

Original operating instructions

LV 453B

Fiber optic amplifier

SAFE IMPLEMENTATION AND OPERATION



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1 About this document

1.1 EC Declaration of Conformity

The device meets the basic requirements and the other relevant provisions of the machinery directive 2006/42/EC.

The manufacturer of the product, Leuze electronic GmbH & Co KG in D-73277 Owen, possesses a certified quality assurance system in accordance with ISO 9001.

1.2 Download Area

You can find the original operating instructions and the EU Declaration of Conformity by entering the part number of the device in the search field on our website www.leuze.com.

The part number can be read on the name plate of the device under the "Part No." entry.

2 Safety

⚠ WARNING	
	To ensure the safe operation of the machine, it is necessary to supply electricity with a fixed amount of power source.
	This product does not belong to explosion-proof structure. Do not use it in flammable or explosive environment.
	This product should not be used for human protection devices and human testing purposes.
NOTE	
	⚡ Do not use in places where water, oil or chemicals are used.
	☀ Do not use in direct sunlight.
	☒ Do not use in places with corrosive gas.
	⚡ Do not use in places with strong electric and magnetic fields.
	🌀 Do not use in places where vibration and shock exceed the rated range.
	🔥 Do not use in places with high temperature and easy condensation.
	🔧 Do not use in case of damaged shell.
	🔌 Please correctly connect the load.
	⚡ Do not load short circuit, otherwise it will lead to damage, cause fire danger.
	⚡ Please pay attention to the polarity of the power supply to prevent wrong wiring.
	⚡ Please separate the sensor from the high-voltage line and power line. If the same line is used, it will induce each other and cause wrong action or damage.
	🔧 Do not disassemble, repair or modify this product without permission.

3 Device Description

3.1 Specification

Series	LV453B (Fiber Amplifier)	
Light Source	Red 4 element LED (625nm)	
Supply Voltage	DC12~24 $\pm 10\%$ (VPP) <10%	
Switching Mode	Light ON / Dark ON (Selectable)	
Output Mode	NPN / PNP (Separate variant)	
Control Output:	Load supply voltage: 26.4VDC Max. load current: <100mA Max.	
Response Time	Super High Speed (SHS)	40 μ s
	High Speed (HS)	250 μ s
	Standard (STD)	1ms
	High Precision (LR)	18ms
Protection Circuit	Power supply reverse polarity protection	
	Output short circuit protection	
	Output with reverse protection	
Ambient Humidity	25%~85%RH (No dew)	
Operating Temperature Range	-10~55°C (No dew)	
Material Quality	Case: ABS, standard cable (black) PVC	

3.2 Outline Dimensional Diagram

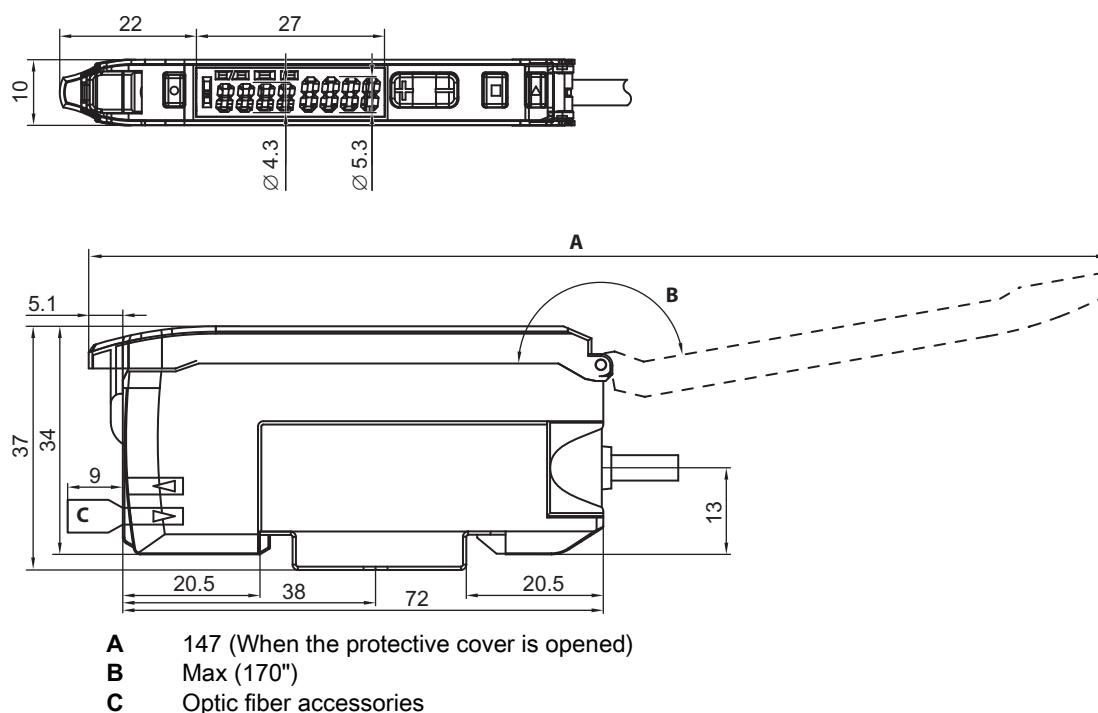
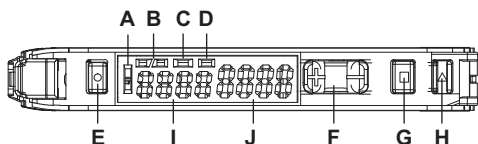


Figure 3.1: Outline Dimensional Diagram

3.3 Setting



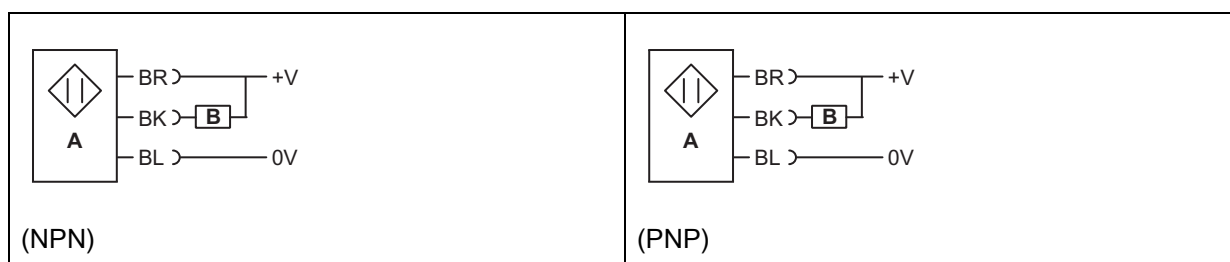
- A** Orange Light is on when output is triggered
- B** L/D indicator light shows
ON/ (D) setting status with incoming
ON (L) shadowing
- C** (ACC indicator light) Orange light is on when the Adaptive Compensation Control function is enabled
- D** Blue light indicator is on when ST (Smart Teach) is pressed
- E** Sensitivity setting
ST (Smart Teach) to detect the object. Press the (ST) once and at any time to detect object at fix position.
- F** Threshold
fine-tuning UP/Down button is green
- G** Mode toggle (MODE)
Press and hold for more than 3 seconds to switch between the set mode and the detection mode
- H** Output Switch Button(L/D)
Press 1 time to switch
ON(L) and ON(D) when the light is in and the indicator light is ON(L/D)
- I** Threshold 4 digital display in Green
- J** Incoming Light Level digital display in Red

Light Volume adjustment (when the light quantity is saturated)	
Setting initialization	
Button locked	
reset to 0	

- + Press simultaneously
- Press simultaneously in order

see chapter 4.7 "Convenient Setting"

3.3.1 Input-Output Circuit Diagram



- A** Main Control Circuit
- BR** Brown
- BK** Black
- BL** Blue

3.3.2 Output Switching Method



Throughbeam Type (with object detected):

"ON" when Dark-on, "OFF" when Light-on (L/D indicator light) is on.

Reflective Type (with object detected):

"OFF" when Dark-on, "ON" when Light-on (L/D indicator light) is on.

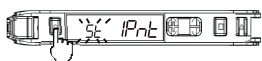


4 Functions

4.1 Detect Objects With / Without Detection

2 points should be adjusted

1. Press the (ST) button  when the object in position.
2. Press the (ST) button  again when the object is removed



Smart Teach setting: Adjust the incoming light of 2 points value to the light volume adjustment levels

→ Setting is finished.

Threshold setting: Set to middle between the 2 points (ST) smart teach of the incoming light levels.

NOTE



The order of 1 and 2 can be reversed.

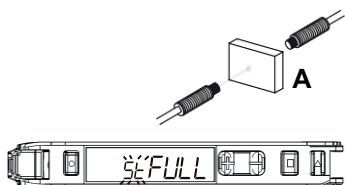
4.2 Strengthen Dust and Pollution Resistance.

Maximum Sensitivity Adjustment

1. If the object is detected in the following state, press and hold the (ST) button  for more than 3 seconds, and release the button when (FULL) appeared.

Reflective type: State of no object detection

Through beam type: State of object detection



A detection objects

- ↪ Continue to press more than 3 seconds
- Red digits appear as (IPnt) toggle to (FULL)



A Setting is finished

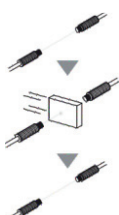
Smart Teach setting: adjust the incoming light to "0"

Threshold setting: a value of about 7% of the incoming light in step 1. In the case of small light exposure at the time of long-distance detection, it is known as the minimum value to correctly execute the output ON.

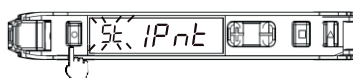
4.3 Keep Running, Adjust By Moving Detection Object

Automatic Adjustment

1. Press (ST) button  and hold for 3sec to switch from (IPnt) to select (FULL) and continue to hold for another 4sec to select (Auto). Release (ST) button  when object is not in detection.



- ↪ Press the button for more than 7 seconds



→ Setting is finished

Smart Teach setting: Adjust the maximum amount of incoming light levels

Threshold setting: Set the middle value between maximum and minimum incoming light received

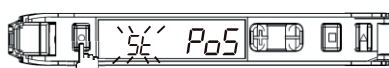
4.4 Confirm The Detection Object position

Position adjustment

1. Short press (ST) button  with no object presence.



2. Detection object is placed in the desired position and press (ST) button  once again and hold for 3sec, the red display will change mode from (2Pnt) to (PoS).



Smart Teach Setting: adjust the amount of light received by half the level of light adjustment.

Threshold setting: set to the same value as the amount of light received in step 2.

4.5 Detect Transparent Objects Or Tiny Objects (Set threshold based on the ratio of light adjustment)

Percentage adjustment

1. Setting the percentage adjustment to ON in the setting mode, see chapter 4.8 "Detail Setting"
2. Short press (ST) button  with no object presence.

Smart Teach Setting: adjust the amount of light to the light volume adjustment level.

Threshold setting: set to (incoming light in point step 2 X percentage adjustment level + incoming light in step 2)

NOTE



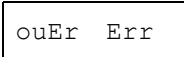
When set to percentage adjustment, (ST) Smart Teach cannot be performed other than light volume adjustment.



→ Setting is finished

Intelligent Adjustment Error

Error Name / Display / Reason	Type Of Adjustment	Countermeasure
Near error nEAr Err Difference between the amount of light received at point 1 and point 2	2-point Automatic Adjustment And Positioning Adjustment	⚠ Please switch to a mode where the response time of the detection feature is slower ⚠ Please narrow the gap between the cast and receive light.(Through Beam Type) ⚠ Please bring the sensor close to the workpiece. (Reflective Type)

Error Name / Display / Reason	Type Of Adjustment	Countermeasure
Over Error  Too much incoming light	All	↗ Please increase the level of light quantity adjustment. ↗ Please use a small-diameter fiber. ↗ Please increase the sensing distance between transmitter and receiver. (Through Beam Type) ↗ Please keep the sensor away from the workpiece. (Reflective Type)
Low Error  Too little incoming light	Beyond Maximum Sensitivity Adjustment	↗ Please reduce the light adjustment level. ↗ Please reduce the sensing distance between transmitter and receiver. (Through Beam Type) ↗ Please bring the sensor close to the workpiece. (Reflective Type)

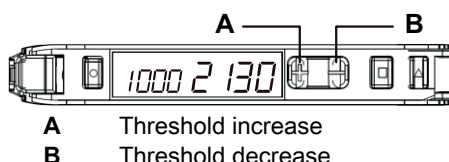
NOTE	
	The adjustment range of the intelligent adjustment is about 20-1/100 times. When the detection function is selected as LR mode, the range of adjustment is about 1.6 ~ 1/100 times because the initial value is large.

To change the level of light volume, see chapter 4.8 "Detail Setting"

4.6 Threshold Fine-Tuning

- (UP/DOWN) Button  setting.

NOTE	
	Continuous press button for quick adjustment of threshold value

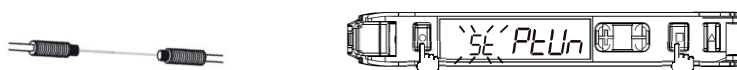


4.7 Convenient Setting

4.7.1 Want to restore light changes caused by dust or dirt

Light volume adjustment

- When no object is presence, press button  and button (MODE)  continuously for more than 1 second



- ↗ Continue to press more than 1 sec
→ Setting is finished

Smart Teach setting: The incoming light is adjusted to the light volume adjustment level.

Threshold setting: This will not change if the value is low. It is set to the minimum value when an output is turned ON/OFF correctly.

If the position adjustment has been performed, then the through beam and reflective type should be executed in the presence of the detection object.

4.7.2 Reliable detection against dust and dirt altering the incoming light level

ACC Function

ACC function recommended for through beam type / retro reflector type product

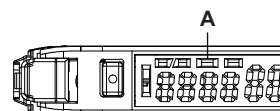
1. Perform smart teach (ST) see chapter 4.7 "Convenient Setting"
2. Turn on the ACC function in setting mode

NOTE



Step 1 and 2 may be reversed.

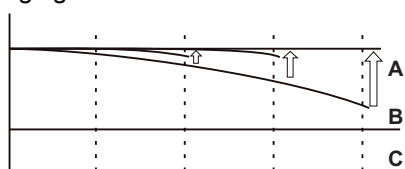
- ↳ The ACC function will be turned off when the smart teach occurs error / performs differential function, and maximum sensitivity adjusted / incoming light level of positioning is low.
- ↳ The incoming light level is adjusted to light volume adjustment level to ensure stable threshold and incoming light level.



A Indicates that the light will turn on when the ACC function is valid

Therefore, it will not be affected by dust, dirt, temperature change, or positioning fault and perform stable detection.

Incoming light level



- A** Correct internal incoming light level to keep display value stable.
- B** Internal incoming light level
- C** Time

If the incoming light level cannot be corrected, it will decrease in value and ACC will flash to indicate correction is not possible.

4.7.3 Setting initialization

Setting initialization

Initialize all settings and return to factory state.

1. Press (ST) button and (L/D) button , and hold for 3 seconds.
2. Select (rSt) through (UP/DOWN) and press (MODE) button .
3. Select (rSt init) through (UP/DOWN) and press (MODE) button .

NOTE



Please note that pressing (L/D) button will inverse the output mode.



- ↳ Continue to press more than 3 seconds at the same

Item	Initial Value
threshold	55
Control output	L-ON

* Other functions for the detailed set state intelligent adjustment is removed.
User saved content is not initialized.

4.7.4 Want to save / read settings

User Saving

Save current Setting

1. Press the state of button  press (L/D) button  for more than 3 seconds.
2. Select (SAvE) through (UP/DOWN)   and press MODE button .
3. Select (SAvE Yes) through (UP/DOWN)   and press MODE button .

User Setting

Read the saved settings

1. Press the state of button  and button (L/D)  for more than 3 seconds.
2. Select (rSt) through (UP/DOWN)   and press MODE button .
3. Select (rSt USER) through (UP/DOWN)   and press MODE button .

NOTE



Please note that pressing (L/D) button  first will cause output inversion.
Prevent misoperation!

Button locked

Turn off all button operation functions and press the button to display (Loc) on

- Execute / release (same step)



↳ Hold for more than 3 seconds at the same time

↳ Please press any key of UP/DOWN

4.7.5 Reset incoming light to display "0"

Reset to "0"

Displays the incoming light level as 0 and the threshold changes accordingly.

- Enable



- Disable



↳ Hold for more than 3 seconds at the same time

↳ Hold for more than 3 seconds at the same time

NOTE



After performing the ACC function / differential function adjustment, the reset function is disabled.

4.7.6 Output triggered within a set range of incoming light

Area detection mode

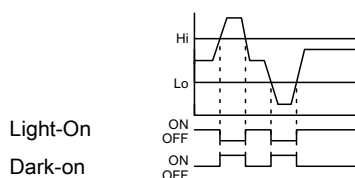
1. Select [Setting Mode] → [Area Detection Mode] Press the (MODE) key  for 3 seconds to enter the setting mode.
2. Short press (MODE) key  to choose [Area Detection Mode]. Short press  to turn on area detection mode. Press (MODE) key  for 3sec to exit the setting mode.

Short press the (MODE) key  in [Detection Mode] to switch between the OUT1 HIGH and OUT1 LOW. The green digital display will flash out HIGH or LOW of the detection mode you select.
3. HIGH and LOW must be set separately by pressing the Smart Teach (ST) button .

When the percentage adjustment function is enabled, the threshold is set as follows:

HIGH: The absolute value of percentage adjustment value X incoming light received in step 3 (High)+ incoming light received in step 3 (high).

LOW: The absolute value of percentage adjustment value X incoming light received in step 3 (Low) + incoming light received in step 3 (Low).



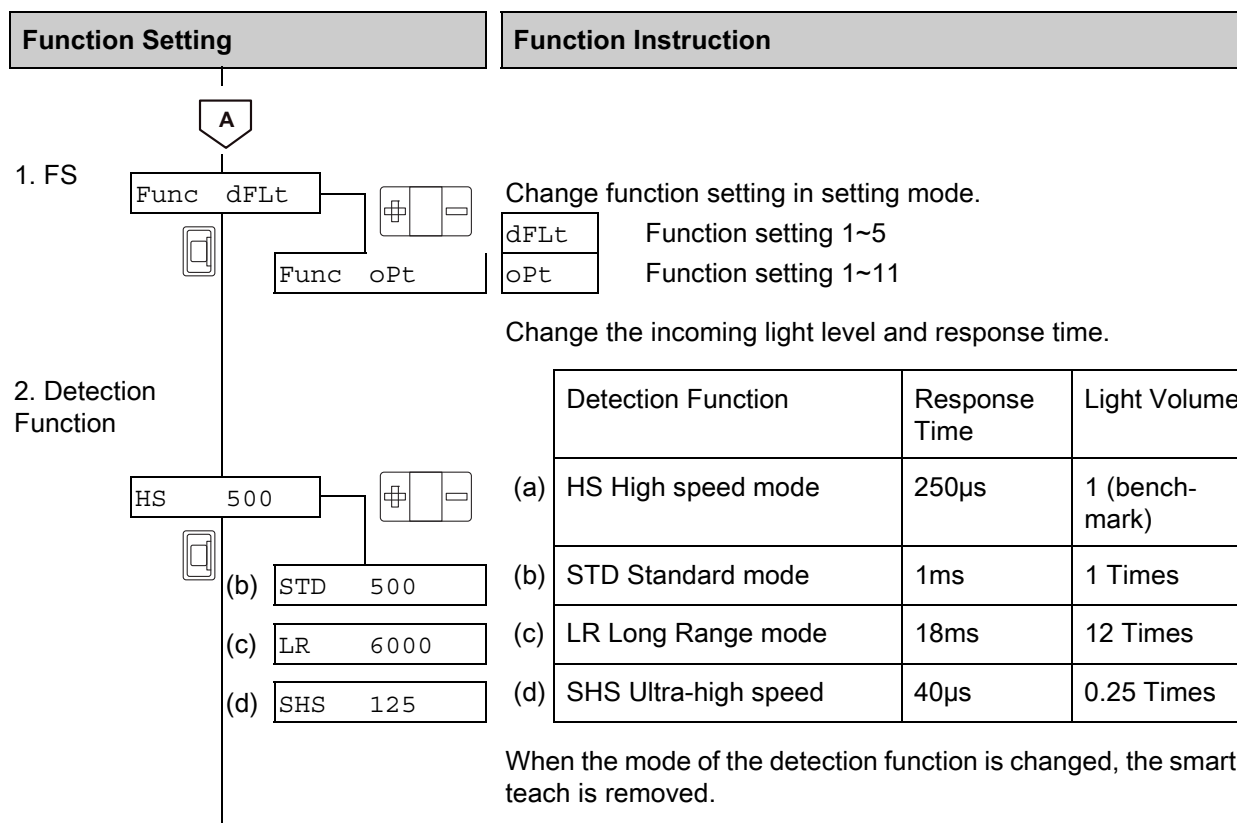
4.8 Detail Setting

Continue press (MODE) button  for more than 3 seconds to switch to

↳ Setting mode

In setting mode, the following functions can be selected by following the instruction below.

↳ The initial function shown is the factory default.



Function Setting

3. ACC Function

ACC OFF

ACC no

4. Area detection function

ArEA OFF

ArEA on

5. Timing Function

toFF ----

(a) oFFd 10

(b) on-d 10

(c) onOF 10

(d) Shot 10

(e) onSt 10

Function Instruction

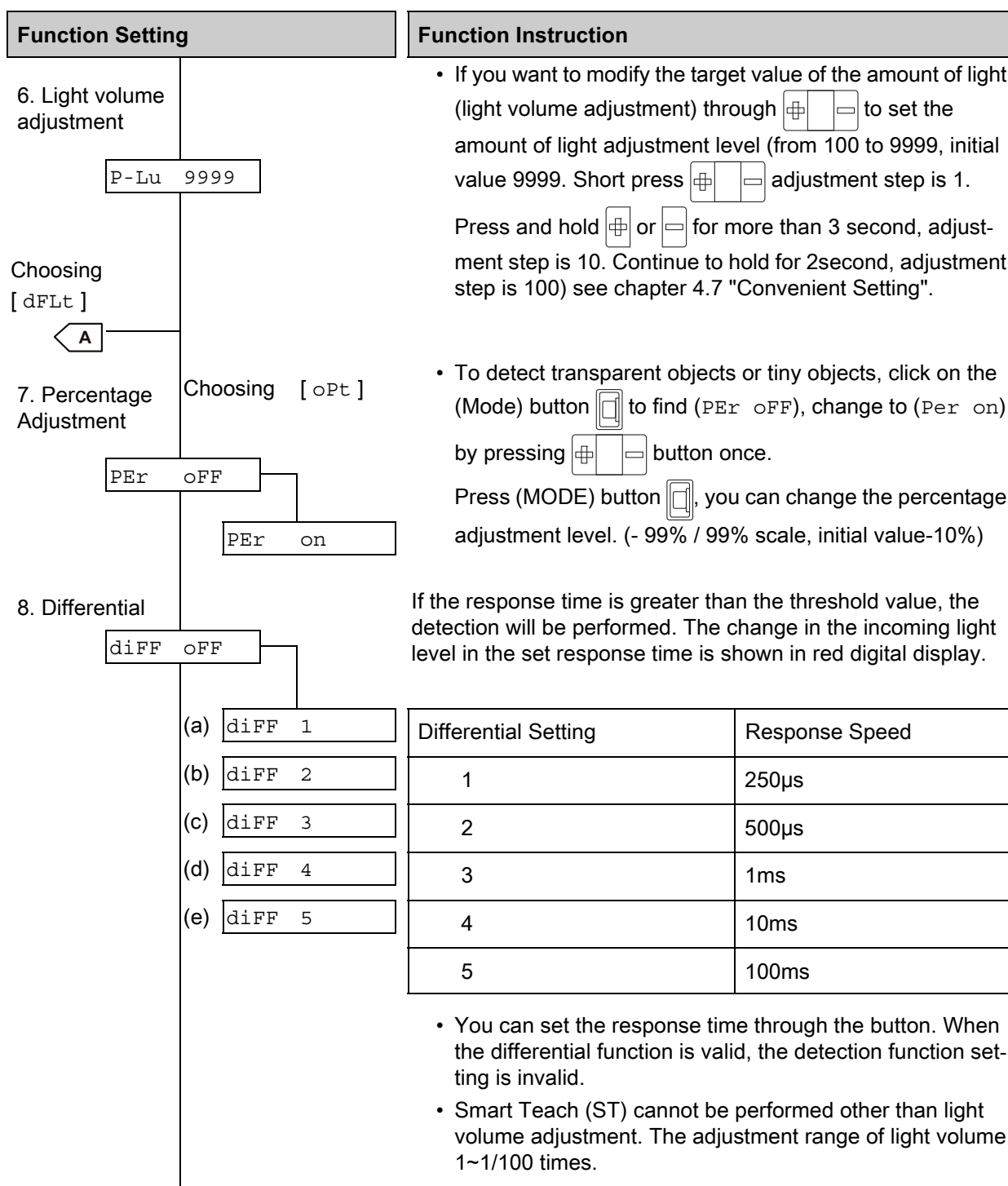
NOTE

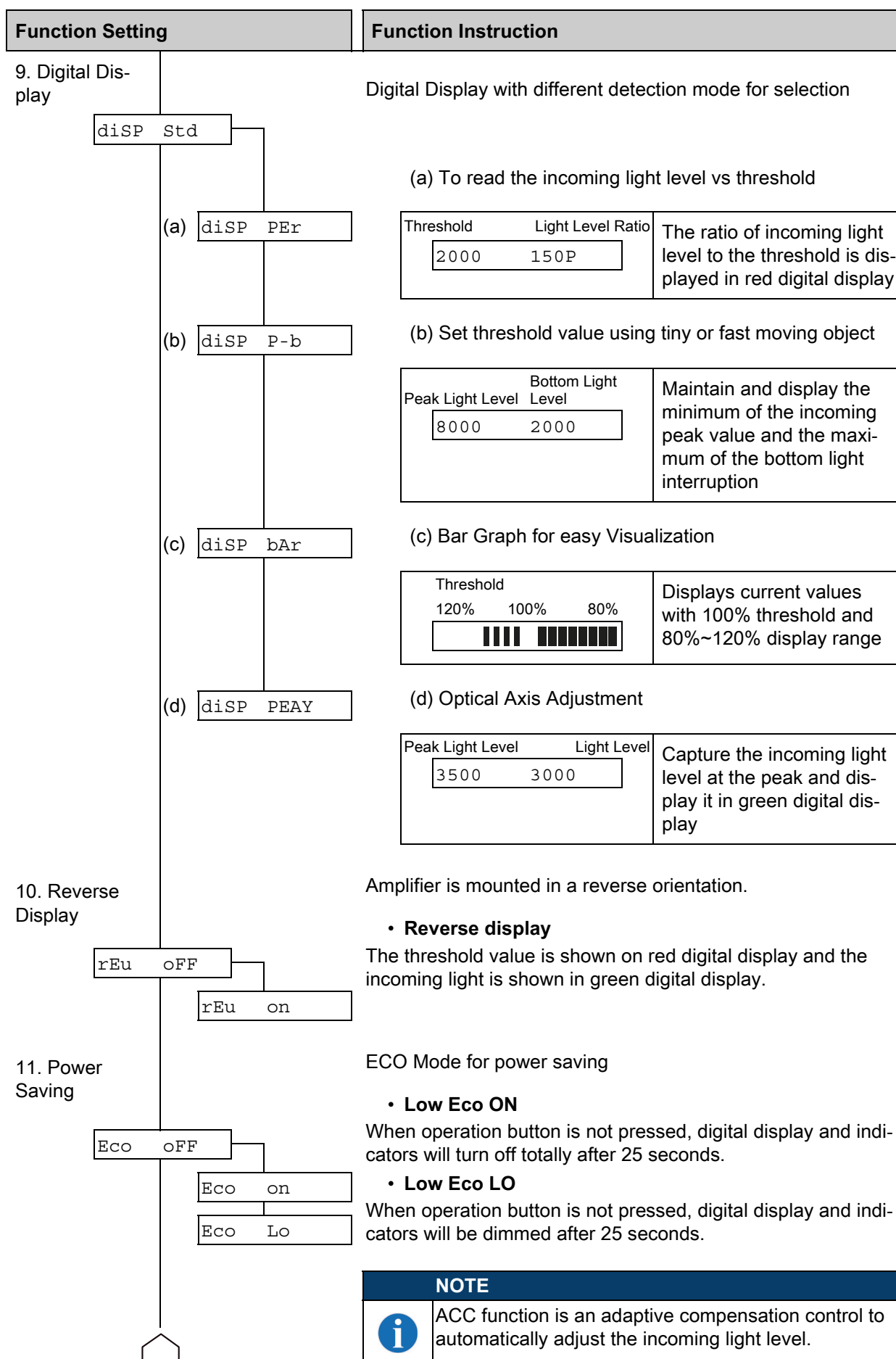
When you want to enable area detection, make sure to set threshold value using (ST) button for HIGH and LOW respectively. You can manually change the state (HIGH or LOW) via (MODE) button to complete the setting.

Output timer setting

(a) Off-delay Timer When the OFF delay timing detection time is short and the detection cannot be performed through PLC, the state of output ON is maintained.	Incoming light No incoming light Light-on mode ON OFF Dark-on mode ON OFF
(b) On-delay Timer Delay the output ON-state after detection.	Incoming light No incoming light Light-on mode ON OFF Dark-on mode ON OFF
(c) On/Off-delay Timer Set both ON and OFF delay, delay the output ON-state and OFF-state.	Incoming light No incoming light Light-on mode ON OFF Dark-on mode ON OFF
(d) Shot-delay Timer Set the output ON-state for a specific time without affected by object size/ uneven.	Incoming light No incoming light Light-on mode ON OFF Dark-on mode ON OFF
(e) ON/Shot-delay Timer Combination of ON-delay and Shot-delay.	Incoming light No incoming light Light-on mode ON OFF Dark-on mode ON OFF

• On the Settings (toFF) menu, press to choose the Timer. Press once to set the timing by pressing (1-9999ms. 1ms scale, initial value 10ms)

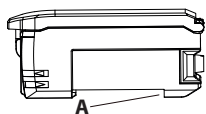




4.9 Installation of Fiber Optic Sensors

4.9.1 Install to DIN Rail

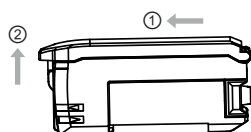
1. Insert the fiber unit into the slot on the side of the rail and push the lock hook until you hear the click



A Slot on insertion side of optical fiber unit

4.9.2 Remove from DIN Rail

1. Push the unit in direction ①
2. Lift up in the direction Foll ②

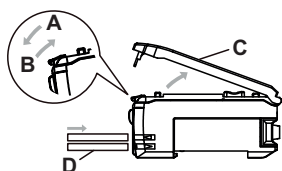


4.9.3 Fiber Optic Cutter

- Use a fiber cutter. For standard fiber optical unit, insert the fiber optic unit into the cutter hole to the position to cut off. For thin diameter fiber optic unit, insert to the bottom of the hole. And the thin diameter fiber optic to the bottom of the hole.
- Press the blade down in a single stroke to cut the fiber optic unit.

4.9.4 Install Fiber Optic Unit

1. Open the cover
2. Lift up the lock lever
3. Insert the fiber unit firmly into the inlet fully until it reaches the end completely.
4. Press the lock lever back to the original position to secure the optical fiber unit.



- A** Push to lock lever
- B** Push to unlock lever
- C** Protection cover
- D** Optical fiber unit

NOTE



When installing a fiber cable into the inlet, make sure the single core fiber unit is inserted into the upper side of the mounting hole (Transmitter) and the multi-core fiber unit to the lower side (Receiver).

5 Error Indication

Error Name	Reason	Strategy
ACC Error	Incoming light level decrease because of dust or dirt.	Please wipe the fiber optic unit to remove dust resided on the surface. Perform Smart Teach (ST) to restore the incoming light level. see chapter 4.7.1 "Want to restore light changes caused by dust or dirt"
EEPROM Error	Read / write internal data failed	Please reconnect the power. If not restored, perform initialization operation see chapter 4.7.3 "Setting initialization"
Lock ON	Button locked to open state	Please unlock the key see chapter 4.7.4 "Want to save / read settings"
Current Over	Control overload current of output	Please confirm the load of the control output and set it in the rated range. Please confirm if the load is short circuit see chapter 3.3.1 "Input-Output Circuit Diagram"

6 Maintenance (Troubleshooting)

Fault	Reason	Strategy
Blank on screen	The state of power off, or disconnected	Please check wiring, power supply voltage, and power supply capacity, "see chapter 3.3.1 "Input-Output Circuit Diagram"
Nothing is displayed on the digital display	Power saving is ON state	Please turn off the ECO Mode function, see chapter 4.8 "Detail Setting"
Cannot be checked or detected even if the threshold value is minimum	The detection function has been set to a small incoming light level due to dust or dirt.	When set to LR mode, the incoming light level increases and the amount of light displayed increases, see chapter 4.8 "Detail Setting"
Incoming light display variation	Affected by dust or dirt and temperature changing	If you use the ACC function, the incoming light level display can be stabilized, see chapter 4.7 "Convenient Setting"
Output indicator blinking	Be affected by mutual interference, etc.	Please confirm the connection status of the sensor and power it up again, see chapter 3.3.1 "Input-Output Circuit Diagram"
The amount of light is displayed as-(negative)	Zero reset is open state	Please disable the return to zero, see chapter 4.7 "Convenient Setting"
	Differential function is open state	Please turn off the differential function, see chapter 4.8 "Detail Setting"
Set unknown		Please perform the set initialization operation, see chapter 4.7 "Convenient Setting"

7 Service and support

Service hotline

You can find the contact information for the hotline in your country on our website www.leuze.com under **Contact and support**.

Repair service and returns

Defective devices are repaired in our service centers competently and quickly. We offer you an extensive service packet to keep any system downtimes to a minimum. Our service center requires the following information:

- Your customer number
- Product description or part description
- Serial number or batch number
- Reason for requesting support together with a description

Please register the merchandise concerned. Simply register return of the merchandise on our website www.leuze.com under **Contact and support > Repair service and returns**.

To ensure quick and easy processing of your request, we will send you a returns order with the returns address in digital form.