

Panasonic INSTRUCTION MANUAL

High-Speed, High-Accuracy Eddy Current Digital Displacement Sensor GP-X Series

MJE-GPXC No.0097-52V

Thank you for purchasing our product. Be sure to read this manual before use in order to ensure the safe and proper operation of this product. Keep this manual at hand for your reference after reading it through. For details, refer to the **GP-X Series User's Manual** to make settings for use. For the new info of the product and new version of the user's manual, please check our website (<https://industry.panasonic.com/>).



This product is to inspect (discriminate/measure) sensing objects. Never use this product for prevention of accidents which damage a human life or properties or for safety maintenance.

Getting Started

Check the following items before using this product.

Controller Type(Product Name)

Check the model number on the top of the controller.

Bundled Items

Make sure that the following items are in the package.

- Controller × 1
- Mounting frame × 1
- Sensor head × 1
- Hexagonal nut × 2 (For **GP-X10M**, **GP-X12ML** and **GP-X22KL** only)
- Toothed washer × 1 (For **GP-X10M**, **GP-X12ML** and **GP-X22KL** only)
- Instruction Manual (This publication) × 1

1 Main Specifications

Sensor head

Type	Φ3.8mm type	Φ5.4mm type	Φ8mm	M10 type	M12 type	Φ22mm
Item	Model No. GP-X3SE	GP-X5SE	GP-X8S	GP-X10M	GP-X12ML	GP-X22KL
Sensing range (Note 2)	0 to 0.8mm	0 to 1mm	0 to 2mm	0 to 5mm	0 to 10mm	
Standard sensing object	Stainless steel (SUS304)/ Iron sheet [Cold rolled carbon steel (SPCC)] 60 x 60 x 1 mm					
Temperature characteristics (Note 3)	0.07% F.S./°C or less					
Protection	IP67 (IEC), IP67G (Note 6)					
Ambient temperature	-10 to +55°C. Storage: -20 to +70°C					
Ambient humidity	35 to 85% RH. Storage: 35 to 85% RH					
Noise immunity	Power line: 300Vp 10ms cycle, and 0.5 μs pulse width (with noise simulator)					
Voltage withstandability	250V AC for one min. between all supply terminals connected together and enclosure					
Insulation resistance	20MΩ or more, with 250V DC megger between all supply terminals connected together and enclosure					
Vibration resistance	10 to 150 Hz frequency, 0.75mm amplitude, in X, Y and Z directions for two hours each					
Shock resistance	500m/s ² acceleration (50G approx.) in X, Y and Z directions for five times each					
Material	Enclosure	Stainless steel (SUS303)		Brass (Nickel plated)		
Sensing surface	ABS	PAR	ABS	PA		
Cable protector	PP					
Cable	Connector attached high frequency coaxial cable, 3m long (Note 4)					
Cable extension	Extension up to 10m is possible with the optional cable					
Weight (Note 5)	40g approx.	40g approx.	40g approx.	50g approx.	45g approx.	80g approx.

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C.
 2) The sensing range is specified for the standard sensing object.
 3) The value represents 20 to 60% of the maximum sensing distance when combining the sensor head and controller.
 4) For the flexible cable type, please contact our office.
 5) The given weight of the threaded type sensor head is value including the weight of the nut and toothed lock washer.
 6) If using the sensor in an environment where cutting oil droplets splatter, the sensor may be deteriorated due to added substances in the oil. Please check the resistivity of the sensor against the cutting oil you are using beforehand.

Controller

Set model No.	NPN output	GP-XC3SE	GP-XC5SE	GP-XC8S	GP-XC10M	GP-XC12ML	GP-XC22KL
Item	PNP output	GP-XC3SE-P	GP-XC5SE-P	GP-XC8S-P	GP-XC10M-P	GP-XC12ML-P	GP-XC22KL-P
Supply voltage	24V DC±10% Ripple P-P 10% or less						
Current consumption	150mA or less						
Analog voltage output (Note 4)	• Output voltage: -5 to +5V (Note 5) • Output impedance: 100Ω approx.						
Response time	0.075ms (Fastest)						
Resolution (Note 2)	0.04% F.S. (64 times average) / 0.02% F.S. (64 times average processing)						
Linearity (Note 2)	Within ±0.3% F.S.						
Temperature characteristic (Note 3)	0.07% / F.S./°C or less						
Comparison output	<NPN output type> NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less			<PNP output type> PNP open-collector transistor • Maximum source current: 100mA • Applied voltage: 30V DC or less			
Alarm output	• (between output and 0V) • Residual voltage: 1.6V or less (at 100mA sink current)						
Strobe output	• Residual voltage: 1.6V or less (at 100mA source current) • 0.4V (at 16mA sink current)						
Short-circuit protection	Incorporated						
External input	<NPN output type> Photo coupler input • Input current: 9mA or less • Operating voltage: 0N voltage 17V or more (between +24V and input) • OFF voltage 4V or less (between +24V and input) • Input impedance: 5kΩ approx.			<PNP output type> Photo coupler input • Input current: 9mA or less • Operating voltage: 0N voltage 17V or more (between 0V and input) • OFF voltage 4V or less (between 0V and input) • Input impedance: 5kΩ approx.			
Sampling frequency	40kHz (25 μs)						
Zero-set setting method	Push button setting/External input setting						
MODE	Orange LED (lights up in mode status)						
HI	Orange LED (lights up when the upper value is exceeded)						
GO	Green LED (lights up when within the upper and lower limit value)						
LO	Orange LED (lights up when less than the lower limit value)						
TIMING	Green LED (lights up as per the external or internal trigger timing)						
Upper line digital indicator part	5 digit orange LED (display of numerical values out of the upper and lower limit value)						
Lower line digital indicator part	5 digit green LED (display of numerical values within the upper and lower limit value)						

Set model No.	NPN output	GP-XC3SE	GP-XC5SE	GP-XC8S	GP-XC10M	GP-XC12ML	GP-XC22KL
Item	PNP output	GP-XC3SE-P	GP-XC5SE-P	GP-XC8S-P	GP-XC10M-P	GP-XC12ML-P	GP-XC22KL-P
Environmental resistance	Ambient temperature: 0 to +50°C (No dew condensation). Storage: 0 to +50°C Ambient humidity: 35 to 85%RH. Storage: 35 to 85%RH Noise immunity: Power supply line: 1,000Vp, 10ms cycle, 0.5μs pulse width Radiation: 300Vp, 10ms cycle, 0.5μs pulse width (with noise simulator) Vibration resistance: 10 to 55Hz frequency, 0.75mm amplitude in X, Y and Z directions for two hours each Shock resistance: 100m/s ² acceleration (10G approx.) in X, Y and Z directions five times each						
Grounding method	Floating earth						
Material	Enclosure: Polycarbonate						
Weight	120g approx.						
Accessory	ATA4811 (Controller mounting bracket): 1 set						

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20°C.
 2) This value was obtained at a constant +25°C.
 3) The value is in the range from 20 to 60% of the maximum detection distance with a combination of sensor head and controller.
 4) When using the BCD output unit GP-XBCD, the analog voltage output of a controller becomes invalid.
 5) Adjusted to a 0 and +5V factory setting.

2 Precautions

Connection

- The **GP-X** series is configured to satisfy the specification with the combination of the sensor head and the controller. Use the sensor head and controller in combination without fail: with other combinations, not only may the specifications may not be satisfied but also failure may result.
- Turn the controller off before mounting or removing the sensor head and controller.
- Note that the cables will be damaged if they are pulled.

Power Supply

- Wait 15 minutes (or 20 minutes with **GP-X3S** and **GP-X5S**) after the power is turned on before operation is started. There may be a variation in the measurements immediately after power-on because the power circuit is not stable.
- There is a muting time of about two seconds after the power is turned on.
- Take care that wrong wiring may damage the sensor.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- Make sure to use an isolation transformer for the DC power supply. If an auto-transformer (single winding transformer) is used, this product or the power supply may get damaged.
- In case a surge is generated in the used power supply, connect a surge absorber to the supply and absorb the surge.

Wiring

- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
- Make sure that the power supply is off while wiring.
- The analog voltage output is incorporated with a short circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.
- Be careful to avoid statically charging connectors during wiring work. A failure may result.
- Use the exclusive extension cable for cable extension of the sensor head. (Overall length: 10m)

Environment

- This product has been developed / produced for industrial use only.
- Avoid dust, dirt, and steam.
- Take care that the sensor does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Take care that stress is not directly applied to the cable joint.
- This sensor is for indoor use only.

Compatibility

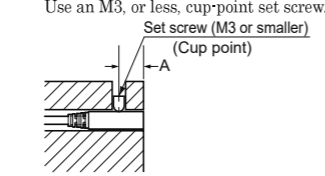
- In case the sensor head is broken, the sensor head replacement is possible with same model. (However, entering a characteristics code (ID code) and calibration are required)

3 Mounting Method

Tighten the sensor head to the torque specified below.

- Mounting with set screw

<Column type>
Use an M3, or less, cup-point set screw.

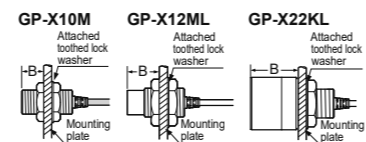


Model	A(mm)	Tightening torque
GP-X3SE	4 to 16	0.1N · m or less
GP-X5SE	5 to 16	0.44N · m or less
GP-X8S	5 to 16	0.58N · m or less

Note: Avoid tightening excessively.

- Mounting with nut

<Screw type>
Use an M3, or less, cup-point set screw.



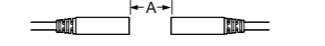
Model	B(mm)	Tightening torque
GP-X10M	7 or more	9.8N · m or less
GP-X12ML	14 or more	20N · m or less
GP-X22KL	20 or more (Note 1)	20N · m or less

- Notes: 1) In case of without a nut. If a nut is fitted, this value will be 23.5mm or more.
 2) Mount such that the nuts do not protrude from the thread portion.

- In case the interference prevention function is not used

If sensor heads are mounted close together without using the interference prevention function, reserve the distance specified below.

In the case of an opposing installation layout



In the case of a parallel installation layout

Model no. of sensor head	A(mm)	B(mm)
GP-X3SE	15	9
GP-X5SE	30	11
GP-X8S	40	15
GP-X10M	40	15
GP-X12ML	170	50
GP-X22KL	200	200

- Distance from surrounding metal

As metal around the sensor may affect the detection, take care of the following.
 <Embedding of the sensor in metal>

Measurement value or analogue voltage output may be changed if the sensor is completely embedded in metal. Keep the minimum distance specified in the table below.

Model	C(mm)	D(mm)
GP-X3SE	φ10	3 or more
GP-X5SE	φ18	
GP-X8S	φ14	
GP-X10M	φ14	
GP-X12ML	φ50	14 or more
GP-X22KL	φ50	20 or more

- Sensing range

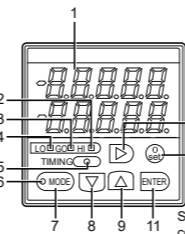
The sensing range is specified for the standard sensing object (Stainless steel/iron). With a metal other than the metals specified in the specifications, multiply with the correction coefficient shown in the table below. Check the effect with the actual machine.

Correction coefficient table

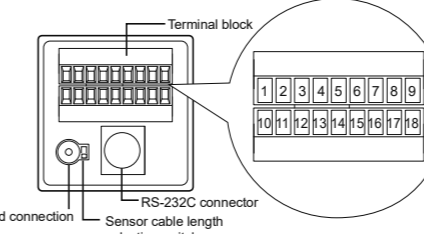
Sensor head	GP-X3SE, GP-X5SE, GP-X8S, GP-X10M, GP-X12ML, GP-X22KL
Metal	1
Stainless steel (SUS304), iron	1
Aluminum	0.5 approx.

4 Parts name and functions

- Operation Panel

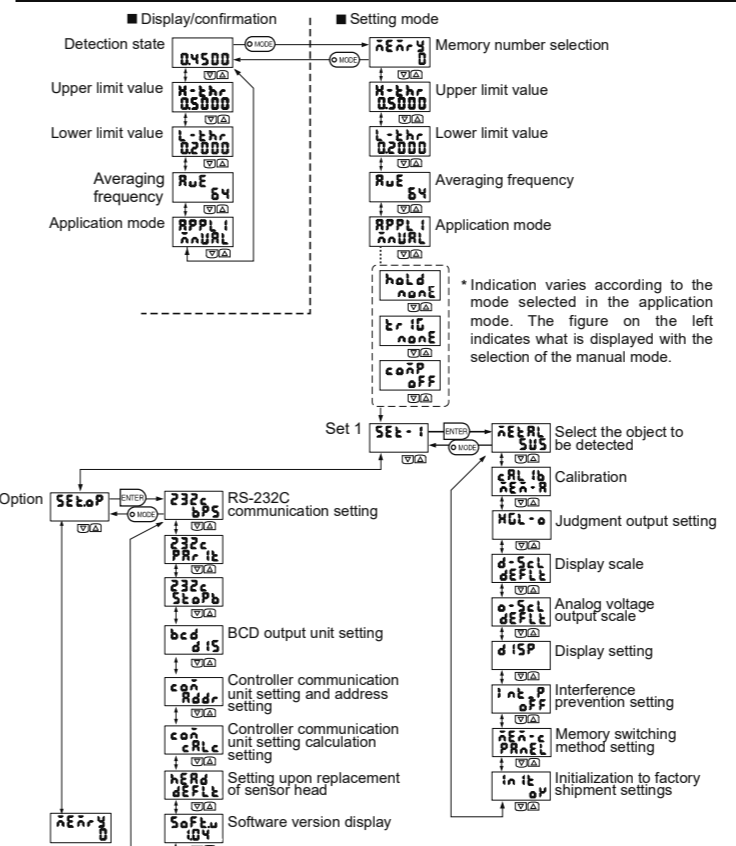


- External I/O



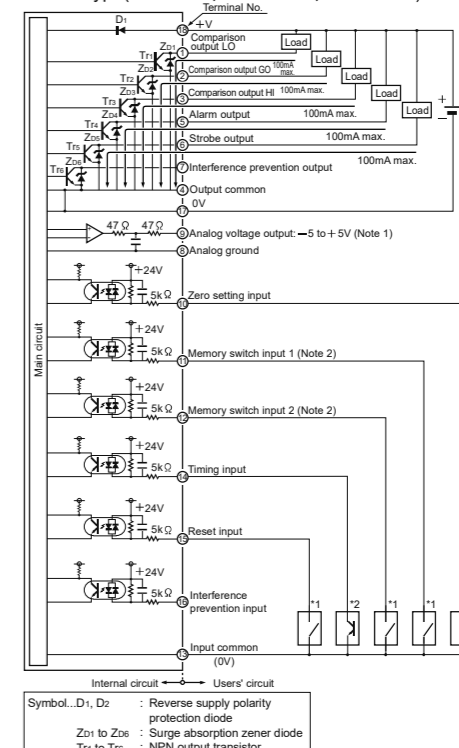
No.	Description	Function	Terminal No.	Indication	Name	Description
1	Digital display (green, orange)	The measurement, calculated value, setting data and so on are displayed. The measurement is displayed in green on the lower line with the GO judgment, while it is displayed in orange on the upper line with the HI or LO judgment.				
2	HI indicator (Orange)	Lights up if the measurement is larger the upper limit value.	Output	1	LO	LO output
3	GO indicator (Green)	Lights up if the measurement is between the upper and lower limit values.		2	GO	GO output
4	LO indicator (Orange)	Lights up if the measurement is smaller than the lower limit value.		3	HI	HI output
5	TIMING indicator (Green)	Lights up at the timing of an external or internal trigger.		4	COM	Common (NPN output type: 0V, PNP output type: 24V)
6	MODE indicator (Orange)	Lights up in the setting mode, while it is not lit during measurement.		5	ALARM	Alarm output
7	MODE key	Starts the setting mode. Returns to the original state in the setting mode.		6	STROBE	Strobe output
8	DOWN key	Use these keys to select the setting value and setting items.		7	INT P OUT	Interference prevention output
9	UP key	Use these keys to select the setting value and setting items.		8	ANA LOG	Analog ground
10	SHIFT key	Moves among setting digits.		9	OUT	Analog voltage output
11	ENTER key	Determines the setting item and setting value.		10	0 SET	Zero setting input
12	0-set key	Resets the controller forcibly to zero (reference position) with the current detection position to shift the display and analog voltage output.		11	MEM 1	Memory switch 1
				12	MEM 2	Memory switch 2
				13	COM	Common (NPN output type: 0V, PNP output type: 24V)
				14	TIMING	Timing input
				15	RESET	Reset input
				16	INT P IN	Interference prevention input
				17	0V	Power supply 0V
				18	24V DC	Power supply 24V DC

5 Operation System



6 I/O Circuit

- NPN Type (GP-XC=S, GP-XC=M, GP-XC=KL)



Notes: 1) Devices connected to the analog voltage output (terminal No. ⑧ and ⑨) must have 1MΩ or larger input impedance.

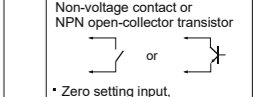
2) To perform memory switching by means of an external terminal, select "Ext" as the memory switching method. For details, refer to section "4.8 Memory Switching Method Setting".

- Memory switching input (Note 2)

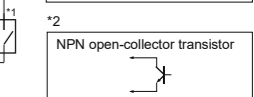
Memory No.	Memory switch 1	Memory switch 2
0	High	High
1	Low	High
2	High	Low
3	Low	Low

Low: 0 to +4V, High: +V or open

*1 Non-voltage contact or NPN open-collector transistor

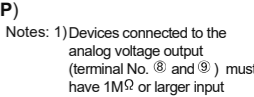


- Zero setting input, memory switch input 1/2



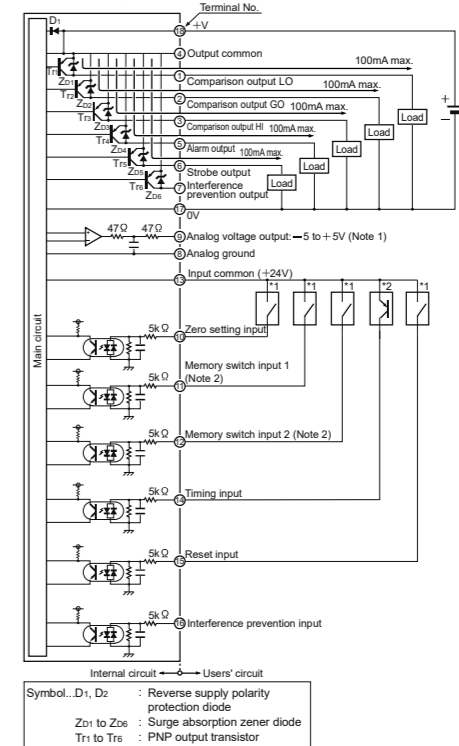
Reset input
Low (0 to 4V): Valid
High (+V or open): Invalid

*2 NPN open-collector transistor



Timing input
Low (0 to 4V): Valid
High (+V or open): Invalid

- PNP Type (GP-XC=S-P, GP-XC=M-P, GP-XC=KL-P)



Notes: 1) Devices connected to the analog voltage output (terminal No. ⑧ and ⑨) must have 1MΩ or larger input impedance.

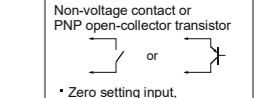
2) To perform memory switching by means of an external terminal, select "Ext" as the memory switching method. For details, refer to section "4.8 Memory Switching Method Setting".

- Memory switching input (Note 2)

Memory No.	Memory switch 1	Memory switch 2
0	Low	Low
1	High	Low
2	Low	High
3	High	High

Low: 0V or open, High: +17 to +24V

*1 Non-voltage contact or PNP open-collector transistor



- Zero setting input, memory switch input 1/2



Reset input
Low (0V or open): Invalid
High (+17 to +24V): Valid

*2 PNP open-collector transistor



Timing input
Low (0V or open): Invalid
High (+17 to +24V): Valid

7 Operating Conditions for Compliance with CE Marking / UKCA Marking

When using as a product in conformity with EMC Directive (2014/30/EU) / EMC Regulation (2016/1091), observe the following requirements and conditions.

- The controller must be connected within 10m of the power supply.
- The Signal cable connected to the controller must be shorter than 30m.
- A ferrite clamp must be mounted within 10mm of the base of the single connector of the cable (GP-XBCC3) for the BCD output unit.

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