



# BACE

## Energy Gateway

*BACE is the critical link for many IoT implementations – the element that connects your assets with your enterprise systems in the cloud. With BACE IoT solutions can be created faster and with a lower investment. BACE combines a module that can be integrated with products, devices and systems, with an application in the Azure cloud that acts as IoT Connector. Together they deliver the key functions that are needed for IoT solutions – such as data transfer, security, over-the-air updating and provision. With the operational management portal that is part of the cloud application, the implementation is easily scalable. For IoT initiatives that want to shorten the development process, make use of a proven solution and avoid vendor lock-in, BACE is the optimal choice.*

## Energy Gateway

**BACE Energy Gateway** is the perfect IoT solution that allows you to remotely access and manage energy devices through the Cloud – for example in Low-Energy or **Zero-Energy Buildings**. It is composed of a hardware module and a Cloud application, the **BACE IoT Connector**, that forwards the data to your platform or enterprise systems. BACE's Module can be connected to devices via Modbus, P1, M-Bus, Z-wave, Zigbee, CANbus, UART, LoRa and Bluetooth. With this solution, you are able to constantly retrieve data from the devices of the building in a reliable, easy, and secure way. BACE Energy Gateway is a ready-to-use, quick to deploy solution that can be configured remotely through a Management Portal to read and write exactly the data registers that you choose, at the frequency you specify.

BACE Energy Gateway accomplishes remote system management by pairing the BACE Module with a **Device Twin** in the cloud. The Device Twin is a digital replica of the BACE module that enables you to see the state of the devices and registers. If the BACE Module is connected to one or more devices, it will retrieve the data, and send it directly to the Cloud through one of several **data transfer** options (LTE-M, 2G, WiFi and Ethernet) for the best operational reliability. Any adjustments made to the module are automatically synchronized with the Device Twin (and vice versa).

BACE Module is able to connect to Modbus via a **serial** connection (RTU) as well as through a **TCP/IP** network. The data is constantly provisioned to your systems via the API of the BACE IoT Connector. The **API** follows an OAuth 2 Model for encryption, authentication and authorization, and has diverse access levels. BACE Energy Gateway can also offer Webhooks, like event based automated messages that can be sent to your system anytime an event occurs.

BACE Energy Gateways' installation requires little effort. Once installed and powered through 120V or 230V, most of the configuration can be done remotely from your desk through the Twin Device using tools in the BACE Management Portal.

To protect your data and information, and to secure the IoT system, BACE Energy Gateway has a **Secure Element** and uses a state-of-the-art IoT security mechanism. This mechanism has been developed by Microsoft and Microchip, and is centered on protecting both the hardware and software of each Module. This secure technology contains the individual encryption certificate of each specific Module and is protected from physical break-ins. In case of a forced attempt, the element destroys itself and the certificate, preventing any subsequent access to other parts of the system.

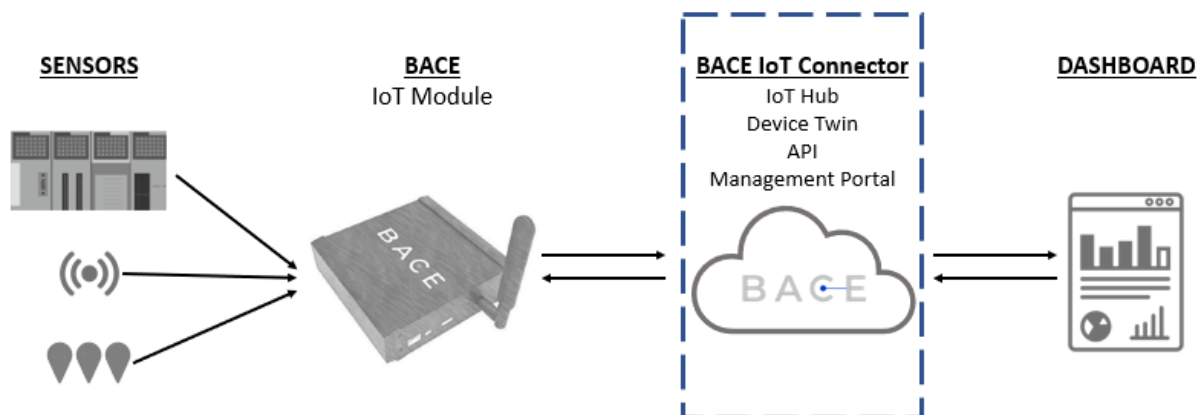
Some additional features that BACE Energy Gateway offers:

- **OTA** – Over The Air updating for security, operational flexibility, and to be ready for future changes.
- **Location** – with the built-in GPS each BACE Module will report its location
- **Solar Panel Powered** version – for use of BACE Energy Gateway outside.

## BACE IoT Connector

**BACE IoT Connector** allows you to connect, manage and store your data in an efficient and secure way. It serves as a connection between the BACE Modules and your platform, dashboard or enterprise system, allowing a dynamic data flow. BACE IoT Connector is a Cloud application composed of various elements, including the **IoT Hub**, **Databases**, the **Device Twin**, the **API** and the **Management Portal**. The information collected by BACE Module is transferred to BACE IoT Connector in the Cloud, while the data is constantly provisioned to your systems via the BACE IoT Connector API.

The BACE Modules and BACE IoT Connector are **completely integrated**, and together form a ready-made gateway with superior functionalities that enable you to **implement** an IoT solution **quickly**. These include end-to-end **security** with unique encryption certificates for each module, a set of tools that enables you to **manage** the **operation** and **scale-up** of your IoT solution, and **multiple data transfer** options (LTE-M, 2G, WiFi and Ethernet). It is future proof, as the Over The Air (OTA) feature enables you to update BACE Modules you already have in use, adding new functions.



BACE IoT Connector runs in the **Microsoft Azure Cloud** and delivers top data **protection** and **recovery** options. Depending on the type of use and data access that best fits your needs, your data storage can be adjusted. BACE IoT Connector can deliver available, on-spot, **ready to view data**; or data from **cold storage** data systems used for delayed checks and referencing. BACE IoT Connector makes automatic **backups** to ensure the least risk for data loss and allows scaling services to provide high data availability.

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The **RESTful API** implemented in BACE IoT Connector allows you to extract data, set configurations and assign BACE Modules to users via your own enterprise systems. Integrating the BACE solution with your systems is **easy** for our clients, so you can operate with all portals you already work with. Alternatively, BACE offers an **optional WebApp** which has a number of visualization and analysis options and can be **customized to fit your needs**. In this WebApp, the overall **energy usage** of each individual device and its performance are visualized. It is also possible to activate **automated alerts** in case of events or interruptions in order to improve maintenance services. Finally, it is possible to generate **reports** with the data from the combined devices per building.



**BACE - Building A Connection, Everywhere**