Operating Instructions

for

Temperature Sensor

Model: TWL

Ignition Protection Ex ia

1. Contents

Manufactured by:

Kobold Mesura S.L.U
Avda. Conflent 68 nave 15
08915 Badalona
Tel.: +34 93 460 38 83
Fax: +34 93 460 38 76
E-Mail: info.es@kobold.com
www.kobold.com

Edition: may 2022

2. Note

Please read these operating instructions before unpacking and putting the unit in operation. Follow the instructions precisely as described herein.
The instruction manuals on our website WWW.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that correspond to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:
- Device model: TWL

4. Regulation Use

The temperature sensors of series TWL are suitable for all applications where processes involving fluids, solid bodies or materials, or gases, require temperature recording and measurement. Our temperature sensors are suitable for use in the following industrial areas: chemicals, petrochemicals, water, feed, food, sanitary, etc.

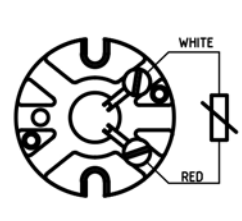
Any use of the Temperature Sensor, model: TWL, which exceeds the manufacturer's specification may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

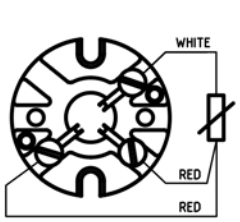
Resistance thermometers work by using the continuous change of resistance of metals subject to temperature rising and decreasing. The most common resistance material used is platinum, as it is very stable and has very good repeatability. The temperature coefficient of platinum is positive, so its resistance increases as the temperature rises. This property is defined in the IEC751 standard, which defines measurements deviations categories A and B.

6. Electrical connection

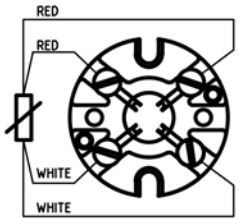
Sensor wiring diagram with head



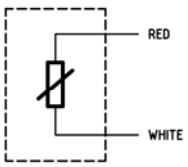
1xPt100 2 wires

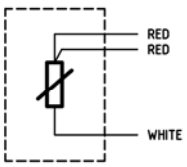


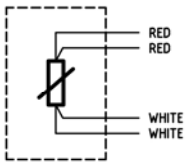
1xPt100 3 wires

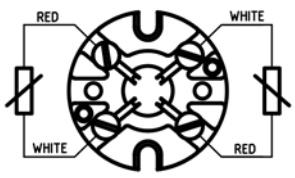


1xPt100 4 wires



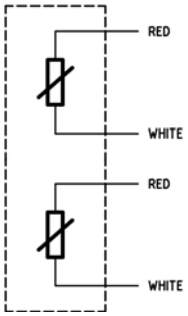


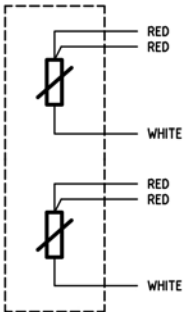




2xPt100 2 wire

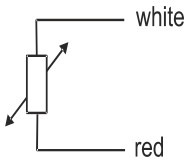
2xPt100 3 wire



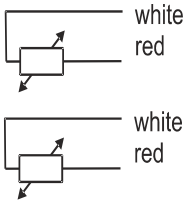


Sensor wiring diagram without head
2 wire

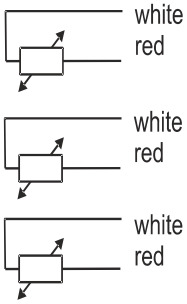
1x Pt100



2x Pt100

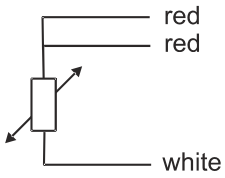


3x Pt100

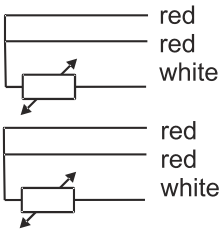


3 wire

1x Pt100

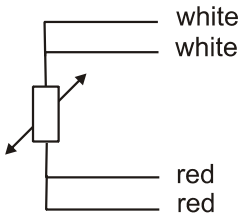


2x Pt100

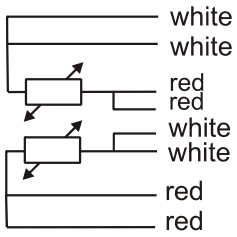


4 wire

1x Pt100

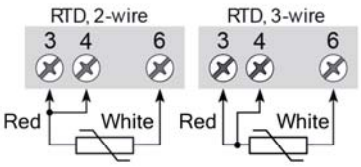


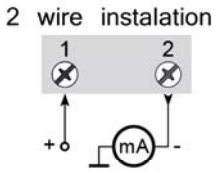
2x Pt100



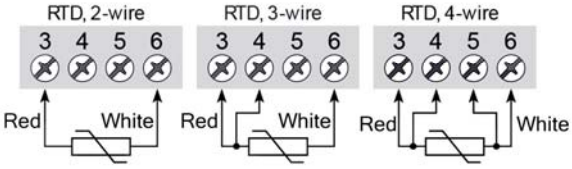
Transmitter wiring diagram

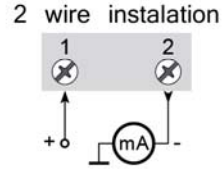
Mod. 5333D



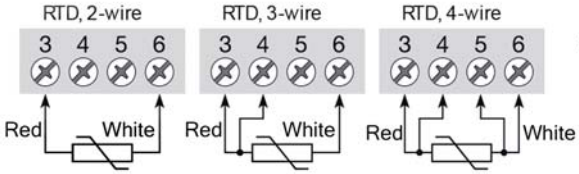


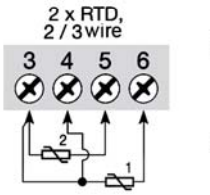
Mod. 5337D





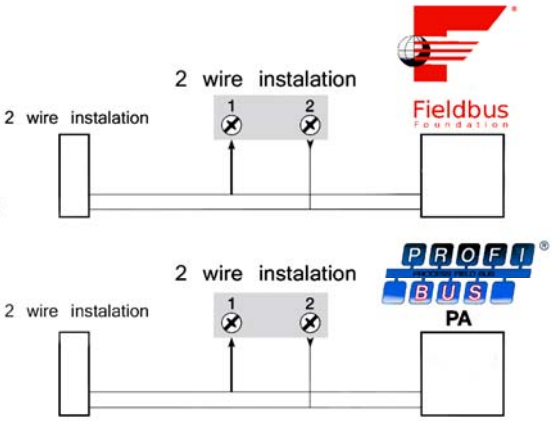
Mod. 5350B





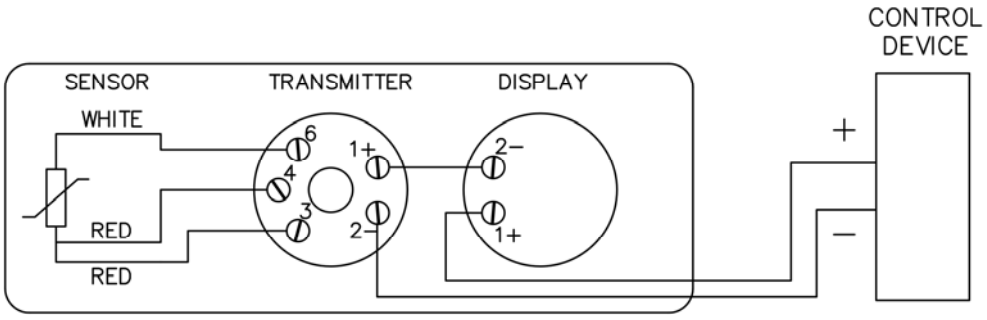
1) 6 White
4 Red
3 Red

2) 5 White
3 Red

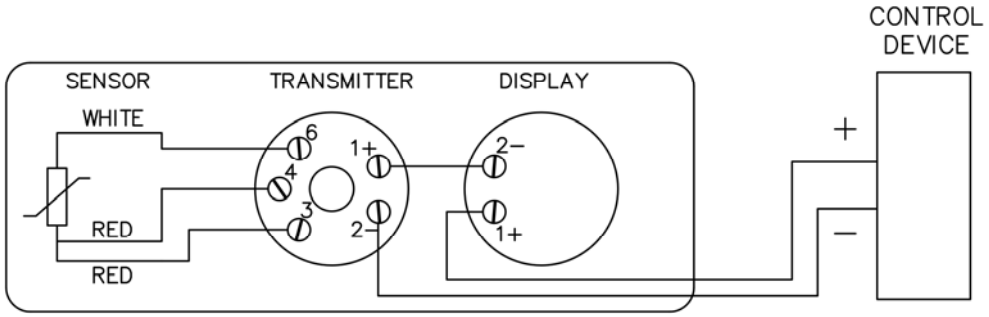


6.1 Head model D wiring diagram

With transmitter 5333D

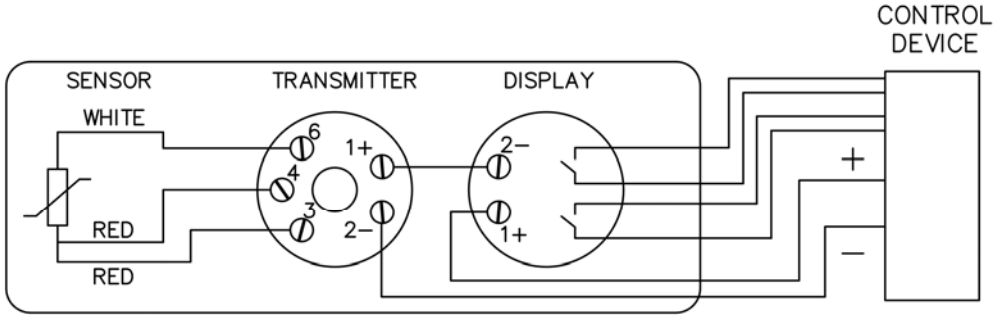


With transmitter 5337D

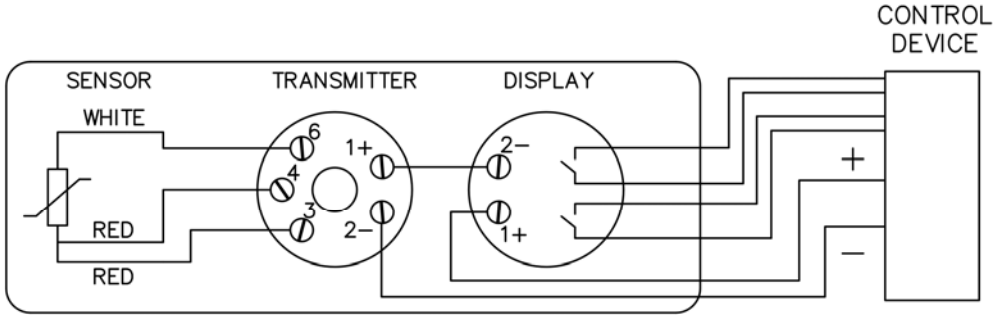


6.2 Head model R wiring diagram

With transmitter 5333D



With transmitter 5337D



Note: For electrical connection of transmitter please refer to their separate manual.

7. Use in hazardous Areas

7.1 Area of validity

These security instructions apply to **TWL** Series temperature sensors and their accessories for use in explosion-proof atmospheres conform to **CE certificate LOM 08ATEX2015 X**

7.2 Guidelines

The TWL Series temperature measuring instruments work according to the heat resistance measuring principle. This measuring principle acts to check and measure the temperature also in Ex areas.

TWL devices can be with a standard 4 to 20 mA signal transmitter, protocol Hart, Profibus/Fieldbus or with direct access to the sensor. They are appropriate for use in Group IIC and Categories 1G/D Atex atmospheres.

The temperature class and/or the surface temperature relates solely to a device operated at ambient temperature. On installation the actual temperature class for process operation must be determined.

The inlet bushings used must conform to the certification for their type in accordance with the directive.

The requirements of Regulation 2014/34/EU, and the applicable national regulations for the use of measuring instruments in Ex areas, such as EN 60079, EN 60079-11 and other regulations relating to this certification type, must be fulfilled.

Only qualified specialist personnel may install devices in Ex areas.

7.3 General

- When installing the sensor, it is necessary to follow all the instructions and regulations for explosion-proof areas and the safety instructions included in these instructions.
- TWL-S, TWL-N, TWL-I and TWL-P must be protected with an enclosure at least a degree of protection IP20.
- Make sure that the details on the sensor’s type label correspond to the working conditions for the application.
- When installing the device, make sure you do not create any mechanical deformation as a result of solder spots or the application of mechanical force.

- **Important**: Make sure there is an electrical connection between the device's earth and the earth of the system.

- Make sure the lid is closed before putting the device into operation.

- Before re-opening the lid, remove the plug from the mains or de-energise the device and make sure there is no danger of explosion.

  The use in zone 0 of heads made of aluminum should be restricted to locations where the risk of ignition due to mechanical impact is not possible.

7.4 Protection against E.S.D. (Electrostatic Discharge)

Temperature sensors with plastic parts that can become electrically charged bear a warning label. Electrical charging must be avoided at all costs. Pay attention to the following:
- Avoid rubbing the device
- Never clean the device dry
- Do not install the device near material airflows or near steam outlets

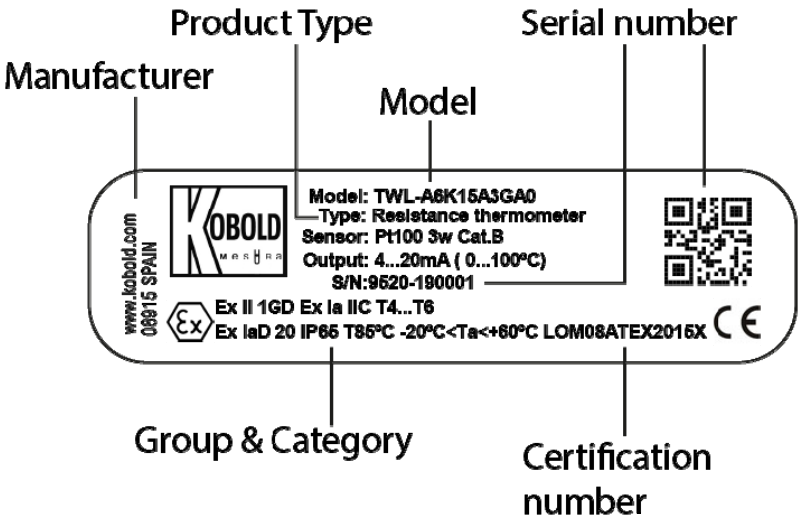
7.5 Maintenance and repairs

The instrument does not require maintenance or servicing.
Repairs must be only carried out by Kobold Mesura (manufacturer)

7.6 Storage

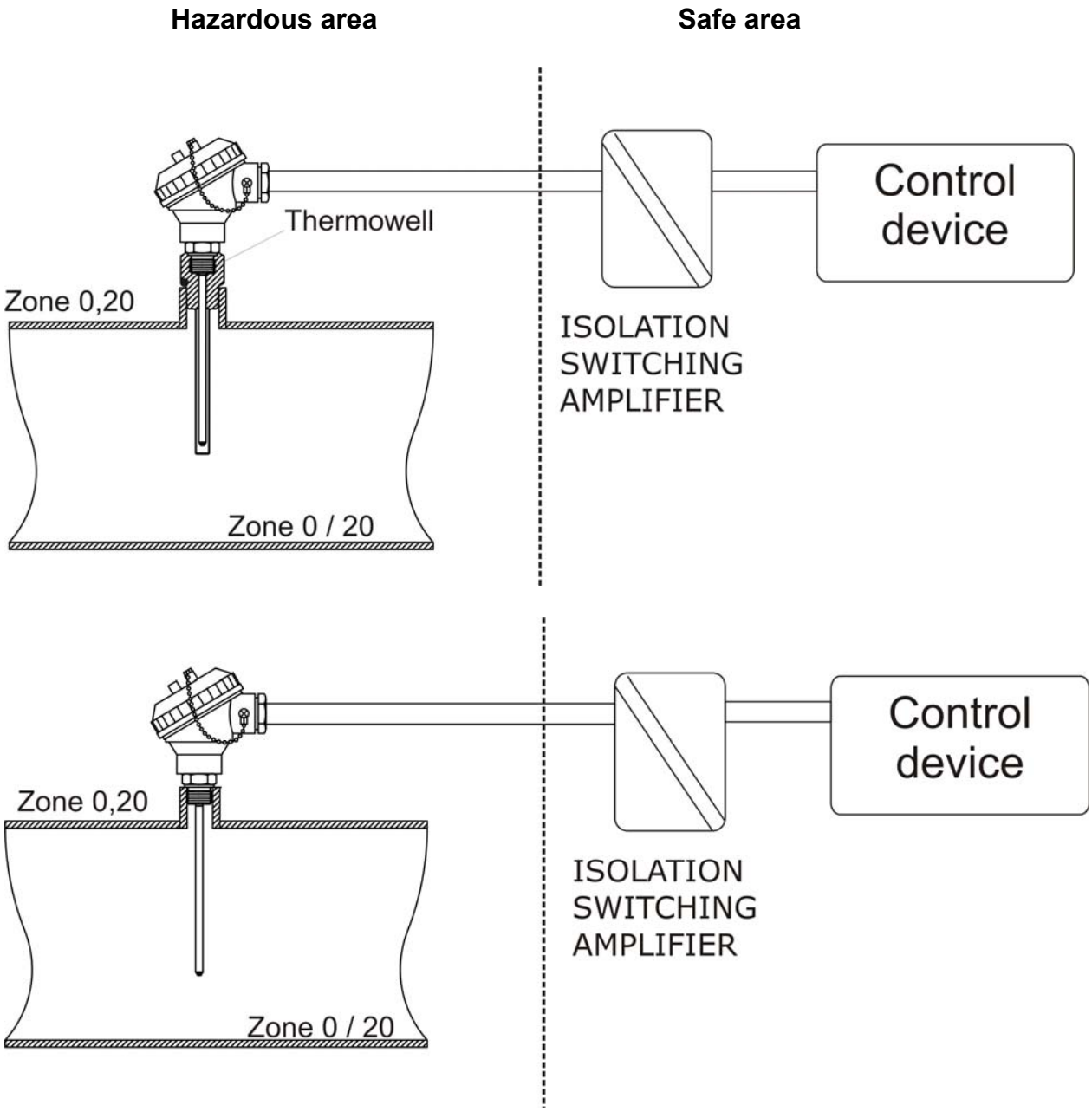
Measuring instruments should be protected against humidity and dust.
Storage temperature: -40ºC….+85ºC for sensors without transmitter.
Storage temperature: See manual of the corresponding transmitter and display model.

8. Description of the Factory Label



9. Installation in the classified area

Examples of installation in explosion-proof areas conform to the protection type “intrinsically safe”: “Ex ia”



10. Technical Details

Sensor wiring

- 2 wires Error due to the lead resistance of the sensor
- 3 wires With connecting wires up to 25 m, lead resistance is negligible.
- 4 wires The lead resistance of the connecting wires is negligible

Sensor according to IEC 60751

-Class B
-Class A
-Class 1/3
-Class 1/10

The nominal value of Pt100 sensors is 100Ω at 0 ºC.

Tolerance class

-Class B ±0.3 + 0.005 * t
-Class A ±0.15 + 0.002 * t
-Class 1/3 ±0.10 + 0.005 * t
-Class 1/10 ±0.03 + 0.0017 * t

t= measuring temperature in ºC without sign

General details

Ambient temperature: -40…+150ºC with ceramic terminal base
-40…+85ºC with transmitter
-40…+85ºC TWL-ST model

Meas. Range: -70…+600ºC (-40…+85ºC TWL-T model)
(other on request)

Operating pressure: Max. 30 bar (depending on model, see order details)

Connection head: Form G with chain.
Aluminium or polycarbonate head on model TWL-T
Without head on models TWL-S, TWL-N, TWL-T, TWL-I and TWL-P

Materials

Sensor: Stainless steel 1.4404 (others on request)
Neckpipe: Stainless steel 1.4404 (others on request)
Connection head: Aluminium, painted, PP, polycarbonate or Stainless Steel (see order details)
Cable: Silicone, PTFE, PVC, Fiberglass with steel braid on model TWL-S, TWL-N, TWL-T, TWL-I and TWL-P (others on request)

Terminal base: Ceramic terminal block only for models with head connections. (without transmitter)

Process connection

Thread: G1/4", G1/2" G3/4", G1" male (others on request)
Flange: DIN or ANSI see codes (others on request)

ATEX-approval

Ex II 1 GD Ex ia IIC T4..T6/
Ex iaD 20 IP65
T85ºC -20ºC ≤ Ta ≤ +60ºC

Head transmitter

- Output:	analogue output 4…20m A
- Communication:	HART®-protocol PROFIBUS®/Fieldbus
- Minimum meas. span:	standard transmitter 25ºK transmitter with HART® 10ºK transmitter with PROFIBUS®/Fieldbus 5ºK
- Supply voltage:	8…35 Vdc for standard transmitter and transmitter with Hart 9…32 Vdc for transmitter with PROFIBUS®/Fieldbus

Note
For programming of transmitter please refer to their separate programming manual.
Sensors model TWL-SN and TWL-SA have not head transmitter, you must use remote transmitter.

Transmitter 5333D

Ambient temperature:	-40...+85 ºC
Power supply:	8...35 V
Accuracy:	Absolute accuracy ≤ ±0.3 ºC Temp. Coefficient (≤ ±0.01 ºC/ºC)
Current Output:	4...20 mA
Load resistance:	≤ (V supply - 8) / 0.023
Sensor error detection:	Programmable 3.5…23 mA NAMUR NE43 Upscale and NAMUR NE43 Downscale

Transmitter 5337D

Ambient temperature:	-40...+85 ºC
Power supply:	8...35 V
Accuracy:	Absolute accuracy ≤ ±0.1 ºC Temp. Coefficient (≤ ±0.005 ºC /ºC)
Current Output:	4...20 mA HART®
Load resistance:	≤ (V supply - 8) / 0.023
Sensor error detection:	Programmable 3.5…23 mA NAMUR NE43 Upscale and NAMUR NE43 Downscale

Transmitter 5350D

Ambient temperature:	-40...+85 ºC
Power supply:	9...32 V
Accuracy:	Absolute accuracy ≤ ±0.1 ºC Temp. Coefficient (≤ ±0.002 ºC / ºC)
Output:	PROFIBUS® PA protocol FOUNDATION™ FIELDBUS protocol

Display type D/R

Ambient temperature:	-30...+80 ºC
Loop voltage drop:	two levels depending on chosen backlight brightness at 20 mA: low bright backlight (<40%): max. 4 V at 23 ºC high bright backlight (>40%) max. 6.5 V at 23 ºC
Accuracy:	≤ ±0.1% of input span within -10...70 ºC ≤ ±0.2% of input span within -30...-10 ºC/70...80 ºC
Measuring range:	4...20 mA
Error/warning indication:	Individually configurable display and backlight indication in white, green or red colour, steady or between 3.5 and 23 mA
Relay (only type R):	Contacts 2 solid state relays Max. Voltage 60 Vp Max. Load current 75 mA

Note

For programming of transmitter please refer to their separate programming manual.
Sensors model model TWL-S, TWL-N, TWL-I and TWL-P have not head transmitter, you must use remote transmitter.

11. Trouble Shooting

Faults	Possible Causes	Corrective actions
No signal/line breakage	Mechanical load too high or over temperature. Line breakage.	Replace probe or measuring insert. Check wiring.
Wrong measured values	Sensor drift caused by over temperature	Replace probe or measuring insert.
	Sensor drift caused by chemical attack	Use a sensor with thermowell
Wrong measured values (too low)	Entry of moisture into cable or measuring insert	Replace probe or measuring insert.
Wrong measured values and response times too long	Wrong mounting geometry, for example mounting depth too deep or heat dissipation too high	The temperature-sensitive area of the sensor must be inside the medium, and surfaces must be isolated.
	Deposits on the sensor or thermowell	Remove deposits
Oscillation of measured value	Cable break in connecting cable or loose contact caused by mechanical overload	Replace probe or measuring insert with a suitable design, for example equipped with a strain relief or a thicker conductor cross-section. Check wiring
Corrosion	Composition of the medium not as expected or modified or wrong thermowell material selected	Analyze medium and then select a more-suitable material or replace thermowell regularly
Signal interference	Stray currents caused by electric fields or ground loops	Use of screened connecting cables, increase the distance to motors and power lines
	Ground loop	Elimination of potentials, use of galvanic isolated transmitter supply isolators or transmitters

12. Dismounting, return and disposal

12.1 Dismounting

Residual media in dismounted instruments can result in a risk to persons, the environment and equipment. Take sufficient precautionary measures.

All instruments delivered to KOBOLD must be free from any kind of hazardous substances (acids, bleaches, solutions, etc.).

12.2 Disposal

Incorrect disposal may endanger the environment.

13. Order codes

For order codes information, please see the technical datasheet.

14. EU-Declaration of conformity

DECLARACIÓN DE CONFORMIDAD EU

EU DECLARATION OF CONFORMITY
EU-KONFOMITÄTSERKLÄRUNG
DÉCLARATION DE CONFORMITÉ
DICHIARAZIONE DI CONFORMITÀ EU

KOBOLD MESURA S.L.U.
Avda. Conflent 68 nave 15, 08915 Badalona (España)

Declara, bajo la propia responsabilidad, que el producto
Declares under our sole responsibility, that the produkt
Erklärt in alleiniger Verantwortung, daß das produkt
Déclare sous sa seule responsabilité, que le produit
Dichiara sotto la propia responsabilità, che il prodotto

TWL.....

A los cuales se refiere esta declaración, son conformes a las siguiente Directivas Europeas:
To which this declaration relates is in conformity with the following European Directives:
Mit folgenden Richtilinien konform ist:
À auxquels se réfère cette déclaration, ils sont conformes aux Directives Européennes suivant :
A ai quali si riferisce questa dichiarazione, sono conformi alle direttive europee seguente:

EMC2014/30/EU LVD2014/35/EU ATEX2014/34/EU RoHS2011/65/EU

Normas armonizadas y documentos de la normativa aplicados:
Applied harmonised standards and normative documents:
Angewandte harmonisierte Normen oder normativer Dokumente:
Normes harmonisées et documents normatifs appliqués
Norme armonizzate e documenti normativi applicati:

EN61010-1:2011 EN61326-1:2021 EN60079-0:2006 (acc. EN60079-0:2021)
EN61000-6-2:2019 EN60079-11:2007 (acc. EN60079-11:2013)

Certificado de examen CE de tipo
EC-type examination certificat
EG-baumusterprübescheinigung
Attestation d´examen CE de type
Certificazione per esame di tipo CE

LOM 08ATEX2015 X

Marcado
Marking
Markierung
Inscription
Marcatura

Ex II 1GD Ex ia IIC T4…T6
Ex iaD 20 IP65
T85ºC -20ºC ≤ Ta ≤ +60ºC

Fabricado en: **KOBOLD MESURA SLU Avda. Conflent 68, nave 15 08915 BADALONA (Spain**)
Made in:
Hergesteltlt in:
Fabriqué dans:
Fabbricato in:

Organismo notificado: **LOM 0163**
Notified organism
Mitgeteilter Organismus
Organization annoncée
Organismo informato

Número notificación : **LOM 05ATEX9070**
Number notification
Zahlmitteilung
Nombre notification
Notifica di numero

Badalona june 2017
DT0312 25/02/2008

Gerente

Azzam Charmand

DT0668

15. ATEX-Certificates

LABORATORIO OFICIAL J. M. MADARIAGA

(1) EC-TYPE EXAMINATION CERTIFICATE

(2) Equipment or protective system intended for use in potentially explosive atmospheres Directive 94/9/EC

(3) EC-Type Examination Certificate nr **LOM 08ATEX2015 X**

(4) Equipment or protection system: Temperature sensors Types TWL... and TTL...

(5) Applicant: KOBOLD MESURA, S.L.U.

(6) Address: Grifé, 655
08918- Badalona (BARCELONA)
ESPAÑA

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) Laboratorio Oficial J.M. Madariaga (LOM), notified body number 0163 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
The examination and test results are recorded in confidential report nr. **LOM 07.165 PP**

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

- Standards **EN 60079-0:2006** **EN60079- 11:2007**

(10) If the sign X is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design and construction of this specified equipment or protective system in accordance with the Directive 94/9/EC. Further requirements of the Directive apply to the manufacture and supply of this equipment or protective system. These are not covered by this certificate.

(12) The marking of the equipment or protective system shall include the following:

II 1 GD Ex ia IIC T4..T6
Ex iaD 20 IP65 T85 ºC
-20 ºC ≤ Ta ≤ +60 ºC

Madrid, 28th March 2008

OFICIAL LABORATORIO J.M. MADARIAGA LOM

Carlos Fernández Ramón
DIRECTOR OF THE LABORATORY

Angel Vega Remesal
Head of the ATEX

RCPCER 07.3/2

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UNIVERSIDAD POLITÉCNICA DE MADRID
ENSAYOS E INVESTIGACIONES DE MATERIALES Y EQUIPOS PARA ATMÓSFERAS EXPLOSIVAS Y MINERÍA
(Real Decreto 334/1992 de 3 de Abril - BOE 1992-04-29)
Alenza, 1 - 28003 MADRID • (34) 91 4421366 / 91 3367009 • (34) 91 4419933 • lom@lom.upm.es

LABORATORIO OFICIAL J. M. MADARIAGA

(A1) SCHEDULE

(A2) EC-Type Examination Certificate: **LOM 08ATEX2015 X**

(A3) Description of equipment or protective system

Temperature sensors based on thermocouple (TTL series) o thermoresistor RTD (TWL series) having a head in three formats and a sheath that contains the sensor element. Also is included an ambient thermometer (ST head) that uses a metallic or plastic enclosure.

Sensors can be connected either directly or indirectly by means of intrinsically safe transmitters placed into the head. Permitted intrinsically safety transmitters are listed in manufactured descriptive documents.

Type codification: T_L _ _ _ _ _ _ _ _ _ _

- Generic reference(series) TWL or TTL
- Sub-type
- Immersion length
- Process connection type
- Type and number of sensor element
- RTD wiring (only TWL series)
- Head type
  Head types BR, DIN B or L
  M, SA and SN have not connection box
  St variant is used as ambient thermometer
- Transmitter type
  0 = without transmitter
  EE = with intrinsically safe transmitter
- Sheath diameter
- Type of protection
  E1 = II 1G Ex ia
  E2 = II 1D Ex iaD
- Option code

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Temperature class

TWL series without transmitter:	T4
TWL series without transmitter:	T6
T_ L series with transmitter:	T4 to T6 temperature class is the same that the used intrinsically safe transmitter modules

Specific parameters of the type of protection

TWL series without transmitter:	Pi: 1,2 W
T_ L series with transmitter:	Input specific parameters are the same that the used intrinsically safe transmitter modules

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LABORATORIO OFICIAL J. M. MADARIAGA

(A1) SCHEDULE

(A2) EC-Type Examination Certificate: **LOM 08ATEX2015 X**

(A4) Test report nr **LOM 07.165 PP**

(A5) Special conditions for safe use

- It must be taken in account the electrostatic hazard when As and BR3 plastic head boxes are used
- Variants without head box (sub-types M, Sa and SN) must be protected with an enclosure having at least a degree of protection IP20
- The marked temperature class or surface temperature only refers to the equipment operating t ambient temperature. It must be determined the real process temperature in the installation. Head temperature must not be greater than 60 ºC.

(A6) Individual tests

None

(A7) Essential Health and Safety Requirements

Explosion safe requirements are covered by application of the standards indicated in page 1/3 of this certificate.

(A8) Descriptive Documents

		Rev.	Date
- Technical description nr.:	DT0315	-	2008-02-25
- Technical manuals nr:	CT3225	-	2008-02-25
	CT3226	-	2008-02-25
- Drawings nr.:	PM0507R0	0	2007-10-23
	PM0508R0	0	2007-10-23
	PM0509R0	0	2007-10-23
	PM0510R0	0	2007-10-23
	PM0511R0	0	2007-10-23
	PM0512R0	0	2007-10-23
	PM0529R0	0	2007-10-23
	PM0530R0	0	2007-10-23
	PM0531R0	0	2007-10-23
	PM0532R0	0	2007-10-23
	PM0533R0	0	2007-10-23
	PM0534R0	0	2007-10-23
	PM0535R0	0	2007-10-23
	PM0536R0	0	2007-10-23
	PM0537R0	0	2007-10-23
	PM0538R0	0	2007-10-23
	PM0539R0	0	2007-10-23
	PM0540R0	0	2007-10-23
	PM0541R0	0	2007-10-23
	PM0542R0	0	2007-10-23
	DT0340	-	2008-01-02
	DT0342	-	2008-01-02
	DT0316	-	2008-01-02

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LABORATORIO OFICIAL J. M. MADARIAGA

EC-TYPE EXAMINATION CERTIFICATE SUPPLEMENT

(1) EC-TYPE EXAMINATION CERTIFICATE SUPPLEMENT

(2) Equipment or protective system intended for use in potentially explosive atmospheres
Directive 94/9/EC

(3) Supplement nr. **1** to EC-Type Examination Certificate number **LOM 08ATEX2015 X**

(4) Equipment or protection system — Temperature sensors
Types TWL..., TTL...

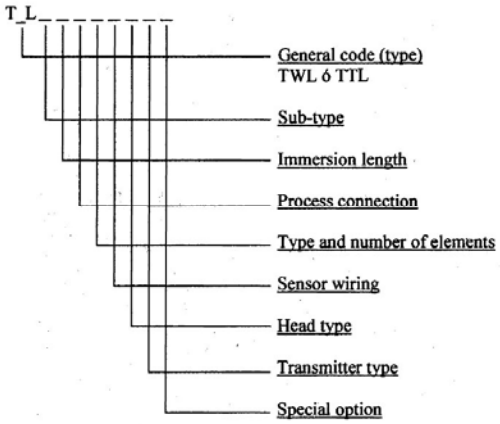
(5) Applicant — KOBOLD MESURA, S.L.U.

(6) Address — Guifré, 665
08918 BADALONA(BARCELONA)
SPAIN

(7) Test report nr.: **LOM 09.495 FP**

(8) Variations included in this certificate

To update de type codification:



(9) Changes in marking

Only those that correspond to the new type codification

OFICIAL LABORATORIO J.M. MADARIAGA LOM

This supplement must be an inseparable part together with the base **LOM 08ATEX2015 X**

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RCPCER 07.4/2 Rev. 0

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(3) Supplement nr. **1** to EC-Type Examination Certificate number **LOM 08ATEX2015 X**

(10) Descriptive documents

	Rev.	Date
- Description nr.: DT0396	-	2009-07-14

Madrid, 2009-10-21

Carlos Fernández Ramón
DIRECTOR OF THE LABORATORY

Angel Vega Remesal
Head of ATEX area

OFICIAL LABORATORIO J.M. MADARIAGA LOM

16. Note

KOBOLD MESURA S.L.U
Avda. Conflent 68 nave 15
08915 Badalona
Tel.: +34 93 460 38 83
Fax: +34 93 460 38 76
E-Mail: info.es@kobold.com
www.kobold.com

Technical data
Subject to change without prior notice