

NPG800

■ Digital generator protection



NPG800 protects generators connected to three phase network and driven by any type of prime mover: steam, hydraulic or gas turbine and also diesel or gas engine.

The various functions and connection possibilities are suitable for hundreds kVA to tens MVA generators.

As well as the usual protection functions, NP800 relays provide monitoring, measurement and recording of the electrical quantities of the network.

The relays can be set locally, using either the keypad and display or the RS232 port, or remotely using the RS485 port.

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



- Multifunction
- Measurement
- Recording / event log
- Disturbance recording
- Local MMI

Protection functions

- Minimum of impedance with 2 thresholds [21]
- Overfluxing with 2 thresholds [24]
- Undervoltage with 2 thresholds [27]
- Maximum [32P*] reverse [32RP] and minimum [37P] of active power
- Maximum with 2 thresholds [32Q*] and minimum [37Q] of reactive power
- Field failure with 2 thresholds [40]
- Negative phase sequence overcurrent with 2 thresholds [46]
- Thermal overload with 2 thresholds [49]
- Overcurrent with 3 thresholds [51-1] [51-2] [50]
With voltage control unit [51-1V] [51-2V] [50V]

- Max of zero sequence voltage with 2 thresholds [59N]
- Overvoltage with 2 thresholds [59]
- Max of zero sequence current with 2 thresholds [64]
- Overfrequency with 2 thresholds [810]
- Underfrequency with 2 thresholds [81U]

* operating mode of power, import or export, configurable

Additional functions

- Latching of the output contacts [86]
- Trip circuit supervision of the breaker [74TC]
- Breaker failure [BF]
- Load shedding – Load Restoration, remote control (communication option)

OUR TRADEMARKS



GENERAL CHARACTERISTICS

Auxiliary supply <ul style="list-style-type: none"> Auxiliary supply ranges Typical burden Memory backup 	19 to 70 – 85 to 255 / Vdc or Vac 50 or 60 Hz 6 W (DC), 6 VA (AC) 72 hours
Analogue inputs <ul style="list-style-type: none"> Phase current inputs 	In 1 or 5 A burden at $I_n < 0.2 \text{ VA}$ continuous rating 3 I_n , short duration withstand 100 I_n / 1s CT setting: primary value from 1 A to 10 kA measurement from 0.01 to 18 I_n display of primary current from 0 to 65 kA
<ul style="list-style-type: none"> Recommended CTs 	5VA 5P10
<ul style="list-style-type: none"> Earth current inputs 	I_{n0} 1 or 5 A burden at $I_{n0} < 0.5 \text{ VA}$ continuous rating 1 I_{n0} , short duration withstand 40 I_{n0} / 1s measurement from 0.005 to 2.4 I_{n0} display of primary current from 0 to 6.5 kA
<ul style="list-style-type: none"> Earth current input from Ring CT 100/1 	adjustment from 0.1 to 48 A primary
<ul style="list-style-type: none"> Phase voltage inputs 	U_n : 33 to 120 V input impedance $> 80 \text{ k}\Omega$ continuous rating 240 V, short duration withstand 275V - 1 min measurement from 1 to 240 V VT setting: primary value from 220 V to 250 kV
<ul style="list-style-type: none"> Frequency (50Hz or 60Hz) 	measurement: 45-55 Hz or 55-65 Hz
Digital inputs (8) <ul style="list-style-type: none"> Polarizing voltage Level 0 Level 1 Operating of the input by level 1 or 0 Burden 	20 to 70 Vdc for 19 to 70 V auxiliary supply range 37 to 140 Vdc for 85 to 255 V auxiliary supply range $< 10 \text{ Vdc}$ range 19 to 70 V – $< 33 \text{ Vdc}$ range 85 to 255 V $> 20 \text{ Vdc}$ range 19 to 70 V – $> 37 \text{ Vdc}$ range 85 to 255 V programmable $< 15 \text{ mA}$
Outputs relays (7 + 1 WD) <ul style="list-style-type: none"> Relays A, B, E, F: (signalling, Shunt Opening Release) 	double contact NO, permanent current 8 A closing capacity 12 A / 4 s short circuit current withstand 100 A / 30 ms breaking capacity DC with $L/R = 40 \text{ ms}$: 50W breaking capacity AC with $\cos \varphi = 0.4$: 1,250 VA
<ul style="list-style-type: none"> Relays C, D, G et WD: (control, WD : Watchdog) (C, D, G: programmable for CB Shunt Opening Release or Under Voltage Release) 	changeover contact, permanent current 16 A closing capacity 25 A / 4 s short circuit current withstand 250 A / 30 ms breaking capacity DC with $L/R = 40 \text{ ms}$: 50W breaking capacity AC with $\cos \varphi = 0.4$: 1,250 VA
<ul style="list-style-type: none"> Relays pulse, except WD 	adjustable from 100 to 500 ms
<ul style="list-style-type: none"> Assignment of name to the output/maximum of 16 characters 	by the setting software/capital letters or digits
Minimum of impedance function [21] <ul style="list-style-type: none"> Trip authorization threshold $I_Z >$ Operating range $Z < - Z < <$ Thresholds accuracy Reset percentage on the operating level Instantaneous operating time Definite time delays Accuracy of the time delays Accuracy of displayed measures 	10 to 40 % I_n 10 to 200 % Z_n $\pm 5\%$ or 3% of Z_n 105% 60 ms including trip relay 40 ms to 300 s $\pm 2\%$ or 20 ms 3% of Z_n
Overfluxing function [24] <ul style="list-style-type: none"> Operating range $(U/F) > - (U/F) >>$ Measurement range Thresholds accuracy Reset percentage on the operating level Definite time delay Accuracy of the time delays Operating curves Curves accuracy Instantaneous operating time Accuracy of displayed measures 	80 to 200 % U_n/F_n 45-55 Hz or 55-65 Hz $\pm 1.5\%$ of U_n/F_n 95% 200 ms to 10 s $\pm 2\%$ or 20 ms IEC 60255-3, ANSI IEEE and factory configurable (consult us) class 5 - Time Multiplier Setting : 0.03 to 3 s 60 ms including trip relay 3% of U_n/F_n

GENERAL CHARACTERISTICS

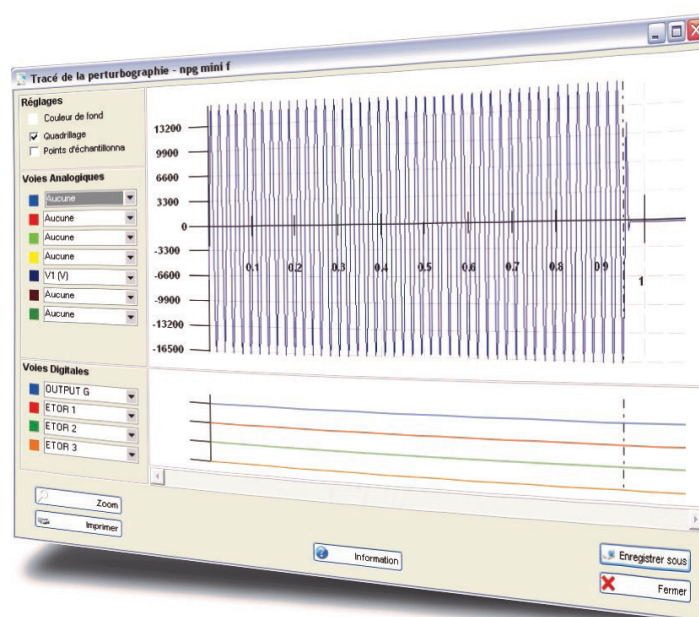
Undervoltage function [27] <ul style="list-style-type: none"> • Operating mode • Measurement method • Undervoltage operating range $U< - U<<$ • Thresholds accuracy • Reset percentage on the operating level • Blocking of the thresholds • Definite time delay • Accuracy of the time delays • Operating curves • Curves accuracy • Instantaneous operating time • Accuracy of displayed measures 	<p>function « Or » or « And » programmable phase-neutral voltages or phase-phase voltages, according to wiring 20 to 120 % U_n 2% U_n 103% 10% of U_n, programmable: in or out of service 40 ms to 300 s $\pm 2\%$ to 20 ms IEC 60255-3, ANSI IEEE and factory configurable (consult us) class 5 - Time Multiplier Setting: 0.03 to 3 s 60 ms including trip relay 3% from 3 to 240 V</p>
Power functions [32P] [32RP] [37P] [32Q] [37Q] <ul style="list-style-type: none"> • Measurement method • Operation of the [32P] threshold and the two [32Q] thresholds • Operating range $RP>$, $P>$ and $P<$ • Operating range $Q>$, $Q>>$ and $Q<$ • P-Q thresholds accuracy • Reset percentage on the operating level • Instantaneous operating time • Definite time delay • Accuracy of the time delays • Operating curves • Curves accuracy • Accuracy of displayed measures 	<p>3I-2U or 3I-3V, according to wiring and programming 3 programmable modes for the power-flow: export / import / export and import 1 to 120 % of S_n 1 to 120 % of S_n 0.5% of S_n, Blocking of the thresholds [37P] and [37Q] 0.5% of S_n 95% for $RP>$, $P>$ and $Q>$, 105% for $P<$ and $Q<$ 60 ms including trip relay 40 ms to 300 s $\pm 2\%$ or 20 ms IEC 60255-3, RI, ANSI IEEE and factory configurable (consult us) class 5 - Time Multiplier Setting: 0.03 to 3 s - RI: 0.01 to 20 s 1% of S_n</p>
Field failure function [40] <ul style="list-style-type: none"> • Setting of the circle offset X2 • Setting of the circle diameter X1 • Thresholds accuracy • Reset percentage on the operating level • Blocking threshold • Instantaneous operating time • Definite time delay • Accuracy of the time delays • Accuracy of displayed measures 	<p>8 to 40 % Z_n 50 to 500 % Z_n $\pm 5\%$ or 3% of Z_n 95% $U<16\%$ of U_n or $I< 8\%$ of I_n 60 ms including trip relay 40 ms to 300 s $\pm 2\%$ or 20 ms 3% of Z_n</p>
Negative phase sequence overcurrent function [46] <ul style="list-style-type: none"> • Negative sequence threshold $I2> - I2>>$ • Thresholds accuracy • Reset percentage on the operating level • Inverse time curve • Min trip time • Curves accuracy • Definite time delay • Accuracy of the time delays • Instantaneous operating time • Accuracy of displayed measures 	<p>3 to 50% I_n $\pm 5\%$ 95% 4 to 80 s (for $I_{neg} = 100\% I_{neg}/I_n$) 0.1 to 10 s class 5, type: see application guide 40 ms to 300 s $\pm 2\%$ or 20 ms 60 ms including trip relay 3%</p>
Thermal overload function [49] <ul style="list-style-type: none"> • Tripping curves • Heating-time constant C_{TE} • Cooling time constant • Negative sequence factor • Thermal trip threshold I_b • Thermal alarm threshold • Thresholds accuracy 	<p>IEC 60255-8 4 to 400 min 1 to 6.0 C_{TE}, in step of 0.1 0 to 9 40 to 130 % I_n 80 to 100 % θ thermal class 5</p>
Overcurrent function [51-1] [51-2] [50] [51-1V] [51-2V] [50V] <ul style="list-style-type: none"> • Operating range $I> - I>> - I>>>$ • Thresholds accuracy • Reset percentage on the operating level • Instantaneous operating time • Definite time delay • Accuracy of the time delays • Curves [51-1] $I> - [51-2] I>>$ • Curves accuracy and type • Operating principle [51V] - [50V] 	<p>0.3 to 10 I_n 1% between 0.5 and 4 I_n - 3% from 0.3 to 0.5 I_n and from 4 to 10 I_n 95% 60 ms including trip for $I \geq 2 I_s$ 40 ms to 300 s: [51-1] $I> - [51-2] I>> - [50] I>>>$ $\pm 2\%$ or 20 ms IEC 60255-3, ANSI IEEE and factory programmable (consult us) class 5 - Time Multiplier Setting: 0.03 to 3s (type: see last page) assignment to [50] [51] thresholds of a criterion of voltage user configurable: in or out of order</p>

GENERAL CHARACTERISTICS

Overvoltage function [59] <ul style="list-style-type: none"> Operating mode Measurement method Overvoltage operating range $U> - U>>$ Thresholds accuracy Reset percentage on the operating level Definite time delay Accuracy of the time delays Operating curves Curves accuracy Instantaneous operating time Accuracy of displayed measures 	function « Or » or « And » programmable phase-neutral or phase-phase voltages, according to wiring 40 to 150 % U_n 2% U_n 97% 40 ms to 300 s $\pm 2\%$ or 20 ms IEC 60255-3, ANSI IEEE and factory programmable (consult us) class 5 - Time Multiplier Setting : 0.03 to 3 s 60 ms including trip relay 3% from 3 to 240 V
Maximum of zero sequence voltage [59N] <ul style="list-style-type: none"> Measurement of V_r (accord. Wiring) Operating range $V_o> - V_o>>$ Thresholds accuracy Reset percentage on the operating level Instantaneous operating time Definite time delay Accuracy of the time delays Accuracy of displayed measures 	calculated or measured (VT in neutral point or broken delta VTs) 2 to 80 % U_n 2% of U_n 97% 60 ms including trip relay 40 ms to 300 s $\pm 2\%$ or 20 ms 3% from 3 to 240 V
Maximum of zero sequence current [64] <ul style="list-style-type: none"> Operating range $I_o> - I_o>>$ Thresholds accuracy Reset percentage on the operating level Instantaneous operating time Definite time delay Curves Curves accuracy 	0.03 to 2.4 I_{n0} / CT - 0.6 to 48 A / ring 1% typical, 2% max from 0.05 to 0.4 I_{n0} / CT 3% typ., 5% max from 0.03 to 0.05 I_{n0} and 0.4 to 2.4 I_{n0} / CT 5% from 0.6 to 48 A / ring 97% 60 ms including trip relay for $I \geq 2 I_s$ 40 ms to 300 s IEC 60255-3, ANSI IEEE and factory programmable (consult us) class 5 - Time Multiplier Setting: 0.03 to 3 s
Frequency functions [810] [81U] <ul style="list-style-type: none"> Operating range $F> - F>>$ Operating range $F< - F<<$ Thresholds accuracy Reset value on the operating level Voltage inhibition threshold Instantaneous operating time Adjustment of time delays Accuracy of the time delays Accuracy of displayed measures 	50.05 – 54.00 Hz / 60.05 – 64.00 Hz 46.00 – 49.95 Hz / 56.00 – 59.95 Hz ± 0.1 Hz 0.2 Hz <10% of U_n 80 ms typical including trip relay, 150 ms maximum 80 ms to 10 s: [810] $F> - F>>$ - [81U] $F< - F<<$ $\pm 2\%$ or 20 ms 0.1 Hz
Trip circuit supervision and breaker failure [74TC] [BF] <ul style="list-style-type: none"> Trip circuit supervision [74TC] Operating time (in faulty condition) Fixed operating range [BF] Breaker failure time delay 	requires one or two digital inputs (see application guide) 500 ms fixed for [74TC] function >0.5 % of I_n / >0.5% of I_n or >1% of U_n 60 to 1,000 ms
Latching of the output contacts [86] <ul style="list-style-type: none"> Manual reset for output relays Reset 	A, B, C, D, E, F, G (assignment programmable) digital input, digital communication or local MMI
Digital inputs assignment <ul style="list-style-type: none"> By setting software Setting table selection Disturbance recording order Interlock o/o Interlock c/o Control mode Reset [86] function Trip circuit supervision CB trip external order Blocking of the protection functions Blocking of the time delays Input-Output Programmable functions 	set 1 – set 2 dedicated to remote control, switching device position dedicated to remote control, switching device position dedicated to remote control, local / remote acknowledgment of the selected output(s) [74TC] function function [74TC] blocked if external trip order (except thermal function) (when time delay cancelled, function acts instantaneously, except [49] function)

GENERAL CHARACTERISTICS

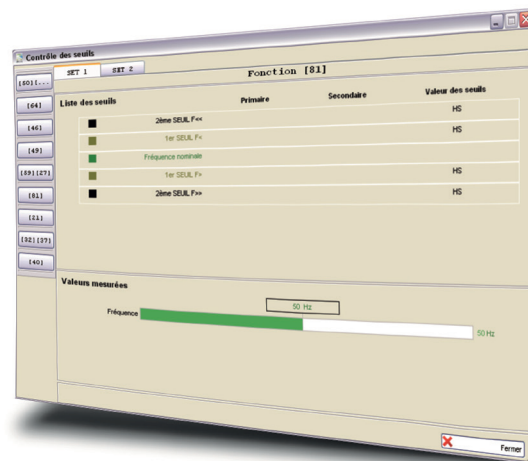
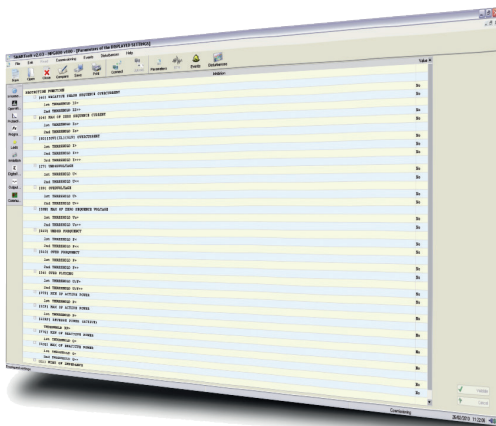
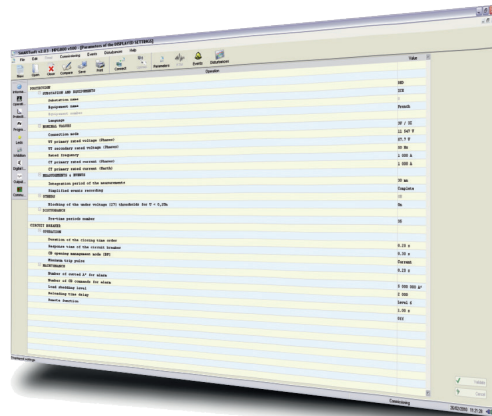
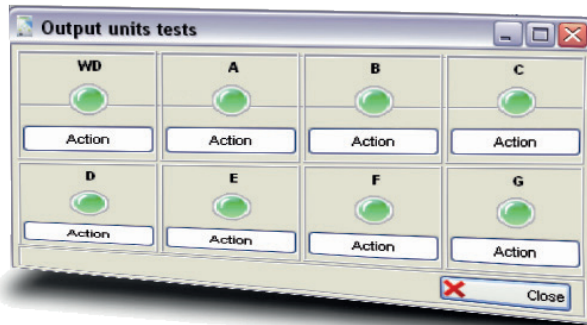
User programmable functions (digital inputs – digital outputs) <ul style="list-style-type: none"> Status of the function Tripping mode or report Operating and release time delays Assignment of name to the function, maximum of 14 characters Assignment of one or more output relays (alarm or trip) 	in or out of service, by local MMI or by setting software report: for time stamping and event recorder tripping mode: 10 ms to 300 s by setting software by local MMI or by setting software A, B, C, D, E, F, G
Load shedding – Load Restoration, remote control (communication option) <ul style="list-style-type: none"> Load shedding level Time delay before reclosing Reclosing pulse Output relays assignment 	1 to 6 1 to 120 s, $\pm 2\%$ 100 to 500 ms by local MMI or by setting software A, B, C, D, E, F, G
Digital outputs assignment <ul style="list-style-type: none"> By local MMI or by setting software 	
Signalling LEDs assignment <ul style="list-style-type: none"> By setting software 	
Counters <ul style="list-style-type: none"> Energy Cumulative breaking current Operation number circuit breaker 	E. Active +, E. Active -, E. Reactive +, E. Reactive - maximum $64 \cdot 10^6 \text{ kA}^2$ (phase 1, 2 and 3) 0 to 10,000
Man Machine Interface <ul style="list-style-type: none"> Relay display Language Configuration and operating software Language 	2 lines of 16 characters French, English, Spanish, Italian Windows® 2000, XP, Vista and 7 compatible French, English, Spanish, Italian
MODBUS® communication (option) <ul style="list-style-type: none"> Transmission Interface Transmission speed 	asynchronous series, 2 wires RS485 300 to 115,200 bauds
Disturbance recording <ul style="list-style-type: none"> Number of recordings Total duration Pre fault time 	4 52 periods per recording adjustable from 0 to 52 cycles



GENERAL CHARACTERISTICS

Climatic withstand in operation <ul style="list-style-type: none"> • Cold exposure • Dry heat exposure • Damp heat exposure • Temperature variation with specified speed 	IEC / EN 60068-2-1: class Ad, -10 °C IEC / EN 60068-2-2: class Bd, +55 °C IEC / EN 60068-2-3: class Ca, 93 % HR, 40 °C, 56 days IEC / EN 60068-2-14: class Nb, -10 °C to +55 °C, 3 °C/min
Storage <ul style="list-style-type: none"> • Cold exposure • Dry heat exposure 	IEC / EN 60068-2-1: class Ad, -25 °C IEC / EN 60068-2-2: class Bd, +70 °C
Electrical safety <ul style="list-style-type: none"> • Ground bond test current • Impulse voltage withstand • Dielectric withstand (50Hz or 60Hz) • Insulation resistance • Clearance and creepage distances 	IEC / EN 61010-1: 30 A IEC / EN 60255-5: 5 kV MC, 5 kV MD (waveform: 1.2/50µs) except Digital Output, 1 kV differential mode except RS485, 3 kV common mode IEC / EN 60255-5: common mode 2 kV _{rms} - 1 min differential mode for Digital Output 1 kV _{rms} - 1 min (open contact) IEC / EN 60255-5: 500 Vdc - 1 s : > 100 MΩ IEC / EN 60255-5: rated insulation voltage: 250 V pollution degree: 2 overvoltage category: III
Enclosure safety <ul style="list-style-type: none"> • Degree of protection provided by enclosure (IP code) 	IEC / EN 60529 : IP51, with front face
Immunity – Conducted disturbances <ul style="list-style-type: none"> • Immunity to RF conducted disturbances • Fast transient • Oscillatory waves disturbance • Surge immunity • Supply interruptions 	IEC / EN 61000-4-6: class III, 10 V IEC / EN 60255-22-4 / IEC / EN 61000-4-4: class IV IEC / EN 60255-22-1: class III, 2.5 kV CM, 1 kV DM except RS485, class II, 1 kV CM IEC / EN 61000-4-5: class III IEC / EN 60255-11: 100% 20 ms
Immunity – Radiated disturbances <ul style="list-style-type: none"> • Immunity to RF radiated fields • Electrostatic discharges • Power frequency magnetic field immunity test 	IEC / EN 60255-22-3 / IEC / EN 61000-4-3 : class III, 10 V/m IEC / EN 60255-22-2 / IEC / EN 61000-4-2: class III, 8 kV air / 6 kV contact IEC / EN 61000-4-8: class IV, 30 A/m continuous, 300 A/m 1 to 3 s
Mechanical robustness - energised <ul style="list-style-type: none"> • Vibrations • Shocks 	IEC / EN 60255-21-1: class 1 - 0.5g IEC / EN 60255-21-2: class 1 - 5g / 11 ms
Mechanical robustness - not energised <ul style="list-style-type: none"> • Vibrations • Shocks • Bumps • Free fall 	IEC / EN 60255-21-1: class 1 - 1g IEC / EN 60255-21-2: class 1 - 15g / 11 ms IEC / EN 60255-21-2: class 1 - 10g / 16 ms IEC / EN 60068-2-32: class 1 - 250 mm
Electromagnetic compatibility (EMC) <ul style="list-style-type: none"> • Radiated field emissivity • Conducted disturbance emissivity 	EN 55022: class A EN 55022: class A
Presentation <ul style="list-style-type: none"> • Height • Width • Brackets 19" rack mounting 	4U 1/4 19" option (see drawing D37739)
Case <ul style="list-style-type: none"> • H, W, D without short-circuiting device • H, W, D with short-circuiting devices • Weight 	173 x 106.3 x 250 mm (see drawing D37739) 173 x 106.3 x 305 mm (see drawing D37739) 3.6 kg
Connection - codification <ul style="list-style-type: none"> • See diagram S39494 • Ring CT 	see diagram 142941

SMARTsoft, integrated software for the Industry, Railway and Transmission ranges, helps the User get the best from NP800 series relays.



SMARTsoft

- User friendly
- Diagnosis
- Fault analysis
- Maintenance tools

FUNCTIONALITIES

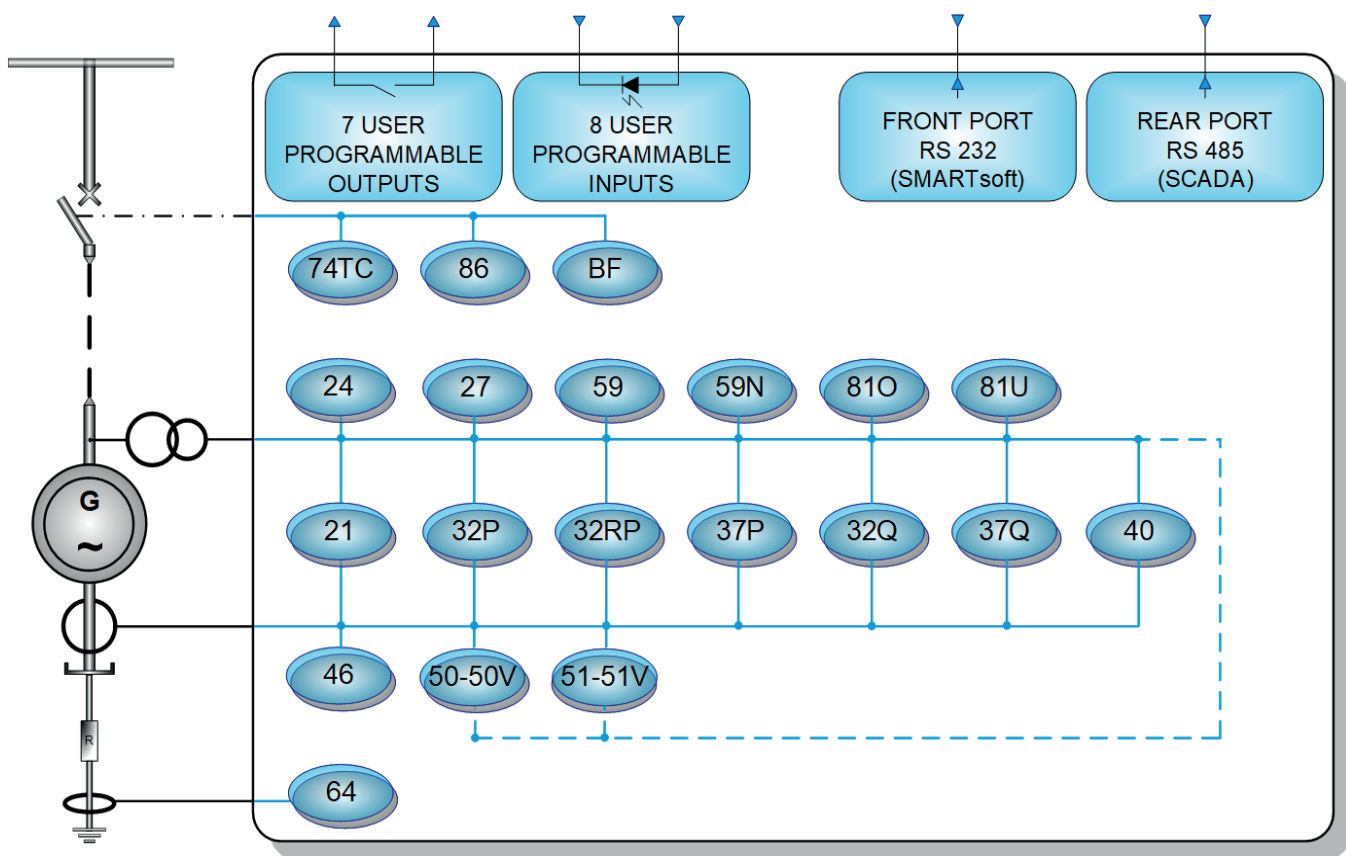
- 2 ranges of auxiliary supply
- Storage of the lack and the restoration of the auxiliary voltage (time stamped events)
- Configuration and parameter setting by local MMI or off-line / on-line PC
- Measurement of electrical quantities:
 - Display expressed in primary values
 - Instantaneous and integrated values of phase currents and S, P, Q powers
 - Values, according to the wiring: phase to phase or phase to neutral voltages - residual voltage - zero sequence current
- Thermal image value
- Impedance
- Frequency
- Power factor, Cos φ
- Instantaneous alarm threshold
- Definite time tripping
- Dependent time tripping according to inverse/very inverse/extremely inverse IEC 60255-3 curves
- Tripping according to moderately inverse/very inverse/extremely inverse ANSI /IEEE curves

- 2 setting groups, locally or remotely selectable by a digital input or by the communication channel
- Energy metering: storage of values / hour
- CB Monitoring: interlocks discrepancy, local or remote control of closing / tripping
- Remote control by communication channel: tripping or closing, load shedding with priority levels and load restoration
- Setting software compatible with Windows® 2000, XP, Vista and 7
- User interface with access to all protection functions
- Time stamping of internal events with 10 ms resolution
- Time stamping of digital inputs with 10 ms resolution
- Event recording: 250 locally recorded events, 200 saved in case of loss of auxiliary supply
- Local / remote event acknowledgment
- Disturbance recording according to Comtrade® format: storage of 4 recordings of 52 periods
- Disturbance recording initiated by digital input, setting software or communication network
- Remote setting, remote reading of measurements, counters, alarms and parameters settings
- Remote reading of disturbance recording and event log
- Self-diagnosis: memories, output relays, A/D converters, auxiliary supply, cycles of execution of software, hardware failure
- Test of wiring, phase rotation and direction of the currents

Options

- Communication by Modbus® RS485
- Communication by Modbus® RS485 with redundancy
- 2 dependent time, configurable and downloadable curves, please consult us.

FUNCTIONAL DIAGRAM



The specifications and drawings given are subject to change and are not binding unless confirmed by our specialists.

