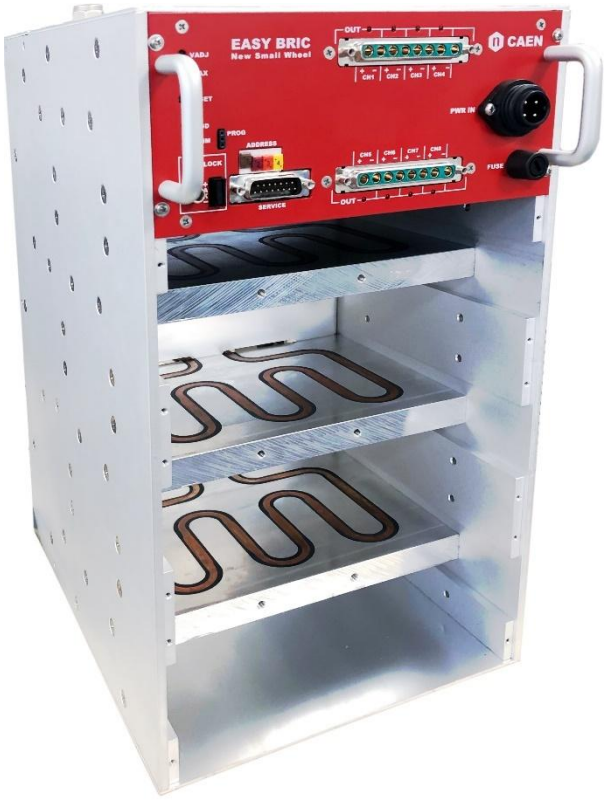
CAEN
*Tools for Discovery*

Electronic Instrumentation

PRELIMINARY




# EASY 6000 System for Atlas NSW ICS

Rev. 4 - 12 December 2025

# Purpose of this Manual

This document is the EASY 6000 System for Atlas NSW ICS user manual; it contains information about the installation, the configuration and the use of the board.

# Change Document Record

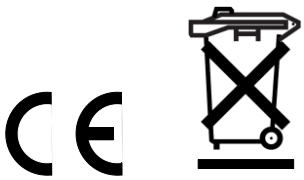
| Date | Revision | Changes |
|---|---|---|
| 20 June 2019 | 0 | PRELIMINARY Release |
| 24 June 2019 | 1 | Updated Operating modes |
| 15 November 2024 | 2 | E6001 Power Supply Module, Operating modes |
| 22 January 2025 | 3 | Firmware Upgrade |
| 12 December 2025 | 4 | Output control and monitoring |

# Symbols, abbreviated terms and notation

N.A.

# Reference Documents



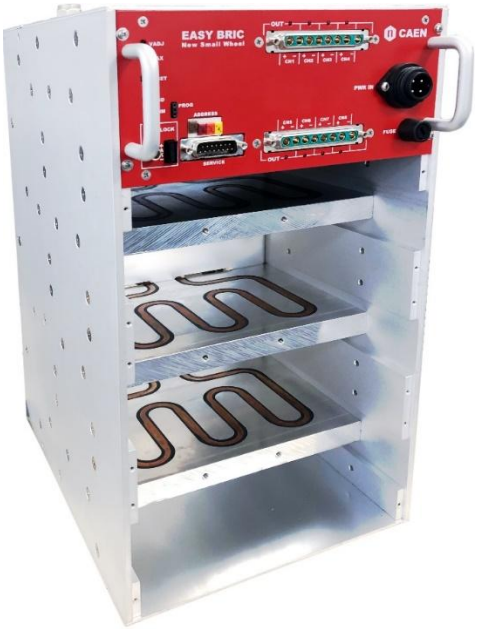


# Index

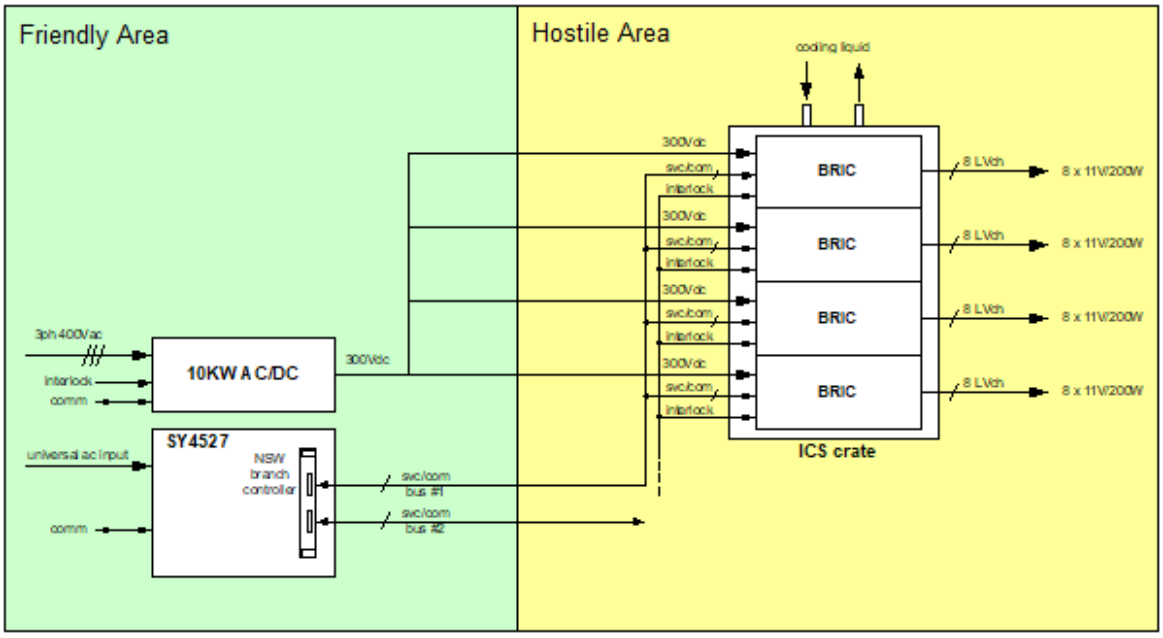
**1. Overview ..... 4**
ATLAS New Small Wheel (NSW) LV System ..... 4
**2. A1660 Branch Controller ..... 5**
**3. E6001 Power Supply Module ..... 6**
**4. Safety and installation requirements ..... 7**
General safety information ..... 7
Injury Precautions ..... 7
Safety Terms and Symbols on the Product ..... 7
**5. Operating modes ..... 8**
Output control and monitoring ..... 8
E6001 Firmware Upgrade ..... 9

# 1. Overview

## ATLAS New Small Wheel (NSW) LV System




The System is composed by remote and a local section. The remote section consists of four 8-channel BRIC modules (E6001) housed in a liquid cooled ICS crate (E6000) and is placed in the hostile area; the local section, consisting of a NSW branch controller (A1660, housed in a SYx527 system) and a 10kW AC/DC converter, is placed in the friendly area.
The A1660 provides the control signals, the AC/DC converter provides the 300Vdc power supplies; one A1660 handles 8 E6001 modules (two full E6000 crates; Branch A and B).
The E6001 output voltage range is 9 ÷ 11V, adjustable via trimmer, with 0 ÷ 17A output current, also adjustable via trimmer.
The E6001 modules house on board controllers that monitor channels voltage and current, as well as module status and temperature and communicate data to the branch controller.



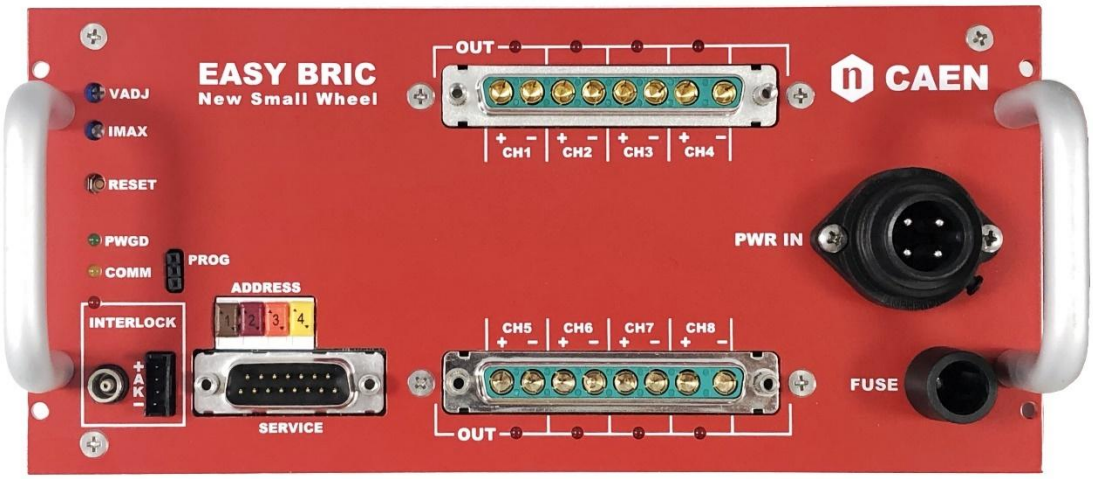
# 2. A1660 Branch Controller

The A1660 Branch Controller is housed in a 1U SYx527 board. It allows to control 8 E6001 modules (2 E6000 remote crates), through two branches, Branch A and Branch B. Once plugged in, the Branch Controller must be linked to the E6001 modules (which can work in the “hostile area”), via front panel D-SUB15 connectors. The A1660 configures the E6001 channels as if they belong to the slot in which the branch controller is located: the E6001 channels operate as channels of the A1660.


| | | |
|---|---|---|
| COMM A, B | D-SUB 15 | Communication with E6001 remote modules (Branch A, B) |
| RESET | | Pushbutton and LEMO connector (NIM/TTL) |

# 3. E6001 Power Supply Module

The E6001 Power Supply Module provides 8 output 10V / 17A channels (channels 1 to 8) and one internal channel which is used for general board settings (channel 0).




| | | |
|---|---|---|
| OUT 1 ÷ 4; 5 ÷ 8 | DC8W8SA00LF D-Sub 8W8 | 10V LV output |
| PWR IN | Amphenol T3110000 | 300Vdc IN |
| INTERLOCK | AMP 280371-2 | UNDRIVEN: Enabled with short circuit pin 1 (-) with pin 2 (K), and pin 3 (A) with pin 4 (+); DRIVEN: Enabled with voltage level (4÷6V, ~5mA current) between pin 2 (K) and pin 3 (A) |
| | LEMO00 | DRIVEN: Enabled with NIM or TTL signal |
| VADJ | Trimmer | Adjust VOUT in the 9 ÷ 11 V range |
| IMAX | Trimmer | Adjust IMAX in the 0 ÷ 17A range |
| RESET | Pin button | Module reset |
| SERVICE | D-Sub 15 | Communication Interface with branch controller |
| ADDRESS | Dip Switch | Module address selector from 1 to 4 (only one switch per module) for communication with branch controller; each E6001 in a crate must have a different address. |
| PROG | Jumper | Reserved |
| FUSE | 5x20 8A | |
| PWGOOD LED | green LED; lights up as internal service voltages are OK | |
| COMM LED | green LED; blinks as the communications take place | |
| INTERLOCK LED | red LED; lights up as the interlock is active | |

Dimensions: 383(W)x220(H)x292(D) mm

# 4. Safety and installation requirements

## 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.

### 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.

## 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**

# 5. Operating modes

The EASY6000 System boards can be controlled through the SYx527 software interface. For details on SYx527 system operation, please refer to the User's Manual of this product.

## Output control and monitoring

For the A1660 Branch Controller, the following parameters are available:

| | |
|---|---|
| Temp A | Monitored temperature of 48V power supply of branch A |
| Temp B | Monitored temperature of 48V power supply of branch B |
| Rec A | Software recovery after communication failure of branch A |
| Rec B | Software recovery after communication failure of branch B |
| Clear Alarm | Clear alarm status after power failure |

For each E6001, the control software handles two types of channels: Channel 0, which is a “virtual” internal channel, and it is used to manage the board parameters, and Channels 1÷8 which are the actual output channels.

Channel 0 parameters

| | | |
|---|---|---|
| Name | symbolic name of the board | Set |
| Pw | allows to send the ON/OFF command to the board | Set |
| VSMon | Trimmer voltage setting | Monitor |
| ISMon | Trimmer current setting | Monitor |
| HVMon | HV input | Monitor |
| VCCMon | Service voltage | Monitor |
| SerNum | Board serial number | Monitor |
| Rel | Board firmware release | Monitor |

Channel 1 ÷ 8 parameters

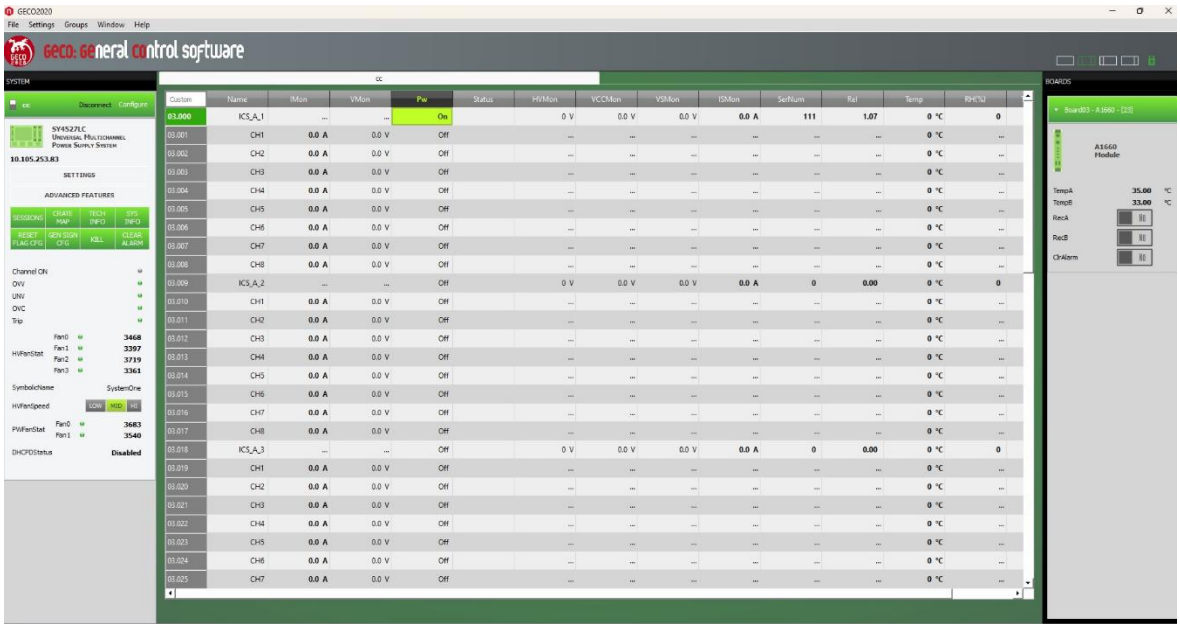
| | | |
|---|---|---|
| Name | symbolic name of the channel | Set |
| Pw | allows to send the ON/OFF command to the channel | Set |
| VMon | Output Voltage | Monitor |
| IMon | Output current | Monitor |
| Temp | Channel temperature | Monitor |
| Status | allows to readout the channel status value | Monitor |

Status bits meaning:

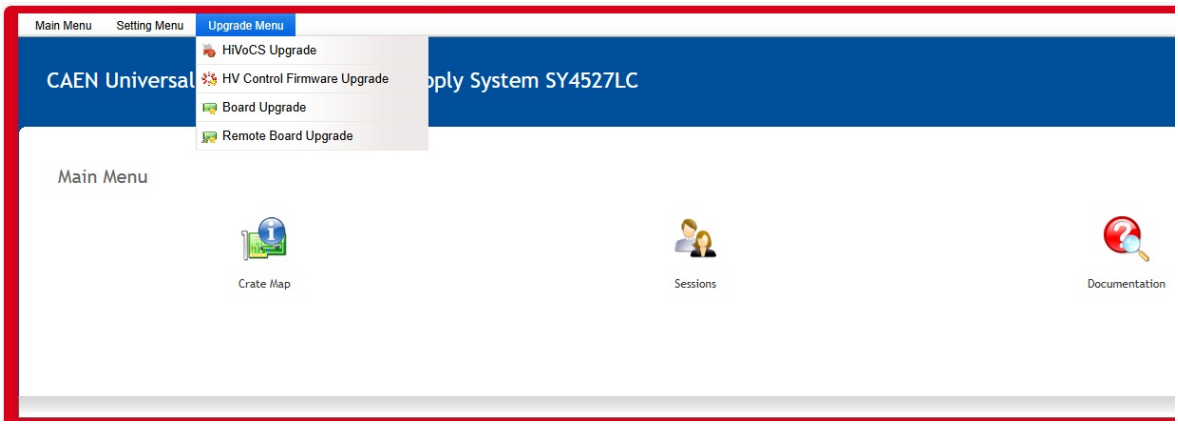
| | | |
|---|---|---|
| Bit 0 | ON/OFF | |
| Bit 10 | CALERR | Calibration error |
| Bit 11 | UNPLUGGED | Fail in communication with A1660 Branch Controller |
| Bit 14 | PWF | Power Fail: HV IN < 200V, OVC, OVV |
| Bit 15 | TERR | Temperature Error: temperature > 70°C |

# E6001 Firmware Upgrade

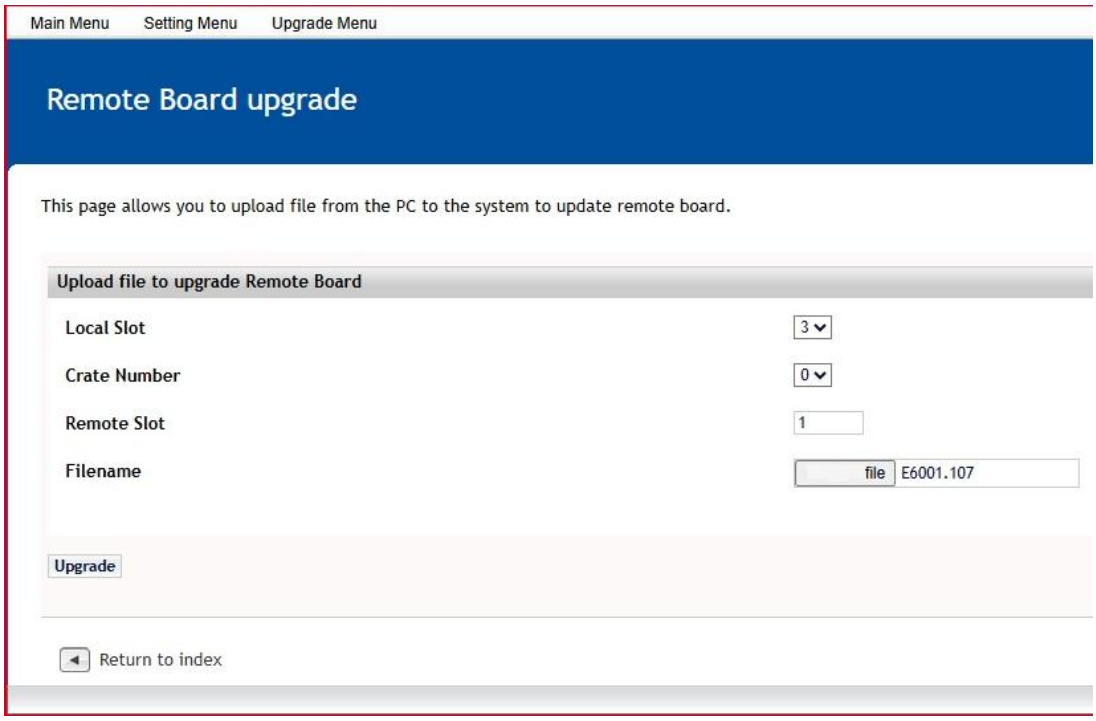
To upgrade the E6001 firmware, launch GECO2020 control software (see www.caen.it website) and connect to the SYx527 mainframe that hosts the A1660 controller:



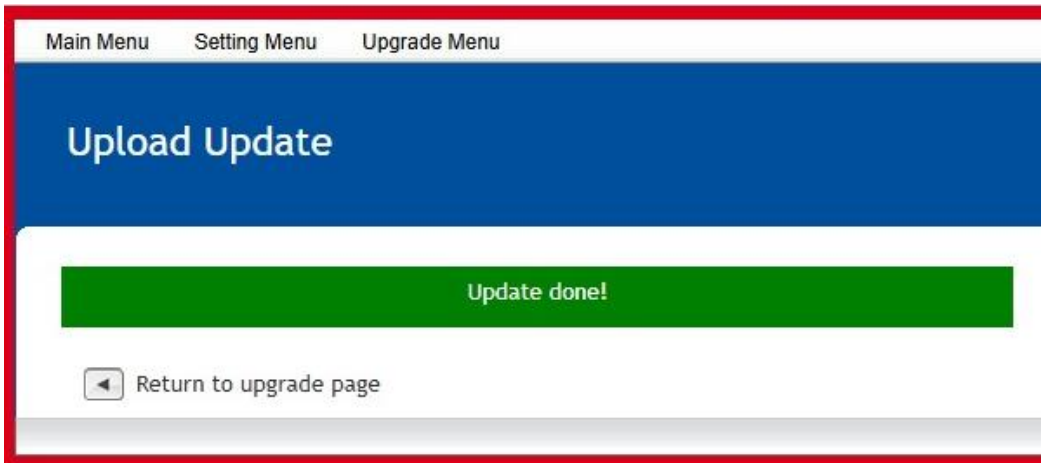

Turn ON the Channel 0 of the E6001 that needs to be updated; then open the web browser with the SYx527 mainframe IP address and select “remote board upgrade” option on the HiVoCS tool:




Enter the A1660 slot number, the remote crate link and the E6001 address (set via dip switch); then browse the new firmware file and launch the upgrade:




When the upgrade is done, this message is shown:




The upgrade is completed by turning OFF/ON the remote board with GECO2020.

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