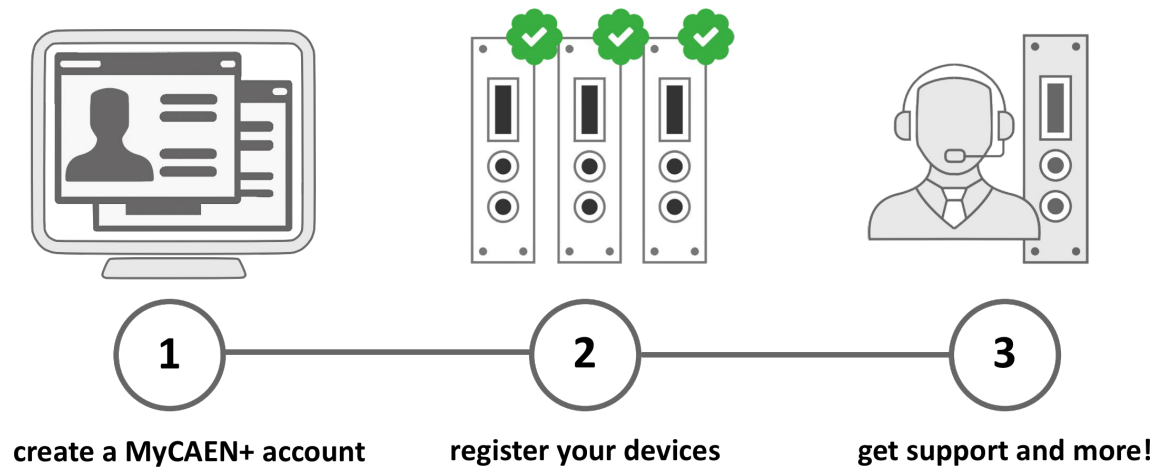




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PRELIMINARY

Technical Information Manual

Revision n.2
12 January 2010

MOD. SY8800

*UNIVERSAL
MULTICHANNEL LV
POWER SUPPLY SYSTEM*

NPO:
00111/08:S8800.MUTx/02

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.

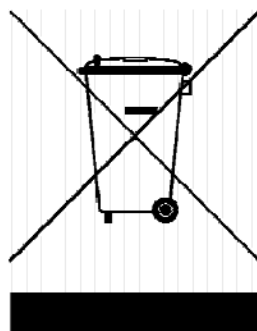


TABLE OF CONTENTS

1.	GENERAL DESCRIPTION	6
1.1	OVERVIEW	6
1.2	SAFETY INFORMATION AND INSTALLATION REQUIREMENTS	7
1.2.1	<i>General safety information</i>	<i>7</i>
1.2.2	<i>Injury Precautions</i>	<i>7</i>
1.2.3	<i>Grounding</i>	<i>8</i>
1.2.4	<i>Input ratings</i>	<i>8</i>
1.2.5	<i>Output connectors</i>	<i>8</i>
1.2.6	<i>Live circuits</i>	<i>8</i>
1.2.7	<i>Parts substitutions and modifications</i>	<i>9</i>
1.3	INSTALLATION	9
1.3.1	<i>Preparation for use</i>	<i>9</i>
1.3.2	<i>Initial inspection</i>	<i>9</i>
1.3.3	<i>Rack mounting</i>	<i>9</i>
2.	TECHNICAL SPECIFICATIONS	10
2.1	TECHNICAL SPECIFICATION TABLE	10
2.2	FRONT PANEL	13
2.2.1	<i>CAN bus connector Specifications</i>	<i>13</i>
2.2.2	<i>RS-232 Connector Specifications</i>	<i>14</i>
2.2.3	<i>Ethernet LAN Connector Specifications</i>	<i>15</i>
2.2.4	<i>FAIL Connector Specifications</i>	<i>15</i>
2.3	BACK PANEL	16
2.3.1	<i>Channel output</i>	<i>16</i>
2.3.2	<i>Reference Ground</i>	<i>16</i>
2.3.3	<i>Analog Input</i>	<i>17</i>
2.3.4	<i>Digital Input</i>	<i>17</i>
2.3.5	<i>Digital Output</i>	<i>18</i>
2.3.6	<i>Mains</i>	<i>18</i>
2.3.7	<i>Voltage sensing</i>	<i>19</i>
2.4	INTERLOCK LOGIC	20
3.	OPERATIONAL DESCRIPTION	21
3.1	SY8800 LOCAL OPERATION	21
3.1.1	<i>Mains Voltage and Connection</i>	<i>21</i>

3.1.2	SY8800 ON/OFF.....	21
3.1.3	SY8800 Display Menu	21
3.2	SY8800 OPERATION VIA TERMINAL	23
3.2.1	Control and Monitor menus	23
3.2.2	Firmware Update menus	27
3.2.3	Remote connection	28
3.2.4	RS232 /USB connection	29
4.	COMMUNICATION PROTOCOL.....	30
4.1	COMMAND FORMAT	30
4.2	MONITOR COMMANDS RELATED TO THE CHANNEL 'X'	30
4.3	SET COMMANDS RELATED TO THE CHANNEL 'X'	31
4.4	MONITOR COMMANDS RELATED TO THE CRATE (CHANNEL 8).....	32
4.5	SET COMMANDS RELATED TO THE CRATE (CHANNEL 8).....	33

LIST OF FIGURES

FIG. 1.1:	THE MOD. SY8800 - MAIN LV POWER SUPPLY SYSTEM	7
FIG. 2.1:	MOD. SY8800 FRONT VIEW	13
FIG. 2.2:	CAN BUS CONNECTOR	14
FIG. 2.3:	RS-232 CONNECTOR (CONNECTOR 9-PIN DSUB FEMALE)	14
FIG. 2.4:	ETHERNET LAN CONNECTOR.....	15
FIG. 2.5:	FAIL OUTPUT CIRCUIT.....	15
FIG. 2.6:	FAIL SIGNAL TIMING	16
FIG. 2.7:	MOD. SY8800 REAR VIEW	16
FIG. 2.8:	DIGITAL INPUT ELECTRICAL SCHEME	17
FIG. 2.9:	DIGITAL OUTPUT ELECTRICAL SCHEME.....	18
FIG. 2.10:	REMOTE VOLTAGE SENSING SCHEME	19
FIG. 2.11:	REMOTE VOLTAGE SENSING TEST SET UP.....	19
FIG. 3.1:	MOD. SY8800 TERMINAL MENU WINDOW	24
FIG. 3.2:	MOD. SY8800 CRATE STATUS 1 MENU WINDOW	24
FIG. 3.3:	MOD. SY8800 CRATE STATUS 2 MENU WINDOW	25
FIG. 3.4:	MOD. SY8800 GENERAL STATUS WINDOW	25
FIG. 3.5:	MOD. SY8800 CHANNELS MAP WINDOW.....	26
FIG. 3.6:	MOD. SY8800 EXTERNAL I/O MENU	26
FIG. 3.7:	MOD. SY8800 INTERLOCK MENU	27
FIG. 3.8:	MOD. SY8800 FIRMWARE UPDATE WINDOW 1	28
FIG. 3.9:	MOD. SY8800 FIRMWARE UPDATE WINDOW 2	28

FIG. 3.10: MOD. SY8800 FIRMWARE UPDATE WINDOW 2.....	28
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LIST OF TABLES

TABLE 1.1: AVAILABLE ITEMS	7
TABLE 2.1: MOD. SY8800 TECHNICAL FEATURES	10
TABLE 2.2: MOD. SY8800 POWER FACTOR CORRECTION MODULE SPECIFICATIONS	11
TABLE 2.3: MOD. SY8800 POWER MODULE (2V÷7V) TECHNICAL SPECIFICATIONS.....	11
TABLE 2.4: MOD. SY8800 POWER MODULE ($\pm 7V\div 16V$) TECHNICAL SPECIFICATIONS.....	11
TABLE 2.5: MOD. SY8800 POWER MODULE ($\pm 20V\div 28V$) TECHNICAL SPECIFICATIONS.....	12
TABLE 3.1: HIRSCHMANN CONNECTOR CABLING.....	21
TABLE 3.2: DISPLAY MENU	22

1. General description

1.1 Overview

The Mod. SY8000 is a high density floating low voltage power supply system, designed to power low noise electronics with medium and high currents. Six modules have been developed so far:

- 2÷7V 550W (typ. 110A @ 5V)
- 2÷7V 1100W (typ. 220A @ 5V)
- ±7÷16V 550W (typ. 23A @ ±12V)
- ±7÷16V 1100W (typ. 46A @ ±12V)
- ±20÷28V 550W (typ. 11A @ ±24V)
- ±20÷28V 1100W (typ. 22A @ ±24V)

The system is factory-configured.

The system is provided with Remote Sensing Lines to compensate for the voltage drop over the connection cables.

Safety features include:

- OVERVOLTAGE and UNDERVOLTAGE protection when the output voltage differs from the programmed value
- Programmable maximum channel output voltage limit (VOVP): the channel is tripped off when its output voltage exceeds VOVP
- OVERCURRENT detection: if a channel tries to draw a current larger than its programmed limit, it is switched off.
- Channels can be enabled or disabled through the Interlock logic. The LV output RAMP-UP and RAMP-DOWN times may be selected independently for each channel in 5ms steps.

Module control can take place either locally, assisted by a Graphic color display or remotely, via Ethernet, USB, CANBUS and RS232.



Fig. 1.1: The Mod. SY8800 - Main LV Power Supply System

Table 1.1: Available items

Code	Version	Slots	Description
WSY8800XXXXX	SY8800		SY8800 - Main LV Power Supply System (1250WUS-2500WEU)
WPERS8800B01	2Ch	1	2Ch - LV Floating Power Module $\pm 7V-16V / 23A$ (550W)
WPERS8800B02	2Ch	1	2Ch - LV Floating Power Module $\pm 20V-28V / 11A$ (550W)
WPERS8800B21	2Ch	2	2Ch - LV Floating Power Module $\pm 7V-16V / 46A$ (1100W)
WPERS8800B22	2Ch	2	2Ch - LV Floating Power Module $\pm 20V-28V / 22A$ (1100W)
WPERS8800M01	1Ch	1	1Ch - LV Floating Power Module 2V-7V / 110A (550W)
WPERS8800M21	1Ch	2	1Ch - LV Floating Power Module 2V-7V / 220A (1100W)

1.2 Safety information and installation requirements

1.2.1 General safety information

This section contains the fundamental safety rules for the installation and operation of the boards. Read thoroughly this section before starting any procedure of installation or operation of the product.

1.2.1.1 Safety Terms and Symbols on the Product

These terms may appear on the product:

- **DANGER** indicates an injury hazard immediately accessible as you read the marking.
- **WARNING** indicates an injury hazard not immediately accessible as you read the marking.
- **CAUTION** indicates a hazard to property including the product.

1.2.2 Injury Precautions

Review the following precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use the product only as specified. Only qualified personnel should perform service procedures.

1.2.2.1 Caution

The following safety precaution must be observed during all phases of operation, service and repair of this equipment. Failure to comply with the safety precautions or warnings in

this document violates safety standards of design, manufacture and intended use of this equipment and may impair the built-in protections within.

CAEN shall not be liable for user's failure to comply with these requirements.

To avoid electric shock or fire hazard, do not apply a voltage to a load that is outside the range specified for that load.

To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

Do Not Operate Without Covers.

To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

Do Not Operate in Wet/Damp Conditions.

To avoid electric shock, do not operate this product in wet or damp conditions.

Do Not Operate in an Explosive Atmosphere.

To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

Do Not Operate With Suspected Failures.

If you suspect there is damage to this product, have it inspected by qualified service personnel.



WARNING: DO NOT TOP LOAD

1.2.3 Grounding

This product is a Safety Class 1 instrument. To minimize shock hazard, the instrument chassis must be connected to an electrical ground. The instrument must be connected to the AC power supply mains through a three conductor power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet.

For instruments designed to be hard-wired to the supply mains, the protective earth terminal must be connected to the safety electrical ground before another connection is made. Any interruption of the protective ground conductor or disconnection of the protective earth terminal will cause a potential shock hazard that might cause personal injury.

1.2.4 Input ratings

Do not use AC supply, which exceeds the input voltage and frequency rating of this instrument. For input voltage and frequency rating of the module see § 2.1. For safety reasons, the mains supply voltage fluctuations should not exceed above voltage range.

1.2.5 Output connectors

Output connectors deliver high energy; be careful to not short them, when cable connectors are not plugged, otherwise big sparks will occur.

1.2.6 Live circuits

Operating personnel must not remove the instrument cover. No internal adjustment or component replacement is allowed by non-CAEN personnel. Never replace components with power cable connected. To avoid injuries, always disconnect power, discharge circuits and remove external voltage source before touching components (wait 15 min at least).

1.2.7 Parts substitutions and modifications

Always disconnect power, discharge circuits and remove external voltage source prior to fuse replacement (wait 15 min at least). Other parts substitutions and modifications are allowed by authorized CAEN service personnel only.

1.3 Installation

This Chapter contains instructions for initial inspection, preparation for use and repackaging for shipment.

1.3.1 Preparation for use

In order to be operational the unit must be connected to an appropriate AC source. The AC source voltage should be within the unit specification.

1.3.2 Initial inspection

Prior to shipment this unit was inspected and found free of mechanical or electrical defects.

Upon unpacking of the unit, inspect for any damage, which may have occurred in transit. The inspection should confirm that there is no exterior damage to the unit such as broken knobs or connectors and that the front panel and meters face are not scratched or cracked. Keep all packing material until the inspection has been completed. If damage is detected, file a claim with carrier immediately and notify CAEN service.

1.3.3 Rack mounting

The Mod. SY8800 is an equipment for BUILDING-IN: it **must** be ventilated **and** installed in a 19" equipment rack. Use the front panel rack-mount brackets to install the unit in the rack.



The Unit is powered by 92 ÷ 264 Vac, 50 ÷ 60 Hz, power factor 0.98% (230VAC); see § 2.1

2. Technical specifications

2.1 Technical specification table

Table 2.1: Mod. SY8800 technical features

Mechanics	3U x 19" x 35 cm crate size
Mains input	Auto range: 92 ÷ 264 Vac, 50÷60 Hz, inrush current: <16 A @ 230 Vac power. fact. > 0.98 @ Output Power > 1 kW
Maximum Total Output Power	1250 W @ 100 Vac 2530 W @ 211 Vac
Interface	RS 232, USB (2.0), CAN bus, Ethernet
Fuse	External 16 A, type B/C
Maximum currents	110/220 A @ +5 V, 23/46A @ ±12 V, 11/28 A @ ±24V
Power Modules	5 slots (Max 5 Modules of width = 1 slot)
Isolation	CE acc. to EN 61010
Load Regulation	< 10 mV for 0-100% load change @ 2V÷7V < 15 mV for 0-100% load change @ ± 7V÷16V < 15 mV for 0-100% load change @ ± 20V÷28V
Efficiency	75% ÷ 85% @ 230 Vac configuration dependent
Ripple and Noise	2V÷7V < 10 mVpp, <2 mVrms(1) Typ: 6.0 mVpp, 1.5 mVrms (1) < 5 mVpp, <1.5 mVrms (2) Typ: 2.5 mVpp, 0.5 mVrms (2) ± 7V÷16V < 10 mVpp, <2 mVrms (1) Typ: 4.5 mVpp, 1.0 mVrms (1) < 10 mVpp, <1.5 mVrms(2) Typ: 5.5 mVpp, 0.5 mVrms (2) ± 20V÷28V < 10 mVpp, <2 mVrms (1) Typ: 4.5 mVpp, 1.0 mVrms (1) < 10 mVpp, <1.5 mVrms(2) Typ: 5.5 mVpp, 0.5 mVrms (2) (1) Measured at the Output connector (full load). (2) Measured at load (0.5 m wire). Load conditions: full; parallel (X) 330µF and 1µF ceramic; conducting to case (Y) 100nF polyester each line.
Temperature sensors	Power Supply Control: nr. 1
Over Voltage Protection	Trip Off when the output voltage > VOVP (programmable)
Under Voltage Protection	Trip Off when the output voltage < 90% of set voltage
Over Current Protection	Trip Off when the current > programmable Iset value
Over Temperature Protection	Trip Off when temperature of a single Power Supply block > 90° C Signaled when temperature Power Supply Control > 65° C
Operation	0÷50°C without derating
Firmware	SY8800 firmware can be upgraded via Ethernet

Table 2.2: Mod. SY8800 Power Factor Correction Module specifications

Input voltage	92 ÷ 264 Vac Frequency 50 ÷ 60 Hz
Inrush Current	<16 A @ 230 Vac Fuse External 16A type B/C Power Factor > 0.98 @ Output Power > 1 kW
Fuse External	16A type B/C Power Factor > 0.98 @ Output Power > 1 kW
Power Factor	> 0.98 @ Output Power > 1 kW
Maximum Total Output Power	1200 W @ 100 Vac 2530 W @ 211 Vac
Turn on Delay	50 ms to 100% of voltage, monotonic rise
Efficiency	75% ÷ 85% @ 230 Vac configuration dependent
Isolation	CE EN 60950 Input to Output 3000 Vac Input to GND 1500 Vac

Table 2.3: Mod. SY8800 Power Module (2V÷7V) technical specifications

Voltage	2V ÷ 7V
Current	115 A / 230 A
Ramp Up/Down time	Max 5s; 10 ms step
Ripple and Noise	< 10 mVpp(1) Typ: 6.0 mVpp(1) < 5 mVpp(2) Typ: 2.5 mVpp(2) <2 mVrms(1) Typ: 1.5 mVrms(1) <1.5 mVrms(2) Typ: 0.5 mVrms(2)
Voltage Accuracy	± 20 mV
Minimum Load	No
Load Regulation	< 10 mV (sense) for 0-100% load change
Transient Response Recovery	< 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
Short Circuit Protection	<125 A / 250 A @ 7 Vout
Over Temperature Protection	When the Power module temperature > 90° C
Flicker immunity	< 50 ms
Environment Temperature	0° to 50° Operational

Table 2.4: Mod. SY8800 Power Module (± 7V÷16V) technical specifications

Voltage	±7V ÷ ±16V
Current	23 A / 46 A
Ramp Up/Down time	Max 5s; 10 ms step
Ripple and Noise	< 10 mVpp(1) Typ: 4.5 mVpp(1) < 10 mVpp(2) Typ: 5.5 mVpp(2) < 2 mVrms(1) Typ: 1.0 mVrms(1) < 1.5 mVrms(2) Typ: 0.5 mVrms(2) (1) Measured at the Output connector (full load). (2) 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 Accuracy	± 20 mV
Minimum Load	No

Load Regulation	< 15 mV for 0-100% load change
Transient Response Recovery	< 100 mV @ $\pm 5A$ current step change 8 ms for recovery to $\pm 1\%$ of set voltage @ 5A to 0A current step change 1.0 ms for recovery to $\pm 1\%$ of set voltage @ $\pm 5A$ current step change 1.8 ms for recovery to $\pm 0.1\%$ of set voltage @ $\pm 5A$ current step change
Short Circuit Protection	< 26 A / 52 A @ 16 Vout
Over Temperature Protection	When the Power module temperature > 90° C
Flicker immunity	< 30 ms
Environment Temperature 0° to 50° Operational	0° to 50° Operational

Table 2.5: Mod. SY8800 Power Module ($\pm 20V \div 28V$) technical specifications

Voltage	$\pm 20V \div 28V$
Current	23 A / 46 A
Ramp Up/Down time	Max 5s; 10 ms step
Ripple and Noise	< 10 mVpp(1) Typ: 4.5 mVpp(1) < 10 mVpp(2) Typ: 5.5 mVpp(2) < 2 mVrms(1) Typ: 1.0 mVrms(1) < 1.5 mVrms(2) Typ: 0.5 mVrms(2) (1) Measured at the Output connector (full load). (2) Measured at load (0.5 m wire). Load conditions: full; parallel (X) 330 μF and 1 μF ceramic; conducting to case (Y) 100nF polyester each line.
Voltage Accuracy	± 20 mV
Minimum Load	No
Load Regulation	< 15 mV for 0-100% load change
Transient Response Recovery	< 100 mV @ $\pm 5A$ current step change 8 ms for recovery to $\pm 1\%$ of set voltage @ 5A to 0A current step change 1.0 ms for recovery to $\pm 1\%$ of set voltage @ $\pm 5A$ current step change 1.8 ms for recovery to $\pm 0.1\%$ of set voltage @ $\pm 5A$ current step change
Short Circuit Protection	< 26 A / 52 A @ 16 Vout
Over Temperature Protection	When the Power module temperature > 90° C
Flicker immunity	< 30 ms
Environment Temperature	0° to 50° Operational

2.2 Front Panel

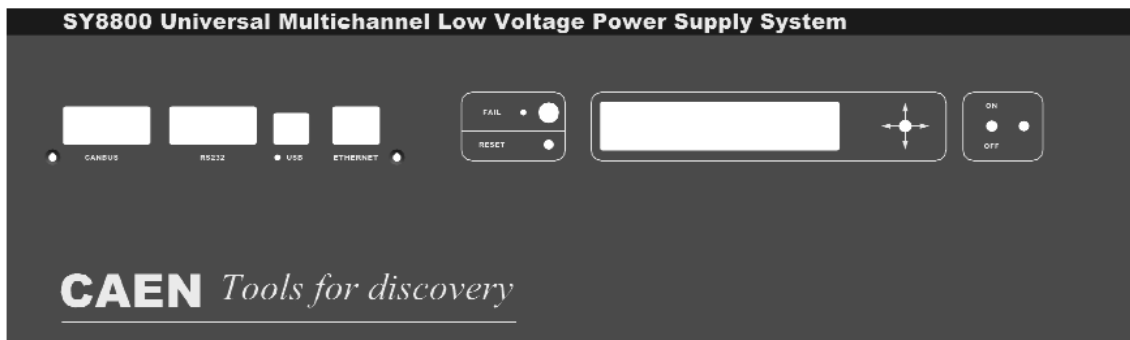


Fig. 2.1: Mod. SY8800 Front view

The location of the components is shown in the figure above. 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 § 2.2.4

Display:

Mechanical specifications:

OLED 3.3-inch. 288x48 Type

4-directional Switch:

Mechanical specifications:

RKJXL100401V Type

2.2.1 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:

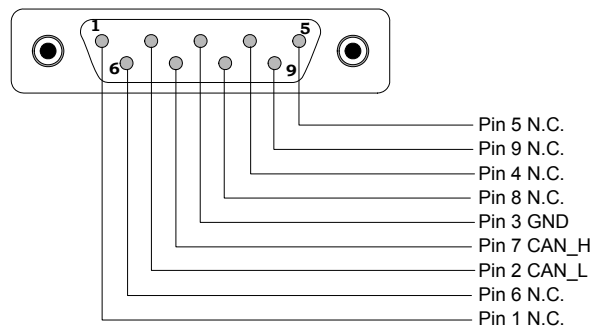


Fig. 2.2: CAN BUS connector

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)

2.2.2 RS-232 Connector Specifications

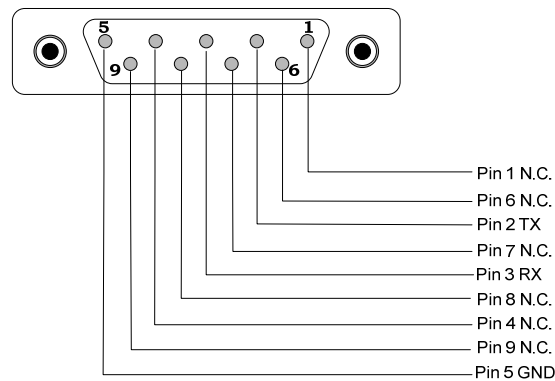


Fig. 2.3: RS-232 Connector (connector 9-pin DSUB female)

2.2.3 Ethernet LAN Connector Specifications

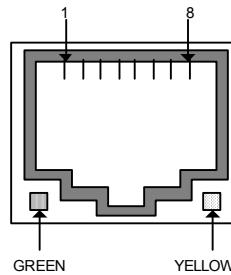


Fig. 2.4: Ethernet LAN Connector

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

Network Activity LED: Green LED indicates network traffic detected

2.2.4 FAIL Connector Specifications

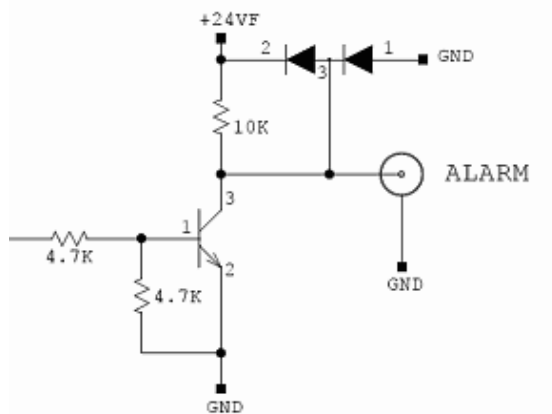


Fig. 2.5: FAIL output circuit

- Transistor model: 2N3904
- max Current: 30 mA
- stand by: pull-up 24V
- ALARM: 0.3V

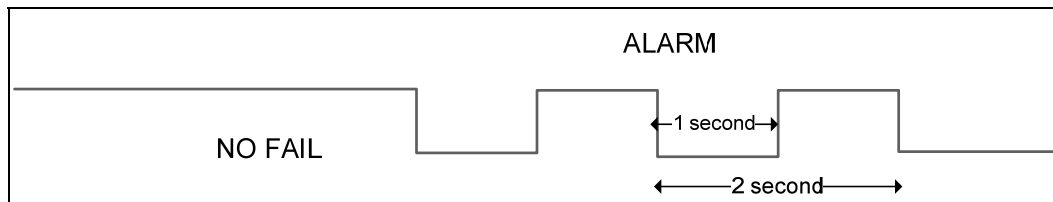


Fig. 2.6: FAIL signal timing

Fail LED and buzzer work like FAIL Connector

2.3 Back Panel

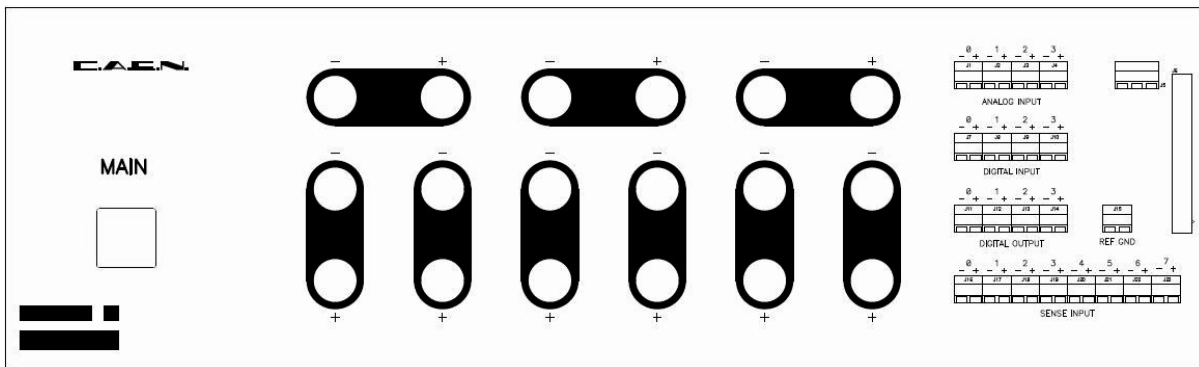


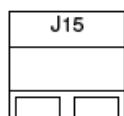
Fig. 2.7: Mod. SY8800 rear view

2.3.1 Channel output



Mechanical specifications: Screw locks, Hexagonal, M8, Brass, 40mm length

2.3.2 Reference Ground

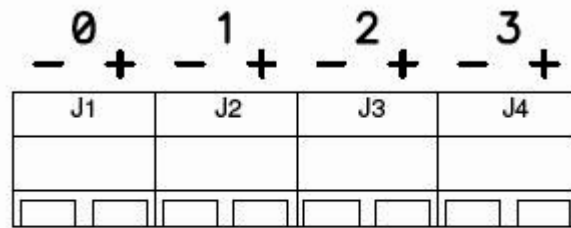


REF GND

Mechanical specifications: PA258 S – 5 Rising clamp terminal blocks;

Function: Chassis ground reference

2.3.3 Analog Input



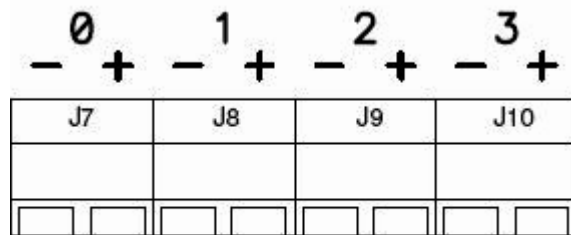
ANALOG INPUT

Mechanical specifications: PA258 S – 5 Rising clamp terminal blocks (4 input channels);
Function: Analog Input can be used for the interlock logic (see § 2.4).

Specifications:

- V_{in} = differential input, 0÷10 V range
- Common mode range = ± 270 V

2.3.4 Digital Input



DIGITAL INPUT

Mechanical specifications: PA258 S – 5 Rising clamp terminal blocks (4 input channels)
Function: Digital Inputs are active low and can be used for the interlock logic (see § 2.4).

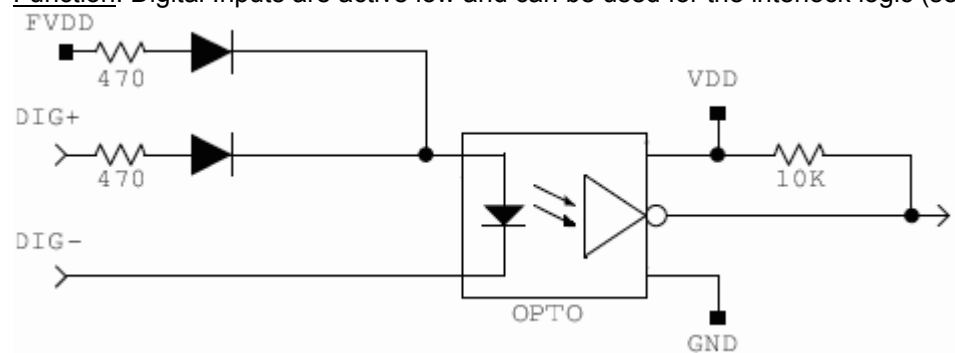
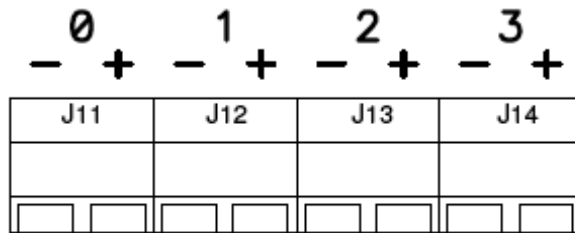


Fig. 2.8: Digital Input electrical scheme

Specifications:

- $FVDD$ = 5V referred to REF GND (see § 2.3.2)
- Input range (between DIG+ and DIG-) = 4 ÷ 7V

2.3.5 Digital Output



DIGITAL OUTPUT

Mechanical specifications: PA258 S – 5 Rising clamp terminal blocks (4 output channels)
Function: Digital Outputs can be programmed (open/closed) via software and can be used for the interlock logic (see § 2.4).

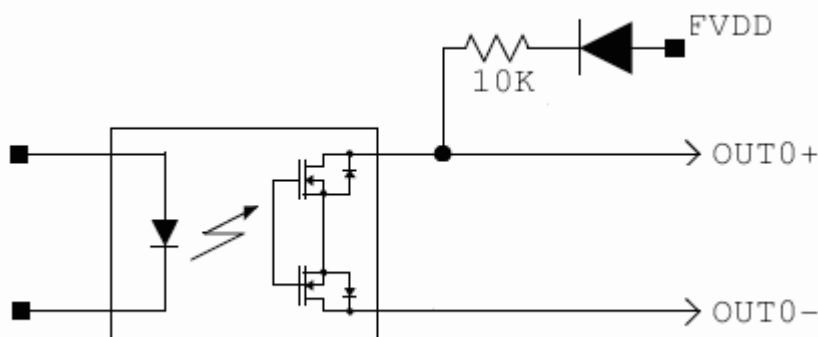


Fig. 2.9: Digital Output electrical scheme

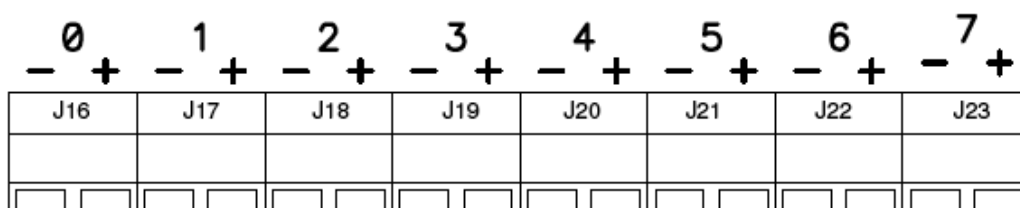
Digital Outputs are realized with Photo-Relais component; specifications are the following:

- Maximum ON state current = 400 mA
- Maximum OFF state voltage = 60V

2.3.6 Mains

The Power supplies are equipped with a “World”- mains input (rated voltage range: 100-240 VAC, frequency: 50-60 Hz, rated current: 16 A).

2.3.7 Voltage sensing



SENSE INPUT

Mechanical specifications: PA258 S – 5 Rising clamp terminal blocks

Function: All output channels have a Remote Sensing Line to compensate for the voltage drop over the cable. Voltage is monitored directly at the load by an high input impedance differential amplifier through the sense wires; the voltage sensing circuit is schematically illustrated in the figure below.

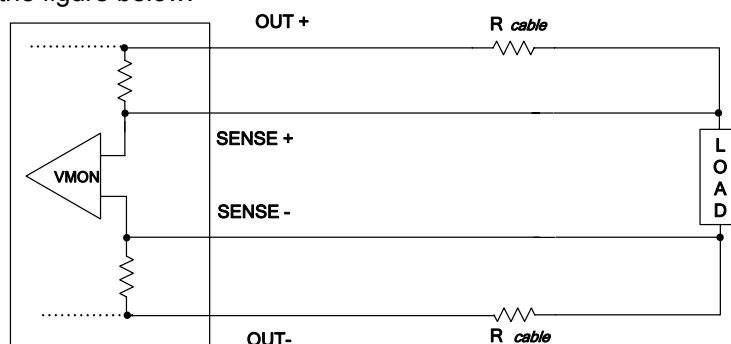


Fig. 2.10: Remote voltage sensing scheme

When the sense wires are connected to the load, the Vset value equals the voltage on the load; if the sense wires are not connected (to the load), Vset will equal the voltage on the connector. If sense lines are not used, then it is necessary to short circuit OUT+ with SENSE+ and OUT- with SENSE-.

Channels tested with cables that permit a 20% maximum drop (of Vset); load changed impulsively and recovery time measured; test results:

Output (Vset)	R _{cable}	Load change	Recovery time (within ±1%)
+5V	5 mohm	27 ÷ 82 A	10 ms
±12V	62.5 mohm	5.7 ÷ 17.2 A	10 ms
±24V	250 mohm	2.9 ÷ 8.6 A	10 ms

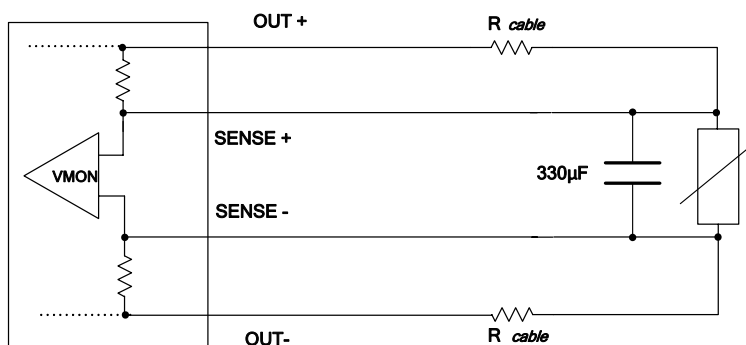


Fig. 2.11: Remote voltage sensing test set up

2.4 Interlock logic

The SY8800 is provided with 3 Digital Input lines (**DI0..DI3**), 3 Analog Input lines (**ANI0..ANI3**) and 3 Digital Output lines (**DO0..DO3**); see § 2.3.2, § 2.3.4 and § 2.3.4.

Via the Interlock Logic menu (see § 3.2.1) it is possible to:

- Turn OFF one or more channels as one of the digital IN associated becomes active
- Turn OFF one or more channels as one of the analog IN associated exceeds the programmed threshold
- Drive active one or more digital Outputs, as the associated channels are turned OFF due to an alarm status

3. Operational description

3.1 SY8800 local operation

3.1.1 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.

Table 3.1: Hirschmann connector cabling

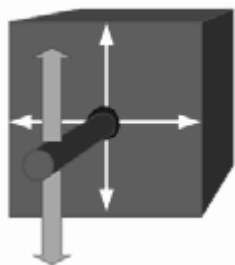
Hirschmann pin nr.	Signal	Description	Color of the Wire
Pin 1	L	Phase	black or brown
Pin 2	N	Return, Neutral	blue
Pin 3		not connected	
Earth	PE	Protective Earth	green/yellow

3.1.2 SY8800 ON/OFF

The front panel ON/OFF switch (see § 2.2) allows the general module ON/OFF; at turning ON all channels are turned ON with the pre-set Ramp Up Time. At turning OFF all channels are turned OFF with the pre-set Ramp Down Time.

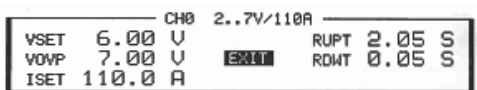
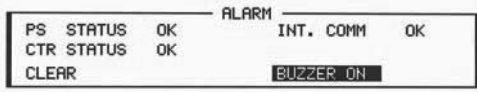
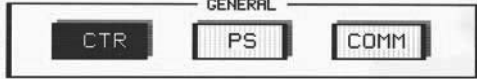
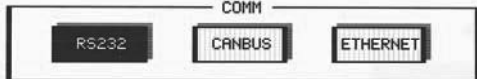
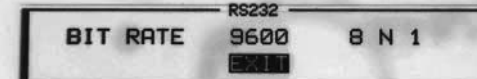
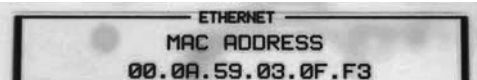
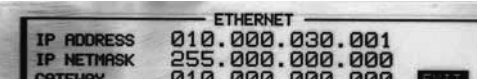
3.1.3 SY8800 Display Menu

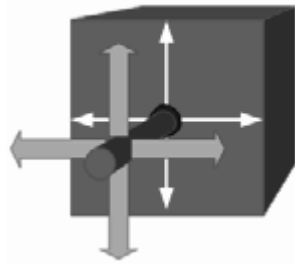
As the module is ON, the SY8800 Display Menu is available



Menu 1..11 are displayed by pulling UP/DOWN the 4-directional Switch with Center Push and are the following:

Table 3.2: Display Menu

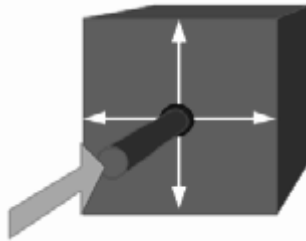
Nr.	Display	Description	Parameters displayed
1.		CHANNEL Monitor	- Vout Value - Current Value - ON/OFF: center push to toggle - Set: center push to enter
2.		CHANNEL Set	- Vset - Vovp - Iset - Rupt - Rdwt
3.		ALARM	- Power Supply Status - CTR Status - INT Comm - Clear Alarm - Buzzer ON/OFF
4.		GENERAL	- CTR Sub Menu - PS Sub menu - COM Sub Menu
5.		Controller	- Status - Temp - Release - Serial number
6.		Power Supply	- Status - Temp - Release - Serial number
7.		Communication	- RS232 - CAN bus - Ethernet
8.		Communication RS232	- Bit rate - Port
9.		Communication CAN bus	- Address - Bit rate
10.		Communication Ethernet	- Mac Address (show 5 sec)
11.		Communication Ethernet	- status and set value



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 high lit.

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.

3.2 SY8800 operation via Terminal

SY8800 operation via Terminal is intended as the interactive control and monitoring of one or more **SY8800 systems** by using a remote terminal. The remote operation via Terminal can be performed in different ways, according to the interface used to communicate with the system. Nominally, it can be achieved by:

- Using the RS232 interface to connect one Mod. **SY8800** system to a VT100-like terminal or to a standard PC running a terminal emulator program;
- Using the USB interface to connect one Mod. **SY8800** system to a standard PC (the USB is managed as RS232 as described in § 3.2.4)
- Using the TCP/IP protocol via Ethernet to perform a Telnet connection.

3.2.1 Control and Monitor menus

From the Terminal prompt:

Digit CAEN + <Cr> the following Main menu opens:

```

#####  ##  ##  #####  #####  #####  #####
##      ##  ##  ##  ##  ##  ##  ##  ##  ##
#####  ##  #####  #####  ##  ##  ##  ##
      ##  ##  ##  ##  ##  ##  ##  ##
#####  #####  #####  #####  #####  #####

C.A.E.N.  SY8800 Universal Multichannel Low Voltage PS   V1.00

B O A R D   M E N U

Crate           Crate Status
General         General Status
Map             Channels Map
I/O             External I/O Signals
Update          Firmware Update
Quit            Abandon program

Select Item

```

Fig. 3.1: Mod. SY8800 Terminal Menu window

- **Update** option is available only with Ethernet connection

From Main menu, by pressing "C", it opens:

```

C.A.E.N.  SY8800 Universal Multichannel Low Voltage PS   V1.00

PS AC Status    OK           PS Temperature 38 Deg
PS VCC Status   OK           CTR Temperature 25 Deg

      VSet      ISet      VMon      IMon      Pw      Status
CH0      05.00 V    110.00 A    00.00 V    000.00 A    Off      Ok
CH1     +12.00 V    023.00 A    00.00 V    000.00 A    Off      Ok
CH2     +12.00 V    023.00 A    00.00 V    000.00 A    Off      Ok
CH3      05.00 V    110.00 A    00.00 V    000.00 A    Off      Ok
CH5     -12.00 V    023.00 A    00.00 V    000.00 A    Off      Ok
CH6     -12.00 V    023.00 A    00.00 V    000.00 A    Off      Ok

All Ch ON      All Ch OFF      More      Reset Alarm      Quit

```

Fig. 3.2: Mod. SY8800 Crate Status 1 Menu window

The arrows allows to select the desired parameter; when it is active it is possible to write a correct value; use <space> to toggle ON/OFF in the Power (Pw) field

From this point, by pressing "M", it opens:

C.A.E.N. SY8800 Universal Multichannel Low Voltage PS V1.00						
PS AC Status	OK		PS Temperature	38 Deg		
PS VCC Status	OK		CTR Temperature	25 Deg		
	VSet	ISet	VMon	IMon	Pw	Status
CH0	05.00 V	110.00 A	00.00 V	000.00 A	Off	Ok
CH1	+12.00 V	023.00 A	00.00 V	000.00 A	Off	Ok
CH2	+12.00 V	023.00 A	00.00 V	000.00 A	Off	Ok
CH3	05.00 V	110.00 A	00.00 V	000.00 A	Off	Ok
CH5	-12.00 V	023.00 A	00.00 V	000.00 A	Off	Ok
CH6	-12.00 V	023.00 A	00.00 V	000.00 A	Off	Ok
All Ch ON	All Ch OFF	More	Reset Alarm	Quit		

Fig. 3.3: Mod. SY8800 Crate Status 2 Menu window

Press "M" again to go back; other commands are:

- O = All channels ON
- F = All channels OFF
- R = Reset alarm
- Q = Quit (go to Main menu)

From Main menu, by pressing "G", it opens:

C.A.E.N. SY8800 Universal Multichannel Low Voltage PS				V1.00
POWER SUPPLY	Firmware Release	1.00	Serial Number	65535
CONTROLLER	Firmware Release	1.00	Serial Number	65535
INTERNAL Communication [Controller <-> Power Supply]				OK
RS232	Bit Rate	9600	[8,N,1]	
CANBUS	Bit Rate	1000K		
	Address	ff		
ETHERNET	MAC Address	00.0A.59.03.10.7D		
	IP Address	010.000.030.001		
	IP Netmask	255.000.000.000		
	Gateway	010.000.000.001		
_Press any key to exit ...				

Fig. 3.4: Mod. SY8800 General Status window

From Main menu, by pressing "M", it opens:

```
C.A.E.N. SY8800 Universal Multichannel Low Voltage PS V1.00

***** CHANNELS MAP *****

CH0      02..07V/110A
CH1      +07..16V/023A
CH2      +07..16V/023A
CH3      02..07V/110A
CH5      -07..16V/023A
CH6      -07..16V/023A
Press any key to exit ...
```

Fig. 3.5: Mod. SY8800 Channels map window

From Main menu, by pressing "I", it opens:

```
C.A.E.N. SY8800 Universal Multichannel Low Voltage PS V1.00

***** EXTERNAL I/O SIGNALS *****
          DIGITAL
IN 0      HIGH          OUT 0      OPEN
IN 1      HIGH          OUT 1      OPEN
IN 2      HIGH          OUT 2      OPEN
IN 3      HIGH          OUT 3      OPEN

          ANALOG
IN 0      11.19 V       THR 0      10.00 V
IN 1      11.19 V       THR 1      10.00 V
IN 2      11.19 V       THR 2      10.00 V
IN 3      11.19 V       THR 3      10.00 V
_Interlock Logic      Quit
```

Fig. 3.6: Mod. SY8800 External I/O Menu

From this point, by pressing "I", it opens:

C.A.E.N. SY8800 Universal Multichannel Low Voltage PS V1.00						
***** INTERLOCK LOGIC *****						
	CH0	CH1	CH2	CH3	CH5	CH6
DIG IN0	*	*	*	*	*	*
DIG IN1	.	.	.	.	.	.
DIG IN2	.	.	.	.	.	.
DIG IN3	.	.	.	.	.	.
AN IN0	.	.	.	.	.	.
AN IN1	.	.	.	.	.	.
AN IN2	.	.	.	.	.	.
AN IN3	.	.	.	.	.	.
DIG OUT0	.	.	.	.	.	.
DIG OUT1	.	.	.	.	.	.
DIG OUT2	.	.	.	.	.	.
DIG OUT3	.	.	.	.	.	.
Save	Quit					

Fig. 3.7: Mod. SY8800 Interlock Menu

In order to turn OFF one or more channels as one of the digital IN associated becomes active, it is necessary to use the arrows to move through rows and columns and use <space> to toggle from *disabled* (.) to *active* (*).

In order to turn OFF one or more channels as one of the analog IN associated exceeds the programmed threshold, it is necessary to use the arrows to move through rows and columns and use <space> to toggle from *disabled* (.) to *active* (*).

In order to drive active or more digital Outputs, as the associated channels are turned OFF due to an alarm status, it is necessary to use the arrows to move through rows and columns and use <space> to toggle from *disabled* (.) to *active* (*).

3.2.2 Firmware Update menus

This option is available only with Ethernet connection.

These menus allows to upgrade the firmware of the Mod. SY8800 control boards.

The files can be retrieved from a computer connected to the crate via TCP/IP protocol by using a TFTP (Trivial File Transfer Protocol) Server Software¹.

In order to add a file in the system flash memory via TFTP, follow this procedure:

- check if the system is connected via TCP/IP protocol to a computer able to run a TFTP (Trivial File Transfer Protocol) Server Software and configured properly;
- run the TFTP Server Software and select the directory containing the file you want to add;

¹ The TFTP Server is usually available on Unix workstations. In case of PCs with Windows XP/2000, there are various shareware programs available on Internet, e.g. the program Pumpkin by the KLEVER GROUP INC. (www.klever.net).

- enter the Update Menu by pressing "U" in the Mod. SY8800 Terminal Menu window.

```
C.A.E.N. SY8800 Universal Multichannel Low Voltage PS V1.00

Firmware Update. Are you sure ? [y/n] _
```

Fig. 3.8: Mod. SY8800 Firmware Update window 1

by pressing "Y", it opens:

```
C.A.E.N. SY8800 Universal Multichannel Low Voltage PS V1.00

Control Unit Firmware Update
Power Supply Firmware Update
_Control unit   Power Supply   Quit
```

Fig. 3.9: Mod. SY8800 Firmware Update window 2

by pressing "C", it opens:

```
C.A.E.N. SY8800 Universal Multichannel Low Voltage PS V1.00

Control Unit Firmware Update

Enter Server IP Address      : 10.0.7.3
Enter File Name [sy8800c.xxx] : sy8800c.100

Firmware Update. Are you sure ? [y/n] _
```

Fig. 3.10: Mod. SY8800 Firmware Update window 2

3.2.3 Remote connection

Connections available

- Ethernet connection via:
 - o Telnet (terminal emulator)
- RS232 via terminal
- USB managed as RS232 requires driver for USB RS232 converter. (The Mod. SY8800 control board houses a FT232BM chip which allows to manage the Unit via USB.

NOTE:

- RS232 and USB cannot be operated at the same time
- Maximum of 3 Ethernet connection are allowed
- 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 SY8800.

3.2.4 RS232 /USB connection

3.2.4.1 USB connection

The Mod. SY8800 control board houses a FT232B chip which allows to manage the unit via USB.

Drivers for this device are freely available at: <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

4. Communication Protocol

The Protocol is based on commands made of ASCII characters strings; it is common to all interfaces (RS232, USB, CAN BUS and ETHERNET)

4.1 Command Format

The Format of a command string is the following:

CMD:*,CH*,PAR:***,VAL:***,**<Cr>**

The fields that form the command are:

CMD : MON, SET

CH : 0..8 (CH8 for the commands related to all Channels)

PAR : (see parameters tables)

VAL : (numerical value must have a Format compatible with resolution and range)

#CMD:ERR<Cr>	Wrong command Format or command not recognized
#CH:ERR<Cr>	Channel Field not present or wrong Channel value
#PAR:ERR<Cr>	Field parameter not present or parameter not recognized
#VAL:ERR<Cr>	Wrong set value (<Min or >Max)
#CMD:OK,VAL:*****<Cr>	Command Ok ***** = value

4.2 Monitor commands related to the Channel 'X'

\$CMD:MON,CH:X,PAR:NAME<Cr>	Readout name del channel (ex. +2..7V/110A)
\$CMD:MON,CH:X,PAR:VSET<Cr>	Readout value of voltage Set
\$CMD:MON,CH:X,PAR:VOVP<Cr>	Readout value of voltage of Over Voltage Protection
\$CMD:MON,CH:X,PAR:VMON<Cr>	Readout value of voltage Monitor
\$CMD:MON,CH:X,PAR:VMIN<Cr>	Readout min value of voltage Mon
\$CMD:MON,CH:X,PAR:VMAX<Cr>	Readout max value of voltage Mon
\$CMD:MON,CH:X,PAR:VRES<Cr>	Readout resolution value of voltage Mon
\$CMD:MON,CH:X,PAR:ISSET<Cr>	Readout value of current limit
\$CMD:MON,CH:X,PAR:IMON<Cr>	Readout value of current Monitor
\$CMD:MON,CH:X,PAR:IMAX<Cr>	Readout max value of current limit
\$CMD:MON,CH:X,PAR:IMIN<Cr>	Readout value min del current limit
\$CMD:MON,CH:X,PAR:IRES<Cr>	Readout resolution value of current limit
\$CMD:MON,CH:X,PAR:RUTIME<Cr>	Readout value of Ramp Up Time
\$CMD:MON,CH:X,PAR:RDTIME<Cr>	Readout value of Ramp Down Time
\$CMD:MON,CH:X,PAR:RTMAX<Cr>	Readout max value of Ramp Time

\$CMD:MON,CH:X,PAR:RTMIN<Cr>	Readout min value of Ramp Time
\$CMD:MON,CH:X,PAR:RTRES<Cr>	Readout resolution value of Ramp Time
\$CMD:MON,CH:X,PAR:IOCONF<Cr>	Readout resolution value of External signals configuration
\$CMD:MON,CH:X,PAR:STAT<Cr>	Readout value of channel status

Readout value are reported in the correct format (comma and decimal where necessary).
Meaning of **STATUS** bits

Bit 0 → ON/OFF	1 : ON 0 : OFF
Bit 1 → Over Current	1 : Current output > Iset
Bit 2 → Over Voltage Protection	1 : Channel OFF because VOUT > VOVP
Bit 3 → Under Voltage Protection	1 : Channel OFF because V _{MON} < V _{SET} - 10%
Bit 4 → Over Temperature	1 : Channel OFF because channel Temperature > 90°C
Bit 5 → Ramp UP	1 : Channel in Ramp UP
Bit 6 → Ramp DOWN	1 : Channel in Ramp DOWN
Bit 7 → External	1 : Channel OFF due to DIGITAL IN active or ANALOG IN over threshold (see External I/O Configuration)
Bit 8 → Calibration Error	1 : Error on calibration coefficient
Bit 9..15 → N.C.	

4.3 Set commands related to the Channel 'X'

\$CMD:SET,CH:X,PAR:VSET,VAL:XX.<Cr>	Set Value of voltage
\$CMD:SET,CH:X,PAR:VOVP,VAL:XX.<Cr>	Set Value of Voltage limit
\$CMD:SET,CH:X,PAR:ISET,VAL:XX.<Cr>	Set Value of current limit
\$CMD:SET,CH:X,PAR:RUTIME,VAL:XX.<Cr>	Set Value of Ramp Up Time
\$CMD:SET,CH:X,PAR:RDTIME,VAL:XX.<Cr>	Set Value of Ramp Down Time
\$CMD:SET,CH:X,PAR:IOCONF,VAL:XX.<Cr>	Set Value of configuration for external I/O
\$CMD:SET,CH:X,PAR:ON.<Cr>	ON Channel
\$CMD:SET,CH:X,PAR:OFF.<Cr>	OFF Channel

Values of VSET,VOVP,ISET, RUTIME,RDTIME, and IOCONF must be passed in the correct format (comma and decimal when foreseen).

Meaning of bits value ('VAL') related to **IOCONF** parameter:

DIGITAL OUT				ANALOG IN				DIGITAL IN			
DO3	DO2	DO1	DO0	ANI3	ANI2	ANI1	ANI0	DI3	DI2	DI1	DI0

DI0..DI3 If one or more of these bits value is 1, channel is turned OFF as one of the digital IN associated becomes active.

ANI0..ANI3 If one or more of these bits value is 1, channel is turned OFF as one of the analog IN associated exceeds the programmed threshold.

DO0..DO3 If one or more of these bits value is 1, as the channel is turned OFF due to an alarm status the relevant digital Outputs become active.

4.4 Monitor commands related to the CRATE (channel 8)

\$CMD:MON,CH:8,PAR:CRNAME<Cr>	Readout Crate name: 'SY8800'
\$CMD:MON,CH:8,PAR:NUMCH<Cr>	Readout number of channels present
\$CMD:MON,CH:8,PAR:CHPRES<Cr>	Readout of channels present (x,x,x,x..)
\$CMD:MON,CH:8,PAR:PSSNUM<Cr>	Readout value of PS serial number
\$CMD:MON,CH:8,PAR:PSFREL<Cr>	Readout of Release Firmware PS Ctr
\$CMD:MON,CH:8,PAR:PSTEMP<Cr>	Readout value of Temperature PS Ctr
\$CMD:MON,CH:8,PAR:CTRSNUM<Cr>	Readout value of serial number of Ctr user interface
\$CMD:MON,CH:8,PAR:CTRFREL<Cr>	Readout of Release Firmware of Ctr user interface
\$CMD:MON,CH:8,PAR:CTRTEMP<Cr>	Readout value of Temperature of Ctr user interface
\$CMD:MON,CH:8,PAR:CRST<Cr>	Readout value of Crate status
\$CMD:MON,CH:8,PAR:DIGIN<Cr>	Readout value of DIGITAL INPUT status
\$CMD:MON,CH:8,PAR:DIGOUT<Cr>	Readout value of DIGITAL OUTPUT status
\$CMD:MON,CH:8,PAR:ANIN0<Cr>	Readout value of ANALOG INPUT 0
\$CMD:MON,CH:8,PAR:ANIN1<Cr>	Readout value of ANALOG INPUT 1
\$CMD:MON,CH:8,PAR:ANIN2<Cr>	Readout value of ANALOG INPUT 2
\$CMD:MON,CH:8,PAR:ANIN3<Cr>	Readout value of ANALOG INPUT 3
\$CMD:MON,CH:8,PAR:ANTHR0<Cr>	Readout value of ANALOG INPUT 0 threshold
\$CMD:MON,CH:8,PAR:ANTHR1<Cr>	Readout value of ANALOG INPUT 1 threshold
\$CMD:MON,CH:8,PAR:ANTHR2<Cr>	Readout value of ANALOG INPUT 2 threshold
\$CMD:MON,CH:8,PAR:ANTHR3<Cr>	Readout value of ANALOG INPUT 3 threshold
\$CMD:MON,CH:8,PAR:ANMAX<Cr>	Readout max value of analog thresholds
\$CMD:MON,CH:8,PAR:ANMIN<Cr>	Readout min value of analog thresholds
\$CMD:MON,CH:8,PAR:ANRES<Cr>	Readout resolution value of analog thresholds
\$CMD:MON,CH:8,PAR:RS232BR<Cr>	Readout Bit Rate RS232 : 0..4 (see below) 
\$CMD:MON,CH:8,PAR:CANBR<Cr>	Readout Bit Rate CANBUS : 0..5 (see below) 
\$CMD:MON,CH:8,PAR:CANADD<Cr>	Readout Address CANBUS : 0..255 
\$CMD:MON,CH:8,PAR:IPADD<Cr>	Readout Address IP : xxx.xxx.xxx.xxx 
\$CMD:MON,CH:8,PAR:IPMSK<Cr>	Readout IP Netmask : xxx.xxx.xxx.xxx 
\$CMD:MON,CH:8,PAR:IPGTW<Cr>	Readout Gateway : xxx.xxx.xxx.xxx 
\$CMD:MON,CH:8,PAR:MACADD<Cr>	Readout Mac Address : xx.xx.xx.xx.xx.xx 

Rs232 Btrate : 0 -> 9600

1 -> 19200
2 -> 38400
3 -> 57600
4 -> 115200

CanBus Btrate : 0 -> 1M

1 -> 500K
2 -> 250K
3 -> 100K
4 -> 50K
5 -> 10K

Meaning of Crate **STATUS** bits

Bit 0 → ON/OFF	1 : at least one channel ON
Bit 1 → VCC Supply Fail	1 : issue on local power supplies (PS)
Bit 2 → Temperature Fail	1 : Temperature on Ctr PS < 5°C or > 65°C
Bit 3 → AC Fail	1 : issue on MAIN POWER SUPPLY
Bit 4..12 → N.C.	
Bit 13 → Temperature Fail	1 : Temperature Ctr user interface < 5°C or > 65°C

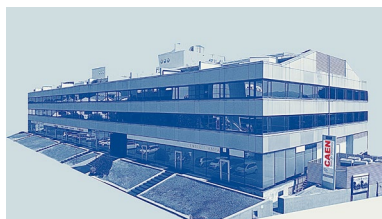
4.5 Set commands related to the CRATE (channel 8)

\$CMD:SET,CH:8,PAR:ON<Cr>	All channels ON
\$CMD:SET,CH:8,PAR:OFF<Cr>	All channels OFF
\$CMD:SET,CH:8,PAR:CLR<Cr>	Clear Alarm
\$CMD:SET,CH:8,PAR:DIGOUT,VAL:X<Cr>	Set DIGITAL OUTPUT
\$CMD:SET,CH:8,PAR:ANTHR0,VAL:XX.XX<Cr>	Set ANALOG THRESHOLD 0
\$CMD:SET,CH:8,PAR:ANTHR1,VAL:XX.XX<Cr>	Set ANALOG THRESHOLD 1
\$CMD:SET,CH:8,PAR:ANTHR2,VAL:XX.XX<Cr>	Set ANALOG THRESHOLD 2
\$CMD:SET,CH:8,PAR:ANTHR3,VAL:XX.XX<Cr>	Set ANALOG THRESHOLD 3

 commands tagged with this symbol are not available for CAN BUS interface.

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