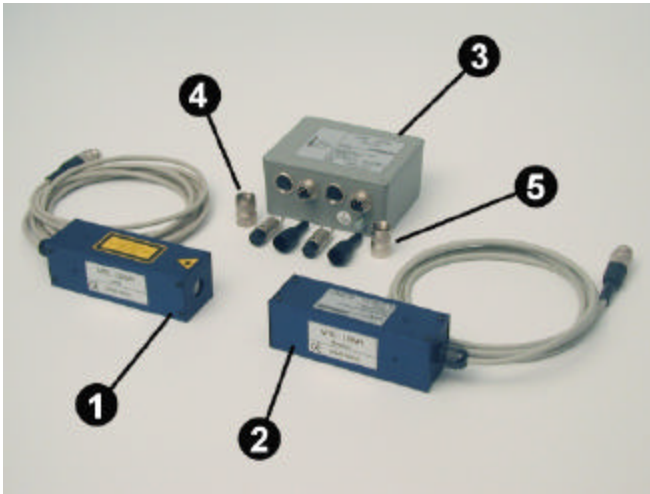


# OPERATING MANUAL

# MTE LSWR

## Laser Light-Barrier with 10 mm Laser Line



Die individual elements will be described in the text

- ❶ Laser  
**MTE LSWR-Lxxxx**
- ❷ Receiver  
**MTE LSWR-Rxxxx**
- ❸ Sensor Electronic  
**MTE LSWR-Exxxx**
- ❹ Connector for machine control unit
- ❺ Connector for power supply

ENGLISH

Fig. 1: Photo of the MTE LSWR

- High switching accuracy perpendicular to the laser line
- Short response time: 0.3 ms
- No adjustment of the sensitivity required for recognition of different materials
- Automatic adaptation to variations in ambient light
- Distance laser to receiver: up to 3500 mm (11.5 ft)

## CONTENTS OF DELIVERY:

- Laser **MTE LSWR-Lxxxx**
- Receiver **MTE LSWR-Rxxxx**
- Sensor electronic **MTE LSWR-Exxxx**
- Connector for machine control Amphenol Best. Nr. T3361001
- Connector for power supply Amphenol Best. Nr. T3261001
- Adjustment aid
- Operating manual

**NOTE:** **xxxx = 4-digit serial number**  
**Use only the elements with the same serial number as a light-barrier unit.**

## SAFETY INFORMATION:

**Under all circumstances it must be made sure that the laser beam will not hit eyes!**

**The device contains a laser:**

- Class 2
- Power < 1 mW
- Wave length 650 nm (red light)



Use this device only as outlined in this operating manual. Improper use may cause damage to the eyes.

Opening the laser light source **MTE LSWR-L** is inadmissible and may change the laser class.

The device must not be opened, repaired or serviced by the user. Should maintenance or repairs be advisable, please contact your MTE-partner.

Should objects or fluids get inside the device, the power must be turned off immediately (unplug the power supply). A technician qualified by MTE must then inspect the device before it is set into operation again.

Always unplug the cables by pulling the connector rather than on the cable.

## FUNCTION PRINCIPLE:

- A **MTE LSWR** consists of a laser light source, an optical receiver and the sensor electronic.
- The laser light source **MTE LSWR-L** emits a laser beam with a cross-section of about 10 x 1 mm (4 x 0.4 in). The optical receiver **MTE LSWR-R** detects the partial interruption of the laser beam.
- The high-sensitivity laser light-barrier **MTE LSWR** allows the recognition of objects that are smaller than the cross-section of the laser beam. Even a partial interruption of the laser beam of approx. 0,5 mm (0.0016 in) results in a secure switching of the light-barrier **MTE LSWR**.
- The **MTE LSWR** contains an automatic adaptation to the ambient light.

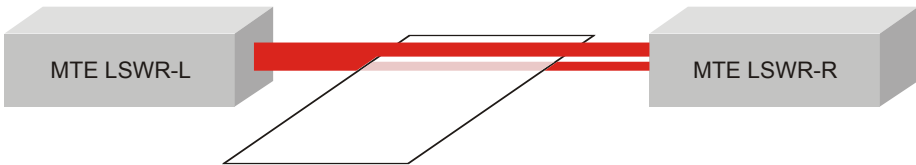


Fig. 2: Function principle of the **MTE LSWR**

## DIRECTIONS FOR USE:

The **MTE LSWR** is a precision light-barrier and must thus be handled with appropriate care. Damages on the casing may impede the function.

**CAUTION: Shock can de-adjust the laser and can thus impede the function.**

Take care that the laser and receiver cannot accidentally be misaligned mechanically, as the exact alignment of these two elements is essential to the function of the **MTE LSWR**. A mechanical protection against accidental misadjustment is advisable.

The **MTE LSWR** works also at high ambient light levels so far direct light or bright light sources (floodlight, sunlight etc.) shining directly onto the measurement hole of the receiver **MTE LSWR-R** is avoided. If necessary, shade with appropriate resources.

Dirt on the laser **MTE LSWR-L** or on the measurement hole of the **MTE LSWR-R** (especially grease, like finger prints) may cause malfunction. The openings should be cleaned (dusted) regularly. If the green LED (light emitting diode) is not lit when no object is located in the optical path, then these openings must be cleaned.

Opening the **MTE LSWR** by persons not trained by MTE is prohibited and warranty voids.

Before setting into operation, the **MTE LSWR** must be mounted and wired.

## MOUNTING:

The **MTE LSWR** is a precision light-barrier. Therefore the mounting frame must be constructed accordingly, stable and free of distortion and vibration.

The laser and the receiver must be mounted such that the all drill holes are on one single axis, i.e. the devices are aligned co-axial. The maximum allowable deviation of the receiver from the optical axis is 1 mm (0.4 in).

**Hint:** To simplify the adjustment, you may use a thread put up between laser and receiver or you may use a long steel-ruler to check the correct alignment.

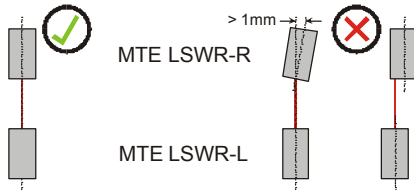


Fig. 3: Correct and erroneous alignment of the **MTE LSWR**

The device is mounted by 4 pieces of screws M4 (4 mm metric screws). The screw must not extend more than 4 mm (0.15 in) into the device (maximum penetration depth; see mechanical drawings). The length of the screws to be used depends on the thickness of the mounting frame. The screws are not included.

The distance between laser and receiver must be in the range of 100 mm (4 in) up to 3500 mm (11.5 ft).

When mounting the device vertically, the laser should be mounted on the bottom and the receiver on top; the laser beam should point upwards.

## CABLING:

Cabling must be done according to the following drawing. All cables are connected to the sensor electronic **MTE LSWR-E**.

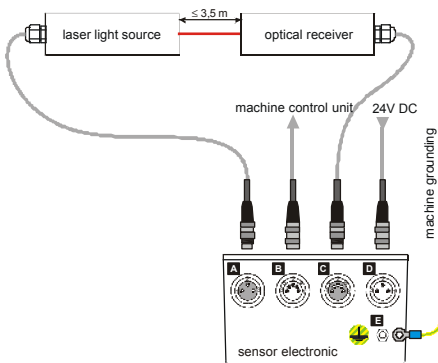


Fig. 4: Cabling of the **MTE LSWR**

For proper operation of the light-barrier **MTE LSWR**, pay special attention to proper grounding.

## Connection of the laser MTE LSWR-L:

The laser is delivered ready-to-use with a cable of approx. 5 m (16.5 ft). It is connected to pos. A in fig. 4 and 11.

## Connection of the machine control unit (opto-coupler outputs):

Connector: Amphenol Order No. T3361001 (comes with the device)

Cable to be used: LSUTPC 2x2xAWG 26 or equivalent (max 0,5 mm<sup>2</sup>)

**B** The outputs of the sensor electronic connecting the machine control unit must be done according to your requirements.







	3	NPN (collector)	closure when NO object recognised (circuit opener; break-contact)
	5	NPN (emitter)	closure when NO object recognised (circuit opener; break-contact)
	2	shield	
	4	NPN (emitter)	closure when object recognised (circuit closer; make-contact)
	1	NPN (collector)	closure when object recognised (circuit closer; make-contact)

Fig. 5: Pinning of the outputs of the sensor electronic to the machine control unit (opto-coupler)

The outputs of the device are opto-couplers that can drive a load of max. 25 mA at 14 V DC. The outputs to the machine control unit must be connected so that:

- either the opto-coupler switches to + when the collector (pin 1 and 3 resp.) is connected directly to the switching-voltage and the emitter (pins 4 and 5 resp.) is connected to the control unit or load, which in turn is connected to 0 (ground).
- or the opto-coupler switches to 0 (ground) when the collector (pin 1 and 3 resp.) is connected to the control unit or load, which in turn is connected to switching-voltage and the emitter (pins 4 and 5 resp.) is connected directly to 0 (ground).

## Connection of the receiver MTE LSWR-R:

The receiver is delivered ready-to-use with a cable of approx. 2m (6.5 ft). It is connected to pos. C in fig. 4 and 11.

## Connection of the power supply:

Connector: Amphenol Order No. T3261001 (comes with the device)

Cable to be used: CY 2x0,25 (braided wire, shielded with wire gauze) or equiv. max 0,5 mm<sup>2</sup>)

**D** The power supply must be connected as follows.



1	GND
2	shield
3	+24 V DC

Fig. 6: Pinning of the power supply

## Ground-connection:



The grounding clip is indicated by the ground symbol as depicted and must be connected to the machine ground.

For proper operation of the light-barrier **MTE LSWR**, a proper grounding is essential.

Fig. 7: Ground connector

## MECHANICAL ADJUSTMENT:

When mounting and cabling is finished and checked for correctness, the light-barrier **MTE LSWR** must be aligned as exact as possible and then adjusted.

An exact mechanical alignment of laser and receiver is essential because of the high sensitivity of this device.

**It is essential that the mounting instructions are followed exactly.**

Position the adjustment aid on the receiver **MTE LSWR-R**, then align the laser **MTE LSWR-L** such that the laser beam hits the target on the indicated area on the adjustment aid. If no adjustment aid is available, the target is the slit-aperture at the laser entry opening. The laser beam (10 x 1 mm) must not be obscured by the aperture at any place. A sheet of paper as projection screen may help you observing the optical path. From 1.5 m (5 ft) of optical path up, stray light will occur on either side of the main beam, which is irrelevant for the measurement.

The 3 adjustment screws in the housing of the laser **MTE LSWR-L** are adjusted by MTE and must never be turned by the user!

When the laser and the receiver of the **MTE LSWR** are properly aligned, the green LED (light emitting diode) **ACL OK** will light up on the sensor electronic **MTE LSWR-E**. If this cannot be achieved, the cause may be:

- no power (24 V DC) applied to the **MTE LSWR**
- laser and/or receiver not connected to the sensor electronic
- distance between laser and receiver too large (more than 3.5 m / 11.5 ft)
- lenses on the laser and/or receiver dirty
- optical path obscured by machine parts
- potentiometer **ACL** – Adjustment Control Level) misaligned by mistake

Except for the last point, all points can easily be corrected by the user. If the potentiometer **ACL** is misaligned, only MTE can properly adjust it.

The adjustment screws on the **MTE LSWR-L** for aligning the laser are set for optimum performance by MTE and may only be adjusted by personnel qualified and trained by MTE.

## ELECTRICAL ADJUSTMENT:

**Prerequisite for electrical adjustment is a correct mechanical adjustment.**

Since deviations from the ideal adjustment happen even if you follow the procedures exactly and since the **MTE LSWR** is suitable for distances between 100 mm (4") and 3.5 m (11.5 ft), the sensitivity of the **MTE LSWR** must be adjusted to your needs.

The sensor electronic of the **MTE LSWR** compares the incoming signal of the receiver with the adjusted threshold level. When the threshold level is not reached, the red LED **DET** (object Detected) will light up and the outputs of the opto-couplers will switch.

When the red LED **DET** is alight, this may mean:

- there is an object in any part of the optical path of the laser that shades the beam enough so that the threshold level cannot be reached
- the threshold level is adjusted too high, causing a permanent response
- laser and/or receiver misadjusted
- laser and/or receiver not connected to the sensor electronic

- distance between laser and receiver too large (more than 3.5 m – 11.5 ft)
- laser beam shaded or obscured by machine parts

The threshold is adjusted with the potentiometer (**DET THD** – Detection Threshold).

By turning the potentiometer clockwise (cw), the threshold is lowered and the **MTE LSWR** becomes less sensitive. Turning the other way (ccw) increases the sensitivity.

To get the most sensitive setting of the **MTE LSWR**, turn the potentiometer **DET THD** cw until the red LED **DET** just about goes out. From this position turn the potentiometer about ¼ turn counter clockwise (ccw).

By putting the object to be detected in the optical path (or by shading the laser beam) the correct response of the **MTE LSWR** must be tested. If necessary, the sensitivity can be increased by cautiously turning the potentiometer ccw or decreased by turning it cw.

The red LED **DET** works synchronously with the outputs of the opto-couplers. The green LED **ACL OK** is an indicator for exact alignment of laser and receiver.

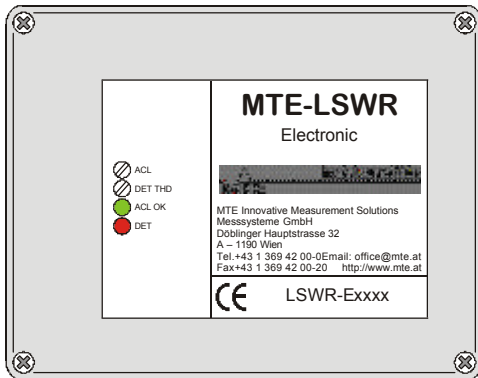


Fig. 8: Adjustment and LED's (Light Emitting Diodes)

## TECHNICAL DATA:

Power supply	24 V DC (15 to 30 V DC)
Current consumption	35 mA typical; max. 50 mA
Laser power	< 1 mW, Class 2
Laser wave length	650 nm
Distance laser to receiver	100 mm to 3500 mm (4 in to 11.5 ft)
Thinnest detectable object	0.5 mm (0.0016 in)
Beam cross-section	10 x 1 mm (4 x 0.4 in)
Response time	0.3 ms
2 digital outputs (opto-couplers)	24 V DC / max. 25 mA
Function and adjustment	light emitting diodes (LED's)
Working temperature	+10 °C up to +40 °C max. 90% rH, not condensing

# MECHANICAL DIMENSIONS:

## Laser and receiver (aluminium housing):

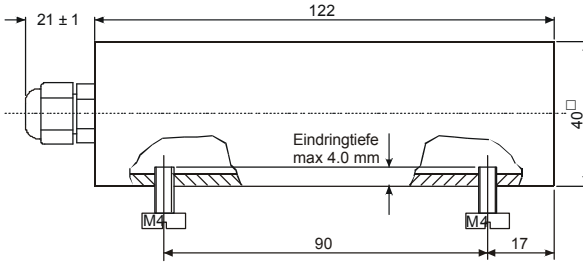


Fig. 9: mechanical dimensions of laser and receiver; all dimensions in mm

## Sensor electronic (aluminium housing):

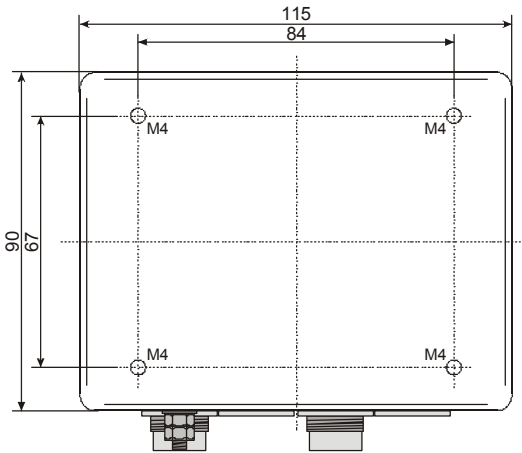


Fig. 10: mechanical dimensions and mounting holes of the sensor electronic, all dimensions in mm

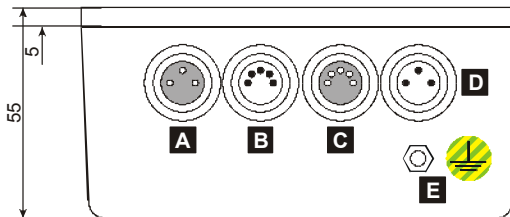


Fig. 11: mechanical dimensions of the sensor electronic, all dimensions in mm

Technical data are subject to change without notice.