Affordable 'Hot and Dry' Reactors For LENR Research.

ALAN SMITH, RUSS GEORGE. OCTOBER 2018.

The Tube Furnace Rationale.

A basic tube furnace can be engineered to create multiple carefully calibrated and closely matched LENR test reactors.

1. Simple ‘in house’ construction means that reactor designs cam be tailored to suit different experimental requirements.

3. Economy alone is not useful, accuracy and discrimination is.

4. Care with assembly and design means that anomalous heat can be detected at levels as low as 2W, and low density walls make particle emissions easier to detect.


ALICE
240V
BOB
CHUCK
240V
240 BUS
EDWARD
FRANK
GROUCHO
42

Design Philosophy and Criteria

- A low-cost system makes multiple reactors affordable.
- More reactors means faster candidate fuel testing.
- In-house rapid build means no waiting for engineering.
- Low unit price need not mean poor quality data.
- System to run reliably for weeks or months at any temperature between 200 and 1200c.
- High-current low-voltage heaters offer good user safety.

The starting point – Class 26 Firebricks

Foamed alumina cement. Around $8 each.

Lightweight, easy to cut, drill, glue and shape, with – because they are foamed - good insulating properties.

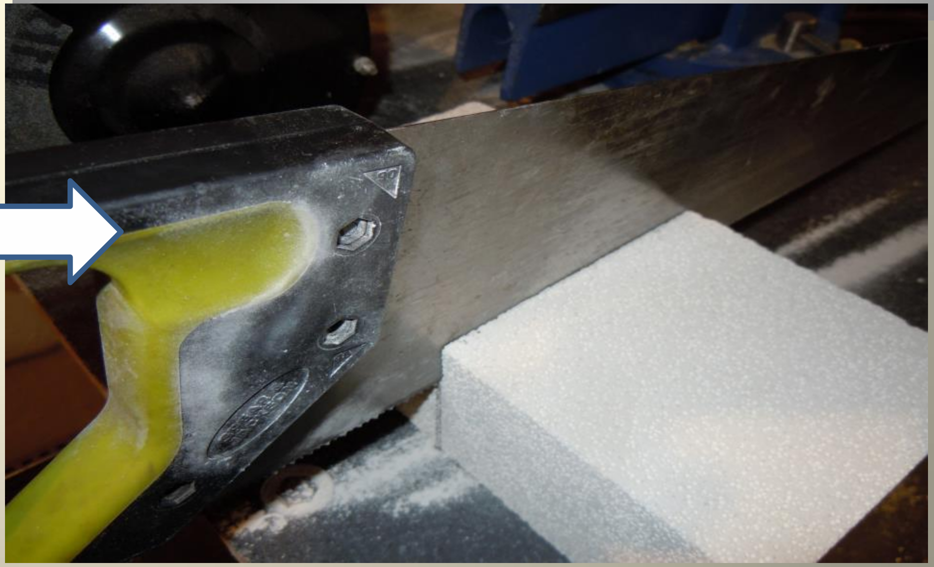
Service temperature up to 1350C

Size 225x112x75mm

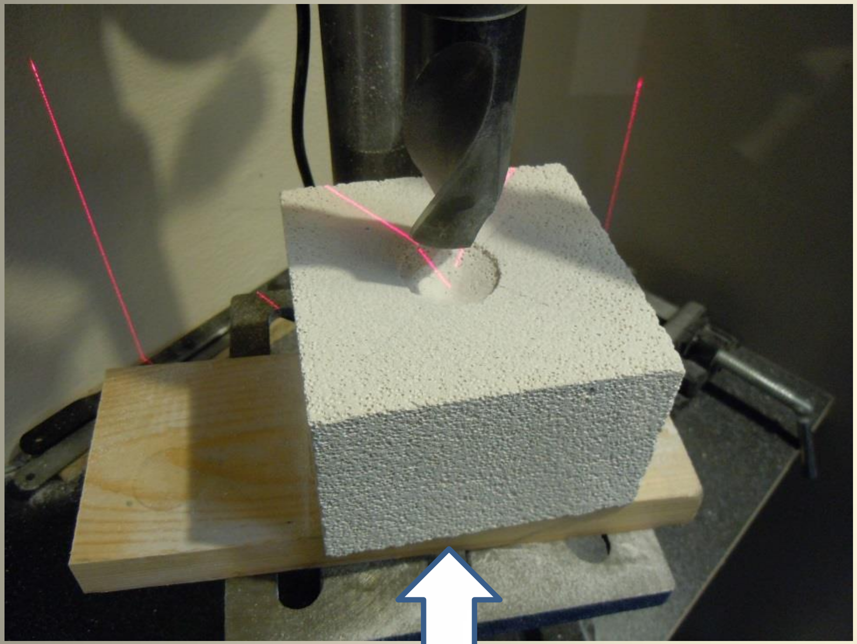
The bricks are cut to size with hand tools, power tools make too much dust.

Although the bricks are soft the dust is very abrasive .

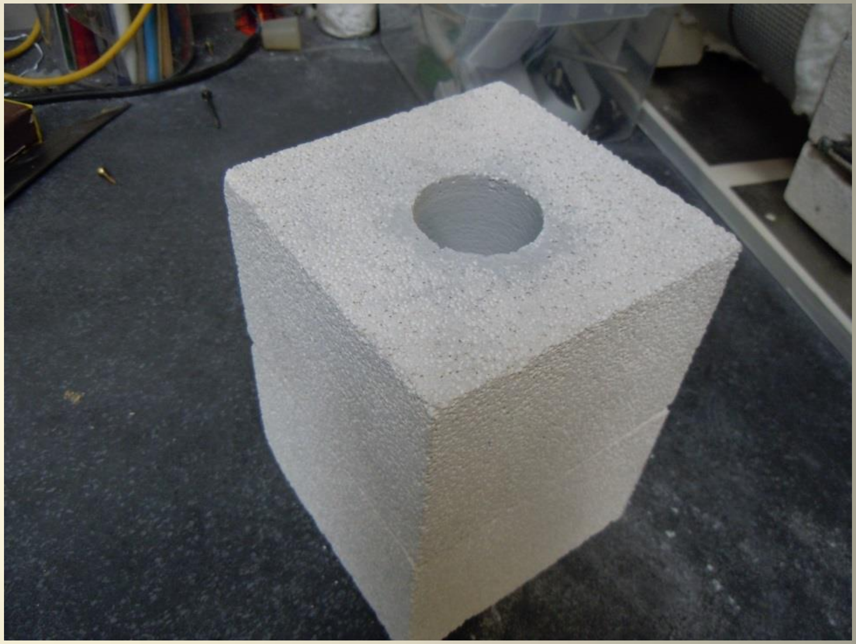
Use dust and eye protection since the bricks contain dangerous silica particles.



Boring!

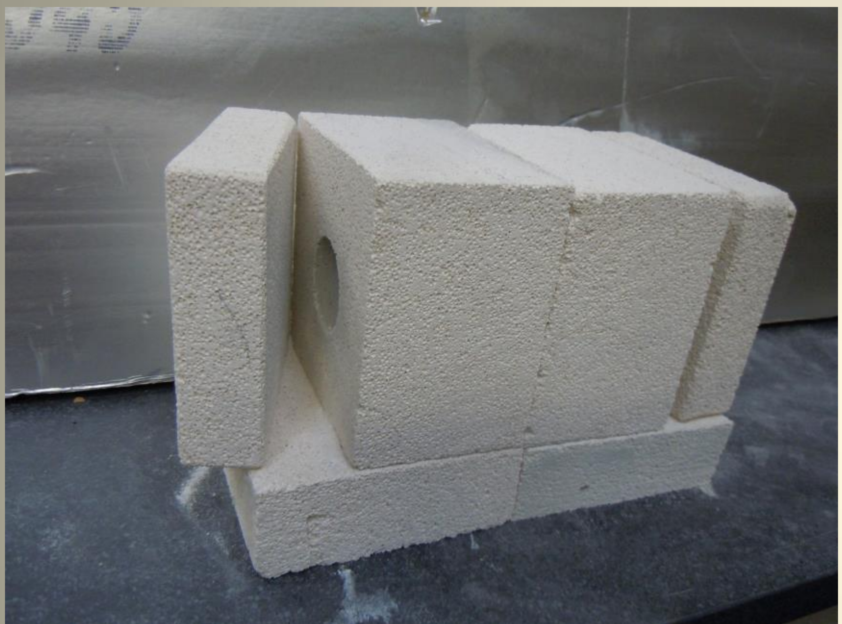


The bricks are cut into two halves and each half bored to accept the quartz tube liner and coil unit.



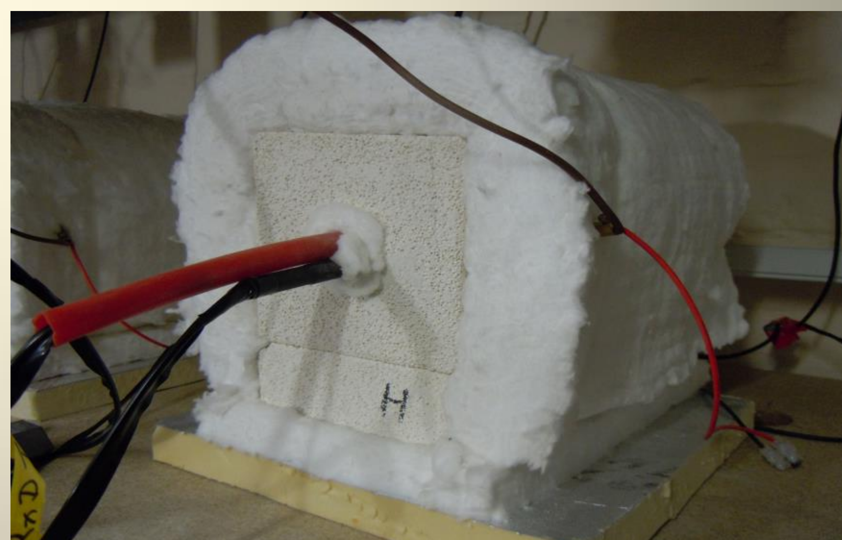
The two bored halves are cemented together using a mix of waterglass zinc oxide and magnesium oxide.

The Basic Furnace



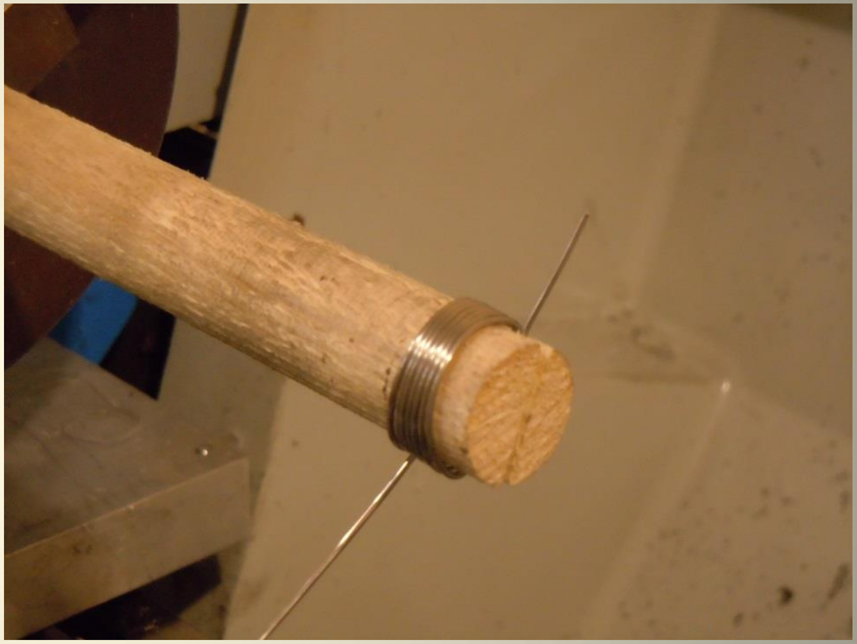
The furnace body is completed by cutting 4x 35mm thick slices from half-bricks, two for the base, one for the removable door and one for the fixed back panel.

The final task is to insert the heater coil ensuring that there is enough Kanthal wire exposed to connect to the heating controller. The whole is wrapped in 50mm ceramic wool insulation, and sits on a 25mm pad of wool and another of aluminium foil/foamed urethane.



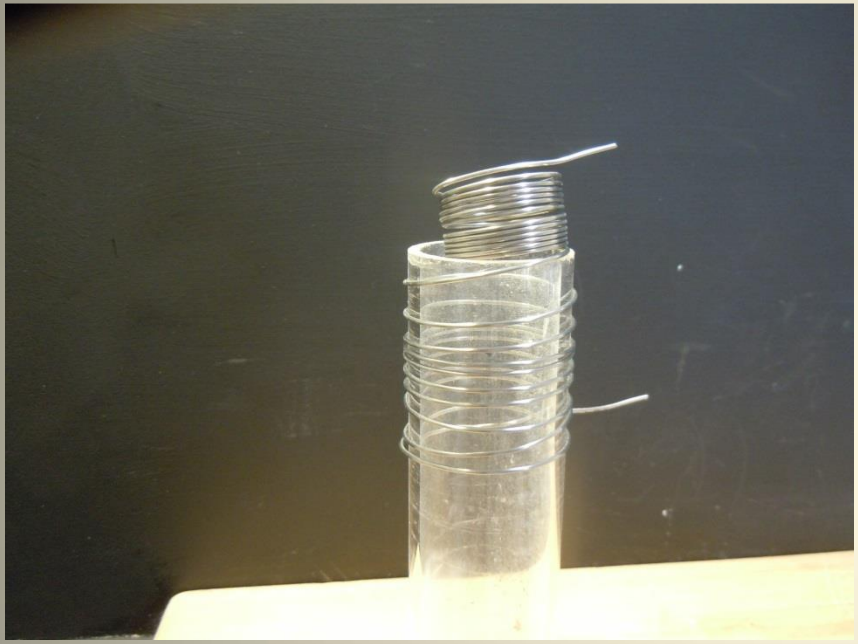
Making the Heaters

Heater Coils are made from 1mm diameter Kanthal wire 2.4M long. Kanthal is Ni-Cr-Al and has well known resistance characteristics.



Coils are easy to wind by hand
We use an undersize wooden mandrel, in this case 25mm.
Coil material cost $1 approx.

Making the tube heaters



The 25mm. coil is coaxed onto a 40 x150mm quartz tube. The diameter difference ensures the heater coil is In good thermal contact with the quartz along its whole length

- Finished coil and tube

Command and Control

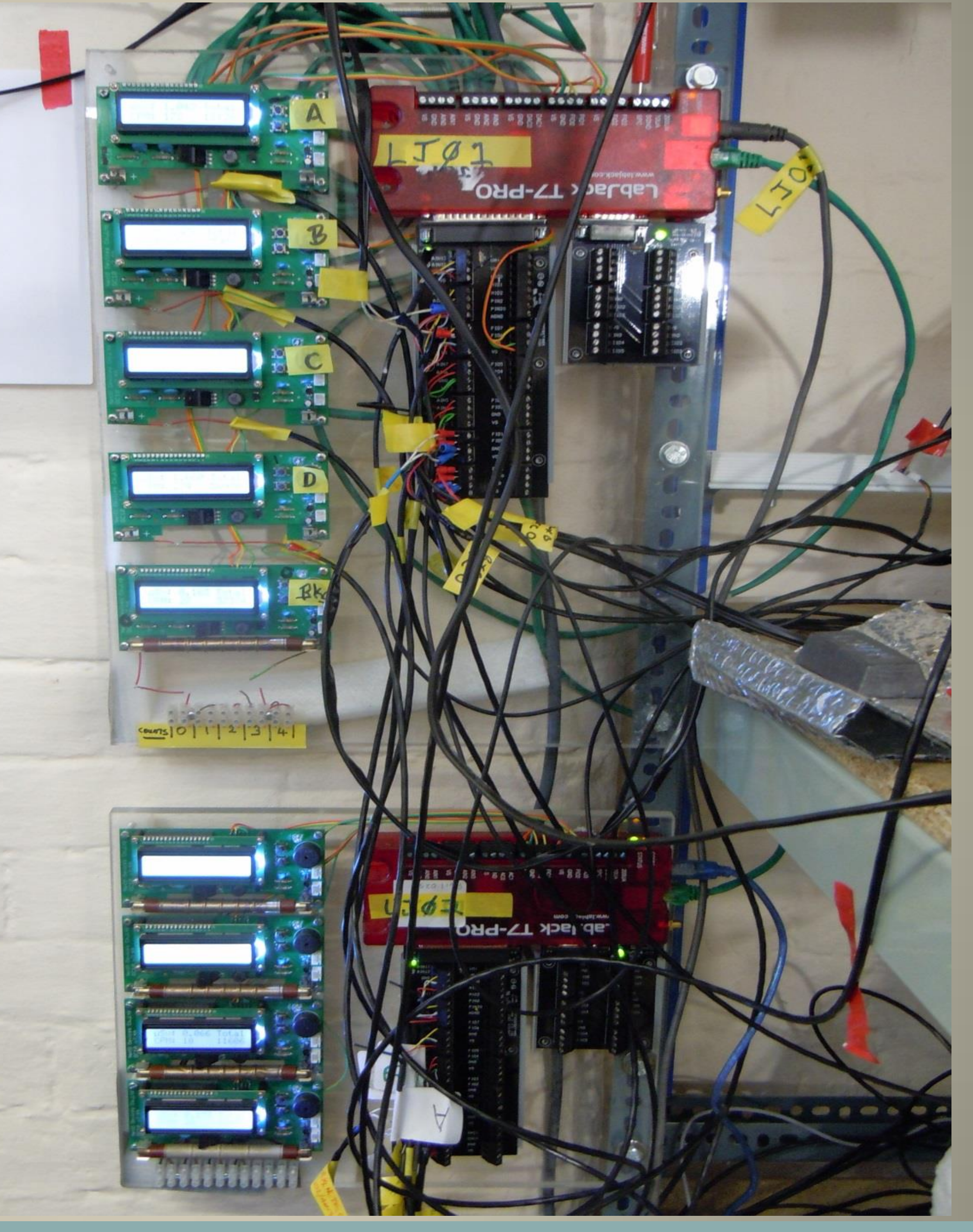
CONTROL ELEMENTS

Temperature control is by PID feedback system, which when correctly programmed holds system temperature to very close tolerances. K-type tc's are used in ceramic thermowells.

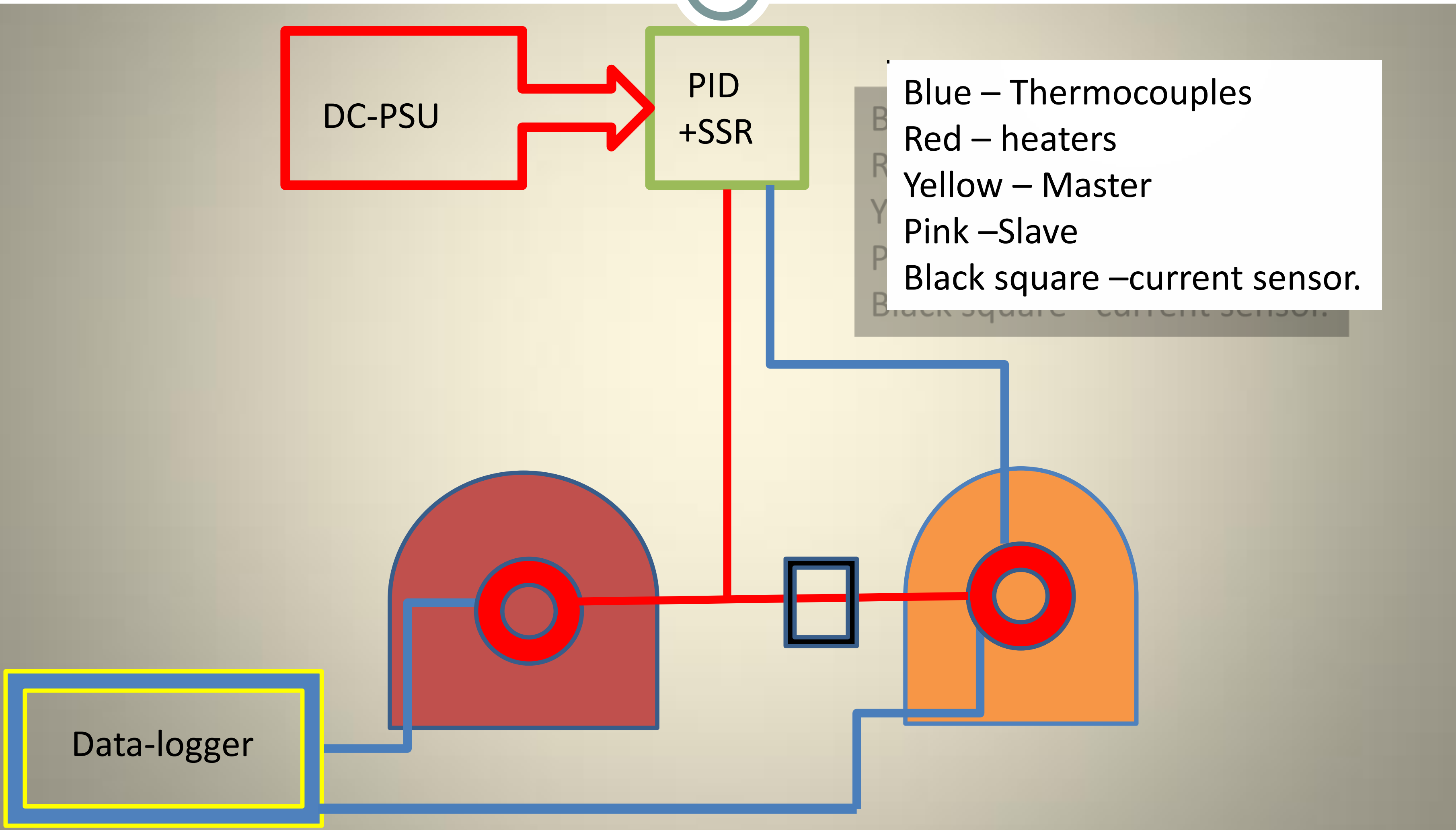
The PID acts as master switch for a solid-state relay (SSR) which switches the heater coil current (40V10A DC) on/off. The system runs on a 2 second loop.

This is the data logger cluster for the 8 reactor bank - every reactor feeds it two thermocouple readings, heater current reading and Geiger-counter data. Add in ambient temperature and background Geiger count and we have 34 channels reading once every second.

We are using Labjack T-7 Pro systems here, with expansion boards. We did have the option of using NI FP2000 systems as we have 2 full suites, but we find the Labjack superior in terms of ease of use, programming, and the number and variety of input types they offer. And much less costly.



Master and Slave.



Master and Slave

These systems are of interest. Starting with a closely matched and calibrated pair of reactors, only one is directly controlled by the PID/thermocouple, which via one relay supplies the same amount of current to both heaters. One reactor is used as ‘test’, the other as ‘control.’

When the PID-regulated master reactor holds good fuel any XSH produced will reduce the heater current requirement This will cause the temperature of the slaved reactor to drop, as it will not get sufficient current to hold its temperature.

This is just one of several methods we have devised to extract quantitative data about XSH using only thermometrics.

THANK YOU FOR WATCHING.

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The Ineffable Research Team