Technical Help
Plant Moisture Systems

Measuring very low pressures

In Skye's range of Plant Moisture Systems the dial gauges offer a good low cost alternative to the digital versions but their limitations must be understood. This is mainly that the dial gauges have a lower measurement resolution than the electronic pressure transducers.

The resolution of the Skye SKPM 1405 series analogue systems is 2 bar, which is 1 division of the dial gauge. If higher resolution measurements are required, Skye recommend the use of the SKPM 1400 series digital readout systems. These give resolutions of 0.01 Bar for the 0 to 20 Bar range and 0.1
Bar above 20 Bar.

Dial gauges use a mechanical mechanism which has a certain "inertia" to register small changes in pressure, hence they are far better at registering larger pressure deviations than small changes. The electronic transducer does not have such mechanical effects and so the digital systems will be more accurate at lower pressures than the analogue dial gauge systems.

During the manufacture and calibration of dial gauges, the needle position in the rest or 'zero pressure being applied' position is set to give the best accuracy over the whole measurement range. It is possible that this position may lay in between the 0 and 1 Bar divisions in some instruments, but it is not necessary to adjust the measurements taken at higher readings to account for the apparent "zero offset". It is also common for some manufacturer's gauges to have the first division missing or condensed, or just a blackened segment to indicate a zero range. These effects may make it difficult to take accurate measurements at very low pressures, so it is best scientific practice to use a dial gauge about its mid scale and tap the glass of the gauge to "settle" the needle before and after each pressure change.

The digital display for the electronic transducer can be set to zero for each measurement using the control on the front panel. The zero point may change according to the local temperature and it is best practice to check and reset to zero if necessary after each measurement. We advise the slow release of pressure from the system to limit thermal gradients within the system not just for safety reasons!

It is Skye's normal calibration procedure to set the Plant Moisture Systems for best accuracy around 20 bar (half full range) and 40 bar (full range). The accuracy of the analogue system below 4 bar (just 10% of the full range) cannot be guaranteed due to the "inertia" effects of the mechanical dial gauge as described above.

This mechanical effect is not present in the electronic pressure transducer system which has no such problems measuring down at the lowest pressures. The biggest possible source of error at low pressures will be the set point of the zero offset. It is advised to keep the system (and gas) at a stabilised temperature if possible, and increase and decrease pressure slowly to limit cooling effects. Adjust the zero at the start of each measurement and note any zero change at the end of the measurement. An average of the zero offset at the start and end of each measurement may be necessary to improve measurement accuracy.

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Skye Instruments Ltd
21, Ddole Enterprise Park, Llandrindod Wells
Powys LD1 6DF, United Kingdom

TEL +44 (0)1597 824811
FAX +44 (0)1597 824812

EMAIL skyemail@skyeinstruments.com
WEB http://www.skyeinstruments.com