

How to do ... with PowerView3.0 Instruction tips

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1 Introduction

PowerView3.0 is a common application for management of the new generation of Metrel's PQA instruments

With this application the wide palette of Metrel's Power Quality Analysers can be managed. Metrel PowerView3 is a powerful tool for downloading, analysing and printing recorded data for Metrel Power Quality instruments. Through a simple but powerful interface, PowerView3 helps you find your data quickly, while allowing you to easily make complex analysis and data comparations.

1.1 Supported instruments:

This application is fully compatible with the new generation of Metrel's PQA instruments, starting with:

- Power Master XT MI 2893,
- Power Master MI 2892,
- Master Q4 MI 2885,
- Energy Master XA MI 2884,
- Energy Master MI 2883.

Also, some other older PQ instruments are supported:

- PowerQ MI 2492 (HW5)
- PowerQ Plus MI 2392 (HW5)
- Power Q4 MI 2592
- PowerQ4 Plus MI 2792
- PowerQ4 Plus MI 2792A

1.2 Supported Operating Systems:

Microsoft Windows 7 SP1 Microsoft Windows 8.1 Microsoft Windows 10 Anniversary update

1.3 Supported Languages:

Since PowerView supports different languages, the list of supported languages could vary from different type of release:

ENGLISH, GERMAN, CHINESE, FRENCH, SPANISH, JAPANESE, KOREAN, POLISH, RUSSIAN, SLOVAK, ITALIAN, UKRAINIAN

2 PowerView 3.0 installation

PowerView3.0 supports 32-bit and 64-bit operation system. Installation file for each operation system is different:

- 32-bit → PowerView.v3.0.0.4589.x86
- 64-bit \rightarrow PowerView.v3.0.0.4589.x64;

where "4589" presents the PowerView3.0 version release. Two "setup" files are available:



Application setup file

2.1 Installation procedure

Double click on PowerViewSetup

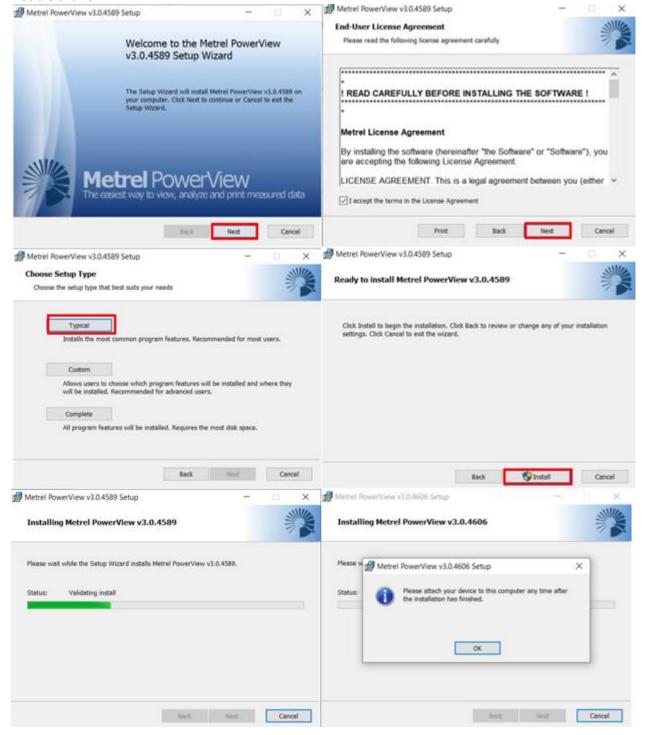


Figure 1 Successful PowerView installation

In case, that PowerView, normally due to administrator restrictions are not installed successfully following screen will appear:



Figure 2 Unsuccessful PowerView installation

In such case, try to start the installation through the "setup.exe" installation file, use option "Run as administrator".

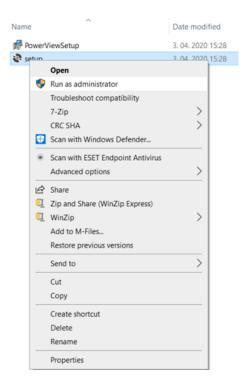


Figure 3 PowerView installation via "setup.exe" file

3 Starting with PowerView



During the installation procedure short cut icon is created the PC desktop Reverview. Double click will start the application and PowerView Quick Start window appears:

Metrel PowerView v3				- 🗆 ×
File Tools View He		directory 📴 Remote 🖬 Real-time Scope 🔍 🗋 🏶		
To get your	ol/REGISTRO 23KV FACTOR 0.57 FN.pwv	most important harives Firmware 2.0.3397 for M1 2885 is released Added "Calabration date" (NoT MUCH NOT NOT" NOTE: Added "Calabration date" (NoT MUCH NOT" NOTE: Calabratic Calabration (NoT Not	nge. In: / tector and Antimustic (, :	Information about new FW releases for: - MI 2893
D-NPQA Program/Proble D-Temp/Nebble (e.cudr D-Temp/Nebble) (e.cudr D-Temp/Nebble) (e.cudr D-NPQA Program/Proble D-NPQA Program/Proble D-NPQA Program/Proble D-NPQA Program/Proble	An Array Carl A 30 TR bands pure *4 pure pure dealer mon Montes, 1 Mac2des SN 1 Mondesons pure mon	Adade doption to name the instrument. Adade tabutement K. Fabor measurement. Adade tabutement K. Fabor measurement. Adade tabutement K. Fabor measurement. Adade tabutement K. Fabor measurement (Labor Mark Mark Mark Mark Mark Mark Mark Mar		- MI 2892/2885 - MI 2884/2883
	Open file from the	saved documents		
*	Import binary files	from the instrument		
	Import binary files	from directory		

Figure 4 PowerView initial windows screen

3.1 Icons explanation ad how to "make visible the whole ribbon"?

Since the ribbon is quite long, on some monitors (or PC's) whole ribbon is not visible.



Non visible ribbon

It is quite easy to expand it by clicking to the marked punctuation line and move none visible icons into



Figure 5 Extended the ribbon

Table 1 PowerView ribbon's description

	Open New Folder.
<i></i>	Open New Document.
	Save Document

Import from directory Print selected documents Import from directory Manual Zoom Import from directory Chart panning (active, when Trend Chart is zoomed) Import from directory Cond In X-Axis (Manual Zoom Only) Import from directory Zoom In X-Axis ("Ctrl + Mouse Wheel" for X-axis zoom Import from directory Zoom Out X-Axis ("Ctrl + Mouse Wheel Down") Import from directory Reset Zoom Import from directory Reset Zoom Import from directory Reset Zoom Import from directory Import data from the Instrument Import from directory Import data from Folder Import from directory Renote connection to the Instrument Import from directory Renote connection to the Instrume		
Manual Zoom	3	Print selected documents
 "Ctrl + Mouse Wheel" for X-axis zoom "Shift + Mouse Wheel" for Y-axis zoom Lock Y axis (Manual Zoom Only) Zoom In X-Axis ("Ctrl + Mouse Wheel Up") Zoom Out X-Axis ("Ctrl + Mouse Wheel Down") Reset Zoom Undo (last operation) Redo (last Undo operation) Cut Copy Paste Copy Rename Download data from the Instrument Import form directory Import data from Folder Real-time Scope Real-time Scope Configure instrument Options settings Contacts management Contacts management Create Snapshot Update Snapshot Change TDD calculation settings (related to AVRG phase current/Nominal transformer current) Create GOST 32144/33073 compliant report Create EN 50160 compliant report 		Chart panning (active, when Trend Chart is zoomed)
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		Create GOST 32144/33073 compliant report
Create OSINERGMIN report		Create EN 50160 compliant report
	<u> </u>	Create OSINERGMIN report
Create Korean report		Create Korean report
Create Korean report ver. 2		Create Korean report ver. 2
Create KESS report		Create KESS report
		Create IEEE 519 compliant report
		Create IEEE 519 compliant report

PE	Create Energy report
E	Create Energy Demand report
1 10	Create Código de Red report
	Create Chinese report
Ŷ	Average measured data
1	Add new site
1	Add new location within site
1	Merge records
<u>(</u>)	Repair Record Data
+	Toggle Min interval display
*	Toggle Avg (Average) interval display
孟	Toggle AvgOn (Average while active) interval display
Ŧ	Toggle Max interval display
%	Show harmonic values in percent
Σ	Show Energy as Cumulative values
φ	Show displacement factor in degrees
	Show Table in Chart View
	Show chart legend
~~	Split data to multiple panes
-	Split data by phase number
×*	Show data markers
	Show Min-Max range as filled area
~	Show EN 50160 criteria as chart regions
\sim	Show Flag Markers
h1	Show First Harmonic

Note 1: some icons became active after opening the PowerView file or selecting specific Quantity. **Note 2:** access to the specific functions are available by selecting appropriate quantity and the clicking the right mouse button.

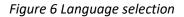
3.2 Language settings

There are many different languages supported (Check **Item 1.3**). Since PowerView is under daily development and implementation of new strings/functions, some of strings could not be presented in local language. No translated terms will be presented in default English language till the next updated localisation.

PowerView select the "language" based on the Windows settings. If appropriate language is not supported in PowerView, the English localisation will be taken.

Language could be changed via: OPTIONS \rightarrow ENVIRONMENT

Tools Help Options Manage contacts Import Remote instrument connection Instrument configuration Dump Instrument Memory (troubleshooting) Or via Icon Metrel PowerView v3		
File Edit View Action Tools Help		
I D 2 日 4 日 4 日 4 日 4 日 4 日 4 日 4 日 4 日 4 日	aje 🖾 Download 🔺 Import from directory	🔁 Remote 💿 Real-time Scope 🚳 🔝 🏟
Settings × Instrument Connection Environment Troubleshooting Appearance Language [gbo (Nigeria) Display welcome stillation (Indonesia) (gbo (Nigeria) Pocus record autom Indiktint (Syllabics, Canada) Indonesian (Indonesia) (gbo (Nigeria) Open record autom Indiktint (Syllabics, Canada) Import directory dept Isikhosa (South Africa) Isilaina (San Marino) Italiano (Clab del Vaticano) Javanese (Indonesia) Javanese (Indonesia) Javanese (Indonesia) Javanese (Indonesia) Javanese (Indonesia) Kabyle (Ageria) Kabyle (Ageria) Kabyle (Ageria) Kalenjin (Kerya) Kashmin (Perso-Arabic) Kastahtinin (Reiso) Kasahkina) Kinche (Camboda) Kinche (Camboda) Kashmin (Perso-Arabic) Kasahkinina) Kasahkinina (Kayanagari, India) Kasahkinina) Kinche (Camboda) Kincheda) Kinche (Camboda) Kincheda) Kasahkin (Camada) Kincheda) Kashmin (Perso-Arabic) Kasahkin (Camada) Kinche (Camboda) Kincheda) Kinche (Camada) </td <td></td> <td></td>		



Supported languages are bolded.

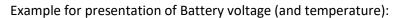
3.3 Troubleshooting

During the data download (import) different specific information data could be imported. Different options could be selected from:

$OPTIONS \rightarrow TROUBLESHOOTING$



Ø	nable detailed logging ((for trouble shooting)		
_	lways download PQ4 da		not recommended	
25	how system records who	en downloading (trou	bleshooting)	
	how system events and	alarms for series 23	, 25 and 27 (trouble	shooting)
S	ihow system channels (e	a.g. Battery voltage)		
✓ s	ihow debug info in Instru	ment Configuration fo	m	
V 5	ihow debug info in Instru	ment Configuration fo	m	



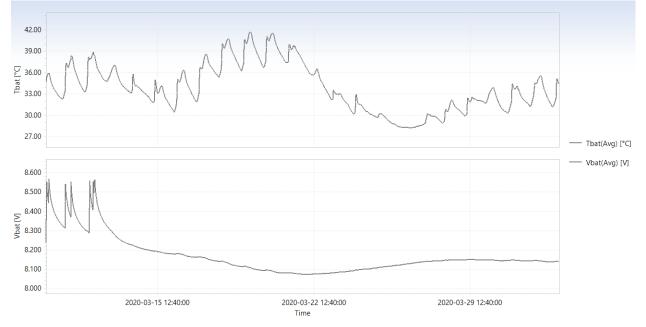


Figure 7 Battery voltage and temperature graphical presentation

3.4 Data download

Data could be directly downloaded from the Power Quality Analyser. Communication channel could be selected from

```
TOOLS \rightarrow OPTIONS \rightarrow INSTRUMENT CONNECTION
```



Few options available:

- Serial – direct connection between PC and PQA via serial (RS232) port on the PC.

Settings		· · · · · · · · · · · · · · · · · · ·
Instrument Connection Env	ironment Troubleshooting	
Connection type	Serial V	
Serial port parameters		
PortName	ection type Serial	
Baud Rate	115200 ~	
	Apply Ok Cancel	

Figure 8 Serial port selection

- USB – direct connection between PC and PQA via USB port on the PC.

Settings		×
Instrument Connection	Environment Troubleshooting	
Connection type	USB v	
USB port parameter	s	
PortName	Measurement Instrument USB VCom Port (COM3)	\sim
Baud Rate	921600 ~	
	Apply Ok	Cancel

Figure 9 USB port selection

- TCP/IP – remote connection via TCP/IP between PC and PQA via Ethernet port on the PC. $_{\rm Settings}$

Instrument Connection	strument Connection Environment Troubleshooting Connection Type Connection type TCP/IP (simple)		
Connection Type			
Connection type TCP/IP (simple) v			
	Apply	Ok	Cancel

Figure 10 TCP/IP connection selection

Note: to connect to PQA via TCP/IP, only PQA S/N and "Secret key" should be entered to PowerView. Connection is performed via Metrel server.

- Internet – remote connection via TCP/IP between PC and PQA via Ethernet port on the PC.

ettings × Instrument Connection Environment Troubleshooting Connection Type Connection type Intranet (LAN) Instrument Connection IP address/Hostname 192.168.1.100 Port number 7373 Test Connection	\times
Connection Type	
IP address/Hostname 192.168.1.100 Port number 7373	
Apply Ok Cancel	

Figure 11 Intranet (LAN) connection selection

Note: this type of connection is directly between PC and PQA. In this case; IP address and specific port should be entered.

Note: Each connection should be properly setup on the PQ Analyser. For specific connection, please check connection setup in the Power Quality Installation manual.

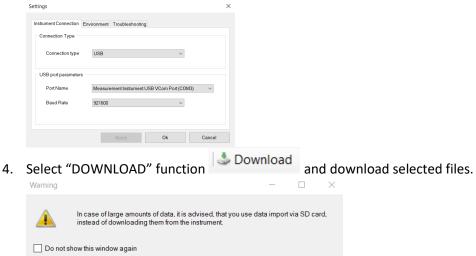
For downloading huge files, we suggest to remove SD card from the PQ analyser and import data directly from the card.

3.4.1 Data download (local) via USB

Procedure:

- 1. Connect PC and PQA with USB cable
- 2. Setup the "PC connection" on the PQA to "USB"
- 3. In the PowerView setup the USB connection type

Ok



Download										- • ×
	Model Serial Compo Firmus	tent name: Po : MI 2853 No.: 16280308 any: Methel d.d are version: 1.6 are version: 8.	l. 0.3447	Instrument	įnformatįon					
										\frown
1d	Icon		Type Name		Start Time End Time	File Size Download Range	Download To			📩 Download
* REC_2	020_02_18	_1310_0000	0		2/10/2020 1-10-01 PM	81.55 kB	<create a="" new="" site=""></create>			Cancel
	1		U/I/F R0001SNP		2/18/2020 1:10:01 PM 2/18/2020 1:10:01 PM		Create a new site>	12		
	2	8	General R0002GEN		2/18/2020 1:10:00 PM 2/25/2020 3:00:00 PM	41.22 MB 2/18/2020 1:10:00 Pt	<create a="" new="" site=""></create>	data		
	3		U/I/F R0003SNP		2/25/2020 3:10:01 PM 2/25/2020 3:10:01 PM	81.55 k8	Create a new star 1 - 2/25/2020 3:69:6*** Selecter <c - 2/25/2020 5: to dow <creater <creater <creater <creater <creater <creater <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <content <con< td=""><td>pload</td><td>0</td><td></td></con<></content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </content </creater </creater </creater </creater </creater </creater </c 	pload	0	
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	5		U/1/F		2/25/2020 6:00:00 PM	81.55 kB	<cre -<="" td="" to=""><td></td><td></td><td>Ĕ</td></cre>			Ĕ
	6		R0005SNP General		2/25/2020 6:00:01 PM 2/25/2020 6:00:00 PM	5.10 MB	<create a="" new="" site=""></create>	NO NO		na
	-		R0006GEN U/1/F		2/26/2020 3:00:00 PM 2/26/2020 3:10:00 PM	2/25/2020 6:00:00 Pt 81.55 k8	1 - 2/26/2020 3:00:00 PM <create a="" new="" site=""></create>	q		Ĩ
	7	-	R0007SNP General		2/26/2020 3:10:00 PM 2/26/2020 3:10:00 PM	 4.45 MB	<create a="" new="" site=""></create>	50		or
	8		R0008GEN		2/27/2020 9:29:59 AM	2/26/2020 3:10:00 PM	1 - 2/27/2020 9:29:59 AM	ġ,	*	U U
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	10	-	R0001SNP		2/27/2020 9:40:01 AM	423.29 18		p)		ai
	11		Triggered R0002WAV		2/28/2020 1:39:51 PM 2/28/2020 1:39:54 PM		<create a="" new="" site=""></create>	ila,		A
	12	•	Triggered R0003WAV		2/28/2020 1:50:04 PM 2/28/2020 1:50:06 PM	423.29 k8	<create a="" new="" site=""></create>	S		-
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analysis Marked Measurem	B U/I/ Pow Pow Piicl D Inte D Unb D Sigr D Instr D Instr	al Logging (f f ker monics & Ti marmonics balance halling hperature rument Batt Vaveform Sr	HD ery Information		General Logging, recorded on 2/18/ General Logging, recorded on 2/18/ Olick here to add record description Record Properties Profile: Standard Stati button presset: 2/18/2020 13:01:13819 Stati time: 2/25/2020 13:00:0000 Duration: 7 of 1h 50 m 0 s	EN) [2/18/2020 2020 13:10:00, dura) 13:10:00] tion: 7 d 1 h 50 m 0 s.			
	💟 U/I/F V	Vaveform Sr	napshot (R0003S	9/2020 15:1000 0 pr) [2/25/2020 15: NP) [2/25/2020 18:	Number of intervals: 1019 Interval duration: 10m 0 s Start cause: Button Press Stop cause: Instrument Reset or Unknown File name: R0002GEN/REC Clock synchronisation: RTC File version: 41 Measurement Settings Nominal voltage: 230.00 VLN 11/2/3 Clamp: A1502 (3300.00 A), Clamp measuring Nominal frequency: 50.00 Hz					1.00 A
<				>	Prequency sync: U1 Connection: 4W Alarm capture: Alarms disabled Events capture: Events enabled with waveform Signalling capture: Signalling enabled Insult capture: Transient disabled Insult capture: Transient disabled Insult capture: TPUE capited	5				

Figure 12 Data download procedure

3.4.2 Data download (remote) via TCP/IP (INTERNET / INTERNET(3G/GPRS))

Procedure:

1. PC should be connected to LAN

- 2. Connect the PQA to LAN (or via GPRS modem) and setup the communication parameters on PQA properly.
- 3. In the PowerView setup the TCP/IP (simple) connection type

	Settings	×	-,	- / 1	
	Instrument Connection Environment Troubleshooting				
	Connection Type				
	Connection type TCP/IP (simple) ~				
	Apply Ok	Cancel			
	Apply Ok	Cancel			
4 9	Select "REMOTE" function 📴	Remote	nd enter POA	serial number and "Secr	et kev"
Instrument Sele		u	×		erney
	ent Selection				
	Ilows you to select one of the recently connected instrum r instrument's serial number, phone number and password				
Serial N	lumber: 16280308				
Phone I	Number: 0 2 Connect				
Secret I	Key: 0000 0				
Descrip	tion:				

5. Press "Connect" and wait, that connection is established

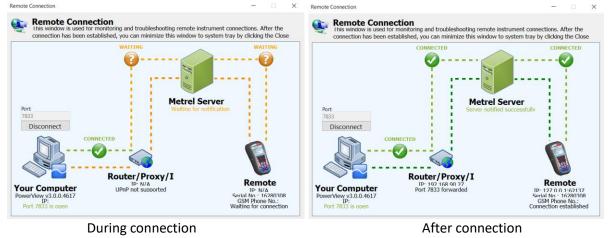


Figure 13 Remote data download procedure

6. Select "DOWNLOAD" function download selected files.

3.4.3 Data download (remote) via TCP/IP (INTRANET (LAN))

Procedure:

- 1. PC should be connected to LAN
- 2. Connect the PQA to LAN (setup the communication parameters on PQA properly)
- 3. In the PowerView setup the Internet (LAN) connection type

Settings		
	Troubleshooting	
Connection type Intranet (I	LAN) ~	
Instrument Connection		
IP address/Hostname	172.21.11.172	
Port number	7373	
	Test Connection	
	Apply Ok Cancel	

4. Test the connection

Connection Type	Wronnien	Troubleshooting	
connection rype			
Connection type	Intranet (L	AN) ~	
instrument Connection			
IP address/Hostnam	10	172.21.11.171	
		[mimi	1
Portnumber		7373	
Portnumber		7373 TestConnection	5
Portnumber			

5. Select "DOWNLOAD" function

and download selected files.

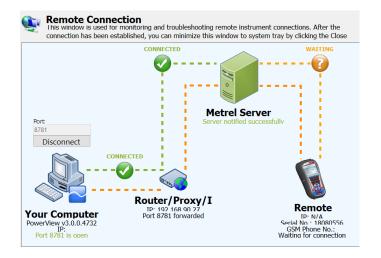
3.4.4 Typical errors during data download via TCP/IP

Be sure, that:

- 1. Communication setup on the PQA is set accordingly. Please check the manual for the PQA and
 - be sure, that status bar icon appears on the LCD (could take few minutes).
- 2. Check that entered instrument serial number and "secret key" are set accordingly.
- 3. Outgoing ports 80, 443, 7781 ÷ 8888 to the gprs.metrel.si server are opened on remote firewall where instrument is placed.

Typical error #1:

Connection to Metrel server is OK, PQA not connected to the system.

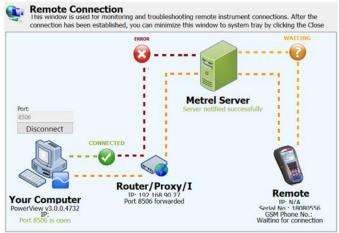


Typical error #2:

Port: Torrect Connect: Vou can minimize this window to system tray by clicking termote instrument connections. After the connection has been established; you can minimize this window to system tray by clicking termote instrument connections. After the connection has been established; Port: Torrect Vou can minimize this window to system tray by clicking termote instrument connections. After the connection has been established; Port: Torrect Vou can minimize this window to system tray by clicking termote instrument connections. After the connection has been established; Port: Torrect Vou can minimize this window to system tray by clicking termote instrument connections. After the connection has been established; Port: Torrect Vou can minimize this window to system tray by clicking termote instrument connections. After the connection has been established; Port: Torrect Vou can minimize this window to system tray by clicking termote instrument connections. After the connection termote instrument connections. After the connection has been established; Port: Torrect Vou can minimize this window to system tray by clicking termote instrument connections. After the connection termote instrument connections. After the connection has been established; Port: Torrect Vou connection: Port: Torrect Port:

Typical error #3:

Metrel server is temporary down:



Note: Server state is regularly checked and updated, so "temporary down" state should be only exceptional.

3.5 Type od logged files

During the recording session, different type of files are created:

- WAW waveform record (samples values)
- INR inrush record (RMS values)
- SNP waveform snapshot
- TRA transient record
- GEN general record. General record generates also AVG, EVT, PAR, ALM, SEL files, which can be found on SD Card and are automatically imported into PowerView.

3.6 Opening PowerView files

Data import direct from the SD card (or PC is the fastest way to import data into PowerView (specially, if import huge files – in the range of GB)).

1. Select folder, from where you want to import data - * Import from directory

R	D:\	kone			Select folder	
	1				Browse For Folder X	
Id	Icon	Type Name		Start Time End Time	> (≝ Local Disk (C) >	🛃 Import
					↓ USE Drive (E) ↓ M/2892	Cancel
	oup by sessi lect/Deselec		Show records	✓ Waveform ✓ Snapshot	Make New Folder OK Cancel	

2. Select data, that you want to import.

	E:\		 				Selectfolder	-		×
Id	Icon	Туре	Start Time		File Size	Download To			🛓 Import	
4 E		Name	End Time		Download Range					
4 E:		11/1/E	3/6/2020 12:29	44 PM	81 55 kB	<create a="" new="" site=""></create>			Cancel	
0		R0001SNP								
		General			3.93 MB	<create a="" new="" site=""></create>	÷			
1	-	Type Start Time File Size Download To Name End Time Download Range Import W/F 3/4/2020 12:29:44 FM 81.55 148 <create a="" new="" site=""> Cancel W/F 3/4/2020 12:29:44 FM Cancel Cancel Monoral P 3/4/2020 12:29:44 FM Cancel Ceneral 3/4/2020 12:31:20 FM R0002CEN 3/4/2020 12:31:20 FM 3/4/2020 12:31:20 FM Show records Show records </create>								
	p by session ct/Deselect a		✓ Waveform ✓ Snapshot	🗸 Inrush						

Imported data are saved under specific PowerView "PWV" format.

3.7 PWV data import

Previously downloaded files are saved as "PWV" file. It is possible to open/share these files.

Use the function	Open	Ctrl+O	، 🔛 / 🏹 t	o open PWV file:
stridgium v vrb			• 0	Scalen VID
^				
Name	~	Date modified	Туре	Size
Fotke		27. 03. 2018 08:54	File folder	
NI 2893 VFD #1		24. 04. 2020 09:56	Metrel PowerView	16.950 KB
MI 2893 VFD		24. 04. 2020 09:53	Metrel PowerView	16.421 KB
🔁 primerjava		11. 09. 2017 17:05	Metrel PowerView	33.900 KB
🔁 VFD test HV Lab osnovni		22. 05. 2018 08:24	Metrel PowerView	14.958 KB
VFD test HV Lab		21. 05. 2018 14:35	Metrel PowerView	15.010 KB

Recently saved files could be directly accessed via "Welcome screen":



4 Data processing with PowerView

PowerView enables different functionality on the downloaded data:

- Data analysing,
- Data export,
- Snapshot creation for custom report creation,
- Data correction,
- Data averaging,
- Creation of different types of reports.

4.1 U/I/F Waveform snapshot

200ms U/I/F waveform snapshot is automatically done at recorder start and end; MI 2893/2892/2885 could also take snapshot each recording hour automatically. Different type of information is presented:

- Record information,
- Meter information,
- Waveform scope,
- Table data,
- Phase diagram,
- Harmonics bar chart,
- Interharmonics bar chart.

4.1.1 U/I/F Record information

200ms U/I/F waveform snapshot is automatically done at recorder start and end.

Snapshot gives the basic info about:

Recorder properties

Profile: Standard Start time: 10/4/2019 12:30:01.199 Stop time: Unspecified Snapshot length: 199.99 ms (1395 samples) Stop cause: Finished Successfully File name: R0003SNP.REC Clock synchronisation: RTC File version: 27

- Measurement settings and nominal voltage

Nominal voltage: 400.00 V L-L I1/2/3 Clamp: A1502 (3,000.00 A), Clamp measuring range (3,000.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A IN Clamp: A1227 (300.00 A), Clamp measuring range (300.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A Nominal frequency: 50.00 Hz Frequency sync: U12 Connection: Open delta

Connection check status

```
Voltage: L1 L2 L3 

Current: L1 L2 L3 

Phase: L1 L2 L3 

Frequency: 

Voltage sequence: (123) 

Current sequence: (123) 

Result: 

Instrument information 

Model: MI 2892 

Instrument name: Power Master 

Hardware version: 8 

Firmware version: 2.0.3370 

S/n: 19331027
```

Calibration date: 8/28/2019 11:49:23

4.1.2 U/I/F Meter information

The complete set of information captured in a 200ms measurement interval presented in tabular form.

			Phase val	ies				
Symbol	Name	11	L2	L3	LN	Total	Unit	
U	Voltage	227.57	227.88	227.13	42.675		v	
I	Current	671.22	639.52	633.51	38.890		A	
f	Frequency	49.936					Hz	
THD U	Voltage THD	2.9419	2.7752	2.7592	11.481		%	
THD U	Voltage THD	6.6836	6.3139	6.2578	4.8577		v	
THD I	Current THD	12.307	12.289	12.269	127.72		%	
THD I	Current THD	81.857	77.895	77.038	30.400		А	
CFu	Voltage Crest Factor	1.4498	1.4462	1.4454				
CFi	Current Crest Factor	1.5265	1.5083	1.5081	2.3489			
Plt	Flicker PLT							
Pst	Flicker PST							
Pst(1min)	Flicker PST 1min	0.3229	0.3057	0.3402				
т	Temperature						°C	
			Line valu	es				
			Peak Values (since la	st user reset)				
			IEEE 1459 Power M	easurement				
Symbol	Name	u	L2	L3	LN	Total	Unit	
ombined								
P	Active Power	145.62	139.13	136.31		421.06	kW	
N	Reactive Power	46.120	43.372	46.083		135.57	kvar	
S / Se	Phase Apparent Power / Total Effe	152.75	145.73	143.89		442.78	kVA	
PF	Phase Power Factor / Total Effecti	0.9533	0.9547	0.9473		0.9510	N/O	
Qfund / Q+	Phase Fundamental Reactive Powe	40.607	38.030	41.381		-0.0208	kvar	
Sfund / S+	Phase Fundamental Apparent Pow	151.12	144.21	142.41		0.0213	kVA	
Sufund	Unbalanced Fundamental Apparent					437.97	kVA	
DPF / DPF+	Phase Displacement Factor / Total	0.9632	0.9646	0.9569		0.2069	N/O	
LU	Load Unbalance					2,056,110.0	%	
indamental						2,000,11010	14	
on fundamental								
on rundamental								
			Arithmetic Power N					
Symbol	Name	u	L2	L3	LN	Total	Unit	
	Departure Departure Autobary Man					105.65	la se a	
Qa	Reactive Power Arithmetic					135.65	kvar	
Sa	Apparent Power Arithmetic					442.37	kVA	
PFa	Power Factor Arithmetic					0.9518		
Indamental								
			Vector Power Me					
			Energy Measu	rement				

Figure 14 Complete meter information captured in 200ms snapshot

4.1.3 U/I/F Phase/Unbalance diagram

Phase and unbalance diagram are used for checking the proper selection (rotation field and proper U/I phase connection). Also, inductive/capacitive load character is easily identifiable.

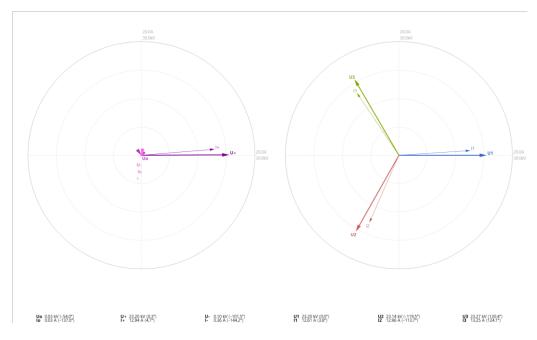
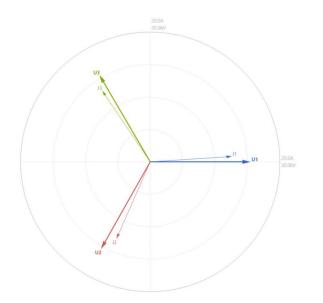
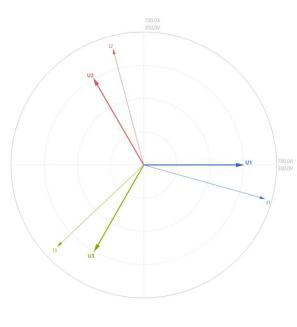


Figure 15 Unbalance and Phase diagram



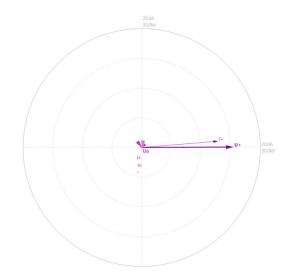


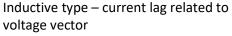
 U1
 227.19 V (0.0°)
 U2
 227.51 V (120.1°)
 U3
 226.80 V (-119.8°)

 I1
 665.15 A (-15.6°)
 I2
 633.86 A (104.9°)
 I3
 627.90 A (-136.7°)

 U1
 23.20 kV (0.0°)
 U2
 23.14 kV (-119.5°)
 U3
 23.27 kV (120.4°)

 I1
 12.61 A (3.8°)
 I2
 12.96 A (-113.7°)
 I3
 13.25 A (124.1°)





 Uo
 0.07 V (-15.0°)
 U+
 0.43 V (-95.5°)
 U 227.17 V (0.1°)

 Io
 7.15 A (8.9°)
 I+
 16.39 A (-17.5°)
 I 642.26 A (-15.8°)

Negative voltage sequence (132, 213, 321)

Capacitive type – current lead related to

 Uo
 0.03 kV (-54.0°)
 U+
 23.20 kV (0.3°)
 U 0.10 kV (-101.5°)

 Io
 0.03 A (-137.0°)
 I+
 12.94 A (4.7°)
 I 0.36 A (-144.2°)

voltage vector Positive voltage sequence (123, 231,312)

4.1.4 U/I waveform presentation

Different type of waveforms could be easily selectable, by selecting voltage and current. Waveforms are presented in "**Waveform scope**". Date are taken from the 200ms Snapshot.

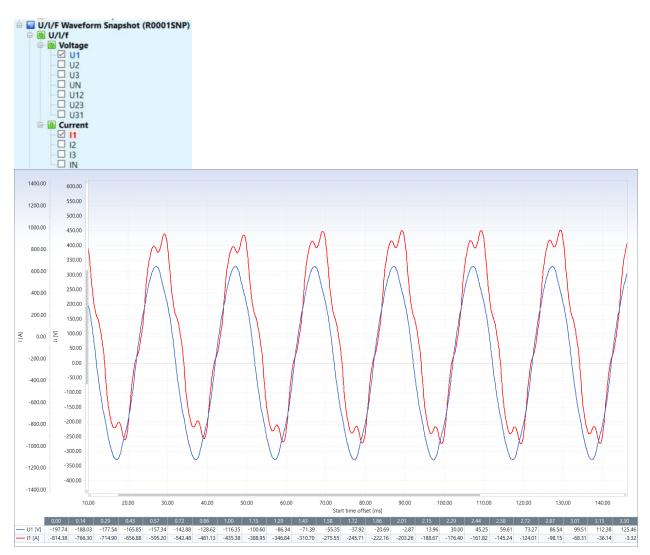


Figure 16 Voltage & Current waveform presentation

4.1.5 Harmonics/Interharmonics bar chart presentation

Harmonics/Interharmonics bar charts are presented by selecting voltage/current harmonics/interharmonics value.



Figure 17 Voltage, Current and THD presentation

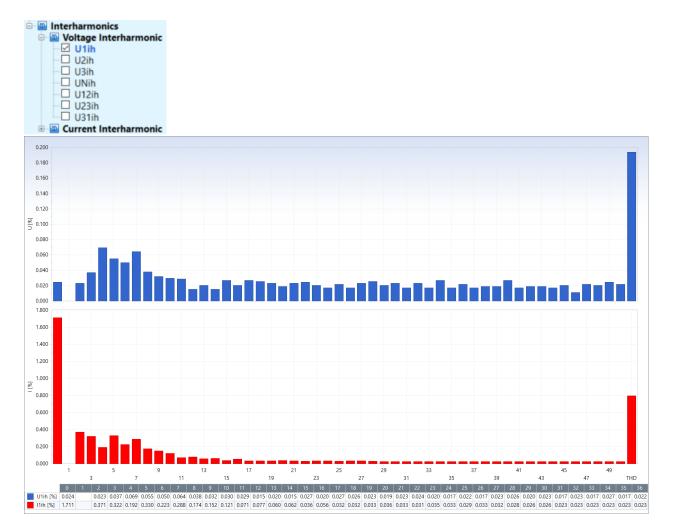


Figure 18 Voltage and Current interhrmonics presentation

4.2 Real-time Scope

During the recording session it is possible to monitor actual measurement values remotely (Ethernet) or via USB. Real-time scope performs 200 ms Snapshot, same as U/I/F Waveform snapshot, which automatically done at recorder start.

- Select appropriate communication port (USB/ Intranet/ TCP/IP) intranet
- 4. For the results interpretation, please check **Item 4.1**
- 5. Stop the updating of Real-time scope, by pressing Real-time Scope again.

4.3 Recorded data analysing

Downloaded/opened files are presented as "Folder" structure:

	Interes Powerview V3	
F	File Edit View Action Tools Help 🗧 🗲 Tabs with access to diffe	rent commands
1.0	🗋 🗃 🗐 🔄 🤤 🔍 역 역 🦉 🔊 🤭 👗 💁 🖾 🗙 🏘 🍰 Download 🔺 Import fr	rom directory 📴 Real-time Scope 🚇 🗎 🏶 🖉 🧭 🖩 🖷 🗮 🗮 🗮 🗮 🗮 🗮 🗮 🗮 🗮 🗮 🖉 🖉 👘 👘 👘 🖬 🗮 🗮 🗮 🗮 👘 👘 👘 🖬
	D:\Recordi - Demo\M ×	
T D	표 Data Explorer 후 ×	N.,
ion i	Group By: Quantity ~	(965)
Chinaineoann navien in stefan in		General Power Quality data presentation as "folder" structure

Figure 19 Downloaded PowerView data presentation

4.3.1 Data presentation "By Quantity" or "By Phase"

Data could be grouped "By Quantity" or "By Phase"

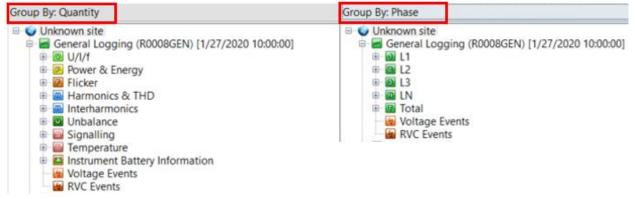


Figure 20 Quantity/Phase data presentation

4.3.2 Recorder Data presentation

With double click on recorded data, recorded items are open. It includes basic data related to the specific recorded data.

Metrel	PowerView v3	Record informa folder		Folder wi Table dat (selected registers	a	Folder wit recorded Events		Folder v recorde alarms	vith d System 0
File Ed	dit View Action Tools Help								Í
0 💕 🖬	🛯 🔄 🔍 🖓 🔍 🖉 🍳 🎗 🔊 (°)	太阳(13)	K 🧃 🗟 Downle	oad 🦂 Import fr	rom direc	tory 🔁 Remot	te 🔽 Real	I-time Scope	۵ 🖻 🔅
D:\Recor	rdi - Demo\MI ×								
표 Data	Explorer	🗙 🖂 Ge	neral Logging (R	E ×					Ļ
Harmonic Gro	up By: Quantity	Reco	rd Information	rend Chart Tab	le Eve	nts RVC Even	ts Transie	ent table Sys	tem alarm
nic Anal	General Logging (REC) [12/1	^			Î				
				hart folder d registers	Folde reco Even		Folde recore Transi	ded	

Figure 21 PowerView data explanation

Also, other Folders could be presented – depends on the actual PowerView selection; for example, Inrush table, ITIC, CBME curve etc.

4.3.3 Recorder information

General Recorder information are available under "Recorder Information" folder.

General recorder data information:

General Logging (R0008GEN) [1/27/2020 10:00:00] General Logging, recorded on 1/27/2020 10:00:00, duration: 15 d 0 h 0 m 0 s. Recorder Start time and duration User comments (remarks)

Basic recorder information:

Record Properties	Type of profile: Standard/Limited
Profile: Standard	Type of prome. Standard/ cjinited
Start button pressed: 1/27/2020 9:52:08.477	
Start time: 1/27/2020 10:00:00.000	Decorder Start & Stan time
Stop time: 2/11/2020 10:00:00.000	Recorder Start & Stop time
Duration: 15 d 0 h 0 m 0 s	
Number of intervals: 1440	Recorder duration
Interval duration: 15 m 0 s	Number of intervals
Start cause: Button Press	Interval duration / Recorder period
Stop cause: Programmed record duration	
File name: R0008GEN.REC	Source file name
Clock synchronisation: RTC	Synchronisation type
File version: 41	File version (related to internal PowerView structure)

Measurement settings information:

 Nominal voltage: 5,000.00 V L-N
 No

 Potential transformer ratio: 100 : 1
 11/2/3 Clamp: A1502 (3,000.00 A), Clamp measuring range (3,000.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A
 Ph

 IN Clamp: A1502 (3,000.00 A), Clamp measuring range (3,000.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A
 Ph

 IN Clamp: A1502 (3,000.00 A), Clamp measuring range (300.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A
 Sel

 Nominal frequency: 50.00 Hz
 Sel

 Frequency: S0.00 Hz
 Sel

 Connection: 4W
 Sel

 Alarm capture: Alarms disabled
 Sel

 Events capture: Events enabled with waveforms
 Sel

 Signalling capture: Signalling disabled
 Sel

 Transient capture: Insish enabled
 Op

 RivsC capture: RVC enabled
 Op

Nominal Voltage & VT ratio

Phase and Neutral current clamps selection & CT ratio Selected nominal frequency Selected synchronisation channel Selected connection

Selected Recorder additional options

Additional Recorder options setup:

Transient Trigger Settings Level UL-N: 5,000.00 V Level UN-GND: 50.00 V Level IL: Off	
Level IGND: Off Envelope UL-N: 50.00 V Envelope IL: Off Envelope IGND: Off	
Inrush Trigger Settings Level: 0.00 A (90.00 %) Slope: Rise Duration: 2.00 s Pretrigger: 1.00 s	
Event Settings Nominal voltage: 5,000.00 V L-N L-N Dip threshold: 90.00 % (4,500.00 V) L-N Dip hysteresis: 2.00 % L-N Swell threshold: 110.00 % (5,500.00 V) L-N Swell hysteresis: 2.00 % L-N Interruption threshold: 5.00 % (250.00 V) L-N Interruption hysteresis: 2.00 %	— Additional Recorder Options settings
RVC Settings Nominal voltage: 5,000.00 V L-N L-N RVC threshold: 3.00 % (150.00 V) L-N RVC hysteresis: 50.00 % (75.00 V) Alarm Settings Quantity: f, Phase: T, Level: > 50.00 Hz, Duration: > 200 ms	
Quantity: U1, Phase: 1, Level: > 5000 Hz, Duration: > 200 Hs Quantity: U1, Phase: L1, Level: > 5,000.00 V, Duration: > 200 ms Signalling Settings Nominal voltage: 5,000.00 V L-N Sig. 1 frequency: 316.00 Hz Sig. 2 frequency: 1,060.00 Hz Duration: 10.00 s	
Threshold: 5.00 % (250.00 V)	

Instrument and Miscellaneous information:

Instrument Properties		
Model: MI 2893 Instrument name: Power Master XT Hardware version: 8	Instrument type	
Firmware version: 1.0.3459 S/n: 16280308 Calibration date: 4/17/2019 8:08:23	Hardware and Firmware ver Instrument serial number Instrument calibration date	•
Miscellaneous Information		
Instrument name: TEST97		User defined instrument name
Downloaded on: 4/28/2020 12:06:23.1	09	Time stamp of downloaded files
Downloaded by: Mihael Hribar		Downloaded by
Downloaded using: Metrel PowerView	v3.0.0.4635 (64-bit), en-US	PowerView version used for download
Windows version: Windows 10 64-bit	(Microsoft Windows NT 10.0.18362.0)	Windows version

4.3.4 Presentation of Power & Energy data according different measurement method IEEE 1459/ Vector/Arithmetic

Metrel PQA support different measurement methods for Power & Energy:

- According IEEE 1459 standard
- Vector type
- Arithmetic type

PQA always register power & energy according IEEE 1459 standard; presentation method on the LCD or in PowerView could be selectable.

More details, about measuring algorithms for specific measurement method is available in the PQA manual.

Measurement method could be changed via:

1.	Select Power & Energy folder
2.	Select appropriate measuring method

🗉 🥥 Unknown site		U		
🖻 🗃 General Logging	(R0004GEN	N) [5/7/2020 9:20:00]		
	_			
Power & From	Cut	Ctrl+X		
e 🙆 Con 🐚	Сору	Ctrl+C		
	Paste	Ctrl+V		
	Delete	Del		
🖻 🌌 P aje	Rename			
	Select all ite	ems		
🕘 📴 Fun		surement method	~	Modern (IEEE 1459)
🕀 🖾 Non Turn	damentar			Classic (Vector)
				Classic (Average)

	Phase Apparent Power / Total Effective Apparent Power		Vector Phase Apparent Power / Total Effective Vector Apparent Power		Apparent Power Arithmetic
	Setot+		Svtot+		Satot+
	Avg [kVA]				Avg [kVA]
2/27/2020 9:50:00.000	156.86	2/27/2020 9:50:00.000	152.95	2/27/2020 9:50:00.000	153.91
2/27/2020 10:00:00.000	154.38	2/27/2020 10:00:00.000	150.50	2/27/2020 10:00:00.000	151.74
2/27/2020 10:10:00.000	156.19	2/27/2020 10:10:00.000	153.24	2/27/2020 10:10:00.000	153.93
2/27/2020 10:20:00.000	151.54	2/27/2020 10:20:00.000	149.43	2/27/2020 10:20:00.000	149.90
2/27/2020 10:30:00.000	151.29	2/27/2020 10:30:00.000	149.49	2/27/2020 10:30:00.000	149.83
2/27/2020 10:40:00.000	162.95	2/27/2020 10:40:00.000	160.27	2/27/2020 10:40:00.000	160.95
2/27/2020 10:50:00.000	172.88	2/27/2020 10:50:00.000	169.15	2/27/2020 10:50:00.000	170.58
2/27/2020 11:00:00.000	181.99	2/27/2020 11:00:00.000	178.71	2/27/2020 11:00:00.000	179.22
2/27/2020 11:10:00.000	180.63	2/27/2020 11:10:00.000	177.18	2/27/2020 11:10:00.000	177.62
2/27/2020 11:20:00.000	175.84	2/27/2020 11:20:00.000	172.30	2/27/2020 11:20:00.000	173.70
2/27/2020 11:30:00.000	176.48	2/27/2020 11:30:00.000	173.49	2/27/2020 11:30:00.000	174.40
2/27/2020 11:40:00.000	180.28	2/27/2020 11:40:00.000		2/27/2020 11:40:00.000	
2/27/2020 11:50:00.000	167.55	2/27/2020 11:50:00.000	163.13	2/27/2020 11:50:00.000	165.06
2/27/2020 12:00:00.000	168.52	2/27/2020 12:00:00.000	165.14	2/27/2020 12:00:00.000	166.43

Figure 22 Apparent Power presentation under IEEE 1459 / Vector / Arithmetic measurement method

4.3.5 Averaging the measurement result

Sometimes, there is a need to present recorded data with different measurement period, for example: data are recorded with period 5 minutes, but we need to present data with the recorded period of 15 minutes.

In the table bellow, there is presented relation between registration period and averaging period.

Registration period Averag. to	1 sec	3 sec	5 sec	10 sec	1 min	2 mjn	5 mįn	10 min	15 mjn	30 mjn
3 s	1	×	×	×	×	×	×	×	×	×
5 s	✓	×	×	×	×	×	×	×	×	×
10 s	 ✓ 	×	×	×	×	×	×	×	×	×
1 min	✓	1	×	×	×	×	×	×	×	×
2 min	✓	×	×	×	×	×	×	×	×	×
5 min	1	1	×	×	×	×	×	×	×	×
10 min	1	1	×	×	×	×	×	×	×	×
15 min	1	1	× .	×	×	×	×	✓	×	×
30 min	✓	1	 Image: A set of the set of the	×	×	 Image: A set of the set of the	×	✓	×	×
60 min	1	1	1	×	×	 Image: A second s	×	1	×	 Image: A second s

Table 2 Relation between Registration vs Averaging measurement period

To perform averaging of measurement results:

1. Select General Logging

. .

. .

2. Double click on right mouse button \rightarrow Average measured data –> select requested averaged

Group By: Quantity		~	
🗉 🥥 Unknown site			
General Logging (R0007-CER General Logging (R007-CER General Logging (R002-INF General Logging (R0002-INF General Logging (R0002-INF General Logging (R0002-INF General Logging (R0002-INF General Logging (R0003-INF General Logging (R003-INF General Logging (R003-INF General Logging (R003-INF Gene	Copy Ct	rl+X rl+C rl+V Del	
8	Average measured data	•	10 min
ন্ত্রি	Select all items		15 min
45	Repair record data		30 min
	Send to		60 min

3. After performong Average function, new general record appears under Folder structure

🖃 🌍 Unknown site

🐵 🗃 General Logging (R0007GEN) [4/20/2020 9:45:00] (averaged - 30 min)

General Logging (R0007GEN) [4/20/2020 9:45:00]

Final result:

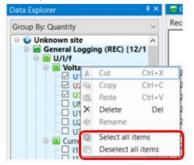
- Two recorders – original one and created one with averaged measurement period

🖬 General Logging (R0 🗡 🔚 General Logging (R0	🗃 General Logging (R0 🛛 💆 General Logging (R0 🗡
Record Information Events RVC Events System alarms Flagged Intervals	Record Information Events RVC Events System alarms Flagged Intervals
General Logging (R0007GEN) [4/20/2020 9:45:00] General Logging, recorded on 4/20/2020 9:45:00, duration: 16 d 22 h 30 m 0 s. Click here to add record description	General Logging (R0007GEN) [4/20/2020 9:45:00] (averaged - 30 min) General Logging, recorded on 4/20/2020 10:00:00, duration: 16 d 22 no mos. Click here to add record description
Record Properties	Record Properties
Profile: Standard	Profile: Standard
Start button pressed: 4/20/2020 9:43:08.531	Start button pressed: 4/20/2020 9:43:08.531
Start time: 4/20/2020 9:45:00.000	Start time: 4/20/2020 10:00:00.000
Stop time: 5/7/2020 8:15:00.000	Stop time: 5/7/2020 8:00:00.000
Duration: 16 d 22 h 30 m 0 s	Duration: 16 d 22 h 0 m 0 s
Number of intervals: 4878	Number of intervals: 812
Interval duration: 5 m 0 s	Interval duration: 30 m 0 s
Start cause: Button Press	Start cause: Button Press
Stop cause: Manually Stopped	Stop cause: Manually Stopped
File name: R0007GEN.REC	File name: R0007GEN.REC
Clock synchronisation: RTC	Clock synchronisation: RTC
File version: 41	File version: 41

Figure 23 Original recorder data (5 min) and averaged recorder data(30 min)

4.3.6 Table and Trend Chart data presentation

Selected registers are presented in Table as well as Trend chart. Registers are selected simple by clicking one by one or to **Select/Deselect all items** (registers) under specific group of parameters:



Data Explorer 🕴 🕴	🗙 🛛 🖃 General Loggin	g (RE ×						
Group By: Quantity	Record Information	n Trend C	hart Table	Events	RVC Events	Transient	table Syste	em alarms
				🖉 Voltage			Current	
General Logging (REC) [12/1			U1	U2	U3	11	12	13
⊜-@ U/I/f			₹Avg [V]		€Avg [V]	Avg [A]	Avg [A]	€Avg [/
⊖ [©] Voltage	12/11/2019 11:20	0:00.000	227.38	227.95	227.59	303.61	289.08	284.2
- 🗹 U2	12/11/2019 11:30	0:00.000	227.55	228.07	227.70	305.84	285.05	284.8
- 🗹 U3	12/11/2019 11:40	0:00.000	227.89	228.47	228.08	304.83	282.66	280.6
	12/11/2019 11:50	0:00.000	227.67	228.21	227.82	304.90	282.70	287.7
🗆 U23	12/11/2019 12:00	0:00.000	228.03	228.56	228.33	300.52	280.41	275.9
U31	12/11/2019 12:10	0:00.000	228.16	228.73	228.44	290.18	267.23	270.6
□-B Current	12/11/2019 12:20	0:00.000	227.35	227.91	227.55	295.85	272.66	281.1
	12/11/2019 12:30	0:00.000	227.54	228.16	227.81	297.24	266.63	273.7
	12/11/2019 12:40	0:00.000	227.67	228.29	227.95	299.62	270.72	276.6
IN	10 11 1 10 0 10 10 10							

Figure 24 Table PowerView data presentation

For selected registers, also appropriate Trend Chart is presented.

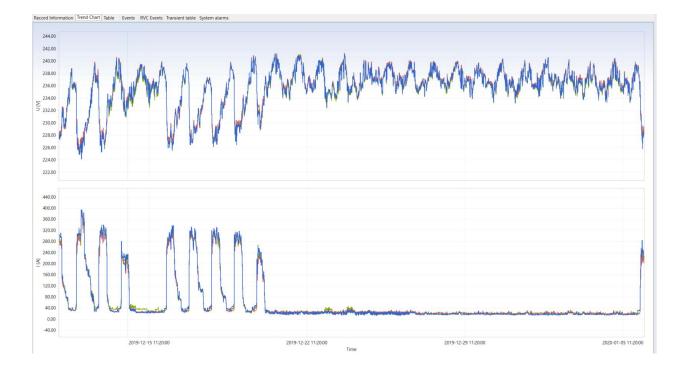
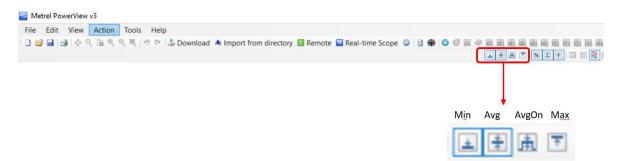


Figure 25 Chart PowerView data presentation

4.3.7 Min, Avg, AvgOn, Max table value presentation

Power Quality Analyser registers Min, Avg, AvgOn and Max value. You can simply add/remove selected value by clicking on:



Note: Min, Avg, AvgOn and Max value are not available for all registers!

Example:

Avg value for Frequency is NOT presented:

Record Information Trend (Chart Table	Events	RVC Events T	ransient tab	le System a	larms		
	Voltage U1				Frequency f			Avg value is no
	Min [V]	🗄 Avg [V]	AvgOn [V]	Max [V]	Min [Hz]	AvgOn [Hz]	Max [Hz]	presented!
12/11/2019 11:20:00.000	225.32	227.38	227.38	228.51	49.958	49.977	49.998	
12/11/2019 11:30:00.000	225.25	227.55	227.55	228.88	49.970	49.985	50.009	
12/11/2019 11:40:00.000	225.59	227.89	227.89	229.31	49.966	49.983	50.010	
12/11/2019 11:50:00.000	225.00	227.67	227.67	229.04	49.963	49.986	50.007	
12/11/2019 12:00:00.000	226.09	228.03	228.03	229.20	49.965	49.997	50.027	
12/11/2019 12:10:00.000	225.98	228.16	228.16	229.51	49.969	49.992	50.013	
12/11/2019 12:20:00.000	225.09	227.35	227.35	228.94	49.979	49.998	50.011	
12/11/2019 12:30:00.000	225.28	227.54	227.54	228.81	49.975	49.995	50.016	

Figure 26 Min/Max/Avg/AvgOn PowerView Table data presentation

4.3.8 Recorder data export

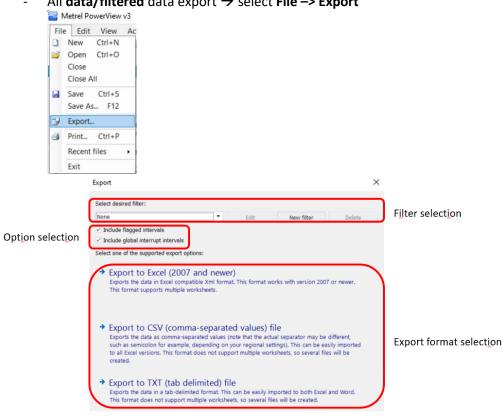
Registered data could be exported into XLS, CSV or TXT format. There are few options:

Direct selection (Copy/Paste) from the Table:

Record Information Trend	Chart Table	Events	RVC Events T	ransient tab	le System a	larms	
		I	/oltage			Frequency	
			U1			f	
	🛋 Min [V]	🗄 Avg [V]	AvgOn [V]	Max [V]	🛋 Min [Hz]	AvgOn [Hz]	Max [Hz]
12/11/2019 11:20:00.000	225.32	227.38	227.38	228.51	49.958	49.977	49.998
12/11/2019 11:30:00.000	225.25	227.55	227.55	228.88	49.970	49.985	50.009
12/11/2019 11:40:00.000	225.59	227.89	227.89	229.31	49.966	49.983	50.01
12/11/2019 11:50:00.000	225.00	227.67	227.67	229.04	49.963	49.986	50.00
12/11/2019 12:00:00.000	226.09	228.03	228.03	229.20	49.965	49.997	50.02
12/11/2019 12:10:00.000	225.98	228.16	228.	Copy sele	ected cells	Ctrl+C	50.01
12/11/2019 12:20:00.000	225.09	227.35	227.			50.01	
12/11/2019 12:30:00.000	225.28	227.54	227.				50.01
12/11/2019 12:40:00.000	225.71	227.67	227.	Annotate	selected cel	ls 🔸	50.00
12/11/2019 12:50:00.000	225.14	227.71	227. 9	Zoom ch	art to selecte	d range	50.01
12/11/2019 13:00:00.000	226.43	228.13	228.13	229.46	49.961	49.989	50.01
12/11/2019 13:10:00.000	226.25	228.25	228.25	229.54	49.955	49.974	49.99
12/11/2019 13:20:00.000	225.91	227.83	227.83	229.27	49.980	49.999	50.02
12/11/2019 13:30:00.000	225.69	227.83	227.83	229.12	49.965	49.989	50.01
12/11/2019 13:40:00.000	225.85	228.18	228.18	229.47	49.944	49.971	49.99
12/11/2019 13:50:00.000	225.06	227.94	227.94	229.19	49.969	49.983	50.00
12/11/2019 14:00:00.000	226.58	228.64	228.64	230.19	49.977	49.997	50.02
12/11/2019 14:10:00.000	226.75	229.03	229.03	230.33	49.964	49.982	50.02

Figure 27 Copying data from PowerView Table

- Only selected cells could be copied 0
- Entire table could be copied 0



All data/filtered data export → select File -> Export

Select "Export format" and follow the procedure...

×

4.3.9 Creating custom designed filter

PowerView enables creation of user defined filter, where only needed data are exported.

1. Select "New filter"

Export			\times
Select desired filter:			
None	Edit	New filter	Delete
 ✓ Include flagged intervals ✓ Include global interrupt intervals 			

2. Set "Filter name"; Channels - values; interval type

The Editor			
Search		Filter name Voltage & Current AVG	
All channels f(10s f(10s intervals) Jo Vbat Voltage Harmonic Current Harmonic Voltage Interharmonic Current Interharmonic	Harmonics Interval type	Applicable channels	*
Voltoge Current CFu Umax Imax Umax Umin Imin Imin IpeakRms IpeakRms IpeakRms IpeakRms Imax1/2 exect/2	Unit type	Absolute Ok Cancel	•
			Ok Cancel

3. Add; Remove unwanted registers and save filter selection.

Search	Filter name	
	Voltage & Current AVG	
All channels	Applicable channels	
f f10s f10s f10s io Votage Votage Harmonic Current Harmonic Current Netharmonic Votage Current CFI CFI CFI CFI CFI CFI Umax Imax Umin Imin UpeakRms IpeakRms IpeakRms	Voltage, Avg. UI, Absolute Voltage, Avg. 12, Absolute Voltage, Avg. 12, Absolute Current, Max, 12, Absolute Current, Max, 12, Absolute Current, Avg. 12, Absolute Current, Avg. 12, Absolute Current, Avg. 12, Absolute Current, Avg. 13, Absolute	†

4. Select created filter and export data

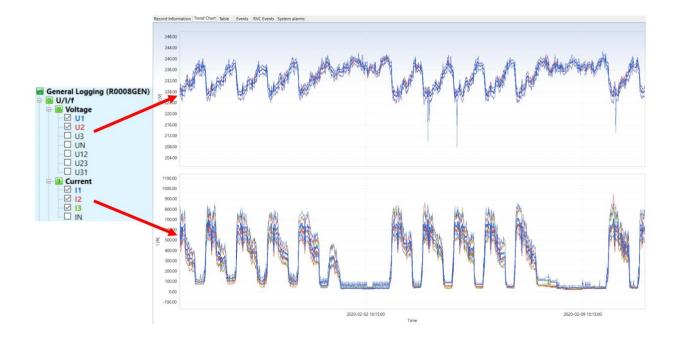
lect desired filter:				S	elect desired filter:				
one	*	Edit	New filter	Delete	/oltage & Current AVG		• Edit	New filter	Delete
sinergmin 10 min dia	-1			5	Include flagged inter	vals			
eco				5	Include global interr	upt intervals			
rrent harmonics					elect one of the suppo	utod overst ontioner			
rrent	10 A				elect one of the suppo	inted export options.			
ditage & Current AVG		(m. 1)			+ Export to Ex	cel (2007 and	nowor)		
Exports the data in Excel co	and the second se	er) hat. This format work	ks with version 2007 o				nl format. This format	works with version 20)7 or newer.
This format supports multip	le worksheets.				This format supp	orts multiple workshee	ts.		
Export to CSV (con Exports the data as comma such as semicolon for exam to all Excel versions. This fo created.	-separated values in hple, depending on	(note that the actual your regional settin	separator may be dif ngs). This can be easily	imported	Exports the data such as semicolo	as comma-separated n for example, depend	values (note that the ad ing on your regional s ot support multiple wo	tual separator may be ettings). This can be e	asily imported
	delimited) 6	le			Export to T	XT (tab delimit	ed) file		
Export to TXT (tab Exports the data in a tab-de This format does not suppo	elimited format. Thi ort multiple workshi	is can be easily impo eets, so several files	will be created.	d Word.	Exports the data This format does	not support multiple v	nat. This can be easily vorksheets, so several	files will be created.	
Export to TXT (tab Exports the data in a tab-dr This format does not suppo	elimited format. Thi ort multiple workshe Avg) [V] U	is can be easily impo eets, so several files 2(Avg) [V]	will be created.	d Word. 11(Max) [A]	Exports the data This format does I2(Max) [A]	in a tab-delimited form not support multiple v I3(Max) [A]	nat. This can be easily worksheets, so several 11(Avg) [A]	files will be created. 12(Avg) [A]	13(Avg) [A]
Export to TXT (tab Exports the data in a tab-dt This format does not suppo [UTC] U1(/ 7.1.2020 10:15:00,000	elimited format. Thi ort multiple workshe Avg) [V] U 227,84	is can be easily impo eets, so several files [2(Avg) [V] 228,26	will be created. U3(Avg) [V] 227,55	d Word. 11(Max) [A] 832,32	Exports the data This format does I2(Max) [A] 794,63	in a tab-delimited forr not support multiple v I3(Max) [A] 792,84	nat. This can be easily worksheets, so several 11(Avg) [A] 675,69	files will be created. 12(Avg) [A] 639,72	13(Avg) [A] 64
Export to TXT (tab Exports the data in a tab-di This format does not support [UTC] U1(/ 7.1.2020 10:15:00,000 7.1.2020 10:30:00,000	elimited format. Thi ort multiple worksho Avg) [V] U 227,84 228,06	is can be easily impreets, so several files (2(Avg) [V] 228,26 228,44	will be created. U3(Avg) [V] 227,55 227,82	d Word. 11(Max) [A] 832,32 801,75	Exports the data This format does I2(Max) [A] 794,63 773,04	in a tab-delimited form not support multiple v I3(Max) [A] 792,84 770,82	nat. This can be easily worksheets, so several 11(Avg) [A] 675,69 660,18	files will be created. 12(Avg) [A] 639,72 622,66	13(Avg) [A] 64 62
Export to TXT (tab Exports the data in a tab-de This format does not suppo [UTC] U12:00,000 7.1.2020 10:15:00,000 7.1.2020 10:45:00,000	elimited format. Thi ort multiple worksho Avg) [V] U 227,84 228,06 229,41	is can be easily impreets, so several files 2(Avg) [V] 228,26 228,44 229,57	will be created. U3(Avg) [V] 227,55 227,82 229,10	d Word. 11(Max) [A] 832,32 801,75 665,69	Exports the data This format does 12(Max) [A] 794,63 773,04 646,94	in a tab-delimited form not support multiple v I3(Max) [A] 792,84 770,82 638,89	nat. This can be easily worksheets, so several 11(Avg) [A] 675,69 660,18 518,85	files will be created. 12(Avg) [A] 639,72 622,66 479,34	I3(Avg) [A] 64 62 48
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Export to TXT (tab Exports the data in a tab-d This format does not support (7.1.2020 10:15:00,000 (7.1.2020 10:30:00,000 (7.1.2020 10:45:00,000 (7.1.2020 11:30:00,000 (7.1.2020 11:30:00,000 (7.1.2020 11:45:00,000 (7.1.2020 11:45:00,000 (7.1.2020 12:15:00,000	elimited format. Thi pt multiple workshu 227,84 228,06 229,41 229,23 227,93 226,94 227,00 226,65	is can be easily imporently a series of the	will be created. U3(Avg) [V] 227,55 227,82 229,10 228,92 227,48 226,42 226,60 226,51	d Word. 11(Max) [A] 832,32 801,75 665,69 576,80 749,93 750,88 712,61 766,60	Exports the data This format does 12(Max) [A] 794,63 773,04 646,94 555,98 735,67 711,56 6685,39 733,38	in a tab-delimited form not support multiple v 13(Max) [A] 792,84 770,82 638,89 574,39 739,14 718,10 734,90 782,30 745,87	nat. This can be easily worksheets, so several 11(Avg) [A] 675,69 660,18 518,85 500,14 597,67 632,37 584,10 631,78	files will be created. 12(Avg) [A] 639,72 622,66 479,34 459,03 567,01 597,71 542,88 595,03	13(Avg) [A] 64 62 48 46 57 59 54 59 59 58
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5. It is also possible to modify (Edit), Delete already created filters.

Export				×
Select desired filter:				
Voltage & Current AVG	· [Edit	New filter	Delete
Include flagged intervals				
✓ Include global interrupt intervals				
Select one of the supported export options:				

4.3.10Creating Trend Charts (Graphs)

Trend Chart – Graph automatically appears by clicking on selected register. All selected values (Min, Max, Avg, AvgOn) are presented. Values presented under same folder are presented in same chart.



4.3.10.1 Trend Charts manipulation

Most of Chart manipulation functions are available via icons:

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4.3.10.1.1 Zoom In – Zoom out

X - Chart could be zoomed IN by using keys "Ctrl + Mouse wheel Up"

	X-Axis (for all Charts)	Y-Axis (for selected Chart only)	
Zoom IN	Ctrl + Mouse wheel Up	Shift + Mouse wheel Up	
Zoom OUT	Ctrl + Mouse wheel Down	Shift + Mouse wheel Down	
Zoom Reset	×		

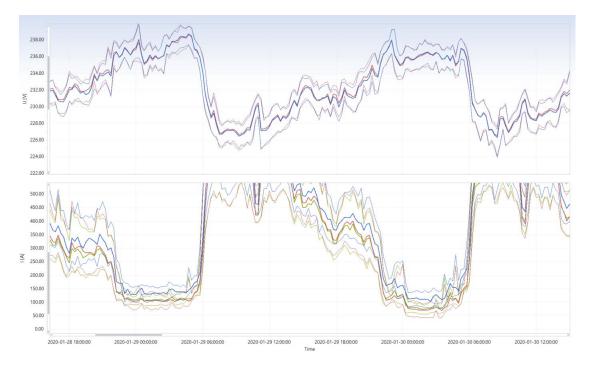


Figure 28 Zoom-in/ Zoom-out data chart data

4.3.10.1.2 Trend Chart Legend presentation



Legend could be added to Trend Chart by clicking on the "Show chart Legend" icon $\rightarrow \stackrel{[]}{=}$ or via View \rightarrow Chart features \rightarrow Show chart legend

Chart info Legend as well as Flag info are presented M ("Show Flag markers" icon).

238.00		U1(Min) [V]
232.00		
228.00 228.00		U2(Max) [V]
226.00	— I1(Avg) [A]	11(Min) [A]
224.00 222.00 v	I1(Max) [A]	
1100.00 1000.00	l2(Min) [A]	12(Max) [A]
900.00 800.00 700.00	— I3(Avg) [A]	— I3(Min) [A]
		Flag (2/4/2020 10:15:00.000) Voltage Event: 2/4/2020 10:07:19:727 - Dip (L1, L2, L3) - 103 ms Flag
400.00	Flag (2/4/2020 11:15:00:000) Voltage Event: 2/4/2020 11:04:43.716 - Dip (L1, L2) - 063 ms Rag	riag (2/5/2202 8:45:00.000) Voltage Event: 2/5/2020 8:36:27.396 - Dip (L1, L3) - 079 ms Flag
200.00	(2/10/2020 11:30:00.000) Voltage Event: 2/10/2020 11:25:28:948 - Dip (L1, L2, L3) - 050 ms	(2/10/2020 11:45:00.000) Voltage Event: 2/10/2020 11:41:43.956 - Dip (L1, L2, L3) - 086 ms
-100.00 2020-01-28 18:00:00 2020-01-29 06:00:00 2020-01-29 06:00:00		

Figure 29 Chart Legend

4.3.10.1.3 Interval Chart presentation – by Week, by Day, by Hour, by Minute

Sometimes is useful to present recorded data by week/day/hour to get better view to the specifics, specially in case of longer registration periods.

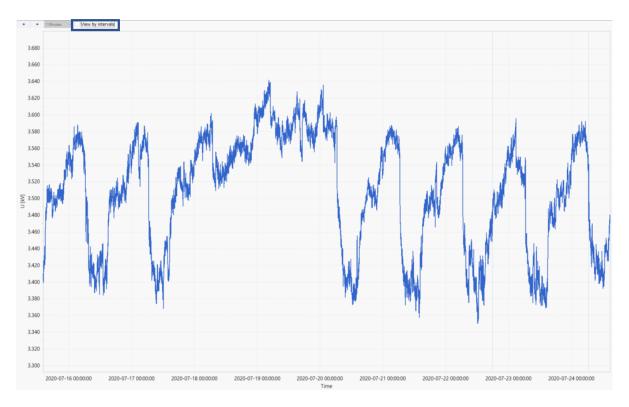
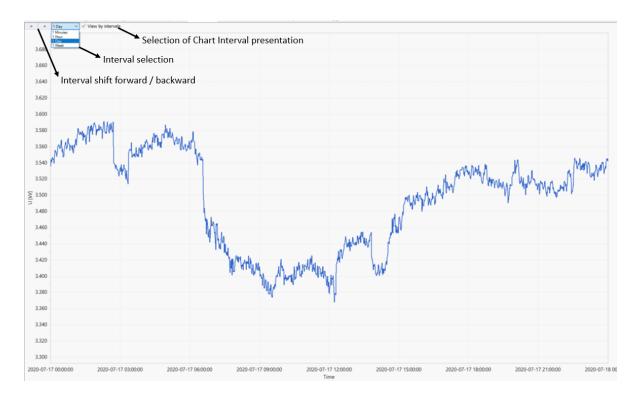
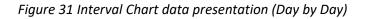


Figure 30 Complete recorded Chart data presentation





4.3.10.1.4 Flagged marker presentation



Flagged intervals are presented in Trend Chart by clicking on "Show Flag markers" icon

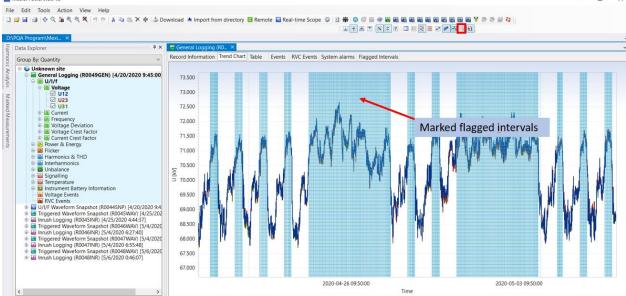


Figure 32 Flagged intervals - Chart

Table Flagged interval presentation: Select View → Enable Flagged Intervals View

Metrel PowerView v3

File	Edit Tools Action	Vie	w Help		
10	🗃 🛃 ಿ 💠 🔍 🎦 🍳 🤅	~	Toolbar		
		~	Status Bar		
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T	Data Explorer	* *	Marked Measurements window	F6	
m		ill	Harmonic Analysis Window	F7	
onio	Group By: Quantity	~	Enable Flagged Intervals View		
Harmonic Analysis	Unknown site		Show Welcome screen	F8	
Ilysi	⊜- 🕑 U/I/f		Chart features		
	□ 🛛 Voltage		Chart data display options		
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i capiorei	Record Information Trend Cl	nart Table Events RVC Events System	alarms Flagged Intervals		
up By: Quantity ~		Measurements	Pit	Pst	Pst(1min)
Unknown site General Logging (R0049GEN) [4/20/2020 9:45:00]	4/20/2020 9:05:00 PM	Current Range L			
0 0/1/f	4/20/2020 9:10:00 PM	Overcurrent L1, Current Range L		Overcurrent L1, Current Range L	Current Range L
😔 📴 Voltage	4/20/2020 9:15:00 PM	Overcurrent L1, Current Range L		Overcurrent L1, Current Range L	
✓ U12 ✓ U23	4/20/2020 9:20:00 PM	Current Range L	***	Overcurrent L1, Current Range L	
- 2 U31	4/20/2020 9:25:00 PM	Overcurrent L1, Current Range L		Overcurrent L1, Current Range L	Overcurrent L1
Gurrent	4/20/2020 9:30:00 PM	Current Range L	1.12	Overcurrent L1, Current Range L	
Prequency Voltage Deviation	4/20/2020 9:35:00 PM	Overcurrent L1, Current Range L		Overcurrent L1, Current Range L	Overcurrent L1, Current Range L
Voltage Deviation Voltage Crest Factor	4/20/2020 9:40:00 PM	Current Range L		Overcurrent L1, Current Range L	
Current Crest Factor	4/20/2020 9:45:00 PM	Overcurrent L1, Current Range L		Overcurrent L1, Current Range L	
Power & Energy	4/20/2020 9:50:00 PM			Overcurrent L1, Current Range L	
Elicker Harmonics & THD	4/20/2020 9:55:00 PM	Overcurrent L1, Current Range L		Overcurrent L1, Current Range L	
Interharmonics	4/20/2020 10:00:00 PM		Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
Unbalance	4/20/2020 10:05:00 PM	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
Gignalling Gignalling Gignalling	4/20/2020 10:10:00 PM		Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
Generature Instrument Battery Information	4/20/2020 10:15:00 PM	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
Voltage Events	4/20/2020 10:20:00 PM		Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
RVC Events	4/20/2020 10:25:00 PM	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
 U/I/F Waveform Snapshot (R0044SNP) [4/20/2020 9:4] Triggered Waveform Snapshot (R0045WAV) [4/25/202] 	4/20/2020 10:30:00 PM	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L
 Inggered waveform Snapshot (R0045WAV) [4/25/202 Inrush Logging (R0045INR) [4/25/2020 4:44:37] 	4/20/2020 10:35:00 PM	Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
Triggered Waveform Snapshot (R0046WAV) [5/4/2020	4/20/2020 10:40:00 PM	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L
Inrush Logging (R0046INR) [5/4/2020 6:27:40]	4/20/2020 10:45:00 PM	Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
	4/20/2020 10:50:00 PM	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L
	4/20/2020 10:55:00 PM		Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
a Inrush Logging (R0048INR) [5/6/2020 0:46:07]	4/20/2020 11:00:00 PM	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Current Range L
	4/20/2020 11:05:00 PM		Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
	4/20/2020 11:10:00 PM	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
	4/20/2020 11:15:00 PM		Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	
>	4/20/2020 11:20:00 PM	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	Overcurrent L1, Current Range L	

Figure 33 Flagged intervals - Table

4.3.10.1.5 Min/Avg/AvgOn/Max value presentation

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To perform different values presentation, just click between Min/Avg/AvgOn/Max selection.

For some registers, all four selections are not available.

General Logging (Ko	<u></u>						
Record Information Tren	d Chart Table	e Events	RVC Events Su	binterval Tab	le System a	larms Flagged	Intervals
		0	/oltage			Frequency	
	U12				f		
	Min [kV]	Avg [kV]	AvgOn [kV]	Max [kV]	Min [Hz]	AvgOn [Hz]	Max [Hz]
4/20/2020 9:50:00.000	68.097	68.504	68.504	68.826	49.967	49.987	50.015
4/20/2020 9:55:00.000	67.964	68.361	68.361	68.645	49.998	50.011	50.022
4/20/2020 10:00:00.000	67.906	68.291	68.291	68.606	50.001	50.018	50.031
4/20/2020 10:05:00.000	67.865	68.185	68.185	68.464	49.987	50.011	50.029
4/20/2020 10:10:00.000	67.610	67.986	67.986	68.378	49.991	50.016	50.031
4/20/2020 10:15:00.000	67.533	67.949	67.949	68.293	49.985	50.003	50.024

For specific registers; like Power Factor, we suggest to monitor AvgOn value or Universal (Unsigned) Power Factor (includes cap & ind part)

Record Information Trend	Chart Tab	le Events	Alarms	System alarn	ns
		📴 Powe	r Factor		Power Factor Universal
	PFet	otcap+	PFet	otind+	UPFtot+
	Avg []	🛋 AvgOn []	🗄 Avg []	🗟 AvgOn []	🖹 Avg []
5/21/2018 14:55:00.000			0.986	0.986	0.986
5/21/2018 15:00:00.000	0.011	0.988	0.974	0.984	0.984
5/21/2018 15:05:00.000			0.985	0.985	0.985
5/21/2018 15:10:00.000			0.986	0.986	0.986
5/21/2018 15:15:00.000			0.987	0.987	0.987
5/21/2018 15:20:00.000	0.022	0.985	0.966	0.988	0.988
5/21/2018 15:25:00.000			0.983	0.983	0.983
5/21/2018 15:30:00.000	0.007	0.993	0.980	0.987	0.987
5/21/2018 15:35:00.000	0.073	0.990	0.910	0.983	0.983
5/21/2018 15:40:00.000			0.984	0.984	0.984
5/21/2018 15:45:00.000			0.987	0.987	0.987
5/21/2018 15:50:00.000			0.989	0.989	0.989
5/21/2018 15:55:00.000			0.987	0.987	0.987
5/21/2018 16:00:00.000			0.985	0.985	0.985
5/21/2018 16:05:00.000			0.987	0.987	0.987
5/21/2018 16:10:00.000			0.986	0.986	0.986
5/21/2018 16:15:00.000			0.985	0.985	0.985
5/21/2018 16:20:00.000			0.986	0.986	0.986
5/21/2018 16:25:00.000	0.070	0.986	0.916	0.985	0.985

4.3.10.1.6 Toggle between harmonics presentation in % or in basic unit [V/A]

Harmonic components and THD could be presented in % (related to the first harmonic component) or as absolute value (presented in V or A). Click on icon \bigcirc or via View \rightarrow Chart data display options \rightarrow Show harmonic values in percent

	🔟 Volta	ge THD	Current THD		🔤 Voltage Harmonic	🖾 Current		t Harmonic	
	THD U12	THD U23	TH	ID I1	U12 h3	11	h1	1	h3
	🖻 AvgOn [%]	🗟 AvgOn [%]	🗄 Avg [%]	🗟 AvgOn [%]		🗟 AvgOn [%] 🗄 Avg [%]	AvgOn [%	5] 🗄 Avg [%]
4/20/2020 9:50:00.000	4.511	4.496	19.01	19.01	0.181	100.	0 100.0	6.1	2 6.12
4/20/2020 9:55:00.000	4.557	4.507	18.38	18.38	0.176	100.	0 100.0	5.9	7 5.97
4/20/2020 10:00:00.000	4.312	4.270	17.10	17.10	0.163	100.	0 100.0	5.9	3 5.93
4/20/2020 10:05:00.000	4.293	4.277	16.80	16.80	0.134	100.	0 100.0	5.8	2 5.82
	😰 Volta	ige THD	e THD Current THD		Voltage Harmonic	Current Harmonic			
	THD U12	THD U23	T	HD I1	U12 h3	1	h1	1	h3
	🗟 AvgOn [kV]	勈AvgOn [kV]	🗄 Avg [A]	🗟 AvgOn [A]	🗄 Avg [kV]	🗄 Avg [A]	🗄 AvgOn [A]	🗄 Avg [A]	🗄 AvgOn [A]
4/20/2020 9:50:00.000	3.088	3.078	50.23	50.23	0.124	267.35	267.35	16.21	16.21
4/20/2020 9:55:00.000	3.112	3.078	48.63	48.63	0.120	267.61	267.61	15.80	15.80
4/20/2020 10:00:00.000	2.942	2.915	6 45.19	45.19	0.111	268.41	268.41	15.72	15.72
			44.01		0.092			15.27	

Figure 34 Harmonics presentation - % / [V/A]

4.3.10.1.7 Energy presentation as "Cumulative" od "Delta" values



Consumed/ Generated Energy could be presented as Cumulative or Delta values. Selection could be

performed by clicking on $\stackrel{[]}{=}$ icon or via View \rightarrow Chart data display options \rightarrow Show energy as cumulative values

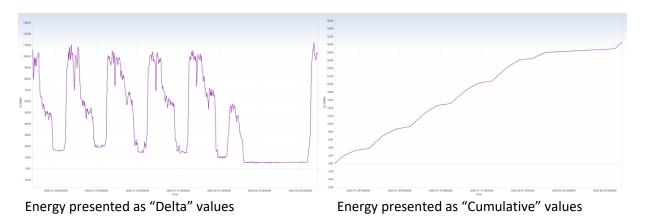


Figure 35 Delta/Cumulative Energy Chart presentation

Also under Table date presentation there is Current of Tatel energy pre-	
Also, under Table data presentation, there is Summ of Total energy pre	esented:

	Active Energy		Active Energy
	Eptot+		Eptot+
	Avg [MWh]		Avg [kWh]
2/3/2020 8:30:00.000	30.06	2/3/2020 8:30:00.000	100.94
2/3/2020 8:45:00.000	30.16	2/3/2020 8:45:00.000	98.54
2/3/2020 9:00:00.000	30.26	2/3/2020 9:00:00.000	96.49
2/3/2020 9:15:00.000	30.36	2/3/2020 9:15:00.000	97.79
2/3/2020 9:30:00.000	30.46	2/3/2020 9:30:00.000	103.73
2/3/2020 9:45:00.000	30.56	2/3/2020 9:45:00.000	103.18
2/3/2020 10:00:00.000	30.67	2/3/2020 10:00:00.000	102.06
Total energy:	30.67	Total energy:	30665.98

4.3.10.1.8 Displacement Power factor presentation in degrees

Displacement power factor could be presented in degrees or as an absolute value (0.00 - 1.00).

Selection could be performed by clicking on the icon	I or via View → Chart data display options →
Show displacement factor in degrees	

0

	•						
	Displacement Factor				Displacement Factor		Factor
	DPF1ind+	DPF2ind+	DPF3ind+		DPF1ind+	DPF2ind+	DPF3ind+
	🗄 Avg [°]	🗄 Avg [°]	🗄 Avg [°]		∄Avg []	€Avg []	€Avg []
1/27/2020 10:15:00.000	15.20	15.06	16.35	1/27/2020 10:15:00.000	0.965	0.966	0.960
1/27/2020 10:30:00.000	13.18	13.66	14.30	1/27/2020 10:30:00.000	0.974	0.972	0.969
1/27/2020 10:45:00.000	6.12	6.35	7.51	1/27/2020 10:45:00.000	0.994	0.994	0.991
1/27/2020 11:00:00.000	5.32	4.47	6.77	1/27/2020 11:00:00.000	0.996	0.997	0.993
1/27/2020 11:15:00.000	11.86	11.29	12.75	1/27/2020 11:15:00.000	0.979	0.981	0.975
1/27/2020 11:30:00.000	14.13	13.54	14.96	1/27/2020 11:30:00.000	0.970	0.972	0.966
1/27/2020 11:45:00.000	12.35	12.05	13.83	1/27/2020 11:45:00.000	0.977	0.978	0.971
1/27/2020 12:00:00.000	14.19	14.25	15.73	1/27/2020 12:00:00.000	0.969	0.969	0.963
1/27/2020 12:15:00.000	14.52	14.59	16.01	1/27/2020 12:15:00.000	0.968	0.968	0.961

4.3.10.1.9 Universal Power factor presentation

In case of compensated load, power factor varies between capacitive and inductive part. Power factor is split into two values according standard definition \rightarrow PF inductive and PF capacitive. Users have problem, how to interpret these values as a unique one; like Unsigned/Universal Power Factor. PowerView makes a summation between PF ind anf PF cap and present it like Universal Power Factor.

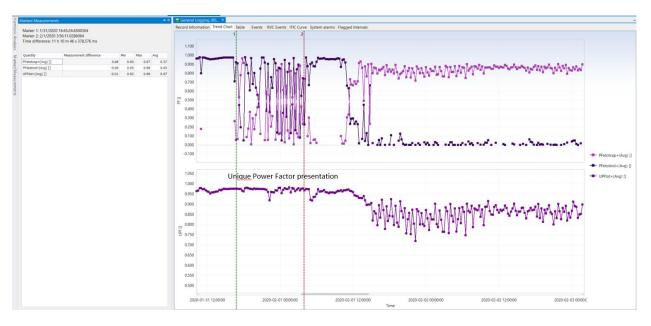


Figure 36 PFind & PFcap vs PFUni

4.3.10.1.10Data markers chart presentation and attaching custom annotations

⊥	Ε % Σ	φ 📰	20	📥 🛀 h1

On the chart presentation it is possible to select data markers, which mark the individual points in the graph. This is useful for specific points labelling under the chart presentation.

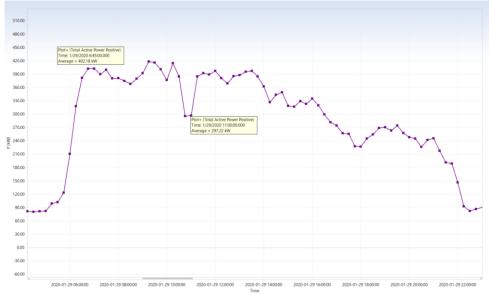
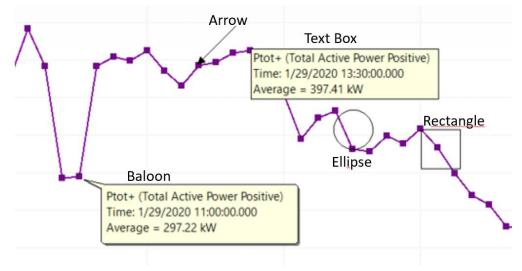


Figure 37 – Chart Annotation

Custom annotation marks could be added through:



Different options of Custom annotations:



4.3.10.1.11MIN-MAX range presentation as filled area

1 + 1 7 %	Σ 🛛 📰 📰	🖹 🎘 🖌 🖉 🖂 🖬
-----------	---------	-------------

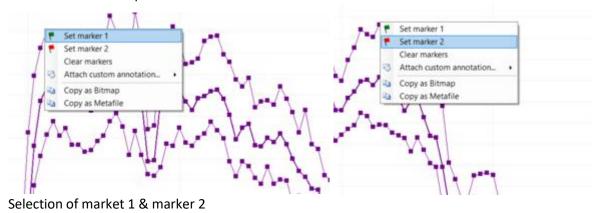
When Min/Max data on the chart are presented, then area between min/max could be presented as filled area.



Figure 38 MIN-MAX Chart presentation

4.3.10.1.12Marked measurements - MIN/MAX/AVG data presentation from the chart selection

For the detailed analyse, it is possible to get Min/Max/Avg values from the selected time frame on the chart. These values are presented for all selected charts. Time frame is defined with marker 1 & 2 selection. Values are presented under folder "Marked Measurements".



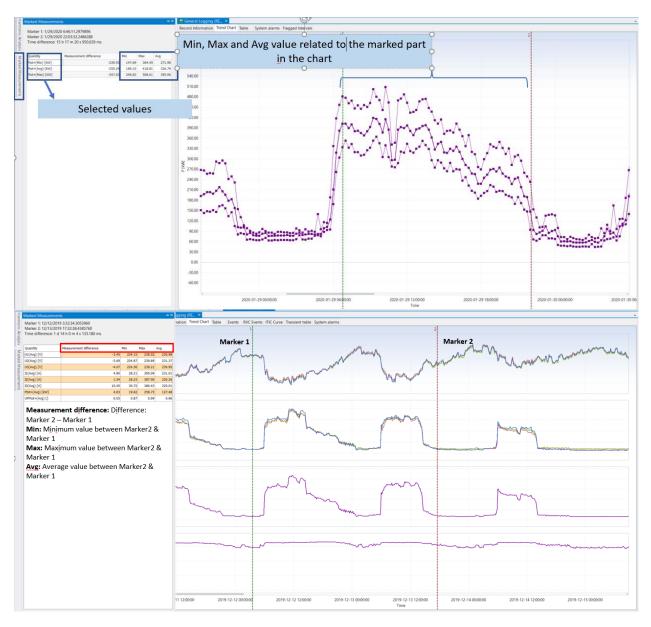


Figure 39 - Min/Max/Avg data presentation from the chart values on the selected time frame

How to fix the "Marked measurements" window?

Click on the "pin" sign to fix the selected window.

farked Measurements	
Marker 1: 1/27/2020 19:52:57.4517376	
Marker 2: 2/2/2020 10:59:21.7760616	
Time difference: 5 d 15 h 6 m 24 s 324.324 ms	

larked Meas	urements			oooooo 4 3
Marker 2: 2,	/27/2020 19:52:57.4517376 /2/2020 10:59:21.7760616 ence: 5 d 15 h 6 m 24 s 324.32	4 ms		
Quantity	Measurement difference	Min	Max	Avg

Same procedure for "Harmonic Analysis" and "Data Explorer" window.

4.3.10.1.13EN 50160 limits presented in Charts

Some data, like Voltage, Long-term Flicker Plt and unbalance could be presented in Trend Chart with EN 50160 limits for specific quantity.

Procedure:

- 1. Select Power Quality Criteria limits. Selection can be between:
 - EN 50160
 - GOST 32144/33073
 - CHINESE

To open Power Quality Criteria limits, click on \blacksquare icon or via \rightarrow Action \rightarrow Define Power Quality Criteria.

Power Quality Criteria limits are updated on regular base to follow mentioned standards.

2. Click on icon or via → View → Chart features → Show EN 50160 criteria as chart regions to insert selected limits on the Chart.



Figure 40 – EN 50160 criteria as Chart limits

4.3.10.1.14Show Table data with Chart view

For easiest data analysing is useful to monitor the Chart and Table data in same window. To create such view, click on \square icon or via \rightarrow View \rightarrow Chart features \rightarrow Show tabular data

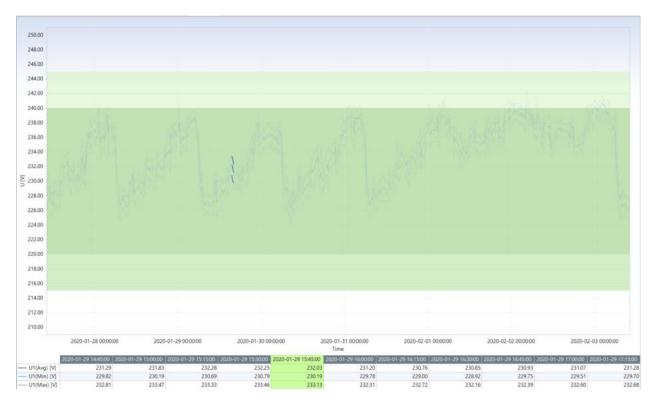


Figure 41 – Chart and Tabular data presentation

4.3.11Creating Snapshots

Snapshot is useful tool for creating and saving particular Charts/Tables used for the customized report creation.

To create Snapshots:

1. Create specific Chart, with specific annotations etc..

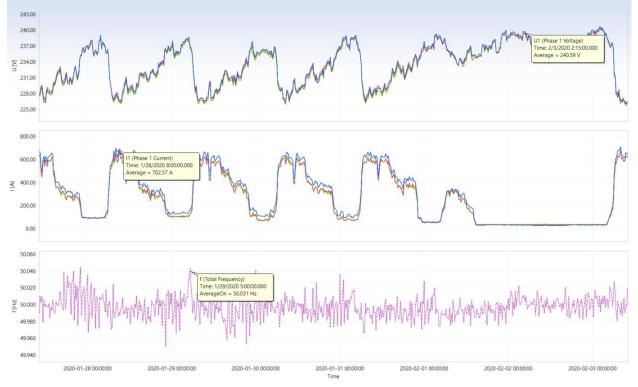
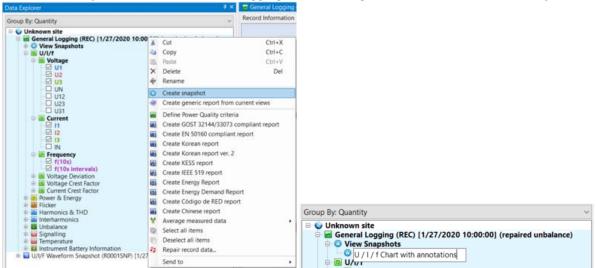


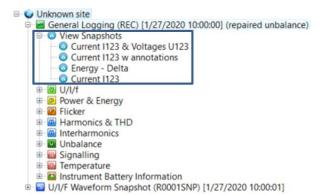
Figure 42 – Chart creating under PowerView



2. Create Snapshot → select General Logging folder and right mouse button -> Crate snapshot

Figure 43 – Creating Snapshot

- 3. You can add additional register to exit Chart under Snapshot, you can rename it, update it etc
- 4. Snapshots are saved under generic folder structure.
- 5. Different type of Snapshots could be crated.



6. For opening already saved Snapshot, double click on the optional Snapshot, where predefined Chart is saved and presented.

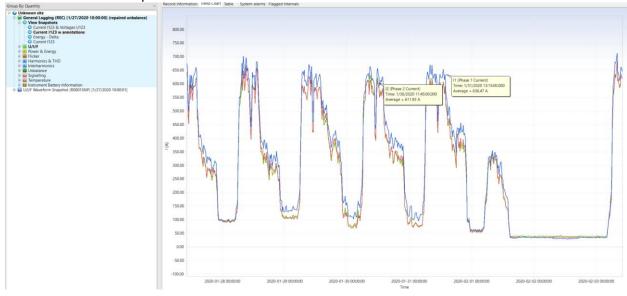


Figure 44 – Opening existing Snapshot

4.3.12Copying Charts as Bitmap/Metafile

Charts could be easily Copy/Paste as Bitmap or Metafile. Select appropriate function by click on the right mouse button.

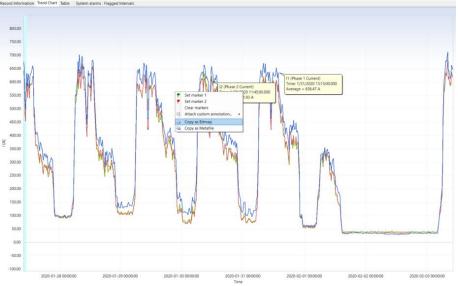
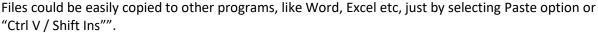


Figure 45 – Bitmap/Metafile copy



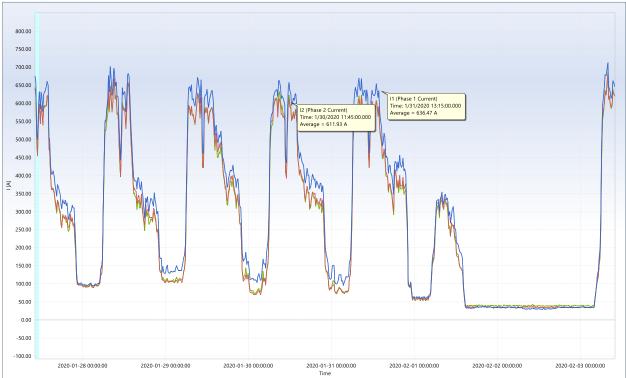
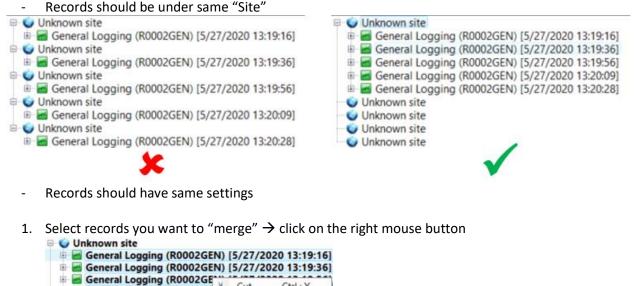
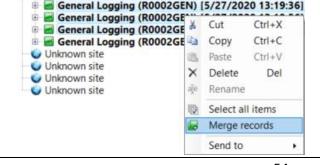


Figure 46 – Bitmap/Metafile copy

4.3.13Merge records

Sometimes it could happen, that due some different reasons we need to merge more records to a single one. Limitations:





2. Default "merged" record is named as "(Merged)" and includes info about all, together merged records

🖻 🌍 Un	known site
	(Merged)
🖲 – 📷	General Logging (R0002GEN) [5/27/2020 13:19:16]
🕀 – 🖂	General Logging (R0002GEN) [5/27/2020 13:19:36]
🕀 – 💌	General Logging (R0002GEN) [5/27/2020 13:19:56]
🔁 💌	General Logging (R0002GEN) [5/27/2020 13:20:09]
œ- 🖂	General Logging (R0002GEN) [5/27/2020 13:20:28]

(Merged)

General Logging, recorded on 5/27/2020 13:19:17, duration: 45 s. Merged from several records: General Logging (R0002GEN) [5/27/2020 13:19:16]; General Logging (R0002GEN) [5/27/2020 13:19:36]; General Logging (R0002GEN) [5/27/2020 13:19:56]; General Logging (R0002GEN) [5/27/2020 13:20:09]. Merged by: Mihael Hribar, on 5/27/2020 13:72:23

3. In case, that records parameters do not match each other, merging is not possible. In such case, alert information appears on display:

Could no	ot merge records	×
	Selected records were saved with different measurement settings. For example, one of the records was made with different time intervals, or different wiring configuration than other records. To ensure data consistency, merging of such records is not supported.	
	ОК	

4.3.14 Record repairing tools

It could happen, that during recording some parameters or connection were not properly set. PowerView enables correction of recorded data in case of wrong settings or connection. It is not possible to correct all possible mistakes; for example – wrong current sequence, related to the voltage one could not be corrected with PowerView.

PowerView enables correction of:

Modify recorded date and time

-

- Modify signal scale factors
- Repair record unbalance

Select **General Logging** and click on icon \checkmark or press **Action** \rightarrow **Repair record data** and select repairing option, that you want to perform on the recorded data.

nu	repair	nig (0013
	Rec	ord repairing tools
		window provides options to help you fix recorded data, if you believe that some of ettings or connections were not set up correctly during recording.
	Wha	t do you want to repair?
	\rightarrow	Modify recorded date and time
		Use this option to shift the record in time. This is useful if you created a record, but your instrument's date and time were not set correctly.
	\rightarrow	Modify signal scale factors
		Use this option to rescale your recorded signals. Use this if your measurement settings did not match the actual configuration of current and voltage input ratios.
	\rightarrow	Repair record unbalance
		Use this option to repair unbalance data. Using this option unbalance may be repaired in case of wrongly connected instrument.

4.3.15 Modify recorded date and time

In case, that actual time was not properly set or GPS receiver was not used during recorder session, PowerView enables correction the recorded time.

Record	d repairing tools	×		
4	Record repairing tools			
	the settings or connections were not set up	ix recorded data, if you believe that some of correctly during recording.		
	What do you want to repair?		_	
	Use this option to shift the record in ti	→ Modify recorded date and time Use this option to shift the record in time. This is useful if you created a record, but your instrument's date and time were not set correctly.		
		ed signals. Use this if your measurement iguration of current and voltage input ratios.		
	→ Repair record unbalance Use this option to repair unbalance da repaired in case of wrongly connected	ata. Using this option unbalance may be I instrument.		
Nime Shifting	- 🗆 X			
General Logging (R0007GEN) [Enter the desired time offset, or type the actu boxes. Date/Time format must be entered as	al desired start or stop time in the provided text			
Downloaded parameters Record start tim 4/20/2020 9:45:00.000 Record stop tim 5/7/2020 8:15:00.000				
Time offset	0 Milliseconds V			
Time offset	0 🔹 Milliseconds 🗸	Add "Time offset" to the e	existing recorder time	
New parameters New start time: 04/20/2020 09:45:00.000 New stop time: 05/07/2020 08:15:00.000		Set new recorder Start or	new Stop time	
	Apply Ok Cancel			

Figure 47 – Correction of recorder Start/Stop time

PowerView corrects recorder time stamps accordingly.

4.3.15.1 Modify signal scale factors (CT/VT ratio)

In case, that actual registration was done on secondary data or with wrong CT/VT ratio, it is possible to multiply/divide all necessary data with proper CT/VT correction factor.

	Reco	ord repairing tools			×	
	69	Record rep	pairing tools			
		This window r	provides options	to help you fix reco	rded data, if you believe that some of	
		the settings o	r connections we	ere not set up correct	ly during recording.	
		What do you	want to repair?			
			-	date and time	in in confid 16 years and a second burg	
				nd time were not set	is is useful if you created a record, but correctly.	
		Use this		le your recorded sign	als. Use this if your measurement on of current and voltage input ratios.	
		Use this			ng this option unbalance may be ment.	
Signal Rescaling			_	пх		
eneral Loggin	-			A CONTRACTOR OF A CONTRACTOR O		
ter the desired sca						
at this will result in ca	ascading upda	ates of all derive	u signais (e.g. r	ower, Energy,		
at this will result in ca :.)	ascading upda	ates of all derive	ru signais (e.g. r	Power, Energy,		
at this will result in ca	ascading upda	ates of all derive	iu signais (e.g. r	Power, Energy,	Voltage Transformer (VT) ratio, sepa	
at this will result in ca :.) Voltage channels U1	U2	U3	UN	Power, Energy.	selection for phase and neutral char	
at this will result in ca :.) Voltage channels				Power, Energy,		
at this will result in ca :.) Voltage channels U1	U2	U3 100	UN 1.0	ower, Energy,	selection for phase and neutral char	
at this will result in c: :.) Voltage channels U1 100	U2	U3 100	UN 1.0	ower, Energy,	selection for phase and neutral char Format: X.yyy	nne
at this will result in c: :) Voltage channels U1 100 ✓ Use same ratio Current channels	U2 100 [U3 100	UN 1.0	ower, Energy,	selection for phase and neutral char Format: X.yyy CurrentTransformer (CT) ratio, separ	rate
at this will result in c: :) Voltage channels U1 100 Use same ratio	U2	U3 100	UN 1.0	ower, Energy,	selection for phase and neutral char Format: X.yyy CurrentTransformer (CT) ratio, separ selection for phase and neutral char	rate
t this will result in c: :) Voltage channels U1 100 ✓ Use same ratio Current channels I1 120	U2 100 [for all voltage 12 [120]	U3 100 (eccentration of the second se	UN 1.0 pt neutral)	ower, Energy,	selection for phase and neutral char Format: X.yyy CurrentTransformer (CT) ratio, separ	rate
t this will result in c: :) Voltage channels U1 100 ✓ Use same ratio Current channels 11	U2 100 [for all voltage 12 [120]	U3 100 (eccentration of the second se	UN 1.0 pt neutral)	ower, Energy,	selection for phase and neutral char Format: X.yyy CurrentTransformer (CT) ratio, separ selection for phase and neutral char	rate
t this will result in c: :) Voltage channels U1 100 ✓ Use same ratio Current channels I1 120	U2 100 [for all voltage 12 [120]	U3 100 (eccentration of the second se	UN 1.0 pt neutral)	ower, Energy.	selection for phase and neutral char Format: X.yyy CurrentTransformer (CT) ratio, separ selection for phase and neutral char	rate

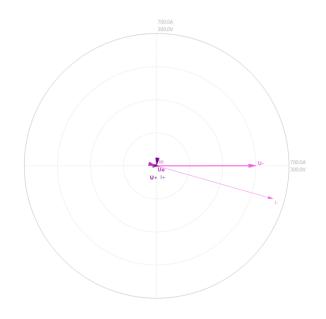
Figure 48 – Correction of VT/CTratio

PowerView corrects all registers, which are influenced to the CT/VT ratio.

4.3.15.2 Repair record unbalance

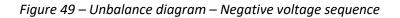
Some measurement installations don't have proper voltage rotation field, which caused FAIL result on EN 50160 report – Negative sequence voltage ratio.

Negative sequence voltage ratio could be detected through Unbalance diagram (significant U⁻ and I⁻ components.



 Uo
 0.07 V (-15.0°)
 U+
 0.43 V (-95.5°)
 U 227.17 V (0.1°)

 Io
 7.15 A (8.9°)
 I+
 16.39 A (-17.5°)
 I 642.26 A (-15.8°)



PowerView enables correction of Negative voltage sequence via "Repair record unbalance".

This window provides options to help you fix recorded data, if you believe that some of the settings or connections were not set up correctly during recording.							
What do you want to repair?							
d, but							
t ratios.							
2							
\times							

Figure 50 – Correction of Record Unbalance

PowerView corrects Record unbalance.

Correction is visible through additional comment, attached to the end of the General recorder naming \rightarrow General Logging (R0007GEN) [4/20/2020 9:45:00] **(repaired unbalance)** Repair record unbalance is reversible operation, so it is possible any time get the previous results.

All changes are noted under "Record Information", for time change and Signal scale factors, there are also correction added.

General Logging (R0004GEN) [7/15/2020 13:36:00] [modified tim Power Quality EN 50160, recorded on 7/15/2020 14:17:40, duration: 9 d 0 h 26 m 0 s.	ne) (modified scale) (repaired unbalance)
Record time changed: 2500000 Milliseconds Signal scale factors changed: U1 - 15.0, U2 - 15.0, U3 - 15.0, I1 - 10.0, I2 - 10.0, I3 - 10.0,	Modified parameters
Correction factors	

Figure 51 – List of changed parameters under PowerView

4.3.16Current and voltage harmonics/interharmonics presentation

Voltage and current harmonics could be presented on the chart. Useful icon/buttons:

h1	Show First Harmonic
F7	Show Harmonic Analysis

Harmonics presentation for Voltage and Current:

- Harmonic components from DC to 50th could be presented
- Harmonics for voltage includes Avg, Max values
- Harmonics for current includes Avg, AvgOn and Max values
- Some current harmonic components are not presented in bar graph. Reason: measured current is under the minimum limit measurement for the used current clamps (bar graph example bellow)
- For the specific point in the harmonic chart, **bar chart** could be presented (present separate harmonic components for the selected point in the harmonic chart)

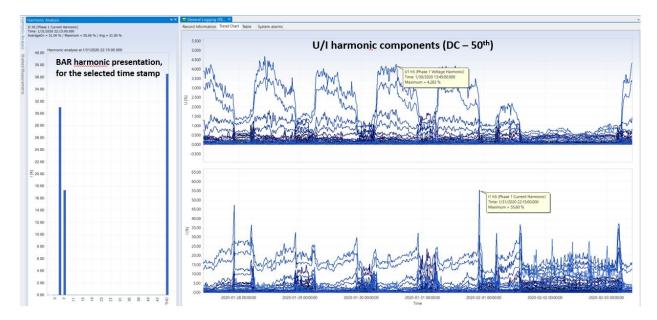


Figure 52 – Current and Voltage harmonics with harmonics bar chart presentation

THD presentation for Voltage and Current:

- THD for voltage includes AvgOn, Max values
- THD for current includes Avg, AvgOn and Max values

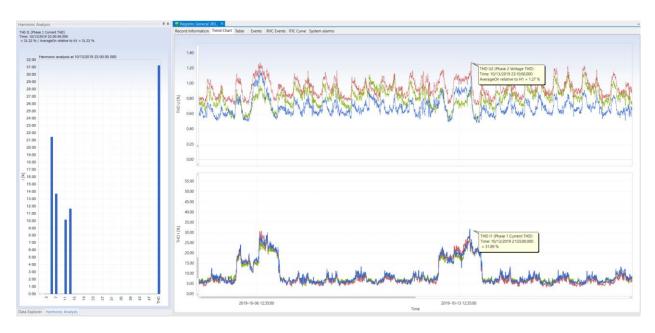


Figure 53 – Current and Voltage THD chart with harmonics bar chart presentation

Same approach is valid also for the interharmonics presentation.

4.3.17TDD calculation – related to measured RMS current or nominal transformer current

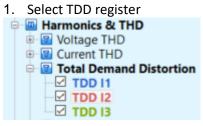
Total Demand Distortion (TDD) is calculated harmonic current distortion against the full load level of the electrical system. At the full load TDD(I)=THD(I). TDD gives better insight about how big is impact of harmonic distortion in the system. For example we could have very high THD but the load of the system is low. In this case the impact on the system is also low. TDD calculation formula:

$$I \text{ TDD} = \frac{\sqrt{I_{2}^{2} + I_{3}^{2} + I_{4}^{2} + I_{5}^{2} + \dots}}{I_{L}}$$

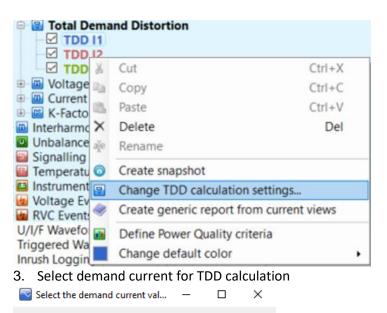
Where " I_L " is to the maximum demand load current. PowerView enables selection of I_L from:

- RMS current for each phase separately
- Nominal transformer current

To select which current is taken into account in the calculation:

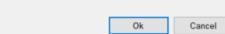


2. Press mouse right button or icon



Please select the demand current for TDD calculation:





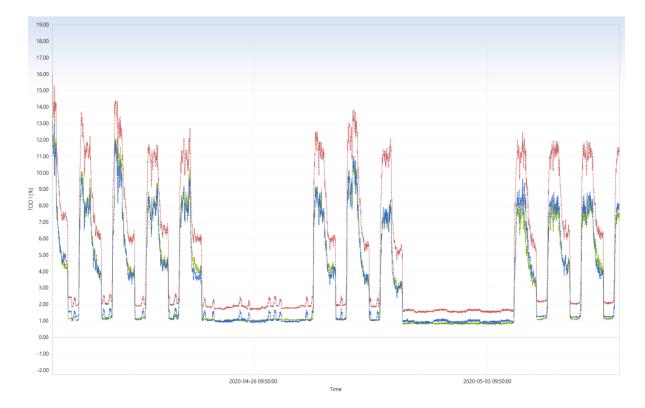


Figure 54 TDD calculated from the RMS current for each phase separately

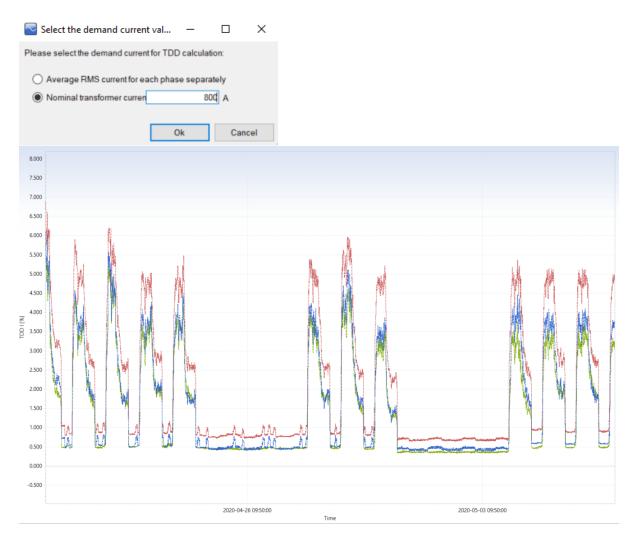


Figure 55 TDD calculated from the nominal transformer current

4.3.18Power harmonics

Harmonic pollution presents an increasing problem which can cause different problems on the installed equipment. They could have destructive impact on the equipment, including classical components like capacitors and also distribution transformers. Harmonics are mainly caused by non-linear loads. Origins of harmonics disturbances:

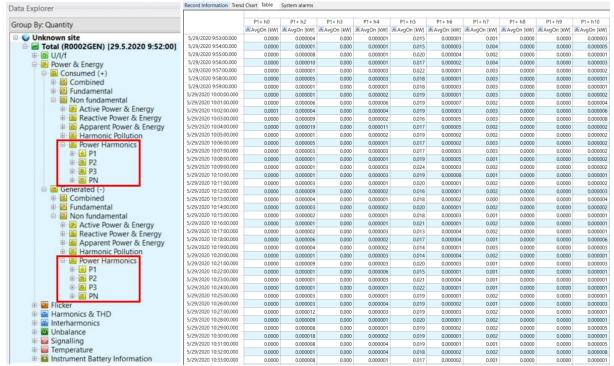
- single phase rectifiers high 3rd harmonic
- three phase loads 5th, 7th, 11th, 13th, 17th harmonic
- non-symmetrically controlled supply even harmonics and DC
- higher pulse number lower THDI
- serial inductance decreases THDI
- · LV power supply network THDU 1.5 ÷ 4.5%, mainly 5th harmonic

Impact on customers' equipment

- · overall energy efficiency is decreased
- · premature ageing of system components
- · triple harmonics can produce high currents in a neutral line causing overheating and losses
- · increased heating, noise and vibrations in transformers and motors
- · current into capacitor bank increases with harmonic order causing failures
- · presence of harmonic increase possibility of resonance
- problems with signalling frequencies
- tripping of protection devices

• electronic drives and switchers failure rate increase if THDU rises above 8%

Most of customers are interested in direction of power harmonics, coming from source to load or load to source. Different measured practice a used, the most common looks harmonics watt (voltage, current and phase angle of specific harmonics). In most cases, the value of harmonics power is meaningless (few mW's) and information is used for determining the harmonic's direction.



Power harmonics are available from General Recorder data:

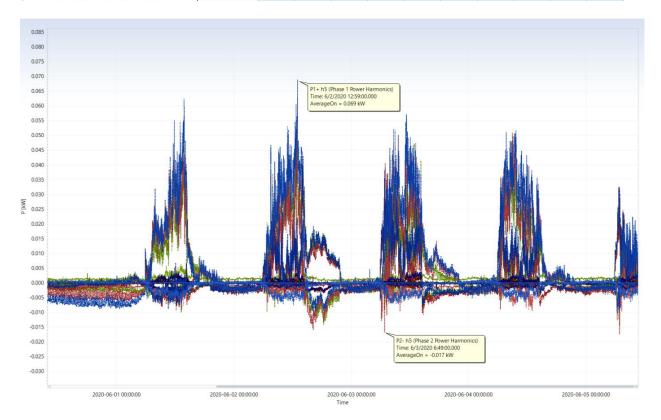


Figure 56 Harmonic power Consumed/Generated

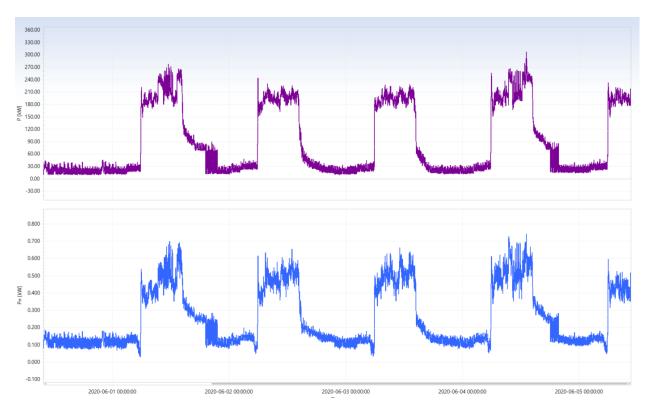


Figure 57 Active power vs Harmonic Active power

4.4 Reports creation

PowerView enables creation od different types of standard/custom specific reports. Each report has specific requirements related to the measurement period and recording time duration. Report based on the General Logging data. Related to the specific for specific report, PowerView could averaged some data to get the requested values according the standard/customer request.

Reports could be accessed from the General Logging data, by clicking on the right mouse button



GOST 32144/33073 report - standard – "Quality standards for electric energy in general power supply systems"; mostly used in Russia; accessed by icon

Korean reports, KESS – custom specific; accessed by ^{LLX} ^{LLX} icons
 IEEE 519 report – standard; "IEEE Recommended Practice and Requirements for Harmonic

Control in Electric Power Systems"; accessed by 🕕 icon

- Energy/Energy Demand report – custom specific: accessed by 📴 / 💼 icon

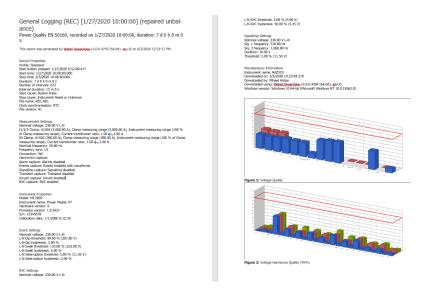
- Codigo de RED report custom specific; accessed by
- Chinese report custom specific; accessed by ^{LEE} icon

4.4.1 Generic report from current View

Simply tool for creating Generic report, which includes currently opened Items:

- Recorder information data
- Voltage Quality *
- Voltage Harmonics Quality *
- Trend Charts

With powerful editor, it is possible editing document inserting charts, tables comments... Report could be saved in different formats, like: DOC, PDF, RTF, TXT, XML....



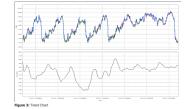


Figure 58 Generic report from current views

4.4.2 Voltage Quality report

Simply tool for creating Generic Voltage Quality and Voltage Harmonics Quality general overview. All data are "normalized", so it easy to determine whether the monitoring values are within or outside the prescribed limits.

Recorded data could be analysed according:

- EN 50160
- GOST 32144/33073
- CHINESE

limits.

In the PowerView base, there are always default limits (values change according to standards) which are regularly updated. End user could also change default values to the customized ones, according the current requirements.

Voltage Quality general overview is created also during generation of above-mentioned reports.

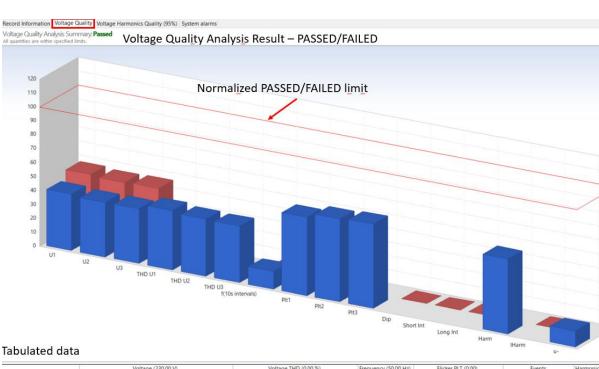
Click icon 🔟 or via 🖬 Define Power Quality criteria

→ Select appropriate Power Quality Criteria or Load defaults one

ec	ified percent of intervals 100% of in	tervals Voltage harr	monics Current harmonic	s Events Monito	oring values		
	Quantity	Percent of intervals	Max. neg. difference (-)	Max. pos. difference (+)	Reference value		
	Voltage	95.00 %	-10.00 %	10.00 %	230.00 V		
	Voltage	99.00 %	-10.00 %	10.00 %	230.00 V		
	Voltage THD	95.00 %	0.00 %	8.00 %	0.00 %		
	Frequency	99.50 %	-1.00 %	1.00 %	50.00 Hz		
	Frequency	95.00 %	-2.00 %	2.00 %	50.00 Hz		
	Negative sequence voltage ratio	95.00 %	0.00 %	2.00 %	0.00 %		
	Flicker PLT	95.00 %	0.00	1.00	0.00		
	Signalling (3s)	99.00 %	0.00 %	10.00 %	0.00		
			Limits for spe	cific values			
			ا Lijmijts for spe	cific values			
	Load defaults for EN50160		 Lijmijts for spe	cific values	Ok	Cancel	
	Load defaults for EN50160 EN50160		ا Liِmiֻts for spe	cific values	Ok	Cancel	
	EN50160	itoring stand		cific values	Ok	Cancel	
	EN50160	ijtorijng stand		cific values	Ok	Cancel	

All specified values are analysed. Analyse is presented in two "tab's":

- All data are normalized, so limit 100% present PASS/FAIL condition -



Voltage (230.00 V) 207.00 V ... 253.00 V Voltage THD Flicker PLT (0.00) 00 Hz
 Events
 Harmonics (0.00 %

 0 ... 100
 0 ... 10
 0 ... 10
 0.00 % ... 6.00 %
 Frequency (50.00 Hz) 49.50 Hz ... 50.50 Hz Percent of intervals 0.00 _ 1.00 0.00 % _ 8.00 % THD U2 [%] THD U3 [%] U1 IVI U3 IVI THD U1 [%] Pit1 () PIt3 II U2 [V] f(10s inte als) [Hz] Pit2 [] Dip Short Int Long Int Ha User defined % of interva 0.71 % ... 3.40 % 0.73 % __ 3.27 % 0.73 % __ 3.23 % 100% of intervals



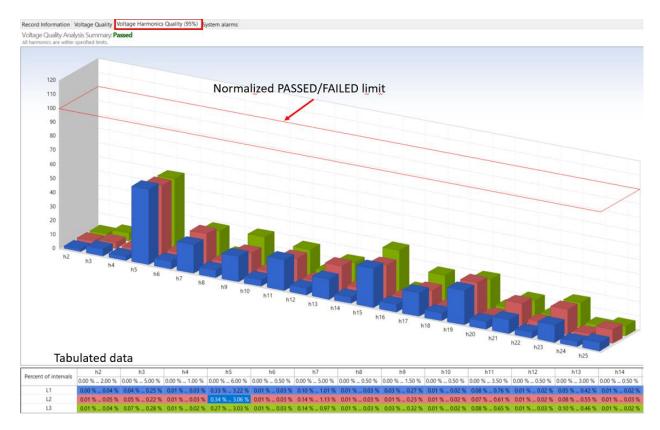


Figure 60 Voltage Harmonics Quality tab

Charts from the Voltage Quality report could be reported under "Generic report", table or charts could not be direct copied as bitmap/metafile to other application.

4.4.3 EN 50160 report

EN 50160, European Standard defines, describes and specifies the main characteristics of the voltage at a network user's supply terminals in public low voltage, medium and high voltage AC electricity networks under normal operating conditions.

Standard describes the limits or values within which the voltage characteristics can be expected to remain at any supply terminal in public electricity networks and does not describe the average situation usually experienced by an individual network user.

EN 50160 report based on 10 minutes measurement values. In case, that shorted period is used, PowerView average period to 10 minutes.

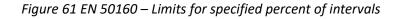
EN 50160 covers all requested characteristics, additionally presents Swells/Dips/Transients which are under the predefined N 50160 limits.

Since EN 50160 limit values change from time to time, user has free access to change them. Default values are regularly updated to follow the values, defined in standard.

To get predefined values, click on the 🛄 icon. Values are predefined for Low Voltage, Medium Voltage and High Voltage networks.

	Quantity	Percent of intervals	Max. neg. difference (-)	Max. pos. difference (+)	Reference value	
•	Voltage	95.00 %	-10.00 %	10.00 %	230.00 V	
	Voltage	99.00 %	-10.00 %	10.00 %	230.00 V	Limits for predefined monitorin
	Voltage THD	95.00 %	0.00 %	8.00 %	0.00 %	intervals.
	Frequency	99.50 %	-1.00 %	1.00 %	50.00 Hz	Reference values (voltage &
	Frequency	95.00 %	-2.00 %	2.00 %	50.00 Hz	frequency) are taken from the
	Negative sequence voltage ratio	95.00 %	0.00 %	2.00 %	0.00 %	from the Power Quality
	Flicker PLT	95.00 %	0.00	1.00	0.00	instruement
	Signalling (3s)	99.00 %	0.00 %	10.00 %	0.00	

Button for load default limits for EN 50160



Spec	ified percent o	fintervals 100%	ofintervals	Voltage harmon	nics Curre	ent harmonics	Events		
	Quantity	Percent of interva	als Max.n	eg. difference (-)	Max. pos	. difference (+)	Refere	nce value	
۶.	Voltage	100.00	%	-15.00 %		10.00 %		230.00 V	
	Voltage	100.00	%	-15.00 %		15.00 %		230.00 V	
	Frequency	100.00	%	-6.00 %		4.00 %		50.00 Hz	
	Frequency	100.00	%	-15.00 %		15.00 %		50.00 Hz	

Figure 62 EN 50160 – Limits for 100% of intervals

			tonage namenies Co		
	Harmonic number	Percent of intervals	Max. neg. difference (-)	Max. pos. difference (+)	Reference value
۶.	2	95.00 %	0.00 %	2.00 %	0.00 %
	3	95.00 %	0.00 %	5.00 %	0.00 %
	4	95.00 %	0.00 %	1.00 %	0.00 %
	5	95.00 %	0.00 %	6.00 %	0.00 %
	6	95.00 %	0.00 %	0.50 %	0.00 %
	7	95.00 %	0.00 %	5.00 %	0.00 %
	8	95.00 %	0.00 %	0.50 %	0.00 %
	9	95.00 %	0.00 %	1.50 %	0.00 %
	10	95.00 %	0.00 %	0.50 %	0.00 %
	11	95.00 %	0.00 %	3.50 %	0.00 %
	12	95.00 %	0.00 %	0.50 %	0.00 %
	13	95.00 %	0.00 %	3.00 %	0.00 %
	14	95.00 %	0.00 %	0.50 %	0.00 %
	15	95.00 %	0.00 %	1.00 %	0.00 %
	16	95.00 %	0.00 %	0.50 %	0.00 %
	17	95.00 %	0.00 %	2.00 %	0.00 %
	18	95.00 %	0.00 %	0.50 %	0.00 %
	19	95.00 %	0.00 %	1.50 %	0.00 %
	20	95.00 %	0.00 %	0.50 %	0.00 %
	21	95.00 %	0.00 %	0.75 %	0.00 %
	22	95.00 %	0.00 %	0.50 %	0.00 %
	23	95.00 %	0.00 %	1.50 %	0.00 %
	24	95.00 %	0.00 %	0.50 %	0.00 %
	25	95.00 %	0.00 %	1.50 %	0.00 %

Specified percent of intervals 100% of intervals Voltage harmonics Current harmonics Events

Figure 63 EN 50160 – Voltage harmonics limits – up to 25th

EN 50160 analyse 25th harmonics. Metrel PQA measures up to 50th harmonics component.

Spec	ified percent of interv	als	100% of intervals	Voltage harmonics	Current harmonics	Events
	Event Type		Number Of Events			^
۰.	Dip	\sim	100			
	Short Interruption	\sim	10			
	Long Interruption	\sim	10			×
Sho	rt/Long interruption th	rest	nold:	3 € m 0 €	S	

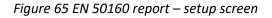
Figure 64 EN 50160 – Events limits

Group By: Quantity

Note: Default limits are set up according EN 50160. PowerView enables user to change them.

			nknown site			
	8	-	General Logging (REC) [1/27/20	20 🐰	Cut	Ctrl+X
			Voltage	2	Copy	Ctrl+C
			Eurrent	125	Paste	Ctrl+V
			 Frequency Voltage Deviation 	×	Delete	Del
			Voltage Crest Factor	ą	Rename	
			Gurrent Crest Factor Power & Energy	4	Create generic report from cur	ent views
		÷-	Flicker		Define Power Quality criteria	
			Harmonics & THD Interharmonics		Create GOST 32144/33073 con	pliant report
			Unbalance		Create EN 50160 compliant rep	ort
			Signalling		Create Korean report	
			Temperature Instrument Battery Informati		Create Korean report ver. 2	
		- 3	U/I/F Waveform Snapshot (R00) 15 🛃	Create KESS report	
				1	Create Energy Report	
				1	Create Energy Demand Report	
					Create Chinese report	
_				×	Average measured data	,
					Select all items	
				-	Repair record data	
To create report according EN 50160, press on icon 💴 or via					Send to	•

General		
Include in report	✓	General setup screen, with selection what is included.
Include additional information	\checkmark	General setup screen, with selection what is included.
Company Logo	🎲 METREL®	
 Client Logo 	METREL [®] Mehanil	ka
System type	Synchronous	
Include interruptions		Flagged data (except interuptions) must be included in EN 50160 report
Operating conditions	Normal	×
Include event curve	None	 Additional voltage curves (ITIC, CBEMA) could be included in the report.
Week Start Day	Next Day	 Selection of Week Start Day: Immediately, Default, Next Day
Report Periodics	Single	 Selection of Report Periodic: Single, Continuous
Included pages		
Power Frequency	V	
Supply Voltage Variations	✓	
Flicker Severity	✓	
Voltage Unbalance	✓	
Harmonics voltage	✓	Coloritien autoristication and a second se
Interharmonics voltage	✓	Selection, which measurement parameters are included in the report
Signalling	✓	
Interruptions		
Dips	\checkmark	
Swells	\checkmark	



Definition od Week Start Day:

- Immediately report starts with the first record
- Default report starts with the first week date, related to the country (region) specifics: Sunday in EU; report starts at 00:00:00
- Next Day report starts next day at 00:00:00

Definition of **Report Periodics**:

- Single first SEVEN days included in the report
- Continuous report consist of more separate reports, each of them include seven consequent days

Generate Report

For creating report, press on button "

After report creation, it is easily to print/save/edit the report.

Table 3 Commands for report editing

🖶 Print Print EN 50160 report to local installed printer or to PDF

- Gave Save EN 50160 report to PDF, HTML, Excel or Word
- 🗊 Report export selection options: mdc, mdx, mdz, pdf, HTML, Excel, Word
- Adding new page (blank) in the report
- 渣 🛛 Delete page

PowerView3.0

- Thumbnails
- 👫 🛛 🛛 Find enter field appears at display bottom 🗖 🗖 🗖
- Tr Editor used for changing/correcting input strings Company/Client
- Full screen report presentation
- One page report presentation
- Page width

System type

EN 50160 Limits

Operating conditions

Effective measurement period

During EN 50160 report creation, also general Voltage Quality overview is generated.

Find What harm

e 3 of 12

Instrument

Instrument name

Instrument model

Max Du

EN 50160 Report

Company			
Name	Janez N	ovak	
Company	Metrel d	l.d	
Address	Ljubljan	ska e. 77	—— 🎇 METREL®
Phone	+386 1 1	23	
Email	janez.no	vak@metrel.si	
Client Name		· ·	lded from entering menu the Report Editor
Company	Metrel M	fehanika d.d.	
Address	Ljubljan	ska c. 71	🧊 METREL® Mehanika
Phone	+386 1 7	89 456	
Email	jana.nov	ak@metrel.si	
Measuremen	nt		
Objective			
-			
Site description		1/27/2020 10:00:00.000	
Site description Start time		1/27/2020 10:00:00.000 2/3/2020 10:00:00.000	Information about the
Site description Start time Stop time			Information about the Measurement place
Site description Start time Stop time Duration		2/3/2020 10:00:00.000	×
Site description Start time Stop time Duration Interval		2/3/2020 10:00:00.000 7 d 0 h 0 m 0 s	×
Objective Site description Start time Stop time Duration Interval Connection Nominal voltage		2/3/2020 10:00:00.000 7 d 0 h 0 m 0 s 15 minutes	×

Systems with synchronous connection

100.00 %

Normal

LV

Manufacturer Metrel d.d. Information about the used Serial Number 12345678 PQA, Operater, used current Firmware version 1.0.3437 clamps Operater name Mihael Hribar Allow (3000 00 A). Clamp measuring range (3,000 00 A). Instrument measuring range (100 % of Clamp measuring range). Current transformer ratio: 1.00 A : 1.00 A Current clamps Additional equipment Additional Information * for informati es only and not related to EN 50160 standard nal purpo Swells L2L3 L1 Count 0 0 0 Max. Value [V] N/A N/A N/A

Power Master XT

MI 2893

NI/A

Find Next
 Match Case
 Match Whole Word

stax. Duration	IN/A		A	18/24		
Dips						
	L1	L	.2	L3		
Count	0	()	0		
Min. Value [V]	N/A	N	/A	N/A		
Max. Duration	N/A	N	/A	N/A		
Transients						
	L1	L2	L3	LN		
Count	0	0	0	0		

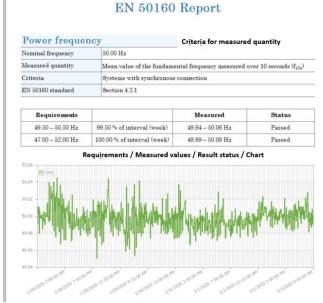
N/A

3.77.6

Swell/Dips/Transients number. Included also events, which are outside the EN 50160 specification

EN50160 Compliance summary

Power frequency	Passed	
Supply Voltage Variations	Passed	
Flicker Severity	Passed	Compliance summary, with additional
Voltage Unbalance	Passed	info about the number of
Harmonic Voltages	Passed	Swells/Dips/Interruptions
Interharmonic Voltages	Measured	
Signalling	Passed	
Dips	0	
Interruptions	0	
Swells	0	



Following report pages include detail overview of measured quantity, equipped with Requirements/Measured results/Result status and Chart.

4.4.4 GOST 32144/33073 report

GOST 32144/33073 report is custom defined for specific country. For more information, please contact local distributor.

4.4.5 Korean reports, KESS report

Korean reports and KESS report are customized report for specific customer. For more information, please contact local distributor.

4.4.6 OSINERGMIN report

OSINERGMIN report is custom defined for specific country. For more information, please contact local distributor.

4.4.7 IEEE 519 report

IEEE 519 is a recommended practice and requirements for harmonic control in electric power systems. It is focused on harmonics measurements and recommend harmonic limits for voltage and current distortion. Report evaluate Very short (3 seconds) and Short (10 minutes) harmonic measurements.

Definition of PCC – point of common coupling:

The limits in this recommended practice are intended for application at a point of common coupling (PCC) between the system owner or operator and a user, where the PCC is usually taken as the point in the power system closest to the user where the system owner or operator could offer service to another user.

Frequently for service to industrial users (i.e., manufacturing plants) via a dedicated service transformer, the PCC is at the HV side of the transformer.

For commercial users (office parks, shopping malls, etc.) supplied through a common service transformer, the PCC is commonly at the LV side of the service transformer.

IEEE STD 519-2014

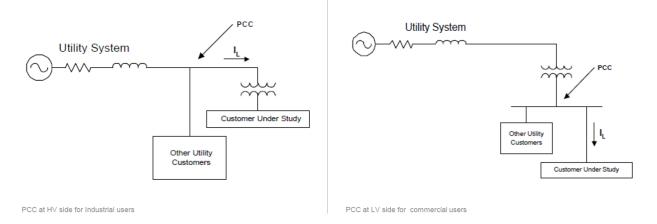


Figure 66 HV and LV PCC specification

The limits in IEEE 519 represent a shared responsibility for harmonic control between system owners or operators and users.

Responsibility to maintaining harmonics below specified levels:

- All users limit their harmonic current emissions to reasonable values determined in an equitable manner based on the inherent ownership stake each user has in the supply system and
- Each system owner or operator takes action to decrease voltage distortion levels by modifying the supply system impedance characteristics as necessary.

Definition of parameters from the IEEE 519 report:

- short-circuit ratio: At a particular location, the ratio of the available short-circuit current, in amperes, to the load current, in amperes $\rightarrow I_{sc}/I_{L}$. PowerView enables entering maximum measured load current direct from the recorder or manually enter the system maximum current.
- total demand distortion (TDD): The ratio of the root mean square of the harmonic content, considering harmonic components up to the 50th order, expressed as a percent of the maximum demand current.
- total harmonic distortion (THD): The ratio of the root mean square of the harmonic content, considering harmonic components up to the 50th order and specifically excluding interharmonics, expressed as a percent of the fundamental.

Very short time harmonic measurements

- Very short time harmonic values are assessed over a 3-second interval based on an aggregation of 15 consecutive 12 (10) cycle windows for 60 (50) Hz power systems
- Measurement duration: 24 hours (1 day)
- For very short time harmonic measurements, the 99th percentile value (i.e., the value that is exceeded for 1% of the measurement period) should be calculated for each 24-hour period for comparison with the recommend limits

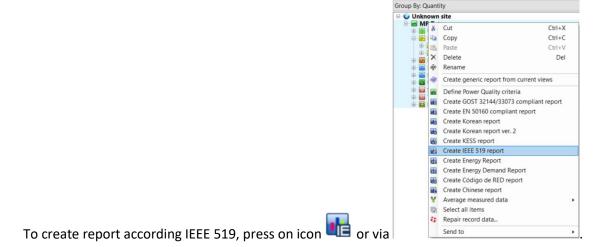
Short time harmonic measurements:

- Short time harmonic values are assessed over a 10-minute interval based on an aggregation of 200 consecutive very short time values for a specific frequency component
- Measurement duration: 7-day period (1 week)
- For short time harmonic measurements, the 95th and 99th percentile values (i.e., those values that are exceeded for 5% and 1% of the measurement period) should be calculated for each 7-day period for comparison with the recommended limits
- These statistics should be used for both voltage and current harmonics (exception → the 99th percentile short time value is not recommended for use with voltage harmonics. Interpretation:
 - Current harmonics evaluate based on 95th and 99th percentile.
 - \circ Voltage harmonics evaluate based on 95th percentile only.

Important:

- Joint responsibility involving both end-users and system owners or operators, that harmonic limits are recommended for both voltages and currents.
- System owners or operators and users must work cooperatively to keep actual voltage distortion below objectionable levels
 - o End-users limit the harmonic current injections
 - System owners or operators should take action to modify system characteristics so that voltage distortion levels are acceptable in case the efforts by end-users are insufficient
- The recommended limits apply only at the PCC and should not be applied to either individual pieces of equipment or at locations within a user's facility.

IEEE 519 report based on **3 second measurement values**, minimum monitoring time is 7 days. To fulfil measuring requirements, PQA General Recorder should be set to "LIMITED" profile, to fulfil the IEEE 519 specification.



IEEE 519

t parameters	4						
General	*						
Include in report	×	l					
Company Logo	⑦ METREL [°]						
 Client Logo 	METREL [®] Mehanika		General setup screen, w	ith selection what is i	ncluded		
Include flagged data			PCC selection:	Transformer/Power g	eneration equipment/C	ustom point on the	svs
Include interruptions] J	Point of common coupling (PCC)	Power generation equipment	* Point of common coupling (PCC)	Custom point on the system	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Point of common coupling (PCC)	Transformer	·	Point of common coupling (PCC)		Point of common coupling (PCC)	custom point on the system	
Week Start Day	Immediately		Bus voltage Usus at PCC	230.00	Bus voltage Usus at PCC	230.00	
int of common coupling (PCC)			Max. demand load current IL [A]	572.11	Short current Isc [A]	11,442.24	
Bus voltage UBUS at PCC	230.00				Max. demand load current lk [A]	572.11	
Transformer impedance [%]	3.00		🔪 Week start day sele	ection:			
Transformer capacity [kVA]	356.40		Immediately				
Short current Isc [A]	17,217.32		Default Next Day				
Max. demand load current IL [A]	5,395.08		Next Day				
Voltage harmonics and THD (95 %)		L 1					
Include in report		1					
Current harmonics and TDD (95 %)			e de la stran de la tella de la d	and the Allene second sector			
Include in report	✓	1) - 3	Selection what is include	ea in the report			
Current harmonics and TDD (99%)	-						

Selectable parameters \rightarrow some of them are automatically get from the PQA; some of them could be manually entered.

Legend:

✓ / ✓

Get from PQA Manual entry

	U _{BUS} at PCC	Transformer impedance	Transformer capacity	Short current	Max. demand load current
Transformer	√/√	×/√	×/√	Calculated	✓ ✓
Power generation equipment	√ √	N/A	N/A	N/A	✓ / ✓
Custom point of the system	√ √	N/A	N/A	Calculated/✓	✓ / ✓

Week Start Day selection:

- Immediately report starts with the first record
- Default report starts with the first week date, related to the country (region) specifics: Sunday in EU; report starts at 00:00:00
- Next Day report starts next day at 00:00:00

IEEE 519 Report

Harmonic Control in Electric Power Systems

C						
Company						
Name	Janez Novak					
Company	Metrel d.d		—— 🎇 METREL®			
Address	Ljubljanska c	.77				
Phone	+386 1 123					
Email	janez.novak@					
Client		Information Field – added from entering menu Could be edited from the Report Editor				
Name	Jana Novak					
Company	Metrel Meha	nika d.d.				
Address	Ljubljanska c	.71				
Phone	+386 1 789 4	56				
Email	jana.novak@	metrel.si				
Objective Site description						
Start time		1/8/2020 1:31:27 PM				
Stop time		1/16/2020 1:12:21 PM				
Duration		7 d 23 h 40 m 53 s 997 ms	1			
Interval		3 seconds / 10 minutes				
Connection		Three phase four wire	Information about the			
Bus voltage at PCC		400.00 VLN	Measurement place and			
Frequency		50.00 Hz	IEEE 519 Lįmįts			
Flag data		Included				
IEEE 519 limits		Voltage: Usus ≤ 1.00 kV Current: 120.00 V < Usus:	≤ 69.00 kV, 20 ≤ lsc/lL < 50			
Maximum demand load cur fundamental) It	rent	572.11 A				
runuamentaljic		11,442.24 A				

	nt name		Power Master	r XT				
strumer	nt model		MI 2893					
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Serial nun			18080556		PQA, Ope	rater, us	ed curren	t
Firmware			1.0.3431		clamps			
Operater	name		Mihael Hribar					
Current cl	lamps			ring range (3, easuring rang	000.00 A), e (100 % of Clam) 1.00 A : 1.00 A	p measuring ra	inge),	
Additiona	lequipment				1.00 A . 1.00 A			
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oltage Ti				Passed				
urrent H				Passed	_			
	and Distortion	020 0:00:00,	99%	Passed				
urrent H				Passed	Comp	liance su	mmary, r	elated t
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	0:10:00 - 1/16/2	2020 13:20:00	95 %	_		ekly Rec		
oltage H				Passed			hort Time	e (10 mi
oltage Ti urrent H				Passed Passed		-	ary/Very	
	and Distortion			Passed		, ne (3 sec)		
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	and Distortion			Passed	_			
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	and Distortion			Passed	_			
1/9/2020	0:00:02 - 1/9/202	0 23:59:59						
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otal Dem	and Distortion			Passed				
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Daily Summary, Very Short Time 3 s, 99 % 1/10/2020 0:00:02 - 1/10/2020 23:59:59 Passed Voltage Harmonic Voltage THD Passed Current Harmonic Passed Total Demand Distortion 1/11/2020 0:00:02 - 1/11/2020 23:59:59 Passed Passed Compliance summary, related to Voltage Harmonic Voltage THD Passed the measurement parameters: Current Harmonic Passed Passed - Weekly Record Total Demand Distortion 1/12/2020 0:00:02 - 1/12/2020 23:59:59 Summary/Short Time (10 min) Voltage Harmonic Passed _ Daily Summary/Very Short Voltage THD Passed Time (3 sec) Current Harmonic Passed Total Demand Distortion 1/13/2020 0:00:02 - 1/13/2020 23:59:59 Passed Passed Voltage Harmonic Voltage THD Passed Passed Current Harmonic Total Demand Distortion 1/14/2020 0:00:02 - 1/14/2020 23:59:59 Passed Voltage Harmonic Passed Passed Voltage THD Current Harmonic Passed Total Demand Distortion 1/15/2020 0:00:02 - 1/15/2020 23:59:59 Passed Voltage Harmonic Passed Voltage THD Passed Current Harmonic Passed Total Demand Distortion 1/16/2020 0:00:02 - 1/16/2020 13:12:21 Passed Voltage Harmonic Passed Voltage THD Passed Current Harmonic Passed Total Demand Distortion Passed

Note:

- IEEE 519 report is created from Sunday to Sunday, so report is split accordingly to mere separated sheets.
- Limits are automatically taken from the IEEE 519 recommended practice -

4.4.8 Energy/Energy Demand report

Energy/Energy Demand report enables the user managing your energy costs, based on recording data with Metrel PQA's.

Energy management is the process of monitoring, controlling and conserving energy and is an essential measure to reduce and optimize the electricity costs. With proper energy management, you can achieve better business results through:

- · Reduction of maintenance costs of equipment
- · Usage of more effective equipment
- Shifting your energy use to the period when energy is at lower tariff (rate)
- · Improving your business results by keeping track on your energy use

Energy report \rightarrow presentation of consumed energy, based on hourly/daily/weekly intervals in kWh or by implementation of different tariff's (rate's) deeply analyse inside which period energy (or cost) exceeds predefined limits.

Energy Demand report \rightarrow provides information about energy consumption in monitoring period, three highest maximum demands and (in pie chart) presentation of positive sequence of consumed active power vs positive sequence of consumed fundamental reactive power vs unbalance apparent power vs harmonic apparent power. Based on the relations between these parameters it is possible to take appropriate actions to improve the entire system.

Energy report includes both parts of Report: Energy and Demand Report; **Energy Demand** report includes only Demand Report.

Example: Consumption comparison → estimating of consumption of Load A & Load C comparing to Total comparison

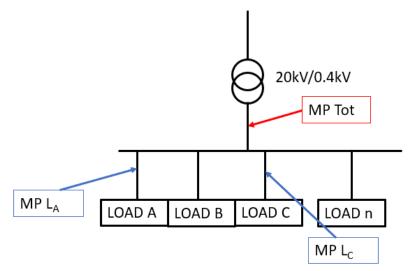


Figure 67 Connection diagram

Legend:

MP L_A – connection point for measuring consumption of Load A MP L_C – connection point for measuring consumption of Load C MP Tot – connection point for measuring Total consumption

How to prepare Energy Report, with three recorder data:

1. Open all Recorder Data, which should be included in the Energy/Demand Report

			Unknown site	
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			Create IEEE 519 report	
			Create Energy Report	
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			Select all items	
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4. Adding new Recorder into same Energy/Energy Demand Report → select new Record and select "Add to Energy Report"



5. Add as many Recorders you want to single Energy/Energy Demand Report.

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Client	Logo		🦄 N	METREL [®] Mehanik	ka	
Includ	e Ene	rgy Demand		\checkmark		
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Unit	KiloW	/attHours *	Tariff editor			
		Record				
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_		6/5/2020 10:35:00 AM				
_		MP LA		Load		
•	2	5/29/2020 12:59:00 PM				
_		6/5/2020 9:43:00 AM				
		MP LC		Load		
•	2	5/29/2020 2:01:00 PM				
-		6/5/2020 10:50:00 AM				

Figure 68 Energy Report with three independent Recorders

- 6. Adding "Tariff program" to specific recorder
- For each recorder an unique tariff program could be loaded/created
- 7. Creating Tariff program:

E	nergy para	meters editor	
	Comp	any Logo	METREL ®
	Client	Logo	腾 METREL [®] Mehanika
	Includ	e Energy Demand	V
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	Interval	Day -	Currency \$
Click on "Tariff editor"	Unit	KiloWattHours *	Tariff editor

Tariff import

Tariff impo	t					– 🗆 X
File						
	Name	Price	Recurrence	Start Time	Stop Time	Duration
> Pro	file Name: ESCOM	winter				
> 🗌 Pro	file Name: Test 1					
> Pro	file Name: Test Tai	riff				
			A	dd Dele	te Edit	Cancel

Add – Adding new Tariff program **Delete** – Delete selected Tariff program Edit – Edit selected Tariff program Cancel - return back to Energy Report

	Name	Price	Recurrence	Start Time	Stop Time	Duration
Profil	e Name: ESCOM	winter				
	Low	0.67000	Every weekday	12:00:00 AM	6:00:00 AM	06:00:00
	High	1.50000	Every weekday	6:00:00 AM	5:00:00 PM	11:00:00
	Medium	0.95000	Every weekday	5:00:00 PM	10:00:00 PM	05:00:00
	Low	0.67000	Every weekday	10:00:00 PM	11:59:59 PM	02:00:00
	Low	0.67000	Every weekend	12:00:00 AM	11:59:59 PM	1.00:00:00
Profil	e Name: Test 1					
	Unit one	0.50000	Base	12:00:00 AM	11:59:59 PM	23:59:59
	tzu	1.00000	Every day	12:00:00 AM	11:59:59 PM	1.00:00:00
Profil	e Name: Test Ta	riff	1.01.101 <i>3</i> 557770104410110110110110110110110110		***************************************	
	T2	0.50000	Every weekday	12:00:00 AM	6:00:00 AM	06:00:00
	T2	0.50000	Every weekday	10:00:00 PM	11:59:59 PM	01:59:59
	T2	0.50000	Every weekend	12:00:00 AM	11:59:59 PM	23:59:59
	T1	1.00000	Every weekday	6:00:00 AM	7:00:00 AM	01:00:00
	T1	1.00000	Every weekday	10:00:00 AM	10:00:00 PM	12:00:00
	Т3	2.00000	Every weekday	7:00:00 AM	10:00:00 AM	03:00:00
	T2	0.50000	Once 4/27/2018	12:00:00 AM	11:59:59 PM	23:59:59
	T2	0.50000	Once 5/1/2018	12:00:00 AM	11:59:59 PM	23:59:59
	T2	0.50000	Once 5/2/2018	12:00:00 AM	11:59:59 PM	23:59:59

Name – tariff name (T1, T2, T3, Low, Medium, High....) **Price** – price per tariff rate Start time - tariff rate start time Stop time - tariff rate stop time Duration – Calculated tariff rate duration

Creating Tariff program:

	Tariff Editor		×	Tariff Editor		×
	Basic Info Profile Test #1 Name T1 Price	Unit KiloWattHours 0.85	×	Basic info Profile Te Name T2 Price	est #1 • Unit K	iloWattHours *
	• Interval			Interval	idau haruan 1 2016 13-00-00 M	
	Start Friday, January 1, 5 Stop Friday, January 1, 5			Stop Fr	iday, January 1, 2016 12:00:00 AM iday, January 1, 2016 11:59:59 PM	Day End
	Pattern Every day Duration 06:00:00		÷	Pattern Ev Duration 23		*
Add ->		Ok Cano	cel →		Ok	Cancel
Profile Name: Test #1						
 Prome name: rest #1 						
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Т2	1.00000	Every day	12:00:00	AM	11:59:59 PM	23:59:59

... complete tariff program

8. Load tariff program – for each recorder. Separate tariff program could loaded for specific recorder

		Tariff import						- 0
		File						
			Name	Price	Recurrence	Start Time	Stop Time	Duration
gy parameters editor		+ Profi	le Name: ESCOM	winter				
			Low	0.67000	Every weekday	12:00:00 AM	6:00:00 AM	06:00:00
			High	1.50000	Every weekday	6:00:00 AM	5:00:00 PM	11:00:00
Company Logo	METREL ®		Medium	0.95000	Every weekday	5:00:00 PM	10:00:00 PM	05:00:00
			Low	0.67000	Every weekday	10:00:00 PM	11:59:59 PM	02:00:00
	MARTDEL [®] MAL		Low	0.67000	Every weekend	12:00:00 AM	11:59:59 PM	1.00:00:00
Client Logo	METREL [®] Mehanik	a Profi	A Profile Name: Test #1					
	111.4		T1	0.85000	Every day	12:00:00 AM	6:00:00 AM	06:00:00
Include Energy Demand	2		T2	1.00000	Every day	12:00:00 AM	11:59:59 PM	23:59:59
First Week Day	Default	+ Profi	le Name: Test 1					
Energy Direction	Consumed		Unit one	0.50000	Base	12:00:00 AM	11:59:59 PM	23:59:59
Interval Day	- Currency \$	- D	tzu	1.00000	Every day	12:00:00 AM	11:59:59 PM	1.00:00:00
Unit KiloWattHours	+ Tariff editor	🔺 🗹 Profi	le Name: Test Ta	riff				
Record			T2	0.50000	Every weekday	12:00:00 AM	6:00:00 AM	06:00:00
MP Tot			T2	0.50000	Every weekday	10:00:00 PM	11:59:59 PM	01:59:59
5/29/2020 9:52:00 AM	Load		T2	0.50000	Every weekend	12:00:00 AM	11:59:59 PM	23:59:59
			T1	1.00000	Every weekday	6:00:00 AM	7:00:00 AM	01:00:00
6/5/2020 10:35:00 AM		× .	T1	1.00000	Every weekday	10:00:00 AM	10:00:00 PM	12:00:00
MP LA	Load		Т3	2.00000	Every weekday	7:00:00 AM	10:00:00 AM	03:00:00
5/29/2020 12:59:00 PM		1	T2	0.50000	Once 4/27/2018	12:00:00 AM	11:59:59 PM	23:59:59
6/5/2020 9:43:00 AM		~	т2	0.50000	Once 5/1/2018	12:00:00 AM	11:59:59 PM	23:59:59
MP LC	Load	×	T2	0.50000	Once 5/2/2018	12:00:00 AM	11:59:59 PM	23:59:59
S/29/2020 2:01:00 PM								10.0
6/5/2020 10:50:00 AM		\rightarrow					Los	d Cancel

Energ	gy pa	ramete	rs editor					
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	Client Logo		METREL® Mehanika			ika		
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Ir	terva	al Day	•	Currency \$				
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Energy Report

Company			
Name	Janez Novak		
Company	Metrel d.d		
Address	Ljubljanska c. 77	METREL®	
Phone	+386 1 123		
Email	janez.novak@metrel.si		
Client			Compnay and Client information
Name	Jana Novak		
Company	Metrel Mehanika d.d.		
Address	Ljubljanska c. 71	· 훩 METREL [®] Mehanika	
Phone	+386 1 789 456	-	
Email	jana.novak@metrel.si	-	
Energy Summa	ary		

783.51

	Record	Start time	Interval	0	uration		consumed gy [kWh]	Total	cost [\$]
MP Tot		5/30/2020 12:00:00 AM	1 d		6 d	9	9931	115	551.7
	Tariff name	Consumed ener [kWh]	Consumed ener	rgy [%]	Cost [5]	Cost	[%]	
	т2	1,567.02	15.78		783.5	1	6.7	в	
	т1	5,959.77	60.01		5,959.77		51.59		
	тз	2,404.21	24.21		4,808.4	12	41.6	3	
	Cons	umed Energy by Ta	riff		Cos	st by Tar	iff		
	T2 T3			T2			4	808.42	

Information about selected record

Energy / Cost presentation by tariff - Value and percentage presentation

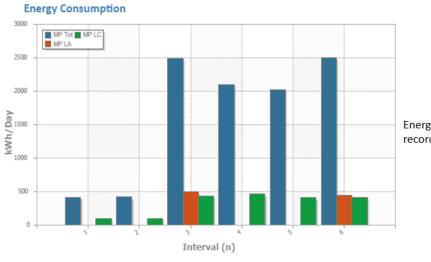
Pie chart Energy/Cost presentation – consumption by tarjff

Tariff name	Start time	Duration	Pattern	Cost [\$]
T2	12:00 AM	6 h	Every weekday	0.5
T2	10:00 PM	1 h 59 m 59 s	Every weekday	0.5
T2	12:00 AM	23 h 59 m 59 s	Every weekend	0.5
T1	6:00 AM	1 h	Every weekday	1
T1	10:00 AM	12 h	Every weekday	1
T3	7:00 AM	3 h	Every weekday	2
T2	12:00 AM	23 h 59 m 59 s	Once 4/27/2018	0.5
T2	12:00 AM	23 h 59 m 59 s	Once 5/1/2018	0.5

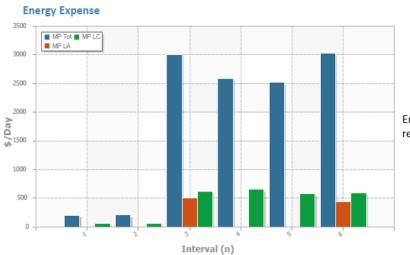
5959.77

1567.02

Tariff program



Energy Consumption presentation for three recorders: Total, Load A and Load C



Energy Expense presentation for three recorders: Total, Load A and Load C

Record	Interval	Average energy consumption (per interval) [kWh]	Average cost (per interval) [\$]		
MP Tot	1 Day	1655.17	1925.28		
MP LA	1 Day	157.84	157.84		
MP LC	1 Day	319.98	433.72		

Average consumption/cost per selected monitoring interval (1 Day)

n	Record	Start time	Consumed energy [kWh]	Cost [\$]	
1	MP Tot	5/30/2020 12:00:00 AM	412.92	206.46	
1	MP LA	5/30/2020 12:00:00 AM	1.43	1.43	Consumption/cost per Day 1
1	MP LC	5/30/2020 12:00:00 AM	101.11	67.74	
2	MP Tot	5/31/2020 12:00:00 AM	417.10	208.55	
2	MP LA	5/31/2020 12:00:00 AM	1.32	1.32	 Consumption/cost per Day 2
2	MP LC	5/31/2020 12:00:00 AM	100.91	67.61	
з	MP Tot	6/1/2020 12:00:00 AM	2,490.13	3,007.16	
3	MP LA	6/1/2020 12:00:00 AM	499.87	499.87	
3	MP LC	6/1/2020 12:00:00 AM	434.21	626.02	
4	MP Tot	6/2/2020 12:00:00 AM	2,095.16	2,586.29	
4	MP LA	6/2/2020 12:00:00 AM	2.13	2.13]
4	MP LC	6/2/2020 12:00:00 AM	460.79	654.11	
5	MP Tot	6/3/2020 12:00:00 AM	2,017.55	2,518.06	
5	MP LA	6/3/2020 12:00:00 AM	2.07	2.07] -
5	MP LC	6/3/2020 12:00:00 AM	407.81	587.36	
6	MP Tot	6/4/2020 12:00:00 AM	2,498.12	3,025.18	
6	MP LA	6/4/2020 12:00:00 AM	440.24	440.24	 Consumption/cost per Day n
6	MP LC	6/4/2020 12:00:00 AM	415.05	599.48	

Energy Demand Report

Time frame: 5/29/2020 0:00:00 - 6/4/2020 0:00:00, Interval: 1 Day

Energy Demand

Description	Symbol	Total	Per 1 Day
Consumed active energy	Ep*	9930997.00 Wh	1655166.21 Wh
Generated active energy	Ep	0.00 Wh	0.00 Wh
Consumed reactive energy	Eq*	967860.13 varh	161310.02 varh
Generated reactive energy	Eq	407002.91 varh	67833.82 varh

Average interval Energy consumption (1 Day)

- Active consumed/generated
- Reactive consumed/generated

Maximum Power Demand Ptot

Average Power Demand

	Time start	Time stop	Total Power Ptot (kW)
1	6/4/2020 13:10:00	6/4/2020 13:11:00	307.15
2	6/4/2020 13:09:00	6/4/2020 13:10:00	301.77
3	6/4/2020 13:06:00	6/4/2020 13:07:00	291.85

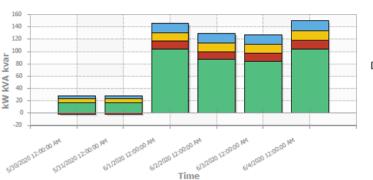
Three maximum demands with time stamp

Description	Symbol	Demand
Active Power	Ptot	68.96 kW
Positive sequence of Consumed Active Power	P*	68.75 kW
Positive sequence of Consumed fundamental reactive power	Q)*	12.46 kvar
Positive sequence of Generated fundamental reactive power	Qe ⁺	4.01 kvar
Unbalance apparent power	Su	11.32 kVA
Nonfundamental (harmonic) apparent power	SeN	12.14 kVA
Harmonic pollution	HP	19.26 %
Load unbalance	LU	21.23 %

System - From

System status overview (averaged to 1 hour): - From selected pie chart it is possible to define:

- If compensation is needed (red pie size)
- If filters are needed (blue pie size)
- If load unbalance should be improved (orange oie size)



Daily "System status overview"

4.4.9 Codigo de RED report

Codigo de RED report is custom defined for specific country. For more information, please contact local distributor.

4.4.10 Chinese report

Chinese report is custom defined for specific country. For more information, please contact local distributor.

4.5 ITIC/CBEMA/IEC 61000-4-11 Voltage events view

ITIC curve is published by Information Technology Industry Council (ITIC) formerly known as Computer & Business Equipment Manufacturer's Association (CBEMA). This curve provides an AC voltage boundary that most information technology equipment (ITE) can tolerate or ride through without experiencing unexpected shutdowns or malfunctions.

The CBEMA curve is a precursor to ITIC curve and was published in the 1970'.

Even though both ITIC and CBEMA names are used interchangeably there are subtle differences.

The curve is primarily intended for 120V, 120/208V and 120/240V 60Hz systems. Other voltages are not specifically part of this and it is the responsibility of the user to verify that the curve is applied correctly at other voltages. People tend to extrapolate these curves to 480V or even higher voltages and also as a general metric of incoming power quality. While there is no harm in using this as a reference to establish a baseline power quality, it is important to recognize that the original intent of the curve was for 120V single phase computer equipment. The curve describes an AC voltage envelop which typically can be tolerate by ITE equipment. The curve describes both steady state and transitory conditions.

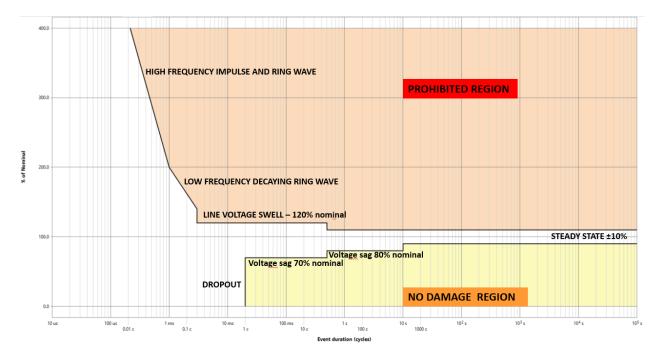


Figure 69 ITIC Curve - definitions

Steady State: ±10% from the nominal voltage.

Line Voltage Swell: Up to 120% of the RMS nominal voltage with duration of up to 0.5 seconds.

Low Frequency Decaying Ring wave: This region describes the decaying ringwave which results from capacitor banks switching. The frequency of transient may range from 200Hz to 5KHz. The magnitude of transient is expressed as a percentage of the peak of 50/60Hz nominal voltage (not the RMS value). Transient is assumed to occur near the peak of the nominal voltage waveform. The transient is assumed to be completely decayed by the end of half-cycle in which it occurs. The amplitude of transient varies from 140% to 200%.

High-Frequency Impulse and Ring wave: This region above 200% describes the transients that typically result from lightning strikes.

Voltage Sag: Two different RMS voltage sags are described. Sags to 80% of nominal for up to 10 seconds and sags to 70% of nominal for up to 0.5 seconds. Voltage sag is an RMS reduction in the AC voltage, at the power frequency, for duration from half cycle to few seconds. The IEC terminology for this phenomenon is voltage dip. Voltage sags are most often caused by faults on the utility system although they may be caused by faults within the facility or by large motor starts.

Dropout: Voltage dropout includes both severe RMS voltage sags and complete interruptions of the applied voltage, followed by immediate re-application of the nominal voltage. Interruption may last up to 20 milliseconds.

No Damage Region: Voltage sags, dropouts, and steady state voltages in this region are not expected to damage the ITE equipment. Normal functioning of ITE equipment is also not expected in region.

Prohibited Region: Any surges or swell in this region could result in damage to the ITE equipment.

CBEMA Curve is one of the most commonly used power acceptance curves. It was developed by the Computer Business Equipment Manufacturers Association in the 1970s, as a guideline for the organization's members in designing their power supplies. Basically, the CBEMA curve was originally derived to describe the tolerance of mainframe computer business equipment to the magnitude and duration of voltage variations on the power system.

The association designed the curve to point out ways in which system reliability could be provided for electronic equipment. It became a standard design target for sensitive equipment to be applied on the power system and a common format for reporting power quality variation data.

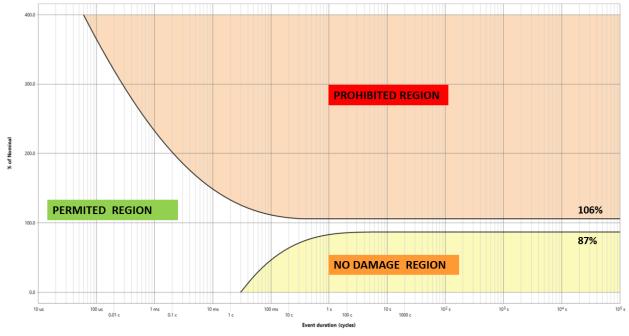
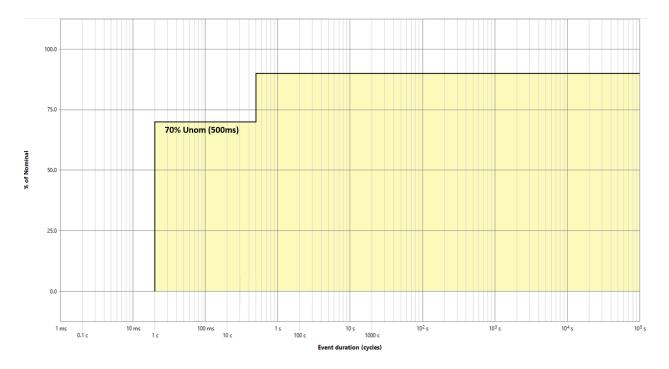


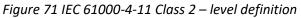
Figure 70 CBEMA Curve - definitions

IEC 61000-4-11 - defines the immunity test methods and range of preferred test levels for electrical and electronic equipment connected to low-voltage power supply networks for voltage dips, short interruptions, and voltage variations. Specification applies to electrical and electronic equipment with nominal current less than 16 A per phase, for connection to 50 Hz or 60 Hz networks. PowerView supports presentation of voltage dips for two classes:

Class 2

This class applies to points of common coupling (PCCs for consumer systems) and in-plant points of common coupling (IPCs) in the industrial environment in general. The compatibility levels in this class are identical to those of public networks; therefore components designed for application in public networks may be used in this class of industrial environment.

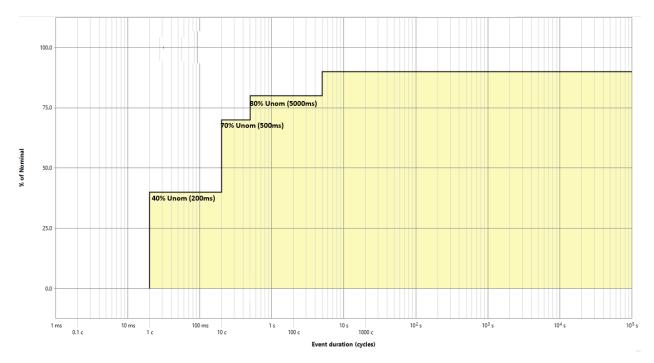


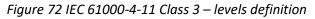


Class 3

This class applies only to IPCs in industrial environments. It has higher compatibility levels than those of class 2 for some disturbance phenomena. For instance, this class should be considered when any of the following conditions are met:

- a major part of the load is fed through converters;
- welding machines are present;
- large motors are frequently started;
- loads vary rapidly.





To present voltage event through ITIC/CBEMA/IEC 61000 charts:

VIEW \rightarrow Voltage Events view \rightarrow ITIC/CBEMA/IEC 61000

~	Metrel PowerView v3
---	---------------------

File Edit Tools Action	View Help				
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± + + • × × • • •	 Status Bar 				
	Data Explorer	F5			
	Marked Measurements window	F6			
	Harmonic Analysis Window	F7			
	 Enable Flagged Intervals View 				
	Show Welcome screen	F8			
	Chart features				
	Chart data display options		,		
	Filter trend data by Interval type				
	Voltage Event views		•	-	Show ITIC chart
					Show CBEMA chart Show IEC61000 charts

All Voltage charts could be presented in same time; each one in separate folder.

Registro General	(KU 🗡									
Record Information	Events	RVC Events	CBEMA Curve	ITIC Curve	IEC 61000-4-11 (C	lass 2) Chart I	EC 61000-4-11	(Class 3) Chart	System alarms	Flagged Intervals
400.0										

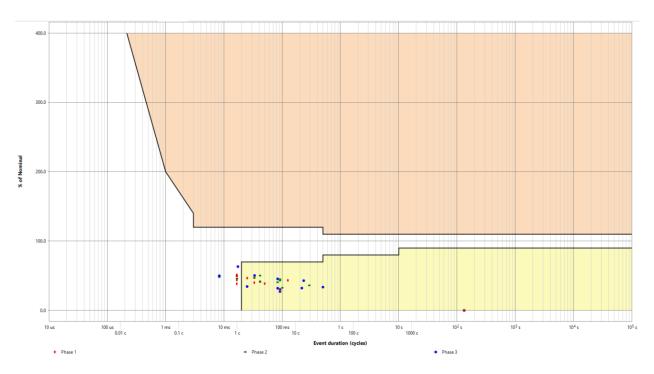


Figure 73 ITIC Curve - example

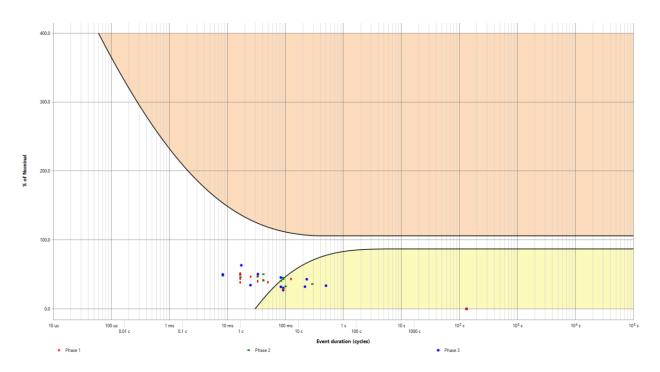


Figure 74 CBEMA Curve - example

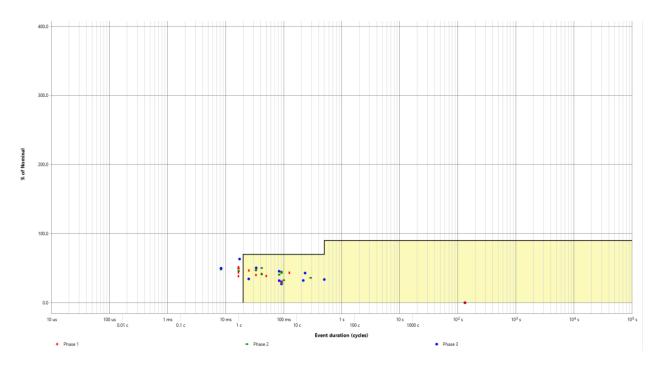


Figure 75 IEC 61000-4-11 Class 2 - example

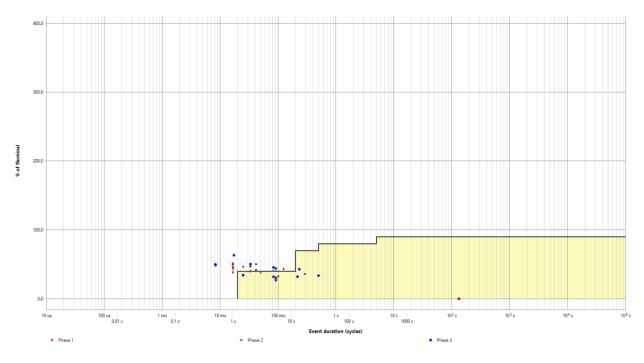


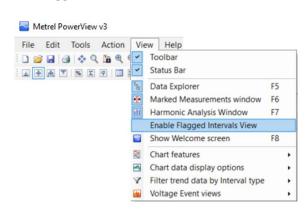
Figure 76 IEC 61000-4-11 Class 3 - example

4.6 Flagged intervals

During a dip, swell, or interruption, the measurement algorithm for other parameters (for example, frequency measurement) might produce an unreliable value. The flagging concept avoids counting a single event more than once in different parameters (for example, counting a single dip as both a dip and a voltage variation), and indicates that an aggregated value might be unreliable.

Note: for most of reports, there is possibility to select, if flagged intervals are included in the report or not.

Flagged intervals could presented in special folder "Flagged intervals", if they are selected. Selection is done by:



VIEW → Enable Flagged Intervals View

Record Information Trend Chart Table Event	ts RVC Events System alarms Flagged Intervals			
	Measurements	Plt	Pst	Pst(1min)
2/28/2020 1:40:00 PM	L1, L3		L1, L3	L1, L3
2/28/2020 2:00:00 PM	L1, L2, L3, Overcurrent LN, Synchronization	L1, L2, L3, Overcurrent LN, Synchronization	L1, L2, L3, Overcurrent LN, Synchronization	
2/28/2020 2:10:00 PM		L1, L2, L3, Overcurrent LN, Synchronization		
2/28/2020 2:20:00 PM		L1, L2, L3, Overcurrent LN, Synchronization		
2/28/2020 2:30:00 PM		L1, L2, L3, Overcurrent LN, Synchronization		
2/28/2020 2:40:00 PM		L1, L2, L3, Overcurrent LN, Synchronization		
2/28/2020 2:50:00 PM	L1, L2, L3, Synchronization	L1, L2, L3, Overcurrent LN, Synchronization	L1, L2, L3, Synchronization	
2/28/2020 3:00:00 PM		L1, L2, L3, Overcurrent LN, Synchronization		
2/28/2020 3:10:00 PM		L1, L2, L3, Overcurrent LN, Synchronization		
2/28/2020 3:20:00 PM		L1, L2, L3, Overcurrent LN, Synchronization		
2/28/2020 3:30:00 PM		L1, L2, L3, Overcurrent LN, Synchronization		
2/28/2020 3:40:00 PM		L1, L2, L3, Overcurrent LN, Synchronization		
2/28/2020 3:50:00 PM		L1, L2, L3, Overcurrent LN, Synchronization		
2/28/2020 4:00:00 PM		L1, L2, L3, Synchronization		
2/28/2020 4:10:00 PM		L1, L2, L3, Synchronization		
2/28/2020 4:20:00 PM		L1, L2, L3, Synchronization		
2/28/2020 4:30:00 PM		L1, L2, L3, Synchronization		

Figure 77 Table "Flagg's" presentation

Flagg's are related to:

- Measurements period;
- Flicker period (Plt, Pst, Pst(1min)).

Legend:

L1, L2, L3 voltage dip, swell, interruption Overcurrent L1, L2, L3, LN overcurrent detected Synchronization ... synchronization performed

Flagg's, related to measurement period are presented also in Trend Chart. To enable this function, click on the icon . Flagged intervals are indicated by a vertical line.

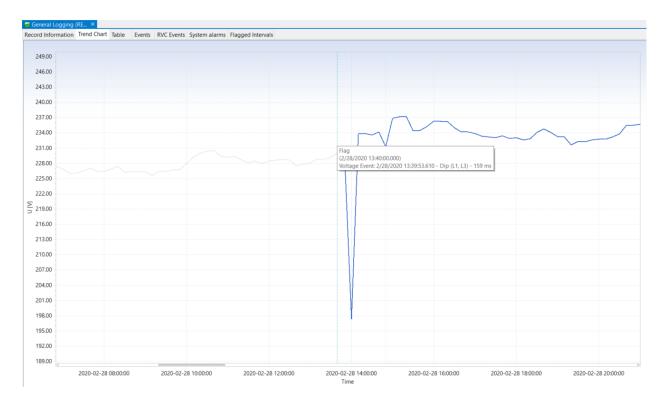


Figure 78 Chart measurements "Flagg's" presentation

4.7 RVC presentation

A rapid voltage change (RVC) is one of the power-quality (PQ) issue related to voltage disturbance. "According to IEC 61000-4-30, Ed. 3 standard, RVC is defined as "a quick transition in root means square (r.m.s.) voltage occurring between two steady-state conditions, and during which the r.m.s. voltage does not exceed the dip/swell thresholds."

The main known effect of rapid voltage changes is light flicker, but other non-flicker effects also have been reported.

The RVC voltage disturbance level is not as big as a dip and swell. While RVC events generally are not destructive for electronic equipment, it can be annoying for final users as they may influence light flicker.

RVC could be caused by the switching on of a specific load or by a sudden change in source voltage; for example: in solar grids when the sun is obscured by clouds or in wind farms when then wind speed decreases. Load switching can cause a rapid voltage change if the rating of the load is a significant fraction of the fault level of the supply voltage.

Reco	ord Information Trend Cha	art Table	Events RV0	C Events	System alarms
	Start time	Duration	ΔUmax	ΔUss	Phase 🗸
Þ	2/27/2020 11:15:16.776	010 ms	9.367	9.109	L1
	2/27/2020 11:15:16.779	010 ms	9.804	9.600	L3
	2/27/2020 11:15:16.783	010 ms	9.736	9.500	L2
	2/27/2020 11:15:59.051	010 ms	9.084	8.563	L3
	2/27/2020 11:15:59.055	010 ms	9.465	8.681	L2
	2/27/2020 11:15:59.068	010 ms	8.937	8.015	L1
	2/28/2020 13:39:53.103	691 ms	20.385	1.341	L2
	2/28/2020 13:40:24.054	061 ms	14.658	2.819	L1
	2/28/2020 13:40:24.058	051 ms	11.135	2.766	L3
	2/28/2020 13:40:24.061	031 ms	8.680	2.425	L2
	2/28/2020 13:49:18.359	030 ms	7.442	1.475	L3
	2/28/2020 13:49:18.363	060 ms	10.681	1.500	L2
	2/28/2020 13:49:53.063	080 ms	16.287	2.990	L2
	2/28/2020 13:49:53.066	040 ms	10.064	2.703	L1
	2/28/2020 13:49:53.069	030 ms	11.913	2.820	L3
	2/28/2020 14:43:50.236	021 ms	7.496	1.509	L2

Figure 79 RVC presentation

RVC are presented in tabular form and data can be sorted across all columns; single phase or all phase presentation.

4.8 Events presentation (Dips/Swells/Interruptions)

All Metrel PQ Analysers records different type of events, some of them (MI 2884/2885/2892/2893) could record also waveform signal \rightarrow Inrush and Waveform preview.

Events are presented in special folder "Events":

lecord information Trend	d Chart Table Events RVC Events S		Time scale Events presentation							
3:39:53 13:42:23 13:44:54	4 13:47:25 13:49:55 13:52:26 13:54:57	13:57:27 13:59:58 14:02:29 14:04	59 14:07:30 14:10:01 14:12	31 14:15:02 14:17:33 14:20:	03 14:22:34 14:25	05 14:27:35 14:3	30:06 14:32:37	14:35:08 14	37:38 14:40:0	9 14:42:4
vent Type	Start Time	End Time	Duration	Phase		Residual Voltage		Unit		
Dip	2/28/2020 1:39:53.100 PM	2/28/2020 1:39:53.260 PM	00:00:00.1604280	L1, L3			149.950	01 V		
Dip	2/28/2020 1:39:53.610 PM	2/28/2020 1:39:53.770 PM	00:00:00.1596950	L1, L3			150.791			
Dip, Interruption	2/28/2020 1:50:05.207 PM	2/28/2020 1:50:35.293 PM	00:00:30.0863760	L1, L2, L3				0 V		
Dip, Interruption	2/28/2020 1:51:23.929 PM	2/28/2020 1:51:54.014 PM	00:00:30.0855130	L1, L2, L3				0 V		
Dip, Interruption	2/28/2020 1:51:55.456 PM	2/28/2020 1:52:32.459 PM	00:00:37.0029970	L1, L2, L3				0 V		
Dip, Interruption	2/28/2020 1:52:33.926 PM	2/28/2020 1:52:59.645 PM	00:00:25.7186870	L1, L2, L3				0 V		
Dip, Interruption	2/28/2020 1:53:01.057 PM	2/28/2020 1:53:53.490 PM	00:00:52.4329970	L1, L2, L3				0 V		
Dip, Interruption	2/28/2020 2:42:09.986 PM	2/28/2020 2:42:40.069 PM	00:00:30.0829360	L1, L2, L3				0 V		
unt Timeline Data'is E	ant DMC(1/s) Dravinus E-mark Minister	Terresianse								
Event Timeline Details Ev	vent RMS(1/2) Preview Event Waveform P	Preview	Jump	o record						
	And a second sec	62 Presentation of	Jump more events unde		":	gered	3.3989			
240.00	And a second sec	62 Presentation of	more events unde		,	triggered	686			
240.00	And a second sec	62 Presentation of	more events unde tion		":	uch triggered	135153989			
240.00	And a second sec	62 Presentation of	more events unde	r one "Event type"	":	Ihrush triggered	020 132 3989			
240.00	And a second sec	62 Presentation of	more events unde tion		*:	Inrush triggered	8/20/20 1 3/2 1 3/3 9/89			
240.00 160.00 80.00	And a second sec	62 Presentation of	more events unde tion	r one "Event type"	*:	Inrush triggered	686 551 551 0202/827			
240.00 240.00 5 160.00 80.00 0.00	And a second sec	Presentation of	more events under tion	r one "Event type"	":	Intuch triggered	0/28/2020 13:51:33:3889			
240.00 160.00 80.00	And a second sec	62 Presentation of	more events under tion	r one "Event type"	*:	in usit triggered	6365 53 500 132 7000			
Lump to record 240.00 5 160.00 80.00 0.00	And a second sec	62 Presentation of	more events under tion	80.00	":	inuch triggered	d/28/2020 135155.989			
Lump to record 240.00 5 160.00 80.00 0.00 300.00 200.00	And a second sec	62 Presentation of	more events under tion	r one "Event type"	":	benegoti tikunul	6865515210202/8270			
Lump to record 240.00 5 160.00 80.00 0.00 300.00 200.00	And a second sec	62 Presentation of	more events under tion	r one "Event type"	":	banggin that n	686.551.551.020.782.00			
Lump to record 240,00 5 160,00 80,00 0,00 300,00 200,00	And a second sec	62 Presentation of	more events under tion	80.00	*:	benedit this to be each	0686 55 1 52 1 0000 / 92 H			
Lump to record 240,00 5 160,00 80,00 0,00 300,00 200,00	And a second sec	62 Presentation of	more events under tion	r one "Event type"	":	Inrush biggered	428/0001351559999			
Aump to record 240.00 5 160.00 80.00 0.00 200.00 200.00 100.00 0.00	Irruchh biograd	Presentation of - Dip & Interrup	more events under tion	r one "Event type"		6	g J			
Lump to record 240.00 5 160.00 80.00 0.00 300.00 200.00 100.00	Irruchh biograd	Presentation of - Dip & Interrup	more events under tion	r one "Event type"		6	6665 551 551 000/2827			

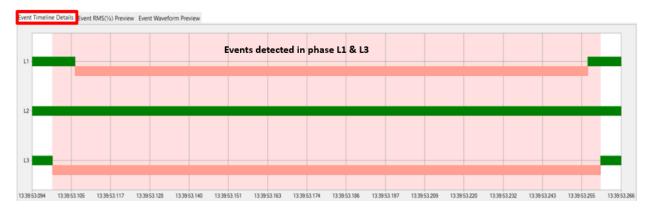
Figure 80 Events presentation

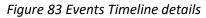
Events type	Events start time	Events stop time	Events Duration	On which phase were events detected	Events Residual voltage	
Event Type	Start Time	▲ End Time	Duration	Phase	Residual Voltage	Unit
🗄 Dip	2/28/2020 1:39:53.100 PM	2/28/2020 1:39:53.260 PM	00:00:00.1604280	L1, L3	149.95	01 V
⊞ Dip	2/28/2020 1:39:53.610 PM	2/28/2020 1:39:53.770 PM	00:00:00.1596950	L1, L3	150.79	17 V
 Dip, Interruption 	2/28/2020 1:50:05.207 PM	2/28/2020 1:50:35.293 PM	00:00:30.0863760	L1, L2, L3		0 V
Dip, Interruption	2/28/2020 1:51:23.929 PM	2/28/2020 1:51:54.014 PM	00:00:30.0855130	L1, L2, L3		0 V
 Dip, Interruption 	2/28/2020 1:51:55.456 PM	2/28/2020 1:52:32.459 PM	00:00:37.0029970	L1, L2, L3		0 V
Dip, Interruption	2/28/2020 1:52:33.926 PM	2/28/2020 1:52:59.645 PM	00:00:25.7186870	L1, L2, L3		0 V
Dip, Interruption	2/28/2020 1:53:01.057 PM	2/28/2020 1:53:53.490 PM	00:00:52.4329970	L1, L2, L3		0 V
Dip, Interruption	2/28/2020 2:42:09.986 PM	2/28/2020 2:42:40.069 PM	00:00:30.0829360	L1, L2, L3		0 V

Figure 81 Events explanation - general

Dip, Interruption	2/28/2020 1:50:05.207 PM	2/28/2020 1:50:35.293	PM 00:00:30.0863760	L1, L2, I	.3		0 V
Sub Events							
Number	Event Type	Start Time	End Time	Duration	Recorded Value	Unit	Phase
	5 Interruption	2/28/2020 1:50:05.327 PM	2/28/2020 1:50:35.266 PM	00:00:29.9397160	0.01858021	v	L2
	6 Dip	2/28/2020 1:50:05.207 PM	2/28/2020 1:50:35.286 PM	00:00:30.0796380	0.01858021	v	L2
	7 Interruption	2/28/2020 1:50:05.320 PM	2/28/2020 1:50:35.270 PM	00:00:29.9496080	0	V	L1
	8 Dip	2/28/2020 1:50:05.210 PM	2/28/2020 1:50:35.290 PM	00:00:30.0796379	0	v	L1
	9 Interruption	2/28/2020 1:50:05.323 PM	2/28/2020 1:50:35.273 PM	00:00:29.9496080	0.02764188	V	L3
	10 Dip	2/28/2020 1:50:05.213 PM	2/28/2020 1:50:35.293 PM	00:00:30.0796380	0.02764188	V	L3

Figure 82 Events explanation – more events detected under one general





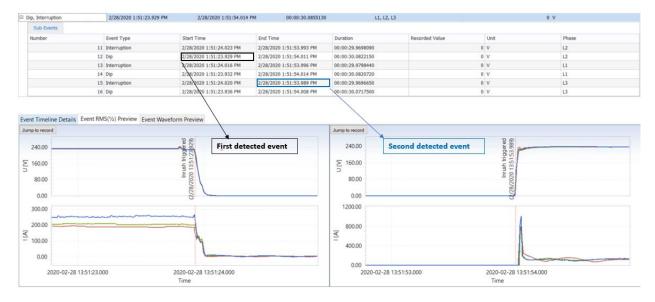
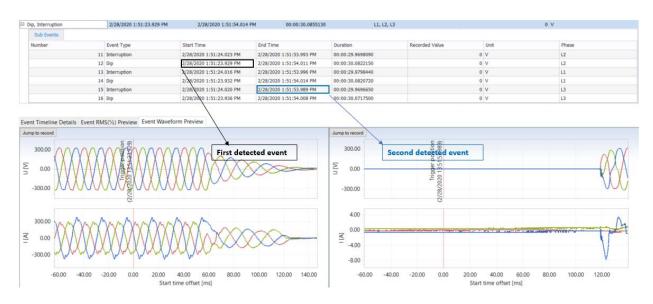
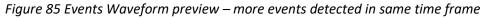


Figure 84 Events "Inrush" (RMS(1/2) preview – more events detected in same time frame





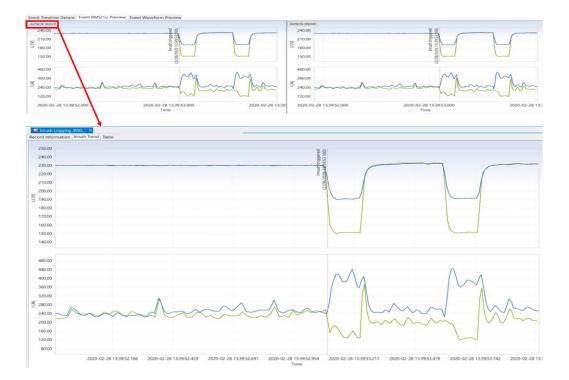


Figure 86 Events Inrush preview

General Logging (RE 🔐 Inrush Logging (R00 ×	
Record Information Inrush Trend Table	
Inrush Logging (R0002INR) [2/28/2020 13:39:53] Inrush Logging, recorded on 2/28/2020 13:39:51, duration: 2 s. Click here to add record description	
Record Properties	
Profile: Standard Start time: 2/28/2020 13:39:51:923 Stop time: 2/28/2020 13:39:54:017 Duration: 2 s 094 ms Number of intervals: 631 Interval duration: 009 ms Stop cause: Finished Successfully File name: R0002INR.REC Clock synchronisation: RTC File version: 41	
Measurement Settings	
Nominal voltage: 230.00 V L-N 11/2/3 Clamp: A1502 (3,000.00 A), Clamp measuring range (3,000.00 A), Instrument measuring IN Clamp: A1227 (300.00 A), Clamp measuring range (300.00 A), Instrument measuring range (Nominal frequency: 50.00 Hz Frequency: Sync: U1 Connection: 4W	
Inrush Trigger Settings	
Sample Duration (1 cycle RMS, refreshed each half-cycle): 9.48 ms Trigger source: Events Trigger detected on channel: 4 Trigger date: 2/28/2020 13:39:53.100	
Event Settings	
Nominal voltage: 230.00 V L-N L-N Dip threshold: 90.00 % (207.00 V) L-N Swell threshold: 110.00 % (253.00 V) L-N Interruption threshold: 5.00 % (11.50 V)	
Instrument Properties	
Model: MI 2893 Instrument name: Power Master XT Hardware version: 8 Firmware version: 1.0.3437 5/n: 18080556 Calibration date: 3/5/2018 14:05:02	
Miscellaneous Information	
Downloaded or: 3/3/2020 12:21:43.724 Downloaded by: Mihael Hribar Downloaded using: Metrel PowerView v3.0.0.4505 (64-bit), en-US Windows version: Windows 10 64-bit (Microsoft Windows NT 10.0.18362.0)	

Figure 87 Events Inrush preview – Recorder details



Figure 88 Events Inrush preview – Current & Voltage details

On the Chart Inrush data, it is possible to perform same operations as on the "regular" charts; like detail analyse with Markers.

🗃 General Logging (RE	📓 Inrush Logg	ing (R00 ×		
Record Information Inrush	Trend Table			
	🖾 vo	itage	<u></u>	rrent
	U1	U3	11	13
	1 cycle RMS [V]	1 cycle RMS [V]	1 cycle RMS [A]	1 cycle RMS [A]
2/28/2020 13:39:51.916	230.15		239.98	
2/28/2020 13:39:51.919		230.45		221.00
2/28/2020 13:39:51.923				
2/28/2020 13:39:51.926	230.44		241.72	
2/28/2020 13:39:51.929		230.44		217.37
2/28/2020 13:39:51.933				
2/28/2020 13:39:51.936	230.29		237.00	
2/28/2020 13:39:51.939		230.28		216.41
2/28/2020 13:39:51.943				
2/28/2020 13:39:51.946	230.24		232.85	
2/28/2020 13:39:51.949		230.33		216.07
2/28/2020 13:39:51.952				
2/28/2020 13:39:51.956	230.33		232.71	
2/28/2020 13:39:51.959		230.27		220.37
2/28/2020 13:39:51.963				
2/28/2020 13:39:51.966	230.36		231.70	
2/28/2020 13:39:51.969		230.41		226.24
2/28/2020 13:39:51.973				
2/28/2020 13:39:51.976	230.41		251.29	
2/28/2020 13:39:51.979		230.44		243.04
2/28/2020 13:39:51.983				
2/28/2020 13:39:51.986	230.16		270.07	
2/28/2020 13:39:51.989		230.22		259.18
2/28/2020 13:39:51.992				
2/28/2020 13:39:51.996	229.93		262.61	
2/28/2020 13:39:51.999		230.13		250.76

Only "effected" values presented in Table form (by default)

Figure 89 Events Inrush preview – Table data

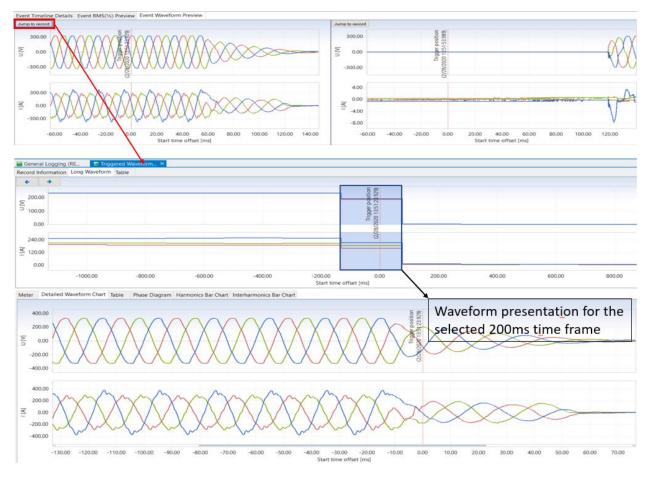
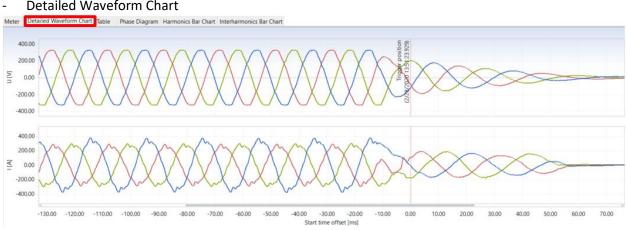


Figure 90 Events Waveform preview

Each selected 200ms time frame includes detail information about:

petalled wavelo	rm Chart Table Phase Diagram	Harmonics Bar Chart Internarmonics					
			Phase valu				
Symbol	Name	u	L2	L3	LN	Total	Unit
U	Voltage	191.24	187.63	188.36	45.631		V
I	Current	212.54	156.91	186.06	59.593		A
f	Frequency	49.575					Hz
THD U	Voltage THD	8.5745	6.5898	12.246	7.7933		v
THD U	Voltage THD	4.9244	3.7475	6.9469	37.684		%
THD I	Current THD	16.935	9.3020	11.355	21.931		A
THD I	Current THD	9.4372	6.9474	7.6748	49.057		%
CFu	Voltage Crest Factor	8.9445	1.7439	1.7361	32.293		
CFI	Current Crest Factor	9.685	3.2900	14.165	7.8857		
Plt	Flicker PLT	0.5283	0.5669	0.5157	0.0000		
Pst	Flicker PST	1.1943	1.3309	1.1477	0.0000		
Pst(1min)	Flicker PST 1min	11.987	11.988	12.006	0.0000		
			Line value	s			
			Peak Values (since las	t user reset)			
			IEEE 1459 Power Me	asurement			
			Arithmetic Power Me	asurement			
			Vector Power Mea	surement			
			Energy Measur				



Detailed Waveform Chart

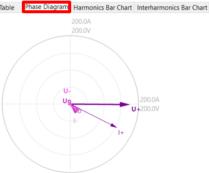
Table data presentation

-

Meter Detailed Waveform Ch	art Table	e Phas	e Diagra	m Harr	monics Ba	ar Chart	Interharmonics Bar Char
			Voltage		Curren	t	
	U1 [V]	U2 [V]	U3 [V]	I1 [A]	12 [A]	13 [A]	
2/28/2020 13:51:23.6922971	273.20	-306.41	23.03	190.20	-234.54	156.77	
2/28/2020 13:51:23.6924405	280.75	-296.00	7.78	206.21	-227.18	148.43	
2/28/2020 13:51:23.6925839	288.00	-284.42	-7.68	220.90	-224.83	141.38	
2/28/2020 13:51:23.6927272	295.05	-272.84	-22.54	232.91	-227.51	133.68	
2/28/2020 13:51:23.6928706	301.81	-261.95	-36.62	241.92	-233.87	123.43	
2/28/2020 13:51:23.6930140	307.97	-251.84	-50.40	249.26	-240.89	110.60	
2/28/2020 13:51:23.6931573	313.33	-242.22	-64.28	255.26	-246.58	94.57	
2/28/2020 13:51:23.6933007	317.40	-232.90	-78.75	261.94	-249.59	76.94	
2/28/2020 13:51:23.6934440	319.49	-223.48	-93.42	269.61	-248.25	58.99	
2/28/2020 13:51:23.6935874	320.58	-213.46	-108.28	279.62	-242.57	42.32	
2/28/2020 13:51:23.6937308	321.58	-202.57	-123.25	291.30	-234.87	27.89	

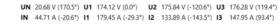
Phase diagram

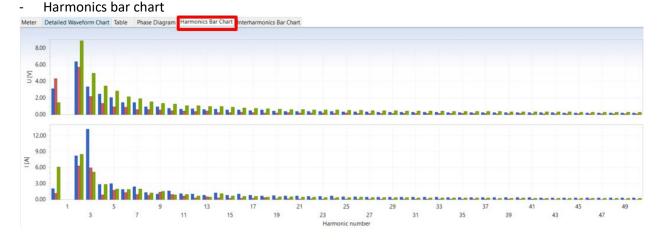






Uo 1.00 V (129.9°) U+ 175.41 V (-0.4°) U 0.83 V (141.3°) Io 14.87 A (-26.3°) I+ 153.63 A (-26.8°) I 13.49 A (-63.8°)





Interharmonics bar chart

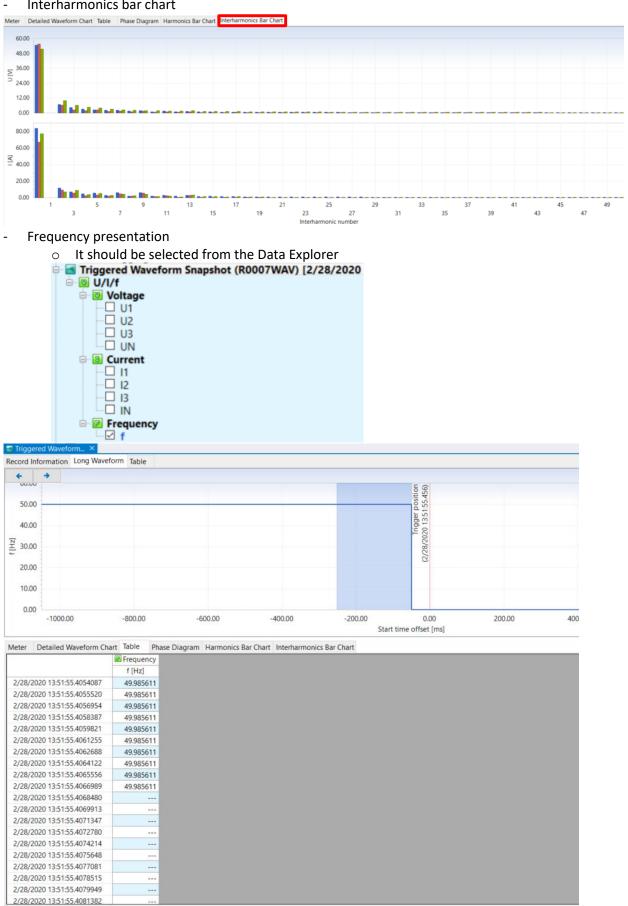


Figure 91 Frequency long waveform and Table presentation

Note:

In case, that Waveform Recorder runs as independent recorder, for data presentation please follow **item 4.10.2**

4.9 Alarms presentation

Metrel PQA enables setting of up seven customer defined alarms which are recorded together with the waveform (programmable option). Similar operation and presentation as it is described under "Events presentation".

Alarms are presented in special folder "Alarms":

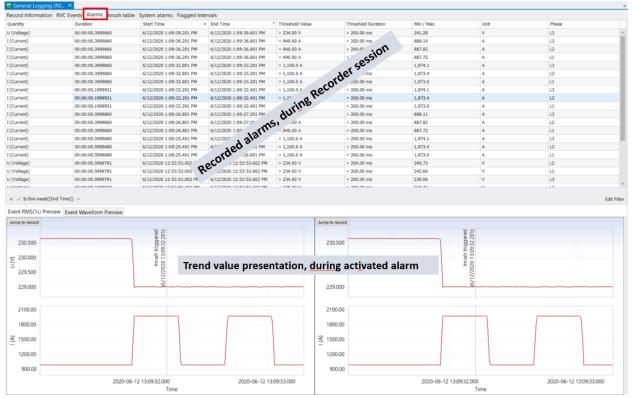


Figure 92 Alarms presentation

Quantity, which trigger Alarm	Alarm duration	Alarm Start Time	Alarm Stop Time	Threshold setup	Threshold Duration	Min/Max recorderd value		Alarm detected on Phase
Quantity	Duration	Start Time	 End Time 	Threshold Value	Threshold Duration	Min / Max	Unit	Phase
U (Voltage)	00:00:00.3999860	6/12/2020 1:09:39.201 PM	6/12/2020 1:09:39.601 PM	> 234.00 V	> 200.00 ms	241.28	v	13
I (Current)	00:00:00.3999860	6/12/2020 1:09:36.201 PM	6/12/2020 1:09:36.601 PM	< 940.00 A	> 200.00 ms	888.10	A	13
I (Current)	00:00:00.3999860	6/12/2020 1:09:36.201 PM	6/12/2020 1:09:36.601 PM	< 940.00 A	> 200.00 ms	887.82	A	12
I (Current)	00:00:00.3999860	6/12/2020 1:09:36.201 PM	6/12/2020 1:09:36.601 PM	< 940.00 A	> 200.00 ms	887.72	A	u
I (Current)	00:00:00.3999860	6/12/2020 1:09:32.801 PM	6/12/2020 1:09:33.201 PM	> 1,100.0 A	> 200.00 ms	1,974.1	A	13
I (Current)	00:00:00.3999860	6/12/2020 1:09:32.801 PM	6/12/2020 1:09:33.201 PM	> 1,100.0 A	> 200.00 ms	1,973.4	A	L2
I (Current)	00:00:00.3999860	6/12/2020 1:09:32.801 PM	6/12/2020 1:09:33.201 PM	> 1,100.0 A	> 200.00 ms	1,973.0	A	11
I (Current)	00:00:00.1999931	6/12/2020 1:09:32.201 PM	6/12/2020 1:09:32.401 PM	> 1,100.0 A	> 200.00 ms	1,974.1	A	L3

Figure 93 Alarms explanation - general

Edit Filte



Quantity	Duration	Start Time	 End Time 	Threshold Value	Threshold Duration	Min / Max	Unit	Phase
U (Voltage)	00:00:00.3999860	6/12/2020 1:09:39.201 PM	6/12/2020 1:09:39.601 PM	> 234.00 V	> 200.00 ms	241.28	v	13
I (Current)	00:00:00.3999860	6/12/2020 1:09:36.201 PM	6/12/2020 1:09:36.601 PM	< 940.00 A	> 200.00 ms	888.10	A	L3
I (Current)	00:00:00.3999860	6/12/2020 1:09:36.201 PM	6/12/2020 1:09:36.601 PM	< 940.00 A	> 200.00 ms	887.82	A	L2
(Current)	00:00:00.3999860	6/12/2020 1:09:36.201 PM	6/12/2020 1:09:36.601 PM	< 940.00 A	> 200.00 ms	887.72	A	u
(Current)	00:00:00.3999860	6/12/2020 1:09:32.801 PM	6/12/2020 1:09:33.201 PM	> 1,100.0 A	> 200.00 ms	1,974.1	A	L3
(Current)	00:00:00.3999860	6/12/2020 1:09:32.801 PM	6/12/2020 1:09:33.201 PM	> 1,100.0 A	> 200.00 ms	1,973.4	A	12
I (Current)	00:00:00.3999860	6/12/2020 1:09:32.801 PM	6/12/2020 1:09:33.201 PM	> 1,100.0 A	> 200.00 ms	1,973.0	A	u
(Current)	00:00:00.1999931	6/12/2020 1:09:32.201 PM	6/12/2020 1:09:32.401 PM	> 1,100.0 A	> 200.00 ms	1,974.1	A	13
(Current)	00:00:00.1999931	6/12/2020 1:09:32.201 PM	6/12/2020 1:09:32.401 PM	> 1,100.0 A	> 200.00 ms	1,973.4	A	L2
(Current)	00:00:00.1999931	6/12/2020 1:09:32.201 PM	6/12/2020 1:09:32.401 PM	> 1,100.0 A	> 200.00 ms	1,973.0	A	11
I (Current)	00:00:00.3999860	6/12/2020 1:09:26.801 PM	6/12/2020 1:09:27.201 PM	< 940.00 A	> 200.00 ms	888.11	A	L3
(Current)	00:00:00.3999860	6/12/2020 1:09:26.801 PM	6/12/2020 1:09:27.201 PM	< 940.00 A	> 200.00 ms	887.82	A	L2
(Current)	00:00:00.3999860	6/12/2020 1:09:26.801 PM	6/12/2020 1:09 27.201 PM	< 940.00 A	> 200.00 ms	887.72	A	u
I (Current)	00:00:00.5999680	6/12/2020 1:09:25.401 PM	6/12/2020 1:09 26.001 PM	> 1,100.0 A	> 200.00 ms	1,974.1	A	13
I (Current)	00:00:00.5999680	6/12/2020 1:09:25.401 PM	6/12/2020 1:09 26.001 PM	> 1,100.0 A	> 200.00 ms	1,973.4	A	12
I (Current)	00:00:00.5999680	6/12/2020 1:09:25.401 PM	6/12/2020 1:09 26.001 PM	> 1,100.0 A	> 200.00 ms	1,973.0	A	LI
U (Voltage)	00:00:00.5999791	6/12/2020 12:53:53.002 PM	6/12/2020 12:53:53.602 PM	> 234.00 V	> 200.00 ms	240.73	v	L2
U (Voltage)	00:00:00.5999791	6/12/2020 12:53:53.002 PM	6/12/2020 12:58:53.602 PM	> 234.00 V	> 200.00 ms	242.66	v	11
U (Voltage)	00:00:00.5999791	6/12/2020 12:53:53.002 PM	6/12/2020 12:58:53.602 PM	> 234.00 V	> 200.00 ms	239.06	v	13
(1./) Initeman)	00-00-00 1000000	6/10/000 10:E0:E0 400 DM	6/10/3030 13-0 - E0 605 DAA	# 33E 06 M	> 300.00 mm	318.43	57	15







Figure 94 Alarms "Inrush" (RMS(1/2) preview – more events detected in same time frame

Quantity	Duration	Start Time	 End Time 	Threshold Value	Threshold Duration	Min / Max	Unit	Phase
(Current)	00:00:00.3999860	6/12/2020 1:09:32.801 PM	6/12/2020 1:09:33.201 PM	> 1,100.0 A	> 200.00 ms	1,974.1	A	L3
(Current)	00:00:00.3999860	6/12/2020 1:09:32.801 PM	6/12/2020 1:09:33.201 PM	> 1,100.0 A	> 200.00 ms	1,973.4	A	L2
(Current)	00:00:00.3999860	6/12/2020 1:09:32.801 PM	6/12/2020 1:09:33.201 PM	> 1,100.0 A	> 200.00 ms	1,973.0	A	L1
(Current)	00:00:00.1999931	6/12/2020 1:09:32.201 PM	6/12/2020 1:09:32.401 PM	> 1,100.0 A	> 200.00 ms	1,974.1	A	L3
(Current)	00:00:00.1999931	6/12/2020 1:09:32.201 PM	6/12/2020 1:09:32.401 PM	> 1,100.0 A	> 200.00 ms	1,973.4	A	L2
(Current)	00:00:00.1999931	6/12/2020 1:09:32.201 PM	6/12/2020 1:09:32.401 PM	> 1,100.0 A	> 200.00 ms	1,973.0	A	L1
(Current)	00:00:00.3999860	6/12/2020 1:09:26.801 PM	6/12/2020 1:09:27.201 PM	< 940.00 A	> 200.00 ms	888.11	A	L3
(Current)	00:00:00.3999860	6/12/2020 1:09:26.801 PM	6/12/2020 1:09:27.201 PM	< 940.00 A	> 200.00 ms	887.82	A	L2
(Current)	00:00:00.3999860	6/12/2020 1:09:26.801 PM	6/12/2020 1:09:27.201 PM	< 940.00 A	> 200.00 ms	887.72	A	L1
(Current)	00:00:00.5999680	6/12/2020 1:09:25.401 PM	6/12/2020 1:09:26.001 PM	> 1,100.0 A	> 200.00 ms	1,974.1	A	L3
(Current)	00:00:00.5999680	6/12/2020 1:09:25.401 PM	6/12/2020 1:09:26.001 PM	> 1,100.0 A	> 200.00 ms	1,973.4	A	L2
(Current)	00:00:00.5999680	6/12/2020 1:09:25.401 PM	6/12/2020 1:09:26.001 PM	> 1,100.0 A	> 200.00 ms	1,973.0	A	L1
(Voltage)	00:00:00.5999791	6/12/2020 12:53:53.002 PM	6/12/2020 12:53:53.602 PM	> 234.00 V	> 200.00 ms	240.73	V	L2
J (Voltage)	00:00:00.5999791	6/12/2020 12:53:53.002 PM	6/12/2020 12:53:53.602 PM	> 234.00 V	> 200.00 ms	242.66	V	L1

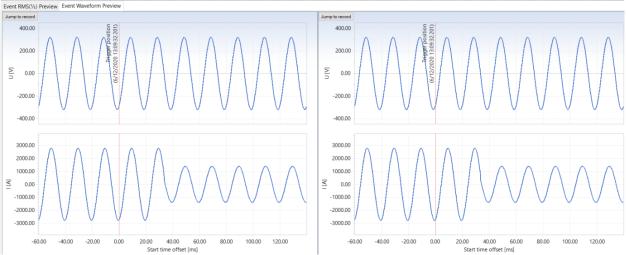


Figure 95 Alarms Waveform preview

Note: if more alarms are activated during single waveform time frame, than only the first waveform is recorded.

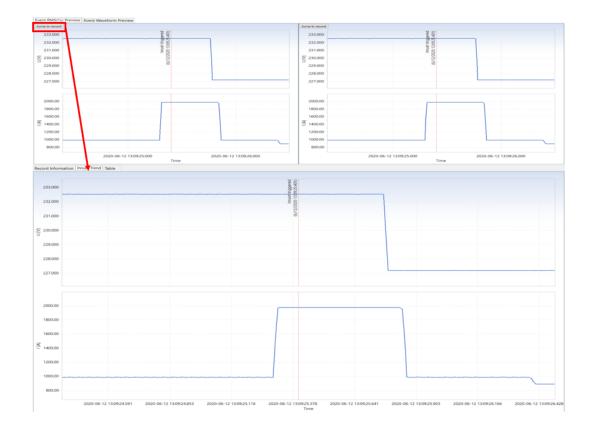


Figure 96 Alarm Inrush Trend – Current & Voltage preview

Record Information Inrush Trend Table
Inrush Logging (R0004INR) [6/12/2020 13:09:25] Inrush Logging, recorded on 6/12/2020 13:09:24, duration: 2 s. Click here to add record description
Record Properties
Profile: Standard Start time: 6/12/2020 13:09:24:401 Stop time: 6/12/2020 13:09:26:494 Duration: 2 s 093 ms Number of intervals: 631 Interval duration: 009 ms Stop cause: Finished Successfully File name: R0004INR.REC Clock synchronisation: RTC File version: 41
Measurement Settings
Nominal voltage: 230.00 V L-N 11/2/3 Clamp: A1033 (1,000.00 A), Clamp measuring range (1,000.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A IN Clamp: Smart Clamps (0.00 A), Clamp measuring range (0.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A Nominal frequency: 50.00 Hz Frequency sync: U1 Connection: 4W
Inrush Triager Settings
Sample Duration (1 cycle RMS, refreshed each half-cycle): 9.48 ms Trigger source: Alarms Trigger detected on channel: 4 Trigger date: 6/12/2020 13:09:25.401
Instrument Properties Model: MI 2885 Instrument name: Master Q4 Hardware version: 8 Firmware version: 3.0.3475 S/n: 15410784 Calibration date: 5/18/2020 11:11:39
Miscellaneous Information
Downloaded on: 6/12/2020 13:12:11.757 Downloaded by: Mihael Hribar Downloaded using: Metrel PowerView v3.0.0.4770 (64-bit), en-US Windows version: Windows 10 64-bit (Microsoft Windows NT 10.0.18362.0)

Figure 97 Alarm Inrush Trend – Recorder details

On the Chart Inrush data, it is possible to perform same operations as on the "regular" charts; like detail analyse with Markers.

🗃 General Logging (R0 🧧 Inrush Logging (R00 🗙				
Record Information Inrush Trend Table				
	🕲 Voltage	Current 😃		
	U1	11		
	1 cycle RMS [V]	1 cycle RMS [A]		
6/12/2020 13:09:24.394	232.523	986.74		
6/12/2020 13:09:24.397				
6/12/2020 13:09:24.401				
6/12/2020 13:09:24.404	232.514	986.10		
6/12/2020 13:09:24.407				
6/12/2020 13:09:24.411				
6/12/2020 13:09:24.414	232.527	986.12		
6/12/2020 13:09:24.417				
6/12/2020 13:09:24.421				
6/12/2020 13:09:24.424	232.524	986.76		
6/12/2020 13:09:24.427				
6/12/2020 13:09:24.431				
6/12/2020 13:09:24.434	232.526	986.74		
6/12/2020 13:09:24.437				
6/12/2020 13:09:24.441				
6/12/2020 13:09:24.444	232.515	986.10		
6/12/2020 13:09:24.447				
6/12/2020 13:09:24.451				
6/12/2020 13:09:24.454	232.526	986.12		
6/12/2020 13:09:24.457				
6/12/2020 13:09:24.461				
6/12/2020 13:09:24.464	232.520	986.76		

Only "effected" values presented in Table form (by default)

Figure 98 Alarm Inrush preview – Table data

Note:

In case, that Waveform Recorder runs as independent recorder, for data presentation please follow **item 4.10.2**

4.10Inrush presentation

Metrel PQA enables registration of Inrush (Level I) current. This function is available under:

- Independent (Inrush) functionality under General Recorder (MI 2893)
- Waveform recorder (Level I functionality) (MI 2892/2885/2884)

4.10.1 Inrush presentation on the MI 2893

On the MI 2893, Inrush events could run simultaneously with the General recorder and Inrush's are presented in special folder "Inrush Table":





Figure 99 Inrush currents presentation

Inrush Start Time	Inrush detected on	Detected maximum current during Inrush
Start Time	Trigger Channel	Maximum Current [A]
6/15/2020 10:29:40.660 AM	L1, L2, L3	1967.521
6/15/2020 10:30:05.431 AM	L1, L2, L3	1967.523
6/15/2020 10:30:14.595 AM	L1, L2, L3	1968.726
6/15/2020 10:30:16.765 AM	L1, L2, L3	1968.689
6/15/2020 10:30:23.522 AM	L1, L2, L3	1968.664
6/15/2020 10:30:31.156 AM	L1, L2, L3	1967.332
6/15/2020 10:30:42.110 AM	L1, L2, L3	1967.376

Figure 100 Inrush Table explanation



Figure 101 Inrush Trend – Current & Voltage preview

Record Information Inrush Trend Table

Inrush Logging (R0004INC) [6/15/2020 10:30:14] Inrush Logging, recorded on 6/15/2020 10:30:13, duration: 2 s. → Click here to add record description
Record Properties
Profile: Standard
Start time: 6/15/2020 10:30:13.595
Stop time: 6/15/2020 10:30:15:595
Duration: 2 s
Number of intervals: 602
Interval duration: 010 ms
Stop cause: Finished Successfully
File name: R0004INC.REC
Clock synchronisation: RTC
File version: 41
Measurement Settings
Nominal voltage: 230.00 V L-N
11/2/3 Clamp: A1033 (1,000.00 A), Clamp measuring range (1,000.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A
IN Clamp: Smart Clamps (0.00 A), Clamp measuring range (0.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A
Nominal frequency: 50.00 Hz
Frequency sync: U1

Connection: 4W						
Inrush Trigger Settings						
Sample Duration (1 cycle RMS)	, refreshed each half-cycle): 10.00 ms					
Max. measured value: 1,968.73	A					
Trigger slope: Rise						
Trigger date: 6/15/2020 10:30:	Trigger date: 6/15/2020 10:30:14:595					
Level: 900.00 A (90.00 %)						
Slope: Rise						
Duration: 2.00 s						
Pretrigger: 1.00 s						
Instrument Properties	Instrument Properties					
Model: MI 2893						
Instrument name: Power Maste	Instrument name: Power Master XT					
Hardware version: 8						
Firmware version: 3.0.3477						
S/n: 16280308						
Calibration date: 4/17/2019 8:0	18:23					
Miscellaneous Information						
Downloaded on: 6/15/2020 10	31:39.451					
Downloaded by: Mihael Hriba	r					
Downloaded using: Metrel Pov	verView v3.0.0.4770 (64-bit), en-US					
Windows version: Windows 10	64-bit (Microsoft Windows NT 10.0.18362.0)					

Figure 102 Inrush Trend – Recorder details

On the Chart Inrush data, it is possible to perform same operations as on the "regular" charts; like detail analyse with Markers.

deneral Logging (R0	📓 Inrush Logg	ing (R00 ×				
Record Information Inrush	Trend Table					
		🗃 Voltage			Current	
	U1	U2	U3	11	12	13
	1 cycle RMS [V]	1 cycle RMS [V]	1 cycle RMS [V]	1 cycle RMS [A]	1 cycle RMS [A]	1 cycle RMS [A
6/15/2020 10:30:13.588			228.533			690.2
6/15/2020 10:30:13.592		230.885			690.15	
6/15/2020 10:30:13.595	232.678			690.41		
6/15/2020 10:30:13.598			228.544			690.7
6/15/2020 10:30:13.602		230.890			690.65	
6/15/2020 10:30:13.605	232.683			690.41		
6/15/2020 10:30:13.609			228.550			691.1
6/15/2020 10:30:13.612		230.894			691.16	
6/15/2020 10:30:13.615	232.684			690.39		
6/15/2020 10:30:13.618			228.541			690.7
6/15/2020 10:30:13.622		230.886			690.62	
6/15/2020 10:30:13.625	232.681			690.37		
6/15/2020 10:30:13.628			228.536			690.2
6/15/2020 10:30:13.632		230.886			690.22	
6/15/2020 10:30:13.635	232.676			690.35		
6/15/2020 10:30:13.638			228.541			690.6
6/15/2020 10:30:13.642		230.888			690.24	
6/15/2020 10:30:13.645	232.674			689.95		
6/15/2020 10:30:13.649			228.540			690.6

Only "effected" values presented in Table form (by default)

Figure 103 Inrush preview – Table data

Note:

In case, that Waveform Recorder runs as independent recorder, for data presentation please follow **item 4.10.2**

4.10.2Inrush presentation on the MI 2892/2885/2884

Inrush recorder is implemented on MI 2892/2885/2884 as "independent" recorder under Waveform recorder. Inrush recorders are presented under Data Explorer view.

Group B	y: Quantity
🗆 🥥 In	rush MI 2892/2885/2884
₽-	Triggered Waveform Snapshot (R0001WAV) [1/1/2000 0:06:55]
	Inrush Logging (R0001INR) [1/1/2000 0:06:55]
B 🔚	Triggered Waveform Snapshot (R0002WAV) [1/1/2000 0:07:02]
B-10	Inrush Logging (R0002INR) [1/1/2000 0:07:02]
8-	Triggered Waveform Snapshot (R0003WAV) [1/1/2000 0:07:04]
·	Inrush Logging (R0003INR) [1/1/2000 0:07:04]
	Triggered Waveform Snapshot (R0004WAV) [1/1/2000 0:07:05]
B .	Inrush Logging (R0004INR) [1/1/2000 0:07:05]
	Triggered Waveform Snapshot (R0005WAV) [1/1/2000 0:07:09]
	Inrush Logging (R0005INR) [1/1/2000 0:07:09]

Figure 104 Inrush recorded data – preview

Two files; waveform (WAV) and Inrush (INR) create the couple, related to single event.

🗉 🥥 Inrush MI 2892/2885/2884

Triggered Waveform Snapshot (R0001WAV) [1/1/2000 0:06:55]
 Inrush Logging (R0001INR) [1/1/2000 0:06:55]

Comparing to MI 2893 presentation, here we also have waveform snapshot and all additional info: meter data, waveform chart, table data, phase diagram, harmonics and interharmonics bar chart. Data are present and analysed in separate folders.

🔄 Triggered Waveform... 🗡 🤪 Inrush Logging (R00...

For more details, about Inrush data presentation click on 4.10.1. For more details, about waveform data presentation click on 4.8.

4.11Transients presentation

Metrel PQA enables registration of Transients on voltage and current. This function is available under:

- Independent functionality under General Recorder (MI 2893)
- Transient recorder (MI 2892/2885/2884)

4.11.1Transients presentation on the MI 2893

On the MI 2893, Transient recorder could run simultaneously with the General recorder and Transient's are presented in special folder "Transient Table". Since transient sampling frequency is 1 MHz, only record of 10 ms is recorded.

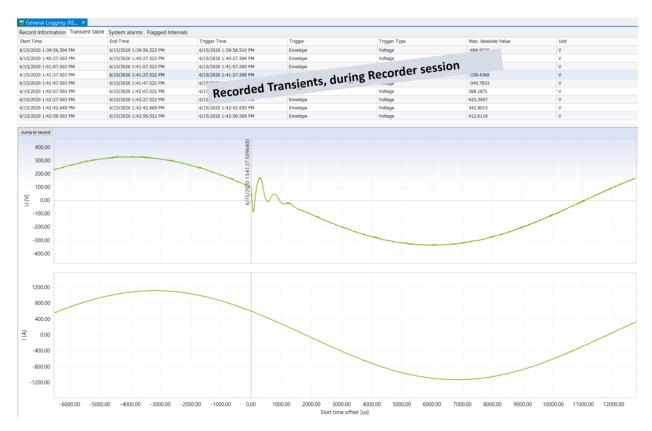


Figure 105 Transients presentation

			Trigger type:			
Transjent Start tjme	Transjent Stop tjme	Trigger timestamp	Envelope/Value	Trigger type	Max. detected value	
Start Time	End Time	Trigger Time	Trigger	Trigger Type	Max. Absolute Value	Unit
6/15/2020 1:39:56.504 PM	6/15/2020 1:39:56.523 PM	6/15/2020 1:39:56.510 PM	Envelope	Voltage	-494.9238	v
6/15/2020 1:40:27.503 PM	6/15/2020 1:40:27.522 PM	6/15/2020 1:40:27.509 PM	Envelope	Voltage	-453.6722	v
6/15/2020 1:41:07.503 PM	6/15/2020 1:41:07.522 PM	6/15/2020 1:41:07.509 PM	Envelope	Voltage	-342.6101	v
6/15/2020 1:41:27.503 PM	6/15/2020 1:41:27.522 PM	6/15/2020 1:41:27.509 PM	Envelope	Voltage	-339.4369	v
6/15/2020 1:41:47.503 PM	6/15/2020 1:41:47.522 PM	6/15/2020 1:41:47.509 PM	Envelope	Voltage	-345.7833	v
6/15/2020 1:42:07.503 PM	6/15/2020 1:42:07.522 PM	6/15/2020 1:42:07.509 PM	Envelope	Voltage	368.1871	v
6/15/2020 1:42:27.503 PM	6/15/2020 1:42:27.522 PM	6/15/2020 1:42:27.509 PM	Envelope	Voltage	425.3047	v
6/15/2020 1:42:42.649 PM	6/15/2020 1:42:42.669 PM	6/15/2020 1:42:42.655 PM	Envelope	Voltage	342.8015	v
6/15/2020 1:42:56.503 PM	6/15/2020 1:42:56.522 PM	6/15/2020 1:42:56.509 PM	Envelope	Voltage	412.6119	v

Figure 106 Transient table explanation

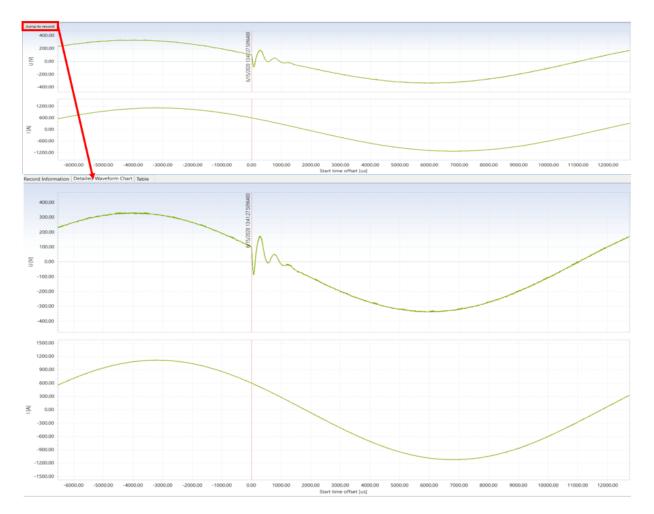
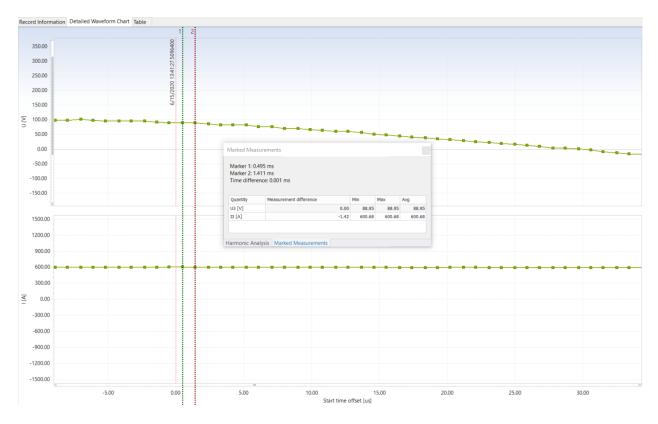
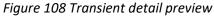


Figure 107 Transient preview





Transient Record (R0005TRA) [6/15/2020 13:41:27] Transient Record, recorded on 6/15/2020 13:41:27, duration: 019 ms. Click here to add record description

Record Properties
Profile: Standard
Start time: 6/15/2020 13:41:27:503
Stop time: 6/15/2020 13:41:27.522
Snapshot length: 19.27 ms (20480 samples)
Stop cause: Finished Successfully
File name: R0005TRA.REC
Clock synchronisation: RTC File version: 41
Measurement Settings
Nominal voltage: 230.00 V L-N
11/2/3 Clamp: A1033 (1,000.00 A), Clamp measuring range (1,000.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A IN Clamp: Smart Clamps (0.00 A), Clamp measuring range (0.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A
Nominal frequency: 50.00 Hz
Frequency sync: U1
Connection: 4W
Transient Trigger Settings
Trigger source: Envelope UL-N
Trigger detected on channel: UL ₃ -N
Triggered value: 10.00 V
Maximum measured value: -339.44 V
Transient occurence on channels: Envelope UL1-N, Envelope UL3-N, Envelope UL3-N
Level UL-N: Off
Level UN-GND: Off
Level I:: Off
Level IGND: Off
Envelope UL-N: 10.00 V
Envelope IL: Off
Envelope IGND: Off
Instrument Properties
Model: MI 2893
Instrument name: Power Master XT
Hardware version: 8
Firmware version: 3.0.3477
S/m 16280308
Calibration date: 4/17/2019 8:08:23
Miscellaneous Information
Downloaded on: 6/15/2020 13:43:51.206
Downloaded by: Mihael Hribar
Downloaded using: Metrel PowerView v3.0.0.4770 (64-bit), en-US
Windows version: Windows 10 64-bit (Microsoft Windows NT 10.0.18362.0)

Figure 109 Tranzient Recorder details

On the Transient Chart data, it is possible to perform same operations as on the "regular" charts; like detail analyse with Markers.

🗃 General Logging (R0	📓 Inrush Logg	ing (R00 ×				
Record Information Inrush	Trend Table					
		🔯 Voltage			Current	
	U1	U2	U3	11	12	13
	1 cycle RMS [V]	1 cycle RMS [V]	1 cycle RMS [V]	1 cycle RMS [A]	1 cycle RMS [A]	1 cycle RMS [A]
6/15/2020 10:30:13.588			228.533			690.22
6/15/2020 10:30:13.592		230.885			690.15	
6/15/2020 10:30:13.595	232.678			690.41		
6/15/2020 10:30:13.598			228.544			690.75
6/15/2020 10:30:13.602		230.890			690.65	
6/15/2020 10:30:13.605	232.683			690.41		
6/15/2020 10:30:13.609			228.550			691.1
6/15/2020 10:30:13.612		230.894			691.16	
6/15/2020 10:30:13.615	232.684			690.39		
6/15/2020 10:30:13.618			228.541			690.7
6/15/2020 10:30:13.622		230.886			690.62	
6/15/2020 10:30:13.625	232.681			690.37		
6/15/2020 10:30:13.628			228.536			690.2
6/15/2020 10:30:13.632		230.886			690.22	
6/15/2020 10:30:13.635	232.676			690.35		
6/15/2020 10:30:13.638			228.541			690.69
6/15/2020 10:30:13.642		230.888			690.24	
6/15/2020 10:30:13.645	232.674			689.95		
6/15/2020 10:30:13.649			228.540			690.6

Only "effected" values presented in Table form (by default)

Figure 110 Inrush preview – Table data

Note:

In case, that Waveform Recorder runs as independent recorder, for data presentation please follow **item 4.10.2**

4.11.2Transients presentation on the MI 2892/2884

Transient recorder is implemented on MI 2892/2885/2884 as "independent" recorder. Captured transients are presented under Data Explorer view.

Group By	r: Quantity
🗉 🥥 Un	known site
B- 🐼	Transient Record (R0001TRA) [6/15/2020 14:39:30
19-10	Transient Record (R0002TRA) [6/15/2020 14:39:40
😐 🔛	Transient Record (R0003TRA) [6/15/2020 14:39:50
æ 🐖	Transient Record (R0004TRA) [6/15/2020 14:40:00
1 II	Transient Record (R0005TRA) [6/15/2020 14:40:10
B- 🐼	Transient Record (R0006TRA) [6/15/2020 14:40:20
(B)	Transient Record (R0007TRA) [6/15/2020 14:40:30
œ 😱	Transient Record (R0008TRA) [6/15/2020 14:40:40
æ 🔐	Transient Record (R0009TRA) [6/15/2020 14:40:50
œ 💽	Transient Record (R0010TRA) [6/15/2020 14:41:00
÷ 💮	Transient Record (R0011TRA) [6/15/2020 14:41:10
	Transient Record (R0012TRA) [6/15/2020 14:41:20
æ 🐷	Transient Record (R0013TRA) [6/15/2020 14:41:30
10 M	Transient Record (R0014TRA) [6/15/2020 14:41:40

Figure 111 Recorded transients – preview

With double click on selected transients, Transient record information is opened:

Transient Record (R0 ×
Record Information
Transient Record (R0001TRA) [6/15/2020 14:39:30] Transient Record, recorded on 6/15/2020 14:39:30, duration: 020 ms. Click here to add record description
Record Properties Profile: Standard Start time: 6/15/2020 14:39:30.944 Stop time: 6/15/2020 14:39:30.964 Snapshot length: 19.97 ms (613 samples) Stop cause: Finished Successfully File name: R0001TRA.REC Clock synchronisation: RTC File version: 311
Measurement Settings Nominal voltage: 230.00 V L-N 11/2/3 Clamp: A1033 (1,000.00 A), Clamp measuring range (1,000.00 A), Instrument measuring range (100 % of Clamp measuring range), Current transformer ratio: 1.00 A : 1.00 A IN Clamp: None (0.00 A), Clamp measuring range (0.00 A), Instrument measuring range (100 % of Clamp measuring range) Nominal frequency: 50.00 Hz Frequency sync: U1 Connection: 4W
Transient Trigger Settings Trigger source: Envelope Trigger detected on channel: U1 Triggered value: 10.00 V
Instrument Properties Model: MI 2884 Instrument name: Energy Master XA Hardware version: 4 Firmware version: 1.0.2393 S/n: 0000009 Calibration date: 1/4/2079 14:52:56
Miscellaneous Information Downloaded on: 6/15/2020 14:42:13.482 Downloaded by: Mihael Hribar Downloaded using: Metrel PowerView v3.0.0.4770 (64-bit), en-US Windows version: Windows 10 64-bit (Microsoft Windows NT 10.0.18362.0)

Figure 112 Transient Recorder information – MI 2892/2884

⊖-⊠ U/I/f ≑-छ Voltage	
U2 U3 B Current	

Select voltage U1 from the Explorer view:

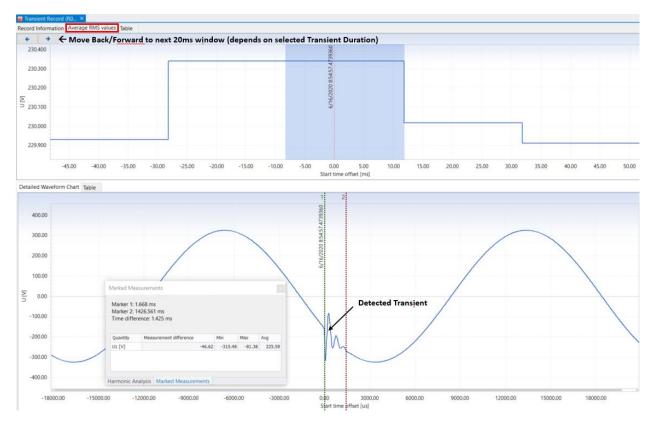


Figure 113 Transient Recorder presentation - waveform

All data are also presented in table form: for MI 2884, with resolution of $32\mu s$ (sampling frequency 30.6 kHz).

	Voltage
	U1 [V]
6/16/2020 8:54:57.4257780	288.37
6/16/2020 8:54:57.4258106	289.90
6/16/2020 8:54:57.4258432	291.31
6/16/2020 8:54:57.4258758	292.84
6/16/2020 8:54:57.4259085	294.25
6/16/2020 8:54:57.4259411	295.72
6/16/2020 8:54:57.4259737	297.06
6/16/2020 8:54:57.4260063	298.35
6/16/2020 8:54:57.4260390	299.63
6/16/2020 8:54:57.4260716	300.98
6/16/2020 8:54:57.4261042	302.20
6/16/2020 8:54:57.4261369	303.42
6/16/2020 8:54:57.4261695	304.59
6/16/2020 8:54:57.4262021	305.81
6/16/2020 8:54:57.4262347	306.85
6/16/2020 8:54:57.4262674	308.01

Figure 114 Transient Recorder presentation – Table data

4.12Instrument Configuration Tool

PQA, with Ethernet port (MI 2893/2892/2885) could be setup remotely, by clicking on ⁴ Available operations:



- Reading instrument setup
- Writing setup to instrument
- Time synchronisation/setting
- Recorder's Start/Stop

Note: Same operation is possible to perform also via USB port (for all PQA's).

	Last known instrument time	ent configuration settings, manage recording settings, m memory. Time zone	, sos e scop	une recordin	
TEST97	6/16/2020 9:29:28 / ~	UTC+2:0 V Use system time Set time			
Measurement Setup General Recorder Waveform Recorder Transient Recorder	Nominal voltage	, •	î	Read	← Read Setup from PQ, ← Write Setup to PQA
	Potential transformer rafi Voltage ratio 1 △+人 1	• • • •			
	Ph. Curr. Clamps	A1033			
	N. Curr. Clamps	W V			
	Synchronization	Voltage ~			
	System frequency (Hz)	50 ~			
	Event Signaling RVC	Inrush Transient Measuring Methods			
	Threshold (%				
	Swell 110 Dip 90	(225.00 V) (275.00 V)			

Figure 115 Instrument Configuration tool (MI 2893)

Note: SD card should be inserted into the PQA, tor remote configuration reading/changing

4.12.1Instrument name/Time setting

Instrument name and time could be changed remotely. For the time setting, user could select time manually or use PC system time. We recommend the second option, since PC time could be synchronised with the accurate network time.

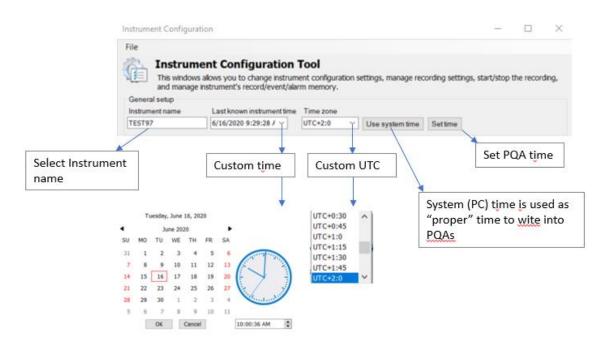
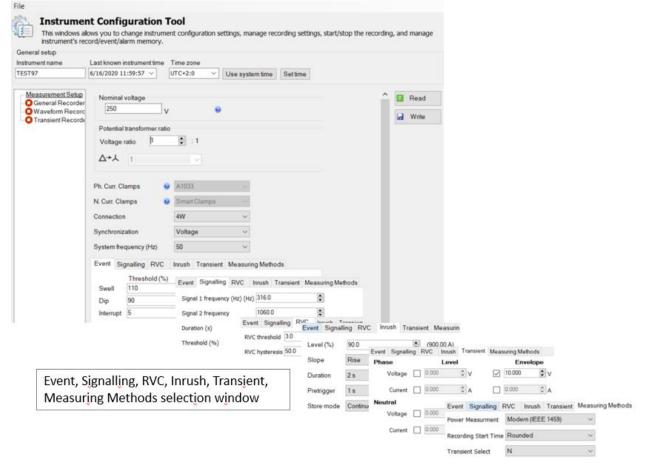
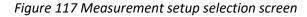


Figure 116 Instrument Name and Time setting screen

4.12.2Measurement setup

Under Measurement setup all PQ functionality settings could be setup, except the current clamp selection and range settings.





	File	Open	Ctrl+O	
		Save As	Ctrl+S	
Change the settings, save them through File $ ightarrow$ Save As	×	Close		and write them into the
instrument by using Write Write icon.				

4.12.3 General Recorder setup

Through the General Recorder setup window, it is possible to manage Recorder parameters as well as perform Remote Start/Stop of the recorder. Setup screen (functions) is related to the type of the PQA.

File								
This windows alk	nt Configuration 1 ows you to change instrume manage instrument's record,	ent configuration settings, manage recordi	ig settings, s	start/stop	the			
General setup								
	Last known instrument time							
TEST97	6/16/2020 12:37:32 ∨	UTC+2:0 V Use system time Se	ttime					
Measurement Setup	General Recorder				Read	1		
General Recorder Waveform Record	Profile Standard		\sim	_				
Transient Recorde	Interval 5 s		\sim	6	Write]		
	Duration 3 days		\sim					
	Include transients	Include events				GENERAL REC.	i.	12:38
	Include alarms	Include inrush				GENERAL REG.		12:30
	✓ Include signalling	Include RVC				PROFILE	Standard	
	Include 200 ms U/I/f					INTERVAL	5 s	
	Start time					START TIME	Manual	
	Manual					DURATION	3 days (1999MB)	
	 Time trigger 	16 jun. 2020 12:37:25				NETWORK EVENTS	EVT SIG TRA INR RVC	4
	O Start					Recommended/maxima Available memory: 11d,	l record duration: 12 hours / 3 d	ays
	O Stop							ECK C.

Figure 118 General Recorder setup screen vs Instrument screen menu

4.12.4 Waveform Recorder setup

Through the General Recorder setup window, it is possible to manage Recorder parameters as well as perform Remote Start/Stop of the recorder. Setup screen (functions) is related to the type of the PQA.

File								
This windows alk the recording, a		tion Tool nstrument configuration set ent's record/event/alarm me		cording setting	gs, start/stop			
General setup								
	Last known instrume							
TEST97	6/16/2020 12:45:06	✓ UTC+2:0 ✓	Use system time	Settime				
Measurement Setup	Waveform Record	ler			Read			
General Recorder	Trigger	Events ~			, nega			
Transient Recorde	Interval	10 min 🗸 🗸		6	Write			
	Level (%)	0.1					_	
	Slope	Rise ~				WAVEFORM REC.		<u>الا المعامة</u> المعادمة المحادثة
	Duration	2 s ~				TRIGGER	Events	
	Pretrigger	1 s ~				DURATION	2 s	
	Store mode	Continuous (max. 200 rec.)	\sim			PRETRIGGER	1 s	
						STORE MODE	Continuous(200/1500 Max) 🖉
	 Start 						L	
	-					Available memory: 414	75 records (7557MB	1
	O Stop					START	SETU	P

Figure 119 Waveform Recorder setup screen vs Instrument screen menu

4.12.5 Transient Recorder setup

Through the General Recorder setup window, it is possible to manage Transient Recorder parameters as well as perform Remote Start/Stop of the recorder. Setup screen (functions) is related to the type of the PQA.

EST97	Last known instrument time	Time zone UTC+2:0 V	Use system time	Settime	•						
Measurement Setup	Transient Recorder	Level	Envel	ope	6	Read					
OWaveform Record			10.000	¢ v		Write	TRANSIENTS SE	TUP		į. 💶 1	2:
	Current 0.00	A 👻 00	0.000	÷ A			TRIGGER	LEVEL		ENVELOPE	
	Neutral						PHASE				
	Voltage 0.00	V 🗘 00					Voltage	Off	십	10V	
	Current 0.00	A \$ 00	0.000	‡ A			Current	Off	දා	Off	
							NEUTRAL Voltage	Off	الم		
		_									
	O Start						Current	Off	ې لې	Off	

Figure 120 Transient Recorder setup screen vs Instrument screen menu

4.12.6 Save/Open Instrument configuration file

Instrument settings could be read out from the instrument and saved as *.SET file.

	File	Open	Ctrl+O
		Save As	Ctrl+S
Setup could be saved through File \rightarrow Save A	\times	Close	

Opening already saved file:

Establish connection with the PQA by reading Instrument Configuration Tool; after that open already

File		
2	Open	Ctrl+O
	Save As	Ctrl+S
\sim		

saved setup through File → Open X Close

With this approach It is possible to perform same setup for the entire fleet of the PQA.

Note:

Configuration setup refers to a specific instrument model and could be re-used on the same type of the instrument.

Example:

Configuration setup from MI 2893 could not be used for MI 2884 PQA.

4.13System alarms

System alarms give information about the PQA status before recorder start and registered system events.

Recorder starting conditions:

Record Starting Conditions				
Charger Status	CONNECTED			
Charger Voltage	11.8V			
Battery Voltage	8.4V			
Time Stamp	2/27/2020 9:40:00 AM			
Battery Temperature	36.6°C			
SD Card Info	14881MB / 14932MB			
GPS Status	DISCONNECTED			
Frequency Synchronization Status	SYNCHRONIZED			
Clock Synchronization Status	RTC			
Events Capture Enabled	YES			
Alarms Capture Enabled	NO			

System alarm presentation:

Record In	formation Events RVC Events System alarms	Flagged Intervals	
Id	Description	Date and time	Message
:	1 Charger disconnected.	2/28/2020 1:50:06 PM	1
:	2 Current over range.	2/28/2020 1:50:35 PM	1
	3 Current in range.	2/28/2020 1:50:35 PM	/
	4 Charger connected.	2/28/2020 1:50:37 PM	/
	5 GPRS status.	2/28/2020 1:50:51 PM	Could not reach gprs.metrel.si at port 80.
	6 Charger disconnected.	2/28/2020 1:51:25 PM	/
	7 Current over range.	2/28/2020 1:51:54 PM	/
-	8 Current in range.	2/28/2020 1:51:54 PM	/
	9 Charger connected.	2/28/2020 1:51:55 PM	/
1	0 Charger disconnected.	2/28/2020 1:51:57 PM	1
1	1 Charger connected.	2/28/2020 1:52:33 PM	/
1	2 Charger disconnected.	2/28/2020 1:52:35 PM	/
1	3 Charger connected.	2/28/2020 1:53:00 PM	/
1	4 Charger disconnected.	2/28/2020 1:53:02 PM	/
1	5 Current over range.	2/28/2020 1:53:53 PM	/
1	6 Current in range.	2/28/2020 1:53:53 PM	/
1	7 Charger connected.	2/28/2020 1:53:55 PM	/
1	8 GPRS status.	2/28/2020 1:55:01 PM	gprs.metrel.si reached at port 3.
1	9 Charger disconnected.	2/28/2020 2:42:10 PM	/
2	0 Charger connected.	2/28/2020 2:42:15 PM	/
2	1 GPRS status.	2/28/2020 2:42:53 PM	Could not reach gprs.metrel.si at port 80.
2	2 GPRS status.	2/28/2020 2:43:51 PM	gprs.metrel.si reached at port 3.
2	3 GPRS status.	2/28/2020 2:50:12 PM	Could not reach gprs.metrel.si at port 80.
2	4 GPRS status.	2/28/2020 2:51:11 PM	gprs.metrel.si reached at port 3.
2	5 GPRS status.	2/29/2020 12:48:24 AM	Could not reach gprs.metrel.si at port 80.
2	6 GPRS status.	2/29/2020 12:49:29 AM	gprs.metrel.si reached at port 3.
2	7 GPRS status.	3/2/2020 10:09:43 AM	Could not reach gprs.metrel.si at port 7781.
2	8 GPRS status.	3/2/2020 10:10:41 AM	gprs.metrel.si reached at port 3.

Figure 121 System alarms presentation

PQA register different type of events, which could appear during the recording session:

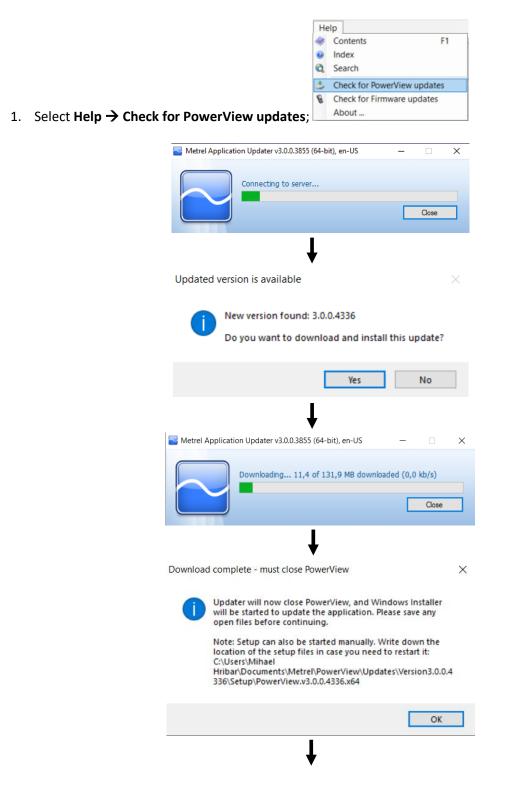
- Recorder has stopped,
- Low battery alarm has been signalled,
- GPS status changed,
- Voltage over range,
- Voltage in range,
- Current over range,
- Current in range,
- Charger connected,
- Charger disconnected,
- Battery overheating,
- Battery freezing,
- Frequency synchronization established,

- Frequency synchronization lost,
- Wrong PIN number was entered,
- Clock synchronization source has changed,
- Battery temperature sensor error,
- GPS change VALID-INVALID diff,
- Wrong IDECO password entered,
- Wrong IDECO2 password entered,
- GPRS status,
 - Could not reach gprs.metrel.si at port XX,
 - o gprs.metrel.si reached at port xx,
- Smart clamp detection,
- GPS synchronization,
- General record restarted,
- Current auto range,
- Recorder has finished,
- Transient module WD reset,
- Battery temperature back to normal.

5 PowerView update

PowerView is subject to constant innovation and improvements, which brings several new features and improvements. Update could be done directly via PowerView, by checking if the installed PowerView version is older than available one on the server.

To check for the available PowerView updates, your PC should be connected to Internet.





Follow the setup instructions.

6 PQA Firmware update

Through the PowerView it is possible to upgrade the PQA Firmware.

Procedure:

- 1. Connect PC and instrument with USB cable
- 2. Establish USB communication between them. In PowerView, go to **Tools→Options** menu and set USB connection as shown on figure below.

Settings		×
Instrument Connection Env Connection Type	ironment Troubleshooting	
Connection type	USB v	
USB port parameters		
PortName	Measurement Instrument USB VCom Port (COM3) $\qquad \lor$	
Baud Rate	921600 ~	
	Apply Ok Cancel	

Figure 122: Selecting USB communication

3. Click on **Help** → **Check for Firmware updates**.

				_
Netrel PowerView v3				
<u>File View T</u> ools	He	lp		
🗋 💕 🖬 🍙 🔍	۲	Contents F	1 h dir	ec
Welcome	0	Index		
	Q	Search		
	3	Check for <u>P</u> owerView updates	ia	L
	8	Check for <u>F</u> irmware updates	IIC	K
Weld To g		<u>A</u> bout	ed s	0
			1	

Figure 123: Check for Firmware upgrade

4. Version checker window will appear on the screen. Click on **Start** button.

Metrel PowerView Version Checker v3.0.0.1789	Metrel PowerView Version Checker v3.0.0.1789	_ 🗆 🗙
USB Measurement Instrument USB VCom Port (COM2) 921600 Restore mode	US8 Measurement Instrument USB VCom Port (COM2) 921600 C Restore mode	Start
This utility will check the current version of your firmware. Please connect your instrument and click Start to begin.	Connecting to instrument	

Figure 124: Check for Firmware upgrade

5. If your instrument has older FW, PowerView will notify you that new version of FW is available. Click on **Yes** to proceed.

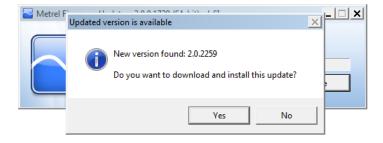


Figure 125: New PowerView firmware is available for download

6. After update is downloaded, FlashMe application will be launched. This application will actually upgrade instrument FW. Click on RUN to proceed.

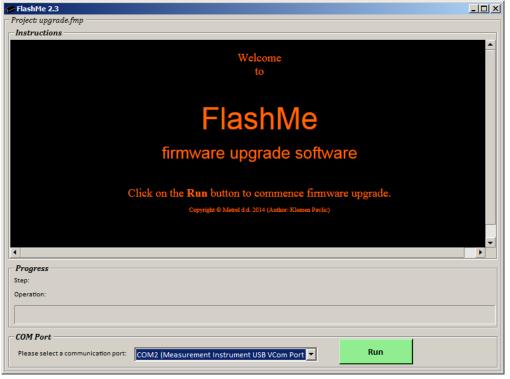


Figure 126: FlashMe firmware upgrade software

7. FlashMe will automatically detect PQ instrument, which can be seen in COM port selection menu. In some rare cases user should point FlashMe manually to COM port where instrument is connected. Click then on Continue to proceed.

🔗 FlashMe 2.3	
Project: upgrade.fmp	
Instructions	
Connect instrument USB p	
with PC.	
Progress Step: 1/3 Operation:	
COM Port Please select a communication port: COM2 (Measurement Instrument USB VCom Port Continue Cance	

Figure 127: FlashMe configuration screen

8. Instrument upgrade process should begin. Please wait until all steps are finished. Note that this step should not be interrupted; as instrument will not work properly. If upgrade process goes wrong, please contact your distributor or Metrel directly. We will help you to resolve issue and recover instrument.



Figure 128: FlashMe programming screen

7 Reporting problems to Metrel

This section deals with unexpected problems, errors and exceptions that may occur during usage of Metrel PowerView. If you have encountered an error while using Metrel PowerView, the best thing to do is to report this issue to our support at <metrel@metrel.si>. This will help us find a solution quickly, and provide you with an updated version, hotfix, or help you extract the data from your instrument if the issue prevents you from doing so.

7.1 Bug report checklist

This section contains a brief list of items which your bug report should contain. For detailed information about each step, consult the next section.

1. Regardless of the problem you are reporting, the minimum amount of information we need is:

- A short description of the problem and, most importantly, steps needed to reproduce it;
- Metrel PowerView log file (located in :\Users\<user>\Documents\Metrel\PowerView\Log folder).

8 How to get support?

8.1 Contact us directly

Metrel d.d. Slovenia Ljubljanska cesta 77 Horjul, SI-1354 Slovenia Phone: +386 1 7558 200 Fax: +386 1 7549 226 E-mail: metrel@metrel.si Web site: www.metrel.si [http://www.metrel.si/]

8.2 Use the online contact form

You can also contact us using our Contact form https://www.metrel.si

9 Version of document

#	Document version	Description of changes
1	1.2.1	Added improvements from the PowerView 3.0 release, Ver. 5059