	•	•		•		•			02000 ppm	050°C	_	Duct sensor CO ₂ , VOC, T
	22DCK	•	•			•	•			02000 ppm	050°C	_	Duct sensor CO2, VOC, CO2/VOC, T

- The factory setting is specified for active sensors with several selectable temperature measuring ranges (multirange). For the other areas as well as the approved ambient and media temperature ranges see data sheet.
 An adjustable measuring range of 0...5000 ppm is available via the Belimo Duct Sensor Assistant App 2.
 For sensors with Modbus RTU only.

- 4) For pressure sensors with several measurement ranges (multirange), the maximal range is noted. For the other ranges see data sheet.

Pressure

Application	pplication Type code Measured values Output signals F						Fluid	ł		Measuring range ³			Options		Application/comment			
			Differential	Relative pressure	Flow ⁴⁾ (Volumetric flow)	Active	Modbus RTU	MP-Bus	Switch	Air	Water	Water/glycol mixtures	Pressure	2 meas. systems 4 analogue outputs 4 Air connections	Multirange (selectable)	Automatic zero point correction Display		
6	Duct	22ADP	•		•	•	•			•			250 Pa, 2500 Pa, 7000 Pa	•	•	•	•	Differential pressure sensor air
		01APS	•						•	•			20300 Pa, 50500 Pa, 2001000 Pa, 5002500 Pa					Duct differential air-pressure switch
Ţ	Pipe	22WP		•		•				•	•	•	4, 6, 10, 16 bar					Pressure sensor water and water-glycol mixtures
		22WDP	•			•					•		1, 2.5, 4, 6 bar					Differential pressure sensor water
		22PDP	•			•					•		5, 10, 35 bar					Differential pressure sensor water

Flow

Application	Type code	DN [mm]	FS [l/s]	Connect	Connection			Output signa	als		Application/comment		
			FS: Full scale (maximum measurable flow)	Thread	Flange	Water	Water/glycol mixtures (< 50 %)	Active	MP-Bus	Modbus RTU	BACnet MS/TP		
Pipe	22PF	1550	0.505.00	•		•	•	010 V 0.510 V 210 V	•	•	-	Flow measurement wit glycol compensation	
	FM	65150	9.6054.00		•	•	•	0.510 V				-	

Thermal Energy Meter

Version	Type code	DN [mm]	Nominal flow [m ³ /h]	Autom. glycol compensation	Glycol alarm	Power over Ethernet (PoE)	EN1434 MID- approved	Display	MP-Bus	M-Bus with converter	Modbus RTU	Modbus TCP	BACnet MS/TP	BACnet IP	Application/comment
MID	22PEM				•	•	•	•	•	•	•	-	•	•	Direct, calibrated energy cost billing
Standard	22PE	1550	1.515	•		•			•	•	•	•	•	•	Thermal energy recording and glycol compensation

All inclusive.

Belimo as a global market leader develops innovative solutions for the controlling of heating, ventilation and air-conditioning systems. Damper actuators, control valves, sensors and meters represent our core business.

Always focusing on customer value, we deliver more than only products. We offer you the complete product range for the regulation and control of HVAC systems from a single source. At the same time, we rely on tested Swiss quality with a five-year warranty. Our worldwide representatives in over 80 countries guarantee short delivery times and comprehensive support through the entire product life. Belimo does indeed include everything.

The "small" Belimo devices have a big impact on comfort, energy efficiency, safety, installation and maintenance.

In short: Small devices, big impact.





