

BACnet Middle East



Issue 9

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Journal



BACnet Solution

BTL Certified Building Automation Components for TU Kaiserslautern

6

BACnet Solution

Hospital in Dresden Trusts a Network Solution to Monitor and Secure the Building Envelope

9

BACnet Insight

Digital Twin of Building Automation with BACnet

14

BACnet News

The BACnet Institute, a One-Stop, Online Learning Environment for BACnet Information and Learning

17



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Editorial

Technology Creates Future – and We Have to Find a Way to Preserve Health and Prosperity **5**

Solutions

BTL Certified Building Automation Components for German University **6**

Benefiting from BACnet as an Integrated Part of HVAC Drives **8**

Hospital in Dresden Trusts a Network Solution to Monitor and Secure the Building Envelope **9**

Products

Meeting Comfort Challenges in the Middle East **10**

BACnet Network Analysis Using Wireshark **11**

Flexible Cloud-Connected BACnet Edge Controller **13**

BACnet Insight

Digital Twin of Building Automation with BACnet – Building Automation in the Area of Conflict of Interests **14**

BACnet Interest Groups News

The BACnet Institute, a One-Stop, Online Learning Environment for BACnet Information and Learning **17**

Calendar of BACnet Events **19**

Editorial Notes **19**



Cover picture:
Skyline of Doha, Qatar
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Issue 9 | November 2020

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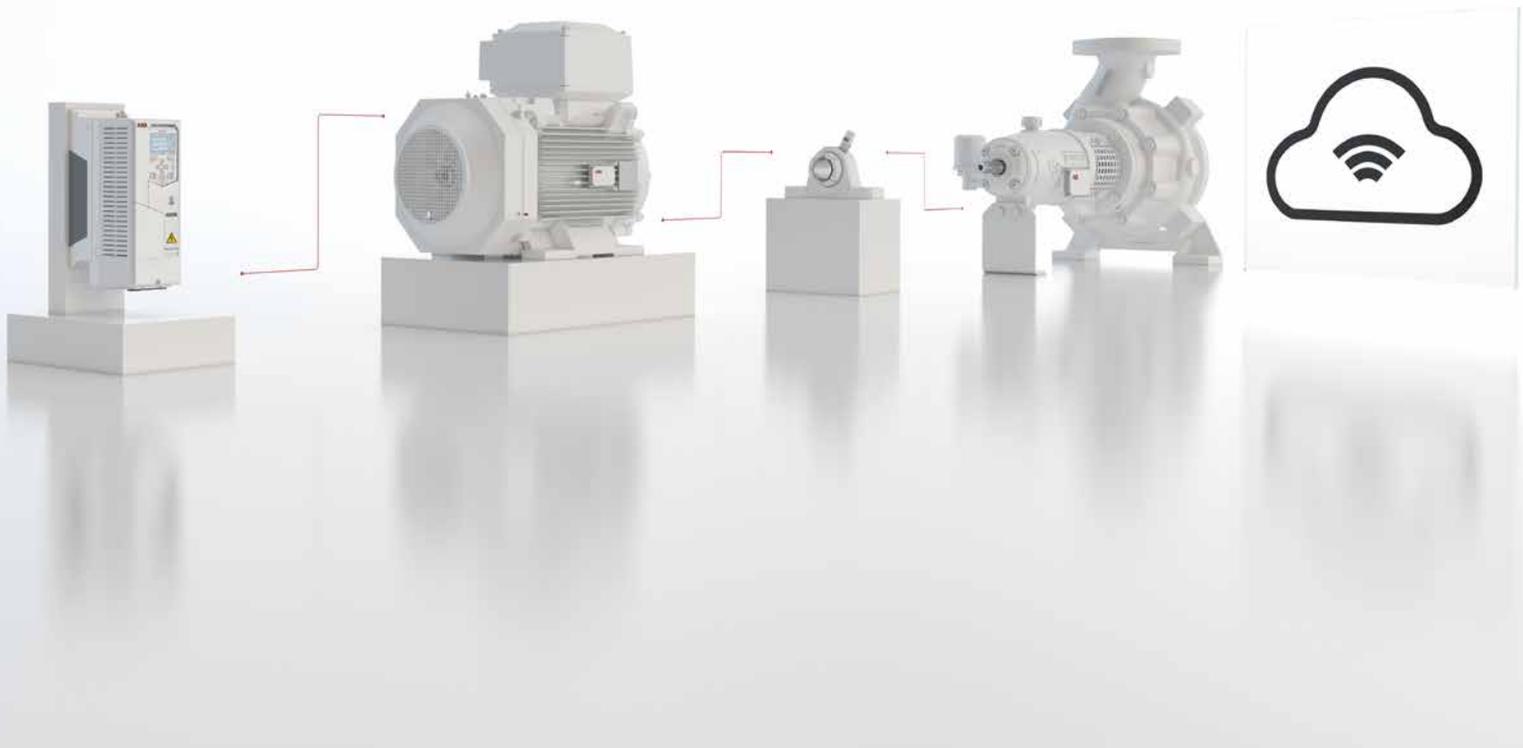


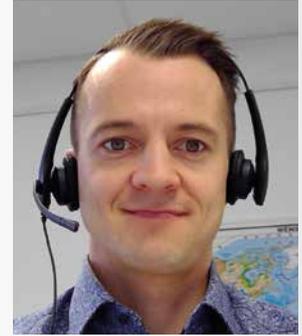
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HVAC operation

ABB Ability™ digital services connect BACnet-enabled drives together with motors, pumps and bearings, taking HVAC system energy savings and uptime to new heights. Data gained from the powertrain provides customers with deep insight into their building's assets, allowing them to make even smarter decisions to ensure efficient, reliable and safe HVAC operation. To discover more, visit new.abb.com/drives/digital-powertrain-monitoring



Technology Creates Future – and We Have to Find a Way to Preserve Health and Prosperity



What a year...

The EXPO 2020, which starts in October 2020 and lasts until April 2021, is expected to boost tourism in Dubai...

These are the first words from my last editorial from November 2019. But now we all know it turned out differently.

The economic crash which was triggered from the in the meantime wellknown virus called Covid19 up from earlier this year was and is historically. Flights from all over the world were cancelled and our world is still in an exceptional state.

There is not a high confident in the local media. For example "Memo" wrote about Saudi Arabia on October 02: "Increased unemployment, expanding poverty rates, a growing deficit in the public budget, a significant decline in general revenues, foreign exchange reserves and public reserves, stagnation in the markets, paralysis in vital activities, expatriate workers fleeing, a sharp decline in the profits of banks and major companies and salaries being paid late".

Opinions from Dubai are sounding similar.

What does that mean for the construction industry and the building automation activities?

It seems that tough times are in front of us. At the same time the energy consumption as well as the security of buidings need to be improved. The members of the BIG-EU have innovative solutions to create sustainable buildings.

Technology creates future – and we have to find a way to preserve health and prosperity.

So let's get closer digital in times where physical distancing is necessary.

Florian Muss

CEO

Romutec

Member of the BIG-EU Advisory Board

BTL Certified Building Automation Components for German University



The buildings of the TU Kaiserslautern.

© OAS Open AutomationSystems

The new building automation systems at the Technical University of Kaiserslautern (TUK) are becoming digital and open. The components and the system integration are supplied by OAS Open AutomationSystems and PGA Gesellschaft für Prozess- und Gebäudeautomatisierungstechnik.

Together, OAS and PGA bring technological innovation and over 20 years of technical building automation experience. The use of the latest generation of Tridium BACnet controllers ensure that the university is ready for the digital future.

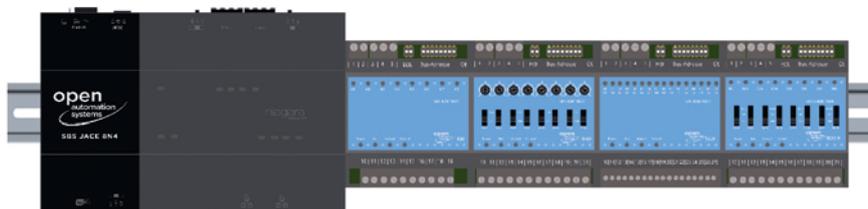
The client is the Landesbetrieb Liegenschafts- und Baubetreuung (LBB), the real estate and construction service provider of the state

building construction in Rhineland-Palatinate. It places high demands on building automation, as it is a member of AMEV, the working group for mechanical and electrical engineering of state and municipal administrations. AMEV has developed a recognized certification for BACnet-compatible Building Automation components. OAS as Tridium distributor supplies PGA with the Tridium BACnet controller JACE-8000.

SBS automation solution configurator with SBS I/O fieldbus modules

First select your datapoint requirements:

Datapoint type	AI	AO	DI	DO
Datapoints needed	<input type="text" value="4"/>	<input type="text" value="6"/>	<input type="text" value="12"/>	<input type="text" value="7"/>
	OAS-SBS-IOM-1021	OAS-SBS-IOMR-1022	OAS-SBS-IOM-1023	OAS-SBS-IOMR-1024



The OAS configurators deliver open system solutions.

Equipped with a BTL certificate and AMEV certificate, it is an OAS top seller from the modular Niagara program.

The combination of modular components from the OAS construction kit used by PGA and the solution-oriented integration consulting provided by PGA ensures that the university buildings are connected to the open system future.

Configurators support open design

OAS offers an added value for all technical building automation managers with the online-supported configurators on their new website. They are powerful online tools and support the open design of intelligent building systems – from fieldbus modules to plant integration. After registration they are freely available online. Professional planners, system integrators and Niagara® users can keep track of their projects and perhaps more users will come on board.

So far, the OAS configurators are available for four areas: Fieldbus modules, automation platforms, plant integration and Tridium Niagara® solutions. In the area of system configura-

tion, additional configurators are grouped together for seven applications: for basic controllers, expansion controllers, for ventilation technology, heating and ventilation systems, district heating technology, boiler sequencing, and solar and multivalent technology.

The fact that further configurators are under development is due to the growing demand for the still relatively new tools. OAS managing director Ralf Rostock: "Soon we will also support room automation solutions and the integration of IOMRX fieldbus modules."

The planning of automation solutions with I/O fieldbus modules shows how convenient it is to operate the configurators. The configurator calculates the number of required mod-

ules, the total number of external IOs, the IO reserve and it specifies the required automation platform. Optionally, the user can select different touch panels and add a web-based visualization. As a result, the configurator delivers an illustrated parts list and the final price. The OAS configurators are available on

www.niagara-solution-provider.store. ■



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BACnet Edge Controller with Azure IoT Central

The BASpi Edge Controller is BACnet/IP (B-ASC) compliant with a built-in Azure IoT Central connector providing an easy interface to a cloud-based dashboard and supervision

- 6 Universal Inputs, 6 Binary Outputs or 4 Binary and 2 Analog Outputs
- Web page configurable, Sedona programmable, BACnet networked
- Convenient installation – 10/100 Mbps Ethernet, Wi-Fi, 24 VAC/VDC power, DIN-rail mounted enclosure, real-time clock
- 12 physical points and 24 virtual points
- Free programming tools

BASpi Edge Controllers

CONTEMPORARY CONTROLS®

Learn more at www.ccontrols.com/baspi

Benefiting from BACnet as an Integrated Part of HVAC Drives

Stringent energy directives and standards for buildings, as well as national energy efficiency programs, are becoming more and more common globally, and the Middle East is no exception. However, relatively low energy prices in the region have discouraged widespread investments in energy saving measures in the private sector. As a result, energy efficiency is not always a priority when selecting equipment for projects. HVAC equipment is among the biggest energy consumers in buildings, but securing the comfort and safety of the building occupants and reducing investment costs often have higher priority than energy savings.

It's well known that, to save energy, variable speed drives are used to adjust energy consumption in HVAC processes to the building's specific needs. But this is not their main function. The drive's primary role is in creating comfort by maintaining the required temperature, humidity and low CO₂ levels, depending on the occupants' needs. In addition, in fire emergency situations, drives can effectively control building ventilation to provide safe evacuation routes for the occupants and suppress smoke propagation.

To enable a proper building's reaction to ever-changing conditions, it's required to secure connectivity between all the building's systems and components to make them interoperable. This can be ensured through the support of common building automation protocols, including the most widespread BACnet.

BACnet comes as standard on ABB's HVAC-dedicated drives, since it offers multiple important benefits. These include great scalability, allowing building of large networks with thousands of components and no limitation in the number of points, and openness meaning BACnet doesn't have any proprietary rights requiring dedicated tools or mandatory licenses for network deployment.

A good example of a project where BACnet as an integrated feature in ABB equipment helped to realize a smart building concept comes from Vietnam. Viettel group headquarters is located at the golden land area of Hanoi and accommodates the group's functions with around a thousand employees. ABB has supported Viettel group's ambitions to make the



Viettel headquarters gained clear benefits from smart building technologies by ABB.

building a cutting edge standard for other Viettel buildings around the world.

For the Viettel headquarters project, besides other power, automation and control solutions, ABB supplied ACH580 HVAC drives with BACnet for controlling key HVAC equipment. This includes supply and return fans in the air handling units, chilled water pumps, booster pumps, condensed water pumps, cooling tower

fans, stairway pressurization fans and basement ventilation fans. The BACnet enabled drives provide seamless integration into the building management system, ensuring better comfort and safety for the occupants while optimizing energy use in HVAC. Coming as a built-in feature, BACnet allows to save on projects costs thanks to reduced wiring, fewer external gateways needed and effortless commissioning.



Drive integration into a BMS is easier with the built-in BACnet support.



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Hospital in Dresden Trusts a Network Solution to Monitor and Secure the Building Envelope

The St. Joseph-Stift hospital in Dresden has developed a comprehensive building services management tool with the help of the building management system provider PcVue and GEZE, the specialist for door and window automation.

In the 2019 major hospital rating of the newspaper Frankfurter Allgemeine Zeitung (FAZ), the St. Joseph-Stift in Dresden came sixth in the category '150 to under 300 beds': they also received top marks for the organisation of procedures and service. To allow the nursing and medical staff to concentrate fully on the patients, the hospital operator regularly invests in the technical infrastructure. The new comprehensive control technology solution from PcVue and GEZE is an example.

Torsten Klotzsche, head of the building's technical services department, says: "The best building management system is the one you hardly notice. For us, that also means that it can be adapted easily and flexibly to the needs of our building. My vision was to achieve intelligent activation of neuralgic information and control points with manageable investments. The aim is to facilitate the daily work of the specialist departments."



© St. Joseph-Stift hospital Dresden

The St. Joseph-Stift hospital in Dresden has developed a comprehensive building services management tool with the help of the PcVue and GEZE.

Flexibility from an interdisciplinary system

The building complex has grown historically, and continues to grow: it currently comprises four main buildings and four annexes. The existing visualisation system was unable to map the more extensive expectations. The main demands were the option of time-based access control, the possibility to adapt escape routes, closing sequence controls, and the capability to guarantee smooth data exchange with a heterogeneous field level. The heads of technology opted for the PcVue building management solution. Thanks to the pre-manufactured GEZE library, the building managers are able to make the necessary changes themselves at any time - even adjustments caused by the Corona pandemic were easily implemented. So far, three door control units, three interlocking door systems, a curved sliding door and some automatic doors have been connected to the system. The renovations were undertaken while business continued as normal, without affecting processes within the building.

Open BACnet IP interface facilitates easy connection

Integrating the doors into the overall system delivers many benefits in terms of access management: typical weak points such as doors that people forget to close in the evening or unauthorised entry are now a thing of the past. The system now locks the doors automatically during a specified period. Where necessary, staff can open a particular door to allow individual persons access. The doors will also be connected to a weather station: each door can react automatically to pre-defined parameters, such as the wind strength or solar radiation. Inside the building, doors can be set to "hold open" during defined periods, which significantly reduces the movement cycles and thus the wear and tear on the doors. By connecting the doors via standardised BACnet IP protocol to the building management system, the St. Joseph-Stift hospital in Dresden is creating greater transparency, comfort and security for its employees and patients. ■



© Annika Feuss / GEZE GmbH

By connecting the doors via standardised BACnet IP protocol to the building management system, the St. Joseph-Stift hospital in Dresden is creating greater transparency, comfort and security for its employees and patients.



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GAMI VAV AHU control panel

© Contemporary Controls

Meeting Comfort Challenges in the Middle East

Established in 1929, BAPCO is one of the leading oil and gas companies in the Middle East. BAPCO's new building designer was seeking a comfortable temperature and humidity environment with high air quality. The building is controlled through a BACnet BMS with air flow to each room served by a central VAV air handler. For proper humidity control, and during heating mode, BAPCO wanted to use modulated electrical heat.

GAMI Air Conditioning Manufacturing in Abu Dhabi, UAE provided the air handling unit (AHU) custom designed to meet the client's requirements. The unit included an economizer for ventilation and free cooling, while reducing the CO₂ from the return air. To control heating and humidity, the AHU incorporates tube type heaters with Thyristor control. To meet VAV requirements, the AHU has a VFD controlled supply fan to maintain the minimum static pressure.

BAS control team, they suggested to use Contemporary Controls' BAScontrol series of BACnet/IP freely programmable controllers and the BASview as a simple BACnet supervisor. Robert Owen from the UK office assisted in developing the sequence of operation which involved supply fan modulation to maintain duct static pressure; maintaining supply air temperature based upon occupancy; invoking free cooling during opportune conditions; and providing humidity control as required by the client.

To meet the project requirements for stand-alone smart control with energy saving and to maintain very precise temperature and humidity with proper air flow, the GAMI design team was looking for an advanced controller with BACnet compliance. After having discussions with



Model GAMI FAHU Chilled Water Type (with mixing box)
© Contemporary Controls



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BACnet Network Analysis Using Wireshark

As an interoperable communication protocol, BACnet normally operates without any problems. However, if something goes wrong in the network communication, a tool such as Wireshark is needed to help analyze the communication process.

The open-source software Wireshark offers a powerful tool to capture network traffic and to help analyze it. For BACnet it offers decoders for BACnet/IP, MS/TP and (currently in the trial phase) BACnet/SC (Secure Connect) up to BACnet revision 19.

Who is allowed to capture network traffic?

It should be noted that data capture in foreign networks may be allowed for the IT department of the corresponding organization only. Therefore, before starting, permission of the operator should be obtained in any case. In some cases, the IT department may need to perform the network traffic capture themselves and hand over the captured files.

Access to the network

Figure 1 shows how to temporarily access a network using a network probe (in this example an ET2000 Industrial Ethernet multi-channel probe from Beckhoff). The probe behaves passively without having any impact on the infrastructure. The traffic between the automation stations and the management station can be provided to a PC used for analysis through a separate Gigabit Ethernet port. On the PC, Wireshark can be started and the capture process begins.

As an example, Figure 2 shows a network traffic recording. Each line represents a single

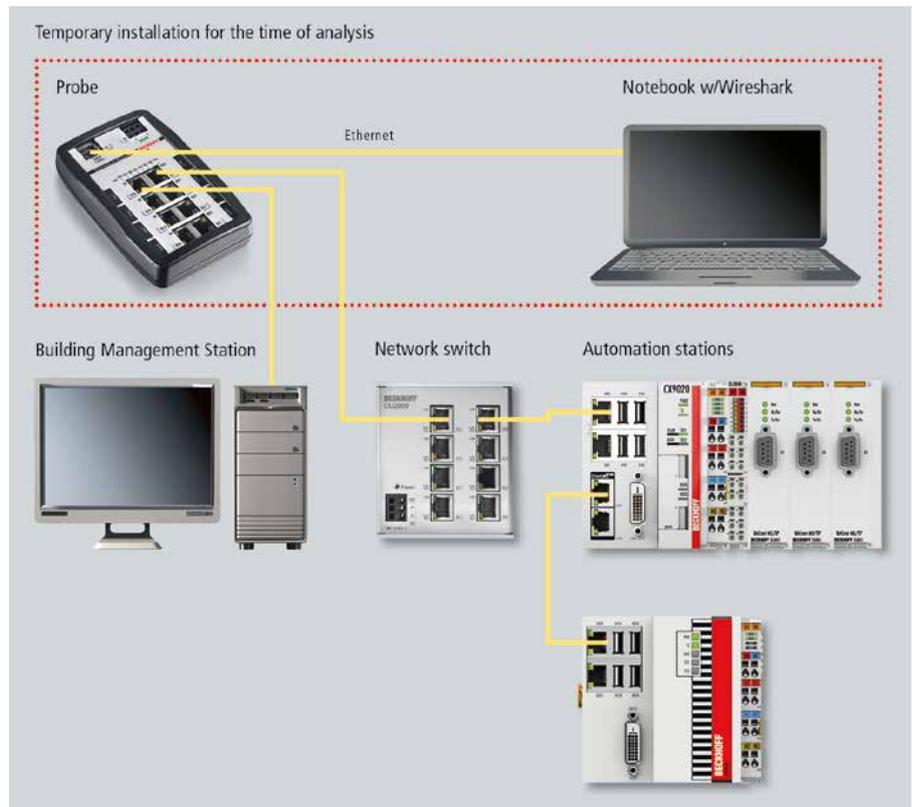


Figure 1 © Beckhoff Automation GmbH & Co. KG Temporarily network access using the network probe ET2000.

telegram. Please note, not only BACnet traffic is captured but also any other communications. Setting the display filter “bacnet” reduces the displayed telegrams to show only BACnet (Figure 3).

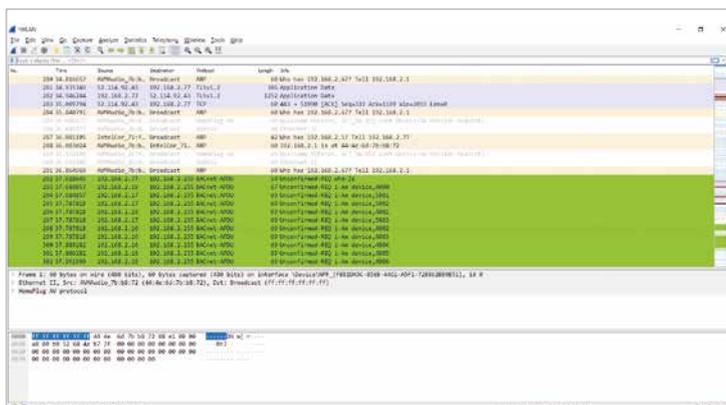
Furthermore, BACnet telegrams are displayed using a coloring rule. This option available in the program settings improves clarity and helps to keep a good overview of different telegram types. Each BACnet telegram is displayed with the associated service (e.g. Who-Is, I-Am, Read Property).

In general, BACnet communication is divided into unconfirmed and confirmed traffic. To observe confirmed data exchange, the requests (“question”) and response (“answer”) need to be considered.

For the unique identification of telegrams BACnet uses an “Invoke-ID”. The sender adds this number to the telegram and the receiver uses the same number in the response to assign the “answer” to the “question”. In Wireshark, the Invoke-ID is shown in square brackets.

Example analysis of Read Property request

Figure 4 shows a “Read Property” request, reading a single property content (in this case the object name of device instance number 4000). The response is shown in Figure 5; the receiver “delivers” the property content. To analyze the content, the read property telegram was selected and the detail view BACnet APDU (Application Protocol Data Unit) was inspected.



Example of a network traffic recording.

Figure 2 © Beckhoff Automation GmbH & Co. KG



© Beckhoff Automation GmbH & Co. KG

The ET2000 multi-channel probe from Beckhoff is a versatile piece of hardware for analyzing any Industrial Ethernet solution.

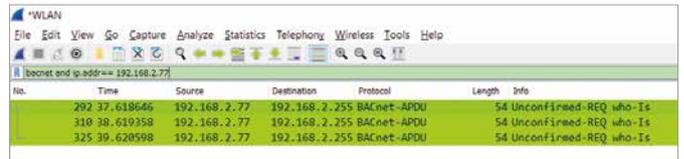


Figure 3 © Beckhoff Automation GmbH & Co. KG
Display filter setting for displaying BACnet telegrams.

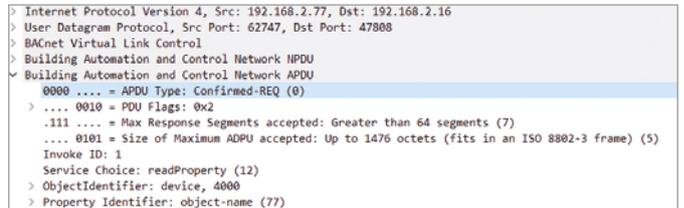


Figure 4 © Beckhoff Automation GmbH & Co. KG
Read Property request for reading a single property content.

Example of communication errors

In case of a communication error, the response contains an error code according to the BACnet standard. If, for example, a read-only property is written, the BACnet standard requires to respond with a pre-defined error message. Figure 6 shows a response containing the error message "Write Access Denied", which means writing to the specified property is forbidden.

Export of data captures

Analysis of missing or incorrectly encoded telegrams is a bit more complicated. For further analysis, a data capture may be exported and sent to the development or support department. For this purpose, Wireshark uses the well-known "pcap" format or the more recent "pcapng" file format (pcap next generation).

BACnet Statistics menu

The menu "Statistics" offers a total of four different BACnet statistic functions. BACnet telegrams may be sorted according to instance number, IP address, object type or service.

Measuring network utilization

Using the function "IO-Graph" in the statistics menu, the network utilization can be visualized. A typical error situation in networks can be caused by too heavy broadcast payload. A payload of about 30 to 40 broadcast telegrams per second may block devices so that regular communication becomes unreliable.

MS/TP

To capture MS/TP traffic, a USB-to-RS485 converter along with a serial capture tool is required.

The open-source tool YABE (Yet Another BACnet Explorer) offers such a tool (MsTp.BACnet Capture) and enables data capture in MS/TP networks in context with Wireshark.

Conclusion

Wireshark offers deep insight into BACnet communication and helps to detect faulty or unwanted communication in networks (e.g. too many proprietary telegrams). These findings may be used to eliminate erroneous communication or to optimize the network usage.

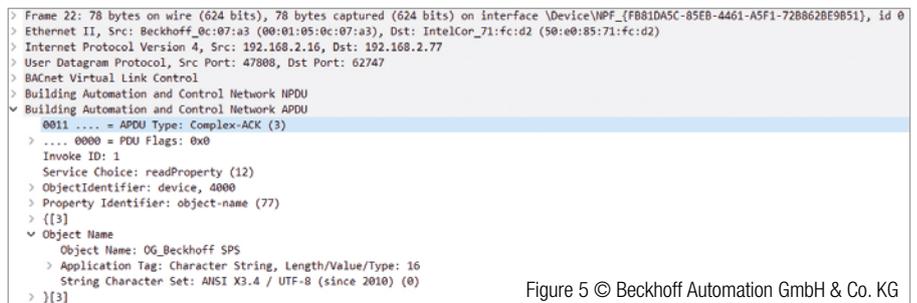


Figure 5 © Beckhoff Automation GmbH & Co. KG

Property content of the requested receiver.

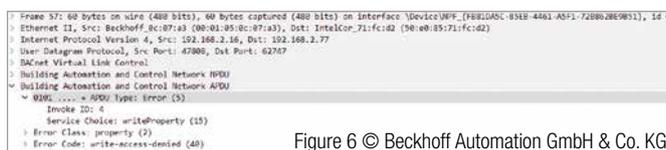


Figure 6 © Beckhoff Automation GmbH & Co. KG

Response containing the error message "Write Access Denied".



Frank Schubert
Marketing & Training at Beckhoff Automation GmbH & Co. KG, Verl
Member of SSPC135 (BACnet Committee)
Treasurer in the executive board BACnet Interest Group Europe
Trainer VDI-Wissensforum and BACnet Academy



Flexible Cloud-Connected BACnet Edge Controller

The BASpi-Edge is a 12-point freely programmable BACnet IP client/server with a resident connector to the Azure IoT Central cloud. Built on the popular Raspberry Pi, the BASpi-Edge has features not found in conventional controllers such as an HDMI port for remote displays, a USB port for a touch screen, Ethernet and Wi-Fi connectivity. Other built-in features include email alarming, scheduler, weather and easy-to-build graphical dashboard making the BASpi-Edge an extremely flexible small system supervisor, human to machine interface, or cloud-connected application specific controller.

Both models in the BASpi-Edge series are housed in compact DIN rail mounted enclosures powered from a 24 VAC/VDC source. While both models have six universal inputs, one model has six relay outputs, and the other four plus two 0-10 VDC analog outputs. A USB port with an optional EIA-485 dongle connects to BACnet MS/TP servers.

The BASpi-Edge is webpage configured and Sedona function block programmed using a free Sedona application editor. A total of 48 virtual points connects BACnet points to wire sheet logic while 48 web components connect wire sheet logic to webpages.

The BASpi-Edge can easily and securely (TLS) connect via MQTT to the Azure IoT Central (SaaS) cloud effectively making any attached equipment a cloud connected asset. Trending can then be accomplished in the cloud. Cloud connectivity provides global asset management and centralized supervision capabilities for multi-site applications. The user can upload any point data to the cloud where it can be analyzed and accessed from anywhere.



Local graphical dashboard and Azure IoT Central cloud dashboard.

©Contemporary Controls



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Digital Twin of Building Automation with BACnet

Building automation in the area of conflict of interests

“User-oriented building technology” is the title of a series of lectures that will be announced with the flyer for the Building Services (TGA) congress on April 2 and 3, 2020 in Berlin. Of course, the technology has to be based on the user and the customer is king! Really?

On the one hand, the user of building technology systems is not always the same as the person who procures them, and on the other hand, not all customers see through the complexity of modern technology, which manufacturers and the market advertise effectively. Purchased devices can often do much more than one actually needs. And, honestly, do you know all the functions and programs of your washing machine and do you actually need and use them? Wouldn't one with less refinement and easier operation have met your needs? It would probably have been cheaper to buy and operate. The interests of the manufacturers of systems and components as well as the trade that sells them, the planners and the system integrators who plan and implement them on behalf of the customer and those who should ultimately use and operate the technology offered to them, lead - wanted or unwanted - to a compromise that is usually not an advantage for the operator.

If you take into account that the standardized requirements for the BACnet interface are in revision 22 (EN ISO 16484-5) and the “protocol-neutral” rules for BACS planning, hardware and implementation since 1995/2004 (VDI 3814 / EN ISO 16484-1, -3) exist unchanged in revision 1, it becomes clear that the overall solution cannot meet the current requirements. The connection from the BACS Functions to the information, i.e., to the BACnet properties, is missing.

In this area of conflict of divergent interests, it is therefore important that the customer formulates his requirements for building technology and its automation precisely and demands that they be fulfilled - given the feasibility. Not all planners, manufacturers and integrators provide that, some follow philosophies, market strategies and proprietary product lines that run counter to the goals of the customer.

The most important requirements relate to the information we need from the automation system to control the mechanical systems. In the BACnet jargon, information that we need to reduce energy expenditure or to adapt the convenience of use to the needs is in the “Properties” that are contained in the BACnet objects. Interoperable solutions with BACnet for landlords with a large real estate portfolio

Companies with a larger real estate portfolio must demand interoperable multi-vendor solutions in order to be able to use economies of scale and to reduce the dependency on integrators and BACnet device manufacturers.

Integrators or manufacturers who know that the client is dependent on them will use this position sooner or later. Only by means of simple and standardized solutions can the human resource dilemma at the real estate locations be countered on the basis of clear corporate guidelines based on the global BACS standards.

BACnet is the data communication protocol that best supports the interoperability of building automation components. This has prevailed internationally, but is interpreted and applied differently in practice, which often counteracts the hoped-for interoperability. All the more so if there are no concrete specifications on the part of the client or the planner. Then the systems are “optimized” by executing companies for the benefit of implementation or due to time pressure or to their own, often proprietary company philosophy and not in terms of operation.

There are also numerous communication gaps in the implementation of building technology projects and their automation:

- organizational (client, planner, integrator, operator, user),
- technical (heating, air conditioning, ventilation, electrical engineering, building automation, information technology, security) and
- time (idea, specifications, planning, work planning, implementation, acceptance, operation).

And there exists currently no continuous, IT-conform process.

Simple, uniform standard systems and specifications

Uniform mechanical systems (e.g., heating circuit, domestic water heating) and components (e.g., aggregates as pumps or fans) offer planners and integrators the advantage of being able to use ready-made implementation templates, reduce the risk of reworking on the construction site, support automated quality management and lead to synergies and savings in acceptance and visualization, but especially in the operation of the systems.

For larger real estate portfolios, the client's goal must therefore be to implement simple, uniform and easy-to-operate solutions, i.e., standardized mechanical systems and components with unique IDs, descriptions and largely predefined functions. For this purpose, the BACnet objects and in particular their properties must be specified with all important information and proprietary BACnet objects and properties must be prohibited to ensure interoperability, knowing that this may limit the variety of solutions and providers. This reliably covers the requirements of a large number of real estates. Due to their special position, individual buildings will, however, require an individual solution.

The client's requirements, for example the content of the specification, usually include Definitions

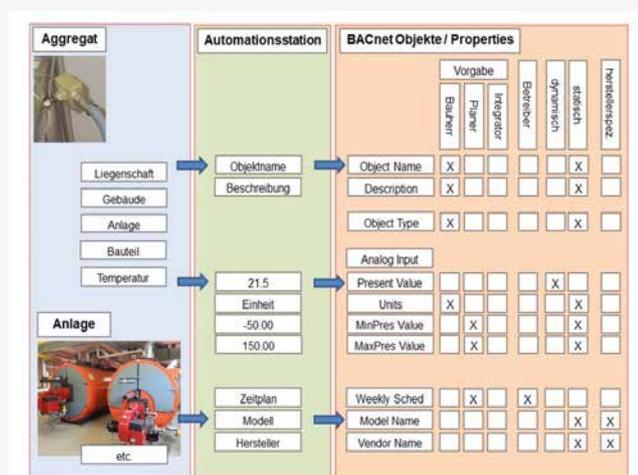
- of the network and its security regulations,
- the nature of the automation stations and the management and operating equipment,
- the addressing system of the data points or BACnet objects, the systems and components,
- for message and information management,
- for planning and implementation documents,
- for visualization and type of image display,
- for general operator requirements, etc.

This content of specifications with the exception of the specifications for properties can be assumed to be generally known.

Less common - and in this sense new - are, however, the topics and guidelines outlined below, which are urgently recommended to owners with larger real estate portfolios.

Competence Matrix

In the competence matrix, all relevant BACnet properties (all information contained in the BACnet objects, such as the name, state condition, unit, limit values, parameters, etc.) of the BACnet objects currently approved in the client's specifications are listed in a spreadsheet with a short description of the respective property and its possible specification of the client. This is used to determine who has to fill in which settings or values (client, user, planner, manufacturer, integrator or the system itself).



Derivation of the competence matrix

© Austrian Army

Practice has proven the need for such clarification of responsibility for individual properties and their value content. In the absence of such a stipulation in the BACS standards, the owner and user are "surprised" by the various

configuration settings depending on the manufacturer and integrator, which call into question the future interoperability of the components in the network.

In autumn 2019, the cci Dialog GmbH published the book "Digital twin of building automation with BACnet - Instructions for low-effort system integration" (ISBN 978-3-922420-66-8) written by Dipl.-Ing. Hans KRANZ and Hofrat Dr. Rupert FRITZENWALLNER.

Digital Twin of building automation with BACnet

In the case of the digital twin, the existing BACS Function List in accordance with EN ISO 16484-3 is expanded to the left by the client's defined standard systems and standard components and supplemented to the right with the BACnet properties and configuration settings of the implementation ("complete EDE table" – for engineering data exchange).

While the EDE table contains only a few BACnet properties as recommended by the BACnet Interest Group Europe (BIG-EU) and the Working Group for Mechanical and Electrical Engineering of State and Local Authorities (AMEV) in Germany, the "Complete EDE table" has to contain all BACnet objects, the properties together with the values and the configuration information used on the automation station.

In this way, an integrated process is supported in a

BACnet implementation guide

In order to ensure the implementation of building technology projects and their automation in accordance with the client's specifications, an implementation guide including appointment allocation has been created in which the outputs of the respective project phase are specified and presented in the correct chronological order. Since usually several participants are involved in projects and the integrator for building automation at the end of the chain often only comes into play as a subcontractor, the chronological representation of the outputs is essential in order to prevent lost effort.

If the documents required by the BACS standard, such as

- Automation schematics,
- BACS-Function Lists,
- Function descriptions,
- network concept, etc.

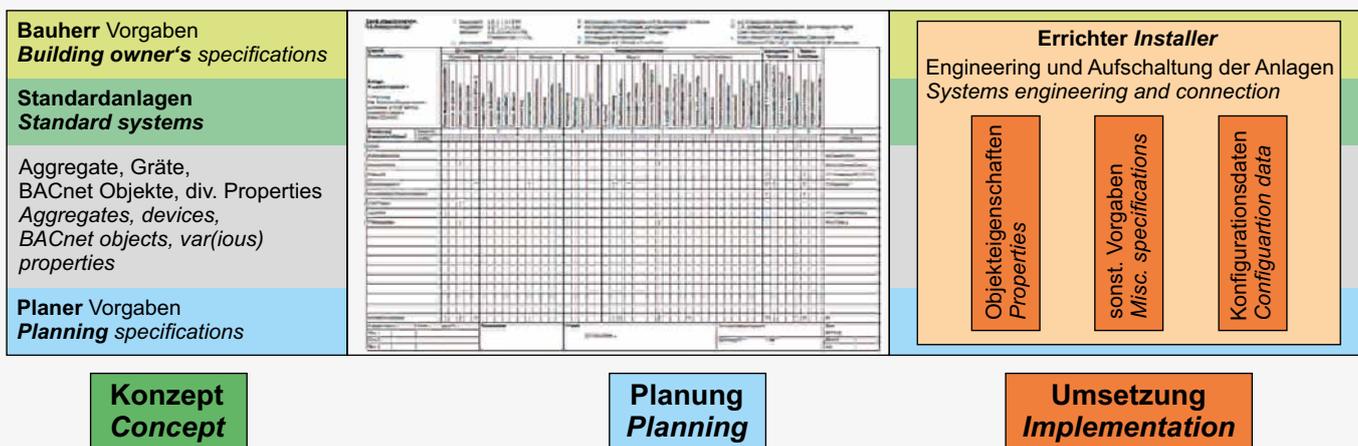
are not based on the actually implemented mechanical systems and are not documented in a current hydraulic diagram, there is a risk of "stranded costs" due to the mostly large number of participants.

Due to the complexity of the projects, a structured processing with uniform terminology is absolutely necessary.

Erweiterung links Left-hand expansion

GA-Funktionsliste gemäß ISO 16484-3 BA function list as per ISO 16484-3

Erweiterung rechts „vollständige EDE“ Right-hand expansion: „Complete EDE“



Digital Twin (© Austrian Army) (GA=BACS)

BACnet test tools

Reworking is time and cost intensive, among other things through repeated re-checking and judging correct implementation as well as through a possibly multiple “uploading” of the data of an automation station to the management and operator unit. The quality control, i.e. the checking of the implementation in accordance with the specification, has to be carried out by the contractor and not the client, but in the end it will be indispensable for the client to check whether the contractual agreements have been implemented.

This check cannot be carried out economically manually, so a simple tool was created in which the client's requirements can be maintained and the automated check is supported with the help of the digital twin of building automation.

By the IT-supported check clear errors, such as incorrect addressing, ObjectNames, descriptions, notifications, NotifyTypes, and points to be clarified, will be transmitted to the integrator for correction.

It is clear that several thousand Excel lines cannot be checked manually, so tools must be made available to the technician on site that are easy to use and nevertheless enable checking the work of the integrator.

There are Tools available on the market for reading out via the network the BACnet objects and content of the properties that are available and used on automation stations, also the settings made by the integrator - provided they have not been created “hidden”.

Some tools also offer the option of comparing the client's or planner's specification with the actual implementation of the integrator and showing differences.

A large Austrian client therefore has developed a tool based on “BACeye” through Bernhard RAMROTH to be able to implement the task efficiently and effectively. This is an ideal tool for quality assurance.

Conclusion and outlook

Landlords with a larger real estate portfolio are well advised to require interoperable solutions with BACnet for GA projects and to specify their ideas in a specification and concrete guidelines for uniform and simple standard systems. Under no circumstances should these change the existing EN/ISO standards, but at most supplement them. Since this requires a high level of knowledge in the field of building technology and its automation, support from planners with sufficient BACS and BACnet know-how would be necessary, who should also be commissioned to monitor the implementation as part of the acceptance of projects

In addition to the client specifications on the topic of BACnet and BACS, a BACnet implementation guide and a BACnet test tool for the economical implementation of simple and uniform systems are essential, according to the authors' experience.

The raw material of digitization is structured information, i.e. the BACnet properties.

Digitization offers the opportunity to overcome gaps in understanding between the building owner, planner and integrator and to map the process from planning to implementation and commissioning, to avoid redundancies and to implement the goals of building automation.

The structured information in the form of predefined BACnet properties is the basis for supporting the organizational goals by means of a management and operator unit (MOU), which in the future will have to have more energy management functions and artificial intelligence.

Only when the parameters for the quality of use can be adapted to a changed need with the available staff during the use phase of the building and, in addition to other goals, the energy expenditure can be reduced, does building automation create added value and benefit.

It should be clear to all experts that the building automation must support the goals of the owner, operator and user in the life cycle of the real estate and that the focus is not the device manufacturer's or the integrator's implementation process.

If the operation of a facility can be optimized through building automation, investors and users will be ready to bear the investment costs of a properly installed building automation system. It is undisputed that standards and interoperability are a mandatory prerequisite for tapping the added value of digitization. ■



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The BACnet Institute, a One-Stop, Online Learning Environment for BACnet Information and Learning

The BACnet Institute (TBI) is an online learning environment that serves as a central source for globally relevant information and education related to BACnet-based Building Automation System (BAS) implementation. It provides building automation professionals across the globe with the knowledge and tools they need to understand the BACnet protocol and ensure its successful implementation. TBI operates under the administration of BACnet

specification, system installation, and facility management. By providing education across various functions, TBI ensures individuals throughout the implementation process have a better understanding of BACnet as a standard data communication protocol and its ability to enable interoperability between different building systems and devices in building automation and control applications.

and best practices in its implementation. This course is geared toward individuals unfamiliar with BACnet and those who need a refresher. As the most popular course on TBI, it is not surprising that over 3,000 users have taken this course.

- The Facility Manager's Guide to Building Automation Systems** provides valuable insight on how to effectively and efficiently implement a BACnet-based BAS. This course discusses best practices to employ, as well as pitfalls to avoid, through the full design process – specification, procurement, construction and commissioning. This course is beneficial to anyone who works in the building automation industry, not only facility managers.
- BACnet Device Profiles** introduces learners to the various BACnet device profiles and explains the role of each in building automation. It also shows the learner how various profiles can be combined in a single device, explaining the rules behind the combinations.

Library

The second section is Resources, which provides a curated library of articles, white papers, and recorded industry lectures. With over 140 items, the TBI library is a mixture of curated existing information as well as new resources commissioned to meet the evolving needs of its audience.

- Articles.** There are over 100 articles that address a variety of topics in various languages and at various experience levels. Popular articles on TBI include "Introduction to BACnet", "BACnet and the IoT", and "Networking Solutions with BACnet".
- Recorded Lectures.** Various lectures from leading industry events are recorded and provided on TBI. A few recent sessions are "BACnet 101", "BACnet Physical Connectivity", and "HVAC as a Service".

Community

The Community offers a knowledge-sharing forum that allows peers with various levels of BACnet involvement to learn best practices and

Each year TBI continues to grow. In early 2020, TBI began issuing Continuing Education Units (CEUs) upon completion of its courses through BACnet International's accredited provider status. As an IACET Accredited Provider, BACnet International complies with the ANSI/IACET Standard, which is recognized internationally as a standard of excellence in instructional practices. As a result of this accreditation, BACnet International is authorized to issue the IACET CEU.

KEY SECTIONS

The BACnet Institute offers three distinct sections on the site – Courses, Resources, and Community.

Education

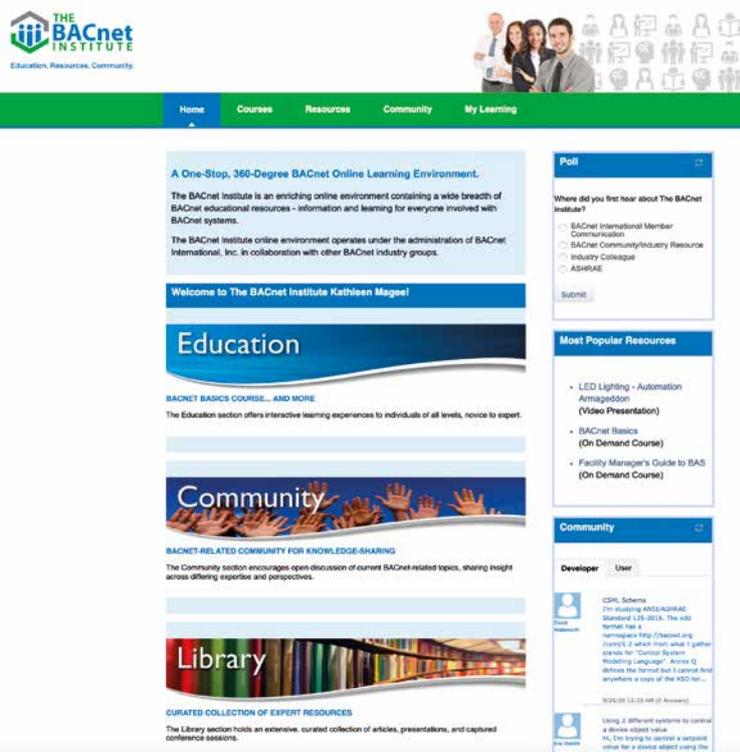
The Courses section contains on-demand, self-paced courses with the goal of providing interactive learning experiences for individuals at all levels. In need of CEUs? All courses on TBI offer free CEUs and Professional Development Hours (PDHs) upon completion. Currently, this section offers the following three courses:

- BACnet Basics** is a comprehensive course that outlines the benefits of BACnet, and provides an overview of how BACnet works

International in collaboration with the BACnet Interest Group – Europe (BIG-EU) and other BACnet industry groups.

Since its launch in January 2017, TBI has realized almost 5,000 registered users across more than 80 countries worldwide. These individuals have benefited from over 140 articles and lectures, three interactive courses and a knowledge-sharing forum. Access to the resources on TBI is completely free.

Learners on The BACnet Institute site span many key areas of BAS involvement, including product development, system design and



procedures from BACnet experts. Participants in the forum can submit new discussions, reply to discussions, and receive updates of peer posts through email subscriptions. Participation in the forum is highly encouraged, not only to submit a new discussion topic, but also to provide expertise to an established discussion.

REGISTER FOR FREE

While registration to TBI is required, it is free. New users can register by selecting 'Sign up now' on www.thebacnetinstitute.org.

About the Author:

Andy McMillan is President and Managing Director of BACnet International, where he works with users and suppliers to expand and enhance the BACnet community. Previously he served as President of a building automation and energy management business unit of Philips Lighting. Andy has been an invited speaker on BACnet and open systems at conferences around the world. He has been awarded a dozen patents, has co-authored a book on data communications and his background includes BSEE and MBA degrees.



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Calendar of BACnet Events

Date	Location	Event	Information
2021			
January 2021	online	ASHRAE committee, council and board meetings, information on SSPC-135 "BACnet committee" meetings are available soon	mosborne@releablecontrols.com
09.-11.02.2021	online	ASHRAE Virtual Winter Conference	www.ashrae.org
22.-26.03.2021	online	ISH digital 2021	www.ish-messefrankfurt.com
05.-07.05.2021	location to follow	14th European BACnet Plugfest	www.bacnetplugfest.org
26.-30.06.2021	Phoenix, AZ, USA	2021 ASHRAE Annual Conference	www.ashrae.org
05.-07.10.2021	Durham, NH, USA	21st BACnet International Annual PlugFest Interoperability Event	www.bacnetinternational.org/page/plugfest
12.-15.09.2021	Dubai World Trade Centre; UAE	The BIG5. International Building & Construction Show	www.thebig5.ae
12.-15.09.2021	Dubai World Trade Centre; UAE	HVAC R EXPO	www.thebig5.ae

Editorial Notes

BACnet Middle East Journal ISSN 2190-944X

The BACnet Middle East Journal is the Middle East magazine for building automation based on BACnet technology. Experts, practitioners and professionals show the way in applying and developing the BACnet standard – from building automation trends to devices and application projects; from qualification and training to testing and certification; from who's who in the BACnet community to useful information on events and publications.

Distribution

This Journal can be ordered free of charge by partners, members, media representatives and friends of the BACnet Interest Group. Order the BACnet Middle East Journal by email from: bacnetjournal@mardirect.de

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MACH-ProView™ LCD with EQUIPMENTview



Pictured with optional Panel Mount Accessory kit.



Better by design™

The Reliable Controls MACH-ProView LCD with EQUIPMENTview is a freely programmable BACnet Building Controller (B-BC) and BACnet Operator Display (B-OD) that resides on Ethernet, PoE, Wi-Fi, or EIA-485 networks. EQUIPMENTview is an easy-to-use interface that allows you to monitor and interact with HVAC, lighting, and security equipment; hospitality and safety services; energy management and more. Supported by an ever-growing library of graphical assets, the MACH-ProView LCD empowers you to stay in touch with your built environment.



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