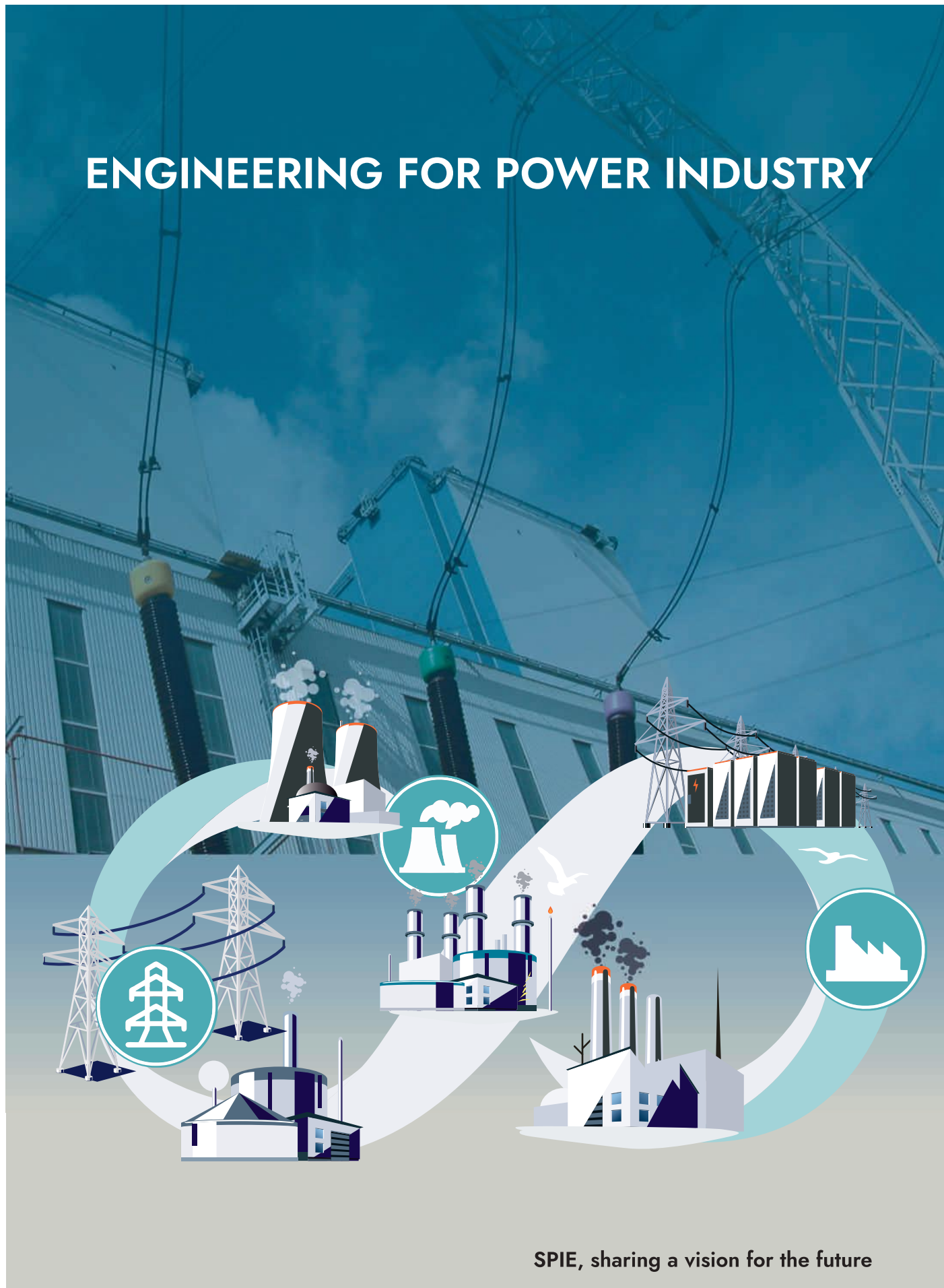


ENGINEERING FOR POWER INDUSTRY





SPIE Energotest



A Polish subsidiary of SPIE Central Europe, SPIE Energotest, is an engineering company and supplier of power automation devices, actively participating in the energy transition in Poland. SPIE Energotest has a long engineering tradition - for over 30 years it has been associated with professional and industrial power engineering. During this time, the company's specialists have managed or participated in the realization of practically all newly built and modernized power plants, CHP plants in Poland and many other facilities such as power stations, RES facilities, industrial plants.

SPIE Central Europe is a subsidiary of the SPIE group, the independent European leader in multi-technical services in the areas of energy and communications. SPIE Central Europe group is operating in Poland, the Czech Republic, Hungary and Slovakia and has about 3.800 employees committed to achieving the energy transition and digital transformation.

With more than 50.000 employees and a strong local presence, SPIE group achieved in 2023 consolidated revenue of €8.7 billion and consolidated EBITA of €584 million.

EXPERTISE



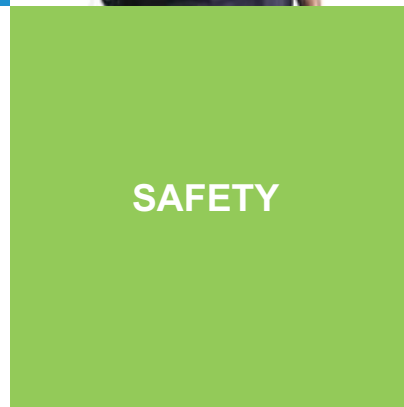
PROFESSIONALISM



EXPERIENCE



SAFETY





We carry out tasks comprehensively!

By entrusting us with all matters related to the secondary circuits engineering including design, supply of protection automation and control systems, prefabrication, and commissioning, the General Contractor or Investor can focus on optimising their core area of operation.

The scope of SPIE Energotest's competencies:

We design electrical automation systems and complete energy systems. We carry out formal project management to obtain administrative approvals.



DESIGN AND ANALYSIS

CONTROL SYSTEM



We are a systems integrator for control and management systems tailored to the unique needs of power plants, combined heat and power plants, and industrial facilities.

We have many years of experience in electrical protection automation. Using our own resources, we carry out the selection, configuration, and commissioning of electrical automation systems.



ELECTRICAL AUTOMATION SYSTEMS AND TELEMECHANICS

GENERATOR EXCITATION AND MOTOR STARTING SYSTEMS



Based on our in-house solutions, we provide generator excitation systems and starting systems for high-power motors.

We specialise in comprehensive prefabrication of protection automation cabinets and control cabinets.



CABINET PREFABRICATION

AUTOMATION AND PROTECTION DEVICES



We are a recognised supplier of electrical automation devices such as automatic changeover switches, disturbance recorders, arc protection relays, field controllers, and more. We have our own R&D department.



DESIGN OFFICE



The Design and Analysis Division of SPIE Energotest provides clients with high-quality design services, continuously developed since year 2000. Leveraging advanced design competencies, we offer support in electrical automation and energy system design. With our wide range of offerings, covering both conventional energy and renewable energy sources, we are a key partner in the energy transition. Collaborating with us means access to innovative solutions and specialised knowledge, which translates into the effectiveness and reliability of the projects we implement.

MULTI-DISCIPLINARY DESIGNS OF HIGH VOLTAGE SUBSTATIONS IN THE FIELD OF ELECTRICITY TRANSMISSION AND DISTRIBUTION

In this area, our primary competence is the comprehensive development of multi-disciplinary design documentation, both in technical and legal aspects, for every stage of investment projects related to the modernisation, expansion, or construction of a new high/medium voltage electrical substation. Depending on the method chosen by the Investor for task execution, we prepare:

- concepts and basic projects,
- construction projects along with formal and legal documentation, necessary administrative decisions, and industry agreements,
- functional and utility programmes (PFU),
- investment implementation guidelines (WRI),
- cost documentation (PR and KI),
- executive designs,
- as-built documentation.

The offered documentation covers both the scope of so-called primary circuits, i.e., high-current systems, as well as secondary circuits, including control, protection, signalling, measurement, recording, substation automation, communication, and other systems.

We also have the competencies to develop design documentation for high voltage cable lines. These competencies encompass both the technical and formal aspects, allowing us to offer design services for the development of:

- construction projects along with formal and legal documentation, necessary administrative decisions, and industry agreements,
- guaranteed/basic data projects,
- executive designs,
- as-built documentation.

In each of these areas, we provide Author Supervision services and are prepared to serve as the Investor's Supervision Inspector or Contract Engineer.

REFERENCES

Tauron Dystrybucja

- S/S Aleksandrowice
- S/S Bolesławiec
- S/S Brzesko
- S/S Brzostów
- S/S Dwory
- S/S Grudzińska
- S/S Grunwaldzka
- S/S Jadwiga
- S/S Juliusz
- S/S Lubawka
- S/S Miedzianka
- S/S Mysłowice
- S/S Piechowice
- S/S Pilczyce
- S/S Przylesie
- S/S Wapienica
- S/S Zabłocie
- R-333 Lwówek Śląski
- R-Kudowa
- S/S Czarna
- S/S Jamki
- S/S Jawor
- S/S Jawor Strefa
- S/S Kalinówka
- S/S Kamieniec

- S/S Katowice
- S/S Łososina
- S/S Pawłowice
- S/S Płaskowicka
- S/S Pogoda
- S/S Przeciszów
- S/S Przeczyce
- S/S Przybków
- S/S Radlin
- S/S Rokitnica
- S/S Rozdzieński
- S/S Rydułtowy
- S/S Szombierki
- S/S Tuczna
- S/S Walenty
- S/S Wiskoza
- S/S Wygoda
- S/S Zabrze
- S/S Żarków

PGE-Dystrybucja

- S/S Rożki
- S/S Stąporków

PSE

- S/S Mikółowa
- S/S Grudziądz - Węgrowo
- S/S Świebodzice
- S/S Ząbkowice

DESIGNS FOR POWER PLANTS AND COMBINED HEAT AND POWER PLANTS

This is an area where our design competencies focus on broadly understood electrical automation systems dedicated to power output systems from small, medium, and large power units. In this regard, we develop Executive Designs and As-Built Documentation for the following systems:

- electrical protection automation,
- excitation and synchronisation,
- control systems,
- generator voltage regulation,
- measurement and settlement energy measurements,
- disturbance recording,
- control and supervision systems (SCADA).

Our design competencies in this area also encompass the scope related to the supply of auxiliary and general power for generation units, covering medium voltage (MV), low voltage (LV), and guaranteed direct current (DC) and alternating current (AC) systems.

We offer the development of Basic, Executive, and As-Built Designs for medium voltage (MV) and low voltage (LV) switchgear, guaranteed AC and DC distribution boards, and their powered consumers. This offer pertains to the electrical industry in terms of both primary and secondary circuits, including power supply switching automation (automatic changeover switches/PPZ), protection systems, including arc protection relays, and more. Additionally, we provide design documentation for electrical installations for power and lighting, as well as cable management.

DESIGNS IN THE INDUSTRY

The scope of design competencies dedicated to the industry primarily involves the electrical sector, supported by the structural and construction sectors for the installation of electrical systems and devices, often within existing, frequently adapted or refurbished spaces. This offer pertains to design work regarding both primary and secondary circuits of electricity supply and distribution systems, including substations (GPZ), medium voltage (MV) and low voltage (LV) switchgear, guaranteed direct current (DC) and alternating current (AC) systems, power transformers and distribution transformers, reactive power compensation systems, as well as power and lighting electrical installations.

As part of this offer, we develop:

- spatial-programmatic concepts and basic designs,
- executive designs,
- as-built documentation,
- network analyses.

The competencies, professionalism, and timeliness of the design services provided by SPIE Energotest, along with teamwork and the ability to share knowledge, are the strengths of our designers, who make up a 25-member team in the company's design office. This team is supported not only by professional tools that facilitate the design process but also by the knowledge, experience, and qualifications gained over years of work. This is confirmed by the references obtained from our clients.

REFERENCES

Power Plants

- PP Bełchatów
- PP Dolna Odra
- PP Kozienice
- PP Opole
- PP Ostrołęka
- PP Turów

CHP Plants

- CHP Bydgoszcz
- CHP Czechnica
- CHP Gdańsk
- CHP Gdynia
- CHP Gorzów
- CHP Kędzierzyn-Koźle

- CHP Lublin-Wrotków
- CHP Łódź
- CHP Nowa
- CHP Siekierki
- CHP Stalowa Wola
- CHP Wrocław
- CHP Zawidawie
- CHP Zielona Góra
- CHP Żerań

Hydroelectric power plants

- HP Niedzica
- HP Włocławek

REFERENCES

- Chemical Plant Anwil
- ArcelorMittal Poland
- Cement Plant Rudniki
- Cement Plant Kujawy
- Cement Plant Ożarów
- CMC Poland
- Dalkia Polska Energia
- Chemical Plant Azoty "Puławy"
- Chemical Plant Azoty „Kędzierzyn”
- Steel Mill Miedzi Legnica
- Steel Mill Pokój
- Chemical Plant „Soda-Mątwy”
- IP Kwidzyn
- Chemical Plant „Janikosoda”
- Coke Plant Radlin
- Naftoport
- Chemical Plant PCC Rokita
- Pern
- Pilkington Automotive Poland
- PKN Orlen
- Synthos
- ZG Sobieski
- ZGH Bolesław



CONTROL AND SUPERVISION SYSTEM ECONTROLplus

At SPIE Energotest, based on many years of experience in the energy sector and industry, we have developed our original **ECONTROLplus** system. Our team of engineers possesses integration competencies and implements solutions based on various system platforms and automation components available on the market. SPIE Energotest provides comprehensive services in the design and implementation of control and supervision systems.

ECONTROLplus

The **ECONTROLplus** system incorporates the latest solutions for data transmission, archiving, and processing, as well as control and cybersecurity.



UNIVERSALITY



MOBILITY



REDUNDANCY



SCALABILITY



CYBERSECURITY



RELIABILITY

The **ECONTROLplus** system is used for:

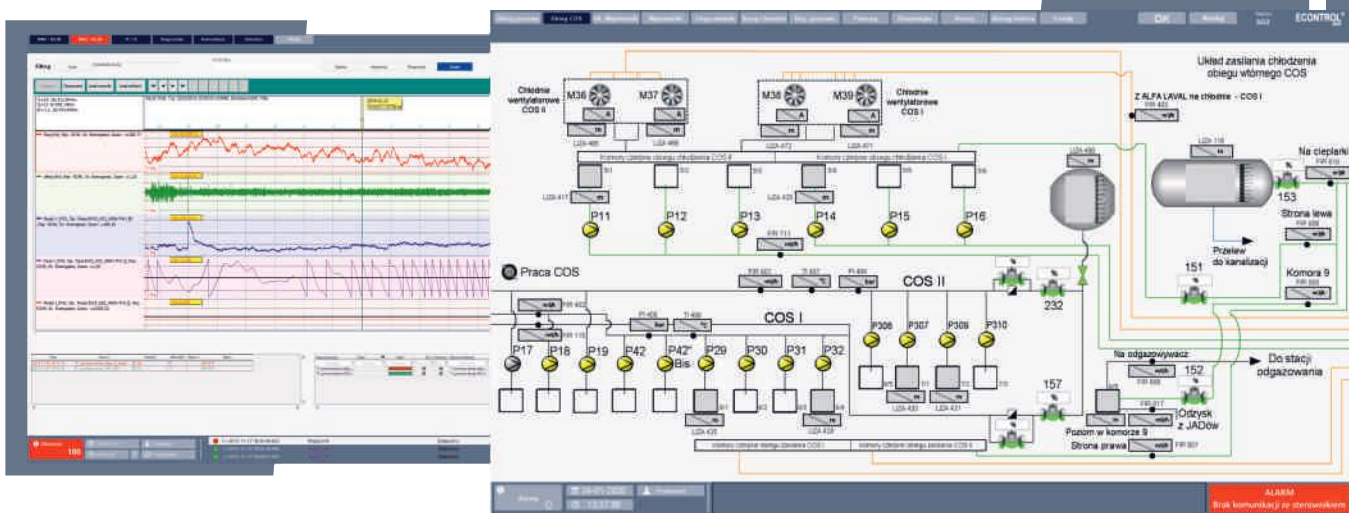
- electrical systems for switchgear, power output, and synchronisation (hydropower, gas, coal, PV, wind farms),
- media monitoring systems,
- recording systems,
- industrial and technological systems – AKPiA (pumping stations, sewage treatment plants, production lines),
- substation systems (GPO/GPZ),
- offshore/onshore wind farms,
- power quality measurement systems,
- systems for nuclear energy.

The **ECONTROLplus** system has been developed based on the standards described in IEC62443 and ISO27001, which specify the responsibilities of the various stakeholders involved in the implemented system, namely:

- the system platform manufacturer,
- the integrator,
- the end user.

As part of the cybersecurity functions in **ECONTROLplus**, we offer, among others:

- network segmentation,
- access levels,
- comprehensive event history,
- hardening, firewall.



SPIE Energotest is an integrator of various SCADA platforms and automation components available on the market, including:

- WinCC, WinCC flexible,
- zenon Platform System (authorised integrator),
- Wonderware System Platform, InTouch,
- Vijeo Citect, Citect SCADA,
- Emerson Industrial Automation & Controls, Proficy Machine Edition, iFIX,
- ASIX (authorised integrator),
- Movicon.



We program PLC controllers from various manufacturers, including:

- ET-DCS – our own product,
- Siemens - S5, S7-300, S7-400, S7-1500 – via Step7, TIA Portal,
- Emerson Industrial Automation & Controls (former GE-Fanuc) 90-30, Rx3i,
- CodeSys family SoftPLC (WAGO),
- Schneider,
- and others...

All components of the ECONTROLplus system (e.g., switches, servers, operator stations, etc.) can be redundant, which ensures the minimisation of risks associated with potential failures of individual system components.

REFERENCES

Power Plants

- PP Bełchatów
- PP Dolna Odra
- PP Kozienice
- PP Łaziska
- PP Ostrołęka
- PP Skawina
- PP Siersza

CHP Plants

- CHP Jankowice
- CHP Pomorzany
- CHP Gdynia
- CHP Gdańsk
- CHP Gorzów
- CHP Żerań
- CHP Skierniewice

RES

- WF Płowki
- WF Zagórze
- microgrid in Bytom
- PVE Construction

Hydroelectric power plants

- HP Niedzica
- HP Ptuśza
- HP Włocławek

Industry

- CMC POLAND
- Edison Next Poland (formerly Fenice Poland)
- Ekocem Dąbrowa Górnicza
- AZOTY Group Chemical Plant Police
- IKS Solino
- ISOROC
- Coke Plant Przyjaźń
- KWB Turów
- KWK Jankowice
- KWK Knurów
- KWK Rydułtowy
- KWK Szczylówice
- Libet Łódź
- Libet Żory
- Wastewater treatment plant Mokra Prawa
- ORLEN
- Paper mill in the north of Poland
- Pilkington Polska
- Qemetica Soda Polska (dawniej CIECH Soda Polska)
- Synthos Dwory
- ZG Janina
- ZG Sobieski
- ZGH Bolesław

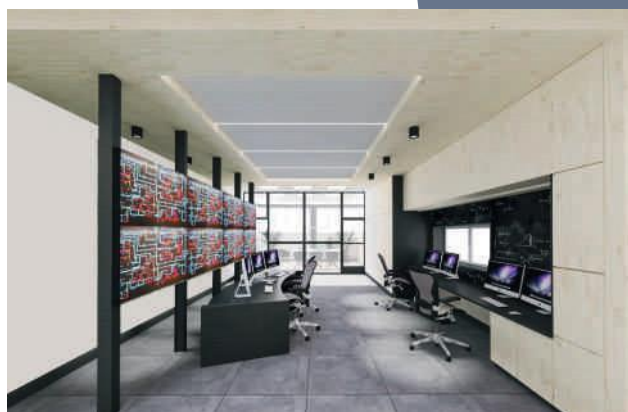
Research Centres:

- Wrocław University of Technology
- National Centre for Nuclear Research

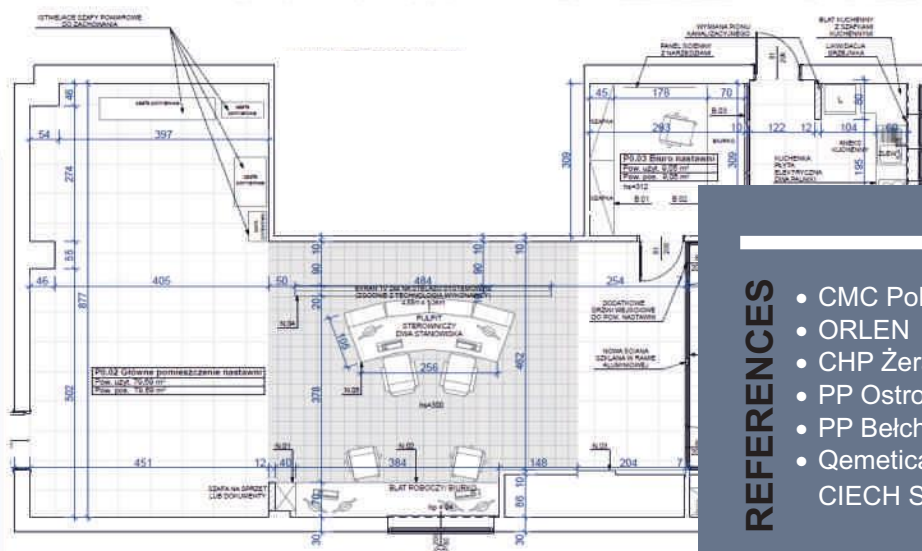


COMPREHENSIVE IMPLEMENTATIONS OF CONTROL ROOMS

Our offer includes the comprehensive implementation of control rooms for centralised control systems in distributed energy and industrial installations, providing clients with full support from design to implementation. We specialise in the design and construction of modern control rooms that meet the highest standards of quality and safety.



We offer the development of designs and execution of all auxiliary installations, such as fire protection, air conditioning, and others. Our solutions also include ergonomic workstations tailored to the needs of operators, which translates into increased efficiency and user comfort.



REFERENCES

- CMC Poland
- ORLEN
- CHP Żerań
- PP Ostrołęka
- PP Bełchatów
- Qemetica Soda Polska (formerly CIECH Soda Polska)

BALANCING, ISOLATING, AND MAINTAINING THE PLANT WITH SELF-GENERATION IN ISLAND MODE



SmartLoad

power loss protection!

SmartLoad is an optimal solution for industrial plants with installed generation sources. The system's task is to manage a controlled islanding during external power failures and to monitor the operation of the plant in an isolated configuration, as well as to safely reconnect to the National Power System (KSE) after the fault has been resolved.



Maintaining production continuity despite external power loss



Support for key technological processes



Reduction of business interruption insurance costs



Reduction of insurance costs for production downtime



Enhancement of personnel safety



Effective operation in a dynamic environment

SmartLoad utilises advanced balancing algorithms that take into account the priority of loads in real time, minimising the number of outages and many other parameters.

The effectiveness of the system is determined by its response speed - reacting in up to 200 ms.

REFERENCES

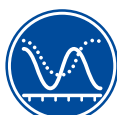
Full implementation

- Tameh Dąbrowa Górnicza
- Chemical Plant Przyjaźń

Development of the concept

- KGHM Legnica
- Kogeneracja SA - EC Czechnica
- Fortum Częstochowa

SmartLoad enables:



To quickly detect regional disturbances in the National Power System using synchrophaser technology



To perform selective disconnections of certain loads and, if necessary, to disconnect the plant from the National Power System (KSE)



To maintain the operation of the isolated plant in island mode, where the power of the remaining loads is balanced with the generator's power



COMPREHENSIVE IMPLEMENTATIONS OF POWER AUTOMATION

Our company specialises in the implementation of power automation services, ensuring the highest quality at every stage of the project. With years of experience and modern technologies, we provide reliable solutions for the professional energy sector. We ensure full compliance with industry standards, which guarantees the safety and efficiency of our systems. Our team of qualified engineers provides professional support at every stage of the implementation, from design to deployment and maintenance. By collaborating with us, clients can expect durable and innovative solutions tailored to their individual needs.

We specialise in power automation systems:

- protection,
- station automation,
- generator synchronisation,
- voltage regulation of generators and transformers,
- power switching,
- disturbance recording.

We carry out the above tasks in the following areas:

- development of concepts and designs,
- selection of equipment,
- configuration, setting, and testing of power automation devices,
- measurement and post-installation testing,
- comprehensive functional testing,
- commissioning.



REFERENCES

In the field of power automation, we are a leading company in Poland!

We have gained unique experience through implementations such as:

- protection systems for power output: **over 130 applications**,
- synchronization systems for large power generators: **over 200 applications**,
- power switching systems for the auxiliary power needs of power plants: **over 200 applications**.

Selected implementations:

Power Plants

- PP Kozienice
- PP Opole
- PP Żarnowiec
- PP Pątnów
- PP Adamów
- PP Konin
- PP Jaworzno
- PP Narva - Estonia
- PP Jaworzno III
- PP Bełchatów
- PP Bełchatów
- PP Pątnów
- PP Skawina
- PP Rybnik
- PP Stalowa Wola
- PP Turów
- PP Połaniec Power Plant
- PP Kozienice
- PP Opole
- PP Łaziska
- PP Bełchatów
- PP Siersza
- PP Opole
- PP Patnów
- PP Łaziska
- PP Dolna Odra

CHP Plants

- CHP Białystok
- CHP Bydgoszcz
- CHP Bydgoszcz
- CHP Czechnica
- CHP Gdańsk
- CHP Gorzów
- CHP Karolin
- CHP Kraków
- CHP Lublin-Wrotków
- CHP Łódź (II,III,IV)
- CHP Nowa Sarzyna
- CHP Rzeszów
- CHP Tychy
- CHP Wrocław
- CHP Wybrzeże
- CHP Zielona Góra
- CHP Zofiówka
- CHP Żerań, Siekierki
- ELCHO Chorzów

International Implementations of HV Stations

- S/S Umuahia Nigeria
- S/S Aloja Nigeria
- HPP Globocica
- HPP Spilje

Hydropower Plants

- HP Globocica
- HP Gródek
- HP Pierzchały
- HP Pilchowice
- HP Porąbka Żar
- HP Raven
- HP Spilje
- HP Tikves
- HP Vrben
- HP Vrutok
- HP Żarnowiec
- HP Żydowo
- 6 HP Rep. Macedonii

PSE Stations

- S/S Blachownia
- S/S Bujaków
- S/S Byczyna
- S/S Glinki
- S/S Kozienice
- S/S Plewiska
- S/S Połaniec
- S/S Siedlce Ujrzanów
- S/S Skawina
- S/S Tucznawa
- S/S Wanda

Industry

- Cement Plant Ożarów
- CMC Poland
- Hutmen
- KGHM
- Lotos
- Orlen
- PCC Rokita
- Pilkington Polska
- Soda Ciech
- Oxygen Yard CRIST
- Synthos Dwory
- Umicore
- Zachem Bydgoszcz
- Chemical Plant Azotowe Kędzierzyn-Koźle
- Chemical Plant Azotowe Puławy
- ZG Sobieski
- ZTUO Szczecin

COMMISSIONING OF ELECTRICAL POWER SYSTEMS



We have nearly 30 years of experience in the commissioning of power systems in the energy sector and industry. We have successfully commissioned over 100 generating units with rated capacities of 50, 100, 200, 360, 560, 900, and 1000 MW, as well as at numerous high voltage substations. Our extensive knowledge and rich experience include collaboration with general contractors such as: ABB, ALSTOM, ANSALDO THOMASSEN, AREVA, BABCOCK, CEZ, DALKIA, EDF, ELBUDBIS, ELECTRABEL, ELFEKO, EMERSON, ENEL, FOSTER WHEELER, GE, HITACHI ENERGY, HITACHI, LURGI LENTIJES, MITSUBISHI ELECTRIC, MOTA-ENGIL, POLIMEX MOSTOSTAL, SCHNEIDER, SIEMENS, SNC-LAVALIN, SPIE ELBUD GDAŃSK, TECNICAS REUNIDAS, and YOKOGAWA.



REFERENCES

Conventional Units

- PP Opole, 2 x 900 MW (GE)
- PP Kozienice, 1000 MW (Polimex)
- PP Turów TG6, 200 MW (Energoserwis Kleszczów)
- PP Nowe Jaworzno, 910 MW (Energotechnika-Energorozruch)
- PP Bełchatów, 858 MW (Alstom)

Gas and Steam Units

- Anwil Włocławek, 460 MW (SNC Lavalin)
- PP Stalowa Wola, 450 MW (Abengoa)
- CHP Gorzów (łącznie 130 MW) (Energotechnika-Energorozruch)

PSE Stations

- S/S Kozienice
- S/S Czerwonak
- S/S Byczyna
- S/S Skawina



ACCEPTANCE TESTS BEFORE CONNECTING UNITS TO THE NATIONAL POWER SYSTEM

SPIE Energotest conducts acceptance tests for electrical systems and devices (including power system automation and ARNE systems) for PSE, prior to connecting new and modernised power units to the KSE. As part of the service, we develop framework and detailed testing programmes in accordance with the requirements of the IRIESP and the NC RfG network code. We participate in their execution and prepare reports on the tests conducted.

REFERENCES

Energy Generation Modules

- PP Ostrołęka
- PP Kozienice, unit 11 1000 MW
- PP Dolna Odra, units 2, 7, 8
- PP Turów, units 2 – on behalf of Energopomiar
- PP Turów, units 6 – on behalf of Energoserwis Kleszczów
- PP Opole, EC Gorzów
- PP Nowe Jaworzno 910 MW
- Orlen – 600 MW
- ZEW Porąbka Żar





EXCITATION SYSTEMS FOR GENERATORS - ETW

SPIE Energotest is a recognised provider of excitation and voltage regulation systems of the ETW type, designed for medium and large power generators.

Our solutions are available in two versions as:

- static excitation systems, powered in a shunt configuration from the generator's power output via a step-down transformer,
- automatic voltage regulators for exciters with an output amplifier based on IGBT transistors.

The ETW-type voltage regulator generates an output signal that controls the firing system of the thyristor rectifier or the IGBT transistor amplifier system. It incorporates all the functions necessary for the control, regulation, and protection of the generator's excitation system. It also features functions that allow for automatic adjustment from inactive to active operating modes.



MOTOR STARTING SYSTEMS



ETS - Synchronous

ETA - Asynchronous

For many years, SPIE Energotest has also provided ETS and ETA starting systems for large power motors. These solutions feature a cabinet design. In a typical configuration, one cabinet contains: the control and protection system, an operator panel tailored to user needs, a thyristor exciter with overvoltage protection, an excitation transformer, a main contactor, and an excitation contactor. In the case of ETA systems, an additional cabinet (or cabinets) houses a resistor starter (alternatively, a soft starter or water starter).



Excitation moment optimisation



Excitation current limiters / stator / underexcitation



Excitation parameter monitoring system

A wide range of protection functions



Shock-free parameter change



Self-diagnosis



ETW

REFERENCES

Power Plants

- PP Adamów
- PP Dolna Odra
- PP Kozienice
- PP Łaziska
- PP Ostrołęka
- PP Połaniec
- PP Siersza
- PP Skawina

Hydropower Plants

- HP Borowo
- HP Braniewo
- HP Czychów
- HP Dobczyce
- HP Gorzupia
- HP Klimkówka
- HP Lubachów

- HP Niedalino
- HP Rożnów
- HP Rutki
- HP Straszyn
- HP Strzegomino

CHP Plants

- CHP Białystok
- CHP Bydgoszcz
- CHP GIGA Świdnik
- CHP Gorzów
- CHP Kostrzyn
- CHP Legnica
- CHP Nowa Sarzyna
- CHP Siekierki
- CHP Tychy
- CHP Wrocław

- CHP Zielona Góra
- CHP Żerań
- CHP Łódź

Industry

- Arcelor Mittal Kraków
- Sugar Factory Ropczyce
- Sugar Factory Strzelin
- Sugar Factory Strzyżów
- Sugar Factory Zbiersk
- Gdańsk Fertiliser Plant
- Jezuitska Struga
- KGHM Głogów
- MM Kwidzyn
- ORLEN
- ZTUO Szczecin

ETS, ETA

REFERENCES

- KGHM ZWR Polkowice
- Chemical Plant Przyjaźń Dąbrowa Górnicza
- Chemical Plant Zdzeszowice
- KWK Murcki
- Lithuania ORLEN - Możejki
- SYNTHOS Dwory Oświęcim
- Tarnów AZOTY Group
- ZA Kędzierzyn - Koźle
- ZGH Bolesław



We carry out the prefabrication of cabinets for:

- protection (including compliance with PSE requirements),
- power switching,
- disturbance recording,
- synchronisation,
- control,
- excitation systems for generators and motor starting.

We carry out designs or work based on documentation provided by the client.

We prefabricate using our own components or those entrusted to us.

We conduct functional tests.

We participate in FAT, SAT, and HAT testing.



REFERENCES

In our history, we have completed the prefabrication of several thousand control and automation cabinets.

Industry

- Arcelor Mittal Dąbrowa Górnicza
- Arcelor Mittal Kraków
- Arcelor Mittal Zdziechowice
- Anwil Włocławek
- Azoty Puławy
- Azoty Police
- Azoty Tarnów
- CMC Zawiercie
- Cement Plant Ożarów
- Cement Plant GóraŹdże
- Ekocem Przemysłownia
- Steel Mill Królewska
- Steel Mill Pokój
- MM Kwidzyn
- KWK ROW Ruch Jankowice
- KWK Zofiówka
- ORLEN Południe
- ORLEN Płock
- ORLEN Możejki
- Piklington Sandomierz
- Radpec
- Soda Ciech
- Synthos Dwory
- Tameh Dąbrowa Górnicza
- Tameh Kraków
- Umicore
- ZA Kędzierzyn Koźle
- ZG Janina
- ZTUO Szczecin

Power Plants

- PP Bełchatów
- PP Jaworzono III
- PP Dolna Odra
- PP Kozienice
- PP Łaziska
- PP Turów
- PP Opole
- PP Ostrołęka
- PP Połaniec
- PP Pomorzany
- PP Skawina
- PP Stalowa Wola

CHP Plants

- CHP Białystok
- CHP Czechnica
- CHP Łódź 3
- CHP Gdańsk
- CHP Gdynia
- CHP Gorzów
- CHP Elbląg
- CHP Kraków
- CHP Siekierki
- CHP Skierniewice
- CHP Zofiówka
- CHP Żerań

PSE Stations

- S/S Buczyna
- S/S Choczewo
- S/S Czarna
- S/S Czerwonak
- S/S Dunowo
- S/S Gdańsk Przyjaźń
- S/S Groszowice
- S/S Kozienice
- S/S Nysa
- S/S Pasikowice
- S/S Pępłin
- S/S Piaseczno
- S/S Plewiska
- S/S Polkowice
- S/S Praga
- S/S Siersza
- S/S Praga
- S/S Rogowiec
- S/S Wielopole
- S/S Żydowo Kierzkowo

Distribution Stations

- MFP Towarowa

Hydropower Plants

- HP Nidzica
- HP Włocławek
- HP Żarnowiec
- HP Porąbka-Żar

RES

- GPO Skarszów
- PVE Group
- Tauron Polska Energia



POWER SWITCHING AUTOMATON APZplus

APZplus, produced by SPIE Energotest, is the latest device for power switching automation. It is dedicated to medium voltage (MV) and low voltage (LV) switchgears supplying technological installations in industry, as well as to high voltage (HV), MV, and LV switchgears operating in the professional energy sector.

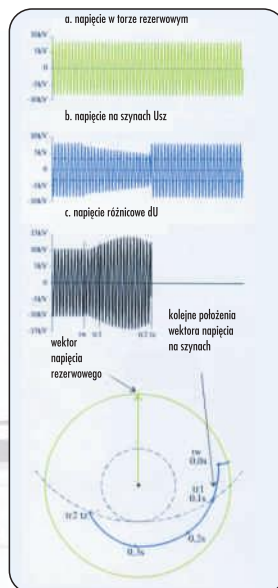
It can manage standard systems (open reserve and hidden reserve) as well as non-standard systems with up to 10 circuit breakers, including typical auxiliary power systems for PSE. It also has the capability to control a power generator.



It can perform switching of automatic power transfer (APZ) in synchronous and quasi-synchronous cycles. The configuration of the device for the specific switchgear setup is carried out by the manufacturer during the production stage. At the customer's request, additional functions and logics can be added to the device's program.

The user on-site has the ability to set the operation mode of the device by blocking or activating individual switches.

It features voltage inputs of 57.7/100V and optionally current inputs of 5A (current measurement is carried out via an external transformer).



Switching quasi-synchronous

SELECTED REFERENCES

Power Plants and CHP plants

- CHP Bielsko
- CHP Czechnica
- CHP Elbląg
- CHP Elbląg
- CHP Gdynia
- CHP Gorzów
- CHP Kalisz
- CHP Lublin Wrotków
- CHP Nowa Dąbrowa G.
- CHP Radlin
- CHP Rzeszów nn
- PP Łaziska
- PP Opole
- PP Turów

Industry

- Anwil Włocławek
- Lotos
- Nemak Fenice Poland
- MM Kwidzyn
- Orlen
- Orlen Południe Jedlicze
- PCC Rokita
- PERN
- Radpec Radom
- Synthos Dwory
- Gorzów Hospital
- Plants Azotowe Puławy
- Plants Azotowe Tarnów
- Zott Polska Opole

Distribution

- Tauron-Dystrybucja Legnica
- Tauron-Dystrybucja Wałbrzych
- Energa Kalisz



Standardised schematics for industry and manufacturing



Synchronous and quasi-synchronous switching



Support for up to 10 circuit breakers



Advanced algorithms for reliability improvement



Built-in cybersecurity features



The automatic power transfer devices (APZ) produced by SPIE Energotest have been widely used since 1995, with over 4,000 units installed in the Polish energy sector.



Communication protocols:
IEC 61850, Modbus TCP/RTU, IEC 103



Communication ports:
2×ETH, 1×RS485, 2×OPTO (optional)

DISTURBANCE RECORDERS



When operating electrical equipment, a crucial issue is the quick and precise assessment of emergency and disturbance states. For this reason, in locations where swift and accurate operational decisions are essential, it is necessary to use specialised recorders with very high measurement parameters (frequency, resolution, and sampling accuracy), typically integrated into a cohesive registration system.

SPIE Energotest is a recognised supplier of disturbance recorders in Poland, with over 2,000 installed devices, predominantly featuring the RZ-40 recorders. The latest device in the company's offering is the RZ-50 recorder, which meets the current PSE requirements.

The RZ-40 and RZ-50 recorders are designed to perform synchrophasor measurement functions. Compliance with the requirements for synchrophasors has been confirmed by a certificate from the Fraunhofer Institute.



RZ-50



RZ-40

SELECTED REFERENCES

PSE Stations

- S/S Abramowice
- S/S Blachownia
- S/S Boguchwała
- S/S Czerwonak
- S/S Dobrzeń
- S/S Jasiniec
- S/S Joachimów
- S/S Kędzierzyn
- S/S Kozienice
- S/S Krajnik
- S/S Krosno Iskrzynia
- S/S Łagisza
- S/S Łomża
- S/S Mokre
- S/S Ostrołęka
- S/S Pasikowice
- S/S Pątnów
- S/S Pęplin
- S/S Piaseczno
- S/S Plewiska
- S/S Pomorzany
- S/S Rogowiec
- S/S Siersza
- S/S Skawina
- S/S Słupsk
- S/S Wanda
- S/S Żabkowice
- S/S Żukowice
- S/S Żydowo-Kierzkowo

Power Plants

- PP Adamów
- PP Bełchatów
- PP Dolna Odra
- PP Jaworzno III
- PP Konin
- PP Kozienice
- PP Łagisza
- PP Łaziska
- PP Nowe Jaworzno
- PP Opole
- PP Ostrołęka
- PP Pątnów
- PP Turów

CHP Plants

- CHP Gorzów
- CHP Lublin-Wrocław
- CHP Rzeszów
- CHP Szczecin

Hydropower Plants

- HP Porąbka-Żar
- HP Żarnowiec

Industry

- ArcelorMittal Kraków
- ArcelorMittal Dąbrowa Górnicza
- Cement Plant Ożarów
- Cement Plant Góraźdże
- Orlen

Cybersecurity



Compliant with the Latest PSE Requirements



Colour display



Number of analog inputs (in standard configuration)



Number of digital inputs (in standard configuration)



Separate processors: communication and measurement



Sampling frequency



Capability to support Synchrophasor Measurement



Time synchronisation precision



Communication protocols: IEC 61850, Modbus TCP/RTU



Communication ports: 2×ETH, 1×RS485, 2×OPTO (optional)





EPROTECT MV PROTECTION AND CONTROLLER

EPROTECT is a microprocessor-based device for power system automation in medium voltage networks, serving protective, substation automation, field control, recording, measurement, and other functions.

The devices in the **EPROTECT** system are applicable in both the professional energy sector (generation, transmission networks, distribution) and in industry.

EPROTECT provides the ability to protect devices and loads associated with the field based on various overcurrent and undercurrent criteria, overvoltage and undervoltage, admittance, underfrequency and overfrequency, power, time-delayed and instantaneous functions, as well as measurement and recording of electrical quantities, and implements substation automation.



MV field controller



Complete set of protection functions



Full range of supported MV fields



Integrated or remote control panel



More information on display, 2 configurable windows



Up to 49 inputs and 32 outputs (including high-power outputs)



Extended lifespan due to reduced operating temperature



Compact size
- 12 cm Depth



Separate processors:
communication and measurement



Compliant with the latest frequency measurement standard PN-EN IEC 60255-181:2019-07



Colour display



Communication protocols:
IEC 61850, IEC 62439 PRP, Modbus TCP/RTU



Communication ports:
2xETH, 1xRS485, 2xOPTO (optional)

Protection Functions Available in EPROTECT

Group	ANSI Code	number of stages	Description
Current-based	50P 51P 67P 57V	4	Overcurrent Functions Configurable as: - instantaneous - time-Delayed Independent - directional - with Voltage Lockout
	50P	2	Instantaneous Overcurrent
	51P	1	Time-Dependent Overcurrent with 3 IEC Characteristics + User-Adjustable Setting
	46	1	Load Asymmetry
	37	1	Undercurrent
	49	1	Thermal Model
Voltage-based	50C	1	Internal Short Circuits of Capacitor Banks
	27 / 27P	2	Interphase / Phase Overvoltages
	27D	1	Overvoltages of the Positive Sequence Component
	59 / 59P	2	Interphase / Phase Overvoltages
	47	1	Overvoltages of the Negative Sequence Component
Power-based	32L/P/Q 37P	2	Directional Power (P., Q)
	55	1	From Power Factor
Earth Fault	50N/50G/50SG 51N/51G/51SG	2	Instantaneous or Time-Delayed Overcurrent
	67N / 67G	2	Directional
	59N / 59G	1	Overvoltage
	21N / 21G	1	Admittance or Directional Admittance
	32N / 32G	1	Reactive / Active Power
Frequency-based	81U / 81O	4	Under / Over Frequency
	81R	1	Rate of Change of Frequency - df/dt (Df/Dt)
Technological (Universal)	30/74	1	Gas-Flow
	86	1	Engagement Lock (e.g., Technological Lock)
	62	2	Other Technological (Binary Inputs)
	50LR	1	Rotor Stalling
	66	1	Limitation on the Number of Starts
	48	1	Extended Start
Monitoring	VTFF	1	Voltage Measurement Fault
	74TCS	1	Control of Disconnecting Circuits (2 Circuits)
Automation		1	Control of the Closing Circuit
	50SOTF	1	Closing on Short Circuit
	50BF	1	Circuit Breaker Fault (LRW)
	ZSZ	1	Signals for Busbar Protection
	SCO	1	Automatic Frequency Load Shedding
	Inne		Based on Logical Functions

REFERENCES

- PV CP Gliwice
- PV Warszowie
- PV Woodpack
- PERN
- Synthos
- KGHM

A total of several dozen controllers installed!

ARC FAULT PROTECTION ArcPRO-6



Protection of people and equipment
against the effects of arc faults

No. 1 in Poland (protecting over 20,000 MV and LV)



Autonomous protection.
20-50 ms faster than solutions integrated
in field controllers



Modular structure allowing optimal
configuration of the device for
various applications



Selectivity of disconnections
(including for open-type switchgear
connections)



Self-protection time
below 8 ms



Arc light detection based
on front sensors or fibre
optic loops



Device configuration capability
via web browser



Loop continuity and front
sensor cable monitoring



Over the past 25 years, SPIE Energotest's arc protection devices have been installed at over twenty thousand MV fields, primarily in the national energy sector, but also at several dozen facilities abroad, including in Africa. We are not aware of a single case of unnecessary activation of our protection systems. However, we are aware of numerous instances where our arc protection devices have saved lives.

REFERENCES

Over 100 HV/MV substations in Poland belonging to all key distribution system operators:

- Tauron-Dystrybucja
- PGE Dystrybucja
- ENERGA Operator
- ENEA Operator
- STOEN

Numerous Industrial Plants, PSE,
Selected Renewable Facilities.



POWER SWITCHING - APZmini



Over a thousand installed devices in Poland.

The device is designed for simple MV and LV switchgear. It can operate in seven commonly used switchgear configurations. It features a distributed structure consisting of:

- One APZmini unit, responsible for controlling the automatic load transfer (SZR),
- several (up to 5) PB relays (or PB-04), which collect information from the designated field (including voltage presence monitoring). They also serve as actuators for the power switching automation. They can cooperate with circuit breakers or contactors.

REFERENCES

Hundreds of devices installed for
the internal needs of industrial
facilities and transformer stations.



The ability to measure medium
voltage without the need
for voltage transformers



EARTH FAULT TRANSFORMERS (FERRANTI) - IO

Earth faults in medium-voltage networks pose a serious risk to both people and equipment. Accurate identification and rapid disconnection of faults reduce hazards and minimise losses related to cable damage, motor damage, other equipment failures, and power outages.

The variety of shapes and sizes of IO transformers makes them applicable in almost any medium-voltage (MV) supply system with either an isolated or grounded neutral point. They can work with any earth-fault protection system.



A full range of shapes and sizes of transformers



Versions with split-core and solid-core



Test winding



Standard ratio 1:100
(custom versions available)



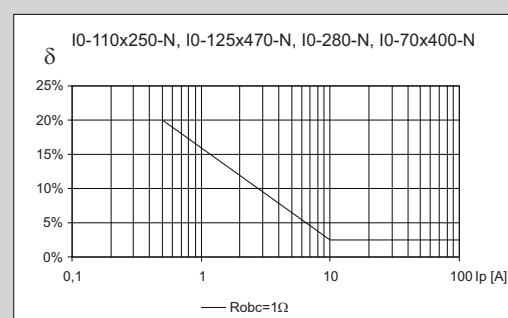
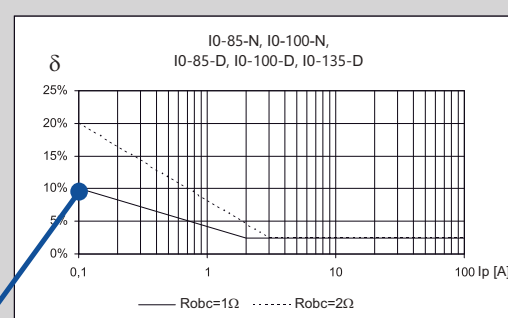
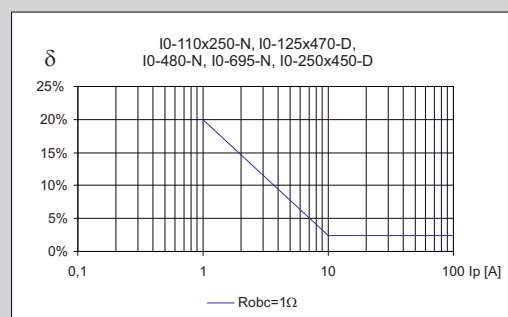
High accuracy in measuring primary currents from as low as 100 mA

A distinguishing feature of transformers produced by SPIE ENERGOTEST in the 85D, 85N, 100D, 100N, and 135D groups is the maintenance of high measurement accuracy (error within 10%) for loads at the 2 Ohm level, with an earth-fault current on the primary side as low as 100 mA!

REFERENCES

Several thousand IO earth-fault transformers operate reliably in medium-voltage networks within the power industry and across various industrial sectors, both domestically and internationally.

Measurement error characteristics of the earth-fault current IO transformers by SPIE Energotest.



Ip- primary current δ- relative error

AUXILIARY RELAYS



Compliant with the requirements of the Polish Power Grid.
Over 10,000 intermediate relays installed in the Polish energy sector.

A complete range of relays, with over 20 different types.

Most commonly used in GPO stations:

- high-speed relay PWS-3,
- fast relay PPS-6,
- timer relay PT-4,
- intermediate relay PP-4,
- bistable relays PBI-4/PBI-8.



Design
without reed switches



Flame-retardant enclosure
(UL 94 V-0 standard)



Disconnection capacity up to
6A 220 V DC L/R = 40 ms



Design resistant
to contact pull-out.



Compact size

REFERENCES

- PSE Stations
- S/S Joachimów
- S/S Piaseczno
- S/S Wyszaków
- S/S Czerwonak
- S/S Plewiska
- S/S Choczewo

Numerous implementations in distribution and industry!

EARTH FAULT LOCATION SYSTEM IN DC NETWORKS



The reliable operation of direct current (DC) networks ensures the correct functioning of the systems and devices powered by them, particularly control, regulation, measurement, and protection systems.

DC networks in the power industry (power plants, substations) are often very extensive (over 100 km) and are significantly exposed to adverse external factors that can deteriorate insulation, such as dirt, moisture, mechanical damage, or aging. Continuous monitoring of network conditions and rapid localisation of fault locations is therefore a clear necessity. The DCtest monitoring system significantly reduces the time required to identify fault locations, thereby minimising the time taken to resolve outages in the DC network.



Quick measurement



Without disconnecting the loads



Portable clamps



Detection of all types
of faults



High accuracy regardless
of network capacitance



Detection of faults between batteries
and loads of two sections

REFERENCES

Over 100 implementations in power plants, combined heat and power plants, distribution companies, Polish Power Grid (PSE), and in the industry.

www.spie-energotest.pl



Since 1992, we have participated in post-installation testing, commissioning, and startup of power engineering devices and systems in practically all newly built and modernised power plants and combined heat and power plants in Poland. We have also carried out this work at numerous substations and various industrial facilities.

Thanks to our experience, we can offer comprehensive support for investment processes in the area of renewable energy sources (RES). Our specialists are at your disposal during both the verification of the technical feasibility of investments and the supervision and execution of the tasks. We can supply integrated installation management systems as well as controllers and protections based on our own production. While carrying out our work, we take full responsibility not only for the equipment we provide but also for the correct operation of the entire power engineering system.

With the unique experience of our specialists gained over the last several decades, we guarantee our clients complete safety in the execution of entrusted tasks and offer a flexible and creative approach to each assignment. We provide a wide range of services, specialist knowledge, and a personalised approach to your needs. With our unique set of competencies, SPIE Energotest is the right partner for undertaking tasks in the field of distributed energy.

INFORMATION SECURITY / MANAGEMENT STANDARDS

In today's world, information is one of the most valuable assets! We have implemented an information security management system:

ISO 27001

Our other implemented management systems:

ISO 9001: Quality Management System

ISO 14001: Environmental Management System

ISO 45001: Occupational Health and Safety Management System



SPIE Energotest sp. z o.o.

ul. Chorzowska 44b

44-100 Gliwice

Tel. : + 48 32 270 45 18



www.spie-energotest.pl