

# 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



CEE Relays Ltd

# CHARACTERISTICS NPRG810

## Auxiliary Supply

- Auxiliary supply ranges
- Typical burden
- Memory backup

19 to 70 – 85 to 255 / Vdc or Vac 50 or 60 Hz  
6 W (CC), 6 VA (CA)  
72 hours

## Analogue Inputs

- Phase voltage inputs

Un: 55 to 120 V  
input impedance > 80 K $\Omega$   
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  
measurement: 45-55 Hz or 55-65 Hz  
measurement: 30-70 Hz (*from V1.50*)

- Frequency (50Hz or 60Hz)

## 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  
< 10Vdc range 19 to 70 V – < 33Vdc range 85 to 255 V  
> 20Vdc range 19 to 70 V – > 37Vdc range 85 to 255 V  
< 15 mA

- Level 0
- Level 1
- Burden

## 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  $\cos \phi = 0.4$ : 1250 VA  
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  $\cos \phi = 0.4$ : 1250 VA

- Relays C\*, WD, D, G

## Characteristics of the function [25]

- Blocking of the output relay C
- Threshold U GE mini for authorisation [25]
- Threshold accuracy
- Setting of voltage difference:  $\Delta U$
- Voltage difference accuracy
- Setting of angular difference:  $\Delta \phi$
- Angular difference accuracy
- Setting of frequency difference:  $\Delta F$
- Frequency difference accuracy
- Setting of rate of frequency change:  $\Delta F/dt$
- Rate of frequency change accuracy
- Time lag before authorisation
- Accuracy of the time delays
- Accuracy of displayed measures

possible by digital input (output relay use for paralleling authorisation)  
50 to 100 % Un  
2% of Un  
thresholds +/- : 1% to 15% Un, with step of 1% Un  
 $\pm 5\%$  of the set value  
thresholds +/- : 1° to 20°, with step of 1°  
 $\pm 2\%$   
thresholds +/- : 0.01 to 1.5 Hz, with step of 0.01 Hz  
 $\pm 5\%$  of the set value  
thresholds +/- : 0.01 to 0.2 Hz/s, with step of 0.01 Hz/s  
 $\pm 2\%$   
0 ms to 1 s, with step of 0.1 s  
 $\pm 2\%$  or 20 ms  
3% from 3 to 240 V

## Dead Bus paralleling

- Dead busbar paralleling enabled
- Info dead busbar paralleling enabled
- Busbar voltage detection threshold
- Threshold accuracy
- Setting of frequency difference
- Angular accuracy / frequency difference
- Setting of voltage difference
- Voltage difference accuracy
- Time lag before paralleling
- Accuracy of the time delay

by dedicated DI or setting software  
HMI, dedicated DI, communication and setting software  
10% to 50% Un, with step of 1% Un  
2% of Un  
thresholds F< and F>: 0 to 1 Hz, with step of 0.1 Hz  
 $\pm 2\%$   
thresholds U< and U>: 1 to 10% Un, with step of 1% Un  
 $\pm 5\%$  of the set value  
1 to 5 s, with step of 0.5 s  
 $\pm 2\%$  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

- Input 1
- Input 2
- Input 3
  
- Input 4
- Input 5 (NPRG810-4g only)
- Input 6 (NPRG810-4g only)
- Input 7 (NPRG810-4g only)
- Input 8 (NPRG810-4g only)

## Digital output assignment

- Relay A
- Relay B (NPRG810-4G only)
- Relay C
- Relay D (NPRG810-4G only)
- Relay E (NPRG810-4G only)
- Relay F (NPRG810-4G only)
- Relay G (NPRG810-4G only)

## Signalling LEDs assignment

- LED 1
- LED 2
- LED 3
- LED 4

## Setting

- Display
- Configuration and operating software

## MODBUS® Communication (option)

- Transmission
- Interface
- Transmission speed

## Disturbance recording

- Number of recordings
- Total duration
- Pre fault time

## Climatic withstand in operation

- Cold exposure
- Dry heat exposure
- Damp heat exposure
- Temperature variation with specified variation rate

## Storage

- Cold exposure
- Dry heat exposure

## Electrical safety

- Ground bond test current
- Impulse voltage withstand
  
- Dielectric withstand: 50Hz
  
- Insulation resistance
- Clearance and creepage distances

## (see application guide)

paralleling of dead bus line  
inhibition of the function [25]  
paralleling order (management of disturbance recording and events)  
contact o/o of the Circuit Breaker (management of events)  
selection generator 1  
selection generator 2  
selection generator 3  
selection generator 4

## (see application guide)

paralleling of dead bus line enable  
generator 1 selected  
paralleling authorisation (permanent order if conditions are valid)  
generator selection fault  
generator 2 selected  
generator 3 selected  
generator 4 selected

info  $\Delta U$  OK  
info  $\Delta \varphi$  OK  
info  $\Delta F$  OK  
paralleling authorised

French, English, Spanish, Italian  
Windows® compatible 2000, XP, Vista and 7  
French, English, Spanish, Italian

asynchronous series, 2 wires  
RS 485  
300 to 115 200 bauds

4  
170 cycles per recording (12 samples / cycle)  
adjustable from 0 to 170 cycles

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 à +55 °C, 3 °C/min

IEC / EN 60068-2-1: class Ad, -25 °C  
IEC / EN 60068-2-2: class Bd, +70 °C

IEC / EN 61010-1: 30 A  
IEC / EN 60255-5: 5 kV MC, 5 kV MD  
except outputs TOR, 1 kV MD  
except RS485, 3 kV MC  
IEC / EN 60255-5: common mode 2 kV<sub>rms</sub> – 1 min  
Differential outputs mode TOR 1 kV<sub>rms</sub> – 1 min  
(open contact type)  
IEC / EN 60255-5: 500 Vdc - 1 s: > 100 M $\Omega$   
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
- Fast transients
- Oscillatory waves disturbance 1 MHz

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 MC, 1 kV MD  
except RS485, class II, 1 kV MC  
IEC / EN 61000-4-5: class III  
IEC / EN 60255-11: 100% 20 ms

- Surge immunity
- Supply interruptions

## Immunity – Radiated disturbances

- 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 permanent, 300 A/m  
1 to 3 s

## Mechanical robustness - energised

- Vibrations
- Shocks

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

## Mechanical robustness - not energised

- Vibrations
- Shocks
- Bumps
- Free falls

IEC / EN 60255-21-1: class 1, 1 Gn  
IEC / EN 60255-21-2: class 1, 15 Gn / 11 ms  
IEC / EN 60255-21-2: class 1, 10 Gn / 16 ms  
IEC / EN 60068-2-32: class 1, 250 mm

## Electromagnetic compatibility (EMC)

- Radiated field emissivity
- Conducted disturbance emissivity

EN 55022: class A  
EN 55022: class A

## Presentation

- Height
- Width
- Brackets 19" rack mounting
- Display

4U  
¼ 19"  
option (see drawing D37739)  
2 lines of 16 characters

## Case

- H, W, D without connectors
- Net weight

173 x 106.3 x 250 mm (see drawing D37739)  
3.6 kg

## Connection - codification

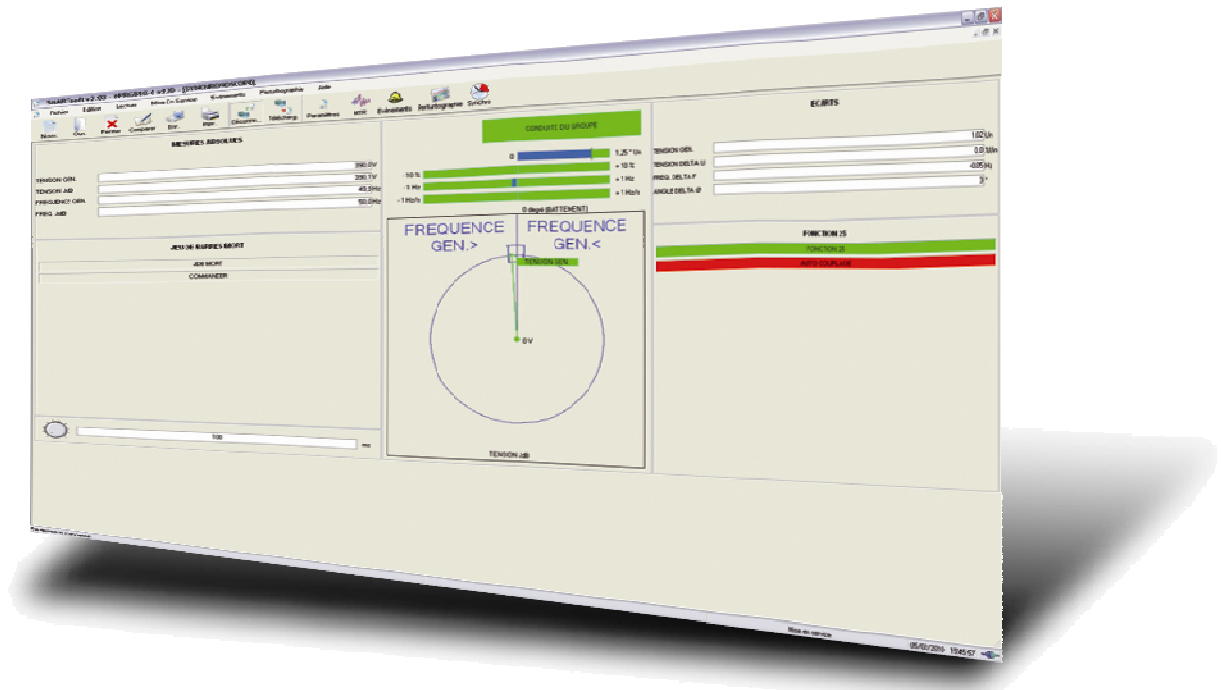
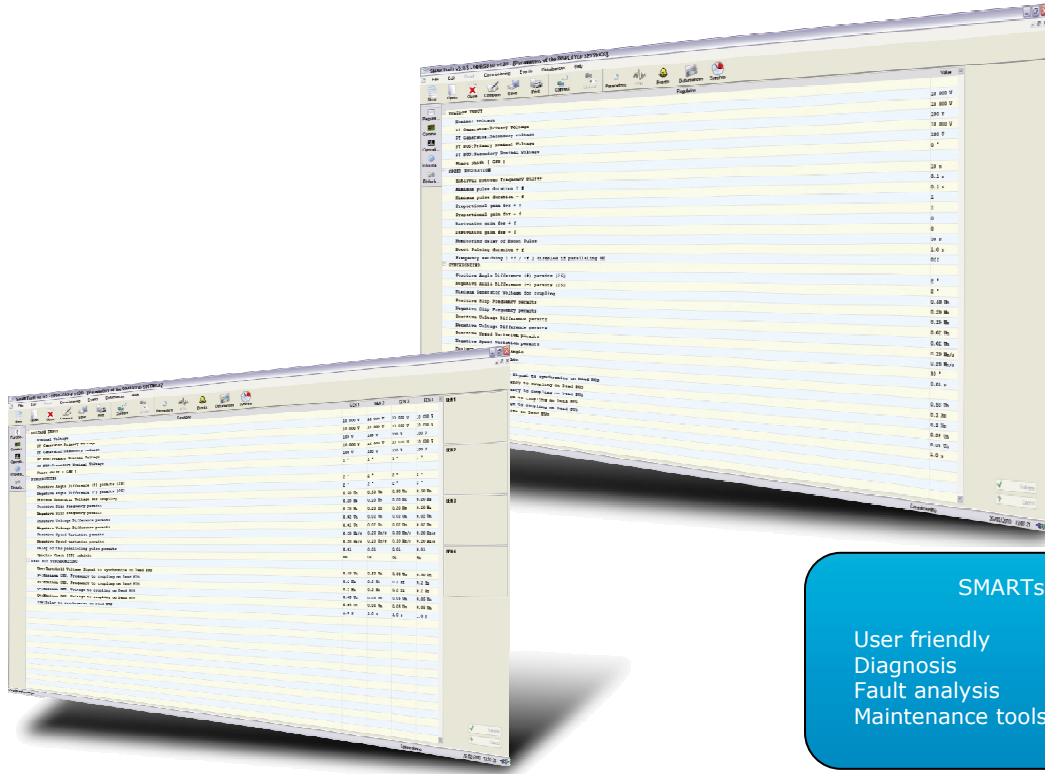
- NPRG810-1G
- NPRG810-4G

see diagram S39371  
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.



## 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  $\Delta U$  ( $U_{GE} - U_{BB}$ )
  - Angular difference  $\Delta\phi$
  - Frequency difference  $\Delta F$  ( $F_{GE} - F_{BB}$ )
  - 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 internal 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

