C S
CODE AND SPECIFICATIONS SHEET

Differential Pressure Transmitter

EDR-N7, EDR-N7E

EDR-N7 is intelligent transmitter equipped with semiconductor sensers and micro processors.

STANDARD SPECIFICATIONS

Model EDR-N7, EDR-N7E (high accuracy type)

Differential pressure range

●EDR-N7

Range Code	Measuring Span	Settable Range Limits
800 H800	0.8 to 8kPa	-8≦LRV≦8kPa, -8≦URV≦8kPa
8000 H8000	0.8 to 80kPa	-80≦LRV≦80kPa, -80≦URV≦80kPa
40000 H40000	20 to 400kPa	-400≦LRV≦400kPa, -400≦URV≦400kPa
100000 H100000	100 to 1000kPa	-1000≦LRV≦1000kPa, -1000≦URV≦1000kPa

●EDR-N7E

Range Code	Measuring Span	Settable Range Limits
800 H800	0.098 to 8kPa	-8≦LRV≦8kPa, -8≦URV≦8kPa
8000 H8000	0.8 to 80kPa	-80≦LRV≦80kPa, -80≦URV≦80kPa
40000 H40000	20 to 400kPa	-400≦LRV≦400kPa, -400≦URV≦400kPa

Note) URV is the input differential pressure to give 100% output (20mA DC)
LRV is the input differential pressure to give 0% output (4mA DC)

Output 4 to 20mA DC

Power supply voltage 11.4 to 42.0V DC

Allowable load resistance 600Ω(at 24V DC power supply voltage)

Communication line condition

Power supply voltage 16.7 to 42.0V DC

Load resistance 250Ω to 1.2kΩ (Refer to Fig.1 for the relation between power supply voltage and load resistance)

Accuracy

●EDR-N7

Range Code	Accuracy	
800 H800	±0.2% ±[0.05+(0.15×3.2/X)]%	X is more than 3.2kPa X is less than 3.2kPa
8000 H8000	±0.2% ±[0.1+(0.1×8/X)]%	X is more than 8kPa X is less than 8kPa
40000 H40000	±0.2% ±[0.1+(0.1×40/X)]%	X is more than 40kPa X is less than 40kPa
100000 H100000	±0.2%	

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Range Code	Accuracy	
800 H800	±0.2% large value between ± [0.05 + (0.15 x 1/X)]% and ± 1.96kPa	X is more than 1kPa X is less than 1kPa
8000 H8000	±0.1% ±[0.05 + (0.05×8/X)]%	X is more than 8kPa X is less than 8kPa
40000 H40000	±0.1% ±[0.05+(0.05×40/X)]%	X is more than 40kPa X is less than 40kPa

Note 1) Accuracy is percent value against X, and X is the largest value among absolute value of URV, LRV and measuring span. Unit is kPa.

Note 2) When square root output,
if zero cut is specified,
for output less than 1.1% : ±(linear output accuracy×45) %
for output 1.1 to 50% : ± (linear output accuracy× 50/square root output %) %
for output more than 50% : same as linear output
※Using the DCR or the HART® type communicator, it is possible to select whether output under zero cutting point equals zero, or getting zero cutting point from arbitrary straight line.
if zero cut is not specified,
for output less than 20%, becomes the straight line between 0-20% point.
for output more than 20%, same as the above case that zero cut is specified

Zero adjustment Externally adjustable within ± 100% of measurement span.

Accidental burn out Can select any one among burn up, burn down and without burn out.

Dead time Approx. 0.4sec

Damping time constant (Amplifier time constant) Adjustable from 0.2 to 102.4sec (0.1sec increment) electrically by the DCR or the HART® communicator.

Time constant of sensor body

Range Code	Time Constant of Sensor Body (at 25℃)
800,H800	Approx. 0.7sec
8000,H8000	Approx. 0.2sec
40000,H40000	Approx. 0.1sec
100000,H100000	Approx. 0.1sec

- Transmitter time constant equals total sum of the above time constant of sensor body, damping setting time constant (amplifier time constant) and dead time.
- When pressure pulsation is expected, fixed electrical damper (about 1sec) shall be specified, at the same time we recommend that inner diameter ϕ1 capillary tube (more than 1m length) is inserted.

Storage temperature limits −40 to 85℃

Operating humidity limits 5 to 100%RH

Operating temperature limits

Ambient temperature limits

−20 to 85℃ (see Fig.2)
(−10 to 60℃ for range code 100000)

Wetted parts temperature limits

−20 to 120℃
(−10 to 100℃ for range code 100000)

Working pressure limits

Range Code	Working pressure limits
800,H800	5MPa
8000,H8000	15MPa
40000,H40000	15MPa
100000,H100000	10MPa

Note) When used under negative pressure, refer to Fig.3, 4

Site vibration Less than 29.4m/s^2 continuous vibration

Temperature effect (at −20 to 60℃)

●EDR-N7

Range Code	Temperature Effect	
800 H800	Zero shift ±[0.05+(0.45×T/30)]%	X is more than 3.2kPa
	±[0.05+(0.25+0.2×3.2/X)×T/30]%	X is less than 3.2kPa
	Overall shift ±[0.05+(0.65×T/30)]%	X is more than 3.2kPa
	±[0.05+(0.35+0.3×3.2/X)×T/30]%	X is less than 3.2kPa
8000 H8000	Zero shift ±[0.05+(0.3×T/50)]%	X is more than 32kPa
	±[0.05+(0.15+0.15×32/X)×T/50]%	X is less than 32kPa
	Overall shift ±[0.05+(0.55×T/50)]%	X is more than 32kPa
	±[0.05+(0.4+0.15×32/X)×T/50]%	X is less than 32kPa
40000 H40000	Zero shift ±[0.05+(0.3×T/50)]%	X is more than 160kPa
	±[0.05+(0.15+0.15×160/X)×T/50]%	X is less than 160kPa
	Overall shift ±[0.05+(0.55×T/50)]%	X is more than 160kPa
	±[0.05+(0.4+0.15×160/X)×T/50]%	X is less than 160kPa
100000 H100000	Zero shift ±[0.05+(0.3×T/50)]%	X is more than 400kPa
	±[0.05+(0.15+0.15×400/X)×T/50]%	X is less than 400kPa
	Overall shift ±[0.05+(0.55×T/50)]%	X is more than 400kPa
	±[0.05+(0.4+0.15×400/X)×T/50]%	X is less than 400kPa

●EDR-N7E

Range Code	Temperature Effect	
800 H800	Zero shift ±[0.05+(0.45×T/50)]%	X is more than 3.2kPa
	±[0.05+(0.25+0.2×3.2/X)×T/50]%	X is less than 3.2kPa
	Overall shift ±[0.05+(0.75×T/50)]%	X is more than 3.2kPa
	±[0.05+(0.45+0.3×3.2/X)×T/50]%	X is less than 3.2kPa
8000 H8000	Zero shift ±[0.05+(0.2×T/50)]%	X is more than 32kPa
	±[0.05+(0.15+0.05×32/X)×T/50]%	X is less than 32kPa
	Overall shift ±[0.05+(0.45×T/50)]%	X is more than 32kPa
	±[0.05+(0.4+0.05×32/X)×T/50]%	X is less than 32kPa
40000 H40000	Zero shift ±[0.05+(0.2×T/50)]%	X is more than 160kPa
	±[0.05+(0.15+0.05×160/X)×T/50]%	X is less than 160kPa
	Overall shift ±[0.05+(0.45×T/50)]%	X is more than 160kPa
	±[0.05+(0.4+0.05×160/X)×T/50]%	X is less than 160kPa

Note) Temperature effect is percent value against X, X is the largest value among absolute value of URV,LRVand measuring span. Unit is kPa.
T is temperature variation width(℃).

Static pressure effect (at 25℃)

●EDR-N7

Range Code	Static Pressure Effect	
800 H800	Zero shift ±[0.05+(0.25×8/X×P/3)]%	X is less than 8kPa
8000 H8000	Zero shift ±[0.05+(0.1×P/10)]%	X is more than 40kPa
	±[0.05+(0.1×40/X)×P/10]%	X is less than 40kPa
	Overall shift ±[0.05+(1.95+0.1×80/X)×P/10]%	
40000 H40000	Zero shift ±[0.05+(0.1×P/10)]%	X is more than 200kPa
	±[0.05+(0.1×200/X)×P/10]%	X is less than 200kPa
	Overall shift ±[0.05+(1.45+0.1×400/X)×P/10]%	
100000 H100000	Zero shift ±[0.05+(0.1×P/10)]%	X is more than 500kPa
	±[0.05+(0.1×500/X)×P/10]%	X is less than 500kPa
	Overall shift ±[0.05+(1.45+0.1×1000/X)×P/10]%	

●EDR-N7E

Range Code	Static Pressure Effect	
800 H800	Zero shift ±[0.05+(0.1×8/X×P/5)]%	X is less than 8kPa
8000 H8000	Zero shift ±[0.05+(0.05×P/10)]%	X is more than 40kPa
	±[0.05+(0.05×40/X)×P/10]%	X is less than 40kPa
	Overall shift ±[0.05+(0.3+0.1×80/X)×P/10]%	
40000 H40000	Zero shift ±[0.05+(0.05×P/10)]%	X is more than 200kPa
	±[0.05+(0.05×200/X)×P/10]%	X is less than 200kPa
	Overall shift ±[0.05+(0.3+0.1×400/X)×P/10]%	

Note) Static pressure effect is percent value against X, X is the largest value among absolute value of URV, LRV and measuring span. Unit is kPa. P is static pressure value, unit MPa.

Overpressure effect ±0.5%
(Zero shift) (at maximum working pressure application)
(at maximum span)

Material

Diaphragm	Hastelloy C (Diaphragm material shall be selected considering corrosion resistance, hydrogen transmission, etc.)
Wetted parts other than diaphragm	SUS316
Amplifier case	Aluminium alloy
Mounting plate	SPCC (acid resistant coating)
U bolt	SUS304

Filled liquid Silicone oil

Process connection Top connection Rc1/4 without oval flange

Electrical connection G1/2

Check terminal With output check terminal
(output voltage 40 to 200mV DC)

Certifications Degree of protection JIS C 0920 IP67

Surge absorber Built-in transmitter
Surge capacity : 1,000A (8/20 μ sec)
Impulse test voltage :15,000V (1.2/50 μ sec)

Finish Light gray amplifier case (acid resistant coating)

Weight Approx. 3.3kg

Installation On 2-inch pipe with U bolt.

Accessories 2-inch pipe mounting bracket and U-bolt.
Zero adjustment magnet.

ADDITIONAL SPECIFICATION

Communication method HART® protocol

Pressure measurement (Absolute pressure)

Output method Communication by the DCR or the HART® communicator and display by built-in indicator. Alternate display of differential pressure and pressure, arbitrary scale setting of pressure (-1,750 to 1,750 range) are available by the DCR or the HART® communicator. Digital indicator distinguishes pressure from differential pressure displaying "P" behind numerical value. And analog output [1 to 5V] is possible by using EDB500M type exclusive distributor.

Measuring span 0.5 to 5MPa abs.

Accuracy

±0.2%	X is more than 1MPa
±0.2×(1/X)%	X is less than 1MPa

Temperature effect

Zero shift

±[0.05+(1.0×T/50)]%	X is more than 2MPa
±[0.05+(0.5+0.5×2/X)×T/50]%	X is less than 2MPa

Overall shift

±[0.05+(2.5×T/50)]%	X is more than 2MPa
±[0.05+(2.0+0.5×2/X)×T/50]%	X Is less than 2MPa

Note) Accuracy and temperature effect are percent value against X, X is the largest value among absolute value of URV, LRV and measuring span. Unit is MPa. T is temperature variation width. (℃).

Structure

TIIS Ex explosion proof type Flameproof
Exdo II CT4
Exdo II CT4X
Note) X is for operating condition (as below)
With meter : Abnormality code is displayed on meter to alert winking, so it is no need to build external alarm display system.
Without meter : it is necessary to build external alarm display system, output exceeds 21mA
Ambient temperature limits : -20 to 55℃
Wetted parts temperature limits: -20 to 100℃
Electrical connection
X-RCAC type pressure resistant packing fixture must be used for using pressure resistant oil filled explosion proof type products. (also applicable to use SXBM-16B made by Shimada Electric Co., Ltd.)

FM explosion proof type Explosion proof CLI,DIV 1,GPS B,C&D
Dust-ignition proof CLⅡ/Ⅲ,GPS E,F&G
Temperature Code T4
NEMA 4X
Ambient temperature limits : -40 to 60℃
Wetted parts temperature limits: -40 to 120℃

Indicator Digital indicator 4.5 figures display
(0 to 100% scale standard)
(Can set to arbitrary scale within the range of -17,500 to 17,500)
Scale plates various units to be sticked are supplied.

Wetted parts matelials

Diaphragm	Wetted Parts
SUS316L	SUS316
SUS316L	SUS316L
Hastelloy C	SUS316L
Hastelloy C	Hastelloy C
Hastelloy C	Hard PVC
Tantalum	SUS316
Tantalum	SUS316L
Tantalum	Tantalum
Tantalum	Hard PVC
SUS316L (with gold plate)	SUS316

※ Material shall be selected considering corrosion resistance. In case hydrogen is present in measuring fluid, it is possible hydrogen transmission can be generated through diaphragm. If corrosion resistance is not so important, we recommend SUS316L or SUS3l6 with gold plating because hydrogen transmission value of these material is relatively low. (But it is difficult to prevent hydrogen transmission completely even if diaphragm of SUS316L with gold plating is applied).

Note) Process connection, working pressure limits and ambient temperature limits are shown in the following Table.

Wetted Parts Material	Process Connection	Working pressure limits	Ambient Temperature limits
Hastelloy C	Rc1/4 Take out from the side	Half of standard product	Same as standard product
Tantalum			
Hard PVC		1MPa	-10 to 60℃

Filled liquid

Fluorine oil Wetted parts temperature limits:-20 to 120℃
(See Fig. 5 for negative pressure)
Specify also no-oil finish together for oxygen measurement

Silicone oil for sanitary use Wetted parts temperature limits:-20 to 120℃
(See Fig. 6 for negative pressure)

Wetted parts finish No oil finish or no-oil and no water finish

Process connection (with ovel flange) Rc1/2, Rc1/4, 1/2NPT, 1/4NPT, 15A socket welding (socket screw-in type)

Replace fitting Metal fittings for renewal of old type Hitachi transmitter are supplied

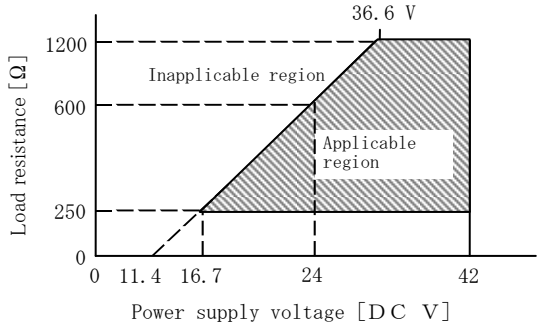
Steam jacket To be attached to the sensor body
(Steam temperature shall be set to get liquid contact temperature less than 120 ℃. But less than 100℃ for explosion proof type)

Drain vent plug Thermal insulation type

Process fluid condition

Vacuum type	Wetted parts temperature limits : −20 to 120℃ Filled liquid is same as standard specification (Workable pressure is different depending on temperature. Use after confirming Fig.3,4)
Density correction	Arithmetic processing function of density correction for measurement of liquefied gas level.
Standard installed correction table	Oxygen, Nitrogen, Argon, Butane, Carbon dioxide and Propane

Above correction table is installed as standard, be able to select by the DCR or the HART® communicator.
(Contact us when other than above is required.)



A minimum load resistance of 250Ω shall be required to communicate by connecting to communicator.

Fig.1 Supply voltage / load resistance property of transmitter

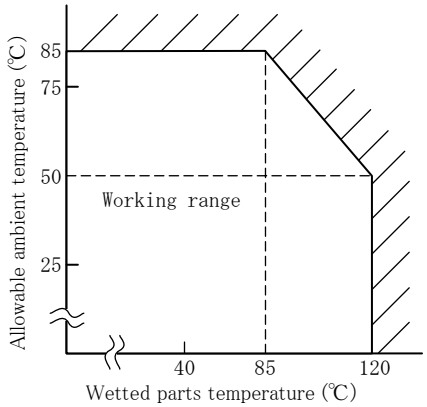


Fig.2 Wetted parts temperature and allowable ambient temperature

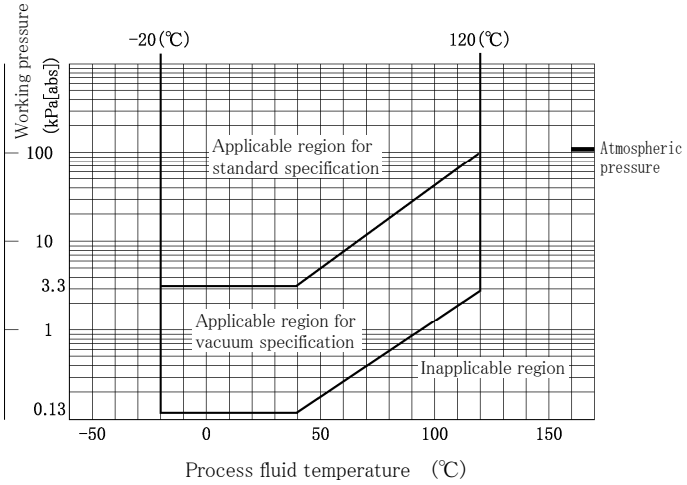


Fig.3 Working pressure and process fluid temperature
(Specification for standard or vacuum type)

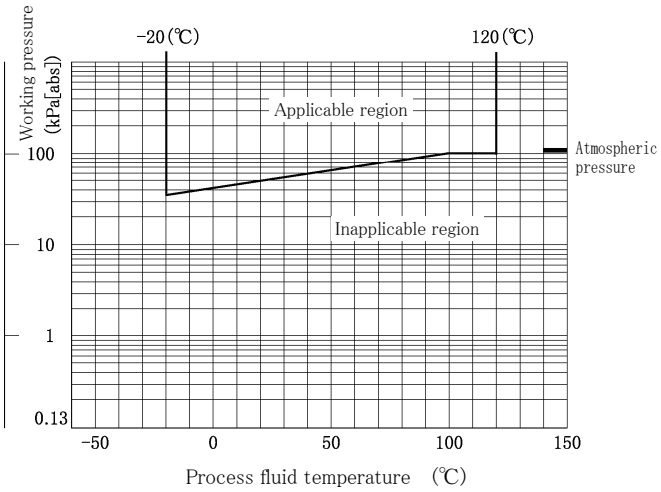


Fig.6 Working pressure and process fluid temperature
(Filled liquid : Silicone oil for sanitary use)

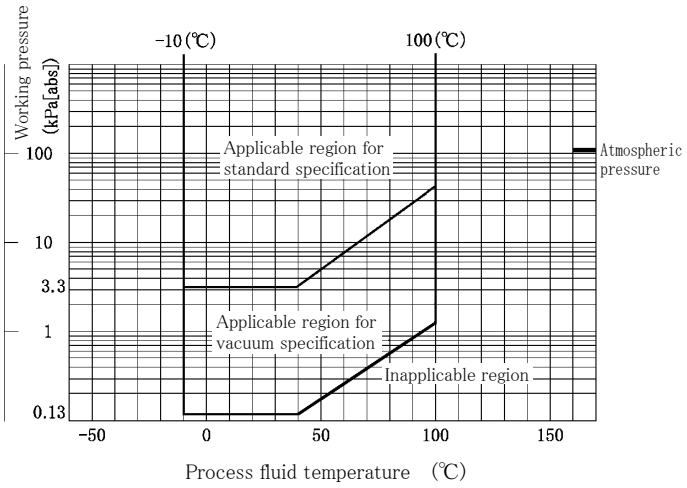


Fig.4 Working pressure and process fluid temperature
(Range code : 100000)

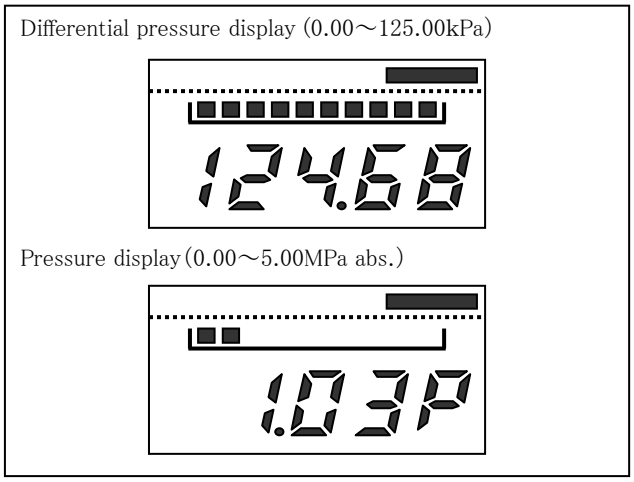


Fig.7 Alternate display of differential
pressure and pressure

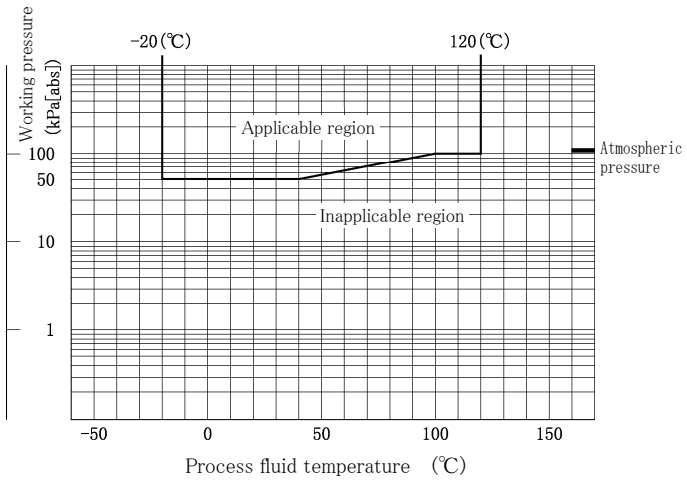
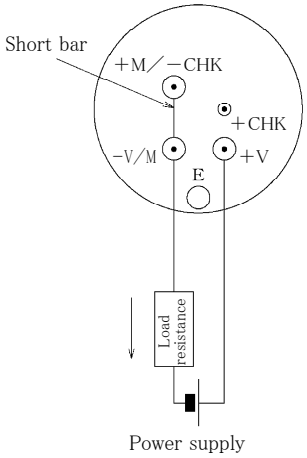
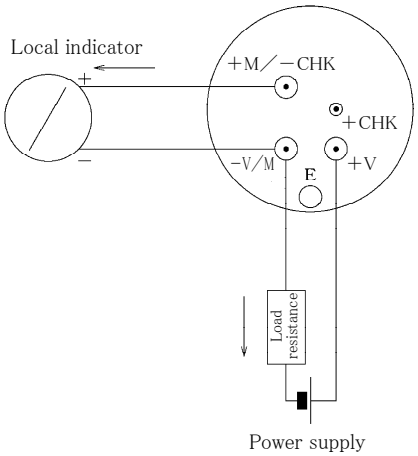


Fig.5 Working pressure and process fluid temperature
(Filled liquid : Fluorine oil)

Without local indicator



With local indicator connected



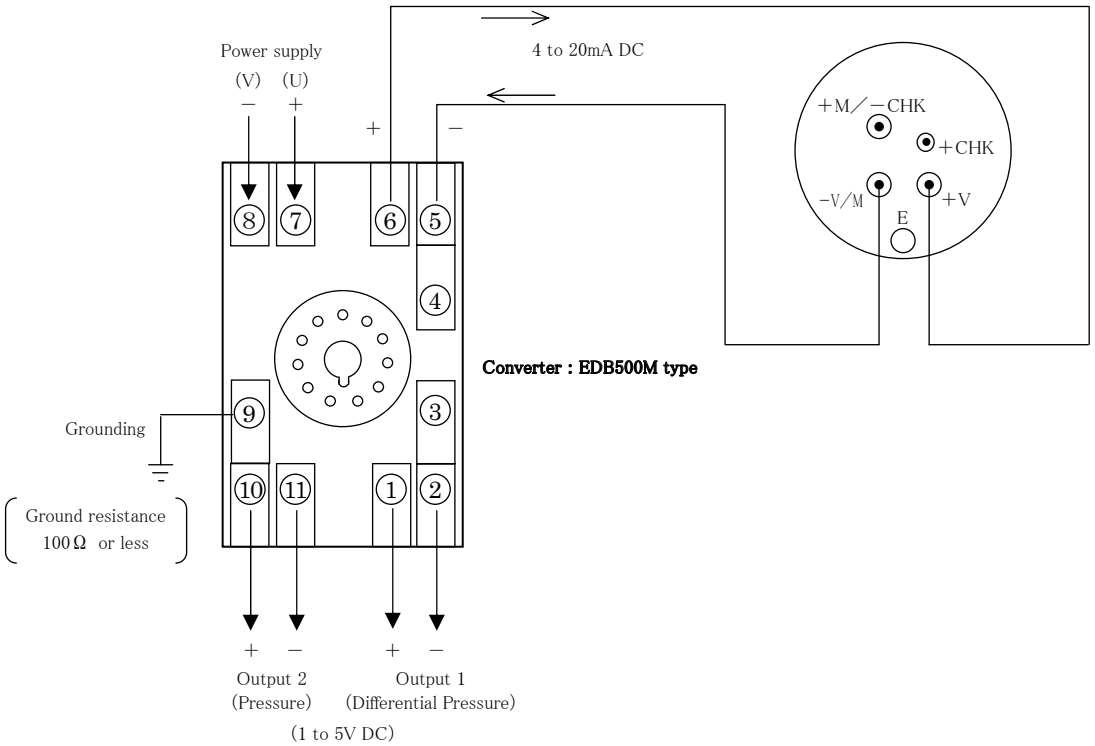
Notes:

(1) Grounding shall be done according to class D grounding practice (grounding resistance less than 100Ω)

(2) Grounding shall be done at one point either transmitter side or receiver instrument side, Give attention to avoid grounding at two points.

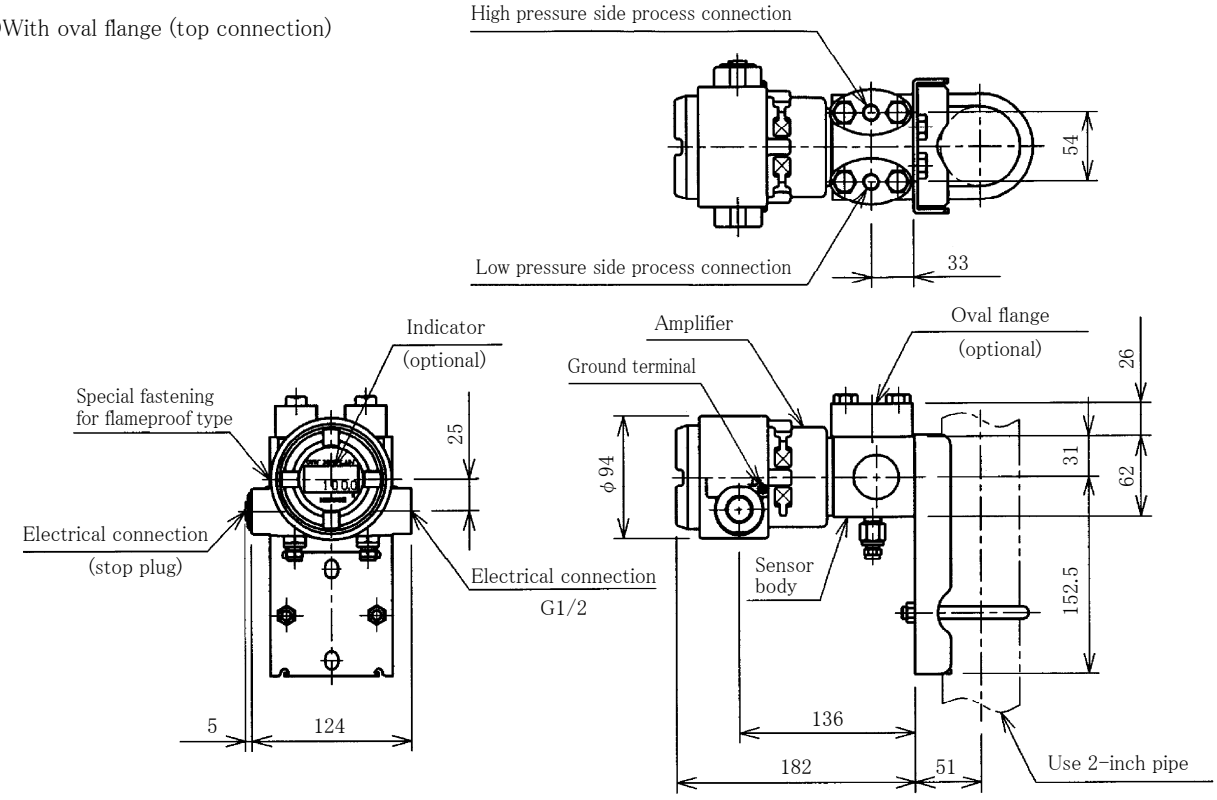
(3) Grounding terminals on transmitter side are furnished inside of terminal box and outside of amplifier case. Either of them can be utilized.

●With EDB500M

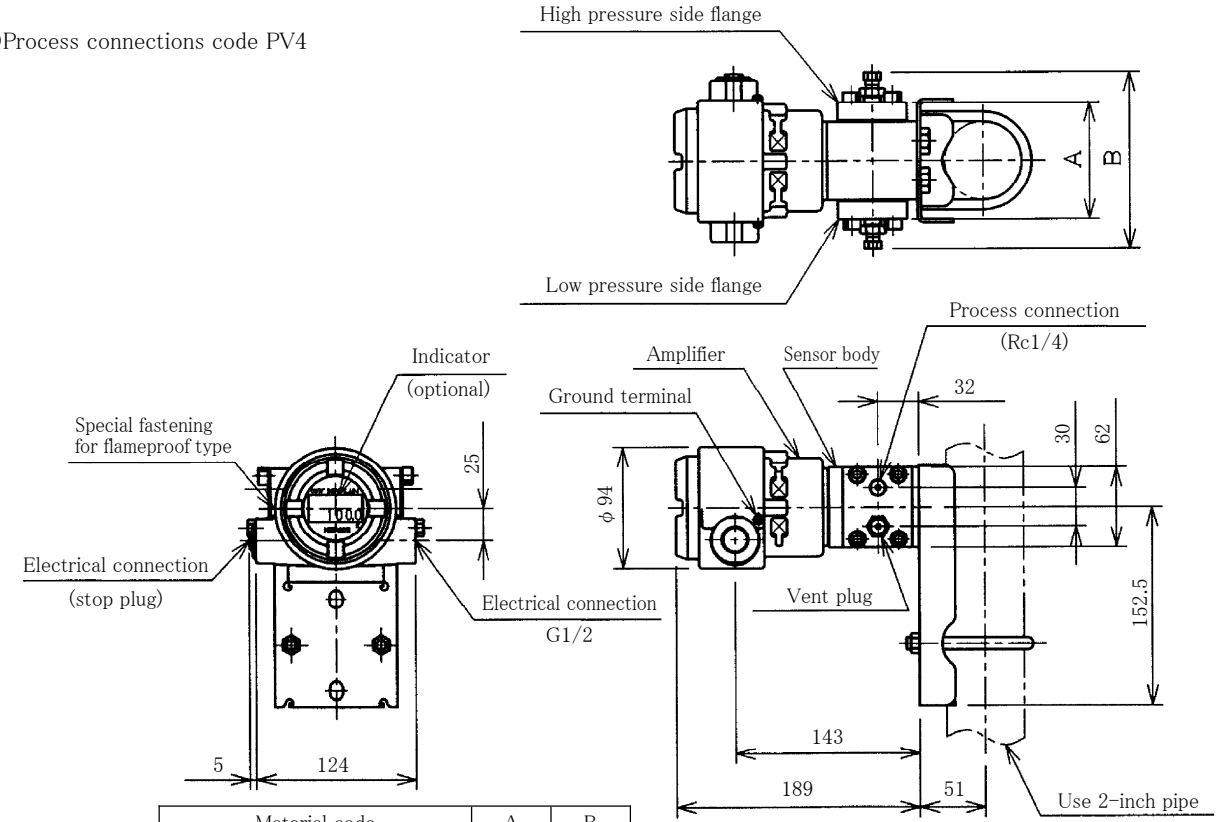


DIMENSIONS (Unit : mm)

●With oval flange (top connection)



●Process connections code PV4



Material code	A	B
HC, TA	90	142
HCPVC,TAPVC	104	172

CODE TABLES

EDR-N7

No., Item	1	2～12	Description
Model	Range code	Option	
EDR-N7			Water - proof, diaphragm material ; Hastelloy C,
	800		wetted parts other than diaphragm :SUS316,
	8000		top process connection Rc1/4 without oval flange,
	40000		U - bolt material,SUS304, without indicator
	100000		
	H800		HART® communication type
	H8000		
	H40000		
	H100000		
		— □ — □	Select a necessary code alone among those in the optional code table below.

OPTION

No.	Item	Code	Description
2	Adjustable range	C( )	Enter adjustable range and unit in parenthesis.
		CDH( )	Adjustable range and the unit are filled in parentheses at the pressure measurement on a high—pressure side.
		CDL( )	Adjustable range and the unit are filled in parentheses at the pressure measurement on a low—pressure side.
3	Certification	XC	TIIS Explosion proof standard approval
		FM	FM explosion proof approval
4	Indicator	M	Digital indicator.
		MJ( )	Digital indicator and actual scale display Fill in ( ) with scale and unit mark
5	Wetted parts Material	HC316L	Diaphragm : Hastelloy C. Vetted parts other than diaphragm : SUS316L
		HC	Diaphragm : Hastelloy C, Wetted parts other than diaphragm: Hastelloy C Process connection code PV4 or BPV4 should be specified
		HCPVC	Diaphragm : Hastelloy C. Wetted parts other than diaphragm: Hard PVC Process connection code PV4 or BPV4 should be specified
		TA316	Diaphragm : Tantalum, Vetted parts other then diaphragm : SUS316
		TA316L	Diaphragm : Tantalum, Vetted parts other then diaphragm : SUS316L
		TA	Diaphragm : Tantalum, lotted parts other than diaphragm : Tantalum Process connection code PV4 or BPV4 should be specified
		TAPVC	Diaphragm : Tantalum, Wetted parts other than diaphragm: Hard PVC Process connection code PV4 or BPV4 should be specified
		316L316	Diaphragm : SUS316L, Vetted parts other than diaphragm : SUS316
		316L	Diaphragm : SUS316L, Vetted parts other than diaphragm : SUS316L
		AU316	Diaphragm : SUS316L with gold plate , Wetted parts other than diaphragm : SUS316
6	Filled liquid	FO	Fluorine oil
		100CS	Silicon oil for sanitary use
7	No - oil	NL	No-oil finish
		NLW	No-oil and dehydrating finish
8	Process connections	R2	Top connection Rc1/2(with oval flange)
		R4	Top connection Rc1/4(with oval flange)
		N2	Top connection 1/2 - 14NPT(with oval flange)
		N4	Top connection 1/4 - 18NPT(with oval flange)
		S2	Top connection 1/2 inch pipe insertion welding(with oval flange)
		PV4	Top connection at side Rc1/4(without oval flange)
		B0	Bottom connection Rc1/4(without oval flange)
		BR2	Bottom connection Rc1/2(with oval flange)
		BR4	Bottom connection Rc1/4(with oval flange)
		BN2	Bottom connection 1/2-14 NPT(with oval flange)
		BN4	Bottom connection 1/4 - 18 NPT(with oval flange)
		BS2	Bottom connection 1/2 inch pipe insertion welding(with oval linage)
		BPV4	Bottom connection at side 1/4(without oval flange)
9	Replacing parts	RD78( )	MODEL EDR-75/81/85
		RD75M	MODEL EDR-75M
		RD71	MODEL EDR-71
		RD11·100( )	MODEL EDR-11/22/31
		RD11L·100( )	MODEL EDR-11L/22L/31L
		RD11M·100( )	MODEL EDR-11M/22M/31M
10	Steam jacket	ST	with steam jacket
		STP	with steam jacket, drain/vent plug for winterizing type
		P	Drain/vent plug for winterizing type
11	Process fluid condition	V	Vacuum type
12	Density correction	D( )	Arithmetic processing function of density correction for measurement of liquefied gas level. It selects from Oxygen,Nitrogen,Argon,Butane,Carbon dioxide, and Propane and it fills it in in parentheses.

Note) Please select the material of the diaphragm in consideration of corrosion resistance.
Hastelloy C might generate the hydrogen permeation by the galvanizing steel pipe piping and the water quality, etc., and cause the output shift and the transformation of the diaphragm.
Please select small SUS316L of the hydrogen permeation when there is no problem in corrosion resistance.

EDR-N7E

No., Item Model	1 Renge code	2～12 Option	Description
EDR-N7E			Water - proof, diaphragm material ; Hastelloy C, wetted parts other than diaphragm :SUS316, top process connection Rc1/4 without oval flange, U - bolt material,SUS304, without indicator
	800		
	8000		
	40000		
	H800		HART® communication type
	H8000		
	H40000		
		— □ — □	Select a necessary code alone among those in the optional code table below.

OPTION

No.	Item	Code	Description
2	Adjustable range	C( )	Enter adjustable range and unit in parenthesis.
		CDH( )	Adjustable range and the unit are filled in parentheses at the pressure measurement on a high-pressure side.
		CDL( )	Adjustable range and the unit are filled in parentheses at the pressure measurement on a low-pressure side.
3	Certification	XC	TIIS Explosion proof standard approval
		FM	FM explosionproof
4	Indicator	M	Digital indicator
		MJ( )	Digital indicator and actual scale display Fill in ( ) with scale and unit mark
5	Wetted parts Material	316L316	Diaphragm : SUS316L Wetted parts other than diaphragm : SUS316
		316L	Diaphragm : SUS316L Wetted parts other than diaphragm : SUS316L
		HC316L	Diaphragm : Hastelloy C Wetted parts other than diaphragm : SUS316L
		AU316	Diaphragm : SUS316L with gold plate, Wetted parts other tnan diaphragm : SUS316
6	Filled liquid	F0	Fluorine oil
		100CS	Silicon oil for sanitary use
7	No-oil	NL	No-oil finish
		NLW	No-oil and dehydrating finish
8	Process connections	R2	Top connection Rc1/2(with oval flange)
		R4	Top connection Rc1/4(with oval flange)
		N2	Top connection 1/2 - 14NPT(with oval flange)
		N4	Top connection I/4 - 18NPT(with oval flange)
		S2	Top connection 1/2 inch pipe insertion welding(with oval flange)
		B0	Bottom connection Rc1/4(without oval flange)
		BR2	Bottom connection Rc1/2(with oval flange)
		BR4	Bottom connection Rc1/4(with oval flange)
		BN2	Bottom connection 1/2-14 NPT(with oval flange)
		BN4	Bottom connection 1/4 - 18 NPT(with oval flange)
		BS2	Bottom connection 1/2 inch pipe insertion welding(with oval linage)
9	Replacing parts	RD78( )	MODEL EDR-75/81/85
		RD75M	MODEL EDR-75M
		RD71	MODEL EDR-71
		RD11･100( )	MODEL EDR-11/22/31
		RD11L･100( )	MODEL EDR-11L/22L/31L
		RD11M･100( )	MODEL EDR-11M/22M/31M
10	Steam jacket	ST	with steam jacket
		STP	with steam jacket,drain/vent plug for winterizing type
		P	Drain/vent plug for winterizing type
11	Process fluid condition	V	Vacuum type
12	Density correction	D( )	Arithmetic processing function of density correction for measurement of liquefied gas level. It selects from Oxygen,Nitrogen,Argon,Butane,Carbon dioxide, and Propane and it fills it in in parentheses.

Note) Please select the material of the diaphragm in consideration of corrosion resistance.
Hastelloy C might generate the hydrogen permeation by the galvanizing steel pipe piping and the water quality, etc., and cause the output shift and the transformation of the diaphragm.
Please select small SUS316L of the hydrogen permeation when there is no problem in corrosion resistance.

●HART® is a registered trademark of the HART Communication Foundation.

●Be sure to read the User's Manual to ensure correct, safe use.

●Some specifications and design are subject to change with or without notice for improvement of quality and performance.

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