

Highly accurate non-contact displacement sensor Model GY series

GYSE-P Profibus DP output type probe





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1 . Read before use

1.1 About the picture display


In this manual, the following pictures are displayed about the act that requires attention and the prohibition.


Picture display that shows danger of electric shock	
Picture display that shows danger of fire	
Picture display that draws attention	
Picture display that prohibits act	

1.2 Attention on safety


Please have reading this book often when this product is used (installation, wiring, driving, and maintenance), the enough payment of attention to safety, and the correct handling. Please note the following respect when you use it.

Attention in design

 Please design so that the entire system may work at the safety side when the sensor breaks down and the output becomes irregular or install the safety circuit.

 Please design so that the entire system may work at the safety side when the sensor output becomes irregular by abnormality in the magnet, the cable, and the power supply, etc. , noises, the vibrations, and impacts, etc. or install the safety circuit.

Attention in driving

 Please do not swing directly to the terminal. It causes the electric shock and the malfunction.

2. Outline

2.1 Outline of function

- **Non-contact linear sensor**

The Model GY series employing the Wiedemann effect is an industrial linear-sensor. It is a displacement sensor that detects the position of the movable magnet by the occurrence of the twist distortion on a special magnetostrictive wire, and the measurement of the spread time of the distortion is done. There is no mechanical wear-out because the measurement thing and the main body of the sensor are non-contact.

- **Absolute measurement**

The magnet can absolutely show the position immediately after turning on of the power supply.

- **Profibus DP output**

This product outputs the displacement of the magnet with Profibus DP (DPV0).

- **Multi magnet measurement**

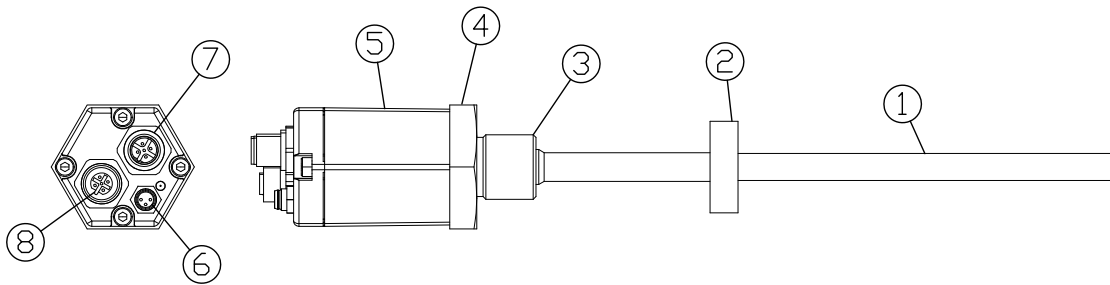
32 detection magnets or less can be measured with one sensor simultaneously.

- **Magnet dropout warning detection**

The dropout of the detection magnet is detected, and it shows by the Profibus data output.

2.2 Each part name

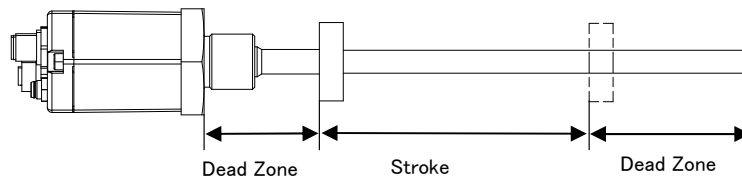
1. Sensor rod
2. Magnet
3. Installation screw
4. Hex-head flange
5. Sensor head
6. Power supply connector
7. Profibus connector(input)
8. Profibus connector(output)



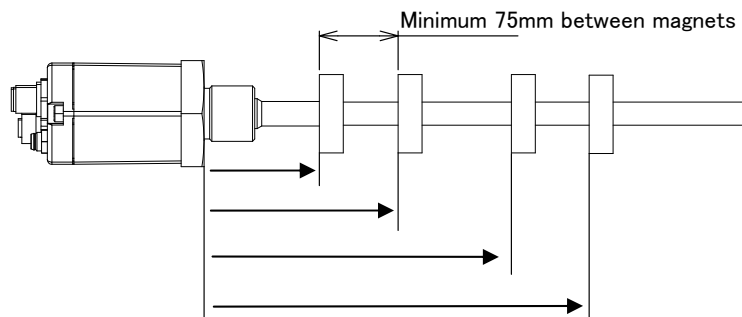
2.3 Range of measurement

The GYSE-P probe can measure by using the single or multi magnets. Zero value is output at the position at 50mm from the hex-head flange edge side. GYSE can not measure correctly on each part shown as “Dead Zone”. It is necessary to open the distance between magnets by 75mm or more at the multi magnet.

Single magnet



Multi magnet




3. Installation

3.1 Attention in handling

■ Probe part

Please do not beat, do not bend, and damage the rod.

Please do not resolve the probe.

 Please do not drop the float from a high position. The magnet in the float might be damaged.


■ Sensor cable


Please strongly do not pull, and do not damage the cable.


It is recommended to protect it with the cover board etc. to use it more at ease in the place where water and oil splash especially though the sensor connector selects parts in consideration of the waterproof.

Please fix the cable to the nearby machine etc. to pull neither the cable playground nor the sensor connector.

The minimum bend radius of the cable is 20mm.

 Please rotate the cable together when the installation thread part of the probe screws in and is installed. The cable is twisted and it is likely to disconnect.

 The power cable and the sensor cable's bundling a main circuit and the power cable, etc. , and storing it in the same duct cause the malfunction by the noise and avoid it, please.

 Please do installation/detaching work after intercepting the power supply without fail.

3.2 Installation method

Please use screw of sensor head or hex nut for installation. There is no problem even if ferromagnetic is used though the installation metal fittings recommend the nonmagnetic material (stainless steel, aluminum, and brass, etc.). However, please do not use magnetized material. The magnet must not enter the figure below shaded portion when you use ferromagnetic for the installation metal fittings.

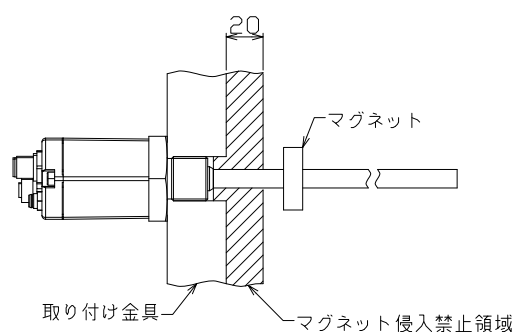


Figure1 Installation figure of main body

When the rod part of the sensor is supported, we will recommend the support material between the probe head and the magnet to use the nonmagnetic material. The magnet must not enter the figure below shaded portion when supporting it by the ferromagnetism material.

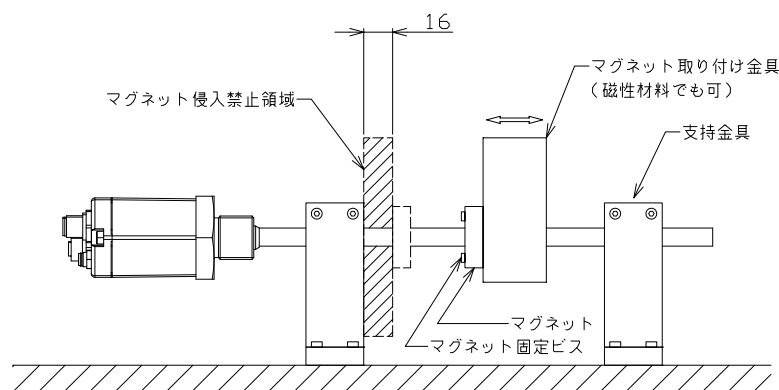





Figure2 Method of supporting rod

Moreover, support rod with the nonmagnetic materials when you use sensor with long stroke.

4. Wiring

4.1 Attention in wiring

-  Do not setup the cable near other power cables.
-  Do installation/detaching work after turning off the power supply.
-  Confirm neither the terminal nor the connector looseness before turning on the power supply.

4.2 Wiring method

This probe processes so little signal that wire noting the following matter to demonstrate the performance.

- ◆ The wiring length should be shortened as much as possible.
- ◆ The power supply line, the electric power line, the sensor cable, and the analog output line should be separated.

Install the surge absorber on the coil products such as relays and electromagnetic switches.

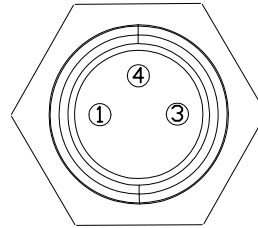
4.3 Sensor connector

The sensor connector includes the power supply connector and the Profibus connector.

4.3.1 Power supply connector

M8 connector

Pin number	Function
1	+24V power supply
3	0[V]
4	N.C.

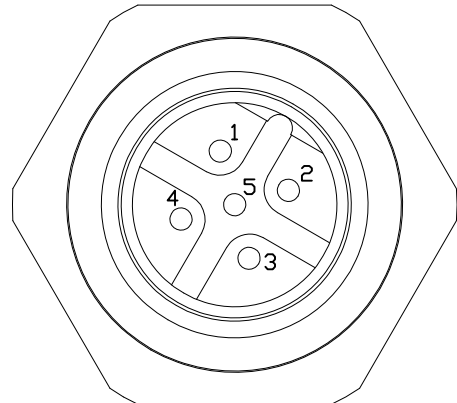


Please ground the drain wire to low impedance earth for the noise decrease.

4.3.2 Profibus connector(input and male)

M12 connector (B coding)

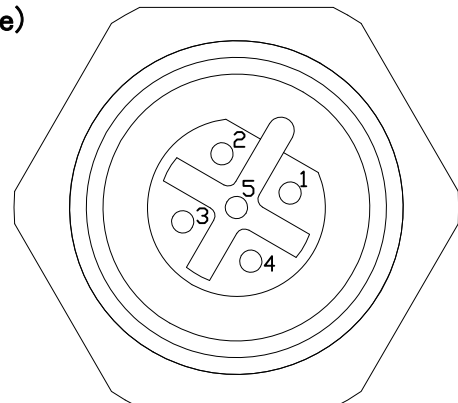
Pin number	Function
1	N.C.
2	RxD/TxD-P (A)
3	N.C.
4	RxD/TxD-N (B)
5	N.C.



4.3.3 Profibus connector(output and surgical knife)

M12 connector (B coding)

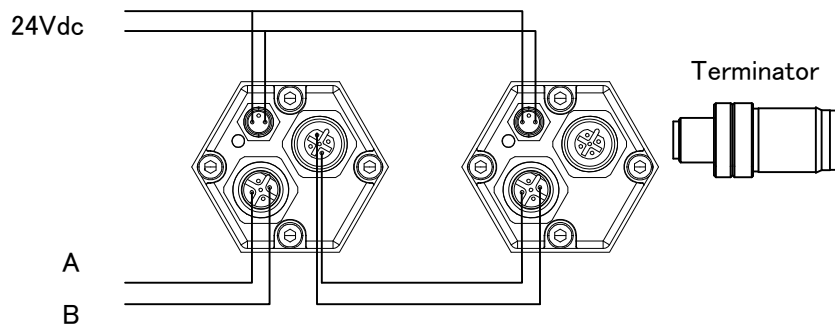
Pin number	Function
1	VP+5 (Bus Termination)
2	RxD/TxD-P (A)
3	DGnd (Bus Termination)
4	RxD/TxD-N (B)
5	N.C.



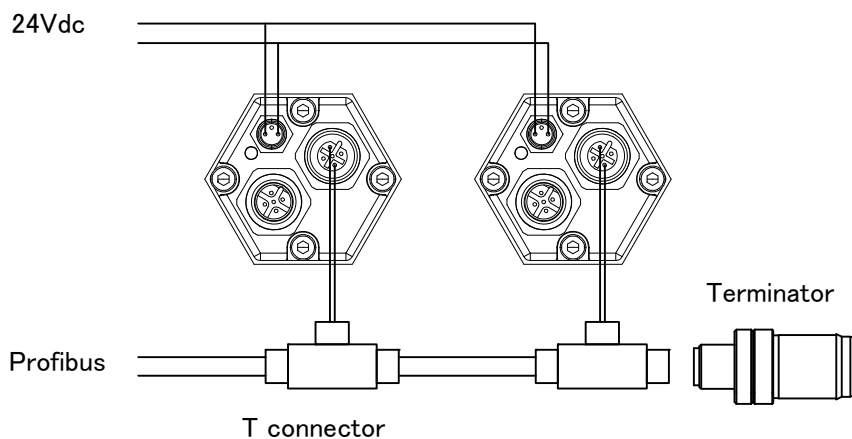
4.4 Connecting wires

Please supply stabilized DC 24V (80mA) to the power supply input terminal.

Profibus bus connection options



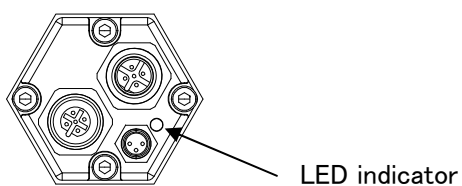
Individual connecting wires



Connecting wires using T connector

4.5 LED indicator

The built-in LED indicator shows operation.



Green lighting	Operating normally
Green blinking	Waiting parameter set from Profibus master

5. Communication

5.1 Setting of slave address

The sensor needs a unique slave address through Profibus “SetSlaveAddress” service. The Profibus system with a class 2 master can assign slave address.

Assigned new slave address is preserved in EEPROM of the sensor.

The default value of slave address is 125.

5.2 Setting of parameter

The parameter of the GYSE-P sensor can be set through standard Profibus start-up sequence.

The first seven bytes of the parameter are standard parameters of the Profibus communication, and an original parameter of the GYSE-P sensor can be set from the 11th byte.

Because the parameter can be set by using GSD file, it is possible to set it easily and conveniently with the configuration tool that can use the GSD file. When the GSD file cannot be used, it is necessary to transmit data according to the following parameter list.

Next, when the parameter setting is completed, it is necessary to do the configuration.

The sensor returns the master the Prm Fault diagnosis when the parameter setting is not correctly done, and confirm for the setting to be done correctly.

■ Parameter list

OCTET11-12: Resolution (1bit=1um)

Default 0x00

	16	15	14	13	12	11	10	9
Octet11								

Default 0x05

	8	7	6	5	4	3	2	1
Octet12								

OCTET13: Operation setting

Default 0xC1

	8	7	6	5	4	3	2	1
Octet13	Data format		Reserved(0)			Direction	Reserved(0)	Err

Err: Error handling

0 = zero output / 1 = old value output

Direction

0 = forward / 1 = reverse

Data format

00 = Status/L/M/H

01 = Status/H/M/L

10 =L/M/H/HH

11=HH/H/M/L

OCTET14: Setting of number of magnets

Default = 0x00

	8	7	6	5	4	3	2	1
Octet14	Reserved(0)			Number of measurement magnets (0=1 pieces and 1=2 pieces, etc.)				

5.3 Configuration

After the parameter setting is successfully done, it is necessary to transmit the configuration data to the sensor. The configuration data decides the number of data that the sensor sends and receives.

Necessary number of sending and receiving data for the GYSE-P sensor is as follows.

Input (sensor → master): $(4 \text{ bytes}) \times \text{Number of magnets}$

Output (master → sensor): 0 bytes

When the GSD file is used, the number of sending and receiving data byte are automatically calculated when the number of magnets is set, and the configuration is done.

5.4 Diagnosis

The GYSE-P sensor supports the Profibus extended diagnostic function.

The first 6 bytes are defined as the Profibus DP standard.

The content of the GYSE-P specific diagnosis data is as follows.

OCTET(7): Length of extended diagnosis

OCTET(8-9): Resolution (1bit=1um, 16 bit unsigned)

OCTET(10): Operation setting

	8	7	6	5	4	3	2	1
Octet10	Data format		Reserved(0)			Direction	Reserved(0)	Err

Err: Error handling

0 = zero output / 1 = old value output

Direction

0 = forward / 1 = reverse

Data format

00 = Status/L/M/H

01 = Status/H/M/L

10 =L/M/H/HH

11=HH/H/M/L

OCTET(11): Number of magnets

	8	7	6	5	4	3	2	1
Octet11	Reserved(0)			Number of measurement magnets (0=1 pieces and 1=2 pieces, etc.)				

OCTET(12-13): 16bit unsigned of effective stroke (mm)

OCTET(14): Sampling 8bit unsigned

	8	7	6	5	4	3	2	1
Octet14	Reserved(0)			Sampling				

2: 2kHz

3: 1kHz

4: 500Hz

5: 250Hz

OCTET(15–18): Manufacturing number 32bit unsigned

OCTET(19–22): 32bit unsigned of sensor calibration data (ZERO)

OCTET(23–26): 32bit unsigned of sensor calibration data (FULL)

OCTET(27): Program version 8bit unsigned

5.5 Data exchange

When the configuration is normally done, the sensor starts the measurement of the detection magnet.

Data is transmitted to the master according to the data format setting shown in OCTET13 of the parameter setting.

The content of the transmitted data of four bytes is as follows.

Status	8	7	6	5	4	3	2	1
	TErr	MErr	IErr	Magnet number				

IErr: Internal data preservation error

MErr: Magnet detection error

TErr: Other measurement errors

It becomes one if abnormality is detected, and it returns to 0 automatically when released.

The magnet number becomes 0, 1, and 2, etc. in order near from the sensor head.

Position(L)	8	7	6	5	4	3	2	1
Position(M)	8	7	6	5	4	3	2	1
Position(H)	8	7	6	5	4	3	2	1

6. Model

GYSE-P-[①]-[②][③]-[④]

①Stroke [mm]

Figure of 50mm-7500mm

②Installation screw

Symbol	Size of screw
M	M24 × P1.0(standard)
N	M18 × P1.5
U	3/4-16UNF-3A

③Rod diameter

Symbol	Size of rod
No filling in	Φ 10 (standard)
8	Φ 8
14	Φ 13.8

④Cable taking out

Symbol	Specification
CN	Connector type

There is no cable grand option in this probe.

7. Specification

7.1 General specification

Item	Specification
Model	GYSE-P
Power supply	DC24V(±2V) 80mA (rush 200mA)
Category temperature range	-20~+80°C
Storage temperature range	-40~+80°C
Operating humidity limits	10~90%RH (no condensation)
Use atmosphere	No causticity/combustible gas/firedamp
Cooling method	Natural air-cooling method
Protection grade	IP67

- There is no cable grand option in this product.

7.2 Performance specification

Item	Specification			
Non-Linearity	±0.02% FS (minimum ±50 μ m)			
Resolution	1 μ m or more (Set it with Profibus DP Configurator)			
Repeatability	0.002%FS or less(Min.±3 μ m)			
Output	Profibus DPV0			
Temperature coefficient	20ppm FS/°C			
Sampling rate	Effective stroke	Frequency	Effective stroke	Frequency
	mm	Hz	mm	Hz
	~800	2000	~5000	500
	~2200	1000	5000~	250
Whenever one number of measurement magnets increases, the calculation time of 20 μ s is added.				
Noise	T.B.D.			
Electric strength	0.5kV 1 minute between Signal/FG			

Insulation resistance	10M Ω or more(500V)
Vibration-proof	15G(20~2000Hz)
Impact	100G (2ms)

7.3 Externals size

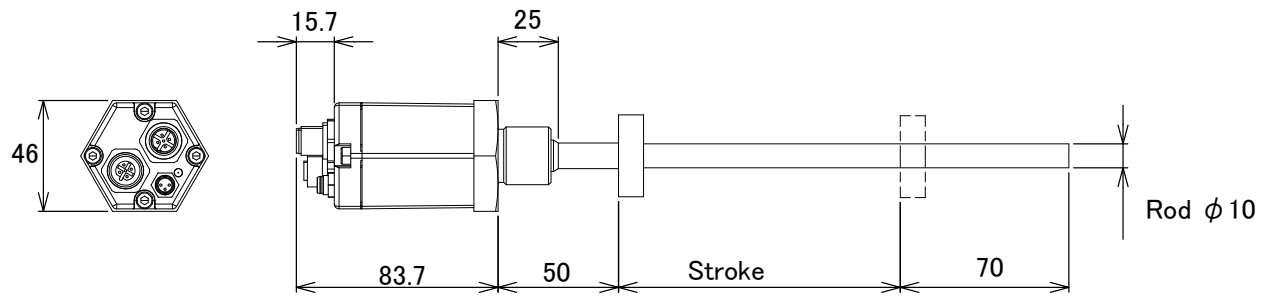


Figure3Externals dimensional drawing

The product described to this material doesn't become a specification corresponding to the critical usage (medical equipment, vehicle, aerospace, and nuclear power control, etc.) in which extremely advanced reliability is required. Please consult us beforehand when you examine use to such a usage.

In general, electronic equipment might malfunction or break down though our tries to improve the quality and reliability. Please design safety of the device and the system so that the life, the body, and the property might not be violated due to the malfunction and the breakdown of our product in the responsibility on the buyer side.

I will assume the guaranteed term of this product to be one year after it delivers it. If the breakdown by our responsibility in the guaranteed term, we repair the returned product or send the substitute for no-charge. However, in following cases, it is beyond the limits of the guarantee.

- ◆ By an improper condition, the environment, handling, and use
- ◆ By causes other than our product
- ◆ At remodeling or the repair that depends besides our company
- ◆ Due to the phenomenon not predictable in our technology at shipment time
- ◆ Due to the natural disaster, etc.

Only the delivered our product is guaranteed and the damage caused by the breakdown of this product is excluded.

GYSE-P manual

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The content of the description might change without a previous notice for the improvement.