

EPIC® SENSORS

MINERAL INSULATED SENSOR FOR MULTIPOINT MEASUREMENT
TYPE nxT-MP-303
DATA SHEET 25

INSTALLATION INSTRUCTIONS AND USER MANUAL



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Product description and intended use

Sensor types nxT-MP-303 (thermocouple, TC) are mineral insulated multipoint temperature sensors with cable, constructed according to DIN 43721.

Sensors are intended for multipoint measuring applications. Sensor element protection tube material can be chosen, and element / cable length can be produced according to customer needs. Wire and cable sheath materials can be chosen.

Mineral insulated multipoint sensors with cable are used in applications, where temperature values are needed from several points/depths/levels with one sensor installation. Especially suitable for chill mould measurements in steel industry.

Measuring elements are mineral insulated (MI) elements, which have bending features depending on structure and application.

NOTE! Please always ask for further info before bending multipoint elements.

Elements can be TC elements; standard versions are K-type thermocouples. Tailored versions are produced on request.

EPIC® SENSORS temperature sensors are measuring devices intended for professional use. They should be mounted by professionally capable installer who understands the installations surroundings. The worker should understand mechanical and electrical needs and safety instructions of the object installation. Suitable safety gear for each installation task must be used.

Temperatures, measuring

Allowed measuring temperature range for sensor element part is:

- With TC -200...+1200 °C, depending on TC type and cable materials

Allowed maximum temperature for the sealant tube*:

- Max. safe temperature +100 °C

*Sealant tube is the transition point between cable and sensor element, please see *Dimensional drawing*.

Temperatures, ambient

Allowed maximum ambient temperature for wires or cable, according to cable type, is:

- SIL = silicone, max. +180 °C
- FEP = fluoropolymer, max. +205 °C
- GGD = glass silk cable/metal braid jacket, max. +350 °C
- FDF = FEP wire insulation/braid shield/FEP jacket, max. +205 °C
- SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C
- TDT = fluoropolymer wire insulation/braid shield/ fluoropolymer jacket, max. +205 °C
- FDS = FEP wire insulation/braid shield/silicone jacket, max. +180 °C
- FS = FEP wire insulation/silicone jacket, max. +180 °C

Note! Max. safe temperature +100 °C for the sealant tube in cable to sensor element transition.

Make sure the process temperature is not too much for the sensor sealant tube and/or to the cable.

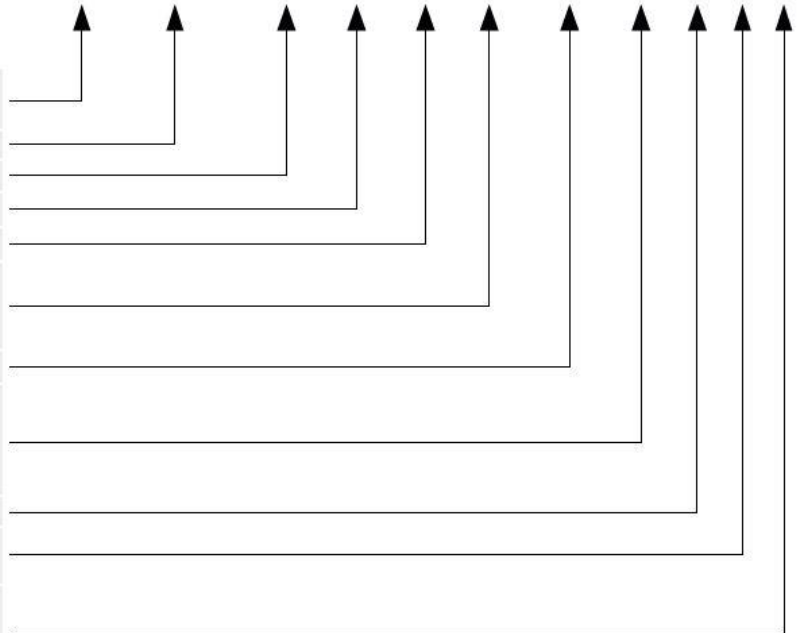
Code key

Product code key

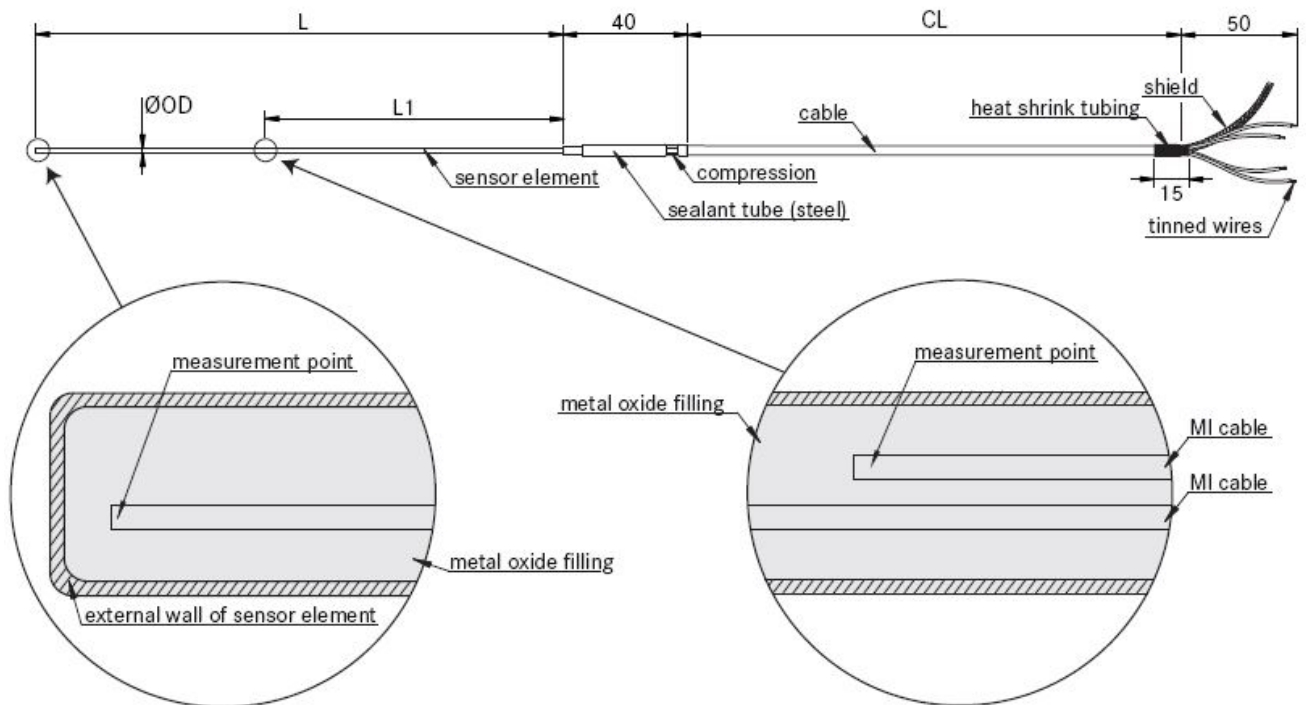
n times the lengths, according to the amount of measurement points

Example code: 2XT – MP – 303 – 2.7 / 2750 / ... / AISI – 5000 / SIL – K – 1 – X

nxT	= n x thermocouple (n = amount of measurement points)
MP-303	= multipoint sensor (constant in code)
2.7	= outer diameter of sensor element (ØOD) [mm]
2750	= MI cable (sensor 1) length, L [mm]
650	= MI cable (sensor 2) length, L1 [mm]
AISI	= AISI316L, max. temp. +550 °C
INCO	= Inconel 600, max. temp. +1100 °C (other materials on request)
5000	= cable length, CL [mm]
SIL, FEP, GGD, FDF, TDT, SDS, FDS, FS	= cable material (for more information, look technical data on first page of the datasheet)
K,N,J	= thermocouple type
1,2,3	= thermocouple accuracy class, (class 1 as standard delivery)
X	= additional details on the text line



Dimensional drawing



Technical data

Materials	AISI 316L, maximum temperature +550 °C, temporarily +600 °C, INCONEL 600, maximum temperature +1100 °C, temporarily +1200 °C Other materials on request (Note. max. safe temperature +100 °C for the sealant tube in cable to sensor element transition)
Tolerances thermocouple (IEC 60584)	Type J tolerance class 1 = -40... 375 °C ±1,5 °C, 375...750 °C ±0,004 x t Types K and N tolerance class 1 = -40...375 °C ±1,5 °C, 375...1000°C ±0,004 x t
Cable materials	SIL = silicone, max. +180 °C FEP = fluoropolymer, max. +205 °C GGD = glass silk cable/metal braid jacket, max. +350 °C FDF = FEP wire insulation/braid shield/FEP jacket, max. +205 °C SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C TDT = fluoropolymer wire insulation/braid shield/fluoropolymer jacket, max. +205 °C FDS = FEP wire insulation/braid shield/silicone jacket, max. +180 °C FS = FEP wire insulation/silicone jacket, max. +180 °C (Note. max. safe temperature +100 °C for the sealant tube in cable to sensor element transition)
Temperature range	-200...+1200 °C depending on thermocouple type and cable material (Note. max. safe temperature +100 °C for the sealant tube in cable to sensor element transition)
Quality certificate	ISO 9001:2015 and ISO 14001:2015 issued by DNV
IP rating	IP65, higher IP rating on request

Materials

These are the standard materials of components for the sensor types nxT-MP-303.

- | | |
|-----------------------------------|--------------------------------------------|
| • Cable/wires | please see <i>Technical data</i> |
| • Heat shrink tube | only on request, not used as standard |
| • Sealant tube | AISI 316L |
| • Sealant / cement | application-specific, ask for more details |
| • Sensor element / MI cable sheet | AISI 316L or INCONEL 600 |

Other materials can be used on request.

Installation instructions

Before any installation, make sure the target process/machinery and site are safe to work!

Make sure the cable type matches the temperature and chemical requirements of the site.

Installation phases:

- Bending the multipoint MI element depends on element structure and application.
 - **NOTE! Please always ask for advice before bending multipoint measuring elements!**
- Insert the measuring element to medium/material to be measured.
- Mount the sensor securely with application-specific mounting accessories.
- Make sure there is no excess bending force loading the cable.
- Mount extra strain relief for cable, if necessary.

Tightening torques

Use only tightening torques allowed in applicable standards of each thread size and material.

Installation of the accessories

Adjustable gland couplings AISI 316:

As accessories there are adjustable gland couplings available, for occasions where the sensor should be installed to a threaded hole in process.

Gland couplings - a.k.a compression fittings - are used with sensing inserts or sensors without wells. The immersion depth of sensing insert can be adjusted, when installing on a thread. Compression fittings have metal ferrules inside. Ferrules are made of stainless steel SS316L (other materials and sizes available upon request). Single or double ferrules are used depending on the inner diameter. By screwing the cap down, the ferrule is permanently pressed on the sensing element. This connection is pressure resistant, which is also reason for the alias name; compression fitting.

Installation phases:

- Screw the coupling in an applicable thread hole.
- Tighten securely with the lower nut.
- Insert the sensor element as far as needed through the coupling.
- NOTE! After next phase there is no coming back, the tightened connection is permanent!
- If you are absolutely sure about the depth, screw down the cap (upper nut) to fix the depth.
- For tightening use only enough force needed. Excess force may damage the sensor element and affect the connection tightness.

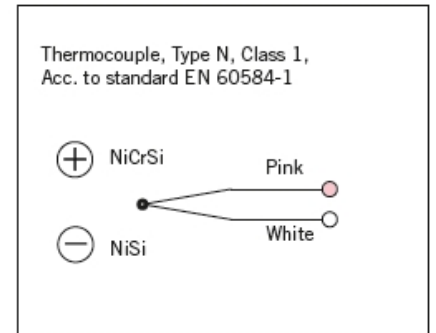
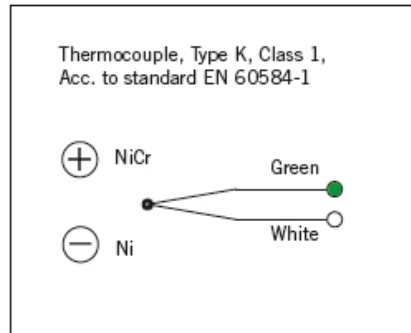
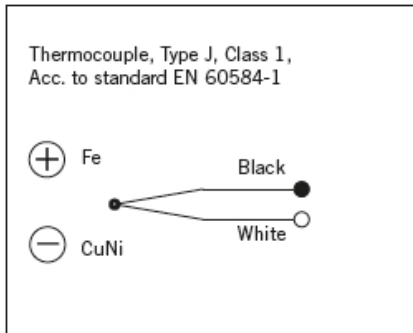
Gland couplings available are:

Product number	Type - thread - inner diameter
875823	Compression fitting G½ - 6 mm
1001171	Compression fitting G½ - 12 mm
914413	Compression fitting G½ - 15 mm
1010922	Compression fitting G¼ - 1.5 mm
911898	Compression fitting G¼ - 3 mm
911897	Compression fitting G¼ - 4.5 mm
920701	Compression fitting G¼ - 6 mm
920587	Compression fitting G⅜ - 1.5 mm
919178	Compression fitting G⅜ - 3 mm
1090957	Compression fitting G⅜ - 1 mm
1062720	Compression fitting M8x1 - 1.5 mm
911908	Compression fitting M8x1 - 3 mm
1040461	Compression fitting M18x1.5 - 6 mm
914237	Compression fitting NPT¼ - 3 mm.
1066586	Compression fitting NPT¼ - 6 mm
1001559	Compression fitting NPT⅜ - 3 mm
1066584	Compression fitting NPT⅜ - 6 mm



TC; connection wiring

Image below: These are the connection colors of TC types J, K and N.



Other types on request.

TC; non-grounded or grounded types

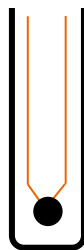
Normally the thermocouple sensors are non-grounded, which means the MI cable sheet is not connected to the thermo material hot junction, where two materials are welded together.

In special applications also grounded types are used.

NOTE! Non-grounded and grounded sensors cannot be connected to same circuits, make sure you are using the right type.

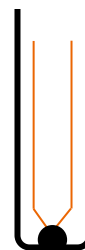
Image below: Non-grounded and grounded structures in comparison.

Non-grounded TC




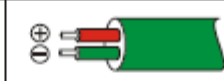

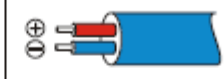


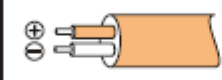
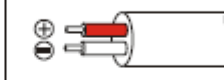


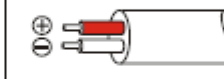




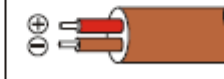
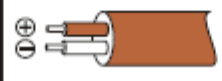

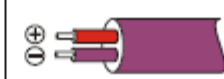
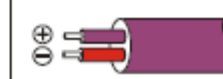
Thermo material hot junction and MI cable sheet are galvanically isolated from each other.

Grounded TC



Thermo material hot junction has galvanic connection with MI cable sheet.

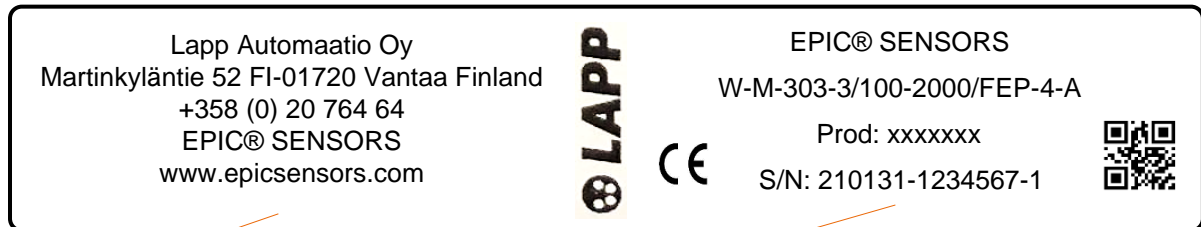
TC; thermocouple cable standards (color table)

New standards:	IEC 60584-3	DIN EN 60584	ISA MC 96.1
Thermo Type	IEC 584	DIN 43714	ANSI MC 96.1
NiCr-Ni / K KCA: Fe-CuNi	 + green/ - white Jacket: green	 + red/ - green Jacket: green	 + yellow/ - red Jacket: yellow
Fe-CuNi / L		 + red/ - blue Jacket: blue	
Fe-CuNi / J	 + black/ - white Jacket: black		 + white/ - red Jacket: black
Pt10Rh-Pt / S SCA: E-Cu/A-Cu	 + orange/ - white Jacket: orange	 + red/ - white Jacket: white	 + black/ - red Jacket: green
Pt13Rh-Pt / R RCA: E-Cu/A-Cu	 + orange/ - white Jacket: orange	 + red/ - white Jacket: white	 + black/ - red Jacket: green
Pt30Rh-Pt6Rh / B BC: S-Cu/E-Cu	 + grey/ - white Jacket: grey		 + grey/ - red Jacket: grey
NiCrosil-Nisil / N NC: Cu-CuNi	 + pink/ - white Jacket: pink		
Cu-CuNi / U		 + red/ - brown Jacket: brown	
Cu-CuNi / T	 + brown/ - white Jacket: brown		
NiCr-CuNi / E	 + purple/ - white Jacket: purple	 + red/ - purple Jacket: purple	 + purple/ - red Jacket: purple

Type label of standard versions

Each sensor has a type label attached to it. It is a moisture and wear proof industrial grade sticker, with black text on white label. This label has printed information as presented below.

Image below: Example of a standard sensor type label.



Manufacturer contact information.
For some sensor types, this may also be printed on a separate label for practical reasons.

Trade name
Type code
Product number
Serial number with production date
CE-mark (RoHS) | Serial number as QR code

Serial number information

Serial number S/N is always printed on type label in the following form: yymmdd-xxxxxx-x:

- yymmdd production date, e.g. “210131” = 31.1.2021
- -xxxxxx production order, e.g. “1234567”
- -x sequential ID number within this production order, e.g. “1”

EU Declaration of Conformity

The EU Declaration of Conformity, declaring products' conformance to the European Directives, is delivered with products or sent on request.

Manufacturer contact information

Manufacturer HQ main office:

Lapp Automaatio Oy
Street address Martinkyläntie 52
Postal address FI-01720 Vantaa, Finland

Production site and logistics:

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Document history

Version / date	Author(s)	Description
20220815	LAPP/JuPi	Material name text corrections
20220401	LAPP/JuPi	Original version

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