ICE

TO SERVE YOU BETTER

PRODUCT GUIDE

PROTECTION & CONTROL COMMAND

international

TECHNIREL

Dear customers,

To choose better, to use better.

This brochure has been prepared in co-operation with our partners around the world in order to make it easier for you to select the range of products and services that are most applicable to your needs. It describes our newly enhanced NP800 range which is ideal for new-build and refurbishment projects and our classic range (PROCOM and static) for re-fit projects.

Your protection and automation applications are our concern.

For already over 60 years, ICE is specialised in the most advanced technologies, relating to electrical networks protection, automation and regulation systems. These are supported by expertly tailored solutions and services (such as network studies, on-site services or training) offered to companies of all sizes around the world.
Complete management of electrical networks, from generation to end-user, is one of the great significance that needs to be thoroughly examined in order to find ways to reduce operating and maintenance costs. These fundamental issues continue to guide our Group today.

Our brands

In the different fields of industry, T&D and railways, three brand names continue to excel - **ICE, CEE and TECHNIREL.**
ICE manufactures many highly reliable products that include the necessary intelligence and performance to optimise exploitation of electrical supply networks.
CEE covers the range of protection and control systems mainly dedicated to industrial electrical networks.
TECHNIREL manufactures controllers for excitation, regulation, synchronisation, control of motors and turbo alternators.

We believe investment in R&D is a key factor for successful solutions

Our R&D anticipates market needs and meets your expectations. That is why we keep investing in R&D to constantly strengthen our know-how in our core business: protection, automation and control systems of electrical networks.

The aim of our « head office » team in France, together with our subsidiaries and agents throughout the world, is to help you to succeed in your projects: from finding the right solutions for your environment to choosing the right products and systems to install or commission.
Furthermore, because preserving the environment is extremely important to us, all our products and services comply with internationally accepted standards regarding environmental issues. In 2008, we obtained the ISO 14001 certification by the AFAQ (French Association for Quality Assurance).

Didier Bantegnies
Sales Director Transmission, Railway and Industry

CERTIFICATIONS

The security of personnel and installations as well as the continuity of supply demand the highest reliability of the protection systems and control systems applied in electrical networks. Therefore you are entitled to expect the highest in reliability, durability and quality assurance, not only in the design and the services, but also in the production of the products.

In order to address these important requirements, ICE obtained in 1995 the ISO 9001 European Quality Certificate. It has recently been renewed in Autumn 2008.

During manufacturing, the level of quality of our products is constantly checked by strict series of controls. The quality of the spare parts is also continuously checked by our technical control services.

As already mentioned, environmental issues and market needs are a constant concern. In 2008 the company obtained the ISO 14001 environmental management certificate

CONTENTS

ICE AT A GLANCE

ICE SA is an independent French company specialised in design, production, sales and marketing of protection and control devices for electrical networks. Our products and systems are intended for protection and control of industrial, production, railway, transmission or distribution networks.

From its very beginning, ICE has turned towards professionals implementing the most advanced technologies, focused on electrical network protection, automation and regulation systems for world-class clients including, in its domestic market, EDF, RTE and SNCF.

The group's technical expertise has constantly been upgraded through technological developments (from electromechanical and electronics to digital technologies).

SALES NETWORK

Our international head office is located near Paris (France) including our management, financial, R&D and sales teams.
We have agents and subsidiaries around the world to answer your needs and support your projects. Visit our website to get in touch with the agent closest to your region, or contact us for more information. Our international subsidiaries are situated close to London (UK), Madrid (Spain) and Milan (Italy).

MANUFACTURING

All our relays are manufactured in our factory at Brie-Comte Robert, located 30 minutes from the head office.

The factory comprises manufacturing, warehouse facilities, purchasing, quality assurance and after-sales service departments in accordance with ISO 9001 V2008 and ISO 14001 V2004 standards. Their quality is guaranteed by continuous monitoring of the process and automatic tests conducted in the factory.

These tests insure the reliability, the conformity to the IEC (International Electrotechnical Commission) standards, as well as the electromagnetic compatibility according to the European directives (CE marking).

ICE GROUP

THESE ARE ALL FORMER CEE SUBSIDIARIES AND, TOGETHER WITH ICE, ARE DEDICATED TO THE SUPPLY OF PROTECTIVE RELAYS AND ASSOCIATED EQUIPMENT AND THE STUDY OF ELECTRICAL NETWORKS.

CEE Relays Ltd.
Based near London, the British subsidiary supplies products and services to companies in the United Kingdom and Eire.
rob@ceerelays.co.uk

Continental de Equipos Eléctricos
Based in Madrid, the Spanish subsidiary supplies products and services to companies in Spain and South America.
cee@relescee.es

CEE Italiana S.r.l.
Based in Milan, the Italian subsidiary supplies products and services to companies in Italy.
info@ceeitaliana.com

FRENCH SUBSIDIARIES BRING TO THE GROUP DIVERSITY, SKILL AND EXPERTISE WITH VARIOUS HIGH-TECH PRODUCTS AND SERVICES.

MEDIANE SYSTEME
Its main activity is engineering and consulting for electronics, technical and industrial IT.
contact@medianesysteme.com

MEDIAL CONCEPT
Engineering and consulting mechatronic company for all trades of mechanical development.
contact@medialconcept.com

SM3A I
Designs, manufactures and sells equipment for safe work at heights including ladders, platforms, footbridges, motorised equipments and fences.
sbarbarin@sm3a-industries.com

S.T.I.C COMMUNICATION CONSEIL
Specialises in HF communication techniques, especially in high frequency broadcasting (107.7 MHz on FM band and 900 MHz).
contact@sticfm.com

COMPELMA
Sells, designs and conducts research into components for electromagnetic compatibility, thermal flow management and customised connections.
info@compelma.com

RESEARCH AND DEVELOPMENT

THE PARTICULAR DOMAIN OF ELECTRICAL PROTECTION REQUIRES AN IMPORTANT LEVEL OF INVESTMENT, ESPECIALLY IN RESEARCH AND DEVELOPMENT.

SPECIALISED IN PROTECTION AND AUTOMATION DEVICES, OUR R&D DEPARTMENT HAS FULFILLED THE NEEDS OF CUSTOMERS THROUGHOUT THE WORLD WITH STATE OF THE ART TECHNOLOGY USING NUMERICAL TECHNIQUES SINCE THE LATE 1980s.

This experience gives the R&D team the ability to develop new and more effective products and systems that fully respect the quality and environmental standards.

The R&D team also provides innovative product design to meet sophisticated market requirements whilst at the same time ensuring maximum ease of production, on-site testing and maintenance.

We invest more than 20% of our turnover in R&D in order to ensure you get the best in protective relay and control system design.

SERVICES

IMPROVE THE PERFORMANCE OF YOUR ELECTRICAL NETWORK



We can help you in the choice of protection relays that best fit your environment.

Our highly professional team of engineers from our Application Service will provide their help not only in choosing the relays, but also in setting and commissioning them.

INTEGRATION STUDIES

ICE has a team of engineers and technicians dedicated to integration and design of racks and cabinets for protection and control systems.

Protection relays and various elements for local control are assemblied to build modular racks and cubicles:

- Switches and circuit breakers
- Commutators
- Local control devices
- Warning lights
- Measurement devices

Many remote control elements can be added:

- RTUs (remote terminal units)
- Event recorder
- Communication interface
- Displays

POWER* TOOLS® FORWINDOWS

Our engineering team uses SKM Power* Tools® for Windows® (PTW) to perform application studies and PTW software for design and analysis of electrical power systems. Interactive graphics and a powerful object-oriented database efficiently organise processes and display of study results. With PTW, we can offer you the following studies:

- Load-flow and Voltage-drop Analysis
- Motor Starting Analysis
- Fault Analysis and Equipment Evaluation
- Protection co-ordination
- Dynamic Analysis Harmonic Analysis

NETWORK STUDIES

Whether engineering consultants, equipment builders, installers or end users, our engineers can provide you the entire range of services needed for complete studies before choosing the protections for your network.

Preliminary studies: These studies can define the type and range of protection and control best suited to ensure proper selectivity and to guarantee rapid clearance of short circuits and disconnection of faulty equipment.
The purpose of such a study is to make the preliminary calculations of short circuit currents for both phase and earth faults in order to establish the selectivity curves and to define the appropriate settings.
We can also provide you with calculations of the CT characteristics related to the protection. Technical notes justifying our proposal accompany this type of study.

Application studies:
Increasing your network efficiency:

- Accurately calculate short circuit currents at each point of the electricity network and in each type of operational scenario,
- Calculate capacitor currents when there are defects between a phase and the earth,
- Calculate power decreases,
- Specify settings for motor starting,
- Evaluate dynamic network stability.

SERVICES

ON - SITE SERVICES

A team of engineers and technicians is trained to deal with electrical and chemical risks, ready to assume commissioning and maintenance on site in France and abroad.

Usual works involved:
Commissioning of protection relays:
- Display of settings and tests with automatic test equipement,
- Control of electrical connections and tripping circuits,
- Assistance at start up of installations,
- Maintenance of protection relays,
- Commissioning and maintenance of PLCs,
- Configuration, commissioning and maintenance of supervision systems,
- Wiring modifications,
- Expert evaluation of installations.

Service reports and test results are provided for all these actions.

CUSTOMER TRAINING

We can offer you a large choice of training courses in the field of electrical protection. These courses are available in our registered training center in Paris or on-site in France and abroad.

Generally, our training courses concern:
Protective relays, where the objectives are to know how to set and test protective relays (for example relays in the NP 800 series).

Protection in general, where the objectives are to master the main elements in designing a plan of industrial network protection and to know how to define and coordinate the types and regulations concerning protective relays.

Other type of training courses are also provided such as use of PTW power system analysis software.

Your training in English or in French according to your needs.

TRANSMISSION, DISTRIBUTION, PRODUCTION

T & D

Since its creation, ICE has provided protections to electricity Transmission and Distribution networks worldwide.

Since their foundation in 1947, the biggest electricity provider in France EDF and its subsidiary RTE have trusted ICE's expertise in the T&D networks, to develop a wide range of protections, management devices as well as regulation or automatic reclosing.

OUR SOLUTIONS

- Analog or digital technologies
- Supervision
- Automatism (recloser, C.B. failure, customised)
- Protection against fault
- Control command
- Overload (lines, transformer)
- A.V.R. with active/reactive compound

CUSTOMER BENEFITS

- High level of quality in services
- Adaptation to the needs of EDF / RTE and other customers
- Ease of use and diagnosis
- Qualified products by EDF / RTE
- Long life cycle and continuity of products and maintenance
- Immunity to perturbations
- Experience benefits

As a specialist of protection and control command of electrical networks and substations, ICE can provide various line and transformer protections and automatisms for transmission network and distribution stations.

Our technical team assures the expertise, commissioning, training and help line.

NUCLEAR

With its strong background in protection and control of thermal and hydro-electric power stations, ICE provides CLASS 1E relays for nuclear power stations, and other ranges for thermal powerstations in France or abroad.

CLASS 1E certified relays

CLASS 1E certified relays is the safety classification for electrical equipment and system in nuclear power stations that are essential to monitoring, detection of faults or even emergency shutdown of the reactor. These relays equip power stations in France as well as in many countries such as Belgium, Spain, India or China.

OUR SOLUTIONS

- Analog or digital technologies
- Safe protection of generators in case of emergency shutdown
- Current, voltage, frequency, rotating machine differential relay, transformer differential or high impedance relay check synchronizing relay
- Alternator negative sequence relay, loss of field relay and rotor earth fault relay

Requirements for nuclear application

Seismic Qualification Tests are passed in accordance with IEEE Standard:

- 344-1987 IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations
- 501-1978 IEEE Seismic Testing of Relays

HYDRAULIC - THERMAL

CUSTOMER BENEFITS

- Relays designed according to Electricité de France EDF standards
- Safety and reliability proven for over 30 years in the nuclear power plants
- Manufacturing assured with the same design for the life time of the station

INDUSTRY

SPECIALIST IN HIGH AND MEDIUM VOLTAGE PROTECTION AND SCADA

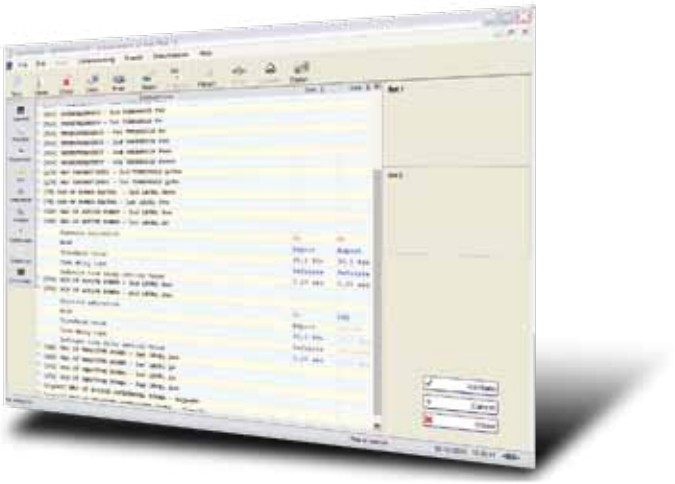
SMARTsoft

SMARTsoft is a certified setting software provided with the NP 800 range relays.

SETTING

Setting is allowed on-line or off-line: each relay is named and configured according to the application and the calculated values.

Two setting tables are available for most of the relays.



CUSTOMER BENEFITS

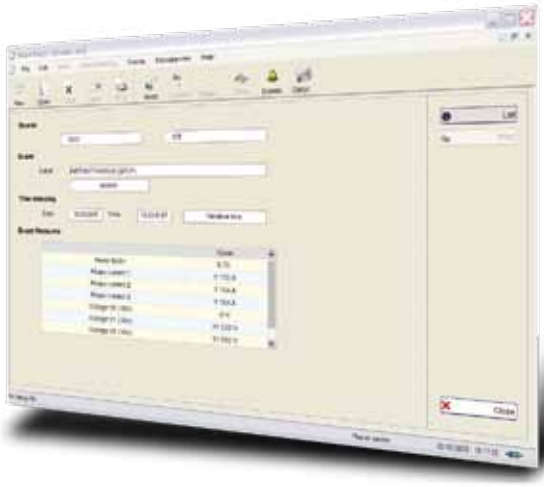
Multi-lingual - User friendly - Easy installation

It has been designed to allow operation with the most recent relays and also with the most popular ones of the former ranges, to avoid the use of several setting software.
NP 800 range, NPDT 600, DMS 7000 and GMS 7000 of the PROCOM series and other can be addressed with SMARTsoft. Furthermore, new databases are available all the time.

MAINTENANCE

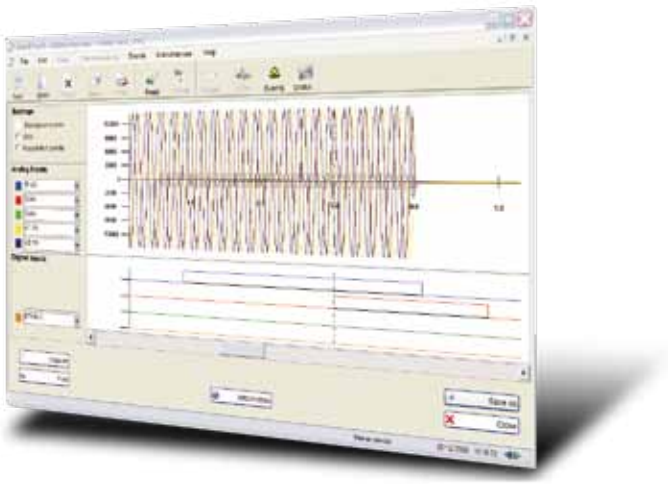
Commissioning and maintenance are made easier by the integrated functions: test of wiring (NP 800), LEDs, I/O, real time measurement...

"OUR ENGINEERS CAN ANSWER YOUR REQUIREMENTS FOR ASSISTANCE AND TRAINING"



ANALYSIS

Analysis is performed using the built-in log feature of the digital relays and uploading in real time the parameters and measures from the device.



RECORDING

Digital relays are provided with a disturbance recording function. Electrical values are available, time stamped and they provide accurate and convenient help to understand faults on the network. The files can even be used with a test set.

TIME SAVING

All these features make the user feel confortable and fast at any stage of the operation. SMARTsoft runs under different versions of Windows.

ELECTRICAL NETWORKS FORM AN INTEGRAL PART OF OUR LIVES.

Production, distribution and availability of electrical energy, in safe conditions, are fundamental for the operation of cities, industries and for everyday life.

The complete management of the electrical network, from generation to consumption is becoming increasingly important. To meet this challenge, ICE has used over 60 years of its experience in the design and manufacture of a wide range of protective relays and associated devices to ensure the highest operational reliability of electrical networks.

ICE can provide you with solutions for network protection, supervision, network studies (such as protection co-ordination, short-circuit and load flow studies) and services (such as maintenance, commissioning and expertise).

PROTECTING HIGH AND MEDIUM VOLTAGE NETWORKS IN INDUSTRIAL PLANTS

To protect the most vital and strategic resource of an industrial site (electrical energy), ICE offers customised solutions that optimise the operation of installations and contribute to the competitiveness of industrial companies.

The protection of medium voltage networks and equipment is our core specialty. Products and technical solutions have already been supplied worldwide to many heavy industries such as steel plants, chemical and petrochemical installations, refineries, cement works and power stations.

These industries require complex networks for their protection needs such as engineering studies to ensure rapid clearance of faults whilst maintaining maximum continuity of electrical supply. Our Application Team can provide many different types of network studies (see page 7) to help determine the best solution.

CUSTOMER BENEFITS FOR ALL PROTECTION RELAYS IN INDUSTRY

- Long experience with internationally known companies like the French utility EDF
- Global support in all your projects
- Advice about choice of protective relays to maximise the security of your electrical network
- Training of electrical engineers and on-site technicians

NP 800 RANGE - Developed and customised to your needs

The NP 800 series provides protection and monitoring of electrical networks as well as low and medium voltage motors.

In addition to the usual protection functions, the NP 800 relays include monitoring, measurement and recording of electrical parameters of the distribution network.

CLASSIC RANGE - Quality and technical innovation

CUSTOMER BENEFITS

Reliability and Availability

The design and manufacture complies with the most stringent standards of reliability and safety for the manufacturing of all relays.

Power and Flexibility of Communication

NP800 and PROCOM relays offer to user local and remote communication channels for setting, network management, commissining, fault diagnostics and post fault analysis.

Adaptability and Autonomy

Each communicating relay can be used either separately or in an integrated system where it can provide all of the intelligent functions of an electrical cubicle: protection, measurement and automation.

Procom range

The optimum operation of an electrical network depends particularly on the reliability and the availability of the protection, measuring and automation devices, and the manner in which these devices can communicate the information they manage.

The PROCOM modular system satisfies the criteria above by providing the possibility of using either separately or within an integrated system all of the intelligent functions of an electrical cubicle:

- protection,
- measurement,
- automation
- communication.

In addition to the PROCOM protection relays such as the RMS, RMSD, RMSR, IMM, GMS and DMS relays, the PROCOM range also includes the CMS digital instrumentation units and AMS local PLCs.

Static range

With its long experience in the field of static relays (more than half a million units in operation throughout the world), ICE still provides these relays for ease of replacement in upgrade and refit projects as well as for new installations.

Other equipment

CTs, VTs, sensors, page 54
Test sets, page 54

Our know-how in the domain of electrical network protection by static and numerical relays has led to the development of new generations of products that comply with the most demanding quality standards and the most recent technological concepts. One of the results of this expertise is the numerical NP 800 relay range.

The NP 800 relays provide the protection of people, networks and electric installations and they allow communication with SCADA systems (for more information on SCADA, see page 55).
As well as the usual protection functions of former ranges, the multifunctional NP 800 relays provide monitoring, measurement and recording of the network electrical quantities.

Dimensions:
Case without short-circuiting current terminal blocks (fixed, non withdrawable):
173x106.3x250 mm

Case with short-circuiting current terminal blocks (withdrawable):
173x106.3x305 mm

Net Weight:
3,6 kg without I/O extension board
4 kg with I/O extension board

CUSTOMER BENEFITS

- Multi function integrated relay
- Easy setting and testing
- Recording of network faults for accurate analysis
- Optional communication facilities
- User friendly SMARTsoft included

Common characteristics for the NP 800 range:

Auxiliary supply ranges: 19V to 70V or 85V to 255V (AC or DC).

2 setting tables.

Self-diagnostic: RAM, ROM, EEPROM, output relays, A/D converters, auxiliary supply, monitoring of software execution time.

Optional I/O extension board (included when directional function is present).

Setting, reading, measuring and recording are all available locally or remotely.

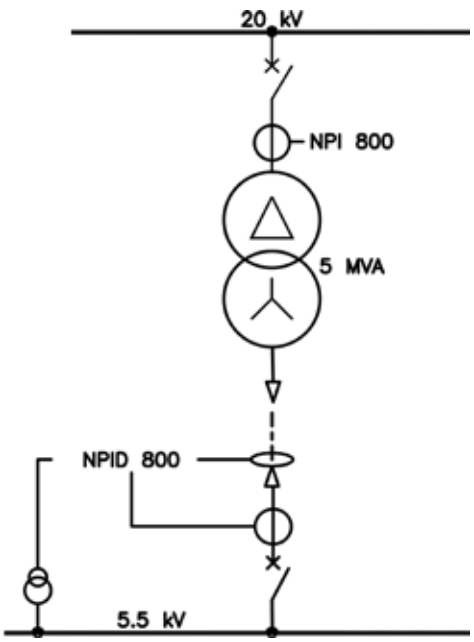
Complies with IEC 60255-4 standard.

Monitoring of circuit breaker failure.

Event recording: 250 events, 10ms resolution.

4 disturbance recordings.

THREE-PHASE OVER CURRENT & EARTH-FAULT NPI 800, WITH DIRECTIONAL NPI D 800



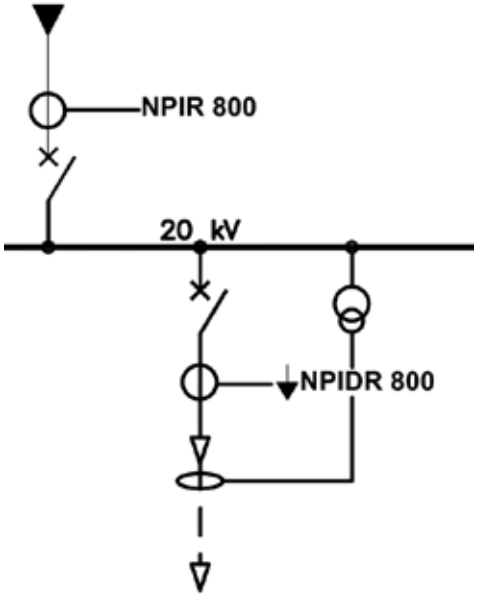
The NPI 800 relay protects three-phase electrical networks against all types of phase to earth and phase to phase faults.

In addition, the NPID 800 features a directional function.

ANSI functions for NPI 800:
50 / 51 / 50N / 51N / 46 / 46BC / 49 / 50BF / 74TC / 86

ANSI functions for NPID 800:
50 / 51 / 50N / 51N / 67 / 67N / 46 / 46BC / 49 / 50BF / 74TC / 86

NPIR 800 & NPIDR 800, INCLUDING RECLOSER



Fitted with a recloser function, the NPIR 800 and NPIDR 800 are dedicated to distribution electrical networks.

In addition to protection of three-phase network against all types of phase to earth and phase to phase shortcircuits, they integrate an automatic 4 shot recloser feature.

ANSI functions for NPIR 800:
50 / 51 / 50N / 51N / 46 / 46BC / 49 / 50BF / 74TC / 79 / 86
ANSI functions for NPIDR 800:

50 / 51 / 50N / 51N / 67 / 67N / 46 / 46BC / 49 / 50BF / 74TC / 79 / 86

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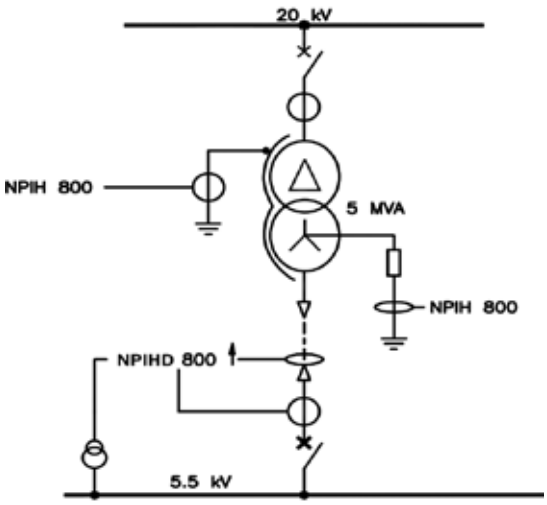
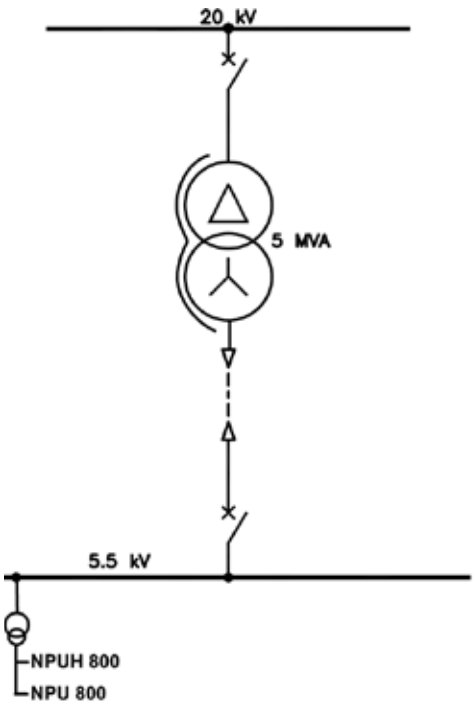


EARTH - FAULT NPIH 800, WITH DIRECTIONAL NPIHD 800

The NPIH 800 and NPIHD 800 relays protect three-phase electrical networks against phase to earth faults. In addition, the NPIHD 800 features a directional function.

ANSI functions for NPIH 800:
51N / 50N / 86 / 74TC / 50NBF

ANSI functions for NPIHD 800:
51N / 50N / 67N / 86 / 74TC / 50NBF

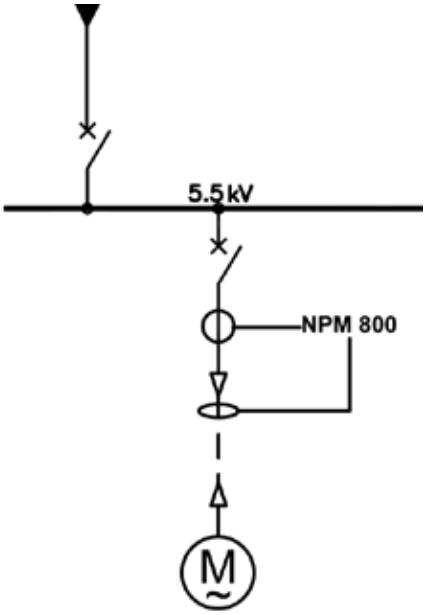


THREE - PHASE UNDER / OVER VOLTAGE & UNDER / OVER FREQUENCY NPU 800, ZERO SEQUENCE OVER VOLTAGE NPUH 800

NPU 800 relay ensures the monitoring of the voltages of electrical supply networks whereas the NPUH 800 protects three-phase networks with isolated or high impedance earthed neutrals against earth-faults.

ANSI functions for NPU 800:
59 / 27 / 27 P / 810 / 81U / 86 / 74TC

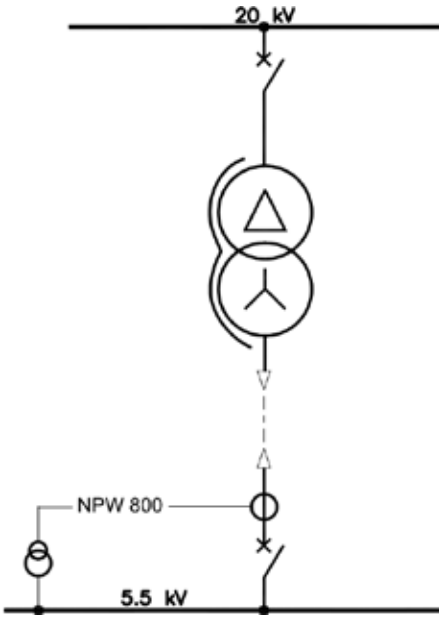
ANSI functions for NPUH 800:
59N / 86 / 74TC



MOTOR PROTECTION NPM 800

The NPM 800 relay protects high power LV and MV motors against thermal overload, too long start, locked rotor, short-circuit, underbalance, phase to earth fault.

ANSI functions for NPM 800:
49 / 50 / 51N / 37I / 46 / 48 / 51LR / 66 / 5 / 50BF / 86 / 74TC



POWER PROTECTION NPW 800

The NPW 800 relay performs measurement of apparent (S), active (P) and reactive (Q) power of 3 or 4 wire electrical networks.

Management of power factor, tangentΦ and supervision of the network voltage and frequency can complement the monitoring of energy flow direction.

ANSI functions for NPW 800:
27 / 32P / 32Q / 37P / 37Q / 59 / 59N / 74TC / 55 / 81U / 81O / 86 / BF

Additional functions:
P / Q / [Q/P] (TgΦ)

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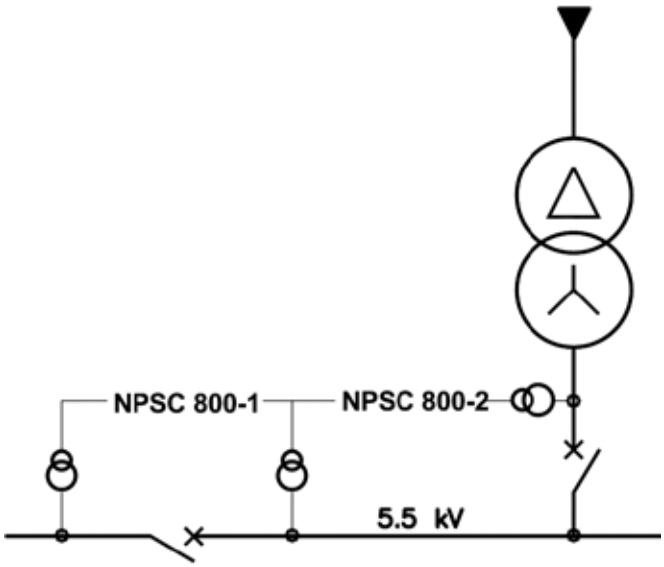


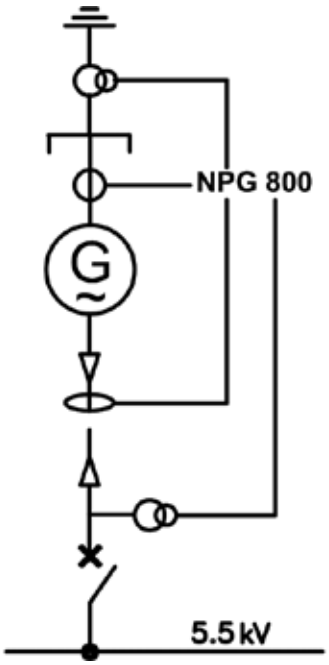
SYNCHRO CHECK NPSC 800-1 & NPSC 800-2

Successor of the STS 7041 (page 31) relay, NPSC 800 - 1 checks synchronism between two sources. It is as well used to authorise a closing order to the paralleling Circuit Breaker.

The NPSC 800 - 2 allows operation of live/dead line and bus. It may also realise the reconnection of two sections supplied by the same source.

ANSI functions for NPSC 800-1 & NPSC 800-2:
25

Additional functions for NPSC 800-2:
DLDB / DLLB / LLDB / RECONNECTION



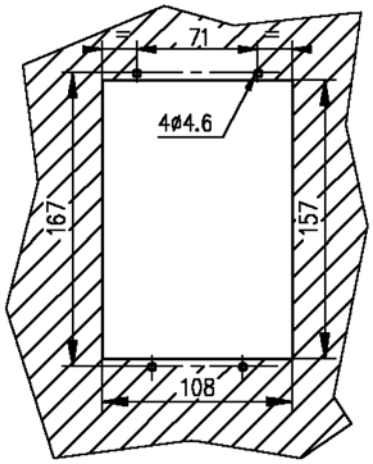
GENERATOR PROTECTION NPG 800

The NPG 800 relay protects the synchronous generators connected to three-phase network, whatever the type of machine:
steam, hydraulic and gas turbines, diesel and gas motors.

ANSI functions for NPG 800:
21 / 24 / 27 / 32RP / 32P / 32Q / 40 / 46 / 49 / 50 / 50V / 51/ 51V / 59 / 59N / 64 / 81 / 86 / 74TC / 50BF

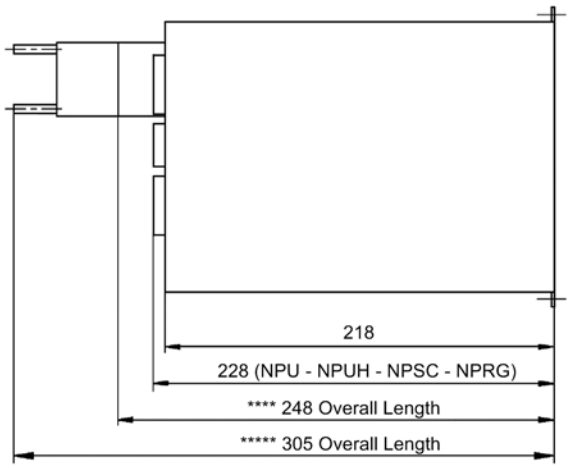
DIMENSIONS AND FIXING

"OUR ENGINEERS CAN ANSWER YOUR REQUIREMENTS FOR ASSISTANCE AND TRAINING"



Flush Mounting

Drilling and cut-out of panel

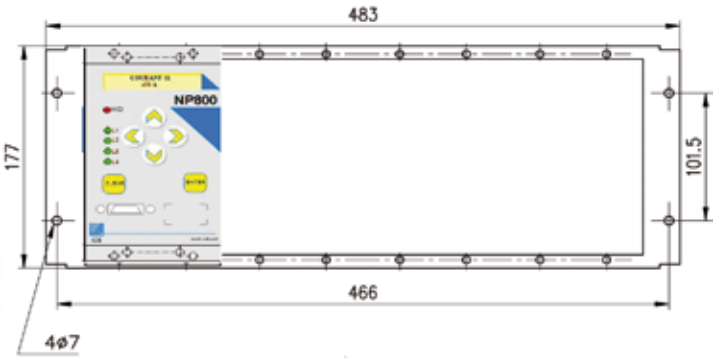


**** Case without short-circuiting devices current terminal block(s) fixed and not withdrawable.

***** Case with short-circuiting devices current terminal block(s) withdrawable.

* Frame
** Flush Mounting
*** Rack

ICE Frame Mounting
1 up to 4 NP800 Case



Dimensions in mm.

FEEDER PROTECTION

> "OUR ENGINEERS CAN ANSWER YOUR REQUIREMENTS FOR ASSISTANCE AND TRAINING"

Protective relays greatly participate in the operation of industrial networks, and help providing the best possible electrical service. Overcurrent protections are the basic protection used in a network for feeder protection. They must be both sensitive and fast in order to minimize the electro dynamic and thermal stresses imposed on the equipment during the fault.

They should also be selective, i.e. to be able to only exclude the faulty element while maintaining the supply of the healthy parts. For feeder protection, relays with a two-level definite or inverse time characteristic for phase faults and a single level for earth faults operate according to this principle.

RMS 700, 7900 and RMSR 7900 relays are microprocessor based relays which use an original method of analysing input current signals: the Fast Fourier Transform.

Procom Range

RMS 700
Overcurrent protection

RMS 711: single phase or zero sequence
ANSI functions: 50 / 51 or 50N / 51N

RMS 761: three-phase
ANSI functions: 50 / 51

RMS 771: two-phase & zero sequence
ANSI functions: 50 / 50N / 51 / 51N

RMS 791: three-phase & zero sequence
ANSI functions: 50 / 50N / 51 / 51N

Case type:
RMS 711/761: R2
RMS 791: R3

Net weight:
RMS 711/761: 3,5 kg
RMS 791: 3,9 kg

Procom Range

RMS 7000
Overcurrent relay with recloser

RMSR 7991: protection of radial outgoing feeder protection in distribution networks.

RMSR 7992: designed to protect incoming feeders in distribution system substations.

Main ANSI functions: 50 / 50N / 51 / 51N / 79

Case type: R4

Net weight: 4,5 kg

FEEDER PROTECTION

Procom Range

RMS 7992
Overcurrent protection

RMS 7992 series provides protection of threephase electrical networks against any kind of short-circuit between phases or between phase and earth.

Protects all types of electrical power equipment, most specifically plain feeders and transformers.
Operates on a principle of signal sampling and calculates the harmonic spectrum of input currents up to seventh harmonic (Fast Fourier Transform, FFT).

RMS 7992:
ANSI functions: 50 / 50 N / 51 / 51N

RMST 7992:
ANSI functions: 50 / 50N / 51 / 51N / 49

Case type: R3

Net weight: 3,9 kg

Procom Range

RMSD 7900
Directional protection

RMSD 7921: Protection of loops of rapid separation or “islanding” of networks having several sources in parallel.

ANSI function: 67

RMSD 7912: Directional earth fault protection on looped or multiple earthing points networks.

ANSI function: 67N

Case type: R3

Net weight: 3,9 kg

Procom Range

CMS 7000
Three-phase instrumentation protection

Performs the measurement functions of the PROCOM system.

Two models available, depending on the number of VT’s used:
CMS 7003: when two of the three phase-to-phase voltages are accessible.

CMS 7004: when the three phase to neutral voltages are accessible.

ANSI function: 11

Case type: R4

Net weight: 4,2 kg

Procom Range

AMS 7000
Programmable logical controler

AMS 7001: Used in automatic changeover and transfer schemes as it can simultaneously control two circuit breakers and monitor two voltages.

AMS 7002: Used where switchboards include supervision / control, metering and instrumentation, and/or automatic local control such as motor restart sequences using real time voltage monitoring.

ANSI functions:
AMS 7001: 34
AMS 7002: 34 / 11

Case type: R3

Net weight: 3,8 kg

ITG FAMILY
Feeder protection

ITG 7xx5 - 7xx6 SERIES
Designed for the protection of electrical distribution networks and substations (both public utility and industrial) against faults between phases, or phase to earth.

ITG 7000 - 7100 RANGE
Overcurrent and undercurrent relays providing instantaneous or definite time protection against phase or earth faults, with either one or two pick-up levels. They can be installed in all types of climatic conditions.

ITG 7200, 7300 and 7400 RANGE
Provide phase and/or earth-fault protection relays. Inverse, very inverse and extremely inverse time types, with or without instantaneous high-set units.

CUSTOMER BENEFITS

Static measuring elements imposing a very low burden on the measuring transformers, and with a very high precision on pick-up value and time-delay, thus permitting a considerable reduction in time intervals required for selective coordination.

Operating level exactly defined as a value of current and time for each type of curve, either inverse, very inverse, extremely inverse, slightly inverse time and not as an asymptote to the time axis.

Total independence between the phase and earth-fault measuring elements and time-delay circuits in the models including two or three phases and earth, thus allowing two entirely separate chains of selectivity to be created.

DIMENSIONS AND CHARACTERISTICS

MODEL	PROTECTION FUNCTION ANSI	TIME	CASE TYPE	NET WEIGHT
ITG 7000				
ITG 7013	50	Definite time	R1	2,4kg
ITG 7100				
ITG 7105	51/51N	Definite time	R2	3,0kg
ITG 7111	51N	Definite time	R1	2,5kg
ITG 7113	51/51N	Definite time	R1	2,4kg
ITG 7114	51	Definite time	R2	2,4kg
ITG 7116	50/50N or 51/51N	Definite time	R2	3,0kg
ITG 7118	37	Definite time	R1	2,4kg
ITG 7123	51	Definite time	R2	3,4kg
ITG 7135	51	Definite time	R2	3,5kg
ITG 7166	50/51	Definite time	R2	3,0kg
ITG 7196	50/50N or 51/51N	Definite time	R3	4,5kg
ITG 7200				
ITG 7205	51/51N	Normally inverse time	R2	3,7kg
ITG 7216	50/50N/51/51N	Normally inverse time	R2	4,0kg
ITG 7266	50/51	Normally inverse time	R2	4,2kg
ITG 7296	50/50N or 51/51N	Normally inverse time	R3	5,1kg
ITG 7300				
ITG 7305	51/51N	Very inverse time	R2	3,0kg
ITG 7316	50/50N/51/51N	Very inverse time	R2	3,0kg
ITG 7366	50/51	Very inverse time	R2	4,2kg
ITG 7396	50/50N/51/51N	Very inverse time	R3	5,0kg
ITG 7400				
ITG 7416	50/50N or 51/51N	Extremely inverse time	R2	3,0kg
ITG 7466	50/51	Extremely inverse time	R2	4,4kg
ITG 7496	50/50N/51/51N	Extremely inverse time	R3	4,5kg

FEEDER PROTECTION

Static Range

ITV 7000
Voltage restrained overcurrent

Selective protection of generators in the event of overloads and heavy internal or external faults.

Can be provided either with definitive time, inverse, very inverse or extremely inverse time characteristic.

Two three-phase overcurrent units.

Four models available:
ITV 7166, ITV 7266, ITV 7366, ITV 7466

ANSI functions: 50V / 51V / 27

Case type: R3

Net weight: 3,7 kg

Static Range

ITH 7111
Zero sequence current

Protection of electrical equipment against zero sequence (earth or ground) faults, rotating machines, transformers, or throughout the network (ITG 7111 having the same characteristics).

Supplied with a specific type of CEE ring transformer, of either opening or non-opening type.

Available internal diameter is in the range of 25 to 245 mm.

ANSI function: 64

Case type: R1

Net weight: 2,5kg

Static Range

WTG 7000
Power protection

Provides a static solution to the various problems of protection requiring a real measure of the active or reactive power (as well as energy flow direction supervision).

Advantages: Unbalanced power in the case of 3 wire three phase networks, measured by the two wattmeter method.

Great directional stability active power relay totally unaffected by current and voltage harmonics.

Continuously adjustable operating thresholds. Low burden on current and voltage transformers.

SIX MODELS AVAILABLE:

WTGA 7131, WTGA 7132
ANSI function: 32P

WTGA 7133
ANSI function: 37P

WTGR 7131, WTGR 7132
ANSI function: 32Q

WTGR 7133
ANSI function: 37Q

Case type: R3

Net weight: 4,5 kg

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To protect all types of motors, the use of digital multi-function relays is recommended.

These relays include the following features:
- A sophisticated thermal image, a unit sensitive to the negative sequence component of current,
- A unit that provides rapid elimination of multiphase faults,
- A zero sequence overcurrent unit supplied either from toroidal (ring-type or corebalance) CT or from the residual connection of line CTs.

FOR DIFFERENTIAL MOTOR PROTECTION, SEE DMS 7001 PAGE 28 AND DTM 7033 PAGE 29

Procom Range

IMM 8000
Motor protection

Two models (IMM 8001 and IMM 8002) of digital relays designed to protect medium to high power MV motors.

ANSI functions for IMM 8001:
27 / 48 / 27RC / 49 / 27ST / 50 / 37I / 51N / 37P / 51LR / 46 / 51 / STALL / 59 / 66

ANSI function IMM 8002: as IMM 8001 + 26

Allows the connection of three temperature sensors (RTDs)

Dimensions:
173 x 186 x 275 mm (flush mounted)
206 x 186 x 275mm (rack mounted)

Net weight: 5 kg

MOTOR PROTECTION

Procom Range

IMM 7990
Motor protection

Provides electrical protection for high and medium voltage motors, as well as LV high power motors.

ANSI functions
37 I / 51 LR / 46 / 51N / 48 / 49 / 50 / 5/49 / 5/66 + thermal pre-alarm

Case type: R3 (+ external resistor for auxiliary supply >48 V)

Net weight: 3,5kg

Procom Range

IMM 7960
Motor protection

Provides electrical protection for high and medium voltage motors, as well as LV high power motors.

ANSI functions:
37 I / 50 / 46 / 51LR / 49 / 51N

Case type: R2

Net weight: 3,5kg

Procom Range

GMS 7002
Synchronous motor protection

Protection of synchronous motors, driving centrifugal, reciprocating compressors, crushers, ...

ANSI functions:

GMS 7002: 49 / 46 / 55 / 50 / 51LR / 59 / 24 / 27 / 81 / 32P / 59G

GMSH 7002: 49 / 46 / 55 / 50 / 51LR / 59 / 24 / 27 / 81 / 32P / 64

Case type: R4

Net weight: 5 kg

Static Range

GTM 7111
Synchronous motor out-of-step protection

Designed to protect synchronous motors against out-of-step conditions caused from sudden overloads, drop in network voltage or in excitation current.

ANSI function: 55

Case type: R2

Net weight: 2,7 kg

The operation of a generator may be as easily affected by faults within the machine itself as by external disturbances occurring on the network to which it is connected. The generator protection must therefore be designed to react efficiently in both conditions.

All the various generator protection functions can be provided by separate relays. However, a much more cost-effective method is to use a multi-function protection relay, which performs all the functions in one relay.

The GMSx 7000 and DMS 7000 series relays are designed to protect synchronous machines connected to three phase 50 Hz or 60 Hz electrical networks.

Procom Range

DMS 7001
Differential protection

Used for the protection of synchronous or asynchronous generators or motors.

Can be used with stabilising resistors to improve stability.

ANSI functions: 87 M

Case type: R4

Net weight: 5 kg

Procom Range

GMS 7001
Synchronous machine protection

Protection of synchronous generators driven by any type of prime mover: steam turbines, water turbines, gas turbines, diesel engines, gas engines.

3 models:
GMS 7001: Used when 3 phase voltages are available (3VT/distributed neutral) and when the zero sequence voltage, built by an internal summation, is used as a characteristic value in the operation of the relay.

GMSH 7001: Used when 2 phase to phase voltages are available and when zero sequence current is used as a characteristic value in the operation of the relay.

GMSV 7001: Used when 2 phase to phase voltages are available and when zero sequence voltage, from a star point or open delta VT, is used as a characteristic value in the operation of the relay.

ANSI functions:
GMS 7001 & GMSV 7001:
21 / 24 / 27 / 32RP / 32P /40 / 46 / 49 / 51 / 59 / 59G / 81

GMSH 7001:
21 / 24 / 27 / 32RP / 32P / 40 / 46 / 49 / 51 / 59 / 64 / 81

Case type: R4

Net weight: 5 kg

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GENERATOR PROTECTION

Static Range

ITI 7521
Negative sequence protection

Protection of alternator against negative sequence.

ANSI function: 46

Case type: R3

Net weight: 3,5 kg

Static Range

DTM 7033
Differential protection

Three-phase percentage biased differential relay.

Provides a solution for the protection of rotating machines against internal faults.

ANSI function: 87 M

Can also be used as a transverse differential protection on machines having two accessible windings in parallel per phase, ensuring protection against short-circuits between turns on the same winding.

Case type: R3

Net weight: 3,6 kg

Static Range

YTM 7111
Loss of field protection

Admittance relay, designed for the detection, by using electrical quantities available in its stator circuit, of the loss of field of an alternator connected to a network.

Supplied with two phase currents and the corresponding phase-to-phase voltage.

ANSI function: 40

Case type: R2

Net weight: 3 kg

Static Range

TTE 7000
Rotor earth fault

TTE 7015 and TTE 7017 detect any fault on the rotor winding of a synchronous machine, in order to give an alarm and, if required, to separate the machine from the network.

TTE 7015: operate on the d.c. current injection principle.

TTE 7017: operate on the a.c. current injection principle with low frequency (maximum 20 V or 5 mA r.m.s.)

ANSI function: 64 F

Case type: R2

Net Weight: TTE 7015: 3,3 kg

TTE 7017: 2,5 kg

TTG FAMILY
Voltage protection

The TTG 7000 and 7100 series have been designed to check AC voltages on electrical power networks.

TTG 7012/7112: single phase undervoltage with a simultaneous checked on the auxiliary supply.

TTGd 7012/7112: supervision of rotating machine torque, by measuring the positive sequence voltage with a simultaneous check on the auxiliary supply.

TTG 7013: check of induction motor flux decay before reclosure, in an automatic transfer sequence.

TTG 7034 / 7134: neutral displacement.

TTGB 7031: voltage balance relay - indicates the failure of voltage transformers or their associated fuses.

CUSTOMER BENEFITS

Protected against severe environments: heat and humidity, saline atmosphere, corrosion.

Conform with the IEC standard 60255

May be stored at very low temperatures

Auxiliary output relay with two high-power contacts and a hand reset mechanical operation indicator

DIMENSIONS AND CHARACTERISTICS

MODEL	PROTECTION FUNCTION ANSI	FUNCTION	CASE TYPE	NET WEIGHT
TTG 7000				
TTG 7012	27	Single phase	R1	2,4kg
TTG 7013	27	Single phase	R1	2,4kg
TTG 7025	27	Two phase	R2	3,4kg
TTG 7032	27	Three phase	R2	3,5kg
TTG 7033	27	Three phase	R2	3,5kg
TTG 7034	59N	Zero sequence voltage	R2	2,7kg
TTG 7100				
TTG 7111	59	Time-delayed	R1	2,4kg
TTG 7112	27	Single phase	R1	2,4kg
TTG 7113	27	Single phase	R1	2,4kg
TTG 7114	59N	Zero sequence voltage	R2	3,5kg
TTG 7123	27	Two phase	R2	3,4kg
TTG 7132	27	Three phase	R2	3,5kg
TTG 7133	27	Three phase	R2	3,5kg
TTG 7134	59N	Zero sequence overvoltage	R2	3,5kg
TTGB 7031	60	Voltage balance relay	R3	5,0kg
TTGD 7012	27P	Positive sequence	R1	2,4kg
TTGD 7112	27P	Positive sequence	R1	2,4kg

GENERATOR PROTECTION

Static Range

STS 7041
Synchro-check relay

Verifies the synchronism between two sources.

High precision and stability based on the analysis of signals by analogue and numerical systems.

ANSI function: 25

Other functions:
- Absolute values of the voltages
- Voltage difference
- Angle difference
- Frequency difference
- Reconnection as alternative

Case type: R3

Net weight: 3 kg

Static Range

PTG 7111
Reverse power protection

Relay for the protection of synchronous motors against operation as generators or diesel driven alternators against motoring conditions. For these situations it operates as a reverse power relay.

Operating time curves have been chosen long enough, and of a slightly inverse type close to the operating point to avoid operation in the event of faults which should normally be tripped rapidly by the appropriate protections on the network or the machine

ANSI function: 32RP

Case type: R2

Net weight: 3,5 kg

Static Range

IAG 7034
High impedance differential protection

Three phase, instantaneous longitudinal differential protection of bus-bars and alternators, synchronous or induction machines - instantaneous transverse protection of machines with two windings in parallel.

ANSI function: 87

Case type: R3

Net weight: 5 kg

Static Range

TTB 7025
D.C. voltage protection

TTB 7025 is an over and under excitation current relays.

ANSI functions: 27DC / 59DC

Case type: R2

Net weight: 3,5 kg

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HV/HV or HV/LV power transformers may be damaged by internal faults or by external faults such as overload or short-circuit which cause overheating and excessive electro dynamic stresses in the windings.
Internal faults consist in inter-turn faults, or short-circuits between windings, or between one winding and the core or tank, their current being variable according to the location.

Detection and elimination of these different faults may require several types of protective relays. However, faults affecting the magnetic circuit itself (local overheating due to induced currents) cannot be detected by electrical protection, and are monitored by a mechanical relay, actuated by the gas accumulation or surge caused by the fault (oil immersed transformers for example).

Whenever the installed power can overload the secondary of a transformer in particular configurations, it is useful to provide protection against low-level but long-duration overloads.

Static Range

DMS 7002
Digital differential protection

Used for the protection of transformer or generator- block transformer units of two-winding transformers.

ANSI function: 87T

Case type: R4

Net weight: 5 kg

Static Range

DTT 7031
Static differential protection

Biased three-phase differential relay designed to protect high voltage transformers against internal faults.

Standard interposing transformer, 1 A or 5 A, ratio being adjustable by taps.

ANSI function: 87T

Case type: R4

Net weight: 6,2kg

TRANSFORMER PROTECTION

Procom Range

NPDT 600
Differential protection

Detects various types of faults such as faults between phases, short-circuit between a winding and earth or between turns on the same phase.

NPDT 620: 2 windings

NPDT 630: 3 windings

ANSI functions:
87T / 64REF (option, NPDT 630) + Buchholz and temperature monitoring via digital input.

Dimensions:
NPDT 620: 275 x 155 x 249 mm
NPDT 630: 275 x 226 x 339 mm

Net weight:
NPDT 620: 10kg
NPDT 630: 12kg

Static Range

IAG 7014
High impedance differential protection

Instantaneous restricted earth fault protection of bus-bars or transformers.

The IAG 7014 relay is equipped with 2 normally open contacts and flag indicator which may be reset by an external hand operated button.

ANSI functions: 87B or 87T

Case type: R2

Net weight: 3,5 kg

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Voltage relays are dedicated to check AC voltages on electrical power networks. Apart from the usual over- and undervoltage protections on the bus-bars of substations or distribution stations, or on the terminals of rotating machines, many applications are concerned, as: undervoltage function with supervision of the auxiliary supply, supervision of rotating machine torque, check of induction motor flux decay, before reclosure in an automatic transfer sequence.

When correctly applied, they provide protection of both equipment and people together and ensure the best possible quality electrical power supply.

Procom Range

TMS 7000
Voltage protection

TMS 7003: used when only phase to phase voltages are available and are used as the measurement quantities in the relay (e.g. 2 VTs connected in V).

ANSI functions: 27, 27P, 47, 59, 59N

TMS 7004: used when phase voltages are available (distributed neutral point).

ANSI functions: 27, 27P, 47, 59, 59N

Case type: R3

Weight 4 kg

TMS 700
Voltage protection

Three types of voltage relays are available:

TMS 711: single phase ; 2 over or under voltage settings
ANSI functions: 27 / 59

TMS 714: zero sequence single phase
ANSI function: 59N

TMS 761: three phases ; 2 over or under voltage settings
ANSI functions: 27/59

Case type: R2

Net weight:
TMS 711 / 714: 3,0 kg
TMS 761: 3,5 kg

VOLTAGE & FREQUENCY PROTECTION

Static Range

HDG 7020
Frequency protection

Two-level frequency relay, suitable for use in a wide range of applications.

High precision, rapid operating time, wide setting ranges and possibility of using each operating level either for over-frequency or under-frequency.

ANSI function: 81

Case type: R2

Net weight: 4kg

Static Range

TTB 7000
DC voltage protection

The TTB 7000 relays form a complete range of instantaneous DC overvoltage or undervoltage relays.

ANSI functions by relay type:
TTB 7011: 59DC
TTB 7013: 27DC
TTB 7026: 27DC
TTB 7027: 59DC

Case type:
TTB 7011 / 7013: R1
TTB 7026 / 7027: R2

Net weight:
TTB 7011 / 7013: 2,5 kg
TTB 7026 / 7027: 3,5 kg

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The auxiliary relays and timers are appreciated for their ruggedness, reliability and ease of installation and operation. Not only indispensable for the maintenance of older installations, these relays provide a range of additional functions supporting the latest applications:

- Control of circuit-breaking devices (circuit-breakers, isolators),
- Galvanic isolations (decoupling) of signals,
- Simple and rapid implementation of automation functions (regulators, reclosers...),
- Analogue measurement applications (measuring relays, convertors),
- Special applications (telecontrol, insulation fault detection...).

TRIP RELAY WITH MECHANICAL LOCK - OUT

RAD 7004 - HAND RESET

Provides in a small volume 4 independent hand-reset contacts.

Consists in an attracted armature unit with one coil, the lock-out function being performed on the contact assembly.

ANSI function: 86

Case type: R1

Net weight: 1,8kg

RADE 7010 - ELECTRICAL RESET (bistable)

The RADE 7010 has 10 contacts either hand reset or electrically reset.

Used as tripping auxiliaries, either when the number of contacts on the protective relay is insufficient compared to the required number of functions or their capacity is below that necessary for the power of the breaker trip coil or for a lock-out function.

ANSI function: 86

Case type: R2

Net weight: 3kg

TAX 7031 - TRIP CIRCUIT SUPERVISION RELAY

Supervises the trip circuit of a breaker and brings up an alarm if the supply of the operation of the mechanism is faulty.

Supervision is provided with the breaker in both open and closed states.

ANSI function: 74 TC

Case type: R1

Net weight: 3kg

TTT 7000 - TIME DELAY RELAY

TTT 7111: time-delayed on operation: output unit operates after a given time-delay, initiated when the auxiliary supply is switched on.

ANSI function: 2

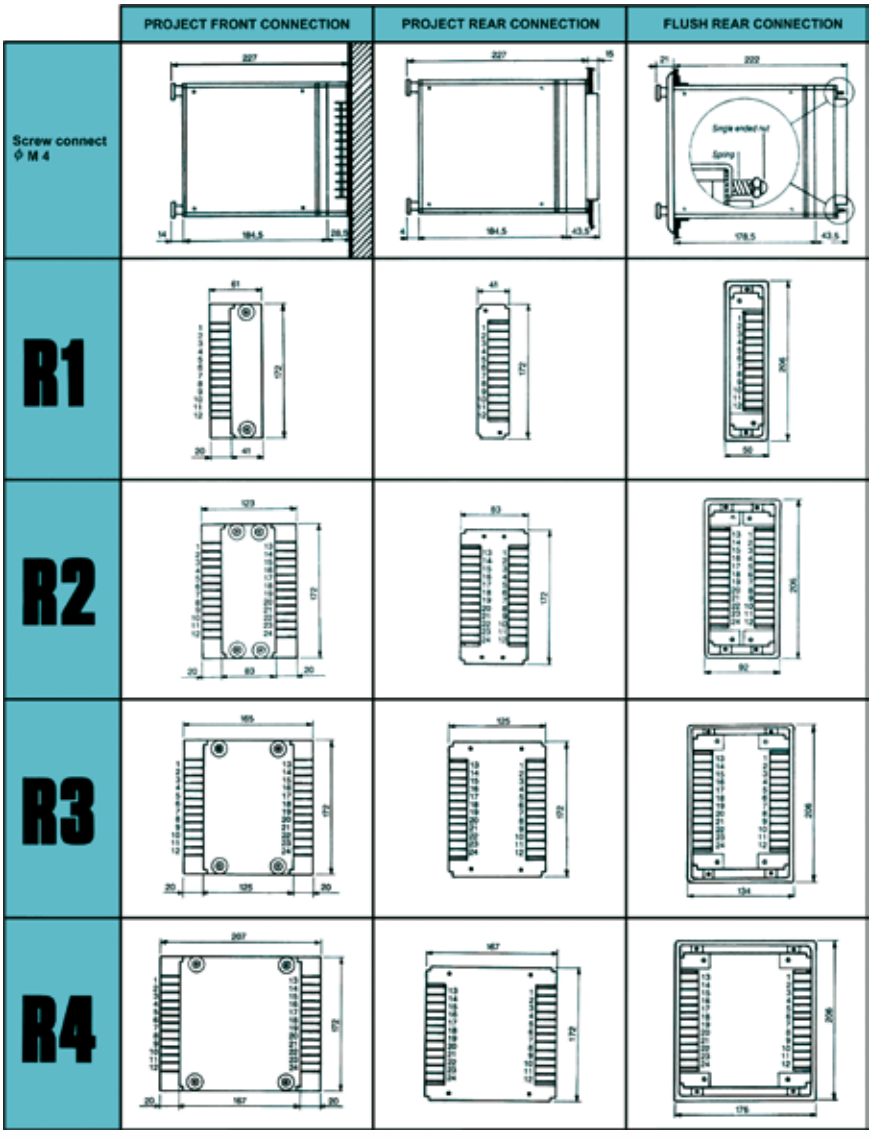
TTT 7112: time-delayed on drop-out: output unit operates instantaneously when an external control contact closes. It returns to its initial state after a time-delay which is initiated by the opening of this external control contact.

ANSI function: 2

Case type: R1

Net weight: 1,8 kg

RX CASE DIMENSIONS



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RAG – INSTANTANEOUS AUXILIARY RELAYS

Auxiliary relay associated with protection relays where necessary to multiply control contacts, in particular in telecontrol and automatic switching schemes which require a large number of repeat contacts.

Relays can be equipped with 2 (RAG 1020), 4 (RAG2040), 8 (RAG 3080) or 16 (RAG 4160) change-over contacts.

Net weight: RAG 1020: 125 g (socket 50 / 60 g)

RAG 2040: 250 g (socket 90 / 110 g)

RAG 3080: 500 g (socket 180 / 225 g)

RAG 4160: 1250 g (socket 500 / 1000 g)

RAT 2002 – TIME - LAG RELAY

Employed in sequential control schemes requiring either a time-delay on pick-up:

Energisation: the output contacts change position at the end of the preset time initiated by the closure of a control contact external to the relay.

Or a time-delay on drop-off:

De-energisation: the same operation occurs at the end of the preset time initiated by the opening of a control contact external to the relay.

Net weight: 200 g

AUXILIARY BASES DIMENSIONS

Relays	Montage	Connection mode	
		Screw	Double Thimbles
RAG 1020 RAG 1020DI	Front Connection	PAV1	PAVC1
	Rear Connection	PAR1	PARC1
RAG 2040 RAG 2040DI RAT 2002	Front Connection	PAV2	PAVC2
	Rear Connection	PAR2	PARC2
RAG 3080 RAG 3080DI	Front Connection	PAV3	PAVC3
	Rear Connection	PAR3	PARC3
RAG 4160 RAG 4160DI	Front Connection	PAV4	-
	Rear Connection	PAR4	-

Bases	Weight	Bases	Weight
PAV1 / PAVC1	60 g	PAV3 / PAVC3	225g
PAR1 / PARC1	50g	PAR3 / PARC3	180 g
PAV2 / PAVC2	110 g	PAV4	1000 g
PAR2 / PARC2	90 g	PAR4	500 g

INSTANTANEOUS RELAY RANGE

Static Range

AF 440
Auxiliary relay

Instantaneous all-or-nothing relay with changeover contacts.

Main features:
- Proven design
- Ruggedness
- Small size
- High level of mechanical and electrical performances

Socket type: F10 or F20

Net weight: 200 g (without socket)

Static Range

ABF 330
Bistable relay

Magnetic holding relay.

Designed for DC or AC operation.

The ABF relays can be incorporated as position repeaters, in automatic and remote switching systems, with their flag indicator memorising the last inputted control voltage.

Type ABF 330 relays incorporate three changeover contact circuits.

Socket type: F 10 or F 20

Net weight: 240 g (without socket)

Static Range

AF 340
Instantaneous relay

Instantaneous relay with 1 NC contact with extended action on pick-up.

Socket type: F10 or F20

Net weight: 200 g (without socket)

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Static Range

CEF 50
Time-lag relay

CEF 50 (pick-up) and CEF 50MU (drop-out) relays are electronic time-delayed relays.

CEF 50MU2 allows having a control source independent of the auxiliary source.

Available on DC or AC supply

Socket type F10 or F20

Net weight: 260 g (without socket)

Static Range

CEF 70
Time-lag relay

Electronic relay with time-delay on pick-up or drop-out.

Possible power supply either AC or DC.

3 instantaneous contacts

2 time-lag contacts

Socket type: H10

Net weight: 700 g (without socket)

Static Range

DTB 210/22
Insulation fault detector

Type DTB 210 detector enables the continuous monitoring of insulation in DC sources.

DTB 22 detector differs from the DTB 210 only regarding:

RATINGS volts	DC OPERATING VALUE
24 V.DC	2 KΩ
48 V.DC	4 KΩ
125 V.DC	10 KΩ
220 V.DC	20 KΩ

Socket type: H 10 or H 20

Net weight:
DTB 210 and DTB 22: 950 g (without socket)

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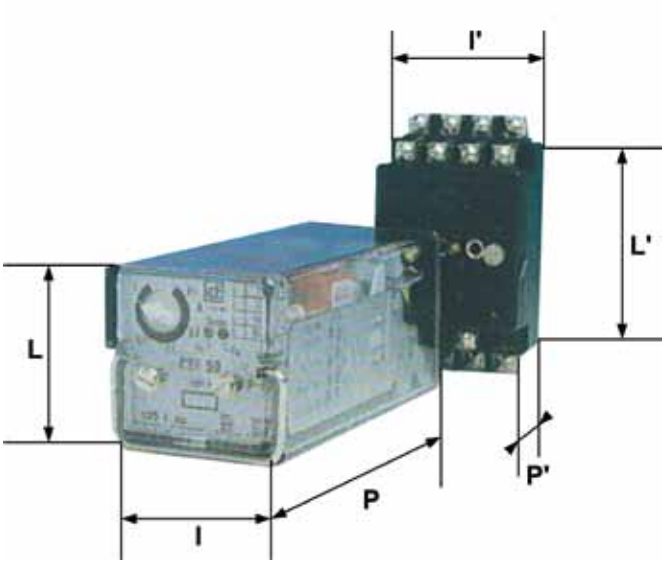
CASE DIMENSIONS FOR AUXILIARY RELAYS

In the drawing below, all the auxiliary relay case types with dimensions are illustrated.



SURFACE-MOUNTING FRONT OR REAR CONNECTION CASINGS

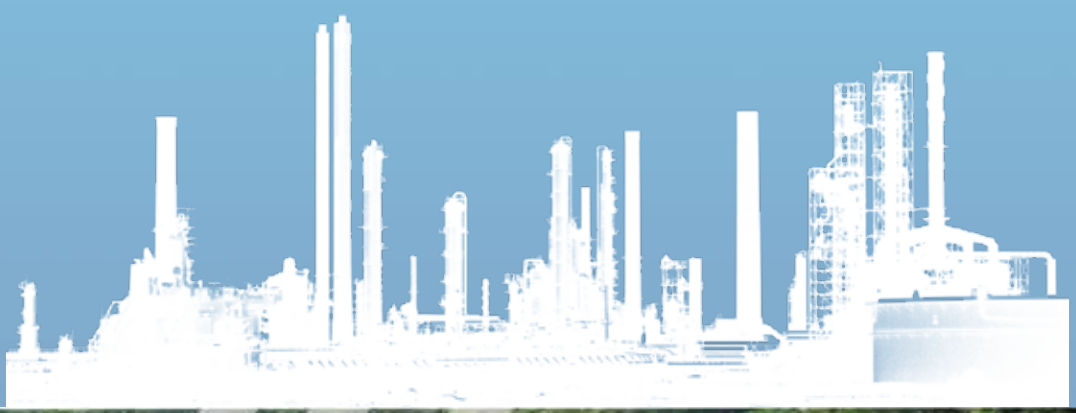
CASE	TYPE	l'xL' (mm)	P' (mm)
F	FA	45x45	84.5
	FB	45x45	87
	FC	45x45	104.5
	FD	45x45	124.5
H	HA1	110x110	105
	HB2	110x110	115
	HD1	110x110	155

FRONT CONNECTION CASINGS

CASE	TYPE	l'xL' (mm)	P' (mm)
F	F10AV	45x78	21
	F10AVC	45x84	21
	F11AV	45x78	21
	F11AVC	45x84	21
	F20AVC	45x92	21
H	F10AV	114x134	6
	H11AV	114x134	6
	H20AV	134x140	6
	H30AV	114x156	6

REAR CONNECTION CASINGS

CASE	TYPE	l'xL' (mm)	P' (mm)
F	F10AR	45x47	9
	F10ARC	45x47	9
	F11AR	45x47	9
	F20ARC	45x47	9
	F20ARC	45x47	9
H	-	-	-
	H10AR	114x114	6
	H11AR	114x114	6
	H20AR	114x114	6
	H30AR	114x114	6



REGULATION

A COMPLETE RANGE OF ELECTRICAL CONTROLLERS

NPRG 810-1G AND NPRG 810-4G
NPRG 860 - NPRG 870
AUTOMATIC VOLTAGE REGULATORS

RG 600
RG 730
RG 750 REGUCOM
EX 600 AND EX 700 SERIES

TECHNIREL

ICE's regulation department was founded more than 60 years ago by Eng Georgin. From the beginning, its aim was to design and manufacture regulation devices necessary to optimise the operation of rotating machines.

Technirel range provides a global answer to the safe and efficient operation of generators and motors.

"OUR ENGINEERS CAN ANSWER YOUR REQUIREMENTS FOR ASSISTANCE AND TRAINING"

Initially popular under the brand «REGULATEURS GEORGIN», the name of the products changed in 1992 and became TECHNIREL. The variety of TECHNIREL products and the technical skills of its teams offer a wide range of solutions to ensure a reliable functioning of synchronous machines (alternators and motors).

Technirel products are mostly designed in individual "R" aluminium cases, and ensure total protection and control.

These units are of a standard 3U height and of variable width. They can be installed either in projecting or flush mounted housings of 9.5" or 19" width to provide completely functional and homogeneous assemblies with common characteristics, adjustments and displays.

TECHNIREL is present in France and abroad, in all the fields of industry:

- Commercial high-rise buildings,
- Hospitals,
- Oil platforms,
- Civil or military ships,
- Airports,
- Refineries,
- Telecommunication centres,
- Republic palaces,
- Factory plants with continuous or discontinuous processes (sugar refineries, paper mills, cement factories, chemical factories and automotive factories),
- Generation power stations.

NPRG 810 SYNCHRO - CHECK FOR ONE OR FOUR GENERATORS

Adding to the TECHNIREL range of modular devices, the new generation of RG81, NPRG 810-1G assures the synchronism check between one generator and the network. Most often, it is used to authorize a closing order to the paralleling Circuit Breaker.

NPRG 810-4G assures the synchronism check between up to four generators and the network.

Both versions allow the dead Busbars function.

ANSI function: 25

NPRG 860 -NPRG 870 ADVANCED SYNCHRO -CHECK FOR ONE OR FOUR GENERATORS

Successors of the RG 86C/RG 87B, the NPRG 860 and NPRG 870 perform the paralleling of generators on grid or Busbars. Paralleling is realised when all conditions are satisfied (frequency slip, voltage angle, ...)

Functions:

- ANSI: 90/25
- Measurement of the circuit breaker closing time (TA)
- Dead Busbars function

Other functionalities:

- NPRG 870
- Voltage matching ± U
- Multi-group management function (choice of 4 tables of parameters for the management of 4 generators).

NPRG 860/870

- Frequency matching ± F
- Dimensions: 173 x 106,3 x 250 mm
- Weight: 3,6 kg

CUSTOMER BENEFITS

Compact design

Compatible with the NP800 Industry - range

User friendly interface and operation

RG 600 AVR

The RG 600 series consist in analogue functional modules which together meet the regulation needs arising from the excitation of synchronous machines, generators or motors, regardless of their type or power rating.

The main module, associated with a trigger module, a rectifier module and a stepdown power transformer, makes up a complete regulator to which, according to the applications, additional regulation or limitation modules, may be added.

Limitation modules:

- MF 61-R 3: Phase measurement.
- MF 62-R: Rotor limitation.
- MF 63-R: Stator limitation.
- MF 64-R: Recopy / Redundancy.
- MF 67-R: Absorbed reactive power limitation.
- MF 68-R: Under / Over current excitation relay.

ANSI function: 90

RG 730 AVR

Mono-processor A.V.R. includes all the usual functions of regulation: voltage, power factor, control.

RG 730 / 3 F-N

RG 730 REGUCOM

RG 730 MS (synchronous motor)

Application: all synchronous machines

ANSI function: 90

AUTOMATIC VOLTAGE REGULATORS

RG 750 REGUCOM

Dual-processor A.V.R. including all the usual functions of regulation and communication.

Applications: all synchronous machines

ANSI function: 90

EX 600 & EX 700 SERIES

The EX 600 and 700 series are two families of static excitation systems.

A static excitation system is a functional assembly built around an RG 600 or 700 AVR inclusive of the elements of power, command and control which are required for the modernization of generators or motors.

Each assembly is customised to the needs of each application.

"OUR ENGINEERS CAN ANSWER YOUR REQUIREMENTS FOR ASSISTANCE AND TRAINING"

RAILWAY

MORE THAN 10 000 KM OF TRACTION FEEDERS PROTECTED ALL OVER THE WORLD

INTRODUCTION TO PROTECTION RELAYS FOR RAILWAY, TRAM AND METRO
PDZIN 1 & LDN 2
PGTN 1 & NPDT 600
DDL 800, EDL
TRANSFORMERS / SENSORS

PROTECTION RELAYS FOR RAILWAY, TRAM AND METRO

For more than thirty years, ICE has equipped railway substations with selective and reliable relays.

Most of the High Speed Trains are under our protection. This expertise is also placed at disposal of conventional and DC networks.

AC: 1*25/27.5 kV or 2*25/27.5 kV
DC: 750 to 3000 V

A complete range of digital multi-function protective devices provide an efficient monitoring of either high speed or conventional train networks.

Dedicated solutions for managing networks and protecting transformers or catenaries against electrical faults.

MAIN PROTECTION FUNCTIONS

- Under impedance-over current feeder protection with fault location and automatic recloser capability.
- Over current or differential transformer protection.
- Stand alone fault locator.
- di/dt protection.

GENERAL FEATURES FOR ALL RAILWAY PROTECTION RELAYS

Complete set of functions
Measurement and display of electrical values
Event log
Maintenance features
Software for setting and commissioning
Local and remote communication interfaces
Disturbance recording
Self tests

In 2007, the French TGV hit the world record at 574.8 km/h under monitoring of the products shown in the following pages.

DIGITAL MULTI -FUNCTION RELAY PDZIN1 / PDZI 800

The digital protection for catenaries and feeders PDZIN 1 protects fixed installations of electric traction, in charge of feeding catenaries with 25 kV or 2 x 25 kV, 50 or 60 Hz. It is used for fast and reliable operation against short-circuits in any condition and can be provided with automatic recloser. Configured with 2 sets of parameters, it allows easy adaptation to a change of operating mode.

CUSTOMER BENEFITS

Help to network operation
Monitoring and assistance to maintenance of CB
Inrush insensitive
Safe operation with secured tripping circuit

PDZIN 1
ANSI functions:
21 / 27 / 32 / 50 / 50BF / 51 / 87 / 79
Dimensions: 260 x 210 x 320 mm
Net weight: 10kg

PDZI 800
ANSI functions:
21 / 27 / 32 / 50 / 50BF / 51 / 79
Dimensions: 173 x 106,3 x 250 mm
Net weight: 4kg

Using complementary algorithms, the PDZIN 1 provides protection against feeder and catenary faults and acts as a distance relay while integrated fault locator improves maintenance efficiency.

The PDZIN 1 includes as well a De-icing protection:

- Desensitizing to de-icing current
- Threshold of de-icing current

FAULT LOCATOR FOR CATENARIES LDN 2

The LDN 2 features an excellent complement for catenary and feeder protections. Designed to help maintaining the network, it measures the distance to a fault appearing on a railway line, at the time of tripping. Therefore, preventive maintenance is greatly enhanced.

Main operation functions:
Based on an ANSI 21 Minimum of Impedance calculation, it indicates the distance to a fault (K.P.), either announced in kilometers or belonging to one of four user-defined zones.

Modeling of line is “Linear” or “Customized”

2 setting groups are available for two line configurations

ANSI functions:

21FL / 51FL / 67FL / 27 / 74

Dimensions: 173 x 106,3 x 250 mm

Net weight: 4kg

CUSTOMER BENEFITS

Compatible with any over current or under impedance protective relay

Saves time in preventive maintenance

The digital protection relays are designed to ensure a fast and selective protection for two and three-winding transformers (including SCOTT transformer) used for electrical traction.

TRANSFORMER GROUP PROTECTION RELAY PGTN 1

The PGTN1 detects short circuits between phases or phase and earth, voltage drops and any operation fault.
In addition to the transformer protection and monitoring, it integrates a backup protection function for catenaries and feeder.
Built-in vector compensation can suit all transformers, including Scott.

CUSTOMER BENEFITS

- Temperature monitoring
- Help to network operation
- Monitoring and assistance to maintenance of CB
- Inrush insensitive (H2 detection)
- Safe operation with secured tripping circuit

ANSI functions:
21 / 27 / 32 / 50 / 51 / 51N

Operating functions:
Voltage reverse protection
CB SF6 fault monitoring

Dimensions:
260 x 210 x 320 mm

Net weight: 10kg

NPDT 620 & NPDT 630

The differential NPDT 600s detect various types of faults such as faults between phases, short-circuit between a winding and the earth or between turns on the same phase.

CUSTOMER BENEFITS

- Buchholz and temperature monitoring
- Help to network operation
- Inrush & Over-excitation insensitive
- Safe operation with secured tripping circuit

ANSI functions:
87T / 64REF (option, NPDT 630)

Dimensions:
NPDT 620: 275 x 155 x 249 mm

Net weight: 10kg

Dimensions:
NPDT 630: 275 x 226 x 339 mm

Net weight: 12kg

"OUR ENGINEERS CAN ANSWER YOUR REQUIREMENTS FOR ASSISTANCE AND TRAINING"

LINE FAULT DETECTOR DDL 800

The line fault detector DDL800 is designed to protect DC railway, tramway or metro lines.
This selective relay detects faults on the track by analyzing the catenary current and discriminates short-circuits from traction current of the machines.
Fast and reliable, it securely operates the circuit breaker of a faulty track and features an automatic recloser function.

ANSI functions:
76 / 27DC / 59DC / 49DC / 76BF / 82

Operation functions:
Three operation modes: di/dt, overcurrent, ΔI

Dimensions: 177 x 270 x 340 mm

Net weight: 12kg

Sensors (see next page) can be provided as a perfect match to the DDL800 relay.

LINE TEST EQUIPMENT EDL

The aim of this device is to allow the reclosing of the circuit breaker. It is initialised by tripping of the DDL800 or a manual order. The EDL performs the checking of substation and catenary voltages.

It improves significantly the safety of operation for people and material.

Dimensions:
(Size and dimensions depend on the voltage of substation).

Typical values for 3 kV network are:
270 x 1000 x 700 mm

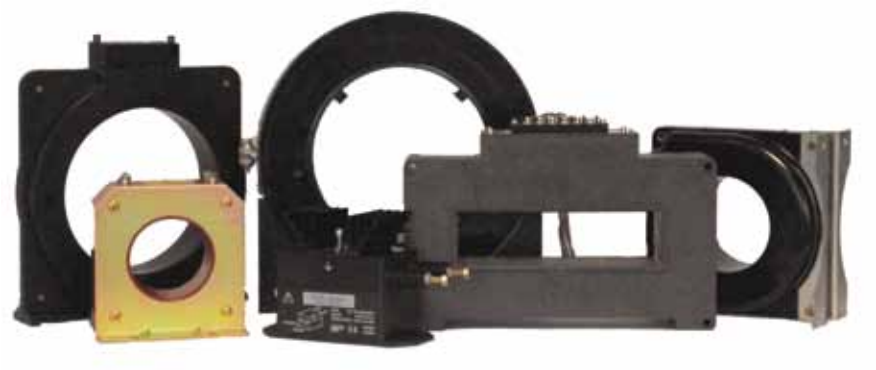
Net weight: 35kg

CUSTOMER BENEFITS

Improves people and installations security
In case of permanent fault after tripping,
the EDL prevents from unsuitable closing of CB
Allows energizing dead lines securely

CTs , VTs & SENSORS

A large choice of sensors adapted to the railway network is available:



Typical measurements for 3 kV network are:

Voltage transformer

Dimensions: 200 x 140 x 120 mm

Weight: 1 kg

Hall effect current sensor:

Dimensions: 350 x 250 x 100 mm

Weight: 7kg

TEST SETS FOR PROTECTIVE RELAYS AND ELECTRICAL MEASURING EQUIPMENT

We can propose various single-phase or three-phase test sets for many different applications and levels of experience.

These sets are available in analogical or numerical technology and can be used in laboratory or on site.

Thanks to the provided software, automatic tests can be carried out (digital test sets).

All are lightweight and easy to use. The test sets can be used to test any device from a simple overcurrent relay to the latest distance and generator protection relays.

"OUR ENGINEERS CAN ANSWER YOUR REQUIREMENTS FOR ASSISTANCE AND TRAINING"

SUPERVISORY CONTROL AND DATA ACQUISITION

MONITORING YOUR NETWORK

PS 8000 Energy

SCADA

The energy consumption is more than ever a big concern for industry.

Whether you are operator, electrical manager, administrator of industrial sites, in charge of maintenance, or simply concerned by the management of an electrical network, the SCADA system will help you optimise your network and make it more profitable

CUSTOMER BENEFITS

- Supervises and commands the whole electrical network
- Assures the security of people and equipment
- Minimises operating costs
- Optimises maintenance
- Reduces electrical invoice

PS 8000 ENERGY

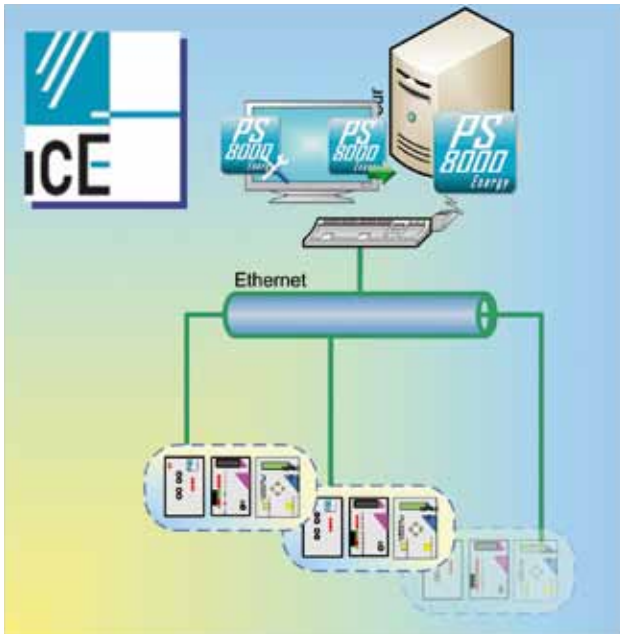
To fulfil the need of managers and assure the continuity of installations and the security of their staff, ICE proposes a financially accessible and evolving system called PS 8000. The main part of this new generation system is the scada software called PS 8000 ENERGY. It allows to identify and eliminate the reasons of faults in order to guarantee a safe environment. This system that centralises data and has a capacity of automation is a real tool that helps minimising the operating costs.

Thanks to the advanced functions of management such as statistics, results or automation of power cuts, PS 8000 ENERGY helps to reduce and optimise your energy invoices.

PS 8000 ENERGY is the latest version of systems specilised in the supervision and command of electrical networks. It offers a global solution with important advantages, particularly in the domain of liability, security of the processes and user-friendly functionalities.

More than a basic SCADA system, PS 8000 ENERGY is a complete set of Hardware and Software which complies with all electrical requirements. Based on a user-friendly configuration, open towards other systems, multilingual and easy to use, PS 8000 ENERGY is a real help in decision making, allowing to react as fast as possible to faults.

MAIN ADVANTAGES OF THE PS 8000 ENERGY



Covers all needs between field level (relays and data acquisition equipments) and the operator.

Complete system from field to operator levels

Advanced functionality for energy management:

- Full dynamic representation and coloring of the network
- Complete interface with relays and data acquisition devices
- Local PLCs for automatic functions
- Optional high speed load shedding

Advanced solution based on Ethernet:

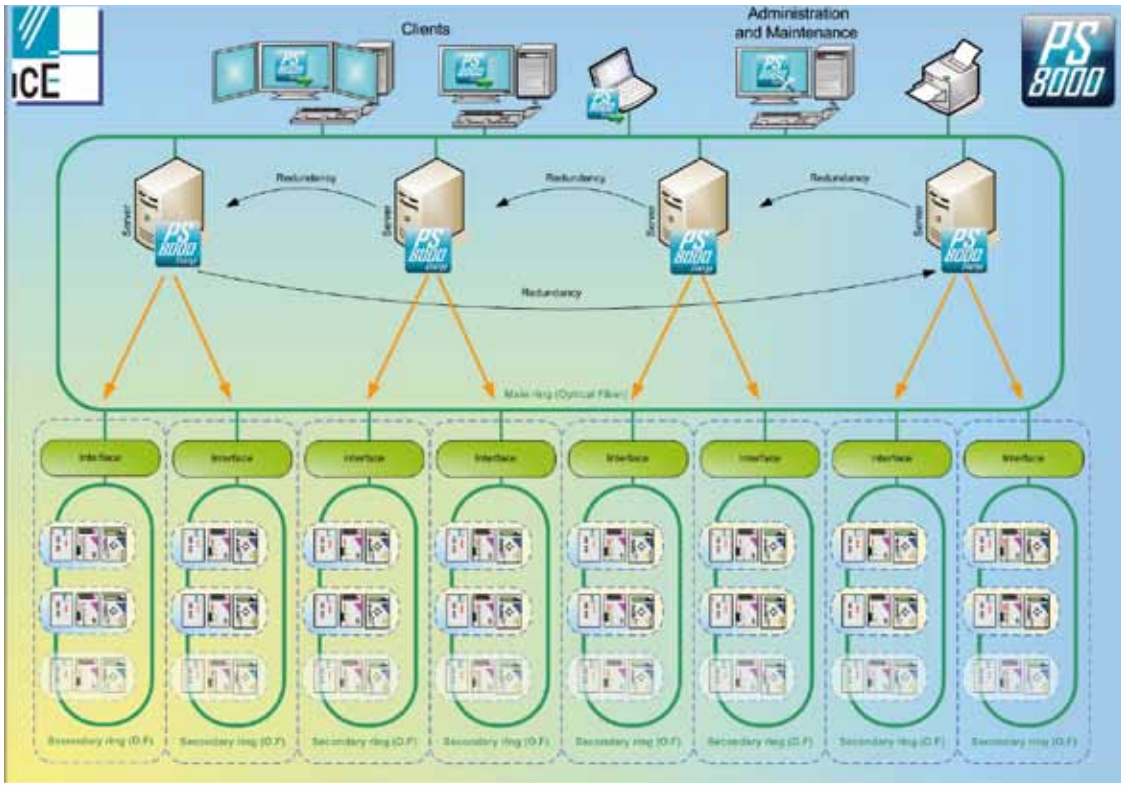
- Reliability and performance
- Industrial, evolving, adaptable solution
- Fast and sure
- Support of IEC 60870-5 and IEC 60850 protocols (and many more...)

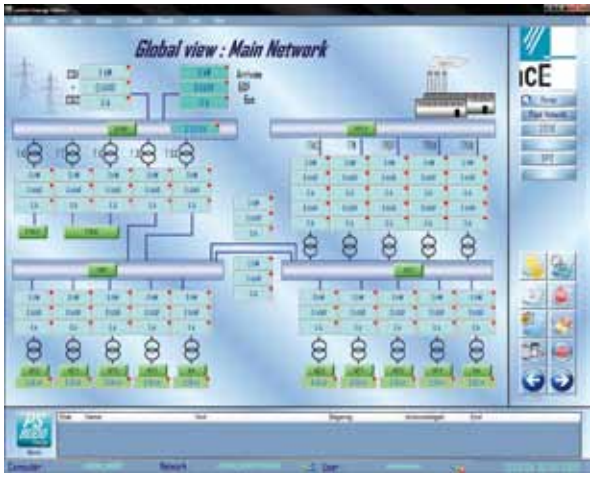
Continuity of services ensured by redundancy

- On all levels of layers of the PS 8000
- From simple configuration (two servers) to more complex applications (cluster of servers as a loop)

From simple ...

... To redundant multi-systems





Real-time update of synoptics, measures and energies

Real-time overview of the state of the electrical network:

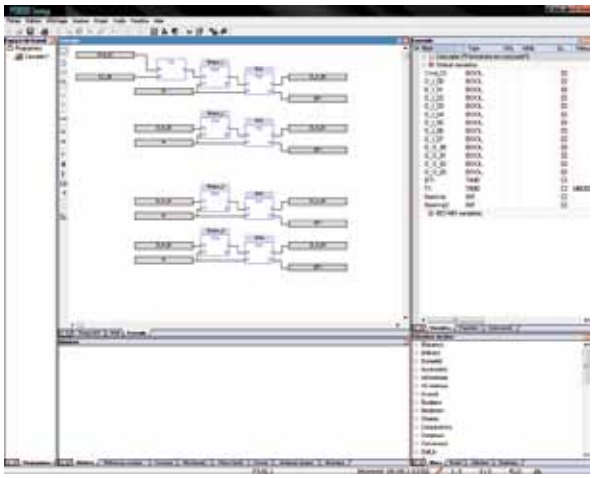
- Status or value of any aperiodic information of all substations,
- Measures and energies,
- Uploading of relay parameters.

Alarm and event management

User configurable list of alarms.

Appearance of an alarm is signalled by a sound alarm, a message on the event log, a make contact and a synthesis of events in a service window.

An overall list of current alarms, cleared or noncleared, is available.



Local PLC embedded

Powerful graphic editor (SFC,FBD, LD).

Text editor (ST, IL).

Fully compatible with IEC61131-3.

Archives

This module stocks the following dated data:

- Displayed events from the stations and relays,
- Analogical values, at every significant change in the stations and relays,
- State changes of inputs,
- Command of orders and their execution reports,
- Table of parameters read or written in the protection relay,
- Disturbance recording files.

Event log

The event log records all events with a precision of 5 ms:

- Appearance/disappearance of events,
- Appearance/disappearance of alarms,
- Follow up of operator actions (discharge, sending of command and orders),
- Messages and errors,
- Specific editions (recordings, results of sorting, parameters, measures etc.).

"OUR ENGINEERS CAN ANSWER YOUR REQUIREMENTS FOR ASSISTANCE AND TRAINING"

PRODUCTION

TRANSMISSION

RAILWAY

DISTRIBUTION

INDUSTRY

PRODUCTS INDEX

IN ALPHABETICAL ORDER

ANSI CODES

	INDUSTRY																																							
	NP800 SERIES (FEEDER, MOTOR, GENERATOR, VOLTAGE & FREQUENCY PROTECTION)													7000 & 700 SERIES (FEEDER PROTECTION)																7000 SERIES (GENERATOR PROTECTION)											
	NPG 800	NPI 800	NPIH 800	NPIHD 800	NPID 800	NPIR 800	NPIDR 800	NPM 800	NPSC 800-1	NPSC 800-2	NPU 800	NPUH 800	NPW 800	AMS 7001	AMS 7002	CMS 7003/7004	ITG 7000	ITH 7111	ITV 7000	RMS 711	RMS 761	RMS 771	RMS 791	RMS 7992	RMSD 7912	RMSD 7921	RMSR 7992	RMST 7992	DMS 7001	GMS 7001	GMSH 7001	GMSH 7002	GMSV 7001	IAG 7034	ITI 7521	TTB 7025	TTE 7000	TTG 7XX1/2/3	TTG 7XX4	TTGd 7X12	YTM 7111
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ANSI CODES

	INDUSTRY																		RAILWAY						REGULATION						
	7000 & 8000 SERIES (MOTOR PROTECTION)					7000 SERIES (TRANSFORMER PROTECTION)		7000 & 700 SERIES (VOLTAGE & FREQUENCY PROTECTION)								7000 SERIES (AUXILIARY AND TIME DELAY RELAYS)															
	GMS 7002	IMM 8001	IMM 8002	IMM 7960	IMM 7990	DMS 7002	IAG 7014	TMS 711	TMS 714	TMS 761	TMS 7003	TMS 7004	TTB 7011	TTB 7013	TTB 7026	RAD 7004	RADE 7010	TAX 7031	LDN 2	NPDT 620	NPDT 630	PDZIN 1	PGTN 1	DDL 800	NPRG 810-1G	NPRG 810-4G	NPRG 860	NPRG 870	RG 600	RG 730	RG 750
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ANSI CODES

5	Stopping Device
11	multifunction device
21	distance relay
21FL	Fault locator distance relay
24	volts per hertz relay
25	synchronizing or synchronism-check device
26	Apparatus Thermal Device
27	undervoltage relay
27DC	dc undervoltage relay
27P	positive sequence undervoltage relay
27RC	undervoltage relay for re-acceleration
27ST	undervoltage relay during start
32	power relay
32RP	Reverse power relay
32P	directional active power relay
32Q	directional reactive power relay
34	master sequence device
37I	undercurrent relay
37P	underpower (active) relay
37Q	underpower (reactive) relay
40	field relay
46	reverse-phase or phase-balance current relay
46BC	broken conductor detection
47	phase-sequence or phase-balance overvoltage relay
48	Incomplete Sequence Relay
49	machine or transformer thermal relay
49DC	dc thermal relay
50	instantaneous overcurrent relay
50N	Instantaneous earth fault overcurrent relay
BF	Breaker failure relay
50BF	Breaker failure overcurrent relay
50NBF	Breaker failure ground fault overcurrent relay
50V	instantaneous overcurrent relay and voltage control
51	ac time overcurrent relay
51FL	Fault locator overcurrent relay
51LR	ac time overcurrent relay for locked rotor detection
51N	ground fault time overcurrent relay
51STALL	ac time overcurrent relay for rotor stalling after start
51V	ac time overcurrent relay and voltage control
55	power factor relay
59	overvoltage relay
59DC	dc overvoltage relay
59G	ground overvoltage relay
59N	zero sequence overvoltage relay
60	voltage or current balance relay
64	ground detector relay
64F	Field ground detector relay
64REF	restricted earth fault protective relay
66	notching or jogging device
67	ac directional overcurrent relay
67FL	Fault locator ac directional overcurrent relay
67N	ac directional ground overcurrent relay
74TC	Trip circuit supervision
76	dc overcurrent relay
76BF	Breaker failure dc overcurrent relay
79	reclosing relay
81	frequency (over & under) relay
82	dc load-measuring reclosing relay
86	lock-out relay
87	differential protective relay
87B	busbars differential protective relay
87M	Machine differential protective relay
87T	Transformers differential protective relay
90	regulating device

SOME REFERENCES

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ICE

ICE HEAD OFFICE
11, rue Marcel Sembat
F 94146 Alfortville cedex
FRANCE
Tel: +33 1 41 79 76 00
Fax: +33 1 41 79 76 01
export@icelec.com

Your local sales representatives