

RAILWAY

Railway Protection for Catenaries

PDZI800 performs the monitoring of AC railway catenaries feeders on conventional network or with autotransformers. This distance protection is fitted with overcurrent function and many operating function such as de-icing monitoring and control of operating of the circuit breaker.

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

- 3 downstream and 2 upstream zones of minimum of impedance [21]
- Overcurrent with 2 phase thresholds [50] [51], with 2 switchable modes for each threshold
- Directional with 2 thresholds [32]
- Differential de-icing [87]
- Circuit-breaker failure [50BF]
- Catenary undervoltage [27]

Option

- 3 shot recloser [79]



CEE Relays Ltd

CHARACTERISTICS PDZI800

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 current inputs

In: 1 or 5A
burden at In < 0.2 VA
continuous rating 3 In, short duration withstand 100 In/1 s
CT setting: primary value from 100 A to 5 000 A
measurement from 0.3 to 24 In
30VA 5P5
Un: 100 or 110 V
input impedance > 80 kΩ
continuous rating 240 V, short duration withstand 275V - 1 min
measurement: 200 or 220 V
VT setting: primary value from 1*25 kV, 2*25 kV
measurement: 44,5-55,5 Hz or 54,5-65,5 Hz

- Recommended CTs
- Phase voltage inputs

- Frequency (50Hz or 60Hz)

Digital Inputs (8)

- 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 (7 + 1WD)

- Relays A, B, E, F:
signalling, Shunt Opening Release
- Relays C, D, G et WD:
control, WD : Watchdog
C, D, G: for C.B. Shunt Opening Release
- Reclosing Relay pulse (D)

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 100ms to 5 s

Minimum of impedance function [21]

- Characteristic
- Definite time delay
- Adjustment values of lines ± 3 %
- 1st stage downstream reactance (D11)
- 1st stage upstream reactance (D12)
- 1st stage downstream resistance (D13)
- 1st stage upstream resistance (D14)
- 1st stage downstr. Switch reactance (D11')
- 2nd stage downstream reactance (D21)
- 2nd stage upstream reactance (D22)
- 3rd stage downstream reactance (D31)
- 1st stage time delay T1
- Angle of the line θ
- H2 detection(D15)
- Harmonic 2 threshold
- Harmonic 2 ratio
- H2 detection's time delay after closing AT
- 2nd stage time delay T2 Downstream
- 2nd stage time delay T2 Upstream
- 3rd stage time delay T3 Downstream

parallelogram with 3 downstream stages and 2 upstream stages
0.04 to 0.70 s in step of 0,01 s accuracy ± 2 % with 20 ms
In 5A
0.2 to 150.0 Ω in step of 0.1 Ω
0.2 to 150.0 Ω in step of 0.1 Ω
1.6 to 30.0 Ω in step of 0.1 Ω
1.6 to 60.0 Ω in step of 0.1 Ω
0.2 to 150.0 Ω in step of 0.1 Ω
0.2 to 150.0 Ω in step of 0.1 Ω
0.2 to 150.0 Ω in step of 0.1 Ω
0.04 to 0.70 s in step of 0.01 s accuracy ± 2 % with 20 ms
60 to 85° in step of 1° accuracy 1°
0.2 to 150.0 Ω in step of 0.1 Ω
10 to 70 % in step of 1%
1 to 4 in step of 0.1
0 to 2 s in step of 0.01 s
0.04 to 2.55 s in step of 0.01 s accuracy ± 2 % with 20 ms
0.04 to 2.55 s in step of 0.01 s accuracy ± 2 % with 20 ms
0.04 to 2.55 s in step of 0.01 s accuracy ± 2 % with 20 ms
In 1A
1.0 to 750.0 Ω in step of 0.5 Ω
1.0 to 750.0 Ω in step of 0.5 Ω
8.0 to 150.0 Ω in step of 0.5 Ω
8.0 to 300.0 Ω in step of 0.5 Ω
1.0 to 750.0 Ω in step of 0.5 Ω
1.0 to 750.0 Ω in step of 0.5 Ω
1.0 to 750.0 Ω in step of 0.5 Ω
1.0 to 750.0 Ω in step of 0.5 Ω

Overcurrent functions [50] [51]

- Status
- Adjustment threshold In : 1A
- Adjustment threshold In : 5A
- Definite time delay
- Curves types

in or out of service
0.40 to 4.00 A in step of 0,02 A accuracy ± 2 %
2.0 to 20.0 A in step of 0.1 A accuracy ± 2 %
0.04 to 3.00 s in step of 0.01 s accuracy ± 2 % / 20 ms
inverse, very inverse, extremely
Inverse according to IEC 60255-4 accuracy 5%

CHARACTERISTICS PDZI800

Directional function [32]

- Status
- Characteristic

- Slow stage In: 1A
- Slow stage In: 5A
- Slow stage time delay
- Fast stage In: 1A
- Fast stage In: 5A
- Fast stage time delay
- Adjustment of angle ½ line D1
- Adjustment of angle ½ line D2

in or out of service		
circular with limitation by two "half-line"		
measure of Ucat and θ angle by the protection		
adjustment of currents threshold ($I_{cat} / I_{cat} + I_{feed}$)		
0.08 to 0.80 A	in step of 0.1 A	accuracy $\pm 2 \%$
0.4 to 4.0 A	in step of 0.1 A	accuracy $\pm 2 \%$
0 to 10 min	in step of 1min	accuracy $\pm 2 \%$
0.24 to 1.60 A	in step of 0.02 A	accuracy $\pm 2 \%$
1.2 to 8.0 A	in step of 0.1 A	accuracy $\pm 2 \%$
0.50 to 60.00 sec	in step of 0.01 sec	accuracy $\pm 2 \%$
85 to 170°	in step of 1°	accuracy $\pm 1^\circ$
- 80 to - 10°	in step of 1°	accuracy $\pm 1^\circ$

De-icing function [87]

- Status
- In 1A: starting threshold
- In 5A: starting threshold
- In 1A: differential current threshold
- In 5A: differential current threshold
- Time delay

in or out of service		
0.10 to 4.00 A	in step of 0.02 A	accuracy $\pm 2 \%$
0.5 to 20.0 A	in step of 0.1 A	accuracy $\pm 2 \%$
0.04 to 0.4 A	in step of 0.02 A	accuracy $\pm 5 \%$
0.20 to 2.0 A	in step of 0.1 A	accuracy $\pm 5 \%$
0.04 to 0.50 sec	in step of 0.01 sec	accuracy 20 ms

Catenary undervoltage function [27]

- Catenary undervoltage threshold
- Time delay

50% to 90% Un	in step of 1%	
0.03 to 300 sec	in step of 0.01 sec	accuracy $\pm 2 \%$, 20 ms min

Circuit breaker maintenance [50BF]

- Alarm for the number of kA² cut off
- Number of operations
- Time delay
- C.B. management mode*

1000 to $(2^{32/2})-1$ kA ²		
1 000 to 20 000		
0.10 to 1.00 sec	in step of 0.01	
Current cut off or Current cut off and Interlocks o/o; c/o; o/o & c/o		

Recloser [79] (option)

- Status
- Number of shots
- Dead time of cycle 1
- Dead time of cycle 2
- Dead time of cycle 3
- Reclaim time for cycle
- Number of cycles per minute (alarm)
- Reclaim time for manual reclosing
- Width of reclosing impulse

in or out of service		
0 to 3		
0.3 to 650 sec	in step of 0.1 sec	accuracy $\pm 2 \%$
0.3 to 650 sec	in step of 0.1 sec	accuracy $\pm 2 \%$
0.3 to 650 sec	in step of 0.1 sec	accuracy $\pm 2 \%$
1 to 650 sec	in step of 1 sec	accuracy $\pm 2 \%$
1 to 999	in step of 1	
1 to 650 sec	in step of 1 sec	accuracy $\pm 2 \%$
0.1 to 5 sec	in step of 0.1 sec	accuracy $\pm 2 \%$

Setting software

- Display
- Configuration and operating software

French, English, Spanish, Italian
Windows® 2000, XP, Vista and 7

MODBUS® Communication (option)

- Transmission
- Interface
- Transmission speed

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

Disturbance recording

- Number of recordings
- Total duration
- Pre fault time

4
52 periods per recording
adjustable from 0 to 52 cycles

Digital inputs

- Input 1
- Input 2
- Input 3
- Input 4
- Input 5
- Input 6
- Input 7
- Input 8 (configurable*)

C.B. interlock o/o
C.B. interlock c/o
Disabling of recloser
Enabling of setting group 2
Enabling of de-icing function
OCR switch on [50]-[51]
Enabling of directional function [32]
Min of Impedance switch-on / SF6 fault/ Disturbance Request

* **see application guide**

CHARACTERISTICS PDZI800

Digital output relays

- Relay A
 - Relay B
 - Relay C
 - Relay D
 - Relay E
 - Relay F
 - Relay G (configurable*)
- * see application guide**

De-icing in service
Undervoltage fault
Trip Relay
Closing relay
C.B. Failure [50BF]
Directional correction requested
Setting group 2 or Directional function in service

Signalling LEDs

- LED 1
- LED 2
- LED 3
- LED 4

RS485 activity
RS232 PC connected
Set 2 active
Events not acknowledged available on RS232 communication port

Climatic withstand in operation

- Cold exposure
- Dry heat exposure
- Damp heat exposure
- Temperature variation with specified variation rate

IEC / EN 60068-2-1: class Ad, -10 °C
IEC / EN 60068-2-2: class Bd, +55 °C
IEC / EN 60068-2-3: class Ca, 93 % HR, 40 °C, 56 days
IEC / EN 60068-2-14: class Nb, -10 °C to +55 °C, 3 °C/min

Storage

- Cold exposure
- Dry heat exposure

IEC / EN 60068-2-1: class Ad, -25 °C
IEC / EN 60068-2-2: class Bd, +70 °C

Electrical safety

- Ground bond test current
- Impulse voltage withstand
- Dielectric withstand (50Hz or 60Hz)
- Insulation resistance
- Clearances and creepage distances

IEC / EN 61010-1: 30 A
IEC / EN 60255-5: 5 kV MC, 5 kV MD (waveform: 1.2/50µs)
except Digital Outputs, 1 kV differential mode
except RS485, 3 kV common mode
IEC / EN 60255-5: common mode 2 kV_{rms} – 1 min
differential mode for Digital Output 1 kV_{rms} – 1 min
(open contact)
IEC / EN 60255-5: 500 Vdc - 1 s : > 100 MΩ
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 cover

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

CHARACTERISTICS PDZI800

Electromagnetic compatibility (EMC)

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

Presentation

- Height
 - Width
 - Brackets 19" rack mounting
 - Display
- 4U
1/4 19"
option (see drawing D37739)
2 lines of 16 characters

Case

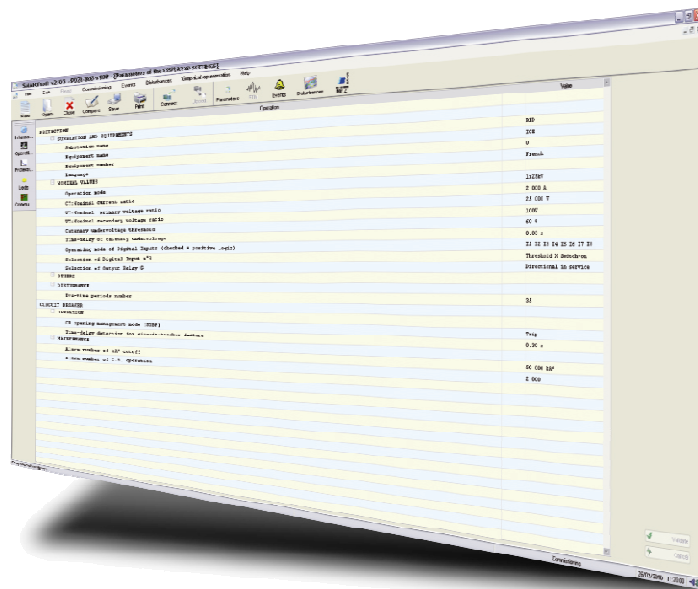
- H, W, D without short-circuiting devices
 - Weight
- 173 x 106.3 x 250 mm (see drawing D37739)
3.6 kg

Connection - codification

- See diagram S39769

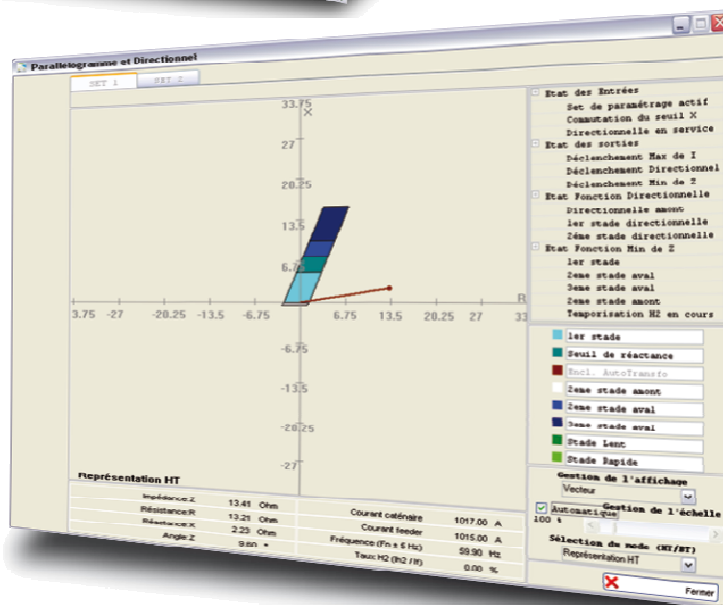
SMARTsoft

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
- Configuration and parameter setting by local MMI or off-line / on-line PC
- Measurement of electrical quantities:
Display expressed in primary values
Instantaneous values of phase currents and voltage
Impedance Z, Resistance R, Reactance X, Angle θ of the line
Harmonic ratio H2
- Instantaneous alarm thresholds
- Definite time tripping
- Dependent time tripping according to inverse/very inverse/extremely inverse IEC 60255-4 curves
- 2 setting groups, locally or remotely selectable by a digital input or by communication channel
- CB Monitoring : interlocks discrepancy, local or remote control of closing / tripping
- 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 : 170 locally recorded events, 100 saved in case of loss of auxiliary supply
- Remote events acknowledgment
- Disturbance recording according to Comtrade® standard : storage of four recordings of 52 periods
- Disturbance recording initiated by digital input, setting software or communication network
- Remote setting, remote reading of measurements, counters, alarms, and parameter settings
- Remote reading of disturbance recording and event log
- Self-diagnosis: RAM, ROM, EEPROM, output relays, A/D converters, auxiliary supply, cycles of execution of software, hardware anomaly
- Test of wiring by output relays activation

Options

- Communication by Modbus® RS 485
- Recloser
 - 3 shots
 - Started by Under Impedance or Overcurrent fault
 - C.B. status (o/o, c/o, o/o & c/o)

Functional diagram

