

## Technical data sheet

### Optical data transmission

Part no.: 50146914  
DDLS 538 200.4 L H S3

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For illustration purposes only



EtherCAT



## Technical data

### Basic data

|        |          |
|--------|----------|
| Series | DDLS 500 |
|--------|----------|

### Special version

|                 |                                       |
|-----------------|---------------------------------------|
| Special version | Heating                               |
|                 | Integrated laser alignment aid        |
|                 | Not influenced by reflective surfaces |
|                 | Operation of parallel light axes      |

### Optical data

|                        |                    |
|------------------------|--------------------|
| Working range          | 100 ... 200,000 mm |
| Light source           | Laser              |
| Transmission frequency | F4                 |
| Opening angle          | 1 °                |

### Electrical data

#### Performance data

|                               |                 |
|-------------------------------|-----------------|
| Supply voltage U <sub>B</sub> | 18 ... 30 V, DC |
|-------------------------------|-----------------|

#### Inputs

|                                    |            |
|------------------------------------|------------|
| Number of digital switching inputs | 1 Piece(s) |
|------------------------------------|------------|

#### Outputs

|                                     |            |
|-------------------------------------|------------|
| Number of digital switching outputs | 1 Piece(s) |
|-------------------------------------|------------|

### Interface

|                       |                                                                |
|-----------------------|----------------------------------------------------------------|
| Transmission protocol | EtherCAT                                                       |
| Type                  | EtherCAT link down 70 ms, EtherCAT Safety-over-EtherCAT (FSoE) |

#### EtherCAT

|                      |            |
|----------------------|------------|
| Function             | Process    |
| Switch functionality | None       |
| Transmission speed   | 100 Mbit/s |

#### Safety-over-EtherCAT (FSoE)

|          |         |
|----------|---------|
| Function | Process |
|----------|---------|

### Connection

|                       |            |
|-----------------------|------------|
| Number of connections | 2 Piece(s) |
|-----------------------|------------|

#### Connection 1

|                       |           |
|-----------------------|-----------|
| Type of connection    | Connector |
| Designation on device | POWER     |
| Thread size           | M12       |
| Type                  | Male      |
| No. of pins           | 5 -pin    |
| Encoding              | A-coded   |

#### Connection 2

|                       |           |
|-----------------------|-----------|
| Type of connection    | Connector |
| Designation on device | BUS       |
| Thread size           | M12       |
| Type                  | Female    |
| No. of pins           | 4 -pin    |
| Encoding              | D-coded   |

### Mechanical data

|                       |                           |
|-----------------------|---------------------------|
| Dimension (W x H x L) | 100 mm x 156 mm x 99.5 mm |
| Housing material      | Metal                     |
| Net weight            | 1,422 g                   |

### Operation and display

|                 |           |
|-----------------|-----------|
| Type of display | Bar graph |
|                 | LED       |

### Environmental data

|                                |               |
|--------------------------------|---------------|
| Ambient temperature, operation | -5 ... 50 °C  |
| Ambient temperature, storage   | -35 ... 70 °C |

### Certifications

|                                                            |                             |
|------------------------------------------------------------|-----------------------------|
| Degree of protection                                       | IP 65                       |
| Approvals                                                  | c UL US                     |
| Test procedure for EMC in accordance with standard         | EN 1000-6-4<br>EN 61000-6-2 |
| Test procedure for noise in accordance with standard       | EN 60068-2-64               |
| Test procedure for oscillation in accordance with standard | EN 60068-2-6                |
| Test procedure for shock in accordance with standard       | EN 60068-2-27               |

### Classification

|                       |          |
|-----------------------|----------|
| Customs tariff number | 84718000 |
| ECLASS 5.1.4          | 19039001 |
| ECLASS 8.0            | 19179090 |
| ECLASS 9.0            | 19179090 |
| ECLASS 10.0           | 19170506 |
| ECLASS 11.0           | 19170506 |
| ECLASS 12.0           | 19170506 |
| ECLASS 13.0           | 19170506 |
| ECLASS 14.0           | 19170506 |
| ECLASS 15.0           | 19170506 |
| ECLASS 16.0           | 19170506 |
| ETIM 5.0              | EC000515 |
| ETIM 6.0              | EC000515 |
| ETIM 7.0              | EC000515 |
| ETIM 8.0              | EC000515 |
| ETIM 9.0              | EC000515 |
| ETIM 10.0             | EC000515 |
| UNSPSC 26.08          | 43201544 |

## Dimensioned drawings

All dimensions in millimeters



- A Center axis of transmitter and alignment laser
- B Center axis of transmitter and receiver
- C Center axis of receiver

## Electrical connection

### Connection 1

### POWER

|                    |                |
|--------------------|----------------|
| Function           | Signal IN      |
|                    | Signal OUT     |
|                    | Voltage supply |
|                    |                |
| Type of connection | Connector      |
| Thread size        | M12            |
| Type               | Male           |
| Material           | Metal          |
| No. of pins        | 5 -pin         |
| Encoding           | A-coded        |

### Pin Pin assignment

|   |           |
|---|-----------|
| 1 | VIN       |
| 2 | IO1       |
| 3 | GND       |
| 4 | IO2       |
| 5 | FE/SHIELD |



### Connection 2

### BUS

|                    |           |
|--------------------|-----------|
| Function           | BUS IN    |
| Type of connection | Connector |
| Thread size        | M12       |
| Type               | Female    |
| Material           | Metal     |
| No. of pins        | 4 -pin    |
| Encoding           | D-coded   |

### Pin Pin assignment

|   |     |
|---|-----|
| 1 | TD+ |
| 2 | RD+ |
| 3 | TD- |
| 4 | RD- |



## Operation and display

### LED Display Meaning

|   |     |                          |                                                   |
|---|-----|--------------------------|---------------------------------------------------|
| 1 | AUT | Off                      | Operating mode not active                         |
|   |     | Green, continuous light  | Operating mode "Automatic"                        |
| 2 | MAN | Off                      | Operating mode not active                         |
|   |     | Green, continuous light  | Operating mode "Manual"                           |
| 3 | ADJ | Off                      | Operating mode not active                         |
|   |     | Green, continuous light  | Operating mode "Adjust"                           |
| 4 | LAS | Off                      | Operating mode not active                         |
|   |     | Green, continuous light  | Operating mode "Alignment-laser mounting support" |
|   |     |                          |                                                   |
| 5 | LLC | Off                      | Operating mode not active                         |
|   |     | Green, continuous light  | LLC without interruption                          |
|   |     | Red, continuous light    | LLC interrupted at least once                     |
| 6 | PWR | Off                      | No supply voltage                                 |
|   |     | Green, flashing          | Device ok, initialization phase                   |
|   |     | Green, continuous light  | Data transmission active                          |
|   |     | Red, flashing            | Data transmission interrupted                     |
|   |     | Red, continuous light    | Device error                                      |
| 7 | TMP | Off                      | Operating temperature OK                          |
|   |     | Orange, continuous light | Operating temperature critical                    |

## Operation and display

| LED               | Display                     | Meaning                                                       |
|-------------------|-----------------------------|---------------------------------------------------------------|
| 7 TMP             | Red, continuous light       | Operating temperature exceeded or not met                     |
| 8 LSR             | Off                         | With function reserve                                         |
|                   | Orange, continuous light    | Device OK, warning set                                        |
| 9 MAS             | Off                         | Installation on slave side                                    |
|                   | Green, continuous light     | Installation on master side                                   |
| 10 OLK            | Off                         | Fault                                                         |
|                   | Green, continuous light     | No data transmission                                          |
|                   | Orange, continuous light    | Data transmission active                                      |
| 11 ERL            | Off                         | Link OK                                                       |
|                   | Orange, continuous light    | Missing link (Ethernet cable connection) on the second device |
|                   | Red, continuous light       | No cable-connected link to the connected device               |
| 12 LINK           | Off                         | No cable-connected link to the connected device               |
|                   | Green, continuous light     | Link OK                                                       |
|                   | Orange, continuous light    | Data transmission active                                      |
| 13 SIGNAL QUALITY | 2 red, 2 orange and 4 green | Received signal level                                         |

## Suitable receivers

|                                                                                    | Part no. | Designation           | Operating range<br>Operating range<br>limit | Description                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------|----------|-----------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50146913 | DDLS 538 200.3 L H S3 |                                             | Special version: Operation of parallel light axes, Heating, Integrated laser alignment aid, Not influenced by reflective surfaces<br>Working range: 100 ... 200,000 mm<br>Transmission frequency: F3<br>Interface: EtherCAT link down 70 ms<br>Connection: Connector, M12 |

## Part number code

Part designation: DDLS 5XXX YYY.Z A B CC

|      |                                                                                                                                                                                                                                                                           |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DDLS | Optical transceiver for digital data transmission                                                                                                                                                                                                                         |
| 5XXX | <b>Series</b><br>508i: without integrated web server for remote diagnostics<br>508i: with integrated web server for remote diagnostics<br>538: without integrated web server for remote diagnostics (EtherCAT)<br>548i: with integrated web server for remote diagnostics |
| YYY  | Range for data transmission in m                                                                                                                                                                                                                                          |
| Z    | <b>Frequency of the transmitter</b><br>0: Frequency F0<br>1: Frequency F1<br>2: Frequency F2<br>3: Frequency F3<br>4: Frequency F4                                                                                                                                        |
| A    | <b>Option</b><br>L: integrated laser alignment aid (for transmitter/receiver)<br>n/a: standard                                                                                                                                                                            |

## Part number code

|           |                                                                                                  |
|-----------|--------------------------------------------------------------------------------------------------|
| <b>B</b>  | <b>Special equipment</b><br>H: with heating<br>n/a: no special equipment                         |
| <b>CC</b> | <b>Special equipment</b><br>S3: Optimized for EtherCAT transmission<br>n/a: no special equipment |

### Note



A list with all available device types can be found on the Leuze website at [www.leuze.com](http://www.leuze.com).

## Notes



### Observe intended use!



- ⚠ This product is not a safety sensor and is not intended as personnel protection.
- ⚠ The product may only be put into operation by competent persons.
- ⚠ Only use the product in accordance with its intended use.



### For UL applications:



- ⚠ For UL applications, use is only permitted in Class 2 circuits in accordance with the NEC (National Electric Code).



### ATTENTION! INVISIBLE LASER RADIATION – CLASS 1M LASER PRODUCT



#### Do not expose users of telescopic optics!

The device satisfies the requirements of IEC 60825-1:2007 (EN 60825-1:2007) safety regulations for a product of **laser class 1M** as well as the U.S. 21 CFR 1040.10 regulations with deviations corresponding to Laser Notice No. 50 from June 24, 2007.

#### ⚠ Do not expose users of telescopic optics!

The device satisfies the requirements of IEC 60825-1:2007 (EN 60825-1:2007) safety regulations for a product of **laser class 1M** as well as the U.S. 21 CFR 1040.10 regulations with deviations corresponding to Laser Notice No. 50 from June 24, 2007.

- ⚠ Looking into the beam path for extended periods using telescope optics may damage the eye's retina. Never look using telescope optics into the laser beam or in the direction of reflecting beams.
- ⚠ CAUTION! The use of operating and adjusting devices other than those specified here or the carrying out of differing procedures may lead to dangerous exposure to radiation!  
The use of optical instruments or devices (e.g., magnifying glasses, binoculars) in combination with the device increases the danger of eye damage.
- ⚠ Observe the applicable statutory and local laser protection regulations.
- ⚠ The device must not be tampered with and must not be changed in any way.  
There are no user-serviceable parts inside the device.  
Repairs must only be performed by Leuze electronic GmbH + Co. KG.

## Notes



### ATTENTION! LASER RADIATION – CLASS 1 LASER PRODUCT (alignment laser)



The device satisfies the requirements of IEC 60825-1:2007 (EN 60825-1:2007) safety regulations for a product of **laser class 1** as well as the U.S. 21 CFR 1040.10 regulations with deviations corresponding to Laser Notice No. 50 from June 24, 2007.

☞ The device satisfies the requirements of IEC 60825-1:2007 (EN 60825-1:2007) safety regulations for a product of **laser class 1** as well as the U.S. 21 CFR 1040.10 regulations with deviations corresponding to Laser Notice No. 50 from June 24, 2007.

☞ Observe the applicable statutory and local laser protection regulations.

☞ The device must not be tampered with and must not be changed in any way.  
There are no user-serviceable parts inside the device.  
Repairs must only be performed by Leuze electronic GmbH + Co. KG.

## Accessories

### Connection technology - Connection cables

|  | Part no. | Designation         | Article          | Description                                                                                                                                                                                                                                                      |
|--|----------|---------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50132079 | KD U-M12-5A-V1-050  | Connection cable | Application: Chemical resistant<br>Connection 1: Connector, M12, Axial, Female, A-coded, 5 -pin<br>Connector, LED: No<br>Connection 2: Open end<br>Shielded: No<br>Cable length: 5,000 mm<br>Sheathing material: PVC                                             |
|  | 50135074 | KS ET-M12-4A-P7-050 | Connection cable | Application: Oil and lubricant resistant<br>Suitable for interface: Ethernet<br>Connection 1: Connector, M12, Axial, Male, D-coded, 4 -pin<br>Connector, LED: No<br>Connection 2: Open end<br>Shielded: Yes<br>Cable length: 5,000 mm<br>Sheathing material: PUR |

### Connection technology - Interconnection cables

|  | Part no. | Designation                 | Article               | Description                                                                                                                                                                                                                                                                    |
|--|----------|-----------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50137078 | KSS ET-M12-4A-M12-4A-P7-050 | Interconnection cable | Application: Oil and lubricant resistant<br>Suitable for interface: Ethernet<br>Connection 1: Connector, M12, Axial, Male, D-coded, 4 -pin<br>Connection 2: Connector, M12, Axial, Male, D-coded, 4 -pin<br>Shielded: Yes<br>Cable length: 5,000 mm<br>Sheathing material: PUR |
|  | 50135081 | KSS ET-M12-4A-RJ45-A-P7-050 | Interconnection cable | Application: Oil and lubricant resistant<br>Suitable for interface: Ethernet<br>Connection 1: Connector, M12, Axial, Male, D-coded, 4 -pin<br>Connection 2: RJ45<br>Shielded: Yes<br>Cable length: 5,000 mm<br>Sheathing material: PUR                                         |

## Accessories

### Connection technology - Connectors

|                                                                                  | Part no. | Designation | Article   | Description                                                                                  |
|----------------------------------------------------------------------------------|----------|-------------|-----------|----------------------------------------------------------------------------------------------|
|  | 50020501 | KD 095-5A   | Connector | Connection: Connector, M12, Axial, Female, A-coded, 5 -pin                                   |
|                                                                                  | 50112155 | S-M12A-ET   | Connector | Suitable for interface: Ethernet<br>Connection: Connector, M12, Axial, Male, D-coded, 4 -pin |

### Services

|                                                                                  | Part no. | Designation | Article          | Description                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------|----------|-------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | S981001  | CS10-S-110  | Start-up support | Details: Performed at location of customer's choosing, duration: max. 10 hours.<br>Conditions: Devices and connection cables are already mounted, price not including travel costs and, if applicable, accommodation expenses. |
|                                                                                  | S981005  | CS10-T-110  | Product training | Details: Location and content to be agreed upon, duration: max. 10 hours.<br>Conditions: Price not including travel costs and, if applicable, accommodation expenses.                                                          |

#### Note



🔗 A list with all available accessories can be found on the Leuze website in the Download tab of the article detailed page.