

### Introduction:

VCL-TP, Teleprotection Equipment is an extremely reliable and flexible product that is available with 1+1 Optical Link Redundancy (C37.94), 1+1 Power Supply and 8/16, Digital Trip Counter Display Panel with 8 user configurable External Relay Alarm output options.

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 is extremely reliable and flexible product that offers up to 8, 2-way independent command channels, operated selectively or simultaneously over a wide choice and a variety of transmission interfaces.

Transmission interface options include:

- 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)
- Option of 1+1 redundant optical path protection / route protection
- 64Kbps, G.703 co-directional digital data interface option for transmission over 64Kbps data links
- E1, 2.048Mbps, G.703 interface option for transmission over E1 links.



### Performance

Less than 2ms command transfer time

- Less than 5ms relay operating time
- Less than 7ms back-to-back operating time (including relay operating time) in IEEE C37.94 Optical mode
- Less than 7ms back-to-back operating time (including relay operating time) in 2.048Mbps, E1 interface mode
- Less than 11ms back-to-back operating time (including relay operating time) in 64 kbps, G.703 Co-directional 4 wire data interface mode.

### 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.

### Event and Alarm Logging

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

### Features and Benefits

- Compact, standard 19-Inch Rack-mountable, 2U high chassis
- Distance Teleprotection applications
- 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
- Option of 1+1 Route / Path Protection for C37.94 Optical interface with less than 5ms link recovery in a point-to-point protected link
- Bi-directional Transmission of 8 command Inputs and 8 command outputs
- IRIG-B Time Synchronization
- Available with Trip Digital Display Counters (8/16) with 8 user configurable External Relay Alarm outputs
- Full Duplex Operation
- Available with 24V DC, 48V DC, 110V DC, 220V DC and 250V DC command and switching voltage options
- Option of 1+1, Redundant Power Supply
- Available with 24V DC, 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.

### C37.94 Optical Repeater

- Optional C37.94 Repeater available for distances greater than 180 KM

### 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
- SNMP Traps and NMS for real time remote monitoring and management over an IP network
- 8, Dry contact external alarm relay to connect external alarms on an annunciator panel to extend audio and / or visual alarms - Optional
- 16 Trip Counter Display - Optional.

## Reliability

- Power Supply Immunity to withstand impulse surges and transients of up to 4kV
- High Quality Relays withstands voltage 10 kV between coil and contacts (1.2/50µs). 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 (RTC) with 10 year battery backup for event and alarm time-stamping.
- Synchronization with an external IRIG-B Input from GPS.

## Transmission Standards and Compliances

- Electrical: ITU-T, G.703 for 64Kbps co-directional 4-wire data interface
- 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 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

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).

## Power Supply Options

- |        |                     |
|--------|---------------------|
| 24V DC | • 110V DC / 125VDC  |
| 48V DC | • 220V DC / 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
IEC 61000-4-4	IEC 61000-4-11	GR-1089 Surge and Power Contact

- 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

## Application Diagrams:

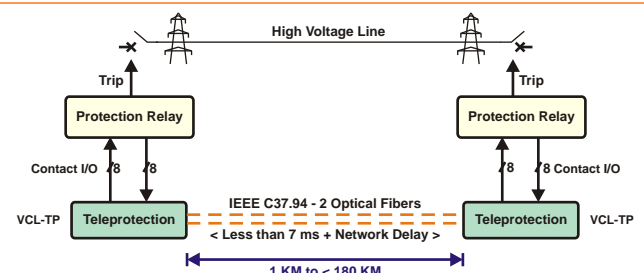


Figure #1 - Typical Point-To-Point Application

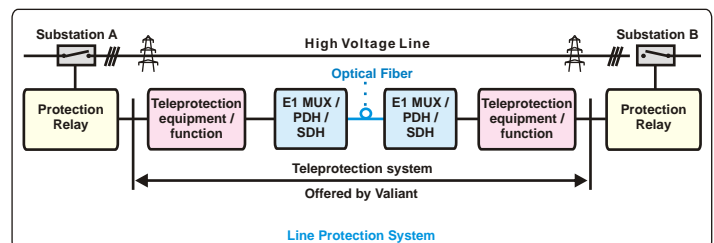


Figure #2 Typical Application over a IEEE C37.94 compliant optical link, as an integrated part of the VCL-MX V6 E1 voice and data multiplexer solution over an SDH or PDH data network.

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### U.K.

Valiant Communications (UK) Ltd  
1, Acton Hill Mews,  
310-328 Uxbridge Road,  
London W3 9QN, United Kingdom

E-mail: gb@valiantcom.com

### U.S.A.

Valcomm Technologies Inc.  
4000 Ponce de Leon, Suite 470  
Coral Gables, FL 33146  
U.S.A.

E-mail: us@valiantcom.com

### INDIA

Valiant Communications Limited  
71/1, Shivaji Marg,  
New Delhi - 110015,  
India

E-mail: mail@valiantcom.com