

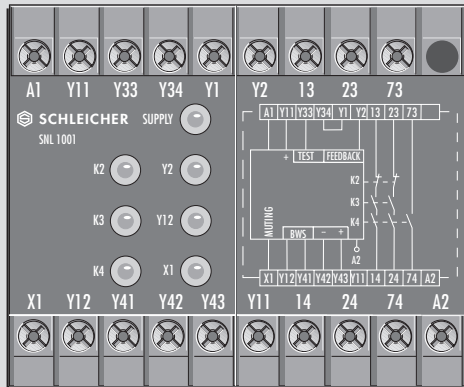


Light Barrier Evaluation Device

Basic Unit Safety Category 3
According to EN 60204 - 1 and EN 954 - 1
For Type 2 Safety Light Barriers
According to prEN 50100-1
With Start-Up and Restart Block
Feedback Loop e.g. for Monitoring External Contactors

SNL 1001	EN 60204-1	For Stop Category	0
	EN 954-1	Safety Category	3

SNL 1001-17



For Example

- ▶ Protection of persons, material, and machinery in a transfer area
- ▶ Access protection: processing machines, paletting facilities, door and gate protection, packing machines
- ▶ Monitoring one-way safety light barriers

Function

The light barrier evaluation unit SNL 1001-17 is used in conjunction with one-way safety light barriers (SL), according to prEN 50100 -1 and -2 , whose prototypes have been tested. The SNL has positively driven contacts. It is constructed redundantly and remains safe even if a component fails. Every fail function of a relay is detected at the latest during the next process. The unit meets safety category 3 and can be used for stop category 0. The SNL is to be used only in conjunction with an SL of safety category 2, whose prototype model has been tested, and with a BWS Type 2 contact-free protective device according to prEN 50100- 1.

After the supply voltage has been applied to the terminals A1/A2 (LED SUPPLY), the startup block becomes operational , the SNL remains in the OFF position. For the required startup/function test with a test time limitation < 150 ms according to prEN 50100-1, the following conditions must be met for the SNL:

- The feedback loop Y1/Y2 (FEED-BACK) must be closed.
- A signal level must be applied to terminal Y42 (LOW-active) or Y43 (HIGH-active) to enable the transmitter Y41.
- There must be a visual connection between the transmitter and the receiver of the SL.

Given these start prerequisites, the relay K3 (LED K3) is excited with the signal input "SL-receiver" at Y12 (LED Y12). When the RESET key is pressed (Y33/Y34), the function test (see below) is started, to test the perfect functioning of the SL. Only after a positive test result of the entire safety-related control system, will the hazardous machine part be turned on.

During the phase of the functioning test, the transmitter of the SL is turned off. If the receiver of the SL now reacts within the test time of < 150 ms, the test result is positive and the SNL has a positive enable preparation. The LED K2 lights up. The control contact 73/74 is closed and the LED K4 lights up. The LED K3 turns off during the test period. If the test result is positive and after the RESET key is released the enabling current paths 13/14, 23/24 are closed, the LED K2 goes out. If the visual connection of the SL is interrupted, the power supply for the relays K3, K4 is interrupted. The enabling current paths 13/14, 23/24 and the control contact 73/74 are opened. The restart block becomes operational.

After the start prerequisites are reestablished (see above), a repeated start/function test is possible by pressing the RESET key.

A cyclic function test can be run in a purely time- or machine cycle-dependent manner. Functionally the outputs of the SNL open for this time interval.

If the receiver of the SL does not react properly during the function test, e.g. because the output transistor or the relay contacts of the SL receiver always switch through, the relay K4 remains dropped out and the enable current paths and the control contact are open.

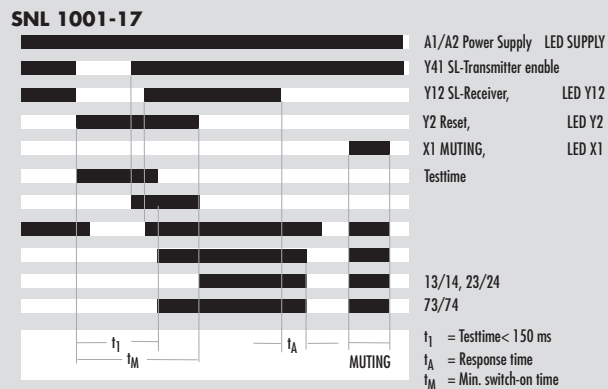
Muting

The device has a muting input X1 (LED X1) which can be activated if the SL must be shunted due to operational necessity. The activation here occurs through the enabling current paths of a separate unit, with the consequence that the relays K3 and K4 do not drop during the muting phase if the light barrier is interrupted.

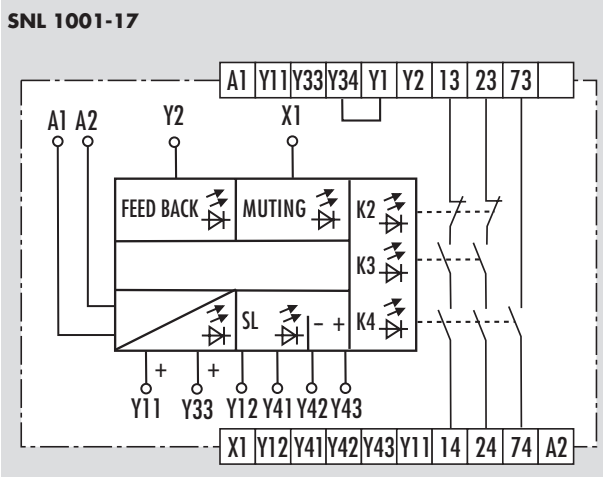
Function Test

After the SNL is turned on, its function is tested manually or automatically. the hazardous machine part will only be turned on after a positive test result of the complete safety-related control system. Depending on the manufacturer and type of the SL, there are different activation conditions for testing the SL. The test can be done through a separate test input or, if such is not

Function Diagram



Connection Diagram





available, through the 24 V DC supply voltage of the SL transmitter. When testing through the supply voltage, the time behaviour of the SL should be noted (test time < 150 ms). For testing, the transmitter is turned off briefly, and the reaction of the receiver is processed by the evaluation unit. It is turned off depending on the SL type by briefly applying or briefly removing a potential at the test/activation input of the SL. If the potential is briefly removed, the definition activation input is used, if it is briefly applied, the definition test input is used. With the SNL, the respective test /activation input of the SL is connected to terminal Y41 (transmitter enable). The necessary signal level for testing must be applied to terminals Y42 ("test" input) or Y43 ("activation" input) of the SNL. This signal level is turned on or off by the SNL for the respective input of the SL for the test time < 150 ms. The signal level of terminal Y42 is applied briefly (the SL has a test input). The signal level of terminal Y43 is turned off briefly (the SL has an activation input). If the SL is to be tested by briefly interrupting the transmitter supply voltage, Y43 must be connected to the supply voltage potential of the SL. The output of the SL receiver is connected to terminal Y12. The SL receiver must generate a high signal at the output when there is a visual connection. With these prerequisites, the SNL, together with its appropriate test functions, can be used universally for all SLs up to safety category 2 (SK 2).

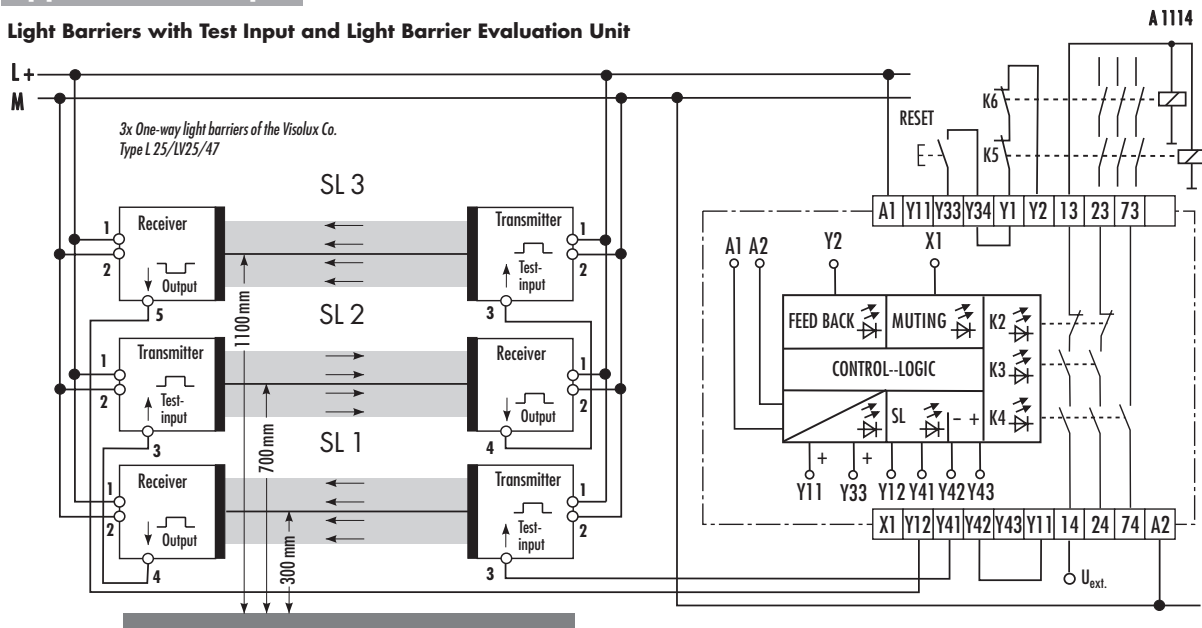
Notes

- ▶ The light barrier evaluation unit may be operated only with Type 2 safety light barriers acc. to prEN 50100-1 and -2 and EN 954-1 of safety category 2, whose prototypes have been tested.
- ▶ The SL can be tested through a separate test input or through the 24 VDC operating voltage of the SL transmitter.
- ▶ To multiply the enabling current paths, expansion units or external contactors with positively driven contacts can be used.
- ▶ The RESET key must be mounted so that it cannot be activated from the protected hazardous area. The entire hazardous area must be visible from the place where the RESET key is located.
- ▶ The Muting-Function impairs the safety-relevant behaviour of the light barrier evaluation unit. With regard to this, please note the information provided by your Professional Association.
- ▶ By applying a positive potential to the muting input X1, the enabling/control current paths are immediately switched through. Please implement appropriate measures to assure safety!
- ▶ Various manufacturers provide applications for the light barrier evaluation unit that will be made available on request



Application Example

Light Barriers with Test Input and Light Barrier Evaluation Unit



Contact-free protective equipment BWS Type 2 (BWS-T) acc. to prEN 50100-1 3x one-way - safety - light barriers with test input and light barrier evaluation unit

Representation of the input and output pulses at the light barriers during the periodic function test.

The number of light barriers for securing a hazardous area is determined by the machine safety standards or technical basic standard (C-standard), in accordance with accident prevention directives: of prEN 999, or through a risk analysis acc. to EN 954-1.

For the evaluation of several one-way safety light barriers with test inputs, a series connection of the light barriers is necessary. This is done by the test input of the transmitter of the SL1 being activated by the light

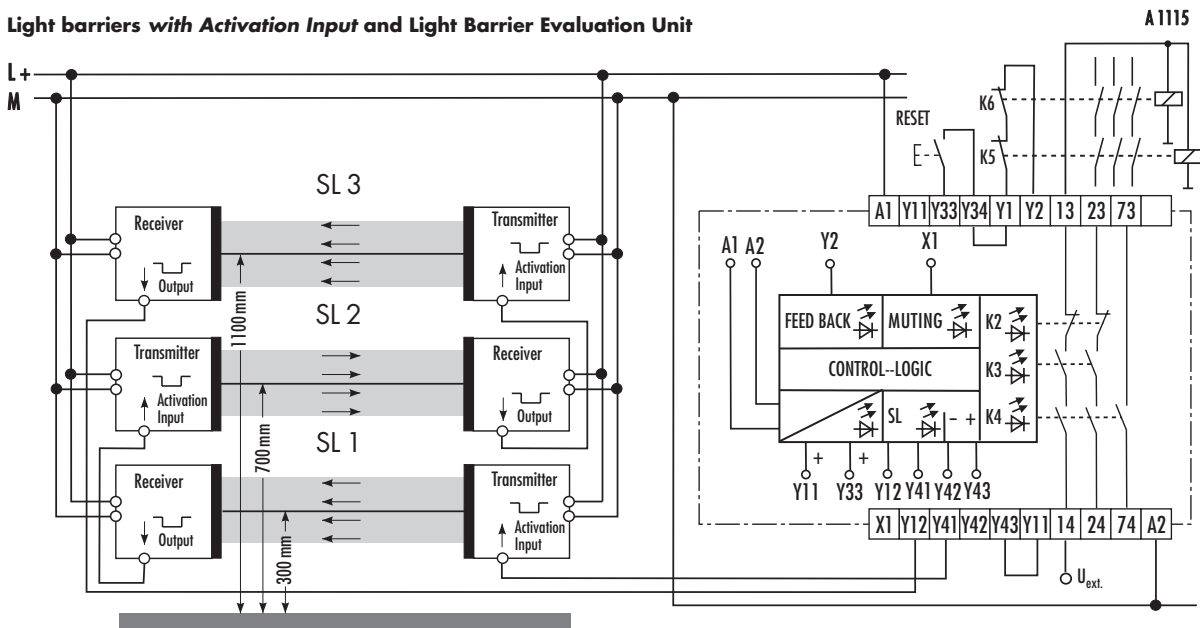
barrier evaluation unit, transmitter enabling output Y41. The output of the receiver of the SL1 controls the test input of the transmitter of the SL2, etc. The output of the last receiver, e.g. SL3 goes back as a signal into the light barrier evaluation unit at the input Y12 (input SL receiver). The "activation" input Y42 is connected to the supply voltage for the control function Y11 (DC 24 V).



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Application Example

Light barriers with Activation Input and Light Barrier Evaluation Unit

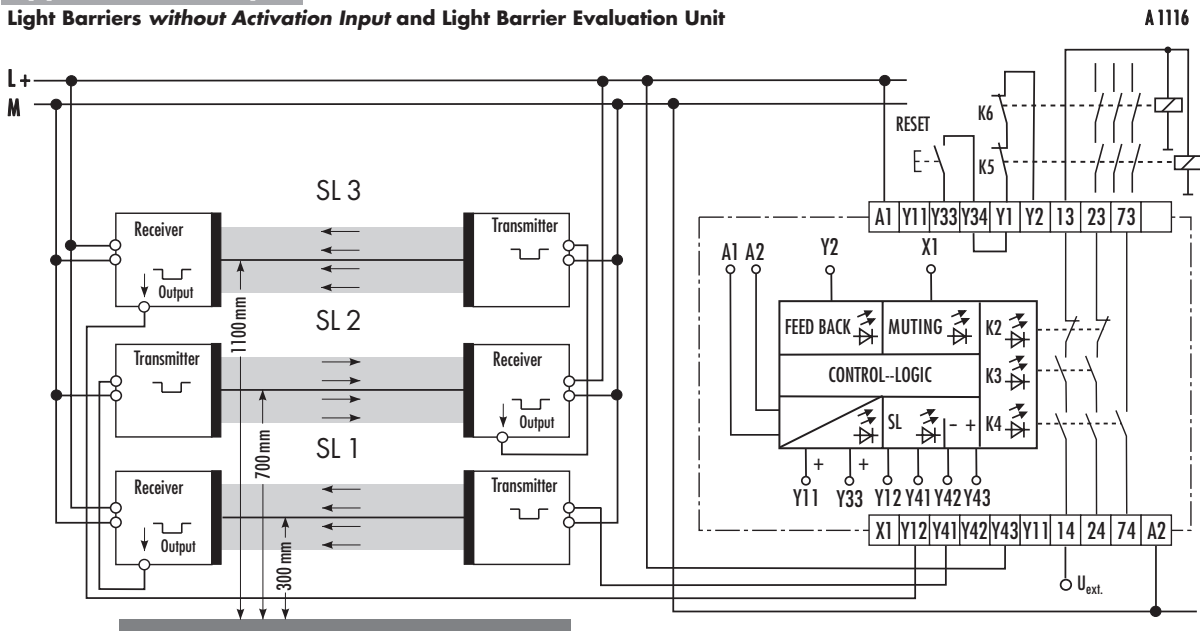


Contact-free protective equipment BWS Type 2 (BWS-T) acc. to prEN 50100-1
3x one-way-safety-light barriers with activation input and light barrier evaluation unit

Representation of the input and output pulses at the light barriers during the periodic function test.

Application Example

Light Barriers without Activation Input and Light Barrier Evaluation Unit



Contact-Free Protective Equipment BWS Type 2 (BWS-T) acc. to prEN 50100-1
3x One-Way-Safety - Light Barriers without Test/ Activation Input and Light Barrier Evaluation Unit

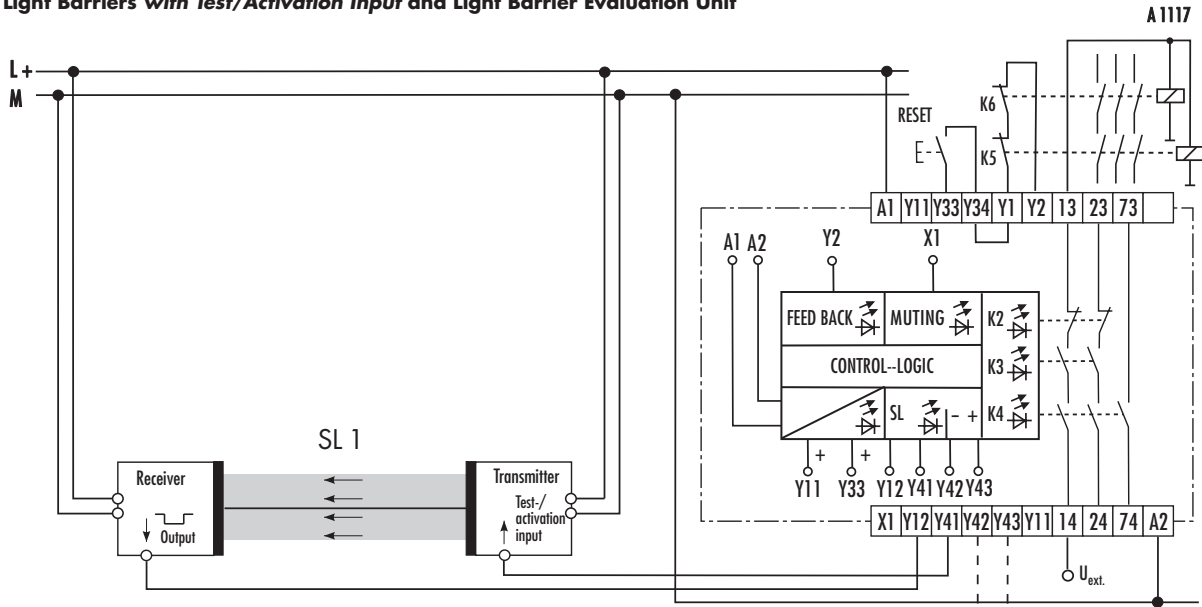
Representation of the input and output pulses at the light barriers during the periodic function test.

Note the reaction time between turning off the supply voltage of the transmitter and the reaction of the receiver !
 As a total of the light barriers, it must be < 150 ms.



Application Example

Light Barriers with Test/Activation Input and Light Barrier Evaluation Unit



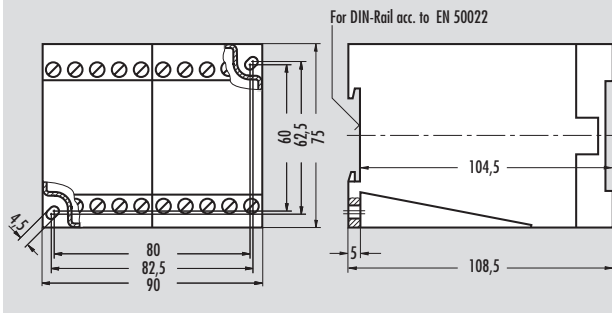
Contact-Free Protective Equipment BWS Type 2 (BWS-T) acc. to prEN 50100-1
1x One-Way - Safety - light Barriers with Test/Activation Input and Light Barrier Evaluation Unit

Transmitter enable Y41			
Activation	Test		
-	-	M/A2	L+/Y11
M/A2	L+/Y11	-	-
			Y42
			Y43

Representation of the input and output pulses at the light barriers during the periodic function test.

Dimension Diagram

S 4-6



Approvals



Order Example

SNL 1001-17 **24 V DC**
 Type Rated Voltage



TECHNICAL DATA

FUNCTION According to EN 50100-1
Function Display
Function Diagram

POWER SUPPLY DATA

Rated Voltage U_N V DC
Rated Consumption at U_N (DC) W
Residual Ripple V_{ss}
Operating Voltage Range

CONTROL CIRCUIT only for supplying the control inputs
Y2, Y12, X1, Y42, Y43

Control Output Y11; Y33 with respect to A2:
Rated Output Voltage V DC
Rated Short-Circuit Current I_K max. mA
Fuse
Response Time s
Recovery Time s

Control Inputs Y2, Y12, X1:

Rated Current Input Y2 mA
Rated Current Input Y12 mA
Rated Current Input X1 mA
Response Time t_A ms
Test Time t_I ms
Minimum Switch-ON Time t_M ms

OUTPUT CIRCUIT

Contact Equipment

Contact Type
Contact Material
Switching Voltage U_n V AC/DC
Maximum Rated Current I_n per Contact A
Maximum Total Current for all Contacts A
Application Category According to EN 60947-5-1:1991

Short-Circuit Protection, Max. Fuse Element Class gG A
Permissible Switching Frequency Switching Cycle/h
Mechanical Lifetime Switching Cycle

GENERAL DATA

Creepage and Clearance Distances Between Circuits According to DIN VDE 0110-1:04.97: Rated Withstand Voltage kV
Over-Voltage Category
Contamination Level
Design Voltage V AC
Test Voltage U_{eff} 50 Hz acc. to DIN VDE 0110-1, Table A.1 kV
Protection Class Housing/Terminals acc. to DIN VDE 0470 Sec. 1:11.92
Radiated Noise
Noise Immunity

Ambient Temperature, Working Range °C
Dimension Diagram
Connection Diagram
Weight kg
Approvals

GENERAL TECHNICAL SPECIFICATIONS

SNL 1001-17

Light Barrier Evaluation Device
7 LEDs: 6 green, 1 yellow
FD 0221-10 W1

24
4,3
2,4
0,9 to 1,1 x U_N

24
2400
PTC-Resistance
2
2

25
100
150
15
< 150
200

2 N.O. Safety Contact
1 N.C. Control Contact
Forced Contact
Ag-Alloy; Gold-Plated
230/230
6
18
AC-15: U_e 230 V AC, I_e 4 A
DC-13: U_e 24 V DC, I_e 6 A
6
3600
30 x 10⁶

4
III
3 Outside, 2 Inside
300
2,21
IP 40/IP 20
EN 50081-1:03.93, -2:03.94
EN 50082-2:1995

- 25 to + 55
S 4-6
KS 0344 -2 W1
0,48
BG

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