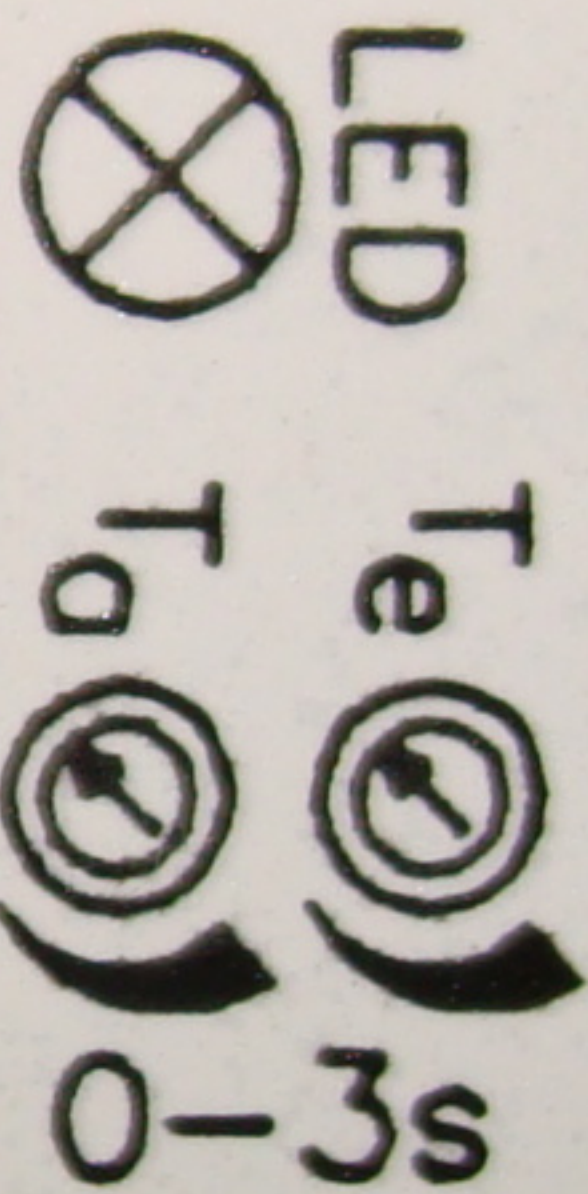
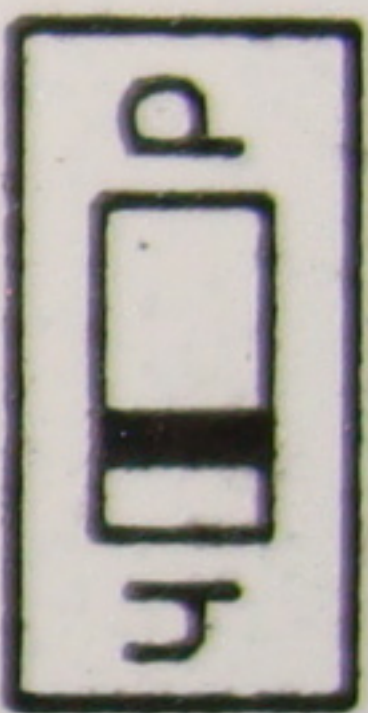
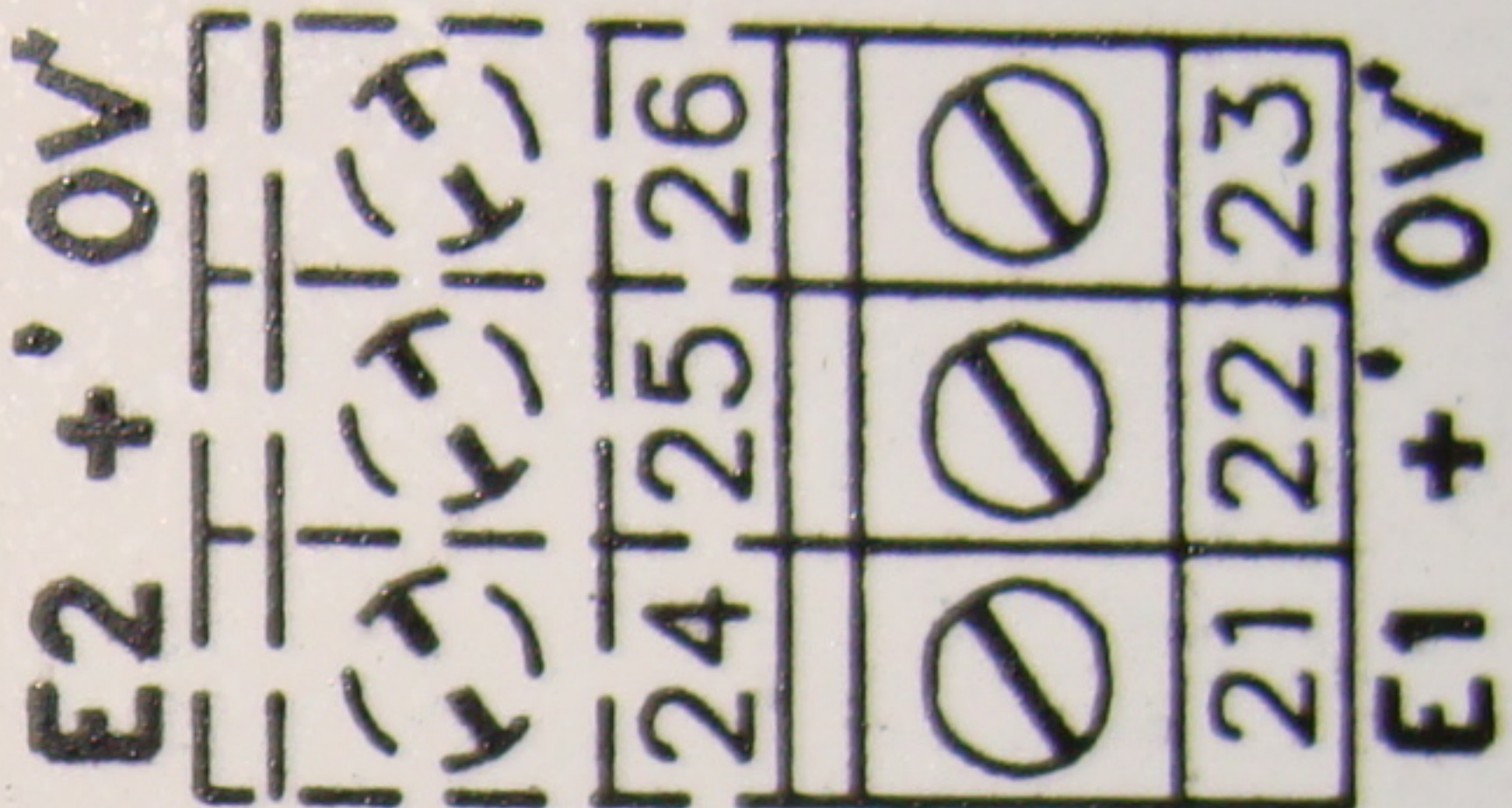
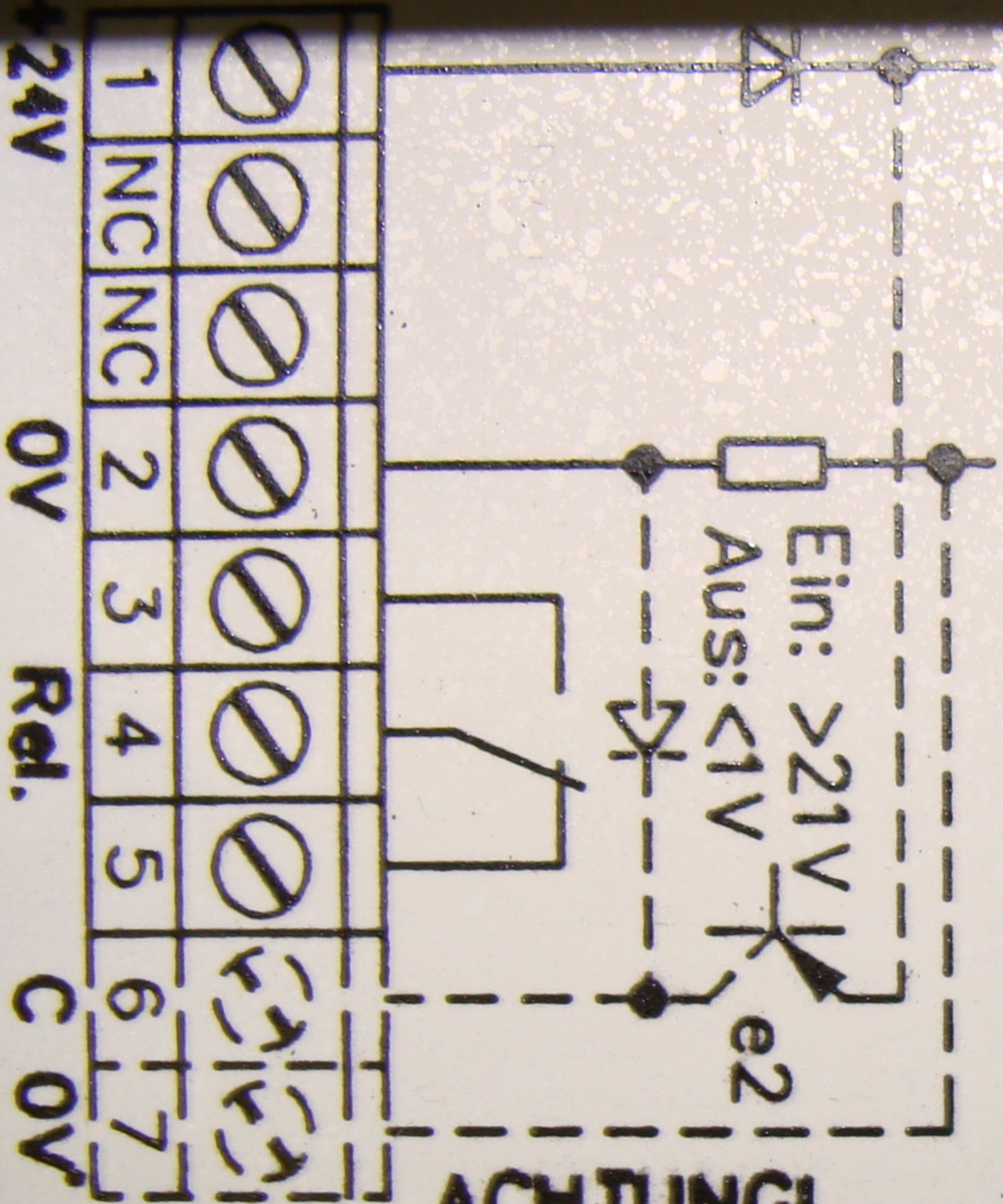


PP2441(q)/308/R153
PP8x201/2
PP8x212/2
 ..DC

21/24: Signaleing.
 22/25: +24VDC
 23/26: 0V



Ri : > 10kOhm
High : 10...30V
Low : < 4V



Klemmen 6,7,24,25,26 optional!

ACHTUNG!
KEINE 0V-Einspeisung auf Klemme 7



BW Series

Area sensor

■ Features

- Long sensing distance up to 7M
- 22 types of products
(Optical axis : 20/40mm, Sensing height : 120~940mm)
- Increased sensing stability by minimizing the non sensing area
- Easy identification of the side, front and long distance with high luminance twin operation indicators
- Includes self-diagnosis function, mutual interference prevention function, external diagnosis function.
- Polished design & slim size (W28.6×H22.6×L□mm)
- IP65 rated waterproof structure (IEC standard)



⚠ Please read "Caution for your safety" in operation manual before using.

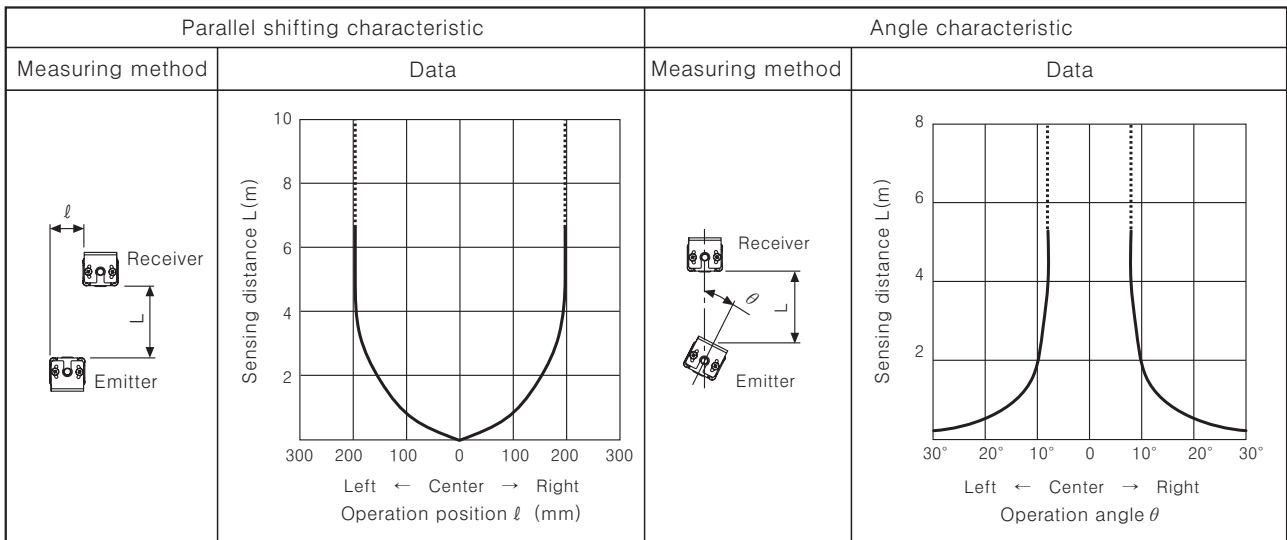


■ Specifications

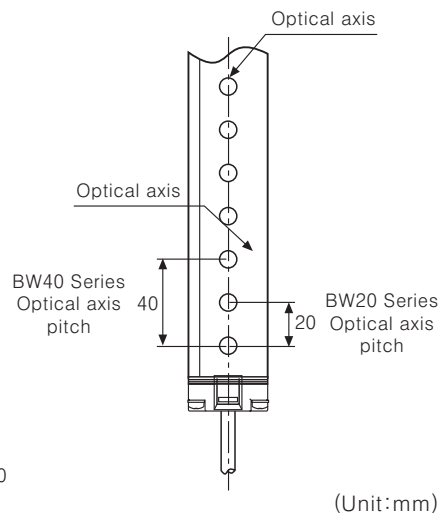
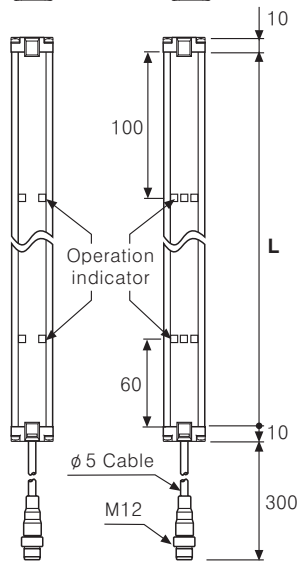
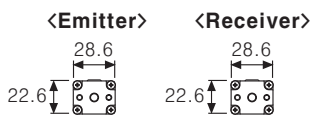
Model	NPN open collector output (Standard type)	BW20-08	BW20-20	BW20-32	BW20-44	BW40-04	BW40-10	BW40-16	BW40-22
	PNP open collector output	BW20-08P	BW20-20P	BW20-32P	BW20-44P	BW40-04P	BW40-10P	BW40-16P	BW40-22P
Sensing type	Transmitted beam type								
Sensing distance	0.1 ~ 7m								
Sensing target	Opaque materials of Min. ϕ 30mm				Opaque materials of Min. ϕ 50mm				
Optical axis pitch	20mm				40mm				
Number of optical axis	8~48pcs				4~24pcs				
Sensing width	140~940mm				120~920mm				
Power supply	12~24VDC \pm 10% (Ripple P-P:Max. 10%)								
Protection circuit	Reverse polarity protection								
Current consumption	Emitter : Max. 80mA, Receiver : Max. 80mA								
Control output	<ul style="list-style-type: none"> • NPN open collector output \Rightarrow Load voltage:Max. 30VDC, Load current:Max. 100mA, Residual voltage:Max. 1V • PNP open collector output \Rightarrow Load current:Max. 100mA, Output voltage:Min. (Power supply-2.5)V 								
Operation mode	Light ON fixed								
Short-circuit protection	Includes								
Response time	Max. 12ms								
Light source	Infrared LED (850nm modulated)								
Synchronization type	Synchronized by synchronous line								
Self-diagnosis	Ambient light monitoring, Emitter/Receiver light circuit monitoring, Output circuit monitoring								
Interference protection	Interference protection by master/slave function								
Ambient temperature	-10 ~ +55°C (at non-freezing status)								
Storage temperature	-20 ~ +60°C								
Ambient humidity	35 ~ 85%RH								
Storage humidity	35 ~ 85%RH								
Ambient illumination	Sunlight : 100,000lx								
Noise strength	The square wave noise by the noise simulator (Voltage: \pm 240V, Period:10ms, Pulse width:1 μ s)								
Dielectric strength	1,000VAC 50/60Hz for 1minute								
Insulation resistance	Min. 20M Ω (500VDC mega)								
Vibration	1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours								
Shock	500m/s ² (50G) in X, Y, Z directions for 3 times								
Protection	IP65 (IEC standard)								
Material	• Body : Aluminum • Front cover, Lens : Acrylic								
Accessory	Bracket A : 4EA, Bracket B : 4EA, Bolt : 8EA								
Unit weight	Approx. 1.4kg (For 48 optical axis)								

Area Sensor

Feature data

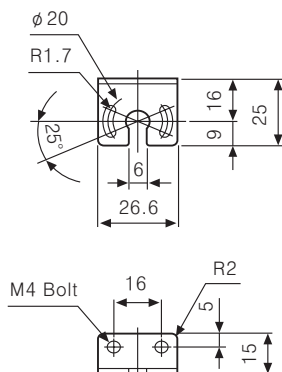


Dimensions

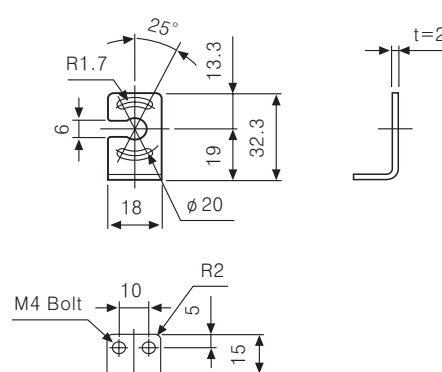


Model	L (mm)	Model	L (mm)
BW20-08(P)	160mm	BW20-32(P)	640mm
BW40-04(P)		BW40-16(P)	
BW20-12(P)	240mm	BW20-36(P)	720mm
BW40-06(P)		BW40-18(P)	
BW20-16(P)	320mm	BW20-40(P)	800mm
BW40-08(P)		BW40-20(P)	
BW20-20(P)	400mm	BW20-44(P)	880mm
BW40-10(P)		BW40-22(P)	
BW20-24(P)	480mm	BW20-48(P)	960mm
BW40-12(P)		BW40-24(P)	
BW20-28(P)	560mm		
BW40-14(P)			

Bracket A



Bracket B



(Unit:mm)

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

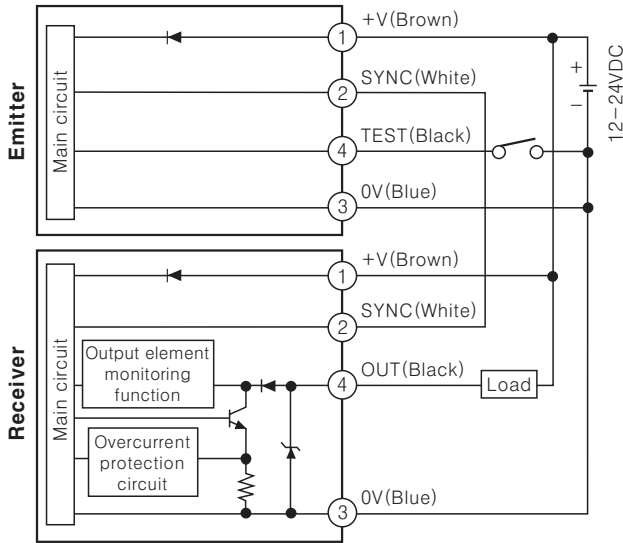
(P) Field network device

(Q) Production stoppage models & replacement

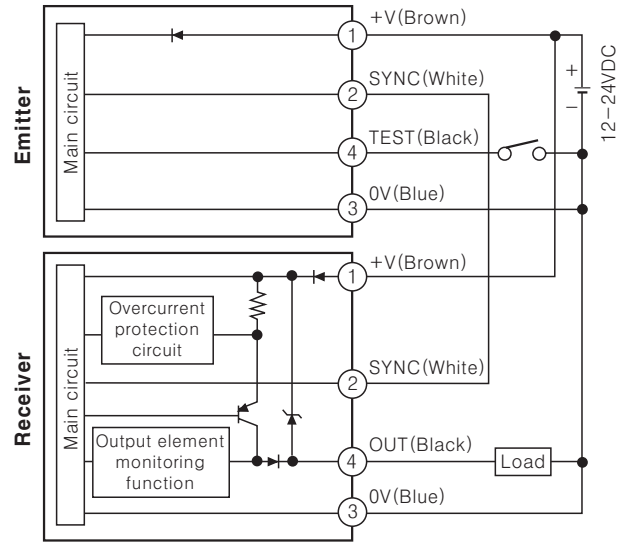
BW Series

Input/Output circuit and connection diagram

●NPN open collector output type

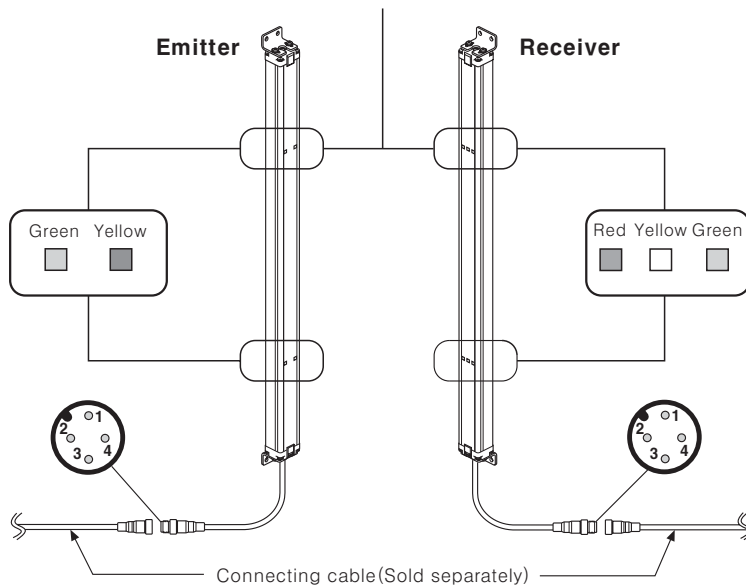


●PNP open collector output type



Structure

Upper operation indicator is set additionally, in case the number of the optical axes is more than 24pcs in BW20-Series and more than 12pcs in BW40-Series.



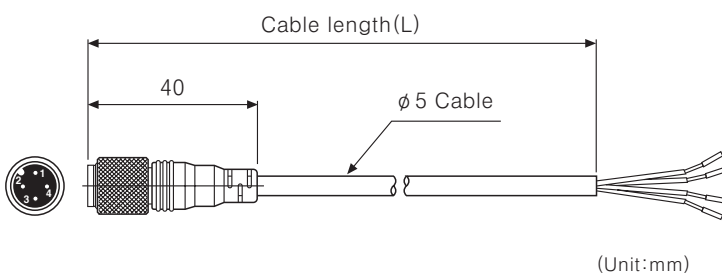
<Operation indicator >

LED color	Emitter	Receiver
Green	POWER	ON
Yellow	TEST (M/S)	UNSTABLE
Red	—	OFF

<Wiring Connection >

Pin No	Cable color	Emitter	Receiver
1	Brown	12-24VDC	12-24VDC
2	White	SYNC	SYNC
3	Blue	0V	0V
4	Black	TEST (M/S)	OUT

Connecting cable(Sold separately)



Model	Cable length(L)	Connector color
CID4-3-T CID4-3-R	3m	Emitter(T) : Black Receiver(R) : Gray
CID4-5-T CID4-5-R	5m	
CID4-7-T CID4-7-R	7m	
CID4-10-T CID4-10-R	10m	

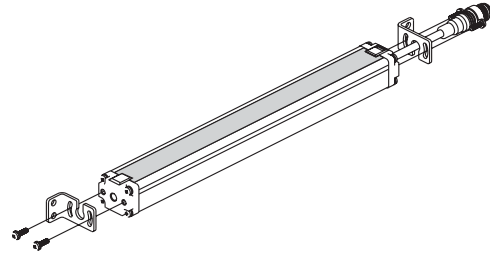
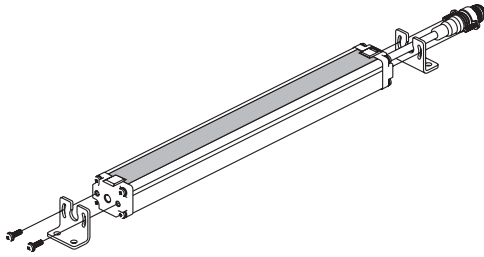
※ Connecting cable is sold separately.

Area Sensor

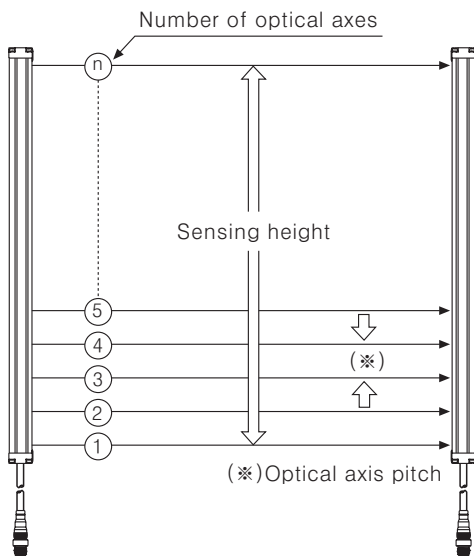
Bracket mounting

●Bracket A

●Bracket B



Optical axis pitch/Number of optical axis/Sensing height

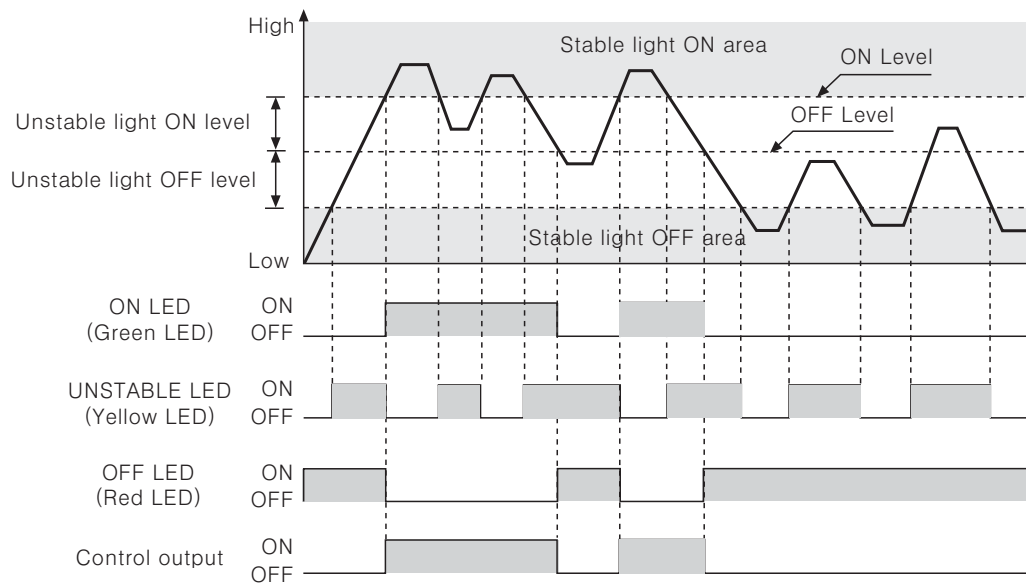


Model	Optical axis pitch
BW20-□□(P)	20mm
BW40-□□(P)	40mm

Model	Number of optical axis	Sensing height	Model	Number of optical axis	Sensing height
BW20-08(P)	8	140mm	BW40-04(P)	4	120mm
BW20-12(P)	12	220mm	BW40-06(P)	6	200mm
BW20-16(P)	16	300mm	BW40-08(P)	8	280mm
BW20-20(P)	20	380mm	BW40-10(P)	10	360mm
BW20-24(P)	24	460mm	BW40-12(P)	12	440mm
BW20-28(P)	28	540mm	BW40-14(P)	14	520mm
BW20-32(P)	32	620mm	BW40-16(P)	16	600mm
BW20-36(P)	36	700mm	BW40-18(P)	18	680mm
BW20-40(P)	40	780mm	BW40-20(P)	20	760mm
BW20-44(P)	44	860mm	BW40-22(P)	22	840mm
BW20-48(P)	48	940mm	BW40-24(P)	24	920mm

Timing diagram of operation

●Operation mode : Light ON



(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

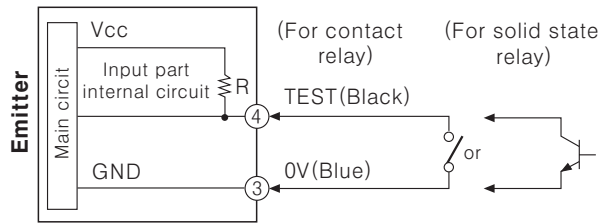
BW Series

Function

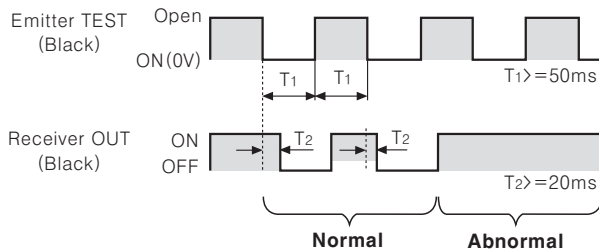
Stop transmission function (External diagnosis function)

The transmission will be stopped and yellow LED is flashed if supplying 0V to test input on the emitter. It is for checking malfunction of the sensors during TEST input on the emitter is 0V. (Control output of the receiver is OFF as it becomes light cut off when the transmission is stopped.)

Connections for TEST input



Control output pulse by TEST input



Self-diagnosis function

Control output will be OFF and operating indicator is ON when malfunction is checked by self-diagnosis regularly in normal operation.

Diagnosis items

- Emitter : ① Break of light emitting element
② Break of light emitting circuit
③ Malfunction of MASTER/SLAVE line (Operation in MASTER)
- Receiver : ① Break of light receiving circuit
② Break of output circuit
③ Overcurrent at output part
④ Synchronous line malfunction
⑤ Extraneous light received

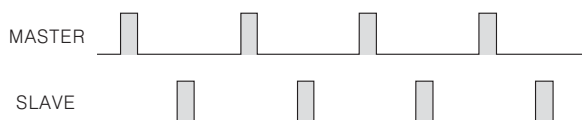
Refer to K-72, "Operation indicator" for the display operation of diagnosis.

Interference protection function

2 sensors are used in parallel in order to extend sensing width, the detection will be failure because as light interference.

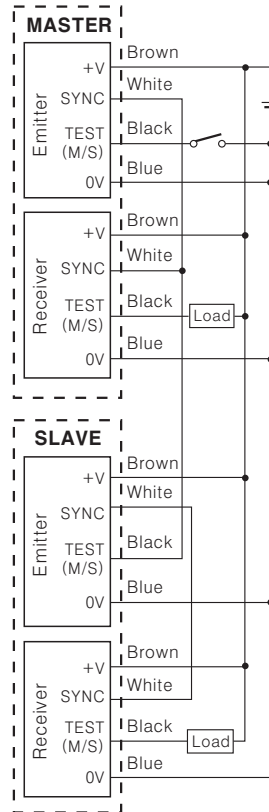
This function is to avoid the light interference as operating a sensor in MASTER and another sensor in SLAVE to protect these kinds of failures.

Time chart for MASTER/SLAVE transmission pulse

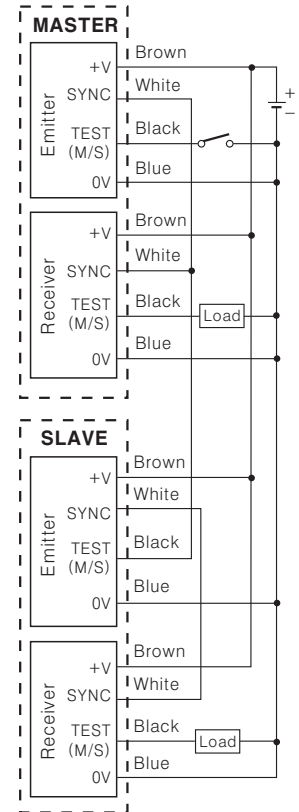


MASTER/SLAVE connections

<NPN open collector output >



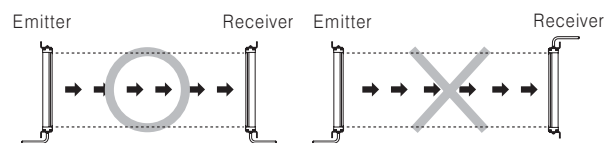
<PNP open collector output >



Installation

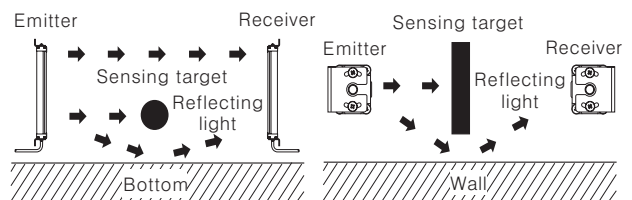
For direction of installation

Emitter and receiver should be installed in same up/down direction.



For reflection from the surface of wall and flat

When installing it as below the light reflected from the surface of wall and flat will not be shaded. Please, check whether it operates normally or not with a sensing target before using. (Interval distance : Min. 0.5m)

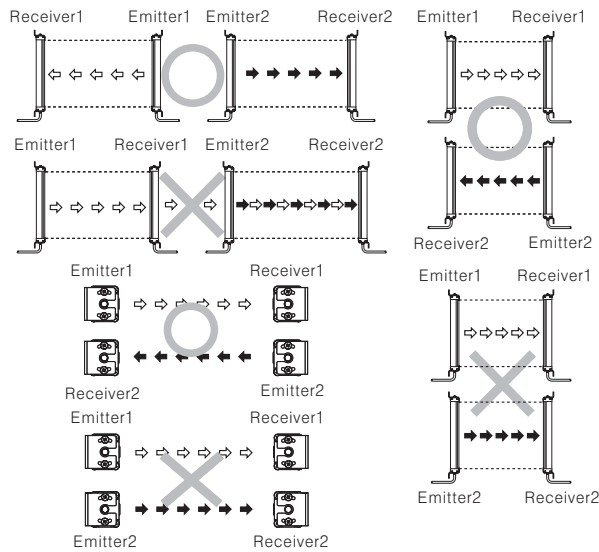


For prevention of interference

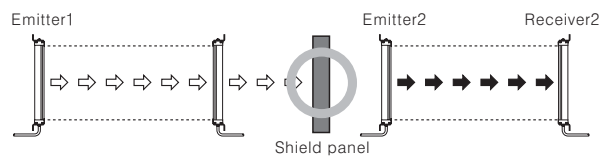
It may cause interference when installing more than 2 sets of the sensor. In order to avoid the interference of the sensor, please install as following figures and use the interference protection function.

Area Sensor

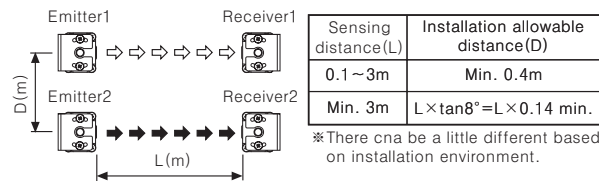
<Light emitting direction should be opposite between 2 sets >



<Shield panel should be installed between 2 sets >



<It should be installed out of the installation allowable distance >



Operation indicator

Item	Emitter		Receiver			Control output
	Indicator	Indicator	Indicator	Indicator	Indicator	
Power supply	☀	●	—	—	—	—
MASTER operation	☀	●	—	—	—	—
SLAVE operation	☀	☀	—	—	—	—
Test input	☀	◐	—	—	—	—
Break of light emitting element	◐	◑	—	—	—	OFF
Break of light emitting circuit	◐	◑	—	—	—	OFF
Stable light ON	—	—	☀	●	●	ON
Unstable light ON	—	—	☀	☀	●	ON
Unstable light OFF	—	—	●	☀	☀	OFF
Stable light OFF	—	—	●	●	☀	OFF
Break of light receiving circuit	—	—	●	◐	◑	OFF
Break of output element	—	—	◐	◑	●	OFF
Synchronous line malfunction	—	—	◐	●	◑	OFF
Overcurrent	—	—	◐	◐	◐	OFF
Extraneous light received	—	—	●	◐	◑	OFF
Breakdown of emitter	—	—	◐	◐	◐	OFF

Display classification list	
☀	Light on
●	Light off
◐	Flashing by 0.5 sec.
◐◐ or ◐◐◐	Flashing simultaneously by 0.5 sec.
◐◑	Cross-Flashing by 0.5 sec.
◐◐◐	Sequence-Flashing by 0.5 sec.

Inspection/Solution for malfunction

Malfunction	Caution	Solution
Non-operation	Power	Supply rated power
	Cable disconnection, incorrect connection	Check the wiring
	Rated connection failure	Use within rated sensing distance
Non-operation in sometimes	Pollution by dirt of sensor cover	Remove dirt by soft brush or cloth
	Connector connection failure	Check the assembled part of the connector
Control output is OFF even though there is not a target object.	Out of rated sensing distance	Use within rated sensing distance
	There is an obstacle to cut off the light emitted between emitter and receiver	Remove the obstacle
	There is a strong electric wave or noise generated by motor, electric generator, high voltage line etc.)	Put away the strong electric wave or noise generator.
LED display for break of light emitting element	Damage on light emitting element	Contact our company
LED display for break of light emitting circuit	Damage on light emitting circuit	
LED display for break of light receiving element	Damage on light receiving element	
LED display for break of output element	Damage on output element	
LED display for synchronous line malfunction	Synchronous line incorrect connection or disconnection	Check the wiring
	Damage on synchronous circuit of emitter or receiver	Contact to our company
LED display for over current	Control output line shorted	Check the wiring
	Over load	Check the rated load capacity
LED display for ambient light receiving	Extraneous light received to receiver	Remove the extraneous light
LED displayed for emitter malfunction	Emitter malfunction	Treat after checking the emitter display LED

- (A) Counter
- (B) Timer
- (C) Temp. controller
- (D) Power controller
- (E) Panel meter
- (F) Tacho/Speed/Pulse meter
- (G) Display unit
- (H) Sensor controller
- (I) Switching power supply
- (J) Proximity sensor
- (K) Photo electric sensor
- (L) Pressure sensor
- (M) Rotary encoder
- (N) Stepping motor & Driver & Controller
- (O) Graphic panel
- (P) Field network device
- (Q) Production stoppage models & replacement

BWP Series

Area sensor with plastic case

■ Features

- 13mm slim body with fresnel lens.
- Adoption of plastic (PC/ABS) injection case
- Includes Stop transmission function, Mutual interference prevention function, Job indicator Blink function, Light ON/Dark ON switching function
- Easy to distinguish of side/front and long distance with high luminance twin operation indicators
- Fast response time, max. 7ms
- 4 types of product (Optical axis pitch : 20mm, Number of optical axis : 8, 12, 16, 20)



⚠ Please read "Caution for your safety" in operation manual before using.

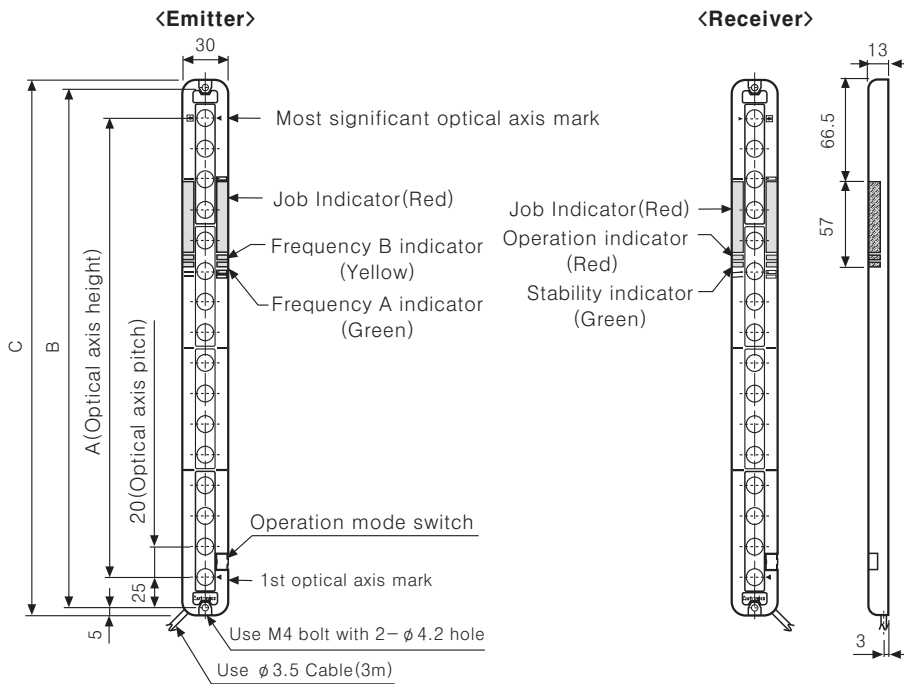


■ Specifications

Model	BWP20-08(P)	BWP20-12(P)	BWP20-16(P)	BWP20-20(P)
Sensing type	Transmitted beam type			
Sensing distance	0.1 ~ 5m			
Sensing target	Opaque materials of Min. ϕ 30mm			
Optical axis pitch	20mm			
Number of optical axis	8pcs	12pcs	16pcs	20pcs
Sensing width	140mm	220mm	300mm	380mm
Power supply	12-24VDC \pm 10% (Ripple P-P:Max. 10%)			
Protection circuit	Includes			
Current consumption	Emitter : Max. 80mA, Receiver : Max. 80mA			
Control output	<ul style="list-style-type: none"> • NPN open collector output \Rightarrow Load voltage:Max. 30VDC, Load current:Max. 150mA, Residual voltage:Max. 1V • PNP open collector output \Rightarrow Load current:Max. 150mA, Output voltage:Min. (Power supply-2.5)V 			
Operation mode	Light ON/Dark ON			
Short-circuit protection	Includes			
Response time	Max. 6ms (Max. 7ms when selecting frequency B)			
Light source	Infrared LED (850nm modulated)			
Synchronization type	Synchronized by synchronous line			
Interference protection	Anti-interference by transmittance frequency selection			
Environment	Ambient temperature	-10 ~ +55°C (at non-freezing status)		
	Storage temperature	-20 ~ +60°C		
	Ambient humidity	35 ~ 85%RH		
	Storage humidity	35 ~ 85%RH		
	Ambient illumination	Sunlight : 100,000lx		
Noise strength	The square wave noise by the noise simulator (Voltage: \pm 240V, Period: 10ms, Pulse width: 1 μ s)			
Dielectric strength	1,000VAC 50/60Hz for 1minute			
Insulation resistance	Min. 20M Ω (500VDC mega)			
Vibration	1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours			
Shock	500m/s ² (Approx. 50G) in X, Y, Z directions for 3 times			
Protection	IP40 (IEC standard)			
Material	• Body : PC/ABS, Lens : Acrylic			
Cable	Emitter : ϕ 3.5mm, 4P, 3m / Receiver : ϕ 3.5mm, 4P, 3m			
Unit weight	Approx. 280g	Approx. 320g	Approx. 360g	Approx. 430g

Area Sensor

Dimensions



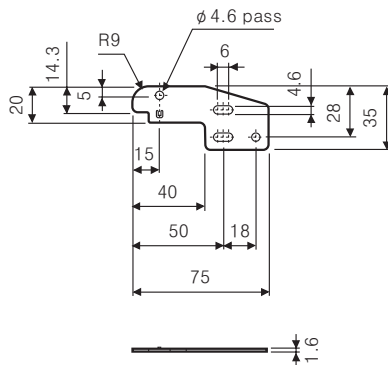
(Unit:mm)

Application model	A	B	C
BWP20-08	140	180	190
BWP20-12	220	260	270
BWP20-16	300	340	350
BWP20-20	380	420	430

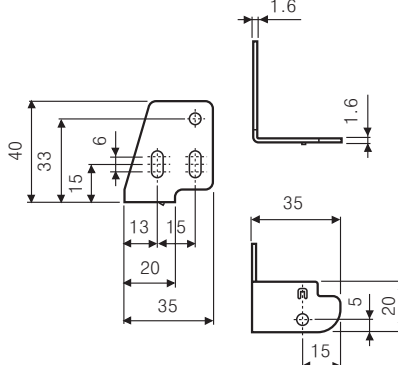
Mounting of bracket

(Unit:mm)

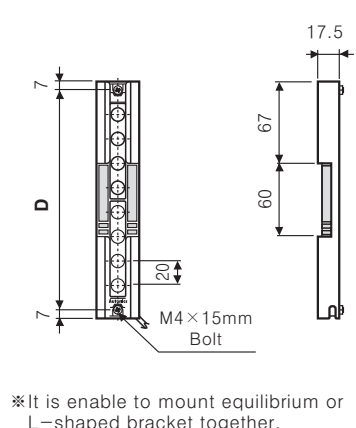
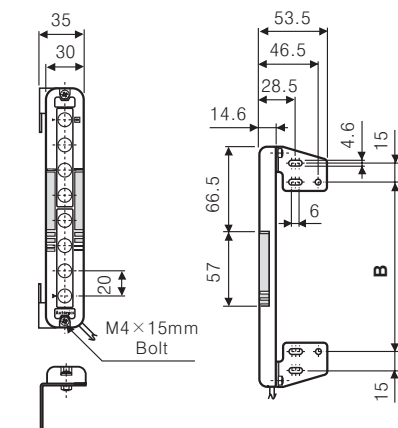
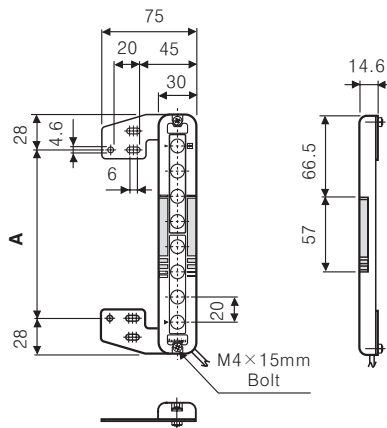
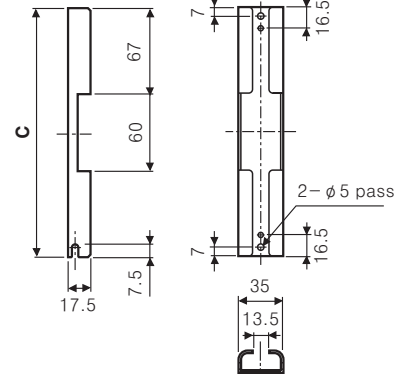
- BK-BWP-ST(Equilibrium bracket)
Option



- BK-BWP-L(L-Shaped bracket)
Option



- BK-BWP-P□(Protection bracket)
Option



*It is enable to mount equilibrium or L-shaped bracket together.

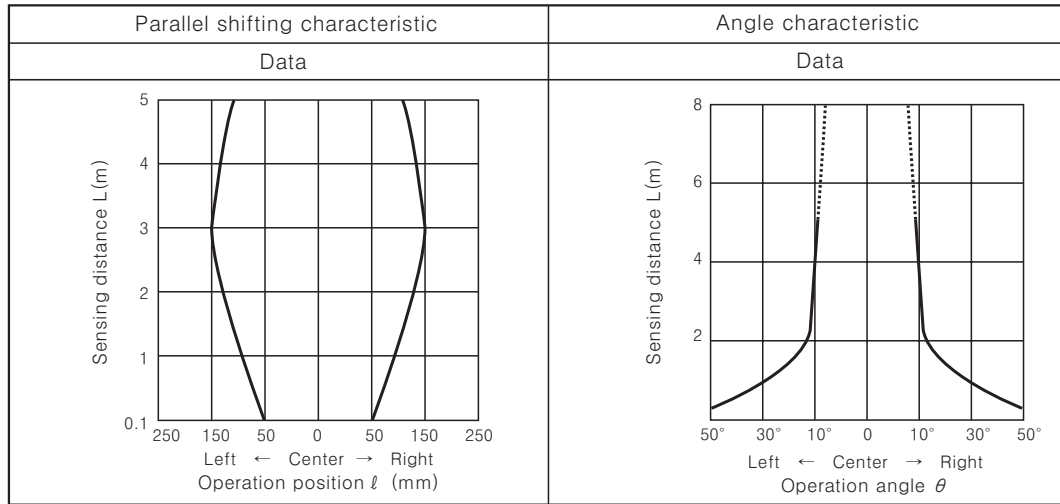
Model	A[mm]	B[mm]	BK-BWP-P		
			Name of bracket	C[mm]	D[mm]
BWP20-08	134	160	BK-BWP-P08	194	180
BWP20-12	214	240	BK-BWP-P12	274	260
BWP20-16	294	320	BK-BWP-P16	354	340
BWP20-20	374	400	BK-BWP-P20	434	420

*Bracket is sold separately.

- (A) Counter
- (B) Timer
- (C) Temp. controller
- (D) Power controller
- (E) Panel meter
- (F) Tacho/Speed/Pulse meter
- (G) Display unit
- (H) Sensor controller
- (I) Switching power supply
- (J) Proximity sensor
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- (L) Pressure sensor
- (M) Rotary encoder
- (N) Stepping motor & Driver & Controller
- (O) Graphic panel
- (P) Field network device
- (Q) Production stoppage models & replacement

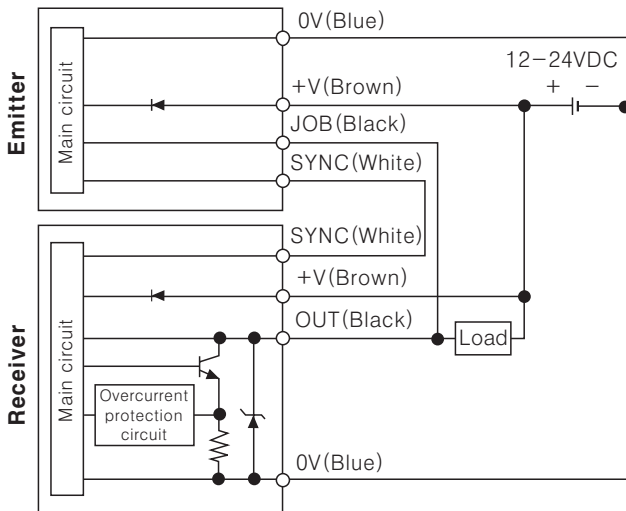
BWP Series

Feature data

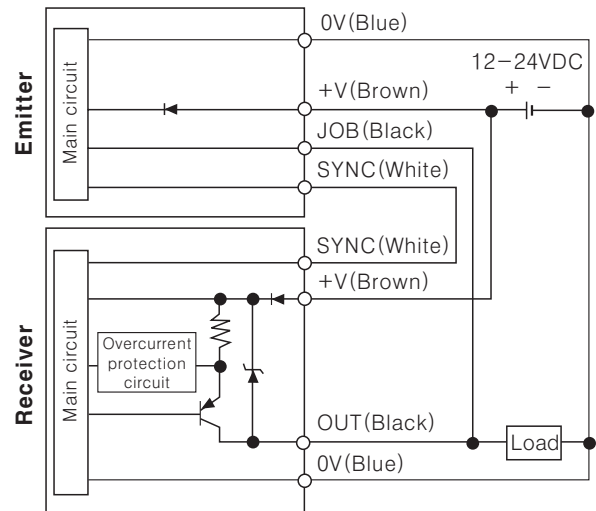


Input/Output circuit and connection diagram

<NPN open collector output type>



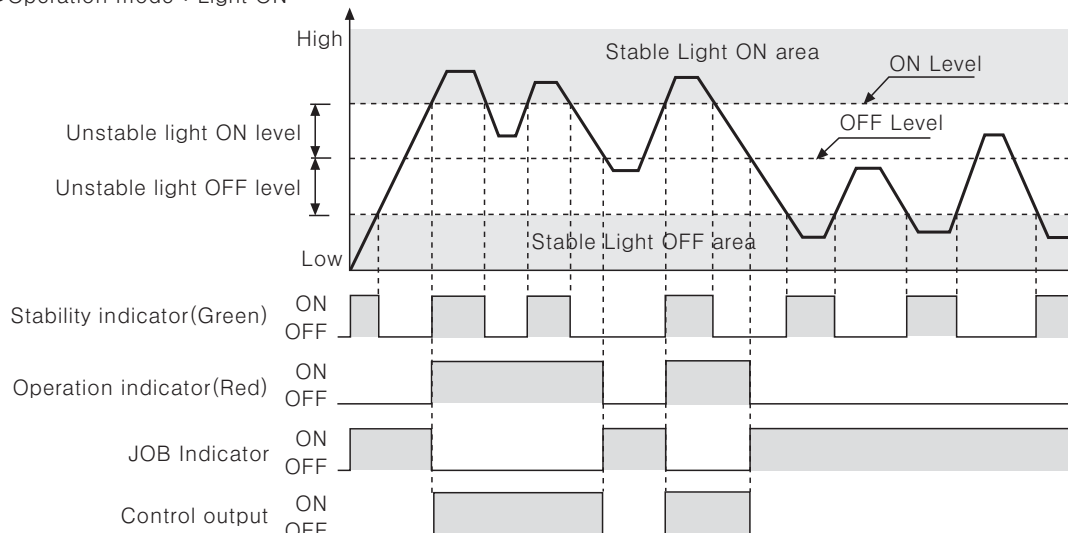
<PNP open collector output type>



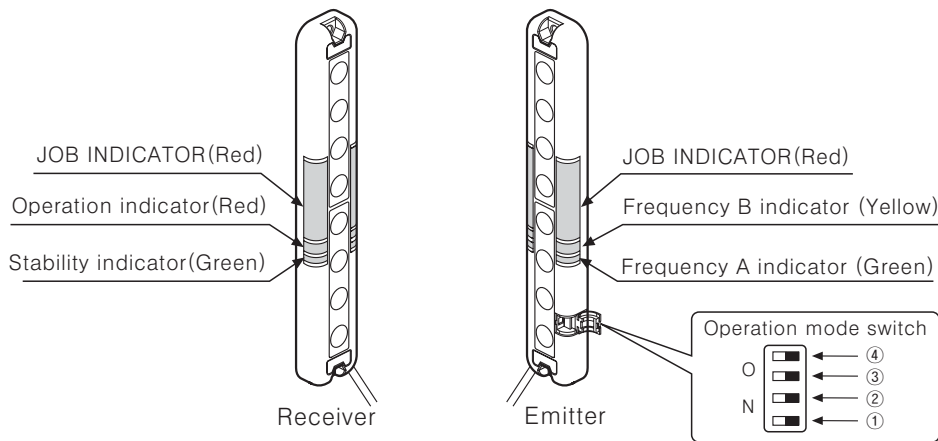
※If the receiver OUT(Black) line and the emitter JOB(Black) line are not connected each other, the JOB indicator of the emitter is not operated and maintain the light status.

Timing diagram of operation

●Operation mode : Light ON



Structure



◎Operation mode switch

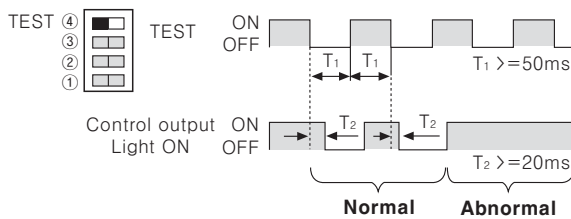
No	Function	Switch OFF	Switch ON
①	Transmission frequency selection	Frequency A	Frequency B
②	Light ON/Dark ON selection	Light ON operation	Dark ON operation
③	Steady/flashing light of JOB indicator selection	JOB indicator with Steady light	JOB indicator with Flashing light
④	JOB/TEST selection	Normal mode	TEST mode

Functions

◎TEST(Stop transmission function) functions

In TEST mode, emission is stopped and Green & Yellow LED on emitter flashes alternately. This function is to see whether sensor operates properly when the transmission is stopped. As it is changed to dark status, control output will be OFF in Light-ON mode and ON in Dark-ON mode.

●Control output pulse for TEST input



◎Interference prevention function

In case of using 2 pcs of sensor in serial or parallel in order to extend sensing height, the detection can be failed because of their light interference. This function is to avoid the light interference as operating a sensor in transmission frequency A and another sensor in transmission frequency B to protect these kinds of failures.

	Operation mode switch	Frequency A, B indicator
Sensor A (Transmission frequency A)	④ ③ ② ① FREQ.A	JOB INDI Frequency B (Yellow) Frequency A (Green)
Sensor B (Transmission frequency B)	④ ③ ② ① FREQ.B	JOB INDI Frequency B (Yellow) Frequency A (Green)

◎Switching Light-ON / Dark-ON

In Light-ON mode, the control output is ON when the target is missing. In Dark-ON mode, the control output is ON when the target is present.

	Operation mode switch	Control output operation
Light-ON	④ ③ ② ① Light-ON	It is ON when it is lighted.
Dark-ON	④ ③ ② ① Dark ON	It is ON when it is shaded.

◎Switching Steady / Flashing Light of JOB indicator

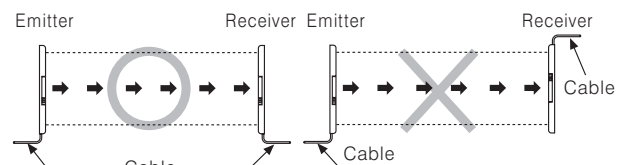
JOB indicator will be lighted and flashed to make out work sensing operation more easily.

Operation mode switch	JOB indicator operation
④ ③ ② ① GLOW	Light on
④ ③ ② ① BLINK	Flashing

Installation

◎For direction of installation

Emitter and receiver should be installed as same up/down position.



(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/Speed/Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

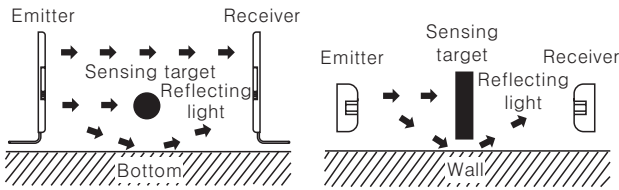
BWP Series

◎ Reflective Surface Interference

In the case shown below, the beam can be reflected from the wall or flat surface and exposed to the receiver.

Please pre-test the operation of sensor with a target under this condition.

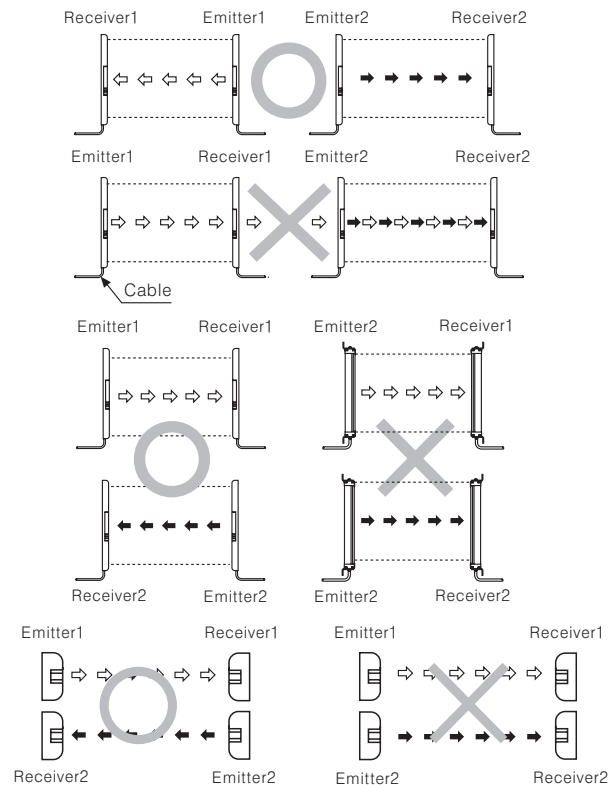
(Interval distance : Min. 0.3m)



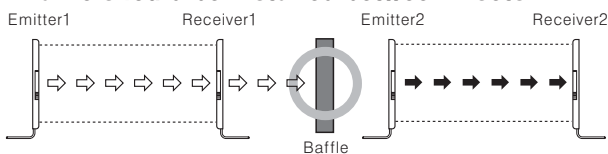
◎ For prevention of interference

It may cause interference when installing more than 2 sets of the sensor. In order to avoid the interference of the sensor, please install as following figures and use the interference prevention function.

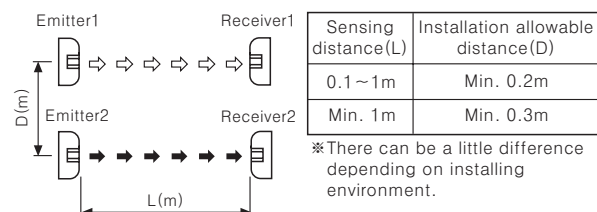
● Transmission direction should be opposed between 2 sets.



● Baffle should be installed between 2 sets.



● Keep sufficient distance between two sets of sensors to avoid mutual interference.



■ Operation indicator

Item	Emitter			Receiver			Control output
	Indicator			Indicator			
	Green	Yellow	JOB indicator	Green	Red	JOB indicator	
Power on	☀	●	—	—	—	—	—
FREQ. A operation	☀	●	—	—	—	—	—
FREQ. B operation	☀	☀	—	—	—	—	—
TEST	▶	◀	☀	☀	●	☀	OFF
Stable light ON	—	—	●	☀	☀	●	OFF
Unstable light ON	—	—	●	●	☀	●	ON
Unstable light OFF	—	—	☀	●	●	☀	ON
Stable light OFF	—	—	☀	☀	●	☀	OFF
Flashing function ON	—	—	◐	☀	●	◐	OFF
Synchronous line malfunction	—	—	☀	▶	◀	☀	OFF
Overcurrent	—	—	☀	◐	◐	☀	OFF

Display classification list

☀	Light on
●	Light off
◐	Flashing by 0.3 sec.
◐ ◐	Flashing simultaneously by 0.3 sec.
▶ ◐	Cross-Flashing by 0.3 sec.

※'Control output' above is for Light ON mode. For Dark ON mode, they operate in opposite. (When malfunction of synchronous line or overcurrent occurs, control output is OFF in both modes.)


■ Inspection/Treatment for malfunction

Malfunction	Caution	Treatment
Non-operation	Power supply	Supply rated power
	Cable disconnection incorrect connection	Check the wiring
	Rated connection failure	Use within rated sensing distance
Irregular operation	Contamination by dirt on sensor cover	Remove dirt by soft brush or cloth
	Connector connection failure	Check the assembled part of the connector
Control output is OFF even though there is not a target object.	Out of rated sensing distance	Use within rated sensing distance
	There is an obstacle that cut off the light between emitter and receiver	Remove the obstacle
LED display for synchronous line malfunction	There is a strong electric wave or noise generated by such as motor, electric generator, high voltage line etc.)	Put away the strong electric wave or noise generator.
	Synchronous line incorrect connection or disconnection	Check the wiring
LED display for overcurrent	Damage on synchronous circuit of emitter or receiver	Contact us
	Shorted control output line	Check the wiring
	Over load	Check the rated load capacity

Picking sensor

■ Features

- Plastic injection case
- Slim body (W30×H140×T10.5mm)
- Wide range of sensing distance (0.1~3m, 0.05~1m)
- Mutual interference prevention (FREQ A/B)
- Light ON/Dark ON switching mode
- Picking indicator includes
- IP40 rated waterproof structure (IEC standard)

 Please read "Caution for your safety" in operation manual before using.



■ Specifications

Model	NPN open collector output	BWPK25-05
	PNP open collector output	BWPK25-05P
Sensing type		Transmitted beam type
Sensing distance	Long mode	0.1 ~ 3m
	Short mode	0.05 ~ 1m
Sensing target		Opaque materials of Min. ϕ 35mm
Optical axis pitch		25mm
Number of optical axis		5pcs
Sensing width		100mm
Power supply		12~24VDC \pm 10% (Ripple P-P:Max. 10%)
Protection circuit		Includes
Current consumption		Emitter : Max. 50mA, Receiver : Max. 50mA
Control output		<ul style="list-style-type: none"> • NPN open collector output \Rightarrow Load voltage:Max. 30VDC, Load current:Max. 150mA, Residual voltage:Max. 1V • PNP open collector output \Rightarrow Load current:Max. 150mA, Output voltage:Min. (Power supply-2.5)V
Operation mode		Light ON/Dark ON
Response time		Max. 30ms
Light source		Infrared LED (850nm modulated)
Interference protection		Anti-interference by transmittance frequency selection
Protection circuit		Reverse power polarity, Output short-circuit (Overcurrent) protection
External picking input		Non-contact or contact input <ul style="list-style-type: none"> • NPN open collector output : Lighting (0-2V), Light out (5-30V or open) • PNP open collector output : Lighting (4-30V), Light out (0-3V or open)
Environment	Ambient temperature	-10 ~ +55°C (at non-freezing status)
	Storage temperature	-20 ~ +60°C (at non-freezing status)
	Ambient humidity	35 ~ 85%RH
	Storage humidity	35 ~ 85%RH
	Ambient illumination	Sunlight : Max. 11,000lx, Incandescent lamp : Max. 3,000lx
Noise strength		The square wave noise by the noise simulator (Voltage: \pm 240V, Period:10ms, Pulse width:1 μ s)
Dielectric strength		1,000VAC 50/60Hz for 1minute
Insulation resistance		Min. 20M Ω (500VDC mega)
Vibration		1.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours
Shock		500m/s ² (50G) in X, Y, Z directions for 3 times
Protection		IP40 (IEC standard)
Material		• Body : PC/ABS, Lens : Acrylic
Unit weight		Approx. 250g

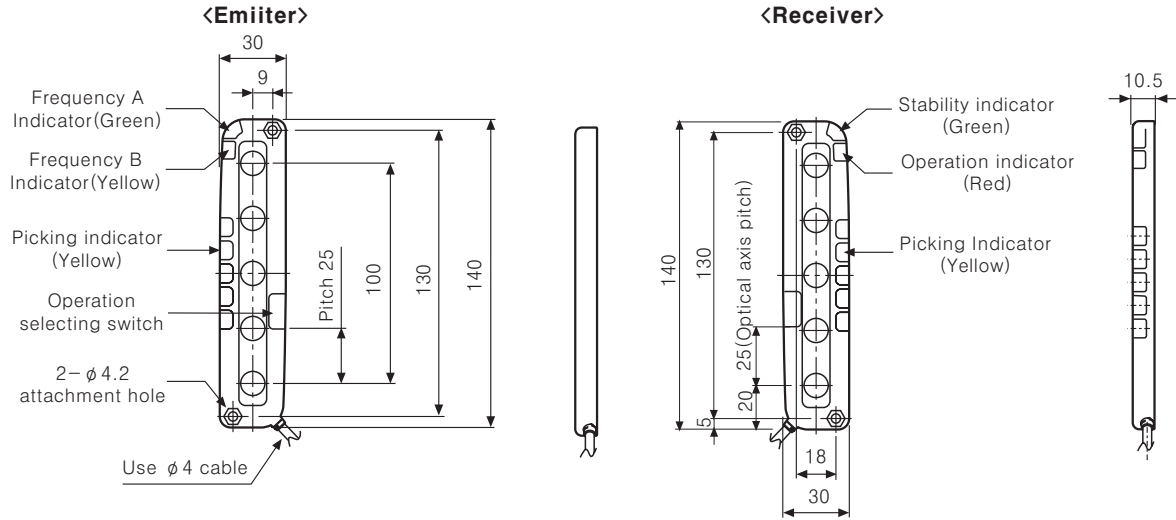
- (A) Counter
- (B) Timer
- (C) Temp. controller
- (D) Power controller
- (E) Panel meter
- (F) Tacho/Speed/Pulse meter
- (G) Display unit
- (H) Sensor controller
- (I) Switching power supply
- (J) Proximity sensor
- (K) Photo electric sensor
- (L) Pressure sensor
- (M) Rotary encoder
- (N) Stepping motor & Driver & Controller
- (O) Graphic panel
- (P) Field network device
- (Q) Production stoppage models & replacement

BWPK Series

Dimensions

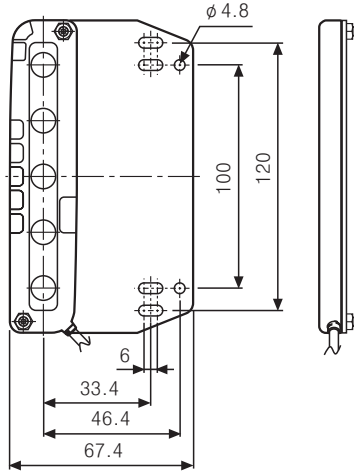
Product dimension

(Unit:mm)

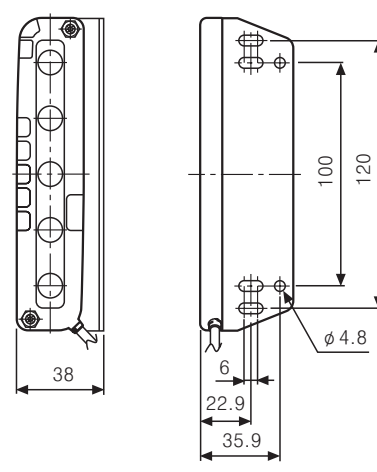


Bracket mounting dimension

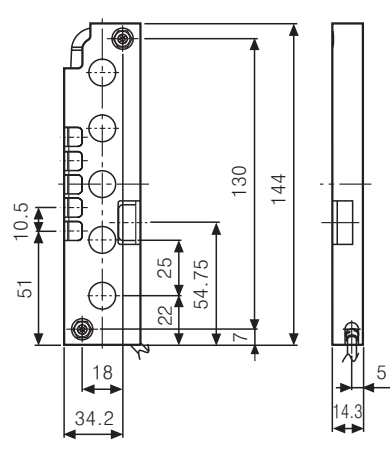
Bracket A



Bracket B

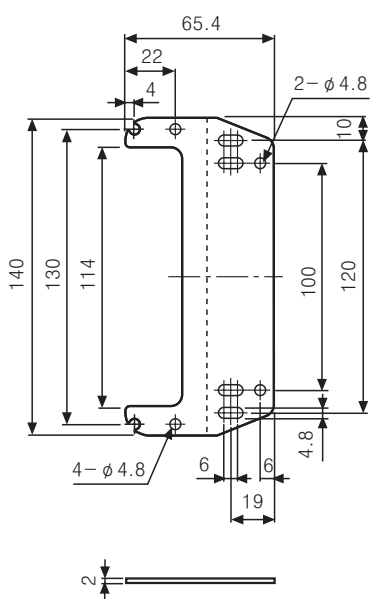


Protection Bracket

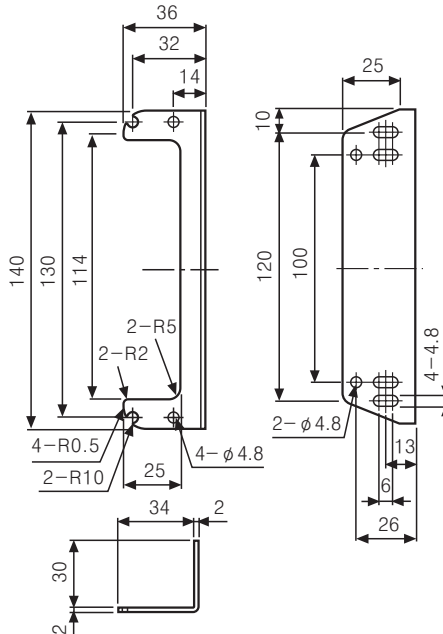


Bracket dimension (It is sold separately.)

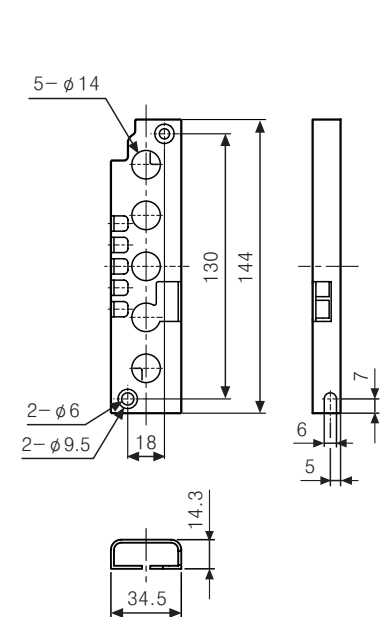
Bracket A (BK-BWPK-ST)



Bracket B (BK-BWPK-L)

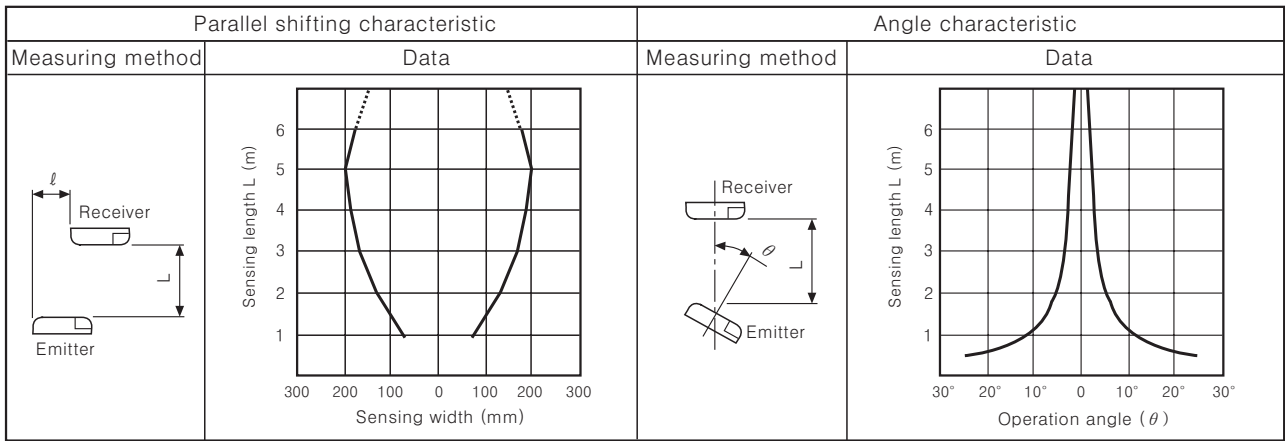


Protection Bracket (BK-BWPK-P)



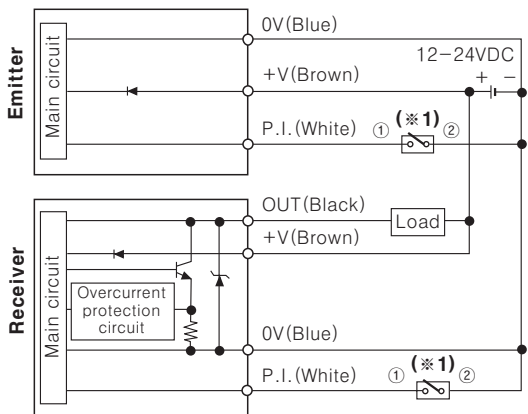
Area Sensor

Feature data



Input/Output circuit and connection diagram

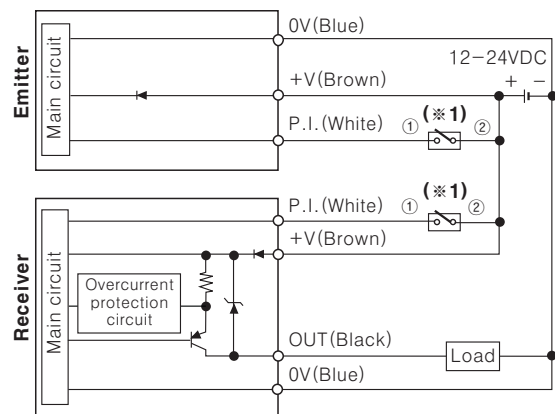
<NPN open collector output type>



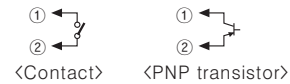
(※1) Picking input (P.I.) : Contact or transistor are ON.
Picking indicator us operated.



<PNP open collector output type>

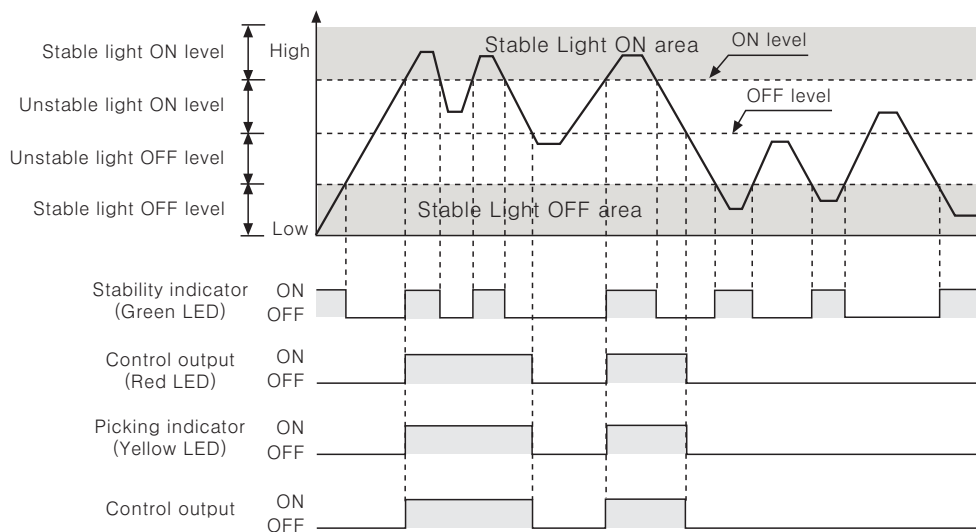


(※1) Picking input (P.I.) : Contact or transistor are ON.
Picking indicator us operated.



*Picking indicator: When external picking input (P.I) is short-circuited with OUT (Black), it is operated same as ON/OFF status of control output.

Timing diagram of operation



※1. Picking indicator is operated connecting output to picking input, or it will be OFF regardless of operation mode.
2. The above diagram is for Light ON mode, it is operated reversely in Dark ON.

(A) Counter

(B) Timer

(C) Temp. controller

(D) Power controller

(E) Panel meter

(F) Tacho/ Speed/ Pulse meter

(G) Display unit

(H) Sensor controller

(I) Switching power supply

(J) Proximity sensor

(K) Photo electric sensor

(L) Pressure sensor

(M) Rotary encoder

(N) Stepping motor & Driver & Controller

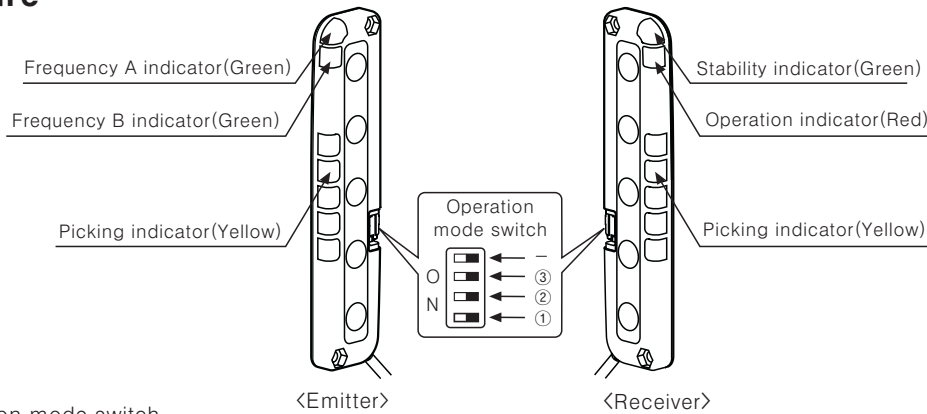
(O) Graphic panel

(P) Field network device

(Q) Production stoppage models & replacement

BWPK Series

Structure



◎ Operation mode switch

No	Function	Switch OFF	Switch ON
①	Transmission frequency selection	Frequency A	Frequency B
②	Operation indicator selection	Lighting indicator	Flickering indicator
③	Emitter	Sensing distance mode selection	Long mode
	Receiver	Operation mode selection	Light ON mode
			Short mode
			Dark ON mode

Functions

◎ Switching function of Long / Short mode (Selectable sensing distance)

The rated sensing distance is 3m for Long mode, 1m for short mode. It minimizes interference setting as short mode when using more than 3 sets closely together.

	Operation mode switch (Emitter)	Rated sensing distance
Long mode	④ ③ ② ① Long	3m
Short mode	Short ④ ③ ② ①	1m

◎ Interference protection function

In case of using 2 pcs of sensor in serial or parallel in order to extend sensing width, the detection can be failed because of their light interference.

This function is to avoid the light interference as operating a sensor in transmission frequency A and another sensor in transmission frequency B to protect these kinds of failures.

	Operation mode switch (Emitter + Receiver)	Frequency A, B indicator (Emitter)
Sensor A (Transmission frequency A)	④ ③ ② ① FREQ.A	Frequency A (Green) Frequency B (Green)
Sensor B (Transmission frequency B)	④ ③ ② ① FREQ.B	Frequency A (Green) Frequency B (Green)

◎ Switching Light-ON / Dark-ON

In Light-ON mode, the control output is ON when the target is missing. In Dark-ON mode, the control output is ON when the target is present.

	Operation mode switch (Receiver)	Control output operation
Light ON	④ ③ ② ① Light ON	It is ON when it is lighted.
Dark ON	Dark ON ④ ③ ② ①	It is ON when it is shaded.

◎ Switching Steady / Flashing Light of Picking indicator

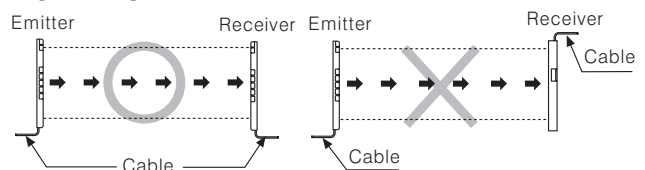
Select the indication method of operating indicator LED to make out work sensing operation more easily.

	Operation mode switch (Emitter + Receiver)	Picking indicator operation
GLOW	④ ③ ② ① GLOW	Lighting indicator
BLINK	BLINK ④ ③ ② ①	Flashing indicator

Installation

◎ For direction of installation

Emitter and receiver should be installed in same up/down position.

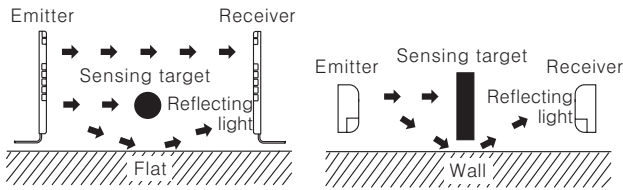


◎ Reflective Surface Interference

In the case shown below, the beam can be reflected from the wall or flat surface and exposed to the receiver. Please pre-test the operation of sensor with a target under this condition.

(Interval distance : Min. 0.3m)

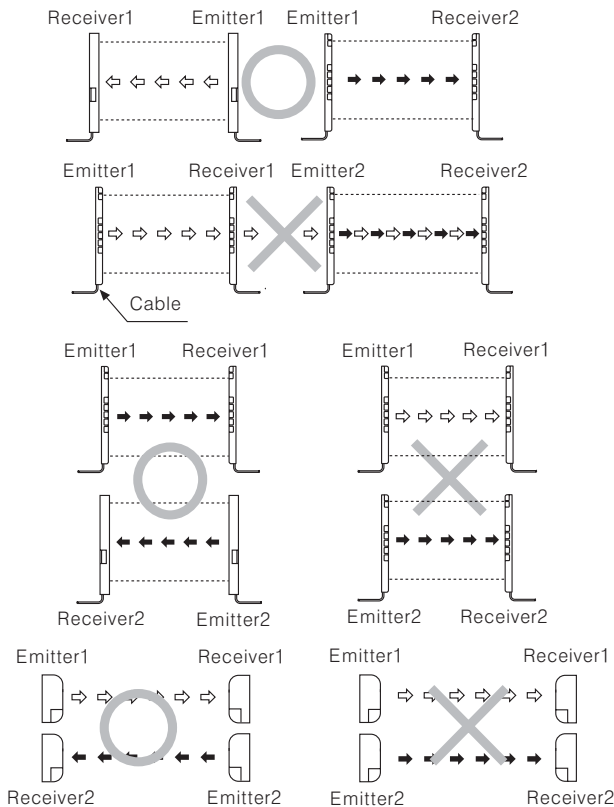
Area Sensor



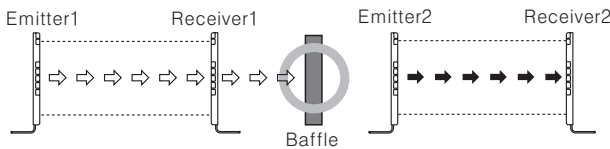
○ For prevention of interference

It may cause interference when installing more than 2 sets of the sensor. In order to avoid the interference of the sensor, please install as following figures and use the interference prevention function not to let light of the other emitter in a receiver..

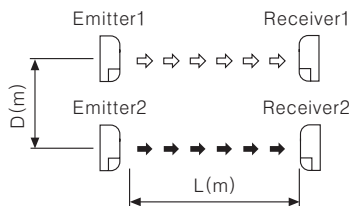
● Transmission direction should be opposite between 2 sets.



● Baffle should be installed between 2 sets.



● Keep sufficient distance between two sets of sensors to avoid mutual interference.



Sensing distance(L)	Allowable installation of distance(D)
0.1~1m	Min. 0.1m
Min. 1m	Min. 0.2m

※ There will be small difference depending on installing environment.

■ Operation indicator

Item	Emitter		Receiver			Control output
	Indicator		Indicator			
	Green	Picking indicator	Green	Red	Picking indicator	
Power supply	☀	●	—	—	—	—
FREQ. A operation	☀	●	—	—	—	—
FREQ. B operation	☀	☀	—	—	—	—
Stable light ON level	—	☀	☀	☀	☀	ON
Flashing function ON	—	◐	☀	☀	◐	ON
Unstable light ON level	—	☀	●	☀	☀	ON
Unstable light OFF level	—	●	●	●	●	OFF
Stable light OFF level	—	●	☀	●	●	OFF
Overcurrent	—		◐	◐	●	OFF

Display classification list	
☀	Light on
●	Light off
◐	Flashing by 0.3 sec.
◐ ◐	Flashing simultaneously by 0.3 sec.

※ Picking Indicator operates when output is connected to picking input. (When it is not connected, picking indicator is OFF regardless of operation modes.)

※ Red indicator, Picking indicator, Control output are for Light ON mode in Stable light ON, Unstable light ON, Unstable light OFF and Stable light OFF. For Dark ON mode, they operate in opposite. (When malfunction of synchronous line or overcurrent occurs, control output is OFF in both modes.)

■ Inspection/Solution for malfunction

Malfunction	Caution	Solution
Non-operation	Power supply	Supply rated power
	Cable disconnection, incorrect connection	Check the wiring
	Rated connection failure	Use within rated sensing distance
Irregular operation	Contamination by dirt on sensor cover	Remove dirt by soft brush or cloth
	Connector connection failure	Check the assembled part of the connector
Control output is OFF even though there is not a target object.	Out of rated sensing distance	Use within rated sensing distance
	There is an obstacle that cut off the light between emitter and receiver	Remove the obstacle
	There is a strong electric wave or noise generated by motor, electric generator, high voltage line etc.)	Put away the strong electric wave or noise generator.
LED display for overcurrent	Shorted control output line	Check the wiring
	Over load	Check the rated load capacity

- (A) Counter
- (B) Timer
- (C) Temp. controller
- (D) Power controller
- (E) Panel meter
- (F) Tacho/Speed/Pulse meter
- (G) Display unit
- (H) Sensor controller
- (I) Switching power supply
- (J) Proximity sensor
- (K) Photo electric sensor
- (L) Pressure sensor
- (M) Rotary encoder
- (N) Stepping motor & Driver & Controller
- (O) Graphic panel
- (P) Field network device
- (Q) Production stoppage models & replacement



General description

Manufacturer:	Fotoelektrik Pauly GmbH & Co. KG, Germany
Type:	PP2441(q)/.../...
One hole detector comprising (for each WPD):	
	1 - Transmitter PP2441(q) S /.../...
	1 - Receiver PP2441(q) E /.../...
	1 - Control Unit PP83201/2 – with 2m cable, with plug (in case of PP2441(q)/308/R153, the Control Unit is inside the Transmitter)
	1 - Cable (4m) – with 2 plugs

Technical Characteristics

Housing	Al-Cast
Weight	see Datasheet
Protection Mode	IP65
Supply Control Device	230/115VAC, 10VA
	optional: 42...48VAC, 24VDC
Output Control Device	Relay 250VAC/8A, 150W/1,500VA, 1xc-o-c
	optional: pnp, e2; npn, e3; Optocoupler, e1
Transmitter Light	GaAs 880nm, invisible
Steady Light Resistance	>80kLx
Interference Suppressor	Forced Synchronisation
Access Time	"normal": Recommended working range: $\geq 18\text{ms/Switch Transition}$ Limit: $\sim 12\text{ms/Switch Transition}$
	"q" (optional): Recommended working range: $\geq 3\text{ms/Switch Transition}$ Limit: $\sim 1,5\text{ms/Switch Transition}$
	"qq" (optional): Recommended working range: $\geq 1\text{ms/Switch Transition}$ Limit: $\sim 0,5\text{ms/Switch Transition}$
Switching Frequency	Relay: 10/s; electronic.: 40/s (normal), 300/s (q)
Switch Indicator	LED
Time Prolongation	0-3s switch-on-off-prolongation, z3
Ambient Temperature	-25...60°C

**Application:**

Detection of hole-marked welded seams.

Principle:

The light of the hole detector-emitter source (gallium arsenide diodes in the transmitter) falls through the material strip's hole onto the hole detector receiver-source, as shown on the drawing (front page of this manual). The control unit actuates the output signal (relay or electronically Output).

Selection of types:

1. **Detection of hole-marked welded seams:**
We assume that the hole punching machine does not change its position. The strip with the hole can move to both sides during the run. The operating width is determined by the widest possible strip run.
2. **See drawing no. E_431x75 for strip speed and hole diameter**
to determine the working range.
3. Based on the following conditions: operating width, strip speed and hole diameter **the suitable device can be selected.**
- 3.1 **Operating width (H):**
The **operating width** is decided by the greatest possible width of the running strip.
(H) is calculated from the operating width increased to multiples of 22 mm: $H_{\min} = 44$ cm; $H_{\max} = 4928$ mm.
- 3.2 **Working range:**
The required access time and the recommended working range "normal" (without addition) and quick (-q) are calculated from the **hole diameter** and **strip speed**.
- 3.2 **Housing**
can be selected at will according to the table below but the appropriate operating width H_{\max} should not be exceeded.

H_{\max} mm	l mm	b mm	c mm	Aluminium	Housing	Order no.
88	125	57	80	die-cast	R26	4311
154	175	57	80	die-cast	R27	4312
220	250	52	80	die-cast	R28	4313
308	360	80	120	die-cast	R153	4314
4928	H+72	70	110	section	AL	4315

**Order example**

H_{\max} = 220mm, **normal** working range (access time <18ms):

Order No.: 4313

Type: PP2441/220/R28

H_{\max} = 308mm, **quick** working range (access time <3ms):

Order No.: 4314q

Type: PP2441q/308/R153

Assembly:

Mount the transmitter and receiver as shown on the drawing (see front page).

Do not exceed distance (4m) to make sure that the smallest hole diameter (2mm) can be used.

Affix the devices (transmitter and receiver) on the back side with M6 screws.

The operating width "H" can be reduced at will by covering the lenses, if this is required by narrow thick strips (outside light which enters the lenses outside the strip-edge is permissible).

The electric connection is set up as shown on the **wiring diagram of the control unit**.

Connection cable:

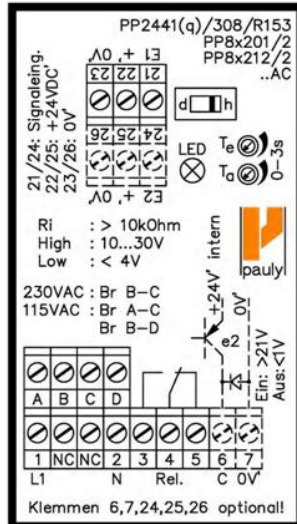
Included in the scope of supply are:

One piece 4m connection cable for **transmitter-receiver-link** with 2 plugs (4-pole, metal) – separately packed – and

One piece 2m connection cable for the connection of the **control unit** with the **transmitter** with 1 plug (5-pole, cranked) – assembled on the control unit (in case of PP2441(q)/308/R153, the control unit is inside the Transmitter).

Upon request other lengths up to 20m can be ordered.

Caution: do not lay parallel to thyristor control leads.

Explanations 'Control Unit PP83210/2':


"h ... d" = Slide Switch for bright (h) / dark (d) - change.
Standard programme = "h" (= bright switching) !

"Te" "Ta" = Potentiometer to prolongate the switching pulse of the switching device depending on switch position "h ... d".

Te: pulse prolongation for switch position "h...d" = "d"
Ta: pulse prolongation for switch position "h...d" = "h"

Note:

The drawing of the layout of the components such as switches (h/d), terminals, LED and potentiometer roughly corresponds to the positions on the original printed circuit board.

Power Supply Connection: (AC)

Terminal 1 (=L1), Terminal 2 (=N).

For 230VAC : Jumper on B & C.

For 115VAC : Jumper on A & C, B & D.

If not otherwise agreed: Delivery 230VAC; Otherwise delivery ex works with Jumper corresponding with order.

Signaling = Signal input LED = LED rot = red Ein = on Aus = off Rel. = Relay
Klemmen ... optional = terminals ... optional

Depending on the construction, the output of the hole detector's switching device is at the relay contact (= terminal 3, 4, 5; floating contact) or in the case of an electronics output with p-n-p transistor switching to 24V DC / "0" V (= terminal 6; terminal 7 = ground).

The slide switch "h ... d" has the following function:

Switch position "h ... d" = "h": If the hole detector sees "light" (=hole) the output switching device is connected. That means, the relay is activated and the contacts are changed over (terminal connection 3 + 4 = closed); the electronics output is connected (terminal connection 6 = approx. 24V DC).

If the slide switch position "h ... d" = "d" is selected, the function of the switching device is merely logical inverted, that means, if the hole detector sees "light" (=hole) the relay contacts 4 + 5 are connected; the electronics output is then "0"V.

Note: If no light (= no hole) is seen, the a.m. switching states are reversed.

Explanation to Te / Ta: (potentiometer to prolongate the switching pulse of the switching device)

Start situation when slide switch "h ...d" = "h":

Te: Potentiometer **must be** turned to "0", that means turn clockwise until stop.

Ta: Potentiometer clockwise until stop (= no prolongation). Then turn potentiometer counterclockwise until the right position for the requested prolongation of the switching pulse is reached (e.g. 0-3sec.).

Start situation when slide switch "h ...d" = "d":

Ta: Potentiometer **must be** turned to "0", that means turn clockwise until stop.

Te: Potentiometer clockwise until stop (= no prolongation). Then turn potentiometer counterclockwise until the right position for the requested prolongation of the switching pulse is reached (e.g. 0-3sec.).

Corresponding to p/o the "h ... d" - slide switch is adjusted to "h" or "d" and the potentiometers "Te", "Ta" are adjusted to minimum or maximum.