

POWER SUPPLY

Number of units: 1
 Main battery supply: 24/48 Vdc (+20% -15%)
 110 Vdc (+20% -20%)
 Power consumption: < 25 W

COMMAND INTERFACES

N° of commands: up to 4
 N° of inputs for each high voltage interface: 2
 (command transmission and start criteria)

N° of outputs for each high voltage interface: 3
 (one main + 2 auxiliary outputs)

Command Input: opto-coupler
 Voltage range: 8 ÷ 200 V_{dc}
 Current range: 3 ÷ 20 mA
 Command output: solid-state relay
 Contact type: normally open
 Max. switchable voltage: 200 V_{ac}/200 V_{dc}
 Max. switchable current: 1 A
 Max. switchable power: 200 VA

ALARM INTERFACE

Electromechanical relays and solid state relays
 Electromechanical relays
 Contact type: switching free contact
 Switchable voltage: 200 V_{dc} Max.
 Switchable current: 2 A Max.
 Switchable power: 400 VA Max.
 Solid-state relays
 Contact type: normally closed
 Switchable voltage: 200 V_{dc} Max.
 Switchable current: 0.5 A Max.
 Switchable power: 100 VA Max.

LINE INTERFACE

SHORT REACH FIBER OPTIC LINE UNIT

Transmission support: single mode (10/125 μm)
 Wavelength: 1310 nm
 Guaranteed attenuation: 15 dB
 Optical connectors: FC/PC

INTERMEDIATE REACH FIBER OPTIC LINE UNIT

Transmission support: single mode (10/125 μm)
 Wavelength: 1310 nm
 Guaranteed attenuation: 22 dB
 Optical connectors: FC/PC

LONG REACH FIBER OPTIC LINE UNIT

Transmission support: single mode (10/125 μm)
 Wavelength: 1550 nm
 Guaranteed attenuation: 28 dB
 Optical connectors: LC

LINE UNIT IN EXTRA-LONG REACH F.O.

Optical fiber (extra-long distance)
 Transmission support: one-way (10/125 μm)
 Wavelength: 1550 nm
 Max. distance: 120 km
 Optical connectors: LC (daSFP)

IEEE C37.94 LINE UNIT

Optical fiber (up to 2 Km)
 Transmission support: multi-mode (50/125 o 62.5/125 μm)
 Wavelength: 850 nm
 Bit rate: Nx64 kb/s (N=1,...,8)

Vector protection: MSP 1+1
 Optical connectors: ST (BFOC/2.5)

E1 G.703 LINE UNIT

E1 2Mbit/s G.703
 Bit rate: 2 Mbit/s
 Line code: HDB3/AMI
 Impedance: - 120 Ω balanced
 - 75 Ω unbalanced

G.703 LINE UNIT

G.703 codirectional/contradirectional
 Bit rate: 64 kb/s
 Line code: HDB3/AMI
 Impedance: 120 Ω balanced

V.11 LINE UNIT

32/64/128 kb/s V.11/X.21
 Bit rate: 64/32 kb/s
 Impedance: 100 Ω balanced /HiZ

LOW FREQUENCY LINE UNIT

Low-frequency channel
 Type: 2/4 wires
 Band: 0 ÷ 4 kHz
 Impedance: 600 Ω balanced/unbalanced
 Nominal guard level: -10 dBm
 Nominal command level: 0 dBm
 Transmission range: 0 ÷ -25 dBm (step 1 dB)
 RX dynamic range: 25 Db

LINE UNIT IN F.O FOR CONVEYED WAVE

Transmission support: plastic optical fiber (1 mm)
 Wavelength: 650 nm
 Guaranteed attenuation: 12 dB
 Optical connectors: Latching duplex

PLC LOW FREQUENCY LINE UNIT

PLC channel
 Type: 4 wires
 TX band: 0 ÷ 4 kHz
 RX band: 12 ÷ 16 kHz
 Impedance: 600 Ω unbalanced
 Nominal guard level: -33 dBm
 Nominal guard level (boost mode): -15 dBm
 Nominal command level: -15 dBm
 Standard: Enel CC5002

SUPERVISION AND PROGRAMMING INTERFACE

TX/RX rate: 10/100 Mb/s
 Electrical Interface: Ethernet 10 BaseT

ENVIRONMENTAL CONDITIONS

Operating temperature range: -10 ÷ +55 °C
 Storage/transport temperature range: -40 ÷ +70 °C
 Relative humidity: ≤ 93% 40 °C

STANDARDS

EMC Directive 89/336/EC
 IEC 60834-1 (Teleprotection Command Systems)
 EN/IEC 61000-6-4, EN 55022 class A (emission)
 EN/IEC 61000-6-2 (immunity)
 Low Voltage Directive 73/23/EEC
 EN/IEC 60950-1 (safety)

MECHANICAL CHARACTERISTICS

Installation: ETSI cabinet
 Dimensions: 482,2x260x149 mm (3 SU)
 Weight: < 9.0 kg



TPS-NU

analog/digital teleprotection equipment

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TPS-NU, SELTA's new teleprotection device, represents a flexible, reliable and economical solution for power line protection systems. **TPS-NU** is a device belonging to the teleprotection line for SELTA electrical networks. The main purpose of the **TPS-NU** is selective protection, identifying the position and character of a fault in the shortest possible time, quickly commanding the switches of the section concerned, excluding it from the rest of the network. In this way the network becomes efficient again, limiting the extent and duration of the outage to the maximum. The protection apparatus is the system located at the ends of the power line, and has the purpose of isolating faults on HV lines, transformers, reactors and other elements of the system. It measures voltage, current, impedance and, in the event of a fault, opens the respective switch to avoid faults and damage to the electrical system.

MAIN FEATURES

- complete configurability of the commands employment and commands priority
- management of independent and/or simultaneous commands
- different protection schemes (intertripping, permissive underreach, permissive overreach and blocking) with dependability, security and transmission time compliant with IEC 60834-1.
- high hardware modularity
- subrack with backside connectors
- different digital/analogue line interfaces (optical fiber, E1 2Mbit/s G.703, codirectional/ contradirectional 64 kbit/s G.703, 32/64/128 kbit/s V.11/X.21, analogue/ digital PLC, 2/4 copper wires, IEEE C37.94)
- up to 4 commands
- commands redundancy
- set-reset command (continuous commands)
- high programmability of the command parameters (i.e. software timers)
- alarms configurability
- commands statistics
- events recording in a non-volatile memory (2048 events: commands and alarms, 1 ms resolution)
- accurate alarms indications
- remote configuration and monitoring (only digital interfaces)
- terminal addressing to protect against channel crossovers in switched or routed networks (only digital interfaces)
- comprehensive self-test diagnostics
- RS-232 interface or LAN interface for configuration and monitoring
- GPS, IRIG-B, NTP and IEEE 1588 synchronization
- access security (RADIUS, TACACS)

APPLICATIONS

The TPS-NU equipment transmits and receives the commands via:

DIGITAL (ELECTRICAL/OPTICAL) LINE INTERFACES

- » digital multiplex channels
- » radio channels
- » optical fibre channels
- » multiplex channel with IEEE C39.94 interface

ANALOGUE LINE INTERFACES

- » analogue PLC (i.e. SELTA STE-N)
- » digital PLC (i.e. SELTA STE-D equipped with analogue interface)
- » 2/4 wires dedicated telephone circuits
- » multiplex channels with analogue user interface
- » radio channels with analogue user interface

OPERATING PRINCIPLES

DIGITAL LINE INTERFACES

The Operating principle is based on encoding a guard signal and sending a certain number of command events encoded using specific bit sequences. When TPS-NU is at rest, the guard signal is transmitted continuously in order to monitor the connection, controlling the link quality and detecting if the connection is interrupted. When a command is transmitted, TPS-NU sends the bits corresponding to a specific sequence. For all the digital interfaces there are 20 available bit sequences for the commands employment.

ANALOG LINE INTERFACES

TPS-NU is based on the FSK method (Frequency Shift Keying). When TPS-NU is at rest, the guard tone is constantly transmitted. This tone allows the link monitoring by detecting its failure or its degradation. In case of command transmission, the guard tone is switched off and another tone is transmitted. The command frequencies are sent at the maximum power made available by the transmission equipment. For all the analogue interfaces there are suitable numbers of frequencies available for the commands employment.

PERFORMANCES

NOMINAL TRANSMISSION TIME (IEC 60834-1 COMPLIANT)

Optical fibre	2.5 ms
N x 64 Kb/s IEEE C37.94	3 ms
2 Mbit/s G.703 (E1)	2.5 ms
64 kbit/s G.703	4.5 ms
64 kbit/s V.11/X.21	5 ms
32 kbit/s V.11/X.21	5 ms
Analogue PLC	12 ms
Digital PLC	12 ms
Low-frequency channels	12 ms

Security and dependability (IEC 60834-1 compliant). Both with digital interfaces (optical fiber, E1, G.703, V.11, IEEE C37.94) and with analogue interfaces (analogue/digital PLC, low-frequency channels) the system is able to respect with a wide margin the performances required by the IEC 60834-1 in terms of safety and dependability in the different protection schemes (intertripping, permissive underreach, permissive overreach and blocking). Furthermore transmission time, security and dependability performance parameters are completely programmable by the user for all the digital and analogue interfaces.

