



TYPES OF INSTRUMENTS IN **FOOD INDUSTRIES**

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1. INTRODUCTION



- The food & beverage industry is required to adhere to strict guidelines and rules for the preservation of food quality from contamination to prevent all the consumer's health and safety.
- Food safety compliance is very critical, even a minor deviation can cause a major impact, Instruments used in Food processing industries are basically used to prevent such issues.

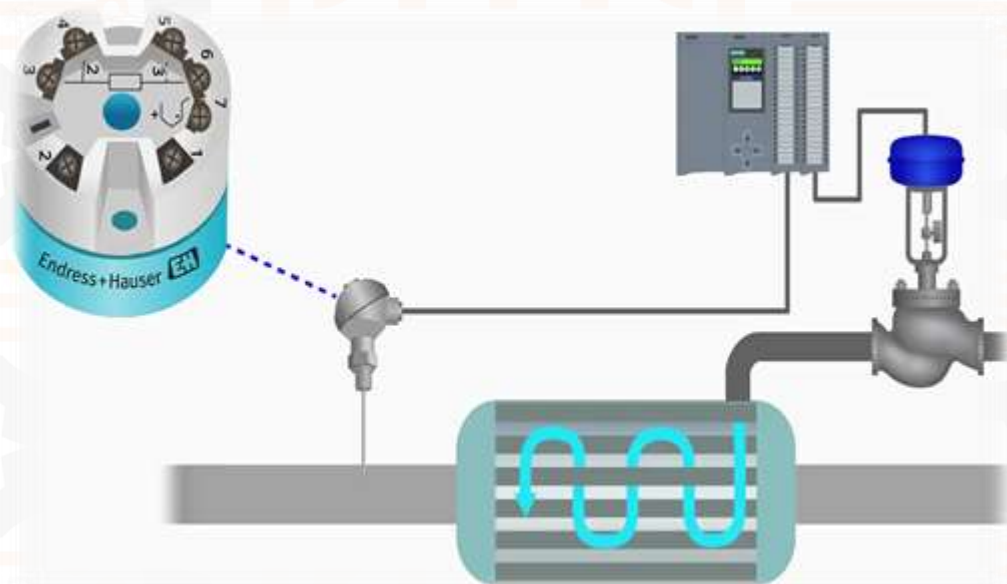
2. CLASSIFICATION OF INSTRUMENTS



Instruments used in Food Industries can be classified into various categories, which are as follows:-

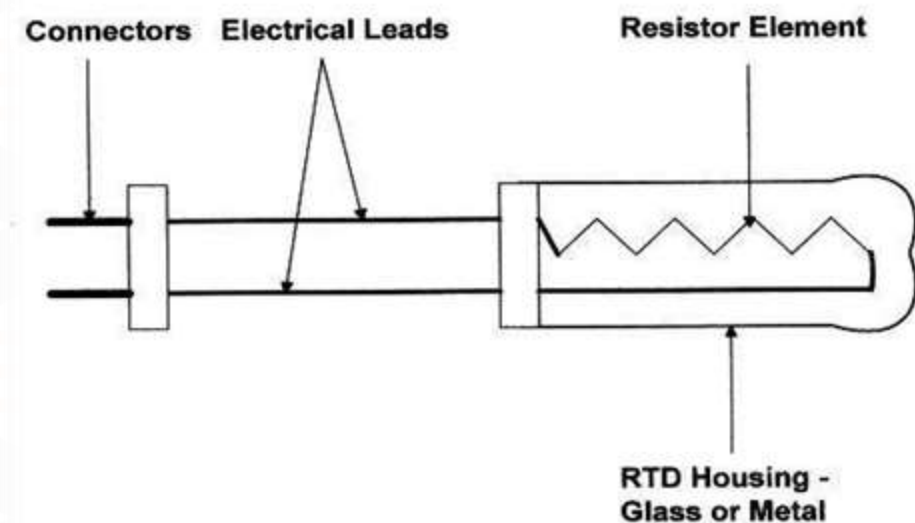
1. Temperature measuring instruments (3.1)
2. Liquid Analysis based instruments (3.2)
3. Pressure measurement based (3.3)
4. Water level measuring (3.4)
5. Flow measurement based (3.5)

3.1-Temperature Measuring Instruments



Temperature Transmitter

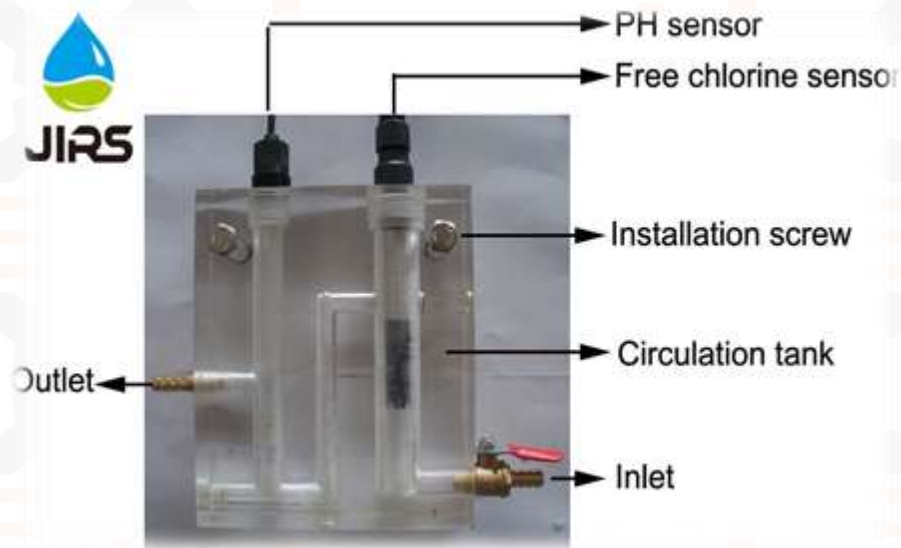
- An ideal solution for measuring temperature.
- **Working:** A transmitter draws current from a remote DC power supply in proportion to its sensor input. And the actual signal is transmitted as a change in the power supply current.



Resistance Temperature Detector(RTD)

- Sensor whose resistance changes as its temperature changes.
- **Working:** The resistance increases as the temperature of the sensor increases. This, resistance vs temperature connection is repeatable over time. It's a Passive device.

3.2-LIQUID ANALYSIS BASED INSTRUMENTS



Chlorine Sensor

- This sensor uses an amperometry method and the measured sample will have chlorine species, from which it will pass through a membrane and will react with the working electrodes. This reaction produces an electrical current proportional to the chlorine concentration.

pH Sensor

- A pH sensor helps in the measurement of alkalinity and acidity in water in the value between 0-14. Below 7-acidic, beyond 7-alkaline.
- it depends upon the exchange of the hydrogen ions, and with the help of a glass electrode, the final difference is measured in the solution sample.



3.3-PRESSURE MEASURING BASED

Types of Pressure Transmitters



Pressure Transmitter

- **Working:** When the pressure is created over the transmitter, the same pressure acts as a force on the diaphragm. Depending upon the applied pressure the diaphragm will either get expand or will get compressed, and the resistance value changes accordingly.



Pressure Gauge

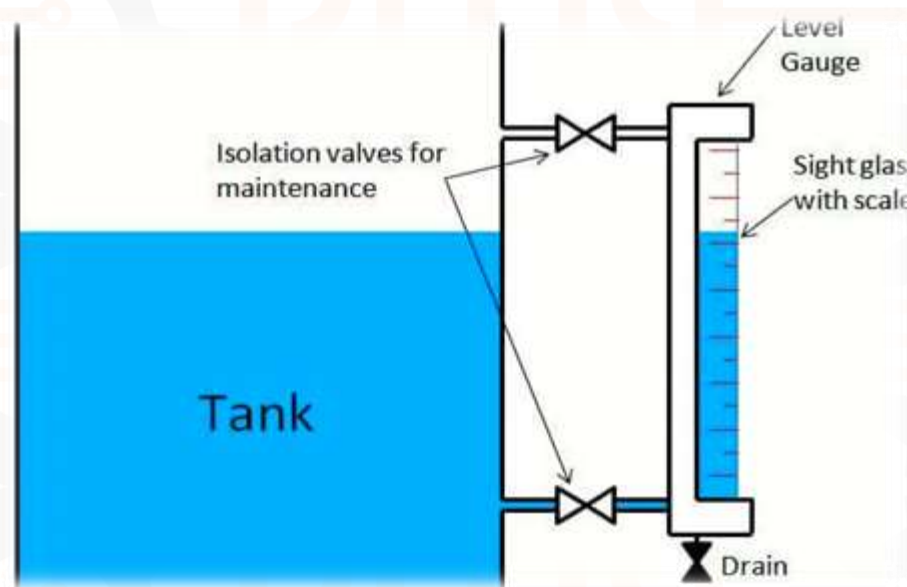
- **Working:** Based on Hooke's Law. It states that the force which is required to expand or to compress a spring, scales in a linear method with regards to the space of compression and extension, inner pressure, and outer pressure will be there.

3.4-WATER LEVEL MEASURING



Radar Level Transmitter (Non-contact type)

- **Working:** This transmits high-frequency radio waves and measures the distance between the transmitter and the liquid surface by measuring the time of flight. The distance to the fluid surface from the transmitter will be subtracted from the depth of the tank and the liquid level will be calculated.



Level Sight Gauge (Contact Type)

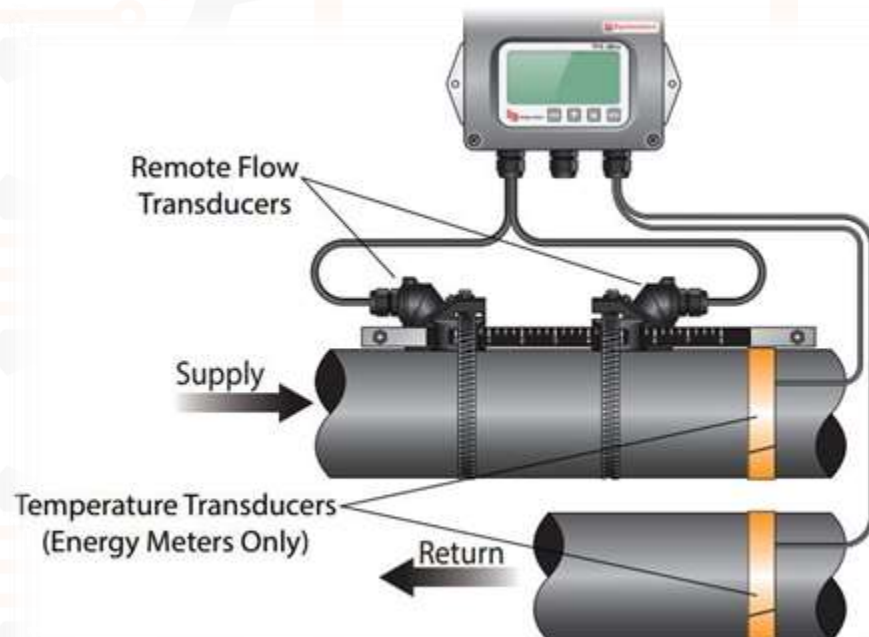
- It is the simplest method to measure liquid level.
- **Working:** The sight glass is attached to the tank's outside body so that the liquid to be measured is visible. Sight glass has graduations on it, to allow the level to be measured.

3.5-FLOW MEASUREMENT BASED



Electromagnetic Flow Meters:

- Based on Faraday's Law of Electromagnetic induction. In a magnetic flow meter, a current is applied to wire coils mounted within or outside the meter body to generate a magnetic field. The liquid flowing through the pipe acts as the conductor, and this induces a voltage that is proportional to average flow velocity.
- This voltage is detected by sensing electrodes mounted in the flow meter's body and sent to a transmitter which calculates the volumetric flow rate based on the pipe dimensions.



Ultrasonic Flow Meters:

- **Working:** It uses sound waves to resolve the velocity of the liquid in the pipe. There are two cases of Flow and No-Flow in the pipe. In the Flow case, the frequency of the reflected wave is different due to the doppler effect and in the second one of the No-Flow case.

4. CONCLUSION



- All the instruments which need to be used in any of the food processing industries, should be cleaned and sanitized on daily basis to prevent cross-contamination and to maintain good manufacturing practices.
- These instruments make the monitoring, regulating, maintaining, and measuring methods easy for us as they are getting advanced. Some of these instruments just require a second to give us the results, which is resulting in good overall quality food products.

5. REFERENCES

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