



#### **Product Description**

The Beam BMeasure-125i unit is a flexible and powerful IOT measurement system for data acquisition, data logging and control in the laboratory, industrial and remote sensing arenas. It is based around an 8 channel, fully differential, synchronous sampling, 24 bit ADC that can sample at speeds up to 128 ksp/s. Multiple units can be connected together for more synchronously sampled channels.

Operating as a data acquisition unit the system can capture the data from 8 analogue and 8 digital channels to a host computer over the USB, Ethernet, Wifi or RS-485 interfaces. It can provide a much more powerful and flexible method of data measurement than a plug in data capture card.

Operating as a data logger, the system can autonomously sample and store the data to internal FLASH storage for later data retrieval.

The unit is low power and has flexible power supply inputs. Options include 5-24V DC input, USB-5V, power over Ethernet and battery operation for remote monitoring applications. A 3G/4G mobile communication option will soon be available for really remote sensing applications.

Direct cloud access via the Internet is a configurable feature.

Customisation of the system's software is possible to allow the unit to perform autonomous control functions for many uses.

#### **Software**

- On-board firmware supports host control or autonomous operation.
- On-board WEB server for simple configuration and control from any device.
- Host software for configuration, data capture and waveform viewing for Microsoft Windows and Linux systems.
- Host API library with C++, Python and Matlab support.

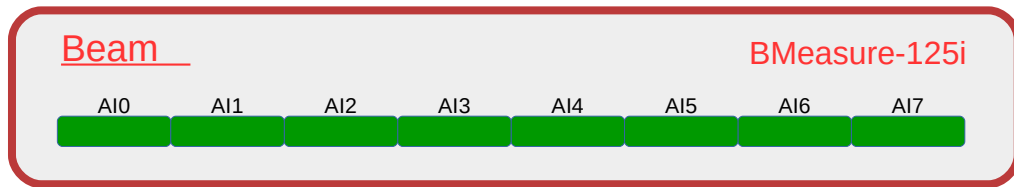
#### **Features**

- 8 x fully differential analogue inputs  $\pm 1.25$  Volts or  $\pm 12.5$  Volts. PGA on each channel to provide 1x, 2x, 4x, or 8x gain options.
- 8 x channels synchronously sampled with 24 or 16 bits resolution. Multiple units can be linked together for up to 32 synchronously sampled channels.
- Sampling rates up to 128 ksp/s
- Flexible input connection system. External connector/PCB can be used for different sensor types.
- 8 x programmable digital IO channels, 0 – 3.3 Volts input.
- 2 x Relay output channels 24V AC, 1 Amp
- 2 x Analogue output channels,  $\pm 5$  Volts, 100 Ohms, 16 bit, 125 ksp/s
- 2 x Switch input channels.
- Battery backed up real-time clock for date/time stamped data
- 4 GByte internal FLASH memory for data logging functionality.
- USB-B high speed (480 Mbps) interface to host system.
- Ethernet interface 10/100 Mbps.
- Wifi Interface up to 10 Mbps.
- RS-485 interface up to 1 Mbps, long range.
- MQTT client for Cloud access to data
- Optional: Battery for standalone operation.
- Optional: 3G/4G Modem for remote operation. Contact us for more information.

#### **Applications**

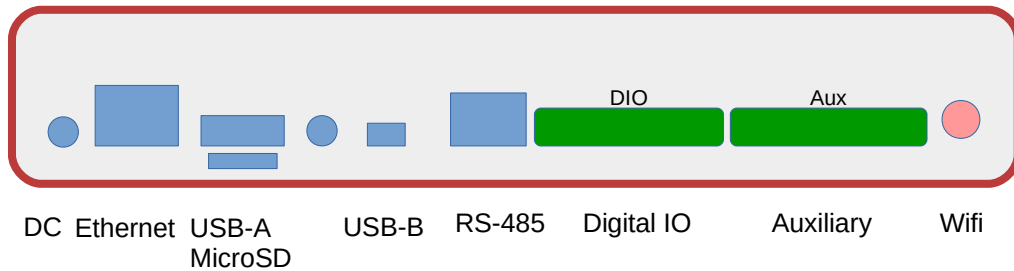
- General data capture for scientific/engineering research.
- Robotics
- Temperature monitoring and logging.
- Sound capture and processing.
- Machine or structure Strain gauge capture, processing and characterisation.
- Machine or structure vibration capture, processing and characterisation.
- Sensor array capture.
- Automatic test equipment.
- Component measurement

## Front panel



Analogue input channels

## Rear Panel

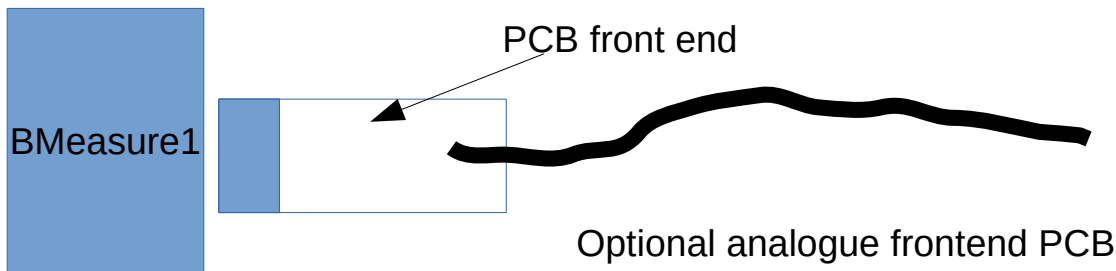


## Analogue Inputs

Each of the 8 analogue inputs has a 4 pin connector that has the fully differential input signals along with ground and a +5V power line. The flexible input system allows many different types of sensor such as thermistors, thermocouples, voltage, current, strain gauges, vibration sensors, audio signals etc. to be directly connected to the system. A conventional 3.81mm plug-in screw terminal connector can be used to directly interface to some sensor types. Dedicated measurement probes and a customisable PCB/wire interface connector allowing components to be added to the front end analogue electronics are available.

Gnd	AI-	AI+	+5V
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The analogue inputs have two jumper selectable ranges. A direct to ADC  $\pm 1.25$  Volt range that offers the best performance with a high impedance input and a  $\pm 12.5$ V range with a 180 kOhms input impedance. Following this is a, per channel, PGA with 1x, 2x, 4x and 8x gain options allowing adaptation of the analogue input range to optimise ADC resolution. These ranges can be extended with passive or active front-end circuits on a small PCB that can be plugged in to each port. An optional front-end connector is a BNC adapter for oscilloscope probe usage.



## Digital IO

An 8 x 2, 2.54mm IDC IO connector provides 8 programmable lines. These 0 – 3.3V input, 0 – 3.3V output lines can be programmed as inputs or outputs and have a range of functions.

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Gnd	Gnd	Gnd	Gnd	Gnd	Gnd	3.3V	+3.3V

The core functions provided include:

- Simple digital inputs captured and logged perhaps for logic analysis.
- Trigger inputs for sampling and control.
- Digital outputs controlled by a host systems or by a local program.

- Multi-unit synchronisation. Two or more BMeasure-125i units (up to 4) can be connected together to provide a high number of synchronously sampled ADC channels.

## Auxiliary Connector

The 8 x 2, 2.54mm IDC auxiliary IO connector provides some dedicated functions including relay outputs, analogue outputs and switch inputs.

R1NO	R1NC	R1C	SW2	SW1	+5V	AO2	AO1
R2NO	R2NC	R2C	Gnd	Gnd	AGnd	AGnd	AGnd

A small plug-in adapter is available to provide a set of 3.81mm screw terminals connected to this port.

## Analogue Outputs

The two channels of analogue output can be used for numerous uses. One use is for system transfer function analysis or component LCR measurements. The analogue outputs provide a voltage over the range +/- 5Volts.

## Relays

Two 24V 1 Amp change over relay connections are provided to control equipment.

## Switch Inputs

Two 24V capable switch inputs are provided for input control.

## Power Supply

The system can be powered via a number of sources. These include:

- DC jack input +5 to +24V
- USB-B +5V from host computer.
- RS-485 connector, +5 to +24V
- Power over Ethernet, 48 Volts
- Battery via USB-B or DC jack input.

The BMeasure-125i uses little power, around 2 Watts operating and has an extreme low power mode (< 10uA) where it can wake occasionally from a deep sleep mode to take and store measurements. This can be used for battery powered remote monitoring applications perhaps with solar cell charging.

## Communications

The system supports a number of communications interfaces:

- USB-B high speed (480 Mbps).
- Ethernet 10/100 Mbps, with optional PoE remote power capability.
- Wifi up to 10 Mbps.
- RS-485 up to 1 Mbps with remote power capability. Can be used for long range operation.
- 3G/4G mobile (Optional)

The USB and Ethernet support data capture at the full sample rate.

## Software

The BMeasure on-board firmware supports standalone operation as well as host driven operation. The system provides a simple to use WEB browser based graphical user interface for configuration, control and basic data viewing.

The Beam BMeasure host software is available for Microsoft Windows and Linux systems. This software provides a simple to use GUI application for configuring BMeasure units, viewing waveform data and capturing the data into local files. The BMeasure software also provides a simple command line program to provide programmed access to the system.

We also provide C++, Python and Matlab/Octave API libraries for direct program access to the system.

## OEM Usage

We can supply the BMeasure-125i as a bare PCB for installation into OEM systems.

We can customise the on-board firmware to provide specialist measurement and/or control functionality.

## Specifications

<b><u>Power Supply</u></b>		<b><u>Analogue output</u></b>	
DC Jack input	5 to 24 Volts, 0.5 Amps	Output voltage	±5 Volts
USB-B	5 Volts, 0.5 Amps	Output impedance	100 Ohms
Battery (via USB-B)	5 Volts, 0.5 Amps	Max Sample rate	125 ksps
Battery (via DC Jack)	5 to 24 Volts, 0.5 Amps	<b><u>Communications</u></b>	
RS-485	5 to 24 Volts, 0.5 Amps	USB 2.0	Mini-B high speed (480 Mbps)
PoE (Option)	48 Volts, 0.060 Amps	Ethernet	RJ45, 10/100 Mbps
<b><u>ADC Performance</u></b>		RS-485	RJ12, 1Mbps
Resolution	24 bits	Wifi	Wi-Fi b/g/n, max 10Mbps
Max Sample rate	Up to 128 ksps	<b><u>Storage</u></b>	
SNR/dynamic range at 32 kSPS	107 dB	Datalog storage eMMC FLASH	4 GBytes
THD	-109 dB	<b><u>Misc</u></b>	
FSR INL	±8ppm	Analogue Connectors	4 pin 3.81mm screw terminal
Offset error	±15uV	<b><u>Physical</u></b>	
Input voltage range1	±1.25 Volts	Case dimensions	170 mm x 117 mm x 35 mm
Input impedance range1	10 MOhm	<b><u>Environment</u></b>	
Input voltage range2	±12.5 Volts	Operating temperature range	-18 to +40 degrees C
Input impedance range2	180 kOhm	Storage temperature range	-18 to +50 degrees C
Input protection	±30 Volts	Relative humidity	15 to 85%
<b><u>Digital IO</u></b>		Core Standards	IEC61010-1:2010, IEC61326-1:2012, IEC61000, IEC61557-8 CE
Input Voltage	0 – 3.3 Volts		
Output Voltage	0 – 3.3 Volts		
Input impedance	> 1M Ohm		
Output impedance	100 Ohm		
Max Sample rate	128 ksps		