**Annex 2.1: Technical Responsiveness Table – LOT 1**

**LOT 1 DISTRIBUTION: PLC Prime**

**Bidder should offer the full quantity per LOT. Please fill in the offered specifications in the below tables.**

|  |  |  |  |
| --- | --- | --- | --- |
| LOT 1:  DISTRIBUTION: PLC Prime | Total | | |
| **1 phase** | **3 phase direct connection** | **3 phase TC Connection** |
| Total Meters | 28860 | 1643 | 346 |
| Total Concentrators | 246 | | |

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| **TECHINCAL SPECIFICATIONS SMART METERS** | | | | | | | | | | | | | |
|  | **REQUIRED SPECIFICATIONS** | | | | | | | | | | **OFFERED SPECIFICATIONS** | | |
| **Specifications** | **Smart meters,**  **single-phase** | **Smart meters,**  **three-phase direct connected** | | | | | **Smart meters,**  **three-phase transformer connected** | | | | **Smart meters,**  **single-phase** | **Smart meters,**  **three-phase direct connected** | **Smart meters,**  **three-phase transformer connected** |
| **Manufacturer:**  **Model:** | **Manufacturer:**  **Model:** | **Manufacturer:**  **Model:** |
| Accuracy class:  for Active Energy  for Reactive Energy | B  2 | B  2 | | | | | С  2 | | | |  |  |  |
| Reference current | min. 5 A | min. 5 A | | | | | min. 5 A | | | |  |  |  |
| Maximum current, Iref | min. 60 A | min. 80 A | | | | | min 5 A | | | |  |  |  |
| Minimum current | 0.05 Iref for active /  0.05 Iref for reactive | 0.05 Iref for active /  0.05 Iref for reactive | | | | | 0.01 Iref for active / 0.02 Iref for reactive | | | |  |  |  |
| Reference voltage, Un | 230 V | 3×230/400 V | | | | | 3×230/400 V | | | |  |  |  |
| Reference frequency | 50 Hz (± 2 %) | 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 | | | | | 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 | | | | | 3 W / 10 VA per phase | | | |  |  |  |
| Internal clock accuracy (IEC 62052-21) | £ 0.5 s / 24 h | £ 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 | | | | | 4 kV, 50 Hz, 1 min | | | |  |  |  |
| Shock voltage (IEC 60060-1) | 6 kV, 1.2/50 ms | 6 kV, 1.2/50 ms | | | | | 6 kV, 1.2/50 ms | | | |  |  |  |
| Electrostatic discharge (IEC 61000-4-2) | 15 kV | 15 kV | | | | | 15 kV | | | |  |  |  |
| High frequency radiant field (IEC 61000-4-3) | ³ 30 V/m | ³ 30 V/m | | | | | ³ 30 V/m | | | |  |  |  |
| High frequency interferences (IEC 6100-4-4) | 4 kV | 4 kV | | | | | 4 kV | | | |  |  |  |
| Surge immunity test (IEC 6100-4-5) | 6 kV | 6 kV | | | | | 6 kV | | | |  |  |  |
| IP rating | IP54 | IP54 | | | | | IP54 | | | |  |  |  |
| Mechanical class | min. M1 | min. M1 | | | | | min. M1 | | | |  |  |  |
| MTL (Mean Total Lifetime) | not less 15 years | not less 15 years | | | | | not less 15 years | | | |  |  |  |
| MTBF (Mean Time Before Fail) | less than / year 0.5% | less than / year 0.5% | | | | | less than / year 0.5% | | | |  |  |  |
| **CERTIFICATES** | **REQUIRED SPECIFICATIONS** | | | | | | | | | | **OFFERED SPECIFICATIONS** | | |
| Specifications | **Smart meters,**  **single-phase** | | | | | **Smart meters,**  **three-phase direct connected** | | | | **Smart meters,**  **three-phase transformer connected** | **Smart meters,**  **single-phase** | **Smart meters,**  **three-phase direct connected** | **Smart meters,**  **three-phase transformer 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** | | | | | | | | | | **OFFERED SPECIFICATIONS** | | |
| Specifications | **Smart meters,**  **single-phase** | | | | | **Smart meters,**  **three-phase direct connected** | | | **Smart meters,**  **three-phase transformer connected** | | **Smart meters,**  **single-phase** | **Smart meters,**  **three-phase direct connected** | **Smart meters,**  **three-phase transformer connected** |
| METERING DATA | * Actual meter readings; * Periodic (billing) meter readings: Day, month; * Interval meter readings: 15’, 30’, 60'; day * Timestamp. | | | | | | | | | |  | | |
| MULTI-RATE METERING | * 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 | * 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 | * 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 | * 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 | * Normal mode; * Energy saving mode - real time clock, opening sensors, and data displaying are active. | | | | | | | | | |  | | |
| POWER QUALITY CONTROL | * Quality indexes: * 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** | | | | | | | | | | **OFFERED SPECIFICATIONS** | | |
| Specifications | **Smart meters,**  **single-phase** | **Smart meters,**  **three-phase direct connected** | | | | | **Smart meters,**  **three-phase transformer connected** | | | | **Smart meters,**  **single-phase** | **Smart meters,**  **three-phase direct connected** | **Smart meters,**  **three-phase transformer connected** |
| DLMS/COSEM SUPPORT | * IEC 62056 compliant; * Object Identification System compliant; * Standard data models; * Standard communications protocols. | | | | | | | | | |  | | |
| DATA TRANSMISSION | * 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 | * Remote (via communication channel); * Local (via RS-485 or optical port) | | | | | | | | | |  | | |
| FRAUD AND THEFT PROTECTION | * 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 | * Real-time clock with 0.5 s accuracy per day; * IEC 62052-21 standard compliant; * External synchronization with HES | | | | | | | | | |  | | |
| EVENTS AND ALARMS HANDLING | * 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 | * Built-in test for continuous self-control; * Quick response on severe error | | | | | | | | | |  | | |
| POWER LOAD CONTROL | * Basic relay (80 A) – for direct connected meters only * Control modes: * remote (by command) * local (by condition) * manual - by push button * Basic relay status displayed on the meter LCD | | | | | | | | | |  | | |
| METER PARAMETRIZATION | * Remote (via communication channel) or local (via optical port); * Access rights assignment from HES; | | | | | | | | | |  | | |
| THRESHOLDS MANAGEMENT | * 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 | * Supports clock/meter operation when the power is off; * Battery, lifetime - not less than 10 years. | | | | | | | | | |  | | |
| **FUNCTIONAL SPECIFICATIONS - SECURITY** | **REQUIRED SPECIFICATIONS** | | | | | | | | | | **OFFERED SPECIFICATIONS** | | |
| Specifications | **Smart meters,**  **single-phase** | | **Smart meters,**  **three-phase direct connected** | | | | | **Smart meters,**  **three-phase transformer connected** | | | **Smart meters,**  **single-phase** | **Smart meters,**  **three-phase direct connected** | **Smart meters,**  **three-phase transformer connected** |
| INFORMATION SECURITY | * Communication encryption (AES-GCM-128 security suite); * Data access according to access rights stated; * Firmware protection. | | | | | | | | | |  | | |
| **FUNCTIONAL SPECIFICATIONS - INTERFACES** | **REQUIRED SPECIFICATIONS** | | | | | | | | | | **OFFERED SPECIFICATIONS** | | |
| Specifications | **Smart meters,**  **single-phase** | | | **Smart meters,**  **three-phase direct connected** | | | **Smart meters,**  **three-phase transformer connected** | | | | **Smart meters,**  **single-phase** | **Smart meters,**  **three-phase direct connected** | **Smart meters,**  **three-phase transformer connected** |
| OPTICAL PORT | * IEC 62056-21 Compliant; * Data rates - up to 19200 bps; * Password protected; * Multiple access levels. | | | | | | | | | |  | | |
| BUILT-IN DISPLAY | * LCD with min 8 lines; * Configurable decimal places (up to 3 digits); * Manual and automatic scrolling; * Backlight. | | | | | | | | | |  | | |
| TEST OUTPUTS | * 2 led outputs; * Active and reactive energy; | | | | | | | | | |  | | |
| PUSH BUTTON | * Scroll meter screens; * View data on LCD, when the power is off. | | | | | | | | | |  | | |
| **RS485 SERIAL INTERFACE**  (**~~optional,~~** mandatory **~~for Lot 3 only)~~** | * EIA/TIA-485A standard; * Baud rate - up to 38400 bps | | | | | | | | | |  | | |
| **FUNCTIONAL SPECIFICATIONS - REMOTE COMMUNICATION** | **REQUIRED SPECIFICATIONS** | | | | | | | | | | **OFFERED SPECIFICATIONS** | | |
| Specifications | **Smart meters,**  **single-phase** | | | | **Smart meters,**  **three-phase direct connected** | | **Smart meters,**  **three-phase transformer connected** | | | | **Smart meters,**  **single-phase** | **Smart meters,**  **three-phase direct connected** | **Smart meters,**  **three-phase transformer connected** |
| POWER LINE COMMUNICATION (PLC) | * OFDM PLC Module; * PRIME compliant with specification ITU-T G.9904 * CENELEC and FCC bands * Auto-discovery; * Repeating. | | | | | | | | | |  | | |
| REMOTE DISCONNECTION | * Bi-stable switching module for local or remote disconnection/reconnection; * Min. 10 000 mechanical disconnections/reconnections under maximum load. | | | | | | | | | |  | | |

**Data Concentrators**

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| **TECHNICAL SPECIFICATIONS DATA CONCENTRATORS** | | |
| **REQUIRED SPECIFICATIONS** | | **OFFERED 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 °С to +70°С, not more than | * ± 0,1 s/°С/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 |  |
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| **DESIGN** | | |
|  | **REQUIRED SPECIFICATIONS** | **OFFERED SPECIFICATIONS** |
| Connection diagram | * Printed on the nameplate |  |
| Enclosure material | * Polycarbonate |  |
| **CERTIFICATES and EXPERIENCE** | | |
|  | **REQUIRED SPECIFICATIONS** | **OFFERED SPECIFICATIONS** |
| **PLC certificate** | * **~~G3 or~~** PRIME Alliance certificate by authorized lab |  |

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| **FUNCTIONAL SPECIFICATIONS** | | |
|  | **REQUIRED SPECIFICATIONS** | **OFFERED SPECIFICATIONS** |
| NETWORK MANAGEMENT | * Full 2-way communication: * 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** | * LV PL communications: * PLC PRIME standards compliant; * **~~Radio Frequency communications in 868 MHz band;~~** * CENELEC band and FCC band * .EMC standards compliance * Auto-discovery * Repeating |  |
| PLC SIGNAL INJECTION. | * DC injects the PLC signal into all three phases simultaneously. |  |
| INTERFACES | * Ethernet interface: * For LAN and WAN communication, 10/100 BASE-T Ethernet IEEE 802.3 standard compliance. * USB interface: * USB 2.0 Full Speed standard compliant, can be used for local communication. * RS-485 interface * TIA/EIA-485 standard compliant used for communication with external devices. |  |
| BALANCE METERING | * Transformer connected smart meter is an integral part of the DC; or * Balance meter is a separate * Allows balance measurements to supervise and monitor the energy supply quality. |  |
| BACKUP POWER SUPPLY | To ensure ВС availability all the time:   * Possibility to connect the external power supply (UPS), from 12 to 24V DC. |  |
| BUILT-IN CLOCK | * 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 | * 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 | * Data storage in non-volatile memory * Long term data storage. * All data is written in non-volatile memory immediately after receiving. |  |
| INFORMATION SECURITY | * 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 | * LEDs to reflect status of available interfaces: * LV, Ethernet, RS-485. Placed on DC front * Power supply and UPS LEDs. |  |
| FRAUD PROTECTION | * 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 | * 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 | * On request. * By preliminary set schedule. * On event occurred. |  |
| PARAMETERIZATION | * Remotely or locally via Ethernet interface or serial interface. * DHCP support. * Web-interface as a parameterization tool. |  |
| SOFTWARE UPGRADE | * 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; |  |

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| **TECHNICAL SPECIFICATIONS - HES SOFTWARE** | | |
|  | **REQUIRED SPECIFICATIONS** | **OFFERED SPECIFICATIONS** |
| SOFTWARE LICENCES | * 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. |  |