![iba logo]

Local Data Acquisition with ibaPDA

The ibaDAQ Family

ibaDAQ
Acquire Data via Ethernet, ibaNet
and the iba Modular System

ibaDAQ-C
Acquire Data via Ethernet

Measurement Systems for Industry and Energy
www.iba-ag.com

Measuring autonomously – process connected

The devices of the ibaDAQ family allow a local data acquisition with ibaPDA and an onboard data storage. You can access relevant data and information anywhere they are needed due to the exhaustive output options of ibaPDA.

In brief

› Local data acquisition with ibaPDA
› Data storage in the device
› Data transfer via Ethernet
› Compact design for on-site installation
› Use in rough environments
› Including analysis with ibaAnalyzer
› Exhaustive output connectivity
› Calculation of meaningful KPIs automatically in the device

Perfectly suitable for the local use in any environment

The devices of the ibaDAQ family are ideal out-of-the-box solutions for the acquisition and recording of data. The devices offer the functionality of a computer with ibaPDA software for up to 64 signals, an internal SSD to store the data, a CPU with high performance and interfaces to acquire measured values.

ibaDAQ is a central unit of the iba modular system and can be combined with up to 4 I/O modules. In addition, ibaDAQ provides two Ethernet interfaces and a fiber optic connection that fulfills the function of an ibaFOB-io card.

Those who merely wish to acquire Ethernet-based protocols will find a practicable solution in ibaDAQ-C with 2 Ethernet interfaces.

These devices are small, compact and fanless. These devices are perfectly suitable for the use in rough environments, for local measuring directly in the plant, machine or at remote places like e.g. cranes.

Relevant component in digitalization projects

The ibaDAQ devices offer an exhaustive process connectivity and can, in a time synchronous way, acquire signals from different sources. But they are able to do more than just simply acquire measured values and process them further.

These measured values are aggregated whereas meaningful characteristic values (KPIs) can be calculated automatically in the device and be transferred in databases or cloud systems via the output and streaming interfaces of ibaPDA.

Additionally, high-resolution raw data is provided for more detailed analyses and can be used for various purposes according to the target group. E.g. to optimize processes or root cause possible deviations.

Combining acquisition, processing and data analysis in a device, the ibaDAQ devices can take over an important role in digitization concepts.

ibaDAQ - Comprehensive connectivity

Gauge	ibaDAQ	E-mail
Sensor		Message Broker
A/D		Database
Field bus	Acquire & Record	Calculate characteristics	OPC UA
Drive bus		Cloud
PLC		Analyze	SNMP
Ethernet		Reports

Flexible application with the iba modular system

ibaDAQ can be expanded as central unit of the iba modular system with up to 4 I/O modules from the modular system. Central unit and I/O modules are connected via a backplane bus.

The system includes several I/O modules for analog and digital inputs and outputs as well as for SSI and encoders. 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.

Full ibaPDA connectivity

The FO input/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. Depending on the ibaNet protocol used, the sampling rate via FO is up to 100 kHz.

Via the Ethernet interfaces, ibaNet-E capable devices, e. g. ibaW-750 for integrating Wago/Beckhoff IO-modules, can be connected and, with additional licenses, data from different controls, drives, special measuring devices, communication networks etc. can be acquired.

A sampling rate of up to 100 Hz can be achieved via Ethernet with an appropriate network layout.

Connection to different networks

With the two independent 1 Gbit/s Ethernet interfaces, the acquisition in the process network and the connection to databases and storage systems in the IT network can be securely separated.
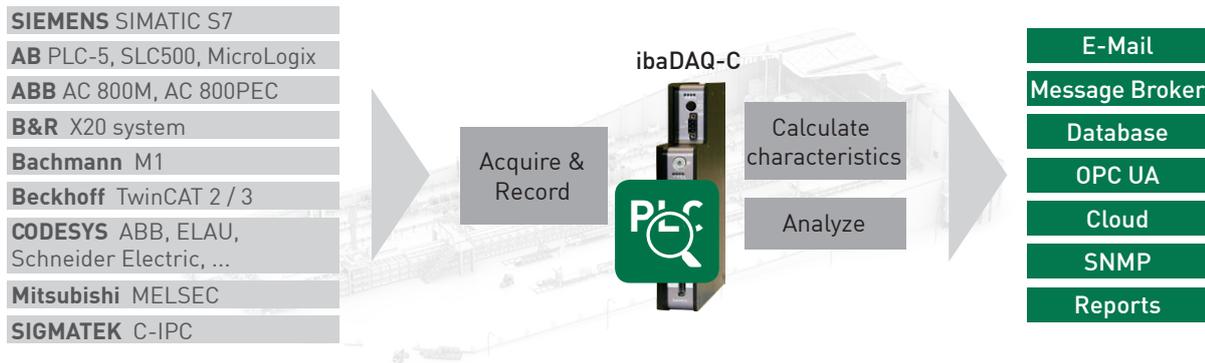
Mobile use in a compact case

ibaDAQ in the ibaMBox measuring case enables powerful, mobile measurement for commissioning and troubleshooting.

ibaMBox

	ibaDAQ	ibaDAQ-C
Processor	Intel Atom 3845 QuadCore 1,91 GHz	Intel Atom 3845 QuadCore 1,91 GHz
Main memory	4 GB	4 GB
Operating system	Windows 10 IoT Enterprise Long-Term Servicing-Version	Windows 10 IoT Enterprise Long-Term Servicing-Version
SSD	512 GB	512 GB
Network	2x 1 Gbit/s	2x 1 Gbit/s
I/O	2x DI / 2x DO	-
ibaNet	3Mbit – 32Mbit Flex	-
Interfaces	USB 2.0, USB 3.0, display port, FO, SFP+ (not used)	USB 2.0, USB 3.0, display port
Mounting	Backplane (iba modular system)	DIN rail
Licenses	ibaPDA-64	ibaPDA-64 ibaPDA-Interface-PLC-Xplorer ibaPDA-OPC-UA-Server+ ibaPDA-Data-Store-MindSphere-16 ibaPDA-Interface-MQTT ibaPDA-Data-Store-MQTT-16

ibaDAQ-C - Connection via Ethernet

SIEMENS SIMATIC S7	
AB PLC-5, SLC500, MicroLogix	
ABB AC 800M, AC 800PEC	
B&R X20 system	
Bachmann M1	
Beckhoff TwinCAT 2 / 3	
CODESYS ABB, ELAU, Schneider Electric, ...	
Mitsubishi MELSEC	
SIGMATEK C-IPC	

ibaDAQ-C

Acquire & Record

Calculate characteristics

Analyze

E-Mail
Message Broker
Database
OPC UA
Cloud
SNMP
Reports

Measuring values directly from different PLCs

ibaDAQ-C complements the ibaDAQ family with a very compact, handy DIN rail device with 2 Ethernet interfaces and integrated license ibaPDA-Interface-PLC-Xplorer. Hence, ibaDAQ-C can directly access different PLC systems. The PLC system can be accessed via standard interfaces without additional hardware. It is not necessary to modify the PLC configuration nor to program the PLC. Most of the ibaPDA-PLC-Xplorer interfaces support a convenient selection of signals based on their symbolic names via address book. The signals can easily be selected by mouse click in the integrated symbol browser. If necessary, the selected signals may flexibly be changed without modifying and interrupting the PLC program.

The following interfaces are included in the ibaPDA-Interface-PLC-Xplorer license:
› S7-Xplorer (interface for SIMATIC S7)
› AB-Xplorer (interface for Allen-Bradley systems)
› B&R-Xplorer (interface for B&R systems)
› Bachmann-Xplorer (interface for M1 systems)
› Codesys-Xplorer (interface for CODESYS-based systems)
› Logix-Xplorer (interface for ControlLogix systems)
› MELSEC-Xplorer (interface for Mitsubishi MELSEC systems)
› Sigmatek-Xplorer (interface for SIGMATEK systems)
› TwinCAT-Xplorer (interface for Beckhoff systems)

Standardized communication via OPC UA

In addition, ibaDAQ-C includes the license ibaPDA-OPC-UA-Server+. With this licence, ibaPDA can be operated as an OPC UA server and acquire all signals configured in ibaPDA via an OPC UA client interface. This means that you can exchange data directly with other systems that support OPC UA.

Integrated cloud connectivity

With the included license ibaPDA-Data-Store-MindSphere-16, you can write your data directly into the cloud and process it there. The ibaPDA-Data-Store-MQTT-16 license is also included and enables streaming to MQTT brokers.

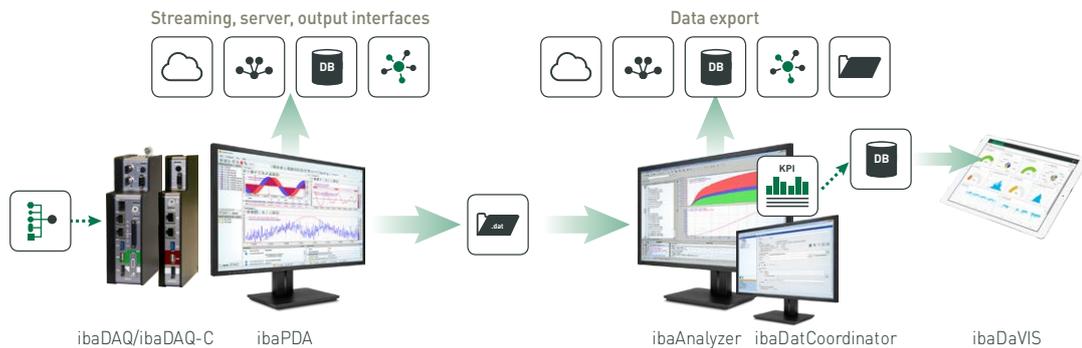### Additional Ethernet communication

With the two independent 1 Gbit/s Ethernet interfaces, ibaDAQ-C can also operate in two networks and enables the separation of IT and process networks. It is also possible to integrate ibaNet-E capable devices via thesew interfaces.

Additional licenses for communication interfaces are required for the acquisition of data from other Ethernet-based protocols.

With the interface ibaPDA-Interface-SINUMERIK-Xplorer the acquisition of machine tool data from SINUMERIK CNC controls is possible.

A selection of communication interfaces can be found on page 11.

Using the advantages of the iba system

Streaming, server, output interfaces   **Data export**

ibaDAQ/ibaDAQ-C   ibaPDA   ibaAnalyzer ibaDatCoordinator   ibaDaVIS

Integration in SNMP monitoring
The Simple Network Management Protocol (SNMP) interface in ibaPDA allows ibaDAQ devices to be integrated into an enterprise-wide network management system. ibaPDA serves as SNMP server and supports the SNMP protocols V1, V2c and V3. The basic ibaPDA license contains objects for status monitoring of ibaPDA. For signal objects, an additional license ibaPDA-SNMP-Server+ is required.

Variable recording profiles
As known in ibaPDA, various recording profiles can be defined for different applications. Continuous data recording of measurement files in iba format (*.dat) is necessary for long-term analyses or process optimizations, while triggered recordings are useful when errors have to be located. Trigger conditions can be defined time or event related. Multiple recordings with different profiles can also run in parallel.

Generating alarms
While monitoring the process, it is important, to immediately detect errors or deviations. Already during data acquisition, the signals can be checked for certain conditions, e.g. comparison with limit values. Warnings or alarms can be issued as output signals or also sent as a message by email.

Operation and configuration as on the PC
Monitor, mouse, and keyboard can be connected to all ibaDAQ devices and can be operated as conveniently as an ibaPDA system running on a PC. Moreover, they can also be operated with an ibaPDA client that is connected via network.

Notebooks or tablets can be connected to the ibaDAQ devices by using an USB-WI-FI stick.

Free analysis included
The generated measuring files can be analyzed using ibaAnalyzer[1] which is available free of charge. ibaAnalyzer can run directly on the ibaDAQ devices or can be used on a separate computer.

User-specific characteristics
Once the evaluation requirements have been defined, the analysis can be saved and reused at any time. It it possible to configure the ibaPDA system so that the analysis of the last file starts automatically. Characteristic values, so-called KPIs, can be calculated individually and automatically from the high-resolution data. During the following analysis, a drill-down to the raw data is possible at any time in order to enable a root cause analysis in case of possible deviations.

Connecting databases
When the data shall be processed in a database, measuring data can be loaded into a database with ibaAnalyzer-DB. It is also possible to analyze data from a database with this application. The main database formats are supported, like Microsoft SQL-Server, Oracle, IBM DB2-UDB, MySQL/Maria DB, PostgreSQL, SQLite, MS Access.

Automated analysis saves time
ibaDatCoordinator and ibaAnalyzer-Reportgenerator provide further support. ibaDatCoordinator is a powerful tool for automated data management. Typical fields of application are the automatic extraction of product-related characteristic values in databases as well as the report creation. This allows reports in various formats and individual layouts to be automatically created and, if desired, sent immediately by email.

Crane monitoring with ibaDAQ reduces production downtimes

Every minute, several hundred tons of material are moved in steel works. Cranes play a key role in the logistics of the production process. To avoid downtimes, the crane control is seamlessly monitored by ibaDAQ.

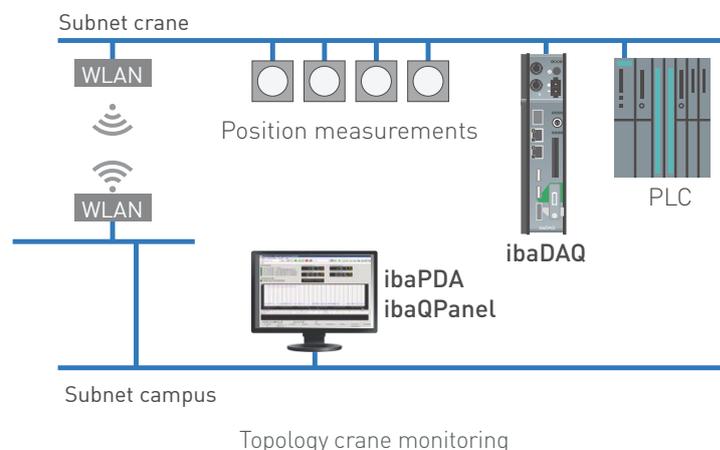Continuous acquisition of measurement data in high resolution

Minimizing produc-tion downtimes

Real-time online monitoring of all relevant signals

The project

Several hundred cranes are providing seamless logistics in production at a steel manufac-turer. Countless movements must be precisely coordinated with each other. Therefore, it is obvious that downtimes can cause enormous failures and costs. To reduce failures and ide-ally avoid them, the steel manu-facturer decided to introduce a crane monitoring with ibaDAQ.

Topology crane monitoring

Technology and products

ibaDAQ devices locally measure relevant data at previously selec-ted cranes like position data, data from drives and controllers etc. These data then is transmitted via Ethernet or - with suitable infra-structure - via WiFi to superordi-nate systems.

ibaQPanel does the clear visu-alization of the measured va-lues. The operating staff will

be informed about the current status at a glance. Even smaller deviations will be recognized thanks to previously defined events and allowed tolerances. Failures can be graphically visualized and then automati-cally be reported via message.

In addition, the status of ibaDAQ and measured values can be

sent to a superordinate network management system via SNMP and also be integrated into a com-prehensive monitoring system.

The result of the project was entirely positive. The integration into the existing infrastructure was accomplished without any problems and troubleshooting was accelerated significantly.

Technical data

Short description	
Name	**ibaDAQ**
Description	CPU for stand-alone data acquisition
Order number	10.170001

Processor units	
Processor	Intel Atom E3845 quad core CPU 1,91 GHz
Operating system	Windows 10 IoT Enterprise Long-Term Servicing-Version
RAM	4 GB
Flash memory	512 GB
Clock (RTC)	Buffered by battery, can be replaced during operation (3V Lithium CR2032) Synchronization via NTP

Interfaces	
ibaNet	32Mbit Flex, 32Mbit, 5Mbit, 3Mbit 2 ST coupling (50/125 µm and 62.5/125 µm) for RX/TX
Ethernet	2x 1 Gbit/s
USB[3]	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	24 V DC
Max. input voltage	±60 V permanent
Signal level log. 0 Signal level log. 1	> -6 V; < +6 V < -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 via ibaPDA
Delay	Typ. 10 µs
Electrical isolation Channel-channel Channel-housing	AC 2,5 kV AC 2,5 kV
Connector type	Screw-type terminal (0.14 mm^2 to 1.5 mm^2), screw connection, included in delivery

Digital outputs	
Number	2
Design	Galvanically isolated, solid-state DC switch
Switching voltage	max. 200 V DC, protection against surge voltages
Switching current	max. 350 mA (permanent), over-current protection
Switching delay	< 2 ms (at 100 mA)
ON resistance (log. 1)	max. 3.75 Ω (at 100 mA)
OFF resistance (log. 0)	min. 100 MΩ
Electrical isolation Channel-channel Channel-housing	AC 2,5 kV AC 2,5 kV
Connector type	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, ±10 % not stabilized; 1 A (without I/O modules), 3 A (with up to 4 I/O modules)
Power consumption	Max. 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

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	Vertical or horizontal
Humidity class (DIN 40040)	F, no condensation
Protection class	IP20
Standards	EMV: IEC 61326-1 FCC part 15 class A

Dimensions and weight	
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) with subrack: 9.02 in x 8.62 in x 6.14 in (229 mm x 219 mm x 156 mm)
Weight (incl. box and documentation)	Approx. 1.5 kg
Licenses incl.	ibaPDA-64 (30.770064)

Short description	
Name	ibaDAQ-C
Description	Compact device for stand-alone data acquisition
Order number	10.170002

Processor units	
Processor	Intel Atom E3845 quad core CPU 1.91 GHz
Operating system	Windows 10 IoT Enterprise Long-Term Servicing-Version
RAM	4 GB
Flash memory	512 GB
Clock (RTC)	Buffered by battery, can be replaced during operation (3V Lithium CR2032) Synchronization via NTP

Interfaces	
Ethernet	2x 1 Gbit/s
USB[4]	1x USB 3.0, 1x USB 2.0
DisplayPort	Connection for monitor

Digital inputs	
Number	1 (for safe shutdown)
Design	Galvanically isolated, protected against reverse polarity
Max. input voltage	±60 V permanent
Signal level log. 0 Signal level log. 1	> -6 V; < +6 V < -10 V; > +10 V
Input current	1 mA, constant
Delay	Approx. 50 µs
Connector type	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, ±10 % not stabilized, max. 1 A
Power consumption	max. 11 W, approx. 18 W with 2 USB hard disks + monitor
Indicators	6 LEDs for device status 2 LEDs for customized applications, can be configured in ibaPDA

Operating and environmental conditions	
Cooling	Passive
Operating temperature	32 °F to 122 °F (0 °C to 50 °C)
Storage / transport temperature	13 °F to 158 °F (-25 °C to 70 °C)
Mounting	DIN rail, vertical
Humidity class (DIN 40040)	F, no condensation
Protection class	IP20
Standards	EMV: IEC 61326-1 FCC part 15 class A

Dimensions and weight	
Dimensions (width x height x depth)	1.34 in x 7.99 in x 5.55 in (34 mm x 203 mm x 141 mm)
Weight	1.0 kg (incl. box and documentation)
Licenses incl.	ibaPDA-64 (30.770064) ibaPDA-Interface-PLC-Xplorer (31.001042) ibaPDA-OPC-UA-Server+ (30.670051) ibaPDA-Data-Store-MindSphere-16 (30.670180) ibaPDA-Interface-MQTT (31.001112) ibaPDA-Data-Store-MQTT-16 (30.671000)

[4] The ibaFOB-io-USB adapter cannot be used with devices of the ibaDAQ family (ibaDAQ/-C/-S).

Order information

ibaPDA (Upgrade licenses)

Order no.	Name	Description
30.770001	Upgrade-PDA-64 to PDA-128	License upgrade 64 signals to 128 signals
30.770002	Upgrade-PDA-128 to PDA-256	License upgrade 128 signals to 256 signals
30.770003	Upgrade-PDA-256 to PDA-512	License upgrade 256 signals to 512 signals
30.770004	Upgrade-PDA-512 to PDA-1024	License upgrade 512 signals to 1024 signals
30.770022	ibaPDA-Data-Store	Additional license for writing two additional dat files (*.dat)
30.670050	ibaPDA-SNMP-Server+	Advanced SNMP Server function
30.670051	ibaPDA-OPC-UA-Server+*	Advanced OPC UA Server function

Communication interfaces (examples)

Order no.	Name	Description
31.001075	ibaPDA-Interface-Generic-UDP	Generic-UDP/IP protocol communication interface
31.001076	ibaPDA-Interface-Generic-TCP	Generic-TCP/IP protocol communication interface
31.001042	ibaPDA-Interface-PLC-Xplorer[5]	PLC-Xplorer interfaces (S7, Codesys, Allen Bradley, B&R, Bachmann, Beckhoff, Sigmatek, Logix, Mitsubishi MELSEC)
31.001112	ibaPDA-Interface-MQTT[5]	MQTT communication interface

Data store DB/cloud

Order no.	Name	Description
30.670141/2/3	ibaPDA-Data-Store-SAP-HANA-64/256/1024	Data streaming into SAP HANA DB/Cloud; 64/256/1024 signals
30.670160/1/2/3	ibaPDA-Data-Store-Kafka-16/64/256/1024	Data streaming into Apache Kafka Cluster, 16/64/256/1024 signals
30.670180	ibaPDA-Data-Store-MindSphere-16[5]	Data streaming into MindSphere Cloud, 16 signals
30.670181/2/3	ibaPDA-Data-Store-MindSphere-64/256/1024	Data streaming into MindSphere Cloud, 64/256/1024 signals
30.671000	ibaPDA-Data-Store-MQTT-16[5]	Data streaming into MQTT Broker, 16 signals
30.671001/2/3	ibaPDA-Data-Store-MQTT-64/256/1024	Data streaming into MQTT Broker, 64/256/1024 signals
30.671020/1/2	ibaPDA-Data-Store-Oracle-64/256/1024	Data streaming into Oracle DB/Cloud; 64/256/1024 signals
30.671030/1/2	ibaPDA-Data-Store-SQL-Server-64/256/1024	Data streaming into SQL-Server DB/Cloud; 64/256/1024 signals
30.671040/1/2	ibaPDA-Data-Store-PostgreSQL-64/256/1024	Data streaming into PostgreSQL DB/Cloud; 64/256/1024 signals
30.671050/1/2	ibaPDA-Data-Store-MySQL-64/256/1024	Data streaming into PostgreSQL DB/Cloud; 64/256/1024 signals
30.671060/1/2	ibaPDA-Data-Store-InfluxDB-64/256/1024	Daten streaming into InfluxDB; 64/256/1024 signals

License extensions for upgrading to a higher number of signals are available for the different data stores.

Trainings

Order no.	Name	Description
61.100000	Measuring, analyzing and automated reporting with iba	3-days compact training
61.000200	Data acquisition and data analysis using iba tools	2-days basic training
61.000400	Long-term acquisition of data and events using ibaHD-Server	2-days advanced training
61.000210	Visualization of measurement data and quality data using ibaQPanel	2-days advanced training
61.000220	Data acquisition from a SIMATIC S7 PLC	1-day advanced training

[5] included in delivery of ibaDAQ-C

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