

Distance-setting photoelectric Sensor

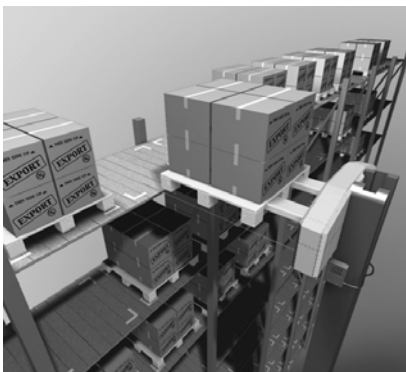
E3NT-L

“Teach & play” in combination with a user friendly display and a large sensing distance

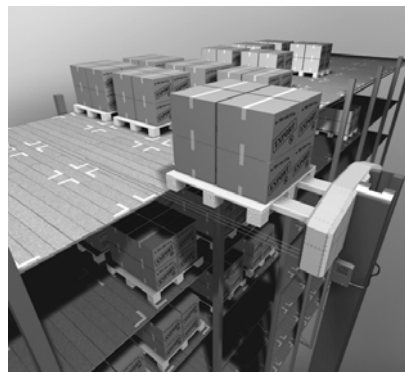


CE

Application



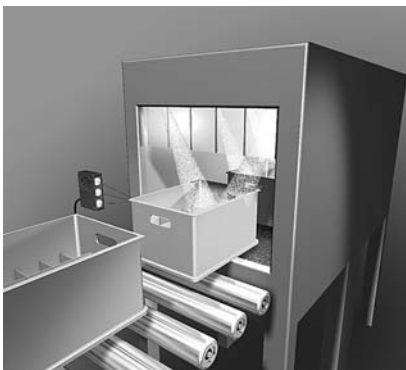
The E3NT-L can check if there is shelf-space free for a pallet.



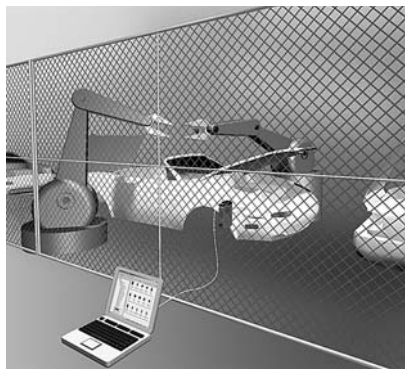
Two outputs can distinguish whether there is one, two or even more pallets in the storage location.



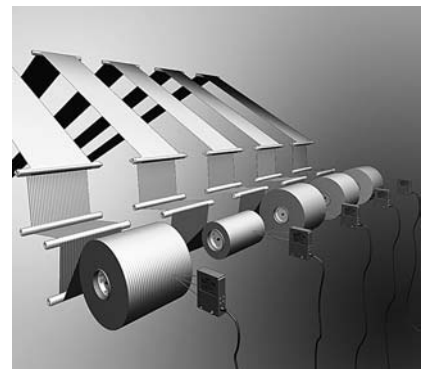
This robust sensor is ideal for operation in the harshest of environments.



Machines in the food industry need to be cleaned frequently. With rapid temperature changes, and lots of water and steam, a completely sealed sensor with window heating is essential.



Thanks to the optic link, the sensor can be remotely set and checked while it is operating in an area where access is restricted.



A version of the E3NT-L with a analogue output is available, making it ideal for winding/unwinding applications.

Features

One of the most advanced sensors in the world.

Omron's E3NT-L is a distance-setting photoelectric sensor whose ease-of-use, robustness and intelligence make it one of the most advanced sensors on the market. The E3NT-L has a detection range of up to 2000 mm, and features background and foreground suppression. Its patented optic design enables this innovative sensor to reliably detect objects regardless of their direction.

It is teachable and can be operated via just three keys. It is fully digital for stable, reliable information, and can be adapted to operate in the harshest of environments. These features make the E3NT-L suitable for applications in the material warehousing and food processing industries, where long yet precise distance sensing is required.



Built for every environment

The E3NT-L is a sealed unit. Its robust aluminium housing and smooth body design prevents dirt from easily attaching to it. This makes the E3NT-L ideal for use in the food processing industry. An optional coating enables it to operate in environmentally aggressive conditions, and an anti-condensation option with heated glass window enables it to cope in very low temperature environments.

Patented optic design for reliable sensing

The E3NT-L sensor's optics are specially arranged so that distance is evaluated using the 'double triangulation' principle. This patented optic design enables the E3NT-L to reliably detect objects regardless of their direction. It also enables the rotary position of the E3NT-L to be selected freely about its optical axis, which makes this sensor ideal for multi-axis handling equipment. The E3NT-L's background and foreground suppression features means that objects are detected only within the predefined sensing zone. Objects in the background or foreground of that zone are ignored.

'Teach & play' manually...

Setting up the E3NT-L is fast and easy via external pushbuttons. Its 'teach & play' design concept enables you to teach the sensor the distance of the detectable object simply by pressing one push-button. The built-in 3 pushbutton keypad and a 4-digit display enable you to set and monitor parameters via a user-friendly menu.



Or via computer!

The E3NT-L can also be remotely configured using Omron's PC configuration Sensor Support Software package, whose features include teaching, operation and mode set-up, I/O configuration and distance monitoring via a trend graph. This software not only saves you configuration time, it also makes field exchange, firmware upgrading and remote troubleshooting easy.

Multi-purpose bracket

Omron's specially designed multi-purpose bracket enables the E3NT-L to be installed in a wide variety of positional choices for optimal sensing performance.

Optical link adapter

Omron's E3NT-AL232 optical link adapter clips to fit the E3NT sensor's communication head for connector-less data transfer between the sensor and your PC. This is ideal when the E3NT-L is installed in an area where access is restricted. Via this link and your PC you can continuously monitor the sensor's operation from the comfort of a remote area.

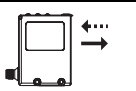
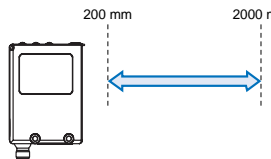
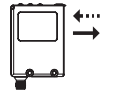
Sensor Support Software (S³)

With Omron's Sensor Support Software (S³) package you can enjoy the benefits of copying multiple customised sensor settings, monitoring for more detailed analysis, setting up parameters much more easily, and tracing.



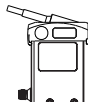
Ordering Information

Sensors



Sensing method	Appearance	Connection method	Setting distance	Model	
				Digital output	Digital and analog output
Distance setting (BGS/FGS)		M12 Connector (5-pole)	0.2 m .. 2.0 m 	E3NT-L17	E3NT-L27
	Window heating			E3NT-LH17	
Window heating				E3NT-L37	E3NT-L47
				E3NT-LH37	

Accessories (order separately)



Optical data link

Communication method to sensor	Appearance	Communication method to PC	Model
IR data interface		RS232	E3NT-AL232 2M

Mounting brackets

Appearance	Model	Qty.	Remarks
	E39-EL1	1	Universal mounting bracket
	E39-EL2	1	Adapter bracket (for use of the universal mounting bracket for not matching holes)

Sensor I/O connectors

Size	Cable type	Shape	Cable length	Model	
M12	Standard 5-pole	Straight		2m	XS2F-D521-DG0-A
			5m	XS2F-D521-GG0-A	
		L-shape		2m	XS2F-D522-DG0-A
				5m	XS2F-D522-GG0-A

E3NT-L

Rating/performance

Sensors

Item	Model		
	E3NT-L17 E3NT-L37	E3NT-L27 E3NT-L47	E3NT-LH17 E3NT-LH37
Sensor type	Diffuse reflective sensor with background suppression respectively foreground suppression		
Signal evaluation	Double triangulation method		
Configuration	By push button on the sensor or with a PC connected via the optical data link E3NT-AL232 2m		
Operating modes	Background suppression, foreground suppression, background and foreground suppression (2-point window evaluation)		
Light source	Infrared LED 850 - 880 nm		
Rated sensing distance	2 m		
Setting distance Sr	Distance – setting possible between 0.2 ... 2.0 m (90 % remission) 0.2 ... 1.7 m (6% remission)		
Standard measured object	Kodak gray card 90% (white), size: 200 x 200 mm		
Blind zone	< 0.1 m		
Black/white error (6%/90%)	< 15 % of setting distance Sr		
Hysteresis	< 5 % of setting distance Sr or 4cm (for white 90%) < 10 % of setting distance Sr or 6cm (for black 6%)		
Repetition accuracy	< 5 % (of setting distance Sr) or 4cm		
Light spot diameter	< 40 mm in the case of Sr = 2 m		
Minimum object size	> 40 mm		
Ambient light immunity to EN 60947-5-2:	Halogen lamps (100-120Hz > 10,000 lux Fluorescent lamps (30 kHz) > 5,000 lux Energy saving lamps > 2,000 lux		
Utilization category to EN 60947-5-2	DC 12		
Rated operating voltage	+ 24 V DC, polarized		
Operating voltage range	+ 10 ... + 30 V DC		
Current consumption	< 90 mA (display off) < 110 mA (display on)	< 100 mA (display off) < 120 mA (display on)	< 220mA with front pane heating
Power-on delay	< 300 ms		
Input – / Output – pins	Pin 2 = Input (In 2) or output (Out 2), depending on configuration Pin 4 = Output (Out 1) Pin 5 = Input (In 1) Pin 5 = Analog output Pin 5 = Input (In 1)		
Digital Outputs	User set functions (e.g. switching output, alarm output, ...)		
Output circuit	User set PNP (open collector), NPN (open collector) or complementary (push-pull)		
Output current	max. 100 mA		
Voltage drop	< 2.0 V		
Residual current	< 100 µA		
Circuit protection	Reversed power supply, overload, short-circuit (pulsed)		
Inputs	User set functions (e.g. teach-in, trigger, test, ...)		
Input circuit	Voltage input +10 V ... U _{supply}		
Input pulse duration	min. 1 ms		
Analog Output		Current output 3..21mA: • 3 mA correspond to distance < 0.2 m • 4 ... 20 mA correspond to distance 0.2 m ... 2.0 m • 21 mA correspond to distance > 2.0 m (or no object)	
Switch-on/off time (T _{ON} / T _{OFF})	£ 2.5 ms	£ 5 ms	£ 2.5 ms
Insulation resistance	20 MW at 500 V DC		
Insulation voltage strength	1 kV AC, 50/60 Hz (1 min)		

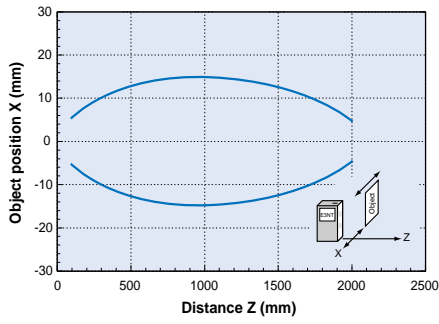
Item	Model		
	E3NT-L17 E3NT-L37	E3NT-L27 E3NT-L47	E3NT-LH17 E3NT-LH37
Impulse strength (insulation)	6 kV		
Dimensions (length x width x depth)	85 x 27 x 65 mm		
Materials			
Housing	Powder-coated aluminum, sea-water resistant, 231 GD AlSi12 (Cu) (standard version) Aluminum with foodstuff-approved coating (option)		
Front pane	Glass		
Keyboard	HTV silicone		
Seals	RTV silicone		
Housing color	Grey, RAL 7030		
Assembly	Screw fastening by way of four M5 threads and two M5 through holes or with universal mounting bracket (order separately)		
Connection	M12 connector, 5-pole (piercing)		
Ambient temperature range	- 25 °C ... + 55 °C	- 10 °C ... + 55 °C (analog output)	- 40 °C ... + 55 °C
Storage temperature range	- 40 °C ... + 60 °C		
Permissible relative humidity	35 % ... 95 %, no condensation		
Enclosure rating	IP 67 (EN 60529/IEC 529)		
Protection class	II (250 V AC)		
Vibration resistance (to IEC 68-2-6)	± 1.5 mm, 1 h , 10 - 70 Hz		
Shock resistance (to IEC 68-2-27)	300 m/s ²		
User set parameters	<ul style="list-style-type: none"> - Mode - Output function - Teach/set switching points - Output switching - Function on connector pin 2 and 5 - Switch-on and off delay - Type of switch-off time function - Type of display on the sensor - Keyboard lock - Energy saving mode - Display direction - Reset to factory defaults 		

Accessories

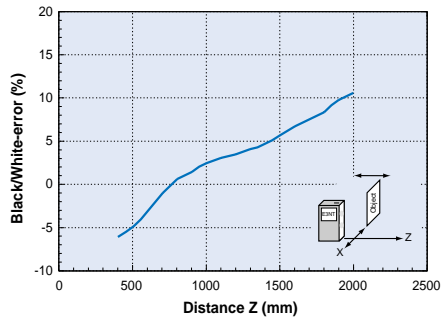
Item	Model
	E3NT-AL 232 2 M
Dimensions (length x width x depth)	29.5 x 72.9 x 26.4 mm
Housing material	ABS and PMMA (IR transparent)
Housing colour	Black, RAL 9005
Assembly	Snap mounting on sensor
Connection	2 m connecting cable with 9-pole sub-D connector
Ambient temperature range	- 10 °C ... + 50 °C
Storage temperature range	- 40 °C ... + 60 °C
Permission relative humidity	35% ... 85%, no condensation
Degree of protection to EN 60529 / IEC 529	IP 54
Emitted light	IR communication element 880 nm
Rated operating voltage	Via RS 232 interface from PC
Current consumption	6 mA

Characteristic data (typical)

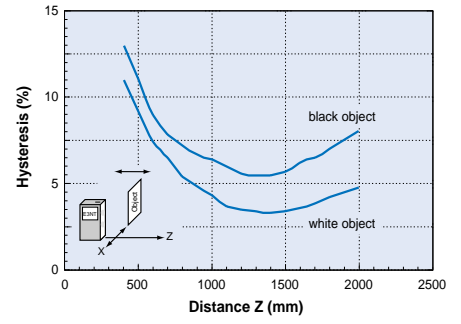
Operating range
(90% remission)



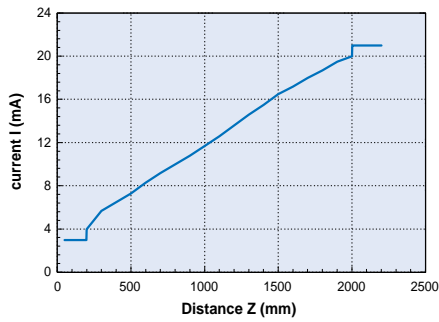
Black/White - Error
(6% - 90% remission)



Hysteresis

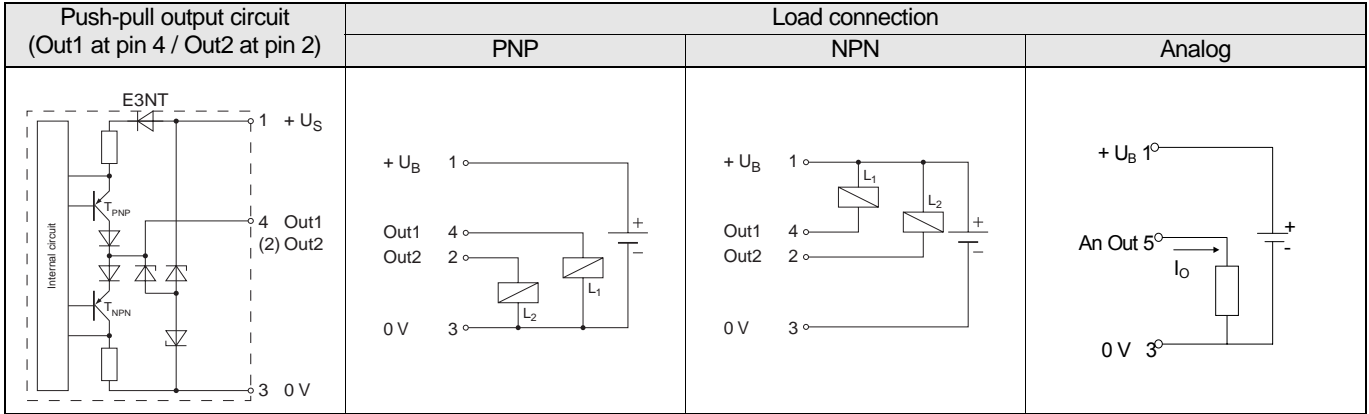


Analog output current
(90% remission)



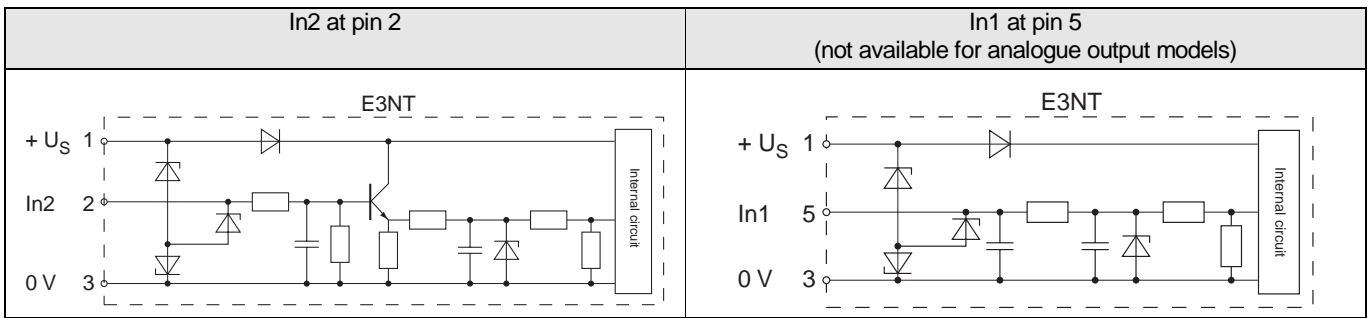
Circuit diagram

Output



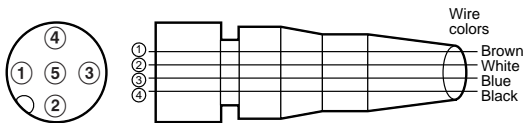
When use is made of the PNP or NPN output circuit, the output circuit that is not selected is deactivated. When used as a complementary output, NPN or PNP outputs act in antiphase as the switch state changes.

Input



The sensor inputs are realised in positive logic and detect a positive voltage level of more than 1 ms duration as a valid signal if the voltage level is between 10 V and the power supply voltage.

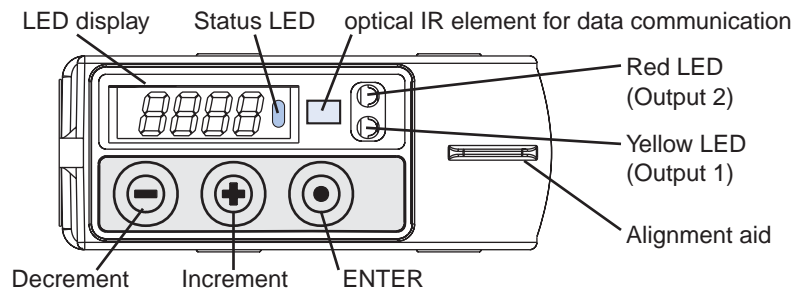
Connectors



Class	Wire jacket color	Connector pin no.	Application
For DC	Brown	1	Power supply (+V)
	White	2	Output or Input Out2 / In2
	Blue	3	Power supply (0V)
	Black	4	Output Out1
	Grey	5	Analog Output or Input In1

E3NT-L

Nomenclature



LED display	The distance from the measured object and the names of the menu levels during set-up of the sensor are displayed by the 4-digit 7-segment LED display. The display appears as red digits or letters. If the sensor is set to a bar chart display, the distance from the measured object is displayed as a green LED bar chart.		
LED	The switching status and the stability of the two outputs are signalled as follows by two LEDs, visible from the top and the front of the sensor:		
	Yellow LED (Output 1)	ON	Object stably detected
		Blinking	Object not stable detected
		OFF	No object within range
	Red LED (Output 2)	ON	Object stably detected
		Blinking	Object not stable detected
OFF		No object within range	
Status LED	ON	Set-up menu selected	
	Blinking	Menu level with change of setting distance	
	OFF	RUN (normal) mode	

Operation

Setting the switching points

The switching points can either be user set (Teach-in mode) with a measured object positioned at the corresponding distance or can be set using the setting input, for remote setting. For each output of the sensor (up to two), up to two switching points can be user set.

Only one switching point is active in the foreground and background suppression modes.

For the 2-point window evaluation mode, two switching points must be set.

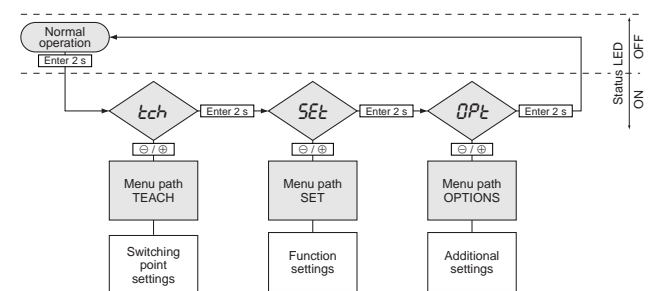
Teaching the switching points in the normal mode

The sensor is set at the factory for both outputs to **BGS**, light on.

- Place the target object in front of the sensor at the desired position.
- Teach the switching point for output 1:
 - Beginning with the ⊕ key, press it simultaneously with the ENTER ⊙ key. Threshold level is obtained and the output/LED is updated. Status LED is blinking.
 - Using the ⊕/⊖ keys an adjustment of the switching point is possible. The output/LED is updated immediately.
 - Pressing the ENTER ⊙ key for more than 2 seconds or after 2 minutes without any activation of the keys, the sensor returns to normal operation. The status LED is turned off.
- Teach the switching point for Output 2:

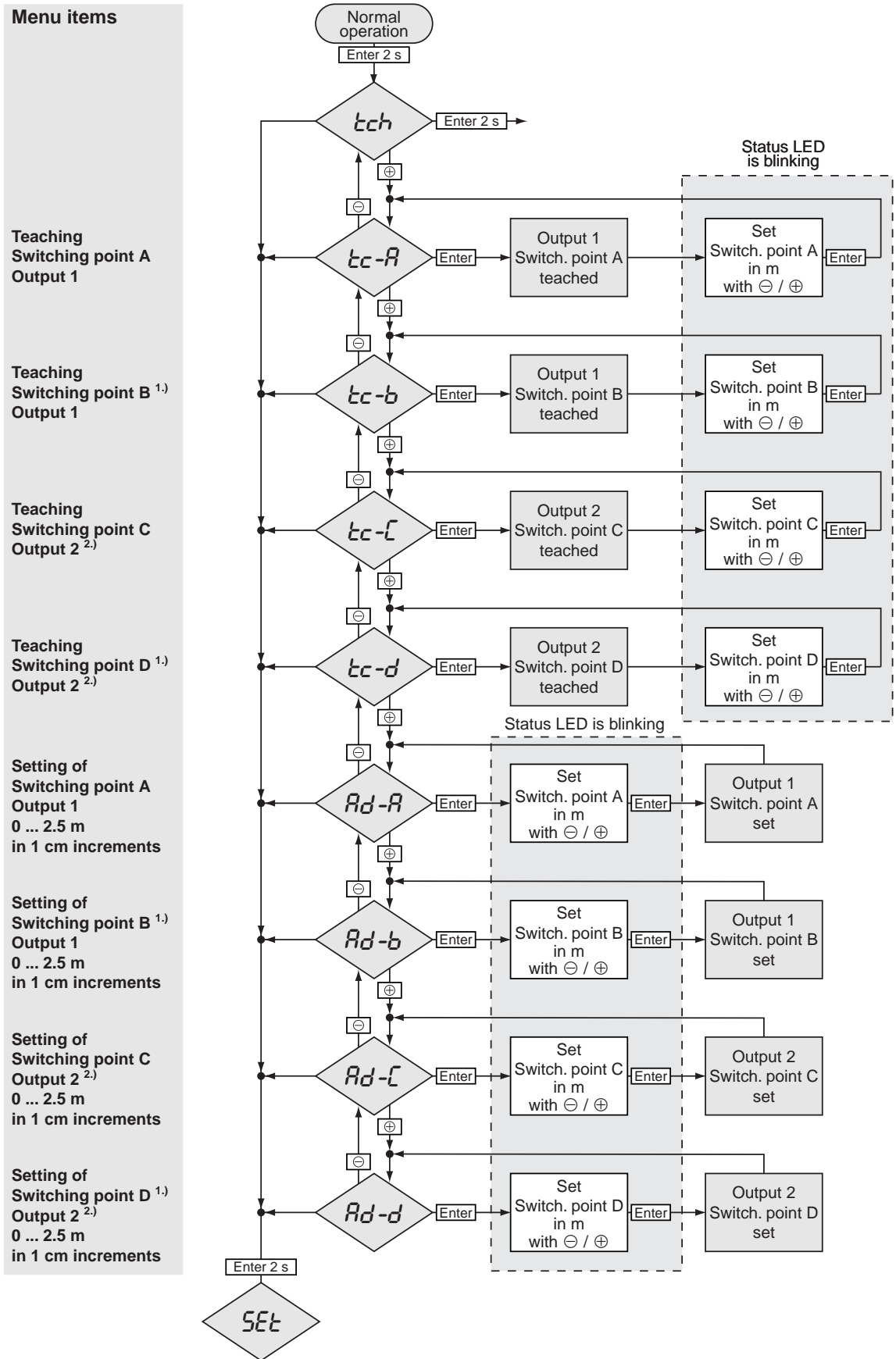
- Beginning with the ⊖ key, press it simultaneously with the ENTER ⊙ key.

Main menu structure



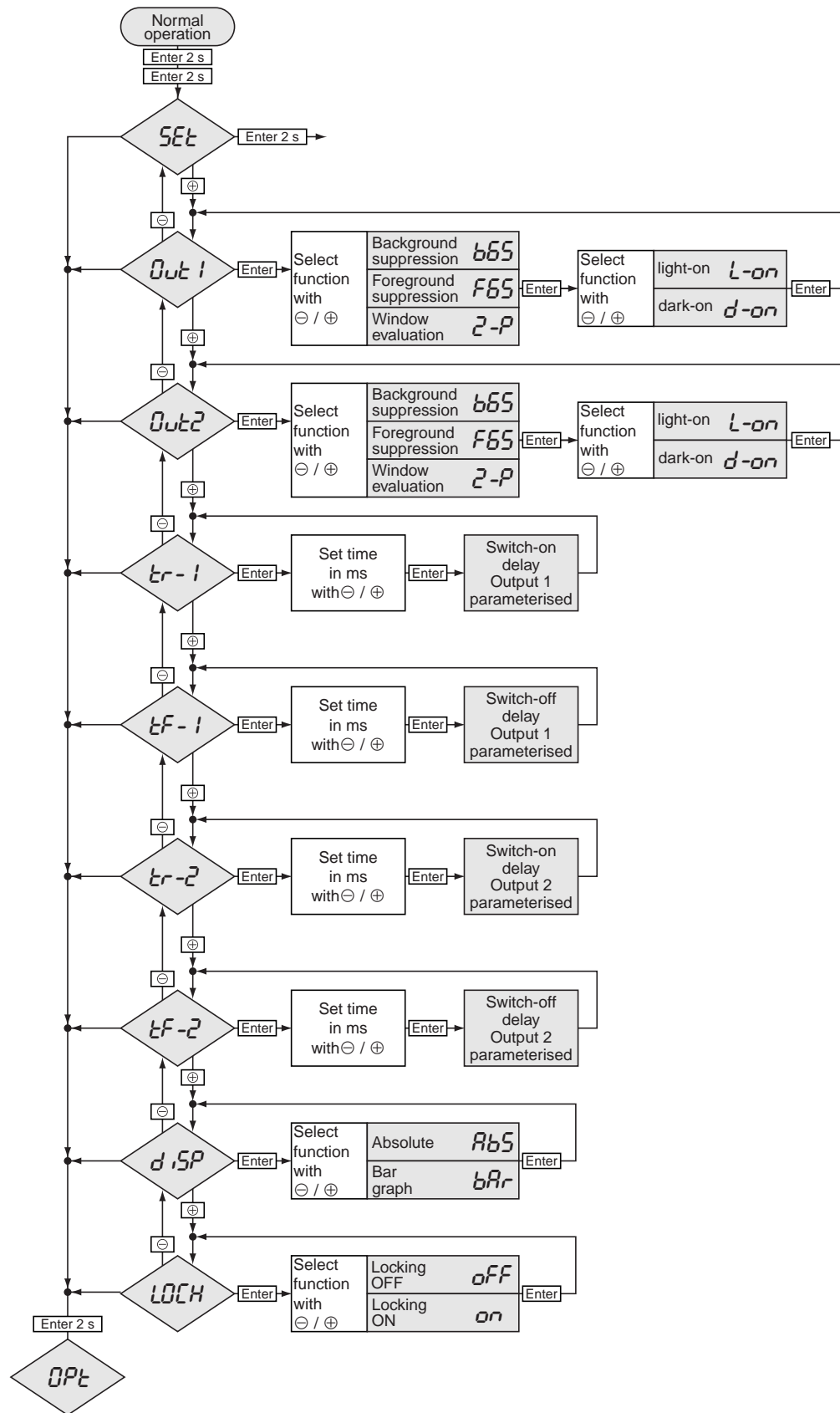
When the ENTER ⊙ key is pressed for 2 seconds, the sensor switches from the normal mode to the TEACH menu path. The sensor switches to each next menu path when the ENTER ⊙ key is repeatedly pressed for 2 seconds. In the menu paths, the required parameters can be selected by pressing ⊖ and ⊕ keys.

- To skip a menu path, you can also press the ENTER key for 4 seconds.
- [ENTER] Press the ENTER ⊙ key < 1 second
- [ENTER 2s] Press the ENTER ⊙ key > 2 seconds.

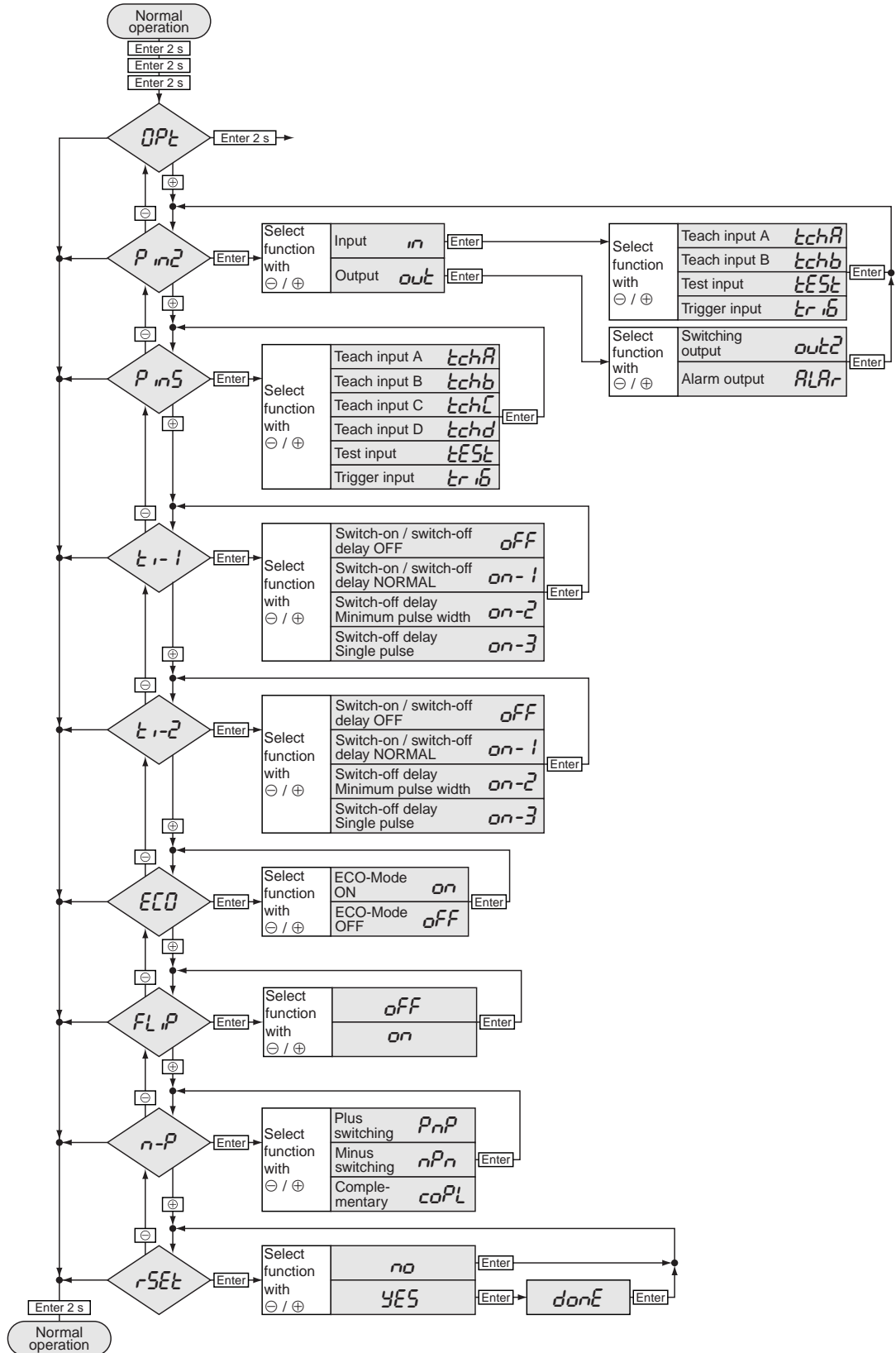


SET menu

- Menu items**
- Function Output 1
 - Function Output 2 ^{1.)}
 - Switch-on delay ^{2.) 5.)} Output 1
0 ... 9999 ms
in 1 ms decrements
 - Switch-off delay ^{2.) 3.)} Output 1
0 ... 9999 ms
in 1 ms decrements
 - Switch-on delay ^{2.) 5.)} Output 2 ^{1.)}
0 ... 9999 ms
in 1 ms decrements
 - Switch-off delay ^{2.) 3.)} Output 2 ^{1.)}
0 ... 9999 ms
in 1 ms decrements
 - Distance display
 - Key lock ^{4.)}



- Menu items
- Function Connector pin 2
- Function Connector pin 5
- Function Switch-on / switch-off delay Output 1
- Function Switch-on / switch-off delay Output 2 ¹⁾
- Energy saving mode ECO ²⁾
- Turn display
- Output stage
- Reset to Works default

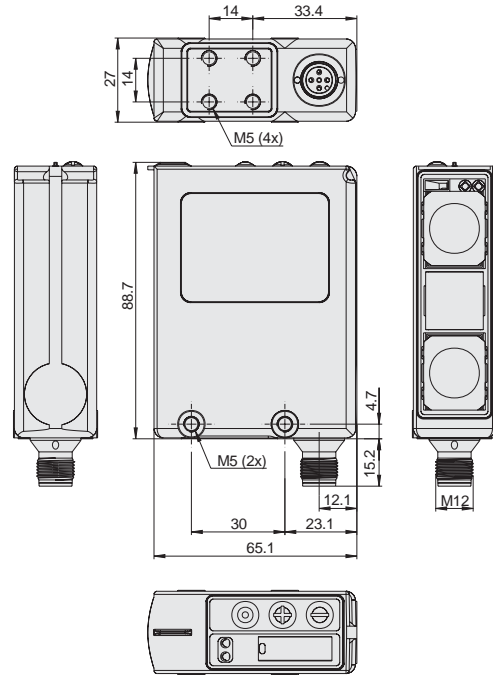
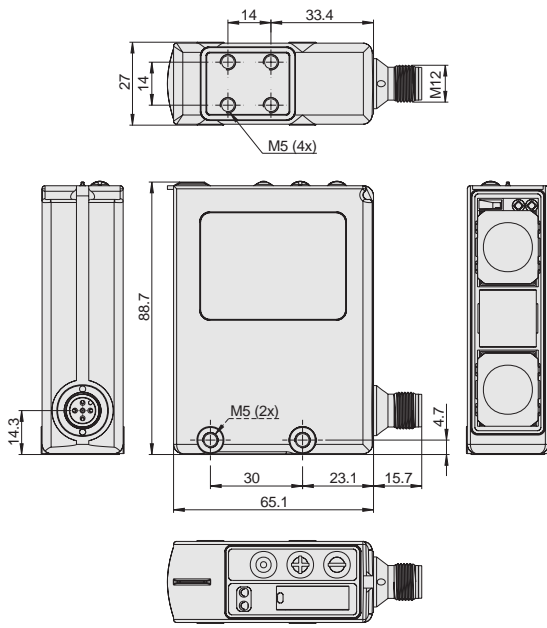


Dimensions

Sensors

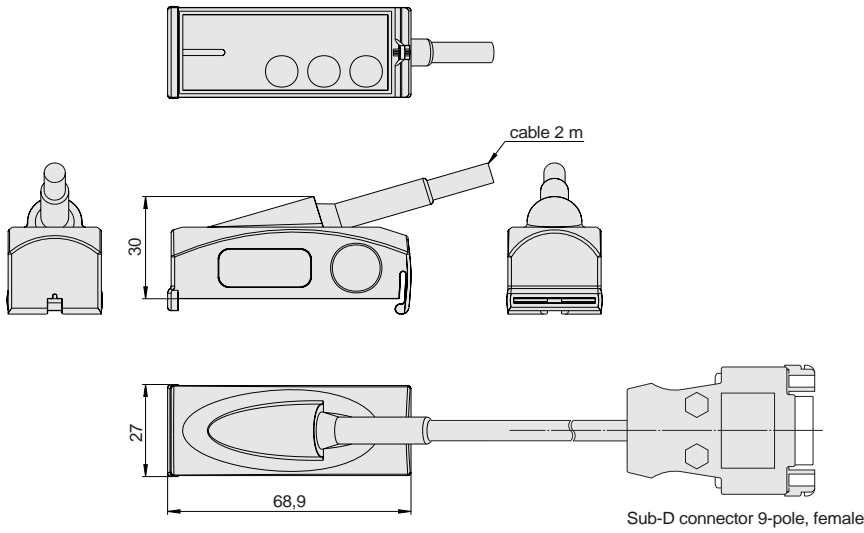
E3NT-L17
E3NT-L27
E3NT-LH17

E3NT-L37
E3NT-L47
E3NT-LH37



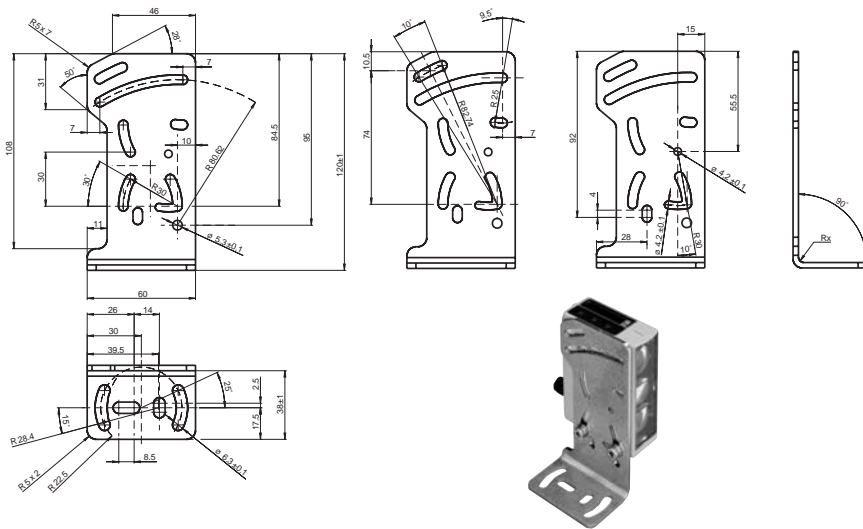
Accessoires (order separately)

Optical data link
E3NT-AL232 2m



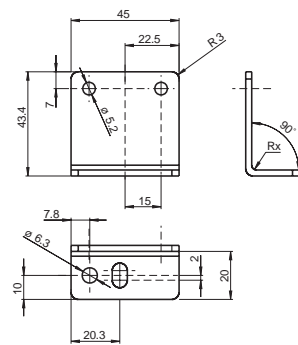
Universal mounting bracket

E39-EL1



Adapter bracket

E39-EL2



Precautions

⚠ Caution

Do not connect an AC power supply to the Sensor. If AC power (100 VAC or more) is supplied to the Sensor, it may explode or burn.

Be sure to abide by the following precautions for the safe operation of the Sensor.

Safety notes

The diffuse reflective sensors in the E3NT type series may only be used as described in these operating instructions.

They may only be operated as part of a higher-level overall system, e.g. of a machine installation.

Diffuse reflective sensors in the E3NT type series must not be used as safety components within the scope of the EU machine guideline.

Their use is not permitted in applications in which the safety of persons depends on functioning of the sensor!

Wiring

Power Supply Voltage and Output Load Power Supply Voltage

Make sure that the power supply to the Sensor is within the rated voltage range. If a voltage exceeding the rated voltage range is supplied to the Sensor, it may explode or burn.

Load Short-circuiting

Do not short-circuit the load, otherwise the Sensor may be damaged.

Operating Environment

Do not use the Sensor in locations with explosive or flammable gas.

Correct Use

Design

Power Reset Time

The Sensor is ready to operate 300 ms after the Sensor is turned ON. If the load and Sensor are connected to independent power supplies respectively, be sure to turn ON the Sensor before supplying power to the load.

Wiring

Avoiding Malfunctions

If using the Photoelectric Sensor with an inverter or servomotor, always ground the FG (frame ground) and G (ground) terminals, otherwise the Sensor may malfunction.

Mounting

Mounting the Sensor

- If Sensors are mounted face-to-face, make sure that the optical axes are not in opposition to each other. Otherwise, mutual interference may result.
- Always install the Sensor carefully so that the aperture angle range of the Sensor will not cause it to be directly exposed to intensive light, such as sunlight, fluorescent light, or incandescent light.
- Do not strike the Photoelectric Sensor with a hammer or any other tool during the installation of the Sensor, or the Sensor will lose its water-resistive properties.
- Use M5 screws to mount the Sensor.
- When mounting the case, make sure that the tightening torque applied to each screw does not exceed 0.54 Nm.

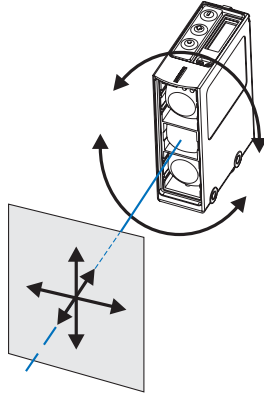
M12 Connector

- Always turn OFF the power supply to the Sensor before connecting or disconnecting the connector.
- Hold the connector cover to connect or disconnect it.
- Secure the connector cover by hand. Do not use pliers, otherwise the connector may be damaged.
- If the connector is not connected securely, it may be disconnected by vibration or the proper degree of protection of the Sensor may not be maintained.

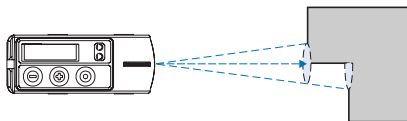
Mounting Directions

Sensor assembly

Contrary to sensors with single triangulation, E3NT with double triangulation, allows the measured object's direction of motion to be in all three directions. Thus, the rotatory position of the sensor about its optical axis can be chosen freely.



If the light spot is not completely on the same plane as the target object (minimum object size) the distance is not determined and malfunction can occur. If necessary a trigger signal or timer function has to be applied.

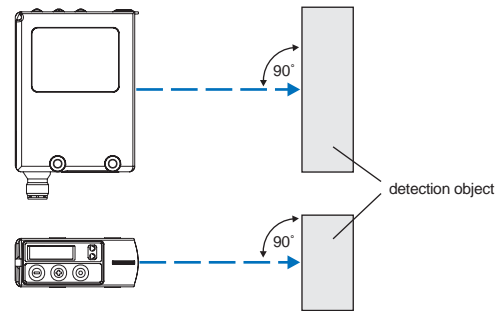


The sensor must be fitted so that:

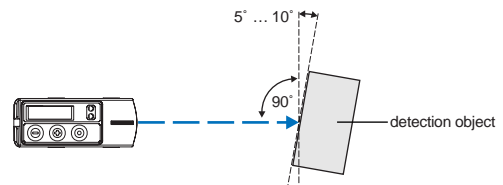
- It is correctly aligned before it is adjusted
- It is protected as far as possible against vibration and shock
- It is protected as far as possible against extraneous incident light
- It is protected as far as possible against damage and soiling
- Electrical connection is possible
- It is as accessible as far as possible for maintenance work
- Operation of the push buttons is possible
- The display is visible.

Sensor's assembly direction

As far as possible, the sensor's optical surface should be aligned parallel to the surface of the measured object.



If the measured object has a glossy, reflecting surface, the sensor's optical system should be tilted by 5 ... 10° in relation to the surface of the measured object.



If there is a reflecting surface in parallel with the sensor's optical axis, this might lead to unstable switching states.

Therefore, reflecting objects within the sensor's optical axis should be avoided.

If this should not be possible, the reflecting surface should not be parallel to the sensor's optical axis, but should be rotated by at least 10°.

Mirror-like objects can cause malfunction inside and outside the sensing range. Avoid mirror-like objects in or close to the optical axis.

Inspection and Maintenance

Cleaning

Do not use any scratching or abrasive cleaning materials. The protective pane of the optical system might get damaged.

The sensor requires no maintenance.

Remove dirt build up from the optical system and the display at regular intervals only with a soft, non abrasive fabric. Residual dirt may have influence on the switching point and display accuracy.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E332-E2-01 **In the interest of product improvement, specifications are subject to change without notice.**

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