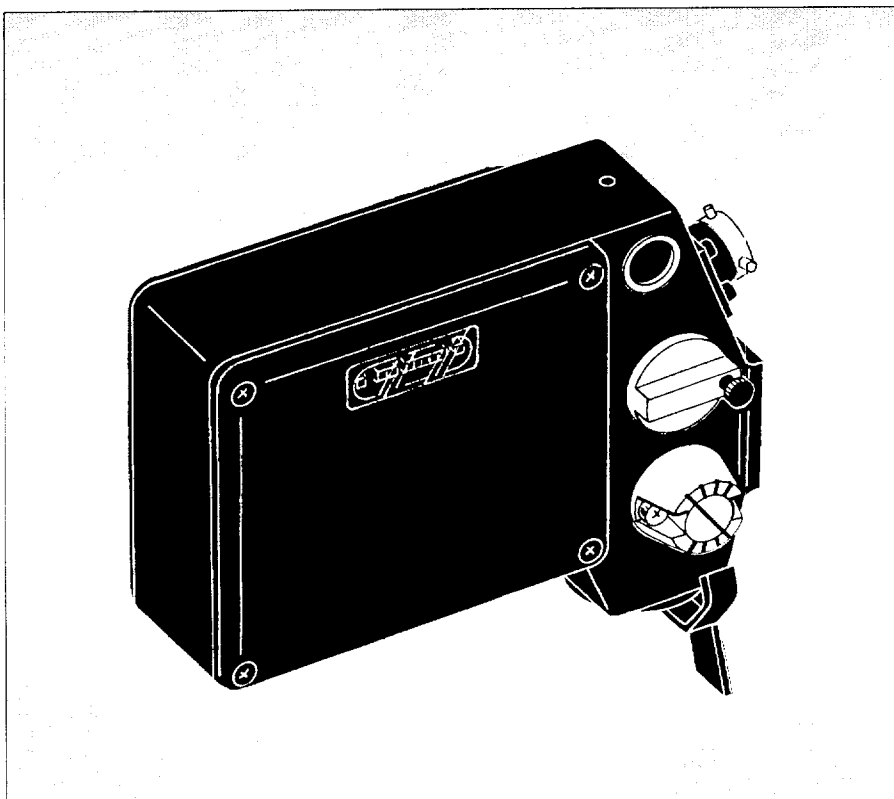


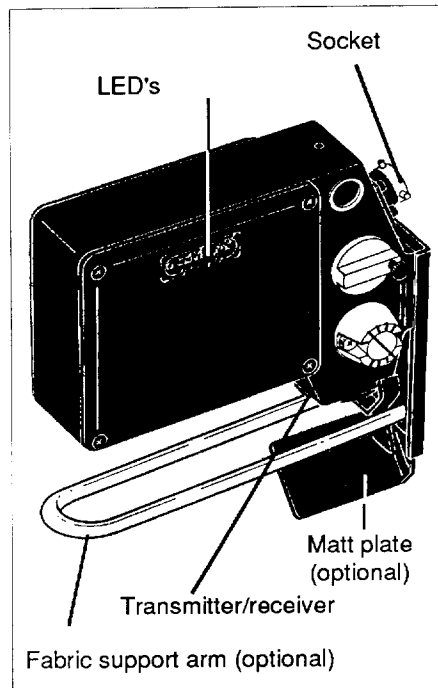
# Operating Instructions

## Edge Sensor FR 1501 (optoelectronic / mechanical)

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## Function



Edge sensor FR 1501

## Use

The FR 1501 edge sensor has been designed for use as part of a center guiding system. It senses the position of the fabric to ensure accurate and even pinning or clipping.

## Construction

The FR 1501 edge sensor consists of an enclosure which integrates a fabric support arm and the mechanical edge feeler.

If the fabric does not run evenly between 20 and 22 millimeters below the sensor, a fabric support arm would have to be installed below the sensor enclosure.

It is also possible to install a matt plate below the sensor together with the fabric support arm. This is necessary if reflecting machine parts are below the sensor which could impair sensing of the fabric (see chapter "Fitting").

A plug connection is provided for the operating voltage ( $\pm 12$  V or +20 V) and signal cable.

The sensor mode setting is also in the sensor housing and depends on the type of system and fabric (see "Commissioning").

## Operation

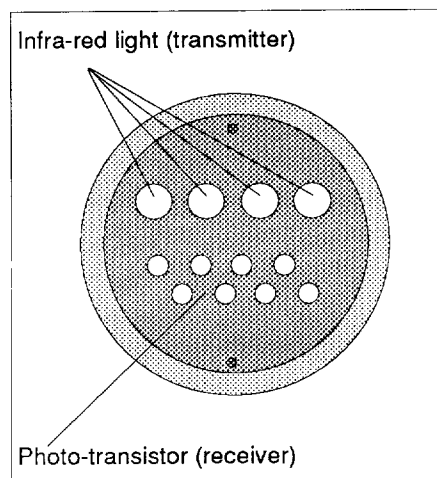
The sensor optically senses the position of the edge of fabric. Its scanning head emits invisible infra-red light from four transmitters. Eight photo-transistors which are mounted one behind the other receive the light reflected by the sensor lever or the web.

You can choose whether the sensor signal should be triggered mechanically or optically.

- In the optical mode the infra-red beams are reflected directly back to the photo-transistors.
- In the mechanical mode the feeler finger itself is used to reflect the infra-red beams. More or fewer photo-transistors receive the reflected light beams depending on how far the feeler finger has been displaced by the fabric.

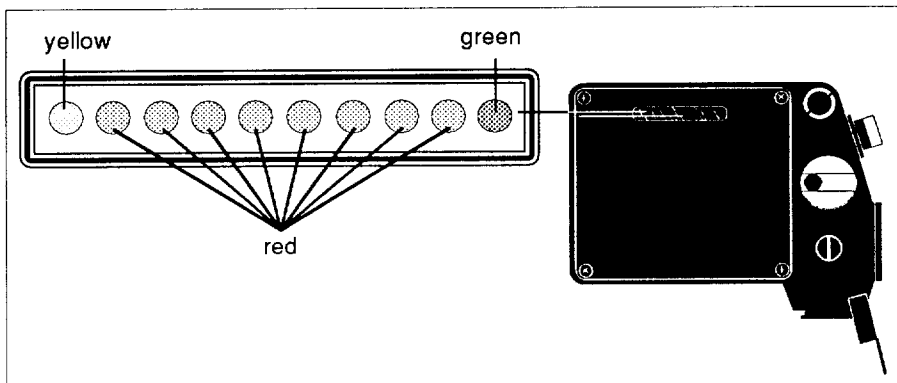
Each photo-transistor is linked to an LED on the front of the sensor and lights up if light is transmitted to it. The 8 LED's form an indicator as to the position of the fabric edge in the sensor.

The scanning head FR 1501



The **green LED** is the equipment-on indicator lamp. It illuminates as soon as the operating voltage is on.

The **yellow LED** is always on the side of the web. If it illuminates, a perfect function is no longer guaranteed. The light reflection is either too low or has disappeared completely.



The LED's on a right handed FR 1511

Normally, the edge of the fabric runs exactly through the center of the operational band. The web reflects infra-red light to four of the eight photo-transistors, and four red diodes are illuminated. If the edge of the fabric is displaced from this position, the sensor emits a signal voltage. This signal voltage is different depending on how many photo-transistors receive the light reflected by the web.

Therefore, there exist 9 different signal voltages:

- 1st signal voltage: No infra-red light is reflected into any photo-transistor (the yellow LED lights).
- 2nd signal voltage: The web reflects infra-red light into one photo-transistor (beside the yellow diode which is no longer illuminated, a red diode is illuminated).
- 3rd signal voltage: The web reflects infra-red light into two photo-transistors (now two red diodes are illuminated).  
... and so on until ...
- 9th signal voltage: The web reflects infra-red light into all eight photo-transistors (all red diodes are illuminated).

The signal voltage is amplified to power the drive. The drive in turn positions the rail on which the sensor is mounted until the fabric edge coincides with the nominal reference line mid-way in the sensor captive range.

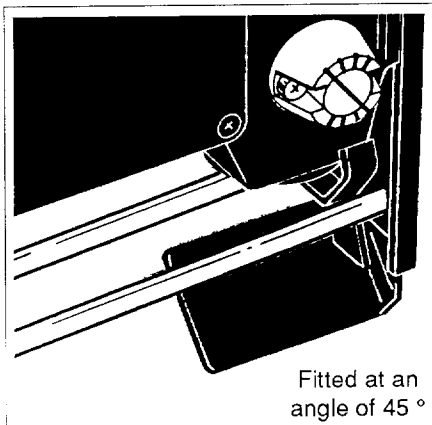
## Fitting

Please install the edge sensor FR 1501 in such a manner that the fabric runs at a distance of 20 to 22 millimeters below the scanning head of the sensor. This distance must be kept at all times and must not vary. If this distance cannot be kept on your plant, you must fasten a fabric support arm at the sensor.

### The fabric support arm

The fabric support arm always keeps the fabric at an optimum distance below the sensor. Fasten the fabric support arm with four Allen screws (thread M5) below the plug for the connection cable.

Edge sensor FR 1501  
with fabric support arm and plate



### The plate

The sensor is sensitive to all forms of light in the immediate vicinity.

**When fitting, ensure that there is no light source for at least 30 cm below the sensor and that no stray light from any other source can enter the sensor's operational zone. Extraneous or reflected light can cause spurious sensor signals.**

If rays are reflected by machine parts or if the edge sensor receives stray light, the signal of the edge sensor could be distorted.

Sometimes it is inevitable that machine parts (such as chains or clips) are running in that area. If you nevertheless want to make use of maximum sensitivity, you must mount a matt plate below the sensor (see illustration on the left). The part number of this plate can be found in the chapter "Spare Parts" on page 8.

## Connections

**To connect sensor FR 1501 note the following:**

1. The sensor housing must be connected electrically to machine mass, for example, by use of the metal sensor positioning device.
2. Connection cables more than 12 m long must be kept totally separate from power cables.  
Cables more than 25 m long are used at your own risk.

## Commissioning

To achieve as good a result of correction as possible, you may set the edge sensor FR 1501 accurately to the individual conditions of your plant. This is done in two steps:

- With the first setting you adjust the sensitivity of the edge sensor to the kind of fabric you are processing. For depending on whether you process dark or light, reflecting or optically absorptive, smooth or rough fabrics, more or less light will be reflected into the photocells of the edge sensor. The edge sensor must be adjusted to the quantity of light reflected into it.
- The second setting refers to the linearity of the sensor signal. You use it to determine how early the plant is intended to react even to small movements of the edge of the fabric.

### 1. Setting the sensitivity

The sensitivity of the edge sensor FR 1501 has been factory-preset. Test first whether you must change this preset value at all.

- Check whether the operating voltage is on and the green equipment-on indicator lamp is illuminated. If no fabric is below the sensor yet, the yellow diode must also be illuminated.
- Put the fabric below the scanning head of the sensor at a distance of 20 to 22 millimeters. Push the fabric until it reaches the stop (see illustration on the right).

If then the yellow LED goes out and all eight red diodes are illuminated, the sensitivity has been set correctly and does not require any alteration.

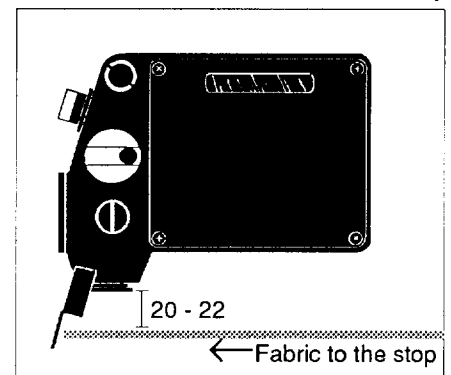
However, if the yellow diode is illuminated or one of the red diodes remains out, you must reset sensitivity.

- Unscrew the rear cover of the edge sensor (the cover without the LED window).
- On the PCB below this cover you will find on the right top a potentiometer (see illustration on the right). Turn at the potentiometer until the yellow LED has gone out and all red diodes are illuminated.
- Screw the cover on again.

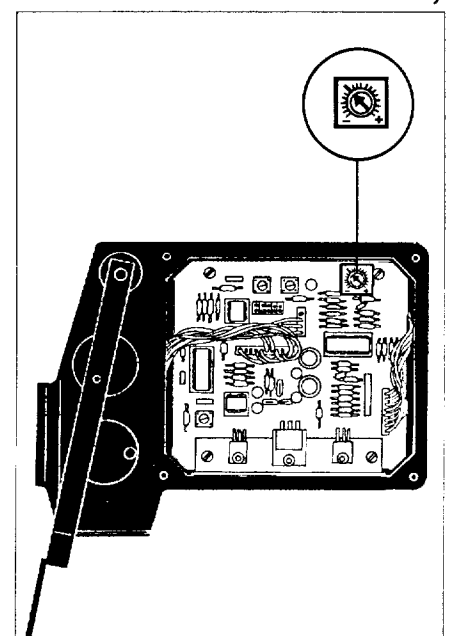
#### Important note:

If one of the red diodes is illuminated without any fabric being under the sensor, the infra-red light is reflected by machine parts below the sensor. In that case you must by all means mount a matt plate below the sensor (see chapter "Fitting").

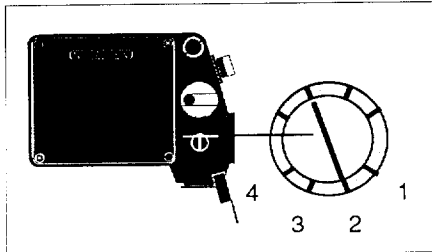
Function test of sensitivity



Potentiometer for setting the sensitivity



Switch for the linearity of the sensor signal

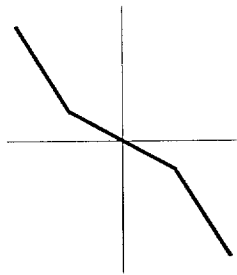


## 2. Setting the linearity

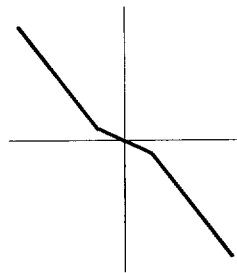
The position of that switch (see illustration on the right) determines whether the sensor signal is emitted in line with the position of the edge of the fabric or whether the signal reacts more or less sensitively in the vicinity of the operating point.

### Important note:

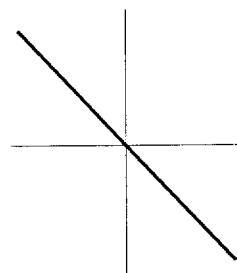
The setting of the linearity of the sensor signal is also dependent on the type of your stenter infeed. Therefore take careful note of the explanations of the various possibilities of positions and choose only a setting which is designed for your plant.



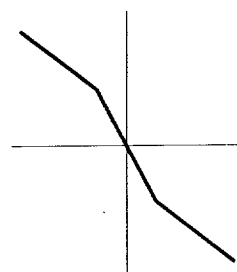
**1** This setting simulates a neutral zone. The sensor signal is flattened about the operating point. This setting is used for stenter guiders with high follow-up speeds or where the fabric has bad edges. It is an option for our stenter guider **KRA 50**.



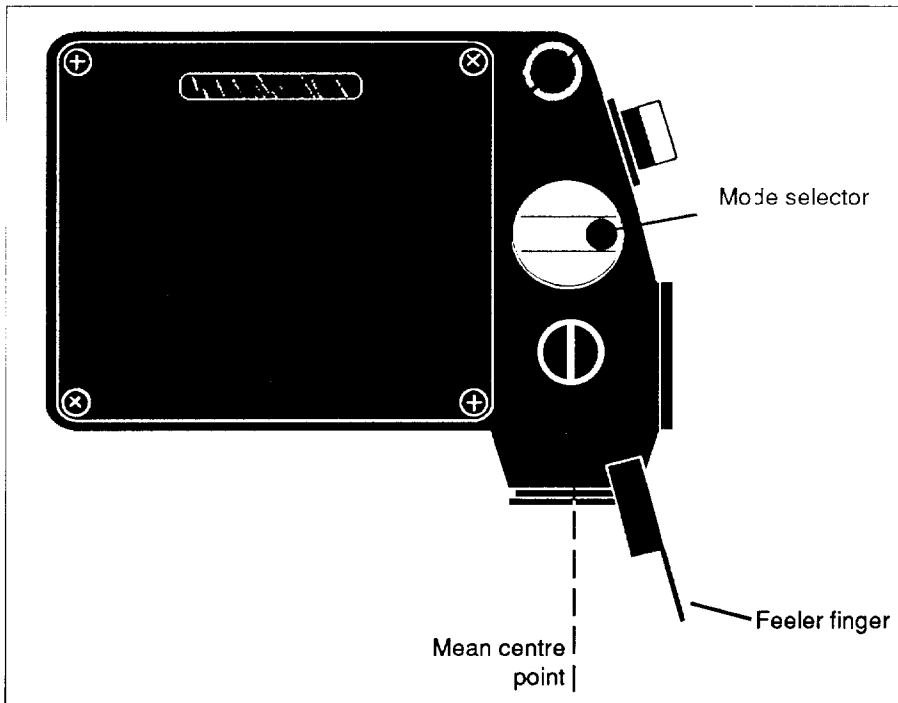
**2** A similarly flattened signal to which sensors supplied with our stenter guiders **KRA 50** are works set. The neutral zone is smaller than in 1: should the rails hunt, select position 1.



**3** This position is intended for stenter guiders with low follow-up speeds up to 50 mm per second (**KRA 46**). The sensor signal is reproduced directly proportionally to the movement of the fabric edge.



**4** Sensors supplied to operate with our stenter guiders **KRA 48** (**KRA 38**) are works set to this position. The response about the operating point is extremely sensitive. Should the rails hunt, select position 3.



Edge sensor FR 1501 right hand, front view

As already described above, the FR 1501 edge sensor can operate in two modes: mechanically by means of a feeler finger or purely optically.

The operating mode selector is on the front of the sensor (see illustration below).

**Remember:**

**Always disengage the locking pin prior to operating the mode selector and re-engage after operation.**

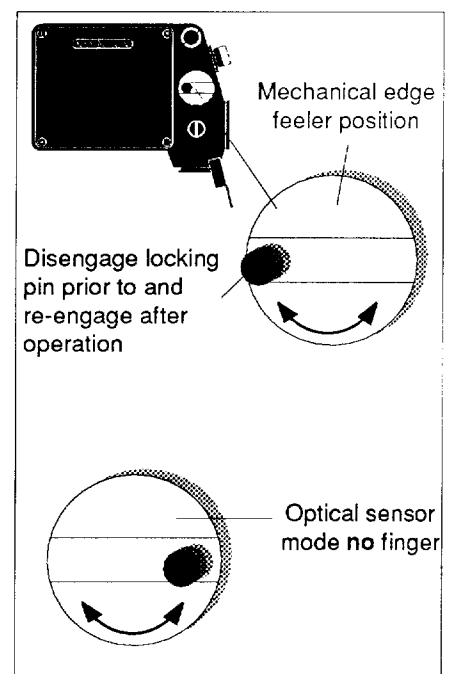
**Mechanical edge feeler**

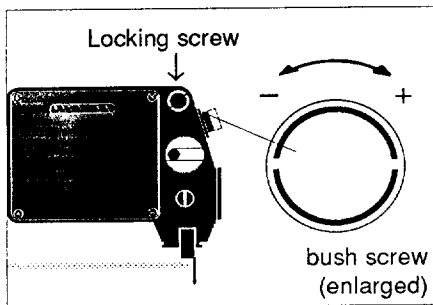
The mechanical edge feeler will be used on irregular or fringed edges or on some black qualities with zero light reflection (i.e. when the yellow LED lights). Set the mode selector so that the locating pin is on the inboard side; this releases the feeler finger for operation.

**Optical sensing**

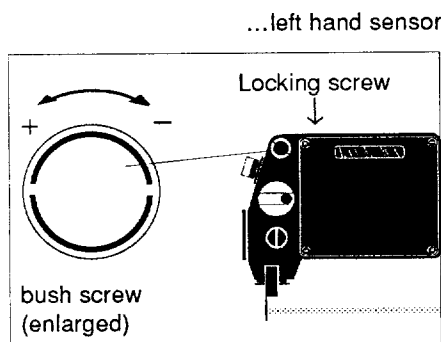
Most fabric edges can be sensed optically. Set the mode selector so that the locating pin is on the outboard side; the feeler finger is locked out of action and the sensor operates purely optically.

Mode selector on right hand FR 1501





Setting the finger load right hand sensor



...left hand sensor

## Setting the finger load

The finger load, which corresponds to the pressure with which the finger rests against the edge of the fabric, is works set at 0.15 N. It may be increased or, for particularly sensitive fabrics, reduced to a minimum permissible of 0.1 N. This is done by means of the bush screw above the selector switch. The direction of adjustment depends on whether a left hand or right hand sensor is to be adjusted.

Proceed as follows:

- Release the locking screw on the top of the sensor.
- Rotate the bush screw inwards, to tighten the spring and increase the finger load.

Rotate the bush screw outwards, to slack the spring and reduce the finger load.

**A quarter turn corresponds to a load of approx. 0,05 N.**

- Retighten the locking screw on the top of the sensor. (see illustrations left)

## Maintenance

Clean the sensor protection glass regularly with a soft cloth. If you have mounted a plate below the sensor, wipe off regularly any drops or splashed water. The surface must always be dull black. Each kind of deposit could reflect the light to the sensor and influence the correction result.

## Spares

The FR 1501 sensor has been works calibrated electronically. Should an electronic fault arise, the complete sensor must be replaced. For this reason only mechanical components are offered as spares.

When a sensor needs to be replaced, a works reconditioned exchange service sensor may be available, subject to full reconditioning of your sensor still being viable. We reserve the right to make the final decision.

Edge sensor FR 1501 left	060069
Edge sensor FR 1501 right	060070
Feeler finger left	062811
Feeler finger right	062810
Reflector left	063505
Reflector right	063506
Fabric support arm	063502



## Technical Data

Operating voltage, stabilised	$\pm 12\text{ V (+20 V)}$
Signal output voltage	$-8\text{ V...0 V...+8 V (2 V...10 V...18 V)}$
Proportional band	$\pm 7\text{ mm}$
Current consumption	ca. 250 mA
Ambient temperature	$0^\circ\text{ to }70^\circ\text{ C}$

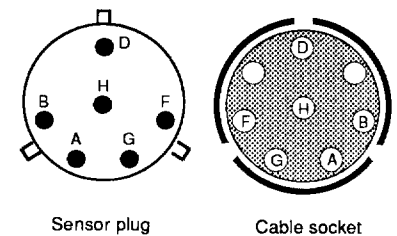
Please check the connection diagram prior to connecting a sensor; establish whether an existing cable or a cable supplied with the sensor is to be used. The cable can be identified by its part number.

## Cable Connection

Old cable		New cable	
7 m	003667	4 m	042920
11 m	010125	7 m	042690
15 m	006177	12 m	042921

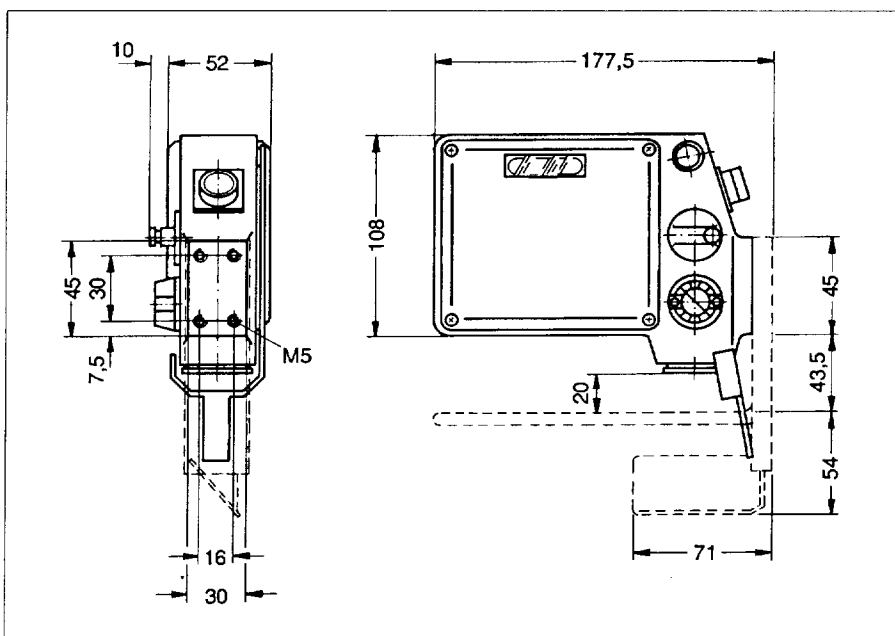
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Sensor plug

Cable socket

## Dimensions



Erhardt + Leimer GmbH  
Postfach 10 15 40  
D-86136 Augsburg  
Phone (0821) 24 35-0  
Telefax (0821) 24 35-666

