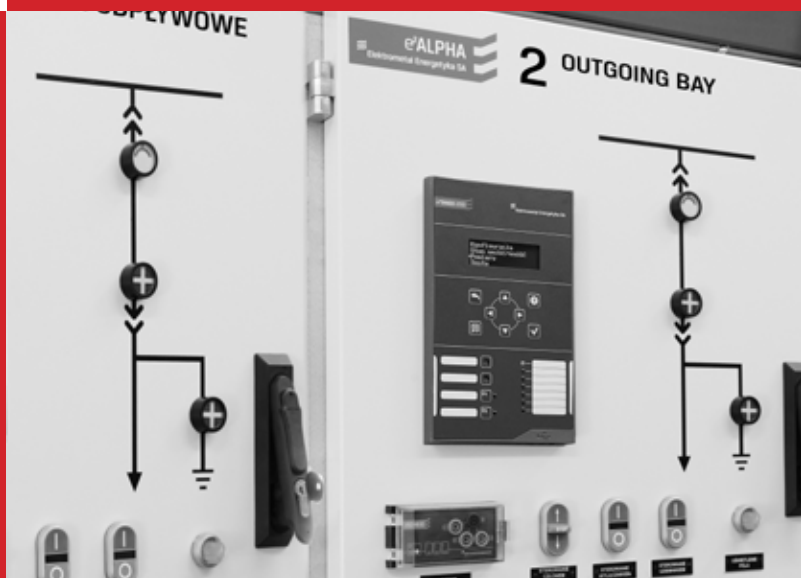




Elektrometal Energetyka SA®



e²TANGO[®]-200 Overcurrent Relay





e²ALPHA

Elektrometal Energetyka SA



eTANGO-200 Elektrometal Energetyka SA

Zab. naderadowe 2
 Faza1 I_{max} = 120 A
 11-11-2016
 12:23:45:127 1/38

Navigation buttons: Home, Up, Down, Left, Right, Info, Help

Indicators: I> (red), I0> (red), F1, F2

Labels: AW, UP, P1>, P2>, i>, Usyg



eECHO-B

A small electronic device with a clear plastic cover. It has three red circular ports on the right side and a display on the left. The display shows a green checkmark and some numbers. The device is labeled 'eECHO-B' and 'Elektrometal Energetyka SA'.

NAPIĘCIE NA KABLU

STOP

A green button with a white arrow pointing up and a white arrow pointing down. A red bar with the word 'STOP' in white is across the middle.

STEROWANIE CZŁONEM RUCHOMYM

A button with a green top half and a red bottom half. The top half has a white vertical bar, and the bottom half has a white circle.

STEROWANIE WYŁĄCZNIKIEM

A button with a green top half and a red bottom half. The top half has a white vertical bar, and the bottom half has a white circle.

STEROWANIE UZIEMNIKIEM

A yellow push button with a white center.

OŚWIETLENIE POLA

We Create Ideas With Power!

e²TANGO-200 protection relay is a solution developed by ELEKTROMETAL ENERGETYKA SA R&D department consisting of engineers with extensive know-how and many years of experience in the industry. Employed solutions and concepts answer challenges which our customer face in their day-to-day operations. These challenges were our key inspiration during design work. This allowed us to develop this compact, user-friendly and intuitive protection relay, which does not require initial, advanced training for operating personnel. e²TANGO-200 is a perfect addition to e²TANGO protection devices' line-up. The device has an interface consistent with that of a protection relay and additionally it may operate autonomously.

We have developed a technologically advanced device, universal in its programming functionality for operating protection relays, control, measurement, data logging and monitoring of MV switchgear bays.

The protection relay stands out in more than one way but easy and convenient operation is one of its more prominent features. We wanted to develop a uniquely user-friendly and intuitive device capable of operating in SMART GRIDS. e²TANGO-200 versatility and compact size allows easy adaptation to specific requirements of users and protected loads. We fully realize the importance of safety in power engineering, this is why this was one of the key aspects we focused on. All our products including e²TANGO protection devices are fully type-tested and certified by most demanding laboratories..

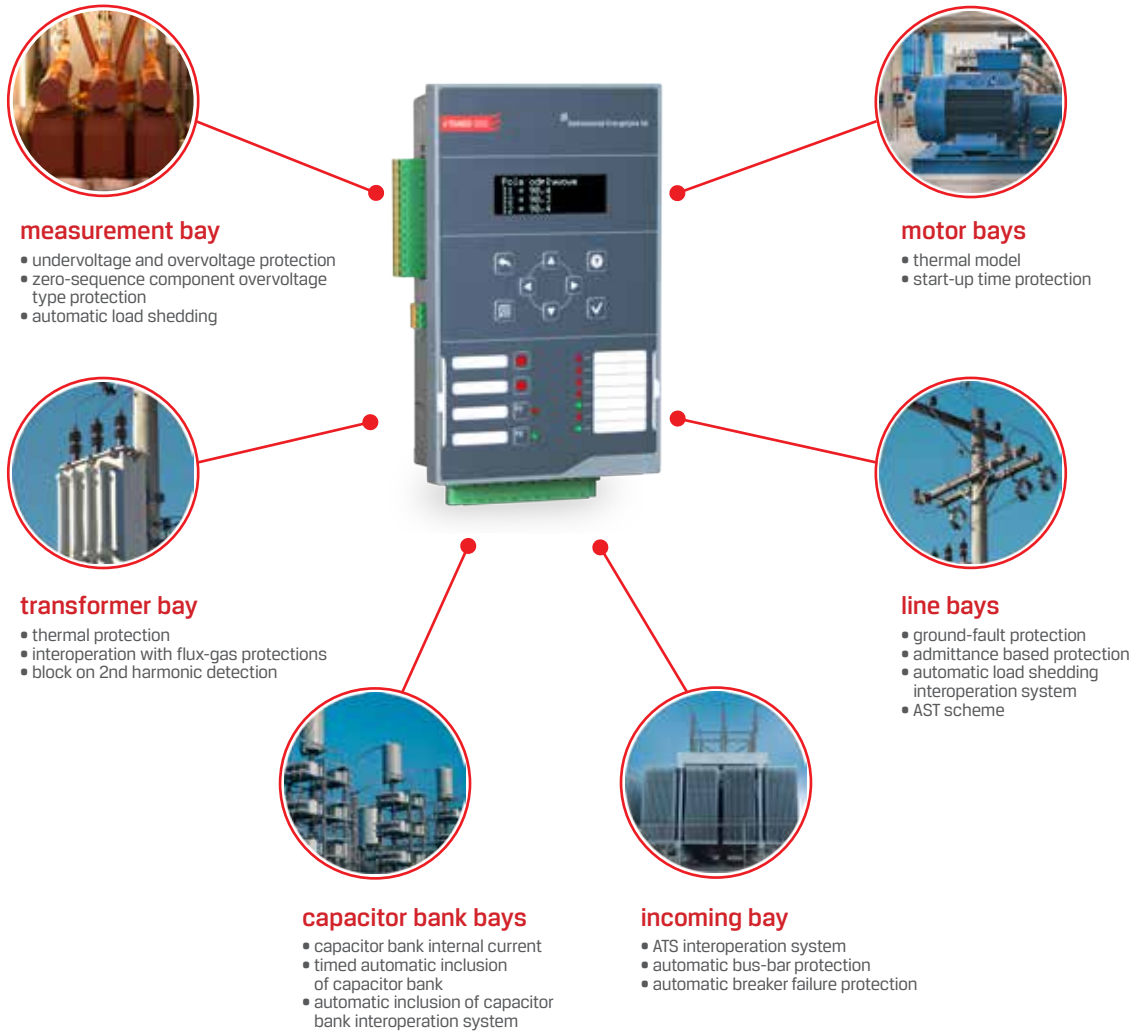
e²TANGO-200 is a unique protection system. This knowledge gives us confidence when recommending this device to our customers.



Dariusz Rybak
Main Designer, Head of Digital Development Department
Elektrometal Energetyka SA

APPLICATION

e²TANGO-200 protection relays feature a complete set of protection functions and station automation schemes making them ideal for any type of bay irrespective of its application and operational characteristics: such as incoming bay, line incoming-outgoing bay, transformer bay, measuring bay, coupling bay, capacitor bank bay for MV grids. e²TANGO-200 overcurrent relays are also capable of autonomous operation.



PROTECTION RELAY ADVANTAGES



quick device start
basic configuration assistant,
comprehensive protection
set database



**no need to replace
batteries**
a supercapacitor is used



remote service access
remote and local readout of
diagnostic data with possibility
of sending it to manufacturer
service department



**autonomous
operation**
suitable for operation with
autonomic adapter,
operation on auxiliary power failure



intuitive interface
legible menus, consistent across
all e²TANGO protection systems
and relays.



Rogowski coil
for phase current measurement
the device may use 1 mV/A sensitivity
Rogowski coils



may be used without training
handy help system

```
Overcurrent Prot. 1
Phase1 Imax = 120 A
11-12-2016
12:34:54:125
```

```
INP:12345678910
OUT:12345678
```

```
TRP/WRN/AL
Events
Disturbance
Autom. lock/
```

**fully configurable
text interface**
up to five configurable screens,
widget database



```
Incomings bay
I1 = 98,4 A
I2 = 98,3 A
I3 = 98,4 A
```



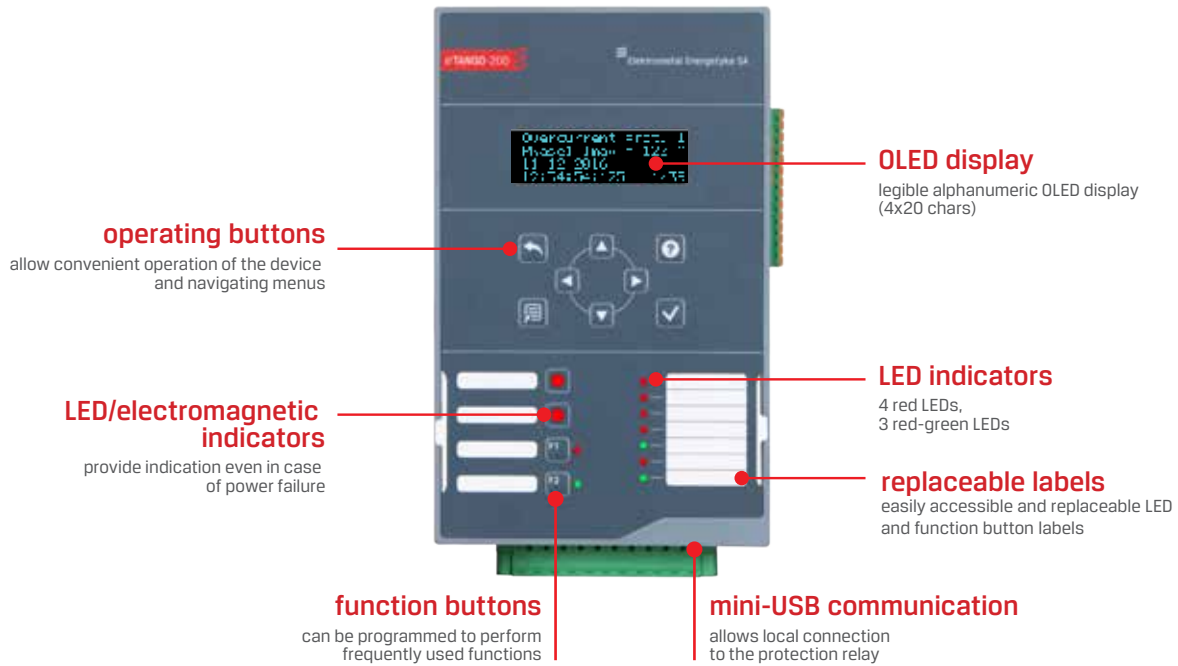
legible menu
consistent across e²TANGO
protection systems and relays

DESIGN

e²TANGO-200 overcurrent relay has an alphanumeric OLED display (4x20 characters) and a keyboard with 8 buttons for easy operation. There are 7 LEDs (4 red and 3 red-green) on the front panel providing visual indication of device statuses. There are also two additional function buttons F1 and F2 with dedicated two-colour LEDs which may be customised. Above the function buttons there are two red LEDs or optionally two electromechanical indicators providing indication even in case of power supply failure. A label pocket is provided on front panel for function button and LED/indicator labels.

INTERFACE AND OPERATION	
Display	OLED
Display resolution	4x20 characters
Colour display	-
Operating buttons (number)	8
Control buttons (I,0,<->)	-
Programmable function keys with LED	2
LED	7
LED/electromagnetic indicators	2
Replaceable labels	•
DESIGN AND STANDARD EQUIPMENT	
Dimensions (external - HxWxD)	235x147x72,5
current input no.	4/0
voltage input no.	1/4
binary input no.	10
relay input no.	8
Max. switching device no.	0
AVAILABLE EXPANSION CARDS	
Binary input cards	-
Relay output cards	-
Temperature input cards	-
Flash sensor input cards	-
4-20 mA analogue input cards	-
0-10 V analogue input cards	-
4-20 mA analogue output cards	-
0-10 V analogue output cards	-
Voltage measurement cards	-
DATA RECORDERS	
Event recorder	1000
Disturbance recorder	10S
OTHER	
Widgets	•
Synoptic diagram database	-
No. of configurable screens	5

•/o - standard/option



PROTECTION FUNCTIONS

50/50N	short-circuit/ground-fault instantaneous	81L	underfrequency
51/51N	overcurrent / zero-component overcurrent delayed	81R	instantaneous frequency change df/dt
50HS	operate time advance on trip on short-circuit operate time advance on trip on short-circuit	59N	zero-sequence component overvoltage
51	inverse overload (IEC characteristic or approximated in 6 points)	21N	admittance based
60/67N	overcurrent / zero-component overcurrent directional	21ND	directional admittance based
49/51	thermal overload	66/86	process motor start-up
46	load unbalance	66	start-up number limit
37	undercurrent	48	prolonged start-up
51VN	zero component overcurrent with voltage control / block	50LR	rotor stall
59	overvoltage (selectable for phase voltage or line-to-line voltage)	25	falling out of synchronism
27	undervoltage (selectable for phase voltage or line-to-line voltage)	30/74	flux-gas
81H	overfrequency	49	thermal (binary input)

Individual functions are available depending on version

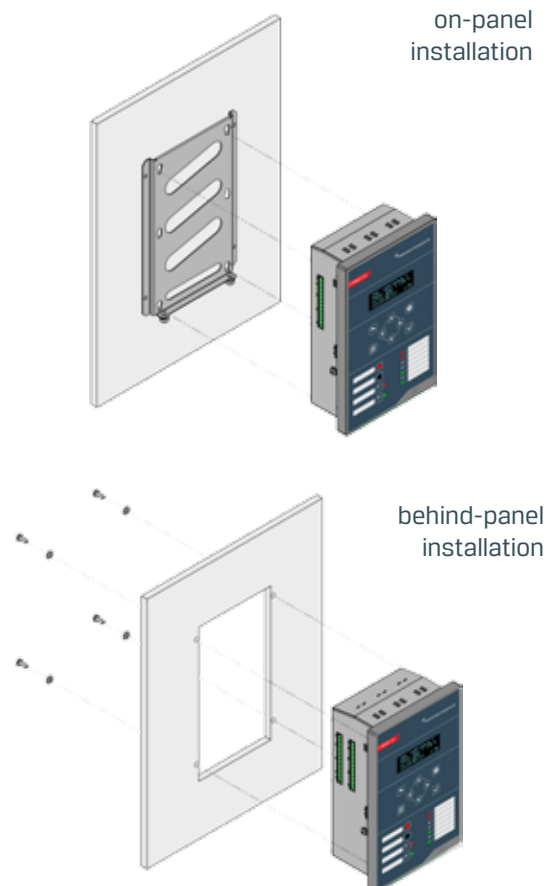
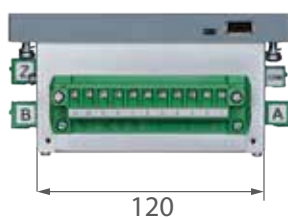
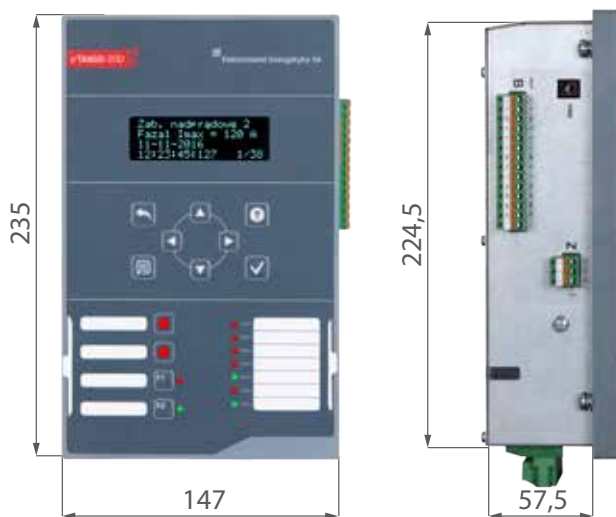
AUTOMATIC SCHEMES

- accelerated protection operation automation
- ATS, 3-stages with circuit-breaker position control and possibility of defining protection functions which trigger ATS
- automatic load shedding
- automatic load shedding interoperation system
- automatic breaker failure protection
- automatic bus-bar protection
- automatic active component forcing equipment
- automatic active component forcing equipment interoperation system or timed automatic active component forcing equipment
- ATS interoperation system
- other programmed using logic

COMMUNICATION PORTS AND PROTOCOLS

- Ethernet
- Multi-mode glass optical fibre - OPTO-MM
- Plastic optical fibre OPTO-PL
- RS485
- CANbus 2x
- USB 2.0
- Modbus TCP
- Modbus RTU
- IEC 60870-5-103
- DNP 3.0
- Profibus
- CANbus/PPM 2

DIMENSIONS AND INSTALLATION METHODS



e²TANGO-STUDIO SOFTWARE

e²TANGO-Studio engineering software allows operation of e²TANGO-200 protection relay and also panel configuration. This software provides comprehensive functionality, which together with visual widget configuration is a perfect aid in daily work by enabling creation of projects for multiple devices, bays, switchgears or stations.



advanced design functions

ability to prepare device configuration for an entire switchgear on a PC and distribute it using USB



quick configuration assistant

helps first time users of the software and facilitates regular use



on-line preview

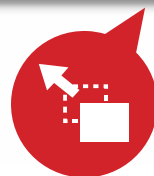
real-time preview of measurement input/output status; displaying actual LCD screen content

display conformity

preview of the actual panel screen

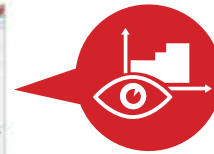
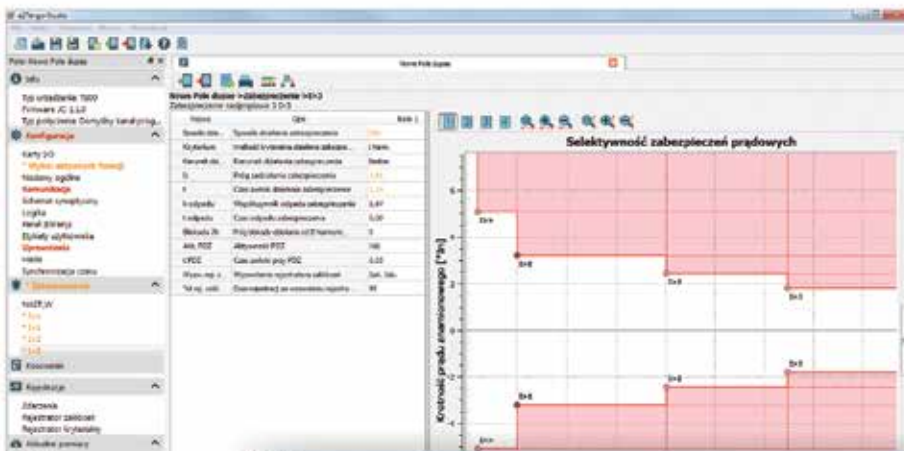


possible expansion using plug-ins



ultra-fast design of custom screens

drag&drop element placement

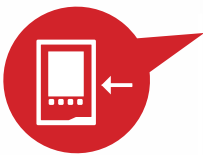
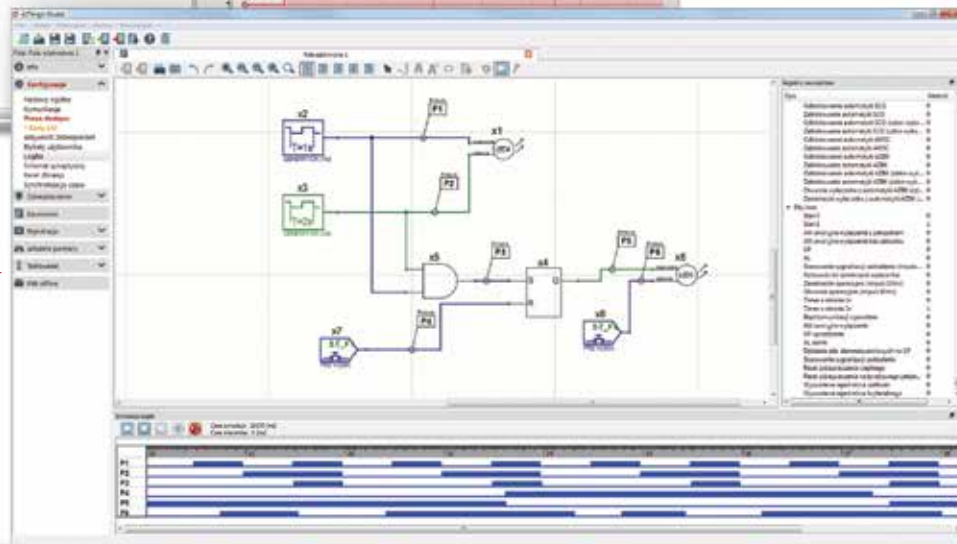


visual characteristic modification

graphical and classic protection setpoint configuration

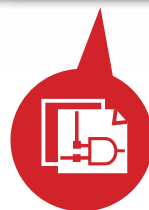
easy setpoint and selectivity verification

displaying setpoints of all related overcurrent protection functions on one chart



full status preview

access to all internal device and protection function statuses

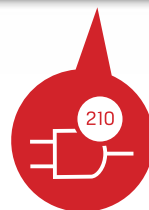


logic simulator

full logic simulation without the need to connect to a device

legible logic

possibility of dividing logic into blocks and sheets



support for sophisticated logical dependencies

up to 210 logic gates / elements

ADVANCED LOGIC EDITOR AND SIMULATOR

e2TANGO-Studio provides an advanced and comprehensive logic editor which allows running logic simulation. It gives preview of logic states when used with a device aiding project design, as well as commissioning and servicing of switching stations. The editor allows creating custom logic adapted to customer infrastructure requirements.

TECHNICAL PARAMETERS

Auxiliary power supply	
VDC	110 V, 220 V (80-300 V)
VAC	230 V (88-265 V)
Maximum power consumption	10 W (VA)
Current measurement circuits	
Rated current	5 A / 1 A
Rated frequency	50/60 Hz
Phase current measurement range	0,1-150 A
IO current measurement range	0,005-1 A / 0,1 - 10A
Ig current measurement range in capacitor bank bay	0,1-10 A
Voltage measurement circuits	
Rated voltage	57,7/100 V
Rated frequency	50 Hz
U, U ₀ voltage measurement range	3-120 V
Basic protection parameters	
Over protection relay resetting ratio	Configurable
Under protection relay resetting ratio	Configurable
Device operate time	typically - 35 ms
Measurement accuracy	
I1, I2, I3 (0.1-150A)	2%
U1, U2, U3, U0 (5-120V)	2%
IO (0.001-10A)	2%
φ0	1°
Binary input circuits	
Rated voltage	110/230 V AC/DC
Maximum power consumption: 220 V DC, 230 V AC	2 mA, 15 mA
Relay output circuits	
Allowable voltage at open contacts	250 V AC / 440 V DC
Continuous current-carrying capacity	5 A
Circuit opening at 220 V DC (L/R = 40 ms)	0,1 A
Circuit opening at 220 V AC (cos φ = 0,1)	2 A
Environmental conditions	
Operating temperature	-10 °C ... +55 °C
Storage temperature	-25 °C ... +70 °C
Relative humidity	5 to 95%, non-condensing
Vibration and mechanical shock resistance	Class 1 acc. IEC 60255-21
Electromagnetic disturbances	Class B acc. IEC 60255-26
Safety	
Insulation electric strength	2 kV/50 Hz/60 s acc. IEC 60255-27
Dimensions	
Weight (central processing unit/panel)	1 kg
Central processing unit dimensions (W x D x H mm)	147 x 72,5 x 235
Central processing unit protection rating	IP 3X
Panel protection rating (at face plate)	IP 4X / IP 54

STANDARDS

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 & AWARDS

IEn compliance certificate
no. 009/2017



Mazowsze Quality Award



ELEKTROMETAL ENERGETYKA SA QUALITY

Implemented Integrated Management System according to:

- PN-EN ISO 9001 Quality management systems
- PN-EN ISO 14001 Environmental management systems
- PN-N 18001 Occupational health and safety management systems
- BS OHSAS 18001 Occupational health and safety management systems

ORDER FORM

To order e²TANGO-200 protection relay fill in this part of the form following FORM INSTRUCTIONS provided below.

STEP 1

① version	<input checked="" type="checkbox"/> 200		
② type	<input checked="" type="checkbox"/> S (standard, 4I+1U)	<input type="checkbox"/> U (voltage measurement, 4U)	
③ measurement card rated current	<input checked="" type="checkbox"/> 5 A	<input type="checkbox"/> 1 A	
④ binary input voltage	<input checked="" type="checkbox"/> UNI (110/230 V AC/DC)	<input type="checkbox"/> 24V	<input type="checkbox"/> other
⑤ Ethernet + COM1 communication	<input checked="" type="checkbox"/> x-none	<input type="checkbox"/> RS485	<input type="checkbox"/> CAN×2 <input type="checkbox"/> OPTO-MM <input type="checkbox"/> OPTO-PL <input type="checkbox"/> Profibus <input type="checkbox"/> other
⑥ mounting	<input checked="" type="checkbox"/> Z- behind-panel	<input type="checkbox"/> N - on-panel	
⑦ Protection rating IP	<input checked="" type="checkbox"/> IP 4X	<input type="checkbox"/> IP 54 ¹⁾	
⑧ Electromagnetic indicators	<input checked="" type="checkbox"/> 0 - no	<input type="checkbox"/> 1 - yes	

1) IP54 protection rating is available only for version mounted behind the panel

customer requirements:

STEP 2

Your code:

e ² TANGO	①	②	③	④	⑤	⑥	⑦	⑧
----------------------	---	---	---	---	---	---	---	---

FORM INSTRUCTIONS

STEP 1

The table contains basic technical specification of e²TANGO-200 protection relay. In each item 1 through 8 choose only ONE element. If you choose "other", in STEP 2 fill in the requested value in a corresponding field.

Step 1 instructions.

- recommended basic configuration
- OPTO-MM - multi-mode optic fibre

STEP 2

e²TANGO-200 protection relay parameters selected above should be filled-in in corresponding locations. Send thus created e²TANGO code along with other requirements or a scanned form page and order form to: eaz@elektrometal-energetyka.pl

Sample e²TANGO-200 protection configuration:

① e ² TANGO-200	⑥ Behind-panel
② Standard	⑦ IP4X
④ Universal 230/110 AC/DC	⑧ electromagnetic indicators
⑤ OPTO-MM	

Sample of correctly created code:

e ² TANGO	200	S	5A	UNI	OPTO-MM	Z	IP4X	1	0
----------------------	-----	---	----	-----	---------	---	------	---	---

e²TANGO PROTECTION RELAYS



e²TANGO-50 Short-Circuit Detectors



e²TANGO-200



e²TANGO-400



e²TANGO-600



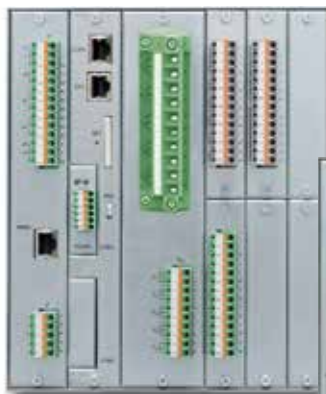
e²TANGO-1200



e²TANGO-800



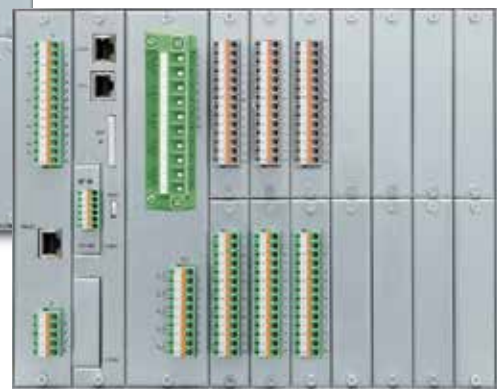
e²TANGO-1000



J6 Central Processing Unit



J10 Central Processing Unit



J14 Central Processing Unit

ELEKTROMETAL ENERGETYKA SA
02-830 Warszawa, ul. Mazura 18A
tel. (+48) 22 350 75 50
fax (+48) 22 350 75 51
eaz@elektrometal-energetyka.pl
www.elektrometal-energetyka.pl