

MonoDAQ-U-X is a fully isolated USB test & measurement device with full software support in DEWESoft data acquisition software. 8 multifunctional front pins can be configured as analog or digital inputs or outputs.

- Power and signal isolation between USB and front end
- Max. sample rate: 50 kS/s (16 bit), max. resolution: 20 bit (100 S/s)
- Can connect up to 2 full bridge strain gauges or up to 4 thermocouples
- Max. 4 differential or 8 single ended voltage inputs
- Current input with internal shunt (0.5 ohm)
- Analog output (+/- 4 V, 14 bit, 50 kS/s)
- Max. 8 digital inputs or outputs
- 1wire, I2C and UART interface on front connector
- Internal humidity sensor
- Internal IMU (3-axial accelerometer and 3-axial gyroscope)



Typical applications:

- Embedded IoT system power consumption measurement
- Analog measurement front end for industrial machines and test benches
- Strain measurement in industrial quality control
- Industrial condition monitoring (voltage, temperature, current)
- Precision measurement front end for single-board computers (Raspberry Pi, LattePanda etc.)
- Precise laboratory power supply for board development

Overall working principle

MonoDAQ-U-X is powered from the USB-C port on the backplane, therefore a single USB-C cable is needed for communication and power supply. Power and communication signals are isolated directly after the USB connector, which makes the microcontroller and the front end of the device fully galvanically isolated. Front end connector features 8 multifunctional pins that can be configured as analog inputs or outputs or as digital inputs or outputs. Front end is configured with the help of a channel setup table in DEWESoft software.



At the core of the measurement chain is a sigma-delta ADC with a maximum sample rate of 50 kS/s (16 bit) and maximum resolution of 20 bit (100 S/s). If only one input channel is used, the signal is alias-free with bandwidth of $0.4 \cdot f_s$ (sampling frequency). If multiple analog input channels are used, the signals are multiplexed in front of the ADC. It is possible to select up to 8 single ended voltage inputs and up to 4 differential voltage inputs. Half of the channels can have a high input range of 10 V while the other half are limited to 2 V since there is no voltage divider on those channels.

Synchronization between devices

Multiple MonoDAQ-U-X devices can be connected to the same PC by using a multiport USB hub. Synchronization between devices is ensured if all of the devices are connected to the same hub. Multiple hubs can be connected to the top-level hub but refer to MonoDAQ support for compatible USB hubs on the market. Official MonoDAQ hub is in development at the time of writing.



MonoDAQ-U-X preliminary capabilities and specification	
ANALOG INPUTS	
Maximum sample rate (1 channel)	50 kS/s
Maximum sample rate (multiplexed)	20 kS/s / nr. of channels *at 100 mV input range max sample rate is 20 kS/s for 1 channels and 5 kS/s / nr. of channels in multiplexed mode
Resolution @50 kS/s	16 bit
Resolution @100 S/s	20 bit
Max. number of differential voltage inputs	2 (10 V...100 mV range) or 4 (2 V...100 mV range)
Max. number of single ended voltage inputs	4 (10 V...100 mV range) or 8 (5 V...100 mV range)
Max. number of current inputs	1 (0.5 ohm internal shunt, 500 mA rated, measuring range 2 A)
Max. number of strain gauge inputs	2 (single excitation source)
Max. number of thermocouple inputs	4
Alias-free bw (single channel mode)	0.4*fs
Typical noise floor	-100 dB
Typical THD	-80 dB
Typical accuracy	0.1 % of reading + 0.02% of range
Temperature drift	10.15 ppm/K
EXCITATION & FRONT END POWER SUPPLY	
Number of sources	1
Low-noise preset levels	2 V, 3.3 V, 5 V, 10 V, 24 V (<1 uVrms noise)
Settable voltage	1.2 V ... 24 V (<1 mVrms noise)
Current Limiter	0 .. 200 mA
Max Power	1 W
ANALOG OUTPUT	
Max. streaming sample rate	50 kS/s
Max. internal sample rate (predefined forms)	500 kS/s
Resolution	12 bit (no missing codes)
Range	0 ... 4 V
DIGITAL INPUTS/OUTPUTS	
Max. number of digital inputs	4 (33 MHz max counting rate) or 8 (1 MHz max. counting rate)
Max. number of digital outputs	8
Max. input level	10 V
Input type	TTL, CMOS
Output levels	2 V, 3.3 V, 5 V
Output type	TTL, CMOS
CLOCK	
Accuracy	synchronized to USB or standalone 10 ppm
Device to device jitter (ref. to USB accuracy)	<25 ns typ.
OTHER	
Supported front end digital bus (D10, D11 pins)	I2C, UART, 1WIRE
Internal monitoring sensors	Humidity, temperature, 6-axis IMU
ENVIRONMENTAL	
Operating temperature	-20 ... 60 degC
Max. power consumption	2.5 W

Software support

MonoDAQ-U-X is supported in DEWESoft X3 data acquisition software. MonoDAQ-U plugin is necessary on top of the DEWESoft X3 (SP4 release) installation. Plugin provides the user with a channel configuration table that sets the functions of the front pins. Data from the devices is seen in regular DEWESoft channels and can be used in other functions of the software packages such as Math section and other plugins.

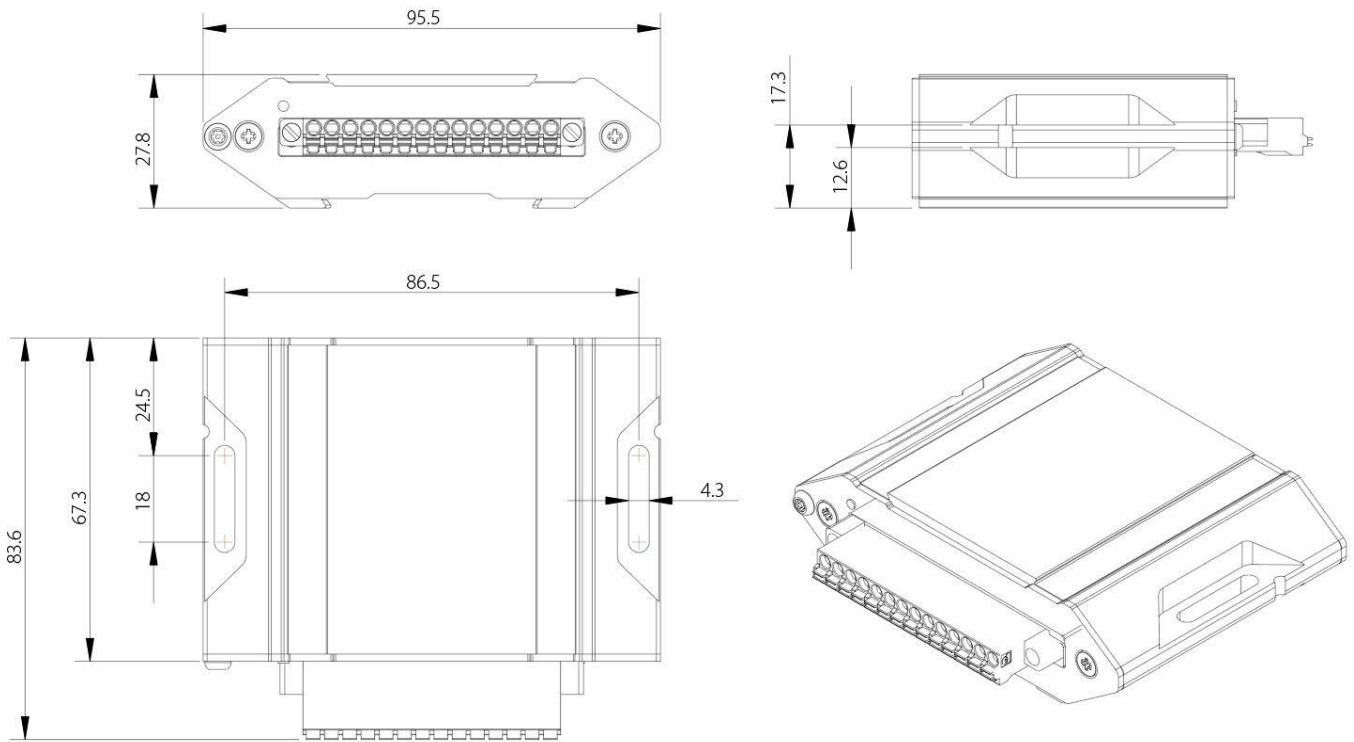
For custom applications the device is also supported in Isotel IDM cross-platform software package based on Java. IDM can

be installed on any operating system supporting Java and provides the basic interface to the device for configuration and data streaming. There is Python API available to access the device through IDM software.

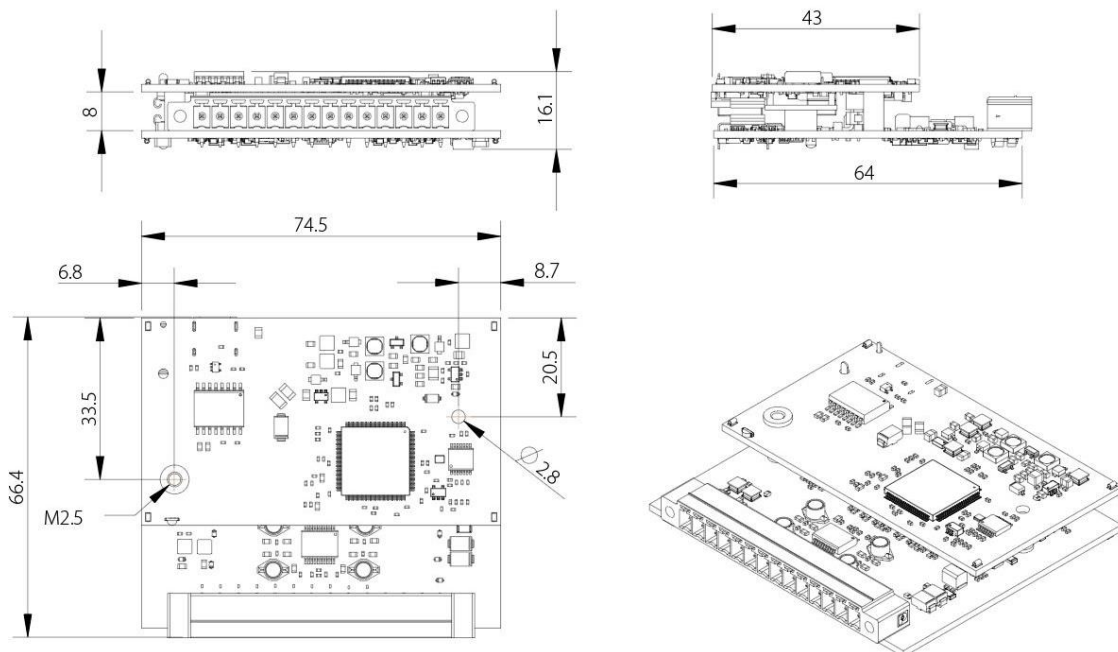
Mechanical drawings

MonoDAQ-U-X is originally comes in an aluminium housing that allows quick stacking of multiple devices. It is also possible to order the OEM-version without housing for building-in.

Dimensions with housing



PCB-only dimensions



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