**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.

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.

**Technical Features:**

**Connectors:**

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

**Chassis:**

- DIN Rail Mounting.

**Power Supply:**

- Power Supply Options (Internal): 24V DC, 48V DC
- Power Supply Options (External Adapters): 110V DC and 220V DC.

**C37.94 Interface Specifications:**

<table>
<thead>
<tr>
<th>Interfaced per card</th>
<th>1 Tx, 1 Rx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards</td>
<td>IEEE C37.94</td>
</tr>
<tr>
<td>Optical connector</td>
<td>ST or LC (SFP)</td>
</tr>
<tr>
<td>Optical Transmitter</td>
<td>LED or Laser</td>
</tr>
</tbody>
</table>

- Optical: 820nm/850nm Multi-Mode 1310nm/1550nm Single Mode (Modulation as per IEEE C37.94)

**E1 Interface Specifications:**

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

---

**Application Diagram:**
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: Complies with ETS 300 019 Class 3.2
- Storage Temperature: -40°C to +70°C
- 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

EMI, EMC, Surge Withstand and other Compliances
- EN 50081-2
- IEC 61000-4-6 (Conducted Immunity)
- IEC 60068-2-78
- CISPR 22 / EN55022 Class A
  (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 61000-4-3 (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)

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 A
- Operation ETS 300 019 Class 3.2
- Transportation ETS 300 019 Class 2.3

Ordering Information (Base Unit):

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCL-2709-ST</td>
<td>VCL-2709, IEEE C37.94 to E1 Converter</td>
</tr>
<tr>
<td></td>
<td>DIN Rail Mounting Version</td>
</tr>
<tr>
<td></td>
<td>Supports:</td>
</tr>
<tr>
<td></td>
<td>- 1 x C37.94 (ST Connector)</td>
</tr>
<tr>
<td></td>
<td>Add E1 and Power Supply from below:</td>
</tr>
<tr>
<td>VCL-2709-LC</td>
<td>VCL-2709, IEEE C37.94 to E1 Converter</td>
</tr>
<tr>
<td></td>
<td>DIN Rail Mounting Version</td>
</tr>
<tr>
<td></td>
<td>Supports:</td>
</tr>
<tr>
<td></td>
<td>- 1 x C37.94 (SFP)</td>
</tr>
<tr>
<td></td>
<td>Add E1 and Power Supply from below:</td>
</tr>
</tbody>
</table>

Add E1 Option:
- 120 1 x 120 Ohms E1 (RJ45 Female)
- 075 1 x 75 Ohms E1 (BNC Female)

Add Power Supply Option:
- DC024 1 x 24V DC (9V~36V) Power Supply Input
- DC048 1 x 48V DC (40V~60V) Power Supply Input
- DC110 1 x 110V DC (90V~250V) Power Supply Input
  (External Adaptor)
- DC220 1 x 220V (90V~250V) DC Power Supply Input
  (External Adaptor)
- AC220 1 x 100-240V, 50/60Hz AC Power Supply Input
  (External Adaptor)

Add Accessories:
- VCL-HRNS 1292 Optical Patch Cord Connectorized Cable [ST-FC, 3m, Multi Mode]
- VCL-HRNS 1301 Optical Patch Cord Connectorized Cable [ST-LC, 3m, Multi Mode]

Technical specifications are subject to changes without notice.
All brand name and trademarks are the property of their respective owners.
Revision – 1.8, January 05, 2020