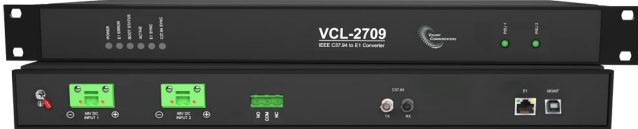


**Introduction:**

The **VCL-2709, IEEE C37.94 to E1 Converter** is a ruggedized and robust, sub-station-hardened protocol converter that converts IEEE C37.94 data to E1 data. VCL-2709 supports point-to-point applications.



**1U high, standard 19-inch Rack Mount Version**

VCL-2709, IEEE C37.94 to E1 equipment includes precise clock recovery and clock re-generation functions which allows the transmission of IEEE C37.94 channels over an E1/SDH network for error free transmission.

VCL-2709 is available in DIN Rail mount version and 1U high, standard 19-inch rack mount version.



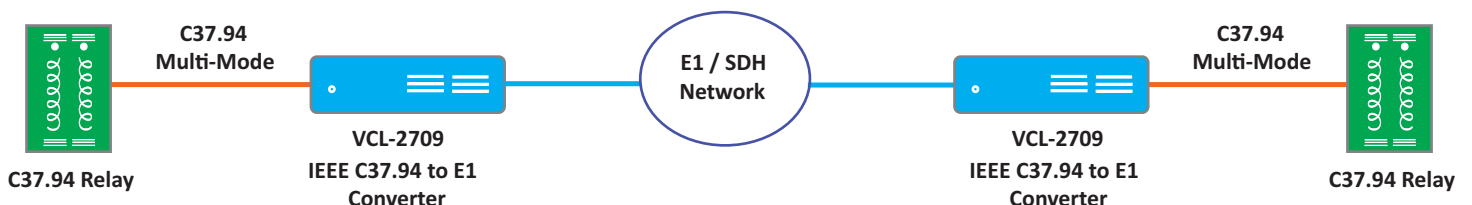
**DIN Rail Mount Version**

The most common application for the VCL-2709 converter is for augmenting legacy IEEE C37.94 data transmission over an E1 network between two sub-stations. By installing a VCL-2709 converter, the existing IEEE C37.94 interfaces from 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.

- Number of C37.94 interfaces per card: 1
- Number of interfaces: 1 E1 (2.048 Mbit/s) Interface (Electrical G.703)

VCL-2709 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.

**Application Diagram:**



**Technical Features:**

**Connectors:**

- Power: Terminal Block, 2-PIN Supply Connector
- IEEE C37.94 Interface: ST Connector / LC Connector (SFP)
- E1 Interface: RJ45 (F) / BNC (F) Connector

**Power Supply:**

- Internal: 48V DC (18V to 60V DC)
- External Adapters: 110V DC, 220V DC, 100~240V AC

**C37.94 Interface Specifications:**

|                     |   |
|---------------------|---|
| Interfaces per card | 1 Tx, 1 Rx  |
| Standards           | IEEE C37.94   |
| Optical connector   | ST or LC (SFP)                                      |
| Optical Transmitter | LED   |
| Optical             | 820nm/850nm Multi-Mode<br>1310nm/1550nm Single-Mode |

**E1 Interface Specifications:**

|                         |   |
|-------------------------|---|
| Number of interfaces    | 1 E1 Interface                            |
| Conformity (electrical) | G.703                                     |
| Frame structure         | As per ITU (CCITT) G.704                  |
| Code                    | HDB3, 50 % Duty Cycle                     |
| Nominal Impedance       | 120 Ohms balanced /<br>75 Ohms Unbalanced |
| Nominal pulse width     | 244 ns                                    |
| Pulse mask              | As per ITU (CCITT) Rec. G.703             |
| Jitter tolerance        | As per ITU (CCITT) G.823                  |
| Frame alignment         | As per ITU (CCITT) G.732                  |

**Regulatory Compliances:**

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

**MTBF:**

- Per MIL-HDBK-217F: ≥ 37 years @ 24C
- Per Telcordia SSR 332, Issue 1: ≥ 42 years @ 24C

**Chassis:**

- DIN Rail Mounting
- 1U high, 19-inch Rack Mounting

**Technical Specification:****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        | -40C to +70C                       |
| Storage                    | 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<br>(Conducted Immunity)                                    | IEC 60068-2-2 |                |
| IEC 60068-2-78   | IEC 60068-2-1 | IEC 60068-2-14 |
| CISPR 32 / EN55032 Class A<br>(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 61000-4-2  |
| IEC 61000-4-3<br>(Radiated Immunity)                                     | IEC 61000-4-8 | IEC 61000-4-4  |
| Telcordia GR-1089 Surge and Power Contact                                |               |                |

**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

**Mechanical Specifications:****DIN Rail Mount Version**

- H x W x D: 72.0mm x 190.0mm x 177.0mm
- Weight: 1.5 KG

**1U, 19-inch Rack Mount Version**

- H x W x D: 44.0mm x 484.0mm x 177.0mm
- Weight: 3.0 KG

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Technical specifications are subject to changes without notice.

Revision – 2.5, April 16, 2021

**Ordering Information:**

| Part No.:       | Description  |
|-----------------|--|
| VCL-2709-DIN-ST | IEEE C37.94 to E1 Converter<br>DIN Rail Mount Version<br>- 1 x C37.94, Tx, 820nm, MM, ST<br>- 1 x C37.94, Rx, 820nm, MM, ST  |
| VCL-2709-DIN-LC | IEEE C37.94 to E1 Converter<br>DIN Rail Mount Version<br>- 1 x IEEE C37.94 modulation<br>820nm/1310nm/1550nm Optical Interface<br><b>(SFP to be ordered separately)</b>      |
| VCL-2709-RAC-ST | IEEE C37.94 to E1 Converter<br>19-Inch, Rack Mount Version<br>- 1 x C37.94, Tx, 820nm, MM, ST<br>- 1 x C37.94, Rx, 820nm, MM, ST   |
| VCL-2709-RAC-LC | IEEE C37.94 to E1 Converter<br>19-Inch, Rack Mount Version<br>- 1 x IEEE C37.94 modulation<br>820nm/1310nm/1550nm Optical Interface<br><b>(SFP to be ordered separately)</b> |

**[# Add E1 and Power Supply]**

- Management: Serial Interface (USB)
- Installation Kit: System Core Cables, Mounting Hardware, Documentation, User Manual

**Select SFP option from below:**

|                      |   |
|----------------------|---|
| VCL-EMOD<br>0469-C37 | SFP Transceiver, Duplex LC,<br>14dB, 820nm, 1 Mile / 2Km, MM    |
| VCL-EMOD<br>0193-C37 | SFP Transceiver, Duplex LC,<br>13dB, 1310nm, 9 Miles / 15Km, SM |

**Add E1 Option (Any One):**

|     |                                |
|-----|--------------------------------|
| 120 | 1 x E1 (120 Ohms, RJ45 F) port |
| 075 | 1 x E1 (75 Ohms, 2xBNC F) port |

**Add Power Supply Option - DIN Rail:**

|          |  |
|----------|--|
| DC018060 | 1 x 18~60V DC (48V DC nominal)<br>Power Supply Input |
|----------|--|

**Add Power Supply Option - 19-inch Rack: (Any One)**

|        |  |
|--------|--|
| AC220  | 1 x 110~240V AC Power Supply Input             |
| AC220R | 2 x 110~240V AC Power Supply Input [Redundant] |
| DC048  | 1 x 48V DC Power Supply Input                  |
| DC220  | 1 x 110~250V DC Power Supply Input             |
| DC048R | 2 x 48V DC Power Supply Input [Redundant]      |
| DC220R | 2 x 110~250V DC Power Supply Input [Redundant] |

**Add Power Supply Option - DIN Rail (Optional):**

|                        |   |
|------------------------|---|
| VCL-EMOD<br>0444-AC220 | External Power Supply - DIN Rail Mount<br>Power Supply (External) AC to DC Converter,<br>DRL30-24-1, DIN Rail Mount:<br>- Input: 1 x AC Input [90~240V AC, 50-60Hz]<br>- Output: 1 x DC Output [24VDC~1.25A, 30W] |
| VCL-EMOD<br>0444-DC220 | External Power Supply - DIN Rail Mount<br>Power Supply (External) DC to DC Converter,<br>DRL30-24-1, DIN Rail Mount:<br>- Input: 1 x DC Input [110~250V DC]<br>- Output: 1 x DC Output [24VDC~1.25A, 30W]         |

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