



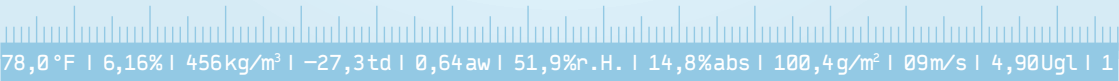
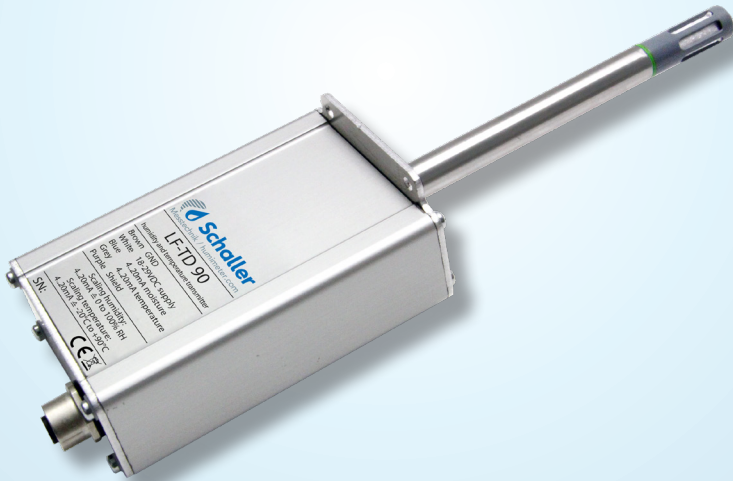
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Moisture meter

# Operating Manual

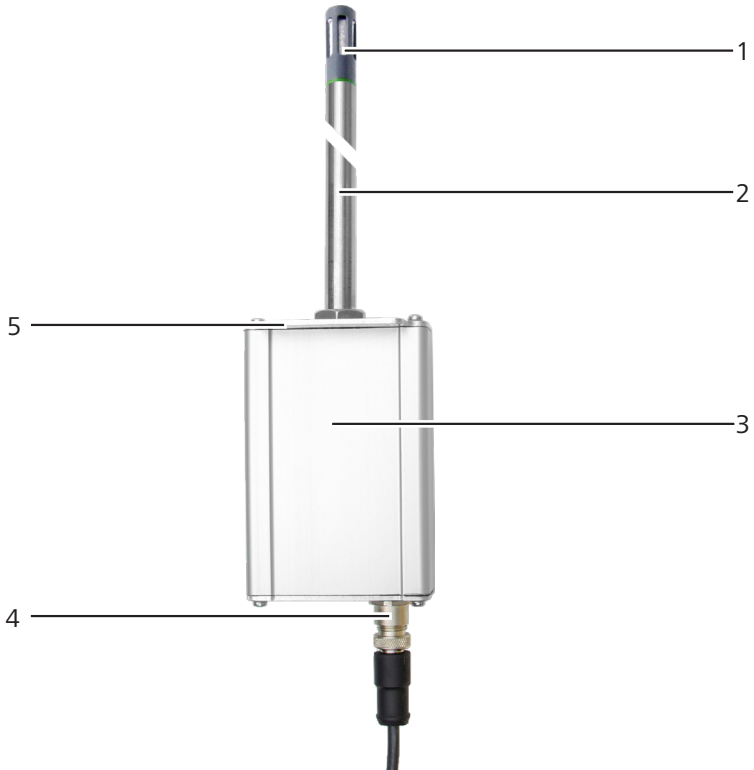
## LF-TD 90

### Air humidity transmitter series



## Your LF-TD 90 at a glance

### The main unit



No.	Name
1	Air humidity and temperature sensor
2	Sensor tube
3	Aluminium housing
4	Sensor plug
5	Mounting bracket

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## 1. Introduction

### 1.1 Information about this operating manual

This operating manual is designed to enable you to use the LF-TD 90 safely and effectively. It is part of the device, has to be stored nearby and must be easily accessible to users at all times.

All users are required to carefully read and make sure that they have understood this operating manual before using the LF-TD 90. All of the safety and operating instructions detailed in this manual have to be observed to ensure the safety of the device.

### 1.2 Limitation of liability

All of the information and instructions provided in this operating manual have been compiled on the basis of the current standards and regulations, the state of the art, and the extensive expertise and experience of Schaller GmbH.

Schaller GmbH does not accept any liability for damage associated with the following, which also voids the warranty:

- Non-observance of this operating manual
- Improper use
- Inadequately qualified users
- Unauthorised modifications
- Technical changes
- Use of unapproved spare parts

This fast measuring procedure can be affected by a range of different factors.

We, as the manufacturer, do not accept any liability for any incorrect measurements and associated consequential damage.

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### 1.3 Symbols used in this manual

All of the safety information provided in this manual is shown with a corresponding symbol.



#### **ATTENTION**

It is essential to observe this warning. Non-compliance can lead to damage to property or equipment.



#### **Information**

This symbol indicates important information that enables users to use the device more efficiently and cost-effectively.

### 1.4 Customer service

For technical advice, please contact our customer service department at:



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## 2. For your safety

The device complies with the following European directives:

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS)
- Electromagnetic compatibility (EMC)

The device corresponds to state-of-the-art technology. However, it is still associated with a number of residual hazards.

These hazards can be avoided through strict observance of our safety information.

### 2.1 Proper use

- Transducer for measuring and transmitting relative humidity and temperature in fixed installation
- The sensor technology used makes it possible to detect even small fluctuations in humidity and their tendencies quickly and reliably so that preventive actions can be taken.
- For some applications (e.g. installation in sewage pipes) it is necessary to use a remote measuring probe for the reason of temperature adjustment.

### 2.2 Improper use

- The device must not be used in ATEX.

### 2.3 User qualifications

The device must only be operated by people who can be expected to reliably take the measurements. The device must not be operated by people whose reaction times may be slowed due to, e.g. the use of drugs, alcohol or medication.

All persons using this device must have read, understood and follow the instructions provided in the operating manual.

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## 2.4 General safety information

The following safety information has to be observed at all times to avoid damage to objects and injury to people:

- In case of damages or loose parts on the device, remove the batteries and contact Schaller GmbH or your dealer.

All of the device's technical features have been inspected and tested before delivery. Every device has a serial number. Do not remove the tag with the serial number.

## 2.5 Warranty

The warranty does not apply to:

- Damage resulting from non-observance of the operating manual
- Damage resulting from third-party interventions
- Products that have been used improperly or modified without authorisation
- Products with missing or damaged warranty seals
- Damage resulting from force majeure, natural disasters, etc.
- Damage from improper cleaning

## 3. On receipt of your device

### 3.1 Taking the device out of its packaging

- Take the device out of its packaging.
- Next, make sure that it is not damaged and that no parts are missing.

### 3.2 Making sure that all of the components have been included

Make sure that all of the components have been included by checking the package contents against the following list:

### 3.2.1 Scope of supply

- LF-TD 90
- Connecting cable of 1.9 m length
- Operating manual

Optional accessories:

- Display for LF-TD
- Display with keypad for LF-TD
- Relay output for moisture for LF-TD
- Mounting bracket for LF-TD
- Stainless steel sinter sensor cap
- Brass sinter sensor cap
- Drip-catcher for LF-TD
- Stainless steel lattice filter
- RS232 interface - described in a separate operating manual
- USB interface - described in a separate operating manual
- Profinet interface - described in a separate operating manual
- Ethernet interface - described in a separate operating manual
- Modbus interface - described in a separate operating manual
- Custom-made design - flat rate for air humidity transmitter series per order
- Factory calibration certificate, calibration equipment, certified calibration ampoules and reference devices - for continuous monitoring



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## 4. Installation of the transmitter

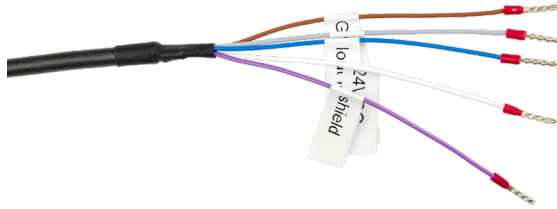
### 4.1 Laying of the supply line or transmission line

- The cable must not be laid in the area of interference fields.
- Do not operate the transmitter in the area of electromagnetic interference fields.
- The permissible cross-sections for the installation must be observed.
- The cable length must be kept as short as possible.
- » If an extension of the cable is required, the cross-section of the extension must not be below 0.25 mm<sup>2</sup>.
- If the electronics housing and the display electronics are grounded, an appropriate equipotential bonding conductor must be provided.

### 4.2 Mounting the transmitter

- The measuring probe must be positioned at a representative location.
- » Avoid positions of draught and unnatural temperature fluctuations.
- » Do not expose the device to direct sunlight.
- Do not unscrew the sensor cap!
- » If the sensor tube is twisted, the tightness is no longer guaranteed.
- In case of possible formation of condensation water, mount the sensor tube at a slightly upwards angle.
- » This ensures that the condensation water can run off towards the housing or cable and drip off there.

### 4.3 Pin assignment



Cable color	Pin no.	Function
White	1	Power supply V- (0 VDC) Ground current output
Brown	2	Power supply V+ (12 to 29 VDC)
Green	3	Analogue output humidity 4 - 20 mA
Yellow	4	n.c.
Grey	5	Analogue output temperature 4 - 20 mA
Purple	Housing	Equipotential bonding GND



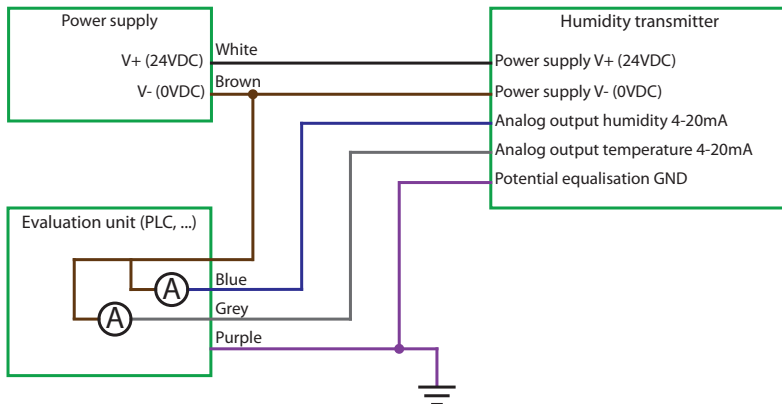
### ATTENTION

#### Damage to the electronics due to incorrect connected cables

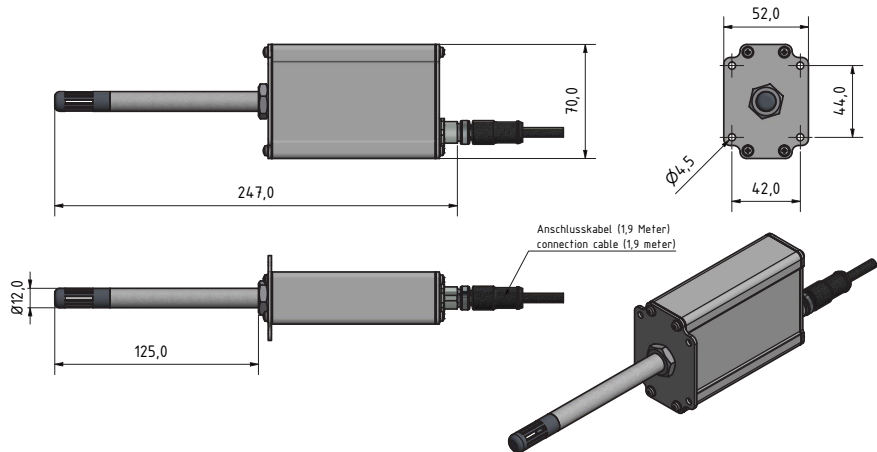
Incorrect connected cables can lead to severe damage to the electronics.

- ▶ Connect all cables correctly.

### 4.4 Wiring diagram



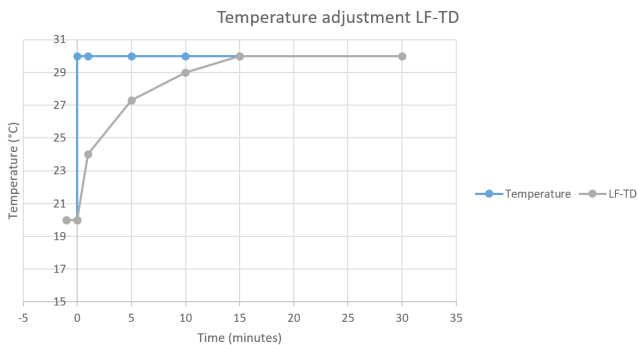
## 5. Technical drawing LF-TD 90



## 6. Adjustment behaviour of the sensor

In humidity and temperature measurement, several parameters are responsible for the adjustment behaviour (time until the actual measured value is displayed). The parameter responsible for the highest measuring error is a temperature discrepancy between the sensor resp. the whole measuring instrument and the material being measured resp. the air.

Therefore, let the device adjust until the displayed temperature corresponds to the actual temperature. The graph below shows how long it takes to adjust from 20 °C to 30 °C.



To demonstrate the importance of temperature adjustment, the table below shows the measuring errors due to a temperature difference between the measuring instrument and the material being measured of only 1 °C / 1.8 °F, at different ambient temperatures.

	10 °C (50 °F)	20 °C (68 °F)	30 °C (86 °F)
10 % r.h.	+/- 0.7 %	+/- 0.6 %	+/- 0.6 %
50 % r.h.	+/- 3.5 %	+/- 3.2 %	+/- 3.0 %
90 % r.h.	+/- 6.3 %	+/- 5.7 %	+/- 5.4 %

At room temperature (20 °C / 68 °F) and an assumed humidity value of 50 % relative humidity a temperature difference between the measuring sensor and the material being measured of 1 °C / 1.8 °F causes a measurement error of 3.2 % relative humidity. A temperature difference of 3 °C / 5.4 °F would cause a measurement error of more than 10 % relative humidity.

## 7. Definition relative humidity

Indicates the relationship between the current water vapour pressure and the maximum possible, the so-called saturation vapour pressure.

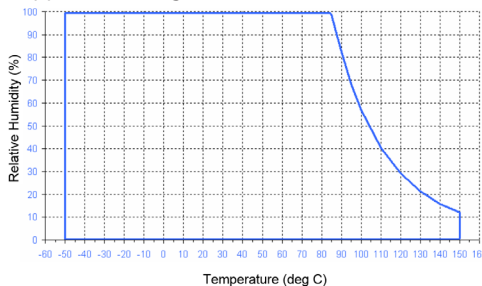
The relative humidity shows the degree the air is saturated with water vapour.

Examples:

50% relative humidity: At the current temperature and pressure, the air is half saturated with water vapour. 100% relative humidity means that the air is totally saturated with water vapour. If the air has more than 100% humidity, the excessive humidity would condense or precipitate as mist.

### 7.1 Application range

Within the normal application range (normal range) the accuracy of the device is as indicated. A long-term application beyond the normal application range (max. range), particularly at an air humidity of more than 80%, can lead to higher measuring errors. Back in the normal application range, the sensor will return to the indicated accuracy automatically.



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## 8. Cleaning and maintenance

Regularly cleaning and maintaining the device will ensure that it will have a long service life and stay in good condition.

### 8.1 Care instructions

- Do not leave the device out in the rain.
- Do not immerse the sensor in water.
- Do not expose the device to extreme temperatures.
- Protect the device from strong mechanical shocks and loads.

### 8.2 Cleaning the device



#### **ATTENTION**

##### **Do not clean with fluids**

Water or cleaning fluid getting inside the device can destroy the device.

- ▶ Only clean with dry materials.

#### Aluminium housing and sensor tube

Clean the aluminium housing and the sensor tube with a dry cloth.

#### Air humidity and temperature sensor

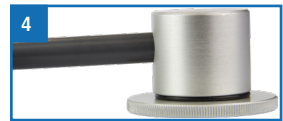
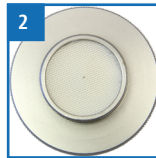
The air humidity and temperature sensor cannot be cleaned. In case of a polluted sensor please contact your dealer.

## 9. Checking the calibration

**To do so:** Calibration equipment (art.no.10006) and calibration ampoules (humidity standards art.no. 10005) required. The device, the calibration equipment and the humidity standards must have a temperature between 20.0 °C and 26.0 °C. It is recommended to store the device, the calibration equipment and the calibration ampoules in a room with little temperature fluctuation for 24 hours.

### 9.1 Assembling the calibration equipment

1. If needed, place the sealing ring over the threads of the lower part like shown in figure 1.
2. Put the textile pad in the lower part (figure 2) and carefully pour the humidity standard onto the pad, beginning with the humidity standard of 35 % relative humidity.
3. Carefully place the upper part onto the lower part (figure 3) and tighten the upper part clockwise.
  - » Recommendation: Keep the lower part on the table while screwing on the upper part.
  - » If necessary, only lift the calibration equipment straight up and do not tilt or turn it over.
4. In case it has been lifted, carefully place the calibration equipment onto an even table.
5. Insert the sensor tube into the upper part of the calibration equipment (figure 4).
  - » Take care to lift the device with calibration equipment straight up and not to tilt or turn it over. Otherwise the sensor may be damaged.
  - » Leave the calibration equipment mounted on the sensor tube until explicitly stated otherwise.





## ATTENTION

### Damage to the sensor

By tilting or turning the device with mounted calibration equipment the sensor can be destroyed.

- ▶ Only lift the device with mounted calibration equipment straight up.

## 9.2 Determining the deviation

1. Let the sensor adjust to the humidity standard for at least 2 hours.
2. Then note down the measured relative humidity and temperature.
3. At ideal temperature conditions (device, calibration equipment and humidity standard have a temperature of 23 °C), the value printed on the humidity standard can be used as reference value.
4. In case of deviation from the factory temperature (23.0 °C), the real humidity value must first be determined according to the table below.

Temperature	Humidity standards		
	35 %	50 %	80 %
20 °C	34.6 %	49.8 %	79.9 %
21 °C	34.8 %	49.8 %	80.0 %
22 °C	34.9 %	49.9 %	80.0 %
23 °C	35.0 %	50.0 %	80.0 %
24 °C	35.1 %	50.1 %	80.0 %
25 °C	35.2 %	50.2 %	80.0 %
26 °C	35.4 %	50.2 %	80.1 %

5. Note down the real humidity value.
6. Compare the noted displayed measuring value with the real humidity value.
  - » If the deviation revealed is below 1.5 % relative humidity, it is not recommended to recalibrate.
  - » If the deviation revealed is more than 1.5 % relative humidity, please contact your dealer.
7. Now remove the calibration equipment from the sensor tube and repeat the procedure from "[9.1 Assembling the calibration equipment](#)", optionally with the humidity standard 50 % relative humidity or the humidity standard 80 % relative humidity.

## 10. Faults

If the measures listed below fail to remedy any faults or if the device has faults not listed here, please contact Schaller GmbH.

Fault	Cause	Remedy
Measuring error	The temperature is outside the operating temperature: lower than -20 °C or higher than +90 °C	Only use the device in temperatures between -20 °C and +90 °C.
	Measurement error due to too short temperature adjustment time	Let the device adjust to the surroundings (see "6. Adjustment behaviour of the sensor").
	Sources of heat or cold that do not correspond to the surrounding temperature	Reposition your device at a location that is representative for the room climate.
	Dripping water or sprayed water	Direct contact of the sensor with dripping or sprayed water will destroy it.
	Irreversible damage of the sensor due to aggressive gases	Please contact your dealer.
	Condensation caused by a change in temperature	Condensation on the sensor interferes with the calibration. Let the device adjust to the surrounding temperature.
	Polluted air humidity and temperature sensor	Please contact your dealer.
	Foreign particles on the sensor	Please contact your dealer.



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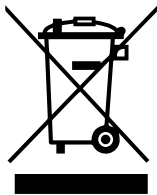
## 11. Storage and disposal

### 11.1 Storing the device

The device must be stored as follows:

- Do not store outdoors.
- Store in a dry and dust-free place.
- Protect the device from sunlight.
- Avoid mechanical shocks/loads.
- Storage temperature: -20 °C to +60 °C

### 11.2 Disposing of the device



Devices marked with this symbol are subject to Directive 2012/19/ EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE).

If the device is being operated outside the European Union, the national regulations on the disposal of such devices that apply in the country of use must be observed.

Electronic devices must not be disposed of as domestic waste.

The device must be disposed of appropriately using appropriate collection systems.

## 12. Device information

### 12.1 Technical data

Measuring range rel. air humidity	0 % to 100 %
Calibration rel. air humidity	10 % to 90 %
Accuracy rel. air humidity	+/- 2.0 % (at 25 °C)
Measuring range temperature	-20 °C to +90 °C
Calibration temperature	+10 °C to +60 °C
Accuracy temperature	+/- 0.3 °C (at 25 °C) / +/- 0.5 °F (at 77 °F)
Operating temperature	-20 °C to +90 °C (sensor tube) -20 °C to +85 °C (electronics)
Outputs	rel. air humidity (4 - 20 mA) -Scaling (0 % to 100 %) Temperature (4 - 20 mA) -Scaling (-20 °C to +90 °C) Working resistance < 500 Ohm (UB 24 V)
Temperature compensation	Automatic
Power supply	12 to 29 VDC
Current consumption	18 mA (without interfaces, display or any bus systems)
Electrical connection	Sensor plug with 1.9 m cable
Housing dimensions	70 x 32 x 120 mm
Housing material	Anodised aluminium
Sensor tube dimensions	12 x 125 mm
Sensor tube material	Stainless steel
Sensor cap	Plastic with filter paper
IP rating electronics housing	IP 54

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## 13. Notes

A series of 15 horizontal dotted lines for taking notes.



Climate  
Environment



Materials



Food



Buildings



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