

**Introduction:**

The VCL-6045, Quad (4x) IEEE C37.94 to E1 Converter is a ruggedized and robust, sub-station-hardened protocol converter that converts up to 4 x IEEE C37.94 interfaces to 4 x E1 interfaces. VCL-6045 supports point-to-point and point-to-multipoint applications for Differential and Distance Teleprotection.

The most common application for the VCL-6045 converter is for transmitting IEEE C37.94 data over an E1 network between sub-stations. By installing a VCL-6045 converter, the existing IEEE C37.94 interfaces from differential protection relays can be transmitted over the E1 network without incurring large capex or without the tiresome task of having to replace or rewire the IEEE C37.94 relays which need to be interconnected to the far end substations over E1 (SDH) transmission links.



VCL-6045 meets and complies with the IEC-61850-3, EMI, EMC, Surge and Temperature specifications making it suitable for sub-station installations to provide uninterrupted service even in the most demanding and harsh environments.

**Power Supply Options:**

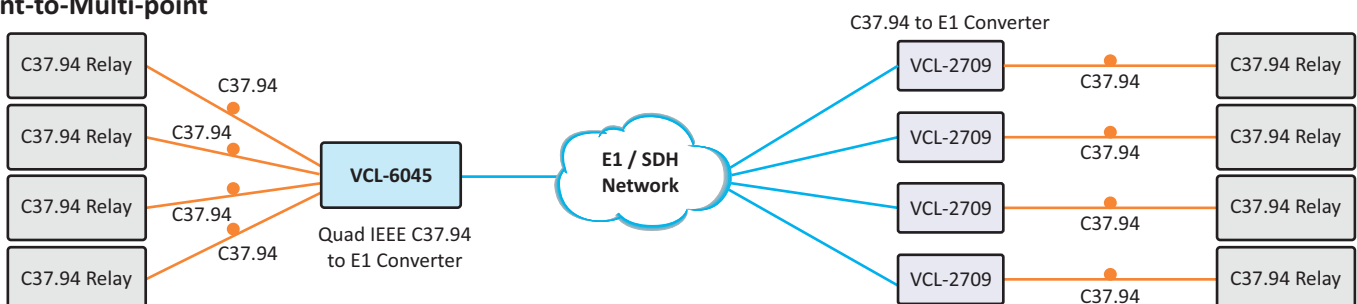
- 48V DC;
- 110V DC;
- 220V DC;
- 90~240V AC, 50/60Hz.

**Application Diagrams:**

**Point-to-Point**



**Point-to-Multi-point**



**Technical Specifications:**

**Connectors**

Power	Terminal Block, 2-PIN Supply Connector for DC C14 Connector for AC
IEEE C37.94 Interface	ST Connectors
E1 Interface	RJ45 (F) / BNC (F) Connector

**Chassis:**

- 1U, 19-Inch Rack Mountable.

**C37.94 Interface Specifications:**

Interfaces per unit	4 Tx, 4 Rx
Standards	IEEE C37.94
Optical Connector	ST
Optical Transmitter	LED
Optical	820nm/850nm Multi-Mode

**E1 Interface Specifications:**

Interfaces per unit	4
Conformity (electrical)	ITU-T G.703
Frame structure	As per ITU G.704
Code	HDB3, 50 % Duty Cycle
Nominal Impedance	120 Ohms Balanced 75 Ohms Unbalanced (Option)
Nominal pulse width	244 ns
Pulse mask	As per ITU Rec. G.703
Jitter tolerance	As per ITU G.823
Frame alignment	As per ITU G.732

**Latency:**

- 250us (i.e. 0.25ms) total, in an end-to-end (in a back-to-back) deployment.

**Environmental:**

Operating Temperature	-20°C to +60°C
Maximum Operating Humidity	95% R.H., Non-Condensing
Maximum Operating Altitude	Up to 3,000 meters above sea Level
Operation	ETS 300 019 Class 3.2
Storage Temperature	-40°C to +70°C
Storage Humidity	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	ETS 300 019 Class 2.3

**EMI, EMC, Surge Withstand and other Compliances:**

EN 50081-2	EN 50082-2	IEC 60068-2-29
IEC 61000-4-6 (Conducted Immunity)	IEC 60068-2-2	IEC 60068-2-78
CISPR 32 / EN55032 Class A (Conducted Emission and Radiated Emission)	IEC 60068-2-1	IEC 60068-2-14
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 61000-4-8
IEC 61000-4-3 (Radiated Immunity)	IEC 61000-4-2	IEC 61000-4-4

**Electromagnetic Standards Compliance:**

- EN 50081-2, EN 50082-2
- IEC 61000-6-2 (Immunity)
- IEC 61000-6-4 (Emission)
- Complies to IEEE and IEC standards

**CE Compliance:**

- Low Voltage Directive 2014/35/EU
- Electromagnetic Compatibility 2014/30/EU

**Other Regulatory Compliances:**

- RoHS, Meets CE requirements
- Complies with FCC Part 68 and EMC FCC Part 15
- Telcordia GR-1089 Surge and Power Contact

**Management:**

- 1 x RJ45 Interface (10/100BaseT)
- Telnet (with clear text disable option),
- SSH,
- SNMPv2,
- 1 x Serial USB.

Technical specifications are subject to changes without notice.  
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Revision – 1.4A, April 11, 2022

**Mechanical Specifications:**

- H x W x D : 44 x 484 x 390 MM
- 1U, 19 inch rack mountable
- Weight: 2.3 Kgs.

**Ordering Information (Base Unit):**

Part No.:	Description:
VCL-6045	Quad (4x) IEEE C37.94 to E1 Converter for Differential and Distance Teleprotection 19-Inch Rack Mountable Supports: - 4 x C37.94, Tx, 820nm, MM, ST - 4 x C37.94, Rx, 820nm, MM, ST - [# Add E1 Option] - [# Add Power Supply Option] Installation Kit: - System Core Cables, Mounting Hardware, Documentation.

**# Add E1 Option:**

120	4 x 120 Ohms 2.048Mbps E1 (RJ45 Female)
075	4 x 75 Ohms 2.048Mbps E1 (BNC Female)

**# Add Power Supply Option:**

DC048	1 x 48V DC (18V to 60V) Power Supply Input
DC110	1 x 110V (90V to 250V) DC Power Supply Input
DC220	1 x 220V (90V to 250V) DC Power Supply Input
AC220	1 x 100-240V, 50/60Hz AC Power Supply Input
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)
AC220R	2 x 100-240V, 50/60Hz AC Power Supply Input (Redundant)

**\*Add Accessories:**

VCL-HRNS 1326	Optical Patch Cord Connectorized Cable [2ST-2ST, 3m, Multi-Mode]
VCL-HRNS 1011	E1 Cross Connectorized Cable [RJ45M-RJ45M, 3 meter]
VCL-HRNS 1247-003	75 Ohm Connectorized Cable [BNCM-BNCM, 3 meter]

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