Heat meters—an introduction.

A **heat meter** is a device which measures thermal energy provided by a source or delivered to a sink, by measuring the flow rate of the heat transfer fluid and the change in its temperature (ΔT) between the outflow and return legs of the system. It is typically used in industrial plants for measuring boiler output and heat taken by process, and for district heating systems to measure the heat delivered to consumers.

It can be used to measure the heat output of say a heating boiler, or the cooling output from a chiller unit.

A heat meter is composed of three parts; a flow sensor, a matched temperature sensor pair, and a calculator (also known as an Integrator). The sum of the parts is a heat meter.

There are a number of different types of meters:

- *Complete* - the complete heat meter does not have separable sub-assemblies,
- *Combined* - this has three separable sub-assemblies: the flow sensor, the calculator and the temperature sensor pair or a combination of these, and
- *Hybrid meters* - like the combined meter, this has three separable sub-assemblies. The difference is that these are assembled for certification and its certification depends on the separate parts remaining combined.

The flow sensor can be: Mechanical, Ultrasonic or Electromagnetic. Each of these flow sensors has its own advantages and disadvantages.

Figure 1 A Typical Heat Meter

Flow meters are designed to operate at a nominal flowrate, and should be operated at or just below this flow for most of the time. This is referred to as **qp** which is defined as the highest flowrate that is permitted permanently for the heat meter to function correctly.

Flow meters will typically be capable of operating at twice qp for short periods of time. This is referred to as **qs** the highest flowrate that is permitted for short periods of time for the meter to function correctly.

Flow meters can operate at lower flows than the nominal flow. The lowest flowrate that is permitted for the meter to function correctly is referred to as **qi**. Some meters will operate at flowrates below qi but will be outside their calibration range.
The ratio between qp and qi, referred to as the turn down ratio, can be as high as 100:1 but may be as low as 30:1.

Pipe size does not always accurately reflect the correct meter to choose, flow rate is more important.

Heat Meter accuracy

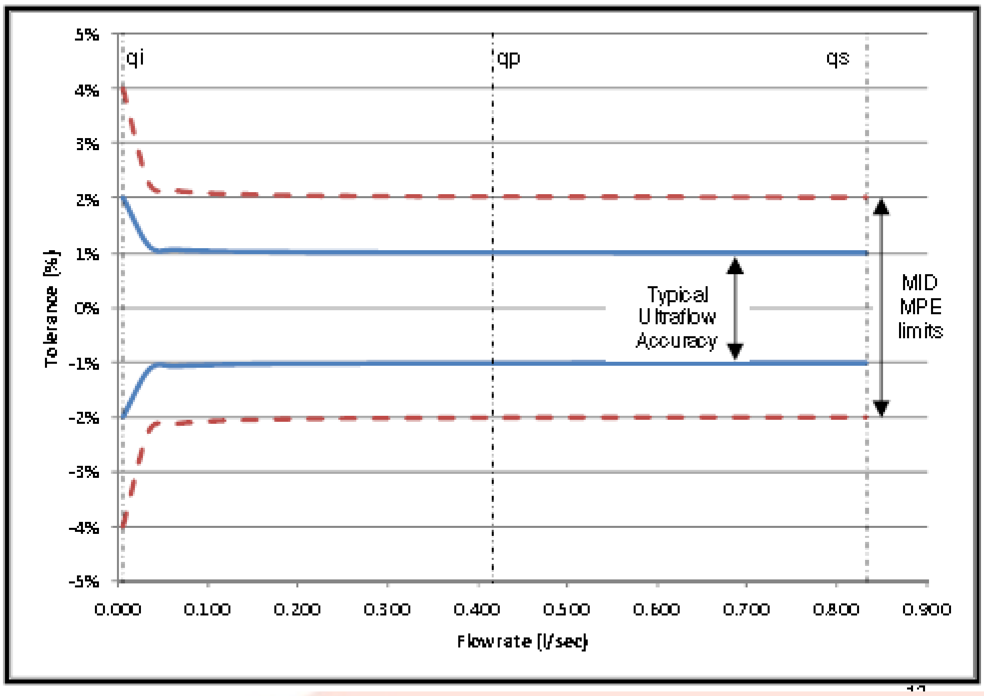

Figure 2 Typical Flowmeter accuracy

As the heat meter operates at its low end of operation the accuracy of the meter reduces and hence it is important to size the meter correctly and as close to the qp point as possible.

Communications.

Heat meters can have various options in how the information is transferred from the meter to elsewhere. This can simply be a display on the unit itself or a full wired communication system. Kensa can offer three different types of communication :-

1) Local display— In built display on the heat meter which allows local reading of the amount of heat produced.
2) M-Bus communications— A two wire signal cable can be used to connect each heat meter together and back to a central unit. This central unit can be configured to text, e-mail or upload meter readings to a website. The central unit can accept up to 8 heat meters. If the number of meters is larger than this an additional expansion model is required. The system also needs to be within an area where a mobile signal can be obtained.
3) Wireless—Readings from wireless units can simply be obtained when a receiving unit passes close by. This is usually by means of a USB stick connected to a power supply or laptop. The readings can simply then be downloaded to the laptop. It does involve the receiving unit being in the vicinity of the heat meter, for example someone carrying the receiving unit and walking by the installation.