

## **GS-315 Guide Sensor**

### **INSTRUCTIONS**

*(CE marked)*

## 1. Summary

GS-315 is an analog voltage output type magnetic tape navigation sensor for AGV. The analog voltage (DEVIATION OUT) changes proportionate to a relative position between GS-315 and a guide tape. GS-315 has a branch selection function (SELECTION IN/straight, right or left) at junctions. By input branch selection signal the voltage changes according to an instruction signal. Gate signal (GATE OUT) indicates that GS-315 is in controllable area.

## 2. Specifications

Item	Content
Power supply	DC+10.8 V to +30V (incl. ripple)
Power consumption	35mA max.
Operation temperature	-10 to +60°C (Storage; -30 to +80°C/avoid dew condensation)
Operation humidity	35 to 95%RH(Storage; ditto/avoid dew condensation)
Housing	IP-54 (IEC standard/not splash nor water-proof)
Operation Air gap	5 to 40mm (with MGL-50 and MGR series.) 20 to 50mm (with MG-611A)
Target	MGL-50 series, MGR series and MG-611A (North pole side of magnet should face to GS-215.)
Detection polarity	N-pole
Opposite polarity	S-pole 6mT and over (Measured by MACOME in-house apparatus)
I/O cord	PVC insulated round cord $\phi 5$ /2m length/cross-section 0.18mm <sup>2</sup>
Dimension	165(W) x 50(H) x 15(D) mm
Weight	approx. 180g (incl. cord 2m)
Conformable Standard	EU Directive Electromagnetic compatibility (EMC) Directive 2004/108/EC EN61326-1
<b>DEVIATION OUT</b>	(Fig.1)
Output element	Operational amplifier
Load resistance	10k $\Omega$ min.
Output impedance	6.5 $\Omega$ max. (at 23°C)
Short circuit protection	between output and GND
Response	Approx. 2ms
Voltage range	+2V to +8V
Center voltage	+5V
Voltage resolution	Approx. 1.5mV
Non-linearity	with MGL-50 series and MGR series $\pm 5\%$ (at Air-gap; 15~30mm), $\pm 7.5\%$ (at Air-gap; 5~15mm or 30~40mm)

Voltage inclination	with MG-611A															
<b>GATE OUT</b>	$\pm 5\%$ (at Air-gap; 25~40mm), $\pm 7.5\%$ (at Air-gap; 20~25mm or 40~50mm)															
Area	30mV/mm (Fig.2)															
Operation Air gap	$\pm 97\text{mm}$ from center of magnet (with MGL-50 and MGR series, Air-gap; 30mm) $\pm 96\text{mm}$ from center of magnet (with MG-611A, Air-gap; 40mm)															
Output logic	Normally open															
Circuit	NPN Transistor open collector DC 30V max. sink current 100mA max															
Residual voltage at ON	2V max. (at sink current 100mA, cord length 2m)															
Response	Approx. 2ms															
<b>SELECTION IN</b>	(Fig.3)															
Combination	L: short to GND H: open															
	<table border="1"> <thead> <tr> <th>Mode</th> <th>SEL1</th> <th>SEL2</th> </tr> </thead> <tbody> <tr> <td>Straight</td> <td>L</td> <td>L</td> </tr> <tr> <td>Right branch</td> <td>L</td> <td>H</td> </tr> <tr> <td>Left branch</td> <td>H</td> <td>L</td> </tr> <tr> <td>not selected</td> <td>H</td> <td>H</td> </tr> </tbody> </table>	Mode	SEL1	SEL2	Straight	L	L	Right branch	L	H	Left branch	H	L	not selected	H	H
Mode	SEL1	SEL2														
Straight	L	L														
Right branch	L	H														
Left branch	H	L														
not selected	H	H														
Input circuit	Comparator															
Response	Approx. 2ms															

← DEVIATION=+5V, GATE=OFF

Fig.1 (DEVIATION OUT)

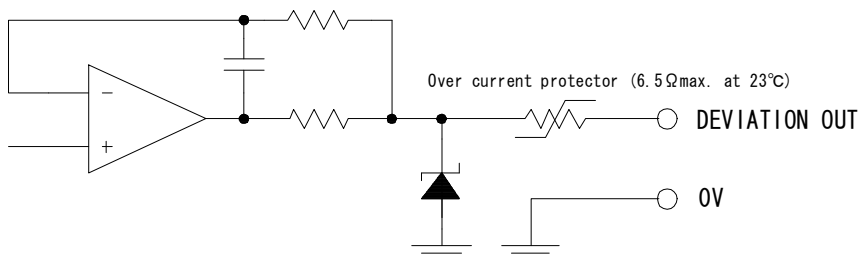
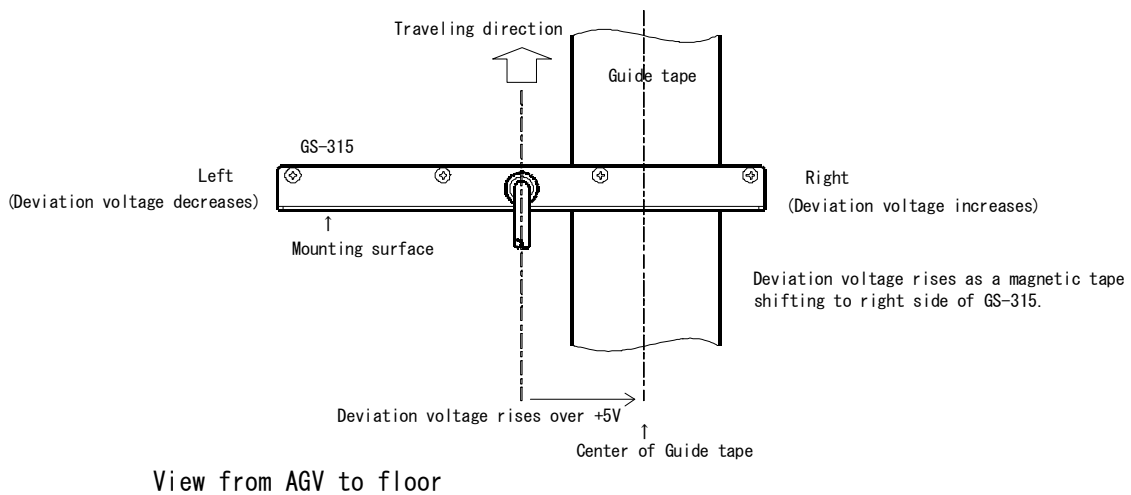


Fig.2 (GATE OUT)

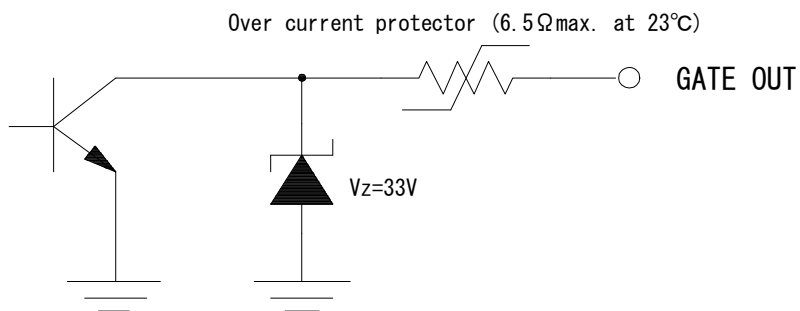
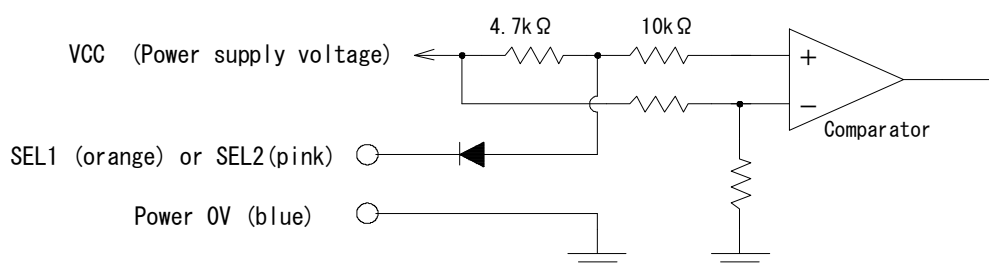


Fig.3 (SELECTION IN)



※ Threshold: approx.  $V_{CC}/4$  [V]

※ SEL1 input and SEL2 input are identical.

### 3. Branch selection

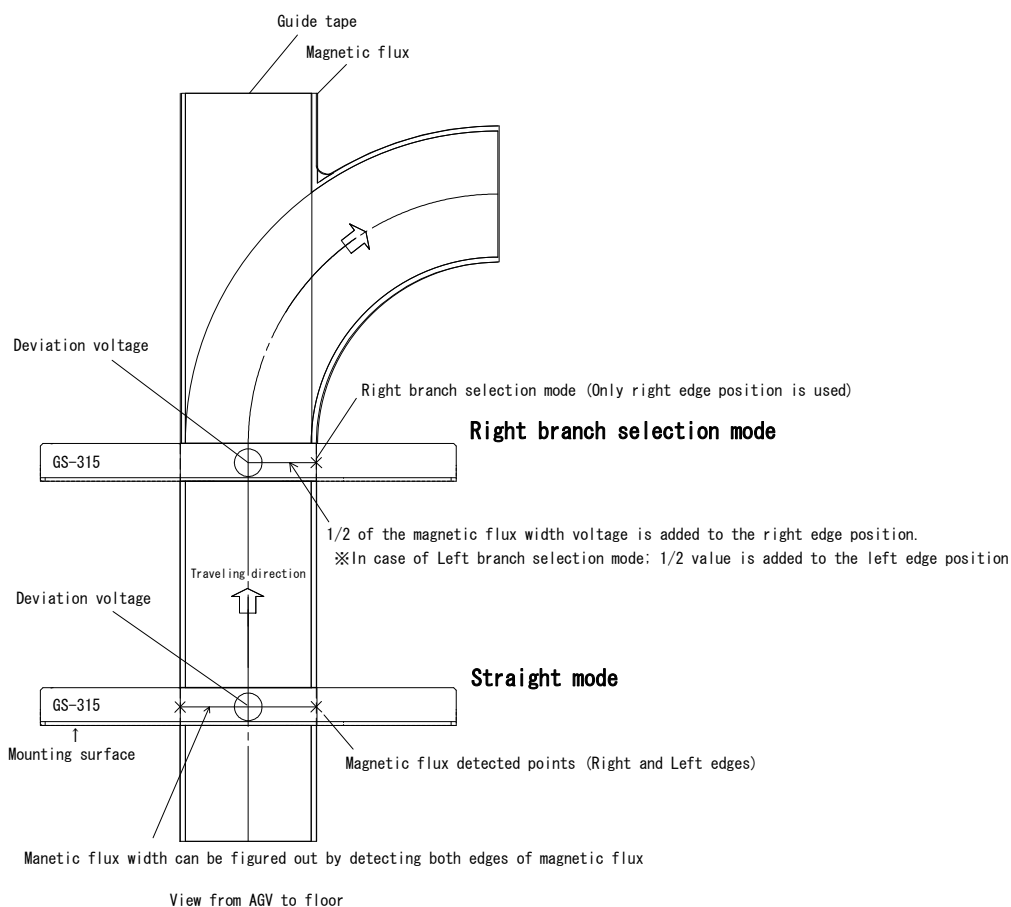
How the deviation output voltages are internally determined.

#### Straight mode

The center point is figured out by halving right and left edge's position of guide tape. The center point is stable even air gap fluctuates, since the detecting width change is symmetrical about the center point.

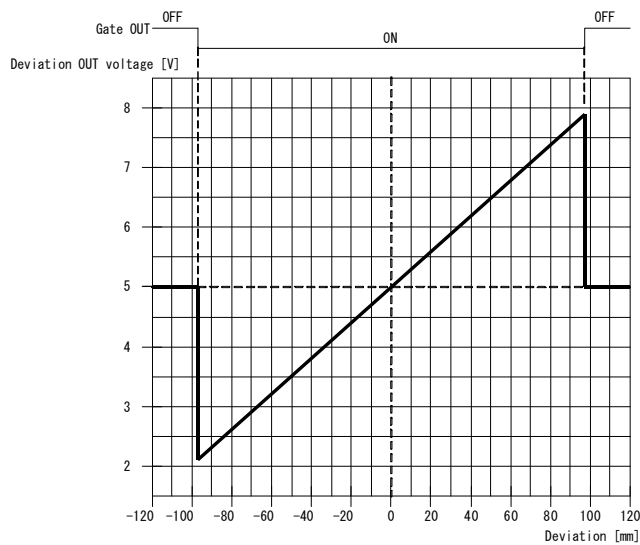
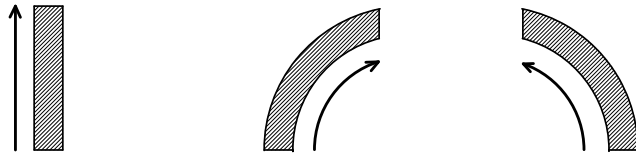
#### Right [Left] branch selection mode

Right [Left] edge point is applied as a reference value. 1/2 of magnetic tape width voltage (i.e. compensation voltage) is added to the value as a center point. The compensation voltage is fixed value, so the center position may be shifted as an air-gap fluctuation.

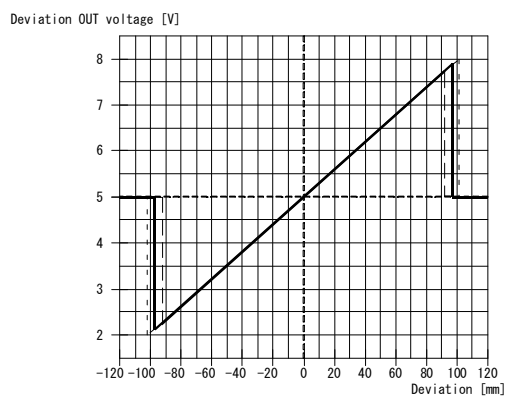


### 1) Straight mode

Normally this mode should be selected.

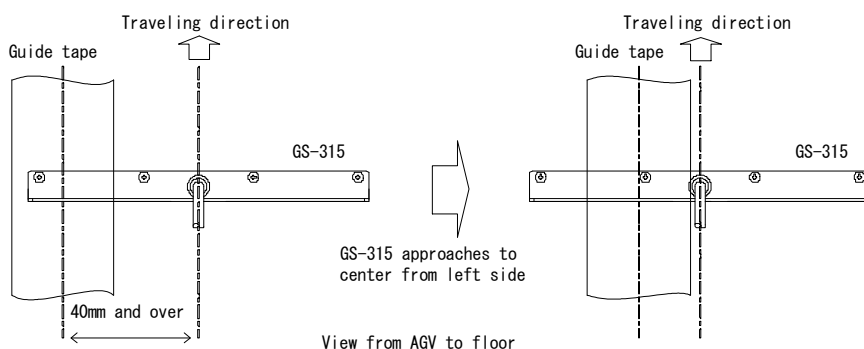


Above graph shows typical voltage output characteristic. Deviation voltage output range may change at air gap fluctuation as indicated in the following graph by a short dashed line or a long dashed line.

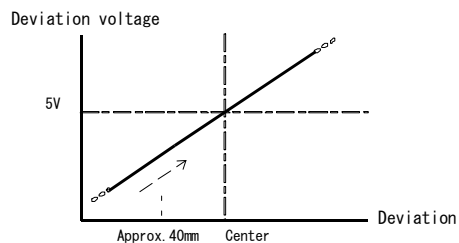


Output voltage characteristics affected by Air gap fluctuation

When the deviation exceeds more than 40mm from the center, the deviation output voltage may change as follows. When GS-315 approaches from the far-right, same voltage change may happen with an inverse characteristic.

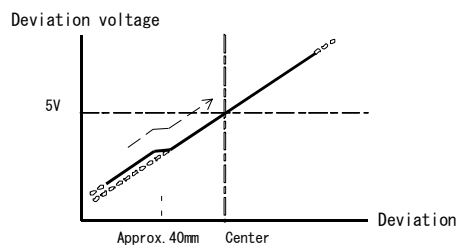


**Air-gap is stable**



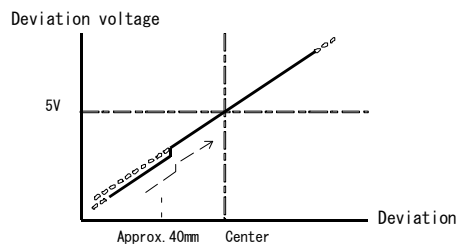
**Air-gap fluctuates**

When detected magnetic flux width becomes narrow  
(Non voltage change area may exist at about 40mm deviated portion.)



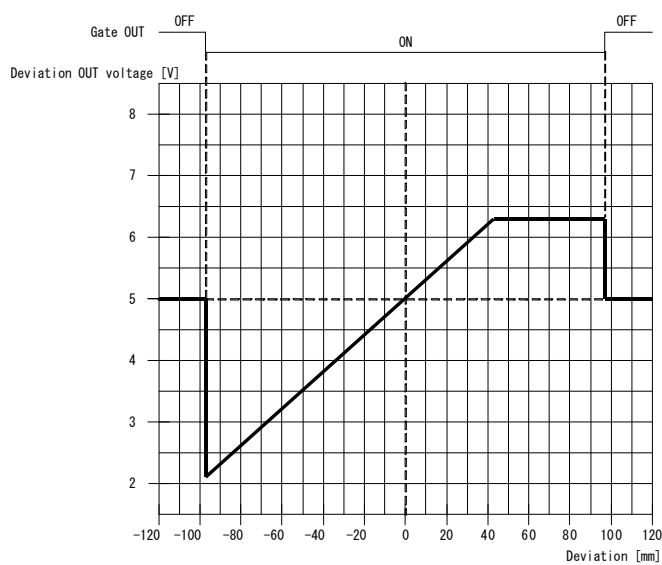
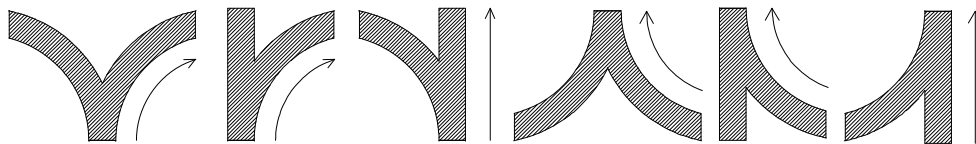
**Air-gap fluctuates**

When detected magnetic flux width becomes wide  
(Acute voltage change area may exist at about 40mm deviated portion.)

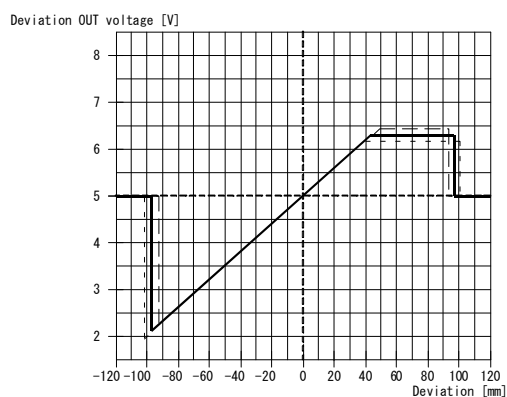


## 2) Right branch selection mode

This mode should be selected to choose right branch or to merge from right branch at junction.

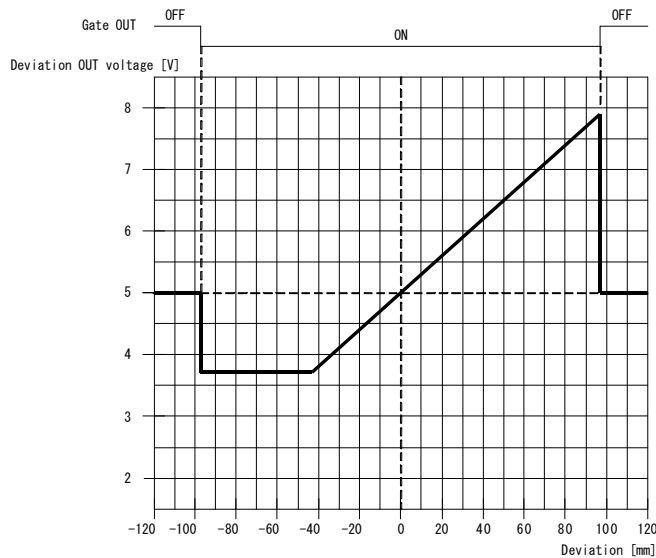
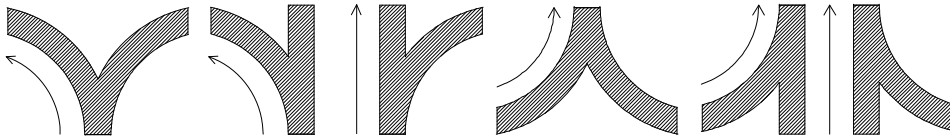


Above graph shows typical voltage output characteristic. Deviation voltage output range may change at air gap fluctuation as indicated in the following graph by a short dashed line or a long dashed line.

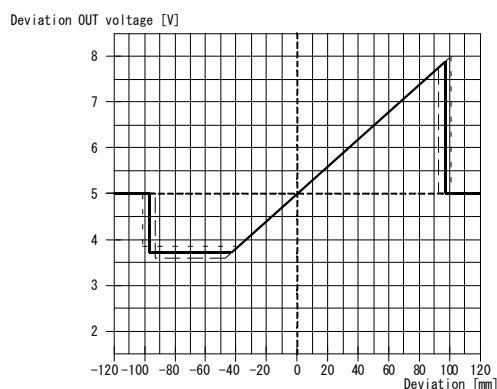


### 3) Left Branch selection mode

This mode should be selected to choose left branch or to merge from left branch at junction.

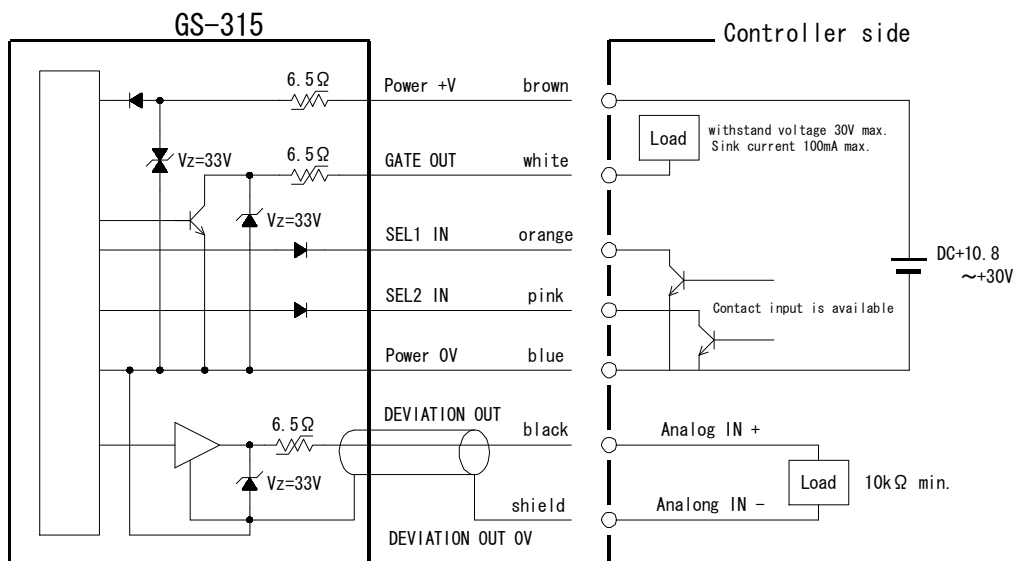


Above graph shows typical voltage output characteristic. Deviation voltage output range may change at air gap fluctuation as indicated in the following graph by a short dashed line or a long dashed line.



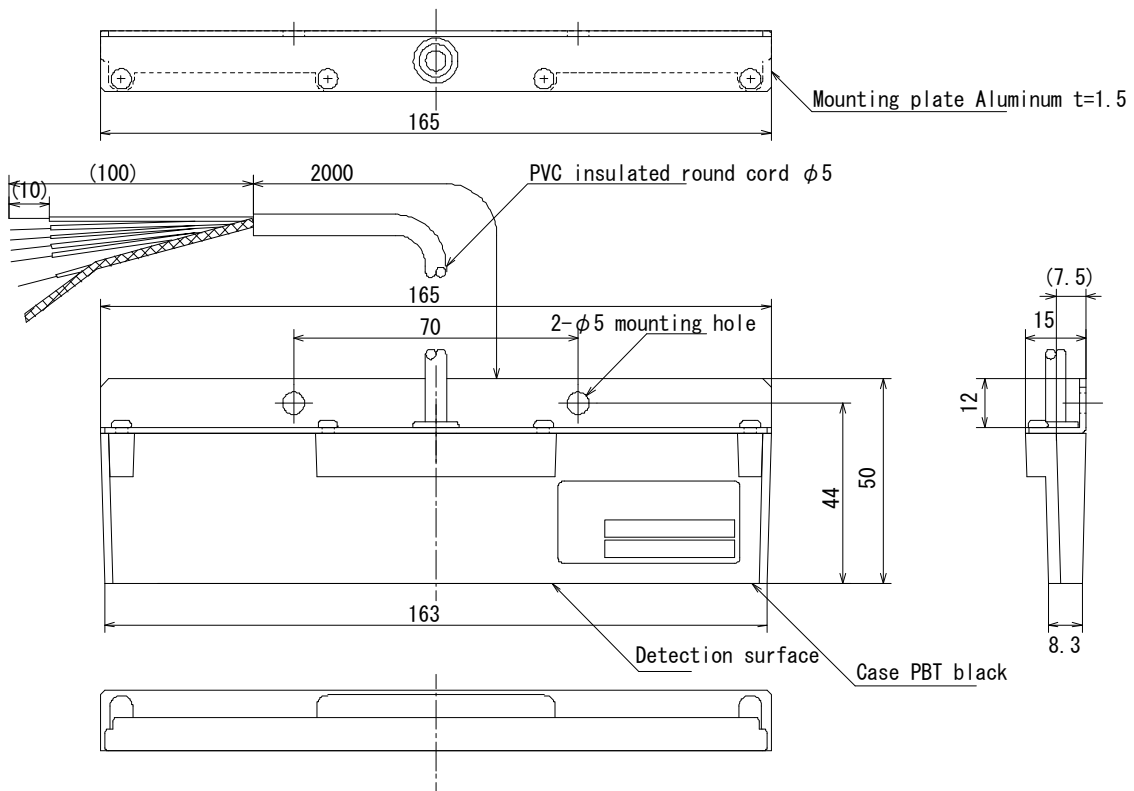


### 4. Wiring



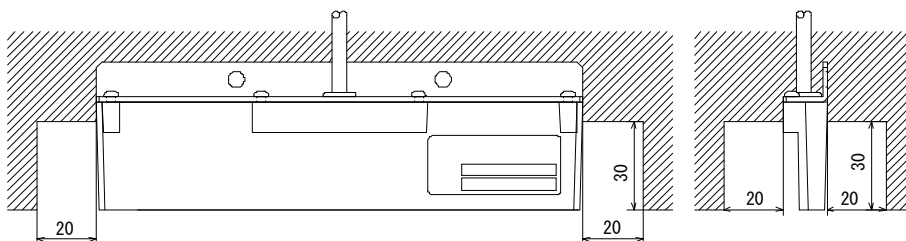
NOTE: Deviation voltage should be read between black and shield (not black and blue).

### 5. External Dimensions



## 6. Mounting

GS-315 should keep distance from magnetism generators such as motor. Vicinity of magnetic material causes GS-315 inaccurate output. In case of mounting GS-315 on magnetic material, keep distance from the material as follows. Use non-magnetic screws in any case.



Avoid physical shock. Don't install on a bumper or a strong impact taking portion.

## 7. Notices

### Environment

- Don't use or keep in a place filled with chemicals and salt, flammable gas, corrosion gas or vicinity of heater or direct sunlight.
- Don't use neither under vibrating conditions nor outdoors.
- Don't install in vicinity of a high voltage apparatus or high powered machineries.
- Don't install in vicinity of magnetic flux generating apparatus such as motor, electromagnetic brake, etc.

### Power supply and wiring

- Don't supply exceeding voltage to the designated value or AC, since it may result the cause of trouble.
- Don't make wiring work while power is supplied, since it may result the cause of trouble or receiving an electric shock.
- Loads should not be shorted, since it may result the cause of trouble.

- If there are occurrences of power surges, absorb the surges by connecting a surge absorber between power supply lines.
- Don't wire in parallel with a high voltage or power lines, since it may result the cause of trouble by receiving inductive voltage.
- Approx. 0.5s is required to stabilize each signal after power is supplied.
- Improper signals may occur at power is suspended.

### Handling

Don't put strong tension or repeatable bending on I/O cord, since it may cause snapping of wires.

### Other

- Operation air gap should be within each mating guide tapes' specified distance.
- GS-315 is designed assuming that to be used for an AGV navigation purpose. It should not be used as other applications, since it may result malfunction of GS-315, facilities breakdown or an accident causing injury or death.
- GS-315 should not be used as s personnel protection device.
- Don't disassemble, repair nor modify.
- Dispose as industrial waste in accordance with local environmental regulations.

## 8. Warranty

Goods are warranted (exchange or repair) return to factory basis against defects in workmanship and material for a period of one year from a date of delivery.

The damage caused by following reasons is out of the warranty.

- (1) Inappropriate installation and usage.
- (2) Abnormal effect from peripheral equipment.
- (3) Alternation or repair without us.
- (4) Force majeure.



The Induced damage is out of the warranty.

## 9. Range of service

Prices on the price list are not including following fees. Consult us for the fees.

- (1) Adjustment, instruction and presence at installation.
- (2) Maintenance and repair.
- (3) Technical advice and training.

\* Specifications are subject to change without notice. \*

		承認	作成
図番	GS-315-02-ENO		
作成日	June 16, 2011		