- Teaching function available for adjustment
- Automatic setting of optimum sensitivity for stable detection
  - Full auto teaching: set without stopping mark
  - Auto teaching: set with mark stopped
  - External teaching: setting from a distant location

Type

Detection method	Detection interval	Model	Operation mode	Output mode	Light source
U-shaped through-beam	2 mm fixed	**MA-U2R**	Light-ON/ Dark-ON selector switch	NPN open collector	Red LED
		MA-U2G			Green LED
		MA-U2B			Blue LED
		MA-U2RPN		PNP open collector	Red LED
		MA-U2GPN			Green LED
		MA-U2BPN			Blue LED

Through-beam sensor capable of full auto or auto teaching mode

- The center of detection is constantly cleaned for stable detection, even with Japanese paper, etc., that generates a large amount of dust.
- The top lens is also cleaned by the “spring effect” of work caused by release of tension that occurs when the work runs out.

Rating/Performance/Specification

Rating/performance	Type	NPN type	**MA-U2R**	**MA-U2G**	**MA-U2B**
		PNP type	**MA-U2RPN**	**MA-U2GPN**	**MA-U2BPN**
	Detection method		Through-beam type (U-shaped)		
	Detection interval		2 mm fixed		
	Power supply		12 – 24 VDC ±10% Ripple: 10 % max.		
	Current consumption		NPN output type: 40 mA max. / PNP output type: 45 mA max.		
	Output type	NPN type	NPN open collector output Current output: Rating: sink current 100 mA (30 VDC) max. (residual voltage: 1 V max.)		
		PNP type	PNP open collector output Current output: Rating: source current 100 mA (30 VDC) max. (residual voltage: 2 V max.)		
	Operation mode		Light-ON/Dark-ON selectable (with switch)		
	External teaching input		No-voltage input (contact/non-contact)		
	Response time		0.7 ms max.		
	Minimum detectable mark width		1 mm		
Specification	Light source (light wavelength)		Red LED (660nm)	Green LED (570nm)	Blue LED (450nm)
	Indicator		LIGHT: light reception indicator (orange LED) STB: stability indicator (green LED)		
	Sensitivity adjustment		Full auto teaching/auto teaching with SET button or external teaching input		
	Short-circuit protection		Provided		
	Switch (SW)		Light-ON/Dark-ON selector switch provided		
	Material	Lens	Glass		
		Case	Heat resistant ABS		
	Connection		Permanently attached cord (outer diameter: dia.4) 0.2 mm² x 4 cores, 3 m, black		
	Mass		120 g max.		

Environmental Specification

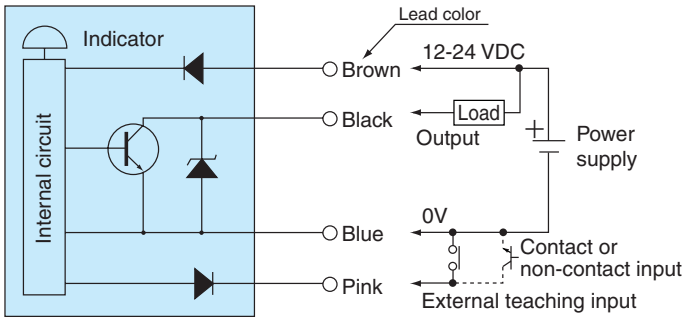
Environment	Ambient light	5,000 lx max.
	Ambient temperature	–25 - +55 °C (non-freezing)
	Ambient humidity	35-85%RH (non-condensing)
	Protective structure	IP67
	Vibration	10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
	Shock	1000m / s² / 2 times each in 3 directions
	Dielectric withstanding	1,000 VAC for 1 minute
	Insulation resistance	500 VDC, 20 MΩ or higher

• White LED type

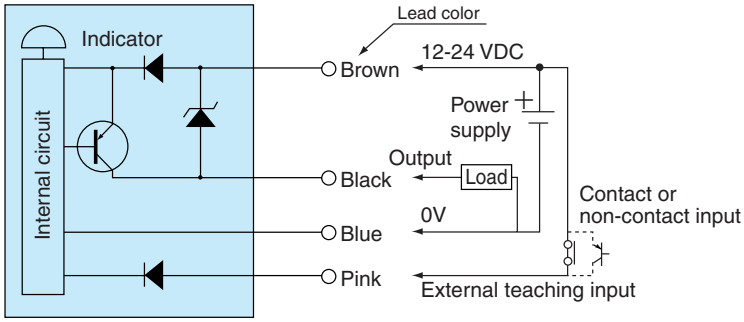
A model with white LED used as the light source is available.
For detection involving large variations, stable operation is available fairly regardless of mark colors.
Test the operation with an evaluation unit before use.
Model MA-U2W (PN)

Input/Output Circuit and Connection

- NPN output type



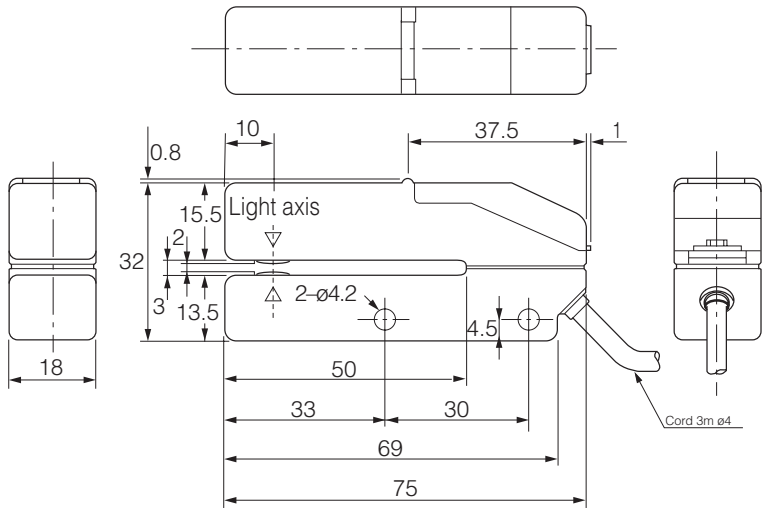
- PNP output type



- The output transistor turns off when load short circuit or overload occurs.
  Check the load and turn the power back on.
- When not using external teaching method, cut the pink lead at the base or connect it to the positive terminal of the power supply.

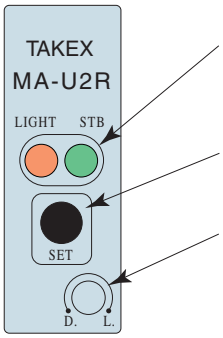
Dimensions (in mm for all models)

CAD



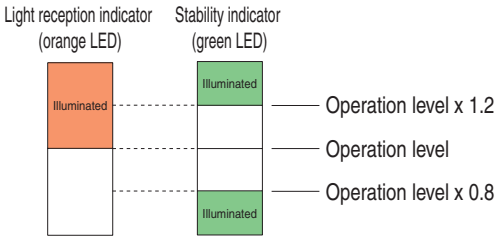
Operation panel

Operation panel



Indicators

LIGHT: light reception indicator (orange LED)
Illuminated when a certain amount of light is received.
STB: stability indicator (green LED)
Illuminated when the received light intensity is in a range that allows stable light reception or blocking.
Flashes during teaching.

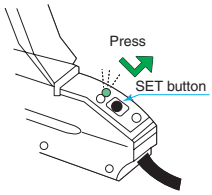


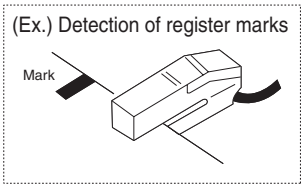
Sensitivity Setting

• Sensitivity full auto teaching with mark in passage

–Convenient for detection of marks passing at high speed–

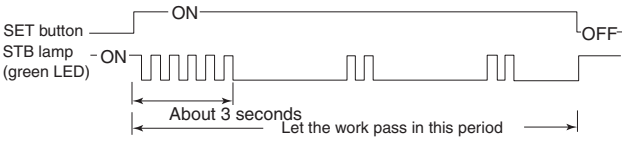
①Press and hold down the SET button.
The green LED (indicator) flashes, indicating that the sensor is in the standby mode.





②Let the mark pass while holding down the SET button.
When the slow flashing of the green LED has been confirmed, release the button. Sensitivity setting is complete.

STB lamp (green LED)
The green LED (indicator) shows teaching processes.
When the SET button has been held down for a certain period of time, the STB lamp starts flashing and, about 3 seconds later, the flashing becomes slower.

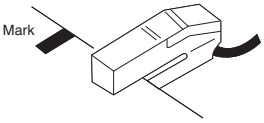


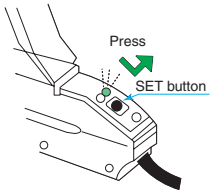
* Releasing the SET button before the flashing of the green LED becomes slow, the full auto teaching mode is exited and the STB lamp keeps flashing.
In this case, press the SET button again and repeat the procedure from (1).
* In full auto teaching, a variation in the receiver light intensity is captured for the CPU to set the optimum sensitivity and operation level.
For this reason, the mark may be passed anytime as long as the SET button is held down even if the STB lamp is flashing slowly.

• Sensitivity auto teaching with stationary mark

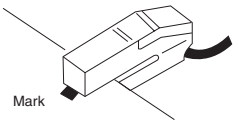
–Example of detection of register marks–

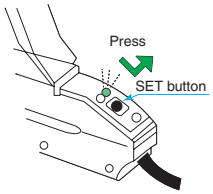
①Press the SET button once with no mark (object) present.
The STB lamp (green LED) starts flashing, indicating that a data has been stored.





②Place the mark (object) at the given position and press the SET button again.
The flashing of the STB lamp changes to illumination, indicating that sensitivity setting is completed.





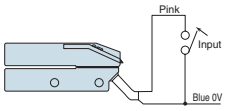
* The order of the steps (1) and (2) mentioned above may be reversed. The latest data are always effective no matter how many times teaching has been performed.

• External sensitivity setting

- External input may be used for sensitivity setting in the same way as sensitivity setting with the SET button of the sensor.
The basic operation is exactly the same as with the SET button.
- Ensure an input duration of at least 100 ms.
- The external teaching input is connected with the SET switch on the operation panel by OR logic.

NPN output type

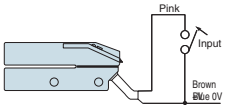
- Place a switch, etc. between the external input line (pink) and 0 V (blue). Input is activated when the external input line is short-circuited to 0 V.



- When not using external teaching, connect the pink line with H (+).

PNP output type

- Place a switch, etc. between the external input line (pink) and + V (brown). Input is activated when the external input line is short-circuited to + V.



- When not using external teaching, connect the pink line with L (–).