INSTRUCTION MANUAL

Magdeburger Prüfgerätebau GmbH

HMP LFG*pro*

The Light Weight Deflectometer

MADE
IN
GERMANY

Calibration-INSTITUTE
authorised by the Federal Highway Research Institute

www.hmp-online.com > Information and videos online

Magdeburger Prüfgerätebau GmbH

General Information

The Light Weight Deflectometer

Measuring

Measured Data

Settings

Options

Maintenance and Repair

Attachment

Applications

The dynamic plate load test employing the Light Weight Deflectometer is used in earthworks and traffic route construction. It serves to determine the soil bearing capacity and the degree of compaction of soils and non-cemented base courses, and assists in soil improvement.
The test method is suited for coarse-grain and mixed-grain soils with a maximum grain size of 63 mm. It may be used to determine the deformation modulus of soil within the measuring range of E_{vd} = 15…70 MN/m².

Further applications

- Road- and railway construction, earthworks
- Quality assurance in canal construction
- Compaction control in pipe trenches
- Testing of pavement beddings
- Testing of foundation backfill
- Quality inspection in boreholes
- Testing of modulus of deformation within the framework of soil examination.

The Light Weight Deflectometer being easy to handle and use is particularly suited for intra-company monitoring.

Safety instructions

Information for Users

This instruction manual was prepared such that users can easily become familiar with the »Light Weight Deflectometer – LWD«, abbreviated herein-after as LWD, and make use of the tester for intended applications.

Users should carefully read this instruction manual and the safety instructions prior to using the LWD. Follow the instructions contained in this Instruction Manual without exception.

Symbols Used

Warnings and instructions are highlighted as described below:

Warning
This symbol is used in conjunction with related text to draw user's attention to hazards and risks which may cause bodily harms, failure of tester components or adversely affect operating procedures, in case users do not take the corresponding precautions.

Note
This symbol and the related text identify technical requirements and provide additional information to be taken into account by the operator to carry out the following operations effectively and safely.

Legal terms of reference

The Light Weight Deflectometer complies with the current state of the art and all applicable safety regulations.
The LWD meets the basic safety requirements laid down in the EU Directives for Harmonisation referenced in the EC Certificate of Conformity.

Construction and function of the LWD meet the requirements laid down in »Technical Test Code for Soil and Rock in Road Construction TP BF – StB Part B 8.3 / Issue 2012« and »ASTM E2835-11 – Standard Test Method for Measuring Deflections using a Portable Impulse Plate Load Test Device«.

Intended Use

The Light Weight Deflectometer is exclusively intended for determining the soil bearing capacity and the compaction quality of the soil referred to »Technical Test Code for Soil and Rock in Road Construction TP BF – StB Part B 8.3 / Issue 2012« and »ASTM E2835-11 – Standard Test Method for Measuring Deflections using a Portable Impulse Plate Load Test Device«.
Its intended use also includes:

- Compliance with the safety instructions and safety regulations contained in this operating manual;
- Compliance with the maintenance and servicing instructions contained in this operating manual.

Any other use or any use beyond this definition is not intended and may cause injury to people and damage to property.
The manufacturer/supplier shall not be held liable for damages resulting from other than the intended use. The risk shall be borne solely by the user.

Technical Terms of Reference / Transport

To avoid damage to the unit and prevent accidents during transport the Light Weight Deflectometer is provided with a transportation lock which is fixed to the guide tube during transport.

The LWD is equipped with a transportation lock designed to avoid damage to the instrument and make sure that it can be safely transported and handled. This lock must be used to secure the drop-weight on the guide tube whilst the equipment is moved from job to job.

The drop height determined for the drop-weight by calibration (⇨ calibration record) has been preset. The drop height is secured against changes and must not be altered by the user.

Engage the drop-weight in the release mechanism prior to any test. To release the drop-weight, just actuate the release mechanism.

Prior to any measurement, test the release mechanism to be sure it functions as necessary.
Support the drop-weight by hand after every impact to avoid faulty measurements.

Construction of the Instrument

The LWD consists of the following assemblies:

- Loading mechanism
- Load plate
- Electronic settlement measuring instrument

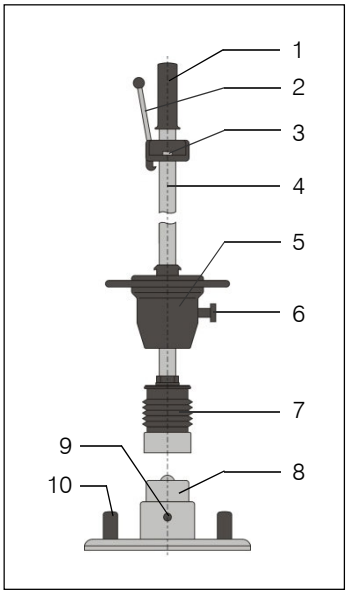

Figure 1

Loading Mechanism and Load Plate

Construction of loading mechanism and load plate is described below with reference to Figure 1.

Loading mechanism

1 Handle
2 Release mechanism
3 Bubble level
4 Guide tube
5 Drop-weight
6 Transportation lock
7 Resilient element with prestressed disc springs

Load plate

8 Cap with sensor
9 Sensor socket (to connect the measuring cable)
10 Load plate carrying handles

The sensor which serves to measure the settlement is arranged under the cap (8) of the load plate. The leads of the sensor are led out on the sensor socket (9) and are connected to the electronic settlement measuring instrument via a measuring cable.

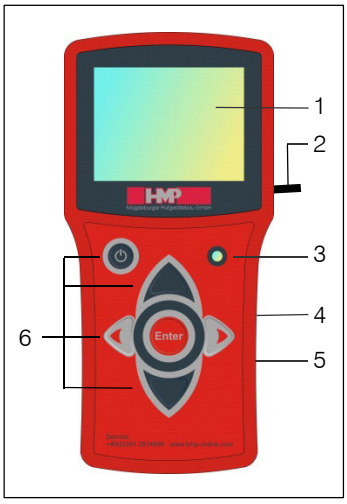

Figure 2

Electronic Settlement Measuring Instrument

The battery-operated settlement measuring instrument is housed in a hand-held case.

Settlement measuring instrument

(Figure 2)

1 TFT colour display
2 Measuring cable
3 Ambient Light Photo Sensor
4 USB port
5 Printer port
6 Function keys

Figure 3

Carrying case

(Figure 3)

1 Carrying case
2 Settlement measuring instrument,
beneath: USB cable, charger for printer *(optional)*
3 USB car charger, USB stick
4 AC/DC adapter (beneath cover)
5 Thermal printer AP 1300 *(optional)*

Function

The load plate is placed on the prepared area to be tested and the loading mechanism is positioned on the load plate. Thereafter the connection is made to the settlement measuring instrument. When the drop-weight is released and drops freely onto the resilient element, the loading mechanism generates a defined impulsive load. Thereby the total settlement of the soil under the load plate is measured.

After the measuring routine is started (after the precompaction) three measuring impacts are to be performed. After each impact, the measuring instrument displays the settlement in millimetres and the settlement curve. Upon completion of a series of measurement the individual settlement amplitudes, the average settlement s_m, the path-speed-ratio s/v and the calculated deformation modulus E_{vd} are displayed on the screen.

Results may be printed via a thermal printer or a printer at the PC, if required *(only instruments with thermal printer or PC-software)*.

Specifications

Mechanical loading mechanism

Total weight	15.0 kg
Weight of drop-weight	10.0 kg
Maximum impact force	7.07 kN
Duration of impact	17.0 ± 1.5 ms
Resilient element	package comprising prestressed disc springs

Load plate

Diameter	300 mm
Plate thickness	20.0 mm
Weight	15.0 kg

Electronic settlement measuring instrument

Power supply	Rechargeable Lithium-ion polymer battery pack (Lithium polymer battery pack)
Dimensions	210 mm x 100 mm x 31 mm
Weight	0.45 kg
Settlement range measured	0.1 to 2.0 mm ± 0.02 mm
Range measured deformation modulus	$E_{vd} < 225$ MN/m²
Temperature range	0 bis 40 °C
Display	3.5“ TFT colour display
Interfaces	Bluetooth, USB, thermal printer
GPS	integrated
Memory capacity	up to 1000 test series

Electronic Settlement Measuring Instrument HMP LFG*pro*

Operation

The electronic settlement measuring instrument **HMP LFG*pro*** can be operated easily and intuitively by means of the function keys.

Key Functions

Switch on / off measuring instrument
Select upward
Select downward
Select to the left / Scroll
Select to the right / Scroll
Confirm selection / Start action

Buttons/Symbols

The currently active button is displayed with colour, the inactive buttons are grey.

Main menu

Measuring⇨ page 11
(precompaction, measuring, store)

Measured data⇨ page 14
(… read, print, export, delete)

Settings/Service ⇨ page 16.
(display, device, printer, support, calibration)

General

Back to the previous menu
Next / measuring initiate
Restore measurement readiness
Scroll (test series/measured data)
Scroll (test series/measured data)
Store
Delete
Print test series
Export test series ⇨ page 14

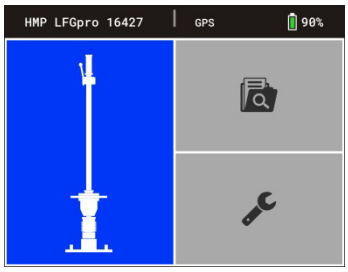

Figure 4

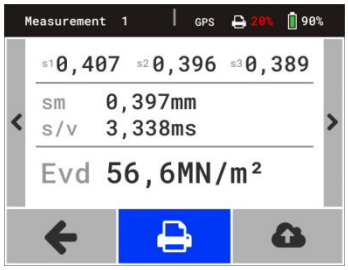

Figure 5

Display

In the main menu the display is subdivided into status line and button area (Figure 4).

In the submenus the display is subdivided into status line, button area/ indicating area and footer (Figure 5). With the keys ▲ ▼ can be switched between button area/indicating area and footer.

The information on the left of status line will be changed according to several menus. In the main menu (Figure 4) type and number of device are displayed for example.
The information on the right side of status line is the same in all menus:

	Status Bluetooth displaying in status line, in case Bluetooth is active (during data transfer only)
GPS	Status GPS displaying in status line, in case GPS is active and available
20%	State of charge of the printer displaying in status line, in case printer is connected
90%	State of charge of the measuring instrument

Overview Menu Functions

Measuring	Precompaction	
	Measuring	Store
		Delete
		Print
		Export
Measured data	Show single measurements	Print
		Export
	Export	
	Delete (all measurements)	
Settings	Display	Date
		Time
		Language
	Device	Drop weight
		GPS
		Unit
		Calibration
	Printer	Head datea
		Date/time
		Graphics
	Service	
	Calibration menu	
	Maintenance	

By confirming the button ← you always come back to the previous menu.

Power Supply

The electronic settlement measuring instrument **HMP LFG*pro*** is powered by a rechargeable Lithium-ion polymer battery pack (abbreviated herein-after as Lithium polymer battery pack) which is provided with overcharge protection and deep discharge protection.

Safety

Do not dismantle, open or shred Lithium polymer battery pack. Exposure to the ingredients contained within or their ingredients products could be harmful.
Do not expose Lithium polymer battery pack to heat or fire. Avoid storage of device/battery pack in direct sunlight.
Lithium polymer battery pack must not be short-circuited.
Do not subject Lithium polymer battery pack to mechanical shock.
Observe local, state and federal laws and regulations for disposal.

The supplied accessories must only be used for devices supplied by HMP and according to this instruction manual. Any other use may cause damages.

Switching-off automatically

The electronic settlement measuring instrument **HMP LFG*pro*** switches off automatically, in case there is no action for about 90 s.

The device will not switch off automatically, as long as it is in the measuring mode.

If the Lithium polymer battery pack of the electronic settlement measuring instrument drops below the voltage required for operation, the device switches off automatically, in order to prevent a deep discharging of the battery pack. Before switching on the instrument again, please charge the battery pack.

Charging of Lithium polymer battery pack

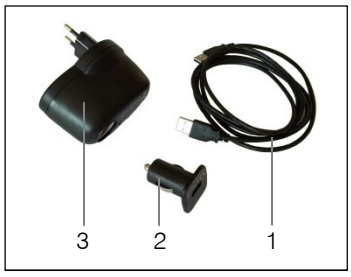

Figure 6

Lithium polymer battery pack should be charged only by means of the supplied accessories (Figure 6). Accessories for charging the battery pack – USB cable (1), USB car charger (2) and AC/DC adapter (3) – are placed in the carrying case.
The USB car charger can be connected with a car-battery 12 V or by means of AC/DC adapter to mains 230 V / 50 Hz.

For charging Lithium polymer battery pack only the supplied chargers, which are provided for use with this device, should be used.
Lithium polymer battery pack should not be charged over a longer period if it is not needed.

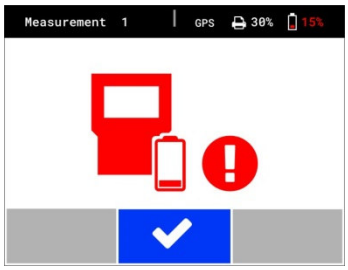

Figure 7

Lithium polymer battery pack of electronic settlement measuring instrument should be charged before first use and in case that state of charge is 15% or lower.

Lithium polymer battery pack should be charged at the latest when the note on the left (Figure 7) appears on the screen of settlement measuring instrument.

- Switch off electronic settlement measuring instrument and connect it with the USB car charger via USB cable.
- Connect the USB car charger to a car socket 12 V or via AC/DC adapter to mains supply 230 V / 50 Hz.
- Disconnect the charger from mains supply when charging of Lithium polymer battery pack has been finished.

It is not possible to overload the Lithium polymer battery pack, since it is equipped with an overload protection. When the battery pack is fully charged, the charging current entry is automatically interrupted.

The Lithium polymer battery pack will only be charged, in case that the electronic settlement measuring instrument is switched off.

Getting Ready for Measuring

The procedure of preparation and performance of measurements is laid down in »Technical Test Code for Soil and Rock in Road Construction TB BF-StB Part B 8.3 / Issue 2012 – Dynamic Plate Load Test by means of the Light Weight Deflectometer« and in »ASTM E2835-11 – Standard Test Method for Measuring Deflections using a Portable Impulse Plate Load Test Device«.

Preparing the area to be tested

The load plate must be in full-area contact, so that the impact force can be optimally transmitted to the ground and the maximum settlement amplitude under the entire area of the load plate is determined.

- Select a plain area on the measuring site.
- Position the load plate while slightly turning and pushing.
- Fill hollow spaces under the load plate if necessary with loose medium sand.

Connecting the settlement measuring instrument

- Connect the sensor, which is located under the cap (8) of the load plate, via sensor socket (9) with the settlement measuring device.
  - Remove the cap from the sensor socket.
  - Insert the plug of the measuring cable from the settlement measuring instrument into the sensor socket until it is locked.

The plug locked in the sensor socket can only be removed by pulling on the plug enclosure. Do not pull on the cable.
Take care to ensure that the contacts of the plug and the sensor socket are not damaged.
Use the protective cap provided on the cap to protect the sensor socket from dirt and moisture.

Positioning the loading mechanism

- Position the loading mechanism on the cap of the load plate.
  ⇨ The tilt protection enables free standing of the loading device on the load plate.

Removing the transportation lock

A transportation lock (6) is provided to secure the drop-weight on the guide tube. This lock must be released prior to performing measurements.

- Withdraw red knob.
- Rotate red knob through 90 deg.

The arrow is horizontal: either ← or → drop-weight is locked

The arrow is vertical: either ↑ or ↓ drop-weight is unlocked

The transportation lock has to be unlocked before measuring, otherwise mis-measurements and damages of the guide tube can be caused.

Measuring Procedure

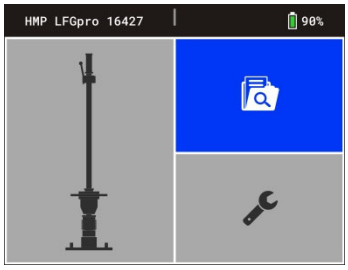

Figure 8

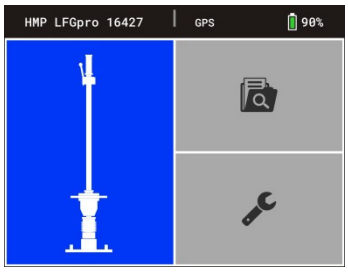

Figure 9

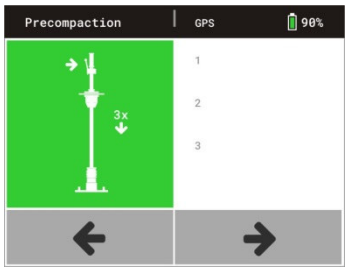

Figure 10

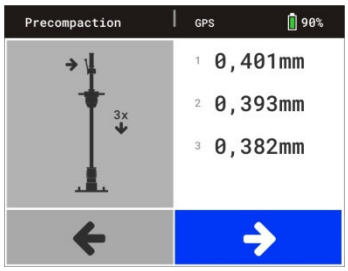

Figure 11

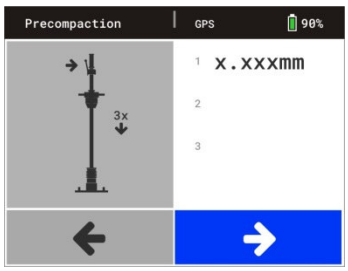

Figure 12

The base settings of the electronic settlement measuring instrument comply with the ordered device type.
Individual adjustments can be carried out in the »Settings« menu (➡ page 16).

- Press the key to switch on the settlement measuring instrument.
  - ⇨ Device will be powered up and GPS starts.
  - ⇨ The main menu (Figure 8) appears on the screen with type & number of device (xxxxx) and state of charge of the measuring instrument in status line as well as the several menu buttons in main area of display.
  - ⇨ Button »Measured data« is active until GPS data are determined.
  - ⇨ Then button »Measuring« will be activated (Figure 9) and »GPS« is displayed in status line.

GPS data are only available and they will only be stored with the test series, in case »GPS« is displayed in status line. In case of switching to button »Measuring« manually, before GPS data were determined, the measurement takes place without capturing the GPS data!

In case that measurement shall be carried out without recording the GPS data, then in the menu settings/device »Off« has to be chosen for GPS (⇨ page 17). Immediately after starting device the button »Measuring« is active and the measuring process can begin.

Precompacting the test area

To achieve an optimal position of the load plate on the base precompact the test area under the load plate by three impacts.

- Confirm the button »Measuring« (Figure 9) by pressing the Enter key.
  - ⇨ The menu »Precompaction« (Figure 10) is displayed on the screen and an acoustic signal is emitted.
- Move the drop-weight fully up on the guide tube and lock it in the release mechanism.
- Use the bubble level (3) to align the guide tube until it is in vertical position.
- Release the lever, the drop-weight falls onto the resilient element package.
- Catch the rebounding drop-weight by hand and lock it back in the release mechanism.
- Repeat this procedure twice each after acoustic signal each.

The button ➔ will be activated automatically after precompaction (Figure 11) and the measuring can then be started.

The button ➔ is being activated after a short time (abt. 6 sec.) even without precompaction impacts (Figure 12). In case that soil was already precompacted, measurement can be started.
If precompaction shall be active again, proceed as follows.

- Switch to button area/indicating area by pressing key.
- Confirm with Enter key.
  - ⇨ An acoustic signal is emitted. Precompaction can be started or continued.

Start measuring

- Start the measuring process by pressing the Enter key, when button ➔ is active.
  ⇨ An acoustic signal is emitted; the measuring instrument is ready for measurement.

The readiness for measurement only insists after acoustic signal. Unless the weight is allowed to drop within 6 seconds after the acoustic signal, confirm button ↻ to restore the readiness for measurement.

- Successively perform 3 impacts as follows.
- Lock the weight in the release mechanism.
- Use the bubble level to align the guide tube until it is in a vertical position.
- Release the lever, the drop-weight falls down, catch the rebounding drop-weight by hand.
- The values of settlement amplitudes s_1, s_2 and s_3 with settlement curves are displayed on the screen (Figure 13).

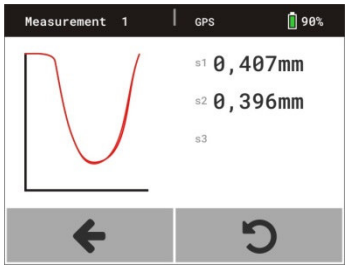

Figure 13

Failure to catch the rebounding drop-weight may cause undesirable compaction of the test area and, hence, faulty measurements.

The measurement is automatically completed after the third impact. The menu on the left (Figure 14) is displayed on the screen including the individual settlement amplitudes, the average settlement s_m, the path-speed-ratio s/v and the calculated E_{vd} -value.

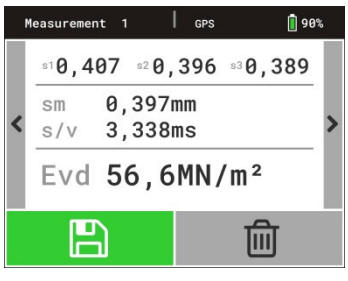

Figure 14

If one settlement value deviates by 50% or more from the average settlement s_m an exclamation mark appears on the screen (Figure 15). Probably it is a mismeasurement. This test series should be rejected and measurement repeated

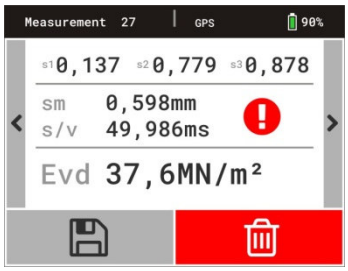

Figure 15

Store, Print and Display Current Measured Data

Upon completion of one measurement the current measured data can be stored 💾 or deleted 🗑 (Figure 14). After storing the current test series can be printed 🖶 *(only devices with printer)* and/or exported ☁ (Figure 16) and there is the possibility to display the curve data and the GPS data ❮ ❯ (Figure 17).

Before using the thermal printer AP1300 please read the instruction manual (➔ page 19) and follow the given instructions regarding putting it into operation and handling.

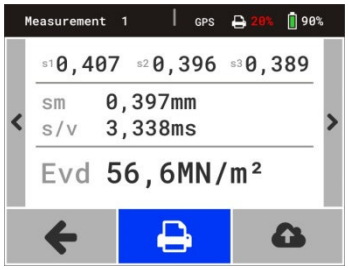

Figure 16

It is recommended to export the measured data stored in the measuring instrument regularly (➔ page 14) and to delete afterwards the data in the measuring instrument (➔ page 15).
In this way the transference time will be shortened and multiple data transfer avoided.

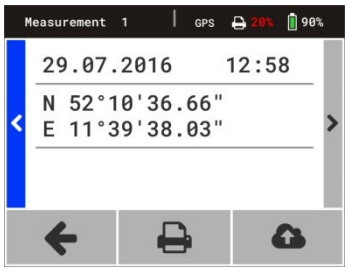

Figure 17

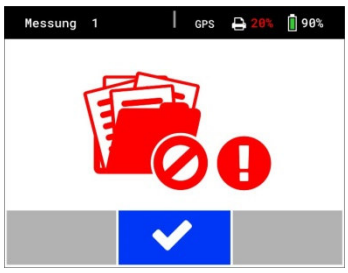

Figure 18

In case memory is full the menu on the left appears on the screen (Figure 18). Storage space in the measuring instrument has to be created by transferring the stored series of measurements to the USB stick or to the PC or via App (⇨ page 14) and subsequent deletion (⇨ page 15).

Completing the Test

- Press the key to switch off the settlement measuring instrument.
- Disconnect the cable establishing connection between the settlement measuring instrument and the sensor on the load plate.
  - Remove the plug from the socket by pulling on the plug enclosure.
- Replace the cap on the sensor socket.
- Lock the drop-weight by means of the transportation lock.
  - Withdraw red knob.
  - Rotate red knob through 90 deg.
  - At the same time, rotate the drop-weight in the lowermost position until the pin locks into the hole in the guide tube.

  The arrow is horizontal: either or drop-weight is locked

The LWD may not be relocated before the drop-weight is fixed by means of the transportation lock.

Error Menus

Figure 19

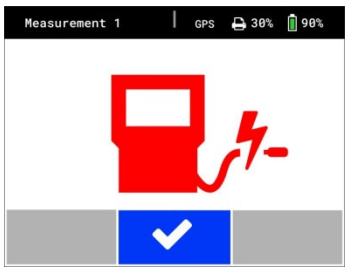

Figure 20

To monitor the measuring procedure the measuring instrument provides instructions which pops up as an error report before, during or after measurement.

The following error reports may appear before the measurement:

Error report	Error cause
connect measuring device to plate (Figure 19)	no connection between measuring instrument and load plate (plug was not connected to the plate, measuring cable defective, plug demolished)
short circuit in measuring cable (Figure 20)	no correct connection between measuring instrument and load plate or measuring cable is damaged

- Check / establish the connection.
- Restart the measuring process by pressing the Enter key, as soon as the connection is correct.

Display / Print the Stored Measured Data

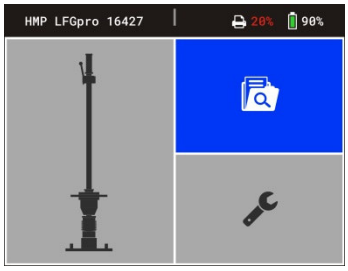

Figure 21

The in the database stored test series and -results can be displayed via button (Figure 21) on the screen and printed out if required *(only devices with printer)*.

When no data are safed in memory, the button is without function.

Before using the thermal printerAP1300 please read the instruction manual (➡ page 19) and follow the given instructions regarding putting into operation and handling.

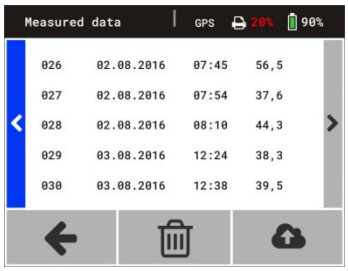

Figure 22

- Select and confirm the button in the main menu.
  ⇨ The stored test series appear on the screen (Figure 22).

By confirming the buttons ❮ or ❯ with Enter more test series can be displayed.

- Select the desired test series by means of the ▲ ▼ keys and confirm by pressing the Enter key.
  ⇨ The values of the selected test series are displayed on the screen (Figure 23).

By confirming the buttons ❮ or ❯ with Enter or by pressing the ◀ ▶ keys GPS position and settlement curves with deformation rates (Figure 24) can be displayed.

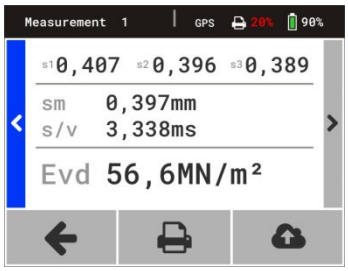

Figure 23

- Select button and confirm with Enter key.
  ⇨ Data of selected test series are printed.

GPS data will only be printed, in case GPS is enabled ✔ in menu Settings/Device.

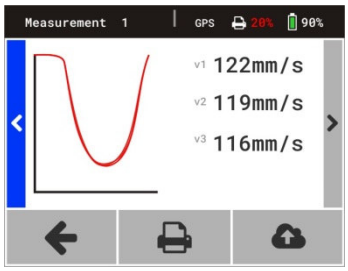

Figure 24

Export the Stored Measured Data

The test series and –results stored in the database can be transferred via USB interface to the supplied USB stick or to PC or via HMPtransfer APP to web-based evaluation software HMPreport.

Data Transfer Measuring Instrument → USB Stick

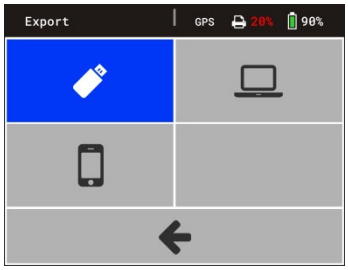

Figure 25

- Connect the USB stick to the measuring instrument.
- Select within measuring instrument under menu measured data / export the transfer mode (Figure 25) and confirm with Enter key.
  ⇨ The data are being copied to the USB stick.
  ⇨ After completion of data transfer the measuring instrument switches off automatically.

To transfer the data from the USB stick to the PC see instruction manual »Protocol software for the Light Weight Deflectometer«.

Data Transfer Measuring Instrument → PC

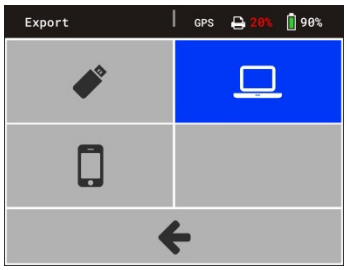

Figure 26

- Connect measuring instrument and PC via the supplied USB cable.
- Select within measuring instrument under menu measured data / export the transfer mode (Figure 26) and confirm with Enter key.
  ⇨ The measuring instrument works now just like removable media.
- After completion of data transfer switch off the measuring instrument and disconnect measuring instrument from PC.

To transfer data from measuring instrument to PC see instruction manual »Protocol software for the Light Weight Deflectometer«.

Data Transfer Measuring Instrument → HMPtransfer APP / HMPreport

The following conditions must be met, in order to transfer the data from the measuring instrument via the HMPtransfer APP to the web-based evaluation software HMPreport.

- The HMPtransfer APP has to be installed on the Smartphone.
- In the Web Application HMPreport a user account including „import“ rights is created.

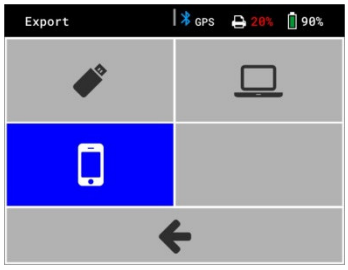

Figure 27

The data transfer from measuring device to smartphone is carried out via Bluetooth connection and is controlled by the HMPransfer APP from the smartphone.

- Select within measuring instrument under menu measured data / export the transfer mode (Figure 27) and confirm with Enter key.
  ⇨ Bluetooth interface will be enabled.
- Carry out all further actions acc. to instructions of HMPtransfer APP.

The HMPtransfer APP imports all measured data, stored in the settlement measuring instrument.

Regarding data transfer from HMPtransfer APP to web-based evaluation software HMPreport see help for HMPtransfer APP.

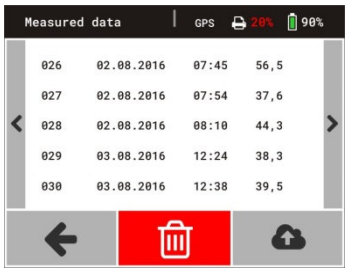

Figure 28

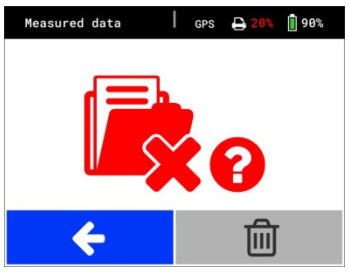

Figure 29

Delete Measuring Results

The test series and –results stored in data base can be deleted via Button .

- Select and confirm the button in the main menu.
- Confirm button by pressing the Enter key (Figure 28).
  ⇨ The menu on the left is displayed on the screen (Figure 29).
- Select button and confirm with Enter key.
  ⇨ All measurements will be deleted.
  ⇨ The main menu is displayed on the screen.

Stored series cannot be deleted individually.

General

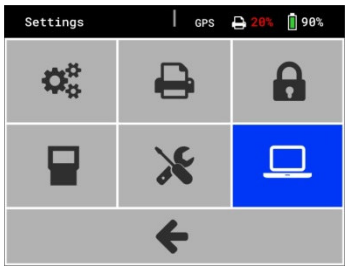

Figure 30

Via button in the main menu you can reach the menu settings (Figure 30), in which different display-, device- and printer settings can be carried out.

All carried out settings are only saved, when returning to the main menu. In case that the measuring instrument is switched off before, all modifications get lost.

Display

Figure 31

In menu »Display« settings for date, time and language can be carried out (Figure 31).

Set Date

- Select button »Date« and confirm with Enter key.
- Change the day by means of the keys.
- Select the month by pressing the key.
- Change the month by means of the keys.
- Select the year by pressing the key.
- Change the year by means of the keys.
- Confirm the current date setting by pressing the Enter key.

By pressing the Enter key the menu »date« can be left at any time.

- Select Footer by means of the or key and confirm with Enter key.
  ⇨ The menu »Settings« appears.
- Select Footer by means of the or key and confirm with Enter key.
  ⇨ The set date will be saved and the main menu appears.

Set Time

- Select button »Time« and confirm with Enter key.
- Change the minutes by means of the keys.
- Select the hours by pressing the or key.
- Change the hours by means of the keys.
- Confirm the current time setting by pressing the Enter key.

By pressing the Enter key the menu »Time« can be left at any time.

- Select Footer by means of the or key and confirm with Enter key.
  ⇨ The menu »Settings« appears.
- Select Footer by means of the or key and confirm with Enter key.
  ⇨ The set time will be saved and the main menu appears.

Select Language

- Press Enter key so often until the desired language appears.
- Select Footer ← by means of the ▲ or ▼ key and confirm with Enter key.
  ⇨ The menu »Settings« appears.
- Select Footer ← by means of the ▲ or ▼ key and confirm with Enter key.
  ⇨ The set language will be saved and the main menu appears.

Device

Figure 32

In menu »Device« the following settings can be carried out for device configuration (Figure 32):

- Drop Weight (10 kg / 15kg[1)]) set configuration of loading mechanism

1)

The configuration 15 kg is only allowed to be used for a loading mechanism with a drop-weight of 15 kg.
There is a separate test code for this.

- GPS (✔ / ✖) activate / deactivate GPS
- Unit (MN/m² / MPa) set unit
- BT-direkt (✔ / ✖) special version, not available
- Calibration (✔ / ✖) show / don't show calibration date on start screen
- RESET Function for HMP-Service

Printer

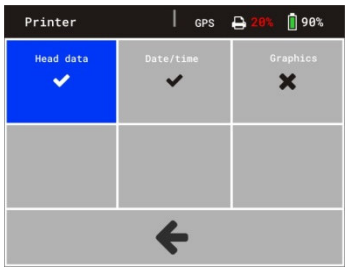

Figure 33

In menu »Printer« the following settings can be carried out for printer configuration (Figure 33):

- Print head (✔ / ✖) Print head »✔« means, that always on every printout the head with information regarding measuring point will be printed out.
  Print head »✖« means, that the first printout is with head, all others without. This setting is paper-saving and is used f. e. to print out an inspection lot.
- Date / Time (✔ / ✖) print out date / time
- Grafik (✔ / ✖) print out curve

Service

In menu »Service« various device information, which are relevant for HMP service, are indicated.

Calibration Menu

The menu »Calibration« is not available for users.

Maintenance Menu

The menu »Maintenance« is not available for users.

Thermal printer AP1300

Included in the Light Weight Deflectometer scope of supply is a thermal printer AP1300 (*optional*).

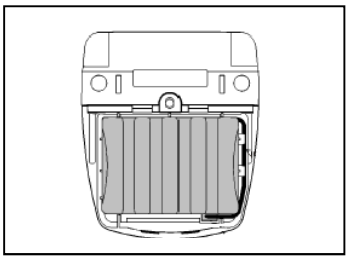

Figure 34

Power Supply

The printer can be operated independently from a power supply unit and is powered by a 1.8 Ah NiMH power pack housed in the printer (Figure 34). Thus, the printer can be carried from job to job.

Safety

- **The NiMH power pack is provided with an internal fuse unit. However, a short-circuit may occur when the NiMH power pack gets into contact with metallic items.**
- **The power pack must not be opened; otherwise it may leak out or a short-circuit may occur.**
- **Before you remove or replace the power pack, disconnect it from the external power pack charger.**

The power pack has to be charged only by means of the supplied power pack charger. The power pack charger can be connected with a car-battery 12–24V or by means of an AC/DC adapter to mains 230 V / 50 Hz. The AC/DC adapter is included in the delivery contents of Settlement measuring instrument **HMP LFG*pro***. Charger and adapter are placed in the carrying case.
The printer AP1300 is shipped with a connected and fully loaded power pack.

- **When the printer is used for the first time after a lengthy period or has been standing idle for a lengthy period, recharge the power pack prior to use.**
- **In the event of malfunction the printer may only be opened by authorised personnel.**

- **The supplied accessories must only be used for devices supplied by HMP and according to this instruction manual. Any other use may cause damages.**

Charging of Power Pack

- **For Changing the power pack it is only allowed to use the supplied power pack charger.**
- **Fully charging the power pack takes 15 hours at most.**
- **Use the power pack charger only indoors. Disconnect the device from the mains if it is not used. Do not operate the device in case of damage to the housing or the mains plug.**
- **Only charge nickel/metal hydride power packs; use of the charger for other batteries may cause an explosion hazard.**
- **Do not open the power pack charger.**

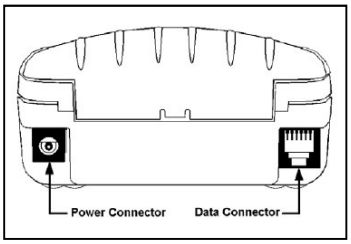

Figure 35

- Connect the power pack charger to the »Power Supply« connection of the printer (Figure 35).
- Connect the power pack charger to the mains supply.
- Disconnect the power pack charger from the mains supply when charging of power pack has been finished (after 15 hours at the latest).

State of Charge of the Printer

Figure 36

The state of charge of the printer is displayed in status line of display after switching on the electronic settlement measuring instrument.

The battery pack of the printer should be recharged as quickly as possible, when state of charge is 15% or less or in case the note on the left (Figure 36) appears on the screen of settlement measuring instrument.

Front panel of printer

(Figure 37)

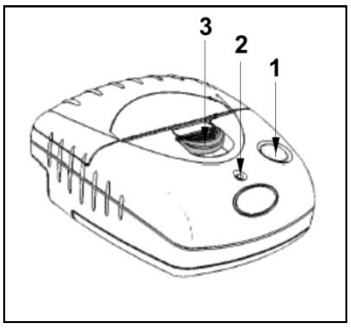

Figure 37

1 Paper feed

Single-line paper feed:
– Press the key for a short interval, and release.

Multi-line paper feed:
– Hold down this key until the desired length of paper is reached.

2 LED

Signals READY
LED off:
– The printer is in the power-saving mode.
– Power pack is discharged.
Green LED (steady):
– Printer is active.
Green flashing LED:
– Paper out.
Green – orange flashing LED:
– Power pack is charged.
Red – green flashing LED:
– Power pack voltage is too low.

3 Paper compartment opener

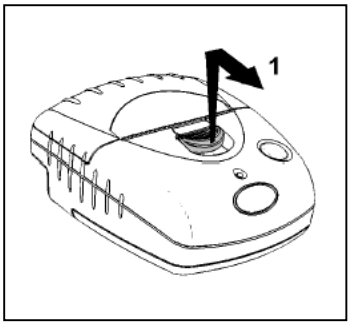

Figure 38

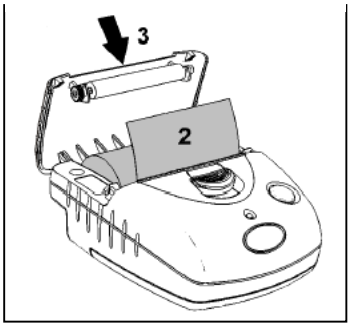

Figure 39

Insert Paper Roll

(Figure 38 and Figure 39)

- Push the paper compartment opener to the front until the printer lid opens (1).
- Unwind a few centimetres of the new roll and load the paper roll into the compartment such that the paper will unwind from below (2).
- Close the printer lid (3).
- Press the paper feed key to check the correct paper movement.
- Excessive paper is rapidly torn off by using the cutting edge.

The thermal printer AP1300 is provided with sensors to detect lacking paper or opened paper compartment. If a sensor is activated, the printer switches to the storage mode; all data transmitted to the printer are preserved. Printing is continued immediately as soon as the defect has been removed.

It is recommended using original paper rolls for thermal printer only, dimensions: ∅ 3 cm, width 5.7 cm (length of paper 10 m).

Malfunction

Printer fails to start printing:

- Connection correct? Check connections/establish connection.
- Has the printer automatically switched on and is the LED on? Check, if the printer can be switched on manually.
- Is the power pack discharged? Charge the printer before use.

Cleaning

Care must be exercised when measuring to ensure there is no higher-than-normal dirt induced friction between the drop-weight and the guide tube; otherwise, incorrect data will be measured.

- Thoroughly clean the LWD after every use.
- Wipe the guide tube with soft cloth slightly soaked in oil.
- Then, move the drop-weight up and down on the guide tube.

Do not use grease to clean the guide tube.

The load plate must not be immersed in water; otherwise the sensor could be damaged.

Calibrating

The company of HMP is an authorised testing institution and calibration laboratory within the meaning of »Technical Test Code for Soil and Rock in Road Construction TP BF-StB Teil B 8.4 / Issue 2016«.

The loading mechanism and the settlement measuring instrument of the LWD were calibrated prior to shipment ex works.
Calibration ensures both, the function of the equipment and compliance with the specifications for the loading mechanism and for the settlement measuring instrument.

Re-calibration is required at least annually.
Also, re-calibration is essential after any repair of the LWD.

The company of HMP has calibrated (DKD-supervised) instrumentation used to conduct force and distance calibrations. In addition, repairs necessary might be carried out.

The user should check the height of fall indicated in the calibration record, at intervals of three months.

Hotline

HMP Magdeburger Prüfgerätebau GmbH
Bülstringer Straße 6
D-39126 Magdeburg

Tel.: (03 91) 2 51 46 66
(03 91) 2 51 46 67
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E-Mail: info@hmp-online.de

Bundesanstalt für Straßenwesen
Abteilung Straßenbautechnik

bast
Bundesanstalt für Straßenwesen

Anerkennung als Kalibrierstelle

für das Leichte Fallgewichtsgerät nach TP BF-StB

Bezeichnung der Kalibrierstelle:	HMP Magdeburger Prüfgerätebau GmbH
Leiter:	Dipl.-Ing. Leue
Anschrift:	Bülstringer Straße 6, 39126 Magdeburg
Telefon / e-mail:	0391 25146-66, info@hmp-online.de

Die privatrechtliche Anerkennung gilt für die Kalibrierung von leichten Fallgewichtsgeräten nach den Technischen Prüfvorschriften für Boden und Fels im Straßenbau, TP BF-StB (Ausgabe 2012) Teil 8.3: Dynamischer Plattendruckversuch mit Leichtem Fallgewichtsgerät.
Grundlage für die Kalibrierung ist die Technische Prüfvorschrift für Boden und Fels im Straßenbau, TP BF-StB (Ausgabe 2016) Teil 8.4: Kalibriervorschriften für das Leichte und das Mittelschwere Fallgewichtsgerät.

Die Anerkennung mit der Registriernummer 04-20160929 ist auf 5 Jahre befristet ab dem Ausstellungsdatum gültig.

Bergisch Gladbach, 09.12.2016

Im Auftrag

Bundesanstalt für Straßenwesen 1

(Dr.-Ing. U. Zander - Direktor und Professor)
Abteilung S - Straßenbautechnik

(Dr. Ing. D. Jansen)
Referat GS3 – Dimensionierung und Straßenaufbau

EU Declaration of Conformity

within the meaning of the EU Directives

- 2004/108/EU Electromagnetic compatibility
- 2006/95/EU Low voltage
- 2011/65/EU Restriction of the use of certain hazardous substances

The »Light Weight Deflectometer«

Make:	HMP
Type:	LFG4 / LFG*pro*
Serial-No.:	from No. 9600 / 16001
Year manufactured:	2016

was developed, designed and manufactured in compliance with the above-mentioned EC Directives under sole responsibility of

Magdeburger Prüfgerätebau GmbH

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39126 Magdeburg
Tel.: +49(0)391 2514666
Fax: +49(0)391 2514668

The following harmonised standards have been applied:

EN 614-1	2006 +A1:2009	Safety of machinery – Ergonomic design principles – Part 1: Terminology and general principles
EN ISO 12100	2010	Safety of machinery – General principles for design – Risk assessment and risk reduction
EN 50581	2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 60335-2-29	2004 A2:2010	Household and similar electrical appliances – Safety – Part 2-29: Particular requirements for battery chargers
EN 61000-6-2	2005	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
EN 61000-6-4	2007 A1:2011	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments
EN 61310-2	2008	Safety of machinery – Indication, marking and actuation – Part 2: Requirements for marking
EN 61310-3	2008	Safety of machinery - Indication, marking and actuation – Part 3: Requirements for the location and operation of actuators

A complete set of Technical Documentation is available. The Instruction Manual associated with the equipment is available:

☒ in the original version
☒ in the language customary in user's country English

Magdeburg	08.11.2016	Hennings, Geschäftsführer	
Place	Date	Undersigned and Position	Signature