

GENERATION & NETWORK

Voltage and Frequency Relay

NPU800

NPU800 provides the voltage and frequency monitoring of electrical networks. This multi-function relay supervises phase to phase and phase to earth faults, positive, negative and zero sequence voltage and the good operating of the circuit breaker and its trip circuit. With its numerous under and over voltage and frequency thresholds, NPU800 is intended for network supervision, load management and load-shedding.

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

- Undervoltage with 4 thresholds [27]
- Positive sequence voltage drops with 3 thresholds [27P]
- Max of negative sequence voltage with 2 thresholds [47]
- Overvoltage with 2 thresholds [59]
- Max of zero sequence voltage with 2 thresholds [59N]
- Overfrequency with 4 thresholds [81O]
- Underfrequency with 4 thresholds [81U]

Additional functions

- Latching of the output contacts [86]
- Trip circuit supervision of the breaker [74TC]



CEE Relays Ltd

CHARACTERISTICS NPU800

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

Connection modes

- 1, 2 or 3 phase to neutral voltages
- 1, 2 or 3 phase to phase voltages
- Zero sequence voltage measured if connection mode 1 or 2 voltage(s)

Analogue inputs

- VT nominal value Un: 33 to 120 V
input impedance > 80 k Ω
Continuous rating 240 V, short duration withstand 275V - 1 min
measurement from 1 to 240 V
VT setting: primary value from 220 V to 250 kV
measurement: 45 to 55 Hz or 55 to 65 Hz
- Frequency (50Hz or 60Hz)

Digital inputs 4 or 8 according option

- Polarizing voltage 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
- Level 0
- Level 1
- Operating of the input by level 1 or 0
- Burden

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

Undervoltage [27]

- Operating mode function « Or » or « And » programmable
- Measurement method phase to neutral or phase to phase, according to wiring
- Setting of thresholds 5 à 120 % Un
U< - U<< - U<<< - U<<<<
- Reset percentage on the operating level 103%
- Thresholds accuracy 2%
- Definite time delays 40 ms to 300 s
- Tripping curves CEI 60255-4, ANSI IEEE
- Accuracy and type of curves class 5 - Time Multiplier Setting: 0,03 à 3 s, type see
Functionalities
- Instantaneous operating time 60 ms including trip relay
- Blocking of the thresholds 10% Un, programmable: in or out of service (If the blocking is
activated, the minimum setting of the thresholds is 20% Un)
5% from 3 to 240 V
- Display accuracy
Note: the functions [27] and [27P] cannot be used simultaneously

Positive sequence voltage drops [27P]

- Measurement method positive voltage calculated with 3 phase connection mode
- Setting of thresholds 5 to 120 % Un
Ud<- Ud<< - Ud<<<
- Reset percentage on the operating level 103%
- Definite time delay 40 ms to 300 s
- Time delays accuracy \pm 2% or 20 ms
- Instantaneous operating time 60 ms including trip relay
- Blocking of the thresholds 10% Un, programmable: in or out of service (If the blocking is
activated, the minimum setting of the thresholds is 20% Un)
5% from 3 to 240 V
- Display accuracy
Note: the functions [27] and [27P] cannot be used simultaneously

CHARACTERISTICS NPU800

Max of negative sequence voltage [47]

- Measurement method negative voltage calculated with 3 phase connection mode
- Setting of thresholds $U_{neg>} - U_{neg>>}$ 3 to 30 % U_n
- Thresholds accuracy 5% U_n
- Reset percentage on the operating level 94%
- Definite time delays 40 ms to 300 s
- Time delays accuracy $\pm 2\%$ or 20 ms
- Instantaneous operating time 60 ms including trip for $U \geq 2 U_s$
- Accuracy of displayed measures 3% from 3 to 240 V

Overvoltage function [59]

- Operating mode function « Or » or « And » programmable
- Measurement method phase-neutral voltages or phase-phase voltages, according to wiring
- Setting of thresholds $U> - U>>$ 40 to 200 % U_n
- Reset percentage on the operating level 97%
- Thresholds accuracy 2% from 40% to 150% U_n – 3% above 150% U_n
- Definite time delays 40 ms to 300 s
- Accuracy of the time delays $\pm 2\%$ or 20 ms
- Operating curves IEC 60255-3, ANSI IEEE and factory programmable (consult us)
- Curves accuracy class 5 - Time Multiplier Setting: 0.03 to 3 s
- Instantaneous operating time 60 ms including trip relay
- Accuracy of displayed measures 3% from 3 to 240 V

Max of zero sequence voltage [59N]

- Measurement method (according wiring) calculated: 3 phase and neutral connection
measured: with 1 neutral point VT or 3 VT with broken delta
(with V1 or U12 connected)
- Setting of thresholds $V_o> - V_o>>$ 2 to 80 % U_n
- Thresholds accuracy 2% of U_n
- Reset percentage on the operating level 97%
- Instantaneous operating time 60 ms including trip relay $V_o \geq 2 V_s$
- Definite time delays 40 ms to 300 s
- Accuracy of the time delays $\pm 2\%$ or 20 ms
- Accuracy of displayed measures 3% from 3 to 240 V

Frequency functions [810] [81U]

- Setting of the 4 thresholds $F> \dots F>>>>$ 50.05 – 54.00 Hz / 60.05 – 64.00 Hz
- Setting of the 4 thresholds $F> \dots F>>>>$ 46.00 – 49.95 Hz / 56.00 – 59.95 Hz
- Thresholds accuracy ± 0.1 Hz
- Reset value on the operating level 0.2 Hz
- Voltage inhibition threshold 10% of U_n
- Instantaneous operating time 80 ms typical including trip relay, 150 ms maximum
- Adjustment of time delays 80 ms to 10 s
- Accuracy of the time delays $\pm 2\%$ or 20 ms
- Accuracy of displayed measures 0.1 Hz

Trip circuit supervision of the breaker [74TC]

- Trip circuit supervision requires four digital inputs (see application guide)
- Operating time (in faulty condition) 500 ms fixed

Latching of the output contacts [86]

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

Digital inputs assignment

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

CHARACTERISTICS NPU800

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

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: 1.2/50 μ s)
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 M Ω
- 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 NPU800

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 connector
- Weight

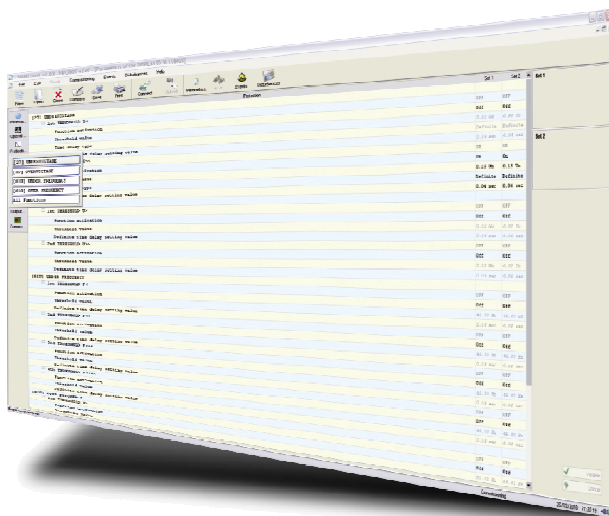
173 x 106,3 x 250 mm (see drawing D37739)
 3.6 kg

Connection - codification

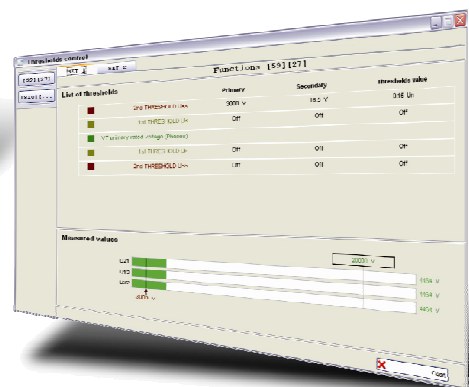
- See diagram S38025

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 to neutral voltages V or phase to phase voltages U
Positive and negative sequence voltage (according wiring)
Frequency
Residual voltage and maximum value
- Instantaneous voltage alarm threshold
- Instantaneous frequency alarm threshold
- Definite time tripping for undervoltage and overvoltage thresholds
- Definite time tripping for undervoltage and overvoltage thresholds inverse/very inverse/extremely inverse time according to IEC inverse/very inverse/extremely inverse time according to ANSI /IEEE
- Definite time tripping for positive sequence voltage drop thresholds
- Tripping on frequency thresholds: programmable definite time
- 2 setting groups, locally or remotely selectable
- CB Monitoring: interlocks discrepancy, local or remote control of reclosing / tripping
- 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 logical states of digital I/O, of measures, of faulty phase (phase to neutral voltages only), of current setting group
- Local / remote events acknowledgment
- Disturbance recording according to Comtrade® format: storage of 4 recordings of 52 periods
- Disturbance recording forced by digital input, setting software or communication channel
- 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 failure
- Test of wiring, phase order

Options

- Communication by Modbus® - (IEC 60870-5-103 protocol: consult us)
- Additional card with 4 assignable output relays and 4 assignable digital inputs

Functional diagram

