



## Best-in-class, All-in-one Middle-range Sensors

### Highest-in-class Repeat Accuracy

Greatly enhanced repeat accuracy of  $0.25 \mu\text{m}$  for short range and  $10 \mu\text{m}$  for middle range of measurement distance

### Highest-in-class Linearity

Improved linearity of  $\pm 0.1 \%$  of F.S. for the measurement range of up to 700 mm

### Wide Measurement Range

Extended measurement ranges with  $350 \pm 250 \text{ mm}$  and  $700 \pm 500 \text{ mm}$

### Fastest-in-class Sampling Period of up to $133.3 \mu\text{s}$

8 levels of sampling period in addition to Auto mode can be selected for best measurement performance.

### Industry-first Feedback-free High-speed Shutter

Real-time measurement is realized, as momentary errors of measurement and delay in response are eliminated.

### Industry-first Easy-to-read OLED Display

Not only numeric values, but also system menu texts in 7 languages and graph or waveform of received light amount can be displayed.

### IO-Link for Data Exchange with Control System

Process data and control outputs can be transferred via IO-Link network, as well as parameters of timer and maintenance data over acyclic communication.

### Output Modes

Modes of 1 point, zone, FGS, and edge detection are available to meet application requirements.

### Enhanced Built-in I/O Connectivity

1 selectable control/IO-Link output, 1 selectable control/analog output and 1 external input are equipped as standard.

### I/O Configurable on System Menu

I/O Polarity, analog output, and external input modes can be selected in the system menu.

## Measurement specifications

| Model                                     | Cable                     | CD2H-30A   | CD2H-50A     | CD2H-130      | CD2H-2452          | CD2H-3502      | CD2H-7002   |
|---|---------------------------|--|--------------|---------------|--------------------|----------------|---|
|   | M12 5-pin pigtail         | CD2H-30M12A  | CD2H-50M12A  | CD2H-130M12   | CD2H-245M122       | CD2H-350M122   | CD2H-700M122  |
| Measurement range                         |                           | 30 +/- 5 mm  | 50 +/- 10 mm | 130 +/- 70 mm | 245 +/- 175 mm     | 350 +/- 250 mm | 700 +/- 500 mm  |
| Reflection mode                           |                           | Diffuse reflective   |              |               |                    |                |   |
| Light source                              |                           | Red semiconductor laser, 655 nm  |              |               |                    |                |   |
| Laser maximum output                      |                           | 0.39 mW  |              |               | 1 mW               |                |   |
| Laser class                               | JIS/IEC/FDA <sup>*1</sup> | CLASS 1 / Class I  |              |               | CLASS 2 / Class II |                |   |
| Spot size <sup>*2</sup>                   |                           | Φ0.05 mm   | Φ0.07 mm     | Φ0.3 mm       | Φ0.5 mm            | Φ0.6 mm        | Φ1.0 mm   |
| Linearity                                 |                           | +/-0.1 % of F.S.   |              |               |                    |                | +/- 0.1 % of F.S.<br>(200 to 700 mm) /<br>+/- 0.3 % of F.S.<br>(700 to 1200 mm) |
| Resolution <sup>*3</sup>                  |                           | 0.25 μm  | 0.25 μm      | 4 μm          | 10 μm              | 20 μm          | 100 μm  |
| Repeat accuracy <sup>*4</sup>             |                           | 0.25 μm  | 0.25 μm      | 4 μm          | 10 μm              | 20 μm          | 100 μm  |
| Sampling period <sup>*5</sup>             |                           | 133.3 μs / 150 μs / 200 μs / 300 μs / 500 μs / 1 ms / 2 ms / 5 ms / Auto |              |               |                    |                |   |
| Temperature characteristics <sup>*6</sup> |                           | +/- 0.06 % of F.S./°C  |              |               |                    |                |   |
| Weight                                    |                           | Cable models: Approx.140 g Connector models: Approx.90 g                 |              |               |                    |                |   |

## Measurement Condition

The measurement conditions are as follows unless otherwise designated:  
 Ambient temperature: 25°C (Room temperature); Supply voltage: 24 V DC;  
 Sampling period: 200 μs; Moving average performed: 128 times; Median filter: 31; at the center of measurement range, with a standard measured object (white ceramic). Furthermore, the sensor is fixed on an aluminum bracket when measurement is performed.

\*1: In accordance with the FDA guidance of Laser Notice No. 56, the laser is classified per the IEC 60825-1:2014 standard.

\*2: Defined with center strength 1/e<sup>2</sup> (13.5%) at the center of the measurement range. There may be leak light other than the specified spot size. The sensor may be affected when there is a highly reflective object close to the detection area.

\*3: The smallest determinable step when changing the distance between the sensor and the target one step at a time (at moving average of 512)

\*4: Peak to peak value of measurement in stationary state (at moving average of 512)

\*5: Set to 200 μs by default.

\*6: Typical example when the object (white ceramic) is measured while the object and the sensor are fixed in place with aluminum brackets. This object is placed at the center of the measurement range.

## Common specifications

|   |                                    |   |
|---|------------------------------------|---|
| Supply voltage                          |                                    | 18 to 24 V DC (± 10 %, including ripple)  |
| Current consumption <sup>*7</sup>       |                                    | 80 mA or less (at 18 V DC), 70 mA or less (at 24 V DC)  |
| IO-Link Specification                   | Version                            | Ver.1.1   |
|   | Transmission rate                  | COM3 (230.4 kbps)   |
|   | Number of process input data bytes | 6 bytes   |
|   | Min. cycle time                    | 0.7 ms  |
| Control output (DO1/DO2 <sup>*8</sup> ) | No. of outputs                     | 2 (DO1 can be switched to IO-Link)  |
|   | Type                               | NPN/PNP open collector or Push-Pull (selectable by setting), max. 100 mA / 24 V DC, residual voltage 1.8 V or less  |
| Analog output AO <sup>*9</sup>          | Current                            | 4 to 20 mA, Load impedance: 300 Ω or less   |
|   | Voltage                            | 0 to 10 V, Output impedance: 100 Ω or less  |
| External input <sup>*9</sup>            |                                    | Switchable among not used, teach, hold, offset, and laser off   |
| Display                                 |                                    | 0.9-inch OLED display   |
| Indicators                              |                                    | Menu languages: English, German, Japanese, Korean, Simplified Chinese, Spanish, Traditional Chinese   |
| Connection                              |                                    | Power indicator (green), flush during IO-Link communication / Output indicators (orange x 2)  |
| Protection circuit                      |                                    | Cable models: φ4.5 2 m cable, Connector models: M12 5-pin 300 mm pigtail cable<br>Minimum bending radius: Cable diameter x 2 (fixed mount), Cable diameter x 6 (when movable) |
| Environmental resistance                |                                    | Reverse connection protection, Overcurrent protection   |
| Environmental resistance                | Degree of protection               | IP67 (Connector models require a YF2A15-***VB5XLEAX or DOL-1205-G**M-R cable connected)   |
|   | Ambient temperature/humidity       | -10 to +50 °C / 35 to 85 % RH (without freezing or condensation)  |
|   | Storage temperature/humidity       | -20 to +60 °C / 35 to 85 % RH (without freezing or condensation)  |
|   | Ambient illuminance                | Incandescent light: 10000 lx Max. Fluorescent light: 10000 lx Max.  |
|   | Vibration resistance               | 10 to 55 Hz Double amplitude 1.5 mm, 2 hours in each X, Y, Z direction  |
|   | Shock resistance                   | 500 m/s <sup>2</sup> (Approx. 50 G) 3 times in each X, Y, Z direction   |
| Applicable regulations                  | EMC                                | EMC Directive (2014/30/EU)  |
|   | Environment                        | RoHS Directive (2011/65/EU), China RoHS (Directive No. 32)  |
|   | Safety                             | FDA Regulations (21 CFR 1040.10 and 1040.11) <sup>*10</sup>   |
| Applicable standards                    |                                    | EN 60947-5-2, IEC 60825-1   |
| NRTL Certification                      |                                    | UL Recognized Components  |
| Warm-up time                            |                                    | Proximity Switch Certified for US and Canada.<br>Approx. 30 minutes   |
| Material                                |                                    | Housing: PBT, Front window: PMMA  |
| Included accessories                    |                                    | M4 x 35mm mounting screws x 2, Washers x 2, M4 nuts x 2   |

\*7: When 21 mA is output through DO2 upon measurement error.

\*8: Set to analog current output by default.

\*9: Set to laser off by default.

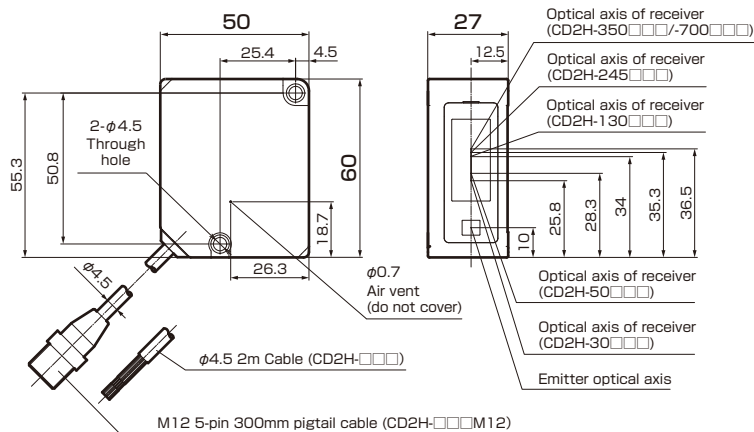
\*10: Excluding differences per Laser Notice No. 56.

## Process data over IO-Link

| No | Bit                  | Variable               |
|----|----------------------|------------------------|
| 1  | Control output 1 & 2 | Measured distance      |
| 2  |                      | Received light amount  |
| 3  |                      | Timer duration         |
| 4  |                      | Edge value of output 1 |
| 5  |                      | Edge value of output 2 |

## Dimensions (mm)

### Sensor

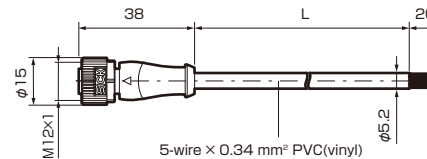


## Accessories

### M12 5-pin cable

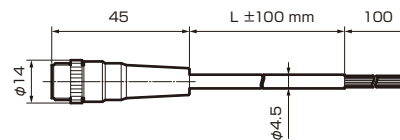
#### Standard cable

YF2A15-020VB5XLAX (L=2,000)  
YF2A15-050VB5XLEAX (L=5,000)  
YF2A15-100VB5XLEAX (L=10,000)



#### Bending resistant cable

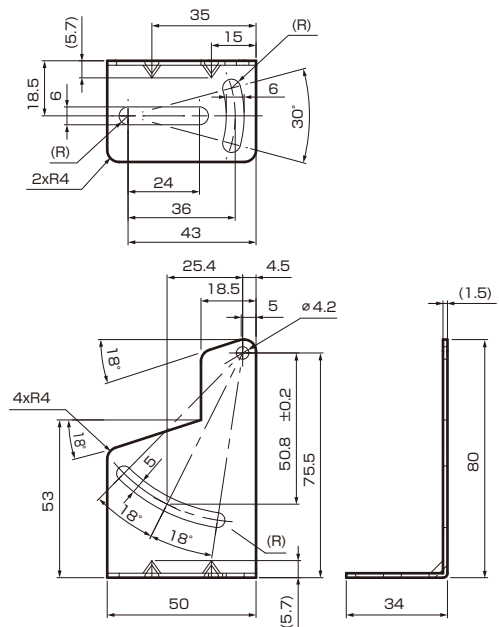
DOL-1205-G02M-R (L=2,000)  
DOL-1205-G05M-R (L=5,000)



Cable section material : PVC  
Conductor cross-section : 5-wire x 0.3 mm²

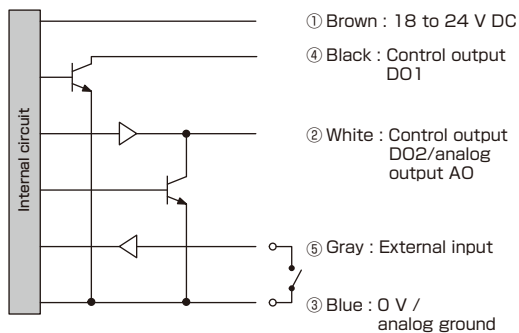
### Mounting bracket

BEF-WN-OD2000-B

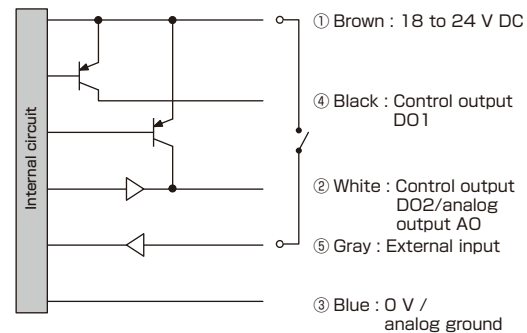


## I/O circuit diagram

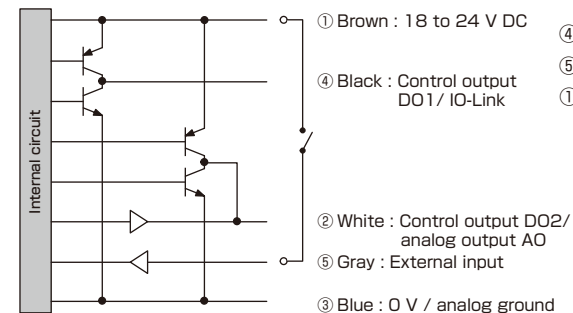
### SIO mode (standard I/O mode) with the NPN setting



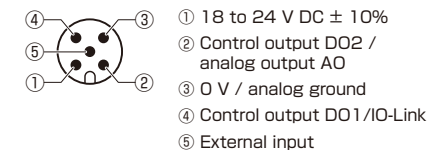
### SIO mode (standard I/O mode) with the PNP setting



### IO-Link mode or the Pushpull setting



### M12 connector pin assignments



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