

## Three phase CT Connection Smart Meter's Technical Specification

General Information		
<b>1</b>		
<b>1.1</b>	<b>Country</b>	
<b>1.2</b>	<b>Manufacturer</b>	
<b>1.3</b>	<b>Vendor</b>	
<b>1.4</b>	<b>type of the Meter &amp; Name</b>	
<b>1.5</b>	<b>and number of sale List of clients referring to name, country, date of sale</b>	
<b>1.6</b>	<b>Company's background on digital Metes technology &amp; capacity of production per year</b>	
<b>1.7</b>	<b>Company's background on Meter production</b>	
2	General Specification	Related Standard for test or control
2.1	Max Nominal current: 5A Min. of max. current (I max): 6A Phase nominal voltage: 230V	IEC 62052-11 parts 4.1 & 4.2
2.2	Starting current should be equal to or less than 0.001 nominal current	IEC62053-22 part 8.3.3
2.3	Accuracy class 0.5 for active energy Accuracy class 2 for reactive energy	IEC62053-22 & IEC62053-21
2.4	Max. Internal power consumption: 10VA (2W) for voltage circuit each phase 0.5VA for current circuit each phase	IEC62053-22 part 7.1
2.5	3-wired & 4-wired connections	performance test
3	Metrology	Related Standard for test or control
3.1	Meter should be 4 Quadrants and it should have the ability of measuring and recording import/export active & reactive Energy separately in trading intervals (the values to be recorded for import and export are actual values).	Software evaluation & performance test
3.2	Record cumulative energy for each TOU channel	Software evaluation & performance test
3.3	Measuring quantity for energy should have following resolutions: for Active Energy ( Min 0.01 kWh resolution ) for Reactive Energy ( Min 0.01 kVarh resolution )	Software evaluation & performance test
3.4	It should be possible to locally and remotely select or configure exported energy whether to be registered or not.(according to standard, when the energy flows from network to the consumer it is registered as IMPORT and when the energy flows from consumer to the network it is registered as EXPORT.)	Software evaluation & performance test
3.5	Meter is configured in such way not to register the consumed energy as Export (except Distributed Generations) and when it is occurred, the system should record this event.	Software evaluation & performance test
3.6	Meter should measure Import/export Energy as well as Absolute value of active energy and it should be possible to activate this capability.	Software evaluation & performance test
3.7	Meter should measure three phase current I1,I2,I3(True RMS)	Software evaluation & performance test
3.8	Meter should measure three phase voltage V1,V2,V3(True RMS)	Software evaluation & performance test
3.9	Meter should measure Power Factor for three phases separately and cumulatively.	Software evaluation & performance test
3.10	Meter should measure appearance Energy and power	Software evaluation & performance test

3.11	<p>Measuring and recording maximum demand of active and reactive power should be based on configurable time intervals and subintervals (sliding mode).</p> <ul style="list-style-type: none"> <li>- It should be possible to reset maximum demand remotely</li> <li>- It should be possible automatically Maximum demand to be reset at specific billing period.</li> </ul> <p>Above capability should be activate or not and all parameter should be adjustable remotely and locally.</p>	Software evaluation & performance test
3.12	Phase sequence should have no affect on Meter measurements	Software evaluation & performance test
3.13	Meter should have two separate pulse outputs (LED) for meter accuracy class test of active(fix impulse/kwh) and reactive(fix impulse/kvarh) energy	performance test
<b>4</b>	<b>Meter's Body</b>	<b>Related Standard for test or control</b>
4.1	Meter's case material should be polycarbonate and it should be fire, heat and ultra violet radiation resistant	IEC62052-11 parts 5.8 & 8.3.4
4.2	All parts of the meter should be resisted against mechanical stroke and shake during the transportation	IEC62052-11 parts 5.2.2.1, 5.2.2.2 & 5.2.2.3
4.3	Meter should be sealed in such way to prevent unauthorized access, theft or tamper. Any attempt for Opening the meter's main cover should not be possible unless by breaking the meter's case.	IEC62052-11part 5.5
4.4	Meter enclosure protection should be at least IP54(without suction) for outdoor installation & IP51 for indoor installation	IEC62052-11 part 5.9
<b>5</b>	<b>Meter's Communication</b>	<b>Related Standard for test or control</b>
5.1	<p>Meter display should have 8 digits (the min size of each digit 3.6×8 mm) and view angle of 15° upward directions and 60° in other directions. Ability to display all measured quantities or desired quantity automatically or scrolling through the button on the meter as follows:</p> <ul style="list-style-type: none"> <li>- Active and Reactive energy in each tariff</li> <li>- Current tariff</li> <li>- Max. Demand in each tariff and also the highest Max. Demand with exact time &amp; date</li> <li>- Time and Persian date</li> <li>- Serial number</li> <li>- Battery charge condition (meter should indicate the battery status and display it on LCD 6 month before complete discharge also battery status should be readable by meter read)</li> <li>- The number of voltage cut off and reverse energy</li> <li>- Internal relay's status</li> <li>- All parts of item 3 ( including instantaneous quantities and cumulative energy values and also maximum demand in all tariffs with time &amp; date indication).</li> </ul> <p>Ability to display kWh and kVarh in at least 8 digits, two fixed decimal digits.</p> <p>Display and record of Max. Demand and also ability of programming Max. Demand time interval calculation. Max. Demand should be measured at least in three integer and two decimal digits.</p> <p>LCD should display measured items in OBIS codes and Appendix1 symbols..</p>	performance test & LCD Documents
5.2	Meter should have optical port with baud rate of 1200 - 9600 bps for local read and configuration according to IEC62056-21, mode E.	IEC62056-21

5.3	<p>Meter should have two wired active RS485 port for remote communication to fulfill AMI system requirements (this port should be physically accessible for authorized person and located on meter base).</p> <ul style="list-style-type: none"> <li>- This port should be screw terminal type and should be easily installed, and also wires should not be contacted directly to this port by screw.</li> <li>- Communication protocol should be according to DLMS/COSEM ,IEC62056</li> <li>- OBIS indication according to IEC62056-61</li> </ul>	IEC62056
5.4	<p>Meter should have a communication port to connect to HAN (Home Area Network). This port could be as follow:</p> <ul style="list-style-type: none"> <li>- Connection to HAN should be established without new wiring.</li> </ul> <p>Note: Based on the costumer's order IHD may be installed or not.</p>	performance test
<b>6</b>	<b>Anti Tampering</b>	<b>Related Standard Number for test or control</b>
6.1	<p>Meter should detect and record physical tamper attempts (fraud and violation) and inform the central system through communication port. some of these tamper attempts are as follows:</p> <ul style="list-style-type: none"> <li>- Big Magnetic field(lower than 0.5mT meter accuracy class should not effected and bigger than 0.5mT should be recorded as tamper, Meters should not be failed to magnetic fields up to 200mT)</li> <li>- Terminal and Meter cover removal</li> <li>- Existence of current, despite absence of one or two phases</li> <li>- Current unbalance, over 50% in one phase or two phases(compare with other phase) should be detected</li> <li>- internal relay is disconnected but customer is not disconnected from power network</li> </ul>	Software evaluation & performance test
6.2	<p>Meter should record following events with their exact time &amp; date and it should be possible to read them remotely;</p> <ul style="list-style-type: none"> <li>- At least 10 recent Magnetic Tamper</li> <li>- At least 10 recent meter cover removal</li> <li>- At least 10 recent terminal cover removal</li> <li>- At least 10 recent energy inverse</li> <li>- At least 10 recent meter turn off (power disconnection)</li> <li>- At least 10 recent remote connect/disconnect order</li> <li>- At least 10 recent meter connect/ disconnect due to load limitation</li> <li>- Meter reprogramming</li> <li>- Tariff change</li> <li>- Time &amp; Date change</li> <li>- Access record with both correct and incorrect passwords</li> <li>- At least 10 recent meter current unbalance</li> <li>- At least 10 recent meter existence of current, despite absence of one or two phases</li> <li>- At least 10 recent relay is disconnected but customer is not disconnected from power network</li> </ul>	Software evaluation & performance test
6.3	Meter should have software serial number which is completely protected by meter	Software evaluation & performance test
6.4	Meter should sealed in such way to avoid any type of tamper and illegal use	Evaluation through terminal cover IEC62052-11 part 5.5
6.5	Stored programs and registers should have Full tamper and fraud protection.	Software evaluation & Manufacturer's assurance
6.6	System and hardware designing should be in such way to make the cumulative memory (holds energy consumption data) unchangeable	Software evaluation & performance test
6.7	<p>Meter should support password with 3 access levels:</p> <ul style="list-style-type: none"> <li>- Meter Reading</li> <li>- Meter Configuration</li> <li>- Firmware upgrade</li> </ul> <p>Each meter password should have inaccessible and protected codes..</p>	Software evaluation
6.8	Meter should detect terminal cover removal in power cut situation (this capability should have no effect on RTC battery life time)	Software evaluation & performance test

7	System Capabilities	Related Standard Number for test or control
7.1	<b>Load Profile</b>	
7.1.1	At least 8 programmable channels for: <ul style="list-style-type: none"> <li>- demand</li> <li>- active and reactive interval energy (import and export)</li> <li>- active and reactive cumulative energy (import and export)</li> </ul> Adjustable time interval from 1 to 60 minutes Meter should keep above channels at least for 31 days	Software evaluation & performance test
7.1.2	At least 8 programmable channels for three-phase voltage, current and power factor separately and totally as well as, frequency and active and reactive appearance demand . Measurement type for each channel can be chosen as follows: <ul style="list-style-type: none"> <li>- average</li> <li>- minimum</li> <li>- maximum</li> </ul> Adjustable time interval from 1 to 60 minutes Meter should keep above channels at least for 31 days	Software evaluation & performance test
7.1.3	2 programmable channel for multi utility meters(water and Gas meter): <ul style="list-style-type: none"> <li>- Meter should keep 31 daily readings of water meter</li> <li>- Meter should keep 31 daily readings of gas meter</li> </ul>	Software evaluation & performance test
7.1.4	Time & Persian date should be included in Load profile	Software evaluation & performance test
7.1.5	Load profile should be readable in complete form and in defined blocks (based on start and end time and channels) locally and remotely.	Software evaluation & performance test
7.2	<b>Tariff</b>	
7.2.1	Meter should be able to calculate and register costumers active and reactive energy consumption in time intervals as bellow: <ul style="list-style-type: none"> <li>- Division of each day in to at least 8 consecutive and adjustable time intervals</li> <li>- Four tariffs for active/reactive energy and Max Demand &amp; record them for normal days and holidays separately and also totally as well as recording of highest Max Demand</li> <li>- 8 day profiles</li> <li>- 4 seasons</li> <li>- 50 definable special days</li> <li>- week profile</li> </ul>	Software evaluation & performance test
7.3	<b>Time &amp; Date</b>	
7.3.1	The accuracy of meter's clock should be 0.5 second per day in 23°C degree and 0.15 second change against 1°C change per day. Meter should have Persian calendar including Leap year, Day light saving time, summer and winter clock and tariffs for normal days, weekend, public holidays. Note: Persian calendar should be readable on each meter interface and this capability should be proved by contractor on each meter interface. Also testing method of this capability should be provided by contractor.	IEC62054-21
7.3.2	Meter should have Day Light Saving Time (DST) mode and it should be possible for operator not only set its time and date but also activate and inactivate it.	Software evaluation & performance test
7.3.3	Activation and inactivation of DST should be registered in the meter with its time & date	Software evaluation & performance test
7.4	<b>Time synchronization</b>	
7.4.1	Meter time & date synchronization should be possible through central system	Software evaluation & performance test
8	<b>Modular Communication modem for LAN (Local Area Network) and direct connection from meter to central system</b>	Related Standard Number for test or control

8.1	Adding or exchanging the communication modem should be done without turning off the meter. Note: Responsibility of communication module is limited only to establish communication with LAN or WAN and other capabilities of Smart Meter should be deployed on meter base.	performance test
8.2	Existence or absence of communication modem should have no impact on meter measurements.	performance test
8.3	Meter should be able to support different communication modems (such as: PLC, RF, GSM/GPRS...) and all this modems should be addible to meter.	performance test
8.4	By turning on the Modem it should be able to communicate directly or indirectly with data concentrator and complete the Self Registration step	performance test
8.5	Communication modem should be industrial type and has watch dog mechanism and also it has the ability to retrieve itself when it is hanged	Contract guaranty
8.6	Communication modem should be manufactured according to industrial equipment standards.	IEC61000 parts 4.2,4.3,4.4,4.5,4.6 4.11,4.16,4.29 IEC60950 & IEC55022
8.7	Meter should be in such way that no needs to unseal the terminal cover to add the communication modem and modem should be sealed in meter body.	performance test
8.8	Power consumption of modem should be determined base on agreement between contractor and client Modem should be on and work until meter is on and working	Contract guaranty
8.9	Plugging and unplugging communication modem should be recorded as event in meter. Meter should record at least 10 recent events for plugging and unplugging of communication modem.	
<b>9</b>	<b>Local or Remote Meter Reading</b>	<b>Related Standard Number for test or control</b>
9.1	Below parameters should be collectable locally and remotely: - Meter status - Meter reading parameters(schedules and on demand parameter) - Meter configuration - Time & Date - Log information - Events and alarms	Software evaluation & performance test
<b>10</b>	<b>Internal Relay's Connection/Disconnection</b>	<b>Related Standard Number for test or control</b>
10.1	Internal Relay should have the ability to be opened and closed	Software evaluation & performance test
10.2	Internal relay's status reading should be on schedule or on-demand	Software evaluation & performance test
10.3	Meter should record status of internal relay and its remote evaluation should be possible.	Software evaluation & performance test
10.4	Complete event record in the case of internal relay connection/disconnection should be done in the meter manually, locally and remotely	Software evaluation & performance test
10.5	Meter should be able to display status of internal relay (connection/ disconnection) clearly	Software evaluation & performance test

10.6	Above-mentioned status should be programmable on meter locally and remotely	Software evaluation & performance test
10.7	<b>Internal Relay's Operation</b>	
10.7.1	Internal relay's remote disconnection (open):  In case of remote disconnection and lock out the operator cannot connect internal relay manually. Internal relay should be able to move from open position to "ready for reconnection" or close position by remote command.	Software evaluation & performance test
10.7.2	Remote "ready for reconnection" position of internal relay:  It should be possible to put internal relay in "ready for reconnection" position, remotely. In this case the internal relay is open but there is a possibility to close it manually or by internal processes. Internal relay should be able to move from "ready for reconnection" position to open and locked out position by remote command. This status should be shown in meter display.	Software evaluation & performance test
10.7.3	Internal relay's remote re-closing: It should be possible to close the internal relay remotely. Internal relay should be able to move from close position to open and locked out position, remotely. Internal relay should be able to move from close position to "ready for reconnection" position, by manual or internal commands.	Software evaluation & performance test
10.7.4	Internal relay's manually re-closing:  Internal relay manually re-closing should be only possible to allowed persons. Meter should only allow manually closing of internal relay if it is in "ready for reconnection" position otherwise (open + locked out) it is not allowed.	
10.8	<b>Internal relay's settings</b>	
10.8.1	Internal relay should be adjustable remotely or locally to answer connection/disconnection commands.	Software evaluation & performance test
10.8.2	Connection/disconnection times for each meter are adjustable manually or remotely	Software evaluation & performance test
10.8.3	For meter, remote commands have the highest priority then there are manual commands and meter internal settings consecutively	Software evaluation & performance test
10.8.4	Internal relay should be adjustable remotely or locally to answer connection/disconnection commands.	Software evaluation & performance test
10.9	<b>Technical Specification of Internal Relay</b>	
10.9.1	Internal relay should be Impulse relay or Latching relay	
10.9.2	Contact Specification: - Support general and safety requirements - Contact material should be AgSnO <sub>2</sub> - Min. switching power 2.5 kVA - Min. switching voltage 400 V - Min. switching current 10 A - Mechanical life time >100.000 cycles off load - Mechanical life time >10.000 cycles by load of 10A and cos phi=1 - Short circuit rating more than 300A for 10 msec.	according to IEC62053-21 & IEC61810-1
10.9.3	Insulation Specification: Dielectric strength, open contact 2kV peak/ 1kV RMS Dielectric strength, coil contact 6kV	SP-1618

10.9.4	Tamper protection against magnetic DC fields	IEC 62053-21
<b>11</b>	<b>Power quality</b>	<b>Related Standard Number for test or control</b>
11.1	Meter should record under voltage and overvoltage and also power cut.	Software evaluation & performance test
11.2	Events related to under voltage and overvoltage should be recorded in the meter. Threshold of under voltage(phase to null) is from 220 to 180 by 5V steps and for overvoltage(phase to null) is from 240 to 265 by 5V steps	Software evaluation & performance test
11.3	These events won't be recorded unless they continue for equal or much more time than the time set for under voltage and overvoltage threshold. This time may adjust between 1 to 60 seconds (by 1 sec. steps).	Software evaluation & performance test
11.4	For each under voltage, min. voltage during one period should be recorded and the phase which under voltage is happened should be detected and recorded.	Software evaluation & performance test
11.5	For each overvoltage, max. Voltage during one period should be recorded and the phase which overvoltage is happened should be detected and recorded.	Software evaluation & performance test
11.6	Moreover, meter should have 3 counters (T1,T2,T3) to read different under voltage and overvoltage periods as bellow: - Overvoltage more than 15% nominal voltage for L1,L2 and L3 phases. - Overvoltage more than 10% and less than 15% nominal voltage for L1,L2 and L3 phases. - Under voltage more than -15% and less than -10% nominal voltage for L1,L2 and L3 phases. - under voltage less than -15% nominal voltage for L1,L2 and L3 phases. T1,T2,T3 counters are defined and readable in following intervals( the intervals are per second): - 1 < T1 < 3 - 3 < T2 < 20 - 20 < T3 < 60	Software evaluation & performance test
11.7	Parameters related to threshold and duration of under voltage and overvoltage stability should be adjustable locally and remotely.	Software evaluation & performance test
<b>12</b>	<b>Demand Management</b>	<b>Related Standard Number for test or control</b>
12.1	It should be possible to define demand limitation for normal and emergency situations locally or remotely (through communication port)	Software evaluation & performance test
12.2	Demand Management system for normal and emergency situations should be remotely activated or deactivated.	Software evaluation & performance test
12.3	It should be possible to record demand deviations. And the demand deviation value should be recorded in meter with its date and time. - Meter should record at least 10 recent demand deviations.	Software evaluation & performance test
12.4	Internal relay's opening and closing event should be recorded. - Meter should record at least 10 recent opening and closing events and their causes (including remote, local and manual processes).	Software evaluation & performance test
12.5	Demand limitation for normal situations: - Demand limitation in normal condition should be adjustable when energy is transmitted from network to the consumer and vice versa.	Software evaluation & performance test

	<ul style="list-style-type: none"> <li>- Whenever the average sent or received power exceeded the normal demand limitation(Y kW), the internal relay should be "ready for reconnection" (when CT ratio is applied). Y is adjustable from 1 to 1000kW, by 1kW steps.</li> <li>- Whenever the average sent or received power exceeded the normal demand limitation(Y kW), the internal relay should be opened but re-armed (without applying CT ratio). Y is adjustable from 1 to 4000W, by 1W steps. Default value 3000W.</li> <li>- If the internal relay is opened due to exceeding of power consumption from normal demand limitation, it should be opened for a time interval of T1 min. (T1 is adjustable from 2 to 60 min. by 1 min. steps) and afterwards it should be closed automatically and remain close for one cycle calculation of demand in sliding mode.</li> <li>- Number of opening and closing the internal relay should be definable (0 to 3 times).</li> <li>- After n1 times opening and closing if the customers power consumption remains more than demand limitation, costumer's load should be reconnected and stay connected until central system send disconnection command.</li> </ul>	
12.6	<p>Demand limitation for emergency situations:</p> <ul style="list-style-type: none"> <li>- If the demand limitation in emergency situation is activated it has the priority to demand limitation in normal situations.</li> <li>- Demand limitation for emergency situation is activated when average transmitted power from the meter exceeded the emergency demand limitation (S kw), which S is adjustable from 1 to 1000kW, by 1kW steps (when CT ratio is applied).</li> <li>- Demand limitation for emergency situation is activated when average transmitted power from the meter exceeded the emergency demand limitation (S kW), which S is adjustable from 1 to 4000W, by 1W steps (without applying CT ratio).</li> <li>- If the internal relay is opened due to exceeding of power consumption from emergency demand limitation, it should be opened for a time interval of T2 min. (T2 is adjustable from 2 to 60 min. by 1 min. steps) and afterwards it should be closed automatically and remain close for one cycle calculation of demand in sliding mode.</li> <li>- Number of opening and closing the internal relay should be definable (0 to 3 times).</li> <li>- After n2 times opening and closing if the customers power consumption remains more than emergency demand limitation, costumer's load should be stayed disconnected till the end of emergency situation and afterwards it could be connected.</li> </ul>	Software evaluation & performance test
<b>13</b>	<b>Type Test</b>	<b>Related Standard Number for test or control</b>
13.1	<p>The meter should have type test certificate that include details of test results according to IEC 62053-23, IEC62052-11, IEC62053-22, IEC62054-21 from international accredited laboratory and approved laboratory by TAVANIR. the type test should include all test that mentioned in the standards</p> <p>Some important tests are :</p> <ul style="list-style-type: none"> <li>- Environment test include Cool, Heat, Dryness, Wet heat, Random vibration and stroke</li> <li>- EMC tests consisting of electrical discharging and electromagnetic waves</li> <li>- surge, fast transient/ Burst</li> <li>- High voltage, Insulation and Error changes tests</li> </ul>	Certificate Representation
13.2	Meter should have certificate for IEC62056 DLMS/COSEM from international accredited laboratory and approved laboratory by TAVANIR	Certificate Representation
13.3	Communication modem should have certificate for industrial equipments from international accredited laboratory and approved laboratory by TAVANIR	Certificate Representation
<b>14</b>	<b>Extra capabilities</b>	<b>Related Standard Number for test or control</b>
14.1	<p>Meter should have 12 registers of billing for 12 periods (monthly) for energy and Max. Demand</p> <p>Meter should have 31 register of billing for 31 period(daily) for energy</p>	Software evaluation & performance test



14.2	Insulation protection class should be 2	IEC62053-22
14.3	<ul style="list-style-type: none"> <li>- Specified Operating Range ranges from -25 to +60°C and tolerable humidity is 95%</li> <li>- Limit Range of Operation ranges from -40 to +70°C.</li> <li>- Limit Range for Storage and Transport ranges that meter work by maintaining its accuracy class without any failure from -40 to +70°C.</li> </ul> <p>If the meter is used in cold or hot climate areas, these ranges will be change according to standard.</p>	IEC62052-11
14.4	Meter's failure rate should be less than 0.5% per year and MTBF will be specified and guaranteed by manufacturer.	Document representation & Contract guaranty
14.5	Meter life time should be more than 20 years	Document representation & Contract guaranty
14.6	Meter should be protected against Electromagnetic Compatibility (EMC).	IEC62053-22 parts 7.5.3, 7.5.5, 7.5.8
14.7	Meter and its power supply should be protected against surge voltages of network	IEC62053-22 & IEC62052-11 part 7.1.2
14.8	Meter input voltage range for normal operation should be from 80% to 115% of nominal voltage Meter should be on and work with at least connection of one phase and neutral.	IEC62053-22 port 8.2
14.9	Meter should be protected against steady state voltage more than 400V between terminals.	IEC62053-22 & IEC62052-11
14. 10	In case of software hanging, the meter should retrieve itself in minimum time without any damage to saved data (meter should be equipped with watch dog mechanism)	Document representation & Contract guaranty
14.11	Max. error permission range for Voltage, Current, Frequency, Power factor , Asymmetric Loads and temperature changes should be according to latest version of IEC standard for electricity meters.	IEC62053-22 part 8.2
14.12	In case of power cut off, basic data like consumed energy, tariffs, customer ref. no and meter serial No, calendar, settings and tariff time intervals should be saved in none volatile memory.	Contract guaranty
14.13	Meter should be self check and Diagnostic. So if an error appears in internal components (such as RAM, EEPROM, RTC ...etc) meter should record and report it to central system through communication port.	Contract guaranty
14.14	Meter should record at least one User ID With 16 characters	Contract guaranty
14.15	Meter calibration should be kept during its life time and there should be no need for re-calibration.	Contract guaranty
14.16	It should be possible to apply CT ratios to the meter through software	Software evaluation & performance test
14.17	Meter should support read without power(RWP) capability with flowing situations: <ul style="list-style-type: none"> <li>- LCD of meter should be readable at least for 3 times</li> <li>- RWP capability should not have effect on RTC battery life time</li> </ul>	performance test
14.18	Meter's firmware should be upgradable remotely and locally. Upgrading of firmware should not stop and affect meter's metrology.	performance test
14.19	Power terminal layout, distance between power terminals and the other requirements should be according to DIN Standard.	DIN
<b>15</b>	<b>Meter's Backup Supply</b>	<b>Related Standard Number for test or control</b>

15.1	Meter's clock and date shall be fed for 7 days after presentation of battery alarm	performance test
15.2	Beside the super cap, the meter should have backup lithium battery. The life cycle of the battery should be more than 10 years and after 5 years from production of battery, the battery should keep meter time & date without power up to 2 years.	Contract guaranty
15.3	Replacement of battery should be easy with no need to solder and access to meter's internal circuits.	performance test
15.4	It should be possible to seal the battery in meter case	performance test
15.5	In the case of meter installation and terminal cover removal the meter's time & date should not stop.	performance test
<b>16</b>	<b>Communicating with HHU(Hand Held Unit)</b>	<b>Related Standard Number for test or control</b>
16.1	HHU should have all capabilities of configuration (including tariff change, connect, disconnect, etc.) and meter reading in format of information package(like configuration file) in suitable access levels	Software evaluation & performance test
16.2	Connection to the meter for sending and receiving data should be possible through Handy terminal and optical port with password and different access levels	Software evaluation & performance test
16.3	Data communicating between optical port and HHU should be according to latest version of standard on data communication	Software evaluation & performance test
16.4	After setting (configuration) is done by HHU system, date, time and Hand terminal Id. Code should be recorded in the meter and make sure all the changes are done from software point of view. The recorded data should be readable locally or remotely.	Software evaluation & performance test
16.5	Delivery of software for computer and HHU with no time limitation is mandatory. The number of its licenses or copies will be on mutual agreement	Software evaluation & performance test
16.6	It should be possible to read load profile through HHU	Software evaluation & performance test
16.7	If use asymmetrical system to update key, corresponding meter public key should be downloaded from master station to HHU. If use symmetrical key system, corresponding master key of symmetrical key Should be downloaded to HHU.	Software evaluation & performance test
<b>17</b>	<b>the other Meters Connecting to</b>	<b>Related Standard Number for test or control</b>
17.1	The meter should be equipped with: - M-BUS port that could establish connection through wired communication (The wired M-Bus is based on the EN 13757-2 physical and link layer) and this port should be convert to wireless easily (by using transceiver in future) communication. The baud rate is 2400 b/s, E, 8, 1. (This port should be physically accessible only for authorized person and located on meter base). or - Wireless M-Bus that according to EN 13757-4 standard with ISM frequency. The baud rate is 2400 b/s, E, 8, 1. (This port should be physically accessible only for authorized person). Other types of meters (such as water, gas, etc.) should connect to this meter through this M-bus port and Contractor should grantee this capability according to requirements of water and gas company	performance test
<b>18</b>	<b>Security Requirements</b>	<b>Related Standard Number for test or control</b>
18.1	Meter should use method for encryption/decryption of data exchanged in all meter interfaces. At least AES128 method should be used in all information exchanges in private network, between meter and data concentrator (LAN interface), and meter and HHU (optical interface).	performance test

	<p>At least ECC192 method should be used in all information exchanges in public network as well as between meter and central system directly. Security method and hardware should be described in details by contractor. Contractor should prove following items:</p> <ul style="list-style-type: none"><li>- Security of method.</li><li>- Client ability to change security key remotely.</li><li>- confidentiality of remote key changing</li><li>- If client change security key there is no way for meter manufactures to achieve new key (new key is not accessible for meter hardware, firmware, and external software).</li><li>- All input and output information decrypted and encrypted.</li></ul>	
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# Appendix1

Meter display element:

**1- OBIS:**



When presenting display is the active energy, the OBIS on the LCD will display the value of 1.8.0 from the right side.

**2- Current tariff number:**



If current tariff number is 1, then the display is T1

**3- Voltage indication:**



Indicate voltage status of phase A, phase B and phase C respectively. When voltage is normal, indications display stably; when there is over-voltage or under-voltage, indications flicker; when voltage is 20% less than rated voltage, indications don't display.

**4- Communication status:**



If the meter is in the process of communication by uplink device this symbol is shown.

**5- Battery condition:**



This symbol will blink at a frequency of 2Hz when battery is in low voltage or battery's lifespan comes to end. The warning symbol will stop only after an execution of complete battery replacement

**6- The status of relay:**



This symbol indicate state of connect and disconnect relay.



This symbol will be on if customer is disconnected remotely for load management purpose.

In "open and ready for reconnection" state that manual connection is possible this symbol should be blink at a frequency of 2Hz.



This symbol will be on if customer is disconnected remotely for debt.

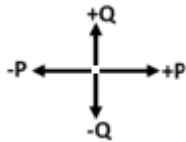


This symbol indicates customer exceeds threshold demand value and customer is disconnected. In normal situation of power network this symbol should be on. In emergency situation of power network this symbol should be blink at a frequency of 2Hz.



This symbol indicates close state of relay

### 7- Quadrant indication :



Indicates current working quadrant of three phases which is judged by algebraic sum of active and reactive of three phases.

### 8- Unit field:

kWhHz

Different units can be displayed, kWh, Hz etc.

### 9- Tamper:



This symbol will be on if meter is tampered.

### 10- Other meters:

**W**

This symbol will be on if Water meter is connected.

**G**

This symbol will be on if Gas meter is connected.

### 11- Demand exceed :



This symbol will be on if customer exceed threshold demand value

## 12- OBIS Items Formats:

- 1.8.0 Total import active energy xxxxxx.xx kWh
- 1.8.1 Import active energy of tariff 1 xxxxxx.xx kWh
- 1.8.2 Import active energy of tariff 2 xxxxxx.xx kWh
- 1.8.3 Import active energy of tariff 3 xxxxxx.xx kWh
- 1.8.4 Import active energy of tariff 4 xxxxxx.xx kWh
- 2.8.0 Total export active energy xxxxxx.xx kWh
- 2.8.1 Export active energy of tariff 1 xxxxxx.xx kWh
- 2.8.2 Export active energy of tariff 2 xxxxxx.xx kWh
- 2.8.3 Export active energy of tariff 3 xxxxxx.xx kWh
- 2.8.4 Export active energy of tariff 4 xxxxxx.xx kWh
- 3.8.0 Total import reactive energy xxxxxx.xx kvarh
- 3.8.1 Import reactive energy of tariff 1 xxxxxx.xx kvarh
- 3.8.2 Import reactive energy of tariff 2 xxxxxx.xx kvarh
- 3.8.3 Import reactive energy of tariff 3 xxxxxx.xx kvarh
- 3.8.4 Import reactive energy of tariff 4 xxxxxx.xx kvarh
- 4.8.0 Total export reactive energy xxxxxx.xx kvarh
- 4.8.1 Export reactive energy of tariff 1 xxxxxx.xx kvarh
- 4.8.2 Export reactive energy of tariff 2 xxxxxx.xx kvarh
- 4.8.3 Export reactive energy of tariff 3 xxxxxx.xx kvarh
- 4.8.4 Export reactive energy of tariff 4 xxxxxx.xx kvarh
- 1.6.0 Import active M.D. xxxxx.xxx kW
- 1.6.0 Import active M.D. occurrence date yy-mmdd
- 1.6.0 Import active M.D. occurrence time hh:mm:ss
- 2.6.0 Export active M.D. xxxxx.xxx kW
- 2.6.0 Export active M.D. occurrence date yy-mm-dd
- 2.6.0 Export active M.D. occurrence time hh:mm:ss
- 3.6.0 Import reactive M.D. xxxxx.xxx kvar 0.000 kvar
- 3.6.0 Import reactive M.D. occurrence date yy-mmdd
- 3.6.0 Import reactive M.D. occurrence time hh:mm:ss
- 4.6.0 Export reactive M.D. xxxxx.xxx kvar
- 4.6.0 Export reactive M.D. occurrence date yy-mmdd
- 4.6.0 Export reactive M.D. occurrence time hh:mm:ss
- 32.7.0 Voltage of phase A xxx.xx V
- 52.7.0 Voltage of phase B xxx.xx V
- 72.7.0 Voltage of phase C xxx.xx V
- 31.7.0 Current of phase A xxxxxx.xx A
- 51.7.0 Current of phase B xxxxxx.xx A
- 71.7.0 Current of phase C xxxxxx.xx A
- 21.7.0 Import active power of phase A xxxx.xxxx kW
- 41.7.0 Import active power of phase B xxxx.xxxx kW
- 61.7.0 Import active power of phase C xxxx.xxxx kW
- 21.7.1 Export active power of phase A xxxx.xxxx kW
- 41.7.1 Export active power of phase B xxxx.xxxx kW
- 61.7.1 Export active power of phase C xxxx.xxxx kW
- 23.7.0 Import reactive power of phase A xxxx.xxxx kvar
- 43.7.0 Import reactive power of phase B xxxx.xxxx kvar
- 63.7.0 Import reactive power of phase C xxxx.xxxx kvar
- 23.7.1 Export reactive power of phase A xxxx.xxxx kvar
- 43.7.1 Export reactive power of phase B xxxx.xxxx kvar
- 63.7.1 Export reactive power of phase C xxxx.xxxx kvar
- 33.7.0 Power factor of phase A x.xxx
- 53.7.0 Power factor of phase B x.xxx

73.7.0 Power factor of phase C x.xxx  
14.7.0 Frequency xx.xx Hz  
0.9.1 Time hh:mm:ss  
0.9.2 Date yy-mmdd  
C.13.1 Standard message xxxxxxxx  
97.97.0 Fault register xxxxxxxx  
1.C.1.0 Gas meter number xxxxxxx  
2.C.1.0 Water meter number xxxxxxx  
0.4.2 CT current on primary side xxxxxx.xx  
0.4.5 CT current on secondary side xxxxxx.xx