



SNS COLLEGE OF ENGINEERING

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME : 190E219 BUILDING AUTOMATION

IV YEAR /VII SEMESTER

Unit 1- HVAC SYSTEM

Topic : Standard Signal & Compatibility between Controller and
Field Devices



Introduction



- Standard signals in HVAC (Heating, Ventilation, and Air Conditioning) systems refer to commonly used measurement and control signals that are standardized for compatibility and interoperability among various system components.



Analog Signals:

0-10V DC: Often used to control variable speed drives, actuators, and sensors like temperature and humidity sensors.

4-20mA: Another common signal for transmitting sensor data such as pressure, flow, and temperature. The range allows for accurate readings even in the presence of signal noise.

Digital Signals:

On/Off (Binary): Simple digital signals used for various purposes, like turning equipment on or off, opening/closing valves and dampers, or indicating alarm conditions.

Pulse Signals: Used for counting purposes, such as measuring energy consumption or fluid flow rates.



Communication Protocols:

- **BACnet:** A widely used protocol for building automation and control networks, **allowing different devices from different manufacturers to communicate and share data.**
- **Modbus:** A protocol used for **serial communication** between devices, often employed in connecting supervisory control and data acquisition (SCADA) systems to field devices.
- **LonWorks:** A platform used for building automation and control networks, enabling **communication between devices over twisted pair or other media.**
- **KNX:** A protocol used for home and building automation, **allowing devices to communicate for lighting, heating, ventilation, and more.**
- **Ethernet/IP:** An Ethernet-based protocol commonly **used for industrial communication, including HVAC systems.**



PWM (Pulse Width Modulation):

- PWM signals are used to control the **speed of fans and pumps**. The duty cycle of the signal determines the output level of the device.

RS-485:

- A standard for **serial communication** that **allows multiple devices to be connected on the same data bus**, often used for communication between sensors, controllers, and other devices.

3-Position Signals:

- Used for control applications like damper positioning. Signals indicate "open," "closed," or "partially open" positions.



Discrete Inputs/Outputs:

- These are binary signals that indicate the state of a device (e.g., a contact closure indicating a door is open) or are used to control devices (e.g., turning on a light or an alarm).

Pressure Transducers: These devices convert pressure measurements into electrical signals, often using standard analog outputs like 4-20mA or 0-10V.

Temperature Sensors: Standardized sensors provide analog signals proportional to the measured temperature.

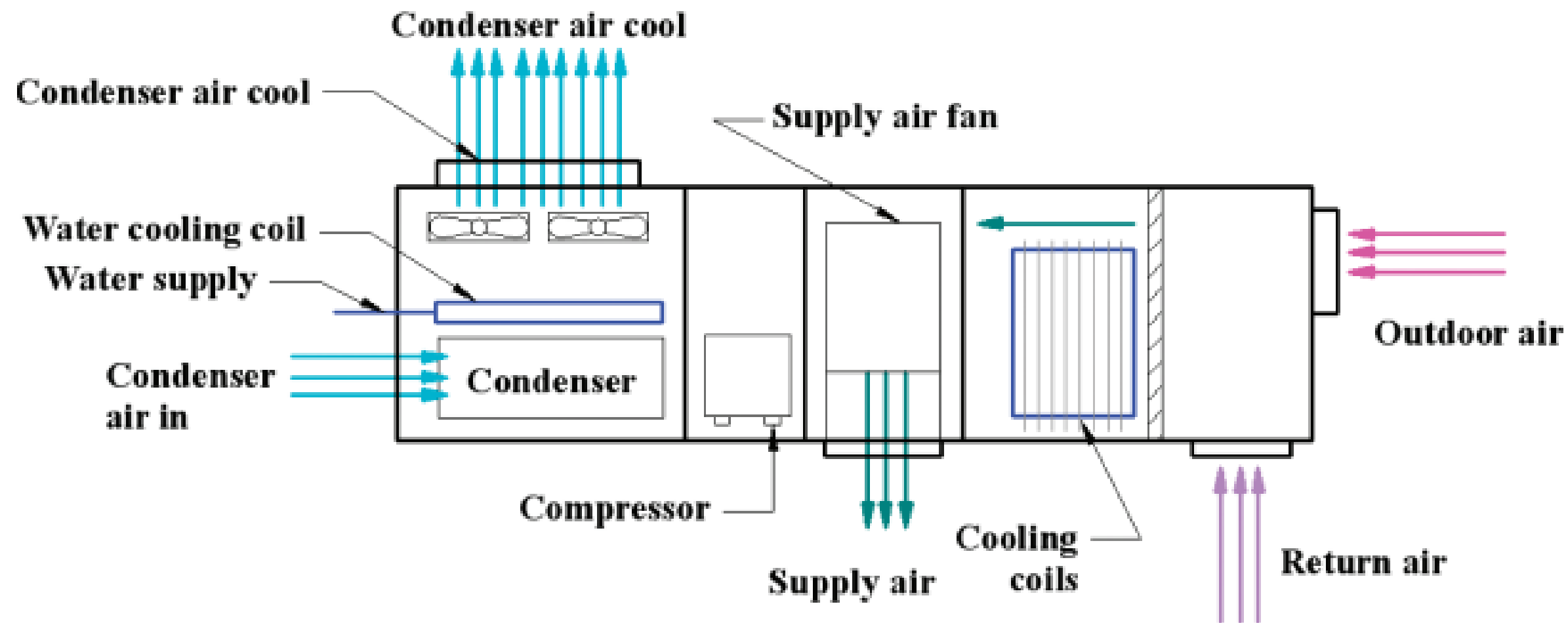


Signal compatibility between controller and field devices



- In HVAC systems, signal compatibility between controllers and field devices is crucial **for proper communication and system operation.**
- Ensure that the controller's communication protocol (such as BACnet, Modbus, LonWorks) matches the protocol supported by the field devices.
- Additionally, check voltage levels, wiring, and signal types to guarantee compatibility and effective communication.

1. Can you say this shown in fig. is the example of which method of HVAC?





References



1. Shengwei Wang, “ Intelligent Buildings and Building Automation”, Routledge 2010.
2. Reinhold A, Carlson Robert A, Di Giandomenico, “Understanding Building Automation Systems: Direct Digital Control, Energy Management, Life Safety, Security Access Control, Lightning, Building”, R. S Means company limited, 1st edition, 1991.

Thank You