



**DiRAC**  
Digital Reliable Amp Converter

**PS120050**  
**PS135040**

Rated at 6-kW output power, it is based on the new three-level ZVS topology that guarantees high efficiency, great performances, high stability and maintenance.

Especially designed to operate in particle accelerator facilities.

Extreme versatility and ease of “tuning” to any load/magnet condition thanks to the digital current control implementation.

#### Features

- Different versions for different output current and output voltage ratings
- Digital feedback current control loop
- High efficiency (up to 90%)
- New three-level ZVS topology
- Long-term output stability
- Ethernet connectivity
- Graphic color OLED and encoder
- 208VAC and 400VAC input versions
- On-module speed-regulated fans
- Internal temperature monitoring
- External configurable interlocks (I/O)
- Epics- and Tango-compatible

#### Applications

- Magnet Power Supplies
- Accelerator Machine Power Supplies
- Current Waveform Generation
- Nuclear Magnetic Resonance (NMR)

The DiRAC power unit is based on the recent AC-DC three-level ZVS converter topology and it is composed of a PFC stage combined with a buck converter into a single stage for a rated 6kW output power (PS120050 version, 120A@50V). The resonant nature of this power supply guarantees high efficiency, a crucial factor to take into account when maintaining into operation a large number of power supplies in the same facility.

The current control loop of the DiRAC, as for all other CAENels power supplies, is completely digital in order to guarantee the same configurability and ease of tuning to any load condition (resistive and inductive parts).

A new feature of the DiRAC units is the current control algorithm, which is performed directly by the on-board FPGA: the parallel nature of the computation allows to greatly reduce time delays in the feedback loop.

Output current setting is performed by the use of a DCCT (DC Current Transformer) that presents high long-term stability, good bandwidth, low noise and extremely low TC (Temperature Coefficient).

The use of state-of-the-art 18-bit SAR ADCs for current and voltage sensing guarantees a reduced group delay and thus higher bandwidth.

Internal interlocks and protections are redundant and distributed inside the DiRAC units – e.g. the temperature is monitored by six different sensors placed in different sections of the board and the internal heatsinks.

The control board of the unit, hosting the FPGA, the diagnostic ADCs, Communication sections, local control + display managing and other ancillary parts is the same used for the SY3634 and SY3662 system modules.

Command syntax and communication protocol

### About CAENels

CAENels is a dynamic company that provides power supplies and state-of-the-art dedicated electronic systems to the particle accelerator community - e.g. synchrotron light sources and Free Electron Laser (FEL) facilities.

- Magnet Power Supply Systems
- Beamline Electronic Instrumentation
- Precision Current Transducers
- High-Voltage Dedicated Systems

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compatibility are maintained with respect to the other CAENels PS systems.

Commercially available modules are PS120050 (120A@50V) and PS135040 (135A@40V) in "A" and "E" versions.

### Technical Specifications

Rated Output Current	PS120050: 120 A PS135040: 135 A
Rated Output Voltage	PS120050: 50 V PS135040: 40 V
Input Voltage	A- version: 3 × 208 V(AC) @ 47-63 Hz E- version: 3 × 400 V(AC) @ 47-63 Hz
PF (Power Factor)	> 0.98
Topology	Three-Level ZVS Converter
Maximum Output Power	up to 6 kW
Maximum Inductive Load	1 H (more upon request)
Current Setting Resolution	18 bit
Output Current Read-Back	20 bit
Output Voltage Read-Back	20 bit
Accuracy	< 0.01 %
Current Control Range	5 % - 100 %
Output Ripple (0-10kHz)	100 ppm / FS
Long Term Stability (8h)	20 ppm / FS
AC/DC Efficiency	up to 90%
External Interlocks/States	4 Inputs: user-configurable "dry" contacts 2 Outputs: user-configurable
Internal Interlocks	Over-Temperature Earth Fault Current Regulation Fault Fan Fault AC Fault
Hardware Protections	Load energy dumping (free-wheeling) Circuit breaker
Auxiliary ADC Read-Backs	Internal Temperatures Earth Leakage Current
Cooling	Air convection - self-regulated internal fans
Connection	Ethernet TCP-IP / UDP
Extra-Features	Soft-start mode Point-by-Point Current Waveform Loading User-definable interlock thresholds, active levels and timings FPGA Firmware Remote Update User-settable Slew-Rate value
Dimensions	19" wide – 3U high Euro-mechanics rack



DiRAC Rear view