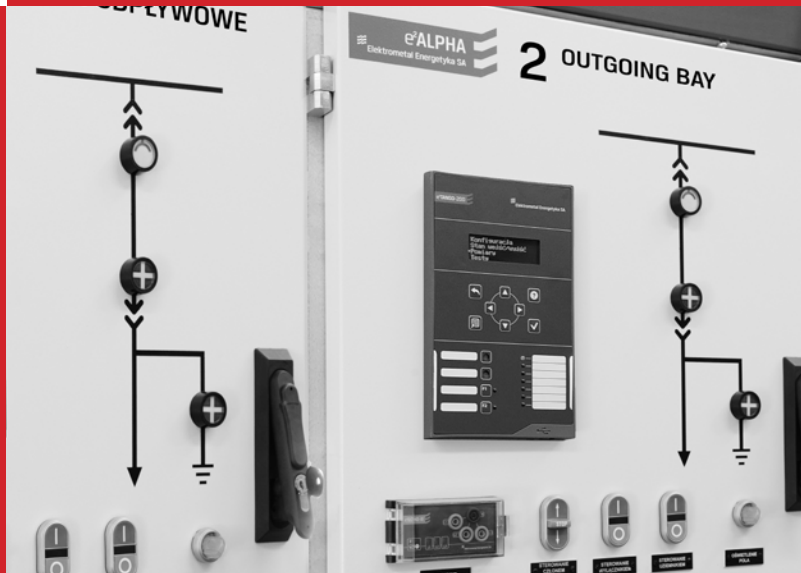
Elektrometal Energetyka SA®

e²TANGO®-200 Overcurrent Relay



K-32.2.6 Catalogue EN


e²ALPHA
Elektrometal Energetyka SA
e²TANGO-200
Elektrometal Energetyka SA
Zab. nadprądowe 2
Faza1 Imax = 120 A
11-11-2016
12:23:45:127 1/38
I>
I0>
F1
F2
AW
UP
P1>
P2>
t>
Usyg
e²ECHO-B
L1
L2
L3
N
Elektrometal Energetyka SA
STOP
NAPIĘCIE NA KABLU
STEROWANIE CZŁONEM RUCHOMYM
STEROWANIE WYŁĄCZNIKIEM
STEROWANIE UZIEMNIKIEM
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.

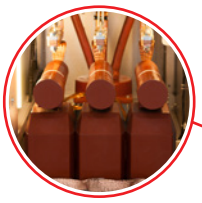
Dariusz Rybak

Main Designer

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.



measurement bay

- undervoltage and overvoltage protection
- zero-sequence component overvoltage type protection
- automatic load shedding

motor bays

- thermal model
- start-up time protection

transformer bay

- thermal protection
- interoperation with flux-gas protections
- block on 2nd harmonic detection

line bays

- ground-fault protection
- admittance based protection
- automatic load shedding interoperation system
- AST scheme

capacitor bank bays

- capacitor bank internal current
- timed automatic inclusion of capacitor bank
- automatic inclusion of capacitor bank interoperation system

incoming bay

- ATS interoperation system
- automatic bus-bar protection
- automatic breaker failure protection

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

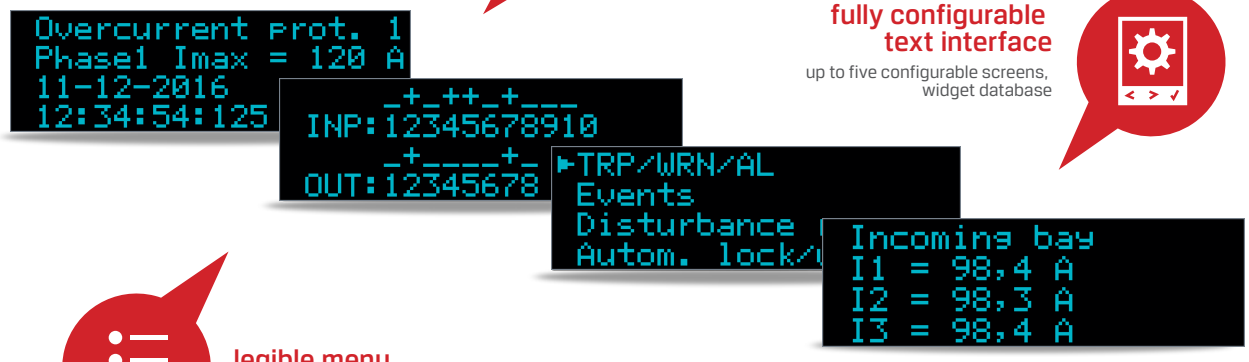
autonomous operation
suitable for operation with autonomic adapter, operation on auxiliary power failure

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

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



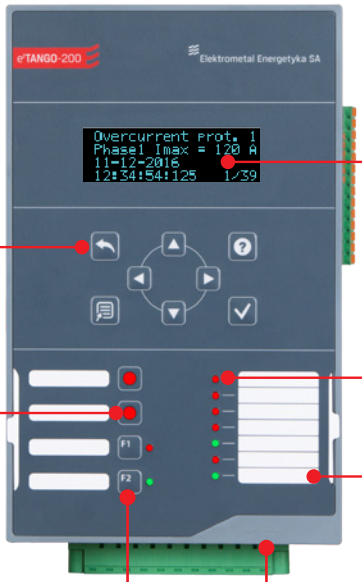
legible menu
consistent across e²TANGO protection systems and relays

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,O,‹-›)	-
Programmable function keys with LED	2
LED	7
LED/electromagnetic indicators	2
Replaceable labels	•
DESIGN AND STANDARD EQUIPMENT	
current input no.	4/0
voltage input no.	1/4
binary input no.	10
relay input no.	8
Max. switching device no.	1
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	512
Disturbance recorder	10S
OTHER	
Widgets	•
Synoptic diagram database	-
No. of configurable screens	5

•/o - standard/option



OLED display
legible alphanumeric OLED display (4x20 chars)

operating buttons
allow convenient operation of the device and navigating menus

LED indicators
4 red LEDs,
3 red-green LEDs

LED/electromagnetic indicators
provide indication even in case of power failure

replaceable labels
easily accessible and replaceable LED and function button labels

function buttons
can be programmed to perform frequently used functions

mini-USB communication
allows local connection to the protection relay

PROTECTION FUNCTIONS

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

Individual functions are available depending on version

AUTOMATIC SCHEMES

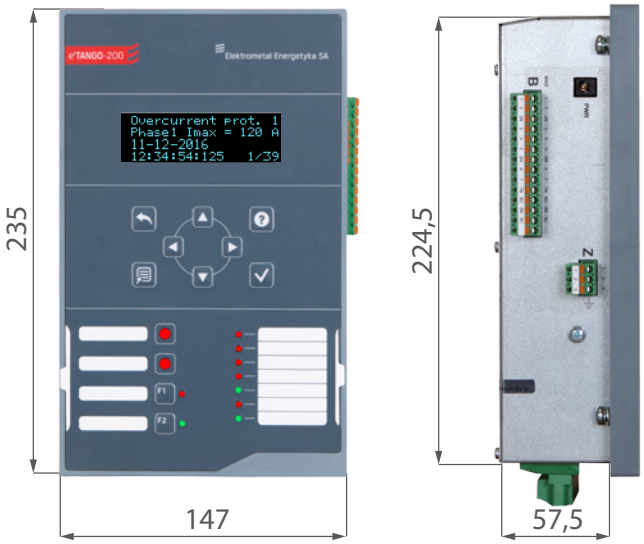
- accelerated protection operation automation
- AR, 3-stages with circuit-breaker position control and possibility of defining protection functions which trigger AR
- automatic load shedding
- automatic load shedding interoperation system
- automatic breaker failure protection
- automatic bus-bar protection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

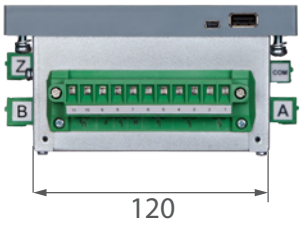
COMMUNICATION PORTS AND PROTOCOLS

- Ethernet
- Multi-mode glass optical fibre - OPTOMM
- Single-mode plastic optical fibre - OPTOSM
- Plastic optical fibre OPTOP
- RS485
- CANbus 2×
- USB 2.0
- Modbus RTU/TCP
- IEC 60870-5-103
- DNP 3.0
- Profibus
- CANbus/PPM 2

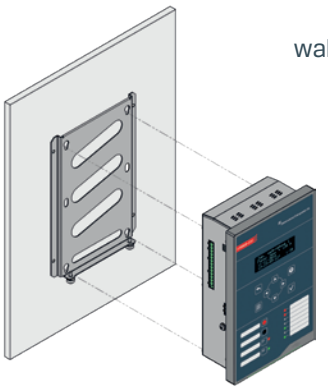
DIMENSIONS AND MOUNTING METHODS

Standard version

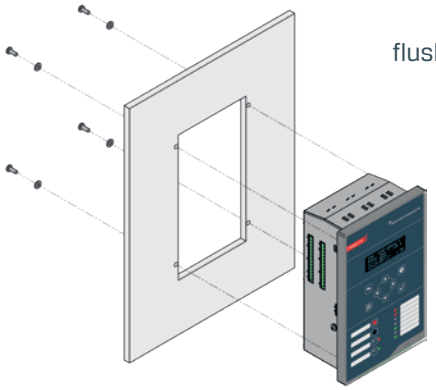




wall mounting

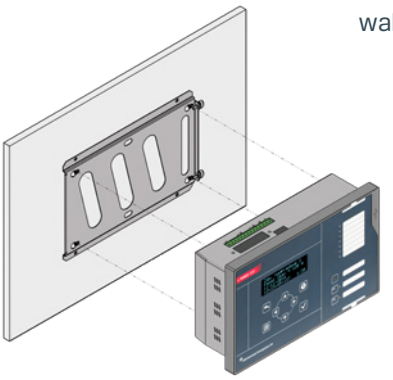


flush mounting

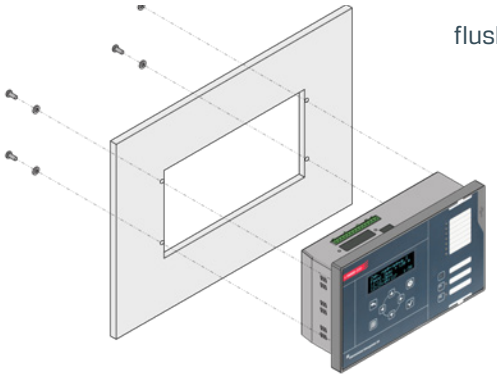


Horizontal version

wall mounting



flush mounting



SELF-POWERED VERSION e²TANGO-200

Self supplied version of protection relay lets the device continue working in case of lack of auxiliary power supply, then device is supplied from secondary windings of current transformers. e²TANGO-200 cooperates with current transformers and Holmgreen system with rated current value on secondary windings equal 5A or 1A.

TECHNICAL PARAMETERS

STRUCTURE AND BASIC EQUIPMENT	
Outputs of sensitive coil	1
Energy contained in output of sensitive coil	0,02J for 12V 0,10J for 24V (optional)
Capacitor bank	option
Energy contained in capacitor bank	7J
Minimal values of current necessary for self supply	3p connection – 0,28 Ins 2p connection – 0,42 Ins 1p connection – 0,72 Ins Ioh connection – 0,65 A
MEASUREMENT	
Rated current	5A / 1A
Power load in phase circuit	‹5,0VA
Power load in Ioh circuit	‹5,5VA
Long-term current durability of current inputs	10A
INTERFACE AND HANDLING	
Electromagnetics indicators (optional)	2

Functions:

- Self supply from secondary windings of current transformers
- Possible to equip in electromagnetic indicators (state sustained after power supply failure)
- Possible to measure current from 2 or 3 current transformers
- Possible to use as redundant protection
- Self supply also in case of single-phase short circuit
- Equipped in output adapted to CB sensitive trip coils
- Equipped in capacitor tank

TECHNICAL PARAMETERS

Auxiliary power supply	
VDC VAC Optional	110 V, 220 V (80-300 V) 230 V (88-265 V) 24V(19-58V AC/DC)
Maximum power consumption	10 W (VA)
Current measurement circuits	
Rated current	5 A / (1 A option)
Rated frequency	50 Hz
Phase current measurement range for current transformers for Rogowski coils	 0,1-150 A 10-1400mV(10-1400A) Other on request
I0 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	57,7/100/230V
Rated frequency	50 Hz
U, U_0 voltage measurement range	3-480 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 (0.1-150 A/10-1400 mV)	2%
U1, U2, U3 (5-480 V - version with voltage measurement)	2%
U0 measured calculated	 2% 3%
I0 (0.001-10A) measured calculated	 2% 3%
φ0 measured calculated	 1° 2°
f (U ⟩ 5 V / 0.05 V, version with voltage measurement)	10 mHz
Binary input circuits	
Rated voltage Optional	110/230 V AC/DC 24 V (19-58V AC/DC) Other on request
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 (standard/self-suplied version)	1 kg/3 kg
Dimensions (W x D x H mm) (standard/self-suplied version)	147 x 72,5 x 235/147 x 122.8 x 235
Central processing unit protection rating	IP 3X
Panel protection rating (at front panel side)	IP 4X/(IP 54 optional)

e²TANGO-STUDIO SOFTWARE

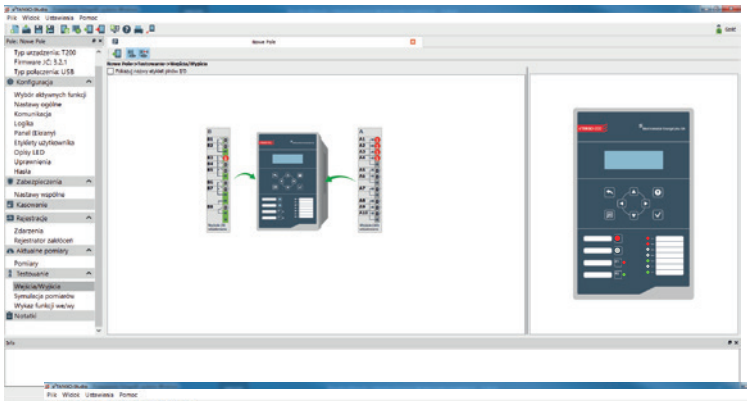
e²TANGO-Studio engineering software allows operation of e²TANGO-200 protection relay and also panel configuration. This software provides comprehensive functionality, which together with visual widget configuration is a perfect aid in daily work by enabling creation of projects for multiple devices,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

quick configuration assistant

helps first time users of the software and facilitates regular use

advanced design functions

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

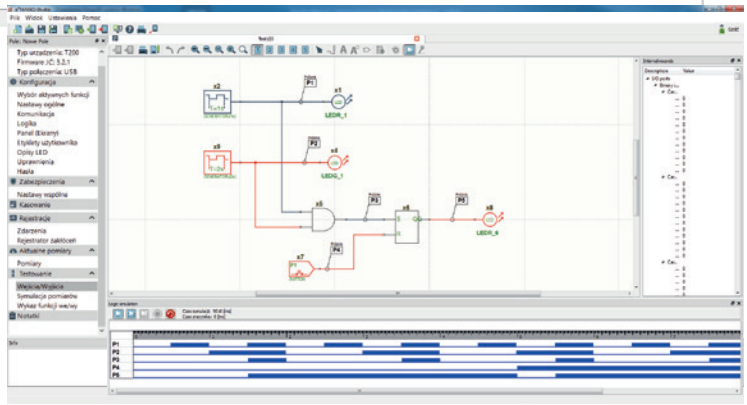


on-line preview

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

display conformity

preview of the actual panel screen



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

possible expansion using plug-ins

logic simulator

possibility to simulate whole logic without connection with device

logic clarity

possibility to split logic in blocks and sheets

ultra-fast design of custom screens

drag&drop element placement

support for sophisticated logical dependencies

up to 340 logic gates / elements

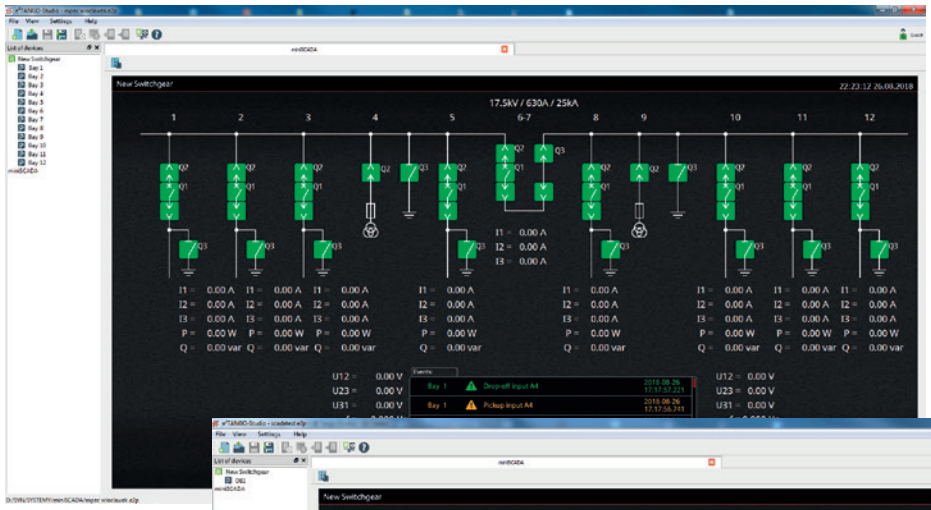
„miniSCADA" FUNCTIONALITY

e²TANGO-Studio has possibility to expand with "miniSCADA" functionality that lets you vusualise state of switchgear, manipulate switches, alarms and events preview and online access to measured parameters of protection relay (e.g. current, voltage, power, energy) installed in switchgear. Functionality was designed to share engineering link (one communication port) to protection relays that gives possibility for costs optimization by wiring and infrastructure simplifying.

"miniSCADA" plug-in is optional as additional license.

intuitive configuration of screens
possible to use widgets

data transmission using available communication ports
RS485, OPTO, Ethernet and others



cost optimization
no need to use advanced SCADA systems

universal software to all e²TANGO types

possible to work in any operating system

access from mobile devices

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.

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 DZC.521.59.2.2023

Masovian Quality Award

The Minister of Energy Cup
ENERGETAB 2018 Fairs

Diamenty Miesięcznika Forbes 2023

Forbes Diamonds 2023

ELEKTROMETAL ENERGETYKA SA QUALITY

Implemented Integrated Management System based on following standards:

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

ORDER FORM

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

STEP 1

①	version	☒ 200	☐ 200H (horizontal version)						
	type	☒ S (standard, 4I+1U)	☐ U (voltage measurement, 4U)						
②	change the way of measurement metod (from core transformer):	☐ C (Rogowski coils 3I cr +1I + 1U)							
③	measurement card rated current	☒ 5A	☐ 1A	☐ X - for U or C					
④	binary input voltage	☒ UNI (110/230V AC/DC)	☐ 24V (24/48V AC/DC)	☐ other (on consultation with manufacturer)					
	Ethernet (standard equipment in each central unit)								
⑤	COM1	☒ x-none	☐ RS485	☐ CAN×2	☐ OPTOMM	☐ OPTOP[1]	☐ Profibus	☐ other	
⑥	mounting	☒ Z- flush mounting	☐ N - wall mounting						
⑦	protection rating IP	☒ IP4X	☐ IP54[2]						
⑧	language version	☐ PL	☒ EN	☐ other (on consultation with manufacturer)					
⑨	electromagnetic indicators[3]	☒ X - no	☐ W - yes						
⑩	self-powered version[4]	☒ X - no	☐ 12VX - sensitive coil output 12V, no capacitor bank	☐ 24VX - sensitive coil output 24V, no capacitor bank					
			☐ 12V11 - sensitive coil output 12V, capacitor bank 110V	☐ 24V11 - sensitive coil output 24V, capacitor bank 110V					
			☐ 12V22 - capacitor bank 220V	☐ 24V22 - capacitor bank 220V					
	selection of cards in slots A and B								
⑪	slot A	☒ 10IN	☐ 10IN24						
⑫	slot B	☒ X 8OUT							

1) OPTOP reccomended only in wall mounting because of optical fibre components extendint beyond the panel
2) IP54 protection rating is available only for version mounted behind the panel
3) for 200H version only one electromagnetic indicator available
4) self-powered version does not work with measurement inputs for Rogowski coils

customer requirements:

STEP 2

Your code:

e²TANGO	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫

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
- OPTOMM - 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 e²TANGO-200	⑦ IP4X
② standard	⑧ EN
③ measurement card rated current	⑨ electromagnetic indicators
④ universal 230 / 110 AC / DC	⑩ self-powered verion - sensitive coil output 12V, without capacitor bank
⑤ OPTOMM	⑪ 10IN
⑥ flush	⑫ 8OUT

Sample of correctly created code:

e²TANGO	200	S	5A	UNI	X	Z	IP4X	EN	W	12VX	10IN	8OUT

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