ABB DRIVES AND MOTORS

30 top tips to tackle HVAC challenges

No.15 - BACnet

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Not all drives feature BACnet...

BACnet is a data communication protocol mainly used in the building automation and HVAC industry (heating, ventilation and air conditioning). The protocol allows equipment such as air conditioning units, pumps and ventilation devices to communicate with a programmable logic controller (PLC). This creates buildings with a high degree of automation.

As an open building automation protocol, BACnet is increasingly popular with building managers who do not want to be tied to proprietary systems. Low voltage AC drives are now adopting BACnet interfaces, making them a powerful controlling device in their own right.

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Technical

BACnet is open to all devices and applications in building management, allowing vendors beyond the core heating, ventilation and air conditioning (HVAC) market to link their products, such as fire detection systems and lighting control, to a building management system (BMS).

Freely programmable
With BACnet, the controllers are more freely programmable. For example, the inputs and outputs (I/O) of field devices and controllers are available throughout the network. Because every application and installation is different, it is important that the control technology is flexible and can be expanded to take account of new applications and new devices – now and in the future. This is what BACnet provides.

Open serial communication protocol
BACnet is an open serial communication protocol and is fast becoming HVAC industry standard, due to its “open” nature. BACnet does not tie a system into a manufacturer’s hardware.

Communication can be via RS485 or Ethernet hardware medium, allowing different communication media. BACnet over RS485 (BACnet MS/TP) and over Ethernet (BACnet/IP) are supported.

Easy integration into BMS and building controllers allows large amounts of data or control signals to be exchanged with minimal cabling (compared to traditional I/O).

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Technical

Access all VSD parameter information
BACnet allows complete access to variable speed drive (VSD) parameter information, including all information surrounding energy saving and other operational parameters. A VSD should feature embedded HVAC communications. This allows users to control applications, report findings and perform diagnostics natively through BACnet MS/TP and HVAC protocols. BACnet IP over EtherNet should also be available as an option.

Seamless integration into overall system
Connecting VSDs to a BACnet-based control system makes the major benefits of drives readily accessible and adds a new dimension in control.

Having the drive communicating in native BACnet code means it can be integrated easily and seamlessly into the overall system. For example, in the past, drives could only be connected to a BMS through a gateway, a translator module that had to be programmed on a point-by-point basis. Alternatively, drives could be hard-wired into the system, which provided for basic control and monitoring.

BACnet-enabled drives, however, can be directly connected to the BACnet system and take advantage of advanced features like automatic discovery of devices, dynamic BACnet object binding and read/write variable requests. This means that the end user of a native BACnet drive will get better control at a lower installed price.

Technical

Multiple objects constantly visible
Another advantage of BACnet is that the data can be accessed at any time. An ABB HVAC drive, for example, has 73 BACnet objects, all of them visible to the network at all times.

This makes it easy for the user to check the energy use direct from the drive without the delays caused by 24 V pulse technology. Using BACnet services, the devices can talk the right language for the application.

Giving VSDs a BACnet capability ensures they become a fully-fledged part of a BMS and can contribute their abilities to an overall control and management strategy.

Frequently Asked Questions

What is the thinking behind BACnet?
Already widely used in the US, BACnet is now gaining momentum in the European building sector. Developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), BACnet lays down a set of rules governing the way in which equipment communicates over a computer and automation network. Where BACnet differs from other protocols is that these rules are designed to suit the needs of building automation and control equipment. For example, they cover issues such as how to ask for the value of a temperature, define a fan-operating schedule, or send a pump status alarm.

Why is BACnet so important for HVAC applications?
There have been many control protocols developed over the last few years, some of which have lasted longer than others. Few of them have proved future proof, but one, BACnet has changed this. Designed as a truly open building automation protocol, BACnet has caught the imagination of device vendors because of its flexibility.

Frequently Asked Questions

Why do consultants particularly like BACnet?
Consultants like the fact that BACnet brings vendor independence. They do not like the idea of being tied to one vendor for the lifetime of a BMS, which is the case with vendors offering building controllers based on proprietary protocols. These protocols are either impossible or cost prohibitive to integrate into the same automation system with other products from other vendors.

What happens if BACnet goes out of date?
BACnet is a powerful and flexible system and allied with low voltage AC drives, it provides a highly capable way of controlling building systems. It is designed to be improved as new technologies and new control ideas and needs come along. Because it is such a dynamic, continuously developing protocol, the system is always being updated.

We do not know what the future BACnet will look like. All we know is that it will be compatible to today's and yesterday's BACnet devices and continue to serve by providing effective control of increasingly diverse processes. Low voltage AC drives will continue to have a role in this developing story.

It is important for drives to be able to flexibly connect to different automation networks via embedded interfaces and optional fieldbus adapter modules.

Frequently Asked Questions

What experience has ABB had with BACnet?
Commonly used HVAC communication protocols such as BACnet MS/TP and Modbus RTU are embedded into the VSD, ensuring that they are always there if you need them. ABB has supplied, to building automation, tens of thousands of drives utilising serial communications, including more than 30,000 BACnet installations.

What is an FBIP-21 adapter?
The FBIP-21 adapter is an optional device for ABB's HVAC drive, ACH580, which enables the connection of the drive to a BACnet/IP network, eliminating the need for a gateway.

A BACnet/IP network is a collection of one or more IP subnetworks (IP domains) that are assigned a single BACnet network number. A BACnet internetwork (3.2.26) consists of two or more BACnet networks, a network standard used by many devices in HVAC installations, such as drives.

What is the difference between this adapter and a gateway?
Unlike a gateway, the adapter does not interpret data or translate from one language into another, but simply passes on the data from one medium to another being invisible by itself. This makes the adapter much easier to set up than a gateway and ensures that no information is lost during the transfer. Using BACnet protocol and adapter technology the complete system is fully transparent and through serial and Ethernet communication, the system is compatible with existing on-site cabling.

Case study

For several years Jackson House, a multi-tenanted office block in Manchester, had air flow problems throughout the tenanted areas. One problem was that the main ventilation plant's fans were running constantly at full speed. The plant consists of four fans, ranging from 45 to 120 kW; two for supply and two for extraction. The block also has a variable temperature heating system comprising four pumps, two duty pumps and two standby pumps, also running at full speed.

During the refurbishment of the office block a BACnet based building energy management system (BEMS) was installed. The company which installed the BEMS was asked to install low voltage AC drives that could be integrated within the new control system to improve the management of the building's ventilation.

Part of the project involved the installation of several BACnet enabled low voltage AC drives. The addition of the drives enables air volumes to be controlled accurately via the BACnet based BEMS.

Communicating with the BEMS allows the drives to provide full technical data on the running conditions of each motor to ensure energy efficient operation is maintained. Because of their use of native BACnet, the drives and the BEMS were very easy to integrate with each other and the building remained occupied during the installation period.

This is one of 30 top tips for users of variable speed drives in heating, ventilation and air conditioning applications. To ensure that you receive ALL the tips as they are published, please register your interest by **clicking here**

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