*ext*CZIP®-PRO
PROTECTION RELAY

DIGITAL PROTECTION, AUTOMATION, MEASUREMENT, CONTROL, RECORDING AND COMMUNICATION

- Underimpedance protection against phase faults in MV lines. An alternative to conventional overcurrent protection in cases where selective coordination and the required sensitivity cannot be achieved.
- Allows measurement using low-power measurement transformers CR/CRR.
- **extCZIP®-PRO extended version of the CZIP® system**
  - flexibility to choose the number of available input and output ports,
  - additional communication ports.

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extCZIP®-PRO digital protection relays for medium voltage switchgear and **extCZIP®-2R PRO** automatic transfer switch system are new versions of devices belonging to the **CZIP®** system. The **extCZIP®-PRO** series protection relays are characterized by great flexibility in choosing the number of available input, output and communication ports.

The **CZIP®** system devices are 100% Polish products, developed in cooperation with the Institute of Electrical Power Engineering of the Poznań University of Technology.

- extCZIP®-PRO – digital protection relay
  for MV switchgear for power utilities and industrial facilities
- extCZIP®-2R PRO – ATS system implementation (automation transfer switch)
  for MV switchgear
- CZIP®-Set – utility software for operating all CZIP® system devices,
  including extCZIP®-PRO

Unique protection functions of the CZIP® system

- **underimpedance protection against phase faults**
- detection of high-impedance earth faults (up to 8 kΩ),
- selective protection against earth faults in earthing transformer bays and earthing circuits.

CHARACTERISTICS

- software for all MV (medium voltage) substation bays in one **extCZIP®-PRO** device,
- ATS system (automatic transfer switch) implemented in **extCZIP®-2R PRO**,
- predefined settings of the protection functions and automation systems,
- **programmable logic support (50)**,
- colour LCD TFT 7" screen, 800x480, with a touch panel,
- bay synoptic diagram presentation with mapping of the switch states,
- switch control from the synoptic screen and using telemechanics (up to 11 switches),
- presentation of the recorded events, measurement values and input or output states,
- **28 or 56 opto-isolated binary inputs,**
- **20 or 40 output relays,**
- 14 bi-colour programmable LEDs, with on-screen description,
- ON and OFF buttons – to control the bay circuit breaker from the device keyboard,
- 512 MB internal memory for recording samples of disturbance recorder, event recorder, energy measurements,
- time synchronization via Ethernet network using SNTP
- independent communication interfaces: USB, 2 x RS-485, Ethernet 10/100 BASE-TX (optional fibre optic port and **CAN-BUS/RS-485**),
- communication protocols: DNP 3.0, IEC 60870-5-103 and 104, IEC 61850, Modbus® ASCII / RTU (optional PPM2 protocol on **CAN-BUS/RS-485 port**),
- 2-bit status monitoring of all switches,
- optional phase current measurement inputs adapted for operation with low-power current transformers based on Rogowski coils.

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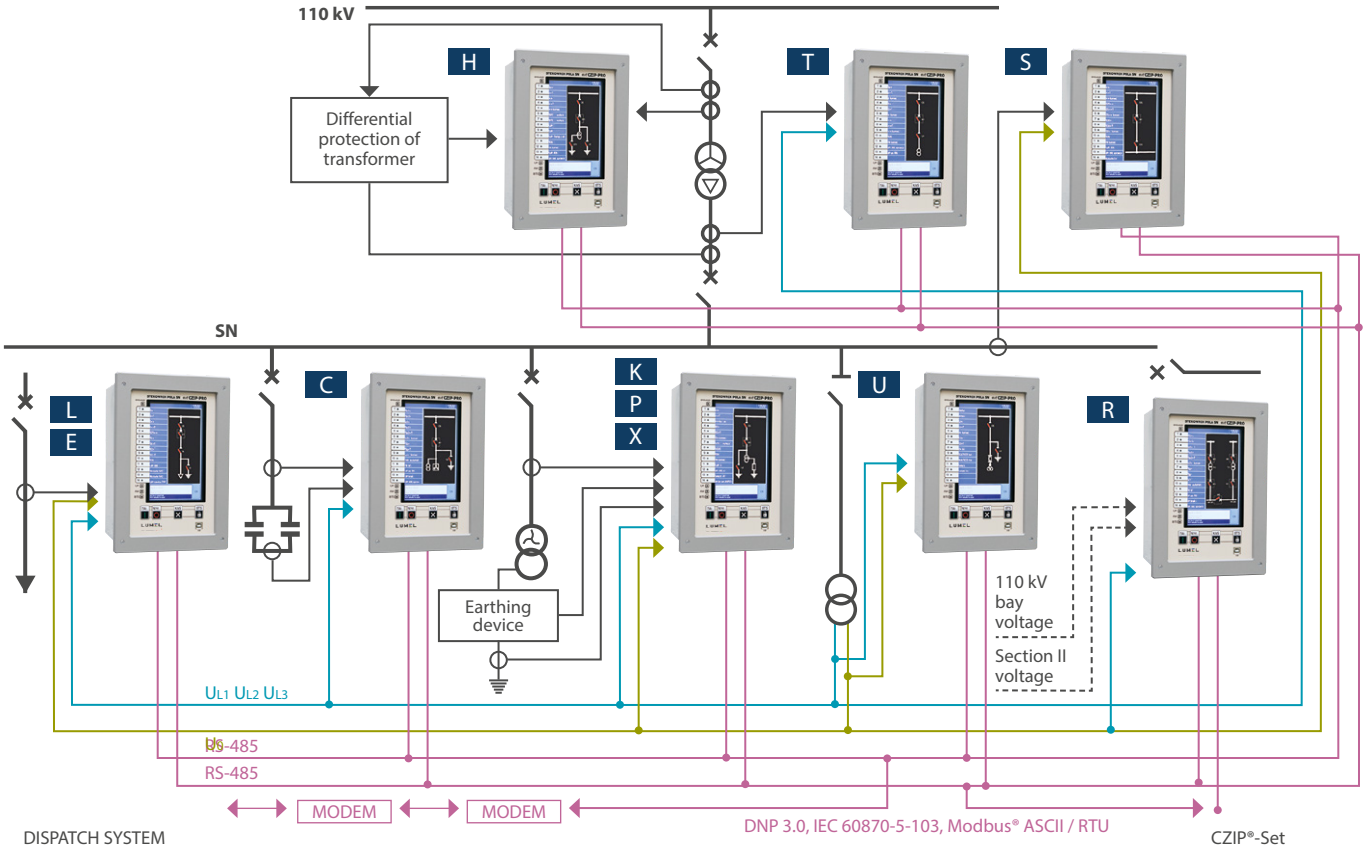
CONNECTION DIAGRAM



FUNCTIONS

Protection functions	L	E	Z	T	C	K	P	X	U	S	H	R
Three-stage overcurrent protection against phase faults	•1	•1	•1			•						
Directional protection for each stage of overcurrent protection	•	•	•									
Current asymmetry criterion based on the negative sequence current component	•	•	•			•	•	•				
Instantaneous switch onto fault protection	•	•	•	•	•	•	•	•		•	•	
Underimpedance protection against phase faults	•	•	•									
Earth-fault overcurrent	•	•	•	•	•	•	•	•		•	•	
Residual overvoltage as start-up element for other protection functions	•	•	•			•	•	•		•		
Residual overvoltage as autonomous criterion		•	•			•	•		•		•	
Earth-fault overcurrent in the neutral point's earthing circuit						•	•	•				
Earth-fault admittance	•	•	•			•	•					
Earth-fault admittance incremental	•	•	•									
Earth-fault conductance (directional and non-directional)	•4	•4	•4			•	•			•2		
Earth-fault susceptance directional	•	•	•									
Wattmetric-based earth-fault I0P>				•								
Adaptive earth-fault conductance RG0adapt. (detection of high-impedance faults)	•	•	•									
Overfrequency		•3	•3						•			
Underfrequency		•3	•3									
Rate of change of frequency df/dt		•3	•3									
Overcurrent busbar protection blocking element	•	•	•		•	•	•	•				
Directional protection for overcurrent busbar protection blocking element	•	•	•									
Overcurrent relay cooperating with busbar protection										•		
Decision element of busbar protection			•	•								
Selective protection against earth faults in earthing transformer and earthing circuit						•	•	•				

Protection functions	L	E	Z	T	C	K	P	X	U	S	H	R
Overvoltage		•3	•3	•	•							
Undervoltage		•3	•3	•	•							
Overload overcurrent				•	•						•	
Time-delay overcurrent against phase faults					•							
Overcurrent against internal faults					•							
Phase overvoltage (criterion: phase-to-phase voltage)									•			
Phase undervoltage (criterion: phase-to-phase voltage)									•			
Overcurrent-logic busbar protection			•	•						•		
Short-circuit overcurrent against internal phase faults						•	•	•			•	
Directional overpower P3>		•	•									
Directional overpower Q3>		•	•									
Voltage asymmetry				•								
Automation systems	**L**	**E**	**Z**	**T**	**C**	**K**	**P**	**X**	**U**	**S**	**H**	**R**
Automatic reclosing	•	•	•									
Circuit breaker failure protection			•	•						•		
Capacitor bank controller				•								
Capacitor bank switching automation (clock)					•							
Underfrequency load shedding - 3 stages									•			
Distributed underfrequency load shedding (applied for line bays)		•	•									
Underfrequency load shedding and restoration									•			
Active current forcing scheme with a controller						•						
Resistor controller							•					
Others	**L**	**E**	**Z**	**T**	**C**	**K**	**P**	**X**	**U**	**S**	**H**	**R**
Cooperation with underfrequency load shedding automation or underfrequency load shedding and restoration system	•	•	•									
Cooperation with circuit breaker failure protection	•	•	•		•	•	•	•			•	
Cooperation with automatic transfer switch			•	•			•	•		•	•	
Operation of automatic transfer switch function for both hot and cold reserve configurations												•
Cooperation with gas detector relay				•		•	•	•				
Cooperation with external differential protection											•	
Second harmonic bias for phase overcurrent protection		•	•									
Synchronism check function when switching on a line with distributed generation		•5	•5									

[1] Settings' change possible after operational switching of the first, second or third stage.
[2] Non-directional.
[3] With separate automatic reclosing system.
[4] Built-in adaptive algorithm supporting effective detection of high-impedance earth faults.
[5] Optional function.

*ext*CZIP®-PRO purpose by bay

- **L** line bay without local power plant
- **E** line bay with local power plant (also wind power)
- **Z** incoming/ outgoing feeder bay
- **T** MV side of the 110 kV/MV transformer
- **C** capacitor bank
- **K** auxiliary services in compensated networks (also networks with an insulated neutral point)
- **P** auxiliary services in networks with resistor-earthed neutral point
- **X** auxiliary services in networks with parallel reactor – resistor earthing system
- **U** voltage measurement
- **S** busbar coupler
- **H** 110 kV side of the 110 kV/MV transformer

*ext*CZIP®-2R PRO purpose

- **R** ATS system (automatic transfer switch)

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TECHNICAL DATA

Phase current inputs		
CURRENT TRANSFORMERS		
Rated current I_n		5 A or 1 A
Current range		0...200 A
Measurement error	0 A > | 0,35...50 A | < 200 A	< 10% | < 1,5% | < 10%
Rated frequency f_n		50 Hz
Power consumption at $I=I_n$		< 0,5 VA
LOW-POWER CURRENT TRANSFORMERS CR/CRR		
Current range		0.1A...150kA
Measurement Circuit Resistance		50 kΩ

Phase voltage inputs	
Rated voltage U_n	100 V
Voltage range	0...130 V
Measurement error in the measurement range	< 1,5%
Rated frequency f_n	50 Hz
Power consumption at $U=U_n$	< 0,4 VA

Zero-sequence current inputs		
Rated current I_{0n}		0,5 A
Current range		0...5 A
Measurement error	0,02...3,5 A	< 1,5%
Rated frequency f_n		50 Hz
Power consumption at $I=I_{0n}$		< 0,4 VA

Zero-sequence voltage inputs	
Rated voltage U_{0n}	100 V
Voltage range	0...130 V
Measurement error in the measurement range	< 1,5%
Rated frequency f_n	50 Hz
Power consumption at $U=U_{0n}$	< 0,4 VA

Binary inputs		
Rated input voltage	24 V	220 V
Input voltage range	17...32 V	88...253 V
Current drain	< 3 mA	< 3 mA

Output relays		
Rated voltage	220 V	24 V
Continuous current carrying capacity	5 A	
Breaking capacity of the induction circuit		
• 220 V DC, L/R = 40 ms	0,1 A	
• 220 V AC, cos φ = 0,4	2 A	

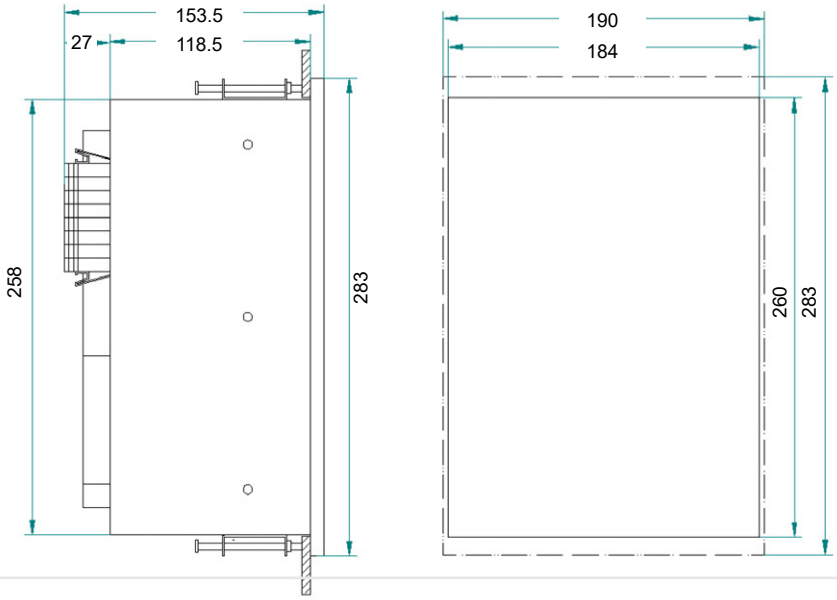
Circuit breaker connection circuits		
Rated voltage	220 V	24 V
Continuous current carrying capacity	8 A	
Breaking capacity of the induction circuit		
• 220 V DC, L/R = 40 ms	1,2 A / 300 cycles	
Duration of the switch-off impulse	min. 0,1 s	
Duration of the switch-on impulse	min. 0,1 s	

Other data			
Power supply			
• nominal auxiliary voltage	220 V DC 90...220...300 V	230 V AC 85...230...265 V	24 V DC 19...24...65 V
• auxiliary power consumption	< 20 W		
Environmental conditions			
• operating temperature	-10...+55°C		
• storage temperature	-20...+70°C		
• altitude	≤ 2000 m		
• relative humidity	5...95%		
Weight	6 kg		
Dimensions	283 x 190 x 153,5 mm backboard version		
	283 x 190 x 233 mm onboard version		
Case protection degree	IP 50		

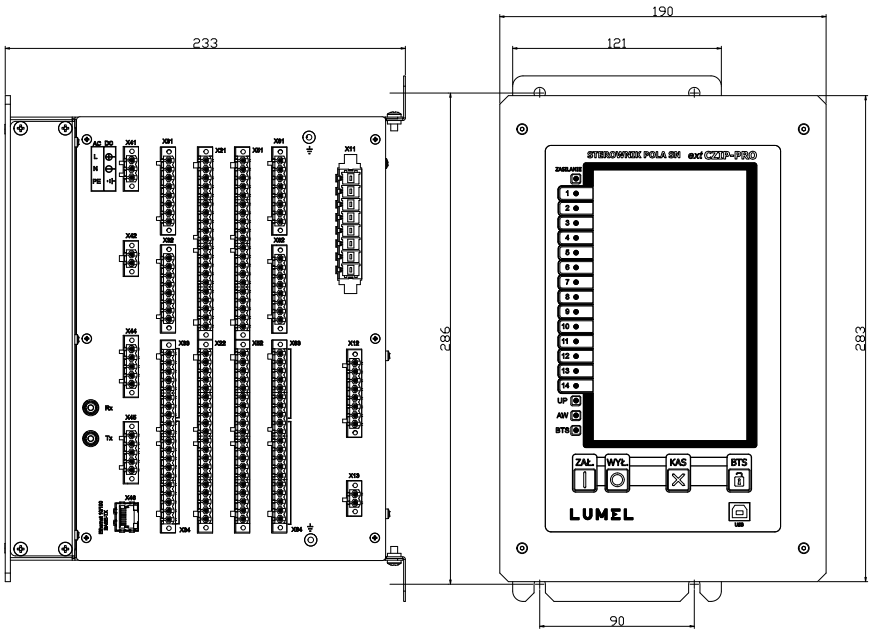
DIMENSIONS

Backboard version

Dimensions of the hole in the mounting plate



Onboard version



Holes with a diameter of 6,5 mm
for mounting on the board
using 4 M5 screws

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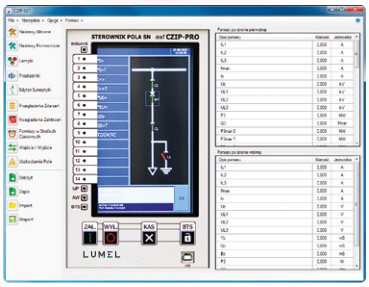
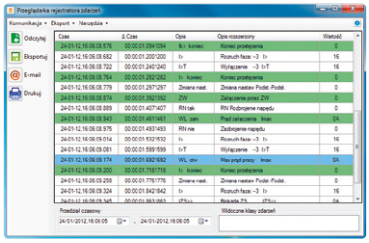
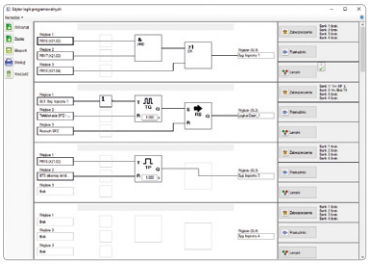
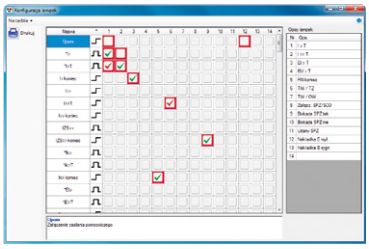
CZIP®-SET extCZIP®-PRO software

- software supplied with extCZIP®-PRO devices,
- excellent engineering tool supporting the user in specifying settings, configuring all available parameters, checking current configuration, measurement data and event recorder,
- a module enabling reading of samples saved in the disturbance recorder and their comprehensive analysis is also included in the software package,
- the tool includes a programmable logic editor, which enables adaptation of the extCZIP®-PRO device to individual needs and solutions,
- software enables communication with extCZIP®-PRO devices via RS-485 serial ports, optical fiber, USB, Ethernet,
- comparator of configuration files,
- synoptic editor - standard connectors + 11 configurable ones,
- remote control of MV and LV switches via Ethernet (VPN).









RELATED PRODUCTS:

*ext*CZIP®-PV-PRO
INTEGRATED PROTECTION AND CONTROL RELAY

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ND45PLUS
POWER NETWORK ANALYZER

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