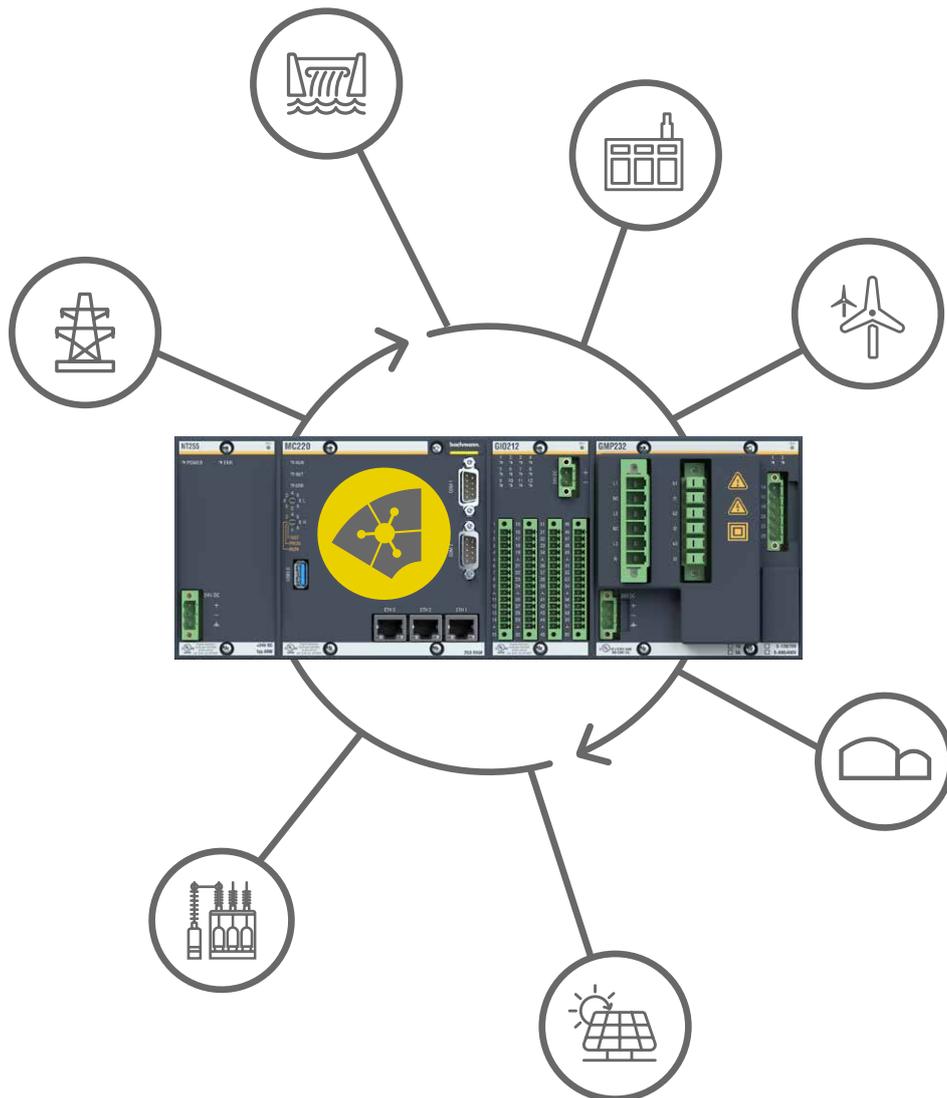


the power to control

bachmann.

Smart Power Plant Controller

Certified power plant controller in accordance with VDE-AR-N 4110/4120



Smart Power Plant Controller



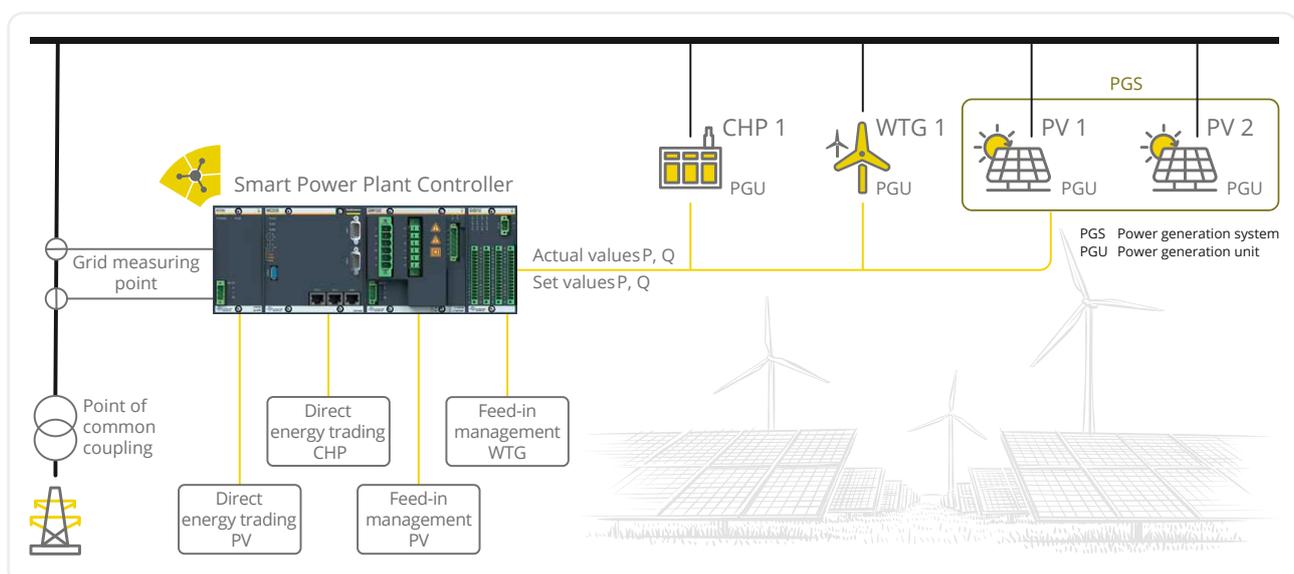
— Certified controller for the power management of the energy park

The power management at the point of common coupling is required for the efficient operation of an energy park (PGS). The power plant controller is the central component of the park, which consists of different power generation units (PGU), such as CHP units, photovoltaic installations (PV), battery storage systems or wind turbines. This takes over the control of power and the resulting setting of manipulated variables for the individual power generation units.

The power setpoint for the entire park is transferred from higher-level instances such as supply network operators and direct marketers to the power plant controller. This in turn takes over the calculation of the setpoints for the individual power generation units and sends this information to them.

Connection example of the Smart Power Plant Controller

as a power plant controller for different power generation units



Certified Power Plant Controller from Bachmann

According to the VDE-AR-N 4110 connection rules, all operators of an energy park with a total output of 135 kW or greater are required to use a certified power plant controller whenever power control and setpoint transfer to the generation units is implemented.

Bachmann has developed a power plant controller that runs on the proven Bachmann hardware and offers additional functions and general procedures as well as the complete range of functions specified by the connection rules.

Easy engineering thanks to standards

Communication with network operators, direct marketers or other participants can be configured easily, thanks to the large number of protocols supported by the Bachmann controller system.

The product is rounded off with a user and access security concept based on the latest standards, as well as a web visualization. This makes it possible to easily enter or adapt all the parameters and characteristics required for commissioning directly via the visualization.

The visualization also displays all the important process data and moving between the set operating modes of the power plant controller is possible if required. Clear graphics show the latest signal flow.

Integrated simulation model

The product range of the Smart Power Plant Controller contains a simulation model for the PC (MATLAB®), which can be incorporated in standard network simulation programs. This makes it possible to speed up the certification process for the entire power plant at the end customer. Furthermore, simulation models are also available for PSCAD, DigSILENT PowerFactory® and FMU (FunctionMockup).

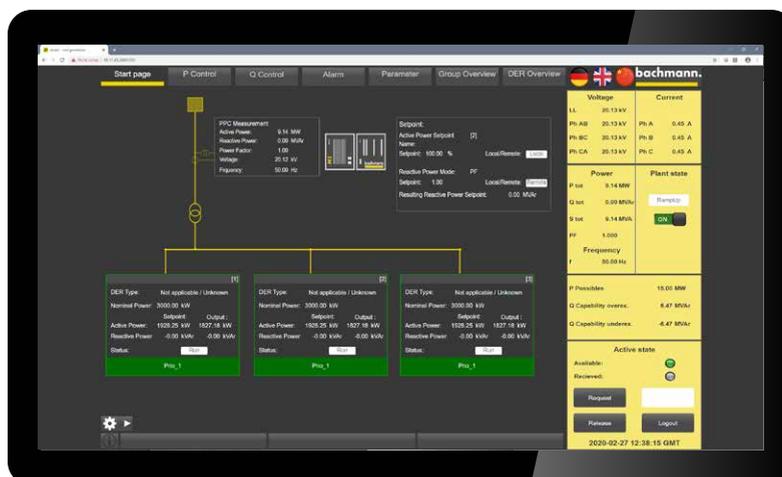
Greater overview through clustering

Bachmann's power plant controller also makes it possible to create groupings in order to meet the requirements of the power plant topology or map higher-level structures, such as different direct marketers. This grouping can also be provided with a prioritization in order to meet contractual requirements.

FACTS & FEATURES

- *Power plant controller, certified according to VDE 4110/4120/4130 and EN 50549-2*
- *Full range of functions for active and reactive power control, as well as all the general processes required*
- *Proven Bachmann hardware with powerful CPU and high-precision grid measurement and protection module*
- *Standard communication and energy protocols in with IEC, OPC UA, etc.*
- *Visualization for commissioning and monitoring of the power plant controller*
- *Simulation model for overall plant certification*
- *Expandable hardware and software concept*

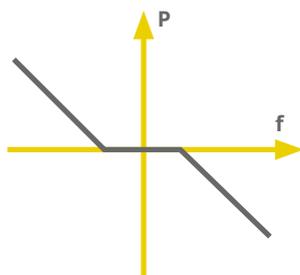
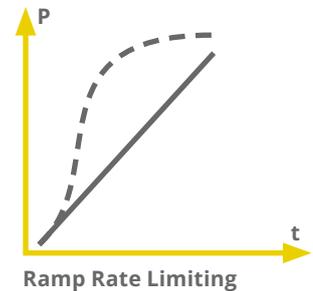
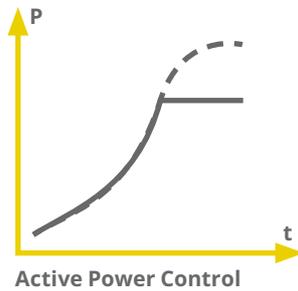
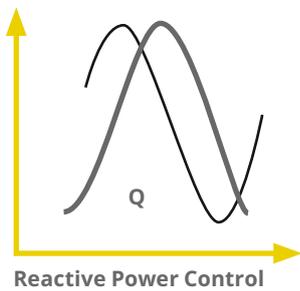
Overview page of the visualization, which can be called as a web application from the integrated web server of the controller.



Functionality (certified)

The following certified functions of the power plant controller are integrated:

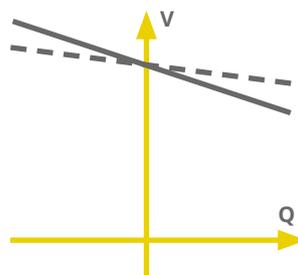
- Active power control (P) according to setpoint definition
- Primary power control
- P(f)-characteristic for PGU Type 1&2 and storage
- Reactive power control (Q) according to setpoint definition
- Q setpoint definition
- Q(U) characteristic
- Q(P) characteristic
- Q setpoint definition with voltage limitation function
- Powerfactor setpoint ($\cos \varphi$)
- Controller bridging (slave mode)
- LFSM-O/U for closed-loop control
- Automatic reconnection after PGU's protective relay trips
- Prioritization for multiple simultaneous P-setpoint commands
- Reactive power method $\cos \varphi$ (P) characteristic



Power Frequency Response

Modular, flexible, expandable

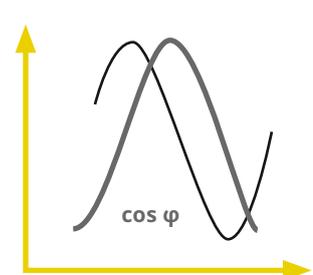
Configurable communication interfaces



Voltage Control

Access security

Simulation model



Power Factor

Web visualization

Process data
P, Q, U, I, f, etc.

Functionality

Other functions:

- Line-loss compensation
- Voltage control U
- Grouping and prioritization function for PGUs/PGSs
- Automatic Frequency Restoration Reserve (aFRR) and manual Frequency Restoration Reserve (mFRR)
- P(U) characteristic
- Reactive power integration of compensation systems
- Event system
- Dynamic data historization
- Intelligent dispatcher function for available power and PGU minimum power

Modularity

The modular design of the hardware and software for the Bachmann controller system also makes it possible for the power plant controller to provide additional interfaces through additional hardware modules of the Bachmann product portfolio.

A central process data pool compliant with IEC 61850 also makes it possible to program additional functions in IEC 61131 or C/C++ on the controller in order to extend the range of functions on the power plant controller.

Networking

The Bachmann controller offers a number of standard protocols and interfaces, such as

- IEC 61850
- IEC 60870-5-101/-103/-104
- IEC 61400-25 (MMS/GOOSE)
- Modbus RTU/TCP
- Profinet/Profibus
- OPC UA
- DNP3
- Analog 4-20mA
- Digital I/Os

for communication with the network operator or other devices.

Security

The software package of the power plant controller includes a user and access management function.

This can be freely configured by the user and authorization levels can be defined for system and visualization access on group level. The created users are assigned to the groups and can also be prioritized within them.

Location-based prioritization of write authorization is also supported so that the user has priority locally at the plant over remote access.

This function thus offers protection from unauthorized access to the Smart Power Plant Controller and intervention in power management.

Visualization

The software package of the power plant controller contains an operating and commissioning visualization tool. The web server contained in the Bachmann controller makes it possible to call the visualization via a standard browser. The start screen of the user interface can be adapted to individual customer requirements, depending on the topology of the energy park.

The technology on which the visualization is based (atvise® M1webMI) also makes it possible to make customized adaptations and provide additional functions.

Configuration

A power plant controller must be designed for use in constantly changing topologies.

The different communication routes and protocols for the particular application therefore have to be identified and configured. Bachmann offers this service to the user, but it is also possible to carry out this engineering yourself. This requires the SolutionCenter, a Bachmann standard software including an extension for the special parameter setting of the Smart Power Plant Controller.

Bachmann's flexible training program offers customers adequate assistance for this and can be requested as necessary.

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