



EU-TYPE EXAMINATION CERTIFICATE

Number: TCM 221/08 - 4574

Addition 5

This addition replaces all previous versions of this certificate in full wording.

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- In accordance:** with Directive 2014/32/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (implemented in Czech Republic by Government Order No. 120/2016 Coll.).
- Manufacturer:** ZPA Smart Energy a.s.
Komenského 821
Střední Předměstí
541 01 Trutnov
Czech Republic
- For:** active electrical energy meter – 3-phase
type: ED310
accuracy class: A or B
mechanical environment class: M1
electromagnetic environment class: E2
temperature range: -25°C...+55°C or -40°C...+70°C
- Valid until:** 8 March 2028
- Document No:** 0115-CS-A010-08
- Description:** Essential characteristics, approved conditions and special conditions, if any, are described in this certificate.
- Date of issue:** 28 May 2018

Certificate approved by:



v. z.

RNDr. Pavel Klenovský

1. Meter Characteristics

The electricity meter ED310 is a 3-phase single to four-tariff active energy meter designed to measure residential, light industrial and commercial energy consumption. As per its HW modification, the meter is designated for connection to the distribution network directly or via measurement current transformers. It measures active energy in classes A or B as per EN 50470-1 and EN 50470-3 in both import and export directions. The meter measures correctly in its class even if connected to two phases or one phase only. In the two phases case, their phase shift may be 180°. The meter is designed for DIN-rail mounting.

Besides energy, it can also measure instant effective values of voltage, current, power and cos φ and it can register voltage interruptions and operational time. These measurements are not subject to the approval process.

Energy values measured (e.g. up to four consumption and supply tariffs, total energy across all tariffs) with additional information (actual active tariff, current direction, factor of transformer operated meter) are shown on the LCD. If the current transformer (CT) factor is entered, the transformer operated meter calculates energy import on the CT primary side. The CT factor (can be up to 400) multiplies energy, power and current values. Values to be displayed are configurable. Meter tariffs are switched by external voltage. The meter, equipped with an optical interface and impulse output S0 as a standard, can also be equipped with either RS 485 or M-Bus interfaces.

Type Designation

ED310.	I.	DR.	0	0	C	30	1	-	00
		D0.	1	1	X		2		
				4	E		3		
				5	Z		4		
							5		
							6		HW Customer Modification (00...99)
							7		
							8		
									Number of Tariffs (1...4) with Impulse Output S0 Number of Tariffs: 5 = Single Tariff with No Impulse Output S0, 6 = Double Tariff with No Impulse Output S0; etc.
									FW Customer Modification (00...99)
									Tariff Control Logics (see user manual)
									Tariff Inputs Wiring (see user manual)
									0- Without Optical Communication Port 1- With Optical Communication Port
									DB – With LCD and M-Bus Communication Module DR – with LCD and RS485 Communication Module D0 – With LCD and No Communication Module
									void – Direct Connected Meter I – Transformer Operated Meter

Symbols ODB or ODB/DOD, that can be entered on the name-plate, differentiate modifications measuring import only or import / export respectively (if sold outside CZ, the symbols can be modified by request of customer).

Hardware Version: 00

Measuring Core Firmware Version: 3.1; CRC: 2008 for direct connected meters, 479E for transformer operated meters



2. Main Metrological Characteristics

Measurement	<ul style="list-style-type: none"> - active energy in 3-phase 4-wire distribution network - can be connected to two phases or one phase only (phase shift may be 180° in case of two phases) - can measure both import and/or export of energy - up to 4 tariffs
Measurement Method	<p>Static Meter</p> <p>Direct Connected Meter - inputs with current shunts and current transformers in parallel</p> <p>Transformer Operated Meter - inputs with current transformers</p>
Class	<p>Direct Connected Meter - Class A or B</p> <p>Transformer Operated Meter - Class B</p>
Display	LCD
Reference Voltage U_n	3 x 230/400 V
Reference Frequency f_n	50 Hz
Reference Current I_{ref}	<p>Direct Connected Meter: 5 A</p> <p>($I_{ref} = 10 \times I_{tr}$)</p>
Rated Current I_n	<p>Transformer Operated Meter: 5 A</p> <p>($I_n = 20 \times I_{tr}$)</p>
Transitional Current I_{tr}	<p>Direct Connected Meter: 0,5 A</p> <p>Transformer Operated Meter: 0,25 A</p>
Minimum Current I_{min}	<p>Direct Connected Meter: 0,2 A</p> <p>Transformer Operated Meter: 0,05 A</p>
Starting Current I_{st}	<p>Direct Connected Meter: 15 mA</p> <p>Transformer Operated Meter: 5 mA</p>
Maximum Current I_{max}	<p>Direct Connected Meter: 63 A</p> <p>Transformer Operated Meter: 6 A</p>
Constant (LED)	Default value 10 000 imp/kWh, configurable
Specified Operating Temperature Range**)	<p>-25°C...+55°C</p> <p>Direct Connected Meter with class index A can have an extended temperature range -40 °C thru +70 °C</p>
Degree of Protection Against Dust and Water*)	IP20
Protective Class (Electrical)	II
Mechanical Environment	M1
Electromagnetic Environment	E2

*) The meter shall be placed in a cabinet with a degree of protection against dust and water of IP51 at least.

**) At -40 °C, the meter measures correctly but the measurement data displayed are illegible. They can be obtained either through the optical interface or read on the display at a higher temperature (≥ -30 °C).

3. Interfaces

- Impulse output: S0 type (configurable, default value 1000 imp/kWh)
- Optical interface according to EN 62056-21
- As per customer modification:
 - RS485
 - M-Bus

4. Main Functional Characteristics

- External tariff switching – energy import and energy export can each be split up into 4 tariffs
- Ability to display energy values with up to 4 decimal places
- Total time registers of energy import and energy export
- Maximum current and maximum power values by phase
- Number of voltage interruptions by phase
- Operational time and time elapsed after resetting of maximum values of current and power

The meters also measure additional values (and display them if so configured):

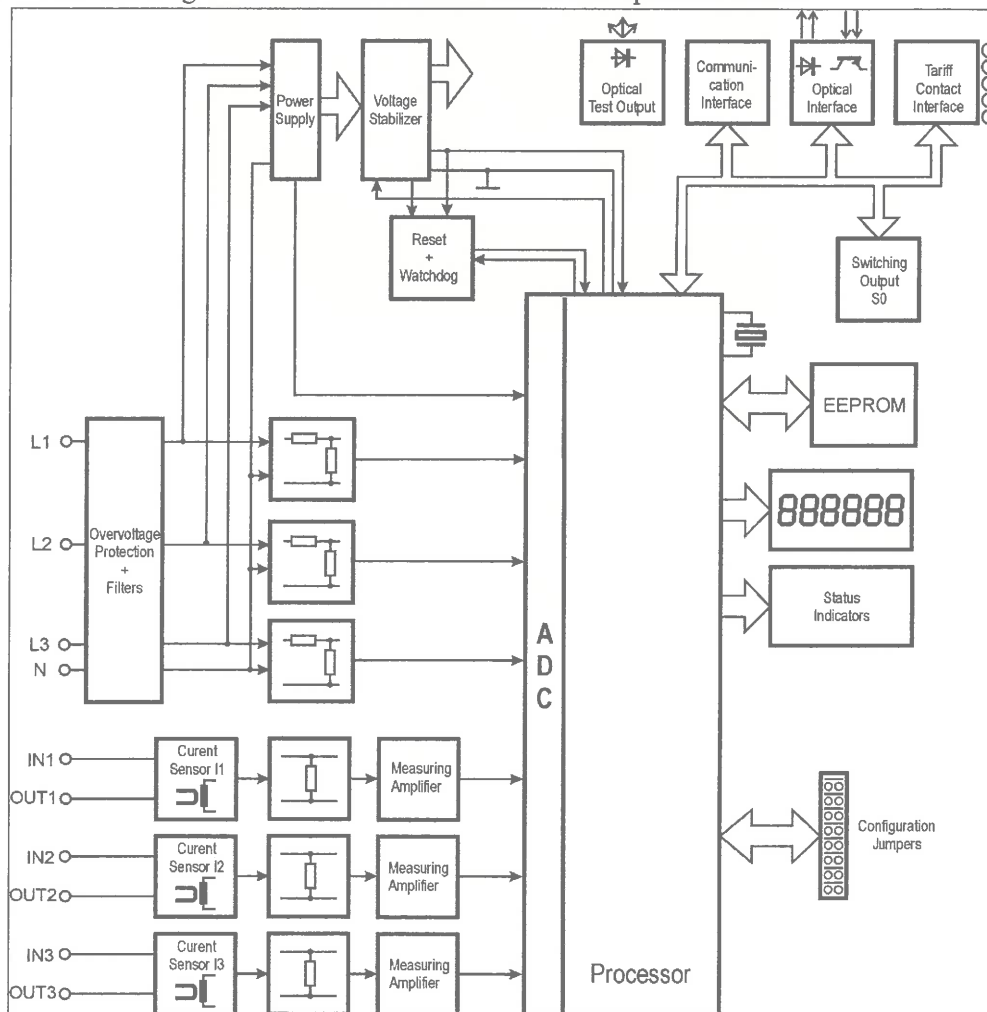
- Instant effective voltage value by phase
- Instant effective current value by phase and in total
- Instant power by phase and in total
- $\cos \varphi$ by phase

The transformer operated meter always shows on the display:

- Current transformer (CT) factor

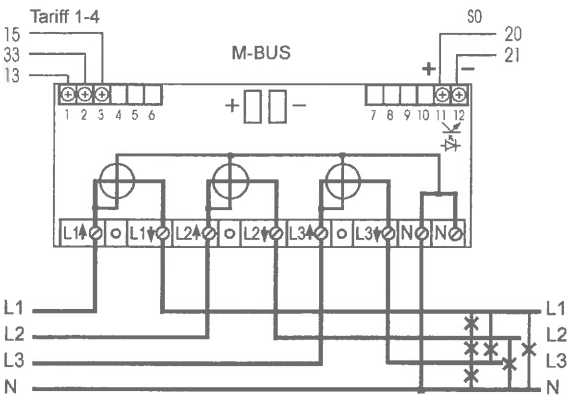
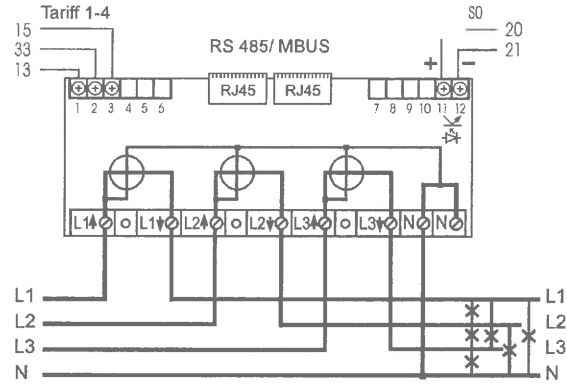
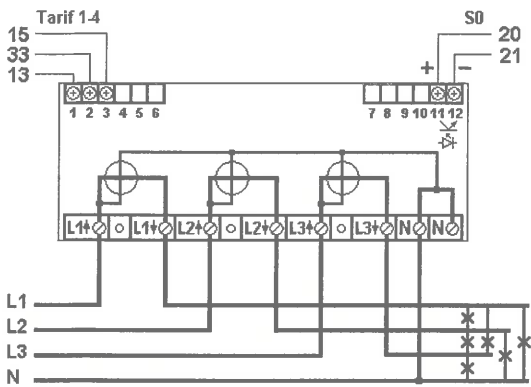
5. Meter Block Diagram

The diagram shows the marking of current terminals of transformer operated meters.

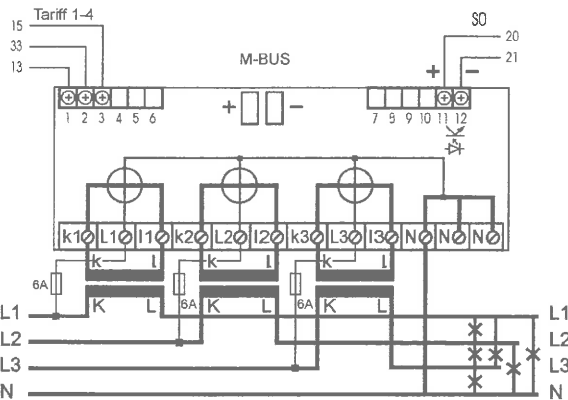
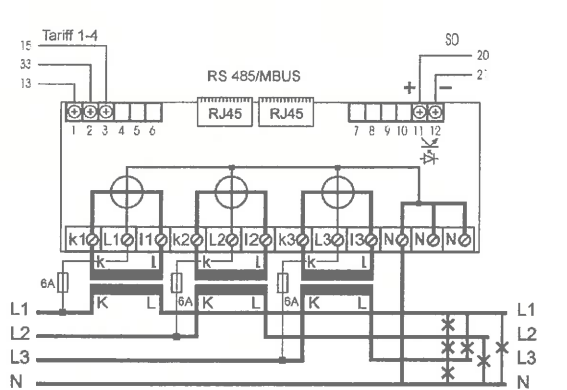
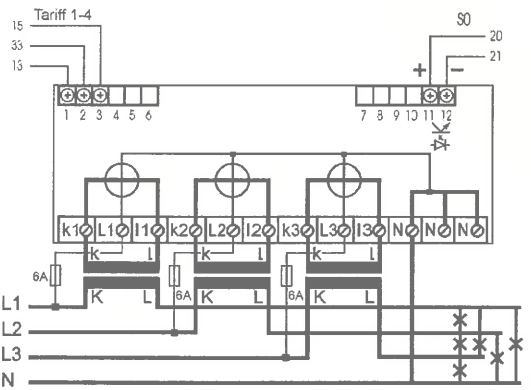


6. Wiring Diagram

Direct Connected Meters



Transformer Operated Meters



7. Photographs of Meters

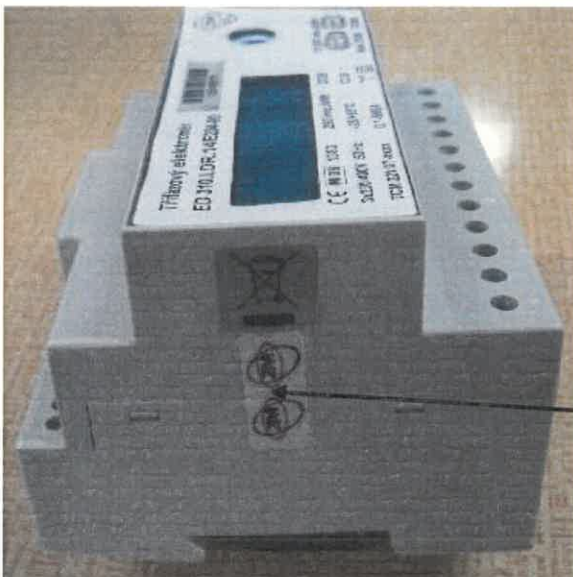
Front Side

Direct Connected Meters



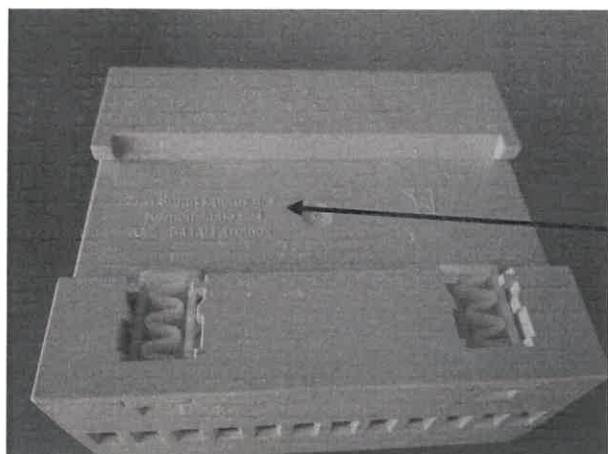
Location of
manufacturer
identification

Transformer Operated Meters



Location of
securing mark

Back Side



location of
correspondence
address of
manufacturer

8. Tests

Meters were tested at the Czech Metrology Institute Brno as per EN 50470-1 and EN 50470-3 standards and WELMEC doc. 7.2:2008 document. Test results are presented in Test Report No. 6011-PT-A071-08, 6011-PT-A952-08, 6011-PT-K010-09, 6011-PT-K024-09, 6011-PT-K027-09 a 6011-PT-TS006-18.

The meters complied with all test requirements.

9. Meter Marking

9.1 Name-plate

The following data shall be quoted on the meter name-plate:

- Manufacturer's name or his trade mark;
- Correspondence address of manufacturer (placed on base of the meter)
- Type Designation or meter commercial name;
- "CE" marking and supplementary metrological marking;
- Number of EU-type examination certificate;
- Serial number and year of production;
- Class index;
- Specified operating temperature range;
- Types of distribution network (graphical symbol);
- Reference voltage;
- Reference (rated) current;
- Maximum current;
- Minimum current;
- Reference frequency;
- Constant of meter;
- Sign of double square for meters with protective class II.

9.2 Supplementary Documentation

The meter shall be accompanied by supplementary documentation. A batch of identical meters intended for a single customer can be accompanied by a single copy of supplementary documentation only. This documentation shall as a minimum include all data listed on the name-plate (see 8.1, except for serial number and production year) and also the following:

- Brief description of meter, including values / data measured, data logging and display possibilities
- Wiring diagram (the wiring diagram shall be also shown on the meter case)

- Storage conditions
- EMC data
- Starting current
- Transitional current
- Consumption of voltage and current circuits
- Specification of impulse output S0
- Specification of optical communication port including communication modes available
- Specification of RS485
- Specification of tariff switch
- Maximum cross-section of connecting conductors
- Mass and dimensions
- Way of meter disposal

9.3 Sealing

The meter is sealed by a single manufacturer's official mark. This is an adhesive label pasted on the side of the meter case (refer to Photographs of Meters – Front Side)

10. Testing

The conformity assessment procedure consists of these tests (at reference conditions):

1. Test of insulation (AC voltage test)
2. Test of no-load
3. Test of starting
4. Accuracy of meter (using of test output)
5. Test of meter constant

Tests are performed in accordance with the EN 50470-1 and EN 50470-3 standards. Meter intrinsic errors $e(I, \cos \varphi)$ are measured at reference voltage $3 \times 230/400$ V, 50 Hz and currents and $\cos \varphi$ as given in tables below. After the test, the composite errors e_c are calculated at rated operating conditions according to the formula as follows:

$$e_c = \sqrt{e^2(I, \cos \varphi) + e^2(T, I, \cos \varphi) + e^2(U, I, \cos \varphi) + e^2(f, I, \cos \varphi)}$$

where

- $e(I, \cos \varphi)$ - intrinsic error for a given current and $\cos \varphi$;
 $e(T, I, \cos \varphi)$ - additional percentage error due to variation of temperature in rated temperature range and for a given current and $\cos \varphi$; the value was determined during type examination;
 $e(U, I, \cos \varphi)$ - additional percentage error due to variation of voltage $\pm 10 \% U_{ref}$ for a given current and $\cos \varphi$; the value was determined during type examination;
 $e(f, I, \cos \varphi)$ - additional percentage error due to variation of frequency $\pm 2 \% f_{ref}$ for a given current and $\cos \varphi$; the value was determined during type examination.

Table given values are substituted for $e(T, I, \cos \varphi)$, $e(U, I, \cos \varphi)$, $e(I, \cos \varphi)$ in the formula. The meter is considered compliant if the composite errors are smaller than the maximum permissible errors MPE.

Calculation of composite error – 3×230/400 V 0,2-5(63) A												
Load			Additional error [%]						MPE (%) for class A in temp. ranges			
Phase	Current	cos φ	δ(T,I,cosφ)				δ(U,I, cosφ)	δ(f,I, cosφ)	1	2	3	4
			1	2	3	4						
Balanced Load	I _{min}	1	0,24	0,42	0,81	0,96	0,32	0,10	±3,5	±5,0	±7,0	±9,0
		I _{tr}	1	0,39	0,66	0,86	1,09	0,12	0,32	±3,5	±4,5	±7,0
	0,5i	0,32	1,00	1,43	1,54	0,12	0,29					
	0,8c	0,14	0,44	0,80	1,35	0,10	0,16					
	I _{ref}	1	0,17	0,55	0,86	0,92	0,16	0,21	±3,5	±4,5	±7,0	±9,0
		0,5i	0,62	0,80	1,34	1,83	0,21	0,37				
		0,c	0,28	0,49	0,78	0,84	0,26	0,30				
	I _{max}	1	0,31	0,50	0,82	1,11	0,02	0,02	±3,5	±4,5	±7,0	±9,0
		0,5i	0,28	1,10	1,33	1,43	0,02	0,30				
0,8c		0,23	0,52	0,73	0,95	0,01	0,12					
Single-phase Load	I _{tr}	1	0,41	0,95	1,25	0,69	0,18	0,45	±4,0	±5,0	±7,0	±9,0
		0,5i	0,32	1,01	1,43	0,96	0,18	0,45				
	I _{ref}	1	0,20	0,75	0,97	1,41	0,07	0,05	±4,0	±5,0	±7,0	±9,0
		0,5i	0,58	1,21	1,49	2,01	0,04	0,32				
	I _{max}	1	0,35	0,71	1,02	0,68	0,03	0,03	±4,0	±5,0	±7,0	±9,0
		0,5i	0,43	1,10	1,46	0,54	0,05	0,31				

Calculation of composite error – 3×230/400 V 0,05-5(6) A												
Load			Additional error [%]						MPE (%) for class B in temp. ranges			
Phase	Current	cos φ	δ(T,I,cosφ)				δ(U,I, cosφ)	δ(f,I, cosφ)	1	2	3	4
			1	2	3	4						
Balanced Load	I _{min}	1	0,18	0,32	0,45	-	0,01	0,01	±2,0	±2,5	±3,5	±4,0
		I _{tr}	1	0,18	0,33	0,46	-	0,01	0,29	±2,0	±2,5	±3,5
	0,5i	0,15	0,65	0,85	-	0,01	0,29					
	0,8c	0,21	0,24	0,43	-	0,01	0,13					
	I _{ref}	1	0,25	0,32	0,42	-	0,48	0,11	±2,0	±2,5	±3,5	±4,0
		0,5i	0,58	0,84	1,23	-	0,07	0,31				
		0,c	0,11	0,40	0,71	-	0,15	0,16				
	I _{max}	1	0,18	0,38	0,42	-	0,00	0,02	±2,0	±2,5	±3,5	±4,0
		0,5i	0,63	0,92	1,23	-	0,01	0,29				
0,8c		0,30	0,49	0,72	-	0,01	0,13					
Single-phase Load	I _{tr}	1	0,23	0,38	0,63	-	0,02	0,30	±2,5	±3,0	±4,0	±4,5
		0,5i	0,23	1,09	1,43	-	0,02	0,30				
	I _{ref}	1	0,21	0,35	0,52	-	0,09	0,09	±2,5	±3,0	±4,0	±4,5
		0,5i	0,49	0,80	1,24	-	0,09	0,31				
	I _{max}	1	0,17	0,48	0,53	-	0,01	0,02	±2,5	±3,0	±4,0	±4,5
		0,5i	0,78	1,16	1,39	-	0,02	0,30				

Temperature Range 1: +5 °C thru +30 °C

Temperature Range 2: -10 °C thru +5 °C and +30 °C thru +40 °C

Temperature Range 3: -25 °C thru -10 °C and +40 °C thru +55 °C

Temperature Range 4: -40 °C thru -25 °C and +55 °C thru +70 °C (if this range is quoted on the name-plate)

Remark: If the meter is used for measuring in a single phase network, each individual phase is tested according to the "Balanced Load" values given in the tables above.

