



TPS-NU

ANALOG/DIGITAL TELEPROTECTION EQUIPMENT

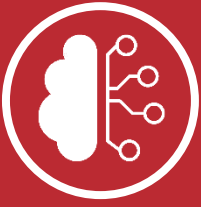
TPS-NU, the new SELTA teleprotection equipment, is a flexible, reliable and cost effective solution for power line protection.

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.

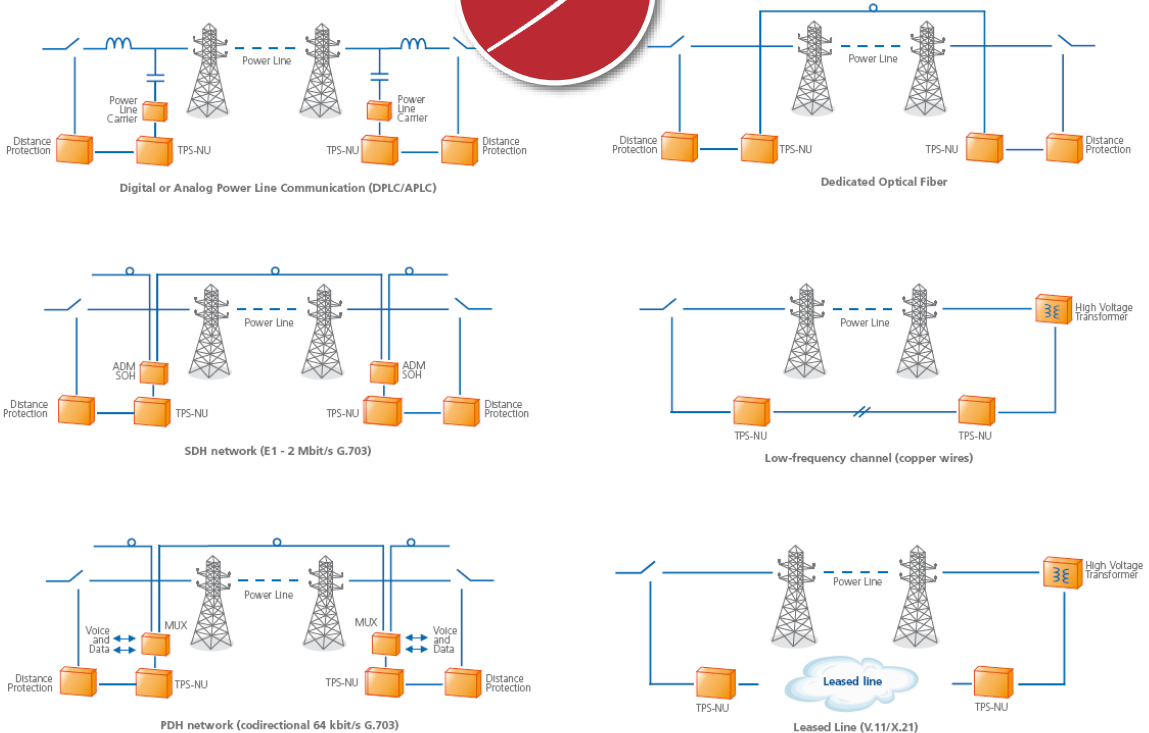
ANALOG LINE INTERFACES

TPS-NU is based on the FSK method (Frequency Shift Keying).

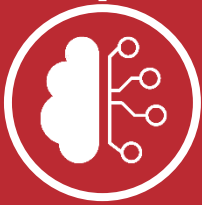
When TPS-NU is at rest, the guard tone is constantly transmitted. This tone allows the link monitoring by detecting its failure or its degradation.

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



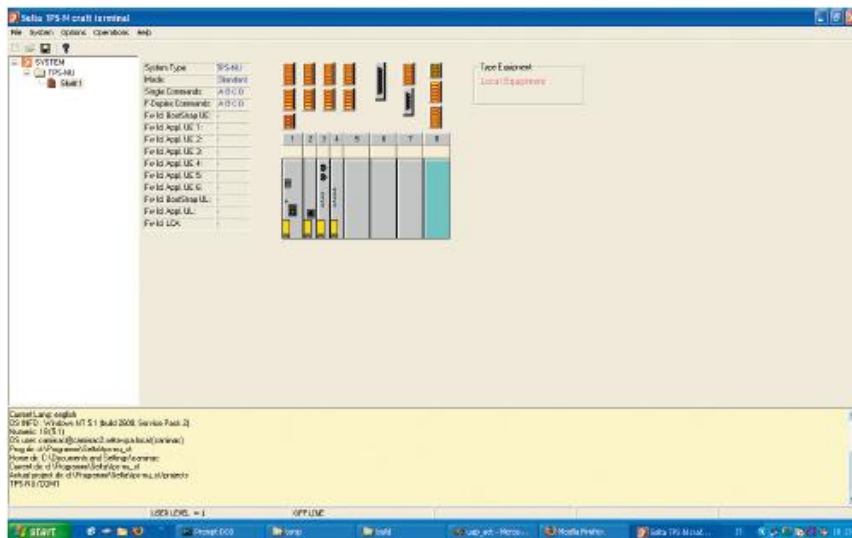
Nominal transmission time (IEC 60834-1 compliant)

▪ 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

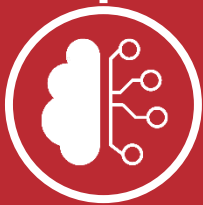
Security and dependability (IEC 60834-1 compliant)

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: (command transmission and start criteria)	2
N° of outputs for each high voltage interface: (one main + 2 auxiliary outputs)	3
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:	250 V _{ac} /250 V _{dc}
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 V _{dc} Max.
Switchable current:	2 A Max.
Switchable power:	500 VA Max.
Solid-state relays	
Contact type:	normally closed
Switchable voltage:	250 V _{dc} 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

E1 G.703 Line Unit

E1 2 Mbit/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

64/32 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

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

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:	< 9.0 kg

