Intrinsically Safe Pressure Transmitter for applications in hazardous environments Models IS-20-S, IS-21-S, IS-20-F, IS-21-F

Applications

- Chemical, Petrochemical
- Oil and gas refining
- Food & Beverage
- Mechanical engineering

Special Features

- Pressure ranges from 0 ... 0.1 bar to 0 ... 1,000 bar
- Ex- protection Ex ia I/II C T6 according to ATEX for:Gases, vapours and mist: Zone 0, Zone 1 and Zone 2
  Dust: Zone 20, Zone 21 and Zone 22
  Mining: Category M1 and M2
- FM, CSA approval for:
  - Intrinsically safe Class I, II and III Division 1, Group A, B, C, D, E, F, G
  - Dust Class II und III Division 1, Group E, F, G
  - Class I, Zone 0, AEx ia II C
- suitable for SIL 2 according to IEC 61508/ IEC 61511

Fig. left: Pressure transmitter IS-21-S
Fig. right: Pressure transmitter IS-20-F

Description

To meet highest standards
The intrinsically safe pressure transmitters have been specially designed to comply with the most difficult requirements of industrial applications and represent an ideal solution for almost any task in hazardous environments.

These pressure transmitters meet approvals such as ATEX, FM, CSA, which are relevant throughout the world. All data required in connection with the approval is included on the product label. Furthermore they are suitable for SIL 2 applications according to IEC 61508/ IEC 61511.

A stock program ensures short delivery times.

Structure
All wetted parts are made of stainless steel and are completely welded. Therefore there are no restrictions of the sealing material based on the pressure media.

The compact case is also made of stainless steel and provides IP 65 ingress protection (special versions up to IP 68).

The model IS-21-S and IS-21-F with flush diaphragm is particularly suitable for the measurement of viscous fluids or media containing particulates that may clog the pressure connection of standard industrial transmitters. Thus, a trouble-free pressure measurement is ensured.

Model IS-2X-F features a fieldcase connection, which enables use in aggravated operating conditions and enables direct wiring of the cables.

The transmitters are supplied via appropriate intrinsically safe line transformers, or via typical zener diode barriers with an input power of 10 ... 30 V. The output signal is 4 ... 20 mA, 2-wire.

Data sheets showing similar products:
Intrinsically Safe Level Probe; model IL-10; see data sheet PE 81.23
Intrinsically Safe Pressure Transmitter for highest pressure applications; model IS-20-H; see data sheet PE 81.51
Intrinsically Safe Pressure Transmitter for Shipbuilding and Off-Shore; model IS-2X-S (-F); see data sheet PE 81.52

Specifications — Model IS-20-S, IS-21-S, IS-20-F, IS-21-F

Specifications without model designation apply for all models.

Pressure ranges *)	bar	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10
Over pressure safety	bar	1	1.5	2	2	4	5	10	10	17	35	35
Burst pressure	bar	2	2	2.4	2.4	4.8	6	12	12	20.5	42	42
Pressure ranges *)	bar	16	25	40	60	100	160	250	400	600	1000[1)]	
Over pressure safety	bar	80	50	80	120	200	320	500	800	1200	1500	
Burst pressure	bar	96	96	400	550	800	1000	1200	1700[2)]	2400[2)]	3000	
	{Vacuum, gauge pressure, compound range, absolute pressure are available}											
	[1)] Only model IS-20.											
	[2)] For model IS-21: the value specified in the table applies only when sealing is realised with the sealing ring underneath the hex. Otherwise max. 1500 bar applies.											

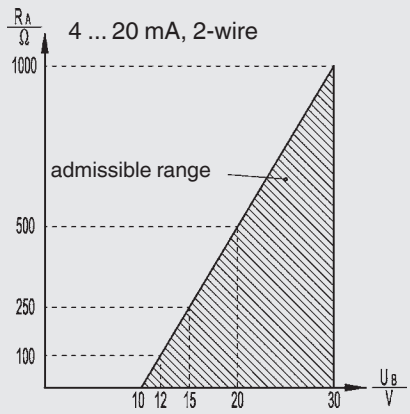
Materials			
■ Wetted part			
» Model IS-20		Stainless steel	
» Model IS-21		Stainless steel	O-ring: NBR {FPM/FKM or EPDM}
■ Case		Stainless steel	
■ Internal transmission fluid [3)]		Synthetic oil {Halocarbon oil for oxygen applications}	
	[3)] Not for IS-20 with pressure ranges > 25 bar.		
Power supply U+			
» Model IS-2X-S	DC V	10 ... 30	
» Model IS-2X-F	DC V	11 ... 30	
Signal output and		4 ... 20 mA, 2-wire	
maximum ohmic load R_A	Ohm		
» Model IS-2X-S		$R_A \leq$ (U+ – 10 V) / 0.02 A - (length of flying leads in m x 0.14 Ohm)	
» Model IS-2X-F		$R_A \leq$ (U+ – 11 V) / 0.02 A	
Test circuit signal / max. load		$R_A \leq$ 15 Ohm (only model IS-2X-F)	
Adjustability zero/span	%	± 5 using potentiometers inside the instrument	
Response time (10 ... 90 %)	ms	≤ 1 [4)]	
	[4)] Response time IS-20: ≤ 10 ms at medium temp. below -30 °C for pressure ranges up to 25 bar. Response time IS-21: ≤ 10 ms at medium temp. below -30 °C / -22 °F.		
Power Pi	W	1 (750 mW with approval for Category 1D)	
Insulation voltage		Insulation complies with EN 60079-11	
Accuracy [5)]	% of span	≤ 0.5 {0.25} [6)]	
	[5)] Including non-linearity, hysteresis, zero point and full scale error (corresponds to error of measurement per IEC 61298-2) Adjusted in vertical mounting position with lower pressure connection		
	[6)] Accuracy { } for pressure ranges ≥ 0.25 bar		
Non-linearity	% of span	≤ 0.2	(BFSL) according to IEC 61298-2
Non-repeatability	% of span	≤ 0.1	
1-year stability	% of span	≤ 0.2	(at reference conditions)
Permissible temperature of			
■ Medium [8)] *)		-20 ... +80 °C [7)]	-4 ... +176 °F [7)]
		{extended temperature ranges see page 6} [7)]	
■ Ambience [8)]		-20 ... +80 °C [7)]	-4 ... +176 °F [7)]
■ Storage		-30 ... +105 °C	-22 ... +221 °F
	[7)] Other temperature ranges are possible, depending on the electrical connection; see EC-type examination certificate, e.g. -30 … +105 °C / -22 … +221 °F and table page 7.		
Rated temperature range		0 ... +80 °C	32 ... +176 °F
Temperature coefficients within rated temp range			
■ Mean TC of zero	% of span	≤ 0.2 / 10 K	(< 0.4 for pressure ranges ≤ 0.25 bar)
■ Mean TC of range	% of span	≤ 0.2 / 10 K	
RoHS-conformity		Yes	
CE-conformity			
■ Pressure equipment directive		97/23/EC	
■ EMC directive		2004/108/EC, EN 61 326 Emission (Group 1, Class B) and Immunity (industrial locations)	

Specifications	Model IS-20-S, IS-21-S, IS-20-F, IS-21-F		
■ Directive ATEX of equipment intended for use in potentially explosive atmospheres		94/9/EC	
Ex-protection	ATEX	Category [8] 1G, 1/2G, 2G, 1D, 1/2D, 2D, M1, M2	
Ignition protection type		Ex ia I/II C T4, Ex ia I/II C T5, Ex ia I/II C T6	
	[8] **Read** the operating conditions and **safety-relevant data in** the **EC-type examination certificate in any case** (BVS 04 ATEX E 068 X)		
Ex-protection	FM, CSA	Class I, II and III	
Ignition protection type		Intrinsic safe Class I, II, III Division 1,	
		Group A, B, C, D, E, F, G and Class I, Zone 0 AEx ia II C	
HF-immunity	V/m	10	
Burst	kV	2	
Functional safety		Suitable for SIL 2 applications according to IEC 61508/ IEC 61511	
		Further information: „Additional Instructions Safety-related data IS-2X SIL“	
Shock resistance			
» Model IS-2X-S	g	1000 according to IEC 60068-2-27	(mechanical shock)
» Model IS-2X-F	g	600 according to IEC 60068-2-27	(mechanical shock)
Vibration resistance			
» Model IS-2X-S	g	20 according to IEC 60068-2-6	(vibration under resonance)
» Model IS-2X-F	g	10 according to IEC 60068-2-6	(vibration under resonance)
Wiring protection			
■ Reverse polarity protection		U+ towards U-	
Weight			
» Model IS-2X-S	kg	Approx. 0.2	
» Model IS-2X-F	kg	Approx. 0.35	

*) In an oxygen version model IS-21 is not available. In an oxygen version model IS-20 is only available in gauge pressure ranges ≥ 0.25 bar with media temperatures between -20 … +60 °C / -4 … +140 °F and using stainless steel or Elgiloy® wetted parts.
{ } Items in curved brackets are optional extras for additional price.

Output signal and admissible load

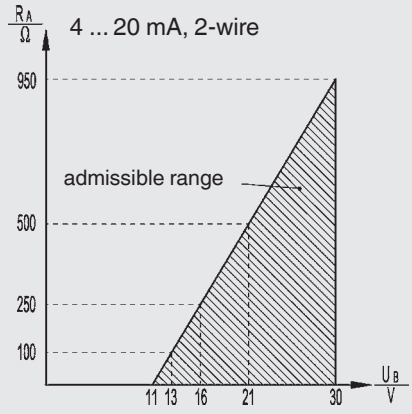
Model IS-2X-S



Output current (2-wire)

4 ... 20 mA: $R_A \leq (U+ - 10\ V) / 0.02\ A$

Model IS-2X-F



Output current (2-wire)

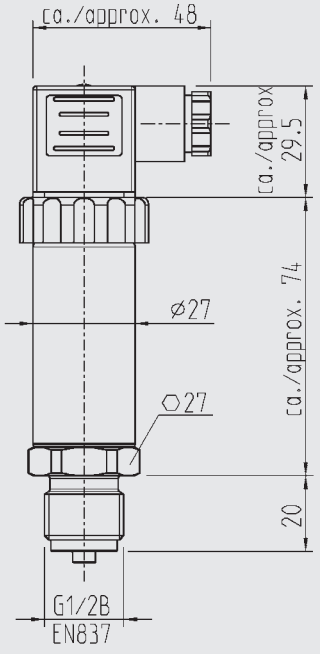
4 ... 20 mA: $R_A \leq (U+ - 11\ V) / 0.02\ A$

Dimensions in mm

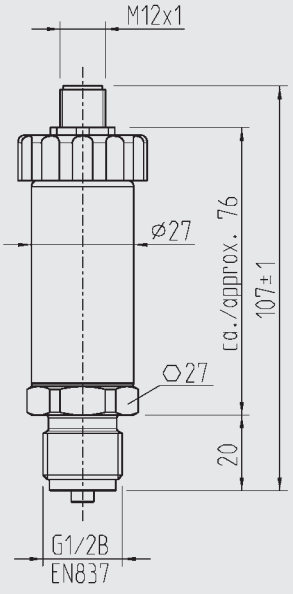
Permissible temperature ranges depending on electrical connections; see table page 7.

Electrical connections IS-2X-S

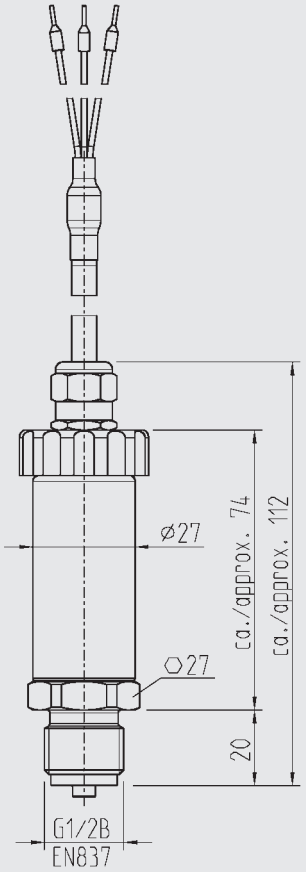
DIN 175301-803 A
L-connector
Order code: A4
ATEX: 1/2 G, M1



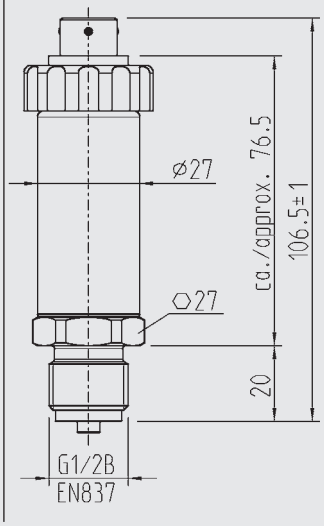
M 12x1
Circular connector
Order code: M4
ATEX: 1/2 G, M1
*)



Flying leads
PUR
Order code: DL
ATEX: 1/2 G, M1

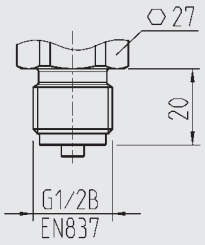


Bayonet connector,
Order code: C6
ATEX: 1/2 G
(not with mining)

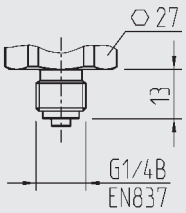


Pressure connections IS-20-S and IS-20-F

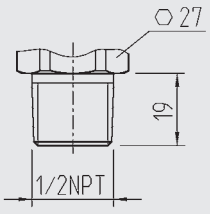
G 1/2
EN 837
Order code: GD



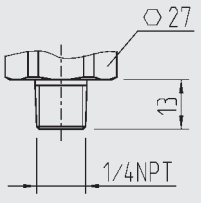
G 1/4
EN 837
Order code: GB



1/ 2 NPT
per „Nominal size for US standard tapered pipe thread NPT“
Order code: ND



1/4 NPT
per „Nominal size for US standard tapered pipe thread NPT“
Order code: NB



For installation and safety instructions see the operating instructions for this product.
For tapped holes and welding sockets please see Technical Information IN 00.14 for download at www.wika.de

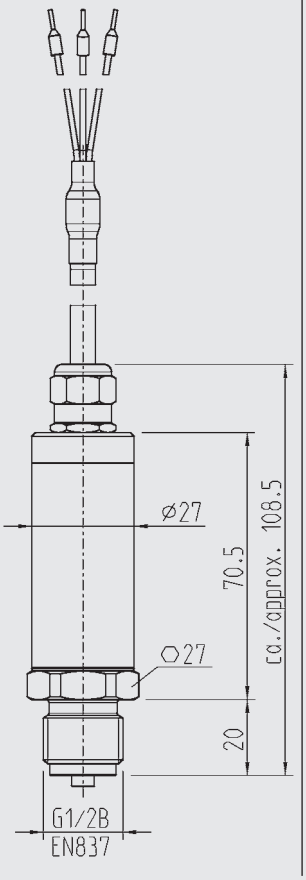
*) Connectors are not included in delivery.

Dimensions in mm

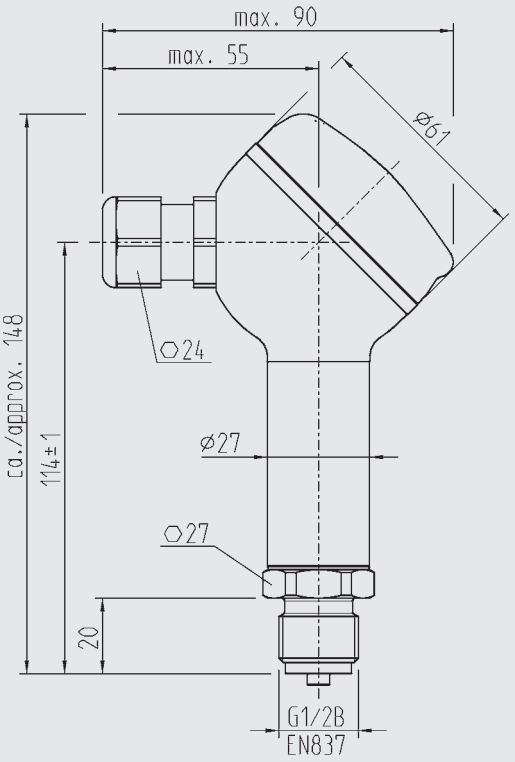
Permissible temperature ranges depending on electrical connections; see table page 7.

Electrical connections

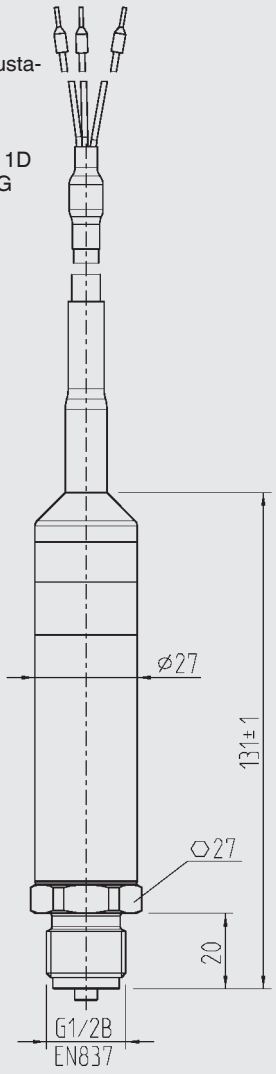
IS-2X-S
Flying leads
zero/span not adjustable,
PUR
Order code: EM
ATEX: 1/2 G, M1



IS-2X-F
Fieldcase
Order code:
FH (threaded connection brass nickel-plated)
FC (threaded connection stainless steel)
ATEX: 1/2 G, M1

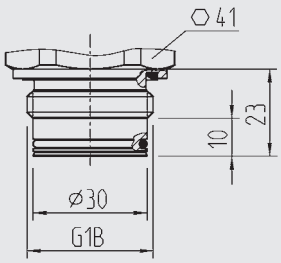


IS-2X-S
Flying leads,
zero/span not adjustable,
PUR {FEP}
Order code: DM
ATEX: II A 1G, 1D
II C 1/2G
M1

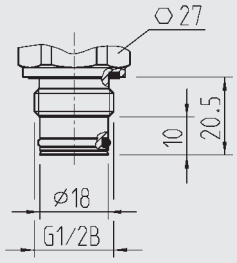


Pressure connections IS-21-S and IS-21-F, flush diaphragm

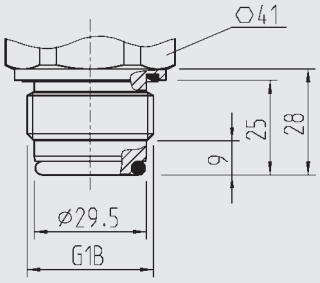
G 1
0 ... 0.1 up to 0 ... 1.6 bar
Order code: 85



G 1/2
0 ... 2.5 up to 0 ... 600 bar
Order code: 86



G 1
acc. EHEDG **)
0 ... 0.1 up to 0 ... 16 bar
Order code: 83



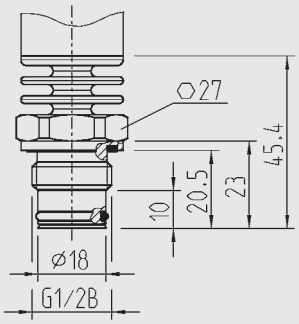
For installation and safety instructions see the operating instructions for this product.
For tapped holes and welding sockets please see Technical Information IN 00.14 for download at www.wika.de

**) European Hygienic Equipment Design Group
{ } Items in curved brackets are optional extras for additional price.

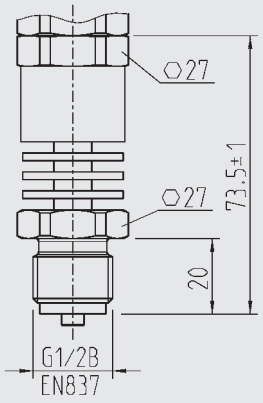
Pressure connections high temperature

Dimensions in mm

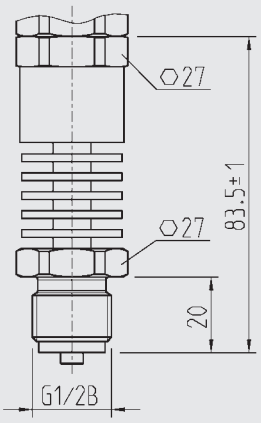
IS-21-S and IS-21-F, flush diaphragm
-20 ... 150 °C
G 1/2
with 2 cooling fins (version Ⓐ)
0 ... 2.5 up to 0 ... 600 bar
Order code: 86 and C



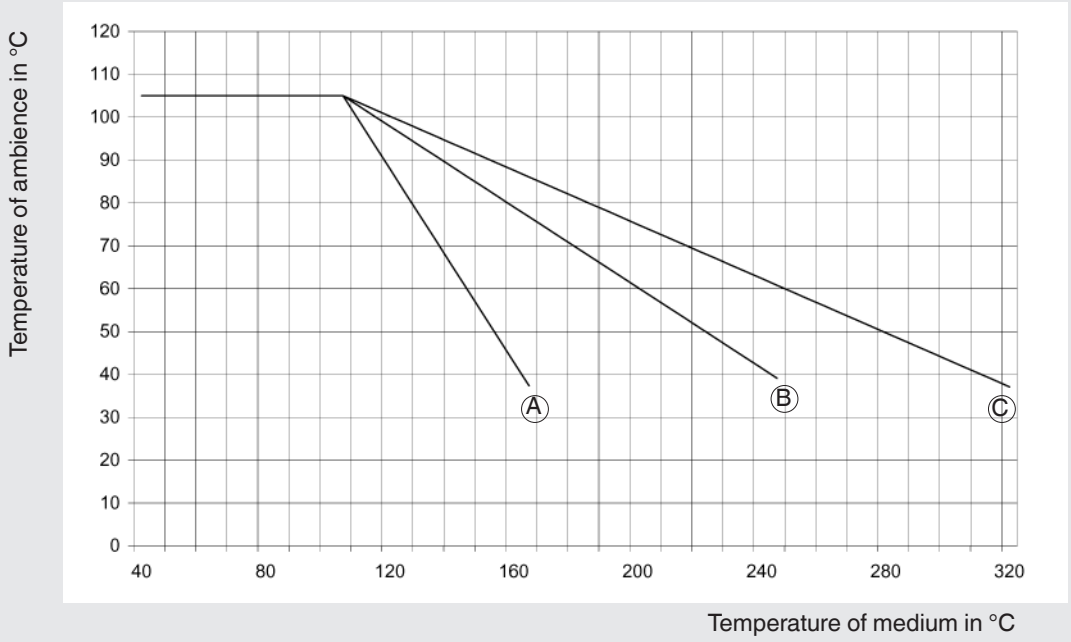
IS-20-S and IS-20-F
-40 ... 150 °C
G 1/2
with 3 cooling fins (version Ⓑ)
0 ... 1000 bar
Order code: GD and 8



IS-20-S and IS-20-F
-40 ... 200 °C
G 1/2
with 5 cooling fins (version Ⓒ)
0 ... 1000 bar
Order code: GD and 9



Relation of medium temperature to ambient temperature



Version	Ⓐ	Ⓑ	Ⓒ
Cooling fin	2	3	5
Constant K	0.47	0.68	0.76

Max. permitted temperature of ambience:

$T_{amb} = T_{med} + (T_B - T_{med}) / K$

Calculation of cooling element:

$T_B = Tmed - (T_{med} - T_{amb}) \times K$

T_B = Operation temperature of transmitter
T_{med} = Max. temperature of process medium
T_{amb} = Max. temperature of ambience
K = Constant of cooling element

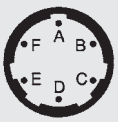
Permissible temperature ranges depending on electrical connections

Electrical connections	Order-code	Category	Ambience-/ Medium temperature range	
DIN 175301-803 A L-Connector	A4	1/2 G (IIC)	-40 ... +60 °C (T6) -40 ... +80 °C (T5) -40 ... +105 °C (T4)	-40 ... +140 °F (T6) -40 ... +176 °F (T5) -40 ... +221 °F (T4)
		M1	-40 ... +105 °C	-40 ... +105 °F
M 12x1 Circular connector	M4	1/2 G (IIC)	-25 ... +60 °C (T6) -25 ... +80 °C (T5) -25 ... +90 °C (T4)	-13 ... +140 °F (T6) -13 ... +176 °F (T5) -13 ... +194 °F (T4)
		M1	-25 ... +90 °C	-13 ... +194 °F
Flying leads	DL	1/2 G (IIC)	-20 ... +60 °C (T6) -20 ... +80 °C (T5) -20 ... +80 °C (T4)	-4 ... +140 °F (T6) -4 ... +176 °F (T5) -4 ... +176 °F (T4)
		M1	-20 ... +60 °C	-4 ... +140 °F
Bayonet connector (not with mining)	C6	1/2 G (IIC)	-50 ... +60 °C (T6) -50 ... +80 °C (T5) -50 ... +105 °C (T4)	-58 ... +140 °F (T6) -58 ... +176 °F (T5) -58 ... +221 °F (T4)
Flying leads zero/span not adjustable	EM	1/2 G (IIC)	-20 ... +60 °C (T6) -20 ... +80 °C (T5) -20 ... +80 °C (T4)	-4 ... +140 °F (T6) -4 ... +176 °F (T5) -4 ... +176 °F (T4)
		M1	-20 ... +80 °C	-4 ... +176 °F
Fieldcase	FH, FC	1/2 G (IIC)	-50 ... +60 °C (T6) -50 ... +80 °C (T5) -50 ... +105 °C (T4	-58 ... +140 °F (T6) -58 ... +176 °F (T5) -58 ... +221 °F (T4
		M1	-50 ... +105 °C (T4)	-58 ... +221 °F (T4)
Flying leads PUR zero/span not adjustable	DM	1 G (IIA), 1/2 G (IIC)	-10 ... +60 °C (T6) -10 ... +60 °C (T5) -10 ... +60 °C (T4)	14 ... +140 °F (T6) 14 ... +140 °F (T5) 14 ... +140 °F (T4)
		1D, M1	-10 ... +60 °C	14 ... +140 °F
Flying leads FEP zero/span not adjustable	DM	1 G (IIA), 1/2 G (IIC)	-30 ... +60 °C (T6) -30 ... +80 °C (T5) -30 ... +105 °C (T4)	-22 ... +140 °F (T6) -22 ... +176 °F (T5) -22 ... +221 °F (T4)
		1D	-30 ... +60 °C	-22 ... +140 °F
		M1	-30 ... +105 °C	-22 ... +221 °F

Wiring details

Wiring details

	L-connector DIN 175301-803 A		Circular connector M12x1, 4-pin		Flying leads, 1.5 m	
						
2-wire	U+ = 1	U- = 2	U+ = 1	U- = 3	U+ = brown	U- = green
Cable screen					PUR-cable: grey FEP-cable: twisted and tinned	
Wire gauge	up to max.1.5 mm²		-		0.5 mm² (AWG 20)	
Cable diameter	6-8 mm ship approval: 10-14 mm		-		6.8 mm (Order code: DL / EM) 7.5 mm (Order code DM)	
Ingress protection according to IEC 60 529	IP 65		IP 67		IP 67 - Order code: DL IP 68 zero/span not adjustable - Order code: EM / DM	
	The ingress protection classes specified only apply while the pressure transmitter is connected with female connectors that provide the corresponding ingress protection.					

	Bayonet connector, 6-pin		Field case (with internal spring clip terminals)				
							
2-wire	U+ = A	U- = B	U+ = 1	U- = 2	Test+ = 3	Test- = 4	screen = 5
Cable diameter			7-13 mm				
Ingress protection according to IEC 60 529	IP 67		IP 67				
	The ingress protection classes specified only apply while the pressure transmitter is connected with female connectors that provide the corresponding ingress protection.						

Hazardous areas (zone classification according to ATEX)

Group II: **Electrical equipment for use in all areas (except mines) which are endangered by an explosive atmosphere.**

Zone	Category	Occurrence of explosive atmosphere
Zone 0	Category 1G (gas)	Continuous
Mounting to zone 0	Category 1/2 G	
Zone 20	Category 1D (dust)	
Mounting to zone 20	Category 1/2 D	
Zone 1	Category 2G	Intermittent
Zone 21	Category 2D	
Zone 2	Category 3G	Hazard under abnormal conditions
Zone 22	Category 3D	

Group I: **Electrical equipment for use in mines (hazard due to mine gas)**

Zone	Category	Requirements
	Category M 1	Very high degree of safety
	Category M 2	High degree of safety (instruments have to be turned off if they are exposed to an explosive atmosphere)

Hazardous areas (ATEX in comparison with FM, CSA)

		ATEX Group	FM / CSA Class	Group
Above ground	Gases and Vapours	IIA / IIB / IIC	I	A / B / C / D / E / F / G
	Dusts		II	
	Fibres		III	
Mining	Gas / Dusts	I	ID / IIF	

	Flammable material present continuously	Flammable material present intermittently	Flammable material normally not present
ATEX	Zone 0 (Zone 20 Dust)	Zone 1 (Zone 21 Dust)	Zone 2 (Zone 22 Dust)
FM /CSA	Zone 0	Zone 1	Zone 2
	Division 1		Division 2
FM (NEC505)	Zone 0	Zone 1	Zone 2

Further information

You can obtain further information (data sheets, instructions, etc.) via our internet address www.wika.de

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