



# EU-TYPE EXAMINATION CERTIFICATE

Number: TCM 221/08 - 4591

## Addition 21

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

Page 1 from 9 pages

- In accordance:** with Directive 2014/32/EU of the European Parliament and of the Council on the harmonisation of 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: ZE311.Dx  
accuracy class: A or B  
mechanical environment class: M1  
electromagnetic environment class: E2  
temperature range: -40 °C...+70 °C
- Valid until:** 14 May 2028
- Document No:** 0115-CS-A017-08
- Description:** Essential characteristics, approved conditions and special conditions, if any, are described in this certificate.
- Date of issue:** 29 June 2018

Certificate approved by:



v. r.

RNDr. Pavel Klenovský

**1. Meter Characteristics**

The electricity meter ZE311.Dx is a 3-phase single- to quadruple-tariff active energy meter designed to measure residential, light industrial and commercial energy consumption. The meter is designated for direct connection to the 3-phase 4-wire or to the single-phase 2 wire distribution network. It measures active energy in classes A or B in both energy import and export directions. In addition to energy values, the meter measures maximum power over a given period and further collateral subsidiary values. These measurements are not subject to the approval process.

Tariffs are controlled by the internal clock. Energy values measured (up to four consumption and supply tariffs, total energy across all tariffs, maximum power (with possibility of time-stamp), number of overruns of contractual power limit, sum of ten largest overruns of contractual power limit) together with other information (tampering with meter case or terminal cover, parameter change, detection of external magnetic field etc.) are logged and, if needed, shown on the display. The display also shows actual tariff, energy direction flow, OBIS codes (as per EN 62056-61), internal clock date and time, etc. Data shown on display scroll automatically or are controlled by three push-buttons, one of which can be sealed.

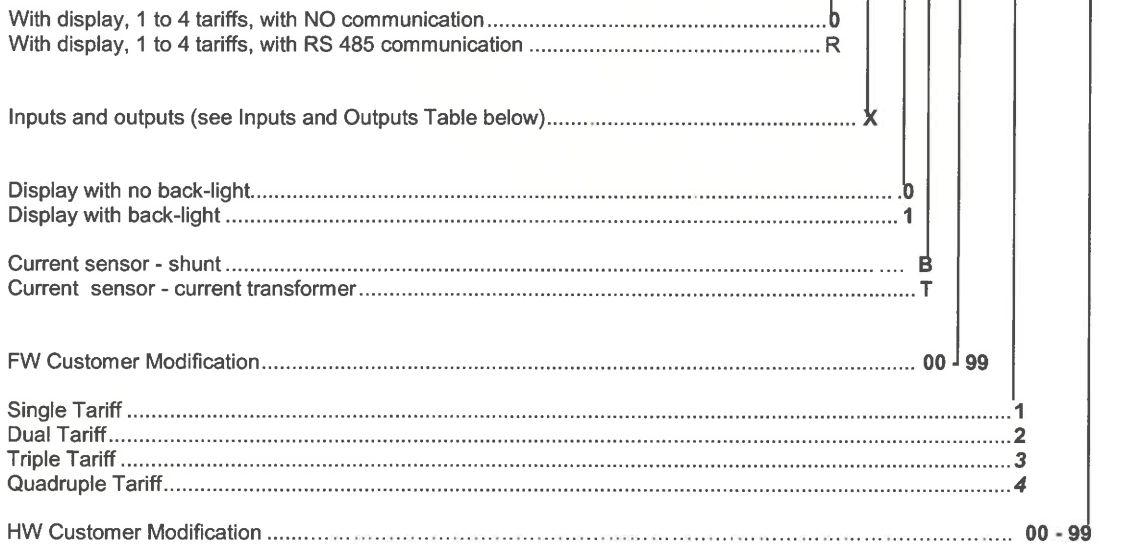
The meter has a sealable compartment where a standard battery can be inserted, granting access to several meter functions even if not hooked to mains (at older design only).

The meter can be equipped with a load profile register.

The meter contains an optical interface as a standard and can be equipped with an impulse output S0 type and RS 485 communication interface. It can also contain an integrated output to work an external power relay governing the coupling / uncoupling of appliances.

**Type Designation**

ZE 311. D ≡ ≡ ≡ ≡ ≡ ≡ - ≡ ≡



**Outputs and Inputs Table**

Symbol Used	Impulse Output S0	Load Control	External Tariff Switching
A	NO	NO	NO
C	NO	YES	NO
E	YES	NO	NO
G	YES	Yes	NO

**Hardware versions:** 08, 11, 12 and 13



**Software versions:**

- CRC: 76BB
- CRC: 0804
- CRC: 400E
- CRC: 2C01

(CRC version is also SW version)

**2. Main Metrological Characteristics**

Measurement	Active energy in 3-phase 4-wire or single-phase 2-wire distribution network, max. 4 tariffs, tariff switching by RTC
Measurement Method	Static meter with shunts or current transformers in current inputs
Class	A or B
Display	LCD, identification of registers OBIS (exceptions from standard OBIS codes can occur)
Reference Voltage $U_n$	3 x 230/400 V
Reference Frequency $f_n$	50 Hz
Reference Current $I_{ref}$	5 A
Transitional Current $I_{tr}$	0,5 A
Minimum Current $I_{min}$	0,2 A or 0,25 A
Starting Current $I_{st}$	15 mA, 20 mA or 25 mA
Maximum Current $I_{max}$	From 60 A to 100 A in steps 5 A (90 A to 100 A only versions with current shunts)
Constant (LED):	1000 imp / kWh
Specif. Operating Temperature Range	-40°C thru +70°C
Degree of Protection Against Dust and Water	IP54
Protective Class (electrical)	II
Mechanical Environment	M1
Electromagnetic Environment	E2

\*) At -40 °C, the meter measures correctly but the values displayed are illegible. They can be obtained either via the optical interface or read on the display at a higher temperature ( $\geq -30$  °C).

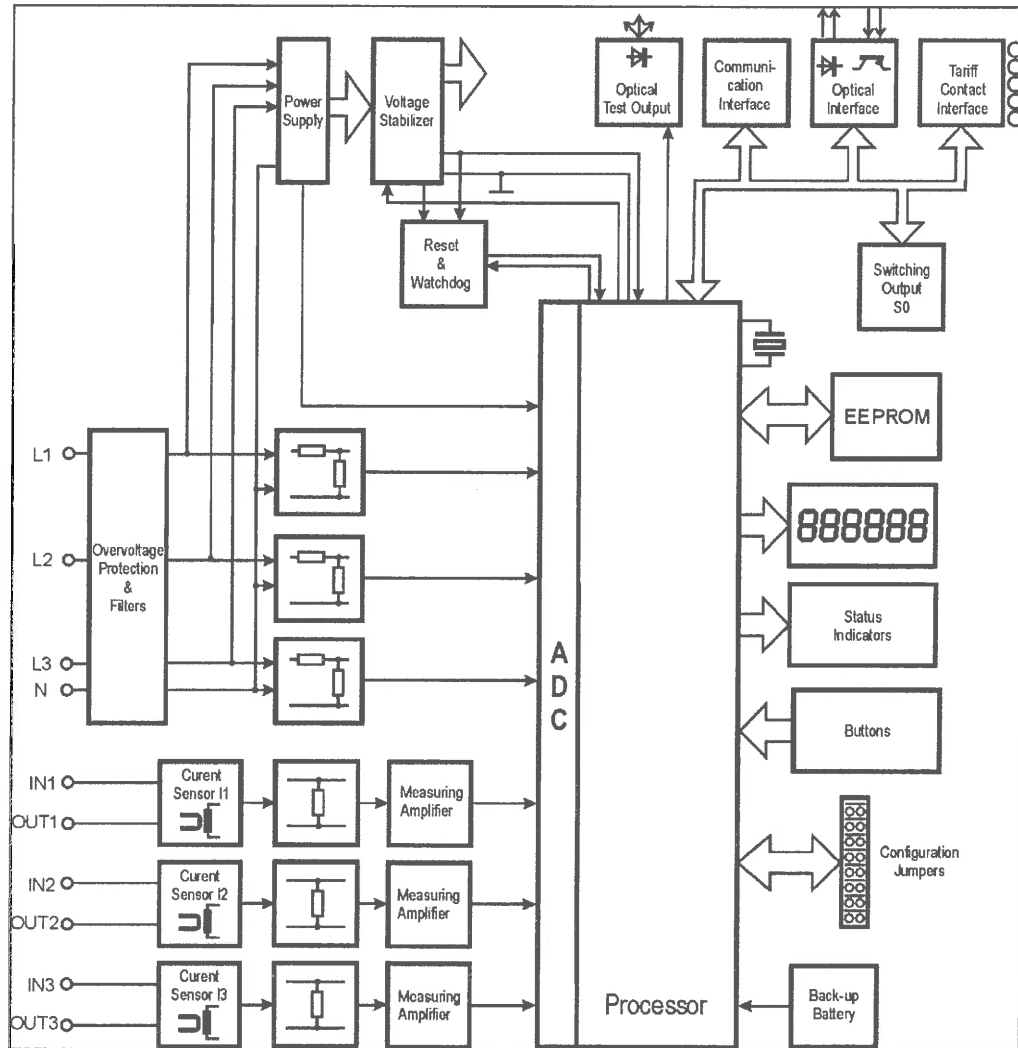
**3. Interfaces**

- Optical interface (as per EN 62056-21);
- As per customer modification: RS 485 (active or passive).

**4. Main Functional Characteristics**

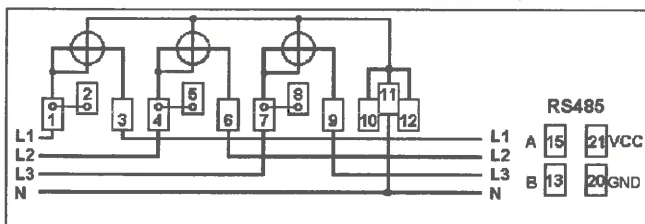
- Up to 4 tariffs;
- Universal definition of tariff switch programs;
- Tampering detection of external magnetic field;
- Incorrect wiring or reversed phase sequence alerts;
- Ability to display energy values with up to 3 decimal places;
- Power maximum registers;
- Ability to read out meter during power outage;
- Self-diagnostics;
- Ability to communicate even if disconnected from mains (optionally).

**5. Meter Block Diagram**



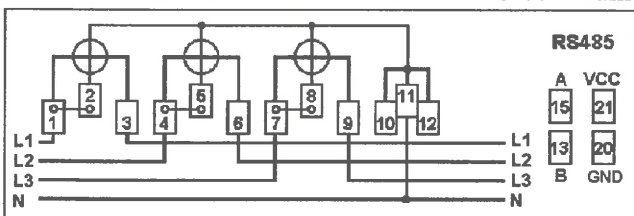
**6. Wiring Diagram**

Meter with shunts and RS485 communication

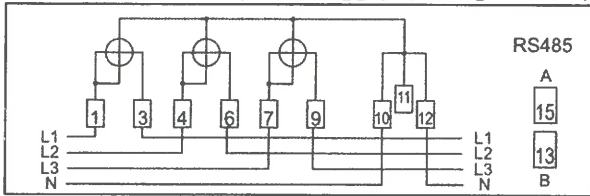


*Clamps 2, 5 and 8 are mounted based on customer request.*

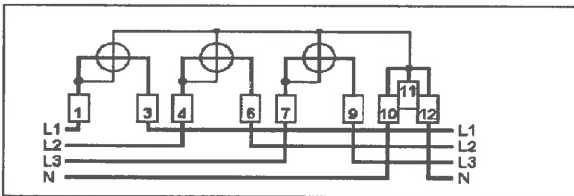
Meter with current transformers and RS485 communication



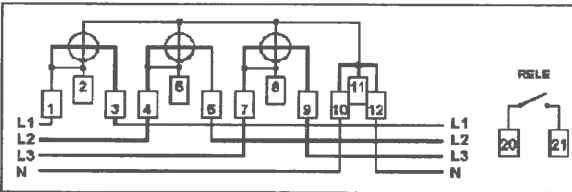
Meter with internal power supply (from phase L1) of RS485



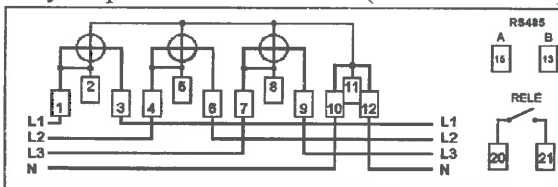
Meter with current shunts



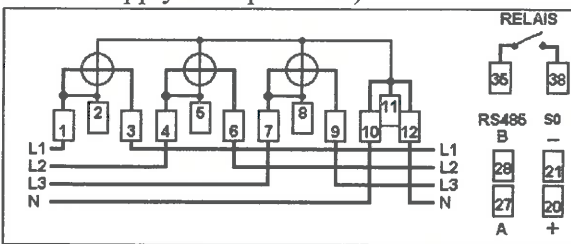
Meter with current shunts, auxiliary voltage terminals and relay output



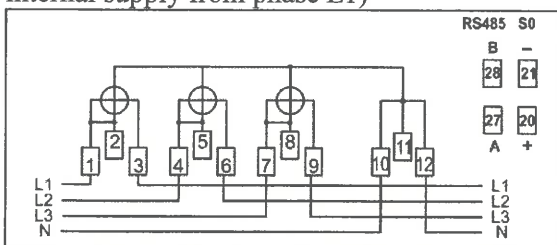
Meter with current shunts, auxiliary voltage terminals, relay output and active RS485 (with internal supply from phase L1)



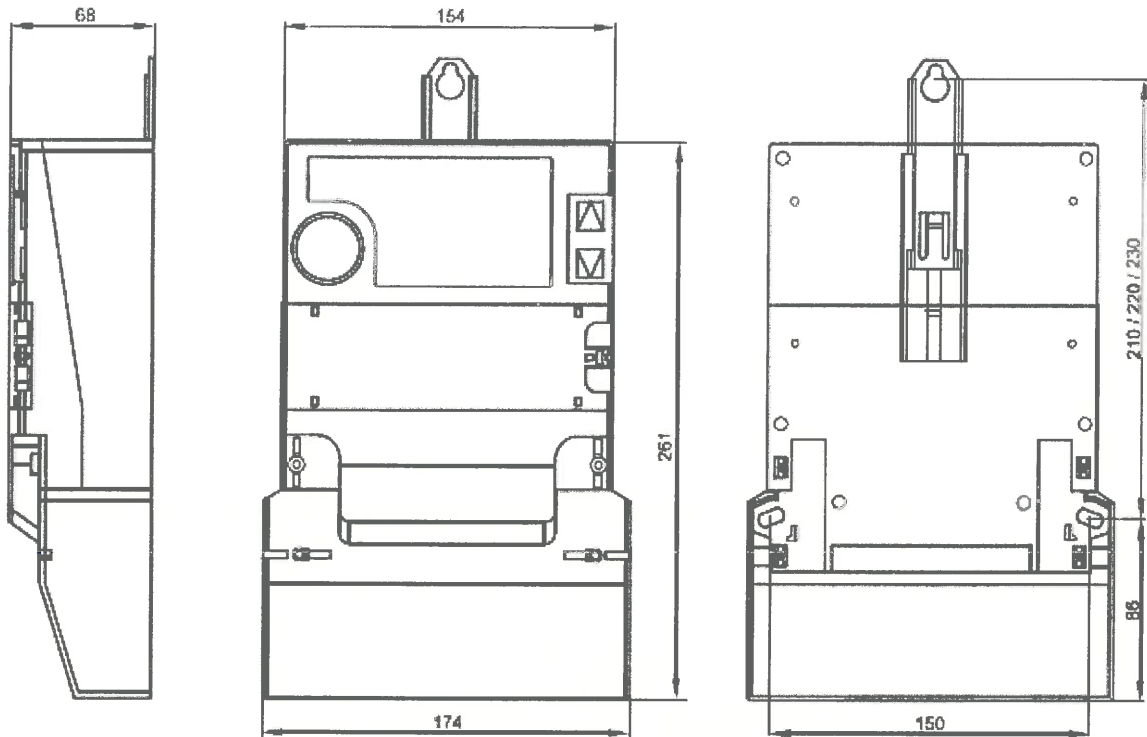
Meter with current shunts, auxiliary voltage terminals, S0, relay output and active RS485 (with internal supply from phase L1)



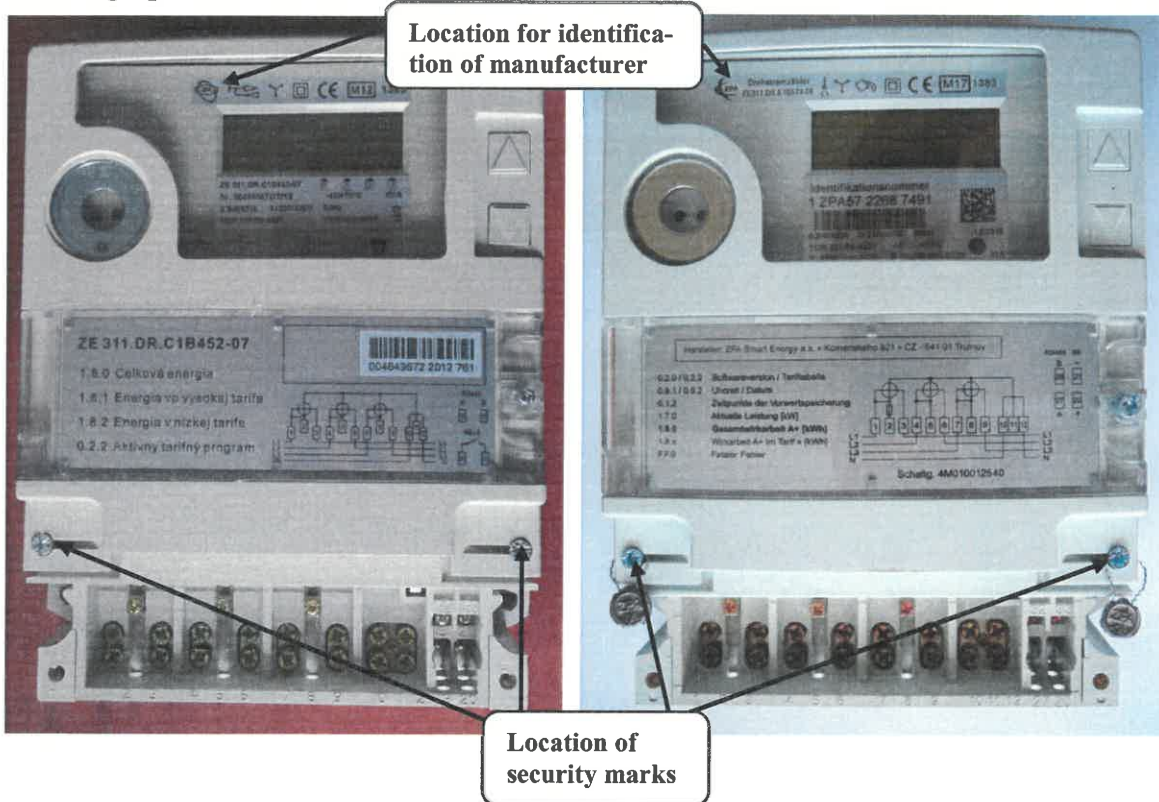
Meter with current shunts, auxiliary voltage terminals, S0, relay output and active RS485 (with internal supply from phase L1)



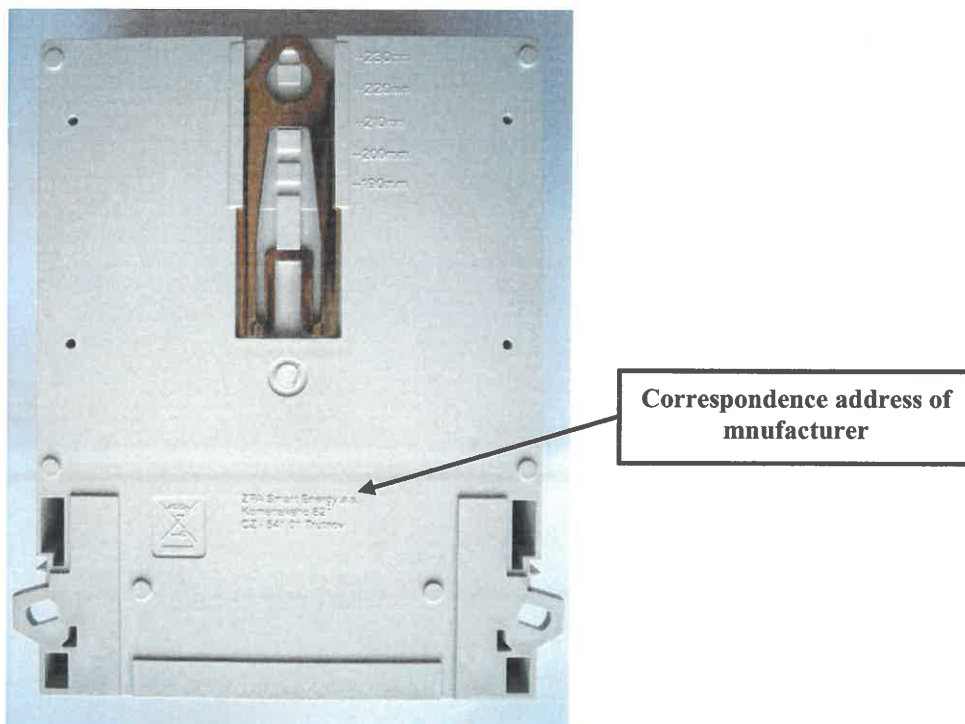
### 7. Dimensional Sketch



### 8. Photographs of Meters



Address of the manufacturer is shown on the back side of meter case



## 9. EU-Type Examination

Samples of ZE311.Dx 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-A251-08, 6011-PT-K006-09, 6011-PT-K018-09, 6011-PT-K021-10, 6011-PT-K043-10, 6011-PT-K005-11, 6011-PT-K015-11, 6011-PT-K030-11, 6011-PT-K0014-12 and 6011-PT-K0065-12, 6011-PT-TS010-13, 6011-PT-TS025-13, 6011-PT-TS033-13, 6011-PT-TS013-14, 6011-PT-TS013-14, 6011-PT-TS029-14, 6011-PT-TS002-15, 6011-PT-TS016-16, 6011-PT-TS028-16, 6011-PT-TS002-17 6011-PT-TS020-17 and 6011-PT-TS010-18.

The meters complied with all test requirements.

## 10. Meter Marking

### 10.1 Name-plate

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

- Name of manufacturer or his trade mark;
- Type designation;
- Correspondence address of manufacturer (placed on base of the meter);
- "CE" marking and supplementary metrology marking;
- EU-type examination certificate number TCM 221/08-4591;
- Serial number and year of production;
- Class index;
- Specified operating temperature range;
- Type of distribution network (graphical symbol);
- Reference voltage;
- Reference current;
- Maximum current;
- Minimum current;
- Reference frequency;
- Constant of meter;
- Sign of double-square for meter of protective class II.

## 10.2 Supplementary Documentation

The meter shall be accompanied by supplementary documentation. A batch of identical meters 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 10.1 (except for serial number and production year) and also the following:

- Brief description of meter, including measured data, their logging and display possibilities;
- Wiring diagram (the wiring diagram shall be shown on the meter case also);
- Storage conditions;
- EMC data;
- Specification of mechanical and electromagnetic environments;
- Starting current;
- Consumption of voltage and current circuits;
- Specification of communication interface RS485;
- Specification of optical communication port including communication modes available;
- Specification of tariff switching and internal calendar (if relevant);
- Maximum cross-section of connecting conductors;
- Mass and dimensions;
- Way of meter disposal.

## 10.3 Sealing

The meter is sealed either by two security marks, one on each side, or by one security mark on either side. The marks are pendent seals.

For location, refer to Photographs of Meters.

## 11. Testing for declaration of conformity to type

The conformity assessment procedure comprises following tests (at reference conditions) as a minimum:

1. Test of no-load;
2. Test of starting;
3. Accuracy of meter (using of test output);
4. Test of meter constant.

Tests are performed as per EN 50470-1 and EN 50470-3 standards. Meter intrinsic errors are measured at reference conditions at reference voltage 230 V, 50 Hz with currents and  $\cos\varphi$  taken from table below. After the test, composite errors  $e_c$  are calculated at rated meter operating conditions as per the following formula:

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

where

- $e(I, \cos\varphi)$  - stands for meter intrinsic error for a given current and  $\cos\varphi$ ;
- $\delta(T, I, \cos\varphi)$  - stands for additional percentage error due to variation of temperature in rated temperature range for a given current and  $\cos\varphi$ ;
- $\delta(U, I, \cos\varphi)$  - stands for additional percentage error due to variation of voltage  $\pm 10\% U_{\text{ref}}$  for a given current and  $\cos\varphi$ ;
- $\delta(f, I, \cos\varphi)$  - stands for additional percentage error due to variation of frequency  $\pm 2\% f_{\text{ref}}$  for a given current and  $\cos\varphi$ .

Table values are substituted for  $\delta(T, I, \cos\varphi)$ ,  $\delta(U, I, \cos\varphi)$  and  $\delta(f, I, \cos\varphi)$ . The meter is compliant if composite errors are smaller than maximum permissible errors (MPE). MPE values for class A are given in the Czech Government Regulation No. 464/2005, Annex 5, Table 2 (equivalent of Directive 2004/22/EC of the European Parliament and of the council on measuring instruments, Annex MI-03, Table 2).



Calculation of composite error												
Load			Additional error (%)						Max. permissible error MPE for temperature range			
Phase	Current	cosφ	δ(T, I, cosφ)				δ(U, I, cosφ)	δ(f, I, cosφ)	1	2	3	4
			1	2	3	4						
Balanced load	I <sub>min</sub>	1	0,50	1,00	1,30	1,80	0,20	0,15	±2,0	±2,5	±3,5	±4,0
		1	0,50	1,00	1,30	1,80	0,10	0,15	±2,0	±2,5	±3,5	±4,0
	0,5ind.	0,50	1,00	1,30	1,80	0,10	0,15					
	0,8cap.	0,50	1,00	1,30	1,80	0,10	0,15					
	I <sub>ref</sub>	1	0,50	1,00	1,30	1,80	0,10	0,15	±2,0	±2,5	±3,5	±4,0
		0,5ind.	0,50	1,00	1,30	1,80	0,10	0,15				
		0,8cap.	0,50	1,00	1,30	1,80	0,10	0,15				
	I <sub>max</sub>	1	0,50	1,00	1,30	1,80	0,10	0,15	±2,0	±2,5	±3,5	±4,0
		0,5ind.	0,50	1,00	1,30	1,80	0,10	0,15				
0,8cap.		0,50	1,00	1,30	1,80	0,10	0,15					
Single phase load	I <sub>tr</sub>	1	0,50	1,00	1,50	2,00	0,10	0,15	±2,5	±3,0	±4,0	±4,5
		0,5ind.	0,50	1,00	1,50	2,00	0,10	0,15				
	I <sub>ref</sub>	1	0,50	1,00	1,50	2,00	0,10	0,15	±2,5	±3,0	±4,0	±4,5
		0,5ind.	0,50	1,00	1,50	2,00	0,10	0,15				
	I <sub>max</sub>	1	0,50	1,00	1,50	2,00	0,10	0,15	±2,5	±3,0	±4,0	±4,5
		0,5ind.	0,50	1,00	1,50	2,00	0,10	0,15				

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.

