

PQAgent

Software for configuration of the
power quality measuring system

PQA450

User's manual

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Regard DIN 34!

We reserve the right to implement technical changes at any time, particularly where these changes will improve the performance of the instrument.

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1 General

The PQA450 system allows a comfortable measurement of power quality in power supply networks and as well as an evaluation and visualisation of power quality factors. The measured data can be stored either on the hard-disk of an conventional PC or at the special network data logger NDL5.

The following values are measured while working with PQA450:

- ✓ R.m.s. values of currents of voltages (four channels)
- ✓ phase angles of currents and voltages (three channels)
- ✓ Harmonics of currents and voltages (up to 40th) as well as THD's
- ✓ Apparent, active and reactive power components as well as power factor (three channels)
- ✓ An additional analogue and digital inputs (four or eight channels)

The resolution of during recording of these values can be chosen from 200ms up to 5 minutes. The later evaluation can be carried out with resolution up to 15 minutes.

The short-term flicker values are recorded with a changeable resolution from 1 second up to 10 minutes.

The signalling voltages are saved each 200 ms.

Additionally there is standing recording of half-wave r.m.s. values available. However, they can be shown only as a part of a voltage dip or a swell. The voltage dips can be evaluated after measuring with changeable reference voltage and threshold.

2 Configuring PQA450

The input signals (voltages and currents) as well as additional analogue and digital signals are measured with a power meter LMG450. There are two ways to store the measured values. One can use a conventional PC. The data transfer is fulfilled via USB or GPIB link. In this case the measurement will be started from PC by PQAgent. While measuring you need a PC to take the data and store it at the hard-disc-drive. The measurement process can be stopped from PQAgent only.

The more comfortable way to measure power quality factors is usage of a network data logger NDL5. In this case you don't need a PC near LMG450. You configure the measurement and start it either over Ethernet or manually. The data will be stored at the hard-disc of NDL5.

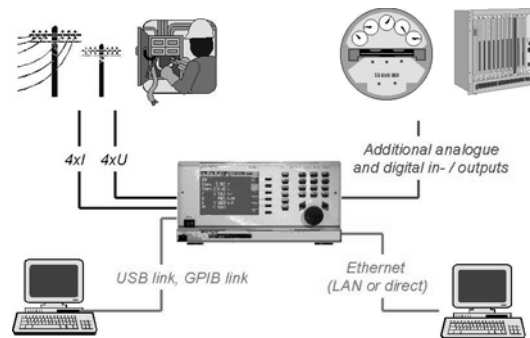


Fig. 1

The main purpose of the PQAgent is to configure the measurement of the power quality factors. While operating with PQAgent the user is able to carry out the following tasks:

- ✓ Setting up the parameter of measurement as measuring ranges, thresholds, resolution etc.
- ✓ Defining which configuration (direct measurement or NDL5) you intend to use
- ✓ Managing of available memory
- ✓ Starting the measurement
- ✓ Asking the status of measurement projects while using a NDL5
- ✓ Stopping the measurement while using a USB- or GPIB-Link.

3 Hardware requirements

You need (at minimum):

- ✓ Pentium 233 MHz
- ✓ 32MB RAM
- ✓ Win 95, Win 98, Win NT, Win 2000 or Win XP
- ✓ Graphic resolution 1024x768
- ✓ About 10MB memory for configuration software, DLL's and drivers

- ✓ Hard disc as required (when storing all data with resolution 200ms, you need about 5GB each Week)

The recommended configuration:

- ✓ Pentium III 1GHz
- ✓ 64 MB RAM
- ✓ Win 95, Win 98, Win NT, Win 2000 or Win XP
- ✓ Interfaces: Ethernet, USB or GPIB
- ✓ Resolution 1024x768
- ✓ About 10MB memory for configuration software, DLL's and drivers
- ✓ Hard disc as required (when storing all data with resolution 200ms, you need about 5GB pro Week)

4 Installation

The software is delivered on CD-ROM. There are PQAgent and PQViewer software packages and as well VISA-Driver on this CD-ROM.

If you are going to use a direct connection between LMG450 and computer, you should install the VISA driver before you install PQAgent software. You find the VISA driver in the directory „\VISA26\“. Start this file to install the driver. Take care that if you have already installed the VISA-driver 2.5 from National Instrument or a driver from Agilent or Tektronix, you have to remove it from your system to guarantee a correct operation of PQAgent. You are able to do this by using the uninstalling tools of MS Windows.

For installing the PQAgent software start „\PQAGENT\SETUP.EXE“. If you have already installed a previous version, it will be uninstall automatically. After uninstalling start the setup.exe again to install the new version.

After installing you have to restart your computer.

5 Starting the PQAgent

The following window appears after starting the PQAgent

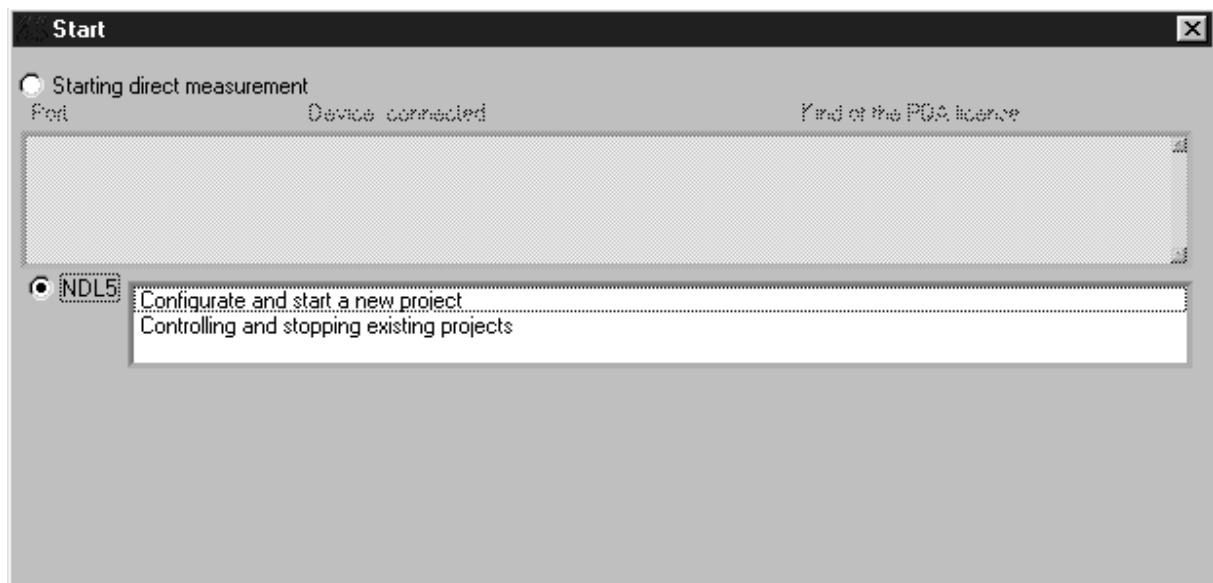


Fig. 2

5.1 Starting direct measurement

Important: You need a valid connection between your PC and LMG450. The following parameters must be set up at the LMG450:

Device:	COM A with a 1:1 RS232-Cable or COMB with a NULL-Modem Cable
Baudrate:	115200
EOS:	<lf>
Echo:	Off
Protocol:	RTS/CTS

The LMG450 communicates with PC by RS232. The LMG450 connected to PC over a serial interface will be found and shown as an active device. However it doesn't mean that you can use the serial cable only to organise the data transfer to your PC. The transfer capability of serial communication under MS-Windows is not enough to guarantee the safe operation of the PQA. That is why we recommend to use a special USB-RS232 cable.

In this case you must install the specific driver of the USB-RS232 cable. After installing, the USB-link will be used as an additional virtual serial port.

If you are going to use the GPIB-Link, you have to set up an appropriate address at the LMG450.

After choosing “Starting direct measurement” the automatic search of all available devices will be started. The connected measuring devices which are capable to operate with PQA450 will be shown.

For a repeat search (if, for instance, the connection was false) you have to switch to NDL5 and back.

After choosing the device which will operate with PQA, you must click double at this line to start the configuring measurement.

The configuration is described in the Section 6. The description of measurement process is given in the section 7.

5.2 Working with the NDL5

If you choose this option, you can choose between two possibilities.

5.2.1 Configure and start a new project

After choosing this line and clicking it double you will be leaded to the main menu to set up the measuring parameter (see Section 6)

5.2.2 Controlling and stopping existing projects

Here you have an opportunity to see all projects situated at the hard-disc of the NDL5. After you double click onto the second line in NDL5 box (Fig. 2) you need to choose the appropriate drive. Then the following table appears (Fig. 3)

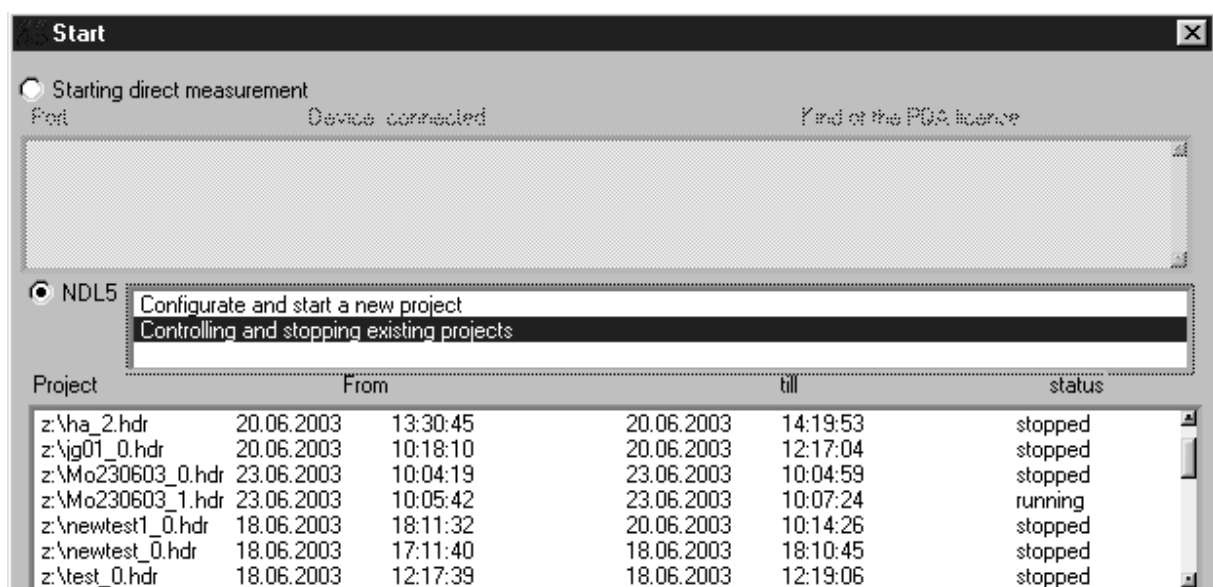


Fig. 3

Here you can see the project name (first column), the date, the time of starting and finishing as well as the status of the project. This can be *running* and *stopped*. You can stop the project with status *running* by means of the double clicking onto the appropriate line. **Attention.** Status *running* doesn't mean that the measurement is still running. Due to a sudden switching the NDL5 off or due to a software updates there could be projects with status *running* at the hard-disc of the NDL5.

Note, that stopping of the running measurement this way fails sometimes because the distinctive features of some operational systems. That is why it is strongly recommended to stop the currently running measurement manually and use the operation above mentioned only to change the false status of the measuring project.

Attention:

You are not able to change the settings of LMG450 while measuring with PQA450. Don't attempt to do it.

6 Configuring the measurement

After choosing the kind of the PQA450 operation, you are able to set up the measurement parameter in the main window of PQAgent. This chapter is valid either for direct operational mode or for operation with NDL5.

6.1 Configuration

Under this menu section you can save the configuration or load an existing configuration file.

6.2 PQ project settings

You can set up the parameter from menu the „PQ Project settings“ (Fig. 4).

6.2.1 Project name

First of all you have to give your project name. The project name means the file with extension *.hdr. It is the header of a power quality project and contains all important information about the measurement to be started. The measured data will be stored in the same directory and will have the same basis name. You were asked to enter the name right after you have chosen the operational way of the PQA450. You can change this name from the submenu point “Change project name”.

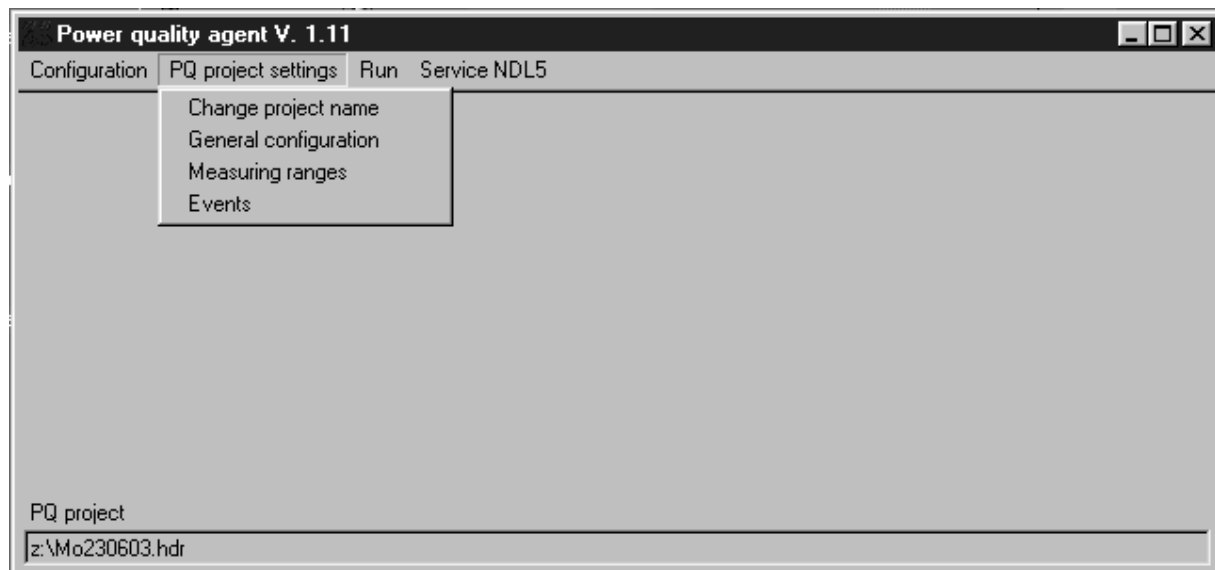


Fig. 4

6.2.2 General configuration

After choosing this menu point the following window appears (Fig. 5).

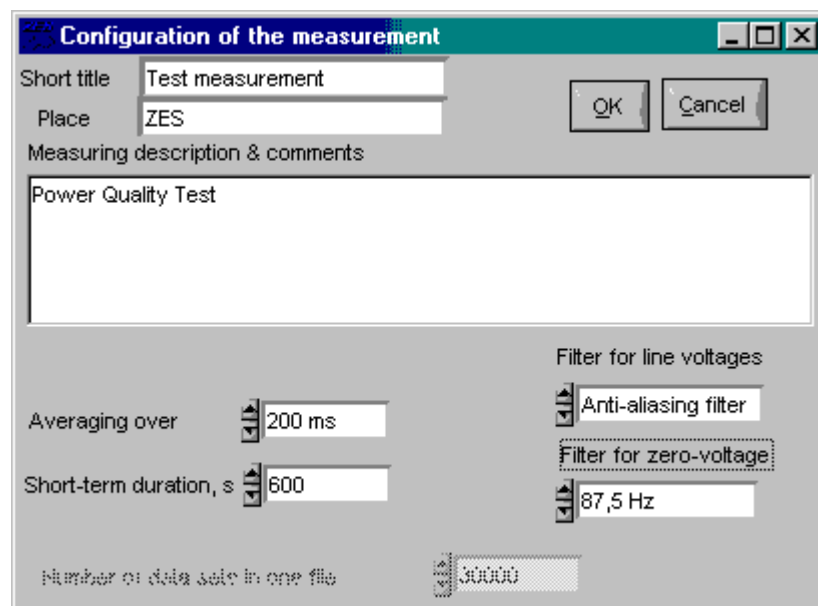


Fig. 5

The short title, place and the description are informative fields which will appear later in measurement protocol.

Averaging over: It is the time resolution of r.m.s. values. This parameter is important for the further evaluation. At the one side the fine resolution give more information about power quality. At the another hand. The resolution impacts the evaluation process. That is why it

must be fine enough to investigate the power quality correctly but not too high in order to prevent the problems when evaluating the results.

Note: The half-wave r.m.s. values of line voltages will be saved independent on this resolution.

Short-term duration, s defines the resolution for short-term flicker value (Pst). It should equal 10 minutes according the existing standards. But for some investigating purposes it is necessary to use a more fine resolution (down to 1 s). It can be set up in this field.

Filter for line voltages. It is an additional filter for the channels 1 till 3 of LMG450. Recommended: Anti-aliasing filter

Filter for zero-voltage. Additional filter for the fourth channel. Recommended: Anti-aliasing filter.

6.2.3 Measuring ranges

Here you can set up the measuring ranges, scale factors and the parameters of external clamps with voltage outputs.

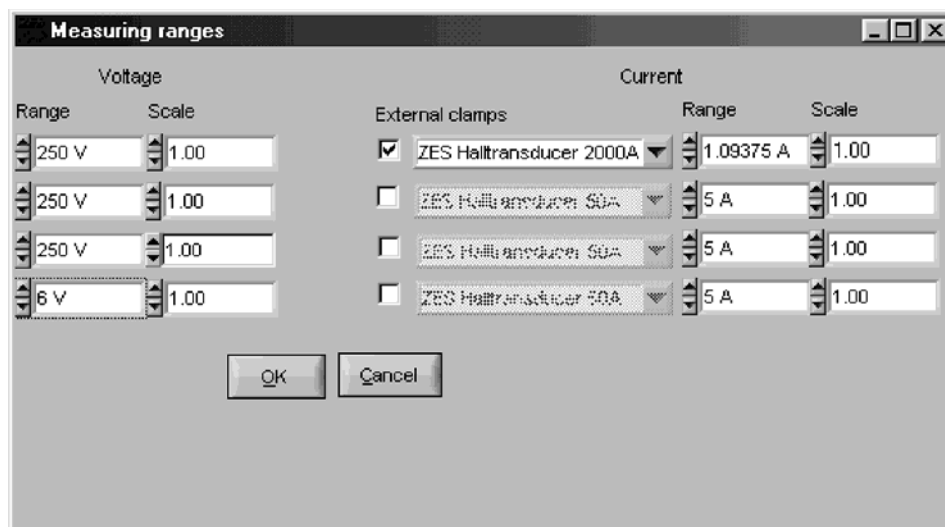


Fig. 6

If you are going to use an external voltage clamp, you have firstly connect it to LMG450. At the display of the LMG450 you can take information about these clamp. Than you have to choose the same type in PQAgent and select the necessary measuring range. Take care that you choose the same type. Otherwise you obtain the false results.

If you intend to use an external clamp with a current output, you have to enter the ratio of the clamp into field „Scale“ in order to recalculate the measured values.

6.2.4 Events

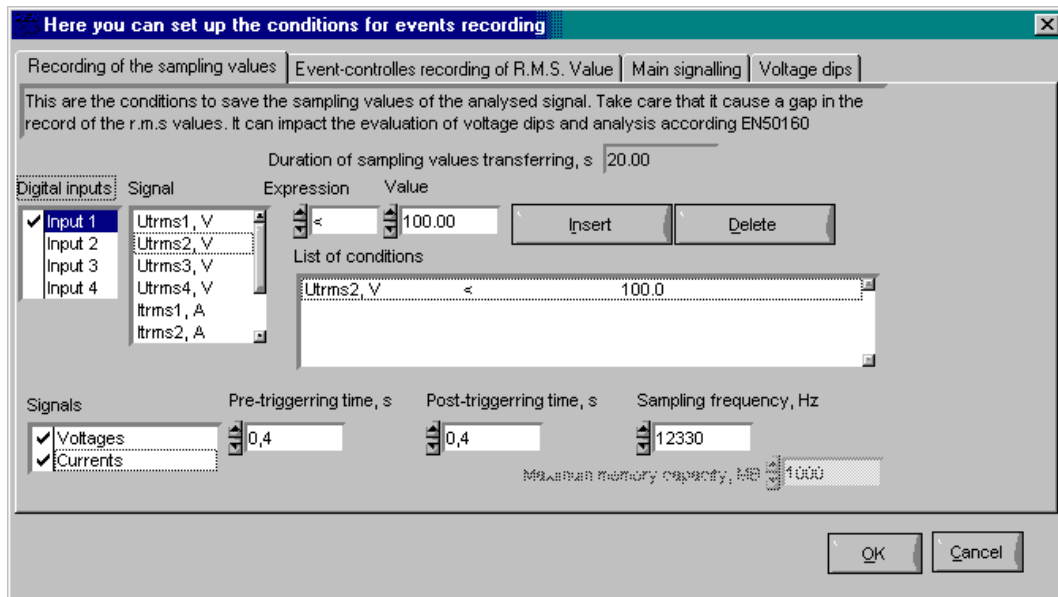


Fig. 7

There are four different kinds of events which can be detected and recorded during the measurement:

- ✓ Sampling values of line voltages and currents. The waveforms can be saved with a pre-defined sampling frequency, pre- and post-triggering time.
- ✓ R.m.s. values with resolution of 200ms independent on the main resolution
- ✓ Signalling voltages with resolution 200 ms
- ✓ Voltage dips and swells with resolution 10 ms.

6.2.4.1 Recording of the sampling values

Firstly you have to set up the triggering condition for recording of the waveforms

Secondly you must define which signals you want to save (voltages, currents or both)

Thirdly you define the pre- and post-triggering time

Finally you choose the sampling frequency. This option is available if you have LMG450 with an extended memory. Take care to set up the proper memory configuration of the LMG450.

There are the following conditions which you can use:

- ✓ Digital inputs: The waveforms will be saved if the chosen digital input become high. The “order” combination of several inputs is possible.

- ✓ The r.m.s. values of measured signals over 200 ms can be used as triggered value. In order to set up the condition you need:
 - Choose the signal from the list “Signal”
 - Choose the comparison type from “Expression”
 - Enter the signal level from “Value”
 - Push “Insert”

In order to remove a condition from the list use the “Delete”-Button. You can use up to three conditions connected with “order”.

Please note, that the recording of sampling values causes a gap in the recording of the r.m.s. values and, therefore, impacts the evaluation according EN50160 as well as the analysis of voltage dips. The length of this gap depends on the sampling frequency, number of stored waveforms, pre- and post-triggering time. It will be calculated immediately after changing one of these parameter and will be shown in the window.

6.2.4.2 Recording of the r.m.s. values

Here you can define the conditions for an additional recording of r.m.s. values with resolution 200 ms. If the duration of an event exceeds the value from the field “Maximum duration of an event, s” than it will be divided into portions of several events. The settings are identical to the ones for sampling values and can be seen on Fig. 8.

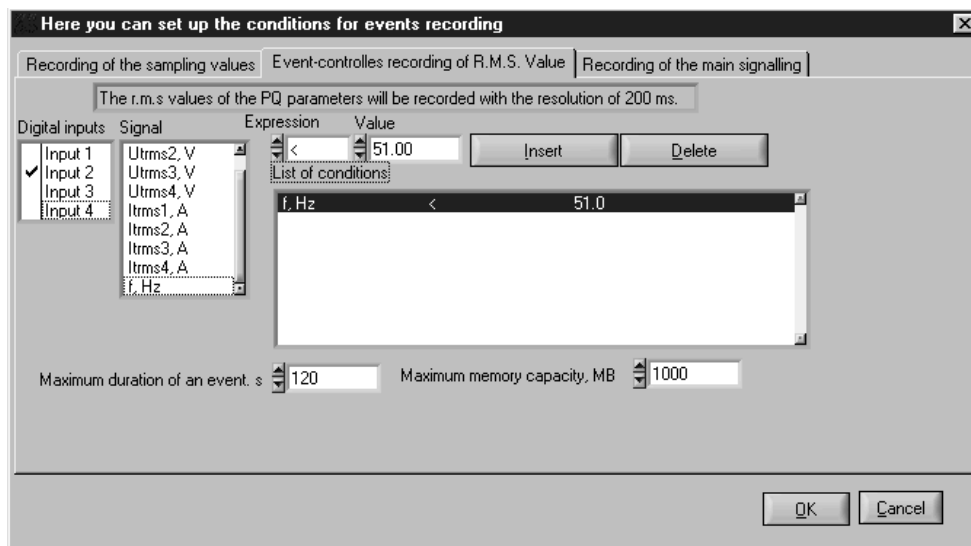


Fig. 8

6.2.4.3 Recording of main signalling

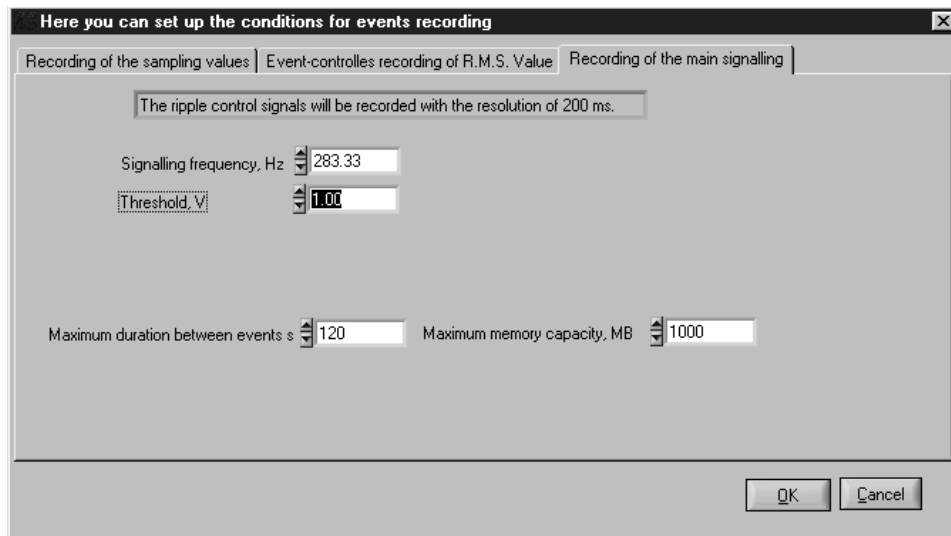


Fig. 9

PQA450 is able to register the signalling voltages which were sent by the supply utility in order to control the energy counter, lighting equipment etc. Signalling voltage means a signal portion from the 20 Hz band around the centre frequency, which must be defined in advance. If this signal portion exceeds the threshold the sequence will be saved during the time which can be set in the field "Maximum duration between events".

6.2.4.4 Voltage dips and swells

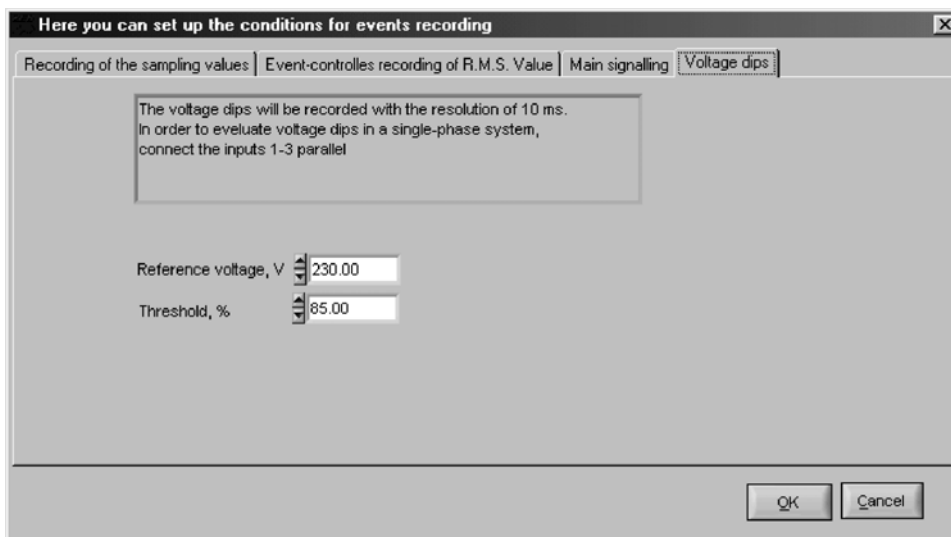


Fig. 10

Here you have to define the reference voltage and the threshold to evaluate voltage dips and swells. These values can be changed later in PQView. The half-wave r.m.s. values of three voltages are the basic for the evaluation. Note that a voltage dip is starting if **one of the line voltages** (channel 1 till 3) becomes lower than threshold. It continues until **all three voltages**

are greater than the threshold. That is why, if you measure in a single-phase system, you have to connect all three channels parallel to carry out the correct evaluation.

6.3 Starting the measurement

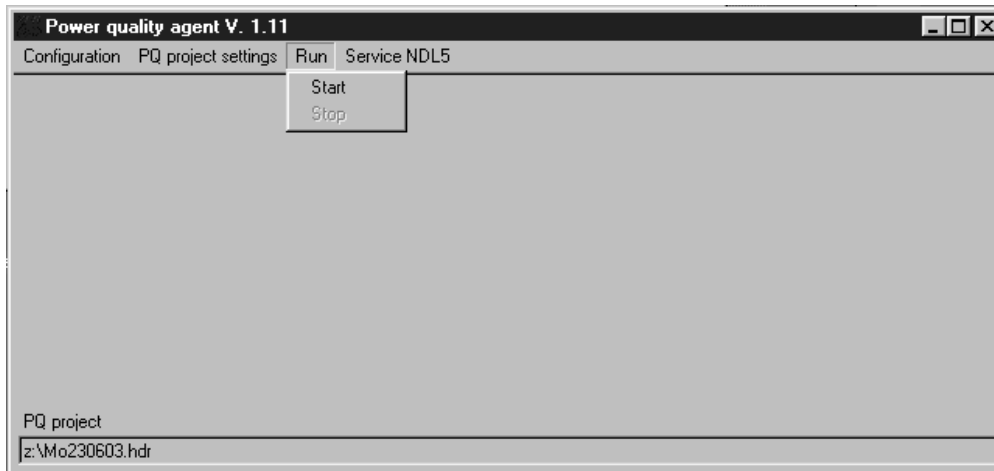


Fig. 11

From here you start the measurement. If you use a direct connection LMG450 to your PC, the PQAgent must stay active during the measurement to record the data. If you use NDL5 for data logging, you can quit the program after an appropriate message. If there are some projects with status “*running*” the NDL5 found, you must change it or stop the measurement.

7 Measurement without PC

7.1 Starting a pre-configured measurement

The functionality of the PQA450 allows an automatic starting of the data recording with NDL5. You can create a configuration and start a new measurement. After stopping the measurement manually or switching the system off, the configuration file will stay on the hard-disc of the NDL5. After a next starting of the NDL5, the new measurement with an old configuration will run automatically.

7.2 “Mother” and “child” projects

After creating a new configuration with PQAgent and copying the project onto hard-disc of NDL5 two files will be created. One file has the same name as the name from the PQAgent. This is a mother project which contains the configuration. The second name will be created after starting and has the following name: “name_0.hdr”. If you stop this measurement, turn

the NDL5 off and turn it back, the new measurement with the header “name_1.hdr” will be running. Name_0.hdr and name_1.hdr are so-called child project.

Project	From		till		status
z:\ha_2.hdr	20.06.2003	13:30:45	20.06.2003	14:19:53	stopped
z:\ig01_0.hdr	20.06.2003	10:18:10	20.06.2003	12:17:04	stopped
z:\Mo230603_0.hdr	23.06.2003	10:04:19	23.06.2003	10:04:59	stopped
z:\Mo230603_1.hdr	23.06.2003	10:05:42	23.06.2003	10:07:24	running
z:\newtest1_0.hdr	18.06.2003	18:11:32	20.06.2003	10:14:26	stopped
z:\newtest_0.hdr	18.06.2003	17:11:40	18.06.2003	18:10:45	stopped
z:\test_0.hdr	18.06.2003	12:17:39	18.06.2003	12:19:06	stopped

Fig. 12

Here you can see the child projects Mo230603_0.hdr and Mo230603_1.hdr which were created from the mother project Mo230603.hdr.

7.3 Stopping the running measurement

You can stop the running measurement **using the keys of LMG450** next way:

1. Push the button **IF/IO** of LMG450
2. Push the soft key *IF*
3. Push the soft key *Go to local* (the second one from the top)
4. Push the button **Stop**

7.4 Analysing the measured values

You have to start the PQViewer to transfer the measured values via Ethernet and to analyse it. The values are immediately available. Note that if you use the averaging time differ from 200ms the first value will be available as far as the averaging cycle is over.

8 Description of the measurement process

8.1 Direct connection via PC-link (USB or GPIB)

While measuring with direct connection LMG450 to PC the results are simultaneously presented by PQAgent. The following window appears after starting (Fig. 13).

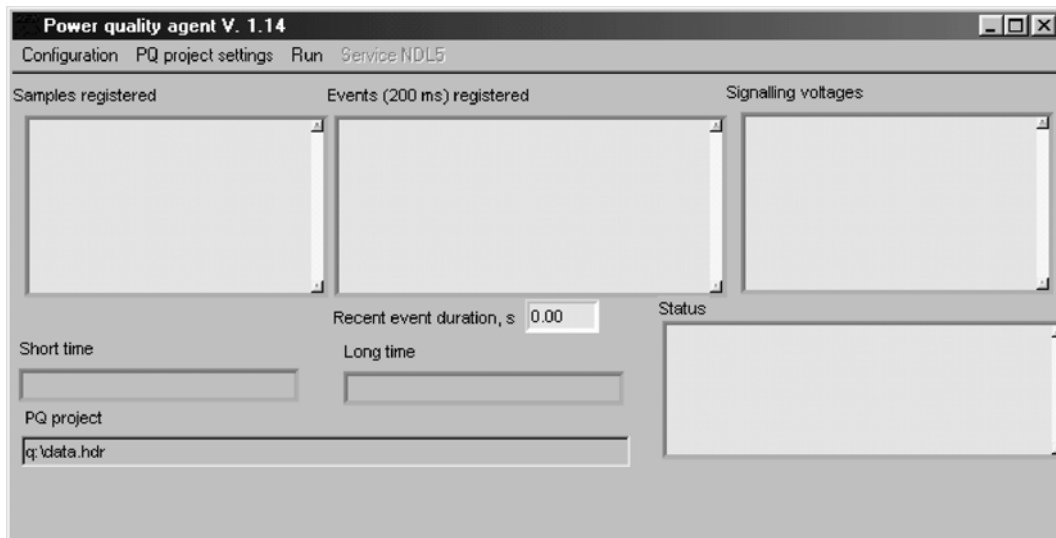


Fig. 13

The first information appears about 7 seconds after starting because of the transient time of a flickmeter. You can see the long and short time which are continuously changing. It means that the measurement is running. If the system find an event it will be displayed in an appropriate window as seen at the Fig. 14.

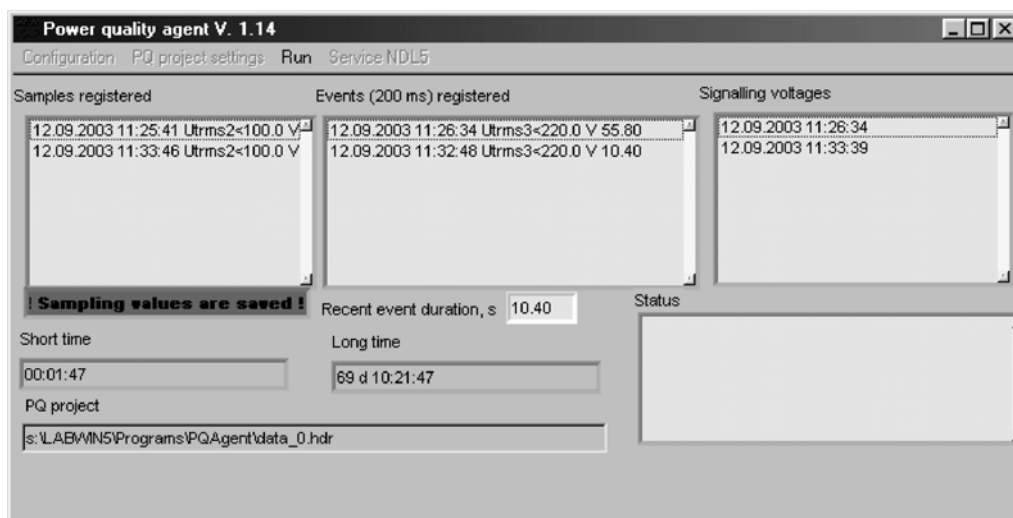
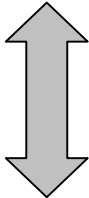
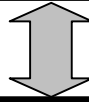
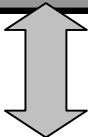



Fig. 14

While transferring the sampling values the displaying time will be frozen and the message “Sampling values are saved” appears. Take care that the sampling values are available after disappearing of this message.

8.2 Configuration with NDL5

You can follow the measuring process using the display of LMG450 where the actual measured data are being displayed as well as a status display of NDL5.

Actual situation	Display NDL5
Switching NDL5 on	ZES ZIMMER GmbH NDL5 Net Analyser
after about 50 seconds	NDL5 system setup Initialisation...
There was no configuration saved	IP: 192.168.2.40 Idle...
There is a pre-configured file. About 2 seconds later the initialisation is beginning. You can see two changing displays IP:192.168.2.40 is the IP-address of NDL5, log_prj means the project name. During this time the LMG450 is prepared according the PQAgent configuration	<div>IP: 192.168.2.40 PQA:Running</div>  <div>Initialising Log_prj</div>
Transient time of a flickermeter (about 7 seconds)	<div>IP: 192.168.2.40 PQA:Running</div>  <div>Starting Log_prj</div>
While measuring: There are three titles which are changing continuously with a period about 8 seconds: First one is the IP-address, the second one shows the date and time, the last one	<div>192.168.2.40 PQA:Running</div> 

<p>shows the project name and the resolution.</p>	<div> Date: 12.08.2003 Time: 11.04.48 </div> <div>  </div> <div> Project: log_prj Resolution: 60.0 s </div>
<p>The sampling values are being saved. Additional you can see the following information about the time and the sampling frequency</p>	<div> 12:03:00 Event !!! Waveform 12230 Hz </div>
<p>Signalling voltage</p>	<div> 12:03:05 Signalling! Saving telegramm </div>
<p>Event and the r.m.s. values are being saving</p>	<div> 12:03:05 Event !!! Saving 200 ms r.m.s. </div>
<p>After the manual stop of the measurement</p> <p>For new start you have either switch NDL5 off and on or configure and start a new project with the PQAgent</p>	<div> IP: 192.168.2.40 Idle... </div>