LIBERA

Libera Current Meter

The Libera Current meter is a **general purpose current measuring device** with 4 input channels, compatible with all current sources and capable of measurements from 60 nA to 2 mA. The instrument features six different ranges which can be set manually or automatically, and each channel can be calibrated using a known current source.

Highlights

- 4 input channels with BNC triax connectors
- 6 current ranges from 60 nA to 2 mA
- 18-bit A/D conversion
- Easy calibration of each channel and range
- Compatible with blade monitors, diamond detectors, wire scanners and Faraday cups
- EPICS, Tango, Python, Matlab and LabVIEW compatible

Applications

- Particle accelerators
- High energy physics
- Nuclear and particle physics
- Dark matter and astroparticle physics

Multi-range current meter

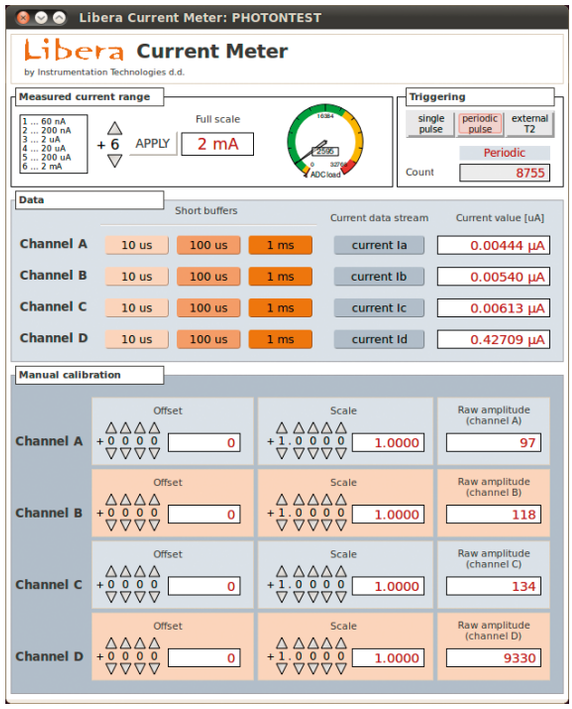
Input currents are immediately converted into voltage via a trans-impedance amplifier, with six different gains depending on the current range selected via software. The signals are then digitized using 18-bit and 2.5 MSps A/D converters. Offsets and gain errors can be calibrated for each channel using a nominal current source.

Flexible data buffering

One LEMO trigger input is used to trigger data acquisition in a large ADC buffer with total size of 1 MS per channel. The data buffer size can be reduced in order to support higher acquisition trigger frequencies.

Intuitive graphical user interface

The instrument comes with an intuitive GUI that allows adjustment of all required settings such as current range, triggering and manual calibration of all four channels. The measured current is then shown and plotted in real time. The current is calculated automatically from measured ADC counts, and each channel can be calibrated separately.



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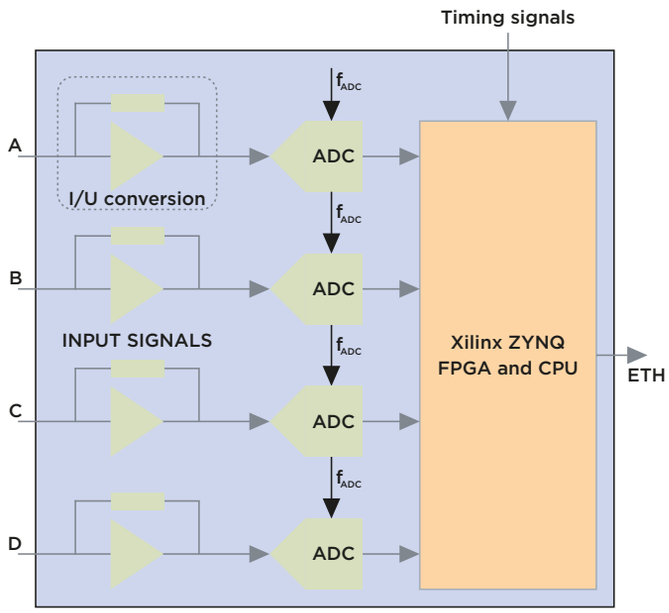
INSTRUMENTATION TECHNOLOGIES

Low-power and no maintenance required

The Libera Current Meter is based on the Xilinx ZYNQ SoC family, with low power consumption which allows the devices to be powered via Ethernet (PoE standard) and passive cooled.



Technical Specifications

Libera Current Meter	
Dimensions	44 mm × 210 mm × 210 mm
Input signals and connector	4, BNC triax connectors
Input current ranges	±60 nA, ±200 nA, ±2 µA, ±20 µA, ±200 µA, ±2 mA, ±20 mA
Input signal bandwidth	From kHz at low input currents to 80 kHz at higher input currents
Trigger signal level and connector	3.3 V TTL, LEMO connector
ADC conversion	2.5 MSps, 18 bit
FPGA / CPU	Zynq-7020 / ARM Cortex-A9
Booting	Micro-SD, TFTP server
Power	PoE
Cooling	Passive

Network-connected with several software interfaces

The instrument is accessible via the internet, and several standard interfaces are available to facilitate the integration of the instrument into the control system. In addition to the EPICS and Tango interfaces, the instrument can also be connected with a TCP-IP socket, enabling connections with Python, LabView, Matlab and others. The operating system is based on Linux and loaded using a Micro-SD card or via a TFTP server.

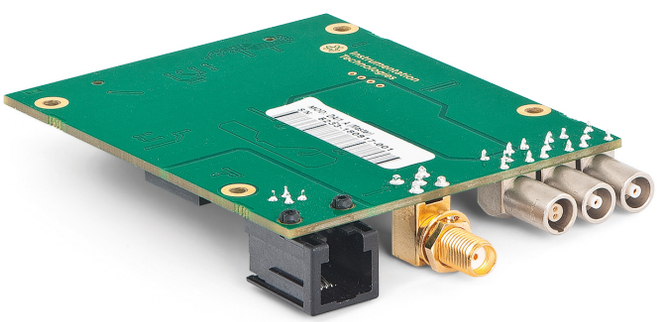
Octave LabVIEW EPICS TANGO python MATLAB

Nominal current ranges

Nominal range	Analog 3 dB bandwidth	RMS
±60 nA	>25 kHz	3.4 pA
±200 nA	>10 kHz	9.1 pA
±2 µA	>80 kHz	0.1 nA
±20 µA	>80 kHz	1.0 nA
±200 µA	>90 kHz	10.4 nA
±2 mA	>90 kHz	97.6 nA
±2 mA	>90 kHz	1.015 µA

HW extensions and further development

Extension module
An extension module can be added to the Libera Current Meter to extend the connection capabilities of the device.



Interface	Description
LEMO single (2x)	Single-ended LEMO, Input/Output configurable
LEMO differential (1x)	Differential LEMO, Interlock output (requires external circuit)
SMA (1x)	16-bit 100 kSps DAC output, 1 V at 50 Ohm
RJ-14 (1x)	6p6, up to 20 Mbps, half-duplex

FPGA / Software code availability

The Libera Current Meter can be further extended by the user with modifications to the FPGA and software code (available under a non-disclosure agreement). Additional features or functionalities can be also added by our developers. For more information contact us at support@i-tech.si.

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