

# GENERATION & NETWORK

## Asynchronous Motors Protection

NPM800 protects MV and high power LV motors. This multi-function relay supervises motor current during all its operating modes: starting, normal operation and reacceleration. The good operating of the circuit breaker and its trip circuits are also supervised.

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

- Thermal start authorisation [5]
- Thermal overload [49]
- Too long start [48]
- Locked rotor [51LR]
- Phase to phase short-circuit [50]
- Limitation of number of starts [66]
- Unbalance, Reversal and Loss of Phase [46]
- Earth fault [51N]
- Minimum of Load - Unpriming [37I]

### Additional functions

- Latching of the output contacts [86]
- Trip circuit supervision of the breaker [74TC]
- Breaker failure [50BF] [50N\_BF]
- Load shedding by external input and high speed restarting
- Load shedding - Load Restoration, remote control (communication option)

# NPM800



CEE Relays Ltd

# CHARACTERISTICS NPM800

## 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

- Phase CT

In 1 or 5 A  
burden at  $I_n < 0.2$  VA  
Continuous rating 3  $I_n$ , short duration withstand 100  $I_n$  / 1s  
CT setting: primary value from 1 A to 10 kA  
measurement from 0.05 to 24  $I_n$   
display of primary current from 0 to 65 kA

- Earth current CT

$I_{n0}$  1 or 5 A  
burden at  $I_{n0} < 0.5$  VA  
Continuous rating 1  $I_{n0}$ , short duration withstand 40  $I_{n0}$  / 1s  
measurement from 0.005 to 2.4  $I_{n0}$   
display of primary current from 0 to 6.5 kA  
5VA 5P15  
measurement from 0.1 to 48 A primary

- Recommended CTs
- Earth current from Ring CT 100/1 or Ring CT 1500/1 and BA800
- Frequency (50Hz or 60Hz)

measurement: 45 to 55 Hz or 55 to 65 Hz

## 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

## Thermal start authorisation [5]

- Thermal start authorisation

40 to 100%  $\theta$  thermal, class 5

## Thermal overload [49]

- Tripping curves
- Heating-time constant  $C_{TE}$
- Cooling time constant
- Negative sequence factor
- Factor of start  $F_D$
- Thermal trip threshold  $I_{ref}$
- Thermal alarm threshold

IEC 60255-8  
4 to 180 min, class 5  
1 to 6.0  $C_{TE}$ , in step of 0.1  
0 to 9  
50 to 100%  $C_{TE}$   
40 to 130 %  $I_n$ , class 5  
80 to 100 %  $\theta$  thermal, class 5

## Too long start [48] and locked rotor [51LR]

- Operating range
- Thresholds accuracy
- Too long start time delay [48]
- Accuracy of the time delays [48]
- Locked rotor time delay [51LR]
- Accuracy of the time delays [51LR]

1 to 10  $I_{ref}$   
 $\pm 5\%$   
2 to 200 s  
 $\pm 5\%$   
0.2 to 10 s  
 $\pm 5\%$

# CHARACTERISTICS NPM800

## Phase to phase short-circuit [50]

- Operating range  $I >>$  3 à 12  $I_n$
- Phase threshold accuracy 3%
- Reset percentage on the operating level 95%
- Instantaneous operating time 60 ms including trip relay for  $I \geq 2 I_s$
- Definite time delay 40 ms to 3 s
- Accuracy of the time delay  $\pm 2\%$  or 20 ms

## Limitation of number of starts [66]

- Number of authorized starts from 1 to 4
- Reference period 15 to 60 min
- Blocking period 15 to 60 min
- Accuracy of the time delays  $\pm 5\%$

## Unbalance, Reversal and Loss of Phase [46]

- Operating range  $I2 >$  20 to 80%  $I_n$ , accuracy  $\pm 5\%$
- Inverse curves 1 to 10 s (for  $I_{neg} = 100\% I_{neg}/I_n$ ), accuracy  $\pm 5\%$
- Reset percentage on the operating level 94 %, accuracy  $\pm 1\%$

## Earth fault [51N]

- Operating range  $I_o >$  0.03 to 0.4  $I_{n0}$  / CT - 0.6 to 8 A / ring CT
- Thresholds accuracy 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
- Reset percentage on the operating level 95%
- Instantaneous operating time 60 ms including trip for  $I \geq 2 I_s$
- Definite time delay 40 ms to 3 s
- Accuracy of the time delay  $\pm 5\%$  or 20 ms
- Blocking during starting period programmable: active / inactive

## Minimum of Load - Unpriming [37I]

- Operating range  $I <$  0.1 to 2.4  $I_n$ , accuracy  $\pm 5\%$
- Operating time delay 0.05 to 120 s
- Accuracy of the time delay  $\pm 5\%$  or 20 ms
- Reset percentage on the operating level 106 %, accuracy  $\pm 1\%$

## 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) 500 ms fixed for [74TC] function
- Failure threshold [50BF] 5% to 30 %  $I_n$ , step of 1  $I_n$
- Failure threshold [50N\_BF] 0.5% to 3%  $I_{n0}$ , step of 0.1  $I_{n0}$
- Breaker failure time delay 60 to 1000 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

## 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
  - Load shedding
  - Reset [86] function
  - Trip circuit supervision
  - CB trip external order
  - Input – output programmable functions
- 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 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

# CHARACTERISTICS NPM800

## Counters

- Cumulative breaking current maximum  $64.10^6$  kA<sup>2</sup> (phase 1 and 3)  
0 à 10 000
- Operation number of circuit breaker
- Working time of the motor since its last energizing 0 minute to 65535 hours
- Working time of the motor since its commissioning 0 to 65535 hours

## Load shedding by external input and high speed restarting

- Load shedding time delay 60 ms to 120 s, accuracy  $\pm 5\%$
- Reacceleration during a time corresponding to a starting [48] If the external order disappears before the end of the time delay

## 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 $\mu$ 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<sub>rms</sub> – 1 min  
differential mode for Digital Output 1 kV<sub>rms</sub> –  
1 min  
(contact open)
- Insulation resistance IEC / EN 60255-5: 500 Vdc - 1 s: > 100 M $\Omega$
- 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 NPM800

## 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 short-circuiting device
- H, W, D with short-circuiting devices
- Weight

173 x 106.3 x 250 mm (see drawing D37739)  
 173 x 106.3 x 305 mm (see drawing D37739)  
 3.6 kg

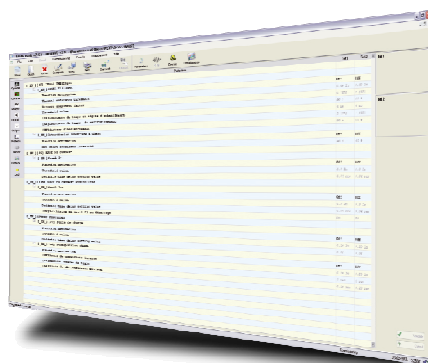
## Connection - codification

- See diagram S38024
- Ring CT
- BA800

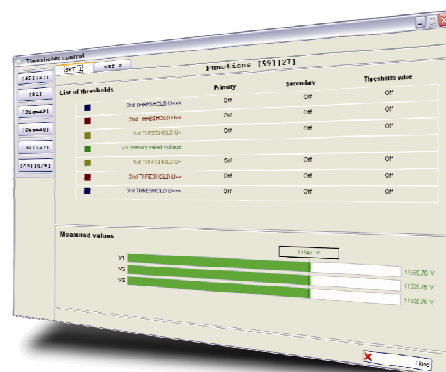
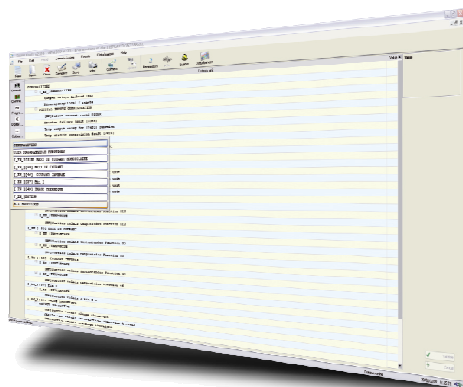
See diagram 142941  
 See diagram 38766

## 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 phase and earth currents I1, I3 and Io  
Current of the last starting  
Time of the last starting  
Max of starting current  
Time of starting  
Negative sequence current value  
Thermal state value  
Frequency value  
Number of authorized starts
- 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 ampers<sup>2</sup> per phase, alarm and threshold
- Motor maintenance:  
Counter of the working time of the motor since its last energizing  
Counter of the working time of the motor since its commissioning
- 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
- 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
- Blocking during starting period of the earth fault threshold
- 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
- LED « Start authorized (or forbidden) » by assignment of function

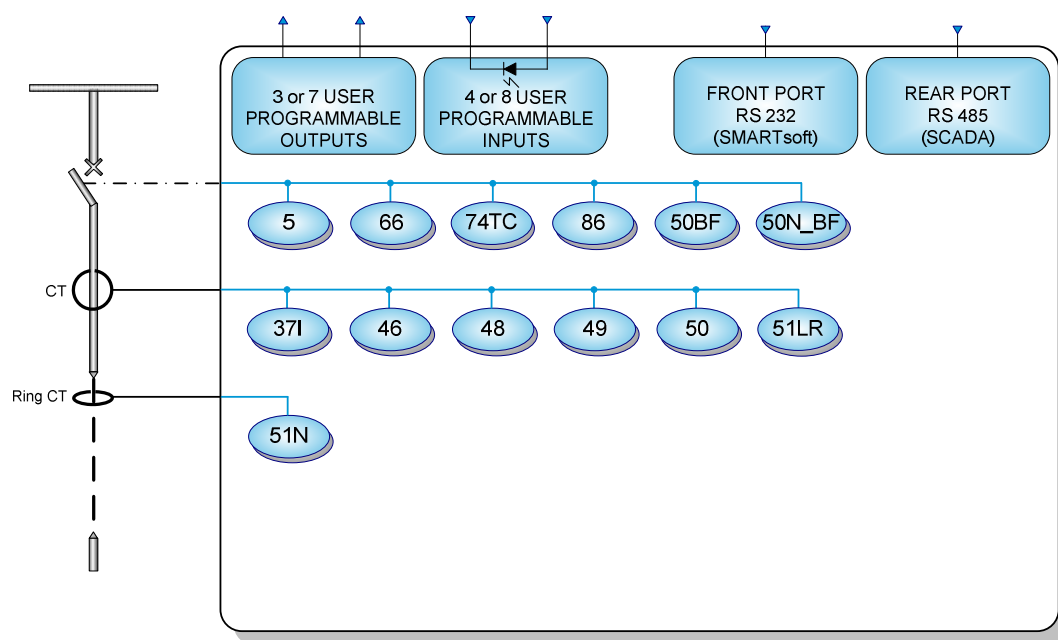
## Options

- Communication by Modbus® or IEC 60870-5-103 protocol
- 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



**CEE Relays Ltd**  
87C Whitby Road, Slough, SL1 3DR (Registered Office)

Tel: +44 1753 576477 Fax: +44 1753 825661

Web: www.ceerelays.co.uk

