NPDT620
NPDT630

The digital differential protection relays NPDT620 and NPDT630 are designed to provide fast and selective protection of 2 and 3-winding three-phase transformers.

The NP600 relays can detect various types of fault in the zone to be protected, such as phase-phase faults, inter-winding faults and earth-fault.

Restricted earth-fault protection, on primary and secondary sides, is available as an optional function for 3-winding transformers.

In addition to the protection functions, NPDT relays also perform monitoring, measurement and recording of the electrical quantities of the network.

Parameters can be set locally, using either the integrated display/keypad or the RS232 port, or remotely using the RS485 port.

Electrical values calculation is achieved by Fast Fourier Transforms.

Setting, reading, measurement and recording functions are available in local mode as well as in remote mode.

Multifunction

Measures

Events log

Disturbance

Local HMI

Main functions
- NPDT 620: Differential protection [87T] for 2-winding transformer or generator / transformer unit
- NPDT 630: Differential protection [87T] for 3-winding transformer
- Circuit breaker failure protection [50BF]

Common options
- Buchholz alarm and trip functions
- Temperature alarm and trip functions

NPDT 630 option
- Restricted earth-fault protection [64]

Protection & Control
ice

CHARACTERISTICS NPDT600

Auxiliary supply

- Supply voltage range   48 VDC or 110 to 125 VDC, +10% -20 %
- Typical burden   20 W
- Power off withstand   20 ms
- Memory backup   32 hours

Analogue inputs

- Phase current In 1 or 5 A   Measurement range: 0.2 to 20*In - Accuracy 2.5%
  Burden at In: < 0.2 VA - Continuous withstand: 3*In, 80*In/1s
  Display of primary current: from 0 to 5 000 A
- Earth current input In 1or 5 A   Measurement range: 0.3 to 24*In
  (restricted earth-fault option)   Burden at In: < 0.2 VA - Continuous withstand: 3*In, 80*In/1s
  Primary current supply: from 0 to 5 000 A
- Frequency   47-53 or 57-63 Hz

Relay outputs

- matrix allocation
- DC breaking capacity with L/R = 40 ms   50W
- AC breaking capacity at cosφ = 0.4   1250 VA
- A and B relays   Double contact NO, permanent current: 8A
  Closing capacity: 10A / 4s - short circuit current withstand: 100A/30ms
- WD, C, D, E, F, G and H Relays   Change over contact, permanent current: 16A
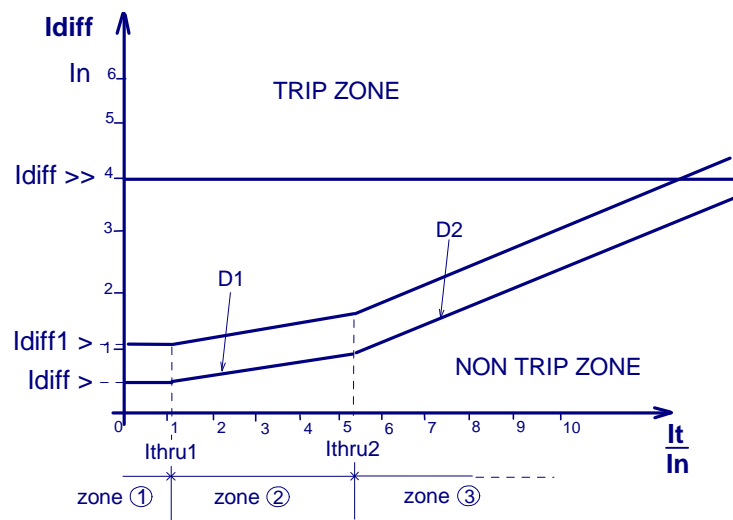 Closing capacity: 25A / 4s - short circuit current withstand: 250A/30ms

Differential protection [87T]

• Differential current	0.05 to 20.00 In	accuracy ± 5%
• Through current	0.05 to 20.00 In	accuracy ± 5%
• Bias curve diagram:		

• Instantaneous high threshold : Idiff>>	0.8 to 20.0 *In, step of 0.1	accuracy ± 5%
• H. Threshold operating time for Idiff=1.5 Is	typical: 17 ms	± 5 ms
• H. Threshold operating time for Idiff ≥ 5 Is	typical: 13 ms	± 5 ms
• Normal low threshold: Idiff>	1 to 200 % *In, step of 1%	accuracy ± 5%
• Over-fluxing low threshold: Idiff1>	5 to 350 % *In, step of 1%	accuracy ± 5%
• Desensitized low threshold: Idiff2	5 to 350 % *In, step of 1%	accuracy ± 5%
• Start of zone 2 Ithru1	0.40 to 6.00 *It/In, step of 0.01	accuracy ± 5%
• Slope of zone 2 D1	10 to 100 %, step of 1%	accuracy ± 5%
• Start of zone 3 Ithru2	2.00 to 8.00 *It/In, step of 0.01	accuracy ± 5%
• Slope of zone 3 D2	20 to 100 %, step of 1%	accuracy ± 5%
• L. Threshold operating time for Idiff ≥1.5 Is	18 to 25 ms	± 5 ms
• Trip time delay	0 to 2000 ms, step of 1 ms	± 1% or 10 ms
• Frequency range	0.9 ≤ f/fn ≤ 1.1	

Stability during transformer energisation

• H2 harmonic measurement	10 to 50 % H1, step of 1 %	accuracy ± 5%
• Maximum duration of Inrush restraint	0 to 2000 ms, step of 1 ms	± 1% or 10 ms

CHARACTERISTICS NPDT600

Desensitisation to magnetizing currents
- ON/OFF function setting
- H5 harmonic measurement   10 to 50 % H1, step of 1%   accuracy ± 5%

Restricted earth-fault protection [64]
- Low and high thresholds   0.05 to 10.00*In, step of 0.01 In   accuracy ± 3%
- Threshold delay   20 to 12 000 ms, step of 1 ms   ± 1 % or 20 ms

Time delay of auxiliary functions
- Buchholz Alarm input   60 ms to 120 s   ± 5 % or 20 ms
- Buchholz Trip input   60 ms to 120 s   ± 5 % or 20 ms
- Temperature Alarm input   60 ms to 120 s   ± 5 % or 20 ms
- Temperature Trip input   60 ms to 120 s   ± 5 % or 20 ms

Compensation for 2-winding transformers
- Dd0, Dy0 et Yy0   0°
- Dy1   phase lag: 30°
- Dy5   phase lag: 150°
- Dy6   phase lag: 180°
- Dy7   phase lead: 150°
- Dy11   phase lead: 30°
- Yy6   phase lag: 180°
- Yd1   phase lag: 30°
- Yd5   phase lag: 150°
- Yd7   phase lead: 150°
- Yd11   phase lead: 30°

Compensation for 3-winding transformers
- Y d1 y0   phase lag: 30°   0°
- Y d11 y0   phase lead: 30°   0°
- Y d5 y0   phase lag: 150°   0°
- Y d7 y0   phase lead: 150°   0°
- D d0 d0   0°   0°

Programming
- Display   Language: English, French
- Configuration software   Environment: Windows® 95, 98, 2000, XP
  Language: English, French

MODBUS® Communication
- Transmission   Asynchronous series, 2 or 4 wires
- Interface   RS 485
- Transmission speed   300 to 19 600 bauds

Disturbance recording
- Number of recordings   8
- Total duration   52 periods per recording
- Pre fault time   adjustable from 0 to 52 periods

Environment
- Transient impulses 5 ns   IEC 801.4 class 4 (equivalent to IEC 255-22-4 class 4)
- Shock   IEC 255-4 class 3 (5 kV - 1.2/50μs)
- Dielectric withstand   IEC 255-5 class 3 (2 kVrms - 1 min)
- Insulation resistance   > 100 MΩ according to IEC 255-5
- EMC emissivity   EN 55011 and EN 55022 class A
- EMC susceptibility   IEC 255-22 (1/2/3/4)
- Operating temperature   -5 to + 55 °C - IEC 870-2-1/B4
- Vibrations   IEC 255.21.1 class 1
- Mechanical shocks   IEC 255.21.2 class 1
- Low voltage directive   89/336/CEE dated 03.05.1989
- Water and dust protection   IP50

Presentation and dimensions
- Rack height and width   NPDT 620 : 6U x ⅓ 19"
  NPDT 630 : 6U x ½ 19"
- Display   2 lines of 16 characters
- Indicators   1 LED for watchdog and 2 LED user programmable
- Overall dimensions (H, W, D)   NPDT 620: 275 x 155 x 249 mm
  NPDT 630: 275 x 226 x 339 mm
- Weight   NPDT 620: 10 kg
  NPDT 630: 12 kg

Characteristics

- 2 plages de tensions auxiliaires
- Two ranges of auxiliary supply voltages
- Configuration and parameter setting by local keypad or by off-line or on-line PC
- Relay configuration reading and saving by PC
- Measurement of electrical data:
  - transformer primary and secondary currents (NPDT 620 and 630) and tertiary currents (NPDT 630)
  - phase differential currents (R, S, T)
  - phase through currents (R, S, T)
  - display of CT measurements expressed in primary current
- Vector group compensation function
- Instantaneous high-set
- Low-set with bias curve
- Detection of transformer inrush (2nd harmonic)
- Detection of magnetising currents (5th harmonic)
- Stability during CT saturation, using 2nd and 3rd harmonic measurement
- Stability for out-of-zone faults
- Stability to DC currents
- Suppression of external earth fault component
- Configuration and communication software under Windows® 95, 98, NT, 2000, XP
- User interface allowing access to all functions

- Correction of CT rating by checking the no-load balance
- Commissioning tests:
  - differential function
  - check of phase sequence and phase displacements according to the transformer type
  - harmonic percentages for inrush and over-fluxing function
  - threshold of restricted earth function (option) and check of internal and external transformer zone
- Time stamping of internal events with 1 ms resolution
- Event recording: 250 locally recorded events, retained in the event of loss of auxiliary supply
- Storage of measurements
- Local/remote acknowledgment of events
- Disturbance recording according to Comtrade format: eight 52-period recordings
- Remote setting, remote reading of measurements, counters, alarms and parameter settings
- Remote reading of disturbance and event log
- Self-diagnosis: RAM, ROM, EEPROM, output relays, A/D converters, auxiliary supply, cycles of software run, hardware anomaly

Options

- Modbus® Communication through RS 485, 2 or 4 wires, for telemetering and telesignalling
- Restricted earth-fault protection, to protect against faults between the windings and the earth

Functional diagram