

GENERATION & NETWORK

Phase and Earth Overcurrent Relay

NP800 provides the three-phase and earth fault overcurrent protection for medium and high voltage electrical networks. This multi-function relay supervises phase to phase and phase to earth faults, negative sequence currents, thermal state of the protected device and the good operating of the circuit breaker and its trip circuit.

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

- Overcurrent with 3 thresholds [51-1] [51-2] [50]
- Earth fault with 2 thresholds [51N] [50N]
- Thermal overload for cable and transformer [49]
- Negative phase sequence overcurrent [46]
- Broken conductor with 2 thresholds [46BC]
- Load reclosing function
- Logical selectivity

Additional functions

- Latching of the output contacts [86]
- Trip circuit supervision of the breaker [74TC]
- Breaker failure [50BF][50N_BF]
- Load shedding – Load Restoration, remote control (communication option)

Additional function NPIR800 only

- Recloser 1 fast cycle and 3 slow cycles [79]

NPI800
NPIR800



CEE Relays Ltd

CHARACTERISTICS NPI800 – NPIR800

Auxiliary Supply

- 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

- Phase CT

In 1 or 5 A
burden at In < 0.2 VA
Continuous rating 3 In, short duration withstand 100 In / 1s
CT setting: primary value from 1 A to 10 kA
measurement from 0.05 to 24 In
display of primary current from 0 to 65 kA
5VA 5P20

- Recommended CTs
- Earth current CT

In₀ 1 or 5 A
burden at In₀ < 0.5 VA
Continuous rating 1 In₀, short duration withstand 40 In₀ / 1s
measurement from 0.005 to 2.4 In₀
display of primary current from 0 to 6.5 kA
measurement from 0.1 to 48 A primary

- Earth current from Ring CT 100/1 or Ring CT 1500/1 and BA800
- Frequency (50Hz or 60Hz)

measurement: 45 to 55 Hz or 55 to 65 Hz

Digital inputs 4 or 8 according option

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

Output Relays 3* or 7 according option + 1 WD

- 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 ms: 50W
breaking capacity AC with cos φ = 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: 50W
breaking capacity AC with cos φ = 0.4: 1250 VA
adjustable from 100 to 500 ms
by the setting software
capital letters or digits

- Relays C*, D, G & WD:
(control, WD: Watchdog)
(C, D, G: programmable for CB Shunt
Opening Release or Under Voltage Release)
- Relays pulse, except WD
- Assignment of name to the output
maximum of 16 characters

Overcurrent function [51-1] [51-2] [50]

- 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

0.3 to 24 In
1% typical, 2% max from 0.5 to 4 In
3% typical, 5% max from 0.3 to 0.5 In and from 4 to 24 In
95%
60 ms including trip relay for I ≥ 2 Is
40 ms to 300 s: [51-1] I> - [51-2] I>> - [50] I>>>
± 2% or 20 ms
IEC 60255-3, ANSI IEEE and factory programmable (consult us)
class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see
functionalities

Earth fault function [51N] [50N]

- Operating range Io> - Io>>
- Thresholds accuracy
- Reset percentage on the operating level
- Instantaneous operating time
- Definite time delay
- Accuracy of the time delays
- Curves [51N] Io>
- Curves accuracy and type

0.03 to 2.4 In₀ / CT - 0.6 to 48 A / ring CT
1% typical, 2% max from 0.05 to 0.4 In₀ / CT
3% typ., 5% max from 0.03 to 0.05 In₀ and 0.4 to 2.4 In₀ / CT
5% from 0.6 to 48 A / ring CT
95%
60 ms including trip for I ≥ 2 Is
40 ms to 300 s: [51N] Io> [50N] Io>>
± 2% or 20 ms
IEC 60255-3, ANSI IEEE and factory programmable (consult us)
class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see
functionalities

Transformer thermal overload function [49]

- Tripping curves
- Heating-time constant C_{TE}
- Cooling time constant

IEC 60255-8
4 to 180 min, class 5
1 to 6.0 C_{TE}, in step of 0.1

CHARACTERISTICS NPI800 – NPIR800

Transformer thermal overload function [49] (Continue)

- Negative sequence factor 0 to 9
- Closing factor F_D 50 to 100% C_{TE}
- Thermal trip threshold I_b 40 to 130 % I_n , class 5
- Thermal alarm threshold 80 to 100 % θ thermal, class 5
- Reclosing thermal threshold inhibition 40 to 100 % θ thermal, class 5

Cable thermal overload function [49]

- Tripping curves IEC 60255-8
- Heating-time constant C_{TE} 4 to 180 min, class 5
- Thermal alarm threshold 80 to 100 % θ thermal, class 5
- Thermal trip threshold I_b 40 to 130 % I_n , class 5

Negative phase sequence overcurrent function [46]

- Threshold I_{neg} : $I_2 >$ 0.1 to 2.4 I_n , accuracy 5% for $I_{ph} > 0.3 I_n$
- Instantaneous operating time 60 ms including trip relay for $I \geq 2 I_s$
- Definite time delay 40 ms to 300 s
- Accuracy of the time delay $\pm 2\%$ or 20 ms
- Curves IEC 60255-3, ANSI IEEE and factory programmable (consult us)
- Curves accuracy and type class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see functionalities

Broken conductor function [46BC]

- Threshold I_{neg}/I_{pos} : $I_2/I_1 > - I_2/I_1 >>$ 10 to 250%
- Accuracy $\pm 5\%$
- Definite time delay 40 ms to 300s
- Accuracy of the time delays $\pm 2\%$ or 20 ms

Recloser [79] (NPIR800 only)

- Dead time delay (1st cycle) 0.1 to 360 s
- Reclaim time delay (1st cycle) 9 to 360 s
- Dead time delay (2nd, 3rd and 4th cycle) 15 to 360 s
- Reclaim time delay (2nd, 3rd and 4th cycle) 1 to 360 s
- Width of reclosing pulse 100 to 500 ms
- Reclaim time for manual reclosing 1 to 360 s
- Accuracy of time delays $\pm 2\%$ or 20 ms
- N cycles alarm / T min N: 4 to 30 and T: 1 to 30 min

Trip circuit supervision and breaker failure [74TC] [50BF] [50N_BF]

- Trip circuit supervision [74TC] requires four digital inputs (see application guide)
- Operating time (in faulty condition) 500 ms fixed for [74TC] function
- Failure threshold [50BF] 5% to 30 % I_n , step of 1 I_n
- Failure threshold [50N_BF] 0.5% to 3% I_{n0} , step of 0.1 I_{n0}
- Breaker failure time delay 60 to 1000 ms, step of 10 ms

Latching of the output contacts [86]

- Manual reset for output relays A, B, C and with option: D, E, F, G (programmable assignment)
- Reset digital input, digital communication or local MMI

Load reclosing function

- Application threshold adjustment [50] [51] [50N] [51N] [46] [46BC]
- Operating principle function activation by digital input
- Ratio « K » of reclosing time 50 à 200%
- Accuracy $\pm 5\%$
- Reclosing time 40 ms to 300s, $\pm 2\%$ or 20 ms

Logical selectivity

- Application on radial network number of relays too important to allow the use of time co-ordination
- Operating principle additional time added to the functions [50] [51] [50N] [51N]
- Additional time delay [51] [51N] 60 ms to 120s, $\pm 2\%$ or 20 ms
- Additional time delay [50] [50N] 60 ms to 3s, $\pm 2\%$ or 20 ms
- Operating mode of digital input negative or positive true-data mode

Digital inputs assignment

- By setting software set 1 – set 2
- Setting table selection
- Disturbance recording order
- Logical selectivity
- Interlock o/o
- Interlock c/o
- Control mode dedicated to remote control, local / remote
- Reclosing mode
- Reset [86] function acknowledgment of the selected output(s)
- Trip circuit supervision [74TC] function
- CB trip external order function [74TC] blocked if external trip order

CHARACTERISTICS NPI800 – NPIR800

Digital inputs assignment (Continue)

- Circuit breaker ready NPIR800 only
- Inhibition 1 NPIR800 only
- Inhibition 2 NPIR800 only
- RSE A NPIR800 only
- RSE B NPIR800 only
- Input – output programmable functions

User programmable functions (digital inputs – digital outputs)

- Status of the function in or out of service, by local MMI or by the setting software
- Tripping mode or report report: for time stamping and event recorder
- Operating and release time delays tripping mode: 40 ms to 300 s
- Assignment of name to the function, maximum of 14 characters by the setting software
- Assignment of one or more output relays (alarm or trip) by local MMI or by the setting software
A, B, C and with option: D, E, F, G

Counters

- Cumulative breaking current maximum $64 \cdot 10^6$ kA² (phase 1,2 and 3)
- Operation number of circuit breaker 0 to 10 000

Load shedding – Load Restoration, remote control (communication option)

- Load shedding level 1 to 6
- Time delay before reclosing 1 to 120 s, $\pm 2\%$
- Reclosing pulse 100 to 500 ms (remote control)
- Output relays assigned programmable by local MMI or by setting software
A, B, C and with option: D, E, F, G

Digital outputs assignment

- By local MMI or by setting software

Signalling LEDs assignment

- By setting software

Man Machine Interface

- Relay display 2 lines of 16 characters
Language French, English, Spanish, Italian
- Configuration and operating software Windows® 2000, XP, Vista and 7 compatible
Language 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 52 periods per recording
- Pre fault time adjustable from 0 to 52 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 speed 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 (waveform: 1.2/50µs)
except Digital Output, 1 kV differential mode
except RS485, 3 kV common mode
- Dielectric withstand (50Hz or 60Hz) IEC / EN 60255-5: common mode $2 kV_{rms} - 1$ min
differential mode for Digital Output $1 kV_{rms} - 1$ min
(contact open)
- 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

Enclosure safety

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

CHARACTERISTICS NPI800 – NPIR800

Immunity – Conducted disturbances

- Immunity to RF conducted disturbances
- Fast transients
- 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

- 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

- 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

- 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)

- Radiated field emissivity
- Conducted disturbance emissivity

EN 55022: class A
 EN 55022: class A

Presentation

- Height
- Width
- Brackets 19" rack mounting

4U
 ¼ 19"
 option (see drawing D37739)

Case

- 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

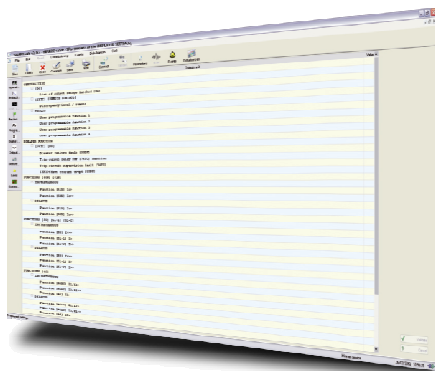
Connection - codification

- NPI800
- NPIR800
- Ring CT
- BA800

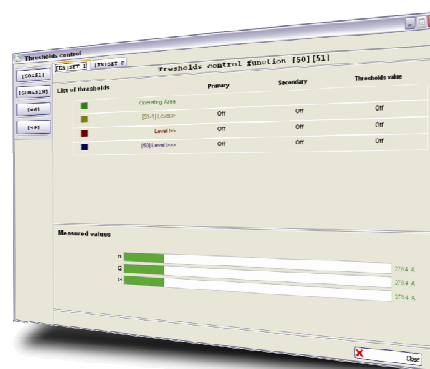
See diagram S38018
 See diagram S38023
 See diagram 142941
 See diagram 38766

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 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, integrated and maximum values of phase and earth currents
- Instantaneous alarm threshold
- Definite time tripping
- Dependent time tripping according to inverse/very inverse/extremely inverse IEC 60255-3 curves
- Tripping according to RI curve (electromechanical)
- Tripping according to moderately inverse/very inverse/extremely inverse ANSI /IEEE curves
- Logical selectivity on the three phase thresholds and the two earth thresholds
- Thermal image according to IEC 60255-8:
- Cable (by phase) and transformer (3 phase)
- 2 setting groups, locally or remotely selectable
- CB Monitoring: interlocks discrepancy, local or remote control of closing / tripping
- Circuit breaker maintenance:
- counters of operation number and cut-off amperes² per phase, alarm and threshold
- Monitoring of breaker failure by checking the disappearance of current after opening
- 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 10ms resolution
- Time stamping of digital inputs with 10ms resolution
- Event recording: 250 locally recorded events, 200 saved in case of loss of auxiliary supply
- Recording of measurements and current setting group
- Local / remote events acknowledgment
- Disturbance recording according to Comtrade® format: storage of 4 recordings of 52 periods
- Disturbance recording initiated by digital input, setting software or communication channel
- Closing function: adjustment of phase, earth, negative sequence current thresholds by external input
- Remote setting and reading of measurements, counters, alarms and parameter 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

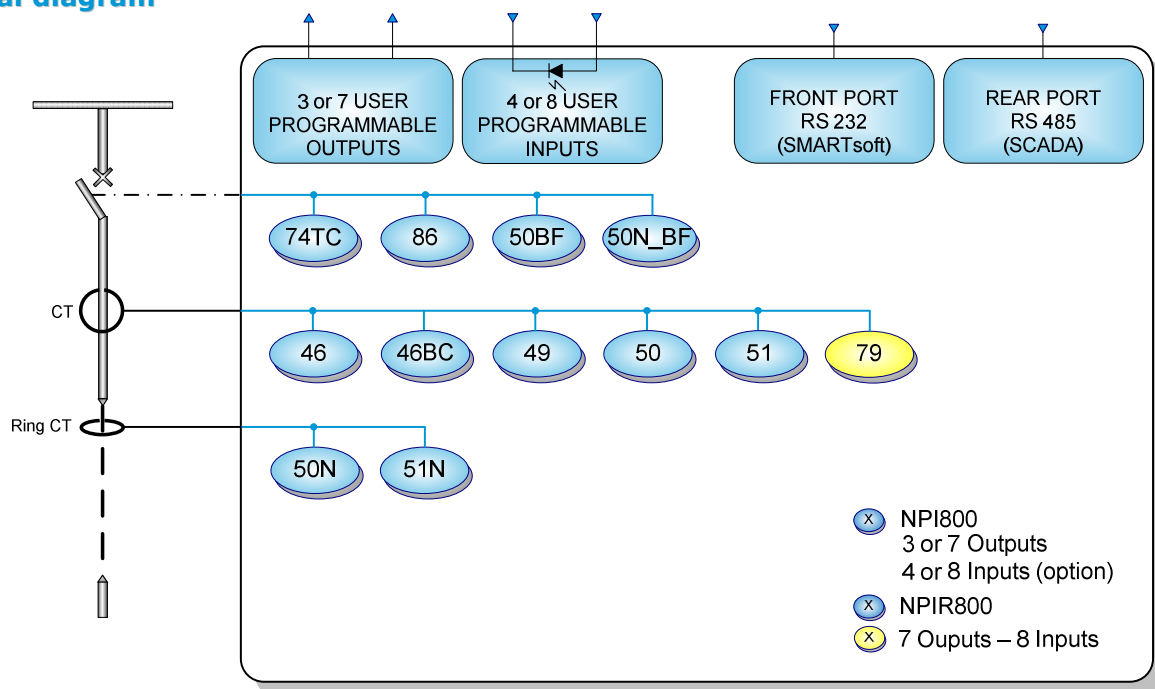
Options

- Communication by Modbus® - (IEC 60870-5-103 protocol: consult us)
- Additional card with 4 assignable output relays and 4 assignable digital inputs (card include for NPIR800)
- 2 inverse time curves, programmable (in factory, consult us) and downloadable

Related equipment

- BA800 for ring CT 1500/1

Functional diagram



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



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