



Ihr Ansprechpartner /
Your Partner:

dataTec AG
E-Mail: info@datatec.eu
datatec.eu

Product Overview

Linux OS



Embedded
WEB-SERVER



Waveform
Generation



Embedded
Oscilloscope



1.5-kW Bipolar
Bidirectional and Regenerative
Power Supply Series



FAST-Bi-1K5

Your **DIGITAL**
POWER ELECTRONICS

Partner.

- Full Four-Quadrant, Bidirectional & Regenerative Power Supply Series with high-stability and fast response, ideal for magnets, superconducting magnets and as an active load
- Stand-alone unit with Local Display, Ethernet 10/100/1000 Mbps, SFP+ and Analog Control modes
- Digital control loop to adapt the power supply to any load condition in Constant Current (CC), Constant Voltage (CV) and Constant Resistance (CR) regulation modes
- Embedded Web-Server with Integrated Waveform Generation and Oscilloscope

FEATURES

- 19"-2U stand-alone crate
- Bipolar, Regenerative and Bidirectional
- Models up to ± 150 A and up to ± 100 V
- Configurable digital control loop
- Multiple regulation modes (CC/CV/CR)
- <0.0002 %/K temperature stability
- <0.001 %/FS long-term stability (8h)
- Analog Control Input, Trigger Input, Aux ADC Input and K-type TC - optional
- Fast SFP+ interface (100-kHz update)
- Embedded Web-Server
- Waveform Generation at 100 kHz
- Embedded 4-channel Oscilloscope
- Embedded EPICS IOC
- Configurable Interlocks and Status Signals
- Local Display and Remote Control modes
- 10/100/1000 Mbit Ethernet TCP-IP or UDP
- Parallel configuration supported

APPLICATIONS

- Superconducting Magnets
- Magnet Power Supply
- Configurable Active Load

FAST-Bi-1K5. The FAST-Bi-1K5 series represents the new generation of fully **four-quadrant, regenerative** power supplies from ELS Instruments.

Designed to **safely return the absorbed energy to the grid**, these units deliver state-of-the-art performance across all output control modes (CC, CV, CR). Models **up to ± 150 A** and **up to ± 100 V** are available, with scalable parallel configurations for higher current requirements.

A built-in **web interface** enables intuitive control and configuration, providing access to advanced tools including a **4-channel Oscilloscope** (100 kSps per channel) and an **Arbitrary Waveform Generator (AWG)**, eliminating the need for external instrumentation.

Remote control is supported via **10/100/1000 Mbit Ethernet** over TCP/IP with SCPI-like commands, as well as UDP over SFP+ and analog input interfaces.





The **fully digital control loop**, with tunable parameters, ensures maximum flexibility and ease of configuration, supporting a wide range of loads.

Hardware protections - e.g. overvoltage, overcurrent, overpower, crowbar and quench - ensure safe operation, complemented by configurable external interlocks, status signals (NO/NC), triggers and I/O for enhanced system integration.



About Us

ELS Instruments (formerly CAEN ELS) is a leading company in the design of power supplies and state-of-the-art complete electronic systems for the Physics research world, having its main focus on dedicated solutions for the particle accelerator community and high-end industrial applications.

-  Power Supply Systems
-  Precision Current Measurements
-  Beamline Electronics Instrumentation
-  FMC and MicroTCA



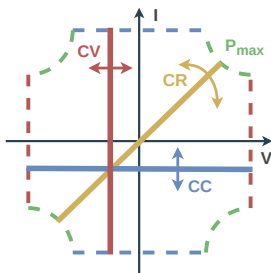
Mess- und Prüftechnik. Die Experten.

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**Full 4-Quadrant with CC/CV/CR
regulation modes**



**Embedded WAVEFORM GENERATOR
and 4-channel OSCILLOSCOPE**

Technical Specifications

FAST-Bi-1K5

| | 15010 | 10020 | 5040 | 3050 | 20100 | |
|--------------------------------------|---|---------|---------|---------|---------|--------|
| Output Current Range | ±150 A | ±100 A | ±50 A | ±30 A | ±20 A | |
| Output Voltage Range | ±10 V | ±20 V | ±40 V | ±50 V | ±100 V | |
| Rated Output Power | 1.500 W | 1.500 W | 1.500 W | 1.500 W | 2.000 W | |
| Output Topology | Full 4-Quadrant | | | | | |
| Regulation Mode | CC, CV, CR | | | | | |
| Current Setting/Readback | 24 bit | | | | | |
| Voltage Setting/Readback | 24 bit | | | | | |
| Equiv. Switching Frequency | 400 kHz | 400 kHz | 200 kHz | 200 kHz | 200 kHz | |
| Efficiency | AC/DC | > 83 % | > 86 % | > 86 % | > 86 % | > 87 % |
| | DC/AC | > 83 % | > 86 % | > 86 % | > 86 % | > 87 % |
| Rise Time 10-90% | < 70 μs | < 70 μs | < 70 μs | < 70 μs | < 70 μs | |
| Closed Loop Bandwidth (-3 dB) | 5 kHz | | | | | |
| Output Accuracy | < 0.01 % | | | | | |
| Temperature Stability | < 0.0002 %/K | | | | | |
| Long-Term Stability (8 h) | < 0.001 %/FS | | | | | |
| Cooling | Forced air convection | | | | | |
| Input Ratings | 180 - 264 V _{AC} / 47 - 63 Hz | | | | | |
| Communication Interfaces | Ethernet 10/100/1000 Mbps TCP-IP and UDP 2 x Fast SFP ports | | | | | |
| External Signals | 4 x External Interlock Inputs (configurable dry contacts) 1 x Status Output relay (magnetic) 1 x Output Relay (solid state) 1 x Persistent Switch Heater output 1 x Trigger Input (LVTTTL, TTL) - FB1K5OPT0001 option 1 x Analog Control Input (±10 V) - FB1K5OPT0001 option 1 x 16-bit 100-kHz ADC Input for external sensors - FB1K5OPT0001 option 1 x K-type thermocouple input - FB1K5OPT0001 option | | | | | |
| Hardware Protection | DC-Link Fault Overtemperature Output protections: Overcurrent, Overvoltage, Overpower Crowbar (overvoltage) 4 x Interlocks Quench Input Fuses | | | | | |
| Auxiliary Readbacks (12-bit) | DC-Link Voltage Ground Leakage Current Temperature | | | | | |
| Operating Ambient Temperature | 0 ... 50 °C | | | | | |
| Mechanical Dimensions | 19" x 2U x 587 mm (including connectors) | | | | | |
| Weight | 15 kg | | | | | |

| Ordering Code | Acronym | Description |
|---------------|---------------------------|--|
| FB1K5150010X | FAST-Bi-1K5 150-10 | FAST-Bi-1K5 - 1.5-kW Bipolar Bidirectional and Regenerative Digital Power Supply ±150 A@±10 V |
| FB1K5100020X | FAST-Bi-1K5 100-20 | FAST-Bi-1K5 - 1.5-kW Bipolar Bidirectional and Regenerative Digital Power Supply ±100 A@±20 V |
| FB1K5050040X | FAST-Bi-1K5 50-40 | FAST-Bi-1K5 - 1.5-kW Bipolar Bidirectional and Regenerative Digital Power Supply ±50 A@±40 V |
| FB1K5030050X | FAST-Bi-1K5 30-50 | FAST-Bi-1K5 - 1.5-kW Bipolar Bidirectional and Regenerative Digital Power Supply ±30 A@±50 V |
| FB1K5020100X | FAST-Bi-1K5 20-100 | FAST-Bi-1K5 - 1.5-kW Bipolar Bidirectional and Regenerative Digital Power Supply ±20 A@±100 V |
| Options | | |
| FB1K5OPT0001 | AIN, AUX, TRIGGER, K-TYPE | Analog Control, Auxiliary ADC, Trigger and K-type thermocouple Inputs add-ons - optional for FAST-Bi-1K5 |
| FB1K5OPT0002 | HIGH-BANDWIDTH | High-Bandwidth - optional for FAST-Bi-1K5 |
| CABL-PSS0041 | PARALLEL BUSBAR KIT CH2 | FAST-Bi-1K5 BUSBAR KIT - 2-Channel Parallel Busbar and protection kit |
| CABL-PSS0042 | PARALLEL BUSBAR KIT CH3 | FAST-Bi-1K5 BUSBAR KIT - 3-Channel Parallel Busbar and protection kit |
| CABL-PSS0043 | PARALLEL BUSBAR KIT CH4 | FAST-Bi-1K5 BUSBAR KIT - 4-Channel Parallel Busbar and protection kit |