Intrinsically Safe Pressure Transmitter

KJ96
Pressure Transmitter for Semiconductor Industry

Outline

This product is a 2-wire intrinsically safe pressure transmitter with semiconductor strain gauge sensor. Conforming to intrinsic safety standard, they can be used in "ZONE 0" places where explosive gas always exists.
(Explosion class: Exia IIC T4)

Features

- **They can be used in "ZONE 0" places where explosive gas always exists.**
- **In combination with use of insulated type safety barrier, intrinsically safe Class A installation work is unnecessary.**
- **Since the gauge is formed on a metal diaphragm by PCVD process, durability is excellent.**
- **The high corrosion resistant pressure sensor made of Co-Ni alloy or SUS316L is directly welded to the 316L st.st. coupling portion, demonstrating excellent corrosion resistance, hermetic properties, stability and reliability.**

***Please confirm that material in contact with gas is suitable for it.**

When ordering the recommended barrier, please specify separately the desired specifications.
When using the non-recommended barrier, please observe the "Safety maintenance rating".

RoHS

List of grade

Cleanliness These pressure transmitters have been assembled, calibrated, inspected and packaged in a clean room, paying special attention for maintaining cleanliness.

Grade		UC (Ultra Clean)	EP (Electro Polishing)
Surface roughness of gas contact		0.18μm Ra Avg. 0.7μm Rz Max.	0.18μm Ra Avg.
Wetted parts	Pressure sensor	Co-Ni alloy	SUS316L
	Fitting *1	SUS316L	SUS316L
Maximum allowable pressure *2		200% of rated pressure	150% of rated pressure
Leakage (Helium leak rate)		5×10^{-12} Pa·m^3/s and under	5×10^{-12} Pa·m^3/s and under
Particle		Zero count for size 0.1 μm or greater (In our inspection standard)	Zero count for size 0.1 μm or greater (In our inspection standard)
Cleaning		Ultra clearance (Cleaning)	Ultra clearance (Cleaning)
Operating media *3 (Recommended)		High-purity gas, semiconductor material gas, etc.	High-purity gas, semiconductor material gas, etc.

*1 For UC Grade, the pressure transmitter can be manufactured in DOUBLE MELT material by request. Please contact us.
*2 Allowable maximum pressure is the upper limit of pressure value which may safely be applied to the product and remain in specification once pressure is returned to the rated pressure range with a couple of times overpressurization for about 10 minutes.
Effects of continuous overpressure are not guaranteed.
*3 Ensure that pressure media is compatible with wetted parts.
*Rises with double packing (Filled with N_2).

General specification

Item	Description
Fluid	Process gasses for semiconductor industry
Pressure range	0 to 0.5, 1, 2, 3.5, 5, 10, 20MPa -0.1 to 0.5, 1, 2MPa
Accuracy *1	±1.0%F.S. at 23℃ (Standard) or ±0.5%F.S. at 23℃ (Option)
Temperature coefficient	±0.1%F.S./℃ [Accuracy±1.0%F.S.] (Zero, Span) or ±0.05%F.S./℃ [Accuracy±0.5%F.S.] (Zero, Span)
Fitting shape	Type T  Type S 
Connection	1/4, 3/8 UJR, UPG, VCR, CVC, etc.
Pressure sensor seal method	Welding type
Power source	24V DC±10%
Output	4 to 20 mA DC (2-wire system)
Load resistance	500Ω maximum
	275Ω maximum (When using the recommended Zener type barrier)*2
Enclosure	Indoor use
Mounting	Connector type
Operating temperature	-10 to 60℃ (No freezing or condensation)
Storage temperature	-20 to 70℃ (No freezing or condensation)
Applicable standards	EN61326/1997, A1/1998, A2/2001, A3/2003 (EMI classA/EMS Annex A, F) *Please use it to connect to the indoor power distribution network which is not affected by the lightning surge voltage and power supply system switching transients.
Insulation resistance	100MΩ or more (50V DC)
Weight	Approx. 150 to 350 g (Excluding cable, varies depending on the fitting shape)

*1 Accuracy includes the effects of Linearity, Hysteresis and Repeatability.
*2 Please ensure that user-connectable load resistance is 275Ω maximum (Including the line resistance of the cable, etc.) when Zener barrier is in use.

Connector and cable

Connector (Plug):

TC1108-12A10-7F (Water proof type) (Manufactured by Tajimi Electronics Co., Ltd.)

Cable:

	Environmental temperature	Conductor		Cable outer diameter	Minimum bending radius (mm)
		Cross-section area (mm^2)	Twisted conductors (pcs./mm)		
Heat resistant cable	-20 to 105℃	0.3	12/0.18	φ6.0	25

Intrinsically safe specification

Item	Description
Type approval number	Technology Institution of Industrial Safety (TIIS) Intrinsically safe construction approved product Type approval number: No. TC17811 — Pressure range (MPa): 0 to 0.5, 1, 2 / -0.1 to 0.5, 1, 2 Type approval number: No. TC17810 — Pressure range (MPa): 0 to 3.5, 5, 10, 20
Intrinsically safe construction type	Exia — Intrinsically safe construction IIC — Gas group T4 — Temperature class
Safety maintenance rating	Max. allowable voltage of intrinsically safe circuit (Ui): 28V Max. allowable current of intrinsically safe circuit (Ii): 93mA Max. allowable power of intrinsically safe circuit (Pi): 651mW Internal inductance of intrinsically safe circuit (Li): 10 μH Internal capacitance of intrinsically safe circuit (Ci): 0.065 μF Ambient temperature: 60℃
External transmission cable	Max. allowable inductance: 2.5 mH Max. allowable capacitance: 0.015 μF (Differs depending on the safety barrier used)
Withstand voltage	500V AC, 1 min.

Combination conditions for the safety maintenance rating

Safety maintenance rating of the KJ96	Combination conditions	Safety maintenance rating of the safety barrier
Max. allowable voltage of intrinsically safe circuit (Ui)	≧	Max. allowable voltage of intrinsically safe circuit (Uo)
Max. allowable current of intrinsically safe circuit (Ii)	≧	Max. allowable current of intrinsically safe circuit (Io)
Max. allowable power of intrinsically safe circuit (Pi)	≧	Max. allowable power of intrinsically safe circuit (Po)

Combination conditions for parameters

Parameters of KJ96 and wiring	Combination conditions	Parameters for safety barrier
Input inductance of KJ96 (Li) + Inductance of wiring (Lw)	≦	Max. allowable inductance of intrinsically safe circuit (Lo)
Input capacitance of KJ96 (Ci) + Capacitance of wiring (Cw)	≦	Max. allowable capacitance of intrinsically safe circuit (Co)

Recommended safety barrier

***The safety barrier can be selected by the customer.**

Insulation type

Item	Description		
Manufacturer	·P & F Co., Ltd.	·Cooper Industries Japan K.K.	·IDEC CORPORATION
Type	KFD2-STC4-Ex1	MTL5541	D5014S (Input signal 1ch) D5014D (Input signal 2ch)
Type approval number	No. TC16232	No. TC19435	No. TC21005
Intrinsically safe construction type	Exia IIC	Exia IIC	Exia IIC

*Ground of intrinsic safety regulation is unnecessary because an insulated barrier is isolated from intrinsically safe circuit.

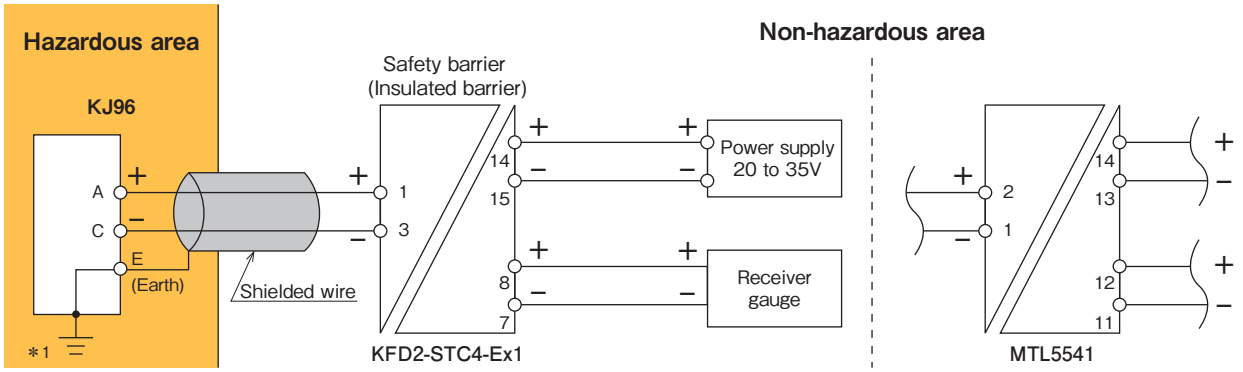
Zener type

Item	Description
Manufacturer	·Cooper Industries Japan K.K.
Type	MTL7787+
Type approval number	No. TC16447
Intrinsically safe construction type	Exia IIC

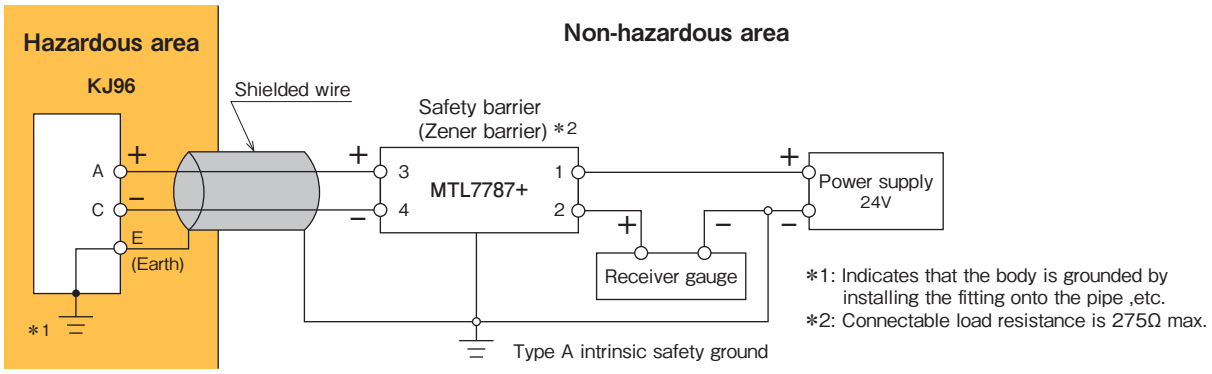
*Use of Zener safety barrier requires Type A intrinsic safety groundwork.

System configuration diagram

When using the isolated barrier



When using the Zener safety barrier



*1: Indicates that the body is grounded by installing the fitting onto the pipe ,etc.
*2: Connectable load resistance is 275Ω max.

Reference data

•Classification of applicable to hazardous area (Whole range)

Hazardous area	Contents
Zone 0	Places where hazardous atmosphere is continuously present or present for a long period under ordinary circumstances.
Zone 1	Places where hazardous atmosphere is likely to occur under ordinary circumstances.
Zone 2	Places where hazardous atmosphere is likely to occur under abnormal circumstances.

•Ignition point of gas or steam which T4 can apply (Within bold-line rectangle)

Ignition point of gas or steam	Applicable temperature class					
Higher than 450℃	T1	T2	T3	T4	T5	T6
Higher than 300℃	—	T2	T3	T4	T5	T6
Higher than 200℃	—	—	T3	T4	T5	T6
Higher than 135℃	—	—	—	T4	T5	T6
Higher than 100℃	—	—	—	—	T5	T6
Higher than 85℃	—	—	—	—	—	T6

•Ignition point of gas or steam which Exia ⅡC T4 can apply (Within bold-line rectangle)

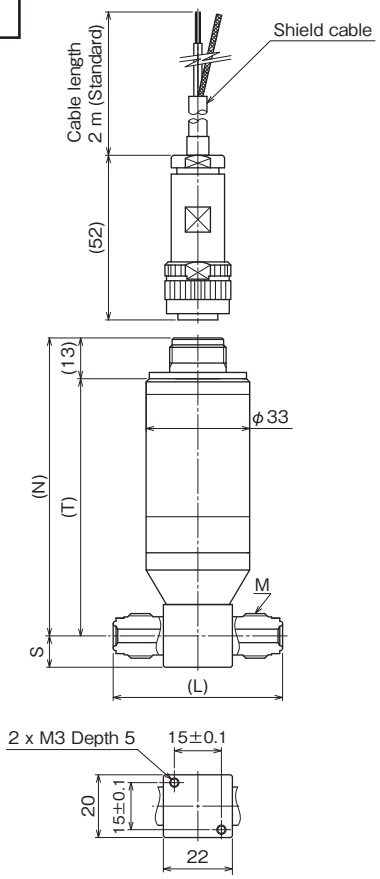
Group \ Temperature class	T1	T2	T3	T4	T5	T6
ⅡA	Acetone Ammonia Ethane Acetic acid Ethyl acetate Toulene Benzene Methane	1-butanol Butane Propane Methanol	Hexane	Acetaldehyde		Ethyl nitrite
ⅡB	Carbon monoxide	Ethylene Ethylene oxide Ethanol		Ethyl methyl Ether		
ⅡC	Hydrogen	Acetylene				Carbon bisulfide

Dimensions 1

Unit: mm

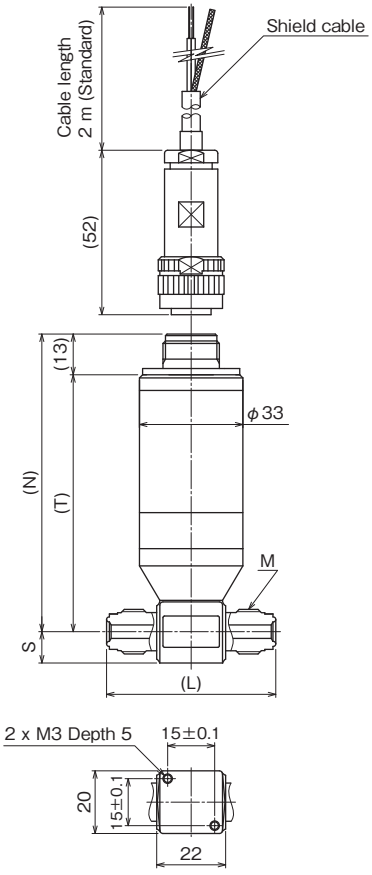
Type T
Male Integrated

UC Grade

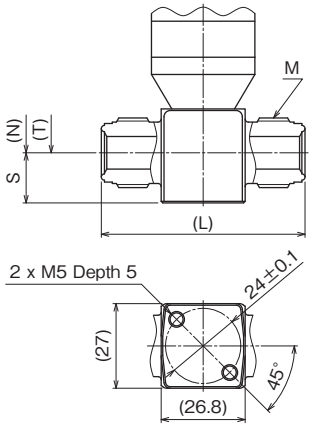


Compatible with 1/4 VCR

EP Grade



Compatible with 1/4 VCR



Compatible with 1/2 (3/8) VCR

Grade	Connection	Piping DIA.	Screw size M	Dimensions				Model number
				N	T	S	L	
UC	Compatible with VCR Male integrated	1/4	9/16-18UNF	95	82	10	54	KJ96-136

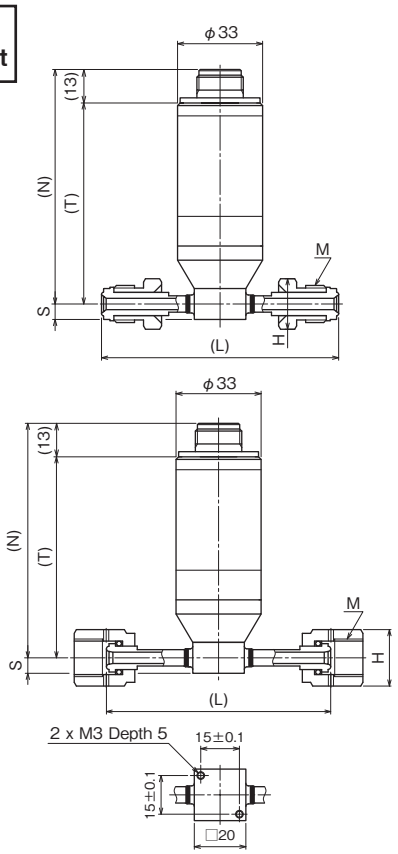
Grade	Connection	Piping DIA.	Screw size M	Dimensions				Model number
				N	T	S	L	
EP	Compatible with VCR Male integrated	1/4	9/16-18UNF	95	82	10	54	KJ96-13E
		1/2 (3/8)	7/8-14UNF	99	86	16	65	KJ96-14E

Dimensions 2

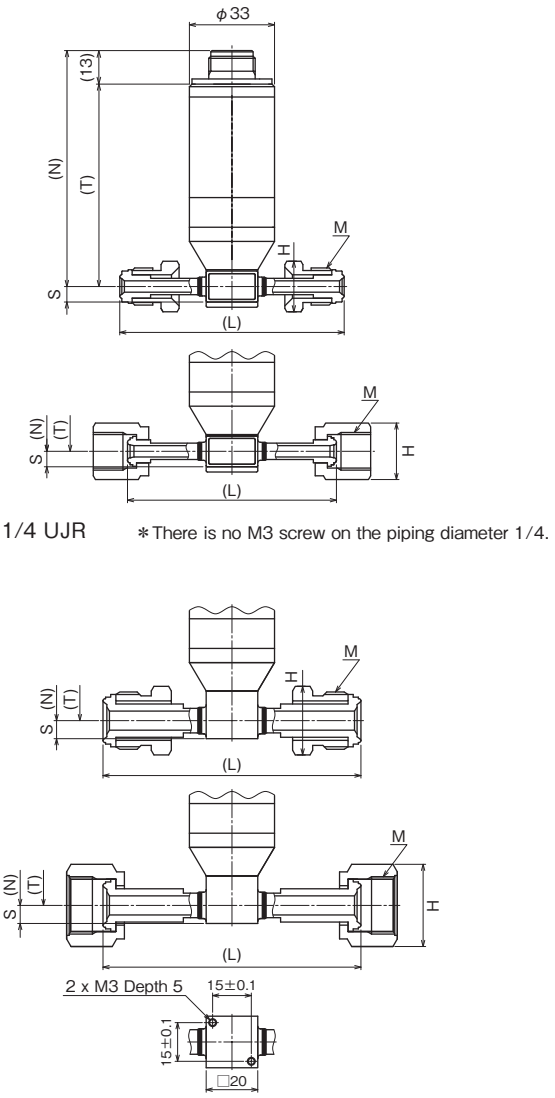
Type T
Male nut/Female nut

Unit: mm

UC Grade



EP Grade



1/4 UJR ＊There is no M3 screw on the piping diameter 1/4.

Grade	Connection	Piping DIA.	Screw size M	Dimensions N	T	S	H	L	Model number
UC	UPG Male nut	1/4	7/16-20UNF	91	78	6	14 x 16.2 Hex.	71	KJ96-166
		3/8	9/16-20UNF	96.5	83.5	7	17 x 19.6 Hex.	85	KJ96-176
	UPG Female nut (With pure ring)	1/4	7/16-20UNF	91	78	6	14 x 16.2 Hex.	71	KJ96-186
		3/8	9/16-20UNF	96.5	83.5	7	17 x 19.6 Hex.	85	KJ96-196
	VCR Male nut	1/4	9/16-18UNF	91	78	6	16 x 18.5 Hex.	86	KJ96-1J6
		3/8	7/8-14UNF	96.5	83.5	7	24 x 27.7 Hex.	90.5	KJ96-1K6
	VCR Female nut (Bearings are not included)	1/4	9/16-18UNF	91	78	6	19 x 21.9 Hex.	80.8	KJ96-1L6
		3/8	7/8-14UNF	96.5	83.5	7	27 x 31.2 Hex.	81.8	KJ96-1M6
	UJR Male nut	1/4	9/16-18UNF	91	78	6	17 x 19.6 Hex.	87	KJ96-1N6
		3/8	7/8-14UNF	96.5	83.5	7	23 x 26.6 Hex.	100	KJ96-1P6
	UJR Female nut (With pure ring)	1/4	9/16-18UNF	91	78	6	19 x 21.9 Hex.	87	KJ96-1Q6
		3/8	7/8-14UNF	96.5	83.5	7	26 x 30 Hex.	100	KJ96-1R6
	CVC Male nut	1/4	9/16-18UNF	91	78	6	15.8 x 18.2 Hex.	86	KJ96-1W6
		3/8	7/8-14UNF	96.5	83.5	7	23.8 x 27.5 Hex.	90.6	KJ96-1X6
	CVC Female nut (Bearings are not included)	1/4	9/16-18UNF	91	78	6	19 x 21.9 Hex.	80.8	KJ96-1Y6
		3/8	7/8-14UNF	96.5	83.5	7	27 x 31.2 Hex.	82	KJ96-1Z6

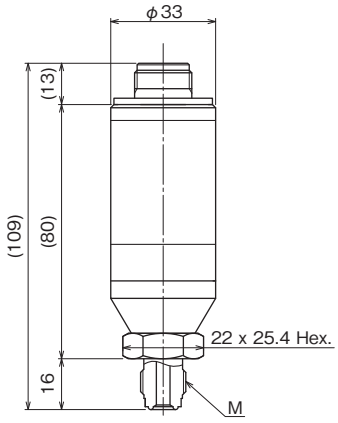
Grade	Connection	Piping DIA.	Screw size M	Dimensions N	T	S	H	L	Model number
EP	UJR Male nut	1/4	9/16-18UNF	91.5	78.5	6	17 x 19.6 Hex.	87	KJ96-1NE
		3/8	7/8-14UNF	96.5	83.5	7	23 x 26.6 Hex.	100	KJ96-1PE
	UJR Female nut (Without pure ring)	1/4	9/16-18UNF	91.5	78.5	6	19 x 21.9 Hex.	81	KJ96-1QE
		3/8	7/8-14UNF	96.5	83.5	7	26 x 30 Hex.	100	KJ96-1RE

Dimensions 3

Unit: mm

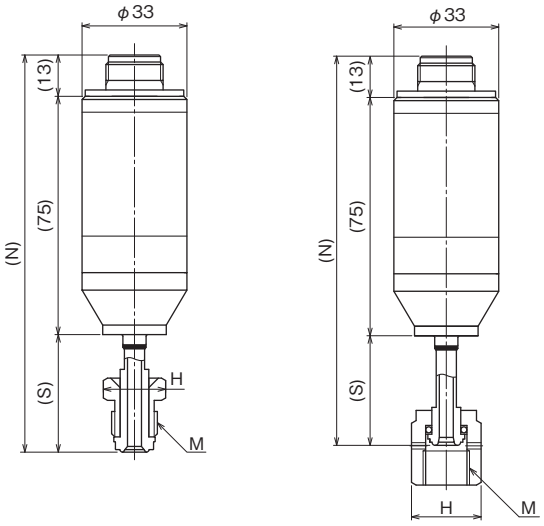
UC/EP Grade

Type S
Male Integrated



UC/EP Grade

Type S
Male nut/Female nut



Grade	Connection	Piping DIA.	Screw size M	Model number
UC	Compatible with VCR Male integrated	1/4	9/16-18UNF	KJ96-236

Grade	Connection	Piping DIA.	Screw size M	Model number
EP	Compatible with VCR Male integrated	1/4	9/16-18UNF	KJ96-23E

Grade	Connection	Piping DIA.	Screw size M	Dimensions			Model number
				N	S	H	
UC	UPG Male nut	1/4	7/16-20UNF	114.5	26.5	14 x 16.2 Hex.	KJ96-266
	UPG Female nut (With pure ring)						KJ96-286
	VCR Male nut		9/16-18UNF	122	34	16 x 18.5 Hex.	KJ96-2J6
	VCR Female nut (Bearings are not included)			119.4	31.4	19 x 21.9 Hex.	KJ96-2L6
	UJR Male nut			125	37	17 x 19.6 Hex.	KJ96-2N6
	UJR Female nut (With pure ring)			122.5	34.5	19 x 21.9 Hex.	KJ96-2Q6
	CVC Male nut			124	36	15.8 x 18.2 Hex.	KJ96-2W6
	CVC Female nut (Bearings are not included)			119.4	31.4	19 x 21.9 Hex.	KJ96-2Y6

Grade	Connection	Piping DIA.	Screw size M	Dimensions			Model number
				N	S	H	
EP	UJR Male nut	1/4	9/16-18UNF	122.5	34.5	17 x 19.6 Hex.	KJ96-2NE
	UJR Female nut (Without pure ring)			119.5	31.5	19 x 21.9 Hex.	KJ96-2QE

Model number configuration

Please specify the model number, each specs and the range for ordering.

Model

K	J	9	6	—			6	—			1	1		×	×	×	×	×	×	
Intrinsically Safe Pressure Transmitter UC Grade					①	②	③		④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮

Model number | Selective spec. | Additional spec. (Option)

① Mounting

1	Type T
2	Type S

② Connection

			Type S	Type T
3	1/4	Compatible with VCR Male integrated	○	○
6	1/4	UPG Male nut	○	○
7	3/8		×	○
8	1/4	UPG Female nut (With pure ring)	○	○
9	3/8		×	○
J	1/4	VCR Male nut	○	○
K	3/8		×	○
L	1/4	VCR Female nut (Bearings are not included)	○	○
M	3/8		×	○
N	1/4	UJR Male nut	○	○
P	3/8		×	○
Q	1/4	UJR Female nut (With pure ring)	○	○
R	3/8		×	○
W	1/4	CVC Male nut	○	○
X	3/8		×	○
Y	1/4	CVC Female nut (Bearings are not included)	○	○
Z	3/8		×	○

③ Wetted parts by grade *1

6	UC Grade ・Pressure sensor: Co-Ni alloy ・Fitting: SUS316L

④ Pressure range

Please specify the pressure range and units separately besides selection of range code.

D	-0.1 to 0.5MPa
E	-0.1 to 1MPa
F	-0.1 to 2MPa
2	0 to 0.5MPa
3	0 to 1MPa
4	0 to 2MPa
5	0 to 3.5MPa
6	0 to 5MPa
7	0 to 10MPa
8	0 to 20MPa

⑤ Accuracy

5	±0.5%F.S. (0.5MPa range or greater can be specified)
7	±1.0%F.S.

⑥ Power source

1	24V DC±10%

⑦ Output

1	4 to 20 mA DC (2-wire system)

⑧ Adjustment cable specification (A heat resistant shield cable)

0	Nil
1	Cable length: 1 m
2	Cable length: 2 m (Standard)
3	Cable length: 3 m
5	Cable length: 5 m
9	Cthers length specification

⑮ Document

0	Nil
1	Required (Please specify the desired documents separately.) Submission drawings, instruction manual, inspection procedure, mill test report, test report (1 pc 1 copy), inspection / traceability certificate, strength calculation, attended inspection

*1 For UC Grade, the pressure transmitter can be manufactured in DOUBLE MELT material by request. Please contact us.

When ordering the recommended barrier, please specify separately the desired specifications. When using the non-recommended barrier, please observe the "Safety maintenance rating".

*Specify "X" if there is no applicable specification.

Model number configuration

Please specify the model number, each specs and the range for ordering.

Model

K	J	9	6	—	①	②	E	—	④	⑤	1	1	⑧	×	×	×	×	×	×	⑮
Intrinsically Safe Pressure Transmitter EP Grade																				

Pressure range | Selective spec. | Additional spec. (Option)

① Mounting

1	Type T
2	Type S

② Connection

			Type S	Type T
3	1/4	Compatible with VCR Male integrated	○	○
4	1/2 (3/8)	Compatible with VCR Male integrated	×	○
N	1/4	UJR Male nut	○	○
P	3/8		×	○
Q	1/4	UJR Female nut (Without pure ring)	○	○
R	3/8		×	○

③ Wetted parts by grade

E	EP Grade ·Pressure sensor: SUS316L (All welding) ·Fitting: SUS316L

④ Pressure range

Please specify the pressure range and units separately besides selection of range code.

D	-0.1 to 0.5MPa
E	-0.1 to 1MPa
F	-0.1 to 2MPa
2	0 to 0.5MPa
3	0 to 1MPa
4	0 to 2MPa
5	0 to 3.5MPa
6	0 to 5MPa
7	0 to 10MPa
8	0 to 20MPa

⑤ Accuracy

5	±0.5%F.S. (0.5MPa range or greater can be specified)
7	±1.0%F.S.

⑥ Power source

1	24V DC±10%

⑦ Output

1	4 to 20 mA DC (2-wire system)

⑧ Adjustment cable specification (A heat resistant shield cable)

0	Nil
1	Cable length: 1 m
2	Cable length: 2 m (Standard)
3	Cable length: 3 m
5	Cable length: 5 m
9	Others length specification

⑮ Document

0	Nil
1	Required (Please specify the desired documents separately.) Submission drawings, instruction manual, inspection procedure, mill test report, test report (1 pc 1 copy), inspection / traceability certificate, strength calculation, attended inspection

When ordering the recommended barrier, please specify separately the desired specifications.
When using the non-recommended barrier, please observe the "Safety maintenance rating".

*Specify "X" if there is no applicable specification.