FIKS-DISS

4-Quadrant Operation Crate for FAST-PS-1K5 Digital Bipolar Power Supply Series

CAENels
Gear For Science

User's Manual

MAGNET POWER SUPPLY SYSTEMS

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This product is CE & UKCA compliant.

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This manual covers the following optional units:

- **F1K5D4100015 - F1K5-DISS-100-15 - 4-Quadrant Operation Crate for FAST-PS-1K5 ±100 A @ ±15 V**

- **F1K5D4050030 - F1K5-DISS-50-30 - 4-Quadrant Operation Crate for FAST-PS-1K5 ±50 A @ ±30 V**

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Document Revisions

Revision	Date	Comment
0.1	September 30th, 2020	Preliminary
1.0	January 11th, 2021	First Release
1.1	November 22nd, 2022	Added UKCA compliance logo
2	August 8th 2024	Updated address and revision numbering

Safety information

The following table shows the general environmental requirements for a correct operation of instruments referred in this User's Manual:

Environmental Conditions	Requirements
Environment	Indore use
Operating Temperature	0°C to 45°C
Operating Humidity	20% to 80% RH (non-condensing)
Altitude	Up to 2000 m
Pollution degree	2
Overvoltage Category	II
Storage Temperature	-10°C to 60°C
Storage Humidity	5% to 90% RH (non-condensing)

The following symbols are used within this manual or are reported in the box and along this manual:

- Caution: Risk of Electrical Shock
- Caution: Documentation must be consulted in all cases where this symbol is marked
- Indicates ground terminal
- Protective Ground Conductor Terminal
- Caution: Hot Surface

- **WARNING** The WARNING sign denotes a hazard. An attention to a procedure is called. Not following the procedure correctly could result in personal injury. A WARNING sign should not be skipped and all indicated conditions must be fully understood and met.

- **CAUTION** The CAUTION sign denotes a hazard. An attention to a procedure is called. Not following procedure correctly could result in damage to the equipment. Do not proceed beyond a CAUTION sign until all indicated conditions are fully understood and met.

CAEN ELS s.r.l. 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.

Please read carefully the manual before operating any part of the instrument

WARNING

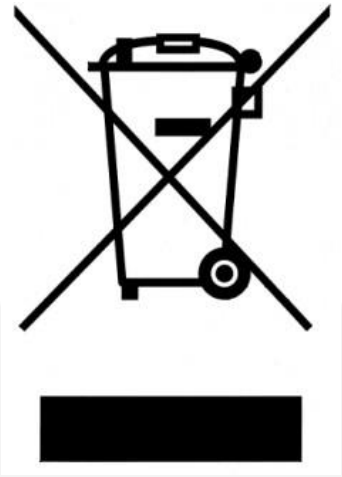
Do NOT open the BOX TOP COVER

CAEN ELS S.r.l. 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 this User's Manual before any kind of operation.

CAEN ELS S.r.l. 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.



WARNING

- Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in this manual.
- Do not use the device if it is damaged. Before you use the device, inspect the instrument for possible cracks or breaks before each use.
- Do not operate the device around explosives gas, vapor or dust.
- Always use the device with the cables provided.
- Turn off the device before establishing any connection.
- Do not operate the device with the cover removed or loosened.
- Do not install substitute parts or perform any unauthorized modification to the product.
- Return the product to the manufacturer for service and repair to ensure that safety features are maintained

1. Introduction

This chapter describes the general characteristics and main features of the F1K5-DISS power dissipation unit.

1.1 F1K5-DISS Overview

The FAST-PS-1K5 by CAEN ELS is an independent current- or voltage-controlled digital bipolar power supply module. Standalone, the FAST-PS-1K5 is a bipolar power converter able to work in the positive current/positive voltage and negative current/negative voltage quadrants only continuously.

The F1K5-DISS unit adds current/voltage sinking capabilities to the system so that a FAST-PS-1K5 together with a F1K5-DISS becomes a full 4-quadrant system capable not only sourcing but also sinking up to 1.500 W.

There are two commercially available models for the F1K5-DISS unit that can be matched to specific models of the FAST-PS-1K5 power unit:

Model Name	Current	Voltage	Compatible with
FAST4R100015	**±100 A**	**±15 V**	FAST-PS-1K5 100-15
FAST4R050030	**±50 A**	**±30 V**	FAST-PS-1K5 50-30

Table 1: F1K5-DISS models

The F1K5-DISS module is compact and fits in a single 19-inch 1U standard crate. The whole system together with a FAST-PS-1K5 fits in a 19" - 3U slot.

2. Installation

This chapter contains the main instructions for initial inspection and preparation for use.

2.1 Preparation for Use

In order to put the system into operation, the power supply must be connected to an appropriate AC source. The AC source voltage should be within the power supply specification. Do not apply power before reading this manual. **Table 2 Errore. L'origine riferimento non è stata trovata.**lists the basic setup procedure. Follow the instructions in the given sequence to prepare the power supply for use.

Step	Checklist	Description
1	**Initial inspection**	Physical inspection of power supply
2	**Mounting**	Installing the power supply, ensuring proper ventilation
3	**F1K5-DISS Connections**	Connect the dissipation unit to main power converter
4	**FAST-PS-1K5 Connections**	Connect the power supply to the AC source
5	**First switch-on**	Switch-on checkout procedure
6	**FAST-PS-1K5 Configuration**	Configure full current sink capability

Table 2: Installation checklist

2.2 Initial Inspection

Prior to shipment, this F1K5-DISS unit was inspected and found free of mechanical or electrical defects. Upon unpacking of the power supply, inspect for any damage which may have occurred in transit.

The inspection should confirm that there is no exterior damage to the power supply such as broken switches or connectors and that all panels and display are not scratched or cracked. Keep all packing material until the inspection has been completed. If damage is detected, compile the RMA form available to the CAEN ELS web site.

2.3 Mounting

The FAST-PS-1K5 & F1K5-DISS system can be used either as a desktop unit or as a rack-mount device since the unit form factor is designed to be installed in a standard 3U 19-inch cabinet.

CAUTION

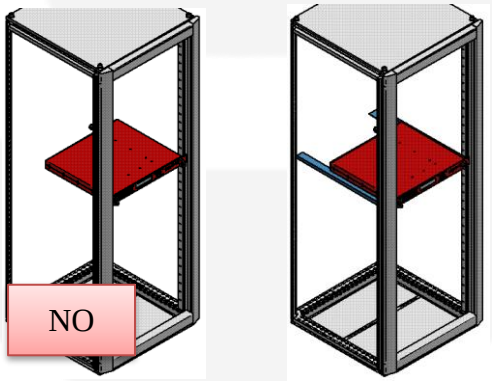
This system is fan cooled, the air intake is at the front panel and the exhaust is at the rear panel. Upon installation allow cooling air to reach the front panel ventilation inlets. Allow minimum 10 cm of unrestricted air space at the front and 20 cm on the rear of the unit.

2.3.1 *Rack Mounting*

The FAST-PS-1K5 & F1K5-DISS system is designed to fit in a standard 19" equipment rack.

CAUTION

Use a support bar to provide adequate support for the power supply.



2.3.2 Desktop Use

The FAST-PS-1K5 & F1K5-DISS system can be used as desktop unit but every precaution must be used to avoid touching the output connectors because of the high energy source.

WARNING

User shall protect output contacts by placing the FAST-PS-1K5 & F1K5-DISS system inside a closed rack or by restricting the access to the back side.

2.3.3 Thermal Management

F1K5-DISS converts electrical into thermal energy, considerable amount of heat is generated. This fact must be taken into consideration when installing the system. Fans cool the dissipation element by drawing air from front side and exhausting it out the back, therefore minimum 10 cm of unrestricted air space at the front and 20 cm on the back of the unit must be provided.

If specific application requires high power dissipation for long periods (> 800 W; > 10 min) it is recommended to install FAST-PS-1K5 and F1K5-DISS with 1U of clearance in between to mitigate heating problems and using blanking panels to prevent mixing hot and cold air. Proper equipment rack ventilation shall be provided to reduce ambient temperature not exceed 45 °C on the front of the units.

WARNING

Do not touch the hot surfaces. The temperature of the back and top-right surfaces may be high when the unit is operating at high power.

2.4 F1K5-DISS connection

WARNING

Turn off the AC input power before making or changing any rear panel connection. Ensure that all connections are securely tightened before applying power. There is a potential shock hazard when using a power supply with a rated output greater than 60 V

2.4.1 Power Connection

It is recommended to use original cables that are contained with the unit. If custom longer connection is required keep wire size of main power connection at 16 mm^2 (AWG 6) and not longer than 1m. Strip wires insulation back 15 mm and push them straight into the power plug and screw them tightly. Be sure that they fit well and make a good contact.

Connect main power cable to *DISSIPATIVE UNIT* connector on FAST-PS-1K5 and to *FAST-PS-1K5* connector on dissipation unit. Secure cable assembly with connectors screws on both ends.

Figure 1: "Power cable" connection

2.4.2 Status Cable Connection

Connect the supplied coaxial cable to *STATUS* BNC connector on F1K5-DISS side and *AUX2* BNC connector on FAST-PS-1K5 side.

Figure 2: "Status cable" connection

2.5 FAST-PS-1K5 Connections

For installation and connection instructions refer to FAST-PS-1K5 User's Manual, chapter 2.

2.6 FAST-PS-1K5 Configuration

FAST-PS-1K5 in standalone configuration has 100 W of negative power. Even if dissipation unit is connected to main power converter 100 W limit is still active and system will go in fault if this limit is exceeded. To achieve full current sinking capability when using dissipative unit this option must be enabled in FAST-PS-1K5 configuration. Power converters purchased together with F1K5-DISS dissipation unit have this option already enabled by default.

To enable (or disable) full current sinking capability use FAST-PS-1K5's web server interface. Under *CONFIG* tab select *INTERNAL MEMORY*. Set Value of ID 54 (Dissipative enabled on AUX2 at start-up) to "1". For more information on configuration refer to Remote Control Manual.

Whenever changing this parameter FAST-PS-1K5 must be power-cycled for new value to be valid.

2.7 Front Panel LED Indicator

The F1K5-DISS has front panel LED indicator as shown in the Figure 3.

Figure 3: front panel indicator

The front panel indicator and its behaviour is outlined in the following table:

Color	Action	Meaning
GREEN	Blinking, LONG interval	Ready, not sinking any current
GREEN	Blinking, SHORT interval	Active, sinking current, below 1.000 W
ORANGE	Blinking, SHORT interval	Active, sinking current, above 1.000 W

Color	Action	Meaning
ORANGE	Blinking, LONG interval	Ready, not sinking any current, high temperature
RED	Solid	Error condition
RED, GREEN, ORANGE, OFF	Blinking in circular fashion	Firmware Update mode

Table 3 – Front-panel LED behaviour

Status LED in green indicates the module is connected properly and fully operational. Solid red at power-on means that wrong FAST-PS-1K5 was detected.

LED will flash orange to indicate warnings; the module is sinking current when flashing interval is short, warning may be for the following reasons: high power, high temperature or fan malfunction. When interval is long the module is not active, warning indicates fan malfunction or high temperature of the module caused by just finished power dissipation.

Solid red is reserved for major errors: thermal overload, too high input current, too high input power or hardware failure. In all this cases dissipation unit reports error to FAST-PS-1K5 which then disables its output and activates crowbar function to prevent potential or further damage.

When in firmware update mode LED will be changing colours. FAST-PS-1K5 will automatically disable its output.

3. Firmware Update

If a firmware update is necessary, this can be done using Firmware-Update.exe utility. It requires the C run-time libraries (CRT), if not already installed you can do it by running "vcredist_x86.exe" which can be found in the same directory ad firmware update utility on supplied USB Flash drive.

3.1 Firmware Update Procedure

Save the file to your computer and note the directory where the file is saved. A firmware update is a file with a ".hex" extension. Preferably save it in the same directory of Firmware-Update.exe utility.

To perform the update F1K5-DISS must be connected to FAST-PS-1K5 which must be switched on with its output disabled. Never try to update if FAST-PS-1K5 output is not disabled.

Connect the computer's USB port to the F1K5-DISS's USB-B port with a USB cable.

Using Windows Device Manager identify COM port number - locate Ports (COM & LPT) in the list, expand it and check for USB Serial Port. Open Command Prompt (CMD) and change directory to folder where Firmware-Update.exe resides.

Launch update utility with following parameters:

- a <file> firmware update filename with path - mandatory
- p COM<num> e.g. COM9 - mandatory
- b <num> baud rate – optional

```
Firmware-Update.exe -a 1k5-Dissipative-Load.hex -p COM5
```

Firmware update takes ~30 seconds with default baud rate. After successful completion front panel status led turns blinking green and the module is ready to use.

4. Technical Specifications

4.1 Technical Specifications

The main technical specifications for the F1K5-DISS units are hereafter listed in **Table 4**:

Technical Specifications	F1K5D4100015	F1K5D4050030
Continuos Maximum Power Dissipation	1500 W	1500 W
Maximum Case Temperature (Input air = 45 °C)	110 °C	110 °C
Maximum Air Exaust Tmperature (input air = 45 °C)	80 °C	80 °C
Fault Temperature (RED LED)	100 °C	100 °C
Maximum Input Voltage	30 V	50 V
Maximum Input Current	60 A	40 A
Status "Error" Voltage	1.5 V	
Status "Warning" Voltage	3 V	
Status "OK" Voltage	5 V	
Weight	7 kg	
Maximum Acoustic Noise (at 1-m distance)	68 dBA	

Table 4: Technical Specifications

4.2 Mechanical Dimensions

The mechanical dimensions of the F1K5D4100015/F1K5D4050030 units are shown (in mm) in **Figure 4**:

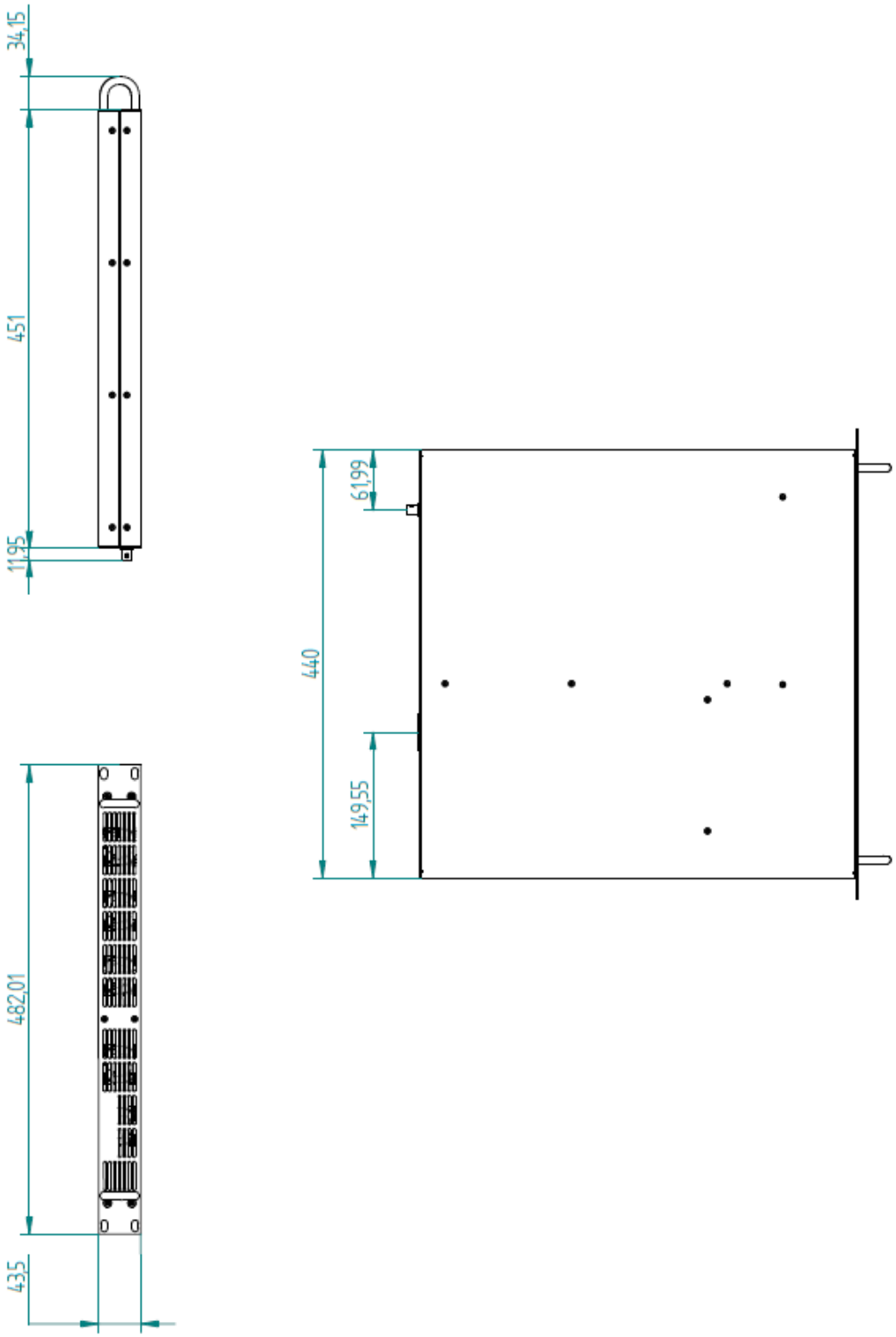


Figure 4: F1K5D4100015/F1K5D4050030 Mechanical Drawings