The Drive & Control Company

Rexroth
Bosch Group

IoT Gateway

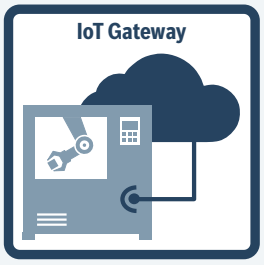
Get ready for Industry 4.0!

Network machines efficiently and optimize processes

Fast and flexible connection of machines to Industry 4.0

Network new and existing machines cost efficiently and optimize production processes and product quality: The IoT Gateway makes it easy to connect to Industry 4.0 environments without intervening in the automation logic. The precisely coordinated combination of control hardware and software for implementing IT applications collects sensor and process data, transmits it to MES, cloud applications or local machine state monitoring systems, for example, and enables process data analysis.

- Boost productivity and efficiency
- Plug-and-run in three steps
- Modularity for individual requirements
- Scalable and robust control hardware
- Future-proof with open software architecture

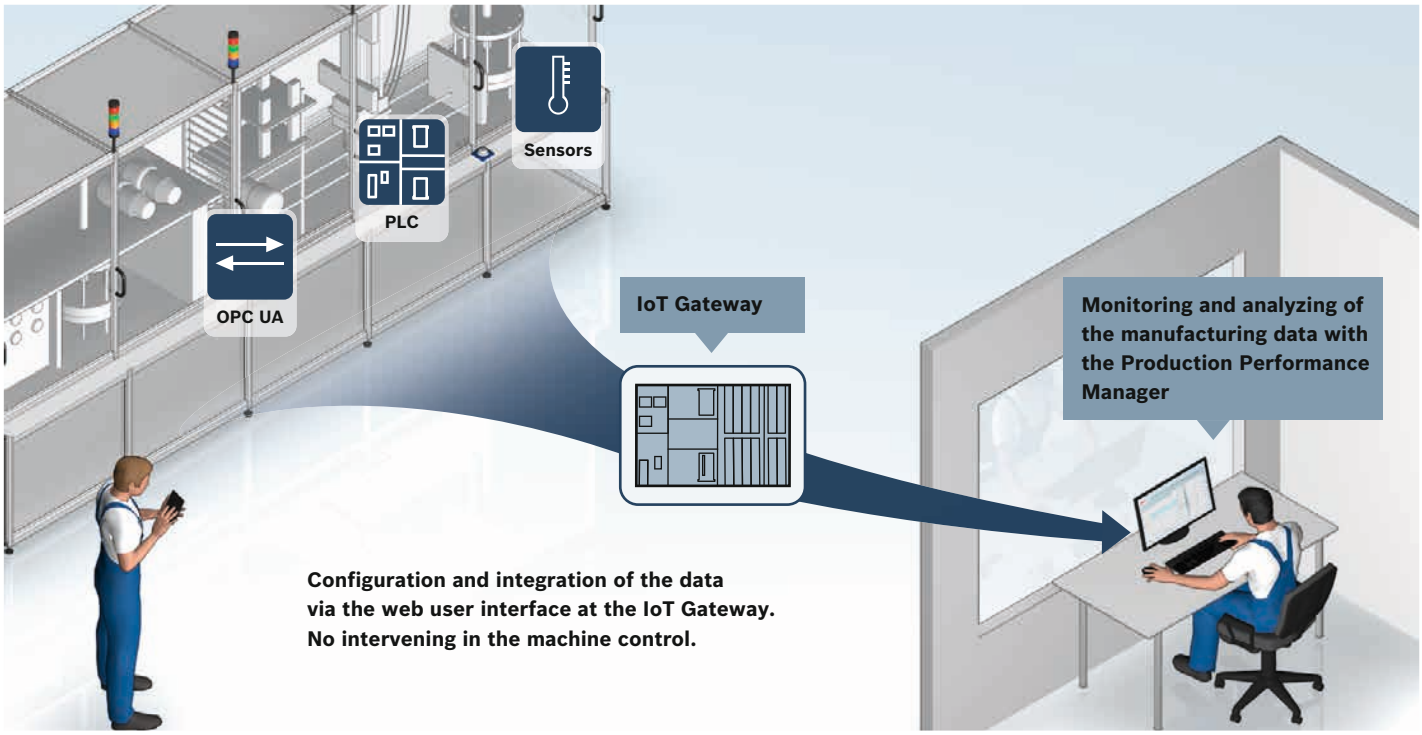


Boost productivity and efficiency

The modular software concept of the IoT Gateway is based on Linux, Java apps and open interfaces. The IoT Gateway makes your machine and process data more transparent. Real-time monitoring of process data such as temperature, pressure, vibration, power consumption, or other parameters ensure that your production is consistently of high quality. Rule-based analysis of specific information simplifies predictive and plannable maintenance of your plants and significantly increases machine availability. Monitoring of energy-related data makes it possible to shut down plant components and thereby optimize the energy balance.

Plug-and-run in three steps

You can configure and commission the IoT Gateway quickly, conveniently and completely free of programming via the integrated web interface – without any changes to existing machine programs:
The first step is to select and configure the sensors in the devices app. The supported range of sensors covers sensors with digital and analog interfaces to Bluetooth low energy, USB and RFID.
In the second step, the data is preprocessed in the processing app and, in the third step, it is sent to higher-level systems. These can be different IoT services for data collection and analysis, such as the Production Performance Manager from Bosch Software Innovations or the Oracle IoT cloud.



Modularity for individual requirements

For quick commissioning, different Java apps for typical application scenarios are provided with the IoT Gateway. The open, modular design allows you to flexibly adapt and expand the IoT Gateway to specific requirements. This is done with the simple expansion of Java apps for new sensors or for the specific connection of new IT solutions. These are provided either directly from Bosch Rexroth, our IT partners or the user.

▲ **You can use the IoT Gateway from Rexroth to make your production machines ready for Industry 4.0 – quickly, easily and cost efficiently**

Scalable and robust control hardware

The IoT Gateway software is run on the IndraControl XM embedded control hardware from Rexroth. It meets high real-time requirements and can be expanded flexibly into a complete automation system with the scalable I/O system IndraControl S20. The IoT Gateway hardware therefore meets the industrial requirements for an i4.0 upgrade of existing systems.

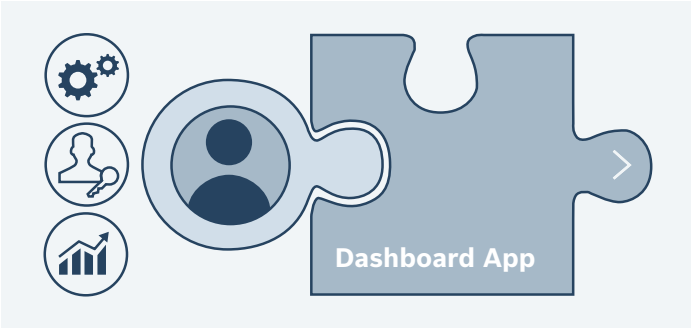
Future-proof with open software architecture

Linux Java OSGi

The IoT Gateway architecture is basically built on open software standards. Open-source Linux is used as the operating system. The integrated Java virtual machine enables efficient deployment of the Java applications and corresponding cloud services via the OSGi framework.

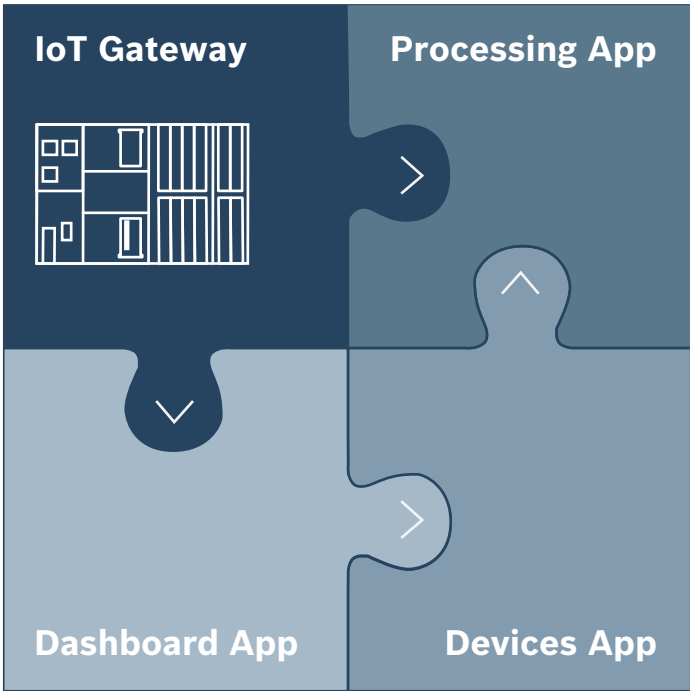
IoT Gateway – Industry 4.0 for new and existing machines

Plug-and-run
The apps in the IoT Gateway make data recording, processing and forwarding very simple and easy. With its combination of control hardware and software, the IoT Gateway enables the opportunity for fast commissioning. The basis for this is the integrated Java VM and OSGi framework, based on which Bosch Rexroth provides various applications.The platform can also be used to develop and integrate customized apps.

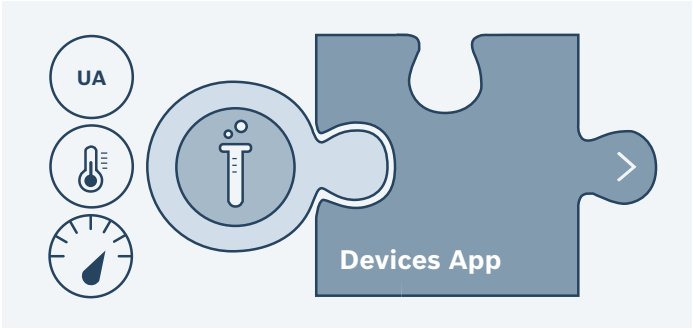


Dashboard App – the central hub
With the web-based Dashboard App, you always have a detailed overview of the collected data and the Devices App. It enables local monitoring of process data via a standard browser without special software.
The Dashboard App provides web-based interfaces for:

- Administration
- Configuration and parameterization
- Visualization of process data

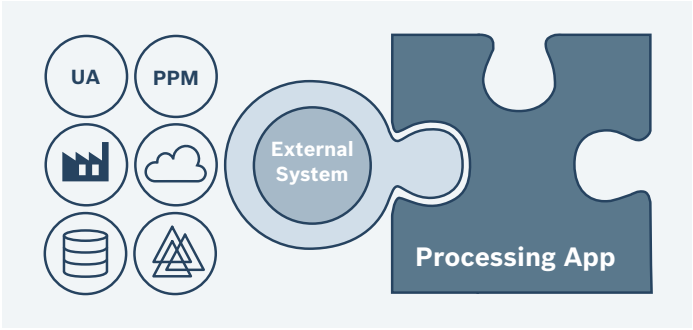


◀ **The IoT Gateway – perfectly coordinated hardware and software components**
- Scalable embedded control hardware
- Dashboard App for system administration, configuration and parameterization
- Devices App for the integration of I/O modules, sensors and PLC
- Processing App for processing and forwarding of process data



Devices App – for flexible peripheral connections
The Devices App establishes connections with peripherals (such as sensors). In the app, signal values are converted into process data (known as "endpoints").
Connection option for:

- Analog voltage and current signals
- Digital voltage signals
- OPC UA
- Open Core Interface for Controls
- Siemens S7
- RFID
- Bluetooth LE



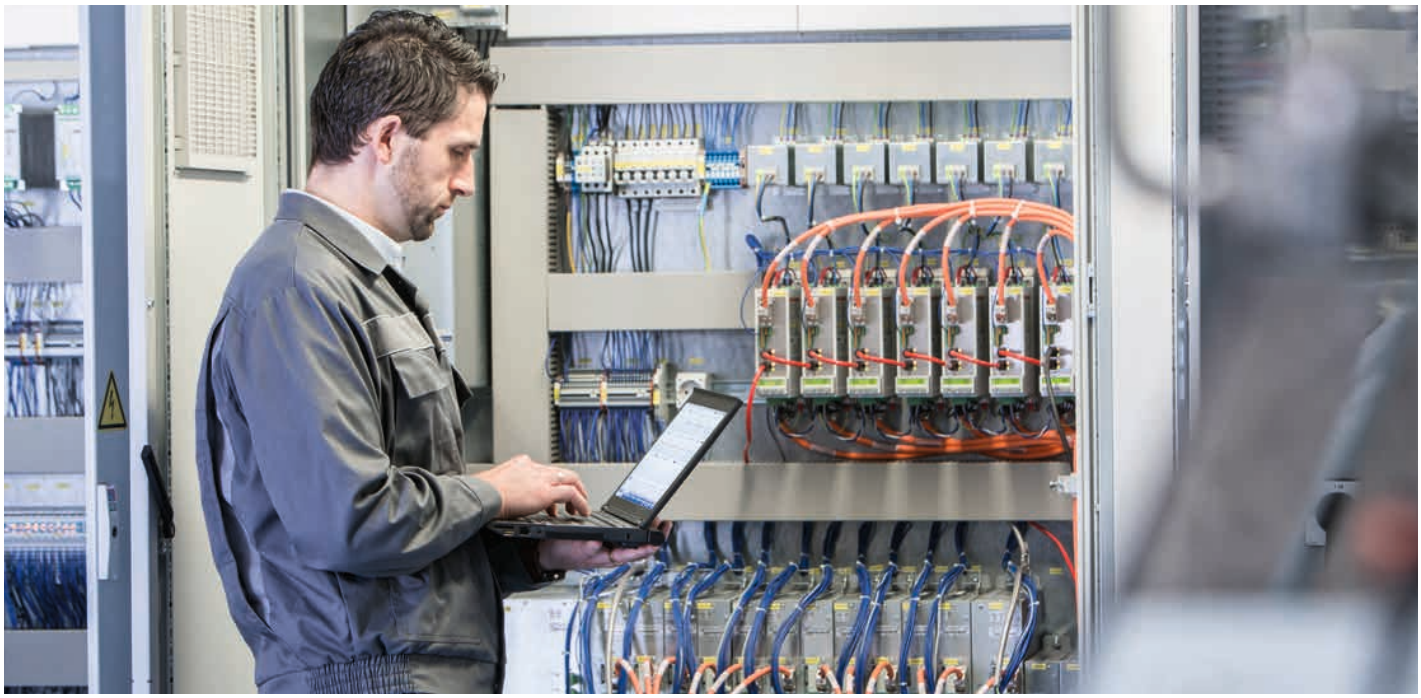
Processing App – for fast data transfer
The Processing App ensures fast processing and forwarding of process data

- Conversion of process data into information using logical and mathematical operations
- Forwarding of information to higher-level systems, for example:
  - Bosch SI – Production Performance Management
  - Bosch Sensor Cloud
  - Bosch Energy Platform
  - Bosch Rexroth ODiN
  - MES Systems
  - Databases

Software Development Kit (SDK) – for your individual applications

- An easy introduction to project planning using application examples
- Complete access to a wide range of functions
- Easy integration of the libraries with the corresponding development environment
- Full documentation of the API

IoT Gateway services



Bosch Rexroth supports you with an extensive package of additional services related to the IoT Gateway.

Consulting
Our trained and experienced specialists support you in the planning and technical implementation of connecting your existing machines to the IoT Gateway. This ranges from joint clarification of technical requirements, to the presentation of possible solutions and coordination of a technical implementation approach.

Implementation of an application
Based on this concept, Bosch Rexroth defines the system configuration and supports you in the complete electrical installation and commissioning of the IoT Gateway. This ensures real-time recording of your process data and enables forwarding to higher-level systems. In addition, based on the initial results, you are supported in implementing the IoT Gateway solution at plant level.

Customized training services
Bosch Rexroth offers you training courses tailored to your own specific needs and employees (e.g. for your own roll-out at plant level).

Application example: IoT Gateway and Production Performance Manager

At the Bosch plant in Homburg, engineers have used the IoT Gateway to network a test facility for hydraulic valves from 2007. Thanks to new sensors that monitor the quality of the oil used, it is now possible to determine the time of the required oil change much more accurately than before. This saves time, money and protects the environment.

In this particular case, retrofitting with the IoT Gateway had paid for itself after just 18 months. In the next step, 22 further test facilities are to be added and later many more machines are to be retrofitted at Bosch.

In addition to the IoT Gateway, Bosch also provides the software needed to analyze, format and display data in the Bosch IoT Cloud, for example.
For the test facilities in Homburg, the IoT Gateway sends the sensor data to a PC that has been installed with standard Bosch software modules.

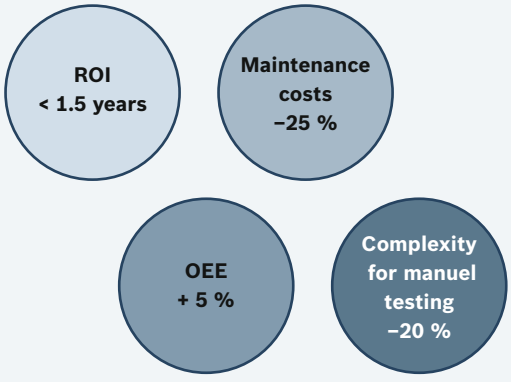
The Production Performance Manager (PPM) from Bosch Software Innovations is a production information and evaluation system. It records production and machine data from the networked test facility in close to real time. The module merges the information into a single visualization and forwards specified events to defined persons. Using the PPM, employees can intervene before critical situations possibly leading to system downtime arise.

Use case

Description

- Networking of existing machines (test facilities) and sensory monitoring of the test medium and the formatting units
- Automated monitoring of the ISO purity classes of the test medium (customer request)
  → Previously a manual process
- Continuous status monitoring of formatting units (filters) and automated alerts and ordering of maintenance
  → Previously a manual process

Result



**At least one working week was quoted for the modernization of the test bed with commissioning of the IoT Gateway, using sensors and interfaces with traditional PLCs.
Web-based configuration means that an electrician with no knowledge of PLCs can complete commissioning within half a day – decreasing the engineering workload by 90 percent.**

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Rexroth
Bosch Group

Bosch Rexroth AG
Bgm.-Dr.-Nebel-Str. 2
97816 Lohr, Germany
www.boschrexroth.com

Find your local contact person here:
www.boschrexroth.com/contact

Further information:
www.boschrexroth.com/gateway

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