SensyTemp TSP131, TTH200, TTH300, NINVA TSP341-N

Temperature measurement in steam pipes of chemical plants

Safeguard processes and production operations by measuring the temperature of supplied steam

Measurement made easy

Introduction

In chemical installations, process steam is used to heat processes or as a heat carrier. The steam is generated centrally before being transported via large pipelines to the various parts of the installation, from where it is distributed. To safeguard the processes and production operations that rely on the supply of steam, the temperature of the steam is measured at numerous points in the system.

Moreover, the energy consumed by a part of the installation, or a process can be recorded by measuring the temperature of the steam upstream and downstream in conjunction with flow measurement and a calculation tool.

Additional Information

Additional documentation on temperature measurement in steam pipes of chemical plants is available for download free of charge at www.abb.com/temperature.

Alternatively simply scan one of this codes:

TSP131 **TTH200** **TTH300** **TSP341-N**

Application requirements

- Reliable supply with steam as heating medium
- Continuous monitoring of steam temperature
- Reliable measurement despite high mechanical load

Description of the measuring task

To measure the steam temperature in pipelines with a nominal diameter of DN 200, for example, which are used to transport steam to the various parts of an installation.

The pipes typically carry steam at moderate pressures of approximately 25 bar. The temperatures can vary from saturated to superheated conditions between 220 to 350 °C. The temperature sensors must be able to accurately capture the temperature changes of the flow and withstand flow velocities up to 50 m/s. In all cases, these process conditions put a terrific amount of stress on the performance requirements of the measurement.

The ability to calibrate and maintain the measurement throughout the plant lifecycle is an important factor. The majority of the pipes are fully insulated and the selection of extension tubes and sensors must be routed out of the insulation to allow for ease of maintenance and calibration. The transmitter used must provide comprehensive diagnostics on the status and performance of the measurement system.

Carrying out the measuring task

An established approach is to use the SensyTemp TSP131 weld-in resistance thermometer to carry out the measurement task. This sensor integrates one of the worlds most trusted temperature transmitters, the TTH300 or TTH200 into the head to provide a repeatable and robust measurement.

The process conditions described require high mechanical strength on the part of the temperature sensor. The SensyTemp TSP131 can be relied upon for safe and reliable measurement of steam temperature at measuring points. To meet requirements for measuring accuracy, resistance thermometers are used instead of thermocouples.

On account of the high pressure and high flow rates, Form 4 weld-in resistance thermometers to DIN 43772 should be used. The risk of the thermowell breaking due to vibrations caused by vortex shedding is low with this design. Under the given operating conditions, the stainless steel 1.4571 from which the sheath is made is resistant up to 400 °C. Welded spuds are also used.

The SensyTemp temperature sensors described are particularly sturdy. They have been designed for trouble-free operation. Maintenance is not required.

Accurate measurement without shutting down – A non-invasive revolution

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01 Superheated steam measurement with an energy supplier in Germany (DN 125 Steel piping, 7 bar steam pressure, with a nominal flow rate of 7 t/h)

With the increasing pressure to monitor and improve energy efficiency, existing plants have the challenge of optimizing their processes without the luxury of shutting down. Measuring temperature is an essential approach to determining the state of the steam at various points is a system to detect if unwanted pressure drops, poor insulation or even leaks are compromising the integrity of the system. However, the challenge is still obtaining a reliable measurement without having to shutdown to put in an invasive thermowell based measurement - until now.

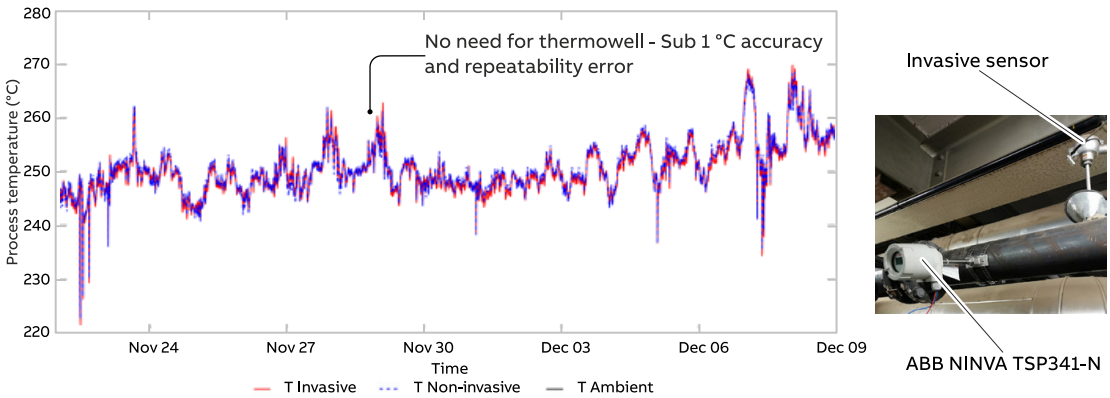
ABB's award winning NINVA TSP341-N, is a non-invasive approach to temperature measurement that converts any piece of piping into a temperature sensor by clamping onto the pipe.

A single variant of the sensor measures process temperatures up to 400 °C* and covers all the typical piping dimensions in a plant. With well-established physics and proven performance (see example in Figure **01**), this sensor provides the ability to accurately measure steam temperature conditions without the need to shutdown and install a thermowell. The NINVA approach opens up new possibilities for cost effectively optimizing steam transfer systems.

* Contact ABB for higher temperature ranges

To see if NINVA TSP341-N will work for your steam process use the performance predictor engineering tool at:

Link / QR Code	
	ABB Performance predictor



01

Product information

— 02 SensyTemp TSP131 temperature sensor

— 03 TTH200 head-mount temperature transmitter

— 04 TTH300 head-mount temperature transmitter

— 05 NINVA TSP341-N non-invasive temperature sensor

SensyTemp TSP131 temperature sensor

02

- DIN 43772 design
- Modular design
- Measuring inset, thermowell, extension tube, connection head, transmitter
- Interchangeable measuring insets
- Global Hazardous Area certifications
- SIL 2

TTH200 head-mount temperature transmitter

03

- HART protocol
- Input functionality without redundancy
- Measuring accuracy: 0.1 K
- Sensor error adjustment
- Optional: LCD indicators with configuration function
- Global Hazardous Area certifications
- SIL 2

TTH300 head-mount temperature transmitter

04

- HART, PROFIBUS PA, FOUNDATION fieldbus-H1
- Input functionality with redundancy
- Measuring accuracy: 0.1 K
- Sensor error adjustment
- Sensor drift monitoring
- Sensor redundancy
- Extended diagnostics
- Optional: LCD indicators with configuration function
- Global azardous Area certifications
- SIL 2

NINVA TSP341-N non-invasive temperature sensor

05

- Uses TTH300-N with non-invasive sensing model
- Surface temperatures up to 400 °C*
- 2 x Class A, IEC60751 Insets
- Single variant for piping from DN 40* to 2500
- Global Hazardous Area certifications

* Contact ABB for higher temperature ranges and smaller diameters

Notes

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Notes

ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/temperature

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