See the Big Picture

Hardware

Compact Measurement Modules for Analog and Digital Signals

ibaPADU-8AI-U/ibaPADU-8AI-I
Analog/digital input modules for data acquisition up to 1 kHz

ibaPADU-D-8AI-U/ibaPADU-D-8AI-I
Analog/digital input modules for data acquisition up to 40 kHz

ibaPADU-4-AI-U
Analog/digital input module for fast sampling up to 100 kHz

ibaPADU-C
Analog/digital data logger for grid independent measurements

The Expert for Measurement and Automation Systems

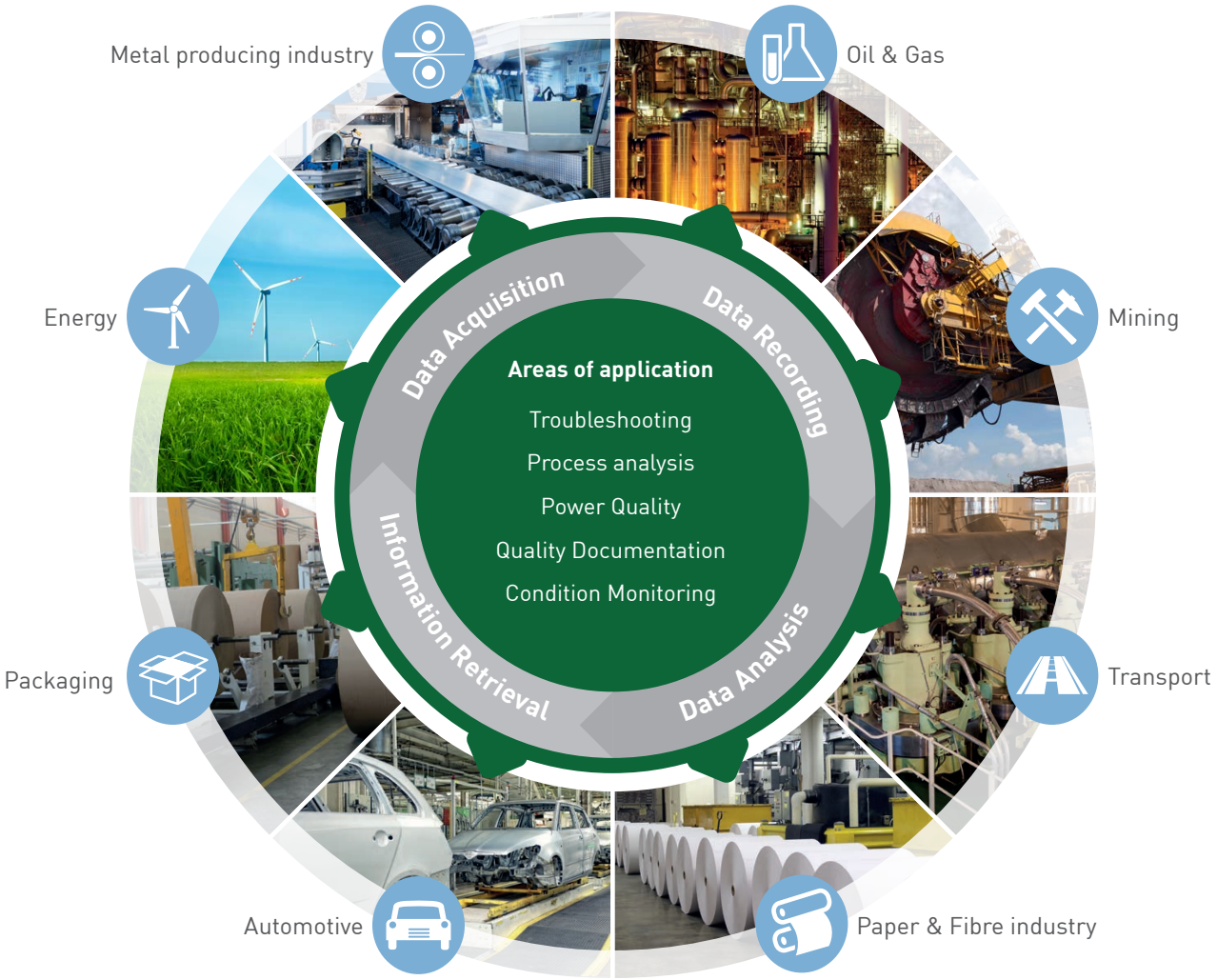
It is our mission to bring transparency to the world of automation with our measurement system solutions. By means of an iba system, the user can understand and master the growing technological complexity of automated processes and mechatronic systems. As with a flight recorder, all essential system and process data from various signal sources, field buses and automation systems are recorded continuously and synchronously. For analyzing these data, we have developed powerful analyzing tools which comfortably support interactive work as well as automatic information generation.

Cutting Edge

For more than 30 years, our area of expertise has been the development of high-quality systems for measurement value acquisition and analysis, signal processing and automation.
iba is one of the few manufacturers who master the whole technology chain from hardware via software to database technology. Only those manufacturers who understand their products in detail can foster innovations and provide competent advice and support to customers.

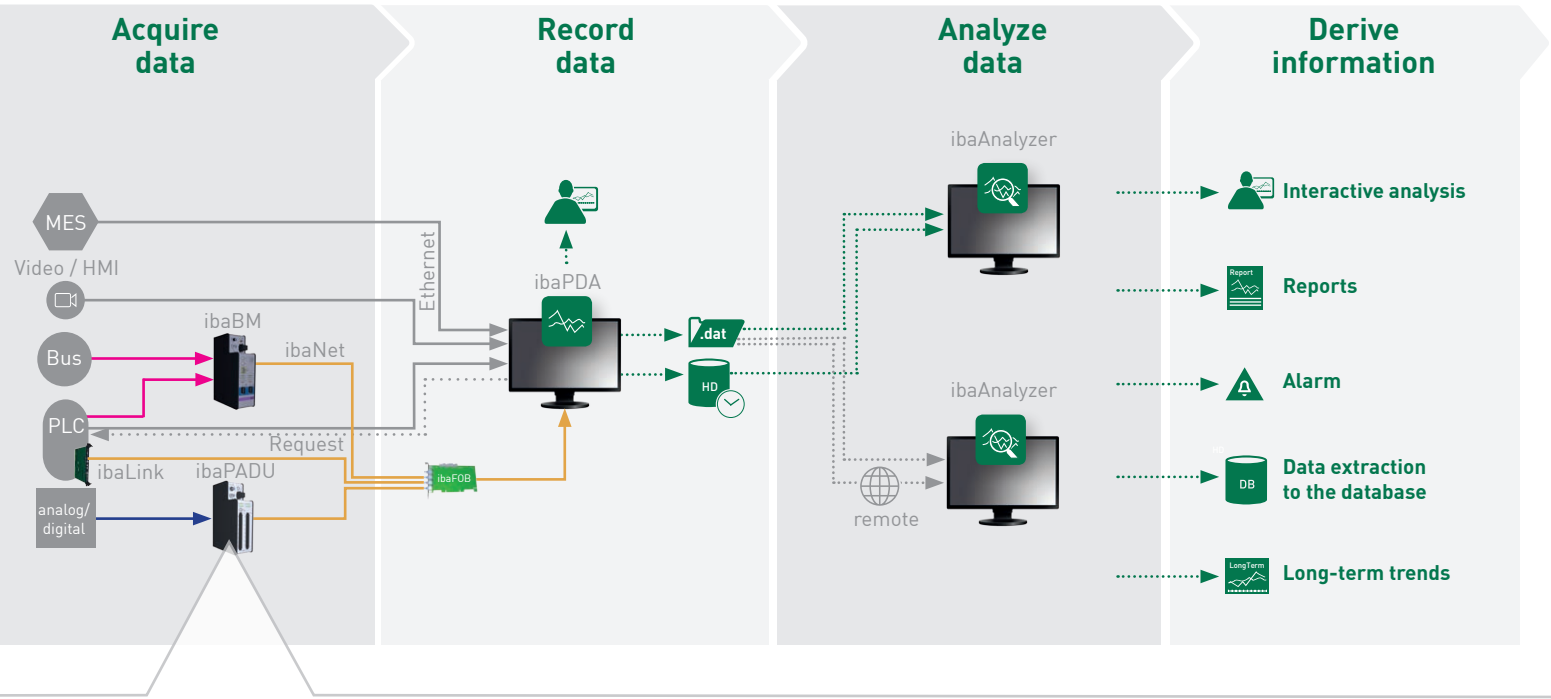
Communicative

In addition to the practice-oriented functionality a main characteristic of our hardware and software products is the distinct connectivity to the automation systems. Various manufacturers and system generations are taken into account and even legacy systems can be integrated as well: A clear benefit in the life cycle of the plant.



Autonomous, modular, scalable

The iba System



Acquire signals with high precision on site

Compact measurement modules

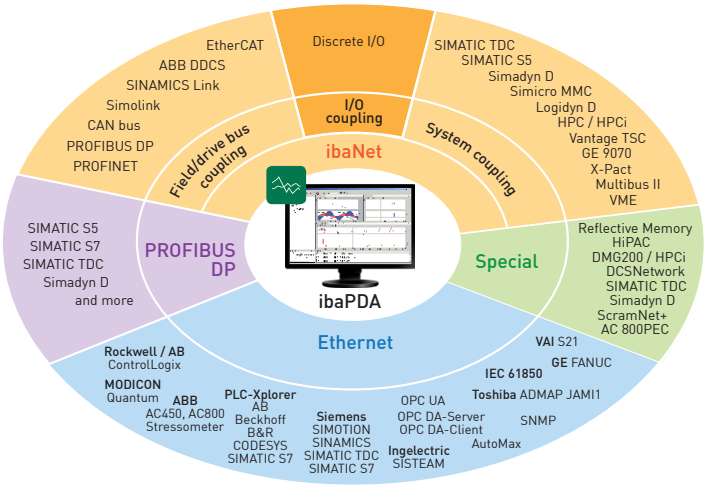
Using the ibaPADU (Parallel Analog Digital Unit) device family, analog and digital signals can be acquired and recorded with high precision by the data acquisition system ibaPDA. Fast and synchronous sampling of all signals allows detailed analyzing of all processes.

In brief

- Sampling rates from 1 kHz to 100 kHz, depending on the device
- Simultaneous data acquisition due to one A/D converter per channel , 16 bit resolution
- Adjustable level and input characteristics
- Each channel galvanically isolated
- Integrated filters reduce disturbances
- Comfortable configuration of the devices and signals in ibaPDA

Inputs for current and voltage signals

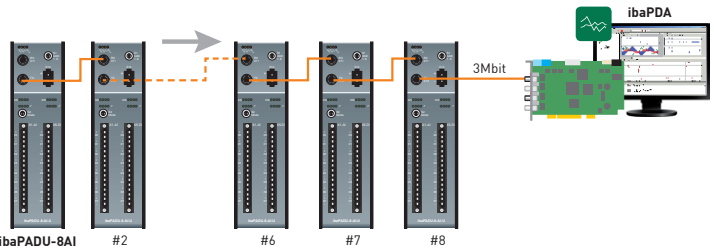
ibaPADU is a device family for measurement of analog and digital signals. The analog inputs are available as current and voltage inputs with different measuring ranges. Each channel is galvanically isolated and equipped with its own A/D converter.
The devices support different ibaNet protocols and hence, offer different properties. The main properties of the devices and the adjustable signal ranges are listed in the table on page 5.



The analog-digital converters are part of the comprehensive connectivity of the iba system

Acquiring measurement data up to 1 kHz

The devices ibaPADU-8AI-U and ibaPADU-8AI-I work with the 3Mbit protocol. Thus, up to 8 devices can be linked in a daisy-chain on the fiber optics link and up to 64 analog and 64 digital signals can be transmitted at a fixed sampling rate of 1 Hz. The possible distance between two devices may be up to 2 km.
An analog low-pass filter is permanently active in both devices ibaPADU-8AI-U and ibaPADU-8AI-I. In the voltage module ibaPADU-8AI-U, an additional digital low-pass filter can be activated as option.
Each device has an additional RJ11-jack for the connection to a notebook with an ibaCom-PCMCIA-F card. Thus, it is possible to carry out measurements in parallel at the RJ11-jack without affecting the data transmission on the fiber optic cable.
Different device modes, which provide the device specific properties of the previous devices like measuring range, input impedance and filters, are set by means of a rotary switch.
The 3Mbit devices can replace all previous ibaPADU-8 models which used the 3Mbit protocol. The existing ibaFOB cards and the I/O configuration in ibaPDA can remain in use.



Up to 8 ibaPADU-8 devices can be linked in a daisy-chain

Acquiring measurement data from 1 kHz to 100 kHz

Flexible settings with „Flex“ protocol

The devices ibaPADU-4-AI-U, ibaPADU-D-8AI-U and ibaPADU-D-8AI-I work with the 32Mbit Flex protocol. With 32Mbit Flex, the data transmission rate is 32Mbit/s and up to 15 „Flex“ devices can be connected to a ring topology. Thus, it is possible to use an ibaPADU-D device as extension for an ibaPADU-S modular system, when all slots are already occupied.

The size of the data telegrams is flexible as long as the total data volume does not exceed 4060 bytes in the ring. The general rule is: The less data that is transferred, the higher the possible sampling rate. The sampling rate of the devices ibaPADU-D-8AI-U und ibaPADU-D-8AI-I can be in the range from 1 kHz to 40 kHz. A sampling rate of even 100 kHz is possbile with ibaPADU-4-AI-U in a point-to-point connection.

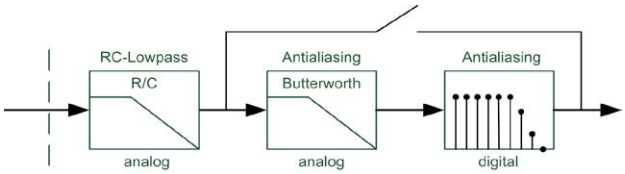
Comfortable configuration in ibaPDA

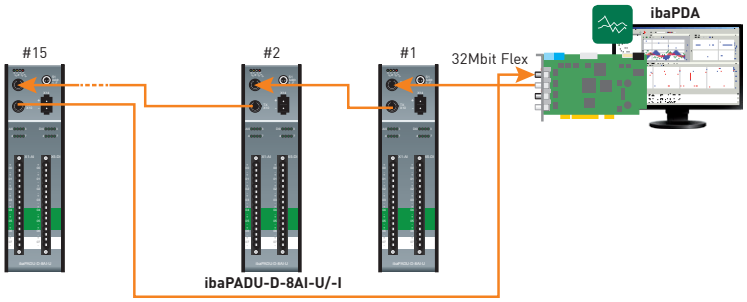
The signals are converted internally and are available via the FO interface. A fiber optic card of ibaFOB-D type is the interface to the data acquisition software ibaPDA. The signals can be conveniently selected and configured with ibaPDA. All necessary parameters like input signal range, input impedance, or filters can be adjusted for each channel in the software.

Anti-aliasing filters reduce disturbances

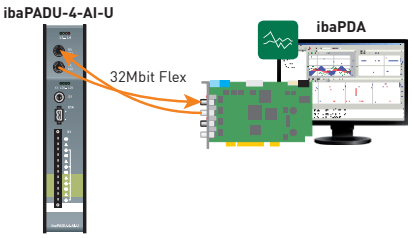
A digital filter can be activated per channel together with an analog anti-aliasing filter. The digital anti-aliasing filter is adjusted automatically to the configured sampling rate.

Filters:





Up to 15 „32Mbit Flex“ devices can be connected to a „Flex“ ring.



With ibaPADU-4-AI-U, the sampling rate can be up to 100 kHz in a point-to-point connection.

Overview compact measurement modules

Device	Input signal range (adjustable)	Sampling rate	Input impedance	Inputs/outputs	ibaNet protocol
ibaPADU-4-AI-U	±250 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V, ±24 V	up to 100 kHz	100 kΩ	4 AI	32Mbit Flex
ibaPADU-D-8AI-U	±2.5 V, ±10 V, ±24 V, ±60 V	up to 40 kHz	100 kΩ or 1 MΩ	8 AI + 8 DI	32Mbit Flex
ibaPADU-8AI-U	±10 V, ±24 V, ±60 V	1 kHz	100 kΩ or 1 MΩ	8 AI + 8 DI	3Mbit
ibaPADU-D-8AI-I	±20 mA, 0..20 mA, 4..20 mA	up to 40 kHz	50 Ω	8 AI + 8 DI	32Mbit Flex
ibaPADU-8AI-I	±20 mA	1 kHz	50 Ω	8 AI + 8 DI	3Mbit

AI: analog input, DI: digital input

Technical data measurement modules with 3Mbit protocol

Short description		
Name	**ibaPADU-8AI-U**	**ibaPADU-8AI-I**
Description	Input module with 8 digital and 8 analog voltage inputs	Input module with 8 digital and 8 analog current inputs
Order number	10.100000	10.100010
Analog inputs		
Number	8	
Design	Galvanically isolated, single ended	
Resolution	16 bit	
Filter	R/C low-pass 4 kHz (permanent) Digital anti-aliasing Tschebyscheff 8th order 330 Hz* Digital low-pass Butterworth 2nd 250 Hz*	R/C low-pass 4 kHz (permanent)
Input signal range	±10 V / ±24 V / ±60 V* (max. for all ranges: ±60 V)	±20 mA (max.)
Input impedance	100 kΩ / 1 MΩ*	50 Ω
Sampling rate	1 sample/ms	
Accuracy	< 0.1 % of total measuring range	
Electrical isolation Channel-channel Channel-housing/power supply	 AC 1.5 kV AC 1.5 kV	
Connector type	16-pin multi-pin connector, clamp-type terminal (0.2 mm² to 2.5 mm²), screw connection, included in delivery	
Digital input		
Number	8	
Design	Galvanically isolated, protected against reverse polarity, single ended	
Input signal	Nominal voltage ±24 V; maximum voltage ±60 V	
Signal level log. 0 Signal level log. 1	> -6 V; < +6 V** < -10 V; > +10 V	
Input current	1 mA, constant	
Connector type	16-pin multi-pin connector, clamp-type terminal (0.2 mm² to 2.5 mm²), screw connection, included in delivery	
ibaNet interface	1 (e. g. for the connection to ibaPDA)	
ibaNet protocol	3Mbit	
Data transmission rate	3 Mbit/s	
Connector type	2 ST connector (62.5 µm / 125 µm), cable length, up to 2000 m without repeater	
Power supply, interfaces, operating and indicating elements		
Power supply	24 V DC (±10 %)	
Power consumption	Typ. 4 W, max. 8 W	
Notebook interface	RJ11 socket (can be used only with ibaCom-PCMCIA-F, no longer available)	
Indicators	4 LEDs for device status 8 LEDs for status of analog inputs 8 LEDs for status of digital inputs	
Rotary switch	S1: device address, S2: device mode	S1: device address, S2: without function

*selectable with rotary switch **when used as replacement for previous devices, please note: signal level log. 0 before: > -9 V; < +9 V

Operating and environmental conditions	
Cooling	Passive
Operating temperature	32° F to 122° F (0 °C to 50 °C)
Storage and transport temperature	-13° F to 158° F (-25 °C to 70 °C)
Mounting	DIN rail mounting, vertical
Humidity class (DIN 40040)	F, no condensation
Protection class	IP20
Certification	EMC: IEC 61326-1 FCC part 15 class A
Dimensions and weight	
Dimensions (w x h x d)	2.1 in x 7.9 in x 5.6 in (53 mm x 200 mm x 141 mm)
Weight (incl. box and documentation)	approx. 1.1 kg

The devices ibaPADU-8AI-U and ibaPADU-8AI-I replace the following devices and integrate the known functions in one device. Different device modes, which provide the device specific properties of the previous devices like measuring range, input impedance, and filters, are set by means of a rotary switch.

	ibaPADU-8AI-U	**ibaPADU-8AI-I**
Replacement for previous devices	ibaPADU-8 ibaPADU-8-F1 ibaPADU-8-60 ibaPADU-8-HI ibaPADU-8-HI-F1 ibaPADU-8-HI-25 ibaPADU-8-HI-60	ibaPADU-8-I
Supported ibaFOB cards	ibaFOB-4i, ibaFOB-io ibaFOB-4i-S, ibaFOB-io-S ibaFOB-4i-X, -2i-X, -2io-X, -io-X ibaFOB-4i-D, -2i-D, -2io-D, -io-D	

Technical data measurement modules with 32Mbit Flex protocol



Short description			
Name	**ibaPADU-4-AI-U**	**ibaPADU-D-8AI-U**	**ibaPADU-D-8AI-I**
Description	Input module with 4 fast analog voltage inputs	Input module with 8 digital inputs and 8 analog voltage inputs	Input module with 8 digital inputs and 8 analog current inputs
Order number	10.121000	10.100100	10.100110
Analog inputs	4	8	
Design	Galvanically isolated, single ended		
Resolution	16 bit		
Filter	R/C low-pass 72 kHz (permanent) Analog anti-aliasing Butterworth 4th order 50 kHz and digital anti-aliasing filter, cut-off frequency 1/3 of the adjusted sampling rate, can be activated only together	R/C low-pass 40 kHz (permanent) Analog anti-aliasing Butterworth 4th order 20 kHz and digital anti-aliasing filter, cut-off frequency 1/3 of the adjusted sampling rate, can be activated only together	
Input signal range	±250 mV / ±500 mV / ±1 V / ±2.5 V / ±5 V / ±10 V / ±24 V	±2,5 V / ±10 V / ±24 V / ±60 V	±20 mA / 0...20 mA / 4...20 mA
Input impedance	100 kΩ	100 kΩ / 1 MΩ*	50 Ω
Sampling rate	Synchronous with ibaNet sampling rate		
Frequency range	0 Hz to 50 kHz	0 Hz to 20 kHz	
Accuracy	< 0.1 % of total measuring range (±1 V; ±2.5 V; ±5 V; ±10 V; ±24 V) < 0.5 % of total measuring range (± 250 mV; ±500 mV)	< 0.1 % of total measuring range	
Electrical isolation Channel-channel Channel-housing/ power supply	 AC 1.5 kV AC 1.5 kV		
Connector type	12-pin multi-pin connector (Phoenix); clamp-type terminal (0.14 mm² to 1.5 mm²) screw connection, included in delivery	16-pin multi-pin connector, clamp-type terminal (0.2 mm² to 2.5 mm²), screw connection, included in delivery	
Digital inputs	-	8	
Design		Galvanically isolated, protected against reverse polarity, single ended	
Input signal		Nominal voltage ±24 V; maximum voltage ±60 V	
Signal level log. 0 Signal level log. 1		> -6 V; < +6 V < -10 V; > +10 V	
Input current		1 mA, constant	
Sampling rate		Synchronous with ibaNet sampling rate	
Debounce filter		Optional: 4 different operating modes	
Connector type		16-pin multi-pin connector, clamp-type terminal (0.2 mm² to 2.5 mm²), screw connection, included in delivery	
ibaNet interface	1 (e. g. for the connection to ibaPDA)		
ibaNet protocol	32Mbit Flex; allows the simultaneous connection of up to 15 devices in a fiber optic ring; can be used simultaneously for data, settings and service (e. g. updates)		
Data transmission rate	32 Mbit/s		
Sampling rate	max. 100 kHz, freely adjustable	max. 40 kHz, freely adjustable	
Connector type	2 ST connector (62.5 µm / 125 µm), cable length, up to 2000 m without repeater		

*1 MΩ not possible in combination with ±2,5 V

	ibaPADU-4-AI-U	ibaPADU-D-8AI-U	ibaPADU-D-8AI-I
Further interfaces, operating and indicating elements			
Power supply	24 V DC (±10 %)	24 V DC (±10 %)	
Power comsumption	Max. 10 W	Max. 10 W	
Ethernet	-	10/100 Mbit/s (for service purposes)	
Indicators	4 LEDs for device status 4 LEDs for status of analog inputs	4 LEDs for device status 8 LEDs for status of analog inputs 8 LEDs for status of digital inputs	
Rotary switch	Device address	Device address	
Operating and environmental conditions			
Cooling	Passive		
Operating temperature	32 °F to 122 °F (0 °C to 50 °C)		
Storage and transport temperature	-13 °F to 158 °F (-25 °C to70 °C)		
Mounting	DIN-rail mounting, vertical		
Humidity class (DIN 40040)	F, no condensation		
Protection class	IP20		
Certification	EMC: IEC 61326-1 FCC part 15 class A		
Dimensions and weight			
Dimensions (w x h x d)	1.5 in x 7.4 in x 5.6 in (37 mm x 188 mm x 141 mm)	2.1 in x 7.9 in x 5.6 in (53 mm x 200 mm x 141 mm)	
Weight (incl. box & documentation)	1.1 kg	1.1 kg	

Grid independent data logger

ibaPADU-C-8AI is a grid independent measurement module for mobile data acquisition and recording. Using the easy-to-handle, compact device analog and digital signals can be recorded just where they arise.

In brief

- Grid independent data logger with internal lithium ion battery
- 8 analog inputs, 16 bit resolution
- 8 digital inputs
- Synchronous data recording of all channels
- Sampling rate 1 sample/min. to 1000 samples/s
- External trigger
- Data storage (4 or 32 GB) for local recording of measuring files
- USB interface
- Battery run-time up to 24 h during normal operation

Independent data recording

ibaPADU-C-8AI is intended for off-line data recording of process data. With the internal lithium ion battery the device can be powered for about 24 h independent of the power grid. Once ibaPADU-C-8AI is connected to the power grid, the internal battery will be charged automatically. Connected to external power supply, the device can be used for longer recordings and thereby provides by-pass protection during unexpected power failure.
ibaPADU-C-8AI is ideally suited for the mobile use. Measuring data can be acquired with high precision via 8 analog and 8 digital inputs and stored autonomously in the device.

Data stored as iba-data files

The settings for the device are done by editing a configuration file (.txt) stored on the internal memory. This process does not need an ibaPDA system.
The data are stored as iba-data files (*.dat) or CSV-files.
The data recording can be started and stopped manually by keystroke or triggered by external signal. The sampling rate can be flexibily adjusted for long term data logging (sampling rate 1 sample/min.) as well as for fast measurement (sampling rate 1000 samples/s).

Powerful analyzing with ibaAnalyzer

In order to retrieve the recorded measurement data the device should be connected to a computer via USB interface.
The computer recognizes the devices per plug and play like a mass storage device. In addition, it is possible to retrieve the data using a network connection via FTP.
For displaying and analyzing the data, the analysis software ibaAnalyzer can be used as usual.

Device versions

The device is available in two versions with different memory space:

- ibaPADU-C-8AI-Z1 with 4 GB
- ibaPADU-C-8AI-Z2 with 32 GB

The 4 GB memory, for example, offers sufficient space for measurements over 1000 days at 1 s acquisition time or 1 day at 1 ms.

Application fields

- Temporary, highly precise data logging of analog and digital data, e. g. during commissioning and trouble shooting
- Flight recorder

Technical Data

Short description		
Name	**ibaPADU-C-8AI-Z1** (4 GB memory)	**ibaPADU-C-8AI-Z2** (32 GB memory)
Order number	10.130000	10.130001
Description	Compact data acquisition module with 8 analog and 8 digital inputs	
Analog inputs		
Number	8	
Design	Single-ended, no galvanic isolation	
Resolution	16 bit	
Filter	R/C filter 8 kHz	
Input signal range	-10 V to +10 V	
Input impedance	680 kΩ (580 kΩ when device is switched off)	
Sampling rate	max. 1 kHz, freely adjustable	
Accuracy	< 0.1 % of total measuring range	
Digital inputs		
Number	8	
Design	Single-ended, no galvanic isolation	
Input signal	0 V to +30 V	
Signal level log. 0 Signal level log. 1	< 0.9 V > 2.2 V	
Sampling rate	Linked with analog sampling	
Communication interfaces		
USB	USB 2.0 Full Speed (12 Mbit/s)	
Ethernet	10/100BASE-T	
Power supply, memory, operating and indicating elements		
Trigger input	External contact or voltage level (signal level like digital inputs)	
Power supply	DC input 9 V to 30 V, USB	
Internal lithium-ion battery	Capacity 7.5 Ah at 3.6 V, rechargeable, battery run time about 24 h during normal operation	
Power consumption	Max. 6 W, depending on parameter settings and mode of operation	
Data storage	4 GByte	32 GByte
Indicators	4 LEDs for device status	
Connector type signal inputs	36-pin multi-pin connector, clamp-type terminal, included in delivery Cable inflexible/flexible (0.2 mm² to 1.5 mm²) Flexible with cable end sleeve without plastic sleeve (0.25 mm² to 1.5 mm²) Flexible with cable end sleeve with plastic sleeve (0.25 mm² to 0.75 mm²)	
Operating and environmental conditions		
Cooling	passive	
Operating temperature	32 °F to 122 °F (0 °C to 50 °C)	
Storage / transport temperature	-4 °F to 158 °F (-20 °C to 70 °C)	
Mounting	DIN rail, vertical	
Humidity class (DIN 40040)	F, no condensation	
Protection class	IP20	
Certification	EMC: IEC 61326-1: 2006-10 FCC part 15 class A	
Dimensions and weight		
Dimensions (width x height x depth)	41 mm x 188 mm x 141 mm	
Weight (incl. box and documentation)	approx. 1.1 kg	

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