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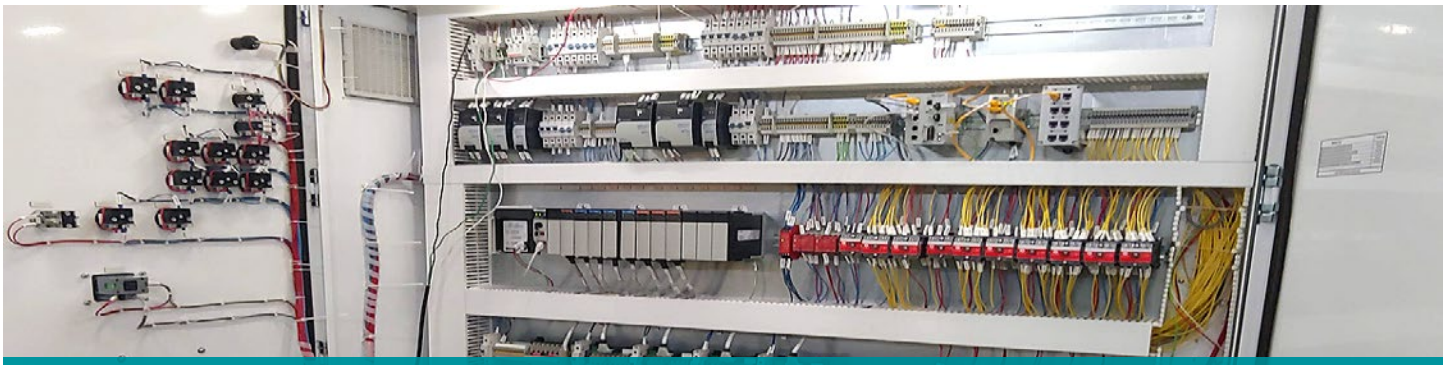

From Experience

Understanding Building Automation System (BAS) Communication Protocols

A Building Automation System (BAS) integrates various controls to enhance energy efficiency and reduce operational costs. However, ensuring all equipment works in harmony presents a key challenge. For optimal performance, the devices within a BAS must communicate seamlessly. This communication depends on protocols – standardized methods for exchanging data between devices. Challenges arise when different equipment uses incompatible protocols, necessitating translation or standardization.

Historically, Programmable Logic Controller (PLC) communication protocols were proprietary. Each supplier developed closed systems that simplified communication within their product line but complicated integration across different manufacturers. These proprietary systems often used distinct physical connections. Despite advancements, some connection types, such as RS-485, USB, and RJ45 (Ethernet), remain industry standards today. (See "Experience in Brief," at right.)

In modern BAS systems, regardless of the physical connection used to interface with a PLC or computer, all communications typically converge to Ethernet (RJ45) connections. This standardization enables centralized access to alarms, data, and status information, streamlining system monitoring and management. To do this, many protocols require modifications to establish Ethernet TCP/IP connectivity or to interface with vendor-specific equipment. In the chart on the next page are typical characteristics and requirements for widely used protocols:

Continued on next page. >

EXPERIENCE IN BRIEF

To avoid integration issues, specifying a communication protocol early in the project planning phase is essential. This ensures compatibility among devices and prevents costly delays during system startup. Where compatibility issues exist, a protocol gateway can translate one protocol into another.

Typical Characteristics /Requirements for Widely Used Protocols

Common Communication Protocols	Operates Via...	Protocol Gateway Requirements
Modbus RTU Protocol	Serial communications	Gateway or translator for Ethernet connectivity
BACnet Protocol	Serial communications	Gateway or translator for Ethernet connectivity
IO-Link Protocol	Serial communication with a unique connector	Gateway or translator for Ethernet connectivity
AS-I Protocol	Serial communication with a unique connector	Gateway or translator for Ethernet connectivity
EtherNet-TCP/IP Network Protocol	Natively over Ethernet	Network Address Translator (NAT) to preserve original OEM IP addresses, if desired
Modbus TCP/IP Protocol	Natively over Ethernet	NAT to preserve original OEM IP addresses, if desired
PROFINET Protocol	Natively over Ethernet	NAT to preserve original OEM IP addresses, if desired

Successful implementation of a BAS depends heavily on selecting and specifying the appropriate communication protocols early in the project. Understanding the compatibility requirements and integration challenges of these protocols can significantly enhance system performance and reduce costs. With a clear communication plan and proper tools like protocol gateways, a BAS can efficiently integrate diverse equipment into a unified and functional system.

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