

RETROFITTING Phase and Earth Fault Overcurrent Relay

NP1800R (R2 case) is dedicated to the refurbishment of 700 and 7000 series (R2 and R3 cases) of CEE phase and earth fault overcurrent relays providing the detection of all type of short-circuits of medium and high voltage electrical networks. This numerical and multi-function relay supervises in particular phase to phase or phase to earth faults, negative sequence currents, thermal state of the protected device, and the good operation of the circuit breaker and its trip circuit.

NP800R 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.

Two mountings are available, Flush Rear Connection (**EDPAR**) or Projecting Rear Connection (**SDPAR**). A blank cover R1, provide in option, can improve mechanical installation (replacement of CEE case R3 by a NP1800R).

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

NP1800R



NP1800R - EDPAR

Minimises retrofitting man-hours

Maximises preservation of existing installation

Simplifies and reduces re-commissioning time

Minimises retrofitting costs

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

CHARACTERISTICS NPI800R

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 80 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)

- 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 + 1 WD)

- Relays A, B, :
(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 10 A
closing capacity 15 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 & WD:
(control, WD: Watchdog)
(C: 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
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
class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see
functionalities

CHARACTERISTICS NPI800R

Transformer thermal overload function [49]

- Tripping curves IEC 60255-8
- Heating-time constant C_{TE} 4 to 180 min, class 5
- Cooling time constant 1 to 6.0 C_{TE} , in step of 0.1
- 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 Ineg: $I_2 >$ 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
- Curves accuracy and type class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see functionalities

Broken conductor function [46BC]

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

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

- Trip circuit supervision [74TC] requires one or two 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 (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 NPI800R

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

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

- 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

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

- 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

CHARACTERISTICS NPI800R

Presentation

- Height
- Width
- Brackets 19" rack mounting

4U
case R2
see diagram 9954 (7000 series rack definition table)

Case (see drawing D40037)

- **EDPAR**
H, W, D (case & base)
H, W (front face dimensions)
- **SDPAR**
H, W, D (case & base)
H, W (front face dimensions)
- Weight

172 x 83 x 222 mm
217 x 98 mm

172 x 83 x 227 mm
172 x 83 mm
3.5 kg

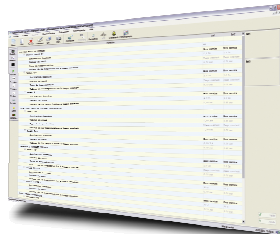
Connection - codification

- NPI800R
- Ring CT
- BA800

See diagram S39962
See diagram 142941
See diagram 38766

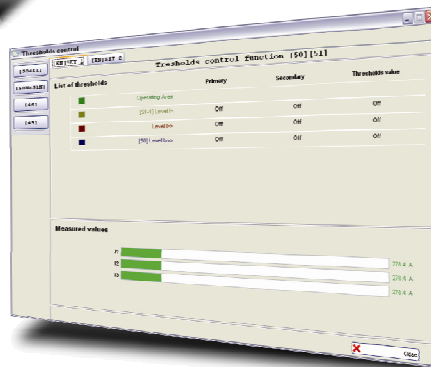
SMARTsoft

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



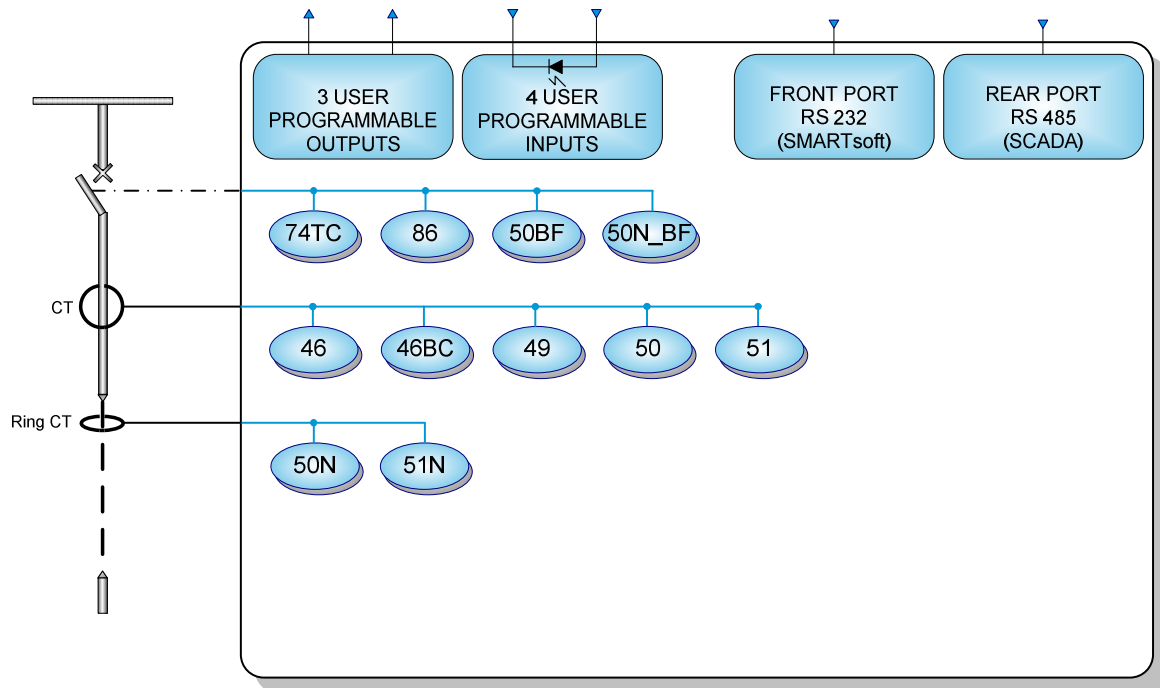
Functionalities

- 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 ampers² 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

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.