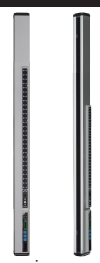
Autonics Diffuse reflective type Mapping Sensor [CC-LINK]

BWML Series

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

1. **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, fire or economic loss.
2. **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.
3. **Do not connect, repair, or inspect the unit while connected to a power source.**
   Failure to follow this instruction may result in fire.
4. **Check the color of cables before wiring.**
   Failure to follow this instruction may result in fire.
5. **Do not disassemble or modify the unit.**
   Failure to follow this instruction may result in fire.
6. **This product is not safety sensor and does not observe any domestic nor international safety standard.**
   Do not use this product with the purpose of injury prevention or life protection, as well as in the place where economic loss maybe present.

⚠ Caution

1. **Use the unit within the rated specifications.**
   Failure to follow this instruction may result in fire or product damage.
2. **Use dry cloth to clean the unit, and do not use water or organic solvent.**
   Failure to follow this instruction may result in fire.
3. **Do not use a load over the range of rated relay specification.**
   Failure to follow this instruction may result in fire, relay broken, contact melt, insulation failure or contact failure.

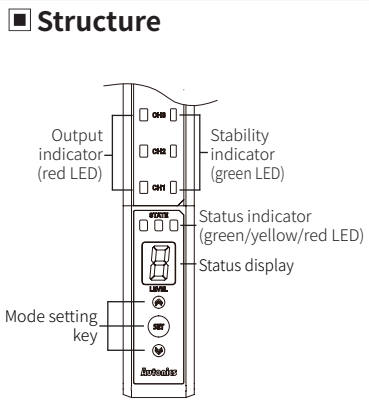
■ Ordering Information

BWML **20** – **24** **CL** **D** - □ □ / □

Custom order option	**No mark**	No option
	A	Mixed sensing pitch
	Number	Option
CH ordering orientation	**No mark**	Forward (bottom=1CH)
	R	Backward (top=1CH)
External device connection mode	**No mark**	Connector type
	T	Terminal type
Operation mode	**L**	Light ON
	D	Dark ON
Control output	**CL**	CC-LINK communication output
Sensing CH	**Number**	4 to 62CH
Sensing target pitch	**Number**	Min. 20mm
Item	**BWML**	Diffuse reflective type Mapping sensor

※□ This information is intended for product management of custom order option. (no need to refer when selecting model)

■ Structure



Pin no.	Cable color	Func.
ⓐ	Black	SET
ⓑ	Brown	VCC
ⓒ	Blue	GND
ⓓ	Yellow	F.G.

Pin no.	Cable color	Func.
ⓔ	Blue	DA
ⓕ	White	DB
ⓖ	Yellow	DG
ⓗ	Black	SLD (shield)

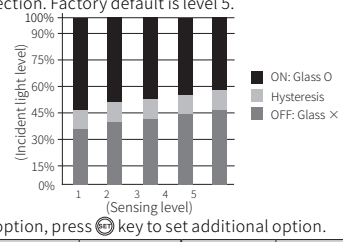
①USB port: This port is only for firmware upgrade, channel setting, and A/S.
Do not use this port for the another purpose, or the product can malfunction.
②Comm. status indicator: It displays the communication status through LED.
③Power cable connector
④Comm. speed setting switch (B RATE): You can set CC-LINK communication speed.
⑤Comm. address setting switch: You can set CC-LINK address. (X10: 10^1, X1: 10^0)
⑥CC-LINK comm. connector

■ Function

◎ Background sensing mode
This function instructs adjusting angle to install the product by displaying presence of the background object in the status display when installing the product. Use this function when sensing is unstable due to the reflection from the background object or any obstacle.

◎ Installation guide mode
This function displays whether the sensing target is in the stable position of the guide line when installing the product through the output indicator. Entering installation guide mode and pressing SET key starts teaching.

◎ Sensing level setting
This function sets sensitivity by dividing receiving light into 5 levels for stable sensing. Use this function when some of the channels shows low sensing level due to the bent glass plate or diffused reflection. Factory default is level 5.



◎ Output option
After setting output option, press SET key to set additional option.

Output option (status display)	Description	Additional option	Output option (status display)	Description	Additional option
0	Returning to operation mode	—	4	Changing error output	A: A point b: B point
1	Status display orientation	F: Forward b: Backward	5	CC-LINK version	1: Ver 1.1 2: Ver 2.0
2	Channel ordering		6	CC-LINK station and points	1: 1 station 32 points 2: 2 station 64 points
3	Operation mode	L: Light ON d: Dark ON			

◎ Self-diagnosis
This function runs self-diagnose periodically in normal operation and displays the part in error at the status display when error occurs. (Refer to '■ Operation Indicator')
- Channel interference alarm: Outputs alarm when interference from another sensing target and external object in a channel area.
- Disturbing light sensing alarm: Outputs alarm when the receiver received external light besides light from the emitter. When the amount of disturbing light is under the affective level, the product operates normally in disturbing light operation mode.
- Emitter/Receiver damage alarm: Outputs alarm when emitter/receiver is damaged due to the long-term usage of emitter/receiver elements or strong impact to the product.

※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

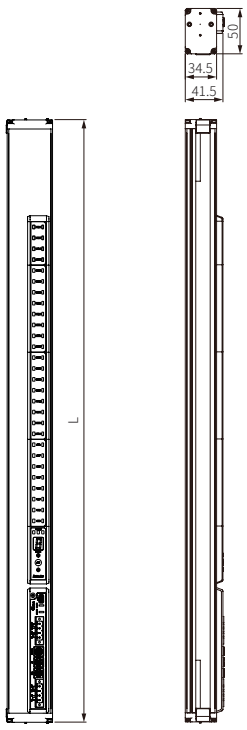
Model	**BWML-□-□CL□-□□/□**		
Sensing type	Diffuse reflective type		
Sensing distance	95mm ±10mm		
Sensing target	Transparent or opaque glass plate		
Sensing area	280 to 1775mm		
Sensing target pitch※1	20mm to ordered specification		
Sensing CH※1	4 to 62CH		
CH ordering orientation	Forward (bottom=1CH) / Backward (top=1CH) (parameter setting)		
Beam pattern	Line beam type		
Power supply	24VDC⎓ (ripple P-P: max. 10%)		
Protection circuit	Reverse polarity protection		
Current consumption	Max. 1.0A		
Operation mode	Light ON/Dark ON (parameter setting)		
Response time	Max. 120ms		
Control output	Version	CC-LINK Ver 1.1	CC-LINK Ver 2.0
	Type of Station	Remote Device station	
	Extended cyclic	—	1 time (single)
	Number of occupied stations	1 station 32 points module, 2 station 64 points module	
	Transmission speed	156kbps/625kbps/2.5Mbps/5Mbps/10Mbps	
	Max. number of connection※2	42 units	
	Number of I/O points	1 station: 32 points (I/O allocation) 2 station: 64 points (I/O allocation)	
Noise immunity	The square wave noise by the noise simulator (voltage: 500V, period: 10ms, pulse width: 1us)		
Dielectric strength	• Between all power input terminals and F.G. terminal: 500VAC 50/60Hz for 1 min • Between communication input terminals and F.G. terminal : 1000VAC 50/60Hz for 1 min • Between power input terminals and communication input terminals : 1000VAC 50/60Hz for 1 min		
Insulation resistance	Over 20MΩ (at 500VDC megger)		
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours		
Shock	210m/s² (approx. 21G) in each X, Y, Z direction for 3 times		
Environment: Allowable temp.	15 to 35°C, storage: -10 to 50°C		
Environment: Allowable humi.	35 to 55%RH, storage: 35 to 85%RH		
Material	Case: aluminum, sensing part and indicator part: polymethyl methacrylate		
Accessory	Bracket A: 4, bracket B: 4, bolt: 8		
Protection structure	IP40 (IEC standard)		
Approval	CE, KC, CC-LINK		
Weight※3	Approx. 4.8kg (approx. 3.64kg) (based on BWML82-20CLL)		

※1: This product is order made.
※2: The number of connectable units = 16×A+54×B+88×C≤2304
- A: remote I/O station, max. 64 units
- B: remote device station, max. 42 units
- C: local, intelligent station, max. 26 units

※3: The weight includes packaging. The weight in parenthesis in for unit only.
※Environment resistance is rated at no freezing or condensation.

■ Dimensions

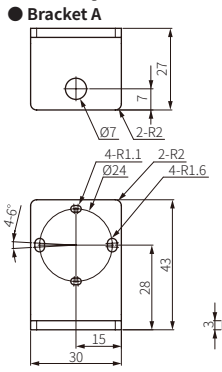
(unit: mm)



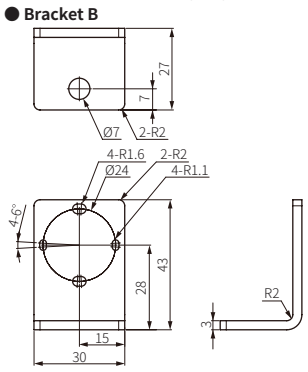
Length of the product (L)	Max. sensing area (mm)
384	280
434	310
484	335
564	460
614	490
664	515
744	640
794	670
844	695
924	820
974	850
1024	875
1104	1000
1154	1030
1204	1055
1284	1180
1334	1210
1384	1235
1464	1360
1514	1390
1564	1415
1644	1540
1694	1570
1744	1595
1824	1720
1874	1750
1924	1775

※Max. sensing area = 20+{sensing target pitch×(the total number of sensing target-1)}

● Bracket A



● Bracket B



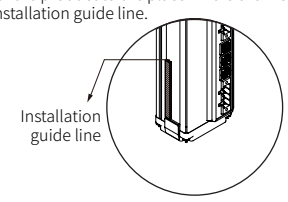
■ Output Connector

※4-pin connector: TS04515B0000G (green), TS04510B0000G (black) (5.08mm pitch)
※Connector socket specification: Contact the manufacture for the socket and cable.

	Specifications	Manufacture
Connector socket (4-pin, green)	OQ0455510000G	ANYTEK
Connector socket (4-pin, black)	OQ0455010000G	ANYTEK

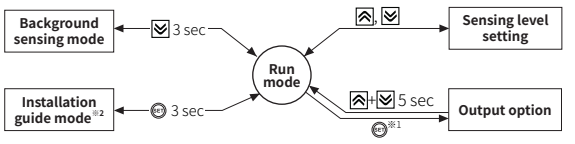
■ Installation and Adjustment

①Install the product on the right side of the sensing target with the bracket.
②Adjust the height of the product to the place where the first glass of the full cassette is aligned with the installation guide line.



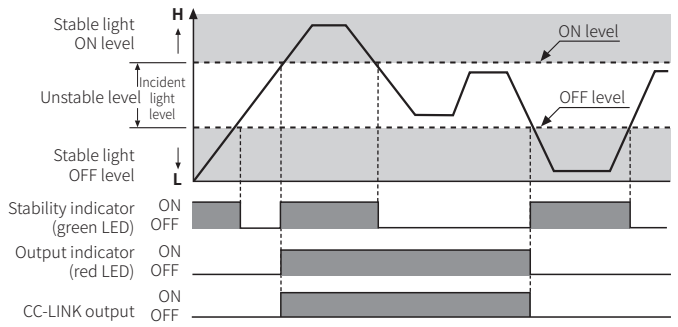
③Supply the power.
④Enter to the background sensing mode to detect background.
If any background object is detected, reinstall the product, changing the installation angle.
⑤Finish installation, when all channels are turned on after placing full cassette.
⑥If all channels are not turned on, enter to the installation guide mode and adjust the product up and down. Return to the run mode and finish installation, when all channels are turned on.
※If there is disturbing light (fluorescent light) near the product, install the product vertically away from the disturbing light (fluorescent light).
※Use the product only for sensing the glass over the 6.5 generation.
If the product is used for sensing the glass under the 6.5 generation, the product can malfunction.

■ Mode Switching Method



※1: When the status display is 0, press SET key to return to the run mode.
※2: Entering to the installation guide mode and pressing SET key starts teaching, and the product returns to the run mode after teaching completed.

■ Operation Timing Diagram



※The waveforms of 'Operation indicator' and 'CC-LINK output' are for Light ON.
The waveforms are reversed for Dark ON.

■ CC-LINK Baud Rate and Address Setting

- For CC-LINK setting, communication speed of PLC Master and BWML should be the same.
- Address is available from 1 to 64 and it should not be duplicated.
- When changing CC-LINK setting, turn OFF the power of this unit and re-supply the power.

Setting		Setting range
B RATE	Baud rate	0: 156kbps, 1: 625kbps, 2: 2.5Mbps 3: 5Mbps, 4: 10Mbps, 5 to F: not used
X10, X1	Address of unit	0: Master, 01 to 64: settable address, 65 to 99: not used E.g.) To set 12 as address, set X10 to 1 and X1 to 2.

■ Operation Indicator

● CH indicator

(☼: light ON, ●: light OFF, ◑: flashing at 0.5 sec interval)

Item	Output indicator (red LED)	Stability indicator (green LED)
Stable light ON	☼	☼
Unstable light ON	☼	●
Unstable light OFF	●	●
Stable light OFF	●	☼

● Status indicator

Item		Output indicator (red LED)	Stability indicator (green LED)	Status: Green	Status: Yellow	Status: Red	Status display	Communication output
Normal operation		—		☼	●	●	Sensing level	—
Background sensing mode	Sensed	ON (all CHs)	OFF (all CHs)	●	●	☼	b	Outputting ON at All CHs, outputting 'H' at N+1
	Not sensed	OFF (all CHs)	ON (all CHs)	☼	●	●		Outputting ON at All CHs
Installation guide mode	Optical axis coinciding CH	ON (LED of the CH)	ON (all CHs)	☼	●	●	n	Outputting ON at All CHs
	Optical axis not coinciding CH	OFF (LED of the CH)		●	◑	●		
	While teaching	OFF (all CHs)		☼	●	●	Flashing twice	Outputting ON at All CHs
	Teaching passed	Displaying result and flashing all CHs twice		☼	●	●	Flashing twice	—
	Teaching failed	Flashing alternately passed/failed CH twice		●	◑	●	Flashing twice	Outputting ON at All CHs, outputting 'H' at N+1
Channel interference error		Flashing alternately relevant CH at 0.5 sec interval	ON (all CHs)	☼	◑	●	—	Outputting ON at All CHs, outputting 'H' at N+1
Disturbing light sensing alarm		Flashing alternately even and odd CH at 0.5 sec interval	ON (all CHs)	◑	☼	☼	—	Outputting alternately even and odd CH, outputting 'H' at N+2
Emitter/receiver damage alarm※1	Emitter damage	ON (damaged CH)	ON (emitter)	●	◑	☼	b	Outputting 'H' at emitter/receiver damaged CH, outputting 'H' at N+1
	Receiver damage	ON (CH 7, 8)	ON (receiver)					
Comm. error	Product ↔ CH indicator	Flashing at 0.25 sec interval		◑	●	◑	E	Outputting ON at All CHs, outputting 'H' at N+1
	Product ↔ emitter/receiver	Flashing (malfunctioning CH)	ON (CH 1)	●	☼	☼	C	

※1: If emitter and receiver are damaged at the same time, output of receiver is prior to that of emitter, and lower number of channel indicator is turned on.
The indicator of damaged channel is flashed at 0.25 second interval.
※N stands for all channel.

● Communication status indicator

CC-LINK		Comm. status indicator
STATE	RUN	ON (green LED)
RD/SD		OFF
STATE	Error	ON (red LED)
RD/SD		ON (red/green/yellow LED)

■ Troubleshooting

Malfunction	Cause	Troubleshooting
Not operate	Power	Supply the rated power.
	Cable cut, disconnection	Check the wiring.
Not operate in sometimes	Sensor cover pollution by dirt	Remove dirt by soft brush or cloth and set sensitivity again.
	Connector connection failure	Check the connection area of connector.
Output is ON without a target	Initial sensitivity setting goes wrong	Remove the cause and set sensitivity again.
	There is a strong electric wave or noise generator.	Put away motor, electric generator, or high voltage line.

■ Cautions during Use

1. Follow instructions in 'Cautions during Use'.
   Otherwise, it may cause unexpected accidents.
2. 24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. Use the product, 1 sec after supplying power.
   When using separate power supply for the sensor and load, supply power to sensor first.
4. 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.
5. When connecting a DC relay or other inductive load, remove surge by using diodes or varistors.
6. Wire as short as possible and keep away from high voltage lines or power lines, to prevent surge and inductive noise.
7. This unit may be used in the following environments.
   ①Indoors (in the environment condition rated in 'Specifications')
   ②Altitude max. 2,000m
   ③Pollution degree 2
   ④Installation category II

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