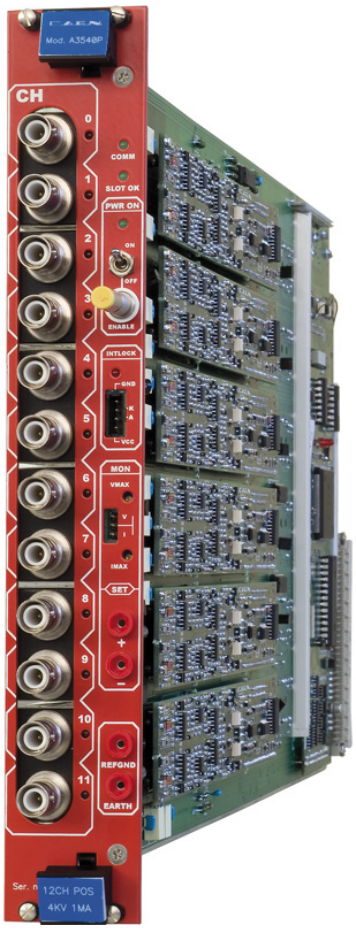
Rev. 08 - 02/11/2009

A3540

12 Channel 4 kV / 1 mA Power Supply Board



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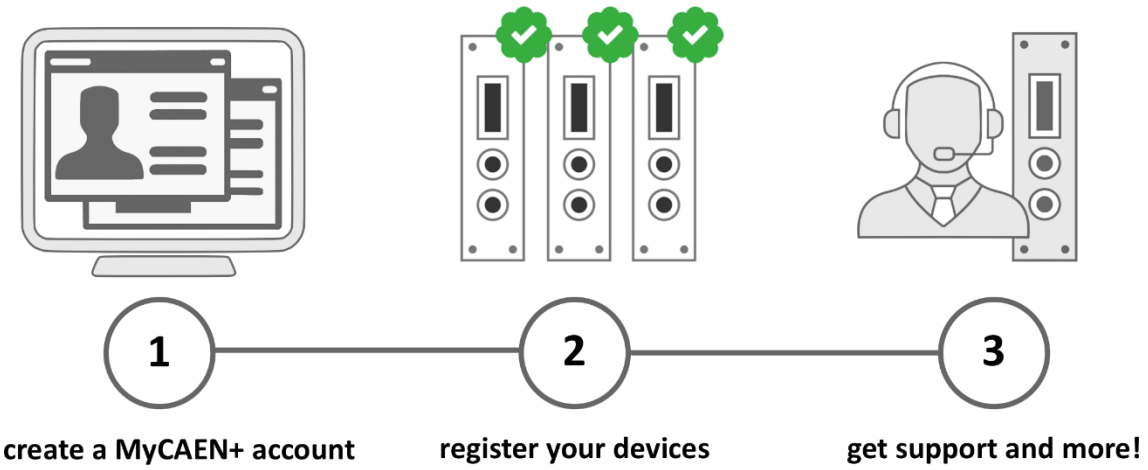

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Technical Information Manual

Revision n. 8
2 November 2009

MOD. A3540
12 CH 4 kV / 1 mA
POWER SUPPLY BOARD
MANUAL REV. 8

NPO:
00105/03:A3540.MUTx/08

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

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

CE

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

Disposal of the Product

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

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1. EASY3000 Embedded Assembly System

1.1 Functional description

EASY3000 (Embedded Assembly SYstem) is the new CAEN power supply solution for operation in magnetic field and radioactive environment. CAEN has been involved for more than a decade in developing different solutions for the main LHC experiments, where the electronic equipment of the experiment is dealing with high dose radiation and intense magnetic field. In order to provide safe and reliable operations in such hostile areas, CAEN started tests with rad-tolerant components and magnetic field resistant solutions, patenting the new technology that is now used in this new line of products. Moreover, though designed for harsh environment, the EASY3000 modules can work also in normal condition with excellent performance. In the new architecture, the power supply can be located directly in the hostile area, where the EASY3000 modules provide a wide variety of output voltages to satisfy the requirements of most detectors and front-end electronics. The control of the EASY3000 power supply system is done remotely using a Branch Controller (Mod. A1676A) plugged in a SY1527 or SY2527 mainframe located in the control room. Each A1676A branch controller can handle up to 6 EASY3000 crates: in this way, one SY1527 power supply system, for example, housing up to 16 A1676A boards, can handle up to 96 EASY3000 systems. The EASY3000 crate can house up to 10 boards, depending on the boards' width. The branch controller is the interface between the mainframe (SY1527 or SY2527) and the remote boards in the EASY3000 crate: its role is to configure the EASY3000 channels as if they belong to the supply unit slot in which the branch controller is located. All the channels of the EASY3000 boards will be considered as channels of the branch control board, thus hugely increasing the number of channels the system can handle. Through the mainframe, the provided and fully reliable OPC server permits an immediate and "automatic" interfacing with the custom control software; moreover, a C-library for Windows and Linux is available as well. The EASY3000 crate can be used with an air and/or water intercooler and its standard width fit the rack mounting. An optional fan tray (A34FU -EASY3000 Fan Unit) can be used for the stand-alone operation of the EASY3000 crate when no magnetic field is present. EASY3000 is powered by external 48 V DC. The EASY architecture foresees two independent 48 V power supplies: the first (48 V Power) to power the channels regulators, the other (48 V Service) to power the control logic. The use of CAEN 48 V power sources (Mod. A3484 and A3485), allows to integrate into the channels control also the management of the 48 V power supplies. Fig. 1.1 shows the system's block diagram.

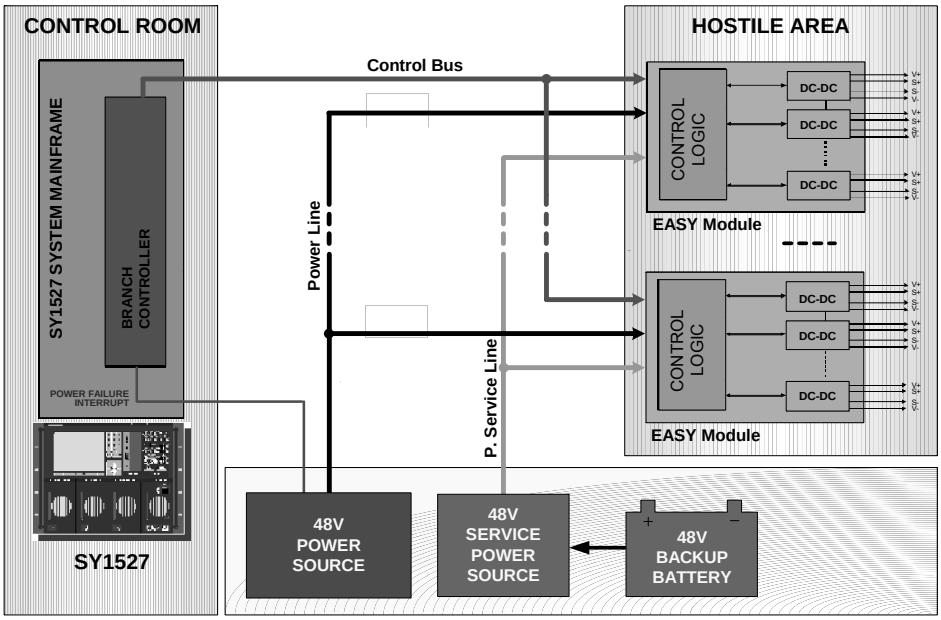


Fig. 1.1 – System's block diagram

1.2 The CAEN Multichannel Power Supply System Overview

The SY1527 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, which range from those of LHC experiments, where the features of this model find prior application, to those of other less challenging, but still demanding, High Energy Physics experiments.
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 boards, distributors and branch controllers;
- the Fan Tray Section, housing 6 fans arranged on two rows;
- the Power Supply Section, which consists of the primary power supply and up to 3 power supply units;
- the CPU and Front Panel Section which includes all interface facilities.

The User Software Interface features the usual friendliness of the previous CAEN systems which now also includes a 7.7" colour LCD. A wide choice of interface facilities provides full communication compatibility with the previous systems and the feasibility of controlling heterogeneous external devices. 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 3 power supply units per mainframe (up to 2250 W), while the Board Section can house up to 16 boards able to fulfil different functions. A complete line of power supply boards and distributors has been specially developed for this new

system. The minimum system configuration consists of the primary power supply, one Power Supply Unit and one board. The system allows also to deal with power supply solutions composed by “branch controllers” (housed in the system main frame) and on-detector “remote boards” (manufactured in order to be magnetic field and radiation tolerant). Channel trip control on other crates is performed via four external differential trip lines. A sophisticated trip handling via software allows to control and correlate trip conditions on the channels of the crate as well as of other crates connected to it. Live insertion and extraction of the boards, which reduces the down time of the global system, and easy access to the computing core and peripherals of the system complete the system flexibility. Easy interfacing is another key-point of the SY1527 system, which can be connected to SY127 and SY527 systems. The Ethernet interface (TCP/IP) allows both an easy Telnet access and the connection via OPC Server to a SCADA control system. Enhanced software programming features a 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. Multi-layered access to the system via Intranet is foreseen through the management of several custom user profiles. In particular, three different access levels have been implemented: Guest, User and Administrator, each of which with password protection. 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. Actually, the Telnet access facility allows remote debugging and technical support of the system, including future firmware upgrading. For a detailed description of the SY 1527 Universal Multichannel Power Supply System please refer to the *SY 1527 User's Manual*.

Table 1.1 – Technical specifications of the SY 1527 mainframe

Packaging	- 19"-wide, 8U-high Euro-mechanics rack; - Depth: 720 mm.
Weight	-Mainframe (*): 24 kg -Mod. A1532: 3.2 kg
Power requirements	*Voltage range*: 100/230 V *Frequency*: 50/60 Hz *Power*: 3400 W
Max. number of boards per crate	16
Max. number of power supply units per crate	3
Primary power supply output (Mod. A 1531)	± 12 V, 8 A +5 V, 20 A
Power supply unit output (Mod. A 1532)	+48 V, 15.6 A
Max. output power	2250 W
Operating temperature	From 0°C (dry atmosphere) to +40°C
Storage temperature	From -20°C (dry atmosphere) to +50°C

(*) One Primary Power Supply (Mod. A 1531) and one Power Supply Unit (Mod. A 1532) are included; boards are not included.

1.3 The Mod. A1676A Branch Controller overview

The Mod. A1676A EASY Branch Controller is implemented in a single width SY1527/SY2527 board. Once plugged in, the Branch Controller must be linked to the EASY3000 crates (placed in the “hostile area”), via front panel connectors (Control and Power Supply). The A1676A is the interface between the mainframe and the remote boards in the EASY3000 crate. It configures the EASY3000 channels as if they belong to the slot in which the branch controller is located: the channels of the EASY3000 boards operate as channels of the A1676A. Up to six EASY3000 crates can be controlled by one A1676A. The provided software tool allows the User to configure the A1676A to operate with any EASY crate layout.

2. A3540 12 Channel 4 kV / 1 mA Board

2.1 A3540 Overview

This document shows the features of the CAEN A3540 12 Channel 4 kV / 1 mA Power Supply Board, developed for operation in magnetic field and moderate radioactive environment. One A3540 houses 12 floating (channels have independent return, floating up to 5 V between each other) 4 kV / 1 mA channels; the board is available with either positive or negative polarity.
The connector output voltage range is 0 ÷ 4 kV with 500 mV monitor resolution.

If the output voltage differs from the programmed value by more than 3% of voltage full scale range, the channel is signalled to be either in OVERVOLTAGE or UNDERVOLTAGE condition. Moreover, for each channel, a voltage protection limit SVMAX can be fixed via software with 1 V resolution and the output voltage can not be programmed beyond this value.

The output current is monitored with 100 nA resolution; if a channel tries to draw a current larger than its programmed limit it is signalled to be in OVERCURRENT condition; the SY 1527 system detects this state as a fault and reacts according to the setting of the TRIP parameter[1], namely:

TRIP=infinite (= 1000 s)

The output current is permitted to keep the programmed limit; if the maximum output current value is reached the channel behaves like a constant current generator.

TRIP=finite (< 1000 s)

The output current is permitted to keep the limit only for programmed time interval and then is switched off.

The TRIP time (i.e. the maximum time an OVERCURRENT condition is allowed to last) can be programmed in 0.1 s steps.
The maximum output voltage (VMAX Hardware) can be fixed for each channel, through a potentiometer located on the front panel. When VMAX is reached the channel is switched off immediately.
The maximum output current (IMAX Hardware) can be fixed for each channel, through a potentiometer located on the front panel. If a channel tries to draw a current larger than IMAX it is signalled to be in OVERCURRENT condition; the SY 1527 system detects this state as a fault and reacts according to the setting of the TRIP parameter (see above).

[1] Refer to the SY1527/SY2527/SY3527 User's Manuals for details about the TRIP Handling.

2.2 A3540 Channel Characteristic Table

Table 2.1 – Channel characteristics of the Mod. A3540 Power Supply Board

Polarity:	Positive (A3540P) or Negative (A3540N), with individual floating return (up to 5 V between each other)
Output Voltage:	0 ÷ 4 kV (connector output)
Max. Output Current:	1 mA
Voltage Set/Monitor Resolution:	500 mV
Current Set/Monitor Resolution:	100 nA
VMAX hardware:	0 ÷ 4 kV
VMAX hardware accuracy:	± 2% of FSR
VMAX software:	0 ÷ 4 kV
VMAX software resolution:	500 mV
Voltage Ripple: [2]	< 30 mV pp
Voltage Monitor vs. Output Voltage Accuracy: [3]	typical: ± 0.3% of reading ± 2.5 V maximum: ± 0.3% of reading ± 5 V
Voltage Set vs. Output Voltage Accuracy: [3]	typical: ± 0.3% of setting ± 2.5 V maximum: ± 0.3% of setting ± 5 V
Current Monitor vs. Output Current Accuracy: [3]	typical: ± 2% of reading ± 1 µA maximum: ± 2% of reading ± 2 µA
Current Set vs. Output Current Accuracy: [3]	typical: ± 2% of setting ± 1 µA maximum: ± 2% of setting ± 2 µA
Test set up:	Test Loads: 4 and 5 MOhm Cable length: 30m
48Vin (Power & Service)	45÷51Vdc

[2] From 10 Hz to 20 MHz at full load

[3] From 10% to 90% of Full Scale Range

2.3 A3540 Front panel components

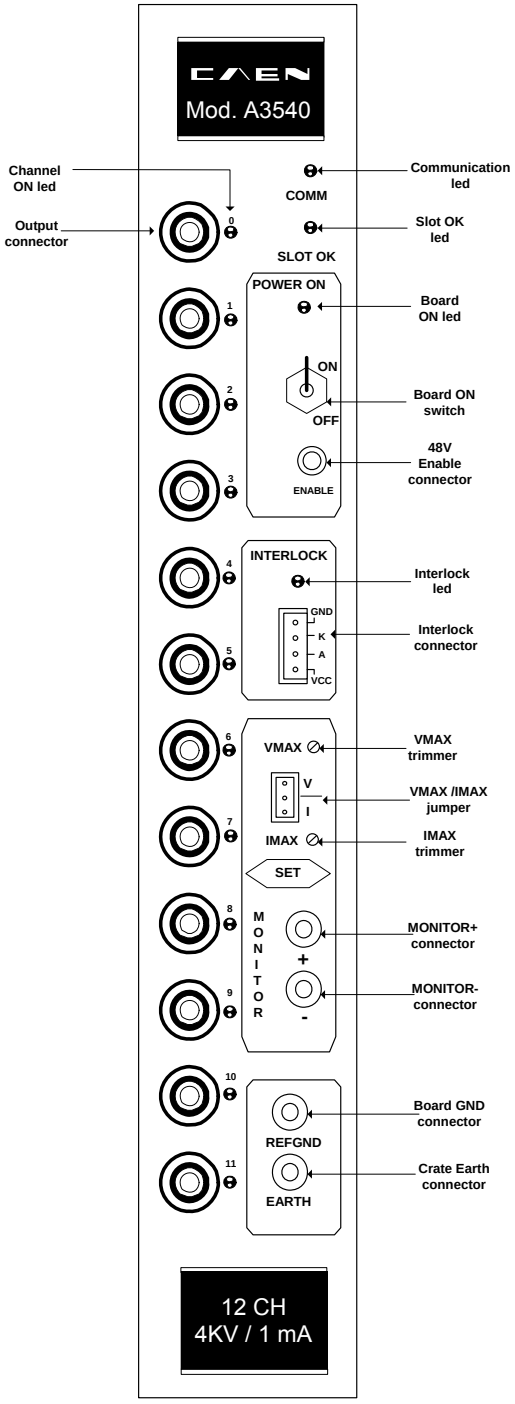


Fig. 2.1 – A3540 Front Panel

2.4 A3540 Technical Specifications

2.4.1 A3540 Packaging

The module is housed in a 8 TE wide, 6U-high mechanics.

2.4.2 A3540 Front panel connections

The board front panel houses the following components:

OUT 0..11:	*Type*: HV coaxial connectors Radiall SHVR317580-type *Function*: HV output
INTERLOCK:	*Type*: Male pin strip *Function*: Interlock enable jumpers (see § 4.2)
EARTH:	*Type*: Radiall R921921 RED (2mm) *Function*: earth auxiliary reference
REFGND:	*Type*: Radiall R921921 RED (2mm) *Function*: floating return, to be connected to the ground reference of the load.
48V ENABLE:	*Type*: Fischer 00 D101A004 ERA.00.250.NTL (LEMO 00) *Function*: TTL signal (active = ON), allows to enable/disable the 48 V power supply (general ON/OFF of the module)
MONITOR±:	*Type*: Radiall R921921 RED (2mm) *Function*: VMON / IMON (jumper setting) Step: MONITOR = 1V → VMAX = 1kV / IMAX = 150µA

2.4.3 A3540 Front panel trimmers and switches

The board front panel houses the following trimmers and switches:

VMAX:	Allows to set VOUT maximum hardware value
IMAX:	Allows to set IOUT maximum hardware value
POWER ON:	Allows to enable/disable the 48 V power supply (general ON/OFF of the module)

2.4.4 A3540 Front Panel Displays

CH ON LED: *Function:* on as HV Out is on.
Type: red LED if positive, yellow if negative

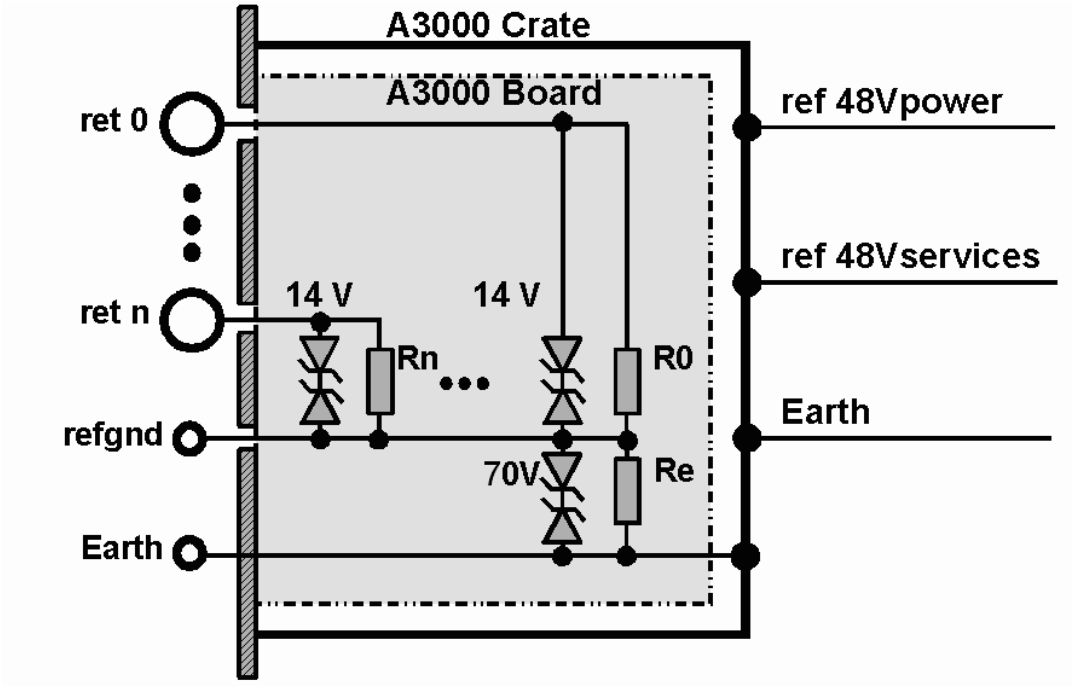
PWGOOD LED: *Function:* on as the +48 V, ± 12V supplies are present.
Type: green LED

COMM LED: *Function:* on as the communications take place.
Type: green LED

SLOT OK LED: *Function:* on up if board is correctly inserted into the crate.
Type: green LED

INTERLOCK LED: *Function:* on up as the interlock is active.
Type: red LED

2.4.5 A3540 Ground scheme



R0..R11 = 100 KOhm
Re = 1 MOhm

Fig. 2.2 – A3540 Channels ground scheme

3. Safety information and installation requirements

3.1 General safety information

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

3.1.1 Injury Precautions

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

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.

Do Not Operate Without Covers.
To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

Do Not Operate in Wet/Damp Conditions.
To avoid electric shock, do not operate this product in wet or damp conditions.

Do Not Operate in an Explosive Atmosphere.
To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

Do Not Operate With Suspected Failures.
If you suspect there is damage to this product, have it inspected by qualified service personnel.

3.2 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 symbols may appear on the product:

DANGER

High Voltage

ATTENTION

Refer to Manual

3.3 Installation

The Mod. A1676A is a single-width board for the SY1527/2527/3527 systems. At power ON the SY1527 system processor will scan all the slots in the crate to find out where the module is plugged and what kind of module it is. The A1676A must be connected to the EASY3000 remote crates through the control lines.
The board must be plugged in specific positions of the EASY 3000 crate. Since A1676A is set up for searching for boards in a programmable list of slots, it is possible to control the boards only if plugged in the programmed slots, otherwise the A1676A firmware must be updated.

3.4 Ventilation

It is necessary to provide the unit the proper ventilation by using for example the CAEN Mod. A3000F Fan Unit; (A34FU Fan Unit must be used when the board is operated with EASY 3000 crate first issue). Ventilation is necessary even when channels and 48VPwS are off (see § 4.1).

Fig. 3.1 – Ventilation-warning Label

4. Operating modes

The Mod. A1676A board can be controlled, either locally or remotely, through the SY 1527 software interface. For details on SY 1527 system operation, please refer to the User's Manual of this product.

ATTENTION

THE MOD. A1676A and A3540 BOARDS REQUIRE

SY 1527 FIRMWARE VERSION 2.00.02 OR LATER

4.1 Output control and monitoring

It is possible, through the SY 1527 system, to perform the following operations:

⇨ OVER THE A1676A BOARD
- **RESET** all remote channels controlled by Branch Controller (all settings will be ERASED)
- **RECOVERY** all remote channels controlled by Branch Controller (all settings will be SAVED and communications reset)
- Enable / Disable 48 V output of Branch Controller (**A1676A 48V**)
- Select destination of software downloading (**UPGRADE**) (REMOTE on remote board/ LOCAL on A1676A controller)
- Monitor board firmware release (**REL**)

⇨ OVER THE A3540 BOARD
- Assign to the board symbolic name
- Monitor auxiliary low voltages (**12 VPSW**) (OK if present, FAIL if absent)
- Monitor service and power 48 V supply (**48PWR**) (OK if presents, FAIL if one absent)
- Monitor 50 Hz synchronisation (**Sync**) (OK if present , FAIL if absent)
- Monitor 625 kHz synchronisation (**HVSync**) (OK if present, FAIL if absent)
- Monitor board channels temperature (**Temp**)
- Monitor of interlock status (**REMILK**)
- Monitor of board name (**Rem Bd NAME**)
- Monitor of 48PWR supply status (**MainPWS**); in case of failure, 48V service is maintained by back up battery and channels can be shut down.

⇨ ON REMOTE CHANNELS
- Assign to channel a symbolic name
- Set output voltage (**VSET**)
- Set max. output current (**ISET**)
- Set output voltage software limit (**SVMAX**)
- Set **TRIP** parameter
- Set voltage ramp-up speed (**RAMP-UP**)
- Set voltage ramp-down speed (**RAMP-DOWN**)
- Switch channel **ON/OFF**
- Monitor output voltage (**VMON**)

- Monitor output current (**IMON**)
- Monitor channel status

The following messages may be returned by the SY 1527 when monitoring the channel status:

- OFF (channel turned OFF)
- ON (channel turned ON)
- OVC (channel in OVERCURRENT condition)
- OVV (channel in OVERVOLTAGE condition)
- UNV (channel in UNDERVOLTAGE condition)
- ITRIP (*) (channel OFF due to internal OVERCURRENT condition)
- HVMAX (*) (channel OFF due to VMON pass Vmax set by panel trimmer)

Moreover it is possible to monitor board temperature and to check board status; the following messages may be returned by the SY 1527 when monitoring the board status:

- TEMPERR (*) (board channels temperature > 65°C)

When the board status is TEMPERR all channels are switched off.

All the alarms marked by (*) requires a **Clear Alarm** operation before returning on the channel(s). To Clear all alarms it's necessary to select menu "*UTILITY*" in SY1527, then "*CLEAR ALARM".*

4.1.1 A3540 Board OPC Items

This chapter describes the items which are available for the A3540 board control.
The **Name** item allows to assign to the board a symbolic name.
A read access to the **Temp** item returns the board's channels temperature.
A read access to the **Temp#EU** item returns a string with the Temp Engineering Units.
A read access to the **Temp#HighEU** item returns the highest possible Temp value.
A read access to the **Temp#LowEU** item returns the lowest possible Temp value.
A read access to the **Rel** item returns a string with the board firmware release.
A read access to the **12VPS** item returns the internal ±12 V status.
A read access to the **12VPS#CoOpen** item returns back the label "Off" associated to 12VPS=FAIL.
A read access to the **12VPS#CoClose** item returns back the label "On" associated to 12VPS=OK.
A read access to the **48VPS** item returns the external +48 V status.
A read access to the **48VPS#CoOpen** item returns back the label "Off" associated to 48VPS=FAIL.
A read access to the **48VPS#CoClose** item returns back the label "On" associated to 48VPS=OK.
A read access to the **Sync** item returns the external 50 Hz status.
A read access to the **Sync#CoOpen** item returns back the label "Off" associated to Sync=FAIL.
A read access to the **Sync#CoClose** item returns back the label "On" associated to Sync=OK.
A read access to the **HVSync** item returns the external 625 Hz status.
A read access to the **HVSync#CoOpen** item returns back the label "Off" associated to HVSync=FAIL.

A read access to the **HVSync#CoClose** item returns back the label "On" associated to HVSync=OK.

Table 4.1 – A3540 board items

ItemID	Data Type	Access Rights	Description
PowerSupplyName.BoardXX.Name	String	R/W	Channel name
PowerSupplyName.BoardXX.Temp	4-byte real	R	Board temperature
PowerSupplyName.BoardXX.Temp#EU	String	R	Temperature EU
PowerSupplyName.BoardXX.Temp#HighEU	8-byte real	R	Temp upper limit
PowerSupplyName.BoardXX.Temp#LowEU	8-byte real	R	Temp lower limit
PowerSupplyName.BoardXX.Rel	String	R	Board firmware release
PowerSupplyName.BoardXX.12VPS	boolean	R	12VPS status
PowerSupplyName.BoardXX.12VPS#CoOpen	string	R	12VPS open label
PowerSupplyName.BoardXX.12VPS#CoClose	string	R	12VPS close label
PowerSupplyName.BoardXX.48VPS	boolean	R	48VPS status
PowerSupplyName.BoardXX.48VPS#CoOpen	string	R	48VPS open label
PowerSupplyName.BoardXX.48VPS#CoClose	string	R	48VPS close label
PowerSupplyName.BoardXX.Sync	boolean	R	Sync status
PowerSupplyName.BoardXX.Sync#CoOpen	string	R	Sync open label
PowerSupplyName.BoardXX.Sync#CoClose	string	R	Sync close label
PowerSupplyName.BoardXX.HVSync	boolean	R	HVSync status
PowerSupplyName.BoardXX.HVSync#CoOpen	string	R	HVSync open label
PowerSupplyName.BoardXX.HVSync#CoClose	string	R	HVSync close label

4.1.2 A3540 Output Channel OPC Items

This chapter describes the items which are available for the control of the power supply channel.
The **Name** item allows to assign to the channel a symbolic name.
The **V0set** item allows to set V0.
A read access to the **V0set#EU** item returns a string with the V0set Engineering Units.
A read access to the **V0set#HighEU** item returns the highest possible V0set value.
A read access to the **V0set#LowEU** item returns the lowest possible V0set value.
The **V1set**[4] item allows to set V1.
A read access to the **V1set#EU** item returns a string with the V1set Engineering Units.
A read access to the **V1set#HighEU** item returns the highest possible V1set value.
A read access to the **V1set#LowEU** item returns the lowest possible V1set value.
The **I0set** item allows to set I0.
A read access to the **I0set#EU** item returns a string with the I0set Engineering Units.

[4] This item is available on mod. A3540A versions only

A read access to the **I0set#HighEU** item returns the highest possible I0set value.
A read access to the **I0set#LowEU** item returns the lowest possible I0set value.
The **Trip** item allows to program the trip time.
A read access to the **Trip#EU** item returns a string with the Trip Engineering Units.
A read access to the **Trip#HighEU** item returns the highest possible Trip value.
A read access to the **Trip#LowEU** item returns the lowest possible Trip value.
The **SVMax** item allows to set the software voltage limit.
A read access to the **SVMax#EU** item returns a string with the SVMax Engineering Units.
A read access to the **SVMax#HighEU** item returns the highest possible SVMax value.
A read access to the **SVMax#LowEU** item returns the lowest possible SVMax value.
The **VMon** item returns back the VMon value.
A read access to the **VMon#EU** item returns a string with the VMon Engineering Units.
A read access to the **VMon#HighEU** item returns the highest possible VMon value.
A read access to the **VMon#LowEU** item returns the lowest possible VMon value.
The **IMon** item returns back the IMon value.
A read access to the **IMon#EU** item returns a string with the IMon Engineering Units.
A read access to the **IMon#HighEU** item returns the highest possible IMon value.
A read access to the **IMon#LowEU** item returns the lowest possible IMon value.
A read access to the **Status** item returns back a 16 bit pattern indicating channel status, as follows:

- Bit 0: ON/OFF
- Bit 1: Ramp Up
- Bit 2: Ramp Down
- Bit 3: OverCurrent
- Bit 4: OverVoltage
- Bit 5: UnderVoltage
- Bit 6: don't care
- Bit 7: Over HVmax
- Bit 8: don't care
- Bit 9: Internal Trip
- Bit 10: Calibration Error
- Bit 11: Unplugged
- Bit 12: don't care
- Bit 13: OverVoltage Protection
- Bit 14: Power Fail
- Bit 15: Temperature Error

The **Pw** item allows to switch ON/OFF the channel.
A read access to the **Pw#CoOpen** returns back the label "Off" associated to Pw=0.
A read access to the **Pw#CoClose** item back the label "On" associated to Pw=1.

Table 4.2 – A3540 Output Channel items

ItemID	Data Type	Access Rights	Description
PowerSupplyName.BoardXX.ChanYYY.Name	String	R/W	Channel name
PowerSupplyName.BoardXX.ChanYYY.V0Set	4-byte real	R/W	Set V0 voltage limit
PowerSupplyName.BoardXX.ChanYYY.V0Set#EU	String	R	V0set EU
PowerSupplyName.BoardXX.ChanYYY.V0Set#HighEU	8-byte real	R	V0set upper limit
PowerSupplyName.BoardXX.ChanYYY.V0Set#LowEU	8-byte real	R	V0set lower limit
PowerSupplyName.BoardXX.ChanYYY.V1Set	4-byte real	R/W	Set V1 voltage limit
PowerSupplyName.BoardXX.ChanYYY.V1Set#EU	String	R	V1set EU
PowerSupplyName.BoardXX.ChanYYY.V1Set#HighEU	8-byte real	R	V1set upper limit
PowerSupplyName.BoardXX.ChanYYY.V1Set#LowEU	8-byte real	R	V1set lower limit
PowerSupplyName.BoardXX.ChanYYY.I0Set	4-byte real	R/W	Set I0 current limit
PowerSupplyName.BoardXX.ChanYYY.I0Set#EU	String	R	I0set EU
PowerSupplyName.BoardXX.ChanYYY.I0Set#HighEU	8-byte real	R	I0set upper limit
PowerSupplyName.BoardXX.ChanYYY.I0Set#LowEU	8-byte real	R	I0set lower limit
PowerSupplyName.BoardXX.ChanYYY.Trip	4-byte real	R/W	Set trip time
PowerSupplyName.BoardXX.ChanYYY.RUp	4-byte real	R/W	Set ramp-up rate
PowerSupplyName.BoardXX.ChanYYY.RUp #EU	String	R	Ramp up rate EU
PowerSupplyName.BoardXX.ChanYYY.RUp #HighEU	8-byte real	R	Rup upper limit
PowerSupplyName.BoardXX.ChanYYY.RUp #LowEU	8-byte real	R	RUp lower limit
PowerSupplyName.BoardXX.ChanYYY.RDWn	4-byte real	R/W	Set ramp-down rate
PowerSupplyName.BoardXX.ChanYYY.RDWn #EU	String	R	Ramp down rate EU
PowerSupplyName.BoardXX.ChanYYY.RDWn #HighEU	8-byte real	R	RDwn upper limit
PowerSupplyName.BoardXX.ChanYYY.RDWn #LowEU	8-byte real	R	RDwn lower limit
PowerSupplyName.BoardXX.ChanYYY.Trip #EU	String	R	Trip time EU
PowerSupplyName.BoardXX.ChanYYY.Trip #HighEU	8-byte real	R	Trip time upper limit
PowerSupplyName.BoardXX.ChanYYY.Trip #LowEU	8-byte real	R	Trip time lower limit
PowerSupplyName.BoardXX.ChanYYY.SVMax	4-byte real	R/W	Set software voltage limit
PowerSupplyName.BoardXX.ChanYYY.SVMax #EU	String	R	SVMax EU
PowerSupplyName.BoardXX.ChanYYY.SVMax#HighU	8-byte real	R	SVMax upper limit
PowerSupplyName.BoardXX.ChanYYY.SVMax#LowEU	8-byte real	R	SVMax lower limit
PowerSupplyName.BoardXX.ChanYYY.VMon	4-byte real	R	VMon
PowerSupplyName.BoardXX.ChanYYY.VMon #EU	string	R	VMon EU
PowerSupplyName.BoardXX.ChanYYY.VMon#HighU	8-byte real	R	VMon upper limit
PowerSupplyName.BoardXX.ChanYYY.VMon#LowEU	8-byte real	R	VMon lower limit
PowerSupplyName.BoardXX.ChanYYY.IMon	4-byte real	R	IMon

ItemID	Data Type	Access Rights	Description
PowerSupplyName.BoardXX.ChanYYY.IMon #EU	string	R	IMon EU
PowerSupplyName.BoardXX.ChanYYY.IMon#HighU	8-byte real	R	IMon upper limit
PowerSupplyName.BoardXX.ChanYYY.IMon#LowEU	8-byte real	R	IMon lower limit
PowerSupplyName.BoardXX.ChanYYY.Status	2-byte integer	R	Channel status
PowerSupplyName.BoardXX.ChanYYY.Pw	boolean	R/W	Power ON/OFF
PowerSupplyName.BoardXX.ChanYYY.Pw#CoClose	string	R	Pw close label
PowerSupplyName.BoardXX.ChanYYY.Pw#CoOpen	string	R	Pw open label
PowerSupplyName.BoardXX.ChanYYY.TripInt	4-byte real	R/W	Internal Trip
PowerSupplyName.BoardXX.ChanYYY.TripInt #EU	string	R	TripInt EU
PowerSupplyName.BoardXX.ChanYYY.TripInt#HighU	8-byte real	R	TripInt upper limit
PowerSupplyName.BoardXX.ChanYYY.TripInt#LowEU	8-byte real	R	TripInt lower limit

4.2 VMAX and IMAX hardware set

In order to set VMAX and IMAX via front panel trimmer, connect the multimeter to the Monitor± connectors, then connect the jumpers according to desired setting (voltage/current) and set the VMAX / IMAX value via trimmers.

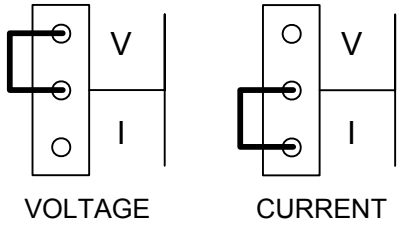


Fig. 4.1 – VMAX / IMAX jumpers setting

4.3 Interlock operation

PASSIVE INTERLOCK: it is necessary to short circuit pin 1 and pin 2 (GND and K), and pin 3 with pin 4 (A and VCC).
ACTIVE INTERLOCK: it is necessary to send a TTL level between pin 2 and pin 3 (A and K), leaving pin 1 and pin 4 disconnected.

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