

uREG

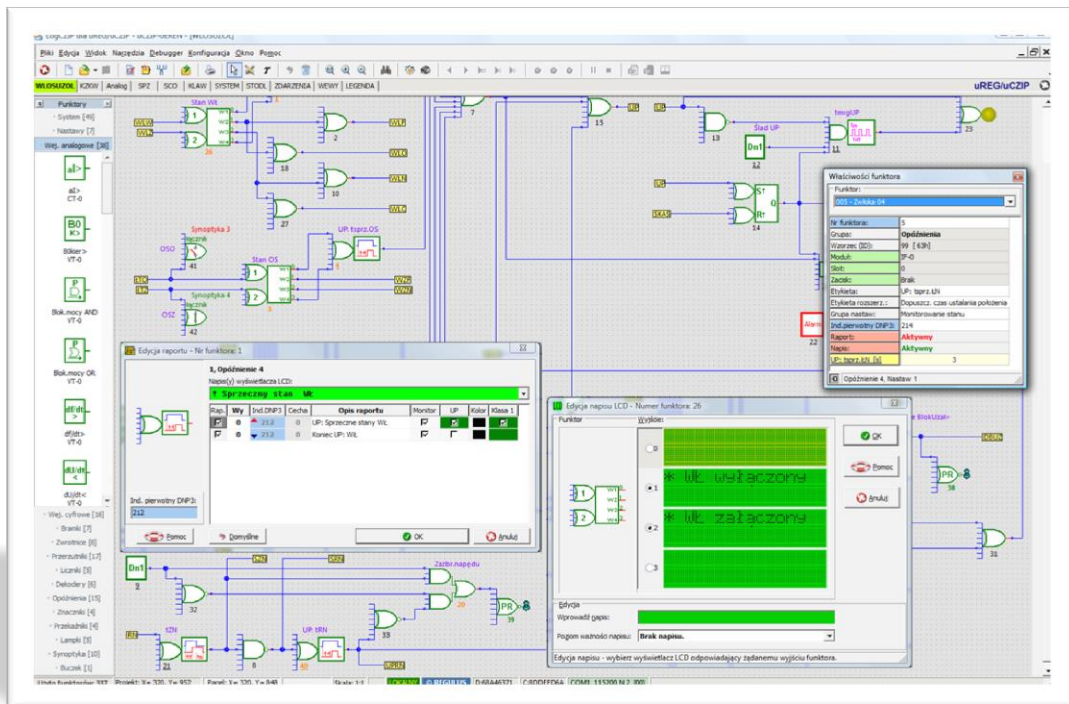
PROTECTION RELAY

UNIVERSAL FIELD CONTROLLER



LogCZIP

NEW SOLUTION FOR DESIGNING, TESTING, IMPLEMENTING APPLICATIONS AND CONTROL

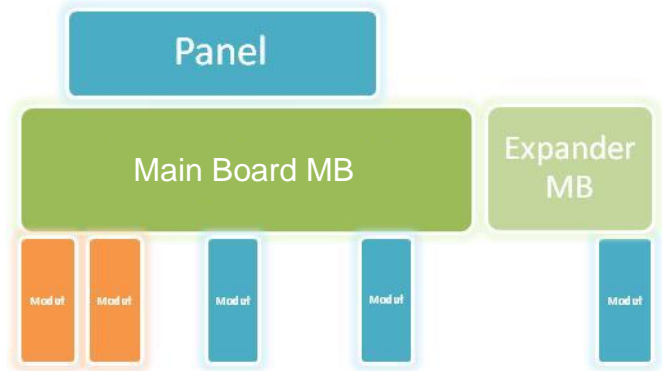


uREG is a new and universal system used for protection, measurement, control, communication and recording functions and designed to cooperate with automatic control engineering installed in medium and high voltage power distribution substations. **uREG** system has been developed basing our own experience gained in designing, manufacturing and operating its former versions.

The application field of **uREG** system includes:

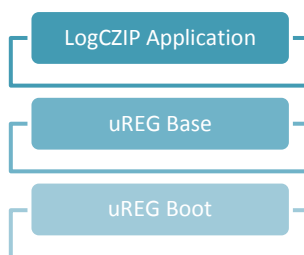
- power sector,
- power plants, heat and power generating plants,
- PV plants,
- wind farms, water power plants, bio-gas power plants,
- industry.

The modular and flexible design of the device ensures optimum adaptability into any chosen project-specific application operating in the power engineering or in the industry. It also ensures the highest level of cost-efficiency, due to its reliable operation even in the simplest configuration. Three versions of the operator panel (two of them are equipped with high-resolution colour display), a wide range of I/O modules and mounting options will fit individual needs of every user. Multi-protocol transmission (including DNP3 and IEC-60870) ensures that the communication is in accordance with current standards, while further standards will be met due to IEC 61850 and IEEE-1588 compliance.



uREG hardware layout

Unified hardware enables user to dedicate **uREG** assembly to a given field mainly by using software (Application), reducing the hardware solutions to a minimum.



uREG software layout

Multiprocessing abilities and layered software structure separates the Base (which is an internal and common part of the entire system, responsible for protection functions and communication) from the application logics, offering the user full freedom to define it.

The application is a structure of logic relations and conditions that determine the purpose and protection functions of **uREG** device. Defining, testing and implementing the application layer is provided by the manufacturer or by the user via flexible software tool called

LogCZIP

SELECTED TECHNICAL SPECIFICATIONS

Casing:

- high-grade, acid-resistant stainless steel, Class A4
- modular, 7 slots (as standard), 10/14 slots (expander), up to 200 I/O
- mounting options: on-board, behind-board, vertical / horizontal / lateral
- behind-board: dimensions incl. panel (HxWxD): 240 x150 x124 mm
- on-board: dimensions including panel (HxWxD): 270x150x200 mm

Operator panel:

- ▶ GV and GH versions with colour graphic display:
 - 3.5" display, resolution 240 x 320 pixels (QVGA), 65536 colours
 - programmable graphics and field synoptic charts
 - 18 programmable LEDs (red)
 - indicating digital I/O statuses (from terminals)
- 8 control buttons, buzzer, LEDs: **Power**, **Emergency**, **UP**
- switch for Tele-Control Lock with LED indication
- mounting options: vertical/horizontal/lateral or remote (up to 15m)
- option for many devices to cooperate with a virtual panel (PC)
- unified dimensions (WxHxD): 150 x 240 x 17 mm

Modules:

- IF-4/IF-7: module of CPU and communication interfaces (FO option)
- CT-0 / CT-1: module 3*I (5A)
- VT-0 (100V) / VT-5 (400V): module 4*U + 2*I (1A)
- VT-1 (400V) / VT-2 (100V): module 8*U + 1*I (1A)
- VT-3 (100V) / VT-4 (400V): module 6*U + 3*I (1A)
- VT-8 (400V) / VT-9 (100V): module 6*U + 3*I (5A)
- VT-6: module 4*U (100V) + 5*I (1A)
- VT-A: module 4*U (100V) + 5*I (5A)
- VT-7 / VT-B: module 3*U (400V) + 6*I (1A)
- VP-0: module 3*U (100V) / 3-section ATS /
- PS-0/PS-1: power supply module with "hot-reserve" support (2 PS modules), equipped with digital I/O
- CM-0, CR-0: intelligent I/O modules with power relays and inputs with programmable thresholds
- IO-0: I/O module with bi-polar inputs with programmable input resistance 220/24 VDC
- CO-0: 16 signal relays module
- CI-0: 16 digital inputs + 1 signal relay module
- AD-0: 4..20mA DC I/O module + RS485 port
- GP-0 / GP-1: dual channel GPRS modem
- standard dimensions 142 x 90 mm
- Plug & Play solution
- coded, internal bus connections
- external connectors with a wide range of plugs with threaded terminals or spring terminals, with tool access from: front / side / at angle

Operational data:

- Time: Time synchronization acc. to IEEE 1588 PTP with accuracy of 1us
Ready-to-start time ≈3.5 s
- Direct measurements:

Phase currents in range (In: 5 A, 1 A)	0 – 192 A
Other currents in range (In: 1 A)	0 – 10 A
Voltage in range (Un: 100 V)	0 – 130V
- Auxiliary power supply:

Rated supply voltage PS-0:	220 VDC/230 VAC
Allowable range of supply voltage fluctuations	88 ÷ 350 VDC
Power consumption at 220 VDC	<15 W (typ 7W)

 or

Rated supply voltage PS-1:	24 VDC
Allowable range of supply voltage fluctuations	21 ÷ 38 VDC
Power consumption at 24 VDC	<15 W (typ 7W)

Secondary measurements:

- Current IL1, IL2, IL3
- Current Ifmax
- Currents I0, Ig
- Voltage U0
- Voltage UL1, UL2, UL3
- Admittance Y0
- Conductance G0
- Susceptance B0
- other
- Active power P3
- Reactive power Q3
- P3 15 min active
- Q3 15 min reactive
- Frequency
- Derivatives df/dt, dU/dt
- Voltage U12, U23, U31
- Current Imax, Imin; Voltage Umax, Umin

Primary measurements:

- Current IL1, IL2, IL3
- Current Ifmax
- Current IO, Ig
- Voltage U0
- Voltage UL1, UL2, UL3
- Voltage U12, U23, U31
- Active power P3
- Reactive power Q3
- Frequency
- Derivative df/dt, dU/dt
- P3max/Q3max 15min in zones
- Energy Eact+/- Energy Ereact+/-
- Eact+/- total Ereact+/- total
- tg(FI) momentary Q3/P3
- tg(FI) Q3m/P3m
- tg(FI) zones
- tg(FI) total average
- Total of I1/I2/I3/I4 switch-offs
- earthing Resistor current
- other

Communication ports:

- 1 x Ethernet 10/100 BaseT (TCP/UDP/ICMP)
- 2 x Serial Port RS-485 (FO option) with LED indication
- 1 x Serial Port RS-485 of the panel (front, back, side)
- 1 x Serial Port RS-232 (panel) with LED indication
- 1 x Type B USB port (panel), operating in HID mode

Communication protocols:

- uCZIPstd / uCZIPnet
- DNP3.0
- IEC 60870-5-103
- IEC 60870-5-101/-104
- TCP/IP, UDP
- Modbus RTU / ASCII (Slave/Master)
- CAN PPM2
- CZIPstd (backward compliance)
- SV (Sample Values), GOOSE
- FTP, server HTTP

Event recorder:

- records up to 1024 event reports in non-volatile memory
- time stamp, microsecond extension of the time stamp
- event code as DNP3 index
- report description and value

Waveform recorder (DAR) 1600/3200 Hz:

- each buffer may store:
- 10 recorded electric values and 96/192 digital states;
- 12 recorded electric values and 64 digital states;
- available configurations of the recorder's buffers:

• 2 * 20.48s (2 buf. po 20.48s)	• 2 * 40.96s
• 4 * 10.24s	• 4 * 20.48s
• 8 * 5.12s	• 8 * 10.24s
• 16 * 2.56s	• 16 * 5.12s
• 32 * 1.28s;	• 32 * 2.56s;
• 2 * 81.92s	• 2 * 163.84s
• 4 * 40.96s	• 4 * 81.92s
• 8 * 20.48s	• 8 * 40.96s
• 16 * 10.24s	• 16 * 20.48s
• 32 * 5.12s;	• 32 * 10.24s

Criterial recorder (CDAR):

- up to 32 buffers * 16 selectable RMS values

Operating conditions:

- recommended ambient temperature : -5 °C...+40 °C
- allowable temperature range: -25 °C...+70 °C
- atmospheric pressure: > 800 hPa
- relative humidity: no condensation
- No frost and ice inside the casing

Insulation strength:

- for input circuits:

sinusoidal voltage	2kV/60s/0.5kVA
surge voltage	5kV/1.2/50us/0.5J
- for relay contacts:

sinusoidal voltage	1kV/60s/0.5kVA
--------------------	----------------
- for I/O power adapter:

sinusoidal voltage	2.5kV/60s/0.5kVA
--------------------	------------------

Resistance to external interferences:

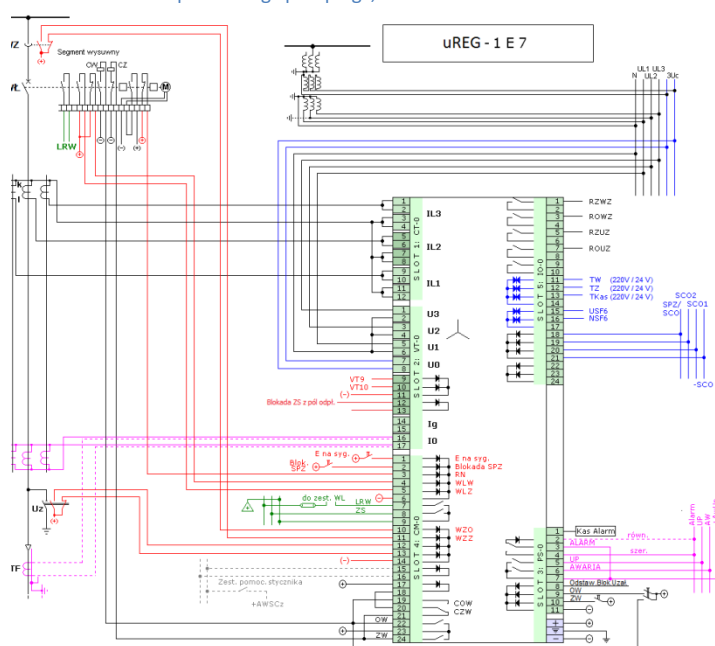
- interference signal: 2.5kV/1MHz/400ud/s

Main standards:

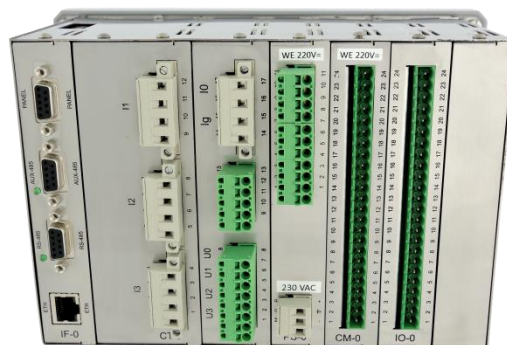
- PN-EN 60255-1: 2010 (Measuring relays and protection equipment)
- PN-EN 61000-6-2: 2008 (Electromagnetic compatibility EMC)
- and other related.

Examples of implemented functions and protection criteria of uREG, available as components of LogCZIP tool

- short circuit overcurrent protection
- voltage dependent overcurrent protection
- overcurrent protection against overload
- overvoltage and under-voltage protection
- protection against ground faults (admittance, conductance, susceptance, IO>, U0>)
- frequency criterion
- criteria for frequency and voltage derivative
- current asymmetry criterion
- busbar protection lock
- cooperation with Automatic Load Shedding (ALS) and ATS /ALS
- cooperation with external protection devices
- cooperation with substation automatic control engineering
- cooperation with remote control engineering
- control of multiple configuration of switchgears
- control of circuit breaker and field disconnecting switches
- aggregating breaker's currents
- operation of SF6 and closed switchgears (security gates)
- lock preventing "pumping", etc.



Application diagram of uREG-1E7 (standard configuration 1): switchgear with ejected segment and earthing switch



uREG-1 - Module connections, behind-board casing



uREG-2R - Automatic Transfer Switch, on-board housing

LogCZIP is a new solution in the field of designing, testing, self-documenting, implementing and operating the applications used for protection and control systems.

LogCZIP provides flexibility, clarity and total freedom in defining applications; starting from hardware configuration (selection of modules, panels), through multi-sheet graphic editor with object library (logic functors) and ending at a complete system for testing and verifying projects (with static and dynamic debugger).

Remote or local testing of application in **LogCZIP** environment may be performed in the following ways:

- ✓ **offline** mode (static debugger) – evaluation of the defined algorithm applying step-by-step approach, including the simulation and observation of analogue and digital states (inputs), reporting events, displaying texts, etc.
- ✓ **online** mode (dynamic debugger) – full, real-time tracking of **uREG** operational mode. This **unique solution** offers views of all logic elements of the running application, significantly improving its evaluation. It also provides data on the conditions present on the device terminals.
- ✓ buffer analysis of the recorder (dynamic recorded debugger) – analysis of output states of up to 96 logic functors (according to the order of DNP3/IEC indexes) with an option to presenting them in datasheets of **LogCZIP** project.

Each **LogCZIP** application has its own unique **signature** - ID Key. The signature is related to a catalogue of automatically generated **configuration files** used by operational software (**Monitor3**). Generated files may be saved in the device or published (made available on a server), enabling many users to use a DEMO version of the application.

This creates a hierarchical structure of accessing **uREG**:

- **Application designer (administrator)** is authorised to modify, test (debugger) and update the application using **LogCZIP** system; the designer sets up the access rights to individual setting. As every **uREG device is a carrier of own application design data**, it may be recalled and used by **LogCZIP** editor in any chosen time and place.
- **Application user** – provided with **Monitor3** software and configuration files, has a full overview of the device and may re-define its settings, however the user cannot change the logics of the application.

LogCZIP application is edited by a graphical interface and is equipped with a self-recording feature and additional incorporated recorders of settings and events that make the implementation process easier and shorter. Flexibility of editing and defining the application is provided on all levels of the project, including display text and graphics, switchgear synoptic diagrams, setting descriptions, management of setting groups, tips, help files, indexing, and event descriptions [DNP3, IEC], etc.

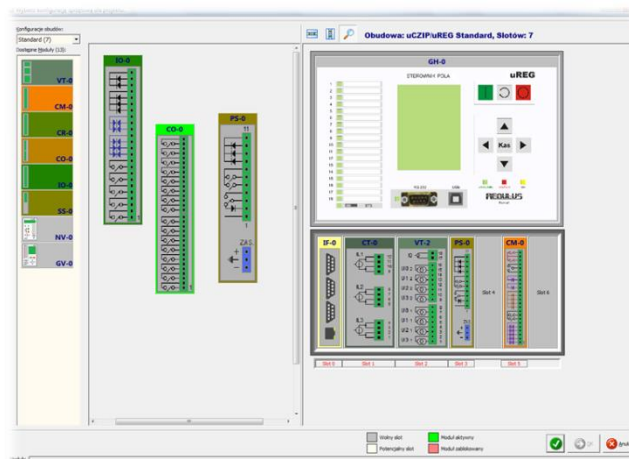
Ready-to-use **LogCZIP** applications include:

HV and MV Transformer, line feeder, power turbine, coupling, own needs, Capacitor Bank, Automatic Transfer Switch and others.

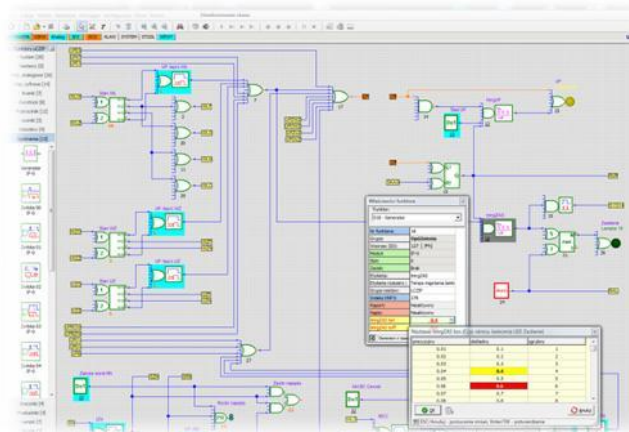
Full access (via any chosen interface) to **uREG** device, i.e.:

- ✓ settings re-definition, LED programming and time setting;
- ✓ observation and tests of I/O states;
- ✓ analyses of: measurements, indications, counters, field synoptic;
- ✓ analysis of event reports;
- ✓ servicing of analogue and digital waveform recorder;
- ✓ re-indexing of DNP3/IEC (applying any chosen index mask);
- ✓ testing and calibration;
- ✓ cooperation with settings archive, data export, etc.

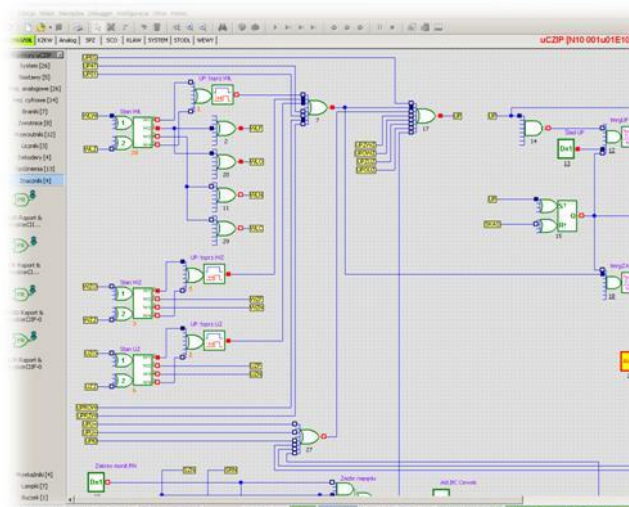
is provided by integrated operational software: **Monitor3**.



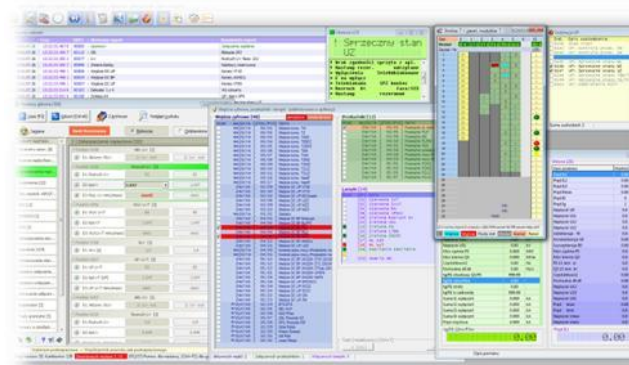
LogCZIP – Designing uREG hardware arrangement



LogCZIP - Designing application logics – diagram editor



LogCZIP – Dynamic debugger



Monitor3 - Integrated operational software designed for working with uREG