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POROČILO O MERITVAH TEST REPORT		

NAZIV / *TITLE:* **DOLOČITEV TEMPERATURNIH MEJ DELOVANJA ZA ŠTEVEC WM3M4C**



DETERMINATION OF OPERATING TEMPERATURE LIMITS OF THE METER WM3M4C

Zaključek / *Conclusion:*

The operation of the meters WM3M4C was checked at extended extreme temperature conditions +85 °C and -40 °C. The meters were in operating mode. The operation was checked regarding communication, digital signature of measured data and accuracy check. At -40 °C also the cold start was checked. The meters operated correctly at both extreme temperatures.

Additionally the temperature change test with 6 cycles from -40 °C to +80 °C was carried out with the meters in operating mode. The meters operated correctly during and after the test.

Prepovedano je neavtorizirano kopiranje oziroma prenos dokumenta ali njegovih delov tretjim osebam.

	Ime / <i>Name</i>	Podpis / <i>Signature</i>	Datum / <i>Date</i>
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APPLIED STANDARDS:

EN 50470-1:2006, Electricity metering equipment (ac) - Part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C)

EN 50470-3:2006, Electricity metering equipment (ac) - Part 3: Particular requirements - Static meters for active energy (class indexes A, B and C)

EN 62052-11:2003, Electricity metering equipment (ac) - General requirements, tests and test conditions - Part 11: Metering equipment

EN 62053-21:2003, Electricity metering equipment (ac) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)

EN 62053-23:2003, Electricity metering equipment (ac) - Particular requirements - Part 21: Static meters for reactive energy (classes 2 and 3)

EN 62053-31:1998, Electricity metering equipment (ac) - Particular requirements - Part 31: Pulse output devices for electromechanical and electronic meters (two wires only)

EN 62059-32-1:2012, Electricity metering equipment - Dependability - Part 32-1: Durability – Testing of the stability of metrological characteristics by applying elevated temperature

OVERVIEW OF REQUIREMENTS AND RESULTS:

TESTS	EN 50470-1	EN 50470-3	IEC 62052-11	IEC 62053-21	Result	Report no./ Page no.
CLIMATIC CONDITIONS						
Influence of temperature variation		8.3		8.2	OK	
Temperature change test	IEC 60068-2-14				OK	

OK – passed

NOK – failed

NA – not applicable

NP – not performed

Test samples:

Type: WM3M4C
 Un: 3x230 V / 400 V or 230 V (single phase)
 Iref: 5 A
 Imin: 0.25 A
 Itr: 0.5 A
 Imax: 40 A
 Constant-LED: 1000 imp/kWh
 Class: B (1)
 Communication: RS485 MODBUS
 Firmware: b0.39 - (short circuiting off the Zener diodes)
 b0.40 - (without short circuiting off the Zener diodes after -10°C)

Ser. No.: 19200201-(SW b0.40), 19200202-(SW b0.40), 19200204-(SW b0.39),

Setting SW: MiQen 2.1 Version 2.1.0.10

TEST LIST:

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1.INFLUENCE OF TEMPERATURE VARIATION (IEC 62053-21 ITEM 8.2, EN 50470-3 ITEM 8.3)

Applied measurement equipment:

Climatic chamber, Kambič, KK-190 CHLT
Fluke 2638A-Data Acquisition Unit, EML-231
Fluke 179- Multimeter, EML-203
Statron AC/DC Power Supply
M 3024 – Current generator
iMC784 Power Quality Analyzer, Iskra, Ser.no. MC024088
MI485 – RS232 RS485 Communicator
USB-RS485-WE Communicator
PC – With SW Miqen for recording values

Test samples: 19200201(SW b0.40), 19200202 (SW b0.40), 19200204 (SW b0.39)

Test conditions:

- Samples in operation
- Test temperature -25 °C , -40 °C , +70 °C, +85°C
- Duration: at least 2,5 hours at each temperature to reach thermal stability
- At -25 °C and -40 °C the meters were disconnected and powered ON after thermal stability with voltage 180 V (cold start)

Sample 1920020 – connected only to voltage supply (no current) – separate phases (single phase in L3 or all three phases)

Samples 19200202, 19200204 – connected all phases 230 V parallel, current in serial connection, for accuracy verification 0,5 A and 10 A current was generated and the readings compared with iMC784 to determine error variation.

All samples connected in RS485 network, 115200 b/s

Test setup (for heat, cold and temperature change test):



Results:

		Sample no.			Allowed err. var. (%)
		19200201	19200202	19200204	
-25 °C	RS485 115200	OK	OK	OK	
	RS485 1200	OK	OK	OK	
	LCD visibility	OK*	OK*	OK*	
	Cripto signature	OK	OK	OK	
	Acc. 0,5 A	Not tested	<1 %	<1 %	2,4
	Acc. 10 A	Not tested	<1 %	<1 %	2,4
	Cold start	OK	OK	OK	
-40 °C	RS485 115200	OK	OK	OK	
	RS485 1200	OK	OK	OK	
	LCD visibility	OK**	OK**	OK**	
	Cripto signature	OK	OK	OK	
	Acc. 0,5 A	Not tested	<1 %	<1 %	3,1
	Acc. 10 A	Not tested	<1 %	<1 %	3,1
	Cold start	OK	OK	OK	
60 °C	RS485 115200	OK	OK	OK	
	RS485 1200	OK	OK	OK	
	LCD visibility	OK	OK	OK	
	Cripto signature	OK	OK	OK	
	Acc. 0,5 A	Not tested	<1 %	<1 %	2,4
	Acc. 10 A	Not tested	<1 %	<1 %	2,4
80 °C	RS485 115200	OK	OK	OK	
	RS485 1200	OK	OK	OK	
	LCD visibility	OK	OK	OK	
	Cripto signature	OK	OK	OK	
	Acc. 0,5 A	Not tested	<1 %	<1 %	3,1
	Acc. 10 A	Not tested	<1 %	<1 %	3,1

Note * - At cold start visibility very poor – after a minute LCD visible but much slower than normal – LCD cycling time should be at least 30 s to read the second row

Note ** - At start up practically not readable – after 10 minutes LCD established – very slow - LCD cycling time should be at least 30 s to read the second row

2. CHANGE OF TEMPERATURE (IEC 60068-2-14)

Applied measurement equipment:

Climatic chamber, Kambič, KK-190 CHLT
Fluke 2638A-Data Acquisition Unit, EML-231
Fluke 179- Multimeter, EML-203
iMC784 Power Quality Analyzer, Iskra, Ser.no. MC024088
Statron AC/DC Power Supply
M 3024 – Current generator
MI485 – RS232 RS485 Communicator
USB-RS485-WE Communicator
PC – With SW Miqen for recording values

Test samples: 19200201-(SW b0.40), 19200202-(SW b0.40), 19200204-(SW b0.39)

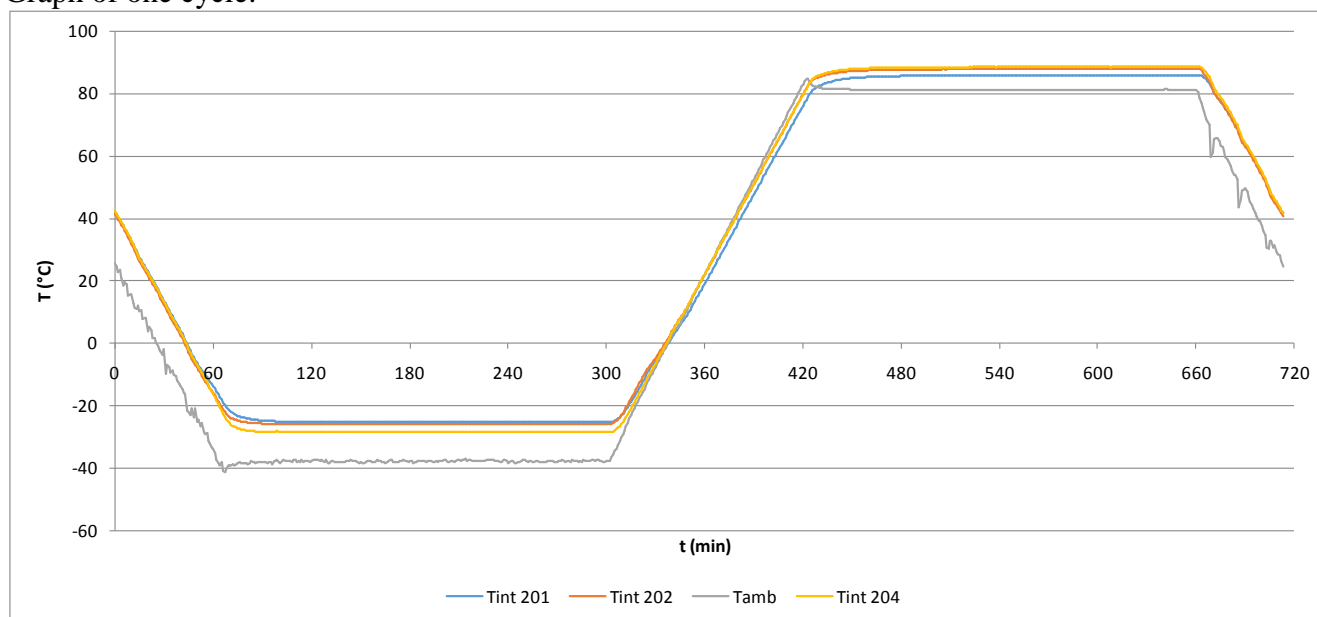
Test conditions:

- Test according to IEC 60068-2-14
- Samples connected to mains voltage 230 V, without current
- Upper temperature +80 °C
- Lower temperature -40 °C
- Duration at each step 4 hours
- Variation speed 1K/min
- Numbers of cycles 6

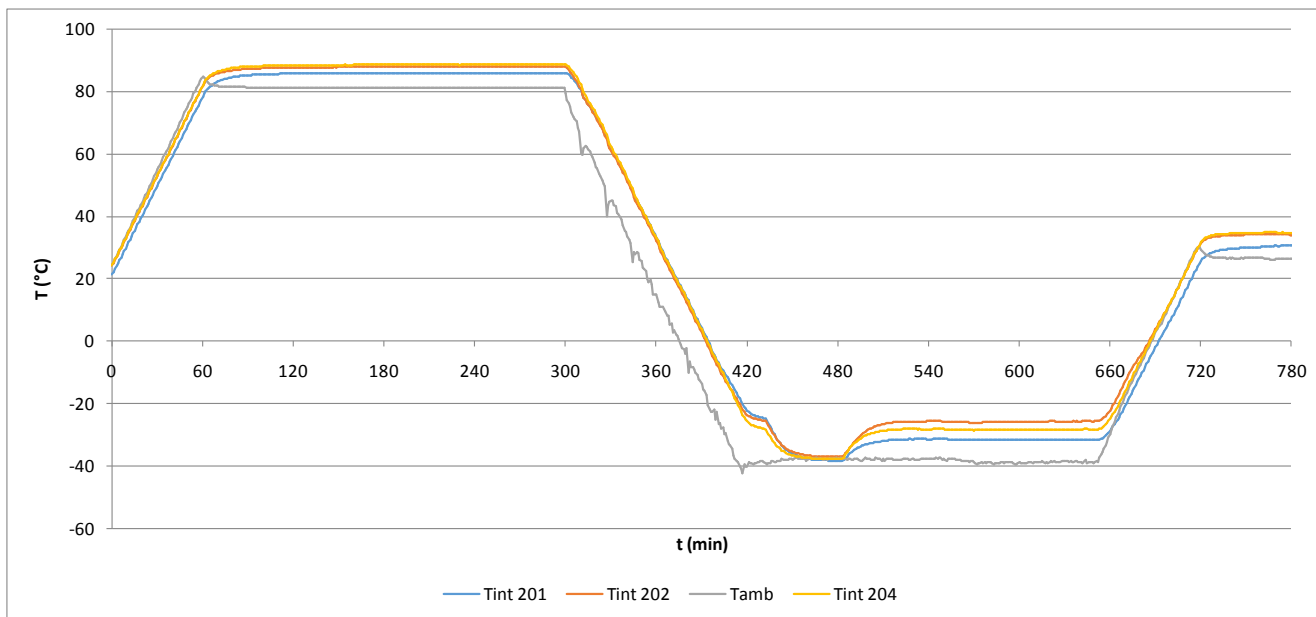
Results:

Internal temperature in the meters monitored with thermocouples inside the meters.

Graph of one cycle:



Graph of last cycle with cold start:



The meter 19200201 connected single phase after reconnection at -40 °C

During temperature cycling also the time drift was determined:

- Clock synchronized with Start charging at the beginning
- At the test end after 66 hours the time compared with NTC synchronized clock to find the time drift.

Sample	Time lag after 66 hours
19200201	-25 s
19200202	-29 s
19200204	-30 s