

ABB MEASUREMENT & ANALYTICS

# Temperature measurement

Precise and flexible for efficient processes



---

## **Measurement made easy**

**To operate any process efficiently, it is essential to measure, actuate, record and control. In selecting ABB you are choosing a partner who is offering the best measurement and analytical solution for your needs, enabling maximum return on your investment. When investing in ABB's measurement and analytical solutions you are receiving the best technology, reliability and service in the business.**

**Research and development is a vital source of ABB's technology leadership. ABB constantly builds on the foundation of existing technologies for new applications, and continues to develop the breakthrough technologies needed to meet the challenges of the future.**

# Comprehensive measurement solutions

## Tailor-made for every industry

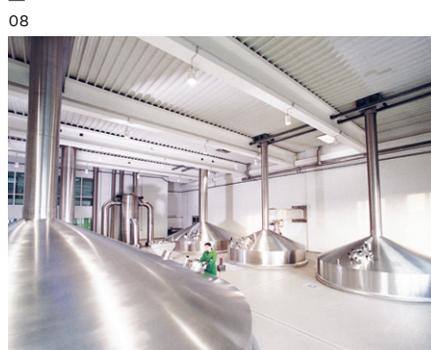
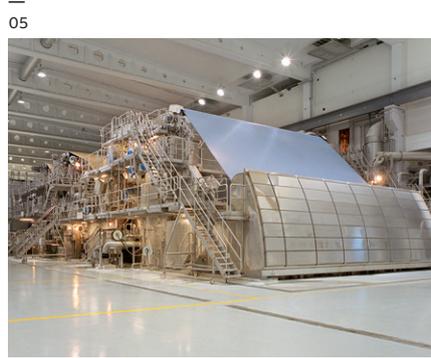
- 01 Water and waste water
- 02 Power and steam generation
- 03 Chemical and petrochemical
- 04 Oil and gas
- 05 Pulp and paper
- 06 Minerals
- 07 Metals
- 08 Food and beverages
- 09 Marine

ABB's measurement and analytical products provide world-class measurement solutions for any industry, utility or municipality. Latest innovations deliver technological solutions to make it easier for you to run your plant. ABB's measurement and analytics products are based on common technology, providing a common look and feel and method of operation. This results in products, that are easy to configure, easy to integrate, and easy to maintain.

For more information please visit:  
[abb.com/measurement](http://abb.com/measurement)

### ABB's measurement and analytics product portfolio

- Analytical measurement
- Flow measurement
- Pressure measurement
- Temperature measurement
- Level measurement
- Actuators and positioners
- Recorders and controllers
- Device management, Fieldbus and Wireless
- Force measurement
- Service



# Global availability

## A partner to rely on

— 01 ABB service – available wherever you are

— 02 ABB wireless measurement: truly autonomous with Energy Harvester

The ABB service is available for you worldwide

ABB is the competent partner for industrial automation. The large number of globally installed products and solutions speaks for itself. Use the knowledge and experience of ABB for stable processes, as well as to optimize the security and accuracy of your plants.

From installation and commissioning to dismantling and disposal, ABB experts provide you with a comprehensive range of service and support services throughout the entire life cycle of your plant.

Device management, fieldbus and wireless  
Important information always accessible

ABB's intelligent measurement and analytical products have innovative, integrated diagnostic functions. Access to information about devices and processes is possible through various communication protocols. Different applications are available for device management. Thus, you can optimize your processes.

#### The portfolio includes:

- Solutions for fieldbus and wireless
- Handheld terminals
- Asset Vision device management software
- Scalable maintenance management

— 01



— 02



# Temperature measurement

## Precise and flexible

—  
03 Temperature measurement in the oil and gas industry

—  
04 High temperature measurement up to 1800 °C

Many industrial processes require precise temperature measurement. For this, ABB offers one of the most extensive product portfolios. The reliable devices and solutions meet your requirements and they have proven themselves in many instances of use in various industries. ABB has extensive experience and supports you in the selection of tailor-made solutions.

With ABB's innovative temperature sensors and transmitters, you benefit from low investment costs and standardized modules with high long-term stability.

The versatile product offering for temperature measurement is based on a flexible modular principle. Standard models are available within a very short time. The clear portfolio structure simplifies the ordering process.

—  
03



—  
04



# SensyTemp temperature sensors

## Overview

	Process measurement	High-temperature measurement
Product series	SensyTemp TSP100 and TSP300	SensyTemp TSH200
		
Applications	<ul style="list-style-type: none"> <li>• Oil and gas</li> <li>• Petrochemical industry</li> <li>• Chemical industry</li> <li>• Power generation</li> <li>• Process engineering</li> <li>• Plant construction</li> </ul>	<ul style="list-style-type: none"> <li>• Power generation</li> <li>• Metal processing</li> <li>• Cement industry</li> <li>• Glass industry</li> <li>• Garbage incineration</li> <li>• Basic industry</li> </ul>
Process connections	<ul style="list-style-type: none"> <li>• Insertion in existing thermowells</li> <li>• Thermowells with cylindrical or conical thread connections</li> <li>• Thermowells with flanges in accordance with international standards</li> <li>• Surface mounting for non-invasive temperature measurement (TSP341-N*)</li> </ul>	<ul style="list-style-type: none"> <li>• Threaded socket</li> <li>• Stop flange with counterflange</li> <li>• Welded standard flange</li> <li>• Ceramic thermowell</li> <li>• Metal thermowell</li> </ul>
Measuring ranges	<ul style="list-style-type: none"> <li>• Resistance thermometers: -196 to 800 °C (-320.8 to 1472 °F)</li> <li>• Thermocouples: -40 to 1600 °C (-40 to 2912 °F)</li> </ul>	Thermocouples up to 1800 °C
Functional safety	Up to SIL2 / SIL3 in accordance with IEC 61508 with integrated transmitters	
Approvals	IECEX, ATEX, GOST / EAC-Ex, further approvals in preparation	
Data sheet	DS/TSP1xx, DS/TSP3xx, DS/TSP341-N	DS/TSH2xx

### Process industry head thermometer

SensyTemp TSP series sensors allow for measuring inset replacement during operation. With their short response time and high vibration resistance these devices meet the most demanding process requirements. The temperature sensor TSP341-N enables a high-precision non-invasive temperature measurement, no intervention in the process is required.

### High temperature thermometer

SensyTemp TSH series temperature sensors have been designed to meet the requirements of temperature applications from 600 to 1800 °C (1112 to 3272 °F). ABB supports a selection of thermowells appropriate for temperature measurements at high temperatures in combustion, annealing and smelting processes.

\* See note on page 13

# Temperature sensor

## Components

### 1. Connection head

Connection heads for temperature sensors are in accordance with EN 50446 industry standard, which sets the electric and mechanical connection requirements for thermowells, measuring insets, transmitters and connection cables. For decades, ABB has been continuously improving the design of connection heads for one and two transmitters.

### 2. Extension tube

The extension tube protects the electronics from high process temperatures. When process lagging is used, the extension tube enables accessibility of the connections above the lagging.

### 3. Process connection

Measuring elements can be connected directly into the process using compression fittings. When a thermowell is used it can be connected to the process via a screwed connector or a flange to any of a number of international standards. Additionally a thermowell may also be provided in a design suitable for welding into position.

### 4. Thermowell

A conventional thermowell consists of a seamless tube, to which a base is welded on process-side. A solid drilled thermowell is manufactured from a single piece of bar material with a hole drilled to within a few millimeters of the tip. A hole is cut in the rod, ending a few millimeters below the top. Both of these thermowell types provide protection for the temperature sensor.

### (a) Measuring inset

The measuring inset protects the temperature sensor and increases the measuring accuracy. The measuring inset can always be replaced (for example for calibration) at any time, without opening the process or shutting down the plant. This allows for easy calibration of the measuring inset.



# SensyTemp TSP series 100

## Process industry head thermometer

Product types	TSP111	TSP121	TSP131
			
<b>Process connections</b>	<ul style="list-style-type: none"> <li>• Without thermowell</li> <li>• Insertion in existing thermowells</li> </ul>	<ul style="list-style-type: none"> <li>• With welded tubular thermowell</li> <li>- Screw-in thread</li> <li>- Flange</li> <li>- Compression fitting</li> </ul>	<ul style="list-style-type: none"> <li>• With drilled barstock thermowell</li> <li>- Screw-in thread</li> <li>- Flange</li> <li>- Weld-in socket</li> </ul>
<b>Design</b>	<ul style="list-style-type: none"> <li>• Modular construction, flexible</li> <li>- Measuring inset, thermowell, extension tube, connection head, transmitter</li> <li>- Exchangeable measuring inset</li> <li>• Connection heads</li> <li>- UZ, BUZH, BUZHD: Aluminum, with hinged cover, integrated LCD indicator optional</li> <li>- BUS, BUSH: Aluminum, with hinged cover with snap fastener</li> <li>- BUKH: Plastic, with upper hinged cover</li> <li>- BEG: Stainless steel, with screw-on cover</li> <li>- Other heads in various designs and materials</li> <li>• Transmitter in connection head (4 to 20 mA / HART, FF, PA)</li> <li>• Suited for types of protection: intrinsic safety and non-sparking</li> </ul>		
<b>Measuring ranges</b>	<ul style="list-style-type: none"> <li>• Resistance thermometer: -196 to 800 °C (-320.8 to 1472 °F)</li> <li>• Thermocouple: -40 to 1600 °C (-40 to 2912 °F)</li> </ul>		
<b>Measuring insets</b>	Exchangeable, in accordance with DIN 43735		
<b>Displays (optional)</b>	Transmitter-controlled, graphic (alphanumeric) LCD indicator for process, sensor and actual values display		
<b>Functional safety</b>	Up to SIL2 / SIL3 in accordance with IEC 61508 with integrated transmitters		
<b>Approvals</b>	IECEX, ATEX, GOST / EAC-Ex, further approvals in preparation		
<b>Connection heads</b>	 <p>BUZ      BUZH      BUZHD      BUS      BUSH      BUKH      BEG</p>		
<b>Data sheet</b>	DS/TSP1x1		

# SensyTemp TSP series 300

## Meeting most demanding requirements

Product types	TSP311	TSP321	TSP331	TSP341-N*
				
<b>Process connections</b>	<ul style="list-style-type: none"> <li>Without thermowell, insertion in existing thermowells</li> </ul>	<ul style="list-style-type: none"> <li>With welded tubular thermowell</li> <li>- Screw-in thread</li> <li>- Flange</li> <li>- Compression fitting</li> </ul>	<ul style="list-style-type: none"> <li>With drilled barstock thermowell</li> <li>- Screw-in thread</li> <li>- Flange</li> <li>- Weld-in socket</li> </ul>	<ul style="list-style-type: none"> <li>No thermowell required because of non-invasive surface measurement</li> </ul>
<b>Design</b>	<ul style="list-style-type: none"> <li>Modular design, sturdy and versatile</li> <li>- Measuring inset, thermowell, extension tube, connection head, transmitter</li> <li>- Exchangeable measuring inset</li> <li>Connection heads</li> <li>- AGL: Aluminum, with screw-on cover</li> <li>- AGLH: Aluminum, with upper screw-on cover</li> <li>- AGLD: Aluminum, with screw-on cover and LCD indicator</li> <li>- AGS: Stainless steel, with screw-on cover</li> <li>- AGSH: Stainless steel, with upper screw-on cover</li> <li>- AGSD: Stainless steel, with screw-on cover and LCD indicator</li> <li>Transmitter in connection head (4 to 20 mA / HART, FF, PA)</li> <li>Suited for types of protection: intrinsic safety, non-sparking, flameproof and dust explosion</li> </ul>			<ul style="list-style-type: none"> <li>Sturdy, modular design</li> <li>Connection heads</li> <li>- AGL: Aluminum, with screw-on cover</li> <li>- AGLD: Aluminum, with screw-on cover and LCD indicator</li> <li>- AGS: Stainless steel, with screw-on cover</li> <li>- AGSD: Stainless steel, with screw-on cover and LCD indicator</li> <li>Transmitter in connection head (4 to 20 mA / HART), integrated calculation algorithms for high-precision non-invasive temperature measurement</li> <li>Suited for types of protection: intrinsic safety and flameproof</li> </ul>
<b>Measuring ranges</b>	<ul style="list-style-type: none"> <li>Resistance thermometer: -196 to 800 °C (-320.8 to 1472 °F)</li> <li>Thermocouple: -40 to 1600 °C (-40 to 2912 °F)</li> </ul>			<ul style="list-style-type: none"> <li>Resistance thermometer: -40 to 400 °C (-40 to 752 °F)</li> </ul>
<b>Measuring insets</b>	In accordance with DIN 43735, exchangeable			In accordance with DIN 43735, optimized for non-invasive surface measurement
<b>Displays (optional)</b>	Transmitter-controlled, graphical (alphanumeric) LCD indicator, also with dual function <ul style="list-style-type: none"> <li>- Configuration of the transmitter via buttons</li> <li>- Process, sensor and actual values display</li> </ul>			Transmitter-controlled, graphical (alphanumeric) LCD indicator <ul style="list-style-type: none"> <li>- Process, sensor and actual values display</li> </ul>
<b>Functional safety</b>	Up to SIL2 / SIL3 in accordance with IEC 61508 with integrated transmitters			-
<b>Approvals</b>	IECEX, ATEX, GOST / EAC-Ex, further approvals in preparation			IECEX, ATEX, further approvals in preparation
<b>Connection heads</b>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>AGL / AGS</p> </div> <div style="text-align: center;">  <p>AGLH / AGSH (not TSP341-N)</p> </div> <div style="text-align: center;">  <p>AGLD / AGSD</p> </div> </div>			
<b>Data sheet</b>	DS/TSP3x1			DS/TSP341-N

\* See note on page 13

# SensyTemp TSH series 200

For temperatures up to 1800 °C (3272 °F)

Product types	TSH210	TSH220	
			
Process connections	Metal thermowell Stop flange with counterflange, threaded socket, welded standard flange	Ceramic thermowell	
Structure	<ul style="list-style-type: none"> <li>• Modular design, versatile               <ul style="list-style-type: none"> <li>- In accordance with EN 50446 and ABB standard</li> </ul> </li> <li>• Connection heads               <ul style="list-style-type: none"> <li>- AUZ: Aluminum, with hinged cover</li> <li>- AUZH: Aluminum, with upper hinged cover</li> <li>- BUZ: Aluminum, with hinged cover</li> <li>- BUZH: Aluminium, with upper hinged cover</li> <li>- Other heads in various designs and materials</li> </ul> </li> <li>• Transmitter in connection head (4 to 20 mA / HART, FF, PA)</li> </ul>		
Max. Operating temperature	1300 °C (2372 °F)	1800 °C (3272 °F)	
Connection head (selection)	 <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <span>AUZ</span> <span>AUZH</span> <span>BUZ</span> <span>BUZH</span> </div>		
Data sheet	DS/TSH2x0		

# Wireless made easy

## Truly autonomous with the Energy Harvester

Product types	TSP3xx-W	TSP3xx-W	TTF300-W
			
<b>Communication protocol</b>	WirelessHART		
<b>Device type</b>	Battery supply without Energy Harvester	Battery supply with Energy Harvester	Battery supply without Energy Harvester
<b>Input</b>	Two sensors inputs - Resistance thermometers, resistance-type remote sensor (0 to 5000 Ohm) - Thermocouples, voltages, mV-voltages (-125 to 1100 mV)		
<b>Sensor connection</b>	<ul style="list-style-type: none"> <li>• Pt100, two-wire, three-wire, four-wire, thermocouple with internal reference junction</li> <li>• 2x Pt100 two-wire and three-wire, 2x thermocouple or 1x Pt100 two-wire, three-wire, four-wire and 1x thermocouple</li> </ul>		
<b>Features</b>	<ul style="list-style-type: none"> <li>• Continuous sensor monitoring and self-monitoring               <ul style="list-style-type: none"> <li>- Supply voltage, wire break and corrosion monitoring</li> </ul> </li> <li>• Sensor error adjustment</li> <li>• Electrical isolation</li> <li>• Specific linearization               <ul style="list-style-type: none"> <li>- Callendar-Van Dusen coefficients, table of value pairs / 32 points</li> </ul> </li> <li>• Innovative energy management</li> </ul>		
<b>Indicator (optional)</b>	Transmitter-controlled, graphical (alphanumeric) LCD indicator with dual function: <ul style="list-style-type: none"> <li>- Configuration of the transmitter via buttons</li> <li>- Process, sensor and actual values display</li> </ul>		
<b>Configuration</b>	Via HART handheld terminal (DTM, EDD, HMI), FIM		
<b>Approvals</b>	IECEX, ATEX, further approvals in preparation		
<b>Data sheet</b>	DS/TSP3x1-W		DS/TTF300-W

### Did you know?

The WirelessHART temperature sensor TSP300-W with Energy Harvester is the world's first self-powered wireless measurement device requiring no wiring, no external power supply and ideally no battery replacement.

# Temperature measurement for oil and gas

## Safe, robust and reliable

**Temperature measurement systems for the oil and gas industry are engineered, manufactured and documented by ABB engineers. Traceability is maintained at all times for both materials and processes. All wetted material can be traced from the mill to the finished product.**

### Vibration-proof design

In high flow installations, unsupported thermowells can produce wake vibrations that could approach their resonant frequency leading to serious cracking and even destruction of the thermowell. This can cause cracks. The thermowell may be damaged completely. ABB engineers know where potential problems could occur and recommend available options.

### Thermowells, sensors, cables and transmitters from a single source

A key component of ABB's quality confidence comes from the use of own cables, components, thermowells and transmitters. The control of quality and materials is maintained at every critical stage. From sensors that are laser welded to thermowells manufactured on dedicated machines, temperature solutions from ABB are safe, tough and reliable. This applies to all products: from laser-welded sensors to specially designed thermowells. For custody transfer metering ABB also provides transmitters with MID certificates in accordance with 2014/32/EU directive for the types TTH300 and TTF300.

### Solutions for the full production cycle

- Exploration
- Production (on shore, off shore, sub-sea)
- Transportation
- Refining

### Standard qualification

- ISO 9001
- ISO 14001
- OHAS 18001
- PED

### Product qualification

- X-ray PMI (positive material identification)
- Dye penetration test
- Weld seam inspection by X-ray
- Weld seam inspection by ultrasonics
- Seamless traceability of materials
- Thermowell concentricity and dimensional reporting
- Welding proof for third parties
- Fully forged flanges to ANSI standards
- RTD and TC calibration traceable to NAMAS
- NACE approval
- NORSOK approval

### Types of protection for use in a hazardous area

- Druckfeste Kapselung
- Flameproof (enclosure)
- Intrinsic safety
- Non-sparking
- Non-incendive



# Non-invasive temperature measurement

## High-precision measuring of temperature outside the process

— 01 Vortex build-up in the area of a thermowell in flowing media

— 02 TSP341-N with and without LCD indicator

The non-invasive temperature sensor TSP341-N\* is designed for surface mounting. By taking the environmental conditions into account, high-precision and reliable temperature measurement is possible without any interference in the process. Plant safety is significantly increased as a result. At the same time, thanks to quick and easy surface mounting and by eliminating the thermowell and the need to open the process, substantial cost reductions are achieved.

For decades, temperature measurement in process technology has usually been conducted by directly inserting a temperature sensor with a thermowell into the medium to be measured. While chemically aggressive measuring media can damage thermowells, therefore requiring regular inspections and replacement as needed, an undersized thermowell can also burst in flowing measuring media due to vortex formation and resulting oscillations. To minimize this risk and possible personal injury or damage to the plant and environment, in part a great effort is required already in the plant planning phase as well as during operation.

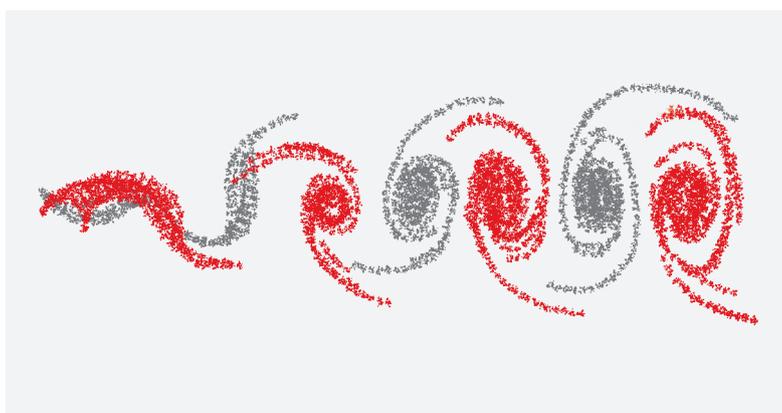
The TSP341-N temperature sensor with integrated transmitter minimizes such risks and therefore significantly reduces costs, since it allows for temperature measurement beyond the process.

With its high level of precision and short response time, it is exceptionally suited for a number of applications. The basis of the high precision of the sensor is built on the fact that it takes ambient conditions and especially ambient temperature into account in the processing algorithms, developed by ABB for non-invasive temperature measurement. Short response time is achieved through its optimized mechanical structure.

Aside from reducing hazards and their associated costs, the TSP341-N increases flexibility within the plant at the same time. The sensor can be installed at any time, later on or even temporarily for additional measurements, without the need for an unavoidable standstill during modification of the plant.

\* The temperature sensor TSP341-N belongs to ABB's product series SensyTemp TSP. It is listed in the type examination certificates for explosion protection as SensyTemp TSP341-N.

— 01



— 02



# Temperature sensor solutions

## First choice for any application

—  
01 Temperature measurement of a process gas with temperature sensor TSP131

—  
02 Specifically designed thermowells

### Intrinsic safety for the chemical industry

Many processes and products in the chemical industry are located in explosive hazardous areas. Only electrical devices that are not an ignition source may be used. Due to their design principles, intrinsically safe devices ensure that ignitable energy cannot evolve even in the event of a fault.

#### The safe solution

The temperature sensors of series TSP are designed for connection to the head-mount temperature transmitter TTH200 and TTH300. Both product lines are available with the intrinsic safety option. Due to this electrical protection standard, the reliable and durable TSP sensor will never produce the amount of energy required to cause an explosion. The building of intrinsically safe circuits is a highly specialized engineering discipline. To assist you, ABB provides all the information you need in a well-structured and easily understandable manner.

#### Functional safety according to IEC 61508

ABB offers temperature sensors and transmitters with SIL declaration of conformity for use in safety-related applications.

### Thermowells for the oil and gas industry

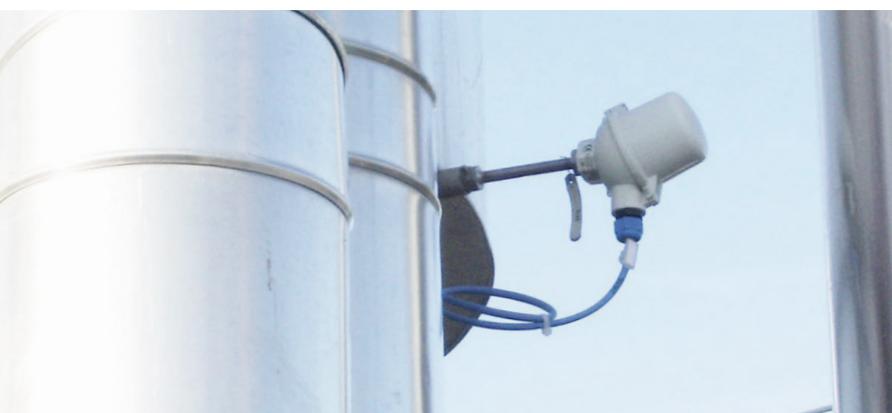
The most important challenge in the design of measurement solutions for the oil and gas industry is the selection of the right thermowells. In liquid natural gas (LNG) plants, natural gas is liquefied at particularly low temperatures up to  $-163\text{ °C}$  ( $-261.4\text{ °F}$ ). Ordinary stainless steel thermowells are not advised for cryogenic temperatures.

In close cooperation with the plant engineers in the oil and gas industry, ABB has developed a solution based on a high-quality chromium-molybdenum alloy (F44, 1.4547) for these particular measurement tasks.

In case given process conditions might lead to wake vibrations close to the thermowells' resonant frequency, the product is subjected to a wake frequency assessment. This helps to preserve product quality of customized products even in very specific situations.

The production and documentation of these thermowells meet the highest requirements.

—  
01



—  
02



—  
03 High temperature  
thermometer in  
use in a furnace  
—

04 Multipoint  
thermometer

## Temperature measurement in the cement industry

The production of cement from raw meal involves intensive and finely controlled heating. Temperatures that are too low result in a poor finished product yield, temperatures that are too high cause excessive energy consumption. Only an accurate and robust high temperature measurement solution will satisfy the need for balance between quality and cost.

### **The challenge: Erosive media in potentially hazardous atmospheres**

The rotary kiln operates between 1400 °C and 1500 °C (2552 and 2732 °F), the raw meal preheaters at 1100 °C to 1300 °C (2012 and 2372 °F). Cement products are extremely erosive. Hot dust can cause an explosive hazardous atmosphere.

### **The solution: High temperature measurement**

TSH high temperature measurement products offer a range of solutions all engineered to the highest degree. For measurements of up to 1100 °C (2012 °F), simple thermocouples with metal thermowells are a cost-effective solution. However, copper elements have a low melting point and are not suitable for high-temperature measurements in an erosive environment. For this purpose, ABB offers precious metal thermocouples with ceramic thermowells, which are robust and temperature-resistant up to 1800 °C (3272 °F).

## Unique solutions for specific tasks

The stepped multipoint thermometer has a specially designed thermowell with several sensors distributed over its length. Thus, different measuring points can be monitored simultaneously via only one vessel entry. Some designs allow the extraction and replacement of the temperature measuring elements whilst the plant is still operating.

Multipoint thermometers are generally adapted individually to the respective application. ABB engineers bring their extensive knowledge of temperature measurement techniques and pressure vessel design and materials together, to provide unique solutions to customer specific measurement tasks. The large installed base of devices already installed in several industries is self-evident.

The application areas of these special measuring devices vary considerably. They are mainly used for temperature measurement in vessels with uneven temperature distribution. The assembly can take place vertically or horizontally. Both RTD based instruments and thermocouple based instruments are available from ABB, depending on the application requirements of the customer.

—  
03



—  
04



# Temperature transmitter series 200

## For demanding applications

Product types	TTH200	TTF200	TTR200
			
Communication protocol	HART		
Device type	Head-mount	Field-mount	Rail-mount
Input	One sensor input - Resistance thermometers, resistance-type remote sensors (0 to 5000 Ohm) - Thermocouples, voltages, mV-voltages (-125 to 1100 mV)		
Sensor connection	Pt100, two-wire, three-wire, four-wire, thermocouple with internal reference junction		
Features	<ul style="list-style-type: none"> <li>• Continuous sensor monitoring and self-monitoring</li> <li>- Supply voltage monitoring</li> <li>- Wire break and corrosion monitoring</li> <li>• Sensor error adjustment</li> <li>• Electrical isolation</li> </ul>		
Indicator (optional)	Transmitter-controlled, graphical (alphanumeric) LCD indicator for process value, sensor value and actual value		-
Configuration	Via DTM, EDD, FIM		
Functional safety	SIL2, SIL3 in a double configuration in accordance with IEC 61508		
Approvals	IECEx, ATEX, FM, CSA, GOST / EAC-Ex, further approvals in preparation		
Data sheet	DS/TTH200	DS/TTF200	DS/TTR200



# Temperature transmitter series 300

## For most demanding applications

Product types	TTH300	TTF300
		
<b>Communication protocol</b>	HART, FOUNDATION Fieldbus, PROFIBUS PA	
<b>Device type</b>	Head-mount	Field-mount, single-compartment housing, 2 cable glands
<b>Input</b>	Two sensor inputs - Resistance thermometers, resistance-type remote sensors (0 to 5000 Ohm) - Thermocouples, voltages, mV voltages (-125 to 1100 mV)	
<b>Sensor connection</b>	<ul style="list-style-type: none"> <li>• Pt100, two-wire, three-wire, four-wire, thermocouple with internal reference junction</li> <li>• 2x Pt100 two-wire and three-wire, 2x thermocouple or 1x Pt100 two-wire, three-wire, four-wire and 1x thermocouple</li> </ul>	
<b>Features</b>	<ul style="list-style-type: none"> <li>• Continuous sensor monitoring and self-monitoring               <ul style="list-style-type: none"> <li>- Supply voltage</li> <li>- Wire break and corrosion monitoring</li> </ul> </li> <li>• Sensor error adjustment</li> <li>• Electrical isolation</li> <li>• Specific linearization               <ul style="list-style-type: none"> <li>- Callendar-Van Dusen coefficient, value pair table / 32 points</li> </ul> </li> </ul>	
<b>Indicator (optional)</b>	Transmitter-controlled, graphical (alphanumeric) LCD indicator with dual function: - Configuration of the transmitter via buttons - Process, sensor and actual values display	
<b>Configuration</b>	Via HART (DTM, EDD, HMI), FF (EDD, HMI), PA (DTM, EDD, HMI, GSD), FIM	
<b>Functional safety</b>	HART, SIL2, SIL3 in a double configuration in accordance with IEC 61508	
<b>Approvals</b>	IECEX, ATEX, FM, CSA, GOST / EAC-Ex, further approvals in preparation	
<b>Certificates</b>	MID certificate in accordance with EC directive 2014/32/EU for custody transfer metering	
<b>Data sheet</b>	DS/TTH300	DS/TTF300



# Temperature transmitter

## First choice for any application

01 Rail-mount temperature transmitter TTR200

02 Field-mount temperature transmitter TTF300

### Reliable temperature measurement

A typical power plant has hundreds of temperature measurements. Most of them are concerned with the burning of fuel to raise steam for the massive turbines which power the generators. A wide range of operation is demanded from a temperature sensor used in this application. The majority of these measurements are therefore made using thermocouples, which are ideally suited due to their wide temperature range.

#### Intelligent solution for temperature measurement

The TTR200 temperature transmitter is designed for rail mounting in cabinet racks. It is a version of the TTH200 transmitter with the addition of two LEDs. A green LED indicates that the transmitter is powered, whilst a red LED would indicate a fault in either the unit or the sensor. The TTR200 converts the voltage signal of the thermocouple to a robust communication protocol such as 4 to 20 mA or HART. Nevertheless thermocouple signals are very small, with the correct compensation cable they can run over relatively long distances without any significant loss in accuracy. The thermocouple sensors themselves are very quick to respond to temperature changes and extremely robust.

#### TTR200 transmitter benefits

- Simplified storage by universal input
- Hardware-write protection

### Comfortable temperature measurement

Certain process conditions do not allow the direct head-mounting of transmitters. The reason may be particularly high or low temperatures, which have a negative effect on the lifetime of the electronics. Vibrations or electromagnetic sources in the immediate vicinity can affect the measurement. In the case of measuring points that are not easily accessible, it is also difficult to read or configure on site.

#### The solution

With TTF200 and TTF300 field-mount temperature transmitters, ABB offers cost-effective solutions for both standard applications and applications that are more demanding. A version with stainless steel housing allows it to be used in harsh ambient conditions at temperatures down to  $-50\text{ }^{\circ}\text{C}$  ( $-58\text{ }^{\circ}\text{F}$ ). The devices are available with an indicator, which optionally also allows configuration on site without additional handheld terminal. Sensor redundancy, sensor drift monitoring and freestyle characteristic are available.

The electronics are completely sealed and thus protected against external influences so that the transmitters are characterized by high reliability and long-term stability. With their approvals for different application environments and SIL2/SIL3, they meet all requirements of the process industry.

01



02



# Temperature measurement under control

## LCD indicator

### ABB operation concept

Temperature sensors and transmitters are optionally equipped with an LCD indicator. With it, all the relevant parameters can be viewed on the spot. The LCD indicator is offered in two variants: with and without push buttons for configuring device parameters. The menu navigation takes place via the integrated display and four buttons. It is intuitive and user-friendly. Buttons and LCD indicator are located under a housing cover with a viewing window for protection.

### The following functions and parameters can be set:

- Sensor configuration
- Measuring ranges, limit values
- Behavior in the event of an error (HART version)
- Software-write protection
- Device address for fieldbus communication
- Diagnostic information

### PSA (Product Selection Assistant)

The PSA is an Internet-based tool for simpler selection and engineering of temperature measuring devices. By entering application-oriented boundary conditions, the optimization towards the desired requirements gradually takes place. The result is a measuring device that is ideally suited to the process in question.



[abb.de/temperature-selector](http://abb.de/temperature-selector)

LCD indicator  
with push buttons for  
configuration

LCD indicator



### Trademarks

HART is a registered trademark of HART Communication Foundation  
PROFIBUS and PROFIBUS PA are registered trademarks  
of PROFIBUS & PROFINET International (PI)  
FOUNDATION Fieldbus is a registered trademark  
of FieldComm Group, Austin, Texas, USA



—

**ABB Limited**

**Measurement & Analytics**

Howard Road, St. Neots  
Cambridgeshire, PE19 8EU  
UK

Tel: +44 (0)1480 475 321

Fax: +44 (0)1480 217 948

Email: [instrumentation@gb.abb.com](mailto:instrumentation@gb.abb.com)

**ABB Inc.**

**Measurement & Analytics**

125 E. County Line Road  
Warminster, PA 18974  
USA

Tel: +1 215 674 6000

Fax: +1 215 674 7183

**ABB Automation Products GmbH**

**Measurement & Analytics**

Schillerstr. 72  
32425 Minden  
Germany

Tel: +49 571 830-0

Fax: +49 571 830-1806

**[abb.com/measurement](http://abb.com/measurement)**