CAEN will repair or replace any product within the guarantee period if the Guarantor declares that the product is defective due to workmanship or materials and has not been caused by mishandling, negligence on behalf of the User, accident or any abnormal conditions or operations.

CAEN declines all responsibility for damages or injuries caused by an improper use of the Modules due to negligence on behalf of the User. It is strongly recommended to read thoroughly the CAEN User’s Manual before any kind of operation.

CAEN Technologies reserves the right to change partially or entirely the contents of this Manual at any time and without giving any notice.

Disposal of the Product
The product must never be dumped in the Municipal Waste. Please check your local regulations for disposal of electronics products.
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1. General description

1.1 Overview

All VME 8100 series crates are presented into a 19” x 8U (6+2) enclosure, with 21 slot for 6U x 160mm VME modules. Pluggable Power Supplies, with different configurations, allows up to 2500 W output. Both VME64 and VME64X compliant monolithic backplanes are available. 2U tray is available for Pluggable Fan Unit.

Safety features include: short circuit protection, Over / Undervoltage protection, Over temperature protection. Remote monitoring and control take place through CAN bus, Ethernet, USB and RS232 interfaces. The crates are also SBC controlled via graphic OLED Display, provides Automatic Daisy Chain and supports Chained Block Transfers (CBLT). User-friendly control software completes the VME 8100 features.

The crate is based on a modularity concept and it has been divided into three detachable parts

- The Subrack (Bin + Backplane): Mod V8100XX (8U Bin, 21 slot monolithic backplane, (VME64, VME64X J1/J2, VME64X J1/J0/J2)
- The Power Supply: Models V81XX VME Power supply (5V 110/220A, +/−12V 20/40A, 3.3V 110/220V)
- The ventilation and control unit (Fan Tray): Mod A8160 Smart VME Fan Unit, 3-fold fan tray, alphanumeric display with TCP-IP, CANbus, RS232 and USB 2.0

The Unit is powered by 92 ÷264 Vac, 50 ÷ 60 Hz, power factor 0.98% (230VAC).
Fig. 1.1: The Mod. VME8100 21-slot 8U VME64 crate

Table 1.1: Mod. Model VME8100 versions

<table>
<thead>
<tr>
<th>Backplane</th>
<th>Description</th>
<th>Ordering Code</th>
<th>+5V</th>
<th>+12V</th>
<th>-12V</th>
<th>+3.3V</th>
</tr>
</thead>
<tbody>
<tr>
<td>VME64</td>
<td>VME64 8U crate, 21 slot J1/J2, smart fan unit</td>
<td>WV8100VME000</td>
<td>110 A</td>
<td>20 A</td>
<td>20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME002</td>
<td>110 A</td>
<td>40 A</td>
<td>40 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME001</td>
<td>220 A</td>
<td>20 A</td>
<td>20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME003</td>
<td>220 A</td>
<td>40 A</td>
<td>40 A</td>
<td></td>
</tr>
<tr>
<td>VME64X</td>
<td>VME64X 8U crate, 21 slot J1/J2, smart fan unit</td>
<td>WV8100VME004</td>
<td>110 A</td>
<td>20 A</td>
<td>20 A</td>
<td>110 A</td>
</tr>
<tr>
<td>J1/J2</td>
<td></td>
<td>WV8100VME006</td>
<td>110 A</td>
<td>20 A</td>
<td>20 A</td>
<td>220 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME008</td>
<td>110 A</td>
<td>40 A</td>
<td>40 A</td>
<td>110 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME005</td>
<td>220 A</td>
<td>20 A</td>
<td>20 A</td>
<td>110 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME010</td>
<td>110 A</td>
<td>40 A</td>
<td>40 A</td>
<td>220 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME007</td>
<td>220 A</td>
<td>20 A</td>
<td>20 A</td>
<td>220 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME009</td>
<td>220 A</td>
<td>40 A</td>
<td>40 A</td>
<td>110 A</td>
</tr>
<tr>
<td>VME64X</td>
<td>VME64X 8U crate, 21 slot J1/J0/J2, smart fan unit</td>
<td>WV8100VME011</td>
<td>110 A</td>
<td>20 A</td>
<td>20 A</td>
<td>110 A</td>
</tr>
<tr>
<td>J1/J0/J2</td>
<td></td>
<td>WV8100VME013</td>
<td>110 A</td>
<td>20 A</td>
<td>20 A</td>
<td>220 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME015</td>
<td>110 A</td>
<td>40 A</td>
<td>40 A</td>
<td>110 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME012</td>
<td>220 A</td>
<td>20 A</td>
<td>20 A</td>
<td>110 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME017</td>
<td>110 A</td>
<td>40 A</td>
<td>40 A</td>
<td>220 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME014</td>
<td>220 A</td>
<td>20 A</td>
<td>20 A</td>
<td>220 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WV8100VME016</td>
<td>220 A</td>
<td>40 A</td>
<td>40 A</td>
<td>110 A</td>
</tr>
</tbody>
</table>
# 2. Technical specifications

## 2.1 Technical specification table

<table>
<thead>
<tr>
<th>Mechanics</th>
<th>8U bin for 6U x 160 mm VME cards, 21 slots, 2U space for fan tray</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backplane</td>
<td>VME64 J1/J2, VME64X J1/J2 – J1/J0/J2 Automatic daisy chain, CBLT compliant</td>
</tr>
<tr>
<td>Mains input</td>
<td>Auto range: 92 +264 Vac, 50÷60 Hz, inrush current: &lt;16 A @ 230 Vac power. fact. &gt; 0.98 @ Output Power &gt; 1 kW</td>
</tr>
<tr>
<td>Maximum Total Output Power</td>
<td>1200 W @ 100 Vac 2530 W @ 211 Vac</td>
</tr>
<tr>
<td>Interface</td>
<td>RS 232, USB (2.0), CAN bus, Ethernet</td>
</tr>
<tr>
<td>Fuse</td>
<td>External 16 A, type B/C</td>
</tr>
<tr>
<td>Output power</td>
<td>110/220 A @ +5 V, 20/40A @ +/-12 V, 110/220 A @ +3.3 V</td>
</tr>
<tr>
<td>Isolation</td>
<td>CE acc. to EN 60950</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>&lt; 10 mV for 0-100% load change @ +5 V  &lt; 10 mV for 0-100% load change @ +3.3 V  &lt; 15 mV for 0-100% load change @ +/-12 V</td>
</tr>
<tr>
<td>Efficiency</td>
<td>75% + 85% @ 230 Vac configuration dependent</td>
</tr>
</tbody>
</table>

### Noise and ripple

<table>
<thead>
<tr>
<th>+5 V, +3.3 V</th>
<th>&lt; 10 mVpp, &lt;2 mVrms&lt;sup&gt;(1)&lt;/sup&gt;  Typ: 6.0 mVpp, 1.5 mVrms&lt;sup&gt;(1)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>+/-12 V</td>
<td>&lt; 10 mVpp, &lt;2 mVrms&lt;sup&gt;(1)&lt;/sup&gt;  Typ: 4.5 mVpp, 1.0 mVrms&lt;sup&gt;(1)&lt;/sup&gt;  &lt; 10 mVpp, &lt;1.5 mVrms&lt;sup&gt;(2)&lt;/sup&gt;  Typ: 5.5 mVpp, 0.5 mVrms&lt;sup&gt;(2)&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

### Temperature sensors

<table>
<thead>
<tr>
<th>Power Supply Control: nr. 1  FAN Unit: nr. 1  Backplane: nr. 8 (optional)</th>
</tr>
</thead>
</table>

### Over Voltage Protection

Trip Off when the output voltage > 103% ÷ 120% (programmable) of set voltage

### Under Voltage Protection

Trip Off when the output voltage < 80% ÷ 97% (programmable) of set voltage

### Over Current Protection

Trip Off when the current > programmable Iset value

### Over Temperature Protection

Trip Off when the temperature of a single Power Supply block > 90°C  Signaled:

- temperature FAN Unit > 50°C
- temperature Power Supply Control > 65°C

### Operation

0÷50°C without derating,

### Cooling Airflow:

540 m³/h (at maximum fan speed)

### Firmware

VME8100 firmware can be upgraded via Ethernet

---

<sup>(1)</sup> Measured at the Output connector (full load).
<sup>(2)</sup> Measured at load (0.5 m wire). Load conditions: full; parallel (X) 330µF and 1µF ceramic; conducting to case (Y) 100nF polyester each line.
2.2 Technical drawings

Fig. 2.1: Mod. VME8100 Front view

Fig. 2.2: Mod. VME8100 Rear view (Power Supply removed)
Fig. 2.3: Mod. VME8100 Top view (Power Supply removed)

Fig. 2.4: Mod. V81XX Power Supply Front view

Fig. 2.5: Mod. V81XX Power Supply Rear view
Fig. 2.6: Mod. V81XX Power Supply Left and Top view

Fig. 2.7: Mod A8160 Smart VME Fan Unit Front view

Fig. 2.8: Mod A8160 Smart VME Fan Unit Top view
3. VME8100 Subrack (Bin + Backplane):

3.1 Mechanical Design

The VMEbus is designed for 19-inch rack technology and supports bus lengths of up to 21 slots. In this system, slot 1 is the leftmost, with the rest of the bus extending to the right.

3 Subrack versions are available:

**VME64:**

VME64 8U Bin, 21 slot monolithic backplane, J1/J2, ADC CBLT compatible
(Ordering code WV8100MV64AA)

**VME64X:**

VME64X 8U Bin, 21 slot monolithic backplane, J1/J2, ADC CBLT compatible
(Ordering code WV8100MV64XN)

VME64X 8U Bin, 21 slot monolithic backplane, J1/J0/J2, ADC CBLT compatible
(Ordering code WV8100MV64XP)

![Fig. 3.1: Mod VME8100 Subrack (Bin + Backplane) front view](image-url)
3.2 VME8100 Backplane

Fig. 3.2: Mod VME8100 Backplane view from SMD components side

VME8100 Backplane technical features
- monolithic
  - VME64 J1/J2,
  - VME64X J1/J2
  - VME64X J1/J0/J2
- 21 slot
- 10 layers (see Fig. 3.3)
- Strip line technology for maximum data rates (320Mbyte/s, 64bit)
- Actively terminated
- Electrical automatic daisy chain
- CBLT Compliant
- Equipped with 8 temperature sensors (optional)
3.3 VME8100 Bin Power connector

---

**Fig. 3.3: Mod VME8100 Backplane Layer stack-up**

---

**Fig. 3.4: Mod VME8100 Bin power connectors VME64**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>10, 11, 13, 14, 15</td>
<td>6mm, 100A max</td>
</tr>
<tr>
<td>1, 2,</td>
<td>8mm, 230A max</td>
</tr>
</tbody>
</table>
Fig. 3.5: Mod VME8100 Bin power connectors VME64X

<table>
<thead>
<tr>
<th>Pin</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>10, 11, 13, 14, 15, 16, 17, 18</td>
<td>6mm, 100A max</td>
</tr>
<tr>
<td>1, 2, 7, 8</td>
<td>8mm, 230A max</td>
</tr>
</tbody>
</table>
4. Power Supply section

The CAEN VME Power Supply Models. V81XX (see Fig. 4.1 and Table 4.1) are micro-processor controlled switching power supplies, which provides extremely low noise output voltage.

Table 4.1: Model V8101 – V8111

<table>
<thead>
<tr>
<th>Ordering Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WV8101AAAAAA</td>
<td>VME Power supply (5V 110A, +/-12V 20A)</td>
</tr>
<tr>
<td>WV8102AAAAAA</td>
<td>VME Power supply (5V 220A, +/-12V 20A)</td>
</tr>
<tr>
<td>WV8103AAAAAA</td>
<td>VME Power supply (5V 110A, +/-12V 40A)</td>
</tr>
<tr>
<td>WV8104AAAAAA</td>
<td>VME Power supply (5V 220A, +/-12V 40A)</td>
</tr>
<tr>
<td>WV8105AAAAAA</td>
<td>VME Power supply (5V 110A, +/-12V 20A, 3.3V 110A)</td>
</tr>
<tr>
<td>WV8106AAAAAA</td>
<td>VME Power supply (5V 220A, +/-12V 20A, 3.3V 110A)</td>
</tr>
<tr>
<td>WV8107AAAAAA</td>
<td>VME Power supply (5V 110A, +/-12V 20A, 3.3V 220A)</td>
</tr>
<tr>
<td>WV8108AAAAAA</td>
<td>VME Power supply (5V 220A, +/-12V 20A, 3.3V 220A)</td>
</tr>
<tr>
<td>WV8109AAAAAA</td>
<td>VME Power supply (5V 110A, +/-12V 40A, 3.3V 110A)</td>
</tr>
<tr>
<td>WV8110AAAAAA</td>
<td>VME Power supply (5V 220A, +/-12V 40A, 3.3V 110A)</td>
</tr>
<tr>
<td>WV8111AAAAAA</td>
<td>VME Power supply (5V 110A, +/-12V 40A, 3.3V 220V)</td>
</tr>
</tbody>
</table>

Fig. 4.1: Mod. V81XX Power Supplies Front an Rear view

the VME8100 power supplies are composed of the following modules (see Fig. 4.2.)
- Power Factor Correction module (PFC)
- Power modules
- Power supply controller

The power modules are readily replaceable. The maximum output power is 1200÷2530W with 92 ÷ 264 V input voltage.


### Table 4.2: Available Power Modules:

<table>
<thead>
<tr>
<th>Type</th>
<th>Vout</th>
<th>Current (max)</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single / 2V ÷ 7V</td>
<td>+(2V ÷ 7V)</td>
<td>115 A</td>
<td>550W</td>
</tr>
<tr>
<td>Twin / ±7V ÷ 16V</td>
<td>+(7V ÷ 16V)</td>
<td>23 A</td>
<td>550W</td>
</tr>
<tr>
<td></td>
<td>-(7V ÷ 16V)</td>
<td>23 A</td>
<td>550W</td>
</tr>
</tbody>
</table>

#### 4.1 Power Connector section

![Fig. 4.2: Mod. V81XX Power Supplies components](image)

**Fig. 4.2: Mod. V81XX Power Supplies components**

![Fig. 4.3: Mod. V81XX Power connector](image)

**Fig. 4.3: Mod. V81XX Power connector**
Fig. 4.4: Mod. V81XX VME64 configuration

Fig. 4.5: Mod. V81XX VME64X configuration

Table 4.3: Mod. V81XX Voltages and power modules configurations

<table>
<thead>
<tr>
<th>Location</th>
<th>VME64</th>
<th>VME64X</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voltage</td>
<td>Power Module</td>
</tr>
<tr>
<td>V0</td>
<td>+5 V</td>
<td>2V ~ 7V</td>
</tr>
<tr>
<td>V1</td>
<td>+12 V</td>
<td>±7V ~ 16V</td>
</tr>
<tr>
<td>V2</td>
<td></td>
<td>3.3 V</td>
</tr>
<tr>
<td>V3</td>
<td></td>
<td>3.3 V</td>
</tr>
<tr>
<td>V4</td>
<td>-12 V</td>
<td>±7V ~ 16V</td>
</tr>
<tr>
<td>V5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.2 VME8100 Power distribution

Table 4.4: Mod. VME8100 Max current per slot

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Max Current per slot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VME64 J1/J2</td>
</tr>
<tr>
<td>+5V</td>
<td>10.5 A</td>
</tr>
<tr>
<td>+12V</td>
<td>1.9 A</td>
</tr>
<tr>
<td>-12V</td>
<td>1.9 A</td>
</tr>
<tr>
<td>+3.3V</td>
<td>10.5 A</td>
</tr>
</tbody>
</table>

4.3 Power Factor Correction Module (PFC)

The mains input includes a Power Factor Correction Module (PFC) with main filters, soft start- circuit and fuses. an external fuse or circuit breaker has to be installed with a capability of 16A.

The AC input module is permanently powered after connecting the unit to the AC- mains. Switch ON/OFF activates only the DC on/off function of the power inverter modules.

Turning on the power supply all voltages reach the nominal values nearly simultaneously within 50 ms whereby the voltage versus time curve shows a monotonic behavior. The start-off-time which corresponds to a value of 10% of the nominal voltages is reached after 50 ms. The turn-on inrush current is limited by a soft start-circuit to a maximum value of 16 A.

The power modules are readily replaceable. The maximum output power is 1200+2530W with 92 ÷ 264 Vac input voltage.

4.4 Mains Voltage and Connection

The Power supplies are equipped with a “World”- mains input, which works properly from 92Vac up to 264Vac and within a frequency range of 50 to 60Hz. Before connecting to the mains please double-check correspondence. Mains input connection at the power supply side is done with a 3-pin “Hirschmann” 16 A connector or power terminals.

![Hirschmann Connector](image)
### Table 4.5: Hirschmann connector cabling

<table>
<thead>
<tr>
<th>Hirschmann pin nr.</th>
<th>Signal</th>
<th>Description</th>
<th>Color of the Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>L</td>
<td>Phase</td>
<td>black or brown</td>
</tr>
<tr>
<td>Pin 2</td>
<td>N</td>
<td>Return, Neutral</td>
<td>blue</td>
</tr>
<tr>
<td>Pin 3</td>
<td></td>
<td>not connected</td>
<td></td>
</tr>
<tr>
<td>Earth</td>
<td>PE</td>
<td>Protective Earth</td>
<td>green/yellow</td>
</tr>
</tbody>
</table>

### 4.5 Power Supply specifications

#### 4.5.1 Power Factor Correction Module

#### Table 4.6: Mod. VME8100 4.1 Power Factor Correction Module specifications

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Range</td>
<td>92 ÷ 264 Vac</td>
</tr>
<tr>
<td>Frequency</td>
<td>50 ÷ 60 Hz</td>
</tr>
<tr>
<td>Inrush Current</td>
<td>&lt;16 A @ 230 Vac</td>
</tr>
<tr>
<td>Fuse</td>
<td>External 16A type B/C</td>
</tr>
<tr>
<td>Power Factor</td>
<td>&gt; 0.98 @ Output</td>
</tr>
<tr>
<td>Output</td>
<td>Power &gt; 1 kW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Total Output Power</td>
<td>1200 W @ 100 Vac</td>
</tr>
<tr>
<td></td>
<td>2530 W @ 211 Vac</td>
</tr>
<tr>
<td>Turn on Delay</td>
<td>50 ms to 100% of</td>
</tr>
<tr>
<td></td>
<td>voltage, monotonic</td>
</tr>
<tr>
<td>Efficiency</td>
<td>75% ÷ 85% @ 230 Vac</td>
</tr>
<tr>
<td>Isolation CE EN 60950</td>
<td></td>
</tr>
<tr>
<td>Input to Output</td>
<td>3000 Vac</td>
</tr>
<tr>
<td>Input to GND</td>
<td>1500 Vac</td>
</tr>
</tbody>
</table>

### 4.5.2 - Power Modules

The power modules are readily replaceable.

Each module is equipped with temperature sensors for Over Temperature Protection.
### Table 4.7: Mod. VME8100 Power Module (+5V +3.3V) technical specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>2V ÷ 7V</td>
</tr>
<tr>
<td>Current</td>
<td>115 A</td>
</tr>
<tr>
<td>Rise Time</td>
<td>&lt;50 ms to 100% of voltage, monotonic rise</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 mVpp&lt;sup&gt;(1)&lt;/sup&gt; Typ: 6.0 mVpp&lt;sup&gt;(1)&lt;/sup&gt; (see Fig. 4.7) &lt;br&gt; &lt; 5 mVpp&lt;sup&gt;(2)&lt;/sup&gt; Typ: 2.5 mVpp&lt;sup&gt;(2)&lt;/sup&gt; (see Fig. 4.8)</td>
</tr>
<tr>
<td>Noise</td>
<td>&lt;2 mVRms&lt;sup&gt;(1)&lt;/sup&gt; Typ: 1.5 mVRms&lt;sup&gt;(1)&lt;/sup&gt; (see Fig. 4.7) &lt;br&gt; &lt;1.5 mVRms&lt;sup&gt;(2)&lt;/sup&gt; Typ: 0.5 mVRms&lt;sup&gt;(2)&lt;/sup&gt; (see Fig. 4.8)</td>
</tr>
<tr>
<td>Voltage Accuracy</td>
<td>± 20 mV</td>
</tr>
<tr>
<td>Minimum Load</td>
<td>No</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>&lt; 10 mV (sense) for 0-100% load change</td>
</tr>
<tr>
<td>Transient Response Recovery</td>
<td>&lt; 100 mV @ ±25A current step change 6 ms for recovery to ±1% of set voltage @ 25A to 0A current step change 0.5 ms for recovery to ± 1% of set voltage @ ±25A current step change 0.7 ms for recovery to ± 0.1% of set voltage @ ±25A current step change</td>
</tr>
<tr>
<td>Over Voltage Protection</td>
<td>When the output voltage &gt; 103% ÷ 120% (programmable) of set voltage</td>
</tr>
<tr>
<td>Under Voltage Protection</td>
<td>When the output voltage &lt; 80% ÷ 97% (programmable) of set voltage</td>
</tr>
<tr>
<td>Over Current Protection</td>
<td>When the current &gt; programmable Iset value</td>
</tr>
<tr>
<td>Short Circuit Protection</td>
<td>&lt;125 A @ 7 Vout</td>
</tr>
<tr>
<td>Over Temperature Protection</td>
<td>When the Power module temperature &gt; 90° C</td>
</tr>
<tr>
<td>flicker immunity</td>
<td>&lt; 50 ms</td>
</tr>
<tr>
<td>Environment Temperature</td>
<td>0° to 50° Operational</td>
</tr>
</tbody>
</table>

<sup>(1)</sup> Measured at the Output connector (full load).  
<sup>(2)</sup> Measured at load (0.5 m wire). Load conditions: full; parallel (X) 330µF and 1µF ceramic; conducting to case (Y) 100nF polyester each line.

### Table 4.8: Mod. VME8100 Power Module (+12V -12V) technical specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>±7V ÷ ±16V</td>
</tr>
<tr>
<td>Current</td>
<td>23 A</td>
</tr>
<tr>
<td>Rise Time</td>
<td>&lt;50 ms to 100% of voltage, monotonic rise</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 mVpp&lt;sup&gt;(1)&lt;/sup&gt; Typ: 4.5 mVpp&lt;sup&gt;(1)&lt;/sup&gt; (see Fig. 4.9) &lt;br&gt; &lt;10 mVpp&lt;sup&gt;(2)&lt;/sup&gt; Typ: 5.5 mVpp&lt;sup&gt;(2)&lt;/sup&gt; (see Fig. 4.10)</td>
</tr>
<tr>
<td>Noise</td>
<td>&lt;2 mVRms&lt;sup&gt;(1)&lt;/sup&gt; Typ: 1.0 mVRms&lt;sup&gt;(1)&lt;/sup&gt; (see Fig. 4.9) &lt;br&gt; &lt;1.5 mVRms&lt;sup&gt;(2)&lt;/sup&gt; Typ: 0.5 mVRms&lt;sup&gt;(2)&lt;/sup&gt; (see Fig. 4.10)</td>
</tr>
<tr>
<td>Voltage Accuracy</td>
<td>± 20 mV</td>
</tr>
<tr>
<td>Minimum Load</td>
<td>No</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>&lt; 15 mV for 0-100% load change</td>
</tr>
<tr>
<td>Transient Response Recovery</td>
<td>&lt; 100 mV @ ±5A current step change 8 ms for recovery to ±1% of set voltage @ 5A to 0A current step change 1.0 ms for recovery to ± 1% of set voltage @ ±5A current step change 1.8 ms for recovery to ± 0.1% of set voltage @ ±5A current step change</td>
</tr>
<tr>
<td>Over Voltage Protection</td>
<td>When the output voltage &gt; 103% ÷ 120% (programmable) of set voltage</td>
</tr>
<tr>
<td>Under Voltage Protection</td>
<td>When the output voltage &lt; 80% ÷ 97% (programmable) of set voltage</td>
</tr>
<tr>
<td>Over Current Protection</td>
<td>When the current &gt; programmable Iset value</td>
</tr>
<tr>
<td>Short Circuit Protection</td>
<td>&lt; 26 A @ 16 Vout</td>
</tr>
<tr>
<td>Over Temperature Protection</td>
<td>When the Power module temperature &gt; 90° C</td>
</tr>
<tr>
<td>flicker immunity</td>
<td>&lt; 30 ms</td>
</tr>
<tr>
<td>Environment Temperature</td>
<td>0° to 50° Operational</td>
</tr>
</tbody>
</table>
Fig. 4.7: Power Module ripple and noise measured at the output connector (@ 5V, 110A)

Fig. 4.8: Power Module ripple and noise measured at load 0.5 m wire (@ 5V, 110A)

Measured at load (0.5 m wire). Load conditions: full; parallel (X) 330µF and 1µF ceramic; conducting to case (Y) 100nF polyester each line. Voltage: 5V; Current: 110A.
Fig. 4.9: Power Module ripple and noise measured at the output connector (@ 12V, 20A)

Fig. 4.10: Power Module ripple and noise Measured at load 0.5 m wire (@ 12V, 20A)
4.6 Fan Tray / Control Connector Specifications

Fig. 4.11: Fan Tray / Control Connector (9-pin D-SUB female)

4.7 Sense / Signal Connector Specifications

Fig. 4.12: Sense / Signal Connector (37-pin D-SUB female)
5. FAN Tray Section

5.1 FAN Tray front panel

The Fan Tray housed a buzzer for Alarm signalling.

5.1.1 Fan tray Front panel connectors

The location of the connectors is shown in Fig. 5.1. Their electromechanical specifications are listed here below.

**USB DEVICE PORT:**

- **Mechanical specifications:**
  - USB B female connector
- **Electrical specifications:**
  - USB 2.0 compliant

**RS232 INTERFACE CONNECTOR:**

- **Mechanical specifications:**
  - 9 pin D type female connector

**ETHERNET INTERFACE CONNECTOR:**

- **Mechanical specifications:**
  - 10Base-T female connector (RJ 145)

**CAN BUS INTERFACE CONNECTOR:**

- **Mechanical specifications:**
  - 9 pin D type male connector

**FAIL Output Connector**

- **Mechanical specifications:**
  - LEMO connector
- **Electrical specifications:**
  - See Fig. 5.5)
5.1.2 **CAN bus connector Specifications**

CAN BUS interface features are as follows:

- CAN protocol 2.0B
- Transceiver PCA82C250
- 110 nodes at least guaranteed by the transceiver
- CAN connector 9-pin DSUB male
- TX/RX of standard frames with 11 bit identifier

Pinout of CAN bus connector is as follows:

![CAN bus connector diagram](image)

Fig. 5.2: CAN BUS connector

If the Bit Rate is higher than 100 Kbit/s it is necessary to terminate the CAN BUS line on 120 Ohm (inserted between CAN_H and CAN_L)

5.1.3 **RS-232 Connector Specifications**

![RS-232 connector diagram](image)

Fig. 5.3: RS-232 Connector (connector 9-pin DSUB female)
### 5.1.4 Ethernet LAN Connector Specifications

![Ethernet LAN Connector Diagram](image)

- Pin 1: TXD+ (Transmit Data+)
- Pin 2: TXD- (Transmit Data-)
- Pin 3: RXD+ (Receive Data+)
- Pin 4: EPWR+ (Power from switch+)
- Pin 5: EPWR+ (Power from switch+)
- Pin 6: RXD- (Receive Data-)
- Pin 7: EPWR- (Power from switch-)
- Pin 8: EPWR- (Power from switch-)

Network Link LED: Yellow LED indicates network link is operational
NetwoorK Activity LED: Green LED indicates network traffic detected

### 5.1.5 FAIL Connector Specifications

![FAIL Output Circuit Diagram](image)

- Transistor model: 2N3904
- Max Current: 30 mA
- Stand by: pull-up 24V;
- ALARM: 0.3V
Fail LED and buzzer work like FAIL Connector
6. V8100 Operating

6.1 Alarm and Trip off

When the Crate Alarm is ON:
- FAIL LED lamps (timing described in Fig. 5.6)
- FAIL Output signal is active (see § 5.1.5)
- Buzzer is active (if enabled)
- The Alarm reason is displayed on the FAN Unit OLED display and managed via remote control

The Crate DC voltages are tripped off and ALARM is ON in the case of:
- **Over Voltage Protection**: when the output voltage > 103% ÷ 120% (programmable) of set voltage (OVP parameter).
- **Under Voltage Protection**: when the output voltage < 80% ÷ 97% (programmable) of set voltage (UVP parameter)
- **Over Current Protection**: when the current > programmable Iset value
- **Over Temperature Protection**: when temperature of a single Power module > 90°C
- **AC FAIL**: Problems On Power Factor Correction Module
- **VCC SUPPLY FAIL**: problems on Power Supply Controller module or on power Modules

The Crate ALARM is ON in the case of:
- temperature FAN Unit > 50°C
- temperature Power Supply Control module > 65°C
- FAN fail
- SYS Fail

6.2 FAN Tray Local programming

The Crate can be controlled via various menu on the OLED display, which is enabled via:
- Crate turning on via local switch
- Crate turning on via remote interface

The display is disabled only via local switch crate off.
6.2.1 List of menu functions

The following menu are available:

1. +5 V Monitor
   - +5 V SET allows to set: Vset, Iset, UVP (% Vset), OVP (% Vset),

2. +12 V Monitor
   - +12 V SET allows to set: Vset, Iset, UVP (% Vset), OVP (% Vset),

3. +3.3 V Monitor
   - +3.3 V SET allows to set: Vset, Iset, UVP (% Vset), OVP (% Vset),

4. -12 V Monitor
   - -12 V SET allows to set: Vset, Iset, UVP (% Vset), OVP (% Vset),

5. FAN Status
   - SET FAN speed

6. ALARM

7. GENERAL
   - Power Supply
   - VME
   - COMM
     - RS 232
     - CAN bus
     - ETHERNET
Menu 1..7 are displayed by pulling UP/DOWN the 4-directional Switch with Center Push and are the following:

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Display</th>
<th>Description</th>
<th>Parameters displayed</th>
</tr>
</thead>
</table>
| 1.  | +5 V Monitor | - Vout Value  
- Current Value |
| 2.  | +12 V Monitor | - Vout Value  
- Current Value |
| 3.  | +3.3 V Monitor | - Vout Value  
- Current Value |
| 4.  | -12 V Monitor | - Vout Value  
- Current Value |
| 5.  | FAN status | - FAN speed  
- FAN unit firmware release  
- Serial Number FAN Unit  
- Temperature of FAN Unit |
| 6.  | ALARM | - Power Supply Status  
- FAN Status  
- INT Comm PS & FAN Unit  
- VME status  
- Clear Alarm  
- Buzzer ON/OFF |
| 7.  | GENERAL | - VME Sub Menu  
- PS Sub menu  
- COM Sub Menu |

In the above described menu, by pulling the switch RIGHT/LEFT and UP/DOWN, it is possible to shift between the available sub-menu/command. The selectable command/menu is highlighted.

On Menu 7 it is possible only to move RIGHT/LEFT

NOTE: ! before any value signal anomalous value.

In order to enter a Sub-menu or launch a command, it is necessary to push the button.
## Table 6.2: Mod. VME8100 FAN Tray Sub Menu

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Display</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td><img src="image" alt="Image" /></td>
<td>+5 V Set</td>
</tr>
<tr>
<td>9.</td>
<td><img src="image" alt="Image" /></td>
<td>+12 V Set</td>
</tr>
<tr>
<td>10.</td>
<td><img src="image" alt="Image" /></td>
<td>+3.3 V Set</td>
</tr>
<tr>
<td>11.</td>
<td><img src="image" alt="Image" /></td>
<td>-12 V Set</td>
</tr>
<tr>
<td>12.</td>
<td><img src="image" alt="Image" /></td>
<td>FAN Set</td>
</tr>
<tr>
<td>13.</td>
<td><img src="image" alt="Image" /></td>
<td>VME Status</td>
</tr>
<tr>
<td>14.</td>
<td><img src="image" alt="Image" /></td>
<td>Power Supply Status</td>
</tr>
<tr>
<td>15.</td>
<td><img src="image" alt="Image" /></td>
<td>Communication</td>
</tr>
<tr>
<td>16.</td>
<td><img src="image" alt="Image" /></td>
<td>Communication RS232</td>
</tr>
<tr>
<td>17.</td>
<td><img src="image" alt="Image" /></td>
<td>Communication CAN bus</td>
</tr>
<tr>
<td>18.</td>
<td><img src="image" alt="Image" /></td>
<td>Communication Ethernet Mac Address (show 5 sec)</td>
</tr>
<tr>
<td>19.</td>
<td><img src="image" alt="Image" /></td>
<td>Communication Ethernet status and set value</td>
</tr>
</tbody>
</table>
6.3 FAN Tray remote connection

Connections available
- Ethernet connection via:
  - Program “VME8100 Manager”
  - Telnet (terminal emulator)
- RS232 via terminal
- USB managed as RS232 requires driver for USB RS232 converter. (The Mod. VME8100 FAN Tray control board housed a FT232BM chip which allows to manage the Mod. VME8100 FAN Tray via USB. Drivers for this device are freely available at: [http://www.ftdichip.com/Drivers/VCP.htm](http://www.ftdichip.com/Drivers/VCP.htm))

NOTE:
- RS232 and USB cannot be operated at the same time
- Maximum of 3 Ethernet connection are allowed

6.3.1 Configure Ethernet connection On a Local Area Network with DHCP Server

In order to Obtain Configuration From Dynamic Host Configuration Protocol (DHCP) Server, the user must write Ethernet IP address = all 0. In this case, the server automatically assigns the IP address for the Crate VME8100.
7. Software overview

7.1 FAN Tray Ethernet connection

The provided program is:

- VME8100_Manager.jar

![Fig. 7.1: Mod. VME8100_Manager Open window](image)

7.2 Connection configuration

Click on

File > connect

![Fig. 7.2: Mod. VME8100_Manager Connection menu](image)

The following pop-up window will open:

![Fig. 7.3: Mod. VME8100_Manager Connection window](image)

Choose the connection type; if you are using TCP-IP enter the IP address then click on Connect.
7.3 VME8100_Manager Status/Set window

Fig. 7.4: Mod. VME8100_Manager Status/Set window (power off)

Click on Power to switch ON the Crate

Fig. 7.5: Mod. VME8100_Manager Status/Set window (power ON)
Values can be over written and confirmed by pressing <enter>

### 7.3.1 VME8100_Manager VME System Reset operation

Click on VME System Reset: the following window asks for confirmation:

![Confirmation Dialog](image)

### 7.4 FAN Tray RS232 /USB connection

#### 7.4.1 FAN Tray USB connection

The Mod. VME8100 FAN Tray control board housed a FT232BM chip which allows to manage the Mod. VME8100 FAN Tray via USB. Drivers for this device are freely available at: [http://www.ftdichip.com/Drivers/VCP.htm](http://www.ftdichip.com/Drivers/VCP.htm)

Connection is made via HyperTerminal configured as follows:

- baud rate 9600
- Data bits: 8
- Parity: none
- stop bit: 1
- Flow control: Xon Xoff

Digit CAEN + <Cr> the following menu opens:
by pressing “C”, it opens:

by pressing “G”, it opens:
8. Communication Protocol

This protocol is based on commands made of sequences of ASCII characters. The format of one command is the following:

\[ \text{\$CMD:***,CH*,PAR:***,VAL:***,**<Cr>} \]

Field 'CH' is:
- 0..7 for commands related to one of possible channels
- 8 for commands related to the Crate.

The format of the response string is one of the following:

| #CMD:ERR<Cr> | Command Format wrong or command not recognised |
| #CH:ERR<Cr> | Channel Field not present or channel value wrong |
| #PAR:ERR<Cr> | Field parameter not present or parameter not recognised |
| #VAL:ERR<Cr> | Set Value wrong (<Min or >Max) |
| #CMD:OK,VAL:*:*:*<Cr> | Command Ok ***** = value |

8.1 Monitor Commands related to channel 'X' :

| \$CMD:MON,CH:X,PAR:NAME<Cr> | Readout channel name (ex. +5V..) |
| \$CMD:MON,CH:X,PAR:VSET<Cr> | Readout value of the voltage Set |
| \$CMD:MON,CH:X,PAR:VMIN<Cr> | Readout minimum value of the voltage Set |
| \$CMD:MON,CH:X,PAR:VMAX<Cr> | Readout maximum value of the voltage Set |
| \$CMD:MON,CH:X,PAR:VRES<Cr> | Readout resolution value of the voltage Set |
| \$CMD:MON,CH:X,PAR:OVP<Cr> | Readout value Over Voltage Protection |
| \$CMD:MON,CH:X,PAR:UVP<Cr> | Readout value Under Voltage Protection |
| \$CMD:MON,CH:X,PAR:VMON<Cr> | Readout value of the voltage Monitor |
| \$CMD:MON,CH:X,PAR:ISET<Cr> | Readout value of current limit |
| \$CMD:MON,CH:X,PAR:IMIN<Cr> | Readout minimum value of current limit |
| \$CMD:MON,CH:X,PAR:IMAX<Cr> | Readout maximum value of current limit |
| \$CMD:MON,CH:X,PAR:IRES<Cr> | Readout value resolution of current limit |
| \$CMD:MON,CH:X,PAR:IMON<Cr> | Readout value of the current Monitor |
| \$CMD:MON,CH:X,PAR:STAT<Cr> | Readout value of channel status |

Values read are reported in correct format (comma and decimal where necessary).

Meaning of STATUS bits

<table>
<thead>
<tr>
<th>Bit 0</th>
<th>ON/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td>0</td>
<td>OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 1</th>
<th>Over Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Current provided &gt; Iset</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 2</th>
<th>Over Voltage Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vout &gt; (Vset * (100 + OVP)) / 100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 3</th>
<th>Under Voltage Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VMON &lt; (Vset * (100 – UVP)) / 100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 4</th>
<th>Over Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temperature channel &gt; 90°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 5,..7</th>
<th>N.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 8</th>
<th>Calibration Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Error on coefficient of calibration</td>
</tr>
</tbody>
</table>
8.2 Set Commands related to channel 'X' :

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$CMD:SET,CH:X,PAR:VSET,VAL:XX.XX&lt;Cr&gt;</td>
<td>Set voltage Value</td>
</tr>
<tr>
<td>$CMD:SET,CH:X,PAR:ISET,VAL:XXX.X&lt;Cr&gt;</td>
<td>Set Value of current limit</td>
</tr>
<tr>
<td>$CMD:SET,CH:X,PAR:OVP,VAL:XX&lt;Cr&gt;</td>
<td>Set Value OVP (in % di Vset)</td>
</tr>
<tr>
<td>$CMD:SET,CH:X,PAR:UVP,VAL:XX&lt;Cr&gt;</td>
<td>Set Value UVP (in % di Vset)</td>
</tr>
</tbody>
</table>

Values of VSET and ISET must be passed with correct format (comma and decimal).

8.3 Monitor Commands related to CRATE (channel 8) :

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$CMD:MON,CH:8,PAR:CRNAME&lt;Cr&gt;</td>
<td>Readout Crate name : 'VME8100'</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:NUMCH&lt;Cr&gt;</td>
<td>Readout number of channels present</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:PSFREL&lt;Cr&gt;</td>
<td>Readout of the PS Release Firmware</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:PSTEMP&lt;Cr&gt;</td>
<td>Readout value of the PS Temperature</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:PSSNUM&lt;Cr&gt;</td>
<td>Readout value PS serial number</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:FANSP&lt;Cr&gt;</td>
<td>Readout Set value of FAN SPEED (0..6)</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:FAN1&lt;Cr&gt;</td>
<td>Readout value Fan Speed 1 (RPM)</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:FAN2&lt;Cr&gt;</td>
<td>Readout value Fan Speed 2 (RPM)</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:FAN3&lt;Cr&gt;</td>
<td>Readout value Fan Speed 3 (RPM)</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:FUFREL&lt;Cr&gt;</td>
<td>Readout of the FAN UNIT Release Firmware</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:FUTEMP&lt;Cr&gt;</td>
<td>Readout value of the FAN UNIT Temperature</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:FUSNUM&lt;Cr&gt;</td>
<td>Readout value FAN UNIT serial number</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:CRST&lt;Cr&gt;</td>
<td>Readout value Crate status</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:VPMAX&lt;Cr&gt;</td>
<td>Readout value maximum of OVP/UVP</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:VPMIN&lt;Cr&gt;</td>
<td>Readout value minimum of OVP/UVP</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:RS232BR&lt;Cr&gt;</td>
<td>Readout Bit Rate RS232 : 0..4</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:CANBR&lt;Cr&gt;</td>
<td>Readout Bit Rate CANBUS : 0..5</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:CANADD&lt;Cr&gt;</td>
<td>Readout Address CANBUS : 0..255</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:IPADD&lt;Cr&gt;</td>
<td>Readout Address IP : xxx.xxx.xxx.xxx</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:IPMSK&lt;Cr&gt;</td>
<td>Readout IP Netmask : xxx.xxx.xxx.xxx</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:IPGTW&lt;Cr&gt;</td>
<td>Readout Gateway : xxx.xxx.xxx.xxx</td>
</tr>
<tr>
<td>$CMD:MON,CH:8,PAR:MACADD&lt;Cr&gt;</td>
<td>Readout Mac Address : xx.xx.xx.xx.xx</td>
</tr>
</tbody>
</table>

RS232 Bitrate : 0 -> 9600 1 -> 19200 2 -> 38400 3 -> 57600 4 -> 115200

CanBus Bitrate : 0 -> 1M 1 -> 500K 2 -> 250K 3 -> 100K 4 -> 50K 5 -> 10K

Fan Speed Set : 0 -> Fan Off 1 -> ~1500 Rpm
8.4 Set Commands related to CRATE (channel 8):

- **$CMD:SET,CH:8,PAR:ON<Cr>**
  - Crate ON

- **$CMD:SET,CH:8,PAR:OFF<Cr>**
  - Crate OFF

- **$CMD:SET,CH:8,PAR:SYSR<Cr>**
  - Sends VME System Reset

- **$CMD:SET,CH:8,PAR:CLR<Cr>**
  - Clear Alarm

- **$CMD:SET,CH:8,PAR:FANSP,VAL:X<Cr>**
  - Set Fan Speed. Values 0..6

For Fan Speed Set see above.