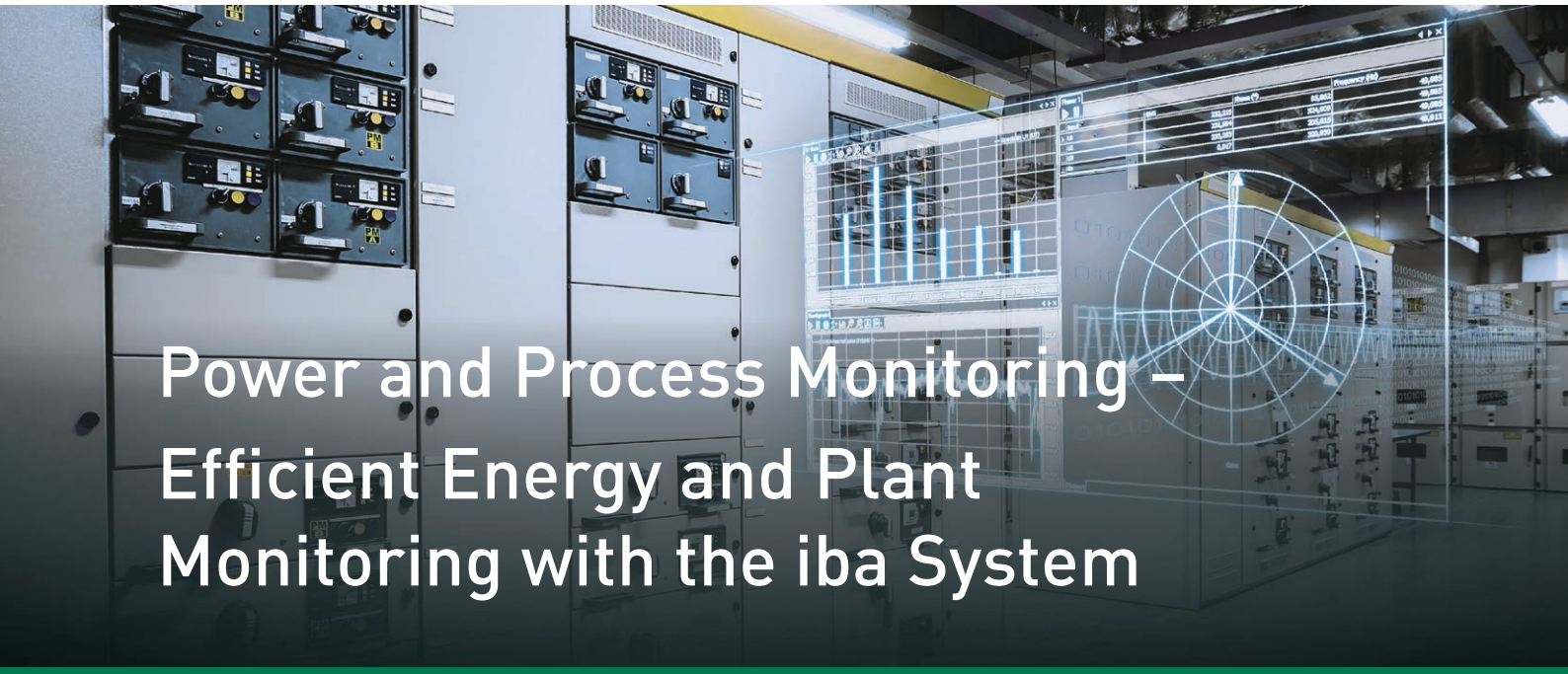


Power and Process Monitoring – Efficient Energy and Plant Monitoring with the iba System

› Energy Monitoring

› IEC 61850 Station Monitoring

› Power Quality Monitoring

› Event Monitoring: Transient Fault Recorder

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

Power and process data – everything in one system

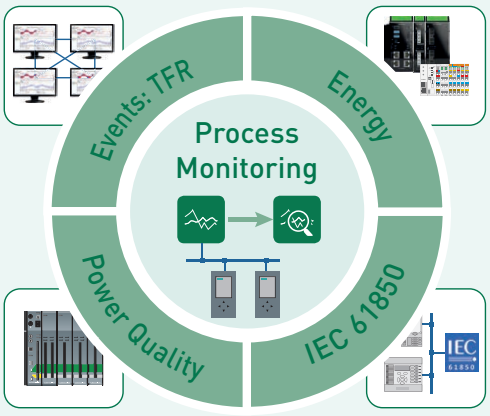
The iba system tells you exactly what is happening in your plants and your energy system. The components are all perfectly coordinated with one another – delivering high-resolution records of everything that is happening, plus all the performance indicators and characteristic values required for the various applications. It shows you where you can improve your processes and the energy system as a whole. The iba system is ideal for the four applications shown in the figure below.

Event Monitoring: Transient Fault Recorder (TFR)

- High-resolution fault records of events
- Measurement and control data, events, and calculated real-time signals are all available at the same time
- Sample-exact synchronization throughout the iba system
- Use the multistation trigger to start recording multiple iba systems simultaneously

Energy Monitoring

- Acquire and analyze energy and process data in real time
- Generate annual assessments
- Evaluate scenarios in detail
- Obtain transparent data about energy efficiency



Power Quality Monitoring (PQM)

- Monitor the power quality in real time
- Calculate characteristic values according to standard IEC 61000-4-30, Class A
- Identify the exact times of energy phenomena
- Correlate power quality data with process data to perform root cause analyses

Station Monitoring IEC 61850

- Station bus MMS: Subscribe to status information
- Process bus GOOSE: Acquire real-time events
- Process bus Sampled Values: Integrate real-time streams of measured values
- Automated transfers of Comtrade files

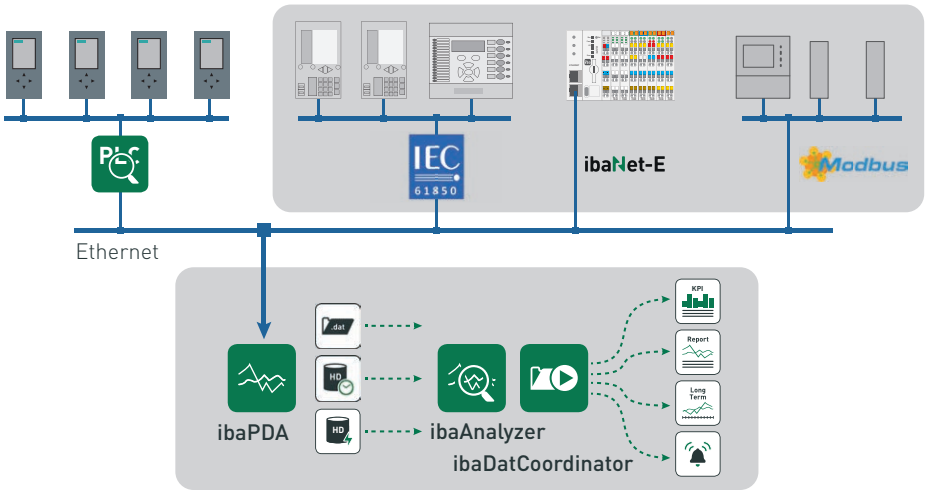
The flexible, scalable iba system

The iba system provides custom-made solutions for many different use cases, such as process monitoring, as well as solutions for various energy applications.

The iba system includes software products that are all coordinated with one another and interact perfectly, plus application-specific hardware components. What's more, the iba system is scalable and can be expanded in a variety of ways whenever you like.

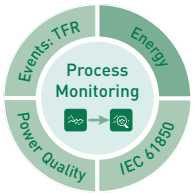
No matter which systems you already have, the different solutions for energy monitoring, station monitoring, power monitoring, and event monitoring are simple to integrate and combine.

Acquire and analyze energy flows and consumption data



Benefits at a glance

- All the usual iba features are available:
  - Seamlessly zoom from the 15-minute value down to µs level
  - Perform real-time analyses of energy and process data
  - Correlate events, e.g., from stations or from production and operation
  - Connect existing systems via OPC UA, M-bus (via gateway), Modbus TCP, or PLC communication
- Energy monitoring system features:
  - Audit-related analyses and automated reports
  - Analyses for annual statistics (15-minute values)



Use as an energy monitoring system

The iba system is ideal for evaluating your energy efficiency as it monitors energy and process data together and gives you a constant overview of all performance indicators and characteristic values.

When used as an energy monitoring system, an important factor is the ability to monitor the energy data over the long term. The data acquired is usually collected in 15-minute intervals over a long period of time to enable statistical analyses, but the recording intervals can also be adjusted in different ways if required.

It does not matter where the data comes from – the iba system determines and calculates the data you need.

In addition to the high-resolution devices from iba (from the PADU range or ibaMAQ system, for example), you can also easily integrate measuring devices from external manufacturers into the iba system via a communication interface such as Modbus TCP in order to acquire energy data. Measurement data from controllers (e.g., SIMATIC S7) can easily be integrated using Xplorer interfaces.

Analyze energy and process data together

Events from the process, switchyard, or power quality analysis which are linked via other interfaces are incorporated into the overall data set and also available for analyses at a later date.

The iba system determines performance indicators and characteristic values to enable efficient, results-oriented energy management.

You benefit because you don't just see the energy flows and can evaluate them statistically, it's also easy to see how things are linked with the production and event data. If required, you can use anomalies as a trigger for the event monitoring function, investigate them with a resolution at ms or even µs level, and identify and address appropriate measures.

Simple to integrate into existing systems

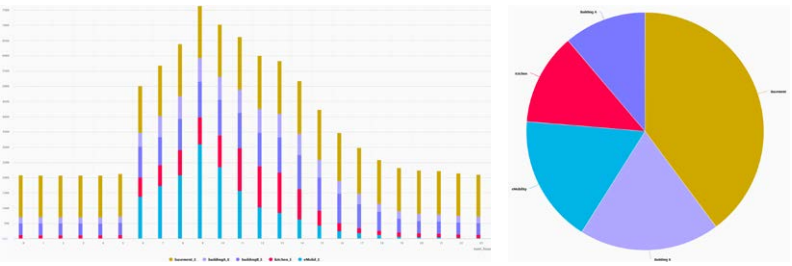
Energy monitoring can be added to all existing iba systems or set up as a new, stand-alone system. It is an advantage that many existing systems can be integrated thanks to the comprehensive connectivity of ibaPDA.

Meaningfully structure energy data

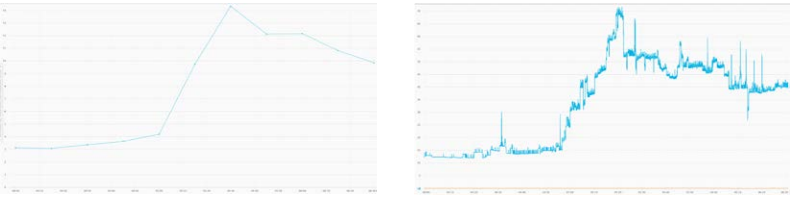
The signals in an energy system have very different properties and structures, but the energy sampling concept in ibaPDA enables the signals to be structured clearly. You can also save metadata, such as descriptive information and other technical data, and use it for analyses later on.

Example visualization of energy data

Energy consumption and production over time



Statistic distribution of energy consumers



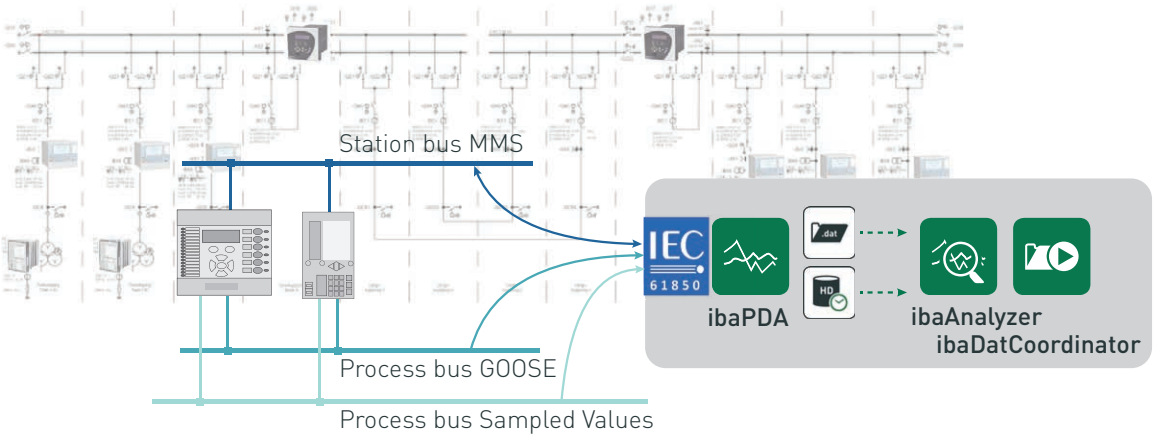
15-minute values from just an energy management system (left) compared with high-resolution measured values from the iba system (right)

Measurement data and calculated characteristic values from the energy data are shown clearly on a dashboard using ibaDaVIS (data visualization and information system).

In the example above, line charts show the energy production and consumption gradient over a freely definable period of time, e.g., a year. For this period of time, bar and pie charts visualize the statistic deviation of all the values included, which could be grouped by hours in the course of the day, for example, or by consumers and what proportion of the overall consumption they are responsible for.

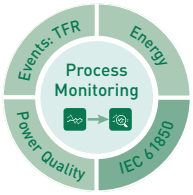
The zoom function provides quick access to daily or minute-based views of the trends, so you can see when the plant or energy system caused events. Whereas the 15-minute values of just an energy management system (bottom left figure) usually only show a rough gradient, the high-resolution measured values provided by the iba system (bottom right figure) clearly show peaks and dips. If high-resolution measuring devices have been connected to the iba system, you can see events accurately right down to µs level (cf. event monitoring).

Accurately acquire events in stations



Benefits at a glance

- Monitor automated operations and measured values in stations
- IEC 61850 communication: Acquire real-time events, measurement data, and status changes at process bus or station bus level
- Station bus with active communication (MMS client & server)
- Process bus: Real-time events (GOOSE) and measured values (GOOSE, Sampled Values (SV))
- Acquire events with the time stamp of the protection device
- Comtrade file exports (IEC 61850-7-2)
- Support for engineering approaches (e.g., by importing SCD or CID files)



The IEC 61850 standard

Switchyards essentially have two different communication tasks, which the IEC 61850 standard defines as station bus and process bus. While the station bus controls the exchange of status information between devices at field level and the control room, the process bus is intended for real-time communication and for exchanging relevant automation-related events. This also includes information for clarifying errors, and the exchange of measured values.

Thanks to its IEC 61850 interface, the iba system enables status information to be obtained from the IEC 61850 devices via MMS (Manufacturing Messaging Specification) as an active user in the station bus, and enables the real-time communication of events (GOOSE) and measured values (9-2 SV) to be acquired at process bus level.

Station bus – MMS communication

MMS communication is a traditional method of client–server communication whereby a device, such as a protection relay, exchanges data with the higher-level control system. This data may include device variables and parameters as well as measured values and status messages.

With MMS, the IEC 61850 standard offers a separate reporting

and data set function which is used with the iba system. ibaPDA registers with an IEC 61850 device (server) for a particular data set as the client and, if the data in the data set changes, receives an update from the IEC 61850 device without the need for polling. This ultimately boosts performance and minimizes the amount of communication required.

Process bus – GOOSE communication

GOOSE communication is used to exchange information between IEC 61850 devices in real time. This communication is based on the publisher–subscriber principle, carried out in real time, and used to transmit safety/security-related and time-critical events. ibaPDA monitors the data exchange in the network as a subscriber and filters out relevant signals together with the time information so that fault events and system responses can be accurately reconstructed.

Process bus – Sampled Values

Sampled Values are used to transmit digitalized measurement variables within the range 4 kHz to 100 kHz, and provide an alternative to the traditional way of acquiring measured values with conversions of analog signals. ibaPDA acts as an additional subscriber in this network and, when an event occurs, also records faults on the basis of the Sampled Value data. As a result, the measured values that the protection device acquired during a fault can be documented.

Precisely follow events

The iba system acquires the data together with the time stamp of the devices that sent it – this is the only way to follow events precisely. You obtain valuable insights into the event sequence over time and you are enabled to evaluate the system response. In doing so, you obtain answers to a variety of questions: Which protection device was the first to respond to the error? Was the system response coordinated well? The network delay is irrelevant here as the events are acquired together with the time stamp of the reporting device, which ensures accurate results.

The iba system enables you to see the grid operations in the station and, in conjunction with iba process monitoring, shows their impact on the connected plants. It also works the other way – you can also see what impact the processes are having on the grid condition, such as when heavy loads are being switched or changed in operation.

Easily select signals using address books

If communication with the IEC 61850 devices is active, ibaPDA reads out all data points and generates internal address books. You can then quickly find your desired signals there and select them for recording.

Even if communication with the IEC 61850 devices is not active, the address books can still be generated from the engineering files (*.scd, *.cid, etc.). This is required during the configuration stage or if it purely concerns process bus sniffing with read-only access to the network – making it a useful function in ibaPDA.

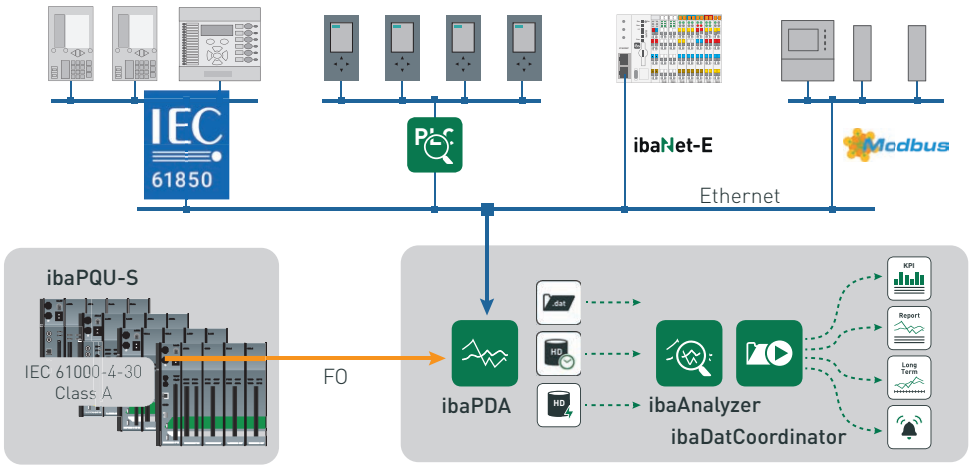
Comtrade file exports

Protection devices have their own data store for recording faults in Comtrade format. ibaPDA recognizes when a protection device has created a new record and copies this record file to a defined target directory. The copied file can be exported to the iba-DAT format or other data formats later on using ibaDatCoordinator and ibaAnalyzer.

The file names can also be supplemented with information like the device name, time stamp, etc. to ensure the files remain matched up with their respective source device, even when many protection devices are involved.

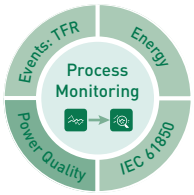
The advantage of the iba system is that you do not need to analyze lots of individual device records – instead, it looks at the overall system in one record. You obtain one central overview of the event messages pertaining to all protection devices and can analyze errors faster and target your response more accurately.

Identify optimization potential with power and process monitoring



Benefits at a glance

- Monitoring in real time
- Immediately detect deviations for voltages and currents
- Calculate characteristic values according to the calculation rules of standard IEC 61000-4-30, Class A
- Perform qualified root cause analyses by correlating energy and process data
- Identify and qualify phenomena in energy systems throughout the grid



Determine characteristic values in real time with utmost accuracy

Power quality measurements are normalized measurements that qualify the voltage signal in its form at the point of common coupling (PCC) between the power grid operator as supplier and the consumer as purchaser. They also mark any deviations from the standard gradient. The ibaPQU-S power quality unit has been specifically designed as a device for monitoring the quality in power grids in accordance with the relevant standards and with maximum accuracy. ibaPQU-S enables you to monitor the power grid at the connection point in real time. You can also systematically identify and qualify phenomena in energy systems throughout the grid.

ibaPQU-S determines all the characteristic values stipulated in the EN 50160 standard. These characteristic values are calculated according to the calculation rules set out in the IEC 61000-4-30 standard, Class A, which is the highest quality class.

Advantages of power quality measurements with the iba system

Due to the normalization, voltage becomes a product subject to requirements that can be evaluated. The contractually agreed requirements apply to the supplier, network operator, and purchaser. The normalized measurement serves as proof and must stand up in court as it may be used as a piece of evidence. If there are any deviations or if contractual obligations are breached, a key part of identifying

the cause is figuring out whether the power grid operator or the consumer is responsible for the issue.

Traditional power quality records are good for documentation purposes but are less suitable for root cause analyses, as measurement data that has been aggregated in 10-minute or even 2-hour intervals does no indicate dynamic peak events nor mark these events in time. The iba system solves this problem by offering not only normalized, aggregated data classes for analysis, but also intermediate values acquired every half-period (e.g., every 10 ms), or after every FFT calculation (every 200 ms) for harmonics.

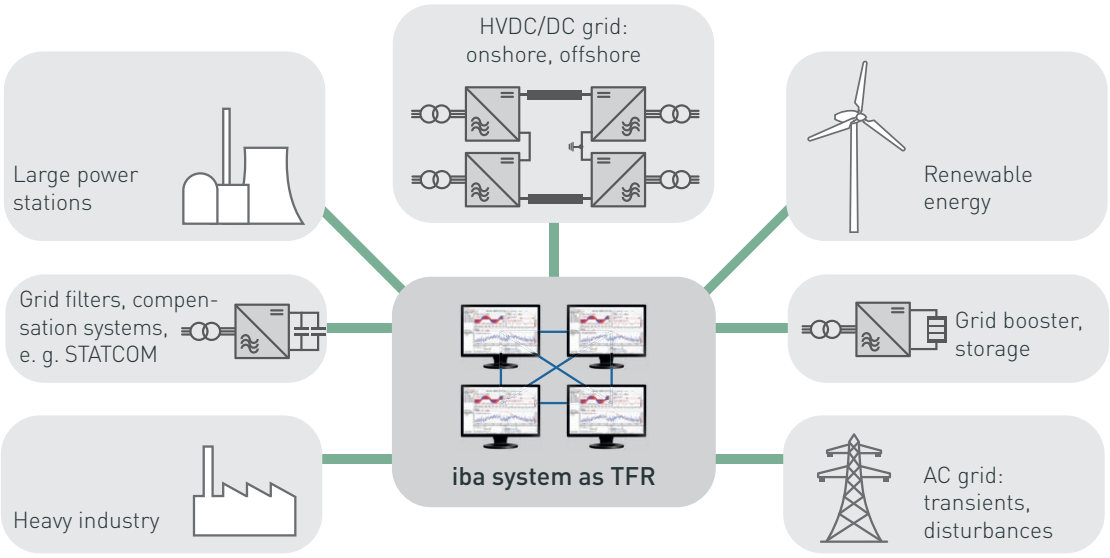
While the normalization focuses on voltages, the iba system also enables all algorithms and calculations for voltages to be applied equally to currents. This is very useful for things like current harmonics and for evaluating filter measures.

Conclusive root cause analyses in the event of faults

For operators of complex, energy-intensive industrial plants, it is a good idea to take additional measurements in the depths of the plant network alongside those at the point of common coupling, so as to trace back to the origin of the disturbance. Thanks to the iba system and its combinable acquisition of process data from the plant controller, the responsible people can quickly compare what is happening in the process with the power quality data to carry out a root cause analysis.

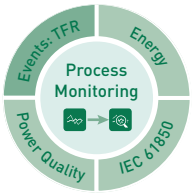
In addition to an event-based analysis which identifies the causes and origin of faults, the iba system is also ideal for monitoring long-term trends and thus evaluating the effectiveness of measures, such as when compensating for harmonics or flicker.

Analyze system faults with precise, high-resolution measurements



Benefits at a glance

- Can be used with more than 10,000 signals per station
- In case of a fault event, trigger high-resolution fault records (with a resolution down to 1 µs) including a history of what happened prior to the event itself
- Multistation option for sample-exact synchronization of multiple iba systems
- Interstation triggering initiates recording process in all stations



Electric systems react extremely fast to errors. Electrical equalization processes then quickly kick in, and they have the potential to destroy equipment if they are not clarified without delay. Malfunctioning protection equipment or control systems will cause enormous damage.

Analyzing and evaluating these types of errors is a complex endeavor and requires a variety of information obtained from analog measured values, the control/safety signals, and the event history.

When attempting to understand the problem, it is often more useful to look at what happened before an error occurred than what happened after. High-quality monitoring systems such as the iba system provide corresponding setting options and adequate buffer memory to record what happened both before and after an event.

Precise analysis of faults

As a high-speed fault recorder TFR (Transient Fault Recorder), the iba system continuously monitors the plants with maximum resolution in order to detect signal faults. If a fault occurs, the signals are recorded in a trigger-driven, high-resolution process. This allows grid faults and other events to be analyzed precisely and their causes to be determined.

Integrated fault and event monitoring

Only the totality of all data and its chronologically correct presentation shows the actual system reaction, enables evaluation and provides a basis for decision-making for future improvement

measures. The iba system provides this complete set of data.

All incoming data can be evaluated and used as a trigger for recording – not just digitalized measured values, but also data from switchyard (IEC 61850), from the controller, from process monitoring, and from power quality measurements.

This functionality is part of every iba system and merely needs to be configured accordingly. Suitable interfaces or fast components for acquiring measured values are important factors here so that dynamic operations can be monitored at ms or even µs level.

Trigger condition for every event

The iba system enables several thousand signals per station to be seamlessly monitored at different locations. Triggers are configured for potential failure conditions or other events; these triggers then activate the high-resolution recording of the signals, synchronously and with pinpoint accuracy. Different sampling rates can be configured for the recording – as much as 500 kHz with the new ibaMAQ system.

There is no limit on the number of triggers. You can use an editor to quickly and easily configure trigger conditions with all analog and digital signals or combinations of several signals. Event and status messages via the IEC 61850 protocol, e.g., GOOSE messages, can also be used as triggers. When using the ibaPQU-S power quality unit, the triggers can also be based on grid quality events.

Furthermore, triggers can be bundled in "trigger pools." A trigger pool enables multiple trigger signals to be configured as start/stop triggers for the data recording.

Synchronize multiple ibaPDA systems in multistation mode

If a single ibaPDA system cannot handle all the signals by itself, multiple (up to 5) ibaPDA systems can be connected together in "multistation" mode. All the ibaPDA systems involved work with one another as if they were a single system. They acquire the signals with absolutely synchronous timing and a synchronization accuracy of less than one sample. If a trigger activates the recording process on one ibaPDA system, the recording process also starts at the same time on every other ibaPDA system.

Synchronous measurements, even over long distances

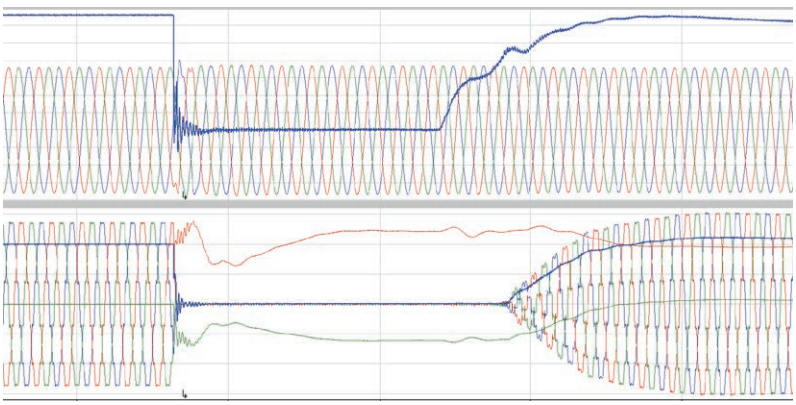
HVDC stations are often located several hundreds if not thousands of kilometers from one another, so it is essential that the measured values are acquired synchronously and the triggers work across the various stations.

When working in "multistation" mode, the iba system is able to cover very large distances, for example several thousand kilometers. When one computer activates the measurement with a trigger, a time stamp is also sent and received by the other computers. This ensures that the data file has the same start time on all the computers. This also works if there is latency because the computers are located far from one another.

While "multistation" mode is an essential feature for recordings in HVDC systems, it also offers many benefits for recordings in industrial environments.

Data analyzed as if it were one system

The related data files can be opened simultaneously in ibaAnalyzer later on. Both the start time and the samples will match up in all files – as if the signals had been recorded with a single system.

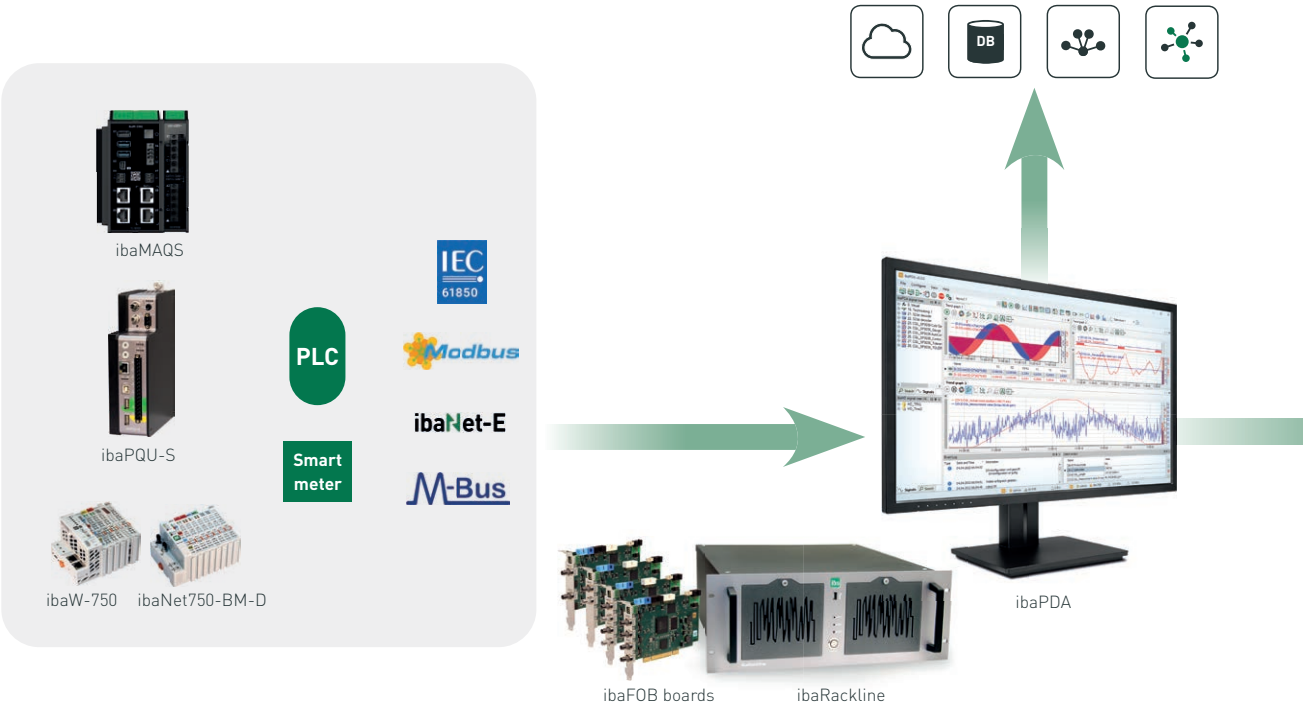


Example: Event monitoring for an HVDC plant

The trend views show the gradient for current and voltage on the AC and DC side when a plant was shut down and then switched back on. The high-resolution measurement data shows in detail what happened before and after the event.

In addition to the AC and DC measured values, the record also documents several thousand signals from the plant controller, all of which have been synchronized down to µs level. As such, the iba system provides tailored insights into what is happening in the plant to developers and to the people responsible for plants and operation.

Acquiring, analyzing, and documenting ...



The flexible, scalable iba system

The iba system is a modular system containing the software products ibaPDA, ibaAnalyzer, ibaHD-Server, ibaDatCoordinator, and ibaDaVIS – all of which are perfectly coordinated with one another – plus technology-specific hardware components. The iba system is scalable and can be expanded in a variety of ways whenever you like.

ibaPDA – data from different sources in a single system

All applications require measurement data that covers every process and all relevant acquired and monitored data from the energy systems.

Thanks to the comprehensive connectivity features in the ibaPDA data acquisition system, the various data sources can be acquired centrally and with synchronous timing, using different acquisition methods.

The strength of the iba system lies in the fact that all energy and process data is measured with isochronous timing, and that it enables causal relationships in complex distributed systems to be identified and understood.

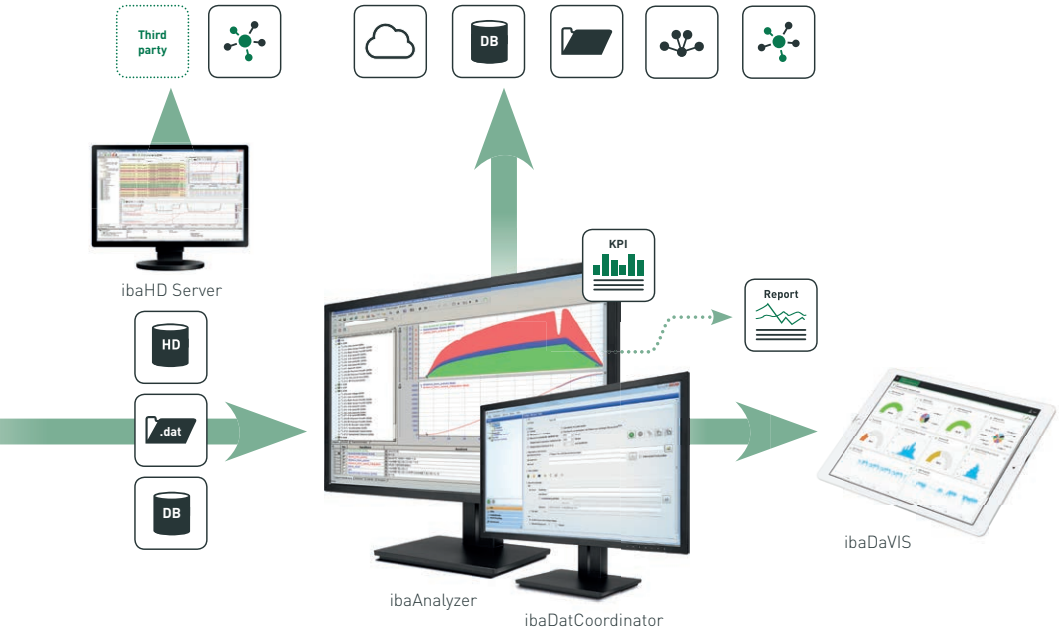
ibaHD-Server – continuously save data

Save the data exactly where it is needed. ibaPDA enables you to save files in iba format in your file system. You can also save the data and events such that they are available for the long-term, with direct access, in ibaHD-Server. You benefit from seamless data in a single system and the ability to determine characteristic values and trends over very long periods of time.

The ibaHD-Server enables you to quickly find events such as overvoltage/overcurrent, even in continuously recorded data. Events are controlled by trigger conditions and displayed in a separate event table with chronological or technological filters so you can quickly find the event you are looking for. With just a click of the mouse you can view the associated data together with your preferred pre-trigger and post-trigger times and evaluate it.

Faults can also be displayed by an alarm function and logged as an event in the ibaHD-Server.

… in a single system



ibaAnalyzer – custom-made analyses

ibaAnalyzer is a powerful analysis software that enables you to carry out tailor-made analyses and generate reports that comply with the relevant standards. Once you have created an analysis you can save it, modify it in different ways, and reuse it whenever you like.

ibaAnalyzer is free of charge, can be installed multiple times, and offers an efficient way to analyze the data acquired using ibaPDA.

ibaDatCoordinator – automated post-processing

With ibaDatCoordinator, even extensive post-processing chains can be automated and used for further analyses.

To meet the needs of different users, custom-made post-processing can be configured to perform different tasks. These tasks can include querying the desired data, outputting ibaAnalyzer calculations, creating and sending reports, or outputting calculated values in databases.

ibaDaVIS – interactive online dashboard

ibaDaVIS has been designed to visualize and analyze your process and energy data and characteristic values clearly in an online browser. An interactive interface provides access to the detailed data from the process and energy values displayed on the dashboard. For example, events in the plant and grid can be highlighted and compared with the process. You can also use defined parameters to quickly and easily analyze, monitor, and compare plants and assess the effectiveness of measures. Long-term analyses are also possible thanks to the informative statistics.

Save data where it is needed

Thanks to the extensive northbound connectivity features, the acquired measurement and quality data can also be used outside the confines of the iba system. You can save, evaluate, and analyze the data acquired with the iba system in your own system. The technology currently supports the writing of data to databases (Oracle, SQL Server, MySQL, MariaDB, PostgreSQL, SAP HANA, InfluxDB), Kafka clusters, and MQTT brokers. Data can also be transferred via standard servers such as OPC UA and SNMP. Depending on your individual requirements, data can be written to databases either continuously or in sync with the process, i.e., triggered.

Powerful hardware components

ibaMAQS modular measurement system

With the modular ibaMAQS measurement system, iba is setting new standards in measurement technology. Its impressive features include extremely easy handling, 24 bit resolution, galvanic isolation of channels, calibrated A/D converters, fast synchronous data acquisition, and process monitoring directly on the plant.

ibaMAQS makes it possible to acquire different types of data – such as sensor, machinery, vibration, and energy data – deterministically and with isochronous timing. It features modules designed specifically for measurement applications in the field of electric energy technology and can achieve a sampling rate of up to 500 kHz and a timebase of 2 µs.

ibaPQU-S power quality unit

The ibaPQU-S power quality unit can monitor the quality in power grids with utmost accuracy. To do so, it calculates characteristic variables for the electrical power quality in accordance with the relevant standards and records them using ibaPDA. The system measures raw values such as current and voltage in sync with the grid and then uses these to internally calculate characteristic values such as frequency, harmonics, or flicker in accordance with the relevant standards. It can achieve a timebase of up to 25 µs. The quality indicators of the voltage and current are calculated internally according to the IEC61000-4-30 standard, Class A.

According to this standard, the characteristic values are calculated in intervals of 10 ms to 200 ms and then aggregated in intervals of 10 s, 10 min or 2 h. Only the Aggregation intervals are relevant for standard-compliant recording. In ibaPDA, however, not only the aggregated values according to the standard are visible, but also the calculated characteristic values and the raw data with a high time resolution. All values can be displayed and monitored as a trend or used as a trigger.

Integration of WAGO I/O modules from the 750 series

WAGO's I/O modules from the 750 series are an affordable extension for measuring power. They are connected to the iba system either via standard Ethernet with ibaW-750, or fiber optics with ibaNet750-BM-D.

Both devices are ideal for applications such as power flow analyses, energy management, and determining energy costs and consumption.

They are also an affordable extension for an ibaPQU-S system to add consumption data from plants of secondary importance. The resolution depends on the module selection and lies in the low ms range.

Compact measurement modules

The ibaPADU series (Parallel Analog Digital Unit) enables analog and digital signals to be acquired very accurately. The analog inputs are available as current and voltage inputs with different measurement ranges. Sampling rates of 1 kHz to 100 kHz and a timebase of up to 10 µs can be achieved with different measurement modules.

The iba industrial computers ibaRackline and ibaDeskline

For demanding tasks in the fields of data acquisition and analysis, iba offers powerful industrial computers that meet the highest requirements. The computers feature high product quality allied to the very latest technology and are designed for a long life in harsh industrial environments.

ibaFOB boards

The boards from the ibaFOB family are communication boards for ibaNet fiber optic connections. The ibaFOB boards connect iba peripheral devices such as ibaPADU compact measurement modules, ibaLink system interconnections, and iba bus modules, with PCs such as iba industrial computers.

The boards support the ibaNet communication protocols 3Mbit, 5Mbit, 32Mbit, and 32Mbit Flex. The 32Mbit Flex protocol can achieve a sampling rate of up to 40 kHz.

ibaN-2E network adapter

The ibaN-2E adapter can be used to connect ibaNet-E-enabled iba devices with a standard/industrial computer. The adapter supports the ibaNet-E protocol with a synchronous signal sampling rate of up to 1 µs. Depending on the exact infrastructure, a transmission rate of up to 1 Gbit/s can be achieved via Ethernet. The adapter is expected to be available in 2025.

Order information

Software

Order no.	Name	Description
30.770064	ibaPDA-64	Basic package with server/client application, for 64 measuring signals
30.770128	ibaPDA-128	Basic package with server/client application, for 128 measuring signals
30.770256	ibaPDA-256	Basic package with server/client application, for 256 measuring signals
30.770512	ibaPDA-512	Basic package with server/client application, for 512 measuring signals
30.771024	ibaPDA-1024	Basic package with server/client application, for 1024 measuring signals
30.772048	ibaPDA-2048	Basic package with server/client application, for 2048 measuring signals
30.774096	ibaPDA-4096	Basic package with server/client application, for 4096 measuring signals
30.778192	ibaPDA-8192	Basic package with server/client application, for 8192 measuring signals
30.779999	ibaPDA-unlimited	Basic package with server/client application, for unlimited measuring signals
30.001930	ibaPDA Multistation	License extension Multi-station application
31.001090	ibaPDA-Interface-IEC61850-Client	IEC61850 communication interface for 64 connections
31.001400	ibaPDA-Interface-IEC61850-9-2	IEC 61850-9-2 interface for 2 streams
30.800064	ibaHD-Server-64	Basic license ibaHD-Server for 64 tags (signals),
30.800256	ibaHD-Server-256	Basic license ibaHD-Server for 256 tags
30.800512	ibaHD-Server-512	Basic license ibaHD-Server for 512 tags
30.801024	ibaHD-Server-1024	Basic license ibaHD-Server for 1024 tags
30.802048	ibaHD-Server-2048	Basic license ibaHD-Server for 2048 tags
30.804096	ibaHD-Server-4096	Basic license ibaHD-Server for 4096 tags
30.808192	ibaHD-Server-8192	Basic license ibaHD-Server for 8192 tags
30.806666	ibaHD-Server-unlimited	Basic license ibaHD-Server for an unlimited number of tags
34.040010	ibaDaVIS	Data Visualization and Information Service (12 tiles)
34.040100	ibaDaVIS-upgrade by 12 Tiles	Upgrade by 12 tiles
34.010550	ibaDatCoordinator	Tool for automated data management
33.010000	ibaAnalyzer[1]	Offline analysis package

License upgrades are additionally available for ibaPDA and ibaHD-Server to increase the number of signals, clients, and data stores.
[1] Software is licensed free of charge for analyzing measurement data generated with the iba system.

ibaPQU-S and I/O modules

Order no.	Name	Description
10.150000	ibaPQU-S	Power Quality Unit
10.124600	ibaMS3xAI-1A	Input module with 3 analog current inputs, ± 3.0 A
10.124610	ibaMS3xAI-5A	Input module with 3 analog current inputs, ± 15.0 A
10.124620	ibaMS3xAI-1A/100A	Input module with 3 analog current inputs, ± 6.25 A (± 100 A for 1 s)
10.124521	ibaMS4xAI-380VAC	Input module with 4 analog voltage inputs, 380 V AC
10.124500	ibaMS8xAI-110VAC	Input module with 8 analog voltage inputs, 110 V AC
10.124100	ibaMS16xAI-10V	Input module with 16 analog voltage inputs, ± 10 V
10.124101	ibaMS16xAI-10V-HI	Input module with 16 analog voltage inputs, ± 10 V, high impedance
10.124102	ibaMS16xAI-24V	Input module with 16 analog voltage inputs, ± 24 V
10.124103	ibaMS16xAI-24V-HI	Input module with 16 analog voltage inputs, ± 24 V, high impedance
10.124110	ibaMS16xAI-20mA	Input module with 16 analog current inputs, ± 20 mA
10.124200	ibaMS16xDI-220V	Input module with 16 digital inputs, ± 220 V
10.124201	ibaMS16xDI-24V	Input module with 16 digital inputs, ± 24 V
10.124210	ibaMS32xDI-24V	Input module with 32 digital inputs, ± 24 V
10.124000	ibaPADU-S-B4S	Backplane panel for one central unit and 4 modules

ibaMAQS

Order no.	Name	Description
10.180000	ibaM-DAQ	Processor module for stand-alone data acquisition
10.180010	ibaM-COM	Communication module for the ibaMAQS modular system
10.181000	ibaM-4AI-5A-150A-AC	Input module with 4 analog current inputs
10.181010	ibaM-4AI-600V-AC	Input module with 4 analog voltage inputs

Central units for the WAGO I/O system

Order no.	Name	Description
15.140020	ibaW-750	Central unit for WAGO I/O system 750 (ibaNet-E)
15.140010	ibaNet750-BM-D	Bus module for WAGO I/O system 750 (fiber optic)

Training

iba offers training courses that are tailor-made for energy applications. They cover design, implementation, saving, and analysis of data plus commissioning of the iba system for energy applications. Other training courses cover data analysis and visualization, specifically for energy applications.

Order no.	Name	Description
61.200330	Engineering – Design and configuration of the iba system for energy applications	3-day course
61.200320	Commissioning – Commissioning of the iba system for energy applications	2-day course
61.200300	Analyzing data in energy applications (basic)	1-day course
61.200310	Analyzing data in energy applications (advanced)	1-day course

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