Autonics

PHOTOELECTRIC SENSOR

BR SERIES

M A N U A L

Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

■ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the cautions that follow;

⚠ **Warning** Serious injury may result if instructions are not followed.

⚠ **Caution** Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.
⚠ caution: Injury or danger may occur under special conditions.

⚠ Warning

1. **In case of using this unit with machinery(Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device.**
   It may cause a fire, human injury or damage to property

⚠ Caution

1. **This unit shall not be used outdoors.**
   It might shorten the life cycle of the product or give an electric shock.
   Use this product inside only. Do not use the product outdoors or location subject to temperatures or humidity outside.(Ex: rain, dirty, frost, sunlight, condensation, etc.)
2. **Do not use this unit where there is flammable or explosive gas.**
   It may cause a fire or explosion.
3. **Please observe the rated voltage and do not suppy AC power.**
   It may shorten the life cycle or damage to the product.
4. **Please check the polarity of power and wrong wiring.**
   It may result in damage to this unit.
5. **Do not use this unit in place where there is vibration or impact.**
   It may result in product damage.
6. **In cleaning the unit, do not use water or an oil-based detergent.**
   It might cause an electric shock or fire that will result in damage to the product.

■ Ordering information

BR P 100 M – T D T □ □ – P

Control output	No-mark	NPN open collector output
	P	PNP open collector output
	1	Emitter
	2	Receiver
Operation mode (Through-beam)	D	Dark ON
	L	Light ON
Optic properties (Diffuse reflective)	N	Narrow beam type
	No-mark	Standard type(Diffuse type)
Output	T	Solid-state output(Transistor)
Power supply	D	DC power
Sensing type	T	Through-beam
	D	Diffuse reflective
	M	Retroreflective
Sensing distance unit	M	Unit: m
	No-mark	Unit: mm
Sensing distance	Number	Sensing distance
Case material	P	Plastic
	No-mark	Metal
Item	BR	Photoelectic sensor series

※□: This information is intended for product management of through-beam type.
(No need to refer when selecting a model.)

■ Operation mode

Operation mode	Light ON	Dark ON
Receiver operation	Received light / Interrupted light	
Operation indicator (LED)	ON / OFF	
Transistor output	ON / OFF	

※The transistor output will be held OFF for 0.5 sec. after supplied power in order to prevent malfunction of this photoelectric sensor(Except through-beam type).
※If the control output terminal is short-circuited or flows beyond the rated current, the control signal will not be output normally due to protection circuit.

※**The above specifications are subject to change without notice.**

■ Specifications

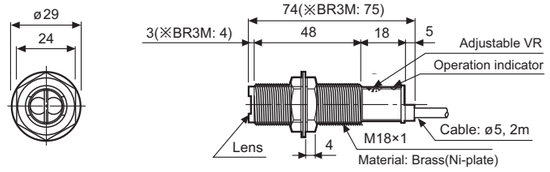
Sensing type	Diffuse reflective				Narrow beam reflective		Retroreflective		Through-beam	
Model	BRP100-DDT	BR100-DDT	BRP400-DDT	BR400-DDT	BRP200-DDTN	BR200-DDTN	BRP3M-MDT	BR3M-MDT	BR4M-TDTD / BR4M-TDTD-P	BR4M-TDTL / BR4M-TDTL-P
	BRP100-DDT-P	BR100-DDT-P	BRP400-DDT-P	BR400-DDT-P	BRP200-DDTN-P	BR200-DDTN-P	BRP3M-MDT-P	BR3M-MDT-P	BR20M-TDTD / BR20M-TDTD-P	BR20M-TDTL / BR20M-TDTL-P
Sensing distance	100mm※1		400mm※2		200mm※2		0.1 to 3m※3		4m, 20m	
Sensing target	Translucent, Opaque materials						Opaque materials of min. ø60mm		Opaque materials of min. ø15mm	
Hysteresis	Max. 20% at rated setting distance						—			
Response time	Max. 1ms									
Power supply	12-24VDC ±10%(Ripple P-P: Max. 10%)									
Current consumption	Max. 45mA									
Light source	Infrared LED(940nm)		Infrared LED(850nm)				Red LED(660nm)		Infrared LED(850nm)	
Sensitivity adjustment	Adjustable(VR)								Fixed	
Operation mode	Selectable Light ON or Dark ON by control cable(White)								Dark ON	Light ON
Control output	•NPN open collector output ☞ Load voltage: Max. 30VDC, Load current: Max. 200mA, Residual voltage: Max. 1V •PNP open collector output ☞ Output voltage: Min. power voltage-2.5V, Load current: Max. 200mA									
Protection circuit	Reverse polarity protection circuit, Output short-circuit protection circuit									
Indicator	Operation indicator: Red LED, Power indicator: Red LED(only for emitter of through-beam type)									
Connection	Outgoing cable									
Insulation resistance	Min. 20MΩ (at 500VDC megger)									
Noise resistance	±240V the square wave noise(pulse width: 1μs) by the noise simulator									
Dielectric strength	1000VAC 50/60Hz for 1 minute									
Vibration	1.5mm amplitude at frequency of 10 to 55Hz(for 1 min.) in each of X, Y, Z directions for 2 hours									
Shock	500m/s² (50G) in X, Y, Z directions for 3 times									
Environment: Ambient illumination	Sunlight: Max. 11,000/x, Incandescent lamp: Max. 3,000/x(Receiver illumination)									
Environment: Ambient temperature	-10 to 60℃, Storage: -25 to 75℃									
Environment: Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH									
Protection	IP66(IEC standard)									
Material	•Case ☞ BRP: PA(Black) BR: Brass, Ni-plate •Sensing part ☞ PC						•Case ☞ BRP3M: PA (Black) / BR3M: Brass, Ni-plate •Sensing part ☞ Acrylic		•Case ☞ Brass, Ni-plate •Sensing part ☞ BR4M: Glass, BR20M: PC	
Cable	ø5mm, 4P, Length: 2m(Emitter of through-beam type: ø5mm, 2P, Length: 2m / Receiver: ø 5mm, 3P, Length: 2m) (AWG 22, Core wire diameter: ø0.08, Number of core wire: 60, Insulator out diameter: ø1.2)									
Accessory: Separate	VR adjustment driver						VR adjustment driver, Reflector(MS-2)		—	
Accessory: Common	BR: Fixing Nuts, Washer / BRP: Fixing Nuts									
Unit weight	Approx. 100g	Approx. 120g	Approx. 100g	Approx. 120g	Approx. 100g	Approx. 120g	Approx. 100g	Approx. 120g	Approx. 300g	
Approval	CE									

※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.
※**1:** Non-glossy white paper 50×50mm ※**2:** Non-glossy white paper 100×100mm.
※**3:** Sensing distance and sensing target for Retroreflective type is rated based on reflector(MS-2). Sensing distance indicates possible reflector setting range. Sensing under 0.1m is also available.

■ Dimensions

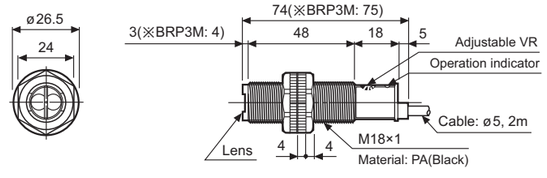
(Unit: mm)

●BR100-DDT / BR100-DDT-P
●BR400-DDT / BR400-DDT-P



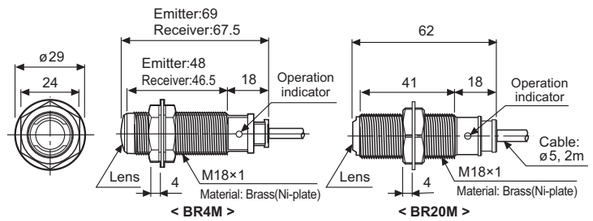
●BR200-DDTN / BR200-DDTN-P
●BR3M-MDT / BR3M-MDT-P (※)

●BRP100-DDT / BRP100-DDT-P
●BRP400-DDT / BRP400-DDT-P



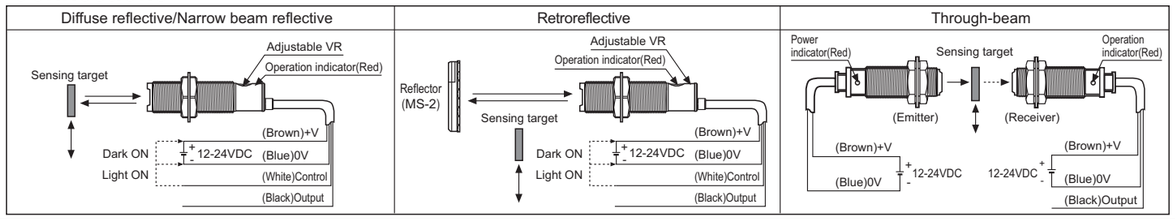
●BRP200-DDTN / BRP200-DDTN-P
●BRP3M-MDT / BRP3M-MDT-P (※)

●BR4M-TDTD / BR4M-TDTD-P / BR4M-TDTL / BR4M-TDTL-P
BR20M-TDTD / BR20M-TDTD-P / BR20M-TDTL / BR20M-TDTL-P



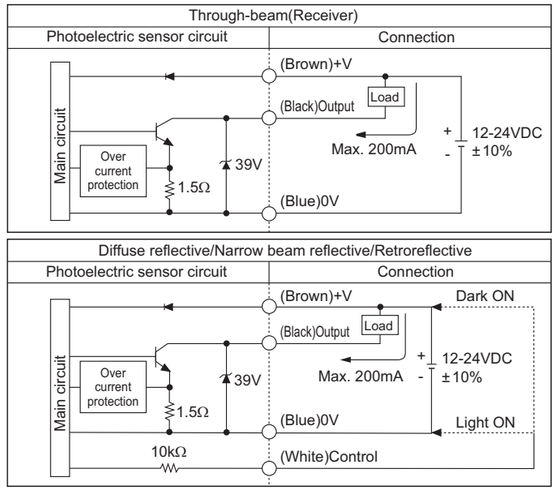
< BR4M > **< BR20M >**

■ Connections

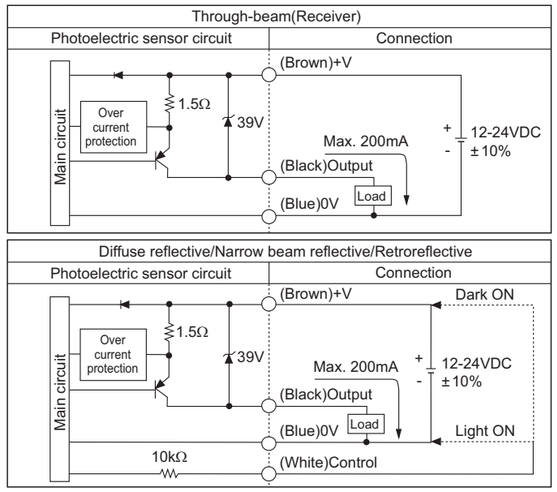


■ Control output circuit diagram

●NPN open collector output



●PNP open collector output



※Before using this unit, select Light ON/Dark ON with control cable.(Light ON: Connect control cable with 0V/Dark ON: Connect control cable with +V)
※Control cable is only for Diffuse reflective/Narrow beam reflective/Retroreflective type.

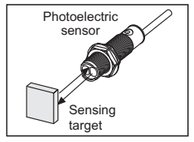
■ Installation and sensitivity adjustment

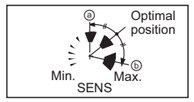
Please supply the power to the sensor, after setting the emitter and the receiver in face to face, and then adjust an optical axis and the sensitivity as follow;

● **Diffuse reflective/Narrow beam reflective**

1. Even though the sensor is still available at the max. sensitivity position, it is recommended to adjust sensor sensitivity with considering existence of reflective material in background.
2. Set the target at a position to be detected by the beam, then turn the adjuster until point ⓐ which the indicator turns on from Min. position of the adjuster.
3. Take the target out of the photoelectric sensor, then turn the adjuster until point ⓑ which the indicator turns ON. [If the indicator does not turn on, max. position is point ⓑ.]
4. Set the adjuster at the center of two switching point ⓐ, ⓑ.

※The sensing distance indicated in the specification chart is for non-glossy white paper 100×100mm or 50×50mm. It is subject to change depending on the size of sensing target, surface status and gloss, etc.

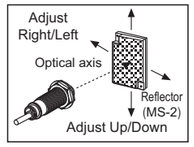


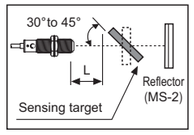


● **Retroreflective**

1. Set the sensor and reflector(MS-2) in opposite each other and supply the power.
2. Check stable indicator operation range with moving both sensor and reflector up/down and right/left and adjust the position in the middle.
3. After finishing position adjustment, check whether the sensor is operated normally with placing a sensing target on optical axis.

※In case of using multiple sensors in parallel, keep each sensor's distance min. 30cm.
※In case sensing target has higher reflectivity than non-glossy white paper, the sensor may cause malfunction due to direct reflected light from the target. Keep certain distance between a sensor and sensing target, or install the sensor with making sensing target's surface inclining 30° to 45° to photo sensor's optical axis.
※Sensitivity adjustment: Please see the diffuse reflective /narrow beam reflective type.

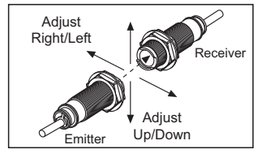




● **Through-beam**

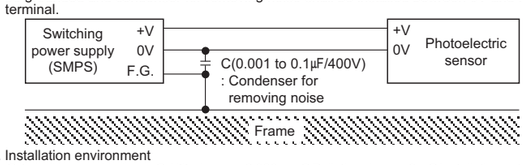
1. Set the receiver and emitter in opposite each other and supply the power.
2. Check stable indicator operation range with moving both receiver and emitter up/down and right/left and adjust the position in the middle.
3. After finishing position adjustment, check whether the sensor is operated normally with placing a sensing target on optical axis.

※If the sensing target is translucent body or smaller than ø15, it might not detect the target cause light passed.



■ Caution for using

1. Intercept a strong source of light as like sunlight, spotlight within inclination angle range of photoelectric sensor.
2. The photoelectric sensor may cause malfunction under the fluorescent lamp light, so be sure to use cut-off light with panel.
3. When more than 2 sets of Through-beam type sensor are used closely, it might cause interference each other. Be sure to put enough space between them in order to avoid malfunction.
4. When more than 2 sets of diffuse reflective/narrow beam reflective type are installed adjacently, it can occur malfunction by light beam from the other target. So it must be installed at an enough interval.
5. If photoelectric sensor is installed at flat part, it might cause malfunction by reflection light from flat part. Be sure to put space between photoelectric sensor and ground.
6. When wiring the photoelectric sensor with high voltage line, power line in the same conduit, it may cause malfunction or mechanical trouble. Therefore please wire separately or use different conduit.
7. Avoid installing the unit as following place. Corrosive gas, oil or dust, strong flux, noise, sunlight, strong alkali, acid.
8. In case of connecting DC relay as inductive load to output, please remove surges by using diode or varistor.
9. The photoelectric sensor cable shall be used as short as possible, because it may cause malfunction by noise through the cable.
10. When it is stained by dirt at lens, please clean the lens with dry cloth, but do not use an organic materials such as alkali, acid, chromic acid.
11. When using switching power supply as the source of supplying power, F.G. terminal shall be grounded and condenser for removing noise shall be installed between 0V and F.G. terminal.



12. Installation environment
    ①It shall be used indoor ②Altitude max. 2,000m ③Pollution degree 2 ④Installation categoryII

※**It may cause malfunction if above instructions are not followed.**

■ Major products

- Proximity sensors
- Area sensors
- Door/Door side sensors
- Counters
- Rotary encoders
- Power controllers
- Panel meters
- Temperature controllers
- Switching power supplies
- Temperature/Humidity transducers
- Tachometer/Pulse(Rate) meters
- Stepping motors/drivers/motion controllers
- Laser marking system(CO_2, Nd:YAG)
- Laser welding/soldering system
- Photoelectric sensors
- Fiber optic sensors
- Pressure sensors
- Timers
- Display units
- Sensor controllers
- Graphic/Logic panels
- Field network devices

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