

# Autonics

## Cylindrical Photoelectric Sensor BRQ SERIES (front sensing type)

### INSTRUCTION MANUAL



Thank you for choosing our Autonics product.  
Please read the following safety considerations before use.

#### ■ Safety Considerations

⚠ Please observe all safety considerations for safe and proper product operation to avoid hazards.  
⚠ symbol represents caution due to special circumstances in which hazards may occur.

**Warning** Failure to follow these instructions may result in serious injury or death.

**Caution** Failure to follow these instructions may result in personal injury or product damage.

#### ⚠ Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.) Failure to follow this instruction may result in personal injury, economic loss or fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present. Failure to follow this instruction may result in explosion or fire.
- Do not disassemble or modify the unit. Failure to follow this instruction may result in fire.
- Do not connect, repair, or inspect the unit while connected to a power source. Failure to follow this instruction may result in fire.
- Check 'Connections' before wiring. Failure to follow this instruction may result in fire.

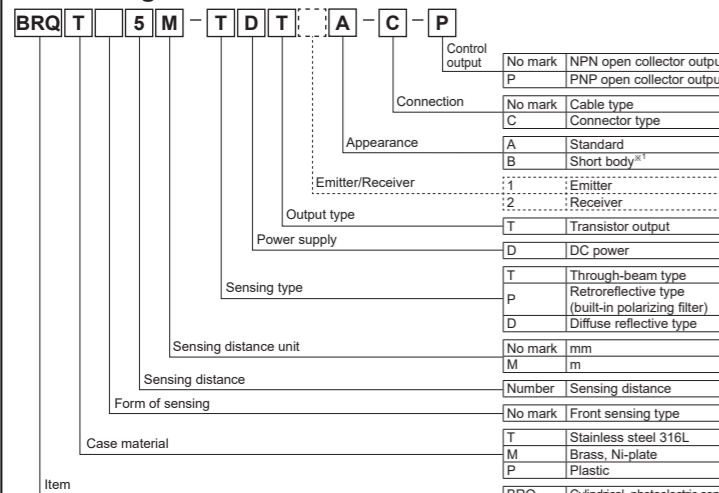
#### ⚠ Caution

- Use the unit within the rated specifications. Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent. Failure to follow this instruction may result in fire.

#### ⚠ Caution

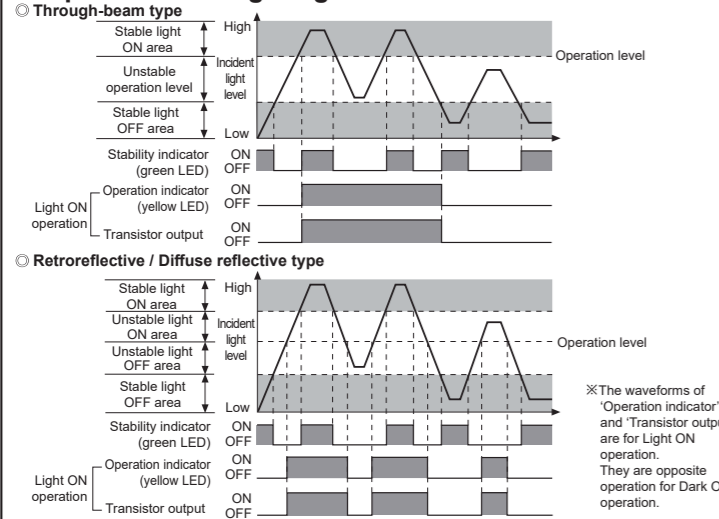
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#### ■ Ordering Information



※1: This is only for BRQP Series.  
※2: This information is intended for product management of through-beam type. (no need to refer when selecting model)

#### ■ Operation Timing Diagram



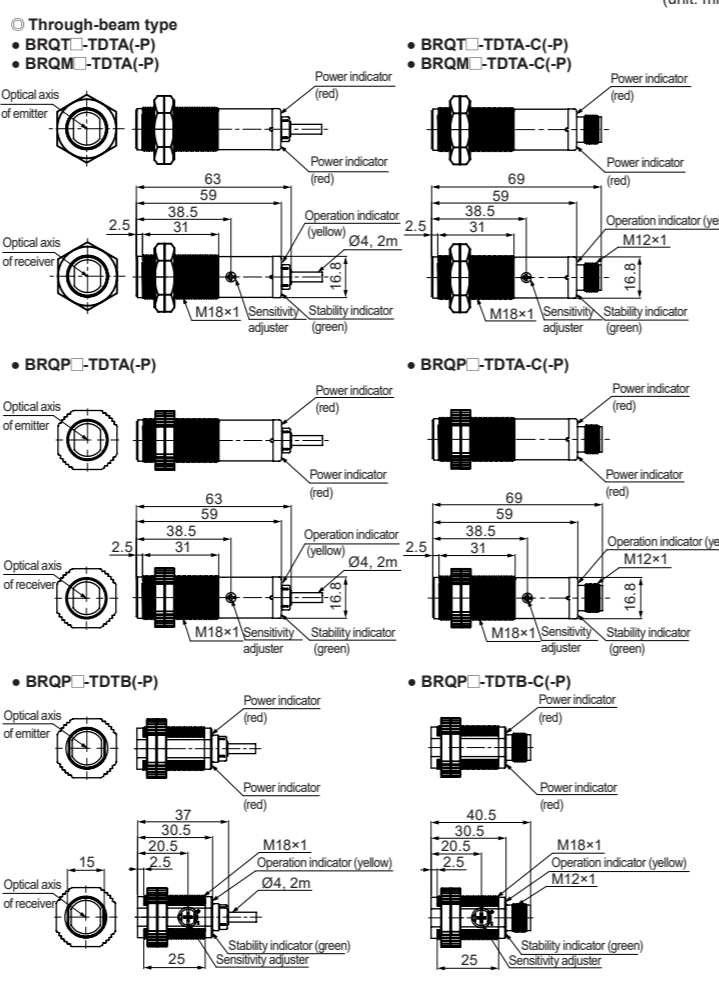
※The above specifications are subject to change and some models may be discontinued without notice.  
※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

#### ■ Specifications

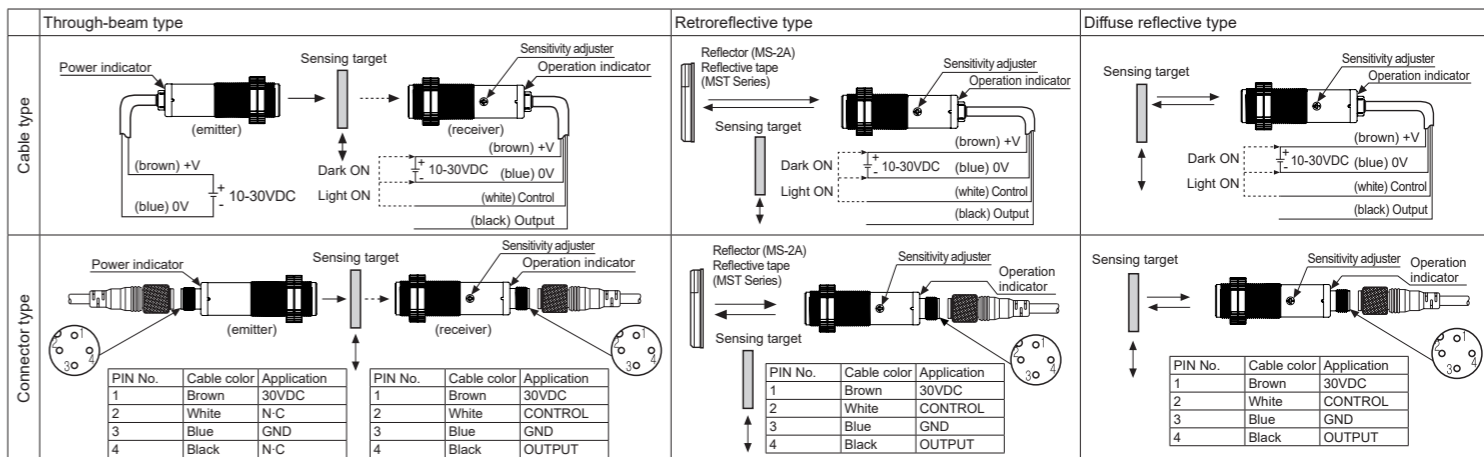
Model	NPN open collector output PNP open collector output	BRQ 5M TDT 5-P	BRQ 20M TDT 20-P	BRQ 30M TDT 30-P	BRQ 3M PDT 3-P	BRQ 100 DDT 100-P	BRQ 400 DDT 400-P	BRQ 1M DDT 1M-P	
Sensing type	Through-beam type	Retroreflective type (built-in polarizing filter)				Diffuse reflective type			
Sensing distance	5m	20m	30m	3m <sup>*1</sup>	100m <sup>*2</sup>	400m <sup>*2</sup>	1m <sup>*3</sup>		
Sensing target	Opaque materials of min. Ø7mm	Opaque materials of min. Ø75mm				Opaque, translucent materials			
Hysteresis	—								
Response time	Max. 1ms								
Power supply	10-30VDC ± 10% (ripple P-P: max. 10%)								
Current consumption	Emitter/Receiver: max. 20mA Max. 30mA								
Light source	Red LED (660nm)				Infrared LED (850nm)		Red LED (660nm)		
Sensitivity adjustment	Sensitivity adjuster								
Operation mode	Selectable Light ON or Dark ON by control wire (white)								
Control output	NPN or PNP open collector output * Load current: max. 100mA * Residual voltage: max. 2VDC=								
Protection circuit	Power/Output reverse polarity protection circuit, output short over current protection circuit, interference prevention function (except through-beam type)								
Indicator	Operation indicator: yellow LED, Stability indicator: green LED (emitter power indicator of through-beam type: red LED)								
Connection	Cable type, connector type								
Insulation resistance	Over 20MΩ (at 500VDC megger)								
Noise immunity	±240V the square wave noise (pulse width: 1μs) by the noise simulator								
Dielectric strength	1,000VAC 50/60Hz for 1 minute								
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours								
Shock	500m/s <sup>2</sup> (approx. 50G) in X, Y, Z direction for 3 times								
Environment	Sunlight: max. 11,000lx, Incandescent lamp: max. 3,000lx (receiver illumination)								
Environment	Ambient illu. Ambient temp. Ambient humi.								
Environment	-25 to 60°C, storage: -30 to 70°C								
Environment	35 to 85%RH, storage: 35 to 95%RH								
Protection structure	* BRQ Series: IP67 (IEC standard), IP69K (DIN standard) * BRQM, BRQP Series: IP67 (IEC standard)								
Material	* Case: BRQ Series - stainless steel 316L / BRQM Series - brass, Ni-plate BRQP Series - polycarbonate * Lens, Lens cover: polymethyl methacrylate acrylic								
Cable <sup>*4</sup>	Ø4mm, 4-wire, 2m (emitter of through-beam type: Ø4mm, 2-wire, 2m) (AWG26, core diameter: 0.52mm, number of cores: 20, insulator out diameter: Ø1mm)								
Accessory	Individual	Reflector (MS-2A)			—				
Approval	Common	M18 fixing nut: 4, adjustment screwdriver			M18 fixing nut: 2, adjustment screwdriver				
Weight <sup>*5</sup>	Cable type	BRQT/ABRQM-A: approx. 220g (approx. 140g) BRQP-A: approx. 160g (approx. 110g) BRQP-B: approx. 150g (approx. 100g)		BRQT-A/BRQM-A: approx. 150g (approx. 70g) BRQP-A: approx. 120g (approx. 60g) BRQP-B: approx. 120g (approx. 50g)		BRQT-A/BRQM-A: approx. 140g (approx. 30g) BRQP-A: approx. 110g (approx. 25g) BRQP-B: approx. 100g (approx. 15g)		—	
Weight <sup>*5</sup>	Connector type	—		—		—		—	

※1: The sensing distance is specified with the MS-2A reflector.  
The distance between the sensor and the reflector should be set over 0.1m.  
When using reflective tapes, the reflectivity will vary by the size of the tape. Please refer to the catalog or web site.  
※2: Non-glossy white paper 100×100mm.  
※3: Non-glossy white paper 300×300mm.  
※4: M12 connector cable is sold separately.  
※5: The weight includes packaging. The weight in parenthesis is for unit only.  
※The temperature or humidity mentioned in Environment indicates a non freezing or condensation.

#### ■ Dimensions

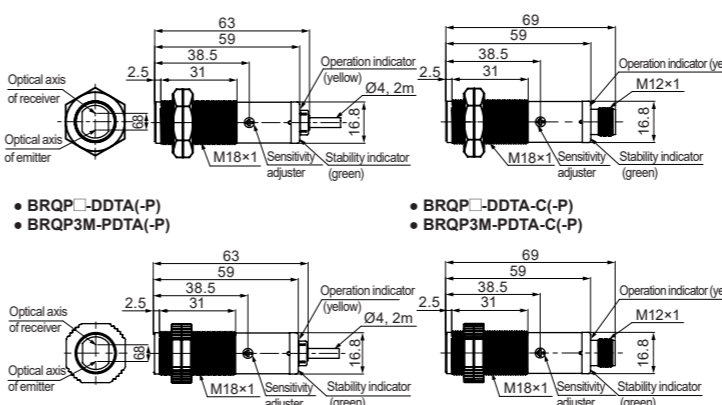


#### ■ Connections

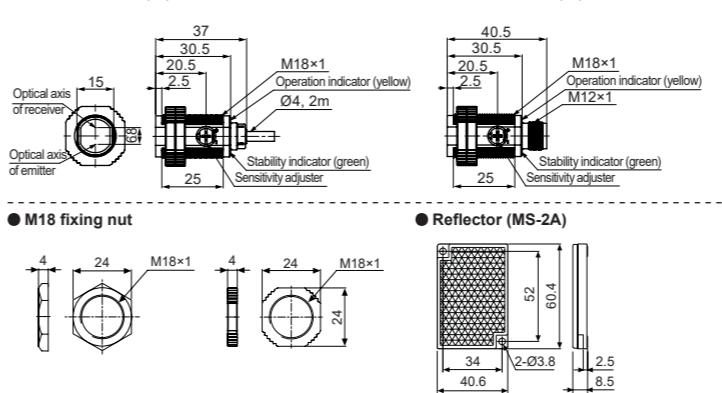


#### ○ Retroreflective/Diffuse reflective type

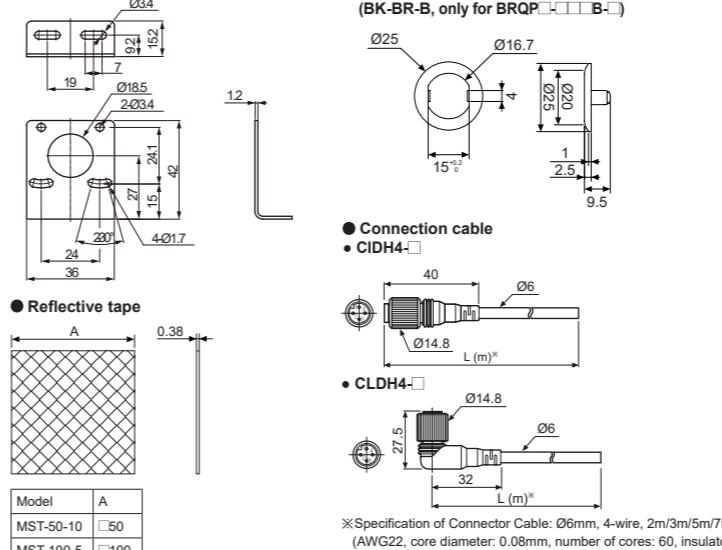
- BRQT-DDTA(-P)/BRQM-DDTA(-P)
- BRQT3M-PDTA(-P)/BRQM3M-PDTA(-P)
- BRQT-DDTA-C(-P)/BRQM-DDTA-C(-P)
- BRQT3M-PDTA-C(-P)/BRQM3M-PDTA-C(-P)



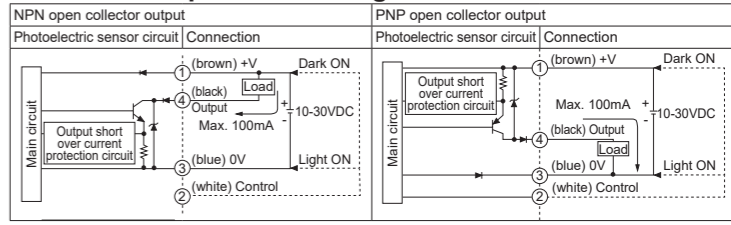
- BRQP-DDTA(-P)
- BRQP3M-PDTA(-P)
- BRQP-DDTA-C(-P)
- BRQP3M-PDTA-C(-P)



- BRQP-DDTB(-P)
- BRQP3M-PDTB(-P)
- BRQP-DDTB-C(-P)
- BRQP3M-PDTB-C(-P)



#### ■ Control Output Circuit Diagram



※Before using this unit, select Light ON/Dark ON with control wire.  
(Light ON: connect control wire with 0V/Dark ON: connect control wire with +V)  
※If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the output short over current protection circuit.

#### ■ Installation and Sensitivity Adjustment

- Install the sensor to the desired place and check the connections. Supply the power to the sensor and adjust the optical axis and the sensitivity as following. When using the reflective type photoelectric sensors closely over three units, it may result in malfunction due to mutual interference.
  - When using the through-beam type photoelectric sensors closely over two units, it may result in malfunction due to mutual interference.
  - When installing the product, tighten the screw with a tightening torque of 14.7N·m for BRQT/BRQM and 0.39N·m for BRQP.
- #### ○ Through-beam type
- Supply the power to the photoelectric sensor, after setting the emitter and the receiver facing each other.
  - Set the receiver in center of position in the middle of the operation range of indicator by adjusting the receiver or the emitter right and left, up and down.
  - After adjustment, check the stability of operation putting the object at the optical axis.
- ※If the sensing target is translucent body or smaller than Ø7mm, it can be missed by sensor cause light penetrate it.
- #### ○ Retroreflective type
- Supply the power to the photoelectric sensor, after setting the photoelectric sensor and the reflector (MS-2A) or reflective tape in face to face.
  - Set the photoelectric sensor in the position which indicator turns on, as adjusting the reflector or the sensor right and left, up and down.
  - Fix both units tightly after checking that the unit detects the target.
- ※Sensitivity adjustment: Refer to the diffuse reflective type's.
- #### ○ Diffuse reflective type
- The sensitivity should be adjusted depending on a sensing target or mounting place.
  - Set the target at a position to be detected by the beam, then turn the sensitivity adjuster until position ① where the operation indicator turns ON from min. position of the adjuster.
  - Take the target out of the sensing area, then turn the sensitivity adjuster until position ② where the operation indicator turns ON. If the indicator dose not turn ON, max. position is ③.
  - Set the sensitivity adjuster at the center of two switching position ①, ②.
- ※Be sure that it can be different by size, surface and gloss to target.

#### ■ Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- When connecting a DC relay or other inductive load to the output, remove surge by using diodes or varistors.
- Use the product, 0.5 sec after supplying power.  
When using separate power supply for the sensor and load, supply power to sensor first.
- 10-30VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
- When using switching mode power supply to supply the power, ground F.G. terminal and connect a condenser between 0V and F.G. terminal to remove noise.
- When using sensor with the equipment which generates noise (switching regulator, inverter, servo motor, etc.), ground F.G. terminal of the equipment.
- This unit may be used in the following environments.
  - ①Indoors (in the environment condition rated in 'Specifications')
  - ②Altitude max. 2,000m
  - ③Pollution degree 3
  - ④Installation category II

#### ■ Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connectors/Sockets
- Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controllers
- Graphic/Logic Panels
- Field Network Devices
- Laser Marking System (Fiber, CO<sub>2</sub>, Nd: YAG)
- Laser Welding/Cutting System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers

**Autonics Corporation**  
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