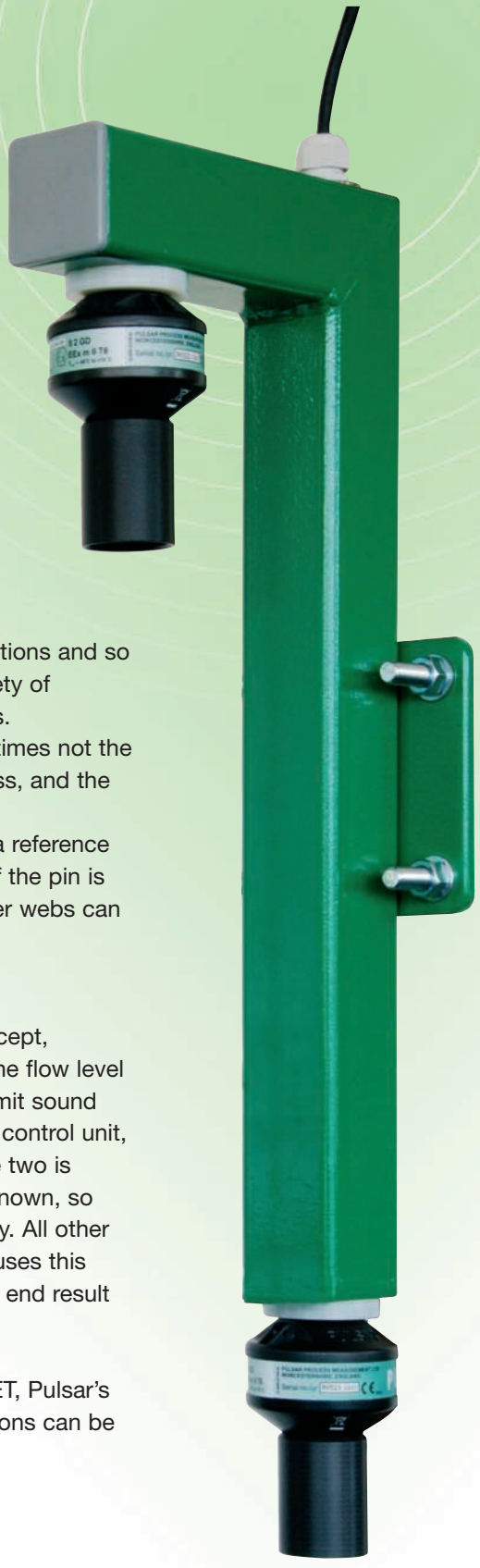
Technical Update

Pulsar DUET – bringing harmony to open channel flow measurement

PULSAR
Process Measurement



Pulsar Process Measurement Ltd celebrate their tenth anniversary with a completely new take on non-contacting ultrasonic open channel flow measurement. Pulsar's DUET takes the technology to a new level of accuracy for this critical measurement with the use of two transducers working in harmony.

Limitations to Accuracy

There has always been a limitation to OCM accuracy, which is that the ultrasonic measurement depends upon the speed of sound, which varies depending upon the density of the air through which the sound is travelling, which in turn depends upon the air temperature. This is such a fundamental effect that some manufacturers avoid the issue altogether by quoting accuracy figures that can only be achieved in the lab.

When one considers the variations in temperature; from changes in water temperature in the channel, the angle of the sun changing the temperature through the day and night, solar radiated heat, seasonal variations and so on, the complications and the potential inaccuracies become clear. A variety of techniques have been employed to compensate for temperature variations. Temperature sensors are used, but the temperature at the sensor is sometimes not the same as in the measurement channel. Temperature sensors also have mass, and the thermal mass effect creates a lag in temperature measurement, affecting compensation accuracy. The other technique generally in use is to install a reference pin that provides an echo from a known point. Results can be very good if the pin is spotless, but contamination from immersion, from ice and even from spider webs can ruin the accuracy of the measurement.

DUET – a new measurement concept

Pulsar's DUET (Double Ultrasonic Echo Tracking) is a completely new concept, employing two separate transducers mounted at different heights above the flow level within the normal Primary Measurement Device (PMD). The transducers emit sound pulses synchronously and the returning echoes are analysed in the Pulsar control unit, discriminating between the two signals so the time difference between the two is accurately measured. The distance between the two transducer faces is known, so the speed of sound at that moment can be calculated extremely accurately. All other effects, including temperature, are irrelevant. The Pulsar control unit then uses this knowledge to dynamically calculate the distance to the liquid surface. The end result – accuracy better than anything the industry has ever been able to offer.

No civil work, extra wiring or complex installation is required to install DUET, Pulsar's standard transducer range is used and best of all, existing Pulsar installations can be retrofitted with the new technology.

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Certificate No: 950136
Literature: TU/DUET R1 9 07