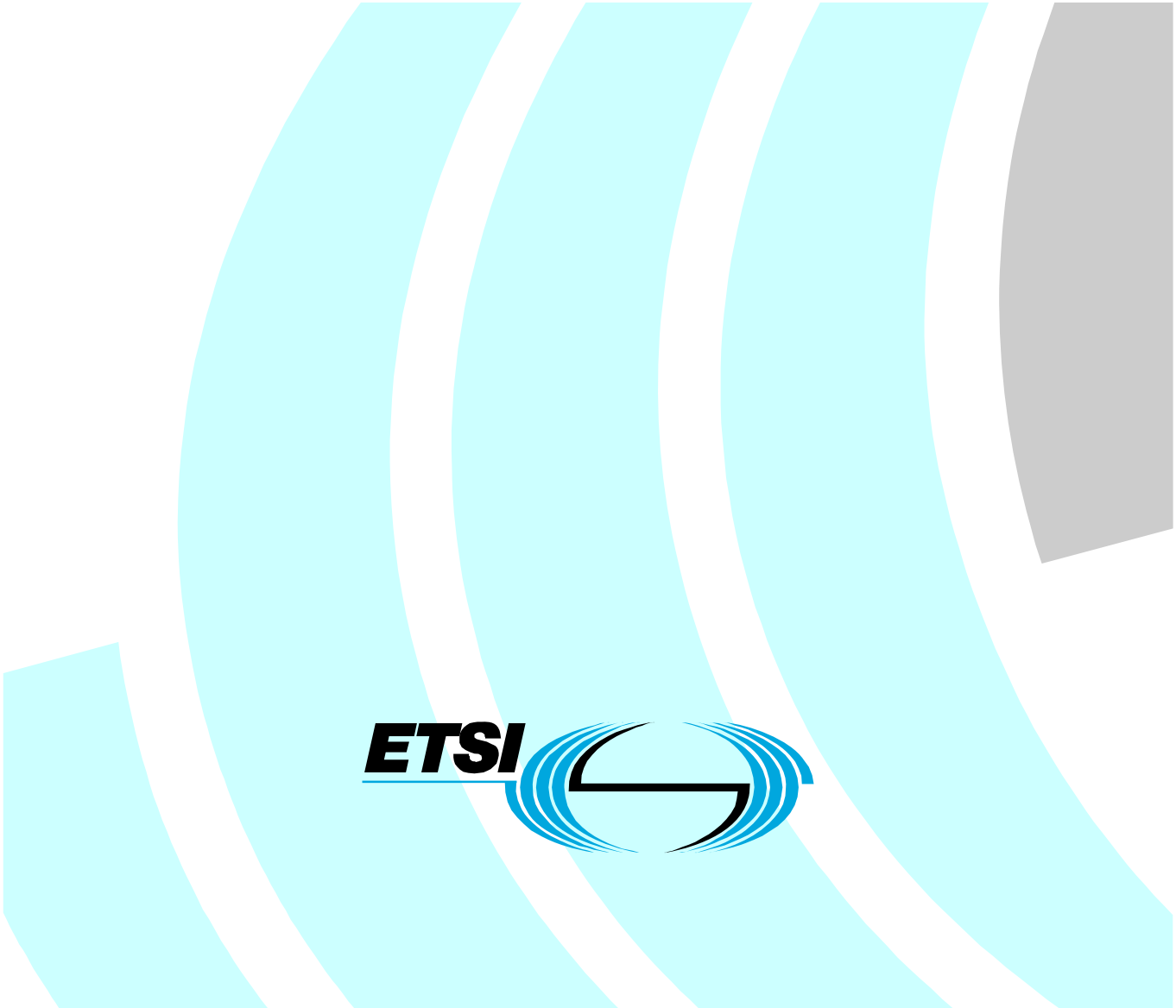
# ETSI ES 202 336-2 V1.1.1 (2009-03)

*ETSI Standard*

**Environmental Engineering (EE);
Monitoring and control interface for infrastructure equipment (Power, Cooling and environment systems used in telecommunication networks);
Part 2: DC power system control and monitoring information model**



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# Contents

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# Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Environmental Engineering (EE).

The present document is part 2 of a multi-part deliverable covering Monitoring and control interface for infrastructure equipment (Power, Cooling and environment systems used in telecommunication networks), as identified below:

Part 1: "Generic Interface";

**Part 2: "DC power system control and monitoring information model";**

Part 3: "AC UPS power system control and monitoring information model";

Part 4: "AC distribution power system control and monitoring information model";

Part 5: "AC diesel back-up generator system control and monitoring information model";

Part 6: "Air conditioning system control and monitoring information model";

Part 7: "Other utilities system control and monitoring information model".

# 1 Scope

The present document applies to monitoring and control of DC power supply systems for telecommunication equipment.

The present document defines:

- The monitored and controlled DC power supply system architectures.
- The minimum set of exchanged information required at the interface, described in "natural language" in text tables.
- The XML files with tags and variables corresponding to the data in the tables.

# 2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
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  - for informative references.

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## 2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI ES 202 336-1: "Environmental Engineering (EE); Monitoring and Control Interface for Infrastructure Equipment (Power, Cooling and Building Environment Systems used in Telecommunication Networks); Part 1: Generic Interface".

[2] ETSI EN 300 132-2: "Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)".

[3] ETSI EN 300 132-3: "Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 3: Operated by rectified current source, alternating current source or direct current source up to 400 V".

[4] ETSI EN 302 099: "Environmental Engineering (EE); Powering of equipment in access network".

## 2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area**.** For non-specific references, the latest version of the referenced document (including any amendments) applies.

[i.1] IEEE 802.1 to 11: "IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture".

[i.2] ISO/IEC 10164 (all parts): "Information technology - Open Systems Interconnection".

[i.3] ISO/IEC 8879:"Information processing - Text and office systems - Standard Generalized Markup Language (SGML)".

[i.4] IEC 60896 (all parts): "Stationary lead-acid batteries".

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

NOTE: Terms referring to energy interface, equipment and distribution are described in power distribution standards EN 300 132-2 [2], EN 300 132-3 [3] for ac and dc interface and EN 302 099 [4] for access network equipment powering.

**alarm:** any information signalling abnormal state, i.e. different to specified normal state of hardware, software, environment condition (temperature, humidity, etc.)

NOTE: The alarm signal should be understood by itself by an operator and should always have at least one severity qualification or codification (colour, level, etc.). Example: rectifier failure, battery low voltage, etc.).

**alarm loop:** electrical loop which open or closed state correspond to alarm start (set) or end (clear) state

**alarm message:** text parts of the alarm structure

**alarm structure:** organized set of information fields in an alarm data frame (time stamp, set/clear, text, etc.)

**battery:** complete arrangement of battery cells or blocks in one string or more in parallel

**battery block:** battery cell (e.g. 2 V for lead-acid) connected and placed in the same container (forming 4 V, 6 V or 12 V blocks)

**battery cell:** basic electrochemical element (e.g. a 2 Vnominal cell for a high capacity lead acid battery)

**battery string:** number of serially interconnected battery blocks or cells

**client post:** any device (laptop, PDA, console, etc.) connected to servers via the operation system networks to perform maintenance or supervision operations

**Control Unit (CU):** integrated unit in an equipment to monitor and control this equipment through sensors and actuators

**Control form Style Sheet (CSS):** simple mechanism for adding style (e.g. fonts, colours, spacing) to Web documents. Tutorials, books, mailing lists for users, etc.

**Data Gathering Unit (DGU):** functional unit used for several functions:

- collect serial, digital, and analog data from several equipment;
- option to send (output) serial or digital commands;
- forward/receive information to/from the Local/Remote Management Application via agreed protocols;
- mediation between interfaces and protocols.

NOTE: This function may be integrated as part of specific equipment.

**Dynamic Host Control Protocol (DHCP):** protocol used for self configuration of TCP/IP parameters of a workstation assigning IP address and a subnetwork mask

NOTE: DHCP may also configure DNS.

**Dynamic Name Server (DNS):** associates a single domain name to an IP address

**dynamic synoptic:** dynamic display of geographical maps, networks, installations and equipment

**Ethernet:** LAN protocol

NOTE: Equivalent to IEEE 802.1 to 11 [i.1].

**event:** any information signalling a change of state which is not an alarm: e.g. battery test, change of state of battery charge

NOTE: The event signal should be understood by itself by an operator and should always have at least one severity qualification or codification (colour, level, etc.). It should be transmitted in a formatted structure with text message and other fields like for alarm, e.g. an event can be coded as an alarm with severity "0".

**infrastructure equipment:** power, cooling and building environment systems used in telecommunications centres and Access Networks locations

EXAMPLE: Cabinets, shelters, underground locations, etc.

**intranet:** internal company network generally using Ethernet protocol and extended IP addresses

**logbook:** chronological file that contains alarm and event messages may be paper or electronic

**Management Information Base (MIB):** dynamic data base that gathers all objects and should evolve to include automatic and manual configuration tools with self coherence tests

**menu:** list of possible input command choices that may be presented in different ways on a display

NOTE: Selection is normally made by a keyboard, a pointing device, a mouse or directly by finger on a sensitive screen.

**object:** class description of items that accept a set of properties or functions

NOTE: Generic objects can include more specific items and inherit from their properties. If correctly structured, object programming can allow the system to evolve, i.e. be more future-proof. The code should intrinsically be open and structured.

**PHP:** powerful tool for making dynamic and interactive Web pages

**pop-up:** information or command screen that appears when a menu choice is selected

NOTE: For example this may be a pop-up menu when the pointer is on a title button.

**REpresentational State Transfer (REST):** way to build an application for distributed system as www

**Simple Object Access Protocol (SOAP):** way to communicate between applications running on different operating systems, with different technologies and programming languages

NOTE: SOAP communicates over HTTP, because HTTP is supported by all Internet browsers and servers, SOAP traffic is not blocked by firewalls and proxy servers (see W3C).

**Systems Management Function (SMF):** object properties or classes with projection on CMIS application context communication

NOTE: Set of ISO system management functions according to ISO/IEC 10164 [i.2].

**warning:** low severity alarm

**World Wide Web Consortium (W3C):** consortium founded in October 1994 to develop common interoperable protocols and promote World Wide Web

NOTE: See http://www.w3c.org.

**Windows:** virtual area on the display that corresponds to a specific application

**web:** common name for the Internet or Intranet

**XCU:** CU enabled to communicate using XML interface as defined in the present document

**XHTML:** stricter and cleaner version of HTML. XHTML consists of all the elements in HTML 4.01 combined with the syntax of XML. It can be read by all XML browser (see W3C)

**eXtensible Mark-up Language (XML):** application profile or restricted form of SGML

NOTE: By construction, XML documents are conforming SGML the Standard Generalized Markup Language (ISO/IEC 8879 [i.3]). documents.XML is designed to describe data and focus on what data is. XML should be discerned from the well known Hypertext Transfer Mark-up Language (HTML) which was designed to display data and to focus on how data looks.

**XML Schema Definition (XSD):** new more detailed XML description compared to the previous one, the DTD

**Extensible Style sheet Language (XSL):** language for expressing style sheets

NOTE: It consists of two parts, a language for transforming XML documents, and an XML vocabulary for specifying formatting semantics. An XSL style sheet specifies the presentation of a class of XML documents by describing how an instance of the class is transformed into an XML document that uses the formatting vocabulary.

## 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

| | |
|---|---|
| CSS | Control form Style Sheet |
| CU | Control Unit of an equipment |
| DGU | Data Gathering Unit |
| DHCP | Dynamic Host Control Protocol |
| DNS | Dynamic Name Server |
| DTD | Document Type Definition |
| HTML | Hypertext Transfer Make-up Language |
| HTTP | Hypertext Transfer Protocol |
| $I_{Av}$ | Average output load current (DC) |
| $I_{Batt}$ | Total battery current (DC) |
| $I_{Load}$ | Total output load current (DC) |
| IP | Internet Protocol |
| $I_{Rect}$ | Total rectifier output current (DC) |
| LAN | Local Array Network |
| MIB | Management Information Base |
| MN | Management network |

| | |
|---|---|
| PHP | Hypertext Preprocessor |
| REST | REpresentational State Transfer |
| RMA | Remote Management Application |
| SMF | Systems Management Function |
| SOAP | Simple Object Access Protocol |
| TCP | Transmission Control Protocol for IP |
| W3C | World Wide Web Consortium |
| XCU | XML enabled CU |
| XML | eXtensible Markup Language (see W3C) |
| XSD | XML Schema Definition |
| XSL | eXtensible Style sheet Language |

# 4 DC power supply system

The DC system subset described in ES 202 336-1 [1] transforms AC interface from mains or AC back-up engine defined in EN 300 132-3 [3], in DC voltage on interface A defined in EN 300 132-2 [2] or EN 300 132-3 [3] for telecom centre or defined for local or remote power supply of access network equipment in EN 302 099 [4].

The DC power systems addressed by the present document are depicted in figures 1 and 2. One single control unit XCU can monitor and control several power cabinets through field bus. Field bus is outside the scope of the present document.

Mandatory monitoring/ supervision information and functions are given in annex A.

Non-mandatory (optional) monitoring/ supervision information and functions are given in annex B.

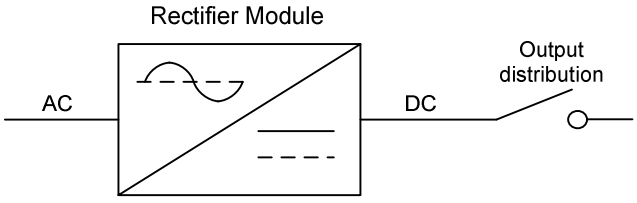


**Figure 1: Simple DC power supply system with no battery backup**

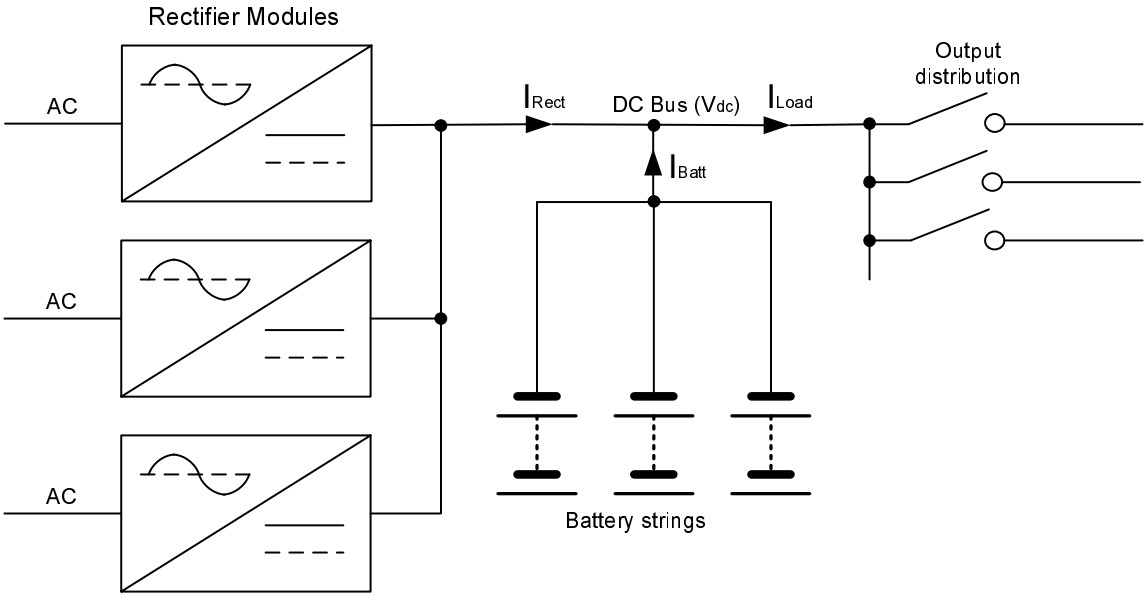


**Figure 2: Modular DC power supply system with battery backup**

The main elements of DC power supply systems are:

- Rectifier (one or more) that converts AC voltage to DC voltage (i.e. 230 VAC to DC voltage).

NOTE: Other alternative energy sources may be used to provide DC power e.g. Photovoltaic, wind turbine, etc.

- Battery (one or more strings of cells) that stores energy and can power the loads when AC interrupts or rectifiers fail. There can be test and permanent battery monitoring system to reduce the failure detection time and the MTTR.
- Protection and distribution (DC bus, breaker, etc.) to power different user loads and discriminate faults
- A system monitoring and control unit (XCU) to monitor voltage, current, power, temperature, etc., extend alarms and provide system control functionality.

Several measurements are possible: rectifier states, rectifier voltage and current, battery voltage, current and temperature, user load currents, etc.

Several controls are possible to adjust rectifier voltage and current, to optimize the load between rectifiers for energy saving and higher reliability, to start a battery test procedure.

Table TP1 (Table Power in annex A) corresponds to mandatory data that shall be provided for a minimal DC system without back-up, and TP1x (see annex B) includes data that should be provided in addition to mandatory one.

Table TP2 (see annex B) corresponds to mandatory data that shall be provided for a common rectifier/battery DC system with back-up, and TP2x (see annex B) includes data that should be provided in addition to mandatory one.

Annex C standardizes XML coding structures for these data.

# Annex A (normative): Summary of mandatory monitoring/supervision information and functions

This annex gathers the information needed on the Remote Management Application (RMA) for different types of power supplies. It specifies the mandatory requirements that must be provided in all cases.

NOTE 1: These tables do not specify the power equipment by itself. These tables refer to subsets or devices that are not necessarily present in each equipment configuration. As a matter of fact, one alarm and its class apply only in case of the presence of this subset or device.

When an optional alarm that requires a parameter set is present, the corresponding parameter set is mandatory in the control section in order to allow remote adjustment under appropriate login procedure.

According to their element type (Description, Alarm, Data, etc.), as defined in ES 202 336-1 [1] the information shall be provided by the Control Unit (XCU).

NOTE 2: If there is no XCU this data should be provided by the Data Gathering Unit (DGU).

When a CU has a field databus connected to the DGU, at least, the DGU shall store data (record measurements, log files). The XCU which has the XML interface over Ethernet TCP/IP, shall store these data.

NOTE 3: The "Explanation" column provided in the following data tables has been used where necessary to further explain the statements in the "Monitored information" column. The "Element type" column gives the assigned name used in XML coding and the "Monitored information" column provides details of the condition or state being monitored. The identifiers used in the Type column of the following tables are described in ES 202 336-1 [1].

NOTE 4: Partial communication network failures e.g. XCU link fault should be detected by an upper element of the network e.g. the RMA (refer to figure 1 of ES 202 336-1 [1]).

NOTE 5: Clause 9.4.4 of ES 202 336-1 [1] details the parameters associated with XML elements e.g. time delay, severity of alarm element. The tables below do not include the application of these parameters.

## A.1 DC POWER SUPPLY SYSTEMS

### A.1.1 Table for DC power supply system without back-up

**Table TP1 minimum set of monitored information**

| Element type | Monitored information | Explanation |
|---|---|---|
| description | Device description | |
| alarm | One rectifier failure at least | |
| | Partial network failure (high error rate, XCU-DGU link fault, etc.) | |
| event | None | |
| data | None | |
| data record | None | |
| config | None | |
| control | All XCU alarm/event/test/command parameters (time-out, counter, thresholds, etc.) if any | |
| | XCU program download with default to previous release | |
| | Default values resetting (safe value for XCU) | |

## A.1.2 Table for DC power supply system with back-up

NOTE: Partial network failure (high error rate, XCU-DGU link fault, etc.) is raised by the DGU, not the DC power system.

Any network communication failure on the DC XCU interface shall be detected by the DC power supervision unit.

**Table TP2 minimum set of monitored information**

| Element type | Monitored information | Explanation |
|---|---|---|
| description | device description (hardware and software) | |
| alarm | Input/output and battery protective device (gathered or unitary information) | AC or DC Fuse/Circuit Breaker open or tripped |
| | Battery discharge (e.g. due to mains loss, mains out of limits or not enough rectifier power) | |
| | Battery test failure | Battery failed to pass defined test criteria e.g. autonomy time, voltage threshold |
| | Output low voltage | Voltage of the DC bus falls below pre-set threshold, e.g. due to battery discharge |
| | Battery over-temperature | Battery temperature exceeds high limit setting |
| | One rectifier failure | Failure of a single rectifier module e.g. loss of DC power output |
| | Greater than one rectifier failure | Failure of more than one rectifier module e.g. loss of DC power output from greater than one rectifier |
| | Mains failure | Loss of AC input to DC power system |
| | XCU reset | Indication of restart by user or automatic watchdog |
| event | Alarm set and clear | |
| | Details of any change of configuration of DC system | Change of configuration e.g. float voltage change from 54,5 V to 55 V |
| | Change of operating mode of DC system | Change of operation e.g. Boost charge , battery operation , battery test, |
| data | DC voltage (±0,1 V)<br>- this precision is required for floating voltage (e.g. 54,6 V) derating detection and temperature charge compensation (around -3 mV/K/cell). | |
| | Charge and discharge battery current $I_{Batt}$ | |
| | DC output load current $I_{Load}$ (±2 %) | Can be measured directly or calculated from measured values of total rectifier output current minus the battery current i.e. $I_{Load} = I_{Rect} - I_{Batt}$ |
| | Average value of DC output load current $I_{Av}$ (±5 %) over a preset time window | |

| Element type | Monitored information | Explanation |
|---|---|---|
| | Battery discharge alarm duration | Time period over which battery is discharging e.g. caused by actual mains supply failure or insufficient output power from rectifiers due to failure. |
| | Battery temperature (±2°C) | |
| | XCU program download with default to previous release | |
| data record | Battery temperature | Battery temperature data log at 1 hour interval limited to a defined number of records |
| | DC output current | Average current data log e.g. at 5 min interval limited to a defined number of records |
| | DC output voltage | Voltage record e.g. at 1 hour interval limited to a defined number of records |
| config | Date and time | |
| | Sliding time window to capture maximum output DC current<br>All XCU alarm/event/test/command parameters (time-out, counter, thresholds, etc.) | Period of time over which power data logging is carried out |
| control | Any forced change of operating mode e.g. battery discharge test, boost charge | |
| | XCU program download with default to previous release | |
| | Default values resetting (safe value for XCU) | |

# Annex B (informative): Summary of non-mandatory monitoring/supervision information and functions

According to their types (Description, Alarm, Data, etc.), as defined in ES 202 336-1 [1] the information should be provided by the Control Unit (XCU) or by the Data Gathering Unit (DGU).

The non mandatory information of a table TPnx (n being the N° of the table).are provided in addition to the mandatory information defined in annex A in table TPn.

NOTE: The "Explanation" column provided in the following data tables has been used where necessary to further explain the statements in the "Monitored information" column. The "Element type" column gives the assigned name used in XML coding and the "Monitored information" column provides details of the condition or state being monitored. The identifiers used in the Type column of the following tables are described in ES 202 336-1 [1].

## B.1 DC power supply system without back-up

**Table TP1x**

| Element type | Monitored information | Explanation |
|---|---|---|
| description | additive information | |
| alarm | Dying gasp (not enough rectifier - mains fail) | Indication that DC power system output failure is imminent |
| | Input/output protection device (gathered or unitary information) | |
| event | None | |
| data | DC output bus voltage (±0,1 V) | |
| | DC load current (±2 %) | |
| | Input (AC) energy consumption over preset period | This value can be measured using a kWh meter or calculated by the DC power system controller using values of voltage and current monitored in the rectifiers |
| | Power capacity management (ratio) = Used/Installed power | |
| | DC power | This value can be calculated by the DC power system controller from DC output voltage and current measurements |
| data record | Additive records (energy consumption, power, etc.) | For ICT impact, and energy cost |
| config | None | |
| control | None | |

# B.2 DC power supply system with back-up

**Table TP2x**

| Element type | Monitored information | Explanation |
|---|---|---|
| description | additive information | |
| alarm | Unbalanced charge branch current | An unbalanced charge current of a certain percentage compared between battery strings |
| | Unbalanced discharge branch current | |
| | Unbalanced cell voltage | |
| | Battery asymmetry (midpoint voltage) | |
| | Battery circuit protection | Fuse or circuit breaker tripped or in open position |
| | Output overload | Connected equipment load is greater than DC power system capacity |
| | Output high voltage | Voltage of the DC bus goes above preset threshold e.g. due to voltage regulation failure |
| | Low Voltage Disconnect open | When there is a battery or load disconnecting device the alarm indicates the disconnection has occurred |
| | Battery over-charge (Ah in excess or high float current) | Measurement/ calculation of charge (current x time) alarm will be raised when threshold charge level is exceeded |
| | Mains supply outside of specified rectifier input limits | |
| | Battery replacement needed (based on time counters or specific conditions) | |
| | Float voltage out of limits (e.g. relative to temperature) | |
| | Earth leakage detection on high voltage battery (e.g. 300 V to 500 V) | Where using EN 300 132-3 [3] |
| | Battery temperature out of limits (jar or ambient lead acid batteries) | |
| | Midpoint dc voltage deviation | |
| | Battery temperature sensor failure | This sensor is for example placed on the battery jar or close to the battery |
| event | Battery test execution report | |
| | Status change or fast repetition (charge-discharge event) | |
| | | |
| | | |
| | | |
| | | |
| | Indication of restart with back-up or customized parameters (auto-recovery in case of Control Unit reset or replacement) | |
| | power interconnection | |
| data | Estimated remaining battery autonomy (time) during discharge | |
| | Battery age since date of installation | |
| | Estimated remaining battery capacity (due to ageing) at full charge (±5 %) | |
| | Power capacity management (ratio) = Used/Installed power | |
| | DC output power | This value can be calculated by the DC power system controller from DC output voltage and current measurements |
| | Cell or block or midpoint dc voltage (±10 mV/cell) | Cell monitoring can be performed by a separate battery analyzer |
| | Battery voltage | |
| | Battery string current | |

| Element type | Monitored information | Explanation |
|---|---|---|
| data record | Detailed battery test data record : discharge chart, temperature, string current, cell voltages | |
| | Input (AC) energy consumption over preset period | |
| | DC output power | This value can be calculated by the DC power system controller from DC output voltage and current measurements |
| config | Battery capacity | |
| | Battery discharge time out | |
| | Output low voltage threshold | |
| | Battery over-charge threshold persistent high float current | |
| | Battery over-temperature threshold | |
| | Unbalanced charge string current (persistent string branch charge current difference/mean string charge current value) | |
| | Unbalanced string discharge current (persistent string branch discharge current difference/mean string discharge current value) | |
| | Unbalanced cell voltage (persistent cell voltage difference/mean cell voltage value) | |
| | Persistent midpoint battery voltage asymmetry | |
| | battery test parameters | |
| | Output overload threshold (consumed power/ useful power where useful power is installed power without redundancy or battery recharge power). | |
| | Battery life expectancy at 20°C (as provided by manufacturer (IEC 60896 [i.4] (all parts)) | |
| control | Battery test on demand | |
| | DC power device control (rectifiers, Low Voltage Disconnection, etc.) | |
| | Acknowledge battery replacement | |
| | Acknowledge alarms | |

## B.3 DC power supply rectifier

The following table is dedicated to each rectifier module control/monitoring.

**Table TP3x**

| Element type | Monitored information | Explanation |
|---|---|---|
| description | Rectifier Reference | |
| | Rectifier Serial Number | |
| alarm | AC Failure | |
| | DC Failure | |
| | FAN Failure | |
| | Over Temperature | |
| event | Alarm Set/Clear | |
| data | Rectifier DC current (±1 %) | |
| | Rectifier DC power (±1 %) | |
| | Rectifier temperature | |
| data record | None | |
| config | none | |
| control | none | |

# Annex C (normative): Mandatory XML structure and elements

## C.1 Structure of an XML document for a DC power supply system

In the site DGU XML data structure as described in ES 202 336-1 [1], a dc system equipment is always a child of a site energy system.

The XML structure shall be as follows:

NOTE: Indicate precisely the generic mandatory XML structure and where to put the information if it exists (where it starts and stops). Every equipment and element, should be considered as a folder in the XML structure

```
<site id="23" status ="normal">
....
    <energy_system id="1" status="normal">
        <description_table>
        …
        </description_table>
        …
        <dc_system id="1" status="normal">
            <description_table>
            …
            </description_table>
            <alarm_table>
            …
            </alarm_table>
            <event_table>
            …
            </event_table>
            <data_table>
            …
            </data_table>
            <data_record_table>
            …
            </data_record_table>
            <config_table>
            …
            </config_table>
            <control_table>
            …
            </control_table>
            <rectifier id="1" status="normal">
            …
            </rectifier>
            <rectifier id="2" status="normal">
            …
            </rectifier>
            ….
        </dc_system>
        …
    </energy_system>
    …
</site>
```

A DC system XCU will only generate the XML document "dc_system.xml". This file can be download by the DGU of the site and embedded in the "site.xml" document. In this case, the structure of the document is as follows:

```
<dc_system id="1" status="normal">
    <description_table>
    …
    </description_table>
    <alarm_table>
    …
    </alarm_table>
    <event_table>
    …
    </event_table>
    <data_table>
    …
    </data_table>
    <data_record_table>
    …
    </data_record_table>
    <config_table>
    …
    </config_table>
    <control_table>
    …
    </control_table>
    <rectifier id="1" status="normal">
    …
    </rectifier>
    <rectifier id="2" status="normal">
    …
    </rectifier>
    …
</dc_system>
```

## C.2 The specific XML elements of a DC power supply system

NOTE: New tags for XML elements that are not detailed in ES 202 336-1 [1].

| Child Element | Description | Datatype |
|---|---|---|
| <rectifier> | For detailed information about each rectifier | xs:complexType |

# Annex D (informative): Examples of XML elements for a DC power supply system

## D.1 The <description> elements of a DC power supply system

Here follows some examples of description elements.

NOTE: Annex A data are mandatory, but not the XML coding. The existence of data in the XML file has to be checked.

| Name | Group | Description |
|---|---|---|
| Manufacturer Name | Manufacturer | The name of the manufacturer |
| Product Name | Manufacturer | The commercial name of the product |
| Short Description | Manufacturer | A short description of the product written by the manufacturer |
| Reference | Manufacturer | The internal manufacturer reference of the equipment/system e.g. ordering code |
| Serial Number | Manufacturer | The serial number of the system/equipment |

EXAMPLE:

```
<description_table>
<description id="1" name ="Manufacturer Name" group="Manufacturer">Best Manufacturer</description>
    …
<description id="4" name ="Serial Number" group="Manufacturer">45623-5F-EG</description>
       …
<description id="10" name ="Reference" group="User">SEP1245-DC</description>
</description_table>
```

## D.2 The <alarm> elements of a DC power supply system

Here follows some examples of alarm elements.

EXAMPLE:

```
<alarm_table>
   <alarm id="1" active="false" name="One Rectifier Failure" severity_type="major"
severity_level="6"/>
   <alarm id="2" active="false" name="More Than One Rectifier Failure" severity_type="major"
severity_level="6"/>
   <alarm id="3" active="false" name="Mains Failure" severity_type="minor" severity_level="4"
start_time="2007-09-15T21:50:43" stop_time="2007-09-15T21:50:58"/>
   <alarm id="4" active="false" name="Partial Mains Failure" severity_type="minor"
severity_level="4"/>
   <alarm id="5" active="false" name="Missing Rectifiers" severity_type="minor" severity_level="4"/>
   <alarm id="6" active="false" name="DC Bus Low" severity_type="major" severity_level="6"/>
   <alarm id="7" active="false" name="DC Bus Extra Low" severity_type="major" severity_level="6"/>
   <alarm id="8" active="false" name="DC Bus High" severity_type="major" severity_level="6"/>
   <alarm id="9" active="false" name="DC Bus Voltage Sense Failure" severity_type="major"/>
   <alarm id="11" active="false" name="Battery On Discharge" severity_type="minor"
severity_level="4"/>
   <alarm id="12" active="false" name="Battery Temperature Too High" severity_type="minor"
severity_level="4"/>
   <alarm id="13" active="false" name="Battery Temperature Too Low" severity_type="minor"
severity_level="4"/>
   <alarm id="14" active="false" name="Battery Temperature Sensor Fail" severity_type="minor"
severity_level="4"/>
   <alarm id="15" active="false" name="Battery Last Test Failed" severity_type="minor"
severity_level="4"/>
   <alarm id="16" active="false" name="Battery Capacity Low" severity_type="minor"
severity_level="4"/>
   <alarm id="25" active="false" name="Load Breaker Open" severity_type="major" severity_level="6"/>
   <alarm id="26" active="false" name="Battery Breaker Open" severity_type="major"
severity_level="6"/>
</alarm_table>
```

## D.3 The <event> elements of a DC power supply system

Here follows some examples of event elements.

```
<event_table>
    ...
   <event id="7" datetime="2007-09-15T21:50:43" severity_type="minor" severity_level="4">Alarm Set :
Mains Failure</event>
   <event id="8" datetime="2007-09-15T21:50:58" severity_type="minor" severity_level="4">Alarm Clear
: Mains Failure</event>
              ...
</event_table>
```

# D.4 The <data> elements of a DC power supply system

Here follows some examples of data elements.

EXAMPLE:

```
<data_table>
   <data id="1" name="Bus Voltage" group="General" unit="volt">53.5</data>
   <data id="2" name="Ratio delivered on available power" group="General" subgroup="General"
unit="">0.00</data>
   <data id="3" name="Rectifiers Output Power" group="Rectifiers" unit="watt">802.5</data>
   <data id="4" name="Rectifiers Output Current" group="Rectifiers" unit="ampere">15.0</data>
   <data id="5" name="Rectifiers Output Power Max" group="Rectifiers" unit="watt">850</data>
   <data id="6" name="Rectifiers Output Current Max" group="Rectifiers" unit="ampere">15.88</data>
   <data id="7" name="Load Power" group="Load" unit="watt">600</data>
   <data id="8" name="Load Current" group="Load" unit="ampere">11.2</data>
   <data id="9" name="Battery Input Power" group="Battery" unit="watt">202.5</data>
   <data id="10" name="Battery Input Current" group="Battery" unit="ampere">3.78</data>
   <data id="12" name="Battery Temperature" group="Battery" unit="°C">28.2</data>
   <data id="13" name="Number of present rectifier" group="NumberOf" unit="">3</data>
   <data id="14" name=" Number of absent rectifier " group="NumberOf" unit="">1</data>
   <data id="15" name="Number of defect rectifier" group="NumberOf" unit="">0</data>
</data_table>
```

# D.5 The <data_record> elements of a DC power supply system

The structure of the data record is really manufacturer dependent and is free.

# D.6 The <config> elements of a DC power supply system

Here follows some examples of config elements.

EXAMPLE:

```
<config_table>
   <config id="1" name="DC Bus Float Voltage at 25 degC" group="Bus Voltage Config">54.00</config>
   <config id="2" name="DC Bus Voltage Low" group="Bus Voltage Config">48.00</config>
   <config id="3" name="DC Bus Voltage Low Hysteresis" group="Bus Voltage Config">0.50</config>
   <config id="4" name="DC Bus Voltage Extra Low " group="Bus Voltage Config">43.20</config>
   <config id="5" name="DC Bus Voltage Extra Low Hysteresis" group="Bus Voltage
Config">2.00</config>
   <config id="6" name="DC Bus Voltage High" group="Bus Voltage Config">58.50</config>
   <config id="7" name="DC Bus Voltage High Hysteresis" group="Bus Voltage Config">0.50</config>
   <config id="8" name="Battery Temp Compensation" group="Battery Config">-50</config>
   <config id="9" name="Max Charging Current" group="Battery Config">4.00</config>
   <config id="10" name="Battery Temperature Low" group="Battery Config">-10.00</config>
   <config id="11" name="Battery Temperature High" group="Battery Config">50.00</config>
   <config id="12" name="Battery Temperature Hysteresis" group="Battery Config">2.00</config>
   <config id="13" name="Battery Capacity" group="Battery Config">100</config>
   <config id="14" name="DC Bus Boost Voltage" group="Boost Mode Config">56.40</config>
   <config id="16" name="Event Table Length" group="General Parameters">100</config>
</config_table>
```

## D.7 The <control> elements of a DC power supply system

Here follows some examples of control elements. Writing a '1' to the "innertext" of these elements start the control function.

```
<control_table>
   <control id="1" name="Open the LVD" group="LVD"/>
   <control id="2" name="Close the LVD" group="LVD"/>
   <control id="3" name="Back to float" group="DC Mode"/>
   <control id="4" name="Start Battery Test" group="DC Mode"/>
   <control id="5" name="Force Battery Test" group="DC Mode"/>
   <control id="6" name="Start Boost mode" group="DC Mode"/>
   <control id="7" name="Clear All Events" group="Events"/>
   <control id="8" name="Clear My Level Events" group="Events"/>
</control_table>
```

## D.8 The <description> elements of a DC power supply rectifier

```
<description_table>
   <description id="1" name="Product Name" group="manufacturer">RECT850TN</description>
   <description id="2" name="Hardware Reference" group="manufacturer">Best
Manufacturer</description>
     ...
</description_table>
```

## D.9 The <alarm> elements of a DC power supply rectifier

```
<alarm_table>
   <alarm id="1" active="false" name="AC Failure" severity_type="major" severity_level="0"
start_time="2007-09-15T22:25:05" stop_time="2007-09-15T22:25:20"/>
   <alarm id="2" active="false" name="DC Failure" severity_type="major" severity_level="0"/>
   <alarm id="3" active="false" name="Temperature Error" severity_type="major" severity_level="0"/>
   <alarm id="4" active="false" name="Fan Error" severity_type="major" severity_level="0"/>
</table>
```

## D.10 The <event> elements of a DC power supply rectifier

```
<event_table>
   <event id="1" datetime="2007-09-19T21:47:41" severity_type="major" severity_level="0">Alarm Set:
Mains Failure</event>
   <event id="2" datetime="2007-09-19T21:47:57" severity_type="major" severity_level="0">Alarm
Clear: Mains Failure</event>
</event_table>
```

## D.11 The <data> elements of a DC power supply rectifier

```
<data_table>
   <data id="1" name="Output Power" group="output" unit="watt">560</data>
   <data id="2" name="Output Voltage" group="output" unit="volt">54.2</data>
   <data id="3" name="Output Current" group="output" unit="ampere">10.33</data>
   <data id="4" name="Output Power Max" group="output" unit="watt">850</data>
   <data id="5" name="Output Current Max" group="output" unit="ampere">15.68</data>
   <data id="6" name="Input Voltage" group="input" unit="volt">232.0</data>
   <data id="7" name="Temperature" group="General" unit="Degree Celsius">57</data>
</data_table>
```

## D.12 The <config> elements of a DC power supply rectifier

```
<config_table>
   <config id="1" name="SomeRectifierConfigName" >1234</config>
</config_table>
```

## D.13 The <control> elements of a DC power supply rectifier

```
<control_table>
   <control id="1" name="SomeRectifierControlName" />
</control_table>
```

# Annex E (informative): Bibliography

ETSI TR 102 336: "Environmental Engineering (EE); Power and cooling system control and monitoring guidance".

# History

| Document history | | |
|---|---|---|
| V1.1.1 | January 2009 | Membership Approval Procedure MV 20090320: 2009-01-20 to 2009-03-20 |
| V1.1.1 | March 2009 | Publication |
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