



IECEX Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEX TUR 14.0001X**

Page 1 of 4

Certificate history:

Status: **Current**

Issue No: 3

Issue 2 (2019-06-26)

Issue 1 (2015-10-14)

Issue 0 (2014-04-07)

Date of Issue: 2022-02-22

Applicant: **HAMILTON Bonaduz AG**
CH – 7402 Bonaduz
Via Crusch 8
Switzerland

Equipment: **pH, conductivity and oxygen sensors and armatures as shown in the annex to this CoC**

Optional accessory:

Type of Protection: **Ex i**

Marking: **Ex ia IIB T4/T5/T6 Ga/Gb**
resp. Ex ia IIC T4/T5/T6 Ga/Gb
Ex ia III C Tx°C Da/Db

Approved for issue on behalf of the IECEx
Certification Body:

Christian Mehrhoff

Position:

Assigned certifier

Signature:
(for printed version)

Date:
(for printed version)

2022-02-22

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.



Certificate issued by:

TUV Rheinland Industrie Service GmbH
Am Grauen Stein
51105 Cologne
Germany





IECEX Certificate of Conformity

Certificate No.: **IECEX TUR 14.0001X**

Page 2 of 4

Date of issue: 2022-02-22

Issue No: 3

Manufacturer: **HAMILTON Bonaduz AG**
CH – 7402 Bonaduz
Via Crusch 8
Switzerland

Manufacturing
locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEX Quality system requirements. This certificate is granted subject to the conditions as set out in IECEX Scheme Rules, IECEX 02 and Operational Documents as amended

STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-11:2011 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "I"
Edition:6.0

IEC 60079-26:2014-10 Explosive atmospheres – Part 26: Equipment with Equipment Protection Level (EPL) Ga
Edition:3.0

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

[DE/TUR/ExTR14.0001/03](#)

Quality Assessment Report:

[DE/TUR/QAR12.0005/03](#)



IECEX Certificate of Conformity

Certificate No.: **IECEX TUR 14.0001X**

Page 3 of 4

Date of issue: 2022-02-22

Issue No: 3

EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

A detailed description is given in the attachment to this certificate.

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. The temperature classification depends on the ambient temperature and input power. The tables in this CoC and the user manual 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.



IECEX Certificate of Conformity

Certificate No.: **IECEX TUR 14.0001X**

Page 4 of 4

Date of issue: 2022-02-22

Issue No: 3

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

- New options for the sensor heads of Conducell 4UxF
- Extension of P_i for sensor type 6
- New armature Hygienic Socket
- New sensor EasyFerm USD *** **
- New armature series Sensor Dummy
- New armature FlexiFlow
- New armature FlowCell

Annex:

[IECEX_TUR_14.0001X-03_Attachment.pdf](#)



Device: pH, conductivity and oxygen sensors
Type: see description

Manufacturer: HAMILTON Bonaduz AG

Address: CH – 7402 Bonaduz, Via Crusch 8, Switzerland

Subject and type
pH, conductivity and oxygen sensors

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.

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):

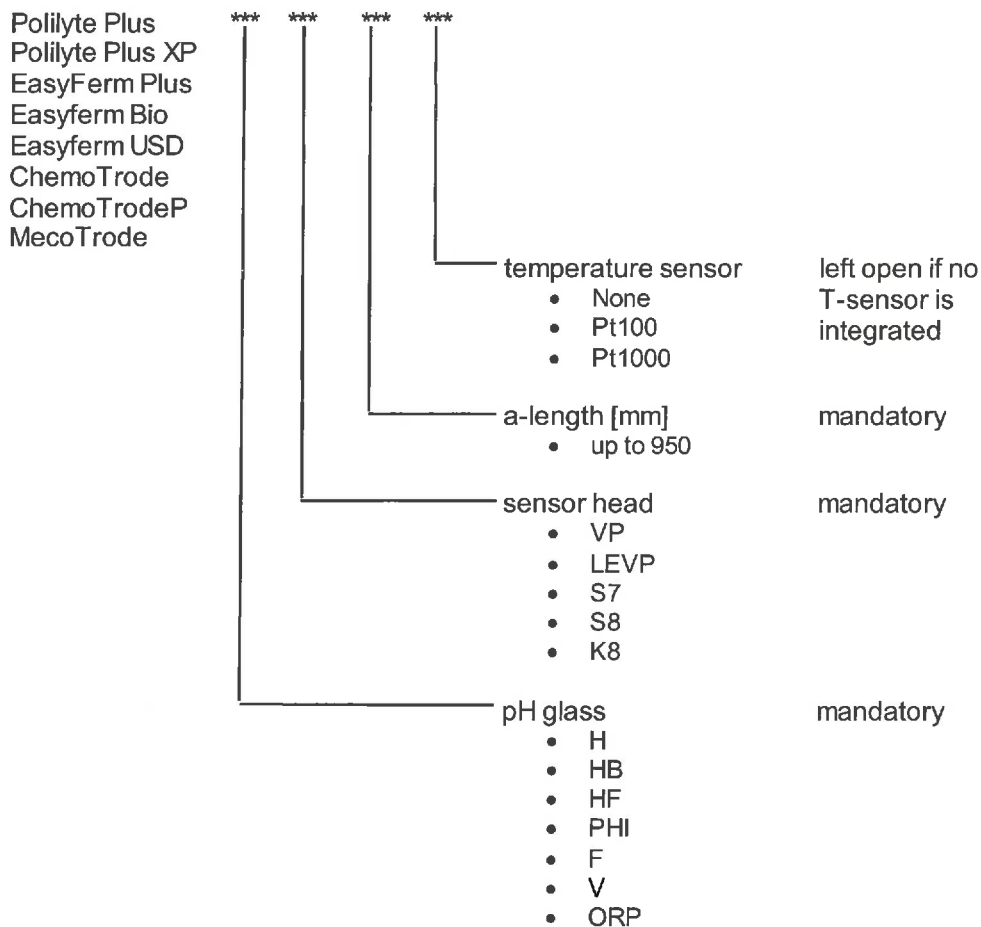
$U_i \leq 24V$

$I_i \leq 173\text{ mA}$

$P_i \leq$ according to the following tables

The inner inductivities and capacities are negligible.

pH sensor families Polilyte Plus, Polilyte Plus XP, EasyFerm Plus, EasyFerm Bio, EasyFerm USD, ChemoTrode, ChemoTrodeP and MecoTrode:



pH Sensors		
Name	Ex marking	Sensor type (1-7)
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



pH Sensors		
Name	Ex marking	Sensor type (1-7)
Polllyte 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
EasyFerm USD *** **	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
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

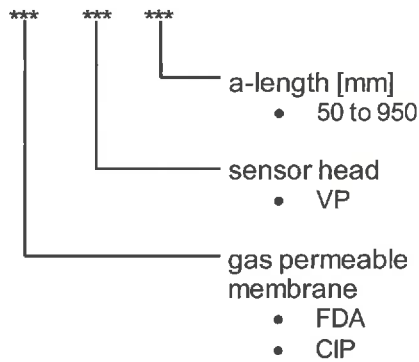


pH Sensors		
Name	Ex marking	Sensor type (1-7)
MecoTrode 120	G: IIC; D: IIIC	7
MecoTrode Flat LEVP 225	G: IIC; D: IIIC	1
MecoTrode VP 120	G: IIC; D: IIIC	1
NovoTrode LEVP 120	G: IIC; D: IIIC	2
NovoTrode LEVP 225 (Pt1000)	G: IIC; D: IIIC	2
NovoTrode LEVP 225 (Pt100)	G: IIC; D: IIIC	1
OxyTrode Platinum	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



O₂ sensor family OxyFerm and OxyFerm XL:

OxyFerm
OxyFerm XL



mandatory

left open:
head T82

left open:
standard
membrane
p/n 2371223

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



Conductivity sensor family Conducell 4US:

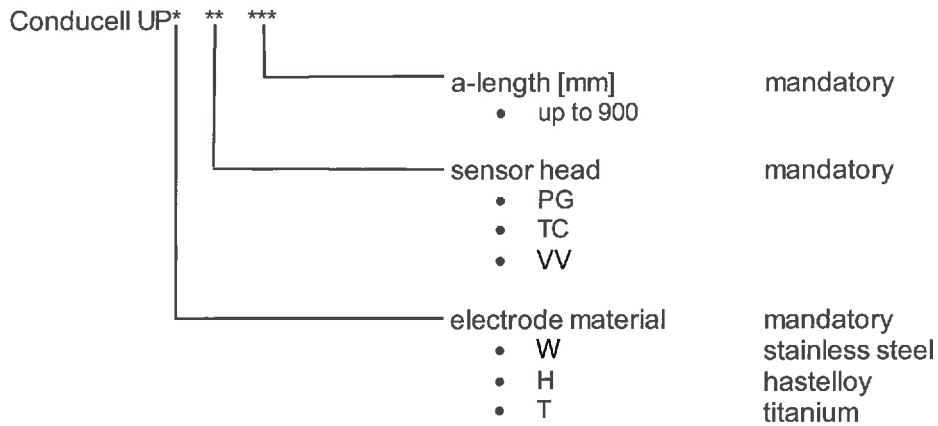
Conducell 4US	***	*** / ***		
			O-ring position [mm]	option
			• 10 to 100	
			a-length [mm]	mandatory
			• up to 130	
			sensor head	mandatory
			• Gxxx	Pipethread xxx
			• Txxx	centi-inch
				Triclamp with
				xxx mm
				diameter

Conductivity sensor family Conducell 4USF:

Conducell 4USF	**	***		
			a-length [mm]	option
			• up to 900	
			sensor head	mandatory
			• VP	
			• VP TC 1.5	
			• VP VV N	
			• VP VV F	
			• VP VV	
			• VP BC	
			• VP BCI	
			• VP NPT 3/4	
			• VP NPT 1	
			electrode material	mandatory
			• S	steel
			• H	hastelloy
			• T	titanium
			• Pt	platinum



Conductivity sensor family Conducell UPW:



Conductivity Sensors		
Name (note: the spelling of Conducell can vary in upper and lower case)	Ex marking	Sensor type (1-7)
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



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

Sensors of type 6 (synthetic body with PT1000)

T-class	Pi ≤ 50 mW	Pi ≤ 100 mW	Pi ≤ 150 mW	Pi ≤ 170 mW
T4	109 °C	91 °C	72 °C	64 °C
T5	74 °C	56 °C	37 °C	29 °C
T6	59 °C	41 °C	22 °C	14 °C



Sensors of type 7 (without temperature sensor)

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

T-class	$P_i \leq 250 \text{ mW}$
T4	125 °C
T5	90 °C
T6	75 °C

Dust atmospheres:

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

Sensor type	Input Power			
	$P_i \leq 50 \text{ mW}$	$P_i \leq 125 \text{ mW}$	$P_i \leq 230 \text{ mW}$	$P_i \leq 360 \text{ mW}$
1 / 3	$T_a + 9^\circ\text{C}$	$T_a + 22^\circ\text{C}$	$T_a + 41^\circ\text{C}$	$T_a + 65^\circ\text{C}$
	$P_i \leq 50 \text{ mW}$	$P_i \leq 100 \text{ mW}$	$P_i \leq 150 \text{ mW}$	
2 / 6	$T_a + 21^\circ\text{C}$	$T_a + 39^\circ\text{C}$	$T_a + 58^\circ\text{C}$	
	$P_i \leq 30 \text{ mW}$	$P_i \leq 60 \text{ mW}$	$P_i \leq 90 \text{ mW}$	
4	$T_a + 12^\circ\text{C}$	$T_a + 23^\circ\text{C}$	$T_a + 34^\circ\text{C}$	
	$P_i \leq 250 \text{ mW}$			
5 / 7	$T_a + 5^\circ\text{C}$			



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; cannot be used in Dust
FlexiFit Series, type a, b and c	G: IIC; D: IIIC
FlexiFlow Series	G: IIC; D: IIIC
FlowCell	G: IIA; cannot be used in Dust
Hygienic Socket	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; cannot be used in Dust
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) cannot be used in Dust
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) cannot be used in Dust
Sensor Dummy Series	G: IIC; D: IIIC

Abbreviations for Retractex:

LT: long tube

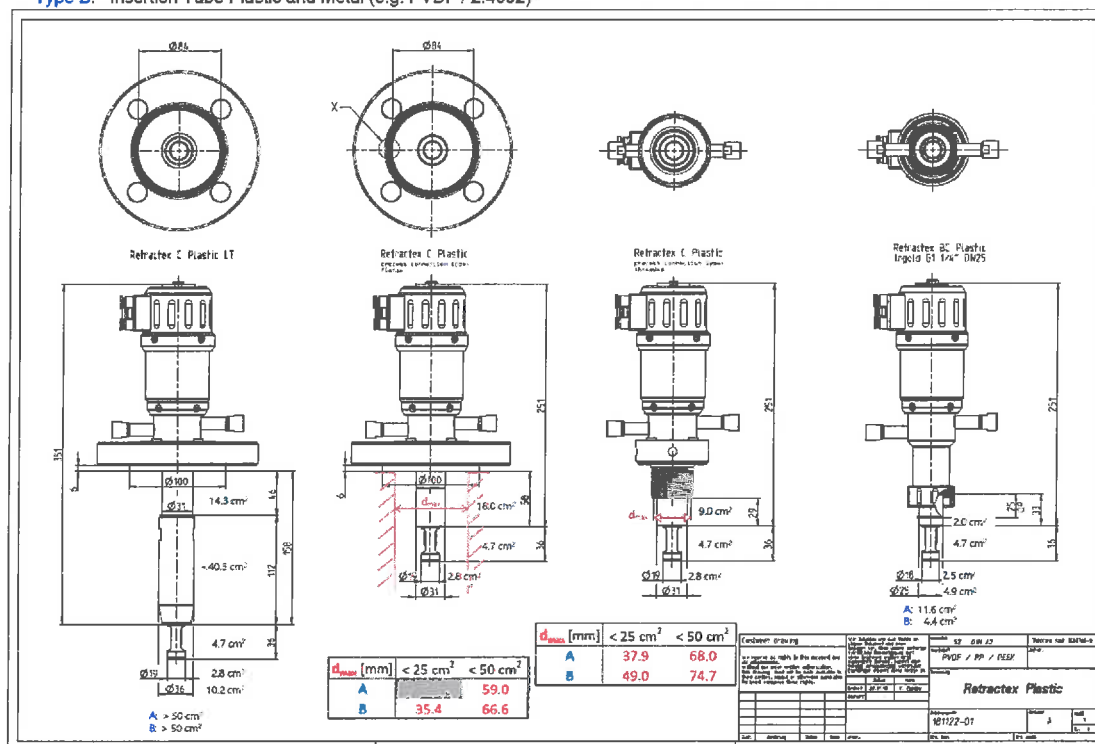
M: manual retraction (not pneumatic)

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

Type B: Insertion tube made of plastic and steel

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 (2nd from left); Max. diameter given in the table below.
- a threaded connection (2nd from right); Max. diameter given in the table below.
- BC version (no restrictions for IIA and IIB)

The max. diameters are given so that the overall exposed surface does not exceed the limits for IIA (50cm²) and IIB (25cm²).



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

Gas Group / permitted plastic surface [cm ²] Product Family	IIA 50	IIB 25	IIC 4
Retractable C Steel (M)	no restriction	no restriction	no restriction
Retractable C Steel LT (M)	no restriction	no restriction	no restriction
Retractable C Plastic (M) Type A flange connection	medium exposed flange diameter $d_{max} < 59.0\text{mm}$	not allowed	not allowed
Retractable 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
Retractable 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
Retractable 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
Retractable C Plastic LT (M)	not allowed	not allowed	not allowed
Retractable BC Steel (M)	no restriction	no restriction	no restriction
Retractable 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)		