## Product Overview

VCL-TP, Teleprotection Equipment is an extremely reliable and flexible product that is available with a choice of E1 or IEEE C37.94 Transmission Interfaces, 8 Binary Protection Commands, IEC-61850 GOOSE Digital Protection Commands (PSCH A and PSCH B), 1+1 Power Supply and 8 Channel Digital Trip Counter Display Panel.

VCL-TP, Teleprotection Equipment may be used independently, in a standalone point-to-point application, or as an integral extension of the VCL-MX Version 6, E1 Voice and Data Multiplexer solution to provide Teleprotection over SDH or PDH data networks.

VCL-TP, Teleprotection Equipment offers up to 8, 2-way independent command channels which can be operated selectively or simultaneously with Binary and IEC-61850 GOOSE Protection Schemes (PSCH A and PSCH B). The VCL-TP, Teleprotection Equipment is suitable for deployment in Sub-Stations that use "Binary" as well as "GOOSE" Protection Schemes without any modification in system hardware or software.

Features and Benefits:

- Compact, standard 19-Inch Rack-mountable, 3U high chassis
- Distance Teleprotection applications
- Ready for use in IEC-61850 compliant Digital Sub-Stations with GOOSE and well is in "Legacy" Sub-Stations with Binary Commands
- User programmable for Direct Tripping, Permissive Tripping and Blocking Protection Schemes
- Compliant with IEC 60834-1 and IEC 834-1 specifications and standards for reliability
- Optical Interface fully compliant with IEEE C37.94 for error resistant transmission
- Use in a Standalone, Point-To-Point application
- Use as an integrated part of the VCL-MX Version 6 E1 Voice & Data Multiplexer solution over an SDH or PDH data network
- IRIG-B and NTP Time Synchronization
- Available with Trip Digital Display Counters (8/16) with 8 user configurable External Relay Alarm outputs
- Full Duplex Operation
- Available with 48V DC, 110V DC, 220V DC and 250V DC command and switching voltage options
- Option of 1+1, Redundant Power Supply
- Available with 48V DC, 110V DC, 220V DC and 250V DC power supply options
- Immunity to Voltage Dips, Short Power Supply Interruptions and Voltage Variations as per IEC 61000-4-11 specifications.
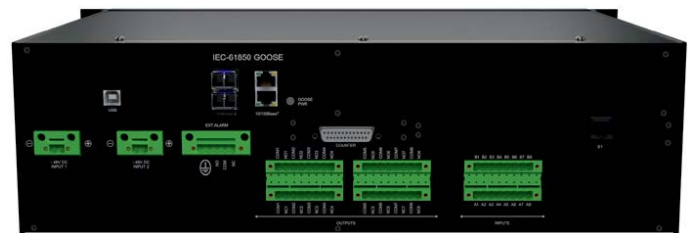
Network Side (Transmission) Interface options:

- IEEE C37.94 compliant Multi-Mode optical fiber interface for transmission over short-reach multi-mode optical fiber links
- IEEE C37.94 compliant Single-Mode optical fiber interface for transmission over long-reach, single-mode optical fiber links (≤ 40 KM, ≤ 80 KM, ≤ 120 KM, ≤ 150 KM)
- E1, 2.048Mbps, G.703 interface option for transmission over E1 links.

Sub-Station Side Interface options:

- Bi-directional Transmission of 8 binary command Inputs and 8 binary command Outputs.
- 110V DC and 250V DC command voltage and switching voltage options.
- IEC-61850, GOOSE Interface (PSCH A and PSCH B)
- Concurrent GOOSE Subscriber and Server functions
- Converts GOOSE Trip Message to Binary Command
- Converts Binary Command to GOOSE Trip Message.
- Converts GOOSE Trip Message for transmission over C37.94 Optical / E1 (TDM).

Flexibility and User Programmability:

- User programmable parameters for "Input" command sampling time and "Output" command holding time
- Input Sampling Time - Sets the "Sampling Time" of the INPUT Commands
- Output Holding Time - Sets the "Holding Time" of the OUTPUT Commands.
- Output Extend Time - Sets the "Minimum Deactivation Time" of the OUTPUT Commands.

Event and Alarm Logging:

- Time-Stamped Alarm Logging
- Time-Stamped Event Logging
- IRIG-B and NTP time synchronization option to synchronize time-stamps with GPS.

Maintenance:

- Manual Loop Test This feature initiates a "Manual Loop-Test" of the transmission link that interconnects the "Local" Teleprotection Terminal and the "Remote" Teleprotection Terminal
- Automatic Loop Test The Automatic Link Test feature automatically initiates "Periodic Loop Tests" at user programmed intervals of the transmission link that interconnects the "Local" Teleprotection Terminal and the "Remote" Teleprotection Terminal
- Delay Measurement This feature automatically initiates an end-to-end "Delay Measurement Test" between the "Local" and the "Remote" Teleprotection Terminal through the interconnecting transmission link.

Access and Monitoring:

- Command Line Interface (English text commands).
- Telnet
- SSH
- SNMPv2 Traps.

Operations and Management (OAM):

- RS232 serial interface for local terminal access
- USB serial interfaces for local terminal access
- 10/100BaseT Ethernet Interface for remote access over an IP network.

Management and Monitoring:

- RS232 serial, USB serial interfaces for local terminal access
- 10/100BaseT Ethernet Interface for remote access over an IP network
- Encrypted Password Protection
- Maintains an access log of over 10,000 most recent entries for security audit
- Telnet - Remote access over IP links
- SSH - Secured remote access using "Secure Shell Protocol" over IP links
- Complaint with IEC-61850 Monitoring and Management Systems
- 8, Dry contact external alarm relay to connect external alarms on an annunciator panel to extend audio and / or visual alarms – Optional
- Trip Counter Display

Performance:

- Less than 2ms command transfer time
- Less than 3ms relay operating time
- Less than 7ms back-to-back operating time (including relay operating time) in IEEE C37.94 Optical mode
- Less than 5ms back-to-back operating time (including relay operating time) in 2.048Mbps, E1 interface mode.

Trip Counter Display:

- Large, LED Trip Counter Display – displays total number for "Trip" and "Sense" Commands for each I/O.

Reliability:

- Power Supply Immunity to withstand impulse surges and transients of up to 4kV
- High Reliability Relays withstands voltage 10 kV between coil and contacts (1.2/50µps). Fully compliant with IEC 255 specifications
- Maximum Switched Relay Voltage and Current: 400V AC or 300V DC; 5 Amps continuous
- Minimum Relay Operations: 10,000,000 operations at 18,000 operations/hour)
- Optoisolated Command Inputs
- Optoisolated Relay Outputs.

Error Detection and Coding

- Line Code Violation Detection
- LOS Detection
- Block Command Encoding as per IEEE C37.94 for reliable transmission.

Time Clock

- Built-in real time clock with battery backup for event and alarm time-stamping.
- Synchronization with an external IRIG-B and NTP Input from GPS.

Transmission Standards and Compliances

- Electrical: ITU-T, G.703 for 2.048Mbps interface
- Optical: IEEE 37.94 compliant Multi-Mode optical interface
- Optical: IEEE 37.94 compliant modulation 1310nm / 1550nm Single-Mode optical interface
- Laser: Class I (for Single-Mode Optical Interface) - Eye-safe as per EN 60825-1 specifications.

Teleprotection Standards and Compliances

- Compliant with IEC 60834-1 and IEC 834-1 specifications and standards
- As per standard IEC 60834-1: Dependability, Transmission time, Recovery time, Alarm time, Security with sudden signal interruption, Security with burst disturbances, DC power supply interruption, Reverse polarity, Jitter and Insulation withstand (as per IEC 60060-1).
- IEC-61850 (PSCH) GOOSE

Power Supply Options:

- 48V DC
- 110V DC
- 220 VDC / 250V DC

Power Consumption:

- < 15 Watts.

EMI, EMC, Surge Withstand and other Compliances:

EN 50081-2	EN 50082-2	IEC 60068-2-29
IEC 61000-4-6 (Conducted Immunity)	IEC 60068-2-6	IEC 60068-2-2
IEC 60068-2-78	IEC 60068-2-1	IEC 60068-2-14
CISPR 22 / EN55022 Class B (Conducted Emission and Radiated Emission)		
IS 9000 (Part II Sec. 1-4, Part III Sec. 1-5, Part IV, Part 14 Sec. 1-3)		
IEC 60870-2-1	IEC 61000-4-5	IEC 61000-4-12
IEC 61000-4-3 (Radiated Immunity)	IEC 61000-4-8	IEC 61000-4-16
IEC 61000-4-2	IEC 61000-4-10	Telcordia GR-1089 Surge and Power Contact
IEC 61000-4-4	IEC 61000-4-11	

- ESD, Voltage and Surge Withstand: Meets and exceeds IEC 61000-4-2, IEC 61000-4-4, IEC 61000-4-5, Level 4 specifications.
- Immunity to Voltage Dips, Short Power Supply Interruptions and Voltage Variations meets and exceeds IEC 61000-4-11, Level 1 specifications.

Other Regulatory Compliances:

- Meets CE requirements
- Complies with FCC Part 68 and EMC FCC Part 15

Environmental

Operating Temperature	-20^{0}C to +60^{0}C
Maximum Operating Humidity	95% R.H., Non-Condensing
Maximum Operating Altitude	Up to 3,000 meters above sea Level
Operation	Complies with ETS 300 019 Class 3.2
Storage Temperature	-40C to +70C
Storage	Complies with ETS 300 019 Class 1.2
Maximum Storage Humidity	98% R.H., Non-Condensing
Maximum Storage Altitude	Up to 3,000 meters above sea level
Transportation	Complies with ETS 300 019 Class 2.3

Dimensions – Teleprotection Unit:

Rack mounting	Standard 19-Inch. DIN Rack
Height	133.00 mm. – standard 3U high
Depth	300.00 mm.
Width	484.00 mm.
Weight	≤ 4.5 kg

Dimensions – Trip Counter Display:

Rack mounting	Standard 19-Inch. DIN Rack
Height	90 mm. – standard 2U high
Depth	240 mm
Width	477 mm
Weight	2 kg

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