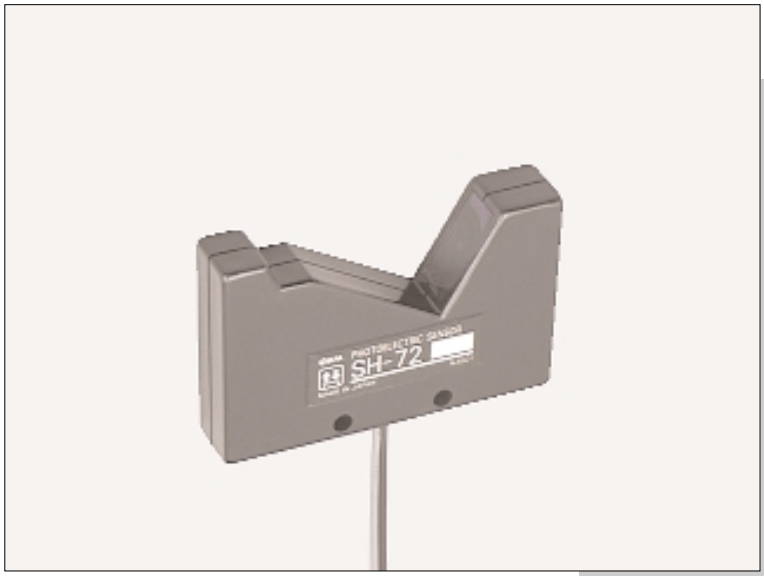
SH-72

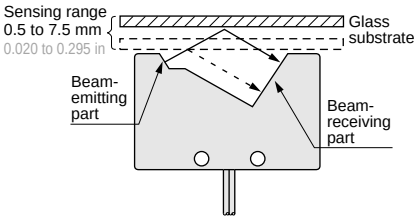
Glass Substrate Detection Sensor **Amplifier-separated**



Optimum sensing capability for LCD manufacturing

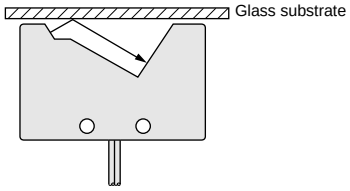
Reliable detection of glass substrates

Its unique optical system enables detection of transparent glass plate, as well as, film deposite glass plates at the same sensing distance.



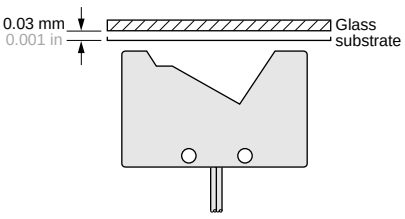
No null zone

The sensor can reliably detect a glass substrate right in front of it.



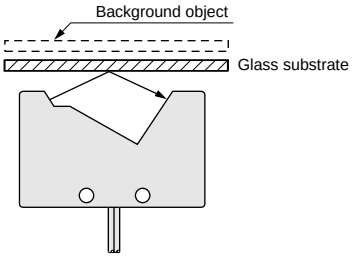
High precision

Repeatability: 0.03 mm 0.001 in



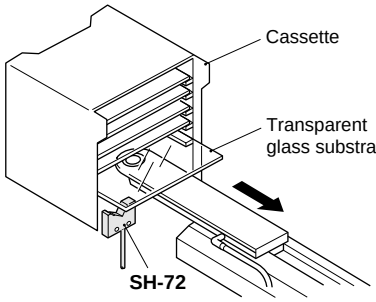
Not affected by background

Because it is convergent reflective type, a glass substrate is reliably detected without any effect of background objects.

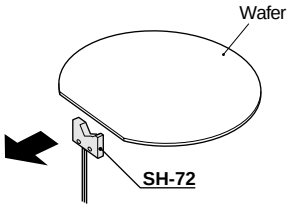


APPLICATIONS

Detecting transparent glass substrates in a cassette

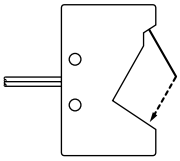


Detecting a wafer



ORDER GUIDE

Sensor head

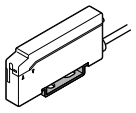
Type	Appearance	Sensing range	Model No.
Convergent reflective		0.5 to 7.5 mm 0.020 to 0.295 in (with transparent glass plate)	**SH-72**

Amplifiers

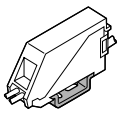
Type			Appearance	Model No.	Supply voltage	Output	Response time	External synchronization function	Timer function
Automatic sensitivity setting	Standard type	NPN output		**SU-7**	12 to 24 V DC ±10 %	Two NPN open-collector transistor outputs (sensing output and self-diagnosis output)	0.6 ms or less (0.8 ms or less when the interference prevention function is used)	———	ON-delay / OFF-delay timer (variable 0 to 5 sec.)
		PNP output		**SU-7P**		Two PNP open-collector transistor outputs (sensing output and self-diagnosis output)			
	External synchronization input type			**SU-75**		Two NPN open-collector transistor outputs (sensing output and self-diagnosis output)		Incorporated (Either gate trigger or edge trigger is selectable)	———
	Remote sensitivity setting type			**SU-77**				———	ON-delay / OFF-delay timer (variable 0 to 5 sec.)
	External sensitivity selection type			**SU-79**					
Manually sensitivity set type				**SS-A5**		Two NPN open-collector transistor outputs (sensing output and self-diagnosis output)	1 ms or less	———	Approx. 40 ms fixed OFF-delay timer

Accessories

• **MS-DIN-2** (Amplifier mounting bracket for **SU-7** series)



• **MS-DIN-1** (Amplifier mounting bracket for **SS-A5**)



SH-72

SPECIFICATIONS

Sensor head

Item \ Model No.		SH-72
Type		Convergent reflective
Applicable amplifiers		**SU-7** series, **SS-A5**
Sensing range		0.5 to 7.5 mm 0.02 to 0.295 in (with transparent glass plate)
Sensing object		□ 24 mm 0.945 in or more transparent glass, aluminum-evaporated mirror, etc.
Hysteresis		5 % or less of operation distance
Repeatability (along sensing axis)		0.03 mm 0.001 in or less
Environmental resistance	Ambient temperature	− 10 to + 60 °C + 14 to + 140 °F (No dew condensation or icing allowed), Storage − 10 to + 60° C + 14 to + 140 °F
	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 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each
	Shock resistance	500 m/s^2 acceleration (50 G approx.) in X, Y and Z directions for three times each
Emitting element		Infrared LED (modulated)
Material		Enclosure: Polycarbonate
Cable		0.089 mm^2 single core two parallel shielded cables, 3 m 9.843 ft long
Cable extension		Extension up to total 5 m 16.404 ft is possible with an equivalent cable.
Weight		25 g approx.

SPECIFICATIONS

Amplifiers

Item \ Type		Slim body with automatic sensitivity setting amplifier		Manually sensitivity set amplifier
		NPN output	PNP output	
Model No.		**SU-7** (Note)	**SU-7P** (Note)	**SS-A5**
Supply voltage		12 to 24 V DC ± 10 % Ripple P-P 10 % or less		
Current consumption		35 mA or less		40 mA or less
Sensing output		NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between sensing output and 0 V) • Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)	PNP open-collector transistor • Maximum source current: 100 mA • Applied voltage: 30 V DC or less (between sensing output and + V) • Residual voltage: 2.0 V or less (at 100 mA source current) 1.0 V or less (at 16 mA source current)	NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between sensing output and 0 V) • Residual voltage: 1.5 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)
	Output operation	Selectable either Light-ON or Dark-ON with the ON and OFF buttons		Selectable either Light-ON or Dark-ON with the operation mode switch
	Short-circuit protection	Incorporated		
Self-diagnosis output		NPN open-collector transistor • Maximum sink current: 50 mA • Applied voltage: 30 V DC or less (between self-diagnosis output and 0 V) • Residual voltage: 1 V or less (at 50 mA sink current) 0.4 V or less (at 16 mA sink current)	PNP open-collector transistor • Maximum source current: 50 mA • Applied voltage: 30 V DC or less (between self-diagnosis output and + V) • Residual voltage: 2.0 V or less (at 50 mA source current) 1.0 V or less (at 16 mA source current)	NPN open-collector transistor • Maximum sink current: 50 mA • Applied voltage: 30 V DC or less (between self-diagnosis output and 0 V) • Residual voltage: 1 V or less (at 50 mA sink current) 0.4 V or less (at 16 mA sink current)
	Output operation	ON under unstable sensing condition (restored automatically after 40 ms approx.), or if the sensing output is short-circuited (restored when short-circuit is rectified)		ON under stable sensing condition
	Short-circuit protection	———		
Response time		0.6 ms or less (0.8 ms or less when the interference prevention function is used)		1 ms or less
Operation indicator		Red LED (lights up when the sensing output is ON)		
Stability indicator		Green LED (lights up under stable light received condition or stable dark condition) (Refer to the **SU-7** series p.392〜 for details)		Green LED (lights up under stable light received condition or stable dark condition)
Sensitivity adjuster		———		Continuously variable twin adjusters
Interference prevention function		Incorporated (Two units of sensors can be mounted close together.)		
Timer function		ON-delay / OFF-delay timer (variable 0 to 5 sec.)		Approx. 40 ms fixed OFF-delay timer, selectable either effective or ineffective
External synchronization function		(Either gate trigger or edge trigger is selectable with **SU-75**)		———
Environmental resistance	Ambient temperature	− 10 to + 55 °C + 14 to + 131 °F, Storage: − 20 to + 70 °C − 4 to + 158 °F		− 25 to + 60 °C − 13 to + 140 °F, Storage: − 30 to + 70 °C − 22 to + 158 °F
	Ambient humidity	35 to 85 % RH (No dew condensation or icing allowed), Storage: 35 to 85 % RH		
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure		
	Insulation resistance	20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure		20 MΩ, or more, with 500 V DC megger between all supply terminals connected together and enclosure
	Vibration resistance	10 to 150 Hz frequency, 0.75 mm 0.030 in amplitude in X, Y and Z directions for two hours each		10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each
	Shock resistance	100 m/s² acceleration (10 G approx.) in X, Y and Z directions for five times each		100 m/s² acceleration (10 G approx.) in X, Y and Z directions for three times each
Material		Enclosure: Heat-resistant ABS Cover: Polycarbonate Cable lock lever: PPS		Enclosure: Heat-resistant ABS Cover: Polycarbonate
Cable		0.2 mm² 4-core cabtyre cable, 2 m 6.562 ft long		0.2 mm² 4-core cabtyre cable, 3 m 9.843 ft long
Weight		65 g approx.		120 g approx.
Accessories		**MS-DIN-2** (Amplifier mounting bracket): 1 pc.		**MS-DIN-1**(Amplifier mounting bracket): 1 pc. Adjusting screwdriver: 1 pc. Adjuster cap: 1 pc.

Note: Refer to p.392 for details of other **SU-7** series amplifiers.

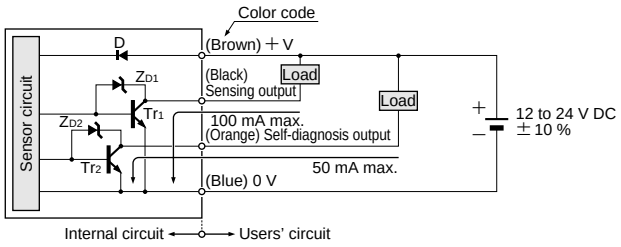
SH-72

I/O CIRCUIT AND WIRING DIAGRAMS

Refer to p.393 for '**I/O CIRCUIT AND WIRING DIAGRAMS**' of **SU-7** series excluding **SU-7** and **SU-7P**, respectively.

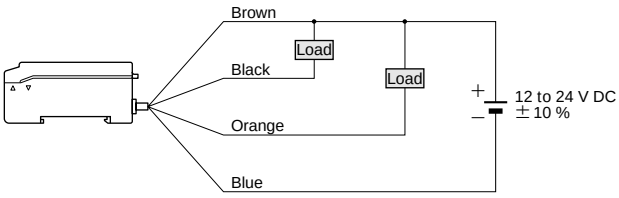
SU-7

I/O circuit diagram



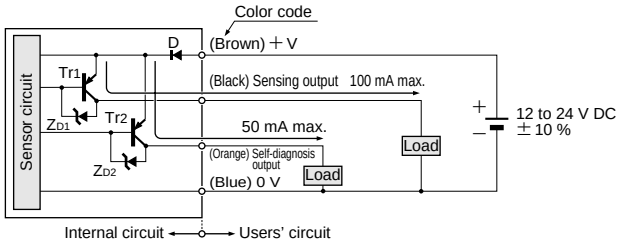
Symbols ... D: Reverse supply polarity protection diode
Z_{D1}, Z_{D2}: Surge absorption zener diode
Tr_1, Tr_2 : NPN output transistor

Wiring diagram



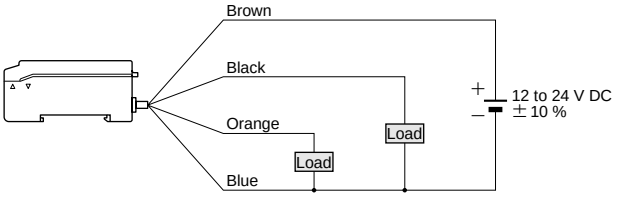
SU-7P

I/O circuit diagram



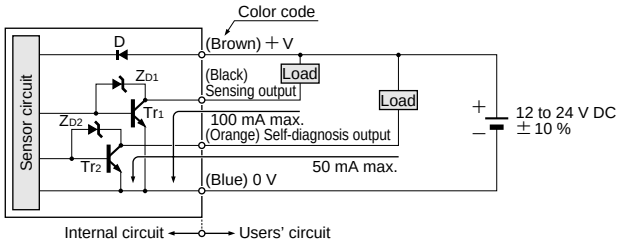
Symbols ... D: Reverse supply polarity protection diode
Z_{D1}, Z_{D2}: Surge absorption zener diode
Tr_1, Tr_2 : PNP output transistor

Wiring diagram



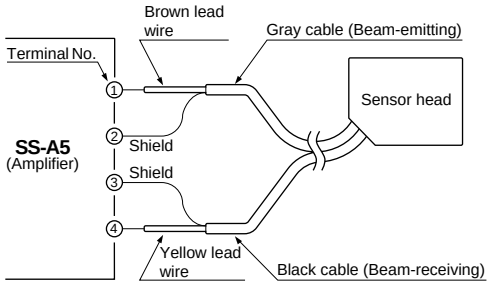
SS-A5

I/O circuit diagram



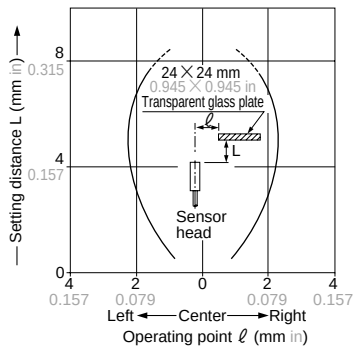
Symbols ... D: Reverse supply polarity protection diode
Z_{D1}, Z_{D2}: Surge absorption zener diode
Tr_1, Tr_2 : NPN output transistor

Wiring diagram to sensor head



SENSING CHARACTERISTICS (TYPICAL)

Sensing field



PRECAUTIONS FOR PROPER USE

Refer to p.1135〜 for general precautions, p.397〜 for precautions for **SU-7** series, and p.409〜 for precautions for **SS-A5.**

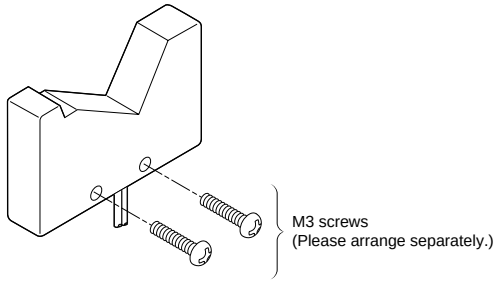
SH-72

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.

• Use the sensor head and the amplifier together at a set.

Mounting of the sensor head

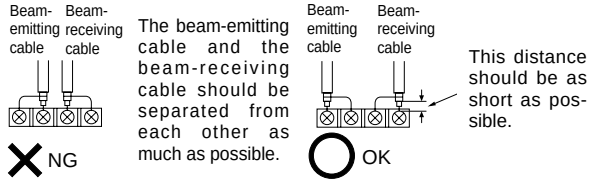
• The tightening torque with M3 screws should be 0.29 N·m or less.



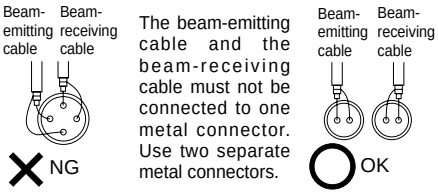
Wiring

• If the attached sensor head cables need to be extended, use two single core shielded cables of at least equivalent quality. (Extension up to total 5 m 16.404 ft is possible.)
If a joint terminal or connector is used for extension, refer to the figures below. (The shielded extension cable must be of ϕ1.45 mm ϕ0.057 in outer diameter.)

Connection with joint terminal



Connection with metal connector



DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the SUNX website: http://www.sunx.co.jp/
Refer to p.402 and p.412 for dimensions of **SU-7** series, and **SS-A5**, respectively.

SH-72 Sensor head