PD 32

en **Operating instructions** 1–30

HILTI

282410

Printed: 07.07.2013 | Doc-Nr: PUB / 5070013 / 000 / 00
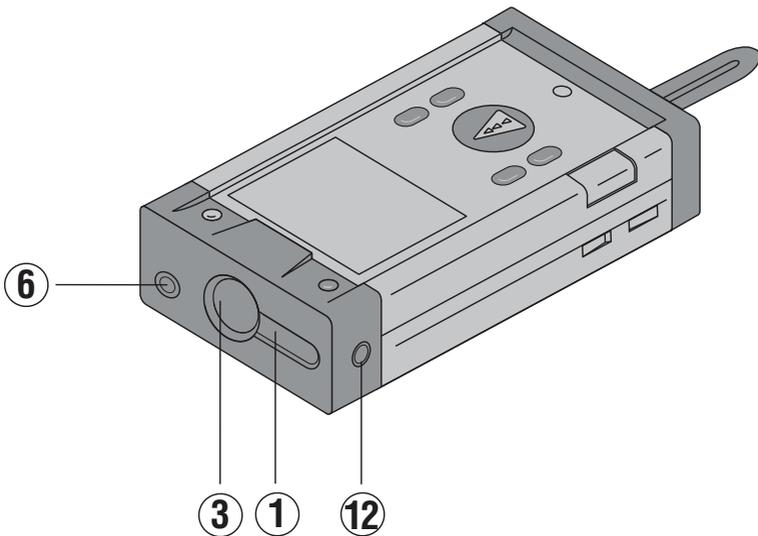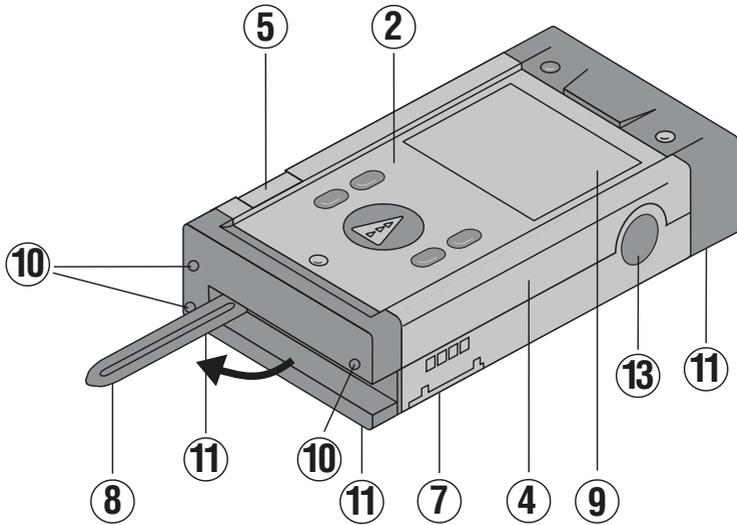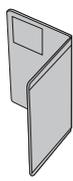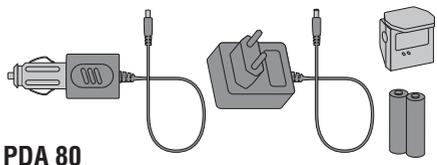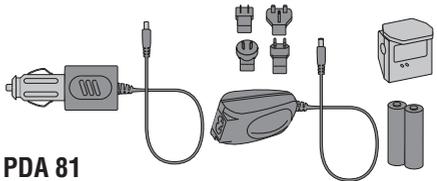
2			
PDA 50		**PDA 80**	
PDA 60		**PDA 81**	
PDA 61		**PDAW 80-1**	
PDA 62		**PDAW 80 / 81-1**	
PDA 70		**PDAW 80 / 81-2**	
PUA 60		**PDAW 80 / 81-3**	
		PDAW 81-1	
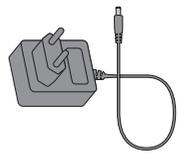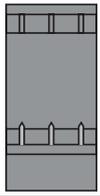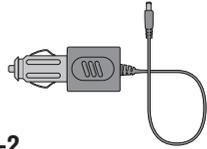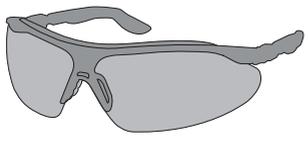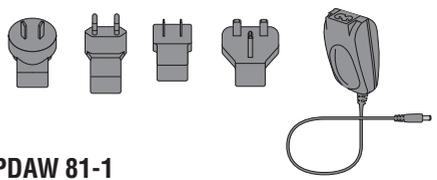
It is essential that the operating instructions are read before the range meter is used the first time.

Always keep these operating instructions together with the tool.

Ensure that the operating instructions are with the range meter when it is given to other persons.

Component parts ▮1

① Laser exit aperture
② Control panel
③ Receiving lens
④ Plastic casing
⑤ Horizontal bubble
⑥ Vertical bubble
⑦ Battery compartment
⑧ Folding spike
⑨ Graphic display of operating status
⑩ Metal contact points for precise measurement (3x rear)
⑪ Metal supports for precise measurement (3x underneath)
⑫ Optical sight
⑬ Side measuring key

Contents

1. General information

1.1 Safety notices and their meaning

- CAUTION -
This word indicates a possibly hazardous situation which could result in slight bodily injuries or damage to property.

- NOTE -
This word indicates information to help the user employ the product efficiently, and other useful notes.

1.2 Pictograms

Warning signs

General warning

Laser class 2
(Do not stare into the beam.)

Symbols

Read the operating instructions before use.

Return waste material for recycling.

1 These numbers refer to the corresponding illustrations. The illustrations can be found on the fold-out cover pages. Keep these pages open when studying the operating instructions. In these operating instructions, the PD 32 laser range meter is referred to as "the range meter".

1.3 Location of identification data on the range meter
The type designation and serial number can be found on the rating plate on the range meter. Make a note of this data in your operating instructions and always refer to it when making an enquiry to your Hilti representative or service department.

Type : _____

Serial-No.: _____

2. Description

The distance is determined along an emitted laser beam up to the surface where the laser beam is reflected. The red laser spot clearly identifies the target from which the measurement is taken.

The measuring range depends on the reflectivity and the surface structure of the target surface.

2.1 Intended use
The range meter is designed for the:
– Measurement of distances
– Calculation of areas, volumes and distances
– Addition and subtraction of distances
– Operation and storage in the specified temperatures

2.2 Items supplied

1	PD 32 laser range meter
1	PDA 50 target plate
1	PDA 60 hand strap
2	Type AA batteries
1	soft pouch
1	Operating instructions
1	Producer Certificate

2.3 Measuring principle
The range meter emits a visible laser beam with measuring waves, which are reflected returning with a phase shift. The phase shift is used to determine the distance.

This measuring principle permits highly accurate and reliable distance measurements to objects without special reflectors.
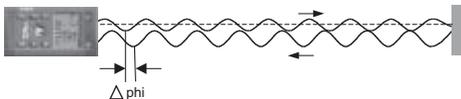
2.4 Range meter functions

2.4.1 General range meter functions
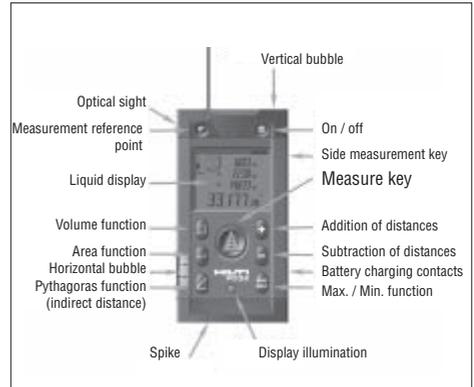
2.4.2 PD 32 Side measurement key
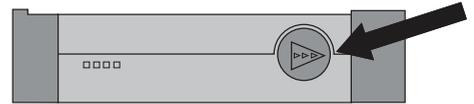
2.4.3 PD 32 Optical sight

3. Tools and accessories 2

Description	Designation
Target plate	PDA 50
Hand strap	PDA 60
Soft pouch	PDA 61
Belt clip	PDA 62
Measuring extension	PDA 70
Charging kit	PDA 80
Charging kit	PDA 81
Mains adaptor	PDAW 80-1
Mains adaptor	PDAW 81-1
Car battery plug	PDAW 80/81-2
Charging adaptor	PDAW 80/81-1
Battery pack	PDAW 80/81-3
Laser visibility glasses*	PUA 60

⚠ * These are not laser safety glasses and do not protect the eyes from laser radiation. The laser visibility glasses restrict colour vision. Therefore these are not permitted to be worn by a person driving on a public road, and must not be used look straight into the sun.

3.1 PDA 50 target plate

The PDA 50 target plate is made of durable plastic with a special reflective coating. In poor light conditions, it is advisable to use the target plate for distances above 10 m (30 ft).

⚠

- NOTE -
– For reliable distance measurements the laser beam should be perpendicular to the target plate whenever possible. If this not the case, the laser spot on the target plate may not be in the same plane as the target point and the distance measured will be incorrect.
– For very accurate measurements using the target plate, 1.2 mm (1/20 inch) should be added to the measured distances.

3.2 PDA 80 / 81 charging kits

The PDA 80 and PDA 81 charging kits enables the use of the range meters with rechargeable cells. The battery charging time takes approx.12 hours for empty cells. However, sufficient current is charged within the first 15 minutes – for 150 - 200 measurements.

Please also refer to the description of battery charging in section 6. Getting started.

Contents of PDA 80 charging kit
– Mains adaptor 100 – 240 V AC with 2-pole Europlug
– Car battery plug
– Charging adaptor for range meter
– 2 chargeable battery cells (NiMH)

Contents of PDA 81 charging kit
– Mains adaptor 100 – 240 V AC with 4 interchangeable plugs for US, GB, AUS, EU.
– Car battery plug
– Charging adaptor for range meter
– 2 chargeable battery cells(NiMH)

3.3 PDAW 80-1 mains adaptor

The mains adaptor is an integral part of the charging kit. It is equipped with a two pin plug. The mains adaptor transforms the power supply from alternating current to direct current which is used to charge the batteries. The mains adaptor automatically adjusts itself to suit an AC voltage between 100 - 240 V and 50 - 60 Hz. The mains adaptor has been specially designed to supply current to the charging adaptor.

- NOTE -

Battery chargers or mains adaptors with other voltage outputs, such as those for mobile phones, may not be used. Use of other battery chargers or mains adaptors may damage the range meter.

3.4 PDAW 80/81-2 car battery plug

The car battery plug is an integral part of the PDA 80/81 charging kit. It can be inserted into a vehicle cigarette lighter or into sockets of the same design. This adaptor has a special design and transforms the 12 - 24 V direct current of a vehicle battery into a voltage suitable for the charging adaptor.
A light-emitting diode (LED) is incorporated in the adaptor to indicate correct connection for charging. An additionalfuse in the adapters front section provides protection against voltage peaks.

- NOTE -

As the car battery plug has been especially designed to charge the NiMH batteries of the PD 32, it may not be replaced by other types of car battery plugs.

3.5 PDAW 80/81-1 charging adaptor

The respective mains adaptor supplies current to the charging adaptor. Prior to charging the battery, the side flange connections should be carefully checked.

3.6 PDAW 80/81-3 battery pack

The battery pack consists of two rechargeable, 1.2-V NiMH cells with a capacity of approx.1800 mAh. The battery pack remains in the battery compartment while being charged.

- NOTE -

– A "memory effect" is virtually non-existent with this type of batteries and the charging process used.
The charging process can be interrupted at any time without damaging the battery cells.
– Other brands of rechargeable batteries can be used. It must be ensured, however, that, as far as possible, batteries have a similar capacity of approx. 1800 mAh.

3.7 PDAW 81-1 mains adaptor

This mains adaptor PDAW 81-1 is virtually identical to the PDAW 80-1 mains adaptor. The only difference is the type of mains plugs which are interchangeable plugs.

3.8 PUA 60 laser visibility glasses

The laser visibility glasses clearly improve the visibility of the laser beam (spot)

3.9 Belt clip PDA 62

The belt clip is made from durable plastics and is quickly and easily fixed to the belt using the snapper. For carrying the range meter snaps into position and easily detaches when being needed.

3.10. Measuring extension PDA 70

The measuring extension is made from aluminium and durable plastic handle.
With the help of the belt clip the range meter attaches to the measuring extension. The rear reference extends by 1.270 m / 50 inches. Please also refer to **chapter 7.Operation** for more explanations how to change the reference setting to use the measuring extension.

4. Technical data

Power supply
3 V DC
Type: AA (LR6, AM3, Mignon)
Standard: two alkaline primary cells
Optional: rechargeable NiMh cells

Battery status indicator
Battery display with four segments
showing 100%, 75%, 50% and
25 % charged
All segments deleted = empty battery

Measuring range
0.05 m to 200 m (2 inch to 600 ft)
0.05 m (2 inch) from the front edge
Max. distance resolution 750 m
(2,500 ft)
Typical measuring range without
target plate:
– Drywall panel, white 70 m (210 ft)
– Concrete, dry 50 m (150 ft)
– Brick, dry 50 m (150 ft)

The maximum range depends on:
– Reflectivity of the target surface
– Ambient light conditions
In case measurements are not
possible, use the Hilti PDA 50
target plate.

Accuracy
±1.5 mm (±1/16 inch) is typical
for individual and continuous
measurements **
** The measuring accuracy is
affected by ± (1.5 mm + 20 ppm) /
± (1/16 inch + 20 ppm) due to
atmospheric conditions. This affect is
typically noticeable at distances >
100 m (> 300 ft).

Smallest unit displayed
1 mm (1/16 inch)

Beam diameter
< 6mm @ 10m (< 0,2 in @ 30 ft)
< 30mm @ 50m (< 1,2 in @ 150 ft)
< 60mm @ 100m (< 2,4 in @ 300 ft)

Basic operating modes
Single measurement
Continuous measurement
Calculation / Functions

Display
Illuminated liquid-crystal display
showing operating status and battery
status

Laser
Visible, 620 – 690 nm, laser class 2
(IEC60825-1: 1993 + A1: 1997 + A2:
2001/DIN EN60825-1: 2003;
CFR 21 § 1040 [FDA]
output power: < 1mW

Automatic time-out
Laser 1 min.
Range meter: 10 min.

Battery life at 25°C (77°F)
Max. number of measurements
with single set of batteries.
Alkaline: 15'000 - 20'000
NiMH: 8'000 - 10'000

Operating temperature
- 10°C…+ 50°C (14°F… 122°F)

Storage temperature
- 30°C…+ 70°C (- 22°F… 158°F)

Protection class
Dust and splash-proof, IP 54 as
per IEC529 standard

Weight
220 g / 0,48 lb (without batteries)

Dimensions
120 (L) x 65 (B) x 28 (H) mm
4,7˝ (L) x 2,5˝ (B) x 1,1˝ (H)

5. Safety information

5.1 Basic safety information
In addition to the safety precautions listed in the individual sections of these operating instructions, the following points must be strictly observed at all times.

5.2 Misuse

The range meter and its accessories can be a source of hazard if they are not used properly or not used for the intended purpose by untrained people.
– Do not use the range meter without suitable prior instruction.
– Do not render any safety devices ineffective and do not remove information and warning notices.
– Have the range meter repaired only at a Hilti service center. Unauthorized opening of the range meter may cause the emission of laser radiation in excess of class 2.
– No changes or manipulations to the range meter are allowed.
– Use only original Hilti accessories and auxiliary tools in order avoid the risk of injury.
– Do not use the range meter in atmospheres where there is a risk of explosion.
– Use only a clean, soft cloth for cleaning. If necessary, moisten the cloth slightly with pure alcohol.
– Keep the range meter out of the reach of children.
– Measurements taken to plastic foam materials, such as polystyrene foam, or to snow or other strongly reflecting surfaces, may be inaccurate.
– Taking measurements to surfaces with low reflectivity surrounded by areas with high reflectivity may lead to measurement errors.
– Measurements taken through panes of glass or other objects may be inaccurate.
– Rapid changes of the measuring conditions, e.g. persons walking through the laser beam, may lead to measurement errors.
– Do not direct the range meter towards the sun or other sources of bright light.
– Do not use the range meter as a levelling tool.
– If you do not check the range meter before taking important measurements and after it has been dropped or subjected to other mechanical stressing.
– No checking of the setting of the measuring reference before measuring.

5.3 General safety precautions
Check the range meter for possible damage before use. If the range meter is found to be damaged, have it repaired at a Hilti service centre. The accuracy of the range meter must be checked after it has been dropped or subjected to other mechanical stressing.
– When the range meter is brought into a warm environment from very cold conditions, or vice versa, allow it to become acclimatised before use.
– Although the range meter is designed for the tough conditions of jobsite use, it should be treated with care, as other optical instruments (binoculars, spectacles, cameras, etc.)
– Although the range meter is protected to prevent entry of dampness, it should be wiped dry each time before being put away in its transport container.
– As a precaution, check the settings you have made before using the range meter.

– When using the circular bubble level (bull's eye) for alignment, only look at the range meter from the side.

5.4 Proper organization of workplace

– Secure the area in which you are measuring. When setting up the range meter, take care to avoid directing the beam towards yourself or other people.
– Avoid unfavourable body position when working on ladders or scaffolding. Make sure you have a stable stance and avoid danger of overbalancing at all times.
– Measurements taken through panes of glass or other objects may be inaccurate.
– Use the range meter only while observing the specified operating conditions, i.e. not directed towards a mirror, bright chromium steel, polished stone, etc.
– Observe the accident prevention regulations in force in the country you are working.

5.4.1 Electromagnetic compatibility
Although the range meter complies with the strict requirements of the relevant guidelines, Hilti cannot entirely rule out the following possibilities:
– The range meter might cause interference to other equipment, e.g. aircraft navigational equipment.
– The range meter might be subject to interference caused by powerful radiation, which can then lead to incorrect operation. Check the readings for plausibility when measuring in these conditions or if you are unsure of the results.

5.4.2 Laser classification
The range meter conforms to laser class 2 based on the IEC60825-1: 1993+A1: 1997+A2: 2001/DIN EN60825-1: 2003; standard and class II based on CFR 21 § 1040 (FDA). These range meters may be used without need for further protective measures. The eyelid closure reflex protects the eyes if a person looks into the beam unintentionally for a brief moment. The eyelid closure reflex can, however, be negatively influenced by medication, alcohol or drugs. Nevertheless, as with the sun, a person should not look directly into sources of bright light. The laser beam should not be directed towards persons.

Laser information plates based on IEC60825-1: 1993+A1: 1997+A2: 2001/ DIN EN60825-1: 2003;

CAUTION
LASER RADIATION - DO NOT STARE INTO BEAM
620-690nm/0.95mW max.
CLASS II LASER PRODUCT

Laser information plates for the US based on CFR 21 § 1040 (FDA)

This laser product complies with 21 CFR 1040, as applicable.

5.4.3. Transport
Remove the alkaline or rechargeable batteries whenever transporting the range meter.

6. Getting started

6.1 Inserting alkaline / rechargeable batteries

- CAUTION -
– Observe the polarity of the batteries. (refer to signs inside the battery compartment.)
– Make sure the battery compartment is properly locked.

1. Lightly press the lid of the battery compartment.
2. Slide the lid out and off.
3. Replace the batteries.
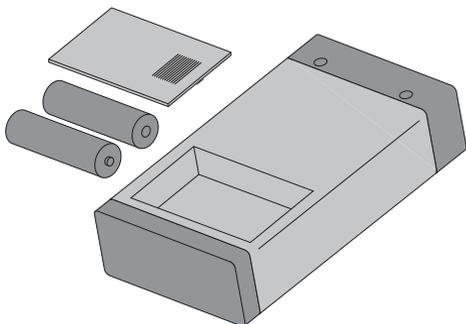
- NOTE -
For alkaline batteries
– Always replace a complete set of batteries.
– Do not mix used and new batteries.
– Do not mix batteries of different makes or types.
– Use only undamaged batteries of an approved type.

For rechargeable batteries
– Always use rechargeable batteries of the same make and same type.
– Always use rechargeable batteries of the same age and charged to the same level.
– New rechargeable batteries are mostly empty and have to be charged prior to first use.
– Use only NiMH batteries with 1.2 V and 1500 – 2000 mAh capacity.

6.2 Battery charging

6.2.1 Standard charging of batteries
The charging process ensures that the there will be no "memory effect". In view of this, charging can begin at any time regardless of the level to which the battery is already charged.

Attach the PDAW 80/81-1 charging adaptor into the range meter ①.

For charging, either connect the mains adapter or the car battery plug ② to the charging adaptor.
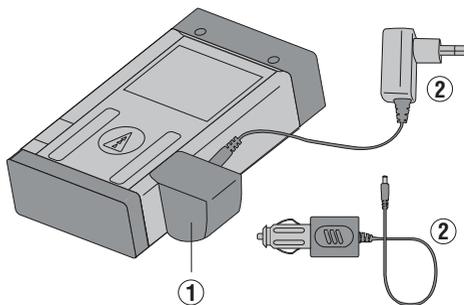
The maximum. charging time is 12 hours. As with many mobile phones, the level of charging is shown by movement of battery display segments.

6.2.1.1 Battery charging level display
– The level of charging is indicated by moving battery status segments ▰▰▰▰▰ at the top on the right of the display.
– When a battery is fully charged, " Accu Full " (battery full) will be displayed.

6.2.1.2 Charging display for unintentionally inserted alkaline batteries

– If alkaline batteries are identified, all battery status segments flash continually to indicate missing rechargeable batteries. Additionally, they sign " no Accu " shows in the display.
The range meter cannot be switched on.
– If defective or non re-chargeable alkaline batteries are inserted, the battery display will flash and, at the same time,
" Accu dEF " (defective battery) will appear in the display.

- NOTE -

– At any time while the batteries are being charged, the range meter can be switched on and used. The battery charging process stops when the range meter is switched on and the laser activated.
– Rechargeable batteries discharge if they are stored for a long time. The battery charging process terminates after 1 minute when charging very empty rechargeable batteries and the display switches off in this case, the charging process can be re-started only by disconnecting the range meter from the mains adaptor or by removing / replace the rechargeable batteries.
– Keep the range meter in a safe place.

6.2.2 Fast battery charging

The charging process ensures that within 15 minutes of charging with the PDAW 80/81-2 car battery plug the battery receives enough power for a further 150 to 200 measurements.
This process in combination with car battery plug is a particular advantage if the user needs the range meter ready for use quickly.

6.3 Switching the range meter On and Off

The range meter is switched on or off by pressing the "On / Off" key.
After being switched on, the range meter is in the basic display mode.
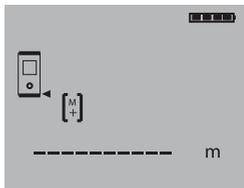
6.3.1 Initial distance measurement

Press the "Measure" key once.
This will switch on the range meter and the laser beam if the range meter was switched off.
If the range meter is already switched on, this will activate the laser beam.
Aim the visible laser spot at a target about 3 to 10 (10 – 30 ft) meters away.
Press the "Measure" key again.
The distance will be shown in less than 1 second, e.g. 5.489 m (16.296 ft).
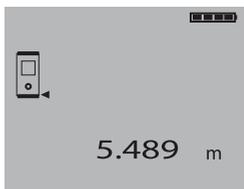
You have taken the first distance measurement with the PD 32 range meter.

6.4 Settings

6.4.1 Activating the setting menu
The menu is activated by pressing the
"On / Off" key pressed for about 2 seconds
while the range meter is switched off.

The **beep** and the **units** may be set
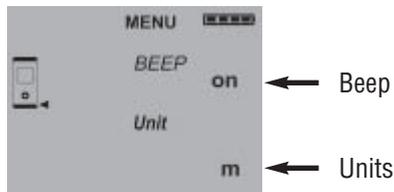
6.4.2 Menu / Beep

The key "Plus" switches between the "On"
and "Off" modes.

Setting	Option
Beep	On
	Off

6.4.3 Menu / Units
The key "Minus" switches between the
units, as shown below.

Setting	Distance	Area	Volume
m	meters	m^2	m^3
mm	millimeters	m^2	m^3
ft	feet (decimal)	$feet^2$	$feet^3$
yd	feet (decimal)	$yard^2$	$yard^3$
in	inch (decimal)	$inch^2$	$inch^3$
in 1/8	feet & inch 1/8	$feet^2$	$feet^3$
in1/16	feet & inch 1/16	$feet^2$	$feet^3$

6.4.4 Terminating the menu
The menu is terminated by pressing the
"On / Off" key. All settings displayed will be
saved.

7. Operation

7.1 General controls

7.1.1 Control panel

7.1.2 On and switch keys

 ON / OFF
– switches the range meter
on and off.

 Measuring reference point
– switches the measuring
reference between front
and rear .

 Display illumination
– switches the display
illumination On and Off.

Measuring extension as reference

 – Tool is off.
Press and hold the reference key
then press the ON/OFF key.
The measuring spike flashes
in the display. The reference is
set to the end of the full
extended measuring extension.

7.1.3 Measure keys

"Measure" key
– switches the range meter On
– activates the laser beam
  for aiming at the target,
– activates single distance
  measurement
– activates and deactivates
  continuous distance
  measurement.

Side "Measure" key
– activates the laser beam for
  aim ing at the target,
– activates individual distance
  measurement
– activates and deactivates
  continuous distance
  measurement.

7.1.4 Function keys

Calculation functions are activated by pressing the relevant function keys. When a measurement using a function has been carried out incorrectly or unintentionally, the function can be reset at any time by pressing the same function key again or any other function key.

Volume
– activates the "volume"
  function and deactivates
  every other function.

Area
– activates the "area" function
  and deactivates every other
  function.

Plus
– activates the "distance
  addition" function and
  deactivates every other
  function.

Minus
– activates "distance
  subtraction" and deactivates
  every other function.

Indirect distance measurement
– activates the "Indirect
  Measurement" function
  and deactivates every other
  function.

Min. / Max.
– activates the "MIN. / MAX."
  function and deactivates
  every other function.

7.2 Display

The display shows the measurements, settings and range meter status.
In the measuring mode, the latest readings are shown in the lowest display line (result line) and the prior readings in the lines above. For such functions such as area, volume, Pythagoras, etc., the measured distances are displayed in the intermediate lines and the calculated result appears in the lowest display line (result line).

7.2.1 Symbols displayed

Temperature too high
> +50 °C (122 °F)
Action:
Allow the range meter to cool down.
Temperature too low
< -10 °C (14 °F)
Action:
Warm up the range meter.

Unfavourable signal conditions
Insufficient reflected laser light
Action:
– Keep the measuring distance > 50 mm (2 inch) from the front edge.
– Clean the lens.
– Take a measurement from another surface or use the target plate PDA 50.

Ambient light at target too bright Action:
– Shade the target from bright light or use the target plate PDA 50.

Laser switched on
– moving dashed line
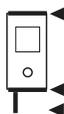
Display reference status
– Front edge
– Rear edge
– Spike
– Spike (flashing) – adds automatically 1.270 m / 50 inch to measurements

Battery status
– 4 segments = 100% full
– 3 segments = 75% full
– 2 segments = 50% full
– 1 segment = 25% full
– 0 segments = empty

Batteries empty
Action:
– Replace batteries.
– Re-charge rechargeable batteries

MENU **Menu activated**

MIN **Line with MIN distance (shortest distance)**

MAX **Line with MAX distance (longest distance)**

Display distances differences
– Difference between MAX and MIN. distances

Historical data mode active
– Display the previous 5 measurements or complete functions results including graphics

General hardware error
Switch the range meter Off and then back On. If the error persists, notify the local Hilti service centre.

Indirect distance measurement
Switches between two options:
– Single rectangular triangle
– Double rectangular triangles

Volume measurement active
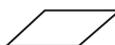
Area measurement active

7.2.2 Display illumination

 = Illumination key

The illumination key, switches the display illumination On or Off. In the dark or in very bright light, e.g. sunlight or a strong spotlight the display illumination helps the user to read the display more easily.

- NOTE-
Display illumination consumes additional power. If it is used frequently, a shorter battery life must be expected.

7.3 Optical sight

The built-in optical sight is a great benefit when measuring outside and whenever the laser spot is poorly visible. Thanks to the optical sight, even at long distances can be easily and precisely aimed at. Whenever the rangemeter's laser is On, the laser spot can be seen in the optical sight. If the laser spot is not visible in the optical sight, either the measurement is completed or the laser beam has switched off, the timer of 60 seconds may have expired.
The optical sight runs parallel to the laser beam.

Typical measuring procedure with the optical sight
– Press the "Measure" key to activate the laser beam.
– Aim for the target with the laser spot in the optical sight.
– Press the "Measure" key or "Side measure" key keep aiming until the laser spot in the optical sight disappears.
– Read the distance in the display.

Diagram of optical sight
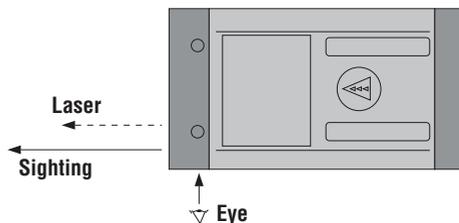
- NOTE -
It is practical for the optical sight to be used for distance above 10 m (30ft).

7.4 Measuring distances
Distance measurements can be taken to all "non-cooperating" stationary targets, i.e. concrete, rock, wood, plastic, paper, etc., The use of prisms or other strongly reflecting targets is not permitted and, if used, might falsify the results.

7.4.1 Measuring references

 = switch key

The range meter can measure distances from three different measuring reference points.
By pressing the "switch" key on the left at the front of the range meter the measuring reference point toggles between front edge and rear edge. If the spike is folded out 90°, the reference position is set to the end of the spike.
The reference for the measuring extension PDA 70 is activated when the range meter is switched off. While the reference key (upper left) is pressed and the range meter switched On with the On/Off key (upper right) the spike symbol starts blinking in the display. The reference for the measuring extension is deactivated when the range meter is switched Off.

Display   Reference position

Front edge

Rear edge

End of spike

Measuring extension PDA 70
Spike (flashing)
extends by 1.270 m/50 inches
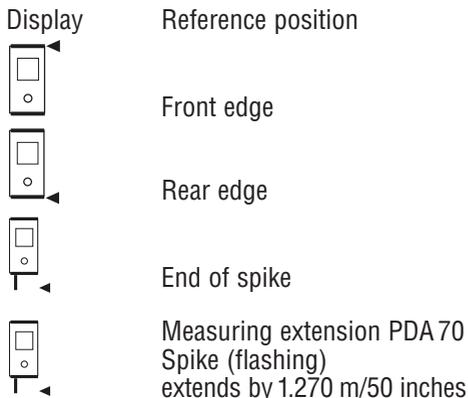
- NOTE -
– If the spike is folded out 180°, reference
 point is always automatically set to the
 rear edge.

7.4.2 Measuring distances step by step
The range meter measures distances in a
very short time and, when doing so, shows
various information in the display.

1. Switch on the range meter by pressing
 the "On" key.
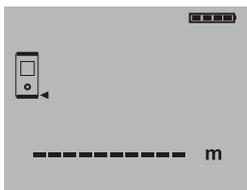
2. Press the "Measure" key once. This
 switches on the red laser beam which
 is visible as a laser spot on the target
 surface. The display shows this aiming
 mode as an animated dashed line
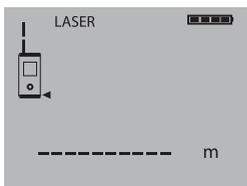
3. Aim to the target.

4. Press the "Measure" key once again
 to measure the distance.

The result appears in the result line
normally in less than a second. The laser
beam switches off.
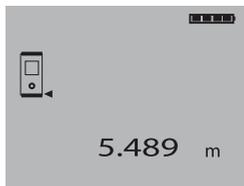
If further measurements are taken, up to
three previously determined distances are
shown in the intermediate result lines,
i.e. a total of the last four measured
distances are shown.
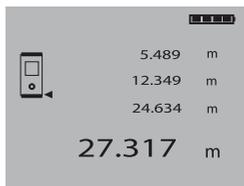
7.4.3 Measuring mode
Two different measuring modes are
available to measure distances. These are
single distance measurement and
continuous distance measurement. The
continuous measurement mode is used for
setting out given distances or offsets and
is also used where distance measurements
are more difficult, e.g. to corners, edges,
niches, etc.

7.4.3.1 Single distance measurement (Measure key)

1. Switch on the laser beam by pressing the "Measure" key.
2. Press the "Measure" key once again. Generally, the measured distance will be completed in less than a second and shown in the result line.

- NOTE -

Alternatively the range meter may be switched on by pressing the On key and the laser then activated by pressing the measure key.

7.4.3.2 Continuous measurement

Press the "Measure" key for about 2 seconds to activate this measuring mode. When doing so, it does not matter whether or not the range meter is off or the laser beam is switched on or off. The range meter will always switch to continuous measurement.

During continuous measurement, the distances are updated in the result line by about 8 to 15 measurements every second. This depends on the reflectivity of the target surface.

If the beep signal is switched on, continuous measurement is indicated by a Beep. The measuring process is stopped by pressing the "Measure" key once again. On doing so, the last valid distance measurement shows in the result line on the display.

- NOTE -

Continuous measurement is possible wherever distances can be measured. This applies also to functions, such as areas and volumes.

7.4.4 Measuring from corners

The spike is used when measuring diagonally across rooms or from inaccessible corners.

1. Fold out the spike 90°.
   This automatically sets the measuring reference to the end of the spike. The range meter takes the extended reference point into account and corrects the measured distances accordingly.
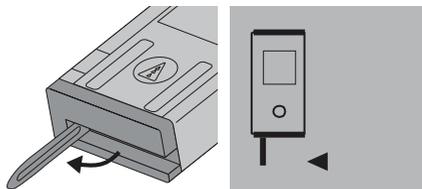
2. Position the range meter with the spike at the desired starting point for the measurement and aim towards the target.
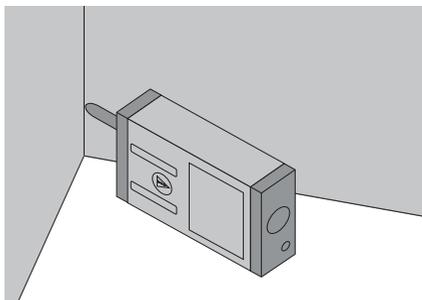
3. Press the "Measure" key. The measured distance will appear in the display.

7.4.5 Measuring with the aid of target objects

When taking measurements to exterior corners, e.g. on buildings, perimeter fences, etc., boards, bricks or other suitable objects can be used as the target.

Use of the PDA 50 target plate is recommended for long distances and in unfavourable light conditions, e.g. strong sunlight.
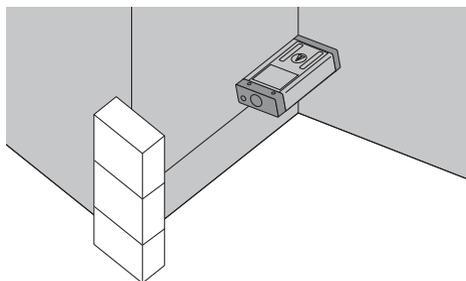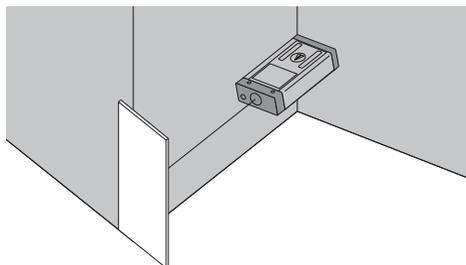
7.4.6 Measuring in bright surroundings

The PD 32 has a built-in optical target sight. When measuring to very bright surfaces, the laser spot is often not visible. Thanks to the laser spot superimposed in the optical sight, you can always clearly and reliably aim at the target.

For long distances and bright light conditions, we recommend the use of the PDA 50 target plate.

7.4.7 Taking measurements to rough surfaces

When measuring to rough surfaces, e.g. coarse render, stucco, etc, an average distance value is measured weighting the centre of laser spot higher that the edges of the laser spot.
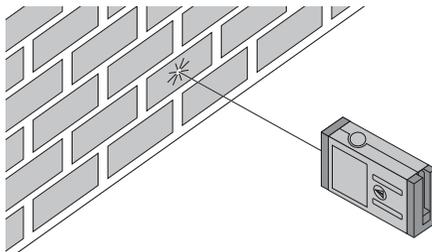
7.4.8 Taking measurements to round or inclined surfaces

If surfaces of this kind are aimed to an obtuse angle, inadequate light energy or, when aimed perpendicular, measurements may refer to the reflected laser spot from elsewhere. In both cases we recommend the use of the PDA 50 target plate

7.4.9 Taking measurements to wet or shiny surfaces

As long as the range meter can be aimed towards the surface, a distance to the target will be reliably measured. In the case of highly reflective surfaces, a reduction in the range or a measurements to the actual light reflex from elsewhere must be expected.

7.4.10 Taking measurements to transparent surfaces

It is not possible to measure distances to transparent materials, e.g. liquids, foam polystyrene, etc. This is because light penetrates these materials and therefore measuring errors may occur. If
measurements are taken through glass, measuring errors may also occur.

7.4.11 Measuring ranges

7.4.11.1 Increased distances

– Taking measurements in the dark, at dawn, dusk and to shaded targets or with the front of the range meter shaded, generally leads to an increase of the measuring range.
– Taking measurements to the PDA 50 target plate also results in an increase of the measuring range.

7.4.11.2 Reduced distances

– Taking measurements in very bright ambient light, e.g. in sunshine or a very bright spotlight etc, can lead to a reduced distances.
– Taking measurements through glass or other objects in the target beam can lead to a reduced measuring range.
– Taking measurements to matt green, blue or black, wet or shiny surfaces can lead to a reduced measuring range.

8. Applications and calculation functions

The individual steps within all functions are mostly supported, on principle, by graphics on the display.

- NOTE -
– Continuous measurement can be used within all functions where single measurements are possible.
– If measuring errors occur during continuous measurement or if continuous measurement is stopped by pressing the "Measure" key again, the last valid distance will be shown.

8.1 Measurement data memory

While measuring, the range meter continuously saves the measured values and the results of calculations.

8.1.1 Saving measurements

When measuring several distances, up to three previous distances, are displayed in the intermediate result lines. This means that in total the last four measured distances are displayed or saved.

5.489 m	← 4. measured value
12.349 m	← 3. measured value
24.634 m	← 2. measured value
27.317 m	← 1. last measured value
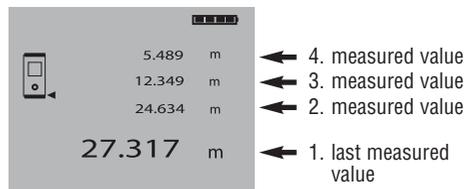
8.1.2 Historical data memory

The range meter saves the last five measurements or calculation including the graphics. Always displays immediately after the range meter is switched On with the On/Off-key, before any function is activated or before the "Measure" key is pressed, these data can be recalled from the memory and displayed one by one using the "Plus/Minus" key.

The symbol "Historical data mode active" shows the data stored in the memory.

Example of the display of a saved volume measurement:
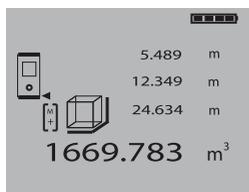
8.2 Area measurement

Areas can be determined easily and quickly. Press the "Area" function key. This switches the laser beam on – ready for measuring.
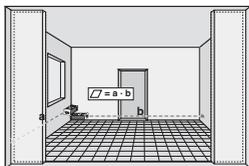
The individual steps for determining an area are supported by a corresponding graphic display. To determine the floor space of a room, for example, the following procedure must be followed:

1. At the start of the area function, the laser beam is switched on.
2. Aim the range meter at the target.
3. Press the "Measure" key.
   The room width will be measured and shown.
4. After this, the graphic display will automatically request measurement of the room length.
5. Aim the range meter at the next target to obtain the room length.
6. Press the "Measure" key.
   The second distance will be measured, the area immediately calculated and the result shown in the result line.

Both distances required to calculate the area appear in the intermediate result lines and can be conveniently noted after the measurements and the calculation.

- NOTE -

To determine another area, press the "Area" function key again.

8.3 Volume measurement

Volumes can be determined in one measuring operation.
Press the "Volume" function key. This switches the laser beam on – ready for measuring.
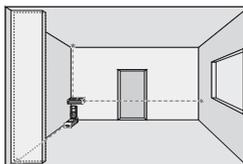
The individual steps for determining a volume are supported by a corresponding graphic display. To determine the volume of a room, for example, the following procedure must be followed:

1. At the start of the volume function, the laser beam is switched on.
2. Aim the range meter towards at the target.
3. Press the "Measure" key.
   The room width will be measured and shown.
4. After this, the graphic display will automatically request measurement of the room length.
5. Aim the range meter at the next target to obtain the room length.
6. Press the "Measure" key.
   The room length will be measured.
7. After this, the graphic display will automatically request measurement of the room height.
8. Aim the range meter at the next target to obtain the room height.
9. Press the "Measure" key.
   The room height will be measured, the volume immediately calculated and the result shown in the result line.
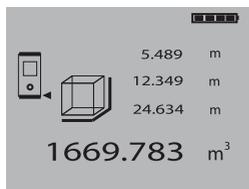
All three distances required to calculate the volume appear in the intermediate result lines and can be conveniently noted after the measurements and the calculation.

- NOTE -
To determine another volume, press the "Volume" function key again until the graphic symbol for "Volume" appears.

8.4 Adding distances
Single distances can be conveniently added. This is useful for determining door or window openings or to add several partial distances to form the perimeter.
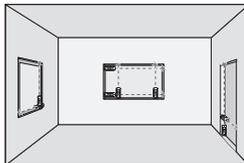
1. Press the "Measure" key.
   (The laser beam will be switched on).
2. Direct the range meter towards the target.
3. Press the "Measure" key.
   The first distance will be measured and shown.
   (The laser will be switched off.)
4. Press the "Plus" key to add the next distance. The first distance will appear in the middle intermediate result line and a plus sign in the lowest one.
   (The laser beam will be switched on.)
5. Aim the range meter at the next target.
6. Press the "Measure" key.
   The second distance will be measured and shown in the bottom intermediate result line. The calculation result will appear in the result line at the same time.

The current total of the distances is always shown in the result line.

This procedure can be repeated until all distances have been added.

To terminate the addition of distances, simply measure a distance without first

pressing the "Plus" key. The previous three measurement and calculation results will be in the intermediate displays.

8.5 Subtracting distances

Single distances can be conveniently subtracted from each other. This is useful for determining, for example, offsets to inaccessible places or the distance from the underside of a pipe to the ceiling. To do so, the distance from the floor to the underside of the pipe is subtracted from the distance from the floor to the ceiling. If, additionally, the pipe diameter is deducted, the result is the distance from the top of the pipe to the ceiling.
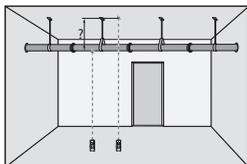
1. Press the "Measure" key.
   (The laser beam will be switched on.)
2. Aim the range meter at the target.
3. Press the "Measure" key.
   The first distance will be measured and shown.
   (The laser beam will switch off.)
4. Press the "Minus" key for subtraction.
   The first distance will appear in the middle intermediate result line and a minus sign in the lowest one.
   (The laser beam will switch on.)
5. Aim the range meter at the next target.
6. Press the "Measure" key.
   The second distance will be measured and shown in the bottom intermediate result line. The result of the subtraction will appear in the result line.

The current difference between distances is always shown in the result line.

This procedure can be followed until all distances have been subtracted.
To terminate the subtraction of distances, simply measure a distance without first pressing the "Minus" key. The previous measurement and calculation results will be shown in the intermediate displays.

8.6 Indirect measurement

An indirect distance can be determined by taking several distance measurements and calculating according to Pythagoras's theorem.
The functions for indirect measurement are called by pressing the "Indirect distance measurement" function key.
When doing so, there are two possibilities:

▷   the combined version using three measured distances
    (Press the function key once.)

�   the simple version using two measured distances
    (Press the function key twice.)

The simple version is suitable when a rectangular reference exist such as two perpendicular walls or a floor adjacent to a vertical wall.
The combined version is more suitable for a free determination where it is not possible to measure a perpendicular distance to one end of the distance to be calculated.

- NOTE -

The result of indirect measurement is, due to principle less accurate than direct

measurements. To obtain the best possible result, attention must be paid to the geometry, e.g. right angle and triangle arrangement. The best results are obtained when:

a) the tool is aimed accurately at the ends of the line
b) all points measured are in one single plane
c) measuring is carried out closer to the object rather than far away.

8.6.1 Measuring criteria

The indirect measurement function verifies the triangular geometry as the measurements are taken. The angle of the triangle(s) at the range meter's position is checked and must be greater than 10°. Otherwise a double beep indicates an error, the function terminates and all previous measurements are lost. The function automatically restarts.
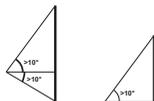
The most reliable results are achieved with the closest offset to the object. Additionally when using the combined version (double-triangle), both triangles should be almost the same size.

8.6.2 Selecting indirect measurement options

Pressing the "Indirect distance measurement" function key, activates the combined version first. Pressing the "Indirect distance measurement" function key once again, switches to the simple version. Pressing this key a third time, switches from this function back to the normal display mode.

8.6.3 Indirect measurement (combined version)
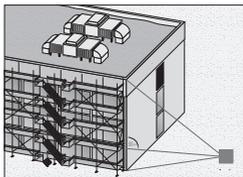
The individual steps for indirect distance determination are supported by corresponding graphics on the display. To use the combined version, for example, the following procedure must be observed:

1. After starting the "Indirect measurement" function, the laser beam will be switched on and the combined version activated.
2. Aim the range meter at one end of the line to be determined as indicated on the graphic display.
3. Press the "Measure" key.
4. Thereafter, the graphic display will automatically request measurement of the perpendicular distance. Here, particular care must be taken to measure this distance in the continuous measurement mode in order to determine the point with the shortest (perpendicular) distance more reliably.
5. Move over the point in the area of suspected minimum distance from the tool with and stop the measurement by pressing the "Measure" key.
6. After the last distance has been measured, the range meter will immediately calculate the indirect distance.
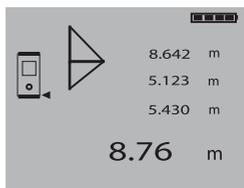
8.6.4 Indirect measurement (simple version)
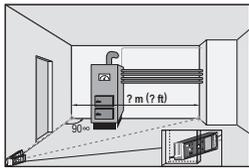
The individual steps for indirect distance determination are supported by corresponding graphics on the display. ◺. To use the simple version, the following procedure must be observed:

1. Press the "Indirect measurement" function key twice to select the simple version.◺.
   The laser beam will switch on.
2. Aim the range meter at the target indicated on the graphic display.
3. Press the "Measure" key.
4. Thereafter this, the graphic display will automatically request measurement of the shortest distance.
5. After the second measurement has been completed, the range meter will immediately calculate the indirect distance.
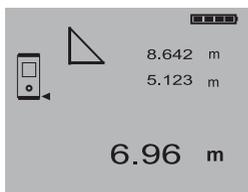
8.7 Min / Max measurement
The minimum / maximum (Min / Max) function is used primarily for determining diagonal distances or taking measurements to inaccessible places and determining or setting out parallel objects.

Both functions are activated simultaneously by pressing the "Min / Max" key.
In addition, the difference between minimum and maximum is shown.

8.7.1 Maximum measurement
The continuous measurement mode is used for the maximum measurement and this mode updates the display every time the measured distance increases.
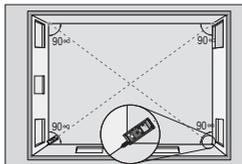
1. After starting the "Min / Max" function, the laser beam will switch on.
2. Aim the range meter towards the target.
3. Press the "Measure" key.
4. After this, continuous measurement will start.
5. The distance shown in the "MAX" display field will update every time the distance increases above the last value displayed.
6. The distance shown in the MIN display field will update every time the measured distance decreases below the last value displayed.
7. Stop measuring by pressing the "Measure" key.
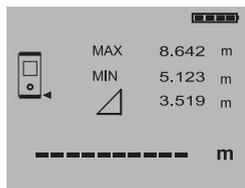
The display then shows values for the Max distance, Min distance and the difference between the two values.

8.7.2 Minimum measurement

The minimum measurement is taken in the continuous measurement mode which updates the display every time the measured distance decreases.
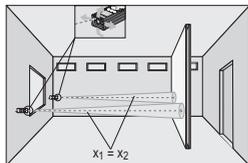
1. After starting the "Min / Max" function, the laser beam will be switched on.
2. Aim the range meter towards the target.
3. Press the "Measure" key.
4. After this, continuous measurement will start.
5. The distance shown in the "MIN" display field will update every time the distance decreases below the last value displayed.
6. The distance shown in the "MAX" display field will update every time the distance increases above the last value displayed.
7. Stop measuring by pressing the "Measure" key.
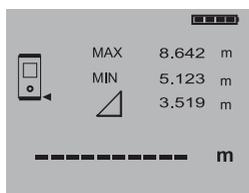
The display then shows values for the Max distance, Min distance and difference between the two values.

8.7.3 Combined measurement

The combination of simultaneous display of maximum and minimum distances permits the calculation of offsets, differences in distances very simply, quickly and reliably. As a result, how much the offset between a pipe and a ceiling or the offset of two objects in general, can be determined reliably even if they are in inaccessible places.
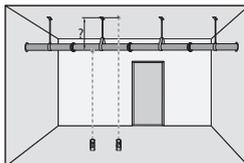
1. After starting the "Min / Max" function, the laser beam will switch on.
2. Aim the range meter towards the target.
3. Press the "Measure" key.
4. After this, continuous measurement will start.
5. Move the range meter so that the longest and the shortest distances are measured.
6. The difference between the two distances is shown in the line ◣
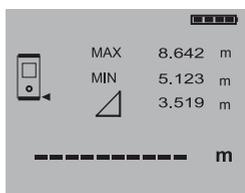
In the given example, the difference in distance between ceiling and underside pipe can be read straight off the display.

8.8 Setting out

With the range meter, pre-determined dimensions can be set-out and marked, such as for installing drywall tracks.

The continuous measurement mode is used when transfering dimensions from drawings. (See also section 7.4.3.2 Continuous measurement.)
Hold the "Measure" key pressed for approx. 2 seconds to activate the continuous measurement mode. When doing so, it does not matter whether the range meter is switched off or the laser beam is switched on or off. The range meter always switches to the continuous measurement mode. Move the range meter slowly until the desired distance is reached or appears in the display.
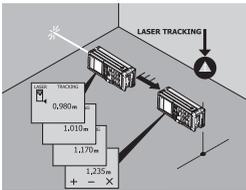
Press the "Measure" key once again to end the continuous measurement mode.

9. Calibration and adjustment

9.1 Calibration

The inspection, measuring and test equipment for the range meter must be certified in accordance with ISO 900X...

You may carry out the inspection, measuring and test of the PD 32 laser range meter as specified in ISO 900X... (See ISO 17123-4 Field Process for Accuracy Examinations of Geodetic Instruments:
Part 6, Close-range Opto-electrical Range Meters.)

Select a readily accessible measuring distance of a known length approx. 1 to 5 meters (3 – 15 ft) long which does not vary with time and take five measurements of the same distance.

Determine the mean of the deviations to the known distance. This value should be within the specific accuracy tolerance for the range meter.

Keep a record of this value and note the time for the next test.
Repeat this check measurement at regular intervals as well as before and after important measuring tasks.
Apply a sticker to the PD 32 documenting this control of the measuring, inspection and test equipment for the range meter and keep a record of the entire control process, inspection procedure and the results.

Please refer to the technical data contained in the operating instructions and the information concerning measuring accuracy.

9.2 Adjustment

For optimized adjustment, have the laser range meter adjusted at a Hilti workshop where accurate adjustment of the range meter will be confirmed with a calibration certificate.

9.3 Hilti calibration service

We recommend that you undertake a regular check of the laser range meter through the Hilti calibration service in order to verify its reliability in accordance with standards and legal requirements.

The Hilti calibration service is available at all times, but a check at least once a year is recommended.

As a part of the Hilti calibration service, it is verified that on the day of the check the specifications of the range meter comply with the technical information given in the operating instructions.

If there are deviations from the manufacturer's information, the range meter will be re-adjusted. After the check and adjustment, a calibration sticker will be applied to the range meter, and it will be verified in writing in a calibration certificate that the range meter functions in compliance with the manufacturer's information.

Calibration certificates are always required for companies that have been certified according to ISO 900X...

Your local Hilti contact / representative will be pleased to provide further information.

10. Care and maintenance

10.1 Cleaning and drying

– Blow dust off the lens.
– Do not touch the lens with your fingers.
– Use only a clean, soft cloth for cleaning. If necessary, slightly moisten the cloths with pure alcohol or a little water.

- NOTE -
– Do not use any other liquids as these might damage the plastic parts.
– Observe the temperature limits when storing your equipment. This is particularly important in winter or summer, especially if the equipment is kept inside a vehicle (storage temperatures: -30°C to +70°C / -22°F to +158°F).
– Replace damaged parts.

10.2 Storage

– Remove the range meter from its case if it has become wet. Clean the range meter, carrying case and accessories. Re-pack the equipment only when it is completely dry.
– Check the accuracy of the equipment before it is used after a long period of storage or transportation.
– Remove the batteries if the range meter is not going to be used for a considerable time. The range meter can be damaged by leaking batteries.

10.3 Transportation

Use either the original Hilti cardboard box the tool was delivered in or packaging of equivalent quality for transporting or shipping your equipment.

- NOTE -
Always remove the batteries before shipment.

11. Disposal

- CAUTION -

Improper disposal of the equipment may have serious consequences:

Burning plastic parts / components generates toxic fumes which may present a health hazard.

Batteries might explode if damaged or exposed to very high temperatures. This could cause poisoning, burns, acid burns or environmental pollution. Careless disposal might permit unauthorized and improper use of the equipment, possibly leading to serious personal injury, injury to third parties and pollution of the environment.

Most of the materials from which Hilti range meters are manufactured can be recycled. A prerequisite for recycling is proper separation of the materials. In many countries, Hilti has already made arrangements for old range meters (and other tools and machines) to be taken back for recycling. Ask the Hilti customer service or your local Hilti representative for further information.

Dispose of batteries in accordance with national regulations

Only for EU countries

Disposal of electric tools together with household waste is not permissible!

In observance of European Directive 2002/96/EC on waste electrical and electronic equipment and its implementation in accordance with national law, electric tools that have reached the end of their life must be collected separately and returned to an environmentally compatible recycling facility.

12. Manufacturer's warranty – tools

Hilti warrants that the tool supplied is free of defects in material and workmanship. This warranty is valid so long as the tool is operated and handled correctly, cleaned and serviced properly and in accordance with the Hilti Operating Instructions, and the technical system is maintained. This means that only original Hilti consumables, components and spare parts may be used in the tool.

This warranty provides the free-of-charge repair or replacement of defective parts only over the entire lifespan of the tool. Parts requiring repair or replacement as a result of normal wear and tear are not covered by this warranty.

Additional claims are excluded, unless stringent national rules prohibit such exclusion. In particular, Hilti is not obligated for direct, indirect, incidental or consequential damages, losses or expenses in connection with, or by reason of, the use of, or inability to use the tool for any purpose. Implied warranties of merchantability or fitness for a particular purpose are specifically excluded.

For repair or replacement, send tool or related parts immediately upon discovery of the defect to the address of the local Hilti marketing organization provided.

This constitutes Hilti's entire obligation with regard to warranty and supersedes all prior or contemporaneous comments and oral or written agreements concerning warranties.

13 FCC statement (applicable in US)

- WARNING -

This equipment has been tested and has been found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference in a residual installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

– Re-orient or re-locate the receiving antenna.
– Increase the separation between the equipment and receiver.
– Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced TV / radio technician for assistance.

Product information plate

14. EC conformity

Designation: Laser range meter
Type: PD 32
Year of design: 2003

In conformance with $C\epsilon$

We declare, on our own responsibility, that
this product complies with the following
standards or standardization documents:
EN 50081-1 and EN 61000-6-2 according
to the stipulations of the directive
89/336/EEC.

Hilti Corporation

Matthias Gillner   Dr. Heinz-Joachim
Head BU   Schneider
Measuring Systems   Executive Vice President
01 / 2005   BA Electric Tools &
                      Accessories
                      01 / 2005

Hilti Corporation

FL-9494 Schaan
Tel.: +423 / 234 21 11
Fax: +423 / 234 29 65
www.hilti.com