DATA VIEWER DVMEG - MANUAL

© 2012 - 2013 Antonín Kubeš, translated by Ing. Jan Souček MEgA – Měřící Energetické Aparáty, a.s.

The program is used for work with data measured by the units of the company MEgA. (PQMEg38, PQMEg39, MEg40, MEg40^{+}, MEg70, MEg71)

Upgrade: http://www.e-mega.cz/DL

CONTENTS

1 Introduction 5
2 Selecting the data file for procesing and work with files 6
2.1 Search for files 7
2.2 Work with binary data 7
3 Quality evaluation 8
3.1 Summary 8
3.2 List 9
4 Recorder evaluation 10
4.1 Summary 10
4.2 Energy 11
4.2.1 List 11
4.2.2 ¼ hour max 12
4.2.3 Off-line energy meter 13
4.2.4 Energy vectors 14
4.3 List 15
5 Events evaluation 16
5.1 List 16
5.2 Contingency table 17
5.3 Immunity chart 18
5.4 Device Power supply outages 19
5.5 Showing the list of oscilloscopic data 20
6 Miscellaneous 21
6.1 Compensation 21
6.2 Circuit breaker 22
7 Oscilloscopic view 23
8 Chart 24
8.1 Zoom settings 24
8.2 Events from MEg40 in the chart 25
8.3 Values from multiple files to one chart 25
8.4 show limits for voltage. 27
8.5 Fixing the cursor 27
8.6 Details 27
8.6.1 Details from oscilloscopic record 28
9 Menu description 30
9.1 Selection of last processed files 30
9.2 Print preset 30
9.2.1 Printout sequence 30
9.2.2 Pictures orientation 31
9.3 Print (PDF output) 31
10 Other 32
10.1 Work with table 32
10.1.1 Saving to ClipBoard 32

10.1.2 Saving to File 32
10.2 Time interpretation (daylight saving time) 32

Glossary of Terms

dblclick	*mouse double click*
NoM	*unmeasured value*

1 INTRODUCTION

The program is used to evaluate the data with *.Mdat structure from devices of the company MEgA.

At the first start of the program (if the user has administrator rights) data files with .Mdat extension are associated with the running program. If the program is moved elsewhere (reinstalled) informations remain in registers and should be eliminated using standard OS equipment. **Functionality of the association is limited** by the name of the path to the file and file name – this string **must not contain two spaces next to each other**.

Switching languages – it is expected to use immediately after the program starts. If the program was working before the language change, some texts in the program can stay in the original language (language set at start).

The program contains following functions:

Data – choice of the data file for evaluation

Quality – evaluation of the voltage quality according to EN 50160

Recorder – maximal, minimal and average values of voltages and currents, energymeter, values of all measured quantities

Events – list of the events and outages recorded by the device, oscilloscopic details for recorded events

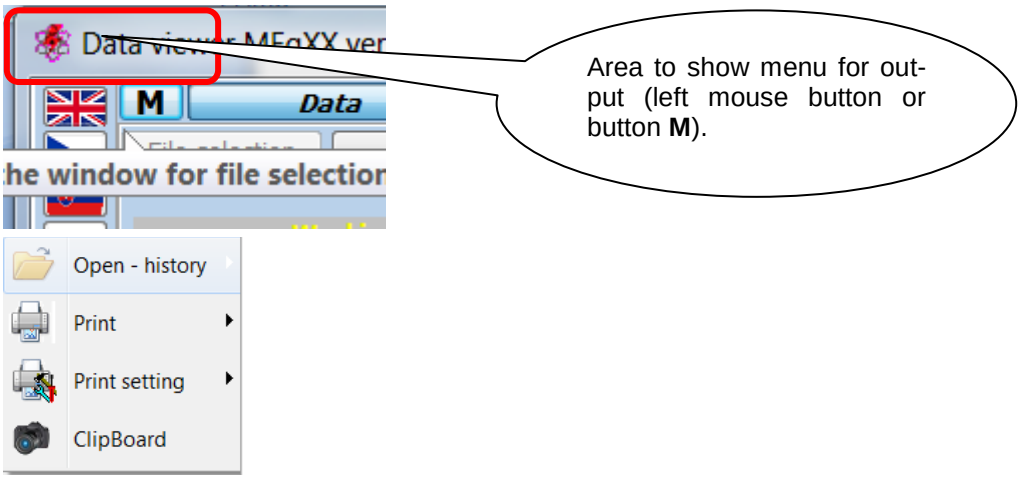
Chart – waveform representation of the measured quantities

Header – data file information, measurement identification and information about measurement settings

Misc. – other functions.

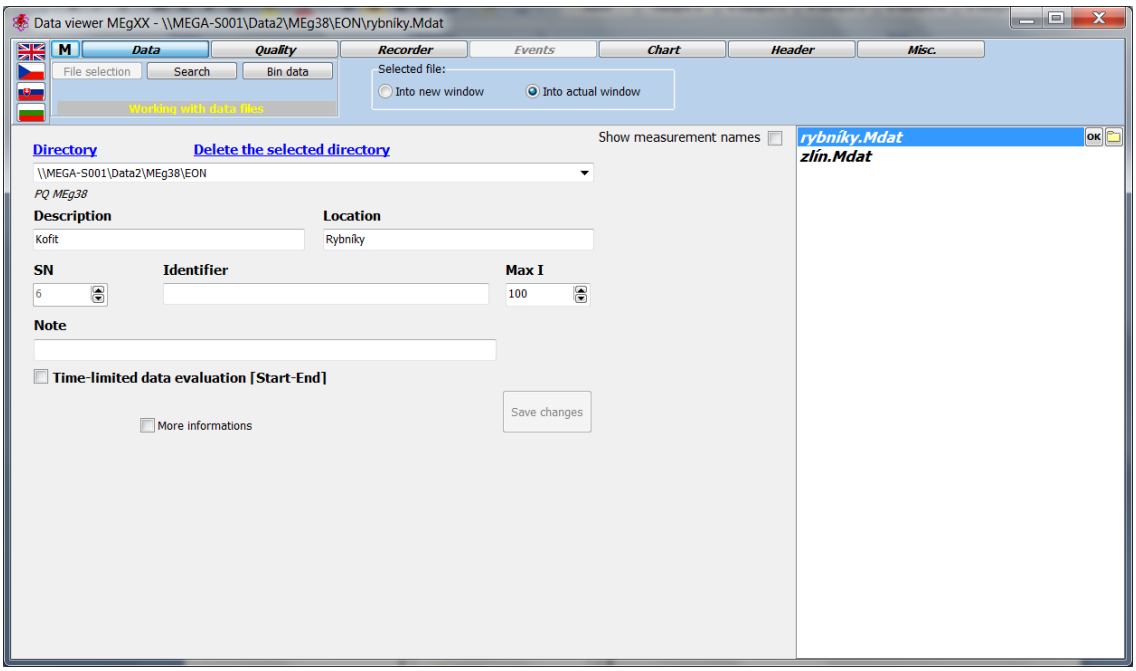
Availability of each function depends on the used measuring device and measurement settings.

Classic menu can be shown by clicking left mouse button on a program icon in top left corner or with the button **M**. It is used for potential outputs from shown results (print, pdf file, clipboard, print settings).



Picture 1 – activation of the menu for history and print

2 SELECTING THE DATA FILE FOR PROCESING AND WORK WITH FILES



Picture 2 – window for data file selection

Displays when pressing the button ***Data*** and possibly ***File selection*** in the submenu. At the program startup it is displayed automatically.

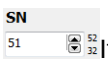
Upon initial startup it is necessary to choose the folder where the data to be evaluated are located.

By clicking the text Directory you can select the directory where the *.Mdat files are located.

Selected directory is written to the “stringlist” and if there is a data it is shown in the list at the right side of the window. Choosing the file in the list shows informations about the data it contains. Dblclicking the file in the list or pressing the ***OK*** button will select the highlighted file for evaluation. Switch ***Selected file*** defines if the selected file will be processed in current window - ***Into actual window*** or new window will be opened – ***Into new window***. Default setting is – ***Into new window***. Selected choice is stored in configuration file for the next time the program starts.

Picture 3 – selection of the window for opening data file

!!! A T T E N T I O N !!! – Refers to files with multiple measured terminals – terminal selection is processed after selecting the file for evaluation (dblclick or button ***OK***). Default setting is always the first terminal.



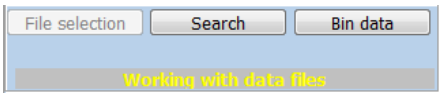
If the terminal was measured with multiple devices (e.g. one phase device MEg70) the information about other devices serial numbers is shown at serial number box. In this case the terminal was measured with three devices with serial numbers 51, 52, 32.

Time limited evaluation – if it is required to evaluate time limited amount of data it can set in this menu. After setting start and end time for evaluation it is necessary to confirm the settings with the button – ***Save changes***. If the edited file is same as evaluated one the file for evaluation selection is canceled and if re-

quired it must be selected again. Likewise the file selection is also canceled when the ***More informations*** checkbox is checked.

2.1 SEARCH FOR FILES

With the button ***Search*** in the submenu it is possible to search files according to set criteria.



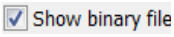
If the file for evaluation is selected the selection will be canceled.

2.2 WORK WITH BINARY DATA

In the data file can be stored any binary data. When the file is created it can be binary data from the device, which is used for internal use, or to already created file can be saved any other files (e.g. reports related to measured data, maps, etc.). This window is used for displaying, importing a removing of binary data (files) to the data file. In this window the active file in the file selection window is shown.

!!! Active file is displayed at the upper part and it doesn't necessarily coincide with the file selected for evaluation !!!

If the file coincides with the file selected for evaluation its selection is canceled.

If there is a file type association with some application and checkbox 

is active then after pressing button ***Save Show*** the file is started in associated application.

!!! Changes are stored to the file after saving with *Save Show* button !!! i.e.:

If new file is imported or existing one is deleted or when changing file after it is saved (***Save Show***) the button ***Save changes*** is activated.

3 QUALITY EVALUATION

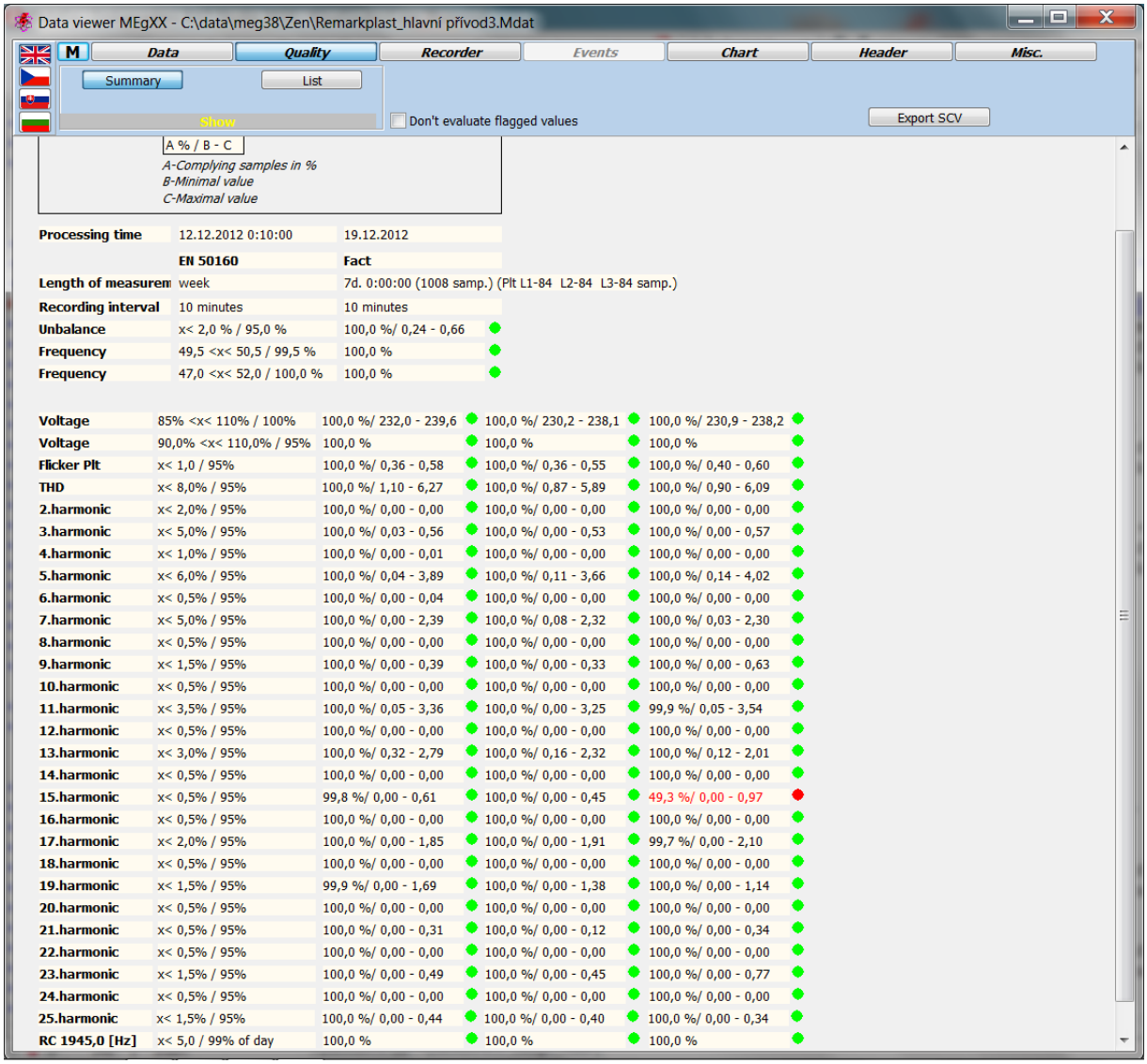
Function for voltage quality evaluation according to the standard EN 50160 is available only for data measured by PQ monitors MEg38 and MEg39. With buttons in the submenu it is possible to switch between summary evaluation and table list of all measured 10-minutes intervals.

3.1 SUMMARY

The first column contains the name of measured quantity

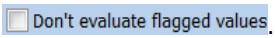
The second column contains limit values according to the EN 50160 standard. For example: **90,0% > 110,0% / 95%** - measured values must be between 90 and 110% to fulfill the standard. Number of measured samples which must meet this criterion is 95%.

Other columns (in case of phase values it is from the left L1, L2, L3) shows percentage of the number of samples which meets the range limit criterion. If the number of samples meeting the criterion is acceptable the value is green, else it is red. If some of the samples are flagged the flag is shown at the upper part of the table at the corresponding phase.



Processing time	12.12.2012 0:10:00	19.12.2012		
	EN 50160	**Fact**		
Length of measurem	week	7d. 0:00:00 (1008 samp.) (Plt L1-84 L2-84 L3-84 samp.)		
Recording interval	10 minutes	10 minutes		
Unbalance	x< 2,0 % / 95,0 %	100,0 %/ 0,24 - 0,66		
Frequency	49,5 <x< 50,5 / 99,5 %	100,0 %		
Frequency	47,0 <x< 52,0 / 100,0 %	100,0 %		
Voltage	85% <x< 110% / 100%	100,0 %/ 232,0 - 239,6	100,0 %/ 230,2 - 238,1	100,0 %/ 230,9 - 238,2
Voltage	90,0% <x< 110,0% / 95%	100,0 %	100,0 %	100,0 %
Flicker Plt	x< 1,0 / 95%	100,0 %/ 0,36 - 0,58	100,0 %/ 0,36 - 0,55	100,0 %/ 0,40 - 0,60
THD	x< 8,0% / 95%	100,0 %/ 1,10 - 6,27	100,0 %/ 0,87 - 5,89	100,0 %/ 0,90 - 6,09
2.harmonic	x< 2,0% / 95%	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
3.harmonic	x< 5,0% / 95%	100,0 %/ 0,03 - 0,56	100,0 %/ 0,00 - 0,53	100,0 %/ 0,00 - 0,57
4.harmonic	x< 1,0% / 95%	100,0 %/ 0,00 - 0,01	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
5.harmonic	x< 6,0% / 95%	100,0 %/ 0,04 - 3,89	100,0 %/ 0,11 - 3,66	100,0 %/ 0,14 - 4,02
6.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,04	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
7.harmonic	x< 5,0% / 95%	100,0 %/ 0,00 - 2,39	100,0 %/ 0,08 - 2,32	100,0 %/ 0,03 - 2,30
8.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
9.harmonic	x< 1,5% / 95%	100,0 %/ 0,00 - 0,39	100,0 %/ 0,00 - 0,33	100,0 %/ 0,00 - 0,63
10.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
11.harmonic	x< 3,5% / 95%	100,0 %/ 0,05 - 3,36	100,0 %/ 0,00 - 3,25	99,9 %/ 0,05 - 3,54
12.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
13.harmonic	x< 3,0% / 95%	100,0 %/ 0,32 - 2,79	100,0 %/ 0,16 - 2,32	100,0 %/ 0,12 - 2,01
14.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
15.harmonic	x< 0,5% / 95%	99,8 %/ 0,00 - 0,61	100,0 %/ 0,00 - 0,45	49,3 %/ 0,00 - 0,97
16.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
17.harmonic	x< 2,0% / 95%	100,0 %/ 0,00 - 1,85	100,0 %/ 0,00 - 1,91	99,7 %/ 0,00 - 2,10
18.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
19.harmonic	x< 1,5% / 95%	99,9 %/ 0,00 - 1,69	100,0 %/ 0,00 - 1,38	100,0 %/ 0,00 - 1,14
20.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
21.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,31	100,0 %/ 0,00 - 0,12	100,0 %/ 0,00 - 0,34
22.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
23.harmonic	x< 1,5% / 95%	100,0 %/ 0,00 - 0,49	100,0 %/ 0,00 - 0,45	100,0 %/ 0,00 - 0,77
24.harmonic	x< 0,5% / 95%	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00	100,0 %/ 0,00 - 0,00
25.harmonic	x< 1,5% / 95%	100,0 %/ 0,00 - 0,44	100,0 %/ 0,00 - 0,40	100,0 %/ 0,00 - 0,34
RC 1945,0 [Hz]	x< 5,0 / 99% of day	100,0 %	100,0 %	100,0 %

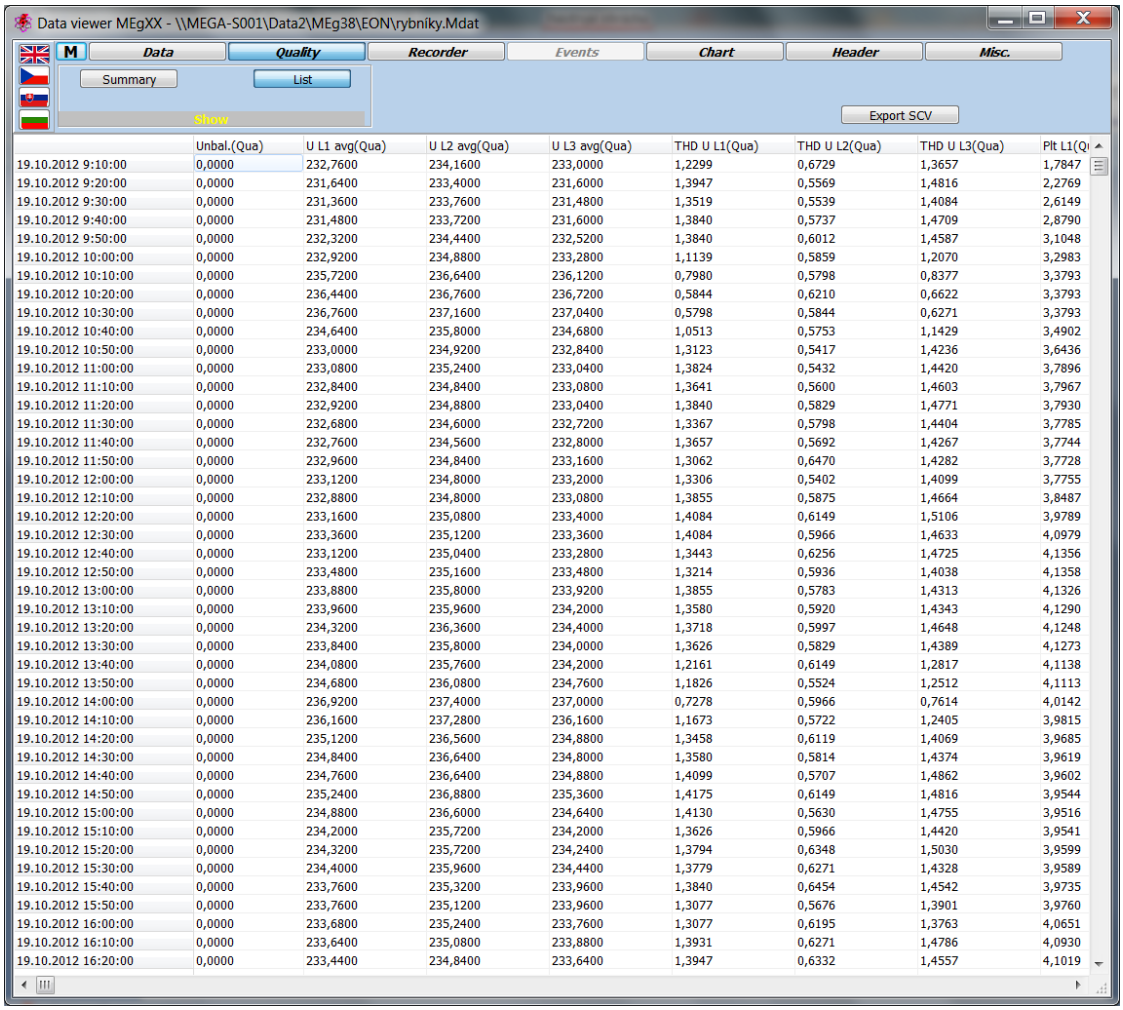
Picture 4 – quality evaluation - summary

Data can be evaluated with the filter of the flagged values 

. *Don't evaluate flagged values* setting will cause that the flagged values won't be evaluated. This setting won't affect voltage quality parameters which are required to evaluate all measured values. Set thresholds for flagging are show on the second line from the top. According to the present standard they are defaultly set to 90% and 110%. Measured value is flagged if at least one $U_{rms(1)}$ or $U_{rms(1/2)}$ value within measurement interval (10-minutes according to the present standard) deviates from the set thresholds.

3.2 LIST

List of all data measured in quality section. See chapter Work with table.



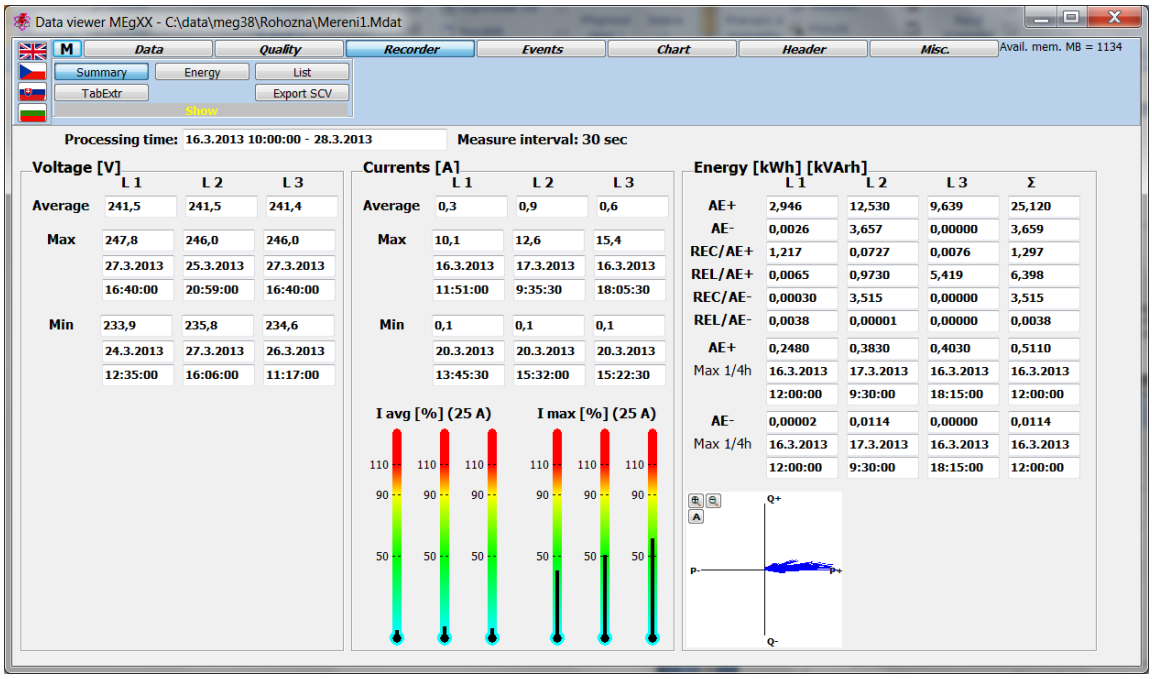
	Unbal.(Qua)	U L1 avg(Qua)	U L2 avg(Qua)	U L3 avg(Qua)	THD U L1(Qua)	THD U L2(Qua)	THD U L3(Qua)	Plt L1(Q
19.10.2012 9:10:00	0,0000	232,7600	234,1600	233,0000	1,2299	0,6729	1,3657	1,7847
19.10.2012 9:20:00	0,0000	231,6400	233,4000	231,6000	1,3947	0,5569	1,4816	2,2769
19.10.2012 9:30:00	0,0000	231,3600	233,7600	231,4800	1,3519	0,5539	1,4084	2,6149
19.10.2012 9:40:00	0,0000	231,4800	233,7200	231,6000	1,3840	0,5737	1,4709	2,8790
19.10.2012 9:50:00	0,0000	232,3200	234,4400	232,5200	1,3840	0,6012	1,4587	3,1048
19.10.2012 10:00:00	0,0000	232,9200	234,8800	233,2800	1,1139	0,5859	1,2070	3,2983
19.10.2012 10:10:00	0,0000	235,7200	236,6400	236,1200	0,7980	0,5798	0,8377	3,3793
19.10.2012 10:20:00	0,0000	236,4400	236,7600	236,7200	0,5844	0,6210	0,6622	3,3793
19.10.2012 10:30:00	0,0000	236,7600	237,1600	237,0400	0,5798	0,5844	0,6271	3,3793
19.10.2012 10:40:00	0,0000	234,6400	235,8000	234,6800	1,0513	0,5753	1,1429	3,4902
19.10.2012 10:50:00	0,0000	233,0000	234,9200	232,8400	1,3123	0,5417	1,4236	3,6436
19.10.2012 11:00:00	0,0000	233,0800	235,2400	233,0400	1,3824	0,5432	1,4420	3,7896
19.10.2012 11:10:00	0,0000	232,8400	234,8400	233,0800	1,3641	0,5600	1,4603	3,7967
19.10.2012 11:20:00	0,0000	232,9200	234,8800	233,0400	1,3840	0,5829	1,4771	3,7930
19.10.2012 11:30:00	0,0000	232,6800	234,6000	232,7200	1,3367	0,5798	1,4404	3,7785
19.10.2012 11:40:00	0,0000	232,7600	234,5600	232,8000	1,3657	0,5692	1,4267	3,7744
19.10.2012 11:50:00	0,0000	232,9600	234,8400	233,1600	1,3062	0,6470	1,4282	3,7728
19.10.2012 12:00:00	0,0000	233,1200	234,8000	233,2000	1,3306	0,5402	1,4099	3,7755
19.10.2012 12:10:00	0,0000	232,8800	234,8000	233,0800	1,3855	0,5875	1,4664	3,8487
19.10.2012 12:20:00	0,0000	233,1600	235,0800	233,4000	1,4084	0,6149	1,5106	3,9789
19.10.2012 12:30:00	0,0000	233,3600	235,1200	233,3600	1,4084	0,5966	1,4633	4,0979
19.10.2012 12:40:00	0,0000	233,1200	235,0400	233,2800	1,3443	0,6256	1,4725	4,1356
19.10.2012 12:50:00	0,0000	233,4800	235,1600	233,4800	1,3214	0,5936	1,4038	4,1358
19.10.2012 13:00:00	0,0000	233,8800	235,8000	233,9200	1,3855	0,5783	1,4313	4,1326
19.10.2012 13:10:00	0,0000	233,9600	235,9600	234,2000	1,3580	0,5920	1,4343	4,1290
19.10.2012 13:20:00	0,0000	234,3200	236,3600	234,4000	1,3718	0,5997	1,4648	4,1248
19.10.2012 13:30:00	0,0000	233,8400	235,8000	234,0000	1,3626	0,5829	1,4389	4,1273
19.10.2012 13:40:00	0,0000	234,0800	235,7600	234,2000	1,2161	0,6149	1,2817	4,1138
19.10.2012 13:50:00	0,0000	234,6800	236,0800	234,7600	1,1826	0,5524	1,2512	4,1113
19.10.2012 14:00:00	0,0000	236,9200	237,4000	237,0000	0,7278	0,5966	0,7614	4,0142
19.10.2012 14:10:00	0,0000	236,1600	237,2800	236,1600	1,1673	0,5722	1,2405	3,9815
19.10.2012 14:20:00	0,0000	235,1200	236,5600	234,8800	1,3458	0,6119	1,4069	3,9685
19.10.2012 14:30:00	0,0000	234,8400	236,6400	234,8000	1,3580	0,5814	1,4374	3,9619
19.10.2012 14:40:00	0,0000	234,7600	236,6400	234,8800	1,4099	0,5707	1,4862	3,9602
19.10.2012 14:50:00	0,0000	235,2400	236,8800	235,3600	1,4175	0,6149	1,4816	3,9544
19.10.2012 15:00:00	0,0000	234,8800	236,6000	234,6400	1,4130	0,5630	1,4755	3,9516
19.10.2012 15:10:00	0,0000	234,2000	235,7200	234,2000	1,3626	0,5966	1,4420	3,9541
19.10.2012 15:20:00	0,0000	234,3200	235,7200	234,2400	1,3794	0,6348	1,5030	3,9599
19.10.2012 15:30:00	0,0000	234,4000	235,9600	234,4400	1,3779	0,6271	1,4328	3,9589
19.10.2012 15:40:00	0,0000	233,7600	235,3200	233,9600	1,3840	0,6454	1,4542	3,9735
19.10.2012 15:50:00	0,0000	233,7600	235,1200	233,9600	1,3077	0,5676	1,3901	3,9760
19.10.2012 16:00:00	0,0000	233,6800	235,2400	233,7600	1,3077	0,6195	1,3763	4,0651
19.10.2012 16:10:00	0,0000	233,6400	235,0800	233,8800	1,3931	0,6271	1,4786	4,0930
19.10.2012 16:20:00	0,0000	233,4400	234,8400	233,6400	1,3947	0,6332	1,4557	4,1019

Picture 5 – quality – list of all measured values

4 RECORDER EVALUATION

4.1 SUMMARY

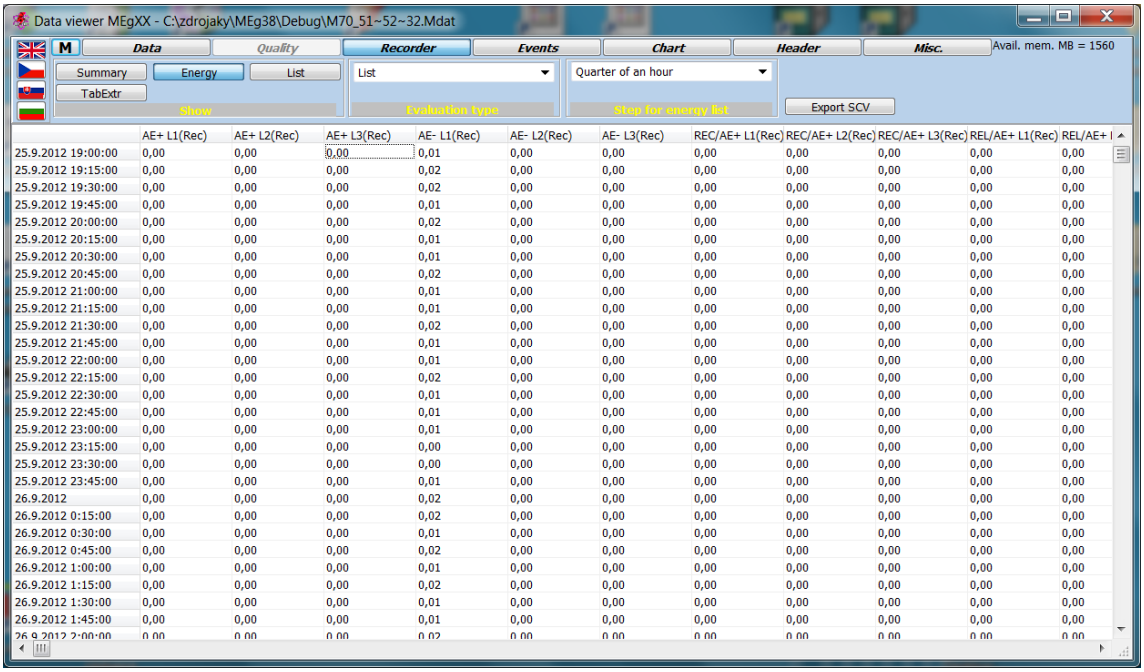
Shows average, max and min values, sums of energies including energy vectors. In the case that max current is defined in the header of the file the percentage is shown in graphical form of load indicator. Load indicators from the left: average L1, L2, L3, max L1, L2, L3. Vector diagram of energy can be zoomed with left and right mouse button.



Picture 6 – recorder - summary

4.2 ENERGY

4.2.1 List



	AE+ L1(Rec)	AE+ L2(Rec)	AE+ L3(Rec)	AE- L1(Rec)	AE- L2(Rec)	AE- L3(Rec)	REC/AE+ L1(Rec)	REC/AE+ L2(Rec)	REC/AE+ L3(Rec)	REL/AE+ L1(Rec)	REL/AE+
25.9.2012 19:00:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 19:15:00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 19:30:00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 19:45:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 20:00:00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 20:15:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 20:30:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 20:45:00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 21:00:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 21:15:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 21:30:00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 21:45:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 22:00:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 22:15:00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 22:30:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 22:45:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 23:00:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 23:15:00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 23:30:00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
25.9.2012 23:45:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
26.9.2012	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
26.9.2012 0:15:00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
26.9.2012 0:30:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
26.9.2012 0:45:00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
26.9.2012 1:00:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
26.9.2012 1:15:00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
26.9.2012 1:30:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
26.9.2012 1:45:00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
26.9.2012 2:00:00	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Picture 7

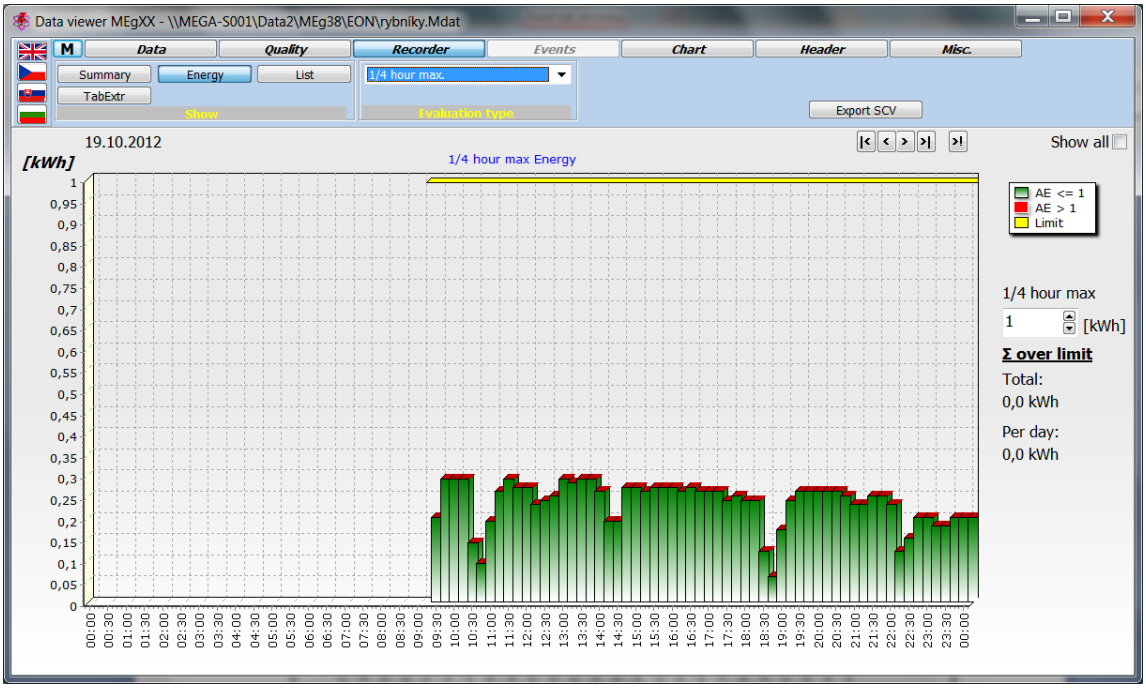
List of energies. The interval is adjustable - ***Interval for energy list***.

! A T T E N T I O N !

The interval setting should respect the device's interval of recording and start of the measurement. For example if device recording interval is set to 10 minutes the ¼ hour intervals for energy evaluation are irrelevant. In this case one ¼ hour energy interval will contain one 10 minutes value and second ¼ hour energy interval will contain two 10 minutes values.

See chapter Work with table.

4.2.2 ¼ hour max



Picture 8

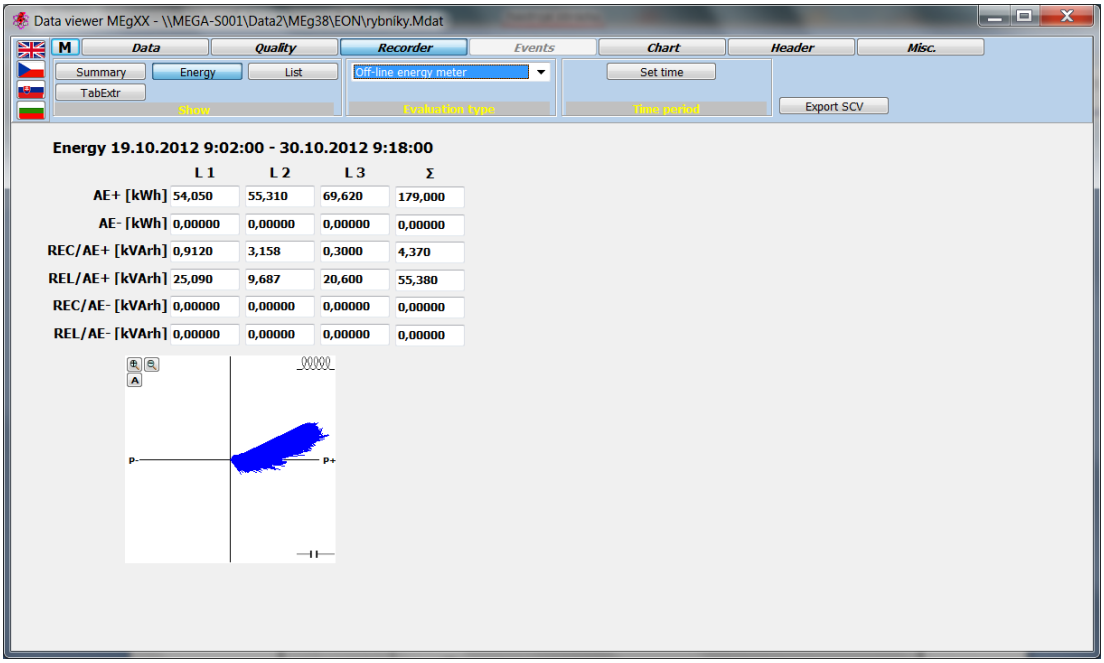
Displays a chart of ¼ hour energy values. If some value exceeds set ¼ hour max the overlimit part is shown in the shape of inverted pyramid. The total energy exceeding the limit is accumulated and displayed on the right side of the chart - ***Σ over limit***. Default is to display the chart for each day. If the checkbox ***Show all*** is checked the whole measured time is displayed.

By default in the left top corner is displayed current day and on the X axis is hour:minute. In case of overall view in the left top corner is displayed current year and on the X axis day:month.

! A T T E N T I O N !

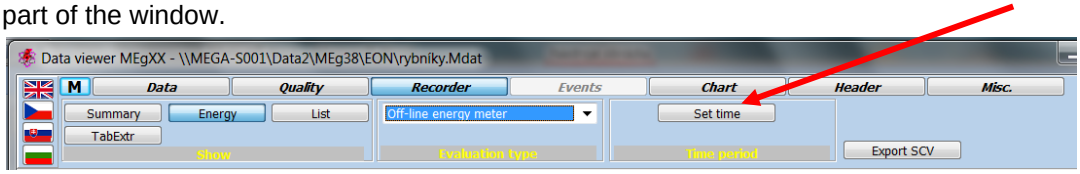
For relevant results the device recording interval must be divisible ¼ hour (e.g. 1 min, 3 min, 5 min, 7min30sec).

4.2.3 Off-line energy meter



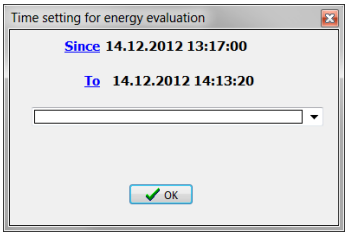
Picture 9

Energy evaluation with time setting from which the amount of energy to be calculated. Under the summation table the energy vectors are shown. Time period can be changed by pressing the ***Set time*** button at right top part of the window.



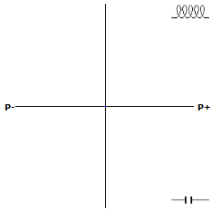
Picture 10

Time period can be set by selecting predefined period (depends on the start and end of measurement and current time) or by left-clicking the text ***From*** or ***To*** and defining specific date and time. After pressing OK the energy is recalculated.



Picture 11

4.2.4 Energy vectors

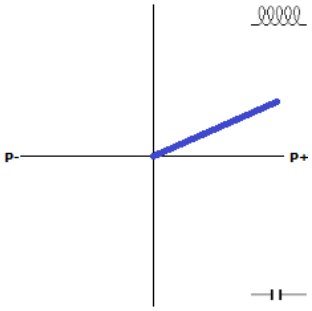


The right half-plane (along the vertical axis Y) denotes the active power consumption resp. energy AE+. In the upper half-plane (above the horizontal axis X) is inductive consumption REL/AE+ (the value of reactive power is positive). In the lower half-plane is capacitive consumption REC/AE+ (the value of reactive power is negative).

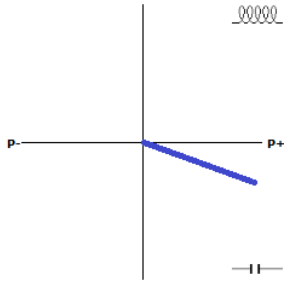
The left half-plane (along the vertical axis Y) denotes the active power supply resp. energy AE-. In the upper half-plane (above the horizontal axis X) is capacitive supply REC/AE- (the value of reactive power is positive). In the lower half-plane is inductive supply REL/AE- (the value of reactive power is negative).

MEgA	E_{P+}	E_{P-}	$E_{QL/EP+}$	$E_{QC/EP+}$	$E_{QL/EP-}$	$E_{QC/EP-}$
OBIS	1.1.1.8.0	1.1.2.8.0	1.1.5.8.0	1.1.8.8.0	1.1.7.8.0	1.1.6.8.0

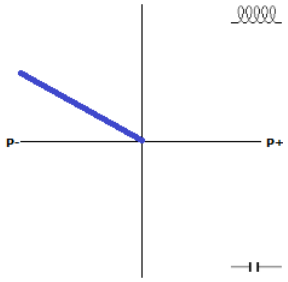
Examples:



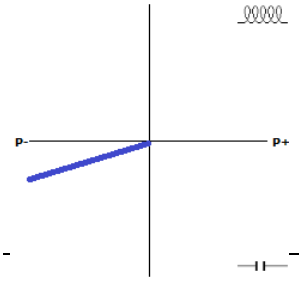
Common power consumption with dominant inductive character, e.g. asynchronous motors. Energy registers AE+ and REL/AE+ are increasing. (The value of reactive power is positive).



Power consumption with dominant capacitive character, e.g. overcompensation or in cable networks. Energy registers AE+ and REC/AE+ are increasing. (The value of reactive power is negative).

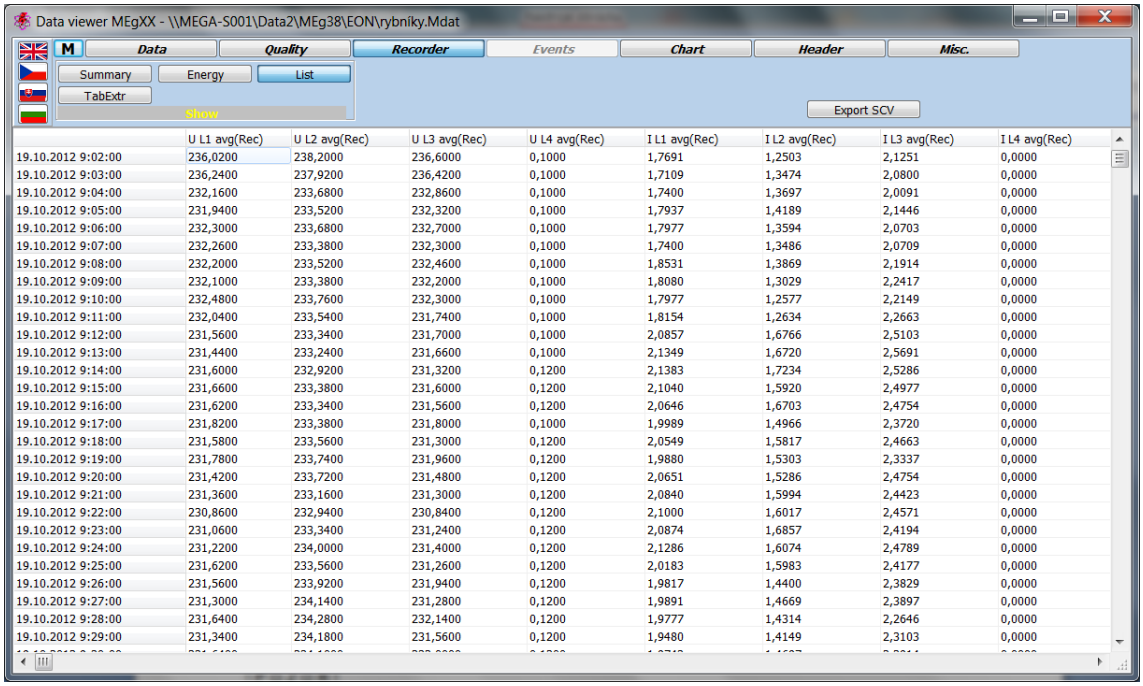


Power supply with dominant capacitive character. Energy registers AE- and REC/AE- are increasing. (The value of reactive power is positive).



Power supply with dominant inductive character. Energy registers AE- and REL/AE- are increasing. (The value of reactive power is negative).

4.3 LIST



	U L1 avg(Rec)	U L2 avg(Rec)	U L3 avg(Rec)	U L4 avg(Rec)	I L1 avg(Rec)	I L2 avg(Rec)	I L3 avg(Rec)	I L4 avg(Rec)
19.10.2012 9:02:00	236,0200	238,2000	236,6000	0,1000	1,7691	1,2503	2,1251	0,0000
19.10.2012 9:03:00	236,2400	237,9200	236,4200	0,1000	1,7109	1,3474	2,0800	0,0000
19.10.2012 9:04:00	232,1600	233,6800	232,8600	0,1000	1,7400	1,3697	2,0091	0,0000
19.10.2012 9:05:00	231,9400	233,5200	232,3200	0,1000	1,7937	1,4189	2,1446	0,0000
19.10.2012 9:06:00	232,3000	233,6800	232,7000	0,1000	1,7977	1,3594	2,0703	0,0000
19.10.2012 9:07:00	232,2600	233,3800	232,3000	0,1000	1,7400	1,3486	2,0709	0,0000
19.10.2012 9:08:00	232,2000	233,5200	232,4600	0,1000	1,8531	1,3869	2,1914	0,0000
19.10.2012 9:09:00	232,1000	233,3800	232,2000	0,1000	1,8080	1,3029	2,2417	0,0000
19.10.2012 9:10:00	232,4800	233,7600	232,3000	0,1000	1,7977	1,2577	2,2149	0,0000
19.10.2012 9:11:00	232,0400	233,5400	231,7400	0,1000	1,8154	1,2634	2,2663	0,0000
19.10.2012 9:12:00	231,5600	233,3400	231,7000	0,1000	2,0857	1,6766	2,5103	0,0000
19.10.2012 9:13:00	231,4400	233,2400	231,6600	0,1000	2,1349	1,6720	2,5691	0,0000
19.10.2012 9:14:00	231,6000	232,9200	231,3200	0,1200	2,1383	1,7234	2,5286	0,0000
19.10.2012 9:15:00	231,6600	233,3800	231,6000	0,1200	2,1040	1,5920	2,4977	0,0000
19.10.2012 9:16:00	231,6200	233,3400	231,5600	0,1200	2,0646	1,6703	2,4754	0,0000
19.10.2012 9:17:00	231,8200	233,3800	231,8000	0,1000	1,9989	1,4966	2,3720	0,0000
19.10.2012 9:18:00	231,5800	233,5600	231,3000	0,1200	2,0549	1,5817	2,4663	0,0000
19.10.2012 9:19:00	231,7800	233,7400	231,9600	0,1200	1,9880	1,5303	2,3337	0,0000
19.10.2012 9:20:00	231,4200	233,7200	231,4800	0,1200	2,0651	1,5286	2,4754	0,0000
19.10.2012 9:21:00	231,3600	233,1600	231,3000	0,1200	2,0840	1,5994	2,4423	0,0000
19.10.2012 9:22:00	230,8600	232,9400	230,8400	0,1200	2,1000	1,6017	2,4571	0,0000
19.10.2012 9:23:00	231,0600	233,3400	231,2400	0,1200	2,0874	1,6857	2,4194	0,0000
19.10.2012 9:24:00	231,2200	234,0000	231,4000	0,1200	2,1286	1,6074	2,4789	0,0000
19.10.2012 9:25:00	231,6200	233,5600	231,2600	0,1200	2,0183	1,5983	2,4177	0,0000
19.10.2012 9:26:00	231,5600	233,9200	231,9400	0,1200	1,9817	1,4400	2,3829	0,0000
19.10.2012 9:27:00	231,3000	234,1400	231,2800	0,1200	1,9891	1,4669	2,3897	0,0000
19.10.2012 9:28:00	231,6400	234,2800	232,1400	0,1200	1,9777	1,4314	2,2646	0,0000
19.10.2012 9:29:00	231,3400	234,1800	231,5600	0,1200	1,9480	1,4149	2,3103	0,0000

Picture 12

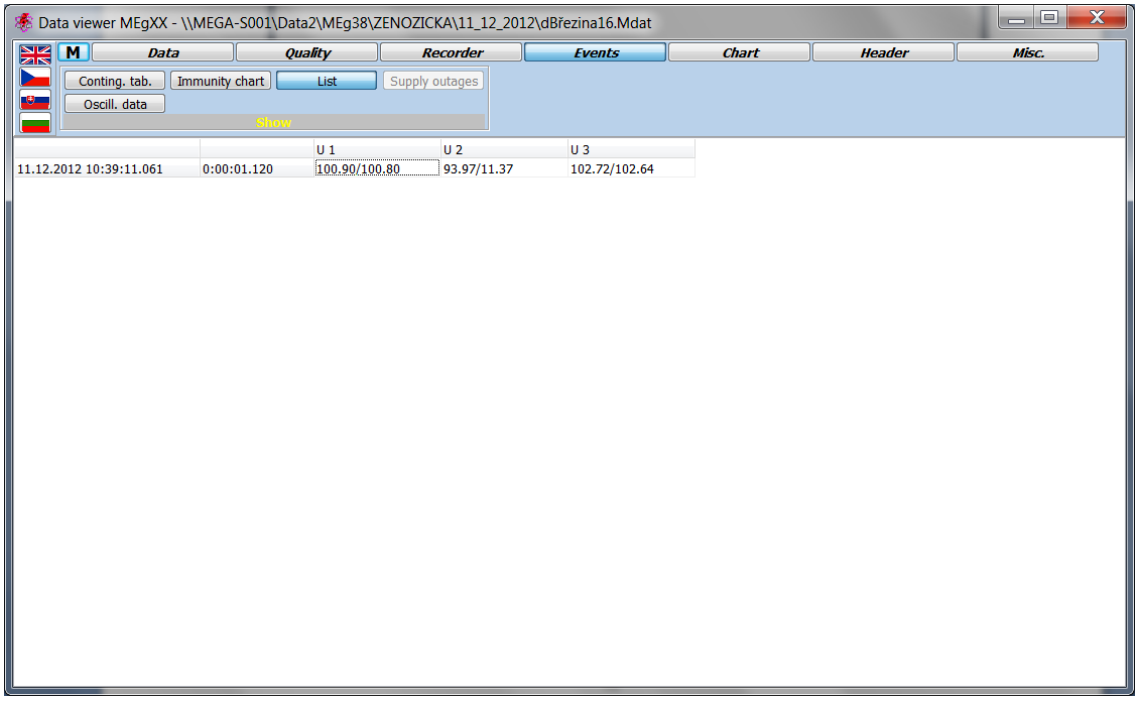
List of recorder data. See chapter Work with table.

5 EVENTS EVALUATION

Evaluations displayed by buttons List, Immunity chart and Contingency table applies only to voltage events. Events shown in oscilloscopic data can be caused by various reasons – voltage events, overcurrent events or external trigger. That depends on the used device and measurement settings. Information if the events from overcurrent or external trigger were set can be found out in the Header.

5.1 LIST

List of voltage events.

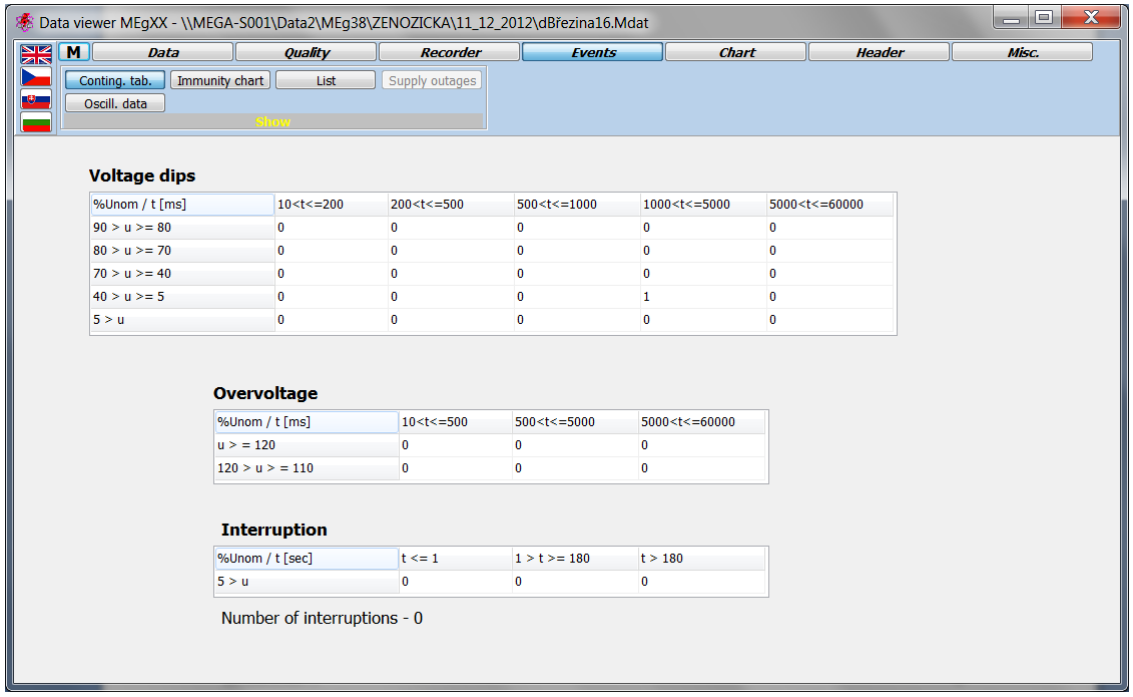


Picture 13

Form of view depends on the measurement device. See chapter Work with table.

5.2 CONTINGENCY TABLE

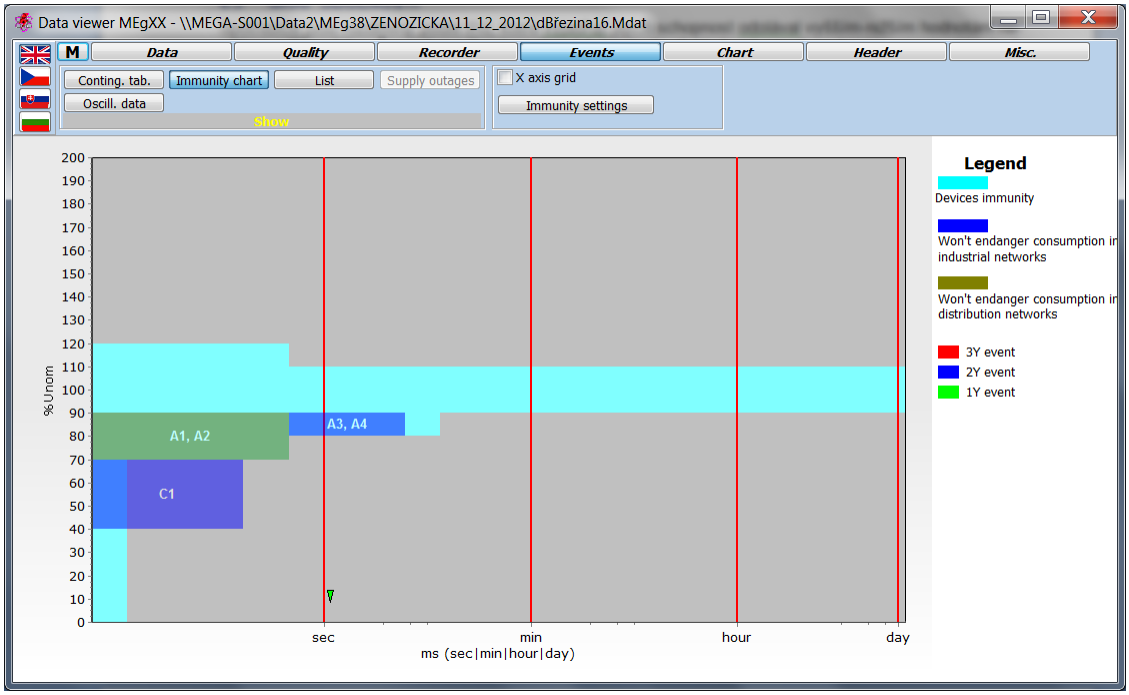
Displays events classified according to residual voltage and duration in the contingency table + informations about interruptions.



Picture 14

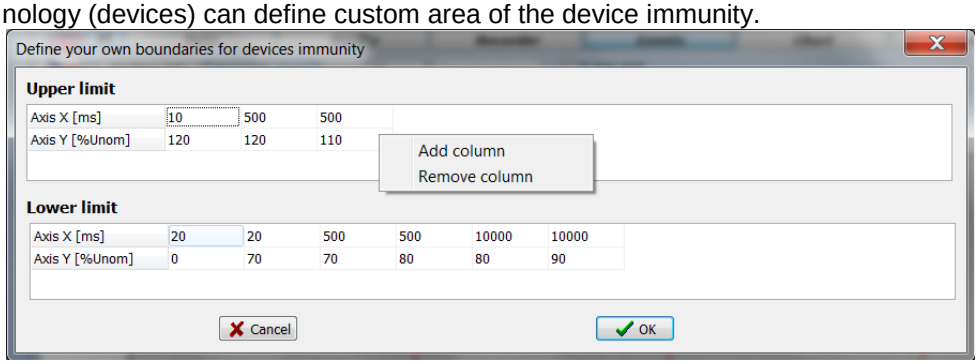
5.3 IMMUNITY CHART

Appliances are sorted to classes that reflect their ability to withstand over-under voltages for specified time. Timeline X is logarithmic and for better clarity it's marked with boundaries sec, min, hour, day. Y-axis shows the residual voltage.



Picture 15

Device immunity area is user-modifiable with button Immunity settings - the user according to used technology (devices) can define custom area of the device immunity.

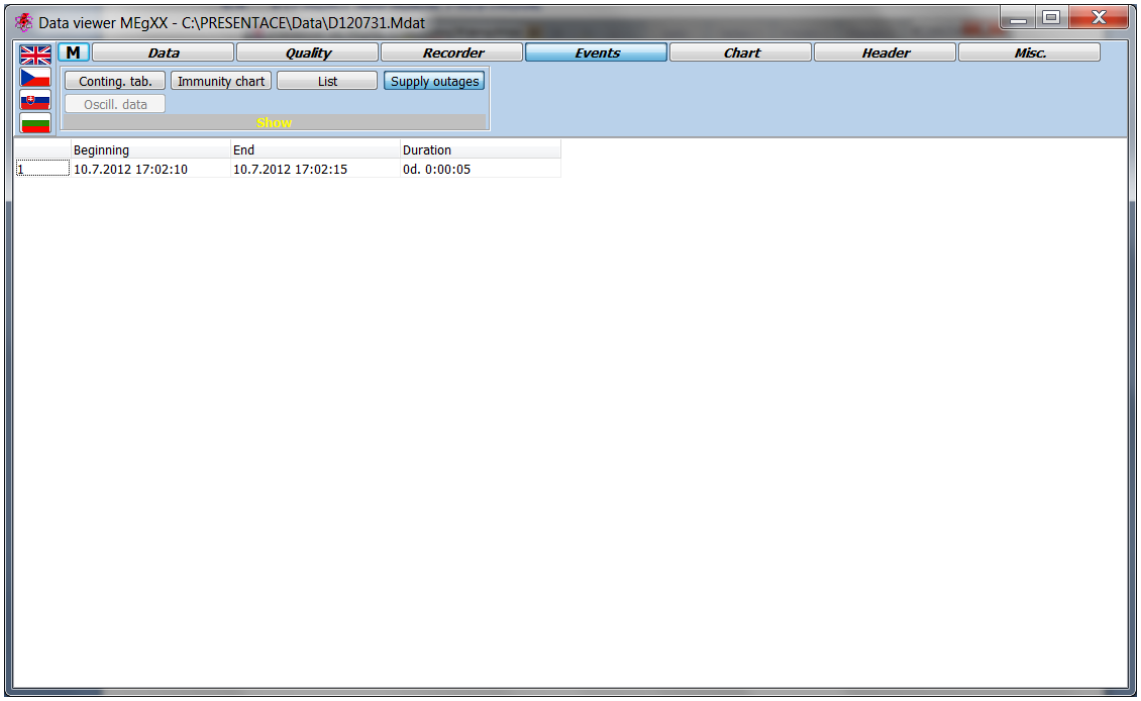


Picture 16

Right-clicking the mouse at a column it is possible to add or remove column.

Boxes "Won't endanger consumption in industrial networks" and "Won't endanger consumption in distribution networks" are based on the standard EN 50160. Areas in the chart can be enabled/disabled by left-clicking on certain rectangle in the legend.
Events colors depend on the number of phases affected – single-phase, two-phase, three-phase (see legend).

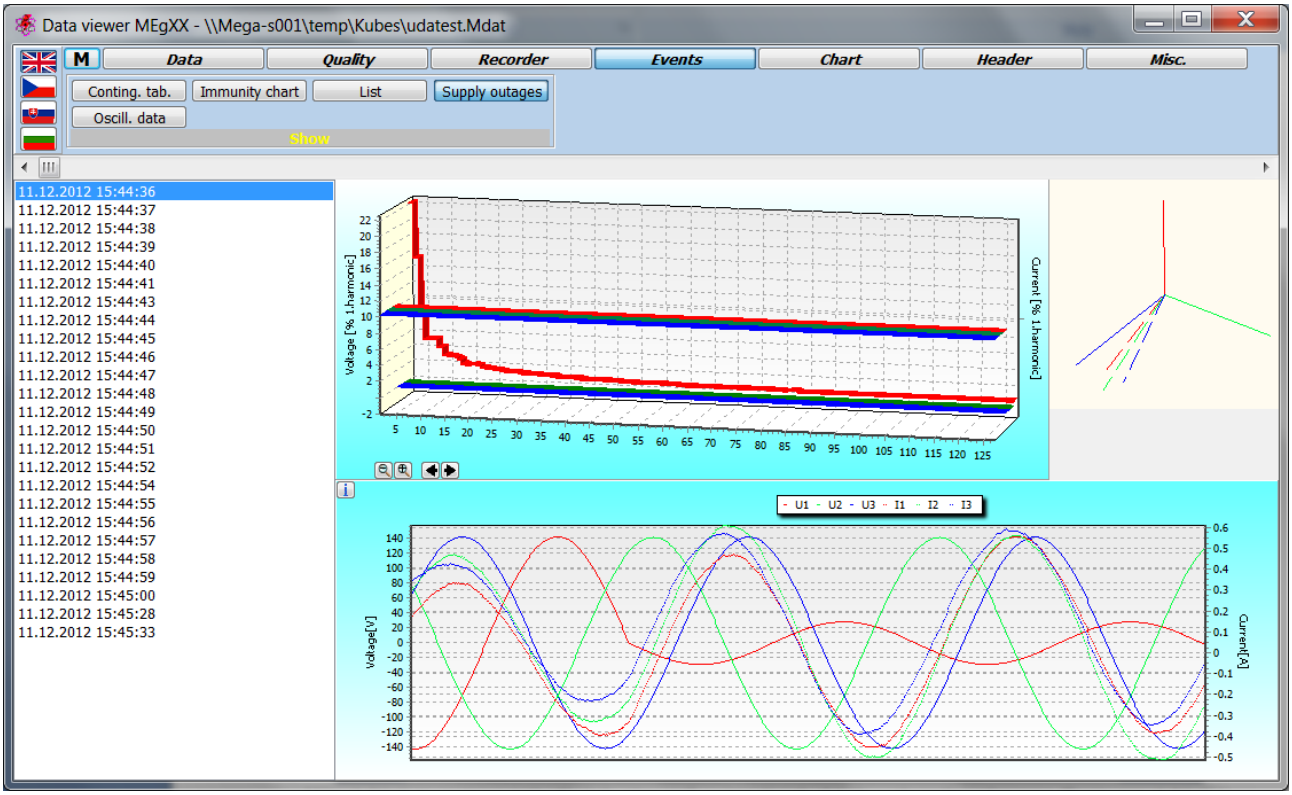
5.4 DEVICE POWER SUPPLY OUTAGES



Picture 17

Informations about moments when the device not measured due to a power outage are in the section Events - Supply outages. In the case of the device is supplied from the measured voltage and doesn't have backup supply it indicates outages on measured phase. In the case that terminal was measured with multiple single-phase devices (e.g. MEg70) column is supplemented with information which phase was affected.

5.5 SHOWING THE LIST OF OSCILLOSCOPIC DATA

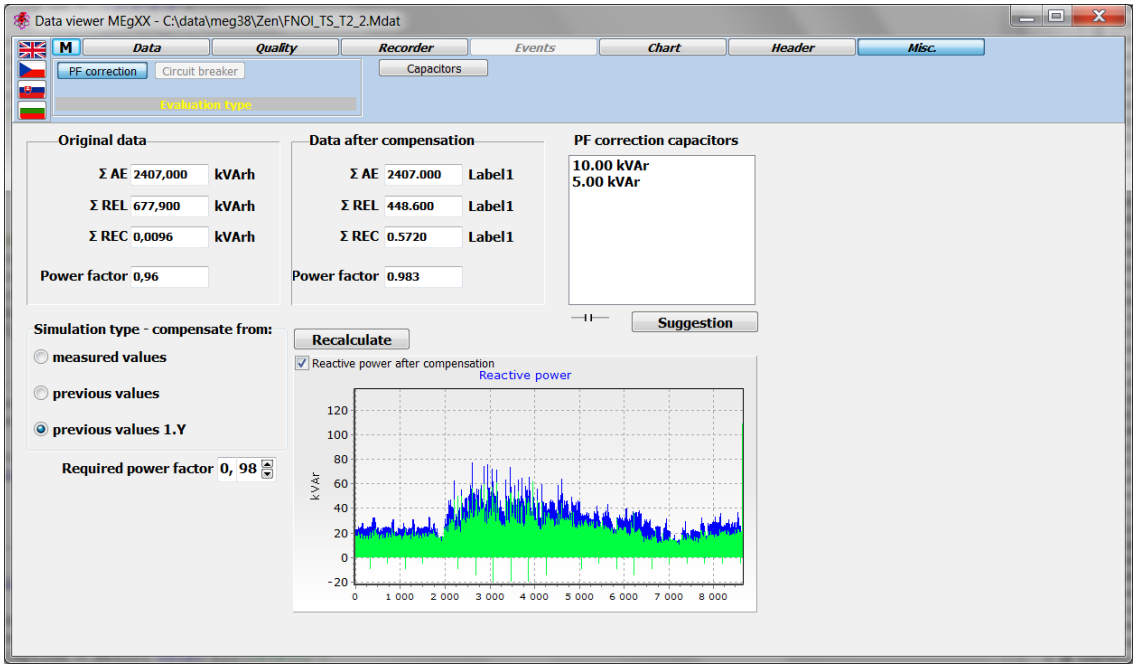


Picture 18

On the left side is a list of records; on the right side are details of the selected record. For description of the right side see Details from oscilloscopic record. Scroll bar in the upper part allows shifting data on X axis in the lower chart.

6 MISCELLANEOUS

6.1 COMPENSATION



Picture 19

Based on the measured energy values the program can suggest set of compensation batteries. The optimum for this purpose is to set measurement interval the same as will be used for compensation. In this case the work of compensator and result after compensation can be accurately simulated (***Simulation type – compensate from previous value or compensate from previous value 1.ph***). If the data was measured with longer interval than interval which will be used it is advisable to use ***Compensate from measured values***.

The program uses only three energy quadrants AE+, REL/AE+ and REC/AE+.

When designing the compensation capacitors the program proceeds as follows:

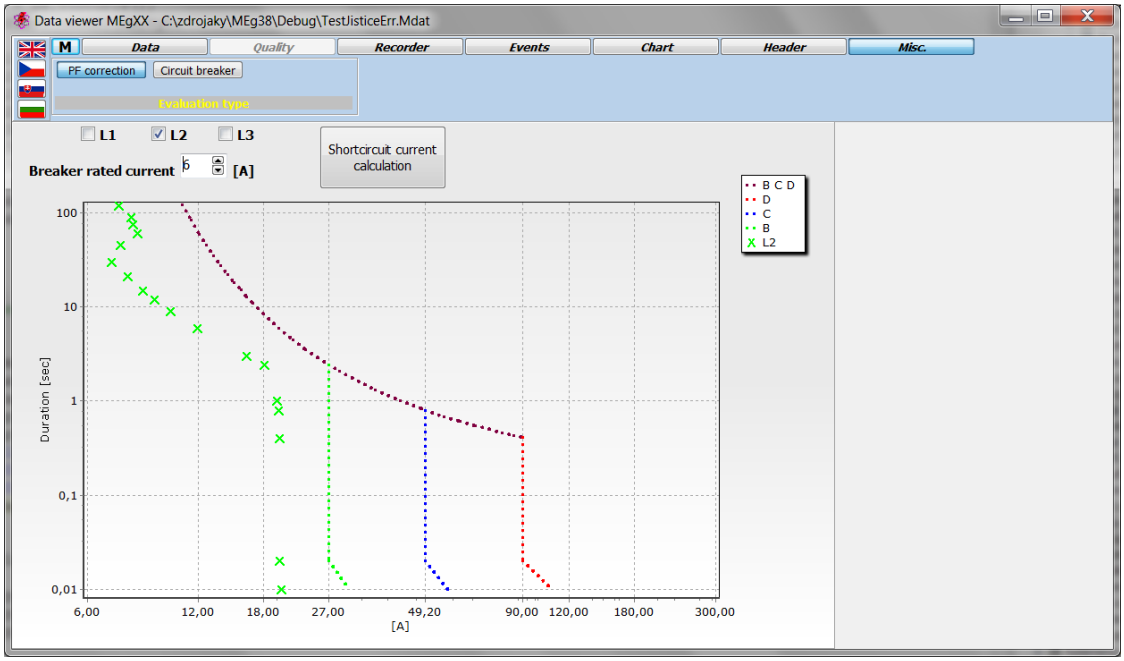
a) From the timeline are selected records which don't meet required power factor and these are included in the calculation.
b) For selected or created (see step d) records is calculated theoretical value of the capacitor which would maximally increase total power factor.
c) On the basis of calculated capacitor is chosen existing capacitor from the list, which would maximally increase total power factor
d) If after simulation with selected capacitor(s) the resulting power factor isn't equal or bigger then required the new list of uncompensated and undercompensated records is created and calculation repeats from step b.

Maximal number of capacitors is 14. Program calculates resulting power factor from any possible combination from the chosen capacitors (List ***PF correction capacitors***). With maximum of 14 capacitors this is up to 16384 combinations. As optimal power factor for individual records is considered average between required power factor and 1. In the case of required power factor 0,95 it's 0,95 + (1 – 0,95)/2 = 0,975.

Capacitors can be added or removed to the list ***PF correction capacitors*** by the user with popupmenu which can be activated by right-clicking above the list.

List of available capacitors for selection and calculation can be modified in the window activated with the button Capacitors.

6.2 CIRCUIT BREAKER



Picture 20

Some devices (MEg38, MEg39) can be configured so that the data outputs can be used for decision about nominal current of the used circuit breaker according to maximum currents.

The maximum current values from time intervals 0.01, 0.02, 0.4, 0.8, 2.4, 3, 6, 9, 12, 15, 21, 30, 45, 60, 75, 90 a 120 [sec] are shown in the chart together with breakers tripping characteristics (type B, C or D). Breaker rated current is adjustable.

If some value is greater than range (in which the accuracy is guaranteed), than a vertical dashed line with titled Over r is displayed in the chart. Measured values are shown to the rigth from this line, but they are without quarantee of specified precision.

! A T T E N T I O N !

It should be noted that the suggestion of the rated current of the circuit breaker takes into account only maximum currents and not other aspects that are important from the perspective of safety such as short-circuit current, type and cross-section of the power line, etc.

Shortcircuit current			
	L1	L2	L3
Impedance [Ω]	0,05	0,12	0,18
Current [A]	4600	1917	1278

If the impedances are known it is possible to calculate short-circuit current with the button ***Short-circuit calculation***.

If there are no event (overcurrent) records and thus no oscilloscopic and 20 msec data, to the limit of 3 sec is only 20 msec value displayed and its value is value set for overcurrent event record. It is therefore only fictious value that could possibly occur. In this case it is preferable to repeat the measurement with lower value for overcurrent event record.

Due to a fact that the event is recorded when the 20 msec value is exceeded, it is exceptionally possible (half-wave rectifier) that the 10 msec value can be greater than what is displayed in the chart.

7 OSCILLOSCOPIC VIEW

If there is oscilloscopic recording it is possible to show its waveform, harmonic analysis and vector diagram either in the Events window - see Showing the list of oscilloscopic data or in the Chart window – see Details from oscilloscopic record.

8 CHART

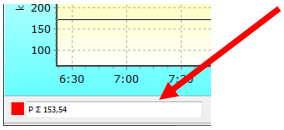
Picture 21

For displaying it's needed to select required quantities in selection, which is activated by **Quantities** button.

Simultaneously can be displayed three types of quantities, while same type means the same unit of measurement. For each type of quantities is generated graph with identical range on time axis X.

Within one type can be displayed up to 9 quantities.

It is possible to work with displayed quantities in Settings window, which is activated by dblclick with mouse cursor on appropriate label with chosen quantity.

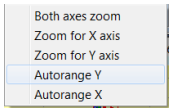


8.1 ZOOM SETTINGS

Using mouse:

Put mouse cursor on beginning of selected waveform, press and hold left mouse button, move mouse right and finally release button.

Zoom will be performed based on settings under button



Zoom on both axes – selection by window.

If the zoom is performed on time axes x, automatically is performed also in charts of other types of quantities. Beginning and end are always identical in all charts.

Return to the previous zoom is performed similarly to zoom, only the direction the mouse is moved to the left.

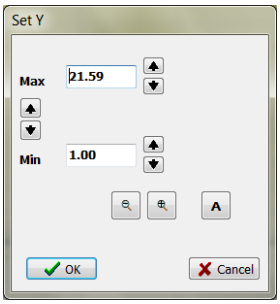
Using mouse buttons and keys Shift and Ctrl (for Y axis):

While holding Shift key and clicking left or right mouse buttons, graph is moving up and down on Y axis.

While holding Ctrl key and clicking left or right mouse buttons, graph is zooming in and out on Y axis.

Using window Set Y (for Y axis):

Window is activated by moving the mouse to the Y axis area and dblclicking left mouse button.



Moving with graph area:

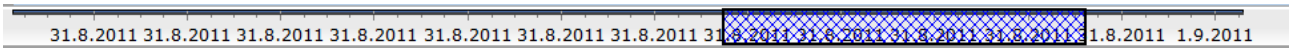
Place mouse cursor in the middle of graph area, press and hold right mouse button, while holding button move graph area by mouse move in required direction.

Autorange Y:

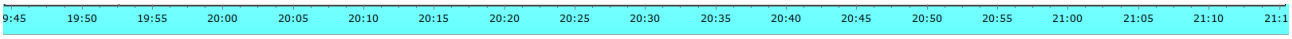
Using button and selecting ***Autorange Y*** is automatically adjusted Y axis scale in order to display whole range of measured values.

Zoom X:

In the case, that zoom on X axis was performed, then overall timeline appears at the top. There is a cross hatch rectangle on timeline, which represents area displayed in chart. It is possible to catch this rectangle (holding left mouse button) and move it in order to change displayed area in chart. Zoom on X axis can be cancelled by dblclick on timeline outside the cross hatch rectangle.



Automatic zoom on X axis according to displayed quantities is performed by dblclick on X axis area.



We can get the same result using item Autorange X under (ZOOM) button menu.

8.2 EVENTS FROM MEG40 IN THE CHART

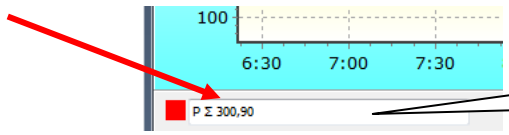
! ATTENTION !

In the case of voltage event the monitor MEg40 returns informations about maximal and minimal values in each phase during the event. For better visibility in the chart there is added nominal value of voltage to the beginning and to the end of the event. **This doesn't mean that when event starts or ends the nominal value really was.**

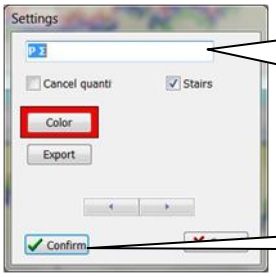
8.3 VALUES FROM MULTIPLE FILES TO ONE CHART

Procedure to display values from multiple files in a single chart.

1) Choose first file and display required values in the chart.
2) Rename shown quantities:



Dblclick on the quantity description.



Change original name to something else (name that isn't in the next file). Here letter A added.

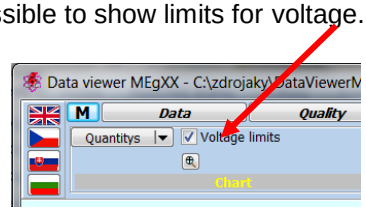
Confirm with the button.

Rename all quantities which will be shown.

3) Choose next file to evaluate.
4) Choose quantity to by shown in the chart.

8.4 SHOW LIMITS FOR VOLTAGE.

If voltage quantities are shown and if voltage events were recorded it is possible to show limits for voltage.



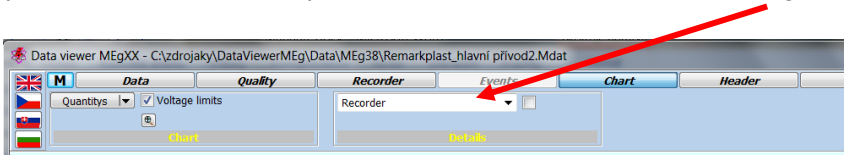
Picture 22

8.5 FIXING THE CURSOR

Chart doesn't support fixing the cursor when moving the mouse in the area of the chart. However it is possible to move the pointer to the required position and by clicking right mouse button the cursor jumps outside of the chart (to the right) leaving the pointer where it is required (e.g. for printing, etc.).

8.6 DETAILS

According to the type of measurement it is possible to show other values according to the position of the cursor in the chart.



Details are displayed from the currently selected file -> if there is a request to show variables from another file see Values from multiple files in one chart, the information in details do not apply to these variables.

8.6.1 Details from oscilloscopic record

If there is an oscilloscopic record in given time, it is possible to show it in detail.

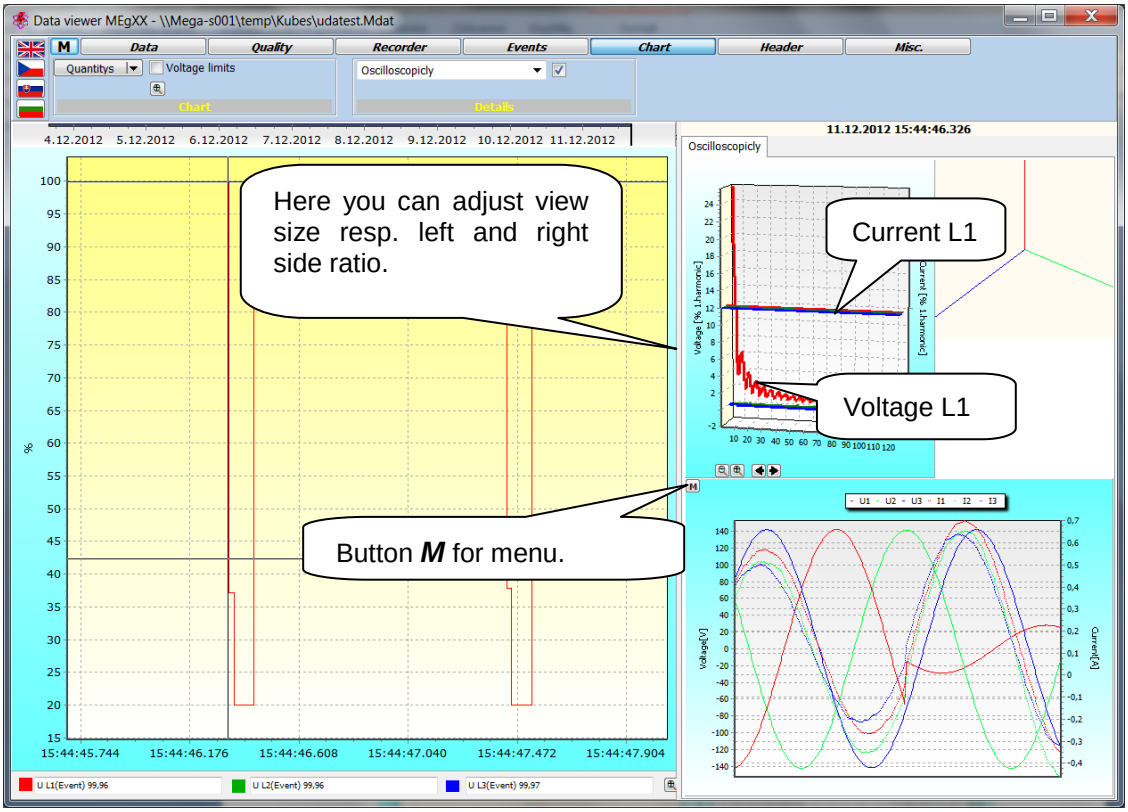
The lower chart shows the samples. Individual variables can be enabled-disabled using the PopupMenu, which can be called by pressing right button in the area of the chart.

The upper-left chart shows the individual harmonics (percentage of the first harmonic). From the rear (the Z axis) are ordered voltage L1 - L4, ahead currents L1 - L4. Individual variables can be enabled-disabled using the PopupMenu, which can be called by pressing right button in the area of the chart.

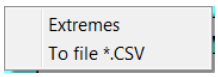
At the top right is a vector diagram with fixed vector U1.

For the harmonic analysis and showing harmonic vectors and harmonics there must be sufficient number of samples in the lower chart (depending on screen resolution and the ratio of the right and left sides).

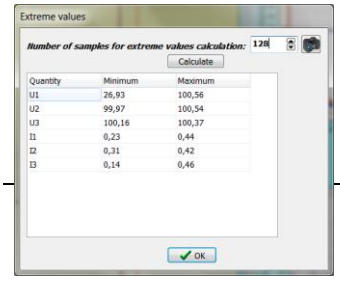
Button **M** calls menu.



Menu after pressing button ***M***



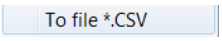
8.6.1.1 Extremes



From the samples shown in detail is carried out moving quadratic average from the number of samples set in the: ***Number of samples for extreme values calculation*** (in this case, the average of 128 samples). Minimal and maximum values of variables are calculated and shown in the table after pressing the ***Calculate***.

Example of use – check correct response of the electromagnetic trigger of the circuit breaker. (Need to know the correct sampling rate for setting the number of samples resp. time). Selected number of samples is graphically represented in the chart.

8.6.1.2 To file *.CSV

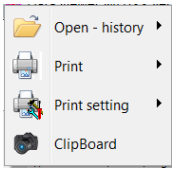


Exports samples from the chart into the txt file with extension CSV. Separator between columns is **;**. Number format respects OS settings.

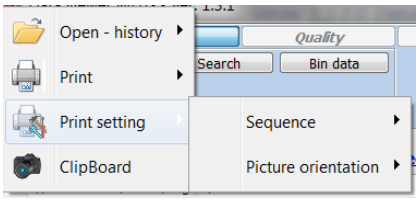
9 MENU DESCRIPTION

9.1 SELECTION OF LAST PROCESSED FILES

Open – history – for quick selection of recently processed files.



9.2 PRINT PRESET



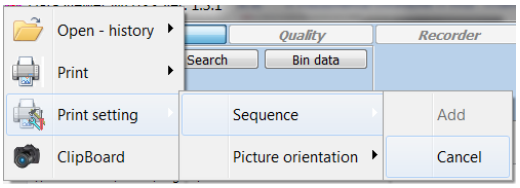
9.2.1 Printout sequence

Setting sequence – it is possible to define sequence of any number of evaluation windows for printout. When selecting a sequential output ***Print – Sequence*** switching to evaluation windows set in the sequence and print is performed automatically. In the case that selected file don't contains evaluation method set in the sequence it is skipped. Set sequence is stored in the configuration file and is therefore available the next time the program is started.

! A T T E N T I O N !

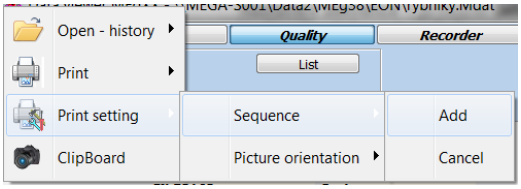
In the case of including chart (time series) into a sequence it is required to activate quantities and other settings in the chart before starting the sequence (***Print – Sequence***). The sequence doesn't ensure data is displayed in the chart.

Setting the sequence – Cancel



- removes previously created sequence.

Setting the sequence – Add

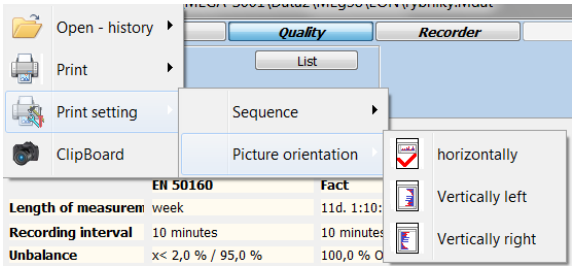


- adds the current window to the sequence (to the end).

9.2.2 Pictures orientation

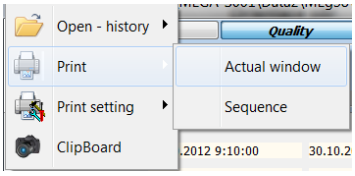
A T T E N T I O N – The choice of orientation applies to clipboard.

Outputs of not-table views for printing and clipboard.



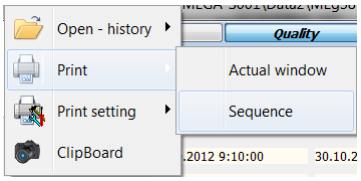
9.3 PRINT (PDF OUTPUT)

Print – Actual window



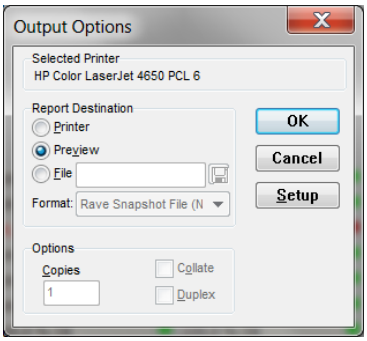
- prints the current window.

Print – Sequence



- prints the pages of the previously defined sequence. See Printout sequence

After selecting ***Print – Actual window*** or ***Print – Sequence*** window is shown in which the required output is set –Printer, Preview, File. If the file output is selected it is necessary to choose the file format.



PDF output doesn't support diacritics.

10 OTHER

10.1 WORK WITH TABLE

Data from the table evaluations can be exported to the clipboard or can be saved in text format. The success of these operations is memory intensive and may not be done when memory is lacking. In this case, it is necessary to reduce data evaluation time see.

10.1.1 Saving to ClipBoard

Saving to clipboard is made by pressing Ctrl-C or Ctrl-Insert. In the case that part of the data is highlighted, only selection is inserted into the clipboard. In the case that nothing or just one cell is selected, whole table is inserted to the clipboard.

10.1.2 Saving to File

Saving a file is made by pressing Ctrl-S. The whole table is always stored.

10.2 TIME INTERPRETATION (DAYLIGHT SAVING TIME)

Data files are always stored in the winter time (in the Czech Republic UTC+1). Interpretation of times in the program based on summer/winter period is according to the rules of the EU legislation on the summer and winter time.

In the case of an event the event start is an authoritative for interpretation of the period. Event end is always in the same time period as the beginning, even if it was already in the other.

Example: Two minutes event, which began in 1 h 59 min winter time and ended at 3 h 1 min summer time (actually 2 h 1 min winter time) is interpreted as follows:

Beginning 1h. 59min

End 2h. 1 minute.

This remains its actual length, which is the standard for determining their parameters.

Upgrade http://www.e-mega.cz/DL

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