# Panasonic INSTRUCTION MANUAL

Metal-sheet Double-feed Detector

# **GD** Series

MJE-GD(03) No.0030-70V

<ul> <li>Never use this product as a sensing device for personnel protection.</li> <li>In case of using sensing devices for personnel protection, use products which meet laws and standards, such OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.</li> <li>Make sure to use the sensor heads and controllers in the specified combinations. If they are used in any other cobination, the sensor heads may get damaged.</li> </ul>

# **1** OUTLINE

• This product detects double feeds of metal sheets, lead frames, etc. The sensitivity is easily set by teaching with actual samples.

# **2** FUNCTIONAL DESCRIPTION



$\square$	Description	Function				Description	Function			
1	Panel cover	—			Г	Comparative output 1	Lights up when OUT-1 is OFF.			
2	Power indicator (Green)	Lights up when the power is ON.			6	(OUT-1) indicator (Green)	<ul> <li>Blinks twice on completion of zero adjustment (0-ADJ.) or SET-1 setting in SET mode.</li> </ul>			
		і S by п	pecifies whether chanr y external channel sele- nunication. 1PANEL: Selection is b	annel selection is by panel operation, elect inputs, or through RS-232C com- s by channel select key. nel selection. In case of <b>GD-C2</b> , this is titing for channel selection by external ugh RS-232C. by external channel select inputs. s the key and external input operation		Ø	Comparative output-2 (OUT-2) indicator (Red)	Lights up when OUT-2 is OFF.     Blinks twice on completion of zero adjustment (0-ADJ.) or     SET-2 setting in SET mode.		
			ILOCK: Locks channel GD-C2: also the setting RS-232C) device through IEXT.: Selection is by e he table below gives th			8	Sensing level indicator (Yellow × 1, Green × 6)	<ul> <li>Seven LEDs show the sensing level.</li> <li>More the number, thicker or larger the object sheets are, more are the LEDs which light up.</li> <li>LEDs light up one after the other during teaching.</li> <li>All LEDs blink at the same time if the teaching fails.</li> </ul>		
		fc	or each channel selectio	n method.	(	D: Operable			<ul> <li>Shows the present channel (1 to 8).</li> <li>Blinks during SET mode.</li> </ul>	
		Op	Mode	PANEL	LOCK (RS-232C)	EXT.	9	Channel display	The decimal point informs whether the set level data has been stored.	
		inputs Panel keys	RUN / SET selection	O(Note)	O(Note)	O(Note)				
3	Channel select key		Timer mode selection	0	0	0			Turns off → Not stored	
	(CH-SELECT)		SET-1	0	0	0				
			SET-2	0	0	0			When an error occurs, the display indicates the error code.	
			0-ADJ.	0	0	0			Refer to 'OSelf-diagnosis (Alarm) function' in ' G EX-	
			Channel shift	0	-				PLANATION OF FUNCTIONS .	
			RUN / SET	0	0	0	10	Channel shift key	<ul> <li>The channel can be selected by the channel shift key when CH-SELECT is set at PANEL</li> </ul>	
			SET-1		0	0	N	SET-2 key	Sets the two-sheet threshold level (larger number of sheets).	
		la l	JN-0			0	12	SET-1 key	Sets the one-sheet threshold level (smaller number of sheets).	
		Exterr	IN-1			0	(13)	Zero adjustment (0-ADJ.) key	Calibrates zero level under sheet non-existing condition.	
			IN-2			0			Switches between RUN mode and SET mode.	
		Not	Note: The RUN / SET selection with the SET-MODE key on			DDE key on	14	SET-MODE key	□RUN: Detection takes place. □SET: Set-up is done	
			the panel is effective only when the RUN / SET selec- tion input is High (RUN mode).			$\vdash$		Switches timer mode.		
						15	TIMER key	□NORM. mode: Timer not used.		
4	Self-diagnosis indicator	I · S	ET mode: Lights up une	der normal ( error	condition.				□OFD. mode: Delay timer (50ms approx.) used.	
5	Sensing mode indicator (Green, Yellow)	Indicates the sensing mode.     Lights up green: Normal sensing mode     Lights up yellow: Precise sensing mode     Refer to 'OSensing Mode' in ' S EXPLANATION OF FUNCTIONS'.								

Thank you very much for using Panasonic products. Please read this Instruction Manual carefully and thoroughly for the correct and optimum use of this product. Kindly keep this manual in a convenient place for quick reference.

# **3 MOUNTING**

#### Placing of sensor heads

· Make the sender and receiver face each other and align their sensing center line.



· Keep a distance from any magnet or a device generating magnetic field. It may degrade the detectability.

# Mounting of sensor heads



- The tightening torque should be 0.5N·m or less.
- To mount the sensor head with a nut, the thru-hole should be  $\phi$  3.4mm. (The mounting board must be 2.3mm, or less, thick.)

#### Distance from nearby metals

· As metals near the sensor head may affect the sensing performance, pay attention to the following points.

#### Influence of nearby metal

The sensor head must be separated from nearby metal by a minimum distance as specified in the table below.



#### Embedding in metal

• The sensing performance may be affected if the sensor is completely embedded in a metal. Keep a minimum clearance between the sensor head and the metal as specified in the table below.



Dimension	B (i	n case	of	iron)
Dimension	-		<b>.</b>	

Setting distance Model No.	5mm	10mm	30mm	70mm
GD-3	¢ 15mm	¢ 20mm	—	—
GD-10	φ 100mm φ 300mm			_
GD-20				

#### Interference prevention

• When two or more sensor heads are mounted in parallel, keep a minimum separation distance as specified below to avoid interference.

## In case the sender and another sensor's receiver are placed adjacently Dimension C (in case of iron)



Model No.	5mm	10mm	20 (35) mm	30 (70) mm
GD-3	60mm	80mm	—	
GD-10		160mm		220mm
GD-20		370mm		630mm

Note: The value in the brackets is for GD-20.

#### In case the respective senders and receivers are placed adjacently Dimension D (in case o



GD-3	30mm
GD-10	
GD-20	

Note: The value in the brackets is for GD-20.

#### Mounting of controller

#### On DIN rail

- With the stopper pressed in the direction of the arrow (it locks), fit the front portion of the mounting section of the amplifier on the 35mm width DIN rail.
- ② Press and fit the rear portion of the mounting section on the 35mm width DIN rail.
- \* To remove, insert a flathead screwdriver into the stopper and pull out.

#### On board with screws

 Use two M4 pan head screws 10mm, or more, long. The tightening torque should be 1.2N m or less.





) Nuts (Please arrange separately.)

## On panel

 To mount the controller on a panel, use two M4 pan head screws 70mm, or more, long and the tightening torque should be 1.2N·m or less. If your mounting panel is metallic, insert the attached insulation plates at the terminals.

10mm

50mm

200mm

450mm

20 (35) mm



\*Mounting hole dimensions (Unit: mm)

30 (70) mm

250mm

700mm



cently	Dimension D (in case of iron)				
	Setting distance (Note) Model No.	5mm			
	GD-3	30mm			



4mm or more

GD-3

Set screv

(M3 or less)

• Use a set screw (M3 or less), and the tightening torque should be 0.12N • m or less.

The tightening torque should be 11.2N·m or less.



#### I/O circuit diagram



Note: 0V of power supply is isolated from 0V of input / output circuitry. To share the power supply with a load, both the 0V terminals should be short-circuited.

/mbols	D	: Reverse supply polarity protection diode
	ΖD	: Surge absorption zener diode
	Tr	: NPN output transistor

#### RS-232C wiring diagram (GD-C2 only)

Connector pin No.

S١



TXD : Transmit date, command RXD : Receive date, command RS : Request-to-send CS : Clear-to-send SG : Signal ground



Note: The terminal ②, 0V of power supply, is isolated from 0V of input / output circuitry for noise immunity. However, if you except to share the power supply with the output loads, connect terminals ② and ⑥, terminals ② and ⑧, or terminals ② and ⑩ to make 0V common.

#### External channel select truth table

Channel No.	IN-0	IN-1	IN-2
1	L	Н	Н
2	Н	L	Н
3	L	L	Н
4	Н	Н	L
5	L	Н	L
6	Н	L	L
7	L	L	L
8	Н	Н	Н

L: Low (0 to 1V), H: High (4.5 to 30V, or open)





- Notes: 1) The order of the above procedure at ⑥, ⑦ and ⑧ is arbitrary. The 'SET-1 key' searches the one-sheet level, and the 'SET-2 key' the two-sheet level. After having selected the SET mode, only by pressing either one once, the one-sheet or two-sheet levels are not undated. After having pressed the 'SET-1' and 'SET-2' keys once in SET mode, as long as it is in SET mode, the one-sheet or the two-sheet level is updated by pressing either SET keys. The moment the RUN mode is set, the data is confirmed. (Setting complete)
  - 2) The zero-sheet level is common for all eight channels. Once the zerosheet level is set for one channel after the sensor heads are installed, there is no need to set it again for the other channels.
  - (However, set the one-sheet level and the two-sheet level on each channel, once again, when 0-ADJ. key is pressed since this resets the zero-sheet level as per the prevailing conditions.
     3) The set data is not erased even if turns the power off.
  - 4) If the setting of the sender and receiver is changed after teaching, detection may become unstable. In this case, perform the teaching once
  - again.

## Teaching by external input

The teaching can also be performed by external input signals.

<Time chart>

RUN / SET selected input	RUN SET	High Low
SET-1 input	50ms or more	High Low
Answer-back output (ANS. OUT)	1ms or less → Teaching successful	High Low
SET-2 input	→ Soms or more	High Low
Answer-back output (ANS. OUT)	1ms or less - CPU processing - time (a few seconds) Teaching successful	High <sub>ul</sub> Low

Notes: 5) In case the set indicator blinking, double-feed teaching cannot be conducted.

The error release method is pressing down SET-1 and SET-2 together more than 5 seconds or making SET-1 or SET-2 input wire Lo side more than 5 seconds.



RUN

Conduct the teaching after the set indicator (red) is changed to blinking.



### Teaching through operation panel

Pro	cedure	Operation
Daration	1	Turn the power on.  • Check that the power indicator lights up.
Prep	2	Open the panel cover.
Channel selection	3	Select 'PANEL' by pressing 'CH-SELECT key'.  • This enables the keys on the panel.
	4	Select one of eight channels by pressing the 'channel shift key'. To modify a previously stored date, choose the particular channel. Otherwise, choose any channel from 1 to 8. • If the selected channel does not have data stored in it, the self-diag- nosis indicator lights up.
	5	Enter into the SET mode from RUN mode by pressing the 'SET- MODE key'. (Note 5) • The self-diagnosis indicator lights up. • The designated channel number blinks.
	(Note 1) (Note 2)	Press the '0-ADJ. key' while no object exists between the sensor heads. • After the sensing level indicators light up one after the other for about four cycles, both OUT-1 and OUT-2 blink twice at the same time.
setting	⑦ (Note 1)	Place one sheet between the sensor heads, and then press the 'SET-1 key'. • The sensing level indicators blink one after the other for about four cycles. After that, OUT-1 blinks twice. • Hold the object steadily between the sensor heads while the sensing level indicators are lighting up in rotation. One sheet
Level	(Note 1)	Place two sheets between the sensor heads, and then press the 'SET-2 key'. • The sensing level indicators light up one after the other for about four cycles. After that, OUT-2 blinks twice. • Hold the object ssteadily between the sensor heads while the sensing level indicators are lighting up in rotation. Two sheets
	*	If the teaching fails, all the sensing indicators blink at the same time. In this case, repeat the sensitivity setting after t
	9	Return to the 'RUN mode' from SET mode by pressing the 'SET-MODE key'.  • The self-diagnosis indicator turns off. [If it does not turn off, an error may be in- herent. Refer to IS EXPLANATION OF FUNCTIONS', '●Self-diagnosis (Alarm) function'.]  • The indicated channel number changes from blinking into continuous lighting.  • During the RUN mode, the '0-ADJ. key', 'SET-1 key', and 'SET-2 key' are ineffective.

## **6** EXPLANATION OF FUNCTIONS

#### Sensing mode

• The GD series has two sensing modes, one is the normal sensing mode and the other is the precise sensing mode. They are automatically selected by the characteristics of the object.



The **GD** series goes into this mode when the number of objects (e.g., large metal sheets) is distinguished with relative ease.



The **GD** series goes into this mode when the number of objects (e.g. lead frames) is difficult to distinguish. In this mode, the sensitivity difference is so minute between two sensing levels that vibration and ambient temperature changes must be carefully managed.

• The sensing mode indicator lights up green during the normal sensing mode, but lights up yellow during the precise sensing mode.

#### Two-sheet threshold level shift function

In normal teaching, the two-sheet threshold level is automatically set at the center or the one-sheet level and the two-sheet level. The two-sheet threshold level shift function enables you to shift the twosheet threshold level towards, either, the one-sheet level, or, the two-sheet level, in four steps. Consequently, if either one of the detection levels is stable, then by shifting the two-sheet threshold level towards that side, stable detection is possible even if the other detection level is unstable. Further, since by shifting the two-sheet threshold level, the difference between it and, either, the one-sheet level, or, the two-sheet level can be made small, fine detection is also possible.



In normal teaching, the two-sheet threshold level is set at 5 (50%)

#### • Timer function

 The GD series is incorporated with a fixed delay timer of 50ms approx. Since the signal output is extended by a fixed time interval, this is useful when the connected device has a slow response time or when small objects are detected and the output signal width is small.

Note: Once the timer becomes effective, it acts upon both OUT-1 and OUT-2 of all channels.

#### Self-diagnosis (Alarm) function

 The GD series diagnoses itself. The result lights up the selfdiagnosis indicator, generates the self-diagnosis output, and shows the error code on the channel display as per the following table

## Setting procedure

Step	Operation			
1	Perform normal teaching.			
2	Select 'RUN mode' by 'SET-MODE key'.			
3	<ul> <li>Press '0-ADJ. key' for more than 3 sec.</li> <li>'-' is displayed on the channel display are the sensor enters the two-sheet threshold level shift mode.</li> <li>When '0-ADJ. key' is released, the '- ' display changes to a blinking display of '5', which is the two-sheet threshold level before the shift.</li> <li>The self-diagnosis indicator lights up in the two-sheet threshold level shift mode.</li> </ul>			
4	$ \begin{array}{llllllllllllllllllllllllllllllllllll$			
5	After having shifted the two-sheet threshold level, press '0-ADJ. key' till ' - ' appears on the channel display. (The shifted two-sheet threshold level is stored and the sensor returns to the RUN mode.) • The self-diagnosis indicator turns off.			
• M le th th	<ul> <li>Make sure to press '0-ADJ. key' after shifting the two-sheet threshold level. If 'CH-SELECT key', 'SET-MODE key' or 'CH key' is pressed, al- though the sensor returns to the RUN mode, the shifted two-sheet threshold level is not stored.</li> </ul>			

 With respect to a single teaching data, make sure to shift the two-sheet threshold level only once. In case you wish to shift the level once again, do so after performing the normal teaching again.

#### <Time chart>

Sensing condition		One-sheet or more (OUT-2: Under one-sheet (OUT-2: Under two-sheets)
Operation	NORM. mode	ON OFF
OUT-1, OUT-2	OFD. mode	

#### Timer period: T = 50ms approx

	Description	Channel display	Sensing lev- el indicators	Self-diagnosis indicator (Note)	Self-diagnosis output (Note)	Countermeasures
On power -ON	Internal circuit failure		Blink	Lights up	OFF	Please contact our office.
	Disconnected sender cable		Blink	Lights up	OFF	Check connection of send- er cable.
During RS-232C communities Communi	Operation key pressed for 30 sec. or more	2	Blink	Lights up	OFF	Check keys on panel.
	Too little contrast between one and two sheet levels	Present channel number		Lights up for 1 sec.	OFF for 1 sec. (self-re- storation)	Change the setting.
	Selection of chan- nel without stored data	Present channel number		Lights up	OFF	Select the channel in which data is stored.
	Syntax error		Blink 10 times	Lights up	ON	Check RS-232C protocol (baud rate, parity, stop) bits, data bits.
	Memory overflow	4	Blink	Lights up	ON	Check if the terminal code is correctly sent.

#### Response time

The controllers GD-C1 and GD-C2 automatically select the most suitable signal processing method, according to the material and thickness of the sensing object. Depending on the selected signal processing method, the response time is also automatically determined as either '5ms or less', or '30ms or less'.

Further, when controller GD-C3 is used, the response time is 5ms or less.

The response time of the controllers, GD-C1 and GD-C2, can be confirmed by the following procedure.

(1) Press '0-ADJ. key' in RUN mode'.

2 The channel display shows an alphanumeric character that represents the response time in the right.

Other than 5ms or less 30ms or less the above

#### ALL-LOCK function

All keys on the operation panel are locked when the channel shift key is pressed for 3 sec. or more (unless CH-SELECT is set on 'PANEL'). To release the lock, press the channel shift key for 3 sec., or more, again.

## 7 RS-232C DATA TRANSMISSION (GD-C2 only)

• GD-C2 can feed in the set level data into a PC or PLC memory using RS-232C serial communication and retrieve it whenever required. In this case, the taught data should be stored in the prescribed channel.

#### Transmission specifications

- Baud rate: Selectable from 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200, or 31,250 bits/sec.
- Format: Data bits .....7 bits or 8 bits

Parity check .....None or Enable Even or Odd Stop bits .....1 bit or 2 bits

Terminal code .....CR or ETX

#### Parameter setting

· Set the paraments with the DIP switches on GD-C2.



Note: Make sure to turn the power off when set the parameter DIP switch. When turn the power on, the set contents are reflected.

After setting, be sure to mount the protective cover.

#### Command

- All commands used to communicate with GD-C2 are classified into three groups: write command, read command, and others (ASCII coded data communication).
- · If the sent command is ineffective, GD-C2 returns 'Not Available'.
- · All characters including send and response statements are based on ASCII code.

#### 1 Write command

	Syntax:	Statement + Numerical data + CR (ETX)				
1	<type commands="" of=""></type>					
	Statement	Usage				
	SCH	Write the date into the channel presently designated.          SCH_, × ×, △ △ △ △       ○OOO, □□□ + (CR (ETX))         Space or comma (, )				
	SRC 1 to 8	Assign the channel and write data into it. The command format is the same as for SCH.				
	SAC	Write the data into all channels.         SAC        X ×∆∆∆∆OOOO         Channel 1        X ×∆∆∆∆OOOO         Channel 2         Channel 8				

After the write command is sent, Statement + CR(ETX) is returned by GD-C2 to confirm the communication.

- Notes: 1) The GD series automatically selects the most effective sensing process according to the material and thickness of the object.
  - The process number ranges from '00 to 47' in decimal number system. 2) Both the one-sheet level data and the two-sheet level data are represented by decimal numbers from '0 to 4,095',
  - 3) The data information, information on the presence of data, the sensing mode, etc., is represented by decimal numbers from '00 to 63'.

#### (2) Read command Syntax: Statement + CR (ETX) <Type of commands> Statement Usage Read the data of the presently designated channel. Send: RCH + CR (ETX) RCH Response: RCH, ××, △△△△, OOOO, □□ + CR (ETX) Assign the channel and read its data. Send: RRC 1 to 8 + CR (ETX) BBC 1 to 8 Response: RRC 1 to 8 × × △△△△△○OOO□□□ + CR (ETX) Read data of all channels. Send: RAC + CR (ETX) RAC $\begin{array}{c} \text{Channel 1} & \text{Channel 2} \\ \text{L} \times \times \square \triangle \triangle \triangle \square \bigcirc \bigcirc \bigcirc \square \square + \boxed{CR (ETX)} \end{array}$ 0000\_00 Channel 8 Read only the sensing level data of the present channel. Send: RAD + CR (ETX) RAD Response: RAD ☆☆☆☆ + CR (ETX) Sensing level data (Note) Read the present sensing condition. Send: OUT 0 + CR (ETX) OUT 0 Response: OUT 0 $\nabla$ + CR (ETX) Sensing condition (0: Zero-sheet sensing, 1: One-sheet sensing, 2: Two-sheet sensing) Read the present sensing level (the number of LEDs which light up). Send: OUT 1 + CR (ETX)OUT 1 Response: OUT 1 + CR (ETX) Sensing level (0 to 7)

Note: Both the one-sheet level data and the two-sheet level data are represented by decimal numbers from '0 to 4.095'.

#### <Type of commands>

Statement	Usage		
\$	\$ Enter into RS-232C communication from other accesses.		
RNM	Enter into panel access.		
EXT.	Enter into EXT. access.		
CH 1 to 8	Change channel.		
LOCK	Disable panel and EXT. accesses.		
UNLOCK	Enable panel and EXT. accesses.		
PLOCK	Disable the operation panel.		
TIM 0	Enter into 'NORM. (non-timer)' timer mode.		
TIM 1	Enter into 'OFD. (timer usage)' timer mode.		
SMD 0	Enter into 'SET mode'.		
SMD 1	Enter into 'RUN mode'.		
ADJ 0	<ul> <li>Execute zero adjust command. (Zero-sheet level teaching)</li> <li>After the command execution, the following response is given depending on the teaching condition.</li> <li>On successful teaching: [OK] + [CR (ETX)]</li> <li>On unsuccessful teaching: [NG] + [CR (ETX)]</li> </ul>		

## **8** CAUTIONS

- Make sure to check the ability of the sensor to detect the number of sheets of your actual objects before use. If real objects differ from teaching samples in size or in characteristics, or the detecting condition deviates, an error may occur. Please note that magnetic metals or metals with low magnetic permeability such as steel especially have a strong tendency.
- In situations when magnets are in close proximity such as during electromagnet conveyance, this causes malfunctions due to electromagnetic disorder.
- When conducting minute detections, favorable sensing conditions are obtained only after having elapsed 60 minutes after the initial introduction of the power supply.
- Make sure that the power supply is off while wiring.
- Take care that wrong wiring will damage the sensor.
- Verify that the supply voltage variation is within the rating.

## **9** SPECIFICATIONS

#### Sensor heads

-									
Туре		Small object detection		High precision		Long sensing range			
Item Model No.			GD-3		GD	GD-10		GD-20	
Applicable controllers			GD-C3 (Note 1)		GD-C1, GD	GD-C1, GD-C2, GD-C3		GD-C1, GD-C2	
Sensing range (between sensor heads)			10mm or less		30mm or less		70mm or less		
Detectable sheet thickness (Note 2)			Standard sensing object size: 20 × 20mm		Standard sensing object size: 80 × 80mm		Standard sensing object size: 200 × 200mm		
		Setting distance	Eman	10,000	00,000	00	05	70	
	Material	Applicable controllers	minc	TOMM	2000	30mm	35000	70mm	
	Iron	GD-C1 / GD-C2	—	—	0.07 to 1mm	0.07 to 0.5mm	0.07 to 10mm	0.07 to 6mm	
	(SPCC)	GD-C3	0.01 to 0.1mm	0.03 to 0.1mm	0.01 to 0.3mm	0.01 to 0.1mm			
		GD-C1 / GD-C2	—	_	0.03 to 6mm	0.03 to 2mm	0.03 to 10mm	0.03 to 6mm	
	Aluminum	GD-C3	0.015 to 1mm	0.015 to 1mm	0.015 to 1mm	0.015 to 1mm		—	
	Commen	GD-C1 / GD-C2	—	—	0.03 to 6mm	0.03 to 2mm	0.03 to 10mm	0.03 to 6mm	
	Copper	GD-C3	0.018 to 1mm	0.018 to 0.3mm	0.018 to 1mm	0.018 to 1mm			
	Dress	GD-C1 / GD-C2	—	—	0.03 to 6mm	0.03 to 2mm	0.03 to 10mm	0.03 to 6mm	
	Brass	GD-C3	0.03 to 1mm	0.03 to 0.5mm	0.01 to 1mm	0.01 to 1mm	—	—	
	Stainless steel	GD-C1 / GD-C2	_	—	0.1 to 6mm	0.1 to 2mm	0.1 to 10mm	0.1 to 6mm	
	(SUS 304)	GD-C3	0.3 to 1mm	0.3 to 1mm	0.05 to 2mm	0.05 to 1mm		—	
Protection			IP67	IP67 (IEC), IP67g (JEM)					
Ambient temperature		-10 to +60°C, Storage: -25 to +70°C							
Ambient humidity		45 to 85% RH, Storage: 35 to 95% RH							
Material		Enclosure: Stainless steel (S	SUS 303), Sensing face: ABS	Sensing face: Polyacetal, Main body: Stainless steel					
Cable		5	Sender: 0.3mm <sup>2</sup> single co	Sender: 0.5mm <sup>2</sup> single core shielded cable, 3m long					
		F	Receiver: 0.1mm <sup>2</sup> 2-core s	Receiver: 0.3mm <sup>2</sup> 2-core shielded cable, 3m long					
Weight			90g approx. 80g approx.			pprox.	440g a	approx.	
Accessory			-	_	Sensor head mounting bracket: 1 set for sender and receiver		-		

Notes: 1) Since it is possible that GD-3 may get damaged if controllers GD-C1 or GD-C2 are connected to it, make sure to use controller GD-C3 along with GD-3. 2) The above detectable sheet thicknesses are typical data at the given sensing distance. The allowable thickness will differ from the range described in the above ta-

ble at other setting distances. Further, double feeds of aluminum foils can also be detected at distances shorter than the above. Please contact our office for details.

#### Controllers

	Туре	Standard	With RS-232C communication function	Small object detection			
Item Model No.		GD-C1	GD-C2	GD-C3			
Supply voltage			12 to 24V DC±10% Ripple P-P 10% or less				
Current consumption		12V DC: 700mA or less, 24V DC: 400mA or less					
Output (OUT-1, OUT-2, ALM., Answer-back)		NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less	NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less (between output and 0V) 0.4V or less (at 100mA sink of 0.4V or less (at 16mA sink of 0.4V				
	Output operation	OUT-1: OFF above the one-sheet three OUT-2: OFF above the two-sheet three	shold level         ALM.: OFF when an error occurs           shold level         Answer-back: Refer to the time ch	art of the 'S SENSITIVITY SETTING'.			
	Short-circuit protection	Incorporated					
Response time		Automatically selected either 5ms or less,	5ms or less				
Ambient temperature		-10 to +50°C (No dew condensation or icing allowed), Storage: -25 to +70°C (Note)					
Ambient humidity		45 to 85% RH, Storage: 35 to 90% RH					
Material		Heat-resistant ABS					
Weight		440g approx.					
Accessory		Insulation plate: 2 pcs.					

Note: When conducting minute ditections, the detection may be affected if the ambient temperature greatly changes from the teaching. In this case, perform the teaching again or use the product under the equable temperature.

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Statement	Usage
SET 1	<ul> <li>Execute SET-1 command. (One-sheet level teaching)</li> <li>After the command execution, the following response is given depending on the teaching condition.</li> <li>On successful teaching: [OK] + [CR (ETX)]</li> <li>On unsuccessful teaching: [NG] + [CR (ETX)]</li> </ul>
SET 2	<ul> <li>Execute SET-2 command. (Two-sheet level teaching)</li> <li>After the command execution, the following response is given depending on the teaching condition.</li> <li>On successful teaching: [OK] + [CR (ETX)]</li> <li>On unsuccessful teaching: [NG] + [CR (ETX)]</li> </ul>

 After the above command is sent, <u>Statement</u> + <u>CR (ETX)</u> is returned by **GD-C2** to confirm the communication.

- 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.
- 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.
- 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.
- Do not operate the sensor for a few seconds immediately after supplying power because of transient conditions including self-diagnosis time.
- The sensor head cable can be extended up to 20m max. by using an equivalent shielded cable. However, when using the sensor head in places having excessive noise, make the cable as short as possible.
- This sensor is suitable for indoor use only.