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CS
CODE AND SPECIFICATIONS SHEET

Intelligent Differential Pressure Transmitter with temperature and pressure Compensation

EDR-N8C

EDR-N8C Differential Pressure Transmitter with Temperature/Pressure Correction Function incorporates semiconductor sensors, a resistance temperature detector input circuit and microcomputer and can measure pressure and temperature as well as differential pressure simultaneously. EDR-N8C converts the measurement results to 4 to 20mA DC signals in proportion to the mass flow volume correcting the density difference by the changes of temperature and pressure. EDR-N8C is also capable of remote configuration and monitoring by communication with the communicator and outputting the analog data of differential pressure (flow volume), pressure and temperature separately with an EDB500MA Composite Converter.

STANDARD SPECIFICATIONS

Model EDR-N8C

Measuring range

Range Code	Measuring Span		Settable Range Limits
800	Differential pressure range	0.5 to 8kPa	−8≦LRV/URV≦8kPa
	Pressure range	0.2 to 5MPa abs.	0≦LRV/URV≦5MPa abs.
	Temperature range	50℃ or higher	−200≦LRV/URV≦850℃
8000	Differential pressure range	2 to 80kPa	−80≦LRV/URV≦80kPa
	Pressure range	0.2 to 5MPa abs.	0≦LRV/URV≦5MPa abs.
	Temperature range	50℃ or higher	−200≦LRV/URV≦850℃

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).
Specify pressure range and temperature range to output pressure and temperature signal separately by using the EDB500 MA Composite Converter.

Output signal 4 to 20mA DC

Output signal range 3.6 to 21.6mA DC (−2.5 to 110%)

Power supply voltage 11.4 to 42.0V DC

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

Communication protocol Hitachi communication

Communication line conditions

Power supply voltage 16.7 to 42.0V DC

Load resistance 250Ω to 1.2kΩ
See Fig. 1 for the relationship between power supply voltage and load resistance.

Temperature input Pt 100Ω or JPt 100Ω (3-wire)

External adjustment / configuration Zero point adjustment (±100% of measured span), LRV and URV adjustment and configuration and damping time constant are configurable (however, only with indicator and when the function is enabled).

Burn-out at error Burn-up, burn-down or no burn-out can be selected. (No burn-out is configured at shipment.)

Accuracy

Range Code:800

Differential pressure	±0.2%	X is 1kPa or higher
	±[0.05+(0.15×1/X)]% or 1.96Pa whichever is bigger	X is less than 1kPa

Range Code:8000

Differential pressure	±0.075%	X is 8kPa or higher
	±[0.002+(0.073×8/X)]%	X is less than 8kPa

Common

Pressure	±0.1%	X is 1MPa or higher
	±[0.05+(0.05×1/X)]%	X is less than 1MPa
Temperature	±0.1%	X is 100℃ or higher
	±[0.1×100/X]% or 0.1℃ whichever is bigger	X is less than 100℃

Note1) Accuracy is the percentage to X.
X is the absolute value of URV, LRV or the biggest value of measured span. X's unit is kPa.

Note2) For square-root output, With zero-cut designation
Output 1.1% or less:
± (linear output accuracy × 45)%
Output 1.1 to 50%:
± (linear output accuracy × 50 / square-root output %) %
Output 50% or higher: Same as linear output
*It is possible to select whether getting the outputs under the zero-cut point zero, or the zero-cut point from an arbitrary straight line or proportional outputs through communication.
Without zero-cut designation
Output 20% or less: Straight line at 0 to 20% point
Output 20% or higher: Same as the above "With zero-cut designation".

Accuracy of output after temperature/pressure correction calculation

$$\pm[0.05+\{(\text{accuracy of differential pressure})^2+(\text{pressure accuracy})^2+(\text{temperature accuracy})^2\}^{1/2}]\%$$

Accuracy of output after saturated steam pressure correction calculation

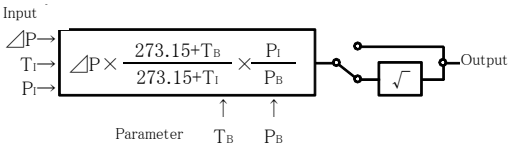
$$\pm[0.05+\{(\text{accuracy of differential pressure})^2+(\text{pressure accuracy})^2\}^{1/2}+(\text{Interpolation accuracy of consolidation degree measured})+(\text{Interpolation accuracy of basic consolidation degree})]\%$$

where Interpolation accuracy of consolidation degree measured
$=0.003/\rho_I\times100$
Interpolation accuracy of basic consolidation degree
$=0.003/\rho_B\times100$

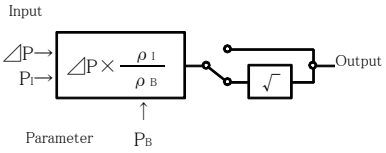
Arithmetic expression

[Virtual input]

Temperature/pressure correction

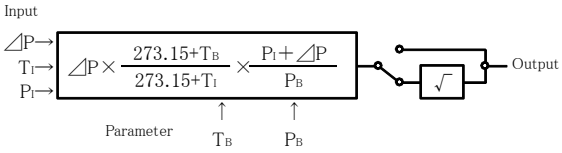


Saturated vapor pressure correction

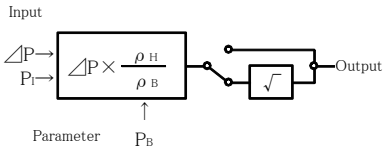


[Actual input]

Temperature/pressure correction



Saturated vapor pressure correction



An arithmetic expression from the following four types with a communicator can be selected:

(1)Temperature correction

(2)Pressure correction

(3)Temperature/pressure correction

(4)Saturated vapor pressure correction

where ⊿P: Measured differential pressure (kPa)

T_I: Measured temperature (℃)

P_I: Measured pressure (MPa abs.)

T_B: Basic temperature for correction (℃)

P_B: Basic pressure for correction (MPa abs.)

ρ_I: Calculated density by measured pressure P_I (kg/m^3)

ρ_H: Calculated density by the sum of measured pressure and differential pressure (P_I+⊿P) (kg/m^3)

ρ_B: Calculated density by basic pressure for correction P_B (kg/m^3)

For the calculation of saturated vapor pressure correction, ρ_I/ρ_B, ρ_H/ρ_B are effective to twofold, and are fixed to two when they exceed two.

Response time

Dead time	0.15s (Minimum)
Damping time constant (Amplifier time constant)	Electrically configurable from 0.1 to 102.4s (at 0.1s step) by using a communicator.
Sensor body time constant (at 25℃)	Range Code 800 : Approx. 0.2s Range Code 8000 : Approx. 0.05s

Storage temperature range −40 to 85℃

Operating humidity range 0 to 100% RH

Operating temperature range

Ambient temperature range	−40 to 85℃ (See Fig. 2)
Wetted parts temperature range	−40 to 120℃

Maximum operating pressure 5 MPa abs.

Note) See Fig. 3 for negative pressure.

Site vibration Continuous vibration below 29.4m/s^2

Temperature characteristics (at -20 to 60℃)

Range Code:800

Differential pressure	Zero shift	±〔0.05+(0.45×T/50)〕%	X is 3.2kPa or higher
		±〔0.05+(0.25+0.2×3.2/X)×T/50〕%	X is less than 3.2kPa
	Total shift	±〔0.05+(0.75×T/50)〕%	X is 3.2kPa or higher
		±〔0.05+(0.45+0.3×3.2/X)×T/50〕%	X is less than 3.2kPa

Range Code:8000

Differential pressure	Zero shift	±〔0.05+(0.2×T/50)〕%	X is 32kPa or higher
		±〔0.05+(0.1+0.1×32/X)×T/50〕%	X is less than 3.2kPa
	Total shift	±〔0.05+(0.45×T/50)〕%	X is 32kPa or higher
		±〔0.05+(0.35+0.1×32/X)×T/50〕%	X is less than 3.2kPa

Common

Pressure	Zero shift	±〔0.05+(0.2×T/50)〕%	X is 2MPa or higher
		±〔0.05+(0.1+0.1×2/X)×T/50〕%	X is less than 2MPa
	Total shift	±〔0.05+(0.45×T/50)〕%	X is 2MPa or higher
		±〔0.05+(0.35+0.1×2/X)×T/50〕%	X is less than 2MPa
Temperature		±〔0.2×T/10〕%	T is 100℃ or higher
		±〔(0.05×15/X)×T/10〕%	T is less than 100℃

Note) Temperature characteristics are the percentage to X.
X is the absolute value of URV, LRV or the biggest value of measured span.
T(℃) is variable range of temperature.

Pressure characteristics (at 25℃)

Range Code	Pressure effect	
800	Zero shift ±〔0.05+(0.1×8/X×P/5)〕%	
8000	Zero shift ±〔0.05+(0.1×P/5)〕%	X is 40kPa or higher
	±〔0.05+(0.1×40/X)×P/5〕%	X is less than 40kPa
	Total shift ±〔0.05+(0.3+0.1×80/X)×P/5〕%	

Note) Pressure characteristics is the percentage to X.
X is the absolute value of URV, LRV or the biggest value of measured span. X's unit is kPa.
P is a pressure. P's unit is MPa.

Overpressure characteristics (zero point) ±0.5%(when the applied operating pressure is the maximum) (for the maximum span)

Long-term stability (zero point) ±0.1%/1 year (for the maximum span)
Range Code:8000,
Material Code:Standard, 316L
Volume of change under basic operation requirements (23 ±2℃, under atmospheric pressure)

Materials

Diaphgram	SUS316L
Sensor body	SUS316L
Sensor body flange	SCS14A(SUS316-equivalent casting)
Sensor body flange bolt	SCM435
Sensor body flange O-ring	EPDM
Amplifier case	Aluminum alloy
Mounting plate	SPCC (anti-acid painting)
U-bolt	SUS304

Sealed liquid Silicon oil

Differential pressure inlet Upper inlet Rc 1/4 without oval flange

Wire connection G1/2

Check terminal Current output (Ampere meter is required for measurement.)

Protection grade JIS C 0920 IP67

Surge absorber Incorporated into the power input circuit
Surge tolerance:1,000A (8/20 μs)
Impact test voltage:15000V (1.2/50 μs)

Color Light gray (anti-acid painting)

Weight Approx. 4.0 kg

Mounting Use U-bolts for 50A pipe, etc.

Accessories A set of 50A pipe mounting plate and U-bolts,
External adjustment/configuration magnet

ADDITIONAL SPECIFICATIONS

Communication protocol HART communication

TIIS flameproof, Oil-immersion

Applicable Standard	Exdo II CT4 X Note) Available for use at Zone1, Zone2 groups of hazardous place. Note) If the indicator is not equipped, please construct an external alarm indication system by scaling out of the output signal.
Operating temperature range	Ambient temperature range:-20 to 55℃ Wetted parts temperature range: -20 to 100℃
Wire connection	Please use X-EXRCA pressure proof packing brackets (or EXPC-16B by Shimada Electric Co., Ltd)

FM explosionproof approval (Arranging)

Applicable Standard	Explosionproof CLI,DIV 1,GPS B,C&D Dust-ignition proof CLⅡ/Ⅲ,GPS E,F&G Temperature Code T4
Operating temperature range	Ambient temperature range: -40 to 60℃ Wetted parts temperature range: -40 to 120℃

NEPSI explosionproof approval (Arranging)

Applicable Standard	Explosionproof Ex d ⅡC T4
Operating temperature range	Ambient temperature range: -40 to 60℃ Wetted parts temperature range: -40 to 120℃

Indicator Digital indicator
Indication 5 digits, unit 7 digits, bar graph
Indication items
Individual enable/disable indication of the following items:
Automatic switching when selecting the items
Differential pressure%, Differential pressure value, Actual scale of differential pressure, Static pressure%, Static pressure value
Actual scale
Unit is selected from pressure, flow volume, height or discretionary configuration.
Configuration range:
-99,999 to 99,999
Ambient temperature range: -20 to 85℃

Wetted parts materials

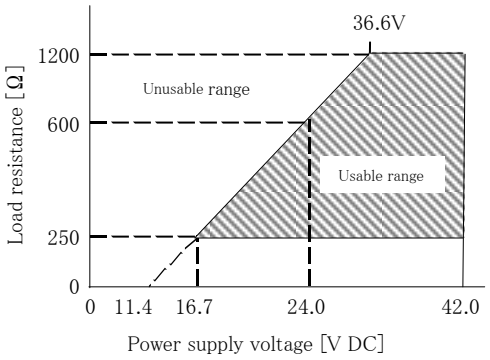
Material Code	Diaphragm	Sensor body wetted parts	Sensor body flange
316L	SUS316L	SUS316L	SCS16A (SUS316L-equivalent)
HC316	Hastelloy C	SUS316L	SCS14A (SUS316-equivalent)
HC316L	Hastelloy C	SUS316L	SCS16A (SUS316L-equivalent)

* Please select a material considering the anti-corrosion characteristics.
Using a gold-plated diaphragm (Code: Z52) is recommended if there is any concern about the error caused by hydrogen permeation of the diaphragm due to hydrogen in the measured fluid, etc. (However, it is difficult for Z52 to completely prevent the error caused by hydrogen permeation.)

Wetted parts finish Oil-prohibitive or oil and water prohibitive finish

Pressure inlet (with oval flange) Rc1/4, Rc1/2, 1/4NPT, 1/2NPT, 15A socket welding (socket screw-in type)

Bolt material Sensor body flange bolt:SUS304, SUS630



The minimum load resistance of 250 Ω is required to communicate by connecting the communicator

Fig. 1 Power supply voltage / load resistance characteristics

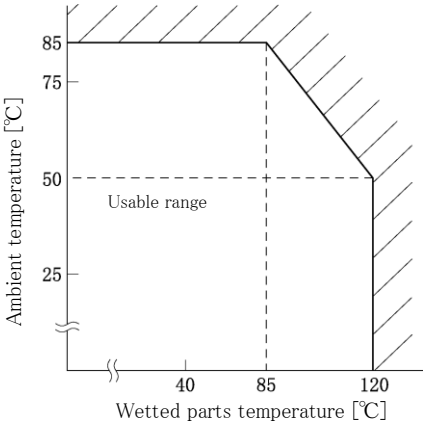


Fig.2 Wetted parts temperature and ambient temperature

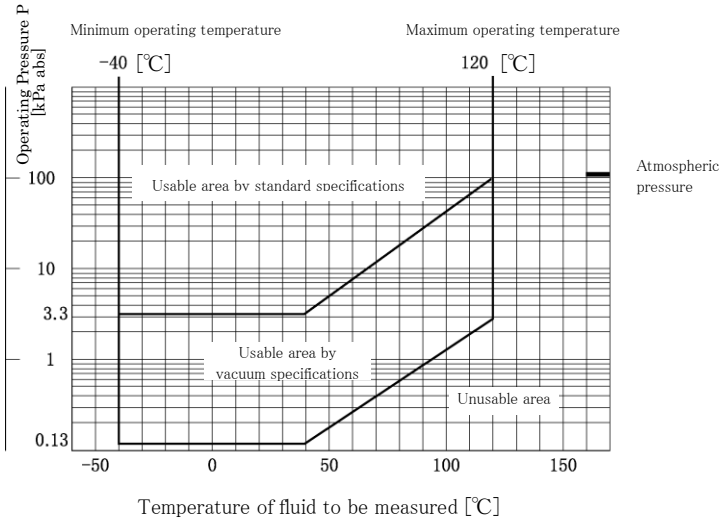
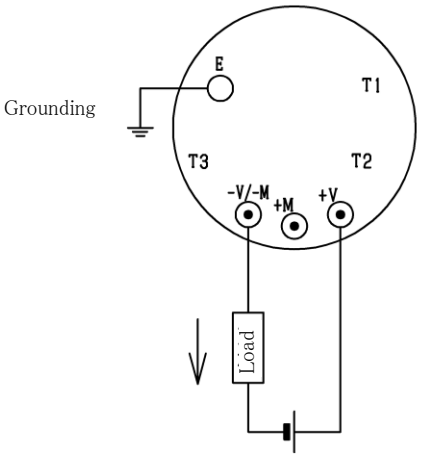


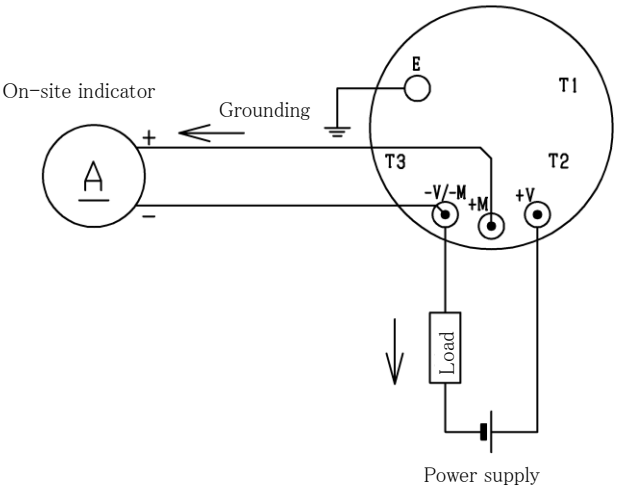
Fig. 3 Operating pressure and wetted parts temperature

EXTERNAL CONNECTION DRAWING

Without on-site indicator



Connected with on-site indicator



Note1) Perform Class D grounding work (ground resistance of 100Ω or less) for grounding.

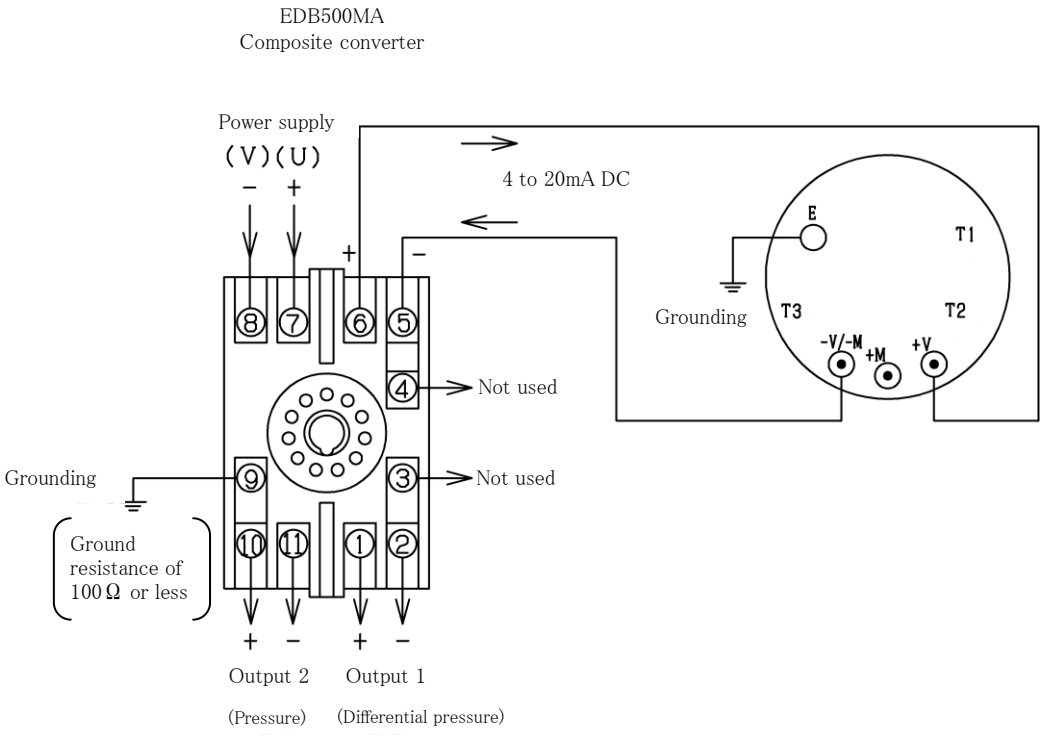
Note2) Ground either the transmitter or the receiving instrument. Be careful not to be dual-grounded.

Note3) Grounding terminals on the transmitter are located inside the terminal box and outside the amplifier case.
You can use either of the groundings.

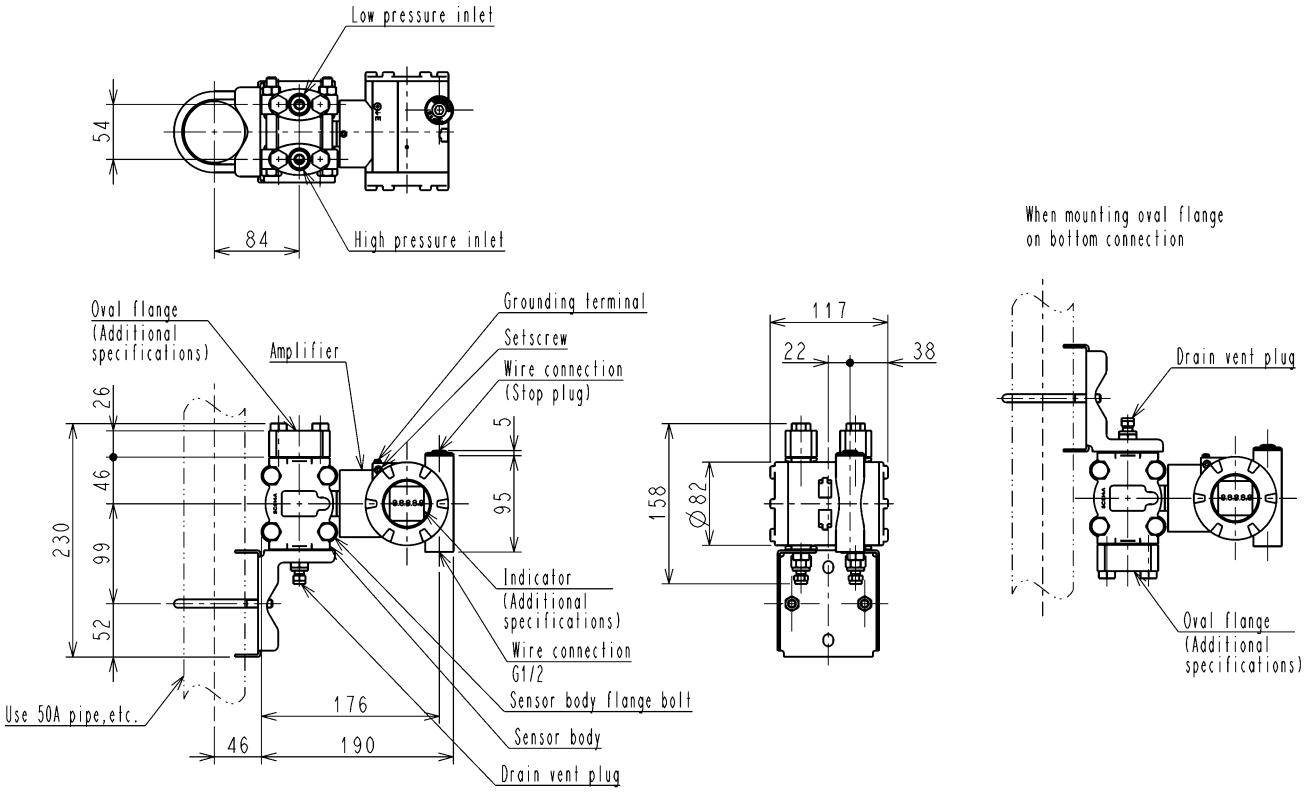
Note4) T1, T2 and T3 terminals are not connected.

Note5) The resistance value needs to be 20Ω or less including wire resistance to connect an on-site indicator.

Connected with EDB500MA



DIMENSIONS (Unit : mm)



CODE TABLES

EDR-N8C Intelligent Differential Pressure Transmitter with Temperature / Pressure Compensation Function

Model			
EDR-N8C			
No.	Item	Code	Remarks
1	Range Code	800	Measurement span Differential pressure: 0.5 to 8kPa, Pressure: 0.2 to 5MPa abs., Temperature: 50℃ or higher
		8000	Measurement span Differential pressure: 2 to 80kPa, Pressure: 0.2 to 5MPa abs., Temperature: 50℃ or higher
2	Communication	–	Hitachi communication
		H	HART communication
3	Functional safety	–	None
4	Adjustment range	–	Adjust between 0 to Maximum range
		C( )	Describe adjustment range and unit sign in ( ). (Describe in the order of differential pressure, pressure and temperature.)
5	Certification	–	None
		XC	TIIS flameproof, Oil-immersion
		FM	FM explosionproof approval (Arranging)
		NEPSI	NEPSI explosionproof approval (Arranging)
6	Indicator	–	None
		M	With digital indicator (Indication 0 to 100%)
		MJ( )	With digital indicator, describe indication scale and unit sign in actual scale indication ( )
7	Material	–	Diaphragm: SUS316L Sensor body: SUS316L Sensor body flange: SCS14A
		316L	Diaphragm: SUS316L Sensor body: SUS316L Sensor body flange: SCS16A
		HC316	Diaphragm: Hastelloy C Sensor body: SUS316L Sensor body flange: SCS14A
		HC316L	Diaphragm: Hastelloy C Sensor body: SUS316L Sensor body flange: SCS16A
8	Bolt /mounting plate material	–	Sensor body flange bolt: SCM435 Mounting plate: SPCC U-bolt: SUS304
		S304	Sensor body flange bolt: SUS304 Mounting plate: SUS304 U-bolt: SUS304 (Maximum operating pressure is 1/2 of the standard.)
		S630	Sensor body flange bolt: SUS630 Mounting plate: SUS304 U-bolt: SUS304
9	Oil prohibition	–	No finish
		NL	Oil prohibitive finish
		NLW	Oil and water prohibitive finish
10	Pressure inlet	T0	Top connection Rc1/4 without oval flange
		R2	Top connection Rc1/2 with oval flange
		R4	Top connection Rc1/4 with oval flange
		N2	Top connection 1/2NPT with oval flange
		N4	Top connection 1/4NPT with oval flange
		S2	Top connection with oval flange 15A pipe insertion welding (socket screw-in type)
		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 1/2NPT with oval flange
		BN4	Bottom connection 1/4NPT with oval flange
		BS2	Bottom connection with oval flange 15A pipe insertion welding (socket screw-in type)
11	Compensation calculation Note)	–	OFF
		TEMP( )	Temperature compensation, Describe basic temperature by ℃ in ( ). (Default:50℃)
		PRESS( )	Pressure compensation, Describe basic pressure by MPa abs.in ( ). (Default:0.5MPa)
		TP( )	Temperature/pressure compensation, Describe basic temperature by ℃, followed by basic pressure by MPa abs.in ( ). (Default:50℃, 0.5 MPa abs.)
		STEAM( )	Saturated steam pressure compensation, Describe basic pressure by MPa abs.in ( ). (Default:0.5MPa abs.)

Note) If not specified: Basic temperature:50℃, Basic pressure:0.5MPa abs.

Example of Code description:EDR-N8C-800-XC-M-R2-OFF

●HART® is a registerd trademark of the Field Comm Group.
●Please read the "Instruction Manual" carefully before use.
●Appearance and specifications are subject to change partially for improvement.