REGULATION
Generator Synchro-check Relay

NPRG810

NPRG810-1G performs check of synchronism between a generator and an electrical network. It is usually used to authorize the closing order of a paralleling circuit breaker.
NPRG810-4G performs check of synchronism between one to four generators and an electrical network.
These two devices are fitted with dead busbar paralleling function.

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 by the RS232 port, or remotely using the RS485 port.
Reading, measurement and recording are all available locally or remotely.

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

Common functions for NPRG810-1G and NPRG810-4G

- Synchro-check - **[25]**
- Dead Bus paralleling
- Adjustment of the phase shift between GE and BB measurements (Step up transformer adaptation)
- Network & Generator configurable rated voltage

Specific function for NPRG810-4G

- 4 settings tables available for management of 4 generators

Protection & Control ice

CHARACTERISTICS NPRG810

Auxiliary Supply

• Auxiliary supply ranges	19 to 70 – 85 to 255 / Vdc or Vac 50 or 60 Hz
• Typical burden	6 W (CC), 6 VA (CA)
• Memory backup	72 hours

Analogue Inputs

• Phase voltage inputs	Un: 55 to 120 V input impedance > 80 KΩ continuous rating 240 V, short duration withstand 275V - 1 min measurement from 3 to 240 V VT setting: primary value from 100 V to 30 kV
• Frequency (50Hz or 60Hz)	measurement: 45-55 Hz or 55-65 Hz measurement: 30-70 Hz *(from V1.50)*

Digital Inputs (4 for NPRG810-1G, 8 for NPRG810-4G)

• Polarizing voltage	20 to 70 Vdc, range 19 to 70 V 37 to 140 Vdc, range 85 to 255 V
• Level 0	< 10Vdc range 19 to 70 V – < 33Vdc range 85 to 255 V
• Level 1	> 20Vdc range 19 to 70 V – > 37Vdc range 85 to 255 V
• Burden	< 15 mA

Relay Outputs (2* for NPRG810-1G + 1 WD, 7 for NPRG810-4G + 1 WD)

• Relays A*, B, E, F	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 ms: 50 W breaking capacity AC with cos φ = 0.4: 1250 VA
• Relays C*, WD, D, G	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 ms: 50 W breaking capacity AC with cos φ = 0.4: 1250 VA

Characteristics of the function [25]

• Blocking of the output relay C	possible by digital input (output relay use for paralleling authorisation)
• Threshold U GE mini for authorisation [25]	50 to 100 % Un
• Threshold accuracy	2% of Un
• Setting of voltage difference: ΔU	thresholds +/- : 1% to 15% Un, with step of 1% Un
• Voltage difference accuracy	± 5% of the set value
• Setting of angular difference: Δφ	thresholds +/- : 1° to 20°, with step of 1°
• Angular difference accuracy	± 2%
• Setting of frequency difference: ΔF	thresholds +/- : 0.01 to 1.5 Hz, with step of 0.01 Hz
• Frequency difference accuracy	± 5% of the set value
• Setting of rate of frequency change: ΔF/dt	thresholds +/- : 0.01 to 0.2 Hz/s, with step of 0.01 Hz/s
• Rate of frequency change accuracy	± 2%
• Time lag before authorisation	0 ms to 1 s, with step of 0.1 s
• Accuracy of the time delays	± 2% or 20 ms
• Accuracy of displayed measures	3% from 3 to 240 V

Dead Bus paralleling

• Dead busbar paralleling enabled	by dedicated DI or setting software
• Info dead busbar paralleling enabled	HMI, dedicated DI, communication and setting software
• Busbar voltage detection threshold	10% to 50% Un, with step of 1% Un
• Threshold accuracy	2% of Un
• Setting of frequency difference	thresholds F< and F>: 0 to 1 Hz, with step of 0.1 Hz
• Angular accuracy / frequency difference	± 2%
• Setting of voltage difference	thresholds U< and U>: 1 to 10% Un, with step of 1% Un
• Voltage difference accuracy	± 5% of the set value
• Time lag before paralleling	1 to 5 s, with step of 0.5 s
• Accuracy of the time delay	± 2% or 20 ms

Adjustment of the phase shift between GE and BB measurements

• GE voltage / BB voltage	0 to 360°, with step of 1°

CHARACTERISTICS NPRG810

Digital inputs assignment	**(see application guide)**
• Input 1	paralleling of dead bus line
• Input 2	inhibition of the function [25]
• Input 3	paralleling order (management of disturbance recording and events)
• Input 4	contact o/o of the Circuit Breaker (management of events)
• Input 5 (NPRG810-4g only)	selection generator 1
• Input 6 (NPRG810-4g only)	selection generator 2
• Input 7 (NPRG810-4g only)	selection generator 3
• Input 8 (NPRG810-4g only)	selection generator 4
Digital output assignment	**(see application guide)**
• Relay A	paralleling of dead bus line enable
• Relay B (NPRG810-4G only)	generator 1 selected
• Relay C	paralleling authorisation (permanent order if conditions are valid)
• Relay D (NPRG810-4G only)	generator selection fault
• Relay E (NPRG810-4G only)	generator 2 selected
• Relay F (NPRG810-4G only)	generator 3 selected
• Relay G (NPRG810-4G only)	generator 4 selected
Signalling LEDs assignment	
• LED 1	info ΔU OK
• LED 2	info Δφ OK
• LED 3	info ΔF OK
• LED 4	paralleling authorised
Setting	
• Display	French, English, Spanish, Italian
• Configuration and operating software	Windows® compatible 2000, XP, Vista and 7 French, English, Spanish, Italian
MODBUS® Communication (option)	
• Transmission	asynchronous series, 2 wires
• Interface	RS 485
• Transmission speed	300 to 115 200 bauds
Disturbance recording	
• Number of recordings	4
• Total duration	170 cycles per recording (12 samples / cycle)
• Pre fault time	adjustable from 0 to 170 cycles
Climatic withstand in operation	
• Cold exposure	IEC / EN 60068-2-1: class Ad, -10 °C
• Dry heat exposure	IEC / EN 60068-2-2: class Bd, +55 °C
• Damp heat exposure	IEC / EN 60068-2-3: class Ca, 93 % HR, 40 °C, 56 days
• Temperature variation with specified variation rate	IEC / EN 60068-2-14: class Nb, -10 °C à +55 °C, 3 °C/min
Storage	
• Cold exposure	IEC / EN 60068-2-1: class Ad, -25 °C
• Dry heat exposure	IEC / EN 60068-2-2: class Bd, +70 °C
Electrical safety	
• Ground bond test current	IEC / EN 61010-1: 30 A
• Impulse voltage withstand	IEC / EN 60255-5: 5 kV MC, 5 kV MD except outputs TOR, 1 kV MD except RS485, 3 kV MC
• Dielectric withstand: 50Hz	IEC / EN 60255-5: common mode 2 kV_{rms} – 1 min Differential outputs mode TOR 1 kV_{rms} – 1 min (open contact type)
• Insulation resistance	IEC / EN 60255-5: 500 Vdc - 1 s: > 100 MΩ
• Clearance and creepage distances	IEC / EN 60255-5: rated insulation voltage: 250 V Pollution degree: 2 Overvoltage category: III

CHARACTERISTICS NPRG810

Enclosure safety

• Degrees of protection provided by enclosures (IP code)	IEC / EN 60529: IP51, with front face

Immunity – Conducted disturbances

• Immunity to RF conducted disturbances	IEC / EN 61000-4-6: class III, 10 V
• Fast transients	IEC / EN 60255-22-4 / IEC / EN 61000-4-4: class IV
• Oscillatory waves disturbance 1 MHz	IEC / EN 60255-22-1: class III, 2.5 kV MC, 1 kV MD except RS485, class II, 1 kV MC
• Surge immunity	IEC / EN 61000-4-5: class III
• Supply interruptions	IEC / EN 60255-11: 100% 20 ms

Immunity – Radiated disturbances

• Immunity to RF radiated fields	IEC / EN 60255-22-3 / IEC / EN 61000-4-3: class III, 10 V/m
• Electrostatic discharges	IEC / EN 60255-22-2 / IEC / EN 61000-4-2: class III, 8 kV air / 6 kV contact
• Power frequency magnetic field immunity test	IEC / EN 61000-4-8: class IV, 30 A/m permanent, 300 A/m 1 to 3 s

Mechanical robustness - energised

• Vibrations	IEC / EN 60255-21-1: class 1, 0.5 Gn
• Shocks	IEC / EN 60255-21-2: class 1, 5 Gn / 11 ms

Mechanical robustness - not energised

• Vibrations	IEC / EN 60255-21-1: class 1, 1 Gn
• Shocks	IEC / EN 60255-21-2: class 1, 15 Gn / 11 ms
• Bumps	IEC / EN 60255-21-2: class 1, 10 Gn / 16 ms
• Free falls	IEC / EN 60068-2-32: class 1, 250 mm

Electromagnetic compatibility (EMC)

• Radiated field emissivity	EN 55022: class A
• Conducted disturbance emissivity	EN 55022: class A

Presentation

• Height	4U
• Width	¼ 19"
• Brackets 19” rack mounting	option (see drawing D37739)
• Display	2 lines of 16 characters

Case

• H, W, D without connectors	173 x 106.3 x 250 mm (see drawing D37739)
• Net weight	3.6 kg

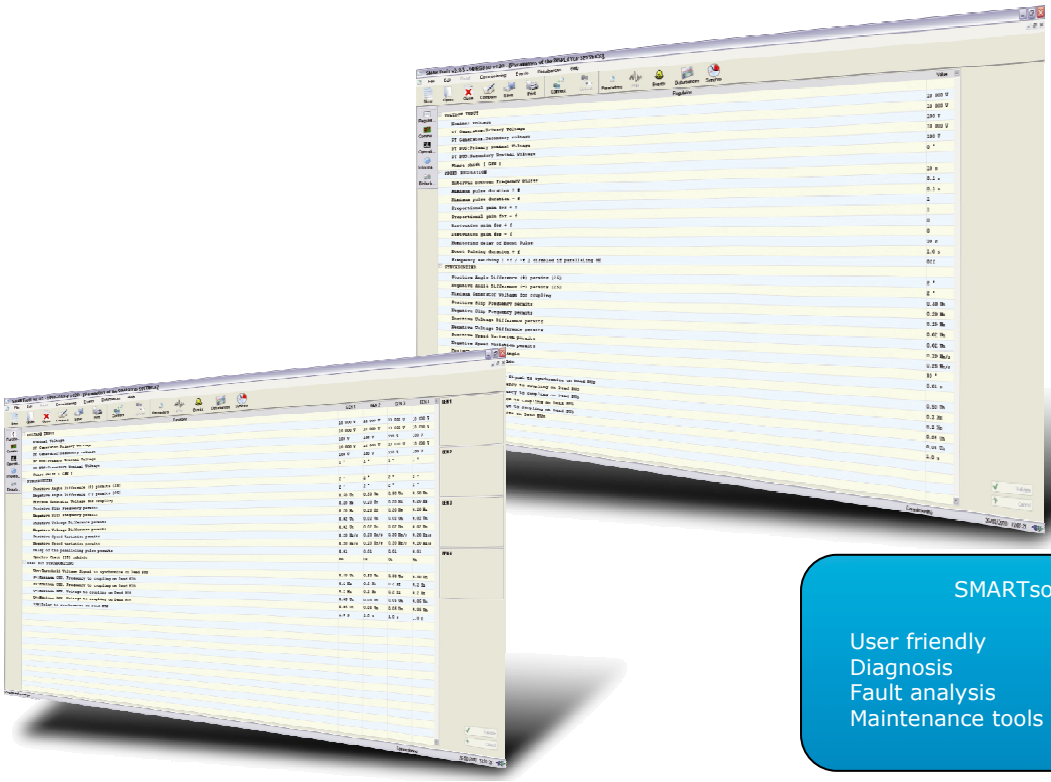
Connection - codification

• NPRG810-1G	see diagram S39371
• NPRG810-4G	see diagram S39610

CHARACTERISTICS NPRG810

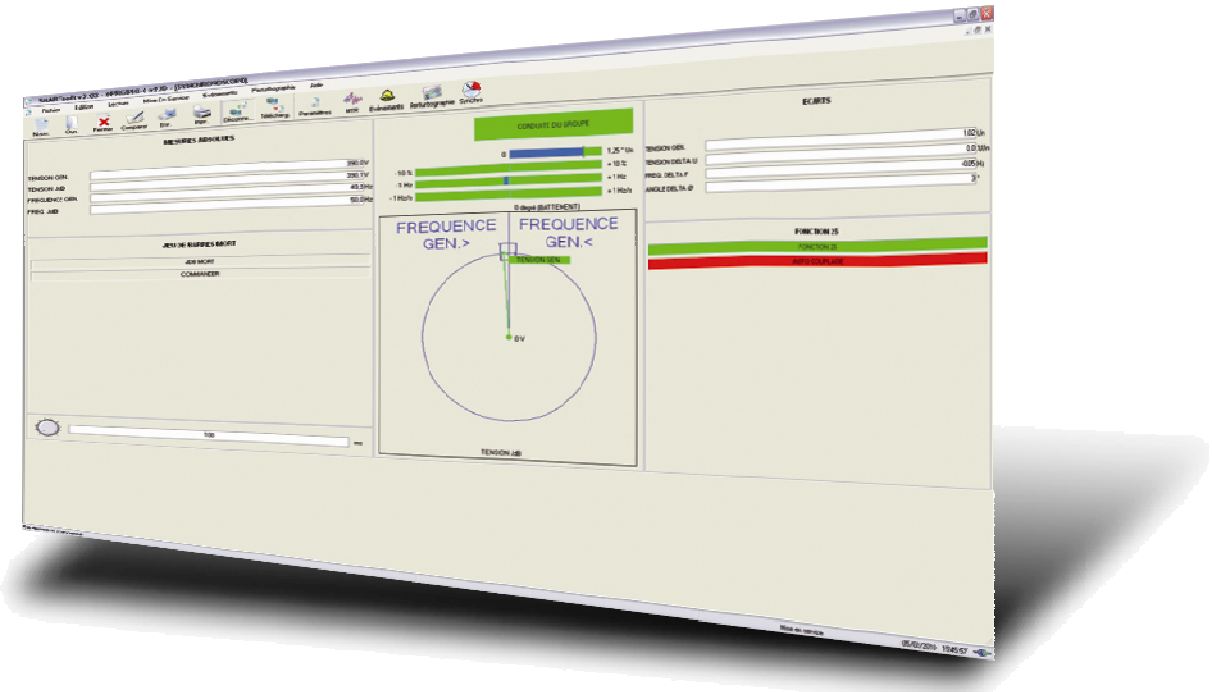
SMARTsoft

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



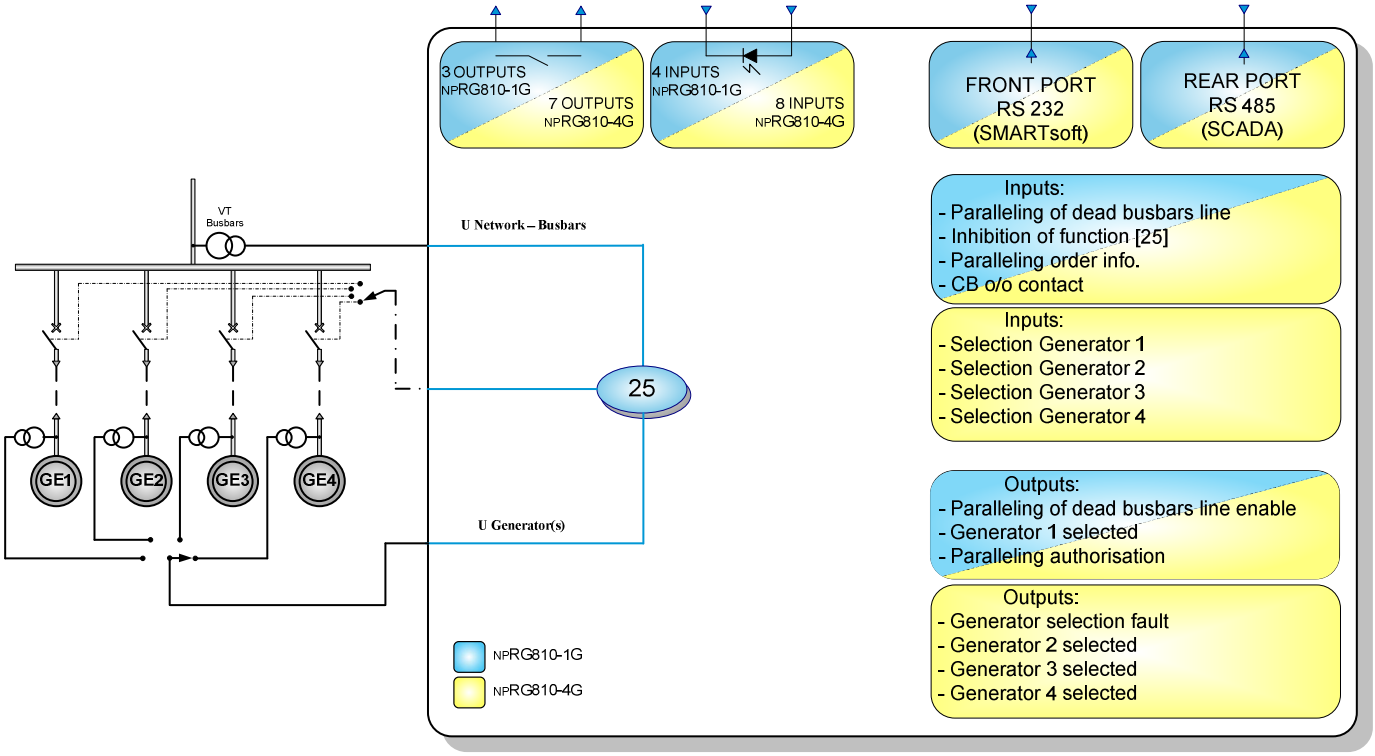
Functionalities

- 2 ranges of auxiliary supply
- Storage of lack and the restoration of the auxiliary voltage (events recorded)
- Configuration and parameter setting by off-line / on-line PC
- Reading and recording of configuration by PC
- Measurement of electrical quantities:
  - Phase voltages U_{GE}, U_{BB}
  - Frequency F_{GE}, F_{BB}
  - Voltage difference ΔU ($U_{GE} - U_{BB}$)
  - Angular difference $\Delta\phi$
  - Frequency difference ΔF ($F_{GE} - F_{BB}$)
  - Rate of frequency change $\Delta F/dt$ (Hz / s)
- Display expressed in primary values
- 4 setting groups for management of several selectable groups remotely by logical input (NPRG810-4G only)
- Setting software compatible with Windows® 2000, XP, Vista and 7
- User interface with access to all functions
- Commissioning facilitated, the inhibition of the output relay of the [25] function allow the validation of the wiring.
- Time stamping of internals events with 10ms resolution
- Time stamping of digital inputs with 10ms resolution
- Event recording: 250 locally recorded events, 200 saved in case of loss of the auxiliary supply
- Local / remote events acknowledgment
- Disturbance recording according to Comtrade® format: storage of 4 recordings of 170 periods. Wiring of the paralleling order requested
- Remote setting, remote reading of measurements, alarms and parameters settings
- Remote reading of disturbance recording and events log
- Self-diagnosis: Memories, output relays, A/D converters, auxiliary supply, cycles of execution of the software, hardware anomaly

Options

- Communication by Modbus® RS 485
- Communication by Modbus® RS 485 with redundancy (NPRG810-4G only)

Functional diagram



11, rue Marcel Sembat - F94146 Alfortville cedex
www.groupeice.com - contact@icelec.com
Tel : +33 (0)1 41 79 76 00 - Fax : +33 (0)1 41 79 76 01