Operating Instructions
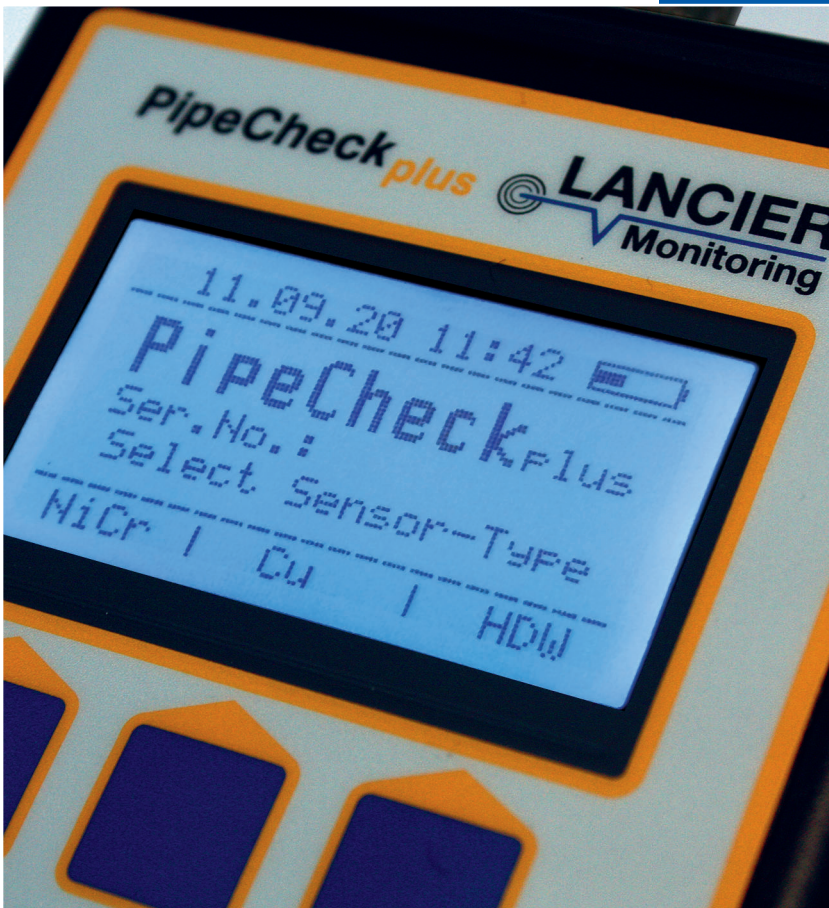
PipeCheck *plus*

Hand-held measuring device for district heating pipe sensors with fault location at NiCr measurement

Contents

Technical Data

Measurement range insulation	0 .. 100 MΩ (fault ±1 % of m. v. for 0 .. 20 MΩ, ±3.0 % of m. v. for > 20 MΩ ±1 Digit)
Resolution insulation	0.1 kΩ
Measurement range loop	0 .. 50 kΩ (fault ±1 % of m. v. ±10 Ω absolute ±1 Digit)
Resolution loop	0.1 Ω (Cu)
Pipe length	NiCr: max. 2500 m (1m = 5.8 Ω) HDW/Cu (nordic system): max. 4000 m
Pipe contact surveillance	yes
Measuring voltage	$\leq$ 24 V DC, < 100 mA (acc. to EN 14419)
Display	LC display, monochrome grey, glare-free
Power supply	Li-Ion rechargeable battery, operating duration 10 h typ.
Features	Location tracking by GPS module SD memory card (max. 2 GB, FAT 16) Integrated LED torch, USB port USB interface Battery status display
Operating temperature	-10 .. 50 °C
Admissible humidity	0 .. 95 % rel. humidity, non condensing
Dimensions (l / w / h)	approx. 221 / 106 / 35 mm
Weight, including case and accessories	approx. 1.55 kg

Ordering Data

Hand-held measuring device *PipeCheck_{plus}*
Included are a measuring cable with banana plugs and alligator clips, pipe connection magnet, mains charger, USB cable, Li-Ion rechargeable battery accessory kit (see below), outdoor case and carrying bag with accessory compartment **Order-No. 075410.020**

Spare parts
Measuring cable 1 m **Order-No. 075224.200**

Carrying bag with exchangeable transparency film **Order-No. 073847.100**

Transparency film for carrying bag **Order-No. 076076.000**

Power supply AC/DC 100 .. 240 V AC / 12 V DC **Order-No. 073845.000**

USB connection cable *PipeCheck_{plus}*/PC **Order-No. 073957.000**

Accessories
Accessory kit consisting of:
1 car charging cable, 2 probes, 2 large alligator clips,
1 test plug (1.1 MΩ / 5.8 kΩ, error rating of 0.1% of the respective measurement value), 2 spring clips, 1 spare magnet,
1 pipe connection holder, 1 pipe connection extension cable,
1 spare SD memory card **Order-No. 075261.200**

⚠️ **It is imperative to read and observe all safety instructions prior to initial operation!**

General Information

These operating instructions should make it easier for you to become acquainted with the product. They contain important information to ensure safe, appropriate and cost-effective use of the equipment.

The operating instructions endorse the directives of national regulations for the prevention of accidents and the protection of the environment.

> ⚠️ **These operating instructions shall be read and adopted by anyone assigned to work with/on the equipment, e. g. during operation to include setting up, maintenance and trouble-shooting.**

In addition to the operating instructions and the mandatory regulations for the prevention of accidents, applicable in the operator's country and at the place of use, the recognised technical regulations for safe and professional operation shall also be observed.

Designated Use

The *PipeCheck$_{plus}$* has been designed to check measurement sections as part of district heating pipe monitoring activities.

The *PipeCheck$_{plus}$* is destined for the use in residential and small business areas.

Any non-compliant use excludes the manufacturer from liability for any damages. The operator carries the risk!

Safety Instructions

> ⚠️ **Important!**
> **Read and observe safety instructions prior to initial operation!**

- Keep the operating instructions ready to hand!
- The unit should only be operated in technically sound condition, for its designated use, with safety and risk awareness in mind, taking into account the operating instructions. In particular, operational faults, which can compromise safety, should be rectified immediately!
- Protect instrument from liquids - danger of short circuit!
- Do not make any modifications to the equipment!
- Mounting, maintenance and repair work should only be performed by trained personnel!
- Only use original LANCIER replacement parts!

> ⚠️ **WARNING - Strong magnet!**
> **Keep the pipe connection magnet away from all devices and objects, which may be damaged by strong magnetic fields, such as cardiac pacemakers etc., hearing aids, televisions and monitors, bank and credit cards, data carriers and computers.**
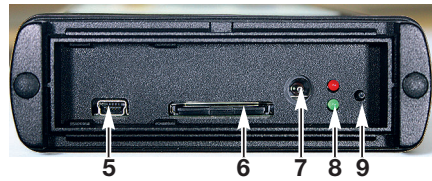
Product description

1 Display with 3 control keys (soft keys)

2 Power/LED switch

3 Connection socket for measurement cable

4 LED flashlight

5 USB interface

6 SD memory card slot

7 Charging socket 12V DC

8 Charging status indicator

9 Reset button
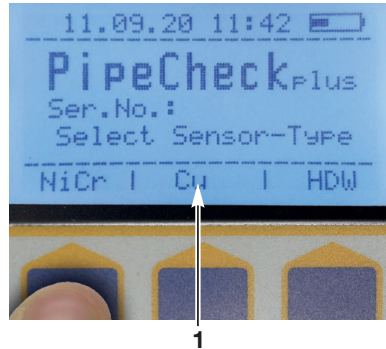
Top of device
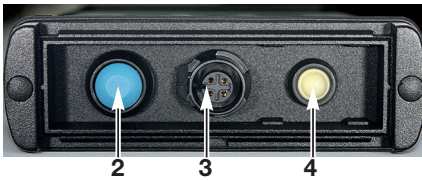
Bottom of device

Scope of supply

10 Measuring device *PipeCheck*$_{plus}$

11 Carrying bag with accessory compartment

12 measuring cable with banana plugs and alligator clips

13 pipe connection magnet

14 USB cable

15 Mains charger

16 Accessory kit

Operating instructions (no fig.)

Measuring connection

Connect the measurement cable to the *PipeCheck*_{plus}

- Insert the supplied measurement cable
  (**12**) into the reverse-polarity-protected
  connection socket (**3**) on the device's
  front side until the plug lock is engaged.

The measurement cable is approx. 1 m
long and branches out around half way.

The red and green measurement lines con-
nect to the sensor wires of the pipe to be
measured.

3 / 12

The two black measurement lines are connected to the medium pipe separately
from each other using the pipe connection magnet (**13**).

All measuring lines are fitted with banana plugs. In order to make connections
easier alligator clips for the sensor wires and one pipe connection magnet (**13**)
are included.

Connect the measurement lines to the district heating pipe

System visualisation
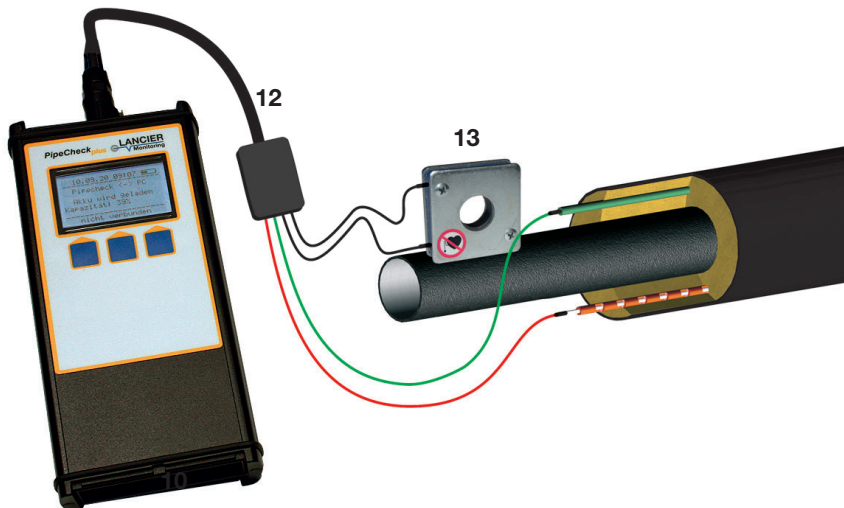
- **How to connect the sensor wire**
  Depending on local conditions, where necessary, fit the green and red measurement lines with alligator clips and for

- **NiCr measurements** match the colours to the pipe's measuring wires.

- **Cu measurements** connect the red measurement line to the bare copper wire and the green measurement line to the tinned copper wire.

- **HDW systems** connect the red measurement line to the red and the green measurement line to the white measuring wire.

> **WARNING - Strong magnet!**
> **Keep the pipe connection magnet away from all devices and objects, which may be damaged by strong magnetic fields, such as cardiac pacemakers etc., hearing aids, televisions and monitors, bank and credit cards, data carriers and computers.**

- **How to connect the pipe connection monitor**
  Using the banana plugs plug the two black measurement lines into the sockets of the supplied pipe connection magnet (**13**) and position the latter parallel to the service pipe to establish a secure point of contact.

  Where there is no pipe connection magnet (**13**), the two black measurement lines must be connected to the medium pipe without touching each other. This is the only way to ensure that the pipe is included in the measurement.

  In the event that the black measurement lines are connected incorrectly, a "No Pipe Contact" error message will appear on the display and the measurement will be discontinued (see page 14).
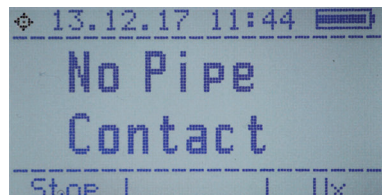
Operation

How to turn on the *PipeCheck_{plus}*

The *PipeCheck_{plus}* is supplied ready for use in a protective bag. During operation the device can remain in the protective bag.

- Open the protective bag and fasten the flap in place using the Velcro closure on the back of the bag.

- Press and hold the power switch (**2**) on the device's front side for approx. 1 second. The *PipeCheck_{plus}* is now switched on.

2

- The display (**1**) will show the device's initialisation messages.

- The start screen will then be shown.

- The *PipeCheck_{plus}* is now ready for use.

- If the *PipeCheck_{plus}* is left unused for longer than 15 minutes, an acoustic signal will sound and the device will turn off automatically.
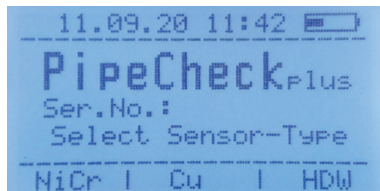
Key

Explanation of symbols

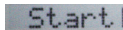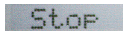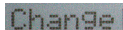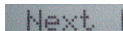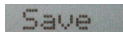| Symbol	Description
⊕	GPS satellite indicator, flashes, if there is no satellite connection, e.g. inside buildings. Is visible, when there is a satellite connection.
▭	Rechargeable battery charge level indicator.
∧	Moves the cursor up one position.
∨	Moves the cursor down one position.
+	Increases an adjustable value.
−	Decreases an adjustable value.
⬅	Moves up one level from the current screen and copies a value selected from a list.
Start	Starts a measurement run.
Stop	Ends a measurement run.
⟶	Changes the device's mode in the following sequence Standard measurement --> Single measurement --> Fault location (NiCr measurement only) --> Read stored data --> Menu for device settings and information --> Back to standard measurement
Change	Opens the setting mode for certain parameters.
Next	Switches to the next adjustable value in the setting mode.
Save	Saves a changed value.
▦	Mix up of measurement lines a and b.

Terms

|	
NiCr	Measurement procedure with a **nickel chrome measuring wire.**
Cu	Measurement procedure with a **copper measuring wire.**
HDW	Measurement procedure according to the **HDW system.**
Iso	Measurement value for **insulation resistance.**
Loop	Measurement value for **loop resistance.**
MH	**MH level** indication. See page 22 for more information about this.
Ux	Displays the element or external voltage.
GPS	Global position system: **Location tracking** by satellite.
I_P	Measurement value for insulation resistance **measuring wire a against the pipe**.
I_ab	Measurement value for insulation resistance **measuring wire a against b.**
Ux aP	Measurement value for voltage **measuring wire a against the pipe**.
Ux ab	Measurement value for voltage **measuring wire a against b.**
Q	Quickstart

Measurements

The *PipeCheck~plus~* determines the MH level as well as the insulation and loop resistance.

The automatic reversal of the measuring voltage eliminates any element voltage interference and typical measurement errors are thereby avoided.

To select the measurement procedure

Using the soft keys you can select one of the following measurement procedures:

- **„NiCr"**
  For pipes with nickel chrome monitoring wires.

- **„Cu"**
  For pipes with copper monitoring wires.

- **„HDW"**
  For pipes with an HDW monitoring system.
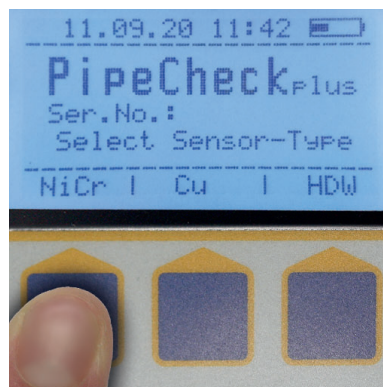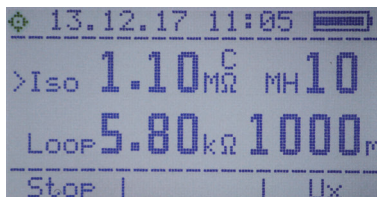
NiCr measurements

Once the "NiCr" measurement procedure has been selected, the corresponding measurement screen will appear.
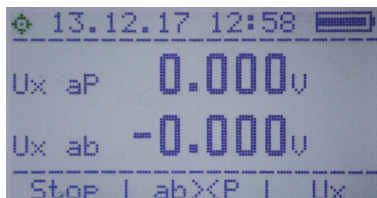
Press the "Start" soft key to start the measurement.
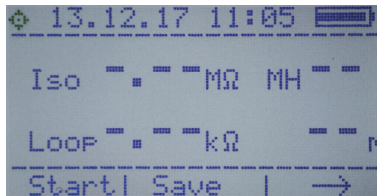
The *PipeCheck* $_{plus}$ will now continuously measure first the insulation and then the loop resistance. The current measurement is indicated by the ">" sign.

The respective last measured values are shown on the display. See page 22 for information on how to interpret the values.

During measurements the element voltage Ux can be displayed by pressing and holding the "Ux" soft key.

The presence of an element voltage can be an indication of moisture in the insulation layer.

Press the "Stop" soft key to end the measurement and freeze the display.

Shown are:
The insulation resistance,
loop resistance,
MH level and
the measuring section length.

Once the measurement has been completed, measurement values can be stored in the SD card's "NICR.CSV" CSV file by pressing the "Save" soft key.

--> See chapter "How to save measurement values" on page 13.

Press and hold the power switch (**2**) on the device's front side for approx. 1 second to call up the home screen. A different measurement procedure can now be selected.
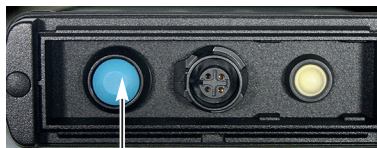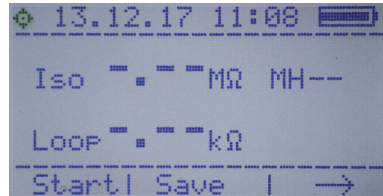
2

Cu measurements

Once the "Cu" measurement procedure has been selected, the corresponding measurement screen will appear.

Press the "Start" soft key to start the measurement.

```
◇ 13.12.17 11:08 ▭▭▭▭
Iso ▀.▀▀MΩ  MH--

Loop▀.▀▀kΩ
Start| Save  |  →
```
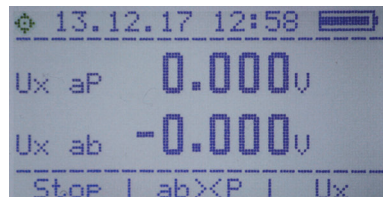
The *PipeCheck*_{plus} will now continuously measure first the insulation and then the loop resistance. The current measurement is indicated by the ">" sign.

The respective last measured values are shown on the display. See page 22 for information on how to interpret the values.

```
◇ 13.12.17 11:08 ▭▭▭▭
Iso 1.10MΩ  MH10
Loop5.80kΩ
Stop |      |   Ux
```

During measurements the element voltage Ux can be displayed by pressing and holding the "Ux" soft key.

The presence of an element voltage can be an indication of moisture in the insulation layer.

```
◇ 13.12.17 12:58 ▭▭▭▭
Ux aP  0.000v

Ux ab  -0.000v
Stop | ab><P | Ux
```

Press the "Stop" soft key to end the measurement and freeze the display.

Shown are:
The insulation resistance,
loop resistance and
MH level

```
◇ 13.12.17 11:08 ▭▭▭▭
Iso 1.10MΩ  MH10
Loop5.80kΩ
Start| Save  |  →
```

Once the measurement has been completed, measurement values can be stored in the SD card's "CU.CSV" CSV file by pressing the "Save" soft key.

--> See chapter "How to save measurement values" on page 13.

Press and hold the power switch (**2**) on the device's front side for approx. 1 second to call up the home screen. A different measurement procedure can now be selected.

2

HDW measurements

Once the "HDW" measurement procedure has been selected, the corresponding measurement screen will appear.
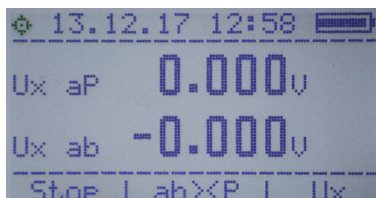
Press the "Start" soft key to start the measurement.

```
◇ 13.12.17 11:09 ▭
Loop -.-- kΩ  -.-
I ab -.-- MΩ
I aP -.-- MΩ
I bP -.-- MΩ
Start| Save  |  →
```

The *PipeCheck*_{plus} will now continuously measure first the loop and then the insulation resistance. The current measurement is indicated by the ">" sign.

The respective last measured values are shown on the display. See page 22 for information on how to interpret the values.

```
◇ 13.12.17 11:11 ▭
>Loop 5.80 kΩ  0.6
I ab  5.8 kΩ
I aP 1.10 MΩ
I bP 1.10 MΩ
Stop |  R/U  |  Ux
```

During measurements the element voltage Ux can be displayed by pressing and holding the "Ux" soft key.

The presence of an element voltage can be an indication of moisture in the insulation layer.

```
◇ 13.12.17 12:58 ▭
Ux aP   0.000v

Ux ab  -0.000v
Stop | ab><P |  Ux
```

Press the "Stop" soft key to end the measurement and freeze the display.

Shown are:
• the loop resistance
• the insulation resistance for measuring wire a against b,
• the insulation resistance for measuring wire a against the pipe,
• the insulation resistance for measuring wire b against the pipe.

```
◇ 13.12.17 11:12 ▭
Loop 5.80 kΩ  0.6
I ab  5.8 kΩ
I aP 1.10 MΩ
I bP 1.10 MΩ
Start| Save  |  →
```

Once the measurement has been completed, measurement values can be stored in the SD card's "HDW.CSV" CSV file by pressing the "Save" soft key.

--> See chapter "How to save measurement values" on page 13.

Error message "Measuring wire mix up"
Where wires a and b are mixed up due to incorrect installation or incorrectly connected measurement lines, this will lead to incorrect measurements.

The *PipeCheck*_{plus} will detect this kind of error and show it on the display as "Loop interrupted" and "a<>b".

```
◇ 15.05.17 15:54 ▭
Loop Interrupted
I ab  0.8 kΩ ▣▣▣▣
I aP >200 MΩ
I bP >200 MΩ
Start| Save  |  →
```

Press and hold the power switch (**2**) on the device's front side for approx. 1 second to call up the home screen. A different measurement procedure can now be selected.

2
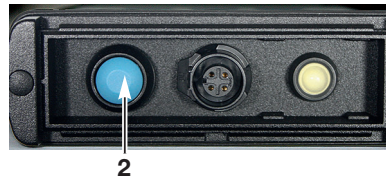
Single measurement

For **experienced measurement technicians** the *PipeCheck_{plus}* has an option to perform any measurement procedure in individual steps. This allows for a detailed assessment of the measurement results.

Pressing the „ " soft key in each respective measuring mode (NiCr, Cu or HDW) activates the single measuring mode.

First, the *PipeCheck_{plus}* measures the „Ux aR" value (voltage measuring wire a against the pipe).

Pressing the „Ux/Rx" soft key alternates between Ux (voltage measurement) und Rx (resistance measurement).


Pressing the „aR/ab" soft key alternates between aR (measuring wire a against the pipe) and ab (measuring wire a against b).

Thus results in 4 measurement methods:

1. Measurement „Ux aP"
   (voltage measuring wire a against the pipe).

2. Measurement „Rx aP"
   (resistance measuring wire a against the pipe) with indication of the MH level.

3. Measurement „Ux ab"
   (voltage measuring wire a against b).

4. Measurement „Rx ab"
   (resistance measuring wire a against b). For NiCr measurements the length of the measuring wire (of the pipe) and the set resistance value of the sensor wire are also displayed.
   If the signalisation „ " is activated (see page 21), a sound confirms the closed measuring loop. Else the symbol is struck „ " .
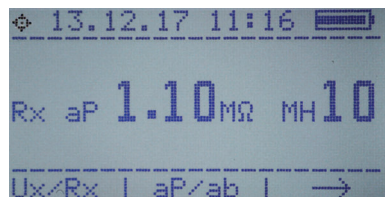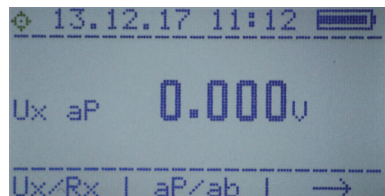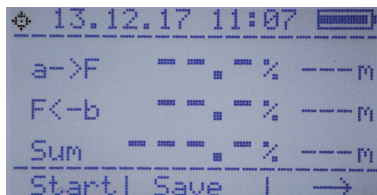
Fault detection (for NiCr measurements only)

Pressing the „ ⟶ " soft key in the single measuring mode activates the fault detection mode (for NiCr measurements only - during other measurement procedures this point is skipped and the "Read stored data" mode is called up instead).

After the fault detection mode has been selected the corresponding measurement screen will appear.

Press the "Start" soft key to start the measurement.

```
⊕ 13.12.17 11:07 ▭
a->F    ==.=% ---m
F<-b    ==.=% ---m
Sum   ===.=% ---m
Start| Save  | →
```

The display for selecting the measurement method appears.

The "Automatic" measurement method automatically performs the necessary fault detection measurements one after another and then displays the measurement result.

```
⊕ 13.12.17 11:07 ▭
    Select FaultLoc
        Method
>Auto
 Manually
Select|   ∨   | ↩
```
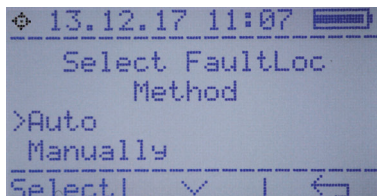
For **experienced measurement technicians** the *PipeCheck$_{plus}$* has an option to perform fault detection measurements in individual steps. This allows for a detailed assessment of the measurement results.

The measurement method can be selected by pressing the „ ∨ " soft key. Press the "OK" soft key to select the measurement method underlaid with the dark background that is marked with a ">".

Automatic measurement

The *PipeCheck$_{plus}$* now automatically continues to perform the necessary fault detection measurements one after another and then displays the measurement result.

```
⊕ 13.12.17 11:07 ▭
a->F  81.1% 810m
F<-b  18.9% 189m
Sum  100.0% 999m
Stop |      | Ux
```
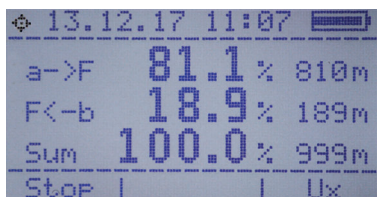
During measurements the element voltage Ux can be displayed by pressing and holding down the "Ux" soft key.

The presence of an element voltage can be an indication of moisture in the insulation layer.

```
⊕ 13.12.17 11:07 ▭

Ux aP  -0.000v

Stop | ab><P | Ux
```
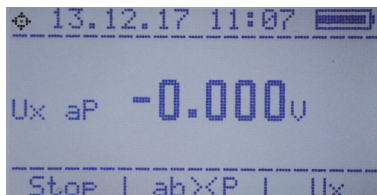
Press the "Stop" soft key to end the measurement and freeze the display.

Displayed are:

a->F Distance **start of the measuring wire - fault** in % and m

F<-b Distance **fault - end of the measuring wire** in % and m

Sum Total length of the **measuring wire** in % and m (values that deviate from 100% are the result of rounding tolerances).

Once the measurement has been completed, the measured values can be stored on the SD card in the "F-ORT.CSV" file by pressing the "Save" soft key. --> See chapter "How to save measured values" on page 17.

Manual measurements

The *PipeCheck*$_{plus}$ now continuous to perform the currently selected measurement and then displays the measurement result.

Press the right „1/6>>" soft key to switch to the next measurement for manual fault location.

For all measurements the right-hand vertical bar shows whether the measured value is stable „✳" or whether it is subject to upward „✳" or downward „✴" fluctuations. This would indicate faults on the measuring section.

The following measurements can be performed one after another:
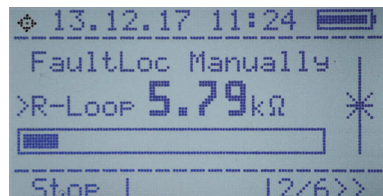
R-Iso Insulation resistance (Home screen)

The bar chart below the measured value shows the measured value in relation to the full scale value of the measuring scale.
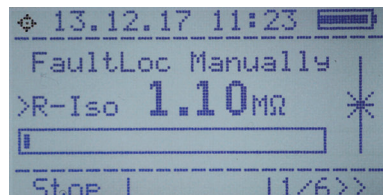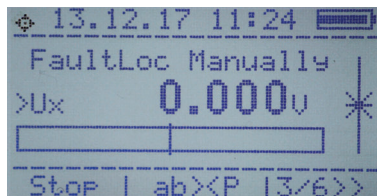
R-Loop Loop resistance

The bar chart below the measured value shows the measured value in relation to the full scale value of the measuring scale.
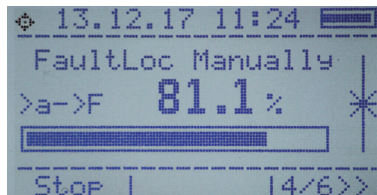
Ux Element voltage

The bar chart below the measured value shows the deviation of the measured value from 0 V (centre).

With the „ `ab×R` " soft key any potentially existing element voltage can be eliminated. This makes it possible to observe how quickly the element voltage builds back up. From this, conclusions can be drawn about the fault source.

```
◈ 13.12.17 11:24 ▬▬▬
FaultLoc Manually
>Ux        0.000v      ✳
▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭
Stop | ab×P |3/6>>
```

a->F Distance **start of the measuring - fault i**n % and m.

The bar chart below the measured value shows the fault location in relation to the full length of the pipe.

```
◈ 13.12.17 11:24 ▬▬▬
FaultLoc Manually
>a->F    81.1%      ✳
▮▮▮▮▮▮▮▮▮▮▮▭▭▭▭▭▭
Stop |         |4/6>>
```

Ux Renewed measurement of the element voltage to check before reversing polarity.

The bar chart below the measured value shows the deviation of the measured value from 0 V (centre).

```
◈ 13.12.17 11:24 ▬▬▬
FaultLoc Manually
>Ux      -0.000v    ✳
▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭▭
Stop | ab×P |5/6>>
```
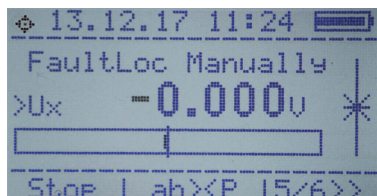
F<-b Distance **fault - end of the measuring wire** in % and m.

The bar chart below the measured value shows the fault location in relation to the full length of the pipe.

```
◈ 13.12.17 11:25 ▬▬▬
FaultLoc Manually
>F<-b    18.9%      ✳
▭▭▭▭▭▭▭▭▭▭▮▮▮▮▭▭
Stop |         |6/6>>
```
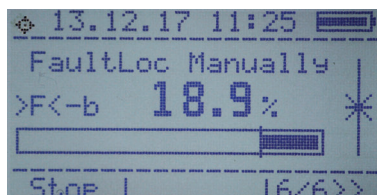
Press the "Stop" soft key to end the the measurement and display the measured value overview.

Displayed are:

a->F Distance **start of the measuring wire - fault** in % and m

```
◈ 13.12.17 11:08 ▬▬▬
a->F   81.1% 810m
F<-b   18.9% 189m
Sum   100.0% 999m
Start| Save |  →
```

F<-b Distance **fault - end of the measuring wire** in % and m

Sum Total length of the **measuring wire** in % and m (values that deviate from 100% are the result of rounding tolerances).

Once the measurement has been completed, the measured values can be stored on the SD card in the "F-ORT.CSV" file by pressing the "Save" soft key.

How to save measurement values

Every measurement can be stored on the SD card in a CSV file by pressing the "Save" soft key (here shown using a CU measurement as an example).

```
◈ 13.12.17 11:08 ▬▬
Iso 1.10MΩ  MH10
Loop 5.80kΩ
Start| Save  |  →
```

Here, the value of the data point under which the measured values are to be stored and the associated info text can be chosen freely.

The corresponding display is called up by pressing the "Change" soft key.

```
◈ 13.12.17 11:25 ▬▬
    Save Data Point
DP No.:2
 Text 1:FL1->Begin
Change| Save  |  ↩
```
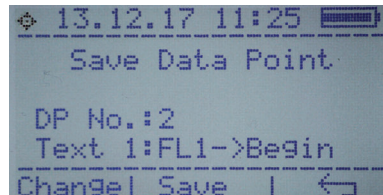
Press the „∨" soft key to select whether increases or decreases the value of the data point.

the measurement point (MP) or info text (text) should be modified. Press the "OK" soft key to select the measured value underlaid with the dark background that is marked with a ">".
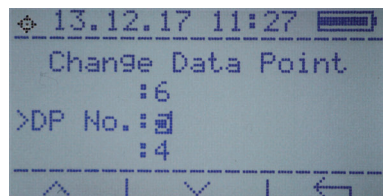
```
◈ 13.12.17 11:26 ▬▬
   Change Data Point
>DP No.:2
 Text 1:FL1->Begin
Select|  ∨  |  ↩
```
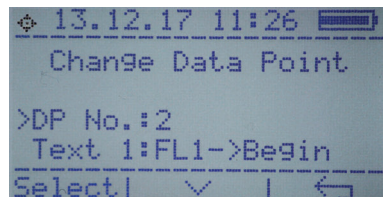
Edit measurement point

Press the „∧" or „∨" soft key to increase or decrease the value of the measurement point.

Already existing measurement points will not be overwritten.

Once the desired measuring point has been edited, press the „↩" soft key to end the input.

```
◈ 13.12.17 11:27 ▬▬
   Change Data Point
         :6
>DP No.:5
         :4
   ∧  |  ∨  |  ↩
```

Assign infotext

Info texts must be created on a PC prior to the measurement, stored in a file named INFOTEXT.TXT and transferred to the *PipeCheck_{plus}* via USB cable (see page 25).

Press the „∧" or „∨" soft keys to select the info text above or below.

Once the desired info text has been selected, press the „↩" soft key to end the input.

```
◈ 13.12.17 11:27 ▬▬
   Change Text
       2:FL1->End
>Text 1: FL1->Begin
        99:
   ∧  |  ∨  |  ↩
```
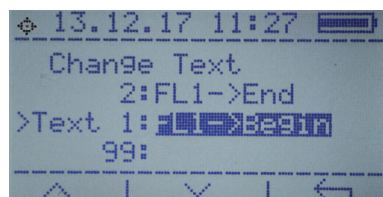
Once the desired measuring point has been set, press the „⬅⌐" soft key to end the input.

Pressing the "Save" soft key stores the measurement values under the specified measuring point, stops the measurement storage procedure and calls up the measurement screen.
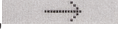
Find out more about how to evaluate data stored in the log file on page 21.

```
Save Data ....
```

If no SD card is inserted, the "Save" menu item will appear in a lighter grey and it will not be possible to select it or to save measurement values.

```
◇ 10.05.17  15:48  ▭
Iso 1.10MΩ  MH10
Loop 5.80kΩ
Start| Save |  →
```
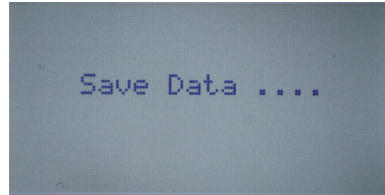
Read stored data

he measured values and fault locations stored on the SD card can be shown on the display.

Pressing the „   " soft key in the single measuring mode or during the fault location mode (for NiCr measurements only) takes you to the "Read stored data" mode.
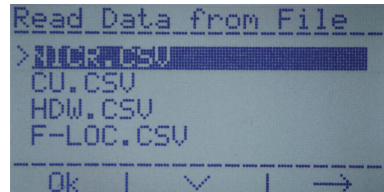
The desired measurement file can be selected by pressing the „ ∨ " soft key. Press the "OK" soft keys to select the measurement method underlaid with the dark background that is marked with a „ > ".

```
Read Data from File
>NICR.CSV
 CU.CSV
 HDW.CSV
 F-LOC.CSV
----------------------
  Ok   I   ∨   I   →
```

The values stored in the measurement file are displayed.
Press the „ ∨ " soft key to scroll downwards through the value list line by line. Once the bottom line is reached, the arrow changes appearance „ ∧ " and renewed pressing of the soft key takes the display back to the top of the list.

```
Record 1 of 1
Data Point 1
Date          12.12.17
Time          14:09
Iso           1.100MOhm
----------------------
   >   I   ∨   I   ↩
```
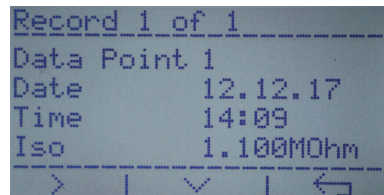
Press the „ > " soft key to display the next stored measurement point. Once the last stored measurement point has been reached, press the soft key again to take the display back to the first stored measurement point.

Pressing the „ ↩ " soft key takes you back to the "Read stored data" menu.

Pressing the „   " soft key leads to the device settings menu.

Device settings

Device settings and information can be called up from all measurement screens by multiple pressing of the „⟶" soft key.

```
⊕ 13.12.17 11:08 ▭
Iso 1.10 MΩ  MH10
Loop 5.80 kΩ
Start| Save  |  ⟶
```

On the information screen the desired menu item can be selected by moving the ">" cursor using the „∨" soft key.

Pressing the "Select" soft key opens the menu item.

```
      Device Info
>GPS
Clock
Akku
PipeCheck
Sens.Wire
Select|    ∨    |  ⟶
```
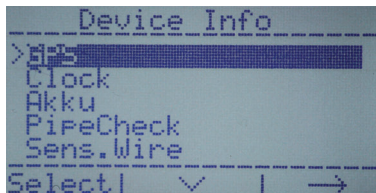
GPS info

Displays the current location and GPS signal quality.

Lati.: Displays geographic latitude coordinates (latitude) with an indication of the position respective to the equator (**N**orth or **S**outh).

Long.: Displays geographic longitude coordinates (longitude) with an indication of the position respective to the prime meridian (Greenwich) (**W**est or **E**ast).

GPS-Q:

1. Digit = 0: No satellite reception
        = 1: Satellite reception available

2. Digit = Number of received satellites

H-Pre: Reception quality, values from 0 to 99.0

```
⊕ 10.05.17 15:57 ▭
Lati.: 51.9291840 N
Long.: 7.8484678 E
GPS-Q: 1   5Sats
H-Pre: 6.10
          | Save |  ⟵
```

 0 = Best value
 Values < 2.0 = Good reception quality,
 Values < 5.0 = Serviceable reception quality,
 Values > 5.0 = The quality of reception is too low to determine the location!

Pressing the "Save" soft key stores the coordinates in the GPS.CSV file on the PipeCheck's SD memory card.

Memory points can be chosen freely (see page 17).

Press the „⟵" soft key to return to the GPS display.

Renewed pressing of the „⟵" soft key calls up the information home screen.

```
 13.12.17 11:30 ▭
  Save GPS Point
   in GPS.CSV
  GPS Point 2
Change| Save  |  ⟵
```
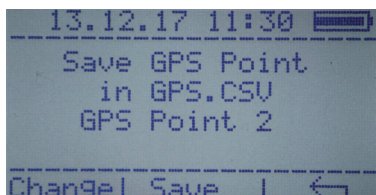
Clock information

Displays the date and time set on the device.

Pressing the "Change" soft key activates the settings mode.

```
  13.12.17 11:40 ▅▅▅▅

Date : 13.12.2017

Time : 11:38

Change|          |   ↩
```
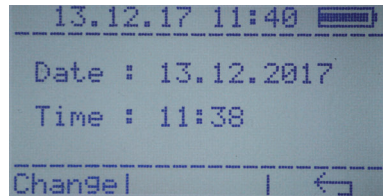
The last two digits of the year are underlined.

Pressing the "+" or "-" soft keys increases or decreases the year setting.

Pressing the "Next" soft key moves the cursor on to the number for the month, which can now be changed by pressing the "+" or "-" soft keys.

The same applies for setting the other values in the order of "Day", "Minute" and "Hour".

```
  13.12.17 11:40 ▅▅▅▅

Date : 13.12.2017

Time : 11:40

Next |    +    |   --
```

The changes are not stored on the device until the "Save" soft key is pressed when the "Hour" setting is shown.

Pressing the „↩" soft key calls up the information home screen.

```
  13.12.17 11:40 ▅▅▅▅

Date : 13.12.2017

Time : 11:40

Save |    +    |   --
```
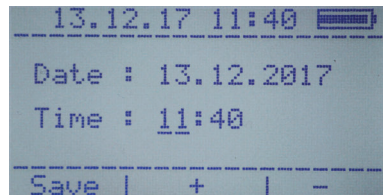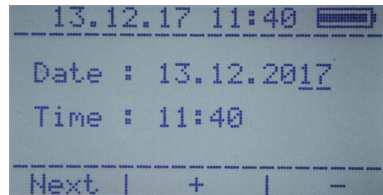
Battery pack information

Shows the status of the integrated rechargeable battery pack.

Pressing the „↩" soft key calls up the information home screen.

NOTE!

For test purposes the unit does NOT switch off automatically after 15 minutes in this mode.

```
✦ 13.12.17 11:40 ▅▅▅▅

Voltage : 8.20V
Current :-0.07A
Temp.   :21.75°C
Capacity:100%

      |        |    ↩
```
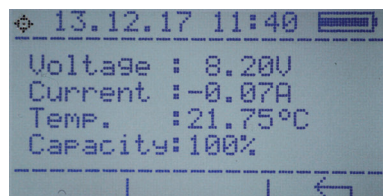
PipeCheck information

Shows the current firmware version and the status of the SD memory card.

The sound for closed measuring loops at single measurement (see page 13) can be toggled by pressing the soft key „ ⬙ "
resp. „ ⬙ ".

```
⬙ 13.12.17 11:40 ▭
Software V2.03
Date 22.06.2017
SD-Card detected
SD-Card init ok
⬙    |   Q   |   ↩
```

You may switch from „ ▬ " to „ Q " = **Quickstart** with the middle key.

Pressing the „↩" soft key calls up the information home screen.

Quickstart

In Quickstart mode the *PipeCheck*~plus~ remembers the area in which it was last used. After switching off and later on again, it starts again in exactly this area.

The last measuring method used is retained and the device does not carry out any calibration. So it is ready for use more quickly.

Sensor wire information

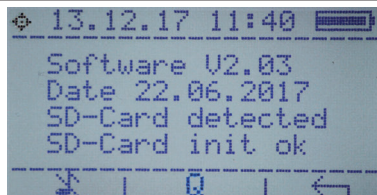Shows the resistance value for the sensor wire set on the device in Ω/m.

Pressing the "+" or "-" soft keys increases or decreases the resistance value.

Pressing the „↩" soft key stores the changes and calls up the information home screen.

```
⬙ 13.12.17 11:41 ▭
Resistance of the
NiCr Sensing-Wire
   5.8 Ohm/m
  +   |   -   |   ↩
```
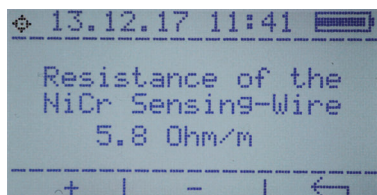
> ⚠ **Important!**
> **Once the *PipeCheck*~plus~ device has been switched off, the resistance value automatically resets itself to the factory setting of 5,8 Ω/m since other values represent a significant exception.**

The resistance value for the sensor wire is important for accurate calculations of the measuring section length.

Select sensor type (only if Quickstart is activated)

On the screen the desired sensor or calibration can be selected by moving the cursor „ ➤ " with the „ ⌄ " soft key.

Pressing the "OK" soft key selects the menu item.

```
__Select Sensor-Type_
 NiCr       selected
 Cu
 HDW
>Calibration
Select|   ⌄   |   →
```
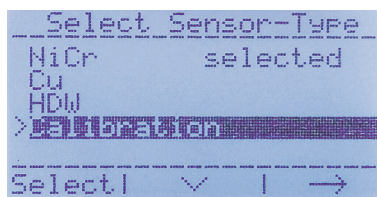
Error messages

The *PipeCheck$_{plus}$* automatically detects and displays pipe connection errors (an incorrect connection of the black measurement lines and the pipe connection magnet to the medium pipe, see page 7), interruptions in the measuring loop as well as errors due to element voltages.

Pipe connection errors

If a **pipe connection error** occurs (an incorrect connection of the black measurement lines and the pipe connection magnet to the medium pipe, see page 7), the display will show the "No pipe contact" error message.

The measurement will then be suspended until the error is fixed.

Pressing the "Stop" soft key makes the display return to the measurement screen.

No measurement values will be shown.
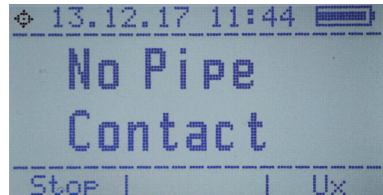
Broken measurement loops

If a **measurement loop is interrupted**, the display will show the "Loop interrupted" error message.

Once the error is corrected, the determined measurement value will be shown.
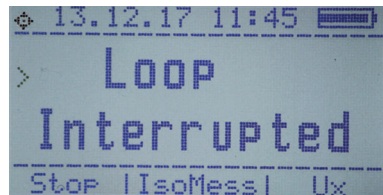
Contact between the pipe/measuring wire

If the display shows a "C" for "contact" above the insulation resistance unit, this could indicate a **metallic contact between the medium pipe and measuring wire**.

Error message "Measuring wire mix up"

Only for HDW measurements!

Where wires a and b are mixed up due to incorrect installation or incorrectly connected measurement lines, this will lead to incorrect measurements.

The *PipeCheck$_{plus}$* will detect this kind of error and show it on the display as "Loop interrupted" and "a<>b".

LED light

For work in poorly lit areas the *PipeCheck_{plus}* is fitted with an illuminated display and an LED light.

The display light comes on automatically with each keystroke for a period of 5 minutes.

For workplace illumination, for example when connecting the measuring cable, the LED light on the PipeCheck's front side can be switched on and off by briefly pressing the power switch (**2**).

2

How to charge the rechargeable battery

The *PipeCheck_{plus}* is fitted with an integrated rechargeable battery. The charge level appears in the top right-hand corner of the display (**1**).

To charge the rechargeable battery connect the supplied mains charger (**15**) to the device's charging socket (**7**) and an electrical outlet or connect the USB cable (**14**) to the USB interface (**5**).

15   **7   8**

The charging process is indicated by the lit up red and green diodes on the charge indicator (**8**) next to the charging socket (**7**). If the device is switched on during charging, the charge indicator bar will move from empty to full on the display (**1**). When charging via USB cable, the display is always automatically switched on and the charging capacity is displayed.
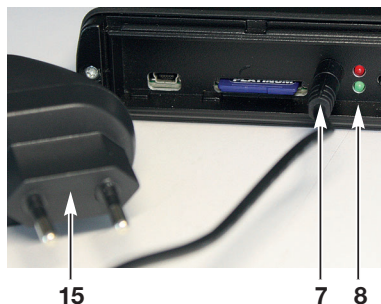
When charging is complete,

• The **green diode** (**8**) **will light up** (the charging voltage is connected),

• The **red diode** (**8**) **will go out** (if the device is switched off),

• The **battery charge indicator** will not move (on the display (**1**)) (if the device is switched on).

• The **capacity indicator shows 100%** (on display (1), charging with USB cable)

Disconnect the mains charger (**15**) and store it in the accessories compartment.

How to switch off the *PipeCheck_{plus}*

• Press and hold the power switch (**2**) on the device's front side for approx. 3 seconds.

The *PipeCheck_{plus}* device is now switched off, the screen will go off.

2

How to transfer measurement data to a PC

All measurement values and GPS data stored on the PipeCheck's SD memory card exist in two tables and in CSV format (comma separated values). These can be interpreted by spreadsheet programs, such as MS Excel.

Data transmission via USB cable

- **Connect the USB cable (14)**
  To do this, disconnect the sensor wire and mains plug, if they are still connected to the device, now insert the cable's mini plug into the USB interface (5) on the PipeCheck's underside.
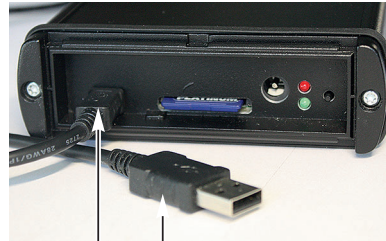
5   **14**

Connect the plug at the cable's other end to one of the PC's free USB ports.
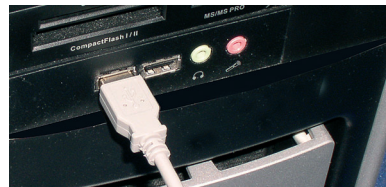
The *PipeCheck_{plus}* starts up automatically. The data connection will be shown on the PipeCheck's display.

The battery is charged at the same time.

The *PipeCheck_{plus}* appears as a USB drive of the PC.

11.09.20 13:55
Pipecheck <-> PC
Battery is charging
Charge : 36%
----
connected
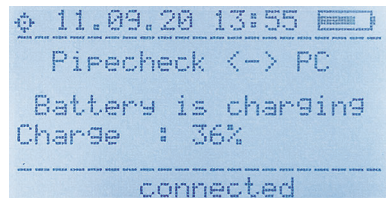
⚠ **Important!**
A joint operation of sensor wire, mains plug and USB cable is not intended. The sensor wire and mains plug must be disconnected.

How to transfer data via a card reader

- Remove the SD memory card (6) from the card slot on the device's front side by pressing on the SD card.
- Slide the SD memory card into the appropriate slot on a card reader.

Following initialisation a new removable drive will appear on the PC, in this case **„PipeCheck (I:)"**.
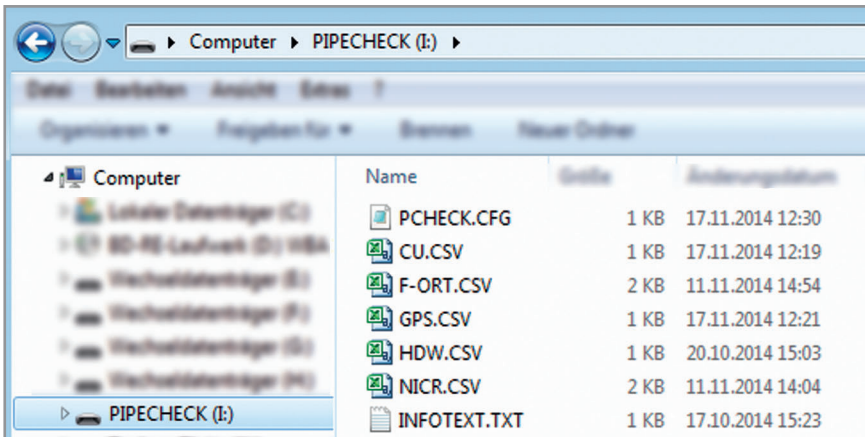
By opening the drive, the files will be displayed:

The file names correspond to the contents:

PCHECK.CFG   Contains information about how to name data points and should not be edited. In the event that this file is accidentally deleted, the *PipeCheck*~plus~ will automatically create a new file and begin naming data points from 1 onwards.

CU.CSV   Contains stored CU measurement data.

GPS.CSV   Contains stored GPS data.

HDWCSV   Contains stored HDW measurement data.

NICR.CSV   Contains stored NiCr measurement data (see page 12).

F-ORT.CSV   Contains stored fault locations (see page 17).

INFOTEXT.TXT Contains info texts for measurement points. This file can be edited freely (see page27).

The measurement files to be archived can now be copied to any directory on the hard disk or opened directly for evaluation.

How to evaluate/process measurement data

CSV files can be opened in a spreadsheet program such as MS Excel. The settings should be selected in such a way that semicolons are interpreted as data separators.

	A	B	C	D	E	F	G	H	I	J	K
1	PipeType:Cu										
2	PipeCheck Ser.Nr.:1131100001										
3	Data Point	Date	Time	Iso	MH	Loop	Pipe	GPS-Sat	Lat/Lon		H-Pre
4	1	04.11.2014	17:03	0.194MOhm	MH 6	0.0Ohm	0Ohm	0	51.5279312,7.4749460	N,E	99.0
5	2	05.11.2014	13:15	---.-MOhm	MH--	0.0Ohm	Kein Rohr-Kontakt	0	51.5279312,7.4749460	N,E	99.0
6	2	11.11.2014	10:52	0.172MOhm	MH 6	0.0Ohm	0Ohm	0	51.5279312,7.4749460	N,E	99.0
7	5	17.11.2014	12:18	1.101MOhm	MH 10	5781.6Ohm	0Ohm	0	53.3610764,7.2147503	N,E	99.00

To display the GPS log file proceed in a similar way:

	A	B	C	D	E	F	G	H	I	J	K
1	GPS Data										
2	PipeCheck Ser.Nr.:1131100001										
3	GPS Point	Date	Time	GPS-Sat	Lat/Lon		H-Pre				
4	1	20.10.2014	13:05	11:05:32	51.9663887,7.5644631	N,E	1	8	01. Feb		
5	2	17.11.2014	12:21	0	53.3610764,7.2147503	N,E	99.00				
6											

How to delete measurement data

Measurement files can be deleted individually or as a whole from the SD memory card (**6**) as long as it is connected to the PC. This should only be done, if they have already been archived on the hard disk or are no longer needed.

⚠️ **WARNING!**
The deletion is irreversible.
SD memory cards have no backup function!

SD memory card data can be completely deleted or formatted.

How to edit info texts

Info texts that relate to measurement points (e.g. routes or location information) can be stored in the INFOTEXT.TXT file and assigned to said measurement points at the time they are stored on the device (see page 17).

99 texts (lines) with a maximum length of 127 characters can be stored.

> INFOTEXT.TXT - Edit...
> Datei Bearbeiten Format Ansicht ?
> Infotextdatei, 99 frei
> vergebbare Texte, maximale
> Textlänge:127 Zeichen;
> ~T1:VL1->Anfang;
> ~T2:VL1->Ende;
> ~T3:VL1->Abzweig;
> ~T4:RL1->Anfang;

The *PipeCheck*_{plus} identifies all characters that start with a tilde (~) followed by a T, a number and a colon (e.g. T34:) and which end with a semicolon (;) as info texts, (e.g. ~T34:pipe 123 start; is displayed as info text "pipe 123 start"). The number after the T serves as a sorting criterion.

After editing, the INFOTEXT.TXT file must be transferred to the PipeCheckplus via the USB interface, so that the info texts become available on the device.
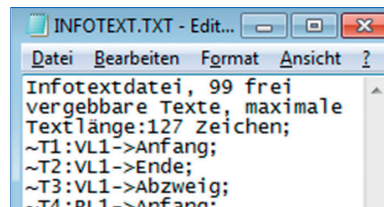
Evaluation of measurement results

Measurement results are evaluated primarily on the basis of the determined MH level.

MH levels

Dry

Wet

50 MΩ	Start of continuous monitoring (only for the PipeMonitor)
30 MΩ	
20 MΩ	
10 MΩ	Inspection value
5 MΩ	Start of the automatic localisation (only for the PipeMonitor for NiCr)
3 MΩ	Stabilisation of the automatic localisation results (only for the PipeMonitor for NiCr)
1 MΩ	Fault elimination in accordance with AGFW guidelines
450 kΩ	
300 kΩ	
200 kΩ	
65 kΩ	
20 kΩ	
5,0 kΩ	
1,2 kΩ	
0,5 kΩ	

0
14
13
12
11
10
9
8
7
6
5
4
3
2
1

For comparison:
Possible localisation range in a Nordic system (Cu)

Cu-Ader

MH levels

MH level 0 means that the pipe is tight and that the insulation layer is dry.

From **MH level 12** and an **insulation resistance** of **< 20 MΩ** onwards permanent monitoring of the pipe must commence because the incipient moisture in the insulation layer implies leaks.

From **MH level 11** and an **insulation resistance of 3-5 MΩ** onwards automatic localisation must commence to obtain initial insights about the fault location. Significant amounts of moisture in the insulation layer are to be expected.

From **MH level 10** onwards the fault location must be pinpointed more accurately, as the fault must be rectified in the immediate future.

From **MH level 9** onwards fault recovery must be initiated. The insulating layer has by now become thoroughly soaked.

Calibration

LANCIER Monitoring recommends that to ensure the PipeCheck's high reliability, it is recalibrated regularly, i.e. every three years in the manufacturer's factory.

Please ship the *PipeCheck*~plus~ to:

LANCIER Monitoring GmbH
Gustav-Stresemann-Weg 11
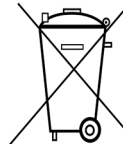48155 Münster, Germany

Helpline
Tel. +49 (0) 251 674 999-0

Disposal

The *PipeCheck*~plus~ is equipped with a Li-Ion rechargeable battery.

When neccessary:

- Do not dispose of old or defective accumulators as normal domestic waste.
- Adhere to environmental laws on battery disposal.
- Return old and/or defective accumulators to a municipal battery disposal point.

EC Declarations of Conformity for power adaptor

Sunny *Your only power source*

COMPUTER TECHNOLOGY EUROPE, s.r.o.

EU Declaration of Conformity

Model name:
SYS1308N-xxyy series
(Note: 'x' is 2 digit number which represents the output power, 'y' is 2 digit number which represents the output voltage)

Name and address of the importer:
SUNNY Computer Technology Europe, s.r.o.
Trnkova 156, Brno, 628 00, Czech Republic
VAT: CZ26920026, tel.: +420-544500327, fax.: +420-544500328

This declaration is issued under the sole responsibility of SUNNY Computer Technology Europe, s.r.o.

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Directive 2014/35/EU relating low voltage (LVD)
Directive 2014/30/EU relating to electromagnetic compatibility (EMC)
Directive (EU) 2015/863 provides an amendment to Annex II of RoHS (2011/65/EU) on the restriction of the use of certain hazardous substances in electrical and electronic equipment
Directive (EU) 2019/1782 on eco design requirements for energy-related products.

References to the relevant harmonised standards used:

EN 62368-1:2014+A11:2017
EN 55032:2015 Class B
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 55035:2017
EN IEC 63000:2018
EN 50563:2011+A1:2013

Signed for and on behalf of:
SUNNY Computer Technology Europe, s.r.o.

Place and date of issue:
Brno, Czech Republic, 2020-07-22

Name, Function, Signature:
Bc. Petr Nešpor, Director of European operations

Sunny
Computer Technology Europe, s.r.o.
Czech Republic, VAT:CZ26920026
Trnkova 156, 628 00 Brno
Tel.:+420 544 500 327
www.sunny-euro.com

EC Declaration of Conformity

We declare under our sole responsibility, that the product

Make:	**LANCIER Monitoring**
Type:	**PipeCheck**~plus~

to which this declaration refers, meets the relevant health and safety requirements of the following EC directives:

2014/30/EU	**Electromagnetic compatibility**
2011/65/EU	**RoHS-II**

For proper implementation of the health and safety requirements named in the EC directives the following standard(s) and/or technical specification(s) have been consulted:

EN 61326-1	**Electrical equipment for measure-ment, control and laboratory use - EMC requirements (class B)**

Münster, 15.09.2020

Managing Director

BA 075431.220/Rev. 00