

**GENERAL REQUIREMENTS OF THREE-PHASE METERING INSTALLATION 35 kV...6 kV FOR ADDITIONAL METERING POINT OF BATTERY ENERGY STORAGE SYSTEM IN ELECTRICAL INSTALLATION OF THE CLIENT**

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## OVERVIEW

The written metering requirements are stated for additional metering points of battery energy storage system with metering system equipped with energy meters or with Dedicated Measurement Devices.

There are the fixed-term deviations in the 2026 technical requirements of additional metering point (hereinafter: 2026 TRs) in Chapter 7 and stated throughout the existing document between 1. January 2026 and 31. December 2026 (hereinafter: Transition Period).

The present document describes requirements for additional metering point for voltage levels 35 kV, 20 kV, 15 kV, 10 kV, 6 kV (hereinafter: 35 kV...6 kV) battery energy storage system within Client's alternating current electrical installation that connected to the Elering AS alternating current network with high voltage supply, consuming and generation points in Elering AS substation. This document applies to energy meters, Dedicated Measurement Devices (hereinafter: DMD), instrument transformers, circuits, accessories and related equipment of additional metering point. All the above-mentioned equipment in the additional metering point shall be used to send the alternating current electrical energy authentic metering data securely to the Elering AS Automatic Metering Acquisition system (hereinafter: Central AMR software system) that connected to *Estfeed* Datahub to calculate the amount of the electrical energy that charging from Elering AS alternating current network and discharging back using the battery energy storage system. Those requirements prepared in accordance with the Estonian Metrology Act and are mandatory for the Clients. <sup>1)</sup>

<sup>1)</sup> Please see in Chapter 7 the fixed-term deviations of 2026 TRs regarding the required accuracy and the sending the metering data to *Estfeed* Datahub that are allowed exclusively during Transition Period

# 1 GENERAL

There are fixed-term deviations in 2026 TRs allowed exclusively during Transition Period to insert the required metering data with lower measuring accuracy of additional metering point measuring instruments in battery energy storage system to *Estfeed* Datahub without connecting the energy meter or DMD to Central AMR software system - see in Chapter 7.

During the Transition Period the Client is allowed to provide the metering data about battery energy storage system from its energy meters or from its Dedicated Measurement Devices directly to *Estfeed* Datahub with one minute Demand Values of Demand Period for 15 minutes Market.

After the expired Transition Period, the primary and secondary equipment for an additional metering point shall meet 2026 TRs, including the technical requirement that the energy meter or Dedicated Measurement Devices shall be able to provide the metering data from metering point of energy storage system to Elering AS Automatic Metering Acquisition system with one minute Demand Values of Demand Period for 15 minutes Market.

More information, instructions, guidelines about how to make a contract and to get connected to *Estfeed* Datahub could be found under link: [Electricity data exchange | Elering](#).

## 1.1. Metering data reliability, validity, integrity, essentiality

The traceability of electrical energy measurement results must be proved, and metrological control is mandatory for measuring instruments which are used for metering and described in this document. See Appendix 1 - “Metrological requirements for procurable measuring instruments”.

Metering system installation of additional metering point must ensure the accurate measurement of energy while minimizing the influence of voltage variation, power factor, burden, temperature, frequency, and harmonics.

The metering system shall be capable of supplying metering data to the Central AMR software system in a timely, accurate and reliable manner. The metering system equipped with energy meter or with DMD shall ensure the validation of metering data with Central AMR software system and that the metering data remains qualitative, trustworthy, uncorrupted, consistent *etc.* for truly representing the battery energy storage system with additional metering point. The essentiality of the metering data of the shall be calculated within energy demand period considering the acting of the battery energy storage system and other possible different parts of electrical installation that all together are electrically interconnected. The measuring instrument of a higher level of accuracy or functionality than that required by this document may be installed. <sup>1)</sup>

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Each measuring instrument shall be provided with a nameplate, list the manufacturer's name, serial number and type of device as well as class accuracy, input output ratings, connection diagram and polarity designation where applicable.

All measuring circuit terminals and MCB, instrument transformers and energy meter terminal covers must be sealable. Seals shall be placed to ensure the detection of unauthorized access to the metering installation.

<sup>1)</sup> Please see in Chapter 7 the fixed-term deviations of 2026 TRs regarding the required accuracy and the sending the metering data to *Estfeed* Datahub allowed exclusively during Transition Period

## 1.2. Metering installation components

A metering system may consist of combination of:

- a energy meter and metering cabinet,
- instrument transformers,
- secure and protected wiring from the instrument transformers to the energy meter included link boxes,
- communication interface equipment such as LAN router, data link equipment,
- auxiliary electricity supply to the energy meter,
- an alarm circuit and monitoring facility.

## 1.3. Installation and location of metering primary equipment

The Client shall install the primary metering equipment of additional metering point to Client's switchyard at the voltage level of 35 kV...6 kV range in switchyard that shall be directly electrically connected to the secondary windings of stepping-down Client's transformer. The primary windings of stepping-down Client's transformer shall be directly connected to the 330 kV or 110kV network in joining bay of Elering AS substation that equipped with metering point for the voltage level of Elering AS network.

The Client shall install primary metering equipment of additional metering point at the nearest place to the afore-mentioned Client's transformer in 35 kV...6 kV switchyard if the voltage level along the electrical connections (cables, busbar *etc.*) remains unmodified and there shall be no more primary equipment/accessories capable to modify the voltage level between the secondary windings of Client's transformer and battery energy storage equipment.

If the Client will have several distributed battery energy storage systems that will be electrically connected to the one power collecting primary element of Client's switchyard (might be busbar) with different collector transformers (*e.g.*, voltage ratio  $U_{prim.} / U_{sec.}$ : 35 kV / 0,69 kV, 10 kV / 0,69 kV), then the Client shall install the primary metering equipment for several additional metering points to the primary connections of each collector transformer in switchyard of 35 kV...6 kV voltage range.

The Client shall send the proposed and designed primary scheme of whole Client's switchyard of electrical installation with battery energy storage system(-s) to Elering AS for reviewing including the connection to the joining point with Elering AS substation.

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#### 1.4. Periodic inspections

Elering AS will start to organize and carry out periodic inspections of the additional metering point of the Client's battery energy storage system. The time and the scope of the periodic inspections will be composed by Elering AS after reviewing of required documentation for approval and after energizing and final commissioning of Client's battery energy storage system with burden.

<sup>1)</sup> Please see in Chapter 7 the fixed-term deviations of 2026 TRs regarding the required accuracy and the sending the metering data to *Estfeed* Datahub that are allowed exclusively during Transition Period

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## 2 MEASURING INSTRUMENTS ACCURACY

There are fixed-term deviations in 2026 TRs allowed exclusively during Transition Period to insert the required metering data with lower measuring accuracy of additional metering point measuring instruments in battery energy storage system to *Estfeed* Datahub without connecting the energy meter or DMD to Central AMR software system - see in Chapter 7.

### 2.1. Energy meters accuracy

The installed energy meter shall meet accuracy and standards as shown below <sup>1)</sup>:

Network voltage $U_n$ at additional metering point (kV)	Measurement accuracy of static combi energy meter Active energy	According to standards
35...6	0.5	EVS-EN 62053-21
	or class C	EN 50470-3

### 2.2. Dedicated Measurement Device accuracy

Thus, the DMD shall comply with 2026 TRs stated in existing document related to energy meters. The accuracy class of the DMD shall be 0.5 and the DMD shall be connected to the appropriated voltage and current instrument transformers with required accuracy 0.2 in voltage range 35 kV...6 kV. <sup>1)</sup>

<sup>1)</sup> Please see in Chapter 7 the fixed-term deviations of 2026 TRs regarding the required accuracy and the sending the metering data to *Estfeed* Datahub that are allowed exclusively during Transition Period

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### 2.3. Instrument transformers accuracy

The installed instrument transformers shall meet accuracy and standards as shown below <sup>1)</sup>:

Network voltage $U_n$ at additional metering point (kV)	Current instrument transformer	Voltage instrument transformer	According to standards
35...6	0.2S	0.2	EVS-EN 61869-2:2013 (CT) EVS-EN 61869-3:2012 (VT)

### 2.4. TOTAL ACCURACY

The total accuracy of the energy measurements equipped with energy meter or DMD in metering system shall be at least 1.0% for three (3) phases together. <sup>1)</sup>

<sup>1)</sup> Please see in Chapter 7 the fixed-term deviations of 2026 TRs regarding the required accuracy and the sending the metering data to *Estfeed* Datahub that are allowed exclusively during Transition Period

## 2.5. Energy meters of additional metering point

The meters shall be located inside a building and in separate metering cubicles.

	Technical specification of energy meter	Requirement
1.	<b>3-phase – 4 wire system</b>	Yes
2.	<b>Nominal frequency <math>f_n</math></b>	50 Hz
3.	<b>Nominal voltage <math>U_n</math>:</b>	
3.1	Extended operating voltage range	3 x 58/100-240/415 V
4.	<b>Voltage range</b>	80%...115% $U_n$
5.	<b>Nominal current <math>I_n</math></b>	1 A or 5 A
6.	<b>Maximal current <math>I_{max}</math></b>	
6.1	Metrological	200 % $I_n$
6.2	Thermal 1 A	2,4 A
6.3	Thermal 5 A	12 A
7.	<b>Starting current</b>	0,1% $I_n$
8.	<b>Power consumption per Phase</b>	
8.1	Voltage circuit, phase voltage 58V	< 1 W, 2 VA
8.2	Current circuit (1 A)	< 10 mW, 10 mVA
8.3	Current circuit (5 A)	< 0,15 W, 0,15 VA
9.	<b>Insulation Strength</b>	4 kV, 50 Hz during 1 min
10.	<b>Impulse voltage 1,2/50 <math>\mu</math>s</b>	8 kV, IEC 62052-11
11.	<b>Protection</b>	Class II to IEC 62052-11
12.	<b>Operation temperature range</b>	-25 °C to +70 °C
13.	<b>Electromagnetic Compatibility</b>	Accordance to IEC 61000-4-2,3,4,5
14.	<b>Outputs</b>	
14.1	Relay Output Contacts	12 to 240 V $_{AC/DC}$ ; 100 mA
14.2	SO pulse output	max 4 pulse outputs
14.3	Pulse length	20-80 ms
14.4	Optical test output	LED indicator
15.	<b>Communication</b>	
	Energy meter shall be supporting data acquisition and time synchronizing from Central AMR software system	Yes
	Communication protocol	DLMS
	Interface for configuration	IEC 62056-21
	Internal Ethernet LAN TCP/IP unit	Yes
16.	<b>Clock</b>	
16.1	Internal Chrystal	Yes
16.2	Accuracy	< 5 ppm
16.3	Backup Time with battery	Yes
17.	<b>Time of Use (TOU)</b>	Yes
18.	<b>Additional Backup Power Supply</b>	Direct Current

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<b>19.</b>	<b>Display</b>	LCD liquid crystal
<b>20.</b>	<b>Minimum Display values in scrolling mode</b>	
20.1	Date and Time	Yes
20.2	Cumulative Active energy import, export	Yes
20.3	Voltage transformer ratio	Yes
20.4	Current transformer ratio	Yes
20.5	Phase voltage L1; L2; L3	Yes
20.6	Phase current L1; L2; L3	Yes
<b>21.</b>	<b>Programmable values and registers</b>	
21.1	Voltage transformer ratio	Yes
21.2	Current transformer ratio	Yes
21.3	Output impulse value and length	Yes
21.4	Output relays assign value (A+, A-, R+, R-)	Yes
21.5	Registers captured in load profile	Yes
21.6	Integration period of load profile	1- 60 min
21.7	Event log events	Yes
21.8	Stored values	Yes
21.9	Passwords	Yes
<b>22.</b>	<b>Information on the front panel of the energy meter</b>	
22.1	Bar code (code 39, 14 symbols + check bit)	Yes
22.2	Explanations of values displayed on screen	Yes
22.3	Additional metering point: battery energy storage system name and switchyard name, sign of additional metering point, current transformer ratio, voltage transformer ratio	Yes
22.4	Register numbers and contents available in auto scrolling mode	Yes
22.5	Electrical connection diagram of the energy meter (e.g., on the cover of the terminal strip, on the front panel).	Yes
<b>23.</b>	<b>Factory information in file format</b>	Yes
23.1	Energy meter configuration and parameterization	Yes
23.2	Type of energy meter	Yes
23.3	Number of energy meters	Yes
23.4	Date of issue	Yes
<b>24.</b>	<b>Documentation</b>	Yes
24.1	Estonian language user/installation manuals/figures, technical documents, conceptual diagram inside the energy meter, and working principle	Yes

## 2.6. Requirements for approval of energy meters

All energy meters shall be compatible and time synchronized with the Central AMR software system. In order to prove compatibility, the parameterized energy meters with respective technical solution must have been tested with Central AMR software system. <sup>1)</sup>

Valid type approval of the Estonian Technical Surveillance Authority is required for energy meters. It is not needed if conformity assessment is done by manufacturer according to Directive 2014/32/EU on measuring instrument and EN 50470-3.

Verification of the Estonian accredited calibration laboratory is required for energy meters. The initial verification is not needed if conformity assessment is done by manufacturer according to Directive 2014/32/EU on measuring instrument and EN 50470-3.

For class energy meters by MID conformity assessment mark CE, supplementary metrology marking consisting of the letter “M” and the last two digits of the year of affixing the marking. The number of the notified body which assessed the conformity shall immediately follow the supplementary marking.

The Client shall take all kinds of responsibility to pay all possible expenses related to:

- the energy meters compatibility with Central AMR software system,
- the test and to the proving the energy meter ability to get in real time metering data from energy meter by Central AMR software system,
- the energy meter testing, configuring, parameterizing and onsite commissioning,
- the commissioning of the energy meter with Central AMR software system.

<sup>1)</sup> Please see in Chapter 7 the fixed-term deviations of 2026 TRs regarding the required accuracy and the sending the metering data to *Estfeed* Datahub that are allowed exclusively during Transition Period

## 2.7. REQUIREMENTS FOR DEDICATED MEASUREMENT DEVICE

The DMD is allowed to install to the additional metering point instead of energy meter of battery energy storing system to measure the energy with required instrument transformers and to deliver the required metering data to the *Estfeed* Datahub by offering the demand response or providing the flexibility services. The DMD is device or system element that is intended to get, to store, to provide all required metering data to Central AMR software system.<sup>1)</sup>

The DMD must provide and operate the metering data to Central AMR software system independently from energy management, control systems and ancillary service systems of battery energy storage systems.

The DMD shall provide the metering data with high integrity level (consistent, accurate, scramble proof, with logging and audit, tamper-alarming *etc.*), protection from metering data modification, protection from authorized and unauthorized access (with software or physical) to DMD while operating, metrologically traceability (meter management system) level and secure communication (VPN, IPsec) to Central AMR software system required by Elering AS, by applicable EU and national metering regulations.

A metering system may consist of combination of:

- a DMD and metering cabinet,
- instrument transformers,
- secure and protected wiring from the instrument transformers to the DMD included link boxes,
- communication interface equipment such as a LAN router, data link equipment,
- auxiliary electricity supply to the DMD,
- an alarm circuit and monitoring facility.

The DMD shall ensure the validation of metering data with Central AMR software system and shall meet at least the following specific requirements of Central AMR software system to operate the DMD:

- DMD shall have type approval, certificates for using with high voltage equipment,
- DMD is not acceptable as virtualized device or system,
- DMD support communication protocol DLMS of Central AMR software system,
- DMD shall support pull driver of Central AMR software system,
- DMD shall allow the Central AMR software system to read from DMD:
  - the load profile,
  - the actual (instant) values,

<sup>1)</sup> Please see in Chapter 7 the fixed-term deviations of 2026 TRs regarding the required accuracy and the sending the metering data to *Estfeed* Datahub that are allowed exclusively during Transition Period

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- billing (historical) values,
- the event log,
- 2<sup>nd</sup> load profile,
- DMD shall allow the Central AMR software system:
  - to perform the test connection,
  - establish DMD association view,
  - to read device info,
  - to set time / to synchronize the time,
  - to perform the billing period reset,
  - to handle the clock settings,
  - to load TOU tables,
  - to perform the relay control.

The Client shall take all kinds of responsibility to pay all possible expenses related to:

- the DMD compatibility with Central AMR software system,
- the test and to the proving the DMD ability to get in real time metering data from DMD by Central AMR software system,
- the DMD testing, configuring, parameterizing and onsite commissioning,
- the commissioning of DMD with Central AMR software system.

## 2.8. Outdoor instrument transformers criteria for metering

The installation requirements of the additional metering point stated in this document for current and voltage instrument transformers are applicable for voltage levels 35 kV, 20 kV, 15 kV, 10 kV, 6 kV.

The installation requirements of the additional metering point for additional metering point for higher voltage levels 110 kV and 330 kV are identical to the technical requirements for the building of revenue metering point for Elering AS.

Metering instrument transformers shall not have any bypass switch.

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### 2.8.1 Current transformers

The current transformer core and secondary wiring associated with the energy meter of the additional metering point shall not be used for any other purpose.

Instrument current transformers must meet the minimum requirements:

- according standards EVS-EN 61869-1, EVS-EN 61869-2,
- earth fault factor min 1.8,
- rated secondary burden for metering winding (power factor 0.8) at least 2.5 VA,
- instrument Security Factor (FS) of the metering and core not more than 5,
- metering winding circuit terminals shall be sealable. However, other terminals shall remain accessible,
- rating plate must be made and fixed to equipment in factory. Markings on marking plate shall be made according to standard (also additional markings). Markings language is English,
- drawings, technical specifications, instructions, manuals, type test and routine test reports shall be provided to Elering AS for reviewing.

### 2.8.2 Voltage transformers

The capacitive voltage transformers are not allowed to use for metering of electrical energy in additional metering points.

The separate inductive voltage transformers with one secondary winding shall be used for metering and shall not be used for any other purpose.

Instrument voltage transformers must meet the minimum requirements:

- according standards EVS-EN 61869-1, EVS-EN 61869-3,
- rated voltages:

The nominal voltage of the system,	Rated voltages, V		
	primary	measuring and protective	residual-voltage
<b>35</b>	38 500: $\sqrt{3}$	110: $\sqrt{3}$	110:3
<b>20</b>	22 000: $\sqrt{3}$	110: $\sqrt{3}$	110:3
<b>15</b>	16 500: $\sqrt{3}$	110: $\sqrt{3}$	110:3
<b>10</b>	11 000: $\sqrt{3}$	110: $\sqrt{3}$	110:3
<b>6</b>	6 600: $\sqrt{3}$	110: $\sqrt{3}$	110:3

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- earth fault factor min 1.8 (8 hours),
- rated secondary burden for metering winding at least 5 VA,
- the total burden of the devices and cabling for any VT winding shall be calculated. In practice the rated secondary burden should be 1.5 times the calculated connected burden, but not less than specified herein before,
- special load resistors in voltage transformer secondary circuits are not allowed,
- metering winding circuit terminals shall be sealable. However, other terminals shall remain accessible,
- instrument voltage transformer all the circuits and terminals regarding residual voltage winding with ferroresonance damping resistor shall be sealable,
- rating plate must be made and fixed to equipment in factory. Markings on marking plate shall be made according to standard (also additional markings). Markings language is English,
- drawings, technical specifications, instructions, manuals, type test and routine test reports shall be provided to Elering AS for reviewing.

### 2.8.3 Requirements for instrument transformer burdens

Current transformer winding rated burden for metering shall be chosen by the Client according to the calculations so that the accuracy class 0.2S shall be guaranteed. The Elering AS shall accept this. If the calculated burden is less than 1 VA, the Client shall present documentation (routine test report) which validates that at least accuracy class 0.2S is guaranteed.<sup>1)</sup>

The total burden of the devices and cabling shall be calculated so that in case of metering windings the total length of the wire (for resistance calculation) shall be once the distance between the CT and energy meter.

The rated secondary burden should be 1,5 times the calculated connected burden, but not less than specified hereinbefore. All secondary circuits of the current transformers shall be dimensioned so that the rated burdens of the secondary windings shall not be exceeded.

Voltage transformer winding rated burden of metering shall be chosen by the Client according to the calculations so that the accuracy class 0.2 shall be guaranteed. The Elering AS shall accept this. If the chosen rated burden is not standardized, the Client shall present documentation (routine test report) which validates that accuracy class 0.2 is guaranteed.

The burden on each instrument transformer shall be calculated and measured at the secondary terminals of the instrument transformers.

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#### 2.8.4 Requirements for approval for instrument transformers

The traceability of electrical energy measurement results must be proved. Each instrument transformer accuracy tests traceable results of laboratory shall be performed and presented to the Elering AS for approval before installing.

### 3 GENERAL REQUIREMENTS FOR MEASUREMENT CIRCUITS

The current and voltage secondary metering circuits installation must be done by copper cables or leads, whose cross-section are not less than 2,5 mm<sup>2</sup>. The voltage drop of remote voltage metering circuits shall not exceed 0.1 % in any part of the circuit.

Outdoor cables must be protected from mechanical damage, electric and magnetic effects.

Secondary measuring cables shall not be installed into the common duct, ladder, or pipe of high voltage drivers.

All cables shall be marked according to their unique cable identification number given in the project in all link boxes, cubicles, places of branching and cable collectors, both sides of walls, both side of tubes, etc.

All the markings shall be easily readable without removing any obstacles and linked to the actual cables.

All wires of cable shall be marked by following order: local address, remote address and cable number.

All measurement current circuit terminals shall be sealable.

The transparent cover shall cover all voltage transformer secondary circuit terminals between VT and MCB. All measurement secondary terminals shall be covered by transparent cover and suitable for sealing. For these propose is acceptable only standard cover profile sapped to lateral ridges.

The additional power supply for energy meters shall be taken from DC backup battery via separate MCB. The MCB shall be mounted into the metering cubicle.

For all voltage transformers the separate VT link boxes shall be used. For 35 kV...6 kV voltage transformers the VT link box may be integrated into corresponding bay link box, if all requirements for voltage circuits and measurement circuits are fulfilled. VT link box shall be mounted as close as possible to VT, for example to VT portal. For voltages up to 110 kV the maximum length of wiring from VT secondary terminals to VT link box secondary terminals shall not exceed 6 m.

## 4 GENERAL REQUIREMENTS FOR METERING DATA TRANSMISSION AND DATA STORAGE

The metering data shall be transmitted via Ethernet LAN TCP/IP using DLMS protocol. <sup>1)</sup>

The Client shall design, build up and manage the secure TCP/IP communication between Central AMR software system and energy meter of battery energy storage system at his own expense. The Client shall ensure the secure connection within LAN using the VPN technology that shall be defined by and agreed with Elering AS. The Client shall sign the contract with telecommunication service provider to establish secure data transmission in the WAN network connections supporting the VPN technology. The static IP address shall be visible for Central AMR software system. The Client shall agree the static IP address with Elering AS.

To prevent unauthorized access from any person and any software except Central AMR software system, there shall not be given any access directly to the energy meter and metering data across communication lines and LAN/WAN. <sup>1)</sup>

The following Demand Values for one minute Demand Period of 15 minutes Market Time shall be registered and stored to Central AMR software system.

- Import kW
- Export kW
- Import kVA
- Export kVA

There are fixed-term deviations in 2026 TRs allowed exclusively during Transition Period to insert the required metering data with lower measuring accuracy of additional metering point measuring instruments in battery energy storage system to *Estfeed* Datahub without connecting the energy meter or DMD to Central AMR software system - see in Chapter 7.

More information, instructions, guidelines about how to make a contract and to get connected to *Estfeed* Datahub could be found under link: [Electricity data exchange | Elering](#).

## 5 COMMISSIONING AND DOCUMENTATION

The additional metering point equipment shall be installed, adjusted, tested and commissioned by the Client. The Client also shall configure all energy meters.

The Client shall distribute to Elering AS the agreed and valid profile of the configured energy meter that is compatible with Central AMR software system before commissioning procedure of

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additional metering point. The energy meter of the additional metering point shall be remotely readable from Central AMR software system before the beginning of testing and commissioning. The commissioning procedure shall include the technical inspection from the representatives of Elering AS before energizing the additional metering point.

Each measuring instrument used for Commissioning shall be Traceable and calibration date is effective.

Commissioning tests on site shall be performed to confirm and record where appropriate the following:

- that measuring instrument is calibrated, and date is effective, or conformity assessment is done according to Directive 2014/32/EU,
- the energy meters are connected to the correct instrument transformers and to the correct windings regarding accuracy classes,
- that the current transformers are of the correct ratio and polarity, required accuracy class, verified and correctly located to record the required power flow,
- that the voltage transformers are of the correct ratio and polarity, required accuracy class, verified and correctly located to record the required power flow,
- the burdens on the measurement's transformers are within the correct limits,
- the energy meters are set to the same current transformer and voltage transformer ratios as the installed instrument transformers.

There is the documentation of the additional metering point that the Client shall submit to Elering AS for verification according to each construction phase of the battery energy storage system project. The submitted documentation must include sufficient technical information required for the Elering AS to carry out the compliance check of the additional metering point with the existing technical requirements.

The structure of the documentation to be submitted to Elering AS is generally described below:

- the project documentation to be submitted at the beginning of the design work must include at least:
  - the complete primary scheme of the electrical installation with the listed measurement instruments, secondary equipment, energy meters or DMDs,
  - manufacturing factory information of instrument transformers, type information, accuracy class conforming documents, reports and certificates, number of windings and technical specifications,
  - manufacturing factory information of energy meters or DMDs, type information, accuracy class conforming documents, reports and certificates and technical specifications,

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- manufacturing factory compatibility declaration for energy meters or DMDs to connect and ready-to-work with Central AMR software system to read out the metering data. The factory conformance tests, reports and certificates from manufacturing factory of Central AMR software system for ready-to-use the proposed energy meters or DMDs;
- the project documentation to be submitted at the end of the design work (main project) must include at least:
  - Main project of the electrical installation with additional information materials:
    - explanatory notes,
    - primary scheme with primary equipment operational signs,
    - locations of primary equipment,
    - schemes with current and voltage measurement circuits between primary equipment, secondary equipment, energy meters or DMDs,
    - layouts of link and terminal boxes containing connections of current and voltage measurement circuits,
    - proof of compatibility documents for voltage transformers with the measuring devices intended to be used and the verification calculations of the secondary circuit load in voltage transformer measurement circuits connected to the energy meters or DMDs,
    - proof of compatibility documents for current transformers with the measuring devices intended to be used and the verification calculations of the secondary load of current transformer measurement circuits connected to the energy meters or DMDs,
    - secondary equipment diagrams,
    - layouts of the energy meter or DMD cabinets/cubicles with secondary equipment, energy meters or DMDs, including types and ordering codes for all secondary devices,
    - the sign plates and markings of the energy meter or DMD cabinets/cubicles and the secondary equipment with accessories, energy meters or DMDs with appropriated specifications,
    - cable specifications;
- the project documentation to be submitted before the delivery of equipment and before starting the installation work must include at least:
  - Factory Acceptance Test measurement protocols and certificates for instrument transformers;
- the project documentation to be submitted after the installation of equipment and after the configuration of energy meters or DMDs must include at least:
  - Calibration measurement report of energy meters or DMDs or verification documentation that declared energy meters or DMDs verified as a result of the manufacturer's legal metrological examination,

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- metrological calibration label of the energy meters,
- primary transformer Factory Acceptance Test measurement protocols with measured load losses,
- information on compliant data transmission, i.e. confirmation that data transmission from energy meters or DMDs to *Estfeed* Datahub or to AMR has been tested and securely commissioned:
  - during the transition period 01.01.2026–31.12.2026 in cooperation with Elering AS,
  - for energy meters or DMDs connected to AMR from 01.01.2027 in cooperation with Elering AS;
- the project documentation to be submitted after the energizing of the additional metering point must include at least:
  - vector diagrams of the metering system after loading (energizing with burden) and the acceptance act of the metering system.

## 6 TRANSFORMER LOSSES

To connect the Client's electrical installation to Elering AS network, the Client installs the primary transformer with primary winding connected to the high voltage joining point in substation of Elering AS and the secondary winding of Client's transformer is connected to collecting point of energy generation/consuming (e.g., busbar) in electrical installation of the Client that also is used for connection of the battery energy storage system. Thus, the Client shall submit to Elering AS the factory acceptance reports with measured no-load and load losses of the primary transformer depending on different burden levels from zero (from no-load losses) to 125% (load losses) with step 25%.

The Client has to submit the afore-mentioned reports to Elering AS before the commissioning and put to the operation of battery energy storage system to form out the primary transformer losses coefficient that shall be considered by calculation of the power energy generating from battery energy storage system to the network of Elering AS.

## 7 Fixed-term Deviations

The 2026 TRs come in force from 1. January 2026. And there are fixed-term deviations in 2026 TRs that are valid exclusively between 1. January 2026 and 31. December 2026 named as Transition Period.

During the Transition Period, the Client may use the metering point that shall be equipped with energy meter or DMD which shall meet the following technical requirements:

- the accuracy class of the DMD shall not exceed 1.0%,
- the total accuracy for metering system shall be at least 2.0% for three (3) phases together,
- the energy meter or DMD shall be able to provide the metering data from metering point to the *Estfeed* Datahub with one minute Demand Values of Demand Period for 15 minutes Market. Connection to Central AMR software system is not mandatory.

The primary and secondary equipment for an additional metering point shall meet 2026 TRs from 1. January 2027, when the Fixed-term Deviations are not valid and applicable anymore.

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## 8 REFERENCES

The references to EU and national metering regulations are here:

- Regulation (EU) 2024/1747, Article 7b (*amending Regulations (EU) 2019/942 and (EU) 2019/943 as regards improving the Union's electricity market design*),
- Directive (EU) 2019/944 Article 23 and Article 24 (*on common rules for the internal market for electricity and amending Directive 2012/27/EU*),
- Directive 2014/32/EU (*on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments*),
- Electricity Market Act, 01.01.2026, § 59<sup>2</sup>, § 71,
- Metrology Act, § 6 (4).

## 9 Appendix 1

### METROLOGICAL REQUIREMENTS FOR PROCURABLE MEASURING INSTRUMENTS

#### 1. Definitions

**Calibration** – a procedure that, under specified conditions, determines the relationship between the value indicated by a measuring instrument and the corresponding value of a realized quantity using a standard (etalon);

**Expanded uncertainty** – a parameter that defines a range around the measurement result which is expected to encompass a large part of the distribution of values that can reasonably be attributed to the measurand;

**Legal metrology expertise** – a procedure in which the documentation of a measuring instrument is compared with the requirements established in the legislation of the Republic of Estonia;

**Measuring instrument** – a technical device with defined metrological characteristics, used for measurement either as sole instrument or together with accessories;

**Verification** – a procedure in which a competent verification laboratory or notified authority checks the conformity of a measuring instrument with established requirements and marks the compliant measuring instrument with a verification mark;

**Verification mark** – a verification sticker, verification seal, or imprint of a verification stamp;

**Customer** – Elering AS;

**Type approval** – a competent decision that a particular type of measuring instrument meets the requirements established by legal acts and may be used in legally regulated operations, enabling reliable measurement results to be obtained during the specified period (verification validity period).

#### 2. General requirements

Procurable measuring instruments (hereinafter – MI) must:

- express measurement results in the units of the International System of Units (SI);
- comply with international (e.g., ISO, IEC), European (CEN, CENELEC) or, in their absence, national (e.g., DIN) standards. If requirements for the procurable MI are

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established in the normative documents of metrology organizations (e.g., OIML), the procurable MIs must comply with those documents;

- comply with the Customer's company standards and procurement documentation;
- maintain operability under the specified operating conditions.

### **3. Requirements for MIs subject to mandatory metrological control according to the Metrology Act**

3.1 The MI-s belong to mandatory metrological control according to Metrology Act that is specified in Regulation No. 65 of the Minister of Economic Affairs and Infrastructure of 18.12.2018.

3.2 The Customer procures MIs that comply with Metrology Act and Directive 2014/32/EU on measuring instruments.

3.3 A verified MI must have a verification mark in general. If this MI is installed independently or together with the equipment to which it belongs in outdoor conditions, then the verification mark shall be weatherproof or covered with a transparent weatherproof film.

### **4. Requirements for MIs which are not the subject to mandatory metrological control according to Metrology Act**

4.1 MIs that are not the subject to mandatory metrological control must be calibrated before installation.

4.2 The Customer specifies the Calibration conditions. If the Customer has not provided calibration conditions, the MI-s shall be calibrated for compliance with the accuracy (accuracy class) that specified in their certificate or in the standard used for MI-s manufacturing.

4.3 If the MI has been calibrated according to the conditions provided by the Customer, the calibration certificate must be submitted to the Customer. The calibration certificate must provide unambiguous identification of the calibration laboratory and the calibrator, calibration conditions and calibration results together with measurement uncertainties. Based on the calibration data that are provided in the certificate, the new calibration must be possible to repeat under the same conditions and using the same standards (etalons).

4.4 If the MI is calibrated for compliance with the accuracy (accuracy class) specified in its certificate or manufacturing standard, the calibration certificate submitted to the Customer must include a conformity decision.

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4.5 By agreement with the Customer, MI-s may be calibrated in a non-accredited laboratory that meets the basic requirements of EN ISO/IEC 17025 or in the MI manufacturer’s laboratory.

4.6 Calibrated MI-s must be marked with a calibration label before installation or before the technical inspection of the site. The label must contain at least:

- the identification mark or logo of the calibration laboratory,
- the calibration date (year, month, and day).

4.7 If the MI is installed independently outdoors or together with associated equipment, the calibration label must be weatherproof.

4.8 The calibration certificate must be submitted to the Customer no later than five (5) working days before the technical inspection.

## 5. References

5.1 Metrology Act, 01.01.2019,

5.2 Regulation No. 65 of the Minister of Economic Affairs and Infrastructure of 18.12.2018 “Mandatory Areas of Application of Metrologically Controlled Measuring Instruments with Exceptions, List of Measuring Instruments Subject to Metrological Control, Requirements for Accuracy, Verification Validity Periods of Measuring Instruments, and Specified Requirements for Metrological Control and Statistical Verification”, Annex

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## 10 Appendix 2

ADDITIONAL METERING POINT INSTALLATION SHEET						
<b>General Site Details</b>		<input type="checkbox"/> New		<input type="checkbox"/> Renovated		<input type="checkbox"/> Equipment change
Battery Energy Storage System	Metering point	Voltage level (kV)	EIC code	Project No.		
Removed Measuring Equipment						
Meter		Display Endreadings		Unit	Date	Time
Type (Model)		Active energy (+A)				
Serial Number		Active energy (-A)				
Accuracy Class	(kWh) (kvarh)	Reactive energy (+R)				
Date of verification		Reactive energy (- R)				
Instrument Transformer	Current Transformer (CT)			Voltage Transformer (VT)		
	L1	L2	L3	L1	L2	L3
Type(Model)						
Connected Ratio						
Accuracy Class						
Date of verification						
Installed Measuring Equipment						
Meter		Display Startreadings		Unit	Date	Time
Type (Model)		Active energy (+A)				
Serial Number		Active energy (- A)				
Accuracy Class Cl.	(kWh) (kvarh)	Reactive energy (+R)				
Date of verification		Reactive energy (- R)				
Verification Mark No		Meter Communication				
Programmed CT Ratio		Com. Module Type				
Programmed VT Ratio		Communication channel				
Location		IP address				
Manufacturer		Com Module Manufacturer				
Instrument Transformer	Current Transformer			Voltage Transformer		
	L1	L2	L3	L1	L2	L3
Type (Model)						
Serial Number						
Accuracy Class						
Date of calibration						
Calibration protocol nr						
Connected Ratio						
Available Ratios						
Rated Burden (VA)						
Manufacturer						
Installed Metering Circuits						
	Current Circuit			Voltage Circuit		
	L1	L2	L3	L1	L2	L3
Cable material (Cu, Al)						
Cable size (mm <sup>2</sup> )						
Cable Route length (m)						
Calculated impedance ( $\Omega$ )						
Added Load Resistor (VA)						
<b>Comments:</b>						
Installation works completed	Client representative	Name	Signature	Date		

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## 11 Appendix 3

ADDITIONAL METERING POINT INSTALLATION COMMISSIONING SHEET						
<b>General Site Details</b> <input type="checkbox"/> New <input type="checkbox"/> Renovated <input type="checkbox"/> Equipment change						
Battery Energy Storage System	Connection point	Primary Voltage (kV)	EIC code	Project No. and Date		
<b>Instrument Transformer Burden Measurements</b>						
<b>Measured</b>	CT measuring winding: S S			Voltage Transformer		
	L1	L2	L3	L1	L2	L3
Secondary Current (mA)						
Secondary Voltage (V)						
Burden (VA)						
<b>Current Transformer Ratio Check</b>						
<b>Measured</b>	L1		L2		L3	
Primary (A)						
Secondary (A)						
K=Prim/sec						
Connected Ratio						
Error %						
<b>3 Phase Vector Diagram</b>						
<b>Measured</b>	Phase A		Phase B		Phase C	
	Ia	Ua	Ib	Ub	Ic	Uc
Current(A); Voltage (V)						
Phase Angle (.°)	(Ua-Ua)= 0					
Phase Angle (.°)						
<b>Test instruments</b>						
<b>Metering Installation checked by</b>	Contractor	Name	Signature	Date		
<b>Comments:</b>						
<b>Seal Number</b>						
	Meter Terminals	Terminals in Metering Cubicle	Terminals and VT CB in Link Box	Current Transformer Terminal	Voltage Transformer Terminal	
1				L1	L1	
2				L2	L2	
3				L3	L3	
<b>Metering Equipment sealed</b>	Client representative	Name	Signature	Date		

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## 12 Document update records

No.	Date	Person	Explanation