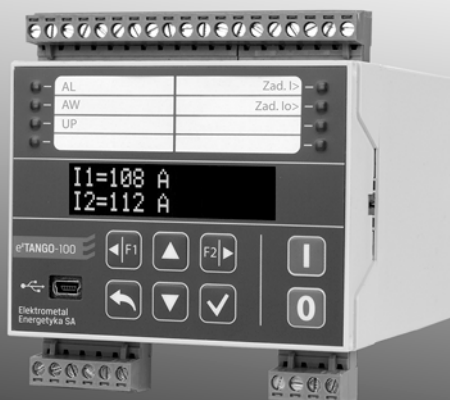
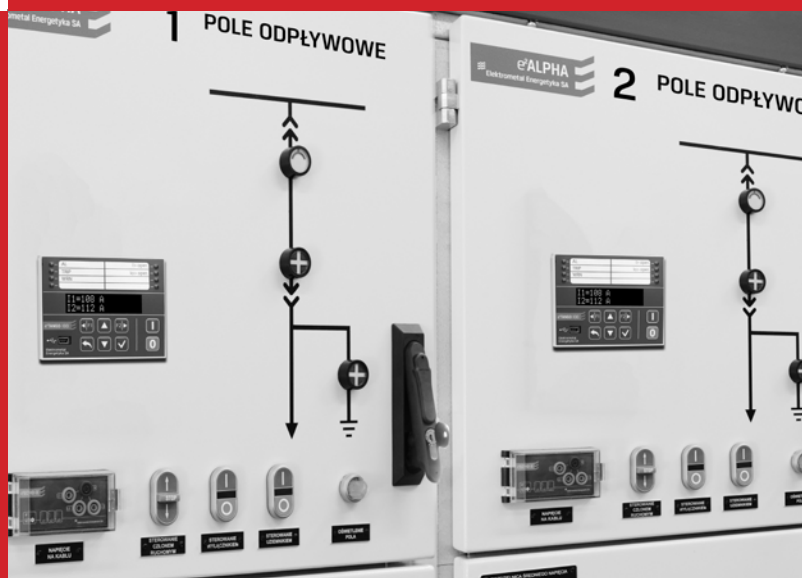




Elektrometal Energetyka SA®



e²TANGO®-100 protection relay



We create ideas with power!

The e²TANGO-100 protection relay is a solution developed by ELEKTROMETAL ENERGETYKA SA R&D team consisting of engineers with extensive know-how and many years of experience in the industry. Applied solutions and concepts address the problems that our customers face on a daily basis. These challenges were our key inspiration during design work. This allowed us to develop a compact, user-friendly protection relay which is intuitive in daily use and does not require any advanced training for operating personnel. The e²TANGO-100 is the perfect complementation to the e²TANGO family of protection devices. It has an interface consistent with the controllers.

The protection relay stands out in more than one way. However, ease and comfort of use are significant advantages. We wanted to develop a unique user-friendly and intuitive device for everyday use. e²TANGO-100 versatility and compact size allow for easy adaptation to specific requirements of users and protected loads. A special emphasis was put on safety because we know how important it is in power industry. All our products, including the e²TANGO-100 family of protection relays, are certified for full type testing in the most demanding laboratories.

e²TANGO-100 is a unique protection relay. We are sure about it, that is why we are confident in recommending this device to our customers.



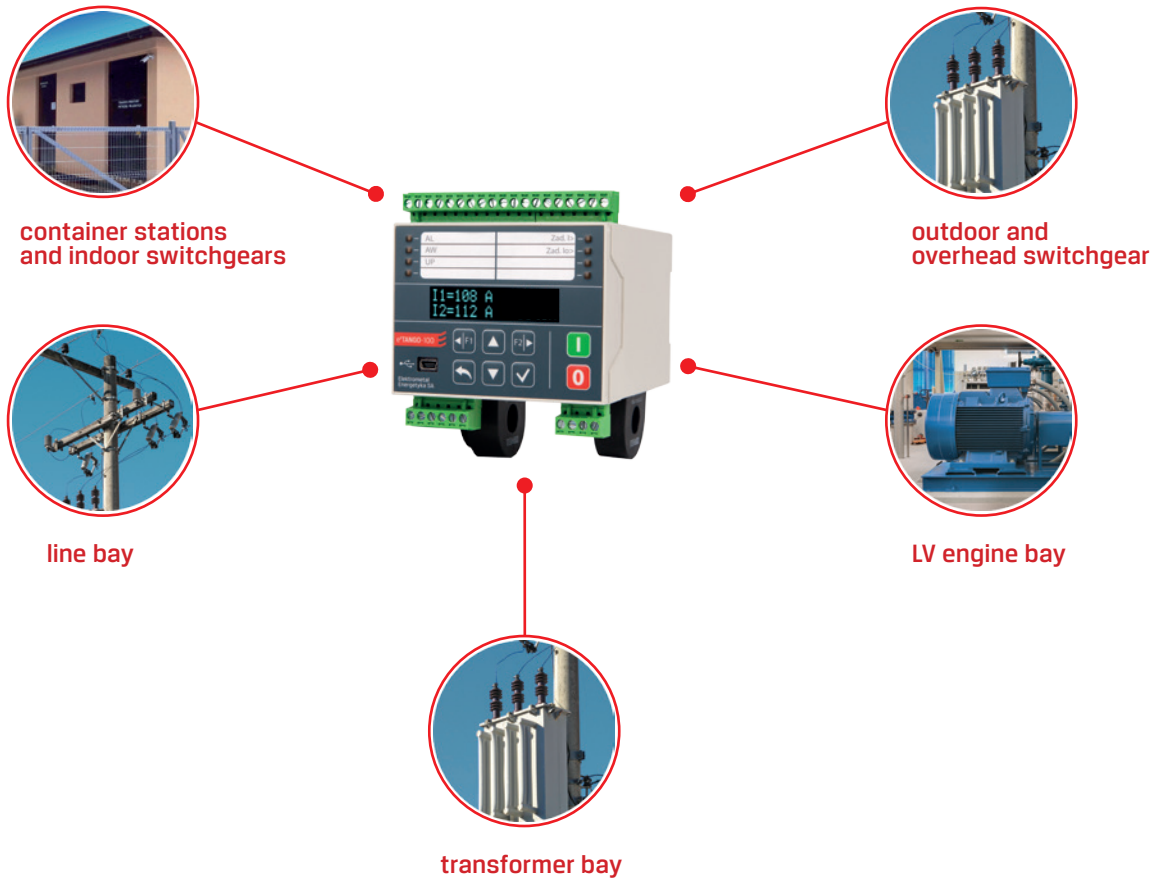
Tomasz Klonowski

Director of the of Digital and Software Development Department
Elektrometal Energetyka SA

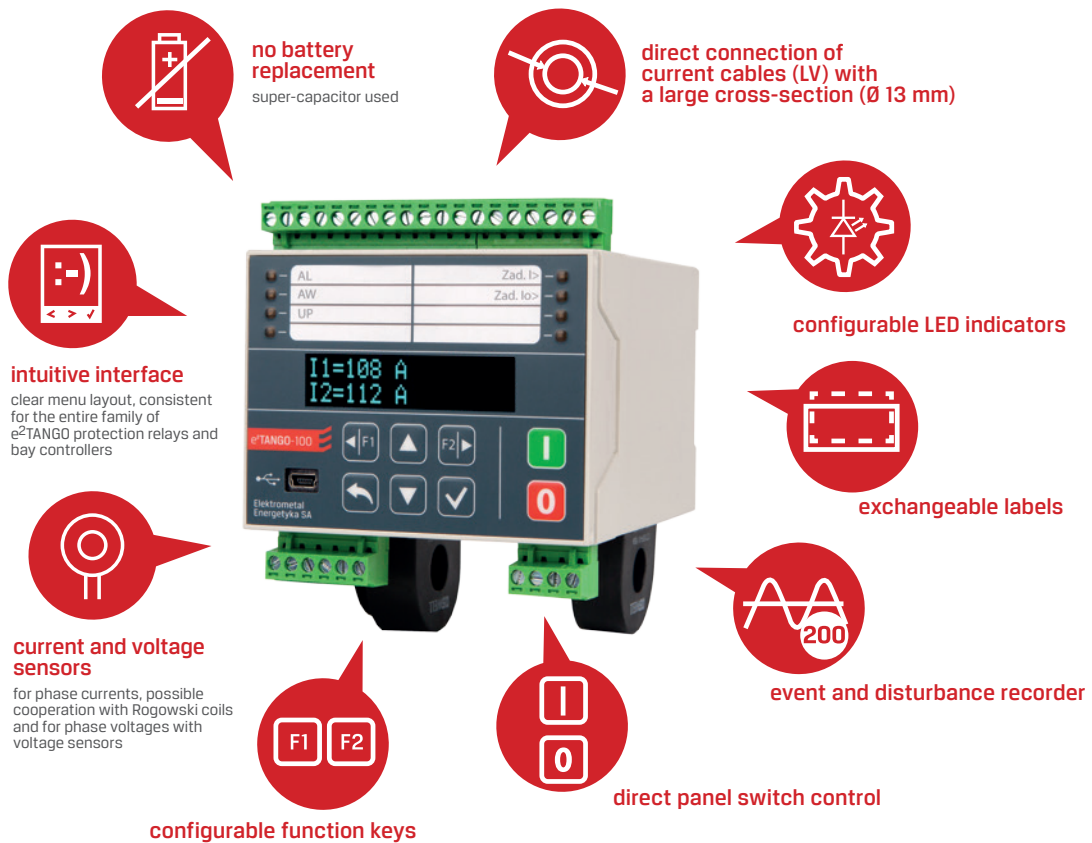


APPLICATION

The e²TANGO-100 protection relay is designed to work in medium and low voltage networks, in either 1-, 2- or 3-phase systems. The product is equipped with short-circuit, overcurrent and earth fault protections, thanks to which it can be used in various types of bays as basic and backup protection and also as protection for medium and low voltage motors.

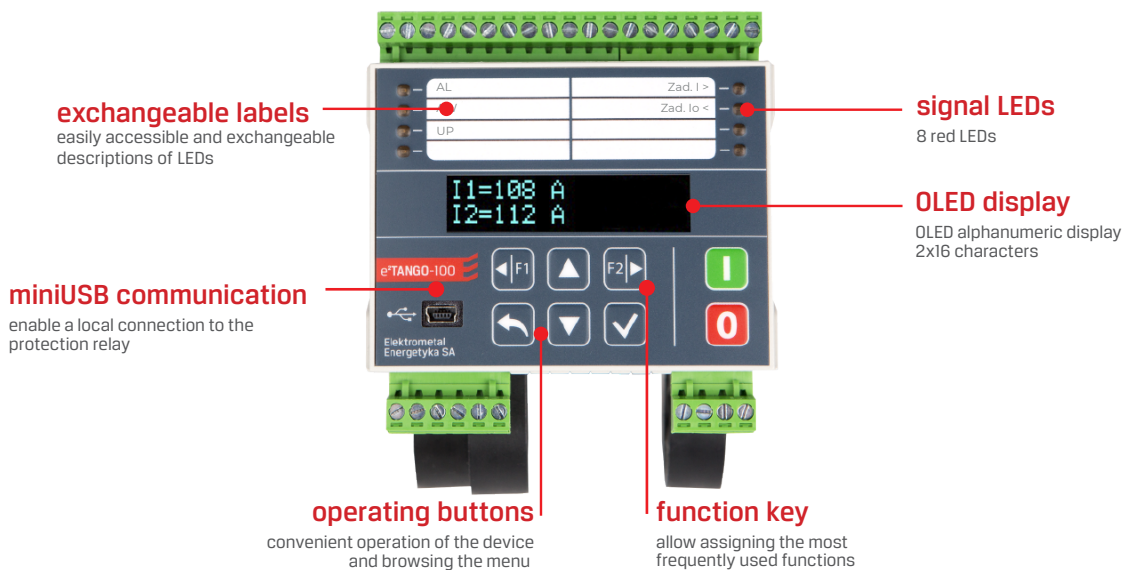


ADVANTAGES OF THE PROTECTION RELAY



STRUCTURE

The e²TANGO-100 protection relay is equipped with a 2x16 character OLED alphanumeric display and an 8-button keypad for convenient operation. The front panel has 8 red LEDs which enable optical indication of the device's status. In addition, there are two function keys: F1 and F2, the purpose of which is assigned by the user. A pocket in the relay front panel is provided for the exchangeable LEDs description.



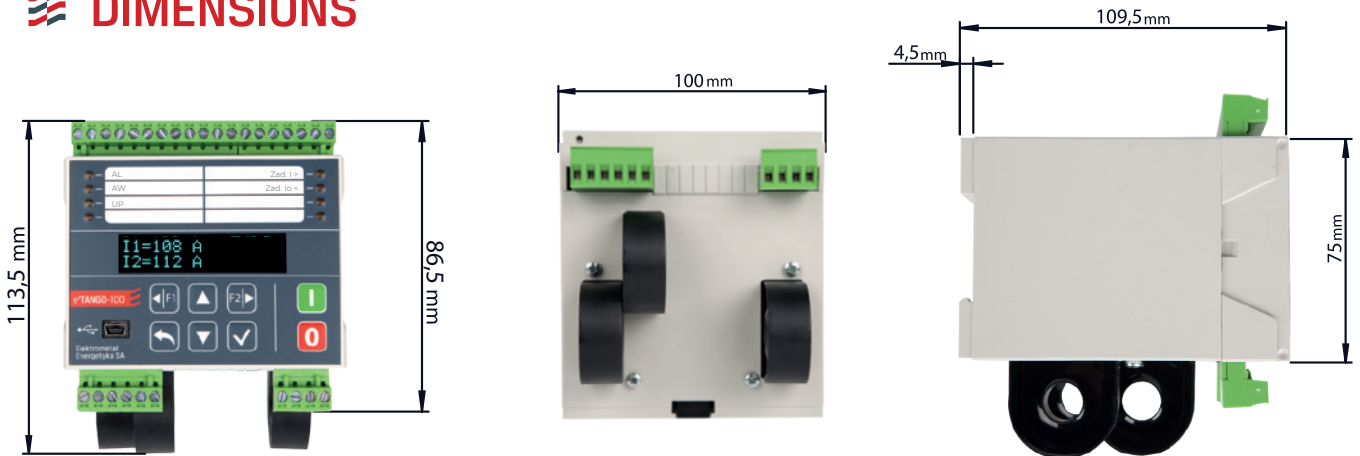
PROTECTION FUNCTIONS

	M	L	G	LG	LGU	U
Protection function						
(50/51) short-circuit/overcurrent phase	•	•	-	•	•	-
(50HS) accelerated action of protection automation	•	•	-	•	•	-
(51) inverse current protection	•	•	-	•	•	-
(46) phase-balance	•	-	-	-	-	-
(37) undercurrent	•	•	-	•	•	-
(49) thermal overload	•	-	-	-	-	-
(50N/51N) ground short-circuit/overcurrent	-	-	•	•	•	-
(51VN) ground overcurrent with voltage monitoring /voltage interlock	-	-	•	•	•	-
(67N) ground overcurrent directional	-	-	•	•	-	-
(59N) zero-sequence over-voltage	-	-	•	•	•	-
(21N) admittance	-	-	•	•	•	-
(21ND) admittance directional	-	-	•	•	•	-
(59) over-voltage	-	-	-	-	•	-
(27) under-voltage	-	-	-	-	•	-
(66) limitation of motor starts	•	-	-	-	-	-
(48) motor starting time supervision	•	-	-	-	-	-
(50LR) locked rotor protection	•	-	-	-	-	•
(49PTC) thermal (PTC)	•	-	-	-	-	•
(74TCM) continuity of control circuits	•	•	•	•	•	-
(TECH) technological	•	•	•	•	•	-
(79) autoreclose	-	•	-	•	•	-
(SCO) automatic load shedding	-	-	-	-	-	•
(CLP) cold load pickup	•	•	•	•	•	-
(81H) over-frequency	-	-	-	-	-	•
(81L) under-frequency	-	-	-	-	-	•

RECORDERS

- event recorders, 200 events
- disturbance recorder up to 20 s
- sampling frequency 1 kHz

DIMENSIONS



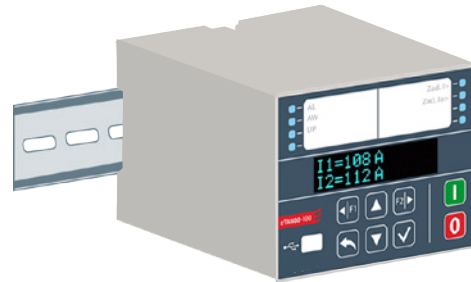
Transformers available on the outside of the device are used only in the version with phase current measurement using current transformers (version P) or direct measurement (version B).

MOUNTING METHODS

flush mounting



surface mounting, DIN rail



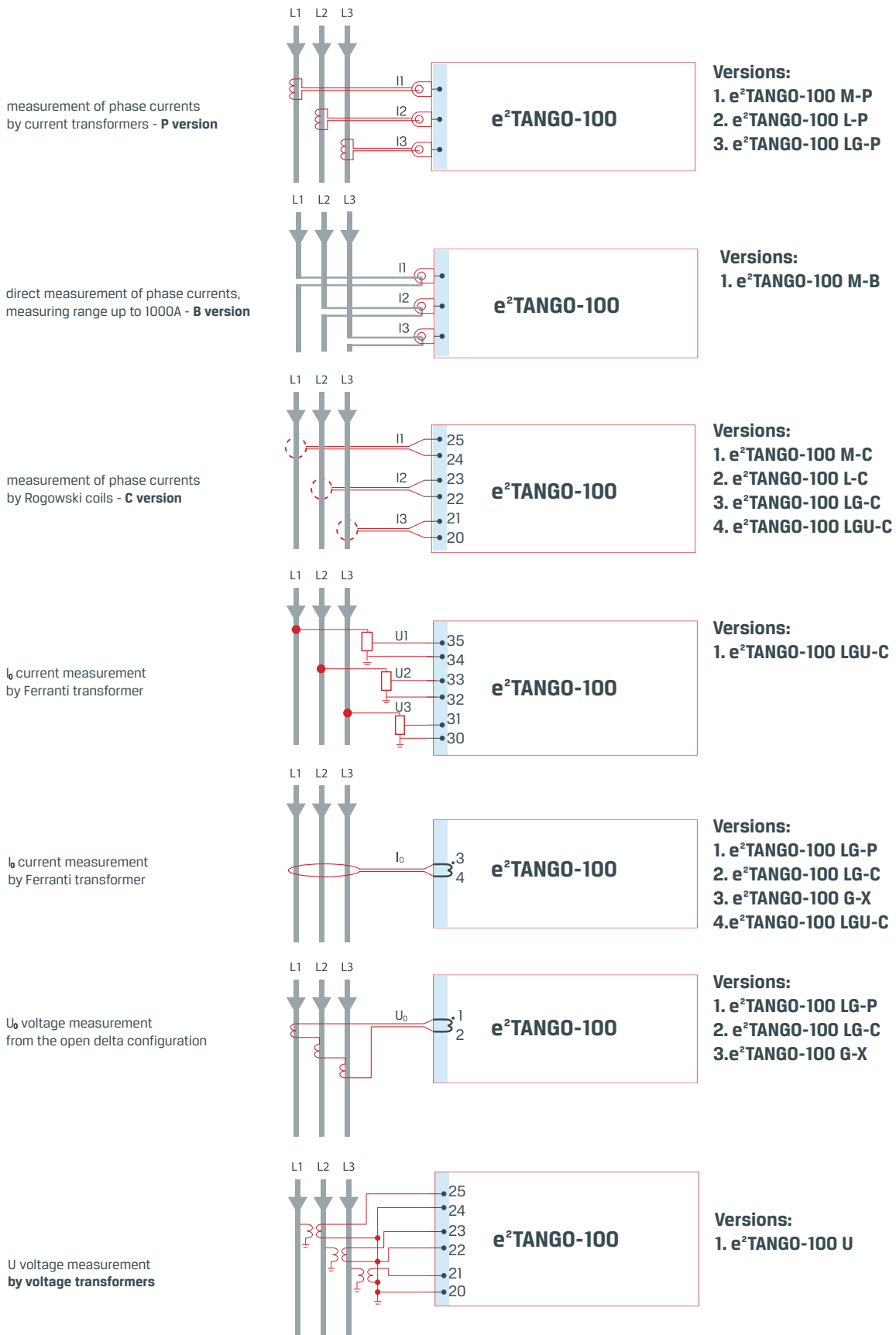
VERSIONS

e²TANGO-100	M	L	G	LG	LGU	U
Protection type	motor	overcurrent	earth fault	overcurrent and earth fault	overcurrent and earth fault with voltage measurement	automatic load shedding
Measurement inputs	I1, I2, I3	I1, I2, I3	I0, U0	I1, I2, I3, I0, U0	I1, I2, I3, I0, U1, U2, U3	U1, U2, U3
Possibility of cooperation with Rogowski coils (C version)	•	•	-	•	•	-
Possibility of cooperation with current transformers (P version)	•	•	-	•	-	-
Possibility of cooperation with voltage sensors	-	-	-	-	•	-
Possibility of cooperation with voltage sensors	-	-	-	-	-	•
Possibility to calculate I0 and U0 values	-	-	-	I0	I0+U0	-
RS485 communication	optional	optional	optional	optional	optional	optional
Input for PTC temperature measurement	•	-	-	-	-	-
Number of 2-state inputs	4	4	4	4	4	4
Number of 2-state outputs	5	5	5	5	5	5

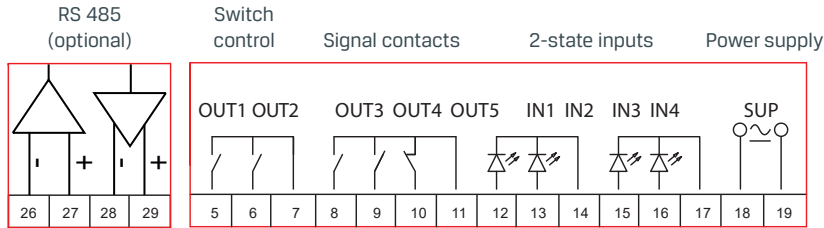
• /- — available / not available

WIRING DIAGRAM

IO current measurement by voltage sensors of the measuring systems



Connection of power supply, inputs and outputs



TECHNICAL PARAMETERS

Voltage	
DC	110V, 220 V (80-300 V DC)
AC	230 V (88-265 V AC)
Optional	
DC	24 V (19-29 V DC)
AC/DC extended range (EXT)	24-230 V (19-276 V AC/DC)
Maximum power consumption	10 W
Rated frequency	50 Hz
Phase rated current	5A (1 A optional)
Phase rated voltage for transformers for sensors	$57,7/100 \text{ V}$ $2/\sqrt{3}$ or $3.25/\sqrt{3} \text{ V}$
Phase current measurement range for core transformers for Rogowski coils	0.2-150 A or 2-1000 A 10-1400 mV (10-1400 A) Other at request
Phase voltage measurement range for transformers for sensors	3-120 V 0,015-2,3 V
I0 current measurement range	0.005-10 A
U0 voltage measurement range	3-120 V
Operating time of the overcurrent protection	35 ms typically
I1, I2, I3 (0.2-150 A/2-1000 A/10-1400 mV)	1%
Measurement accuracy U1, U2, U3 for transformers for sensors	1% 1%
I0 measurement accuracy measured (0.005-10 A) calculated (0.2-150 A/2-1000 A/10-1400 mV)	1% 1%
U0 measurement accuracy measured (5-120 V) calculated (0.15-2.3 V)	1% 1%
I0 measurement accuracy for transformers ($U_0 > 5 \text{ V}$, $0.005 \text{ A} < I_0 < 10 \text{ A}$) for Rogowski coils ($U_0 > 5 \text{ V}$, $10 \text{ mV} < I_0 < 1400 \text{ mV}$)	1° 2°
Measurement accuracy φ_0 for core transformers ($U_0 > 5 \text{ V}$, $0.005 \text{ A} < I_0 < 10 \text{ A}$) For Rogowski coils ($U_0 > 5 \text{ V}$, $10 \text{ mV} < I_0 < 1400 \text{ mV}$)	1° 2°
Operating temperature	-25°C ... +55°C
Degree of protection (from the connections)	IP 4X / IP 54 (option)

STANDARISATION

PN-EN 60255-1	Measuring relays and protection equipment. Part 1: Common requirements
PN-EN 60255-26	Measuring relays and protection equipment. Part 26: Electromagnetic compatibility requirements
PN-EN 60255-27	Measuring relays and protection equipment. Part 27: Product safety requirements

CERTIFICATES AND AWARDS



Certificate of IEN Conformity
No. 009/2019



Mazovian Quality Award



Minister of Energy Cup
ENERGETAB 2018 trade fair



Forbes Diamonds 2023

ELEKTROMETAL ENERGETYKA SA QUALITY

Implemented Integrated Management System based on the following standards:

- PN-EN ISO 9001 Quality Management Systems
- PN-EN ISO 14001 Environmental Management Systems
- PN-EN ISO 45001 Health and Safety Management System

ORDER FORM

To order the e²TANGO-100 protection relay, please fill in this part of the form according to the INSTRUCTIONS FOR FILLING IN THE FORM presented below.

STEP 1

① version	<input type="checkbox"/> 100-M	<input type="checkbox"/> 100-L	<input type="checkbox"/> 100-G	<input type="checkbox"/> 100-LG	<input type="checkbox"/> 100-LGU	<input type="checkbox"/> 100-U
② phase current measurement method	<input type="checkbox"/> B	<input type="checkbox"/> P	<input type="checkbox"/> C	<input type="checkbox"/> P	<input type="checkbox"/> C	<input type="checkbox"/> X
③ Input for I ₀ measurement ¹⁾	<input type="checkbox"/> X	<input type="checkbox"/> X	<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> X
④ power supply	<input type="checkbox"/> UNI 110-230 V AC/DC	<input type="checkbox"/> 24 V	<input type="checkbox"/> EXT 24-230 V AC/DC	<input type="checkbox"/> other (on consultation with the manufacturer)		
⑤ mounting method	<input type="checkbox"/> N -surface (DIN rail)		<input type="checkbox"/> Z-flush			
⑥ protection class	<input type="checkbox"/> IP4X	<input type="checkbox"/> IP54 ²⁾				
⑦ communication	<input type="checkbox"/> X	<input type="checkbox"/> RS485				
⑧ language version	<input type="checkbox"/> PL	<input checked="" type="checkbox"/> EN	<input type="checkbox"/> other (in agreement with manufacturer)			

1) Input for U₀ measurement from an open triangle available in G and LG versions, for LGU version 3U₀ value is calculated from phase voltages

2) IP54 protection degree is available only with flush mounting

Legend:

- P - phase current measurement in cooperation with current transformers 5A or 1A on the secondary side, measuring range up to 150A
- B - direct measurement of phase currents, measuring range up to 1000A
- C - measurement of phase currents in cooperation with Rogowski coils, measuring range up to 1400A with Rogowski coil sensitivity 1mV/A
- F - measurement with Feranti transformer
- X - none

additional requirements:

STEP 2

Code:

e ² TANGO	①	②	③	④	⑤	⑥	⑦	⑧
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INSTRUCTIONS FOR FILLING IN THE FORM

STEP 1

The table below shows the basic technical parameters of the e²TANGO-100 protection relay. Only 1 item should be selected from each item numbered 1 to 8. If „other“ is selected, enter the ordered value in the corresponding field in STEP 2.

STEP 2

The above-selected e²TANGO-100 protection relay parameters must be entered in the corresponding fields. The e²TANGO code created in such a way together with other requirements or a scanned page of the form should be sent with the order to: eaz@elektrometal-energetyka.pl

Example of the e²TANGO-100 protection relay configuration:

① Motor design	⑤ Surface mounting (DIN rail)
② transformers, Phase current measurement range up to 150 A	⑥ Protection class IP4X
③ Without I ₀ measurement input	⑦ RS485 communication
④ Universal power supply 110-230 V AC/DC	⑧ EN

Example of correct code completion:

e ² TANGO	100-M	P	X	UNI	N	IP4X	RS485	EN
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