

METRAwin 10

Parameters Configuring and Analysis Software for Electrical Measuring Instruments

SECULIFE **HIT**

METRAHIT **OUTDOOR**

METRAHIT **WORLD**

METRAHIT **EBASE**
METRAHIT **ESPECIAL**
METRAHIT **ETECH**
METRAHIT **EXTRA**
METRAHIT **ENERGY**
METRAHIT **ULTRA**

METRAHIT **X-TRA**
METRAHIT **T-COM**
METRAHIT **ISO**
METRAHIT **COIL**
KMM 2006/2009

METRAHIT **MULTICAL**

METRA**CAL MC**

METRAport **40S**

METRAwin[®] 10

the measuring software
for the PC

GOSSEN METRAWATT

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We make every effort to keep these instructions up-to-date in accordance with the latest software version. It is nevertheless possible that differences may exist between the software and the instructions. Further information may be provided in a README.TXT file in your program directory.

Subject to change without notice.

Preface

Contents of these Operating Instructions

This document describes the specific functions of METRAWin 10 parameters configuring and analysis software in combination with METRAHIT Starline Series multimeters. Detailed information regarding the device functions is included in the operating instructions for each respective instrument.

Use of the general functions of this software is described in a separate document which can be accessed by clicking **Program Functions** in the **Help** menu.



Note on reading the document at your PC monitor with the help of Adobe Acrobat Reader™

The electronic version of this document may contain numerous cross-references with hyperlinks. For purposes of identification, these appear in blue with underlining, and simplify location of the texts to which reference is made. The monitor jumps to the referenced text after clicking the blue, underlined term. If you then wish to return to the previous text, use the [Alt+←] key combination or click the symbol (Previous View) in the Acrobat Reader tool bar.

Target Group

These instructions are intended for users of the software.

The software is designed for use with the Microsoft Windows[®] operating system. Users must be familiar with basic Windows[®] functions.

Scope of Validity

These instructions are valid for METRAWin 10 version 6.20 or higher.



Note

The version number can be displayed by clicking **About** in the **Help** menu.

Table of Contents

PREFACE	2
TABLE OF CONTENTS	3
1 FEATURES	4
1.1 Scope of Functions	4
1.2 System Requirements	4
Hardware Requirements	4
Software Requirements	4
2 INITIAL START-UP	5
2.1 Setting Communication Parameters at the Multimeter	5
Infrared interface	5
Bluetooth Interface (METRAHIT ULTRA BT only)	5
Device Address	5
Automatic PowerOff disable	5
2.2 Installing the USB Device Drivers	6
2.3 Connecting the Multimeter to the PC	7
2.3.1 Communication via USB	7
Plug the Adapter/Cable to the Multimeter	7
Connecting the Adapter to the PC	8
2.3.2 Communication via Bluetooth (METRAHIT ULTRA BT only)	8
Add Bluetooth Device to Windows System	8
Determining the assigned COM ports	10
2.4 Executing the Communication Test	11
3 OPERATION	13
3.1 Online Recording of Live Measurement Data	13
Number of Channels	13
Sampling Interval	13
Measuring Function	13
Measuring Range	13
Channels Setup	13
3.2 Reading Out and Visualizing Stored Data	15
3.3 Device Settings via the Interface	17
4 APPENDIX	22
4.1 Schematic Diagram of Program Functions	22
4.2 Examples of Measurement Data	23

1 Features

1.1 Scope of Functions

With the help of METRAWin 10 software, live or stored measurement data acquired with multimeters of the METRAHIT Starline Series and models METRAHIT WORLD and METRAport 40S can be read out, visualized, analyzed and documented.

In addition to this, for most models present device settings can be queried, and the measuring functions and ranges which are available for the position to which the function selector switch is currently set can be remote controlled. For some models remote control of all functions is possible independent of the position of the function selector switch. Measurement data as well as device settings can be saved to specific files.

In order to connect a METRAHIT Starline Series or METRAHIT WORLD multimeter to the PC, an interface adapter (optional accessory) is required. This connects the multimeter's optical infrared interface to an available USB port at the PC via a cable with a length of approximately 1½ meters. Up to ten multimeters can be connected simultaneously with one adapter each.

METRAport 40S can be connected directly to the USB ports by means of the provided USB cable, because here the IR-USB converter is already integrated.

METRAHIT ULTRA BT can alternatively communicate wireless via Bluetooth®.

Simultaneous communication with other types of multimeters is not possible. However, most memory data files (*.MDM) which have been separately read out of device memory from METRAHIT Starline Series and METRAHit 12-29S/M/C/I instruments can be combined and analyzed together.

1.2 System Requirements

Refer to the description of the program functions in section 1.2 (**Program Functions** in the **Help** menu) for general requirements.

Special requirements for the connection of multimeters:

Hardware Requirements

Computer 1 free USB port per instrument with a load capacity of 50 mA for electrical power supplied via USB.

For METRAHIT ULTRA BT: Integrated or external Bluetooth® Interface

Measuring Instruments 1 to 10 multimeters of METRAHIT Starline Series, METRAHIT WORLD or METRAport 40S; complete overview of models see [coverpage](#)

Adapters Per multimeter
 METRAHIT Starline Series^{*)}: "USB|X-TRA" IR-USB interface adapter (optional accessory);
 METRAHIT WORLD: "USB-HIT" IR-USB interface adapter (optional accessory);
 METRAport 40S: USB cable with plugs type A and type Mini-B (provided accessory).

^{*)} except METRAHIT ULTRA BT, when communication via Bluetooth

Software Requirements Installed METRAWin 10 software (version 6.20 or higher) with device drivers for METRAHIT Starline Series multimeters (*MULTL_R.DLL*).

Installed device driver „GMC-I Driver Control“ for IR-USB interface adapter(s) USB|X-TRA, USB-HIT and multimeter METRAport 40S with assigned virtual COM port in the range COM1 ... COM256.

2 Initial Start-Up

2.1 Setting Communication Parameters at the Multimeter

The following settings are important for communication between METRAWin 10 and the multimeter, and must be entered using the device's setup menu. Please refer to the operating instructions for the multimeter for detailed information on how to set the device parameters.

Infrared interface

As long as the device is switched on, its infrared interface is ready to receive data and is capable of communicating with METRAWin 10.

METRAHIT Starline Series

In order to be able to "wake up" the device via the IR interface when switched off (e.g. after being shut down by the "auto power off" function), the IR standby function must be activated:

► **SETUP : SEt : irStb : ir on**

⇒ The IR symbol appears in the upper right-hand corner of the display at the multimeter.

The continuous transmission mode (**Send**) may not be activated, because measured values are polled from METRAWin 10:

► **SETUP : Send : Send off**

Bluetooth Interface


(METRAHIT ULTRA BT only)

The METRAHIT ULTRA BT has an infrared and a Bluetooth® interface. But it can not communicate simultaneously over both interfaces. In the device setup menu, the interface to be used must be set:

► **SETUP : SEt : CoM : ir**

⇒ Symbol „IR“ appears in the upper right corner of the multimeter display.

► **SETUP : SEt : CoM : bt**

⇒ Symbol  appears in the upper right corner of the multimeter display.

It is not possible to „wake up“ the unit via its Bluetooth® interface.

Device Address

METRAHIT Starline Series

With the exception of address 0 (= device does not respond to interface commands), the device address can be set as desired within a range of 1 to 15 (default setting after battery replacement is 15). If several multimeters are connected simultaneously, it is advisable to set the individual multimeters to different addresses, so that they can be readily identified when device settings are entered via METRAWin 10.

► **SETUP : SEt : Addr : 01 / 02/ ... / 15**

The device address is irrelevant as far as assignment of the multimeters to measuring channels C1 through C10 in METRAWin 10 is concerned.



Example

Multimeter Device Address	Adapter COM Port No.	METRAWin 10 Device Number/Meas. Channel
Addr 15 (better: Addr 1)	COM3	1
Addr 3 (better: Addr 2)	COM5	2

Automatic PowerOff disable


During computer controlled multimeter operation, it is usually advisable to deactivate automatic device shutdown which is provided in order to extend the service life of the batteries:

METRAHIT Starline Series

► **SETUP : SEt : APoFF : on**

⇒ The ON symbol is displayed next to the battery symbol at the upper left-hand corner of the multimeter display.

Depending upon the application, it may also be sufficient to select a long shutdown delay time (e.g. 30 minutes) and activate the infrared interface standby function (see above).

- METRAHIT WORLD** ▶ Hold the **FUNC** key pressed when switching on the device.
METRAport 40S ⇒ The  symbol is displayed at the upper left-hand corner of the multimeter display.



Note (METRAHIT Starline Series only)

Maximum operating time with new alkaline manganese batteries is 70 to 200 hours depending on multimeter model. The **NA|X-TRA** mains power pack (accessory) is recommended for long-term recording.

2.2 Installing the USB Device Drivers



Important Notes

Install the USB device driver before you plug one of the adapters on the PC. Otherwise there is a risk that a wrong driver is installed by the automatic driver installation from Windows Update.

Note that for the driver installation administrator rights will be required!

A CD ROM is provided with the adapter and with the multimeter METRAport 40S which includes the driver installer "GMC-I Driver Control" and the corresponding Installation Instructions. Both can also be found on the METRAWin 10 installation CD and on our website for free download: <http://www.gossenmetrawatt.com> > Products > Software > Software for Measuring Devices > Utilities > Driver Control

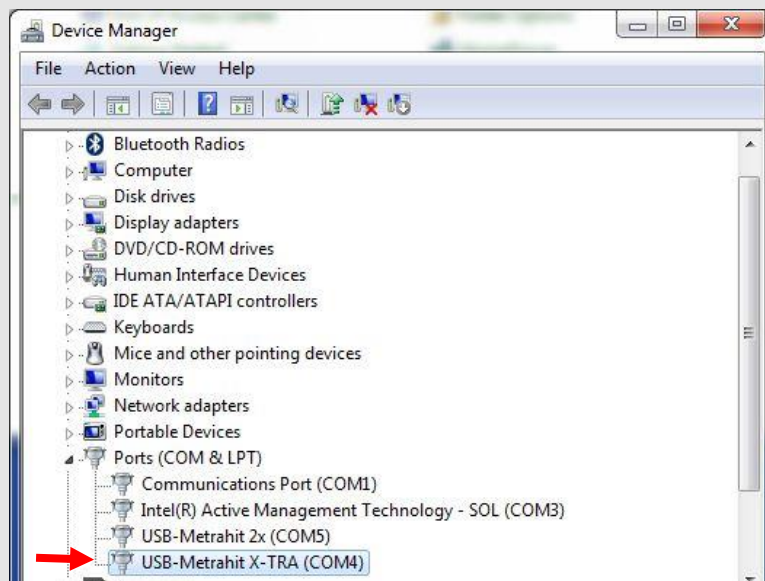
- ▶ To install it, follow the steps described in the Installation Instructions.

Driver Control installs the USB device drivers for almost all of our products with USB port. When connecting the device / adapter to an USB port the associated driver is loaded and Windows assigns to the device / adapter an individual, virtual COM port.



Note

You can check to make sure that installation has been successful in the Windows Device Manager, which also displays the COM port numbers which have been assigned to the adapters and must be in the range COM1 ... COM256: Click the **Start** button, and then **Settings : Control Panel : System : Hardware : Device Manager**



2.3 Connecting the Multimeter to the PC

2.3.1 Communication via USB

In order to connect a METRAHIT Starline Series or METRAHIT WORLD multimeter to the PC, an interface adapter (optional accessory) is required. This connects the multimeter's optical infrared interface to an available USB port at the PC via a cable with a length of approximately 1½ meters. Up to 10 multimeters can be connected simultaneously with one adapter each. METRAport 40S multimeters can be connected directly to the USB ports by means of the provided USB cable, because here the IR-USB Converter is already integrated.

Separate supply power is not required, because the adapter/converter is supplied with electrical power via the USB port. Maximum load placed upon USB supply power is 50 mA (typically 25 mA) per device.



Notes

If there is only one free USB port at the PC, then an usual USB Hub can be used to connect several multimeters.

Maximum distance between the PC and the multimeter is restricted to approximately 1½ meters due to the length of the cable for the IR-USB interface adapter. USB extension cables and USB couplers for other communication systems (e.g. Ethernet, Bluetooth etc.) are available from commercial outlets, by means of which greater distances can be spanned either with a cable, or with a wireless connection. However, we have had no experience with systems of this type to date.

The interface of the multimeters doesn't use the IrDA protocol. Therefore a communication via an IrDA port of a PC is not possible.

Ensure that the IR elements are not obscured by stickers on the upper end of the housing.

Plug the Adapter/Cable to the Multimeter

- ▶ Insert the studs on the adapter USB|X-TRA into the slots at the top of the multimeter so that the cable points to the right as seen from the front of the multimeter, and the socket for the power pack is not obstructed. Communication via the interface is only possible with the adapter in this position.



The adapter can also be connected when the multimeter is in its protective rubber cover.

METRAHIT WORLD

- ▶ Snap-on the adapter USB-HIT at the top of the multimeter as shown here.



METRAport 40S

- ▶ Plug-in the Mini-B connector of the supplied USB cable into the socket at the left side of the multimeter.

**Connecting the Adapter to the PC**

- ▶ Insert the adapter's USB plug into a free USB port at the PC.
 - ⇒ If the USB driver for the adapter/device has already been installed, this is now loaded by the Windows operating system and a virtual COM port is assigned to the adapter/device.
 - ⇒ Else Windows reports that a new USB device has been found and will start driver installation. Cancel this and proceed as described in Section [2.2](#).

2.3.2 Communication via Bluetooth (METRAHIT ULTRA BT only)


METRAHIT ULTRA BT can alternatively communicate via Bluetooth® wirelessly over a distance up to 10 meters approx..

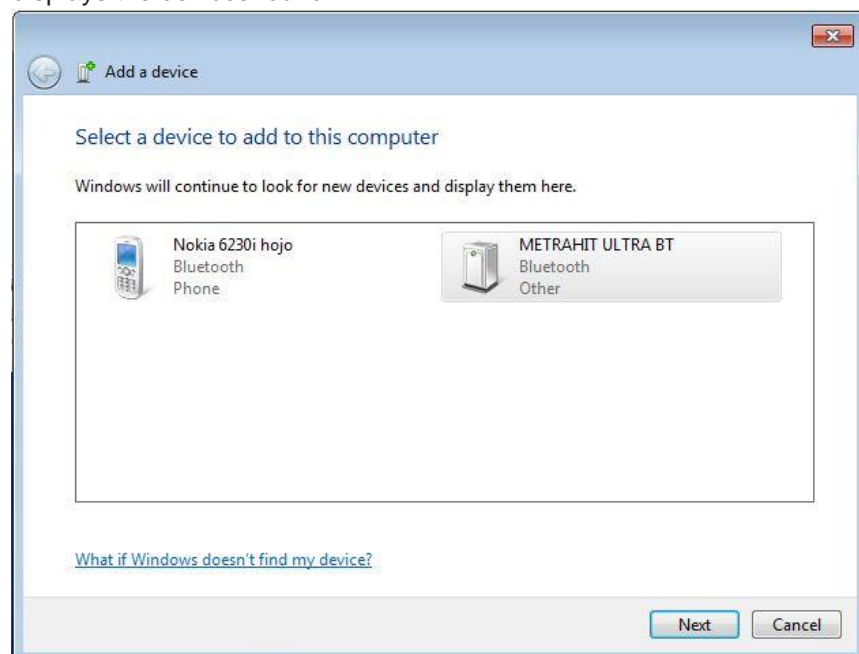
**Notes**

When setting up a multi-channel measurement system with multiple METRAHIT Starline Series multimeters the communication links can also be mixed via Bluetooth and USB ports.

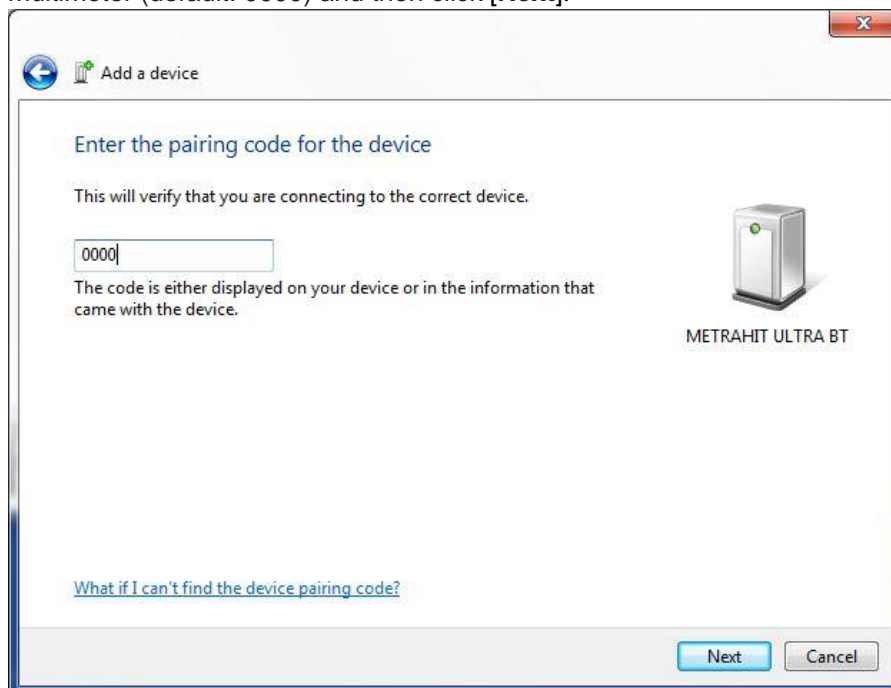
If you want to include several METRAHIT ULTRA BT via Bluetooth in the measuring system, it is recommended to perform the steps described below with only one switched-on multimeter to identify the affected device unambiguously.

Add Bluetooth Device to Windows System

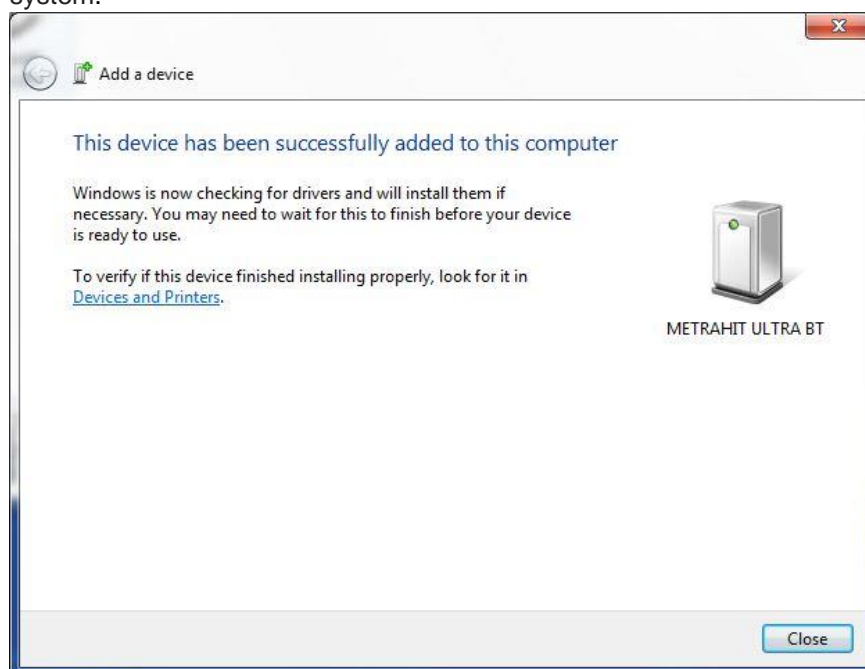
- ▶ Ensure that the multimeter is switched on and its Bluetooth interface is activated (→ [2.1](#))
- ▶ Open the dialog window **Add a device** by clicking the Bluetooth Symbol  in the info area of the Windows taskbar or via **Start : Control Panel : Hardware and Sound : Devices and Printers : (Bluetooth-)Gerät hinzufügen**
 - ⇒ The Windows system automatically searches for available devices and displays the devices found:



- ▶ Select the found METRAHIT ULTRA BT and then click **[Next]**.
- ▶ In the following dialog box, enter the pairing code **bt Pin** you have set at the multimeter (default: 0000) and then click **[Next]**:

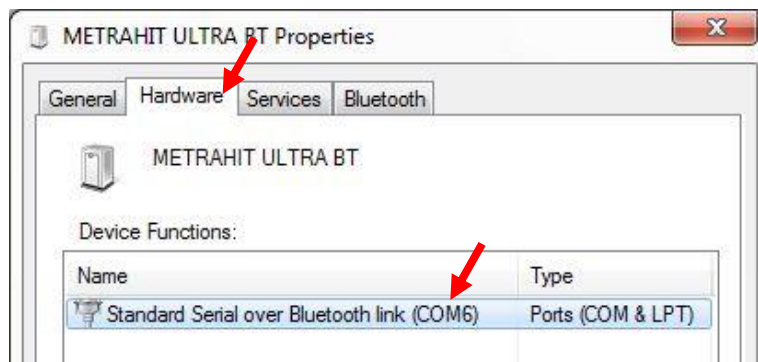
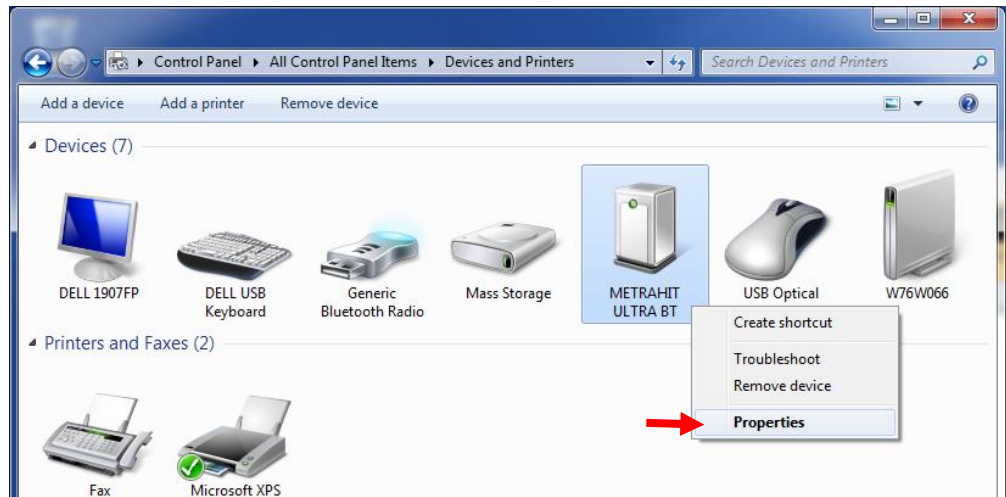


- ⇒ When the device has been added successfully, the following dialog box appears. Otherwise, follow the steps suggested by the Windows operating system.

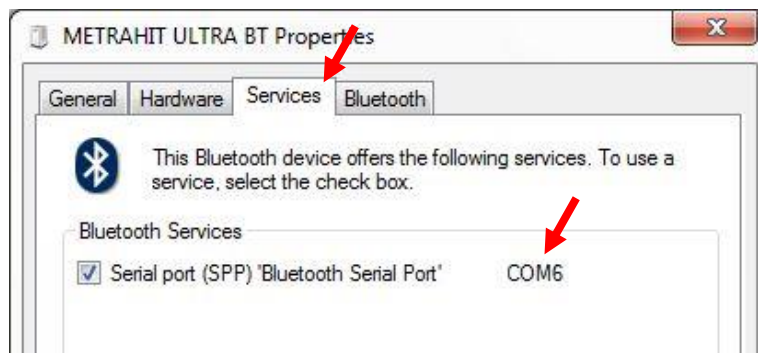


Determining the assigned COM ports

As the added BT ULTRA METRAHIT Multimeter(s) cannot directly be identified in the Windows Device Manager under Ports (COM & LPT), METRAWin 10 can not automatically find the device(s) when running the communication test. The following images show how you can determine the COM port(s) being assigned to the device(s) yourself:



or

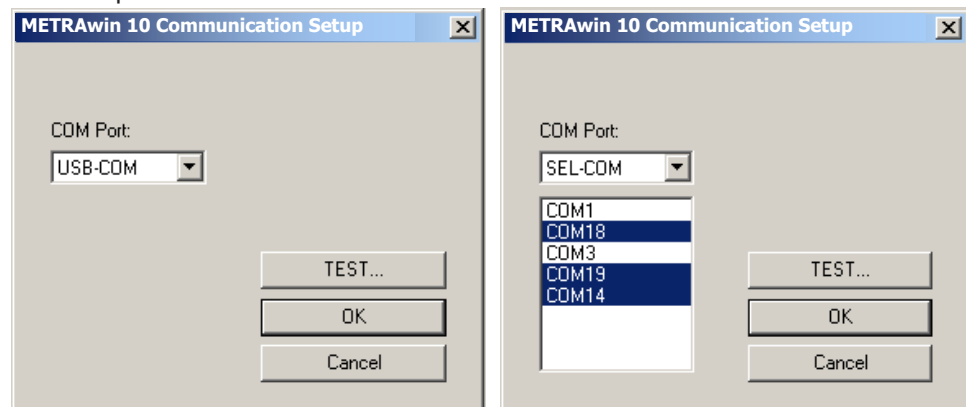



2.4 Executing the Communication Test

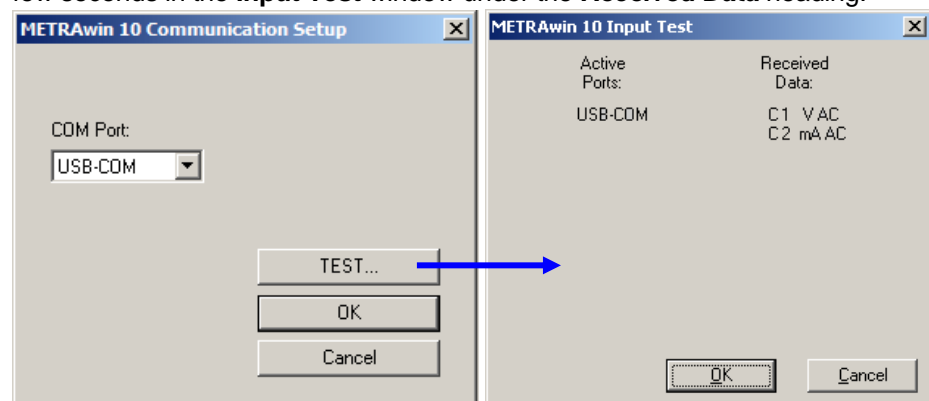
A communication test can be executed in order to test the connection between METRAWin 10 and the multimeter for correct functioning:

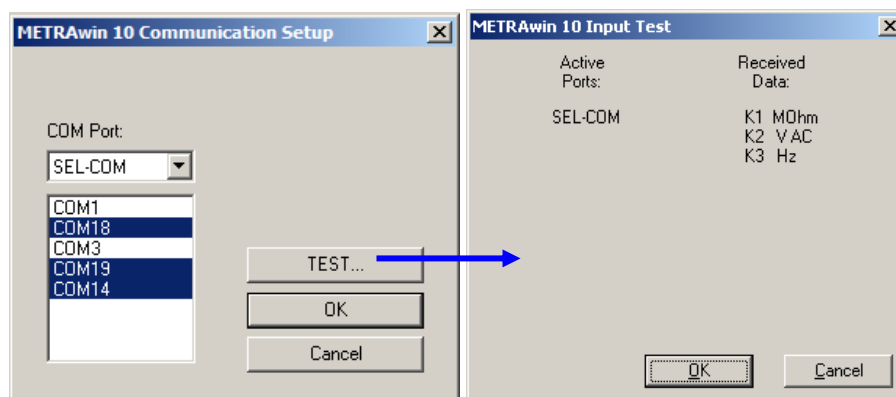
- ▶ Switch the multimeter(s) on and select any desired measuring function.
- ▶ Start METRAWin 10 and make sure that **METRAHIT Starline Series** is selected under **Device Type** in the **Device** menu.
- ▶ Open the **Communication Setup** dialog box by clicking **Communication** in the **Device** menu.
- ▶ When communicating with all multimeters via USB ports, then **USB-COM** can be selected as communication path. The program will then find itself all connected devices.

If at least one METRAHIT ULTRA BT communicates via Bluetooth, you have to choose **SEL-COM** as the communication path and in the displayed list of COM ports being available in the Windows Device Manager you must check by yourself all COM ports to be used:



- ▶ Start the communication test by clicking the **[TEST]** button.
 - ⇒ Switched-off **METRAHIT Starline Series** multimeters with status IR Standby will now turn on automatically.
 - ⇒ The  icon in the **tool bar** indicates active communication:
 - green lamp on = PC is transmitting data to the device
 - red lamp on = PC is receiving data from the device
 - ⇒ If communication functions correctly, the measured quantities acquired from the multimeters, as well as their measuring channel assignments, are listed after a few seconds in the **Input Test** window under the **Received Data** heading.





- These are automatically activated as measuring channels in the **Channels Setup** dialog box after closing the window by clicking the [OK] button.

If data are not received correctly, “- -” is displayed or an appropriate error message appears. If this is the case, check the above described parameter settings at the multimeter, and make sure that the adapters have been correctly connected and that their drivers have been installed.



Notes

The elements in the **Communication Setup** dialog box are identical to those in the **Input Setup** section of the **Channels Setup** dialog box, by means of which the communication test can also be executed.

In the measuring functions Power and Harmonics the METRAHIT ENERGY multimeters send nine measurands simultaneously. In order to recognize that all devices communicate, when several devices are connected, it is recommended, not to use these functions for the communication test.

3 Operation

3.1 Online Recording of Live Measurement Data

Before starting online recording, be sure to read all of the applicable notes included in the description of the **Program Functions** in section 3.5.2 regarding the **Start Online Recording** function in the **File** menu.

The following specific operating parameters and conditions apply to recording currently measured live data from the connected METRAHIT Starline Series multimeters to the PC by means of METRAWin 10:

Number of Channels

Up to ten multimeters can be connected to the PC, to which active measuring channels C1 through C10 will be assigned (in ascending order based on the COM port numbers assigned to the adapters).

Sampling Interval

The shortest selectable sampling interval is 1 second.



Notes

METRAHIT Starline Series with memory only: Measured values can be stored to memory at the multimeters at a minimum sampling interval of 0.1 seconds.

METRAHIT ENERGY only: Measured DC values can be stored to memory at the multimeters at a minimum sampling interval of 0.5 milliseconds..

Measuring Function

METRAHIT ULTRA With these models all measuring functions and ranges can be set under **Device : Setup Device** in METRAWin 10 independent of the position of the function selector switch.
METRAHIT ENERGY
METRAHIT MULTICAL

METRAHIT Starline Series Switching amongst the measuring functions and ranges available for each respective selector switch position is possible under **Device : Setup Device** in METRAWin 10.

METRAHIT WORLD The desired measuring function must be selected manually with the function selector switch and FUNC key at the multimeter.
METRAport 40S

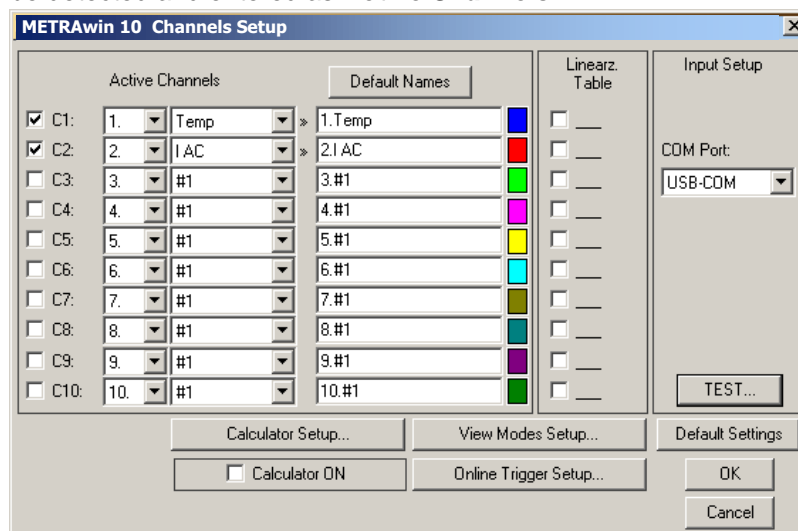
Measuring Range

As is the case with all devices which are equipped with auto-ranging, it is advisable to deactivate this function and to work with an adequately large, fixed measuring range. Erroneous measured values and/or recording gaps may otherwise occur as a result of range switching. This applies to recordings in device memory as well (→4.2).

Channels Setup

- Before you start online-recording, execute a communication test by clicking **[TEST]** in the dialog window **Channels Setup**.

⇒ The measured parameters being available at the connected multimeters will be detected and entered as **Active Channels**.

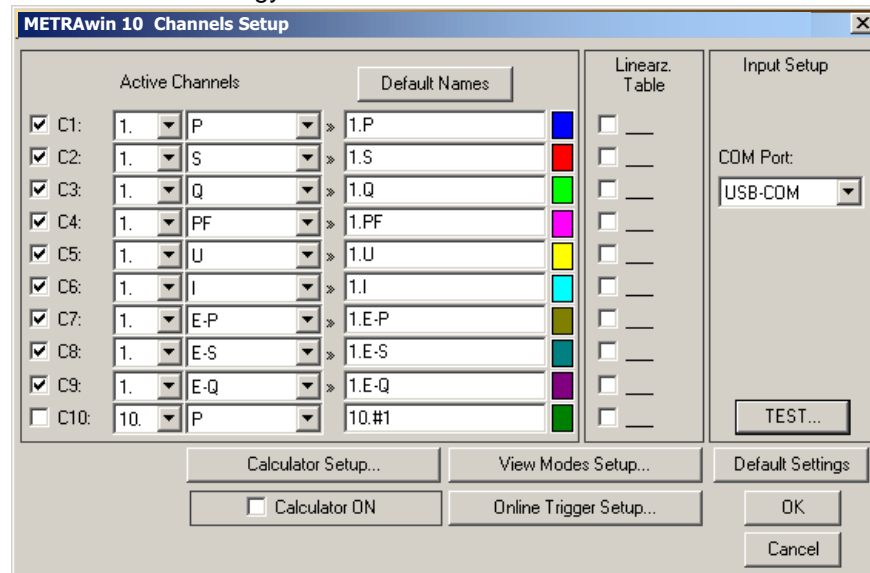


- If this automatic setting of the channels is not what you want, you can enable or disable channels or assign them to another device or another measured parameter.

METRAHIT ENERGY With this multimeter multiple measurands are available in power measuring function (W) and in harmonics analysis (📊).

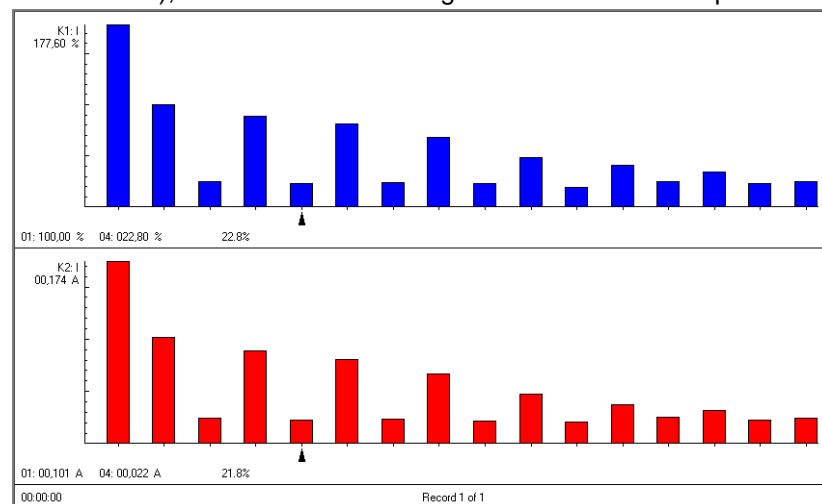
The following nine measurands are available in power measuring mode:

P	Active Power	S	Apparent Power
Q	Reactive Power	PF	Power Factor
U	Voltage	I	Current
E-P	Active Energy	E-S	Apparent Energy
E-Q	Reactive Energy		



The measured parameters of harmonic analysis can also be read completely and displayed as a frequency spectrum:

- Before you start online recording, select **FFT Bargraph** (📊) in the **View** menu.
- ⇒ When online record is started, the Total Harmonic Distortion THD, the Fundamental component H01 and the individual Harmonics H02 through H15 are displayed in two bar charts: above as a relative value in % (based on the fundamental), below as absolute magnitudes in Volts or Amps.



These values are updated every 5s, but not recorded continuously. After finishing the measurement, the last read data can be stored as a snapshot.

3.2 Reading Out and Visualizing Stored Data

Proceed as follows in order to read out and visualize measurements which have been recorded to memory at METRAHIT Starline Series multimeters:



Note

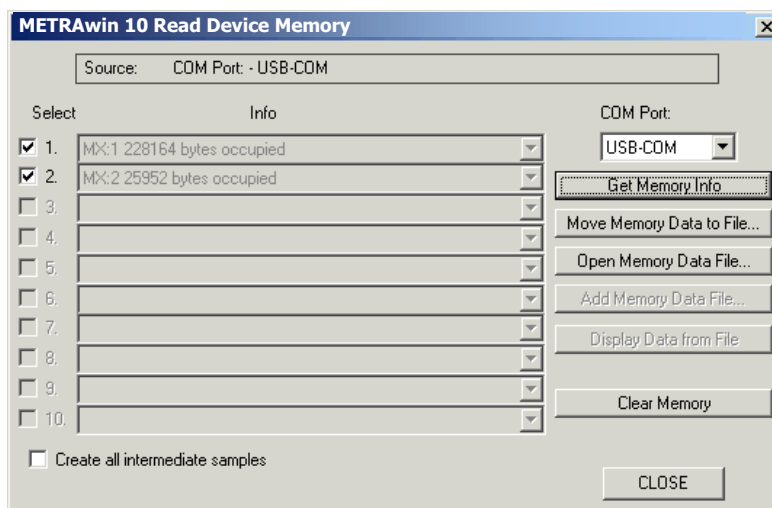
Recording mode must be stopped before data can be read out of the instrument.

Device : Read Memory

- Open the **Read Device Memory** dialog box by clicking **Read Memory** in the **Device** menu.



[F5]



The fields and buttons in this dialog box have the following functions:

COM Port:

As the communication path here is given the setting that you have made under **Device : Communication** (→2.4).

Get Memory Info

Starts a search for connected multimeters and queries their memory occupancy. The results are displayed in the **Info** fields.

Move Memory Data to File

Open the **Save as** dialog box in order to select a directory path and enter a **filename** for the memory data file to which the memory contents from the selected devices will be saved after clicking the [Save] button. The file type for memory data from these multimeters is always pre-specified as **MDM**.

Progress is displayed in the information bar at the main program window during read-out.

Open Memory Data File

The above described files can be opened again later by clicking this button.

The button has the same function as the **Memory Data File** item under **Open File** in the **File** menu, which is described in detail in section 3.5.2 under **Program Functions** in the **Help** menu.

Add Memory Data File

An additional memory data file can be added to an already open memory data file by clicking this button. This may also be the already opened file, for example if it contains several recordings.

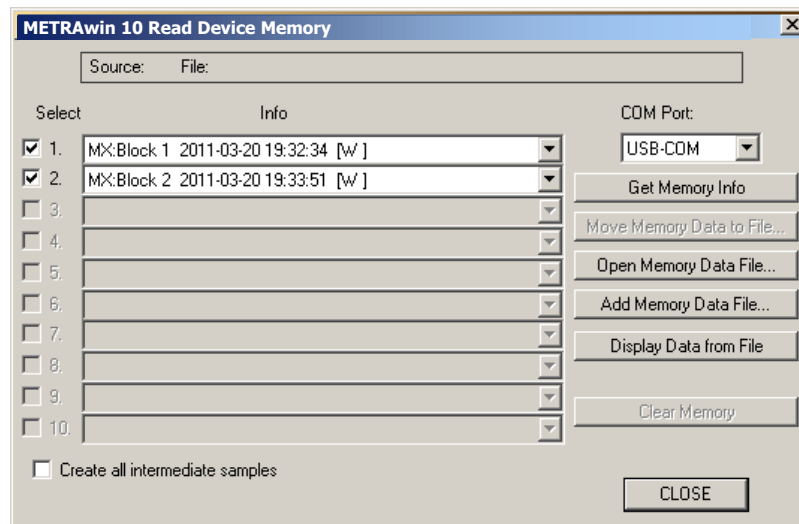


Note

Memory data files read out individually from device memory at METRAHIT Starline Series and METRAHit 12-29S/M/C/I multimeters can be combined with this function, so that they can be analyzed together.

Display Data from File

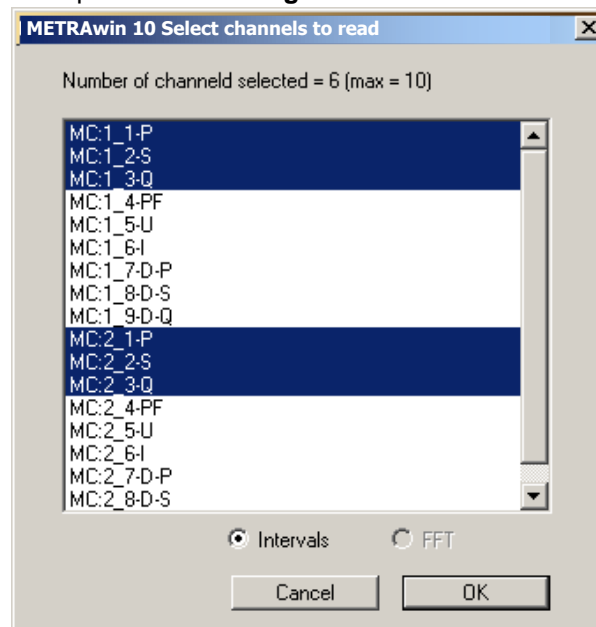
After memory read-out has been completed, or memory data files have been opened or added, the *measuring modes* and *recording start times* are displayed in the **Info** fields for the recordings (*data blocks*) which are contained in the respective multimeter's memory.



► **Select** the recording(s) being desired for analysis.

► Then click the [**Display Data from File**] button.

⇒ If at least one of the recordings contains several measurands, then a dialog box opens for **Selecting channels to read**:



All available measurands are listed here from which up to 10 can be selected as channels to be displayed by clicking with the mouse whilst holding the [**Ctrl**] key pressed. Confirm your selection with [**OK**].

⇒ Measured values from the selected recording(s) or measured quantity(ies) appear at the monitor and can be analyzed, edited and printed in various views, and finally saved together to a common measurement data file (*.MDF).

Create all intermediate samples

This checkbox is relevant only to memory data from METRAHIT ENERGY multimeters. If data have been recorded using "Hysteresis", then the samples have unequal time distance. By checking this box, the software will create all intermediate samples by interpolation according to the used interval setting.

3.3 Device Settings via the Interface

METRAHIT ULTRA With these devices all measuring functions and ranges can be set independent of
METRAHIT ENERGY the position of the function selector switch. The source functions of METRAHIT
METRAHIT MULTICAL MULTICAL cannot be controlled by METRAWin 10.

METRAHIT WORLD For these multimeters reading or remote control of the device setting is not available.

METRAport 40S The desired measuring function must be selected manually with the function selector switch and FUNC key at the multimeter.

METRAHIT Starline Series The measuring functions and ranges which are available for the position to which the function selector switch is currently set can be remote controlled with METRAWin 10.

Device : Setup Device



- Open the **Device Setup** dialog box by clicking **Setup Device** in the **Device** menu, by means of which remote control of the devices is possible.

The fields and buttons in this dialog box have the following functions:

Search

Starts a search for connected multimeters. The following is displayed in the **Connection** section after a few seconds:

- The **number** of detected devices (**2** in the example shown above)
- The selected **device address for this device** (**5** in the example shown above)
- The **device type** of the multimeter with the currently selected address

Read In

Reads in current settings and status information from the multimeter with the currently selected address, and displays them:

The following status information is available and will be updated every 5 seconds:

- **Current Time** from the real-time clock at the **Device** and the **PC**
- **Firmware version** of the operating software installed to the device
- **Battery voltage** in V
- **Memory Occupancy** as a percentage (%)*)
- **Recording status**: if recording is currently in progress, the LED symbol next to the memory occupancy field blinks*)

*) if the multimeter has this feature

Send Params.

Transmits the device setting parameters displayed in the **Parameters** section to the selected device, or to all multimeters of the same type.

METRAHIT Starline Series If the function selector switch at the device is set to a position for which the desired measuring function is not available, a corresponding message is displayed and the user is prompted to set the switch to the appropriate position.

ZERO/REL on Activates zero offset / relative measurements for the multimeter with the currently selected device address. From this point on, the value measured by the multimeter at this moment (< 50% of the measuring range!) is subtracted from measurements performed with this function.

ZERO/REL off Deactivates zero offset / relative measurements for the multimeter with the currently selected device address.

Start Memory Starts recording of measurement data to multimeter memory.

Stop Memory Stops recording of measurement data to multimeter memory.

Clear Memory Deletes recorded measurement data from multimeter memory.

Personalize... Opens the dialog box **Personalize Device**:



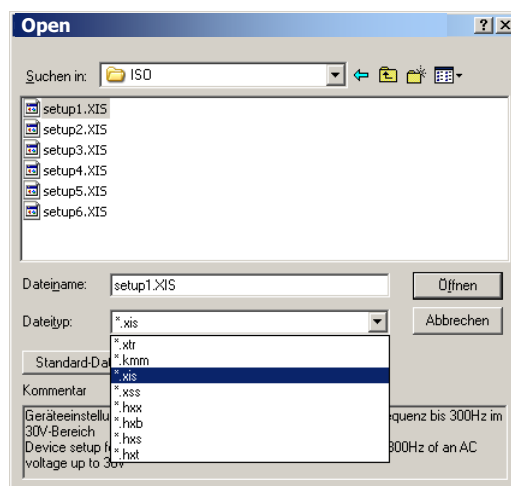
Up to 6 characters text (name, department, etc.) can be entered here and sent to the device. This text is displayed permanently at the turned-off device when the IR port is in standby mode (SEt> IrStb on). Otherwise, it appears only briefly when switching off.

Send Time Synchronizes the real-time clock at the currently selected device with PC system time.

Send Time to All Synchronizes the real-time clocks at all connected devices with PC system time. The time difference after synchronization is max. 0.1 s. The drift of the clocks at a constant temperature can be $\pm 2\text{s/day}$. The temperature effect is 50 ppm/K. At 10°C temperature difference equivalent to about 40s/day.

Setup Files **Save** Saves currently displayed parameters to a specific device setup file (*.xtr / *.kmm / *.xis / *.xss / *.hxx / *.hxb / *.hxs / *.hxt / *.xme / *.xmc / *.xmu / *.xml) for reuse.

Open Opens a dialog box for selection and read-in of a previously stored device setup file.



Parameters

The settings for the following device **Parameters** are given and can be changed and then sent to the device or stored in a file. Detailed descriptions of these parameters and their functions, as well as their setting ranges, are included in the operating instructions for the respective devices.

- **Meas. Mode**
- **Meas. Range**
- **Storage Rate** ^{*)}
- **Current Clamp Factor** ^{*)} (when Meas. Mode = ...*CLIP*)
Transformation ratio of the connected current transformer/sensor:
 - Current probe with current output, e.g. 1mA/A \Rightarrow 1:1000
 - Current sensor with voltage output, e.g. 100mV/A \Rightarrow 1:10
- **Cable Capacitance Constant** ^{*)}
required for the cable length measuring mode *m*
- **dB-ref** ^{*)} Reference value in Volts for ratio measuring mode *dB* (AC voltage levels)
- **Short-limit** ^{*)} Limit value in Ohms for continuity measuring mode *Beeper*, below which the acoustic signal sounds

**Note**

If measurement data are to be recorded (either online to the PC or offline to device memory), a fixed measuring range should always be used, because erroneous measurements may otherwise occur during automatic measuring range selection (auto-ranging).

Temp. Sensor... Opens the dialog box **Temperature sensor setup** with the following options:

- Selection of **Sensor** type
- Setting the **Lead resistance** for Pt100 sensor
- Selection of temperature **Unit**

Trigger... ^{*)} Opens the dialog box **Trigger setup** with the following options:

In **Storage Trigger** segment:

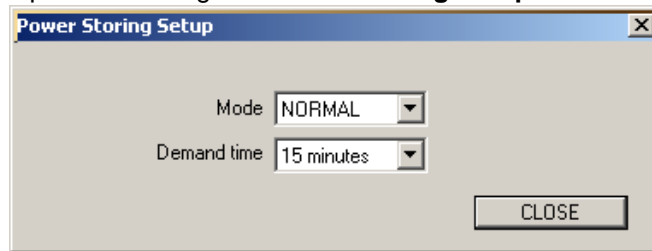
- **Hysteresis:** Minimum required change of measured value (in digits) in order to be recorded.
- **Trigger mode:**
 - > *STORE-IN* \Rightarrow only values inside the range between **Low level** and **High level** (in digits) will be stored;
 - > *STORE-OUT* \Rightarrow only values outside the range between **Low level** and **High level** (in digits) will be stored.
- **Storing time:** Defines the maximum duration for which the measured values will be recorded after meeting the trigger condition.

In **Event Trigger** segment:

- **Low level** and **High level** define the trigger levels for the event counter measuring modes *Events DC* and *Events AC*.

^{*)} if the multimeter has this feature

Energy...*) Opens the dialog box **Power Storing Setup**:



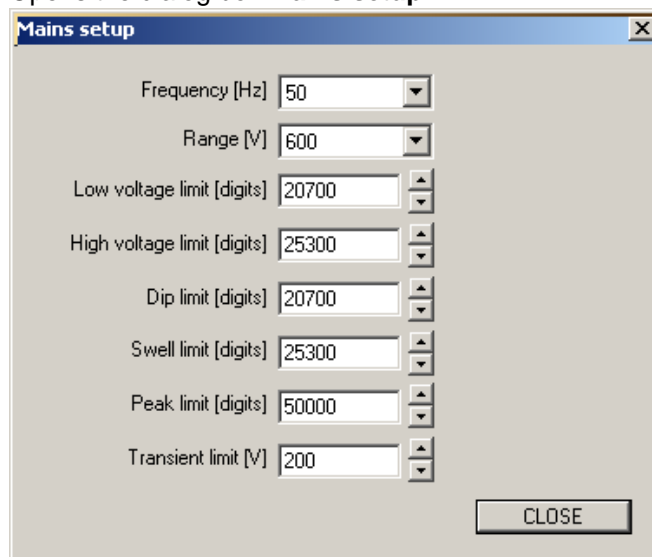
With parameter **Mode** you can select which type of measured values shall be recorded in *Power* measuring mode when storing is activated:

> **NORMAL**: The instantaneous values of current, voltage, active, reactive and apparent power and power factor will be registered according to the selected **Storage rate** (≥ 0.5 s).

> **DEMAND**: Always at the end of the time period being specified by parameter **Demand time**, the average values of active, reactive and apparent power will be registered.

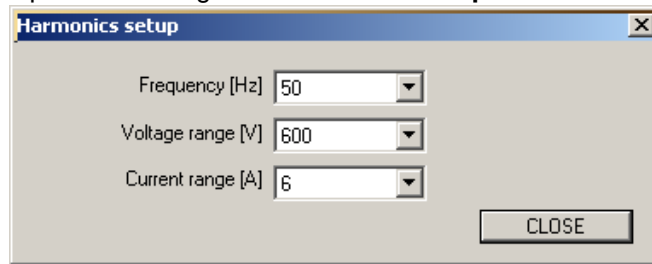
> **ALL**: All the above values will be stored.

Mains...*) Opens the dialog box **Mains setup**:



- **Frequency [50 Hz / 60 Hz]**: Selection of the nominal frequency of the mains voltage to be monitored is required for the calculation of the half-cycle TRMS value. Selection is irrelevant for DC signals.
- **Range [6,0000 V / 60,000 V / 600,00 V]**: A fixed voltage measuring range must be selected for this function.
- **Low voltage limit [00000 ... 20700 ... 60000 digits]** and **High voltage limit [00000 ... 25300 ... 60000 digits]** define the tolerance band for under/over voltage detection based on the continuously recorded V ACDC value.
- **Dip limit [00000 ... 20700 ... 60000 digits]** and **Swell limit [00000 ... 25300 ... 60000 digits]** define the thresholds for detection and event triggered recording of short voltage dips and swells based on the half-cycle TRMS value.
- **Peak limit [00000 ... 50000 ... 100000 digits]** defines the absolute threshold value for detection and event triggered recording of voltage waveform peaks (>1ms duration) based on the sampled voltage signal (1.2 kS/s).
- **Transient limit [200 ... 600 V]** defines the trigger magnitude for detection and event triggered recording of voltage transients (0.5 ... 5µs duration) relative to the momentary waveform value.

Harmonics... ^{*)} Opens the dialog box **Harmonics Setup**:

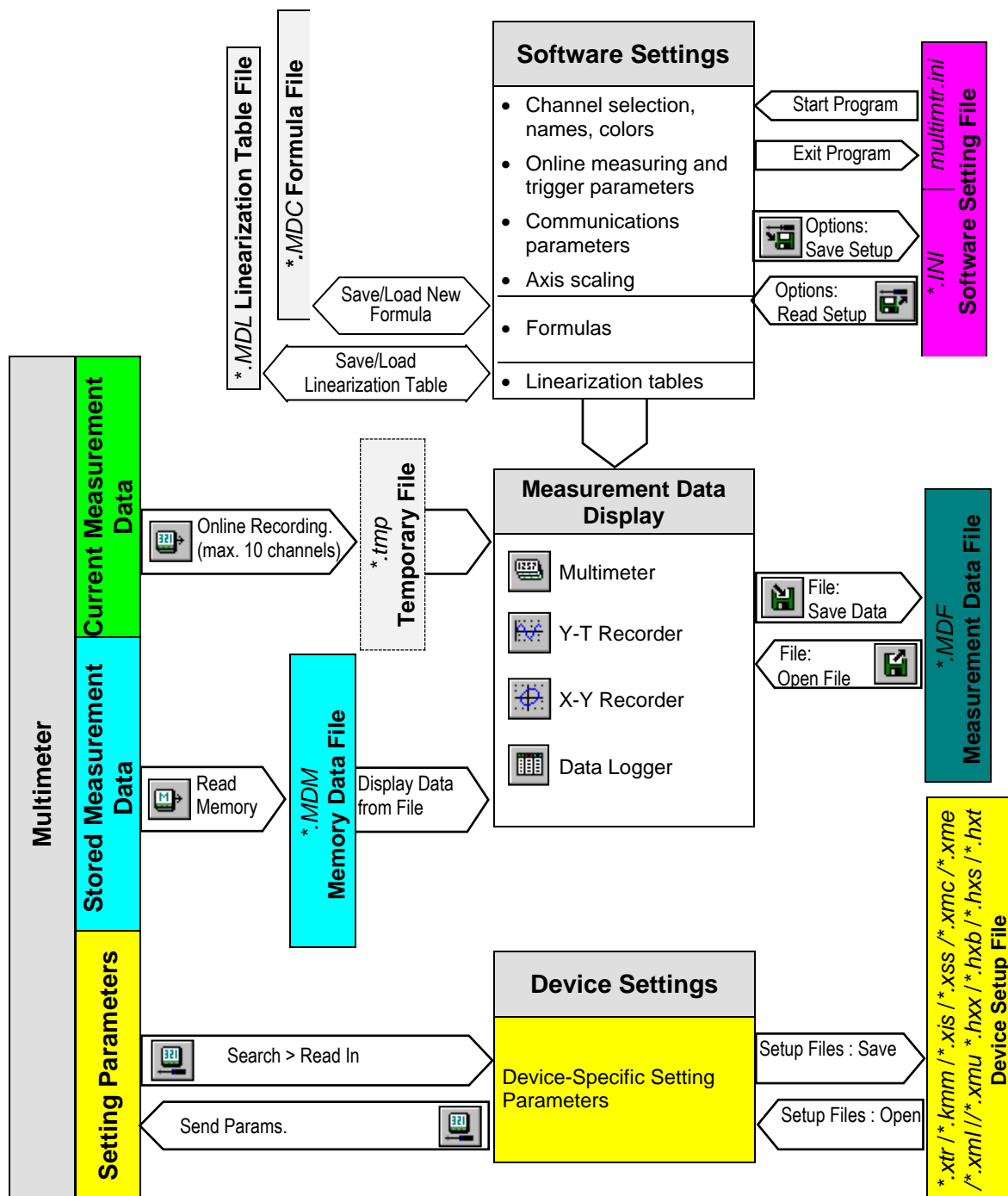


- **Frequency** [16,7 / **50** / 60 / 400 Hz]: In order to analyze the measuring signal's harmonics, its fundamental frequency must be specified with this parameter.
- **Voltage range** [600 mV / 6 V / 60 V / 600V / **Auto**] and **Current range** [600 μ A / 60 mA / 600 mA / 6 A / 10 A / **Auto**]: Due to the fact that at the device the MAN/AUTO key is used for another purpose in the harmonic analysis function, it cannot be used to switch back and forth between automatic and manual range selection. For this reason, these parameters are used to specify a measuring range for harmonic analysis.

^{*)} if the multimeter has this feature

4 Appendix

4.1 Schematic Diagram of Program Functions

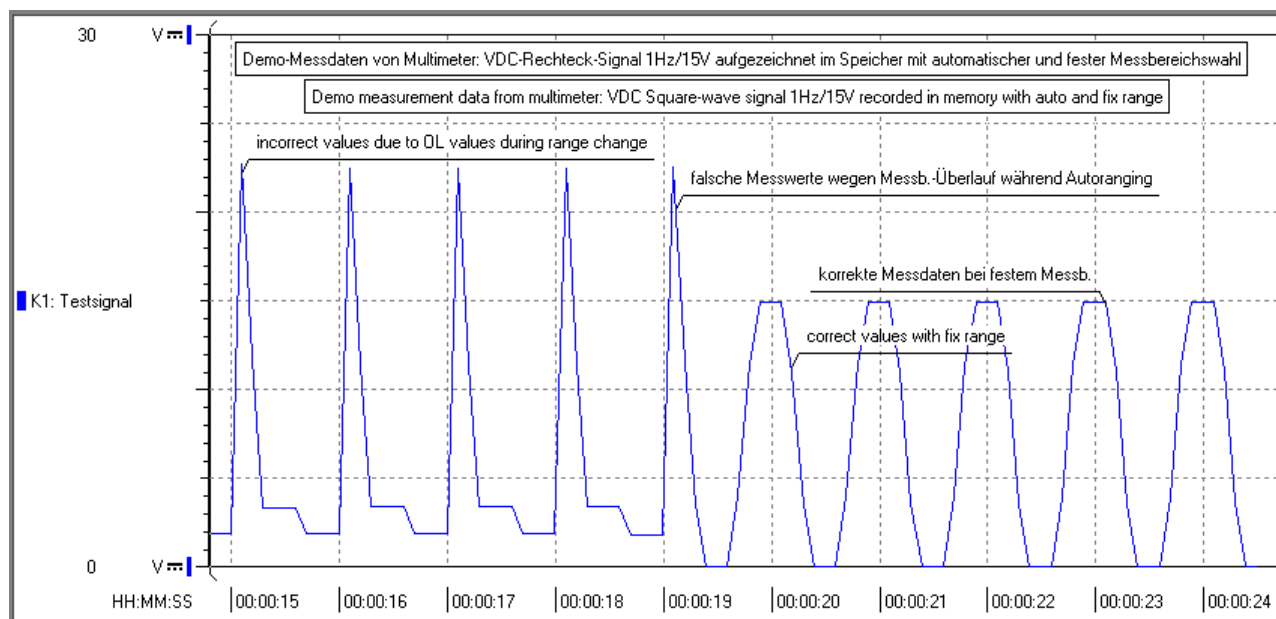


4.2 Examples of Measurement Data

DEMO_R1.MDF

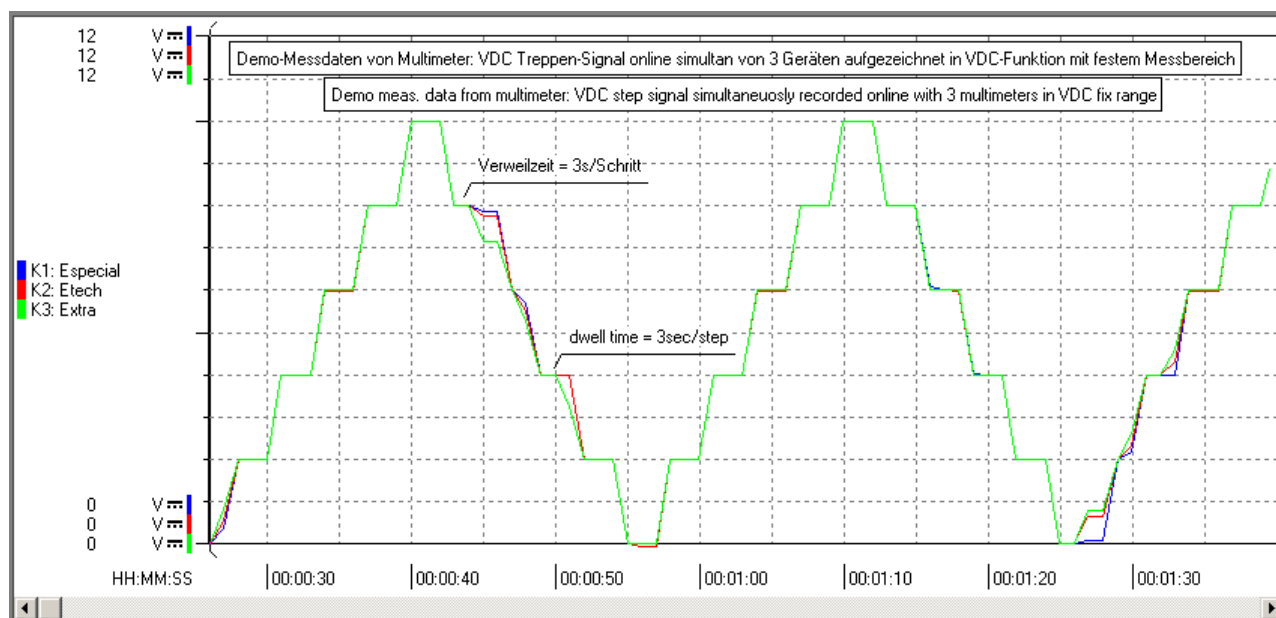
METRAWin 10 contains some sample data files for these multimeter types:
Rectangular signal recorded in the device memory with automatic and fixed measuring range selection.

It is shown here that automatic range selection can result in false values and therefore data should be recorded with a fixed range if possible.



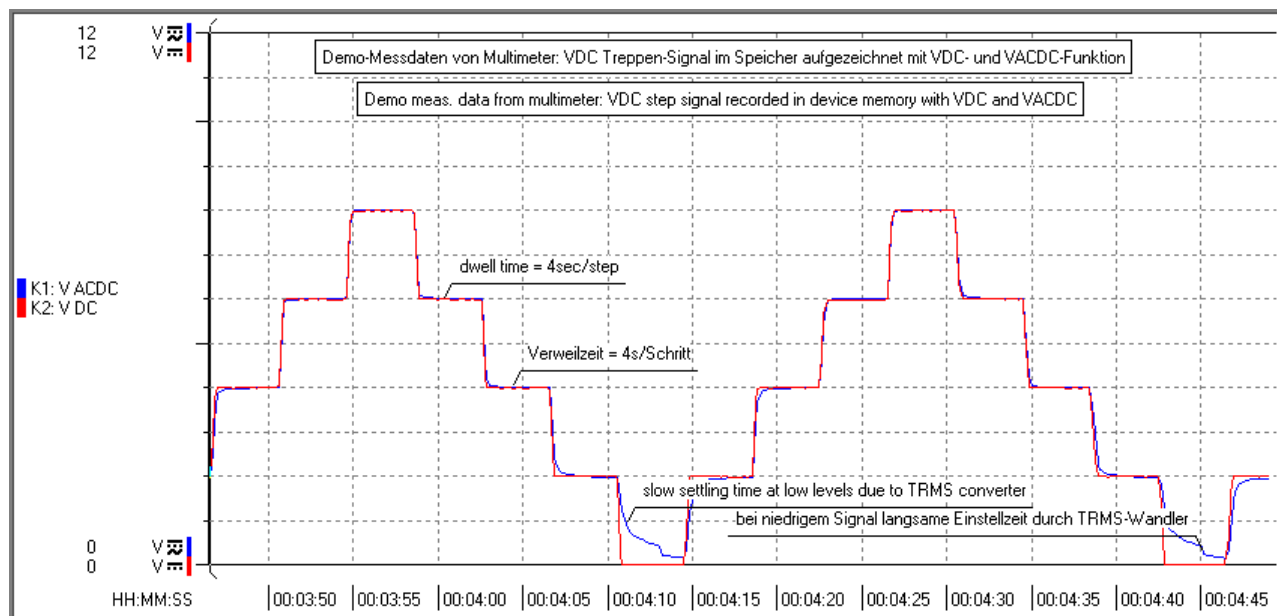
DEMO_R2.MDF

This measurement example shows the synchronicity of channels for simultaneous online recording of the measured values of three multimeters.



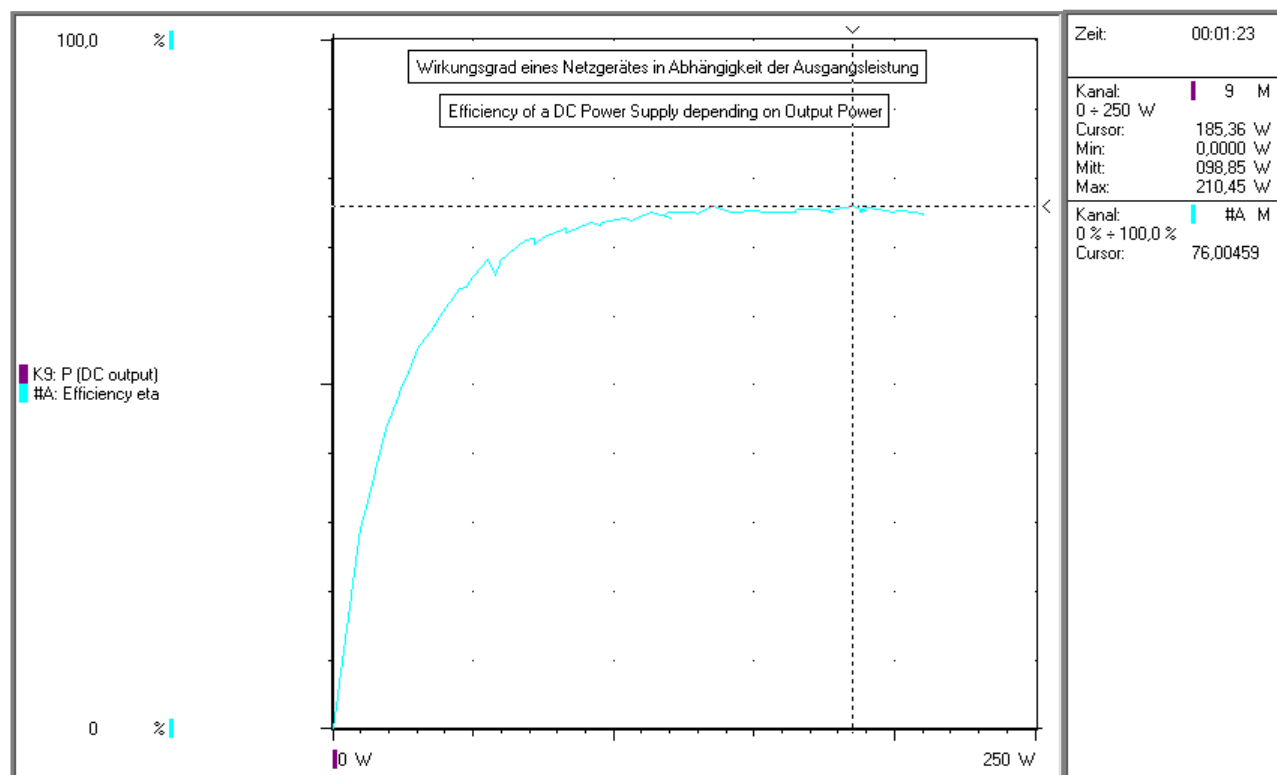
DEMO_R3.MDF

This example shows that at low measurement signal in the ACDC and AC measurement functions longer setting times are resulting from the TRMS converter.



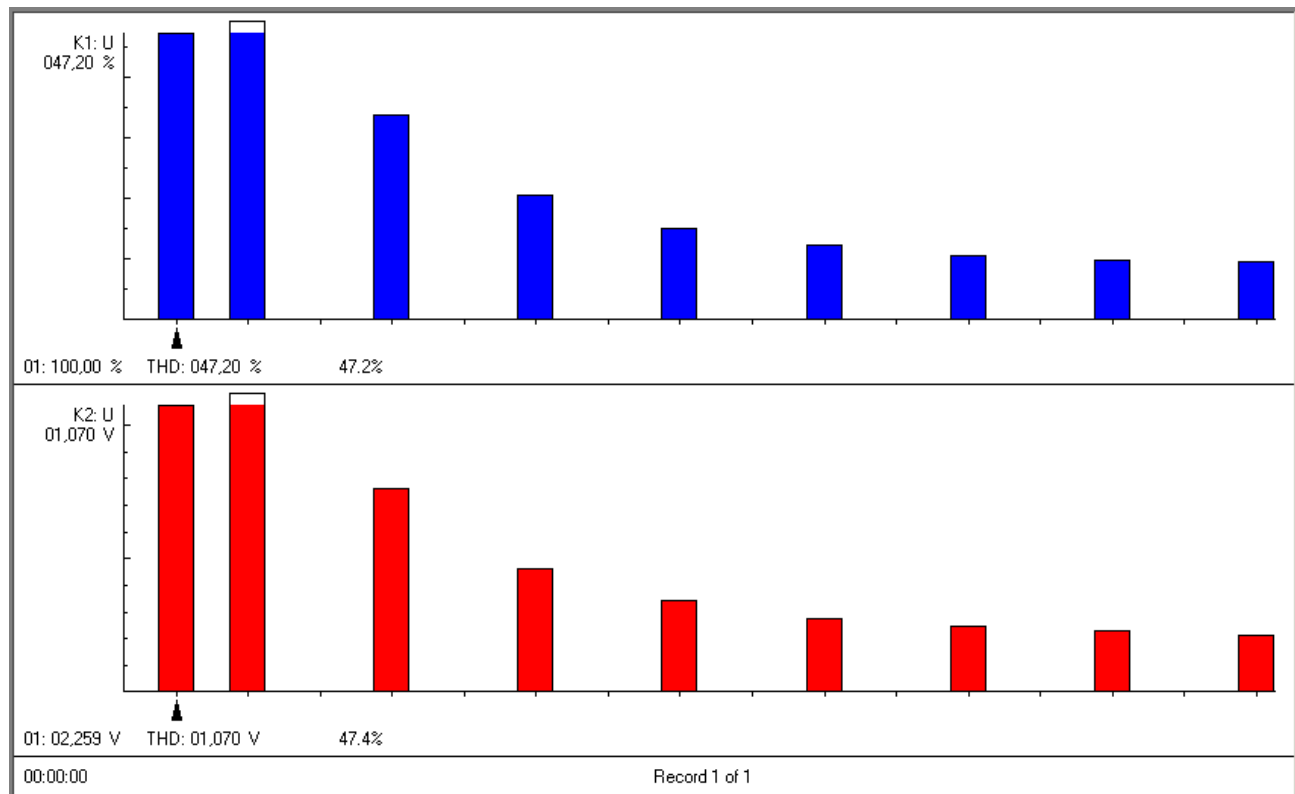
DEMO_R4.MDF

In this example, two **METRAHIT ENERGY** multimeters have been used to record online various power parameters simultaneously at the AC input and DC output of a power supply. By means of the Equation Editor the efficiency η = output active power / input active power is calculated and displayed in the XY view mode as a function of the extracted output power.



DEMO_R5.MDF

In this example, the measurement data of the harmonic analysis have been read online from a **METRAHIT ENERGY** multimeter and are displayed in view mode FFT Bargraph. It shows the snapshot of the spectrum of the voltage harmonics of a square wave signal, in the upper diagram with relative values (in% of fundamental) and in the bottom graph with absolute values (in volts).

**DEMO_R6.MDF**

The file shows data of a mains voltage monitoring recorded by METRAHIT ENERGY in the function PQ Mains, with short voltage dips and swells as well as peaks and spikes (transients). To see the details, zoom in by stretching the time axis. The used device settings can be found in the Device Setup file PQ Mains.XME.

