M100 | Comparator

Comparator M100 is a precision test set for measurement of quantities used during the calibration and verification of Current and Voltage Transformers

FEATURES AND BENEFITS

- Measurement of CT and VT errors, phase displacement, test current and voltage, resistance, conductance and power of burden

- High measurement accuracy (CT and VT testing): up to ± 0,005 % and ± 0,05 min

- VT testing requires the use of test and standard transformers with equal rated ratios

- CT testing requires the use of test and standard transformers with equal rated ratios or 5:1 of secondary currents ratio

- Possibility of using with automated CT and VT calibration system

- Automatic test reports generation using basic or user-created templates

VERSIONS

Comparator M100 is available in two versions:
M100.1 allows CT calibration in secondary current range from 1 % to 120 % of rated current
M100.2 allows CT calibration in secondary current range from 1 % to 150 % of rated current

APPLICATIONS

M100 is used by:

- Manufacturer of Current and Voltage Transformers
- On-site testing Current and Voltage Transformers
- Calibration laboratories
- Metrology Institutes

TECHNICAL SPECIFICATIONS

Value		Range	Limit of errors	Condition
Voltage error, ε_U		-15...+15 %	$\pm\ (0{,}005\cdot\lvert\varepsilon_U\rvert+1\cdot10^{-4}+10^{-4}\cdot\lvert\Delta\varphi_U\rvert)$ %	$20\ V \le U_S \le 240\ V$
			$\pm\ (0{,}005\cdot\lvert\varepsilon_U\rvert+1\cdot10^{-3}+10^{-4}\cdot\lvert\Delta\varphi_U\rvert)$ %	$6\ V \le U_S < 20\ V$
Phase displacement, $\Delta\varphi_U$		-300...+300 min	$\pm\ (0{,}005\cdot\lvert\Delta\varphi_U\rvert+0{,}05+5\cdot10^{-2}\cdot\lvert\varepsilon_U\rvert)$ min	$20\ V \le U_S \le 240\ V$
			$\pm\ (0{,}005\cdot\lvert\Delta\varphi_U\rvert+0{,}1+5\cdot10^{-2}\cdot\lvert\varepsilon_U\rvert)$ min	$6\ V \le U_S < 20\ V$
Current error, ε_I		-15...+15 %	$\pm\ (0{,}005\cdot\lvert\varepsilon_I\rvert+2\cdot10^{-4}+10^{-4}\cdot\lvert\Delta\varphi_I\rvert)$ %	$1\ A \le I_S \le 7{,}5\ A$
			$\pm\ (0{,}005\cdot\lvert\varepsilon_I\rvert+3\cdot10^{-3}+10^{-4}\cdot\lvert\Delta\varphi_I\rvert)$ %	$0{,}05\ A \le I_S < 1\ A$
			$\pm\ (0{,}005\cdot\lvert\varepsilon_I\rvert+1{,}5\cdot10^{-2}+10^{-4}\cdot\lvert\Delta\varphi_I\rvert)$ %	$0{,}01\ A \le I_S < 0{,}05\ A$
Phase displacement, $\Delta\varphi_I$		-300...+300 min	$\pm\ (0{,}005\cdot\lvert\Delta\varphi_I\rvert+0{,}03+5\cdot10^{-2}\cdot\lvert\varepsilon_I\rvert)$ min	$0{,}25\ A \le I_S \le 7{,}5\ A$
			$\pm\ (0{,}005\cdot\lvert\Delta\varphi_I\rvert+0{,}5+5\cdot10^{-2}\cdot\lvert\varepsilon_I\rvert)$ min	$0{,}01\ A \le I_S < 0{,}25\ A$
Active (reactive) VT burden power, P (Q)		0...500 W (V·A)	$\pm\ [0{,}005\cdot\sqrt{(P^2+Q^2)}+U_{Sr}^2\cdot10^{-7}]$ %	$50\ V \le U_S \le 240\ V$
			$\pm\ [0{,}005\cdot\sqrt{(P^2+Q^2)}+U_{Sr}^2\cdot2\cdot10^{-7}]$ %	$30\ V \le U_S < 50\ V$
			$\pm\ [0{,}005\cdot\sqrt{(P^2+Q^2)}+U_{Sr}^2\cdot10^{-6}]$ %	$6\ V \le U_S < 30\ V$
Active (reactive) CT burden power, P (Q)		0...500 W (V·A)	$\pm\ [0{,}005\cdot\sqrt{(P^2+Q^2)}+I_{Sr}^2\cdot3\cdot10^{-4}]$ %	$0{,}01\ A \le I_S \le 7{,}5\ A$
Active (reactive) VT burden conductivity G (B)		0...0,05 S	$\pm\ [0{,}005\cdot\sqrt{(G^2+B^2)}+1\cdot10^{-7}]$ %	$50\ V \le U_S \le 240\ V$
			$\pm\ [0{,}005\cdot\sqrt{(G^2+B^2)}+2\cdot10^{-7}]$ %	$30\ V \le U_S < 50\ V$
			$\pm\ [0{,}005\cdot\sqrt{(G^2+B^2)}+1\cdot10^{-6}]$ %	$6\ V \le U_S < 30\ V$
Active (reactive) CT burden resistance R (X)		0...200 Ω	$\pm\ [0{,}005\cdot\sqrt{(R^2+X^2)}+3\cdot10^{-4}]$ %	$0{,}01\ A \le I_S \le 7{,}5\ A$
Standard CT relative current	M100.1	1...120 %	± 0,5 %	–
	M100.2	1...150 %		
Standard VT secondary voltage		6...240 V	± 0,5 %	

ε_U – VT voltage error, %
$\Delta\varphi_U$ – VT phase displacement, min
ε_I – CT current error, %
$\Delta\varphi_I$ – CT phase displacement, min
U_{Sr} – rated value of the secondary voltage of tested VT, V
P – value of active power measurement result, W

Q – value of reactive power measurement result, V·A
I_{Sr} – rated value of the secondary current of tested CT, A
G – value of conductance measurement result, S
B – value of susceptance measurement result, S
R – value of burden resistance measurement result, Ω
X – value of burden reactance measurement result, Ω

Power mains
Rated voltage   220/230 V
Rated frequency   50 Hz

Operating temperature   0...40 °C

Relative humidity   up to 80 % non-condensing

Size   235 × 148 × 250 mm

Weight   5 kg

Standards
Safety   EN 61010-1:2010
EMC   EN 61326-1:2013

Calibration interval   2 years recommended

ORDERING INFORMATION

Scope of supply
The following items are supplied with the standard M100 modification:

No	Item Name	Part no.	
1*	Main Unit M100.1 M100.2	411439.017 411439.017-01	
2	IC(U) Instrument cable (U); 1,5 m	685611.008	
3	IC (I) Instrument cable (I); 1,5 m	685611.009	
4	Power cord 10 A EU (CEE 7/XVII - C13)	–	
5	Jumper with U-shaped lugs	685611.012	
6	U-shape lug, ø8 mm (10 pcs.)	–	
7	Bag	323382.007	
8	Operating manual Part 1. Operation and maintenance	411439.019 OM	
9	Operating manual Part 2. Comparator's PC software manual	411439.019 OM1	
10	Passport	411640.019 P	
11	USB Cable (CBL-USB2 AMBM-6 USB)	685612.107	
12	Software M100 (installation disk)	411439.019 K	

* Please specify modification when ordering

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