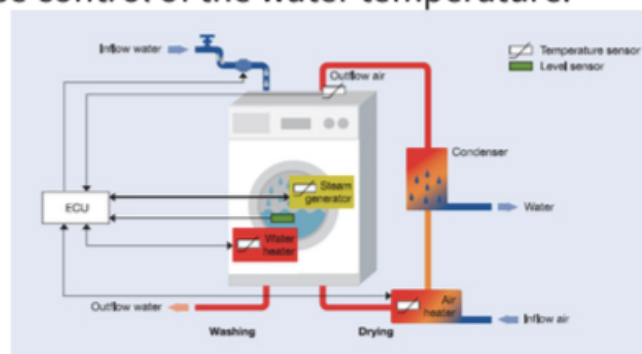


Temperature Sensors in Household Appliances

- **Large appliances** – washing machines, clothes dryers, dishwashers, refrigerators and freezers, ovens and ovens,
- **Small appliances** – coffee makers, induction hobs, irons and ice makers,
- **Heating devices** – heaters, radiators, fans and air conditioners.

-
- **Washing machines** – The temperature sensor in washing machines allows precise control of the water temperature.



Overall specification of washing machine's temperature sensors:

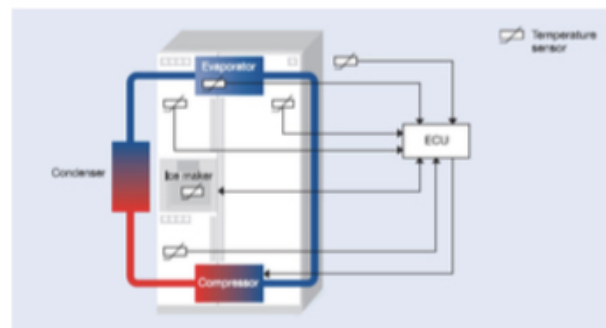
- NTC thermistor in a stainless steel housing,
- Suitable for corrosive environments (water with suds),
- K276 meets the standards of water temperature sensors in washing machines,
- Temperature range: from -10 to 100° C,
- Long-term stability,
- Possibility to adapt the sensor construction to specific needs.

Overall specification of dishwasher's temperature sensors:

- NTC thermistor placed in a specially formed, plastic housing,
- The housing is resistant to moisture and water,
- Possibility to adapt the sensor construction to specific needs,
- Temperature range: from 0 to 85 ° C.

Refrigerators and freezers

- Temperature sensors in refrigerators and freezers measure the temperature of the cooling chamber, protect against ice build-up of the evaporator, support the formation of ice cubes and detect the ambient temperature.

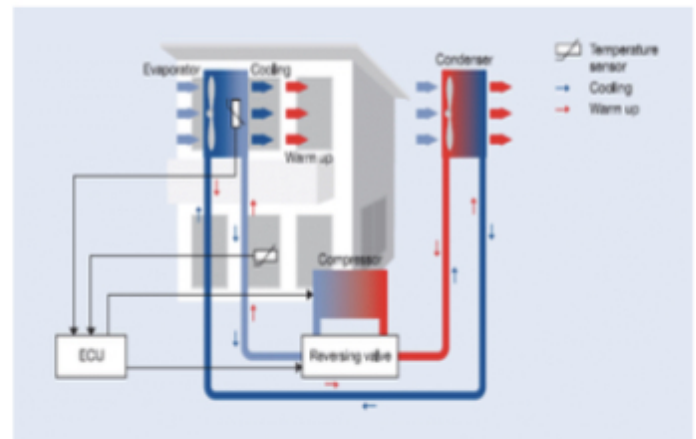


Overall specification of refrigerator's and freezer's temperature sensors:

- NTC thermistor placed in a specially formed, plastic housing with cable outlet,
- High [resistance](#) to moisture and water,
- Double insulated power cable (M2025), individually (M2010, M1005),
- Possibility to adapt the sensor construction to specific needs.

Air conditioners

- Sensors measure the temperature on the evaporator, preventing it from icing. They also measure the temperature at the air outlet or in the room.



Overall specification air conditioner's temperature sensors:

- Copper housing well dissipating heat (K500),
- Measuring the temperature on the evaporator (K500),
- NTC thermistor in an epoxy casing (M500, M800),
- Increased resistance to moisture (M800),
- Possibility to adapt the sensor construction to specific needs.

Sensors used in Automation:

In the industrial automation, sensors play a vital part to make the products intellectual and exceptionally automatic. These permit one to detect, analyze, measure and process a variety of transformations like alteration in position, length, height, exterior and dislocation that occurs in the Industrial manufacture sites.

These sensors also play a pivotal role in predicting and preventing numerous potential proceedings, thus, catering to the requirements of many sensing applications.

The following are the various types of sensors used in automation:

- Temperature Sensors
- Pressure sensors
- MEMS Sensors
- Torque Sensors

Let's discuss about these different Types of industrial automation sensors in detail to understand their scope of use:

Temperature Sensors :

A **temperature sensor** is a device that collects information concerning the temperature from a resource and changes it to a form that can be understood by another device. These are commonly used category of sensors which detect Temperature or Heat and it also measures the temperature of a medium.

Digital Temperature Sensors:



These **Digital Temperature Sensors** are silicon-based temperature- sensing ICs that provide accurate output through digital representations of the temperatures they are measuring. This simplifies the control system's design, compared to approaches that involve external signal conditioning and an analog-to digital converter (ADC).

Humidity & Temperature Sensors



The **Temperature & Humidity sensors** attribute a temperature & humidity sensor complex with a measured digital signal output. By utilizing the technique and temperature & limited digital-signal-acquisition humidity sensing technology, it ensures high consistency and exceptional long-standing stability.

Vaccum Sensors



Vaccum Sensors are used when the Vaccum pressure is below atmospheric pressure levels and it can be difficult to sense through mechanical methods. These sensors generally depend on a heated wire with electrical resistance correlating to temperature. When vaccum pressure increases, convection falls down and wire temperature up rises. Electrical resistance increases proportionally and is calibrated adjacent to pressure in order to give an effective measurement of the vaccum.

Applications of Pressure Sensors:

- Used to measure pressure below than the atmospheric pressure at a given location
- Used in weather instrumentation, aircrafts, vehicles, and any other machinery that has pressure functionality implemented
- Pressure sensors can be used in systems to measure other variables such as fluid/gas flow, speed, water level, and altitude

Washing Machine / Clothes Dryer

- Temperature sensor measures water temperature and controls heating elements
- Pressure sensor monitors water level
- Vibration sensor detects out-of balance conditions during spin
- Proximity sensor verifies door closed and latched before start-up
- Force sensors measure payload weight at the beginning of the wash cycle
- Humidity sensor monitors process humidity and stops the dryer when clothes are dry
- Thermopile measures clothing temperature to prevent overheating and fabric damage
- Force sensors measure payload weight at the beginning of the cycle

Applications of Temperature Sensors:

- They are weatherproof & designed for continuous temperature measurement in air, soil, or water
- Exceptional accuracy and stability
- For measurements in complex industrial applications
- For measurements under rough operating conditions

Pressure Sensors:

The **Pressure Sensor** is an Instrument that apprehends pressure and changes it into an electric signal where the quantity depends upon the pressure applied.

Turned parts for Pressure Sensors and Vacuum Sensors are few of the major pressure sensors used in Industrial automation.

Turned parts for Pressure Sensors



These **Pressure sensors** are widely used in Industrial and hydraulic systems, these are high pressure industrial automation sensors also used in climate control systems.

Appliances create their own unique challenges based on the environment they are

creating. Sensors in many cases are put into a position to measure in the challenging environment. For example, a sensor can be used to measure humidity and temperature in a dishwasher. While our dishes and forks are cleaned with water jets spraying, elevated temperatures and high humidity, it creates unique challenges for sensors to survive humidity while producing an electrical output signal. In similar cases, we cook food in ovens to ensure our meals are safe to eat. Building a temperature sensor to ensure the meat is cooked completely requires the survival of the sensor and cabling at elevated oven temperatures. Various sensor types are manufactured with the customer in mind.

Microwave Oven / Small Appliances

- Temperature sensors measure liquid and heating element temperatures in toaster ovens, coffee makers, popcorn poppers, etc.
- Humidity sensor monitors relative humidity and steam production for espresso machines, clothes steamers, etc.
- Humidity sensor monitors food moisture content during cooking
- Thermopile measures food temperature without the need to make physical contact
- Force sensor measures food weight on the turntable