18.2.4 Measuring instruments and their characteristics

Measuring instrument

Device intended to be used to make measurements, alone or in conjunction with supplementary device(s).

Measuring system

Complete set of measuring instruments and other equipment assembled to carry out specified measurements.

Sensor

Element of a measuring instrument or measuring chain that is directly affected by the measurand.

Detector

Device or substance that indicates the presence of a phenomenon without necessarily providing a value of an associated quantity.

Scale (of a measuring instrument)

Ordered set of marks, together with any associated numbering, forming part of a displaying device of a measuring instrument.

Note: Each mark is called a *scale mark*.

Measuring range - working range

Set of values of measurands for which the error of a measuring instrument is intended to lie within specified limits.

Response characteristic

Relationship between a stimulus and the corresponding response, for defined conditions.

Sensitivity (of a measuring instrument)

Change in the response of a measuring instrument divided by the corresponding change in the stimulus. For analytical process see Section 18.4.3.2.

Resolution (of a displaying device)

Smallest difference between indications of a displaying device that can be meaningfully distinguished.

Note: For a digital displaying device, this is the change in the indication when the least significant digit changes by one step.

Stability

Ability of a measuring instrument to maintain constant its metrological characteristics with time.

Drift

Slow change of a metrological characteristic of a measuring instrument.

Response time

Time interval between the instant when a stimulus is subjected to a specified abrupt change and the instant when the response reaches and remains within specified limits around its final steady value.

Accuracy of a measuring instrument

Ability of a measuring instrument to give responses close to a *true value*.

Note: "Accuracy" is a qualitative concept.

Error (of indication) of a measuring instrument

Indication of a measuring instrument minus a true value of the corresponding input quantity.

Bias (of a measuring instrument)

Systematic error of the indication of a measuring instrument.

Repeatability (of a measuring instrument)

Ability of a measuring instrument to provide closely similar indications for repeated applications of the same measurand under the same conditions of measurement.