



The iba Modular System

Intelligent Central Units
and I/O Modules with
suitable Interfaces



ibaPADU-S-CM

Data Acquisition

ibaPADU-S-IT

Acquiring and Processing Data

ibaCMU-S

Condition Monitoring

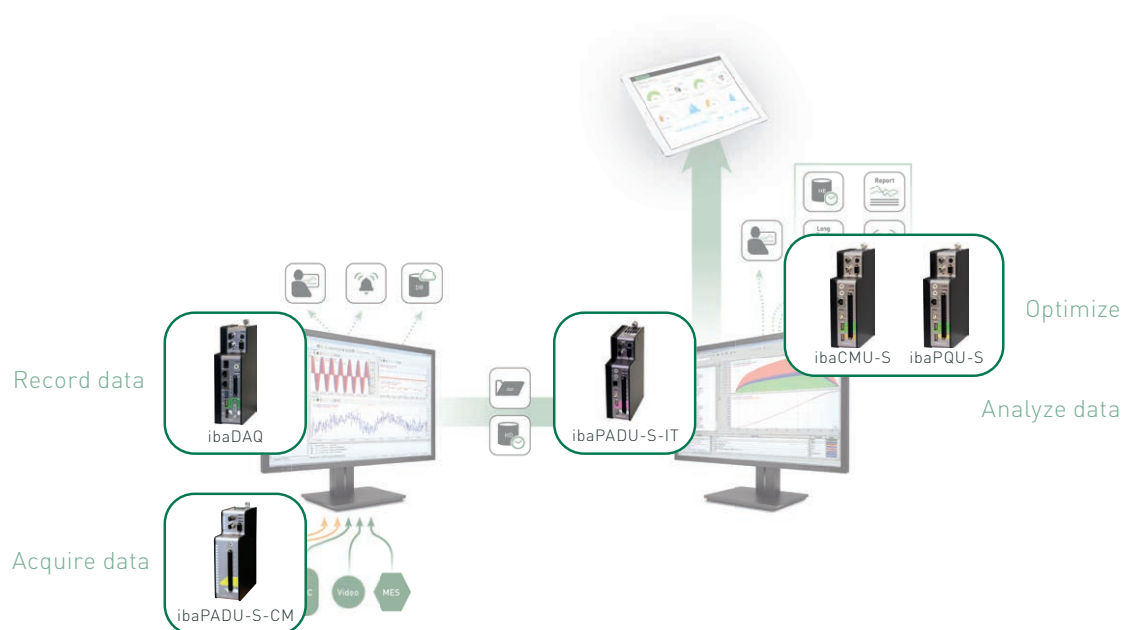
ibaPQU-S

Power Quality Monitoring

ibaDAQ

Stand-alone Data Acquisition

The central units of the iba modular system in the iba system



The flexible modular system

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The central units

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iba Modular System



The iba modular system acquires and processes measurement signals and, with the appropriate signal output modules, is perfectly suited for control applications. The decisive advantage of the system is the freely configurable concept: a central unit can be combined with up to four additional input/output modules.

Modular concept

The modular concept is based on a module rack with backplane bus for one central unit and up to 4 input and output modules.

With user-specific central units, various applications can be implemented:

Central units for each application

- › ibaPADU-S-CM is a pure communication unit for the input and output of different signals.
- › ibaPADU-S-IT has an integrated processor and an internal memory and is suitable not only for the fast acquisition of measurement values but also for intelligent processing of signals and system controls.
- › ibaCMU-S is the metrological core for condition monitoring applications.
- › ibaPQU-S is a Power Quality Unit for monitoring the grid quality according to standards with the highest precision.
- › ibaDAQ is equipped with an integrated ibaPDA system and can be used as stand-alone data acquisition device

Broad range of modules

The system includes several I/O modules for analog and digital inputs and outputs as well as for SSI and pulse transmitters. All I/O modules work with sampling rates of up to 40 kHz absolutely time-synchronously. Due to the modular technology and the broad range of I/O modules, the iba modular system can be flexibly adapted to the respective requirements.

Areas of application

The areas of application depend on the central unit that is used, the plugged modules and the used iba applications.

Typical examples are:

- › Acquisition of measurement values with and without pre-processing
- › Signal management
- › Controlling
- › Fast drive and position control
- › Condition monitoring
- › Data logger (Transient Fault Recorder)
- › Mill chatter monitoring and eccentricity analysis

At a glance

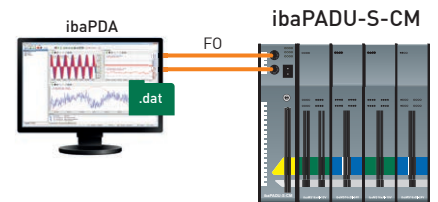
- › Modular system for acquiring and processing measurement signals
- › Suitable for measurement and control applications
- › Central units for interfacing to ibaPDA and ibaLogic
- › Application-specific central units with integrated special functions
- › Intelligent processing of signals
- › I/O modules for input/output of analog and digital signals
- › Modules with special functions, e.g. counter module
- › Up to 4 input/output modules that can be combined as required

- › Power Quality Monitoring
- › Stand-alone data logger for local applications
- › Mobile measuring

The central units

ibaPADU-S-CM

- › Modular data acquisition system
- › Data acquisition with ibaPDA
- › FO connection to ibaPDA required
- › No pre-processing of signals



Sample-synchronous acquisition

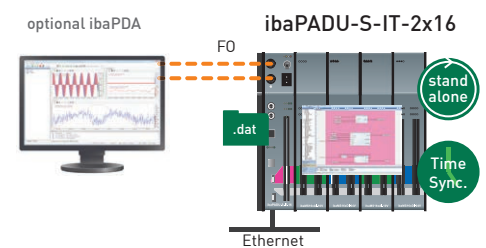
In an iba modular system, the signals of all connected modules are acquired absolutely time synchronously. If several systems are connected in an FO ring topology,

the run time is taken into account in the FO conductor and the data are acquired sample-precisely on the ibaFOB card in the ibaPDA system. This means that all channels which are acquired by means

of an ibaFOB card, are also recorded sample-synchronously in ibaPDA. A prerequisite for the data acquisition in the ring topology is the ibaNet protocol 32Mbit Flex.

ibaPADU-S-IT-2x16

- › Modular data acquisition and control system
- › Graphical programming by the user (IEC61131)
- › Stand-alone system with ibaLogic onboard
- › Optional acquisition of raw data and values calculated with ibaPDA
- › Control system, Soft PLC
- › Time-synchronization possible (NTP, DCF77)
- › Data storage in the device (110 GB SSD)



Autonomous central unit with a cycle of up to 1 ms

Due to the integrated processor and the large RAM, the ibaLogic control programs can be loaded in ibaPADU-S-IT and executed in a temporally deterministic way with a cycle of 1 ms. After having been programmed with ibaLogic, an iba modular system with ibaPADU-S-IT as central unit can work autonomously without a connection to the ibaLogic development computer. In case of an autonomous measurement data acquisition, the measurement data can be stored as files in the .dat format on the local hard disk and then downloaded via the network.

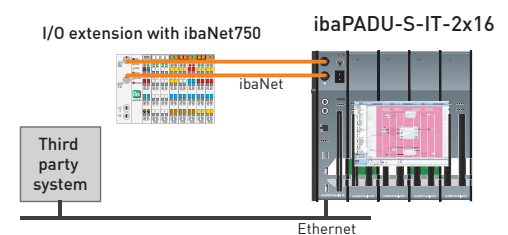
Online calculation of characteristic values

Moreover, ibaPADU-S-IT can transfer in parallel raw data and characteristic values calculated from the measurement data in real-time to the ibaPDA system. Thus, e.g. a local pre-processing of the signals like e.g. digital filtering or FFT calculations can be done with an ibaLogic application in the central unit.

Universal system interfaces

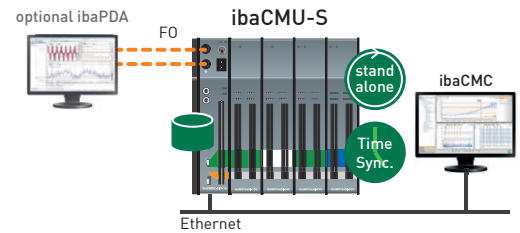
In addition to the ibaMS-modules, a huge number of different peripherals can be connected and acquired and processed with ibaPADU-S-IT. This includes process data from external systems,

that are fed in e.g. with ibaNet periphery over FO cable. The internal ibaLogic application allows the selection of all raw data and user-specific processing of these data with freely programmable function blocks. Moreover, an Ethernet connection provides access to internal signals and allows control applications to run.



ibaCMU-S

- › Modular Condition Monitoring Unit (CMU) with integrated calculation of CM characteristic values
- › Cross-plant solution with decentralized CMUs and centralized Condition Monitoring Center ibaCMC for configuration, long-term trends and alarms
- › Complex spectrum analysis functions that can be configured particularly for the measurement location and the part of the plant that has to be monitored
- › Configuration with ibaCMC (Condition Monitoring Center)
- › Optional acquisition of raw data with ibaPDA via FO outputs
- › Data storage in the device (110 GB SSD)



Flexible, decentralized measuring units

ibaCMU-S is the metrological core of an iba modular system for condition monitoring applications. The central unit is extended by I/O modules which are suited for condition monitoring purposes, especially with analog current and voltage inputs and modules for IEPE sensors.

Central configuration and analysis with ibaCMC

The system is configured by means of the Condition Monitoring Center ibaCMC. ibaCMC is a web-based application which serves as analysis and configuration backend for ibaCMU-S systems. In ibaCMC, the user can configure the plant that is to be monitored, specify analyses and define alarm functions as well as report generation. For larger plants or a cross-plant solution, several CMUs can be used, that are configured in a centralized Condition Monitoring

Center. ibaCMC is not only used for configuration but also for the visualization of long-term trends.

But ibaCMC is not necessary for the measuring process itself. Measuring can be carried out autonomously with ibaCMU-S.

Scalable through decentralized calculation of characteristic values

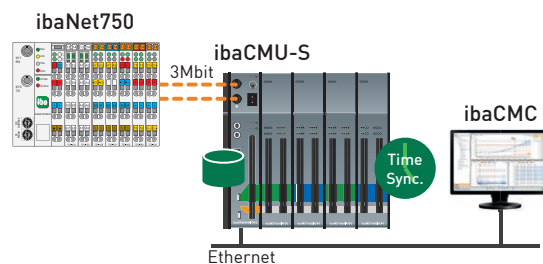
ibaCMU-S acquires the raw data of the connected sensors time-synchronously with up to 40 kHz and processes them in real-time. The central unit exchanges data with the automation environment and carries out internally a major part of the signal analysis. The

calculation results and raw data are stored in the internal memory and optionally transferred to an ibaPDA system via FO conductor. The outputs can be used for warning and alarm messages, but also for an automatic adaptation of parameters in the plant control.

Autonomous operation

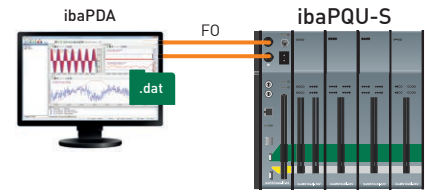
ibaCMU-S can also be operated without an ibaPDA system. On the central unit, a web interface is available which offers comprehensive diagnostic functions.

Optionally, slower process signals can be interfaced using ibaNet750 modules.



ibaPQU-S

- › Modular Power Quality Monitoring System for monitoring the grid quality according to standards
- › Grid-synchronous measurement
- › Internal calculation of grid quality parameters according to IEC 61000-4-30, class A
- › Data acquisition and calculation of statistical and long-term grid quality parameters with ibaPDA (FO connection required)
- › Raw values available for drill-down in ibaPDA
- › All calculated parameters are available as individual values in ibaPDA and can be monitored



Acquire and prove power quality according to standards

An essential basis for improving the grid quality and the availability of the grid is the precise knowledge and analysis of all decisive quality parameters. ibaPQU-S is a compact system for monitoring the grid quality and for analyzing failures. It realizes all measurement tasks that are relevant therefore. On the basis of the determined characteristic values, grid failures can be analyzed in detail and the grid operation can be managed more efficiently.

ibaPQU-S is suited for DC grids, for grids with 50 Hz and 60 Hz as well as for special grids like e.g. the railway grid with 16.7 Hz.

The system measures raw values like current and voltage grid-synchronously and calcu-

lates internally the characteristic values which are relevant for the grid quality according to e. g. IEC 61000-4-30, class A.

The raw values are available for the drill-down in ibaPDA. Harmonics and interharmonics are calculated up to the 50th.

For the Power Quality function, selected input modules are suitable, please see overview table on page 11.

Power quality analysis and transient fault recording in one system

In ibaPDA, any triggers can be configured for triggering event-related measurements and acquiring failures. For a detailed analysis, the data are acquired at a high resolution with pre- and post-trigger time. All calculated

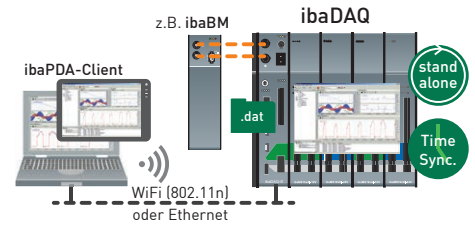
parameters are available as individual values in ibaPDA and can thus be monitored, e.g. the xth harmonic. Moreover, failures can be indicated by means of an alarm function.

With ibaAnalyzer, long-term trendings and comprehensive reports can be created, that prove e.g. the compliance with the EN 50160 standard.

Calculation	Calculation period						Grid type		
	Half period	10/12	150/180	10 s	10 min	2 h	1	3	3+N
RMS	•	•	•	•	•	•	•	•	•
Peak	•	•	•	•	•	•	•	•	•
Rectified	•	•	•	•	•	•	•	•	•
Form factor	-	•	•	•	•	•	•	•	•
Crest factor	-	•	•	•	•	•	•	•	•
Frequency	•	•	•	•	•	•	•	•	•
Phase	-	•	•	•	•	•	•	•	•
Harmonics	-	•	•	•	•	•	•	•	•
Interharmonics	-	•	•	•	•	•	•	•	•
THD	-	•	•	•	•	•	•	•	•
TIF	-	•	•	•	•	•	•	•	•
Mains signalling	-	•	•	•	•	•	•	•	•
Power/energy	-	•	•	•	•	•	•	•	•
Power/energy VA	-	•	•	•	•	•	•	•	•
Power/energy VAr	-	•	•	•	•	•	•	•	•
Fundamental reactive power/ energy	-	•	•	•	•	•	•	•	•
Power factor	-	•	•	•	•	•	•	•	•
Cos ϕ	-	•	•	•	•	•	•	•	•
Positive/negative/zero sequence component	-	•	•	•	•	•	-	-	•
Unbalance	-	•	•	•	•	•	-	•	•
Flicker (Pinst, Pst, Plt)	•	-	-	-	•	•	•	•	•
Events	-	•	-	-	-	-	•	•	•
Commutation notches	•	-	-	-	-	-	•	•	•

ibaDAQ

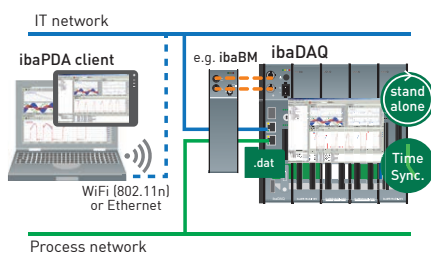
- ▶ Intelligent central unit for stand-alone data acquisition
- ▶ Integrated, complete ibaPDA system
- ▶ Can be combined with I/O modules from the iba modular system
- ▶ Data storage in the device
- ▶ More iba devices can be connected via FO
- ▶ DisplayPort for connecting a monitor
- ▶ USB interfaces for USB devices like mouse, keyboard, WLAN stick, etc.
- ▶ ibaPDA basic license for 64 signals included in delivery, can be upgraded



Measuring with high precision - in an autonomous and flexible way

ibaDAQ is an intelligent central unit providing a complete integrated ibaPDA system and an internal Solid State Disk (SSD). Thus, it can acquire and record data as stand-alone device.

With the 2 independent 1Gbit/s-Ethernet interfaces, ibaDAQ can operate in two networks and thus enable the separation of IT and process networks. This separation allows, for example, databases and storage systems to be connected to ibaDAQ, which are located in the IT network.



Operation and configuration as on the PC

Monitor, mouse, and keyboard can be connected to ibaDAQ. The device can be operated as conveniently as an ibaPDA

system running on a PC. Moreover, it can also be operated with an ibaPDA client that is connected via network.

External devices are not required for data acquisition. The measurement process can start automatically after the configuration or can be controlled by a trigger signal.

In case a notebook or tablet is used, it can be connected to ibaDAQ by using a USB-WLAN stick.

Storing data on the device

An internal SSD offers sufficient space for the measurement data. The storage capacity can be extended with an external hard disk on the USB interface, if required. After the measurement process, the measurement data can be collected via an Ethernet connection or WLAN. The data can be processed and analyzed as usual in ibaAnalyzer.

Time synchronization

All time sources supported by ibaPDA (DCF77, PTP, ibaClock) can be used for synchronizing the time. The time is buffered with an internal battery.

Monitoring and alarm

Two digital inputs and two digital outputs, which can be configured for user-specific functions, are available on the central unit. If the Watchdog function is configured in ibaPDA, one output can function as alarm output. In case a trigger signal reports an interruption of the voltage supply on a digital input, the device will be shut down and switched off in a save way.

Connection via ibaNet

The FO input and output offers the functionality of an ibaFOB-io card and supports all ibaNet protocols. Here, more iba devices can be connected, like e.g. the ibaPADU family, iba bus monitors, or system connections.

Basic license

ibaDAQ is available by default with the ibaPDA basic license for up to 64 signals. If required, the license can be extended anytime by more signals, additional data stores, or Ethernet based interfaces.

I/O modules

The I/O modules are detected automatically by the central unit. The iba modular system can be configured by means of the I/O Manager in the ibaPDA application or the I/O Configurator in the ibaLogic application.

The central unit requires a power supply of 24 V DC. The power supply of I/O devices is provided internally by the backplane bus. A synchronization channel on the backplane guarantees isochronous sampling of all I/O modules.

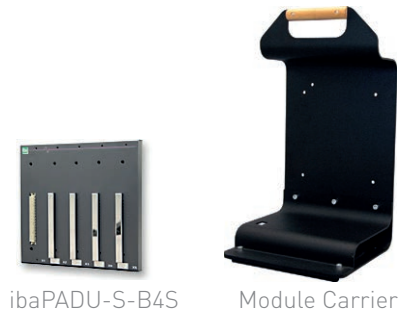
The following table gives an overview over the current I/O modules and how they may be combined with the different central units.

			ibaPADU -S-CM	ibaPADU -S-IT	ibaCMU-S	ibaPQU-S	ibaDAQ
Inputs	ibaMS3xAI-1A	3 analog inputs, 1 A AC	●	●	-	●	●
	ibaMS3xAI-5A	3 analog inputs, 5 A AC	●	●	-	●	●
	ibaMS3xAI-1A/100A	3 analog inputs, 1 A AC/100 A DC	●	●	-	●	●
	ibaMS4xAI-380VAC	4 analog inputs, 380 V AC	●	●	-	●	●
	ibaMS8xAI-110VAC	8 analog inputs, 110 V AC	●	●	-	●	●
	ibaMS16xAI-10V	16 analog inputs, ±10 V	●	●	●	●	●
	ibaMS16xAI-10V-HI	16 analog inputs, ±10 V (high impedance)	●	●	-	●	●
	ibaMS16xAI-24V	16 analog inputs, ±24 V	●	●	●	●	●
	ibaMS16xAI-24V-HI	16 analog inputs, ±24 V (high impedance)	●	●	-	●	●
	ibaMS16xAI-20mA	16 analog inputs, ±20 mA	●	●	●	●	●
	ibaMS16xDI-220V	16 digital inputs, ±220 V	●	●	-	○	●
	ibaMS16xDI-24V	16 digital inputs, ±24 V	●	●	-	○	●
	ibaMS32xDI-24V	32 digital inputs, ±24 V	●	●	-	○	●
	ibaMS8xIEPE	8 inputs for IEPE vibration sensors	●	●	●	-	●
	ibaMS4xUCO	Counter module, 4 inputs	●	●	-	○	●
Outputs	ibaMS16xAO-10V	16 analog outputs, ±10 V	●	●	-	○	●
	ibaMS16xAO-20mA	16 analog outputs, ±20 mA	●	●	-	○	●
	ibaMS32xDIO-24V	32 digital outputs, 24 V	●	●	●	○	●
Combi	ibaMS16xDIO-24V	16 digital inputs and 16 digital outputs, 24 V	●	●	-	○	●
	ibaMS4xADIO	4 analog inputs, 4 analog outputs, 4 digital inputs, 4 digital outputs	●	●	-	◐	●

- Module supports the function of the central unit
- Module can be used, but signals are only transmitted as raw values
- ⦿ The analog inputs can be used for the central unit's function

Backplane panels and mounting accessories

Several backplane panels with backplane bus are available for mounting as well as the corresponding accessories for the installation in 19" racks. Up to two separated backplane panels fit in a 19" rack side by side.



Name	Order no.	Description
ibaPADU-S-B4S	10.124000	Backplane panel for a central unit and 4 modules w x h x d: 229 mm x 219 mm x 21 mm
ibaPADU-S-B1S	10.124002	Backplane panel for a central unit and 1 module w x h x d: 99 mm x 247 mm x 21 mm
ibaPADU-S-B	10.124001	Backplane panel for a central unit w x h x d: 56 mm x 219 mm x 28 mm
Mounting panel 19" for iba modular system	10.124005	19" mounting panel for up to two ibaPADU-S-B4S backplane panels incl. mounting accessories w x h: 483 mm x 221 mm
Mounting angle for iba modular system	10.124006	2 mounting angles for mounting an iba modular system backplane in a cabinet w x h x d: 57 mm x 179 mm x 10 mm
Module Carrier	10.124007	Module carrier for an iba modular system

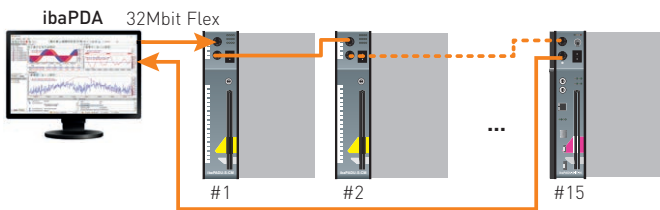
ibaNet protocols

All central units can send and receive the ibaNet protocol 32Mbit Flex bidirectionally. The signal acquisition can be done with up to 40 kHz and can be selected variably for each modular system. Moreover, some central units support the previous 3Mbit and 32Mbit ibaNet protocols, see table below.

32Mbit Flex protocol

With 32Mbit Flex, the measurement data and the configuration data are transferred bidirectionally via 2 FO cables. A LAN connection for transferring the configuration data - as for the previous ibaNet protocols - is not required.

32Mbit Flex works with a data transfer rate of 32 Mbit/s and supports up to 15 „flex-capable“ devices connected in a ring topology. The size of the data



In the ring topology with 32Mbit Flex, all modules in the different modular systems work sample synchronously.

telegrams is flexible, as long as the overall data volume of 4060 Byte is not exceeded.

The sampling rate can be set flexibly for the modular systems at up to 40 kHz. Every system can work with its own sampling rate. The sampling rates only

have to be a multiple of the basic sampling rate and the whole volume in the FO conductor must not be exceeded. In principle, the following rule applies: The less data is transmitted, the higher the possible sampling rate.

	32Mbit Flex	32Mbit	5Mbit	3Mbit
ibaPADU-S-CM	●	-	-	-
ibaPADU-S-IT	●	●	-	●
ibaCMU-S	●	-	-	●
ibaPQU-S	●	-	-	-
ibaDAQ	●	●	●	●

Technical data central units



Short description			
Name	ibaPADU-S-CM	ibaPADU-S-IT-2x16	ibaCMU-S
Description	CPU for modular data acquisition system	CPU for control applications	CPU for condition monitoring applications
Order number	10.124030	10.124021	10.125010
Processor units			
Processor	–	1.6 GHz Atom processor, dual core CPU	1.6 GHz Atom processor, single CPU
Operating system	–	Windows Embedded Compact 7	Windows CE® 5.0
Main memory	–	2 GB	512 MB
Flash memory	–	Solid State Drive 110 GB	Solid State Drive 110 GB
RAM	–	RAM-Drive 128 MB	RAM-Drive 128 MB
Clock (RTC)	–	Unbuffered; optional external buffering via X30, synchronization by DCF77 (digital input) or NTP	Unbuffered; optional external buffering via X30, synchronization by DCF77 (digital input) or NTP
Interfaces			
ibaNet	32Mbit Flex 2 ST coupling (50/125 µm and 62.5/125 µm) for RX and TX	3Mbit, 32Mbit, 32Mbit Flex 2 ST coupling (50/125 µm and 62.5/125 µm) for RX and TX	3Mbit, 32Mbit Flex 2 ST coupling (50/125 µm and 62.5/125 µm) for RX and TX
Ethernet	–	10/100 Mbit/s	10/100 Mbit/s
USB	for service purposes only	2x host, 1x device for service purposes	for service purposes only
Digital inputs			
Number	8	8	8
Design	Galvanically isolated, protected against reverse polarity, single ended	Galvanically isolated, protected against reverse polarity, single ended	Galvanically isolated, protected against reverse polarity, single ended
Input signal	24 V DC	24 V DC	24 V DC
Max. input voltage	±60 V permanent	±60 V permanent	±60 V permanent
Signal level log. 0 Signal level log. 1	> -6 V; < +6 V < -10 V; > +10 V	> -6 V; < +6 V < -10 V; > +10 V	> -6 V; < +6 V < -10 V; > +10 V
Input current	1 mA, constant	1 mA, constant	1 mA, constant
Debounce filter	Optional: 4 operating modes	Optional: 4 operating modes	Optional: 4 operating modes
Sampling rate	Up to 40 kHz, freely adjustable	Up to 40 kHz, freely adjustable	Up to 40 kHz, freely adjustable
Delay	Typ. 10 µs	Typ. 10 µs	Typ. 10 µs
Electrical isolation channel-channel channel-housing	AC 2.5 kV AC 2.5 kV	AC 2.5 kV AC 2.5 kV	AC 2.5 kV AC 2.5 kV
Connector type	16-pin terminal block, connector with clamp-type terminal and screw flanges [0.2 mm² to 2.5 mm²], included in delivery	16-pin terminal block, connector with clamp-type terminal and screw flanges [0.2 mm² to 2.5 mm²], included in delivery	16-pin terminal block, connector with clamp-type terminal and screw flanges [0.2 mm² to 2.5 mm²], included in delivery
Power supply, indicators			
Power supply	24 V DC ±10 % not stabilized 200 mA (without I/O modules), 3 A (with I/O modules)	24 V DC ±10 % not stabilized 1 A (without I/O modules), 3 A (with I/O modules)	24 V DC ±10 % not stabilized 1 A (without I/O modules), 3 A (with I/O modules)
Power consumption	Up to 5 W	Up to 20 W	Up to 20 W
Indicators	4 LEDs for device status 8 LEDs for digital inputs	4 LEDs for device status 8 LEDs for digital inputs 4 LEDs user-defined applications	4 LEDs for device status 8 LEDs for digital inputs 4 LEDs for CM applications
Certification			
Standards	EMC: IEC 61326-1 FCC part 15 class A	EMC: IEC 61326-1 FCC part 15 class A	EMC: IEC 61326-1 FCC part 15 class A
MTBF ¹⁾	1,951,614 hours / 222 years	255,939 hours / 29 years	–

1) MTBF (mean time between failure) according to Telcordia 3 SR232 (Reliability Prediction Procedure of Electronic Equipment; Issue 3 Jan. 2011) and NPRD (Non-electronic Parts Reliability Data 2011).



Short description	
Name	ibaPQU-S
Description	CPU for Power Quality Monitoring applications
Order number	10.150000
Processor unit	
Processor	1.6 GHz Atom processor, dual core CPU
Flash memory	Solid State Drive
Clock	Unbuffered / external buffering possible
Interfaces	
ibaNet	32Mbit Flex 2 ST coupling (50/125 µm and 62.5/125 µm) for RX/TX
Ethernet	10/100 Mbit/s
USB	for service purposes
Digital inputs	
Number	8
Design	Galvanically isolated, protected against reverse polarity, single ended
Input signal	24 V DC
Max. input voltage	±60 V permanent
Signal level log. 0	> -6 V; < +6 V
Signal level log. 1	< -10 V; > +10 V
Input current	1 mA, constant
Debounce filter	Optional: 4 different operating modes
Sampling rate	Up to 40 kHz, freely adjustable
Delay	Typ. 10 µs
Electrical isolation	
channel-channel	AC 2.5 kV
channel-housing	AC 2.5 kV
Connector type	16-pin terminal block, connector with clamp-type terminal and screw flanges (0.2 mm² to 2.5 mm²), included in delivery
Measured values	
	Voltage, current (raw values) Frequency (all standard-compliant times) RMS and peak value, rectified value, form factor, crest factor (all standard-compliant times) FFT (harmonic up to 50, interharmonic up to 50, from 200 ms all standard-compliant times) THD (from 200 ms all standard-compliant times) Phase values (U / I phase angle relating to the reference voltage) Power values (active, apparent and reactive power, fundamental reactive power, energy, power factor for single conductors and the whole grid system) Symmetrical components of 3-phase systems with N/PE (positive, negative, zero sequence), voltage symmetry Flicker (short term, long term, actual) Events, commutation notches
Power supply, indicators	
Power supply	24 V DC, ±10 % not stabilized; 1 A (without I/O modules), 3 A (with I/O modules)
Power consumption	Up to 20 W
Indicators	4 LEDs for device status 8 LEDs for digital inputs
Certification	
Standards	EMC: IEC 61326-1 FCC part 15 class A IEC 61000-4-30:2015 Class A IEC 61000-4-15:2010 IEC 61000-4-4:2012 IEC 61180:2016 IEC 62586-2:2013



Short description	
Name	ibaDAQ
Description	CPU for stand-alone data acquisition
Order number	10.170031
Processor unit	
Processor	Intel Atom E3950 quad core CPU 1.6 GHz
Operating system	Win10 LTSC 2021/v21H2
Main memory	8 GB
Flash memory	Solid State Drive 512 GB
Clock	Buffered by battery, can be replaced during operation [3V Lithium CR2032] Synchronization via NTP
Interfaces	
ibaNet	32Mbit Flex, 32Mbit, 5Mbit, 3Mbit
Connectors	2 ST connectors each for RX and TX; iba recommends the use of FO with multimode fibers of type 50/125 µm or 62.5/125 µm; cable length up to 2000 m possible without amplifier, depending on transmitter, receiver, FO and environment.
Ethernet	2x 1 Gbit/s
USB	1x USB 3.0, 1x USB 2.0
DisplayPort	Connection for monitor
Digital inputs	
Number	2
Design	Galvanically isolated, protected against reverse polarity, single ended
Input signal	DC 24 V
Max. input voltage	±60 V permanent
Signal level log. 0	> -6 V; < +6 V
Signal level log. 1	< -10 V; > +10 V
Input current	1 mA, constant
Debounce filter	Optional: 4 operating modes, can be configured in ibaPDA
Sampling rate	Up to 40 kHz, freely adjustable in ibaPDA
Delay	Typ. 10 µs
Electrical isolation	
channel-channel	AC 2,5 kV
channel-housing	AC 2,5 kV
Connector type	Screw-type terminal (0.14 mm² to 1.5 mm²), screw connection, included in delivery
Digital outputs	
Number	2
Design	Galvanically isolated, solid-state DC switch
Switching voltage	up to DC 200 V, protection against surge voltages
Switching current	up to 350 mA (permanent), overcurrent protection
Switching delay	< 2 ms (at 100 mA)
ON resistance (log. 1)	up to 3.75 Ω (at 100 mA)
OFF resistance (log. 0)	min. 100 MΩ
Electrical isolation	
channel-channel	AC 2.5 kV
channel-housing	AC 2.5 kV
Connector type	Screw-type terminal (0.14 mm² to 1.5 mm²), screw connection, included in delivery
Power supply and indicators	
Power supply	24 V DC, ±10 % not stabilized; 1 A (without I/O modules), 3 A (with up to 4 I/O modules)
Power consumption	Up to 36 W
Indicators	6 LEDs for device status, 2 LEDs for digital inputs, 2 LEDs for digital outputs 2 LEDs for customized applications, can be configured in ibaPDA
Certification	
Standards	EMC: IEC 61326-1, FCC part 15 class A
MTBF ¹⁾	162168 h / approx. 18 a

1) According to Telcordia 3 SR232 (Reliability Prediction Procedure of Electronic Equipment; Issue 3 Jan. 2011) und NPRD (Non-electronic Parts Reliability Data 2011).

Input modules for analog signal electronics

- › ibaMS16xAl-10V
- › ibaMS16xAl-10V-HI
- › ibaMS16xAl-24V
- › ibaMS16xAl-24V-HI
- › ibaMS16xAl-20mA



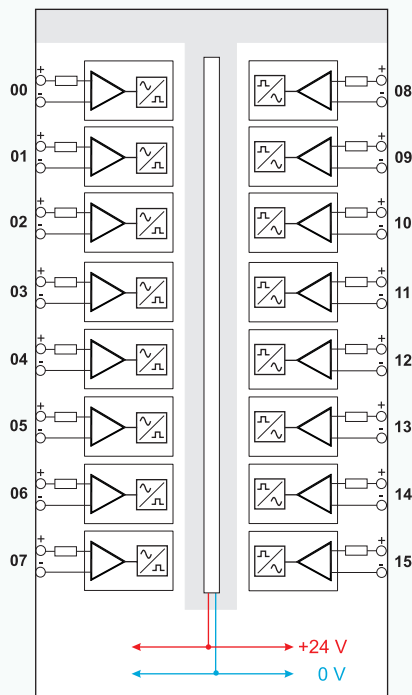
Short description			
Name	ibaMS16xAI-10V ibaMS16xAI-10V-HI ibaMS16xAI-24V ibaMS16xAI-24V-HI		ibaMS16xAI-20mA
Description	Input modules with 16 analog voltage inputs		Input module with 16 analog current inputs
Order number	10V: 10.124100 10V-HI: 10.124101 24V: 10.124102 24V-HI: 10.124103		10.124110
Analog inputs			
Number	16		16
Design	Galvanically isolated, single ended		Galvanically isolated, single ended
Resolution	16 Bit		16 Bit
Filter ¹⁾	permanent in addition	R/C low-pass, 1 st order, 40 kHz (-HI: 25 kHz) Analog anti-aliasing filter (Butterworth), 4 th order, 20 kHz Digital anti-aliasing filter (Tschebyscheff II) ²⁾ , 8 th order , cutoff frequency can be adjusted	R/C low-pass, 1 st order, 40 kHz Analog anti-aliasing filter (Butterworth), 4 th order, 20 kHz Digital anti-aliasing filter (Tschebyscheff II) ²⁾ , 8 th order , cutoff frequency can be adjusted
Input signal range	10V/10V-HI: -10 V ... +10 V 24V/24V-HI: -24 V ... +24 V		-20 mA ... +20 mA
Max. input voltage	±60 V permanent ±100 V for 1 min., followed by 10 minutes max. input voltage		±60 V permanent ±100 V for 1 min., followed by 10 minutes max. input voltage
Input impedance		Device switched off Device switched on	50 Ω
	10 V 10 V-HI 24 V 24 V-HI	100 kΩ 750 kΩ 100 kΩ 1.0 MΩ	133 kΩ 1.0 MΩ 111 kΩ 1.113 kΩ
Sampling rate	Up to 40 kHz, freely adjustable		Up to 40 kHz, freely adjustable
Frequency range	0 Hz ... 20 kHz		0 Hz ... 20 kHz
Accuracy	< 0.1 % of total measuring range		< 0.1 % of total measuring range
Electrical isolation channel-channel channel-housing/ power supply	AC 1.5 kV AC 1.5 kV		AC 1.5 kV AC 1.5 kV
Connector type	2x 16-pin multi-pin connector, clamp-type terminal, (0.2 mm ² to 2.5 mm ²), screw connection, included in delivery		2x 16-pin multi-pin connector, clamp-type terminal, (0.2 mm ² to 2.5 mm ²), screw connection, included in delivery
Additional functions			
Grid frequency measurement 10 Hz ... 80 Hz	Interval 1 s / 10 s (according to IEC 61000-4-30)		Interval 1 s / 10 s (according to IEC 61000-4-30)
Power supply and indicators			
Power supply	24 V DC, internal via backplane bus		24 V DC, internal via backplane bus
Power consumption	Up to 12 W		Up to 12 W
Indicators	4 LEDs for device status 16 LEDs for status of the analog inputs		4 LEDs for device status 16 LEDs for status of the analog inputs
Certification			
Standards	EMC: IEC 61326-1; FCC part 15 class A		EMC: IEC 61326-1; FCC part 15 class A
MTBF according to Telcordia 3 SR232 and NPRD	10V: 1,084,665 hours / 123 years		1,124,943 hours / 128 years

Fields of application

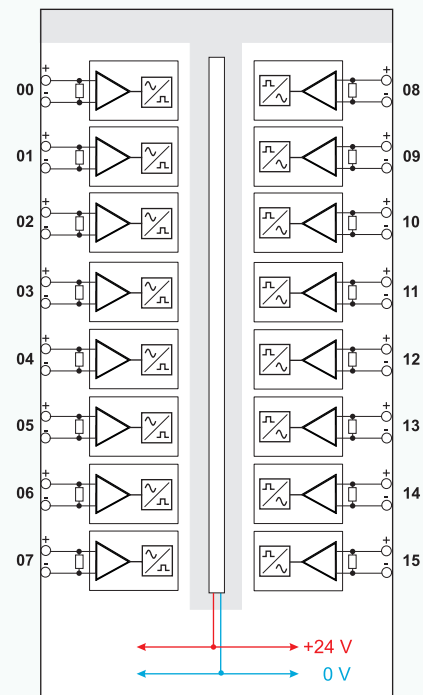
- › Power generation and distribution
- › Test benches
- › Power factor compensation plants
- › General voltage or current measurement
- › Condition monitoring

Connection diagrams

ibaMS16xAI-10V / -10V-HI / -24V / -24V-HI



ibaMS16xAI-20mA



Special feature

The additional functions are automatically detected in ibaPDA and can be configured in the I/O Manager. In addition to the actual measured values, the additional function is available as virtual signal in the signal tree and can be displayed, recorded and used for calculations like all other signals.

Input modules for current transformers in medium and high voltage technology

- › ibaMS3xAI-1A
- › ibaMS3xAI-5A
- › ibaMS3xAI-1A/100A



Short description			
Name	ibaMS3xAI-1A	ibaMS3xAI-5A	ibaMS3xAI-1A/100A
Description	Input module with 3 analog current inputs	Input module with 3 analog current inputs	Input module with 3 analog current inputs
Order number	10.124600	10.124610	10.124620
Analog inputs			
Number	3	3	3
Design	Galvanically isolated, single ended	Galvanically isolated, single ended	Galvanically isolated, single ended, 2 A/D converters per channel
Resolution	16 Bit	16 Bit	16 Bit
Filter ¹⁾	permanent R/C low-pass, 1 st order, 40 kHz in addition Analog anti-aliasing filter (Butterworth), 4 th order, 20 kHz Digital anti-aliasing filter (Tschhebyscheff I) ²⁾ , 8 th order	permanent R/C low-pass, 1 st order, 40 kHz in addition Analog anti-aliasing filter (Butterworth), 4 th order, 20 kHz Digital anti-aliasing filter (Tschhebyscheff I) ²⁾ , 8 th order	permanent R/C low-pass, 1 st order, 40 kHz in addition Analog anti-aliasing filter (Butterworth), 4 th order, 20 kHz Digital anti-aliasing filter (Tschhebyscheff I) ²⁾ , 8 th order
Input signal range	-3.0 A ... +3.0 A	-15.0 A ... +15.0 A	-6.25 A ... +6.25 A -100 A ... +100 A ³⁾
Max. input current	±10.5 A permanent	±24 A permanent	±24 A permanent ±100 A for 1 s per minute ±500 A for 0.2 s per 5 minutes ⁴⁾
Input impedance	25 mΩ	5 mΩ	2.5 mΩ
Sampling rate	Up to 40 kHz, freely adjustable	Up to 40 kHz, freely adjustable	Up to 40 kHz, freely adjustable
Frequency range	0 Hz ... 20 kHz	0 Hz ... 20 kHz	0 Hz ... 20 kHz
Accuracy	< 0.1 % of total measuring range	< 0.1 % of total measuring range	< 0.1 % of total measuring range
Electrical isolation channel-channel channel-housing/ power supply	AC 2.5 kV AC 2.5 kV	AC 2.5 kV AC 2.5 kV	AC 2.5 kV AC 2.5 kV
Connector type	1x 8-pin multi-pin connector, clamp-type terminal (0.5 mm ² to 10.0 mm ²), and interlocking device, included in delivery, without jumper	1x 8-pin multi-pin connector, clamp-type terminal (0.5 mm ² to 10.0 mm ²), and interlocking device, included in delivery, without jumper	1x 8-pin multi-pin connector, clamp-type terminal (0.5 mm ² to 10.0 mm ²), and interlocking device, included in delivery, without jumper
Additional functions			
Grid frequency measurement 10 Hz ... 80 Hz	Interval 1 s / 10 s (according to IEC 61000-4-30)	Interval 1 s / 10 s (according to IEC 61000-4-30)	Interval 1 s / 10 s (according to IEC 61000-4-30)
Power supply and indicators			
Power supply	24 V DC, internal via backplane bus	24 V DC, internal via backplane bus	24 V DC, internal via backplane bus
Power consumption	Up to 12 W	Up to 12 W	Up to 12 W
Indicators	4 LEDs device status 3 LEDs status of analog inputs	4 LEDs device status 3 LEDs status of analog inputs	4 LEDs device status 3 LEDs status of analog inputs
Certification			
Standards	EMC: IEC 61326-1 FCC part 15 class A Safety: IEC 61010-1	EMC: IEC 61326-1 FCC part 15 class A Safety: IEC 61010-1	EMC: IEC 61326-1 FCC part 15 class A Safety: IEC 61010-1
MTBF acc. to Telcordia 3 SR232 and NPRD	-	-	475,416 hours / 54 years

¹⁾ beginning with hardware version B0 ²⁾ can only be enabled when sampling rate > 500 Hz, cut-off frequency adjustable from 100 Hz to 0.5*sampling rate

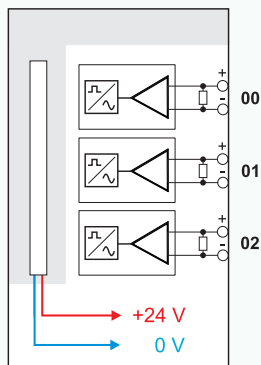
³⁾ no additional filters in 100 A measuring range ⁴⁾ A recalibration is recommended after the occurrence of this current, as in this case a permanent deviation of the measured values may occur.

Fields of application

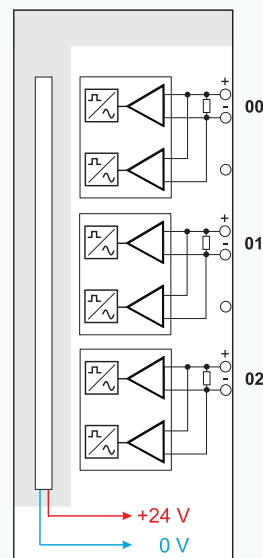
- › Power generation and distribution
- › Test benches
- › Power factor compensation plants

Connection diagrams

ibaMS3xAI-1A / -5A



ibaMS3xAI-1A/100A



Special Feature

The additional functions are automatically detected in ibaPDA and can be configured in the I/O Manager. In addition to the actual measured values, the additional function is available as virtual signal in the signal tree and can be displayed, recorded and used for calculations like all other signals.

Input modules for voltage transformers in medium and high voltage technology

- › ibaMS4xAI-380VAC
- › ibaMS8xAI-110VAC



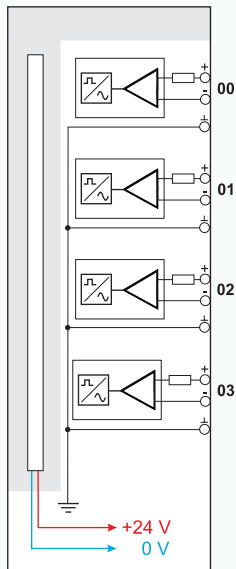
Short description		
Name	ibaMS4xAI-380VAC	ibaMS8xAI-110VAC¹⁾
Description	Input module with 4 analog voltage inputs	Input module with 8 analog voltage inputs
Order number	10.124521	10.124500
Analog inputs		
Number	4	8
Design	Galvanically isolated, single ended	Galvanically isolated, single ended
Resolution	16 Bit	16 Bit
Filter	permanent in addition R/C low-pass, 1 st order, 40 kHz Analog anti-aliasing filter (Butterworth), 4 th order, 20 kHz Digital anti-aliasing filter (Tschebyscheff I) ²⁾ , 8 th order	R/C low-pass, 1 st order, 40 kHz Analog anti-aliasing filter (Butterworth), 4 th order, 20 kHz Digital anti-aliasing filter (Tschebyscheff I) ²⁾ , 8 th order
Input signal	380 V AC	110 V AC
End value of measuring range	±1074 V	±312 V
Input impedance	1 MΩ	250 kΩ
Sampling rate	Up to 40 kHz, freely adjustable	Up to 40 kHz, freely adjustable
Frequency range	0 Hz ... 20 kHz	0 Hz ... 20 kHz
Accuracy	< 0.1 % of total measuring range	< 0.1 % of total measuring range
Electrical isolation	channel-channel channel-housing/ power supply AC 2.5 kV AC 2.5 kV	AC 1.5 kV AC 1.5 kV
Connector type	1x 12-pin multi-pin connector, clamp-type terminal and interlocking device (0.08 mm ² to 2.5 mm ²), included in delivery	1x 16-pin multi-pin connector, clamp-type terminal (0.2 mm ² to 2.5 mm ²), screw connection, included in delivery
Additional functions		
Grid frequency measurement 10 Hz ... 80 Hz	Interval 1 s / 10 s (acc. IEC 61000-4-30)	Interval 1 s / 10 s (acc. IEC 61000-4-30)
Power supply and indicators		
Power supply	24 V DC, internal via backplane bus	24 V DC, internal via backplane bus
Power consumption	Up to 8 W	Up to 8 W
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
Certification		
Standards	EMC: IEC 61326-1 FCC part 15 class A Safety: IEC 61010-1 (CAT II 300 V)	EMC: IEC 61326-1 FCC part 15 class A Safety: IEC 61010-2-030 (CAT II 150 V)
MTBF according to Telcordia 3 SR232 and NPRD	233,973 hours / 26 years	225,984 hours / 25 years

Fields of application

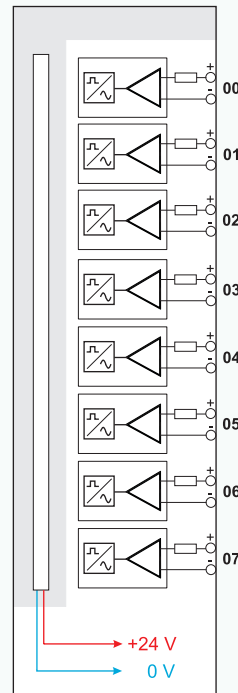
- › Power generation and distribution
- › Test benches
- › Power factor compensation plants

Connection diagrams

ibaMS4xAI-380VAC



ibaMS8xAI-110VAC



Special feature

The additional functions are automatically detected in ibaPDA and can be configured in the I/O Manager. In addition to the actual measured values, the additional function is available as virtual signal in the signal tree and can be displayed, recorded and used for calculations like all other signals.

Input modules with digital inputs

- › ibaMS16xDI-24V
- › ibaMS16xDI-220V
- › ibaMS32xDI-24V

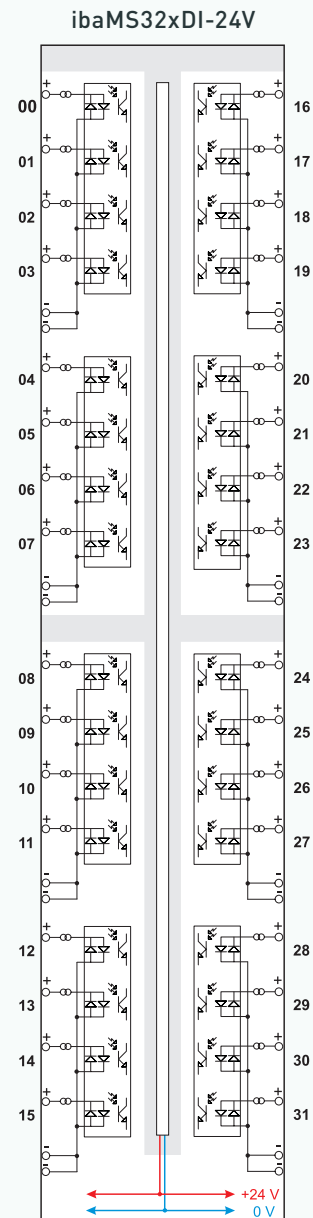
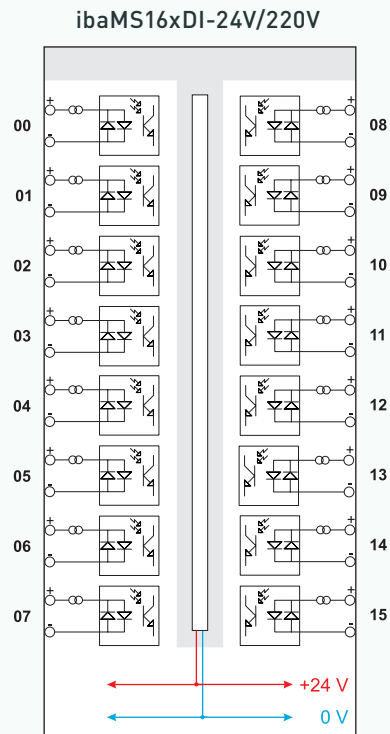


Short description			
Name	ibaMS16xDI-24V	ibaMS16xDI-220V	ibaMS32xDI-24V
Description	Input module with 16 digital inputs	Input module with 16 digital inputs	Input module with 32 digital inputs
Order number	10.124201	10.124200	10.124210
Digital inputs			
Number	16	16	32
Design	Galvanically isolated, protected against reverse polarity, single ended	Galvanically isolated, protected against reverse polarity, single ended	8 galvanically isolated roots with 4 inputs each
Input signal	24 V DC	220 V DC	24 V DC
Max. input voltage	±60 V permanent	±300 V for 1 minute	±48 V permanent
Signal level log. 0	> -6 V; < +6 V	> -56 V; < +56 V ¹⁾	> -6 V; < +6 V
Signal level log. 1	< -10 V; > +10 V	< -76 V; > +76 V ¹⁾	< -10 V; > +10 V
Hysteresis	none	none	Typ. 1 V
Input current	1 mA, constant	1 mA, constant	1 mA, constant
Debounce filter	Optional: 4 different operating modes	Optional: 4 different operating modes	Optional: 4 different operating modes
Sampling rate	Up to 40 kHz, freely adjustable	Up to 40 kHz, freely adjustable	Up to 40 kHz, freely adjustable
Frequency range	0 Hz ... 20 kHz	0 Hz ... 20 kHz	0 Hz ... 20 kHz
Delay	Typ. 10 µs	Typ. 10 µs	Typ. 10 µs
Electrical isolation			
Channel-channel	AC 2.5 kV	AC 2.5 kV	Root-root AC 1.5 kV
Channel-housing/ power supply	AC 2.5 kV	AC 2.5 kV	Root-housing/ AC 1.5 kV power supply
Connector type	2x 16-pin multi-pin connector, clamp-type terminal (0.2 mm ² to 2.5 mm ²), screw connection, included in delivery	2x 16-pin multi-pin connector, clamp-type terminal (0.2 mm ² to 2.5 mm ²), screw connection, included in delivery	4x 12-pin multi-pin connector, screw-type terminal (0.14 mm ² to 1.5 mm ²), screw connection, included in delivery
Power supply and indicators			
Power supply	24 V DC, internal via backplane bus	24 V DC, internal via backplane bus	24 V DC, internal via backplane bus
Power consumption	Up to 8 W	Up to 8 W	Up to 8 W
Indicators	4 LEDs for device status 16 LEDs for status of digital inputs	4 LEDs for device status 16 LEDs for status of digital inputs	4 LEDs for device status 32 LEDs for status of digital inputs
Certification			
Standards	EMC: IEC 61326-1 FCC part 15 class A	EMC: IEC 61326-1 FCC part 15 class A Safety: IEC 61010-1	EMC: IEC 61326-1 FCC part 15 class A
MTBF according to Telcordia 3 SR232	-	2,460,501 hours / 280 years	1,140,726 hours / 130 years

Fields of application

- › Power generation and distribution
- › Test benches
- › Power factor compensation plants
- › Condition monitoring

Connection diagrams



Output modules with analog outputs

- › ibaMS16xAO-10V
- › ibaMS16xAO-20mA



Short description		
Name	ibaMS16xAO-10V	ibaMS16xAO-20mA
Description	Output module with 16 analog voltage outputs	Output module with 16 analog current outputs
Order number	10.124150	10.124160
Analog outputs		
Number	16	16
Design	4 galvanically isolated roots with 4 outputs each	4 galvanically isolated roots with 4 outputs each
Resolution	16 Bit	16 Bit
Filter	R/C low-pass 40 kHz ¹⁾ , permanent	R/C low-pass 40 kHz ¹⁾ , permanent
Output signal range	-10 V ... +10 V	-20 mA ... +20 mA
Load	≥1 kΩ	≤ 500 Ω
Output frequency	Up to 40 kHz, freely adjustable	Up to 40 kHz, freely adjustable
Delay	8 μs + 12 μs (settling time, until 90% of the output value is reached)	8 μs + 12 μs (settling time, until 90% of the output value is reached)
Accuracy	< 0.1 % of total measuring range	< 0.5 % of total measuring range
Electrical isolation		
root-root	AC 2.5 kV	AC 2.5 kV
root-housing/power supply	AC 2.5 kV	AC 2.5 kV
Connector type	4x 12-pin multi-pin connector, screw-type terminal (0.14 mm² to 1.5 mm²), screw connection, included in delivery	4x 12-pin multi-pin connector, screw-type terminal (0.14 mm² to 1.5 mm²), screw connection, included in delivery
Protective functions		
Safe state	Channel root switched off	Channel root switched off
Current limitation	Short-circuit protection	Short-circuit protection
Hardware error (e.g. over temperature)	The root switches to „safe state“, when connection is incorrect (resettable via software)	The root switches to „safe state“, when connection is incorrect (resettable via software)
Power supply and indicators		
Power supply	24 V DC, internal via backplane bus	24 V DC, internal via backplane bus
Power consumption	Up to 14 W	Up to 14 W
Indicators	4 LEDs for device status 16 LEDs for status of analog outputs	4 LEDs for device status 16 LEDs for status of analog outputs
Certification		
Standards	EMC: IEC 61326-1 FCC part 15 class A	EMC: IEC 61326-1 FCC part 15 class A
MTBF according to Telcordia 3 SR232 and NPRD		218,234 hours / 24 years

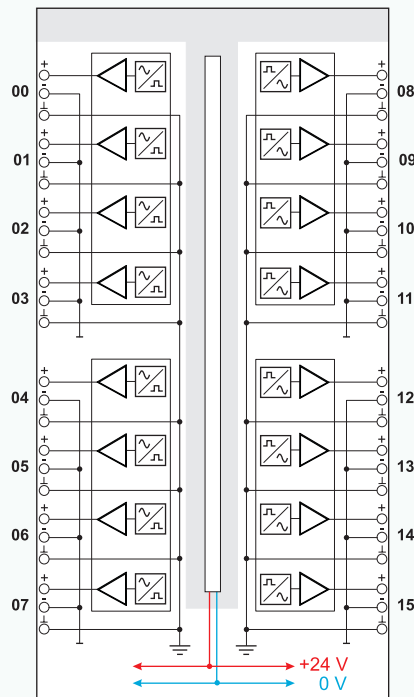
Fields of applications

Triggering of

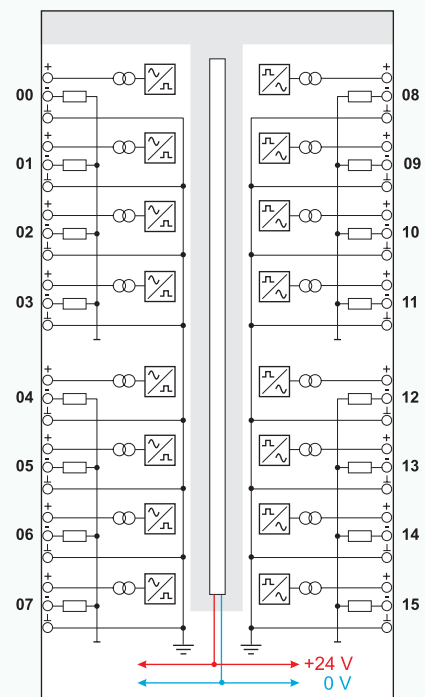
- › Converters
- › Controllers
- › Drives / linear drives
- › Valves
- › Test benches

Connection diagrams

ibaMS16xA0-10V



ibaMS16xA0-20mA



Output modules with digital outputs

▸ ibaMS32xD0-24V

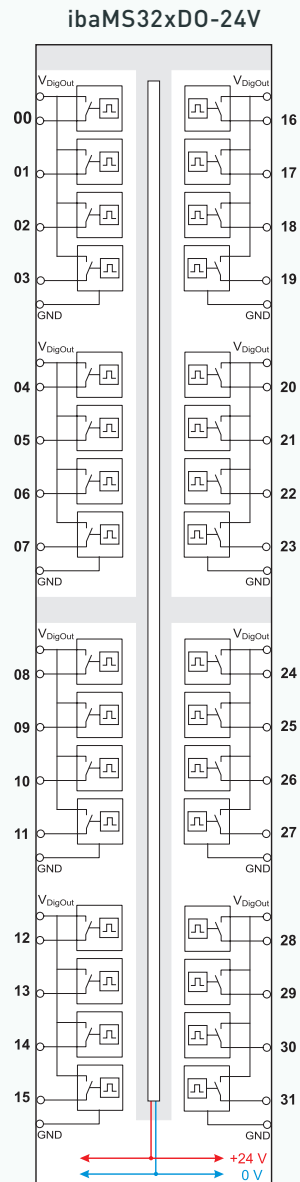


Short description	
Name	ibaMS32xD0-24V
Description	Output module with 32 digital outputs
Order number	10.124260
Digital outputs	
Number	32
Design	8 galvanically isolated roots of 4 outputs each, P switch
Load voltage	24 V DC, external per root, protected against reverse polarity
Load voltage range	+10 V ... +30 V
Switching voltage per channel	= load voltage
Switching current per channel	250 mA
Switching current range p. chan.	10 mA ... 500 mA
Inductive load	Up to 200 mJ
Switching frequency	Up to 40 kHz ¹⁾ , freely adjustable
Switching delay	Switch-on delay (90% ... 10%) < 10 µs Switch-off delay (10% ... 90%) < 10 µs at 24 V DC switching voltage with 100 Ω load
Electrical isolation	Root-root AC 1.5 kV Root-housing/power supply AC 1.5 kV
Connector type	4x 12-pin multi-pin connector screw-type terminal (0.14 mm ² to 1.5 mm ²), screw connection, included in delivery
Protective functions	
Safe state	Channel root switched off
Current limitation	From approx. 0.6 A per channel The root switches to „safe state“, when connection is incorrect (resettable via software)
Power supply and indicators	
Power supply	24 V DC, internal via backplane bus
Power consumption	Up to 7 W
Indicators	4 LEDs for device status 32 LEDs for status of the digital outputs
Fault indication	Overcurrent, supply voltage
Certification	
Standards	EMC: IEC 61326-1, FCC part 15 class A
MTBF [Telcordia 3 SR232]	2,005,894 hours / 228 years

Fields of application

- › Triggering of solenoid valves
- › Triggering of transmitters (e. g. lamps)
- › Test benches

Connection diagrams



Counter module with 4 channels and digital inputs and outputs

► ibaMS4xUC0



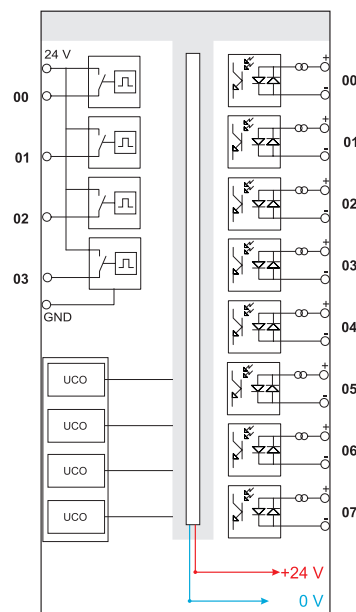
Short description	
Name	ibaMS4xUC0
Description	4 channel counter module with digital inputs and outputs
Order number	10.124310
Counter inputs	
Number	4
Design	Galvanically isolated, differential (DIF) or single ended (SE) for incremental encoder or absolute encoder (SSI) in addition Pullup, pulldown and termination resistors RS422 termination with 120 Ω Encoder supply 5 V DC / 100 mA
Configuration	Encoder parameter file (xml) per channel
Incremental encoder connection	
Functions	Pulse and up/down counter; measurement of period time, frequency, pulse width and duty cycle
DIF	RS422, 2-wire technology, TTL, HTL (only with external series resistors) Signals A+, A- / B+, B- / N+, N- Quadrature decoder for 4-fold evaluation (in addition)
SE	2-wire technology, TTL, HTL Signals A / B / N R/C low-pass filter, 1 st order, 180 kHz, in addition
Frequency range	0 Hz ... 500 kHz (SE) or 0 Hz ... 2 MHz (DIF)
Absolute decoder connection	
Functions	SSI master receiver for direct connection of an encoder SSI slave receiver for sniffing an existing encoder
SSI interface	Binary code, Gray code
SSI master receiver	RS422, 2-wire technology, TTL Signals: clock output (clock+ / clock-), data input (data+ / data-)
SSI slave receiver	RS422, 2-wire technology, TTL Signals: clock input (clock+ / clock-), data input (data+ / data-)
Max. clock frequency T_f	390 kHz
Data rate	$T_f/36$
Multi-function input	
Functions	Input for additional alarm and status signals
Design	single ended, 2-wire technology, TTL, HTL Signal MF Current limitation 10 mA Auxiliary voltage 5 V DC, in addition R/C low-pass filter, 1 st order 180 kHz, in addition
Resolution	32 Bit
Input signal	
TTL	5 V
HTL	24 V
Sampling rate counter inputs	50 MHz
Sampling rate system	Up to 40 kHz, freely adjustable
Electrical isolation	
channel-24 V ground	AC 1.5 kV
channel-channel/housing	AC 1.0 kV
Connector type	1x37-pin Sub-D connector; soldered terminal (0.8 mm ² to 1.2 mm ²), can be connected by screws, included in delivery

Fields of application

- › Period measurements
- › Frequency measurements
- › SSI Slave
- › Sony roll gap encoder

Digital inputs	
Number	8
Design	Galvanically isolated, protected against reverse polarity, single ended
Input signal	24 V DC
Max. input voltage	±60 V permanent
Signal level log. 0	> -6 V; < +6 V
Signal level log. 1	< -10 V; > +10 V
Hysteresis	none
Input current	1 mA, constant
Debounce filter	Optional: 4 different operating modes
Sampling rate	Up to 40 kHz, freely adjustable
Frequency range	0 Hz ... 20 kHz
Delay	Typ. 10 µs
Electrical isolation	
channel-channel	AC 2.5 kV
channel-housing/power supply	AC 2.5 kV
Connector type	1x16-pin multi-pin connector, clamp-type terminal (0.8 mm ² to 2.5 mm ²), screw connection, included in delivery
Digital outputs	
Number	4
Design	1 root with 4 outputs, P switch
Load voltage	24 V DC, external per root, protected against reverse polarity
Load voltage range	+10 V ... +30 V
Switching voltage per channel	= load voltage
Switching current per channel	250 mA
Switching current range per channel	10 mA ... 500 mA
Inductive load	Up to 200 mJ
Switching frequency	Up to 40 kHz ¹⁾ , freely adjustable
Switching delay	
switch-on delay (90%...10%)	< 10 µs
switch-off delay (10%...90%)	< 10 µs at 24 V DC switching voltage with 100 Ω load
Electrical isolation	
root-root	AC 1.5 kV
root-housing/power supply	AC 1.5 kV
Connector type	1x6-pin multi-pin connector, clamp-type terminal (0.8 mm ² to 2.5 mm ²), screw connection, included in delivery
Protective functions	
Safe state	Channel root switched off
Current limitation	From approx. 0.6 A per channel The root switches to „safe state“, when connection is incorrect (resettable via software)
Power supply, indicators	
Power supply	24 V DC, via backplane bus
Power consumption	Up to 10 W
Indicators	4 LEDs for device status 16 LEDs for counters and digital outputs 8 LEDs for digital inputs
Certification	EMC: IEC 61326-1, FCC part 15 class A

Connection diagram



¹⁾ deviating switching frequency with ibaLogic (up to 1 kHz) and ibaPDA (up to 20 Hz)

Combi module with analog and digital inputs and outputs

▸ ibaMS4xADIO



Short description	
Name	ibaMS4xADIO
Description	Combi module with 4 analog inputs, 4 analog outputs, 4 digital inputs and 4 digital outputs
Order number	10.124120

Analog inputs	
Number	4
Design	Galvanically isolated, single ended, can be configured: voltage (10 V) or current (20 mA)
Resolution	16 Bit
Filter	permanent R/C low-pass, 1 st order, 40 kHz in addition Analog anti-aliasing filter (Butterworth), 4 th order, 20 kHz Digital anti-aliasing filter (Tschebyscheff I) ¹⁾ , 8 th order
Input signal range	10 V -10 V ... +10 V 20 mA -20 mA ... +20 mA
Max. input voltage	±60 V permanent
Input impedance	10 V 107 kΩ (80 kΩ when device is switched off) 20 mA 50 Ω
Sampling rate	Up to 40 kHz, freely adjustable
Frequency range	0 Hz ... 20 kHz
Accuracy	< 0.1 % of total measuring range
Electrical isolation	channel-channel AC 1.5 kV channel-housing/ power supply AC 1.5 kV
Connector type	12-pin multi-pin connector, screw-type terminal (0.14 mm ² to 1.5 mm ²), screw connection, included in delivery
Additional functions	
Grid frequency measurement 10 Hz ... 80 Hz	Interval 1 s / 10 s (according to IEC 61000-4-30)

Digital inputs	
Number	4
Design	Galvanically isolated, protected against reverse polarity, single ended
Input signal	24 V DC
Max. input voltage	±60 V permanent
Signal level log. 0	> -6 V; < +6 V
Signal level log. 1	< -10 V; > +10 V
Hysteresis	none
Input current	1 mA, constant
Debounce filter	Optional with 4 different operating modes
Sampling rate	Up to 40 kHz, freely adjustable
Frequency range	0 Hz ... 20 kHz
Delay	Typ. 10 µs
Electrical isolation	root-root AC 1.5 kV root-housing/power supply AC 1.5 kV
Connector type	8-pin multi-pin connector, screw-type terminal (0.14 mm ² to 1.5 mm ²), screw connection, included in delivery

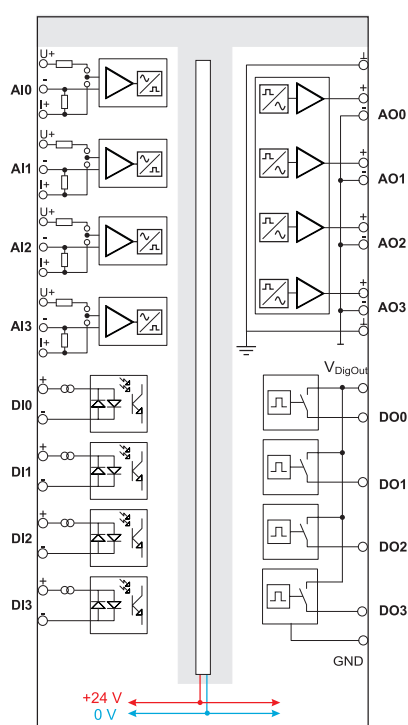
Power supply and indicators	
Power supply	24 V DC, internal via backplane bus
Power consumption	Up to 12 W
Indicators	4 LEDs for device status 4 LEDs for analog inputs 4 LEDs for digital inputs 4 LEDs for analog outputs 4 LEDs for digital outputs
Certification	
Standards	EMC: IEC 61326-1, FCC part 15 class A

Analog outputs	
Number	4
Design	1 root with 4 outputs
Resolution	16 Bit
Filter	R/C low-pass 40 kHz, permanent
Output signal range	-10 V ... +10 V
Load	$\geq 1 \text{ k}\Omega$
Output frequency	Up to 40 kHz ²⁾ , freely adjustable
Delay	8 μs + 12 μs (12 μs = (settling time, until 90% of the output value is reached))
Accuracy	< 0.1 % of total measuring range
Electrical isolation root-root root-housing/ power supply	AC 1.5 kV AC 1.5 kV
Connector type	10-pin multi-pin connector, screw-type terminal (0.14 mm ² to 1.5 mm ²), screw connection, included in delivery
Protective functions	
Safe state	Channel root switched off
Current limitation	Short-circuit protection
Hardware error (e.g. over temperature)	The root switches to „safe state“, when connection is incorrect (resettable via software)

Digital outputs	
Number	4
Design	1 root with 4 outputs, P switch
Load voltage	24 V DC, external per root, protected against reverse polarity
Load voltage range	+10 V ... +30 V
Switching voltage per channel	= load voltage
Switching current per channel	250 mA
Switching current range per channel	10 mA ... 500 mA
Inductive load	Up to 200 mJ
Switching frequency	Up to 40 kHz ²⁾ , freely adjustable
Switching delay switch-on delay (90%...10%) switch-off delay (10%... 90%)	< 10 μs < 10 μs at 24 V DC switching voltage with 100 Ω load
Electrical isolation root-root root-housing/ power supply	AC 1.5 kV AC 1.5 kV
Connector type	6-pin multi-pin connector, screw-type terminal (0.14 mm ² to 1.5 mm ²), screw connection, included in delivery

Protective functions	
Safe state	Channel root switched off
Current limitation	From approx. 0.6 A per channel The root switches to „safe state“, when connection is incorrect (resettable via software)

Connection diagram



2) deviating output/switching frequency with ibaLogic (up to 1 kHz) and ibaPDA (up to 20 Hz)

Combi module with digital inputs and outputs

› ibaMS16xDIO-24V

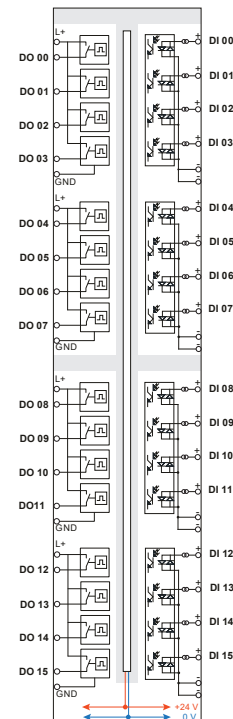


Short description	
Name	ibaMS16xDIO-24V
Description	Module with 16 digital inputs and 16 digital outputs
Order number	10.124220
Digital inputs	
Number	16
Design	4 galvanically isolated roots with 4 inputs each
Input signal	24 V DC
Max. input voltage	±48 V permanent
Signal level log. 0	> -6 V; < +6 V
Signal level log. 1	< -10 V; > +10 V
Hysteresis	Typ. 1 V
Input current	1 mA, constant
Debounce filter	Optional 4 different operating modes
Sampling rate	Up to 40 kHz, freely adjustable
Frequency range	0 Hz ... 20 kHz
Delay	Typ. 10 µs
Electrical isolation	root-root AC 1.5 kV
root-housing/power supply	AC 1.5 kV
Connector type	2x 12-pin multi-pin connector, screw-type terminal (0.14 mm ² to 1.5 mm ²), screw connection, included in delivery
Digital outputs	
Number	16
Design	4 galvanically isolated roots with 4 outputs each; P switch
Load voltage	24 V DC, external per root, protected against reverse polarity
Load voltage range	+10 V ... +30 V
Switching voltage p. channel	= load voltage
Switching current p. channel	250 mA
Switching current range per channel	10 mA ... 500 mA
Inductive load	Up to 200 mJ
Switching frequency	Up to 40 kHz ¹⁾ , freely adjustable
Switching delay	
switch-on delay (90%...10%)	< 10 µs
switch-off delay (10%...90%)	< 10 µs at 24 V DC switching voltage with 100 Ω load
Electrical isolation	root-root AC 1.5 kV
root-housing/power supply	AC 1.5 kV
Connector type	2x 12-pin multi-pin connector, screw-type terminal (0.14 mm ² to 1.5 mm ²), screw connection, included in delivery
Protective functions	
Safe state	Channel root switched-off
Current limitation	From approx. 0.6 A per channel The root switches to „safe state“, when connection is incorrect (resettable via software)

Fields of application

- › Power generation and distribution
- › Compensation plants
- › Test benches
- › Condition monitoring

Connection diagram



Power supply and indicators

Power supply:
24 V DC, via backplane bus

Power consumption:
Up to 8 W

Indicators:
4 LEDs for device status
16 LEDs for digital inputs
16 LEDs for digital outputs

Certification:
EMC: IEC 61326-1,
FCC part 15 class A

Input module with analog inputs for IEPE sensors

› ibaMS8xIEPE



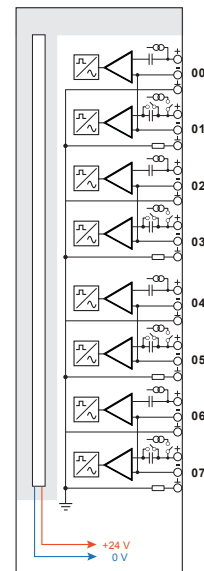
Short description	
Name	ibaMS8xIEPE
Description	Input module with 8 analog inputs, supporting different modes: DC, AC and IEPE 4 x IEPE non-adjustable, 4 x IEPE/DC/AC adjustable
Order number	10.124302
Analog inputs	
Number	8
Design	4 galvanically isolated roots of 2 inputs each, single ended The second input of each root can be adjusted: IEPE or AI-24 V DC or AI-24 V AC 1 GND and 1 GND with 50 Ω per root
IEPE	Integrated constant current source +4 mA (up to 30 V DC) for direct connection and supply of IEPE sensors
Resolution	24 Bit (delta-sigma)
Delay	37 / sampling rate
Filter	
R/C filter	AI-24 V DC R/C low-pass, 1 st order, 25 kHz AI-24 V AC Like AI-24 V DC, in addition: R/C high-pass, 1 st order, 1 Hz IEPE R/C high-pass, 1 st order, 1 Hz or 0.1 Hz, can be adjusted
Analog filter	AI-24 V DC / AI-24 V AC / IEPE Anti-aliasing filter (Butterworth), 4 th order Sampling rate ≤ 8 kHz: cutoff frequency = 4 kHz Sampling rate > 8 kHz: cutoff frequency = 20 kHz
Digital filter	AI-24 V DC / AI-24 V AC / IEPE Anti-aliasing filter (delta-sigma) Oversampling = 16 * sampling rate Cutoff frequency = 0,49 * sampling rate
Input signal range	AI-24 V DC / AC -24.0 V ... +24.0 V IEPE -5.0 V ... +5.0 V (at ~160 Hz)
Max. input voltage	±60 V permanent
Input gain IEPE	none
Sampling rate	1 kHz ¹⁾ ... 40 kHz, freely adjustable
Frequency range	0.1 Hz ... 20 kHz
Error / status signals per channel	
AI-24 V DC / AC	data valid
IEPE	data valid, not connected, shorted
Electrical isolation	
root-root	AC 1.5 kV
root-housing/power supply	AC 1.5 kV
Connector type	2x 12-pin multi-pin connector, screw-type terminal (0.14 mm ² to 1.5 mm ²), screw connection, included in delivery
Sensor cable length	Up to 30 m at 100 pF/m cable capacitance and a bandwidth of used signals up to 20 kHz

Fields of application

Measurement of mechanical vibration by means of IEPE accelerometers:

- › Wind turbines
- › Machine condition monitoring
- › Test benches
- › Monitoring of bearings
- › Mill chatter monitoring

Connection diagram



Power supply and indicators

Power supply:
24 V DC, via backplane bus

Power consumption:
Up to 8 W

Indicators:
4 LEDs for device status
8 LEDs for analog inputs

Standards:
EMC: IEC 61326-1,
FCC part 15 class A

MTBF²⁾: 1,840,484 h / 210 a

1) Due to the integrated filters, a minimum sampling rate of 1 kHz is recommended for the correct operation of this module, even if an even lower sampling rate (time base) can be set in the ibaPDA configuration

2) According to: Telcordia Issue 4 SR332 (Reliability Prediction Procedure of Electronic Equipment; Issue Mar. 2016) und NPRD (Non-electronic Parts Reliability Data 2011)

Technical data, valid for central units and I/O modules

Operating and environmental conditions			
Cooling	Passive		
Operating temperature	32 °F ... 122 °F (0 °C ... 50 °C)		
Storage and transport temperature	-13 °F ... 158 °F (-25 °C ... 70 °C)		
Mounting position	Vertical, mounted on backplane panel		
Installation altitude	Up to 2000 m		
Humidity class (IEC 40040) (Operation, storage, transport)	F (5% - 95%), no condensation		
Protection class	IP20		
Dimensions and weight	ibaPADU-S-CM	ibaPADU-S-IT / ibaCMU-S / ibaPQU-S / ibaDAQ	ibaMS-xxx
Dimensions (width x height x depth)	2.20 in x 8.43 in x 5.83 in (56 mm x 214 mm x 148 mm)	2.20 in x 8.43 in x 5.83 in (56 mm x 214 mm x 148 mm)	1.69 in x 8.43 in x 5.83 in (43 mm x 214 mm x 148 mm)
Weight (incl. box and documentation)	approx. 2.65 lb (1.2 kg)	approx. 3.31 lb (1.5 kg)	approx. 2.42 lb (1.1 kg)



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