ORION TELECOM NETWORKS INC.

VCL-TP, Teleprotection Equipment with Trip Counter Display

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.
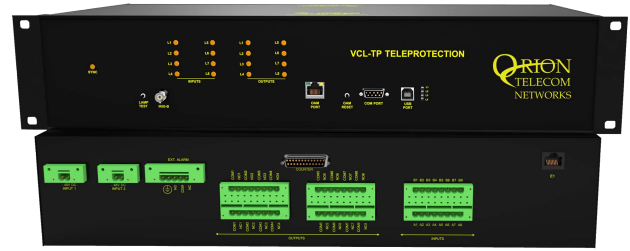
VCL-TP, Teleprotection Equipment

The VCL-TP, Teleprotection Equipment offers a choice of transmission interfaces which include the IEEE C37.94; IP/MPLS; 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 over C37.94 or IP/MPLS links, or as an integrated part of the VCL-MX Version 6, E1 Voice and Data Multiplexer solution over SDH / PDH E1 networks.

The **"Trip Counter Display"** shows the total number of "Trip Input / Trip Receive" and "Trip Output / Trip Send" commands on each of the 8 Teleprotection channels, individually. A manual display counter reset option is also provided which may be enabled or disabled by the system administrator.

Trip Counter Display and Alarm Extension Unit is designed as an optional extension of the Teleprotection Equipment to provide 8 Channel, Digital Trip Counter Display along with 8 External Relay Alarm outputs.

**Front View: Trip Counter Display
And Alarm Extension Unit**

The Trip Counter Display and Alarm Extension Unit may be either powered from the Teleprotection Equipment, or directly from a 48V DC, 110V DC, 220V DC or 250V DC power source. 1+1 Redundant Power is also offered as an option.

Transmission interface options include:

- IEEE C37.94 compliant Multi-Mode optical fiber interface for transmission over short-reach multi-mode optical fiber link
- IEEE C37.94 modulation compliant Single-Mode optical fiber interface for transmission over long-reach, single-mode optical fiber link (≤ 40 KM, ≤ 80 KM, ≤ 120 KM, ≤ 150 KM)
- IP/MPLS Interface – 10/100BaseT (Electrical) or 100BaseFX (Optical) Ethernet link
- 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 link
- Automatic switchover to redundant link in the event of primary link failure.
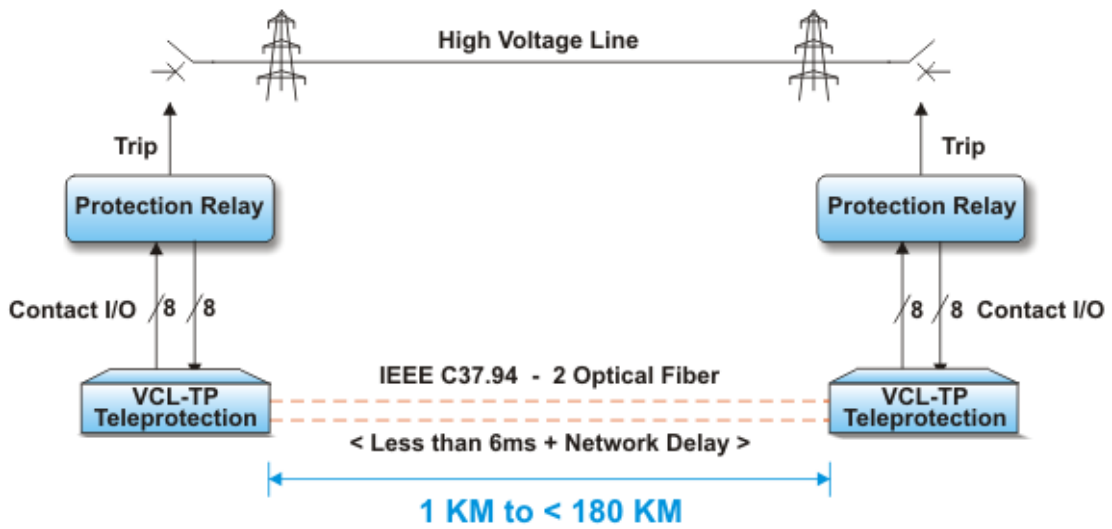
Application Diagrams

Figure #1 *– Teleprotection over IEEE C37.94 Optical Interface*

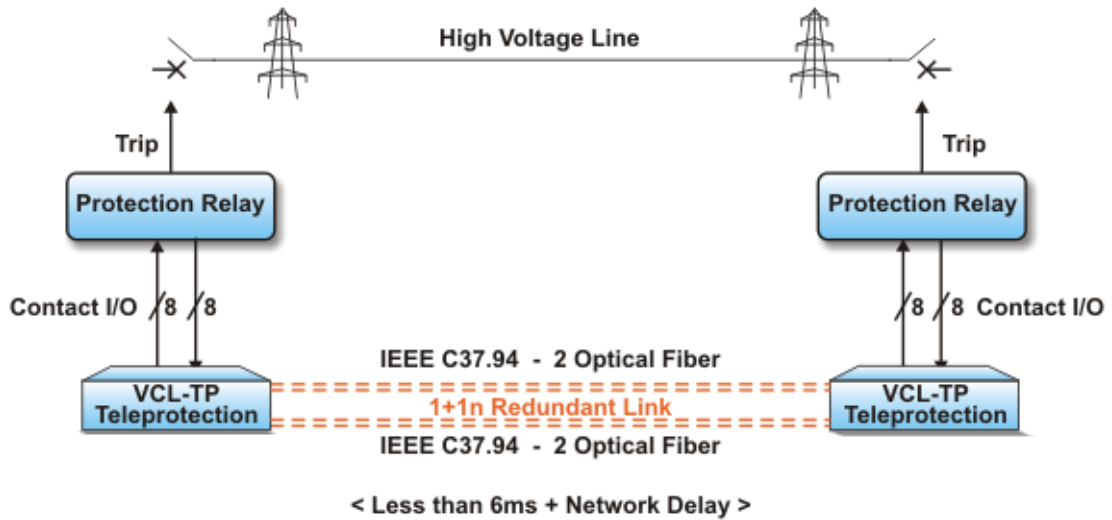***Figure # 2*** *– Teleprotection over IEEE C37.94 Optical Interface in 1+1 Configuration*
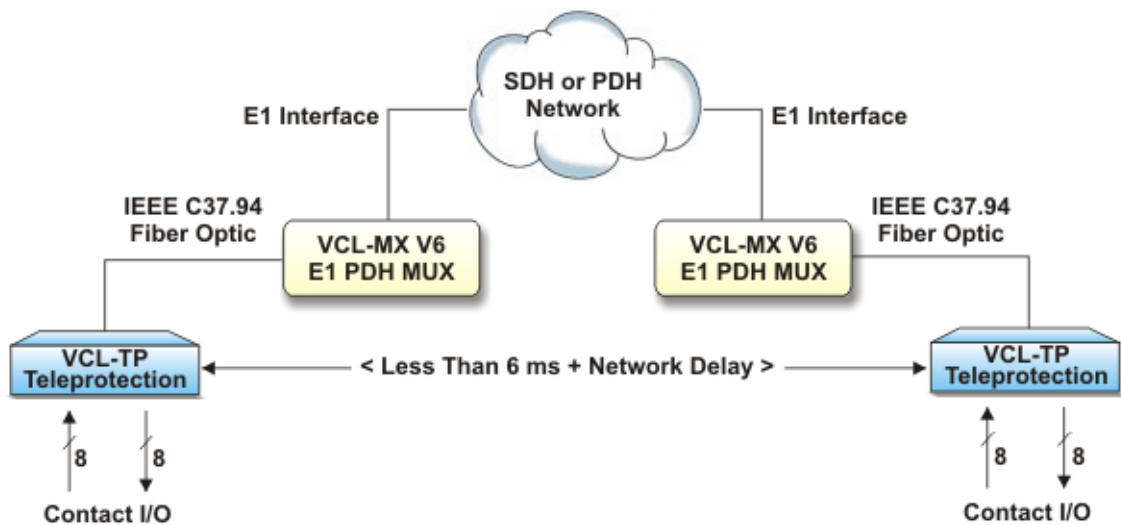

Figure # 3 *– Teleprotection – IEEE C37.94 Interface over SDH / PDH Network*
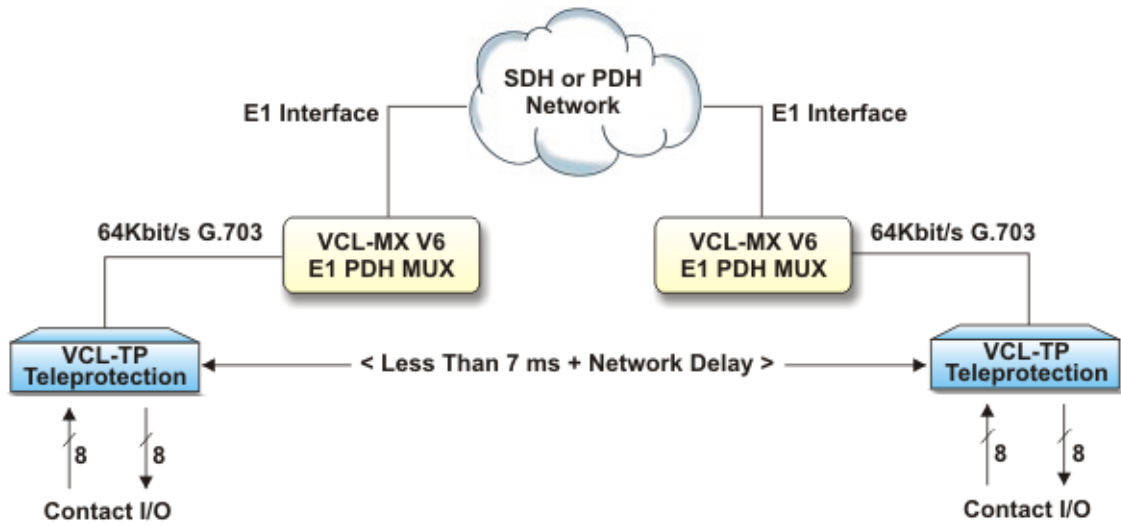
Figure # 4 – *Teleprotection - 64 kbit/s G.703 co-directional data channel over SDH / PDH Network*
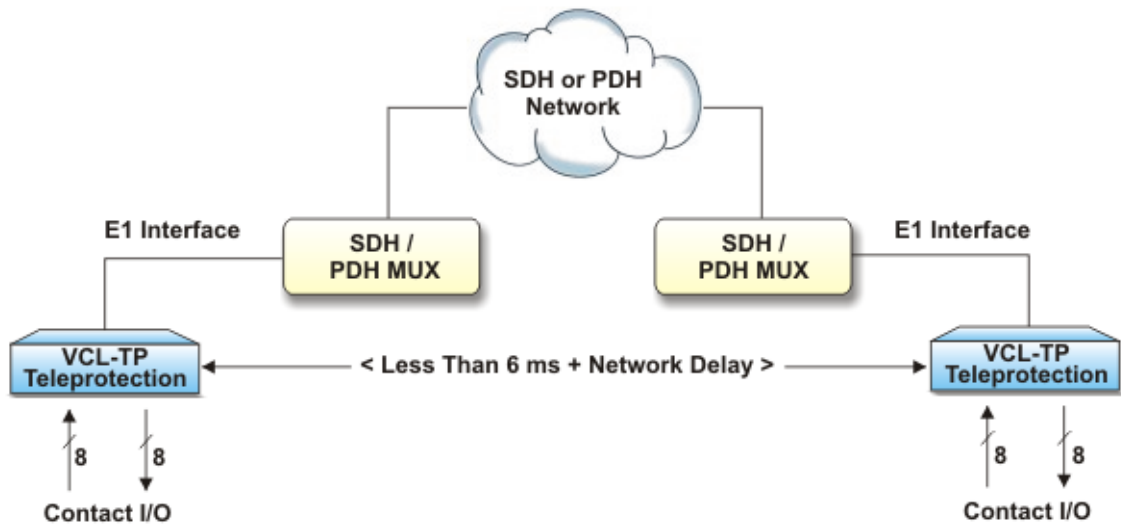
Figure # 5 – *Teleprotection over an E1 Interface*

Figure # 6 – *Teleprotection over an IP/MPLS Network*

Figure # 7 – *VCL-TP Teleprotection over redundant 1+1 C37.94 compliant links with IEC-61850 GOOSE support*

Note: *Available with 1+0 and 1+1 Redundant C37.94 Compliant Optical Interface options*

Figure # 8 – *VCL-TP Teleprotection over SDH / E1 PDH links with IEC-61850 GOOSE support*

Features and Benefits:

- Unrivaled Speed, Security and Reliability
- Use in a Standalone, Point-To-Point Application over C37.94; IP/MPLS; E1 and G.703 64kbps Transmission Links.
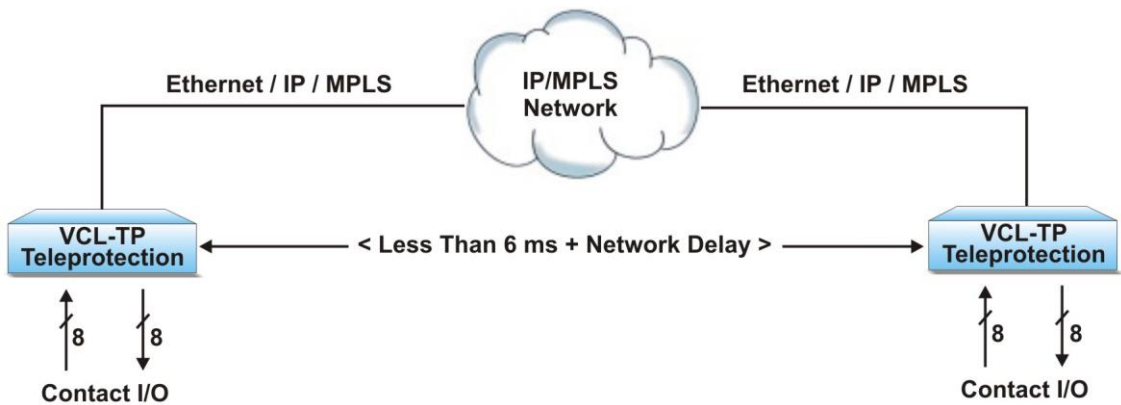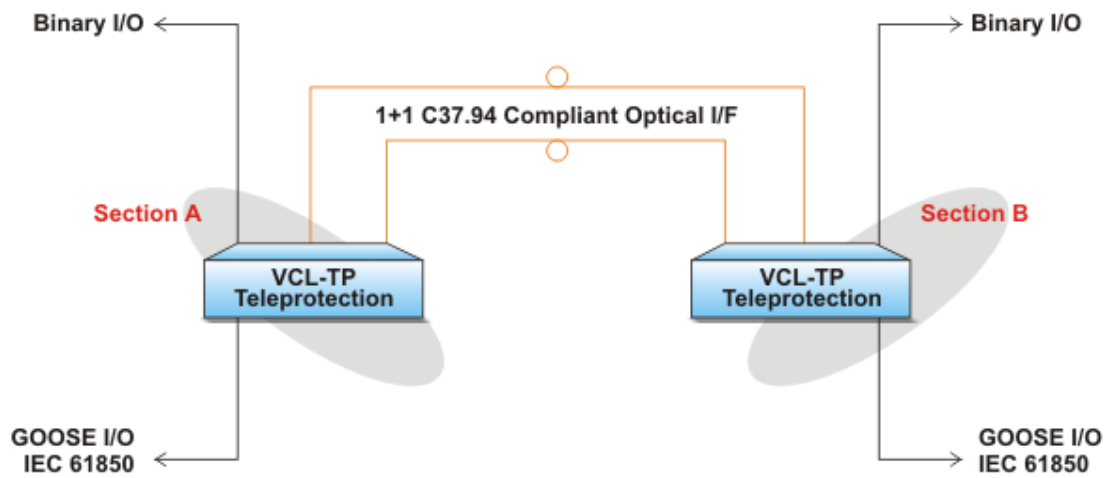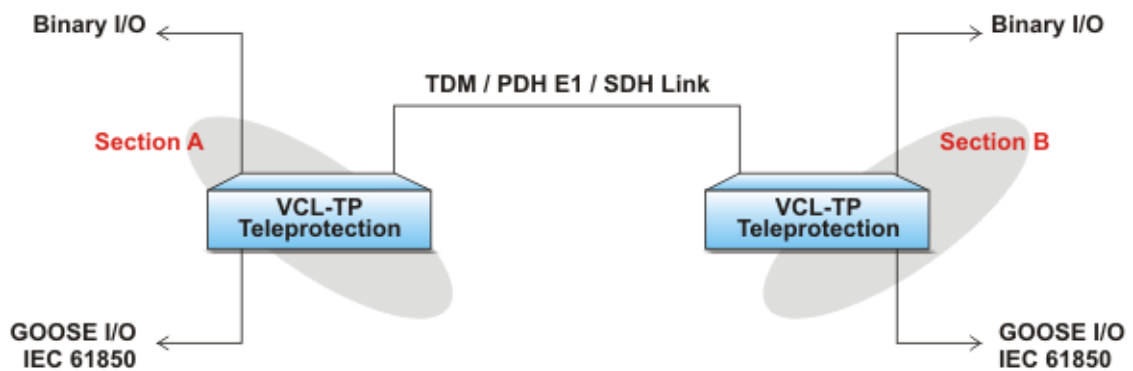- Use as an integrated part of the VCL-MX V6 E1 Voice and Data Multiplexer solution over an SDH or PDH data network
- 1+1 Route / Path Protection when used as an integrated part of the VCL-MX V6 E1 Voice and Data Multiplexer solution over an SDH or PDH data network
- Compact, standard 19-Inch Rack-mountable chassis
- Bi-directional Transmission of 8 command Inputs and 8 command outputs
- 8 Channel "Trip Counter Display"
- 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 and all applicable sections of IEC 60834-2 standards
- SNMPv2 management protocol for management and monitoring
- Optional - IEC 61850 GOOSE support. PSCH.1 Distance Protection Scheme as per IEC-61850.
- 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, ≤ 150 KM)
- IP/MPLS Network Interface to provide "Distance Protection" over IP/MPLS Network.
- 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
- Optional - 1+1 redundant optical path protection / route protection
- Optional - 1+1 Route / Path Protection between E1 + C37.94 Optical interfaces; or C37.94 + C37.94 Optical interfaces for point-to-point protected transmission links. "Automatic Fail-Over Switching" in the event of the failure of the Primary Link
- Available in 24VDC, 48VDC, 110VDC, 220VDC, 250VDC, 110V AC and 220V AC configurations.

Performance:

- Less than 2ms command transfer time.
- Less than 4ms relay operating time.
- Less than 6ms back-to-back operating time (including relay operating time) over IEEE C37.94 Optical Interface.
- Less than 7ms back-to-back operating time over IP/MPLS Interface. Typically, less than 6ms back-to-back operating time (including relay operating time).
- Less than 6ms back-to-back operating time (including relay operating time) over 2.048Mbps, E1 Interface.
- Less than 7ms back-to-back operating time (including relay operating time) over 64 kbps, G.703 Co-directional 4 wire data interface.

Flexibility and User Programmability:

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

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.

Event and Alarm Logging

- Time-Stamped Alarm Logging
- Time-Stamped Event Logging
- IRIG-B time synchronization option to synchronize time-stamps with GPS.
- NTP time synchronization option to synchronize time-stamps with NTP Server.
- IEEE-1588v2 time synchronization option to synchronize time-stamps with PTP Grandmaster.

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
- Web Interface
- 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 × 50 µþs)
- 2.5kV RMS - Contact Input / Output Hi-port dielectric strength
- Maximum Switching Voltage: 400V AC or 300V DC
- Optoisolated Command Inputs
- Optoisolated Relay Outputs
- Relays compliant with IEC-255-0-20 / VDE 0435, 0631, 0700, 40013847 standards
- Relays - Mechanical: 10,000,000 operations min. (at 18,000 operations/hour).

Error Detection and Coding

- Link Loss Detection
- LOS Detection

- Line Code Violation Detection
- Block Command Encoding as per IEEE C37.94 (for C37.94 optical links).

Technical Specifications:

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 ± 50 ppm
Code	HDB3
Nominal Impedance	120 Ohms balanced / 75 Ohms un-balanced (any one option only)
Peak Voltage of a mark For 120 Ohms Balanced interface 75 Ohms Unbalanced interface	3.0 V ± 0.3 V 2.37 V ± 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 / BNC (any one option only)

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

C37.94 Optical Fiber Interface - Option 1:

Optical Module Type	Connector	Fiber	Distance	Type	IEEE C37.94
SFP	LC	Multimode 850 nm, 1310 nm	≤ 500 m ≤ 2 Km	Laser	Fully Compliant

C37.94 Optical Fiber Interface - Option 2:

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

C37.94 Modulation Compliant Optical Fiber Interface - Option 3:

Optical Module Type	Connector	Fiber	Distance	Type	IEEE C37.94
SFP	LC	Single-mode 1310 nm, 1550 nm	≤ 40 Km, ≤ 80 Km, ≤ 120 Km ≤ 150 Km	Laser	Modulation Only

IP / MPLS Network Interface:

Number of Interfaces	1
Conformity	IEEE 802.3
Interface(s)	10/100baseT (Electrical Ethernet) – RJ45 100BaseFX Optical Ethernet - SFP

Command Voltage Options:

48V DC	110V DC	220V DC	250V DC

Teleprotection Inputs Commands

Command	Minimum Operating Command Voltage	Maximum Operating Command Voltage	Sense Off	Consumption on a digital input (W)
48V DC	41V DC	72V DC	< 25V DC	≤ 5mA @ 48V DC; < 0.24W
110V DC	75V DC	140V DC	< 60V DC	≤ 5mA @ 110V DC; < 0.55W
220V DC	172V DC	290V DC	< 140V DC	≤ 5mA @ 220V DC; < 1.1W
250V DC	172V DC	290V DC	< 140V DC	≤ 5mA @ 250V DC; < 1.25W

Teleprotection Outputs Commands:

Maximum Switching Voltage	400V AC or 300V DC
Closing Ability (W/VA)	91W / 1,000VA
Short time current (0.5 sec.)	20A
Crossing a continuous-current (A)	5A
Maximum breaking current at 220V DC	8A
Surge protection arrestor module	Built-in / Integrated, MOV Protected @ > 350 VDC

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"**

Command Transfer Time:

- Less than 2ms command transfer time

Relay Operating Time:

- Less than 4ms relay operating time

Back to Back Switching Time (including command transfer and relay operating time):

- Less than 6ms back-to-back operating time (including relay operating time) over IEEE C37.94 Interface.
- Less than 7ms back-to-back operating time over IP/MPLS Interface. Typically, less than 6ms back-to-back operating time (including relay operating time).
- Less than 6ms back-to-back operating time (including relay operating time) over G.703 E1, 2.048Mbps interface.
- Less than 7ms back-to-back operating time (including relay operating time) over G.703 E0, 64kbps, co-directional 4 wire data interface.

Time Clock:

- Built-in real time clock (RTC)
- IRIG-B / NTP / IEEE-1588v2 Time synchronization options.

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.
- Ethernet: As per IEEE 802.3 specifications

Teleprotection Standards and Compliances

- IEC 60834-1 and IEC 60834-2 (Teleprotection Command Systems)

Power Supply Options

- 24V DC, range 18V DC ~ 32V DC
- 48V DC, range 36V DC ~ 70V DC
- 110V DC / 125V DC, range 80V DC ~ 140V DC
- 220V DC / 250V DC, range 80V DC ~ 300V DC
- 110V AC / 220V AC, range 80V AC ~ 264V AC
- Voltage Withstand: Meets and exceeds IEC 834-1 and IEC 255 requirements.
- Dual / redundant power supply inputs and power supplies are also offered as an option.
- Short circuit protection
- Reverse power input protection.

Power Consumption

- < 18 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	-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 – Teleprotection Unit

Rack mounting	Standard 19-Inch. DIN Rack
Height	90.00 mm / 133mm – standard 2U* / 3U* high *Depending on the types of network interface*
Depth	260.00 mm.
Width	477.00 mm.
Weight	4 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

Ordering Information

BASE UNIT without Network Interface and PSUs

Part #	Description	Remarks
VCL-TP-1531	VCL-TeleProtection Terminal Equipment 19-Inch, Rack mountable Supports: - upto 8, 2-way independent-simultaneous command channels which may be configured to operate selectively or simultaneously over Optical / PDH / SDH network(s) - OAM [SNMP, Telnet (RJ45 Port) and Serial Port (USB and DB-9 COM Port)] - Graphical User Interface (GUI) and Network Management Software (NMS), System Core Cables, Installation Accessories, Documentation, System User Disk etc (Set) **[# Add IRIG-B / NTP / 1588 PTP Time synchronization (optional)]** **[# Add Network Interface]** **[# Add Power Supply]** **[# Select / Specify Command Voltage]** **[# Add Trip Counter Display (optional)]**	BASE UNIT without Network Interface and PSUs

 # Add IRIG-B / NTP /IEEE-1588v2 PTP Time Synchronization (Optional)

Part #	Description	Remarks
IRIG-B / NTP / 1588v2 PTP	IRIG-B / NTP / 1588v2 PTP Time Synchronization Option (50 Ohms BNC Input for IRIG-B)	Optional

Add Network Interface

Part #	Description	Remarks
1534	G.703 @ 64Kbps co-directional interface (RJ45)	
1546	2.048Mbps 120 Ohms E1 digital data interface (RJ45)	
1550	2.048Mbps 75 Ohms E1 digital data interface (BNC)	
1572-0850MM-FC	C37.94 protocol optical fiber 2Mbps, **0.5Km, 850nm, Multi-Mode (MM), Duplex FC,** interface	
1572-0850MM-ST	C37.94 protocol optical fiber 2Mbps, **0.5Km, 850nm, Multi-Mode (MM), Duplex ST,** interface	
1572-MM-FC	C37.94 protocol optical fiber 2Mbps, **2Km, 1310nm, Multi-Mode (MM), Duplex FC,** interface	
1572-MM-ST	C37.94 protocol optical fiber 2Mbps, **2Km, 1310nm, Multi-Mode (MM), Duplex ST,** interface	
1572-SM-FC	C37.94 protocol optical fiber 2Mbps, **20Km, 1310nm, Single-Mode (SM), Duplex FC,** interface	
1572-SM-ST	C37.94 protocol optical fiber 2Mbps, **20Km, 1310nm, Single-Mode (SM), Duplex ST,** interface	
1572R-0850MM-FC	1+1 redundant, C37.94 protocol optical fiber 2Mbps, **0.5Km, 850nm, Multi-Mode (MM), Duplex FC,** interface	
1572R-0850MM-ST	1+1 redundant, C37.94 protocol optical fiber 2Mbps, **0.5Km, 850nm, Multi-Mode (MM), Duplex ST,** interface	Any one option
1572R-MM-FC	1+1 redundant, C37.94 protocol optical fiber 2Mbps, **2Km, 1310nm, Multi-Mode (MM), Duplex FC,** interface	
1572R-MM-ST	1+1 redundant, C37.94 protocol optical fiber 2Mbps, **2Km, 1310nm, Multi-Mode (MM), Duplex ST,** interface	
1572R-SM-FC	1+1 redundant, C37.94 protocol optical fiber 2Mbps, **20Km, 1310nm, Single-Mode (SM), Duplex FC,** interface	
1572R-SM-ST	1+1 redundant, C37.94 protocol optical fiber 2Mbps, **20Km, 1310nm, Single-Mode (SM), Duplex ST**, interface	
1569	C37.94 protocol SFP based optical fiber interface (without SFP - the SFP must be ordered separately) **^ Select SFP Option from below [1 SFP per / each Card]**	
1569R	1+1 redundant, C37.94 protocol SFP based optical fiber interface (without SFP - the SFP must be ordered separately) **^ Select SFP Option from below [2 SFP per / each Card]**	
2432	IP / MPLS Network Interface - Includes both 10/100BaseT (Electrical) Ethernet and 100BaseFX (Optical) Ethernet options. **^ Select SFP Option from below [1 SFP per / each Card]**	

2405	1+1 redundant, automatic protection E1 / C37.94 interface
	- 1 x 2.048Mbps E1 digital data interface (RJ45 or BNC)
	- 1 x C37.94 protocol SFP based optical fiber interface
	    (without SFP - the SFP must be ordered separately)
	        ^ Select SFP Option from below [1 SFP per / each Card]	

| 2433-MM-ST | AVARA C37.94 protocol optical fiber interface. 1.5Km, 820nm, Multi-Mode (MM), TX/RX, ST Connector. | |

Add Power Supply Option

Part #	Description	Remarks
DC024	1 x (-) 24V DC Power Supply Input	Any one option
DC048	1 x (-) 48V DC Power Supply Input	
DC110	1 x 110V-125 V DC Power Supply Input	
DC220	1 x 220V-250V DC Power Supply Input	
DC024R	2 x (-) 24V DC 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]	
AC110	1 x 110V AC Power Supply Input	
AC220	1 x 220V AC Power Supply Input	
AC110R	2 x 110V AC Power Supply Input [Redundant]	
AC220R	2 x 220V AC Power Supply Input [Redundant]	

Specify Command Voltage

Part #	Description	Remarks
CV048	Command Voltages: -48V DC	110VDC-220VDC Command Voltage is field selectable
CV110-220	Command Voltages: 110-125V DC; 220-250V 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 1569 & 2 SFPs per UNIT for 1569R ONLY
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 0194TP	SFP Transceiver, Duplex LC, 1310nm, 40Km, SM (Single-Mode)	
VCL-EMOD 0348-TP	SFP Transceiver, Duplex LC, 1550nm, 40Km, SM (Single-Mode)	
VCL-EMOD 0217-TP	SFP Transceiver, Duplex LC, 1550nm, 80Km, SM (Single-Mode)	

Part #	Description	Remarks
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)	
VCL-EMOD 0171-TP	SFP Transceiver, Duplex LC, 1550nm, 180Km, SM (Single-Mode)	
VCL-EMOD 0244-TP	SFP Transceiver, Duplex LC, 1550nm, 200Km, SM (Single-Mode)	

 # Add Trip Counter Display - optional, if required

Part #	Description	Remarks
VCL-DISP-1599-1597-04-DC048	Trip Counter Display / Alarm Extension Unit - 8 x Trip (4 Input and 4 Output) Counter Display - 4 x User Assignable External Relay Alarm outputs 19-Inch, 2U High Rack mountable - 1 x (-) 48V DC Power Supply Input	External Trip Counter Display
VCL-DISP-1599-1597-04-DC048R	Trip Counter Display / Alarm Extension Unit - 8 x Trip (4 Input and 4 Output) Counter Display - 4 x User Assignable External Relay Alarm outputs 19-Inch, 2U High Rack mountable - 2 x (-) 48V DC Power Supply Inputs	
VCL-DISP-1599-1597-08-DC048	Trip Counter Display / Alarm Extension Unit - 16 x Trip (8 Input and 8 Output) Counter Display - 8 x User Assignable External Relay Alarm outputs 19-Inch, 2U High Rack mountable - 1 x (-) 48V DC Power Supply Input	
VCL-DISP-1599-1597-08-DC048R	Trip Counter Display / Alarm Extension Unit - 16 x Trip (8 Input and 8 Output) Counter Display - 8 x User Assignable External Relay Alarm outputs 19-Inch, 2U High Rack mountable - 2 x (-) 48V DC Power Supply Inputs	

Note 1: The Trip Counter Display and Alarm Extension Unit is an optional extra unit which interconnects with the main Teleprotection unit through an interconnecting cable (supplied with the Trip Counter Display and Alarm Extension Unit).

Note 2: The Trip Counter Display and Alarm Extension Unit may, or may not be ordered with the Teleprotection Equipment, depending upon the user requirements.

 # Add VCL-TP external feed-through terminal block panel optional, if required

Part #	Description	Remarks
VCL-HTER 1014-60IO	VCL-TP external feed-through terminal block with 60 (Point) Input / Output connection Panel 19-Inch, 2U High Rack mountable Version	External feed-through terminal block panel
VCL-HRNS 1294-03M	8 Point, Feed-through Connectorized Cable [8PINF/RA-Open, 3 meter] [6 cables required to order]	
VCL-HRNS 1294-10M	8 Point, Feed-through Connectorized Cable [8PINF/RA-Open, 10 meter] [6 cables required to order]	

Note:

Technical Specifications are subject to changes without notice.
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