

Hazardous Area Industrial Transmitters

Type IS-20, IS-21, IS-20-F, IS-21-F Intrinsically Safe



Applications

Chemical, Petrochemical
Oil and gas refining
Food industry
Mechanical engineering

Special Features

Pressure ranges from 50 inWC to 15,000 psi
FM, CSA approval for

- Intrinsically safe Class I, II and III Division 1, Group A, B, C, D, E, F, G
- Dust Class II and III Division 1, Group E, F, G
- Class I, Zone 0, AEx ia II C

Ex- protection EEx ia I/II C T6 according to ATEX for:

Gases, vapors and mist: Connection to Zone 0,
Zone 1 and Zone 2

Dust: Connection to Zone 20,
Zone 21 and Zone 22

Mining: Category M1 and M2



Left: IS-20-S standard version
Center: IS-21-S with flush diaphragm
Right: IS-20-F with integral junction box

Description

Approvals meet international standards

The IS-20 series of intrinsically safe pressure transmitters are designed for industrial pressure measurement applications in hazardous areas where intrinsically safe ratings are required.

Multiple intrinsically safe approvals include FM, ATEX, and CSA. These multiple approvals provide for global recognition and acceptance of the intrinsically safe ratings. The transmitters are labeled with all three approvals to help support international shipments of OEM equipment designed with these transmitters.

Rugged construction

The stainless steel wetted parts feature an all-welded measuring cell for improved media compatibility. There are no internal soft sealing materials that may react with the media or deteriorate over time. The compact case is also made of stainless steel and is available with environmental protection ratings up to NEMA 6 (IP 68).

The IS-21-S and IS-21-F transmitters feature a flush diaphragm process connection. They are specifically designed for the measurement of viscous fluids or media containing solids that may clog a NPT process connection.

Models IS-20-F and IS-21-F feature an integral stainless steel junction box with internal terminal block for use in extremely harsh environments. A 1/2" NPT female conduit connection is standard on all models and a cable compression electrical connection is available as an option.

All models require a 10 to 30 volt supply provided by an intrinsically safe power supply or through an approved intrinsically safe zener diode barrier.

Datasheet: IS-20

Specifications

Models IS-20-S, IS-21-S, IS-20-F, IS-21-F

Specifications without model designation apply for all models.

Pressure range	50inWC	5psi	10psi	25psi	30psi	60psi	100psi	160psi	200psi
Maximum pressure*	15psi	29psi	58psi	145psi	145psi	240psi	500psi	1160psi	1160psi
Burst pressure**	29psi	35psi	69psi	170psi	170psi	290psi	600psi	1390psi	1390psi
Pressure range	300psi	500psi	1000psi	2000psi	3000psi	5000psi	8000psi	10000psi ¹	15000psi ¹
Maximum pressure*	1160psi	1160psi	1740psi	4600psi	7200psi	11,600psi	17,400psi	17,400psi	21,750psi
Burst pressure**	1390psi	5800psi	7970psi	14,500psi	17,400psi	24,650psi ²	34,800psi ²	34,800psi	43,500psi

(vacuum, gauge pressure, compound ranges, and absolute pressure references are available)

¹ Ranges only available with Model IS-20

² For Model IS-21 the burst pressure is limited to 21,000psi unless the pressure seal is accomplished by using the sealing ring underneath the hex.

*Pressure applied up to the maximum rating will cause no permanent change in specifications but may lead to zero and span shifts

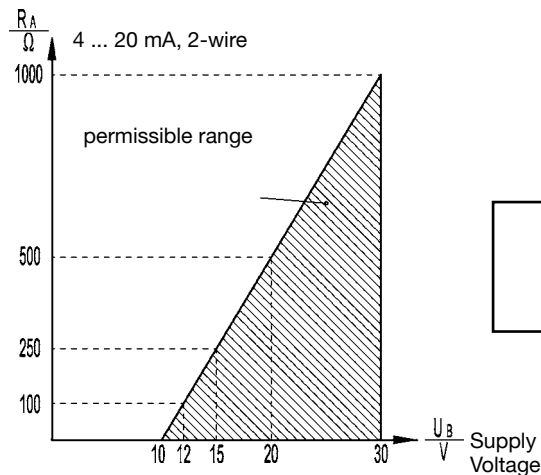
**Exceeding the burst pressure may result in destruction of the transmitter and possible loss of media

Materials		
■ Wetted parts		(for other materials see WIKA diaphragm seal program)
➢ Models IS-20-S, IS-20-F		Stainless steel
➢ Models IS-21-S, IS-21-F		Stainless steel {Hastelloy C4}
		O-ring: NBR {Viton or EPDM}
■ Case		Stainless steel
Internal transmission fluid ³⁾		Synthetic oil {Halocarbon oil for oxygen applications} ⁴⁾ {Listed by FDA for food applications}
		³⁾ Not available with Model IS-20 in pressure ranges > 300 psi
		⁴⁾ Media temperature for oxygen version: -30 ... +60 °C / -22 ... +140 °F. Not available in vacuum or absolute pressure ranges or in Model IS-21 flush diaphragm version > 500 psi
Power supply U _B	DC V	10 < U _B ≤ 30 (11 < U _B ≤ 30 with Model IS-2 _z -F)
Signal output and		4 ... 20 mA, 2-wire
Maximum load R _A		
➢ Models IS-2 _z -S		R _A ≤ (U _B - 10 V) / 0.02 A - (length of cable in feet x 0.043 Ohm)
➢ Models IS-2 _z -F		R _A ≤ (U _B - 11 V) / 0.02 A
		with R _A in Ohms and U _B in Volts
Test circuit signal / max. load R _A		R _A < 15 Ohm (only for Model IS-2 _z -F)
Adjustability zero/span	%	± 10 using potentiometers inside the instrument
Response time (10 ... 90 %)	ms	≤ 1 (≤ 10 ms at media temperatures below -22°F (-30°C) for ranges < 300 psi
Isolation voltage		Insulation complies with EN 50020, 6.4, 12
Accuracy ⁵⁾	% of span	≤ 0.25 {0.125} ⁶⁾ (BFSL)
	% of span	≤ 0.5 {0.25} ⁶⁾ (limit point calibration)
		⁵⁾ Including linearity, hysteresis and repeatability.
		Limit point Calibration performed in vertical mounting position with pressure connection facing down.
		⁶⁾ For pressure ranges above 100 inWC
Non-repeatability	% of span	≤ 0.05
1-year stability	% of span	≤ 0.2 (at reference conditions)
Permissible temperature		
■ Medium ^{7) 8)}		-22 ... +221°F -30 ... +105°C {extended temperature ranges see Page 6} ⁹⁾
■ Ambient ^{7) 8)}		-22 ... +221°F -30 ... +105°C
■ Storage ⁸⁾		-40 ... +221°F -40 ... +105°C
		⁸⁾ Also complies with EN 50178, Tab. 7, Type C, Class 4KH Operation, 1K4 Storage, 1K3 Transport
		⁹⁾ Response time for IS-20: ≤ 10 ms at medium temp. below -30 °C (-22 °F) for pressure ranges up to 300 psi
		Response time for IS-21: ≤ 10 ms at medium temp. below -30 °C (-22 °F) for all pressure ranges
Compensated temperature range		32 ... +176°F 0 ... +80°C
Temperature coefficients (TC) within compensated temperature range:		
■ Mean TC of zero	% of span	≤ 0.2 / 10 K (< 0.4 for pressure range ≤ 100 inWC)
■ Mean TC of range	% of span	≤ 0.2 / 10 K
⊕ -protection	ATEX	Categories ⁷⁾ 1G, 1/2G, 2G, 1D, 1/2D, 2D, M1, M2
Ignition protection type		EEx ia I/II C T4, EEx ia I/II C T5, EEx ia I/II C T6
⊕ -protection	FM, CSA	Class I, II and III
Ignition protection type		Intrinsically safe Class I, II, III Division 1, Groups A, B, C, D, E, F, G and Class I, Zone 0 AEx ia II C
		⁷⁾ Refer to the EC type-examination certificate (BVS 04 ATEX E 068 X) for more information

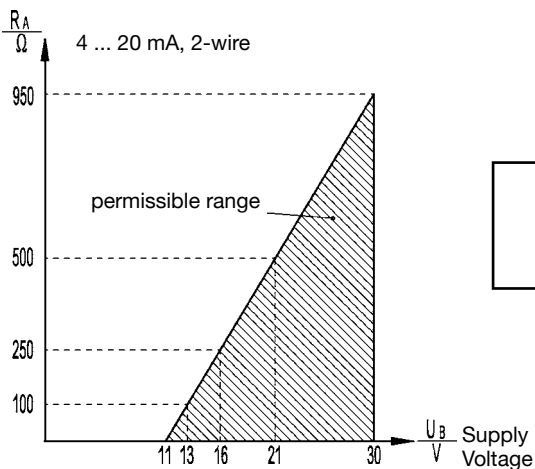
Specifications		Models IS-20-S, IS-21-S, IS-20-F, IS-21-F	
CE - conformity		89/336/EWG interference emission and immunity see EN 61 326, interference emission limit class A and B EN 50 014 (general part), EN 50 020 (intrinsic safety), {EN 50 284 (Zone 0)}, {EN 50 281-1 (dust-Ex)}, {EN 50 303 (mining industry)}	
FM, CSA		FM standards according to FMRC 3600, 3610, 3611 (including supplement #1), ISA-S12.0.01, IEC 60 529 (including amendment #1) CSA standard C22.2 No. 0-M1991 / 142-M1987 / 157-M1992 UL 50, Eleventh Edition / UL 508, Seventeenth Edition / UL 913, Sixth Edition	
HF-immunity	V/m	10	
BURST	KV	2	
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		Protected against reverse polarity and short circuiting	
Weight ➤ Model IS-2X-S	lb	Approx. 0.45	
➤ Model IS-2X-F	lb	Approx. 0.80	

Output signal and permissible load

Model IS-2X-S



Model IS-2X-F



Dimensions in inches (mm)

IS-2X-S (electrical connections)

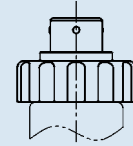
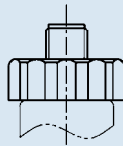
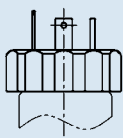
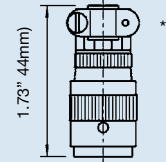
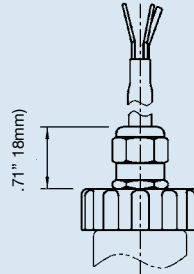
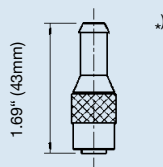
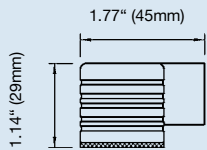
Ingress Protection IP per IEC 60 529

L-connector plug
DIN EN 175301-803,
Form A
½ NPT conduit
IP 65
Order code: AX
ATEX: 1/2 G, M1

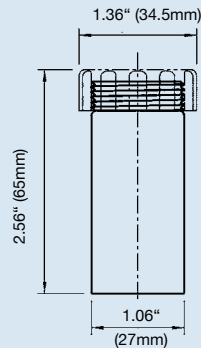
Circular connector,
M 12x1, 4-pin
IP 67
Order code: M4
ATEX: 1/2 G, M1

Cable with free ends
outer conductor
diameter 6.8 mm, PUR
NEMA 4 / IP 67
Order code: DL
ATEX: 1/2 G, M1

Bayonet connector
6-pin NEMA 4 / IP 67
Order code: C6
ATEX: 1/2 G
(not available with
mining approval)



Case



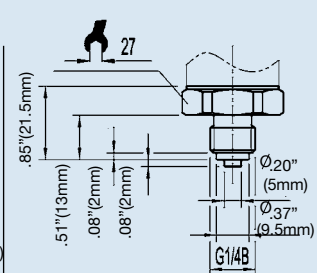
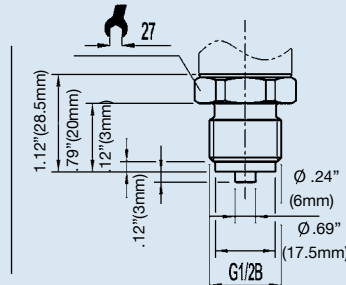
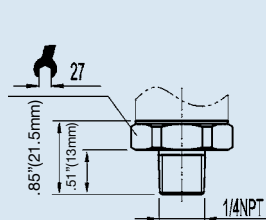
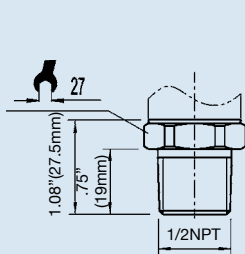
Pressure connections IS-20-S and IS-20-F

1/2 NPT male
Order code: ND

1/4 NPT male
Order code: NB

G 1/2 metric
EN 837
Order code: GD

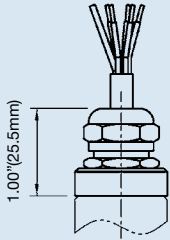
G 1/4 metric
EN 837
Order code: GB



.) Mating connectors not included.

Electrical connections IS-2X-S

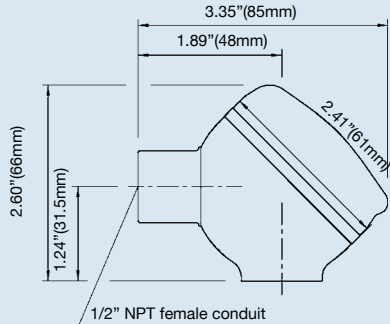
Cable with free ends, zero/span not adjustable, conductor outer diameter 6.8 mm, PUR IP 68/NEMA 6
Order code: EM
ATEX: 1/2 G, M1



Other connections available

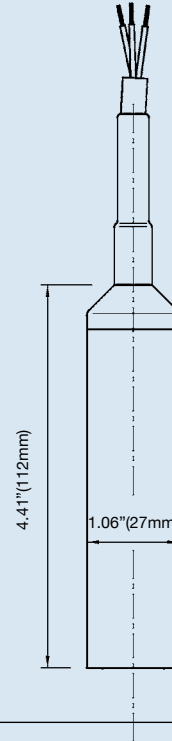
Electrical connections IS-2X-F

Integral junction box with internal spring clip terminals NEMA 4X IP 67
Order code:
FE (1/2" NPT female conduit standard)
FH (threaded connection brass nickel-plated)
FC (threaded connection stainless steel)
ATEX: 1/2 G, M1

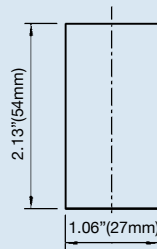


Electrical connections IS-2X-S

Cable with free ends, zero/span not adjustable, conductor outer diameter 7.5 mm, PUR {FEP} NEMA 6P / IP 68
Order code: DM
ATEX: 1G, 1D, M1



Case dimensions

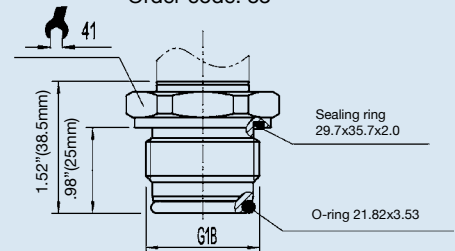
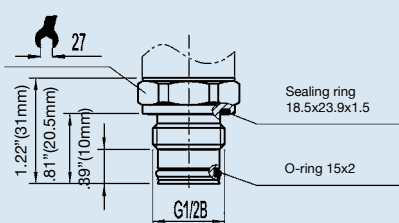
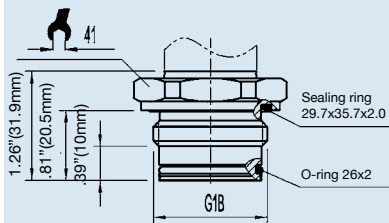


IS-21-S and IS-21-F flush diaphragm pressure connections

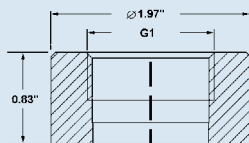
G 1
50 inWC to 25 psi
Order code: 85

G 1/2
30 psi to 8,000 psi
Order code: 86

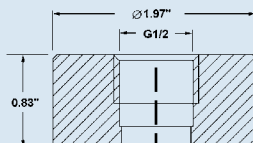
G 1
according to EHEDG **
100 inWC to 250 psi
Order code: 83



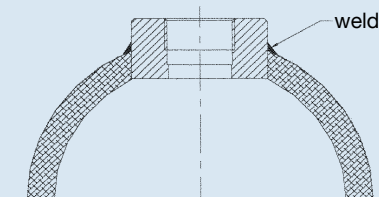
Matching P-1 weld insert adapters for IS-21-S and IS-21-F transmitters



P-1 G1 weld insert adapter
Part # 1206974
for pressure ranges \leq 25 psi



P-1 G1/2 weld insert adapter
Part # 1097008
for pressure ranges \geq 30 psi



Cross section view of P-1 adapter installed in pipe.

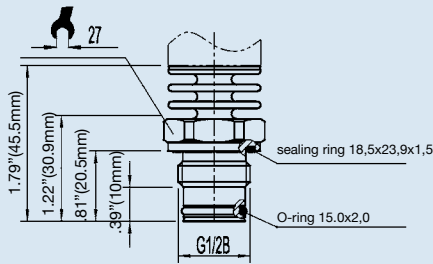
**) European Hygienic Equipment Design Group

{ } Items in curved brackets are optional extras at additional cost.

pressure connections for high temperature media

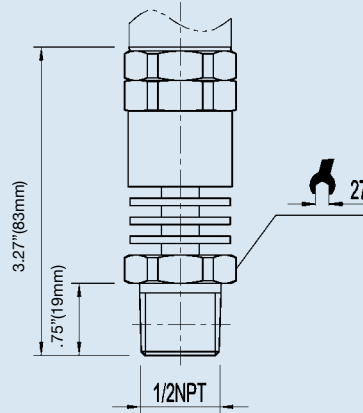
IS-21-S and IS-21-F, flush diaphragm
 -4 °F to 302 °F (-20 °C to 150 °C)

G 1/2
 with 2 cooling fins (version **A**)
 0 ... 30 psi up to 0 ... 8000 psi
 Order code: 86 and C



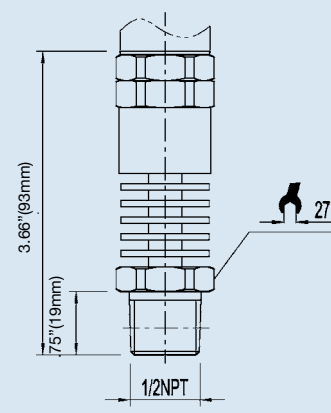
IS-20-S and IS-20-F
 -40 °F to 302 °F (-40 °C to 150 °C)

1/2 NPT male
 with 3 cooling fins (version **B**)
 0 - 5psi to 0-15,000 psi
 Order code: ND and 8

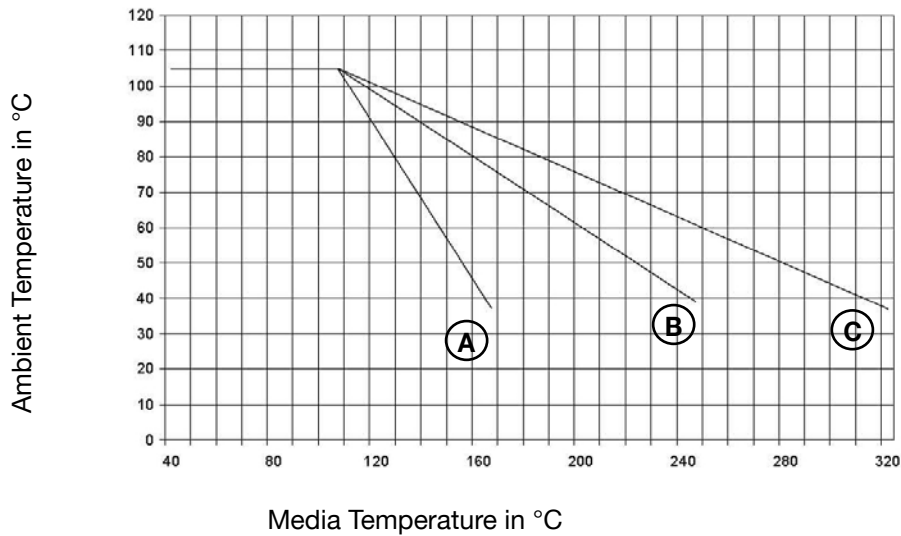


IS-20-S and IS-20-F
 -40 °F to 392 °F (-40 °C to 200 °C)

1/2 NPT male
 with 5 cooling fins (version **C**)
 0-5 psi to 0-15,000 psi
 Order code: ND and 9



Relationship of media temperature to ambient temperature



Version	A	B	C
Cooling fins	2	3	5
K *	0.47	0.68	0.76

*cooling constant specific to each version

Calculation of cooling element performance:

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

T_B = Operating temperature of transmitter
 T_{med} = maximum temperature of process media
 T_{amb} = maximum ambient temperature
 K = Constant of cooling element

Maximum permissible ambient temperature:

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

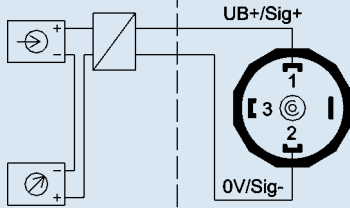
Wiring

Model IS-2X-S

2-wire

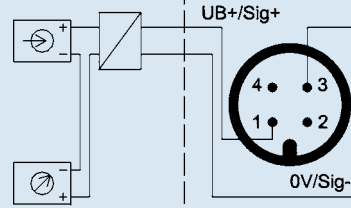
L-connector

Non hazardous area | Hazardous (classified) area



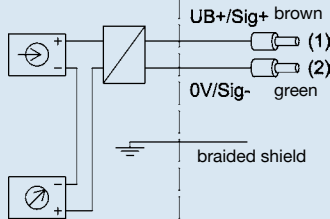
Circular connector
M 12x1

Non hazardous area | Hazardous (classified) area



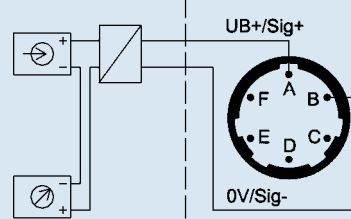
5 foot (1.5 m) of vented cable with free ends

Non hazardous area | Hazardous (classified) area



6 pin mil plug connector

Non hazardous area | Hazardous (classified) area

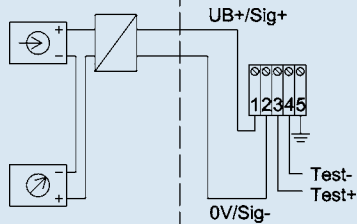


Model IS-2X-F

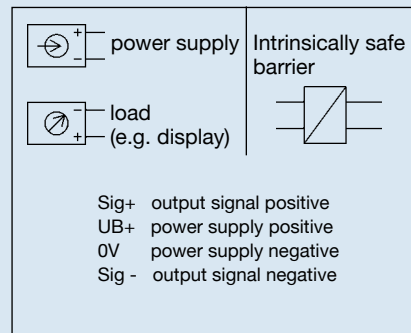
2-wire

Field case
(internal spring clip terminal)

Non hazardous area | Hazardous (classified) area



Legend



Hazardous areas (ATEX zone classifications)

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	

Zone	Category	Requirements
	Category M1	Very high degree of safety
	Category M2	High degree of safety
		(instruments have to be turned off if they are exposed to an explosive atmosphere)

Hazardous areas (ATEX compared to FM and CSA)

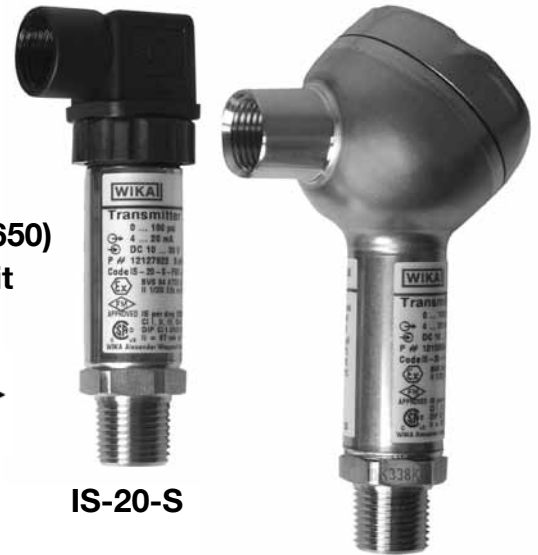
		ATEX Group	FM / CSA Group	Class
Above ground	Gases and Vapors	IIA / IIB / IIC	I	A / B / C / D / E / F / G
	Dusts		II	
	Fibers		III	
Mining	Gas / Dusts	I	ID / IIF	

	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

Type IS-20 Intrinsically Safe Industrial Pressure Transmitter

Standard Features

- **Signal Output:** 4-20 mA 2-wire
- **Supply Voltage:** 10-30 VDC
- **Process Connection:** 1/2 NPT Male
- **Electrical Connection:** DIN EN 175301-803 (DIN 43 650) with 1/2" NPT female conduit plug connector



IS-20-S

IS-20-F

Gauge Ranges	
Description	
Range	Part #
0-5 psi	12127851
0-10 psi	12127877
0-15 psi	12127885
0-25 psi	12127893
0-30 psi	12127906
0-60 psi	12127914
0-100 psi	12127922
0-160 psi	12127940
0-200 psi	12127966
0-300 psi	12127974
0-500 psi	12127982
0-1000 psi	12128040
0-1500 psi	12128058
0-2000 psi	12128066
0-3000 psi	12128074
0-5000 psi	12128104
0-8000 psi	12128112
0-10,000 psi	12128121

NOTE: Ready-to-ship part numbers shown in **bold, blue** print.

Vacuum & Compound Ranges	
Description	
Range	Part #
30INHG VAC	12127796
30INHG/30 psi	12127833
30INHG/60 psi	12127841

Absolute Pressure Ranges	
Description	
Range	Part #
0-100 psia	12128147

Gauge Ranges	
Description	
Range	Part #
0 - 100 psi	12128554
0 - 1000 psi	12128687
0 - 3000 psi	12128732

IS-20 Option List

Feature
Model
Standard version
With integral junction box
High pressure version
Unit
psi
InWC
psi absolute
On inquiry
Pressure Range
-30 inHg ... 0
-30 inHg ... 30 psi
-30 inHg ... 60 psi
-30 inHg ... 100 psi
-30 inHg ... 160 psi
-30 inHg ... 200 psi
0 InWC ... 50 InWC
0 InWC ... 100 InWC
0 psi ... 5 psi
0 psi ... 10 psi
0 psi ... 15 psi
0 psi ... 25 psi
0 psi ... 30 psi
0 psi ... 50 psi
0 psi ... 60 psi
0 psi ... 100 psi
0 psi ... 160 psi
0 psi ... 200 psi
0 psi ... 250 psi
0 psi ... 300 psi
0 psi ... 400 psi
0 psi ... 500 psi
0 psi ... 600 psi
0 psi ... 750 psi
0 psi ... 1000 psi
0 psi ... 1500 psi
0 psi ... 2000 psi
0 psi ... 3000 psi
0 psi ... 5000 psi
0 psi ... 8000 psi
0 psi ... 10000 psi
0 psi ... 15000 psi
0 psi ... 15 psi absolute
0 psi ... 25 psi absolute
0 psi ... 50 psi absolute
0 psi ... 100 psi absolute
0 psi ... 250 psi absolute
On inquiry
Process Connection
G 1/4 B
G 1/2 B
1/4 NPT
1/2 NPT
M16 x 1.5 female, w/sealing cone

Feature
Process Connection continued
9/16 - 18 UNF female F250-C
M20 x 1.5 female, w/sealing cone
On inquiry
Special Design Features
Without
Suitable for food
Oxygen, oil and grease free
On inquiry
Accuracy
+/- 0.25% B.F.S.L.
+/- 0.125% B.F.S.L.
Electrical Connection
4 Pin L-plug DIN 43 650 with 1/2"
NPT female conduit (NEMA 5/IP 65)
4 Pin L-plug DIN 43 650 with pg 9 (NEMA 5 / IP 65)
Cable with free ends (NEMA 4 / IP 67)
Submersible cable (NEMA 6 / IP 68)
6 Pin MIL Plug PT02E-10-6P (NEMA 5 / IP 65)
1/2" NPT female conduit (IP67)
Field case, cable gland stainless steel conduit w/spring clip terminal
Field case, cable gland brass nickel-plated w/spring clip terminal
Field case, cable gland stainless steel w/spring clip terminal
Cable Length
Without
5 feet
10 feet
20 feet
30 feet
40 feet
50 feet
On inquiry
Temperature Range of Medium
-20 ... +80 °C (-4 ... +176 °F)
-40 ... +150 °C (-40 ... +302 °F)
-40 ... +200 °C (-40 ... +392 °F)
Changed because of chemical seal attachment
Approvals
EEx ia I M1 + 1/2G, 2G including FM and CSA
Reserved for TRONIC
EEx ia Dust in Compliance with ATEX 100a
EEx ia IIC T6 1/2G per ATEX including FM, CSA and ship approval GL
Quality Certificates
Without
NIST Certificate of Calibration
Digital Display
Without
Digital display
Additional Order Details
Without
Additional text

Type IS-21 Intrinsically Safe Flush Diaphragm Industrial Pressure Transmitter

Standard Features

- **Signal Output:** 4-20 mA 2-wire
- **Supply Voltage:** 10-30 DC
- **Process Connection:** G1B or G1/2B depending upon pressure
- **Electrical Connection:** DIN EN 175301-803 (DIN 43 650) with 1/2" NPT female conduit plug connector



IS-21-S stocked part numbers

Gauge Ranges Ready-To-Ship Transmitters	
Description	
Range	Part #
0-5 psi ¹	12128252
0-10 psi ¹	12128287
0-15 psi ¹	12128295
0-30 psi ¹	12128325
0-50 psi	12128333
0-100 psi	12128368
0-1000 psi	12128376
0-3000 psi	12128481
0-5000 psi	12128503
0-8000 psi	12128538

NOTE:

¹Pressure ranges from 50 inWC to 30 psi are supplied with G1B flush process connections; see Datasheet for details

NOTE: Ready-to-ship part numbers shown in **bold, blue** print.

Datasheet: IS-21

IS-21 Option List

Feature
Model
Standard version
Field case - integral junction box
Unit
psi
InWC
psi absolute
On inquiry
Pressure Range
-30 inHg ... 0
-30 inHg ... 30 psi
-30 inHg ... 60 psi
-30 inHg ... 100 psi
-30 inHg ... 160 psi
-30 inHg ... 200 psi
0 InWC ... 50 InWC
0 InWC ... 100 InWC
0 psi ... 5 psi
0 psi ... 10 psi
0 psi ... 15 psi
0 psi ... 25 psi
0 psi ... 30 psi
0 psi ... 50 psi
0 psi ... 60 psi
0 psi ... 100 psi
0 psi ... 160 psi
0 psi ... 200 psi
0 psi ... 250 psi
0 psi ... 300 psi
0 psi ... 500 psi
0 psi ... 600 psi
0 psi ... 750 psi
0 psi ... 1000 psi
0 psi ... 1500 psi
0 psi ... 2000 psi
0 psi ... 3000 psi
0 psi ... 5000 psi
0 psi ... 8000 psi
0 psi ... 15 psi absolute
0 psi ... 25 psi absolute
0 psi ... 50 psi absolute
0 psi ... 100 psi absolute
0 psi ... 250 psi absolute
On inquiry
Process Connection
G 1 B, flush diaphragm with O-ring
G 1/2 B, flush diaphragm with O-ring
On inquiry

Feature
Material of Wetted Parts
Stainless steel, NBR O-ring
Stainless steel, FPM/FKM O-ring
Hastelloy C4, Viton O-ring
On inquiry
Special Design Features
Without
Suitable for food
On inquiry
Accuracy
+/- 0.25% B.F.S.L.
+/- 0.125% B.F.S.L.
Electrical Connection
4 Pin L-plug DIN 175301-803 with pg 9 (NEMA 5/IP 65)
4 Pin L-plug DIN 175301-803 with 1/2" NPT female conduit (NEMA 5 / IP 65)
Cable with free ends (NEMA 4 / IP 67)
Submersible cable (NEMA 6 / IP 68)
4 Pin MIL Plug PT02E-8-4P (NEMA 5 / IP 65)
6 Pin MIL Plug PT02E-10-6P (NEMA 5 / IP 65)
Field case, cable gland stainless steel conduit with spring clip terminal
Field case, cable gland nickel-plated with spring clip terminal
Field case, cable gland stainless steel with spring clip terminal
On inquiry
Cable Length
Without
5 feet
10 feet
20 feet
30 feet
40 feet
50 feet
On inquiry
Temperature Range of Medium
-20 ... +80 °C (-4 ... +176 °F)
-40 ... +150 °C (-40 ... +302 °F)
Approvals
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Reserved for TRONIC
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Quality Certificates
Without
NIST Certificate of Calibration
Digital Display
Without
Digital display
Additional Order Details
Without
Additional text