CATALOGUE

2024

CONTENTS

PROJECTS

Products	Company	Q-ty	Date
Line Traps	PJSC Rosseti and other companies	> 15000	since 1998
Coupling Filters	PJSC Rosseti and other companies	> 10000	since 2004
Automatic Control Systemfor Gas Compressor Station (SAU GPA)	PJSC Gazprom	222	since 2005
Automatic Control System for Gas Distribution Station (SAU GRS)	PJSC Gazprom	21	since 2009
Automatic Control System for Mobile Gas Turbine Power Station (SAU PAES)	PJSC Gazprom	3	since 2014
Industrial Control System 'Pylon'	PJSC Gazprom	25	since 2011
Data Acquisition System (CITRON, CITRON-M)	PJSC Gazprom	1044	since 2005
Anti-surge control system (EIS-RT-01)	PJSC Gazprom	6	since 2012
Remote control system for the pipe crane via radio channel with autonomous power supply (SDKU-RK)	PJSC Gazprom	3	since 2014
Automatic long-distance communication equipment (ADASE-BK)	PJSC Rosseti and other companies	78	since 2011

OUR CUSTOMERS

The company's main customers are PJSC 'Federal Grid Company-Rosseti', PJSC 'RusHydro', PJSC 'Gazprom' and other major generating companies in Russia and foreign countries.

Company background

COMPANY BACKGROUND

CJSC 'Research and Production Enterprise 'Electronic Information Systems' (EIS) was founded in 1992. The company is an engineering, software development and technical research company, specializing in providing turn-key automation and monitoring solutions. The of EIS' activities includes engineering new technological processes, the design and manufacturing of devices, and monitoring and control systems in the following industries: power, oil and gas, chemicals, petrochemicals and metallurgy. Our aim is to manufacture high quality products and to be a reliable partner exceeding all customer expectations.

Keyfacts

More than 100 highly qualified specialists work at the company. The company manages 5 production workshops with over 4,000 sq meters of production, assembly and testing facilities across the 10 internal departments. During 30 years the company has automated more than 200 control complexes of gas pumping units, supplied more than 15000 line traps, more than 10 000 coupling filters. Our quality management system is certified according to ISO 9001-2015.

Directions

- One of the key EIS' working directions is development and manufacture of the PLC equipment (line traps, tuning devices for line traps, coupling and decoupling devices), intended to transmit the telemetry signals through PLC lines. The company plays an important role in the Russian market of PLC equipment, manufacturing 60 different customized line traps, being the only Russian manufacturer of the tuning devices of new generation.
- Moreover EIS develops SCADA and Data Acquisition Systems to monitor and control the technological processes in the following industries: power, oil and gas, chemicals, petrochemicals and metallurgy. The company designs and manufactures a wide spectrum of devices for the monitoring and regulation of electric and non-electric values (temperature, pressure, flow rate etc), rating transducers, supply units, flame monitoring devices, and temperature sensors.

Our advantages

EIS specializes in providing turn-key automation and monitoring solutions. The areas of focus include: automation and control solutions for the oil and gas industry and control solutions utilizing the transmission of data over high voltage power lines:

- exploratory design;
- research and design work;
- environmental survey;
- engineering;
- manufacture and delivery;
- assembly and commissioning;
- after-sale service;
- overhaul.

COMPANY HISTORY

EIS was established

1992

1998

EIS began to develop PLC products with the manufacturing of line traps. At the moment the company manufactures about 50 different customized line traps: line traps with enhanced dynamic specifications, line traps with naturally air cooled reactor, made on the basis of the modern electrical insulating composites, economy models of line traps..

2005

Gas Compressor Unit Control Systems (SAU GPA) were implemented at Gazprom for the first time. Coupling devices FP series were first produced at EIS. Newly developed technologies and solutions were used in the development of the coupling devices. The coupling devices can be used in PLC networks either with typical coupling capacitor or with customized coupling capacitor or phase transformer.

2010

Automatic long-distance communication equipment ADASE-BK for energy systems was first produced. EIS developed this new product line to be compatible with modern technological advances in this field.

2011

EIS began to produce the terminal boxes ShON and decoupling devices. In 2013-2014 EIS developed and implemented the systems for remote monitoring and control of the objects such as water pump stations, the stations for cathodic protection of the pipelines using the transmission lines (6-10 kV) on the basis of Pylon system.

2014

the Filter ShON has been manufactured. The new product performs the functions of the filter as well as the voltage arrester equipment. The remote control systems for a mobile gas turbine power plant of PAES-2500M type were implemented at Gazprom. The system of remote monitoring and control of pipeline crane via radio channel with autonomous power supply 'SDKU-RK' was put into pilot operation at Gazprom.

2017

The Industry Control System PYLON-R was designed and implemented.

2018

Dry-type reactors were produced for the first time. The innovatve construction of the line trap was designed.

2020

New-type line traps were tested. A universal equivalent for the new line traps was developed.

2021–2023

Dry-type reactor was tested, certified and included into the list of official equipment for PJSC ROSSETI. Monolithic and innovative line traps are mass produced.

Pylon Certificates

PLC Certificates

Patents

Company Certificates

PYLON

PYLON
SUPERVISORY CONTROL AND DATA ACQUISITION

Purpose

Pylon complex is designed for construction of modular automation systems with programme control - automatic process control systems, automatic control systems of units, dispatch control systems (DCS), emergency protection systems (EPAS), automatic fire protection systems (AFPS), systems of automatic monitoring of environment or object parameters, etc.

The principle of operation of the designed complexes is based on measurement of signals, their conversion into digital code, representation of measured values in numerical or graphical form, realisation of automatic control and management of actuators in real time, storing information in the database on measured values and technological operations, providing information to the upper level in the structure of the object.

Main functions

In general, the complex 'Pylon', provides the following functions of monitoring, control and regulation:

- automatic start, stop and control of the operation of object;
- automatic protection of equipment and automatic emergency stop of process execution in case of disturbance of normal operation;
- possibility of manual remote control of actuators;

- automatic control of control commands for permissibility of their execution and automatic blocking of their passage in an unacceptable situation
- automatic self-diagnostics of own technical means and control of sensors and communication channels;
- possibility of interaction with related systems.

Construction

PTC 'Pylon', regardless of the composition of the equipment of the automated system, has a single unified technical structure, consisting of a set of the following commercially available basic devices and units commercially available basic devices and blocks:

- block of industrial automation controllers (PCA);
- block of input-output modules (IO modules);
- module of measuring transducers (MIP) MIP-2;
- power supply unit;
- emergency stop and emergency shutdown unit (ESU);
- automated workplace (AWP) of the operator,
- automated workplace (AWP) of the engineer.

Structurally, all blocks and modules of the Pylon PTC are designed for installation in cabinets with one-sided service or on mounting panels. The equipment can be placed:

- in the automation unit;
- in an instrument block-box.

Modules included in the Pyilon complex are divided into the following groups according to their functions:

- modules of relay command formation;
- operating and dispatching stations (manual control and information display facilities, ARMs);
- specialised means of program-command and logical control (control automata, regulators, aggregate protection units, etc.).

Modules included in the Pylon complex are realised in the form of unified types of (bearing) constructions - sub-block, set of modification of sub-blocks, a set of frame sub-blocks of sub-blocks of frame design, installed in a crate (typical frame) with a connecting cross-board, block, device, cabinet, or console. All products of the same type are interchangeable and do not require adjustments.

Exchange of information between modules is carried out in accordance with the regulated for the complex 'Pylon' intra-unit and external interfaces RS-485.

Measuring transducers or devices that do not have an output on the specified interface, are connected to the modules input modules of the Pilon complex via a 4 – 20 mA current loop. Exchange information exchange between the complex and peripheral systems is carried out according to standard network protocols via coordinating devices, including optical communication systems.

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Diagram
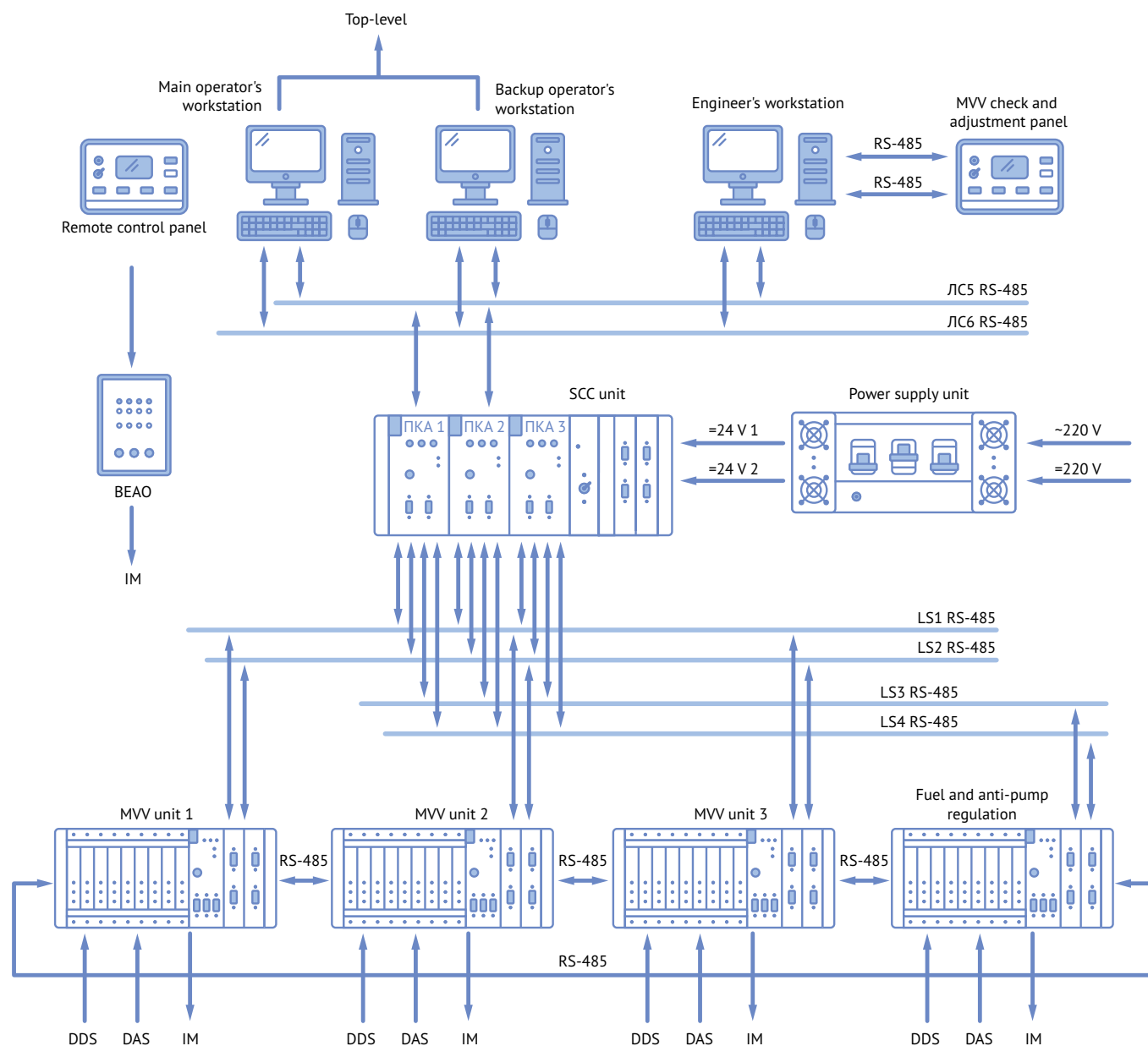
DDS — ∂discrete signal sensor; DAS — ∂analogue signal sensor; IM— actuators

Advantages

Composition and number of functional devices of PTC 'Pylon' are determined by the order, based on the configuration of a particular technological process.

The complex has the following distinctive features:

- has developed possibilities of redundancy (duplication or trialling) of modules, which allows to design systems resistant to a single failure;
- allows optimal (both in terms of functions and cost) design of systems of the required configuration on the scale from 100 to 1500 channels;

- allows to create systems of centralised or distributed structure due to the modular design;
- each communication module (MC) has a controller, which allows to organise on the basis of PTC controller, which makes it possible to organise on the basis of PTC 'Pilon' distributed control system;
- block (sets of input-output blocks (I/O)) construction of the control system allows to increase the functionality of the control system (increase the number of input-output channels) without increasing the time of the full algorithm cycle (100 msec): since all MCs interrogate 'their' BBBs in parallel and adding a new BBB (of course with its own MS) does not increases the polling time of each MS.

UNIT PKA

PKA module — industrial computer of machine automation, Vortex86DX processor with 600 MHz frequency, 256 Mbyte RAM, 2xRS-232/422/485, 2xRS-232, 6xRS-422/485 (with galvanic isolation), 2xCAN, LAN 10/100, LPT, 4xUSB2.0, 8xGPIO, 2xI2C, VGA. Responsible for communication with communication modules and with the operator's workstation, fulfils the control algorithm.

PKA module

MODULE MIP-2

Two-channel measuring transducer module (MIP-2) — two-channel measuring transducer with individual galvanic isolation with selectable input (signals from resistance thermometers, thermocouples, DC or AC voltage sources); output (on each output (for each channel): 4–20 mA signal
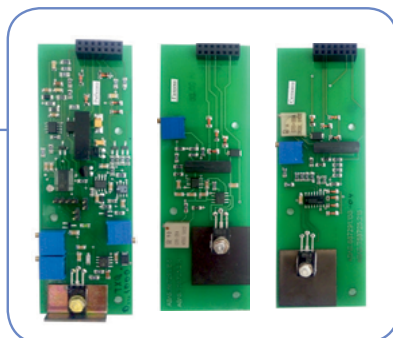
BEAO

BEAO Emergency Stop Unit provides emergency stop (EO) of the unit at the command of the EO operator or emergency shutdown (ES) in case of a malfunction of the SCC unit. In the event of a malfunction of the SCCU. AO differs from EO in the presence of a simple algorithm, e.g. in AO the sequence of crane closures will be observed, while in EO the crane closing commands will be followed. EO commands to close the valves will be generated simultaneously.

MVV UNIT

Provides switching of input mains supply voltages -220 V, =220 V, 27 V AB and formation of secondary redundant voltage =24 V for power supply of technical means of the control system. It is intended for receiving input signals from technological equipment and issuing control signals to the executive mechanisms. The number and type of input and output channels in the MVV Unit depends on the composition of input-output modules, one MVV Unit contains up to 16 input-output modules. The number of MVV Blocks in the composition of ACS and types of MBV modules is determined by the volume and type of input and output parameters of the automated object. A MBV unit can contain an individual operating algorithm and fulfil control and regulation functions, for example, fuel and / or anti-spring control functions.
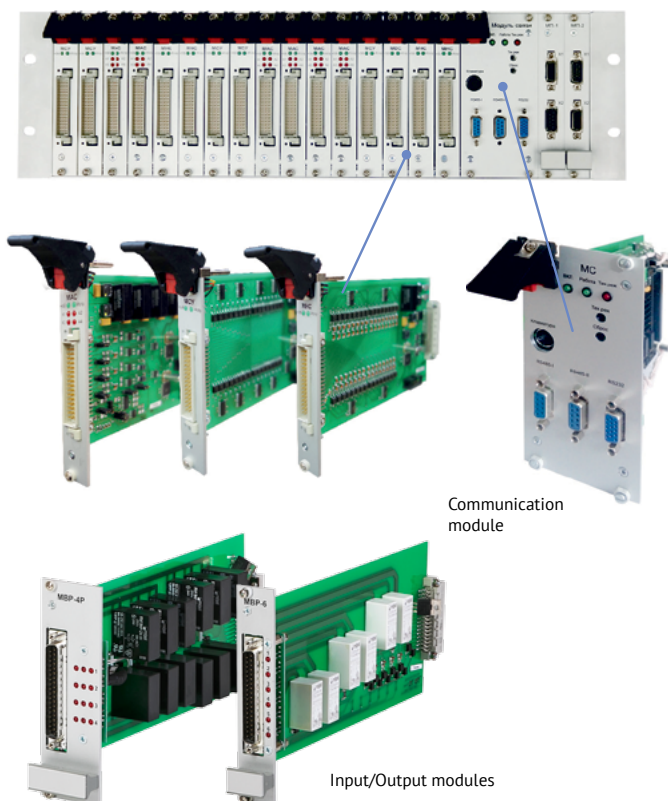
Communication module

Input/Output modules

MVV modules:

- **communication module (MC)** — industrial controller, 600 MHz Vortex86DX processor, 256 Mbyte RAM, 2xRS-232/422/485, 2xRS-232, 6xRS-422/485 (with galvanic isolation), 2xCAN, LAN 10/100, LPT, 4xUSB2.0, 8xGPIO, 2xI2C. Responsible for communication with input-output modules (I/O) and with PCA, performs the functions of polling and control of I/O modules by commands from PCA.

- **analogue signal module (ASM)** — 4 analogue inputs (4–20 mA) with galvanic isolation; one channel is universal (4–20 mA, 0–10 V, 0–40 V, 0–4000 Hz); output: RS-485 interface and RS-485/RS-422 interface, power supply: from main and backup sources = (18–36) B;

- **module of low-voltage signals (MNS)** — 32 channels low-voltage discrete input =24 V, with individual galvanic isolation; output: interface RS-485 and RS-485/RS-422 interface, power supply: from main and backup sources =(18–36) V;

- **control signal module (CSM)** — 32 channels of discrete output =24 V, 0,4 A (transistor keys) with individual galvanic isolation; input: RS-485 interface and RS-485/RS-422 interface, power supply: from main and backup sources =(18–36) V;

- **module of analogue output signals (MVAS)** — Two-channel DAC with individual galvanic isolation; input: RS-485, output: 4–20 mA signal;

- **Module of high-voltage signals (MVS)** — 16 channels discrete input (=220 V or ~220 V), with individual galvanic isolation. Output: interface RS-485 and RS-485 / RS-422 interface, power supply: from main and backup sources =(18–36) V;

- **four-channel redundant output relay module (MVR-4P)** — four relay channels with triple redundancy, working on the principle of redundancy, working on the principle 2 out of 3; switched signals: ~220 V / 5 A; =220V / 0,3 A; 27 V / 5 A;

- **six-channel output relay module (MVR-6)** — six relay channels; switched signals: ~220 V / 5 A; =220 V / 0,22 A; =27 V / 5 A;

- **transient module No. 1 (MP-1)** — communication channels: broadcasting of signals from input cables to the cross-board in the crate;

- **transition module No. 2 (MP-2)** — communication circuits power supply: transmission of signals from the input cables to the cross-board in the crate.

POWER SUPPLY UNIT

Provides switching of input mains supply voltages −220 V, =220 V, 27 V AB and formation of secondary redundant voltage =24 V for power supply of technical means of the control system.

OPERATOR'S WORKSTATION, ENGINEER'S WORKSTATION

The automated workstation (AWS) of the operator is designed for:

- presentation of information on the state of the unit and current values of controlled parameters;
- formation of remote control commands;
- storage of retrospective information, with the possibility of viewing it;
- calculation of current values of technological parameters and technical and economic indicators.

The operator's workstation contains:

- workshop control panel (PCP);
- emergency remote control panel.
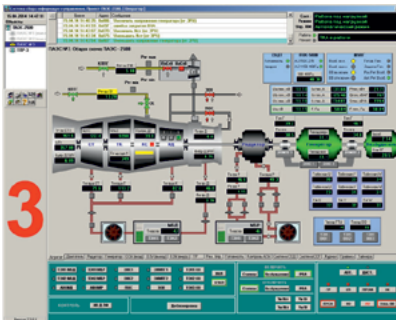
Aggregate tab
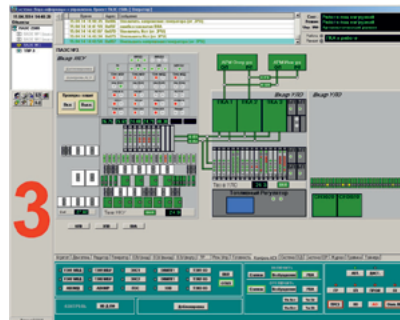
Control tab

Graph tab
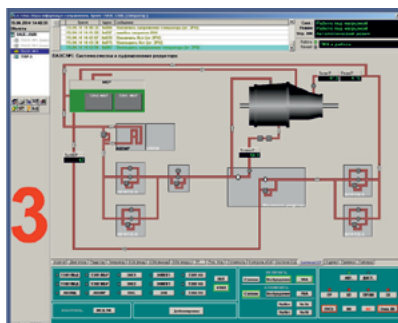
Gearbox lubrication system tab
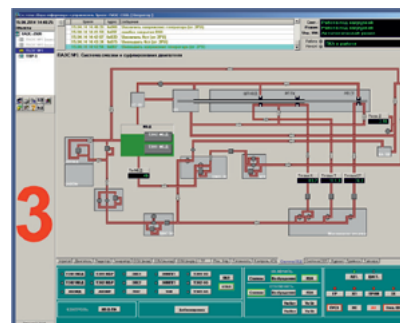
Engine lubrication system tab

EISCADA

- EIScada is multi-platform and allows you to work on Windows, WindowsCE/Mobile, Linux, EmbeddedLinux, MacOS, Symbian;
- EIScada supports work in standard network environments (Ethernet, etc.) using standard protocols (NetBIOS, TCP, TCS, etc.), as well as provides support for popular industrial interfaces (ModBus, etc.);
- the system is open if external data formats are defined and described external data formats and procedural interface, which allows to connect to it 'external', independently operating components;
- EIScada system allows to develop its own software modules, input/output drivers for work with different types of equipment and additional visualisation components by third-party developers, which makes it possible to significantly expand it for a wide range of tasks;

- EIScada uses an SQL syntax that is independent of the database type and allows interchange with different types of DBMSs. The available database processing and conversion tools allow you to import and export data, build graphs and print various reports.
- EIScada software complex has a convenient user interface, made in a 'window' style and allows the operator and administrator to quickly orientate themselves in the whole list of the system capabilities;
- EIScada software system does not use any extraneous proprietary software and does not require the purchase of additional licences during the entire period of operation.

EIS-RT-01
FUEL AND ANTI-SURGE CONTROL SYSTEM

Purpose

The fuel and anti-surge control system solves the tasks of changing the fuel supply to the gas turbine and opening the anti-surge valve based on the information received from sensors and top-level control systems in order to ensure the engine and blower operating modes in accordance with the task.

Regulators of different designs (see photos) are produced for the following types of gas turbines:

- NK-16STD, NK-16-18STD for GPA-C-16 units;
- gas turbine unit GTN-25;
- D-30 as a part of PAES-2500;
- any centrifugal blowers.

Main functions

- generates a control signal to the dosing device in the modes of start-up, operation, normal and emergency stops
- maintains the speed of the power turbine, signalling excessive speed and initiating shutdown upon activation of the protection against excessive speed of this turbine;
- fulfils the functions of limiting regulation for maximum and minimum rotational speeds of the gas generator shafts, signalling when the speeds are out of a certain range.
- fulfils the functions of limiting regulation on maximum temperature of exhaust gases, as well as stops the turbine on exceeding the exhaust gas temperature, signalling on temperature exceeding and temperature variation;
- performs functions of limiting regulation of the maximum compressor discharge pressure;
- fulfils the functions of limiting the acceleration speed and deceleration speed (ramp) of the turbine and gas generator shafts;
- performs automatic programme start-up with monitoring of speed stagnation, improper warm-up or operation of the turbine in the critical zone.

- performs automatic turbine shutdown with the cooling programme running out and prevents the turbine from entering the critical speed zone;
- calculates the proximity of the blower to pumping and generates a signal for opening the anti-pumping valve or controls the turbine speed.
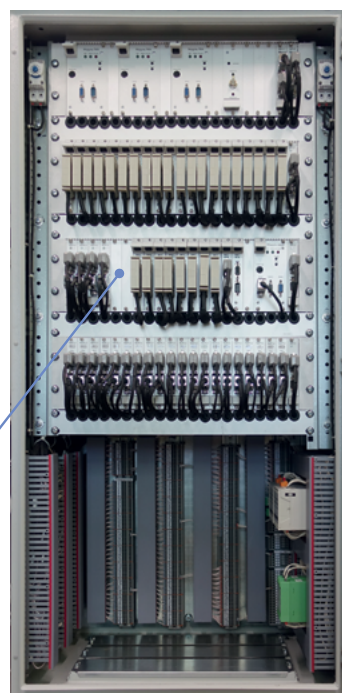
SPAZ
EMERGENCY PROTECTION SYSTEM

Purpose

The emergency protection system (EPAS) is designed to ensure safe automatic control of technological process (gas pumping shops and units, refinery shops or oil storage facilities) in real time at abnormal technological situations, the development of which may lead to an accident.

Main functions

SPAZ provides protection of personnel, process equipment and the environment in case of process disruption, failure of components of the control system or abnormal power failure. SPAZ functions independently of the object control system and disruption of the latter does not affect its operation.

- automatic detection of potentially dangerous changes in the state of the technological object or its control system;
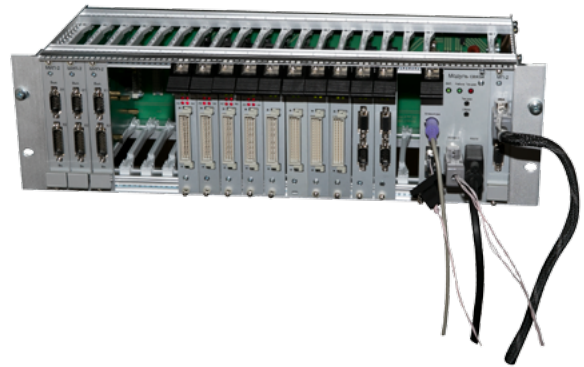- - automatic measurement of process variables important for the safe operation of the technological process (e.g. measurement of variables, values of variables, values of the control system, etc.), which values characterise the proximity of the object to the boundaries of the safe operation of the process);
- automatic (real-time) diagnosis of failures occurring in the SPAZ and (or) in the technical and software tools it uses;
- automatic pre-emergency signalling, informing the process operator on potentially dangerous changes that have occurred in the facility or in the SPAZ;
- automatic protection against unauthorised access to the parameters of setting and (or) selection of the mode of operation of the SPAZ.

Construction

Structurally, SPAZ components are located in one or several PTC Pylon cabinets depending on the required number of inputs/outputs. When one to ten signals, SPAZ is executed in the form of a block. For example, a block of gas turbine engine protection.

SPAZ is built with redundancy of its components, i.e. such that to exclude the presence of nodes (single elements and links), the failure of which will lead to its failure as a whole.

The SPAZ includes:

- duplicated processor modules;
- duplicated I/O modules;
- redundant power supply modules;
- duplicated data transmission modules;
- duplicated SPAZ operator workplaces

The replacement of these modules is performed on the operating equipment without disconnecting the power supply and reducing the system reliability.

Information on the operation of the SPAZ is displayed on the screen of the operator's workplace and stored in memory. The protocols of its work can be printed out. Interlocks operation is registered with indication of time. After the blocking is triggered and the parameter returns to the normal state, the display of the emergency parameter on the operator's workstation is reset automatically. Restart of electrical equipment and switching on/off of actuators is performed by the operator.

Advantages

The emergency protection system achieves a safety level of SIL 3 and fulfils the international standards IEC 61508 and IEC 61511.

SCADA

SAU GPA
AUTOMATIC CONTROL SYSTEM FOR GAS-COMPRESSOR STATIONS

Purpose

The firmware facilities of automatic control system for gas-compressor stations comply with all international standards for dangerously explosive industrial objects, such as gas compressor stations.

Construction

The devices of the complex are placed in three cabinets with two-way access:

- Logical processing unit (ULO) performs processing of input analogue and discrete signals, execution of automatic control algorithm, formation of programme commands for controlling actuators of the machine;
- object communication device (USO) contains output relays for issuing control commands to the machine's actuators relays for issuing control commands to actuators;
- installation equipment rack (SMO) is equipped with power supply panel, fuel regulator and additional equipment.

The Complex also includes:

- Operator's workstation (for displaying information, issuing the warning and emergency signalling, issuance of operator commands);
- engineer's workstation (technological workstation);
- information presentation device (UPI), supplied upon customer's request, functionally identical to the operator's workstation.

Main functions

The complex provides the following functions:

- control and regulation (automatic and remote);
- emergency protection of the unit;
- formation of warning and emergency signalling;
- presentation of information in graphical and textual form;
- information archiving;
- self-diagnostics (serviceability control).

Technical specifications

Name	Value
Input analogue signals	up to 101
Input low-voltage DC discrete signals (0 to 40 V)	up to 352 (including 64 triple redundant)
Input high-voltage DC/AC binary signals (0 to 242 V)	up to 32
Output binary control signals	up to 96 (including triple redundancy — 32)
Output analogue control signals	up to 2
Interrogation time of analogue and discrete signals	not more than 0,1 s
Time of formation of control commands	not more than 0,1 s
Main AC mains voltage 50 Hz	220 V
Backup DC mains voltage	220 V

Diagram
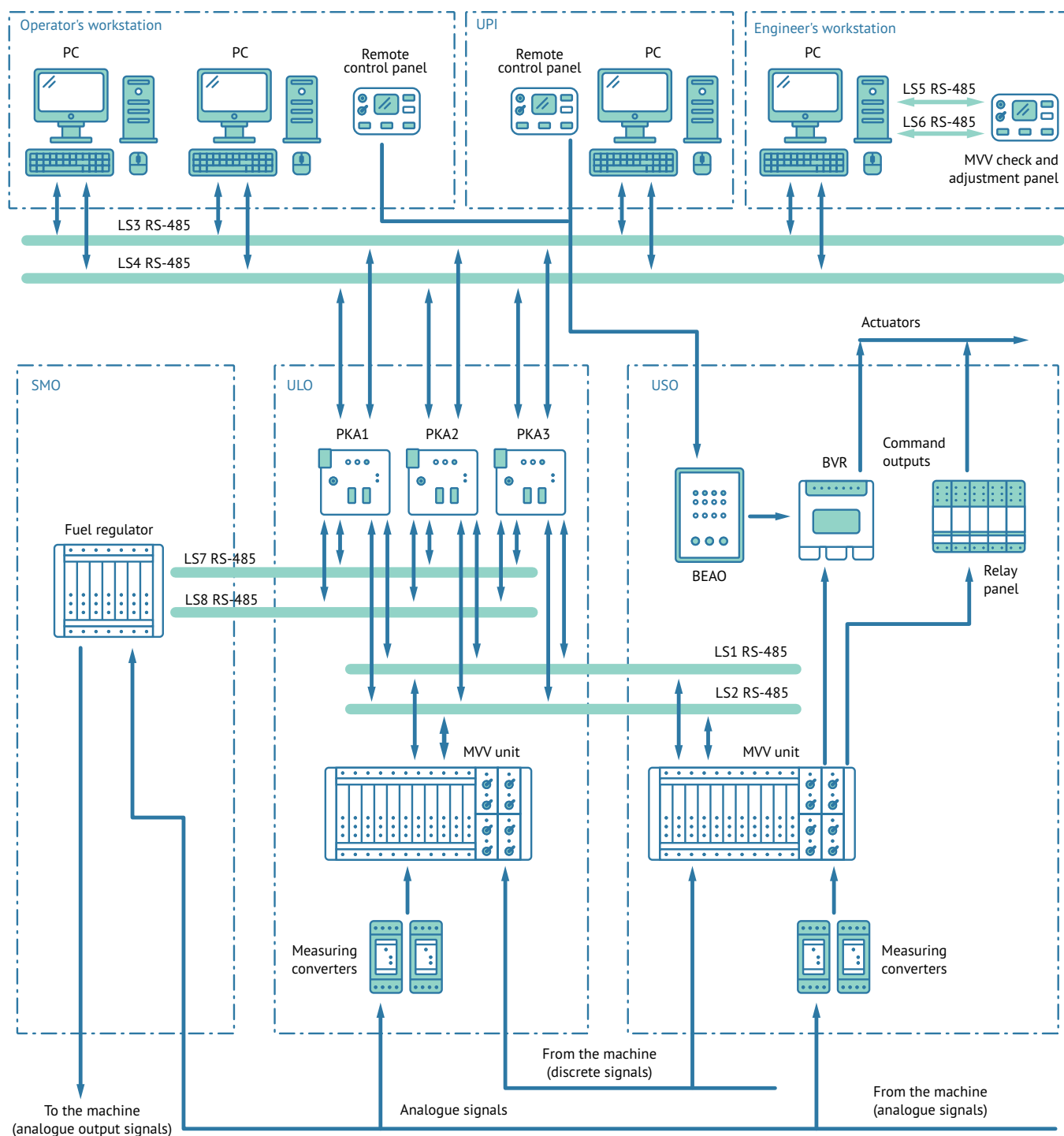
Advantages

SAU GPA meets all the requirements for control systems of explosive objects.

It embodies many modern technical solutions:

- three-channel and two-channel redundancy;
- multi-window interface for GPA operator;
- self-diagnostics with the accuracy of a replaceable unit or module;
- integrated I/O modules on modern microcontrollers;
- software fault and failure management.

SAU GRS
AUTOMATIC CONTROL SYSTEM FOR GAS-DISTRIBUTION STATION

Purpose

SAU GRS is intended for the control and automation of one- or two-thread gas-distribution stations of different capacities.

SAU GRS is built on the basis of software and hardware complex 'Pylon'.

Control modes

- fully automatic control;
- remote control of actuators from remote operator's workstation;
- remote manual and remote automatic control of actuators from the operator's panel built into the control system cabinet;
- fulfilment of telemechanics control functions.

Main tasks to be solved

- Execution of automatic control programs in emergency situations.
- Tap control
- Ability to query gas flow rate calculators via interface, calculation of summary gas flow rate and control of gas odor system.
- Data acquisition, processing and archiving.
- Automatic transmission of emergency and warning signals to the workstation operator and the recording of each emergency event.
- Change of warning and emergency setups from the built-in and remote operator workstation.
- Control of exhaust ventilation, emergency light and acoustic signaling.
- Good condition monitoring of all operating mechanisms of technological equipment, continuously runs self-diagnostics on all system modules and supply units.

- Displays information about process flows and the state of equipment graphically via the remote operator workstation.
- Integration with the protection signaling system.
- Integration with the fire signaling system.
- Interaction with remote control & monitoring system supporting the command transmission via communication line from the operator to control objects, and remote control devices in operator house.
- Data transmission to information-control systems via interface lines, telephone lines or radio channel.
- Provides uninterrupted electricity supply support of ACS GPA and automation devices in the event of voltage loss from an uninterrupted supply assembly with the use of aback up battery (from 2 to 8 hours).

Diagram

ABP

Mains ~ 220 V

Remote operator's workstation

SAU cabinet

AKB

Flow meters

Telemechanics equipment

Remote control and signalling equipment

A0 AI DI D0

GRS technological equipment
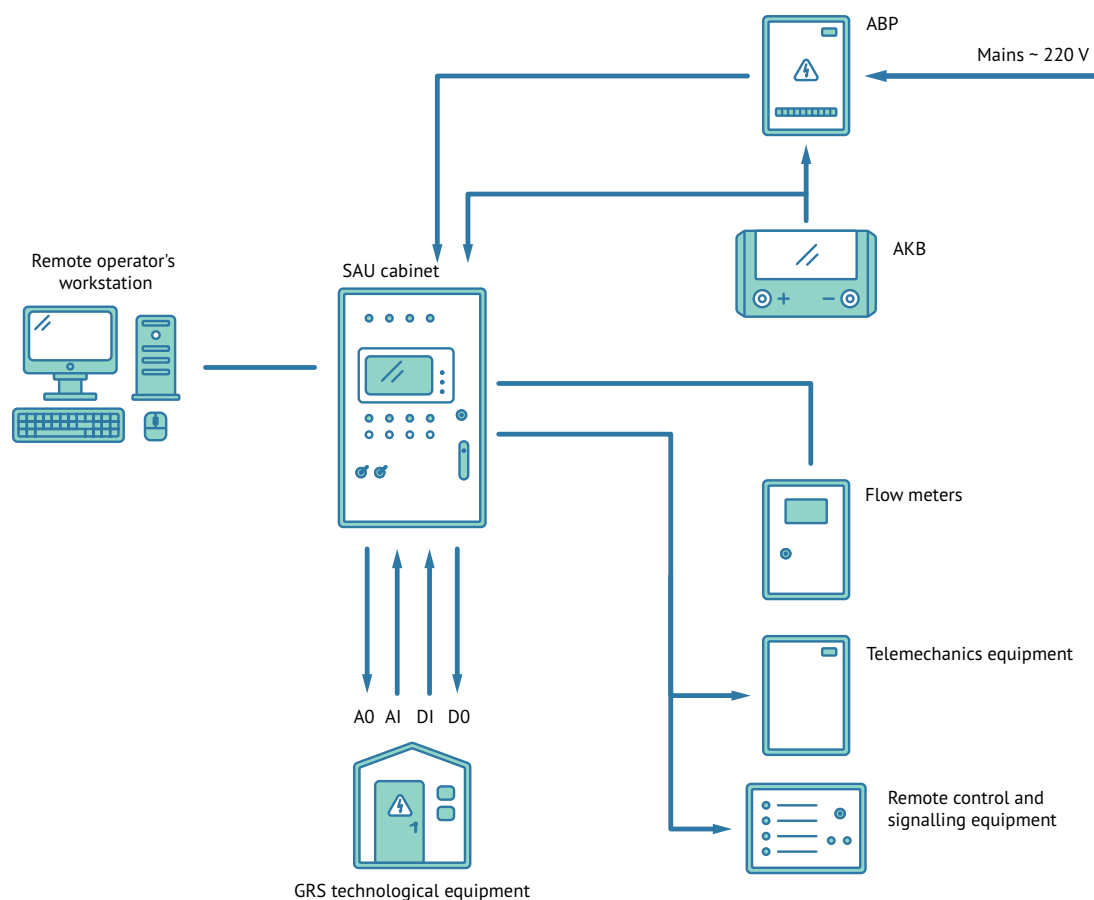
Specifications

- 24 analog input signals TCM (RTD Copper), ТСП (RTD Platinum) thermal resistance transducers with calibrations under State Standart 6651; (0–5), (0–20), (4–20) mA direct current; direct voltage from ±15 mV to 550 V; alternating voltage from 200 mV to 600 V; frequency signals from (0–500) Hz to (0–100) kHz; including signals from TCM (RTD Copper), ТСП (RTD Platinum) and pressure sensors with spark-proof input circuits of level "ia".

- 104 discrete low-voltage (24 V) input signals, including 24differential and 5 groups with one common (of 16 signals "dry contact").

- Up to 16 low-frequency number-pulse (count) inputs with pulserecurrence frequency up to 100 Hz.

- 32 output discrete signals (transistor with open collector = 30 V, 100 mA;

- electromechanical relays with commutating contact (~220 V or = 30 V, 6 A) or optorelays (~220 V, 2 A or = 24 V, 2 A).

- Up to 4 analog output signals (0–20), (4–20) mA or (0–10), (0–5) V.

- Cycle of inquiry and control under discrete signals – 100 ms (under analog signals — 1 s).

Installed equipment specifications

- ACS GDS cabinet with built-in panel operator workstation: 2200×600×400 mm (H×W×D).

- Remote operator workstation: industrial desktop computer: system unit, keyboard, mouse, acoustic columns — at client's request.

- ABP1300-ОО-24/220 (ABP — Uninterruptible power supply) uninterrupted supply assembly - 440×530×500 mm (H×W×D) — at client's request.

- 2 pieces of AKB DJM 12200 (12 V, 200 A*h) — 224×522×240 mm (H×W×D) – at client's request. (АКБ — storage battery)

- ABP & AKB case-support — 300×540×500 mm (H×W×D) — at client's request.

MINI-SAU GRS
AUTOMATIC CONTROL SYSTEM FOR GAS DISTRIBUTION STATION

Purpose

mini-SAU GRS is designed for automation of control the single- or double-line gas distribution stations of different capacity.

Control modes

- fully automatic control;
- remote manual and remote automatic control of actuators from the operator panel built into the control centre cabinet.

Main functions

- execution of automatic control programmes in emergency situations;
- tap control;
- interrogation of gas flow calculators via interface, calculation of the total gas flow rate and control gas odourisation system;
- data collection, processing and archiving;
- automatic transmission to the operator panel alarm and warning signals, their registration;
- change of warning and emergency settings from the operator panel;
- control of exhaust ventilation, emergency light and sound signalling;
- control of serviceability of all actuators process equipment, continuous self-diagnostics of the operability of all modules of the system, power supply units;
- display of graphical information about the technological process and the actual state of the process equipment on the operator panel;
- interaction with security and fire alarm systems signalling systems, telemechanics and remote control devices in the operator's house;
- transmission of information to the upper level and control system via interface, telephone lines or radio channel;
- ensuring uninterrupted power supply of the SAU GRS and automation devices in case of mains voltage failure from the uninterruptible power supply unit using high capacity accumulator batteries for a long period of time (24 to 48 hours).

Technical specifications

Name	Value
Analogue input signals	up to 24
Discrete low-voltage (24 V) input signals	up to 72
Low-frequency pulse counting inputs with pulse repetition rate up to 25 Hz	up to 16
Discrete output signals	up to 28
Pulse output signals	up to 2
Analogue output signals	up to 2
Polling and control cycle for discrete signals	100 - 200 ms (for analogue signals — 1 s)
Power consumption	not more than 150 W
Archive storage	not less than 90 days
Software — SCADA-system	'ElScada'
Dimensions of the equipment as part of the GDS control system	
GDS control cabinet floor cabinet	2000×600×400 mm
GDS SAU cabinet hinged	1400×650×285 mm (on customer's request)
Uninterruptible power supply unit ABP-OO-400-220/24 (400 W, with double conversion)	650×500×220 mm (on customer's request)
Batteries DJM 1255 (12 V, 55 A*h), 2 pcs.	216×228×137 mm (on customer's request)
Battery DJM 12200 (12 V, 200 A*h), 2 pcs.	224×522×240 mm (on customer's request)
DJM 1255 battery cabinet	335×455×615 mm (on customer's request)
DJM 12200 battery cabinet	615×455×660 mm (on customer's request)

SAU PAES
AUTOMATIC SYSTEM FOR CONTROL OF GAS TURBINE

Purpose

SAU PAES is designed for automated control of the gas turbine power plant (GTPP) with aircraft engine of different types.

The PAES control system interacts with the following equipment:

- engine;
- generator;
- fans and heaters of the engine and gearbox oil tanks;
- generator excitation control cabinet with the regulator;
- complete switchgear;
- precise synchronization system;
- engine and generator vibration control equipment;
- gassiness control equipment;
- fire alarm and fire extinguishing equipment;
- pipeline valves: fuel gas supply valve, starting gas supply valve, shut-off valve for microclimate maintenance equipment of the operator compartment in the van;
- top-level automatic process control system with time synchronization device.содержания метана в отсеках и др.);
- взаимодействие с верхним уровнем АСУ ТП.

NKU   ULO

It consists of:

- logic processing unit;
- low-voltage switching device;
- automated operator's workplace.

PAES provides automation of technological processes control in the following modes:

- cold standby;
- hot standby;
- cold cranking;
- routine operations;
- normal shutdown;
- emergency stop;
- remote control;
- start-up for parallel operation with the network with automatic control;
- start-up for parallel operation with a network with automated control;
- start-up for autonomous operation with the network with automatic control;
- start-up for autonomous operation with the network with automated control.

PAES provides the following control and display functions:

- continuous control of technological parameters, including measurement and presentation of values of selected parameters on the PC screen at the operator's call;
- call of controlled parameters at the operator's request to the PC screen in tabular form or in the form of trends with display of warning and emergency settings lines on the screen;
- automatic control of general station parameters, i.e. methane concentration and temperature in rooms, temperature, humidity, outdoor air pressure;
- automatic control of GTPP equipment condition;
- solving calculation tasks;
- accounting of generated electric power;
- accounting of the number of starts;
- presentation of mnemonic diagrams of the unit on the screen with indication of values of measured parameters and positions of actuators and main parameters of the GTPP operation;
- automatic detection, display and audible signaling of deviations of technological parameters from the settings;
- presentation of information on unfulfilled pre-start conditions;signaling of the main unit modes;
- memorization and documentation of signals that caused an emergency stop, as well as values of the main technological parameters of the unit.

Diagram

Fuel supply regulator and
gas metering unit

Operator's workstation

ULO   NKU   SUDT-7   KRU
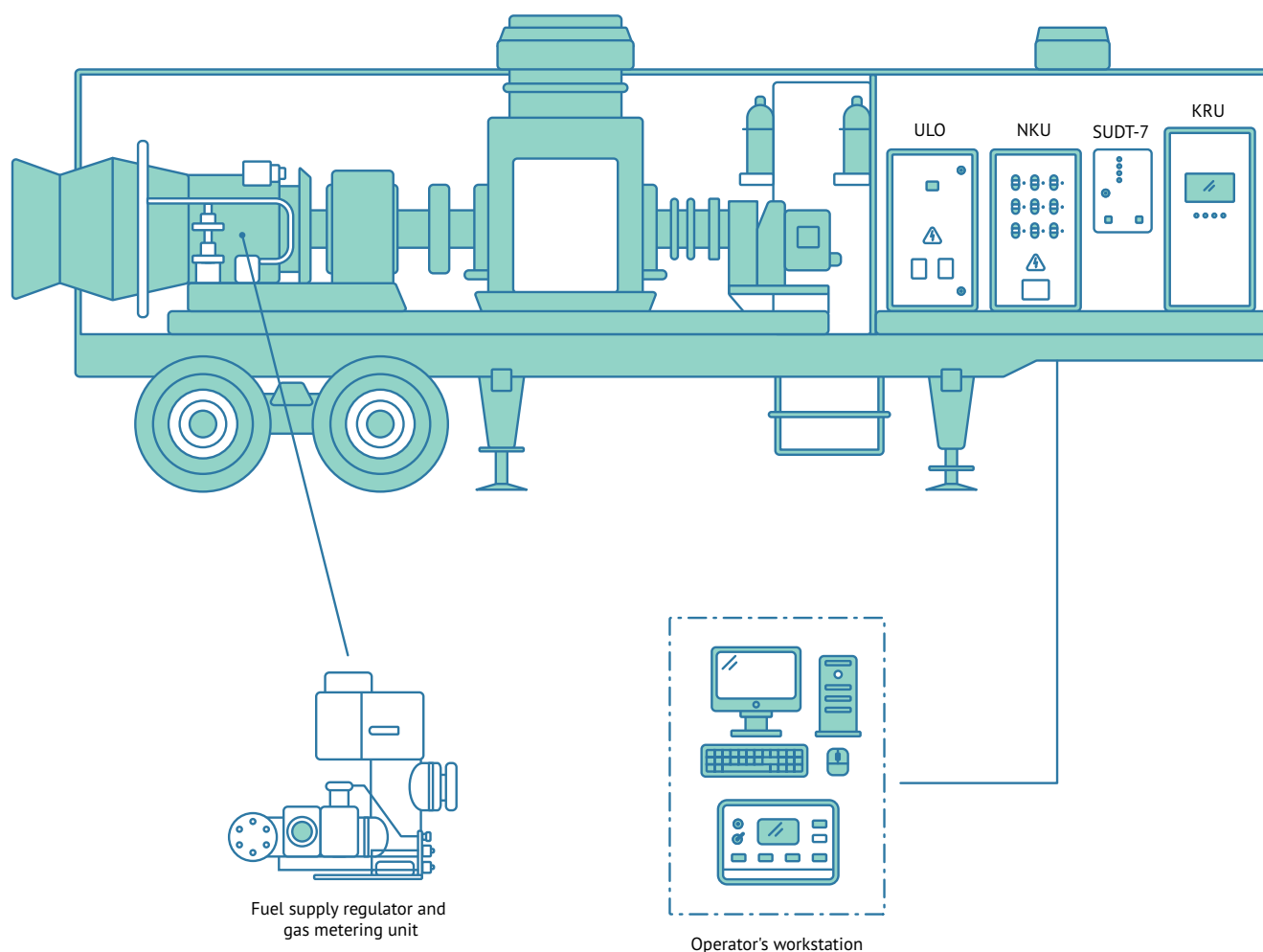
Technical specifications

Name	Value
Number of measuring channels	72
Number of channels to receive the discrete signals	256
Number of channels (discrete commands)	160
Number and types of communication channels: • fiber-optic communication line RS-485 with the operator's workstation • fiber-optic communication line with upper-level control system via Ethernet 10/100	2 2
Duration of inquiry cycle: • for engine • for the rest of the system	not more than 0,02 s not more than 0,1 s
Период обновления информации на мониторе АРМ оператора	not more than 1 s
Power supply: • from two independent inputs with voltage • from on-board DC network with voltage	380 V and frequency (50±1) Hz 24 V

SAU PAES differs from similar systems by a high level of complex automation of control and monitoring of the power plant, increased reliability and survivability due to hardware redundancy, as well as the openness of software (EIScada designed by our company) for the user and the possibility of its rapid adaptation to changing conditions.

SAU AGNKS
AUTOMATIC CONTROL SYSTEM FOR AUTOMOBILE GAS-filLING STATION

Purpose

SAU AGNKS is designed for monitoring, control and emergency protection of MBCE-250 (modular blockcontainer execution) AGFCS stations in all modes of operation. It also performs compressor state diagnoses, measuring the quantity of gasoline delivered into the station's reserve tanks and the quantity of gas filled in customer's automobiles.

SAU AGNKS are used at automobile gas-filling compressor stations in modular or block-container execution instead of obsolete and often technically used up automation of home production. The measuring devices come installed in a black box and can only measure up to 250 instances of re-fuelling per day.

- For MBCE-250 AGFCS:
  A705-15-01MA microprocessor system.
- For BCE-250 AGFCS: relay control system.

Construction

ACS is intended for the control of AGFCS devices common to all gas stations (slides, pumps, ventilators, fireextinguishing system) and operating mechanisms of gas-drying unit.

Compressor ACS is intended for the control of compressors used for gas compression on AGFCS.

The SAU AGNKS complex is built with use both of own firmware facilities and equipment of leading world firms. Controllers being firmware basis for each SAU AGNKS subsystem are based on devices produced by ICP DAS, Atmel, Advantech companies, as well as modules of own development.

The division of the AGFCS subsystem control functions between control units allows the user to:

Increase the safety of the ACS system as a whole.

Simplifies system implementation and provides the ability to update AGFCS with less than twenty-four hour down times

Workstation of SAU AGNKS operator represents a PC with SCADA-system of own design installed on it (CuteSCADA software).

Main functions

- Controls compressor installations and their auxiliary mechanisms, AGFCS operating mechanisms, gas-drying unit and fire automation systems according to specified metrics.
- Automatic AGFCS protection by technological parameter values, including fire-prevention measures and excessive gas pollution elimination measures.
- Provides a graphical or tabular interface for the visualization of desired metrics and emergency notifications on a PC-based workstation.
- Continuous diagnostic monitoring all channels of ACS measurement and control.
- Maintaining archives of historical data, including gas flow rate on "input" and when fuelling.
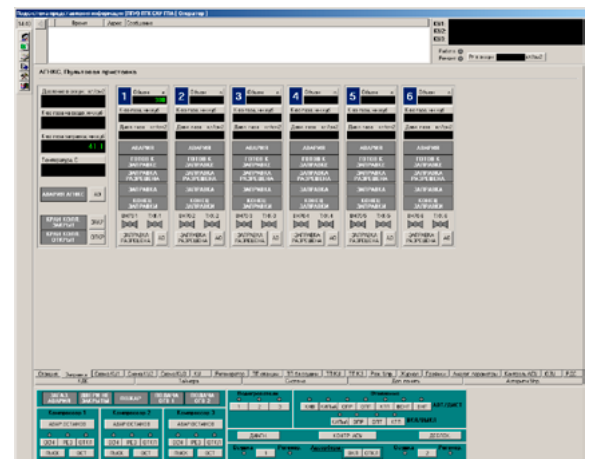
Refuelling tab
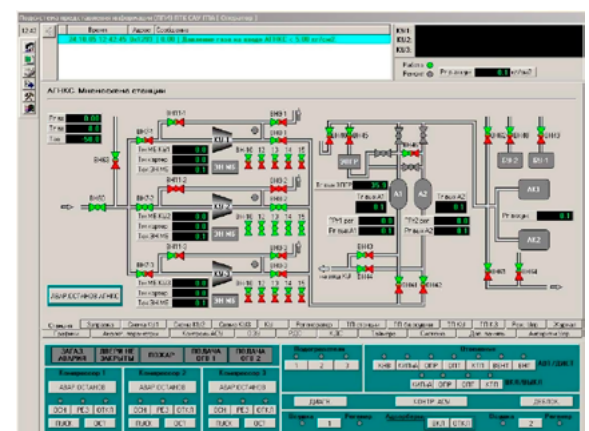
Station tab

- Allows the granting of system access rights subject to user category.
- Formation of both electronic and printed reports.

Technical specifications

Name	Value
Signal reception and processing	up to 100 analogue signals up to 120 discrete signals
Generation of control output signals	up to 120
Fast archiving system	sampling step from 20 ms
Permanent retrospective	rdepth 100 GB for 36 years for 27000 tags to change 100 ms

Operating conditions

Technical means of the complexes are placed in instrument cabinets, having IP54 degree of protection against external influences.

Diagram
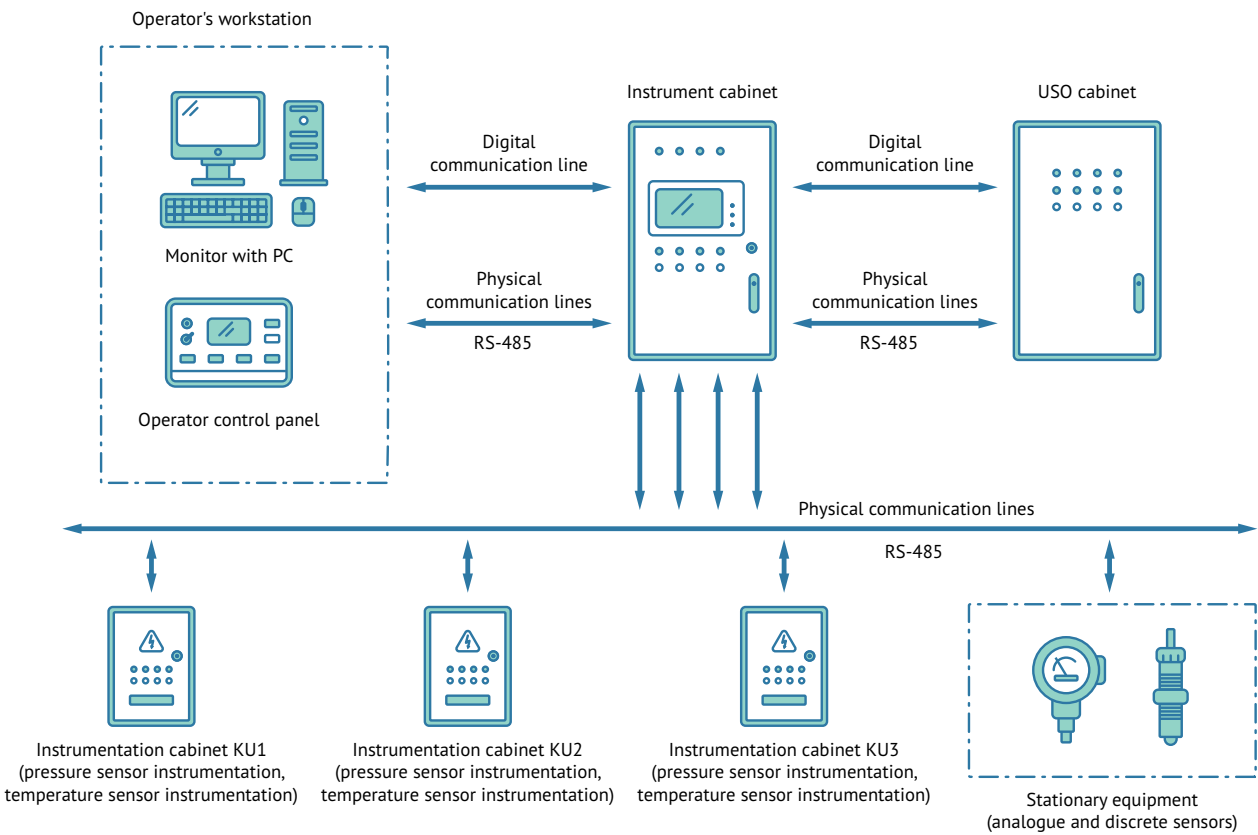
Advantages

Reduces expenses for routine automation maintenance and automation repair in case of failures

Increases AGFCS operation safety due to opportune maintenance and repair

Decreases the probability of false stops.

Reduces personnel expenses in case of use of workstations for cashier-filler and compressor machinist on a single PC.

Automates AGFCS reporting.

Ease of Integration: SAU AGNKS was designed to have the capability to interface with non-standard (individual or obsolete) calibration sensors.

Flexibility: SAU AGNKS is able to increase the number of input and output signals, as well as interface with automated control systems of workshop level and higher, and third party systems.

Ease of Use: Designed with the user in mind with a customizable user interface.

CITRON
SOFTWARE AND HARDWARE COMPLEX

Purpose

Software and hardware complex Citron is a multifunctional build-up control system of the object and technological process. The complex is designed for application in various fields automation and measurements in conditions of round-the-clock operation.

Analogue and discrete parameters tab

TsBN tab

Design

The complex uses data acquisition controllers as object communication devices, controllers of communication with the object and Sh-9329 devices can also be used. The complex can be operated with different number of devices, depending on the configuration of the software.

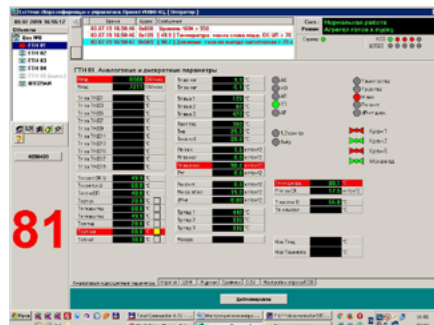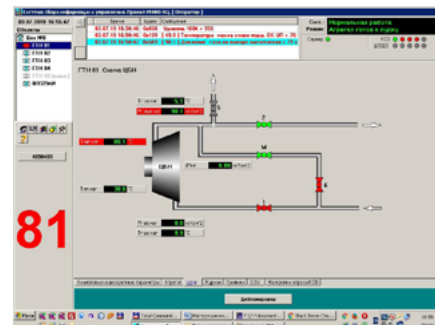It is based on the ICP DAS I-8811 controllers, modules external I-7000 series input-output modules and measuring transducers produced by EIS for analogue signal processing (depending on the types of sensors) and on the basis of internal modules of I-8000 series to receive discrete signals (depending on the types of sensors and number of signals).

There is also a solution based on CSR, receiving various types of analogue (up to 48) and discrete (up to 16) signals.

Software by EIS.

Technical specifications

Name	Value
Maximum number of measuring channels • from all objects • from one object	1344 84
Maximum number of information channels • from all sites • from one facility	768 48
Parameter value range • voltage • current	от +10 до −10 V, от +5 до −5 V 0 – 5 mA, 0 – 20 mA, 4 – 20 mA
Basic reduced error of measuring channels	not more than 0,25 %
Data transmission speed	9600 Baud
Polling cycle	from 1 s to 60 min
Time between polling of neighbouring (in the exchange cycle) devices	from 1 ms
Operating temperature of the complex (and its components)	from +5 to +40 °C
Permissible deviation of supply voltage	from −15 to 10 %
Deviation of mains frequency	±1 Hz
External modules for analogue data reception	up to 32 (from 8 to 16 per module)
Internal modules for discrete signals	up to 8
Interfaces: • for communication of the controller with external modules • for communication of the controller with the top-level computer	RS-485 RS-485
Protocol	Modbus RTU
Exchange cycle	from 500 ms
Number of controllers in the project	not more than 255

Diagram

To the top level

Server

PC

PC

HUB

PC

PC

Citron UNS cabinet

Citron M cabinet

RS-485

RS-485

Analogue and frequency signals

Discrete signals

Measuring converters-40374

Analogue and frequency signals

Citron M cabinet

Discrete signals

RS-485

Measuring converters-40010
Measuring converters-40040

Citron UNS cabinet

Citron M cabinet

RS-485

Analogue and frequency signals

Discrete signals

Analogue and frequency signals

Citron M cabinet

Discrete signals

Advantages

- data from the upper level can be transmitted via TCP/IP to a higher level (control centre, e.g. Intranet, servers, etc.);
- possibility to integrate the system with other data acquisition or control systems via different protocols through the upper level (SCADA);
- diagnostics of each element of the system, down to input sensor failures.

ASU UKZ MG
AUTOMATED MONITORING AND CONTROL SYSTEM FOR CATHODIC PROTECTION UNITS OF MAIN GAS PIPELINES

Purpose

The system is designed for automation of technological processes of remote monitoring and control of the control centre on trunk pipelines.

Main functions

- automatic collection of information from all control centres;
- analyses and control of process parameters process parameters;
- control of modes and transfer of necessary data transfer to the top-level automated control system..
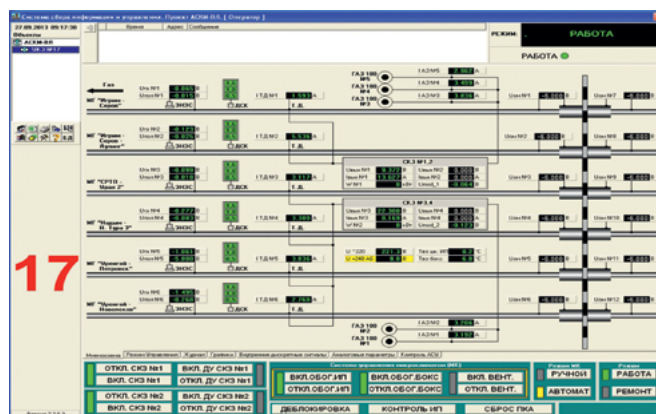
Mnemonic diagram tab

Diagram
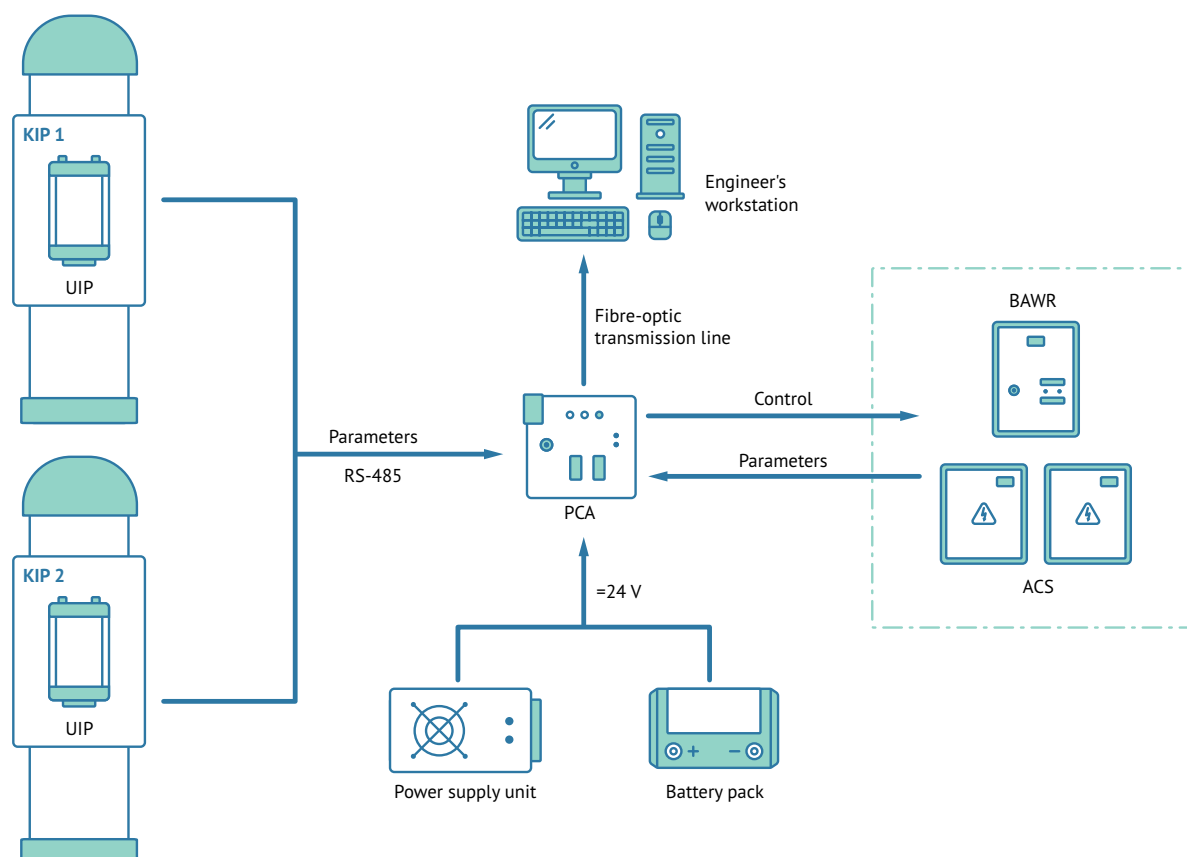
click for more details

SCADA for infrastructure facilities

SDU-NV
SCADA FOR PUMP STATIONS

Purpose

Scada for pumping stations and water intake is designed for controlling pumping stations and dispatching of the whole water intake system industrial enterprise or settlement.
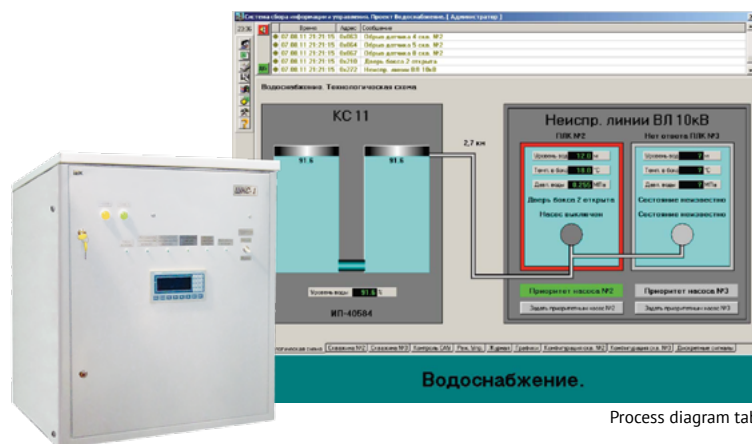
Process diagram tab

Diagram

As a variant

Wells

Well No.2

Well No.3

Controller cabinet

PLC devices

Power switchboard

Controller cabinet

Power switchboard

PLC equipment

Компрессорная станция

PLC devices

Clean water tank

Water level sensor

Dispatcher's PC

Input module cabinet

PLC equipment
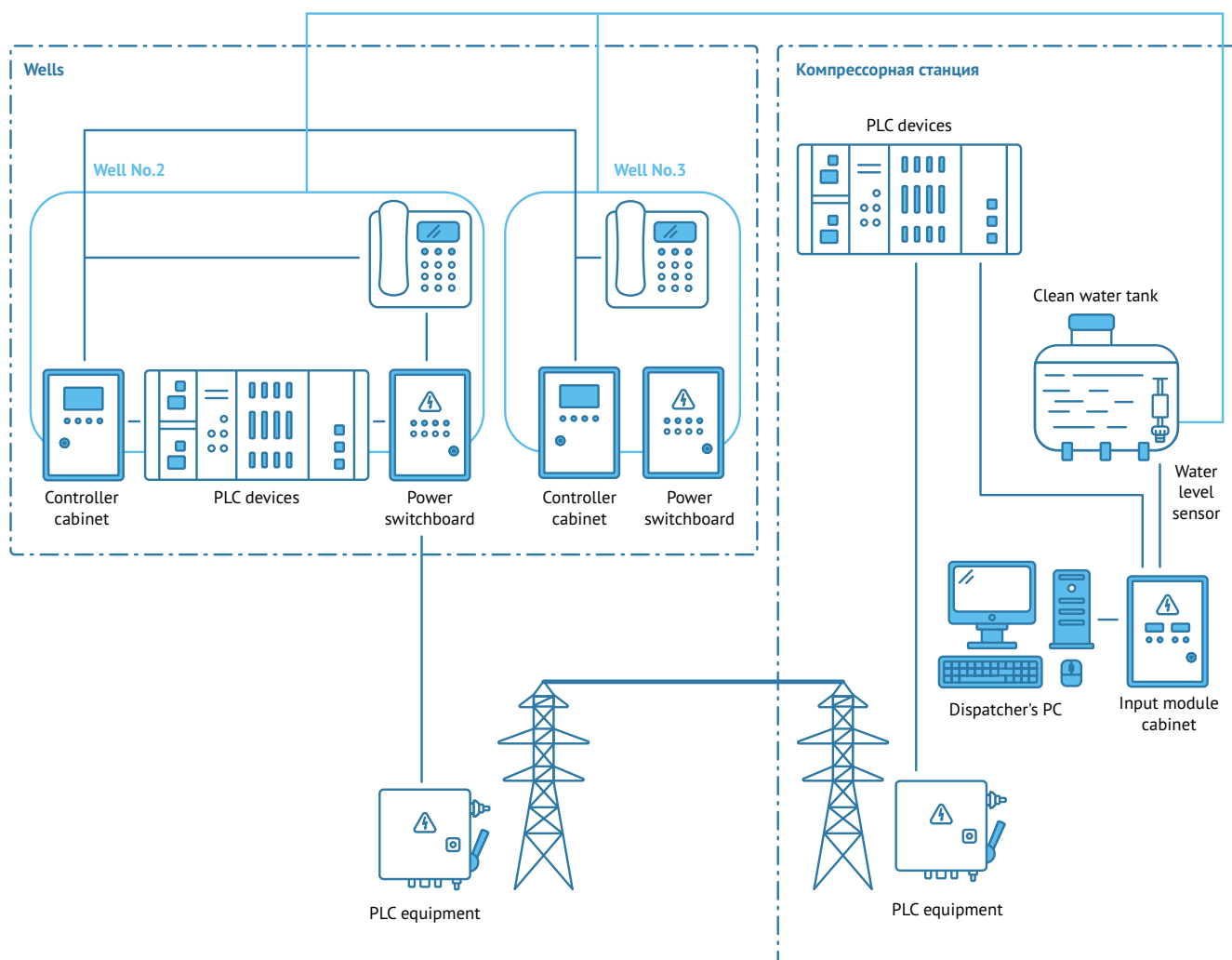
click for more details

SAU-K
SCADA FOR BOILER ROOMS

Purpose

SCADA SAU-K is designed for control of a boiler house with steam or hot-water boilers used for domestic or industrial use (e.g. for supplying hot water and heating to residential buildings or gas compressor station).

Diagram
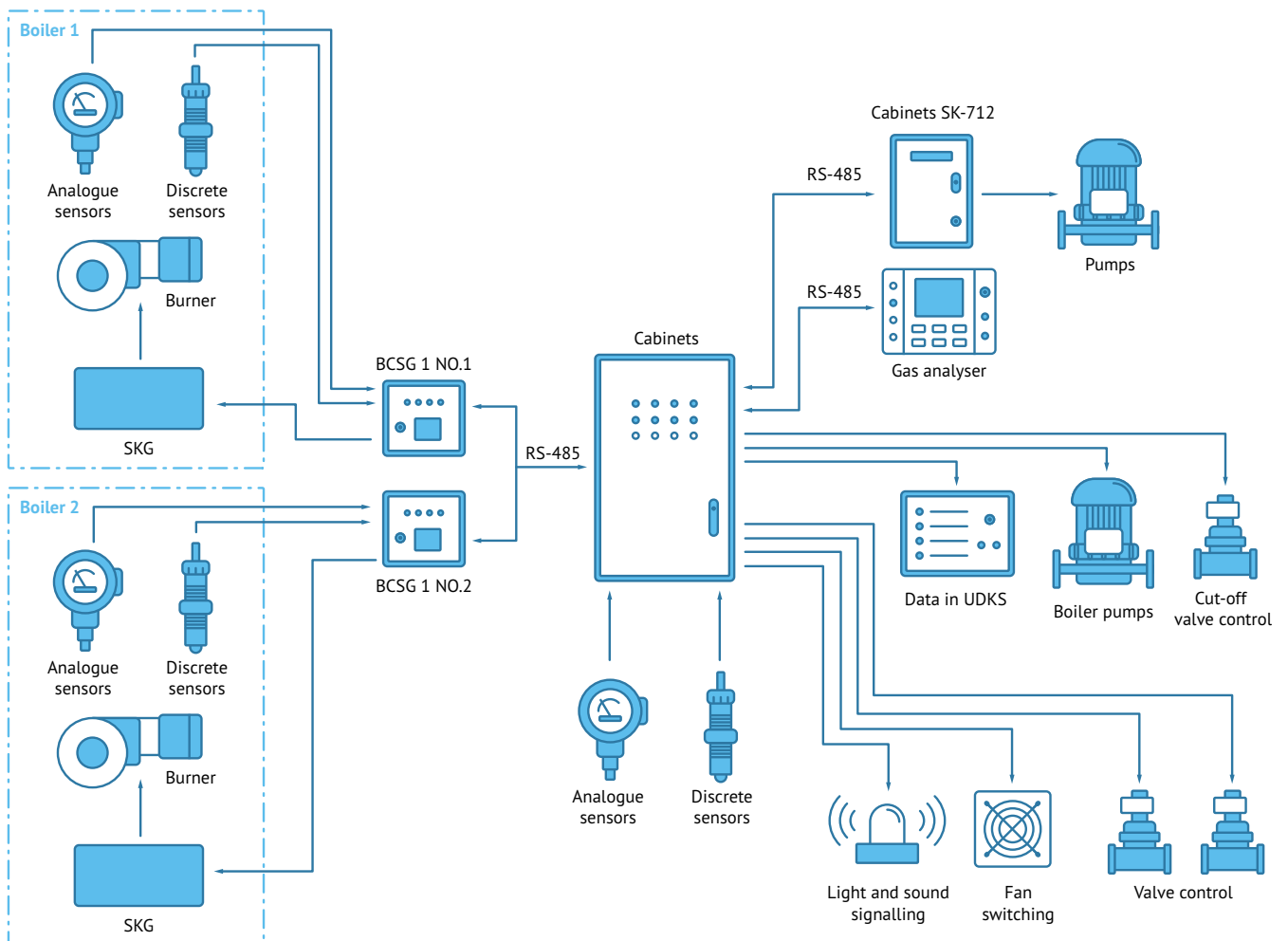
click for more details

URAL
DIESEL POWER PLANT CONTROLLER

Purpose

'URAL' is a controller for control of diesel power plant used as the main or backup source of electricity.
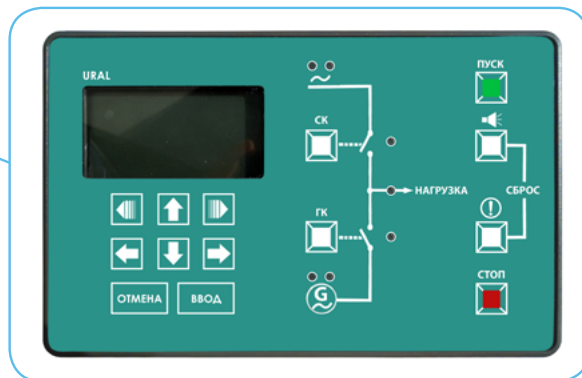
Basic functions

Using the information from its own and external sensors, the controller automatically fulfils the main functions of the power plant control, which can be in the following states: standby (grid reserve), start-up, operation or shutdown.

In general, the 'URAL' controller provides:

* automatic control and display of parameters of the power plant itself and the external network;
* automatic control of the power plant equipment and maintaining its readiness to receive the load;
* automatic start-up of the power plant in case of loss of mains voltage or start-up with automatic synchronisation in case of parallel operation of generating units for the common load;
* automatic control of the power plant in the mode of autonomous or parallel operation of generating units for common load;
* automatic shutdown of the power plant according to set parameters;
* signalling and emergency protection of the power plant equipment of the power plant;
* remote control, monitoring and communication;
* accounting of generated electricity, motor hours, number of starts and stops;
* recording of measurements and events with time and date stamping and date;
* programming of work schedule fulfilment (start-ups during peak hours) and preventive start-ups;
* automatic continuous diagnostics of the power plant;
* manual control of the power plant.

Design

'URAL' controller is integrated into the control panel (cabinet) of the power plant and can be used with the power plant, the main structure of which includes:

* diesel engine (Russian or foreign production);
* synchronous generator (of Russian or foreign manufacture);
* electric starter;
* charging generator of the starter battery;
* accumulator batteries;
* oil pressure sensor;
* coolant temperature sensor;
* fuel level sensor in the fuel tank;
* switching devices of power electrical circuits.

The power plant may additionally include:

* fuel pump for automatic refuelling (auto fuel boost);
* low fuel level signalling sensor;
* electric heaters (coolant, oil);
* wall heaters (tank, cabinet, generator);
* supply and exhaust fans;
* fire alarm and fire extinguishing equipment.

Technical specifications

Name	Value
Input analogue signals	
AC phase voltages A, B, C from generator and external mains	up to 480 V
Generator A, B, C phase currents	0 – 5 A
Engine speed • Input • Input from charging alternator terminal	2 – 70 V, 10 – 10000 Hz up to 70 V
Oil Pressure (Input)	0 – 2500 Ohms or 0 – 2,5/20 mA
Coolant Temperature (Input)	0 – 2500 Ohms or 0 – 2,5/20 mA
Fuel Level (Input)	0 – 2500 Ohms or 0 – 2,5/20 mA
Battery voltage	12/24 VDC
Output analogue signals	
Output to speed controller	0 – 10 V or 5 V PWM
Output to PWM generator voltage regulator	5 V
Input discrete signals	
Inputs with galvanic isolation. Internally connected at one end to an external terminal. Pack of 9 pcs. Input voltage	12/24 V DC
Output discrete signals	
Built-in relay output. Pack of 9 pcs. Permissible current of relay contacts	dry contact $V_{max} = 60$ V, $I_{max} = 0{,}4$ A
General technical characteristics	
Interfaces	2×RS-485, CAN
DC supply voltage • Nominal value • Permissible value	12/24 V 8 – 36 V
Enclosure	Built-in, material — high-temperature plastic, fireproof
Degree of protection • front panel • rear panel	IP65 IP51
Operating temperature range	from −25 to +70 °C
Dimensions	226×146×70 mm
Installation hole size	207×127 mm

Advantages

- simple and easy change of signalling and emergency protection settings;
- customisation of parameters and logic of the power plant operation in accordance with the required level of automation and the option of its connection to the power system;
- changing the list of control tasks to be executed in the algorithm in accordance with the available devices at the power plant;
- possibility to monitor and control the power plant via RS-485, Ethernet and GSM (SMS) ports;
- proprietary application software;
- possibility for the developer to make changes in the device and programme required by the customer.

AGRO-PLUS
SCADA FOR GREENHOUSES

Purpose

Data transmission for agro-industrial complex on the basis of wireless technologies.

click for more details

Main functions

With the help of sensors connected to the radio module, it is possible to operatively monitor:

- air or soil temperature;
- soil, grain, etc. moisture;
- the presence of rain or spray;
- presence or level of liquid (water or fuel) in the tank;
- illumination;

- ground, animal or vehicle pressure threshold;
- movement (motion) of animal or machinery on the site;
- data from other devices (meteorological stations or specialised devices);
  and chemical rapid tests: hydrogen index (pH), electrical conductivity (pH), soil solution conductivity (ES), soil redox potential).

Diagram

point-to-point

до 1 км

star

до 1 км

tree

до 1 км
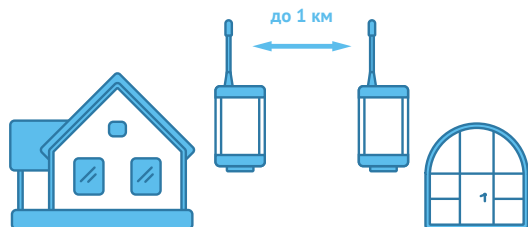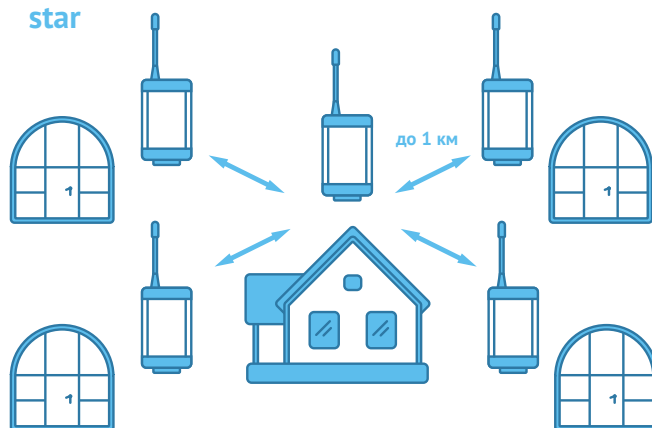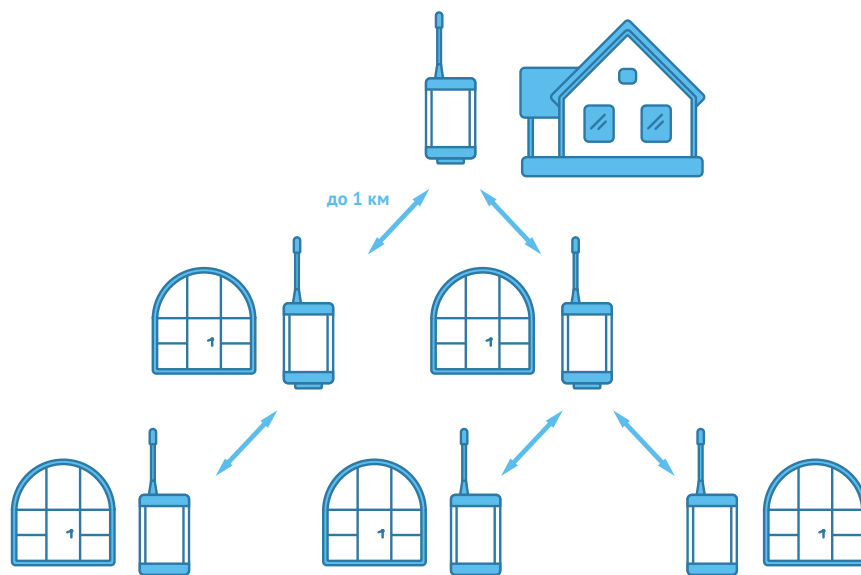
SDKU-RK
REMOTE MONITORING AND CONTROL SYSTEM OF VALVE VIA RADIO CHANNEL WITH AUTONOMOUS POWER SUPPLY

Purpose

The system is designed for transmission of telecontrol commands and reception of telemetering control signals via radio channel in unlicensed frequency range.

Basic functions

- receiving commands 'open', 'close', 'telemetering' from the control system via RS-485, or 'open' and 'close' commands by discrete inputs;
- transmission of the specified commands from the crane control centre to the crane control centre;
- control over the execution of the specified commands, crane position, serviceability of the ECUU and operability of the main system components;

- reception by the CSH cabinet from the MC cabinet via radio channel telemetering values of two analogue parameters of the gas pipeline in the area of the crane site, data resistance of solenoid circuits, crane position, signalling with subsequent output of these parameters via RS-485 to the control system;
- reception of data by the KSH cabinet from the MC cabinet via radio channel data on solenoid circuits serviceability, crane position, crane platform signalling with subsequent output of these parameters via discrete outputs to the ACS (in case of 'operation by discrete inputs/outputs').

Diagram

СДКУ-РК

ГРС

Крановая площадка

АК-433 или АН-433

Шкаф КШ

Охранная система

АН-433

Опора УК

Шкаф УК

ТСМ-80В

САУ ГРС

Мачта КШ

Шкаф телемеханики (ТМ)

Конечные выключатели охраны периметра

ЭПУУ

Крановый узел

Датчики 1 – 5 В или 4 – 20 мА
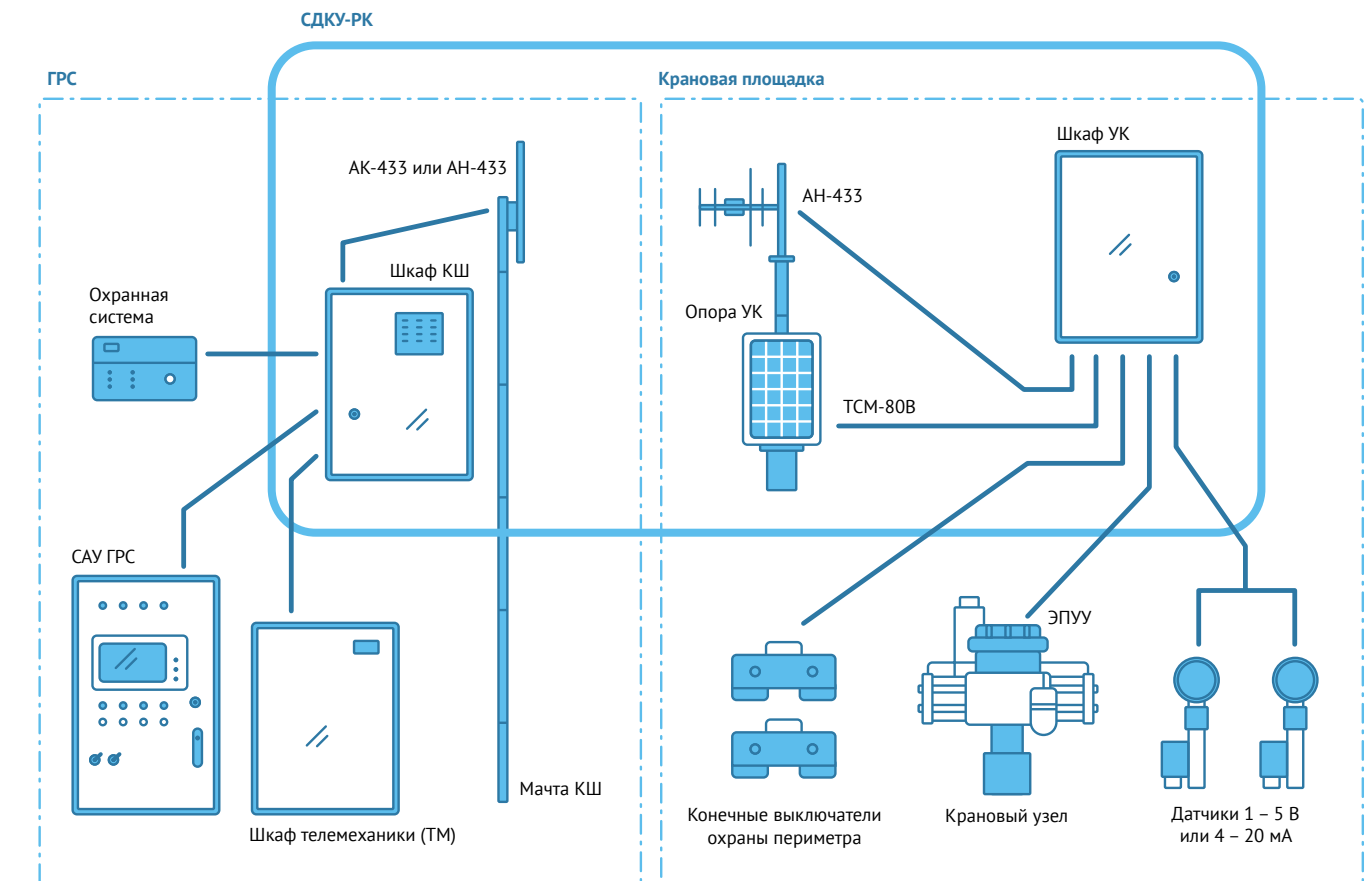
SCADA FOR HOUSING AND UTILITIES

Purpose

Automated system of control and accounting of electric power, water and heat energy consumption, water and heat energy (ASCU-EWT) is designed to measure the amount of electricity, water and heat energy and collection, storage, processing, transmission of the results of these measurements for the purposes of mutual settlements for the supplied electric power and capacity, as well as for the services related to these supplies.

Diagram

Floor 2

Office 3

CE301

SCVM-15 UI
2 pcs

Floor 1　　**Restaurant**　　**Office 1**　　**Office 2**

CE301　　CE301　　CE301

SCVM-15 UI
2 pcs

Basement

SCVM-15 UI
4 pcs

SCVM-15 UI
2 pcs

Low voltage signal module　　Single board computer　　Internet
(Ethernet or GSM)
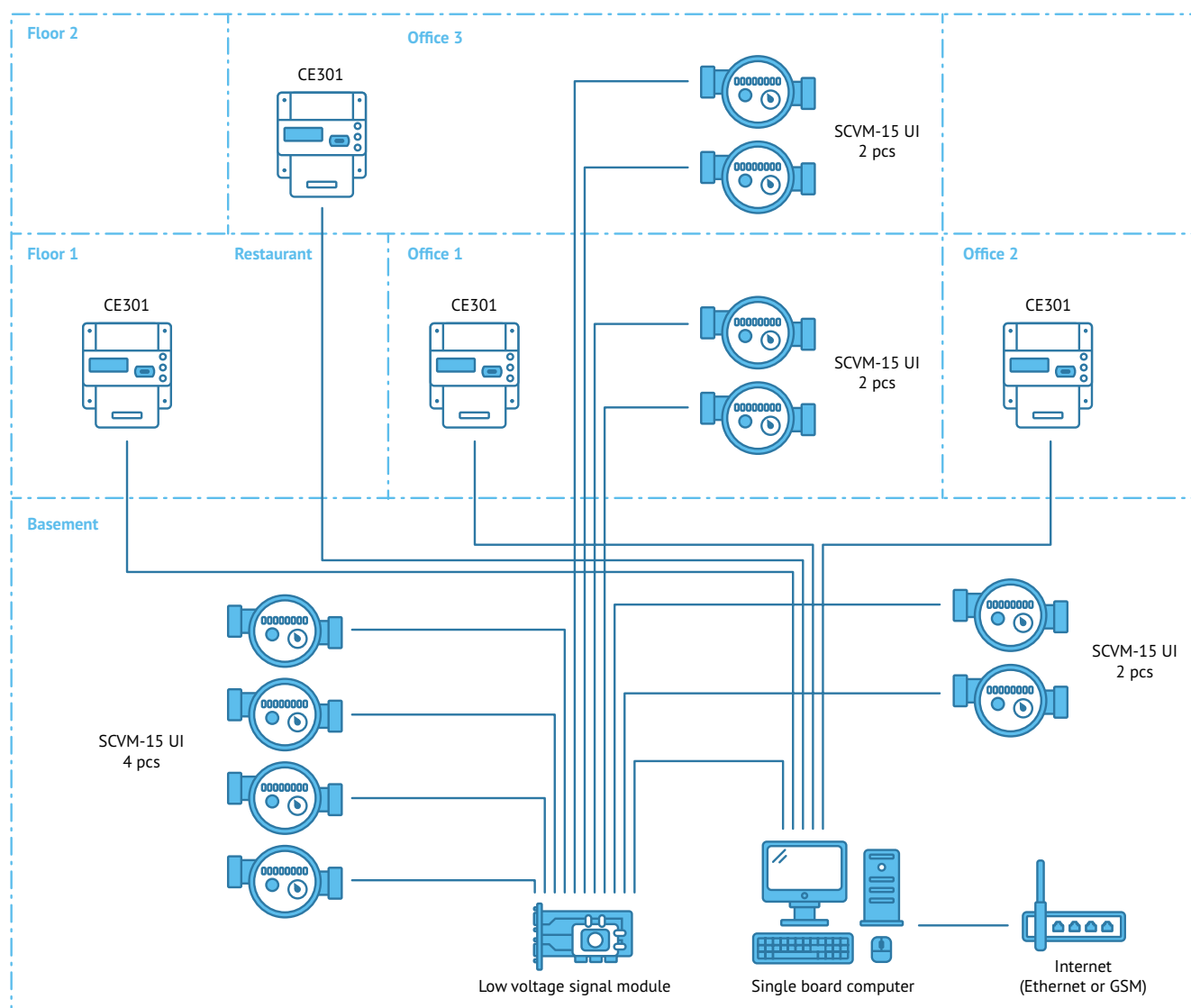
click for more details

Software

EISCADA

Purpose

EIScada is a software for building automated process control systems.

Main functions

- collection and processing of primary information from devices lower level;
- visualisation of process and equipment parameters with the help of mnemonic diagrams, graphs, tables, etc. Call of necessary data or sections of technological lines on the display screen;
- remote control of technological processes and objects;
- notification of personnel about pre-emergency and emergency situations (light and sound signalling). Registration of emergency situations and accumulation of archive data (possible for any period);
- provision of current and accumulated (archive) data in the form of graphs (trends);
- creation of new control algorithms;
- modification of all functions of SCADA-system (addition or removal of sensors, actuators, actuators, etc.); creation of new control algorithms or deletion of sensors, actuators

and change of their characteristics, change of parameters adjusting process variables, adding new modules to controllers or new controllers, adjusting and creating any mnemonic diagrams, trends, documentation);

- transmission (and reception) of the necessary data to the system upper level;
- provision of diagnostic procedures, and their logging and automatic reporting to the operator;
- ensuring reliability of technological processes and the whole system (full support of 'hot' redundancy, automatic transfer to the reserve and restoration, setting of redundancy and restoration, redundancy setting should be without additional programming, automatic synchronisation of trend data after restoration of the main server);
- protection against unauthorised access (password protection for a specific site providing more than one million combinations; definition of sites and levels for each user taking into account their priority).

Diagram

Central level

Backup servers

Stationary level

WiFi, wireless clients

Wireless networks

Ethertnet

Shop level

Internet servers

PLC, IIoT and other devices

Remote users
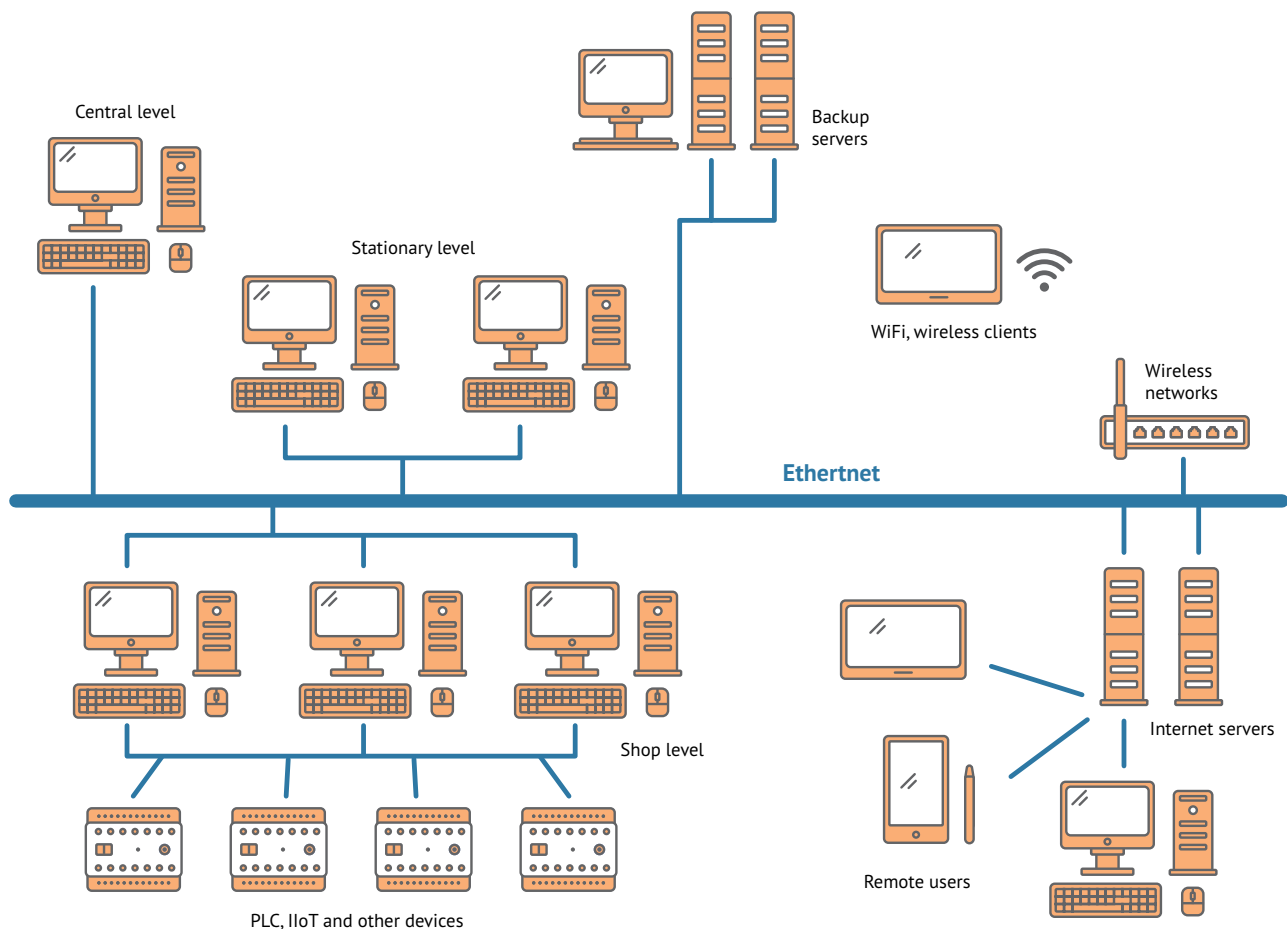
Technical specifications

Name	Value
Maximum number of discrete signals *	65535
Maximum number of analogue signals *	65535
Maximum number of timer signals *	65535
Maximum number of analogue signal settings *	65535
Maximum number of control objects	256
Number of synchronously working APMs **	2
Exchange cycle, ms ***	100
Requirements to the characteristics of the used personal computer (PC)	
Processor	P-IV 2400 and higher
RAM capacity	not less than 1Gb
Hard drive capacity	not less than 40Gb
The video card and monitor of the PC must provide the resolution of the image on the monitor screen	not lower than 1024×768 dots with the number of colours not less than 64000 (16 bit colours)
Operating system	Windows 2000/XP/7

for one control object

** *on one line*

*** *adjustable according to the task*

Advantages

Security

- data exchange between the components using user authentication, asymmetric public and private key encryption, SSL certification;
- delimitation of user rights to control operational data input/output servers;
- wide possibilities of user rights customisation when working with functions of client applications;
- delimitation of user rights with logging actions for each of them.

Cross-platform

An important criterion for selecting a SCADA-system is the hardware and software platform, because it determines whether it can be operated on a PC or on a PC depends on whether it is possible to work with it on existing computing facilities.

EIScada, is multi-platform and allows you to work on the systems Windows, WindowsCE/Mobile, Linux, Embedded Linux, MacOS, Symbian, thus overriding the importance of this factor when choosing software.

Report generation system

- a wide range of basic report templates;
- human-friendly editor of report templates;
- for complex custom reports, full-fledged Java Script;
- receiving operational and historical data on OPC UA and SQL, including from third-party data servers;
- manual data input into ready reports;
- generation of reports by schedule, by event, by user request, mailing by E-Mail;
- backup system;
- storage of not generated reports, but data from these reports.

System openness

A system is open if external data formats and procedural interface are defined and described for it, which allows to connect 'external' independently working components to it.

EIScada system allows you to develop your own software modules, I/O drivers to work with different types of equipment and additional visualisation components by third-party development companies, which makes it possible to significantly extend it for a wide range of tasks.

Built-in network support

EIScada supports work in standard network environments (Ethernet, etc.) using standard protocols (ModBUS RTU, TCP/IP, NetBIOS, ProfiBUS, CanBUS, etc.), as well as provides support for popular industrial interfaces (ModBUS, RS-232, RS-485, RS-422, Fast Ethernet, Industrial Ethernet), and thus, does not lag behind its foreign analogues.
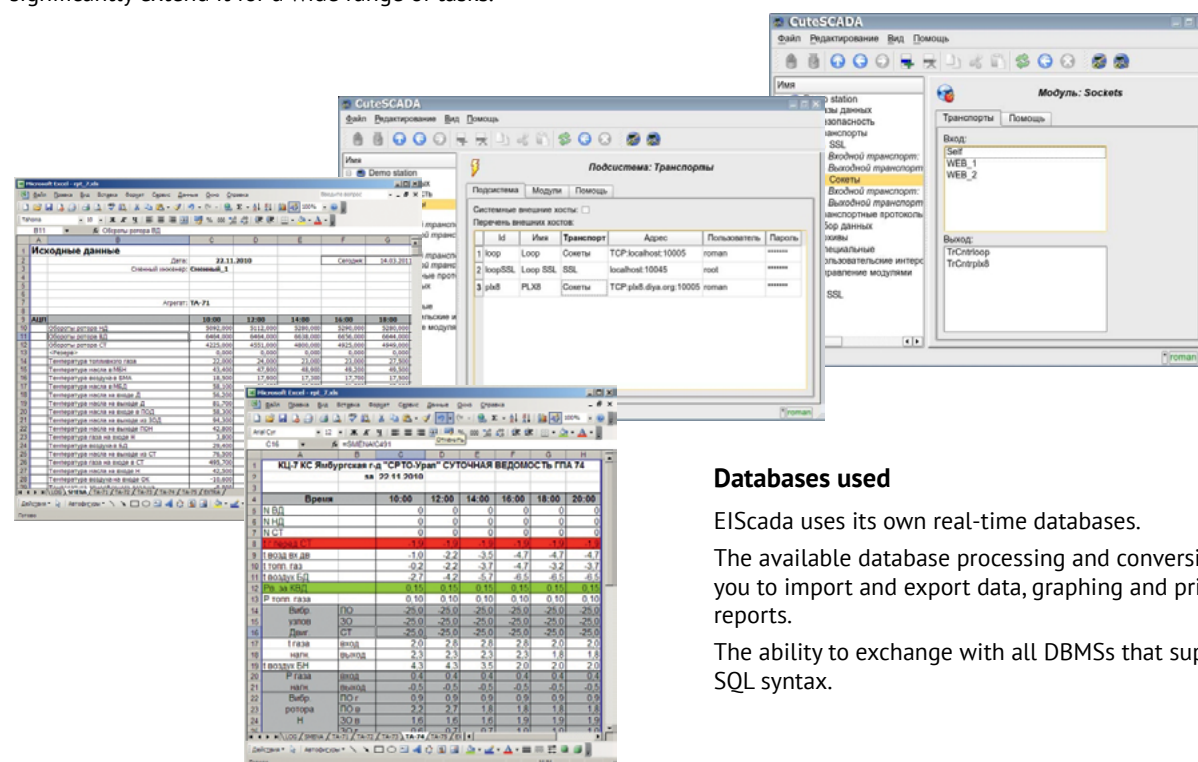
Databases used

EIScada uses its own real-time databases.

The available database processing and conversion tools allow you to import and export data, graphing and printing of various reports.

The ability to exchange with all DBMSs that support the ANSI SQL syntax.

User-friendly interface

EIScada software system has a convenient user interface, designed in a 'window' style and allows the operator and administrator to quickly navigate through the entire list of system features.

Transparent architecture

No complications with loading different modules, all 'in one box'.
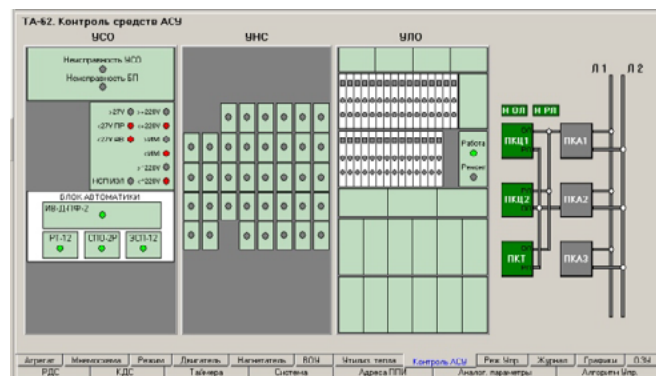
Example of a management of the control system

Example of a form with blower parameters
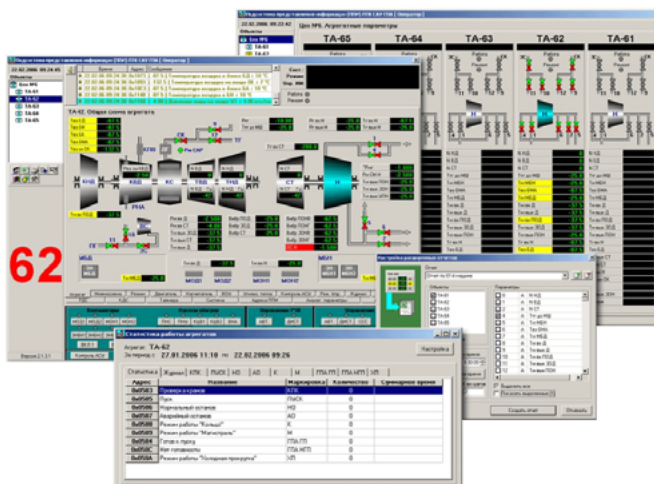
Example of operator control panel
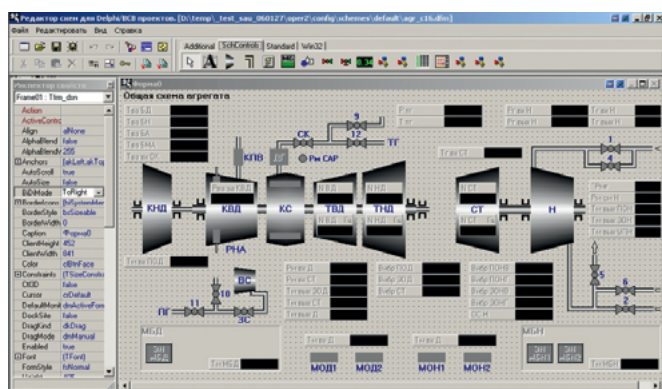
Graphical editor tab

Graphic editor

The used vector graphics allows to perform a wide range of operations on the object, as well as to update the image on the screen, using the means of animation.

Built-in EIScada graphic editor allows you to draw components on the display form, setting them all the necessary properties.

Also, the implemented system of plug-ins allows to create new various components in the shortest possible time.

Control Algorithm Editor

The control algorithm editor allows technologists to create and modify control algorithm control algorithm without involving software specialists software specialists, i.e. to operate only the control of actuators.

In the editor it is possible to create algorithms of actuator control with the help of block diagrams.

Algorithm editor tab

Interaction with other systems

The system can be integrated into various subsystems (ERP,MES) and set up interaction with other SCADA-systems both on one personal computer and in a network, which will not affect the speed of its operation.

In addition, the modularity and flexibility of the system allows you to with any other types of communication with control objects, actuators, equipment, recording devices, operator workplaces, servers, databases, etc.

Expanding the system's capabilities

The EIScada system has a built-in programming language with C++ syntax, increasing the flexibility of the whole system.

There is also a simplified ability to generate events in accordance with the specified conditions, which puts this system in a line with the world's famous analogues.

LABTRACE +

Purpose

LABTrace technological processes monitoring system is realised as a hardware-software complex designed for monitoring of technological processes in accordance with quality management system ISO 9001.
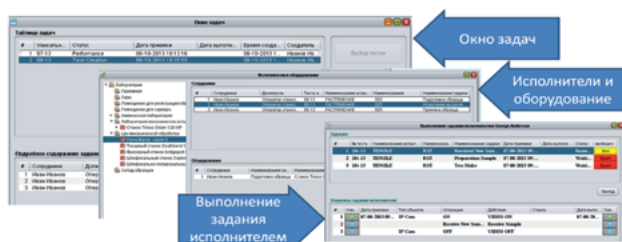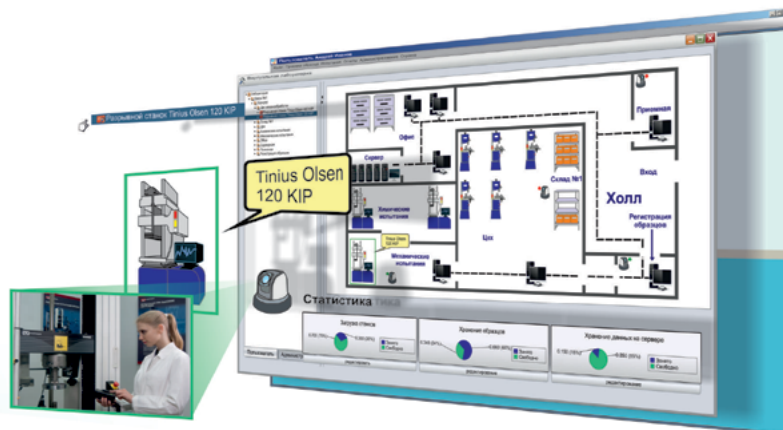
Main functions

- electronic document management in the laboratory (creation of reports according to the customer's form, electronic logging and storage of video archives of tests).

- personnel management (automated issuance of staff assignments and maintenance of an electronic personnel database);

- automated management of laboratory equipment;

- automated tracking of all processes laboratory processes (installation of video cameras in the laboratory and recording of all stages of laboratory testing);

- ensuring a high level of safety;

- management of intra-laboratory quality control;

- reduction of laboratory costs through rational utilisation of resources and use of modern means of process automation.

Diagram
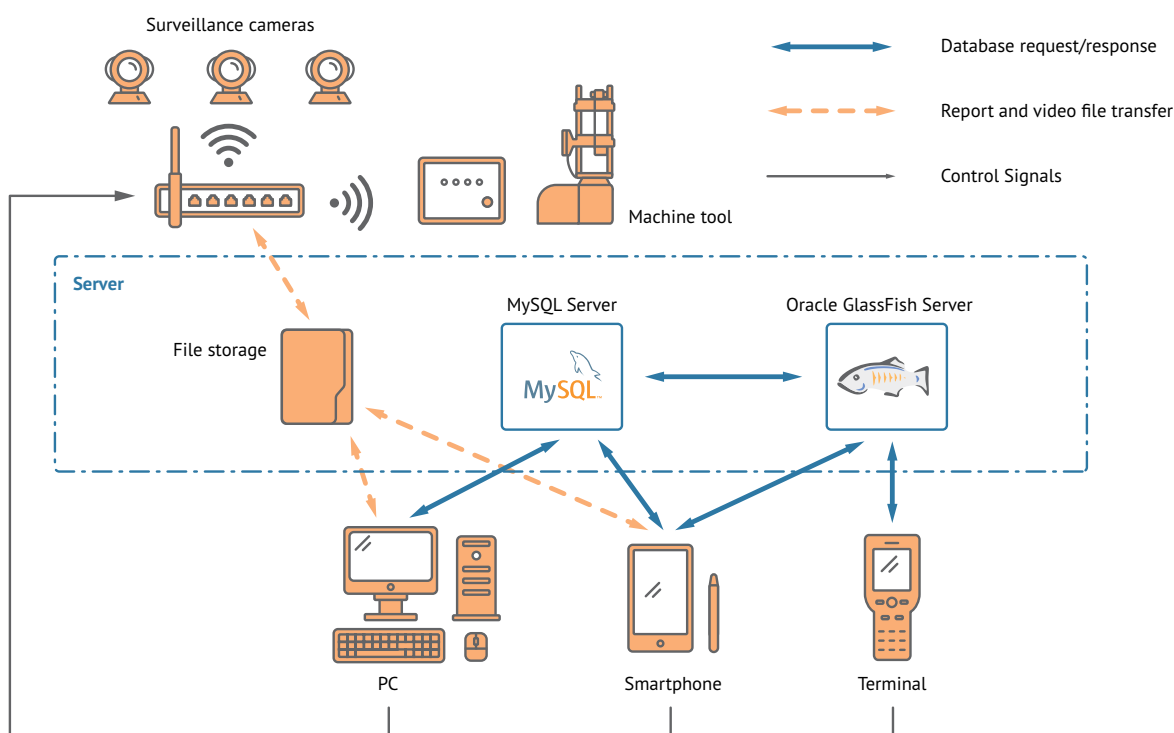
PLC Devices

PLC DIAGRAM (EXAMPLE)

High voltage transmission lines with 35 up to 1150 kV

Linear Disconnector

Line Trap

Coupling Capacitor

Disconnector

Coupling Filter

Filter ShON

Coupling Filter

ShON

to equipment

Equipment for transmission of signals /commands of relay protection and emergency automation

High-frequency protection transceiver PVZU E

Decoupling Filter

To phone line, controlling place etc.

Automatic long-distance communication equipment

Miscellaneous auxiliary PLC devices

to telemetry equipment

switching

optional switching

LINE TRAPS VZ

Innovative
H 800 mm, Ø 780 mm

Classic
H 1500 mm, Ø 1300 mm

Monolithic
H 920 mm, Ø 780 mm

VZ-630-0,5-16B UHL   **VZ-630-0,5 UHL**   **VZ-630-0,5-31,5-2H UHL**

Purpose

The line traps are used to attenuate the switching effects of high-voltage lines and equipment as well as
to prevent signal losses (signals for remote control, voice communication, remote metering) transmitted
along high-voltage lines (6–1150kV).
The line traps are filter-barriers, mounted in-line on phase conductors and could be configured for certain
attenuation band range (16–1000 kHz).
Line traps can also be used to ground the cables in case PLC channels use stand-alone lightning
protection cables.

Line traps characteristics

Main parameters of the line traps are as follows:

- blocking impedance;

- frequency bandwith;

- continious rated current;

- rated short-time current;

- emergency overload current;

- main coil inductance;

- class of transmission lines.

IEC 60353 and STO 56947007 (Russian Standard) have set the following values for transmission lines
resistance, blocking impedance, continuous rated current.

Values of transmission lines resistence 35–750 kV

Trans-mission lines' rated voltage, kV	Transmission lines' resistance / Line trap blocking impedance, not less than						Continuous rated current of line traps (recommended IEC, STO)
	Phase-to-Earth	Phase-phase*	Two phases - Earth*	cable-Earth	Cable-cable*	Two cables – Earth*	
35 kV	450/640 Ohm	400/570 Ohm	540/770 Ohm				100, 200, 400, 630 A
110 kV							400, 630, 800, 1000, 1250 A
220 kV							1000, 1250, 1600 A
330 kV	330/470 Ohm	300/430 Ohm	400/570 Ohm				1600, 2000, 2500 A
500 kV	310/440 Ohm	275/390 Ohm	370/525 Ohm	550/780 Ohm	480/680 Ohm	550/780 Ohm	2000, 2500, 3150 A
750 kV	280/400 Ohm	250/355 Ohm	340/485 Ohm	550/780 Ohm	480/680 Ohm	550/780 Ohm	2000, 2500, 3150, 4000 A

* for each phase (each cable)

IEC and STO recommend the following values of the main coil inductance (mH):

0,2 − 0,25 − 0,315 − 0,4 − 0,5 − 1,0 − 2,0

IEC and STO recommend the following values for the short-time current and emergency overload current

Peak values of rated continuous and overload current

| Rated continuous current of the line trap (actual)	Rated continuous current (actual)		Emergency overload current (peak value)	
	Series 1	Series 2	Series 1	Series 2
100 A	2,5 кА	5 кА	6,38 кА	12,75 кА
200 A	5 кА	10 кА	12,75 кА	25,5 кА
400 A	10 кА	16 кА	25,5 кА	40,8 кА
630 A	16 кА	20 кА	40,8 кА	51 кА
800 A	20 кА	25 кА	51 кА	63,75 кА
1000 A	25 кА	31,5 кА	63,75 кА	80,33 кА
1250 A	31,5 кА	40 кА	80,33 кА	102 кА
1600 A	40 кА	50 кА	102 кА	127,5 кА
2000 A	40 кА	50 кА	102 кА	127,5 кА
2500 A	40 кА	50 кА	102 кА	127,5 кА
3150 A	40 кА	50 кА	102 кА	127,5 кА
4000 A	63 кА	80 кА	160,65 кА	204 кА

Construction

Main components:

- Main Coil is used to carry rated continuous power frequency currents of transmission lines with the line trap.
- Protective Device is used to protect the main coil and tuning device from over voltages occurring on lines and distribution devices of substations (atmospheric and switching over voltages, from short circuits);
- Tuning Device (together with the main coil) is used to adjust the blocking frequency or bandwith i.e. the frequency range over which the line trap can provide a certain specified minimum blocking impedance or resistance. Sometimes the line traps are supplied without the tuning devices depending upon the special requirements.
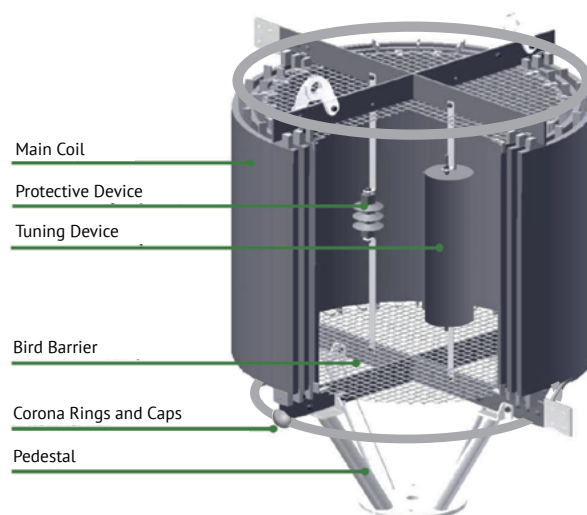
Accessories:

- Bird Barrier;
- Corona Rings and Corona Caps;
- Pedestal for vertical mounting.

Main Coil
Protective Device
Tuning Device
Bird Barrier
Corona Rings and Caps
Pedestal

MAIN COIL

The main coil (single-layer or multi-layer) is an inductor coil, its winding (typically aluminum or copper) is placed on the frame (rack-based, cylindrical, etc.) from the well-proved insulating material. The main coil has high mechanical strength withstanding the short circuit currents (maximum values are indicated in table), working reliably during the long-term life cycle (up to 30 and more years) under harsh weather conditions.

The reactor coil is made from good insulating and high mechanical strength material.

Being an outdoor equipment the line trap should be designed to withstand the climatic and other environmental conditions (temperature, humidity, salt fog, ice, solar radiation, air pollution etc.)

The frame of the coil is made of composite materials.

The main coil the special surface (usually multi-layer) protecting from bypassing happened due to the ice coating, active (particularly contaminated) atmospheric precipitation, metal items accidentally fell on the coil conducting surface.

TUNING DEVICE

The tuning device is used to adjust together with the main coil the necessary blocking frequency or bandwith.

The tuning device, depending on the desired frequency bandwidth could be either damped single frequency, double frequency or wide band tuned.

The manufacturer calculates and sets the frequency range individually for each customer .

According to the customer's specifications the tuning device can be made for any frequency range, with an accuracy of 0.5 kHz in frequency range from 16 to 1000 kHz.

Due do the unique scheme, design, types of materials, components and technologies of the tuning device the line trap could withstand the overvoltage caused by:

- the nominal short-term current see item 19.3.2 IEC 60353;
- atmospheric impacts (lightning) see item 19.3.1 IEC 60353;
- other effects see items 4.3 and 5.2 IEC 60353.

The warranty period for the tuning devices is 5 years.
Lifespan is 20 years.

"Electronic Information Systems" is ready to produce the customizable tuning devices (their specifications are available upon request):

- to ensure the blocking frequency for two, three or more bands:
    - universal, for the line traps of different classes and manufacturers;
    - tunable, with possibility to change the blocking frequency range;
    - universal and tunable, combined product;
- for all kinds of the line traps utilized in Russia at the moment.

Rating plate of the tuning device

EN-X-XX XXX XXXX (XXX−XXXX),

EN – tuning device (Russian abbreviation);

X - rated continuous current, A;

XX - main coil inductance, mH;

XXX – type;

- *UD - enhanced dynamic performance;*
- *D - IEC 60353 Series 2 (Series 1 default);*
- *M - small-size version;*

XXXX – climatic type according to GOST 15150-69 (Russian Standard);

(XXX–XXXX) − frequency bandwith, kHz.

Example for order
EN-630-0,5 UD UHL1 (160−1000)

PROTECTIVE DEVICE

As a protective device we use the non-linear surge arresters.

Non-linear polymer housed surge arresters are designed to protect the tuning device against atmospheric (lightning) and switching over voltages.

Hermetically-sealed polymer housed varistors are the main elements of the surge arresters.

Its operation is based on a highly nonlinear current-voltage characteristic of the varistors.

The varistors have an electrical resistance that varies with the applied voltage: at operating voltage the active currents flowing through the varistors do not exceed 10 µA, while at overvoltage they could reach hundreds or thousands of amperes.

Customer benefits

Many types of the line traps are produced (about 60) which have:

- different rated current;
- various inductance;
- different rated short-time current values.

Line traps with non-standard frequency band

- including the range from 16 to 24 kHz;
- two-, three-and multi-frequency bandwith.
- Bandwith Ranges Ra > 1000 Ohm

Relatively small dimensions and light weight give:

- great opportunities to install the line traps directly on the coupling capacitors and switchgears;
- advantages during overhaul and repair when the old line traps could be replaced by the new ones without changing the whole PLC system.

INNOVATIVE LINE TRAP

Innovative design and technological ideas were implemented in the development and production of the new line traps.

Design

- Significantly reduced losses and improved frequency characteristics as there are almost no bolts in construction.
- No operations associated with the production of "ridge-shaped" rail (only cutting is used during machining of the reinforced plastics).
- A wire of rectangular cross-section is used.
- Elements made of fiberglass plastic with improved mechanical characteristics and heat resistance insulation class "H" are widely used in the construction.
- Due to the reduced dimensions, the wind load is reduced, and the wind less moves the line trap relative to the center of mass to the level that protects from fracture at the point of connection of the phase wire to the contact plates.

Advantages

- **Energy saving technologies.** Reactor power losses are reduced by 20–25%.
- **Resource-saving technologies.** Reduced size and weight by 50–70%.
- **Reduced environmental pollution.** Waste-free technologies of processing composite materials.
- **Improved performance and reliability.** Thanks to the introduction of manufacture technologies of open and closed type reactor with the use of composite insulating, the variability in the types of barriers has been increased, including barriers with the ability to operate at above-normal continuous currents and above-normal operating temperatures, with increased resistance to short-circuit currents, barriers with increased resistance to short-circuit currents, and line-traps with increased resistance to short-circuit currents, line traps for operation in difficult climatic conditions (tropics, high mountains, sea fog, etc.).
- **Reduction of dimensions and weight** has significantly changed the cost of suspension and support structures designed for installation of the line traps, structures designed for installation of the line traps, reduced transportation costs and installation costs. Low reactor capacitance and high goodness of fit have provided excellent frequency characteristics.

MONOLITHIC LINE TRAP

Design

The design provides complete insulation of the reactor coils. Insulating layers of fiberglass plastic with heat resistance class "H", which make up the intercrew and outer insulation, form the bearing structure of the line trap's reactor and determine its mechanical strength. Due to the fact that the entire space between the coils is filled with dielectric, it provides an extremely high resistance to short circuit currents.

Advantages

- increased reliability of the line trap;
- operation in the most difficult environmental conditions: in tropical climates, high mountains (more than 2000 m above sea level), under the influence of sea fog, in the zone of anthropogenic pollution;
- improved dimensional and mass characteristics, which allow to reduce the load on supporting structures (1.5 times) and wind load (1.5 – 2 times);
- smaller dimensions and weight;
- protection of the reactor winding from aggressive impact of the environment;
- high mechanical strength;
- high resistance to short-circuit currents;
- reduced wind load;
- no inter-turn and interlayer short circuits;
- possible to use in industrial polluted areas;
- small dimensions and insulated winding of the reactor allows to use more freely in switchgear substations;
- thanks to design there is no ice on the reactor winding;
- high overload capacity
- comply with regulatory and technical requirements (STO Rosseti and IEC 60353);
- corresponds to the high level of equipment performance of the world's leading manufacturers;

- possibility to install a monolithic line trap on a standard communication capacitor, without using reinforced capacitor structures; the monolithic line trap can be installed on a standard communication capacitor without using reinforced capacitor designs;
- high resistance of tuning elements to switching overvoltages during the whole period of operation.

Three main reasons to use the monolithic line traps, manufactured by EIS

- uniform (universal) design for all climatic zones, including high mountains and tropics;
- energy saving: less added losses due to reduction of metal parts in the construction;
- environmental friendly: the level of environmental pollution is considerably lower due to the absence of mechanical processing of composite materials in the manufacture of line traps.

Line traps specifications

№	Line trap classification	Dimensions of the main coil		Weight of the line trap incl. the tuning device and surge arrester, not more than, kg	Class of transmission lines	Rated short-time current, kA (r.m.s.)	Short-time current, kA (peak value)
		Height, mm	Diameter, mm				
1	VZ-630-0,25 UHL1*	1000	1060	100	35 – 220	16	41
2	VZ-630-0,5 UHL1*	1456	1060	167			
3	VZ-630-0,5 UD UHL1*	1193	980	202		40	102
4	VZ-630-1,0 UHL1*	1640	1390	268		16	41
5	VZ-1250-0,1 UHL1*	1060	950	167	110 – 330		
6	VZ-1250-0,25 UHL1*	1235	1070	220		31,5	80
7	VZ-1250-0,5 UHL1*	1540	1250	300			
8	VZ-1250-0,5 D UHL1*	1575	1250	390		40	102
9	VZ-1250-1,0 UHL1*	1595	1540	450		31,5	80
10	VZ-1250-1,0 D UHL1*	1585	1540	475		40	102
11	VZ-1250-1,5 UHL1*	1595	1760	580		31,5	80
12	VZ-1250-2,0 M UHL1*	1680	1415	757			
13	VZ-2000-0,1 D UHL1*	1060	1060	282	330 – 750	50	128
14	VZ-2000-0,25 UHL1*	1235	1100	347		40	102
15	VZ-2000-0,5 UHL1*	1510	1205	424			
16	VZ-2000-0,5 D UHL1*	1535	1540	629		50	128
17	VZ-2000-1,0 UHL1*	1595		610		40	102
18	VZ-2000-1,0 D UHL1*	1595	1540	835		50	128
19	VZ-2000-1,5 UHL1*	1718	1850	900		40	102
20	VZ-2000-2,0 UHL1*	3170	1540	1270			
21	VZ-3150-0,1 UHL1*	1065	1200	360	330 – 750	40	102
22	VZ-3150-0,5 UHL1*	1535	1540	865		54	138
23	VZ-4000-0,1 UHL1*	1065	1200	380	500 – 750	63	161
24	VZ-4000-0,5 UHL1	1535	1540	870			
25	VZ-100-0,5-5-B UHL1	715	780	40	35 – 110	5 (10**)	12,75 (25,5**)
26	VZ-200-0,5-5-B UHL1	800	700	60 (75**)			
27	VZ-200-1,0-5-B UHL1	1200	780	105 (120**)		5 (10**)	12,75 (25,5**)
28	VZ-400-0,5-10-B UHL1	800	700	64 (70**)		10 (16**)	25,5 (40,8**)
29	VZ-400-1,0-10-B UHL1	1200	780	120 (130**)		10 (16**)	25,5 (40,8**)
30	VZ-630-0,25-16-B UHL1	620	700	72 (75**)		16 (20**)	41 (50**)
31	VZ-630-0,5-16-B UHL1	800 (750***)	780 (750***)	110 (80***)	35 – 220	16	41
32	VZ-630-0,5-20-B UHL1	800	780	120		20	50
33	VZ-630-0,5-16-2H UHL1	800	780	110 (90***)		16	41
34	VZ-630-0,5-20-2H UHL1	850	780	120		20	50
35	VZ-630-0,5-31,5-2H UHL1	920	780	130		31,5	80
36	VZ-630-0,5-40-2H UHL1	1317	780	190		40	102
37	VZ-630-1,0-16-B UHL1	1450	780	170		16 (20**)	41 (50**)
38	VZ-630-2,0-16-B UHL1	1600	1250	260		16 (20**)	41 (50**)
39	VZ-1250-0,25-31,5-B UHL1	850	780	180	110 – 330	31,5 (40**)	80 (102**)
40	VZ-1250-0,5-31,5-B UHL1	1250	1000	270		31,5 (40**)	80 (102**)
41	VZ-1250-0,5-40-B UHL1	1250	1000	320		40	102
42	VZ-1250-1,0-31,5-B UHL1	1350	1250	380		31,5 (40**)	80 (102**)
43	VZ-2000-0,25-40-B UHL1	1000	1050	280	350 – 750	40 (50**)	102 (128**)
44	VZ-2000-0,5-40-B UHL1	1250	1250	400		40	102
45	VZ-2000-0,5-50-B UHL1	1250	1250	450		50	128
46	VZ-2000-1,0-40-B UHL1	1850	1250	540		40	102

Performance:

- UD — enhanced dynamic characteristics
- E — Series 2 IEC 60353 (default is Series 1)

* Class of insulation heat resistance according to GOST 8865-93 — "A"

** Variant with increased resistance to short-circuit currents

*** Lightweight version

Heat resistance classes and their corresponding temperatures according to GOST 8865-93:

Y — 90 °C	H — 180 °C
A — 105 °C	200 — 200 °C
E — 120 °C	220 — 220 °C
B — 130 °C	250 — 250 °C
F — 155 °C	

RATING PLATE OF THE LINE TRAP

VZ XXXX-XX-XXX-XX (XXX–XXXX)-XXX XXX

climatic performance according to GOST 15150-69

guaranteed active resistance impedance in the relevant frequency range (taking into account operating conditions), Ohm

frequency band, kHz

reactor type (open type by default, closed — "2"), insulation heat resistance class according to GOST 8865-93

rated short-time current (thermal resistance current), Ka

rated inductance of the reactor, MH

rated current, A

line trap (abbreviation)

Examples for ordering

VZ-2000-0.1 D UHl1 (470–1000)
VZ-630-0,5-31,5-2H (16–1000)-650 UHl1

Besides EIS manufactures line traps with rated current of up to 4000 A, with reactor inductance up to 2,5 mHn, characteristics of which are not given in the table above, on the basis of technical specifications.

COUPLING FILTER FP

Purpose

The coupling filter (FP) is designed to ensure (together with the coupling capacitor) resistance matching when connecting equipment of high-frequency relay protection channels, emergency control and telephone communication equipment to the phase of overhead power lines (overhead lines) with voltage of 6–1150 kV and to overhead line lightning protection cables.

Main functions

- tuning, designed to compensate for the reactive component of the coupling capacitor(s) impedance
- galvanic isolation between high voltage overhead lines and input circuits of communication equipment;
- impedance matching between the power line and the carrier frequency connection;
- earthing the coupling capacitor bottom plate.

In combination with the coupling capacitor, the coupling device makes up a transformer (autotransformer) bandpass filter. The filter can be supplied in different configurations, each designed to operate within a specific frequency band and in conjunction with a specific coupling capacitor.

The difference between our coupling filter and the devices of other manufacturers is that it employs new protective devices in its input circuits. Protective devices such as transmission line arrester OPN (instead of the valve dischargers). on the line side and the varistor cable (instead of the gas discharger) on the HF side.

For application in a phase to phase circuit, design of the FP coupling device allows for 180 degree input (output) signal phase shift. You can do it by shifting connection of the terminals on the secondary winding of the transformer.

Design

Elements of the filter are installed in a cast silumin enclosure under an aluminum cover with a rubber sealant held together by stainless steel connecting screws. There is a coaxial cable inlet hole and a ventilation device on the bottom panel of the enclosure.

Operating conditions

Climatic performance — UHL.
Placement category — 1 according to GOST 15150.
Seismic resistance on MSK-64 scale — 9 points.

Advantages

If required, the coupling filters can be manufactured:

- with 180° phase rotation;
- with two-band tuning;
- for phase-to-phase organization of the PLC channel the filters can be manufactured with built-in differential transformer.

Technical specification

Name	Value
Composite loss within passband	not more than 1.5 dB
Return loss within passband	not less than 12 dB
Rated input impedance of the FP from the high-frequency cable side	75 Ohms
Resistance of FP from the overhead line side to industrial frequency current	not more than 4 Ohm
The nominal input impedance of the FP from the overhead line side	corresponds to the wave impedance of the overhead line
Nominal peak power P.E.P.	not more than 400 W
Non-linear distortion, intermodulation 2nd and 3rd orderregarding to the acceptable HF signal power	not more than minus 80 dB
Dimensions	335×328×172 mm
Maximum weight	not more than 12 kg

Основные характеристики фильтров серии ФП соответствуют рекомендации МЭК 60481.

Designation

FP (XX-XXX)/XXXXX UHL1,
where: FP — coupling filter; XX — lower frequency bandwidth, kHz; XXX — upper frequency bandwidth, kHz; XXXX — capacitance of the coupling capacitor, pF; UHL-1 — climatic version according to GOST 15150.

SEPARATING FILTERS

Purpose

Separating filters RF are designed to reduce the bypass action of apparatus on various HF channels operating via a common coupling filter.

Separating filters must be integrated:

- into the circuit of each channel where devices on dedicated HF protection channels or dedicated relay protection and emergency control automatics channels are connected in parallel;

- into the communication equipment circuit where devices on dedicated HF protection channels or dedicated relay protection and emergency control automatics channels are connected in parallel.

For application in HF channels with bypass of substations, where several channels are connected to one phase in parallel, we recommend to integrate a decoupling filter in the HF bypass. Such filter will pass signals at transit channel frequencies and block signals at the frequencies of the channels that terminate at the bypass.

Design

Steel enclosure and steel cover. All units inside the filter are installed on the housing base. The cover is attached to the base with screws.

Designed and manufactured in accordance with requirements and recommendations of IEC 60481, GOST 15150-69.

Types of mounting

- mounting on DIN-rail;

- possibility of mounting on any surface.

Technical specifications

Name	Value
High frequency bandwidth signal power	250 VA
Attenuation introduced by the isolation filter when it is included in the RF path in parallel with a 75 Ohm load	does not exceed 0.8 dB in the frequency band ±2 kHz relative to the filter tuning frequency. To ensure Δ F > 4 kHz, a bandpass RF can be manufactured
Attenuation introduced by the separating filter when it is included in the RF path in series with a 75 Ohm load	does not exceed 0.8 dB at frequencies that are 10 % or more away from the filter tuning frequency in both directions. For bandpass RF 10% is considered from the boundary frequencies
Isolation resistance of the separating filter output circuits with respect to the housing	⩾ 100 mOhm
Electrical strength of the insulation between the housing and the terminal of the terminal block)	withstands 1500 V (effective) AC current with a frequency of (50 ± 3) Hz for 1 minute
Operating frequency range	from 16 till 1000 kHz
Dimensions	120×120×95 mm
Maximum weight	not more than 1 kg
Warranty period	5 years
Service life	at least 12 years

Operating conditions

Climatic performance — UHL.

Placement category — 4 according to GOST 15150-69.

Nominal value of main technical characteristics are specified for nominal climatic conditions according to GOST 15150-69:

- temperature from 1 to 45°C;

- relative air humidity from 45 to 80%;

- atmospheric pressure from $8.4×10^4$ Pa to $10.7×10^4$ Pa

- (630 to 800 mmHg)

Advantages

- reduced size and mass characteristics;

- enhanced dust and moisture protection;

- two types of RF cable connection: through the terminal block (version 1); through the high-frequency connector SR-75 (version 2)

Designation

1. Standard separating filter RF-F xx UHL4,
*where: F — filter tuning frequency, kHz; xx — method of radio-frequency cable connection: "KK" — terminal block.
or "SR" — high-frequency connector SR-75.*

2. Band-pass separating filter RF-(Fn - Fv) xx UHL4,
where: Fn — lower boundary of the frequency range, kHz; Fv — upper boundary of the frequency range, kHz; xx — method of connection of radio-frequency cable: "KK" — terminal block or "SR" — high-frequency connector SR high-frequency connector SR-75.

VOLTAGE SAMPLING CABINET SHON

Purpose

Voltage sampling cabinet (ShON) is designed to generate control voltages for control, measurement, and protection of the power line to which it is connected by means of a coupling capacitor, at AC electrical substations with rated frequency 50 Hz and rated voltage 110 kV, 220 kV and 330 kV.

Construction

Structurally, ShON is a cabinet with access through the front door. Functional units installed in ShON are placed on a mounting plate fixed to the rear wall of the cabinet.

Technical specifications

Name	Value	
	ShON-301S	**ShON-303P**
Operating voltage	380 V	380 V
Rated current of primary winding at frequency 50 Hz, Inom input	0,128 A	0,128 A
Rated secondary winding current Inom out	0,075 A XT1 (XT3) 0,15 A XT2 (XT4)	0,075 A XT1 (XT3) 0,15 A XT2 (XT4)
Type of coupling capacitor/capacitance, nF for overhead line voltage, 110 kV 220 kV 330 kV	1*(110√3–6,4)/6,4 2*(110√3–6,4)/3,2 3*(110√3–6,4)/2,15	1*(110√3–6,4)/6,4 2*(110√3–6,4)/3,2 3*(110√3–6,4)/2,15
Possibility of step regulation of secondary winding current	±5 % ±10 %	
Permissible deviation of secondary winding current	±5 %	±5 %
Maximum secondary winding voltage	120 V	120 V
Degree of protection according to GOST 14256-96	IP 54	IP 54
Mechanical design according to GOST 17516.1-90	M3	M3
Overall dimensions	470×398×210 mm	667×488×250 mm
Weight	not more than 25 kg	not more than 25 kg

NPP "EIS" CJSC manufactures the cabinets with the characteristics, not given in the table above.

Operating conditions

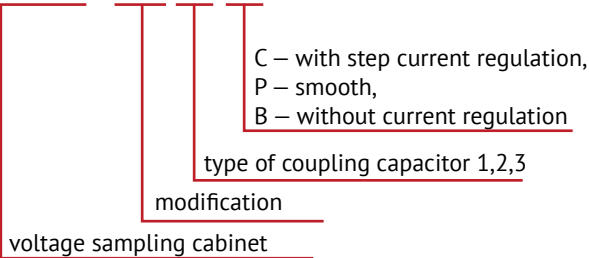*Climatic version according to GOST 15543-70 and GOST 15150-69:*

- U1 — for delivery to areas with moderate climate;
- UHL1 — for delivery to areas with moderate-cold climate;
- T1 — for delivery to areas with tropical climate.

Group of operating conditions with regard to the impact of mechanical factors — M1 according to GOST 17516-92..
Method of installation — mounted.

Designation

ShON-30X X

C — with step current regulation,
P — smooth,
B — without current regulation

type of coupling capacitor 1,2,3

modification

voltage sampling cabinet

FILTER-SHON
COUPLING fiLTER WITH FUNCTIONS OF VOLTAGE SAMPLING CABINET

Purpose

The product consists of a coupling filter intended for connection of equipment of high-frequency relay protection and emergency control channels and telephone communication by means of a coupling capacitor to the phase of the overhead power lines with nominal voltages of 110 kV, 220 kV and 330 kV, and a voltage sampling cabinet, designed to generate control voltages for control, measurement and protection of the transmission line.

Construction

Filter-ShON by the type of construction represents small-sized cabinets with access through the front door and elements of fixing and protection elements. Components to be installed in the cabinet, are placed on a frame fixed on the back wall of the cabinet.

Filter-ShON enclosure is made of stainless steel.

On request the enclosure can be made of sheet steel with polymer-powder coating.

Connection method — standard connection of the Filter-ShON and the voltage sampling cabinet ShON.

Degree of protection according to GOST 14254-96 — IP54.

Technical specifications

Name	Value
Operating voltage	380 V
Rated current of primary winding at frequency 50 Hz, Inom input	0,128 A
Rated secondary winding current Inom out	0,075 XT1 (XT3) A 0,15 XT2 (XT4) A
Type of coupling capacitor/capacitance, nF for overhead line voltage, 110 kV 220 kV 330 kV	$1*(110\sqrt{3}{-}6,4)/6,4$ $2*(110\sqrt{3}{-}6,4)/3,2$ $3*(110\sqrt{3}{-}6,4)/2,15$
Possibility of step regulation of secondary winding current	±5 % ±10 %
Permissible deviation of secondary winding current	±5 %
Maximum secondary winding voltage	120 V
Degree of protection according to GOST 14256-96	IP 54
Mechanical design according to GOST 17516.1-90	M3
Overall dimensions	470×300×225 mm
Weight	not more than 27 kg

Operating conditions

Climatic design — UHL1.

Placement category — 1 according to GOST 15543-70 and GOST 15150-69.

Group of operating conditions with regard to the impact of mechanical factors — M1 according to GOST 17516-92.

Method of installation — mounted.

Advantages

• Reduced costs;

• no additional connection busbars are required between the feeder filter and the extraction cubicle voltage selection cabinet;

• no switching operations are required: Filter-ShON simultaneously fulfils the functions of the feeder filter and the voltage sampling cabinet at the same time;

• integrated line disconnector (earthing switch).

Designation

ShONFP-301S (XX-XXX)/XXXXX UHL1,
where:
ShON — voltage sampling cabinet; FP — feeder filter;
301S — modification of ShON with step-by-step regulation of secondary currents of transformers; XX — lower frequency of the bandwidth, kHz; XXX — upper frequency of the bandwidth, kHz; XXXX — capacitance of the coupling capacitor, pF; UHL1 — climatic design according to GOST 15150.

UNIVERSAL PEDESTAL

Purpose

The universal pedestal is intended for vertical mounting of the line traps with rated current from 630 to 4000 A.

The pedestals are installed:

• on any kind of the bearing construction;

• on the insulated coupling capacitor for line traps connected to 35and 110 kV transmission lines ;

• on the 220 kV coupling capacitor column, consisting of two coupling capacitors and the insulating support, in case the line traps are connected to 220 kV transmission line;

• on all existing types of bus-bar supports, consisting of one or more supporting insulators;

• on other supporting constructions upon customer's request.

Marking

Universal pedestal (PVZ)-XXXX UHL1 (moderate cold climatic modification),
where: XXXX-nominal current frequency of the line trap, for which the pedestal is mounted.

ERVZU
UNIVERSAL LINE TRAP EQUIVALENT

Purpose

ERVZU is designed to check the tuning element of the line trap (barrier band).

ERVZU parameters (inductance and capacitance) according to the type of the tuning element to be tested are set by switches located on the front panel.

The testing of the tuning element is carried out together with the protective device from the delivery set of VZ line trap.

ERVZU is manufactured in a shockproof case.

Technical specifications

Name	Value
Inductance, Lnom	0,1...2,09 mHn
Capacitance, Snom	10...1005 pF
Operating temperature range	+5...+ 45 ˚C
Protection class according to GOST 14254: closed open	IP 67 IP 40
Overall dimensions	258×230×170 mm
Weight	not more than 5 kg

Operating conditions

Climatic design according to GOST 15150-69 — UHL4.

COUPLING CAPACITORS

As the network of high-voltage transmission lines develops, their length increases, and they are equipped with automatics, it becomes necessary to have a reliable dispatching and administrative and economic communication between individual points, transmission of telemetering signals, emergency shutdowns, relay protection and other data. Usually such communication is carried out directly via high-voltage power lines. One of the elements of such communication are capacitors, which separate the communication equipment from the high voltage of 50 Hz, allowing high frequency signals

through the communication channels. The same capacitors are used to make power take-off devices at 50 Hz directly from power lines to supply measuring equipment and power equipment, as well as measuring devices (dividers, voltage transformers) for measurement of transmission line voltage.

Purpose

- to provide high-frequency communication at frequencies from 16 to 1500 kHz in power transmission lines with nominal voltage of 35,110, 150, 150, 220, 330, 500, 750 kV AC of 50 and 60 Hz frequency.
- for connection of communication equipment to power lines 6 to 35 kV power lines and lightning protection ropes.

Capacitors are made in porcelain or composite covers and are impregnated with environmentally safe liquid.

Construction

- Capacitors are manufactured using a film dielectric material.
- By agreement with the customer it is possible to manufacture the capacitors for nominal voltages 110/√3 kV with paper-film dielectric.
- The coupling capacitors are impregnated with an environmentally friendly dielectric fluid, which is not included in the list of substances banned by the Stockholm Convention on Persistent organic pollutants (2001).
- suspended capacitor for active power extraction from AC electric power from alternating current networks of frequency 50 Hz with a voltage of 110 kV.

Upon agreement with the customer it is possible to manufacture capacitors with the leakage path length of external insulation corresponding to III or IV degree of contamination according to GOST 9920-89.

Depending on the design of tyres there may be differences in overall and installation dimensions

capacitors. The required dimensions are specified when ordering.

TERMINATING RESISTOR RO-75/100

Purpose

The RO-75/100 terminating resistor is designed for connection to the coupling filter on the high frequency cable side.

Technical specifications

Name	Value
Active resistance R	75 Ohm ± 5%
Total resistance Z	75 Ohm ± 10%
Attenuation of incoherence Ans	not more than 15 dB
Power dissipation, R	not more than 100 W
Protection class according to GOST 14256-96	IP 54
Overall dimensions	350×330×165 mm
Weight	9 kg

Operating conditions

Climatic design according to GOST 15150-69 — UHL1.

USPD-VL-M

DATA ACQUISITION AND TRANSMISSION DEVICE FOR MONITORING THE STATE OF COMMUNICATION CAPACITORS

Purpose

The data acquisition and transmission device (USPD-VL-M) is designed to determin automatically the change of leakage current of high-voltage communication capacitors.

Design

19" 42U telecoms cabinets.

Main functions

- Detection of changes in the capacitance of the communication capacitors (standard number of communication capacitors 8 with the possibility of increasing to 16, 24, 32 on request);

- display of parameters (capacitance, capacitance change) on a full-colour liquid crystal display;

- information about normal, warning or emergency value of capacitor capacity value of communication capacitors by means of inbuilt sensors, installed in feeder filters or voltage sampling cabinets manufactured by EIS;

- transmission of measured parameters to the control system via Ethernet interface 100 Base-T, MODBUS TCP protocol.

CABLE RK 75-9-12

Purpose

Radio frequency coaxial cable RK 75-9-12 is designed for transmission of radio and video signals in the range from metre to centimetre waves.
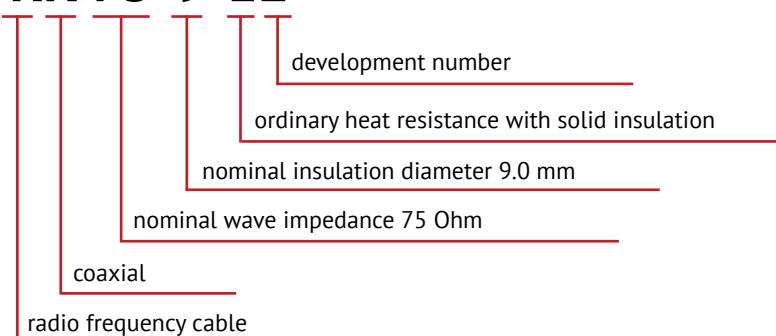
Construction

• inner conductor made of copper wire with nominal diameter of 1,4 mm;
• low density polyethylene insulation overlaid on the inner conductor until it reaches the diameter of the insulation conductor until the insulation diameter reaches 9,00±0,25 mm;
• outer conductor in the form of braid of copper wires with nominal diameter of 0,2 mm, overlapped at an angle of 50-60° with a density of 88-92%;
• PVC plasticate sheath overlaid on the outer conductor until the outer diameter reaches 12,0±0,4 mm.

Designation

RK 75-9-12

development number

ordinary heat resistance with solid insulation

nominal insulation diameter 9.0 mm

nominal wave impedance 75 Ohm

coaxial

radio frequency cable

Mass and dimensions characteristics

Name	Value
Calculated mass (weight)	189,0 kg/km
Outer diameter	12,0 mm
Minimum reel length	№ 8 – 360 m
Maximum length in a coil	264 m

Technical specifications

Name	Value
Wave impedancee	75±2,5 Ohm
Attenuation coefficient	not more than 0,12 dB/m at frequency 0,2 GHz not more than 0,75 dB/m at frequency 3,0 GHz
Internal discharges onset voltage in insulation	not less than 5.0 kV with frequency 50 Hz
Test alternating insulation voltage	10 kV with frequency 50 Hz
Bonding resistance	not more than 200 mOhm/m
Electrical capacitance	67 pF/m
Wavelength shortening factor	1,52
Insulation resistance at 20 °C	not less than 5.0 GOhm-km
Construction length	not less than 100 m
Small sizes in a batch	not more than 20% in pieces from 10 m
Minimum bending radius	120 mm during storage and transport 60 mm at installation from 5 °C and above
Operating temperature range	−40...+85 °C
Service life	not less than 8 years from the date of acceptance
Minimum operating time	1000 h at 85 °C 5000 h at 70 °C 10000 h at 50 °C

INDOOR DISCONNECTORS TYPE RVZ, RVFZ, RVO, RVF
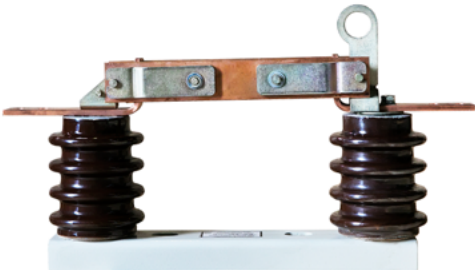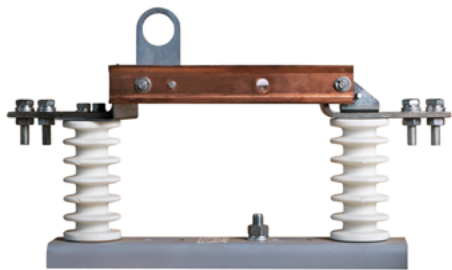
Purpose

AC indoor single-pole disconnectors are used for 10kV. Indoor disconnectors are used:

- to close and open the electrical circuits in curentless state, and to modify the circuit diagram.
- to ensure safety of the staff on off-load areas;
- to enable and disable the charging currents of air and cable lines, idling current of the transformers and light load currents.

Operating conditions

Disconnectors are manufactured for UHL 2 (moderate cold) climatic conditions for working at a height of up to 1000 m above sea level; in rooms where indoor temperature and humidity fluctuations do not differ much from outdoor values and have relatively free access of outside air, e.g. in tents, trailers, trailers, metal rooms without thermal insulation, as well as housed in the complete device or under a porch to avoid direct exposure and fall.

Technical specification

Name	Value
Voltage	
• Rated	10 kV
• Peak	12 kV
Rated current	400 A
Rated short-withstand current	
Current amplitude	41 kA
Peak current for main knives, 4s	16 kA
Peak current for earthing knives, 1s	16 kA

Designation

Disconnector nameplate:
Disconnector RVO-10/400 UHL1, 2
R — disconnector
V — indoor use
O — single pole
10 — rated voltage, kV
400 — rated current, A
UHL — moderate cold climatic version as per GOST 15150
1 (2) — mounting according to GOST 15150.

Reactors
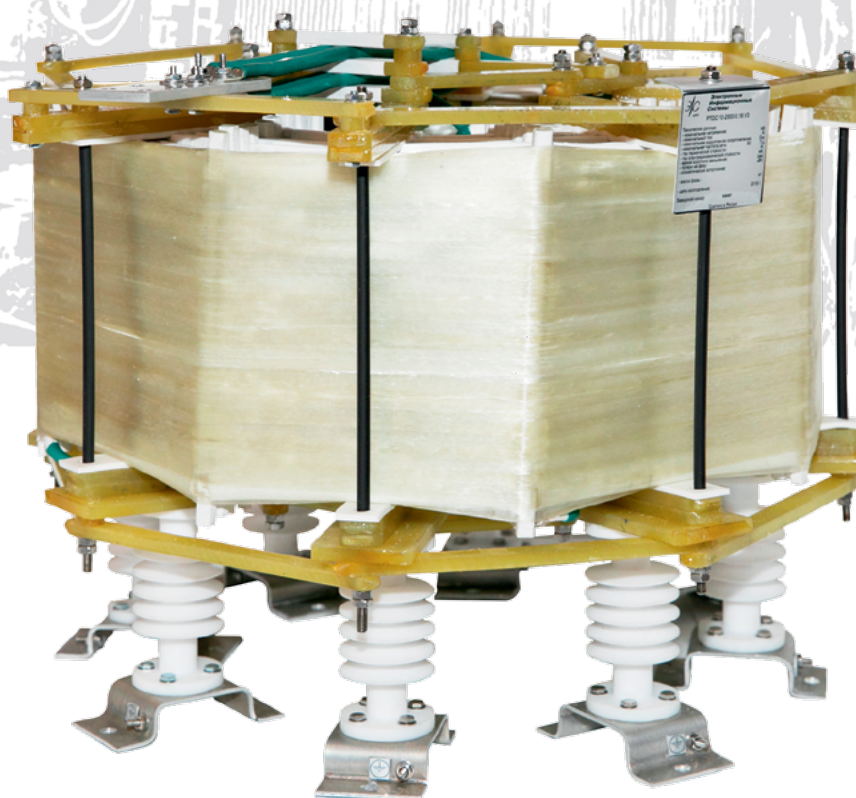
Dry-type reactor

DRY-TYPE REACTOR

Purpose

Reactors are designed to limit short-circuit currents up to the level ensuring safety of cable and overhead power lines and equipment in 50 Hz transmission lines.

With the use of dry-type reactors makes you can make the requirements for dynamic resistance of windings of transformers, circuit breakers and other primary equipment less strict.

Design

- dry-type reactors are made without steel core, their voltampere characteristic is linear;
- the reactor consists of a winding and a pressing system, which securely fixes the winding, the winding is wound on a dielectric frame;
- wires with silicone insulation are used for winding, which corresponds to H class of heat resistance;
- aluminum wire of rectangular cross-section consists of multiwire conductors (it is possible to use wire with insulated conductors, which will reduce losses during reactor operation);
- pressing system consists of stainless steel tie rods and a system of glass-textolite strips;
- silicone gaskets are used between wires and fiberglass plates to prevent damage to wire insulation.

Technical characteristics

Name	Value
Voltage class	3 – 10 kV
Rated current	250 – 4000 A
Rated inductive resistance	0,1 – 2,5 Ohm
Structural design	vertical, horizontal, step-be-step phase arrangement
Climatic design	U, UHL, HL
Placement category	1, 2, 3

Advantages

- The reactor has passed the tests to confirm compliance with GOST 14794-79 and STO PJSC ROSSETI No.56947007-29.180.04.165.165-2014 "Current-limiting reactors for rated voltage of 6-500 kV. Typical technical requirements";
- customized design;
- rectangular cross-section wire with silicone insulation is used in the reactor winding, which increases mechanical reliability of the reactor;
- use of modern insulating materials of H class heat resistance;
- canopies are included in the outdoor type set;
- 30–45 days production period.