

Gateways for Building Automation: Increasing communication, decreasing energy! A Best Practice Whitepaper





Introduction

In order to achieve climate goals, the CO₂ balance of buildings must be reduced, as they are responsible for 36% of emissions and 40% of energy consumption within the EU. Air conditioning units in particular are among the main consumers.

EU Directive 2018/844 requires that commercial buildings (e.g. offices, businesses and hotels) with a rated output for an air conditioning system or combined air conditioning and ventilation system of more than 290 kW must be equipped with building automation and control systems by the year 2025. The lower limit of 290 kW nominal power for the air conditioning technology corresponds approximately to a hotel with approx. 200 rooms or an office space of approx. 3000 sqm or 300 employees.

The building control system must be able to continuously monitor, log and analyse energy consumption and enable its adjustment. In addition, building management systems must network the various systems and applications, e.g. lighting control, meter data collection, heating, ventilation and air conditioning technology and charging points for electric cars.

Under the Intesis brand, HMS Networks offers suitable gateways that enable the integration and networking of such building technology systems. This is explained in more detail using the following application examples in supermarkets, fashion stores and hotels.

Case Study 1:

3 at a stroke – Integration of lighting control, charging stations and electricity meters in supermarkets

A comprehensive integration solution was implemented for a Spanish supermarket chain. In addition to the lighting control, the charging stations for electric cars and the electricity meters were integrated into the supermarket chain's Modbus-based building management system.

Integration of DALI 2.0 lighting control

One requirement in this project was to integrate a lighting control system based on the DALI 2.0 protocol into the supermarket chain's Modbus-based building management system, which already controls and regulates a large number of other consumers such as air conditioning units, refrigerated counters, etc. The customer was thus faced with one of the most common problems in integration projects: Bring the large number of different protocols and devices to be controlled under one roof. He chose the Intesis solution because HMS Networks' Intesis portfolio covers all common building automation protocols, such as DALI, M-Bus, BACnet, KNX, LON or Modbus, and can combine any two protocols with the protocol converters. For the lighting control of the supermarket chain, the integration task was solved with the DALI protocol converter, which converts the DALI protocol to Modbus. The protocol converter supports both group control and addressed control of the DALI devices. By using the DALI protocol converter, the installation was easily integrated into the Modbus system. But this was only the first step. This is because the integration of lighting control into the overall system should first and foremost optimise energy consumption when it comes to lighting. It was therefore also very important for the customer that the lighting control system takes natural light into account depending on the time of day and

that artificial light is automatically reduced or completely switched off when natural lighting conditions are good. A further energy saving was achieved by linking the lighting control to the opening hours of the supermarket. Another important aspect for the customer was the ability to define different sectors for which different lighting scenarios can be stored depending on use. By integrating DALI lighting control, the customer was able to achieve energy savings of 33% in lighting per supermarket.

Integration of OPCC-compatible charging stations

In Spain it is a legal requirement that supermarkets also offer a certain number of parking spaces for electric cars with charging infrastructure. The charging stations communicate via the OPCC protocol. To optimise energy consumption, the supermarket chain also wanted to integrate the charging stations into the central Modbus system. This is the only way to avoid power peaks and optimise load management. This requirement could also be solved with an Intesis protocol converter, which converts the OPCC protocol to the Modbus protocol and vice versa.



At a Spanish supermarket chain, not only the lighting control system but also the charging stations for electric cars and the electricity meters were integrated into the Modbus-based building management system

Integration of electricity meters

The final element of the integration project was the collection of meter data from the electricity meters in the supermarkets. Each supermarket has a main electricity meter from the public utility company, which is used to bill the electricity consumption of the entire supermarket. The supermarket operator has also installed its own electricity meters in its stores in order to be able to track the electricity consumption of the individual areas – e.g. freezers, refrigerated shelves, lighting, etc. These downstream electricity meters communicate via M-Bus. As with the rest of the project, they were to be integrated into the supermarket chain’s central Modbus system in order to detect above-average consumption at an early stage.

With the Intesis Protocol Converter from M-Bus to Modbus this integration task could also be solved with little effort, especially since the protocol converter automatically scans and recognises the M-Bus meters and their registers.

Case Study 2:

Control of air conditioning systems for a retail chain

Air-conditioned sales rooms are a must for a positive shopping experience. Unfortunately, air conditioning systems are also among the largest energy consumers in buildings. For this reason, an international fashion chain based in Spain wanted to reduce the energy consumption caused by air conditioning in its stores. And all this while maintaining the same level of comfort for customers. Since the Modbus protocol is widely used in the retail industry, a solution was needed that could integrate the proprietary protocol of the air

KNX, BACnet and Modbus in the direction of building control systems. Wireless solutions are also available. In the case of the fashion chain, a Modbus gateway was used. In the direction of air conditioning, the AC interfaces support the proprietary protocols of leading air conditioning manufacturers such as Daikin, Toshiba, Samsung, Mitsubishi, etc. The goal of the fashion chain was to be able to centrally control and monitor the air conditioning systems of all stores in order to reduce overall energy consumption. By integrating the AC interfaces, it was possible to implement various energy-saving measures. For example, the



By connecting the air conditioning technology to the building automation an internationally active fashion chain can reduce energy consumption significantly

conditioning system into a Modbus system. The retail chain found what they were looking for in HMS Networks, which can solve exactly this application with Intesis AC interfaces. The AC interfaces are gateways that integrate air conditioning systems from leading manufacturers into common building management systems. The AC interfaces support

target temperature of the air conditioning systems for all stores was limited to a defined minimum temperature in order to cover energy consumption. In addition, the opening hours of the individual stores were stored in order to exclude the operation of the air conditioning systems outside opening hours. As a result, energy consumption has

been significantly reduced. The fashion chain also benefits from other advantages. For example, alarms and malfunctions occurring during the operation of air conditioning systems converge at a central location, which is interesting in terms of regular maintenance, but also for acute troubleshooting. A typical example of this is changing the filters of air conditioning units. Over time, dust collects on the filter, making it difficult for air to pass through, which in turn increases power consumption. Thanks to the integration of the air conditioning units, these types of faults are now detected and can be quickly rectified. And well-maintained air conditioning systems generally consume less energy because they can run in their optimum range. With the AC interfaces, the fashion chain has fully exploited the energy-saving potential of air conditioning systems. But the interfaces offer yet another advantage.

Because the air conditioning systems are now integrated into the Modbus-based building management system, interaction with other systems such as the fire alarm system is possible. This is relevant in case of fire. This is because a European safety directive requires that air conditioning systems must be switched off immediately in the event of a fire. This is to prevent additional oxygen being supplied to the fire via the air conditioning system.



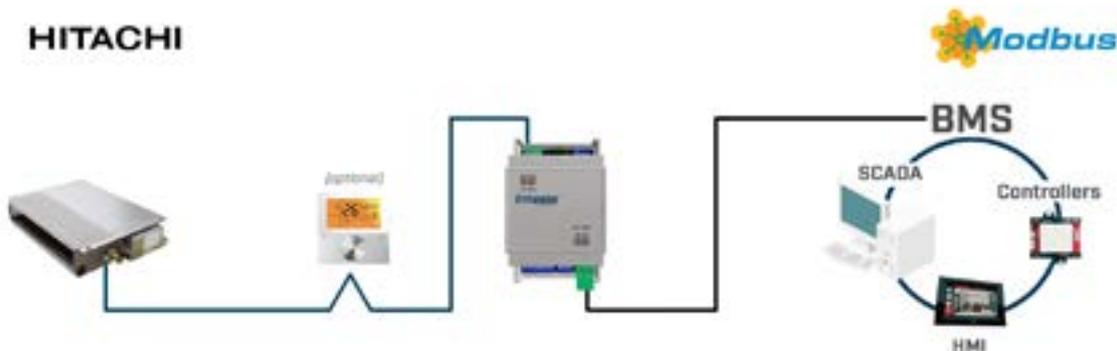
The Intesis Air Conditioning interfaces form a portfolio of highly reliable interfaces for Air Conditioning integration, developed in collaboration with all major AC manufacturers.

Case Study 3:

HVAC integration in hotels

The operator of a 5-star hotel in Munich had already equipped its 280 rooms and suites with air conditioning units from HITACHI, a Modbus-based room control system and a thermostat from a third-party supplier. There was also a central control of the air conditioning units. However, the reaction time of the system was too slow. For a 5-star hotel this is a big shortcoming, as the guests expect the highest comfort. This includes that the air conditioning in the hotel room reacts immediately when it is switched on or off, which unfortunately was not the case. For this reason, the hotelier wanted to switch to local control at room level so that

The desired room temperature, operating mode (cooling, ventilation, dehumidification), fan speed and vane position can also be set via the AC interface. It also provides access to error codes and maintenance information. . In addition, the check-in/check-out processes can be linked to the air conditioning system via the building management system to improve guest comfort and optimise energy consumption. The hotelier can typically specify when the air conditioner is to start cooling automatically on the arrival day of the guest when the booking is received for a room. In the same way, he can specify for the day of departure when the air conditioner in the room is to switch off automatically.



The AC interface has a compact design, is mounted on a DIN rail and requires no external power supply, as it is supplied via the air conditioner

the commands from the thermostat would immediately reach the air conditioning system. Since the hotel was open during the integration project, a key requirement was to implement the project as quickly as possible with minimal disruption to hotel operations. In addition, aspects such as quiet operation of the air conditioning units and optimum temperature control for a high level of comfort were important to the hotelier. HMS Networks had the right solution to meet the hotelier’s needs with the Intesis AC interface, which can integrate HITACHI VRF systems into Modbus networks. . This is because the Modbus-based room control can communicate with the HITACHI air conditioning system via the AC interface. For room control, the AC interface is a Modbus slave. It supports all common control options for the air conditioning units. For example, the air conditioner can be switched on/off via the AC interface.

This ensures that the air conditioning units only run when the rooms are occupied, which has led to a significant reduction in energy consumption. Of course, guests can still set their personal feel-good temperature via the room controller during their stay in the hotel and can also switch the air conditioning unit on and off. The AC interface has a compact design, is mounted on a top-hat rail and requires no external power supply, as it is supplied via the air conditioner. This makes installation and commissioning very easy and the hotel operation was not disturbed during the project implementation.

Conclusion:

Building automation makes an important contribution to increasing the energy efficiency of buildings and to achieving climate targets. Especially the control of the heating, ventilation and air conditioning units plays a major role. With the AC interfaces of the Intesis brand, the air conditioning systems are easily and smoothly integrated into the building management system.

Author

David Garcés is Deputy Director of the Business Unit Intesis at HMS Networks.



About Intesis

Intesis was founded in 2000 and is today a market leader in design, production and marketing of innovative Solutions for building automation.

In 2016, Intesis was acquired by HMS Networks, the market leader for solutions for industrial communication and Industrial Internet of Things (IIoT). Intesis is a Brand of HMS for products and solutions in the field of building automation. Other main markets of HMS are manufacturing, energy, Transport, infrastructure and logistics.

In 2020 it is time to celebrate the 20th anniversary of a strong and reliable brand. More than 700,000 integrated air conditioners around the world confirm that Intesis is the right choice for the integration of air conditioning systems.





HMS Networks ist Ihr Partner
und Ihre erste Wahl im Bereich
industrielle Kommunikation
und IIoT.