Baumer
Passion for Sensors

How to specify a product

Process Sensors and Mechanical Instruments

Keep the overview.

Here is some guideline information on how to specify our products. Intended as supplementary help to specification sheets and part numbers, the present pocket guide will prompt you to ask the right questions in order to find the ideal, application-specific product.

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How to specify

A pressure transmitter

They enable customized solutions for almost any task in pressure transmitters – absolutely precise and reliable. We have to consider installation conditions (flush, non-flush), application requirements (hygienic, industrial) and media properties.

What we need to know:

- Process media
- Process temperature
- Process connection
- Pressure range & units of measurement
- Accuracy
- Signal output
- Electrical connection
- Integrated / detached / without display
- Certifications (E.g. 3A, EHEDG)
- Hazardous area classification
- IP protection requirements

How to specify

A pressure gauge

Pressure gauges are autonomous local pressure indicators without power supply. They are used in many applications for fast and easy pressure readout on an analog display. Equipped with diaphragm seals, electrical contacts or different accessories, adapt to almost any application and process requirements.

What we need to know:

- Process media
- Temperature (medium & ambient)
- Material of sensing element
- Type of process connection
- Location of process connection
- Mounting type
- Pressure (relative, absolute, differential)
- Measurement range & unit
- Accuracy class
- Dry or filled with damping fluid
- Safety requirements
- Hazardous area classification
- Electrical output signal (contacts or analog)
- Window material
- Pointer options
- IP protection
- Special requirements & options

How to specify

A pressure switch

Pressure switches are mechanical or electronic instruments with or without integrated display. They are used to signal excess pressure outside the defined limits to trigger an actuator in a regulation circuit or a 2-position control system.

What we need to know:

- Process media
- Pressure range
- Type of pressure (gauge or differential)
- Overpressure
- Temperature (medium & ambient)
- Wetted parts material
- Process connection
- Electrical connection
- Type of mounting
- Repeatability
- Number of contacts
- Setpoint & deadband
- Electrical contact rating
- Hazardous area classification
- Seal requirements
- Special requirements & options
- Setpoints defined in the factory according to customer specifications (on request)

How to specify

A diaphragm seal

Diaphragm seals are used to protect pressure gauges against high temperatures, aggressive, crystallizing or corrosive fluids or to ensure hygienic requirements. Diaphragm seals are attached to pressure gauges, transmitters or pressure switches directly or via a flexible capillary.

What we need to know:

- Type of seal (threaded, flanged, hygienic, tubular etc.)
- Upper part / body material
- Lower part material (if applicable)
- Diaphragm material
- Coating of wetted parts
- Process connection
- Instrument connection
- Type of mounting (direct / remote)
- Capillary length (if remote)
- Capillary protection (if remote)
- Height difference between instrument and seal
- Type of measuring instrument
- Pressure range
- Temperature (medium and ambient)
- Filling fluid
- Hygienic requirements (FDA / 3A / EHEDG)
- Special requirements & options

How to specify

A thermometer

Thermometers are autonomous temperature indicators without power supply for fast and easy temperature readout on the analog display. Bi-metal thermometers are common use in standard applications up to 600 °C. Higher temperatures call for capillary measurement from remote. For temperature with contacts, gas-filled thermometers are the product to choose. Thermometers should always provide a thermowell compliant to the prevailing process conditions.

What we need to know:

- Bi-Metal or gas filled system
- Process media
- Case diameter
- Case material
- Immersion tube material
- Diameter and length of immersion tube
- Type of process connection
- Immersion tube outlet (back, bottom, every angle)
- Type of mounting
- IP protection
- Capillary length (if applicable)
- Measurement range & unit
- Accuracy
- Electrical contacts (if applicable)
- Window material
- Pointer options
- Hazardous area classification
- Thermowell requirements
- Special requirements & options

How to specify

A temperature sensor

The temperature sensors in the broad Baumer portfolio meet all industry requirements and are compatible with process connections of international standards. Thanks to their building block architecture you will always find the right product for your application. Easily and with the highest level of flexibility.

What we need to know:

- Sensor element type (single / duplex, accuracy)
- Sensor insert (2-wire / 4-wire)
- Transmitter requirements
  - Required output signal
  - Accuracy
  - Galvanic insulation requirements
- Ambient temperature
- Process temperature
- Temperature range
- Process connection (industrial / hygienic environment)
- Sensor tube length
- Sensor tube diameter
- Response time
- Case type (IP-class, integrated display)
- Built-in display requirements
- Electrical connection
- Approvals and certifications (e.g. 3A, EHEDG, FDA, EN 50155, …)
- Hazardous area classification (Atex)
- Pocket / thermowell

How to specify

A temperature switch

Temperature switches are mechanical or electronic instruments with or without integrated display. They are used to signal excess temperature outside the defined limits to trigger an actuator in a regulation circuit or a 2-position control system.

What we need to know:

- Process media
- Temperature range
- Wetted parts material
- Process connection
- Electrical connection
- Type of mounting
- Length of capillary
- Repeatability
- Number of contacts
- Setpoint and deadband
- Electrical contact rating
- Hazardous area classification
- Thermowell requirements
- Special requirements & options
- Customer specific factory adjustment of setpoints

How to specify

A temperature transmitter

Baumer offers a wide range of temperature transmitters that convert either an RTD or T/C signal into analog or digital communication (HART or Profibus). The portfolio comprises transmitters for in-head and rail mounting.

What we need to know:

- Din rail or head mounting
- Type of sensor input
- Wiring configuration
- Output signal – mA / HART
- Hazardous area classification
- Programming of measuring range
- Failure mode settings

How to specify

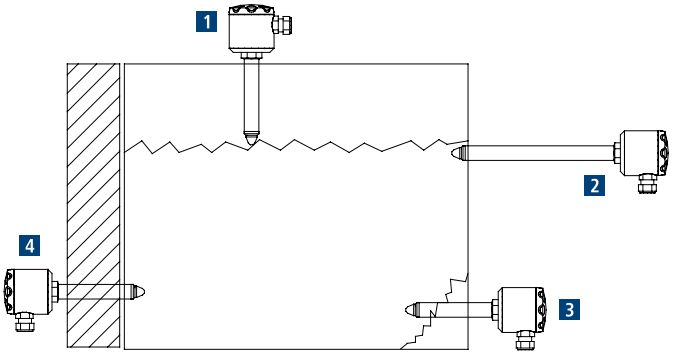
Point Level measurement

The Baumer level switch is designed for point level measurement in any task and industry. Universal in use, *CleverLevel* is capable of detecting all media – whether solid, liquid or adhering. *CleverLevel* is the smart alternative to vibrating forks.

What we need to know:

- Ambient temperature
- Process connection (industrial / hygienic)
- Electrical connection
- Hazardous area classification
- Signal output
- Approvals
- Media temperature
- Configured in the factory

- Applications for the level switch with sliding connection (see illustration).



1 Mounted at the top of a tank to adjust a maximum level (250 mm).
2 Serving as a cooling neck in high media temperature applications.
3 Flexible adjustment of the sensor tip to ensure true level detection, e.g. for powder media.
4 To penetrate insulation material of vessels.

How to specify

A conductivity transmitter

The Baumer conductivity transmitters are designed for media separation and analysis in applications in the food and beverage industry and water treatment. They provide outstanding benefits in terms of accuracy and display options.

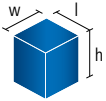
What we need to know:

- Electrical connection
- Cable length, if using a detached display (split version)
- Media temperature
- Ambient temperature
- Integrated / detached / without display
- Immersion length
- Approvals
- Configured in the factory

Tank volumes

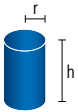
Volume of a rectangle tank

$v = l \times h \times w$



Volume of a cylindrical tank

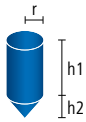
$v = 3.142\ r^2 \times h$



Volume of conical tank

= volume of cone + cylinder

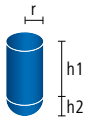
$= 1/3\ (3.142 \times r^2 \times h2) + (3.142 \times r^2 \times h1)$



Volume of hemispherical tank

= volume of hemispher + cylinder

$= 2/3\ (3.142 \times r^2 \times h2) + (3.142 \times r^2 \times h1)$



Unit Conversions

Pressure:

	Pa	mbar	H_2O	psi	Torr
1 Pa =	1	0.01	0.102 mm	0.000145	0.0075
1 hPa =	100	1	10.2 mm	0.0145	0.75
1 bar =	100 000	1 000	10.2 m	14.5	750.2
1 m H_2O =	9 810	98.10	1 000 mm	1.422	73.56
1 psi =	6 895	68.95	0.703 m	1	51.72
1 Torr =	133.3	1.333	13.6 mm	0.01933	1

Values partly rounded

Temperature:

°C	−20	0	20	40	60	80	100	120	140	160	180	200	220	240
°F	−4	32	68	104	140	176	212	248	284	320	356	392	428	464

°F	−40	0	40	80	120	160	200	240	280	320	360	400	440	460
°C	−40	−18	4	27	49	71	93	116	138	160	182	204	227	238

Values partly rounded

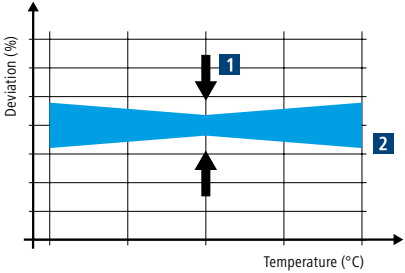
Dimension:

	mm	cm	m	ft	inch
1 mm =	1	0.1	0.001	0.003281	0.03937
1 cm =	10	1	0.01	0.03281	0.3937
1 m =	1 000	100	1	3.281	39.37
1 ft =	304.8	30.48	0.3048	1	12
1 inch =	25.4	2.54	0.0254	0.8333	1

Values partly rounded

Stuck on the meaning of a word?

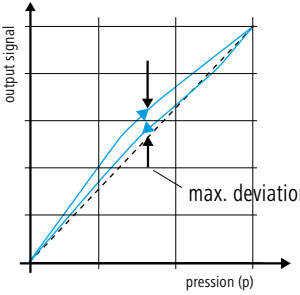
- **Total error:**
  Cumulated error of non-linearity, hysteresis, non-repeatability, error of span and error at zero point, long term drift and temperature coefficients.



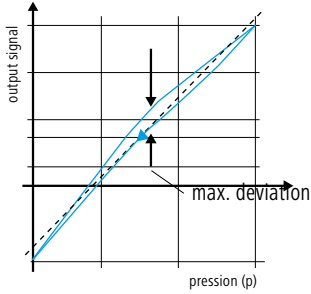
1 Characteristic deviation at ambient temperature

2 Thermal drift

- **Accuracy:**
  - Setpoint adjustment (% in full scale): Nonlinearity, hysteresis, repeatability, error of span and error at zero point in reference to ideal curve.
  - Best fit straight line (% in full scale): Nonlinearity, hysteresis, repeatability in reference to best fit straight line.

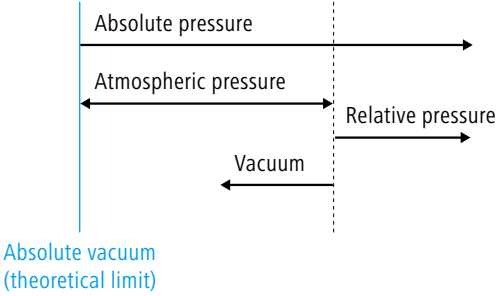


Limite points adjustement



Best fit straight line (BFSL)

- **Absolute:** Measurement of pressure with respect to vacuum.
- **Relative:** Measurement of pressure with respect to atmospheric pressure.
- **Differential:** Measurement of the difference between two pressures.
- **Compound:** Measurement of gauge or differential pressure from negative to positive values.



- **Thermocouple:** Two dissimilar metals joined at a hot point, which produce a millivolt signal in proportion to the surrounding temperature. Different metal combinations produce different millivolt tables to give temperature sensing up to 2 300 °C.
- **Resistance thermometer:** The resistance of a metal is proportional to temperature. Generally platinum is used with a resistance of 100 Ohm at 0 °C but older options of copper or nickel are also used. These are often more accurate than thermocouples but have upper temperature limitations of 840 °C.

Certificates

Certificate according SN/EN 10204:2004	Declaration of compliance 2.1	Test report 2.2	Inspection certificate 3.1
What does it say?	Confirmation of compliance with the order	Confirmation of compliance with the order in reference to chosen quality characteristics Surface roughness Free of oil and grease Ferrite content Material	Confirmation of compliance with the order in reference to chosen quality characteristics Material analysis Calibration
How it is tested?	No real test, just documentation of delivered products	No specific measurement, quality characteristics are confirmed by means of our production standard	Specific measurement of quality characteristics
Along with which product can it be ordered?	All products	All products, but certain paramters are only available if applicable to the reference product	Not all products, compare Productfinder

Productfinder

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