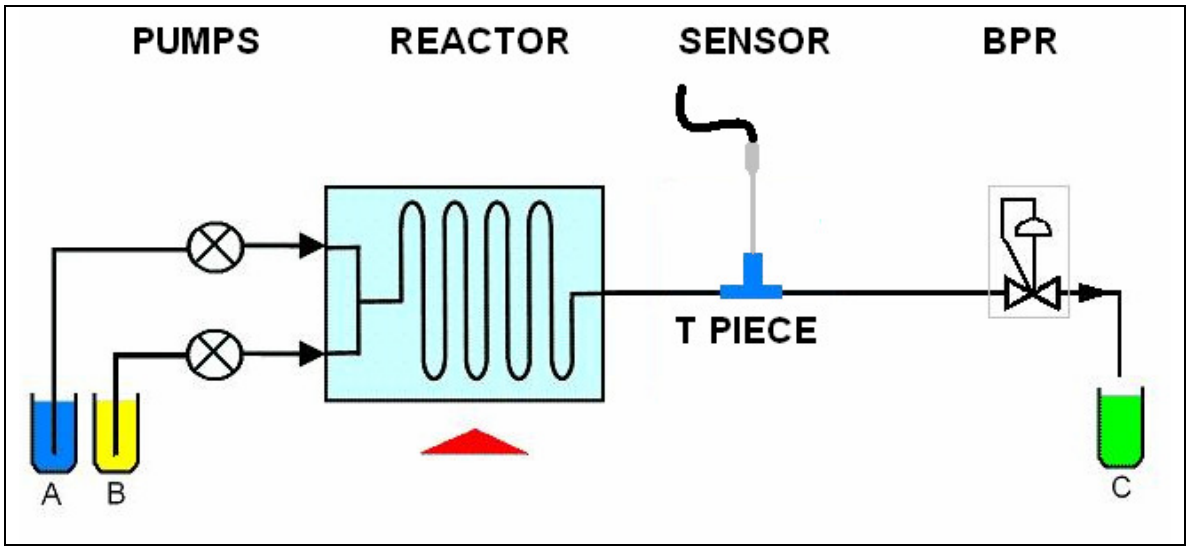
Controlled Temperature Sensor Manifold

Background

Increasingly there is a requirement to use online measurement (IR, UV, Raman) with flow chemistry systems, usually after the reaction products leave the main reactor system. This may be used for quality control during a long run, as part of a reaction optimisation process, or for determining when to start collecting a peak.

It is attractive to utilise existing investment in sensing technologies by simply inserting a probe (as used to monitor batch reactions) into a tee piece placed in line with the flow reactor (see below).



The Problem

However, there are sometimes issues with using a sensor in this way, related to temperature.

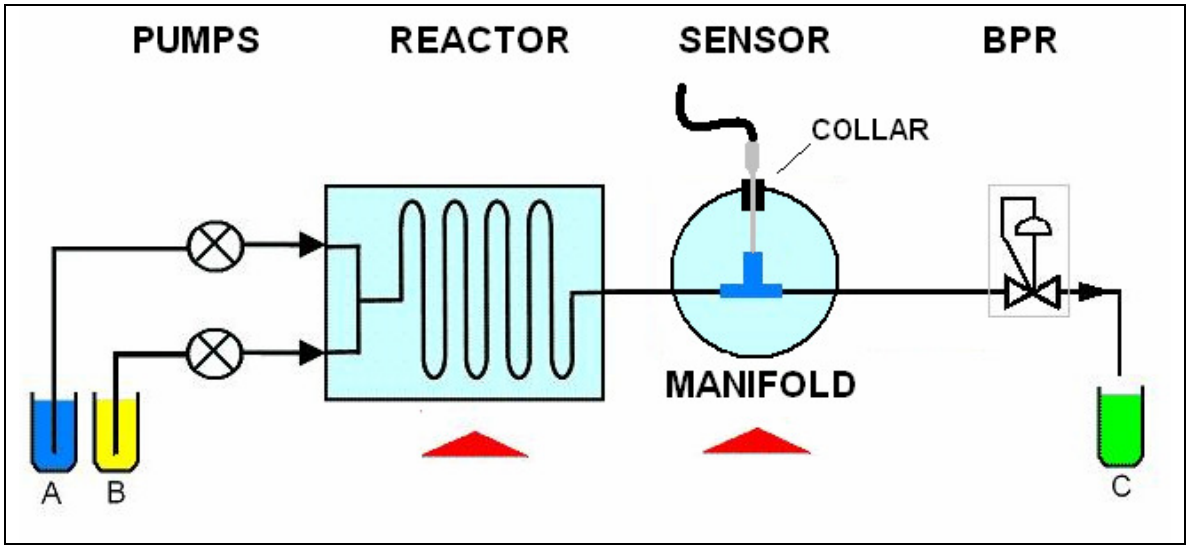
One problem is that the presence of the sensor in the flow can cause local cooling, In the case of a hot, saturated product stream, this can cause undesirable precipitation.

Another problem is that the sensor itself may require a stable temperature if it is to operate in a consistent fashion, and the presence of a reagent stream at various different temperatures (as a sequence of reaction parameters are investigated) will prevent that stabilisation.

The Solution

What is required is some means of keeping the sensor in a stable temperature environment.

This is exactly what the new Vapourtec sensor manifold offers.



Simple but Effective – Forced Convection Heating

The Vapourtec reaction temperature control system is simple but effective. Each reactor is housed inside an insulated glass manifold (right). The gas inside the manifold is rapidly circulated and heated or cooled according to the desired reactor temperature (depending on the reactor type, from -70°C to + 250°C)

The R4 reactor heater (below) can accept up to 4 of these reactor manifolds and control each one at a different temperature. Manifolds can be clicked into place in seconds with no tools required.

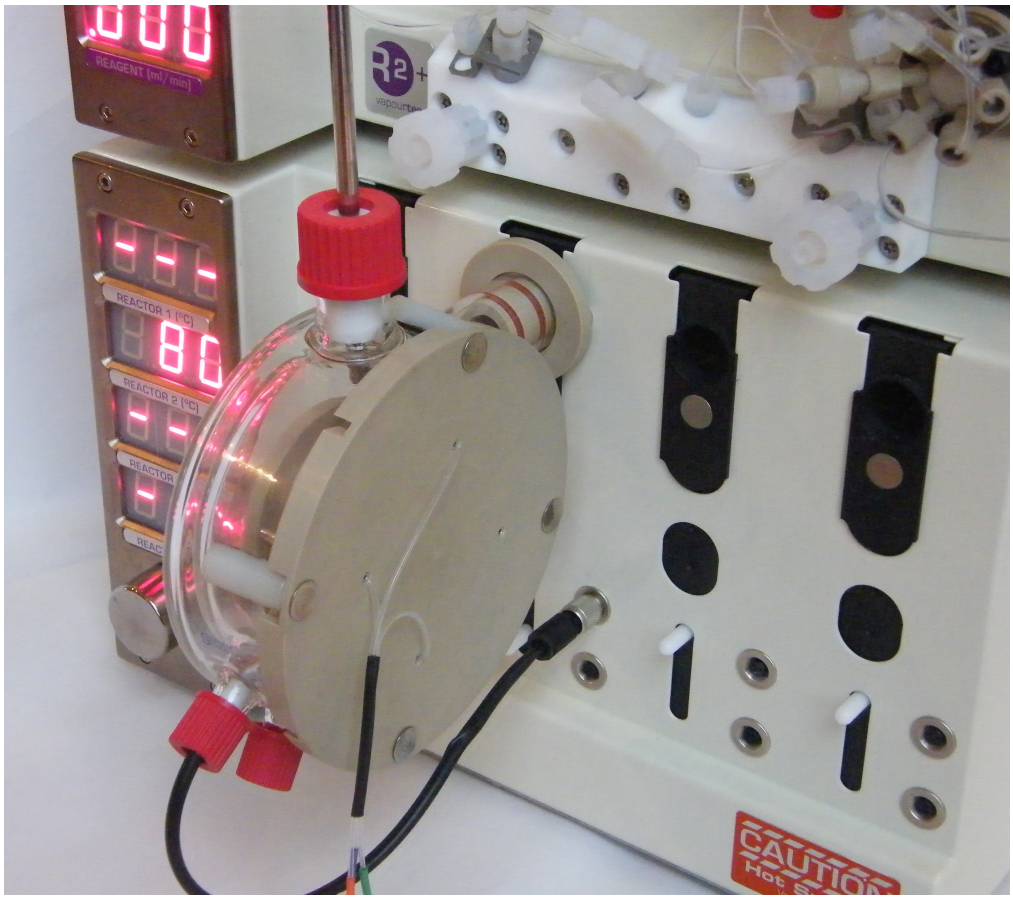
The beauty of this design is that no conductive physical contact need be made with the reactor and the whole reactor is kept at a uniform temperature, while affording full visibility at all times. This avoids physical stress points and temperature hotspots.

The new Vapourtec sensor manifold works in exactly the same way.

Just like a reactor manifold, it has an inlet and an outlet for the reagent flow, and a port for the controlling temperature probe.

There is also a port for the sensor probe itself, with a collar that clamps onto the probe shaft. The working end of the probe and the T piece through which the flow travels are then all contained within a closed environment of rapidly circulating air, at a tightly controlled temperature.

Just like a standard reactor manifold, the new sensor manifold snaps straight onto the R4 and can be used in any of the 4 reactor positions. And the required temperature is set on the R4 front panel (or via the FlowCommander software) just like a reactor.



Sensor manifold in place on R4, shown with probe fitted (top)

FAQ

Q **Is this compatible with my older R4 ?**
A The sensor manifold is compatible with every R4, from the very first one ever built.

Q **What size collars are available for mounting the probe shaft ?**
A Currently either ¼", 12 mm or ½" diameter probes can be accommodated. Please contact Vapourtec with any special requirements.

Q **What sensors is it compatible with ?**
A Any reaction monitoring technology utilizing probes, providing that
- the sensor (probe) and T piece can be fitted within a space 45 mm x 100 mm diameter
- the cable or probe can be taken out through a 13 mm port with a suitable seal collar (a range of collar sizes are available)

Q **What temperature range can the sensor be controlled at ?**
A Ambient to 150^{o}C

Q **I need to control my sensor at below ambient conditions. Can you help ?**
A This is possible but non standard. Contact Vapourtec for details.

Q **How accurately is the environment within the manifold controlled ?**
A +/- 1 ^{o}C

Q **When is this item available ?**
A 1st February 2011

Q **How much does it cost ?**
A Please Contact Vapourtec.