‘Introduction to Instruments’

Topics covered

- The fundamental requirements of instrumentation.
- Typical instrument errors and common faults.
- The transmission and conversion of standard instrument signals.
- Pressure
- Flow
- Level
- Temperature
- Process Control
- Final control devices
- Safeguarding Systems

Fundamental ‘Functional’ requirements of Instrumentation equipment.

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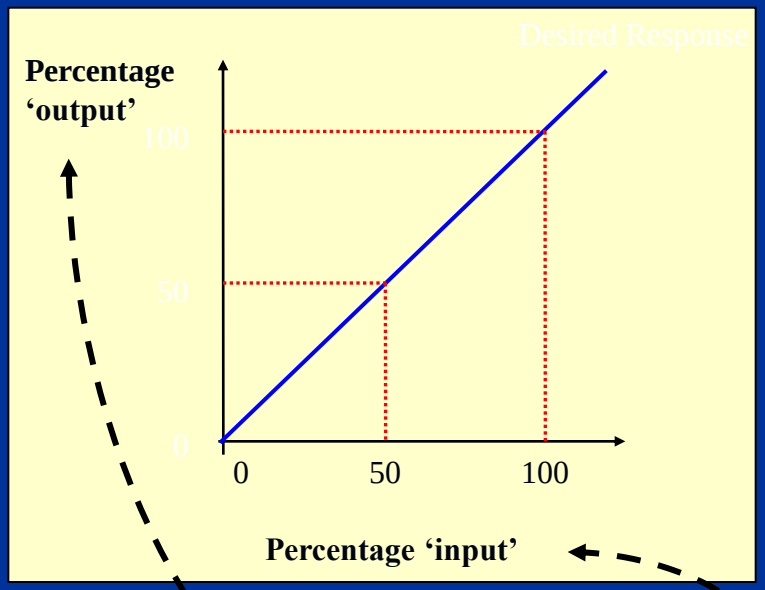
- Safe – properly constructed / fit for purpose / 'fail-safe'.
- Reliable and easily maintained.
- Repeatable.
- Sensitive to small changes.
- Fast response time.
- Linear – able to produce linear readings from non-linear inputs.
- Able to maintain performance over prolonged period.
- Robust construction (including ability to resist corrosion).
- Easily understood.
- Cost effective.
- Accurate.

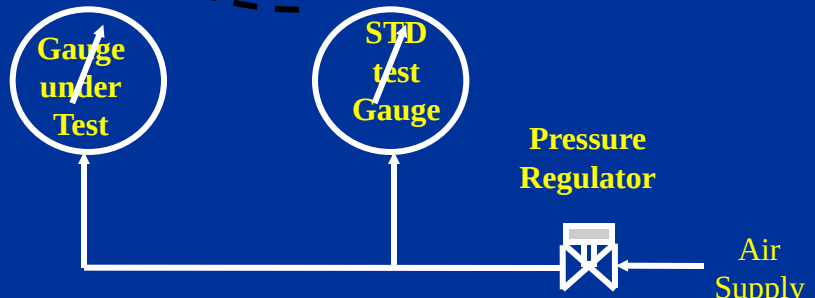
Instrument Errors
&
Calibration.

Calibration - What is it?

"The act of checking or adjusting (by comparison with a standard) the accuracy of a measuring instrument "

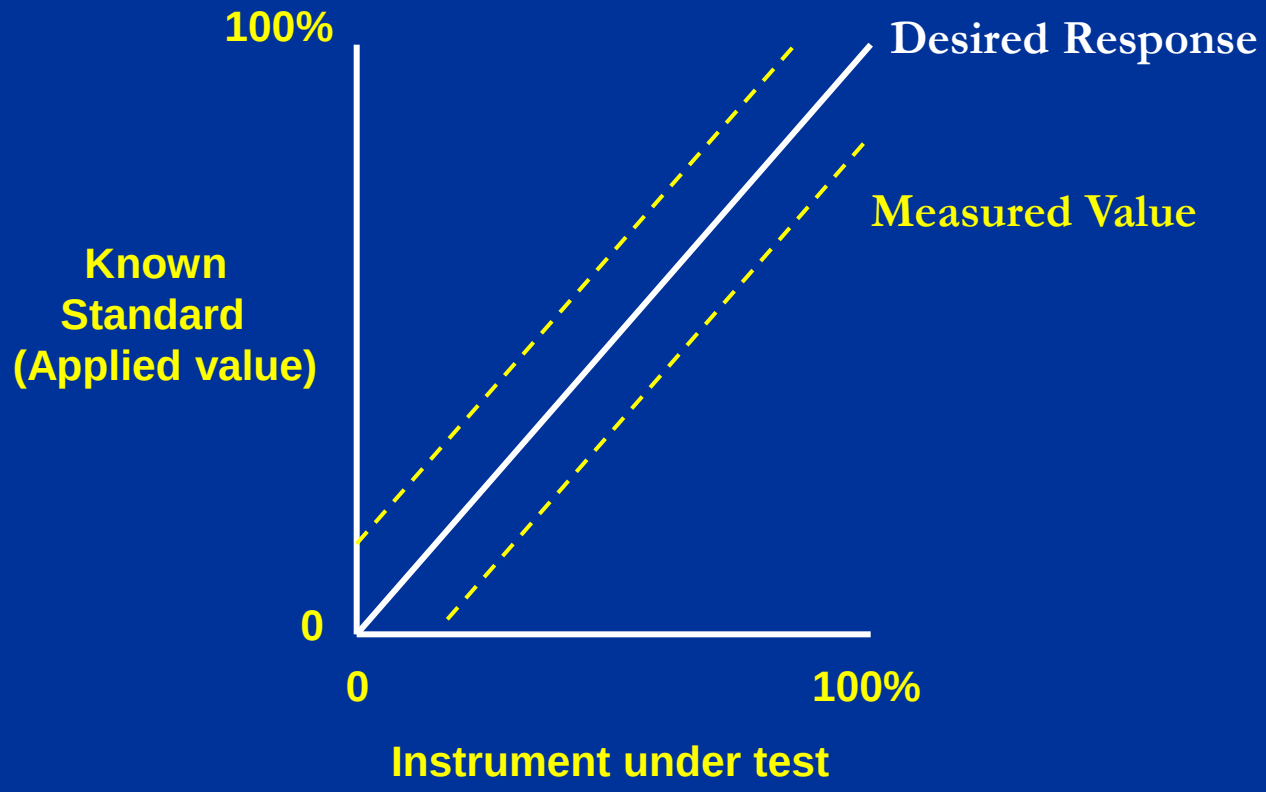
1. Instrument Calibration against Known Standard





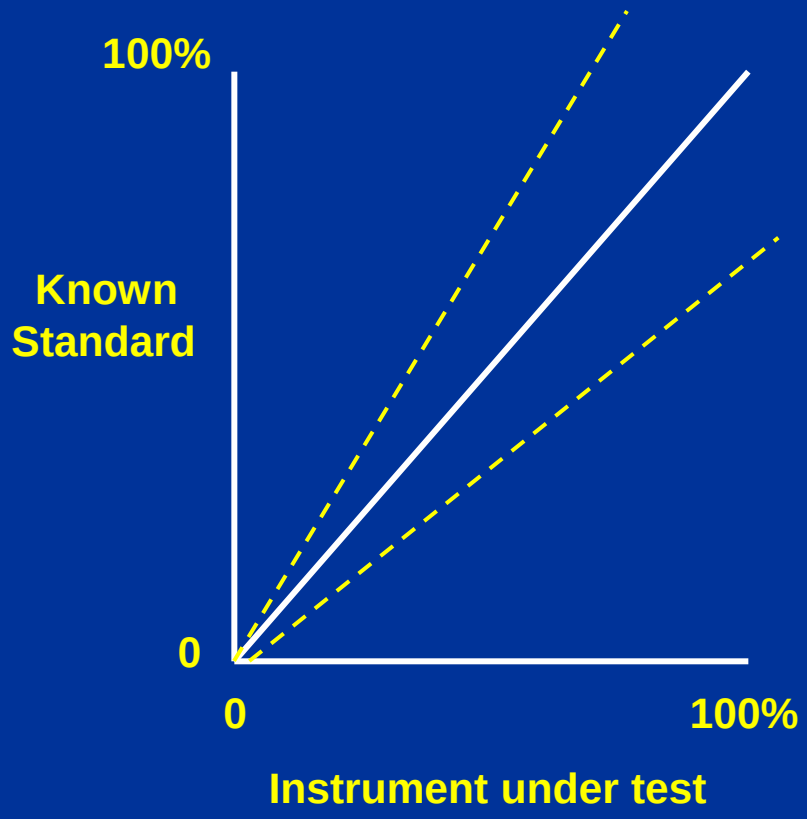
Basic calibration equipment

1. Zero Error



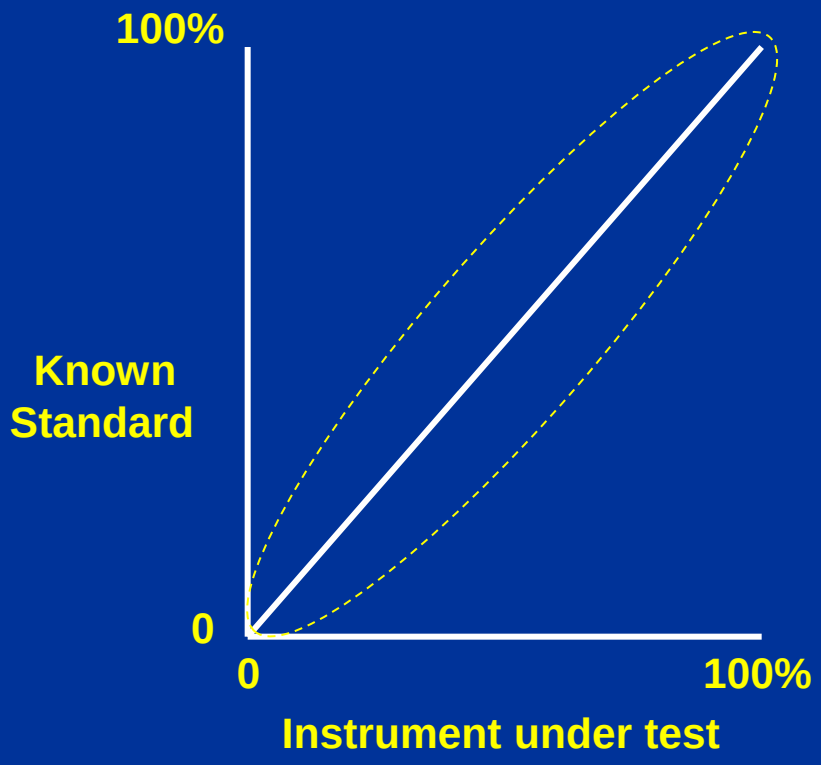
- Most common type of error & can be positive or negative as shown.
- Most instruments fitted with a ‘zero’ adjustment.

2. Range Error



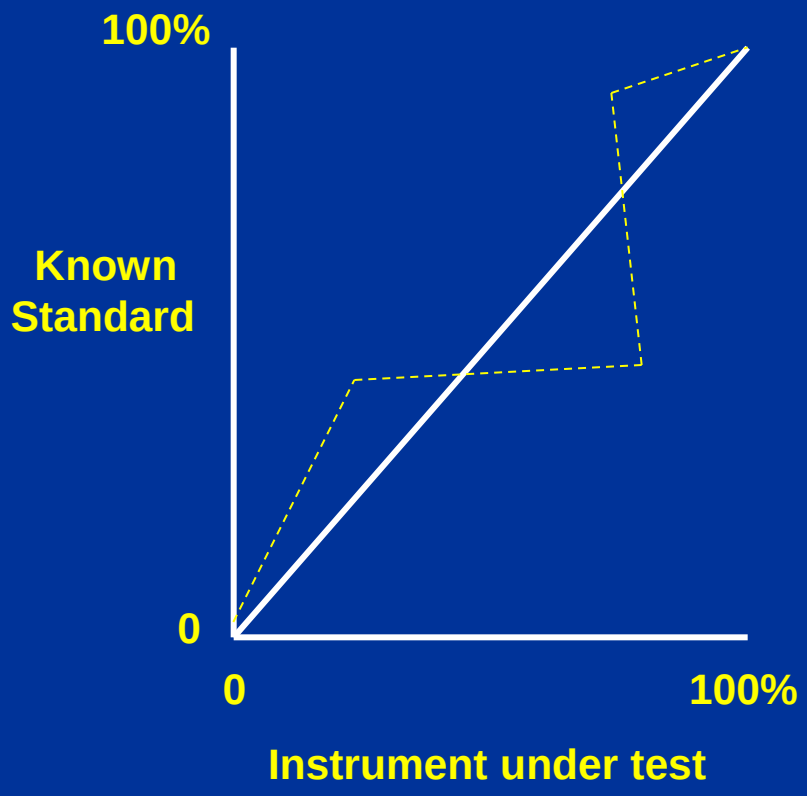
- Error gets increasingly worse and can be positive or negative.
- Unlike zero errors, can only be corrected for by re-calibration.

3. Linearity Error.



- Error at maximum around mid range before ‘correcting’ itself.
- Commonly due to wear or miss-alignment of mechanical components.

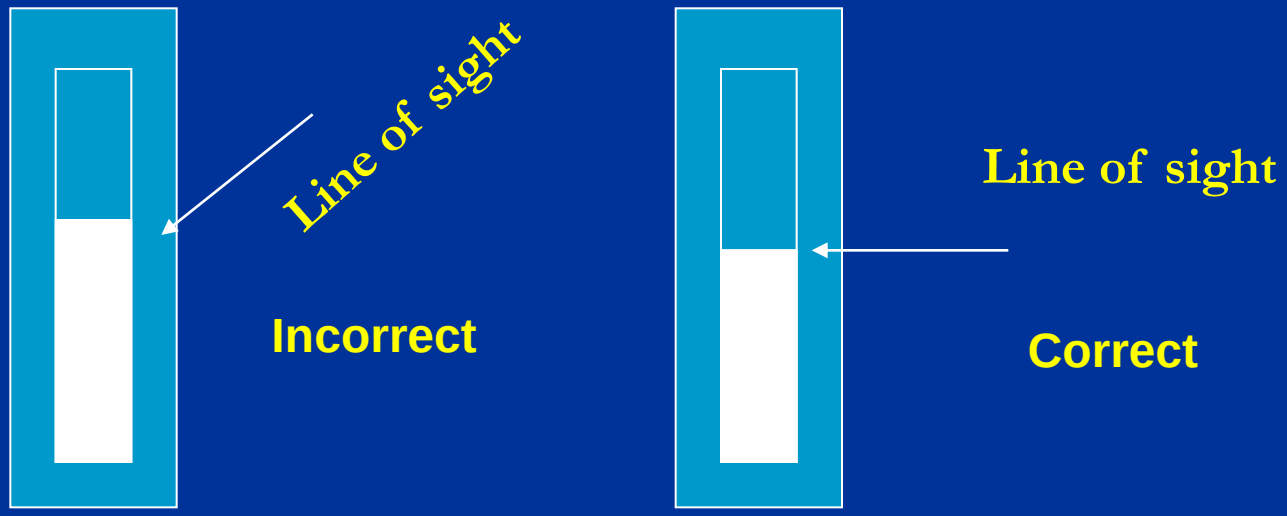
4. Hysteresis.



- Error shows no pattern and is often unrepeatable.
- Is largely due to worn or defective parts

5. Parallax

Visual error resulting from the incorrect sighting of gauges, sight glasses and indicators etc.



Instrument Performance/ Lag's