

# (1) EU-TYPE EXAMINATION CERTIFICATE



- (2) Equipment and Protective Systems intended for use in  
Potentially Explosive Atmosphere - **Directive 2014/34/EU**
- (3) EU-Type Examination Certificate Number

**TÜV 03 ATEX 7005 X**

Issue: 10

- (4) Equipment: pH, conductivity and oxygen sensors
- (5) Manufacturer: HAMILTON Bonaduz AG
- (6) Address: Via Crusch 8  
CH – 7402 Bonaduz
- (7) This product and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.
- (8) The TÜV Rheinland Zertifizierungsstelle für Explosionsschutz of TÜV Rheinland Industrie Service GmbH, Notified Body No. 0035 in accordance with Article 21 of the Council Directive 2014/34/EU of 26<sup>th</sup> February 2014, certifies this product which 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 atmosphere, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report 557/Ex7005.10/03

- (9) Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule of this certificate, has been assessed by reference to:

**EN 60079-0: 2018**

**EN 60079-11: 2012**

**EN 60079-26: 2015**

- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EU-Type Examination Certificate relates only to the design and specification for construction of the equipment or protective system. It does not cover the process for actual manufacture or supply of the equipment or protective system, for which further requirements of the directive are applicable.
- (12) The marking of the equipment shall include the following:

II 1/2 G Ex ia IIB T4/T5/T6 Ga/Gb resp. Ex ia IIC T4/T5/T6 Ga/Gb

II 1/2 D Ex ia IIIC T x°C Da/Db

TÜV Rheinland Zertifizierungsstelle für Explosionsschutz

Cologne, 2019-06-26

Dipl.-Ing. Christian Mehrhoff



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TÜV Rheinland Industrie Service GmbH TÜV Rheinland Group Am Grauen Stein 51105 Köln  
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(13) Annex

(14) **EU Type Examination Certificate**  
**TÜV 03 ATEX 7005 X** Issue: 10

(15) Description of equipment

15.1 Equipment and type:

pH, conductivity and oxygen sensors

15.2 Description / Details of Change

General product information

The sensors are used for the measurement of the pH value, the content of oxygen or the conductivity of liquids. For this purpose the tip of the sensors is inserted into the medium to be measured using different types of fittings (armatures). Some of the sensors are equipped with an integrated temperature sensor PT100, PT1000 or NTC22kΩ. The tip of the sensors are located in zone 0 whereas the connection terminals are located in zone 1. The separation of the zone is done by sealing rings. The sensors have to be supplied by intrinsically safe circuits.

The principle of the pH measurement is the separation of charge in liquids. The quantity of the separated charge is an indicator for the pH value. Therefore the sensors are intended to be used in conductive liquids.

The principle of the measurement of oxygen is the reduction of oxygen at the cathode of the sensor. The current flow is proportional to the content of oxygen.

The conductivity of the liquid is measured directly from its resistive behavior.

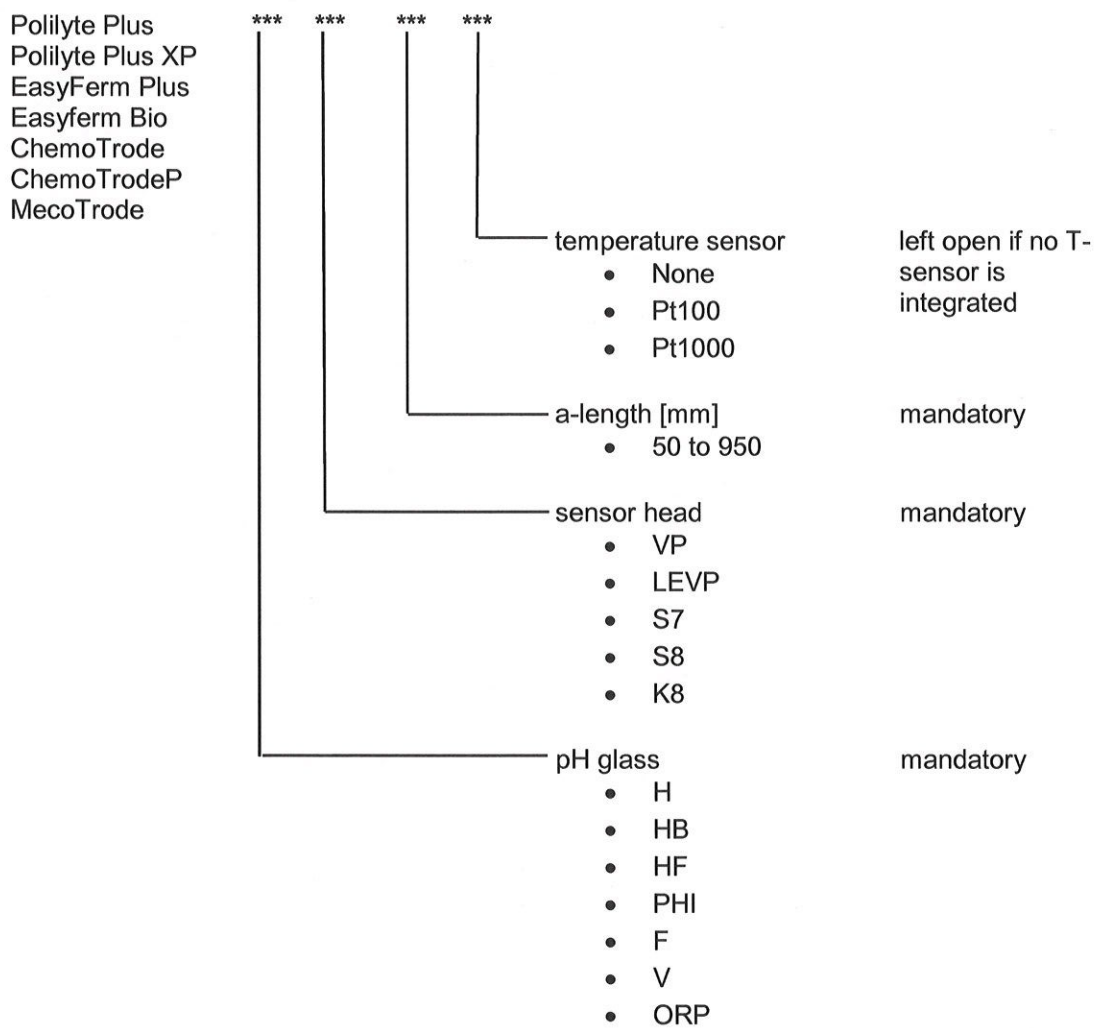
The temperature is measured by sensors PT100, PT1000 or NTC22kΩ which are located directly in the probe.

According to their design, the sensors are classified into different types, which take environmental temperature ranges and the electrical input parameters into account..

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Type Code:

**pH sensor families Polilyte Plus, Polilyte Plus XP, EasyFerm Plus, EasyFerm Bio, ChemoTrode, ChemoTrodeP and MecroTrode:**



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<b>pH Sensors</b>		
<b>Name</b>	<b>Ex marking</b>	<b>Sensor type (1-7)</b>
Polilyte PRO 120	G: IIC; D: IIIC	7
Polilyte PRO VP 120	G: IIC; D: IIIC	2
Polilyte RX 120	G: IIC; D: IIIC	7
Polilyte Plus *** **	G: IIC; D: IIIC	1,2,7
Polilyte Plus XP *** **	G: IIC; D: IIIC	1,2,7
Polilyte Plus XP VP 120 Pt1000	G: IIC; D: IIIC	2
Polyplast PRO 120	G: IIB; D: IIIC	7
Polyplast PRO RX 120	G: IIB; D: IIIC	7
EasyFerm Plus *** **	G: IIC; D: IIIC	1,2,7
EasyFerm Bio *** **	G: IIC; D: IIIC	1,2,7
ChemoTrode *** **	G: IIC; D: IIIC	1,2,7
ChemoTrode 120	G: IIC; D: IIIC	7
ChemoTrode 150	G: IIC; D: IIIC	7
ChemoTrode 200	G: IIC; D: IIIC	7
ChemoTrode 250	G: IIC; D: IIIC	7
ChemoTrode 550	G: IIC; D: IIIC	7
ChemoTrode ORP 120	G: IIC; D: IIIC	7
ChemoTrode ORP 150	G: IIC; D: IIIC	7
ChemoTrode VP 120	G: IIC; D: IIIC	2
ChemoTrode VP 150	G: IIC; D: IIIC	2
ChemoTrode VP 250	G: IIC; D: IIIC	2
ChemoTrode P *** **	G: IIC; D: IIIC	1,2,7
ChemoTrode P PHI 120	G: IIC; D: IIIC	7
ChemoTrode P PHI 150	G: IIC; D: IIIC	7
ChemoTrode P PHI 250	G: IIC; D: IIIC	7

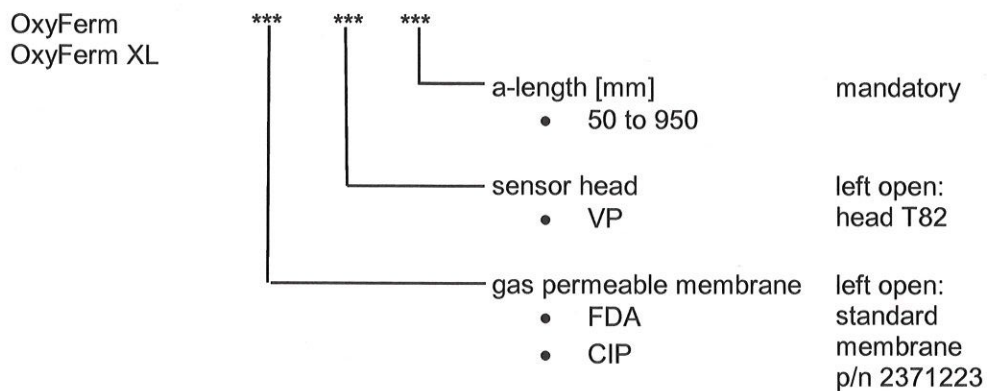
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<b>pH Sensors</b>		
<b>Name</b>	<b>Ex marking</b>	<b>Sensor type (1-7)</b>
FermoTrode 120	G: IIC; D: IIIC	7
FermoTrode 150	G: IIC; D: IIIC	7
FermoTrode 200	G: IIC; D: IIIC	7
FermoTrode 250	G: IIC; D: IIIC	7
Liq-Glass PG	G: IIC; D: IIIC	7
MecoTrode *** **	G: IIC; D: IIIC	1,2,7
MecoTrode 120	G: IIC; D: IIIC	7
MecoTrode Flat LEVP 225	G: IIC; D: IIIC	1
MecoTrode VP 120	G: IIC; D: IIIC	1
NovoTrode LEVP 120	G: IIC; D: IIIC	2
NovoTrode LEVP 225 (Pt1000)	G: IIC; D: IIIC	2
NovoTrode LEVP 225 (Pt100)	G: IIC; D: IIIC	1
OxyTrode Platinum	G: IIC; D: IIIC	7
InchTrode N75F	G: IIB; D: IIIC	6
InchTrode N75P	G: IIB; D: IIIC	6
InchTrode N75FC10	G: IIB; D: IIIC	3
InchTrode N75PC10	G: IIB; D: IIIC	3

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## O2 sensor family OxyFerm and OxyFerm XL:



Oxygen Sensors		
Name	Ex marking	Sensor type (1-7)
Oxysens	G: IIC; D: IIIC	4
OxyFerm *** **	G: IIC; D: IIIC	4,5
OxyFerm VP 120	G: IIC; D: IIIC	5
OxyFerm VP 225	G: IIC; D: IIIC	5
OxyFerm VP 325	G: IIC; D: IIIC	4
OxyFerm XL *** **	G: IIC; D: IIIC	4
OxyFerm XL	G: IIC; D: IIIC	4
OxyFerm XL 150	G: IIC; D: IIIC	4
OxyFerm XL 300	G: IIC; D: IIIC	4
OxyGold B 120	G: IIC; D: IIIC	5
OxyGold B 225	G: IIC; D: IIIC	5
OxyGold G 120	G: IIC; D: IIIC	5
OxyGold G 225	G: IIC; D: IIIC	5

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### Conductivity sensor family Conducell 4US:

Conducell 4US - *** - ***/***		
	O-ring position [mm]	option
	• 10 to 100	
	a-length [mm]	mandatory
	• 40 to 130	
	sensor head	mandatory
	• Gxxx	Pipethread xxx
	• Txxx	centi-inch
		Triclamp with xxx
		mm diameter

### Conductivity sensor family Conducell 4USF:

Conducell 4U*F - ** - ***		
	a-length [mm]	mandatory
	• 50 to 900	
	sensor head	mandatory
	• VP	
	electrode material	mandatory
	• S	steel
	• H	hastelloy
	• T	titanium
	• Pt	platinum

### Conductivity sensor family Conducell UPW:

Conducell UP* - ** - ***		
	a-length [mm]	mandatory
	• 50 to 900	
	sensor head	mandatory
	• PG	
	• TC	
	• VV	
	electrode material	mandatory
	• W	stainless steel
	• H	hastelloy
	• T	titanium

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<b>Conductivity Sensors</b>		
<b>Name</b>	<b>Ex marking</b>	<b>Sensor type (1-7)</b>
Conducell 4US - *** - *** / ***	G: IIB; D: IIIC	6
Conducell 4US-G125	G: IIB; D: IIIC	6
Conducell 4US-T150-50	G: IIB; D: IIIC	6
Conducell 4US-T150-100	G: IIB; D: IIIC	6
Conducell 4U*F ** ***	G: IIB or IIC; D: IIIC	6
Conducell 4USF-PG-120	G: IIC; D: IIIC	6
Conducell 4USF-PG-225	G: IIC; D: IIIC	6
Conducell 4USF-PG-325	G: IIB; D: IIIC	6
Conducell 4USF-PG-425	G: IIB; D: IIIC	6
Conducell 4UTF-PG-120	G: IIC; D: IIIC	6
Conducell 4UHF-PG-120	G: IIC; D: IIIC	6
Conducell UP* ** ***	G: IIB or IIC; D: IIIC	6
Conducell UPW PG 120	G: IIC; D: IIIC	6

#### Technical Data:

All sensors are suitable for the connection to intrinsic safe circuits with a protection level ia.  
 None of the declared values shall be exceeded in its sum (measuring and temperature circuit):

$U_i \leq 24V$  (unchanged)

$I_i \leq 173 \text{ mA}$  (unchanged)

$P_i \leq$  according to the following tables

The inner inductivities and capacities are negligible

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### Gas atmospheres:

The sensors are applicable up to the maximum environmental and media temperatures stated in the following tables depending on their power and temperature class:

#### **Sensors of type 1 (glass shank / PT100)**

T-class	Pi <= 50 mW	Pi <= 125 mW	Pi <= 230 mW	Pi <= 360 mW
T4	125 °C	119 °C	111 °C	100 °C
T5	90 °C	84 °C	76 °C	65 °C
T6	71 °C	58 °C	39 °C	15 °C

#### **Sensors of type 2 (glass shank / PT1000)**

T-class	Pi <= 50 mW	Pi <= 100 mW	Pi <= 150 mW	Pi <= 360 mW
T4	125 °C	121 °C	117 °C	100 °C
T5	90 °C	86 °C	82 °C	65 °C
T6	59 °C	41 °C	22 °C	NA

#### **Sensors of type 3 (synthetic shank / PT100)**

T-class	Pi <= 50 mW	Pi <= 125 mW	Pi <= 230 mW
T4	123 °C	114 °C	102 °C
T5	88 °C	79 °C	67 °C
T6	71 °C	58 °C	39 °C

#### **Sensors of type 4 (metal shank 22kΩ NTC)**

T-class	Pi <= 30 mW	Pi <= 60 mW	Pi <= 90 mW
T4	129 °C	129 °C	128 °C
T5	94 °C	94 °C	93 °C
T6	68 °C	57 °C	46 °C

#### **Sensors of type 5 (metal shank 22kΩ NTC and certain fittings)**

Sensors of type 5 must be incorporated in one of the following fittings – otherwise they may be considered a sensors of type 4:

Retractofit, Retractofit Bio, Flexifit TC, Flexifit Bio

T-class	Pi <= 250 mW
T4	125 °C
T5	90 °C
T6	75 °C

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**Sensors of type 6 (synthetic body with PT1000)**

T-class	Pi <= 50 mW	Pi <= 100 mW	Pi <= 150 mW
T4	109 °C	91 °C	72 °C
T5	74 °C	56 °C	37 °C
T6	59 °C	41 °C	22 °C

**Sensors of type 7 (without temperature sensor)**

The shank of the sensors of type 7 are made of glass or synthetic.

T-class	Pi <= 250 mW
T4	125 °C
T5	90 °C
T6	75 °C

**Dust atmospheres:**

The maximum surface temperature for dust atmospheres depends on the input power Pi and ambient/process temperatures Ta as follows:

Input Power Sensor type	Pi <= 50mW	Pi <= 125mW	Pi <= 230mW	Pi <= 360mW
1 / 3	Ta + 9°C	Ta + 22°C	Ta + 41°C	Ta + 65°C
	Pi <= 50 mW	Pi <= 100 mW	Pi <= 150 mW	
2 / 6	Ta + 21°C	Ta + 39°C	Ta + 58°C	
	Pi <= 30 mW	Pi <= 60 mW	Pi <= 90 mW	
4	Ta + 12°C	Ta + 23°C	Ta + 34°C	
	Pi <= 250 mW			
5 / 7	Ta + 5°C			

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### Armatures:

Following limitations for the usage of armatures have to be considered:

Armature/fitting	Ex marking
RetractoFit Series	G: IIC; D: IIIC
RetractoFit PEEK Series	G: IIB; <b>cannot be used in Dust</b>
FlexiFit Series, type a, b and c	G: IIC; D: IIIC
MasterFit 120	G: IIC; D: IIIC
MasterFit 150	G: IIC; D: IIIC
MasterFit 200	G: IIC; D: IIIC
Flange Adapter	G: IIB; <b>cannot be used in Dust</b>
Retractex B Series	G: IIC; D: IIIC
Retractex C Steel (M) Series Retractex C Steel LT (M) Series (process connection in stainless steel)	G: IIC; D: IIIC
Retractex C Plastic (M) Series Retractex C Plastic LT (M) Series Type A and B  (process connection in PEEK, PVDF or other polymeric materials)	G: IIB or IIA (see certificate for the restrictions)  <b>cannot be used in Dust</b>
Retractex BC Steel (M) Series	G: IIC; D: IIIC
Retractex BC Plastic (M) Series  (process connection in PEEK, PVDF or other polymeric materials)	G: IIB or IIA (see certificate for the restrictions)  <b>cannot be used in Dust</b>

### Abbreviations for Retractex:

LT: long tube

M: manual retraction (not pneumatic)

Type A: insertion tube completely made of plastics (e.g. polypropylene, PEEK, ...)

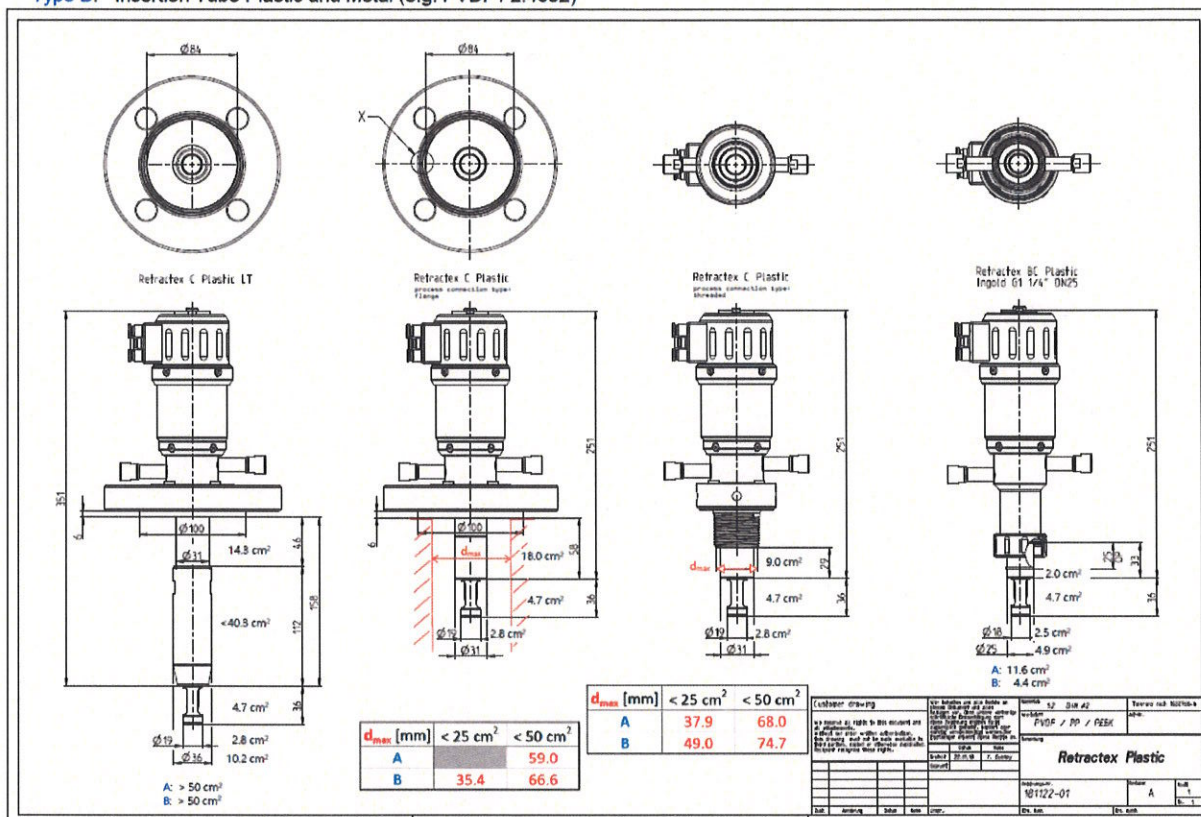
Type B: Insertion tube made of plastic and steel

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The end user shall assess the suitability of the Retractable armatures in different gas groups and configurations:

**Type A:** Insertion Tube Plastic only (e.g. Polypropylene; PEEK)

**Type B:** Insertion Tube Plastic and Metal (e.g. PVDF / 2.4602)



The drawing shows the correlation between the mounting situation and the diameter (flange or shaft) of the exposed plastic surface for

- a flange connection (left, not allowed in Ex atmospheres)
- a connection where the flange is partly covered (2<sup>nd</sup> from left); Max. diameter given in the table below.
- a threaded connection (2<sup>nd</sup> from right); Max. diameter given in the table below.
- BC version (no restrictions for IIA and IIB)

The max. diameters are given in so that the overall exposed surface does not exceed the limits for IIA (50cm<sup>2</sup>) and IIB (25cm<sup>2</sup>).

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A summary for the suitability of Retractex armatures is given below:

Gas Group / permitted plastic surface [cm <sup>2</sup> ] Product Family	IIA 50	IIB 25	IIC 4
Retractex C Steel (M)	no restriction	no restriction	no restriction
Retractex C Steel LT (M)	no restriction	no restriction	no restriction
Retractex C Plastic (M) Type A flange connection	medium exposed flange diameter $d_{\max} < 59.0\text{mm}$	not allowed	not allowed
Retractex C Plastic (M) Type B flange connection	medium exposed flange diameter $d_{\max} < 66.6\text{ mm}$	medium exposed flange diameter $d_{\max} < 35.4\text{ mm}$	not allowed
Retractex C Plastic (M) Type A threaded connection	medium exposed flange diameter $d_{\max} < 68.0\text{ mm}$	medium exposed flange diameter $d_{\max} < 37.9\text{mm}$	not allowed
Retractex C Plastic (M) Type B threaded connection	medium exposed flange diameter $d_{\max} < 74.7\text{ mm}$	medium exposed flange diameter $d_{\max} < 49.0\text{mm}$	not allowed
Retractex C Plastic LT (M)	not allowed	not allowed	not allowed
Retractex BC Steel (M)	no restriction	no restriction	
Retractex BC Plastic (M)	no restriction	no restriction	not allowed
Type A	Insertion tube completely made of plastic (e.g. Polypropylene, PEEK)		
Type B	Insertion tube of plastic and steel (e.g. PVDF / 2.4602)		

### Details of Change:

The scope of the 10<sup>th</sup> supplement is

1. Standard update to EN 60079-0:2018.
2. Editorial corrections.
3. Consolidation of relevant information (the tables in the previous versions of the certificate are not valid anymore).
4. Inclusion of the new conductivity sensor CONDUCELL UPW

(16) Test-Report No. 557/Ex7005.10/03

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(17) Special Conditions for safe use

1. The temperature classification depends on the ambient temperature and input power. The tables in the CoC have to be observed.
2. The sensors, cableways and associated apparatus have to be included into the equipotential bonding.
3. The attached marking plate must be applied at the cable or connection device as close as possible to the sensor at the time of installation.
4. The proper click-in of the safety button shall be observed after cleaning.
5. The gaskets (O-rings) have to be renewed after cleaning or maintaining of the armatures.

(18) Basic Safety and Health Requirements

Covered by afore mentioned standard

TÜV Rheinland Zertifizierungsstelle für Explosionsschutz

Cologne, 2019-06-26

  
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