TPS-NU, the new SELTA teleprotection equipment, is a flexible, reliable and cost effective solution for power line protection.

**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 2 Mbit/s G.703, codirectional/contradirectional 64 kbit/s G.703, 32/64 kbit/s V.11/X.21, analogue/digital PLC, 2/4 copper wires, C37.94)
- Up to 4 commands
- Commands redundancy
- High programmability of the command parameters (i.e. software timers)
- Set-reset command (continuous commands)
- Alarms configurability
- Events recording in a non-volatile memory (2048 events: commands and alarms, 1 ms resolution)
- Commands statistics
- 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 synchronization with Irig-B interface and NTP synchronization interface.
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 C37.94 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.
PERFORMANCE

Nominal transmission time (IEC 60834-1 compliant)
- Optical fibre: 2.5 / 3 ms
- N x 64 Kb/s C37.94: 3.5 / 5.5 ms
- 2 Mbit/s G.703 (E1): 3.5 / 5.5 ms
- 64 kbit/s G.703: 4.5 / 7.5 ms
- 64 kbit/s V.11/X.21: 4.5 / 7.5 ms
- 32 kbit/s V.11/X.21: 6.5 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) 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 60384-1 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.
TECHNICAL DATA

POWER SUPPLY
Number of units: 2
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 Vdc
Current range: 3 ÷ 20 mA
Command output: solid-state relay
Contact type: normally open
Max. switchable voltage: 250 Vdc/250 Vdc
Max. switchable current: 1 A
Max. switchable power: 250 VA

ALARM INTERFACE
Electromechanical relays and solid state relays
Electromechanical relays
Contact type: switching free contact
Switchable voltage: 250 Vdc, Max.
Switchable current: 2 A Max.
Switchable power: 500 VA Max.
Solid-state relays
Contact type: normally closed
Switchable voltage: 250 Vdc, Max.
Switchable current: 0.5 A Max.
Switchable power: 125 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
Fiber Optic (plastic only for digital PLC) Line Unit
Transmission support: plastic optical fiber (1 mm)
Wavelength: 650 nm
Guaranteed attenuation: 12 dB
Optical connectors: Latching duplex

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)

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 (6 SU)
Weight: < 5.0 kg