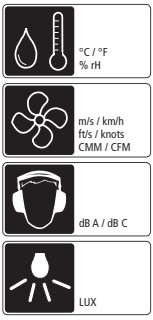
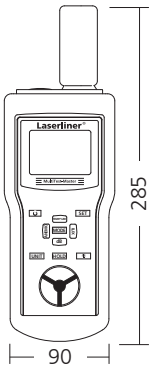
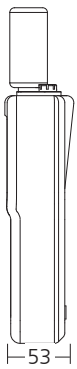
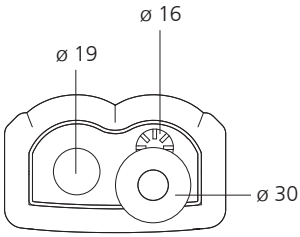
MultiTest-Master









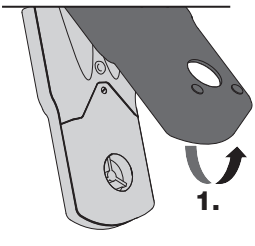
Laserliner®
Innovation in Tools

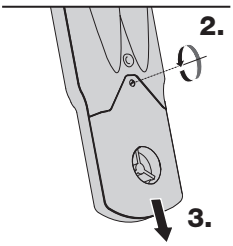
> **!** Lesen Sie die Bedienungsanleitung und das beiliegende Heft „Garantie- und Zusatzhinweise“ vollständig. Befolgen Sie die darin enthaltenen Anweisungen. Diese Unterlagen gut aufbewahren.

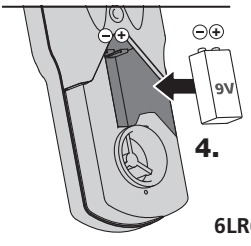
Function/Application

This product is an all-in-one measuring device that allows you to measure all the key quantities associated with environmental measurements in the field of building physics. Within surveying applications, it can be used to measure the following: Ambient temperature (climate, building moisture), relative humidity (climate, building moisture), wind speed/air flow (climate, ventilation, heating), illuminance (illumination), sound pressure level (noise). Consequently, you can use it to determine and assess the impact that general environmental conditions are likely to have on human physiology.

1







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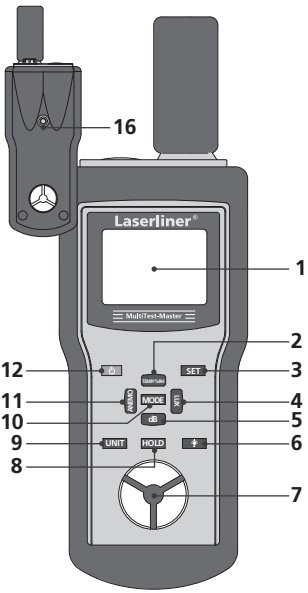
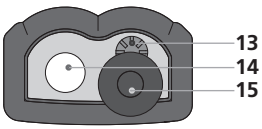
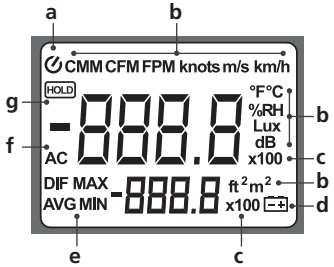


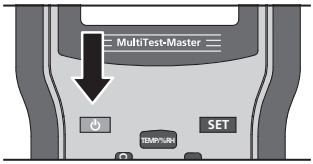


1	LCD display
2	Temperature/Relative humidity
3	Cross sectional area for volumetric flow
4	Illuminance (lux)
5	Sound pressure level (dB)
6	Display illumination
7	Fan wheel
8	Hold current measured value
9	Change unit
10	Min., max., average or difference value
11	Wind speed/Air flow
12	ON/OFF
13	Temperature/Humidity sensor
14	Light sensor
15	Microphone/Wind deflector
16	1/4“ tripod connection

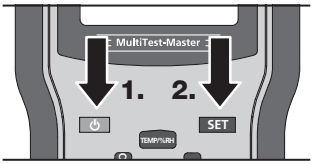


a	AUTO OFF function
b	Wind speed/Air flow units: Cubic metres per minute, cubic feet per square foot, feet per minute, knots, metres per second, kilometres per hour, Fahrenheit, Celsius, % relative humidity, lux, decibels, square feet, square metres
c	Measured value factor: x10; x100
d	Low battery charge
e	Min., max., average or difference value
f	Sound pressure dB A, dB C
g	Hold current measured value

2 ON / OFF



3 AUTO OFF FUNCTION



Activated Deactivated

When you switch the device on, the „AUTO OFF FUNCTION" is activated automatically. After 20 minutes, the device switches off automatically unless one of the buttons is pressed. To activate or deactivate the device's „AUTO OFF FUNCTION", press the „SET" button while pressing and holding down the „ON/OFF" button. For optimum measurements, please wait approximately 15 minutes after switching on the measuring device so that it has time to adapt to the new ambient conditions in a particular room.

4 Display illumination

If visibility is poor, switch on the display illumination. In order to preserve the batteries, the illumination switches off automatically after 10 seconds. To reactivate it, simply press the button again.

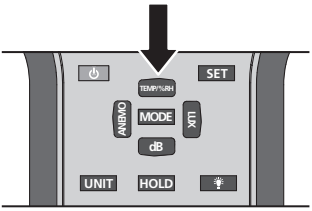
5 Ambient temperature

When you switch the device on, it shows the current ambient temperature in °C on the display. To display the value in °F, press the „Unit" button. By pressing the „Mode" button, you can get the device to display the highest (MAX), lowest (MIN), average (AVG) or difference value (DIF) in addition to the current measured value. As its name suggests, the „HOLD" button enables you to hold the current measured value.

! In the event of rapid temperature fluctuations (± 1°C), the sensor needs to adapt to the new conditions. Consequently, it takes a certain amount of time for a stable value to be established.

6 Relative humidity

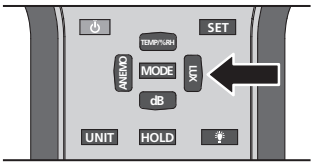
Relative humidity may be defined as the ratio between the air's current water vapour content and the maximum that it can contain at the same temperature and constant pressure. Hot air can hold more water vapour than cold air. At 100% relative humidity, the saturation point has been reached and the air cannot hold any more water vapour.



Press the „Temp/%rH" until a measured value in % relative humidity (%RH) appears on the display. By pressing the „Mode" button, you can get the device to display the highest (MAX), lowest (MIN), average (AVG) or difference value (DIF) in addition to the current measured value. As its name suggests, the „HOLD" button enables you to hold the current measured value.

! In the event of rapid fluctuations in relative humidity (± 1%), the sensor needs to adapt to the new conditions. Consequently, it takes a certain amount of time for a stable value to be established.

7 Illuminance (lux)



A photoelectric sensor is used to measure the incident light intensity. This is the power of the radiated light per unit of area. Photometry defines light in terms of how it is perceived by the human eye. The sensitivity of the eye also depends on the wavelength or light colour. The measuring unit uses special colour filters on the sensor that adapt to the sensitivity curve (CIE curve).

After switching on the device, press the „Lux" button.
Please observe the following application notices when determining illuminance:
– Align the sensor on the measuring surface so it is perpendicular to the light source
– During measurement, the incidence of light must not be affected by shadows from the operator or other objects not involved in the measurement
– Remove the wind deflector from the microphone
– You can check the measuring device's zero position by covering the sensor completely.
– Discharge, fluorescent or energy-saving lamps should be switched on well in advance of the measurement process (approximately 15 minutes) so that the brightness has time to stabilise

By pressing the „Mode" button, you can get the device to display the highest (MAX), lowest (MIN), average (AVG) or difference value (DIF) in addition to the current measured value. As its name suggests, the „HOLD" button enables you to hold the current measured value.

! The device measures radiation in the main direction, perpendicular to the sensor plane. Incident light rays at an angle are taken into account by the sensor using an adjustment curve.

Reference values for illuminance in indoor spaces

Practical example	Luminous intensity in lux
Traffic areas, ancillary rooms	20
Corridors in buildings used by people	50
Sanitary facilities, machine rooms, staircases	100
Regularly occupied work stations within production facilities, canteens	200
Conference rooms, gyms	300
Offices, medical facilities (emergency unit)	500
Design and drawing rooms	750
Monitoring locations, assembly rooms, test stations	1000
Assembly rooms for small components	1500

The amount of light available in outdoor spaces is approximately 100 times greater than in indoor spaces. In the event of a high incidence of light, the measured value on the display is reduced by a factor of 10 or a factor of 100.

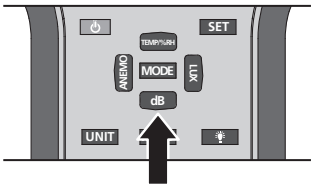
Reference values for illuminance in outdoor spaces

Practical example	Luminous intensity in lux
Sunshine	50,000 – 100,000
Overcast	2000 – 10,000
Good street lighting	20
Full moon	0.01 – 0.1

8 Sound pressure level (dB)

This device registers sound in a similar way to the human ear. The integrated microphone receives the incoming sound waves and converts them into electrical signals. Human hearing involves specific auditory curves. The greater the sound pressure, the louder the sound is perceived to be. The higher the frequency, the higher the pitch of the sound is perceived to be. To ensure that measurements are aurally compensated, this measuring device is fitted with filters. The A-weighting (dB A) replicates the frequency response associated with human hearing and is used for the majority of industrial noise and environmental noise measurements. The C-weighting is used in the case of scientific measurements, for example.

After switching on the device, press the „dB" button. To switch between dB (A) and dB (C), press the „Unit" button. Point the microphone towards the relevant sound source and observe the relevant distance. By pressing the „Mode" button, you can get the device to display the highest (MAX), lowest (MIN), average (AVG) or difference value (DIF) in addition to the current measured value. As its name suggests, the „HOLD" button enables you to hold the current measured value.

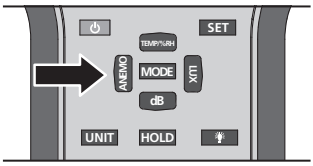


! Powerful wind noises (> 10m/s) can affect the measured value. In such cases, you should use the wind deflector supplied with the product.

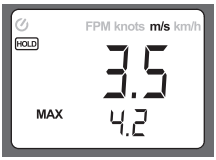
Sound source	Sound pressure level in dB (A)
Auditory threshold	0
Quiet residential area	30 to 40
Low-level conversation, quiet office	40 to 50
Normal conversation	50 to 60
Heavy road traffic	70 to 80
Shouting, screaming	80 to 85
Pneumatic hammer (10 m away)	90 to 100
Start-up of a jet aircraft (100 m away)	120 to 130
Pain threshold	140

9 Wind speed/Air flow

The measuring device is capable of measuring wind speed or air flow with the built-in fan wheel. The resulting measurements can be output in various units. On the basis of these quantities, it is also possible to measure volumetric flow.

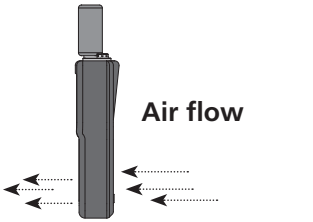


After switching on the device, press the „Anemo" button. Press the „Unit" button repeatedly to change the units: FPM (feet per minute), knots, m/s (metres per second) and km/h (kilometres per hour). Press the „Anemo" button again if you want to determine the volumetric flow. Use the „Unit" button to switch between the units CMM (cubic metres per minute) and CFM (cubic feet per minute). Firstly, measure the flow opening area. Then you can set the measured area by pressing the „Set" button and making the necessary adjustments with the „Unit" (change position of decimal point), „Hold" (+) and „Illumination" (-) buttons. Press the „Set" button to confirm your entry.



Please observe the following application notices when determining wind speed/air flow:
– Avoid direct sunlight during the measurement process
– Place the device as close as possible to the source of the air flow
– Position the device parallel to the source of the air flow
– Use the MAX function to determine the point where the air flow is greatest

By pressing the „Mode" button, you can get the device to display the highest (MAX), lowest (MIN), average (AVG) or difference value (DIF) in addition to the current measured value. As its name suggests, the „HOLD" button enables you to hold the current measured value.



Wind force	m/s	km/h	Knots	Description
0	0.0 to 0.2	0	0	Calm
1	0.3 to 1.5	1 to 5	1 to 3	Light air
2	1.6 to 3.3	6 to 11	4 to 6	Light breeze
3	3.4 to 5.4	12 to 19	7 to 10	Gentle breeze
4	5.5 to 7.9	20 to 28	11 to 15	Moderate breeze
5	8.0 to 10.7	29 to 38	16 to 21	Fresh breeze
6	10.8 to 13.8	39 to 49	22 to 27	Strong breeze
7	13.9 to 17.1	50 to 61	28 to 33	Moderate gale
8	17.2 to 20.7	62 to 74	34 to 40	Fresh gale
9	20.8 to 24.4	75 to 88	41 to 47	Strong gale
10	24.5 to 28.4	89 to 102	48 to 55	Whole gale
11	28.5 to 32.6	103 to 117	56 to 63	Violent storm
12	> 32.6	> 117	> 63	Hurricane

! Functional and operational reliability are only warranted when the measuring device is operated within the specified climatic conditions and only when used for those purposes for which it is designed. It is the user's responsibility to assess the measurement results and any actions taken as a consequence in accordance with the nature of the task concerned.

Technical data	
Ambient temperature Resolution Accuracy	-10°C to 60°C 0.1°C ± 1.5°C
Relative humidity Resolution Accuracy Resolution Accuracy	0% to 100% r.H. 0.1% (20 to 80%) ± 3% / 25°C 0.1% (< 20% and > 80%) ± 5% / 25°C
Sound pressure level 30 to 130dB (A): Resolution Accuracy **Sound pressure level 30 to 130dB (C):** Resolution Accuracy Frequency range Test conditions	 0.1% ± 1.5 dB 0.1% ± 1.5 dB 100 to 8000 Hz 94dB, 1 kHz sine curve
Illuminance At a colour temperature of 2856 K, calibrated according to reference incandescent lamp 2856K 0 to 2 klx: Resolution / Accuracy 0 to 20 klx: Resolution / Accuracy 0 to 50 klx: Resolution / Accuracy	 1 lux / ± (5% of measured value + 10 digits) 10 lux / ± (5% of measured value + 10 digits) 100 lux / ± (5% of measured value + 10 digits)
Wind speed 0.5 to 20 m/s: Resolution / Accuracy 1.8 to 72 km/h: Resolution / Accuracy 1.6 to 65.7 ft/s: Resolution / Accuracy 0.9 to 38.9 knots: Resolution / Accuracy	 0.1m/s / ± (3% of measured value + 10 digits) 0.1km/h / ± (3% of measured value + 10 digits) 0.1ft/s / ± (3% of measured value + 10 digits) 0.1 knots / ± (3% of measured value + 10 digits)
Air flow 0 to 999.9 CMM m/s: Accuracy 0 to 999.9 CFM ft/s: Accuracy	 ± (3% of measured value + 10 digits) ± (3% of measured value + 10 digits)
Power supply	1 x 9 V IEC 6F22
Operating temperature	0°C to 60°C
Dimensions (W x H x D)	280 x 89 x 50 mm
Weight	0.430 kg

Subject to technical changes without notice. 06/10

EU-Bestimmungen und Entsorgung

Das Gerät erfüllt alle erforderlichen Normen für den freien Warenverkehr innerhalb der EU. Dieses Produkt ist ein Elektrogerät und muss nach der europäischen Richtlinie für Elektro- und Elektronik-Altgeräte getrennt gesammelt und entsorgt werden.

Weitere Sicherheits- und Zusatzhinweise unter: **www.laserliner.com/info**

MoistureMaster

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