



VCL-TP, Teleprotection Equipment

Data Sheet

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Product Overview

VCL-TP, Teleprotection Equipment is an extremely reliable and flexible product that offers up to 8, 2-way independent command channels which can be operated selectively or simultaneously over a wide choice and a variety of transmission interfaces.



Front View: VCL-TP Teleprotection

The VCL-TP, Teleprotection Equipment offers a choice of transmission interfaces which include the IEEE C37.94 compliant optical fiber interface for transmission over Multi-Mode and Single Mode Optical Fiber pairs, as well as G.703 E1, 2.048Mbps and G.703 64Kbps co-directional digital data interface options.

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

Application Diagrams

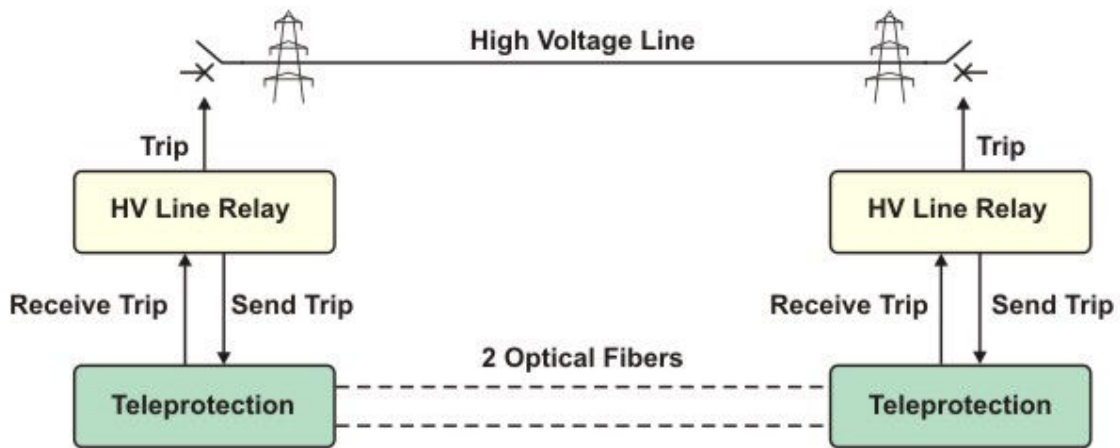


Figure #1 - Typical Point-To-Point Application

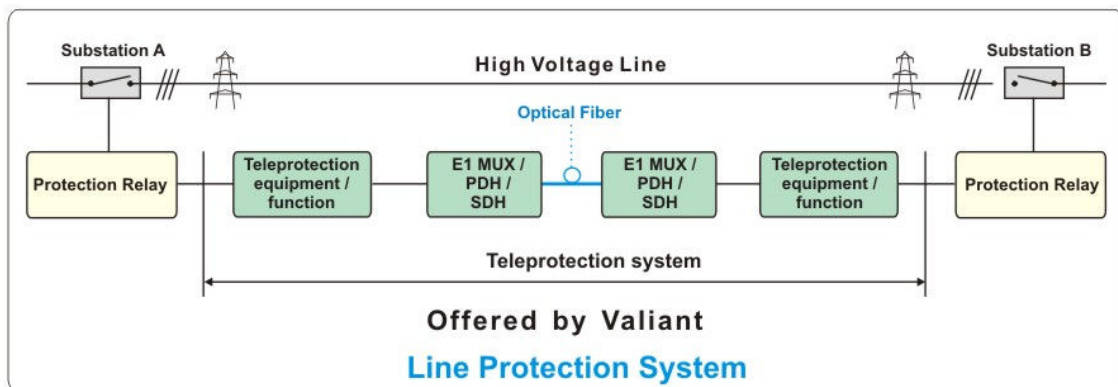


Figure #2 – Typical Application over a IEEE C37.94 compliant optical link, as an integrated part of the VCL-MX V6 E1 Voice and Data Multiplexer solution over an SDH or PDH data network.

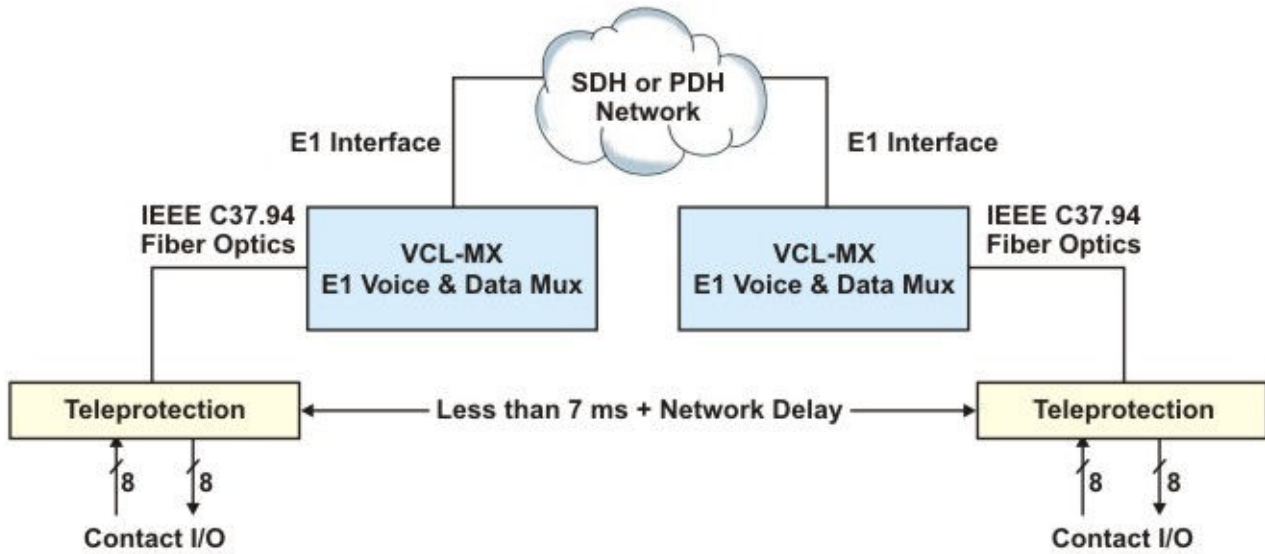


Figure # 3 - Typical Application over a IEEE C37.94 Optical Channel, or E1 interface, or as an integrated part of the VCL-MX V6 E1 Voice and Data Multiplexer solution over an SDH or PDH data network.

Teleprotection Connectivity

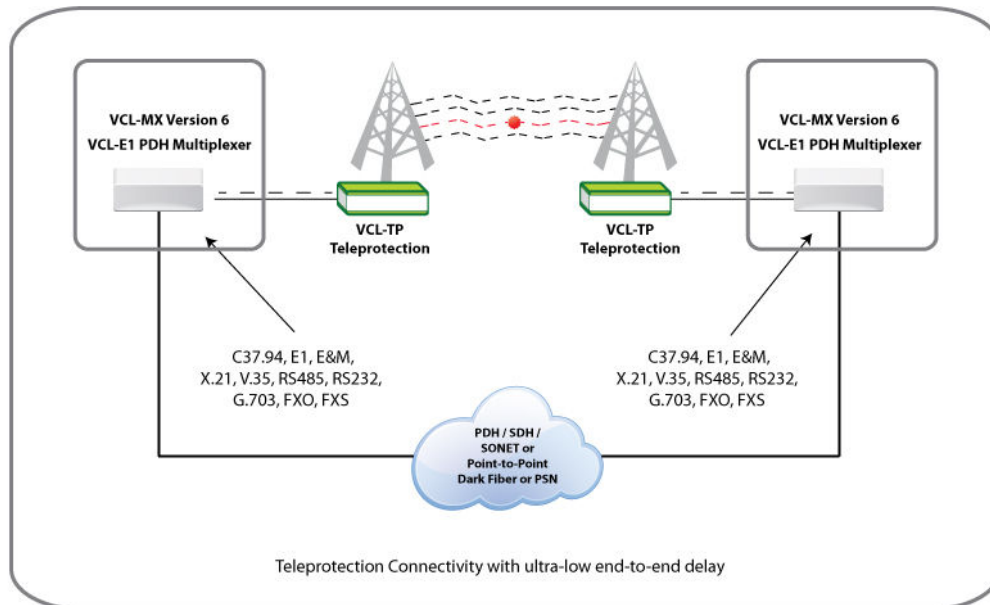


Figure # 4 – Teleprotection with ultra-low end-to-end delay

Features and Benefits

- Unrivaled Speed, Security and Reliability
- Use in a Standalone, Point-To-Point Application
- Use as an integrated part of the VCL-MX V6 E1 Voice and Data Multiplexer solution over an SDH or PDH data network
- 1+1 Route / Path Protection when used as an integrated part of the VCL-MX V6 E1 Voice and Data Multiplexer solution over an SDH or PDH data network
- Compact, standard 19-Inch Rack-mountable, 2U high chassis
- Bi-directional Transmission of 8 command Inputs and 8 command outputs
- Full Duplex Operation
- Automatic loop test facility
- User programmable for Direct Tripping, Permissive Tripping and Blocking Protection Schemes (Distance Teleprotection).
- Compliant with IEC 60834-1 standards
- IEEE C37.94 compliant Multi-Mode optical link interface option for short reach optical links
- IEEE C37.94 compliant (modulation only) Single Mode optical link interface option for long reach optical links (≤ 40 KM, ≤ 80 KM, ≤ 120 KM)
- 64Kbps, G.703 co-directional interface option for transmission over 4-wire electrical links
- 2.048Mbps, G.703 interface option for transmission over 4-wire electrical links
- Available in 24V DC, 48V DC, 110V DC, 220V DC and 250V DC configurations.

Flexibility and User Programmability

- User programmable command holding delay for error resistant command inputs
- User programmable command sampling rate for error resistant command transmission
- 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, G.703, 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

Event and Alarm Logging

- Time-Stamped Alarm Logging
- Time-Stamped Event Logging.

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
- 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
- Automatic Link Test feature – link testing at user programmable periodical intervals
- Visual I/O status – LED Display.
- Dry contact external alarm relay to connect an external alarm on an annunciator panel, which can be wired up for either NO or NC condition.

Reliability

- Advanced Communication Protocols to ensure reliable transmission of commands
- Power Supply Immunity to withstand impulse surges and transients of up to 10,000 Volts
- High Quality Relays – withstands voltage 10 kV between coil and contacts ($1.2 \times 50 \mu\text{ps}$)
- Maximum Switching Voltage: 400V AC or 300V DC
- Optoisolated Command Inputs
- Optoisolated Relay Outputs
- Relays - Mechanical: 10,000,000 operations min. (at 18,000 operations/hour).

Error Detection and Coding

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

Technical Specifications:**64Kbps, G.703, 4-wire Data Interface:**

Number of Interfaces	1
Conformity (Electrical)	G.703 (E0)
Nominal Impedance	120 Ohms balanced
Bit Rate	64 Kbps
Type	Co-directional, Synchronous
Connector	RJ45

2.048Mbps, G.703 E1 Interface:

Number of Interfaces	1
Conformity (Electrical)	G.703 (E1)
Frame Structure	As per ITU (CCITT) G.704
PCM Sampling Rate	8000 Samples/sec
Bit Rate	2048 Kbps \pm 50 ppm
Code	HDB3
Nominal Impedance	120 Ohms balanced
Peak Voltage of a mark For 120 Ohms Balanced interface 75 Ohms Unbalanced interface	3.0 V \pm 0.3 V 2.37 V \pm 0.237 V
Nominal Pulse Width	244 ns
Pulse Mask	As per ITU (CCITT) Rec. G.703
Output Jitter	< 0.05 UI (in the frequency range of 20Hz to 100 KHz)
Permissible Attenuation	6 dB at 1 MHz
Return Loss at: 51.2 KHz to 102.4 KHz 102.4 KHz to 2048 KHz 2048 KHz to 3072 KHz	> 12dB > 18dB > 14dB
Jitter Tolerance	As per ITU (CCITT) G.823
Loss and recovery of frame alignment	As per clause 3 of ITU (CCITT) G.732
Connector	RJ45

Optical Fiber Interface - Option 1:

Optical Module Type	Connector	Fiber	Distance	Type	IEEE C37.94
1x9	FC	Multimode	≤ 2 Km	LED	Fully Compliant
	FC	Single-mode 1310 nm	≤ 20 Km	Laser	Modulation Only

Optical Fiber Interface - Option 2:

Optical Module Type	Connector	Fiber	Distance	Type	IEEE C37.94
SFP	LC	Single-mode 1310 nm, 1550 nm	≤ 40 Km, ≤ 80 Km, ≤ 120 Km	Laser	Modulation Only

Command Voltage Options

24V DC	48V DC	110V DC	220V DC	250V DC
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Teleprotection Inputs Commands

<10mA input current

Command	Sense On	Sense Off
24V DC	15-30V DC	< 10V DC
48V DC	41-72V DC	< 25V DC
110V DC	90-140V DC	< 60V DC
220V DC	210-270V DC	< 140V DC
250V DC	210-270V DC	< 140V DC

Number of Commands

Number of Input Commands	8	Type - Binary
Number of Output Commands	8	Type - Potential Free

Input / Output Commands Combination Options

off	When all 8 inputs are independent		
and	When two adjacent inputs are used logically, “ and-ed ”		
or	When two adjacent inputs are used logically, “ or-ed ”		
log	When two inputs are used in a combination		
	In-a	In-b	Out
	0	1	0
	1	0	1
	1	1	Previous
0	0	Previous	

Command Transfer Time

- Less than 2ms command transfer time

Relay Operating Time

- Less than 5ms relay operating time

Back to Back Switching Time (including command transfer and 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 G.703 E1, 2.048Mbps electrical mode
- Less than 11ms back-to-back operating time (including relay operating time) in G.703 E0, 64kbps, co-directional 4 wire data interface mode

Time Clock

- Built-in real time clock (RTC) with 10 year battery backup.

Operations and Maintenance Interfaces

- 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.

Configuration and Access Command Language

- Command Line Interface (English text commands).

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 only) 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

- IEC 60834-1 (Teleprotection Command Systems)

Power Supply Options

- 24V DC
- 48V DC
- 110V DC/ 125VDC
- 220V DC / 250V DC
- Voltage Withstand: Meets and exceeds IEC 834-1 and IEC 255 requirements.

Power Consumption

- < 15 Watts.

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	-40 ⁰ C to +70 ⁰ C
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

Electromagnetic Standards Compliance

- EN 50081-2
- EN 50082-2
- IEC 61000-6-2 (immunity)
- IEC 610000-6-4 (emission)

Compliance / Regulatory

- Meets CE requirements
- Complies to IEEE and IEC standards
- Complies with FCC Part 68 and EMC FCC Part 15 and CISPR 22 Class B
- Operation ETS 300 019 Class 3.2
- Storage ETS 300 019 Class 1.2
- Transportation ETS 300 019 Class 2.3

Dimensions

Rack mounting	Standard 19-Inch. DIN Rack
Height	90.00 mm. – standard 2U high
Depth	260.00 mm.
Width	477.00 mm.
Weight	4.00 kg

Ordering Information

CORE UNIT without Network Interface and PSUs

Part #	Description	Remarks
VCL-TP-1531	<p>VCL-TeleProtection Terminal Equipment 19-Inch, 2U High Rack mountable Version Supports :</p> <ul style="list-style-type: none"> - upto 8, 2-way independent-simultaneous command channels which may be configured to operate selectively or simultaneously over # Add Network Interface - OAM [SNMP, Telnet (RJ45 Port) and Serial Port (USB and DB-9 COM Port)] - System Core Cables, Installation Accessories, Documentation, System User Manual / Disk etc (Set) - Graphical User Interface (GUI) and Network Management Software (NMS) <p>* Add Power Supply Option from below</p>	CORE UNIT without Network Interface and PSUs

Add Network Interface

Part #	Description	Remarks
1532	G.703 @64Kbps co-directional interface (RJ45)	Any one option
1542	2.048Mbps EI digital data interface (RJ45)	
1533-SM-FC	C37.94 protocol optical fibre 2Mbps. Duplex FC. 20Km1310nm, Single-Mode (SM) interface	
1533-SM-ST	C37.94 protocol optical fiber 2Mbps, Duplex ST, 20Km, 1310nm, Single-Mode (SM) interface	
1533-MM-FC	C37.94 protocol optical fiber 2Mbps, Duplex FC, 2Km, 1310nm, Multi-Mode (MM) interface	
1533-MM-ST	C37.94 protocol optical fiber 2Mbps, Duplex ST, 2Km, 1310nm, Multi-Mode (MM) interface	
1566	<p>C37.94 modulation compliant protocol SFP based optical fiber interface (without SFP - the SFP must be ordered additionally) ^ Select SFP Option from below [1 SFP per / each Card]</p>	

Add Power Supply Option

Part #	Description	Remarks
AC110	1 x 110V AC Power Supply Input	Any one option
AC220	1 x 220V AC Power Supply Input	
DC048	1 x (-) 48V DC Power Supply Input	
DC110	1 x 110V DC Power Supply Input	
DC220	1 x 220V DC Power Supply Input	
AC110R	2 x 110V AC Power Supply Input [Redundant]	
AC220R	2 x 220V AC Power Supply Input [Redundant]	
DC048R	2 x (-) 48V DC Power Supply Input [Redundant]	
DC110R	2 x 110V DC Power Supply Input [Redundant]	
DC220R	2 x 220V DC Power Supply Input [Redundant]	

Select Command Voltages Option

Part #	Description	Remarks
CV048	Command Voltages : -48V DC	Any one option
CV110	Command Voltages : 110V DC	
CV250	Command Voltages : 250V DC	

Select Switching Voltages Option

Part #	Description	Remarks
SV048	Switching Voltages : -48V DC	Any one option
SV110	Switching Voltages : 110V DC	
SV250	Switching Voltages : 250V DC	

^ Select SFP Option from below

Part #	Description	Remarks
VCL-EMOD 0262-TP	SFP Transceiver, Duplex LC, 850nm, 2Km, MM (Multi-Mode)	Maximum 1 SFP per UNIT for 1566
VCL-EMOD 0294-TP	SFP Transceiver Duplex LC, 1310nm, 2Km, MM (Multi-Mode)	
VCL-EMOD 0193-TP	SFP Transceiver, Duplex LC, 1310nm, 15Km, SM (Single-Mode)	
VCL-EMOD 0194-TP	SFP Transceiver, Duplex LC, 1310nm, 40Km, SM (Single-Mode)	
VCL-EMOD 0217-TP	SFP Transceiver, Duplex LC, 1550nm, 80Km, SM (Single-Mode)	
VCL-EMOD 0156-TP	SFP Transceiver, Duplex LC, 1550nm, 120Km, SM (Single-Mode)	
VCL-EMOD 0243-TP	SFP Transceiver, Duplex LC, 1550nm, 150Km, SM (Single-Mode)	

Technical Specifications are subject to changes without notice.
All brand name and trademarks are the property of their respective owners.
Revision 2.9 – November 29, 2013

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