

## Measurement and Calibration - Glossary of Terms

The following information may help in selecting the appropriate measuring device for your needs.

### Accuracy

The precision of the instrument which can be reported in three ways.

1. By quoting the guaranteed tolerance as a percentage of the reading or indicated value, (eg. "0.5% of Reading").
2. By quoting the guaranteed tolerance as a percentage of the full scale value of the instrument, (eg. 0.1% FS or 0.1% FSD).
3. By quoting a 'class' of device in accordance with BS7882:2008 "Method for calibration and classification of torque measuring devices". (See page 90).

### Modes of Operation

**First Peak of Torque** - when a "click type" torque wrench signals that the set torque has been achieved, the applied torque will momentarily drop before climbing again. Generally the fastener stops rotating at point 1, and from a standstill, the breakaway torque to achieve further rotation of the fastener will be higher than point 3b. Only if the operator is very insensitive to the break point will the final tightening effort be incorrect.

"First Peak of Torque" mode will detect the break point of the torque wrench, not the highest torque applied.

**Peak Torque** - this mode of operation will record the highest torque applied. In the case of a "click type" torque wrench this may be higher than the actual break point if the wrench continues to be loaded beyond the break.

Consequently, Peak Torque is more useful for calibrating devices without a break signal such as dial or electronic wrenches.

**Track** - this mode has no memory at all. When the load is removed the display will return to zero.

Track is used for calibrating the device itself or for monitoring a fluctuating torque.

### Resolution

The smallest measurement interval that can be determined on the indicating device.

This applies to analogue and digital devices.

### Number of Digits

Digital displays are described as having a certain number of 'digits' or 'active digits'.

Half digits can be used to increase the resolution of a device without the expense of going to an additional full active digit.

Eg 1. 1000 N.m displayed on a 4 digit system would read 1000 (resolution = 1 N.m).

Eg 2. 1000 N.m displayed on a 4½ digit system would read 1000.0 (resolution = 0.1 N.m).

Active digits change as the torque changes. Non active digits only assist in showing the magnitude of the torque. For example, 10,000 N.m requires 5 digits to display its magnitude.

Eg 3. With 4 active digits (and 1 passive digit), 10,000 N.m would change in steps of 10 N.m.

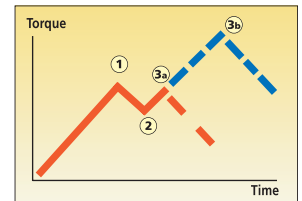
Eg 4. With 4½ or 5 active digits, 10,000 N.m would change in steps of 1 N.m.

### Signal Processing

Electronic Circuitry falls broadly into two types, analogue and digital, with most electronic measurement systems comprising a mixture of the two. There are also whole analogue electronic systems, but these are rare in torque measurement. Most systems start with an analogue signal. The point at which the signal is converted defines the type.

Analogue systems – one in which the signal is processed before being converted to digital.

Digital systems – the original analogue signal is converted to digital before processing.



- 1 = Torque wrench activates
- 2 = 'Click' heard
- 3a = Wrench released quickly
- 3b = Wrench released slowly