

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

Unit 1- HVAC SYSTEM

Topic : Level Sensor



Introduction



- A level transducer in an HVAC (Heating, Ventilation, and Air Conditioning) system is a device used to measure the level of a liquid or other fluids within a container, tank, or reservoir.
- This measurement is then converted into an electrical signal that can be used for monitoring, control, and automation purposes in the HVAC system.
- Level transducers play a crucial role in maintaining the proper functioning and safety of various HVAC components that involve fluid management.



Classification



- Direct and indirect level measurements.
- Continuous and discrete level measurements.
- In **direct method** of measurement, the liquid level is converted directly to electrical signal.
- This can be done with the help of some indicators.
- In **indirect method**, liquid level is first converted to displacement and this displacement is then converted to electrical signal.



Continuous Level Transducer



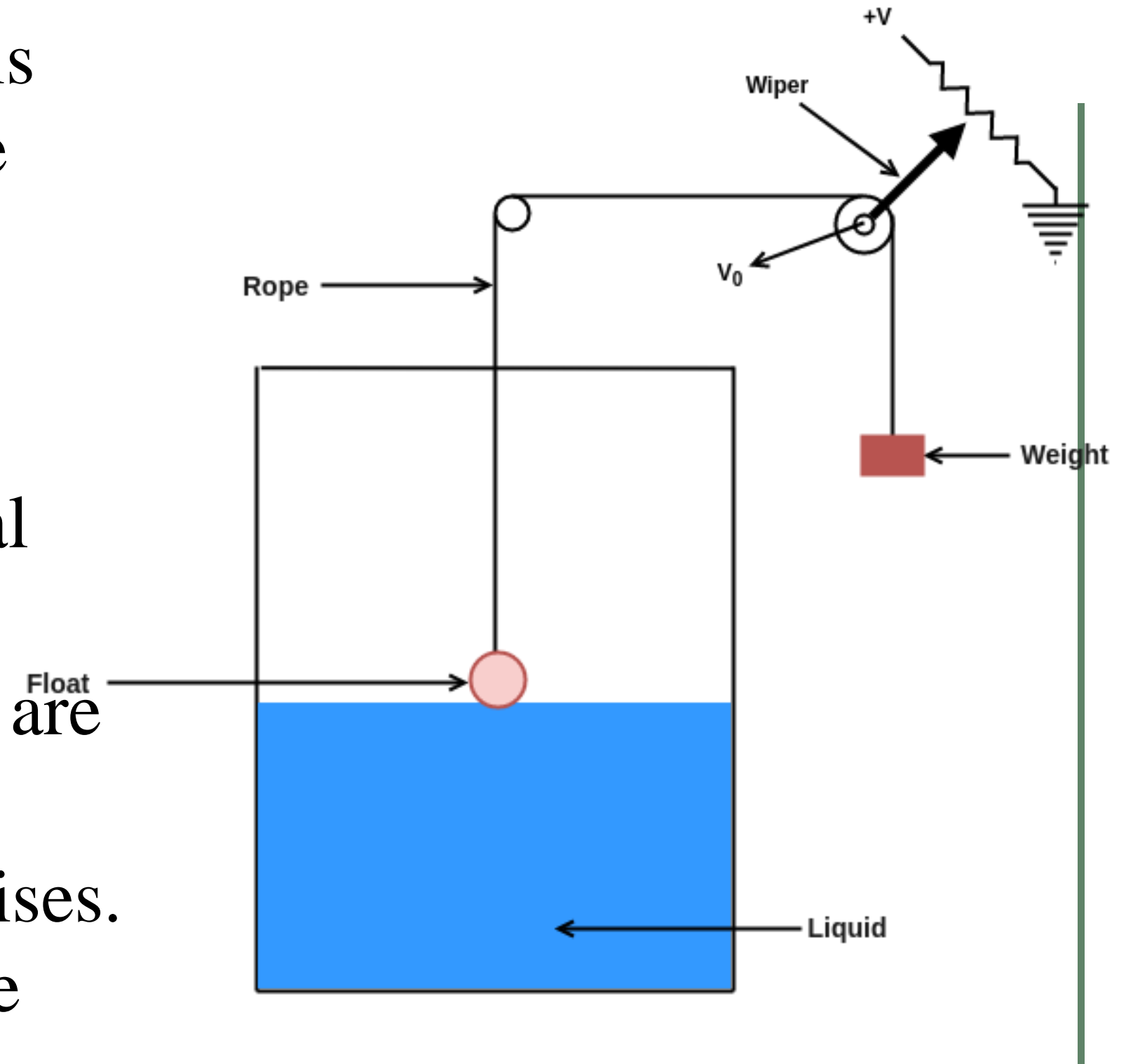
Continuous level transducers measure the exact position of liquid level. It can monitor the entire system.

Different types of continuous level transducers are

- Ultrasonic level transducers
- Float element type-level transducers
- Capacitive level transducers
- Pressure type-level transducers
- Inductive level transducers
- Resistive level transducers etc.

Float Element Type Level Transducers

- A float element type liquid level transducer is the most common simple method to measure liquid levels.
- As the liquid level rises in the tank, the float rises.
- It causes to move the wiper over the potential divider.
- The output terminals of the potential divider are connected to a voltmeter.
- The output voltage is increased as the float rises. That is the voltage will be proportional to the liquid level.





Advantages

- Simple in construction.
- Easy to operate.
- Works at large temperature range.

Disadvantages

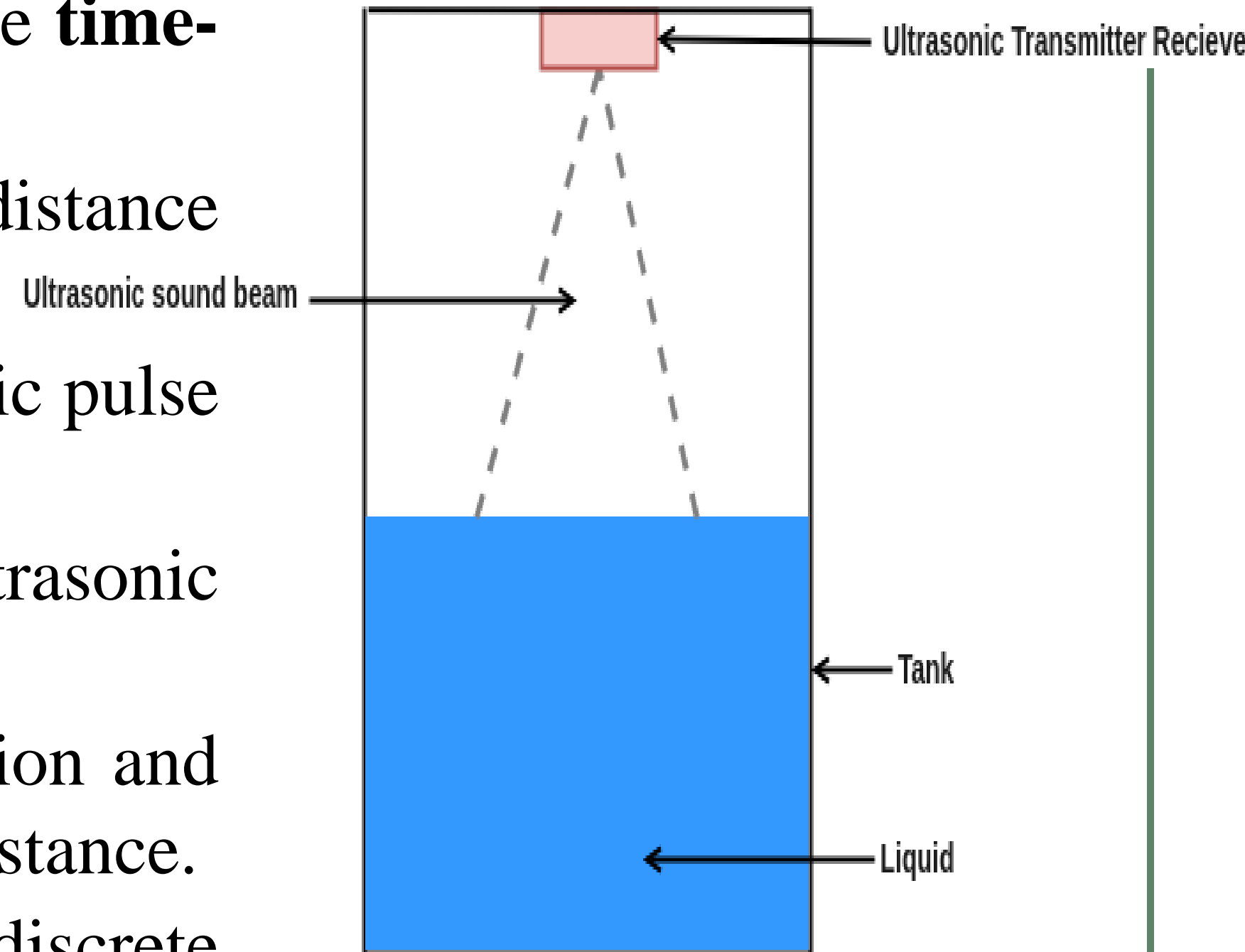
- Not suitable in moderate pressure.
- Design of float should be selected properly.



Ultrasonic Level Transducers



- The ultrasonic level transducers work by the **time-of-flight** principle.
- It is a method used for measuring the distance between a sensor and an object.
- The ultrasonic transmitter emits an ultrasonic pulse beam towards the liquid.
- This pulse is reflected back to the ultrasonic receiver by the liquid surface.
- The time difference between the transmission and reception is measured and is calibrated to distance.
- It can be used for both continuous and discrete level measurements.





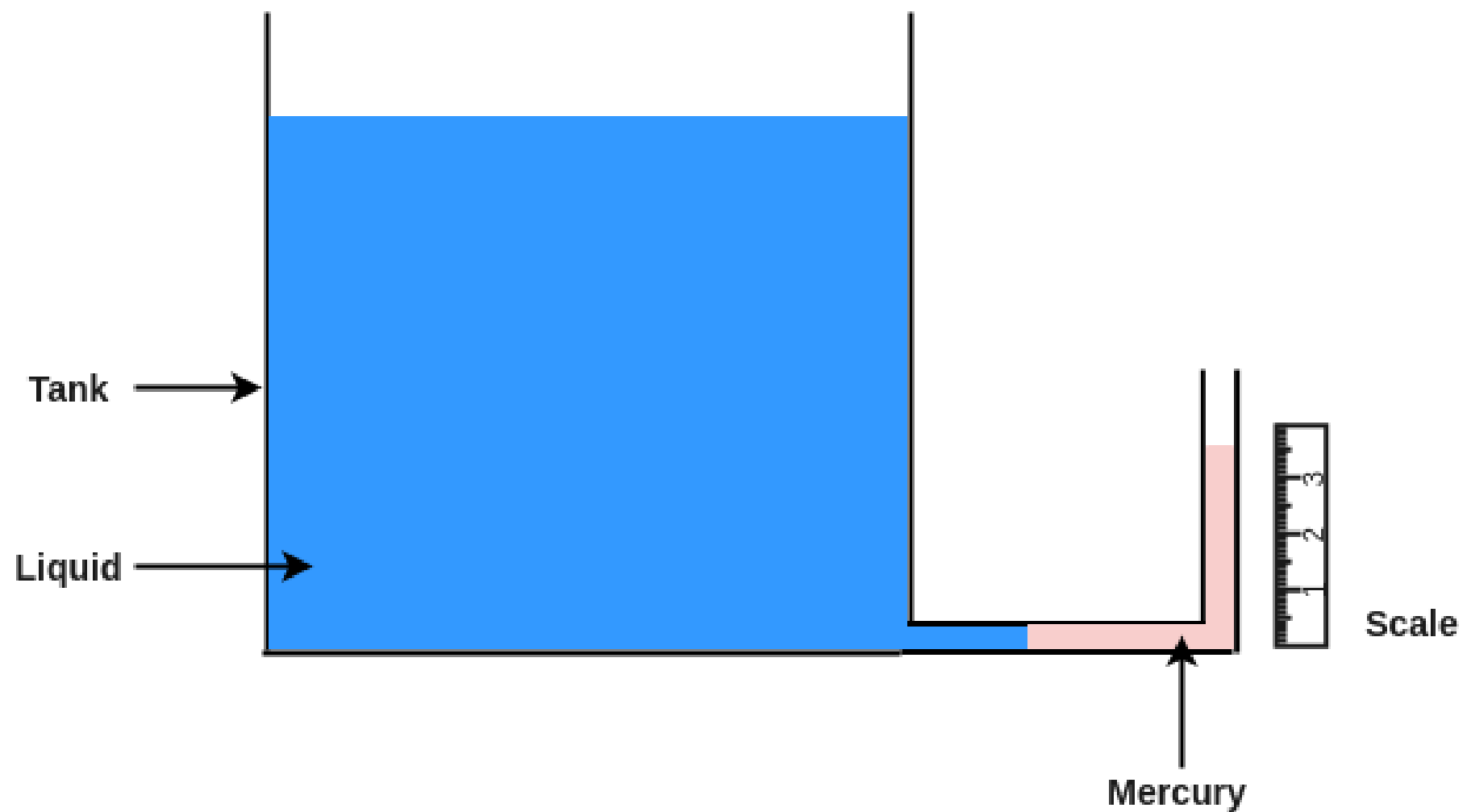
Advantages

- Reliable.
- There are no moving parts.
- Can be used in high humidity.
- Material density or conductivity is not affected.

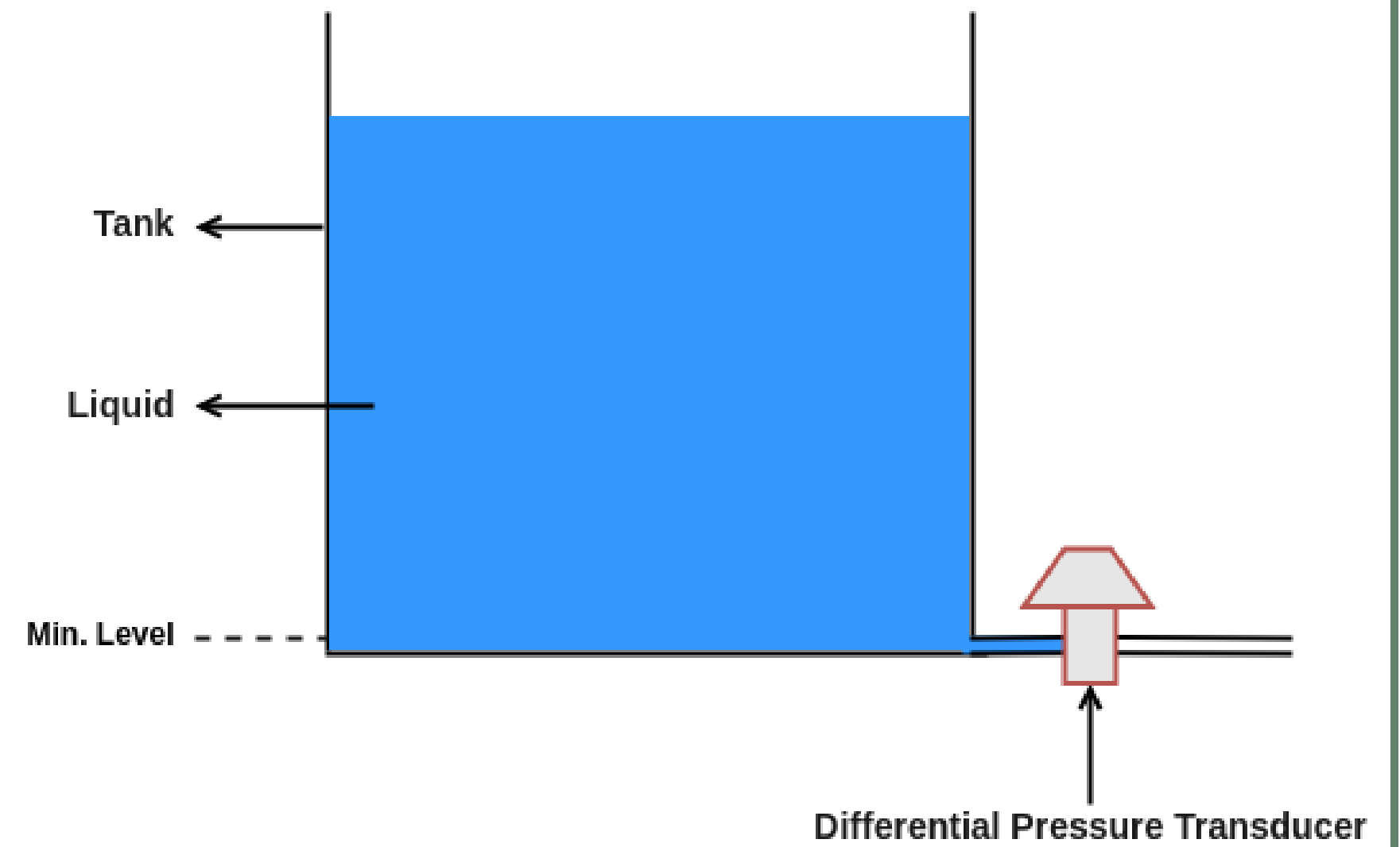
Disadvantages

- Dust particle may create distortion.
- Vibration or high noise will affect result.

Manometer Type Level Transducers



Pressure Type Level Transducers

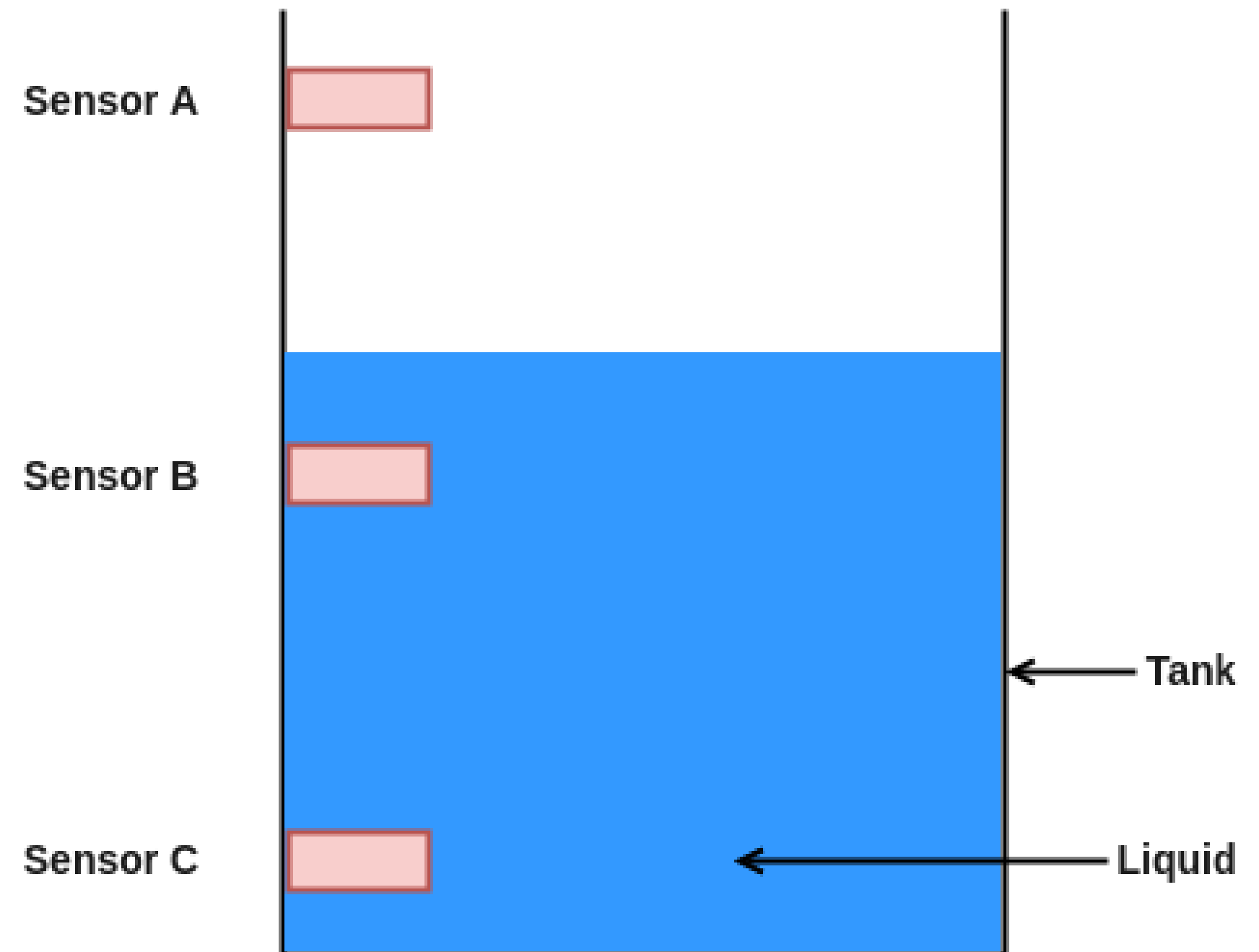




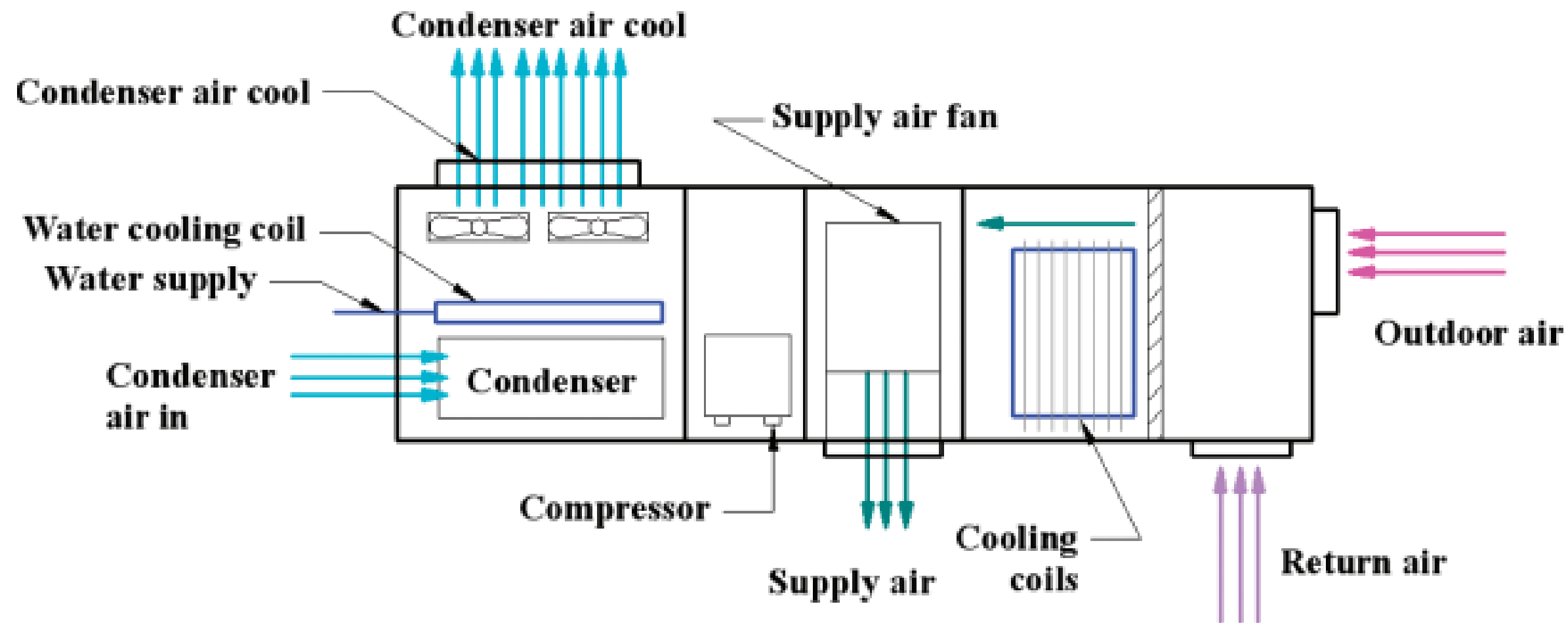
Point (Discrete) Level Transducer



- Discrete level transducers are used to detect a single discrete liquid height.
- It is normally used for detecting overflow or below the required level conditions.



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