INSTRUCTION MANUAL

Magdeburger Prüfgerätebau GmbH



HMP LFG*pro*

The Light Weight Deflectometer

MADE IN GERMANY

TÜVNORD ISO 9001

Calibration-INSTITUTE authorised by the Federal Highway Research Institute







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

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1 Certificate „BASt-authorised calibration institute …“
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General Information

Safety instructions

Information for Users

This instruction manual was prepared such that users can easily become familiar with the »Light Weight Deflectometer«, 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 E2835-21 – 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 E2835-21 – 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 safety instructions and safety regulations 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.

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.

Handling / 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.



Before transporting the LWD, the drop-weight must be locked by means of the transportation lock (⇨ page 13).
The LWD must not be transported on the handle, but only on the ring of the drop-weight.
Works on the LWD itself may only be carried out, if the drop-weight has been locked previously by means of the transportation lock.

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.



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.

The Light Weight Deflectometer

Construction of the Instrument

The LWD consists of the following assemblies:

- Loading mechanism
- Load plate
- Electronic settlement measuring instrument

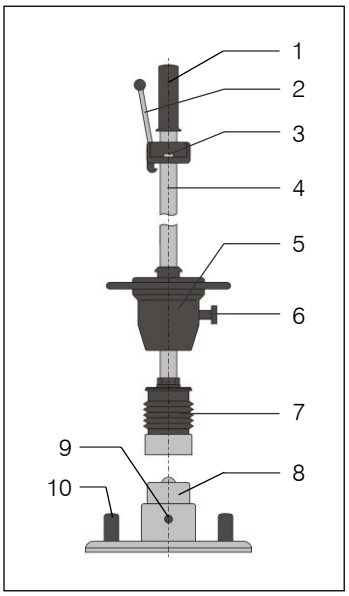


Figure 1

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 Thrust piece 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 thrust piece (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.

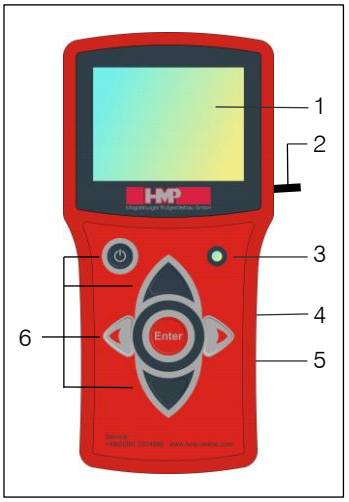


Figure 2

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 Charging indicator
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 AC/DC adapter, USB car charger (beneath cover)
4 USB stick
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 to the settlement measuring instrument is made. 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	Evd < 225 MN/m²
Temperature range	0 bis 40 °C
Display	3.5“ TFT colour display
Interfaces	Bluetooth, USB, thermal printer
GPS	integrated
Memory capacity	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

Enter — Confirm selection / Start action

Buttons/ Symbols

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

Main Menu

Measuring ⇨ page 10
(precompaction, measuring, store)

Measured data ⇨ page 15
(… read, print, export, delete)

Settings/Service ⇨ page 18
(display, device, printer, service, check up)

General

Back to the previous menu

Next / measurement initiate

Restore measuring readiness

Scroll (test series/measured data)

Scroll (test series/measured data)

Store

Delete

Print test series

Export test series ⇨ page 15



Figure 4

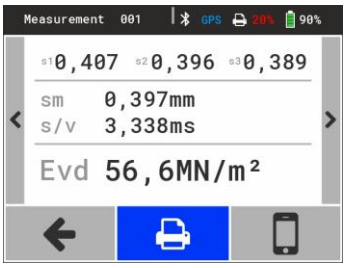


Figure 5

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 white: Bluetooth inactive displaying in status line blue: Bluetooth active
GPS	Status GPS displaying in status line white: active, GPS data not (yet) available displaying in status line blue: active, GPS-data 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 via App
Measured data	Show single measurements	Print
		Export via App
	Delete (all measurements)	
	Export	USB stick
		PC
		App
Settings	Display	Date
		Time
		Language
	Device	Drop-weight
		GPS
		Unit
		Battery 30%
		Calibration…
		Coordinates
	Printer	Head data
		Date/time
		Graphics
		Company data
	Service	
	Check-up	

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 components could be harmful.**
- **Do not expose the Lithium polymer battery pack to heat or fire. Avoid storage of the device/battery pack in direct sunlight.**
- **The Lithium polymer battery pack must not be short-circuited.**
- **Do not subject the 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 2 minutes.



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 safe operation, a warning note (⇨ page 9, Figure 7) appears. Right after confirming the warning note, the device is switched off, in order to prevent a deep discharging of the battery pack. In this case, the battery pack must be charged immediately.



- **In case a warning note (⇨page 9, Figure 7) appears and the measuring device switches off, the Lithium polymer battery pack must be charged immediately.**

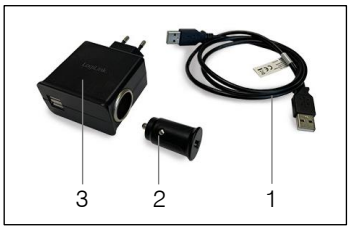


Figure 6

Charging of Lithium Polymer Battery Pack

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.

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

The Lithium polymer battery pack of the electronic settlement measuring instrument should be charged before the first use and in case that the state of charge is 25 % or lower.

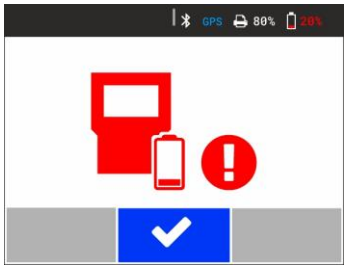


Figure 7

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

The electronic settlement measuring instrument can be used during the charging process.

- Connect the electronic settlement measuring instrument via USB cable to the USB car charger or to the AC/DC adapter.
- Connect the USB car charger to a car socket 12 V or the AC/DC adapter to mains supply 230 V / 50 Hz.
  ⇨ The charging indicator lights red.
- After completion of the charging process, disconnect the charger from mains socket.

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. However, the charger should be disconnected from the power supply once charging is complete to avoid constantly recharging the Li-Polymer battery.

Constant recharging is harmful to the battery and can shorten its service life. The Li-polymer battery should only be recharged when the state of charge falls below 50%.

Measuring

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 E2835-21 – 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 with loose medium sand if necessary.

Connecting the Settlement Measuring Instrument

- Connect the sensor, which is located under the thrust piece (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 thrust piece provided on the cap to protect the sensor socket from dirt and moisture.

Positioning the Loading Mechanism

- Position the loading mechanism on the thrust piece 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

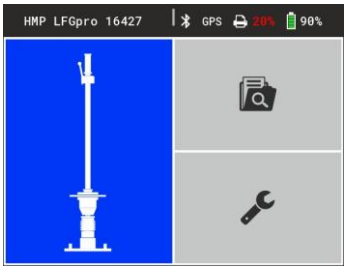


Figure 8

The base settings of the electronic settlement measuring instrument comply with the ordered device type.
Individual adjustments can be carried out in the menu »Settings« (⇨ page 18).

- Press the key to switch on the settlement measuring instrument.
  - ⇨ The Device will be powered up and GPS starts.
  - ⇨ The main menu (Figure 8) appears on the screen.
  - ⇨ The button »Measuring« is active.
  - ⇨ The GPS data are determined.

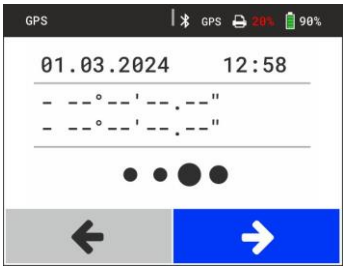


Figure 9

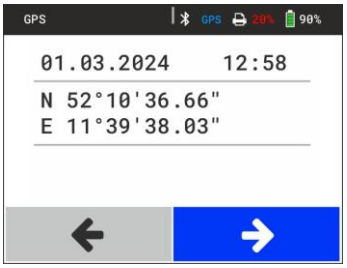


Figure 10

Read in GPS Data

- Confirm the button »Measuring« (Figure 8) by pressing the Enter key.
  - ⇨ The menu »GPS« (Figure 9) appears on the screen, the GPS data are read in.
  - ⇨ An acoustic signal sounds, the GPS data are displayed (Figure 10).

GPS data will only be stored with the test series, in case the GPS data are read in and displayed before precompaction. If the precompaction is started before GPS data have been read in and displayed, the measurement takes place without capturing the GPS data!

In case the measurement shall be carried out without recording the GPS data, »GPS« has to be deactivated in the menu »Settings« / »Device« (⇨ page 19). After confirming the button »Measuring« the menu »Precompaction« appears immediately.

Precompacting the Test Area

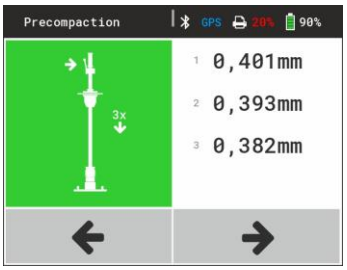


Figure 11

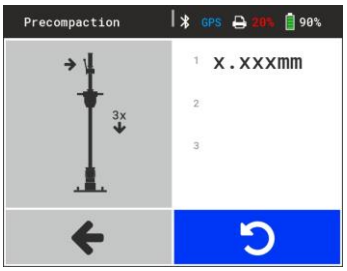


Figure 12

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

After reading in the GPS data the menu »Precompaction« appears automatically (Figure 11). An acoustic signal sounds and a green bar pops up.

- 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 a 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, always after the acoustic signal.

If the drop-weight is not dropped within 15 seconds after the signal tone, the precompaction has to be reactivated as follows.

- Confirm button by pressing the Enter key (Figure 12).
  - ⇨ An acoustic signal sounds and a green bar appears.

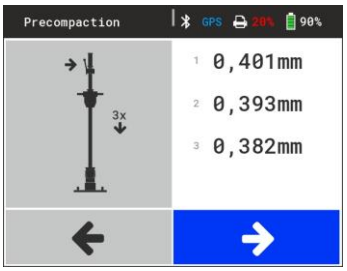


Figure 13

After the precompaction the button ➔ will be activated (Figure 13) and the measuring instrument switches to the menu »Measuring« automatically.

Measuring

After the automatic switch from menu »Precompaction« to menu »Measuring« an acoustic signal sounds and a green bar appears. The device is ready to measure.

The device is only ready to measure after the acoustic signal and as long as a green bar is being displayed.
In case the drop-weight is not dropped within 15 seconds after the signal tone, readiness for measuring can be restored by selecting and confirming button ↺.

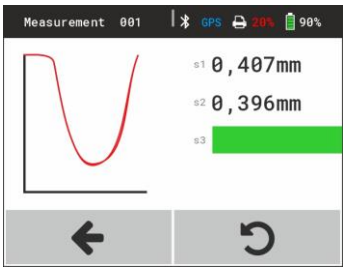


Figure 14

Successively perform 3 impacts as follows:

- Lock the drop-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 14).

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

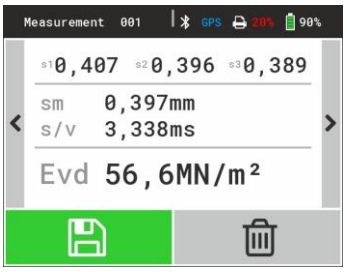


Figure 15

The measurement is automatically completed after the third impact. The menu on the left (Figure 15) 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.

If one settlement value deviates by 50% or more from the average settlement s_m an exclamation mark appears on the screen (Figure 16). It is probably a mismeasurement. This test series should be rejected and measurement repeated.

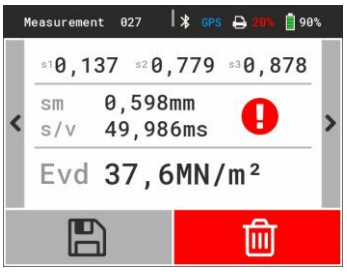


Figure 16

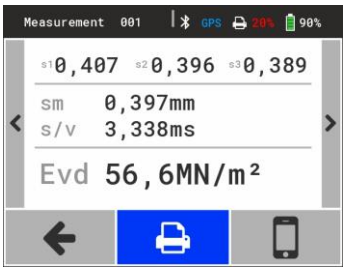


Figure 17

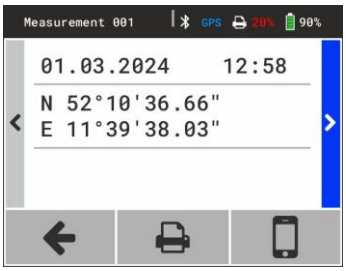


Figure 18

Store, Print and Display Current Measured Data

Upon completion of one measurement the current measured data can be stored or deleted (Figure 15 / Figure 16, page 12).

- Confirm button by pressing the Enter key.
  ⇨ The current measured values will be stored.
  ⇨ The menu on the left appears on the screen (Figure 17).
- Choose button and confirm by pressing Enter key.
  ⇨ The current measured values will be rejected.
  ⇨ The main menu appears.

After storing there are the possibilities,

- to print out the current test series *(only devices with printer)*, ⇨ page 15,
- to export the current test series, ⇨ page 16,
- to display the curve data and the GPS data (Figure 18).

Before using the thermal printer AP1300 please read the instruction manual (⇨ page 21) and follow the given instructions regarding putting it into operation and handling.

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

Error Menus

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

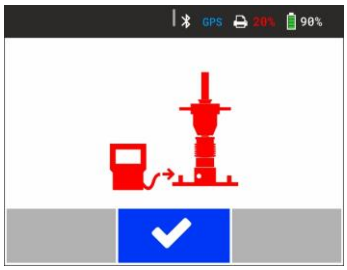


Figure 19



Figure 20

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/plug defective)
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.

The following error report may appear after storing the measurement:



Figure 21

Error report	Error cause
Memory full (Figure 21)	The memory is nearly full. 10 test series can still be stored.

- Export the stored test series to the USB stick, to the PC or via the App. (⇨ page 15).
- Create storage space in the measuring device by deleting the test series afterwards (⇨ page 17).

Measured Data

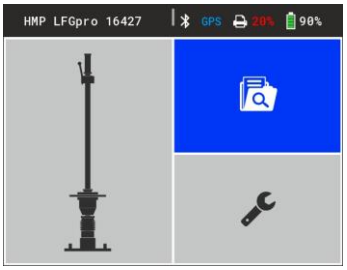


Figure 22



Figure 23

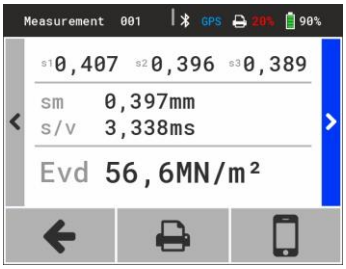


Figure 24

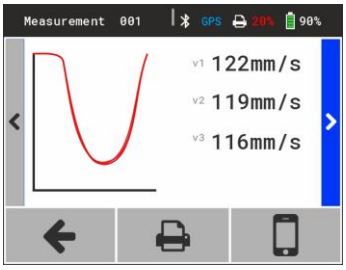


Figure 25



Figure 26

Display / Print the Stored Measured Data

The in the database stored test series and test results can be displayed via button (Figure 22) on the screen and printed out if required *(only devices with printer)*.

If no data are stored in the memory, the button has no function.

Before using the thermal printerAP1300 please read the instruction manual (⇨ page 21) and follow the given instructions regarding putting into operation and handling.

- Select and confirm the button in the main menu.
  ⇨ The stored test series appear on the screen (Figure 23).

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 24).

By confirming the buttons ❮ or ❯ with Enter the GPS position and settlement curves with deformation rates (Figure 25) can be displayed.

- 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« (⇨ page 19).

In case the printer is not connected, the menu on the left appears (Figure 26).

- Connect the printer and confirm the button again by pressing the Enter key.

Export the Stored Measured Data

Data Transfer via USB

The test series and test results, stored in the database, can be transferred via menu item »USB« to the supplied USB stick or to PC (⇨ page 16).

It is recommended to export the measured data stored in the measuring instrument regularly and to delete the data in the measuring instrument afterwards (⇨ page 17).
In this way the transference time will be shortened and multiple data transfer avoided.

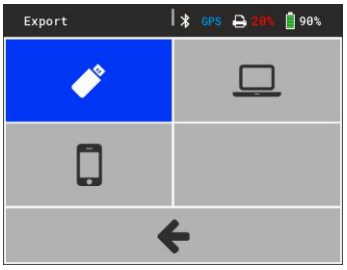


Figure 27

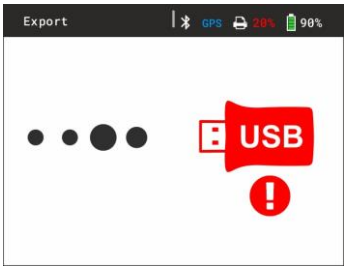


Figure 28

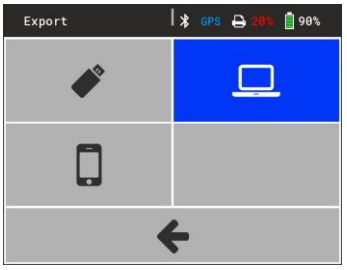


Figure 29

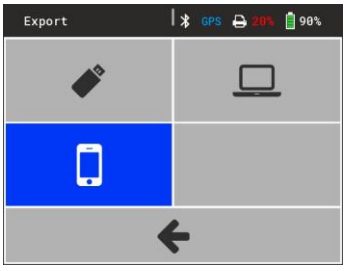


Figure 30

Data Transfer Measuring Instrument → USB Stick

- Connect the USB stick to the measuring instrument.
- Select within measuring instrument under menu »Measured data« / »Export« the transfer mode (Figure 27) and confirm with Enter key.
  - ⇨ The data are copied to the USB stick.
  - ⇨ After completion of data transfer the measuring instrument switches off automatically.

In case there is no connection between measuring instrument and USB stick the display on the left appears (Figure 28).

- Check the connection and connect the USB stick correctly.

If the connection is correct, the data are copied as described above.

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

- Connect measuring instrument and PC via the supplied USB cable.
- Select within measuring instrument under menu »Measured data« / »Export« the transfer mode (Figure 29) and confirm with Enter key.
  - ⇨ The measuring instrument works now just like removable media.
- After completion of the data transfer switch off the measuring instrument and disconnect it from PC.

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

Data Transfer via Bluetooth

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

- In the Web Application HMPreport a user account including „import“ rights is created.
- The HMPtransfer APP must be installed on the Smartphone.
- The user must be logged into the HMPtransfer APP with the same user account as in the Web Application HMPreport.

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 30) 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 values contained in memory of the settlement measuring instrument, which are not yet stored in the APP.

Single test series can be transferred as follows:

- Select under menu »Measured data« the desired test series by means of the ▲ ▼ keys and confirm by pressing the Enter key.
  ⇨ The values of the selected test series appear on the screen.
- Select the button 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 only the measured values of the desired test series.

The data can be transferred from the HMPtransfer APP to the web-based evaluation software HMPreport. It is also possible to send the data by email, in order to import the data into the PC software LFGkurv.

To transfer the data from the HMPtransfer APP to the web-based evaluation software HMPreport and to send the data by email, please see help at HMPtransfer APP.

Links for HMPtransfer App:

GET IT ON Google Play
Google Play Store

Download on the App Store
Apple App Store



Figure 31



Figure 32

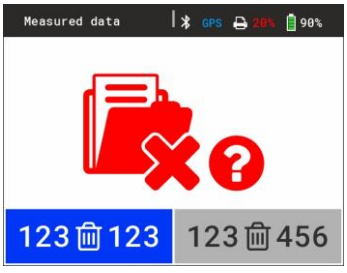


Figure 33

Delete the 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 31).
  ⇨ The menu on the left is displayed on the screen (Figure 32).
- Select button and confirm with Enter key.
  ⇨ The menu on the left is displayed on the screen (Figure 33).

There is the possibility to start again with test series number 1 (button 123 123) or to continue the test series numbers (button 123 456) after deleting.

- Choose button 123 123 or 123 456 and confirm by pressing Enter key.
  ⇨ All measurements will be deleted.
  ⇨ The main menu is displayed on the screen
  ⇨ The measuring instrument is switched off automatically.
  ⇨ Depending on selection, the following measurements start again with test series number 1 or the test series numbers will be continued.

Stored series cannot be deleted individually.

Settings

General

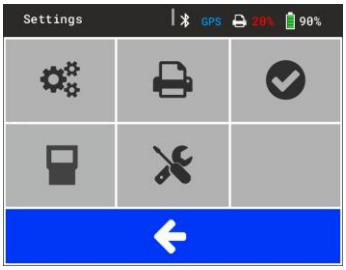


Figure 34

Via button in the main menu, you can reach the menu »Settings« (Figure 34), 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 35

In menu »Display« settings for date, time and language can be carried out (Figure 35).

Set Date



Figure 36

- Select button »Date« and confirm with Enter key.
  ⇨ The menu »Date« appears on the screen. (Figure 36).
- 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



Figure 37

- Select button »Time« and confirm with Enter key.
  ⇨ The menu »Time« appears on the screen. (Figure 37).
- 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 repeatedly 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 38

In menu »Device« the following settings can be carried out for device configuration (Figure 38):

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
Battery	30%	discharging the battery to 30 %
Calibration…	(✔ / ✖)	show / do not show calibration date on start screen
Coordinates	(GPS / UTM)	set the display of coordinates

Printer

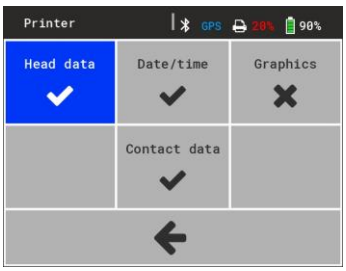


Figure 39

In menu »Printer« the following settings can be carried out for printer configuration (Figure 39):

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

Service

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

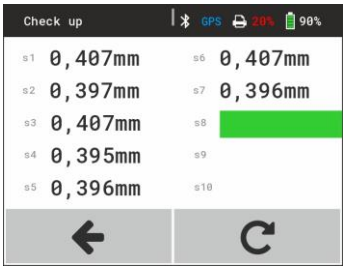


Figure 40

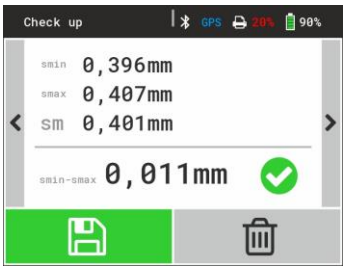


Figure 41

Check Up

The menu »Check-up« is used to carry out test measurements (Figure 40).

10 test measurements can be carried out. Once all measurements have been recorded, the measured values will be evaluated and the minimum settlement s_{min}, the maximum settlement s_{max}, the average settlement s_m and the difference between maximum and minimum settlement are displayed on the screen (Figure 41).

If the values deviate widely from each other, the information symbol changes from green to red with exclamation mark.
In any case the user can store or reject the test values and then carry out a measurement as described in chapter MEASURING.

After storing the measured values can be printed out or saved on the USB stick.

Options

Thermal Printer AP1300

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

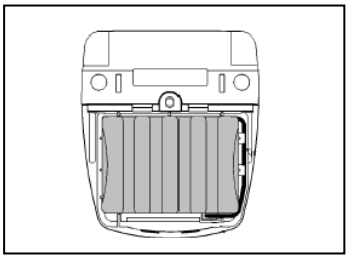


Figure 42

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 42). 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 / 50-60 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.

- **In case 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 charging 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.**

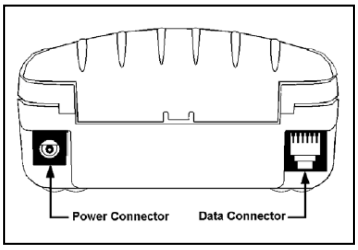


Figure 43

- Connect the power pack charger to the »Power Supply« connection of the printer (Figure 43).
- 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 44

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 25 % or less or in case the note on the left (Figure 44) appears on the screen of settlement measuring instrument.

Front Panel of Printer

(Figure 45)

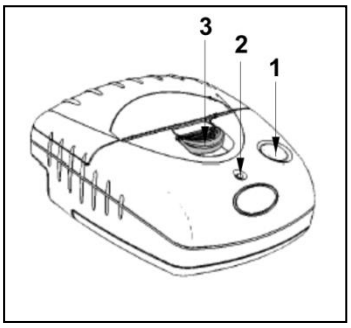


Figure 45

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

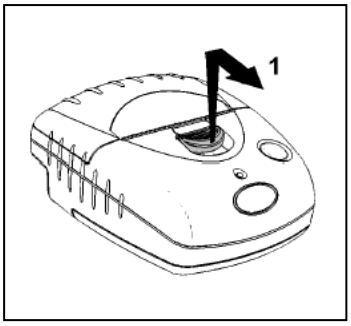


Figure 46

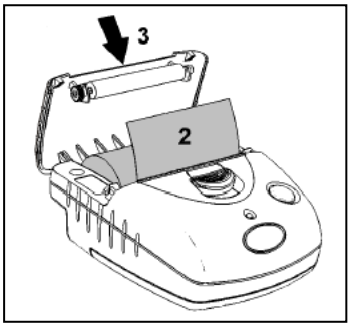


Figure 47

Insert Paper Roll

(Figure 46 and Figure 47)

- 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.
- Has the printer automatically switched on and is the LED on?
  - Check, if the printer can be switched manually.
- Is the power pack discharged?
  - Charge the printer before use (⇨ page 21).

Maintenance and Repair

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 Part 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, necessary repairs 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.: 0391 244539-0
Fax: 0391 244539-20
E-Mail: info@hmp-online.de
https://www.hmp-online.com

Bundesanstalt für
Straßen- und Verkehrswesen
Abteilung Straßenbautechnik

bast
Bundesanstalt für
Straßen- und Verkehrswesen

Anerkennung als Kalibrierstelle

für das Leichte und Mittelschwere Fallgewichtsgerät nach TP BF-StB

Bezeichnung der Kalibrierstelle:	HMP Prüfstand 1
Leiter:	Herr Leue
Anschrift:	HMP Magdeburger Prüfgerätebau GmbH, Bülstringer Straße 6, 39126 Magdeburg
Telefon / e-mail:	0391 244539-0 / 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" und für mittelschwere Fallgewichtsgeräte nach den Technischen Prüfvorschriften für Gesteinskörnungen im Straßenbau TP Gestein-StB (Ausgabe 2012) Teil 8.2.1: „Dynamischer Plattendruckversuch mit dem Mittelschweren 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 04-20251211-LM ist auf 5 Jahre befristet ab dem Datum der letzten Vorort-Abnahme.

Bergisch Gladbach, 15.12.25

Im Auftrag

Bundesanstalt für Straßen- und Verkehrswesen
4

(Dr.-Ing. U. Stöckert – Leitende Regierungsdirektorin)
Abteilung S - Straßenbautechnik

(Dr. Ing. D. Jansen)
Leitung FG-Kalibrierung

EU Declaration of Conformity

within the meaning of the EU Directives

- 2014/30/EU Electromagnetic compatibility
- 2014/35/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. 20016 (LFG4) / from No. 17126 (LFG*pro*)
Year manufactured:	2026

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

Magdeburger Prüfgerätebau GmbH

Bülstringer Straße 6
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 IEC 63000	2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 60335-2-29	2021/ A11:2024	Household and similar electrical appliances – Safety – Part 2-29: Particular requirements for battery chargers
EN IEC 61000-6-2	2019	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
EN IEC 61000-6-4	2019	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	08.07.2026	Hennings, Geschäftsführer	
Place	Date	Undersigned and Position	Signature