



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME : 190E219 BUILDING AUTOMATION

IV YEAR /VII SEMESTER - CSE

Unit 1- HVAC SYSTEM

Topic : Pressure Sensor in HVAC System





Introduction



- Building automation system (BAS) involves monitoring and adjusting how a heating, ventilation, and air conditioning (HVAC) system reacts to changes in air pressure.
- Modern HVAC systems use air intakes, exhaust fans, relief dampers, and other mechanical means to adjust air pressure inside or within specific portions of a building.
- These mechanical components create negative or positive building pressure, either throughout the building or in specific areas that require an air pressure differential.
- Facility managers can use a building pressure monitoring system to maintain optimal conditions while improving energy efficiency and protecting human health.



Pressure Sensor



- A pressure sensor in an HVAC (Heating, Ventilation, and Air Conditioning) system is a device used to monitor and measure the pressure of various fluids or gases within the system.
- These sensors play a crucial role in maintaining the efficiency, safety, and proper functioning of the HVAC system.
- They provide real-time data that allows the system to adjust its operations based on changing pressure conditions.

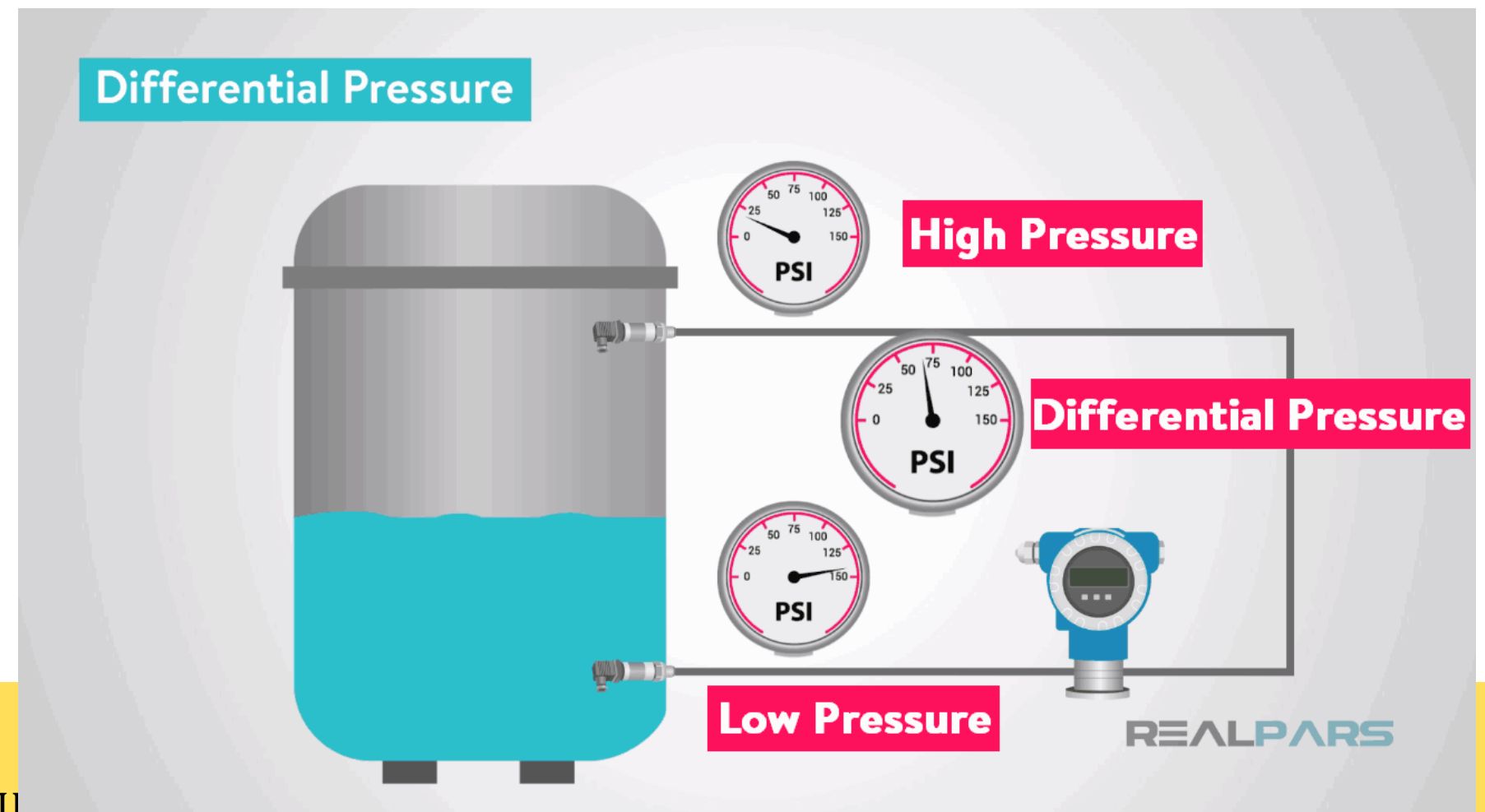
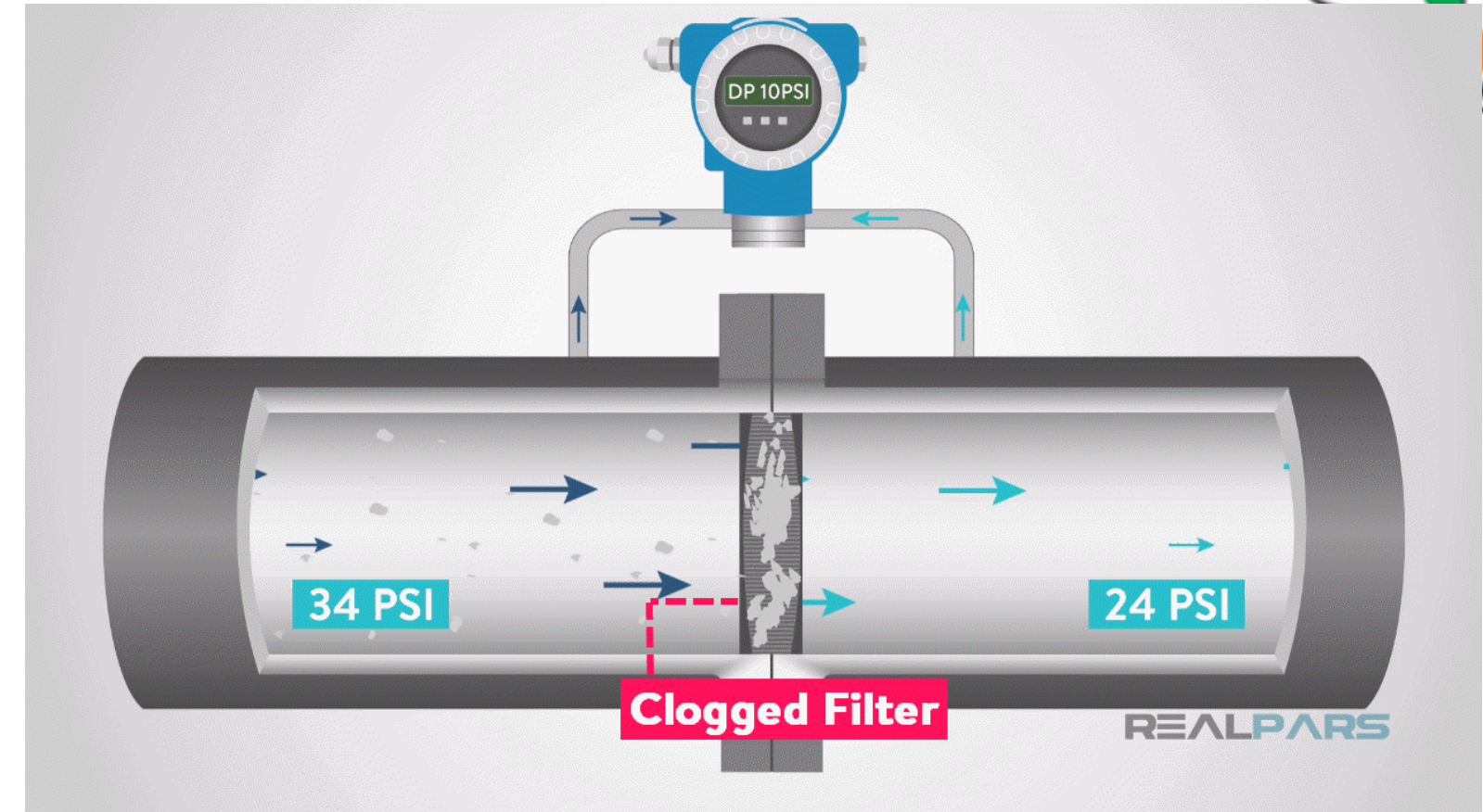


Types of Pressure Sensors



➤ Differential Pressure Sensors:

These sensors measure the difference in pressure between two points in the system, often used for air filters, ducts, or across heat exchangers.





Absolute Pressure Sensors



- These sensors measure pressure relative to a perfect **vacuum** and are commonly used to monitor atmospheric pressure or refrigerant pressure in a closed HVAC system.
- If you need to read a pressure that is lower than atmospheric pressure, this is the type of sensor you would use.
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Gauge Pressure Sensors



- These sensors measure pressure relative to ambient atmospheric pressure and are used to monitor pressures within a specific range, like air pressure in a room.
- This is measured in reference to **atmospheric pressure** which is typically 14.7 PSI.
- You will show a “positive” pressure when it is above atmospheric pressure and a “negative” when it is below atmospheric pressure.



Applications



- **Duct Pressure Measurement:** Pressure transducers can be installed in HVAC ducts to measure the air pressure.
- This information helps to monitor and maintain proper air distribution throughout the building.
- By measuring pressure differentials between different parts of the duct system, the HVAC system can adjust dampers and fan speeds to ensure balanced airflow.



- **Filter Monitoring:** Pressure transducers are used to monitor the pressure drop across air filters.
- As filters accumulate dust and particles, the pressure drop increases.
- Pressure transducers detect this increase and provide signals to the control system, which can trigger alerts for filter replacement or adjustment to prevent excessive pressure buildup.



Ventilation Control: Pressure transducers can be installed in ventilation systems to monitor pressure differences between indoor and outdoor environments.

- This is crucial for ensuring proper ventilation rates and preventing contaminants from entering the building.
- **Fan Control:** Pressure transducers can be used to monitor the pressure within ducts or ventilation zones.
- By measuring the pressure, the system can adjust the speed of fans to maintain consistent pressure levels and airflow rates.
- **Boilers and Furnaces:** Pressure transducers are employed in combustion systems to monitor combustion chamber pressure.
- This helps to ensure efficient and safe combustion by maintaining the proper air-fuel mixture.

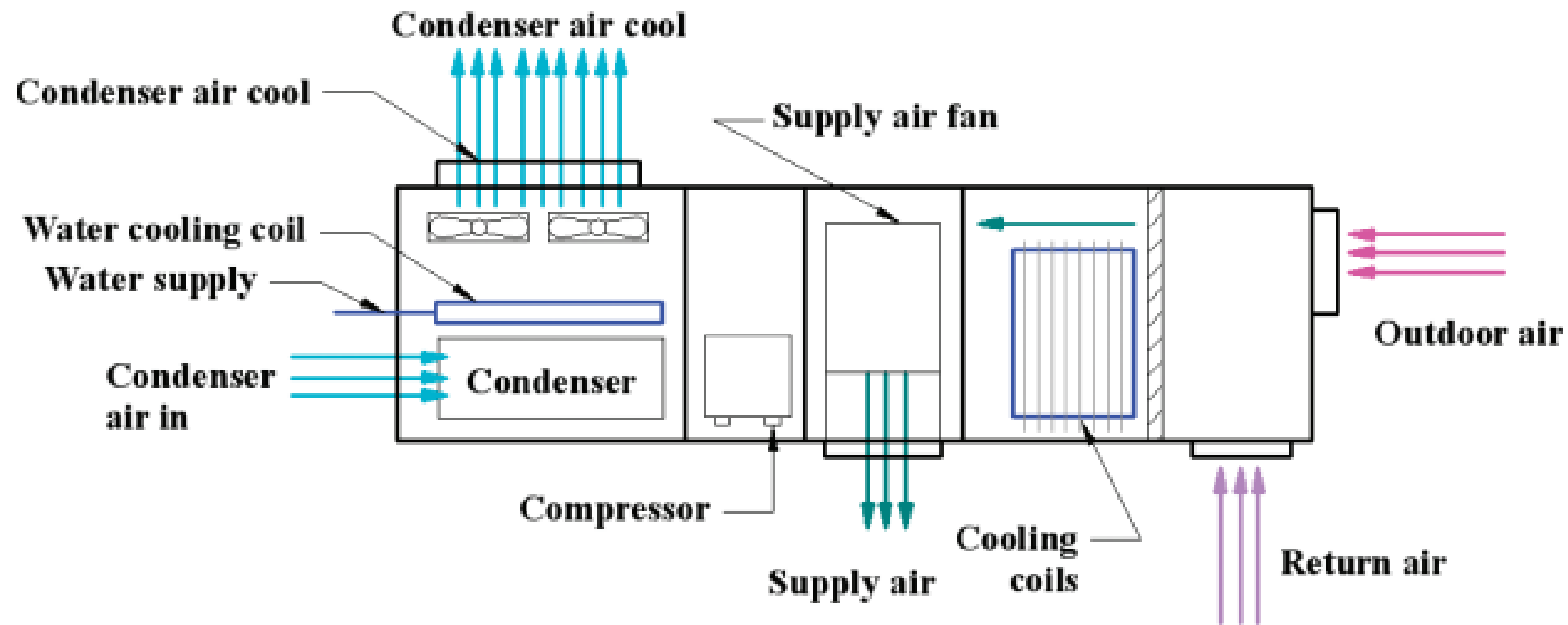


- **Refrigerant Pressure:** In cooling systems, pressure transducers are used to monitor refrigerant pressure levels.
- This is essential for maintaining proper cooling performance and preventing issues like compressor overloading or system malfunctions.
- **Safety and Alarms:** Pressure transducers can provide inputs to safety systems that trigger alarms or shutdowns if pressure levels exceed safe limits.
- This can help prevent system damage, leaks, or hazardous conditions.



- **Energy Efficiency:** Pressure transducers contribute to energy efficiency by allowing the HVAC system to optimize its operation based on real-time pressure measurements.
- This can lead to reduced energy consumption and increased system lifespan.
- **Remote Monitoring:** Pressure transducers with standardized electrical outputs can provide remote monitoring capabilities.
- This is useful for facility managers and technicians to track HVAC system performance and make adjustments as needed.

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