rev. 03 - 04/07/2017

A3484/A3485

1/2 channel AC/DC Converter 400 Vac - 48 Vdc (2.5/5 KW)

CAEN
Tools for Discovery

User Manual

UM4574

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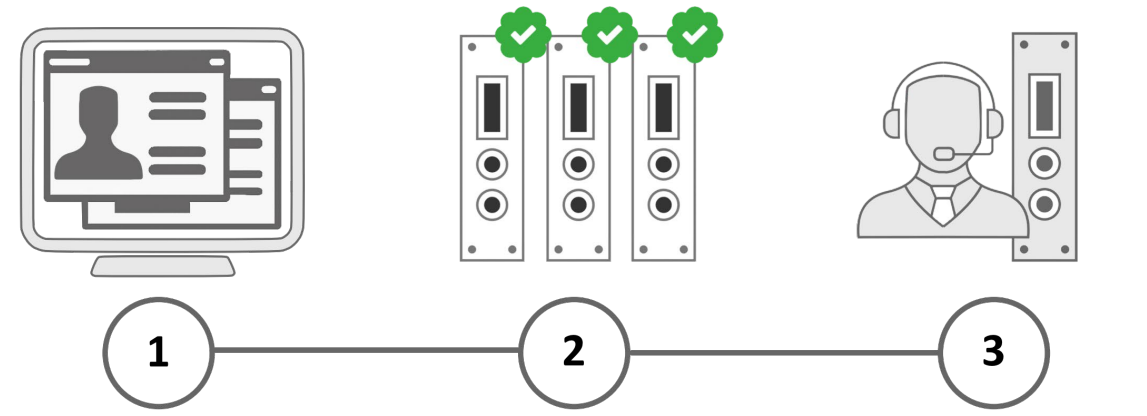

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CAEN will repair or replace any product within the guarantee period if the Guarantor declares that the product is defective due to workmanship or materials and has not been caused by mishandling, negligence on behalf of the User, accident or any abnormal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

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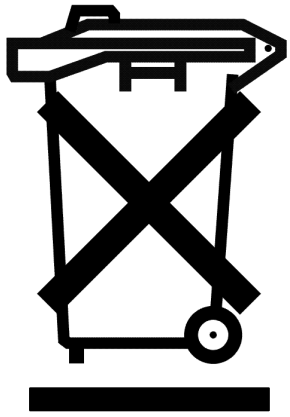

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1. EASY Embedded Assembly System

1.1 Functional description

EASY (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 EASY 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 EASY modules provide a wide variety of output voltages to satisfy the requirements of most detectors and front-end electronics. The control of the EASY 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 EASY crates: in this way, one SY1527 power supply system, for example, housing up to 16 A1676A boards, can handle up to 96 EASY systems. The EASY 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 EASY crate: its role is to configure the EASY channels as if they belong to the supply unit slot in which the branch controller is located. All the channels of the EASY 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 EASY crate can be used with an air and/or water intercooler and its standard width fit the rack mounting. Fig. 1.1 shows the system's block diagram.

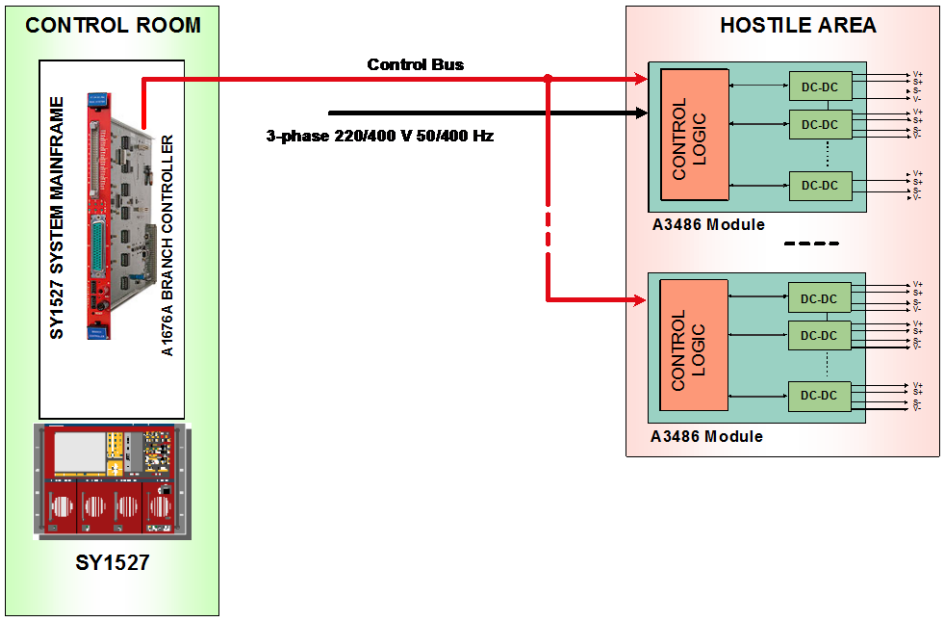


Fig. 1.1 – System's block diagram

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. nr. 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 EASY 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 EASY crate. It configures the EASY channels as if they belong to the slot in which the branch controller is located: the channels of the EASY boards operate as channels of the A1676A. Up to six EASY 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. Mod. A3484 and A3485 AC/DC Converters

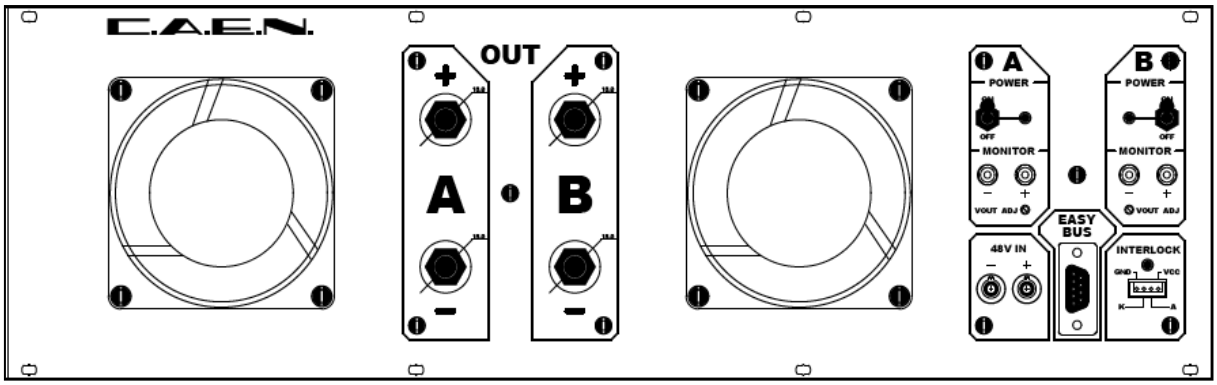


Fig. 2.1 – Mod. A348x Front panel

The Mod. A3484 is a 400 Vac – 48 Vdc converter, which allows to integrate into the EASY channels control also the management of the 48 V power supplies. Features include local or remote control (Mod. A3484S only), overload protection and local or remote inhibit function.
The Mod. A3485 is a two channel 400 Vac – 48 Vdc converter, which allows to integrate into the EASY channels control also the management of the 48 V power supplies. Features include local or remote control (Mod. A3485S only), overload protection and local or remote inhibit function.

Table 2.1 – Technical specifications of the A3484 and A3485 48V Power Sources

Model:	A3484/A3484S	A3584/A3485S
No. of channels:	1	2
Polarity:	positive	positive
AC input:	3-phase 400 V /50-60 Hz	3-phase 400 V /50-60 Hz
Output Voltage:	48 V ± 5% trimmer adjustable	48 V ± 5% trimmer adjustable
Max. Output Power:	2500 W	5000 W
Voltage Ripple:	< 100 mV pp	< 100 mV pp
Test set up:	test load: 0÷2x2 kW load capacitance: 100µF electrolytic // 100nF ceramic (// to the load) cable length: 120m	

2.1 Front panel components

2.1.1 OUTPUT±

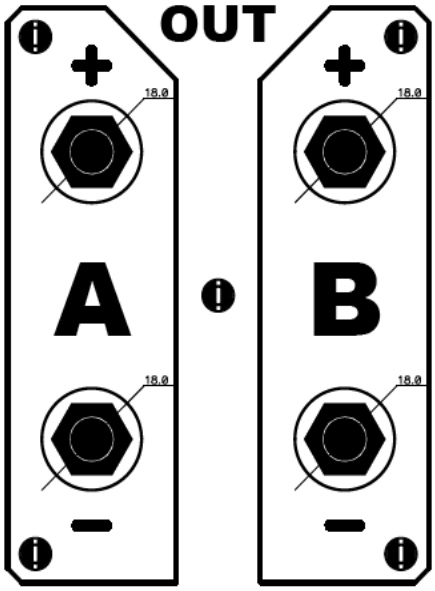


Fig. 2.2 – OUTPUT± section

These sections provide the channels output and includes (for each channel):
2 Hexagonal bolt type connectors: ±48V power

2.1.2 Power/Monitor

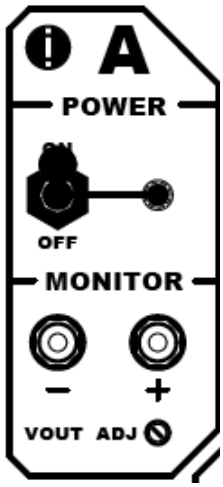


Fig. 2.3 – OUTPUT± section

This section allows to enable/disable, adjust and monitor the channel output and includes (for each channel):

2 AMP 280372-2 type connector (MONITOR +/-)
1 Trimmer (Vout adjustment)
1 Bistable switch (CHANNEL ON/OFF)
1 green LED (CHANNEL ON)

2.1.3 EASY BUS

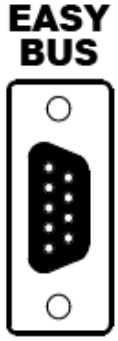


Fig. 2.4 – EASY BUS section

This section (available on Mod. A3484S/A3485S) provides the link for the module connection with the A1676A and includes:
1 9 Pin DB-type male connector

2.1.4 Interlock

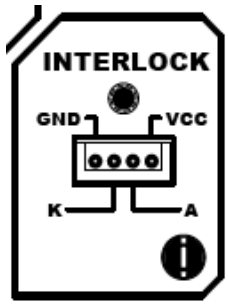


Fig. 2.5 – Interlock section

This section allows to enable/disable the module output and includes:
1 AMP 280372-2 type connector
1 red LED
The Interlock can work in two ways:
PASSIVE OPERATION: it is necessary to short circuit pin 1 (“GND”, the first from left to right) with pin 2 (“K=katode”), and pin 3 (“A=anode”) with pin 4 (“VCC”).
ACTIVE OPERATION: it is necessary to send a voltage level (for example a TTL; the recommended current is about 10 mA) between pin 2 = katode and pin 3 = anode (high = interlock disabled, the channel can be turned on; low = interlock enabled, the channel cannot be turned on), leaving pin 1 and pin 4 disconnected.

The LED is ON when the Board is enabled.

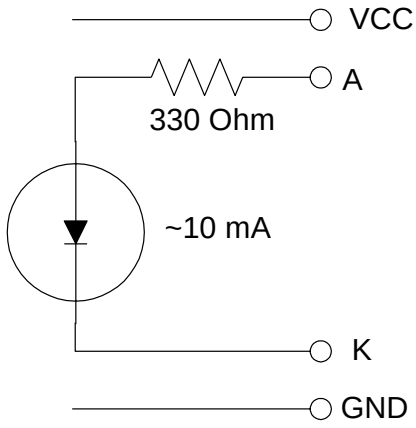


Fig. 2.6 – Interlock diagram

2.1.5 48V IN

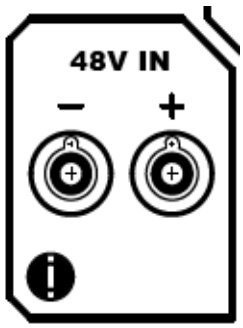


Fig. 2.7 – 48V IN section

This section provides the input of 48 V supply for local and remote auxiliary low voltages and includes:
2 APP30 1317G4 type connectors (+ and -)

2.1.6 Ground schemes

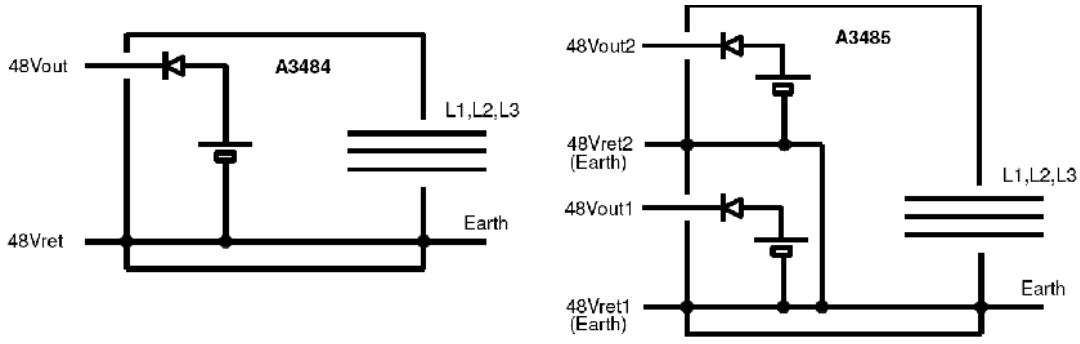


Fig. 2.8 – A3484/A3485 Ground schemes

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

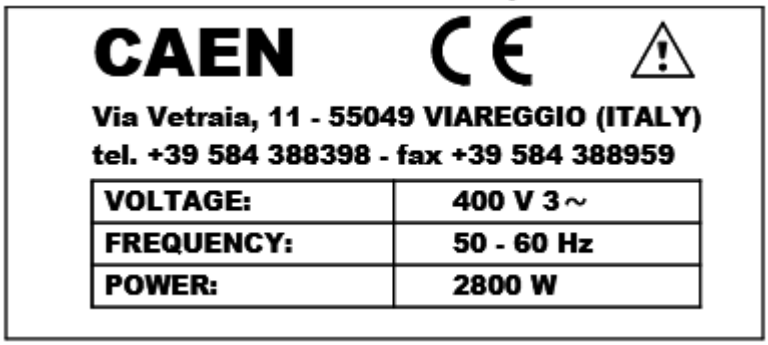
High Voltage

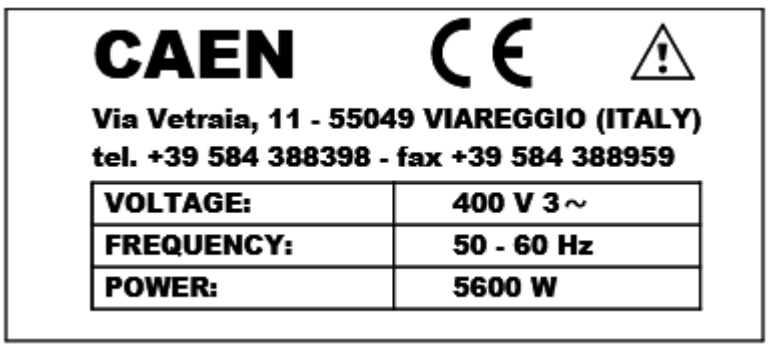
ATTENTION

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 A3484S/A3485S converters through the EASY BUS control lines.





4. Operating modes

The Mod. A3484S/A3485S can be controlled, either locally or remotely, through the SY 1527 software interface.
For details on the EASY3000 System, please refer to the User's Manual of the A1676A Branch Controller. For details on SY 1527 system operation, please refer to the User's Manual of this product.

ATTENTION

THE MOD. A1676A and A348x BOARDS REQUIRE

SY 1527 FIRMWARE VERSION 2.01.00 OR LATER

4.1 Output control and monitoring

The control software handles two types of channels: the **Channel 0**, which is a "virtual" internal channel and it is used to manage the board parameters, and the **Channnel 1** and **2** (A3484S has Channel 1 only), which are the actual output channels. A1676A Branch Controller parameters are listed in the relevant User's Manual.

Table 4.1 – CH0 Parameters (Board parameters)

Name	Dir	Sign	ValType	Min	Max	Res	UM	OnStr	OffStr
Name	SET	UNSIGNED	STRING						
Rel	MON	UNSIGNED	NUMERIC	1.00	99.99	0.01	NONE		
12VPwS	MON	UNSIGNED	ON_OFF					Fail	Ok
Sync	MON	UNSIGNED	ON_OFF					Fail	Ok
HVSync	MON	UNSIGNED	ON_OFF					Fail	Ok
StatusIn	MON	UNSIGNED	ON_OFF					Fail	Ok
SerNum	MON	UNSIGNED	NUMERIC	1	65535	1	NONE		
RemBdName	MON	UNSIGNED	ON_OFF					A348x	A348x

Name allows to assign a symbolic name to the board

Rel allows to readout the module firmware release.

12VPwS allows to readout the status of the +/-12V voltages generated inside the module.
If **12VPwS = Fail** all channels are turned OFF.

Sync allows to readout the status of the 50Hz synchronisation signal (EASY BUS) provided by the A1676A Branch Controller .
If **Sync = Fail** all channels are turned OFF.

HVSync allows to readout the status of the 625KHz EASY BUS clock signal provided by the A1676A

If **HVSync = Fail** the 625KHz signal is generated by the board itself.

StatusIn allows to readout the back panel STATUS IN signal.
If **StatusIn = Fail** all the channels are turned OFF.

SerNum allows to readout the module serial number.

RemBdName allows to readout the module name.

Table 4.2 – CH1..2 Parameters (output channel parameters)

Name	Dir	Sign	ValType	Min	Max	Res	UM	OnStr	OffStr
Name	SET	UNSIGNED	STRING						
Temp	MON	SIGNED	NUMERIC	0	70	1	CELSIUS		
Status	MON	UNSIGNED	STATUS	0	0	0	---		
Pw	SET	UNSIGNED	ON_OFF					On	Off
Trip	SET	UNSIGNED	NUMERIC	0.0	1000.0	0.1	SEC		
VCon	MON	UNSIGNED	NUMERIC	0.0	55.0	0.1	VOLT		
SVMax	SET	UNSIGNED	NUMERIC	44.0	52.0	0.1	VOLT		
VMon	MON	UNSIGNED	NUMERIC	0.0	52.0	0.1	VOLT		
GlbOffEn	SET	UNSIGNED	ON_OFF					En	Dis
GlbOnEn	SET	UNSIGNED	ON_OFF					En	Dis
RemIlk	MON	UNSIGNED	ON_OFF					Yes	No
V0Set	SET	UNSIGNED	NUMERIC	44.0	52.0	0.1	VOLT		
IMon	MON	UNSIGNED	NUMERIC	00.0	40.0	0.1	AMPERE		
I0Set	SET	UNSIGNED	NUMERIC	00.0	40.0	0.1	AMPERE		
IntFail	MON	UNSIGNED	ON_OFF					Yes	No
MaxDrop	MON	UNSIGNED	ON_OFF					Yes	No

Name allows to assign a symbolic name to the channel

Temp allows to readout the Temperature value.
If **Temp > 70°C** the channel is turned OFF.

Status allows to readout the channel status value.

The status word significant bits are:

Table 4.3 – Status word significant bits

Status	Name	Meaning
Bit 0	ON/OFF	
Bit 3	OVC	Over Current : IMon > I0set
Bit 4	OVV	Over Voltage : VMon > V0set + 5V
Bit 5	UNV	Under Voltage : VMon < V0set - 5V
Bit 9	TRIP	Channel in OVC for a duration > TRIP
Bit 11	UNPLUGGED	Fail in communication with A1676A Branch Controller
Bit 13	OVP	Over Voltage Protection : Output voltage > 55V
Bit 15	TERR	Temperature Error : temperature > 70°C

If a channel is in '**TRIP**', '**OVP**',or '**TERR**', it is turned OFF.
Before turning one channel ON, every fail cause must be removed via the 'Clear Alarm' command, sent by the Sy1527/Sy2527 system.

Pw	allows to send the ON/OFF command to the channel.
Trip	allows to set the Trip time. If the channel Over Current (Imon >= I0set) lasts more than the Trip time, the channel is turned OFF. If Trip = 1000 sec the channel in OVC is not turned OFF.
VCon	allows to readout the voltage on the output connector. if **VCon > 55V** the channel is turned OFF.
SVmax	allows to set the upper limit of V0Set. (V0Set cannot exceed SVMax).
VMon	allows to readout the voltage on the load.
GlbOnEn	allows to enable the channel to respond to a GlobalOn command provided by the A1676A. All the channels with GlbOnEn = En are turned ON any time the A1676A broadcasts a GlobalOn command.
GlbOffEn	allows to enable the channel to respond to a GlobalOff command provided by the A1676A. All the channels with GlbOffEn = En are turned OFF any time the A1676A broadcasts a GlobalOff command.
RemIlk	allows to readout the status of the **Interlock** signal on the front panel. If **RemIlk = Yes** the channel is turned OFF.
V0Set	allows to set the output voltage.
IMon	allows to readout the current value delivered by the channel.
I0Set	allows to set the current threshold value.
IntFail	allows to readout the Internal Fail condition, provided by the channel in order to signal an internal failure. If **IntFail = Yes** the channel is turned OFF.
MaxDrop	allows to readout the Max Drop condition, provided by the channel in order to signal that the drop between the voltage on the load and the voltage on the output connector is too big (it could be a cable problem). If **MaxDrop = Yes** the channel is turned OFF.

4.1.1 Internal Channel OPC Items

This chapter describes the items which are available for the control of the internal channel (Channel 0).

The **Name** item allows to assign to the channel a symbolic name.

A read access to the **SerNum** item returns the board serial number.

A read access to the **Rel** item returns the board firmware release.

A read access to the **SerNum** item returns the board serial number.

A read access to the **12VPwS** item returns the internal ±12 V status.
A read access to the **12VPwS#CoOpen** item returns back the label “Off” associated to 12VPwS=FAIL.

A read access to the **12VPwS#CoClose** item returns back the label “On” associated to 12VPwS=OK.

A read access to the **StatusIn** item returns the StatusIn connector signal.
A read access to the **StatusIn#CoOpen** item returns back the label “Off” associated to StatusIn = FAIL.
A read access to the **StatusIn#CoClose** item returns back the label “On” associated to StatusIn = 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.

A read access to the **RemBdName** item returns a string with the board name.

Table 4.4 – Internal Channel items

ItemID	Data Type	Access	Description
PowerSupplyName.BoardXX.ChanYYY.Name	String	R/W	Channel name
PowerSupplyName.BoardXX.Chan0.SerNum	2-byte int.	R	Board serial number
PowerSupplyName.BoardXX.Chan0.Rel	String	R	Board firmware release
PowerSupplyName.BoardXX.Chan0.12VPwS	boolean	R	12VPS status
PowerSupplyName.BoardXX.Chan0.12VPwS#CoOpen	string	R	12VPS open label
PowerSupplyName.BoardXX.Chan0.12VPwS#CoClose	string	R	12VPS close label
PowerSupplyName.BoardXX.Chan0.StatusIn	boolean	R	StatusIn status
PowerSupplyName.BoardXX.Chan0.StatusIn#CoOpen	string	R	StatusIn open label
PowerSupplyName.BoardXX.Chan0.StatusIn#CoClose	string	R	StatusIn close label
PowerSupplyName.BoardXX.Chan0.Sync	boolean	R	Sync status
PowerSupplyName.BoardXX.Chan0.Sync#CoOpen	string	R	Sync open label
PowerSupplyName.BoardXX.Chan0.Sync#CoClose	string	R	Sync close label
PowerSupplyName.BoardXX.Chan0.HVSync	boolean	R	HVSync status
PowerSupplyName.BoardXX.Chan0.HVSync#CoOpen	string	R	HVSync open label
PowerSupplyName.BoardXX.Chan0.HVSync#CoClose	string	R	HVSync close label
PowerSupplyName.BoardXX.Chan0.RemBdName	string	R	Board name

4.1.2 Output Channel OPC Items

This chapter describes the items which are available for the control of the power supply channels.

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 **I0set** item allows to set I0.
A read access to the **I0set#EU** item returns a string with the I0set Engineering Units.
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 **VCon** item returns back the VCon value.
A read access to the **VCon#EU** item returns a string with the VCon Engineering Units.
A read access to the **VCon#HighEU** item returns the highest possible VCon value.
A read access to the **VCon#LowEU** item returns the lowest possible VCon 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.

The **Temp** item returns back the channel 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 **Status** item returns back a 16 bit pattern indicating channel status, as follows:

Bit 0: ON/OFF
Bit 1: don't care
Bit 2: don't care
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: don't care
Bit 12: don't care
Bit 13: OverVoltage Protection
Bit 14: Power Fail
Bit 15: Temperature Error

The **RemIlk** item returns back the Remote Interlock value.

A read access to the **RemIlk#CoOpen** returns back the label “Off” associated to RemIlk =0.
A read access to the **RemIlk#CoClose** returns back the label “On” associated to RemIlk =1.

The **IntFail** item returns back the Internal Failure value.
A read access to the **IntFail#CoOpen** returns back the label “Off” associated to IntFail =0.
A read access to the **IntFail#CoClose** returns back the label “On” associated to IntFail =1.

The **MaxDrop** item returns back the Maximum Drop status value.
A read access to the **MaxDrop#CoOpen** returns back the label “Off” associated to MaxDrop =0.
A read access to the **MaxDrop#CoClose** returns back the label “On” associated to MaxDrop =1.

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** returns back the label “On” associated to Pw=1.

The **GlbOnEn** item enables the channel to respond to the A1676A Global On command.
A read access to **GlbOnEn#CoOpen** returns back the label “Off” associated to GlbOnEn=0.
A read access to **GlbOnEn#CoClose** returns back the label “On” associated to GlbOnEn=1.

The **GlbOffEn** item enables the channel to respond to the A1676A Global Off command.
A read access to **GlbOffEn#CoOpen** returns back the label “On” associated to GlbOffEn=0.
A read access to **GlbOffEn#CoClose** returns back the label “Off” associated to GlbOffEn=1.

Table 4.5 – Output Channel items

ItemID	Data Type	Access	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.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.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

ItemID	Data Type	Access	Description
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.VCon	4-byte real	R	VCon
PowerSupplyName.BoardXX.ChanYYY.VCon#EU	String	R	VCon EU
PowerSupplyName.BoardXX.ChanYYY.VCon#HighU	8-byte real	R	VCon upper limit
PowerSupplyName.BoardXX.ChanYYY.VCon#LowEU	8-byte real	R	VCon lower limit
PowerSupplyName.BoardXX.ChanYYY.Imon	4-byte real	R	IMon
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.Temp	4-byte real	R	Board temperature
PowerSupplyName.BoardXX.ChanYYY.Temp#EU	String	R	Temperature EU
PowerSupplyName.BoardXX.ChanYYY.Temp#HighEU	8-byte real	R	Temp upper limit
PowerSupplyName.BoardXX.ChanYYY.Temp#LowEU	8-byte real	R	Temp lower limit
PowerSupplyName.BoardXX.ChanYYY.Status	2-byte integer	R	Channel status
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
PowerSupplyName.BoardXX.ChanYYY.RemIlk	Boolean	R/W	Remote interlock ON/OFF
PowerSupplyName.BoardXX.ChanYYY.RemIlk#CoClose	String	R	Rem. interlock close label
PowerSupplyName.BoardXX.ChanYYY.RemIlk#CoOpen	String	R	Rem. interlock open label
PowerSupplyName.BoardXX.ChanYYY.IntFail	Boolean	R	Internal fail ON/OFF
PowerSupplyName.BoardXX.ChanYYY.IntFail#CoClose	String	R	Internal fail close label
PowerSupplyName.BoardXX.ChanYYY.IntFail#CoOpen	String	R	Internal fail open label
PowerSupplyName.BoardXX.ChanYYY.MaxDrop	Boolean	R	Max Drop ON/OFF
PowerSupplyName.BoardXX.ChanYYY.MaxDrop#CoClose	String	R	Max Drop close label
PowerSupplyName.BoardXX.ChanYYY.MaxDrop#CoOpen	String	R	Max Drop open label
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.GlbOnEn	boolean	R/W	Enable global ON
PowerSupplyName.BoardXX.ChanYYY.GlbOnEn#CoClose	string	R	GlbOnEn close label
PowerSupplyName.BoardXX.ChanYYY.GlbOnEn#CoOpen	string	R	GlbOnEn open label
PowerSupplyName.BoardXX.ChanYYY.GlbOffEn	boolean	R/W	Enable global OFF
PowerSupplyName.BoardXX.ChanYYY.GlbOffEn#CoClose	string	R	GlbOffEn close label
PowerSupplyName.BoardXX.ChanYYY.GlbOffEn#CoOpen	string	R	GlbOffEn open label

CAEN GmbH
Brunnenweg 9
64331 Weiterstadt
Germany
Tel. +49 (0)212 254 4077
Mobile +49 (0)151 16 548 484
info@caen-de.com
www.caen-de.com

CAEN Technologies, Inc.
1 Edgewater Street - Suite 101
Staten Island, NY 10305
USA
Phone: +1 (718) 981-0401
Fax: +1 (718) 556-9185
info@caentechnologies.com
www.caentechnologies.com

CAEN S.p.A.
Via Vetraia 11
55049 - Viareggio
Italy
Phone +39 0584 388 398
Fax +39 0584 388 959
info@caen.it
www.caen.it

CAENspa INDIA Private Limited
B205, BLDG42, B Wing,
Azad Nagar Sangam CHS,
Mhada Layout, Azad Nagar, Andheri (W)
Mumbai, Mumbai City,
Maharashtra, India, 400053
info@caen-india.in
www.caen-india.in