Ministry of Higher Education and Scientific Research
Al-Mustaqbal University College
Department of Technical Computer Engineering

measurement and instrumentation
2st Stage
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7. **Zero drift**: Is the description of the effect where the zero reading of the instrument is modified by a change in ambient conditions *as illustrated in fig. (2.2)

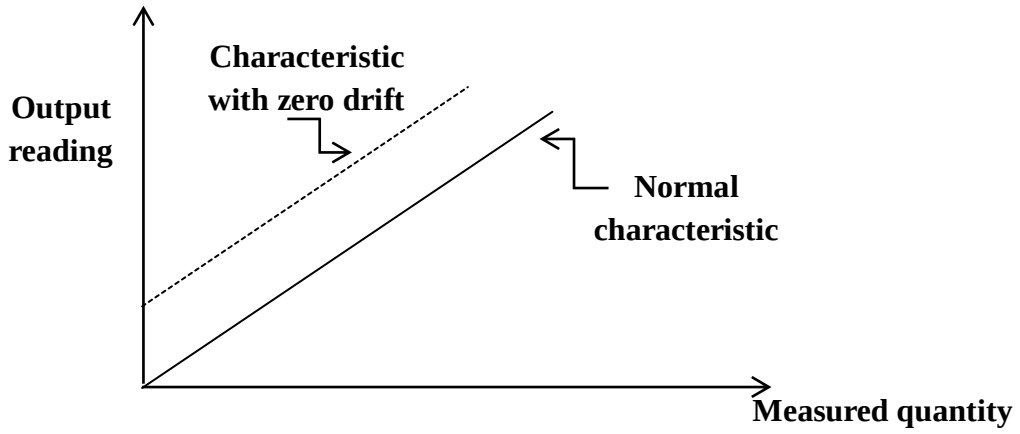

Fig (2.2). Description of Zero drift

8. **Sensitivity drift**: Is the amount by which the instrument's sensitivity varies as absent conditions change .It is also known as "scale factor drift".

The effect of sensitivity drift on the output of the instrument is shown in fig (2.3)

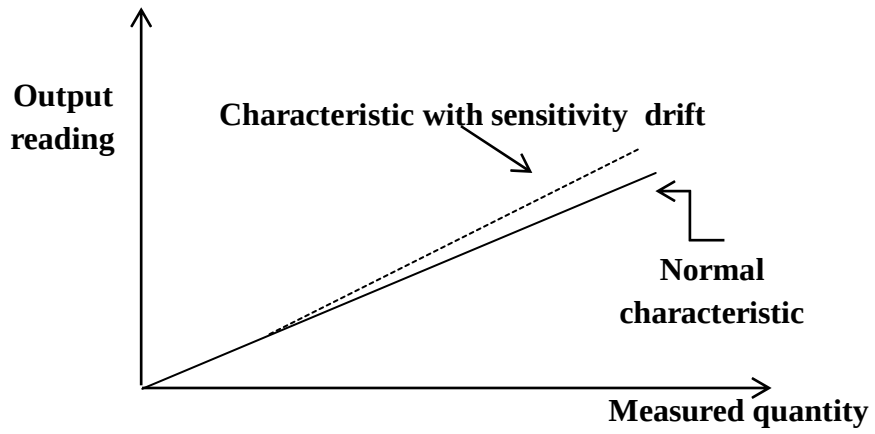

Fig (2.3). The effect of sensitivity drift on the instrument characteristic

If the instrument suffers both the zero drift and sensitivity drift at the same time, then the modification of the output characteristic is shown in fig. (2.4).

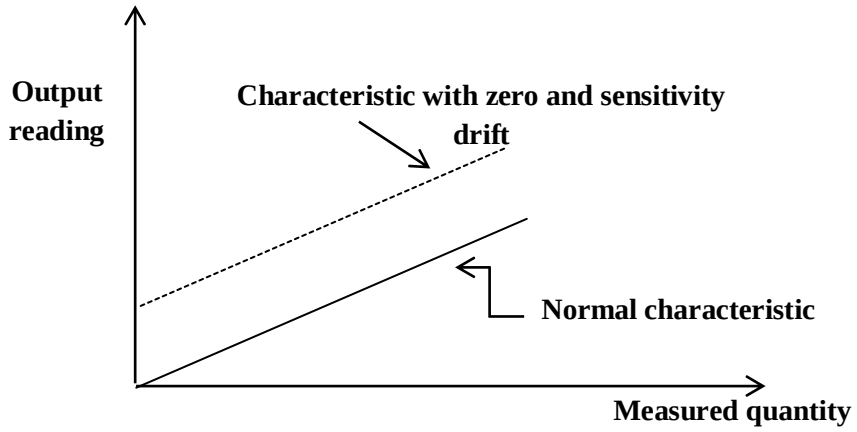

Fig (2.4). The effect of both the Zero and sensitivity drift on the output characteristic of instrument

9. **Resolution**: Is the ability of instrument to sense the smallest change in the measured quantity.

The resolution is generally specified as a percentage of the full-scale deflection (FSO) as follows:

$$\text{Res} = \frac{\text{full-scale deflection}}{\text{number of divitions}}$$

9-Tolerance: It is the maximum deviation of a manufactured componentfrom a specified value.

Example (2.8)

A resistor is chosen at random from a batch having a nominal value of 1000 Ω and a tolerance of ±5 % determine the actual value of this resistor.

Solution

5/100 * 1000 Ω = 50

the tolerance of this resistor = ±50

= 950 ~ 1050

10. **Range and span**: Are the maximum or minimum values of the quantity that the instrument is designed to measure.

As an Example, for the instrument shown in Fig. (2.5)

The input range is from -10 C° to 90 C°

The output range Is from 2 V to 12 V

The input span = 90 – (-10) = 100 C°

The output span = 12 – 2 = 10 V

Fig (2.5) The input and output range and span

11. **Significant Figure**: The significant figures convey the actual information regarding the magnitude and the measurement precision

of the measured quantity,

For Example, if a resister is specified as having a resistance of 68 Ω, its resistance should be closer to 68 Ω, thanto 67 Ω or 69 Ω . But, if the value of resistance is described as 68.0 Ω, it means that it is closer to 68.0 Ω than it is to 67.9 Ω.

Or 68.1 Ω. In 68 Ω, there are two significant figures and in 68.0 Ω there are three. The later with more significant figures, express a measurement of greater precision than the former.

Example (2.9)

Two resistors, R_1 and R_2 are connected in series.

Individual resistance measurements using Wheatstone bridge, give $R_1 = 18.7\ \Omega$ and $R_2 = 3.624\ \Omega$.

Calculate the total resistance to the appropriate number of significant figures:

Solution:

$R_1 = 18.7\ \Omega$ (Three significant figures)

$R_2 = 3.624\ \Omega$ (Four significant figures)

$R_T = R_1 + R_2$

$= 18.7 + 3.624$

$= 22.324$