Material Specification code: GRI-GRI-MAT-NE&D-0029

Version no. 1 dated 20/05/2025

Subject: GSSM010 – Smart Meter P2P

Application Areas

Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Enel Grids and Innovation*

CONTENTS

THE HEAD OF GLOBAL NETWORK DEVICES
Ottavio Dinale

1. DOCUMENT AIMS AND APPLICATION AREA

This document describes the requirements for the purchase monophase or multiphase energy meter for billing with direct and indirect connection, in accordance with countries regulations, Normative and Resolutions, which regulate the electrical energy measurement system.

This document applies to Enel Grids Colombia and Argentina.

This policy applies to the Enel Group with the respect to its operations in Colombia and Argentina, in accordance with applicable laws, regulations, collective agreements and governance standards, including the General Data Protection Law, which in any situation take precedence over the provisions contained in this document.

The General Data Protection Act, Law No. 25.326 of 2020 (Argentina) and Law No. 1581 of 2012 (Colombia) regulates the processing of personal data. These Laws 1581/2012 for Colombia and 25.326/2020 for Argentina defines that treatment is any operation carried out with personal data, such as those related to collection, production, reception, classification, use, access, reproduction, transmission, distribution, processing, filing, storage, deletion, evaluation or control of information, modification, communication, transfer, dissemination or extraction, as well as that Personal Data is all information related to a natural person (physical person), which can make it identified or identifiable (such as: name, id number, phone number, address, mail address, name of family members, consumption profile, geolocation, Consumer Unit number, etc. , which in isolation, or associated with two or more, may directly or indirectly identify a data subject).

The Processing of Personal Data carried out during the activities described in this document, must be duly mapped in the Enel Group personal data processing registry system, according to the Operational Instruction n. 3341 - Management of Personal Data Processing Registry and must take place in line with the rules of Personal Data Protection, SDG and Information Security of the Enel Group, established in the respective internal Policies and Procedures, listed in section 4 of this document.

This document shall be implemented and applied to the extent possible within the Enel Grids and Innovation Business Line and in compliance with any applicable laws, regulations and governance rules, including any stock exchange and unbundling-relevant provisions, which in any case prevail over the provisions contained in this document.

This document applies to Colombia and Argentina. All the following requirements are for both countries except where expressly specified.

1.1 RELATED DOCUMENTS TO BE IMPLEMENTED AT COUNTRY LEVEL

This document doesn’t require implementation of further documents.

Anyway, each Enel Grids Company can issue, under the supervision of Enel Grids and Innovation Global Network Devices a detailed documents, according to the provisions of the present document and in case of specific needs.

2. DOCUMENT VERSION MANAGEMENT

Version	Date	Main changes description
1	20/05/2025	First issuing of "GSSM010 – Smart Meter P2P" Material Specification

3. UNITS IN CHARGE OF THE DOCUMENT

Responsible for drawing up the document:

- Enel Grids and Innovation: Network Engineering and Development / Engineering Components and Devices / Network Devices unit.

Responsible for authorizing the document:

- Enel Grids and Innovation: Head of Network Devices unit;
- Enel Grids and Innovation: Operational Excellence and Processes Quality unit.

4. REFERENCES

- Integrated Policy for Quality, Health and Safety, Environment, anti-Bribery and Information security;
- ISO 9001- Quality Management System – Requirements;
- ISO 14001 - Environmental Management System - Requirements with guidance for use;
- ISO 45001 - Occupational Health and Safety Management System - Requirements with guidance for use;
- ISO 37001 - Anti-bribery Management System - Requirements with guidance for use;
- ISO 27001 - Information Security Management System – Requirements;
- Policy n.344 - Application of Privacy Regulation within the scope of the Enel Group;

- Policy n.33 - Information Classification and Protection;
- Policy n.347 - Data Breach Management;
- Policy n.25 - Management of Logical Access to IT Systems;
- Policy n.37 - Enel Mobile Applications;
- Test Specification GRI-GRI-TST-E&C-0002 “GSSMC002: Qualification and reliability tests for meters production process validation”;
- GSCG002: “Technical Conformity Assessment”;
- Resolución SICyM N°171/2016
- IEC/EN 62052-31:2015 Electricity metering equipment (AC) – General requirements, test and test conditions. Part 31: Product safety requirements and tests.
- EN IEC 62053-21:2021/A11:2021 Electricity metering equipment - Particular requirements - Part 21: Static meters for AC active energy (classes 0,5, 1 and 2). EN IEC 62053-23:2021/A11:2021 Electricity metering equipment - Particular requirements. Part 23: Static meters for reactive energy (classes 2 and 3).
- IEC 62058-11 “Electricity metering equipment (AC) - Acceptance inspection - Part 11: General acceptance inspection methods”
- IEC 62058-31 “Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)”;
- EN 50065-1 “Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz Part 1: General requirements, frequency bands and electromagnetic disturbances”
- IEC/EN 62056-21 Data exchange for meter Reading, tariff and load control - Direct local data exchange.
- Nota ENRE NO-2024-109520846-APN-ENRE#MEC
- IEC/EN 60529 Degrees of protection provided by enclosures (IP Code).
- IEC 62059-41 Reliability prediction test.
- IEC 62059-32-1 Electricity metering equipment - Dependability - Part 32-1: Durability - Testing of the stability of metrological characteristics by applying elevated temperature.
- IEC/EN 62054-21:2004/AMD1:2017 Electricity metering equipment (AC) – Tariff and load control Part 21: Particular requirements for time switches.
- EN 50550 “Protectores contra Sobretensiones Permanentes (POP)”;
- IEC 62059-41 Reliability prediction test
- IEC 62059-32-1 Electricity metering equipment - Dependability - Part 32-1: Durability - Testing of the stability of metrological characteristics by applying elevated temperature.
- IEC/EN 62053-52 Electricity metering equipment (AC) – Particular requirements – Part 52: Symbols.

- IEC 62055
- Cyber Security Guideline no. 13

Colombia:

- NTC 1340 (IEC 60038)
- NTC 4597 (IEC61358)
- NTC 4649 (IEC62053)
- NTC 5226 (IEC 62052-11)
- NTC 2147 (IEC 62053-22)
- NTC 6232 (IEC 62053-24)
- CREG 038/2014
- NTC 6079
- CREG 101 001/2022

Argentina:

- IRAM 2412-2 “Medidores de energía eléctrica activa de inducción tetrafilares clase 1 y2. Especificaciones para la aceptación de lotes”.
- IRAM 15 – “Sistema de muestreo para inspecciones por atributos”
- ISO 2859-1 – “Procedimientos de muestreo para la inspección por atributos — Parte 1: Planes de muestreo para las inspecciones lote por lote, tabulados según el nivel de calidad aceptable.”
- Resolución 247/2019 “Reglamento técnico y metrológico para los medidores de energía eléctrica en corriente alterna” de la secretaria de Comercio Interior dependiente del Ministerio de Producción y Trabajo de la República Argentina.

Notes:

1) The supplier must make available, for the Enel inspector, at the site of the inspection, all the abovementioned Standards, in their latest revisions.

2) The International System of Units (Metric System) must be used for any and all supplies to be carried out.

Group Pillar References:

- The Code of Ethics of Enel Group;
- The Enel Group Zero Corruption Tolerance Plan (ZTC);
- Human Rights Policy;
- Organization and Management Model as per Legislative Decree No. 231/2001;
- Enel Global Compliance Program (EGCP).

5. ORGANIZATIONAL PROCESS POSITION IN THE PROCESS TAXONOMY

Value Chain/Process Area: Engineering Macro Process:

Devices and Components Development Process: Standard

Catalog Management

6. DEFINITIONS AND ACRONYMS

Acronym and Key words	Description
Acceptable Quality Level (NQA)	Acceptable Quality Level
Dado Pessoal/Personal Data	Personal Data is any information relating to an identified or identifiable natural person, such as name, identification number, location data, an online identifier, or to one or more of the characteristic elements of his/her physical, physiological, genetic, mental, economic, cultural or social identity (see also Special categories of personal data).
Distribution Line Carrier (DLC)	System technology used a frequency range of 9 to 500 kHz with data rate up to 576 kbit/s.

IEC	International Electrotechnical Commission
Legal Metrology Board (DIMEL)	Legal Metrology Board
Low Voltage Manager (LVM)	Low Voltage Manager
L1	Phase R
L2	Phase S
L3	Phase T
Metrological Technical Regulation (RTM)	Metrological Technical Regulation
P2P	Point-to-point communication between the management and operation software and the meter. Typically, directly over a WAN.
P2M	Point-to-multipoint communication between the management and operation software and the meter. Usually, indirectly through UCD data concentrators or gateways.
Personal Data Holder	Natural person to whom the personal data subject to processing refer to. He / she understood as an identified or identifiable natural person.
Processing	Any operation carried out with personal data, such as those relating to collection, production, reception, classification, use, access, reproduction, transmission, distribution, processing, filing, storage, elimination, evaluation or control of the information, modification, communication, transfer, dissemination or extraction.
Sensitive Personal Data (including biometric and health data)	In the context of data protection, particular attention deserves the category of personal data concerning racial or ethnic origin, religious conviction, political opinion, membership of a trade union or organization of a religious, philosophical or political nature, to data concerning to health or sex life, genetic or biometric data, if linked to a natural person. These data are defined by the LGPD as Sensitive Personal Data. - Genetic data: personal data concerning the genetic, inherited or acquired characteristics of a natural person which provide unambiguous information about the physiology or health of such natural person, and which result in particular from the analysis of a biological sample of the natural person in question; - Biometric data: personal data resulting from specific technical processing relating to the physical, physiological or behavioural characteristics of a natural person which allow or confirm the unique identification of that person, such as photo, video, facial images or fingerprint data. - Health data: personal data relating to the physical or mental health of a natural person, including the provision of health services, which reveal information about the state of health of that person

7. ENEL GRIDS CODES

Item	N of phases	N of wires	Basic Nominal Current (A)	Maximum Current (A)	Nominal Voltage (V)	Operating Voltage (V)	Cut-off Relay (A)	Connection / Communication	Country	Code
1	**1**	**2**	**5**	**≥ 60**	**220**	**±10%**	**≥ 100**	**Direct / P2P**	AR	0105-0169
2	**3**	**4**	**5**	**>120**	**380**	**±10%**	**±10%**	**Direct / P2P**	AR	0105-0142
3	**1**	**2**	**5**	**≥100**	**120**	**±10%**	**≥ 100**	**Direct / P2P**	CO	510993
4	**2**	**3**	**5**	**≥ 100**	**120/208**	**±10%**	**≥ 100**	**Direct / P2P**	CO	510992
5	**3**	**4**	**5**	**≥ 100**	**120/208**	**±10%**	**≥ 100**	**Direct / P2P-**	CO	510991
6	**3**	**4**	**1**	**≥10**	**120/208 Multirange**	**±10%**	Not applicable	**Semi direct / P2P-**	CO	510990

Table 1 - Material codes and characteristics

7.1 Constructive Characteristics

7.1.1. General requirements

The meter must have a design that incorporates, as much as possible, the improvements that modern technique suggests, even when not referred to in this specification.

If several units of the same meter are provided in a supply, each meter must be the same and have the same design as the others, with all its corresponding parts identical and interchangeable.

The meter must have self-diagnostics routines (watchdog) reaching all its internal functional modules.

Measurement records must only consider the fundamental component of the measured electrical quantities (without the influence of harmonics).

The meter must be delivered to the DSO with the energy registers zeroed, including the displayed values, with the exception of meters that undergo final inspection sampling in accordance with local reference standard.

(in particular for Colombia the CREG 101001:2022 resolutions must be considered)

The meter's power supply must not be considered as consumption of the consumer unit (line-load).

All meter technical literature, operating manuals, catalogs and software must be in Spanish.

The meter must offer sufficient shielding to external electromagnetic fields, so as to ensure stable performance and reliability under normal operating conditions.

The metrological accuracy and functionality of the meter must be immune to magnets of at least 0.4 T.

The meter must have a minimum useful life of 15 years with a failure rate of up to 1% p.a.

The meter must be certified in compliance to all applicable international standards and local regulations that allows its infield installation in the country of destination

7.1.2. Electrical requirements

The following meters must be compliant to the standards in the chapter of references.

Argentina:

The Monophase (1F) Smart Meter must contain the following characteristics:

- 1 element, 2 wires, 220V, nominal current 5A, maximum current 60A.

The Three-phase (3F) Smart Meters must contain the following characteristics:

- 3 elements 4 wires 380V, nominal current 5A, maximum current 120A

The meter must come into operation as soon as it is energized, by any of the phases.

The nominal frequency must be 50Hz.

The operating voltage must ±10% of the Nominal Voltage.

The temperature operative range must be from -25 ºC to +70º C.

The relative humidity without condensation must be ≤95%.

The meter must be able to operate from sea level up to a height, at least, of 3000 meters above sea level

Meter Constant for active and reactive energy measurements must be **≥** 1.000 pulses/ (kwh / kvarh)

Colombia:

The Monophase (1F) Smart Meter must contain the following characteristics:

- 1 element, 2 wires, 120V, basic current 5A, maximum current 100A.

The two-phase (2F) Smart Meter must contain the following characteristics:

- 2 element, 3 wires, 120/208V, basic current 5A, maximum current 100A.

The three-phase (3F) Smart Meters with direct connection must contain the following characteristics:

- 3 elements, 4 wires, 120/208V, basic current 5A, maximum current 100A.

The three-phase (3F) Smart Meters with semi-direct connection must contain the following characteristics:

- 3 elements, 4 wires, 120/208V / multirange (58/100…277/480), nominal current 1A, maximum current 10A

The meter must come into operation as soon as it is energized, by any of the phases.

The nominal frequency must be 60Hz.

The operating voltage must ±10% of the Nominal Voltage.

The temperature operative range must be from -25 ºC to +70º C.

The relative humidity without condensation must be ≤95%.

The meter must be able to operate from sea level up to a height, at least, of 3000 meters above sea level.

Meter Constant for active and reactive energy measurements must be at least 3.000 pulses/ (kwh / kvarh)

7.1.3. Measurement Registers

The meter must measure active and reactive energy, even if it must display active energy values only.

The meter must be bidirectional and it must have separate registers for import and export active and reactive energies. It must have a “ratchet” type recorder for direct energy and a “ratchet” type recorder for reverse energy.

The meter must have separate registers for each quadrant (Q1, Q2, Q3, Q4) of reactive energy.

The meter must indicate on the display which phases are energized.

The meter must indicate on the display the direction of energy flow (import or export and, for reactive energy also inductive or capacitive).

The meter shall have a register of each of the following measurements:

- Active and Reactive Power per phase [kWh; kVarh];
- Apparent Power [kVA];
- Maximum demand (active and reactive);
- Instantaneous and average voltage per phase;
- Instantaneous and average current intensity per phase;
- Instantaneous current intensity and total average;
- Service Tariff;
- Absence of voltage;
- Presence of Voltage;
- Amount of interruptions;
- Duration of interruptions;
- Firmware in operation;

- Prepayment function Energy balance (only for Colombia)
- First breath and Last gasp

7.1.4. Display Requirements

The meter must have an LCD display. The display must be active and showing information whenever the meter is mains supplied.

The meter shall provide a system that allows reading of the display in the absence of voltage with autonomous system (other than battery). This autonomous system shall allow at least 24 hours of visualization of the last register. The minimum data to be displayed in the absence of voltage are Meter series and last recorded reading of active energy (kWh) and reactive energy (kvarh) (this requirement is specific to Colombia).

The same system could be used for last-gasp functionality.

The display must be composed by two different areas: it must show at least 16 alphanumeric characters in one area and icons (special symbols or operating indicators). The heightof the alphanumeric characters must not be less than 7mm.

DLMS OBIS Size Code (IEC 62056-64).

The meter must have a main cover opening sensor. When the meter is opened, the display must be switched off and leave a fixed message such as "THEFT" or "APC". The display can be activated with a special password and only in the laboratory.

Icon’s area must show icons related to the following information:

- Quadrant in use (Q1, Q2, Q3, Q4);
- Meter serial number (12 numeric characters). This parameter must remain visible on the display for 3 seconds;
- Measurement unit indication for active/reactive energy/power (kW, kWh, kvar, kvarh). These measurements must remain visible on the display for 5 seconds;
- Per phase voltage presence;
- Per phase current presence and direction (for example, “+” -> import active energy, “-“ -> export active energy, “ “ -> current not present).
- Backup power status indicator;
- Alarm condition indicator;
- Communication Indicator ;
- Communication signal level indicator;
- Tariff indicator;
- Cut-off element open
- It is desiderable to have an alarm that informs of the sending of the Last Gasp message.

Display device must be capable of registering, starting from zero, for a minimum time of 1150h, the energy corresponding to the maximum current at the highest rated voltage and unitary power factor.

Although this should be configurable, the display must show the energy quantity (kWh) with 5 (five) full digits. The LCD display must be side-lit or local dimming, high contrast reflective type to allow the reading in a bright environment or in dark spaces with a viewing angle of up to 30 degrees. The display life shall be equal

to the life of the meter and this shall be guaranteed in writing.

The display must be able to show all registers, with their respective identification code, at an interval time of 6s for each register.

The meter must allow also other configurations of display messages showed on the display for future implementation. In particular, it must guarantee the opportunity to display messages related to:

- Firmware version running into the meter
- Checksum of the Firmware version running into the meter
- N° of download of new Firmware performed on the meter
- Date of Last Billing period closure
- Instantaneous Voltage
- Instantaneous Current
- Instantaneous Power
- Instantaneous Frequency

7.1.5. Accuracy Class

The meters (monophase and three-phase) with direct connection must have an accuracy class equal to 1 o better for active energy measurement (for Colombia this requirement must be compliant to CREG 038 of 2014).

For Colombia, the meters (monophase and three-phase) to be connected by instrument transformers must have an accuracy class equal to 0.5S o better for active energy measurement in compliance to CREG038/2014.

The meters (monophase and three-phase) must be able to measure reactive energy with an accuracy class equal to 2 or better (for Colombia this requirement must be compliant to CREG 038 of 2014).

The meter must be able to provide and store in independent registers the following measurands:

- Active (imported and exported) energies per phase;
- Reactive (imported and exported) in the 4 quadrants energies per phase;
- Active and Reactive Power per phase;
- rms voltage and current values (phase and neutral currents with 1% accuracy);
- power factor and phases angle values;
- frequency.

7.1.6. Climatic conditions

The meter must have a type approval certificate withstand with the following climatic conditions:

- Temperature range: from -25°C to 70°C (Colombia) and -10° to 70°C (Argentina)
- Relative humidity: ≤ 95%
- Minimum heigh over sea level: ≥ 3.000 m.a.s.l(Colombia) and ≥ 1000 m.a.s.l((Argentina)

7.1.7. General mechanical requirements

The meter, intended for internal use, must conform to the degree of protection of IEC60529.The metrology compartment must ensure an IP52 for Colombia andIP51 for Argentina protection degree to prevent any access (both intentional and unintentional) to inner components without visibly braking meter case.

The meter must have an external insulation protection class III according to IEC62052-11.

The meter must be overvoltage category III according to IEC 62052-31.

The base and the cover of the meters must have the following characteristics:

- polycarbonate suitable for recycling (related symbol must be printed on bigger parts) + Fiber Glass
- color light resistant
- flame retardant
- heat and flame resistant (class V0 in accordance with UL94)

The transparent window (display) must be made with a plastic material that isn't subject to degradation due to direct solar radiations. The transparency of the window must be guaranteed for the whole lifetime of the meter when installed indoor and within rated environmental conditions.

Metal parts of the meter subject to corrosion must be protected and must resist to abrasives substances and normal operating handling.

The assembly, base, terminal block, terminal cover and cover must be realized with insulating and non-

hygroscopic materials. Materials must also be able to withstand high temperatures without deforming during the meter's useful life.

The meter must have a clamping device in the upper rear part for mounting on the measurement panel.

The meter must have two holes in the lower part so that, by means of screws, the mounting on the measurement panel is completed (these screws must be protected by the sealing of the terminal block cover).

The meter must be compliant to the mechanical requirements indicated in the IEC 62052-11 (protection class III)

7.1.8. Cover

The meter must have a cover constructed and adjusted so that to ensure the perfect operation of the device in normal condition and in cases of non-permanent deformation.

The electromechanical parts of the meter must be assembled in such a way as to prevent any access to the internal electronics without making external damage evident. This means that the base and the cover must be anchored to each other through a process that makes them like a single body avoiding their disassembling. In addition, this process doesn't have to show residues from the joining (such as burrs or damages to the cover and/or base).

The meter cover must be attached to its base throughout its perimeter, so that it is possible to identify a possible opening of the lid.

The meter and other devices must have proper securing in their casing to leave traces in case of an attempt to open the casing. If the meter is opened by any tool, due to thermal shock or mechanical shock, it should not be possible to reassemble the casing (base and/or cover) without leaving any visible marks of tampering (such as cracks, fractures, deformations, breaks, and holes).

7.1.9. Terminal Block Cover

The meter must have the terminal block cover with the connection scheme drawings to the LV grid, engraved externally and indelibly.

The terminal block cover must allow the use of an external seal (for more details please refer to section 7.1.16 Seals).

The terminal block cover of the Meter must be made of polycarbonate in a color that allows good visualization of the meter terminals. Moreover, the terminal cover material must comply with national applicable regulations

The Terminal Block cover of the meter must be short and transparent

7.1.10. Terminals block

a) The meter must have a terminal block made of insulating material capable of not deforming after the meter has been submitted to the maximum current heating test.

b) The terminal material must comply with national technical standard (for example for Colombia: at 960°C ±15°C for 30s ±1s)

c) The meter must have the terminal block fixed to the base so that it can be removed only by breaking the seals of the meter cover and leaving on the cover the evidence of braking.

d) The meter must have an identification of the neutral terminal position in blue color, on the front face of the terminal block.

e) The meter must not allow the terminals to move inside the meter, regardless of the fastening screws of the connection cables.

f) The terminals must be arranged in the line-load format according to national regulation.

g) Terminals Block must admit bimetallic cables (Cu – Al). Terminals Block must admit cables sections form 4 to 50 mm² for Colombia and sections from 4 to 35 mm² for Argentina.

h) Terminal block must prevent accidental contact or short circuit of any live part.

i) All terminals must be clearly, unequivocally, and indelibly numbered on their front face, from left to right (meter in operating position) showing the function of the connected wires.

j) Terminals and screws set must be dimensioned to resist to a torque of 4 Nm to direct meters.

k) The terminal screws for meters from 30 to 200 A must have screws sized to withstand a torque of 20 N.m;

l) Terminal screws for 30-200 A meters must be of the “allen” type;

m) The screws set must be of the "cross-slotted" type to direct meters.

n) The set of screws and terminals must be made of carbon steel with zinc-nickel.

o) The terminals must be of the drawer type to direct meters.

p) Terminals and communication device (if any) must be galvanically isolated from each other.

q) The meter must have a barrier for housing the terminal screws. In the event of complete loosening of the terminal screw, the barrier should not leave them exposed.

7.1.11. Visual Measurements Indication Device

The meter must have one or two optical test output for verification of energy consumption. If the device has only one optical test output, it must be selectable locally and remotely both active and reactive energy by a push - button or SW.

This output will emit light in the visible spectrum.

This output will allow the user a visual indication of the energy measurement.

7.1.12. Nameplate of the meter and information present on the device

Nameplate of the meter must comply with type approval report “and it must be agreed with the distribution company.

The nameplate must include information written with ndelible ink, engraved on or under relief.

The information to be included on the device must be at least the following:

- Name of manufacturer
- Country of manufacturing

- Manufacturing year
- Logo of DSO
- Order number
- Serial number (12 numerical characters)
- Model
- Rated Frequency, voltage and currents
- Minimum or rated current
- Maximum current
- Number of elements
- Constant of the meter
- Class index for active energy measurement
- Class index for reactive energy measurement
- Temperature range
- Bar code (20 characters as minimum)
- Connection diagram to the network
- Certificate of conformity of the product

Serial number of the meter must be available also into the meter memory to be available for remote reading and visualization on the display (if required).

7.1.13. Maximum dimensions

The meter must meet the maximum dimensions:

Maximum Dimensions					
Country	**AR**	**AR**	**CO**	**CO**	**CO**
N of phase	**1**	**3**	**1**	**2**	**3**
Height (mm)	215	257	210	305	305
Width (mm)	142	190	130	175	175
Depth (mm)	80	80	100	100	100

7.1.14. Voltage outages

The meter must be capable of maintaining the internal clock time, configuration and recorded information during a power failure of at least 8.760 hours (365 calendar days).

The meter must be able to record and store, at least, the last 20 Voltage outages for each phase.

The meter must have a routine to automatically return to normal operation mode when power is restored.

7.1.15. Seals

The seal must meet the applicable national regulation and in addition the following requirement:

- Every meter must have independent devices for installing security seals on each removable cover or each reset button of the meter (e. g. the meter cover, the terminal block cover, communication module cover, demand reset device, if any).
- The meter must be capable of including 2 seals (on opposite sides).
- The sealing holes must not be smaller than 2.0 mm.

7.1.16. Firmware requirements

The meter firmware must be compliant with Local Regulations and it must be developed with line and table structure, maintaining its principles of openness, interoperability, efficiency, robustness and communication security.

The meter must support, among the other functionalities, firmware update through remote communication interfaces, complying with the characteristics of the meters offered, subject to prior approval by Enel and with guaranteed support from the supplier during the approval process.

The meter must allow its remote programming and local programming (through optical port) for different applications, such as simple tariffs (single tariff) set, hourly tariffs set, distributed generation, measuring quality indicators and others.

Remote and local programming must be done using the same protocol commands.

The meter must also support last gasp/ first breath functionalities

The supplier must offer unlimited support for activities related to firmware updating, including communicating any FW changes that may have an impact on the meters already installed.

Any new firmware version must not generate new integration and development costs; if they exist, these costs must be assumed by the supplier. Any new firmware version must be authorized by Enel Colombia.

7.1.17. Security

It must be provided with security keys to allow access only to authorized users and prevent the attempt of any unauthorized intervention, whether the access is local or remote.

Keys management must comply with requirements issued by Enel Group and in general to should guarantee at least the **suite 1 level required by the DLMS protocol**.

The device must guarantee the compliance to all security legal requirements applicable in Argentina and

Colombia for smart meters.

All the communications managed by the meter towards remote system must be secured and in line with Enel Policies.

The manufacturer must detail in the technical offer all the security measures implemented by the device itself.

7.1.18. Alarms

The meter must support at least the following sensors that must be monitored by the meter also to activate an alarm:

- Magnetic sensors for the detection of external magnetic fields.
- Sensor to detect removal of the terminal block cover (even with the meter off);
- Sensor to detect current flow with relay open
- Sensor (or alternative solution) to detect status of the relay (open/closed).
- Sensor of the balance between the phase and neutral current;
- Sensor (or any other solution) for detecting the presence of voltage on the consumer side. It means that being the customer disconnected (i.e., meter main relay open) the meter must be able to detect the presence of voltage at the “client side”, between any phase and neutral. If the voltage read is greater than a certain threshold when the cut-off device is in open status an alarm must be activated.
- Sensor for detecting the absence of voltage;
- Communication module removal sensor.

The events and alarms must be configurable.
The meter must be able to detect and record (or activate an alarm) the following conditions:

- Fault and intervention alarms in the voltage and neutral circuits.
- Event to records Low Voltage Network overvoltage, undervoltage and voltage spikes in real time.
- The meter must generate alarms to identify the events occurring and must allow the alarms status to be extracted locally or remotely.
- Fault in a power supply backup element (necessary to keep the RTC and antitamper circuits running also when the meter is not powered).
- The meters must activate the Electromagnetic Pulse Display Alarm if subjected to any electromagnetic stimulus exceeding what is tested according to national standard. The meter has to support among the others last gasp ad first breath functionalities
- Voltage and storage interruption alarm
- Electricity supply quality alarm.
- Power limit violation alarm with history management in the meter's memory.
- Meter tampering alarm on first commissioning.

7.1.19. Battery

The battery must be a high-quality lithium battery to guarantee its correct operation for 13 years.

The battery must maintain the meter's internal clock, preserve its programming and detect opening of the terminal block cover, in case of power failure for the entire lifetime of the meter.

The battery must be internal the meter or, if it is external, it must guarantee its functionality for the entire lifetime of the meter and it must be accompanied with the seal specified in 7.1.15.

7.1.20. The Clock

The real time clock (RTC) must be inside the meter.

The clock must have a precision of < 0,5 sec. /day at a reference temperature of 23°C

The clock (RTC) precision without primary power for up to 36 hours < 1.5 sec. /day at reference temperature of 23°C.

It is permitted a drift in clock accuracy by temperature change of < 0.15 sec. /day/°C.

The meter must have remote clock synchronization

7.1.21. Communication requirements

The smart meters must support a communication technology P2P towards the measurement data management systems of the DSO via 4G /standard cellular communication network available in Argentina and/or Colombia**.**

The smart meters must support remote communication at a logical communication level so that it can be efficiently controlled by Enel's automatic measurement management system.

In particular the communication protocol that must be supported by the devices is DLMS/COSEM as defined by the standard IEC 62056.

- IEC 62056-6-1, Electricity Metering Data Exchange. The DLMS/COSEM Suite. Part 6-1: Object Identification System (OBIS).
- IEC 62056-6-2, Electricity metering data exchange - The DLMS/COSEM suite - Part 6-2: COSEM interface classes.
- IEC 62056-5-3, Electricity metering data exchange - The DLMS/COSEM suite - Part 5-3: DLMS/COSEM application layer.

The communication profile to guarantee the interoperability is one of the twos below:

GCP DLMS o IDIS PACKAGE3

Considering the communication technology offered, the manufacturer must demonstrate that have all the experience and documentation necessary to develop autonomously the communication technology in the devices without the need of any documentation support by Enel Grids. A declaration must be submitted by the

supplier on this item.

In any case, the supplier must provide all the documentation necessary to read and manage the meters and concentrators through the HES systems defined by Enel.

The P2P meter must support cellular communication (e.g 4G) working in Argentina and Colombia for the communication directly with the remote system implemented by the DSO. The communication module shall operate multifrequency band and at least B2 (1900), B4 (1700/2100 AWS 1), B5 (850), B7 (2600), B28a (700)).

Para el caso de 5G, debe soportar las bandas a utilizar en Argentina.

The antenna of the meter must be internal of the device itself. The smart meters has to guarantee also the installation of an external antenna by means an SMA connector available on the device

The meter must have a local communication interface (optical), which accepts parameter modification commands and data reading commands, with reserved protection keys (activable/deactivable), according to IEC 62056-21.

The communication protocol used for the local interface must be the same indicated for the communication via the remote system.

The supplier must provide an updated version of the software for local reading and parametrization of the meter.

The meter must support, among the others, the Last Gasp functionality so that when an outage of power supply of electrify network occurs it is capable to inform the DSO regarding the outage event before its shut down. First breath must be also implemented.

In general it is desirable, the Smart Meter must guarantee the flexibility in terms of communications management to allow its deployment in different countries according to local regulation.

For TCA, the offered device must be integrated into Enel Colombia's management software. If the device and its firmware are not integrated into Enel Colombia's management and operation software, the supplier must assume the integration and development costs. Any new firmware version must not generate new integration and development costs; if they exist, these costs must also be assumed by the supplier. Any new firmware version must be authorized by Enel Colombia.

For Argentina, the following detailed additional requirement must be considered applicable: the communication between the meter and the DSO must be by means of SIM card, simple or dual, M2M, that allows to configure manual APN (at least 3) and that supports the bands of 3G, 4G and 5G of Argentina. In case there is the dual SIM it must be inside the counter, external SIMs are not acceptable.

7.1.22. Last gasp functionality

The smart meter must be equipped with an internal backup supply in order to guarantee the right implementation of last gasp functionality. In particular in case of outages of electric energy on the network meter must be alive, before its shut down, for a time period of at least of 45 seconds.

For the structure of last gasp message please refer to the annex 1

7.1.23. Non volatile memory

Meter registers must store mass memory at least minus 5 minutes, but the meter must be able to set values for: 5, 10, 15, 30 or 60 minutes.

The meter must have at least 9 channels for load profiles recording. These channels can be configured in order to record load profile of voltage, current, direct and reverse active energy, and direct and reverse reactive energy (Q1, Q2, Q3, Q4).

For Argentina, the meter must be able to set the integration period to the following values: 5, 10, 15, 30 or 60 minutes. Integration period defines how often data must be saved in nonvolatile memory. Considering an integration period of 15 minutes, the meter must store information related to the 9 channels for at least 60 days.

For Colombia, the meter must be able to set the integration period to the following values: 5, 10, 15, 30 or 60 minutes. Integration period defines how often data must be saved in nonvolatile memory. Considering an integration period of 15 minutes, the meter must store information of energy, voltage and current channels (e.g. 15 channels for three phase meter: A+, A-, R+, R-, A net, R+L, R+C, R-L, R-C, Iavrg L1, Iavrg L2, Iavrg L3, Vavrg L1, Vavrg L2, Vavrg L3) for at least 60 days in compliance to CREG 101001/2022 resolution.

7.1.24. Cut-Off Device

The meter must have an internal relay to allow the power disconnection and reconnect function. In particular the cut-off device must implement the following number of poles (only phase cut-off):

	Monophase meter	2 phase meter	3 phase meter
N°of poles	1	2	3
Note: This table is to be considered only for Colombia			

Reconnecting function of the internal relay must be implemented in the following way:

- Automatic (depending on the functionality)
- Protocol command.
- Remote command triggered from the customer premises.

The internal relay must not have any parts accessible from the outside.

For Colombia, the meter must have a polyphase cutoff module that allows continuous conduction and switching of loads up to 120A for each phase.

For Argentina it is necessary that the meter have a monophase cutoff module that allows continuous conduction and switching of loads up to 60 A for the monofasic meter and 120A for the three-phase-meter.

The relay must operate in the ambient temperature range of -10 to 70°C and in the voltage range of 120/208 V for Colombia and 220/380V for Argentina.
± 20%.

The relay must guarantee a life cycle of at least 10.000 operations without the need of maintenance for

Colombia while for Argentina the relay must guarantee a life cycle of at least 1000 operations without the need of maintenance.

The relay must return to the same condition (open or closed) after irregular events (e.g. blackout).

The relay shall generate information about functionality success or functionality failure beyond the interface of communication.

NOTE: Table 1 lists the material codes that contain the cut and reconnect module.

7.2 Specific requirements

The meter must calculate consumption in at least 4 (four) tariffs (6 tariffs would be preferable to allow any future developments).

The meter must allow the configuration of at least 8(eight) different time slots throughout the day.

The meter must allow the start and end of each tariff band to be programmed.

The must support seasonal configuration to allow the customer to have at least two tariff structures during the year (one for summer and one for winter).

The meter must be able to show the active tariff on the display.

The meter must allow the automatic management (activation and de-activation) of the daylight-saving time (DST). This functionality must be configurable to be disabled or activated in other days of the year compared to the standard ones.

The meter must have sufficient memory to manage at least 20 public holidays (fixed or mobile) throughout its useful life or allow public holidays to be updated remotely.

7.3 Identification

7.3.1. Meter

The meter identification must be provided to the distributor by ENEL before starting the production process. The identification of the meter must be included into the marking of the meter. Marking of the meter must comply with local regulation and it must include also a QR code.

Markings of the meter must be indelible and easily readable.

The QR-code, printed on the meter, must comply with the following format indications:

- The type of coding to be used is "Alphanumeric".
- The QR code pattern is "Model 2".

The QR-code version to be used is 5 (up to 122 alphanumeric characters can be encoded with error correction level "M"). The meter identification must have the space reserved for the DSO with a minimum of: 12x60mm and a maximum of 15x90mm, while the area for QR code must be at least 19,5x19,5 mm.

The identification must have a contrast that allows reading.

Marking of the meter must include also logo of the DSO, that must be indelibly engraved in monochromatic

colors.

The asset number must be engraved in bas-relief and completed with indelible monochromatic ink (according to requirement 7.1.12) alternatively the asset number must be laser engraved or conventionally printed.

Regarding the detailed information to be included see paragraph “meter nameplate” (7.1.12)

7.3.2. Packaging label

Packaging must comply with requirements included in the documentation of Enel Argentina and Enel Colombia.

The packaging label must be approved by the DSO before starting the production process.

The packaging used for the materials for this acquisition must contain the following information:

a) name or trademark of the manufacturer.

b) Complete identification of the content;

c) Type and quantity;

d) Mass (gross and net) and dimensions of the envelope;

e) Client name;

f) Purchase order number.

7.4 Probes for local communication with devices

The supplier has to provide, in addition to the infield devices, probes allowing the local communication with the smart meters. These probes must be in line with all applicable regulation (Argentina and Colombian ones and international ones) guaranteeing their compatibility with the infield devices offered and the tools available by the infield operators of the DSO,

The supplier has to describe the main characteristics of the probes, providing main technical details, so that they can be evaluated and approved, if in line with enel needs, by Enel itself.

7.5 Tests

Suppliers must submit, compulsorily, upon product approval, or at any time, at the request of the DSO (Enel Colombia and Enel Argentina), under their responsibility, the following certificates and test reports:

- Certificates of “Model Approval” (initial and any modifications).
- Retie certification (if applicable)
- Test reports referring to the type approval process, of all the regulations, for which the equipment is approved/mentioned in an approval decree;
- Minimum technical warranty starting from the installing date
- All devices have to include warranty certificates
- Test Report including the lifetime of the meter according to the standard IEC 62059-31-1
- Functional and Communication Tests to ensure integration into the system used by the ENEL group for measurement and functionalities management;

For Argentina, the following two points are also additionally required:

- Certificate of “Model Approval”, issued by the Secretariat of Industry and Commerce (SIC) under the Economy Ministry;

- Electrical safety certificate, issued by the certifying body (IRAM) approved by the SIC.

For all countries:

All legal certificates need to allow the infield installation of the devices according to national regulation.

All tests must be carried out by laboratories accredited.

During integration into the Enel system, the supplier must provide all necessary technical support.

The TCA will be managed according to the specification GSCG002 Ver.3.

NOTE: The material must have implemented all technical requirements that were determined during the approval process (TCA). If the material changes, the supplier must inform Enel to prior assessment of the impact on the distribution network. Depending on the change, the supplier must carry out new tests so that the change in material does not compromise the minimum requirements required in this design technique. As provided for in GSCG002, any change in technology, the supplier must carry out a new TCA process with Enel.

7.5.1. Further documentation to support the TCA process

With regard to each Field Device, the manufacturer must deliver all the technical documentation listed below, necessary for the fully autonomous management of the functionalities of the products supplied as updated from time to time, in the event of any HW and/or SW modification developed by the manufacturer - through the Technical Conformity Assessment process - and with a guarantee of confidentiality by Enel for the management of such documents. The following is a list of documents that must be considered an integral part of the TCA process in addition to the documentation necessary for the tests and certifications indicated in the previous paragraphs:

- Functional technical specification of the devices describing HW and SW operation
- Technical specification of the communication protocol describing the procedure and the structure of the messages exchanged between the filed devices ;
- Technical specification of the communication protocol describing the procedure and the structure of the messages exchanged between the filed devices and remote system allowing the integration of the device into Enel remote systems;
- Software Default values specification
- Identification parameters specification allowing their integration from a supply chain point of view;
- Adress communication programming;
- Secret key management;
- Firmware release notes;
- Installation requirements Manual;
- Software to support problem determination and diagnostic analysis

The documents will be managed in accordance with the provisions of MAT-O&M-NCS-2021-0033-EGIN through the use of the MLM system.

7.6 Transport, packaging and conditioning

Provide packaging that aid the circular economy and the environment, i.e.:

- Use of reusable packaging;
- Packaging made with recycled raw material.

The material must be packed so as to prevent the penetration of water and contain the identification

7.7 Supply

For the supply to DSO, a prototype must be homologated in advance.

7.8 Warranty

The equipment, as well as its components and accessories must have a factory warranty for the minimum period 5 years or as indicated in the acquisition processes, against any manufacturing defect, counted from the date of delivery.

The equipment must have a failure rate of up to 1% per year throughout the warranty period and if this rate exceeds the limit of 1.00%, the supplier must automatically extend the guarantee for another 12 months, up to a limit of 7 years.

The meter must have a minimum useful life of 15 years.

The equipment must have 1 (one) year of local technical support to resolve problems, if necessary.

The supplier must provide the necessary support for the installation and use of the equipment and

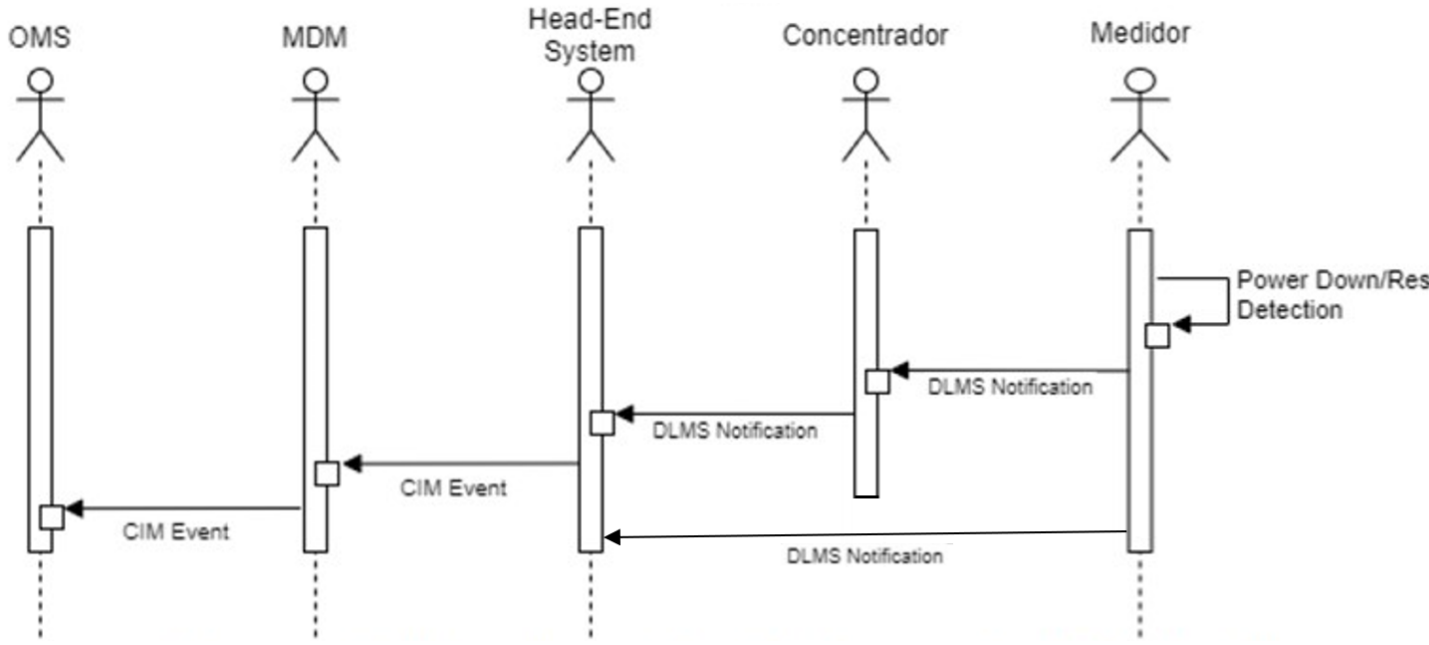
integration of the product into the remote systems.

8. Annex 1

This paragraph describes the "last gasp" functionality that the meter must support.

This functionality consists of automatic notification of loss of supply to improve reaction times.

When a power outage occurs and it does not correspond to a scheduled suspension (for example, associated with maintenance work on the distribution network), the energy company typically relies on calls from its customers to be notified and identify the location of the failure. Through the measurement infrastructure, detect the occurrence of the failure automatically (Last Gasp functionality), improving service restoration times and therefore quality indicators.



OMS: Outage Management System.

MDMS: Meter Data Management System.

HES: Head End System.

Material Specification code: GRI-GRI-MAT-NE&D-0029

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Subject: GSSM010 – Smart Meter P2P

Application Areas

Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Enel Grids and Innovation*