

|                                            |                     |                  |               |
|--------------------------------------------|---------------------|------------------|---------------|
| <b>Minimum cycle time</b>                  |                     | 0.5 ms           |               |
| <b>Baud rate</b>                           |                     | COM3 (230.4kbps) |               |
| <b>M-Sequence code in Preoperate mode</b>  |                     | 0                |               |
| <b>M-Sequence code in Operate mode</b>     |                     | 0                |               |
| <b>ISDU support</b>                        |                     | Available        |               |
| <b>IO-Link revision</b>                    |                     | 1.1              |               |
| <b>Number of process input data bytes</b>  |                     | 2                |               |
| <b>Number of process output data bytes</b> |                     | 0                |               |
| <b>Vendor ID</b>                           |                     | dec: 1076        | hex: 0x0434   |
| <b>Device ID</b>                           | <b>Z4R-400</b> □□   | dec: 65540       | hex: 0x010004 |
|                                            | <b>Z4D-100</b> □□   |                  |               |
|                                            | <b>Z4D-L09</b> □□   |                  |               |
|                                            | <b>Z4T-2500</b> □□□ | dec: 65541       | hex: 0x010005 |

| Higher order byte    |        |        |        |        |        |       |       |       | Lower order byte |       |       |       |       |       |               |  |  |
|----------------------|--------|--------|--------|--------|--------|-------|-------|-------|------------------|-------|-------|-------|-------|-------|---------------|--|--|
| Bit 15               | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 | Bit 7 | Bit 6            | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0         |  |  |
| Numeric process data |        |        |        |        |        |       |       |       |                  |       |       |       |       |       | ON/OFF status |  |  |

This can be switched with index 0xC0, Select process data

|   |                                                                                                                                                                                                                 |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | Displays the averaged receiving light level as a percentage. It is displayed so that the value is 100% for ON points. The maximum value is 999%. Data is updated to the average value over a period of 12.8 ms. |
| 1 | Displays the real-time receiving light level as a percentage. It is displayed so that the value is 100% for ON points. The maximum value is approx. 1100%.                                                      |
| 2 | Displays the detection margin as a percentage.                                                                                                                                                                  |
| 3 | Displays the estimated number of days before maintenance is required.                                                                                                                                           |

ing light level is greater than or equal to the threshold. (During Light ON mode. This behavior is inverted in Dark ON mode.)

| Index No. | Sub index No. | Read/Write* | Name/Setting details | Default value                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Length in bytes                                                      | Z4R Z4D Diffuse, retro, limited diffuse reflective | Z4T Through-beam receiver |   |
|-----------|---------------|-------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|---------------------------|---|
| 12        | 0x0C          | —           | R/W                  | Device lock<br>bit 0: Setting writing lock<br>bit 1: Storage lock                                                                                                                                                                                                                                                                                                                                                                                                | 0                                                                    | 2                                                  | ✓                         | ✓ |
| 14        | 0x0E          | —           | R                    | Process input data format<br>1, 1, 0: ON/OFF information, 1-bit width, bit offset 0<br>3, 15, 1: Receiving light level value, 15-bit width, bit offset 1                                                                                                                                                                                                                                                                                                         | 3, 15, 1,<br>3, 15, 1,<br>3, 15, 1,<br>3, 15, 1,<br>1, 1, 0,<br>0, 0 | 17                                                 | ✓                         | ✓ |
| 15        | 0x0F          | —           | R                    | Process output data format<br>0, 0, 0: No information                                                                                                                                                                                                                                                                                                                                                                                                            | 0, 0, 0                                                              | 3                                                  | ✓                         | ✓ |
| 16        | 0x10          | —           | R                    | Vendor name                                                                                                                                                                                                                                                                                                                                                                                                                                                      | OPTEX FA                                                             | 8                                                  | ✓                         | ✓ |
| 17        | 0x11          | —           | R                    | Vendor character string                                                                                                                                                                                                                                                                                                                                                                                                                                          | www.optex-fa.com                                                     | 16                                                 | ✓                         | ✓ |
| 18        | 0x12          | —           | R                    | Product model                                                                                                                                                                                                                                                                                                                                                                                                                                                    | —                                                                    | —                                                  | ✓                         | ✓ |
| 19        | 0x13          | —           | R                    | Product code Z4R/Z4D (Diffuse, retro, limited diffuse reflective)<br>Product code Z4T Receiver (Through-beam type receiver)                                                                                                                                                                                                                                                                                                                                      | Z4 Diffuse<br>Z4 Through-beam                                        | —                                                  | ✓                         | — |
| 20        | 0x14          | —           | R                    | Product function explanation                                                                                                                                                                                                                                                                                                                                                                                                                                     | IO-Link PE Sensor                                                    | 17                                                 | ✓                         | ✓ |
| 21        | 0x15          | —           | R                    | Serial number                                                                                                                                                                                                                                                                                                                                                                                                                                                    | —                                                                    | 14                                                 | ✓                         | ✓ |
| 22        | 0x16          | —           | R                    | Hardware version                                                                                                                                                                                                                                                                                                                                                                                                                                                 | —                                                                    | 4                                                  | ✓                         | ✓ |
| 23        | 0x17          | —           | R                    | Firmware version                                                                                                                                                                                                                                                                                                                                                                                                                                                 | —                                                                    | 4                                                  | ✓                         | ✓ |
| 24        | 0x18          | —           | R/W                  | Application tag name (max. 16 characters)                                                                                                                                                                                                                                                                                                                                                                                                                        | *****                                                                | 16                                                 | ✓                         | ✓ |
| 32        | 0x20          | —           | R                    | Read number of communication errors (max. 65535)                                                                                                                                                                                                                                                                                                                                                                                                                 | 0                                                                    | 2                                                  | ✓                         | ✓ |
| 36        | 0x24          | —           | R                    | Read device data<br>The internal data is stored here when an event occurs. This area is cleared automatically when the event information is read.<br>0: Normal<br>1: Maintenance of the emitting/receiving part is required<br>4: Internal memory error                                                                                                                                                                                                          | 0                                                                    | 1                                                  | ✓                         | ✓ |
| 40        | 0x28          | —           | R                    | Read process data                                                                                                                                                                                                                                                                                                                                                                                                                                                | —                                                                    | 2                                                  | ✓                         | ✓ |
| 64        | 0x40          | —           | R                    | Read actual sensitivity setting<br>0 to 1000 (1000: max. sensitivity)                                                                                                                                                                                                                                                                                                                                                                                            | 0                                                                    | 2                                                  | ✓                         | ✓ |
| 65        | 0x41          | —           | R/W                  | Sensitivity setting<br>0: Set with the sensitivity knob on the main unit<br>1 to 1001: Direct specification of the sensitivity (1001: max. sensitivity)<br>If the sensitivity adjuster of the sensor is turned while the set value is 1 to 1001, the value is automatically changed to 0 and the sensitivity volume of the sensor is enabled.                                                                                                                    | 0                                                                    | 2                                                  | ✓                         | ✓ |
| 67        | 0x43          | —           | R/W                  | Hysteresis<br>0: Small<br>1: Medium<br>2: Large                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                                                                    | 1                                                  | ✓                         | ✓ |
| 68        | 0x44          | —           | R/W                  | Synchronization mode<br>0: Not synchronized (the ambient light removal function operates)<br>1: Emission synchronized with IO-Link communication<br>2: Emission synchronized with IO-Link communication but delayed by 10 μs<br>3: Emission synchronized with IO-Link communication but delayed by 20 μs<br>4: Emission synchronized with IO-Link communication but delayed by 30 μs<br>5: Emission synchronized with IO-Link communication but delayed by 40 μs | 0                                                                    | 1                                                  | ✓                         | — |
| 128       | 0x80          | —           | R/W                  | L-on/D-on switch<br>0: Set with the L/D selection knob on the main unit<br>1: L-on (ON when light is detected)<br>2: D-on (ON when light is not detected)                                                                                                                                                                                                                                                                                                        | 0                                                                    | 1                                                  | ✓                         | ✓ |
| 129       | 0x81          | —           | R/W                  | Select timer function<br>0: No timer<br>1: ON delay<br>2: OFF delay<br>3: One-shot<br>4: ON delay + OFF delay<br>5: ON delay + one-shot                                                                                                                                                                                                                                                                                                                          | 0                                                                    | 1                                                  | ✓                         | ✓ |
| 130       | 0x82          | —           | R/W                  | ON delay time<br>1 to 10000: Time for which the output turning ON is delayed (in units of ms)                                                                                                                                                                                                                                                                                                                                                                    | 10                                                                   | 2                                                  | ✓                         | ✓ |
| 131       | 0x83          | —           | R/W                  | OFF delay time<br>1 to 10000: Time for which the output turning OFF is delayed (in units of ms)                                                                                                                                                                                                                                                                                                                                                                  | 10                                                                   | 2                                                  | ✓                         | ✓ |
| 160       | 0xA0          | —           | R                    | Estimated number of days before maintenance is required<br>This value is the estimated period before the receiving light level drops, leading to unstable detection. The data is updated approx. once every 14 minutes. The maximum value is 10000 days.                                                                                                                                                                                                         | 10000                                                                | 2                                                  | ✓                         | ✓ |
| 161       | 0xA1          | —           | R/W                  | Number of days before maintenance required notification event generation<br>0 to 2000: An event occurs when the estimated number of days before maintenance is required falls below this setting.                                                                                                                                                                                                                                                                | 180                                                                  | 2                                                  | ✓                         | ✓ |
| 162       | 0xA2          | 1           | R                    | Operating time information<br>Indicates the time that the sensor is ON. The unit is hours. The sensor being on for a length of time of 7.5 minutes or less is not added to the total.                                                                                                                                                                                                                                                                            | 0                                                                    | 4                                                  | ✓                         | ✓ |
|           |               | 2           | R                    | Detailed operating time information<br>The value is returned in units of 7.5 minutes, the same as above.                                                                                                                                                                                                                                                                                                                                                         | 0                                                                    | 4                                                  | ✓                         | ✓ |
| 163       | 0xA3          | 0           | R                    | Detection margin<br>Returns as a percentage the margin of the time with the light detected when the output is ON and the margin of the time with the light not detected when the output is OFF. Before the margin is detected, the value -1 is returned. The maximum value is 9999%.                                                                                                                                                                             | -1                                                                   | 2                                                  | ✓                         | ✓ |
|           |               | 1           | R                    | Detection margin with light detected                                                                                                                                                                                                                                                                                                                                                                                                                             | -1                                                                   | 2                                                  | ✓                         | ✓ |
|           |               | 2           | R                    | Detection margin with light not detected                                                                                                                                                                                                                                                                                                                                                                                                                         | -1                                                                   | 2                                                  | ✓                         | ✓ |
| 192       | 0xC0          | —           | R/W                  | Select process data<br>0: Averaged receiving light level percentage (bits 15 to 1) + output (bit 0)<br>1: Real-time receiving light level percentage (bits 15 to 1) + output (bit 0)<br>2: Detection margin percentage (bits 15 to 1) + output (bit 0)<br>3: Estimated number of days before maintenance is required (bits 15 to 1) + output (bit 0)                                                                                                             | 0                                                                    | 1                                                  | ✓                         | ✓ |
| 203       | 0xCB          | —           | R                    | Stability indicator status<br>0: Stable detection<br>1: Fine me flashes<br>2: Unstable detection<br>3: Requesting maintenance<br>4: Error, failure                                                                                                                                                                                                                                                                                                               | 0                                                                    | 1                                                  | ✓                         | ✓ |
| 204       | 0xCC          | —           | R/W                  | Find Me function<br>0: Normal<br>1: Stability indicator flashes (at an interval of 0.5 seconds)                                                                                                                                                                                                                                                                                                                                                                  | 0                                                                    | 1                                                  | ✓                         | ✓ |

\*R: Read only, R/W: Read/Write

| Event code |        | Description                                                                                 | Event No. | Mode        | Type         | Measure                                                                                                                                                                                                                                                                                                                                                                     |
|------------|--------|---------------------------------------------------------------------------------------------|-----------|-------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| dec        | hex    |                                                                                             |           |             |              |                                                                                                                                                                                                                                                                                                                                                                             |
| 6144       | 0x1800 | The estimated number of days before maintenance is required has been reached.               | 1         | Occurrence  | Warning      | If the emitting part, receiving part, or mirror is dirty, clean it.<br>If the light axis is misaligned, adjust it again.<br>To enable stable detection, adjust the sensitivity or execute teaching.                                                                                                                                                                         |
| 6145       | 0x1801 | Setting memory has been rewritten more than 100,000 times.                                  | 2         | Occurrence  | Warning      | This indicates the end of the product's service life, so we recommend you replace it as soon as possible.<br>Memory is only rewritten when the power supply is turned OFF. The operating time is updated once every 7.5 minutes, so if, for example, the product is used such that the power is turned OFF once every 10 minutes, this event will occur in approx. 2 years. |
| 20480      | 0x5000 | A hardware failure has occurred.                                                            | 4         | Occurrence  | Failure      | A hardware error has been detected. Replace the product as soon as possible.                                                                                                                                                                                                                                                                                                |
| 20497      | 0x5011 | There is an error in the calibration values stored in memory.                               | 3         | Occurrence  | Failure      | Turn the power supply ON again. If the event occurs again, consider replacing the product or having it repaired.                                                                                                                                                                                                                                                            |
| 65425      | 0xFF91 | Settings have been changed either by executing teaching or by writing settings via IO-Link. | 0         | Single-shot | Notification | This event occurs in the IO-Link system and is processed automatically by the IO-Link master.                                                                                                                                                                                                                                                                               |

| Index No. |      | Read/write* | Code       | Functions           | Length in bytes | Z4R Z4D | Z4T Receiver |
|-----------|------|-------------|------------|---------------------|-----------------|---------|--------------|
| dec       | hex  |             |            |                     |                 |         |              |
| 2         | 0x02 | W           | 130 (0x82) | Initialize settings | 1               | ✓       | ✓            |
|           |      |             | 160 (0xA0) | Teaching            |                 | ✓       | ✓            |
|           |      |             | 161 (0xA1) | Stop emission       |                 | ✓       | —            |
|           |      |             | 162 (0xA2) | Start emission      |                 | ✓       | —            |

\*W: Write only

## Function overview

This function estimates the period until detection will become unstable by observing the changes in stability over time and judging the detection stability from the relationship between the receiving light level and the output ON/OFF threshold.

The level at which the receiving light level exceeds the ON point threshold is averaged over a period of 0.2 seconds and is calculated.

if the receiving light level is the same as the ON point threshold, the detection margin becomes 0%.

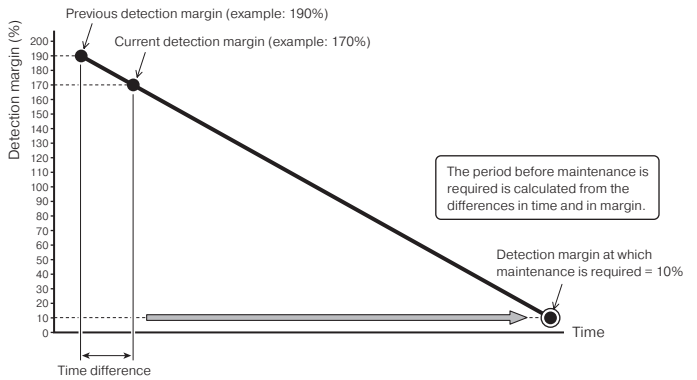
if the receiving light level is the same as the ON point threshold, the detection margin becomes 0%.

The detection margin explained above is averaged over an additional 14 minutes. If this averaged detection margin is less than 10%, the current estimated period until maintenance is required is reduced by 25% at a time toward 0 days.

If the detection margin is 200% or higher, the current estimated number of days until maintenance is required is increased by 25% at a time toward the number of days obtained by subtracting the operating time from 10000 days.

If the detection margin is less than 200%, the number of days until the detection margin drops to 10% is calculated on the basis of the time from the point where there was a difference of 5% or more in the detection margin. Then, the current estimated number of days until maintenance is required is changed by 4% at a time toward this calculated number of days.

The event for the estimated number of days before maintenance is required occurs once every 14 minutes while the estimated number of days is less than the set number of days for event occurrence.



A diagram of a 2-pin power plug. It features two circular pins on the left and a ground pin on the right. The ground pin is a single vertical line. The plug is shown within a rectangular frame.

| Indicator status                          | Description                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lit for 0.5 seconds + off for 0.5 seconds | Flashes when the Find Me function is in use. Use this function to find the location of the sensor.                                                                                                                                                                                                                                                                                     |
| Lit for 0.2 seconds + off for 0.2 seconds | <p>Flashes when maintenance of the light emitting/receiving system is judged to be necessary.</p> <p>In detail, the indicator flashes when an event occurs due to the number of days estimated before maintenance is required falling below the specified number of days.</p> <p>It only flashes when the current detection margin is less than 100% during IO-Link communication.</p> |
| Lit for 0.1 seconds + off for 0.1 seconds | Flashes when IO-Link communication is interrupted for three communication cycles. The indicator stops flashing when communication is established.                                                                                                                                                                                                                                      |

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