

METRACABLE TDR PRO

Time Domain Reflectometer – Cable Fault and Length Measuring Instrument

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2/2.26



Table of Contents

1 Safety Instructions..... 4

2 Applications 6

 2.1 Intended Use /
 Use for Intended Purpose6

 2.2 Use for Other than Intended Purpose..... 6

 2.3 Liability and Guarantee..... 6

 2.4 Repairs and Modifications 6

3 Documentation 7

 3.1 Information Concerning these Instructions..... 7

 3.2 Identification of Warnings 7

4 The Instrument..... 8

 4.1 Scope of Delivery 8

 4.2 Symbols on the Instrument 8

 4.3 Instrument Overview 9

 4.4 Technical Data 11

 4.5 Supported Cable Types 12

5 Operation & Settings 13

 5.1 Power Supply 13

 5.2 Switching the Instrument On/Off 13

 5.3 Display (TDR trace)..... 13

 5.4 Instrument Menus 14

 5.5 Selecting Instrument Settings..... 15

 5.6 Changing Measurement Settings 16

6 Measurements 17

 6.1 Preparation 17

 6.2 TDR Measurement 18

 6.3 Measuring Coaxial Cables..... 20

 6.4 Additional Functions..... 21

 6.5 Pinpointing and Identifying Faults 22

7 METRACABLE MANAGER 23

 7.1 Downloading & Installation 23

 7.2 Starting and Exiting the Program..... 23

 7.3 Querying Help 23

 7.4 Accessing Information on the Program and the Manufacturer 23

 7.5 Program Settings 24

 7.6 Connecting the Instrument and METRACABLE MANAGER Software 25

7.7 Synchronizing Instrument and PC Time	26
7.8 Cable Database Management	27
7.9 Importing Measurements to the Software	29
7.10 Viewing, Evaluating, Exporting, Saving and Printing Measurements	30
7.11 Querying Instrument Information	32
7.12 Instrument Updates	33
8 Storage and transport	34
9 Care and Maintenance	35
9.1 Battery Replacement	35
9.2 Cleaning	36
10 Repair	37
11 Contact, Support and Service	38
12 CE Declaration	39
13 Disposal and Environmental Protection	40
13.1 Disposal of Old Devices, Batteries and Rechargeable Batteries	40
13.2 Disposal of Packaging Materials	40
13.3 Regulations for the Federal Republic of Germany	41

1 Safety Instructions

	Read and follow these instructions carefully and completely in order to ensure safe and proper use. The instructions must be made available to all persons who use the instrument. Keep for future reference.
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General

- Tests may only be performed by a qualified electrician, or under the supervision and direction of a qualified electrician. The user must be instructed by a qualified electrician concerning performance and evaluation of the tests. The instrument may only be used in commercial environments. It is not a consumer product.
- Observe and comply with all safety regulations which are applicable for your work environment.
- Comply with applicable safety regulations, for example in accordance with DIN VDE 0100, DIN VDE 0800 and DIN VDE 0805.
- Wear suitable and appropriate personal protective equipment (PPE) whenever working with the instrument.

Accessories

- Use only the specified accessories (included in the scope of delivery or listed as optional accessories) with the instrument.

Handling

- Use the instrument in undamaged condition only. Inspect the instrument before use. Pay particular attention to damage, interrupted insulation or kinked cables.
- Use the accessories and all cables in undamaged condition only. Inspect accessories and all cables before use. Pay particular attention to damage, interrupted insulation or kinked cables.
- If the instrument or its accessories don't function flawlessly, permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- If the instrument or accessories are damaged during use, for example if they're dropped, permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- If there are any signs of interior damage to the instrument or accessories (e.g. loose parts in the housing), permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- The instrument and the accessories may only be used for the tests/measurements described in the documentation for the instrument.
- The instruments and accessories of Gossen Metrawatt GmbH are designed to ensure optimum compatibility with the Gossen Metrawatt GmbH products that are expressly

provided for them. Unless otherwise expressly confirmed in writing by Gossen Metrawatt GmbH, they are neither intended nor suited for use with other products.

Measurements/Tests

- Do not apply any external voltage to the instrument.
- Hands must be kept behind the probe/terminal guards during testing.
- The instrument may only be used with voltage-free cables.
- The operator must check the safety of the circuit before starting the test, and appropriate precautions must be implemented.
- Circuits must be de-energized and isolated before making any test connections.

Operating Conditions

- Do not use the instrument and its accessories after long periods of storage under unfavorable conditions (e.g. humidity, dust or extreme temperature).
- Do not use the instrument and its accessories after extraordinary stressing due to transport.
- Do not expose the instrument to direct sunlight for long periods of time. Overheating may cause damage to the instrument.
- Only use the instrument and its accessories within the limits of the specified technical data and conditions (ambient conditions, IP protection code, measuring category etc.).

Rechargeable or Regular Batteries

- Use (rechargeable) batteries in undamaged condition only. Risk of explosion and fire in the case of damaged (rechargeable) batteries!
Inspect the (rechargeable) batteries before use. Pay particular attention to leaky and damaged (rechargeable) batteries.
- When using (rechargeable) batteries, the respective test/measuring instrument may only be used with inserted and secured battery compartment lid. Otherwise, dangerous voltages may occur at the battery terminals under certain circumstances.

Measurement Cables and Establishing Contact

- Plugging in the measurement cables must not necessitate any undue force.
- Never touch conductive ends (e.g. of test probes).
- Ensure appropriate contacting (e.g. on the test probes, crocodile clips, Kelvin probes, etc.).

Emissions

- The instrument is equipped with a Bluetooth® module. Determine whether or not use of the implemented frequency band of 2400 to 2483.5 MHz is permissible in your country.

Data Security

- Always create a backup copy of your measurement/test data.

2 Applications

2.1 Intended Use / Use for Intended Purpose

The METRACABLE TDR PRO is a time domain reflectometer for localizing faults in electrical cables (e.g. twisted pair, coaxial and power cables), and for measuring their lengths. The instrument is connected to the voltage-free cable to this end, to which it transmits a pulse. The pulse's reflection, i.e. its TDR trace, appears at the instrument's display panel. The shape of the trace indicates the length of the cable, any included components, the wiring itself and even any cable faults.

The METRACABLE TDR PRO can be used in indoor environments, in laboratories, in industrial settings and on construction sites. It's a portable instrument which can be held in the hand during measurement. Alternatively, the METRACABLE TDR PRO can be set up on a suitable surface with the help of the tilt stand. It can be stored and transported in the included pouch.

The instrument and the cable database can be managed and measurements can be transferred to a PC and viewed with the help of included METRACABLE MANAGER software.

Safety of the operator, as well as that of the instrument, is only assured when it's used for its intended purpose.

2.2 Use for Other than Intended Purpose

Using the instrument for any purposes other than those described in the operating instructions or these condensed operating instructions of the instrument is contrary to use for intended purpose. Use for other than intended purpose may lead to unpredictable damage!

2.3 Liability and Guarantee

The warranty provided by Gossen Metrawatt GmbH, and its liability, are governed by the applicable contractual and mandatory statutory provisions.

2.4 Repairs and Modifications

Unauthorized modification of the product is prohibited. Only authorized, trained personnel is permitted to perform repairs. Refer to the device's operating instructions for information concerning repairs.

3 Documentation

3.1 Information Concerning these Instructions

Read these instructions attentively and carefully. They contain all necessary information for safe use of the instrument. Comply with them in order to protect yourself and others from injury, and to avoid damaging the instrument.

The latest version of these instructions is available on our website:

<https://www.gossenmetrawatt.de/en/services/download-center/>



Trademark Law

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3.2 Identification of Warnings

Instructions for your safety and for the protection of the instrument and its environment are provided as warnings and notes at certain points within these instructions.

They're laid out as shown below and are graded in terms of the severity of the respective hazard. They also describe the nature and cause of the hazard, the consequences of non-observance and what must be done to avoid it.



DANGER

Death or serious injury is almost certain.



WARNING

Death or serious injury is possible.



CAUTION

Minor or moderate injury possible.

ATTENTION

Damage to the product or the environment

**Note**

Important information.

**Tip**

Useful additional information or application tip.

4 The Instrument

4.1 Scope of Delivery

Please check for completeness.

- 1 METRACABLE TDR PRO (with carrying strap) (M281A)
- 1 Set of test probes (1.3 m, banana plugs, 300 V Cat II)
- 2 Alligator clips (plug-on)
- 1 BNC adapter (banana plug to coaxial cable)
- 1 Pouch (with carrying strap)
- 1 Condensed operating instructions

Included “METRACABLE MANAGER” software is available from our website at <http://www.gossenmetrawatt.com>. For further information concerning the software please refer to the following section: “METRACABLE MANAGER ➔ 23”.

4.2 Symbols on the Instrument



Warning concerning a point of danger
(attention, observe documentation!)



European conformity marking



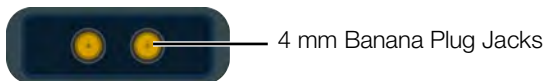
The instrument may not be disposed of with household trash ➔ 40.

4.3 Instrument Overview

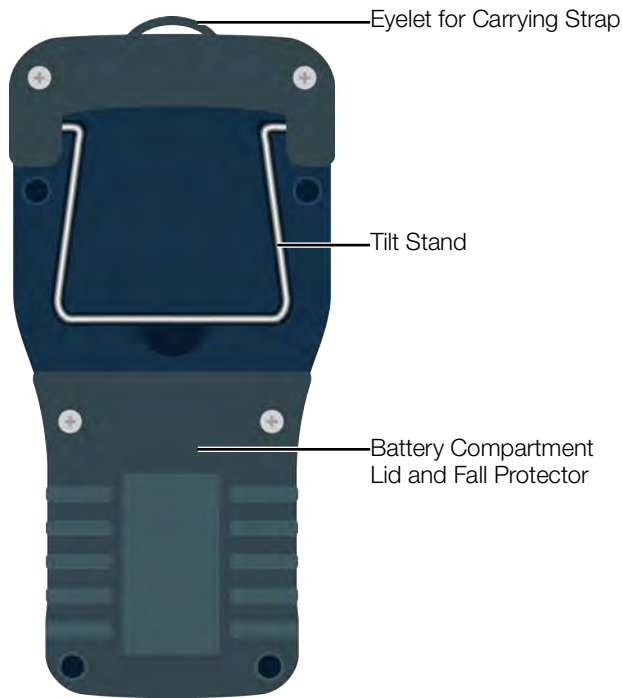
Front



Top



Back



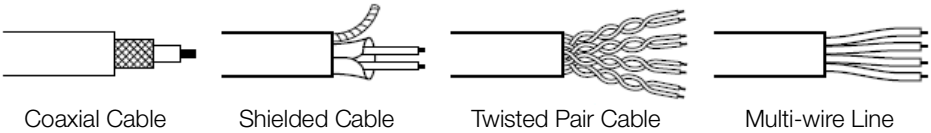
4.4 Technical Data

Power Supply	4 ea. LR6 battery, 1.5 V, type AA or 4 ea. rechargeable NiMH, 1.2 V, type AA	
Operating time	Up to 30 hours (depending on battery type and quality), adjustable automatic shutdown	
Connections	2 ea. 4 mm banana plug safety jacks	
Place of use	Indoor environments, laboratories, industrial settings, construction sites	
Ambient Conditions	Operating temperature:	-10 ... +50 °C
	Storage temperature:	-25 ... +75 °C
	Relative humidity:	No condensation allowed
	Elevation:	Max. 2000 m
Electrical Safety	Pollution degree:	1
	Protection category:	II per DIN EN 61140/VDE 0140-1
	Surge protection	DC: 100 V AC: 230 V / 50 Hz
Electromagnetic Compatibility (EMC)	Interference emission:	EN 55011
	Interference immunity:	EN 61000-4-2 EN 61000-4-3
Mechanical Design	Housing (W × H × D):	Approx. 19.5 cm × 10.0 cm × 4.5 cm
	Mechanical protection:	Impact-resistant ABS housing with fall protector and display protection (2 mm Plexi-glas with hardened safety glass)
	Protection:	IP 52 per DIN VDE 0470, part 1/EN 60529 (protection against ingress of solid foreign objects: ≥ 1.0 mm diameter, protection against ingress of water: protection against falling dripping water, when the housing is inclined up to 15°)
	Weight:	approx. 390 g (without batteries)
	Display:	LCD, monochrome, luminous, 240 × 128 pixels, adjustable on-time and contrast for background illumination
Internal Memory	Up to 32 entries in the cable database Up to 510 measurements in the instrument	
Languages	German, English, French	

Interface	Bluetooth® Frequency range: 2.402 GHz ... 2.480 GHz Transmission intensity: Class 2, +1,5 dBm BDR, -1 dBm EDR, +0,5 dBm LE	
Measurements	Signal type:	Symmetrical search signal
	Range:	≤ 14 km
	Accuracy:	+1% ± pixels at 0.66 VF
	Resolution:	3.125 ns or 0.3 m (depending on cable)
	Output pulse:	Max. 20 V pp
	Pulse lengths:	12, 25, 50, 100, 200, 500, 1000 and 2500 ns
	Velocity factor:	Variable from 0.2 to 0.99 in steps of 0.01
	Impedance:	50, 75, 100, 125 Ω
	Signal type:	Symmetrical
	Zoom (magnification factor):	In steps of 6 dB

4.5 Supported Cable Types

Symmetrical cables with maximum attenuation of 80 dB can be measured using the TDR method. Examples:



5 Operation & Settings

This section describes operation of the instrument and the settings which can be selected for the instrument, as well as for measurements performed with the instrument.

- Power Supply ⇨ 13
- Switching the Instrument On/Off ⇨ 13
- Display (TDR trace) ⇨ 13
- Instrument Menus ⇨ 14
- Selecting Instrument Settings ⇨ 15
- Changing Measurement Settings ⇨ 16

5.1 Power Supply

The instrument is battery-operated, and you installed them during initial startup ⇨ condensed operating instructions (included with the instrument).

If the batteries are depleted and have to be replaced ⇨ “Battery Replacement” 35.

5.2 Switching the Instrument On/Off

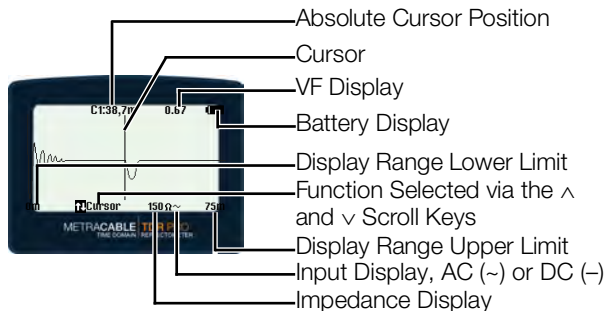
Press the **ON/OFF** key in order to switch the instrument on and off. The TDR trace is displayed immediately after pressing the **ON/OFF** key.

5.3 Display (TDR trace)

The TDR trace appears in the display as a default function.

The cursor can be moved to the right or the left with the help of the scroll keys. Pressing and holding the scroll key causes the cursor to move more quickly.

By pressing the **SEL** key, a function is selected which can then be controlled with the help of the two scroll keys, namely Cursor, Length, Y-Zoom or X-Zoom. For example if length is selected, length can be reduced or increased with the help of the scroll keys.



Detailed information concerning the use of the TDR trace display ⇨ “Measurements” 17

5.4 Instrument Menus

The instrument has two menus: the main menu with basic settings and the TDR menu with specific settings for measurements.

- Main Menu Overview ⇨ 14
- TDR Menu Overview ⇨ 15

Main Menu Overview

Press and hold the **ESC** key in order to open the main menu. Use the scroll keys to navigate within the menu, and to make selections and entries. Press the **SEL** key in order to acknowledge a selection. Click **TDR Measurement** in order to return to the TDR trace.

TDR measurement	Exit menu / return to measurement	
Velocity factor	VF value The material-dependent velocity of propagation of the signal within the cable is taken into consideration by means of the VF value. It must be selected individually for each respective cable so that distance can be calculated correctly.	
Cable type	Access to the cable database and selection of the cable type (including VF value entries) (max. 32 entries) (⇨ "METRACABLE MANAGER" 23)	
Data transmission	Activate Bluetooth for data transmission to the PC (METRACABLE MANAGER ⇨ 23).	
Settings	→ Language	German, English, French
	→ Unit of measure	Meters (m) or feet (ft) in combination with velocity factor VF or half of velocity factor VF/2
	→ Battery type	Battery or rechargeable battery (depending on which is used ⇨ 35)
	→ Illumination	Display illumination time after last entry 0 ... x sec. (0 = continuously on)
	→ Shutdown	Auto-shutdown of the instrument after last entry 0 ... x min. (0 = continuously on)
	→ Contrast	-20 ... +50 (default: 20)
	→ Program update	Start the update process
	→ Time	Time of day in 24-hour format
	→ Date	Date in format DD/MM/YY

TDR Menu Overview

The TDR menu is opened by pressing and holding the SEL key. Use the scroll keys to navigate within the menu, and to make selections and entries. Press the SEL key in order to acknowledge a selection. Press the ESC key in order to return to the TDR trace.

Reference	 Saves the momentary measurement as a reference curve in the background for comparing two measurements. Hinweis The reference curve is not changed during Y zooming.
Save	Saves the momentary measurement with timestamp. (Data can be transferred subsequently to the PC via Bluetooth ⇄ “METRACABLE MANAGER” 123.)
Freeze	Freezes the momentary trace at the display.
Input	Selection of either AC or DC. - AC = capacitive coupling to the cable. Increased protection against interference voltage. - DC = direct connection to the cable. Less protection against interference voltage. Use DC for long cables (long pulse times influence the graphic representation of the TDR trace when using AC).
Pulse length	Selection of the desired pulse length. Pulse transmission duration is changed when the TDR range is adjusted. Pulse length must be increased in order for the instrument to overcome signal attenuation and still be able to determine cable length. However, shorter pulse lengths result in better resolution.
Z	Impedance of the cable to be measured. These values are available from the respective cable manufacturers (determined automatically when the AUTO Test function is used).

5.5 Selecting Instrument Settings

The most important settings have already been selected during initial startup ⇄ 12 condensed operating instructions (included with the instrument). These include the following basic instrument settings:

- Language
- Units of measure in combination with the velocity factor
- Illumination
- Shutdown
- Contrast

Detailed information concerning the settings and their values ⇄ “Main Menu Overview” 14. Instrument settings can be adjusted at any time:

1. Press the **ON/OFF** key at the instrument.
The instrument is switched on and the TDR trace is displayed.
2. Open the main menu by pressing and holding the **ESC** key.
The main menu appears.
3. Navigate to the **Settings** submenu with the help of the **▲** and **▼** keys.
4. Acknowledge by pressing the **SEL** key.
The **Settings** menu is displayed.
5. Navigate to the desired setting with the help of the **▲** and **▼** scroll keys.
6. Acknowledge by pressing the **SEL** key.
The respective submenu is displayed.
7. Select the desired option or enter the desired value.
8. Acknowledge by pressing the **SEL** key.
The setting is saved.
9. Return to the measurement function by pressing the **ESC** key.
↳ The instrument is ready to perform measurements.

5.6 Changing Measurement Settings

The following settings are required for measurements:

- AC or DC input
- Pulse length
- Cable impedance

Detailed information concerning the settings and their values ⇨ “TDR Menu Overview” 15.

These settings should be selected before performing a measurement. However, if necessary they can also be changed during a measurement. The measurement is restarted automatically after each change.

1. Press the **ON/OFF** key at the instrument.
The instrument is switched on and the TDR trace is displayed.
2. Open the TDR menu by pressing and holding the **SEL** key.
The TDR menu appears.
3. Navigate to the desired setting with the help of the **▲** and **▼** scroll keys.
4. Acknowledge by pressing the **SEL** key.
The respective submenu is displayed.
5. Select the desired option or enter the desired value.
6. Acknowledge by pressing the **SEL** key.
The setting is saved.
7. Return to the measurement function by pressing the **ESC** key.
↳ The measurement is updated automatically based on the changed settings.

6 Measurements

The METRACABLE TDR PRO is connected to the voltage-free cable to be measured. It performs a TDR measurement (time domain reflectometry) whose results appear at the display as a TDR trace.

The instrument transmits an electrical pulse during measurement. Cable length can be calculated based on the amount of time it takes for the pulse signal to return to the instrument (reflection). The shape of the reflection provides information concerning:

- Any included components (e.g. a splitter)
- The wiring itself (e.g. splices, branches etc.)
- Cable faults (short-circuits, broken cable, pinching etc.)

The locations of these items are also calculated – accurate to approximately 0.3 m – based on the time it takes for the signal to return to the instrument.

Cables with lengths of up to 14 km can be examined with the METRACABLE TDR PRO.

Proceed as follows:

1. Prepare for measurement ➔  17.
2. Perform the measurement.
 - TDR Measurement ➔  18
 - Measuring Coaxial Cables ➔  20
3. Optional: Evaluate any detected cable faults ➔  22.
4. Optional: Transfer your measurements to METRACABLE MANAGER PC software for detailed viewing and evaluation ➔ “METRACABLE MANAGER”  23.

6.1 Preparation

1. The cable's velocity factor (VF value) must be known in order to perform measurements. The material-dependent velocity of propagation of the signal within the cable is taken into consideration by means of the VF value. It must be selected individually for each respective cable so that distance can be calculated correctly.

The instrument includes a cable database which can accommodate up to 32 entries (all of which are completed upon shipment). You can select an appropriate cable type from the database (including velocity factor). The cable database can be maintained in METRACABLE MANAGER software, e.g. cable types can be edited (➔  23).

As an alternative, the VF value can be specified manually. You can obtain the VF value from the cable manufacturer or determine it yourself. Set the unit of measure to half of the velocity factor $V/2$ (➔  14) to this end, perform a TDR measurement on an identical cable with a known length and manually adjust the VF value until displayed cable length coincides with the actual length of the reference cable. This value is the VF value for all cables of identical design.
2. The METRACABLE TDR PRO includes a number of helpful additional functions. Familiarize yourself with these functions before performing measurements ➔ “Additional Functions”  21.
3. Read the instructions concerning pinpointing and identifying faults ➔  22.

6.2 TDR Measurement

The momentary TDR trace is always shown at the display. If you change a setting, the TDR trace is adjusted automatically.



Note

A special procedure is required for measuring coaxial cables → 20.

- ✓ The electrical cable to be measured is not in use.
 - ✓ The velocity factor (VF value) of the cable to be measured is known, or there's a corresponding entry in the cable database (→ 20).
1. Connect the test probes to the METRACABLE TDR PRO.
 2. Optional (recommended): Plug the alligator clips on to the test probe.
 3. Hold the probes against the cable to be measured or connect the alligator clips to the cable to be measured. One test probe or alligator clip must directly contact each of the two conductors (without insulation).
 4. Press the **ON/OFF** key at the instrument.
The instrument is switched on and the TDR trace is displayed.
 5. Adjust the velocity factor (VF value) to match the cable under test.
 - The instrument includes a cable database with entries for various cable types. Select an appropriate cable type:
Open the main menu by pressing and holding the **ESC** key. Navigate to the **Cable Type** submenu with the help of the scroll keys and acknowledge your selection by pressing the **SEL** key. Select the appropriate entry from the database which then appears with the help of the scroll keys, and acknowledge your selection by pressing the **SEL** key. In order to return to the TDR trace, navigate to the **TDR Measurement** submenu and acknowledge your selection by pressing the **SEL** key.
(Enter the value manually if you don't find an appropriate entry. See instructions below.)
 - Enter the value manually.
Open the main menu by pressing and holding the **ESC** key. Navigate to the **Velocity Factor** submenu and acknowledge your selection by pressing the **SEL** key. Enter the value with the help of the scroll keys and acknowledge by pressing the **SEL** key. In order to return to the TDR trace, navigate to the **TDR Measurement** submenu and acknowledge your selection by pressing the **SEL** key.
 6. Open the TDR menu by pressing and holding the **SEL** key.
The TDR menu appears.
 7. Enter the basic settings for the momentary measurement: input (AC or DC), pulse length and impedance (Z) (→ 16).
Press and hold the **SEL** key to this end, in order to open the TDR menu. Use the scroll keys to navigate through the options, and to make selections and entries. Press the **SEL** key to acknowledge your selection and entries. Then return to the TDR trace by pressing the **ESC** key.

**Tip**

Use the AUTO Test function (⇒“Additional Functions”
21)!

Instead of adjusting impedance (Z) manually, it can be determined automatically by the instrument.

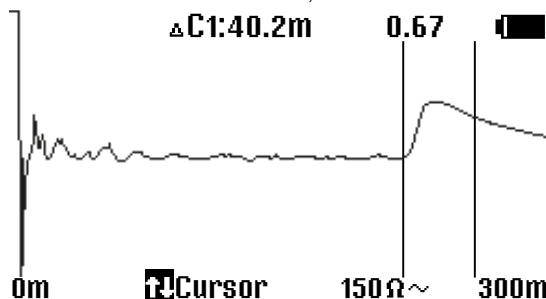
Briefly press the **ESC** key in order to activate the AUTO Test function.

8. Adjust length (display range) in the TDR trace:
 Briefly press the **SEL** key repeatedly until the **Length** function is selected. Adjust length with the help of the **▲** and **▼** scroll keys.
 (Maximum length depends on the cable.)

**Note**

If length is changed, pulse length is automatically readjusted.

9. Adjust the display range of the TDR trace as required:
 Briefly press the **SEL** key repeatedly until the **X Zoom** or **Y Zoom** function is selected. Zoom in with the **▲** scroll key and zoom out with the **▼** scroll key.
 - Y Zoom: Magnifies/reduces the measuring range display in steps of 6 dB.
 - X Zoom: Magnifies/reduces the display of the measurement segment. A cursor which has been inserted in the display can be used as a zoom reference.
10. Navigate to the desired position within the TDR trace with the help of the cursor:
 Briefly press the **SEL** key repeatedly until the **Cursor** function is selected. Move the cursor with the help of the **<** and **>** scroll keys (press and hold a scroll key for rapid motion). You can display a second cursor to measure two reflection points (e.g. measurement of distance between distributor and fault or distributor and distributor). Use the **▲** scroll key to switch back and forth between the two cursors and absolute position and difference:
 - C1: absolute position of cursor 1, cursor 1 is active
 - C2: absolute position of cursor 2, cursor 2 is active
 - $\Delta C1$: difference between cursors 1 and 2, cursor 1 is active
 - $\Delta C2$: difference between cursors 1 and 2, cursor 2 is active



**Note**

Distance is calculated on the basis of the velocity factor (VF value ⇨ 17). If this has not been entered correctly for the respective cable, distance is displayed incorrectly.

11. Optional: determine cable length. Move the cursor to the end of the trace where either the reflection curve for “open end” or “short-circuit” is displayed (⇨ 22). The displayed cursor position corresponds to the length of the cable.
 12. Optional: ascertain and analyze any detected reflection curve(s) ⇨ “Pinpointing and Identifying Faults” 22.
 13. Optional: save your measurement.
Open the TDR menu to this end by pressing and holding the **SEL** key. Navigate with the **Λ** and **▼** scroll keys until the **Save** function is selected. Acknowledge by pressing the **SEL** key. Enter a name with the help of the **Λ** and **▼** scroll keys. Acknowledge by pressing the **SEL** key. The measurement is saved to memory.
 14. Switch the METRACABLE TDR PRO off by pressing the **ON/OFF** key.
The instrument is switched off.
 15. Remove all measurement cables from the cable under test and from the instrument.
 16. Optional: Transfer the measurements to METRACABLE MANAGER software for further evaluation and storage ⇨ “METRACABLE MANAGER” 23.
- ↳ Measurement has now been completed.

6.3 Measuring Coaxial Cables

A BNC adapter is included with the instrument for the measurement of coaxial cables.

**DANGER****Live Voltage!**

Electric shock

- Only measure voltage-free coaxial cables.
- Only use the BNC adapter for low-voltage systems.

1. Connect to the BNC adapter's banana plugs to the banana jacks on the instrument (⇨ 9).
2. Connect the BNC adapter's coaxial plug to the coaxial cable to be measured.
3. Perform the measurement ⇨ “TDR Measurement” 18. Skip the steps described in the procedure for connecting the test leads.

6.4 Additional Functions

AUTO Test Function

The AUTO Test function determines the impedance of the cable to be measured (up to the first impedance change, i.e. up to the first reflection which results from, for example, a cable end or a short-circuit.).

Prerequisite: The cable is longer than 10 meters.

Briefly press the **ESC** key during measurement in order to use the AUTO Test function (⇒ "Measurements" 17).

Freeze

The freeze function can be used to "freeze" the momentary measurement at the display. This makes it possible to view and evaluate the TDR trace at leisure.

Proceed as follows in order to freeze the TDR trace during measurement:

1. Open the TDR menu by pressing and holding the **SEL** key.
The TDR menu appears.
2. Navigate to the **Freeze** submenu with the help of the **▲** and **▼** scroll keys.
3. Acknowledge by pressing the **SEL** key.
The **Freeze** menu appears.
4. Select **On** with the **▲** and **▼** scroll keys.
5. Acknowledge by pressing the **SEL** key.
The **Freeze** menu appears.
6. Return to the measurement function by pressing the **ESC** key.
↳ The measurement is displayed and is frozen.

Reference Function

Two measurements can be compared at a glance with the help of the reference function. The first measurement is saved as a reference curve in the background of the second measurement.

Proceed as follows in order to save a TDR trace in the background during a measurement:

1. Perform the first measurement ⇒ 18.
2. Open the TDR menu during the measurement by pressing and holding the **SEL** key.
The TDR menu appears.
3. Navigate to the **Reference** submenu with the help of the **▲** and **▼** scroll keys.
4. Acknowledge by pressing the **SEL** key.
The **Reference** menu appears.
5. Select **On** with the **▲** and **▼** scroll keys.
6. Acknowledge by pressing the **SEL** key.
The **Reference** menu appears.
7. Return to the measurement function by pressing the **ESC** key.
The measurement is displayed in the background.
8. Perform the second measurement.
↳ Both measurements are displayed and can be compared with each other.

6.5 Pinpointing and Identifying Faults

Please observe the following notes in the specific case of pinpointing and identifying faults.

Fault Finding Recommendation

When conducting fault finding at a cable, measurement should be performed from both cable ends – in particular in the case of faults in open circuits in which the actual end of the cable is not visible.

You can use the reference function in order to compare the two measurements with each other → 21.

When measuring from both ends, the combined results should correspond to the expected cable length. Even if the actual cable end is indicated at the display, the reflections downstream from the fault may be too uncertain for a conclusive analysis. In this case, measurement from both ends provides a clearer picture with increased accuracy.

Fault Identification Help

During the TDR method, the instrument transmits a pulse to the cable which is reflected by cable faults and returned to the instrument. The type of fault can be determined on the basis of characteristic reflection curves. The instrument also indicates the location of the fault – accurate down to approximately 0.3 m.

Typical reflection curves and associated cable faults:



Short-Circuit



Poor Contact



Water in Cable



Water Ingress



Open End



Branch



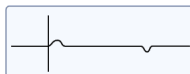
Branch, Short



Splice



Splitter



Split/Resplit

7 METRACABLE MANAGER

Measurement results stored at the instrument can be viewed and evaluated, the internal cable database can be managed and firmware updates can be installed with the help of METRACABLE MANAGER PC software.

1. Install the program to your PC ⇨  23.
2. Start the program ⇨  23.
3. Adjust the program settings to meet your own specific needs ⇨  24.
4. Connect the instrument to the program ⇨  25.
5. Various tasks can be executed:
 - Synchronizing Instrument and PC Time ⇨  26
 - Cable Database Management ⇨  27
 - Importing Measurements to the Software ⇨  29
 - Viewing, Evaluating, Exporting, Saving and Printing Measurements ⇨  30
 - Querying Instrument Information ⇨  32
 - Instrument Updates ⇨  33

7.1 Downloading & Installation

Installation requirements:

- ✓ Windows XP
- ✓ 10 MB available hard disk memory

1. Download the latest version from our website:
<http://www.gossenmetrawatt.com>

(The download can be found on the instrument's individual page.)

2. Unpack the ZIP file.
 3. Launch the metracablemanager.exe file.
A Windows wizard guides you through the installation.
- ↳ The program is installed to the PC.

7.2 Starting and Exiting the Program

- ✓ METRACABLE MANAGER is installed on your PC ⇨  23.

The program can be launched by means of the usual Windows® procedures, for example by using the desktop shortcut.

The program can be closed by clicking **Exit** in the menu or by clicking the usual **×** icon.

7.3 Querying Help

The operating instructions for the instrument and the software (this document) can be opened in the program by clicking **Help** in the menu.

The current version of the operating instructions is always displayed.

7.4 Accessing Information on the Program and the Manufacturer

Information concerning the program (e.g. version) and the manufacturer (e.g. contact data) can be accessed by clicking the arrow next to **Help** in the menu and selecting the desired item from the list.

7.5 Program Settings

Selecting the Program Language

The program language can be set to either English or German.

1. Select **Configuration** from the menu.
The **Configuration** dialog appears.
2. Select the desired language from the **Language** list in the **Basic Settings** panel.
3. Acknowledge by clicking **OK**.
↳ The setting is saved.

Display Options

Whenever a menu item is accessed, the menu is opened in a separate window. You can specify various display options for this window.

You can activate or deactivate window scaling.

1. Select **Configuration** from the menu.
The **Configuration** dialog appears.
2. Activate or deactivate the **Dialog Scaling** option in the **Basic Settings** panel.
3. Acknowledge by clicking **OK**.
↳ The setting is saved.

The arrangement of all currently open windows can be specified with the help of the **Windows** menu item.

1. Select **Windows** from the menu.
The window management drop-down menu appears.
2. Activate or deactivate the **Dialog Scaling** option in the **Basic Settings** panel.
3. Acknowledge by clicking **OK**.
↳ All currently open windows are arranged in accordance with the selected option.

Entering Inspectors

Entries can be made indicating which inspector performed each respective measurement.

When measurements are loaded from the instrument (⇒ )29), the specified inspector is automatically added to the imported measurements. If you generate a report for the measurement (⇒ )31), the inspector's name is added automatically.



Note

If you load a measurement from the PC, the inspector's name is not overwritten. In this case either no inspector's name appears, or the name of the inspector is entered which was saved to the program with which the measurement was read out from the instrument. However, you can manually overwrite the inspector's name when editing the measurement (⇒ )31).

1. Select **Cable Measurement** from the menu.
The **Load Measurements** dialog appears.
2. Enter the name to the **Inspector's Name** field in the **Predefined Inspector Data** panel.

3. Enter additional information concerning the inspector to the **Inspector Comment** field in the **Predefined Inspector Data** panel.
- ↳ The information is saved.

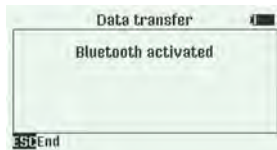
7.6 Connecting the Instrument and METRACABLE MANAGER Software

A Bluetooth® connection must be established between the instrument and the PC to which METRACABLE MANAGER has been installed in order to transfer data between the instrument and METRACABLE MANAGER software.

When establishing a connection for the first time, the two devices have to be paired. It must be assured that the COM port in the operating system and in METRACABLE MANAGER software match up with each other. After pairing, paired devices link up with each other automatically when they're in close proximity to each other and their Bluetooth® modules are activated.

The corresponding procedure is described below for Windows® 10. The procedure is similar for other Microsoft® Windows® operating systems.

- ✓ Your PC is equipped with a Bluetooth® port.
 - ✓ METRACABLE MANAGER has been installed to the PC.
1. Open the Windows® start menu.
 2. Click **Settings**.
The **Windows Settings** dialog opens.
 3. Click the **Devices** button.
The **Devices** dialog appears with the **Bluetooth & other devices** window.
 4. Press the **ON/OFF** key on the METRACABLE TDR PRO.
The instrument is switched on. The TDR measurement is displayed.
 5. Press the **ESC** key.
The main menu appears.
 6. Select **Data Transfer** from the menu with the help of the scroll keys.
 7. Acknowledge by pressing the **SEL** key.
Bluetooth® is activated.



Note

Do not exit this menu item.
If the menu item is exited, the Bluetooth® module is deactivated.

8. In Windows®, click the **Add Bluetooth or other device** button in the **Add Bluetooth & other devices** dialog.
The **Add a device** dialog appears.
9. Click the **Bluetooth** button.
The system searches for Bluetooth® devices. Wait for METRACABLE TDR PRO to appear.

10. Click **METRACABLE TDR PRO**.
Connection is established.
11. Click **Done** in the **Add a device** dialog in Windows®.
The devices are paired and connected.
12. Open the Windows® start menu.
13. Click **Settings**.
The **Windows Settings** dialog opens.
14. Click the **Devices** button. The Devices dialog appears with the **Bluetooth & other devices** window.
15. Click **More Bluetooth options** in the list on the right.
The **Bluetooth Settings** dialog is displayed.
16. Click the **COM Ports** tab.
The **COM Ports** tab is displayed.
17. Search the list for the port named **METRACABLE <serial number>** with the **Outgoing** direction.
Make a note of the port number.
18. Start METRACABLE MANAGER software.
19. Select **Configuration** from the menu.
The **Configuration** dialog appears.
20. Check to determine whether or not the previously ascertained COM port appears in the **RS 232 Interface** list in the **Basic Settings** panel. If not, change the entry accordingly.



Tip

If the COM port doesn't appear in the list, click the **Rescan COM Ports** button. The COM port list is updated.

21. Acknowledge by pressing the **OK** key.
The setting is saved.
- ↳ The devices are paired and connected.

Deactivate the Bluetooth® module in the METRACABLE TDR PRO in order to terminate the connection. The module can be deactivated by simply exiting the **Data Transfer** menu item.

7.7 Synchronizing Instrument and PC Time

Measurements are furnished with a timestamp. Instrument time can be set manually ⇄ 15.

Alternatively, instrument and PC date and time can be synchronized so that the times at which measurements are performed coincide exactly.

- ✓ The instrument and the PC/METRACABLE MANAGER are connected to each other.

1. Select **Configuration** from the menu.
The **Configuration** dialog appears.
2. Click the **Set Time at METRACABLE and PC** button in the **Update** panel.
- ↳ Time is synchronized.

7.8 Cable Database Management

The instrument includes a cable database which is filled with entries for different cable types at the factory. The appropriate cable entry can be selected for measurements (⇒ 18), thus making it unnecessary to manually enter cable data.

A maximum of 32 cable types can be stored. The cable database can be managed, e.g. edited, in the software. The edited database must then be transferred back to the instrument.

The entries in the cable database can also be exported in order to back them up and/or transfer them to other METRACABLE MANAGER installations, and thus to other instruments as well. Entries are exported and imported as a proprietary copper parameters file with the extension “.CUP”. Compatible CSV files can also be used.



Note

The cable database is not permanently stored in the program. It has to be loaded from the instrument or the PC each time it's needed. After editing, it has to be transferred back to the instrument and/or saved to the PC. Changes are otherwise lost.

- Loading the Cable Database from the Instrument to the Software ⇒ 27,
- Manually Adding, Deleting and Editing Cable Parameters ⇒ 27
- Exporting the Cable Database from the Software to the PC ⇒ 28
- Importing the Cable Database from the PC to the Software ⇒ 28
- Uploading the Cable Database from the Software to the Instrument ⇒ 28

Loading the Cable Database from the Instrument to the Software

Load the cable database from your instrument to the software, after which it can be edited. The cable database must then be transferred back to the instrument or saved at the PC (see the following sections).

- ✓ There's a cable database in the instrument (included as a default feature).
 - ✓ The instrument and the PC/METRACABLE MANAGER are connected to each other ⇒ 25.
1. Select **Cable Parameters** from the menu.
The **Cable Parameters** dialog appears.
 2. Click the **Load Cu Parameters from METRACABLE** button.
 - ↳ The data are imported to the software from the instrument.
The entries can now be edited.

Manually Adding, Deleting and Editing Cable Parameters

Some cable types are specified in the cable database as a default feature. Existing cable types can be edited and entries can be deleted in order to add new cable types. entries are deleted by removing the values from the **Cable Name** and **VF** fields.

1. Select **Cable Parameters** from the menu.
The **Cable Parameters** dialog appears.

2. Select the field to be edited from the list with a double-click.
The selected entry turns blue.
3. Enter the new name or value, or delete the field's content
(cable name: max. 23 characters).
- ↳ The entry is edited. Repeat this procedure as often as required. After all of your changes have been completed, transfer the cable database to the instrument.

Sorting Cable Types

Database entries can be sorted in a given order. Frequently used cable types can be placed at the top of the list and can thus be selected quickly at the instrument.

- ✓ A cable database has been loaded to the software ⇨ 27.
1. Select **Cable Parameters** from the menu.
The **Cable Parameters** dialog appears.
 2. Select the desired entry from the list
 3. Click the **↑** or **↓** button in order to move the entry up or down within the list.
 - ↳ The entries are resorted. Transfer the cable database to the instrument or continue editing.

Exporting the Cable Database from the Software to the PC

You can save the cable database to your PC as a CUP file. The entire cable database is always exported – individual entries cannot be selected for export.

- ✓ A cable database has been loaded to the software ⇨ 27.
1. Select **Cable Parameters** from the menu.
The **Cable Parameters** dialog appears.
 2. Click the **Save Cu Parameters to PC** button.
 - ↳ The cable database is exported from the software to the PC.

Importing the Cable Database from the PC to the Software

A previously saved cable database can be imported to the software. It can then be edited and/or transferred to an instrument.

- ✓ A cable database is available as a CSV or CUP file ⇨ 28.
1. Select **Cable Parameters** from the menu.
The **Cable Parameters** dialog appears.
 2. Click the **Load Cu Parameters from PC** button.
The Copper Parameters File dialog appears.
 3. Select the CSV or CUP file.
 4. Click the **Open** button.
 - ↳ The cable database is imported and displayed.

Uploading the Cable Database from the Software to the Instrument

- ✓ A cable database has been loaded to the software ⇨ 27.
 - ✓ The instrument and the PC/METRACABLE MANAGER are connected to each other ⇨ 25.
1. Select **Cable Parameters** from the menu.
The **Cable Parameters** dialog appears.

2. Click the **Upload Cu Parameters to METRACABLE** button.
- ↳ The cable database is exported from the software to instrument.

7.9 Importing Measurements to the Software

In order to import the measurements from the instrument to the software, the import settings must first be selected after which data transfer can be started.

If the measurements are available in the form of a file, the file can also be imported to METRACABLE MANAGER software.

Selecting Import Settings for Import from the Instrument

You can specify whether the data are:

- Only displayed
- Only saved
- Saved and displayed

If the “only saved” or “saved and displayed” option is selected, you also have to specify settings for saving the data:

- The name under which the data will be saved
 - Where the data will be saved
 - Whether or not the data will be deleted from the instrument after transfer
 - Whether or not data on the PC will be overwritten if they have already been transferred in the past (and perhaps edited)
1. Select **Cable Measurement** from the menu.
The **Load Measurements** dialog appears.
 2. Select the desired data handling settings, the filename and the memory location in the **Options for Loading from the Instrument** panel.
(Information concerning placeholders for filenames can be accessed by clicking the help button.)
- ↳ The settings are saved.

Importing Data from the Instrument to the Software

- ✓ The import settings have already been selected ⇨ 29.
 - ✓ Measurements have been saved at the instrument ⇨ 17.
 - ✓ The instrument and the PC/METRACABLE MANAGER are connected to each other ⇨ 25.
1. Select **Cable Measurement** from the menu.
The **Load Measurements** dialog appears.
 2. Click the **Load Measurement Data from Instrument** button.
The data are transmitted.
- ↳ The measurement data are imported to the software.
You can view, evaluate, save and print the measurement data ⇨ 30.

Importing Measurement Data from a File

If measurement data are already available as a file, for example from a colleague who performed a measurement with another instrument and stored it to a PC, you can import these

data to the software. The imported data can then be viewed and evaluated. In order to be able to save the data, a filename must first be specified.

✓ Measurements are available in the TDR file format ⇨ 31.

1. Select **Cable Measurement** from the menu.

The **Load Measurements** dialog appears.

2. Specify the file name in the **Options for Loading from the PC** panel.

(Information concerning placeholders for filenames can be accessed by clicking the help button.)

3. Connect the PC to the instrument ⇨ 25.

4. Click the **Load Measurement Data from PC** button.

The data are transmitted.

↳ The measurement data are imported to the software.

You can view, evaluate, save and print the measurement data ⇨ 30.

7.10 Viewing, Evaluating, Exporting, Saving and Printing Measurements

If you've transferred measurements from the instrument to METRACABLE MANAGER software, reports can be generated and printed. The measurement must be uploaded from the instrument and displayed to this end ⇨ 29.

Reports include:

- A logo (selectable)
- Information concerning the measuring instrument (type, serial number)
- Information concerning the measurement (name and time of measurement, measuring parameters)
- Graphic evaluation of the measurement data
- Information concerning the inspector (name, comment)
- Information concerning the customer (name, comment)
- Signature field
- The filename in the footer (optional)
- A signature field for signing the report (optional)

Proceed as follows:

1. Enter the inspector's name ⇨ 24 (optional).

2. Select your logo ⇨ 31 (optional).

3. Select a printer and specify printing options ⇨ 31.

4. Load the measurement data and open them for viewing ⇨ 29.

5. Generate a report ⇨ 31.

6. Save and/or print the report ⇨ 31.

Using Your Own Logo

You can add your own logo to the reports. Logo requirements:

- File format: JPG or BMP
- Dimensions: ideally 280 × 110 pixels (W × H) – other formats are compressed to these dimensions.



Note

The logo is included as a reference, i.e. it's not saved in the program and must always be available at the specified memory location.

- ✓ Your logo has been saved to the PC.
- 1. Select **Cable Measurement** from the menu.
The **Load Measurements** dialog appears.
- 2. Click the **Settings** button in the **Print Options** panel.
The print options dialog appears.
- 3. Select your logo file in the **Logo Image for Report Header** in the **Print Options** field.
- 4. Acknowledge by clicking OK.
- ↳ The selected logo is then printed in all reports.

Selecting Print Options

Before printing reports, a printer must be selected and options must be specified with regard to format, the footer and the signature field.

- ✓ A printer has been connected and installed to your PC.
- 1. Select **Cable Measurement** from the menu.
The **Load Measurements** dialog appears.
- 2. Click the **Settings** button in the **Print Options** panel.
The print options dialog appears.
- 3. Select either the **Portrait** or **Landscape** format.
- 4. Activate or deactivate the **Footer (filename)** option.
- 5. Activate or deactivate the **Signature** option.
- 6. Select which printer will be used from the **Printer** list.
- 7. Acknowledge by clicking OK.
- ↳ The print settings are saved.

Viewing, Evaluating, Saving and Exporting Measurements and Generating Reports

1. Import the measurement data to the software.
If the data are imported directly from the instrument, several measurements are displayed. Select the window with the desired measurement.
If the data are imported as a file from the PC, only one measurement is displayed → 29.
2. Specify the desired excerpt from the TDR trace:
 -  : Excerpt from the TDR trace. Select the desired excerpt by clicking into the TDR trace and marking the desired range with the mouse pointer while pressing and holding the left mouse key.
 -  : Entire TDR trace.

3. Insert 1 or 2 cursors into the TDR trace in order to display the absolute position of the event and/or to measure the distance between two events (optional). Click  to this end and then click into the TDR trace with the left mouse key in order to insert the blue cursor, and with the right mouse key in order to insert the red cursor. If only one cursor is inserted into the trace, its absolute position is displayed. If a second cursor is inserted, distance between the two cursors is additionally displayed.
4. Optional: Enter the customer's name or company to the **Customer** field, for whom the measurement has been performed.
5. Optional: Enter additional information concerning the customer to the **Comment** field.
6. If an inspector has been entered (⇒ )24), his name appears in the report. The name of the inspector can be changed as an option. Enter another name to the **Inspector** field to this end.
7. If a comment concerning the inspector has been entered (⇒ )24), the comment appears in the report. The comment can be changed as an option. Enter other information to the **Comment** field to this end.
8. Optional: Save the edited measurement.
 - Click the **Save** button in order to save the measurement to the program folder.
 - Click the **Save As** button in order to save the measurement to any desired memory location. Enter a new memory location and filename. Acknowledge by clicking **Save**.
(The memory location and filename are displayed above the buttons in the **Filename** panel.)
The measurement is saved to memory.
9. Optional: Export the edited measurement as a CSV file. Click the **Export** button to this end. The Export Measurement Data as CSV dialog appears. Enter a new memory location and filename. Acknowledge by clicking **Save**.
The measurement is exported.
10. Optional: Print the edited measurement as a report. Click the **Print** button to this end. Before printing, you can display a report preview by clicking the **Preview** button.
The report is printed.
11. Close the measurement view by clicking the **Exit** button.

7.11 Querying Instrument Information

You can query information concerning a connected instrument with the help of METRACABLE MANAGER software, for example its hardware version and serial number. This information is necessary if you should need to contact our product support department ⇒ )38.

- ✓ The instrument and the PC/METRACABLE MANAGER are connected to each other ⇒ )25.
1. Select **Configuration** from the menu.
The **Configuration** dialog appears.
 2. Click the **Download Instrument Information** button.
 - ↳ Instrument information is displayed at the left-hand side of the **Update** panel. Make a note of this information for your support query.

7.12 Instrument Updates

Firmware and FPGA updates are made available for the instrument.

Firmware Update

In order to update the instrument's firmware, the new firmware must first be downloaded and transferred to the instrument. Updating is then started at the instrument.

- ✓ The instrument and the PC/METRACABLE MANAGER are connected to each other
⇒ 25.
- 1. Select **Configuration** from the menu.
The **Configuration** dialog appears.
- 2. View the **Firmware Version** in the **Update** panel and make a note of it.
- 3. Determine the newest firmware version by visiting the Gossen Metrawatt GmbH website at:
<http://www.gossenmetrawatt.com>
- 4. Compare the two versions.
 - If they're identical, the instrument is up-to-date and no action is required.
 - If the firmware on the website is newer, download it and proceed as follows.
- 5. Click the **Update Firmware** button in the **Configuration** dialog in the **Update** panel in the METRACABLE MANAGER program.
The **Select Update File** dialog appears.
- 6. Select the downloaded firmware file.
The file is transferred to the instrument.
- 7. Exit the **Data Transfer** menu item at the instrument.
The Bluetooth® module is deactivated. The main menu appears.
- 8. Select **Settings** from the menu with the help of the scroll keys.
- 9. Acknowledge by pressing the **SEL** key.
The **Settings** menu is displayed.
- 10. Select **Program Update** from the menu with the help of the scroll keys.
- 11. Acknowledge by pressing the **SEL** key.
The update is executed. **Update Active** appears at the display during the update process.
A message indicating successful completion then appears.
- ↳ The instrument's firmware has been updated.

FPGA Update

In order to update the instrument's FPGA, the new FPGA must first be downloaded and transferred to the instrument. Updating is then started at the instrument.

- ✓ The instrument and the PC/METRACABLE MANAGER are connected to each other
⇒ 25.
- 1. Select **Configuration** from the menu.
The **Configuration** dialog appears.
- 2. View the **FPGA Version** in the **Update** panel and make a note of it.
- 3. Determine the newest FPGA version by visiting the Gossen Metrawatt GmbH website at:
<http://www.gossenmetrawatt.com>

4. Compare the two versions.
 - If they're identical, the instrument is up-to-date and no action is required.
 - If the FPGA on the website is newer, download it and proceed as follows.
 5. Click the **Update FPGA** button in the **Configuration** dialog in the **Update** panel in the METRA-CABLE MANAGER program.
The **Select FPGA Update File** dialog appears.
 6. Select the downloaded FPGA file.
The file is transferred to the instrument.
 7. Exit the **Data Transfer** menu item at the instrument.
The Bluetooth® module is deactivated. The main menu appears.
 8. Select **Settings** from the menu with the help of the scroll keys.
 9. Acknowledge by pressing the **SEL** key.
The **Settings** menu is displayed.
 10. Select **Program Update** from the menu with the help of the scroll keys.
 11. Acknowledge by pressing the **SEL** key.
The update is executed. **Update Active** appears at the display during the update process.
A message indicating successful completion then appears.
- ↳ The instrument's FPGA has been updated.

8 Storage and transport

ATTENTION

Improper storage

Damage to the product and measuring error due to environmental influences

- Store the instrument in a protected location and only within the limits of permissible ambient conditions
⇒ 11.

ATTENTION

Improper transport

Damage to the product and measuring error

- Transport the instrument only within the limits of permissible ambient conditions (temperature, humidity etc.) ⇒ 11.
- Only use the included pouch to transport the instrument.

9 Care and Maintenance

With the exception of the batteries which need to be replaced or recharged from time to time, the METRACABLE TDR PRO does not include any components which require maintenance by the user. Battery replacement and care of the instrument and its accessories are described below.

9.1 Battery Replacement

During the initial startup you installed batteries →  condensed operating instructions (included with the instrument). If the batteries are depleted they have to be replaced. Either conventional or rechargeable batteries can be used.

ATTENTION

Incompatible (rechargeable) batteries

Damage to the device.

- Only insert and use (rechargeable) batteries which comply with the technical data given →  11.

After replacing the batteries with new conventional or rechargeable batteries, the instrument has to be set for use with either conventional or rechargeable batteries.

Required tools: Philips screwdriver

Required replacement parts: 4 conventional or rechargeable batteries (→  11)

- ✓ The instrument is switched off.
 - ✓ All measurement cables and accessories have been removed from the instrument.
1. Place the instrument face down on a stable surface.
 2. Loosen and remove the 2 screws from the battery compartment lid.
 3. Remove the battery compartment lid by pulling it down.
 4. Insert 4 conventional or rechargeable batteries into the battery compartment, making sure that the plus and minus poles match up with the provided polarity symbols.
 5. Slide the battery compartment lid onto the battery compartment.
 6. Secure the battery compartment lid with the screws.
 7. Press the **ON/OFF** key at the instrument.
The instrument is switched on and the TDR trace is displayed.
 8. Open the main menu by pressing and holding the **ESC** key.
The main menu appears.
 9. Navigate to the **Settings** submenu with the help of the **▲** and **▼** scroll keys.
 10. Acknowledge by pressing the **SEL** key.
The **Settings** menu is displayed.
 11. Navigate to the **Battery Type** setting with the help of the **▲** and **▼** scroll keys.
 12. Acknowledge by pressing the **SEL** key.
The **Battery Type** submenu appears.
 13. Depending on whether you've inserted conventional or rechargeable battery, select the appropriate setting.

14. Acknowledge by pressing the **SEL** key.
The setting is saved.
15. Return to the measurement function by pressing the **ESC** key.
↳ The instrument is ready to perform measurements.

9.2 Cleaning



DANGER

Life endangering due to electric shock!

The instrument and its accessories are operated with electrical power, therefore there is a general risk of electric shock. This can be fatal or cause serious injuries.

- The instrument, the accessories and all connected conductors must be voltage-free before and during cleaning. Switch the test instrument off and disconnect it from the mains power supply.
- Never immerse the instrument/accessories in water or other fluids.
- Never touch the instrument/accessories with wet or moist hands.

ATTENTION

Unsuitable cleaning agents

Unsuitable cleaning agents such as aggressive or abrasive cleansers result in damage to the instrument/accessories.

- Use a cloth which has been slightly dampened with water for cleaning.
- Avoid the use of cleansers, abrasives or solvents.

Keep the outside surfaces of the instrument and any accessories clean.

10 Repair

If your instrument requires repair, please contact our service department ➔ 38.



Note

Loss of warranty and guarantee claims

Unauthorized modification of the instrument is prohibited. This also includes opening the instrument.

If it can be ascertained that the instrument has been opened by unauthorized personnel, no guarantee claims can be honored by the manufacturer with regard to personal safety, measuring accuracy, compliance with applicable safety measures or any consequential damages.

- The device may only be repaired or opened by authorized, qualified personnel who are familiar with the associated dangers.
- Original replacement parts may only be installed by authorized, qualified personnel.

11 Contact, Support and Service

Gossen Metrawatt GmbH can be reached directly and simply – we have a single number for everything! Whether you require support or training, or have an individual inquiry, we can answer all of your questions here:

+49-911-8602-0

Monday to Thursday: 8 a.m. to 4 p.m.

Friday: 8 a.m. to 2 p.m.

Or contact us by e-mail at: info@gossenmetrawatt.com

Do you prefer support by e-mail?

Measuring and Test Technology: support@gossenmetrawatt.com

Industrial Measuring Technology: support.industrie@gossenmetrawatt.com

Please contact GMC-I Service GmbH for repairs, replacement parts and calibration*:

+49-911-817718-0

service@gossenmetrawatt.com

<https://www.gmci-service.com/en/>

Beuthener Str. 41

90471 Nürnberg

Germany



* DAkkS calibration laboratory per DIN EN ISO/IEC 17025
accredited by the Deutsche Akkreditierungsstelle GmbH under reference number D-K-15080-01-01.

12 CE Declaration

The instrument fulfills all requirements of applicable EU directives and national regulations. We confirm this with the CE mark.



EU-KONFORMITÄTSERKLÄRUNG
DECLARATION OF CONFORMITY



GOSSEN METRAWATT

Dokument-Nr./
Document-no: 20-3-003

Hersteller/
Manufacturer: Gossen Metrawatt GmbH

Anschrift /
Address: Südwestpark 15
D - 90449 Nürnberg

Produktbezeichnung/
Product name: TDR Prüfgerät
TDR Tester

Typ / Type: METRACABLE TDR PRO

Artikel-Nr / *Article no:* M281A

Das bezeichnete Produkt stimmt mit den Vorschriften folgender Europäischer Richtlinien überein, nachgewiesen durch die vollständige Einhaltung folgender Normen:

The above mentioned product has been manufactured according to the regulations of the following European directives proven through complete compliance with the following standards:

Nr. / No.	Richtlinie	Directive
2014/53/EU	Bereitstellung von Funkanlagen - RED Richtlinie – Anbringung der CE-Kennzeichnung : 2020	<i>Making available of radio equipment - RED Directive - Attachment of CE mark : 2020</i>

Anforderungen an die Sicherheit gemäß 2014/35/EU

Safety requirements according to 2014/35/EU

EN/Norm/Standard
EN 61010-1 : 2010

Anforderungen an die elektromagnetische Verträglichkeit gemäß 2014/30/EU

Requirements for electromagnetic compatibility according to 2014/30/EU

Grundnorm / Generic Standard
EN 55011 : 2016
EN 61000-4-2 : 2009
EN 61000-4-3 : 2006

Nürnberg, den 02.12.2020

Ort, Datum / Place, Date:

Geschäftsführung / Managing Director

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitsanweisungen der mitgelieferten Produktdokumentationen sind zu beachten.

This declaration certifies compliance with the above mentioned directives but does not include a property assurance. The safety notes given in the product documentations, which are part of the supply, must be observed.

13 Disposal and Environmental Protection

Proper disposal makes an important contribution to the protection of our environment and the conservation of natural resources.

ATTENTION

Environmental Damage

Improper disposal results in environmental damage.

- Follow the instructions concerning return and disposal included in this section.

13.1 Disposal of Old Devices, Batteries and Rechargeable Batteries

Old devices and (rechargeable) batteries contain valuable raw materials that can be recycled, as well as hazardous substances which can cause serious harm to human health and the environment, and they must be recycled and disposed of correctly.



The symbol depicting a crossed-out garbage can on wheels refers to the legal obligation of the owner or end-user not to dispose of old devices and batteries or rechargeable batteries with unsorted municipal waste ("household trash"). The (rechargeable) batteries must be removed from the old device (where possible) without destroying them and the old device and the (rechargeable) batteries must be disposed of separately. The type and chemical composition of the (rechargeable) battery are indicated on the battery's labelling. If the abbreviations "Pb" for lead, "Cd" for cadmium or "Hg" for mercury are included, the (rechargeable) battery exceeds the limit value for the respective metal.

You are obliged to comply with respective local requirements and implement them correctly on site. Further information can be obtained, for example, from the responsible authorities or the local distributor.

Please also observe the owner's or end user's responsibility with regard to deleting personal data, as well as any other sensitive data, from old devices before disposal.

13.2 Disposal of Packaging Materials

Packaging and its parts must be correctly disposed of separately from unsorted municipal waste ("household trash").

You are obliged to comply with respective local requirements and implement them correctly on site. Further information can be obtained, for example, from the responsible authorities or the local distributor.

We recommend retaining the original packaging materials in case you might require servicing or calibration in the future.

**WARNING****Danger of Asphyxiation Resulting from Foils and Other Packaging Materials**

Children and other vulnerable persons may suffocate if they wrap themselves in packaging materials, or their components or foils, or if they pull them over their heads or swallow them.

- Keep packaging materials, as well as their components and foils, out of the reach of babies, children and other vulnerable persons.

13.3 Regulations for the Federal Republic of Germany

The following comments refer specifically to the legal situation in the Federal Republic of Germany.

Old devices, electrical or electronic accessories and batteries or rechargeable batteries

Old devices, electrical or electronic accessories, batteries and rechargeable batteries used in Germany can be returned free of charge to Gossen Metrawatt GmbH or the service provider responsible for their disposal in compliance with applicable regulations, in particular laws concerning packaging and hazardous goods. Batteries and rechargeable batteries must be returned in the discharged state or with appropriate precautions against short circuiting. Further information regarding returns can be found on our website.

Packaging Materials

Packaging which is not subject to so-called system participation is returned to the appointed service provider. Further information regarding returns can be found on our website.

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