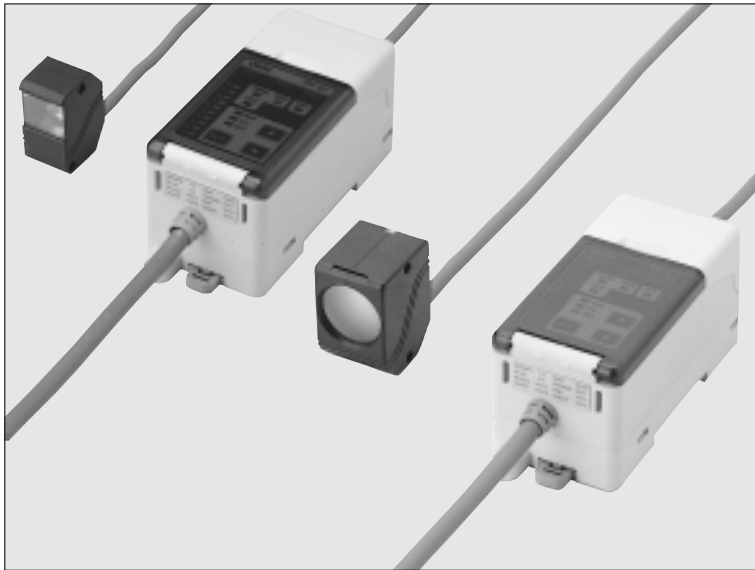


TH SERIES

Hot Melt Glue Detector



Quick, Reliable and Non-contact Detection of Hot Melt Glue

CE Marked
Conforming to EMC Directive
(TH-12CPS only)

Miniature Sensor Head Spot type

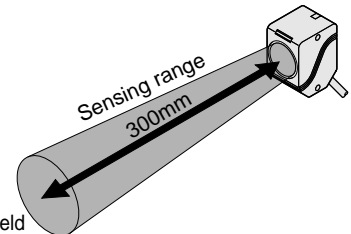
The sensor head can be mounted in a congested and tight place as it has a miniature size of W18 × H33 × D23mm. Further, since a red alignment marker has been provided, setting can be done while confirming the detection point projected on the work-piece.



Incorporated with red marker

Wide Sensing Area Long sensing range type

Since the view field is $\phi 30\text{mm}$ at a sensing distance of 300mm, the hot melt glue can be detected even if its position of application varies slightly.



View field $\phi 30\text{mm}$ approx.

Sensitive and Reliable Detection

The spot type reliably detects a hot melt drop of 3mm diameter at 85°C, or more, and the long sensing range type reliably detects a hot melt drop of 6mm diameter (equivalent to 3 × 10mm) at 100°C or more.

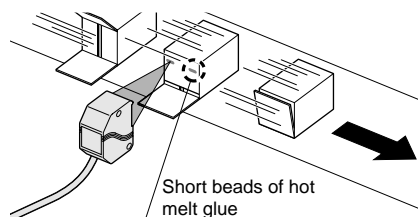
Long Sensing Range 300mm Long sensing range type

A long sensing range of 300mm max. is possible. Hot melt glue can be reliably detected not only on small pharmaceutical or confectionary boxes, but also on large cardboard boxes.

Suitable for High Speed Production Line

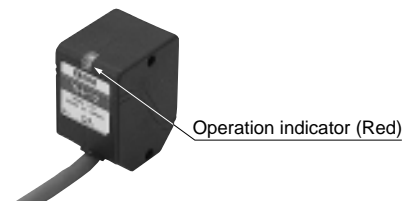
As the response time is 1ms or less, the TH series reliably detects hot melt adhesives even where product boxes flow extremely fast.

(However, for the long sensing range type, this is valid for a sensing distance of 200mm or less.)



Sensor Head with Operation Indicator Long sensing range type

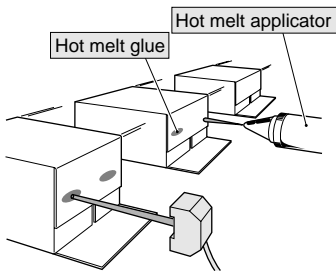
Since the operation indicator lights up when hot melt glue is detected, position alignment of the sensor head is easy.



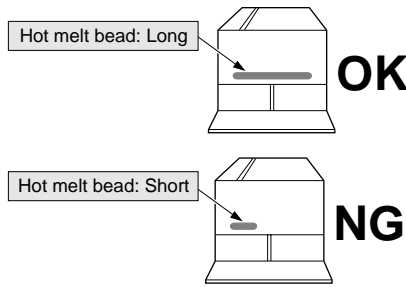
Operation indicator (Red)

APPLICATIONS

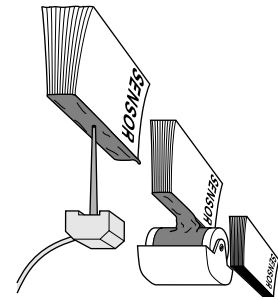
High speed packing line



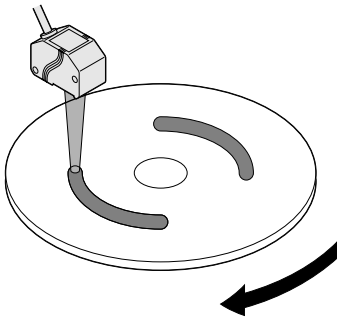
Hot melt length evaluation



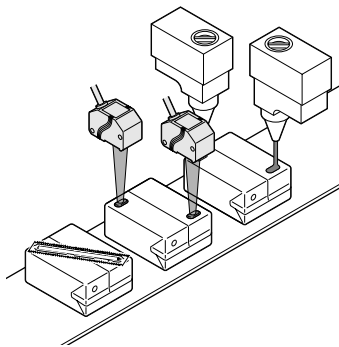
Bookbinding line



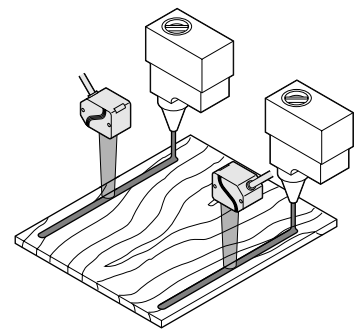
Magnetic disk assembly line



Straw attachment line



Plywood adhesion line



ORDER GUIDE

Type	Appearance		Sensing range	Set model No.	Output
	Sensor head	Controller			
Spot			 40 ± 10mm	TH-11CS	NPN open-collector transistor
Long sensing range			 10 to 300mm (Note)	NEW TH-12CS	NPN open-collector transistor
				NEW TH-12CPS	PNP open-collector transistor

Note: Teaching is possible for this sensing range.

However, the sensing range varies with the size of the sensing object and its temperature, ambient temperature, etc.

A sensor head and its respective controller comprise a set. Make sure to use the sensor head and the controller specified in the set model No. together as a set. [Please refer to 'SPECIFICATIONS' on P.467, P468 for more details.]

SPECIFICATIONS

TH-12CS
TH-12CPS

Long sensing range type

Sensor head

Model No.		TH-12
Item		
Applicable controller		TH-C2, TH-C2P
Sensing range		10 to 300mm (Note1, 2)
Sensing object		φ6mm (equivalent to 3×10mm) or more hot melt glue (emissivity 0.9) at 100°C or more, under ambient temperature of 25°C (Note 2)
Environmental resistance	Pollution degree	3 (Industrial environment)
	Ambient temperature	0 to + 50°C (No dew condensation), Storage: - 10 to + 60°C
	Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH
	Ambient illuminance	Sunlight: 11,000 lx at the light-receiving face, Incandescent light: 3,500 lx at the light-receiving face
	Vibration resistance	10 to 55Hz frequency, 1.5mm 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 three times each
OUT 1 operation indicator		Red LED (lights up when hot melt is detected)
Material		Enclosure: Polycarbonate, Indicator: Polycarbonate, Lens: Silicone
Cable		0.2mm ² 5-core shielded cable, 2m long
Weight		120g approx.
Accessories		MS-TH-2 (Sensor head mounting bracket): 1 set, TH-B2 (Heat shield): 1 No., OS-TH12 (Slit mask): 1 No.

Notes: 1) Teaching is possible for this detection range. However, the detection range varies with the size of the sensing object and its temperature, ambient temperature, etc.

2) Refer to 'Reference table for sensing distance' on P.473 for the relation between the sensing distance and the hot melt condition.

Controller

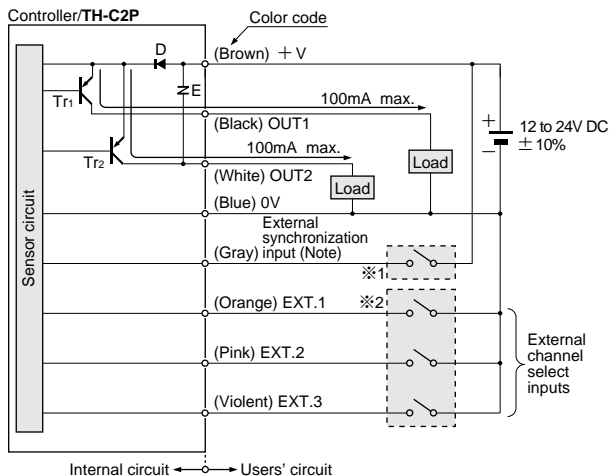
Type		NPN output (for TH-12CS)	PNP output (for TH-12CPS)
Item	Model No.	TH-C2	TH-C2P
Applicable sensor head		TH-12	
Supply voltage		12 to 24V DC ± 10% Ripple P-P 10% or less	
Current consumption		100mA or less	
Output (OUT 1, OUT 2)		NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less (between output and 0V) • Residual voltage: 1V or less (at 100mA sink current) 0.4V or less (at 16mA sink current)	PNP open-collector transistor • Maximum source current: 100mA • Applied voltage: 30V DC or less (between output and + V) • Residual voltage: 2V or less (at 100mA source current)
	Utilization category	DC-12 or DC-13	
	Output operation	OUT 1: ON when hot melt adhesive is detected, OUT 2: OFF when the evaluated result is NG (Max. 1 sec. approx.)	
	Short-circuit protection	Incorporated	
Response time		Sensing distance 200mm or less: 1ms or less (1 to 200Hz), Sensing distance 300mm or less: 1.5ms or less (1 to 100Hz)	
Warm-up time		40 sec. approx.	
Sensitivity setting		Teaching method (Push-button operation)	
Level storage function		Sensitivity levels of eight channels can be stored.	
External channel select function		Incorporated	
Timer function		Incorporated with approx. 40ms fixed OFF-delay timer, switchable either effective or ineffective	
Environmental resistance	Pollution degree	3 (Industrial environment)	
	Ambient temperature	0 to + 50°C (No dew condensation), Storage: - 10 to + 60°C	
	Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH	
	EMC	Emission: EN50081-2, Immunity: EN50082-2	
	Voltage withstandability	1,000V 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 55Hz frequency, 1.5mm 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 three times each	
Material		Enclosure: Heat-resistant ABS, Terminal cover: Heat-resistant ABS, Front cover: Polycarbonate	
Cable		0.3mm ² 8-core cabtyre cable, 2m long	0.3mm ² 8-core cabtyre cable, 1m long
Cable extension		Extension up to total 100m is possible with 0.3mm ² , or more, cable.	
Weight		200g approx.	140g approx.

Note: Refer to 'Functional description' on P.473 for controller indicator functions.

I/O CIRCUIT AND WIRING DIAGRAMS

PNP output type

I/O circuit diagram

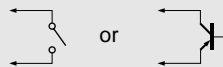


Note: The external synchronization input is active High.

Symbols ... D: Reverse supply polarity protection diode
E: Surge absorption varistor
Tr1, Tr2: PNP output transistor

※1

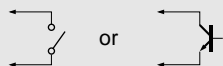
Non-voltage contact or PNP open-collector transistor



Low: 0 to 1V
High: +V or open

※2

Non-voltage contact or NPN open-collector transistor



Low: 0 to 1V
High: 4.5 to 30V, or open

Specifying channel with external channel select inputs

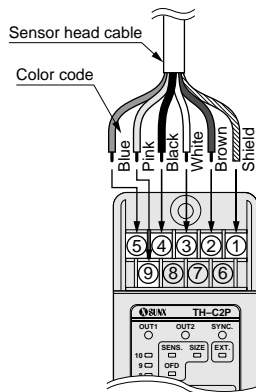
Input Channel No.	EXT.1 (Orange)	EXT.2 (Pink)	EXT.3 (Violet)
1	L	H	H
2	H	L	H
3	L	L	H
4	H	H	L
5	L	H	L
6	H	L	L
7	L	L	L
8	H	H	H

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

- Notes: 1) The channel can be specified from the front panel only when all external channel select inputs (EXT.1, EXT.2, and EXT.3) are High (corresponding to Channel No. 8).
2) The external channel select inputs take precedence over the front panel channel selection (except for Channel No. 8).
3) If channel specification is changed from front panel operation to external channel select inputs and Channel No. 8 is to be selected by the external channel call inputs, make sure to specify a channel other than No. 8 before setting all the external channel select inputs (EXT.1, EXT.2, EXT.3) to High.
If this operation is not done, channel specification by front panel operation gets precedence.

Sensor head wiring diagram

TH-12CPS



Terminal No.	Color code
①	Shield
②	Brown
③	White
④	Black
⑤	Blue
⑥ to ⑧	—
⑨	Pink

Caution: Do not make any connection to terminals ⑥ to ⑧. If connected, the internal circuit may get damaged.

PRECAUTIONS FOR PROPER USE



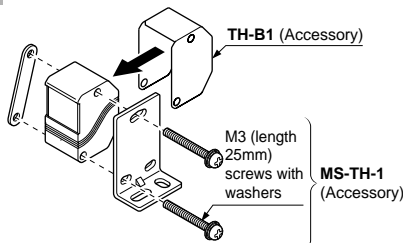
This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

Mounting

Mounting sensor head

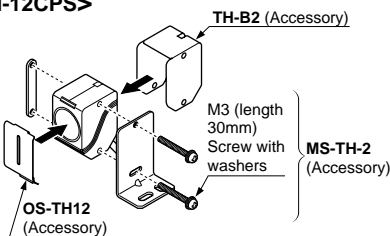
<In case of TH-11CS>

- The tightening torque should be 0.5N·m or less.
- Use the attached heat shield **TH-B1**, if the sensor head is installed nearby a hot melt applicator.



<In case of TH-12CS, TH-12CPS>

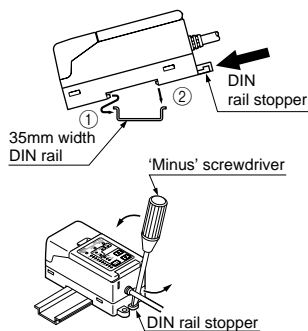
- The tightening torque should be 0.5N·m or less.
- Use the attached heat shield **TH-B2**, if the sensor head is installed near a hot melt applicator.
- When length evaluation, etc., of a short hot melt glue is to be done, install the attached slit (**OS-TH12**). However, if the slit is used, the sensing range reduces.



Mounting controller

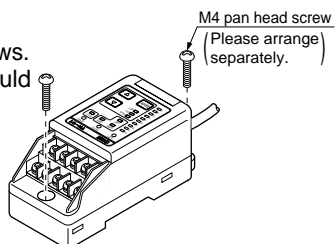
<Using DIN rail>

- ① Push the DIN rail stopper in the direction of the arrow to lock it. Hook the front (non-stopper) side of the bottom slot on the 35mm width DIN rail.
- ② Now, press down the rear side of the bottom slot on the 35mm width DIN rail to fit it.
- ③ For removing, insert a 'minus' screwdriver into the hole of the DIN rail stopper and pull it out.



<Using screws>

- Use two M4 pan head screws. The tightening torque should be 1.2N·m or less.

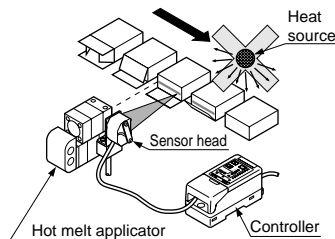


Wiring

- Make sure to carry out the wiring in the power supply off condition.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that its frame ground (F.G.) terminal is connected to an actual ground.
- In case noise generating equipment (switching regulator, induction 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.
- The sensor head cable cannot be extended.

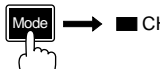
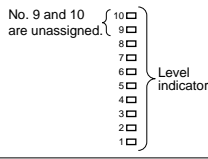

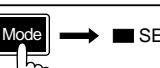
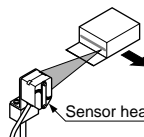
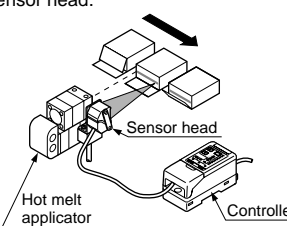
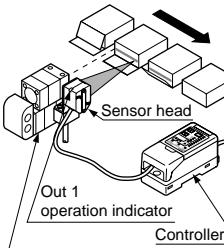
Others



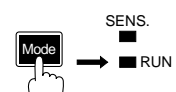
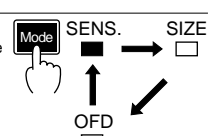
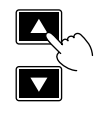
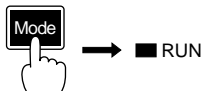
- Since the **TH** series employs a differential method for sensing, if the length of the box or its traveling speed is different from that at the time of teaching, proper sensing may not be possible. Make sure to teach under the actual sensing conditions.
- If the sensor is used in an environment of marked temperature changes, perform the teaching periodically for stable detection.
- Do not use the **TH** series during the warm-up time (40 sec. approx.) after the power supply is switched on. Further, do not touch any key during the warm-up time, as this may erase the sensitivity settings stored in the controller.
- In case the power supply is switched off in a mode other than the RUN mode, take care that operation commences in the channel selection mode when the power supply is switched on again.
- Avoid dust, dirt, and steam.
- Take care that the product does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.
- Wipe the lens of the sensor head clean with a cloth dampened with ethanol if hot melt glue, dirt, etc, sticks to it.
- Make sure to detect the hot melt glue with the sensing object moving. Stationary hot melt glue cannot be detected.
- The time duration for detecting hot melt glue should be 1 sec. or less. If this time duration exceeds 1 sec., Out 1 automatically turns OFF. Take care that, in this case, it may take approx. 40 sec. max., after being brought to the no-detection state, for the sensor to return to the stable sensing condition.
- Do not place any heat source such as an incandescent lamp around the sensor head or the hot melt glue application area. It may cause a malfunction.
- If some thermal reflector (glossy object, etc.) exists near the hot melt glue application area, the reflected heat may cause an error. In this case, install a heat shield, etc., to make sure that the reflected heat does not reach the sensor head.
- Make sure that sunlight, or light from an incandescent lamp or fluorescent lamp does not enter the sensor head directly. In addition, also take care against reflected sunlight or reflected light from an incandescent lamp.



PRECAUTIONS FOR PROPER USE

Sensitivity setting

Step	Operation
Starting up	<p>① Switch on the power supply</p> <ul style="list-style-type: none"> During the warm-up time (40 sec. approx.), several indicators on the panel blink. The RUN mode indicator then lights up. <p>• Do not operate the keys during the warm-up time (40 sec. approx.).</p>
Channel selection	<p>② Press the Mode key once to enter into the CH. selection mode (CH.).</p>  <p>• The level indicators indicate the teaching condition of each channel. (The TH series has eight channels) (numbered from No. 1 to 8.)</p> <p>Lights up green: Teaching done Lights off : Teaching not done Lights up red : Selected</p>  <p>③ Select the channel. (Note 1)</p> <ul style="list-style-type: none"> Select the channel with UP and DOWN keys. (The channel selection is available from No. 1 to 8.) The selected channel indicator lights up red. 
Beam alignment	<p>④ Press the Mode key again to enter into the teaching mode (SET).</p>  <p>⑤ Align the beam axis.</p> <p>In case of TH-11CS</p> <ul style="list-style-type: none"> Fix the sensor head after aligning the red marker emitted by the sensor head with the position through which the hot melt glue passes.  <p>In case of TH-12CS, TH-12CPS</p> <ul style="list-style-type: none"> Fix the sensor head after aligning its front face along the direction in which the hot melt glue passes. <p>⑥ The box on which hot melt glue has been applied is made to pass the sensor head.</p> <p>In case of TH-11CS</p> <ul style="list-style-type: none"> When hot melt glue is detected, OUT 1 operation indicator of the controller lights up in red. Moreover, if you desire to perform the beam alignment accurately, carry out the alignment while confirming the detection level from the controller's level indicators.  <p>In case of TH-12CS, TH-12CPS</p> <ul style="list-style-type: none"> When hot melt glue is detected, Out 1 operation indicators of the sensor head and the controller light up red. ※ In case the detection time is short, it is possible that the sensor head indicator may not light up or light up at the same time as the controller indicator. Moreover, if you desire to perform the beam alignment accurately, carry out the alignment while confirming the detection level from the controller's level indicators. 
Teaching	<p>⑦ Teach in the teaching mode (SET).</p> <ul style="list-style-type: none"> Make sure to perform the teaching when the box is moving. To effect either presence or length evaluation, the external signal synchronized with travelling boxes must be input during teaching. Non-glued articles must be taught earlier than well-glued articles. (Refer to P.475 for Presence/absence detection function · Length evaluation function (SIZE).) <p>• Either, [2-level teaching] in which, both, well-glued and non-glued articles are taught, or [1-level teaching], in which only well-glued articles are taught, is possible.</p> <p>• However, the [2-level teaching] is recommended, unless you have only well-glued articles, because of its much more stable detection.</p>

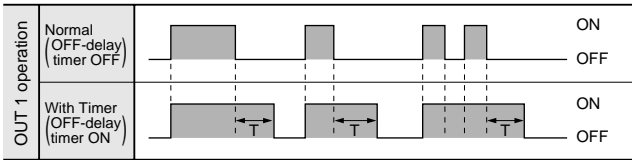
Teaching	<p>2-level teaching</p> <p>(1) Feed five or six non-glued articles and press the DOWN key continuously while two or three of them are passing by the TH series. (Note 2)</p>  <p>(2) Feed five or six well-glued articles and press the UP key continuously while two or three of them are passing by the TH series. With this, the sensitivity is set.</p>  <p>• When using the presence/absence detection function or the length evaluation function, make sure to pass two or three boxes even after releasing the up key and input the external synchronization signal (passage signal of the box).</p> <p>Result of teaching</p> <p>The temperature and the amount of thermal radiation from hot melt glue limit the operating ambient temperature range. The level indicators indicate this after the teaching.</p> <p>⑦ a) If use is possible over the ambient temperature range (0 to +50°C), all the ten level indicators blink (green) twice after the teaching.</p> <p>b) If use is possible over the ambient temperature range [0 to (ambient temperature during teaching + 10°C)], all the ten level indicators blink (green) continuously after the teaching.</p> <p>c) If use is possible over the ambient temperature range [0 to (ambient temperature during teaching + 5°C)], five level indicators blink (green) continuously after the teaching.</p> <p>d) If teaching is not done properly, all the level indicators blink continuously (red). In this case, press the Mode key to change once to some other mode, then set to the teaching mode (SET) and repeat the procedure from '⑤ Align the beam axis.' (Note 3)</p> <p>(3) If the Mode key is pressed to set to RUN mode, the sensitivity level is set to Level 5 and length evaluation level is set to Level 10 automatically (presence/absence detection).</p> <p>※ 'SENS.' (sensitivity level set-up mode indicator) of the taught channel lights up in RUN mode too.</p>  <p>1-level teaching</p> <p>• Carry out the step (2) followed by (3). Then the teaching is completed.</p>
	Notes: 1) Channel selection is possible from the front panel only when all external channel select inputs, EXT.1, EXT.2 and EXT.3, are High.
	2) When carrying out 2-level teaching, make sure to continuously press the Down key. If the Down key is not continuously pressed, 1-level teaching is carried out.
	3) If the teaching is repeatedly unsuccessful, some other heat source may exist around the sensor head or near the hot melt glue application area. Check the surroundings and screen the sensor head from extraneous heat radiation.
4) The set data is not erased even when power is switched off.	
<p>Sensitivity level set-up function (SENS.)</p> <p>• This function enables adjustment of the sensitivity level (operating threshold level) in ten steps after the teaching. It enables fine sensitivity adjustment to accept only adequate hot melt glue.</p>	
Step	Operation
①	<p>Refer to 'Sensitivity setting' given above, and teach the TH series.</p> <ul style="list-style-type: none"> If the sensitivity has already been set, start from step ②. To adjust the sensitivity stored in another channel, select the channel by referring to 'Sensitivity setting' given above.
②	<p>Press the Mode key for 3 sec. or more.</p> <ul style="list-style-type: none"> After that, the Mode key enables you to select the SENS., SIZE, and OFD. modes in rotation. Select 'SENS.', the sensitivity level set-up mode. 
③	<p>Adjust the sensitivity level with UP and DOWN keys.</p> <ul style="list-style-type: none"> After teaching, the sensitivity level is set to Level 5, i.e., the center of well-glued and non-glued levels. As the sensitivity level is increased, it becomes more difficult to detect a hot melt glue of less quantity. 
④	<p>Press the Mode key for 3 sec. or more to return to the RUN mode.</p> 

PRECAUTIONS FOR PROPER USE

OFF-delay timer function (OFD)

- The controller is equipped with an approx. 40ms fixed OFF-delay timer. Since it extends the output duration of OUT 1 by a fixed time interval, it is convenient to detect short hot melt beads on a quick production line or to send the signal to a device having a slow response time.

Time chart

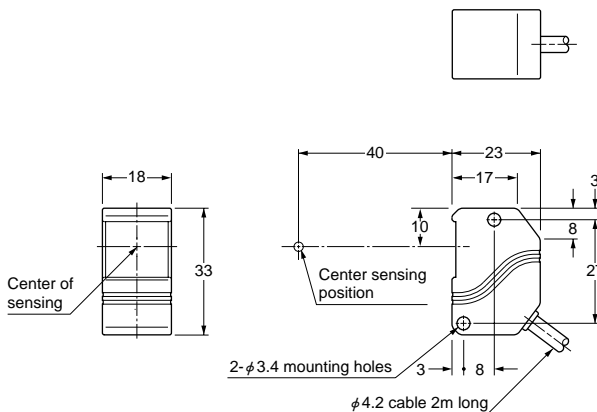


Note: The OFF-delay timer is effective only for OUT 1. T = 40ms approx.

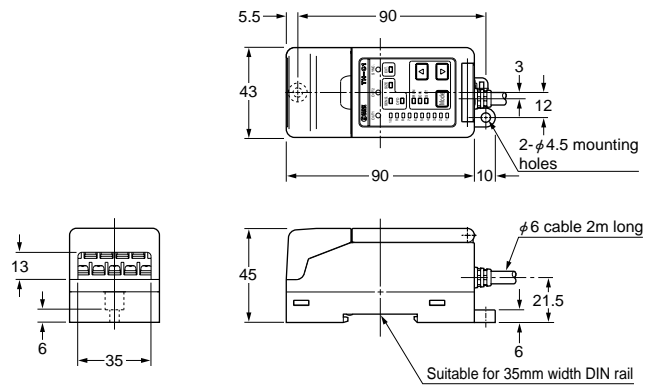
Step	Operation
①	Refer to ' Sensitivity setting ' on P.474 and select the channel. • If the channel is not to be changed, start from Step ②.
②	Press the Mode key for 3 sec. approx. or more. • After that, the Mode key enables you to select the SENS., SIZE, and OFD modes in rotation. Select 'OFD', the OFF-delay timer set-up mode.
③	Press the UP key. • The level indicators numbered from 1 to 4 light up in green to notify that the OFF-delay timer is set. • When the DOWN key is pressed, the OFF-delay timer turns OFF. (All level indicators go off.)
④	Press the Mode key for 3 sec. or more to return to RUN mode. • The 'OFD' indicator always lights up even in the RUN mode once the OFF-delay timer is set.

DIMENSIONS (Unit: mm)

TH-11CS Spot type



Sensor head/TH-11



Controller/TH-C1

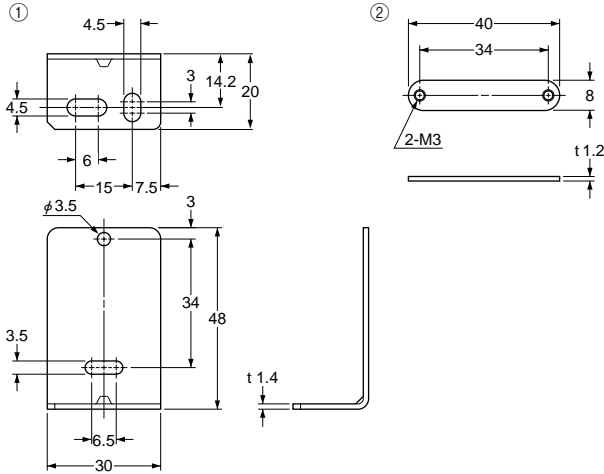
DIMENSIONS (Unit: mm)

MS-TH-2

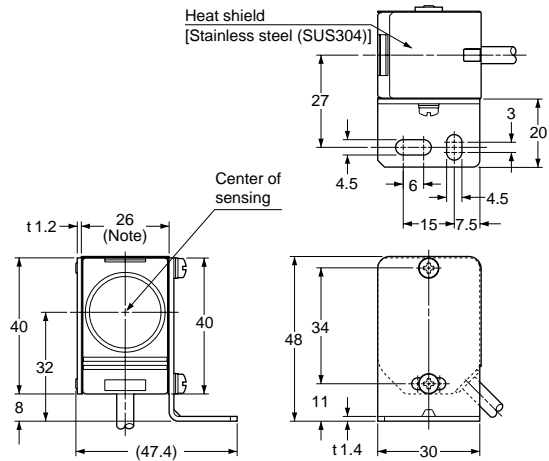
Sensor head mounting bracket for long sensing range type (Accessory for TH-12)

Assembly dimensions

The drawing below shows **MS-TH-2** mounted on **TH-12** fitted with heat shield **TH-B2** (accessory)



Material: Cold rolled carbon steel (SPCC)
Two M3 (length 30mm) screws with washers are attached.

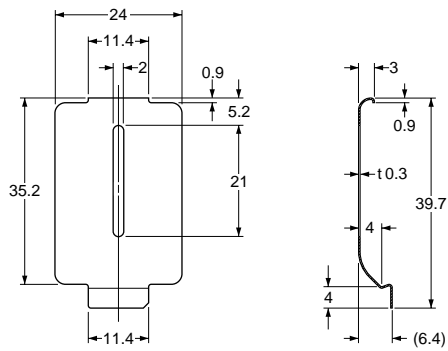


Note: 25mm when the heat shield is not used.

OS-TH12

Slit mask for long sensing range type (Accessory for TH-12)

Assembly dimensions



Material: Stainless steel (SUS304)

