

Selecting EPIC® SENSORS temperature sensors for potentially explosive (Ex) atmospheres

Lapp Automaatio Oy's product range meets various temperature measurement needs in potentially explosive atmospheres. The company's range covers temperature measuring sensors, temperature transmitters, barriers, displays, cables, and cable glands. Lapp Automaatio Oy is part of the LAPP Group.



Lapp Automaatio Oy has been granted an ATEX Product Quality Assurance Notification (**EESF 18 ATEX Q 006**) as required under EU directive 2014/34/EU. The notification, issued by *Eurofins Expert Services Oy*, gives the right to manufacture Ex e, Ex d, Ex t, Ex m and Ex i type temperature sensors for use in explosive atmospheres.



The Lapp Automaatio Oy's sensor manufacturing operations have been assessed in an IECEx Quality Assessment Report (**FI/EESF/QAR18.0004**) as required by the EN ISO/IEC 80079-34 standard. The auditing organization was *Eurofins Expert Services Oy*. The report gives the right to manufacture Ex e, Ex d, Ex t, Ex m and Ex i type temperature sensors for use in explosive atmospheres and to apply for IECEx approval for them.
(Name of the auditing organization is today: *Eurofins Electric & Electronics Finland Oy*).

Our sensor production operations are also ISO 9001 and ISO 14001 certified.

Currently you can choose from three Ex types of protection when selecting EPIC® SENSORS temperature sensors manufactured by the Lapp Automaatio Oy:

Ex i or I.S.

- "i" or "I.S." provides "intrinsic safety" (Ex i).
- Designed for Ex zones 0, 1, 2, 20, 21 or 22.
- Either a "simple electric device" (*) or certified device (**)
- (*) The sensor is a standard-type RTD or TC temperature sensor (no Ex requirements)
- (**) Alternatively, the sensor is ATEX/IECEX certified Ex i type RTD or TC sensor, which can also be produced as a cable structure
- The connection hood, if included, is a standard-type, IP 65-protected metallic hood, with a protective earth connection screw. The hood can be equipped with terminals or with an Ex i certified temperature transmitter, e.g., PR electronics
- The whole circuit must be designed as an intrinsically safe Ex i circuit (cable length, ATEX/IECEX transmitters, ATEX/IECEX barriers).
- **More details on pages 2 and 3**

Ex db, Ex tb

- "db" stands for "flameproof", for Ex gas zones 1 or 2 (Ex db).
- "tb" stands for "protection by enclosure", for Ex dust zones 21 or 22 (Ex tb).
- The sensor is ATEX, IECEx and EAC Ex certified and consists of a Pt100 or TC sensor element specially adapted for Ex db-construction, an Ex db-grade connection head including terminals or a temperature transmitter (no Ex requirements), e.g., PR electronics. Also, other transmitter brands are possible, more info available in the certificate.
- The measuring circuit can be cabled to a safe area and to a standard device (no Ex requirements).
- **More details on page 4**

Ex e, Ex tb

- "e" provides "increased safety", for Ex gas zones 1 or 2 (Ex e).
- "tb" stands for "protection by enclosure", for Ex dust zones 21 or 22 (Ex tb, former Ex tD A21).
- The sensor is an ATEX/IECEX/EAC Ex/KCs certified, Ex e type, Pt100 or TC sensor, which can also be used for dust areas, thanks to its dust-protected Ex tb structure.
- The measuring circuit can be cabled to a safe area and to a standard device (no Ex requirements).
- Our currently certified types are cable sensors, without a connection head.
- Our sensors can be manufactured with Ex e grade connection heads, which makes them new types that must be individually certified.
- **More details on page 5**

EPIC® SENSORS temperature sensors (Ex i or I.S. – “simple electrical device”)



The standard type EPIC® SENSORS temperature sensors made in Finland by Lapp Automaatio, are either RTD (mainly Pt100) or TC (e.g. K, N or J type) sensors. Both are classified as **simple electrical devices** which can be installed in potentially explosive atmospheres without Ex approvals or Ex markings.

When installed in an Ex i circuit the sensor itself has no need for ATEX/IECEx approval, if it has IP65 protection class and is equipped with a separate ground terminal in connection head. The whole circuit is intrinsically safe (I.S.) only when the sensor's outgoing measuring circuit is connected to an I.S.-approved device outside the Ex area. The I.S.-approved device can be an Ex temperature transmitter, e.g. from PR electronics (see figure below). In addition, the cable length must be chosen not to exceed the electrical data given in the certificate and data label of the circuit-supplying device.

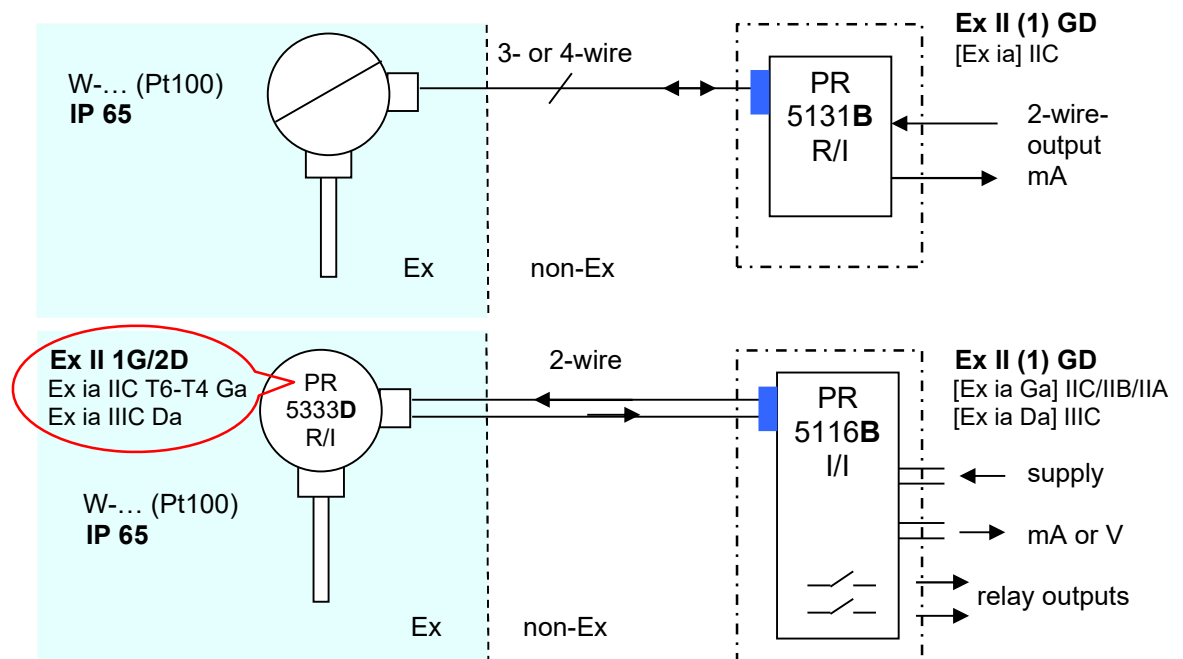


Figure: Two examples of Pt100 temperature sensor solutions:

- In the upper image the sensor is wired directly to an ATEX-approved electrical device (associated equipment) in a safe (non-Ex) area. The device shall be enclosed according to certificate instructions.
- In the lower image the sensor is connected to an ATEX-approved, I.S. 2-wire transmitter installed in a connection head, in which the transmitter's mA output signal is wired to an ATEX-approved electrical device (associated equipment) in a safe (non-Ex) area. The device shall be enclosed according to certificate instructions.

EPIC® SENSORS temperature sensors (Ex i or I.S. – certified device)



The standard type EPIC® SENSORS temperature sensors made in Finland by Lapp Automaatio, are either RTD (mainly Pt100) or TC (e.g. K, N or J type) sensors. Most of them are also available as ATEX and IECEx certified, Ex i -grade devices.

The whole circuit is intrinsically safe (I.S.) only when the sensor's outgoing measuring circuit is connected to an I.S.-approved device outside the Ex area. The I.S.-approved device can be an Ex temperature transmitter, e.g., from PR electronics (see figure below). In addition, the cable length must be chosen not to exceed the electrical data given in the certificate and data label of the circuit-supplying device.

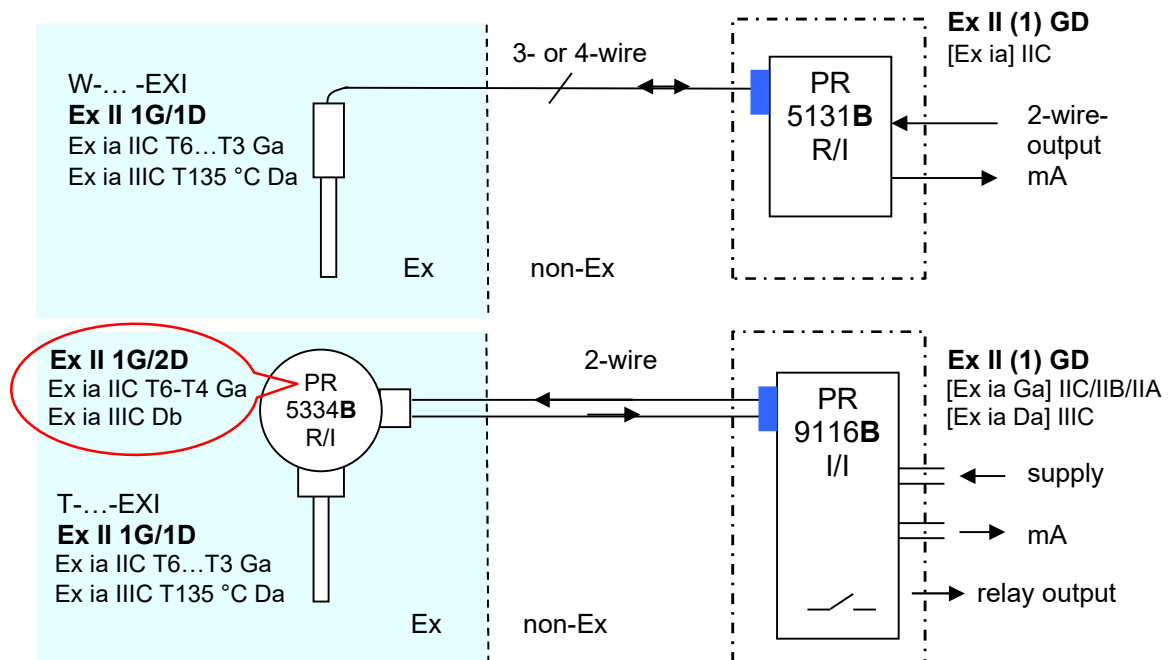


Figure: Two examples of Ex i certified temperature sensor solutions:

- In the upper image the RTD sensor is wired directly to an ATEX-approved electrical device (associated equipment) in a safe (non-Ex) area. The device shall be enclosed according to certificate instructions.
- In the lower image the TC sensor is connected to an ATEX-approved, I.S. 2-wire transmitter installed in a connection head, in which the transmitter's mA output signal is wired to an ATEX-approved electrical device (associated equipment) in a safe (non-Ex) area. The device shall be enclosed according to certificate instructions.

ATEX-/IECEx Ex approved, Ex i -type sensor

Approval data

W-...-EXI or 2xW-...-EXI – RTD sensor or
T-...-EXI or 2xT-...-EXI – TC sensor

EESF 21 ATEX 043X*
IECEx EESF 21.0027X*

- cable structure or connection head (metal) with earth screw
- connection head with terminals or a Ex i temperature transmitter (e.g. PR5331D, PR5332D, PR5333D, PR5334B, PR5335D, PR5337D, PR5437B or PR5437D)
- installation and connection according to the user manual

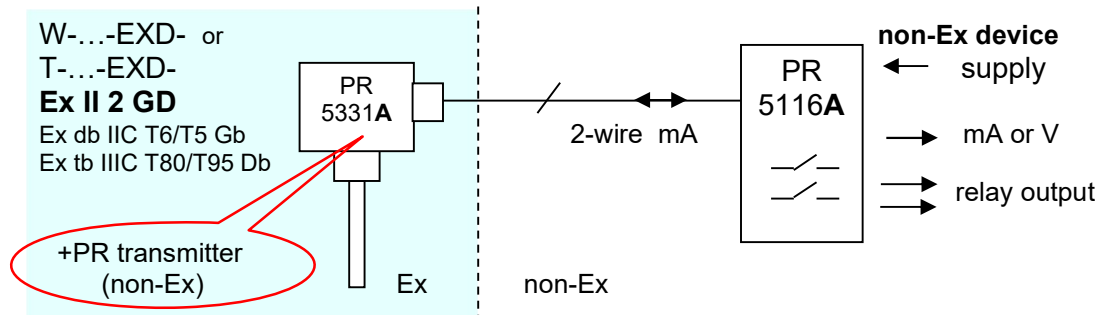
Ex II 1G Ex ia IIC T6...T3 Ga
Ex II 1/2G Ex ib IIC T6...T3 Ga/Gb
Ex II 1D Ex ia IIIC T135 °C Da
Ex II 1/2D Ex ib IIIC T135 °C Da/Db
(*X = special conditions for safe use in certificate).

EPIC® SENSORS temperature sensors (Ex db / Ex tb)

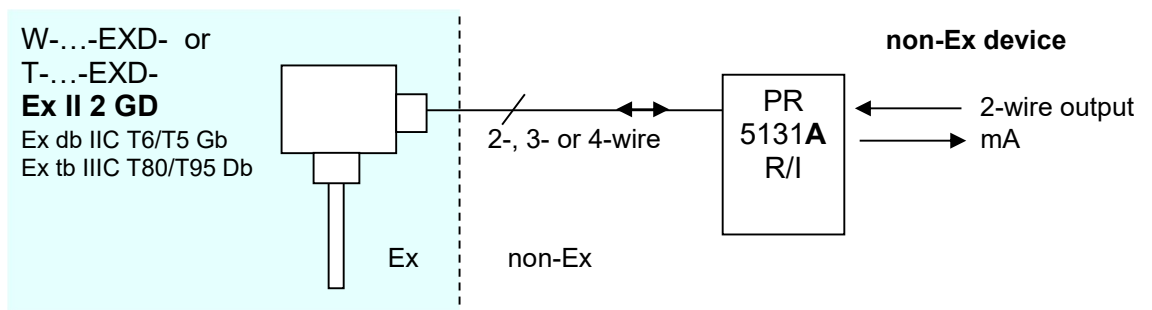


Most of the temperature sensors manufactured by Lapp Automaatio Oy can be assembled with an Ex db -approved connection head. The sensor element part is a replaceable RTD or TC probe specially adapted for an Ex db -construction (a standard element is not fit to be used in Ex db-construction), while the connection head (made of aluminum or stainless steel) is Ex db-classified and equipped with wire terminals or a 2-wire temperature transmitter (the approved transmitter types are e.g. PR5331A, PR5332A, PR5332N, PR5333A, PR5334A, PR5335A, PR5337A, PR5331D, PR5332D, PR5333D, PR5334B, PR5335D, PR5337D, PR5437A, PR5437B and PR5437D). Other transmitters can also be used, please find more info in the certificate. This assembly is ATEX and IECEx Ex db-approved. Certificate numbers are given below.

A device installed in an Ex db enclosure has no ATEX/IECEx requirements, and therefore the transmitter can be a standard-type temperature transmitter for a safe area (see figure below).



A measuring circuit extending outside the Ex db enclosure has no ATEX/IECEx requirements for the next device outside the Ex area. The signal can be wired to a standard-type signal converter in a safe area (see figure above) or to a temperature transmitter (see figure below).



ATEX/IECEx/EAC Ex-approved, Ex db -type sensor

Approval data

- W-...-EXD- or 2xW-...-EXD- - RTD sensor
- T-...-EXD- or 2xT-...-EXD- - thermocouple sensor
- RTD or TC sensor element adapted for Ex db -construction
- Ex db type connection head (aluminum or stainless steel), with terminals or a temperature transmitter acc. to certificate (e.g. PR5331A/D, PR5332A/N/D, PR5333A/D, PR5334A/B, PR5335A/D, PR5337A/D or PR5437A/B/D)
- installation and connection according to the datasheet/manual

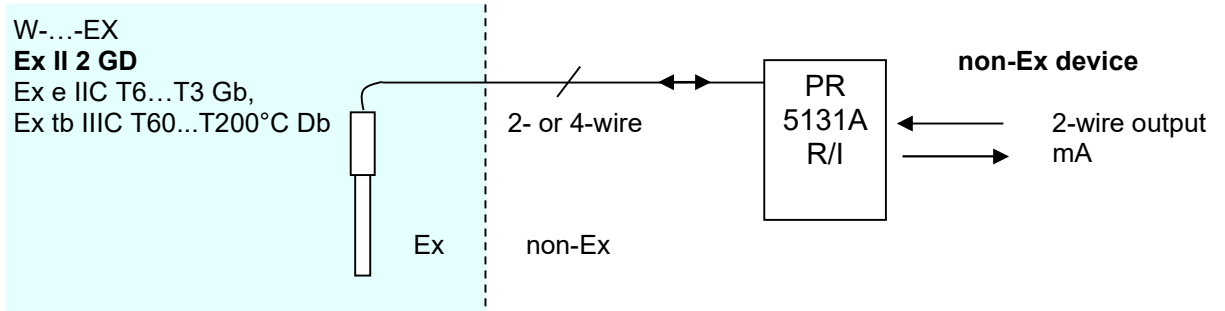
EESF 18 ATEX 052X*
 IECEx EESF 20.0034X*
 № EA3C RU C-FI.AA71.B.00130-19
 Ex II 2 G Ex db IIC T6/T5 Gb,
 Ex II 2 D Ex tb IIIC T80/T95°C Db

(* X means that the cable gland can be chosen according to the temperature class).

EPIC® SENSORS temperature sensors (Ex e / Ex tb)

Lapp Automaatio Oy also produces Ex e -type temperature sensors, which have at least one of these certificates: ATEX, IECEx, EAC Ex, KCs.

An Ex e -approved sensor's measuring circuit has no ATEX/IECEx requirements for the next device outside the Ex area. The signal can be wired to a standard-type temperature transmitter in a safe area (see figure below).



Ex e -type sensors and their product certificates are presented on the next pages.



www.epicsensors.com

epicsensors.fi.lav@lapp.com

Certificate copies can be downloaded from our Ex product pages, please visit:

www.epicsensors.com/en/industry-sectors/explosive-areas/

EPIC® SENSORS temperature sensors (Ex e / Ex tb)

Ex e -approved sensor types

Certificates

**Product number - this product number is a certificate reference number; manufactured products will have new numbers.*

Features - the dimensions XXX and YYY can be defined before production, all other dimensions are fixed.

Structure 302:

Type: W-M-302-3/XXXX-YYY/FEP-4-A-EX

Certificates: EESF 18 ATEX 050X

*Product nr: 5111619

Permitted process temperature: -200... +550 °C

Features: Pt100 MI-element, diameter 3 mm, length XXXX mm, 4-wire, wire length YYY mm.

Type: W-M-302-3/1000-200/FEP-4-A-EX

Certificates: EESF 18 ATEX 050X

*Product nr: 1125387

Features: Pt100 MI-element, diameter 3 mm, length 1000 mm, 4-wire, wire length 200 mm.

Type: W-M-302-3/XXXX-YYY/FEP-4-A-T-EX

Certificates: EESF 18 ATEX 050X

*Product nr: 5111621

T = Permitted process temperature: -200... +400 °C

Features: Pt100 MI-element, diameter 3 mm, length XXXX mm, 4-wire, wire length YYY mm.

Type: W-M-302-6/XXXX-YYY/FEP-4-A-EX

Certificates: EESF 18 ATEX 050X

*Product nr: 5112026

Permitted process temperature: -200... +550 °C

Features: Pt100 MI-element, diameter 6 mm, length XXXX mm, 4-wire, wire length YYY mm.

Type: W-M-302-6/XXXX-YYY/FEP-4-A-T-EX

Certificates: EESF 18 ATEX 050X

*Product nr: 5112025

T = Permitted process temperature: -200... +400 °C

Features: Pt100 MI-element, diameter 3 mm, length XXXX mm, 4-wire, wire length YYY mm.

Type: WT-MI-302-6/XXXXX-200/FEP-4J-KLA-EX

Certificates: EESF 18 ATEX 049X, EAC Ex

*Product nr. 1068685

Features: Pt100 MI-element, diameter 6 mm, length XXXXX mm, 4-wire, wire length 200 mm.

Type: WT-MI-302-6/1000-200/FEP-4J-KLA-EX

Certificates: EESF 18 ATEX 049X, EAC Ex

*Product nr: 1073428

Features: Pt100 MI-element, diameter 6 mm, length 1000 mm, 4-wire, wire length 200 mm.

Type: WT-MI-302-6/2000-200/FEP-4J-KLA-EX

Certificates: EESF 18 ATEX 051X, EAC Ex

*Product nr. 1072372

Features: Pt100 MI-element, diameter 6 mm, length 2000 mm, 4-wire, wire length 200 mm.

Structure 303:

Type: T-M-303-3/XXX-YYY/FDS-Z-1-Ex

Certificates: EESF 18 ATEX 055X T M, IECEx EESF 18.0027X, EAC Ex, KCs 19-KA4BO-0461X

*Product nr: 1258335

Features: MI-element thermocouple, K or N type (Z), diameter 3 mm, length XXX mm, silicon-sheathed braided cable length YYY mm.

Type: T-M-303-6/XXX-YYY/FDS-Z-1-Ex

Certificates: EESF 18 ATEX 055X T M, IECEx EESF 18.0027X, EAC Ex, KCs 19-KA4BO-0461X

*Product nr: 1258337

Features: MI-element thermocouple, K or N type (Z), diameter 6 mm, length XXX mm, silicon-sheathed braided cable length YYY mm.

continued next page...

Type: T-M-303-8/SV/XXX-YYY/FDS-Z-1-Ex

Certificates: EESF 18 ATEX 055X T M, IECEx EESF 18.0027X, EAC Ex, KCs 19-KA4BO-0461X

*Product nr: 1258338

Features: MI-element thermocouple, K or N type (Z), diameter 8 mm with protection sleeve (SV), length XXX mm, silicon-sheathed braided cable length YYY mm.

Type: W-M-303-3/XXX-YYY/FDF-4-A-Ex

Certificates: EESF 18 ATEX 055X W M, IECEx EESF 18.0027X, EAC Ex, KCs 19-KA4BO-0460X

*Product nr: 1258122

Features: Pt100 MI-element, diameter 3 mm, length XXX mm, 4-wire, braided FEP-cable length YYY mm.

Type: W-M-303-6/XXX-YYY/FDF-4-A-Ex

Certificates: EESF 18 ATEX 055X W M, IECEx EESF 18.0027X, EAC Ex, KCs 19-KA4BO-0460X

*Product nr: 1258333

Features: Pt100 MI-element, diameter 6 mm, length XXX mm, 4-wire, braided FEP-cable length YYY mm.

Type: W-M-303-8/SV/XXX-YYY/FDF-4-A-Ex

Certificates: EESF 18 ATEX 055X W M, IECEx EESF 18.0027X, EAC Ex, KCs 19-KA4BO-0460X

*Product nr: 1258334

Features: Pt100 MI-element, diameter 8 mm with protection sleeve (SV), length XXX mm, 4-wire, braided FEP-cable length YYY mm.

Structure BAJONETTI (bayonet):**Type: WT-BAJONETTI-6/XXX-YYYY/TDT-4J-KLA-EX**

Certificates: EESF-18-ATEX-054X, IECEx EESF 18.0026X, EAC Ex, KCs 19-KA4BO-0463X

*Product nr: 1059616

Features: Pt100 bayonet sensor, diameter 6 mm, length XXX mm, 4-wire, braided fluoropolymer-cable length YYYY mm.

Type: 2xWT-BAJONETTI-8/XXX-YYYY/TDT-4J-KLA-EX

Certificates: EESF-18-ATEX-054X, IECEx EESF 18.0026X, EAC Ex, KCs 19-KA4BO-0463X

*Product nr: 1059620

Features: 2xPt100 bayonet sensor, diameter 8 mm, length XXX mm, 2x4-wire, braided fluoropolymer-cable length YYYY mm.

Structure KAAPALI (cable):**Type: WT-KAAPALI-6/XXX-YYYY/SDS-2J-KLA-EX**

Certificates: EESF 18 ATEX 048X

*Product nr: 1061958

Features: Pt100 cable sensor, diameter 6 mm, length XXX mm, 2-wire, braided silicon-cable length YYYY mm.

Type: WT-KAAPALI-6/XXX-YYYY/TDT-4J-KLA-EX

Certificates: EESF-18-ATEX-053X, IECEx EESF 18.0025X, EAC Ex, KCs 19-KA4BO-0462X

*Product nr: 1061957

Features: Pt100 cable sensor, diameter 6 mm, length XXX mm, 4-wire, braided fluoropolymer-cable length YYYY mm.

Type: 2xWT-KAAPALI-6/XXX-YYYY/TDT-4J-KLA-EX

Certificates: EESF-18-ATEX-053X, IECEx EESF 18.0025X, EAC Ex, KCs 19-KA4BO-0462X

*Product nr: 1061961

Features: 2xPt100 cable sensor, diameter 6 mm, length XXX mm, 2x4-wire, braided fluoropolymer-cable length YYYY mm.

ATEX	Type specific approval according to European ATEX-directive.
IECEx	Type specific, international IECEx-approval.
EAC Ex	Ex-approval for use in Eurasian Customs Union area (Belarus, Kazakhstan, Russia). Certificate number for all our EAC Ex -approved sensor types is: № EAЭC RU C-FI.AA71.B.00130-19.
KCs	Type specific Ex-approval for use in Korea.
