ENGLISH

User manual

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1. PRECAUTION AND SAFETY MEASURES

The instrument has been designed in compliance with the directives relevant to electronic measuring instruments. For your safety and in order to prevent damaging the instrument, please carefully follow the procedures described in this manual and read all notes preceded by the symbol ⚠ with the utmost attention.

CAUTION

In case the instrument is used in a way different from the one described in this user manual, this could result in a failure of the protections the instrument is provided with.

CAUTION

When this symbol is displayed, the instrument is not able to emit a laser pointer. **Always prevent the laser from radiating to your eyes, in order to prevent any injury.** Class II laser device compliant with EN 60825-1

In this manual, and on the instrument, the following symbols are used:

Warning: observe the instructions given in this manual; improper use could damage the instrument or its components

Warning: always prevent the laser from radiating to your eyes, in order to prevent any injury

The instrument and its accessories must be collected separately and correctly disposed of in the appropriate containers

2. PREPARATION FOR USE

2.1. Initial checks

Before shipping, the instrument has been checked from an electric as well as mechanical point of view. All possible precautions have been taken so that it is delivered undamaged.

However, we recommend generally checking the instrument in order to detect possible damage suffered during transport. In case anomalies are found, immediately contact the forwarding agent.

We also recommend checking that the packaging contains all components indicated in § 9. In case of discrepancy, please contact the Dealer.
In case the instrument should be returned, please follow the instructions given in § 10.1

2.2. Instrument power supply

The instrument is supplied with two 1.5V AAA LR03 batteries, included in the package. Battery life equals about 5000 measurements. The "  " symbol flashes on the display when the battery is flat. Replace the battery by following the instructions given in § 6

2.3. Storage

In order to guarantee precise measurement, after a long storage time under extreme environmental conditions, wait for the instrument to come back to normal condition (see § 8.1). Given its simplicity, the instrument does not need any periodic calibration.

3. INSTRUMENT DESCRIPTION

3.1. Description of the controls

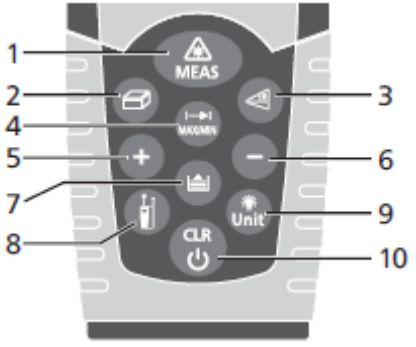


Fig. 1: Instrument description

Caption	Description
1	**ON/MEAS** key
2	**Area/Volume** key
3	Key for indirect distance measurement
4	Key for single/continuous distance measurement
5	"**+**" key
6	"**-**" key
7	Key for saving measurement results
8	Reference setting key
9	**Backlight/Measuring unit** key
10	**OFF/CLR** key

3.2. Display description

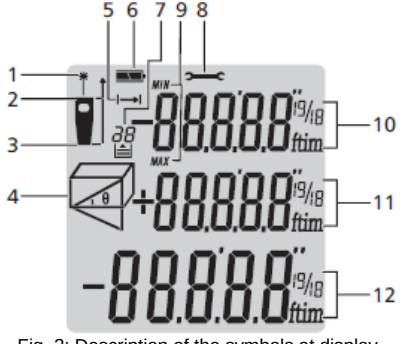


Fig. 2: Description of the symbols at display

Caption	Description
1	Active laser
2	Front reference
3	Rear reference
4	Type of measurement: → Area measurement → Volume measurement → Indirect 2-point measurement → Indirect 3-point measurement
5	Single distance measurement
6	Battery charge level
7	Memory for partial data saving
8	Instrument error message
9	Max and Min measurements in continuous mode
10	First measurement partial value display
11	Second measurement partial value display
12	Last measurement value display and result

3.3. General description of the instrument

DM40 has the following functions:

- Direct measurement of distances expressed in m/in/ft and ft+in
- Measurement of area and volume
- Indirect 2- and 3-point distance measurement (Pitagora)
- Distance measurement in continuous mode
- Sum/difference of measured distance values
- Setting of measuring reference
- Activation of the laser pointer for measurement
- Partial operations with use of internal memory (max 20 locations)
- Display backlight

The model is provided with a comfortable membrane keyboard with 10 function keys and a class II laser pointer for a precise definition of the application point.

The measurement of distance between two points (with a measuring range from 5cm to 40m) is carried out by reflection of the laser light from the surface hit to the receiving sensor located in the upper part of the instrument.

Measurement can be influenced by the brightness of the environment in which it is performed and by the type of surface hit by the laser pointer.

4. OPERATING INSTRUCTIONS

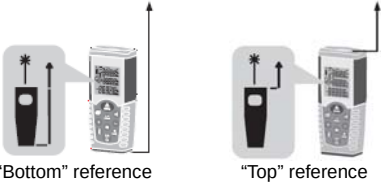
4.1. Initial operations and settings

- Press the MEAS key to switch on the instrument and the laser pointer. Press and hold the CLR key to switch off the instrument.
- Press the CLR key to clear (CLR) the last datum shown on the display.
- Press the key to see the saved distance values. Press the and CLR keys at the same time to delete the temporary memory's content. The value "0" is shown on the display.
- Press the Unit key to activate/deactivate the backlight of the display.
- Press and hold the Unit key to activate the section for setting distance measuring units. Cyclically press the key to select the options: "**m**", "**ft**", "**in**" and "**ft+in**"

4.2. Setting of measuring reference

In order to perform correct measurements, it is important to define beforehand the measuring reference on the instrument by pressing the key. Possible options are (see the following figure):

- **Top** → measurement is carried out by the upper part of the instrument.
- **Bottom** → measurement is carried out by the lower part of the instrument and therefore also the whole instrument length is considered (default condition)



"Bottom" reference "Top" reference

4.3. Distance measurement

1. With the instrument in stand-by, press the MEAS key to activate the laser pointer
2. Use the laser pointer to precisely determine the measuring point, keeping the instrument as perpendicular as possible with respect to the surface of the object to be measured
3. Press the MEAS key again for measuring. The value will be displayed in the selected measuring unit (see § 4.1) and the result will be automatically saved in the memory area

4.4. Continuous distance measurement

Upon start-up, the instrument is set to normal mode or measuring the distance between 2 points. Continuous measuring mode allows for a dynamic management of the distance and the display of the maximum and minimum measurement values.

1. With the instrument in stand-by, press the key to select the desired type of reference (see § 4.2)
2. Press and hold the key to activate the continuous measuring mode. The indications “Min” and “Max” are shown on partial displays
3. Press the MEAS or **OFF/CLR** key to stop continuous measurement. The function is automatically stopped after approx. 20s
4. The minimum and maximum value of distance are shown in the partial displays while continuous measurement is shown dynamically when moving the instrument (see Fig. 3) in the resulting display

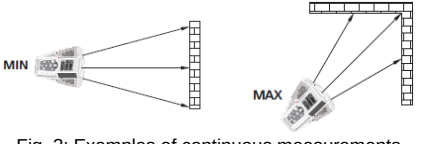


Fig. 3: Examples of continuous measurements

5. Press the key to exit the continuous measuring mode and go back to normal mode

In Fig. 4 some applications of continuous measurement are indicated

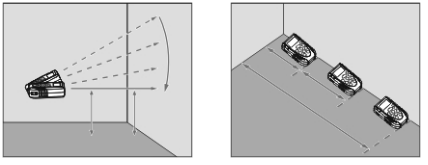


Fig. 4: Applications of continuous measurement

4.5. Additions / subtractions of measures

When measuring distance, it is possible to use the following functions:

Key	Function
+	The subsequent measure is added to the previous one. The result of the sum is shown on the resulting display.
−	The subsequent measure is subtracted from the previous one. The result of the difference is shown on the resulting display.

4.6. Area measurement

This measurement allows calculating the area of surfaces expressed in m^2, in^2 or ft^2

1. With the instrument in stand-by, press the key to select the desired type of reference (see § 4.2)
2. Press the key to enter the Area/Volume measuring section. The symbol "▱" appears on the display with side "1" flashing
3. Press the MEAS key to perform the first measurement (length) of the surface concerned (see Fig. 5). The corresponding value appears on the first partial display. The symbol "▱" appears on the display with side "2" flashing
4. Press the MEAS key again to perform the second measurement (width) of the surface concerned (see Fig. 5). The corresponding value appears on the second partial display, while the (up-to-date) total value of the area appears on the resulting display
5. Measuring result is automatically saved in the instrument's memory

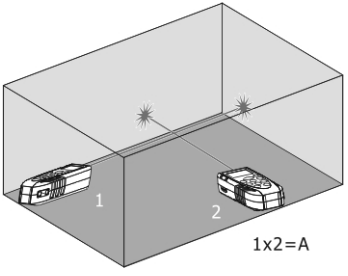


Fig. 5: Example of area measurement

4.7. Volume measurement

This measurement allows calculating the volume of solids expressed in m^3, in^2 or ft^3

1. With the instrument in stand-by, press the key to select the desired type of reference (see § 4.2)
2. Press the key twice to enter the Area/Volume measuring section. The symbol "▭" appears on the display with side "higher" flashing
3. Press the MEAS key to perform the first measurement (length) of the surface (see Fig. 6). The corresponding value appears on the first partial display. The symbol "▭" appears on the display with side "1" flashing
4. Press the MEAS key again to perform the second measurement (width) of the surface (see Fig. 6). The corresponding value appears on the second partial display. The value of the corresponding area is shown in the resulting display. The symbol "▭" appears on the display with side "2" flashing
5. Press the MEAS key again to perform the third measurement (height) (see Fig. 6). The total value of volume is shown in the main resulting display
6. Measuring result is automatically saved in the instrument's memory

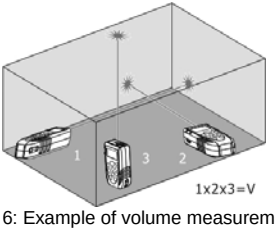


Fig. 6: Example of volume measurement

4.8. Indirect 2-point measurement

Indirect measurement allows precisely evaluating a distance between two points on a vertical wall (height) exploiting the mathematical principle of the Pythagorean theorem. For accurate measures we recommend using a tripod.

1. With the instrument in stand-by, press the key to select the desired type of reference (see § 4.2)
2. Press the key to enter the indirect 2-point measuring section. The symbol "△" appears on the display with side "1" flashing
3. Position the instrument in the highest point (1) of measurement (see Fig. 7) and press the MEAS key to measure. The result appears on the first partial display. The symbol "△" appears on the display with side "2" flashing
4. Position the instrument as horizontally as possible (2) (see Fig. 7) and press the MEAS key to measure. The result appears on the second partial display
5. The final value of the result (obtained as $\sqrt{(1)^2-(2)^2}$) is shown in the resulting display
6. Measuring result is automatically saved in the instrument's memory

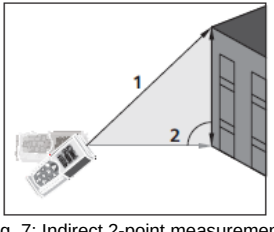


Fig. 7: Indirect 2-point measurement

4.9. Indirect 3-point measurement

1. With the instrument in stand-by, press the key to select the desired type of reference (see § 4.2)
2. Press the key twice to enter the indirect 3-point measuring section. The symbol "" appears on the display with side "1" flashing. The distance to be measured flashes on the symbol
3. Position the instrument in the lowest point (1) of measurement (see Fig. 8) and press the key. The result appears on the first partial display. The symbol "" appears on the display with side "2" flashing
4. Position the instrument as horizontally as possible (2) (see Fig. 8) and press the key to measure. The result appears on the second partial display. The symbol "" appears on the display with side "3" flashing
5. Position the instrument in the highest point (3) of measurement (see Fig. 8) and press the key to measure
6. The final value of the result obtained with the combination of previous measures is shown in the resulting display
7. Measuring result is automatically saved in the instrument's memory

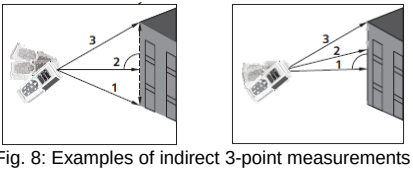


Fig. 8: Examples of indirect 3-point measurements

4.10. Operations with the memory

The instrument is provided with a memory section in which it is possible to recall measuring results. It is possible to save up to 20 measurements, shown in reverse order.

- Use the + or − keys for internal navigation.
- Press the MEM and CLR keys at the same time to delete the memory's content

5. MEASURING CONDITIONS

Measuring range

The instrument's measuring range is 40m. At night, under poor visibility conditions or if the surface to be measured is in shadow, the measuring range can be reduced. To prevent this, carry out measurements during the day or use luminous plates when the object to be measured has poor reflecting properties.

Object surface

The instrument can give errors when measurements are carried out on colourless liquids (e.g. water), transparent glass, polystyrene, very polished or half-permeable surfaces because of the deviation of the laser beam. Non-reflecting surfaces may cause delays when measuring.

Maintenance

Do not immerse the instrument in water. To clean the instrument, use a soft cloth moist with neutral detergent

6. REPLACING INTERNAL BATTERIES

The instrument is supplied by 2x1.5V AAA LR03 alkaline batteries. When the symbol "  " flashes on the display, it is necessary to replace the batteries. Proceed as follows:

1. Loosen the battery compartment cover fastening screw and remove the cover (see Fig. 9)
2. Remove the batteries and insert the same number of batteries of the same type, respecting the correct polarity. **Only use alkaline batteries**
3. Restore the battery compartment cover and fasten the relevant screw

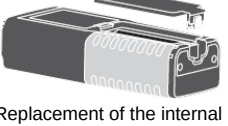


Fig. 9: Replacement of the internal battery

7. ERROR MESSAGES ON THE DISPLAY

Code	Description	Solution
204	Calculation error	Press MEAS and repeat procedure
208	Weak signal reflection, measuring time too long, distance > 40m or <5cm	Carry out measurement on an appropriate surface
255	Hardware error	Turn off the instrument and turn it on again several times. Contact Customer Service if the message is displayed again.

8. TECHNICAL SPECIFICATIONS

8.1. Technical characteristics

Measuring range (*):	0.05 ÷ 40m (0.2in÷131ft)
Resolution:	0.001m (0.001ft)
Accuracy (@10m):	±1.5mm (**)
Laser pointer:	635nm, Class II, <1mW
Display:	LCD, 5 digits with backlight
Power supply:	2x1.5V type AAA LR03
Duration:	up to 5000 measurements
Operating temperature:	0°C ÷ 40°C
Storage temperature:	-10° ÷ 60°C
Auto power off:	30s (laser), 3min (DM40)
Size (LxWxH):	110 x 48 x 28mm
Weight (batteries included):	135g
Mechanical protection:	IP54

(*) Measuring range and accuracy depend on the correct reflection of the laser beam from the surface of the object to the instrument's sensor and on the brightness of the environment in which tests are performed.
(**) Under favourable conditions (optimum object surface, room temperature). Under unfavourable conditions (intense sunshine, poor reflective properties of the object, high variations in temperature) the resolution in measurements >10m may be higher by ±0.15mm/m (±0.0018in/ft)

8.2. Reference standards

EMC:	IEC/EN61326-1 :2006 IEC/EN61326-2-2 :2006 IEC/EN61326-1 :2005 IEC/EN61326-2-2 :2005 2004/108/EC EMC directive
Laser :	IEC/EN60825-1

9. ACCESSORIES PROVIDED

- Carrying bag
- Non-slip strap
- Batteries
- User manual

10. SERVICE

10.1. Warranty conditions

This instrument is warranted against any material or manufacturing defect, in compliance with the general sales conditions. During the warranty period, the manufacturer reserves the right to repair or replace the product.

Should the instrument be returned to the After-sales Service or to a Dealer, transport will be at the Customers charge. A report will always be enclosed to a shipment, stating the reasons for the products return. The manufacturer declines any responsibility for injury to people or damage to property.

The warranty shall not apply in the following cases:

- Repair and/or replacement of accessories and battery (not covered by warranty)
- Repairs that may become necessary as a consequence of improper use.
- Repairs that may become necessary as a consequence of improper packaging.
- Repairs which may become necessary as a consequence of interventions performed by unauthorized personnel.
- Modifications to the instrument performed without the manufacturers explicit authorization.
- Use not provided for in the instruments specifications or in the instruction manual.