Baumer
Passion for Sensors

Description of functions and interfaces

OF10 with Remote-Command-Control interface

Fiber optic sensor

EN-US

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Table of contents

1 About this document 4
1.1 Purpose and scope of application 4
1.2 Applicable documents 4
1.3 Labels in this manual 4
1.4 Warnings in this manual 5
2 Structure and function 6
3 Interfaces 7
3.1 OLED display 7
3.2 Remote-Command-Control 7
4 Operating functions 8
4.1 AUTOSET function 8
4.2 AUTOSET Percent 12
4.3 Detect Mode 13
4.4 Response Time 14
4.5 Hysteresis 15
4.6 Anti-Crosstalk 18
4.7 Timer/counter function 19
4.8 Input function 23
4.9 Display-Mode 24
4.10 Lock-Mode 25
4.11 Factory settings 26

List of illustrations

Ill. 1 Pulse sequence example 2 - 3 - 2 (function *Detect Mode = Dark ON*) 7
Ill. 2 Comparison of AUTOSET settings 10
Ill. 3 Diagram of the LO/DO switching logics 13
Ill. 4 Hysteresis 15
Ill. 5 Switching output behavior in mode *Single Point* and negative hysteresis (*Left Aligned*) 16
Ill. 6 Switching output behavior in mode *Window* and negative hysteresis (*Left Aligned*) 16
Ill. 7 Switching output behavior in mode *Single Point* and negative hysteresis (*Left Aligned*) 16
Ill. 8 Switching output behavior in mode *Window* and negative hysteresis (*Right Aligned*) 17

1 About this document

1.1 Purpose and scope of application

This manual enables safe and efficient sensor parameterization. The manual describes the functions and is intended to support sensor installation and use.

The illustrations are examples only. Deviations are at the discretion of Baumer at all times. This manual is a supplement to the existing product documentation.

1.2 Applicable documents

- Available for download at www.baumer.com:
  - Data sheet
  - EU Declaration of Conformity
- Attached to product:
  - Quickstart
  - General information sheet (11042373)

1.3 Labels in this manual

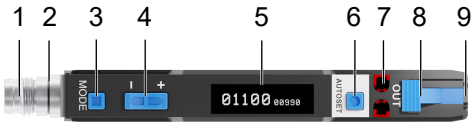
Identifier	Usage	Example
Dialog element	Indicates dialog elements.	Click the ***OK*** button.
Unique name	Indicates the names of products, files, etc.	*Internet Explorer* is not supported in any version.
`Code`	Indicates entries.	Enter the following IP address: `192.168.0.250`

1.4 Warnings in this manual

Warnings draw attention to potential personal injury or material damage. The warnings in this manual indicate different hazard levels:

Symbol	Warning term	Explanation
	DANGER	Indicates an imminent potential danger with high risk of death or serious personal injury if not being avoided.
	WARNING	Indicates potential danger with medium risk of death or (serious) personal injury if not being avoided.
	CAUTION	Indicates a danger with low risk, which could lead to light or medium injury if not avoided.
	NOTE	Indicates a warning of material damage.
	INFO	Indicates practical information and tips that enable optimal use of the devices.

2 Structure and function



1	4-pin connection: M8 or cable	2	LED - activity indicator*
3	Mode button	4	Selector +/-
5	OLED display	6	AUTOSET button
7	Output LEDs	8	Locking lever
9	Fiber-optics port		

* Only variant with M8 connector

The sensor can be deployed with every standard fiber optics with 2.2 mm adaptor sleeve and this way provides to right solution for most varied applications and installation conditions.

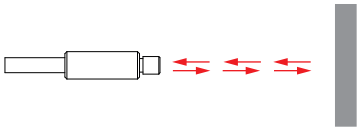
Functional principle: through-beam sensor

Through-beam sensors detect interruptions in the light beam between transmitter and receiver caused by an object passing through.

The separate arrangement allows for long-range detection and large signal reserve capacities. Through-beam sensors are hence ideal for harsh environmental conditions (e.g. dust, dirt and moisture).

- The clearly defined and permanent active zone provides a high level of constant reproducibility throughout the entire detection range.
- The switching point is independent from object surface properties.

Functional principle: Diffuse sensor



Diffuse sensors evaluate the intensity of light reflected by the object. One and the same sensing head accommodates both transmitter and receiver.

In other words, transmission and reception beams are co-axial. This allows for detection in narrow openings and the object's approaching direction does not matter.

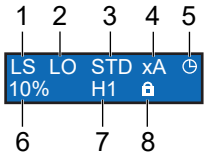
3 Interfaces

This section describes the available interfaces for operator to sensor communication.

3.1 OLED display

The individual sensor functions are accessed using the display button MODE. Pressing MODE once will provide an overview of sensor settings. Every further press on the button will skip to the next setting.

Display layout



1	AUTOSET Mode	2	Detect Mode
3	Processing Mode	4	Anti-Crosstalk Channel
5	Timer	6	AUTOSET Percentage
7	Hysteresis	8	Lock Active

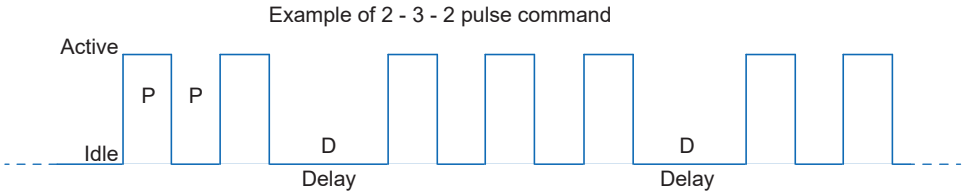
3.2 Remote-Command-Control

Mode *Remote-Command-Control* serves for configuration of some options straight via the input line. For doing so, a simple pulse sequence is transmitted to PIN2 or WIRE2 (white cable).

Example

The switching logic (*Detect Mode*) should be *Dark ON*.

Doing so requires transmission of pulse sequence 2 - 3 - 2. In other words, two pulses followed by three pulses followed by two pulses:



Ill. 1: Pulse sequence example 2 - 3 - 2 (function *Detect Mode* = *Dark ON*)

The pulses received appear on the display. Valid commands are executed immediately. If the input remains active, any partial command will be deleted.

4 Operating functions

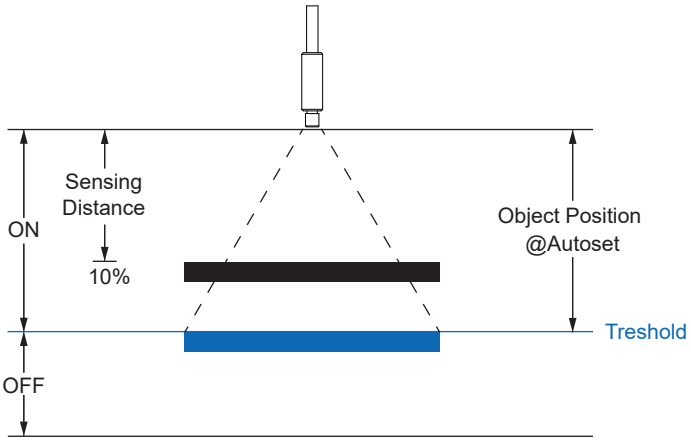
4.1 AUTOSET function

Function AUTOSET is for setting the sensor's switching point. The sensor provides different modes for setting the switching point.

To select the appropriate mode, find out first which type of setup mode is best for the respective application. The most common and easiest mode is **Light State**. That is sensor default. This mode can be used with both through-beam sensors and diffuse sensors.

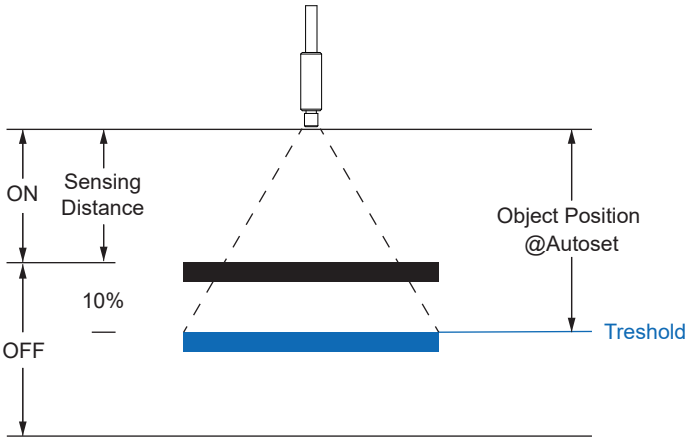
Light State LS (Default)

Position the object to be detected in the most unfavorable light state and press AUTOSET. The switching point is set 10 % (default) lower than the light intensity of the beam received. Use the selector +/- to adjust the switching point.



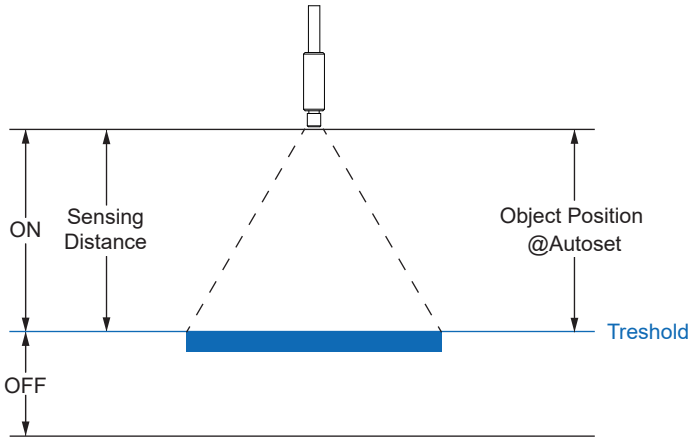
Dark State DS

Position the object to be detected in the most unfavorable dark state and press AUTOSET. The switching point is set 10 % (default) higher than the light intensity of the beam received. Use the selector +/- to adjust the switching point.



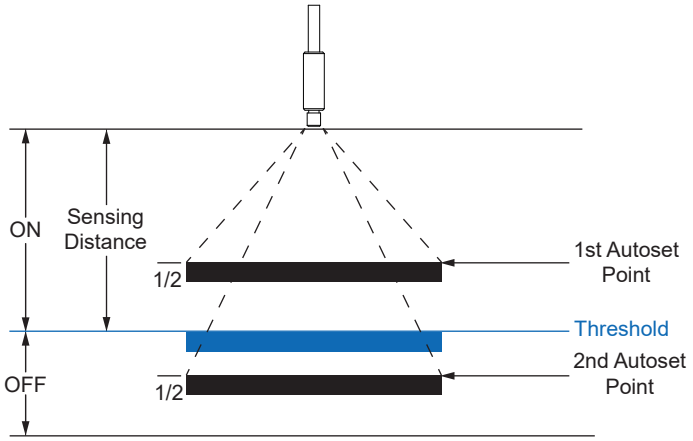
Midpoint MP

Position the object to be detected in the place you like to set the switching point and press AUTOSET. Use the selector +/- to adjust the switching point.



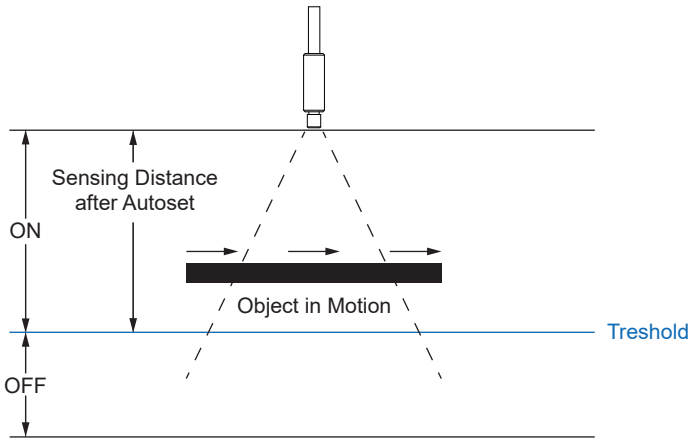
Two-Point 2P

Position the object to be detected inside the sensing range and press AUTOSET. Next take the object out of the sensing range and press AUTOSET again. The switching point is set in the mid of both light intensities. Use the selector +/- to adjust the switching point.



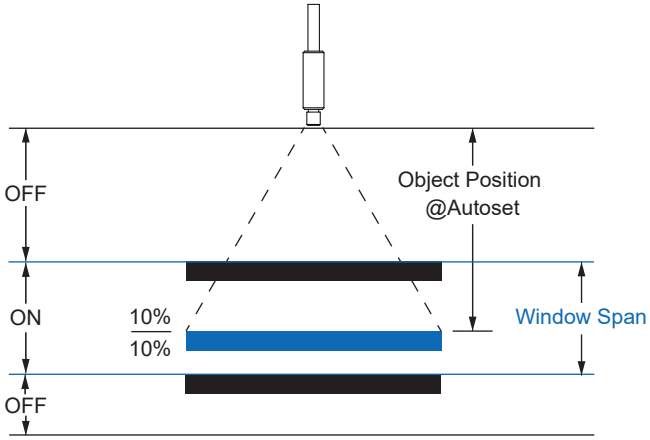
Dynamic DY

Press AUTOSET to start dynamic AUTOSET. Now move the object at least once through the beam and press AUTOSET again to complete dynamic AUTOSET. The switching point is set between the highest and lowest light intensities received. Use the selector +/- to adjust the switching point.

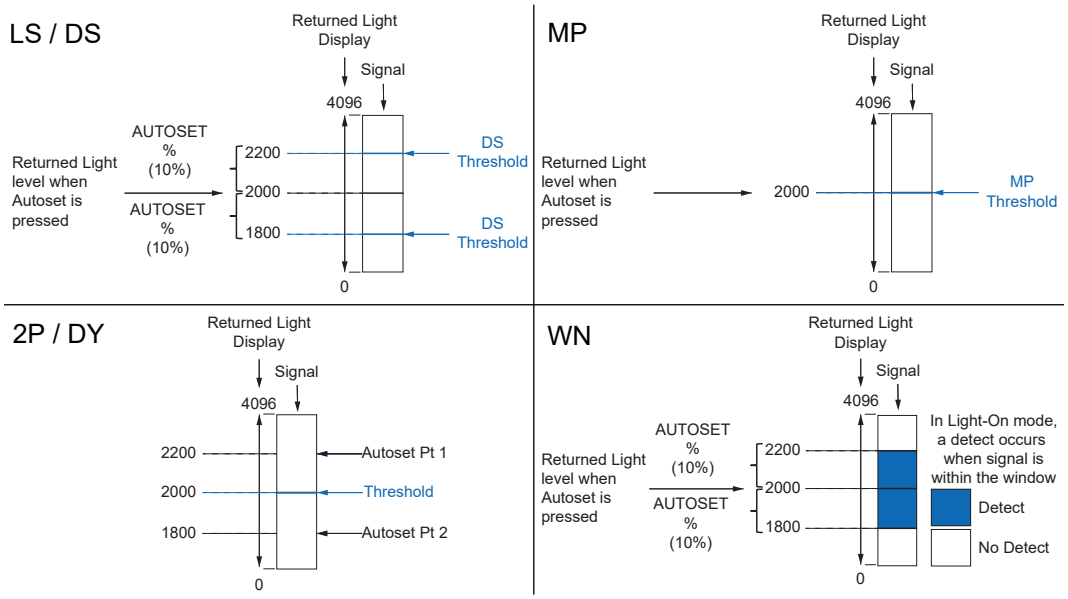


Window WN

Window mode is a particular mode in AUTOSET. Window mode generates two switching points and can be used as a dual-channel fiber optic sensor. Position the object at the point it must be reliably detected and press AUTOSET. The sensor sets two switching points, each of which being (by default) 10 % above and (by default) 10 % below the received light intensity. The object will detected when back in the fiber optics field of view and being within a ± 10% window of its original position. Use the selector +/- to adjust the 10% switching point window.



Following is a diagram of signal behavior in the different modes.



Ill. 2: Comparison of AUTOSET settings

Remote command control access: AUTOSET

A single pulse command will trigger an AUTOSET operation. Another single pulse command is required to complete Two-point and Dynamic AUTOSET operations.

Option	Icon	Sequence
Light-State	LS	2 – 1 – 1
Dark-State	DS	2 – 1 – 2
Midpoint	MP	2 – 1 – 3
Two-point	2P	2 – 1 – 4
Dynamic	DY	2 – 1 – 5
Window	WN	2 – 1 – 6

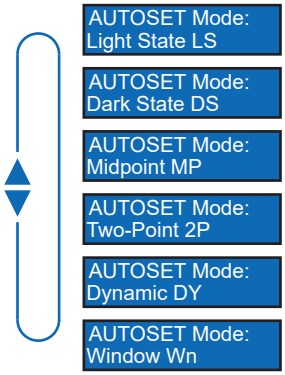
Display access: AUTOSET

Instruction:

a) Press ***Mode*** until ***AUTOSET Mode*** appears on the display.

b) Use the selector +/- to set the required mode.

c) Press ***AUTOSET*** to trigger the desired teaching process.



4.2 AUTOSET Percent

The offset percentages for the AUTOSET modes Light State (LS), Dark State (DS) and Window (WN) can be adjusted. This will set the switching point by AUTOSET mode and delivers the intensity of the received light beam as a percentage.

Remote Command Control access: AUTOSET Percent

Option	Icon	Sequence
1%	01%	2 – 2 – 1
2%	02%	2 – 2 – 2
5%	05%	2 – 2 – 3
10%	10%	2 – 2 – 4
20%	20%	2 – 2 – 5
50%	50%	2 – 2 – 6

Display access: AUTOSET Percent

Instruction:

a) Press ***Mode*** until ***AUTOSET Pct.*** appears on the display.

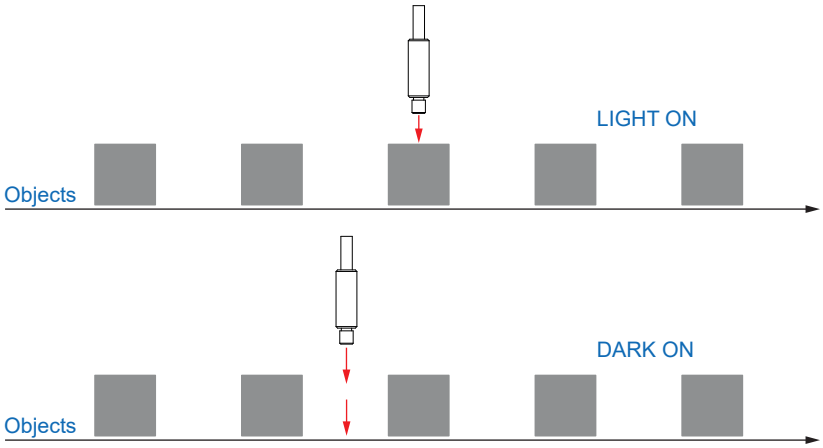
b) Set the required value with the selector +/-. To scroll, press and hold the button.

c) Press ***Mode*** to select the setting.

4.3 Detect Mode

This function defines the sensor's switching logic.

- **Light ON (LO)** - Output is active when the light intensity of the received beam is above the defined switching point. In Window Modus (WN) is the output active when the intensity of the received light beam is within the defined switching limits.
- **Dark ON (DO)** - The output is not active if the light intensity of the received beam is above the defined switching point. In Window Modus (WN) is the output active when the intensity of the received light beam is outside the defined switching limits.



Ill. 3: Diagram of the LO/DO switching logics

Remote Command Control access: Detect Mode

Option	Icon	Sequence
Light On	LO	2 – 3 – 1
Dark On	DO	2 – 3 – 2

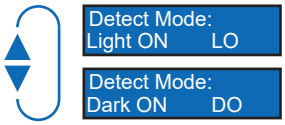
Display access: Detect Mode

Instruction:

a) Press ***Mode*** until ***Detect Mode*** appears on the display.

b) Make the required setting by help of the selector +/-.

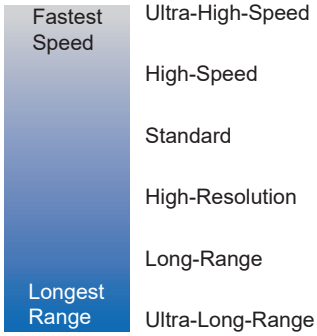
c) Press ***Mode*** to select the setting.



4.4 Response Time

This function is to define the response time delivering the optimum results in the respective application.

Select the best performance for the respective application in *Response Time*. Sensor speed, range and sensitivity are optimized for the best performance.



Parameter	Abbreviation / Term	Description
Ultra-High-Speed	UHS	Shortest response time (50us) Not available in asynchronous anti-crosstalk mode.
High-Speed	HS	Short response time (120 us) Not available in asynchronous anti-crosstalk mode.
Standard	STD	Good balance between response time and overall detection (250 us)
High-Resolution	HR	Improved resolution for general applications (1ms)
Long-Range	LR	General application with extended range (4ms)
Ultra-Long-Range	ULR	Special application with maximum range and sensitivity (16ms)

Remote Command Control access: Response Time

Option	Icon	Sequence
Ultra-High-Speed	UHS	2 – 4 – 1
High-Speed	HS	2 – 4 – 2
Standard	STD	2 – 4 – 3
High-Resolution	HR	2 – 4 – 4
Long-Range	LR	2 – 4 – 5
Ultra-Long-Range	ULR	2 – 4 – 6

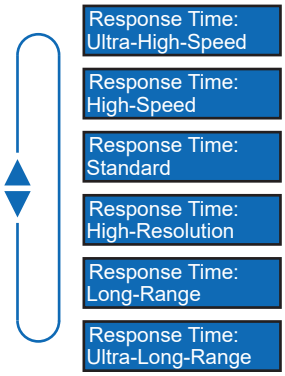
Display access: Response time

Instruction:

a) Press ***Mode*** until ***Response Time*** appears on the display.

b) Make the required setting by help of the selector +/-.

c) Press ***Mode*** to select the setting.

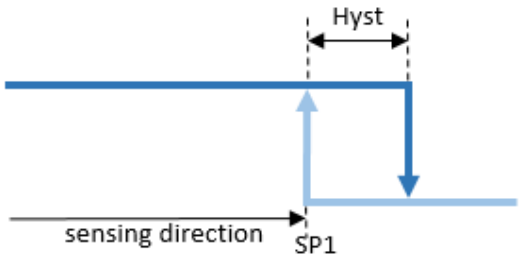


4.5 Hysteresis

This function prevents unwanted switching operations by the switching output. The parameterized value of the hysteresis is the difference in distance between the points at which the switching output is activated and deactivated. Baumer recommends always setting the hysteresis not equal to 0.

Hysteresis is the difference between switching point and reset point. The following diagram shows the function principle:

- Light blue: object moving from far to near (here switching point)
- Dark blue: object moving from near to far (here reset point)



Ill. 4: Hysteresis

Hysteresis is specified in percent, i.e. in relation to the set switching distance.

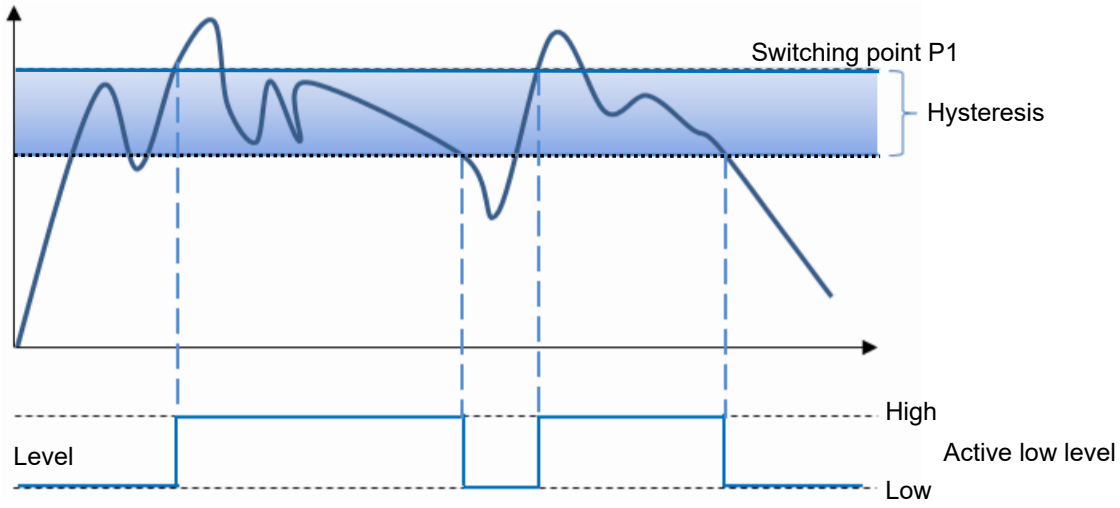
Hysteresis alignment

Axial detection tasks such as stop trigger or point level detection require accurate switching distance. To align switching behavior and hysteresis to the object's moving direction, the hysteresis orientation be modified.

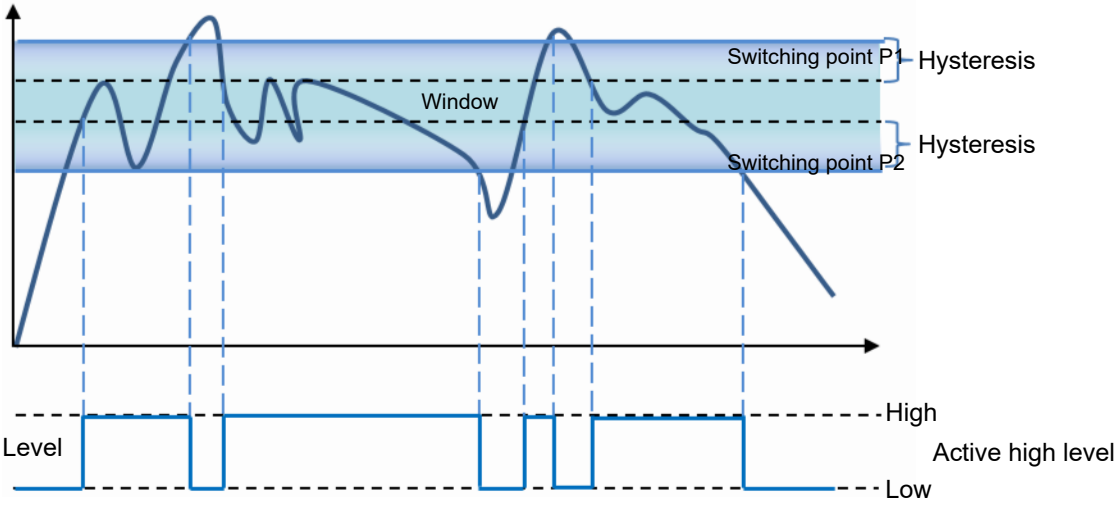
This function is only active in *Single Point* or *Window* mode.

Left Aligned (negative hysteresis):

Hysteresis is aligned either to or against the sensing direction.



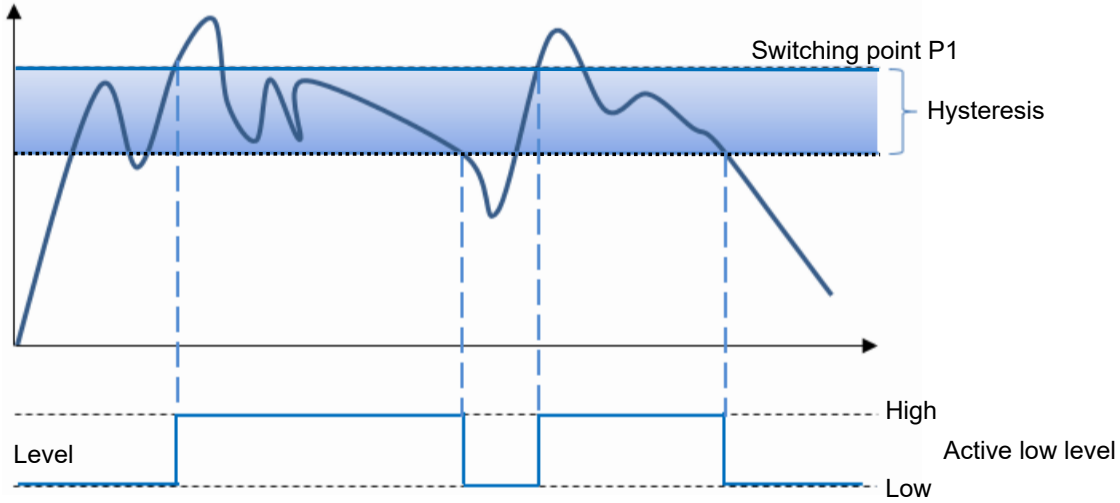
Ill. 5: Switching output behavior in mode *Single Point* and negative hysteresis (*Left Aligned*)



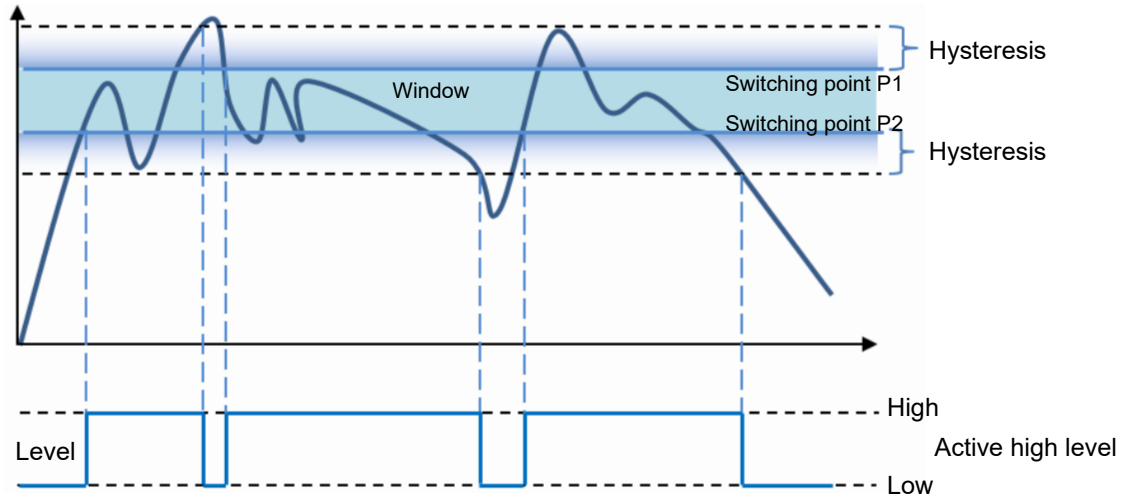
Ill. 6: Switching output behavior in mode *Window* and negative hysteresis (*Left Aligned*)

Right Aligned (positive hysteresis):

Hysteresis is aligned to or against the sensing direction.



Ill. 7: Switching output behavior in mode *Single Point* and negative hysteresis (*Left Aligned*)



Ill. 8: Switching output behavior in mode *Window* and negative hysteresis (*Right Aligned*)

Center Aligned:

Compromise between positive and negative hysteresis. Hysteresis alignment is in symmetry to the individual target values.

Remote Command Control access: Hysteresis

Option	Icon	Sequence
Low	H0	2 – 5 – 1
Standard	H1	2 – 5 – 2
High	H2	2 – 5 – 3

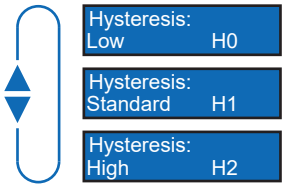
Display access: Hysteresis

Instruction:

a) Press ***Mode*** until ***Hysteresis*** appears on the display.

b) Make the required setting by help of the selector +/-.

c) Press ***Mode*** to select the setting.



4.6 Anti-Crosstalk

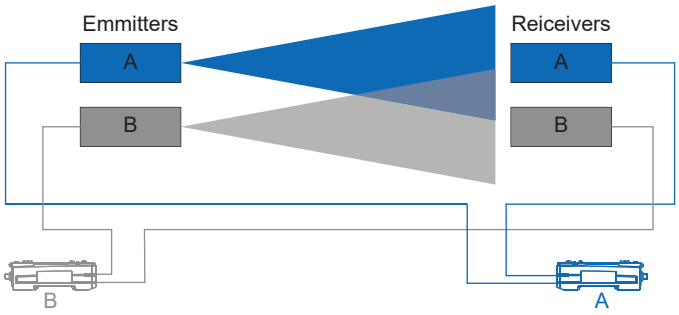
Where having deployed two sensors close to each other, this function provides settings for anti-crosstalk channels. This prevents output of wrong signals in the event the sensors' fields of view should overlap.

INFO

SSC1 and SSC2 cannot be defined as channels A and B.

The anti-crosstalk function is intended for use of two individual sensors.

This function is NOT available in UHS and HS mode.

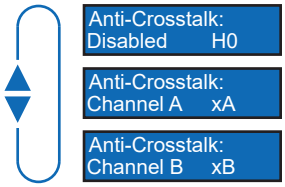


Display access: Anti-Crosstalk

a) Press ***Mode*** until ***Anti-Crosstalk*** appears on the display.

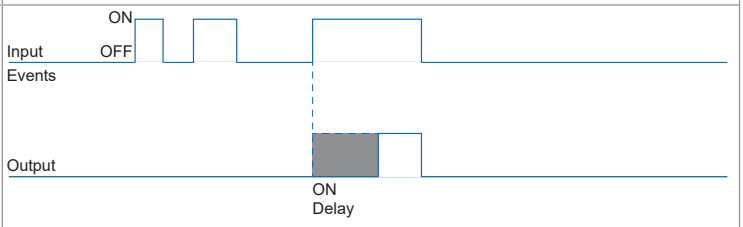
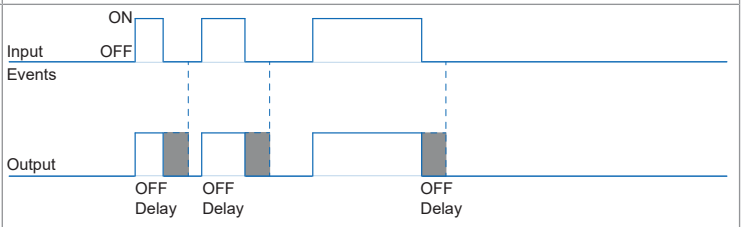
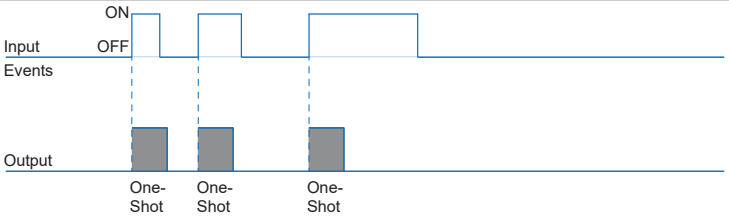
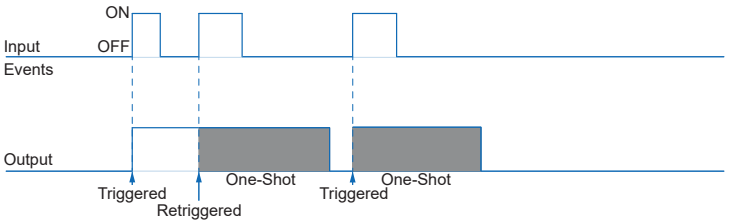
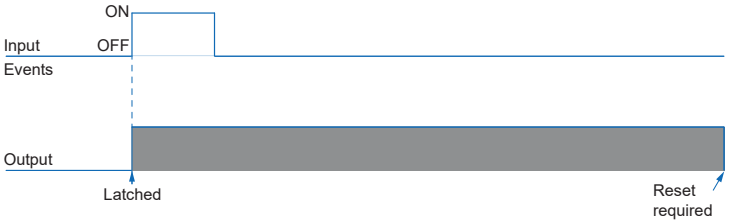
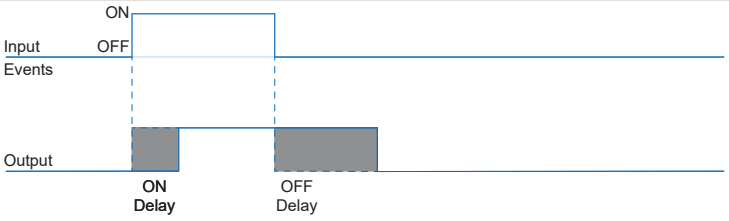
b) Make the required setting by help of the selector +/-.

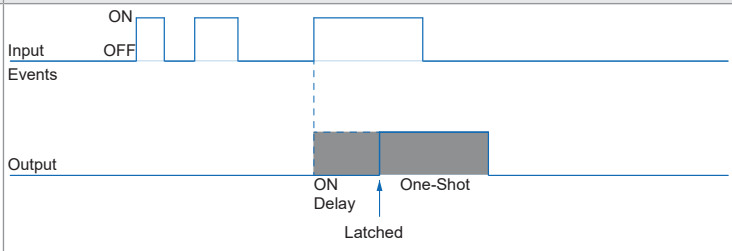
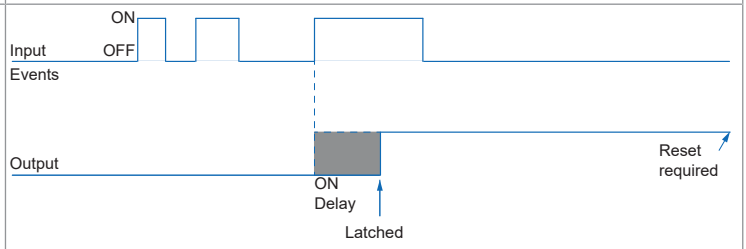
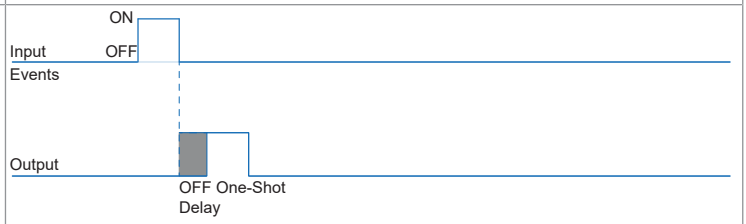
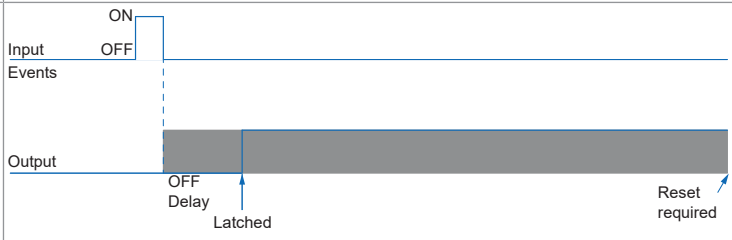
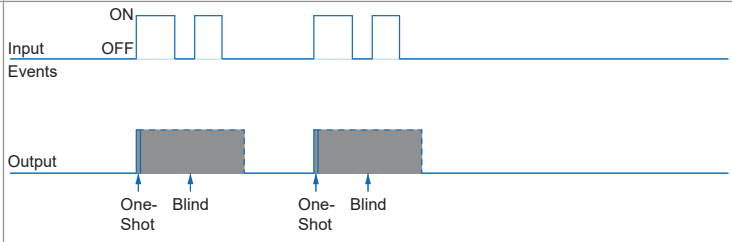
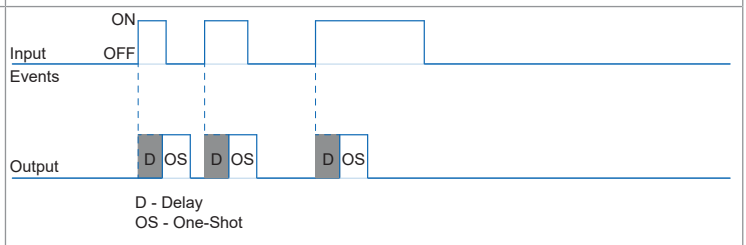
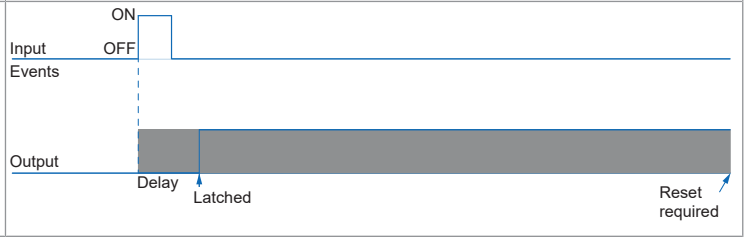
c) Press ***Mode*** to select the setting.

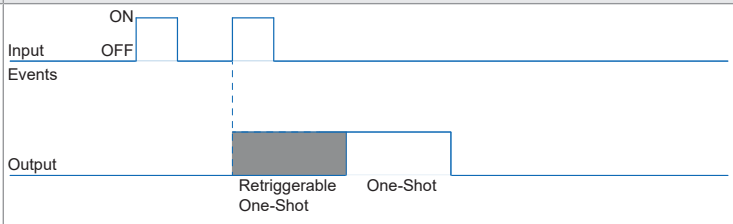
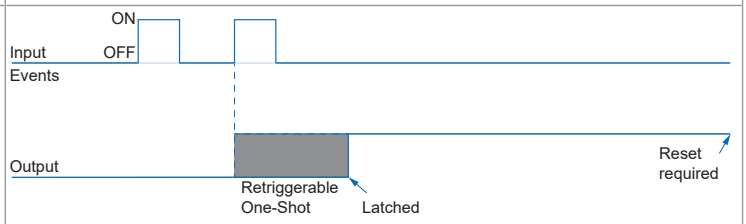
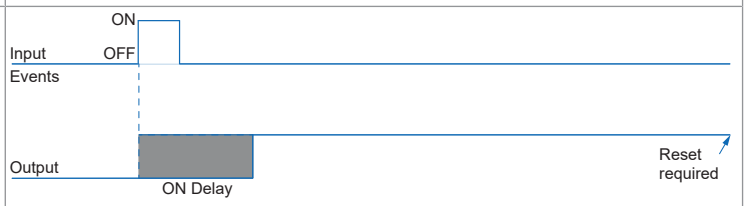
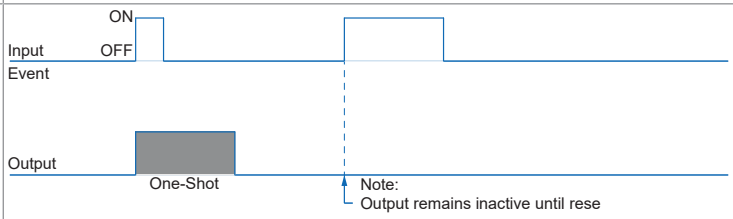
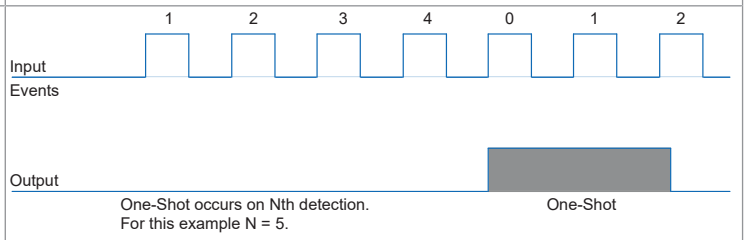
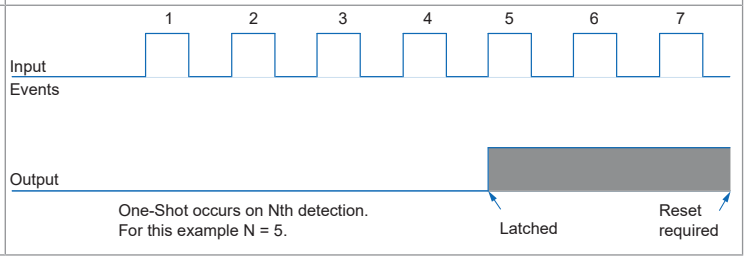


4.7 Timer/counter function

You can choose among 19 pre-configured timer/counter functions. Each one represents a function, e.g. switch-on delay, switch-off delay, etc. When having selected a function you are provided with the related programming parameters.

No.	Parameter	Signal curve
00	Bypass	
01	On-Delay	
02	Off-Delay	
03	One-Shot	
04	Motion	
05	Latch	
06	On, Off-Delay	

No.	Parameter	Signal curve
07	On, One-Shot	
08	On, Latch	
09	Off, One-Shot	
10	Off, Latch	
11	Blind One-Shot	
12	Delayed One-Shot	
13	Delayed Latch	

No.	Parameter	Signal curve
14	Stop, One-Shot	
15	Stop, Latch	
16	Latch, On-Delay	
17	Latch, One-Shot	
18	Count, One-Shot	
19	Count, Latch	

Remote Command Control access: Response Time

Option	Sequence
Bypass	3 – 1– 1
On-Delay	3 – 1– 2
Off-Delay	3 – 1– 3
One-Shot	3 – 1– 4
Motion	3 – 1– 5
On, Off-Delay	3 – 1– 6
On, One-Shot	3 – 1– 7
Off, One-Shot	3 – 1– 8
Blind One-Shot	3 – 1– 9
Delayed One-Shot	3 – 1– 10
Stop, One-Shot	3 – 1– 11

Display access: Timer Function

Instruction:

a) Press ***Mode*** until ***Timer Func*** appears on the display.

b) Make the required setting by help of the selector +/- (e.g. On-Delay).

c) Press ***Mode*** to select the setting.

✓ According to the selected settings you may be provided with more options for the function (e.g. ***OnDelay***).

Make choice using the selector +/- and confirm each setting with ***Mode***.

4.8 Input function

This function is to adjust the input behavior.

Parameter	Description
Disabled	Unwanted signals will be ignored.
Remote Set	The input line changing from idle to active state and back will execute an AUTOSET operation. Note: The input line may be used in addition to the AUTOSET button.
Remote Command	Sensor parameterization uses defined pulses.
Interrogate	Sensor output locked if input line switches from inactive to active.
Gate	Detection is disabled. Detection is enabled if input is active.
Remote Dark On	The input status defines detection mode. Mode **Dark On** is applied if input is active.
Remote Lockout	Remote access to mode AUTOSET, selector +/- settings and most mode functionalities are disabled.

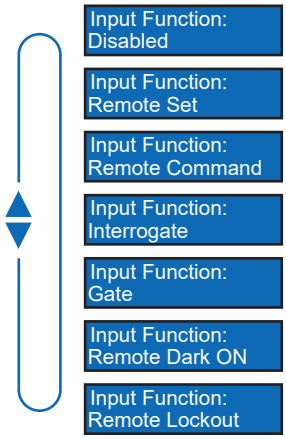
Display access: Input function

Instruction:

a) Press ***Mode*** until ***Input*** appears on the display.

b) Make the required setting by help of the selector +/-.

c) Press ***Mode*** to select the setting.



4.9 Display-Mode

Use this function to shift the display orientation by 180%. You can also select the display to provide a numerical value or percentage.

Remote command control access: Display mode

Option	Sequence
Numeric	4 – 2 – 1
Percentage	4 – 2 – 2
Numeric (Flipped)	4 – 2 – 3
Percentage (Flipped)	4 – 2 – 4

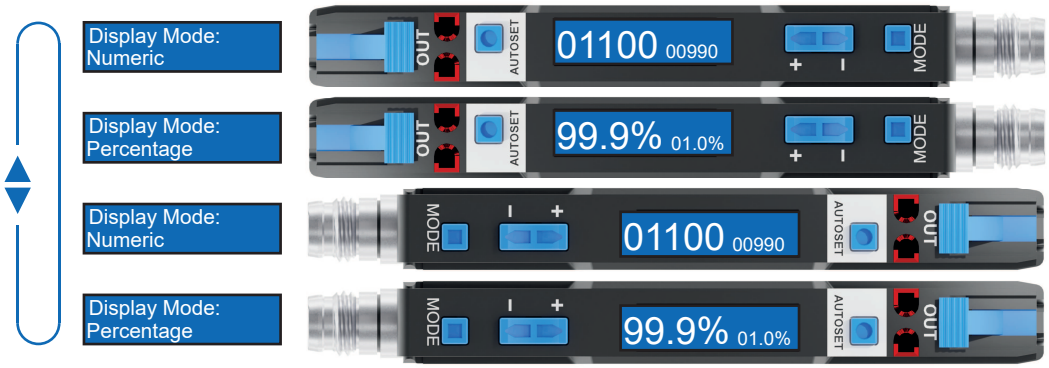
Display access: Display mode

Instruction:

a) Press ***Mode*** until ***Display Mode*** appears on the display.

b) Make the required setting by help of the selector +/-.

c) Press ***Mode*** to select the setting.



4.10 Lock-Mode

Lock mode will block every button.

- *Enabled*
  - In lock mode, all buttons are locked to prevent unintended access for effective access control.
  - However, please note, that the input line remains unblocked.
- *Disabled*
  - Buttons are enabled and will react to standard input prompts.

Remote command control access: Lock mode

Option	Icon	Sequence
Disabled		4 – 1 – 1
Enabled	Lock symbol	4 – 1 – 2

Display access: Lock mode

Instruction:

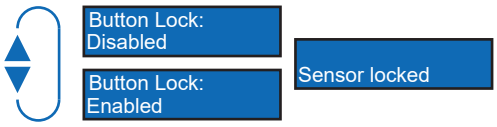
a) Press ***Mode*** until ***Button Lock*** appears on the display.

b) Make the required setting by help of the selector +/-.

c) Press ***Mode*** to select the setting.

Result:

✓ The display shows ***Sensor Locked*** if lock mode is active.



4.11 Factory settings

This function restores default in the entire sensor values and parameterization. Default will be restored in the entire user settings.

Overview on default settings

Function	Factory settings
AUTOSET Button Mode	Light-State
AUTOSET Percent	10%
DETECT Mode	Light On
Response Time	Standard
Hysteresis	Standard
Anti-Crosstalk	Disabled
Timer	Bypass
Timer Duration	10ms
Input Functions	Disabled
Display Mode	Numeric
Lock Mode	Disabled

Display access: Factory settings

Instruction:

a) Press and hold ***Mode*** while connecting the sensor.
   ✓ The display will give visual feedback.
b) Confirm with selector +/-.

Result:

✓ Default settings have been restored.

537385227

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