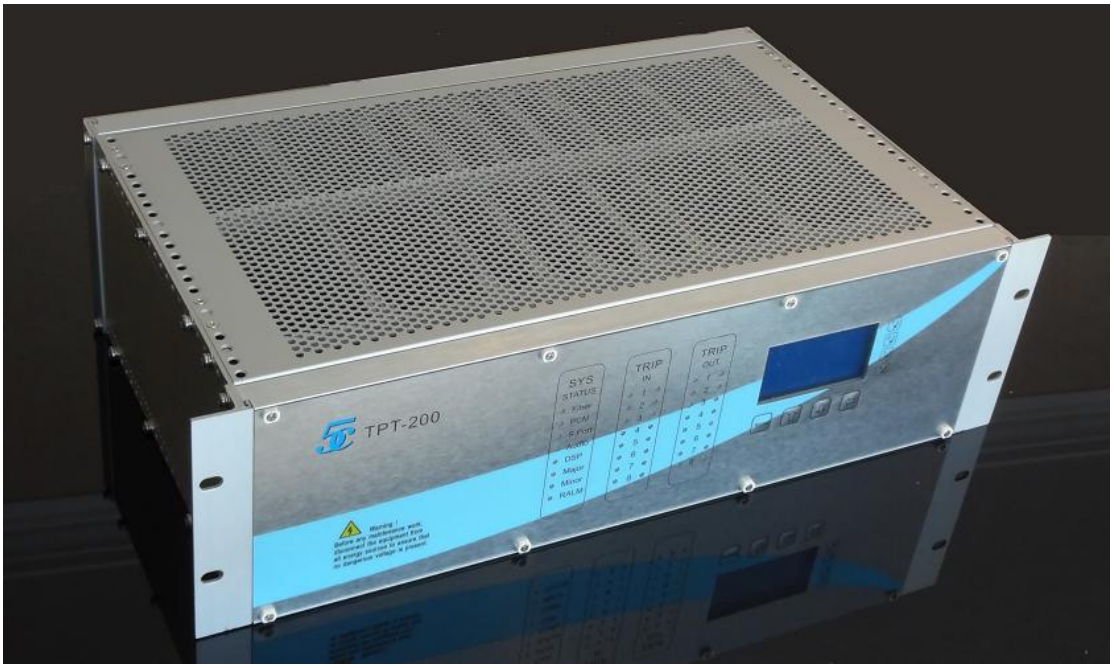
Utility Communications
Teleprotection Equipment TPT-200



Teleprotection is designed to transfer protection commands coming, in most cases, from distance protection relay contacts to one remote location through a communication media. TPT-200 gives fast, reliable and secure transmission of protection signals

The advance feature

- **Multiple transmission routes that provide fully redundant signaling capabilities** If uninterrupted reliability is your primary goal, transmission route redundancy is absolutely essential.
- **Impulse Noise Compression technology**.

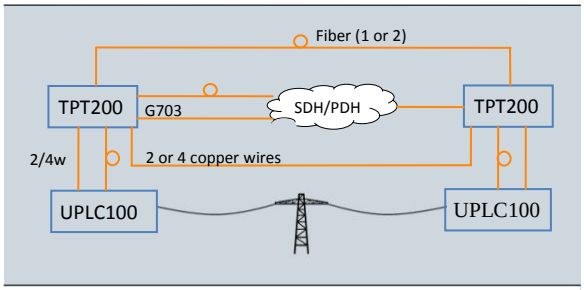
  The impulse noise is on high voltage power line. The most serious disturbance can make false command accidentally on receiver and actuate protection relays. The DSP software is developed to check such impulse noise, increase the system security
- **Device addressing** prevent unwanted interconnections between two equipments due to routing errors in digital networks and ensure that protection signals are received at the correct destination
- **Redundant power supply with hot standby**
- **Various direct fiber optic connections** between two TPT-200 devices, fiber optic to a multiplexer or to a PLC terminal
- **Coded tripping mode for 4 independent commands via analog transmission lines**.

  Coded tripping utilizes two tones for the transmission of a protection command. This increases the transmission security anti tone interference.
- **High speed transmission time**
  digital channel <3ms and analog channel <10ms
- **User friendly management system** supports the remote access through **Ethernet network.**
- **Up to 24K sequence-of-events recording**

Support to record events of the teleprotection commands, system alarm and performance record per hour.

Valid transmission media

TPT-200 enables transmission of protection signals over all kind of communication media. A mix of analog, digital/optical and Ethernet transmission in any combination at the same time is supported, and multi-channels on various medias are hot backup each other.



TPT-200 offers a complete set of line interfaces to the various communication medias for teleprotection.

TPT-200 for digital network

TPT-200 could utilize various serial communications port for transmission.

G.703.6 - E1(2.048M) / T1 for direct connection to SDH / SONET multiplexer.

G.703.1, 64Kbps

X.21 /V.35/ RS-232/RS-485 / RS-530 Multiprotocol. The transmission speed can be configured as 16, 32, 64, 128 or 256 kbps.

Addressing for high security

Devices are identified via addresses when digital communication interfaces are used. This can prevent the unintended connection of two devices following digital network reconfiguration.

Use for digital transmission

Up to eight commands can be digitally transmitted transparently to the far end, where they can be cross-connected to signal outputs in any required combination. Commands can be transmitted for the protection of two three-phase systems or for one three-phase system with individual phase protection.

The high-voltage power circuit breaker can be operated either in conjunction with selective relays or directly.

TPT-200 for fiber optics network

A variety of fiber optic applications (single mode, multi mode, short range, long range, bidirectional on one or two fiber) is supported by TPT-200.

Direct fiber optic connection between two TPT-200

Support long transmission distance up to 200Km

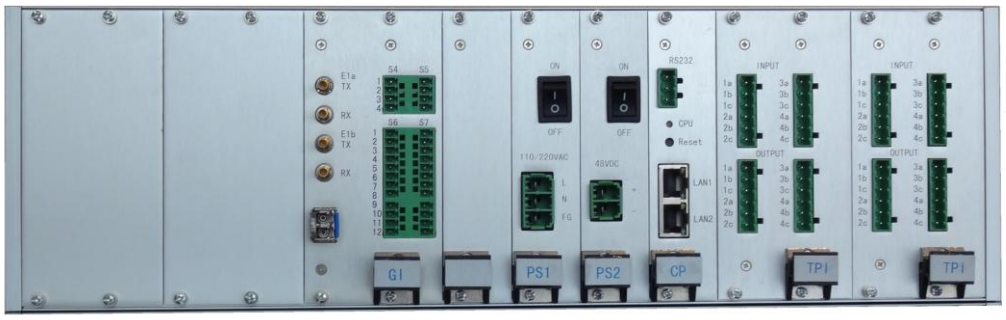
TPT-200 for analog network

Noncoded signals / F6 modulation

The TPT-200 uses F6 modulation. In this mode only one out of the possible frequencies is transmitted at a time. This allows to use all the available transmission power for one single frequency providing the largest transmission ranges for the protection signal.

Coded signals / Extended F6 modulation

Two frequencies are sent at the same time to transmit one coded signal. Acceptance of the signal by the receiver depends on the proper detection of both frequencies at the same time. This protects the system against unwanted interference from single frequencies and increases security.



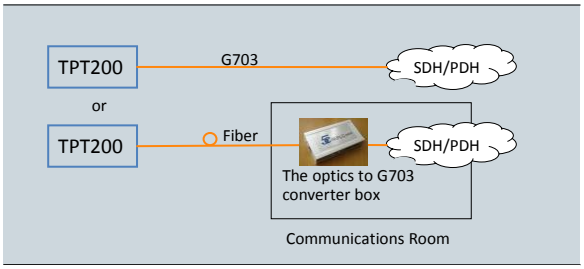
The complete set of line interfaces on TPT-200 back planel

Fiber optic connection between the TPT-200 and a multiplexer or PLC in the substation

A short-distance connection of up to 3 km is supported between:

- a TPT-200 and PDH/SDH multiplexer
- a TPT-200 and 5C UPLC-100

The multiplexer could be connected to the TPT-200 via a 5C fiber modem box or integrated fiber board, which converts the optical signal back to an electrical signal for PDH/SDH networks.



The connectiosn between the TPT-200 and PDH/SDH networks

Teleprotection operating mode

The TPT-200 is used for fast and reliable transmission of 4 tele-protection commands, which support protection of one or two three-phase system.

- 2+2 mode (F6): offers the transmission of two three-phase systems. 2 commands are transmitted in the fast permissive trip, and other 2 commands in the direct trip using the coded tripping feature.
- 3+1 mode (F6): offers 3 fast trips and 1 direct trip using the coded tripping feature.
- 4 independent commands (Extended F6): offer four binary inputs and every possible combination of inputs is assigned to a pair of protection frequencies. This function is only available with the coded tripping feature.

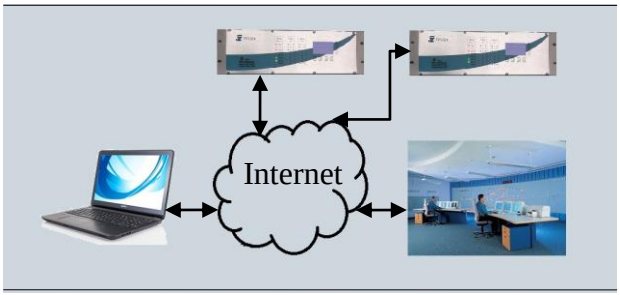
BroadBand or NarrowBand Mode

The TPT-200 supports transmission on both of 4KHz band(0.3~3.4KHz) and 2KHz band(0.3~2.0KHz).

Easy to access and to manage

The IP network based Human Machine Interface (HMI) allows easy configuration, operation and monitoring of the system. In addition, integrated LCD and LEDs on front panel display the system status.

Our Windows-based HMI software, MTPT-200, is easily installed on your PC. Self-explaining menus of MTPT-200 are used friendly for configuration, operation and maintenance. All parameters relating to system operation are stored in nonvolatile memory. All of local or remote TPT-200s can be connected



Remote access to your system

through the Internet by a single Management interface. In such a network, all TPT-200s are accessible with a unique device address. A connection to the equipment, either local or remote, is always secured by means of a user log-in with a two-level password, identification (admin or view access rights).

Technical data

General features	
Operating modes	Blocking, Unblocking, Permissive Transfer Tripping(PTT), Direct Transfer Tripping(DTT)
Number of commands	Up to 4 independent commands for analog communication channels Up to 8 independent commands for digital communication channels
Power Supply	24 VDC (Tolerance ±20%)– range 18 to 35 VDC 48VDC (Tolerance ±20%)– range 36 to 70 VDC 125/250 VDC Wide Range 100 – 370 VDC 110/220 VAC Wide Range 85 – 265 VAC 47Hz~63Hz
Alarm outputs	Mechanical relay contacts, max. 280 VDC/5A
Event logging	24K time-stamped command/alarm events, command counters; stored in non-volatile memory
Clock synchronizing	IRIG-B port
Management facility	By means of standard PC via the interface 115.2 kbps RS 232, or SNMP on Ethernet interface 10/100 BaseT
Front panel	Integrated LCD display panel
Command input	
Nominal input voltage	24 , 48, 125, 250V DC (–20 % to +15 %)
Threshold value	50~70 % of the nominal input voltage

Method of tripping	Contact and battery,
Polarity independence	Yes
Pulse suppression	0.125 ms to 50 ms, (programmable in 0.125-ms steps)
Command output	
Type of outputs	Solid state relays and mechanical relay contacts
Switching voltage	max. 280 VDC
Switched current	max. 1 A (3A/10ms) for solid state max. 5 A (20A peak) for mechanical relay
Insulation dielectric strength	2.5 kVrms
Line Interface (Digital)	
Digital 2M	G.703.6 - E1(2.048M) / T1 for direct connection to SDH / SONET multiplexer, sym. 120 Ω or asym. 75 Ω Transmission time: < 3 ms
Digital low speed	G.703.1 64Kbps or X.21 / X.24; RS-422 / RS-530 / RS-449 Multiprotocol (16, 32, 64, 128, 256 kbps) Transmission time:<5ms
Fiber Optic	Utilizing standard SFPs. different SFP modules can be selected. Bidirectional one fiber is option. 850 nmLED Multimode 1300 nm LED Multimode 1300 nm LED Singlemode 1300 nm LASER Singlemode 1550 nm LASER Singlemode Standard: IEEE C37.94 Transmission time: < 3 ms
Security	< 10-8
Dependability	< 10-4 at BER of 10-6
Line Interface (Analog)	
Modulation type	Extended F6 modulation (frequency shift keying or coded tripping).
Trip frequencies	0.5 to 1.95 kHz
Guard frequencies	2.1 to 3.9 kHz
Transmitter	Impedance 600 Ω, Level max. +11 dBm
Receiver	Impedance 600 Ω, Level range –50 dB to +3 dB
Normal transmission time	Blocking <10ms Permissive tripping <11ms Direct tripping <12ms
Security	Blocking < 1E-04 Permissive tripping < 1E-06 Direct tripping < 1E-09
Dependability, condition:	Blocking 6 dB/11 ms, <1E-3

SNR/Tac	Permissive tripping 3 dB/20 ms, <1E-4 Direct tripping 0 dB/40 ms, <1E-4
Electromagnetic compatibility (EMC)	
Insulation withstand voltage	VF input/output 500 Vrms Power supply 2.5 kVrms Command input/output 2.5 kVrms Alarm outputs 2.5 kVrms Digital input/output(G703, V11/X.21) 500 Vrms
Impulse withstand level (1.2/50 μs)	VF input/output 1 kV Digital input/output 1 kV Power supply 5 kV Command input/output 5 kV Alarm outputs 5 kV
Damped oscillatory waves	Common mode (line-to-line) 2.5 kV Differential mode(line-to-ground) 2.5 kV
Surge	Common mode (line-to-line) 4 kV Differential mode(line-to-ground) 2 kV
Fast transient bursts	Power supply 4KV Data line 2KV
Electrostatic discharge	8 kV (contact discharge) 15KV(air discharge)
Electromagnetic fields(RF fields)	10 V/m (80 MHz – 2 GHz)
Conducted disturbances	10 Vrms (150 kHz – 80 MHz)
Ambient conditions	
Operation	-5 ℃ to + 55 ℃
Storage and transport	– 40 ℃ to + 70 ℃
Relative humidity	5 to 95 %
Mechanical conditions	
Degree of protection	IP 20
Vibration	5 – 9 Hz: 1.5 mm amplitude 9 – 200 Hz: 0.5 g acceleration
International standards	
teleprotection equipment IEC 60834-1 second edition 1999-10 Power supply and electromagnetic compatibility IEC 60870-2-1 Environmental conditions IEC 60870-2-2	
Mechanical design	
Height/Width/Depth	132mm/485mm/280mm (3U/19"inch)
Weight	approx. 5 kg