

**VSU 15**

**Multi-lane label inspector**

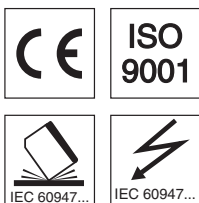
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**22 ... 24mm**

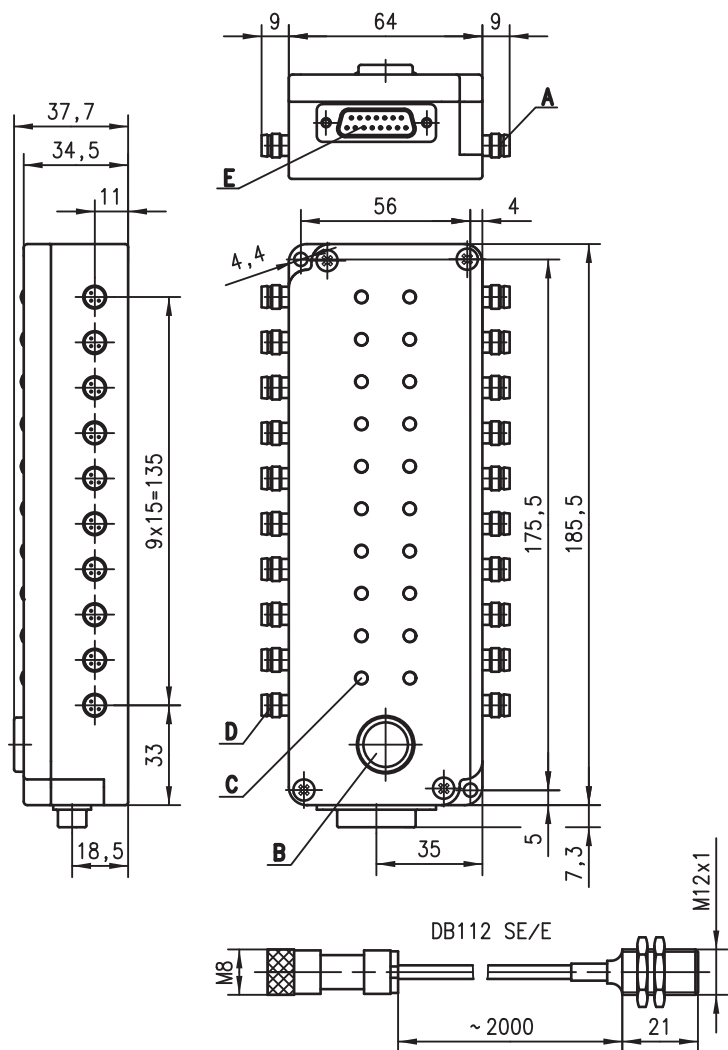


- Reliable detection of labels on the stock material
- Simultaneous detection of up to 10 label lanes
- Ultrasonic sensor in the M12 round-sleeve housing
- Plug connection
- Short-circuit proof PNP transistor outputs
- Operating-state indication by means of LEDs
- Sensors have a very short construction (can thus also be used in applications with limited available space)



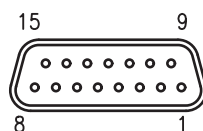
We reserve the right to make changes • DS\_VSU15\_en.fm

**Dimensioned drawing**



- A** Transmitter DB 112SE
- B** Teach-in
- C** Indicator diodes (20x)
- D** Receiver DB 112E
- E** 15-pin SUB-D socket

**Electrical connection**



Q1	1	Q3	9
Q5	2	Q7	10
Q9	3	Teach	11
Q2	4	Q4	12
Q6	5	Q8	13
Q10	6	NC	14
VDC	7	Level	15
GND	8		

## Specifications

### Sensor data

Operating range  
Converter frequency  
Sound cone

### DB 112SE/E

23mm  
300kHz  $\pm$  2%  
approx. 12°

### VSU 15/4

### Physical data

Label length  
Label spacing  
Band speed  
Delay before start-up

$\geq$  2mm  
 $\geq$  2mm  
 $\leq$  2m/s (120m/min)  
 $\leq$  100ms

### Electrical data

Operating voltage  $U_B$   
  
Residual ripple  
Bias current  
Switching output  
Function  
Signal voltage high/low  
Output current

10 ... 28VDC  
(incl. residual ripple)  
 $\leq$  15% of  $U_B$   
 $\leq$  350mA  
10 PNP transistor outputs  
gap detected (light switching)  
 $\geq (U_B - 2V) \leq 2V$   
max. 200mA per output

### Indicators

LED green continuous light  
LED green flashing  
LED yellow

operation  
Teach  
gap detected

### Mechanical data

Housing  
Weight  
Connection type

nickel-faced brass  
30g  
M8 connector, 3-pin, with 2m cable

aluminium, black powder-coated  
1000g  
15-pin SUB-D plug

### Environmental data

Ambient temp. (operation/storage)  
Protective circuit<sup>1)</sup>  
VDE safety class  
Protection class  
Electromagnetic compatibility

0°C ... +60°C/-40°C ... +70°C  
1,2,3  
III  
IP 54  
severity level 3 acc. to  
(IEC 801-4 and IEC 17 B  
(CO) 180-I and II)

### Options

#### Teach-in input PIN 11

Active/not active  
Activation/disable delay  
Input resistance

$\geq$  8V/ $\leq$  2V  
 $\leq$  0.2ms  
10k $\Omega$

#### Level output PIN 15

Base calibration  
Channel calibrated

0 ... 3.5V  
2V

1) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection

## Tables

## Diagrams

## Order guide

	Designation	Part No.
Sensors and amplifier module	SET DB 112 SE+E+VSU 15M	500 40436
Base device	VSU 15/4	500 39681

## Note

**VSU 15**

**Technical description**

**General Information**

The ultrasonic system for multi-lane label inspection consists of a VSU 15/4 base device and up to 10 channels as defined by the user. Each analysis channel consists of a VSU 15M amplifier module and the two ultrasonic sensors DB 112SE and DB 112E. The amplifier module and the sensors are packaged and delivered together and must always remain associated with one another. With this system, it is possible to reliably check a continuous sheet of labels, consisting of up to 10 lanes of labels, for label presence and completeness. A multiplex function reliably prevents mutual interference of the sensors.

**Mounting**

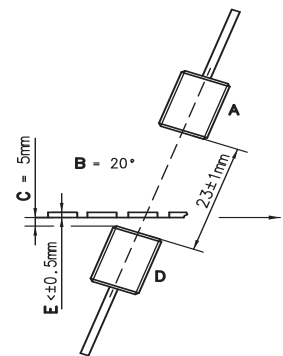
Transmitter (DB 112SE) and receiver (DB 112E) should be mounted at an angle of 20° (± 2°) relative to vertical.

The distance between transmitter and receiver should be 23mm (± 1mm).

Exact alignment (± 2°/≤ 0.5mm axial offset) is important. Misalignment with the axis results in a reduction of the working range.

The flutter range must be less than ± 0.5mm. A contact area near the sensors helps to minimise the flutter range. In addition, the labels should always be guided through the measurement zone under a certain amount of sheet tension.

After installation and base calibration, the sensors should be secured against rotation.



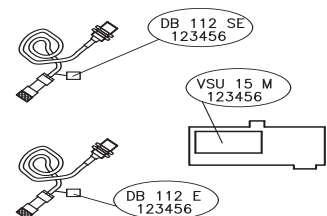
- A** Receiver
- B** Pitch
- C** Label sheet
- D** Transmitter
- E** Flutter range

**Note!**

- When aligning the sender and receiver, the best possible alignment must be ensured.
- For proper function, the sensors must be positioned at angle B 20° (±2°) relative to vertical.

**Installation**

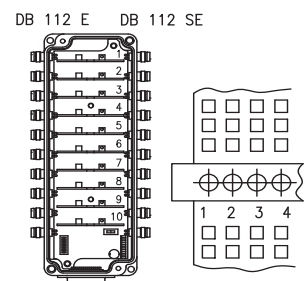
The VSU 15/4 base device is delivered without cabling. The individual channels can be installed in the device by the user. Each channel consists of a VSU 15M amplifier module and the two sensors DB 112SE and DB 112E. This combination has been calibrated and adjusted together at Leuze electronic. This combination must, therefore, always be used together. Each combination has its own serial number, which is included as part of the device designation, e.g. 123456.



**Attention!**

The combination of ultrasonic sensors DB 112SE and DB 112E must only be used together with the VSU 15M amplifier module having the same serial number.

The channels must be plugged into the sensor bracket in the order of sensor installation. It must be ensured that the sockets are filled starting with channel 1 and without gaps.

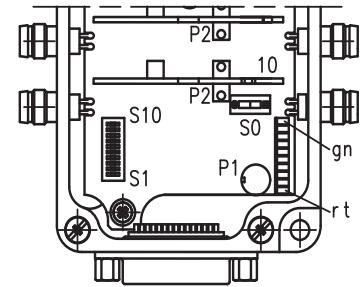


### Base calibration

Prior to commissioning the system, a base calibration must be performed for each channel using a potentiometer. The base calibration and adjustment of the channels is very important for proper function of the system.

In order to enter the mode, switch S0 must be switched to position 1 (base calibration). In addition, a carrier foil (transparent polypropylene foil) without labels must be placed between the sensors. The appropriate channel can be selected with the aid of the 10-DIP-switch S1-S10. If, for example, switch S1 is moved to the left, the ON position, the reception level (Level) of channel 1 is displayed on the bar graph. By using potentiometer P2 on the individual channel cards, a range of 8 LEDs should now be set on the bar graph (2 red, 6 yellow segments). The corresponding voltage of 2VDC can be measured on PIN 15 (Level).

Now perform the exact same procedure with all other channels.



### Note!

It must be ensured that all channels have the same level setting.

The channels must be selected alternately via the DIP switch. Multiple channels must not be selected simultaneously.

The voltage measurement device for measuring the calibration voltage at PIN 15 should have an intrinsic impedance of  $\geq 10k\Omega$ . (In normal operation, switch S0 must be returned to position 0 (normal operation).)

### Teach-in

The teach-in function can be performed in two different ways:

#### Manual teach-in

- Position the label sheet at the correct location and below all sensors
- Press the button on the device for teaching until all green LEDs flash
- Advance the label sheet so that approx. 2 to 3 label gaps pass through the measurement zone. This can be performed at either setup speed or at operating speed
- The button is then pressed again until all green LEDs illuminate without interruption. The teach-in procedure is concluded

#### Remote teach-in

- Position the label sheet at the correct location and below all sensors
- Apply voltage at "Teach in" control input (PIN 11). Teach-in is activated.
- Advance the label sheet so that approx. 2 to 3 label gaps pass through the measurement zone. This can be performed at either setup speed or at operating speed
- Disconnect voltage at the input.

The measurement values are stored and teach-in ends after 100ms.

### Operation

As soon as the sensors have been aligned and the teach-in procedure successfully concluded, the system is ready for operation. Each detected label gap is output per channel via the 15-pin SUB-D socket to the controller.

### Note!

To prevent interfering influences caused by sensors not covered with labels or stock material, these channels should be deactivated. This can be performed either by pulling out the plug or by covering the transmitter with stock material.