Leuze

Ultrasonic label fork

GSX 14E

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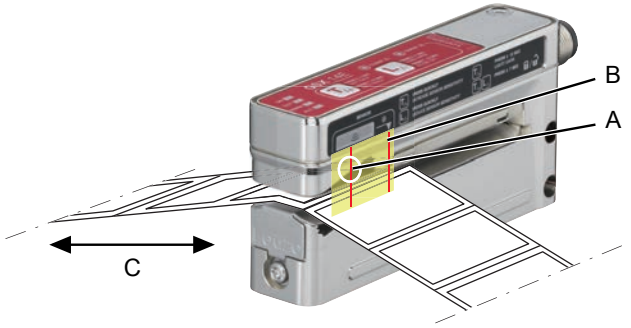
1


B
A
C

2


ON
OUT
WARN
ALC
GSX 14E
CLEAR
PAPER
T/+
PRESS 2..7 SEC
EASY TEACH
PRESS 7..12 SEC
STATIC TEACH
L/-
PRESS 2..7 SEC
CLEAR/ PAPER
PRESS 7..12 SEC
ALC ON/ OFF
Leuze electronic
Leuze

3


ON
OUT
WARN
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Leuze electronic
Leuze
2-7 s

4


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ALC ON/ OFF
Leuze electronic
Leuze
2-7 s

5


ON
OUT
WARN
ALC
GSX 14E
CLEAR
PAPER
T/+
PRESS 2..7 SEC
EASY TEACH
PRESS 7..12 SEC
STATIC TEACH
L/-
PRESS 2..7 SEC
CLEAR/ PAPER
PRESS 7..12 SEC
ALC ON/ OFF
Leuze electronic
Leuze
7-12 s

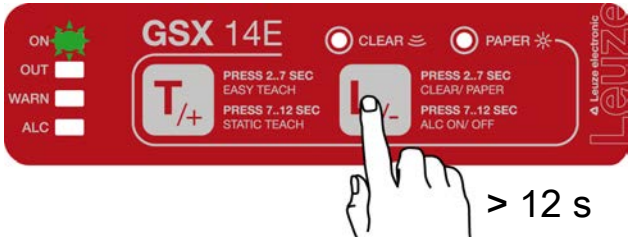
6


ON
OUT
WARN
ALC
GSX 14E
CLEAR
PAPER
T/+
PRESS 2..7 SEC
EASY TEACH
PRESS 7..12 SEC
STATIC TEACH
L/-
PRESS 2..7 SEC
CLEAR/ PAPER
PRESS 7..12 SEC
ALC ON/ OFF
Leuze electronic
Leuze
> 12 s

7


ON
OUT
WARN
ALC
GSX 14E
CLEAR
PAPER
T/+
PRESS 2..7 SEC
EASY TEACH
PRESS 7..12 SEC
STATIC TEACH
L/-
PRESS 2..7 SEC
CLEAR/ PAPER
PRESS 7..12 SEC
ALC ON/ OFF
Leuze electronic
Leuze
7-12 s

8


ON
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PRESS 7..12 SEC
STATIC TEACH
L/-
PRESS 2..7 SEC
CLEAR/ PAPER
PRESS 7..12 SEC
ALC ON/ OFF
Leuze electronic
Leuze
> 12 s

9


ON
OUT
WARN
ALC
GSX 14E
PRESS 2..7 SEC
EASY TEACH
PRESS 7..12 SEC
STATIC TEACH
+
< 2 s
ON
OUT
WARN
ALC
GSX 14E
CLEAR
PAPER
PRESS 2..7 SEC
EASY TEACH
PRESS 7..12 SEC
STATIC TEACH
PRESS 2..7 SEC
CLEAR/ PAPER
PRESS 7..12 SEC
ALC ON/ OFF
Leuze electronic
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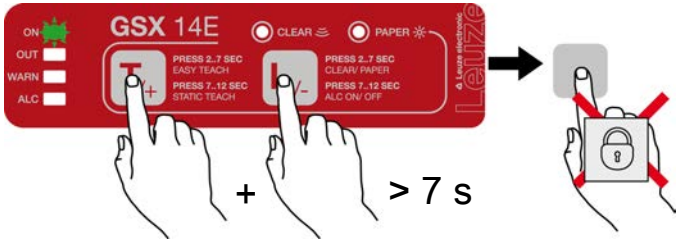
–
< 2 s

10


ON
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PRESS 7..12 SEC
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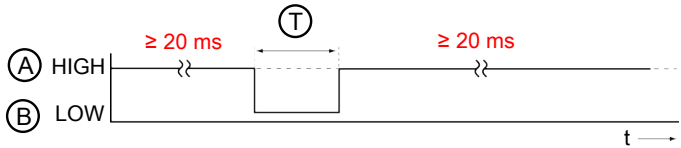
PRESS 2..7 SEC
CLEAR/ PAPER
PRESS 7..12 SEC
ALC ON/ OFF
Leuze electronic
Leuze
+
> 7 s

11

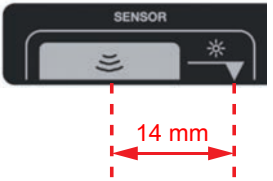

T
≥ 20 ms
≥ 20 ms
A HIGH
B LOW
t

12


ON
OUT
WARN
ALC
GSX 14E
CLEAR
PAPER
T/+
PRESS 2..7 SEC
EASY TEACH
PRESS 7..12 SEC
STATIC TEACH
L/-
PRESS 2..7 SEC
CLEAR/ PAPER
PRESS 7..12 SEC
ALC ON/ OFF
Leuze

13


SENSOR
14 mm


SENSOR
14 mm

Intended use

The ultrasonic label forks are ultrasonic sensors for contactless detection of the gap between two consecutive labels on a carrier tape.

	NOTICE
	**Observe intended use!** This product is not a safety sensor and is not intended as personnel protection. ↳ Only allow competent persons to put the product into operation. ↳ Only use the product in accordance with its intended use.

Function and device operation

The label material used determines the achievable precision and the reliability of gap detection between labels.

- Light switching: signal in the label gap.
- Dark switching: signal on the label.

Overview of the operating structure via teach and label buttons

Function	Configuration via buttons
Standard function	Normal operation after switch-on
easy Teach (2-point calibration on carrier and label)	Press the teach (+) button: 2 … 7 s
Static teach (1-point calibration on carrier)	Press the teach (+) button: 7 … 12 s
Set switching behavior (light/dark switching)	Press the teach (+) button: >12 s
easyTune function – Manual fine tuning of the switching threshold Increase sensitivity Reduce sensitivity	 Press the teach (+) button: <2 s Press the label (-) button: <2 s
Select active detection process	Press the label (-) button: 2 … 7 s
Deactivate/activate the *ALC* (Auto Level Control) function (automatic optimization of the switching threshold)	Press the label (-) button: 7 … 12 s
Set the *easy Teach* mode	Press the label (-) button: >12 s
Manual locking/unlocking of the buttons on the device	Simultaneously press the teach button (+) and the label button (-): > 7 s

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A	*Ultrasonic* detection process position
B	*Optical* detection process position
C	Label run

- To achieve a high switching accuracy, place the label tape on the lower fork with slight tension.
- Orient the label tape so that it is guided both under the "*Ultrasonic* detection process position" marking as well as under the "*Optical* detection process position" marking.

GSX 14E standard functions

During operation the sensor is always in this function.
The sensor detects label gaps with high precision and speed.
This is indicated by the yellow OUT LED and the switching output.

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ON LED green	Constantly ON when operating voltage is applied.
OUT LED yellow	Indicates the switching signal. LED is ON if the sensor detects label gaps. The display is independent of the output setting.
WARN LED continuous red light	OFF: error-free operation. ON: teaching error caused by unfavorable label material. ON: *ALC* (Auto Level Control) function is faulty.
ALC LED Yellow	*ALC* (Auto Level Control) function is active.
CLEAR LED Yellow	*Ultrasonic* detection process is active.
PAPER LED Yellow	*Optical* detection process is active.

Select active detection process

The GSX14E forked sensor can detect label gaps with the *ultrasonic* detection process or with the *optical* detection process.

- In many cases, labels can, in principle, be reliably detected with both detection processes.
- The advantage of the optical detection process over the ultrasonic detection process is that it has better repeatability, even at high conveyor speeds – realized through short response time and high switching frequency.
- The advantage of the ultrasonic detection process over the optical detection process is that transparent labels can also be reliably detected.

The operator can change the active detection process of the sensor:

- After successfully ending a teach event
- Before starting a teach event

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- Press the label button until the green ON LED and the yellow OUT LED flash synchronously.
- Release the label button.

The sensor indicates the currently active detection process via the yellow CLEAR LED or the yellow PAPER LED:

- CLEAR LED: *ultrasonic* detection process is active
- PAPER LED: *optical* detection process is active

easy Teach while the label tape is passing through (dynamic)

During the *easy Teach* process, a two-point calibration is performed on the carrier and the label.

NOTICE
With respect to detection reliability, the *easy Teach* process is generally to be preferred over the static teach process.

Preparation: Insert label tape into the sensor.

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- Press the teach button until the green ON LED and the yellow OUT LED flash synchronously.
- Release the teach button.
- Allow the label tape to advance through the sensor at a maximum speed of 50 m/min.
  - ⇨ The sensor indicates the belt transport by a more rapid synchronous flashing of the green ON LED and yellow OUT LED.
  - ⇨ The sensor indicates the currently active detection process via the yellow CLEAR LED or the yellow PAPER LED:
    CLEAR LED: *ultrasonic* detection process is active
    PAPER LED: *optical* detection process is active

– If sufficient teach values are determined, the sensor automatically terminates the teach event and goes into standard mode.
  The transport of the label tape can be stopped immediately.
– The number of labels to be transported is always based on the material combination. From experience, approximately 2-10 labels should be advanced through the sensor.
– If the teach event is faulty (e.g., unfavorable material combination, uneven transport, jittering during transport), the red WARN LED illuminates and the warning output (if present for the sensor model) is activated.
  If the fault cannot be rectified, e.g., via the *easyTune* function, the label material cannot be detected with the device.

Intelligent mode (preset on delivery)

After ending the teach event, the sensor automatically selects the appropriate detection process for the present label-carrier combination (*ultrasonic* or *optical*).

NOTICE
The teach event is performed in parallel with both detection processes, *ultrasonic* and *optical*. The teach values of both detection processes for the corresponding label-carrier combination are stored in the sensor.

Manual mode

With manual *easy Teach*, the operator selects the detection process (*ultrasonic* or *optical*) in advance ("Configuration of the easy Teach mode").

	NOTICE
	↳ To switch the *easy Teach* mode from *intelligent* to *manual*, press the label button for longer than 12 seconds. **8**

With manual *easy Teach*, the operator can deliberately teach a label with a specific detection process. As a result, specific label types can be taught for each detection process.

- Unlike intelligent *easy Teach*, with manual *easy Teach* you can switch the detection process after ending the teach event and then teach another label type with the second detection process without overwriting the teach values of the first detection process.
- For example, you can teach a transparent label 1 with the *ultrasonic* detection process and simultaneously teach a paper label 2 with the *optical* detection process.
- If the roll is changed from label 1 to label 2, simply change the detection process ("Select active detection process") – a new teach does not need to be performed.

Static teach on the label carrier without transport

With the static teach process, a one-point calibration is performed on the blank carrier. This process is especially advantageous because no labels are lost while teaching.

NOTICE
After the teach event is ended, the sensor does not automatically select the appropriate detection process (*ultrasonic* or *optical*) but rather operates with the detection process that was active before the teach event was started.

Preparation: depending on the label size, pull off one or more labels from the carrier and insert the blank area into the sensor.

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- Press the teach button until the green ON LED and the yellow OUT LED flash alternately.
- Release the teach button.
  - ⇨ The sensor indicates the currently active detection process via the yellow CLEAR LED or the yellow PAPER LED:
    CLEAR LED: *ultrasonic* detection process is active
    PAPER LED: *optical* detection process is active

NOTICE
To manually change the detection process (*ultrasonic* or *optical*), press the LABEL button ("Select active detection process").

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

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- Press the teach button until only the green ON LED flashes.
- Release the teach button.
  The green ON LED flashes for another 2 seconds and the yellow OUT LED indicates the changed switching behavior for 2 seconds:
  – Yellow OUT LED ON: switching output, light switching (signal in the label gap)
  – Yellow OUT LED OFF: switching output, dark switching (signal on the label)

ALC (Auto Level Control) function

With the *ALC* function, the sensor automatically corrects the switching threshold in such a way that the maximum function reserve is always available during operation.

	NOTICE
	The *ALC* function is active by default and is indicated by illumination of the yellow ALC LED.

In each teach event, the current signal values in the sensor are digitally determined. This results in the optimum switching threshold being calculated for maximum function reserve.
All values are saved and are non-volatile, retaining their validity as long as the dynamic parameters of the system remain unchanged and the material is not changed.
Signal changes can result each time the roll is changed, even with labels that are apparently the same.

- This is caused, for example, by material variations which affect the acoustic impedance of the ultrasonic system (material thickness, homogeneity, etc.) or the optical system (transmission factor, homogeneity).
- In addition, changes to the dynamic system parameters (tape tension, middle position of the labels, jitter, etc.) could have a negative effect on the function reserve of the sensor.

With the *ALC* function, the sensor automatically corrects the switching threshold in such a way that the maximum function reserve is always available during operation - the sensor works absolutely reliably and free of errors.
The teach event only needs to be repeated if the sensor does not switch following a change of material.

	NOTICE
	When changing to another type of label, a new adjustment must generally be carried out by teaching it.

Activate or deactivate *ALC* function

The *ALC* function can be manually deactivated and activated.
Manual deactivation/activation of the *ALC* function is always only performed for the respective active detection process.
The *ALC* function remains deactivated for the active detection process until it is manually reactivated by the operator.

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- Press the label button until the green ON LED and the yellow OUT LED flash alternately.
- Release the label button.

	NOTICE
	The manual deactivation/activation of the *ALC* function is stored in non-volatile memory in the sensor.

Configuration of the easy Teach mode

You can change the *easy Teach* mode of the sensor from *intelligent* to *manual* ("easy Teach while the label tape is passing through (dynamic)").

- *Intelligent*: The sensor automatically selects the most suitable detection process.
- *Manual*: Manual preselection of the detection process by the operator.

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- Press the label button until only the green ON LED flashes.
- Release the label button.
  The green ON LED continues to flash for 2 seconds and the yellow CLEAR and PAPER LEDs indicate the changed *easy Teach* mode for 2 seconds:
  CLEAR LED and PAPER LED ON: *intelligent easy Teach* mode active
  CLEAR LED and PAPER LED OFF: *manual easy Teach* mode active

easyTune – Manual fine tuning of the switching threshold

With homogeneous label material, the signal in the gap between two labels is much larger compared to the signal on the label.
For the taught switching threshold, there is a high function reserve in both the gap as well as on the label, and the sensor functions reliably.

To achieve a better function reserve, it can be advantageous to change the taught switching threshold, especially for inhomogeneous label material.

The sensitivity of the sensor and, thus, the switching threshold can be adjusted with the *easyTune* function, which is in principle comparable to a potentiometer.

	NOTICE
	Use of the *easyTune* function temporarily deactivates the *ALC* function! The *ALC* function is reactivated after teaching again.

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The sensitivity of the sensor can be adjusted by pressing the teach button (+) or the label button (-).

Increase sensitivity:

- Briefly press the teach button (+).
  - ⇨ A single flash of the green ON LED confirms button actuation.

Reduce sensitivity:

- Briefly press the label button (-).
  - ⇨ A single flash of the yellow OUT LED confirms button actuation.

Recommended settings

Observation	Measure	Action
After teaching, the yellow LED and the switching output flicker if the label is moved through the sensor: The function reserve on the label is too low.	Reduce sensitivity of the sensor (upward shift of the switching threshold)	Repeatedly press the **label button (-)** briefly until the sensor detects the moving label stably and without interruption.
In rare cases, a highly inhomogeneous carrier tape can affect the functional reliability. The yellow LED and the switching output flicker if the blank carrier tape is moved through the sensor without labels: The function reserve on the carrier is too low.	Increase sensitivity of the sensor (downward shift of the switching threshold)	Repeatedly press the **teach button (+)** briefly until the sensor detects the moving carrier tape without labels stably and without flickering.

Manual locking/unlocking of the buttons on the device

To protect against erroneous operation, the locking of the buttons is intended to prevent a button on the device from accidentally being pressed. Accidental button actuation could unintentionally trigger the *easyTune* function or the teaching of the device and thereby deactivate the *ALC* function.

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- Press the teach button (+) and the label button (-) simultaneously until the green ON LED flashes at approx. six times per second.
- Release the teach button (+) and the label button (-).
- ⇨ The buttons are now locked and can no longer be operated.
- ⇨ The buttons are unlocked using the same button combination.

NOTICE	
	Manual locking of the buttons on the device is stored in volatile memory.

Sensor adjustment via teach input (pin 5)

Teach-in

To teach, a teach signal is applied to the teach input (pin 5). The duration of the teach signal (low level on the teach input) determines the teach-in function.

NOTICE

Before a low level is applied for teaching-in functions, a high level must be applied for at least 20 ms.

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A	Buttons locked
B	Buttons can be operated
T	Duration of the teach signal

Duration T [ms]	Function
20 … 80	*easy Teach* while the label tape is passing through
120 … 180	Static teach
220 … 280	Configure the switching behavior of the switching output: light switching
320 … 380	Configure the switching behavior of the switching output: dark switching
420 … 480	easyTune (-): reduce sensitivity
520 … 580	easyTune (+): increase sensitivity
620 … 680	Activate the *ALC* function
720 … 780	Deactivate the *ALC* function
820 … 880	Changeover of the detection process: *ultrasonic* active
920 … 980	Changeover of the detection process: *optical* active
1020 … 1080	*Manual* easy Teach mode active
1120 … 1180	*Intelligent* easy Teach mode active

Locking the buttons via the teach input

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Manual locking of the buttons on the device is only suitable for protecting against tampering to a limited extent since locking can be canceled using the corresponding button combination. For this reason, it is also possible to lock the buttons via the teach input (pin 5).

- A **static high signal** (≥ 20 ms) on the teach input locks the buttons on the device so that no manual operation is possible. The buttons can then no longer be unlocked using the described button combination.
- If the teach input is not connected or if there is a static low signal, the buttons are unlocked and can be operated freely.

NOTICE	
	The buttons can also be locked/unlocked via IO-Link.

Handling narrow labels

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The distance between the markings of the *ultrasonic* and *optical* detection processes is 14 mm.

For reliable and successful teaching, labels that are not wider than 14-18 mm should only be guided under one of the two available markings, *ultrasonic* or *optical*. This eliminates the risk that the labels are only partially detected with both detection processes while teaching, thereby causing errors.

The decision as to which detection process should be used to detect a narrow label must be made by the operator himself in this case and the label positioned under the marking for the desired detection process on the sensor.

easy Teach with the *ultrasonic* detection process

If the label to be detected is guided only under the marking for the *ultrasonic* detection process while marking for the *optical* detection process remains free, the teach event during *easy Teach* is ended automatically.

easy Teach with the *optical* detection process

If the label to be detected is guided only under the marking for the *optical* detection process while the marking for the *ultrasonic* detection process remains free, the teach event during *easy Teach* is ended manually by again briefly pressing the teach button.

As soon as the sensor has determined sufficient teach values, the yellow PAPER LED illuminates to indicate to the user that the teach button can be pressed to end the event.

	NOTICE
	In this case, the sensor does not indicate the transport of the label tape through alternating rapid flashing of the green ON LED and the yellow OUT LED.