

GENERATION & NETWORK

Earth Fault Overcurrent Relay with or without Directional criteria

NPIHD800

NPIHD800 provides the earth fault overcurrent protection for medium and high voltage electrical networks. This multi-function and directional relay supervises phase to earth short-circuits and the good operating of the circuit breaker and its trip circuits.

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.



Multifonction

Measurement

Recording / event log

Disturbance recording

Local MMI

Protection functions

- Earth fault with 2 thresholds **[51N]** **[50N]**
- Earth directional **[67N]**
- Load reclosing function
- Logical selectivity

Additional functions

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

CHARACTERISTICS NPIHD800

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

- Earth current CT

I_{n0} 1 or 5 A
measurement from 0.005 to 2.4 I_{n0}
burden at $I_{n0} < 0.5$ VA
continuous rating 1 I_{n0} , short duration withstand 40 I_{n0} / 1s
CT setting: primary value from 1 A to 10 kA
display of primary current from 0 to 6.5 kA
5VA 5P20
measurement from 0.1 to 48 A primary

- Recommended CTs
- Earth current from Ring CT 100/1 or Ring CT 1500/1 and BA800
- VT nominal value

U_n : 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

- 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 $\cos \varphi = 0.4$: 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 $\cos \varphi = 0.4$: 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

Earth fault function [51N] [50N]

- Operating range $I_{o>} - I_{o>>}$
- Thresholds accuracy

0.03 to 2.4 I_{n0} / CT - 0.6 to 48 A / ring CT
1% typical, 2% max from 0.05 to 0.4 I_{n0} / CT
3% typ., 5% max from 0.03 to 0.05 I_{n0} and 0.4 to 2.4 I_{n0} / CT
5% from 0.6 to 48 A / ring CT
95%
60 ms including trip for $I \geq 2 I_s$
40 ms to 300 s: [51N] $I_{o>}$ [50N] $I_{o>>}$
 $\pm 2\%$ 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

- Reset percentage on the operating level
- Instantaneous operating time
- Definite time delay
- Accuracy of time delays
- Curves [51N] $I_{o>}$
- Curves accuracy and type

Earth directional function [67N]

- Operating principle
- Measurement of residual voltage V_r
- Polarization threshold
- Operating mode according to the
polarization voltage
- Angle measurement V_p/I_o
- Setting of characteristic angle α
- Inhibition of the function

assignment of a directional criteria to the functions [50N] [51N]
measured or calculated, to be defined at the order
3% to 20% U_n , step of 1 %, accuracy ± 5 % or 1 V
programmable: blocking or permission
(tripping by functions [50N] [51N])
-180° to + 180°, accuracy $\pm 5^\circ$
-180° to + 180°, step of 1°, accuracy $\pm 5^\circ$
programmable: yes or no ; by digital input or by the
communication

CHARACTERISTICS NPIHD800

Load reclosing function

- Application
- Operating principle
- Ratio « K » of reclosing time
- Accuracy
- Reclosing time

threshold adjustment [50N] [51N]
function activation by digital input
50 to 200%
± 5 %
40 ms to 300s, ± 2% or 20 ms

Latching of the output contacts [86]

- Latching of output relays
- Reset

A, B, C and with option: D, E, F, G (programmable assignment)
digital input, digital communication or local MMI

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

- Trip circuit supervision [74TC]
- Operating time (in faulty condition)
- Failure threshold [50N_BF]
- Breaker failure time delay

requires four digital inputs (see application guide)
500 ms fixed for [74TC] function
0.5% to 3% I_{n0} , step of 0.1 I_{n0}
60 to 1000 ms, step of 10 ms

Logical selectivity

- Application on radial network
- Operating principle
- Additional time delay [51N]
- Additional time delay [50N]
- Operating mode of digital inputs

number of relays too important to allow the use of time
co-ordination
additional time added to the functions [50N] [51N]
60 ms to 120s, ± 2% or 20 ms
60 ms to 3s, ± 2% or 20 ms
negative or positive true-data mode

Digital inputs assignment

- By setting software
- Setting table selection
- Disturbance recording order
- Logical selectivity
- Interlock o/o
- Interlock c/o
- Control mode
- Closing mode
- Reset [86] function
- Trip circuit supervision
- CB trip external order
- Input – output programmable functions

set 1 – set 2

dedicated to remote control, local / remote

acknowledgment of the selected output(s)
[74TC] function
function [74TC] blocked if external trip order

User programmable functions (digital inputs – digital outputs)

- Status of the function
- Tripping mode or report
- Operating and release time delays
- Assignment of name to the function, maximum of 14 characters
- Assignment of one or more output relays (alarm or trip)

in or out of service, by local MMI or by the setting software
report: for time stamping and event recorder
tripping mode: 40 ms to 300 s
by the setting software

by local MMI or by the setting software
A, B, C and with option: D, E, F, G

Counters

- Operation number of circuit breaker

0 to 10 000

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

- Load shedding level
- Time delay before reclosing
- Reclosing pulse
- Output relays assigned

1 to 6
1 to 120 s, ± 2%
100 to 500 ms (remote control)
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
Language
- Configuration and operating software
Language

2 lines of 16 characters
French, English, Spanish, Italian
Windows® 2000, XP, Vista and 7 compatible
French, English, Spanish, Italian

MODBUS® Communication (option)

- Transmission
- Interface
- Transmission speed

asynchronous series, 2 wires
RS 485
300 to 115 200 bauds

CHARACTERISTICS NPIHD800

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 to +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

Immunity – Conducted disturbances

- Immunity to RF conducted disturbances IEC / EN 61000-4-6: class III, 10 V
- Fast transients IEC / EN 60255-22-4 / IEC / EN 61000-4-4: class IV
- Oscillatory waves disturbance IEC / EN 60255-22-1: class III, 2.5 kV CM, 1 kV DM except RS485, class II, 1 kV CM
- Surge immunity IEC / EN 61000-4-5: class III
- Supply interruptions IEC / EN 60255-11: 100% 20 ms

Immunity – Radiated disturbances

- Immunity to RF radiated fields IEC / EN 60255-22-3 / IEC / EN 61000-4-3: class III, 10 V/m
- Electrostatic discharges IEC / EN 60255-22-2 / IEC / EN 61000-4-2: class III, 8 kV air / 6 kV contact
- Power frequency magnetic field immunity test IEC / EN 61000-4-8: class IV, 30 A/m continuous, 300 A/m 1 to 3 s

Mechanical robustness - energised

- Vibrations IEC / EN 60255-21-1: class 1 - 0.5g
- Shocks IEC / EN 60255-21-2: class 1 - 5g / 11 ms

Mechanical robustness - not energised

- Vibrations IEC / EN 60255-21-1: class 1 - 1g
- Shocks IEC / EN 60255-21-2: class 1 - 15g / 11 ms
- Bumps IEC / EN 60255-21-2: class 1 - 10g / 16 ms
- Free fall IEC / EN 60068-2-32: class 1 - 250 mm

Electromagnetic compatibility (EMC)

- Radiated field emissivity EN 55022: class A
- Conducted disturbance emissivity EN 55022: class A

Presentation

- Height 4U
- Width ¼ 19"
- Brackets 19" rack mounting option (see drawing D37739)

Case

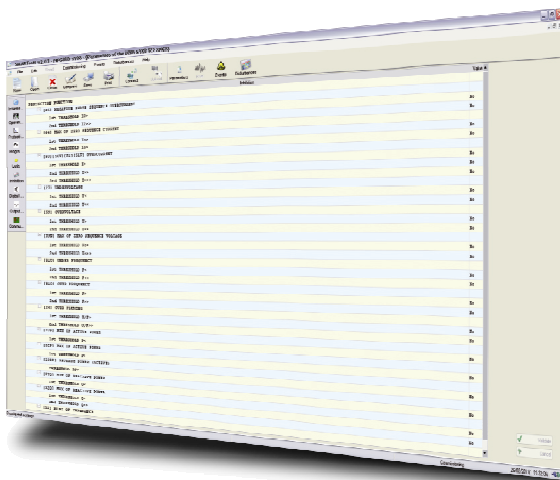
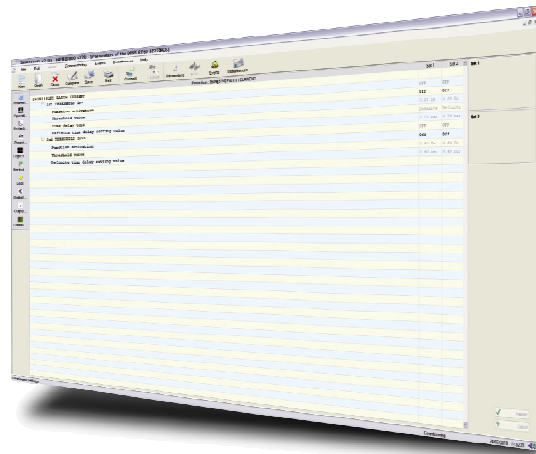
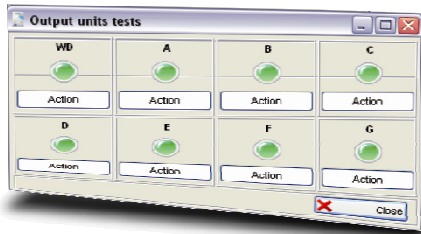
- H, W, D without short-circuiting device 173 x 106.3 x 250 mm (see drawing D37739)
- H, W, D with short-circuiting devices 173 x 106.3 x 305 mm (see drawing D37739)
- Weight 3.6 kg

Connection - codification

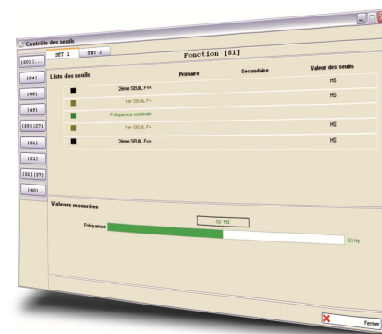
- See diagram S38022
- Ring CT See diagram 142941
- BA800 See diagram 38766

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 earth currents
Residual voltage value
- 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
- 2 setting groups, locally or remotely selectable
- CB Monitoring: interlocks discrepancy, local or remote control of closing / tripping
- Circuit breaker maintenance: counter of operation number, over operation alarm
- Monitoring of breaker failure by checking the disappearance of earth 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 forced 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

Options

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

Related equipment

- BA800 for ring CT 1500/1

Functional diagram

