

ABB MEASUREMENT & ANALYTICS | DATA SHEET

NINVA™ TSP341-N

Sensor for non-invasive temperature measurement



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Measurement made easy

A simpler and safer approach to temperature measurement

Safer – no process penetration

- Global approvals for explosion protection up to Zone 0
- Consideration of the NAMUR recommendation NE 24
- Sensor monitoring and self-monitoring (NE 89, NE 107)
- Functional safety SIL2 in accordance with IEC61508

Lower cost of ownership – faster and more cost-effective measurements

- Quick installation for lower installation costs
- No thermowell testing, calculations or exotic materials
- No shutdown required for verification of the measurement

Simpler – straightforward from ordering to maintenance

- Eliminates stocking thermowells and inset length variants
- Single variant for piping from DN 15 to DN 2500 (0.5 to 88 in)
- Plug and play – no need to input pipe size and material

High performance – keep your measurement quality

- Accuracy and response times matching invasive measurements
- Repeatability proven under long term industrial testing
- Based on TTH300 (HART) transmitter with NINVA™ non-invasive temperature model

Introduction

Non-invasive temperature measurement

Classic temperature measurement in process technology is made by directly introducing the temperature sensor into the measuring medium.

The measuring medium (gaseous, liquid or paste-like) is usually in a vessel or piping and highly influences the selection of traditional invasive measurements.

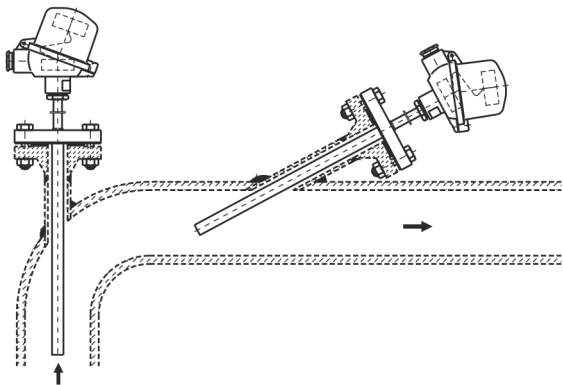


Figure 1: Classic installation of temperature sensors in piping

Depending on the process properties, the temperature sensor needs special protection to protect it from chemical and mechanical loads. For example, abrasive dust or sands, which move through the piping at high speeds, present a special challenge.

To protect the temperature sensor, the thermowells used must be inspected regularly and replaced as needed. Chemically aggressive or abrasive media can lead to the erosion of thermowell material.

A thermowell placed in flowing media can also begin to vibrate due to vortex formation and in extreme cases it can break.

Therefore, guidelines and standards for the stability of thermowells have become more restrictive over time, and so the costs of maintenance and exchange have increased as well. In addition, to prevent potential catastrophic failure, thermowells used must be inspected regularly and replaced as needed in known critical conditions.

These life cycle costs are in addition to capital expenditure costs incurred during planning and designing temperature measurement points. Engineering costs for stability calculations, structural flanges to support and seal the thermowells, and welding and fabrications costs all add up to the total capital expenditure.

The costs mentioned above can be eliminated if the process temperature could be measured non-invasively. Using ABB's non-invasive approach, it is possible to get an accurate measurement of the process temperature without the need for a thermowell.

The NINVA™ TSP341-N* temperature sensor now combines non-invasive temperature measurement with the established HART® communications protocol in two-wire technology. Therefore, the device can be integrated seamlessly in existing and future process facilities.

The 'N' in TSP341-N stands for non-invasive temperature measurement and can turn a metal pipe carrying a process media into a temperature sensor. Using model based algorithms in the transmitter electronics to compensate for ambient and surface contact conditions, a NINVA delivers an accurate measurement of the true surface temperature of the pipe. When coupled with process conditions, the sensor provides a non-invasive approach to measure the process temperature without the need for a thermowell for the process conditions.

A non-invasive approach to temperature measurement is well suited for turbulent, liquid like flows in metal pipes where the surface temperature is well correlated with the bulk temperature of the process media. The sensor can be effectively used in the wide range of possible process and piping conditions without any need for the input of process or piping specification into the device. Please see more details in the 'how to effectively use a non-invasive measurement' section in the **operating instructions**.

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

... Introduction

System design

The TSP341-N temperature sensor contains a TTH300-N temperature transmitter with integrated calculation algorithms for non-invasive temperature measurement. The transmitter has an analog 4 to 20 mA current output and supports communication through the HART 7® protocol.

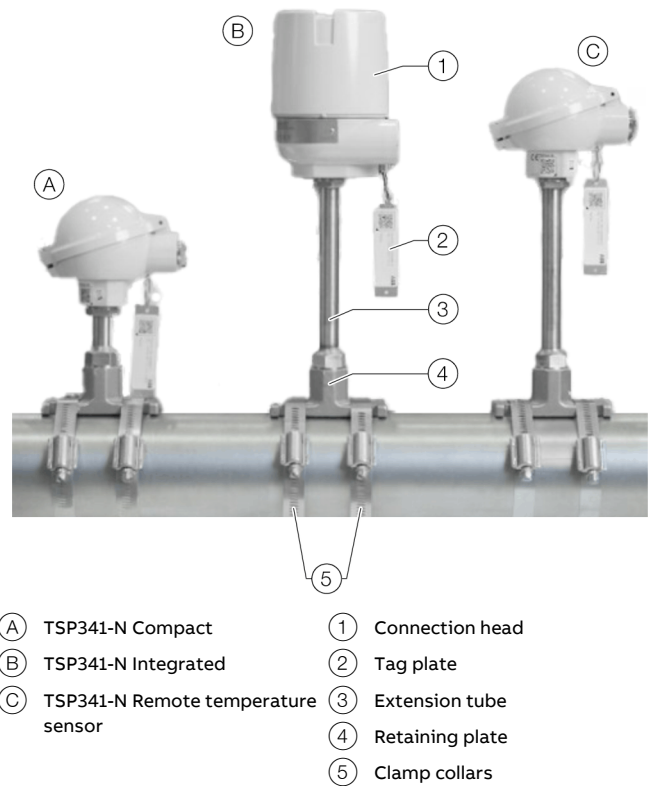
The transmitter is connected to two connected temperature sensors. One sensor (sensor 1) measures the contact temperature at the measuring point, while a second sensor (sensor 2) measures the ambient temperature at a reference test point near the measuring point.

There are four installation variants for non-invasive temperature measurement:

- **TSP341-N Integrated** – TSP341-N with integrated head-mount transmitter TTH300-N
- **TSP341-N Remote temperature sensor** – TSP341-N with connected field mount transmitter TTF300-N
- **TSP341-N Compact** – TSP341-N with integrated head-mount transmitter TTH300-N for high vibration
- **TSP341-N Compact remote temperature sensor** – TSP341-N for high vibration with connected field mount transmitter TTF300-N

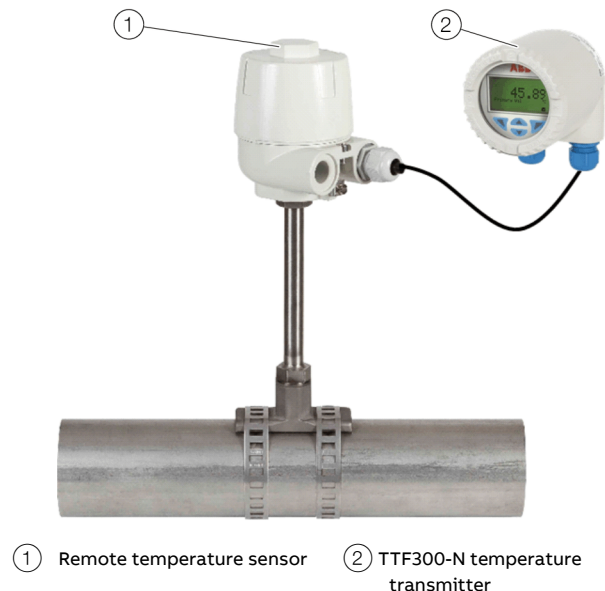
By using the algorithms for accurate non-invasive temperature calculation, a process temperature range of -40 to 400 °C (-40 to 752 °F) with an ambient temperature of (-40 to 177 °F) is covered. In a remote configuration, process temperatures up to 550 °C (1022 °F) are possible. The remote sensor can be operated with ambient temperatures up to 100 °C (212 °F).

The transmitter can be configured using the LCD indicator with configuration function or the device driver provided by ABB for TSP341-N / TTx300-N (FDIX, EDD, DTM) in accordance with the current conditions of use.



- | | |
|--|---------------------|
| (A) TSP341-N Compact | (1) Connection head |
| (B) TSP341-N Integrated | (2) Tag plate |
| (C) TSP341-N Remote temperature sensor | (3) Extension tube |
| | (4) Retaining plate |
| | (5) Clamp collars |

Figure 2: TSP341-N terminology



- | | |
|-------------------------------|--------------------------------------|
| (1) Remote temperature sensor | (2) TTF300-N temperature transmitter |
|-------------------------------|--------------------------------------|

Figure 3: Installation of the TTF300-N with the TSP341-N Remote temperature sensor

For non-invasive temperature measurement, the temperature sensor is fastened to a piping or vessel surface. Installation is made using two clamp collars, which fix the retaining plate to the pipe.

Clamps with different expansion coefficients are available to adapt to the piping or vessel material. For a good measurement, the surface under the retaining plate should be straight, and cleaned to remove any particles or dust. The presence of standard paint coatings (up to 300 µm) on a surface have a minimal effect on the absolute accuracy. For larger organic or non-thermally conductive coatings, please see more details in the section 'How to effectively use a non-invasive measurement' in the **operating instructions**.

During installation, make sure that the measuring tip with the integrated sensor element has optimal contact with the measuring point.

In addition, insulation to minimize the effect of humidity (rain and ice) and wind on the pipe surface temperature is recommended.

Note

Verify the expected measurement performance:

Input nominal process parameters and pipe dimensions into the **ABB performance predictor** to obtain an expected steady state result of a NINVA™ measurement. If the outcome is satisfactory for the application, proceed with the installation.

[ABB performance predictor](#)



Overview of temperature sensors

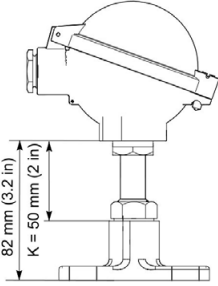
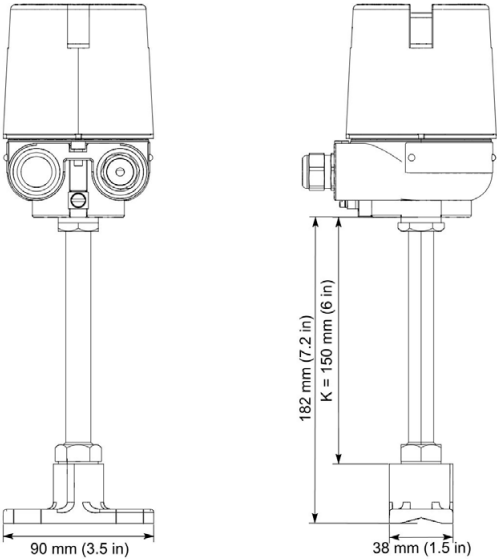
Type	TSP341-N Compact	TSP341-N Integrated
		
Design	Temperature sensor with or without integrated transmitter for surface mounting	
	Note If devices are to be used in potentially explosive atmospheres, the temperature and electric data in accordance with the separate safety instructions document must be maintained.	
Components	Retaining plate, measuring inset with measuring tip, extension tube, connection head, temperature transmitter, optional LCD indicator	
Materials	Retaining plate: stainless steel 1.4408 (J92900) Measuring inset: stainless steel 1.4571 (ASTM 316Ti) Measuring tip: pure nickel 2.4068 (LC-Ni99)	Extension tube: stainless steel 1.4571 (ASTM 316Ti) Gasket for connection head: EPDM (ethylene propylene diene-monomer rubber)
Casting compound used for the device electronics	Polyurethane (PUR)	
Process connection	Surface mounting to piping	
Transport temperature / storage temperature	-20 to 70 °C (-4 to 158 °F)	
Ambient temperature range at connection head	Without integrated transmitter: -40 to 100 °C (-40 to 212 °F)** With integrated transmitter: -40 to 85 °C (-40 to 185 °F)	
Vibration resistance	TSP341-N Integrated: up to 2 g with BUZ head up to 1 g with AGx head TSP341-N Compact: up to 4 g	
Measuring range (surface temperature)	TSP341-N Integrated: -40 to 400 °C (-40 to 752 °F)* TSP341-N Compact: -40 to 135 °C (-40 to 275 °F)	
Sensor	Thin film resistor Pt100 in three-wire circuit, accuracy class A in accordance with IEC 60751, measuring range -40 to 400 °C (-40 to 752 °F)	
Extension tube	Diameter: 15 mm (0.59 in) Length: TSP341-N Integrated: K = 150 mm (6 in) TSP341-N Compact: K = 50 mm (1.96 in)	
	Note For the distance from connection head to piping include additional ≈32 mm (≈1.3 in) for the retaining plate.	
Clamp collars	Clamp collars for a variety of thermal expansion coefficients are available. Clamp collars are available for pipe diameters of 15 to 2500 mm (DN 15 to 2500, 0.5 in to 88 in) Recommendation for pipes and vessels made of chrome steel or carbon steel Clamp collar material: chrome steel 1.4016 (ASTM 430), $\alpha = 10$ to $10.5 \times 10^{-6}/K$ Recommendation for pipes and vessels made of chrome-nickel steel Clamp collar material: stainless steel 1.4301 (ASTM 316), $\alpha = 16$ to $17.5 \times 10^{-6}/K$	

Table 1: Overview

* Higher temperature ranges available for TSP341-N Remote temperature sensor. Please contact your ABB sales representative

** Without cable gland. When used with a cable gland, the temperature range of cable gland must be considered.

Specification

Measuring accuracy

The temperature sensors used correspond to accuracy class A in accordance with the IEC 60751 standard, measuring range -40 to 400 °C (-40 to 752 °F).

For digital and sensor accuracy calculations please refer to the **TTH300 datasheet**.

Both temperature sensors of the TSP341-N temperature sensor are connected in a three-wire circuit.

Vibration resistance

Unlike invasive thermowell measurements, the sensor is not subject to the vibration loads of the process flow but those of the piping. The piping vibrations are orders of magnitude less than those experienced by devices in the flow.

The temperature sensor with the AGL or AGLD connection head in accordance with IEC 60068-2-6:

- 10 to 58 Hz: 0.075 mm (0.003 in)
- > 58 to 2000 Hz: 10 m/s² (1 g)

Shock resistance:
50 ms⁻¹ (5 g)

The temperature sensor with BUZ connection head without transmitter in accordance with IEC 60068-2-6:

- 10 to 58 Hz: 0.15 mm (0.003 in)
- > 58 to 2000 Hz: 20 m/s² (2 g)

Shock resistance:
50 ms⁻¹ (5 g)

The TSP341-N Compact high vibration temperature sensor is available with a BUZ head with and without transmitters in accordance with DNV-CG-0339:

- High vibration strain Class B, 40 m/s² (4.0 g)

Electromagnetic compatibility

Emitted interference and interference immunity in accordance with

- IEC EN 61326-1
- IEC EN 61326-3-2
- NAMUR NE 21

SIL functional safety

The following two variants of the non-invasive temperature measurement devices meet the SIL safety requirements for the integration in Safety Instrumented Systems in compliance to IEC 61508:2010 within the process industry sector according to IEC 61511:2016:

- 'TSP341-N Integrated with integrated head-mount transmitter TTH300-N'
- 'TSP341-N Remote temperature sensor with connected field mount transmitter TTF300-N'

The area of SIL safety applications is limited to:

- up to SIL 2 as single (HFT=0) transmitter installation
- for the 'Low Demand Mode' safety operation

Detailed information can be found in the SIL-Safety Manual.

Insulation resistance of measuring inset

The insulation resistance is measured between the outer sheath and both measuring loops. In addition, the insulation resistance between both measuring loops is also measured. Thanks to a special process used during manufacturing, ABB measuring insets can boast outstanding insulation values even at high temperatures.

Insulation resistance R_{i50}
≥ 500 MΩ with a ambient temperature range from
15 to 35 °C (59 to 95 °F)

Air humidity
< 80 %

Extension tube

The extension tube as a module between the retaining plate and connection head allows for the use of insulation material at the measuring point.

Without insulation, the extension tube serves as a cooling line between the temperature-sensitive electronics of the transmitter in the connection head and the hot piping surface. The protection of the electronics from excessive temperatures should be ensured through suited measures.

Extension tube length

TSP341-N Integrated: K = 150 mm (6 in)*
TSP341-N Compact: K = 50 mm (1.96 in)*

* Plus the height of the retaining plate of approx. 32 mm (1.3 in).

Extension tube outer diameter

15 mm (0.59 in)

Extension tube material

Stainless steel 1.4571 (ASTM 316Ti)

Connection heads

Functions of the connection head

- Housing of a transmitter and the optional LCD indicator or a terminal block
- Protection of the connection area against adverse environmental influences

When the connection cable is fed into the connection head, a special cable guide cable automatically positions it inside the connection area. The flat base of the housing ensures optimum access to the connection area.

Ambient temperature at connection head

Connection head without transmitter and without cable gland	-40 to 100 °C (-40 to 212 °F)
Connection head with transmitter	-40 to 85 °C (-40 to 185 °F)

Note

When using the device in potentially explosive atmospheres, restrictions of the ambient temperature range are possible. The notes in the corresponding declarations of conformity and type examination certificate should be complied with.

When using a surface sensor, temperature measurement is performed in direct contact with the hot surface. Without suited insulation of the measuring point, the permissible ambient temperature must be reduced to prevent an up-scale of limit values.

The following table shows as an example the maximum ambient temperature $T_{amb.}$ for the TSP341-N at different surface temperatures $T_{surf.}$ for the TSP341-N with integrated LCD indicator.

Surface temperature $T_{surf.}$	Maximum permissible ambient temperature $T_{amb.}$
100 °C (212 °F)	66 °C (150.8 °F)
200 °C (392 °F)	61 °C (141.8 °F)
300 °C (572 °F)	58 °C (136.4 °F)
400 °C (752 °F)	55 °C (131.0 °F)

Table 2: Ambient temperature as a function of surface temperature

Note

The operator must make sure, with the help of measurements if needed, that the maximum permissible temperature **in the connection head** is not up-scaled in intrinsically safe devices.

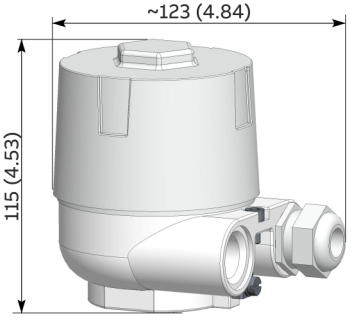
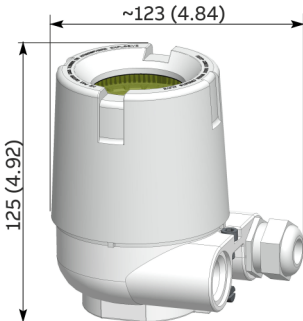
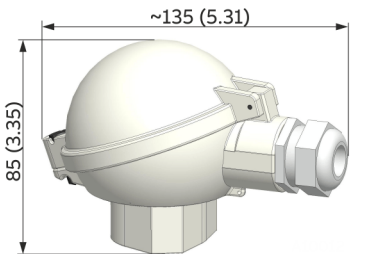
Head form	AGL / AGS	AGLD / AGSD	BUZ head
			
Material	AGL: Aluminum, epoxy-coated AGS: Stainless steel (1.4404/316L)	AGLD: Aluminum, epoxy-coated AGSD: Stainless steel (1.4404/316L)	Aluminum, epoxy-coated
Cover locking system	Screw-on cap		Hinged cover with screw plug
Cable entry	M20 × 1.5, optional cable entry ½ in NPT, without screwed connection		
IP rating	IP 66 / IP 67		IP 66
Transmitter mounting	On the measuring inset		

Table 3: Overview of connection heads

Dimensions in mm (in)

Transmitter

The TSP341-N temperature sensor contains a TTH300-N temperature transmitter with integrated calculation algorithms for non-invasive temperature measurement. The transmitter has a current output of 4 to 20 mA and communication through the HART 7 protocol.

Installing a transmitter has the following advantages:

- Cost savings due to reduced wiring costs
- Amplification of the sensor signal at the measuring point and conversion to a standard signal (thereby increasing the signal's interference immunity).
- Option to install an LCD display in the connection head

The transmitter built into the TSP341-N has algorithms enabling accurate temperature calculation for the defined process temperature range.

For this purpose, the current ambient temperature is considered in addition to the measured surface temperature. Self-heating of the transmitter should be neglected.

The transmitter has continuous sensor and self-monitoring (supply voltage monitoring, wire break / corrosion monitoring in accordance with NE 89) and supplies diagnostic information in accordance with NE 107.

HART Device Type ID

TSP341-N: 0x1A4E

Write protection

Software write protection

Note

For additional information on the transmitter please refer to the **TTH300 datasheet**.

LCD-indicator



- | | |
|-----------------|------------------|
| ① Quit / Cancel | ③ Scroll forward |
| ② Scroll back | ④ Select |

Figure 4: LCD indicator

CE-Marking

The LCD indicator fulfills all requirements for CE marking in accordance with all applicable guidelines.

Properties

Transmitter-controlled graphic (alphanumeric) LCD indicator

- Character height, mode-dependent
- Sign, 4 digits, 2 decimal places
- Bar graph display
- Turnable in 12 increments of 30° each

Display options

Process information and display diagnostic information related to transmitter and sensor status.

- Display of either one or two process values
- Advanced diagnostics: Error display in plain text with possible shutdown measures. Display of multiple simultaneous diagnoses.

... Transmitter

... LCD-indicator

Specification

Temperature range

-40 to 85 °C (-40 to 185 °F)

Restricted display function (contrast, reaction time) in the temperature ranges:

- -50 to -20 °C (-58 to -4 °F) or
- 70 to 85 °C (158 to 185 °F)

Air humidity

0 to 100 %, condensation permitted

Configuration function

- Sensor configuration for standard sensors
- Measuring range
- Behavior in the event of a fault (HART)
- Software write protection for configuration data
- Device address for HART

Use in potentially explosive atmospheres

ATEX and IECEx

Notes

- The temperature sensor TSP341-N belongs to ABB's product family SensyTemp TSP. It is listed in the related type examination certificates for explosion protection as SensyTemp TSP341-N.
- Further information on the approval of devices for use in potentially explosive atmospheres can be found in the explosion protection test certificates (at www.abb.com/temperature).
- Depending on the design, a specific marking in accordance with ATEX or IECEx applies.
- A list of standards, including the output data to which the device conforms, can be found in the examination certificate or manufacturer's declaration supplied with the device.
- Devices with several types of protection may only be operated in one of the possible types of protection.
- In devices with several types of protection, for example TTD300-E4, observe the 'Product Identification' chapter in the operating or commissioning instruction before commissioning.

Ex marking

ATEX intrinsic safety

Approved for use in Zone 0 & 1

Model TSP341-N-D2

Type examination certificate:	PTB 18 ATEX 2002 X
Ex marking	ATEX II 1 G Ex ia IIC T6...T1 Ga ATEX II 2 G Ex ib IIC T6...T1 Gb

ATEX intrinsic safety in accordance with NAMUR NE 24

Approved for use in Zone 0 & 1

Model TSP341-N-N3

Type examination certificate:	PTB 18 ATEX 2002 X
Ex marking	NE24 and ATEX II 1 G Ex ia IIC T6...T1 Ga NE24 and ATEX II 2 G Ex ib IIC T6...T1 Gb

ATEX flameproof enclosure

Approved for use in Zone 1

Model TSP341-N-D7

Type examination certificate:	PTB 99 ATEX 1144 X
Ex marking	ATEX II 2 G Ex db IIC T6/T4 Gb

IECEx intrinsic safety

Approved for use in Zone 0 & 1

Model TSP341-N-J2

Type examination certificate:	IECEx PTB 18.0041 X
Ex marking	Ex ia IIC T6...T1 Ga Ex ib IIC T6...T1 Gb

IECEx flameproof enclosure

Approved for use in Zone 1

Model TSP341-N-J7

Type examination certificate:	IECEx PTB 12.0039 X
Ex marking	Ex db IIC T6/T4 Gb

... Use in potentially explosive atmospheres

cFMus, FM and CSA

Note

- Further information on the approval of devices for use in potentially explosive atmospheres can be found in the explosion protection test certificates (at www.abb.com/temperature).
- Depending on the design, a specific marking in accordance with FM, CSA or cFMus applies.

Ex marking

cFMus Intrinsically Safe

Model TSP341-N-L1H for USA

Model TSP341-N- R1H for Canada

Control Drawing TSP341-N-L1H

IS Class I,II,III, Div. 1,2 Group ABCDEFG T6, T4

Zone 0 AEx/Ex ia IIC T6, T4 Ga

Zone 1 AEx/Ex ia IIC T6, T4 Gb

Ta= -40°C up to +81°C

Model TSP341-N-L1Y, for USA and Canada

(without Transmitter, AGL head)

Control Drawing TSP341-N-L1Y

IS Class I,II,III, Div. 1,2 Group ABCDEFG T6,T4

Zone 0 AEx/Ex ia IIC T6, T4 Ga

Zone 1 AEx/Ex ia IIC T6,T4 Gb

Ta= -40°C up to +100°C

Model TSP341-N-L1YB, for USA and Canada

(without Transmitter, BUZ head)

Control Drawing TSP341-N-L1YB

IS Class I, Div. 1,2 Group ABCD T6,T4

Zone 0 AEx/Ex ia IIC T6, T4 Ga

Zone 1 AEx/Ex ia IIC T6,T4 Gb

Ta= -40°C up to +100°C

cFMus Non-Incendive

Model TSP341-N-L2H for USA

Model TSP341-N-R2H for Canada

Control Drawing TSP341-N-L2H

NI Class I,II,III, Div. 2 Group ABCDEFG T6, T4,

Zone 2 AEx/Ex nA IIC T6, T4 Gc

Zone 2 AEx/Ex ec IIC T6, T4 Gc

Ta= -40°C up to +81°C

Model TSP341-N-L2Y, for USA and Canada

(without Transmitter, AGL head)

Control Drawing TSP341-N-L2Y

NI Class I,II,III, Div. 2 Group ABCDEFG T6,T4,

Zone 2 AEx/Ex nA IIC T6,T4 Gc

Zone 2 AEx/Ex ec IIC T6,T4 Gc

Ta= -40°C up to +96°C

Tests and certificates

In order to increase the safety and accuracy of the process, ABB offers various mechanical and electrical tests. The results are confirmed with certificates in accordance with EN 10204.

The following certificates are issued:

- Declaration of compliance 2.1 for order conformity
- Inspection certificate 3.1 for visual, dimensional and function checks of the temperature sensor
- Inspection certificate 3.1 acc. EN 10204 for sensor calibration, double RTD and TSP341-N
- DAkkS sensor calibration, double RTD and TSP341N, calibration certificate per thermometer

Additional ordering information

TSP341-N	XX	XXX	XXX	XX	XX
Sensor for non-invasive temperature measurement					
Declarations and Certificates					
SIL 2 - Certificate acc. to IEC 61508 for sensor with integrated transmitter	CS ⁴⁾				
Declaration of compliance with the order 2.1 acc. EN 10204	C4				
Inspection certificate 3.1 acc. EN 10204 for visual, dimensional and functional test	C6				
Inspection certificate 3.1 acc. EN 10204 for sensor calibration, double RTD and TSP341-N	CE				
DAkKS sensor calibration, double RTD and TSP341N, calibration certificate per thermometer	CJ				
Other certificates	CZ				
Handling of Certificates					
Send with Instrument		GHA			
Send via e-mail		GHE			
Send via e-mail and with instrument		GHC			
Approvals					
PAC-K - Metrological Pattern Approval Certificate for Kazakhstan					CGK ⁴⁾
Number of Test Points					
1 point					P1
2 points					P2
3 points					P3
4 points					P4
5 points					P5
Temperatures for Sensor Calibration					
Standard calibration: 0 °C (32 °F)					V1
Standard calibration: 100 °C (212 °F)					V2
Standard calibration: 0 °C and 100 °C (32 °F and 212 °F)					V4
Standard calibration: 0 °C, 100 °C and 200 °C (32 °F, 212 °F and 392 °F)					V7
Standard calibration: Customer specific temperatures					V6
DAkKS calibration: 0 °C (32 °F)					D1
DAkKS calibration: 100 °C (212 °F)					D2
DAkKS calibration: 400 °C (752 °F)					D3
DAkKS calibration: 100 °C (212 °F)					D4
DAkKS calibration: 0 °C and 400 °C (32 °F and 752 °F)					D5
DAkKS calibration: 0 °C, 100 °C and 200 °C (32 °F, 212 °F and 392 °F)					D7
DAkKS calibration: 0 °C, 200 °C and 400 °C (32 °F, 392 °F and 752 °F)					D8
DAkKS calibration: Customer specific temperatures					D6

... Ordering Information

... TSP341-N

TSP341-N	XX	XX	XX	XX	XX	XX	XX
Sensor for non-invasive temperature measurement							
Cable Entry Options							
1 × M20 × 1.5, without cable gland	U1						
1 × 0.5 in NPT, without cable gland	U2						
Display Type							
Configurable LCD Indicator type A		L2					
Other Options							
Earth screw outside housing				PG ⁵⁾			
Name plate stainless steel, standard plate for TSP300				PV			
Others				PZ			
Documentation Language							
German					M1		
English					M5		
Language package Western Europe / Scandinavia (Languages: DA, ES, FR, IT, NL, PT, FI, SV)					MW		
Language package Eastern Europe (Languages: EL, CS, ET, LV, LT, HU, HR, PL, SK, SL, RO, BG)					ME		
Hardware Version							
Hardware 02.00						Z2	
TAG Plate							
On stainless steel plate							T1
Additional Identification Plate							
Stainless steel plate with customer specific text							T2
Adhesive label							T3

1) Not recommended for new installations

2) Only available for TSP341-N Compact

3) Larger diameters than those indicated here can be achieved by combining clamp collar sets available in accessories.

4) Not available for TSP341-N Compact

5) Only available for: BUZ - aluminum, hinged cover

6) Only available for: Without explosion protection

Accessories

NINVA Clamp set 3KXT081202V -		XX	XX	XXX
Version				
SAE Standard J1508, Type HD, Worm-drive hose clamp, 16 mm (0.63 in) Band, 8 mm (0.32 in) Hexagonal screw		S1		
Others		Z9		
Material				
Stainless steel 1.4401 / AISI 316, austenitic			M1	
Stainless steel 1.4016 / AISI 430, ferritic			M2	
Others			Z9	
Nominal pipe diameter				
DN 15 to DN 25 (0.5 in to 0.75 in), 2x SAE No. 175. Clamping range: 25 to 44 mm (0.98 to 1.73 in)				D02
DN 32 (1.25 in), 2x SAE No. 262, Clamping range: 44 to 66 mm (1.73 to 2.59 in)				D03
DN 40 (1.5 in), 2x SAE No. 262, Clamping range: 44 to 66 mm (1.73 to 2.59 in)				D04
DN 50 (2 in), 4x SAE No. 175, Clamping range: 50 to 88 mm (1.96 to 3.46 in)				D05
DN 65 (2.5 in), 2x SAE No. 362, Clamping range: 69 to 92 mm (2.71 to 3.62 in)				D06
DN 80 (3 in), 6x SAE No. 175, Clamping range: 75 to 132 mm (2.95 to 5.19 in)				D07
DN 100 (4 in), 2x SAE No. 512, Clamping range: 107 to 130 mm (4.21 to 5.11 in)				D08
DN 125 (5 in), 8x SAE No. 175, Clamping range: 100 to 176 mm (3.93 to 6.92 in)				D09
DN 150 (6 in), 4x SAE No. 362, Clamping range: 139 to 184 mm (5.47 to 7.24 in)				D10
DN 200 (8 in), 2x SAE No. 912, Clamping range: 209 to 231 mm (8.22 to 9.09 in)				D11
DN 250 (10 in), 4x SAE No. 562, Clamping range: 241 to 285 mm (9.48 to 11.22 in)				D12
DN 300 (12 in), 6x SAE No. 462, Clamping range: 285 to 352 mm (11.22 to 13.85 in)				D13
DN 350 (14 in), 6x SAE No. 512, Clamping range: 323 to 390 mm (12.71 to 15.35 in)				D14
DN 400 (16 in), 4x SAE No. 862, Clamping range: 393 to 438 mm (15.47 to 17.24 in)				D15
DN 450 (18 in), 8x SAE No. 512, Clamping range: 431 to 520 mm (16.96 to 20.47 in)				D16
DN 500 (20 in), 8x SAE No. 562, Clamping range: 482 to 571 mm (18.97 to 22.48 in)				D17
DN 550 (22 in), 10x SAE No. 512, Clamping range: 539 to 650 mm (21.22 to 25.59 in)				D18
DN 600 (24 in), 6x SAE No. 862, Clamping range: 590 to 657 mm (23.22 to 25.86 in)				D19
DN 650 (26 in), 6x SAE No. 912, Clamping range: 628 to 695 mm (24.72 to 27.36 in)				D20
DN 700 (28 in), 12x SAE No. 512, Clamping range: 647 to 781 mm (25.47 to 30.74 in)				D21
DN 750 (30 in), 8x SAE No. 812, Clamping range: 736 to 825 mm (28.97 to 32.48 in)				D22
DN 800 (32 in), 8x SAE No. 862, Clamping range: 787 to 876 mm (30.98 to 34.48 in)				D23
DN 900 (36 in), 8x SAE No. 912, Clamping range: 838 to 927 mm (32.99 to 36.49 in)				D24
DN 1000 to DN 1050 (40 in to 42 in), 10x SAE No. 862, Clamping range: 984 to 1095 mm (38.74 to 43.11 in)				D25
Others				Z99

Sensor connection cable 3KXT081200V -		XX
Length		
3 m		L03
5 m		L05
10 m		L10

Description	Order number
Clamp collar set for pipe diameters DN 40 to DN 80 (1.5 in to 3 in) Chrome steel 1.4016 (ASTM 430) ¹⁾	3KXT091100L0002
Clamp collar set for pipe diameters DN 80 to DN 300 (3 in to 12 in) Chrome steel 1.4016 (ASTM 430) ¹⁾	3KXT091100L0005
Clamp collar set for pipe diameters DN 80 to DN 600 (3 in to 24 in) Chrome steel 1.4016 (ASTM 430) ¹⁾	3KXT091100L0007
Clamp collar set for pipe diameters DN 40 to DN 80 (1.5 in to 3 in) Stainless steel 1.4301 (ASTM 304) ¹⁾	3KXT091100L0008
Clamp collar set for pipe diameters DN 80 to DN 300 (3 in to 12 in) Stainless steel 1.4301 (ASTM 304) ¹⁾	3KXT091100L0011
Clamp collar set for pipe diameters DN 80 to DN 600 (3 in to 24 in) Stainless steel 1.4301 (ASTM 304) ¹⁾	3KXT091100L0013



Trademarks

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Service



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