

HILTI

PS 200

Bedienungsanleitung

de

Operating instructions

en

Mode d'emploi

fr

Istruzioni d'uso

it

Manual de instrucciones

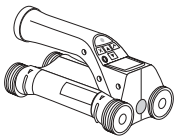
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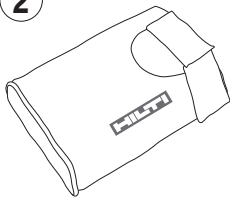
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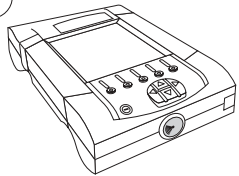
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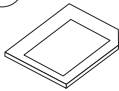
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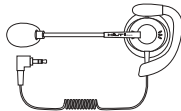
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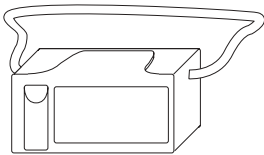
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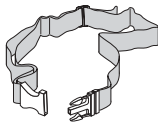
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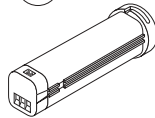
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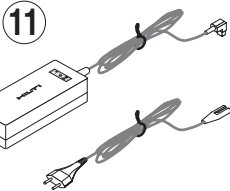
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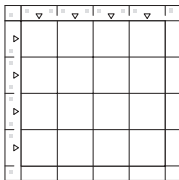


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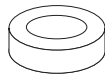


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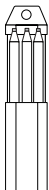
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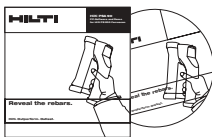
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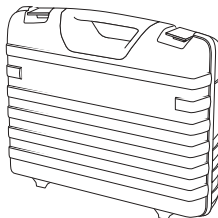
14



15



16



PS 200 Ferroskan

It is essential that the operating instructions are read before the appliance is operated for the first time.

Always keep these operating instructions together with the appliance.

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

Components

- ① PS 200 S scanner
- ② PSA 60 soft pouch
- ③ PS 200 M monitor
- ④ PSA 94 memory card
- ⑤ PSA 92 data cable
- ⑥ PSA 93 headset with microphone
- ⑦ PSA 61 soft pouch
- ⑧ PSA 62 shoulder belt
- ⑨ 2× PSA 80 battery
- ⑩ 2× PUA 80 battery charger
- ⑪ 2× supply cord
- ⑫ PSA 10/11 reference grid set
- ⑬ PUA 90 adhesive tape
- ⑭ PUA 70 marking pen set
- ⑮ PSA 90 PC software
- ⑯ PS 200 toolbox

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1. General information

1.1 Safety notices and their meaning

-WARNING-

Draws attention to a potentially dangerous situation that could lead to serious personal injury or fatality if the instructions are not followed.

-CAUTION-

Draws attention to a potentially dangerous situation that could lead to slight personal injury or damage to the equipment or other property if the instructions are not followed.

-NOTE-

Draws attention to an instruction or other useful information.

1.2 Pictograms

Warnings



General warning

Symbols



Read the operating instructions before use



Return waste material for recycling

1 The numbers refer to the corresponding illustrations. The illustrations can be found on the fold-out cover pages. Keep these pages open while studying the operating instructions.

In these operating instructions, the designation «the appliance» always refers to the PS 200 Ferroskan system.

Location of identification data on the appliance

The type designation and serial number can be found on the type identification plate on the appliance. Make a note of this data in your operating instructions and always refer to it when contacting your Hilti representative or service center.

Type: PS 200 S scanner

Serial no.:

Type: PS 200 M monitor

Serial no.:

2. Description

2.1 Purpose

The PS 200 Ferroskan system is designed to be used for localizing steel reinforcing bars and determining their diameter and depth of cover.

2.2 Overview

The appliance can be used for various concrete reinforcement detection applications. The scanning mode used depends on the application. These fall broadly into the following categories:

Application	Scanning mode
Avoiding hitting reinforcing bars when hammer drilling or coring	Quickscan detection, Imagescan or Blockscan
Determining the position/ number and diameter of reinforcing bars for checking loading capacity	Imagescan
Determining depth of cover over large areas	Quickscan recording

2.3 Operating principle

The system functions by running the scanner directly over the surface of the structure. The data collected is stored in the scanner until it can be transferred to the monitor. The monitor is used for storing large amounts of data, viewing the scans and also for evaluation of results. The data can also be downloaded to a PC. The PC software offers advanced evaluation options, data archiving functions and the ability to quickly print out complete reports.

2.3.1 Quickscan detection

The scanner is run over the surface perpendicular to the reinforcing bars. The position and approximate depth of the reinforcing bars can be determined and marked on the surface of the concrete.

2.3.2 Quickscan detection with accurate determination of depth of cover

Before scanning, the operator is required to enter values for the diameter of the reinforcing bars and the spacing between the bars. The scanner is then used as described in "2.3.1 Quickscan detection".

2.3.3 Quickscan recording

The scanner is used as in described in "2.3.2 Quickscan detection". The data, however, is recorded while the scanner moves over the surface. This data is then transferred to the monitor where it can be evaluated and the average depth of cover determined. If the data is downloaded to a PC, this information can be evaluated, archived and a report printed. Enhanced evaluation options allow Quickscans to be imported and evaluated automatically.

2.3.4 Imagescan

A reference grid is attached at the area of interest using the adhesive tape supplied. After selecting the Imagescan mode with the scanner, the rows and columns of the grid are scanned following the instructions on the screen. The data is transferred to the monitor where the image can be viewed and evaluated. The position of the reinforcing bars relative to the concrete surface is indicated. The diameter of the bars and the depth of cover can be determined.

If the data is downloaded to the PC application, this information can be evaluated as on the Ferroskan monitor, with the additional advantage of allowing a series of points to be recorded along with associated depth and diameter, archived and a report printed.

2.3.5 Blockscan

A reference grid is attached at the area of interest using the adhesive tape supplied. After selecting Blockscan mode, the user is prompted to select the first area to scan. An Imagescan is then made. After completing the Imagescan, the user is prompted to select the next area to scan. This should be adjacent to the previous area. Move the grid and then scan as before. This procedure can be repeated for up to 3 x 3 Imagescans. The data is transferred to the monitor. The Imagescans are automatically stitched together to form a larger image. The reinforcement layout can then be viewed over the whole area. Individual Imagescans can be selected for evaluation by "zooming in".

If the data is downloaded to the PC application, this information can be evaluated as on the Ferroskan monitor, with the additional advantage of allowing a series of points to be recorded along with associated depth and diameter, archived and a report printed.

3. Items supplied

A complete PS 200 Ferroskan system consists of the following:

No.	Designation	Comments
1	PS 200 S scanner	*
1	PSA 60 soft pouch	Soft pouch for the scanner
1	PS 200 M monitor	*
1	PSA 94 memory card	Memory card (SD memory card)
1	PSA 92 data cable	USB cable
1	PSA 93 headset with microphone	2.5 mm jack plug
1	PSA 61 soft pouch	Soft pouch for monitor
1	PSA 62 shoulder belt	Belt for carrying the scanner and monitor in the soft pouches
2	PSA 80 batteries	NiMH rechargeable battery for the scanner or monitor
2	PUA 80 chargers	Charger for the PSA 80 battery
2	Supply cords	Supply cord for the PUA 80 charger *
2	PSA 10 reference grids	Units in mm
1	PUA 80 adhesive tape	3M Scotch tape 399 E, cotton tape for covering concrete
1	PUA 70 marking pen	Set of 12 marking pens
1	PSA 90 PC software	PC software for the PS 200 Ferroskan system on CD-ROM
1	PS 200 toolbox	Plastic toolbox with insert for the PS 200 Ferroskan system

Accessories/spare parts

Item no.	Designation	Comments
377654	PSA 10 reference grid set	5 reference grids – mm
340806	PUA 70 marking pen set	12 red marking pens
305141	PSA 91 memory card	MMC card (128 MB)
319911	PSA 94 memory card	SD card (at least 128 MB)
305142	PSA 92 data cable	USB cable for transferring data
319416	PSA 90 PC software	PC software on CD-ROM
*	PS 200 S scanner	Comprising PS 200 S scanner, PSA 80 battery, PSA 60 soft pouch, PSA 63 hand strap and operating instructions in a cardboard box as replacement items
*	PS 200 S scanner set	Comprising PS 200 S scanner, PSA 80 battery, PUA 80 charger, PSA 60 soft pouch, PSA 93 hand strap and operating instructions in a Hilti toolbox
377656	PSA 60 soft pouch	For the PS 200 S scanner
305144	PSA 63 hand strap	For the PS 200 S scanner
377658	PSA 62 shoulder strap	For carrying the PS 200 S scanner and PS 200 M monitor
*	PS 200 M monitor	Comprising PS 200 M monitor, PSA 80 battery, PSA 61 soft pouch and operating instructions in a cardboard box as replacement items
377657	PSA 61 soft pouch	For the PS 200 M monitor
305143	PSA 93 headset with microphone	For the PS 200 M monitor
319362	PUA 90 adhesive tape	Adhesive tape for attaching the reference grid to concrete
377660	PS 200 operating instructions de/en/fr/it/es/nl/el/tr/pl/ru	German, English, French, Italian, Spanish, Dutch, Greek, Turkish, Polish, Russian
377663	PS 200 operating instructions en/ja/zh/ko/tr/pl/ru	English, Japanese, Chinese, Korean, Turkish, Polish, Russian
377659	PS 200 toolbox	With insert for the PS 200 system
377472	PSA 80 battery	For the PS 200 S scanner or PS 200 M monitor
*	PUA 80 charger	For charging the PSA 80 battery

* Item number depends on country where item is ordered

Wearing parts

The scanner wheels can be replaced by the user.

Item no.	Designation	Comments
305152	PSW 200 S – 1 set of wheels	4 wheels for the PS 200 S scanner, complete with hexagon socket wrench (Allen key)

Refer to section 8.4 for instructions on removing and replacing the wheels.

4. Technical data

-NOTE-

For PUA 80 charger, refer to PUA 80 charger operating instructions.

4.1 Environmental

Operating temperature range	-10 °C to +50 °C
Storage temperature	-20 °C to +60 °C
Relative humidity (operation)	max. 90 %, no condensation
Dust and water protection (operation)	IP54
Impact resistance (appliance in toolbox)	EN 60068-2-29
Dropping	EN 60068-2-32
Vibration (not in operation)	MIL-STD 810 D

4.2 System scanning performance

For reliable scanning results, the following conditions must be fulfilled:

- Concrete surface smooth and flat.
- Reinforcement not corroded.
- Reinforcement lying parallel to concrete surface.
- Concrete does not contain additives or components with magnetic properties.
- Reinforcing bars lying within $\pm 5^\circ$ of right angle to direction of scan.
- Reinforcing bars are not welded.
- Neighboring bars are of similar diameter.
- Neighboring bars are at a similar depth.
- Accuracy specifications are valid only for the first layer of reinforcement.
- No interfering influences from external magnetic fields or objects nearby with magnetic properties.
- Bars have relative magnetic permeability of 85-105.
- The scanner wheels are clean and free from sand or grit.
- All 4 scanner wheels rotate on when scanner is moved across the object to be scanned.
- Bars comply with one of the following standards (depends on PS 200 Ferrosan system item number printed on underside of original toolbox).

Item number	Standard	Origin/applicability of the standard
377638, 377639, 377645	DIN 488	European Union

377642	ASTM A 615/ A 615M-01b	United States of America
377643	CAN/CSA-G30, 18-M92	Canada
377644	JIS G 3112	Japan
228001	GB 50010-2002	China



-WARNING-

If any one or more of these conditions are not fulfilled, accuracy and precision may be compromised.

The ratio of bar spacing:cover (s:c) is often a limiting factor in resolving individual bars.

This is defined as:



4.2.1 Detection range, measurement range and accuracy

Minimum bar spacing of 36 mm (1.4 inches) for resolving individual bars or bar spacing:cover (s:c) 2:1, whichever is greater. A minimum depth of 10 mm (0.4 inch) is required for a depth reading.

Minimum distance of nearest reinforcing bar from starting point and finishing point of the scan (e.g. from edge of reference grid): 30 mm (1.2 inch).

a. Imagescan and Blockscan

Rebar diameter given

Bar diameter (DIN 488)	Depth (mm)									
	20	40	60	80	100	120	140	160	180	
6	±2	±3	±3	±4	±5	0	X	X	X	
8	±2	±2	±3	±4	±5	0	0	X	X	
10	±2	±2	±3	±4	±5	0	0	X	X	
12	±2	±2	±3	±4	±5	±10	0	X	X	
14	±2	±2	±3	±4	±5	±10	0	0	X	
16	±2	±2	±3	±4	±5	±10	±12	0	X	
20	±2	±2	±3	±4	±5	±10	±12	0	X	
25	±2	±2	±3	±4	±5	±10	±12	0	X	
28	±2	±2	±3	±4	±5	±10	±12	0	X	
30	±2	±2	±3	±4	±5	±10	±12	0	X	
36	±2	±2	±3	±4	±5	±10	±12	±13	0	

	Depth (mm)									
	20	40	60	80	100	120	140	160	180	
Bar diameter (ASTM)	#3	±2	±2	±3	±4	±5	0	0	X	X
	#4	±2	±2	±3	±4	±5	±10	0	X	X
	#5	±2	±2	±3	±4	±5	±10	±12	0	X
	#6	±2	±2	±3	±4	±5	±10	±12	0	X
	#7	±2	±2	±3	±4	±5	±10	±12	0	X
	#8	±2	±2	±3	±4	±5	±10	±12	0	X
	#9	±2	±2	±3	±4	±5	±10	±12	0	X
	#10	±2	±2	±3	±4	±5	±10	±12	0	X
	#11	±2	±2	±3	±4	±5	±10	±12	±13	0

	Depth (inch)									
	0.8	1.6	2.4	3.1	3.9	4.7	5.5	6.3	7.1	
Bar diameter (ASTM)	#3	±0.1	±0.1	±0.1	±0.15	±0.2	0	0	X	X
	#4	±0.1	±0.1	±0.1	±0.15	±0.2	±0.4	0	X	X
	#5	±0.1	±0.1	±0.1	±0.15	±0.2	±0.4	±0.5	0	X
	#6	±0.1	±0.1	±0.1	±0.15	±0.2	±0.4	±0.5	0	X
	#7	±0.1	±0.1	±0.1	±0.15	±0.2	±0.4	±0.5	0	X
	#8	±0.1	±0.1	±0.1	±0.15	±0.2	±0.4	±0.5	0	X
	#9	±0.1	±0.1	±0.1	±0.15	±0.2	±0.4	±0.5	0	X
	#10	±0.1	±0.1	±0.1	±0.15	±0.2	±0.4	±0.5	0	X
	#11	±0.1	±0.1	±0.1	±0.15	±0.2	±0.4	±0.5	±0.5	0

	Depth (mm)									
	20	40	60	80	100	120	140	160	180	
Bar diameter (CAN)	#10	±2	±2	±3	±4	±5	0	0	X	X
	#15	±2	±2	±3	±4	±5	±10	±12	0	X
	#20	±2	±2	±3	±4	±5	±10	±12	0	X
	#25	±2	±2	±3	±4	±5	±10	±12	0	X
	#30	±2	±2	±3	±4	±5	±10	±12	0	X
	#35	±2	±2	±3	±4	±5	±10	±12	±13	0

	Depth (mm)									
	20	40	60	80	100	120	140	160	180	
Bar diameter (JIS)	6	±2	±3	±3	±4	±5	0	X	X	X
	10	±2	±2	±3	±4	±5	0	0	X	X
	13	±2	±2	±3	±4	±5	±10	0	X	X
	16	±2	±2	±3	±4	±5	±10	±12	0	X
	19	±2	±2	±3	±4	±5	±10	±12	0	X
	22	±2	±2	±3	±4	±5	±10	±12	0	X
	25	±2	±2	±3	±4	±5	±10	±12	0	X
	29	±2	±2	±3	±4	±5	±10	±12	0	X
	32	±2	±2	±3	±4	±5	±10	±12	0	X
	35	±2	±2	±3	±4	±5	±10	±12	±13	0
	38	±2	±2	±3	±4	±5	±10	±12	±13	0

	Depth (mm)									
	20	40	60	80	100	120	140	160	180	
Bar diameter (GB 50010-2002)	8	±2	±3	±3	±4	±5	0	X	X	X
	10	±2	±2	±3	±4	±5	0	0	X	X
	12	±2	±2	±3	±4	±5	±10	0	X	X
	14	±2	±2	±3	±4	±5	±10	±12	0	X
	16	±2	±2	±3	±4	±5	±10	±12	0	X
	18	±2	±2	±3	±4	±5	±10	±12	0	X
	20	±2	±2	±3	±4	±5	±10	±12	0	X
	22	±2	±2	±3	±4	±5	±10	±12	0	X
	25	±2	±2	±3	±4	±5	±10	±12	0	X
	28	±2	±2	±3	±4	±5	±10	±12	±13	0
	32	±2	±2	±3	±4	±5	±10	±12	±13	0
	36	±2	±2	±3	±4	±5	±10	±12	±13	0

The value indicates typical accuracy of depth measurement (deviation from actual) in mm or inches, as applicable.

O: Bar is visible at this depth but no depth is calculated.
X: Bar cannot be detected at this depth.

Imagescan – rebar diameter not given.

	Depth (mm)									
	20	40	60	80	100	120	140	160	180	
Bar diameter (DIN 488)	6	±3	±3	±4	±6	±8	0	X	X	X
	8	±3	±3	±4	±6	±8	0	0	X	X
	10	±3	±3	±4	±6	±8	0	0	X	X
	12	±3	±3	±4	±6	±8	±12	0	X	X
	14	±3	±3	±4	±6	±8	±12	0	0	X
	16	±3	±3	±4	±6	±8	±12	±14	0	X
	20	±3	±3	±4	±6	±8	±12	±14	0	X
	25	±3	±3	±4	±6	±8	±12	±14	0	X
	28	±3	±3	±4	±6	±8	±12	±14	0	X
	30	±3	±3	±4	±6	±8	±12	±14	0	X
	36	±3	±3	±4	±6	±8	±12	±14	±16	0

	Depth (mm)									
	20	40	60	80	100	120	140	160	180	
Bar diameter (ASTM)	#3	±3	±3	±4	±6	±8	0	0	X	X
	#4	±3	±3	±4	±6	±8	±12	0	X	X
	#5	±3	±3	±4	±6	±8	±12	±14	0	X
	#6	±3	±3	±4	±6	±8	±12	±14	0	X
	#7	±3	±3	±4	±6	±8	±12	±14	0	X
	#8	±3	±3	±4	±6	±8	±12	±14	0	X
	#9	±3	±3	±4	±6	±8	±12	±14	0	X
	#10	±3	±3	±4	±6	±8	±12	±14	0	X
	#11	±3	±3	±4	±6	±8	±12	±14	±16	X

	Depth (inch)									
	0.8	1.6	2.4	3.1	3.9	4.7	5.5	6.3	7.1	
Bar diameter (ASTM)	#3	±0.1	±0.1	±0.2	±0.2	±0.3	0	0	X	X
	#4	±0.1	±0.1	±0.2	±0.2	±0.3	±0.4	0	X	X
	#5	±0.1	±0.1	±0.2	±0.2	±0.3	±0.4	±0.6	0	X
	#6	±0.1	±0.1	±0.2	±0.2	±0.3	±0.4	±0.6	0	X
	#7	±0.1	±0.1	±0.2	±0.2	±0.3	±0.4	±0.6	0	X
	#8	±0.1	±0.1	±0.2	±0.2	±0.3	±0.4	±0.6	0	X
	#9	±0.1	±0.1	±0.2	±0.2	±0.3	±0.4	±0.6	0	X
	#10	±0.1	±0.1	±0.2	±0.2	±0.3	±0.4	±0.6	0	X
	#11	±0.1	±0.1	±0.2	±0.2	±0.3	±0.4	±0.6	±0.6	X

	Depth (mm)									
	20	40	60	80	100	120	140	160	180	
Bar diameter (CAN)	#10	±3	±3	±4	±6	±8	0	0	X	X
	#15	±3	±3	±4	±6	±8	±12	±14	0	X
	#20	±3	±3	±4	±6	±8	±12	±14	0	X
	#25	±3	±3	±4	±6	±8	±12	±14	0	X
	#30	±3	±3	±4	±6	±8	±12	±14	0	X
	#35	±3	±3	±4	±6	±8	±12	±14	±16	X

	Depth (mm)									
	20	40	60	80	100	120	140	160	180	
Bar diameter (JIS)	6	±3	±3	±4	±6	±8	0	X	X	X
	10	±3	±3	±4	±6	±8	0	0	X	X
	13	±3	±3	±4	±6	±8	±12	0	X	X
	16	±3	±3	±4	±6	±8	±12	±14	0	X
	19	±3	±3	±4	±6	±8	±12	±14	0	X
	22	±3	±3	±4	±6	±8	±12	±14	0	X
	25	±3	±3	±4	±6	±8	±12	±14	0	X
	29	±3	±3	±4	±6	±8	±12	±14	0	X
	32	±3	±3	±4	±6	±8	±12	±14	0	X
	35	±3	±3	±4	±6	±8	±12	±14	±16	X
	38	±3	±3	±4	±6	±8	±12	±14	±16	X

en

	Depth (mm)									
	20	40	60	80	100	120	140	160	180	
Bar diameter (GB 50010-2002)	8	±3	±3	±4	±6	±8	0	X	X	X
	10	±3	±3	±4	±6	±8	0	0	X	X
	12	±3	±3	±4	±6	±8	±12	0	X	X
	14	±3	±3	±4	±6	±8	±12	±14	0	X
	16	±3	±3	±4	±6	±8	±12	±14	0	X
	18	±3	±3	±4	±6	±8	±12	±14	0	X
	20	±3	±3	±4	±6	±8	±12	±14	0	X
	22	±3	±3	±4	±6	±8	±12	±14	0	X
	25	±3	±3	±4	±6	±8	±12	±14	0	X
	28	±3	±3	±4	±6	±8	±12	±14	±16	X
	32	±3	±3	±4	±6	±8	±12	±14	±16	X
	36	±3	±3	±4	±6	±8	±12	±14	±16	X

Value indicates typical accuracy of depth measurement (deviation from actual) in mm or inches, as applicable.

O: Bar is visible at this depth but no depth is calculated.
X: Bar cannot be detected at this depth.

b. Quickscan recording

Diameter is known.

	Depth (mm)					
	20	40	60	80	100	
Bar diameter (DIN 488)	6	±1	±1	±2	±4	±5
	8	±1	±1	±2	±4	±5
	10	±1	±1	±2	±4	±5
	12	±1	±1	±2	±4	±5
	14	±1	±1	±2	±4	±5
	16	±1	±1	±2	±4	±5
	20	±1	±1	±2	±4	±5
	25	±1	±1	±2	±4	±5
	28	±1	±1	±2	±4	±5
	30	±1	±1	±2	±4	±5
	36	±1	±1	±2	±4	±5

	Depth (mm)					
	20	40	60	80	100	
Bar diameter (ASTM)	#3	±1	±1	±2	±4	±5
	#4	±1	±1	±2	±4	±5
	#5	±1	±1	±2	±4	±5
	#6	±1	±1	±2	±4	±5
	#7	±1	±1	±2	±4	±5
	#8	±1	±1	±2	±4	±5
	#9	±1	±1	±2	±4	±5
	#10	±1	±1	±2	±4	±5
	#11	±1	±1	±2	±4	±5

	Depth (inch)					
	0.8	1.6	2.4	3.1	3.9	
Bar diameter (ASTM)	#3	±0.05	±0.05	±0.1	±0.15	±0.2
	#4	±0.05	±0.05	±0.1	±0.15	±0.2
	#5	±0.05	±0.05	±0.1	±0.15	±0.2
	#6	±0.05	±0.05	±0.1	±0.15	±0.2
	#7	±0.05	±0.05	±0.1	±0.15	±0.2
	#8	±0.05	±0.05	±0.1	±0.15	±0.2
	#9	±0.05	±0.05	±0.1	±0.15	±0.2
	#10	±0.05	±0.05	±0.1	±0.15	±0.2
	#11	±0.05	±0.05	±0.1	±0.15	±0.2

	Depth (mm)					
	20	40	60	80	100	
Bar diameter (CAN)	#10	±1	±1	±2	±4	±5
	#15	±1	±1	±2	±4	±5
	#20	±1	±1	±2	±4	±5
	#25	±1	±1	±2	±4	±5
	#30	±1	±1	±2	±4	±5
	#35	±1	±1	±2	±4	±5

	Depth (mm)					
	20	40	60	80	100	
Bar diameter (JIS)	6	±1	±1	±2	±4	±5
	10	±1	±1	±2	±4	±5
	13	±1	±1	±2	±4	±5
	16	±1	±1	±2	±4	±5
	19	±1	±1	±2	±4	±5
	22	±1	±1	±2	±4	±5
	25	±1	±1	±2	±4	±5
	29	±1	±1	±2	±4	±5
	32	±1	±1	±2	±4	±5
	35	±1	±1	±2	±4	±5
	38	±1	±1	±2	±4	±5

	Depth (mm)					
	20	40	60	80	100	
Bar diameter (GB 50010-2002)	8	±1	±1	±2	±4	±5
	10	±1	±1	±2	±4	±5
	12	±1	±1	±2	±4	±5
	14	±1	±1	±2	±4	±5
	16	±1	±1	±2	±4	±5
	18	±1	±1	±2	±4	±5
	20	±1	±1	±2	±4	±5
	22	±1	±1	±2	±4	±5
	25	±1	±1	±2	±4	±5
	28	±1	±1	±2	±4	±5
	32	±1	±1	±2	±4	±5
	36	±1	±1	±2	±4	±5

Value indicates typical accuracy of depth measurement (deviation from actual) in mm or inches as applicable.

c. Quickscan detection with depth measurement

Diameter is known.

	Depth (mm)					
	20	40	60	80	100	
Bar diameter (DIN 488)	6	±2	±2	±3	±4	±5
	8	±2	±2	±3	±4	±5
	10	±2	±2	±3	±4	±5
	12	±2	±2	±3	±4	±5
	14	±2	±2	±3	±4	±5
	16	±2	±2	±3	±4	±5
	20	±2	±2	±3	±4	±5
	25	±2	±2	±3	±4	±5
	28	±2	±2	±3	±4	±5
	30	±2	±2	±3	±4	±5
	36	±2	±2	±3	±4	±5

	Depth (mm)					
	20	40	60	80	100	
Bar diameter (ASTM)	#3	±2	±2	±3	±4	±5
	#4	±2	±2	±3	±4	±5
	#5	±2	±2	±3	±4	±5
	#6	±2	±2	±3	±4	±5
	#7	±2	±2	±3	±4	±5
	#8	±2	±2	±3	±4	±5
	#9	±2	±2	±3	±4	±5
	#10	±2	±2	±3	±4	±5
	#11	±2	±2	±3	±4	±5

	Depth (inch)					
	0.8	1.6	2.4	3.1	3.9	
Bar diameter (ASTM)	#3	±0.1	±0.1	±0.1	±0.15	±0.2
	#4	±0.1	±0.1	±0.1	±0.15	±0.2
	#5	±0.1	±0.1	±0.1	±0.15	±0.2
	#6	±0.1	±0.1	±0.1	±0.15	±0.2
	#7	±0.1	±0.1	±0.1	±0.15	±0.2
	#8	±0.1	±0.1	±0.1	±0.15	±0.2
	#9	±0.1	±0.1	±0.1	±0.15	±0.2
	#10	±0.1	±0.1	±0.1	±0.15	±0.2
	#11	±0.1	±0.1	±0.1	±0.15	±0.2

	Depth (mm)					
	20	40	60	80	100	
Bar diameter (CAN)	#10	±2	±2	±3	±4	±5
	#15	±2	±2	±3	±4	±5
	#20	±2	±2	±3	±4	±5
	#25	±2	±2	±3	±4	±5
	#30	±2	±2	±3	±4	±5
	#35	±2	±2	±3	±4	±5

	Depth (mm)					
	20	40	60	80	100	
Bar diameter (JIS)	6	±2	±2	±3	±4	±5
	10	±2	±2	±3	±4	±5
	13	±2	±2	±3	±4	±5
	16	±2	±2	±3	±4	±5
	19	±2	±2	±3	±4	±5
	22	±2	±2	±3	±4	±5
	25	±2	±2	±3	±4	±5
	29	±2	±2	±3	±4	±5
	32	±2	±2	±3	±4	±5
	35	±2	±2	±3	±4	±5
	38	±2	±2	±3	±4	±5

	Depth (mm)					
	20	40	60	80	100	
Bar diameter (GB 50010-2002)	8	±2	±2	±3	±4	±5
	10	±2	±2	±3	±4	±5
	12	±2	±2	±3	±4	±5
	14	±2	±2	±3	±4	±5
	16	±2	±2	±3	±4	±5
	18	±2	±2	±3	±4	±5
	20	±2	±2	±3	±4	±5
	22	±2	±2	±3	±4	±5
	25	±2	±2	±3	±4	±5
	28	±2	±2	±3	±4	±5
	32	±2	±2	±3	±4	±5
	36	±2	±2	±3	±4	±5

Value indicates typical accuracy of depth measurement (deviation from actual) in mm or inches as applicable.

d. Quickscan detection

Depth measurement is typically accurate to within ±10% of the effective depth.

4.2.2 Accuracy of bar diameter measurement

±1 standard diameter when rebar spacing: depth of cover ≥2 : 1. Bar diameter measurement is possible only at depths of up to 60 mm.

4.2.3 Accuracy of rebar location

Relative bar center measurement accuracy (all modes), typical: Typically ±3 mm or typically ±0.1 inch relative to the measured position, when the bar spacing: depth of cover ≥1.5:1.

4.3 Specifications

	PS 200 S scanner	PS 200 M monitor
Maximum scanning speed	0.5 m/s	--
Memory type	Built-in data flash memory	Removable SD card, max. memory card size: 1 GB
Memory capacity	9 Imagescans plus up to 30 m of recorded Quickscan (max. 10 scans)	At least 150 Imagescans or 75 Quickscans (total 2250 m), plus up to 15 minutes of speech with 32 MB card.
Screen type/size	LCD/50×37 mm	LCD/115×86 mm
Screen resolution	128×64 pixels	320×240 pixels/16 gray scales
Dimensions	260×132×132 mm	264×152×57 mm
Weight (with PSA 80 battery)	1.40 kg	1.40 kg

Minimum battery life (with PSA 80 battery)	8 hours under typical conditions	8 hours under typical conditions
Automatic power-off	5 min. after last press of a button	Set by the user
Backup battery type/life	Lithium/10 years (typically)	Lithium/10 years (typically)
PC connection	--	USB V 1.1
Headset connection	--	2.5 mm mini jack
Scanner-monitor data interface	Infrared	Infrared
Scanner-monitor data transfer time	<16 s for 9 images, <2 s for 1 image	<16 s for 9 images, <2 s for 1 image
Infrared range	0.3 m (typically)	0.3 m (typically)
Infrared output power	Max. 500 mW	Max. 500 mW

4.4 Technical data for PSA 80 battery

Battery type	NiMH
Nominal voltage	9.6 V nominal
Capacity	2000 mAh nominal
Dimensions	42×46×46 mm or 5.6×1.8×1.8 in
Weight	0.3 kg or 0.7 lb
Min. no. charge cycles	Typically 500

5. Safety rules

5.1 General safety rules

In addition to the safety rules listed in the individual sections of these operating instructions, the following rules must be strictly observed at all times.

5.2 Intended use

The appliance is intended to be used for locating reinforcing bars in concrete, measuring depth of concrete cover and estimating the diameter of the bars in the uppermost layer in accordance with the specifications detailed in section 4.



- Dangerous situations may occur when the appliance is either not used for its intended purpose or is used incorrectly by untrained personnel.
- To minimize the risk of injury, use only genuine Hilti accessories and replacement parts.
- Tampering with the appliance or modification of its parts is not permissible.
- Take notice of the instructions regarding use, care and maintenance given in the operating instructions.
- Do not deactivate any safety devices. Do not remove any information or warning labels.
- Have the appliance repaired only at a Hilti service center.
- In particularly critical situations where measurements have safety and structural stability implications, always

check results by removing material from the surface of the structure and physically checking the position, depth and diameter of reinforcement at key positions.

- When drilling at or near to a bar indicated by the appliance, never drill deeper than the bar depth indicated.

5.3 Work area safety



- Ensure there are no objects in the area of work with which you could injure yourself.
- Keep other people away from the work area, especially children.
- Avoid working in awkward body positions.
- Wear footwear with a non-slip tread and ensure you always employ a stable standing position.
- Avoid leaning when working on ladders. Always work from a secure position and stay in balance.
- Use the appliance only within its defined performance limits.
- Check with a qualified person that it is safe to drill at a specified point before beginning drilling.
- Never use the appliance in areas where there is danger of explosion.
- Ensure the toolbox is properly secured during transport and does not pose a risk of injury.

5.3.1 Electromagnetic compatibility

Although the appliance fulfills the requirements of the relevant regulations, Hilti cannot rule out the possibility that:

- Other equipment (e.g. airborne navigation systems, medical equipment) will be disturbed by the PS 200 or
- That this disturbance will lead to a malfunction of the PS 200. In such cases or in case of any uncertainty, control measurements must be carried out.

5.4 General safety measures

5.4.1 Mechanical



- Check the appliance for possible faults before use. In case of a fault, have the appliance repaired by Hilti Service.
- If the appliance is dropped or subjected to an impact, its accuracy must be subsequently checked.
- Check the accuracy of the appliance each time before use.
- When moving the appliance between temperature extremes, allow it to become acclimatize to the new temperature before use.
- Even though the appliance is protected against the ingress of moisture, always wipe it dry before storing it in the toolbox.

5.4.2 Electrical



- Avoid shorting the battery terminals. Such electrical shorting can cause fire.
- Ensure that the exterior surfaces of the battery are clean and dry before connecting it to the charger.
- Use only the battery specified in these operating instructions.
- Ensure that the battery is safely disposed of at the end of its life.
- When transporting the appliance or storing it for a longer period of time, remove the battery. Before reusing it, inspect the battery for any signs of leakage or damage.
- To avoid environmental pollution, the battery must be disposed of in accordance with country-specific regulations. In case of doubt, contact Hilti.

5.4.3 Liquids



-WARNING-

A corrosive liquid can leak from defective batteries. Avoid contact with this liquid. Should the liquid come into contact with the skin, wash the area affected liberally with soap and water. In case of contact with the eyes, rinse them immediately with water and consult a doctor.

5.5 Requirements to be met by the user

- The appliance is intended for professional users.
- The appliance may be used, maintained and cared for only by authorized, personnel who have received instruction in its use. This personnel must be specially instructed in the hazards associated with the appliance.
- Always concentrate on your work. Always think carefully about what you are doing. Do not use the appliance if you are unable to concentrate.
- Do not use the appliance if it appears to be defective in any way.
- If you are unsure of any scan results, consult a Hilti specialist before proceeding.
- Observe all warning and information messages displayed by the scanner and monitor.

5.6 Scanning requirements and limitations

- Always check the accuracy of the appliance before commencing work on structures where measurements have safety and structural stability implications. Scan a reinforcing bar of known location, depth and diameter and check the results against the accuracy specifications.
- Do not use the PS 200 S scanner if the wheels do not turn freely or appear to be worn. Contact Hilti for repair information. Additionally, you can clean or replace the wheels – refer to section 8.
- Check the settings made in the appliance before use.
- Apply only light pressure to the scanner when moving it across the surface.
- Reinforcement that lies beneath the uppermost layer of reinforcement may not be detected.
- Remove all items such as rings, bracelets, etc. before commencing scanning.

6. Operation



en

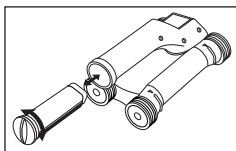
6.1 PSA 80 battery

Charge both batteries using the PUA 80 chargers. Full instructions are contained in the PUA 80 charger operating instructions. Before first use, the batteries must be charged for 14 hours continuously.

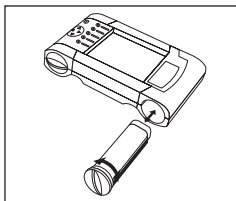
6.1.1 Inserting and removing the battery

Check that the battery is correctly aligned with the scanner or monitor as shown below.

Scanner – With the battery end cap facing you, the large groove on the battery should be on the left.



Monitor – With the battery end cap facing you, the large groove on the battery should be on the right.



Push the battery into the opening as far as it will go. Turn the end cap clockwise until it slots into place and snaps tight. To remove the battery, turn the end cap anti-clockwise as far as it will go. Withdraw the battery from the scanner or monitor.



-CAUTION-

The battery should slide easily into the scanner or monitor. Do not force the battery into the scanner or monitor as this may damage the battery itself or the scanner or monitor casing.

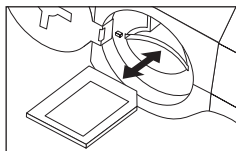


-WARNING-

Do not remove the battery during operation or when the monitor is switched on. Removing the battery at such a time may result in data loss. Remove the battery only when the monitor is switched off.

6.2 PSA 91/PSA 94 memory card

Insert the memory card in the slot provided on the back of the monitor.



To remove the memory card, press it once. The card will release from the slot. It can now be easily gripped and removed.



-WARNING-

Although the memory card is of the SD or Multimedia Card type, standards vary between different manufacturers. To help ensure data security and integrity, memory cards supplied by Hilti should be used. Data may be irretrievably lost if memory cards other than those supplied by Hilti are used.



-WARNING-

Do not remove the memory card during operation or when the monitor is switched on. Removing the card at such a time may result in data loss. Only remove the card when the monitor is switched off.

-NOTE-

When the memory card is removed, the monitor will automatically revert to using the 3 MB internal memory. Data will then be saved in this memory under a project with the name "Prj00001" until a memory card is inserted in the monitor. When a memory card is inserted and the monitor switched on, all data in internal memory will be transferred to the memory card automatically.

6.2.1 Using memory cards

With monitors with item no. 319281, only memory cards of the MMC type may be used (up to a max. capacity of 128 MB). With monitors with item no. 31225, memory cards of the MMC and SD types may be used (up to a max. capacity of 1 GB).

-WARNING-

SD memory cards cannot be used with the old-type monitor.

-NOTE-

The item no. can be found on the type identification plate on the underside of the monitor.

7. Operation

7.1 Carrying and using the system

The scanner can be used without the monitor for scanning, or the monitor can be carried in the PSA 61 soft pouch on the PSA 60 shoulder belt. The first option is advantageous when working in areas that are difficult to access and maximum mobility is required, such as on a scaffold or ladder. When the scanner memory is full (9 Imagescans made, 1 complete Blockscan or 30 m of Quickscan have been recorded), the user must return to the monitor to transfer the data. The monitor can be kept nearby (e.g. at the foot of the scaffold, in a vehicle, in the site office etc.). When the user intends to make more scans than the scanner is capable of storing in its memory and wishes to avoid repeated journeys to the monitor, the monitor can be attached to a belt or carried using the shoulder strap supplied.

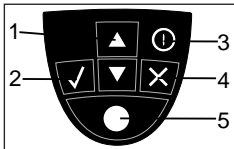


-CAUTION-

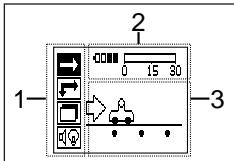
The temperature inside a vehicle that is left exposed to the heat of the sun can easily exceed the maximum storage temperature for the PS 200. Damage to one or more components of the PS 200 may occur if it is stored in temperatures exceeding 60 °C or 158 °F.

7.2 Operating the scanner

7.2.1 Control panel and screen layout



- 1 – *Arrow buttons* Toggle up or down in options or values.
- 2 – *Confirm button* Confirms a value or a selection.
- 3 – *On/off button*
- 4 – *Cancel button* Cancels an input or moves back one screen.
- 5 – *Record button* Starts or stops a recording.



- 1 – *Menu area.* Functions that can be selected using the *Arrow* and *Confirm* buttons
- 2 – *Status information* – information such as battery level, memory status

- 3 – *Variable area* – information displayed is user feedback – e.g. measuring mode, bar depth, scan progress etc.

7.2.2 Switching on and off

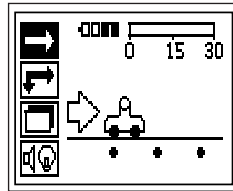
To switch the scanner on or off, press and hold the *On/off button* momentarily.

The scanner can be switched off only when it is in the main menu.

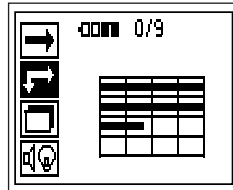
7.2.3 Main menu

The system always starts in the main menu. All scanning functions and set-up options are selected here. The battery charge status is displayed at the top of the screen together with the memory status. The various scan modes and settings menus are displayed as icons on the left side of screen. Use the *Arrow buttons* to toggle between these options. The *Confirm button* selects the option.

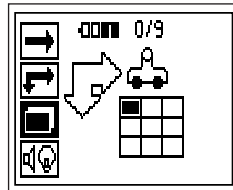
Quickscan – The remaining memory for Quickscan recording is shown at the top of the screen in meters or feet (depending on the scanner type and units set).



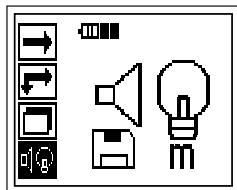
Imagescan – The number of Imagescans in the scanner, up to a maximum of 9, is shown at the top of the screen.



Blockscan – The number of Imagescans in the scanner, up to a maximum of 9, is shown at the top of the screen.



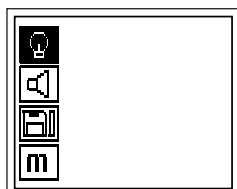
Settings – Sets various parameters and deletes all scans held in memory.



7.2.4 Settings

Use this menu to set general parameters and to delete scans from the scanner that have not been transferred to the monitor.

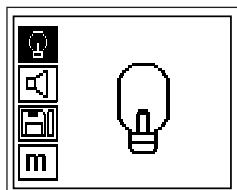
Upon entering *Settings*, the following screen is displayed:



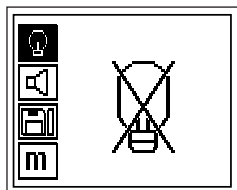
Use the *Arrow buttons* to toggle between options, *Confirm* to select an option and *Cancel* to return to the main menu.

7.2.4.1 Set display backlight

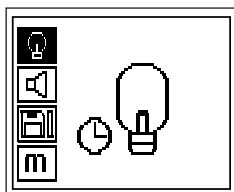
Sets the display backlight. Use the *Arrow buttons* to toggle between options. Use the *Confirm button* to select the desired option and then press the *Cancel button* to return to the settings menu.



Backlight permanently on



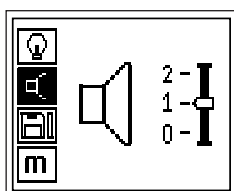
Backlight permanently off



Backlight timed – switches off 5 minutes after the last press of a button. Backlight activates automatically on next press of a button.

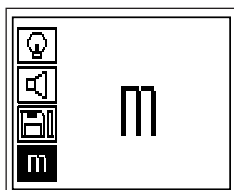
7.2.4.2 Set volume

Sets the volume level of the audible signal during scanning. Use the *Arrow buttons* to toggle between options. Use the *Confirm button* to select the desired option and then press the *Cancel button* to return to the settings menu.

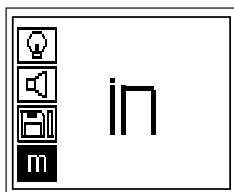


7.2.4.3 Set units

Sets the units used during measurement. This is available only in units with item no. 377642. Use the *Arrow buttons* to toggle between options. Use the *Confirm button* to select the desired option and then press the *Cancel button* to return to the *Settings* menu.



metric (mm or m, as appropriate)



imperial (inches or feet, as appropriate)

7.2.4.4 Delete data

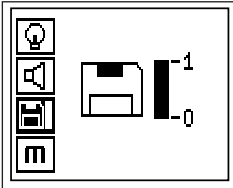
Deletes **all** data contained in the scanner. This function can be accessed only if data is contained in memory. If data is contained in memory, the bar that appears next

to the diskette symbol is filled. If not, the bar is shown empty.



-WARNING-

This may result in permanent data loss. Data that has not been transferred to the monitor will be permanently deleted.



Press the *Down arrow* button and then the *Confirm button* to delete data. Alternatively, press the *Cancel button* to return to the *Settings* menu.

7.2.5 Quicksan

Quicksan can be used to quickly detect bar positions and depths that are then subsequently marked on the surface. This is procedure is named Quicksan detection.

Accurate depth measurement is another Quicksan function in which values for bar diameter and bar spacing must be previously entered.

Alternatively, the data can be recorded and evaluated on the monitor or in the PC application. In this way, the average depth of cover over the reinforcement over large stretches of the surface can be easily determined. This is termed Quicksan recording.

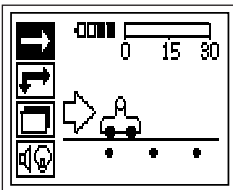


-CAUTION-

The scanner only detects reinforcing bars that lie perpendicular to the direction of travel. Bars that lie parallel to the direction of travel will not be detected. Therefore, ensure that the object is scanned in both the horizontal and vertical directions.

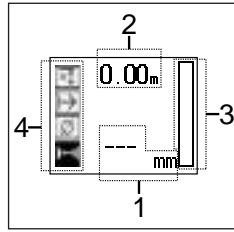
An incorrect depth may be calculated for bars that lie diagonal to the direction of travel.

Switch on the scanner. The Quicksan icon is automatically the first selected.



Select Quickscan from the main menu.

The Quicksan screen is then displayed.



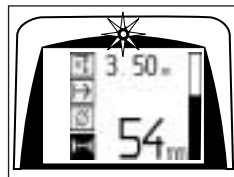
- 1 – Bar depth
- 2 – Distance traveled
- 3 – Signal strength
- 4 – Settings: minimum depth, scan direction, bar diameter, bar spacing

7.2.5.1 Quicksan detection

Move the scanner over the surface. Reinforcing bars that lie perpendicular to the direction of travel will be detected. The distance covered by the scanner is recorded.

When approaching a reinforcing bar, the signal strength increases and depth values may appear in the display. When at the center of a reinforcing bar:

- the red LED lights,
- the scanner beeps,
- the signal strength bar is at maximum,
- and the approximate depth of the bar is indicated (lowest depth value indicated = center of the bar).



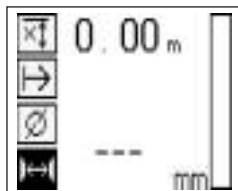
The bar is positioned along the center line of the scanner and may be marked on the surface using a PUA 70 marker. The accuracy of the depth measurement can be increased by switching to accurate depth measurement measuring mode. Please refer to section 7.2.5.2.



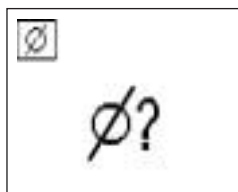
This symbol may appear when the scanner is moved over the surface. It indicates that the scanner is being moved too quickly to be able to process all signals generated. The maximum speed is 0.5m/s (20 inches/sec.). If the symbol appears during Quicksan detection, press *Confirm* and scan again.

7.2.5.2 Quickscan with accurate depth measurement

The measuring mode "Quickscan with accurate depth measurement" is selected by pressing the *Confirm button*.



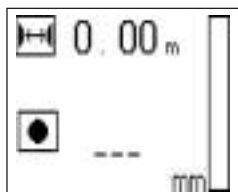
The diameter must be known and previously entered.



In addition, the value for the spacing between bars must also be entered if it lies between >36 and <120 mm.

-NOTE-

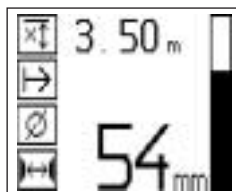
Bar spacing of 36 mm or less cannot be measured.



This can be calculated automatically using the Quickscan detection function by searching for the center of the bar and pressing the red *Record button* when the scanner is over the mid point of the bar. Next, search for the mid point of the next bar and again press the *Record button*. Bar spacing is then calculated automatically and recorded. If the spacing is known, the value can also be entered manually.



After setting the bar diameter and bar spacing, the scanning procedure is identical to the procedure described at 7.2.5.1.



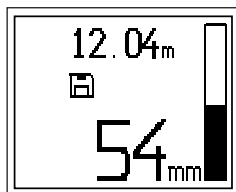
7.2.5.3 Quickscan recording

To record the position and depth of all reinforcing bars detected, place the scanner on the surface and use Quickscan detection to find a position where there are no bars present. Mark the starting point with a PUA 70 marker and press the *Record button*. The diskette symbol appears on the screen, indicating that the scanner is recording data. Move the scanner over the surface.

At the end of the scan, take care to ensure that the end point is not directly over a rebar. To stop recording, press *Record* again. Use a PUA 70 marker to mark the end of the stretch that has been scanned.

-NOTE-

Reinforcing bars that lie perpendicular to the direction of travel will be detected and automatically recorded. Ensure that the settings are correctly set before beginning recording.



-WARNING-

Always carry out an Imagescan prior to Quickscan recording in order to:

- establish the direction of the uppermost layer of reinforcement,
- minimize the risk of measuring on a spliced bar,
- and immediately see if there are any ferrous materials in the concrete that may affect the accuracy of the result.



-CAUTION-

Do not press *Record* before placing the scanner at the point where the scanning should begin. Failure to do this may result in incorrect or misleading measurements. Up to 30 m (98 ft) can be recorded before it is necessary to transfer the data to the monitor. It is also possible to record several separate stretches (max. 10) that add up to a maximum of 30 m.



-WARNING-

Do not remove the scanner from the surface before stopping the recording or setting a marker. Failure to do this may result in incorrect or misleading measurements. For information on setting a marker, refer to section 7.2.5.5.



This symbol may appear when the scanner is being moved over the surface. It indicates that the scanner is being moved too fast and it is unable to process all the signals generated. The maximum scanning speed is 0.5 m/s. If the symbol is displayed while recording a Quickscan, press the *Confirm* button. You will need to begin the recording operation again from the original starting point or from where the last marker was set.

The data may be transferred to the monitor. Refer to section 7.4.

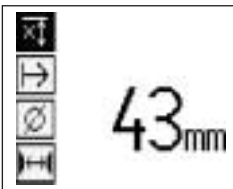
7.2.5.4 Quickscan settings

The Quickscan settings are shown on the left hand side of the display. The settings can be made before making a Quickscan or a Quickscan with accurate depth measurement. Use the *Arrow buttons* and *Confirm* to access the setting.

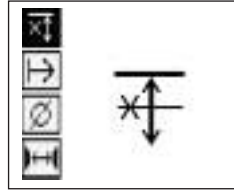
Minimum depth

Use this setting when scanning a surface and looking specifically for bars that are located above a certain depth. For example, if checking for 40 mm minimum depth of cover, set the value to 40 mm. (For quality assurance measurements add an extra 2 mm to account for any accuracy limitations). The LED will light only if a reinforcing bar lying within 40 mm of the surface is detected.

Select the minimum depth function using the *Arrow buttons* and then press *Confirm*.



Setting minimum depth

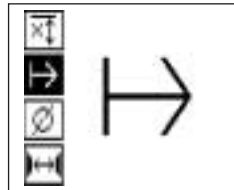


Minimum depth function disabled

When the value is set to 0, the function is deactivated and appears as above. Enter the required minimum depth using the *Arrow buttons*. Press *Confirm* to make the setting. The system returns to the main menu.

Scan direction

This setting is used to set the direction in which Quickscan recording is performed. Although it has no direct effect on any measurement values subsequently contained in the monitor or PC application, it helps to match the resulting chart and depth values in the PC application with the actual structure surface. The scan direction will be saved with all Quickscan recordings.

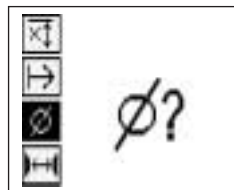


Select the direction in which the scan is to be performed and press *Confirm*.

Bar diameter

This setting must be made in order to be able to measure depth of cover accurately, or to allow values to be recorded. Only then can depth be measured accurately.

Select the Bar Diameter function using the *Arrow buttons*. Press *Confirm*.



If no bar diameter is selected, the scanner will calculate the depth as though the average bar diameter of the relevant standard setting range were set.

Standard	Ø
DIN 488	16 mm
ASTM A 615/A 615M-01b	# 7
CAN/CSA-G30, 18-M92	C 20
JIS G 3112	D 22
GB 50012-2002	18 mm

-NOTE-

The bar diameter previously set will be stored in the scanner after it has been switched off.

Bar spacing

Please refer to 7.2.5.2.

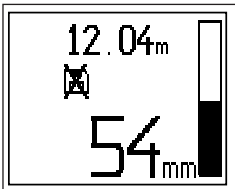


7.2.5.5 Setting a marker

When recording, the surfaces of many structures contain obstacles that prevent the scan being recorded without lifting the scanner from the surface. Examples of such obstacles are piers or columns in a wall, door openings, expansion joints, corners etc.

If an obstacle is encountered, a marker may be set. This interrupts the scan and allows the user to safely remove the scanner from the surface, place it beyond the obstruction and then continue scanning. It also indicates where certain objects are located within a scan, providing additional information for referencing the scan data to the actual surface.

To set the marker press and hold *Confirm*, whilst in recording mode. The diskette symbol will be crossed out, indicating that recording has been suspended and a marker has been set.



Then lift the scanner from the surface whilst still holding the *Confirm* button depressed. If necessary, mark the position on the surface using a PUA 70 marker. Place the scanner back on the surface beyond the obstacle, release *Confirm* and continue scanning. The marker will be shown as a vertical line in the scan data when viewed on the monitor or in the PC application.

-CAUTION-

De to interruption of the recorded signal, scanning results are less accurate immediately before and after the point where a mark is made.

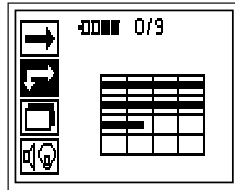
7.2.6 Imagescan

Imagescan is used to create an image of the reinforcement layout. The depth and diameter of the bars can be determined.

Firstly, a PSA 10 or PSA 11 reference grid has to be fixed to the wall. Use the adhesive tape supplied. This tape is designed specifically for sticking to concrete structures and can be torn off the roll by hand at the correct length. For most surfaces, a 100 mm (4 inch) piece of tape at each corner is adequate to secure the grid. Particularly moist or dusty surfaces may require a length of tape along each side of the grid.

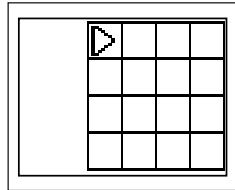
Alternatively, a grid can be marked directly on the surface. Using a straight edge (such as a piece of wood) as a guide, mark a 4x4 grid with 150 mm spacing between the parallel lines.

Switch on the scanner. Move to the Imagescan symbol. The battery level is displayed together with the number of Imagescans currently held in the memory out of a maximum of 9.



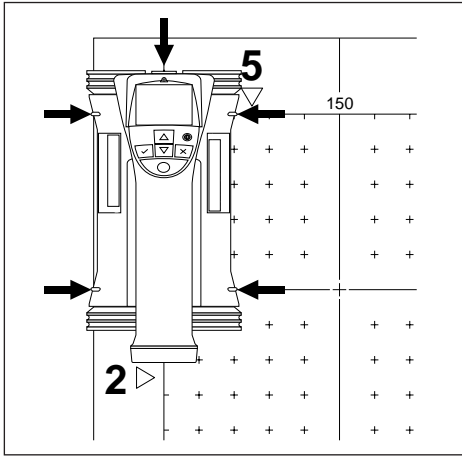
Select Imagescan from the main menu.

The Imagescan screen is displayed.



A representation of the grid appears on the screen with a suggested starting point. This is always upper left and will suffice for most scans. Image data will only be generated for areas of the grid that have been scanned both vertically and horizontally. In some cases, obstacles on the scan area may prevent this (e.g. a pipe penetrating a beam). The starting point can then be changed to optimize the area scanned in such a case. Use the *Arrow* buttons to change the starting point.

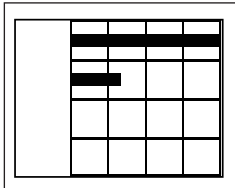
Place the scanner on the grid at the starting point shown by the blinking arrow. Ensure the alignment marks on the scanner are aligned correctly with the grid as shown below.



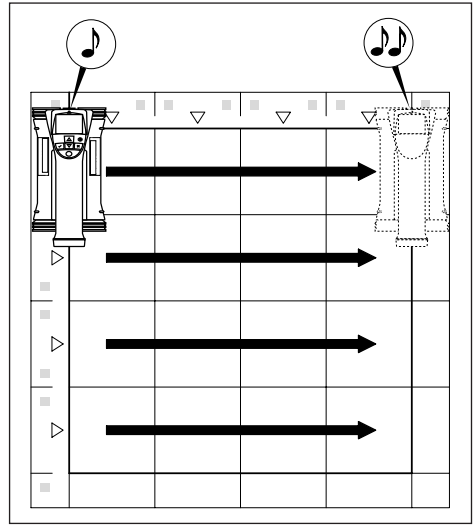
-NOTE-

Incorrect alignment of the scanner on the grid may lead to the bar positions being incorrect on the generated image.

Press *Record* and move the scanner along the first row. Progress when scanning is shown by a thick black line which advances on the display as the scanner is moved over the surface.

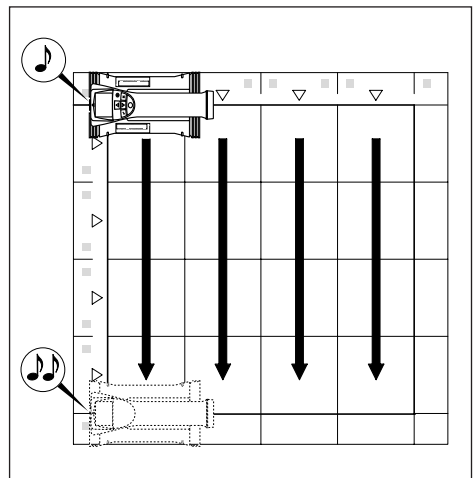
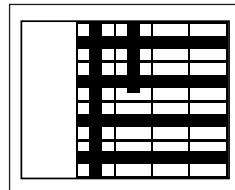


The scanner will emit a double beep at the end of the row, automatically stopping the recording. Repeat the process for each row, observing the prompts on the scanner display telling you to begin a new line.



en

When all rows are complete, scan the columns in a similar way.



The recording of any row or column may be interrupted before reaching the end by pressing *Record* again. This may be required if an obstacle prevents scanning of the full path. Similarly, an entire row or column may be skipped by starting and stopping the recording without running the scanner over the grid.

Note that no image will be created for areas of the grid that are not scanned in both directions.

It is possible to repeat the previous row or column by pressing *Cancel*. This may be necessary if the user is not sure that the scan field has not been followed accurately. Pressing *Cancel* a second time aborts the scan and returns to the main menu.



This symbol may appear when the scanner is being moved over the surface. It indicates that the scanner is being moved too quickly to allow it to process all the signals generated. The maximum speed is 0.5 m/s or 20 inch/s. If this symbol appears, press *Confirm* and repeat the row or column you were scanning. In all cases, move the scanner more slowly over the surface.

When the scan is complete, press the *Confirm button* to return to the main menu. The data may be transferred to the monitor for viewing and evaluation. Please refer to section 7.4.

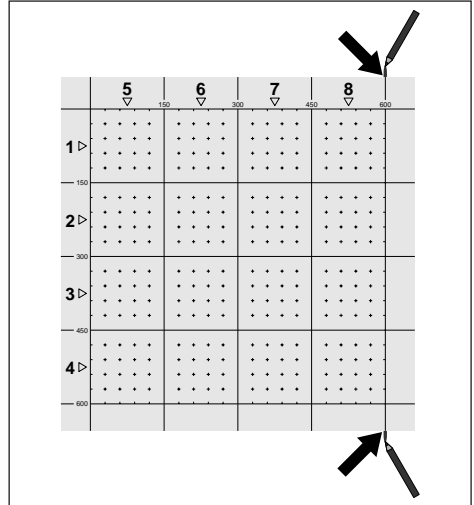
-CAUTION-

Pressing the *Cancel button* causes the recorded Imagescan to be deleted. The screen then returns to the main menu.

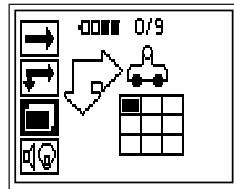
7.2.7 Blockscan

Blockscan automatically stitches Imagescans together to give an impression of the reinforcement layout over a large area. The exact bar position, depth and diameter can also be determined on the monitor by selecting each Imagescan individually.

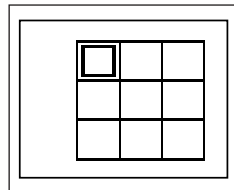
Attach the reference grid in the same way as when making an Imagescan. Mark the edge(s) for the transition to the next grid using a PUA 70 marker, as shown below.



Switch on the scanner. Move to the Blockscan symbol. The battery level is given, together with the number of Imagescans currently held in the memory out of a maximum of 9.

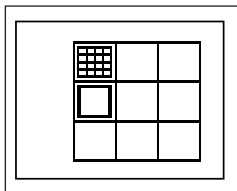


To begin, select Blockscan from the main menu.

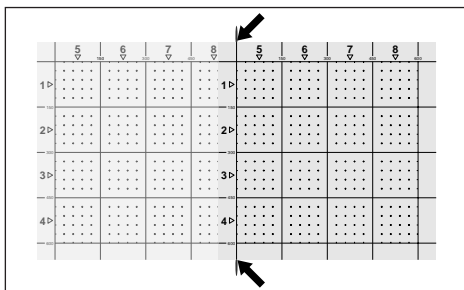


A representation of a Blockscan is shown on the screen. Each square represents an Imagescan. Up to 3x3 Imagescans can be scanned. Select the position of the first Imagescan that you will make in the series using the *Arrow buttons*. Press *Confirm* to begin the first Imagescan. Note that the coordinates of any points on the Blockscan will be referenced from the upper left corner.

Refer to the previous section for details on how to carry out the Imagescan. When the Imagescan is complete, the system returns to the Blockscan screen.



The completed Imagescan is shown shaded. Attach a new grid to the wall so that the edges of the reference grid overlap and the scan areas are aligned as shown in the diagram.



Select the location of the next Imagescan and repeat the scanning process. Completed Imagescans may be repeated by simply reselecting the area to scan and performing the Imagescan process. The data will be overwritten. When sufficient Imagescans have been made, or when all nine are complete, press *Cancel* to return to the main menu and transfer the data to the monitor. Please refer to section 7.4.

-CAUTION-

Pressing the *Cancel* button twice causes the recorded Imagescan to be deleted. The screen then returns to the main menu.

7.2.8 Error messages from the scanner when starting or scanning

Error messages may be displayed graphically on the scanner. Generally, a stop symbol indicates a fatal error with the scanner. In this case, the scanner requires to be serviced at a Hilti repair center.



One of these symbols may be displayed immediately after the scanner is switched on. They indicate a possible electronic fault. Switch the scanner off and then back on again. If the error message appears again, the appliance will need to be sent to Hilti for repair.

An exclamation symbol indicates either an error caused by the operator or an error that can be solved by the operator.



This symbol may appear either when trying to enter the Imagescan or Blockscan scanning mode, when trying to begin a new Imagescan within Blockscan scanning mode or when trying to start Quickscan recording. It indicates that the memory allocated for the operation is full and that no more data can be stored. In this situation, the data must either be transferred to the monitor or deleted from scanner memory.



-WARNING-

Deleting the scanner memory may result in permanent data loss. Data that has not been transferred to the monitor will be permanently deleted.



This symbol may appear during any type of scanning when the Scanner is being moved over the surface. It indicates that the Scanner is being moved too quickly to allow it to process all the signals generated. The maximum speed is 0.5m/s or 20 inches/s.

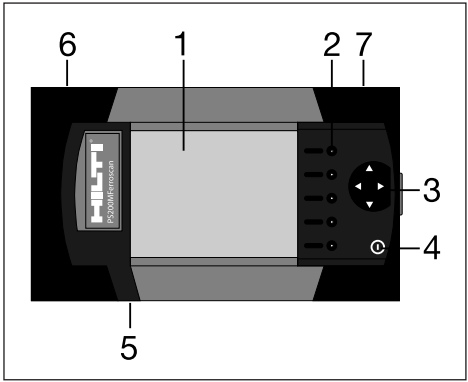
If the symbol appears during Quickscan detection, press *Confirm* and repeat the scan. During Quickscan recording, press *Confirm*. You will need to begin the recording operation again from the original starting point or from where the last marker was set. During Imagescan, press *Confirm* and repeat the row or column previously scanned. In all cases, move the scanner more slowly over the surface.



This symbol may appear if the scanner has been moved in the wrong direction during scanning, e.g. you begin scanning from right to left but during the scan move the scanner toward the right. The warning does not appear immediately, but only when moved 15 cm or more in the wrong direction.

7.3 Operating the monitor

The monitor provides extensive data storage capability, the ability to analyze scan data at the site where it was collected and also to add voice records to scans.

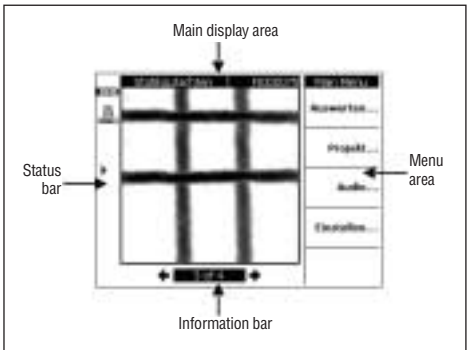


- 1 – Display
- 2 – "Soft" buttons – used to select menu options.
- 3 – Arrow buttons – used to move the cursor around the screen or adjust values.
- 4 – On/off button
- 5 – Headset connection (at the side)
- 6 – Battery (at the side)
- 7 – Compartment containing USB connection and memory card (at the side)

7.3.1 Switching on and off

To switch the monitor on, press and hold the *On/off button* for 1 second. The monitor will display a boot-up screen for about 15 seconds until it is ready for use. To switch off, press and hold the *On/off button* for about 1 second. The system switches itself off.

7.3.2 General screen layout



Status bar



Battery level. All 5 blocks filled indicates that the battery is fully charged. Warnings will appear when the level reaches the last block and about 15 minutes and 5 minutes before the battery is totally exhausted. Thereafter, the system will beep every two minutes until it is switched off. If the monitor is switched off when battery power is low, it will not be possible to switch it back on until the battery has been recharged.


 – Memory card




Indicates the memory source being used and the free space available. A full bar indicates that memory is full. When the memory card is inserted, it is used as the memory source and the symbol appears as above. If the card is removed, the monitor uses its own limited-capacity internal memory which provides space for a minimum of 20 scans. The symbol then changes to the following:


 – Internal memory



 – Connected to PC for data transfer

 – Connected to PC for data transfer, memory card removed: no data transfer possible.

 – Infrared symbol – indicates the status of the infrared port.

 – Ready

 – Data backup

 – Transmitting/receiving data

 – Voice record available

 – Bar diameter fixed

 – Scan calibrated (Imagescan only)

Information bar

Information about the items currently shown in the main display area appears here. This varies with the type of scan being viewed.

Menu area

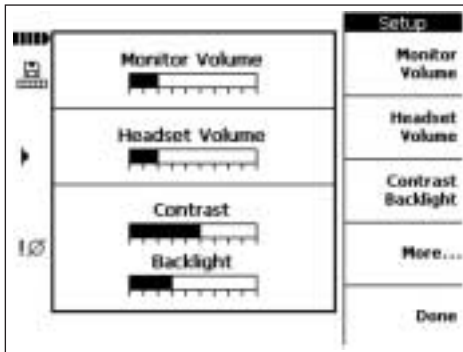
The menu items differ according to the operation being carried out, with the menu title being displayed at the top. Each item or command is executed by pressing the associated soft button.

Main display area

Scanned images, settings and project information are displayed here.

7.3.3 Setup

General settings for the monitor are made here. Use the soft buttons to access a menu item and the arrow buttons to move between options in an item and to select values.



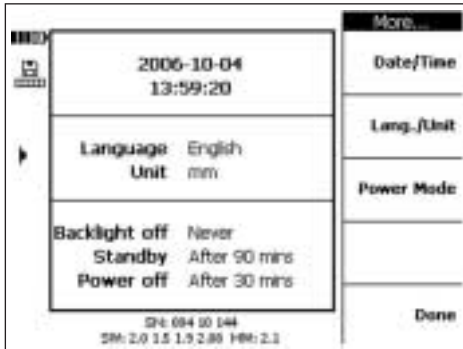
Monitor Volume sets the volume for the acoustic signal (beep).

Headset Volume sets the headset volume level.

Contrast sets the level of the screen contrast.

Backlight sets the brightness of the screen backlight.

To access further settings press *More...*



Use the soft buttons to access a menu item and the arrow buttons to move between options in a menu and to select values.

Date/Time sets the correct date and time. This is used for scan management and naming purposes.

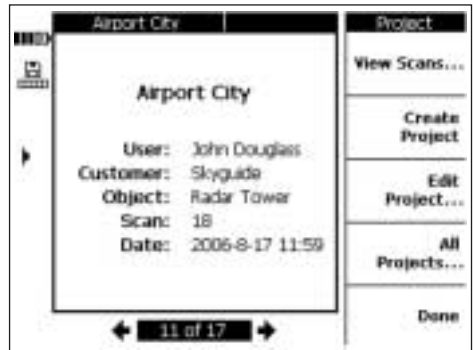
Lang./Unit sets the language and the units of distance to be used.

Power Mode sets the various power saving features on the monitor. *Backlight Off* sets the time until the backlight is switched off after the last press of a button. *Standby* sets the length of time until the system goes into standby – the screen is inactive but reappears instantly at the next press of a button or when the scanner is brought close to transfer data. *Power Off* sets the length of time until the monitor automatically powers down.

When you have completed your selection, press *Done* to return to the previous menu.

7.3.4 Project

Scans are organized on the monitor under project names. Scans from objects belonging to different customers, locations or jobs can thus be meaningfully differentiated.



The project currently selected is shown. The number of the current project and the total number of projects contained on the memory card or in internal memory are shown in the information bar. Use the left/right arrow buttons to select a different project.

View Scans... allows the scans contained in a project to be listed, opened for analysis, moved and deleted.

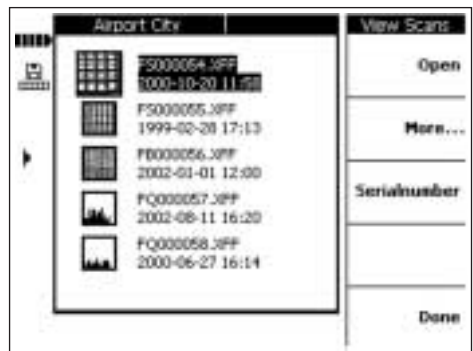
Create creates a new project.

Edit allows text to be entered.

All Projects provides an overview of all projects.

7.3.4.1 Viewing scans

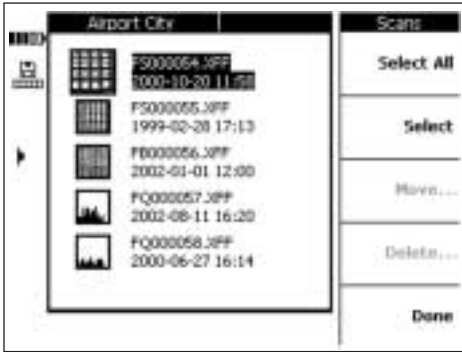
Press *View Scans...*



All scanned images from a project are shown in the form of a thumbnail view complete with names and the date and time of scanning. Use the up and down arrow buttons to move up and down the list.

Open opens the highlighted scan.

More... accesses further scan management functions.



Use *Select All* or *Select* to select scans for moving or deletion.

Select All selects all the scans in the project.

Select selects the scan currently highlighted and may also be used to select multiple scans.

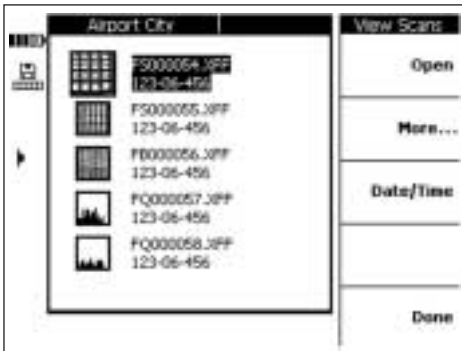
Move... moves the selected scans to another project of your choice.

Delete deletes the selected scans.

-NOTE-

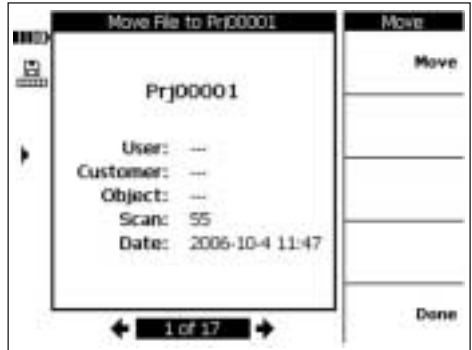
Move and *Delete* are unavailable until one or more scans have been selected.

Date/Time and *Serial Number* allow the date and time of the scans in the project, or the serial number of the scanner used to make the scans, to be shown.



7.3.4.1.1 Moving scanned images

After selecting one or more scans, select *Move...*



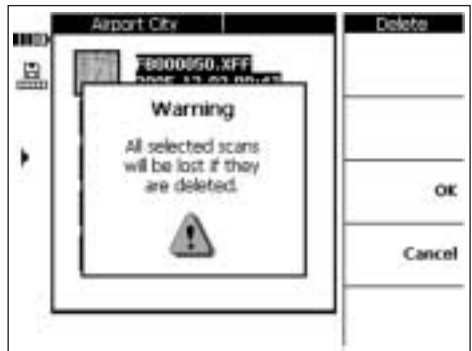
Select the project to which you wish to move the scans using the left and right arrow buttons. The source and target projects are shown at the top of the main display area.

Move moves the scans to the selected project and returns to the View Scans menu.

Done returns to the View Scans menu without moving the selected scans.

7.3.4.1.2 Deleting scanned images

After selecting one or more scans, press *Delete*.



Press *OK* to confirm.

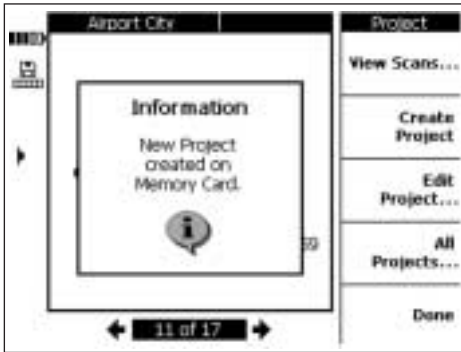


-WARNING-

This operation will result in permanent deletion of data. Ensure that the data is no longer needed or has been transferred to the PC before deleting.

7.3.4.2 Creating a new project

Press *Create Project* to create a new project. A short message confirming that the project was successfully created appears before the project then appears.

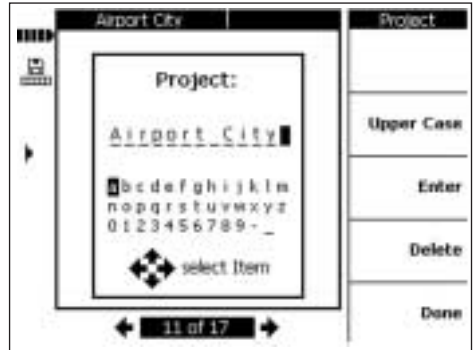
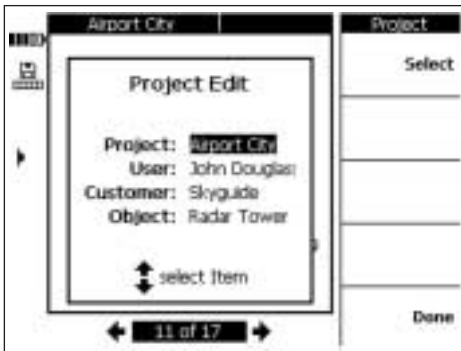


Projects created in the monitor receive a standard name beginning with the prefix "Prj" and a consecutive number assigned by the monitor. The names to be used for *User*, *Client* and *Object* remain unspecified, but can be edited as described in Section 7.3.4.3, or using the PC application after transferring the data.

Projects may also be created in the PC application and uploaded to the monitor. The PC application allows project names of your choice to be entered together with information under *User*, *Customer* and *Object*.

7.3.4.3 Editing

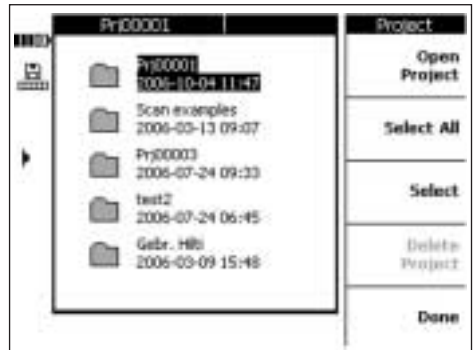
Names can be assigned under *Project*, *User*, *Customer* or *Object*. Use *Select* to choose the appropriate field for editing and *Done* to confirm completion of editing.



7.3.4.4 Show all projects

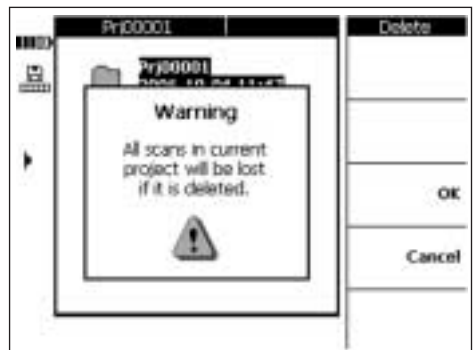
All Projects shows an overview of all projects saved in the monitor. Projects can be *opened*, selected (*marked individually* or *marked collectively*) or *deleted*.

Done takes the user back to the previously opened project or starting point.



7.3.4.5 Deleting a project

Press *Delete Project* to delete the currently selected project.



Press *OK* to confirm or *Cancel* to abort the operation and return to the project screen.

en

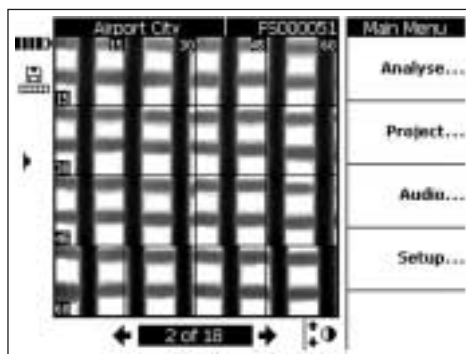


-WARNING-

This operation will result in permanent deletion of data. Ensure the data is no longer needed or has been transferred to the PC before deleting.

7.3.5 Imagescans

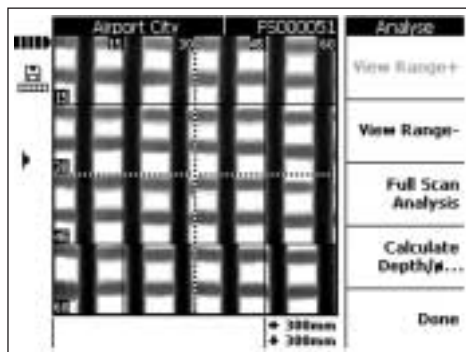
Imagescans show a representation of the reinforcement layout. The layout can be referenced on the surface, the depth determined at any point and the diameter of a bar estimated at any point.



Select *Analyse...* to analyze the image.

7.3.5.1 Analyzing the image

The bar depth and diameter may be determined at any point on the image. Other analysis options include viewing horizontal slices through the image at different depths and a calibration option for an accurate check of depth of cover.



View Range + and *View Range -* raise or lower the depth at which the scan is viewed. This is useful when trying to find which bars lie closest to the surface and for an overall impression of how level the reinforcement is compared to the concrete surface.

Full Scan Analysis

This function performs an analysis of the complete image. All bars within the area of the image are calculated and shown.

Cal. Depth/Ø – Used to calculate the depth and diameter of a bar at the point where the cursor lies.

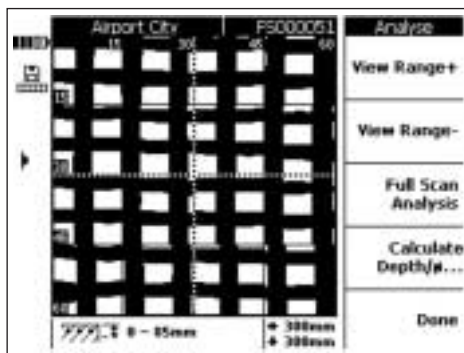


-WARNING-

When scanning bars that are welded, it must be expected that accuracy will not be within specifications. It is not possible to determine from the image whether bars are welded at their intersection points. If in doubt, remove concrete from the structure at an intersection to determine whether the reinforcement is welded.

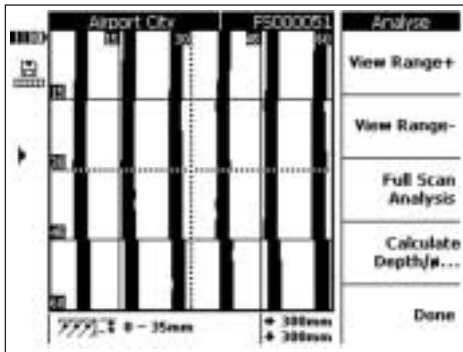
7.3.5.1.1 Selecting the view range

Press *View Range* to reduce the image depth viewed.



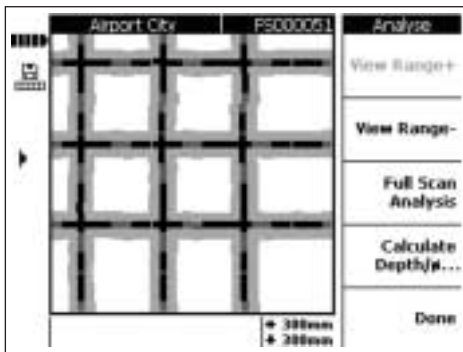
The current depth range viewed is displayed in the information bar at the bottom of the screen (e.g. 0–85 mm).

Use *View Range -* and *View Range +* to adjust the depth at which the image is viewed. In this way it is possible to determine which bars lie closest to the surface and how level the reinforcement is in relation to the surface. In the example shown, the vertical bars lie closest to the surface.



Note that the depth value given is an estimate and does not conform to the specifications given in section 4.0. To return to the original view, press *View Range +* until the maximum view range is displayed.

7.3.5.1.2 Full scan analysis



A full scan analysis can be used to evaluate the complete scanned image.

-NOTE-

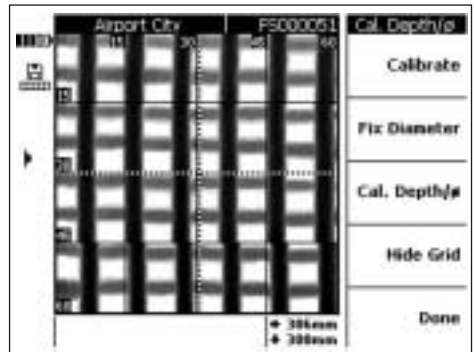
This operation may take some time.

When calculation is complete, all data from the analysis is shown on the screen. *Calculate Depth/Ø* can then be used to determine the results at any point on a reinforcing bar shown on the screen.

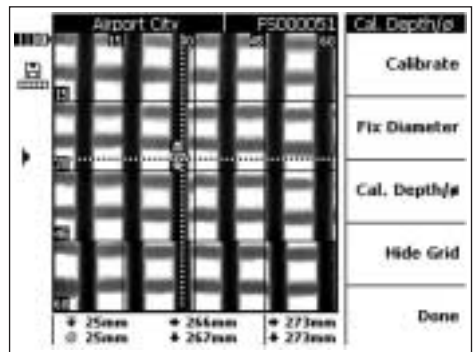
Full Scan Analysis is used mainly to show the position of the bars and to determine locations where holes can be drilled without risk of hitting bars.

7.3.5.1.3 Calculating depth and diameter

Use the *Arrow buttons* to move the cursor to the point on the bar you are interested in. The position of the cursor is displayed in the information bar at the bottom of the screen. Press *Calculate Depth/Ø*.



To display the depth and diameter at that point, press *Cal. Depth/Ø*. The system then calculates the depth and the diameter.



The position of the point calculated is displayed as a small target with an arrow either side showing the direction of the bar. The depth and diameter of the bar are displayed in the information bar at the bottom of the screen together with the coordinates of the point calculated.

If no depth or diameter values are given, then these lie outside what could be reasonably expected. When calculating depth and diameter, several points must be observed:



-WARNING-

Diameter calculations are based on one of the following standards for steel reinforcement:

Standard	Origin/applicability of the standard
DIN 488	European Union
ASTM A 615/A 615M-01b	United States of America
CAN/CSA-G30, 18-M92	Canada
JIS G 3112	Japan
GB 50010-2002	China

Diameters given for bars that do not conform to one of these standards may not fall within the accuracy specifications.

en



-WARNING-

The diameter calculation is an estimate and intended to indicate probable diameter only. If the bar diameter must be known with 100% certainty, concrete must be removed from the structure and the bar measured physically.



-WARNING-

Never attempt to determine the diameter of a bar by measuring it on the image. Whilst the center of the bars in the image correspond with those in the structure, the image is not a scale drawing of the bars. The width of the bars shown is representative of the signal strength received by the scanner. Small bars close to the surface may thus appear similar in size to larger bars at greater depth.

-NOTE-

The most accurate and reliable diameter and depth values are obtained at points on the bar as far away from other bars as possible and away from edges of the scan that are parallel to the bar in question. Effects at the edges of the scan may affect bars lying parallel typically up to 100 mm from the edge.

Depth and diameter calculations should not be made along the grid lines and not at points where bars cross.

Other factors influencing depth and diameter accuracy are rough scanning surfaces, ferrous or magnetic substances in the concrete mix, a smooth scanning technique starting at the correct point on the grid and following the grid lines exactly and an adequate ratio between cover and bar spacing.

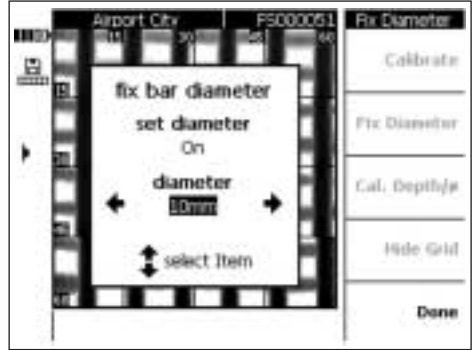
Please refer also to section 7.5 for further advice on how to get the most out of the system.

-NOTE-

If the bar diameter is known, it can be entered under *Fix Diameter*. See below.

Fixing the diameter

If the diameter is known, the value should be entered as this improves the accuracy and reliability of depth determination. Press *Fix Diameter*.



Set the diameter to *On* using the left or right arrow buttons. Move to the diameter input field using the up or down arrow buttons and select the diameter.

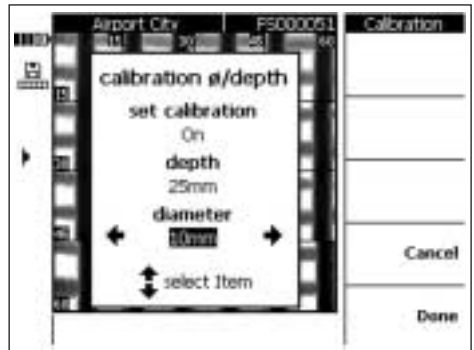
Press *Done* to confirm the selection and return to the scan. The Fix Diameter symbol appears in the status bar to the right of the display.

Calibrating the image

This option is intended for measurements of the highest accuracy and can be used when the depth and diameter of a bar at a certain point are already known. It should be used with caution as improper use can lead to incorrect depths being displayed. The image will be calibrated depending on the information given and the depth around the point calibrated will be given with the utmost accuracy. It is normally only of use to manufacturers of precast concrete components.

Depths and diameters of bars in a different part of the scan may lie outside the specification if the calibration function is applied.

After moving the cursor to the point where the depth and diameter are known, select *Calibrate*.



Set *Calibration* to *On* and enter the depth and diameter values for this point on the image. Press *Done* to confirm and return to the scan. The system checks whether the values entered are plausible based on the information it has for that point. If this is not the case, calibration will be rejected.

The calibration symbol appears in the status bar to the left of the display. If the information entered was accurate, the depth and diameter around the point will be shown with increased accuracy.



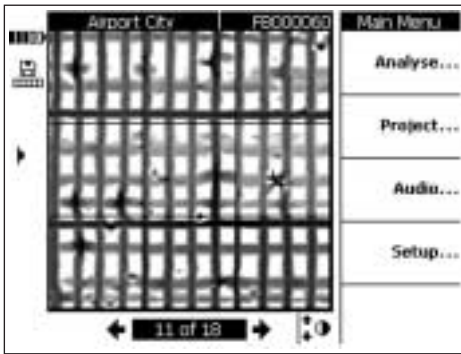
-WARNING-

Calibrating the scan with incorrect values can lead to depth readings outside the quoted accuracy specifications.

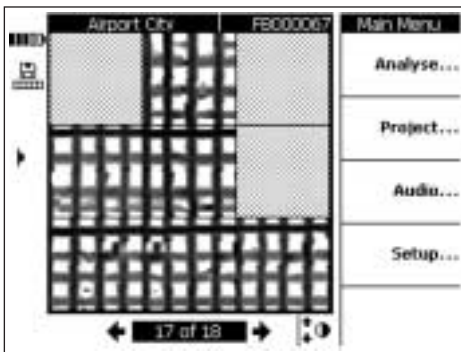
7.3.6 Blockscans

Blockscans consist of up to 3×3 Imagescans that have been scanned at positions adjacent to one another and then automatically stitched together.

Blockscan with all blocks scanned:

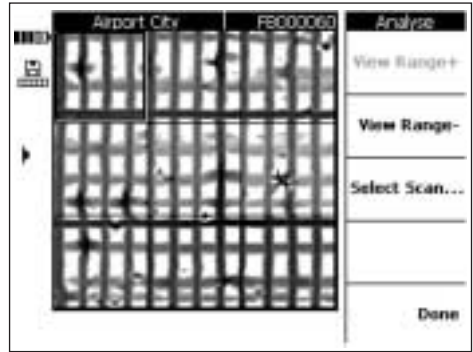


Blockscan with some of the blocks scanned:



7.3.6.1 Analyzing a Blockscan

Select *Analyze*.

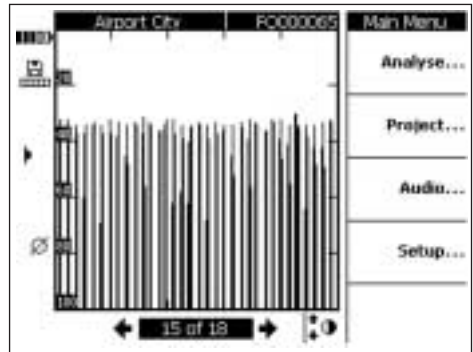


View Range + and *View Range -* raises and lowers the depth at which the scan is viewed, as with Imagescan. This is useful when trying to find which bars lie closest to the surface and for an overall impression of how level the reinforcement is compared to the concrete surface.

Use the arrow buttons to select the block you wish to analyze. *Select Scan* displays the Imagescan marked for analysis. Refer to section 7.3.5 for details of how to analyze individual Imagescans.

7.3.7 Quickscans

Quickscans recorded in the scanner can be analyzed to provide information about the number and average depth of reinforcing bars over a large area of the structure.



The Quickscan is displayed as a graph containing a series of vertical bars or peaks. The horizontal axis represents the distance traveled along the structure. The vertical axis represents the signal strength or, after analysis, the depth of cover. Each peak represents a reinforcing bar.

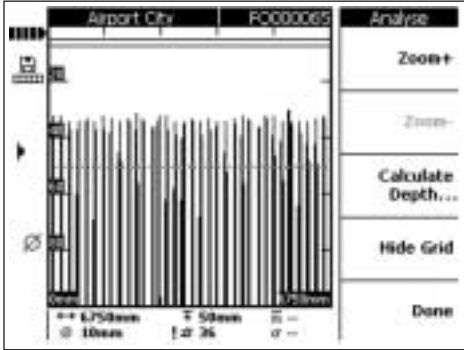
Select *Analyze...* to analyze the Quickscan.

-NOTE-

To carry out an accurate analysis, the diameter of the bars must be known and entered. If the bar diameter has been set in the scanner, this diameter will be transferred automatically to the monitor. If the diameter has

not been set, a diameter value will be assigned automatically (please refer to 7.2.5.4). If the real bar diameter is different, it must be set under *Fix Diameter* when calculating the depth.

7.3.7.1 Analyzing Quickscans
 Select *Analyze*



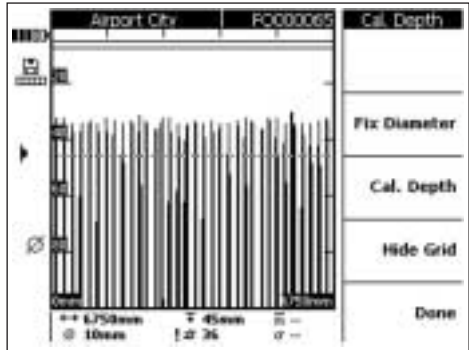
In the information bar at the bottom of the screen, the following information is displayed:

- ▬ — The length of the Quickscan
- ⊗ — The currently set diameter of the bars
- ⊥ — The depth at which the trigger is currently set
- # — The number of bars at or above the current trigger depth
- !# — Estimate of the number of bars (before analysis)
- ≡ — The average depth of the bars in the Quickscan (displayed after calculation has been made).
- σ — The standard deviation of the calculation, indicating the amount of deviation in the depth of the bars.

Zoom +/Zoom - can be used to increase/decrease the zoom level for viewing the Quickscan signal. The bar at the top of the screen gives an indication of the zoom level selected and the currently viewed position in the scan. The length of the current view is indicated by the figures shown in the bottom right and bottom left corners of the image. Move along the scan using the arrow buttons when zooming. Various zoom levels can be used. Zoom is at maximum when *Zoom +* is grayed and no longer active.

Cal. Depth – opens the calculation menu.
Hide Grid – removes the scale shown at the side of the graph.

Calculating the depth
 Press *Calculate Depth...*



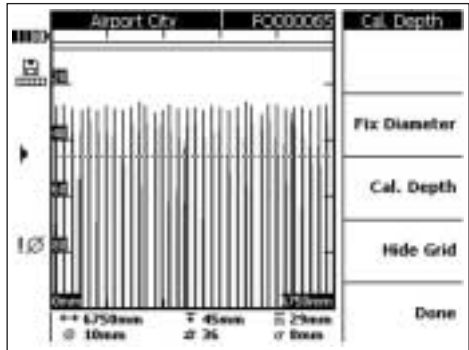
Ensure that the diameter is set to the correct value. Use *Fix Diameter* and select the appropriate value.

The trigger depth is used to set a depth of particular interest. This is usually the minimum cover required over the first layer of reinforcement. Use the arrow up and down buttons to adjust the trigger depth.

Press *Cal. Depth* to calculate the average cover depth and standard deviation of all the bars in the Quickscan. The evaluation is performed.



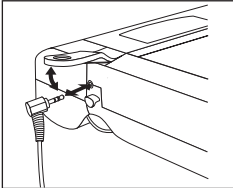
After several seconds, the results are presented in the Information Bar at the bottom of the screen.



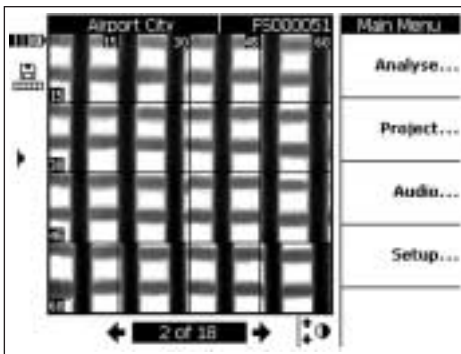
7.3.8 Voice records

A voice record up to 15 seconds long may be added to any scan. The record is stored with the scan and will be transferred to the PC application if the scan is downloaded. The voice record is intended to contain information about the scan such as location on the structure, special conditions at the time of scanning etc.

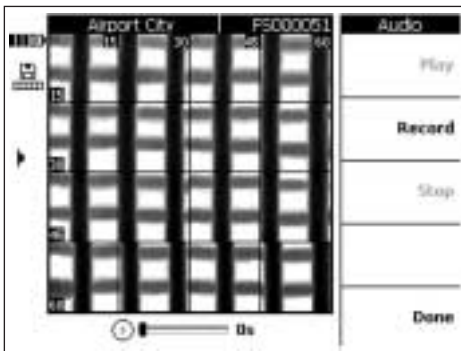
Flip the rubber cover up, revealing the headset connection. Insert the headset jack.



Select the scan to which you want to add the voice record.



Select *Audio...*



Put on the PSA 93 headset and take care to ensure that the microphone is positioned close to your mouth.

Record starts recording. Speak your message.

Stop halts the recording.

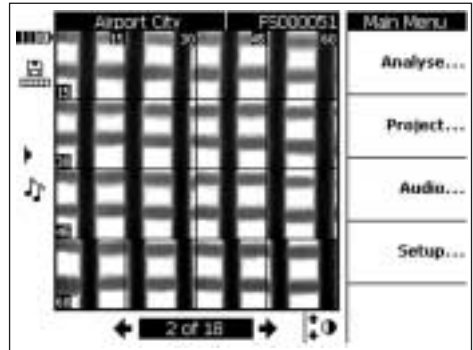
Play enables the message to be replayed.

The message length is displayed at the bottom of the screen.

-NOTE-

If you cannot hear the recording, adjust the headset volume. Refer to section 7.3.3.

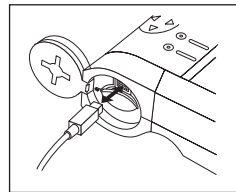
Scans containing a voice message are indicated by the music note symbol in the status bar on the left side of the display.



7.3.9 Data transfer from monitor to PC application

Data can be transferred to a PC through a USB port using the cable provided. Alternatively, the memory card can be removed and the data transferred to the PC by way of a card reader.

Connect the monitor to the PC using the PSA 92 data cable. The cable connects to the USB port inside the connection cover on the monitor and also to a USB port on the PC.



-WARNING-

To help ensure data integrity and immunity to interference, use only the PSA 92 data cable supplied by Hilti. Data integrity and immunity to interference may be compromised if a USB cable other than that supplied by Hilti is used.

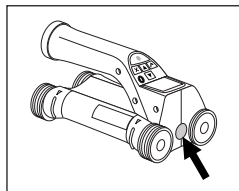


-WARNING-

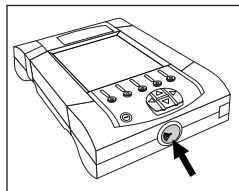
Never remove the Multimedia Card if the monitor is switched on.

7.4 Data transfer between the scanner and monitor

Data is transferred from the scanner to the monitor using the infrared connection. The infrared ports are located on the ends of the scanner and monitor as shown below.



Infrared port on the scanner



Infrared port on the monitor

-NOTE-

The maximum range of the infrared connection is approximately 30 cm (12 inches). The maximum angle between scanner and monitor for successful data transmission at close ranges (up to 10 cm or 4 inches) is $\pm 50^\circ$ relative to the axis of the infrared port on the monitor. At a distance of 15 cm (6 inches), this angle is reduced to $\pm 30^\circ$. At a distance of 30 cm (12 inches), the scanner must be accurately aligned with the monitor to ensure successful data transmission.



-CAUTION-

Ensure that the windows covering the infrared ports are free from dirt, dust and grease and are not excessively scratched before commencing data transfer. Failure to do so may result in a reduced transfer range or may prevent the data being transferred.



-WARNING-

Never remove the memory card while data transfer is in progress. Data may be permanently lost.

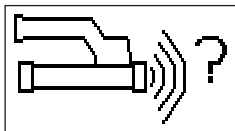
7.4.1 Procedure for data transfer

Data can be transferred whenever the monitor and scanner are switched on and the scanner is in the main menu. Data is transferred to the currently selected project on the monitor.

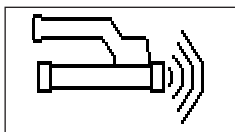
-NOTE-

Ensure that the correct project is selected on the monitor before transferring data.

Bring the scanner and monitor close together so that the infrared windows are facing each other. The scanner and monitor automatically sense each other and establish communication. The following screen appears on the scanner and a beep sounds:



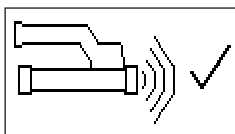
Press *Confirm* on the scanner to begin data transfer. The following screen is shown while data transfer is in progress:



The infrared symbol is displayed on the monitor screen:

this indicates that data transfer is in progress. The red LED on the scanner flashes constantly.

Data transfer takes between 1 and 15 seconds, depending on the number and length of scans contained in the scanner. When data transfer is complete, the following screen appears:



The infrared symbol on the monitor reverts to until the data has been secured on the memory card or internal memory.

Then the infrared symbol then reverts to "ready": All scan data has then been successfully transferred. Press the *Confirm* button to delete the scans in the scanner and return to the main menu.

7.4.2 Error messages during data transfer



This symbol may appear on the scanner during data transfer between the scanner and monitor. It indicates that the data transfer has been interrupted or communication cannot be established. Before retrying to transfer data, ensure that the scanner and monitor are within the maximum range of 0.3 m (12 inches) and that they are accurately aligned with each other. Ensure that

the atmosphere is dust-free as far as possible and that the infrared windows on both scanner and monitor are clean and relatively free from scratches. Excessively scratched windows must be replaced by Hilti Service.

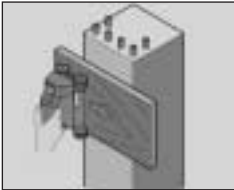
During data transfer, try to hold the monitor and scanner correctly aligned for the entire period that data is being transmitted.



This symbol may appear while transferring data from the scanner to the monitor. Remedy the problem by switching the units off and on again and check their alignment with each other. If the error message reappears, the appliance will need to be sent to Hilti for repair.

In the event that data transfer is interrupted, data cannot be lost. Data is deleted from the scanner only once all scans have been successfully transferred and the *Confirm* button on the scanner has been pressed.

7.5 Tips for scanning and evaluation



Object too narrow to scan or reinforcement is too close to an exterior corner to be scanned properly.

Use a thin overlay board that extends beyond the edge(s) of the structure and scan on the board beyond the edge. Note that the thickness of the board must be deducted from any depth measurements. The thickness of the board can be entered in the PC application. This value will then be automatically deducted from any depth measurements.



Surface is rough.

Rough surfaces (e.g. concrete surfaces with exposed aggregates) cause additional noise in the signal and may mean that the depth or diameter of a bar cannot be determined. In such cases it is also advantageous to scan on a thin overlay board. The same reminder about deducting the thickness of the board applies, as above.



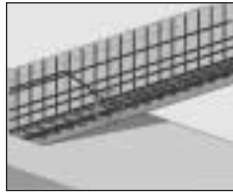
"Interference" in images

Interference in images may occur due to:

- Scraps of reinforcement in the concrete
- Tie wires where rebars cross
- Aggregates with ferromagnetic properties
- Ends of bars lying parallel to the scanning plane
- Ends of bars lying orthogonal to the scanning plane (bars scanned end-on.)

-NOTE-

Diameters and depths calculated in the area where interference occurs must be treated with caution as they may be inaccurate.



Scanning columns and beams for penetrations

In such cases where the reinforcement must not be damaged, ensure that Imagescans are made on at least three sides of the component in order to ensure that shear bars (placed at an angle in the concrete) can also be identified.

Simple diameter check

A simple, rough check of the diameter of the bars in the first layer can be made by deducting the depth of the second perpendicular layer from that of the first. This assumes however that the two layers touch each other or are at least very close.

7.6 PC software

The PC application provides functions for enhanced analysis, easy creation of reports, data archival, image and data export to other PC applications as well as automated batch processing of large volumes of data.

Instructions for installation of the software can be found on the PSA 90 PC-SW CD-ROM. Detailed information about using the PC application can be found in the Help menu.

8. Care and maintenance

8.1 Cleaning and drying

Clean the parts of the appliance only with a clean, soft cloth. Moisten the cloth with pure alcohol or a little water if necessary.



-CAUTION-

Do not use any other liquids as these may affect the plastic parts.

8.2 Storage

Do not store the appliance when it is wet.

Dry and clean the appliance, its case and accessories before storing.

Remove the batteries before storing.

After storing for a long period of time, carry out a measurement check before use.

Observe the temperature limits when storing the appliance ($-20\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$ or $-4\text{ }^{\circ}\text{F}$ to $+158\text{ }^{\circ}\text{F}$), especially in winter and summer and when storing it in a vehicle.

8.3 Transport

Use the original Hilti toolbox for transporting the appliance.



-WARNING-

Always remove the batteries before transporting the appliance.

8.4 Removing the scanner wheels

The scanner wheels can be removed either for cleaning or replacement. Using a 2.5 mm Allen wrench, loosen and remove the screw at the center of each wheel.

Gently withdraw the wheel from the axle whilst holding the other end of the axle or wheel. If required, carefully clean the housing or wheel in accordance with section 8.1 above before refitting it on the axle and replacing the screw.



-CAUTION-

Do not overtighten the screw when refitting the wheel as this may result in damage to the wheel and axle. Replace only one wheel at a time.

9. Troubleshooting

Fault	Possible cause	Remedy
The monitor or the scanner doesn't switch on.	The battery is not charged.	Charge or change the battery.
	Contacts on the battery or in the monitor/scanner are dirty.	Clean the contacts.
	The battery is old or defective, or the maximum number of charging cycles has been exceeded.	Contact Hilti Service.
The monitor or the scanner can be operated only for a short time before the battery is exhausted.	The battery is old or defective, or the maximum number of charging cycles has been exceeded.	Contact Hilti Service.
The scanner doesn't move smoothly.	The wheels are dirty or dusty.	Remove the wheels and casing and clean the parts.
	The drive belt or gear teeth are worn.	Contact Hilti Service.

10. Disposal



-CAUTION-

Incorrect disposal can lead to the following:

- The burning of plastic parts emits toxic fumes that present a health hazard.
- Batteries can explode if damaged or heated excessively, thereby causing poisoning and burns (including corrosive burns) as well as pollution of the environment.
- Careless disposal may allow unauthorized persons to use the appliance in an incorrect way, thereby presenting a risk of person injury or injury to third parties and pollution of the environment.

Hilti products contain a high proportion of reusable materials. These materials must be correctly separated before they can be recycled. In many countries, Hilti has already made arrangements for taking back old appliances for recycling. Please ask Hilti Customer Service or your Hilti representative for further information.

en



Dispose of the battery in accordance with national regulations.



Only for EC countries

Disposal of electric appliances 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.

11. 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 the 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.

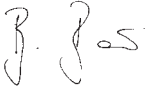
12. EC declaration of conformity

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Designation:	Ferroscon
Type:	PS 200
Year of design:	2003

We declare on our sole responsibility that this product complies with the following directives and standards: EN 55011, EN 50082-1, EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4.

Hilti Corporation



Bodo Baur
Quality Manager
Business Area
Electric Tools & Accessories
10 / 2006



Matthias Gillner
Executive Vice President
Business Area
Electric Tools & Accessories
10 / 2006

HILTI

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