## IGSU 14D SD — Splice sensor


4mm

12 - 30 V DC

- Reliable detection of splices on paper web or plastic web
- With integrated paper tear monitoring
- Simple teach process on sheet with or without splice transport
- Switching signal with pulse stretching (can be switched off)
- Warning output for indicating teach errors or paper tear
- Easy adjustment via lockable teach button or teach input

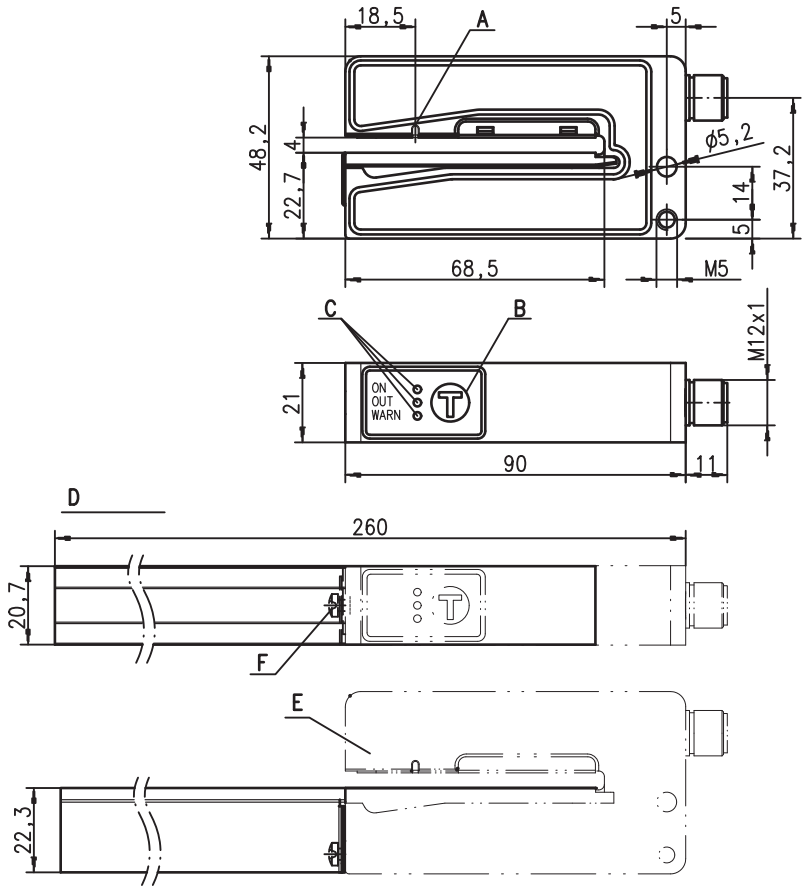
IP 65

## Accessories:

**(available separately)**

- Carriage short (Part No. 50114055)
  As replacement for the series part.
- Extended carriage (Part No. 50114056)
  For better guiding of oversized labels.
  The rail can be shortened at any point.
- M12 connectors (KD …)
- Cable with M12 connector (K-D...)

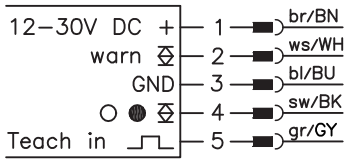
## Dimensioned drawing




**A** Sensor marker
**B** Teach-in button
**C** Indicator diodes (ON, OUT, WARN)
**D** View with extended carriage mounted
**E** Sensor
**F** Fastening screw for carriage

## Electrical connection

IGSU 14D/6.3 SD-S12



## Specifications

**Physical data**

| | | |
|---|---|---|
| Mouth width | | 4mm |
| Mouth depth | | 68mm |
| Web speed [1] | | ≤ 2400m/min (≤ 40m/s) at 10mm splice width |
| Web speed during teach-in | | ≤ 50m/min (≤0.83m/s) |
| Response time | | ≤ 250µs |
| Delay before start-up | | ≤ 300ms acc. to IEC 60947-5-2 |

**Electrical data**

| | | |
|---|---|---|
| Operating voltage $U_B$ [2] | | 12VDC (-5%) … 30VDC (incl. residual ripple) |
| Residual ripple | | ≤ 15% of $U_B$ |
| Open-circuit current | | ≤ 80mA |
| Switching output [3] | …/6 | pin 4: push-pull switching output<br>PNP transistor: ON if splice is detected,<br>NPN transistor: ON if paper is detected |
| Warning output [2] | | pin 2: push-pull switching output<br>active low (normal operation high, event case low) |
| Function switching output IGSU | | splice detected |
| Pulse stretching [4] | | 20ms |
| Signal voltage high/low | | ≥ ($U_B$-2V)/≤ 2V |
| Output current | | ≤ 100mA |
| Capacitive load | | ≤ 0.5µF |

**Indicators**

| | |
|---|---|
| Green LED | ready |
| Yellow and green LEDs flash | teach-in activated |
| Yellow LED | splice detected |
| Red LED | teaching error / function error / paper tear |
| Red LED flashing | short-circuit at switching/warning output |

**Mechanical data**

| | |
|---|---|
| Housing | diecast zinc, painted |
| Color | red/black |
| Weight | 270g |
| Ultrasonic transducer | piezoceramic [5] |
| Connection type | M12 connector, 5-pin |

**Environmental data**

| | |
|---|---|
| Ambient temp. (operation/storage) | 0°C … +60°C/-40°C … +70°C |
| Protective circuit [6] | 1, 2 |
| VDE safety class | III |
| Degree of protection | IP 65 |
| Standards applied | IEC 60947-5-2 |
| Certifications | UL 508, C22.2 No.14-13 [2] [7] |

**Options**

**Teach-in input**

| | |
|---|---|
| Active/Not active | ≥ 8V/≤ 2V |
| Input resistance | 15kΩ |

1) Dependent on material
2) For UL applications: for use in class 2 circuits according to NEC only
3) The push-pull switching outputs must not be connected in parallel
4) Can be switched off
5) The ceramic material of the ultrasonic transducer contains lead zirconium titanate (PZT)
6) 1=polarity reversal protection, 2=short circuit protection for all outputs
7) These proximity switches shall be used with UL Listed Cable assemblies rated 30V, 0.5A min, in the field installation, or equivalent (categories: CYJV/CYJV7 or PVVA/PVVA7)

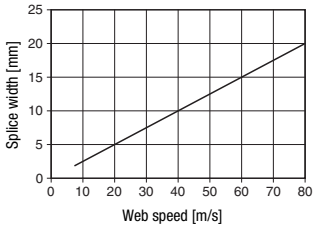
## Order guide

| | Designation | Part no. |
|---|---|---|
| **Ultrasonic sensor for splice inspection**<br>With 2 x push-pull outputs:<br>Pin 4: signal at splice, pin 2: warning output;<br>Teach-in via button on device and teach input;<br>Connection: M12 connector | IGSU 14D/6.3 SD-S12 | 50126787 |

## Tables

## Diagrams

Splice width in dependence of web speed



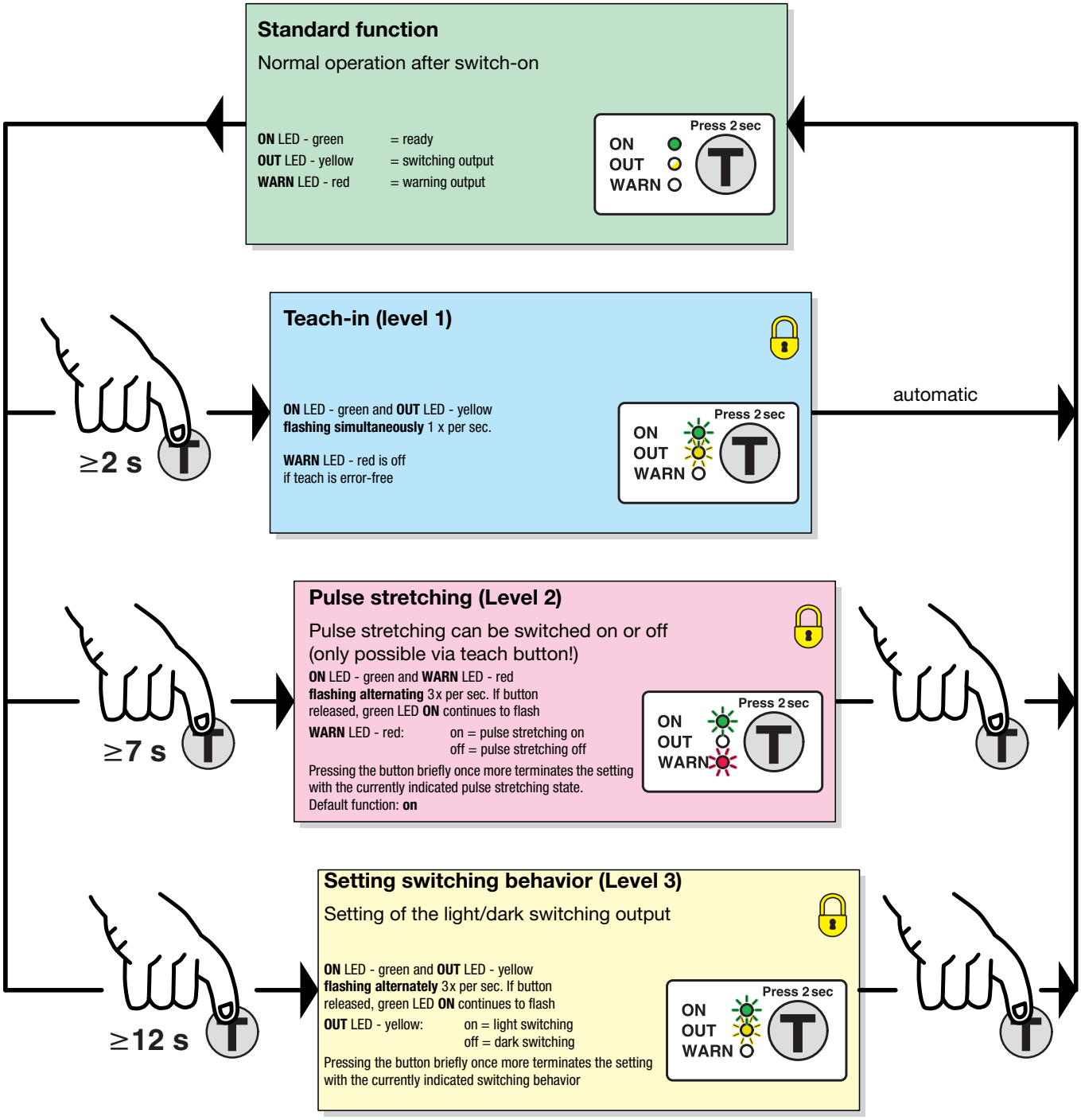

## Remarks

**Operate in accordance with intended use!**

- This product is not a safety sensor and is not intended as personnel protection.
- The product may only be put into operation by competent persons.
- Only use the product in accordance with the intended use.

- To achieve reliable splice detection, the sheet must be slightly under tension on the carriage (B).

## Overview of operating structure for IGSU 14D




= function lockable through constant application of $U_B$ on the teach input

## Sensor adjustment (teach-in) via teach button

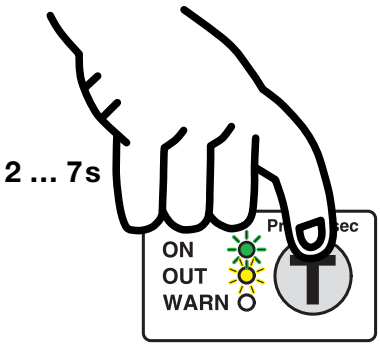
### *easy Teach with or without foil web transport*

Preparation: Insert sheet into the sensor.

- **Press the teach button until green and yellow LEDs flash simultaneously.**
- **Release teach button - the green and yellow LEDs flash simultaneously and faster. The teach time of approx. 6s begins.**
- **If the sheet is not transported, it remains unchanged and slightly under tension in the sensor. Alternatively, the sheet can be transported through the sensor with a max. speed of 50m/min. If no splice is transported through the sensor, the sensor calculates the switching threshold as a function of this state. Advantage: very simple execution.**
- **If a splice is transported through the sensor during teach time, the sensor calculates the switching threshold as a function of both states. Advantage: very reliable detection.**
- **After the teach time is over, the sensor automatically ends the teach event.**

If the teach process is faulty (e.g. unfavorable material combination), the red LED lights and the warning output is activated. Repeat the teach process. If the fault cannot be rectified, the sheet material cannot be detected with the IGSU 14D.

**When changing to another type of sheet, a new adjustment should generally be carried out by carrying out a new teach-in event.**

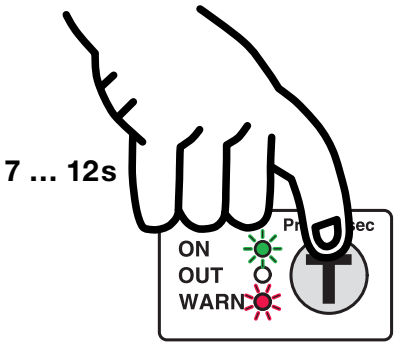



The **green** and the **yellow** LEDs flash **simultaneously** approx. **1**x per sec.

### *Setting the pulse stretching*

- **Press the teach button until green and red LEDs flash alternately.**
- **Release the teach button - the green LED continues to flash, the red LED alternates slowly between ON and OFF.**
- **Red LED ON = pulse stretching on**
  **Red LED OFF = pulse stretching off.**
- **Pressing the button briefly once more terminates the setting with the currently indicated pulse stretching state.**
- **Ready.**

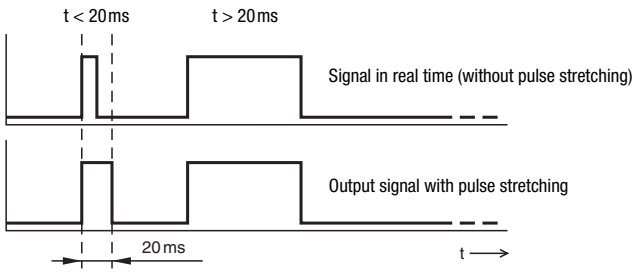
**Attention**: This function can only be executed with the teach button!




The **green** and the **red** LEDs flash **alternately** approx. **3**x per sec.

**Pulse stretching (20ms):**

If the web speed is high and the splice width is thin, the signal on the switching output is very short when moving over a splice. Therefore pulse stretching (set to 20ms) is activated in the factory settings. If this is undesirable, the function can be switched off as described above.



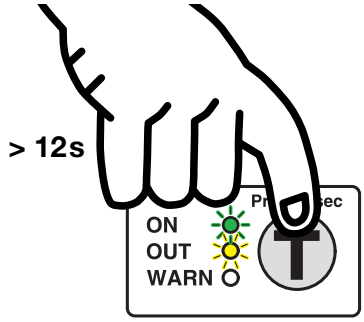
### *Warning output and red LED on sensor*

| Function | Red LED on sensor | Warning output (Pin 2) | Explanation and measures |
|---|---|---|---|
| Paper tear | LED ON | Active: low | Paper tear:<br>–> check sheet. |
| Teach error | LED ON | Active: low | Material outside of working range (too thin or too thick):<br>–> with use of too-thick material, check the use of Leuze VSU 12. |
| Subvoltage | LED ON | No change | –> Check supply voltage. |
| Short-circuit or overload on an output | LED flashes | Tri-state [1)] | –> Check connections,<br>–> remedy short-circuit or overload. |

1) The output on the sensor is high-impedance in tri-state mode. Depending on the input wiring of the downstream control electronics, the signal is **low** in the case of input wiring with pull-down resistor or **high** in the case of wiring with a pull-up resistor.

### *Adjusting the switching behavior of the switching output (light/dark switching)*

- **Press the teach button until green and yellow LEDs flash alternately.**
- **Release the teach button - the green LED continues to flash, the yellow LED alternates slowly between ON and OFF.**
- **Yellow LED ON = output switches on light**
  **Yellow LED OFF = output switches on dark.**
- **Pressing the button briefly once more terminates the setting with the currently indicated switching behavior.**
- **Ready.**




The **green** and the **yellow** LEDs flash alternately approx. **3**x per sec.

## Sensor adjustment (teach-in) via teach input

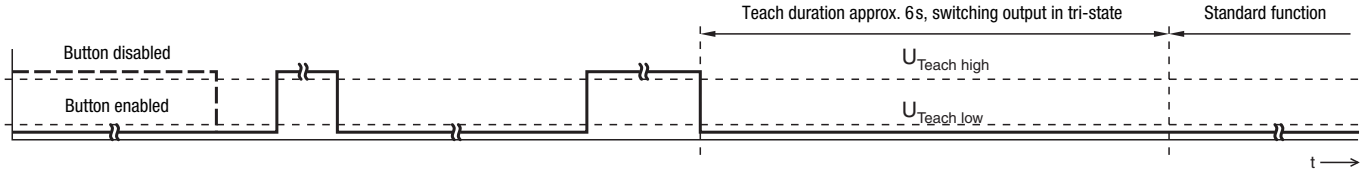
**The following description applies to PNP switching logic!**

| | | | |
|---|---|---|---|
| $U_{Teach}$ | **Not connected** | Internal pull-down resistor pulls the input down to zero | Teach button can be operated;<br>all functions adjustable |
| $U_{Teach\ low}$ | ≤ **2V** | Low level | Teach button can be operated;<br>all functions adjustable |
| $U_{Teach\ high}$ | ≥ **($U_B$-2V)** | High level | Teach button disabled;<br>button has no function |
| $U_{Teach}$ | **> 2V … < ($U_B$-2V)** | Not permitted | Level not defined;<br>current state is retained |

The device setting is stored in a fail-safe way. A reconfiguration following voltage interruption or switch-off is thus not required.

### *easyTeach with or without foil web transport*

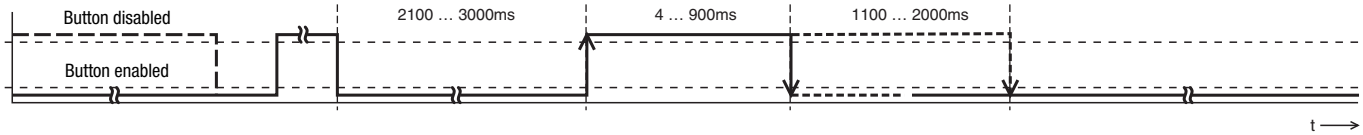
Preparation: Insert sheet into the sensor.




| | | | | | |
|---|---|---|---|---|---|
| After switching on the supply voltage and after the delay before start-up has concluded (≤ 300 ms), the teach button on the device can be operated. | 2 x 4 … 100 ms<br>Only if the teach button was disabled before the teach.<br>The teach button is disabled after the 1st edge transition. | ***easyTeach***:<br>$t_{Teach}$ = 4 … 900 ms | 4 … 100 ms | Teach event starts: the green and yellow LEDs flash simultaneously for approx. 1x a second. If the sheet is not transported, it remains unchanged and slightly under tension in the sensor.<br>Alternatively, the sheet can be transported through the sensor with a max. speed of 50 m/min. If no splice is transported through the sensor, the sensor calculates the switching threshold as a function of this state.<br>Advantage: very simple execution.<br>If a splice is transported through the sensor during teach time, the sensor calculates the switching threshold as a function of both states.<br>Advantage: very reliable detection.<br>During the event, the button on the device is disabled, it can be operated again after this. | |

When a teach error occurs (e.g. sheet cannot be reliably detected due to insufficient signals), the red LED flashes. Independent of the state, the green LED switches on when the teach event has ended, and the yellow LED displays the current switching state.

### *Adjusting the switching behavior of the switching output – light/dark switching*




| | | | | |
|---|---|---|---|---|
| After switching on the supply voltage and after the delay before start-up has concluded (≤ 300 ms), the teach button on the device can be operated. | 2 x 4 … 100 ms<br>The teach button is disabled after the 1st edge transition.<br>The teach button is disabled after the 1st edge transition. | **Teach switching output:**<br>$t_{Teach}$ = 2100 … 3000 ms | Switching output light switching (4 … 900 ms)<br>Switching output dark switching (1100 … 2000 ms) | The teach button is enabled again. |

## Locking the teach button via the teach input

### IGSU 14D:

A **static high signal** (≥ 4 ms) on the teach input locks the teach button on the device if required so that no manual operation is possible (e.g. protection against erroneous operation or manipulation).

If the teach input is not connected or if there is a static low signal, the button is enabled and can be operated freely.