CAEN
Tools for Discovery

Electronic Instrumentation

User Manual UM2462

SY4527 - SY4527LC Power Supply Systems

Rev. 20 - 9 April 2020

Purpose of this Manual

This document is the SY4527 - SY4527LC Power Supply Systems User's Manual; it contains information about the installation, the configuration and the use of the Power Supply System.

Change Document Record

Date	Revision	Changes
16 March 2012	0	Preliminary release
3 April 2012	1	Output Power notes
20 April 2012	2	Installation procedures
26 November 2012	3	Reboot procedures, new HiVoCS
27 February 2013	4	Firmware upgrade options
26 March 2013	5	Updated introduction
16 October 2013	6	Added SY4527LC specifications
28 November 2013	7	Details on TRIP function
13 December 2013	8	Updated power requirements
23 January 2014	9	Updated table 2 (packaging)
14 March 2014	10	Updated § 8 (EPICS; Upgrade)
2 July 2014	11	Updated Reset Configuration Flag
9 June 2015	12	Added SSH connection
9 May 2017	13	Updated SSH connection, Hardware Installation, Safety requirements, Support
27 September 2017	14	Updated §2
27 June 2018	15	Updated Configuration, DHCP Server sections
20 December 2018	16	Updated Upgrade menu
12 June 2019	17	Added Note on Power Sockets
5 July 2019	18	Added description for CAEN Analytics (HiVoCS Rel. 1.5.1)
2 October 2019	19	Updated table 3
9 April 2020	20	Updated table 1

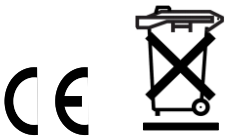
Symbols, abbreviated terms and notation

N.A.

Reference Documents

N.A.

CAEN S.p.A.
Via Vetraia, 11 55049 Viareggio (LU) - ITALY
Tel. +39.0584.388.398 Fax +39.0584.388.959
info@caen.it www.caen.it



Index

List of Figures

List of Tables

1. Introduction

Fig. 1 – SY4527 Universal Multichannel Power Supply System

The SY4527 system is the fully equipped experiment version of a new line of power supply systems which represent CAEN's latest proposal in the matter of High Voltage and Low Voltage Power Supplying. This system outlines a completely new approach to power generation and distribution by allowing the housing, in the same mainframe, of a wide range of boards with different functions, such as High/Low Voltage boards, generic I/O boards (temperature, pressure monitors, etc.) and branch controllers, where the latter are used to control other remote generators and distributors. Modularity, flexibility and reliability are the key-points of its design, enabling this module to meet the requirements needed in a wide range of experimental conditions. The mainframe is housed in a 19"-wide, 8U-high euro-mechanics rack and hosts four main sections:

- the Board Section, with 16 slots to house power supply boards, distributors and branch controllers;
- the Fan Tray Section, housing 6 fans arranged on two rows, with programmable rotation speed regulation;
- the Power Supply Section, which consists of the Primary power supply and up to 3 “Booster” units;
- the CPU and Front Panel Section which includes all interface facilities.
- The CPU controller is available in 3 different versions: BASIC, ADVANCED and FULL.
  - The BASIC version provides all communication interfaces, RESET control, INTERLOCK control and status LEDs.
  - The ADVANCED version also provides the beam handshake management signals (CH-ON, GEN, VSEL, ISEL).
  - The FULL version provides the complete set of connectors, ENABLE control section, and fan speed control.

The User Software Interface features the usual friendliness of the previous CAEN systems which now also can optionally include a color touchscreen LCD (two version are available: 10.4” and 5.7”). Modularity has been one of the leading criteria in the design and development of the system: both the Power Supply Section and the Board Section are completely modular. The Power Supply Section allows different configurations with up to 4 power supply units per mainframe (up to 4.2kW), while the Board Section can house up to 16 boards able to perform different functions. The complete line of power supply boards and distributors that has been specially developed for SY1527 are fully compatible with the new mainframes. The minimum working system configuration consists of the Primary power supply, one CPU controller and one board. The system allows also to deal with power supply solutions composed by "branch controllers" (housed in the system mainframe) and on-detector "remote boards" (manufactured to be magnetic field and radiation tolerant). A sophisticated trip handling via software allows to control and correlate trip conditions on the channels of the crate. Live insertion and extraction of the boards, which reduces the down time of the global system and eases access to the computing core and peripherals of the system, complete the system flexibility.

Easy interfacing is another key-point of the SY4527 system. The Gigabit Ethernet interface (and the optional Wi- Fi interface) allows both an easy web access and the connection via OPC Server to a SCADA control system. Enhanced software programming features an unified command set independent from the

interface used to communicate with the system. The Power Supply Section and Board Section can be externally synchronised via front panel connectors. Handy maintenance and upgrading, which constitute a major issue in the reliability of a system, are further guaranteed by the possibility of accessing and servicing the system via network facilities. A USB service port allows debugging, configuration and firmware upgrade.

- Two new powerful improvements have been carried out on the new backplane:
- A new 48V Power Bus distribution
- FLEXRAY Fast Serial Link

Fig. 2 – SY4527LC Universal Multichannel Power Supply System

The SY4527LC system is a simplified version of the SY4527 power supply system; it shares most of its feature with its bigger brother, with the following exceptions:

- the Board Section has 10 slots to house power supply boards, distributors and branch controllers;
- the Power Supply Section hosts the 600 W non expandable power supply unit
- the CPU provides all communication interfaces, RESET control, INTERLOCK control and status LED
- colour touchscreen LCD for local control is not available

Table 1 – Available Items

Code	Item	Description
WSY4527FLLXA	SY4527	Universal Multichannel Power Supply System - FULL 600W
WSY4527ADVXA	SY4527	Universal Multichannel Power Supply System - ADVANCED 600W
WSY4527BSCXA	SY4527	Universal Multichannel Power Supply System - BASIC 600W
WSY4527PREXA	SY4527	SY4527 Premium - Includes SY4527 FULL, A4534, A4535, SW4536
WSY4527LCXAA	SY4527LC	10 Slot LOW COST Universal Multichannel Power Supply System
WA4528FLLXAA	A4528	SY4527/SY5527 CPU Module FULL
WA4528ADVXAA	A4528	SY4527/SY5527 CPU Module ADVANCED
WA4528BSCXAA	A4528	SY4527/SY5527 CPU Module BASIC
WA4531XAAAAA	A4531	SY4527/SY5527 Primary Power Supply 600W
WA4532S600XA	A4532	SY4527/5527 Optional Single Power Supply Unit 600W
WA4533D1200X	A4533	SY4527/5527 Optional Double Power Supply Unit 1200W
WA4534XAAAAA	A4534	10.4" LCD Touch screen color Display Unit
WA4537XAAAAA	A4537	5.7" LCD Touchscreen color Display Unit
WA4535XAAAAA	A4535	SY4527/SY5527 Wi-Fi Dongle for Wireless connectivity
WSW4536XAAAA	SW4536	SY4527/SY5527 Control software functionality enhancement activation code[1]

[1] Refer to CAENGECO2020 Control Software User's Manual for details

2. Safety and operation requirements

This section contains the fundamental safety rules for the installation and operation of the SY4527 system. Read thoroughly this section before starting any procedure of installation or operation of the product.

General information

Review the following safety 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.

Injury Precautions

- Use Proper Power Cord and HV Cables
- To avoid fire hazard, use only the power cord and HV cables specified for this product.
- Avoid Electric Overload.
- To avoid electric shock or fire hazard, do not apply a voltage to a load that is outside the range specified for that load.
- Avoid Electric Shock.
- To avoid injury or loss of life, do not connect or disconnect cables while they are connected to a voltage source.
- Ground the Product.

WARNING: this product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to any input or output terminals of the product, ensure that the product is properly grounded. The HV channels contain hazardous voltages. Be certain that the high voltage is completely discharged before removing or connecting the high voltage cables. High voltage cables can store charge if they are disconnected from the supply while high voltage is turned on, and can cause personal injury or death if not handled properly. Use only connecting cables with a rated voltage within the foreseen range. Do not connect the high voltage output to exposed circuitry. The load connected to the high voltage output should be enclosed in a metal shield that is connected to safety earth ground using a properly designed cord.

- 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 install the crates on top of each other
- Install in equipment racks with flame breaker top and bottom panels
- A minimum distance of 15cm is required between the crate and other object over or under it.
- If required, the equipments may be cleaned with isopropyl alcohol or deionised water and air dried. Clean the exterior of the product only. Do not apply cleaner directly to the items or allow liquids to enter or spill on the product.

Product Damage Precautions

- Use Proper Power Source.

- Do not operate this product from a power source that applies more than the voltage specified.
- To prevent product overheating, do not obstruct cooling fans vents
- Do Not Operate With Suspected Failures.
- If you suspect there is damage to this product, have it inspected by qualified service personnel.

Product cleaning

If required, the equipments may be cleaned with isopropyl alcohol or deionised water and air dried. Clean the exterior of the product only. Do not apply cleaner directly to the items or allow liquids to enter or spill on the product.

EC Certifications and Compliance

Use in conformity of the definition with fully equipped mainframe with fully closed slots by boards or dummy panels. Sufficient cooling and mains connection must be secured according to regulations. Signal lines length during all tests was less than 3 m. Admitted for powering by industrial mains only.

Terms in this Manual

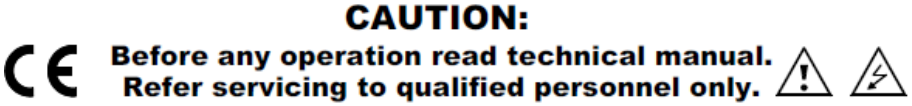
- **WARNING:** Warning statements identify conditions or practices that could result in injury or loss of life.
- **CAUTION:** Caution statements identify conditions or practices that could damage this product or other property.

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.

The following label is printed on the back panel of the product:



These symbols mean:

DANGER
High Voltage

ATTENTION
Refer to Manual

Functional earth terminal

General Operation Requirements

Before operation, check the following requirements:

Operating temperature:	5÷40°C (dry atmosphere)
Max. length of cables:	according to cable specifications

Power cords

The system is provided with power cord, suitable to configuration requirements, as reported on the following label:

SY4527

VOLTAGE RANGE:	100 - 240 V~
FREQUENCY:	50 - 60 Hz
INPUT CURRENT:	25A MAX

SY4527LC

VOLTAGE RANGE:	100 - 240 V~
FREQUENCY:	50 - 60 Hz
INPUT CURRENT:	10A MAX

Note on Power Sockets

In countries with **220Vac** power supply, the SY4527 can be expanded up to 4200W output (3 x A4533 optional power modules). Please note that the factory AC power socket supports output power up to 2400W (one A4532 and one A4533 optional power modules); when output power exceeds this value, the factory AC power socket must be replaced with a **32A 3 pole Industrial plug**

In countries with **110Vac** power supply, the SY4527 can be expanded up to 2200W output (one A4532 and one A4533 optional power modules). Please note that the factory AC power socket supports output power up to 1100W (one A4532 optional power module); when output power exceeds this value, the factory AC power socket must be replaced with a **NEMA L5-30P Plug**

VAC	Maximum Power Configuration (MPC)	Critical Power Configuration (CPC)	If > CPC, replace factory socket with:
220V	4200W (3 x A4533)	2400W (1x A4532 + 1x A4533)	32A 3 pole Industrial plug
110V	2200W (1x A4532 + 1x A4533)	1100W (1x A4532)	NEMA L5-30P Plug

3. Functional description

This section will describe in detail all the items that compose the SY4527-4527LC.

Technical specifications

Table 2 – SY4527 Technical specifications

Version		SY4527	SY4527LC
Packaging		19" 8U Euro-mechanics rack W: 19'' (483 mm) H: 8U (355 mm) D: 747 mm (with handles) 667 mm (without handles)	19" 8U Euro-mechanics rack W: 19'' (483 mm) H: 8U (355 mm) D: 556 mm (with handles) 489 mm (without handles)
Weight		Mainframe(*): 18 kg	Mainframe: 15 kg
Power Requirements	**Voltage range**	100/240 Vac; 50/60 Hz	
	Max current	25 A; Fuse 10x38 30A 600V screw cap	10A; Fuse 5x20 10A 250V slot cap
	Max power	5500 W @ 220 Vac 2750 W @ 110 Vac	1050 W @ 220 Vac 1020 W @ 110 Vac
Cooling fans		9 x 120x120 24V 9GV1224P4G01	6 x 120x120 24V 9GV1224P4G01
Ventilation sound pressure level	**High**	78.5 dBA	
	Medium	67.5 dBA	
	Low	48 dBA	
Max. number of boards per crate		16	10
Max. number of Power Supply Units per crate		4 (1 Primary + 3 Optional)(**)	1
Primary Power Supply Unit Output Power		600 W with 220 Vac Mains; 550 W with 110 Vac Mains	
Optional Power Supply Unit Output Power		Single Version: 600 W (220 Vac Mains); 550 W (110 Vac Mains) Double Version: 1200 W (220 Vac Mains); 1100 W (110 Vac Mains)	n.a.
Maximum. Output Power		4200 W @ 220 Vac 1990 W @ 110 Vac	600 W @220 Vac 550 W @ 110 Vac
CPU		3 versions: BASIC, ADVANCED and FULL	See p.13
Display		10.4" or 5.7" Colour Touchscreen LCD (optional) with two USB 2.0 ports for event logging, configuration backup & restore	n.a.
Communication		Gigabit Ethernet, Wi-Fi (optional)	
Software		Graphical interface control software; OS Platforms: MS Windows, Linux HiVoCS tool	
Enhanced Software (optional)		Includes advanced features like Logging, Scripting, Alarm handling	
Additional features		OPC Server compatibility; FLEXRAY Fast Serial Link	
Operating temperature		From 5°C to +40°C	
Operating humidity		From 10% to +90% non-condensing	
Storage temperature		From -30°C to +80°C	
Storage humidity		From 5% to +90% non-condensing	

(*) One Primary Power Supply (Mod.A4531) and one CPU(Mod.A4528) are included; boards are not included.

(**) See Fig. 3

A4528 Output Power

The following chart shows the available typical output power depending on installed Power Supply Units and input power voltage line.

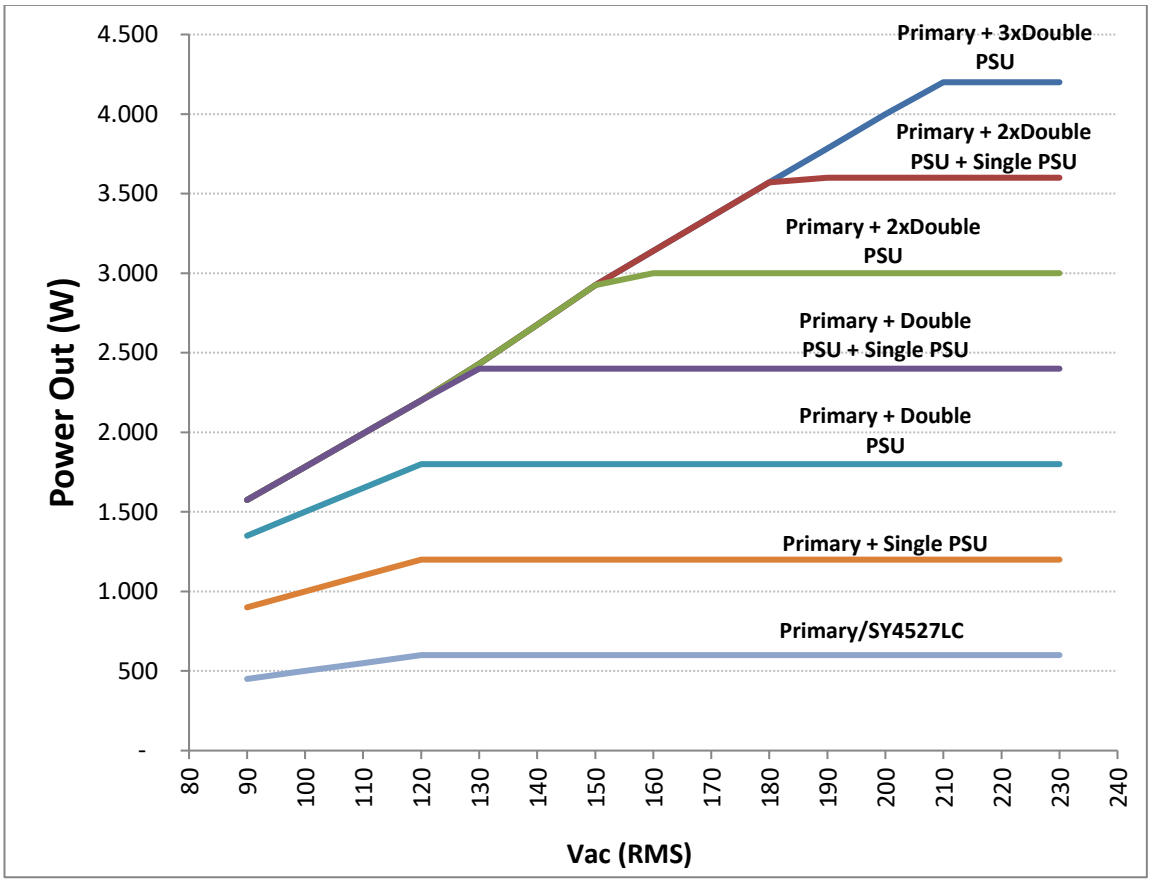


Fig. 3 – Maximum Output Power vs. Power Supply Units and power voltage line

A4528 CPU Section

The CPU Front Panel Section includes all interface facilities; it is available in 3 different versions: BASIC, ADVANCED and FULL: the BASIC version provides all the communication interfaces, the RESET control, the INTERLOCK control and status LEDs; the ADVANCED version also provides the beam handshake management connectors (CH-ON, GEN, VSEL, ISEL); the FULL version provides the complete set of panel connectors, the ENABLE control section, and the fan speed control. The CPU version installed on the SY4527LC shares the same features with the BASIC issue.

The tables below resume the front panel facilities of the 3 CPU versions.

Fig. 4 – A4528 CPU Full Version

Table 3 – CPU Front Panel I/O signals

Name	Direction	Electrical Specification	Function	CPU Version		
				Full	Advanced	Basic SY4527LC
CH-ON	Out	Std. NIM/TTL (selectable); 00-type LEMO connector.	at least one channel is ON	X	X	
GEN	Out	Std. NIM/TTL (selectable); 00-type LEMO connector.	GENERAL STATUS indication; corresponds to the logic combination (defined by the user) of OVC, UNV, OVV, TRIP	X	X	
CHK PASS	Out	Std. NIM/TTL (selectable); 00-type LEMO connector.	initial system check successful and system ready	X		
RSTFLAG	Out	Std. NIM/TTL (selectable); 00-type LEMO connector.	a RESET occurred according to user's settings (RESET FLAG window).	X		
OVV	Out	Std. NIM/TTL (selectable); 00-type LEMO connector.	at least one channel is in *Over Voltage*	X		
UNV	Out	Std. NIM/TTL (selectable); 00-type LEMO connector.	at least one channel is in *Under Voltage*	X		
OVC	Out	Std. NIM/TTL (selectable); 00-type LEMO connector.	at least one channel is in *Over Current*.	X		
TRIP	Out	Std. NIM/TTL (selectable); 00-type LEMO connector.	status of External Trip line 0 is HIGH (see p. 54)	X		
VSEL	In	Std. NIM/TTL (selectable); 00-type LEMO connector.	channel voltage selection	X	X	
ISEL	In	Std. NIM/TTL (selectable); 00-type LEMO connector.	channel current selection	X	X	
KILL	In	Std. NIM/TTL (selectable); 00-type LEMO connector.	KILL from the front panel: it turns all channels off	X		
HV SYNC MASTER	In/Out	Std. NIM/TTL (selectable); 00-type LEMO connector.	sync clock for the PWS Units (RS485 Std., 1.25 MHz).	X		
ENABLE	In	Std. NIM/TTL (selectable); 00-type LEMO connector.	remote enable.	X		
RESET	In	Std. NIM/TTL (selectable); 00-type LEMO connector.	RESET from the front panel. If the duration of the RESET signal is > T_{RCPU}=100÷200 ms, the CPU is reset; if it is > T_{RCH}= T_{RCPU} + 900 ms, also the boards are reset and the channels are turned off. Reset must be enabled via software (RESET FLAG window	X	X	X
INTERLOCK	In	open/closed contact; 00-type LEMO connector.	INTERLOCK command: it turns all the channels off as it is open/closed, according to the position of the relevant switch.	X	X	X
USB		USB A female connector, USB 2.0 compliant		X	X	X
SERVICE		USB B female connector, USB 2.0 compliant		X	X	X
ETH		10Base-T female connector, TTL signals (TCP/IP)		X	X	X

Table 4 – CPU Front Panel Displays

Name	Description	CPU Version		
		Full	Advanced	Basic
CH-ON	Red LED, lights up as at least one channel is ON	X	X	
GEN	Red LED, lights up as GENERAL STATUS signal, corresponding to a logic combination (defined by the user) of OVC, UNV, OVV, TRIP, is TRUE	X	X	
CHK PASS	Green LED, lights up as the initial system check has been performed successfully and the system is ready	X		
RSTFLAG	Red LED, lights up after a RESET	X		
OVV	Red LED, lights up as at least one channel is in *Over Voltage* condition	X		
UNV	Red LED, lights up as at least one channel is in *Under Voltage* condition	X		
OVC	Red LED, lights up as at least one channel is in *Over Current* condition	X		
TRIP	Red LED, lights up as status of External Trip line 0 is HIGH (see p. 54)	X		
TTL	Green LED, lights up as the relevant standard is selected	X	X	X
NIM	Green LED, lights up as the relevant standard is selected	X	X	X
VSEL	Green LED, lights up as the relevant connector for voltage selection is TRUE	X	X	
ISEL	Green LED, lights up as the relevant connector for current selection is TRUE	X	X	
KILL	Green LED, lights up as the system is in KILL condition	X		
HV SYNC MASTER	Red LED, lights up as the HV SYNC clock is internally generated	X		
ENABLE	Red LED, lights up, as either the *Local Enable* mode is selected or as the *Remote Enable* mode is selected and the proper REM EN signal is sent in	X		
RESET	Red/orange LED, lights up as a RESET occurs: it is initially red and then becomes orange, depending on the duration of the RESET signal	X	X	X
INTERLOCK	Green LED, lights up as the system is in INTERLOCK condition	X	X	X
OVER TEMP	Red LED, lights up as the *Over Temperature* condition occurs	X	X	X
FAN FAIL	Red LED, lights up as the *Fan Failure* condition occurs	X	X	X
PWR FAIL	Red LED, lights up as the *Power Failure* condition occurs	X	X	X
HI	Fan speed High	X		
MD	Fan speed Medium	X		
LO	Fan speed Low	X		

Table 5 – CPU Front Panel Switches

Name	Description	CPU Version		
		Full	Advanced	Basic
ENABLE	Allows, respectively, to enable the channels locally or to disable them or to allow their remote enable via the proper ENABLE input signal	X		
INTERLOCK	Select whether the INTERLOCK function is active when the contact is closed or open, respectively	X	X	X
RESET	"short" pressure; only the CPU is reset and the whole system resumes its operation from the beginning. All the channels which are ON remain ON, channels which are OFF remain OFF "long" pressure; also the boards are reset and the channels which are ON are dropped to zero at the maximum rate available and turned off. Reset must be enabled via software (RESET FLAG window)	X	X	X
FAN	Fan speed; 3 positions: High, Medium, Low	X		

System control

Several commands are available to control the system. These commands are shared to all channels and can be sent to the system in different ways, depending on their type. The simplest way to forward a command to the system is to send a proper input signal through the relevant connector on the A4528 CPU front panel; however, some commands feature a hardware input, such as a button or a switch,

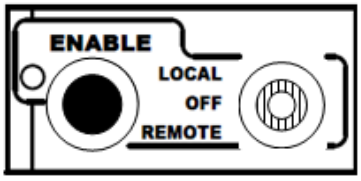
depending on the front panel command input availability on the featured A4528 CPU (Full, Advanced or Basic; SY4527LC CPU has the same I/O capabilities of the A4528 BASIC). It is always possible to send the commands via software.

The following sections describe the available commands. Unless differently specified, all input signals mentioned below are referred to a common ground (COMMON GROUND) and are insulated up to 150 V with respect to the ground of the crate (CRATE GROUND).

NIM / TTL standard selection

It is possible to select, via software, the standard for almost all the control inputs and output signals; the standard selection is signalled by the corresponding green LED lit up (default: NIM).

LOCAL/REMOTE Channel Enable



The channel outputs can be enabled either locally or remotely.

A three-position lever switch (**LOCAL ENABLE / REMOTE ENABLE / OFF switch**) allows for the selection of the enable mode:

*Central position (***OFF***)*: the channel outputs are disabled;

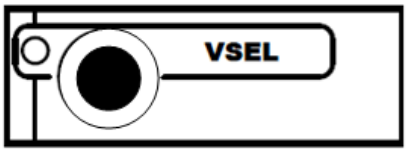
*Upper position (***LOCAL** ENABLE*):* the channel outputs are enabled locally (**LOCAL** ENABLE red LED on);

*Lower position (***REMOTE** ENABLE*)*: the channel outputs can be enabled remotely: the remote enable of the channel outputs will occur by sending a proper **ENABLE input signal** through the relevant connector (the **REMOTE** ENABLE red LED is lit up as the ENABLE signal is TRUE).

As the channels are enabled either locally or remotely, the output voltages of the channels which are ON increase up to the programmed value (V0SET or V1SET, according to the level of the VSEL input) with the rate determined by the Ramp-Up parameter. The channels which are OFF will remain OFF.

If the channels are disabled via the switch (**OFF** position), the output voltages of the channels which are ON drop to 0 at the rate determined by the Ramp-Down parameters. If then they are enabled again, they restore the previous state bringing the output voltage to the programmed value at the rate determined by the Ramp-Up parameters.

VSEL command

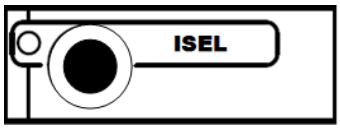


Two Voltage values can be programmed for each channel: V0SET and V1SET. They are selected by the status of the **VSEL input signal**, according to the following:

VSEL input signal	Selected Output voltage	VSEL green LED
VSEL False	V0SET	LED OFF
VSEL True	V1SET	LED ON

When channels are switched from V0SET to V1SET or vice versa, the output voltage drifts from one value to the other at the rate programmed for each channel (Ramp-Up or Ramp-Down parameter).

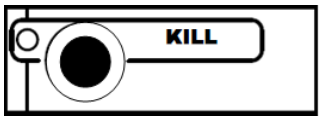
ISEL command



Two current limit values can be programmed for each channel: I0SET and I1SET. They are selected by the status of the **ISEL input signal**, according to the following:

ISEL input signal	Selected Current limit	ISEL green LED
ISEL False	I0SET	LED OFF
ISEL True	I1SET	LED ON

KILL command

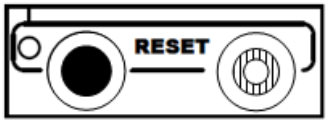


The **KILL input signal**, sent through the relevant connector, allows to switch all the channels off at the maximum rate available, regardless of the Ramp-Down or other parameters.

The relevant green LED will be lit up as the KILL signal is True.

The KILL command can be also forwarded via software.

RESET command



The RESET command allows via the RESET input signal or the RESET push-button to reset the system CPU and, optionally, to reset the boards and to turn all the channels off. The action of the RESET command depends on the duration of the signal or of the press action:

RESET Signal: 100÷200 ms; only the CPU is reset and the whole system resumes its operation from the beginning. All the channels which are ON remain ON, channels which are OFF remain OFF

>1000 ms; also the boards are reset and the channels which are ON are dropped to zero at the maximum rate available and turned off

RESET push-button: “short” pressure; only the CPU is reset and the whole system resumes its operation from the beginning. All the channels which are ON remain ON, channels which are OFF remain OFF

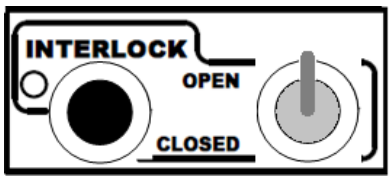
“long” pressure; also the boards are reset and the channels which are ON are dropped to zero at the maximum rate available and turned off

After the RESET, the system will react so as to Power-On: if the Power-On option is enabled, each channel will be restored in the same condition it was before the RESET at the correct rate. If it is disabled, all the channels will be off, independently from the condition in which they were before the RESET.

N.B.: please note that any type of reset command must be enabled via software in the RESET FLAG Configuration register by tagging the relevant reset condition (see p.33).

The occurrence of RESET is also signaled by RESET FLAG output signal, according to the software user’s settings.

INTERLOCK command



The INTERLOCK command allows to switch off simultaneously all the channels, similarly to the KILL command.

The INTERLOCK command can be activated via the INTERLOCK input which acts as an open/closed contact. The selection of the contact position (open or closed) which will cause the INTERLOCK command is performed via the two-position INTERLOCK switch:

Upper position (OPEN): the channels are switched off as the INTERLOCK contact is open (the ground connection in the INTERLOCK input is removed);

Lower position (CLOSED): the channels are switched off as the INTERLOCK contact is closed (the INTERLOCK input is grounded).

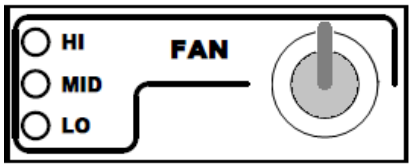
The INTERLOCK condition of the system is signalled by the INTERLOCK green LED lit up.

In order to turn the channels on again, the user must remove the INTERLOCK condition. Any attempt to turn the channels on without removing the INTERLOCK condition will result unsuccessful.

HV SYNC

HVSYNC is the synchronisation clock for the Power Supply Units (RS485 standard, 1.25 MHz). It can work either as MASTER (MASTER red LED on), i.e. the synchronisation clock is internally generated and the HVSYNC connector works as output, or as SLAVE (red LED off), i.e. the synchronisation clock is externally generated and sent through the HV SYNC connector which works as input.

FAN

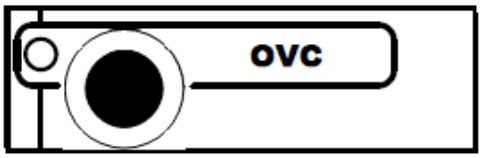


Three position switch; it allows to select Fan speed: High, Medium or Low. The red LEDs light up as the relevant speed is selected. Fan speed must be selected according to cooling requirements of the power supply modules.

System status monitoring

Several output signals and alarms are available to monitor the system status, as described in the following subsections. Please note that all output signals mentioned below, unless differently specified, are referred to a common ground (COMMON GROUND) and are insulated up to 150 V with respect to the ground of the crate (CRATE GROUND).

Over Current



The Over Current condition (OVC) occurs when at least one channel is in Over Current condition, i.e. at least one channel has reached the current limit. The Over Current condition is signalled by the OVC output signal True and the relevant red LED on. The system detects this condition as a fault and reacts according to the setting of the TRIP parameter, namely:

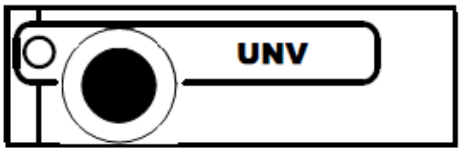
1) TRIP = 1000 (constant CURRENT mode)

If the Board has programmable current hardware protections, the output voltage is varied to keep the current below the programmed limit (I0SET or I1SET, according to the ISEL signal level). The channel behaves like a current generator. If the Board has fixed current hardware protections, the output current is permitted to exceed the ISET value; the channel behaves like a current generator only if the maximum current value is reached.

2) 0 < TRIP < 1000 (TRIP mode)

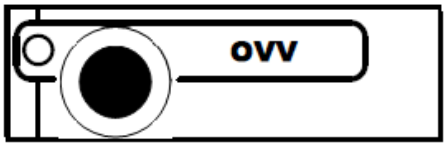
In this case, the channel behaves as in the constant CURRENT mode for a time equal to the finite value set as TRIP parameter, and then it is switched off according to the selected Power-Down option (KILL/RAMP). If the Kill option is selected, the channel will be switched off at the maximum rate available. If Ramp option is selected, the voltage will drop to zero at a rate determined by the value of the Ramp parameter programmed for that channel.

Under Voltage



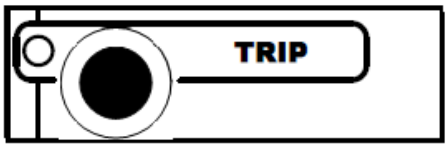
The **Under Voltage** condition (UNV) occurs when at least one channel is in Under Voltage condition, i.e. when the actual value of the channel output voltage is lower than the programmed value. The Under Voltage condition is signalled by the UNV output signal True and the relevant red LED on.

Over Voltage



The Over Voltage condition occurs when at least one channel is in Over Voltage condition, i.e. when the actual value of the channel output voltage is higher than the programmed value. The Over Voltage condition is signalled by the OVV output signal True and the relevant red LED on.

Trip



The TRIP output signal is asserted True (and the relevant red LED is lit up) as the status of External Trip line 0 is HIGH (see p. 54); therefore the TRIP condition occurs as at least one channel, latched on External Trip line 0, has tripped and has been switched off due to an Over Current condition. To recover from this state, it is sufficient to turn the tripped channel On again or to execute a clear alarm command via software.

Reset flag

RST FLAG (RESET FLAG) output signal is TRUE (and relevant red LED on) after a RESET occurred, according to the user's settings. The type of reset which asserts RST FLAG TRUE can actually be selected via software.

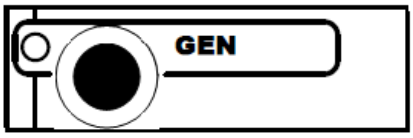
Check passed

CHK PASS (CHECK PASSED) output signal is True (and the relevant green LED on) when the initial check of the system is successful and the system is ready.

At normal operation, this signal is True and the relevant green LED is ON.

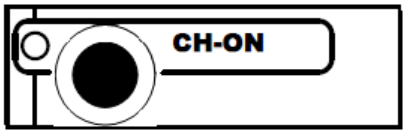
This output signal becomes false either as the Fan failure LED is lit up or as the Power failure LED is lit up. As the condition which caused the CHECK PASSED being FALSE is remove, the CHECK PASSED signal becomes true again.

GEN



GEN (GENERAL STATUS) output signal is True (and relevant red LED on) according to a logic combination of OVC, UNV, OVV and TRIP (status of External Trip line 0 is HIGH see also p.57). The logic combination of these conditions is defined by the user via software.

CH-ON



CH-ON (CHANNEL ON) output signal is True (and the relevant red LED on) as at least one board channel is ON (i.e. the channels are enabled and the POWER parameter of that channel is set to ON).

Over Temperature

Over Temperature condition occurs when there is at least one board at a temperature out of the range TMIN ÷ TMAX, where TMIN and TMAX are two parameters depending on the board type. As the Over Temperature condition is reached, the relevant front panel LED lights up.

Fan Failure

Fan Failure condition occurs when at least one of the fans of the system has stopped or is turning below 20% of normal speed. As the Fan Failure condition is reached, the relevant front panel LED lights up.

Pwr Failure

Power Failure condition occurs when there is a fault in the voltage supplies at the +12 V, -12 V or +48 V level. As the Power Failure condition is reached, the relevant front panel LED lights up.

A4531 Primary Power Supply Section (SY4527)

The **Power Supply Section** of the SY4527 system, consists of the Primary power supply and up to 3 power supply units; the Primary unit carries the system Power ON capability.

Fig. 5 – A4531 Primary Power Supply

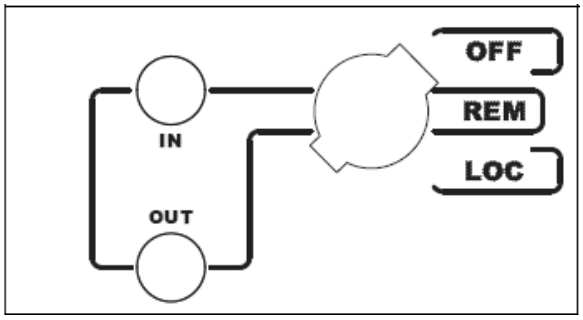
Table 6 – Primary Power Supply Signals and Switches

Name	Description
REM/LOC/OFF key	Key to power on the system locally or to enable its remote power on
OUT	+8.5V level, refer. to the crate ground; tol ±10%; 00 LEMO connector. Remote power-on of the adjacent daisy-chained crate. N.B. Not compatible with SY527 System!
IN	+5 ÷ 12V, 10mA max., electric. insulated; 00 LEMO connector. Remote power-on of the system. N.B. Not compatible with SY527 System!

Table 7 – Primary Power Supply Displays

Name	Description
AC-OK	it indicates the presence of Mains power supply; if it is off it indicates that there is a fault
VDD	it indicates the presence of +5 V power supply; if it is off it indicates that there is a fault
+VCC	it indicates the presence of +12 V power supply; if it is off it indicates that there is a fault.
-VCC	it indicates the presence of -12 V power supply; if it is off it indicates that there is a fault
VFAN	it indicates the presence of Fan unit power supply; if it is off it indicates that there is a fault
VPWR	it indicates the presence of +48 V power supply; if it is off it indicates that there is a fault

LOCAL/REMOTE Power-On (SY4527)



The system can be powered on either locally or remotely. The **POWER-ON** key, located on the front panel of the A4531 Primary Power Supply, has three different positions:

Up position (OFF): the system is turned off;

Down position (LOCAL): the system is turned on locally;

Central position (REMOTE): the system is enabled to be turned on remotely: the remote power ON of the system will occur by sending a proper REMOTE IN input signal through the relevant connector.

The REMOTE IN input signal must be a +5 ÷ +12 V input level (10 mA max.). As the REMOTE IN connector is supplied, the REMOTE OUT connector provides itself a +8.5 V voltage level (with a delay of some seconds; tolerance: ±10%) that can be used to power on another crate remotely (N.B. Not compatible with SY527 Systems). This feature allows to power on many crates with a single signal. The AC-OK yellow LED lights up as the system is powered on, either locally or remotely. N.B. The system can be turned on only if the MAIN switch on the rear panel is in the position 1.

Mainframe panel

The back panel of the SY4527 mainframe houses the AC input connectivity:

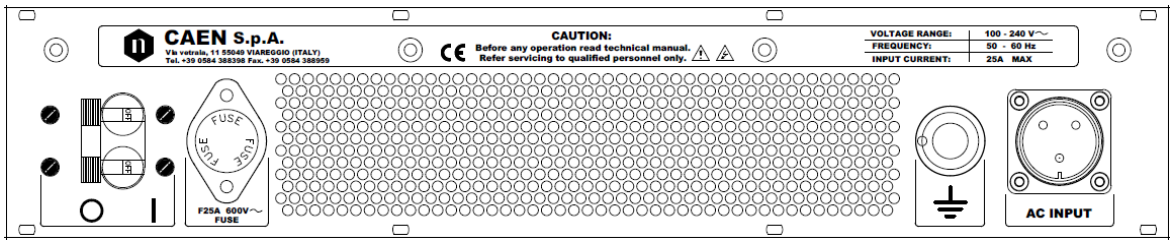


Fig. 6 – SY4527 back panel

The panel of the SY4527LC mainframe houses the AC input connectivity:

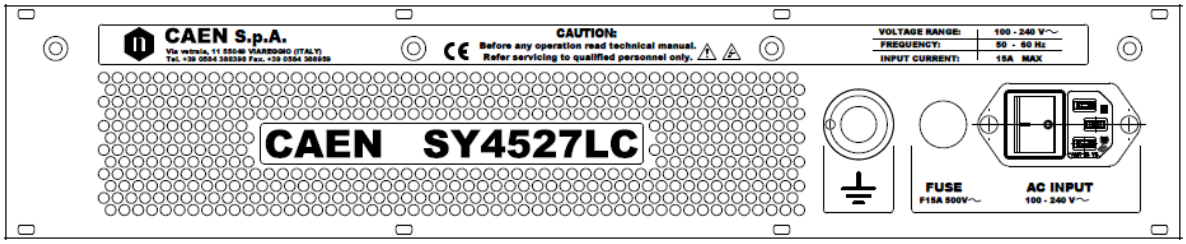
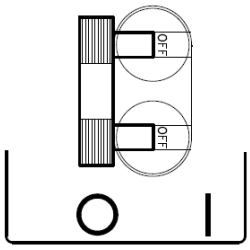


Fig. 7 – SY4527LC panel

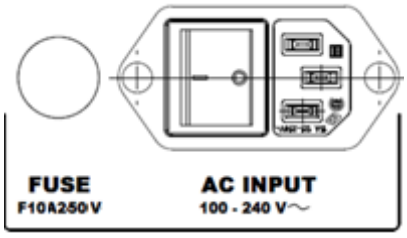
MAIN switch

SY4527



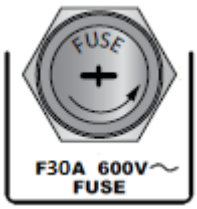
Carling 24A BA2-B0-42-624-B12-D type 2 pole circuit breaker

SY4527LC



C14 Type Inlet (Fused) with Switch; Fuse 5x20 10A 250V slot cap

Fuse

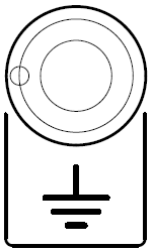


SY4527: Littel Fuse 10x38 30A 600V screw cap;

SY4527LC: Fuse 5x20 10A 250V slot cap

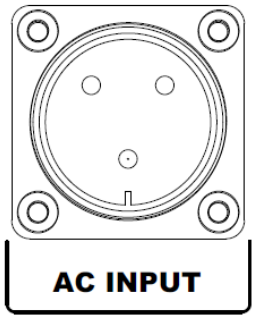
Fuse must be replaced only by trained personnel; disconnect the system from the mains and wait 5 minutes at least, before fuse replacement

Earth



L309-1 heavy current terminal; max ratings: 30A, -25÷+85 °C.

AC Input (SY4527)



SY4527: CA-COM-E-20-19 3-Pin Cannon Industrial

4. System and channel organization

The CPU of the system handles readout or modification requests, coming from different sources (local or remote control), of all the parameters. The A4528 CPU also monitors the crate general parameters, such as Fan Speed, System Alarms and so on.

The current system status is stored in a permanent memory so that all this information is not lost at Power-Off.

The Channel Boards as well house a microcontroller with its permanent memory where it stores all the channels' parameters values. This feature allows easy upgrading and expansion of the system: new modules, or custom modules specially developed to fit the user's needs, can be added to the system without modifying the system CPU firmware.

The microcontroller has two main functions:

- control and monitoring of the channels of the board;
- communication with the system CPU.

The following sections contain an overview of the commands, parameters and alarms for the control and monitoring of the system and board channels.

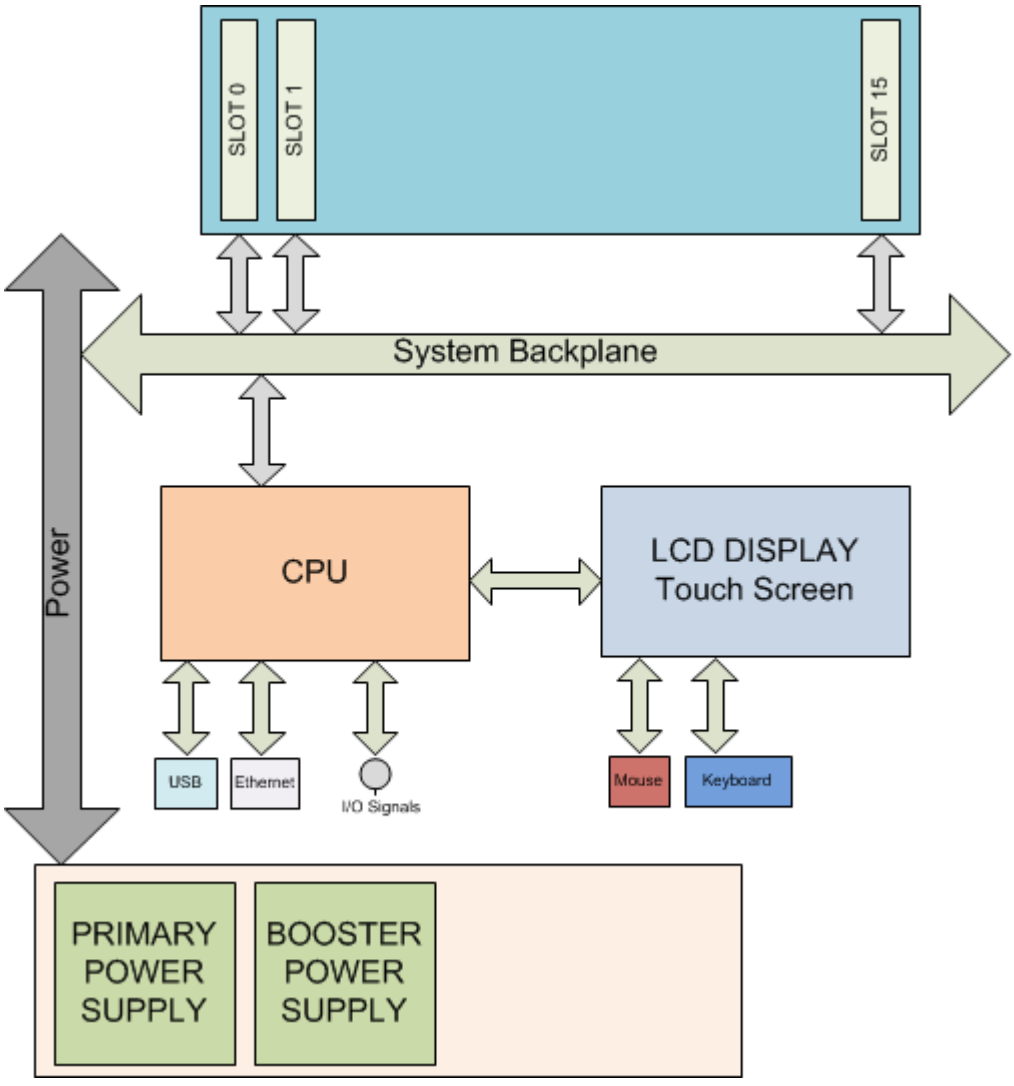


Fig. 8 – SY4527 System Block Diagram

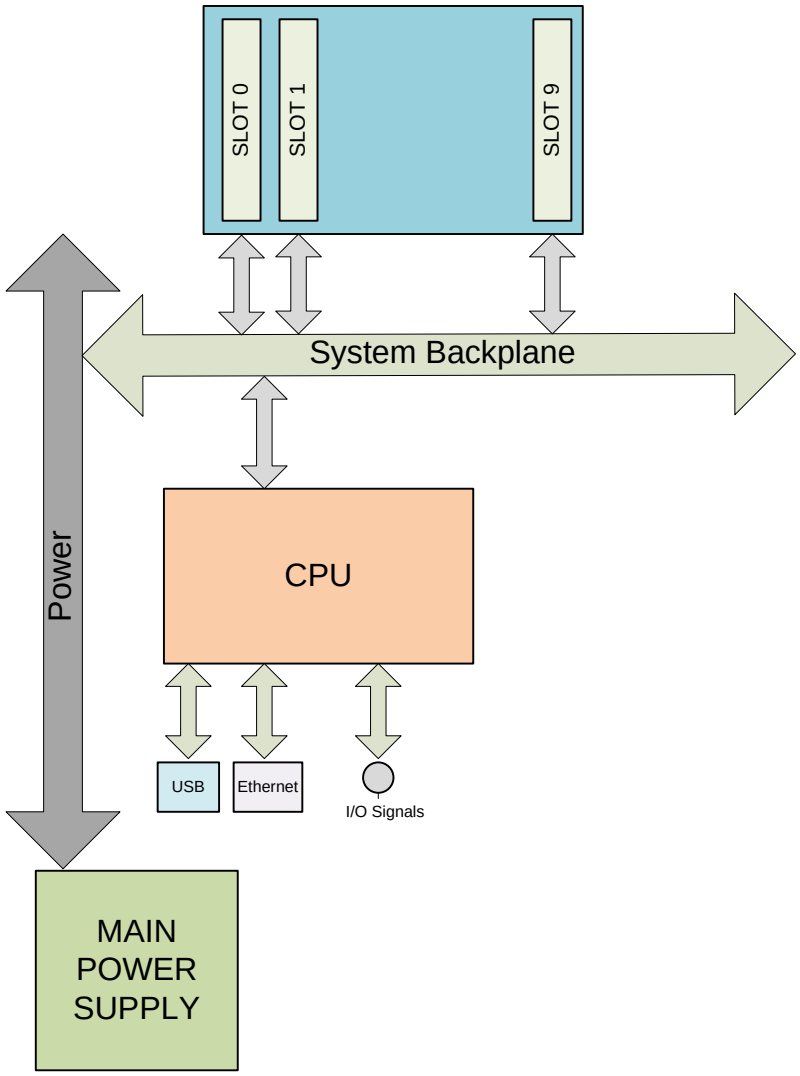


Fig. 9 – SY4527LC System Block Diagram

5. Operating modes

The System can be operated in one of the following ways:

- Standalone operation
- Remote operation via host computer by using TCP/IP protocol (OPC Server and CAEN HV Wrapper Library).

Standalone operation

Standalone Operation is intended as the interactive control and monitoring of one SY4527 system by using one of these devices:

SY4527

- optional LCD Touchscreen (A4534 or A4537)
- LCD + external keyboard and/or mouse (via USB port)
- external PC (via Gigabit Ethernet)
- external Tablet PC (via A4535 Wi-Fi dongle, connected to the USB port)

SY4527LC

- external PC (via Gigabit Ethernet)
- external Tablet PC (via A4535 Wi-Fi dongle, connected to the USB port)

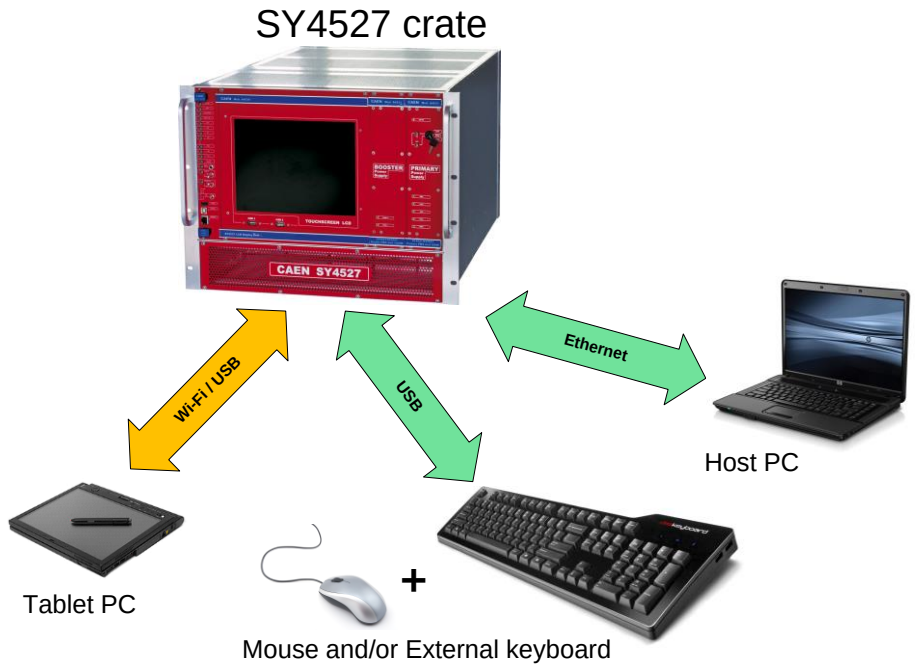


Fig. 10 – Standalone Operation with LCD Touchscreen

Software Version

Description of the *User Interface Software* running on the SY4527 system refers to the:

Software Version x.yy.zz

A variation in the last two figures (.zz) of the software version refers to a debug operation; a variation in the two figures placed in the middle (.yy) refers to a feature upgrading of the software version; a variation in the first figure (x.) refers to a radical change of the software version.

Remote operation via Host Computer

A newly released suite of applications guarantees CAEN power supplies' inter-operability between virtually all available computing environments and communication protocols.

OPC is an open interface based on the OLE/COM (now ActiveX) and DCOM technology; OPC offers "Plug&Play" connectivity between disparate control applications and hardware devices. The introduction of the OPC interface has caused the number of driver developments which hardware manufacturers implement for their components to be reduced to only one: the OPC server. On the other hand, OPC client applications (from any vendor) can communicate with the OPC server to exchange data and control commands in a standard way. Each device property is accessed via an OPC item. An OPC server creates OPC items on behalf of an OPC client. The client's OPC items are organized in OPC groups with a hierarchical structure.

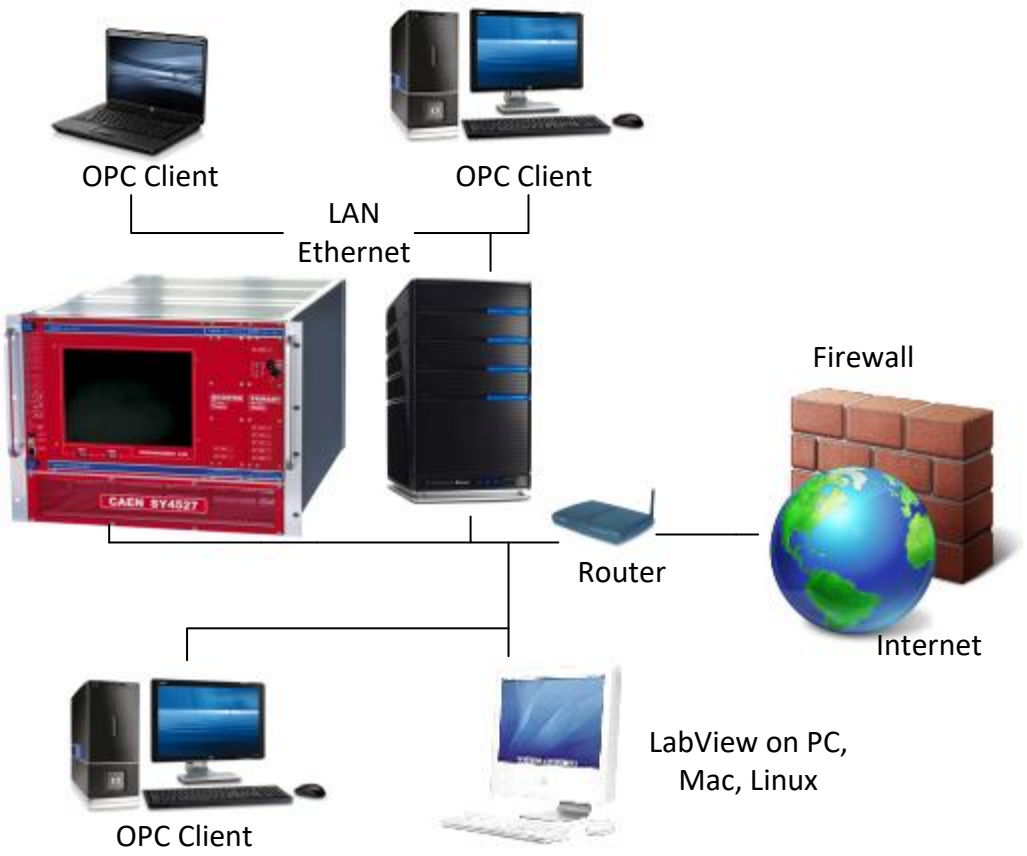


Fig. 11 – Remote Operation via Host Computer

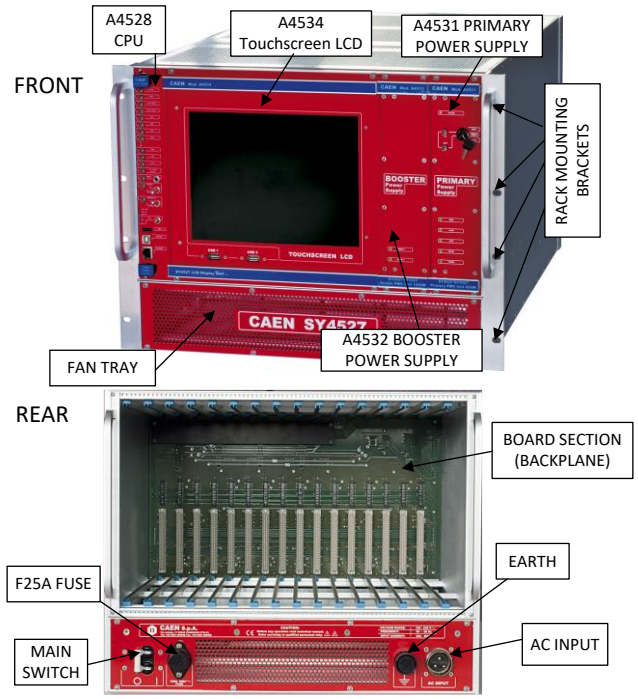
CAEN, in close collaboration with CERN (IT-CO group) has developed an **OPC server** which allows powerful, flexible and yet simple control of its power supply systems through TCP/IP by any OPC compliant client application. For further details please refer to the *OPC Server for CAEN Power Supplies User's Manual* available at www.caen.it site.

A C library (CAENHVWrapper) providing the software developer an unified software interface for the control of all the CAEN Power Supply Systems is also available.

6. Hardware Installation

Initial inspection

SY4527



The mainframe is housed in a 19"-wide, 8U-high euro-mechanics rack and hosts four main sections:

- the Board Section, on the back of the rack, with 16 slots to house power supply boards, distributors etc.;
- the Fan Tray Section, housing 6 fans arranged on two rows, with programmable rotation speed regulation;
- the Power Supply Section, which consists of the Primary power supply and up to 3 “Booster” units;
- the CPU and Front Panel Section which includes all interface facilities.

SY4527LC

The mainframe is housed in a 19"-wide, 8U-high euro-mechanics rack and hosts four main sections:

- the Board Section, with 10 slots to house power supply boards, distributors etc.;
- the Fan Tray Section, housing 6 fans arranged on two rows, with programmable rotation speed regulation;
- the Power Supply Section; which hosts the 600 W power supply unit
- the CPU Section which includes all interface facilities.

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 transport. The inspection should confirm that there is no exterior damage to the unit, such as broken knobs or connectors, and that the panels 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. Before installing the system, make sure you have read thoroughly the safety rules and installation requirements, then place the package content onto your bench; you shall find the following parts:

- SY4527 mainframe;
- Primary Power Supply (A4531); already installed
- CPU Board (Mod. A4528); already installed
- A4534 - A4537 LCD Display; OPTIONAL, to be installed
- A4532 Booster Power Supplies; OPTIONAL, to be installed
- A4535 Wi-Fi Dongle for Wireless connectivity; OPTIONAL
- Power Supply cord
- 10BASE-T Ethernet cable

Moreover, in order to operate the SY4527, are also required, an external Personal Computer (if you have not the optional A4534 - A4537 LCD Display) and (at least) one Power Supply Board (for example the A1535 24 Channel 3.5 kV/3 mA Common Floating Return Board).

- SY4527LC mainframe;
- CPU Board (A4528); already installed
- A4535 Wi-Fi Dongle for Wireless connectivity; OPTIONAL
- Power Supply cord
- 10BASE-T Ethernet cable

Moreover, in order to operate the SY4527LC, are also required, an external Personal Computer and (at least) one Power Supply Board (for example the A1535 24 Channel 3.5 kV/3 mA Common Floating Return Board).

Rack mounting

The SY4527 and SY4527LC are designed for BUILDING-IN: they must be installed in a 19" equipment rack; the rack must be of the following type: Standard 19-inch (48.3 cm) four-post EIA rack, a minimum of 39.4 inches (100 cm) deep, with mounting rails that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992.

- The rack must be provided with flame-breaker top and bottom panels.
- Use the front panel rack-mount brackets to install the units in the rack.
- Leave at least 15cm free space above and below the chassis, to allow heat dissipation
- Only trained and qualified personnel must be allowed to install, replace, or service this equipment.
- Never lift the chassis alone—Always use two people to lift the chassis. If available, use a scissor jack or other lifting device designed for installing the chassis into the equipment rack.
- Ensure that your footing is solid and the weight of the system is evenly distributed between your feet.
- Lift the system slowly, keeping your back straight. Lift with your legs, not with your back. Bend at the knees, not at the waist.

A4532 Booster Power Supply installation (SY4527 only)

If you have not ordered optional A4532s, skip this step.

The Power Supply Section may host up to 3 A4532 Booster power supply units; in order to install them:

- Unpack the unit
- Remove the SY4527 dummy panels on the left of the A4531 via the M2.5x11 screws (four per panel)
- Slide the first A4532 into the first slot next to the A4531 Primary PS (on the left of the A4531)
- Fix it via four M2.5x11 screws

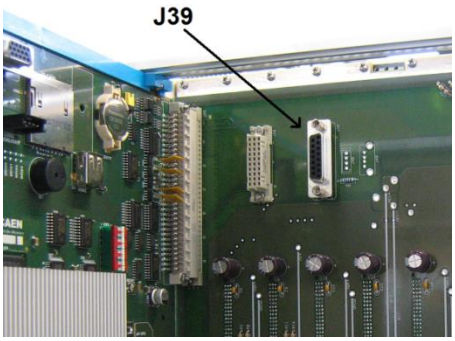
Other A4532s must be inserted one next another, from right to left.

A4534 and A4537 LCD Display installation (SY4527 only)

If you have not ordered optional A4534 or A4537, skip this step.

In order to install A4534 or A4537 LCD Display:

- Unpack the unit
- Remove the SY4527 dummy panels on the right of the A4528 CPU via the M2.5x11 screws (four per panel)
- Plug the DB15 connector of the A4534 or A4537 into the J39 connector on the SY4527 backplane



- Slide the A4534 or A4537 into the housing next to the A4528 CPU (on the right of the A4528)
- Fix it via four M2.5x11 screws
- A4534 and A4537 are touchscreen devices, but can be operated via an external keyboard, through either USB1 or USB2 port

The A4534 and A4537 can be RESET in the following way:

- Press the ALT GR + PRINT SC + K key combination
- Wait a few seconds than press the CTRL+ALT+DEL key combination

A4535 Wi-Fi Dongle installation

The A4535 Wi-Fi Dongle allows the wireless control of the SY4527; in order to use it follow these steps:

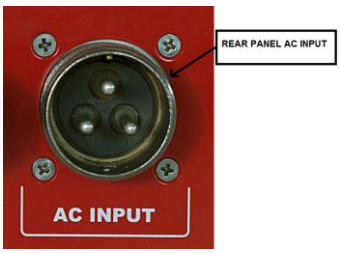
- Connect the A4535 into the USB port of the A4528 CPU
- Activate the A4535 via the "License manager" option of the HIVOCS Web configurator
  - Go to Setting Menu
  - Select License Manager > Wi-Fi Add-On
  - Type the Activation Code provided with the A4535
- At this point, the SY4527 will be listed in the wireless network of your PC
  - If this does not happen, then reboot both the System and PC

Click on the SY4527 icon then perform the System Access

Power connection

SY4527

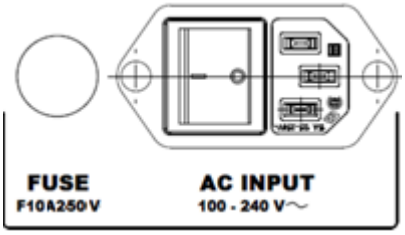
In order to connect the SY4527 the Mains:
Plug the Power Supply Cord into the CA-COM-E-20-19 3-Pin Cannon Industrial AC Input rear panel connector



Plug the AC Power Socket into the Mains

SY4527LC

In order to connect the SY4527LC the Mains:
Plug the Power Supply Cord into the C14 Type Inlet (Fused) connector



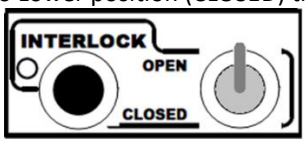
Plug the AC Power Socket into the Mains

Connection to host PC

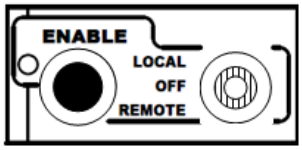
In order to connect the System to Host PC via Gigabit Ethernet connect the Ethernet port of the 4528 CPU to the relevant port of the PC, using the 10BASE-T Ethernet cable.

System Power-On

- Slide and Plug one or more power supply boards, such as A1535[2], into the board section slots (see p. 29)
- Fix them properly
- Switch On the Host PC
- Configure the Host PC as DHCP Client
- Set to Lower position (CLOSED) the INTERLOCK switch on the A4528 CPU (see p. 13)

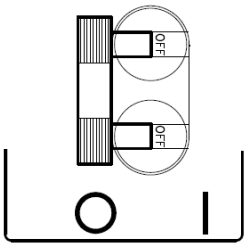


- Set the ENABLE switch of the A4528 CPU (if present) to Upper position (LOCAL ENABLE[3])

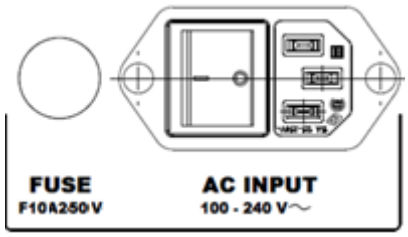


- Set to ON (position 1) the MAIN switch

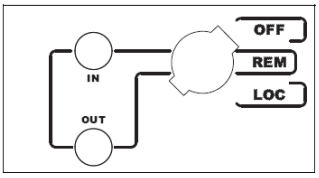
SY4527



SY4527LC



- SY4527 ONLY: Turn the Power-On key, located on the panel of the A4531 Primary Power Supply (see p.21), in the right position (ON LOCAL[4]): the AC OK LED (yellow), located on the front panel of the A4531, lights up and the fan tray unit starts to work.



- Following these operations, the following LEDs will be lit up on the front panels of the Primary Power Supply: AC-OK, VDD, +VCC, -VCC, VFAN, VPWR (see also A4531 Primary Power Supply Section on p.21). On the CPU: INTERLOCK led will be OFF and ENABLE led will be ON; this means that boards channels are ready to deliver output voltage
- After the initial check of the system, it is possible to access the system through the HIVOCS Web configurator.
- The system has a default address is 192.168.0.1 and the DHCP server configured to assign IP addresses on the network 192.168.0.0/255.255.255
- Perform System access (see p. 29)

[2] Read carefully the power supply board User's manual in order to have it correctly configured
[3] This allows LOCAL Channel Enable, without the need of an external enable signal (REMOTE position)
[4] This allows LOCAL Power ON, without the need of an external enable signal (REMOTE position)

Remote Power-On (SY4527)

To power-On the system remotely follow this procedure:

- Set to ON (position 1) the back panel Main switch, p.23.
- Turn the Power-On key, on the front panel of the Primary Power Supply, in the left position (ON REMOTE), p.26;
- Send a proper signal through the REMOTE IN input connector on the front panel of the Primary Power Supply: the OK LED (yellow), located on the front panel of the Primary Power Supply, will light up and the fan tray unit starts to work.
- Following these operations, the following LEDs will be lit up on the front panels of the Primary Power Supply: AC-OK, VDD, +VCC, -VCC, VFAN, VPWR.
- After the initial check of the system, it is possible to access the system through the HiVoCS.

Configuration

To configure the system, if the LCD Touchscreen color Display is not installed, connect it to your local network or use a Ethernet cable and connect it directly to your PC Ethernet port (see also SYx527 Quickstart Guide).

By default, the network interface is configured in Automatic mode (DHCP). When the mainframe is turned on, that is, when the network connection is detected, it will try to obtain an IP address from an external DHCP Server.

If the mainframe gets an address, then it is possible to connect to it with a device on the same local network.

In the scenario that there is not a DHCP Server, the mainframe after a short time is auto-configured with a static IP address and enables its own internal DHCP Server. Default IP address is 192.168.0.1 /24.

Usually the first time a point-to-point connection is used with a PC. Wait until the PC has received an IP address, then it is possible to connect to the HiVoCS and configure the desired network, by following the instructions in Networking chapter (p.41) and in DHCP Server chapter of this manual (p. 43).

To connect to the HiVoCS web interface, open a web browser and type in the address bar http://192.168.0.1 (or the current IP address of the mainframe) and enter username and password in the login page, then enter user id and password. The system default is:

User ID: admin Password: admin

You should change your password as soon as possible to prevent other people from altering system settings without your consent.

If case of forgotten IP address of the system or the admin username and password, in order to restore the default setting, connect an USB keyboard to the USB connector of the CPU panel and use key combination CTRL+ALT+DEL; the system will produce a "buzz" sound, after the last buzz, wait for about 15 sec, then reboot the system, default settings will be restored.

System Reset Flag Configuration

The SYx527 system allows to configure different reset conditions, in order to set the system behavior after reset signals. Such settings can be performed by accessing via software to the ResFlagCfg 16 bit register; such register can be set and monitored via CAEN OPC Server, CAEN HV Wrapper Library and CAENGECO2020 Control Software Tool.

The ResFlagCfg bits are as follows:

bit	Reset condition
0	1 = backplane reset due to CPU failure: the system cannot recover after a A4528 CPU error; the board section backplane is reset
1	always set to 1

2	1 = backplane reset due to front panel reset input signal (pushbutton or logic level; see p. 17)
3	1 = CPU reset due to front panel reset input signal (pushbutton or logic level; see p. 17)
4 ÷ 5	always set to 1
6 ÷ 15	always set to 0

This register allows also to enable the relevant reset condition. If the corresponding bit is set to 1, it is enabled; if it is 0, it is disabled. For example, if the bit 3 (front panel reset) is 0, a signal sent through the front panel connector does not reset the CPU.

Reset signal must be compliant to the specifications described at p. 17.

If more than one reset types are selected in the ResFlagCfg 16 bit register, the system will be reset according to the occurrence of any of them.

SYX527 Quick Troubleshooting Guide

Goal of this troubleshooting guide is helping the CAEN Mainframe SYX527 users to quickly identify the most common reason in the system malfunctioning and, if possible, leading them to fix it by themselves.

Problem: The system does not power up.
Possible Issue to check:

1. Is the 110V/220V cable connected?
   If not: plug it properly.
2. Is the rear Main Switch on “I” position?
   If not: put it on the “I” position
3. Is the rear fuse continuity still intact?
   If not: replace the fuse.
4. Is the front panel key on “LOC” (if you are working locally) or “REM” (if you are working remotely) position?
   If not: put the key in the desired position according to you needs.
5. Are the CPU board and the Primary Power Supply and the Booster properly plugged?
   If not: plug them properly
6. Are all the AC-OK, VDD, +VCC, -VCC, VFAN, VPWR led on the A4531 front panel on?
   If not: contact the CAEN Power Supply support and follow their instruction. If asked, send the A4531 back for repairing.
7. Are all the HV SYNC, CHK PASS led on the A4528 front panel on?
   If not: contact the CAEN Power Supply support and follow their instruction. If asked, send the A4528 back for repairing.

Problem: I cannot connect to the system.
Possible Issue to check:

1. Is the Ethernet cable connected both to the pc and to the system?
   If not: plug it properly.
2. Is the host PC set as DHCP client?
   If not: set the pc as DHCP client
3. If the system is directly connected to the pc, is the system set as DHCP server?
   If not: set it as DHCP using the HiVoCS web interface
4. Are the system IP address and subnet mask properly set?
   If not: set them properly using the HiVoCS web interface
5. Did you forget the system IP address or the admin user and password?
   If yes: in order to restore the default setting, connect an USB keyboard to the USB connector of the CPU panel and use key combination CTRL+ALT+DEL; the system will produce a "buzz" sound, after the last buzz, wait for about 15 sec, then reboot the system, default settings will be restored.
6. **If none of the previous point worked:** contact CAEN Power Supply support and follow their instruction. If asked, send the A4528 CPU back for reparation.

Problem: The SY hosted boards cannot be switched on or do not provide any voltage/current.
Possible Issue to check:

1. Are the boards properly plugged?
   If not: plug them properly
2. Are the boards recognized by the SY system?
   If not: contact the CAEN Power Supply support and send the board back for repairing
3. Is the CPU Interlock led on?
   If yes: change the interlock switch position.
4. Is the CPU Enable switch on “LOC” (if you are working locally) or “REM” (if you are working remotely) position?
   If not: put the switch in the desired position according to you needs
5. Do the boards foresee a 50 Ohm termination? If yes, is the terminator plugged?

If not: plug a 50 Ohm termination

If none of the previous point worked: contact CAEN Power Supply support and follow their instruction. If asked, send the board back for reparation.

7. HiVoCS

The HiVoCS is the web tool that allows to manage the SY4527 Connection status and system/board upgrade.

System Log-in

First of all, launch the web browser, then type the Power Supply System IP address into the address bar; the following log-in window will open:

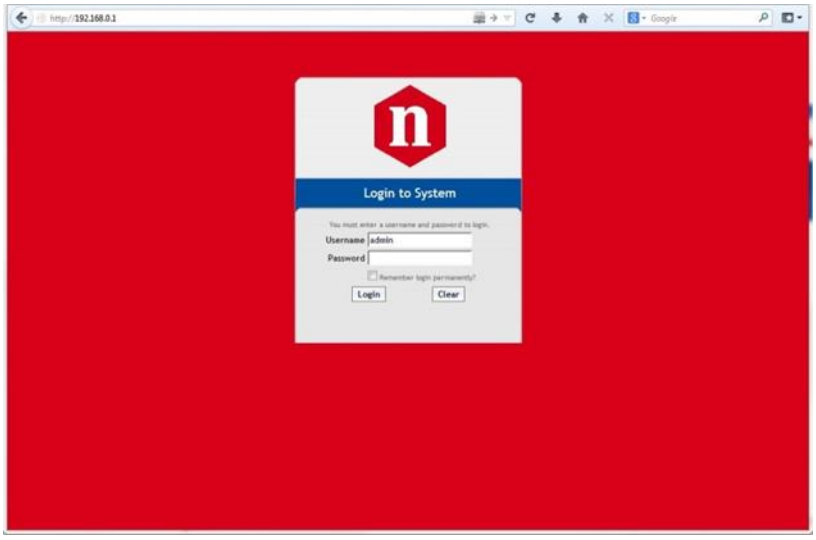


Fig. 12 – HiVoCS Log in window

Three access levels are foreseen: admin, user, guest

factory setting allows to access the System under the following profile:

User ID	Password	Level
admin	admin	Admin

The Admin level allows to access all the settings of the system, of the boards and of the channels; moreover it allows to upgrade the system software and the board firmware. Moreover the Admin level allows to:

- Create new lower level (User and Guest) users (up to 15 users);
- Remove lower level users;
- Change the admin password;
- Execute the Format command, which restores the factory-set users, with the related passwords (and deletes all the other ones).

Two lower level are foreseen:

“User” level can turn on/off the channels and change their own passwords, but cannot perform any setting.

“Guest” level can only monitor the system configuration and channel status and change their own passwords.

Once logged as “admin”, the next window will show, in the upper toolbar, two thumbnails:

- Upgrade
- Main Menu

Main Menu

By selecting “Main Menu” the configurator will offer the following options:

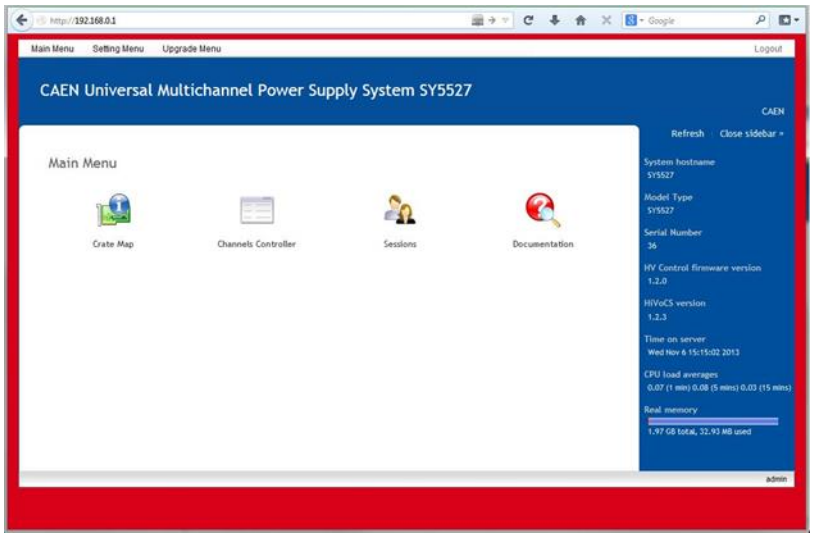


Fig. 13 – HiVoCS Main menu

The side bar shows the System features (type, version, s/n, etc.)

Crate Map

Crate Map is entered from the Main menu and opens the Crate Map Window showing what types of boards are inserted into the crate and in which slot they are plugged into.

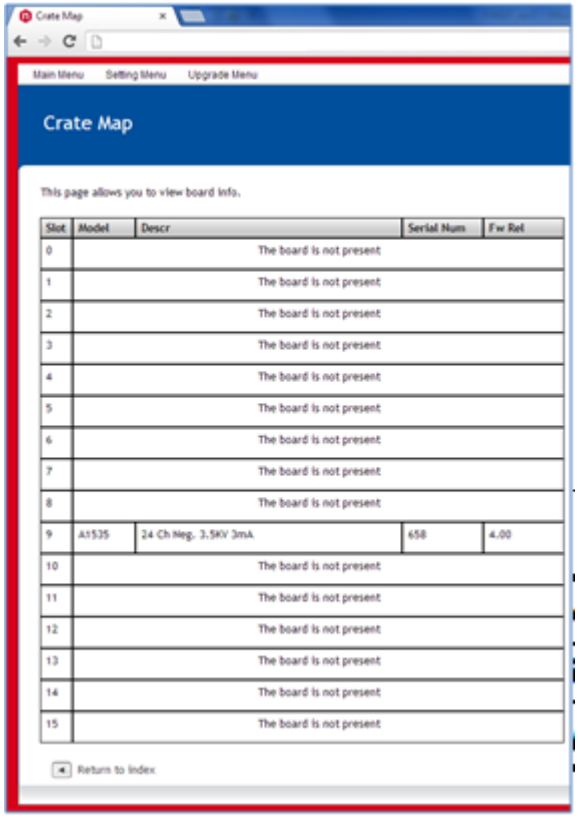


Fig. 14 – HiVoCS Crate Map

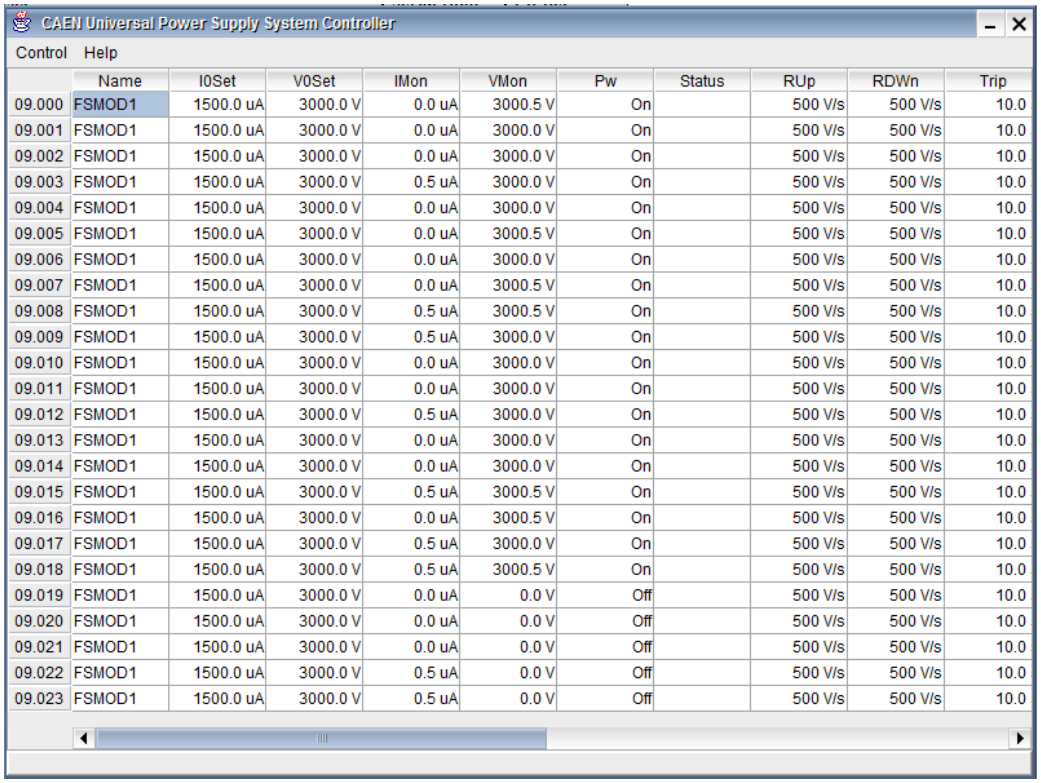
Channels Controller

From this page it is possible launch the CAEN HVPSS ChannelsController to manage channels.

CAEN HVPSS ChannelsController requires Java Web Start software to be installed on your computer. Java Web Start is included in the Java Runtime Environment (JRE) since release of Java 5.0. This means that when you install Java, you get Java Web Start installed automatically. For more information visit the website http://www.java.com/

If your browser does not support Java Web Start, you can also download the indicated zip file. Oracle Java Runtime Environment (JRE) downloaded from the websitehttp://www.java.com/ is required.

When launched the CAEN HVPSS ChannelsController will look like this:



	Name	I0Set	V0Set	IMon	VMon	Pw	Status	RUp	RDWn	Trip
09.000	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.5 V	On		500 V/s	500 V/s	10.0
09.001	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.002	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.003	FSMOD1	1500.0 uA	3000.0 V	0.5 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.004	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.005	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.5 V	On		500 V/s	500 V/s	10.0
09.006	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.007	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.5 V	On		500 V/s	500 V/s	10.0
09.008	FSMOD1	1500.0 uA	3000.0 V	0.5 uA	3000.5 V	On		500 V/s	500 V/s	10.0
09.009	FSMOD1	1500.0 uA	3000.0 V	0.5 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.010	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.011	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.012	FSMOD1	1500.0 uA	3000.0 V	0.5 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.013	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.014	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.015	FSMOD1	1500.0 uA	3000.0 V	0.5 uA	3000.5 V	On		500 V/s	500 V/s	10.0
09.016	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	3000.5 V	On		500 V/s	500 V/s	10.0
09.017	FSMOD1	1500.0 uA	3000.0 V	0.5 uA	3000.0 V	On		500 V/s	500 V/s	10.0
09.018	FSMOD1	1500.0 uA	3000.0 V	0.5 uA	3000.5 V	On		500 V/s	500 V/s	10.0
09.019	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	0.0 V	Off		500 V/s	500 V/s	10.0
09.020	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	0.0 V	Off		500 V/s	500 V/s	10.0
09.021	FSMOD1	1500.0 uA	3000.0 V	0.0 uA	0.0 V	Off		500 V/s	500 V/s	10.0
09.022	FSMOD1	1500.0 uA	3000.0 V	0.5 uA	0.0 V	Off		500 V/s	500 V/s	10.0
09.023	FSMOD1	1500.0 uA	3000.0 V	0.5 uA	0.0 V	Off		500 V/s	500 V/s	10.0

Fig. 15 – CAEN HVPSS Channels Controller

Parameters to set can be selected individually or by columns, by holding on left click. Please note that the displayed parameters are “refreshed” every 500 msec, therefore when, for example, quickly scrolling the view selection, there is a <500 msec delay between the displayed parameters and their actual value; please allow a 500 msec interval in order to let the actual values to be shown.

“Control” thumbnail allows to select Cooling Fan Speed, or to perform

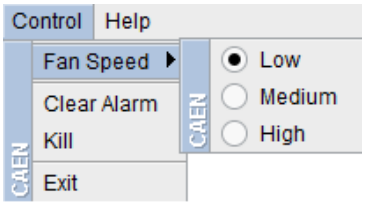


Fig. 16 – CAEN HVPSS Control options

- Fan speed allows also to set Hv Fan Speed (LO, MD, HI)
- Kill option turns all channels off
- Clear Alarm command allows to remove all the alarm conditions from the Channel Status
- Exit option allows to quit the program

Sessions

The Session option shows the parameters of the connected Users sessions.

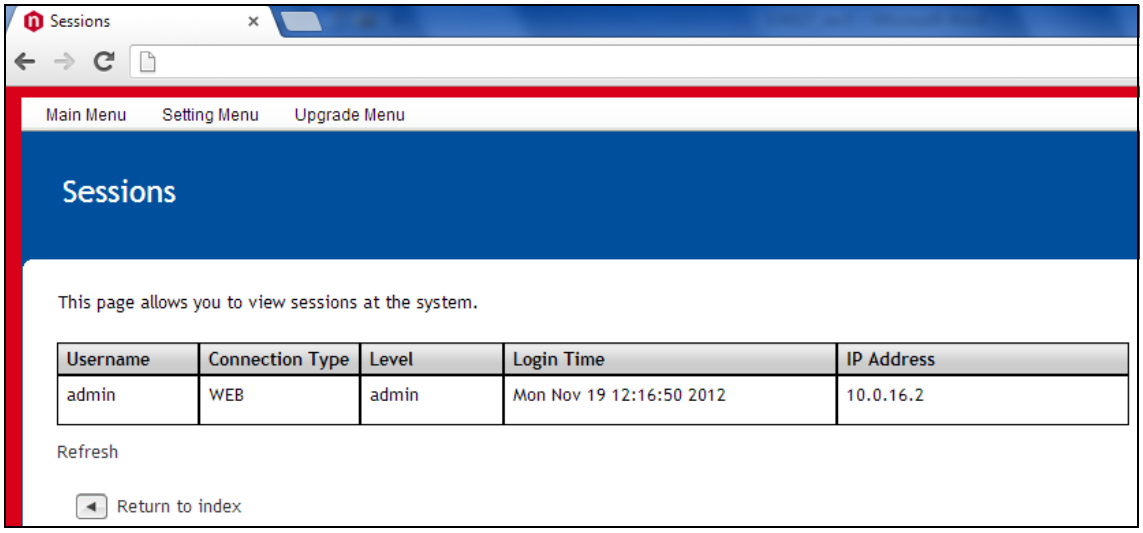


Fig. 17 – HiVoCS session parameters

Documentation

The documentation option allows to download the available technical manuals and guides.

Setting Menu

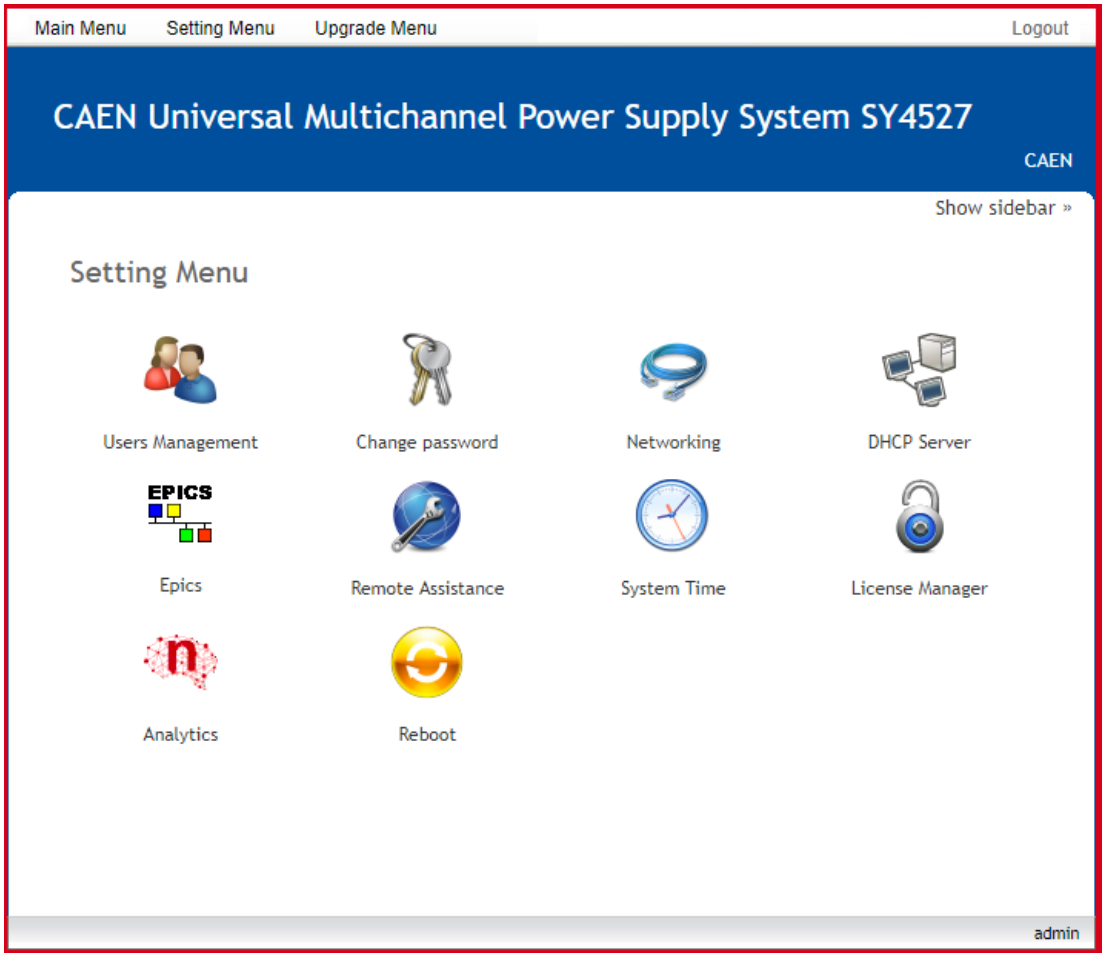


Fig. 18 – Setting Menu

The Setting Menu has the following options:

- Users Management
- Change password
- Networking
- DHCP Server
- Remote Assistance
- System Time
- License Manager
- EPICS
- Analytics
- Reboot

Users management

The User management option shows the parameters of the connected Users and allows to add new ones

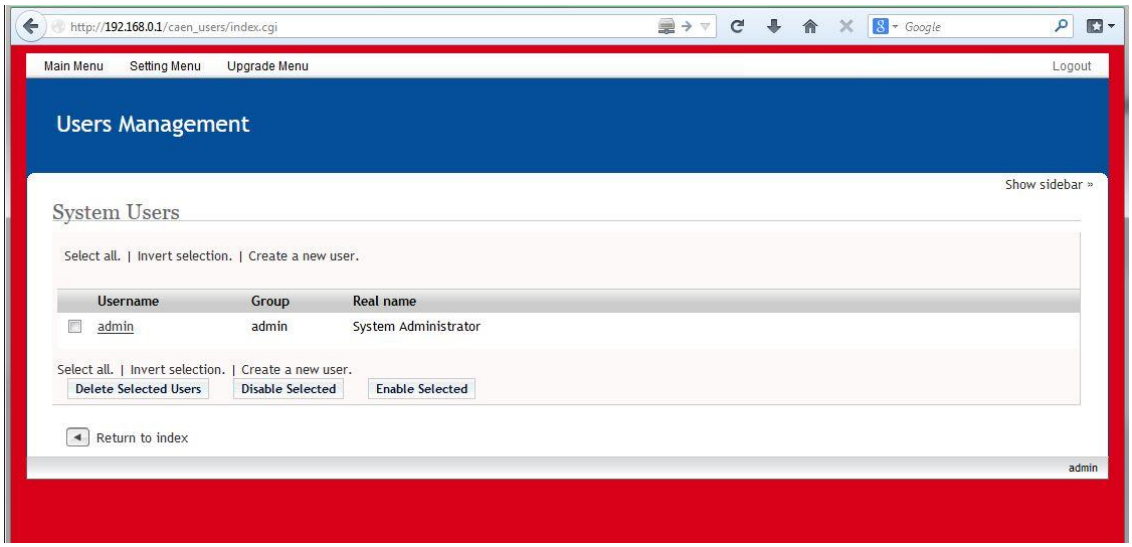


Fig. 19 – HiVoCS local user status

By clicking on “Create a new user”, the following form is displayed:

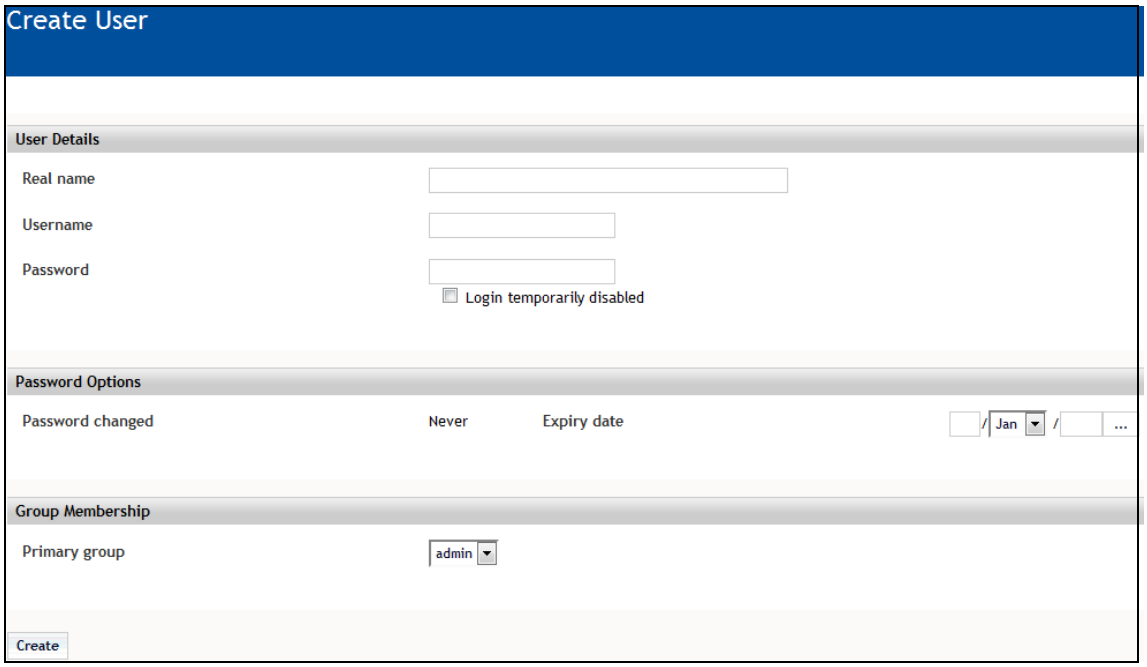


Fig. 20 – HiVoCS new user registration

Change password

Change password option will open a simple form box that allows to update the User's password.

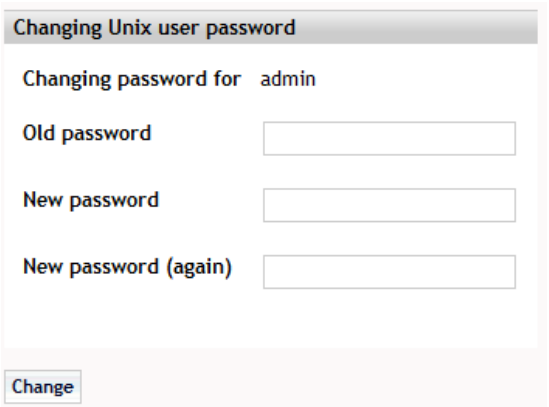


Fig. 21 – HiVoCS Change password form

Networking

The Networking option allows to configure the SY4527 System for network connection.

The Ethernet connector provided with the system is a 10/100baseT connector and can be used to interface the SY4527 system to an Ethernet LAN. This allows the system control via an external standard PC connected to a TCP/IP network and running a web browser.

Before establishing a connection to a TCP/IP network, a specific IP Address, IP Net Mask must be assigned by the local Network Administrator to the SY4527 System.

If the User needs to connect to the SY4527 system from outside the local network, a Gateway address must be specified in the TCP/IP settings.

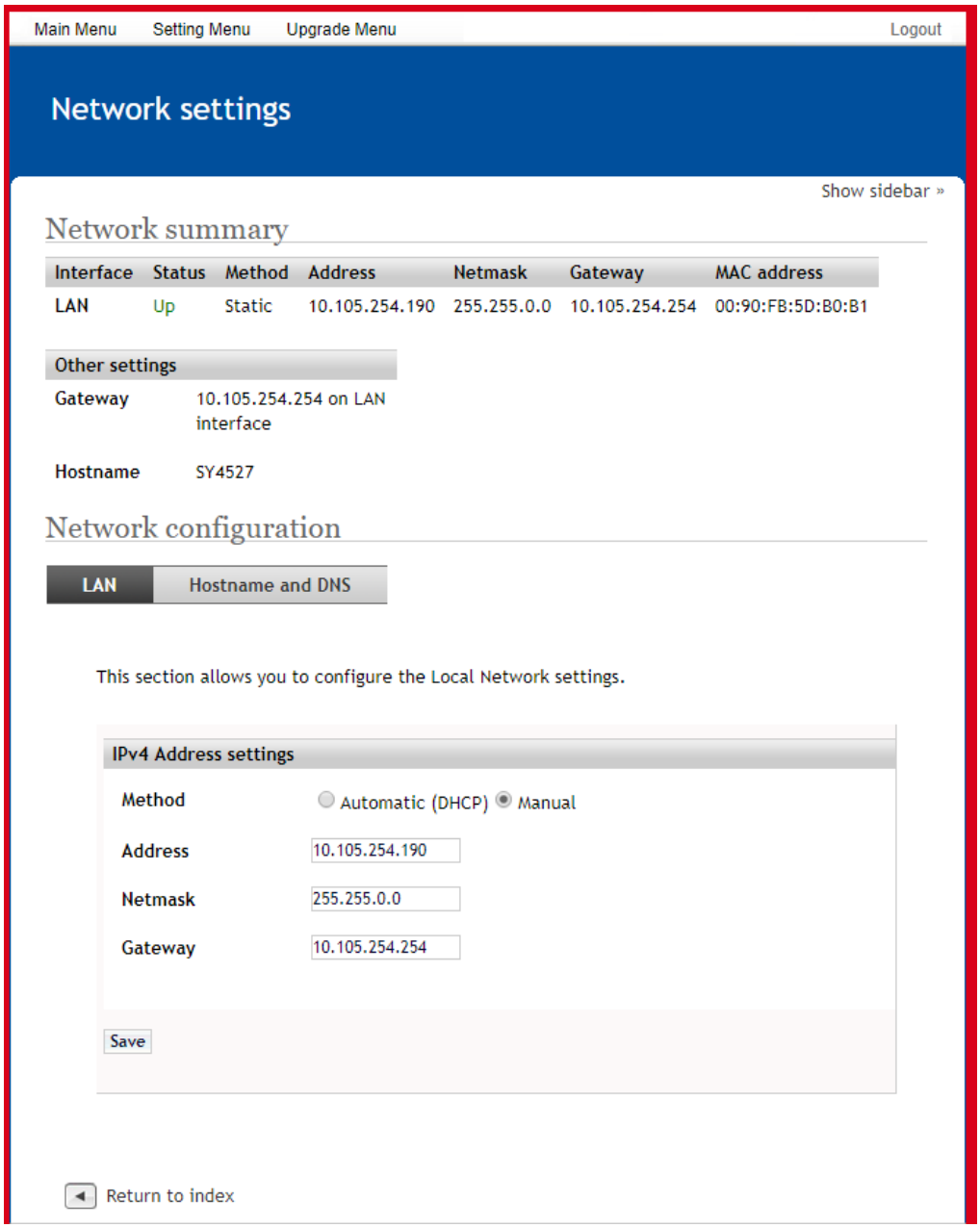
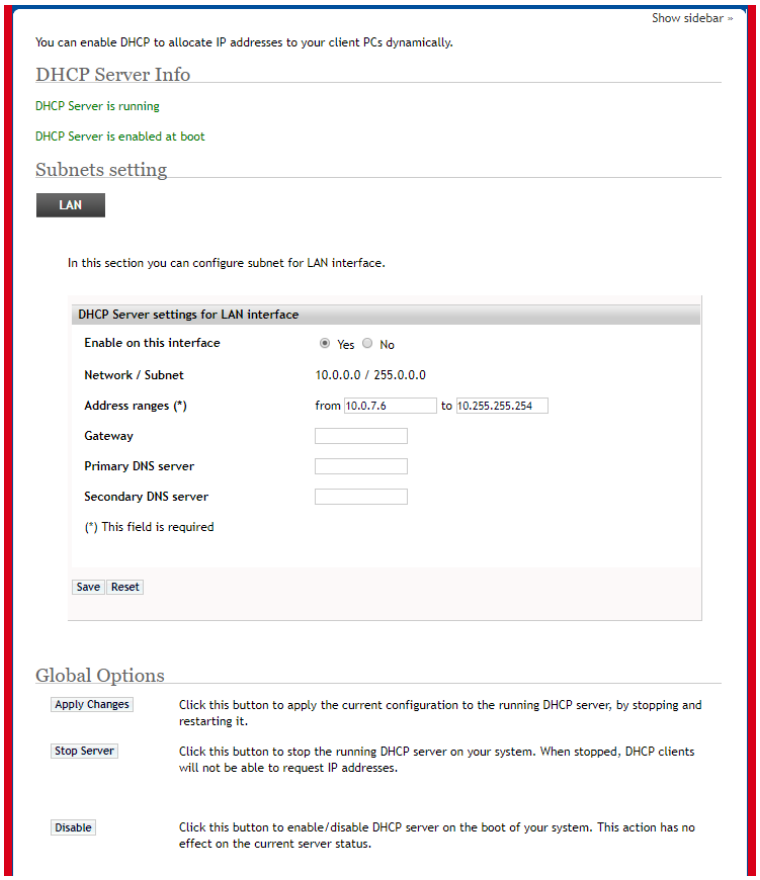


Fig. 22 – HiVoCS network status

DHCP Server

DHCP Server allows to assign IP addresses to the Client's PC connected to the network, through the following form box:



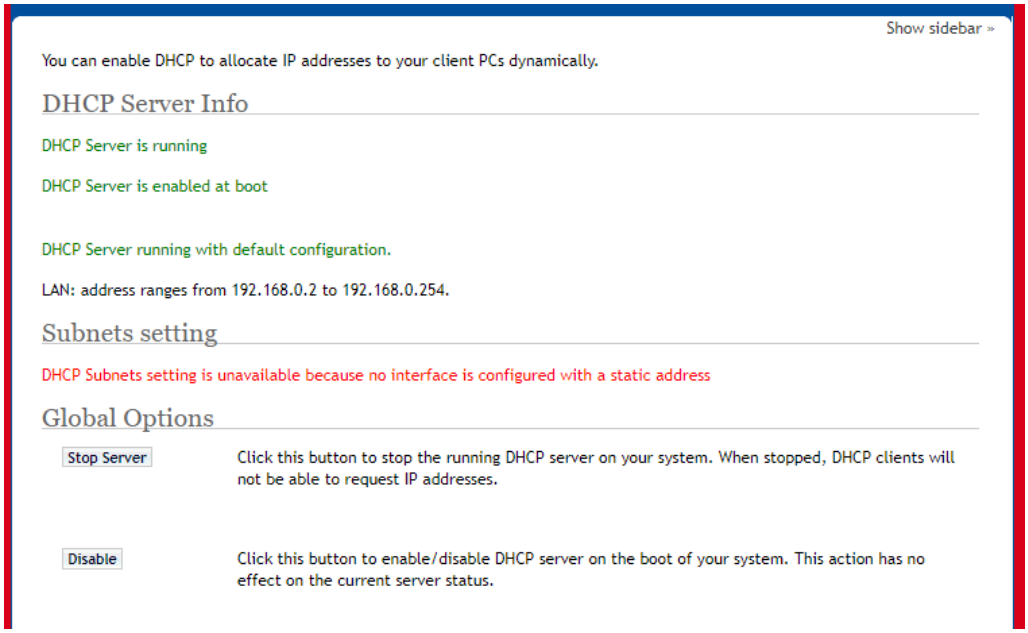


Fig. 23 – HiVoCS DHCP Server form

Remote Assistance

The Remote Assistance option allows to enable or disable the remote assistance. When Remote Assistance is enabled, CAEN personnel can access the system for remote maintenance intervention; in order to do this the system must also be connected to an externally accessible network.

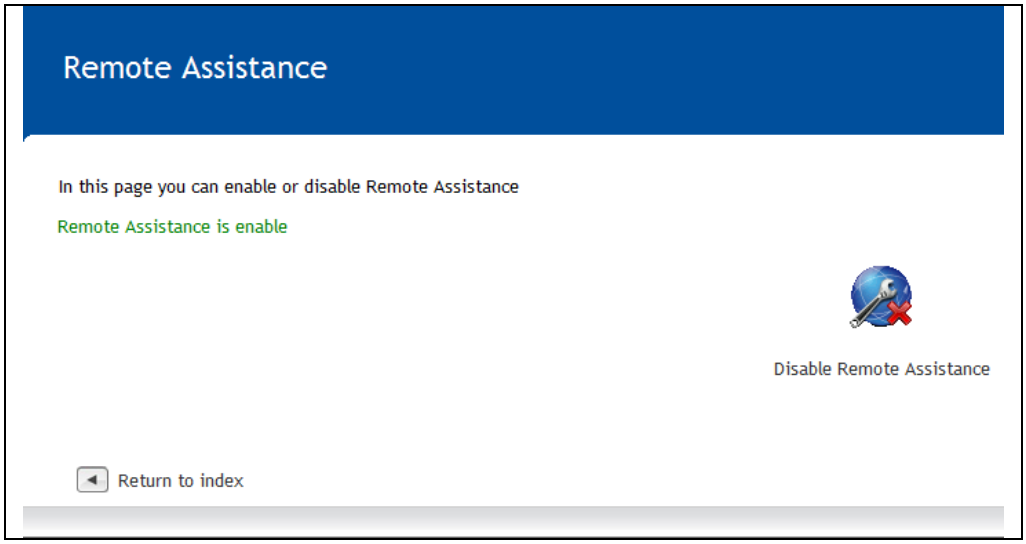


Fig. 24 – HiVoCS remote assistance

System time

The System time option allows to set the time and date of the SY4527

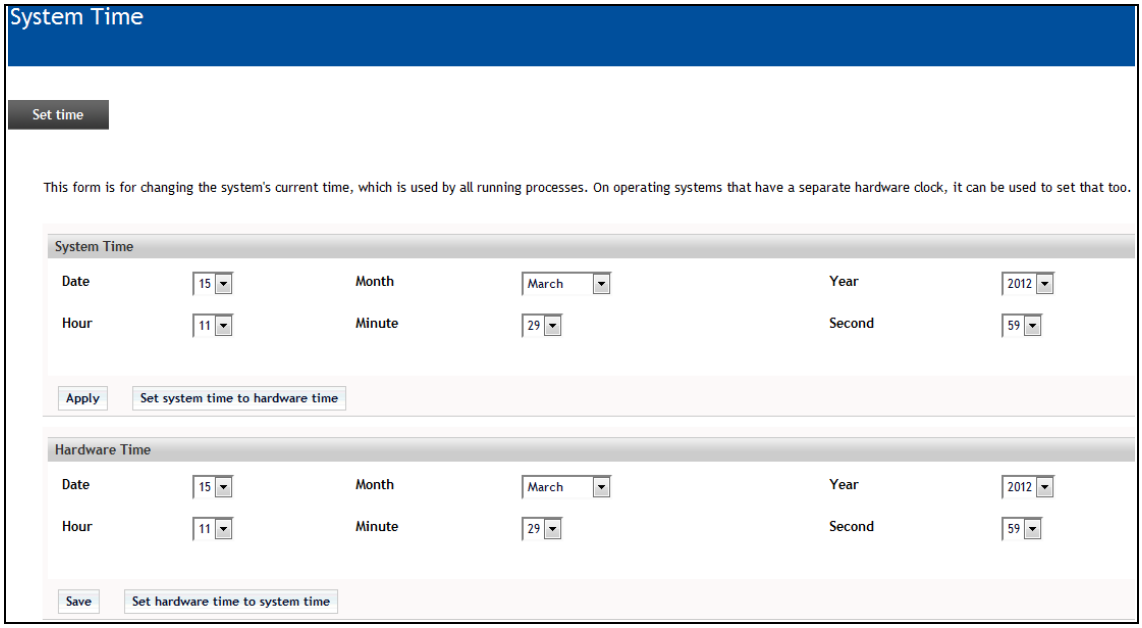


Fig. 25 – HiVoCS System time setting

License Manager

The License Manager has two options:

- System Add On allows to activate the optional “enhancement activation code”
    - CAEN HV Control Software functionality enhancement is available upon purchase. If you have purchased the “Control software functionality enhancement activation code” (ordering code WSW4536XAAAA), prior to installation of the CAEN HV Control Software, you have to go to “Main menu” > License Manager, then type the “enhancement activation code” you received

into the “Insert key” field than select save. Install CAEN HV Control Software as described in the relevant manual and the “Advanced Features” will work!

- Wi Fi Add On allows to activate the optional A4535 Wi-Fi Dongle (see SY4527 Quick start guide
    - The A4535 Wi-Fi Dongle allows the wireless control of the SY4527; in order to use it connect the A4535 into the USB port of the A4528 CPU and select License Manager > Wi-Fi Add-On; type the Activation Code provided with the A4535; at this point, the SY4527 will be listed in the wireless network of your PC (if this does not happen, then reboot both the System and PC) click on the SY4527 icon then perform the System Access.

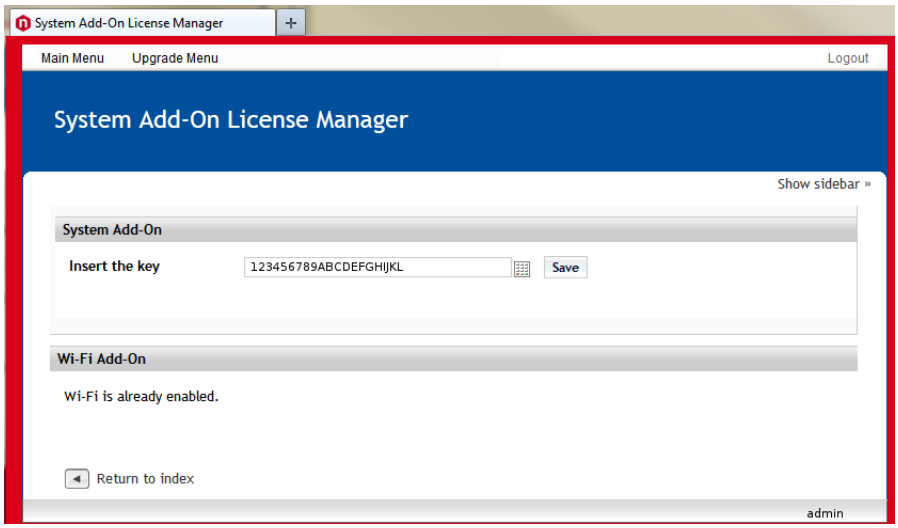


Fig. 26 – System Add On License Manager

EPICS

EPICS (Experimental Physics and Industrial Control System) is a set of software tools and applications which provide a software infrastructure for use in building distributed control systems, widely used to control experimental Physics and industrial electronics.

CAEN Universal Multichannel Power Supply System integrates an EPICS Service that provides access to a Process Variable using the Channel Access Protocol. Process Variable is a named piece of data associated with the system (e.g. status, readback, setpoint, parameter).

Client software (EPICS Channel Access Client), which requests access to a Process Variable, runs on the Host PC and is connected to the system via TCP/IP.

More information about EPICS and a list of available client applications can be found at:

http://www.aps.anl.gov/epics/.

By selecting the EPICS option in the Setting menu, it is possible to:

- Enable EPICS Service at Boot automatically.
- Set the name of service (e.g. the system hostname). This term will be used as a prefix for the Process Variable, so as to be unique in case of multiple systems connected.

To apply changes click on Save button. Service name will be changed at the next restart of the EPICS Service, in case it was already running.

- Note: when EPICS Service is enabled, it is not provided authentication for the access to the Process Variables, therefore the network administrator would implement appropriate access rules.

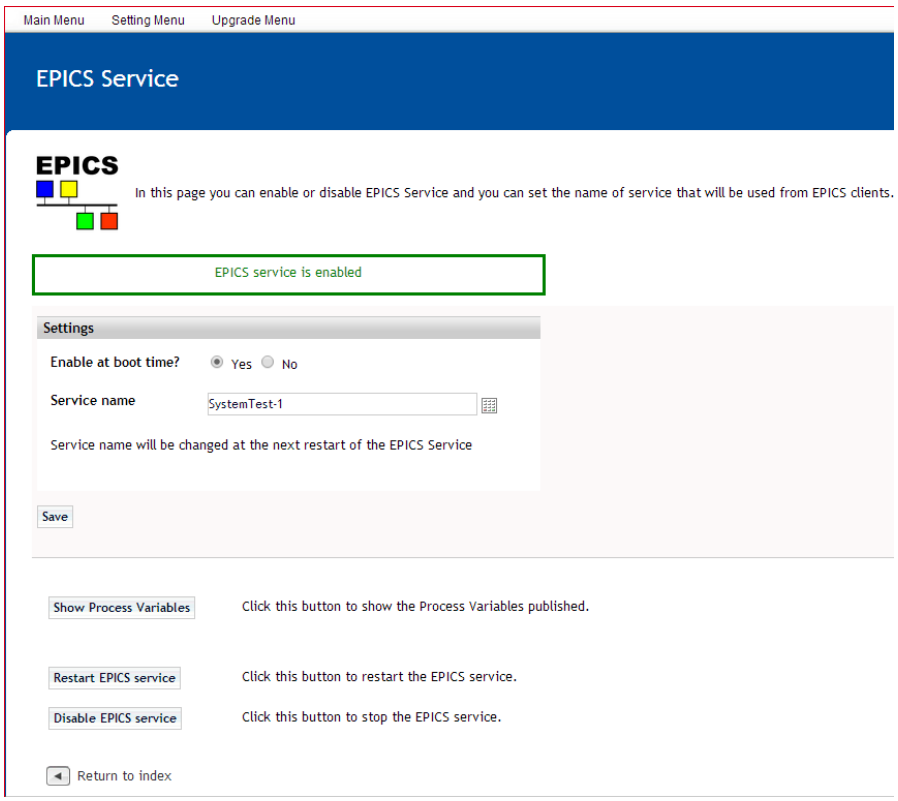


Fig. 27 – EPICS Service configuration menu

The relevant buttons allow to:

- show the Process Variables published
- enable/disable/restart EPICS Service

- Note: If any HV card is inserted or removed from the system, you should restart the EPICS Service to update the Process Variable.

In the Process Variable page, it is possible to see:

- The “Records” option lists all Process Variables available. Items can be filtered with the System/Slot entries select, or located with the search input box.
- For each record is indicated the type and the read/write operations that are allowed.

The “Control Fields” option lists the fields that are available, grouped by Record Type.

All records have fields: VAL (default), DESC and DTYP.

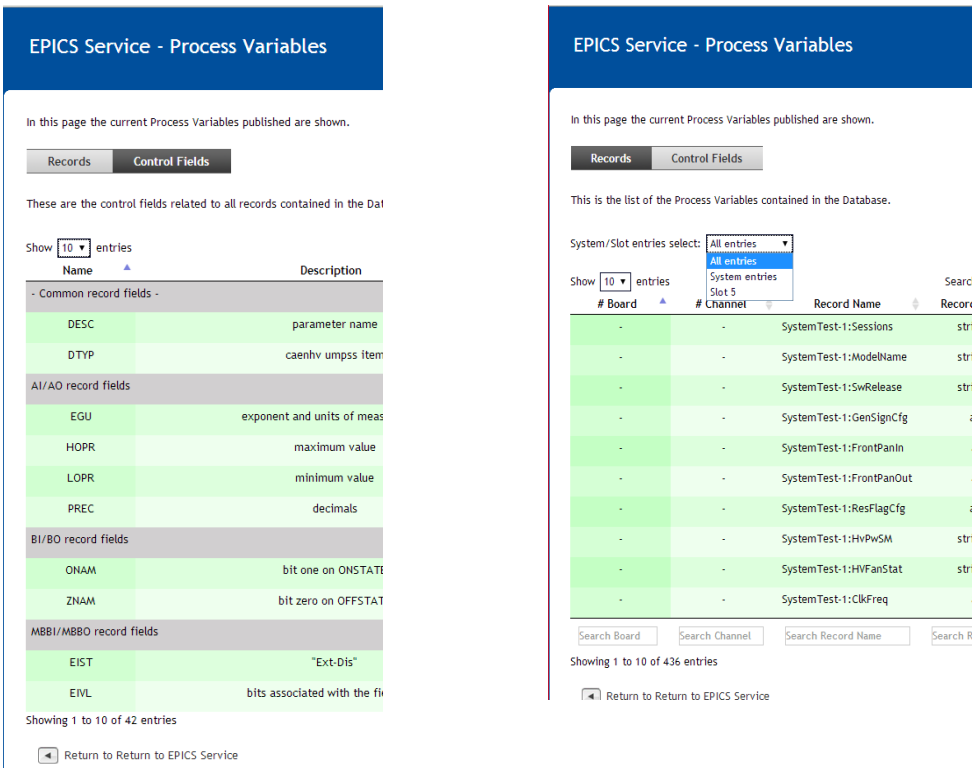


Fig. 28 – EPICS Process Variables

Records related to the system have the syntax: service_name:record_name

Record Name	Record Type	Read	Write	Description
Sessions	stringin	x		A read access to the **Sessions** Item returns a string with the list of Users connected to the system, their access level, communication line and access time
ModelName	stringin	x		A read access to the ModelName Item returns a string indicating the system model (SY4527, SY5527, …).
SwRelease	stringin	x		A read access to the SwRelease Item returns a string indicating the system firmware release (example: 2.00.00).
GenSignCfg	ao	x	x	The **GenSignCfg** Item allows to configure the GEN signal by writing an 16 bit pattern as follows: Bit 0: GEN enable Bit 1: GEN always ON Bit 2: GEN ON due to OvV (Over Voltage) Bit 3: GEN ON due to OvC (Over Current) Bit 4: GEN ON due to UnV (Under Voltage) Bit 5: GEN ON due to TRIP Bit 6÷7: Don’t care (=0) Bit 8: GEN enable MASK Bit 9: GEN always ON MASK Bit 10: GEN ON due to OvV (Over Voltage) MASK Bit 11: GEN ON due to OvC (Over Current) MASK

				Bit 12: GEN ON due to UnV (Under Voltage) MASK Bit 13: GEN ON due to TRIP MASK Bit 14-15: Don't care (=0) This Item is a 2-byte integer; in order to set or reset bits 0..5, it is necessary to set to 1 the corresponding "MASK" bit (bits 8..13).
FrontPanIn	ai	x		A read access to the FrontPanIn Item returns a 16 bit patterns indicating the system inputs and switches status, as follows: Bit 0: Vsel, 0=V0 1=V1 Bit 1: Isel, 0=I0 1=I1 Bit 2: Kill Bit 3: Interlock Bit 4: Remote Enable Bit 5: Local Enable Bit 6: TTL/NIM, 0=TTL 1=NIM Bit 7-15: Don't care (=0)
FrontPanOut	ai	x		A read access to the FrontPanOut Item returns a 16 bit patterns indicating the system outputs status, as follows: Bit 0: OVC Bit 1: UNV Bit 2: OVV Bit 3: CHON Bit 4-7: Don't care (=0) Bit 8: Fan failure Bit 9: OVT Bit 10-15: Don't care (=0)
ResFlagCfg	ao	x	x	The ResFlagCfg Item allows to configure the system reset by writing an 16 bit pattern as follows: Bit 0: backplane reset due to CPU failure Bit 1: always set to 1 Bit 2: backplane reset due to front panel reset input signal Bit 3: CPU reset due to front panel reset input signal Bit 4-5: always set to 1 Bit 6-15: always set to 0
HvPwSM	stringin	x		A read access to the **HvPwSM** Item returns a string with the power supply module status, like follows: "ACstatus:Primary:Add 0:Add 1:Add 2 ". If: ACstatus = -1 ⇒ FAIL ACstatus = 1 ⇒ GOOD Primary = -1 ⇒ Primary supply module FAIL Primary = 1 ⇒ Primary supply module GOOD Add X = -1 ⇒ Add on supply module nr. X FAIL Add X = 0 ⇒ Add on supply module nr. X NOT PRESENT Add X = 1 ⇒ Add on supply module nr. X GOOD
HVFanStat	stringin	x		A read access to the **HVFanStat** Item returns a string with the cooling fans status. If: status = -1 ⇒ FAIL status = 1 ⇒ GOOD
ClkFreq	ai	x		A read access to the ClkFreq Item returns an integer idicating the clock frequency as follows: ClkFreq = -1 .: FAIL ClkFreq = 0 : 50 Hz ClkFreq = 1 : 60 Hz ClkFreq = 2 : 400 Hz
HVClkConf	stringout	x	x	Clock = 1 ⇒ MASTER Clock = 0 ⇒ SLAVE Status = -1 ⇒ FAIL Status = 0 ⇒ NOT PRESENT Status = +1 ⇒ GOOD
IPAddr	stringout	x	x	allows to specify the system IP address (for example 192.168. 0.1)
IPNetMsk	stringout	x	x	allows to specify the system IP net mask (for example 255.255.255.0)
IPGw	stringout	x	x	allows to specify the system IP gateway (for example 0.0.0.0)
PWCurrent	stringout	x	x	Primary power supply current
OutputLevel	ao	x	x	Primary power supply voltage
SymbolicName	stringout	x	x	System symbolic name
CmdQueueStatus	ai	x		The CmdQueueStatus item allows to monitor the number of commands in queue in the system; if CmdQueueStatus >0 then the System is performing commands on the boards, therefore monitor

				values may not be updated until all queued commands are executed. As soon as all commands are performed and CmdQueueStatus returns to 0, monitor values are updated to correct values.
CPULoad	stringin	x		The CPULoad item allows to monitor the load on the system CPU. This item has the following format: value1:value5:value15 Value1, value5 and value15 are the average CPU loads, calculated respectively over one, five and fifteen minutes
MemoryStatus	stringin	x		The MemoryStatus item allows to monitor the system memory usage This item has the following format: value0:value1:value2:value3 Value0 is the total memory, value1 is the used memory, value2 is the free memory, value3 is the buffers memory

Records related to the board have the syntax: service_name:board_slot:record_name; the parameters list refers to A1536 board

Record Name	Record Type	Read	Write	Description
BdStatus	mbbi	x		A read access to the BdStatus item returns the status of generic board's parameters, namely: bit 0: PowerFail; if 1, it indicates a failure in the channels local power supply bit 1: Firwmare Checksum Error; if 1, it indicates an error in the board firmware checksum bit 2: HVMax Calibration Error; if 1, it indicates that the board HVMax parameter (if present) is not calibrated bit 3: Temperature Calibration Error; if 1, it indicates that the board temperature sensor (if present) is not calibrated bit 4: Under Temperature; if 1, it indicates that the board temperature sensor (if present) signals a board temperature < 5 °C bit 5: Over Temperature; if 1, it indicates that the board temperature sensor (if present) signals a board temperature > 65 °C bits 6..31: Reserved for future use
HVMax	ao	x	x	returns the voltage hardware limit set by trimmer on the board
Temp	ao	x	x	returns the board's temperature

Records related to the channel have the syntax: service_name:board_slot:channel_number:record_name; the parameters list refers to A1536 board, refer to board manual for parameter description

Record Name	Record Type	Read	Write
Name	stringout	x	x
V0Set	ao	x	x
I0Set	ao	x	x
V1Set	ao	x	x
I1Set	ao	x	x
RUp	ao	x	x
RDWn	ao	x	x
Trip	ao	x	x
SVMax	ao	x	x
VMon	ai	x	
IMon	ai	x	
Status	mbbi	x	
Pw	bo	x	x
POn	bo	x	x
PDwn	bo	x	x
TripInt	mbboDirect	x	x
TripExt	mbboDirect	x	x

These are the control fields related to all records contained in the Database, grouped by record type.

Name	Description
- Common record fields -	
DESC	parameter name
DTYP	caenhv umpss item
AI/AO record fields	
EGU	exponent and units of measurement
HOPR	maximum value
LOPR	minimum value
PREC	decimals
BI/BO record fields	
ONAM	bit one on ONSTATE
ZNAM	bit zero on OFFSTATE

MBBI/MBBO record fields	
EIST	"Ext-Dis"
EIVL	bits associated with the field EIST
ELST	"Unplugg"
ELVL	bits associated with the field ELST
FFST	"Temp Err."
FFVL	bits associated with the field FFST
FRST	"Ovv"
FRVL	bits associated with the field FRST
FTST	"Pwr Fail"
FTVL	bits associated with the field FTST
FVST	"Unv"
FVVL	bits associated with the field FVST
NIST	"I-Tripped"
NIVL	bits associated with the field NIST
ONST	"Up"
ONVL	bits associated with the field ONST
SVST	"HVMax"
SVVL	bits associated with the field SVST
SXST	"E-Tripped"
SXVL	bits associated with the field SXST
TEST	"Cal-Err"
TEVL	bits associated with the field TEST
THST	"Ovc"
THVL	bits associated with the field THST
TTST	"Ovv Prot."
TTVL	bits associated with the field TTST
TVST	"Unc"
TVVL	bits associated with the field TVST
TWST	"Down"
TWVL	bits associated with the field TWST
ZRST	"On"
ZRVL	bits associated with the field ZRST
MBBIDIRECT/MBBODIRECT record fields	
	there are not specific fields
STRINGIN/STRINGOUT record fields	
	there are not specific fields

System Reboot

This option allows to immediately reboot the system. All currently logged in users will be disconnected and all services will be re-started.

CAEN Analytics

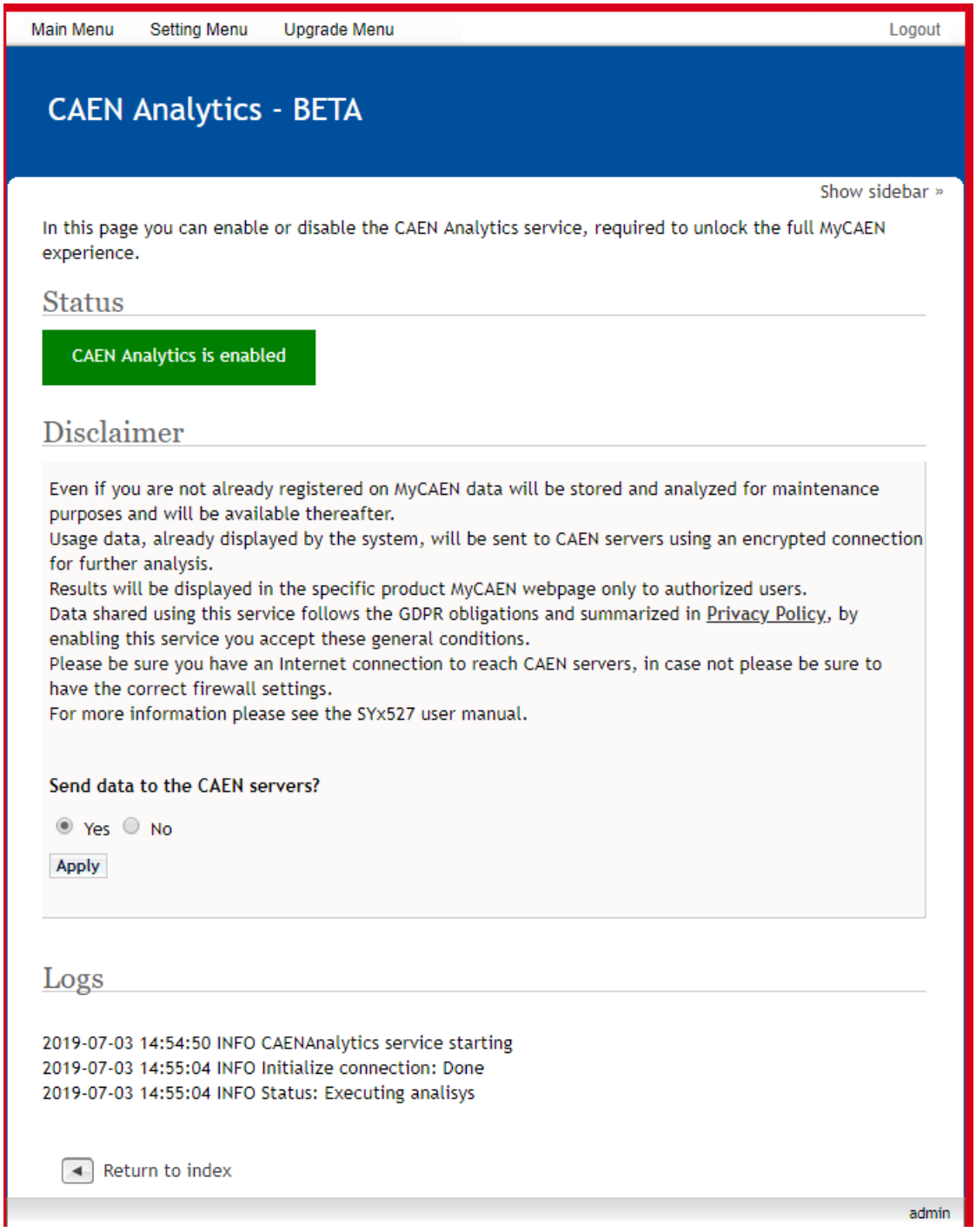


Fig. 29 – CAEN Analytics

CAEN Analytics, allows Users to pair the SYx527 with their MyCAEN account. MyCAEN is the on-line service where Users can register their CAEN devices and, when connected, receive accurate operation analysis and dedicated CAEN support. The connection is secure and encrypted. CAEN Analytics reports the following Log messages: INFO about the service operation, and ERROR if an issue is detected.

For more info and updates about the service, please visit www.caen.it/mycaen.

Upgrade menu

The Upgrade menu allows to update the firmware version of both the SY4527 system and the boards plugged into the system slots or into remote crates, handled via branch controllers.

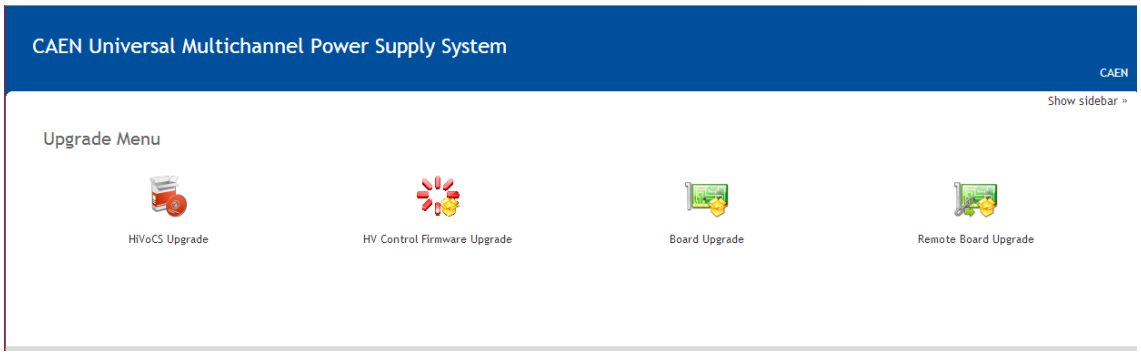
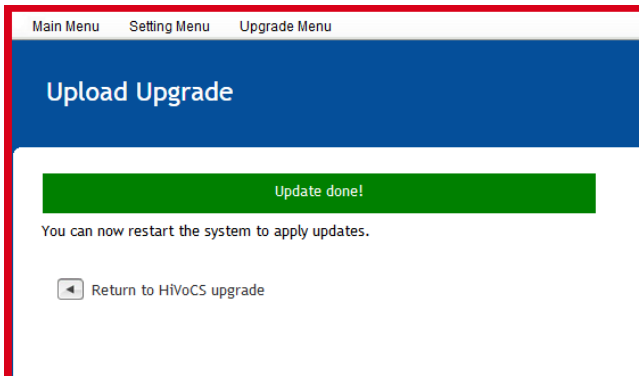


Fig. 30 – HiVoCS Upgrade menu

- The HV Control Firmware Upgrade option allows to upgrade the firmware that handle the system activities (board control, channels control, OPC Server access etc.). In order to do this:
  - click the relevant icon,
  - browse the file to load, which has the format: *sy4527-5527-HVFw- x.y.z-date.bin*
  - click <upload>
  - wait for the "update done!" message



  - restart the system for the upgrades to become effective
  - wait for buzz sound to communicate successful upgrade

    - **N.B. this may take up to some minutes: do not turn off the system meanwhile!**

- The Board Upgrade option allows to upgrade the firmware of the board in the selected slot. In order to do this:
  - click the relevant icon
  - select the slot that hosts the board to upgrade
  - browse the file to load, which has the format: *A1535-689.301* (example of A1535 board)
  - click <upgrade>
- The Remote Board Upgrade option allows to upgrade the firmware of a remote board handled by a branch controller housed in a Syx527 slot. In order to do this:
  - click the relevant icon
  - select the slot that hosts the branch controller
  - select the remote crate number
  - select the remote slot number
  - browse the file to load, which has the format: *A3100-558.204* (example of A3100 board)
  - click <upgrade>

Upgrade trouble-shooting

If failure occurs while HV Control Firmware Upgrade process is running, it is possible to repeat the procedure in the following way:

- Turn Off the system
- Remove the CPU
- Place SW1 switch of the CPU on BKP position (left); see figure below
- Plug the CPU into the system
- Turn On the system
- Repeat the HV Control Firmware Upgrade procedure
- Turn Off the system
- Remove the CPU
- Place SW1 switch of the CPU on STD position (right)

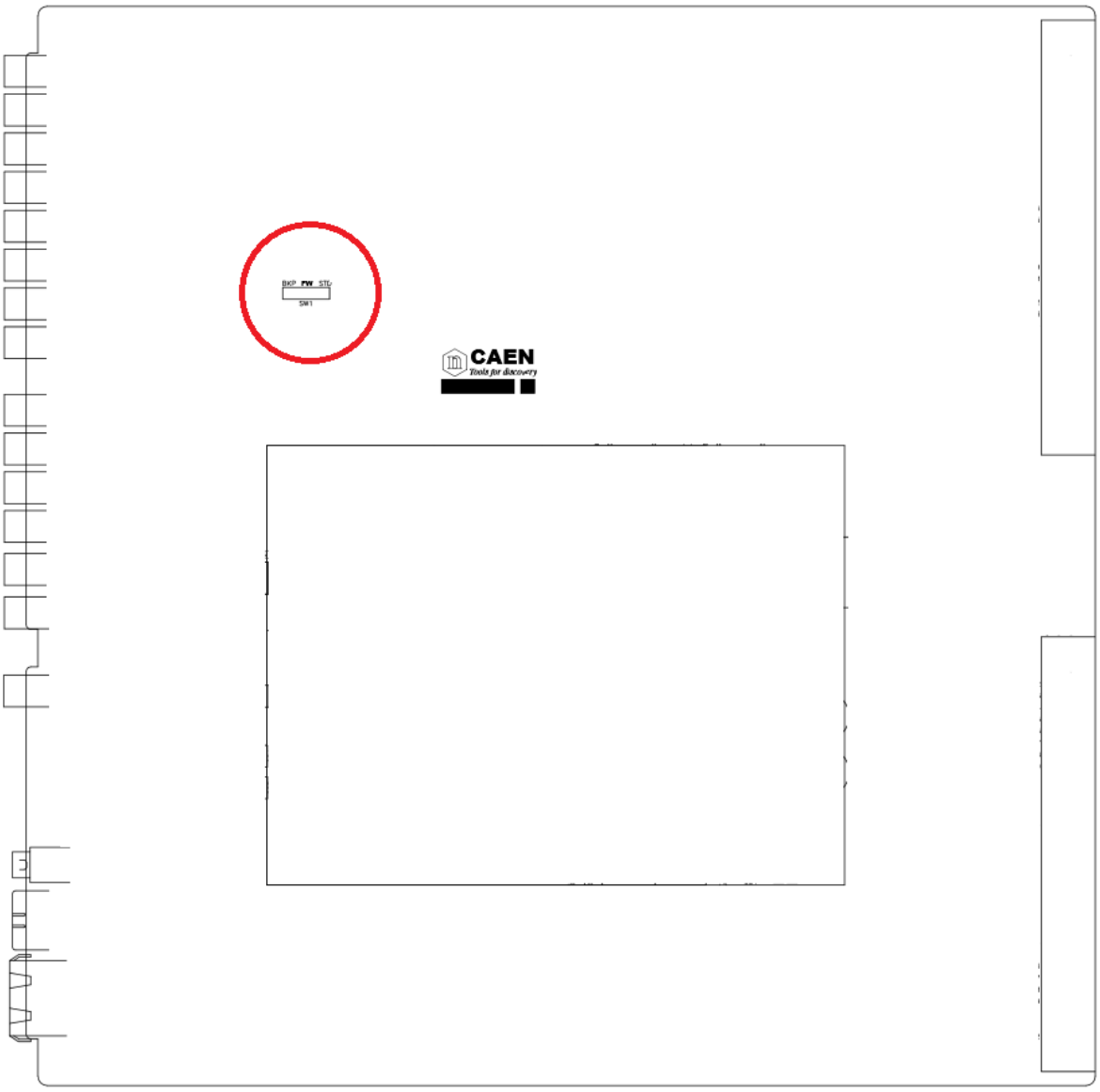


Fig. 31 – SW1 location on A4528 CPU mother board

8. Secure shell connection

It is possible to connect with the SYx527 via SSH protocol; in order to do this, “Remote assistance” (see p. 44) must be enabled. At this point:

- Launch a terminal emulator (such as Tera Term VT)
- Connect to SYx527 with the following settings:
    - Connection: TCP/IP
    - Service: SSH
    - TCP port #: 22
    - Host: SYx527 IP address

The terminal emulator will ask user ID and password;

entering

- Username: admin
- Password: admin

The terminal will show three options:

Main, Utility, Maintenance;

The Utility Menu provides 2 options:

- Kill, which allows to kill all channels;
- Clear Alarm, which allows to remove all alarm conditions

The Maintenance Menu allows to access directly the slots in “transparent mode” for debug purposes.

The Main Menu will display the channel parameters list; use the “arrows” to select the parameter fields; numerical parameters are changed by typing the new value and confirmed via “enter”, “boolean” parameters (such as Pw) are toggled via “space bar”:

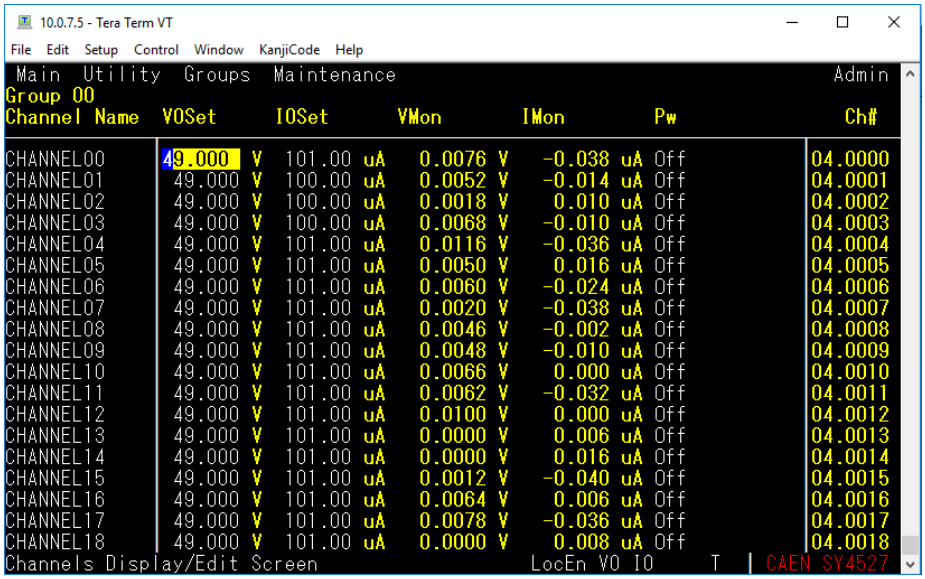


Fig. 32 – Main menu SSH with protocol connection

Groups Menu

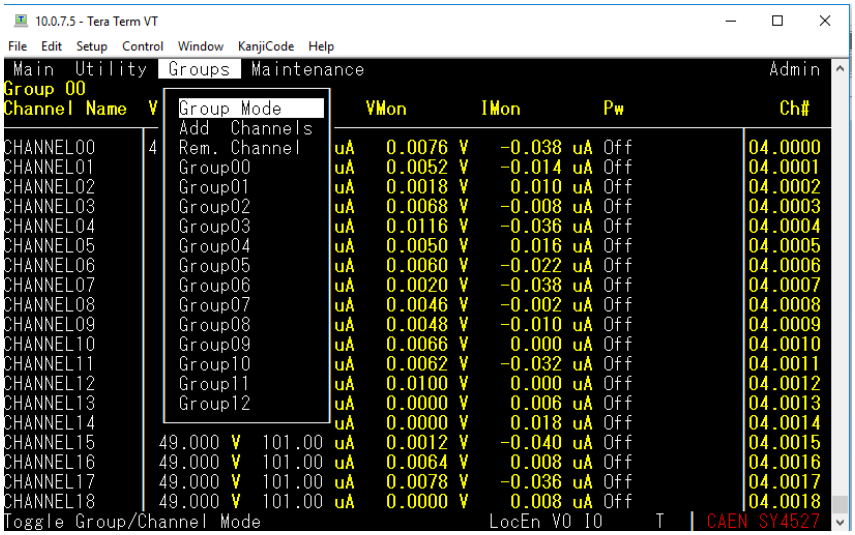
The Groups Menu allows to create up to 15 different custom groups of channels (Group 01 through Group 15), containing a subset of the channels available. By default, the Group 00 is the group containing all the channels and cannot be edited.

The Groups menu gives access to:

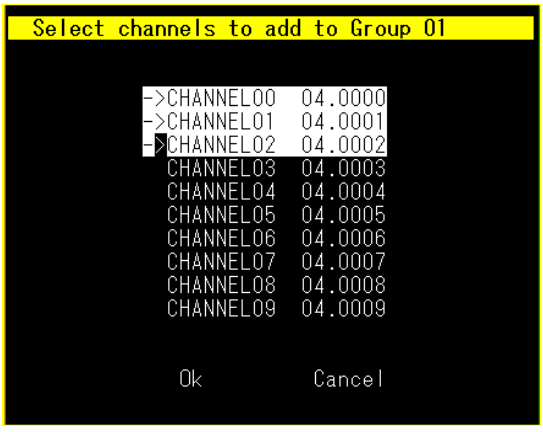
- Group mode toggle command,
- Add Channels,
- Remove Channels,
- Group 00 through Group 15 windows.

To create a new group, follow this procedure:

1. Select the Group you want to create (one among Group 01 through Group 15) in the pop-up Groups Menu: if the group you selected already exists, the screen will display the Channels Window for the selected group; if it does not yet exist, the software will directly display the Add Channels pop-up window



2. Select Add Channels (if not yet displayed) from the Groups Menu: a pop-up window will show a list containing all the channels which are NOT included in the current group;



3. Select the channel you want to add to the group, if any, and press SPACEBAR to select it;
4. Repeat point 3. for each channel you want to add to the current group;
5. Press TAB key and select OK or CANCEL to confirm the channel selection you have made or to cancel it;
6. Select Remove Channels Window: a pop-up window will show a list containing all the channels which are already included in the current group;
7. Select the channel you want to remove from the group, if any, and press SPACEBAR to select it;
8. Repeat point 6. for each channel you want to remove from the current group;

9. Press TAB key and select OK or CANCEL to confirm the channel selection you have made or to cancel it.

Please note that both the Add Channels and Remove Channels affect only the group which is displayed on the screen.

Group Mode is a toggle command which allows to operate in Group Mode, i.e., if the Group Mode option is selected, any operation performed on one channel in the Channels Window will affect all the channels of the group displayed in the window.

For example, when the Group 01 be displayed in the Channels Menu, if the user selects the Group Mode option from the View Menu and then change the V0SET parameter of the channel 'ChName', the V0SET parameters of all the channels of the Group 03 will be automatically set to the new value set for the channel 'ChName'.

9. Trip handling

If a channel trips due to Over Current, it can be useful to have the possibility of letting automatically other channels (which are not in Over Current) trip; this feature is implemented on most of the PS boards. Please check also the Board User's Manual, since some boards provide decimal TripInt and TripExt parameters, while other boards provide hexadecimal TripInt and TripExt.

Internal Trip

A Power Supply Board features a number of "virtual" trip lines usually equal to half the number of its channels, so a 12 channel board features an internal 6-line Trip Bus. The channels communicate with each other through this bus: a channel can be allowed to either propagate or sense (or both propagate and sense) the *trip status* through one or more *trip lines*. This feature is achieved by writing a 2N-bit word (Dec. $0 \div 2^{2N}-1$; maximum 16 lines) in the relevant channel's TRIPINT parameter (see CAEN HV Control Software and CAENGECO2020 User's manual), where N is the number of the board's Internal Trip Bus lines. Bits [0;N-1] allow the channel to sense the trip status from the corresponding lines when set to one; in the same way, bits [N;2N-1] allow the channel to propagate the trip status over the Trip Bus: bit N on line 0 and so on. For example we consider a 12 channel board with a 6-line trip bus (TRIPINT[n]: 0÷4095): if TRIPINT[0] is set to 64 (CH0 propagates the TRIP on line 0), TRIPINT[3] is set to 65, TRIPINT[4] is set to 65 (CH3 and CH4 both propagate and sense the TRIP on line 0) and TRIPINT[5] is set to 1 (CH5 senses the TRIP on line 0), then:

CH3 trips whenever either **CH0** or **CH4** trips

CH4 trips whenever either **CH0** or **CH3** trips

CH5 trips whenever either **CH0** or **CH3** trips or **CH4** trips

This configuration is shown below

INTERNAL TRIP BUS												
	Propagate						Sense					
	Line 5	Line 4	Line 3	Line 2	Line 1	Line 0	Line 5	Line 4	Line 3	Line 2	Line 1	Line 0
TRIPINT0	0	0	0	0	0	1	0	0	0	0	0	0
TRIPINT1	0	0	0	0	0	0	0	0	0	0	0	0
TRIPINT2	0	0	0	0	0	0	0	0	0	0	0	0
TRIPINT3	0	0	0	0	0	1	0	0	0	0	0	1
TRIPINT4	0	0	0	0	0	1	0	0	0	0	0	1
TRIPINT5	0	0	0	0	0	0	0	0	0	0	0	1
TRIPINT6	0	0	0	0	0	0	0	0	0	0	0	0
TRIPINT7	0	0	0	0	0	0	0	0	0	0	0	0
TRIPINT8	0	0	0	0	0	0	0	0	0	0	0	0
TRIPINT9	0	0	0	0	0	0	0	0	0	0	0	0
TRIPINT10	0	0	0	0	0	0	0	0	0	0	0	0
TRIPINT11	0	0	0	0	0	0	0	0	0	0	0	0

External Trip

The External Trip shares most of its features with the internal one. The number of lines is four, fixed for any kind of board, so the TRIPEXT parameter must be set in the 0÷255 range. Bits [0;3] allow the channel to sense the trip status from the corresponding lines when set to one; in the same way, bits [4;7] allow the channel to propagate the trip status over the trip bus of the system mainframe: bit 4 on line 0 and so on. Line 0 status of the trip bus of the system mainframe is exported by the TRIP out signal of the CPU (see Table 3).

10. Support

CAEN Offers Technical Support to its Customers in several ways:

By Web:

For any technical question about CAEN products, two email addresses are available to our clients. The proper CAEN specialist will be happy to assist.

For questions about the hardware:

support.nuclear@caen.it

For questions about software and libraries:

support.computing@caen.it

By Phone:

Telephone number: +39.0584.388.398

This service is available during normal CAEN business hours:

(from Monday to Friday 9.00:12.30 - 13.30:18.00 GMT+1).

By Fax:

FAX number: +39.0584.388.959

Please include the following information: name, institution/company, phone number and e-mail

CAEN SpA is acknowledged as the only company in the world providing a complete range of High/Low Voltage Power Supply systems and Front-End/Data Acquisition modules which meet IEEE Standards for Nuclear and Particle Physics. Extensive Research and Development capabilities have allowed CAEN SpA to play an important, long term role in this field. Our activities have always been at the forefront of technology, thanks to years of intensive collaborations with the most important Research Centres of the world. Our products appeal to a wide range of customers including engineers, scientists and technical professionals who all trust them to help achieve their goals faster and more effectively.

CAEN S.p.A.
Via Vetraia, 11
55049 Viareggio
Italy
Tel. +39.0584.388.398
Fax +39.0584.388.959
info@caen.it
www.caen.it

CAEN GmbH
Klingenstraße 108
D-42651 Solingen - Germany
Phone +49 (0)212 254 4077
Fax +49 (0)212 25 44079
Mobile +49 (0)151 16 548 484
info@caen-de.com
www.caen-de.com

CAEN Technologies, Inc.
1140 Bay Street - Suite 2 C
Staten Island, NY 10305
USA
Tel. +1.718.981.0401
Fax +1.718.556.9185
info@caentechnologies.com
www.caentechnologies.com

CAEN
Tools for Discovery
Electronic Instrumentation

UM2462 - SY4527 - SY4527LC Power Supply Systems rev. 20 - 9 April 2020

00118-10-4527M-MUTX