

LV463 IO-Link

Amplifier for fiber optics

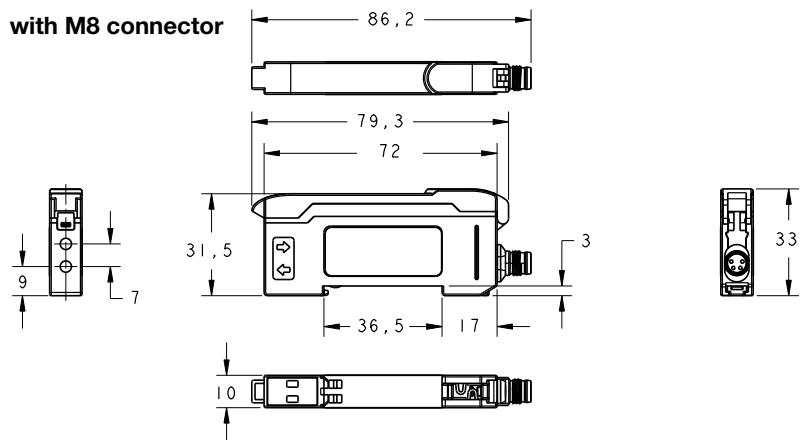
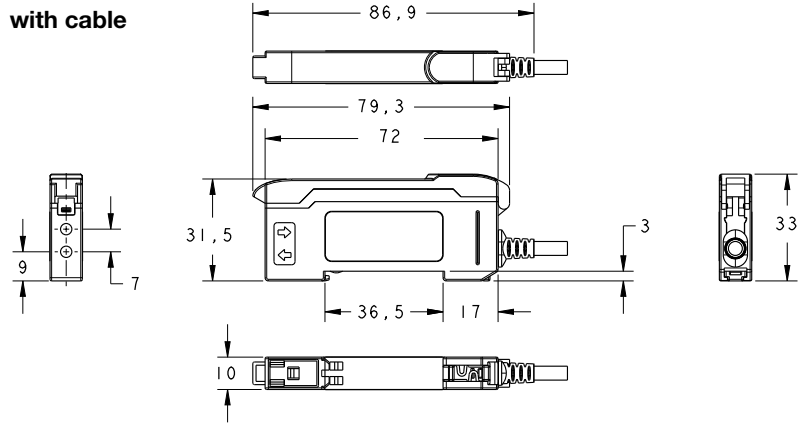
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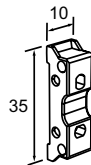
up to 1050mm
 up to 270mm
 10 - 30 V DC
 Ø 2.2mm
 IO-Link

- 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

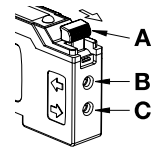
Dimensioned drawing



Mounting accessories



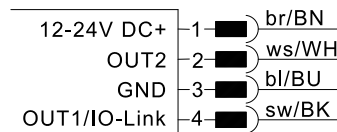
BTU LV463
Part no. 50120869



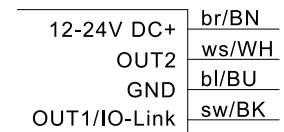
- A** Clamping lever for fiber optic cable (unlock in direction of arrow)
- B** Connection for fiber optics receiver
- C** Connection for fiber optics transmitter

Electrical connection

4-pin plug

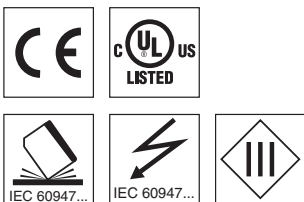


4-wire cable



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

We reserve the right to make changes • DS_LV463_7L4_en_50125193.fm



Accessories:

(available separately)

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

Specifications

Optical data		Throughbeam principle	Scanning principle		
Operating range/scanning range ¹⁾		up to 1050mm	up to 270mm		
Light source		LED (modulated light)			
Wavelength		660nm (visible red light)			
Timing		Delay before start-up	≤ 500ms		
	Signal range	High Speed (HS)	Standard (STD)	Long Range (LR)	Extra Long Range (XLR)
Response time		200µs	500µs	2000µs	5000µs
Switching frequency ²⁾		2500Hz	1000Hz	250Hz	100Hz
Display area (digits)		0 ... 4000	0 ... 4000	0 ... 9999	0 ... 9999
Sensor operating modes		IO-Link	COM2		
SIO		Dual Channel	standard push-pull		
			yes		
Electrical data		Operating voltage U_B ³⁾	SIO mode: 12 ... 24VDC ± 10 % COM2 mode: 18 ... 24VDC ± 10 %		
Residual ripple		Open-circuit current	≤ 10% of U_B ≤ 40mA @ 24VDC		
Switching output	.../L4...	pin 4/bk:	IO-Link SIO mode, Push-pull (PNP light switching, NPN dark switching)		
		pin 4/bk:	IO-Link COM2 mode		
Function		pin 2/wh:	PNP dark switching		
Switching output time functions			light/dark switching, adjustable by means of a switch switch-on/-off delay, passing contact (on actuation or fall-back), (combinations are limited → <i>Combinations of timing functions</i>)		
Adjustable times (time functions)			0 ... 9999ms		
Signal voltage high/low			≥ (U_B -2.5V)/≤ 2.5V		
Output current			≤ 100mA		
Sensitivity			adjustable using the teach function or +/- buttons		
Indicators		Yellow LED	switching output active		
Display			2 x 7-segment LED, 4-digit, red: signal strength, green: switching threshold		
Mechanical data		Housing	ABS/PC black/red, transparent PC cover		
Weight			50g with M8 connector 63g with 2000mm cable 70g with 150mm cable and M8/M12 connector		
Connection type			M8 connector, 4-pin, or 2000mm cable, 4 x 0.25mm ² , or 150mm cable with M8 connector, 4-pin, or 150mm cable with M12 connector, 4-pin		
Fibre optic cable connection			clamp-mounting, 2 x Ø 2.2mm		
Environmental data		Ambient temp. (operation/storage)	-10°C ... +55°C/-20°C ... +85°C		
Protective circuit ⁴⁾			2, 3		
Protection class			IP 50, NEMA 1		
Standards applied			EN 60947-5-2		
Certifications			UL 508, C22.2 No.14-13 ^{3) 5)}		
Options		Sensor adjustment	menu-driven by means of display/rocker push button or via IO-Link		

Remarks



Notice!

Detailed specifications on the range/scanning range are enclosed in the data sheets of our fiber optics type **KF** or **KFX**.

Explanation of the signal areas

High Speed (HS):

shortest response time; shortest operating range

Standard (STD):

response time and operating range suitable for many standard applications

Long Range (LR):

long operating range; high-resolution display format; response time somewhat shorter

Extra Long Range (XLR):

longest operating range; high-resolution display format; short response time

● Approved purpose:

This product may only be used by qualified personnel and must only be used for the approved purpose. This sensor is not a safety sensor and is not to be used for the protection of persons.

- 1) Range/scanning range depending on the fiber optics used
- 2) With a duty cycle of 1:1
- 3) For UL applications: for use in class 2 circuits according to NEC only
- 4) 2=polarity reversal protection, 3=short circuit protection for all outputs
- 5) These proximity switches shall be used with UL Listed Cable assemblies rated 30V, 0.24A min, in the field installation, or equivalent (categories: CYJV/CYJV7 or PVVA/PVVA7)

Additional information on the IO-Link can be found on the Internet at www.leuze.com.

Order guide

	Designation	Part no.
IO-Link models		
Connection: M8 connector, 4-pin	LV463.7/L4-M8	50122456
Connection: cable 2000 mm, 4 x 0.25mm ²	LV463.7/L4	50122460
Connection: cable 150mm with M8 connector, 4-pin	LV463.7/L4-150-M8	50122459
Connection: cable 150mm with M12 connector, 4-pin	LV463.7/L4-150-M12	50122457

IO-Link process data

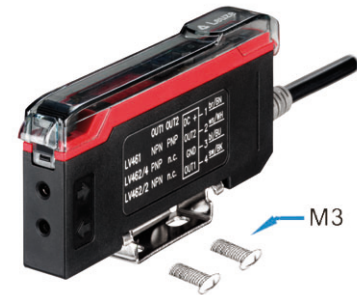
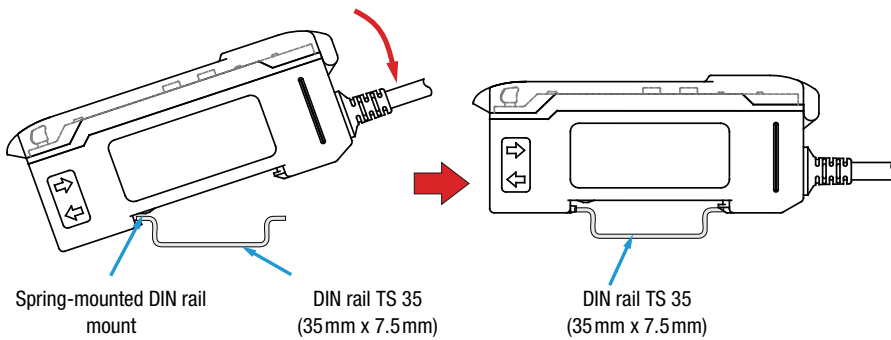
The sensor transmits 2 bytes to the master.

Data bit																Assignment	Default settings
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
																Switching output	Object detection
																Error message	e. g. Teach error
																Measurement value LSB	Value range 0 ... 9999 0 = min. signal level 9999 = max. signal level
																Measurement value	
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Additional information on the IO-Link service data can be found on the Internet at www.leuze.com.

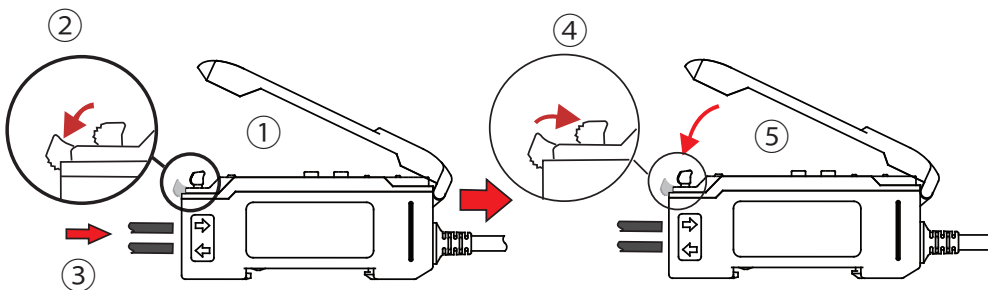
Mounting the amplifier



Alternatively, the amplifier can also be mounted without a DIN rail using the mounting accessory and M3 screws.

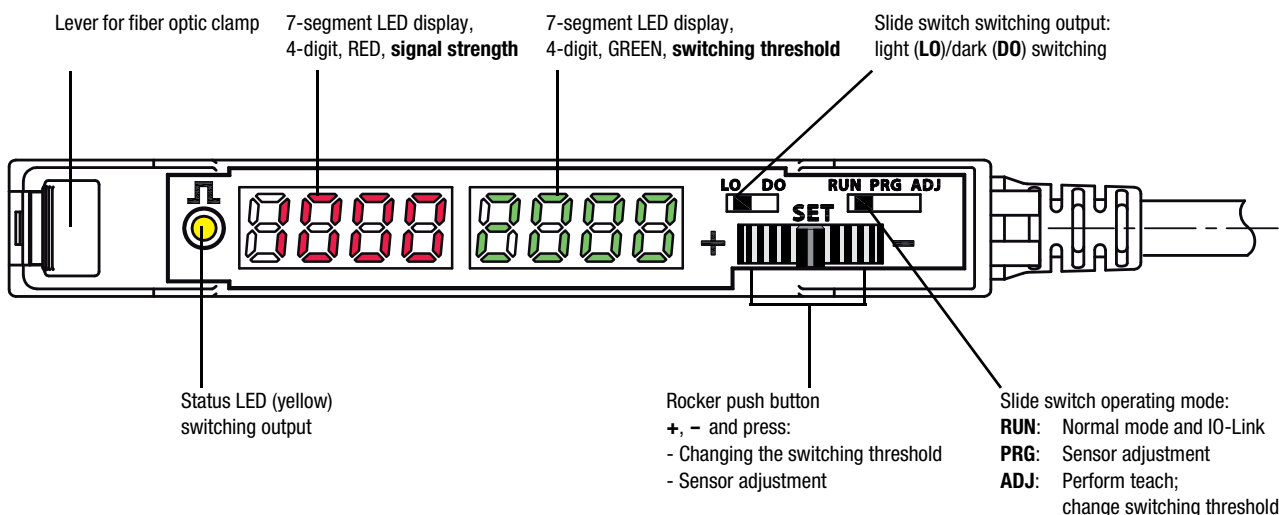
The amplifier is mounted as shown on a TS 35 DIN rail while disconnected from voltage.

Installing the fiber optics









- ① Open the transparent protective cover.
- ② Push down the lever of the fiber optic clamp to open.
- ③ Lead the **KF/KFX** type fiber optics in completely as far as they will go (ca. 12mm deep) into the fiber optic intake. **When doing so, observe the transmitter/receiver assignment** on the amplifier (transmitter at bottom / receiver on top).
- ④ Pull up the lever of the fiber optic clamp to close.
Check if the clamp is secure by pulling lightly on the fiber optics.
- ⑤ Close the transparent protective cover.

Controls and indicators



LV463 IO-Link

Amplifier for fiber optics

	Selector switch Operating mode	RUN: Normal mode - no settings possible at the device - configuration of the IO-Link only possible in this setting ADJ: press rocker push button: the set teach is executed. Rock to left - right: change the switching threshold, left = + and right = -. PRG: menu-driven device setting via display and rocker push button
	Selector switch Switching output	LO: Switching output light switching: If throughbeam fiber optics are installed, the switching output is active when the light path is free; if a scanning system is installed, the switching output is active when an object is detected. The status LED illuminates when the switching output is active. DO: Switching output dark switching: The switching behavior is the inversion of the light switching setting.
	Rocker push button - Set switching threshold - Navigation in menu	The rocker push button can be rocked to the right and to the left and pressed in the middle position. Rock +, -: in the ADJ operating mode, the switching threshold can be increased (+) or decreased (-) by rocking. In the PRG operating mode, rock to navigate in the menu. Button: press the rocker push button in the middle position to accept a setting made in the PRG operating mode.
	Indicator Signal strength	In the RUN and ADJ operating modes, the display shows the current signal value. In the PRG operating mode, information on menu navigation appears on the display.
	Indicator Switching threshold	In the RUN and ADJ operating modes, the display shows the currently set switching threshold. In the PRG operating mode, information on menu navigation appears on the display.
	Status LED (yellow) Switching output state	LED ON Switching output active. LED OFF Switching output inactive.

RUN operating mode - normal operation

The RUN operating mode is the standard operating mode in which the sensor detects objects; it signals this according to the set functions. If the selector switch for the operating mode is in the **RUN** position, changes can only be made via IO-Link. This setting is thus suitable for protection against unintended operation and changes to device settings.

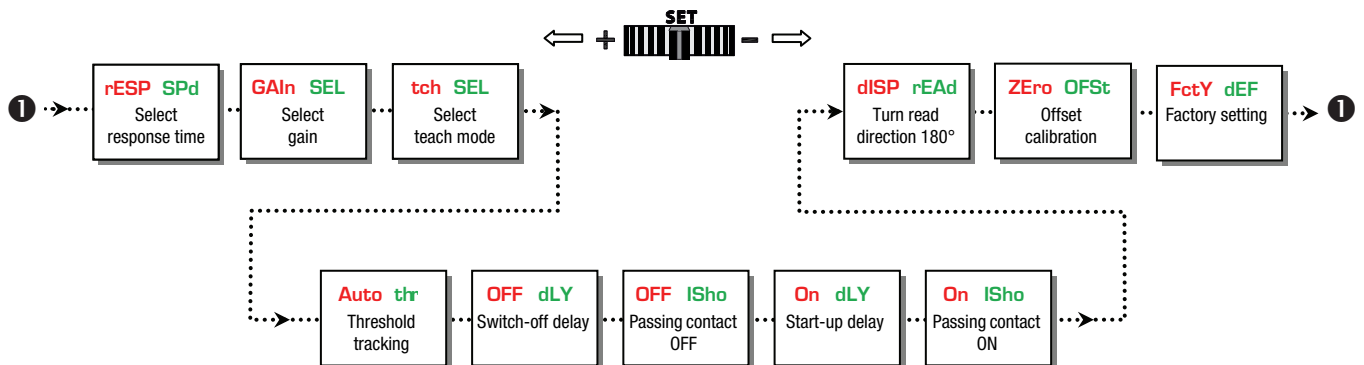


PRG operating mode - sensor adjustment

The LV463 can be adjusted to meet customer requirements with a simple menu-driven system. To do this, set the **selector switch** for the **operating mode** to position **PRG**.



The menu consists of 11 successive subfunctions. Rock to right or left to freely navigate through the subfunctions.



Selecting a subfunction and changing the setting

1. Rock to left or right to select the desired subfunction.
2. Press rocker push button in middle position. The currently set value is displayed statically.
3. Rock to right or left to display the selectable adjustment values - these flash slowly.
4. Accept the new value by pressing the rocker push button in the middle position.
Fast flashing indicates that the new value is accepted.
5. Automatic return to the heading for the subfunction.
6. Press again to statically display the previously selected value.

Description of the subfunctions

Subfunction	Possible settings / value range	Factory setting (default)	Explanation
rESP SPd Select response time	$t_{RESP} =$ 200 (signal range HS) 500 (signal range STD) 2000 (signal range LR) 5000 μ s (signal range XLR)	500 μ s	The response time is the max. time required by the switching output to switch to the active state following a signal change at the input. From this, the switching frequency can be calculated as follows: $f = \frac{1}{2 \cdot t_{RESP}} \text{ [Hz]}$ Notice: A change to the response time is equivalent to a change to the signal range.
GAIIn SEL Select gain	Gain stage Gn 1 ... Gn 8; Auto GAIIn	Auto GAIIn	The gain stage can be set either by manually presetting a value between Gn 1 ... Gn 8 or automatically by selecting Auto GAIIn . The left, red display shows the current signal value. The gain stage should be selected so that the signal value is approximately in the middle of the display area. If Auto GAIIn is selected, the device automatically determines the optimum gain setting during teaching .
tch SEL Select teach mode	Teach modes 1 Pt tch (static), 2 Pt tch (static), dYn tch (dynamic)	1 Pt tch	Presetting a suitable teach process. To trigger the teach event, see Teaching operating mode . 1-point teach, static: during teaching, the current signal value is accepted as the new switching threshold. Actuate the rocker push button to make fine adjustments to the threshold. 2-point teach, static: the switching threshold is calculated at approximately midway between two signal values, e.g., teach to two different objects or teach to the same object at two different distances from the probe. Example: signal value 1 = 100 digits, signal value 2 = 400 digits → Switching threshold = 280 digits. Actuate the rocker push button to + or - to make fine adjustments to the threshold. Dynamic teach: suitable for processes that cannot be stopped for teaching. When the teach event is started, the sensor begins to scan the signal values. On the left, red display, the signal values are constantly displayed. At the end of the teach event, the switching threshold is calculated at approximately midway between the smallest and largest signal value.
Auto thr Threshold tracking	Tracking the switching threshold oFF, On	oFF	The function is only available during dynamic teaching. If the function is switched on, the switching threshold is automatically and continuously optimized by the sensor in such a way that maximum functional reliability is ensured. This can be used to compensate for, e.g., soiling or process changes. Warning message: thr ALrt: The limit of threshold tracking is reached - the sensor continues to operate. Cleaning and, if necessary, alignment of the fiber optics recommended Error message: thr Err: The limit of threshold tracking is exceeded - the sensor stops operating . Cleaning and, if necessary, alignment of the fiber optics urgently necessary
OFF dLY Switch-off delay	0 (off), 1 ... 9999 ms (milliseconds)	0	Switch-off delay (OFF Delay): Individually adjustable from 1 ... 9999 ms. Combination options → Combining timing functions
OFF ISho Passing contact OFF	0 (off), 1 ... 9999 ms (milliseconds)	0	Passing contact on fall-back (OFF 1-Shot): Individually adjustable from 1 ... 9999 ms. Combination options → Combining timing functions
On dLY Switch-on delay	0 (off), 1 ... 9999 ms (milliseconds)	0	Switch-on delay (ON Delay): Individually adjustable from 1 ... 9999 ms. Combination options → Combining timing functions
On ISho Passing contact ON	0 (off), 1 ... 9999 ms (milliseconds)	0	Passing contact on actuation (ON 1-Shot): Individually adjustable from 1 ... 9999 ms. Combination options → Combining timing functions

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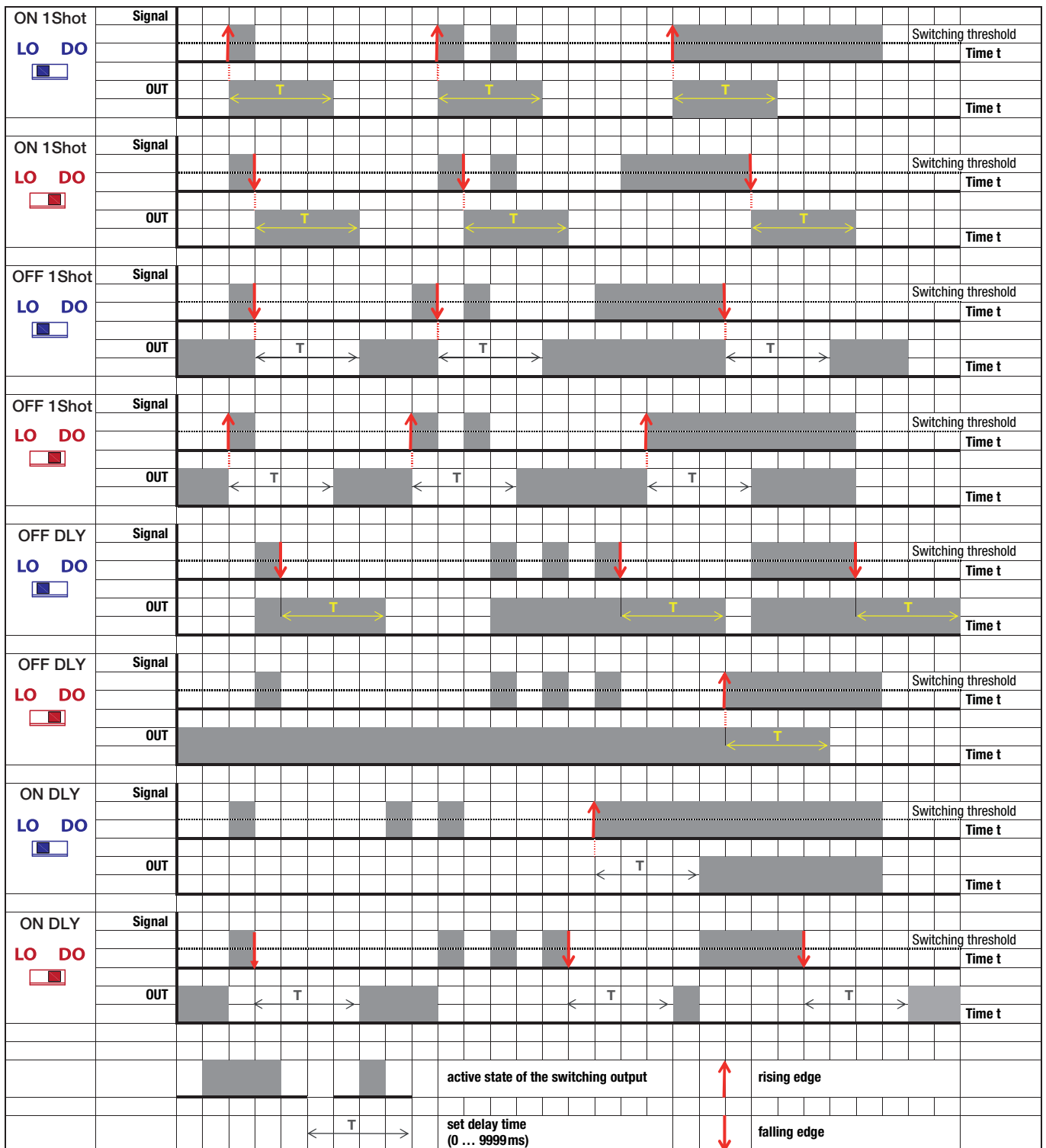
Subfunction	Possible settings / value range	Factory setting (default)	Explanation
dISP rEAd Turn read direction 180°	dISP rEAd, pV3r dSIP	dISP rEAd (same read direction as other texts)	Changes the read direction of the two 7-segment displays by 180°.
ZErO OFSt Offset calibration	no, YES	no	This subfunction is used for suppressing an offset signal that can result, e.g., from crosstalk between transmitter and receiver at the fiber optic head. To activate this function, select YES and confirm the selection by pressing the rocker push button. The current signal value is now set to 0 . To perform another offset calibration, the previous calibration must first be reset. To do this, select no and confirm by pressing the rocker push button. Now again perform the offset calibration as previously described. Notice: Resolution is lost when using offset suppression! Example: display area = 4000 digits, offset value = 550 digits → Remaining resolution = 3450 digits
FctY dEF Factory setting	no, YES	no	Attention! Resets all sensor settings to factory settings. If desired, select YES and execute by pressing the rocker push button.


Tip!

The maximum operating range can be achieved as follows:

- Set **rESP SPd** to **5000µs** (signal range **XLR**).
- Set **GAIIn SEL** to **Gn 8** (gain stage 8).
- The switching threshold can be set to minimum 32 digits, the amplifier detects objects up to display value **0**.

Time functions



Combining timing functions

Timing functions can only be combined to a limited extent. Impermissible combinations are suppressed from the subfunctions menu. Here is an overview of the permissible combinations (●):

	OFF dLY Switch-off delay	OFF ISho Passing contact OFF	On dLY Switch-on delay	On ISho Passing contact ON
OFF dLY Switch-off delay		●	●	
OFF ISho Passing contact OFF	●			
On dLY Switch-on delay	●			●
On ISho Passing contact ON			●	

Teaching operating mode

Set the selector switch for the operating mode to the **ADJ** position.



Depending on the setting of the **Select teach mode** subfunction (**tch SEL**), one of the following teach modes appears:

- **Static 1-point teach**
- **Static 2-point teach**
- **Dynamic teach**

Teach process

Step	Static 1-point teach	Static 2-point teach	Dynamic teach
①	Place object in light beam. The red display shows the signal value, the green display the current switching threshold.	Place object in light beam. The red display shows the signal value, the green display the current switching threshold.	Press the rocker push button. The green display shows dYn , the red display the current signal value. The amplifier now scans signal values for approx. 1 minute.
②	Press the rocker push button; the teach value is accepted.	Press the rocker push button, first teach value is accepted.	Move several objects through the light beam; to end the event, press the rocker push button again. After the scanning time elapses, the teach event ends automatically.
③	Following a successful teach, PASS appears on the green display and the signal value is displayed as the new switching threshold. In the event of a faulty teach, FAIL appears on the red display. In this case, the signal value may be too small and cannot be accepted as a teach value (→ Table with minimum teach values as a function of the setting). Check object and/or placement and repeat event.	2nd appears on the green display; the red display shows the current signal value. Place object 2 or object at distance 2 and press the rocker push button within one minute . The second teach value is accepted. If the rocker push button is not pressed within one minute, the teach event is interrupted and the previous switching threshold is retained. Following a successful teach, PASS appears on the green display. The new switching threshold now lies approximately midway between the two taught signal values. In the event of a faulty teach, FAIL appears on the red display. In this case, the minimum distance between the two teach points may be too small (→ Table with minimum teach values as a function of the setting). Try to set a larger distance between the two signal values and repeat the event.	Following a successful teach, PASS appears on the green display. The new switching threshold now lies between the maximum and the minimum of the scanned signal values. In the event of a faulty teach, FAIL appears on the red display. In this case, the minimum distance between the scanned signal values may be too small (→ Table with minimum teach values as a function of the setting). Try to set a larger distance between the signal values and repeat the event.
④	The switching threshold can be freely increased or decreased at a later time by rocking the rocker push button to the left (+) and right (-). The change is accepted if both displays flash briefly several times.	The switching threshold can be freely increased or decreased at a later time by rocking the rocker push button to the left (+) and right (-). The change is accepted if both displays flash briefly several times.	The switching threshold can be freely increased or decreased at a later time by rocking the rocker push button to the left (+) and right (-). The change is accepted if both displays flash briefly several times.

Tip!

For reliable function, the difference between the signal value while an object is present and the signal value with no object should be at least 10 ... 20%. In general: the larger the difference, the more reliable the detection.

Table with minimum teach values as a function of the setting

Signal range	Static 1-point teach:				Static 2-point teach Dynamic teach:			
	MINIMUM VALUES for setting the switching threshold				DIFFERENCE between teach values 1 and 2			
	HS	STD	LR	XLR	HS	STD	LR	XLR
Display area (digits)	0 ... 4000	0 ... 4000	0 ... 9999	0 ... 9999	0 ... 4000	0 ... 4000	0 ... 9999	0 ... 9999
Response time [µs]	200	500	2000	5000	200	500	2000	5000
Gain Gn 1	27	27	17	11	36	36	22	14
Gain Gn 2	27	27	17	11	36	36	22	14
Gain Gn 3	27	27	17	11	36	36	22	14
Gain Gn 4	41	41	27	17	54	54	36	22
Gain Gn 5	41	41	27	17	54	54	36	22
Gain Gn 6	41	41	27	17	54	54	36	22
Gain Gn 7	53	53	32	21	70	70	42	28
Gain Gn 8	78	78	48	32	104	104	64	42

■ = values for the following examples.

Example 1:

- 1-point teach, static
- Standard signal range (**STD**) = response time **500µs**
- Gain **Gn 3**

The **signal value during teaching** must be ≥ 27 digits.

Example 2:

- 2-point teach, static
- Standard signal range (**STD**) = response time **500µs**
- Gain **Gn 5**
- **Teach value 1 = 150 digits**

The **signal value for teach point 2** must be ≥ 204 digits or ≤ 96 digits.