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	Power Quality Management System – Human Machine Interface	<b>GSTQ004</b> Rev. 01 20/12/2016

## Power Quality Management System – Human Machine Interface

This global standard define the Human Machine Interface, based on web interface, for the new set of power quality central systems within ENEL.

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Revision	Date	List of modifications
00	02.11.2016	First version
01	20.12.2016	Approved first version

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## ACRONYMS

- **PQ** Power Quality
- **PQI** Power Quality Instrument according to IEC 62586-1
- **AVR** Automatic Voltage Regulator
- **GPS** Global Positioning System
- **PQMS** Power Quality Management System
- **REST** Representational State Transfer
- **COMTRADE** Common format for Transient Data Exchange for power systems
- **CSV** Comma-separated values
- **SCADA** Supervisory Control And Data Acquisition
- **HMI** Human Machine Interface

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## 1 NORMATIVE REFERENCES AND BIBLIOGRAPHY

All the references are intended in the last revision or amendment.

### 1.1 For all countries

IEC 61000-4-30	Electromagnetic compatibility (EMC) – Part 4-30: Testing and measurement techniques – Power quality measurement methods.
IEEE 519	IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems
IEEE 1159.3	IEEE Recommended Practice for the Transfer of Power Quality Data.
IEEE C37.111	IEEE Standard Common Format for Transient Data Exchange (COMTRADE) for Power Systems
RFC 4180	Common Format and MIME Type for Comma-Separated Values (CSV) Files
Appnote,1 APPNOTE.TXT	ZIP File Format Specification, PKWARE® Inc., September 2012
GSTQ001	Power Quality Instrument
GSTQ002	Extended Power Quality Data Interchange Formats
GSTQ003	Power Quality Management System
GSTQ005	Power Quality Management System – Batch Data Processing

### 1.2 For EU countries

EN 50160	Voltage characteristics of electricity supplied by public distribution systems.
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### 1.3 For Italy

RSE 12004159	Specifiche tecnico-funzionali delle apparecchiature di monitoraggio della qualità della tensione per le reti MT.
[1]	R. Chiumeo, M. de Nigris, L. Garbero, C. Gandolfi, L. Tenti, E. Carpaneto, "Implementation of a New Method for an Improved Voltage Dips Evaluation by the Italian Power Quality Monitoring System in Presence of VT Saturation Effects", International Conference on Renewable Energies and Power Quality (ICREPQ'10), Granada (Spain), 23rd to 25th March, 2010.
ARG/elt 198/11	Testo integrato della qualità dei servizi di distribuzione e misura dell'energia elettrica per il periodo di regolazione 2012-2015

### 1.4 For Spain

R.D. 1955/2000	Real Decreto 1955/2000, de 1 de diciembre, por el que se regulan las actividades de transporte, distribución, comercialización, suministro y procedimientos de autorización de instalaciones de energía eléctrica.
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### 1.5 For Colombia

CREG 065/2012	RESOLUCIÓN N° 065 DE 2012 por el cual se ordena hacer público un proyecto de resolución de carácter general, que pretende establecer las normas de calidad de la potencia eléctrica aplicables en el Sistema Interconectado Nacional.
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### 1.6 For Argentina

ENRE 184/2000 ANEXO	Base Metodológica para el Control de la Calidad del Producto Técnico Etapa 2.
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### 1.7 For Brazil

ANEEL PRODIST Módulo 8	Agência Nacional de Energia Elétrica – ANEEL Procedimentos de Distribuição de Energia Elétrica no Sistema Elétrico Nacional – PRODIST Módulo 8 – Qualidade da Energia Elétrica
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### 1.8 For Peru

NTCSE D.S. 020-97-EM	Norma Técnica de Calidad de los Servicios Eléctricos
Resolución 616-2008-OS/CD	Base Metodológica para la aplicación de la Norma Técnica de Calidad de los Servicios Eléctricos – Urbana
Resolución 016-2008-EM/DGE	Norma Técnica de Calidad de los Servicios Eléctricos Rurales (NTCSER)
Resolución 046-2009-OS/CD	Base Metodológica para la aplicación de la Norma Técnica de Calidad de los Servicios Eléctricos Rurales – Resolución de Consejo Directivo OSINERGMIN

### 1.9 For Romania

Ord 11/2016	Standardului de performanță pentru serviciul de distribuție a energiei electrice.
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### 1.10 For Chile

D.S. 327/1997	Reglamento de la ley general de servicios eléctricos.
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## 2 APPLICATION FIELDS

The PQ monitoring architecture can be made by a central system and distributed power quality instruments (PQIs).

The PQI (according to GSTQ001 and GSTQ002) will be installed in any distribution grid for measuring any relevant PQ parameter. The relevant PQ parameters are defined in IEC 61000-4-30, IEC 62749 and EN 50160.

The installation will be a substation or another indoor premise in a country where one or more utilities are under Enel control.

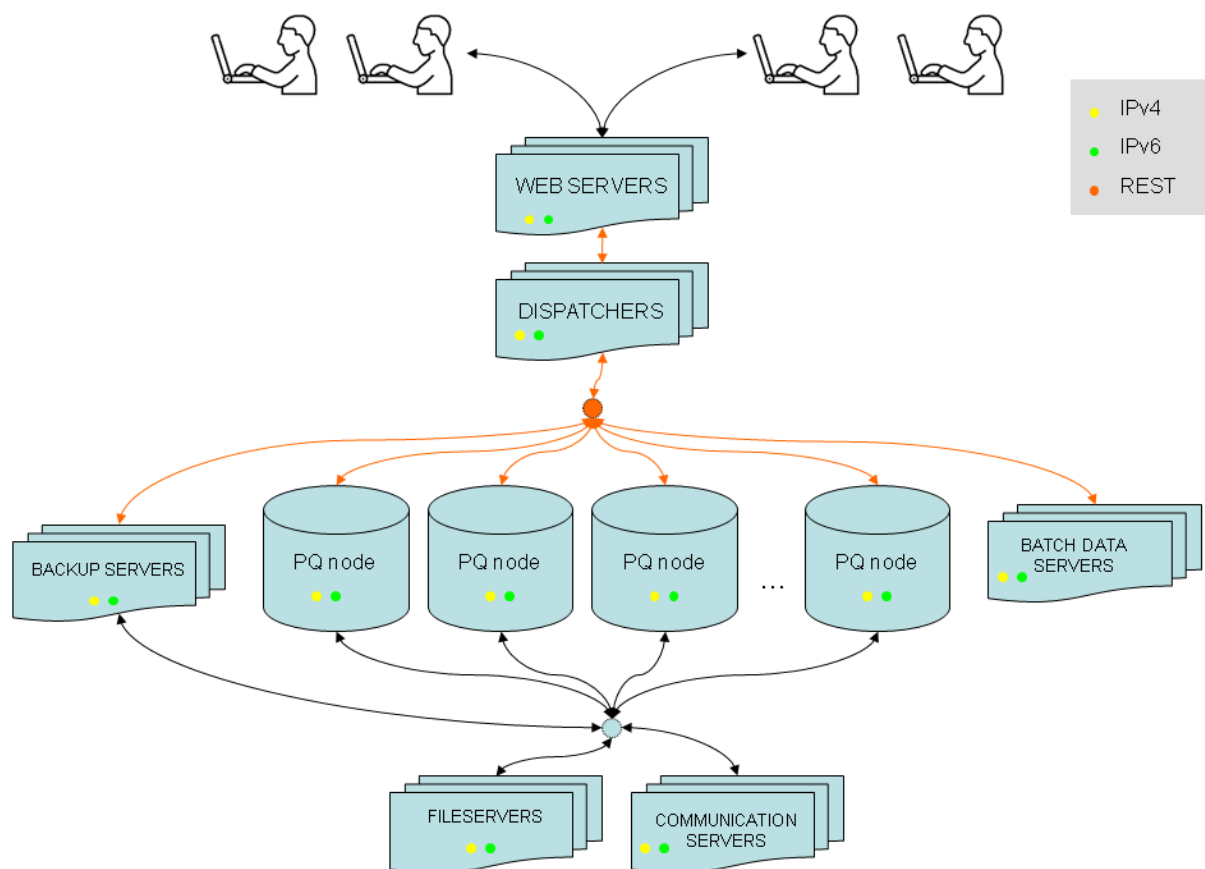
The PQMS is the Power Quality Management System (according to GSTQ003), including data acquisition from PQI, SCADA, weather stations and other relevant systems.

The PQMS Human Machine Interface (HMI) is defined in this global standard (GS). The GSTQ003 is fundamental for the understanding of this document, generally also further GSs may complement this document.

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### 3 HMI IN THE PQMS ARCHITECTURE

The HMI is a web interface inside a modular architecture (according to GSTQ003) with predefined interface methods, the main block of this architecture are depicted in the following picture:



- **WEB SERVER**, to store, process and deliver web pages to end-users.
- **PQ NODES**, consisting of any of the following elements:
  - **PQIs** in remote substation. These PQIs are connected by means of proper and reliable IP networks or any other communication way as in GSTQ002.
  - **PQ DATABASES**, comprising data from several PQIs, that may not have a strong, permanent and reliable IP connection. Aggregated and calculated indices (such as percentile values) could also be inserted in these databases.
  - **WEATHER DATABASES**, collecting data from external weather information services.
  - **GRID EVENTS DATABASES**: these units collect basic information about tripping of feeders, protections and other events or measures from SCADA. The aim is to be fast and standard regardless the SCADA database already used within the DSO.
  - **META DATABASES**: they keep information about the location of any set of data and important attributes (e.g. IP address, latitude, voltage ratio, alias, etc.).
- **COMMUNICATION SERVERS**: they behave as repositories where PQIs upload data or may initiate a connection to them and download specific sets of data.
- **FILE SERVERS**: they just provide shared file services to any server.



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- **BATCH DATA SERVERS:** they perform specific calculations on raw data in order to get aggregated indices, such as percentiles or HV/MV origin of events. The results are stored in PQ databases.
- **DISPATCHERS:** they forward any request from the web server to the specific node.
- **BACKUP SERVERS:** they connect to remote PQIs and download specific sets of measurements. Typically they will consist of few 10-minute recordings and events list. Data is stored in a PQ DATABASE.

All these elements exchange information by means of a REST API and few other standard protocols.

This GS provide the basilar HMI specifications, other GSs may require additional requirements, as an example the GSTQ005 specify the reporting and visualizations for the results of the batch data processing.

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#### 4 DATA PRESENTATION

During the tender phase all or few of the following enumerated functions shall be chosen.

##### 4.1 Multiple selection of measuring points

Multiple selection of measuring points can be done in various ways:

- By single dropdown menu:



fig. 1 Example of single dropdown menu.

- By chained dropdown menus:
  - o DSOSITE.area0
  - o DSOSITE.area1
  - o DSOSITE.area2
  - o DSOSITE.alias + DSOSITE.description

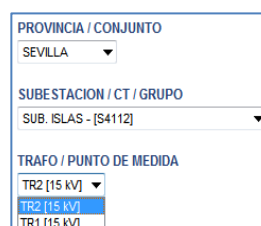


fig. 2 Example of chained dropdown menus

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- By a multiple selection tree (similar to the above structure).



fig. 3 Example of multiple selection tree.

- By several filter selection:

- o DSOSITE.area0.
- o DSOSITE.area1.
- o DSOSITE.area2.
- o DSOSITE.extra.
- o PQSITE.voltage.

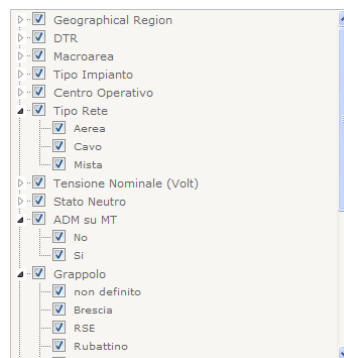


fig. 4 Example of filter selection.

- By selecting a rectangular region on a map with the mouse.



fig. 5 Example of selected rectangular region on a map.

- By other selecting modes.

Anagrafica siti

Siti di misura

Trova sito o codice installazione:  Trova siti che non inviano dati da piu' giorni:

Filtro selezione

Siti totali: 3537

» Modifica » Elimina » Ingressi Digitali » Manutenzione

Paginazione tabella

Sito	Codice Installazione	Geographical Region	DTR	Macroarea	Tensione Nominale (Volt)	Indirizzo Ip	Ultima lettura
<input type="checkbox"/> 4MANDAMENTI - RO	DR0013801492RO	Sicilia	SIC	MAS	20000	10.213.130.234	01/11/2016 10:27
<input type="checkbox"/> 4MANDAMENTI - VE	DR0013801492VE	Sicilia	SIC	MAS	20000	10.213.130.235	01/11/2016 10:42
<input type="checkbox"/> 4VENTI_20 - B1	DR0013801122B1	Sicilia	SIC	MAS	20000	10.213.130.236	01/11/2016 10:25
<input type="checkbox"/> 4VENTI_20 - B2	DR0013801122B2	Sicilia	SIC	MAS	20000	10.213.130.237	01/11/2016 10:27
<input type="checkbox"/> 4VENTI_20 - B3	DR0013801123B3	Sicilia	SIC	MAS	10000	10.213.133.60	01/11/2016 10:26
<input type="checkbox"/> ABANO - R1	DG0013803285R1	Veneto	TRI	MANE	20000	10.213.133.25	02/11/2016 03:40
<input type="checkbox"/> ABANO - R2	DG0013803285R2	Veneto	TRI	MANE	20000	10.213.133.26	02/11/2016 01:34
<input type="checkbox"/> ...	...	...	...	...	...	...	02/11/2016

fig. 6 Example of interactive tables with user selectable rows.

Identificazione

Nome:

Descrizione:

Codice Installazione:

Codice Sezione Sbarra:

Apparato di Misura (AdM):

Prefisso file di misura:

Indirizzo Ip:

Parametri di Base

Geographical Region:

DTR:

Macroarea:

Tipo Impianto:

Centro Operativo:

Tipo Rete:

Tensione Nominale (Volt):

Stato Neutro:

Codice linea MT:

Nome linea MT:

ADM su MT:

Grappolo:

Costruttore:

Perimetro AdM:

AdM di confine:

Extra Field 8:

Extra Field 9:

» Parametri Anagrafica Estesa

fig. 7 Example of linked web forms and drop-down menus.

#### 4.2 Time intervals selection

Either input HTML forms or interactive calendars may be used.

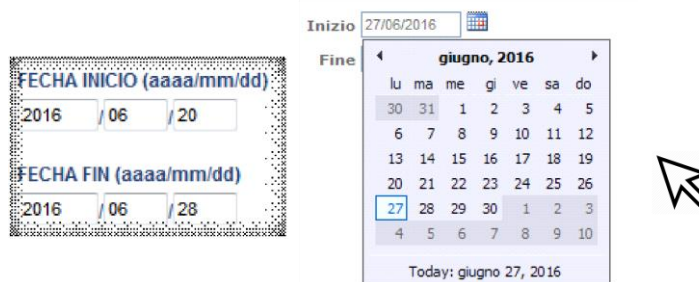


fig. 8 Examples of time interval selection.

#### 4.3 Options selection

One or several options may be selected by using drop-down menus or HTML selection lists.

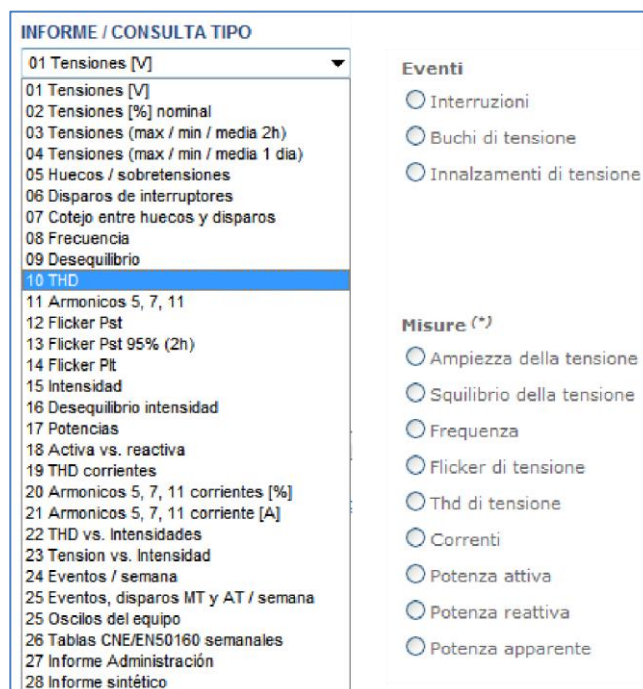
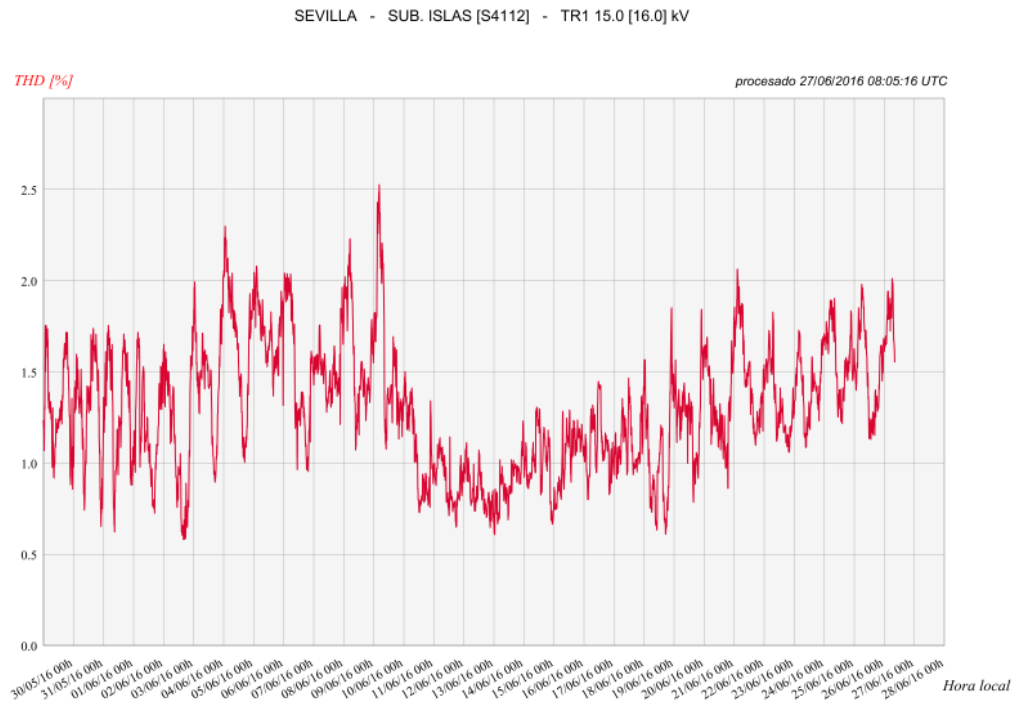


fig. 9 Example of options selection

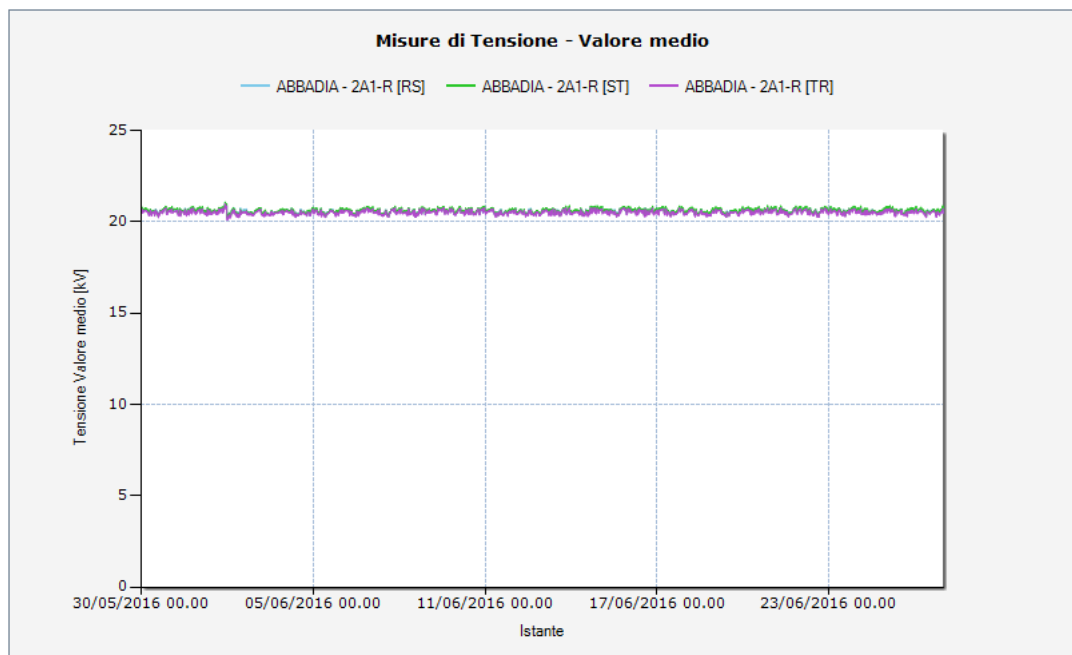
#### 4.4 10-minute trends

Having selected one or several measuring sites, a time interval and one or several 10-minute magnitudes, a chart or table is displayed. X-axis will be associated to timestamps and Y-axis to the 10-

minute magnitudes. Only similar magnitudes will share the same scale. Not comparable magnitudes will have independent vertical scales.



**fig. 10 Example of 10-minute trend (THD).**



**fig. 11 Example of 10-minute trend (average voltages).**

Hora local	THD [%]
30/05/2016 0:00	1,24
30/05/2016 0:10	1,2
30/05/2016 0:20	1,23
30/05/2016 0:30	1,07
30/05/2016 0:40	1,17
30/05/2016 0:50	1,32
30/05/2016 1:00	1,29
30/05/2016 1:10	1,51
30/05/2016 1:20	1,69
30/05/2016 1:30	1,75
30/05/2016 1:40	1,5
30/05/2016 1:50	1,64
30/05/2016 2:00	1,58
30/05/2016 2:10	1,75
30/05/2016 2:20	1,69
30/05/2016 2:30	1,7
30/05/2016 2:40	1,65
30/05/2016 2:50	1,72
30/05/2016 3:00	1,64
30/05/2016 3:10	1,74
30/05/2016 3:20	1,67
30/05/2016 3:30	1,68
30/05/2016 3:40	1,47

fig. 12 Example - tabular view of a 10-minute trend.

#### 4.5 Power Quality events

Having selected one or several measuring sites, a time interval and one or several PQ event types according to GSTQ003, an output chart or table may be selected. The result shall be selected among these options:

- Enumerated list of events with associated attributes (timestamp, duration, depth, phases, root origin at HV or MV).
- Table with SARFI-X indices (see IEC TS 62749 for further explanation).
- Magnitude-duration tables according to national regulations, IEC TS 62749, EN 50160 and/or IEC 61000-4-11 immunity classes.
- Magnitude-duration charts.

Several examples are depicted below:

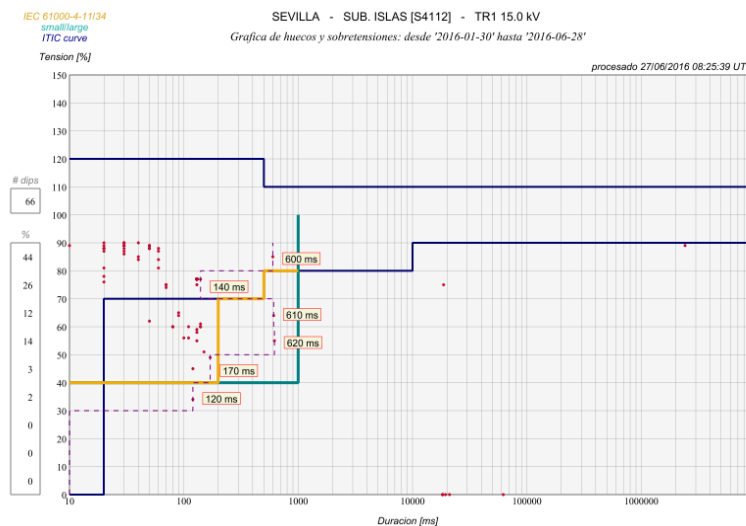


fig. 13 Example of magnitude-duration chart

Buchi di Tensione								
Tensione Residua %Vn	Durata t						Totali	
	50÷100 ms	100÷150 ms	150÷300 ms	300÷500 ms	0,5÷1 s	1÷60 s	Totale	Totale/Sito
80÷90	2	0	0	0	0	0	2	2,00
70÷80	0	1	0	0	0	0	1	1,00
60÷70	0	0	0	0	0	0	0	0,00
50÷60	0	0	0	0	0	0	0	0,00
40÷50	0	0	0	0	0	0	0	0,00
30÷40	0	0	0	0	0	0	0	0,00
20÷30	0	0	0	0	0	0	0	0,00
10÷20	0	1	0	0	0	0	1	1,00
5÷10	0	0	0	0	0	0	0	0,00
<b>Totale</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4,00</b>
<b>Totale/Sito</b>	<b>2,00</b>	<b>2,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>4,00</b>	<b>4,00</b>

Buchi di Tensione (EN50160: 2011-05)							
Tensione Residua %Vn	Durata t					Totali	
	10≤ t ≤200 ms	200< t ≤500 ms	0,5< t ≤1 s	1< t ≤5 s	5< t ≤60 s	Totale	Totale/Sito
80≤ Vn <90	2	0	0	0	0	2	2,00
70≤ Vn <80	1	0	0	0	0	1	1,00
40≤ Vn <70	0	0	0	0	0	0	0,00
5≤ Vn <40	1	0	0	0	0	1	1,00
Vn <5	0	0	0	0	0	0	0,00
<b>Totale</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4,00</b>
<b>Totale/Sito</b>	<b>4,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>4,00</b>	<b>4,00</b>

Tensione residua[%]	Durata[ms]						
	10÷200	200÷500	500÷1000	1000÷5000	5000÷60000	60000÷180000	180000
90÷80	14,04	5,55	0,33	0,37	0,00	0,00	0,06
80÷70	6,78	4,55	0,20	0,39	0,00	0,00	0,06
70÷40	7,18	2,18	0,08	0,27	0,00	0,00	0,00
40÷5	1,55	0,33	0,08	0,00	0,00	0,00	0,00
5÷0	0,00	0,04	0,00	0,00	0,04	0,00	0,08

fig. 14 Example of magnitude-duration tables.

Start	End	Duration [ms]	Type	Phases	Voltage [%]
2016-02-01 07:51:01.402	2016-02-01 07:51:01.423	20	dip	A	90
2016-02-03 01:38:54.990	2016-02-03 01:38:55.020	30	dip	AB	90
2016-02-06 00:59:26.306	2016-02-06 00:59:26.336	30	dip	AC	89
2016-02-08 20:11:42.741	2016-02-08 20:11:42.771	30	dip	A	89
2016-02-10 22:00:17.268	2016-02-10 22:00:17.298	30	dip	A	90
2016-02-11 11:28:31.520	2016-02-11 11:28:31.687	170	dip	ABC	49
2016-02-12 19:39:51.286	2016-02-12 19:39:51.426	140	dip	ABC	60
2016-02-12 19:40:51.659	2016-02-12 19:40:51.679	20	dip	AB	87
2016-02-12 19:40:52.578	2016-02-12 19:40:52.725	150	dip	ABC	51
2016-02-12 19:44:34.507	2016-02-12 19:44:34.537	30	dip	AC	88
2016-02-13 00:40:01.620	2016-02-13 00:40:01.760	140	dip	ABC	61
2016-02-13 11:04:36.967	2016-02-13 11:04:37.110	140	dip	ABC	60
2016-02-14 13:04:03.411	2016-02-14 13:04:03.541	130	dip	AC	77
2016-02-14 13:10:16.148	2016-02-14 13:10:16.278	130	dip	AC	77

fig. 15 Example of detailed list of events.



If any event has an associated waveform, a direct link can displayed in the tabular view. This link will redirect either to pop-up window with an interactive chart, a PDF file or a compressed zip file with the waveform capture in COMTRADE format.

This list may be expanded by correlating each PQ event with network or weather events according to GSTQ005. Geographical and temporal distance between events shall be included in the output.

Next table shows a typical example of correlated voltage dips with both network faults and lightning strikes:

Inicio (hora local)	Fin (hora local)	Duración [ms]	Tipo	Fases	vmin/max [%]	Rayo [kA]	Proximidad [km]	Subestación	Elemento/Línea	kV	Distancia [km]
2008-02-17 17:12:12.180	2008-02-17 17:12:13.300	1120	hnecco	ABC	18	-28		4 SUB. CHICLANA	PUERTO REAL	66	0
								SUB. CHICLANA	CARTUJA	66	0
								SUB. CARTUJA	CHICLANA	66	23

fig. 16 Example of correlation between PQ, SW and WEATHER events

Each event may link to a map according to 4.5 Power Quality events.

#### 4.6 Events maps

Having selected a geographic area or a set of measuring points, a time interval and one or several PQ/SWITCHES/WEATHER event types, a map is displayed with specific icons for each type.

Typically there will different icons for voltage dips, overvoltages, interruptions, openings of switching elements and lightning strikes. Each icon may show a pop-up window with additional information about the event.

Next map shows a typical map for a timespan of 1 hour:

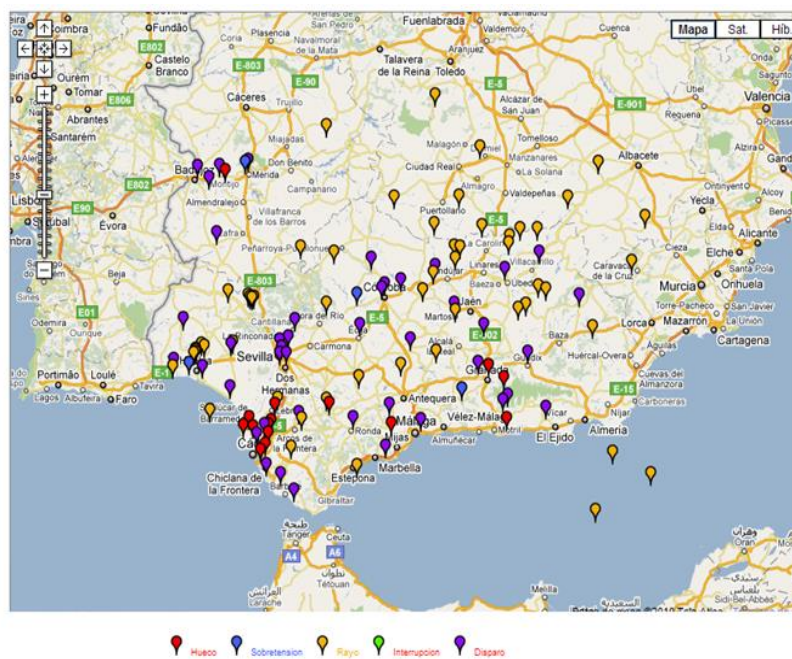


fig. 17 Example of events map.

In order to find out the spread of a particular PQ events across a region, the events map can be centered around a PQ event with a very reduced timespan (e.g. 5 seconds). This view is rather useful for labeling the voltage dips and finding the root cause (a lightning strike and/or network fault):

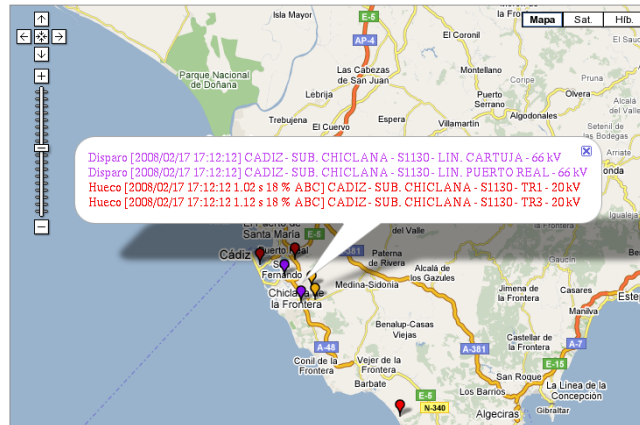


fig. 18 Example of events map around a voltage dip.

#### 4.7 Weather magnitude trends

Having selected one or few weather stations, a time interval and one or several weather magnitudes, a chart or table is displayed. Next follows a typical example both as a chart and a table:

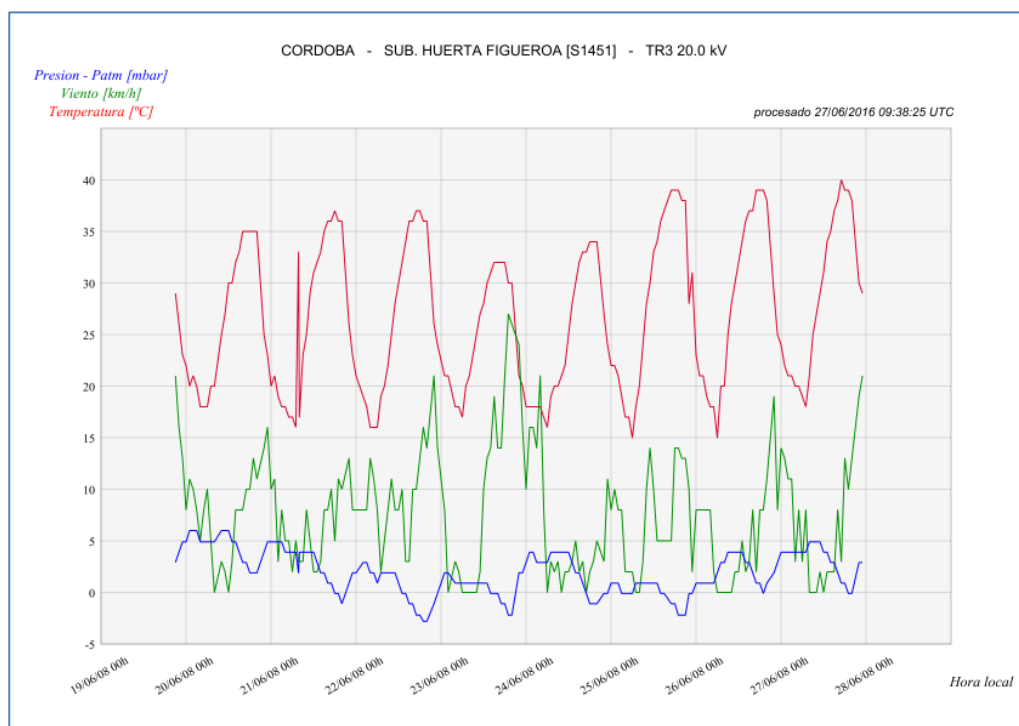


fig. 19 Example of weather trend.

Time	Temperature [°C]	Wind speed [m/s]	Pressure [mbar]
19/06/2008 21:00	29	5,83	1002,90
19/06/2008 22:00	26	4,44	1003,90
19/06/2008 23:00	23	3,61	1004,90
20/06/2008 0:00	22	2,22	1004,90
20/06/2008 1:00	20	3,08	1006,00
20/06/2008 2:00	21	2,78	1006,00
20/06/2008 3:00	20	2,22	1006,00
20/06/2008 4:00	18	1,39	1004,90
20/06/2008 5:00	18	2,22	1004,90
20/06/2008 6:00	18	2,78	1004,90
20/06/2008 7:00	20	1,39	1004,90
20/06/2008 8:00	20	0,00	1004,90
20/06/2008 10:00	25	0,83	1006,00
20/06/2008 11:00	27	0,56	1006,00
20/06/2008 12:00	30	0,00	1006,00
20/06/2008 13:00	30	0,83	1004,90
20/06/2008 14:00	32	2,22	1004,90
20/06/2008 15:00	33	2,22	1003,90
20/06/2008 16:00	35	2,22	1002,90
20/06/2008 17:00	35	2,78	1002,90
20/06/2008 18:00	35	2,78	1001,90
20/06/2008 19:00	35	3,61	1001,90
20/06/2008 20:00	35	3,06	1001,90
20/06/2008 22:00	25	3,69	1003,90
20/06/2008 23:00	23	4,44	1004,90
21/06/2008 0:00	20	2,78	1004,90
21/06/2008 1:00	21	3,06	1004,90
21/06/2008 2:00	19	0,83	1004,90
21/06/2008 3:00	18	2,22	1004,90
21/06/2008 4:00	18	1,39	1003,90
21/06/2008 5:00	17	1,39	1003,90
21/06/2008 6:00	17	0,56	1003,90
21/06/2008 7:00	16	1,39	1003,90
21/06/2008 7:45	33	0,83	1001,90
21/06/2008 8:00	17	0,83	1003,90
21/06/2008 9:00	23	0,83	1003,90
21/06/2008 10:00	25	2,22	1003,90

fig. 20 Example of weather trend in tabular view.

#### 4.8 Alarms and warnings from PQIs

Having selected one, several or all measuring sites and a time interval, an output chart or table may be selected. The result shall be show these allarms:

- PQIs no able to send the data for a predetermined period;
- PQIs no able to GPS synchronization for a predetermined period;
- PQIs missed a predetermined number of measure samples;
- PQIs detecting an anomalous number of events to respect the historical trend;
- PQIs detecting events characteristics (e. g. duration, residual voltage) greater/smaller than a predetermined value;
- PQIs detecting events characteristics (e. g. duration, residual voltage) incongruous with threshold values (eg. for wrong nominal voltage setting);
- PQIs delaying in sending raw measurement files for a predetermined period;
- PQIs sending incongruous data about the same grid event (by including the case of 2 PQI that are monitoring the same grid protection);
- Inconsistency between periodic average values out of range and events.


Next follows a typical example:

Allarmi e Segnalazioni

Intervallo: libero | Inizio: 02/05/2016 | Fine: 15/05/2016

Funzione: Tutte | Processo: Tutti

Contenuto:  Richiesta elaborazione

 Excel

ID	Istante	Funzione	Processo	Segnalazione
10657672	09/05/2016 10.07.26	Genesis		There are no DIPS to handle for voltage level AT = 1 and zone = 1
10657678	09/05/2016 10.07.27	Genesis		There are no DIPS to handle for voltage level AT = 1 and zone = 2
10657673	09/05/2016 10.07.27	Genesis		There are no DIPS to handle for voltage level AT = 3 and zone = 1
10657674	09/05/2016 10.07.27	Genesis		There are no DIPS to handle for voltage level AT = 4 and zone = 1
10657675	09/05/2016 10.07.27	Genesis		There are no DIPS to handle for voltage level AT = 5 and zone = 1
10657677	09/05/2016 10.07.27	Genesis		There are no DIPS to handle for voltage level AT = 8 and zone = 1
10657676	09/05/2016 10.07.27	Genesis		There are no DIPS to handle for voltage level AT = 6 and zone = 1

fig. 21 Example of alarms and warnings.

## 5 DATA REPORTING

During the tender phase all or few of the following enumerated functions shall be chosen.

### 5.1 One-site PQ compliance report

Having selected a site, a time interval and a reference standard (either EN 50160, IEC TS 62749 or any other regulation in force), a PDF document is generated for checking compliance.

For example, for both EN 50160 and IEC TS 62749 these are the magnitudes to be checked per week (either by extreme or percentile 10-minute values):

- Voltage.
- Unbalance.
- Frequency.
- Harmonics up to 25<sup>th</sup>.
- Flicker P<sub>It</sub>.

Nevertheless, several national regulation requires additional topics, for example:

- Harmonics up to 50<sup>th</sup> order.
- Flicker P<sub>st</sub>.
- Total Demand Distorsion (TDD).

For voltage events tabular views as in 4.5 Power Quality events shall be displayed.

Thus a typical compliance report may be as simple as the following example:

EN50160 COMPLIANCE REPORT						
Site: PIPERA, Week #1 (12/30/2015 04:58:41,0 to 01/06/2016 04:58:41,0)						
Nominal Voltage (Un) = 20000 V						
<b>Power Frequency</b>						
<b>Range</b>	<b>Threshold</b>	<b>Compliance</b>				
50 Hz +1%/-1%	99.5%	100.0%				PASSED
50 Hz +4%/-6%	100.0%	100.0%				PASSED
<b>Supply Voltage Variations</b>						
<b>Range</b>	<b>Threshold</b>	<b>Compliance:</b>	<b>CHA</b>	<b>CHB</b>	<b>CHC</b>	
20000 V +10%/-10%	95.0%	100.0%	100.0%	100.0%	100.0%	PASSED
20000 V +10%/-15%	100.0%	100.0%	100.0%	100.0%	100.0%	PASSED
<b>Flicker</b>						
<b>Range</b>	<b>Threshold</b>	<b>Compliance:</b>	<b>CHA</b>	<b>CHB</b>	<b>CHC</b>	
<1	95.0%	100.0%	100.0%	100.0%	100.0%	PASSED
<b>Supply Voltage Unbalance</b>						
<b>Range</b>	<b>Threshold</b>	<b>Compliance</b>				
0-2%	95.0%	100.0%				PASSED
<b>Harmonics</b>						
All shown figures are 95% values						
	<b>Limit(% of Un)</b>	<b>A</b>	<b>B</b>	<b>C</b>		<b>Status</b>
THD	<8.00%	2.26%	2.33%	2.40%		PASSED
H02	<2.00%	0.03%	0.03%	0.03%		PASSED
H03	<5.00%	0.18%	0.28%	0.32%		PASSED
H04	<1.00%	0.03%	0.02%	0.02%		PASSED
H05	<6.00%	2.05%	2.17%	2.23%		PASSED
H06	<0.50%	0.02%	0.02%	0.01%		PASSED
H07	<5.00%	0.95%	0.88%	0.81%		PASSED
H08	<0.50%	0.02%	0.00%	0.01%		PASSED
H09	<1.50%	0.05%	0.08%	0.08%		PASSED
H10	<0.50%	0.02%	0.00%	0.00%		PASSED
H11	<3.50%	0.51%	0.47%	0.51%		PASSED
H12	<0.50%	0.02%	0.00%	0.00%		PASSED
H13	<3.00%	0.17%	0.20%	0.24%		PASSED
H14	<0.50%	0.01%	0.00%	0.00%		PASSED
H15	<0.50%	0.03%	0.03%	0.02%		PASSED
H16	<0.50%	0.01%	0.00%	0.00%		PASSED
H17	<2.00%	0.07%	0.07%	0.08%		PASSED
H18	<0.50%	0.01%	0.00%	0.00%		PASSED
H19	<1.50%	0.05%	0.07%	0.06%		PASSED
H20	<0.50%	0.02%	0.00%	0.00%		PASSED
H21	<0.50%	0.02%	0.02%	0.04%		PASSED
H22	<0.50%	0.02%	0.00%	0.00%		PASSED
H23	<1.50%	0.08%	0.09%	0.08%		PASSED
H24	<0.50%	0.02%	0.00%	0.00%		PASSED
H25	<1.50%	0.06%	0.07%	0.05%		PASSED

fig. 22 Example of compliance report according to EN 50160 for a single site.

Buchi di Tensione								Totale	Totale/Sito
Tensione Residua %Vn	Durata t						Totale	Totale/Sito	
	50÷100 ms	100÷150 ms	150÷300 ms	300÷500 ms	0.5÷1 s	1÷60 s			
80÷90	2	0	0	0	0	0	2	2,00	
70÷80	0	1	0	0	0	0	1	1,00	
60÷70	0	0	0	0	0	0	0	0,00	
50÷60	0	0	0	0	0	0	0	0,00	
40÷50	0	0	0	0	0	0	0	0,00	
30÷40	0	0	0	0	0	0	0	0,00	
20÷30	0	0	0	0	0	0	0	0,00	
10÷20	0	1	0	0	0	0	1	1,00	
5÷10	0	0	0	0	0	0	0	0,00	
<b>Totale</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4,00</b>	
<b>Totale/Sito</b>	<b>2,00</b>	<b>2,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>4,00</b>	<b>4,00</b>	

Buchi di Tensione (EN50160: 2011-05)								Totale	Totale/Sito
Tensione Residua %Vn	Durata t					Totale	Totale/Sito		
	10≤ t ≤200 ms	200< t ≤500 ms	0.5< t ≤1 s	1< t ≤5 s	5< t ≤60 s				
80≤ Vn <90	2	0	0	0	0	2	2,00		
70≤ Vn <80	1	0	0	0	0	1	1,00		
40≤ Vn <70	0	0	0	0	0	0	0,00		
5≤ Vn <40	1	0	0	0	0	1	1,00		
Vn <5	0	0	0	0	0	0	0,00		
<b>Totale</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4,00</b>		
<b>Totale/Sito</b>	<b>4,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>4,00</b>	<b>4,00</b>		

fig. 23 (cont.) Example of compliance report according to EN 50160.

Information can also be displayed as one or several tables (for each week a compliance row is displayed):

Semana del	Huecos	Interrupciones	Pequeños	Dentro IEC
2016-05-23	0	0	0	0
2016-05-30	0	0	0	0
2016-06-06	0	0	0	0
2016-06-13	3	0	3	3

Cuadro 1.1: Huecos, sobretensiones e interrupciones por semana.

Semana del	Percentil 5 %	Percentil 95 %	Mínimo	Máximo	Promedio	Fuera ±7 % [min]
2016-05-23	107.14	105.67	105.34	107.42	106.4	1210
2016-05-30	107.22	105.68	105.36	107.53	106.44	1570
2016-06-06	107.25	105.65	105.31	107.47	106.44	1580
2016-06-13	107.2	105.64	105.36	107.58	106.43	1340

Cuadro 1.2: Tensiones [%] en cada periodo semanal.

Semana del	Percentil 95 %	Mínimo	Máximo	Promedio	Tiempo >8 % [min]
2016-05-23	1.5	0.48	1.8	0.88	0
2016-05-30	1.39	0.7	1.72	1.08	0
2016-06-06	1.42	0.61	1.88	1.04	0
2016-06-13	1.47	0.56	1.67	1.09	0

Cuadro 1.3: Distorsión armónica [%] en cada periodo semanal.

Semana del	Percentil 95 %	Mínimo	Máximo	Promedio	Tiempo >2 % [min]
2016-05-23	0.7	0.31	0.8	0.53	0
2016-05-30	0.67	0.29	0.79	0.5	0
2016-06-06	0.66	0.26	0.79	0.51	0
2016-06-13	0.67	0.31	0.78	0.5	0

Cuadro 1.4: Desequilibrio [%] en cada periodo semanal.

Semana del	Percentil 95 %	Mínimo	Máximo	Promedio	Tiempo >1 [h]
2016-05-23	0.57	0.12	0.62	0.44	0
2016-05-30	0.48	0.12	0.55	0.37	0
2016-06-06	0.46	0.17	0.55	0.34	0
2016-06-13	0.47	0.14	0.51	0.34	0

Cuadro 1.5: Flicker de larga duración en cada periodo semanal.

fig. 24 Example of compliance report for a single site (red color for non-compliances).

## 5.2 Several-sites PQ compliance report

The main goal of this view is to show those sites exceeding a specific level of disturbance level. Having selected a geographic area or a set of measuring points, a time interval and several indices and their allowed limits, a list of sites exceeding limits per week is displayed.

The input form must allow to select at least one of the following items:

- Voltage outside standard limits (e.g. EN 50160): seconds or % of a week.
- Frequency outside limits: seconds or % of a week.
- Unbalance 95% percentile over a certain limit.
- $P_{It}$  95% percentile over a certain limit.
- $P_{St}$  95% percentile over a certain limit.
- Number of rapid voltage changes above a threshold.
- Number of interruptions above a threshold and duration.
- Number of voltage dips above a residual voltage and duration.
- Number of overvoltages above a residual voltage and duration.
- THD 95% percentile over a certain limit.
- A specific harmonic order above a threshold (95% percentile).

The following picture shows an example of a form with almost all the aforementioned items:

Misura	Limite max.	Filtro di selezione siti
<input type="checkbox"/> Ampiezza della tensione fuori dal $\pm 10\%$ $V_n$ per un tempo superiore al limite (%) e nessun valore della tensione fuori dal $\pm 15\% V_n$	1	<input checked="" type="checkbox"/> Geographical Region
<input type="checkbox"/> Frequenza fuori dal $\pm 0.1$ Hz per un tempo superiore al limite (%)	5	<input checked="" type="checkbox"/> DTR
<input type="checkbox"/> Squilibrio di tensione, 95° percentile	2	<input checked="" type="checkbox"/> Macroarea
<input type="checkbox"/> Flicker PLT, 95° percentile	1	<input checked="" type="checkbox"/> Tipo Impianto
<input type="checkbox"/> Flicker PST, 95° percentile	1	<input checked="" type="checkbox"/> Centro Operativo
<input type="checkbox"/> Numero di Variazioni Rapide	10	<input checked="" type="checkbox"/> Tipo Rete
<input type="checkbox"/> Numero di Interruzioni Brevi	3	<input checked="" type="checkbox"/> Tensione Nominale (Volt)
<input type="checkbox"/> Numero di Interruzioni Lunghe	0	<input checked="" type="checkbox"/> Stato Neutro
<input type="checkbox"/> Numero di Buchi di Tensione	25	<input checked="" type="checkbox"/> ADM su MT
<input type="checkbox"/> Numero di Sovraelongazioni di Tensione	5	<input checked="" type="checkbox"/> Grappolo
<input type="checkbox"/> THD di tensione, 95° percentile	8	<input checked="" type="checkbox"/> Costruttore
		<input checked="" type="checkbox"/> Perimetro AdM
		<input checked="" type="checkbox"/> AdM di confine

Intervallo	libero	Inizio	20/06/2016
		Fine	20/06/2016

fig. 25 Example of an input form for checking compliance.

## 5.3 Several-sites PQ ranking report

Having selected a geographic area or a set of measuring points, a time interval and several indices, sites are sorted in descending order according to their highest indexes values. Output format shall be HTML or PDF.

Next follows an example for the THD index:

Continuación de la tabla - Ranking de puntos de medida: THD [%] CP95 %

Grupo	Tensión [kV]	Punto medida	Elemento	THD [%] CP95 %
BADAJOS	20.0	SUB. BALBOA	TR5	3.53
CADIZ	15.0	SUB. MENACHA	TR1	3.43
CADIZ	15.0	SUB. SAN ROQUE	TR2	3.39
TENERIFE	20.0	SUB. LOS LLANOS	264 NORTE LLANOS	3.35
TENERIFE	20.0	SUB. LOS LLANOS	262 SUR LLANOS	3.34
HUESCA	25.0	SUB. FRAGA	TR1	3.27
SEVILLA	15.0	SUB. CDA P. CAZALLA	TR-S.AUX	3.26
BARCELONA	25.0	SUB. COLBLANC	TR1B	3.26
GRANADA	20.0	SUB. GUADIX	TR2	3.21
JAEN	25.0	SUB. VILLANUEVA ARZOBISPO	TR2	3.16
HUELVA	15.0	SUB. COLON	TR9	3.14
MALAGA	20.0	SUB. TORRE DEL MAR	TR1	3.11
TERUEL	15.0	SUB. PLANDORRA	TR1	3.07
BARCELONA	25.0	SUB. R.CALDES	TR2	3.06
BARCELONA	25.0	SUB. R.CALDES	TR1	3.02
CADIZ	20.0	SUB. SOTOGRAN	TR1	3.01
BARCELONA	25.0	SUB. MOGENT	TR2	3.01
MALAGA	20.0	SUB. SAN RAFAEL	TR2	2.98
ZARAGOZA	15.0	SUB. BORJA	TR1	2.97
LAS PALMAS	20.0	SUB. ALDEA BLANCA	TR1	2.96
BARCELONA	25.0	SUB. LAGELTRU	TR3	2.94
CADIZ	15.0	SUB. VALENCIANA	TR2	2.91

Continúa en la página siguiente

fig. 26 Example of a rankings report.

#### 5.4 Faulty AVRs report

Having selected a geographic area or a set of measuring points a a time interval above 1 week, it displays likely candidates with faulty automatic voltage regulators (AVR). The algorithm is described in GSTQ005.

The report will display the highest voltage dispersion and will include links to voltage charts. Next picture shows an example of such report:

Posibles reguladores de tension defectuosos								
Provincia	Subestacion/CT	Medida	kV	Inc tension [%]	Inc tension [V]	Curva de tensiones	Envolvente [2h]	Min/med/max diarios
HUELVA	SUB. COLON	TR9	15.0	19.0	2809.0			
GRANADA	SUB. ORGIVA	TR1	20.0	17.0	3523.0			
GRANADA	SUB. ORGIVA	TR6	20.0	16.0	3308.0			
GRANADA	SUB. SAN ANTONIO	TR3	20.0	9.0	1752.0			
BADAJOS	SUB. FUENTE DE CANTOS	TR2	15.0	8.0	1313.0			
SEVILLA	SUB. ALCOLEA DEL RIO	TR3	15.0	7.0	1189.0			
ALMERIA	SUB. ENIX	TR1	20.0	7.0	1531.0			
CADIZ	SUB. VILLAMARTIN	TR3	20.0	7.0	1353.0			
BADAJOS	SUB. PROSERPINA	TR1	15.0	7.0	1095.0			
TENERIFE	SUB. GUIA ISORA	TR2	20.0	6.0	1256.0			

fig. 27 Example of a report of faulty AVRs.

### 5.5 Massive extraction

The main goal of this function is the extraction of anagraphic and events data in small time, with asincronized request.

Having selected a geographic area or a set of measuring points, a time interval, the type of request (anagraphic or the single type of events according with GSTQ001 and GSTQ002) and several indices, the user send a request of elaboration.

Next picture shows an example of such request:

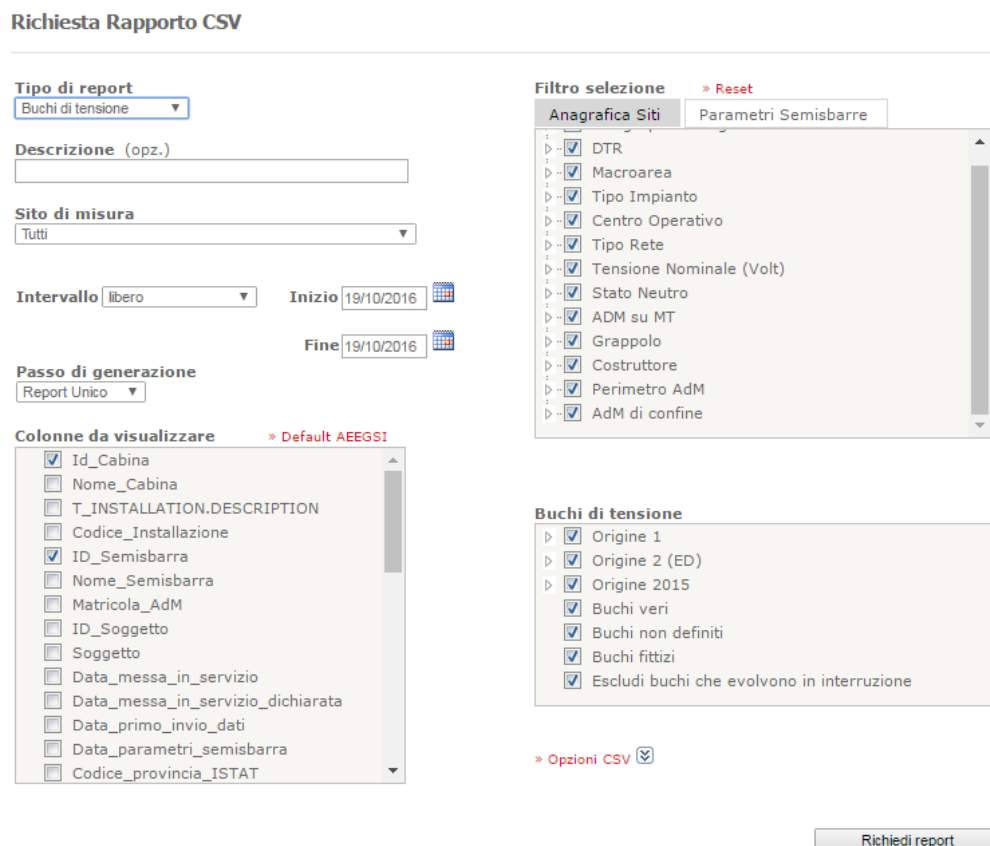


fig. 28 Example of an input form for massive extraction.

After the elaboration of the PQDW, the result shall be show in another window, where it's possible to download the resulting file of elaboration. Output format shall be CSV.

Next picture shows an example of such download window:

Report totali: 2

»Elimina (Nota: i rapporti CSV sono automaticamente cancellati dopo 2 giorni.)


	Scarica Report	ID	Tipo	Descrizione	Data	Stato	Messaggio	Creato da	Nomefile
<input type="checkbox"/>		460	Buchi di Tensione		19/10/2016 08.28.58	OK		PQ_Riva	E-435-161019082858-ED.csv
<input type="checkbox"/>		459	Buchi di Tensione		18/10/2016 10.13.41	OK		PQ_Riva	E-435-161018101341-ED.csv

fig. 29 Example of an output for massive extraction.



## 5.6 Alarms/warnings report

Having selected a geographic area or a set of measuring points, a time interval and several indices, sites with alarms are sort for type of alarm/warning. Output format shall be HTML or PDF or CSV.

Next follows an example for the GPS Synchronization Failure:

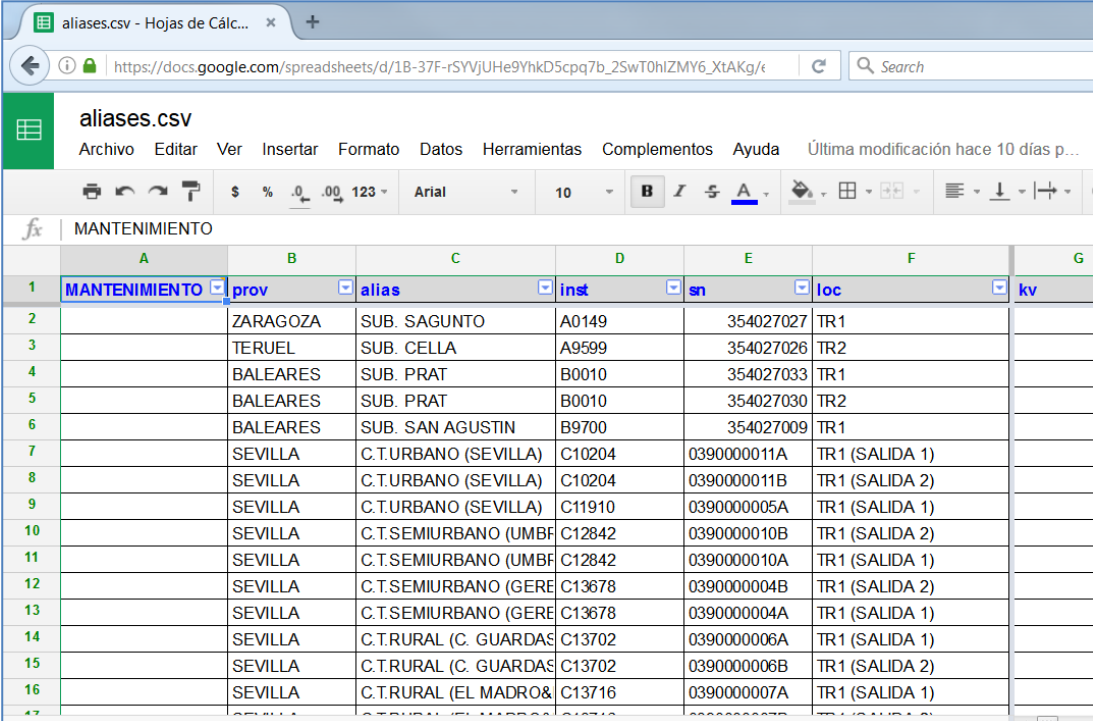
Dettaglio Eventi di Sistema				
Progressivo	Sito	Istante	Descrizione	Valido
1	S.P.D'ORZIO - R1	17/10/2016 02.03.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
2	S.P.D'ORZIO - V1	17/10/2016 02.03.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
3	CASTELFRANCO EMILIA - RO	17/10/2016 02.04.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
4	CASTELFRANCO EMILIA - VE	17/10/2016 02.04.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
5	MELFI - RO	17/10/2016 02.04.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
6	MELFI - VE	17/10/2016 02.04.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
7	SAVONA - RB	17/10/2016 02.05.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
8	VILLA DI SE. - R1	17/10/2016 02.05.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
9	SEZZE - BV	17/10/2016 02.06.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
10	VILLA DI SE. - V2	17/10/2016 02.06.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
11	SEZZE - BR	17/10/2016 02.07.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
12	S.P.D'ORZIO - R1	17/10/2016 02.08.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
13	S.P.D'ORZIO - V1	17/10/2016 02.08.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
14	COTIGNOLA - RO	17/10/2016 02.09.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>
15	COTIGNOLA - VE	17/10/2016 02.09.00,00	Errore Sincronizzazione GPS	<input checked="" type="checkbox"/>

fig. 30 Example of an alarms/warnings report.

## 6 DATA ENTRY AND ADMINISTRATION

This functionality will be in charge of updating the META DB database. Few examples on how to accomplish this task are enumerated:

- Issuing SQL commands through the REST API or basic web forms.
- Importing CSV tables through a basic web form.
- Online edition of tables/worksheets through a rich web interface (e.g. Google Sheets, as shown next).



MANTENIMIENTO							
	A	B	C	D	E	F	G
1	MANTENIMIENTO	prov	alias	inst	sn	loc	kv
2		ZARAGOZA	SUB. SAGUNTO	A0149	354027027	TR1	
3		TERUEL	SUB. CELLA	A9599	354027026	TR2	
4		BALEARES	SUB. PRAT	B0010	354027033	TR1	
5		BALEARES	SUB. PRAT	B0010	354027030	TR2	
6		BALEARES	SUB. SAN AGUSTIN	B9700	354027009	TR1	
7		SEVILLA	C.T.URBANO (SEVILLA)	C10204	0390000011A	TR1 (SALIDA 1)	
8		SEVILLA	C.T.URBANO (SEVILLA)	C10204	0390000011B	TR1 (SALIDA 2)	
9		SEVILLA	C.T.URBANO (SEVILLA)	C11910	0390000005A	TR1 (SALIDA 1)	
10		SEVILLA	C.T.SEMIURBANO (UMBF)	C12842	0390000010B	TR1 (SALIDA 2)	
11		SEVILLA	C.T.SEMIURBANO (UMBF)	C12842	0390000010A	TR1 (SALIDA 1)	
12		SEVILLA	C.T.SEMIURBANO (GERE)	C13678	0390000004B	TR1 (SALIDA 2)	
13		SEVILLA	C.T.SEMIURBANO (GERE)	C13678	0390000004A	TR1 (SALIDA 1)	
14		SEVILLA	C.T.RURAL (C. GUARDAS)	C13702	0390000006A	TR1 (SALIDA 1)	
15		SEVILLA	C.T.RURAL (C. GUARDAS)	C13702	0390000006B	TR1 (SALIDA 2)	
16		SEVILLA	C.T.RURAL (EL MADRO&	C13716	0390000007A	TR1 (SALIDA 1)	

fig. 31 Example of online edition of tables.

Another choice is by using interactive tables with user selectable rows, drop-down menus and linked web forms. This method is depicted in the next sections. During the tender phase all or few of the following enumerated functions shall be chosen.

### 6.1 Configuration of metadata

The configuration of metadata can be divided in two type:

1. User configuration.
2. PQI configuration.

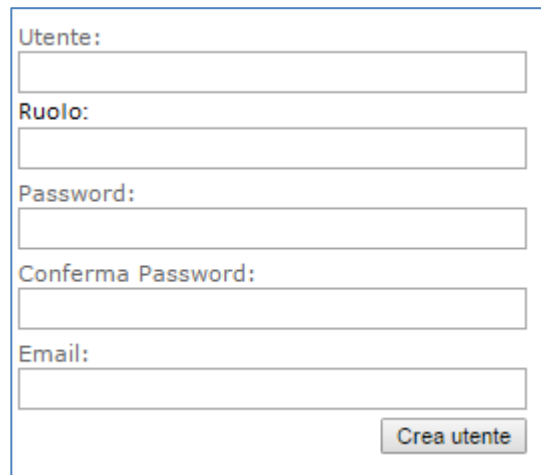
In the User configuration shall be present the following set of data:

- Username.
- Password.
- Role of user: user / Superuser / Administrator.

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- E-Mail.

Next follows an example for the User Configuration:



The screenshot shows a user configuration window with the following fields and a button:

- Utente:
- Ruolo:
- Password:
- Conferma Password:
- Email:
- 

**fig. 32 Example of an user configuration window.**

At least the following information shall be made available:

- PQI name.
- Communication system.
- PQI code.
- Serial number.
- PQI filename.
- IP addresses.
- Geographical region.
- Any territorial division by according to the company organization and country administrative organization.
- Installation type.
- Operative center.
- Grid type.
- Nominal voltage.
- State of neutral connection.
- Producer.
- PQI project.
- IMEI Modem (in case of wireless communication).
- IMSI SIM (in case of wireless communication).
- ICCD SIM(in case of wireless communication).
- Number of passive customers.
- Number of active customers.
- Power of passive customers.
- Power of active customers.
- HV nominal voltage.
- Latitude.
- Longitude.
- PQI Digital Input with channel number and type of signal (protection / busbar switch).

Next follows an example for the User Configuration:

**Identificazione**

Nome: 4MANDAMENTI - RO  
 Descrizione: SIM  
 Codice Installazione: DR0013801492RO  
 Codice Sezione Sbarra: 2RO  
 Apparato di Misura (AdM): B111050116  
 Prefisso file di misura: DR0013801492RO  
 Indirizzo Ip: 10.213.130.234

---

**Parametri di Base** » Gestione parametri

Geographical Region: Sicilia  
 DTR: SIC  
 Macroarea: MAS  
 Tipo Impianto: CP  
 Centro Operativo: DR80  
 Tipo Rete: Cavo  
 Tensione Nominale (Volt): 20000  
 Stato Neutro: NC  
 Codice linea MT: non definito  
 Nome linea MT: non definito  
 ADM su MT: No  
 Grappolo: non definito  
 Costruttore: AmperCom  
 Perimetro AdM: 198/11  
 AdM di confine: No  
 Extra Field 8: non definito  
 Extra Field 9: non definito

Abilitato	Canale	Descrizione	Stato d'Allarme	Congiuntore semisbarra
<input type="checkbox"/>	n.ro 1	Non definito	1	Non definito
<input type="checkbox"/>	n.ro 2	Non definito	1	Non definito
<input type="checkbox"/>	n.ro 3	Non definito	1	Non definito
<input type="checkbox"/>	n.ro 4	Non definito	1	Non definito
<input type="checkbox"/>	n.ro 5	Non definito	1	Non definito
<input type="checkbox"/>	n.ro 6	Non definito	1	Non definito
<input type="checkbox"/>	n.ro 7	Non definito	1	Non definito
<input type="checkbox"/>	n.ro 8	Non definito	1	Non definito
<input type="checkbox"/>	n.ro 9	Non definito	1	Non definito
<input type="checkbox"/>	n.ro 10	Non definito	1	Non definito
<input checked="" type="checkbox"/>	n.ro 11	Congiuntore	1	4MANDAMENTI - VE

fig. 33 Example of an user configuration window.

All of this data shall be possible to import/export by CSV or JSON file.

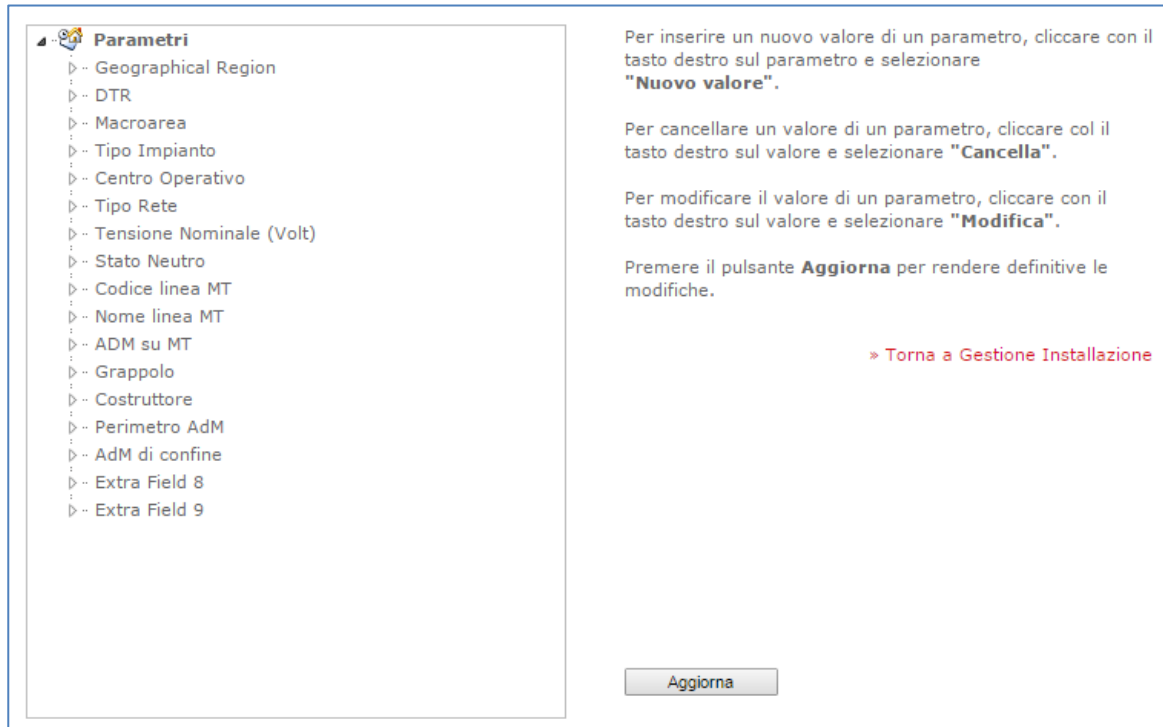
## 6.2 Configuration of parameters

The Administrator shall be able to add/edit/delete the parameters of metadata.

The parameters are all possible data for each type of information of metadata.

Next follows an example for the Parameters configuration:

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**fig. 34 Example of an user configuration window.**

All of this data shall be possible to import/export by CSV/JSON file.

### 6.3 Administration

The Administrator shall be able to enter and manage the following sections:

- User Management:
  - Add/ Edit /Delete User
  - Edit User/PQIs association (each user can display only those PQIs under his responsibility)
- System Management:
  - System status
  - System configuration
  - System Logs

Next follows an example of the Administration windows:

- Gestione profili utenti
- Nuovo utente
- Associazione utenti vs. siti di misura
- Stato sito EDSWeb Pro
- Gestione banner notizie
- Log di sistema

### Utenti registrati in EDSWeb Pro

» Modifica    » Elimina

	Username	Ruolo	Email	Attivo da	Attivo fino a
<input type="checkbox"/>	DD40	Utente	enel@enel.com	10/05/2013	
<input type="checkbox"/>	DD45	SuperUser	enel@enel.com	29/05/2013	
<input type="checkbox"/>	DD80	Utente	enel@enel.com	10/05/2013	
<input type="checkbox"/>	DD85	SuperUser	enel@enel.com	29/05/2013	
<input type="checkbox"/>	DD90	Utente	enel@enel.com	10/05/2013	
<input type="checkbox"/>	DD95	SuperUser	lorenzo.piccardo@enel.com	29/05/2013	
<input type="checkbox"/>	DF20	Utente	enel@enel.com	10/05/2013	
<input type="checkbox"/>	DF25	SuperUser	enel@enel.com	30/05/2013	
<input type="checkbox"/>	DF30	Utente	enel@enel.com	10/05/2013	
<input type="checkbox"/>	DF35	SuperUser	enel@enel.com	30/05/2013	
<input type="checkbox"/>	DF70	Utente	enel@enel.com	10/05/2013	
<input type="checkbox"/>	DF75	SuperUser	enel@enel.com	29/05/2013	
<input type="checkbox"/>	DG40	Utente	enel@enel.com	10/05/2013	
<input type="checkbox"/>	DG45	SuperUser	enel@enel.com	30/05/2013	
<input type="checkbox"/>	DG70	Utente	enel@enel.com	10/05/2013	
<input type="checkbox"/>	DG75	SuperUser	enel@enel.com	30/05/2013	

fig. 35 Example of an user configuration window.

**Utente**  
DD40 [Utente]

Associa siti selezionati

Selezionare nelle caselle di spunta della tabella sottostante i siti che si intende rendere visibili all'utente selezionato e premere il pulsante "Associa siti selezionati" per salvare le impostazioni effettuate.

**Parametri filtro**

- Geographical Region
- DTR
- Macroarea
- Tipo Impianto
- Centro Operativo
- Tipo Rete
- Tensione Nominale (Volt)
- Stato Neutro
- Codice linea MT
- Nome linea MT
- ADM su MT
- Grappolo
- Costruttore

» Applica filtro

**Colonne da visualizzare**

- Descrizione
- AUI
- AdM
- Seed
- Geographical Region
- DTR
- Macroarea
- Tipo Impianto
- Centro Operativo
- Tipo Rete
- Tensione Nominale (Volt)
- Stato Neutro
- Codice linea MT

» Applica selezione

Siti totali: 3558

	Sito	AUI	AdM	Geographical Region	DTR	Macroarea	Tipo Impianto	Centro Operativo	Tipo Rete	Tensione Nominale (Volt)
<input type="checkbox"/>	4MANDAMENTI - RO	DR0013801492RO	B111050116	Sicilia	SIC	MAS	CP	DR80	Cavo	20000
<input type="checkbox"/>	4MANDAMENTI - VE	DR0013801492VE	B111050129	Sicilia	SIC	MAS	CP	DR80	Cavo	20000
<input type="checkbox"/>	4VENTI_20 - B1	DR0013801122B1	B111020005	Sicilia	SIC	MAS	CP	DR80	Cavo	20000
<input type="checkbox"/>	4VENTI_20 - B2	DR0013801122B2	B111020001	Sicilia	SIC	MAS	CP	DR80	Cavo	20000
<input type="checkbox"/>	4VENTI_20 - B3	DR0013801123B3	B1110A0003	Sicilia	SIC	MAS	CP	DR80	Cavo	10000
<input type="checkbox"/>	ABANO - R1	DG0013803285R1	1094141001543	Veneto	TRI	MANE	CP	DG40	Mista	20000
<input type="checkbox"/>	ABANO - R2	DG0013803285R2	1094141001542	Veneto	TRI	MANE	CP	DG40	Mista	20000
<input type="checkbox"/>	ABBADIA - 2A1-R	DH0013802522A1	1094131000759	Marche	ERM	MANE	CP	DH60	Mista	20000
<input type="checkbox"/>	ABBADIA - 2A2 V	DH0013802522A2	1094131000753	Marche	ERM	MANE	CP	DH60	Mista	20000
<input type="checkbox"/>	ABBADIA SAN SALVATORE - RO	DI0013801902RO	B111040073	Toscana	TOU	MAC	CP	DI50	Mista	15000

fig. 36 Example of an user configuration window.