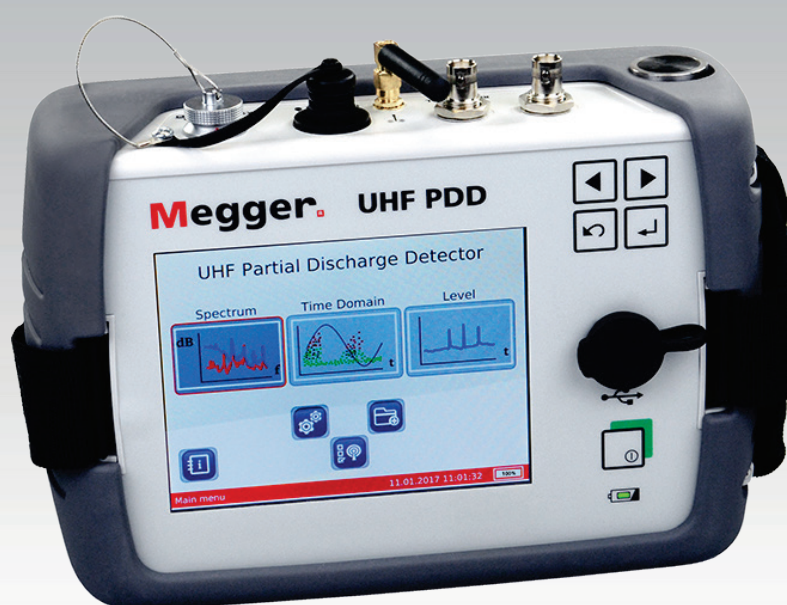


Megger[®]



UHF PDD

UHF PD Detector

USER GUIDE

Issue: A (01/2023) - EN
Article number: 85393

Consultation with Megger

The present system manual has been designed as an operating guide and for reference. It is meant to answer your questions and solve your problems in as fast and easy a way as possible. Please start with referring to this manual should any trouble occur.

In doing so, make use of the table of contents and read the relevant paragraph with great attention. Furthermore, check all terminals and connections of the instruments involved.

Should any question remain unanswered or should you need the help of an authorized service station, please contact:

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Megger warrant that at the time of delivery Megger products are free from manufacturing or material defects which might considerably reduce their value or usability. This warranty does not apply to faults in the software supplied. During the period of warranty, Megger agree to repair faulty parts or replace them with new parts or parts as new (with the same usability and life as new parts) according to their choice.

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All warranty claims versus Megger are hereby limited to a period of 12 months from the date of delivery. Each component supplied by Megger within the context of warranty will also be covered by this warranty for the remaining period of time but for 90 days at least.

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Since some states do not allow the exclusion or limitation of an implied warranty or of consequential damage, the limitations of liability described above perhaps may not apply to you.

Contents

Consultation with Megger3

Terms of Warranty4

Contents5

1 General Notes7

2 Technical description9

2.1 System description9

2.2 Technical data11

2.3 Connections, controls and display12

3 Start-up.....13

3.1 Securing the power supply13

3.2 Connecting antennas /sensors14

3.3 Ensuring network synchronisation18

3.4 Connecting headphones19

4 Principles of operation20

4.1 Operation20

4.2 First steps21

5 Performing measurements.....23

5.1 Analysing the frequency spectrum23

5.2 Analysing the time-resolved signal28

5.3 Analysing the level34

6 Adapting device settings.....36

7 Functional tests.....37

7.1 Self-test37

7.2 Functional test of an installed UHF coupler38

8 Using the demo box.....39

9 Processing and archiving of measured data.....40

10 Maintenance, care and transport.....41




11 Troubleshooting42

1 General Notes

Safety precautions This manual contains basic instructions for the commissioning and operation of the device / system. For this reason, it is important to ensure that the manual is always available to the authorised and trained operator. He needs to read the manual thoroughly. The manufacturer is not liable for damage to material or humans due to non-observance of the instructions and safety advices provided by this manual.

Locally applying regulations have to be observed!

Labelling of safety instructions The following signal words and symbols are used in this manual and on the product itself:

Signal word / symbol	Description
DANGER	Indicates a potential hazard which will result in death or serious injury if not avoided.
WARNING	Indicates a potential hazard which may result in death or serious injury if not avoided.
CAUTION	Indicates a potential hazard which may result in moderate or minor injury if not avoided.
NOTICE	Indicates a potential hazard which may result in material damage if not avoided.
	Serves to highlight warnings and safety instructions. As a warning label on the product it is used to draw attention to potential hazards which have to be avoided by reading the manual.
	Serves to highlight warnings and safety instructions that explicitly indicate the risk of an electric shock.
	Serves to highlight important information and useful tips on the operation of the device/system. Failure to observe may lead to unusable measurement results.

Working with products from Megger It is important to observe the generally applicable electrical regulations of the country in which the device will be installed and operated, as well as the current national accident prevention regulations and internal company directives (work, operating and safety regulations).

After working on the system, it must be voltage-free and secured against reconnection as well as having been discharged, earthed and short-circuited.

Use genuine accessories to ensure system safety and reliable operation. The use of other parts is not permitted and invalidates the warranty.

Operating staff The system may only be installed and operated by an authorised electrician. DIN VDE 0104 (EN 50191), DIN VDE 0105 (EN 50110) and the German accident prevention regulations (UVV) define an electrician as someone whose knowledge, experience and familiarity with the applicable regulations enables him to recognise potential hazards.

Anyone else must be kept away!

Declaration of Conformity (CE) The product meets the following security requirements of the European Council Directives:

- Radio Equipment Directive (RED 2014/53/EU)
- RoHS Directive (2011/65/EU)

Use of third party software This product contains protected software, which is licensed under the General Public License (GPL) and the Lesser General Public License (LGPL). This certifies your right to request the source code for these software components.

You can find detailed information on the GPL/LGPL licenses under www.gnu.org.

Intended use The operating safety of the system delivered is only guaranteed in the event of intended use (see page 9). Incorrect use may expose the operator, the system and any equipment connected to risks.

The thresholds listed in the technical data may not be exceeded under any circumstances.

Behaviour at malfunction of normal operation The equipment may only be used when working properly. When irregularities or malfunctions appear that cannot be solved consulting this manual, the equipment must immediately be put out of operation and marked as not functional. In this case inform the person in charge who should inform the Megger service to resolve the problem. The instrument may only be operated when the malfunction is resolved.

2 Technical description

2.1 System description

Intended use Defects on medium and high voltage sets not only require costly repairs, but can also lead to failures of network sections with associated adverse consequences. It is therefore in the interest of all grid operators to be able to detect signs of imminent defects as early as possible so as to take suitable countermeasures promptly.

With the UHF PDD , Megger offers a lightweight, sturdy and portable measuring device with which various equipment can be quickly examined for partial discharge signals in ultra high frequency (UHF) ranges from 150 MHz up to 1000 MHz. The signal recording can optionally be performed via UHF antenna, UHF coupler or using both simultaneously. The device also additionally offers the option of displaying and analysing decoupled high frequency signals (in the cut-off frequencies of $100\text{ kHz} \leq f \leq 70\text{ MHz}$) from HFCT and TEV sensors.

Used in combination with the UHF coupler UHF C-1, likewise developed by Megger, the UHF PDD is especially suited for testing of live high voltage terminations, the failure of which is usually accompanied by the most devastating impacts on network operation. But also for regular and quick checks of extensive installations such as substations, the UHF PDD in combination with a UHF antenna makes the perfect tool.

Thanks to the two UHF signal inputs, the UHF PDD can be used for real-time comparison of the base noise level of the surroundings (caused by transmitter systems, for example) and the useful pulse-shaped signal on the sensor or the antenna. Of course, two sensor signals can also be easily compared to each other if needed.

Advantages of UHF measurement The UHF frequency band is ideal for selective and interference-resistant measurement of electromagnetic pulses caused by partial discharges, since disturbances output from, for example, transducers or transformers, are largely in frequencies $<100\text{ Mhz}$.

Measuring in the UHF frequency band also enables you to detect the differences between outer corona or sliding discharges as compared to the dangerous internal discharges.

Performance features The UHF PD Detector combines the following features in one device:

- Measurement of PD signals in the UHF range
- Measurement of spectrum, time and level on live equipment
- Real-time signal comparison thanks to two channels
- Intuitive operation using a touchscreen or operating buttons
- High-performance internal rechargeable battery enables long operating time
- Built-in UHF pulse generator for functional testing and checking of sensor installations
- Synchronous network operation through internal or external sensors

Included in delivery The product supplied comprises the following components:

Quantity	Component	Description	Item number
1	UHF PDD	Main device	1007234 (Standard) 1008524 (US version with deviating radio frequency)
1	Charger		1007523
1	UHF DIPOL-230	UHF reference antenna for the interference signal measurement in the surroundings	1008295
1	Synchronisation sensor UHF MS5060	For network synchronisation via socket tapping	1007235 (868 MHz / standard) 1008497 (913 MHz / US version)
1	Power supply	For synchronisation sensor	country-specific
1	BNC cable, 30 cm	To connect the dipole antenna	90019085
1	Transport case		90017139
1	Manual		85393

Check contents Check the contents of the package for completeness and visible damage right after receipt. In the case of visible damage, the device must under no circumstances be taken into operation. If something is missing or damaged, please contact your local sales representative.

Optional accessories The following optional accessories can also be ordered from the sales department if required:

Accessory	Description	Item number
Stereo headphones	For acoustic analysis of the demodulated useful signal	810002087
Synchronisation sensor UHF ES5060	For network synchronisation based on the electrical or magnetic field	1007236
BNC rod antenna	25 to 1900 MHz	90017365
Partial discharge coupler UHF C-1	Request installation material and connection cable	138315730
Folding HFCT sensor, SC40	For quick and temporary installation on the cable shield	1009667
TEV sensor, TEV C900	For measuring PD on metallic surfaces	1009680
BNC cable	5 m length; for connecting the HFCT and TEV sensors	502020108
Closed HFCT sensor HFFCT 20 including connection cable	For permanent installation; 20 mm diameter	1006296
Demo box UHF DB-XXX	Partial discharge simulator for function demonstration	1009554 (230 V version) 1009551 (110 V version)

2.2 Technical data

The UHF PD Detector is defined by the following parameters:

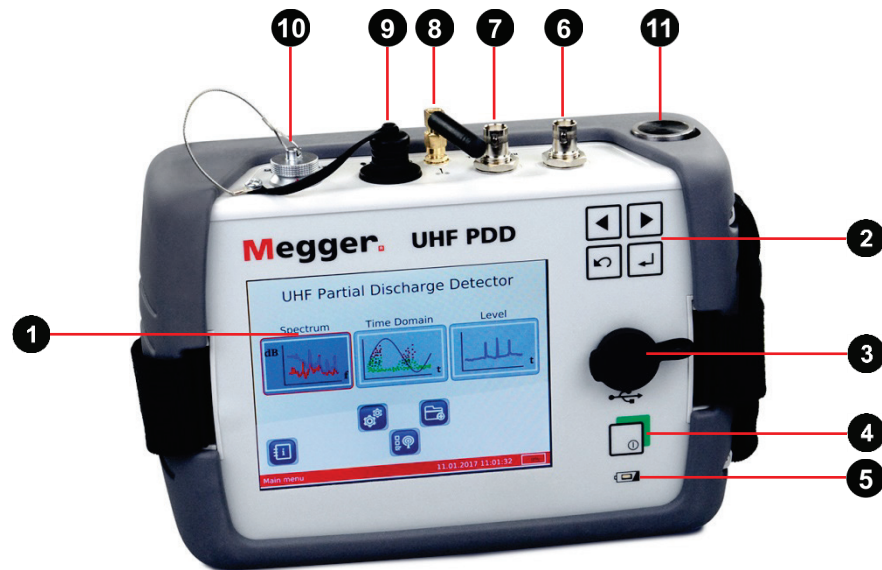
Parameter	Value
UHF frequency range	150 MHz to 1000 MHz
RF frequency range	100 kHz to 70 MHz
Measurement range	-90 dBm ... 20 dBm
Resolution	1 dBm
Accuracy	±1 dBm
Withstand voltage of the measurement inputs (BNC)	4.5 V _{PEAK}
Sensitivity	-90 dBm
Input voltage	100 V–240 V, 50 / 60 Hz (through supplied charger)
Internal rechargeable battery	Li-ion 7.4 V / 12.25 Ah
Battery operating time	>10 hours
Charging time	6 hours
Display	6" touch display, 640 x 480 pixels
Internal memory	10 GB
Wireless connection	868 MHz (standard version) 913 MHz (US version)
Data interface	USB 2.0 (Host)
Operating temperature	-20 °C–50 °C
Storage temperature	-30 °C–70 °C
Operating humidity	93% at 30 °C
Weight	1900 g
Dimensions (L x W x H)	250 x 190 x 100 mm
IP protection class (in accordance with IEC 60529 (DIN VDE 0470-1))	IP65 (during use) IP67 (in case)



The included sensors are defined by the following parameters:

Parameter	Value
Bandwidth of UHF antennas (rod and dipole)	25 MHz to 1900 MHz
Bandwidth of TEV sensor (TEV C900)	2 MHz to 80 MHz
Bandwidth of HFCT sensor (SC40)	100 kHz to 50 MHz

2.3 Connections, controls and display

Control module The UHF PD Detector has the following connection, display and control elements:



Element	Description
①	Touchscreen
②	Operating buttons
③	USB socket for data export and firmware updates
④	On/Off button (brief activation)
⑤	Charging indicator light
⑥	UHF useful signal input
⑦	REF / RF / CAL This socket can be used for the following purposes: <ul style="list-style-type: none"> • Input for UHF reference signal • Input for RF useful signal (TEV and HFCT sensors) • Output of UHF pulse generator
⑧	Radio antenna For the synchronisation with the synchronisation sensor UHF MS5060
⑨	12 V DC /  Jack for the connection of charger and headphones
⑩	EXT. SYNC. /  This socket can be used for the following purposes: <ul style="list-style-type: none"> • Connection of the synchronisation sensor UHF ES5060 • Service interface
⑪	Magnet for securing the UHF dipole antenna

3 Start-up



DANGER

Danger to life from electric shock or electric arcs

To avoid any electrical hazards when starting up and using the detector, the following instructions must be followed:

- All notices, instructions, rules of conduct and operating manuals of the facility manager/plant operator must be complied with!
- The safe distances applicable for the corresponding voltage level must be observed at all times in the vicinity of live operating equipment! Information regarding the minimum distances to be observed must be obtained from the facility manager/plant operator before beginning work.
- Antennas which are connected to the detector for measuring purposes are conductive components. Their length is therefore especially to be taken into account when approaching live components!

3.1 Securing the power supply

Battery operation The UHF PD Detector is fitted with an internal Li-ion rechargeable battery. This can power the device for at least 10 hours.

Before installing at the place of use, the detector should be briefly switched on and the charge status of the battery determined by checking the charging bar shown at the bottom right in the display. If the bar is insufficiently full, it is recommended to charge the battery again before beginning the measurement.

If there is an electrical outlet in the immediate surroundings, the detector can also be operated via the connected charger while the measurement is in progress.

Charging the battery To charge the UHF PD Detector, connect the device to the general power grid. Always use the supplied charger. Insert the round plug of the charger into the **12 V DC** socket of the detector. Observe the markings on the plug and socket. You must feel the plug engage.

It takes about 6 hours for a full charging cycle. During charging, the charging indicator light **5** is lit red. The battery is fully recharged once the charging indicator light goes out.



NOTE

To avoid damage, please observe the following when charging:

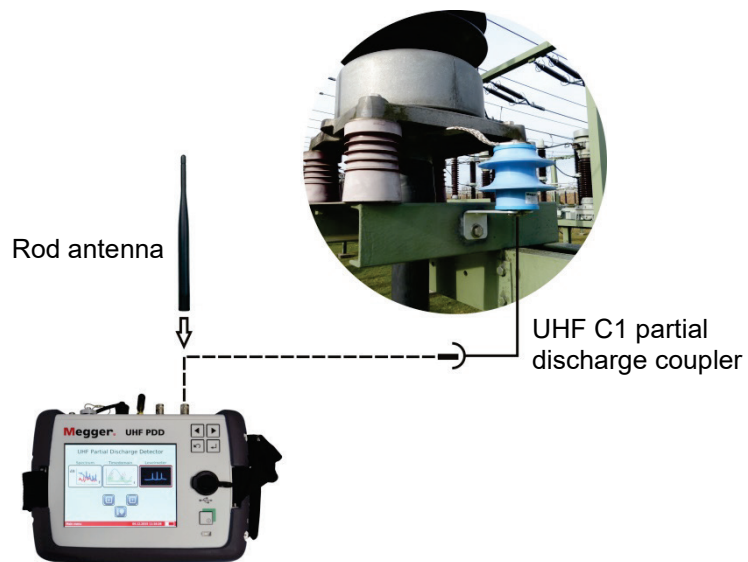
- Always use only the supplied charger.
- The ambient temperature should lie between 10 °C and 35 °C.
- In the event of problems with the battery, contact your sales or service partner at Megger. Do not open the device yourself.

3.2 Connecting antennas /sensors

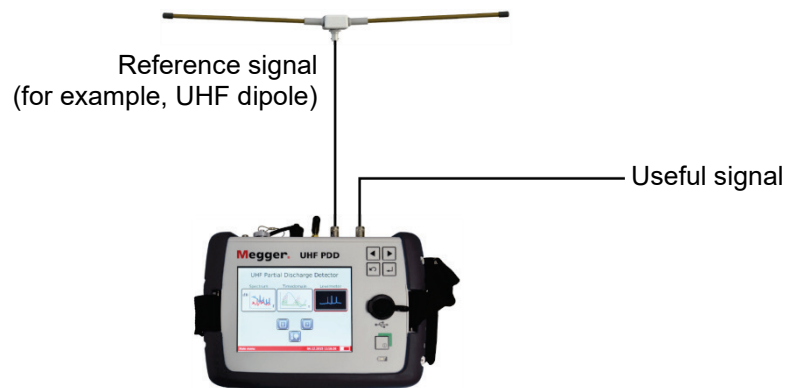
Introduction In principle, the most varied types of sensors and antennas can be connected to the device, providing they deliver a usable input signal.

Besides UHF antennas and sensors, which deliver signals in the frequency range of 150 MHz to 1000 MHz (UHF mode), the detector is also suitable for the connection of TEV and HFCT sensors. With sensors of this type, with which partial discharges can be diagnosed in a capacitive or inductive manner, the detector operates in RF mode in the frequency range of 100 kHz to 70 MHz. In principle, the TEV and HFCT sensors can also be used in UHF mode. The sensors work in this case like antennas, but offer a lower sensitivity in comparison.

Connection of UHF sensors In order to measure in UHF mode, a UHF antenna must be connected at the BNC plug connector of the measurement input **UHF 6**. In addition to the included rod, other suitable antennas and sensors can also be used (such as the optional UHC-C1 partial discharge coupler and the included TEV and HFCT sensors).

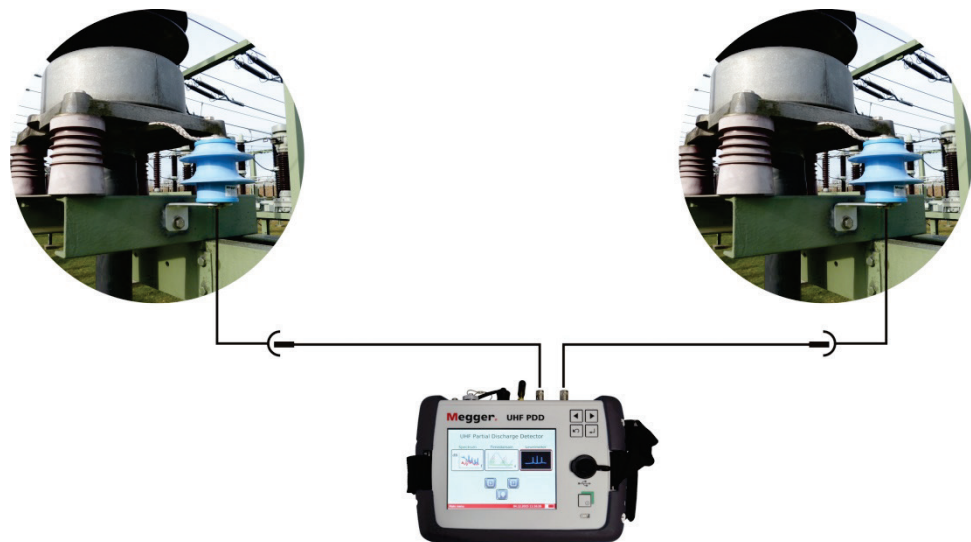


In addition, it is possible to couple in a second "reference" signal in order to be able to compare the frequency spectrum of the useful signal with it. Connecting a suitable UHF reference antenna (for example, the included UHF dipole) to the input **REF/RF/CAL** **7** is recommended.



In order to be able to operate the device properly when using the UHF dipole antenna, the antenna can be attached to the magnet **11** on the back of the case.

The possibility of comparing two frequency spectra is also useful if several identically constructed sensors are present (for example, with multiple UHF couplers installed). In this case, two of these sensors can be connected in parallel to the two measurement inputs and the two frequency spectra can be examined for conspicuous differences:



If there is a suspicion of PD activity in one of the two spectra, the respective sensor can be connected to the **UHF** **6** measuring input and a further investigation performed in the time domain.

Measurements at TEV and HFCT sensors With a TEV sensor, partial discharges in the high-frequency range can be measured on the metallic surfaces (for example, control cabinet doors) of medium-voltage switchgear. A suitable sensor, which can be conveniently mounted to metallic surfaces with its magnetic contact surface, is available as a special accessory (see page 10).



With the HFCT SC40 and the HFFCT 20, Megger also offers in its accessories range (see page 10) two HFCT sensors, which can be used outdoors, for measurement of partial discharges in cables and their components and that are designed to work perfectly with the device. The installation is carried out on the ground wire of the cable ends.



While the folding ESC 40 is suitable for fast, temporary measurements, the HFFCT 20 is designed for permanent installation for routine control measurements.

In principle, however, other HFCT and TEV sensors designed for decoupling partial discharges in the high-frequency range are also suitable for connection to the UHF PDD.

HFCT and TEV sensors are connected to the output **REF/RF/CAL** **7**.

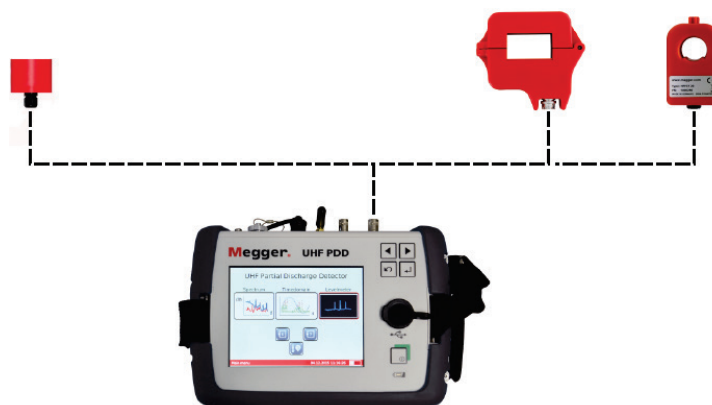


The connection of a comparison or reference sensor is not possible in RF mode.

Using TEV and HFCT sensors in the UHF range

The TEV and HFCT sensors can be used not only in the RF range, but also in the UHF range. Although their sensitivity is lower than normal UHF antennas, the measurement results can provide useful information about the PD levels measured in the cable. For example, if measured partial discharge activities are expressed in both the RF and UHF range, this indicates that they are local partial discharges.

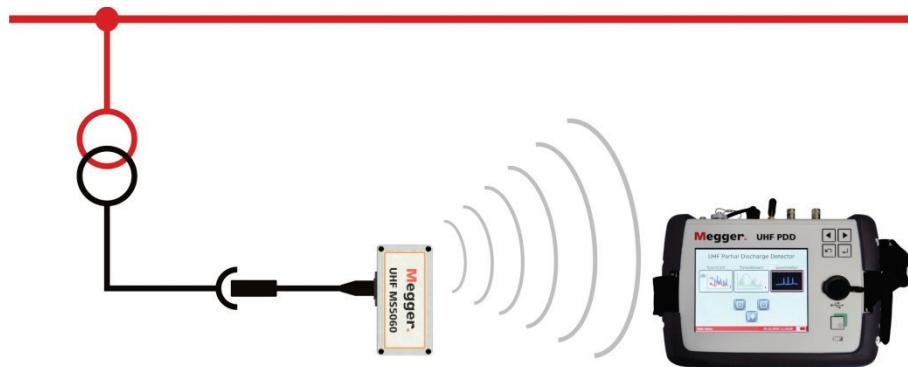
In order to measure with TEV or HFCT sensors in the UHF range, they must be connected to the **UHF** measuring input **6**. In addition, before starting the measurement, the mode **UHF** needs to be selected instead of the **TEV** or **HFCT** modes!



3.3 Ensuring network synchronisation

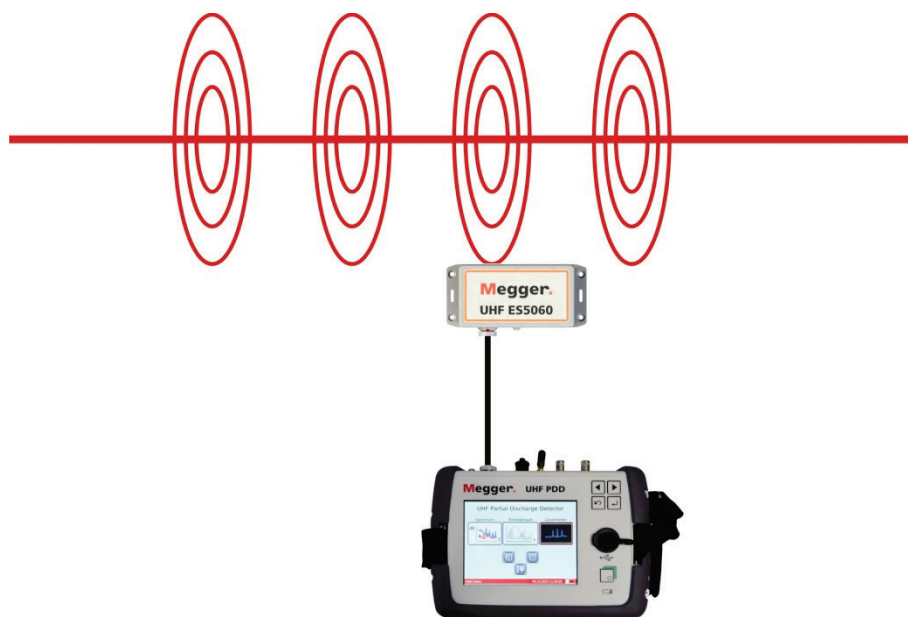
Thanks to the comprehensive accessories, the network synchronisation required for reliable analysis of the charge pulses in the time-based display can be ensured in various ways.

For the most reliable and therefore preferred method, the supplied network synchronisation sensor UHF MS5060 must be plugged into a network socket within wireless range of the detector (≤ 50 m with visual contact). In the device software, the setting **MS5060** must be selected during the measurement.

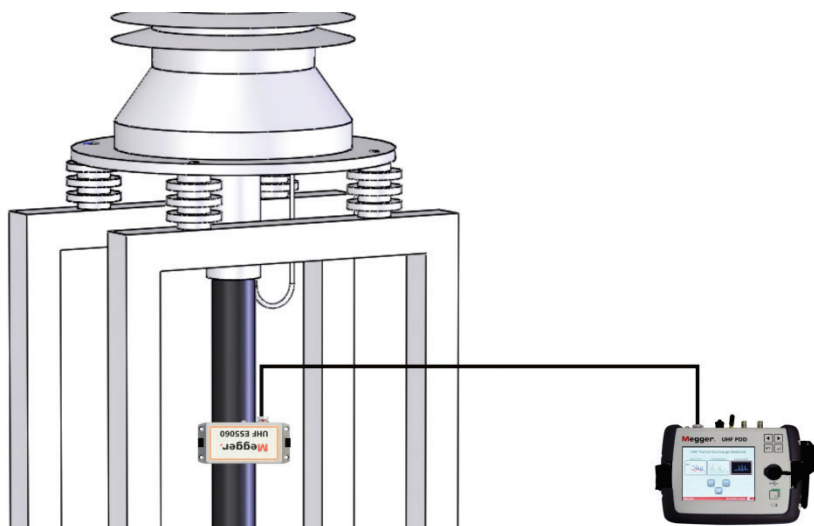


If this method cannot be implemented due to the distance of the socket or impaired radio wave propagation, the network synchronisation can also be produced using the optionally available UHF ES5060 external synchronisation sensor, which must then be connected to the socket **EXT. SYNC.** 10

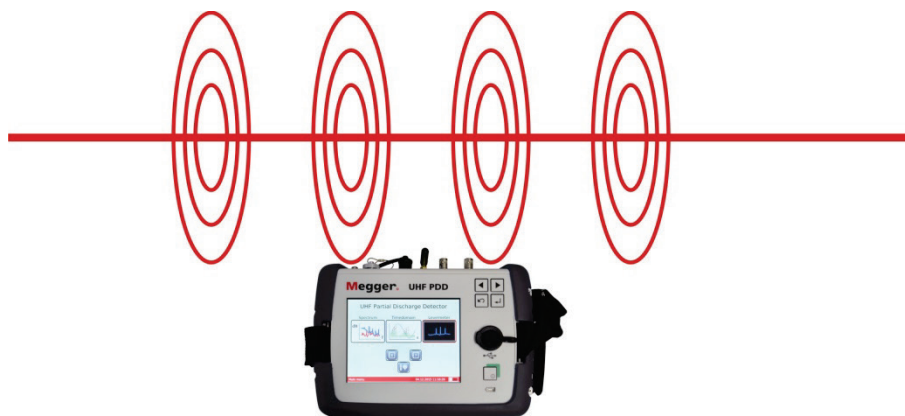
This sensor is able to synchronise based on the electrical or magnetic field of electrical equipment. It can, for example, be laid underneath overhead lines, which are known to have a strong electric field strength. In this case, for the time-based measurement the synchronisation sensor **ES5060 (E)** must be selected in the software.



It can also be attached in the shielded area of a cable end with the aid of the supplied hook and loop fasteners. Since in this case, synchronisation of the sensor to the magnetic field of the cable is to be preferred, in the software the setting **ES5060 (H)** must be selected accordingly.




If a synchronisation using the external sensors fails or cannot be done, the detector itself can be brought as close as possible – while observing the mandatory minimum distances – to a live piece of equipment with a strong electrical field. Ideally, it should then be possible for the internal synchronisation sensor to synchronise to the mains frequency.



In the software, in this case the synchronisation sensor **Int E** must be selected.

3.4 Connecting headphones

In some cases, the supplied headphones can be used to acoustically perceive the demodulated partial discharge pulses during the time-resolved measurement.

When connecting the headphones to the socket **12 V DC /**  the markings on the plug and socket must be observed. You must feel the plug engage.

4 Principles of operation

4.1 Operation

Basic operation Operation is performed either using the operating buttons **2** or via the touchscreen. While with touchscreen operation the desired functions are triggered with the brief press of a fingertip, the button operation is laid out as follows:



- Select required menu item
- Increase or decrease the value of a variable parameter
- Select an option from a selection list

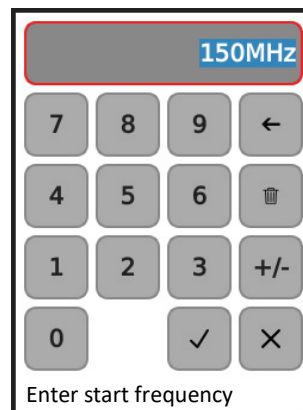


- call up selected menu item
- Confirm the setting or the selection made



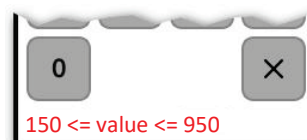
- Exit measuring mode, selection window or menu

Inputs via the numeric keypad For the input of numerical values, a numeric keypad is shown in the display:



For values with a negative preceding sign, you first always enter the number and then press the +/- button once.


If the entered value lies outside the possible range of values, the input cannot be concluded via ✓. The range of values to be complied with is displayed underneath the numeric keypad.



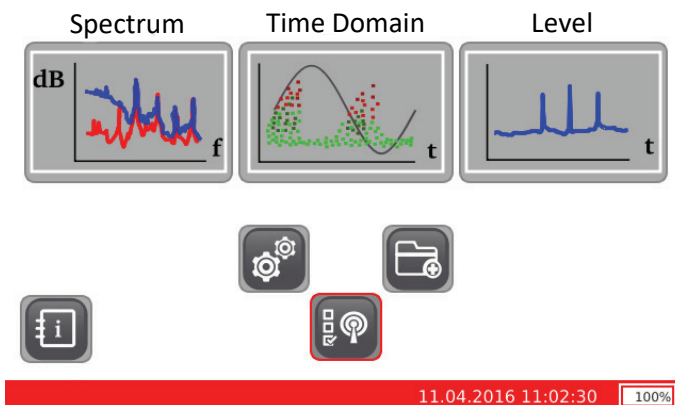
With **x**, the numeric keypad can be closed at any time, without adopting the entered value.


Validity of settings All settings that can be made in the various operating modes and the device adjustments are permanently saved and retain their validity, including in the case of a restarting of the device.

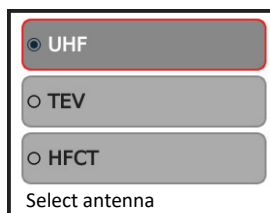
4.2 First steps

Switching on Only a few seconds after the detector is switched on with a brief press of the button , the main menu appears.

UHF partial discharge detector



Select sensor type To ensure that the detector is working in the correct mode, the button  should always be used first directly after switching on in order to select the connected sensor type.




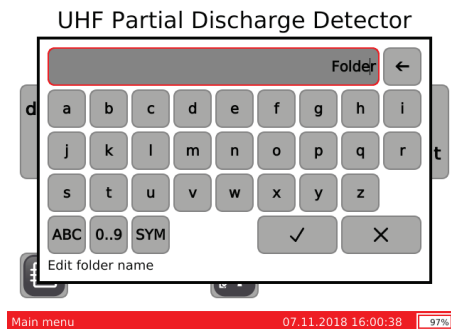
Depending on the connected sensor and the desired frequency range, select the following mode:

Sensor/frequency range	Mode
UHF antenna or UHF coupler at the input UHF	UHF
TEV sensor at the input REF/RF/CAL (measurement in the RF range)	TEV
HFCT sensor at the input REF/RF/CAL (measurement in the RF range)	HFCT
TEV or HFCT sensor at the input UHF (measurement in the UHF range)	UHF

If basically only one type of sensor is used for measurement with the detector, this preselection can also be omitted, since the software automatically starts with the setting of the last performed measurement.

Creating a new measured data directory

In order to easily assign the saved measured data to the individual measurement procedures / equipment at a later time point in the office, the button  can be used at any time to create a new subdirectory in the internal memory. Immediately after the button is pressed, the on-screen keyboard is opened, with which the desired directory name can be entered.



The entered name is preceded by the current date, so that the final directory name is composed as follows:

%Date%_%Entered designation%

Directly after starting the device, a new directory is automatically created. Over the further course of the measurement, whether and when a new directory should be created is up to the operator. In principle, however, it is recommended to do this at least for phase changes or for coupler change. But it can also be useful to create a new directory after adapting certain measurement parameters.

On days with very numerous measurements (directories), it is also recommended to include handwritten notes on the content of the individual directories.

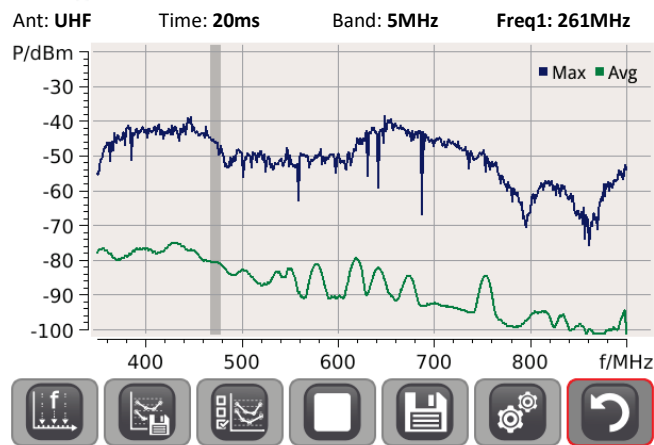
5 Performing measurements

5.1 Analysing the frequency spectrum

Introduction In the spectrum analysis, the intensity of the recorded UHF signal (in dBm) in the frequency range is shown. Each measurement should always be started with this mode in order to obtain information on the base noise level and to identify ambient disturbances and conspicuous frequencies.

Starting the operating mode The **Spectrum** operating mode can basically only be started from the main menu if the detector is operating in UHF mode (see page 21).

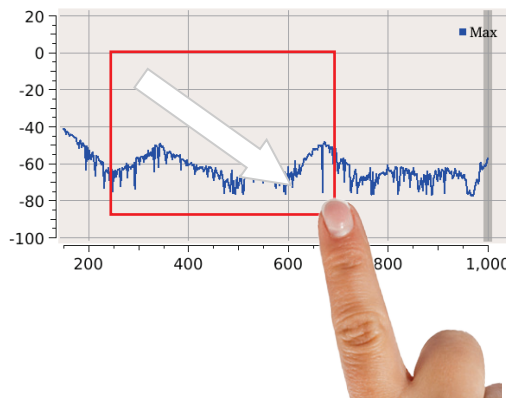
Directly after the operating mode is called up, the software begins with the successive measurement runs (sweeps) and presents the measurement curve(s) in the display.



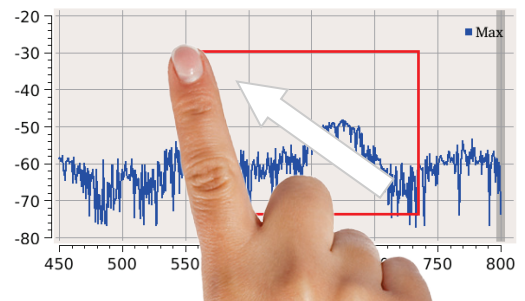
Detailed instructions on the procedure and how to analyse the frequency spectra can be found in the included application note.

Zoom in on display area / unzoom To zoom in on a certain portion of the diagram for a detailed analysis, you need only mark it with your finger as follows:

Zoom in on section

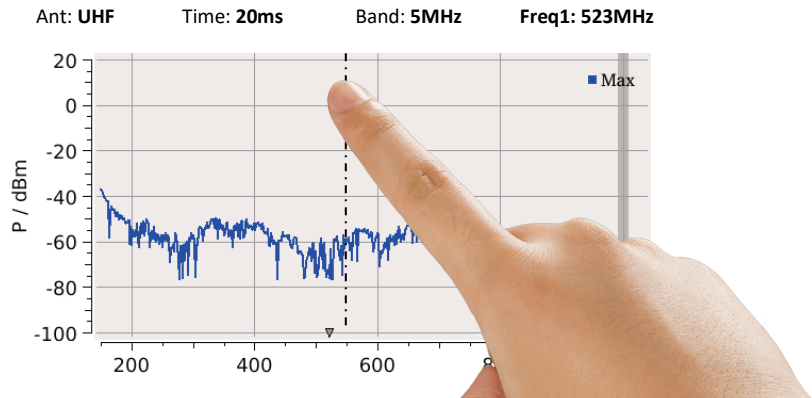


Unzoom




Placing markers If a suspect frequency was found in the analysis of the spectra, with significant level differences indicating possible partial discharges, it can be marked by tapping on it. The

marked frequency is displayed as **Freq1** in the header and is then automatically preset when entering the **Time domain** operating mode.

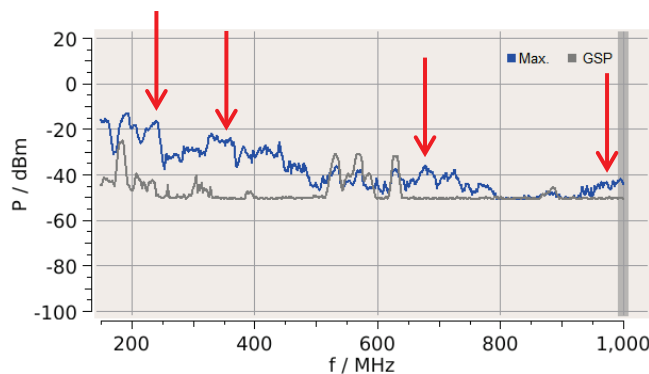


Using long taps at another position, up to 3 more markers (**Freq2** ... **Freq4**) can be placed. These are also available for quick selection during a subsequent time domain measurement.

Briefly touching a screen position causes the active marker (thicker line) to be moved to this position. The selection of the active marker is done via the menu item  (see next page).

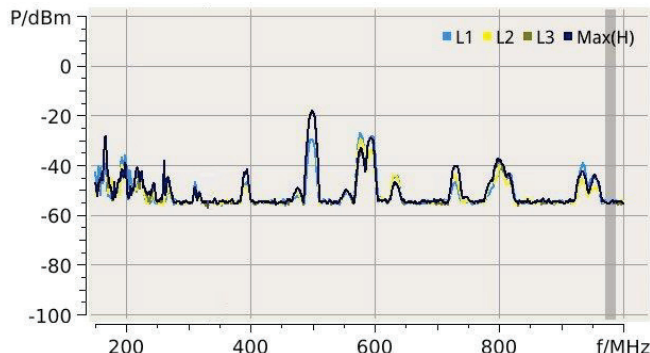
Comparing curves

In order to identify conspicuous frequencies, it is recommended to compare the spectrum recorded on the test specimen with that of a reference signal. This reference spectrum can be recorded, for example, in advance with the aid of the supplied reference antenna placed at a sufficient distance (> 15 m) to the test specimen. If the two spectra cannot be recorded simultaneously due to the spatial conditions, sequential recording is recommended. Recorded curves can be stored in the internal memory and accessed (see page 23) at any time for comparison purposes.



The above example diagram shows the comparison of a recorded base noise level (**GSP** curve) with the spectrum measured on the test specimen. The diagram shows some frequencies with noticeable level peaks (red arrows), which should be marked and analysed in the time domain.

The comparison of temporally offset recorded curves also makes it possible, for example, to compare the three phases of a cable system (see picture below).








On the basis of such a comparison, it is usually even easier to determine which peaks in the spectrum are due to interference from the environment and which actually indicate partial discharges in one of the measurement objects.

Adapting measurement and display parameters

The most important measurement and display characteristics can be directly influenced during measuring with the aid of the following buttons:

Icon	Description
	<p>With this menu item, you can switch which marker is the active marker (thicker line) when multiple markers have been set. A marker must always be selected as the active marker to move it to another position.</p> <p>Using the menu item Clear all, all set markers can be deleted.</p>
	<p>Using this menu item, the currently displayed curves can be stored in up to 4 memory locations and accessed again later for comparisons. The saved curves remain in memory even after a restart.</p> <p>Using the menu item , one of the curves currently shown in the display can be stored in one of the memory locations. Any curve previously stored at this memory location will be overwritten. If several curves are currently shown on the display, the curve to be saved must first be selected.</p> <p>Using the menu item , the saved curves can be provided with a short identifier or the existing identifier can be modified.</p> <p>To display one of the saved curves on the display for comparison purposes, you only need to activate the checkbox of the corresponding memory location.</p> <p>Using the menu item Clear all, all saved curves can be deleted.</p>

Icon	Description
	<p>Selection of the displayed curves.</p> <p>These buttons can be used to show or hide the following curves:</p> <p>(Ref) Maximum Signal maximum at the UHF or reference input. The points of this curve are derived from the highest values recorded during the respective signal recording period.</p> <p>(Ref) Average Signal average values at the UHF or reference input. The points of this curve are derived from the average value of the signal level in the respective signal recording period. This display can be particularly useful in distinguishing between UHF interfering signals (such as the DVB-T signal, for example) and partial discharges, since these interfering signals are continually emitted and thus always present within the measurement period. In contrast, partial discharge signals do not continually occur within a period.</p> <p>Difference If exactly two “Live” curves are shown in the diagram, this menu item can be used to show the difference of the two signals as an additional curve. Based on this curve, you can then quickly and unambiguously identify those frequencies at which the UHF signal clearly deviates from the reference signal on the test specimen.</p>
	<p>This button can be used to write a data set (including screenshot and measured data) from the current diagram view to the internal memory.</p> <p>To be able to unambiguously assign the data set at a later time point, after activating the button the phase at which is currently being measured can also be specified. This additional query can be enabled/disabled in the device settings (see page 36).</p> <p>An export of the saved data sets for the purpose of further processing can also be performed via the device settings.</p>
	<p>This button can be used to stop the current run (sweep), and the button  is then used to start it again.</p>

The button  can in addition be used to perform the following advanced settings:

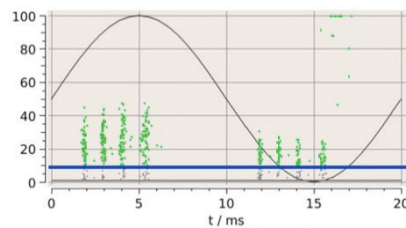
Parameter	Description
Pulse generator	This menu item can be used to switch on the internal pulse generator for the purpose of a functional test (see page 37).
Preamplifier	Activates / deactivates the preamplifier (30 dB) at the start of the signal path. With the preamplifier activated, weaker signals can be better distinguished from the background noise.
Bandwidth	Resolution bandwidth of the measurement filter (1, 5 or 20 MHz). A decrease of the bandwidth increases the frequency resolution and should particularly be considered for smaller frequency measurement ranges.
Gating Time	Signal recording period per frequency measurement point in milliseconds. A recording time of one mains frequency period is recommended.
Frequency (min / max)	Setting of the frequency measuring range (SPAN) between 150 MHz and 1000 MHz.
Amplitude (min / max)	This menu item is used to adapt the minimum and maximum values of the Y-axis so that the display optimally reflects the level of the currently measured signal.
Hold maximum	If this option is activated, the displayed curves are derived from the maximum values from all of the measurement runs (sweeps). The curves will accordingly hardly change at all as measurement duration is increased.

5.2 Analysing the time-resolved signal

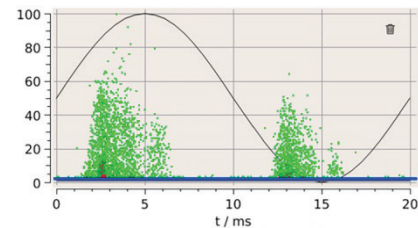
Introduction This mode allows evaluation of a signal within a time range. Here, precisely those frequency windows must be considered in which the frequency spectrum was previously identified as conspicuous.

In this mode, only the respective useful signal is displayed which means that even while measuring in the UHF range, the signal at the **REF/RF/CAL** input is not taken into account.

Directly upon entering the measurement screen, the levels (Y-axis / dB μ V) and phase position (X-axis / ms) of all measured pulses are plotted in the diagram. If multiple pulses with exactly identical coordinates (level and phase position) are measured, then the respective dot in the diagram gradually changes colour from blue to red in accordance with the colour scale shown. The emerging PRPD (Phase Resolved Partial Discharge) diagram provides insight into whether the measured pulses are accumulating in one phase position or are randomly distributed over the time domain. In this way, the partial discharge activities that actually arise from the mains can be distinguished from “wandering” interference pulses.



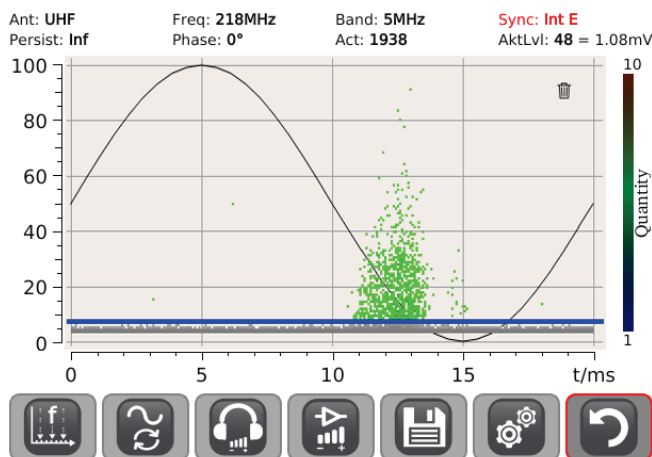
Typical sources of interference



Typical partial charge pattern

In the case of PD activity, cloud-shaped clusters take shape over the course of the measurement, the form and phase position of which allow conclusions about the type of PD to be made (e.g. corona discharge or surface discharge). This is described in detail in specialist literature.

Starting the operating mode The operating mode can be started from the main menu via the menu item **Time Domain**.



If an abnormal frequency is identified during the analysis of the frequency spectrum and was marked (see page 23), it is preselected directly after entering the measurement screen. If multiple conspicuous frequencies were marked in the frequency spectrum, you can use the menu item to quickly switch between these frequencies.

Creating network synchronisation Directly after accessing the operating mode, you should use the menu item to select the synchronisation sensor (see page 18) used.

The selected sensor type is then permanently shown in the upper right corner of the display. Based on the colour of the writing, the software signals whether synchronisation to the mains frequency was successful (green script) or the attempt failed (red script).

grid synchronous

Sync: INT E

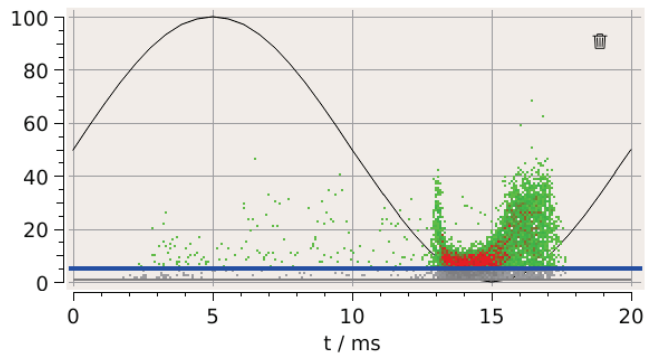


not synchronous

Sync: INT E



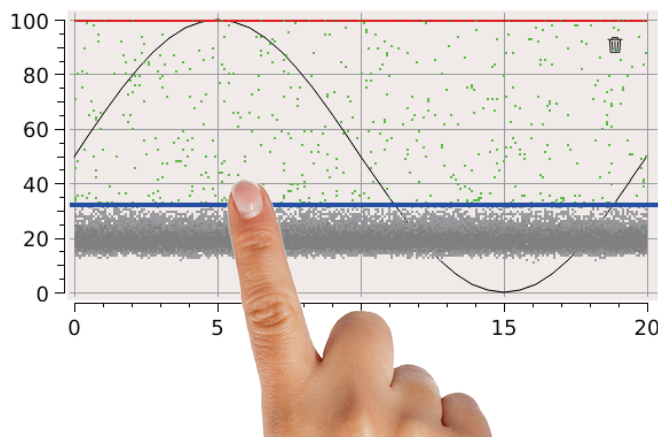
If it can be reliably ensured that the voltage used for the synchronisation is in phase with the measured object voltage, the period of a sine wave produced in the diagram reflects the actual progression of the mains voltage period. The illustrated phase position of the measured pulses thus corresponds to the actual phase position. For example, the following picture shows a significant accumulation of discharges at a constant level at the peak of the negative voltage half-wave.




If, on the other hand, it cannot be ensured that the synchronisation voltage and the measured object voltage are in phase (for example, when the E-field sensor is placed under overhead lines), no conclusion can be made about the actual phase angle. In this case, however, it can at least be determined whether the measured pulses form phase-stable accumulations that are typical for partial discharge.


Procedure At the start of the measurement, the variable amplification (see table below) should be adapted so that the recorded charge level is distributed evenly over the diagram to fill it. This makes it easier to identify and evaluate the appearing patterns of the phase-resolved partial discharge (PRPD).

The base noise threshold (blue line) should be moved to a suitable position just above the base noise level by touching the screen.



This ensures that all events below this base noise threshold are not included in the calculation of the activity level (**ActLvl**). This is a measure for the frequency of events occurring above the noise threshold and facilitates evaluation of the changes and criticality of the fault location.

By touching the  symbol, the diagram can at any time be completely wiped clean and a new recording started. However, this button is only available if the parameter **Persistency** is set to **Infinite** (see following pages) and no automatic overwriting of the image points takes place.






Using the supplied headphones connected to the headphone socket , the input signal can also be evaluated acoustically in **Time Domain** mode. The tones produced by the partial discharges typically vary their sound with rising/falling intensity.




Detailed instructions on the procedure and how to evaluate the phase-resolved partial discharge pattern can be found in the included application note.

Adapting measurement and display parameters

The most important measurement and display characteristics can be directly influenced during measuring with the aid of the following buttons:

Icon	Description
	Frequency at which the input signal is measured. You can either enter a frequency value or use the quick-selection buttons to switch between the frequencies marked in Spectrum mode (Marker1 ... Marker4).
	Selection of the sensors (see page 18) used for network synchronisation.
	Volume setting for the headphone jack.
	Variable amplification, which is effected independently of the preamplification.
	This button can be used to write a data set (including screenshot and measured data) from the current diagram view to the internal memory. To be able to unambiguously assign the data set at a later time point, after activating the button the phase at which is currently being measured can also be specified. This additional query can be enabled/disabled in the device settings (see page 36). An export of the saved data sets for the purpose of further processing can also be performed via the device settings.

The button  can in addition be used to perform the following advanced settings:

Parameter	Description
Bandwidth	Resolution bandwidth of the measurement filter (1, 5 or 20 MHz).
Preamplifier	<p>Activates / deactivates the preamplifier (30 dB) at the start of the signal path.</p> <p>In principle, it is always recommended to activate the preamplifier. It should only be deactivated if an overmodulation of the measurement signals cannot be reached by adapting the variable amplification. (Overmodulation is present if the measurement pulses always lie at the upper end of the Y-axis of the measurement graph.)</p>
Persistence	<p>This menu item is used to determine how many image points on a vertical line are to be shown at once before the respectively oldest image point is overwritten with the last measured activity.</p> <p>Only with a high number of displayed image points can a statement be made regarding the frequency and phase stability of the pulses and a PRPD pattern be recognised.</p> <p>If one and the same phase angle of multiple pulses is recorded with the same amplitude, the colour of the image point changes (green -> orange -> red) and signals in this way the increased frequency of the pulses.</p> <p>In the “Infinite” setting, new activities are continually shown without deleting old image points.</p>
Phase shift	If between the current tested phase and the phase used for the synchronization a known phase shift exists, this can be input here. The measurements will be shifted accordingly by this value within the diagram.
Amplitude (min / max)	This menu item is used to adapt the minimum and maximum values of the Y-axis so that the display optimally reflects the level of the currently measured signal.
Maximum quantity	<p>This value defines the upper threshold of the frequency scale.</p> <p>If this value was set at 50 as shown in the adjacent example, a total of 50 charge pulses with the exact same amplitude and phasing must be measured before the corresponding display point in the diagram is shown in red.</p>



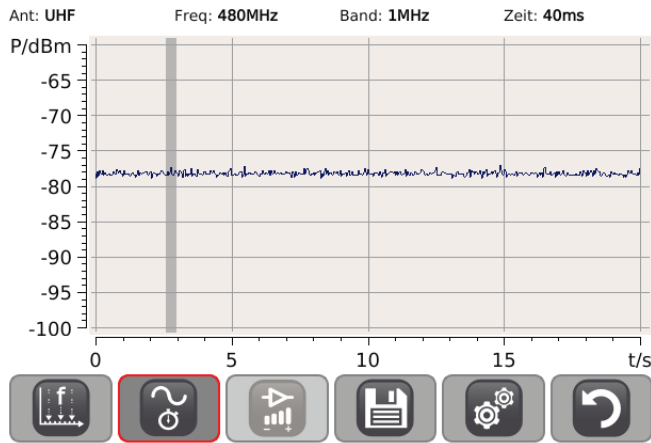
Parameter	Description
Resolution	<p>This menu item can be used to adjust the resolution of the diagram – i.e. the number of pixels displayed vertically and horizontally.</p> <p>In particular, in direct sunlight in outdoor use, it may be useful to reduce the resolution, since the wider image points are easier to read under these conditions.</p> <p>However, it should be noted that when the resolution is reduced, several coordinates of the diagram are combined to form one image point, and the image points therefore correspondingly change from blue to red faster.</p>
Update Interval	<p>The update interval determines the intervals at which the diagram representation is updated (between 100 and 1000 ms).</p> <p>Measurement continues to take place uninterrupted even at a lower update interval, which is why the quantity of measured values considered in the diagram representation also remains the same regardless of the update interval.</p> <p>A lower update interval has a positive effect on the battery life.</p>


5.3 Analysing the level

Introduction In this operating mode, the signal progression for a certain frequency window can be recorded and displayed over a longer period of up to 40 seconds, which allows a trend observation of the discharge level to be made and aids in identification of sporadically occurring partial discharges.

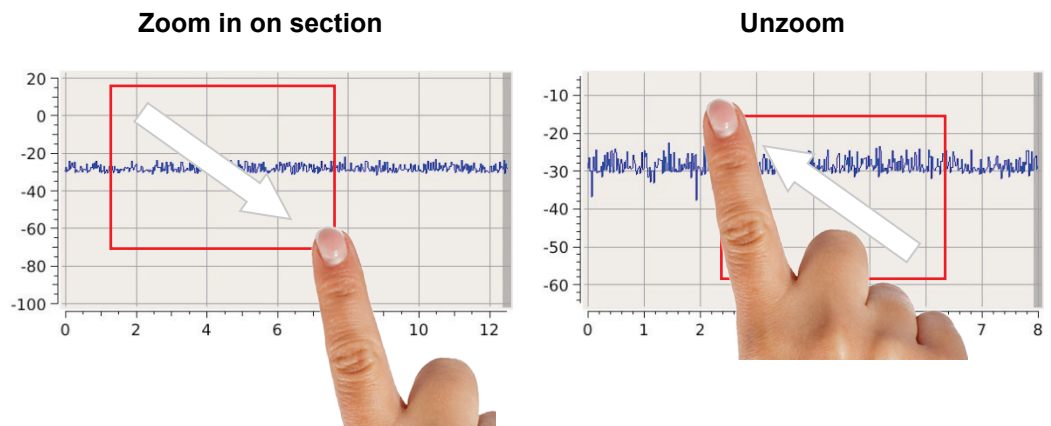
In this mode, only the respective useful signal is displayed which means that even while measuring in the UHF range, the signal at the **REF/RF/CAL** input is not taken into account.

Starting the operating mode The operating mode can be started from the main menu via the menu item **Level**.



If an abnormal frequency is identified during the analysis of the frequency spectrum and was marked (see page 23), it is preselected directly after entering the measurement screen. If multiple conspicuous frequencies were marked in the frequency spectrum, you can use the menu item  to quickly switch between these frequencies.

Procedure To zoom in on a certain portion of the diagram for a detailed analysis, you need only mark it with your finger as follows:




Detailed instructions on the procedure and analysis can be found in the included application note.

Adapting measurement and display parameters


The most important measurement and display characteristics can be directly influenced during measuring with the aid of the following buttons:



Icon	Description
	Frequency at which the input signal is measured. You can either enter a frequency value or use the quick-selection buttons to switch between the frequencies marked in Spectrum mode (Marker1 ... Marker4).
	Signal recording period per measurement point in milliseconds. An increase in this value automatically also raises the displayed time range in a proportional manner.
	This button can be used to write a data set (including screenshot and measured data) from the current diagram view to the internal memory. To be able to unambiguously assign the data set at a later time point, after activating the button the phase at which is currently being measured can also be specified. This additional query can be enabled/disabled in the device settings (see page 36). An export of the saved data sets for the purpose of further processing can also be performed via the device settings.
	Variable amplification, which is effected independently of the preamplification.

The button  can in addition be used to perform the following advanced settings:

Parameter	Description
Measure Mode	This button can be used to select between the following measurement modes: LOG Logarithmic scaling in dBm (recommended) RMS Effective value of the measured level ENV Maximum value of the measured level
Bandwidth	Resolution bandwidth of the measurement filter (1, 5 or 20 MHz).
Preamplifier	Activates/deactivates the preamplifier (30 dB) at the beginning of the signal path.
Amplitude (min / max)	This menu item is used to adapt the minimum and maximum values of the Y-axis so that the display optimally reflects the level of the currently measured signal.

6 Adapting device settings



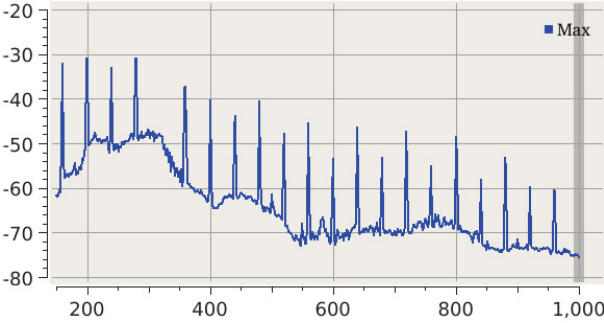
The menu item  takes you from the main menu to the device settings, where you can make the following adjustments:

Setting	Description
Copy data to USB	For the purpose of archiving and further processing (see page 40), activating this button enables you to copy all measured data sets in the internal memory onto an inserted USB stick.
Clear data	Deletes all data in the internal memory.
Time	Set the time
Date	Set the date
Language	Set the menu language.
Date format	Date format
Sweep rate	Run-through frequency for the time-resolved measurement. The frequency must generally be set only once to the value of the applicable mains frequency in the usage range (50 Hz or 60 Hz).
Brightness	Sets the screen brightness
Ask for phase	This menu item can be used to activate or deactivate the phase query when saving measured data.
SW update	<p>When this button is activated, the inserted USB stick is searched for legitimate installation files containing a more current version of the installed firmware.</p> <hr/> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">  The firmware file must be located in the main directory of the USB stick! </div> <hr/> <p>After the desired file is touched, the installation of the new firmware starts directly.</p> <hr/> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">  The device may not be switched off during the update! </div> <hr/> <p>After completion of the installation, the detector is restarted.</p>
Factory defaults	Activating this button will reset the device and measurement settings back to their original factory defaults. The saved measured data sets will remain however.
Enable Service mode	This password-protected area is only accessible to authorised service employees.

7 Functional tests

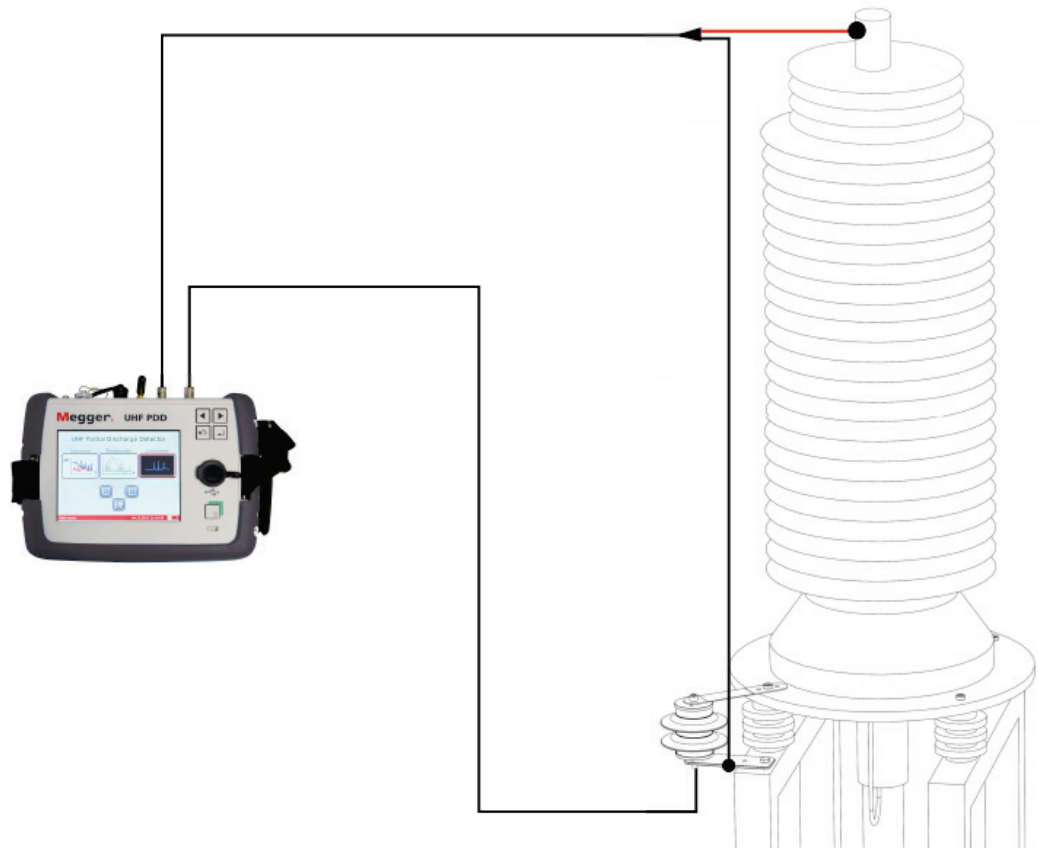
7.1 Self-test

The functioning and measurement accuracy of the detector should be tested at regular intervals with the aid of the internal pulse generator. To do so, proceed as follows:

Step	Action
1	Use the BNC cable to connect the calibrator output REF/RFF/CAL 7 with the UHF 6 . <div style="text-align: center; margin-top: 20px;">  </div>
2	Switch on the detector, switch to UHF mode (see page 21) and start the Spectrum operating mode.
3	Start the internal pulse generator through the menu item  → Pulse generator on .
4	Set the measurement and display parameters as follows: <ul style="list-style-type: none"> • Preamplifier: On • Bandwidth: 1 MHz • Gating Time: 5 ms • Amplitude: -80 to -20 dB
<p>Result: The spectrum should now display the pulse of the generator and look similar to the following screenshot:</p>	
<div style="text-align: center;">  </div>	
<p>If the display deviates greatly, it is recommended to send the detector into a Megger service centre for calibration.</p>	

7.2 Functional test of an installed UHF coupler

The internal pulse generator can also be used to check the frequency transfer characteristics of an installed UHF coupler. To this end, the signal of the pulse generator must be coupled into the measurement object via the socket **REF/RFF/CAL** ⑦ and the measuring signal output of the UHF coupler connected with the socket **UHF** ⑥. Using the example of a UHF C-1 coupler installed on a high voltage terminal, this would appear as follows:

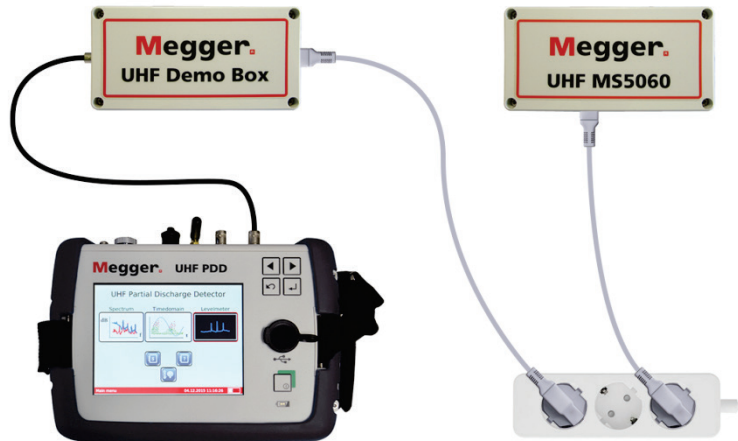


The actual measurement is then carried out analogously to steps 2 to 4 of the procedure described in the previous section.

8 Using the demo box

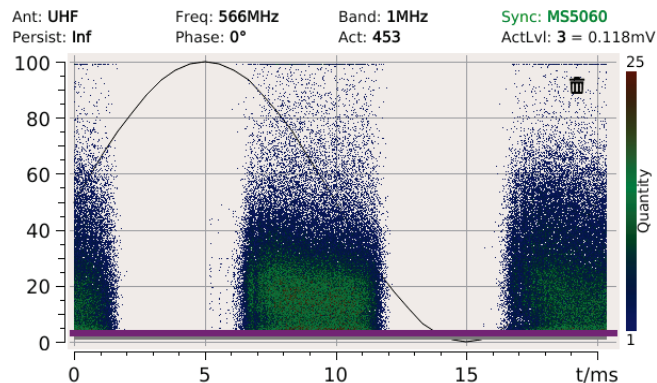
The optionally available demo box simulates partial discharges in the UHF frequency range and is ideal for demonstrating the function of the detector or practising with the device.

Particularly clear results can be achieved if the demo box is connected in conjunction with the external synchronisation sensor UHF MS5060 to the same power strip and the output of the demo box is connected directly to the UHF input of the detector.



After switching on the demo box using the toggle switch, in the **Spectrum** operating mode, significant partial discharge activity should be identifiable over the entire frequency spectrum. The levels are dependent on the characteristics of the gas arrester used in the demo box.

In the **Time Domain** operating mode, type **MS5060** must be selected as the synchronisation sensor. After a few seconds, sharply demarcated and phase-locked patterns, typical for partial discharge, should then form.



The partial discharge activity of the demo box can also be measured with a UHF antenna. This allows especially inexperienced users to gain an idea of how the distance to the measurement object and the amplification adjustments affect the measured levels.

9 Processing and archiving of measured data

In an export, the measured data are stored in a chronological folder structure and grouped by day. Each of these folders contain an *index.html* file, through which all measurements of the respective day can be quickly and easily displayed as an overview in the browser.

If necessary, the data of the individual measurements can also be separately called up from the directory and further processed with suitable software. Each measured data set contains the following files:

- Screenshot (*%Messmodus%_yyyyMMdd_hhmmss.png*)
- Measurement file in XML format (*%Messmodus%_yyyyMMdd_hhmmss.xml*)

10 Maintenance, care and transport

Repair and maintenance Repair and maintenance work may only be performed by Megger or authorised service partners and only using genuine replacement parts. Megger also offers its customers on-site service. Please contact your service centre as needed.

To ensure that a high measuring accuracy can be maintained for a long period of time, the device should be regularly calibrated at the manufacturer's (a two-year cycle is recommended).

Caring for the display Do not clean the display with aggressive products such as solvents or spirits.

Instead, lukewarm water containing some washing-up liquid and a microfibre cloth should be used to clean the display.

Special transportation requirements The lithium batteries of the device are dangerous goods. The transport of the batteries themselves and of devices which contain such batteries is subject to regulations based on the UN Model Regulations "Transport of Dangerous Goods" (ST/SG/AC.10-1).





Please inform yourself about the transportation requirements and follow them when shipping the device.

Storage If the device is not used for an extended period, it should be stored in a dust-free and dry environment.

For lengthier periods of non-use, charge the battery about once a year.

11 Troubleshooting

Independent fault clearance If problems occur, these can, under certain circumstances, be diagnosed and solved using the following table:

Problem / error message	Possible cause / remedy
The software crashes and the software no longer reacts to user actions.	Perform a hard reset by pressing the buttons  ,  ,  and  simultaneously on the front panel.



Tento symbol indikuje, že výrobek nesoucí takovéto označení nelze likvidovat společně s běžným domovním odpadem. Jelikož se jedná o produkt obchodovaný mezi podnikatelskými subjekty (B2B), nelze jej likvidovat ani ve veřejných sběrných dvorech. Pokud se potřebujete tohoto výrobku zbavit, obraťte se na organizaci specializující se na likvidaci starých elektrických spotřebičů v blízkosti svého působiště.



Dit symbool duidt aan dat het product met dit symbool niet verwijderd mag worden als gewoon huishoudelijk afval. Dit is een product voor industrieel gebruik, wat betekent dat het ook niet afgeleverd mag worden aan afvalcentra voor huishoudelijk afval. Als u dit product wilt verwijderen, gelieve dit op de juiste manier te doen en het naar een nabij gelegen organisatie te brengen gespecialiseerd in de verwijdering van oud elektrisch materiaal.



This symbol indicates that the product which is marked in this way should not be disposed of as normal household waste. As it is a B2B product, it may also not be disposed of at civic disposal centres. If you wish to dispose of this product, please do so properly by taking it to an organisation specialising in the disposal of old electrical equipment near you.



Този знак означава, че продуктът, обозначен по този начин, не трябва да се извърля като битов отпадък. Тъй като е B2B продукт, не бива да се извърля и в градски пунктове за отпадъци. Ако желаете да извърлите продукта, го занесете в пункт, специализиран в извърлянето на старо електрическо оборудване.



Dette symbol viser, at det produkt, der er markeret på denne måde, ikke må kasseres som almindeligt husholdningsaffald. Eftersom det er et B2B produkt, må det heller ikke bortskaffes på offentlige genbrugsstationer. Skal dette produkt kasseres, skal det gøres ordentligt ved at bringe det til en nærliggende organisation, der er specialiseret i at bortskaffe gammelt el-udstyr.



Sellise sümboliga tähistatud toodet ei tohi käidelda tavalise olmejäätmena. Kuna tegemist on B2B-klassi kuuluva tootega, siis ei tohi seda viia kohalikku jäätmekäitluspunkti. Kui soovite selle toote ära visata, siis viige see lähimasse vanade elektriseadmete käitlemisele spetsialiseerunud ettevõttesse.



Tällä merkinnällä ilmoitetaan, että kyseisellä merkinnällä varustettua tuotetta ei saa hävittää tavallisen kotitalousjätteen seassa. Koska kyseessä on yritysten välisen kaupan tuote, sitä ei saa myöskään viedä kuluttajien käyttöön tarkoitettuihin keräyspisteisiin. Jos haluatte hävittää tämän tuotteen, ottakaa yhteys lähimpään vanhojen sähkölaitteiden hävittämiseen erikoistuneeseen organisaatioon.



Ce symbole indique que le produit sur lequel il figure ne peut pas être éliminé comme un déchet ménager ordinaire. Comme il s'agit d'un produit B2B, il ne peut pas non plus être déposé dans une déchetterie municipale. Pour éliminer ce produit, amenez-le à l'organisation spécialisée dans l'élimination d'anciens équipements électriques la plus proche de chez vous.



Cuireann an siombail seo in iúl nár cheart an táirgeadh atá marcáilte sa tsíl seo a dhíúscairt sa chóras fuíoll teaghlaigh. Os rud é gur táirgeadh ghnó le ghnó (B2B) é, ní féidir é a dhíúscairt ach oiread in ionaid dhíúscartha phobail. Más mian leat an táirgeadh seo a dhíúscairt, déan é a thógáil ag eagraíocht gar duit a sainfheidhmiúnn i ndíúscairt sean-fhearas leictirigh.



Dieses Symbol zeigt an, dass das damit gekennzeichnete Produkt nicht als normaler Haushaltsabfall entsorgt werden soll. Da es sich um ein B2B-Gerät handelt, darf es auch nicht bei kommunalen Wertstoffhöfen abgegeben werden. Wenn Sie dieses Gerät entsorgen möchten, bringen Sie es bitte sachgemäß zu einem Entsorger für Elektroaltgeräte in Ihrer Nähe.



Αυτό το σύμβολο υποδεικνύει ότι το προϊόν που φέρει τη σήμανση αυτή δεν πρέπει να απορρίπτεται μαζί με τα οικιακά απορρίματα. Καθώς πρόκειται για προϊόν B2B, δεν πρέπει να απορρίπτεται σε δημοτικά σημεία απόρριψης. Εάν θέλετε να απορρίψετε το προϊόν αυτό, παρακαλούμε όπως να το παραδώσετε σε μια υπηρεσία συλλογής ηλεκτρικού εξοπλισμού της περιοχής σας.



Ez a jelzés azt jelenti, hogy az ilyen jelzéssel ellátott terméket tilos a háztartási hulladékokkal együtt kidobni. Mivel ez vállalati felhasználású termék, tilos a lakosság számára fenntartott hulladékgyűjtőbe dobni. Ha a terméket ki szeretné dobni, akkor vigye azt el a lakóhelyéhez közel működő, elhasznált elektromos berendezések begyűjtésével foglalkozó hulladékkezelő központhoz.



Questo simbolo indica che il prodotto non deve essere smaltito come un normale rifiuto domestico. In quanto prodotto B2B, può anche non essere smaltito in centri di smaltimento cittadino. Se si desidera smaltire il prodotto, consegnarlo a un organismo specializzato in smaltimento di apparecchiature elettriche vecchie.



Št zíme noráde, ka izstrádajumu, uz kura tá atrodas, nedrīkst izmest kopā ar parastiem mājsaimniecības atkritumiem. Tā kā tas ir izstrádājums, ko cits citam pārdod un lieto tikai uzņēmumi, tad to nedrīkst arī izmest atkritumos tādās izgāztuvēs un atkritumu savākuvēs, kas paredzētas vietējiem iedzīvotājiem. Ja būs vajadzīgs šo izstrádājumu izmest atkritumos, tad rīkojieties pēc noteikumiem un nogādājiet to tuvākajā vietā, kur īpaši nodarbojas ar vecu elektrisku ierīču savākšanu.



Šis simbolis rodo, kad juo paženklinto gaminio negalima išmesti kaip paprastų buitinių atliekų. Kadangi tai B2B (verslas verslui) produktas, jo negalima atiduoti ir buitinių atliekų tvarkymo įmonėms. Jei norite išmesti šį gaminį, atlikite tai tinkamai, atiduodami jį arti jūsų esančiai specializuotai senos elektrinės įrangos utilizavimo organizacijai.



Dan is-simbolu jindika li l-prodott li huwa mmarkat b'dan il-mod m'ghandux jintrema bħal skart normali tad-djar. Minhabba li huwa prodott B2B , ma jistax jintrema wkoll f'centri civici għar-rimi ta' l-iskart. Jekk tkun tixtieq tarmi dan il-prodott, jekk jogħġbok għamel dan kif suppost billi tiehdu għand organizzazzjoni fil-qrib li tspecjalizza fir-rimi ta' tagħmir qadim ta' l-eletriku.



Dette symbolet indikerer at produktet som er merket på denne måten ikke skal kastes som vanlig husholdningsavfall. Siden dette er et bedriftsprodukt, kan det heller ikke kastes ved en vanlig miljøstasjon. Hvis du ønsker å kaste dette produktet, er den riktige måten å gi det til en organisasjon i nærheten som spesialiserer seg på kassering av gammelt elektrisk utstyr.



Ten symbol oznacza, że produktu nim opatrzonego nie należy usuwać z typowymi odpadami z gospodarstwa domowego. Jest to produkt typu B2B, nie należy go więc przekazywać na komunalne składowiska odpadów. Aby we właściwy sposób usunąć ten produkt, należy przekazać go do najbliższej placówki specjalizującej się w usuwaniu starych urządzeń elektrycznych.



Este símbolo indica que o produto com esta marcação não deve ser deixado fora juntamente com o lixo doméstico normal. Como se trata de um produto B2B, também não pode ser deixado fora em centros civicos de recolha de lixo. Se quiser desfazer-se deste produto, faça-o correctamente entregando-o a uma organização especializada na eliminação de equipamento eléctrico antigo, próxima de si.



Acest simbol indică faptul că produsul marcat în acest fel nu trebuie aruncat ca și un gunoi menajer obișnuit. Deoarece acesta este un produs B2B, el nu trebuie aruncat nici la centrele de colectare urbane. Dacă vreți să aruncați acest produs, vă rugăm s-o faceți într-un mod adecvat, ducând-ul la cea mai apropiată firmă specializată în colectarea echipamentelor electrice uzate.



Tento symbol znamená, že takto označený výrobek sa nesmie likvidovať ako bežný komunálny odpad. Keďže sa jedná o výrobek triedy B2B, nesmie sa likvidovať ani na mestských skládkach odpadu. Ak chcete tento výrobek likvidovať, odnesť ho do najbližšej organizácie, ktorá sa špecializuje na likvidáciu starých elektrických zariadení.



Ta simbol pomeni, da izdelka, ki je z njim označen, ne smete zavreči kot običajne gospodinjске odpadke. Ker je to izdelek, namenjen za druge proizvajalce, ga ni dovoljeno odlagati v centrih za civilno odlaganje odpadkov. Če želite izdelek zavreči, prosimo, da to storite v skladu s predpisi, tako da ga odpeljete v bližnjo organizacijo, ki je specializirana za odlaganje stare električne opreme.



Este símbolo indica que el producto así señalizado no debe desecharse como los residuos domésticos normales. Dado que es un producto de consumo profesional, tampoco debe llevarse a centros de recogida selectiva municipales. Si desea desechar este producto, hágalo debidamente acudiendo a una organización de su zona que esté especializada en el tratamiento de residuos de aparatos eléctricos usados.



Den här symbolen indikerar att produkten inte får blandas med normalt hushållsavfall då den är förbrukad. Eftersom produkten är en så kallad B2B-produkt är den inte avsedd för privata konsumenter, den får således inte avfallshanteras på allmänna miljö- eller återvinningsstationer då den är förbrukad. Om ni vill avfallshandera den här produkten på rätt sätt, ska ni lämna den till myndighet eller företag, specialiserad på avfallshantering av förbrukad elektrisk utrustning i ert närområde.