OPERATING MANUAL
MTE LTDB

Laser sensor for recognition of coatings on glass

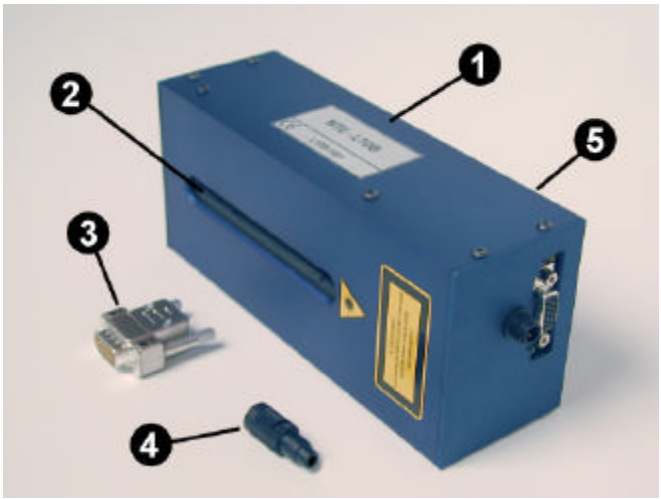

Fig. 1: Photo of the MTE LTDB

The individual elements will be described in the text.

❶ Sensor MTE LTDB
❷ Opening for laser and Sensor
❸ Connector for machine control unit
❹ Connector for power supply
❺ mounting surface (on the rear; not visible)

ENGLISH

- suitable for daylight and for use against-the-light
- contact-less operation
- high processing speed
- simple implementation in the machine control unit
- digital outputs (opto-coupler)
- distance to the glass 5 to 20 mm (0.2 to 0.8")
- possible glass thickness 3 to 30 mm (0.12 to 1.2")

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CONTENTS OF DELIVERY:

- Sensor **MTE LTDB**
- Connector for machine ctrl unit High Density D-SUB 15 (male) e.g. HTDS15L
- Connector for power supply Binder Nr. 99-0976-102-03
- Operating manual

SAFETY INFORMATION:

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

The device contains a laser:

- Class IIIa
- Power < 3 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 sensor **MTE LTDB** 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:

- The **MTE LTDB** emits a laser beam which is reflected from the glass surface. The reflections are received by a sensor element and analysed by the internal electronics.
- **The measurement principle patented by MTE** ensures the reliable recognition of virtually all common coatings on float glass.
- The built-in interference filter ensures insensitiveness of the **MTE LTDB** against ambient light.

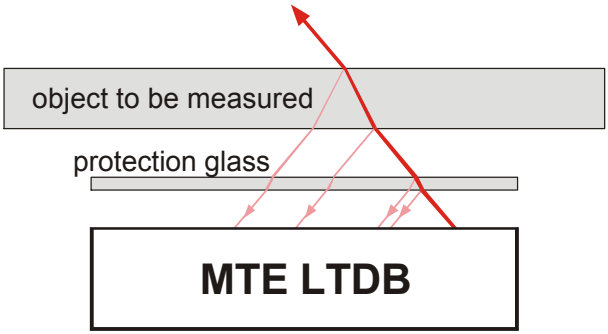


Fig. 2: Function principle of the MTE LTDB

DIRECTIONS FOR USE:

The **MTE LTDB** is a precision measurement-instrument 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 result in erroneous measurements.

Take care that the sensor cannot accidentally be misaligned mechanically, as the exact alignment of the sensor is essential to the function of the **MTE LTDB**. A mechanical protection against accidental misadjustment is advisable.

For protection of the **MTE LTDB** against splash-water and dust, it must be mounted behind a protection glass. The protection glass plate must be a clear uncoated float glass with a thickness of 3 to 5 mm (0.12" to 0.2").

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

Dirt on the laser-opening, on the measurement hole or on the protection glass of the **MTE LTDB** (especially grease, like finger prints) may cause malfunction. The openings and the protection glass should be cleaned (dusted) regularly. If you encounter increased erroneous measurements or error messages, then these openings must be cleaned.

Opening the **MTE LTDB** by persons not authorised by MTE is prohibited and warranty voids.

An external start-signal is required to trigger a measurement which must be provided by an external sensor or by the machine control.

Tipp: For this, we recommend a **MTE LSWR**.
For optical display of the measurement the signal box **MTE SB1** is suited best.

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

MOUNTING:

The **MTE LTDB** is a precision measurement instrument. Therefore the mounting frame must be constructed accordingly, stable and free of distortion and vibration. Mounting must be done on a well-grounded metal frame, on which the sensor will be grounded.

When mounting the **MTE LTDB**, the mounting surface must be plane-parallel to the objects to be measured. The maximum allowable deviation in the longitudinal axis is 0,5 mm (0.02") and in the lateral axis 0,1 mm (0.004").

For protection of the **MTE LTDB** against splash-water and dust, it must be mounted behind a protection glass. The protection glass plate is unconditionally required and must be a clear uncoated float glass with a thickness of 3 to 5 mm (0.12" to 0.2"). Alternatively an acrylic-glass plate of the same thickness may be used. When mounting the protection glass, the same maximum deviations of parallelism must met under all circumstances.

The minimum and maximum mounting distances in Fig. 3 are to be met under all circumstances.

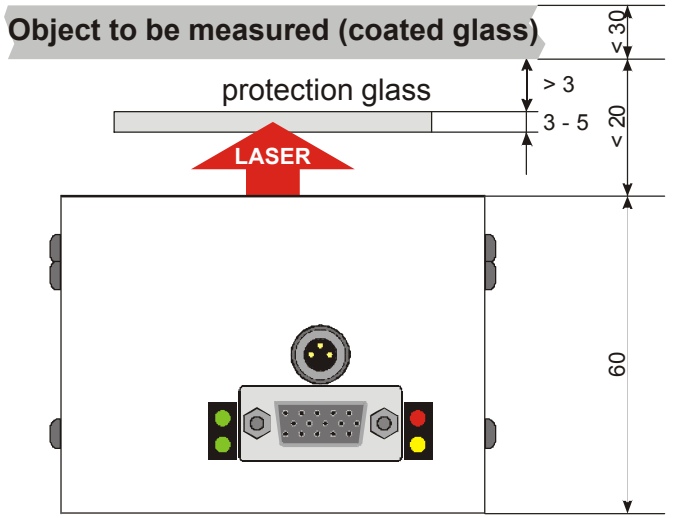


Fig. 3: Mounting of the MTE LTDB

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 measurement opening (slit) should always be perpendicular to the direction of the object's movement.

It is essential that the mounting instructions are followed exactly.

CABLING:

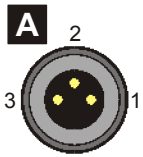
Cabling the **MTE LTDB** is performed via the connectors A and B (see fig. 6).

For proper operation of the sensor **MTE LTDB**, take care that it is properly grounded via the mounting frame.

Connection of the power supply:

Connector: Binder Nr. 99-0976-102-03 (comes with the device)

Cable to be used: CY 2x0,25 (braided wire, shielded with wire gauze) or equiv. max 0,25 mm^2 or AWG 24



The power supply must be connected as follows.

1	GND
2	N.C. (not connected)
3	+24 V DC

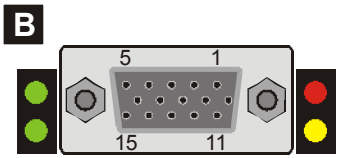
Fig. 4: Pinning of the power supply

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

Connector: High Density D-SUB 15 (male) e.g. HTDS15L (comes with the device)

Cable to be used: e.g. LSUTPC 4x2xAWG 24 or equiv. max 0,25 mm^2 or AWG 24

The outputs of the sensor electronic connecting the machine control unit must be done according to your requirements.(see also fig. 7).



5	Start (-)	negative input for start-signal
15	Start (+)	positive input for start-signal
12	NPN (collector)	coating recognised on side D (see fig. 6)
2	NPN (collector)	coating recognised on side C (see fig. 6)
7	NPN (emitter)	common connection for sides C and D
6	NPN (collector)	error message
11	NPN (emitter)	error message
	Connections not listed are reserved and must not be connected.	

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

The start-signal must be connected to pins 15 (positive) and 5 (negative). See also chapter *Digital Input*.

The outputs (see chapter *Digital Outputs*) are opto-couplers that can switch max. 120 mA at 24 V DC.

The connections to the machine control unit must be so that the opto-couplers switch to 0V (GND). The collector is connected to the control unit or the load. The emitter is connected to 0 V (GND). The other side of the load must be connected to the control voltage or the machine control unit must deliver the control voltage.

The opto-coupler for the error message may also switch to + when the collector (pin 6) is directly connected to the control voltage and the emitter (pin 11) with the control unit or the load, which in turn is connected to 0 V (GND).

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Ground-connection:

Grounding must be done via the machine's metal mounting frame.

For proper operation of the sensor **MTE LTDB**, proper grounding is essential.

To simplify cabling, the following drawings show the internal connection of the **MTE LTDB**. The right side of the opto-coupler symbols is connected to the internal electronics.

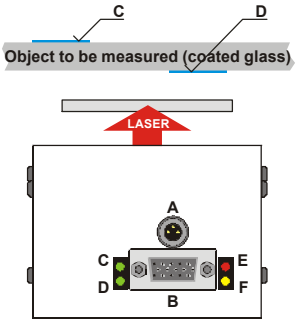

Fig. 6: Connector and LED's

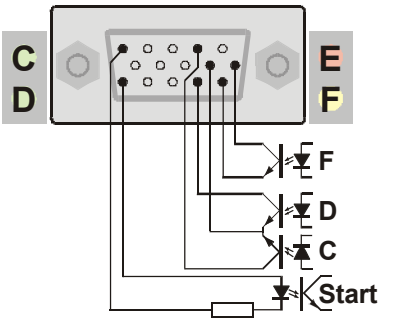

Fig. 7: Connection to the machine control unit

DIGITAL INPUTS:

To trigger a measurement, an external start-signal is required (pulse with a minimum of 100 ms of duration) to be received by the **MTE LTDB**. After ending the pulse (no voltage on pins 15 (start +) and 5 (start -)), the measurement is started. About 0.8 seconds later, the results are available on the digital outputs.

A resistor is integrated in the device which allows to directly connect the pins to 24 V DC. Typically 5 mA at 24 V DC are drawn. The sensor switches at voltages between 20 V and 30 V.

DIGITAL OUTPUTS:

The opto-couplers of the outputs and the light emitting diodes (LED's; see fig. 6 and 7) are in parallel. The transistor on the output switches when the LED on the sensor is alight. In the following, the signals are explained by the status of the LED's.

After a measurement, one of the LED's C, D or F will be alight. If glass but no coating has been recognised, then the LED's C, D and F remain dark. If coating is recognised on both sides, then both LED's C as well as D will be alight. The LED's C, D and F light as long as the result of a new measurement is available.

LED C

The green LED **C** lights when coating is recognised on the glasses surface looking away from the sensor (pos. C in fig. 6 and 7).

LED D

The green LED **D** lights when coating is recognised on the glasses surface facing the sensor (pos. D in fig. 6 and 7).

LED E

The red LED **E** lights as long as power is applied (24 V DC).

LED F

The yellow LED **F** lights when an error is encountered during a measurement. Possible reasons might be:

- Measurement started but no object in the range of recognition
- The measurement object is not float glass or it is structured
- Dirty measurement opening and/or protection glass
- Measurement object and sensor are not plane-parallel
- Missing protection glass
- Laser defective

TECHNICAL DATA:

Power supply	24 V DC (15 to 30 V DC)
Current consumption	20 mA typical; max. 30 mA at 24 V DC
Laser power	< 3 mW, Class IIIa
Laser wave length	650 nm
Distance sensor to glass	5 mm up to 20 mm
Recognisable glass thickness	3 mm up to 30 mm
Measurement time	approx. 800 ms
1 digital input	20 V to 30 V; typical 5 mA at 24 V DC (start-signal; min. 100 ms)
3 digital outputs (opto-couplers)	24 V / max. 120 mA
Function display	Light emitting diodes (LED's)
Weight	790 g
Working temperature	+10 °C up to +40 °C max. 90% rH, not condensing

MECHANICAL DIMENSIONS:

Sensor (aluminium housing):

If the cables are to be connected and/or disconnected while the device is mounted, a minimum of 80 mm / 3.2” (instead of 50 mm / 2”) is required in this area.

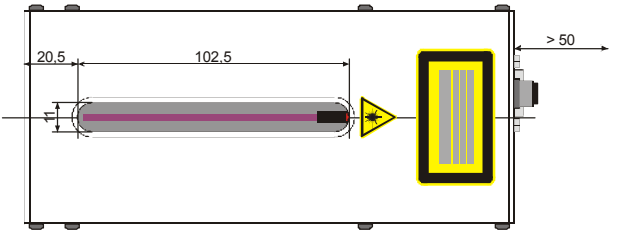

Fig. 8: mechanical dimensions (measurement plane) of the MTE LTDB; all measures in mm

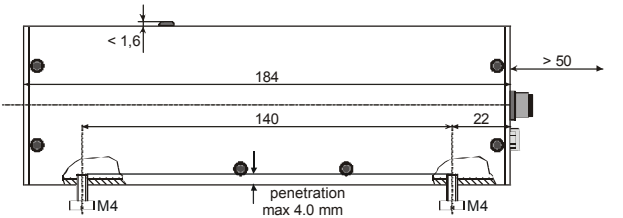

Fig. 9: mechanical dimensions (side view) of the MTE LTDB; all measures in mm

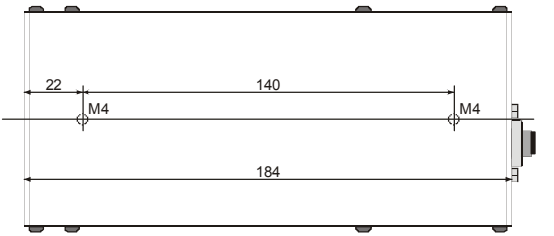

Fig. 10: mechanical dimensions (mounting plane) of the MTE LTDB; all measures in mm

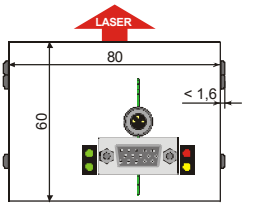

Fig. 11: mechanical dimensions (connectors) of the MTE LTDB; all measures in mm

Technical data are subject to change without notice.