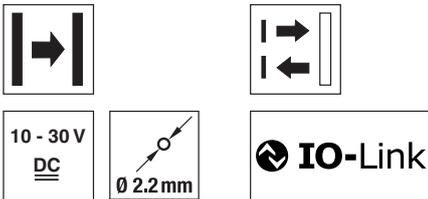


LV463 IO-Link

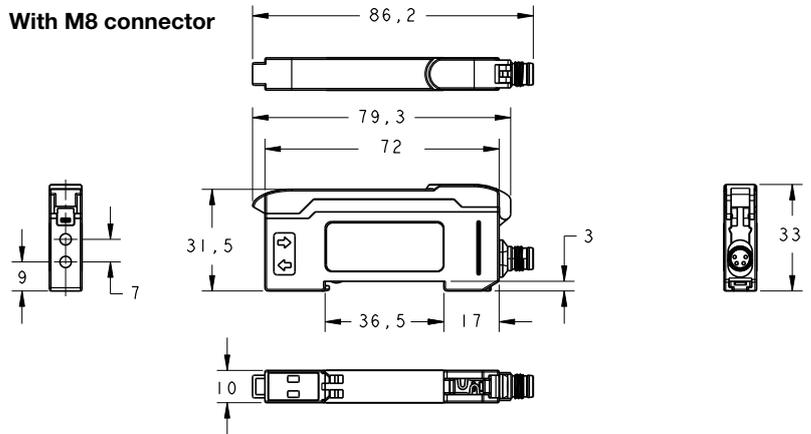
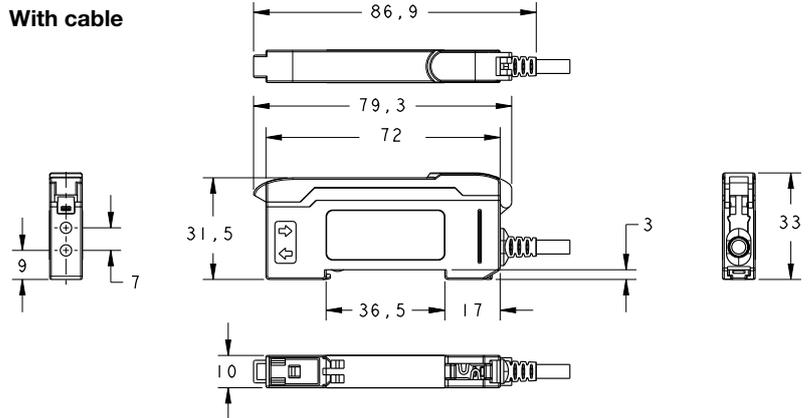
Amplifier for fiber optics

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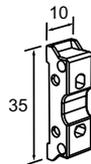


- Two, large, easy-to-read displays for the simultaneous display of the signal value and the switching threshold
- IO-Link with additional switching output (Dual Channel)
- Three different teach modes for fast sensor adjustment
- Switch for changing between light and dark switching

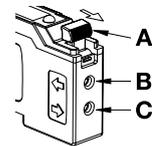
Dimensioned drawing



Mounting accessories



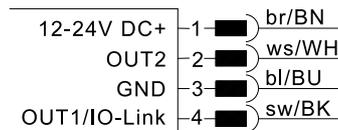
BTU LV463  
Part no. 50120869



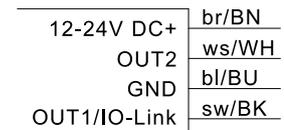
- A** Clamping lever for fiber optic cable (unlock in direction of arrow)
- B** Connection for fiber optics receiver
- C** Connection for fiber optics transmitter

Electrical connection

4-pin connector

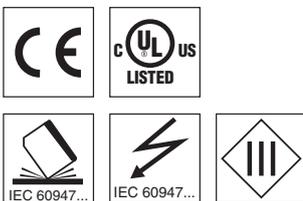


4-wire cable



**NOTE:** Open lead wires must be connected to a terminal box.

We reserve the right to make changes • DS\_LV463\_IOLink\_en\_50135323.fm



Accessories:

(available separately)

- Plastic fiber optics (KF, KFX)
- Ready-made cables (KB ...)
- Mounting device (BTU LV463)

## About this document



### NOTE

This document supplements the device-specific data sheets for the **LV463.XV7/L...** and **LV463.XR7/L...** fiber optic amplifiers with information and details on the IO-Link interface.

## 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.

## Type overview of amplifier for fiber optics with IO-Link

### With one switching output and IO-Link

| Features                          | Order code           | Part no. |
|-----------------------------------|----------------------|----------|
| Red light, 1 PNP switching output | LV463.XV7/L4-M8      | 50133969 |
| Red light, 1 PNP switching output | LV463.XV7/L4         | 50133970 |
| Red light, 1 PNP switching output | LV463.XV7/L4-150-M12 | 50133971 |
| Red light, 1 PNP switching output | LV463.XR7/L4-M8      | 50134007 |
| Red light, 1 PNP switching output | LV463.XR7/L4         | 50134008 |
| Red light, 1 PNP switching output | LV463.XR7/L4-150-M12 | 50134009 |

## IO-Link interface

The LV463.../L... fiber optic amplifiers have a dual-channel architecture.

The IO-Link interface in accordance with specification 1.1.1 (October 2011) is provided on pin 4 (OUT 1). This allows the devices to be configured quickly and easily and, therefore, cost-effectively.

Furthermore, the sensor transmits its process data and makes diagnostic information available through it.

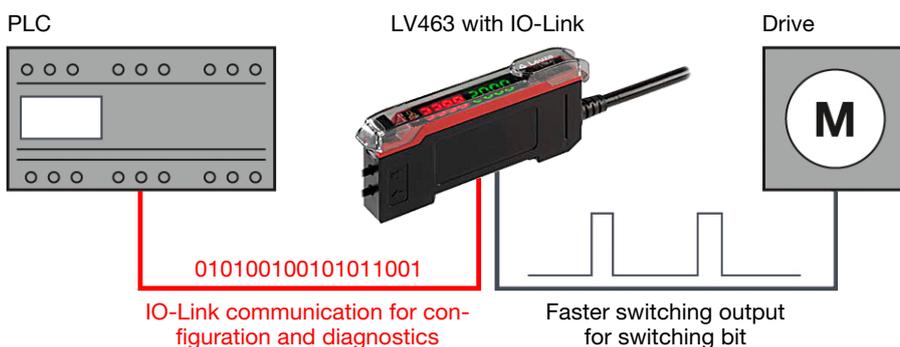
Parallel to the IO-Link communication, the sensor can output the continuous switching signal for object detection on OUT 2. The IO-Link communication does not interrupt this signal.



### NOTE

In **Leuze Sensor Studio**, the following applies with regard to the designations: **Q1 = OUT 1**, **Q2 = OUT 2**.

## Dual-channel operation



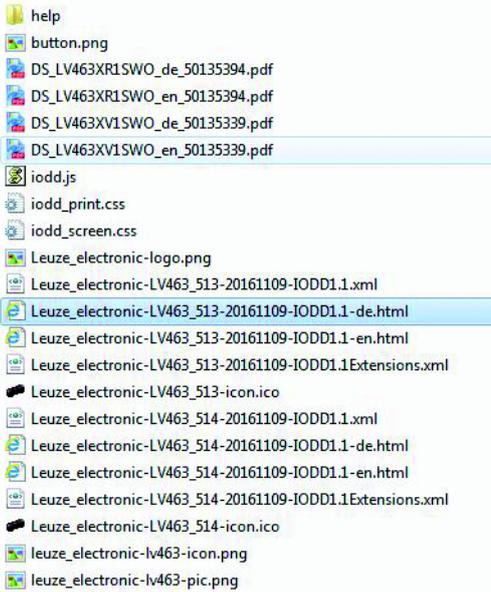
For diagnostics and recipe changes/format changeover (configuration of the machine in production operation), it is necessary to exchange diagnostic and configuration data with the sensor, e.g., via the IO-Link interface. For applications with high real-time requirements, it is, however, advantageous to make the fast switching output of the sensor available separately from the IO-Link communication interface for the further processing.

**LV463 IO-Link**

**Amplifier for fiber optics**

**Device-specific IODD**

At [www.leuze.com](http://www.leuze.com) in the download area for IO-Link sensors you will find the IODD zip file with all data required for the installation.



**IO-Link parameter documentation**

A complete description of the IO-Link parameters is given in the \*.html files. Please double-click one of the two language variants: \*IODD\*-de.html for German or \*IODD\*-en.html for English.

**Functions configurable via IO-Link**

PC configuration and visualization is performed comfortably with the USB-IO-Link Master SET MD12-US2-IL1.1... (part no. 50121098) and the **Leuze Sensor Studio** visualization software (in the download area of the sensor at [www.leuze.com](http://www.leuze.com)).

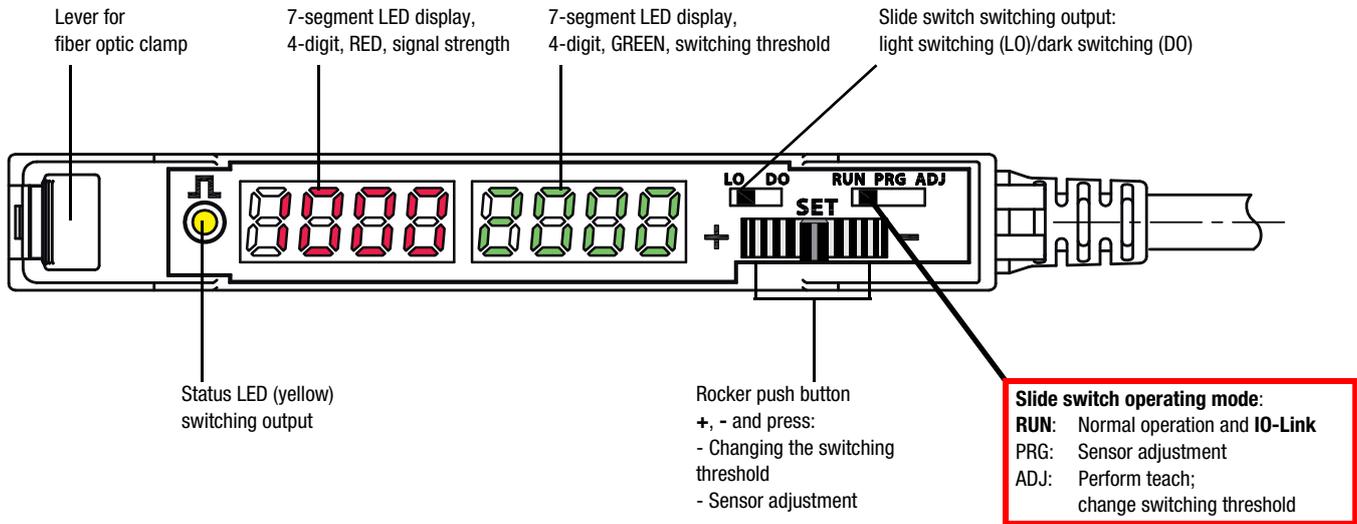
**IO-Link process data**

The sensor transmits 2 bytes to the master.

| Data bit |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Assignment                        | Default settings  |   |                   |   |
|----------|----|----|----|----|----|---|---|---|---|---|---|---|---|---|---|-----------------------------------|---|---|-------------------|---|
| 15       | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |                                   | Object detection  |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | State of Q1 switching output      | Light switching L0                                      |   | Dark switching D0 |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   |                                   | Sensor  | 1 = Object detected<br>0 = No object          |                   | 1 = No object<br>0 = Object detected          |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Throughbeam photoelectric sensors | Light switching L0                                      |   | Dark switching D0 |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   |                                   |   | 1 = Light path free<br>0 = Light path blocked |                   | 1 = Light path blocked<br>0 = Light path free |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value LSB                 | Process value 15 bit:<br><b>Sensor reception signal</b> |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value                     |   |   |                   |   |
|          |    |    |    |    |    |   |   |   |   |   |   |   |   |   |   | Process value MSB                 |   |   |                   |   |

## Working with IO-Link

First make sure that the slide switch for the operating mode is in the **RUN** position. Then, the amplifier can be connected to an IO-Link interface.



## Leuze Sensor Studio

In combination with an IO-Link USB master, the **Sensor Studio** from Leuze electronic is used for the operation, configuration and diagnostics of the sensors and actuators (IO-Link devices) with an IO-Link interface. Basic information concerning this can be found in the *Short instructions for Sensor Studio IO-Link USB master 2.0* on the Leuze electronic website.

In **Sensor Studio**, a selection of parameters, commands, process values and diagnostic data, grouped into submenus, is usually displayed. However, the designations and names used in the device-specific IODD usually differ from the designations in **Sensor Studio**. In spite of this, it is possible to find the corresponding information.

To do this, position the mouse pointer on a parameter, command, process value or diagnostic value and click the right mouse button. This opens a window containing all of the data for this parameter.

**Example:** the mouse pointer was positioned on **Parameter (write) Access Lock** and then the right mouse button was clicked.

**PARAMETER**

DEVICE ACCESS LOCKS

Parameter (write) Access Lock false

|   |            |
|---|------------|
| <b>Variable name:</b> Device Access Locks | false      |
| Variable id: V_DeviceAccessLocks          | false      |
| Index: 12 (0x0C)                          | false      |
| Data type: Record                         | false      |
| Bit length: 16                            |            |
| Access rights: ReadWrite                  |            |
| Dynamic: No                               | Normal     |
| Subindex support: No                      | 24 ms      |
| Data storage: Yes                         | Auto Gain  |
|   | Gain 6     |
|   | 0,00000 ms |

**Record item:** Parameter (write) Access Lock

Subindex: 1

Data type: Bool

Bit length: 1

Bit offset: 0

BDCT SETTINGS

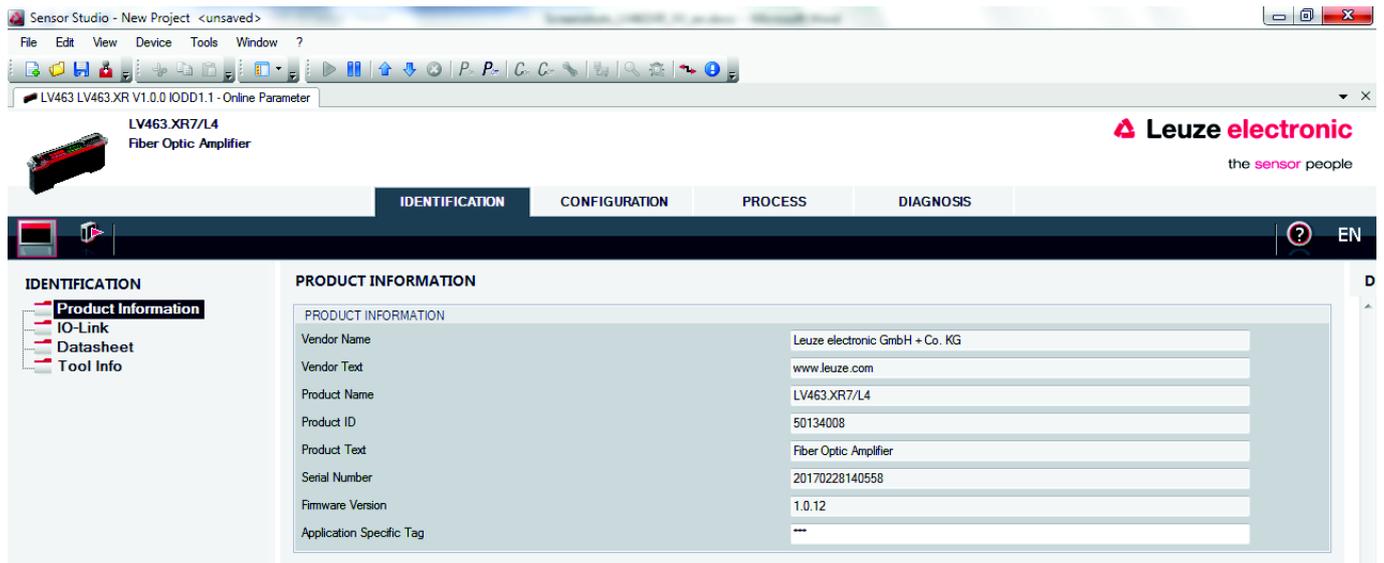
BDC Logic: Switch Select

BDC Mode: Single Point

**LV463 IO-Link**

**Amplifier for fiber optics**

**IDENTIFICATION tab**



The screenshot shows the 'Sensor Studio - New Project <unsaved>' window. The title bar indicates the device is 'LV463 LV463.XR V1.0.0 IO-Link Parameter'. The main workspace is titled 'LV463 XR7/L4 Fiber Optic Amplifier' and features the Leuze electronic logo with the tagline 'the sensor people'. The interface has four tabs: IDENTIFICATION (selected), CONFIGURATION, PROCESS, and DIAGNOSIS. A sidebar on the left lists 'IDENTIFICATION' sub-items: Product Information (selected), IO-Link, Datasheet, and Tool Info. The central area displays 'PRODUCT INFORMATION' with the following details:

| PRODUCT INFORMATION      |                                |
|--------------------------|--------------------------------|
| Vendor Name              | Leuze electronic GmbH + Co. KG |
| Vendor Text              | www.leuze.com                  |
| Product Name             | LV463.XR7/L4                   |
| Product ID               | 50134008                       |
| Product Text             | Fiber Optic Amplifier          |
| Serial Number            | 20170228140558                 |
| Firmware Version         | 1.0.12                         |
| Application Specific Tag | ---                            |

| IDENTIFICATION               |   |  Notes |
|------------------------------|---|---|
| <b>Product information</b>   | Display of device and manufacturer-specific information             |   |
| <b>IO-Link</b>               | Display of IO-Link-specific information                             |   |
| <b>Operating information</b> | Information on working with the <b>Leuze Sensor Studio</b> software |   |
| <b>Datasheet</b>             | Data sheet for the LV463 fiber optic amplifier                      |   |

CONFIGURATION tab

The screenshot shows the 'CONFIGURATION' tab in the Sensor Studio software. The main area is divided into several sections:

- DEVICE ACCESS LOCKS:**
  - Parameter (write) Access Lock: false
  - Data Storage Lock: false
  - Local Keyboard Lock: false
  - Local User Interface Lock: false
- BASIC SETTINGS:**
  - Display Orientation: Normal
  - Response Speed: 24 ms
  - Gain Mode: Auto Gain
  - Gain Level: Gain 6
  - Process Data Filter Update Time: 0.00000 ms
- BDC1 SETTINGS:**
  - BDC Logic: Switch Select
  - BDC Mode: Single Point
  - Hysteresis: medium
  - Delay Mode: Disabled
  - Timer ON Delay / OFF 1-Shot: 0 ms
  - Timer OFF Delay / ON 1-Shot: 0 ms
- TEACH SETTINGS BDC1:**
  - Teach-in Channel: Default
  - TEACH Selection: Single Point Set
  - Auto Threshold: Disabled
  - upper threshold: 5000

| CONFIGURATION                                  |                               |   | Notes |
|--|-------------------------------|---|-------|
| <b>Parameter -&gt;<br/>DEVICE ACCESS LOCKS</b> | Parameter (write) Access Lock | True: blocks access to sensor configuration parameters.<br><b>Default: false (access possible)</b>  |       |
|  | Data Storage Lock             | True: only blocks access to the data memory interface (see section 10.4 "Data storage (data storage mechanism)" of the IO-Link interface specification - version 1.1). <b>Default: false (data storage mechanism possible)</b>  |       |
|  | Local Keyboard Lock           | True: locks all adjustment options at the amplifier with the exception of the LO/DO toggle switch, provided that "Preselection via device operation" has been selected under SWITCHING OUTPUT ADJUSTMENT.<br><b>Default: false (adjustments possible on the device)</b> |       |
|  | Local User Interface Lock     | True: locks all adjustment options at the amplifier, including the LO/DO toggle switch.<br><b>Default: false (adjustments possible on the device)</b>   |       |

| CONFIGURATION                                  |                                 |  |  Notes |
|--|---------------------------------|--|---|
| <b>Parameter -&gt;<br/>BASIC SETTINGS</b>      | Display Orientation             | Adjustment option for rotating the read direction of the two displays by 180° (normal -> rotated).<br><b>Default: normal</b> (readable if the fiber optic clamp is on the left)  |   |
|  | Response Speed                  | Selection of the response time. This influences the number of display digits, the response speed and the operating range.<br><b>Default LV463.XV: 250 µs</b><br><b>Default LV463.XR: 2ms</b>   |   |
|  | Gain Mode                       | With the "Auto Gain" setting, the device independently selects the most suitable gain level when teaching in. Alternatively, the gain level can also be specified using the "Fixed Gain Level" setting.<br><b>Default: automatic gain level</b>  |   |
|  | Gain Level                      | A suitable gain level can be selected here depending on the device model. Make sure that the display value does not overflow with the maximum possible signal value<br>-> reduce the gain level if necessary.<br><b>Default LV463.XV: 32</b><br><b>Default LV463.XR: 6</b>   |   |
|  | Process Data Filter Update Time | The process value is averaged with the time constant.<br><b>Default: 0.00000 ms</b>  |   |
| <b>Parameter -&gt;<br/>BDC1 SETTINGS</b>       | BDC Logic                       | Defines the switching function of the switching output independently of the position of the slide switch on the device.<br>The position of the LO/DO slide switch determines the switching function with "as per slide switch position on the device".<br><b>Default: as per slide switch position on the device</b> |   |
|  | BDC Mode                        | Single point fixed   |   |
|  | Hysteresis                      | Defines the size of the hysteresis at the switching point.<br>Small: more precise in the switching point but sensitive.<br>Large: e.g. with slightly fluctuating (unstable) display.<br><b>Default: small</b>  |   |
|  | Delay Mode                      | The amplifier has 3 selectable time functions.<br>First select the required function:<br>- ON / OFF delay<br>- OFF 1-Shot<br>- ON 1-Shot<br><b>Default: OFF (no switching delay)</b>   |   |
|  | Timer ON Delay / OFF 1-Shot     | If the "ON delay" or "OFF 1-Shot" switching delay was previously selected, a time value must be entered here. The device then operates with this delay time and the previously selected switching delay. If "0" is entered, the time function is deactivated.<br><b>Default: 0ms (no time function)</b>              |   |
|  | Timer OFF Delay / ON 1-Shot     | If the "OFF delay" or "ON 1-Shot" switching delay was previously selected, a time value must be entered here. The device then operates with this delay time and the previously selected switching delay. If "0" is entered, the time function is deactivated.<br><b>Default: 0ms (no time function)</b>              |   |
| <b>Parameter -&gt;<br/>TEACH SETTINGS BDC1</b> | Teach-in Channel                | Selection of the teachable switching output.<br><b>Default: presetting (default)</b>   |   |
|  | TEACH Selection                 | The device has the following configuration options:<br>- Single-point setting<br>- 2-point teach<br>- Dynamic teach<br><b>Default: single-point setting</b>  |   |
|  | Auto Threshold                  | The function is only available during dynamic teaching and can be switched to ON or OFF here.<br><b>Default: OFF</b>   |   |
|  | Upper Threshold                 | Display the current upper switching threshold (green display on the amplifier). The display value is modifiable and can be overwritten.<br><b>Default: 2000</b>  |   |

**CONFIGURATION**

- Parameter
- All Commands**

**ALL COMMANDS**

**TEACH COMMANDS**

- Command: SP1 Single Value Teach
- Command: SP1 Two Value Teach TP1
- Command: SP1 Two Value Teach TP2
- Command: SP1 Dynamic Teach Start
- Command: SP1 Dynamic Teach Stop
- Command: S1 Exit Teach

**SYSTEM COMMANDS**

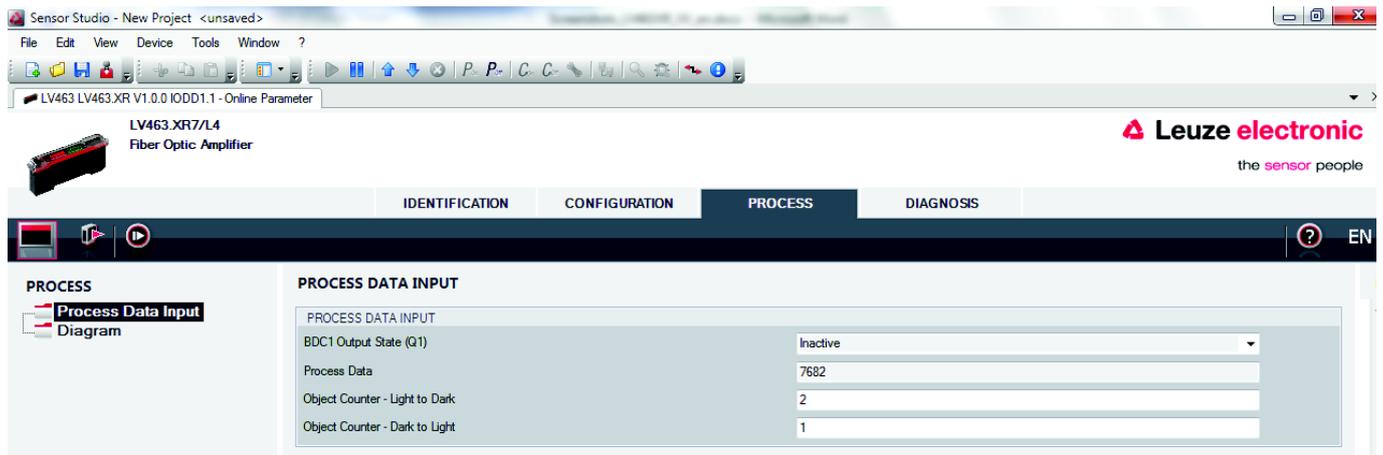
- Command: Baseline Null
- Command: Baseline Disable
- Command: Disable Emitter
- Command: Enable Emitter
- Command: Start Sensor Search
- Command: Stop Sensor Search
- Command: Restore Factory Settings

| CONFIGURATION       |   |  Notes |
|---------------------|---|---|
| <b>All commands</b> | Commands are executable commands. These are started by clicking on the respective button. |   |

**LV463 IO-Link**

**Amplifier for fiber optics**

**PROCESS tab**

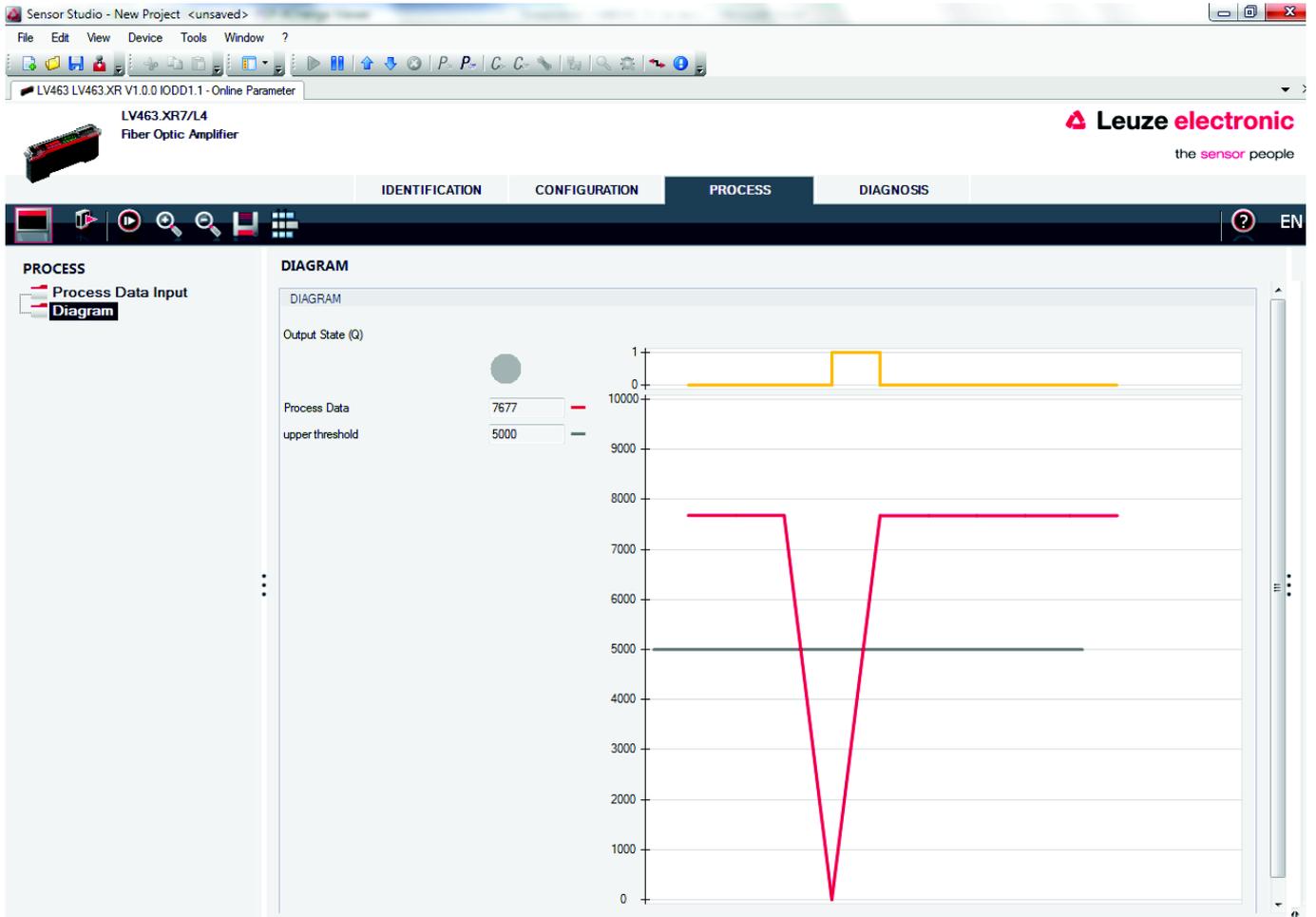


| <b>PROCESS</b>                                     |                                | <b>Note:</b> Click on  to start the cyclical updating of the process data.  |  <b>Notes</b> |
|--|--------------------------------|--|--|
| <b>Process Data Input -&gt; PROCESS DATA INPUT</b> | BDC1 Output State (Q1)         | Displays the current state (active or inactive) of BDC1 output.  |  |
|  | Process Data                   | Current process value in digits.   |  |
|  | Object Counter - Light to Dark | The count is increased if the signal level reduces compared to the free light path.<br>Throughbeam principle example: an object moves into the light beam and interrupts it.<br>Diffuse reflection principle example: an object moves out of the detection range of the fiber and the resulting background signal is smaller.                                    |  |
|  | Object Counter - Dark to Light | The count is increased if the signal level increases compared to the current value.<br>Throughbeam principle example: an object moves out of the light beam and the free light path occurs.<br>Diffuse reflection principle example: an object moves into the detection range of the fiber and the current signal is larger than the previous background signal. |  |

 **NOTE**

The object counter can be used in the process monitoring, for example, to determine the number of detected objects. The function differs depending on the switching logic setting of the switching output transitions from light to dark and from dark to light. The counts can be edited and can be set separately to a value between 0 and 10,000.

If an object moves through a throughbeam light path, both counts of the object counter are increased by the same extent because there is both a light/dark transition as well as a dark/light transition.



| PROCESS               |                  | Note: Click on  to start the cyclical updating of the process data.             |  Notes |
|-----------------------|------------------|--|---|
| Diagram -><br>DIAGRAM | Output State (Q) | The display corresponds to the yellow diode on the device.<br>ON (yellow / 1): Output active<br>OFF (gray / 0): Output inactive                                    |   |
|                       | Process Data     | Displays the chronological trend of the sensor signal in digits (corresponds to the display of the red display on the device, shown as a red line in the diagram). |   |
|                       | Upper Threshold  | Displays the current upper switching threshold (corresponds to the display of the green display on the device, shown as a gray line in the diagram).               |   |

**LV463 IO-Link**

**Amplifier for fiber optics**

**DIAGNOSIS tab**

**DIAGNOSIS**

**DIAGNOSIS**

**BDC1 STATUS**

|                  |                  |
|------------------|------------------|
| Lower Threshold  | 4951             |
| Upper Threshold  | 5000             |
| Output State (Q) | Inactive         |
| Hard Alarm State | No alarm present |

**DETAILED DEVICE STATUS**

|               |              |
|---------------|--------------|
| Device Status | Device is OK |
| [1]           | -            |
| [2]           | -            |
| [3]           | -            |
| [4]           | -            |
| [5]           | -            |
| [6]           | -            |

**TEACH STATUS**

|              |       |
|--------------|-------|
| Teach State  | Idle  |
| SP1 TP1 Flag | false |
| SP1 TP2 Flag | false |
| SP2 TP1 Flag | false |
| SP2 TP2 Flag | false |

**STATISTICS**

|  |  |
|--|--|
| Number of Samples                      | 23845  |
| Sum                                    | 183050992                                      |
| Min                                    | 7678   |
| Max                                    | 0  |
| BDC1 Light-dark:Dark Transition Count  | 0  |
| BDC1 Dark-light:Light Transition Count | 0  |
| All-time Run Time                      | 35,5000 h                                      |
| Resetable Run Time                     | 23,2500 h <input type="text" value="35,5000"/> |

| <b>DIAGNOSIS</b>                              |   | <b>Note:</b> Click on  to start the cyclical updating of the diagnostic data. The diagnostic data consists of display-only values, and cannot be modified (exception: resettable timer).                        |  <b>Notes</b> |
|---|---|--|--|
| <b>Diagnosis -&gt; OUTPUT STATE Q1</b>        | Lower Threshold                         | Switch-on threshold, depending on the hysteresis parameter: upper threshold minus hysteresis = lower switching threshold.  |  |
|   | Upper Threshold                         | Displays the current upper switching threshold (green display on the amplifier) -> switch-off threshold  |  |
|   | Output State (Q)                        | State display: active = 1; passive = 0.  |  |
|   | Hard Alarm State                        | Displaying of device errors.   |  |
| <b>Diagnosis -&gt; DETAILED DEVICE STATUS</b> | Device status                           | Detailed device status.  |  |
|   | Fields [1] - [6]                        | Displays possible detailed device statuses.  |  |
| <b>Diagnosis -&gt; TEACH STATUS</b>           | Teach State                             | Detailed device status.  |  |
|   | SP1 TP1 Flag                            | Status information regarding teach.  |  |
|   | SP1 TP2 Flag                            | Status information regarding teach.  |  |
|   | SP2 TP1 Flag                            | Status information regarding teach.  |  |
|   | SP2 TP2 Flag                            | Status information regarding teach.  |  |
| <b>Diagnosis -&gt; STATISTICS</b>             |   | Click on  to start the cyclical updating of the statistical data.   |  |
|   | Number of Samples                       | The counter value that is entered defines a number of measurements which are carried out for the following evaluations: "Sum", "Min", "Max", "BDC1 Light-dark; Light Transition Count" and "BDC1 Dark-light; Dark Transition Count". The evaluation is carried out for max. 32,761 measurements. |  |
|   | Sum                                     | Sum total of "Number of measurements".   |  |
|   | Min                                     | Minimum process value within "Number of measurements". The values are not averaged and can also be negative due to signal noise (negative signal values are not displayed on the device).  |  |
|   | Max                                     | Maximum process value within "Number of measurements". The values are not averaged and can be somewhat higher than shown on the red display due to signal noise.   |  |
|   | BDC1 Light-dark; Light Transition Count | Number of transition counts within "Number of measurements".   |  |
|   | BDC1 Dark-light; Dark Transition Count  | Number of transition counts within "Number of measurements".   |  |
|   | All-time Run Time                       | Counts the number of operating hours after initial commissioning. The value cannot be reset.   |  |
|   | Resetable Run Time                      | Can be used as a timer (hour counter). Any offset can be entered as a counter start value.   |  |


**NOTE**

The statistics data can be reset again after every read-out.