

Annex 1.2: Schedule of Requirements Table

LOT2 DISTRIBUTION: PLC Hybrid

LOT 2:		Total
DISTRIBUTION: PLC Hybrid	1 phase	3 phase direct connection
Total Meters	2353	78
Total Concentrators	31	

Smart Meters

REQUIRED SPECIFICATIONS		
Specifications	Smart meters, single-phase	Smart meters, three-phase direct connected
Accuracy class: for Active Energy for Reactive Energy	B 2	B 2
Reference current	min. 5 A	min. 5 A
Maximum current, Iref	min. 60 A	min. 80 A
Minimum current	0.05 Iref for active / 0.05 Iref for reactive	0.05 Iref for active / 0.05 Iref for reactive
Reference voltage, Un	230 V	3×230/400 V
Reference frequency	50 Hz (± 2 %)	50 Hz (± 2 %)
Inherent consumption (EN 50470-3 , IEC 62053/21-22-23, IEC 62053-61, without communications overhead) of current circuit, not more than of voltage circuit, not more than	1 VA 2 W / 10 VA	1 VA 2 W / 10 VA per phase
Inherent consumption of voltage circuit (IEC 62052-11, IEC 62053/21-22-23, IEC 62053-61, including communication overhead), not more than	5 W / 10 VA	3 W / 10 VA per phase
Internal clock accuracy (IEC 62052-21)	≤ 0.5 s / 24 h	≤ 0.5 s / 24 h
Insulation strength (IEC 61010-1-90)	4 kV, 50 Hz, 1 min	4 kV, 50 Hz, 1 min
Shock voltage (IEC 60060-1)	6 kV, 1.2/50 μs	6 kV, 1.2/50 μs
Electrostatic discharge (IEC 61000-4-2)	15 kV	15 kV
High frequency radiant field (IEC 61000-4-3)	≥ 30 V/m	≥ 30 V/m
High frequency interferences (IEC 6100-4-4)	4 kV	4 kV
Surge immunity test (IEC 6100-4-5)	6 kV	6 kV

IP rating	IP54	IP54
Mechanical class	min. M1	min. M1
MTL (Mean Total Lifetime)	not less 15 years	not less 15 years
MTBF (Mean Time Before Fail)	less than / year 0.5%	less than / year 0.5%
CERTIFICATES		
Specifications	Smart meters, single-phase	Smart meters, three-phase direct connected
MID certificate	Should be issued by European recognized lab	
PLC certificate	PLC PRIME 1.3.6 and 1.4	
Production certificate	According to MID (mode D)	
ISO	9001	
FUNCTIONAL SPECIFICATIONS - METERING PARAMETERS	REQUIRED SPECIFICATIONS	
Specifications	Smart meters, single-phase	Smart meters, three-phase direct connected
METERING DATA	<ul style="list-style-type: none"> - Actual meter readings; - Periodic (billing) meter readings: Day, month; - Interval meter readings: 15', 30', 60'; day - Timestamp. 	
MULTI-RATE METERING	<ul style="list-style-type: none"> - Up to 4 tariff registers, flexible adjustment of tariff intervals; - Min. 4 changeovers per day; - Tariff indicator is displayed on LCD and transmitted to an external system; - Active and passive tariff plans, configurable activation time of the passive tariff plan. 	
MEASURED VALUES	<ul style="list-style-type: none"> - Active energy, class B, export/import; - Reactive energy, class 2, 4 quadrants; - Apparent energy; - Active/reactive power, apparent power; - Phase voltage/current, instantaneous value (True RMS, integration period 1 s); - Voltage angle values relative to the voltage in first phase and phase currents relative to relevant phase voltages. 	
METERING CALENDAR	<ul style="list-style-type: none"> - Up to 4 seasons per year; - Up to 7 daily profiles per week; - Up to 30 special days per year; - Support of movable holidays. 	
DATA STORAGE	<ul style="list-style-type: none"> - Non-volatile memory; - Not less than 3 interval profiles and 1 billing profile. - Storage capacity: - 15 minutes interval profile: not less than 45 days for 6 parameters - Asynchronous profile (spontaneous events), last entries data. 	
OPERATING MODES	<ul style="list-style-type: none"> - Normal mode; - Energy saving mode - real time clock, opening sensors, and data displaying are active. 	
POWER QUALITY CONTROL	<ul style="list-style-type: none"> - Quality indexes: <ul style="list-style-type: none"> ✓ average voltage; ✓ voltage sags and swells; ✓ outages; ✓ network frequency; ✓ THD for voltage/current harmonics; - Remote or local configuring of parameters thresholds and control actions. 	
FUNCTIONAL SPECIFICATIONS - MANAGEMENT AND CONTROL PARAMETERS	REQUIRED SPECIFICATIONS	

Specifications	Smart meters, single-phase	Smart meters, three-phase direct connected
DLMS/COSEM SUPPORT	<ul style="list-style-type: none"> - IEC 62056 compliant; - Object Identification System compliant; - Standard data models; - Standard communications protocols. 	
DATA TRANSMISSION	<ul style="list-style-type: none"> - On demand; - By Schedule; - Remote HES request; - Local request (via optical port). - Internal interface for transformer connected meters (which is an integrated part of the data concentrator) 	
SOFTWARE UPGRADE	<ul style="list-style-type: none"> - Remote (via communication channel); - Local (via RS-485 or optical port) 	
FRAUD AND THEFT PROTECTION	<ul style="list-style-type: none"> - Non-stop monitoring, including sleep mode time; - Meter cover opening sensor; - Terminal block cover sensor; - Reverse meter connection control; - Strong magnetic field detection; - Events registering in relevant logs; 	
BUILT IN CLOCK	<ul style="list-style-type: none"> - Real-time clock with 0.5 s accuracy per day; - IEC 62052-21 standard compliant; - External synchronization with HES 	
EVENTS AND ALARMS HANDLING	<ul style="list-style-type: none"> - Continuous control of current state of meter functional nodes and alarms/events; - Standard set of events processing including: registration in special logs and registers, event report sending, states displaying; - Different types of event logs; - Asynchronous sending of Event; - Notification can be configured for specific events. 	
METER SELF CONTROL	<ul style="list-style-type: none"> - Built-in test for continuous self-control; - Quick response on severe error 	
POWER LOAD CONTROL	<ul style="list-style-type: none"> - Basic relay (80 A) – for direct connected meters only - Control modes: <ul style="list-style-type: none"> ✓ remote (by command) ✓ local (by condition) ✓ manual - by push button - Basic relay status displayed on the meter LCD 	
METER PARAMETRIZATION	<ul style="list-style-type: none"> - Remote (via communication channel) or local (via optical port); - Access rights assignment from HES; 	
THRESHOLDS MANAGEMENT	<ul style="list-style-type: none"> - Threshold for active power, active power demand, current/voltage (per phase), differential current (direct connected meters only); - Remote or local configuring of parameters thresholds; - Possibility to disconnect consumer from the network, when a threshold is crossed. 	
BACK-UP POWER SUPPLY	<ul style="list-style-type: none"> - Supports clock/meter operation when the power is off; - Battery, lifetime - not less than 10 years. 	
FUNCTIONAL SPECIFICATIONS - SECURITY	REQUIRED SPECIFICATIONS	
Specifications	Smart meters, single-phase	Smart meters, three-phase direct connected
INFORMATION SECURITY	<ul style="list-style-type: none"> - Communication encryption (AES-GCM-128 security suite); - Data access according to access rights stated; 	

	- Firmware protection.	
FUNCTIONAL SPECIFICATIONS - INTERFACES	REQUIRED SPECIFICATIONS	
Specifications	Smart meters, single-phase	Smart meters, three-phase direct connected
OPTICAL PORT	<ul style="list-style-type: none"> - IEC 62056-21 Compliant; - Data rates - up to 19200 bps; - Password protected; - Multiple access levels. 	
BUILT-IN DISPLAY	<ul style="list-style-type: none"> - LCD with min 8 lines; - Configurable decimal places (up to 3 digits); - Manual and automatic scrolling; - Backlight. 	
TEST OUTPUTS	<ul style="list-style-type: none"> - 2 led outputs; - Active and reactive energy; 	
PUSH BUTTON	<ul style="list-style-type: none"> - Scroll meter screens; - View data on LCD, when the power is off. 	
RS485 SERIAL INTERFACE (optional , mandatory for Lot 3 only)	<ul style="list-style-type: none"> - EIA/TIA-485A standard; - Baud rate - up to 38400 bps 	
FUNCTIONAL SPECIFICATIONS - REMOTE COMMUNICATION	REQUIRED SPECIFICATIONS	
Specifications	Smart meters, single-phase	Smart meters, three-phase direct connected
POWER LINE Hybrid COMMUNICATION (PLC+RF)	<ul style="list-style-type: none"> - OFDM PLC Module; - PLC PRIME Hybrid (PLC+RF) - CENELEC and FCC bands for PLC - IEEE 802.15.4 for RF channels - Auto-discovery; - Repeating. 	
REMOTE DISCONNECTION	<ul style="list-style-type: none"> - Bi-stable switching module for local or remote disconnection/reconnection; - Min. 10 000 mechanical disconnections/reconnections under maximum load. 	

Data Concentrators

TECHNICAL SPECIFICATIONS	
REQUIRED SPECIFICATIONS	
Nominal voltage	- 230/400V±20%
Supply voltage	- 85-460 V
Frequency	- 50 Hz ± 2%
Clock accuracy (at 25°C), not more than (IEC 62052-21)	- 0.5 s /24 h
The variation of the time-keeping accuracy with the temperature from – 40 °C to +70°C, not more than	- ± 0,1 s/°C/24 h
Maximum active consumed power	- 12 W

Average total consumed power	- 30 VA
Operation temperature range	- -20°C ... +75°C
Storage and transportation temperature	- -40°C ... +85°C
Difference between temperature of internal parts and environment	- 30°C (ambient temperature less than 55°C)
Maximum humidity	- Up to 95 %
Impulse voltage (IEC 62052-11) - between power circuits and neutral and their combinations); - between all phases, neutral and earth	- 12kV, 1,2/50 µs, 40 Ohm - 6 kV, 1,2/50 µs, 500 Ohm
High frequency radiant field (IEC 61000-4-3)	- 10 V/m
Electrostatic discharge (EN 61000-4-2)	- 15 kV
High frequency interferences (IEC 61000-4-4)	- 4 kV
Surge immunity (IEC 61000-4-5)	- 6 kV
Voltage fluctuations, not more than	- 1 s
IP rating, not less than	- IP54
Insulation protection	- Class 2
Protection against mechanical impacts	- IK 02
Mean time between failures (at fault probability of 0.8)	- 24 000 hours
Mean lifetime, not less than	- 15 years
DESIGN	
REQUIRED SPECIFICATIONS	
Connection diagram	- Printed on the nameplate
Enclosure material	- Reinforced polymer
CERTIFICATES and EXPERIENCE	
REQUIRED SPECIFICATIONS	
PLC Prime certificates	- PRIME Alliance certificate by authorized lab
FUNCTIONAL SPECIFICATIONS	
REQUIRED SPECIFICATIONS	

NETWORK MANAGEMENT	<ul style="list-style-type: none"> - Full 2-way communication: <ul style="list-style-type: none"> ✓ Transmitting metering data and alerts to the HES; ✓ Transmitting commands from the HES to the Smart Meters; - Automatic detection, registration and support of end-point devices within the network. - Support of up to 1,000 end-point devices. - Ability to work when there are power outages ("last gasp" function) - Ability to notify when there is a power outage.
COMMUNICATIONS	<ul style="list-style-type: none"> - LV PL communications: <ul style="list-style-type: none"> ✓ PLC PRIME standards compliant; ✓ CENELEC band and FCC band ✓ .EMC standards compliance ✓ Auto-discovery ✓ Repeating
PLC SIGNAL INJECTION.	<ul style="list-style-type: none"> - DC injects the PLC signal into all three phases simultaneously.
INTERFACES	<ul style="list-style-type: none"> - Ethernet interface: <ul style="list-style-type: none"> ✓ For LAN and WAN communication, 10/100 BASE-T Ethernet IEEE 802.3 standard compliance. - USB interface: <ul style="list-style-type: none"> ✓ USB 2.0 Full Speed standard compliant, can be used for local communication. - RS-485 interface <ul style="list-style-type: none"> ✓ TIA/EIA-485 standard compliant used for communication with external devices.
BALANCE METERING	<ul style="list-style-type: none"> - Transformer connected smart meter is an integral part of the DC; or - Balance Meter is a separate transformer connected meter - Allows balance measurements to supervise and monitor the energy supply quality.
BACKUP POWER SUPPLY	<p>To ensure BC availability all the time:</p> <ul style="list-style-type: none"> - Possibility to connect the external power supply (UPS), from 12 to 24V DC.
BUILT-IN CLOCK	<ul style="list-style-type: none"> - RTC accuracy 0,5 s /24 h. according to (IEC 62052-21). - Network Time Protocol (NTP) for clock synchronization. - Support in backup supply mode. - Automatic changeover for daylight saving time.
DLMS/COSEM SUPPORT	<ul style="list-style-type: none"> - The DC communicates with the meters using the DLMS protocol according to the COSEM Profile and OBIS Code DLMS - Based on interoperability concept allows support of meters from different manufacturers which follow the same communication standards
DATA STORAGE	<ul style="list-style-type: none"> - Data storage in non-volatile memory - Long term data storage. - All data is written in non-volatile memory immediately after receiving.
INFORMATION SECURITY	<ul style="list-style-type: none"> - Provides secure data transmission based on DLMS/COSEM encryption and authentication - Communication encryption protection (AES-128 bit key). - HTTP secure protocol. - Support of VPN-tunneling (IPSec protocol). - Data access according to access rights stated. - Firmware protection.
INDICATION LEDS	<ul style="list-style-type: none"> - LEDs to reflect status of available interfaces: - LV, Ethernet, RS-485. Placed on DC front - Power supply and UPS LEDs.
FRAUD PROTECTION	<ul style="list-style-type: none"> - DC case and terminal block opening sensors. - Continuous monitoring of opening sensors, including backup supply mode. - Sealing: Two protective seals for DC and its terminal block. - Secure design: terminal block should not be opened without removing DC cover.

EVENTS & ALARMS HANDLING	<ul style="list-style-type: none"> - Continuous control of DC current state in real time mode: managed devices registration/unregistration, power failures, tamper attempts, communication events, firmware update etc. - Events processing, storage and reporting: registration in different event logs, event report sending, state presentation by LEDs. - Immediate notification to HES in case of alarms. - Timestamps.
ADDRESSING MODE	- Unicast, broadcast and multicast modes of transmission.
DATA COLLECTION	<ul style="list-style-type: none"> - On request. - By preliminary set schedule. - On event occurred.
PARAMETERIZATION	<ul style="list-style-type: none"> - Remotely or locally via Ethernet interface - DHCP support. - Web-interface as a parameterization tool.
SOFTWARE UPGRADE	<ul style="list-style-type: none"> - Managed meters remote update via HES platform; - Remote DC firmware update by Web browser (also local) or HES application; - DC automatic update from the stated URL at scheduled time;

TECHNICAL SPECIFICATIONS - HES SOFTWARE	
REQUIRED SPECIFICATIONS	
SOFTWARE LICENCES	<ul style="list-style-type: none"> - HES software licenses will be offered for piloting, free of charge with full functionality; - The Bidder will provide the necessary hardware and operating system specifications for the HES software installation; - The HES platform must have sufficient licenses to cover the meters delivered by the Bidder; - Licenses must be valid for a period of 12 months from the time of commissioning.