

CONTROL CABINETS & ELECTRIC SWITCHGEARS



ZPAS
GROUP

solutions for connections



solutions for connections

ZPAS

C R O U P

ZPAS Milestones – 47 years of experience

2019 – new investments in machinery

2018 – ZPAS celebrates its 45th birthday with all the employees

2016 – opening of an electrical assembly plant with an area of 9 000 m²
in Nowa Ruda – Drogosław at Piłsudskiego Street

2007 – opening of a production plant with an area of 3 500 m²
in Nowa Ruda – Drogosław at Górnicza Street

2007 – opening of a 10 000 m² serial production plant in Nowa Ruda – Słupiec

2003 – the Przygórze plant expanded with new production halls and automatic powder coating plant

1991 – transformation of the experimental plant into the Network Automation Manufacturing Plant (ZPAS) and privatization of the company – joint stock company established

1973 – the former steelworks “Barbara” and buildings of the Przygórze mine “Bolesław”,
decommissioned in 1971, become the seat for the Experimental Department of the Wrocław
Power Systems Institute

We are an innovative company, offering our customers comprehensive solutions for data communication, power engineering and automation.

Our products are used by companies such as General Electric, Siemens, ABB, Dell, Porsche, Homag and many others world leaders. Recently, we have launched a state-of-the-art electrical production plant. The area of 9 000 m² is a place for specialized production related to electrical prefabrication of cabinets and production of AHP heat pumps which is a world-wide unique cooling solution for outdoor cabinets.

Dynamic growth of the company also means taking care of the local community and the environment. ZPAS has always supported institutions of culture, sport and social development.

Piotr Baranowski
*President of the Board
of ZPAS S.A.*

” People power – the real engine of any business.
Good people are not just crucial to a business.
They are the business themselves!

Richard Branson



See the video:
zpas.pl/qr/f16

ZPAS PRODUCTION PLANTS



Przygórze
ZPAS S.A. Management Board Office, administration and design production plant



Nowa Ruda – Drogosław, Piłsudskiego Street
Manufacturing plant – electrical assembly



Nowa Ruda – Drogosław, Górnicza Street
Outdoor Enclosures Production Plant



Nowa Ruda – Słupiec, Spacerowa Street
Serial production plant and warehouse for finished products





For standard indoor products, the manufacturer provides a 5-year guarantee for mechanical components.

Electrical and electronic components, as well as woodwork finishes (desktops and covers) are covered by a 2-year guarantee, provided that they are used as intended and serviced in accordance with the manufacturer's instructions.

For outdoor and custom-made products, the guarantee is determined individually.

QUALITY AND ENVIRONMENTAL MANAGEMENT SYSTEM





CONTROL CABINETS & ELECTRIC SWITCHGEARS

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PREFABRICATION OF SWITCHGEARS FOR ELECTRICAL SUBSTATIONS

We specialize in full-scale prefabrication of switchgears for utility industry, industrial power engineering and automation. Our switchgears are delivered complete with prefabrication, assembly and commissioning.

We prefabricate:

- wiring cabinets (aluminium and thermoset)
- automation cabinets for zero-sequence resistive current forcing (outdoor or indoor)
- control-relay cabinets
- meter cabinets
- controller cabinets
- auxiliaries switchgears (400/230 V AC , 220 V DC, 110 V DC, 48 V DC, 24 V DC, guaranteed 230 V AC)
- telemechanics cabinets
- communications cabinets
- intermediate cabinets (transformers)

Prefabrication is carried out on the basis of documentation provided by the customer or developed by our partner design contractors.

Our workmanship is characterized by the highest quality and attention to detail.

Each switchgear that we manufacture undergoes a quality test.

In the final stage of production, as-built documentation is prepared.



PREFABRICATION OF SWITCHGEARS FOR ELECTRICAL SUBSTATIONS

Wiring cabinets

Wiring cabinets are made based on enclosures intended for outdoor use. Electric instrumentation installed inside the cabinets is used for supplying power to and controlling drives of HV and MV power station switches as well as for transmitting data from measuring circuits.

As a standard, the plinth of the cabinet is equipped with a firescreen compartment. In addition, it is possible to deliver the cabinet in an option with a special concrete foundation.

The cabinet has a basic wiring system designed for:

- supplying power to the cabinet's circuits and transferring it to other cabinets;
- maintaining preset climatic conditions inside the cabinet to ensure correct operation of electric devices;
- providing a lighting system;
- supplying power to one- and three-phase maintenance sockets;
- installing electric gear inside the cabinet, as per customer's request and in accordance with specifications prepared for a specific facility.

The basic configuration of the wiring cabinet is made in conformance with assumptions typically adopted for wiring cabinets designed for HV and MV power stations and is available with or without sectionalisation of circumferential circuits.

The basic electric circuits of the cabinet are protected by means of RCCBs with overcurrent protection. The cabinet's heating is provided using two Cirrus 60 heaters, with a power output of 400 W each, controlled by means of a thermostat with a control range of 0-60 °C. Heating is controlled automatically using the thermostat or manually, by means of a special switch located in the control panel. 40 W light fixtures, one on each side of the cabinet, are powered by door limit switches or manually, by means of a switch located in the control panel. The basic wiring system is designed for the operation in the TN-C-S power system. The wiring cabinet meets the requirements listed in the EN 60439-1 standard.



Wiring cabinet made on the basis of SZD enclosure, made of aluminium profiles (see catalogue ZPAS Outdoor Cabinets)



Wiring cabinet made on the basis of the SZDRP enclosure, with aluminium sheet insulated double walls

RATING

Cabinet factory designation	SZDs-355
Rated primary voltage	400/230 V
Rated continuous current of the cabinet's own wiring system	25 A
Rated frequency	50 Hz
Rated insulation voltage	500 V
Protection degree	IP 54 / IP 55

With many years of prefabrication experience, ZPAS is able to supply a mechanically prepared empty enclosure for prefabrication companies. Each enclosure configuration is individually selected according to customer needs.

PREFABRICATION OF SWITCHGEARS FOR ELECTRICAL SUBSTATIONS



Control & protection cabinets

Control cabinets designed to house control and safety automation systems in substation control rooms.

We offer prefabrication of:

- feeder panel cabinets
- transformer panel cabinets
- coupler panel cabinets
- voltage measurement panel cabinets
- central indication cabinets
- clutch safeguard cabinets

Protection cabinets

FR protection cabinets offered by ZPAS are indoor structures, designed for installing safeguards, control equipment, signalling equipment and instrumentation as well as control for MV and HV switchrooms.

FR protection cabinets are made based on SZE2 enclosures with dimensions 2000 x 800 x 600 or 2000 x 800 x 800 mm. Depending on customer requirements and equipment provided by the technical design, cabinet construction can be customized to individual needs – both in terms of dimensions and equipment.

Typical cabinets configuration:

- glazed front door,
- symmetrical swing frame and mounting plate or a set of mounting profiles for installing devices behind the swing frame,
- access to equipment on one side or both sides,
- equipment protected by IP 30 masking panels,
- descriptions made as requested and according to standard of the facility which the switchgears are designed for,
- plinth with a height of 100 or 200 mm, solid or perforated.

Protection cabinets we make:

- Protection of 110 kV, 220 kV, 400 kV lines
- Protection of HV transformers
- Protection of coupler

Installed safeguards:

- Distance
- Differential protection
- Overcurrent protection
- Earth-fault protection
- Section protection
- Breaker failure protection
- Bus-bar protection



The standard protection cabinet configuration includes control gear and signalling equipment, instrumentation and control mounted on a symmetrical hinged frame as well as auxiliary relays, circuit protection equipment, power supplies, connectors for connecting external circuits, etc. mounted on a mounting plate or on mounting profiles inside the cabinet. The cabinets are made with single-sided or double-sided access.

With many years of prefabrication experience, ZPAS is able to supply a mechanically prepared empty enclosure (see catalogue ZPAS Industrial Enclosures) for prefabrication companies. Each enclosure configuration is individually selected according to customer needs.

PREFABRICATION OF SWITCHGEARS FOR ELECTRICAL SUBSTATIONS

Meter cabinets

Meter cabinets are made on the basis of SZE2 enclosures. Depending on a project, their dimensions are 2000 x 600-800 x 600-800 mm. The typical configuration is the mounting plate. There is also a solution with a split mounting plate. Its upper part is then rotatable, and the lower part is fixed. The upper one is designed for installation of electricity meters, whereas the lower one for mounting measurement strips. There are also solutions with a swing frame. Electricity meters are then mounted on the frame, and the measurement strips on the mounting plate or the system of mounting profiles. Access may be one-sided or two-sided. Glazed door.

Cabinet configuration is tailored to the station design and can always be adapted to the customer's requirements – both in terms of dimensions and equipment.



PREFABRICATION OF SWITCHGEARS FOR ELECTRICAL SUBSTATIONS



AC auxiliaries switchgears
400/230 V

FX, FA auxiliaries switchgears offered by ZPAS are indoor structures, designed for supplying auxiliary demand of MV and LV switchrooms.

FX and FA switchgears are based on SZE2 enclosures. They consist of three or more cabinets with dimensions 2000 x 600-1200 x 600-800 mm.

Depending on customer requirements or equipment provided by the technical design, cabinet construction can be customized to individual needs – both in terms of dimensions and equipment.

A typical configuration of FX and FA switchgears:

- solid or glazed front door,
- access to equipment on one side or both sides,
- terminal strips, busbar trunkings are mounted inside the cabinet on the mounting plate or the system of mounting profiles,
- descriptions made as requested and according to standard of the facility which the switchgears are designed for, - plinth with a height of 100 or 200 mm, solid or perforated.



Auxiliaries switchgear 400/230 V AC is supplied from two or more sources. Circuit-breakers or contactors are fitted in the main tracks in accordance with the project requirements. The basic element of the system is the SZR automation system tailored to customer requirements. For protecting outgoing feeds, fused load break switches, e.g. NH, TYTAN II, circuit breakers or thermal fuses are used. Each outgoing track is led to the terminal block. Switchgears are equipped with measurement of current and voltage of each incoming feed. Meters can be located on switchgear door or inside the cabinet on masking panels. Switchgears are equipped with signalling and emergency circuits incorporated into the station's central signalling system.

RATING

Cabinet factory designation	FX, FA
Primary rated voltage	400/230 V
Rated continuous current of cabinet's auxiliaries	up to 1600 A
Rated frequency	50 Hz
Rated insulation voltage	500 V
Protection degree	IP 54

PREFABRICATION OF SWITCHGEARS FOR ELECTRICAL SUBSTATIONS



PREFABRICATION OF SWITCHGEARS FOR ELECTRICAL SUBSTATIONS



FC auxiliaries switchgears 110/220 V DC and guaranteed voltage switchgears 230 V AC and 24-48 V DC

FC auxiliaries switchgears offered by ZPAS are indoor structures, designed for supplying auxiliary demand of MV and LV switchrooms.

FC switchgears are made based on of SZE2 enclosures with dimensions 2000 x 600-800 x 600-800 mm. Depending on customer requirements or equipment provided by the technical design, cabinet construction can be customized to individual needs – both in terms of dimensions and equipment.

A typical configuration of FC switchgears:

- glazed front door,
- set of 19" mounting profiles in front and rear of the cabinet,
- equipment protected by IP 30 masking panels,
- access to equipment on one side,
- descriptions made as requested and according to standard of the facility which the switchgears are designed for,
- plinth with a height of 100 or 200 mm, solid or perforated.

Constant voltage switchgears are intended for supplying appliances with DC with rated voltage of 110 V and 220 V. The switchgear is supplied with alternating voltage from one or two sources. The main element of this system is a rectifier with external current measurement and a battery pack placed on the outside of the cabinet.

Guaranteed voltage switchgears are intended for supplying appliances of critical internal functions of the station, such as secondary protection circuits, control circuits and emergency signalling circuits. 230 V AC switchgears are equipped with inverters, whereas 24-48 V DC switchgears have power supplies with parameters in accordance with the station design. For protecting outgoing feeds, fused load break switches, e.g. NH, TYTAN II, circuit breakers or thermal fuses are used. Each outgoing track is led to the terminal block. Switchgears are equipped with measurement of current and voltage of each incoming feed. Meters can be located on switchgear door or inside the cabinet on masking panels. Switchgears are equipped with signalling and emergency circuits incorporated into the central signalling system.



RATING

Cabinet factory designation	FX, FA
Primary rated voltage	230 V AC, 24-48 V DC
Rated continuous current of cabinet's auxiliaries	up to 63 A
Rated frequency	50 Hz, 0 Hz
Rated insulation voltage	500 V
Protection degree	IP 54

We also offer prefabrication of 220 V DC, 110 V DC, 48 V DC, 24 V DC and 230 V AC guaranteed voltage auxiliaries switchgears, designed for use in substations.

PREFABRICATION OF SWITCHGEARS FOR ELECTRICAL SUBSTATIONS

Telecommunication cabinets

FT and SUT telecommunication cabinets are made based on of SZE2 and SZB enclosures. Their dimensions are 2000 x 600 x 600-800 mm. The typical configuration includes front glazed door, a set of 19" mounting profiles in front and rear of the cabinet, equipment protected by IP 30 masking panels. Access is one-sided. Usually it houses equipment for collecting information on the state of the station, and transferring the information to the master system. Cabinet configuration is tailored to the station design and can always be adapted to the customer's requirements – both in terms of dimensions and equipment.



**SUT telecommunication cabinet
on the basis of SZB enclosure**

Telemechanics cabinets

Telemechanics cabinets designed for use in substation control rooms in order to ensure remote control and monitoring of substation equipment.



ELECTRIC SWITCHGEARS



Switchgears up to 630 A

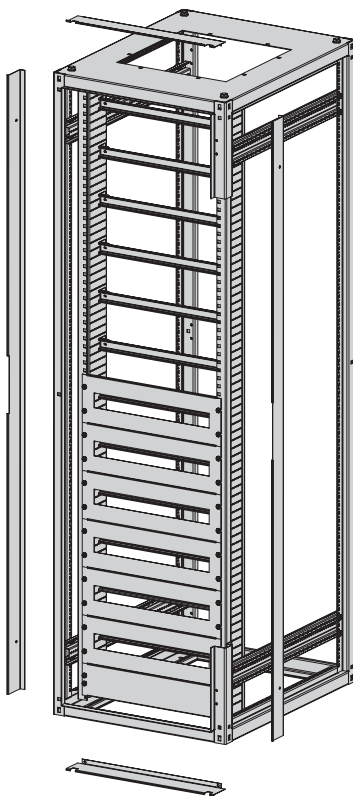
Switchgears for currents up to 630 A are made based on our own enclosures and enclosures of all the companies on the market. Our own structures are based on the basic version of the power cabinets manufactured by ZPAS – i.e. SZE2 cabinets. These cabinets are made of single-walled steel sheet and powder coated. Modular equipment is installed on dedicated structure. Switchgears based on this design are featured with IP 30 safe-to-touch protection degree, and IP 64 in case door is closed.

These switchgears utilize 60 mm rails from Wohner, Hager, Eaton, equipment from ABB, Efen, ETI, Hager, Eaton, Schneider, Schrack, Siemens.

The switchgears have three distinguished assembly zones:

- busbar system zone (3 BMHs),
- apparatus assembly zone (8 BMHs in case of the cabinets 2000 mm high),
- cable entry zone (1 BMHs + 100 mm).

With such a switchgear construction, the cabinets 2000 mm high and 600 mm wide can contain modular instrumentation counting 288 units (18 mm), cabinets 800 mm wide – 432 modules, and cabinets 1000 mm wide – 576 modules, respectively.



ZPAS Modular System
- see catalogue ZPAS Industrial Enclosures

SWITCHGEAR PARAMETERS

Switchgear factory designation	RM 630
Primary rated voltage	400/230 V
Rated continuous current of the switchgear	630 A
Rated peak withstand current	14.7 kA
Rated short time withstand current	7 kA / 1 s
Rated frequency	50 Hz
Rated insulation voltage	500 V
Rated short duration power frequency withstand voltage	2.5 kV
Protection degree with the door open	IP 64

ELECTRIC SWITCHGEARS

Switchgears up to 3200 A

The SZE3/SGP System Switchgears are designed for distribution of electricity, as well as for control and protection of electrical equipment against short circuits and overloads. They give the user a high level of safety and comfort. The main features of SZE-3/SGP switchgears are modularity and compactness. Also, the cabinets are adapted to the units they hold so that the units can be used fully.

SZE3/SGP System highlights:

- easy and safe operation,
- easy to modify (reconstruct and expand), easy to replace damaged units and adapt them to changing needs,
- clear spatial and functional division,
- compact design for optimum use of space,
- highly reliable,
- withdrawable units provide high level of safety for personnel and enable quick replacement of supply units without having to shut down the entire switchgear,
- easy service and maintenance,
- withdrawable, mobile (pin) and fixed functional units can be used together in a cabinet,
- possible to use disconnectors with fuses in the form of moving units in a horizontal layout.

As presented, the most frequently used cabinets and functional units can be expanded with other solutions to suit the customer's needs.

Switchgears and controlgears available in the SZE3/SGP system undergo full type testing and meet PN-EN 61439-1 and PN-EN 61439-2 standards, with every single unit being subject to product testing.

SWITCHGEAR PARAMETERS

Switchgear type	SZE3/SGP 3200 A	
Rated current I_n	3200 A	
Rated switching voltage U_e	230/400 V	
Rated insulation voltage U_i	1000 V	
Withstand voltage at 50 Hz mains frequency	2200 V	
NRated short-time power frequency withstand voltage U_{imp} 1.2/50 of the main circuit	8000 V	
Rated frequency f_n	50 Hz	
Rated short-time withstand current I_{cw}		
- main busbars	100 kA, 1 s	
- distribution busbars	100 kA, 1 s	
- N and PE busbars	60 kA, 1 s	
Rated peak withstand current I_{pk}		
- main busbars	220 kA	
- distribution busbars	220 kA	
- N and PE busbars	132 kA	
Protection class	IP31 – design I	IP55 – design II
Insulation class	I	
Busbar layout	L1, L2, L3, N, PE	
Main phase busbar system	Overhead	
Mains type	TN-C, TN-C-S, TN-S, TT, IT	
Design	For indoor systems	For outdoor systems
Body dimensions $H \times W \times D$ [mm]		
- incoming feeder	2100 x 800 x 600	
- outgoing feeder with vertical strip disconnectors	2100 x 800 x 600	
- outgoing feeder with horizontal strip disconnectors	2100 x 1000 x 600	
- outgoing feeder with moulded-case circuit breakers	2100 x 1000 x 600	

ELECTRIC SWITCHGEARS

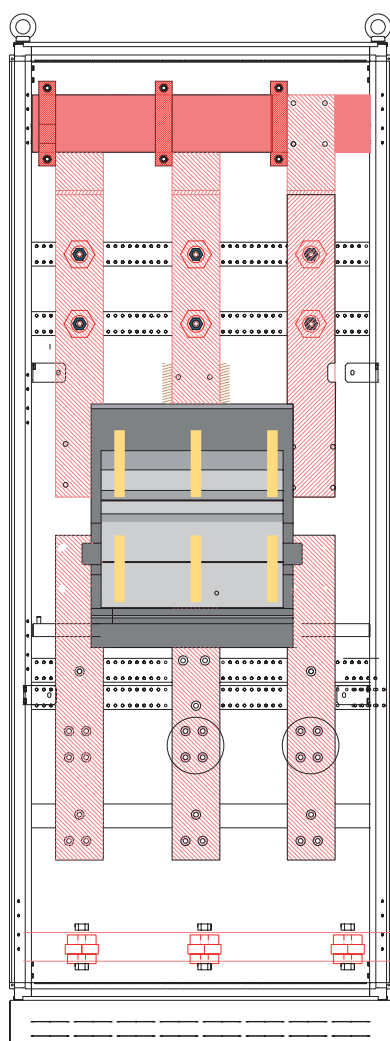
Switchgears up to 3200 A

INCOMING FEEDER 3200 A

Incoming feeder – with air circuit breaker up to 4000 A

Circuit breaker technical data

- Rated current $I_n = 4000$ A
- Rated voltage = 440 V
- Short-circuit breaking capacity:
 $I_{cs} = 100$ kA
 $I_{cm} = 220$ kA
- Rated impulse withstand voltage = 12 kV
- Rated short-circuit current 1 s = 100 kA
- Short-circuit breaking capacity $I_{cc} = 100$ kA
- Switching voltage $U_e = 690$ V

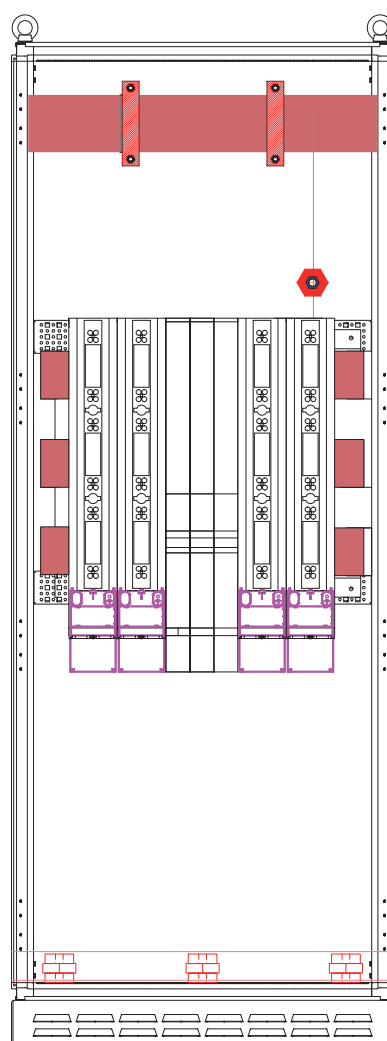


OUTGOING FEEDER WITH VERTICAL STRIP DISCONNECTORS

Outgoing disconnector feeder – with NSL-E3 vertical strip disconnectors spaced by 185 mm

Disconnector technical data

- Rated thermal current $I_{th} = 250-630$ A
- Maximum rated working voltage U_e AC = 690 V
- Use category = AC-21B
- Switching voltage $U_e = 690$ V
- Nominal operational current = 160–630 A
- Rated conventional short-circuit current = 100 kA
- Rated insulation voltage = 1000 V
- Rated impulse withstand voltage $U_{imp} = 8$ kV
- Fuse link type = NH1-3



ELECTRIC SWITCHGEARS

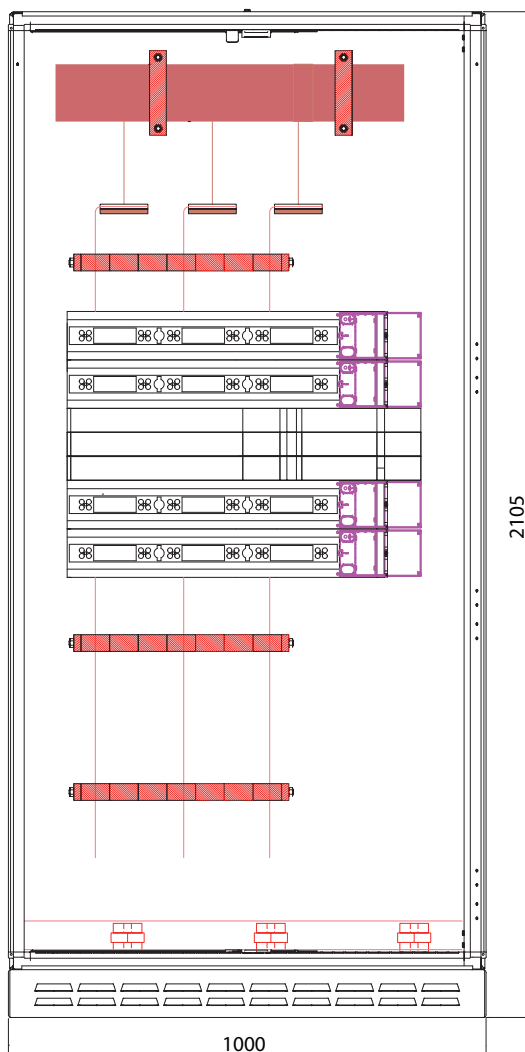
Switchgears up to 3200 A

OUTGOING FEEDER WITH HORIZONTAL STRIP DISCONNECTORS

Outgoing disconnector feeder – with NSL-E3 vertical strip disconnectors spaced by 185 mm

Disconnector technical data

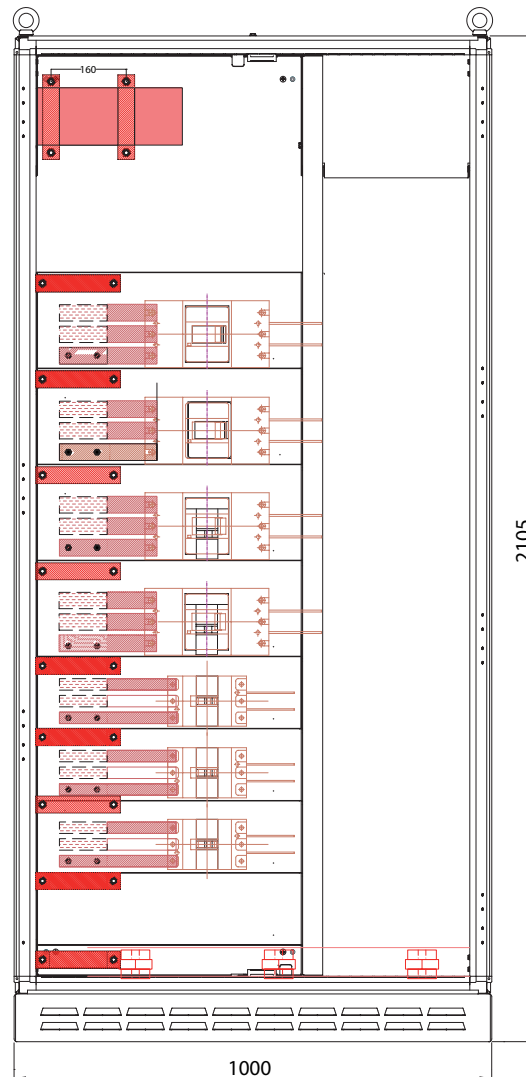
- Rated thermal current $I_{th} = 250-630$ A
- Maximum rated working voltage U_e AC = 690 V
- Use category = AC-21B
- Switching voltage $U_e = 690$ V
- Nominal operational current = 160–630 A
- Rated conventional short-circuit current = 100 kA
- Rated insulation voltage = 1000 V
- Rated impulse withstand voltage $U_{imp} = 8$ kV
- Fuse link type = NH1-3

**OUTGOING FEEDER WITH MOULDED-CASE CIRCUIT BREAKERS**

Outgoing circuit-breaker feeder

Circuit breaker technical data

- Rated current $I_n = 160-630$ A
- Rated voltage $U_n = 690$ V
- Rated impulse withstand voltage $U_{imp} = 8$ kV
- Rated limit breaking capacity: = 120 kA



ELECTRIC SWITCHGEARS



Capacitor bank cabinets

The electric reactive power Q (kVar) is taken from the grid and used to generate the electromagnetic field necessary for the operation of induction motors and transformers. This power cannot be transformed into a different form of energy, but it only flows idly between sources and takeoffs of alternating current. Instead of transmitting reactive power over long distances through the transmission grid, it can be produced locally (e.g. at an industrial plant or in a power distribution location). This is referred to as reactive power compensation and is often done by installing capacitors and capacitor banks. Reactive power compensation and the use of capacitor banks delivers real technical, economic and ecological benefits. Using a properly selected capacitor bank for the customer means that additional appliances can be installed without having to replace the power transformer. However, the most important economic factor is the lack of charges for reactive energy consumption, as electricity suppliers use additional charges to compensate for losses incurred as a result of reactive power transmission (when power factor $\text{tg } \varphi$ at customer's industrial plant is higher than 0.4 or $\cos \varphi$ is lower than 0.93);

The technical and economic aspects are also very important for the electricity supplier, since the power to be generated in the power plant and then sent to the industrial plant is decreased.

As described above, the use of capacitor banks for inductive reactive power compensation is aimed at reducing losses in transmission grids, reducing inductive power consumption and, consequently, reducing electricity bills. There are many methods for determining the reactive power values.

A quick method of selecting the capacitor bank power involves using an electricity bill. This should be done when the plant load was at the target level during the invoiced period. The bill also gives $\text{tg } \varphi$ – maximum in a given billing period.

Capacitor bank power is determined from the formula:

$Q_{\text{BAT}} = P_{\text{max}} (\text{tg } \varphi - 0.4 + 0.1)$, where:

P_{max} = 15-minute maximum power read from the bill in kW,

Q_{BAT} = capacitor bank power in kVar

Another equally simple method used to calculate the power needed for compensation is calculated from the formula:

$Q_{\text{BAT}} = P_{\text{obl}} (\text{tg } \varphi_{\text{obl}} - \text{tg } \varphi_w)$, where:

P_{obl} = the total calculated active power of the appliances in the plant, taking into account coincidence factors, etc.

$\text{tg } \varphi_{\text{obl}}$ = tangent corresponding to the calculated $\cos \varphi$

$\text{tg } \varphi_w$ = tangent required by power plants (typically 0.4 for standard contracts)

This gives you an approximate value of the power to be compensated for. Then you select a bank and a controller for this.

To select the right power of a capacitor bank, you will also need type of power and level of voltage and current distortion. This information can be obtained through measurements. Type of capacitor bank is selected based on load variation rate and distortion level.

A capacitor bank often pays for itself just after a few months. Since the lifetime of a properly selected unit is at least a dozen years, this is certainly money well spent, money that will come back to you even 20-fold. Installing capacitor banks does not require you to give notice to your electricity supplier, and does not increase active energy consumption.

When set up correctly, a capacitor bank works autonomously and automatically. It only requires periodic inspections (at least once a year) which involve dust removal and visual inspection of devices and current circuits.

ZPAS produces two types of capacitor banks for automatic compensation:

- 1. BKZN basic version for networks with small harmonic interference of SH/ST < 25 %,
- 2. version with BKDZN protective chokes for networks with harmonic interference of SH/ST < 50 %.

For the production of banks we use Alpivar capacitors of Legrand. The capacitors are made with insulation class II in the housing made of self-extinguishing polyurethane resin. Each capacitor bundle is triple-protected by:

- self-extinguishing metallized polypropylene tape,
- electrical fuse,
- overpressure disconnecter.

The maximum allowable capacitor voltage is 1.18 U_n , and the maximum allowable current is 1.5 In. Operating temperature -25/+55 °C. Capacitors have internal discharge resistors with discharge time of 3 min. Alpivar capacitor loss power is 0.3 W per 1 kVar. The capacitor banks we produce are automatic; thus, switching on individual capacitor stages is done via electromechanical contactors controlled by Alptec power factor controller.

Cabinets are equipped with compensation panels and have the typical and uniform dimensions, which simplifies installation and expansion of the cabinets.

Our range of capacitor banks is presented in the following tables; however, configurations tailored to customer requirements are also available.

ELECTRIC SWITCHGEARS

NON-CHOKE CAPACITOR BANK SPECIFICATIONS

Basic type BKZN
 Nominal power of a single rack 2.5 up to 125 kVAr
 Nominal power of a cabinet set 7.5 up to 300 kVAr
 Nominal voltage 3x400 V, 50 Hz
 Maximum allowable voltage 520 V (capacitor)
 Harmonics THDU < 3 %
 THDI < 10 %
 SH/ST ≤ 25 %
 Loss factor 2 W/kVAr
 Operating temperature range -10 °C up to +45 °C
 24-hour average: +40 °C
 Storage temperature -20 °C up to +60 °C
 Cabinet dimensions (W x D x H) 600 x 500 x 1400 mm
 Rack dimensions (W x D x H) 580 x 400 x 248 mm
 Compliant with IEC 61439-1 and 2

Capacitor banks cabinets with automatic power control without chokes					
Type	Catalogue number	Bank power [kVAr]	Degrees [kVAr]	Cabinet dimensions [mm] (H x W x D)	Number of units
BKZN-7,5	WN-1464-01-01-011	7.5	(3x2.5)	1400 x 600 x 500	3
BKZN-10	WN-1464-01-02-011	10	(2x2)+(1x5)	1400 x 600 x 500	3
BKZN-15	WN-1464-01-03-011	15	(1x2.5)+(1x5)+(1x7.5)	1400 x 600 x 500	3
BKZN-20	WN-1464-01-04-011	20	(1x2.5)+(1x5)+(1x12.5)	1400 x 600 x 500	3
BKZN-25	WN-1464-01-05-011	25	(1x5)+(2x10)	1400 x 600 x 500	3
BKZN-30	WN-1464-01-06-011	30	(3x10)	1400 x 600 x 500	3
BKZN-35	WN-1464-01-07-011	35	(1x5)+(1x7.5)+(1x10)+(1x12.5)	1400 x 600 x 500	4
BKZN-40	WN-1464-01-08-011	40	(1x7.5)+(2x10)+(1x12.5)	1400 x 600 x 500	4
BKZN-45	WN-1464-01-09-011	45	(2x10)+(2x12.5)	1400 x 600 x 500	4
BKZN-50	WN-1464-01-10-011	50	(2x12.5)+(1x25)	1400 x 600 x 500	3
BKZN-55	WN-1464-01-11-011	55	(1x7.5)+(1x10)+(1x12.5)+(1x25)	1400 x 600 x 500	4
BKZN-60	WN-1464-01-12-011	60	(1x10)+(2x12.5)+(1x25)	1400 x 600 x 500	4
BKZN-62,5	WN-1464-01-13-011	62.5	(3x12.5)+(1x25)	1400 x 600 x 500	4
BKZN-70	WN-1464-01-14-011	70	(1x7.5)+(1x12.5)+(2x25)	1400 x 600 x 500	4
BKZN-75	WN-1464-01-15-011	75	(3x25)	1400 x 600 x 500	3
BKZN-87,5	WN-1464-01-16-011	87.5	(1x12.5)+(3x25)	1400 x 600 x 500	4
BKZN-100	WN-1464-01-17-011	100	(2x25)+(1x50)	1400 x 600 x 500	3
BKZN-112,5	WN-1464-01-18-011	112.5	(1x15)+(2x25)+(1x50)	1400 x 600 x 500	4
BKZN-125	WN-1464-01-19-011	125	(1x25)+(2x50)	1400 x 600 x 500	3
BKZN-150	WN-1464-01-20-011	150	(1x25)+(1x50)+(1x75)	1400 x 600 x 500	3
BKZN-175	WN-1464-01-21-011	175	(1x25)+(3x50)	1400 x 600 x 500	4
BKZN-200	WN-1464-01-22-011	200	(1x25)+(2x50)+(1x75)	1400 x 600 x 500	4
BKZN-225	WN-1464-01-23-011	225	(1x25)+(1x50)+(2x75)	1400 x 600 x 500	4
BKZN-250	WN-1464-01-24-011	250	(2x50)+(2x75)	1400 x 600 x 500	4
BKZN-275	WN-1464-01-25-011	275	(1x50)+(3x75)	1400 x 600 x 500	4
BKZN-300	WN-1464-01-26-011	300	(4x75)	1400 x 600 x 500	4
BKZN-65	WN-1464-01-27-011	65	(2x12.5)+(1x25)+15	1400 x 600 x 500	4
BKZN-90	WN-1464-01-28-011	90	(1x155)+(3x25)	1400 x 600 x 500	4

CHOKE CAPACITOR BANK SPECIFICATIONS

Type with chokes BKDZN
 Nominal power of a single rack 2.5 up to 125 kVAr
 Nominal power of a cabinet set 7.5 up to 300 kVAr
 Nominal voltage 3x400 V, 50 Hz
 Maximum allowable voltage 520 V (capacitor)
 Harmonics THDU < 6 %
 THDI < 40 %
 SH/ST ≤ 50 %
 Loss factor 6 W/kVAr
 Operating temperature range -10 °C up to +45 °C
 24-hour average: +40 °C
 Storage temperature -20 °C up to +60 °C
 Cabinet dimensions (W x D x H) 800 x 500 x 1600 mm
 Rack dimensions (W x D x H) 700 x 458 x 325 mm
 Compliant with IEC 61439-1 and 2

Capacitor banks cabinets with automatic power control with chokes					
Type	Catalogue number	Bank power [kVAr]	Degrees [kVAr]	Cabinet dimensions [mm] (H x W x D)	Number of units
BKDZN-7,5	WN-1465-03-01-011	7.5	(3x2.5)	1600 x 800 x 500	3
BKDZN-10	WN-1465-03-02-011	10	(2x2.5)+(1x5)	1600 x 800 x 500	3
BKDZN-15	WN-1465-03-03-011	15	(1x2.5)+(1x5)+(1x7.5)	1600 x 800 x 500	3
BKDZN-20	WN-1465-03-04-011	20	(1x2.5)+(1x5)+(1x12.5)	1600 x 800 x 500	3
BKDZN-25	WN-1465-03-05-011	25	(1x5)+(2x10)	1600 x 800 x 500	3
BKDZN-30	WN-1465-03-06-011	30	(3x10)	1600 x 800 x 500	3
BKDZN-35	WN-1465-03-07-011	35	(1x5)+(1x7.5)+(1x10)+(1x12.5)	1900 x 800 x 500	4
BKDZN-40	WN-1465-03-08-011	40	(1x7.5)+(2x10)+(1x12.5)	1900 x 800 x 500	4
BKDZN-45	WN-1465-03-09-011	45	(2x10)+(2x12.5)	1900 x 800 x 500	4
BKDZN-50	WN-1465-03-10-011	50	(2x12.5)+(1x25)	1600 x 800 x 500	3
BKDZN-55	WN-1465-03-11-011	55	(1x7.5)+(1x10)+(1x12.5)+(1x25)	1900 x 800 x 500	4
BKDZN-60	WN-1465-03-12-011	60	(1x10)+(2x12.5)+(1x25)	1900 x 800 x 500	4
BKDZN-62,5	WN-1465-03-13-011	62.5	(3x12.5)+(1x25)	1900 x 800 x 500	4
BKDZN-70	WN-1465-03-14-011	70	(1x7.5)+(1x12.5)+(2x25)	1900 x 800 x 500	4
BKDZN-75	WN-1465-03-15-011	75	(3x25)	1600 x 800 x 500	3
BKDZN-87,5	WN-1465-03-16-011	87.5	(1x12.5)+(3x25)	1900 x 800 x 500	4
BKDZN-100	WN-1465-03-17-011	100	(2x25)+(1x50)	1600 x 800 x 500	3
BKDZN-112,5	WN-1465-03-18-011	112.5	(1x12.5)+(2x25)+(1x50)	1900 x 800 x 500	4
BKDZN-125	WN-1465-03-19-011	125	(1x25)+(2x50)	1600 x 800 x 500	3
BKDZN-150	WN-1465-03-20-011	150	(1x25)+(1x50)+(1x75)	1600 x 800 x 500	3
BKDZN-175	WN-1465-03-21-011	175	(1x25)+(3x50)	1900 x 800 x 500	4
BKDZN-200	WN-1465-03-22-011	200	(1x25)+(2x50)+(1x75)	1900 x 800 x 500	4
BKDZN-225	WN-1465-03-23-011	225	(1x25)+(1x50)+(2x75)	1900 x 800 x 500	4
BKDZN-250	WN-1465-03-24-011	250	(2x50)+(2x75)	1900 x 800 x 500	4
BKDZN-275	WN-1465-03-25-011	275	(1x50)+(3x75)	1900 x 800 x 500	4
BKDZN-300	WN-1465-03-26-011	300	(4x75)	1900 x 800 x 500	4
BKDZN-90	WN-1465-03-27-011	90	(2x12.5)+(1x25)+15	1900 x 800 x 500	4
BKDZN-140	WN-1465-03-28-011	140	(1x15)+(3x25)	1900 x 800 x 500	4

ELECTRIC SWITCHGEARS

Automatic transfer switch system

Automatic transfer switch (ATS) devices are used to increase supply reliability for important takeoffs. Their task is to detect excessive decrease or loss of the primary power supply voltage and switch to backup power.

There are ATS systems with overt and covert backup. In ATS systems with overt backup, after detecting primary power failure, reserve power switch is turned on, whereas in systems with covert backup, breaker switch of the coupler.

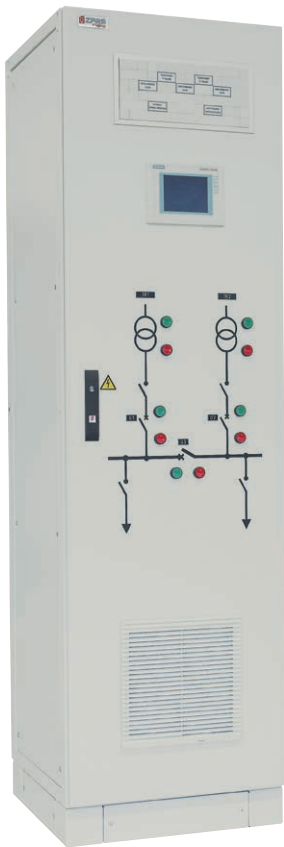
In terms of ATS operation time, one can distinguish:

- slow ATS devices with a sufficiently long time of operation (above 0.4 s) to suppress residual voltage of rundown motors,
- fast ATS devices with a sufficiently short time (below 0,25 s) to prevent too large difference between vectors of the mains voltage and residual voltage.

There is short ATS cycle when excitation takes place from the moment of opening the primary power switch, and full ATS cycle when excitation takes place from the moment of voltage loss for the primary power supply.

ATS devices are usually installed in auxiliaries networks of utility power plants and industrial power plants, industrial switchrooms that power important takeoffs, as well as in power grid switchrooms.

OUR PROPOSALS



Controller-based ATS systems

We also offer you controller-based ATS systems. We use controllers of most companies present on the market. ATS system status is visualised on control panels, matrix panels and on panels lined on the switchgear door. In the controller version, the ATS system can perform any type of ATS and any switching scenario. Acting on the ATS system status can be performed using switches located on the switchgear door, as well as the touch control panel.

Example of a controller-based ATS system with touch panel, matrix panel and lined panel

ELECTRIC SWITCHGEARS

ATS systems based on dedicated control panels

We also offer you precise ATS systems based on dedicated control panels for specific cases, network-to-network, network-to-generator, etc. These panels are designed for installations where power reliability is essential. These panels have high measurement accuracy and are highly reliable.



ATS system for multiple incoming feeds, based on the control panels of Energotest-Energopomiar, made for the Wielopole power station

Relay-based ATS systems

We offer you slow relay-based ATS systems in network-to-network version in overt or covert backup configuration, and a network-to-generator for overt backup. Our ATS system can control both contactors and circuit breakers equipped with motor drives, and can be supplied with or without them.

Installing the system is possible in two variants:

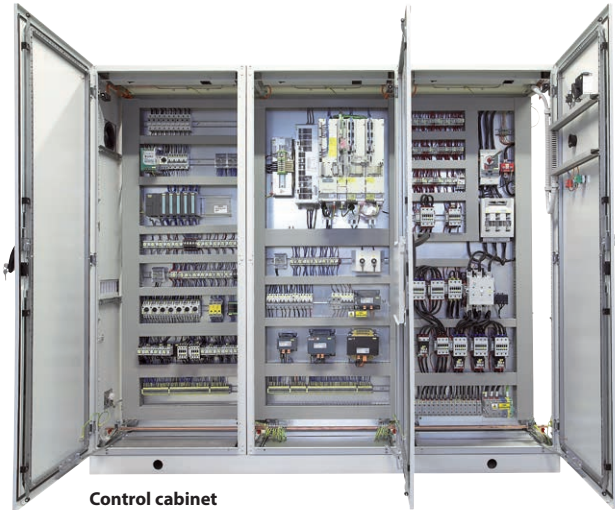
- on the mounting plate (e.g. in SWN cabinet made by ZPAS or in any switchgear that has enough space on the plate),
- on 19" frame using a PS-3U panel made by ZPAS.

The systems provide for signalling the presence of voltage across individual power lines and signalling current power line that is supplying takeoffs. Supply is switched from the primary power supply to the backup and then returns to the primary one, once the set delay time has elapsed. The delay is set separately for backup switching and return switching. Switching to backup network or power generator supply is triggered by voltage loss in the primary network or voltage asymmetry in at least one phase of the primary network. For the network-to-generator configuration, also UPS is provided to power the devices that control the ATS system in the event of voltage loss in the primary power supply (in the version where the system is integrated with the PS-3U panel, UPS is not installed inside the panel).



Relay-based ATS system mounted in a cabinet

PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS



Control cabinet
based on the SZE2 enclosure

Scope of offer

ZPAS delivers switchgear, control cabinets, cross-connection cabinets, wiring cabinets, metering cabinets, automatics cabinets and a complete range of power engineering structures for any application in line with our customers' wishes. We manufacture switchgears type **SZE-3/SGP 3200 A** and **SZE-2/SGP 1250 A** based on our own enclosure designs. Common switchgears up to 3200 A of the SZE3/SGP system are designed for distribution of electricity, as well as for control and protection of electrical equipment against short circuits and overloads.

In addition to the switchgears mentioned above, we also manufacture switchgears based on the equipment and widely available enclosures of other manufacturers, such as Hager, Eaton, Schrack, ABB and Siemens.

ZPAS equips all their enclosures with electrical equipment according to their own designs, or designs developed by other design contractors and submitted by the customer.

For our switchgear we manufacture input, coupling and output bays with stationary and withdrawable circuit breakers, with knife switches and fuse switches (the latter offered in box and strip versions), as well as horizontal and vertical terminal bays. We deliver outgoing feeders equipped with contactors and inverters. We manufacture switchgears with guaranteed power supply, equipped with ATS systems in relay and control configuration.

We make control cabinets equipped with controllers from Siemens, GE Fanuc, Wago, Beckhoff, Phoenix Contact and other manufacturers, which are used to control production processes. We provide cabinets dedicated for power distribution purposes which can be used in the following applications: cross-connection cabinets, wiring cabinets, control cabinets, lighting cabinets, battery cabinets, protection cabinets, telemechanics cabinets, central signalling system cabinets, meter cabinets, etc.



Switchgear based on the SZE3 enclosure

PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS



Outdoor
telecommunication
cabinet



Low-voltage distribution cabinet



Outdoor cabinet
for an electrical substation

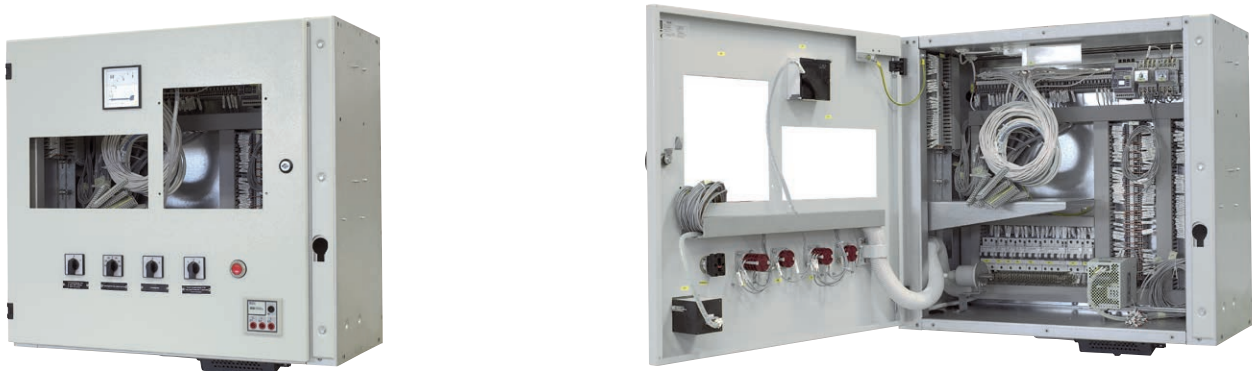
We produce **cabinets dedicated for telecommunications**, intended for telecommunication devices, equipped with power supply, ventilation, heating and signalling systems for access, power and climate conditions. These designs are based on **SZD outdoor enclosures**.

SZD enclosures are also used in the manufacture of wiring cabinets for electrical substation. As a result, the enclosures have a long operating life and optimum climatic conditions for electrical devices, which increases their efficiency and reliability.

We equip our cabinets for all industrial sectors and for various purposes: from switchgears used for power distribution or uninterrupted power supply, through power supply in automatic production lines, to control, signalling and wiring cables with traditional control and via controllers, with visualization of production or technological processes on our own mimic boards and on monitor screens. Depending on customers' preferences, for our energy systems we use the equipment from most companies operating on the European market, such as: GE Industrial Components, ABB, Eaton, J. Müller, Legrand, Hager, Schrack, Schneider, Apator, Pokój, Phoenix Contact, Wago, Weidmüller, Dehn, Relpol, Finder and other manufacturers.

We always make sure that our products are state-of-the-art, reliable and perfectly safe. As part of our ongoing commitment to client satisfaction, we are pleased to implement any solutions suggested by our customers.

PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS

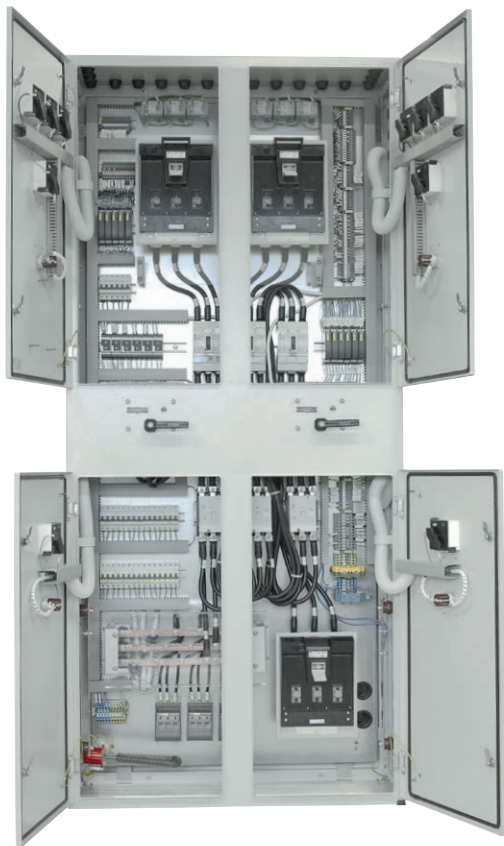


LV chamber for 12 kV power distribution station switchgear for oil extraction industry

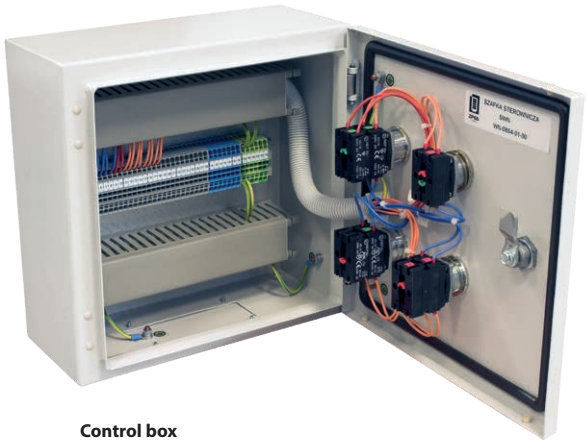


A set of control cabinets for a gas compressor station

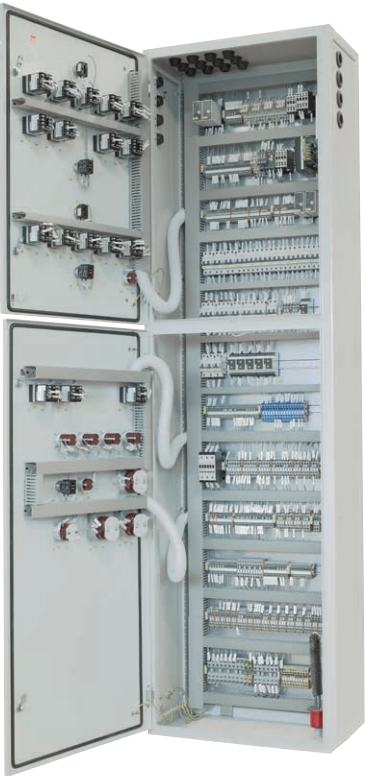
PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS



LV switchgear for 35/6 kV power distribution station
for oil extraction industry



Control box



PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS



220/110/24 V switchgear for a mining company



Set of control and power cabinets for a ceramic plant

PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS



Control cabinet made on the basis of SZD outdoor enclosure (see catalogue ZPAS Outdoor Cabinets), acting as an object station for a dispersed boiler room control system



Control cabinet for machine tools

PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS



Excitation cabinet for 600 MW generator



Excitation cabinet for 600 MW generator - rectifier box



Excitation cabinet for 600 MW generator - indication box

PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS



Control cabinets for industrial ceramic factory industrial oven



Control cabinets for molding line of industrial ceramic factory

PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS



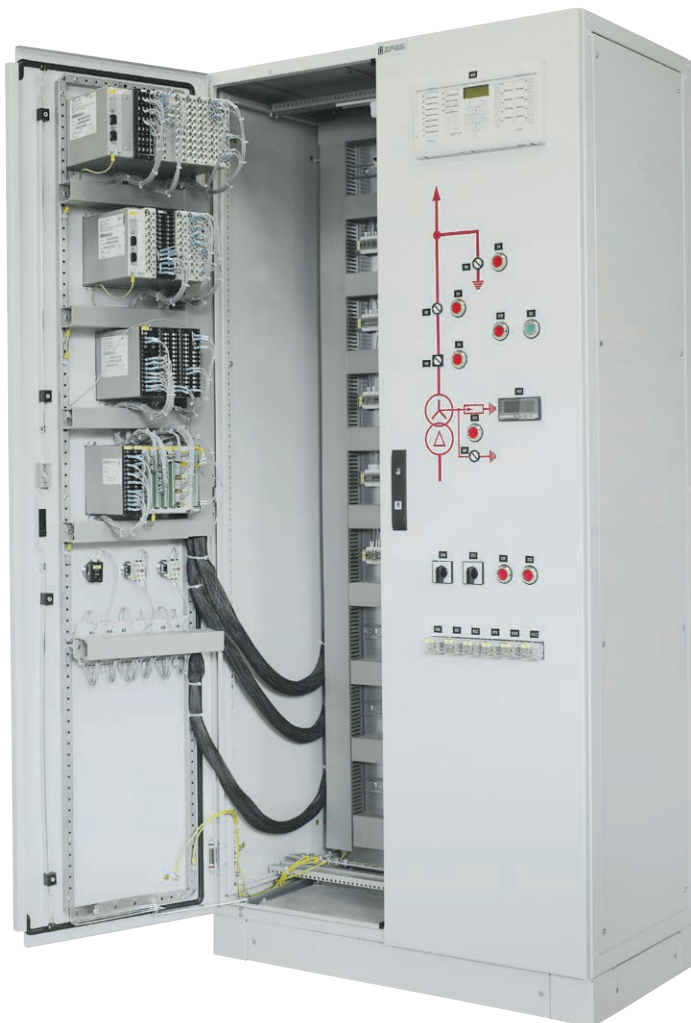
Protection cabinet



Control and monitoring cabinet with door-mounted computers



PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS



Control and monitoring system cabinet
of a 110 kV switchroom transformer panel

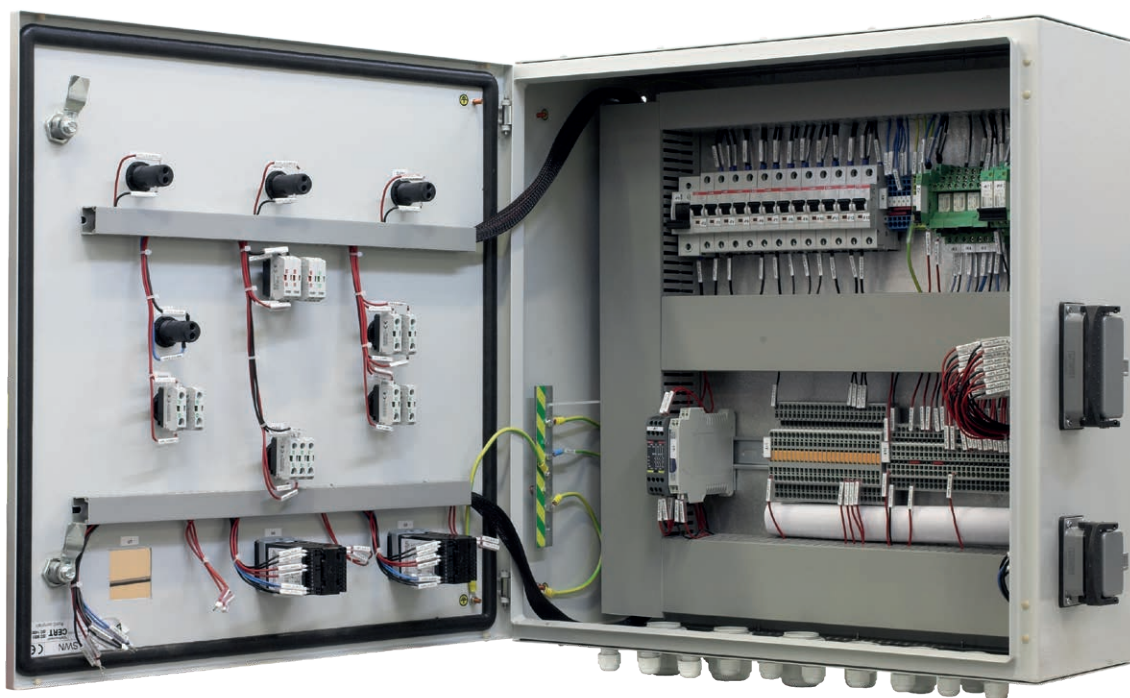
PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS

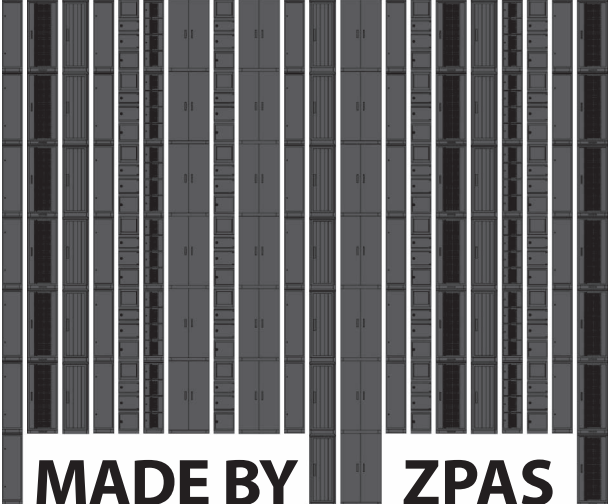


Control cabinet
for machine tools

PREFABRICATION OF SWITCHGEARS AND CONTROL CABINETS

Control cabinet
for boiler rooms





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Catalogue of ZPAS Group Products
Control Cabinets & Electric Switchgears
Edition: 01.2020 EN

Published by:
ZPAS S.A., Przygórze 209, 57-431 Wolibórz, Poland

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