Searching for the Secrets of the E-Cat QX

By

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Since the first Rossi-Gullström paper, further called R-G paper, I have felt uncomfortable with some details in it. Recently after the next paper was published and following discussions here on ECW and with Andrea Rossi I became increasingly concerned and I studied the worrying details more. I collected my thoughts in this assay and I hope that in discussions here on ECW we come to a consensus.

So where is it all about? Just for you to know that I am an experienced chartered electrical engineer. When both R-G papers explicitly state that 'input energy' is measured over an external resistor of 1 ohm and equal to the energy dissipated into this resistor, then this statement feels very uncomfortable for everyone that has studied electro technology. I use the second R-G paper to further explore this.

These are the statements:

1. *"The circuit of the apparatus consists of a power source supplying direct current, a 1-Ohm resistor load, and a reactor containing two nickel rods with LiAlH4 separated by 1.5 cm of space.*
   Measurements:
   During the test, a direct current was switched on and off. When the current was switched on, a plasma was seen flowing between the two nickel rods. The current was running through the plasma but the plasma was found to be charge-neutral from a Van de Graaff test. This implies that the plasma has an equal amount of positive ions flying in the direction of the current and negative ions(electrons) in the opposite direction.
   Input: 0.105 V of direct current over a 1 Ohm resistance."

I am not sure what a 'charge neutral' current means in physical terms, but the maybe authors covertly say that the plasma has no resistance?
The output of the reactor is calculated on page 18 is with the 'Boltzmann's equation'.
(Should be with 'Stefan Boltzmann Law').
It continues with the experiment in the heat exchanger:

2. *The system is displayed in figure 5. In the figure, the yellow thermometer measures the temperature of the oil inside the heat exchanger. In the left in the figure there is two voltmeters that measure the mV of the current passing through the 1 Ohm brown resistance.*
   Calculations of the calorimetry made by the heat exchanger:
   efficiency of the heat exchanger:10%
   Primary heat exchange fluid: lubricant oil (Shell mineral oil)
   Characteristics of the lubricant oil: D = 0.9 Specific Heat: 0.5
   Calorimetric data of the fluid: 0,5 Kcal/h = 0.57 Wh/h
   Flow heating: 1.58 C / 1.8" x 11 g
   Resulting rating: ***20 Wh/h***
   Energy input: V=0.1 R=1 Ohm→W=0.01
   The COP of the system with the calorimetric measurement is substantially conciliable with the measurements made by the Wien's equation and the Boltzmann equation.

I am not sure why Andrea now suddenly uses the Wh/h as an end result for the output power. It's just Watt, power. Maybe because it is an average over an hour period, but I do not think that 20 Watt and 244.9 Watt are 'conciliable' = compatible, when the two power output values are compared. But that is not what Andrea says. He compares the COP's of both calculations.
The COP is not found as a value in these R-G papers. I am sure that is done deliberately. **Andrea knows very well that the 'input power' mentioned is the power dissipated in the resistor and not the input power of the reactor**.
I have been trying to find out what the voltmeters exactly measure, by studying figure 5:

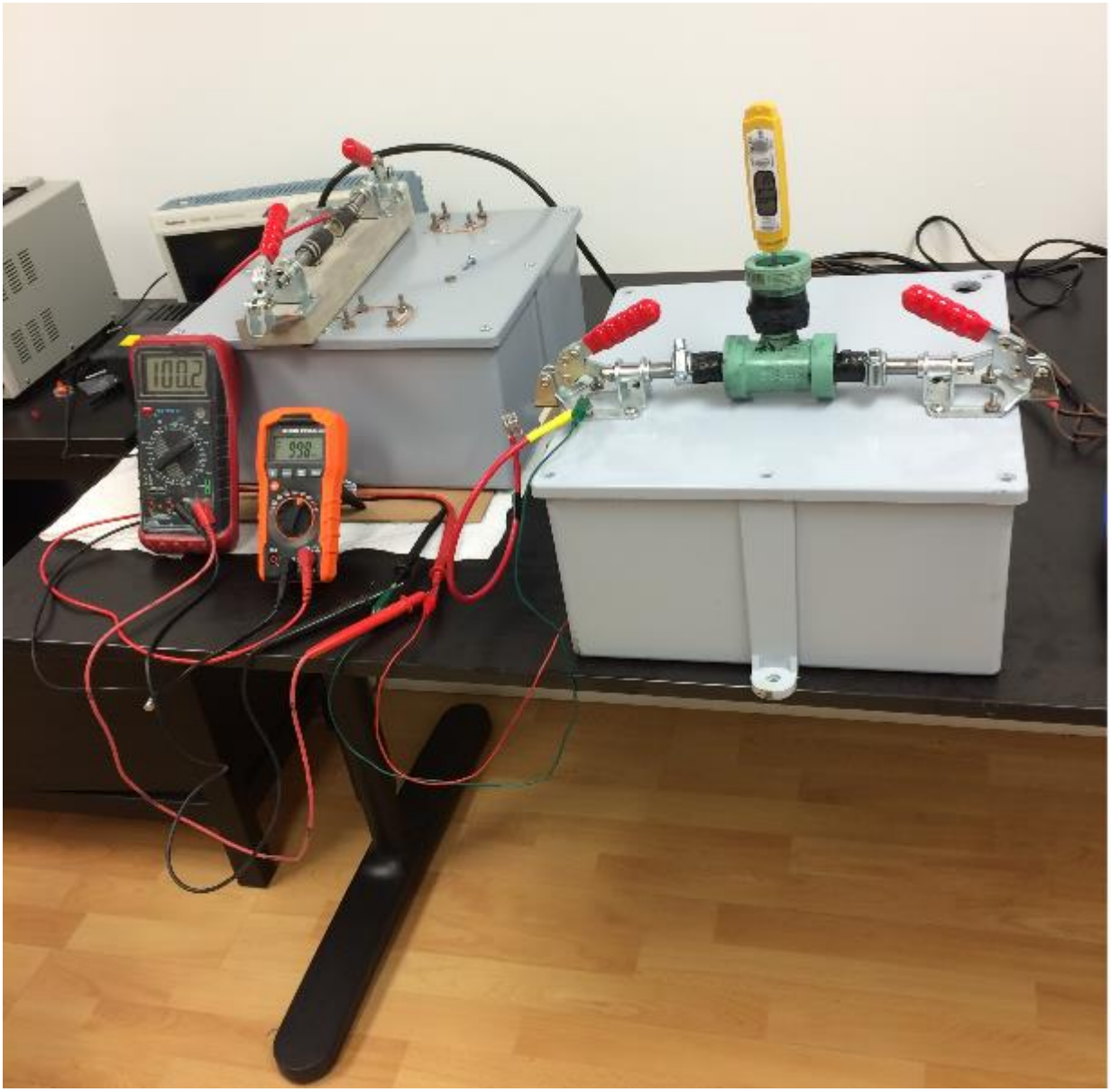

Figure 5 shows the measurement set-up for the E-cat QX

You can see that the green wire with alligator clips is connected to the left side of the reactor and the other side is holding the two black meter pins together. The red wire with the alligator clips is at one side connected to the red meter pins but where it runs to is unclear. According to the paper it is connected to the 1 ohm (brown) resistor on the left box. I believe that everything is deliberately arranged and pictured in such a way that it cannot be determined how things are exactly connected to each other.

Recently, among some questions I recommended Andrea to measure the input power at the mains side of the reactor controller for the sake of accuracy and credibility. Andrea left that comment out. He obviously does not want to discuss this. A Question about the power of the controller (Frank Acland , August 3rd) were left unanswered. Detailed questions by Mark (August 4th) and myself (July 29th and 24th) are replied as 'confidential'. I do not mind Andrea saying this, it is his perfect right, but this all intrigues me.

A question of Mario Marini (August 4th) and Andrea's answer made me decide to write this essay:

> *"Dr Andrea Rossi:*
> *Looking at the paper Gullstrom Rossi I understand you measured the wattage across the 1 Ohm resistance to determine the wattage in the circuit, based on the rule of the circuit with two resistances of which one has a known value in Ohm, the other has not. I learned this at the school of electrotecnics: when a circuit is made by a power source and 2 reasistances, to know how much is the energy in the circuit you can measure the voltage across a resistance with well known ohms and get the amps from the ohm's equation. Multiplying V x A you know the amount of energy in the circuit, less the dissipation caused by the resistance.*
> *Am I correct?*
> *Mario"*
>
> *Andrea's answer: "Exactly"*

If Andrea understands what he is saying and that he has sufficient knowledge of electrical circuits and if a circuit looks like this (as we all have been assuming)....:

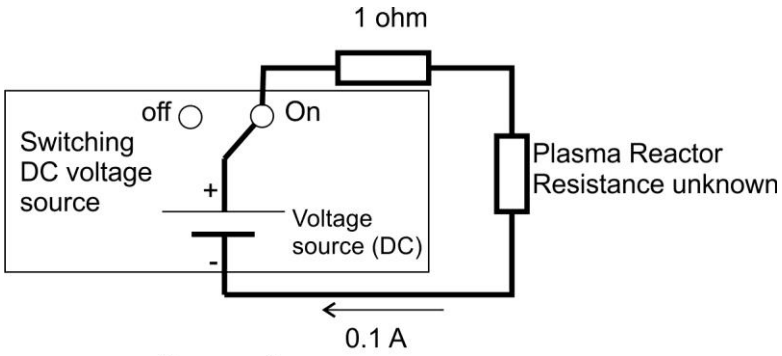

Diagram 1

.... then it is impossible to calculate what power the reactor consumes, because both the reactor resistance and the voltage of the voltage source is unknown. This is where this is all about and why I was concerned.

So the situation must be different, let's try to find out which of the diagrams below suits Andrea's answers.

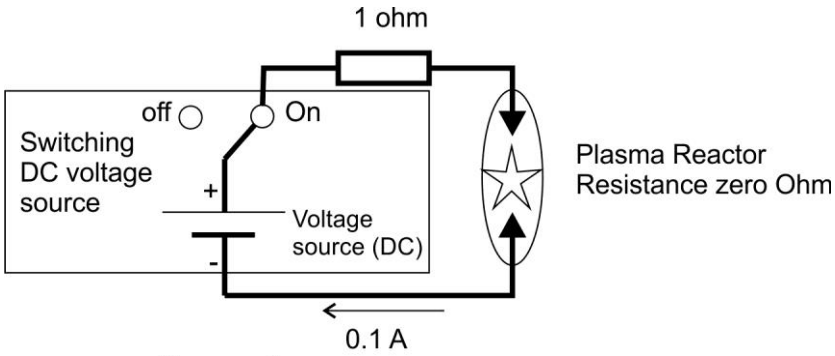

Diagram 2

Remarks:
A plasma resistance of **zero Ohm** could imply that it is **super conductin**g. A resistor of 1 Ohm is needed to limit the current.
(BTW: There are indications that local super conduction may spread further over some materials in connection with it).

I have asked Andrea if the 1 Ohm resistor is part of the E-cat QX design. Answer: 'Confidential'.

The assumption of diagram 2 seems to be in agreement with some of the answers and comments I have seen from Andrea however, I am a bit uncomfortable with the low voltage of the DC source because only 0.1 Volt is needed and I think that is too low to start a plasma. So maybe it looks like this:

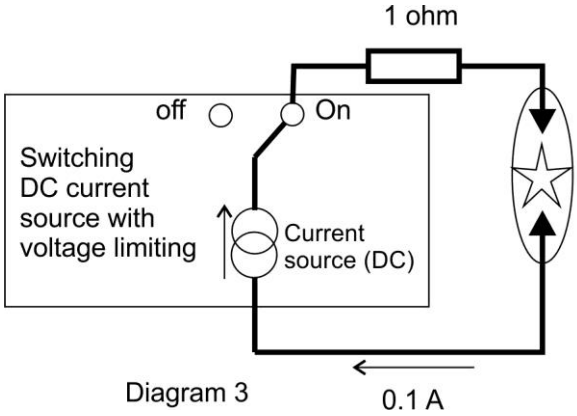

Diagram 3

Remark:
A perfect current source cannot be interrupted. Therefore you need a current source that is voltage limited.
A voltage source with current limiting would be similar.

So for starting the plasma the current source has always sufficient voltage. But where is the resistor needed for if the current source will limit the current to 0.1 Amp? Maybe just to measure the current and controlling the on-off switch?

As we were recently made aware of is that the QuarkX can have a Self-Sustaining Mode. This requires a bit more thought. Andrea has said the reactor runs during 2/3 of the time in Self Sustaining Mode. This means that while the switch is off the current still runs. That means the reactor acts like a current or voltage source with no internal resistance:

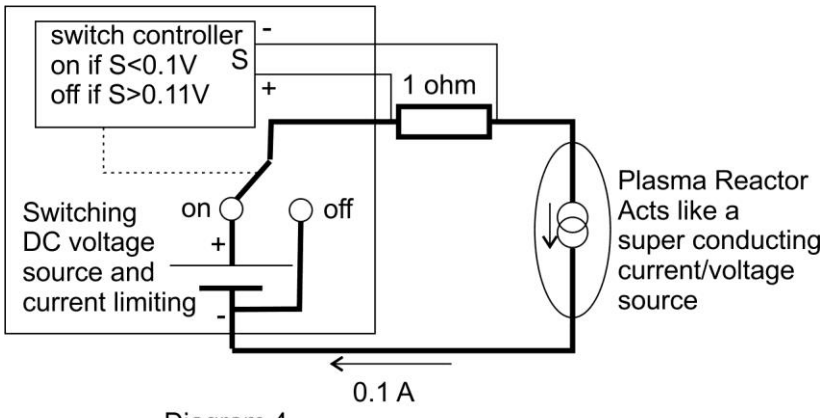

Diagram 4

Remark:
This 'super conducting' current/voltage source is more a combination of a voltage source and a current source it is not perfect in either way.
The current, generated by the reactor, needs to continue while the switch is off, to maintain the plasma. Therefore the loop is closed in the off position. The reactor is in SSM then.

Diagram 4 is my favourite and shows how the system may work. Obviously the resistor can be used for controlling the switch in all diagrams. I have just shown in this diagram how this may be done. The voltage over the plasma is 0.1V. I believe the resistor is needed for damping and keeping the plasma stable. I think this is in line with most of Andrea's comments. Only, if the reactor is an electrical power source, and the reactor in SSM, then the energy generated in the resistor is not an 'input' energy, but an 'output' energy of the reactor.

There is one more possibility. Assume the resistor is not in series, but in parallel with the reactor. Then it could look like what is drawn in diagram 5:

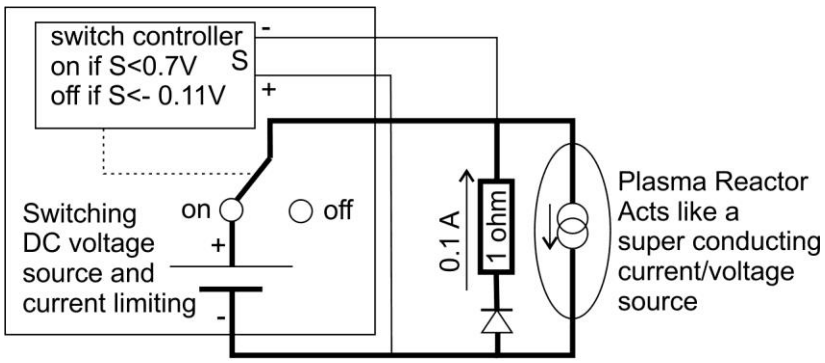

Diagram 5

Remark: The DC voltage needed to start may be a few hundred volt. Once in operation and maintaining the reactor in SSM, the DC voltage is maybe 0.11V maximum. This is also applies also for diagram 2 to 4.

The diode is added to avoid high currents through the resistor while starting. There is no evidence of a diode being used, though.

The diode can be omitted if Andrea has found another way to start the plasma like e.g. a high voltage electrostatic pulse. If that is the case, also this diagram (without diode) seems to comply with Andrea's comments and answers to questions.

When I consider diagram 4 and 5 I believe it is possible to 'construct' a solution and that satisfies the explanation in the R-G papers as well as Andrea's assumed honest answers and comments on the JONP. It also means that the 1 Ohm resistor is an integral part of the reactor.

There is one issue left. Andrea does not want to measure the input power at the mains side of the control unit, nor reveal how much the unit consumes. That worries me, but I can understand it also. This control unit is probably not optimized yet. Its losses would possibly dramatically lower the COP and the real COP of the reactor cannot be demonstrated . On the other hand, the engineers who will perform the demonstration must know how the voltage and current shapes are to select a suitable power meter that can measure the input power. (Assume Andrea uses short GHz pulses to keep the reactor going. These pulses would not be measured by most power meters). That is one of the reasons I asked to measure the input power of the reactor at the mains or battery side of the control unit. **The engineers performing the demonstration must therefore check on these issues to be credible. I hope Andrea will allow them to do everything they think is necessary for an undisputed demonstration.**

I would really welcome your thoughts about the issues mentioned in this essay.

Thanks, Gerard McEk