

# Panasonic

## INDUSTRY

NEW

## Self-Monitoring and Self-Reporting Self-Monitoring Sensor

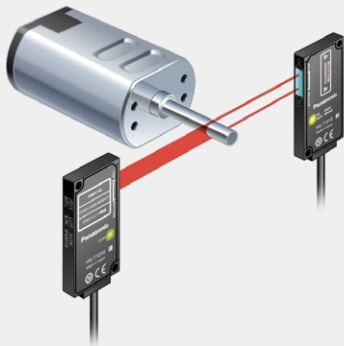
Thru-beam Type Digital Displacement Sensor **HG-T** SERIES

Contact-Type Digital Displacement Sensor **HG-S** SERIES

Sensor that diagnoses its own state

New HG-T / HG-S series digital displacement sensors

Featuring a **self-monitoring function!**



Thru-beam Type  
**HG-T** SERIES



Contact-Type  
**HG-S** SERIES



Use of a communication unit enables the transmission of digital displacement sensor status to the host controller!

### Compatible\* with self-monitoring function Communication Unit for Digital Displacement Sensors

EtherCAT communication unit  
**SC-HG1-ETC**

**EtherCAT**  
Communication speed: 100 Mbps  
(100BASE-TX)



\* Compatible

CC-Link IE Field communication unit  
**SC-HG1-CEF**

**CC-Link IE Field**  
Communication speed: 1 Gbps



\* Units shipped in and after December 2019 are compatible.

CC-Link communication unit  
**SC-HG1-C**

**CC-Link** IQSS compatible  
Communication speed: 10 Mbps (max.)



\* Units manufactured in and after December 2019 are compatible.

RS-485 communication unit  
**SC-HG1-485**

Communication speed:  
1.2 kbps / 2.4 kbps / 4.8 kbps / 9.6 kbps /  
19.2 kbps / 38.4 kbps / 57.6 kbps / 115.2 kbps

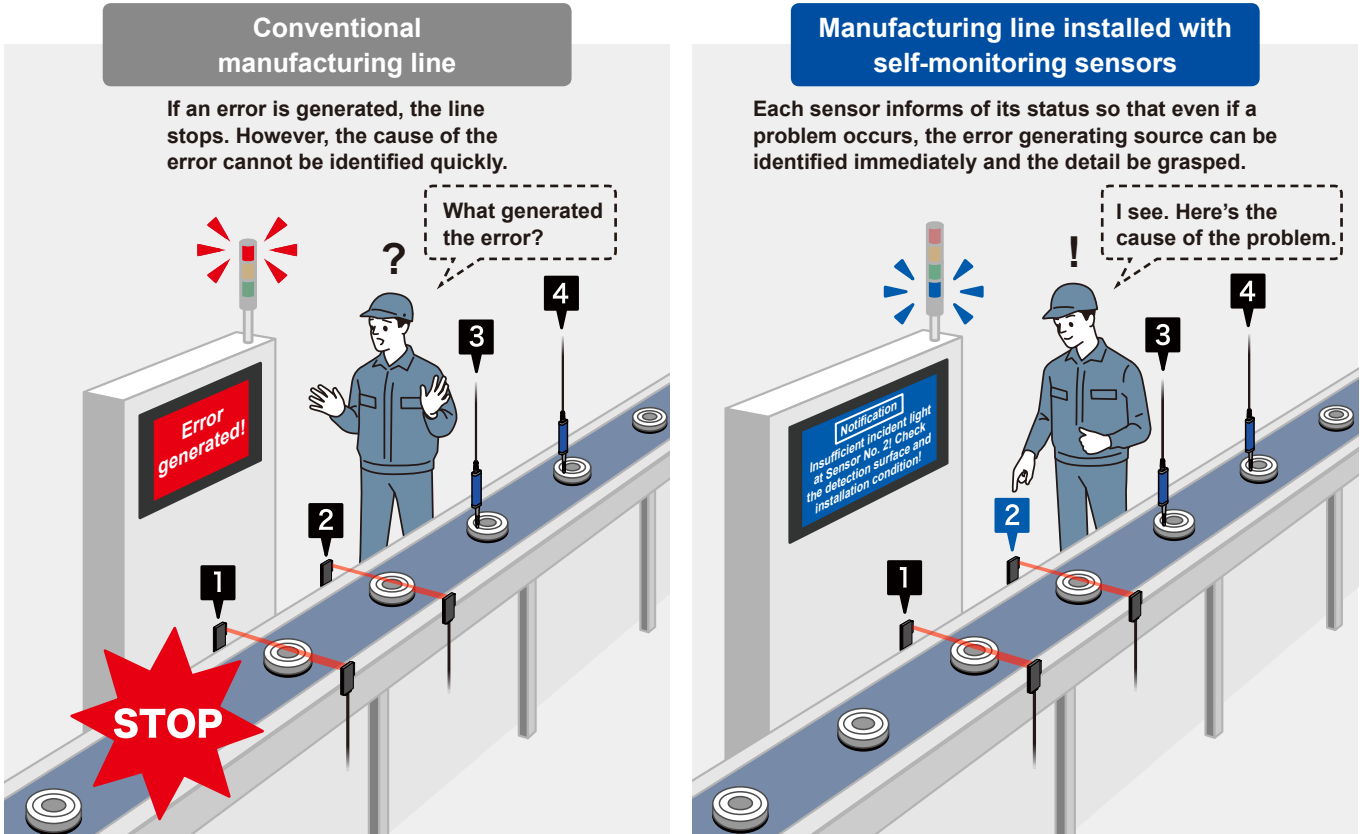


\* Units manufactured on and after November 18, 2019 are compatible.

# Suitable for use on manufacturing lines Sensor equipped with a new self-monitoring function!

A sensor with a self-monitoring function diagnoses its own state and notifies when readjustment of settings / setup is required or when maintenance is needed.

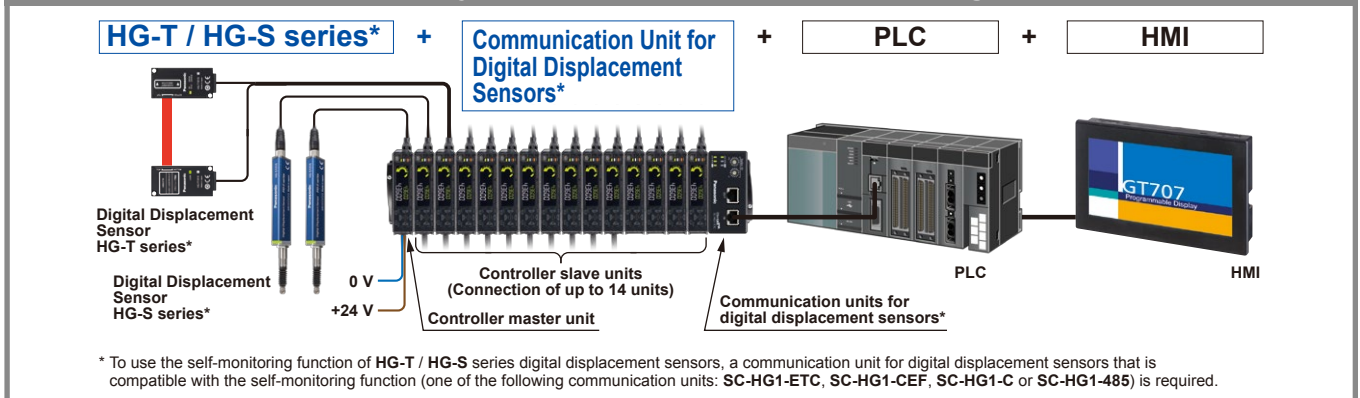
The sensor determines its status and indicates “Normal,” “Notification,” “Caution” or “Fault.” When not in normal status, the sensor checks the cause of problem and corrective measure, thus reducing equipment downtime and maintenance workload.



## Self-monitoring function: Four types of status indication and judgment of state

Status	Judgement of the state	
Normal	Operation is normal.	
Notification	Check the settings. Detected state is unstable.	* Recover to the normal state through checking installation and settings. Reduction in the incident light intensity.
Caution	Getting close to the end of service life. Reached the state where the device should be replaced.	* Limitation in the writing frequency into the memory or in the operation hours, etc.
Fault	Short-circuited or broken. Reached the state where it is impossible to control as a device.	* Short-circuited output, damaged EEPROM, etc.

## Example of a system that utilizes the self-monitoring function



# Identification of malfunctioning location and cause

The sensor self-diagnoses its state, so if a malfunction occur, it is easy to identify the problem location and discover the cause of the problem. Therefore, even if there is no experienced worker or skilled technician at the site to respond to the problem, it is possible to take an appropriate measure immediately. This minimizes the restoration time and reduces the maintenance workload.

Reduction of downtime

Reduction of maintenance workload

Dirty detection surface



End-of-life / damaged sensor



Positional deviation



## Easy planning of maintenance schedule

Conventional sensors can generate unexpected malfunctions and require many hours for maintenance and replacement; thus, an unscheduled shutdown of the manufacturing line may be required from time to time. The self-monitoring function notifies the sensor replacement timing, thus allowing for planning the most efficient maintenance and replacement schedule. This helps prevent unexpected shutdowns of the manufacturing line and improves productivity.

Improved productivity

Predictive maintenance

### Details of self-monitoring function

HG-T series' self-monitoring function				
Status	Response parameter	Measures	Controller HG-TC□	
			Error code (Note 1)	Measurement alarm (Note 1)
Notification	Sensor head unconnected	Status check	E200	—
	Connected sensor head incompatible	Status check	E230	—
	Connected unit count check error	Status check	E160 (For master units only)	—
	NPN / PNP output type mixture error	Status check	E100 (For master units only)	—
	Calculated unlit count error	Status check	E110 (For master units only)	—
	Copy executionerror (Slave unit problem)	Status check	E170 (For master units only)	—
	Detection capability limit (obtained edge information) (Note 2)	Sensing object check	—	Measurement alarm 1
	The amount of entering light is too much due to the influences of ambient light, etc. (Note 2)	Status check	—	Measurement alarm 1
	The amount of entering light decreases due to stain on the detection surface, beam axis misalignment, etc.	Sensing object check	—	Measurement alarm 2
	The specified measurement direction differs from the insertion direction of the detected object.	Status check / Sensing object check	—	Measurement alarm 2
Caution	Controller cumulative run time exceeded (87,600 hours)	Controller replacement	—	—
	Sensor head cumulative run time exceeded (87,600 hours)	Sensor head replacement	—	—
	Controller memory saving count exceeded (1,000,000 times)	Controller replacement	—	—
	Sensor head memory saving count exceeded (for receivers only, 1,000,000 times)	Sensor head replacement	—	—
Fault	Controller memory function damaged	Controller replacement	E600 E610 E620	—
	Sensor head memory function damaged	Sensor head replacement	E630 (For receivers only) E640 (For emitters only)	—
	Output section short-circuit error	Status check / Replacement	E700	—
	Detection circuit damaged	Sensor head replacement	E240	—
	System error	Controller replacement	E900 E910 E911 E912 E920	—

HG-S series' self-monitoring function					
Status	Response parameter	Measures	Controller HG-SC□		
			Error code (Note)	Measurement alarm (Note)	
Notification	Sensor head unconnected	Status check	E200	—	
	Connected unit count check error	Status check	E160 (For master units only)	—	
	NPN / PNP output type mixture error	Status check	E100 (For master units only)	—	
	Calculated unlit count error	Status check	E110 (For master units only)	—	
	Copy executionerror (Slave unit problem)	Status check	E170 (For master units only)	—	
	The thrust on the sensor head stroke is above the specified range.	Status check	E210	—	
	Pressure check	Status check	—	Alarm	
	Catch check	Status check	—	Alarm	
	Fault	Controller memory function damaged	Controller replacement	E600 E610 E620	—
		Sensor Head memory function damaged	Sensor head replacement	E630	—
Output section short-circuit error		Status check / Replacement	E700	—	
Detection circuit damaged		Sensor head replacement	E240	—	
System error		Controller replacement	E900	—	
			E910		
			E911		
	E912				
E920	—				

Note: Error codes and alarms are displayed on HG-SC□ controllers.

Notes: 1) Error codes and alarms are displayed on HG-TC□ controllers.  
2) If "Alarm condition selection (ALM.CND)" is set to "Hold last value (HOLD)", Measurement alarm 1 is not notified.

# Digital Displacement Sensors

**NEW** CMOS Type Self-Monitoring Sensor

## Thru-beam Type Digital Displacement Sensor HG-T SERIES

The industry's highest-class\*1 measurement accuracy is now yours



Sensor head

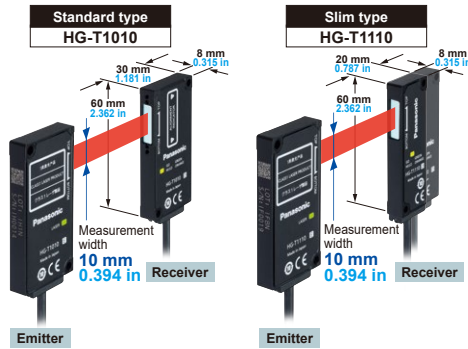
### Ultra-slim



- Measurement width: 10 mm 0.394 in
- Installation distance: 0 to 500 mm 0 to 19.685 in
- Laser class: Class 1 (JIS / IEC / GB / FDA\*)

- The belt-shaped laser beam with a measurement width of 10 mm 0.394 in is used for measurement of dimensions and positions.
- The HG-T series boasts repeatability\*3 of 1 μm 0.039 mil\*4 and offers the highest\*1 measurement accuracy in the industry.

\*1: As a thru-beam type sensor. As of October 2019, in-company survey.  
 \*2: Conformance with 21 CFR 1040.10 and 1040.11 Laser Notice No. 50, dated June 24, 2007, issued by CDRH (Center for Devices and Radiological Health) under the FDA (Food and Drug Administration).  
 \*3: This is the P-P value of digital measurement value with half shading at the middle position of the installation distance.  
 \*4: When installation distance is 20 mm 0.787 in

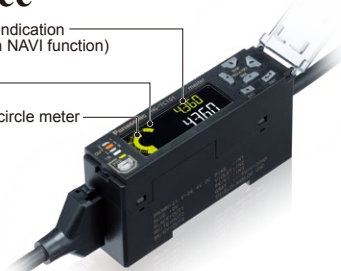


- Two types of sensor heads are available.
- Side view attachment is available (optional). [for HG-T1010]
- Beam axis adjustment assist function for easy setup of emitter and receiver
- Automatic emitter / receiver cable recognition for simplified connector connection
- Lightweight and robust die-cast aluminum case
- Protection structure IP67 (IEC)

Controller

### High-performance

- Dual display for added indication flexibility (equipped with NAVI function)
- All-direction LCD
- Equipped with intuitive circle meter
- Five types of detection modes
  - Auto edge detection mode
  - Edge detection mode
  - Inside diameter / gap detection mode
  - External form / width detection mode
  - Central position detection mode
- Monitoring of effects caused by stains
- Stable measurement of even transparent workpieces
- Elimination of effects caused by fine foreign matters
- Connectable to contact-type digital displacement sensor HG-S series



Please contact .....

Self-Monitoring Sensor

## Contact-Type Digital Displacement Sensor HG-S SERIES

The optical absolute method eliminates "value skipping" and "unset zero point"!



Sensor head

- Tip deviation amount of 35 μm 1.378 mil or less (typical value)\*1
- Plain bearings with 2-point support structure for ensuring high resistance to lateral load
- Hot-swappable
- Bending-resistant cable

\*1: Calculated based on the upper and lower bearing clearances in a 10 mm 0.394 in type product.



NEW 10 mm 0.394 in type 10 mm 0.394 in type 32 mm 1.260 in type 50 mm 1.969 in type  
 Air-driven type General purpose type

### Development target: Slim & Robust

- The 10 mm 0.394 in type has a slim 11 × 18 × 84.5 mm 0.433 × 0.709 × 3.327 in body, for easy adjacent installation
- Class-top robustness in the industry

Lateral load resistance No. 1\* in class Vibration / impact resistance No. 1\* in class

\* As of October 2019, in-company survey.

### Development goal: Highest Accuracy in Class

- Resolution of 0.1 μm 0.004 mil and indication accuracy of 1 μm 0.039 mil or less
- Absolute value scale reading for elimination of "value skipping" and "unset zero point"

Resolution No. 1\* in class Indication accuracy No. 1\* in class Optical absolute method

\* As of October 2019, in-company survey.

Controller

### Development focus: Intuitive Dual Display

- 2-line digital display for unprecedented ease of use
- Full-fledged functions designed for optimum ease of operation on production floor

Industry's first\*

\* As of September 2015, in-company survey

- High-speed response of 3 ms
- Alarm setting for notification of upward thrust



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# Panasonic®

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