Default software configuration explained

There are two sets of configuration within the software which alter the TEOM measurements reported:

1. U.S. EPA Correction Constants A and B

These constants are an offset and multiplication factor respectively:

$$TEOM = A + B \times RawTEOM$$

Which, in the default configuration is:

$$TEOM = 3.0 \ \mu g \ m^{-3} + 1.03 \times RawTEOM$$

These factors were derived from collocation tests between the TEOM and the U.S. reference method in 1989-90 and their application is required for the TEOM to fulfil its U.S EPA Equivalence Criteria.

To enable the VCM to be applied correctly, these factors (either default or user specified) need to be mathematically removed from the measurements.

2. Reporting measurements to standard temperature and pressure

In its default software configuration, the TEOM reports measurements at the U.S. EPA standard temperature and pressure (25 ⁰C and 1013 mbar respectively), as opposed to ambient temperature and pressure required by the EU. This was a requirement of the U.S. EPA at the time when the TEOM was originally designed; this has been superseded but is still the default configuration in the TEOM software. To enable the VCM to be applied the TEOM measurements must be reported to ambient temperature and pressure. This can be achieved by recalculating the TEOM measurements using ambient temperature and pressure from the measurement period. These meteorological measurements can be sourced from within our database or supplied by the user. This is done using the following equation:

$$TEOM \ (ambient) = TEOM \ (U.S.EPA) \times \left(\frac{Ambient \ Pressure}{1013} \right) \times \left(\frac{298}{Ambient \ Temperature(K)} \right)$$

In practice UK temperatures are generally below 25 °C, atmospheric pressure does not vary substantially from 1013 mbar; temperature therefore has the dominant impact here. The percentage impact that the difference between ambient temperature and 25 °C (ΔT) has on the ambient PM_{10} measurements has can be seen in the above equation ($\Delta T/298$). Therefore, if we assume that your ambient temperature is 5 °C, $\Delta T/298$ = 298/20 = 6.7%. When your TEOM reports 50 $\mu g \ m^{-3}$ (reported at 25 °C and 1013 mbar), the concentration at 5 °C and 1013 mbar would be 53.35 $\mu g \ m^{-3}$.