# RETROFITTING

## Power and Volatge Protection Relay

# NPW800R

Protection & Control ice

NPW800R (R3 case) is dedicated to the refurbishment of CEE WTG 7000 relays (R3 case) providing the measurement of apparent (S), active (P) and reactive (Q) powers of electrical networks. The monitoring of the energy flow direction of this numerical and multi-function relay is completed by the management of power factor, of tangent φ and by the supervision of network voltage and frequency.

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**).

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


**NPW800R - EDPAR**

- Minimises retrofitting man-hours
- Maximises preservation of existing installation
- Simplifies and reduces re-commissioning time
- Minimises retrofitting costs

### Protection functions

- Maximum of active power with 2 thresholds* **[32P]**
- Minimum of active power with 2 thresholds* **[37P]**
- Max of reactive power with 2 thresholds* **[32Q]**
- Min of reactive power with 2 thresholds* **[37Q]**
- Overvoltage with 3 thresholds **[59]**
- Undervoltage with 3 thresholds **[27]**
- Overfrequency with 4 thresholds **[81O]**
- Underfrequency with 4 thresholds **[81U]**
- Max of zero sequence voltage with 2 thresholds **[59N]**

### Additional functions

- Management of the network power factor with 2 thresholds* **[55]**
- Management of the network tangent φ with 2 thresholds* **[Q/P]**
- Max of Active **ΣP** and reactive **ΣQ** integrated power with 2 thresholds*
- Latching of the output contacts **[86]**
- Trip circuit supervision of the breaker **[74TC]**
- Breaker failure **[BF]**
- Load shedding – Load Restoration, remote control

*operating mode: user configurable see characteristics

# CHARACTERISTICS NPW800R

## Auxiliary Supply

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

## Analogue Inputs

| | |
|---|---|
| • Phase current inputs | In: 1 or 5A<br>burden at In < 0.2 VA<br>continuous rating 3 In, short duration withstand 80 In / 1 s<br>CT setting: primary value from 1 A to 10 kA<br>measurement from 0.01 to 18 In<br>display of primary current from 0 to 65 kA |
| • Recommended CTs | 5VA 5P10 |
| • Phase voltage inputs | Un: 33 to 120 V<br>input impedance > 80 KΩ<br>continuous rating 240 V, short duration withstand 275V - 1 min<br>measurement from 1 to 240 V<br>VT setting: primary value from 220 V to 250 kV |
| • Frequency (50Hz or 60Hz) | measurement: 45-55 Hz or 55-65 Hz |

## Digital Inputs (8)

| | |
|---|---|
| • Polarizing voltage | 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 |
| • 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 |
| • Operating of the input by level 1 or 0 | programmable |
| • Burden | < 15 mA |

## Outputs Relays (7 + 1 WD)

| | |
|---|---|
| • Relays A, B, E, F :<br>(signalling, Shunt Opening Release) | 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 φ = 0.4 : 1250 VA |
| • Relays C, D, G & WD :<br>(control, WD : Watchdog)<br>(C, D, G: programmable for CB Shunt Opening Release or Under Voltage Release) | 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 φ = 0.4: 1250 VA |
| • Relays pulse, except WD | adjustable from 100 to 500 ms |
| • Assignment of name to the output<br>maximum of 16 characters | by the setting software<br>capital letters or digits |

## Power functions [32P] [32Q] [37P] [37Q] [55] – tg φ [Q/P] – ΣP and ΣQ

| | |
|---|---|
| • Measurement method | 2 wattmeter or 3 wattmeter as an alternative |
| • Operation of P-Q thresholds [32P] [32Q] [37P] [37Q] | 3 programmable modes for the power flow:<br>export / import / export and import |
| • P> - P>> and P< - P<< operating range | 1 to 120 % of Sn |
| • Q> - Q>> and Q< - Q<< operating range | 1 to 120 % of Sn |
| • P-Q thresholds accuracy | 0.5% of Sn, Blocking of the [37] thresholds 0.5% of Sn |
| • Reset percentage on the operating level | 95% for P> and Q>, 105% for P< and Q< |
| • Operation of PF thresholds [55] | 3 programmable modes: lead / lag / lead-lag |
| • PF< - PF<< operating range | 0.1 to 0.99 |
| • Reset percentage on the operating level | PF< - PF<<: adjustable from 0.1 to 0.99 |
| • Operation of tg φ thresholds [Q/P] | 6° < φ < 84.28° |
| • tg φ> - tg φ>> operating range | 0.1 to 9.99 |
| • Reset percentage on the operating level | tg φ> - tg φ>>: adjustable from 0.1 to 9.99 |
| • Maximum of integrated power ΣP> and ΣQ><br>Integrated period | 3 programmable modes for the power flow:<br>export / import / export and import<br>5 to 60 min, step of 1 min (common value for the integrated measures) |
| • ΣP> and ΣQ> thresholds | 1 to 120 % of Sn |
| • ΣP> and ΣQ> thresholds accuracy | 0.5% of Sn |
| • Reset percentage on the operating level | ΣP> and ΣQ>: 95% |
| • Instantaneous operating time | 60 ms including trip relay |
| • Definite time delay | 40 ms to 300 s : [32P] [32Q] [37P] [55] tg φ [Q/P] ΣP ΣQ |
| • Accuracy of the time delays | ± 2% or 20 ms |
| • Operating curves [32P] [32Q] [37P] [37Q] | according to IEC 60255-3, ANSI IEEE |
| • Curves accuracy and type | class 5 – Time Multiplier Setting: 0.03 to 3 s, type : see Functionalities |
| • Accuracy of displayed measures | 3% of Sn |

# CHARACTERISTICS NPW800R

## Phase voltage functions [59] [27]

| | |
|---|---|
| • Operating mode | function « Or » or « And » programmable |
| • Measurement method | phase to phase voltage for the 2 wattmeter method<br>phase to neutral voltage for the 3 wattmeter method |
| • Overvoltage operating range [59] | 40 to 200 % Un |
| • Thresholds accuracy | 2% from 40% to 150% Un – 3% over 150% Un |
| • Reset percentage on the operating level | 97% |
| • Undervoltage operating range [27] | 5 to 120 % Un |
| • Thresholds accuracy | 2% |
| • Reset percentage on the operating level | 103% |
| • Blocking of the [27] thresholds | 10% of Un, programmable: in or out of service |
| • Definite time delay | 40 ms to 300 s |
| • Accuracy of the time delays | ± 2% or 20 ms |
| • Operating curves | according to IEC 60255-3, ANSI IEEE |
| • Curves accuracy and type | class 5 – Time Multiplier Setting: 0.03 to 3 s, type : see Functionalities |
| • Instantaneous operating time | 60 ms including trip relay |
| • Accuracy of displayed measures | 3% from 3 to 240 V |

## Zero sequence voltage functions [59N]

| | |
|---|---|
| • Measurement method | zero sequence voltage calculated |
| • Operating range | 2 to 80 % Un (3W) or Un/√3 (2W) |
| • Thresholds accuracy | 2% of Un |
| • Reset percentage on the operating level | 97% |
| • Instantaneous operating time | 60 ms including trip relay |
| • Definite time delay | 40 ms to 300 s |
| • Accuracy of the time delays | ± 2% or 20 ms |
| • Accuracy of displayed measures | 3% from 3 to 240 V |

## Frequency functions [81O] [81U]

| | |
|---|---|
| • Operating range | 46 – 49.95 Hz / 50.05 – 54 Hz or 56 – 59.95 Hz / 60.05 – 64 Hz |
| • Thresholds accuracy | ± 0.1 Hz |
| • Reset percentage on the operating level | 0.2 Hz |
| • Blocked for voltage | <10% of Un |
| • Instantaneous operating time | 80 ms typical including trip relay, 150 ms maximum |
| • Definite time delay | 80 ms to 10 s |
| • Accuracy of the time delays | ± 2% or 20 ms |
| • Accuracy of displayed measures | 0.1 Hz |

## Trip circuit supervision and breaker failure [74TC] [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 |
| • Fixed operating range [BF] | >0.5 % of In / >0.5% of In or >1% of Un |
| • Breaker failure time delay | 60 to 1000 ms |

## Latching of the output contacts [86]

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

## Digital inputs assignment

| | |
|---|---|
| • By the setting software | |
| • Settings table selection | set 1 – set 2 |
| • Disturbance record | |
| • Interlock o/o | dedicated to remote control, switching device position |
| • Interlock c/o | dedicated to remote control, switching device position |
| • Control mode | dedicated to remote control, local / remote |
| • Reset [86] function | acknowledgment of the selected output(s) |
| • Trip circuit supervision | [74TC] function |
| • CB external trip order | function [74TC] blocked if external trip order |
| • Blocking of the protection functions | |
| • Blocking of the time delays | (time delay cancel, function acts instantaneously) |
| • Programmable function | |

## 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, maximum of 14 characters to the function | by the setting software |
| • Assignment of one or more output relays (alarm or trip) | by local MMI or by the setting software<br>A, B, C, D, E, F, G |

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## Load shedding – Load Restoration, remote control

| | |
|---|---|
| • Load shedding level | 1 to 6 |
| • Time delay before reclosing | 1 a 120 s, ± 2% |
| • Reclosing pulse | 100 to 500 ms (remote control) |
| • Output relays assigned | programmable by local MMI or by the setting software<br>A, B, C, D, E, F, G |

## Digital output assignment

- By local MMI or by the setting software

## Signalling LEDs assignment

- By the setting software

## Counters

| | |
|---|---|
| • Energy | E. Active +, E. Active -, E. Reactive +, E. Reactive – |
| • Cumulative breaking current | maximum $64.10^6$ kA² (phase 1,2 and 3) |
| • Operation number circuit breaker | 0 to 10 000 |

## 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 NPW800R

## Presentation

| | |
|---|---|
| • Height | 4U |
| • Width | case R3 |
| • Brackets 19” rack mounting | see drawing 9954 (7000 series rack definition table) |

## Case (see drawing D40037)

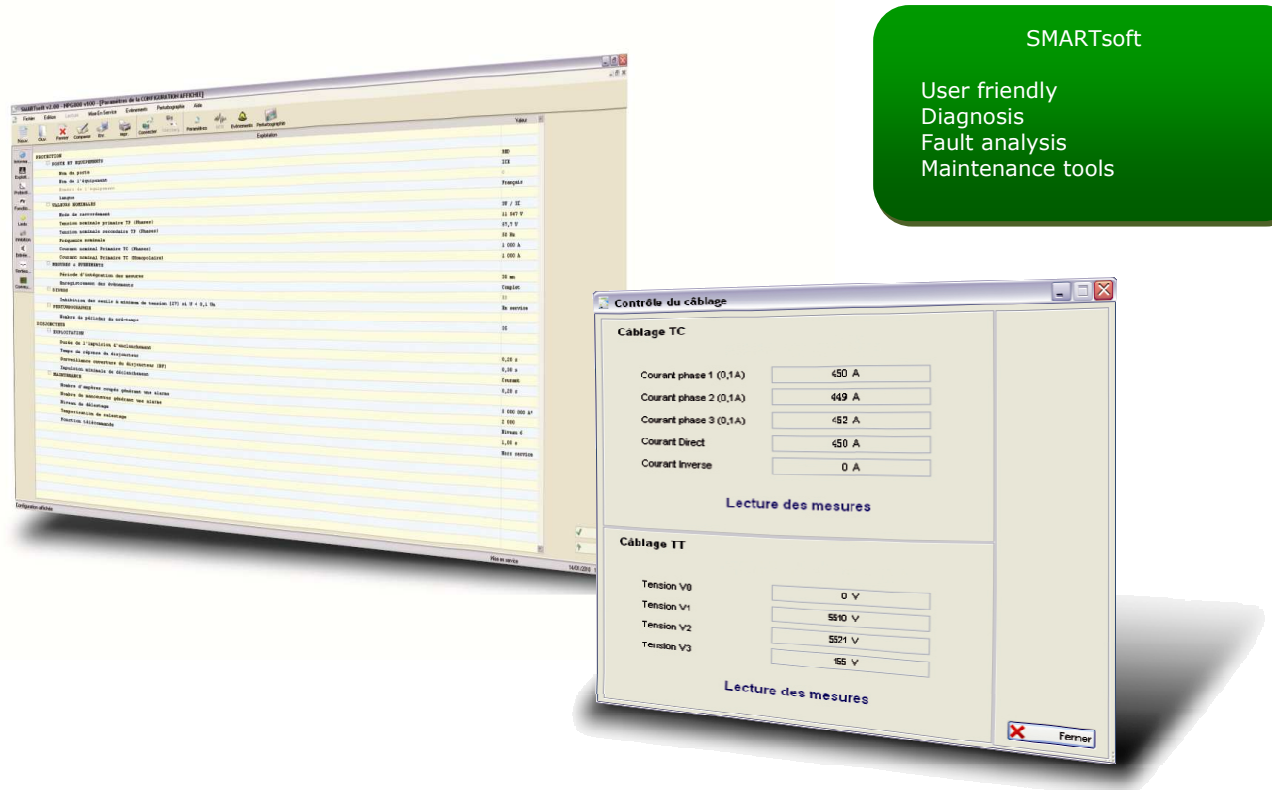
| | |
|---|---|
| • **EDPAR** | |
| H, W, D (case & base) | 172 x 125 x 222 mm |
| H, W (front face dimensions) | 217 x 140 mm |
| • **SDPAR** | |
| H, W, D (case & base) | 172 x 140 x 227 mm |
| H, W (front face dimensions) | 172 x 140 mm |
| • Weight | 4.5 kg |

## Connection - codification

| | |
|---|---|
| • NPW800R | See diagram S39970 |

## SMARTsoft

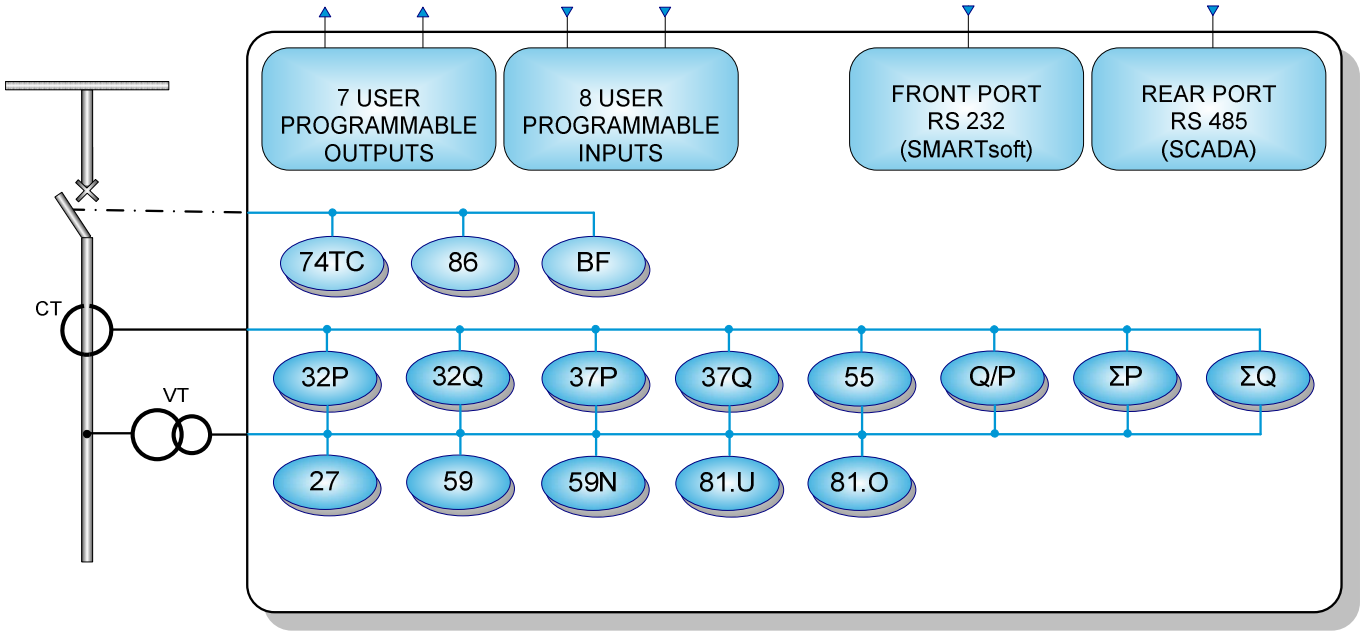
SMARTsoft, integrated software for the Industry, Railway and Transmission ranges, helps the User get the best from NP800R series relays.



## Functionalities

- 2 ranges of auxiliary supply
- Storage of the lack and the restoration of the auxiliary voltage (events recorded)
- Configuration and parameter setting by local MMI or off-line / on-line PC
- Measurement of electrical quantities:
  Display expressed in primary values
  Instantaneous and integrated values of phase currents and S, P, Q power
  Values, according to the wiring, phase to phase or phase to neutral and the residual voltage
  Frequency
  Power factor, Cosφ
  Instantaneous value of tangent φ
- Instantaneous alarm threshold
- Definite time tripping
- Dependent time tripping according to inverse/very inverse/extremely inverse IEC 60255-3 curves
- Tripping according to RI inverse curve (electromechanical)
- Tripping according to moderately inverse/very inverse/extremely inverse ANSI /IEEE curves
- 2 setting groups, locally or remotely selectable by a digital input or by the communication channel
- Energy metering : storage values / hour
- CB Monitoring : interlocks discrepancy, local or remote control of closing / tripping
- Remote control by the 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 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 auxiliary supply
- Local / remote events acknowledgment
- Disturbance recording according to Comtrade® format: storage of four 52 periods recordings
- Disturbance recording initiated by digital input, setting software or communication network
- Remote setting, remote reading of measurements, counters, alarms and parameters 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 and failure
- Test of wiring, phase rotation and direction of the current.

## Functional diagram



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