ICE

PROTECTION

& CONTROL

COMMAND

NPI800

ICE Group

EE

TECHNIREL

PHASE and EARTH OVERCURRENT RELAY

NPI800 provides the three-phase and earth fault overcurrent protection for medium and high voltage electrical networks. This multi-function relay supervises phase to phase and phase to earth faults, negative sequence currents, thermal state of the protected device and the good operating of the circuit breaker and its trip circuit.

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

- 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 (communication option)

Option (NPIR800)

- Recloser 1 fast cycle and 3 slow cycles **[79]**

CHARACTERISTICS NPI800

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 CT	In 1 or 5 A burden at In < 0.2 VA Continuous rating 3 In, short duration withstand 100 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
• Recommended CTs	5VA 5P20
• Earth current CT	In_0 1 or 5 A burden at In_0 < 0.5 VA Continuous rating 1 In_0, short duration withstand 40 In_0 / 1s measurement from 0.005 to 2.4 In_0 display of primary current from 0 to 6.5 kA
• Earth current from Ring CT 100/1 or Ring CT 1500/1 and BA800	measurement from 0.1 to 48 A primary
• Frequency (50Hz or 60Hz)	measurement: 45 to 55 Hz or 55 to 65 Hz

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
• 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

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
• Relays C*, D, G et WD: (control, WD: Watchdog) (C, D, G: programmable for CB Shunt Opening Release or Under Voltage Release)	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
• Relays pulse, except WD	adjustable from 100 to 500 ms
• Assignment of name to the output maximum of 16 characters	by the setting software capital letters or digits

Overcurrent function [51-1] [51-2] [50]

• Operating range I> - I>> - I>>>	0.3 to 24 In
• Thresholds accuracy	1% between 0.5 and 4 In 3% from 0.3 to 0.5 In and from 4 to 24 In
• Reset percentage on the operating level	95%
• Instantaneous operating time	60 ms including trip relay for I ≥ 2 Is
• Definite time delay	40 ms to 300 s: [51-1] I> - [51-2] I>> - [50] I>>>
• Accuracy of the time delays	± 2% or 20 ms
• Curves [51-1] I> - [51-2] I>>	IEC 60255-4, ANSI IEEE and factory programmable (consult us)
• Curves accuracy and type	class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see Functionalities

Earth fault function [51N] [50N]

• Operating range Io> - Io>>	0.03 to 2.4 In_0 / CT - 0.6 to 48 A / ring CT
• Thresholds accuracy	1% between 0.05 and 4 In_0 3% from 0.03 to 0.05 In_0 and from 0.4 to 2.4 In_0 / CT 5% from 0.6 to 48 A / ring CT
• Reset percentage on the operating level	95%
• Instantaneous operating time	60 ms including trip for I ≥ 2 Is
• Definite time delay	40 ms to 300 s: [51N] Io> [50N] Io>>
• Accuracy of the time delays	± 2% or 20 ms
• Curves [51N] Io>	IEC 60255-4, ANSI IEEE and factory programmable (consult us)
• Curves accuracy and type	class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see Functionalities

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

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Transformer thermal overload function [49] (Continue)

• Negative sequence factor	0 to 9
• Closing factor F_D	50 to 100% C_{TE}
• Thermal trip threshold I_b	40 to 130 % In, 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 % In, class 5

Negative phase sequence overcurrent function [46]

• Threshold Ineg: I2>	0.1 to 2.4 In, accuracy 5% for Iph > 0.3 In
• Instantaneous operating time	60 ms including trip relay
• Definite time delay	40 ms to 300 s
• Accuracy of the time delay	± 2% or 20 ms
• Curves	IEC 60255-4, ANSI IEEE and factory programmable (consult us)
• Curves accuracy and type	class 5 - Time Multiplier Setting: 0.03 to 3 s, type: see Functionalities

Broken conductor function [46BC]

• Threshold Ineg/Ipos: I2/I1> - I2/I1>>	10 to 250%
• Accuracy	± 5 %
• Definite time delay	40 to 300s
• Accuracy of the time delays	± 2% or 20 ms

Recloser [79] (option)

• Dead time delay (1st cycle)	0.1 to 360 s
• Reclaim time delay (1st cycle)	9 to 360 s
• Dead time delay (2nd, 3rd and 4th cycle)	15 to 360 s
• Reclaim time delay (2nd, 3rd and 4th cycle)	1 to 360 s
• Width of reclosing pulse	100 to 500 ms
• Reclaim time for manual reclosing	1 to 360 s
• Accuracy of time delays	± 2% or 20 ms
• N cycles alarm / T min	N: 4 to 30 and T: 1 to 30 min

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

• Trip circuit supervision [74TC]	requires four digital inputs (see application guide)
• Operating time (in faulty condition)	200 ms fixed for [74TC] function
• Failure threshold [50BF]	5% to 30 % In, step of 1 In
• Failure threshold [50N_BF]	0.5% to 3% In_0, step of 0.1 In_0
• Breaker failure time delay	60 to 500 ms, step of 10 ms

Latching of the output contacts [86]

• Manual reset for output relays	A, B, C and with option: D, E, F, G (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	± 5 %
• Reclosing time	40 ms to 300s, ± 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, ± 2% or 20 ms
• Additional time delay [50] [50N]	60 ms to 3s, ± 2% or 20 ms
• Operating mode of digital input	negative or positive true-data mode

Digital inputs assignment

• By setting software	
• Setting table selection	set 1 – set 2
• 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

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Digital inputs assignment (Continue)

• Circuit breaker ready	recloser option only
• Inhibition 1	recloser option only
• Inhibition 2	recloser option only
• RSE A	recloser option only
• RSE B	recloser option only
• Input – output programmable functions	

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

Counters

• Cumulative breaking current	maximum 65 10^6 kA² (phase 1,2 and 3)
• Operation number of circuit breaker	0 à 10 000

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

• Load shedding level	1 to 6
• Time delay before reclosing	1 to 120 s, ± 2% or 20 ms
• 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

Setting software

• Display	French, English, Spanish, Italian
• Configuration and operating software	Windows® 2000, XP, Vista and 7 compatible 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: 1.2/50µs) 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

CHARACTERISTICS NPI800

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)
• Display	2 lines of 16 characters

Case

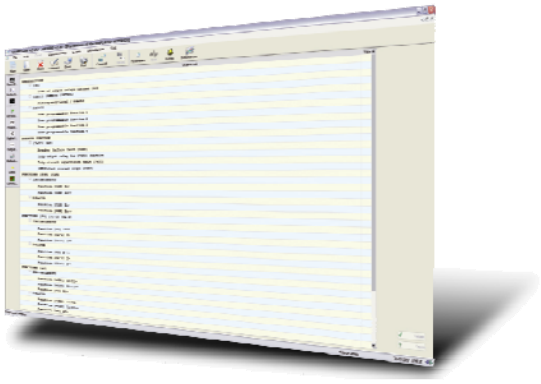
• H, W, D without short-circuiting device	173 x 106.3 x 250 mm (see drawing D37739)
• H, W, D with short-circuiting devices	173 x 106.3 x 305 mm (see drawing D37739)
• Weight	3.6 kg

Connection - codification

• NPI800	See diagram S38018
• NPIR800	See diagram S38023

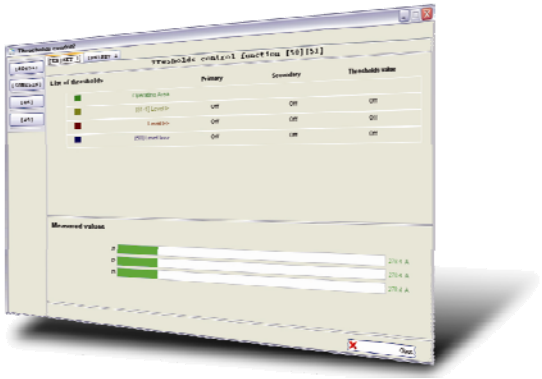
SMARTsoft

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



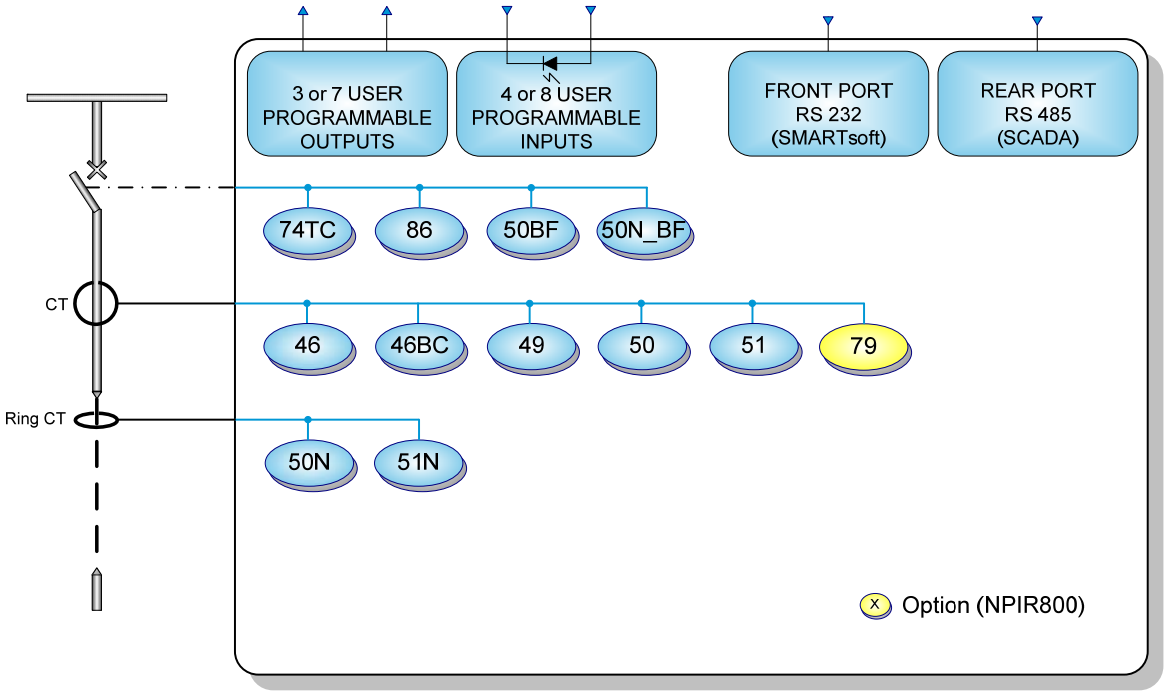
Functionalities

- 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 60255-4 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 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
- 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

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

Functional diagram



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