



EC-TYPE EXAMINATION CERTIFICATE

Number: TCM 221/10 – 4731

Addition 2

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

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- In accordance:** with Directive 2004/22/EC of the European Parliament and of the Council as amended implemented in Czech Republic by Government Order No. 464/2005 Coll. as amended that lays down technical requirements on measuring instruments.
- Manufacturer:** Zakład Elektronicznych Urządzeń Pomiarowych POZYTON Sp. z o.o.
ul. Staszica 8
42-200 Częstochowa
Poland
- For:** active electrical energy meter - 3-phase
type: EABM
Accuracy class: A or B
mechanical environment class: M1
electromagnetic environment class: E2
temperature range: -40 °C...+70 °C
- Valid until:** 18 March 2020
- Document No:** 0115-CS-A009-10
- Description:** Essential characteristics, approved conditions and special conditions, if any, are described in this certificate.
- Date of issue:** 21 December 2015

Certificate approved by:




RNDr. Pavel Klenovský

1. Meter Characteristics

The electricity meter EABM is a 3-phase one 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 and/or voltage 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.

It measures reactive energy in classes 2 or 3 as per EN 62053-23 and in classes 0,5 S or 1 S or 1 as per EN 62053-24 in both import and export directions or in four quadrants.

Besides active energy, it can also measure and register load profile of active and reactive power in both directions or for reactive energy in four quadrants, in 15, 30 or 60 minutes of integration period, maximum demand, measurement and registration of active power over-limit consumption, instantaneous effective values of voltage, current, power and frequency and can register voltage interruptions, opening the cover or register strong magnetic field. 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 as actual tariff, phase sequence, power direction are shown on the LCD. Values to be displayed are configurable. Metering data measured by the meter can be scrolled manually using push-button on the meter front or automatically in predefined sequence of LCD screens (upon the customer's definition).

Meter tariffs are switched by internal real time clock. Meters EABM are equipped with 2 batteries: First for internal real time clock, second one enables readout of metering data in case of voltage failure. All billing data are registered in non-volatile memory.

The meter, equipped as a standard, with an optical interface for local readout, configuration and parameterization, with RS485 (or CLO) interface and with optical interface used for operating with external communication modules. Meter can be equipped with relay output for controlling external devices and auxiliary power supply circuit.

On the nameplate LEDs for testing purposes are placed.

Hardware Version: EABM_v4

Software Version:

v01.01 (CRC: 0x23C3)

v02.01 (CRC: 0x8F8F)

v03.01 (CRC: 0x8637)

v01.03 (CRC: 4507)

v02.03 (CRC: 5735)

v03.03 (CRC: 090C)



Type designation including internal identification of configuration is:

EABM-

bT37CEFMORSTWY-D09DG0103 (example)

where (internal identification of configuration):

bT37	C	E	F	M	O	Q	R	S	T	W	Y-	D	09	D	G	0103
Manufacturer marking																
Sensor of cover opening																
Remote configuration blocking switch																
Sensor of magnetic field																
Maximum demand indicator																
External battery input																
Optionally remote date and time programming by communication interfaces																
Auxiliary power supply circuit																
OC (open collector) time synchronization input																
OC (open collector) synchronisation output according to the integration periods																
Relay output																
Optical interface blocking switch																
Hardware generation																
Communication Interfaces																
Reference voltage																
Reference current																
Software version																

Detailed explanation of letters/digits – see user`s manual

2. Main Metrological Characteristics

Measurement	- active energy in 3-phase 4-wire distribution network - can measure both import and/or export of energy - up to 4 tariffs
Measurement Method	Static Meter Current inputs with current transformers Voltage inputs with resistor dividers
Class	Direct Connected Meter - Class A Transformer Operated Meter - Class B
Display	LCD
Reference Voltage U_n	3 x 230/400 V; 3 x 57,7/100 V
Reference Frequency f_n	50 Hz
Reference Current I_{ref}	Direct Connected Meter: 5 A
Rated Current I_n	Transformer Operated Meter: 5 A
Transitional Current I_{tr}	Direct Connected Meter: 0,5 A Transformer Operated Meter: 0,25 A
Minimum Current I_{min}	Direct Connected Meter: 0,15 A Transformer Operated Meter: 0,05 A



Starting Current I_{st}	Direct Connected Meter: 20 mA Transformer Operated Meter: 5 mA
Maximum Current I_{max}	Direct Connected Meter: 60 A, 100 A Transformer Operated Meter: 6 A, 10 A
Constant (LED)	Direct Connected Meter: 800 imp/kWh
	Transformer Operated Meter: 4000 imp/kWh; 10 000 imp/kWh
Specified Operating Temperature Range	-40°C...+70°C (3K7) (LCD visible from -35°C)*)
Degree of Protection Against Dust and Water*)	IP51
Protective Class (Electrical)	II
Mechanical Environment	M1
Electromagnetic Environment	E2

*)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 (≥ -35 °C).

3. Interfaces

- Optical interface according to EN 62056-21
- As per customer modification: RS485 or CLO
- Optical interface used for operating with external communication modules

4. Main Functional Characteristics

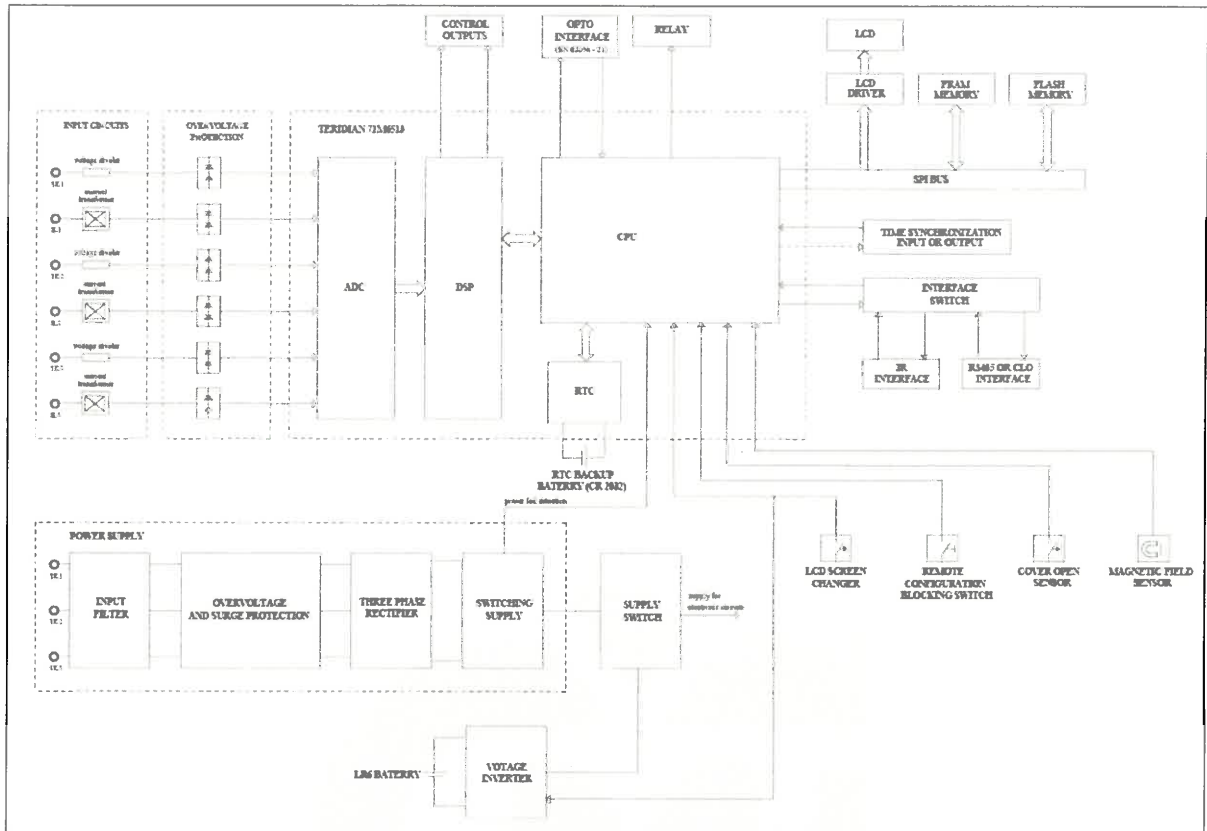
- Internal tariff switching – energy import and energy export can each be split up into 4 tariffs
- Ability to display energy values with up to 4 decimal places
- Load profiles
- Maximum power values in defined time range
- Number of voltage interruptions
- Number of strong magnetic fields acting in meter vicinity

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

- Reactive power and energy in both directions or in four quadrants
- 10 maximum active power values (value, date, time) in both directions
- Instantaneous value of active power with actual cycle minute (both directions)
- Instantaneous effective voltage value by phase
- Instantaneous effective current value by phase and in total
- Instantaneous power by phase and in total
- Frequency
- Date and time of last billing period closing
- Historical active and reactive energy counters (both directions or for reactive energy in four quadrants, all tariffs and total)
- Maximum demand value programed into the meter's memory

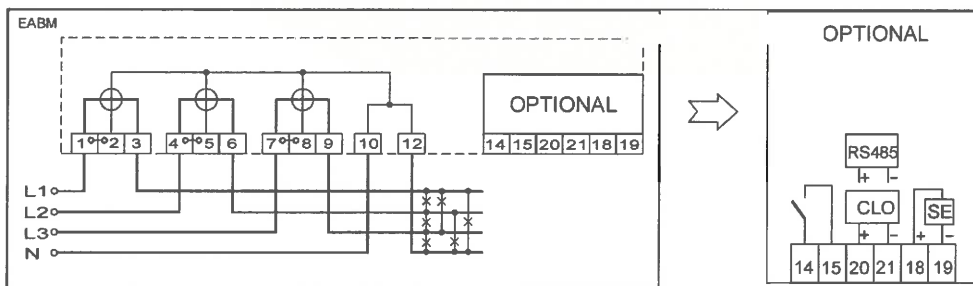


5. Meter Block Diagram

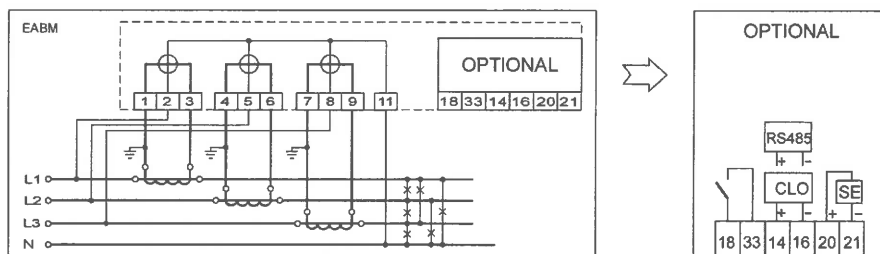


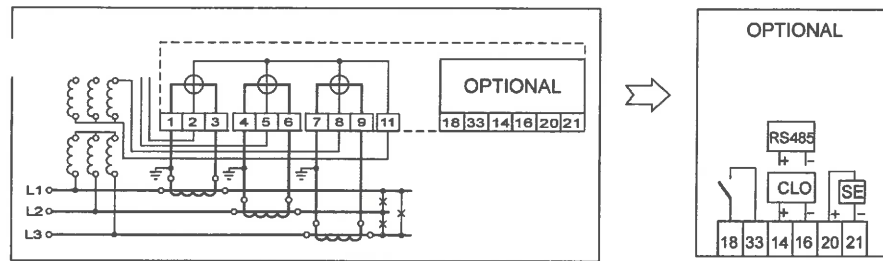
6. Wiring Diagram

Direct Connected Meters



Transformer Operated Meters

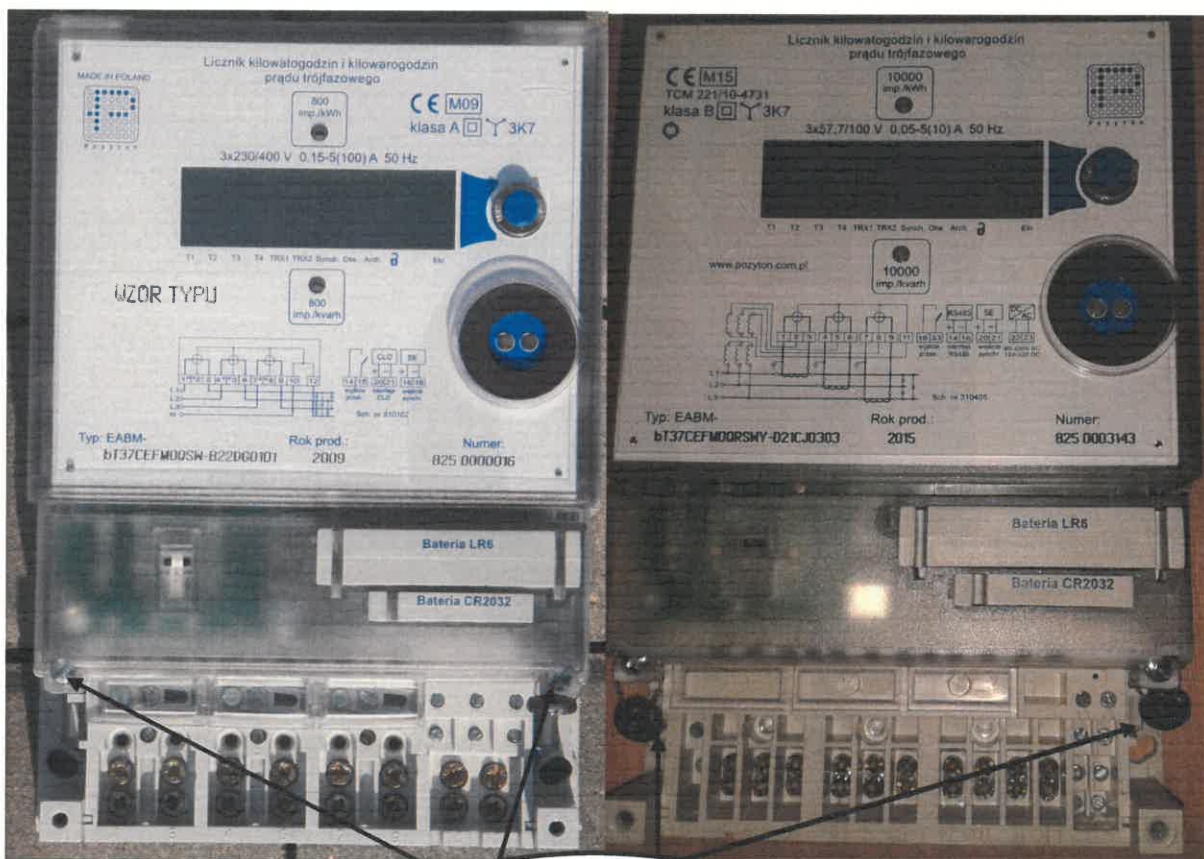




7. Photographs of Meters

Direct Connected Meter

Transformer Operated Meter



Location of securing marks

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-K009-10 and 6011-PT-TS035-15.

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;
- Type Designation or meter commercial name;
- "CE" marking and supplementary metrological marking;
- Number of EC-type examination certificate;
- Serial number and year of production;
- Class index;
- Specified operating temperature range (in °C or as IEC environmental class);
- 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 9.1, 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
- Maximum cross-section of connecting conductors
- Mass and dimensions
- Way of meter disposal

9.3 Sealing

The meter is sealed by two manufacturer's official marks or by two marks of notified body (module F of MID). These marks are pendent seals (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 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:

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

where

$e(I, \cos \varphi)$ - intrinsic error for a given current and $\cos \varphi$;

$\delta(T, I, \cos \varphi)$ - 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;

$\delta(U, I, \cos \varphi)$ - 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;

$\delta(f, I, \cos \varphi)$ - 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 $\delta(T, I, \cos \varphi)$, $\delta(U, I, \cos \varphi)$, $\delta(f, I, \cos \varphi)$ in the formula. The meter is considered compliant if the composite errors are smaller than the maximum permissible errors MPE.

MPE values for class A and B are given in Directive 2004/22/EC of the European Parliament and of the council on measuring instruments Annex MI-003, Table 2.

Calculation of composite error – meter for direct connection												
Load			Additional error [%]						MPE (%) for class A in temp. ranges			
Phase	Current	$\cos \varphi$	$\delta(T, I, \cos \varphi)$				$\delta(U, I, \cos \varphi)$	$\delta(f, I, \cos \varphi)$	1	2	3	4
			1	2	3	4						
Balanced Load	I_{min}	1	0,77	1,26	1,69	2,12	0,05	0,05	±3,5	±5,0	±7,0	±9,0
		I_r	1	0,77	1,25	1,66	2,09	0,05	0,05	±3,5	±4,5	±7,0
	0,5i	1,64	2,68	3,54	4,39	0,05	0,05					
	0,8c	0,39	0,64	0,85	1,09	0,05	0,05					
	I_{ref}	1	0,75	1,20	1,62	2,04	0,05	0,05	±3,5	±4,5	±7,0	±9,0
		0,5i	1,60	2,58	3,46	4,31	0,05	0,05				
		0,8c	0,40	0,63	0,86	1,09	0,05	0,05				
	I_{max}	1	0,75	1,20	1,63	2,03	0,05	0,05	±3,5	±4,5	±7,0	±9,0
		0,5i	1,55	2,53	3,43	4,29	0,05	0,05				
0,8c		0,39	0,64	0,85	1,06	0,05	0,05					
Single-phase Load	I_r	1	0,72	1,21	1,66	2,10	0,05	0,05	±4,0	±5,0	±7,0	±9,0
		0,5i	1,50	2,41	3,42	4,32	0,05	0,05				
	I_{ref}	1	0,71	1,18	1,63	2,07	0,05	0,05	±4,0	±5,0	±7,0	±9,0
		0,5i	1,39	2,35	3,28	4,19	0,05	0,05				
	I_{max}	1	0,71	1,19	1,62	2,07	0,05	0,05	±4,0	±5,0	±7,0	±9,0
		0,5i	1,41	2,38	3,31	4,23	0,05	0,05				



Calculation of composite error – transformer operated meter													
Load			Additional error [%]						MPE (%) for class B in temp. ranges				
Phase	Current	cos φ	$\delta(T, I, \cos\varphi)$				$\delta(U, I, \cos\varphi)$	$\delta(f, I, \cos\varphi)$	1	2	3	4	
			1	2	3	4							
Balanced Load	I_{min}	1	0,34	0,27	0,25	0,44	0,02	0,02	±2,0	±2,5	±3,5	±4,0	
		1	0,04	0,09	0,27	0,46	0,02	0,02	±2,0	±2,5	±3,5	±4,0	
	0,5i	0,15	0,11	0,17	0,33	0,02	0,02						
	0,8c	0,06	0,12	0,29	0,50	0,02	0,02						
	I_{ref}	1	0,04	0,09	0,25	0,44	0,02	0,02	±2,0	±2,5	±3,5	±4,0	
		0,5i	0,01	0,03	0,17	0,32	0,02	0,02					
		0,8c	0,03	0,09	0,28	0,52	0,02	0,02					
	I_{max}	1	0,04	0,12	0,27	0,46	0,02	0,02	±2,0	±2,5	±3,5	±4,0	
		0,5i	0,01	0,13	0,18	0,33	0,02	0,02					
		0,8c	0,04	0,11	0,30	0,50	0,02	0,02					
	Single-phase Load	I_{tr}	1	0,10	0,10	0,28	0,49	0,02	0,02	±2,5	±3,0	±4,0	±4,5
			0,5i	0,26	0,22	0,18	0,37	0,02	0,02				
I_{ref}		1	0,02	0,09	0,27	0,49	0,02	0,02	±2,5	±3,0	±4,0	±4,5	
		0,5i	0,04	0,05	0,20	0,38	0,02	0,02					
I_{max}		1	0,03	0,12	0,29	0,49	0,02	0,02	±2,5	±3,0	±4,0	±4,5	
		0,5i	0,02	0,05	0,21	0,40	0,02	0,02					

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

