

# NPI800R

## RETROFITTING

## Phase and Earth Fault Overcurrent Relay



NPI800R (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 NPI800R).

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



NPI800R - 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

#### OUR TRADEMARKS



## GENERAL CHARACTERISTICS

|   |   |
|---|---|
| <b>Auxiliary Supply</b> <ul style="list-style-type: none"> <li>Auxiliary supply ranges</li> <li>Typical burden</li> <li>Memory backup</li> </ul>  | 19 to 70 – 85 to 255 / Vdc or Vac 50 or 60 Hz<br>6 W (DC), 6 VA (AC)<br>72 hours  |
| <b>Analogue inputs</b> <ul style="list-style-type: none"> <li>Phase CT</li> </ul>   | In 1 or 5 A<br>burden at $I_n < 0.2$ VA<br>Continuous rating 3 $I_n$ , short duration withstand 80 $I_n$ / 1s<br>CT setting: primary value from 1 A to 10 kA<br>measurement from 0.05 to 24 $I_n$<br>display of primary current from 0 to 65 kA   |
| <ul style="list-style-type: none"> <li>Recommended CTs</li> </ul>   | 5VA 5P20  |
| <ul style="list-style-type: none"> <li>Earth current CT</li> </ul>  | $I_{n0}$ 1 or 5 A<br>burden at $I_{n0} < 0.5$ VA<br>Continuous rating 1 $I_{n0}$ , short duration withstand 40 $I_{n0}$ / 1s<br>measurement from 0.005 to 2.4 $I_{n0}$<br>display of primary current from 0 to 6.5 kA   |
| <ul style="list-style-type: none"> <li>Earth current from Ring CT 100/1 or Ring CT 1500/1 and BA800</li> </ul>  | measurement from 0.1 to 48 A primary  |
| <ul style="list-style-type: none"> <li>Frequency (50Hz or 60Hz)</li> </ul>  | measurement: 45 to 55 Hz or 55 to 65 Hz   |
| <b>Digital inputs (4)</b> <ul style="list-style-type: none"> <li>Polarizing voltage</li> <li>Level 0</li> <li>Level 1</li> <li>Operating of the input by level 1 or 0</li> <li>Burden</li> </ul>  | 20 to 70 Vdc for 19 to 70 V auxiliary supply range<br>37 to 140 Vdc for 85 to 255 V auxiliary supply range<br>< 10Vdc range 19 to 70 V – < 33 Vdc range 85 to 255 V<br>> 20Vdc range 19 to 70 V – > 37 Vdc range 85 to 255 V<br>programmable<br>< 15 mA   |
| <b>Output Relays (3 + 1 WD)</b> <ul style="list-style-type: none"> <li>Relays A, B:<br/>(signalling, Shunt Opening Release)</li> </ul>  | double contact NO, permanent current 8 A<br>closing capacity 12 A / 4 s<br>short circuit current withstand 100 A / 30 ms<br>breaking capacity DC with L/R = 40 ms: 50W<br>breaking capacity AC with $\cos \varphi = 0.4$ : 1,250 VA   |
| <ul style="list-style-type: none"> <li>Relays C &amp; WD:<br/>(control, WD : Watchdog)<br/>(C: programmable for CB Shunt<br/>Opening Release or Under Voltage Release)</li> </ul>   | changeover contact, permanent current 10 A<br>closing capacity 15 A / 4 s<br>short circuit current withstand 250 A / 30 ms<br>breaking capacity DC with L/R = 40 ms: 50W<br>breaking capacity AC with $\cos \varphi = 0.4$ : 1,250 VA   |
| <ul style="list-style-type: none"> <li>Relays pulse, except WD</li> </ul>   | adjustable from 100 to 500 ms   |
| <ul style="list-style-type: none"> <li>Assignment of name to the output maximum of 16 characters</li> </ul>   | by the setting software / capital letters or digits   |
| <b>Overcurrent function [51-1] [51-2] [50]</b> <ul style="list-style-type: none"> <li>Operating range <math>I&gt;</math> - <math>I&gt;&gt;</math> - <math>I&gt;&gt;&gt;</math></li> <li>Thresholds accuracy</li> <li>Reset percentage on the operating level</li> <li>Instantaneous operating time</li> <li>Definite time delay</li> <li>Accuracy of the time delays</li> <li>Curves [51-1] <math>I&gt;</math> - [51-2] <math>I&gt;&gt;</math></li> <li>Curves accuracy and type</li> </ul> | 0.3 to 24 $I_n$<br>1% typical, 2% max from 0.5 to 4 $I_n$<br>3% typical, 5% max from 0.3 to 0.5 $I_n$ and from 4 to 24 $I_n$<br>95%<br>60 ms including trip relay for $I \geq 2 I_s$<br>40 ms to 300 s: [51-1] $I>$ - [51-2] $I>>$ - [50] $I>>>$<br>$\pm 2\%$ or 20 ms<br>IEC 60255-3, ANSI IEEE<br>class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see functionalities   |
| <b>Earth fault function [51N] [50N]</b> <ul style="list-style-type: none"> <li>Operating range <math>I_{o&gt;}</math> - <math>I_{o&gt;&gt;}</math></li> <li>Thresholds accuracy</li> <li>Reset percentage on the operating level</li> <li>Instantaneous operating time</li> <li>Definite time delay</li> <li>Accuracy of the time delays</li> <li>Curves [51N] <math>I_{o&gt;}</math></li> <li>Curves accuracy and type</li> </ul>  | 0.03 to 2.4 $I_{n0}$ / CT - 0.6 to 48 A / ring CT<br>1% typical, 2% max from 0.05 to 0.4 $I_{n0}$ / CT<br>3% typ., 5% max from 0.03 to 0.05 $I_{n0}$ and 0.4 to 2.4 $I_{n0}$ / CT<br>5% from 0.6 to 48 A / ring CT<br>95%<br>60 ms including trip for $I \geq 2 I_s$<br>40 ms to 300 s: [51N] $I_{o>}$ [50N] $I_{o>>}$<br>$\pm 2\%$ or 20 ms<br>IEC 60255-3, ANSI IEEE<br>class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see functionalities |

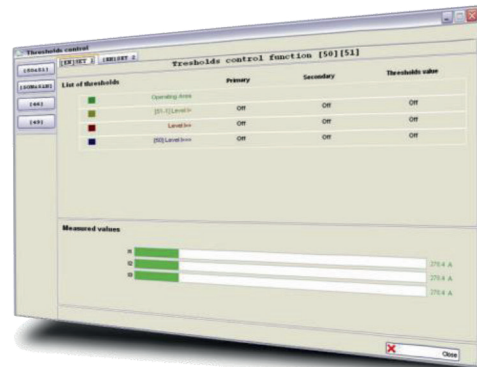
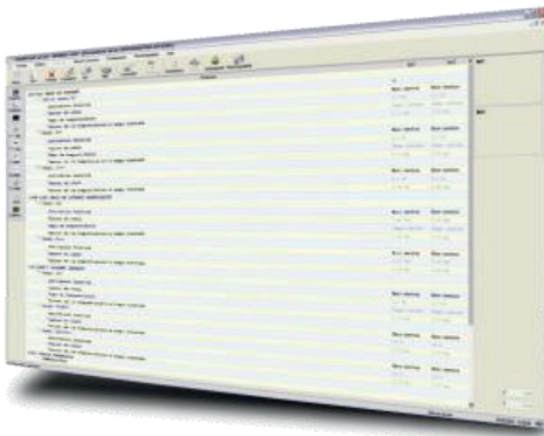
## GENERAL CHARACTERISTICS

|  |   |
|--|---|
| <b>Transformer thermal overload function [49]</b> <ul style="list-style-type: none"> <li>• Tripping curves</li> <li>• Heating-time constant <math>C_{TE}</math></li> <li>• Cooling time constant</li> <li>• Negative sequence factor</li> <li>• Closing factor <math>F_0</math></li> <li>• Thermal trip threshold <math>I_b</math></li> <li>• Thermal alarm threshold</li> <li>• Reclosing thermal threshold inhibition</li> </ul> | IEC 60255-8<br>4 to 180 min, class 5<br>1 to 6.0 $C_{TE}$ , in step of 0.1<br>0 to 9<br>50 to 100% $C_{TE}$<br>40 to 130 % $I_n$ , class 5<br>80 to 100 % $\emptyset$ thermal, class 5<br>40 to 100 % $\emptyset$ thermal, class 5                    |
| <b>Cable thermal overload function [49]</b> <ul style="list-style-type: none"> <li>• Tripping curves</li> <li>• Heating-time constant <math>C_{TE}</math></li> <li>• Thermal alarm threshold</li> <li>• Thermal trip threshold <math>I_b</math></li> </ul>   | IEC 60255-8<br>4 to 180 min, class 5<br>80 to 100 % $\emptyset$ thermal, class 5<br>40 to 130 % $I_n$ , class 5   |
| <b>Negative phase sequence overcurrent function [46]</b> <ul style="list-style-type: none"> <li>• Threshold Ineg: <math>I2&gt;</math></li> <li>• Instantaneous operating time</li> <li>• Definite time delay</li> <li>• Accuracy of the time delay</li> <li>• Curves</li> <li>• Curves accuracy and type</li> </ul>  | 0.1 to 2.4 $I_n$ , accuracy 5% for $I_{ph} > 0.3 I_n$<br>60 ms including trip relay for $I \geq 2 I_s$<br>40 ms to 300 s<br>$\pm 2\%$ or 20 ms<br>IEC 60255-3, ANSI IEEE<br>class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see functionalities |
| <b>Broken conductor function [46BC]</b> <ul style="list-style-type: none"> <li>• Threshold Ineg/<math>I_{pos}</math>: <math>I2/I1&gt;</math> - <math>I2/I1&gt;&gt;</math></li> <li>• Accuracy</li> <li>• Definite time delay</li> <li>• Accuracy of the time delays</li> </ul>   | 10 to 250%<br>$\pm 5\%$<br>40 ms to 300s<br>$\pm 2\%$ or 20 ms  |
| <b>Trip circuit supervision and breaker failure [74TC] [50BF] [50N_BF]</b> <ul style="list-style-type: none"> <li>• Trip circuit supervision [74TC]</li> <li>• Operating time (in faulty condition)</li> <li>• Failure threshold [50BF]</li> <li>• Failure threshold [50N_BF]</li> <li>• Breaker failure time delay</li> </ul>   | requires one or two digital inputs (see application guide)<br>500 ms fixed for [74TC] function<br>5% to 30 % $I_n$ , step of 1 $I_n$<br>0.5% to 3% $I_{n0}$ , step of 0.1 $I_{n0}$<br>60 to 1000 ms, step of 10 ms                                    |
| <b>Latching of the output contacts [86]</b> <ul style="list-style-type: none"> <li>• Manual reset for output relays</li> <li>• Reset</li> </ul>  | A, B, C (programmable assignment)<br>digital input, digital communication or local MMI  |
| <b>Load reclosing function</b> <ul style="list-style-type: none"> <li>• Application</li> <li>• Operating principle</li> <li>• Ratio « K » of reclosing time</li> <li>• Accuracy</li> <li>• Reclosing time</li> </ul>   | threshold adjustment [50] [51] [50N] [51N] [46] [46BC]<br>function activation by digital input<br>50 à 200%<br>$\pm 5\%$<br>40 ms to 300s, $\pm 2\%$ or 20 ms   |
| <b>Logical selectivity</b> <ul style="list-style-type: none"> <li>• Application on radial network</li> <li>• Operating principle</li> <li>• Additional time delay [51] [51N]</li> <li>• Additional time delay [50] [50N]</li> <li>• Operating mode of digital input</li> </ul>   | number of relays too important to allow the use of time co-ordination<br>additional time added to the functions [50] [51] [50N] [51N]<br>60 ms to 120s, $\pm 2\%$ or 20 ms<br>60 ms to 3s, $\pm 2\%$ or 20 ms<br>negative or positive true-data mode  |
| <b>Digital inputs assignment</b> <ul style="list-style-type: none"> <li>• By setting software</li> <li>• Setting table selection</li> <li>• Disturbance recording order</li> <li>• Logical selectivity</li> <li>• Interlock o/o</li> <li>• Interlock c/o</li> <li>• Control mode</li> <li>• Reclosing mode</li> <li>• Reset [86] function</li> <li>• Trip circuit supervision</li> <li>• CB trip external order</li> </ul>         | set 1 – set 2<br><br>dedicated to remote control, local / remote<br><br>acknowledgment of the selected output(s)<br>[74TC] function<br>function [74TC] blocked if external trip order   |

## GENERAL CHARACTERISTICS

|   |  |
|---|--|
| <b>User programmable functions (digital inputs – digital outputs)</b> <ul style="list-style-type: none"> <li>• Status of the function</li> <li>• Tripping mode or report</li> <li>• Operating and release time delays</li> <li>• Assignment of name to the function, maximum of 14 characters</li> <li>• Assignment of one or more output relays (alarm or trip)</li> </ul> | in or out of service, by local MMI or by the setting software<br>report: for time stamping and event recorder<br>tripping mode: 40 ms to 300 s<br>by the setting software<br>by local MMI or by the setting software A, B, C |
| <b>Counters</b> <ul style="list-style-type: none"> <li>• Cumulative breaking current</li> <li>• Operation number of circuit breaker</li> </ul>  | maximum 64.10 <sup>6</sup> kA <sup>2</sup> (phase 1, 2 and 3)<br>0 to 10,000   |
| <b>Load shedding – Load Restoration, remote control</b> <ul style="list-style-type: none"> <li>• Load shedding level</li> <li>• Time delay before reclosing</li> <li>• Reclosing pulse</li> <li>• Output relays assigned</li> </ul>   | 1 to 6<br>1 to 120 s, ± 2%<br>100 to 500 ms (remote control)<br>programmable by local MMI or by setting software A, B, C   |
| <b>Digital outputs assignment</b> <ul style="list-style-type: none"> <li>• By local MMI or by setting software</li> </ul>   |  |
| <b>Signalling LEDs assignment</b> <ul style="list-style-type: none"> <li>• By setting software</li> </ul>   |  |
| <b>Man Machine Interface</b> <ul style="list-style-type: none"> <li>• Relay display<br/>Language</li> <li>• Configuration and operating software<br/>Language</li> </ul>  | 2 lines of 16 characters<br>French, English, Spanish, Italian<br>Windows® 2000, XP, Vista and 7 compatible<br>French, English, Spanish, Italian  |
| <b>MODBUS® Communication (option)</b> <ul style="list-style-type: none"> <li>• Transmission</li> <li>• Interface</li> <li>• Transmission speed</li> </ul>   | asynchronous series, 2 wires<br>RS485<br>300 to 115,200 bauds  |
| <b>Disturbance recording</b> <ul style="list-style-type: none"> <li>• Number of recordings</li> <li>• Total duration</li> <li>• Pre fault time</li> </ul>   | 4<br>52 periods per recording<br>adjustable from 0 to 52 cycles  |
| <b>Presentation</b> <ul style="list-style-type: none"> <li>• Height</li> <li>• Width</li> <li>• Brackets 19" rack mounting</li> </ul>   | 4U<br>case R2<br>see diagram 9954 (7000 series rack definition table)  |
| <b>Case (see drawing D40037)</b> <ul style="list-style-type: none"> <li>• <b>EDPAR</b><br/>H, W, D (case &amp; base)<br/>H, W (front face dimensions)</li> <li>• <b>SDPAR</b><br/>H, W, D (case &amp; base)<br/>H, W (front face dimensions)</li> <li>• Weight</li> </ul>   | 172 x 83 x 222 mm<br>217 x 98 mm<br><br>172 x 83 x 227 mm<br>172 x 83 mm<br>3.5 kg   |
| <b>Connection - codification</b> <ul style="list-style-type: none"> <li>• NPI800R</li> <li>• Ring CT</li> <li>• BA800</li> </ul>  | See diagram S39962<br>See diagram 142941<br>See diagram 38766  |

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



- User friendly
- Diagnosis
- Fault analysis
- Maintenance tools

## FUNCTIONALITIES

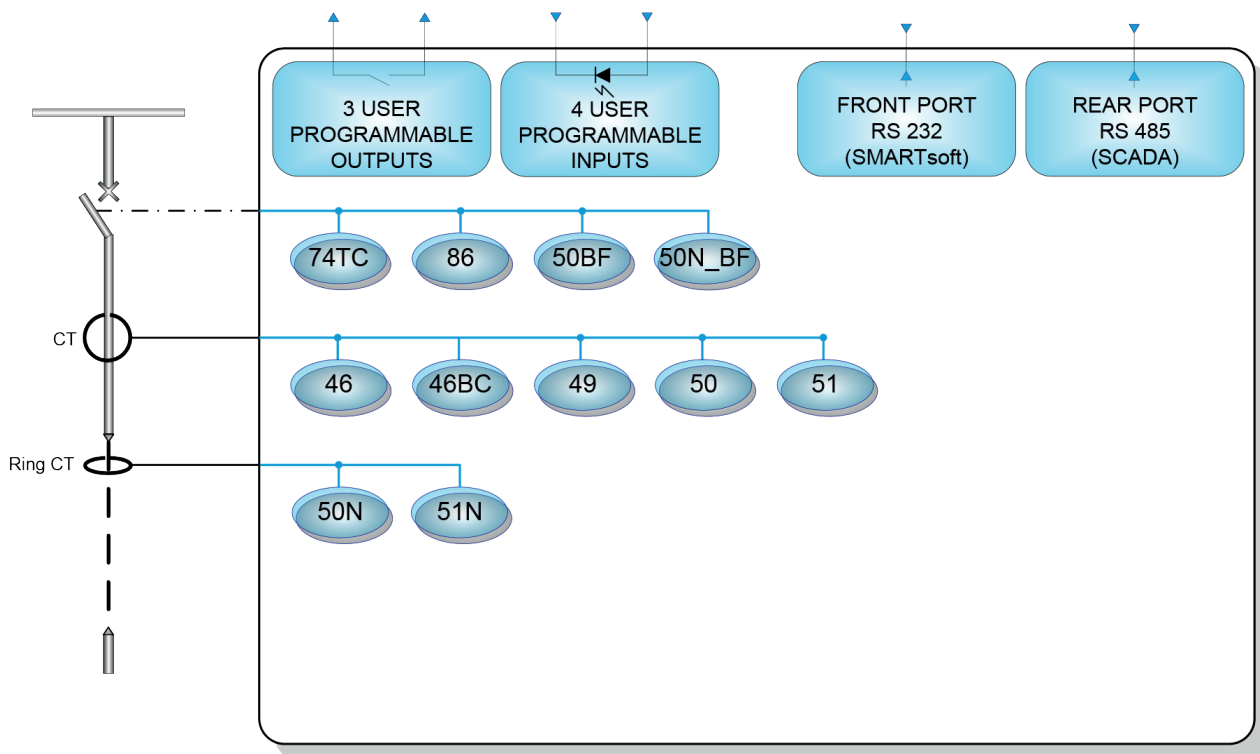
- 2 ranges of auxiliary supply
- Storage of the lack and the restoration of the auxiliary voltage (time stamped events)
- Configuration and parameter setting by local MMI or off-line / on-line PC
- Measurement of electrical quantities: Display expressed in primary values  
Instantaneous, integrated and 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
- 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
- CB Monitoring: interlocks discrepancy, local or remote control of closing / tripping
- Circuit breaker maintenance
- Counters of operation number and cut-off amperes<sup>2</sup> 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
- 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.

