Datasheet   LUCI-M
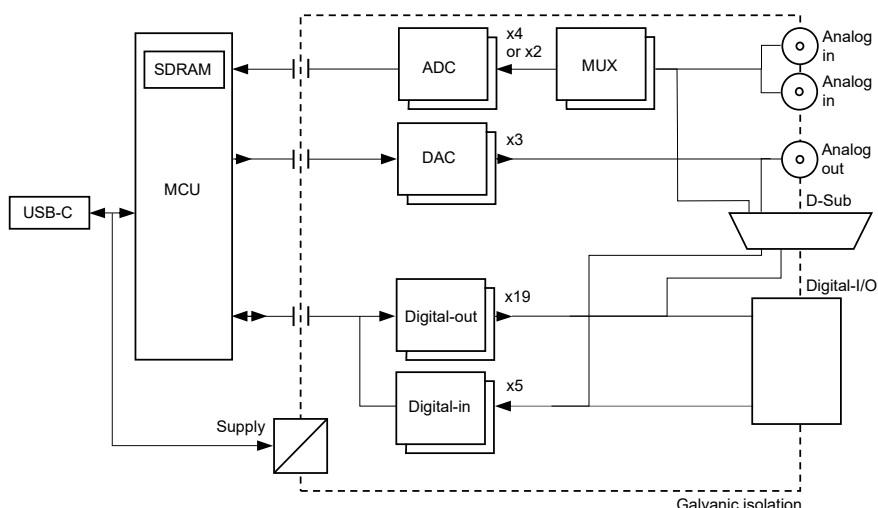
Data Acquisition and Digital Control System

Features	
	• **4-channel or 2-channel analog signal acquisition**
	• **Analog bandwidth 1.1 MHz, 16-bit ΣΔ-ADC**
	• **2.5 MS/s per channel, synchronous sampling**
	• **Selectable input sources: 4 from D-Sub, 2 additional per coaxial connector**
	• **3 Channel DAC for static control signals:**
	2 channels on control interface for bias or offset adjustments,
	1 channel on coaxial connector for general purpose
	• **Digital outputs: 17 on D-Sub, 2 on external connector for general purpose**
	• **Digital inputs: 3 on D-Sub, 2 on external connector for general purpose**
	• **USB-C interface to host computer, bus-powered on a 3 A port**
	• **SCPI-compatible command set**
	• **D-Sub interface to directly connect to FEMTO devices with digital interface**

Applications	
	• **General data acquisition**
	• **Long-term data recording**
	• **Lab automation**

Block Diagram

BS-LUCI-M_R01

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY   **F E M T O**

Data Acquisition and
Digital Control System

Intended Use	The LUCI-M is a universal data acquisition and digital control system for FEMTO amplifiers and photodetectors with remote control functionality and for various third party devices. The analog input channels allow for the acquisition of the output voltage of any device. The analog outputs support the adjustment of voltages. In combination with FEMTO amplifiers and photoreceivers with selectable gain, LUCI-M enables the design of a complete, computer-networked measurement chain without the need of additional devices such as external ADC cards. For questions, please consult this document, the manual, or contact support@femto.de.
	For safe operation, please refer to the damage thresholds specified in the "Absolute Maximum Ratings" and "Temperature Range" sections of this document.
	The operating environment must be free of smoke, dust, grease, oil, condensing moisture, and other contaminants that could affect the operation or performance.

Available Accessories	Third-party USB hub (contact FEMTO support for advice)	USB hub with power supply for connecting LUCI-M to USB ports with insufficient power delivery cababilities

Available Versions	LUCI-M-4	4 analog input channels, each routable to one of 6 input connectors
	LUCI-M-2	2 analog input channels, each routable to one of 6 input connectors

Specifications	Test conditions	V_S = 5 V USB-powered, T_A = 25 °C, warm-up 20 minutes (min. 10 minutes recommended)
Analog inputs	Analog input channels	
	LUCI-M-4	4 channels, each routable to one of 6 input connectors
	LUCI-M-2	2 channels, each routable to one of 6 input connectors
	Input voltage range	±10 V
	Bandwidth (-3dB):	1.15 MHz
	Resolution	16 bit[1]
	Input impedance:	10 kΩ ±0.2 %
	Linearity:	≤0.01 % full-scale
	THD	≤0.02 % (@100kHz)
	Gain accuracy:	≤0.1 % full-scale
	Noise:	≤500 µV RMS (input shorted)
	Offset drift:	≤75 µV/K
	Sampling rates	2.5 MS/s and downsampled: 500, 100, 10, 1 kS/s

[1] The actual analog input signal range is ±12 V, which results in a resolution of ~0.37 mV at full sample rate. All specifications are guaranteed up to ±10.0 V.

Analog Outputs	Analog output channels	3 channels
	Output voltage	±10 V
	Resolution	12 bit[2]
	Gain accuracy:	≤0.1 % full-scale
	Noise:	≤200 µV RMS (@20 MHz BW)
	Rise / fall time	500 µs typ.
	Output impedance	50 Ω, terminate with ≥10 kΩ load
	Max. output current	±20 mA
	Offset drift:	≤10 µV/K

[2] The actual analog output signal range is ±10.5 V, which results in a resolution of ~5.1 mV. All specifications are guaranteed up to ±10.0 V.

Digital Inputs	Digital input channels	5 channels, TTL compatible
	Input impedance	10 kΩ
	Logic level, low	≤0.8 V
	Logic level, high	≥2.0 V

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY   FEMTO

Data Acquisition and Digital Control System

Specifications (continued)		
Digital Outputs	Digital output channels	19 channels, TTL compatible
	Output impedance	50 Ω
	Max. output current	20 mA
	Logic level, low	≤0.4 V
	Logic level, high	≥4.0 V (@ load 1 kΩ)
Power Supply	Power source	Connected computer via USB connection, USB C port with 3 A power delivery capability or USB 2.0 PD (e.g. via hub)
	Supply voltage	5 V
	Supply current	2 A
Case	Weight	263 g (0.58 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage temperature	−40 °C ... +80 °C
	Operating temperature	0 °C ... +40 °C

Absolute Maximum Ratings	Analog max. input voltage	±20 V
	Digital max. Input voltage	±30 V

Connectors	Analog inputs	2 × BNC jack (female) and D-Sub port (see below)
	Analog outputs	BNC jack (female) and D-Sub port (see below)
	Digital inputs and outputs	8-Pin port and D-Sub port (see below)
	Power supply and data transfer	USB-C
	8-Pin port	DMC 1,5/ 4-G1-3,5 P20THR (mating plug type: DFMC 1,5/ 4-ST-3,5 BK)
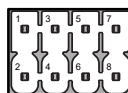
Pin 1:   digital input (DIN1)
Pin 3:   digital input (DIN2)
Pin 5:   digital output (DOUT1)
Pin 7:   digital output (DOUT2)
Pin 2,4,6,8: GND

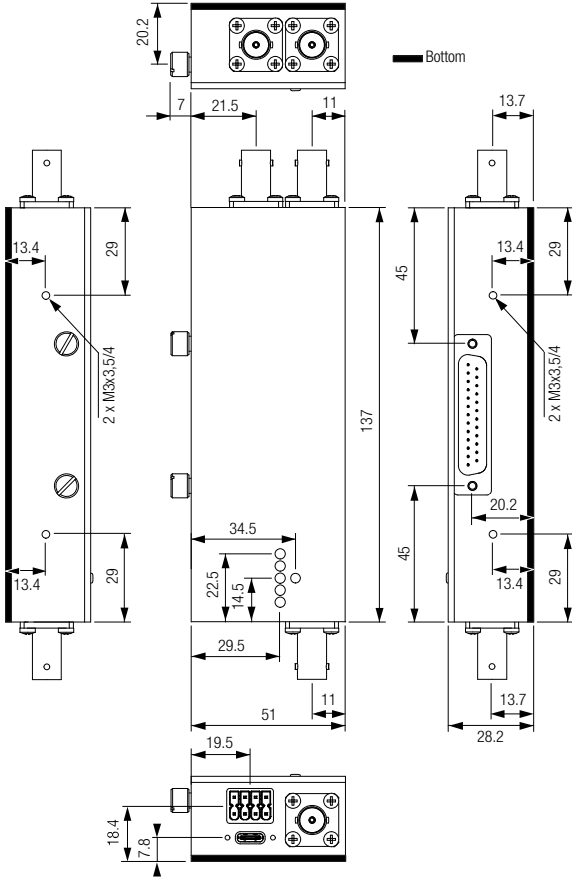Universal D-Sub port   Sub-D 25-pin, male, qual. class 2
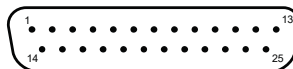
Pin 1 and 2:   not connected
Pin 3:   GND
Pin 4:   not connected
Pin 5 to 7:   analog input or digital input (selectable)
Pin 8:   analog output or digital output (selectable)
Pin 9:   GND
Pin 10 to 19: digital output
Pin 20:   analog output or digital output (selectable)
Pin 21 to 23: digital output
Pin 24:   analog input or digital output (selectable)
Pin 25:   digital output

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY   FEMTO

Data Acquisition and Digital Control System

Remote Control Operation	Command syntax	SCPI-compatible (Standard Commands for Programmable Instruments)
Indicator LEDs	ERR (red) ACQ (amber) USER (amber) COM (amber) PWR (green)	Error (e.g. communication error or data overflow) Data acquisition in progress Freely programmable LED USB communication in progress Power status (solid light: OK, flashing: insufficient power supply)
Button	Manual USER button	Freely programmable button
Scope of Delivery	LUCI-M, 8-pin DFMC connector, USB-C to USB-C cable, datasheet, transport package	
Dimensions	LUCI-M	

All dimensions in mm unless otherwise noted

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY   FEMTO