Measurement protokoll for VHG-3 (vortex heat generator)

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date:	29. June 2005
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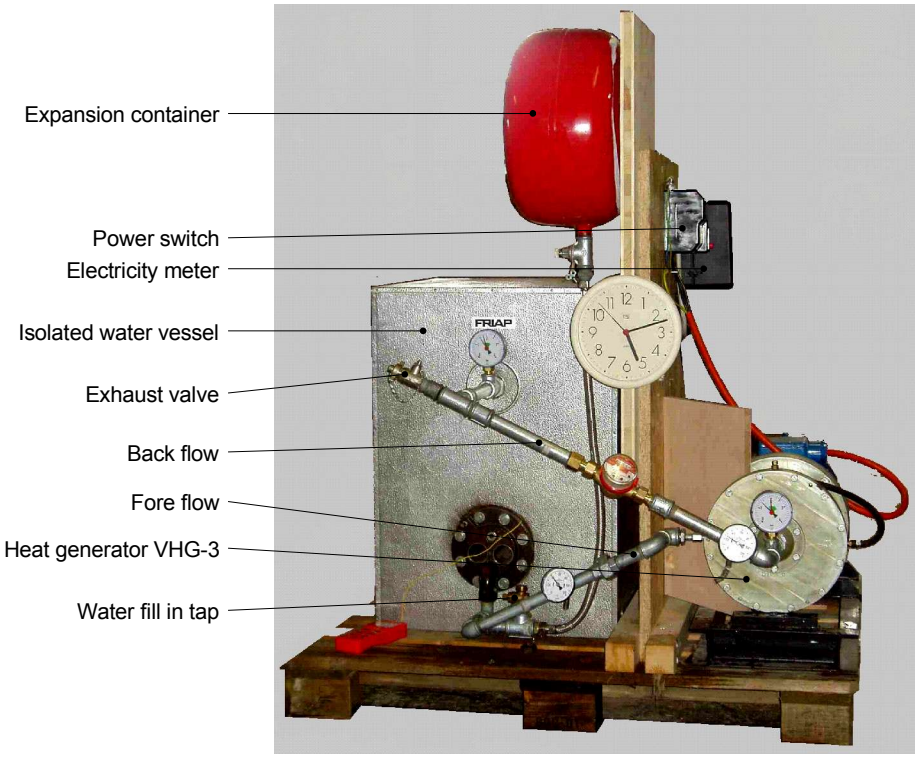
room temperature:	25°C

The measurements was made in a closed room with no external air-flow
The water comes from the water tab of the drink water supply
The electrical power is 3x380 VAC / 20A

Object:

The heat generator is has been completed to a test system with a isolated water vessel with a volume of 120l, and an expansion 25l container to provide the desired system pressure. The water tubes have a diameter of ¾" (25mm). The heat generator is driven by an electric motor with an output power of 7.5kW, mounted on the support housing of the generator. The generator is built to heat water with a higher efficiency as 100% of its input power.



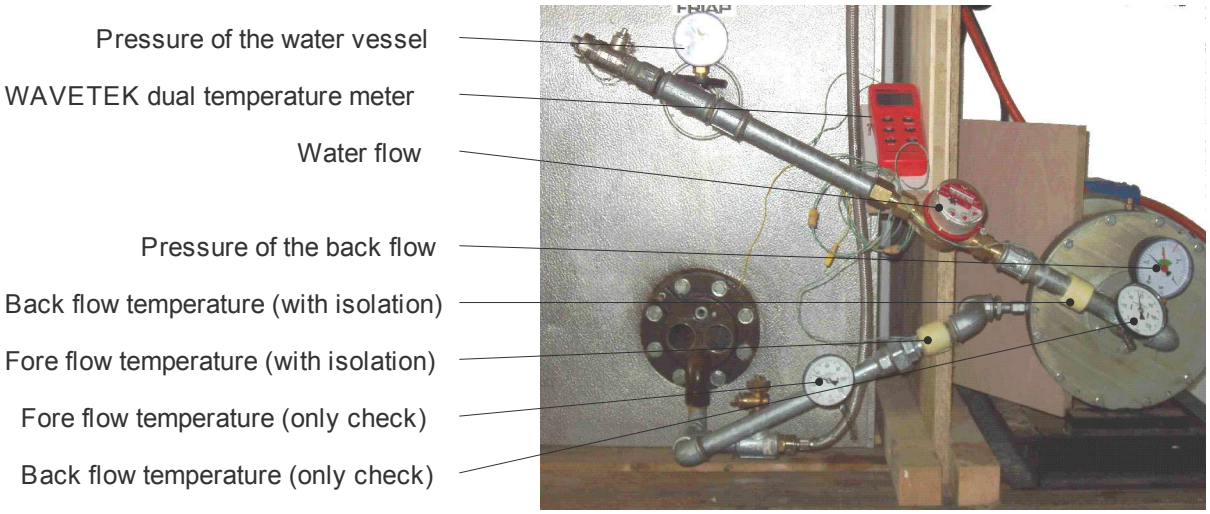
Measurement equipment

Categorie	Measurement equipment	Toleranz / readability
Temperatures	WAVETEK Meterman TMD90 with sensors: 3x Typ K thermo element alaloque temperature meters 0 to 120°C	0.1%, 0.7°C 1°C, readable 0.1K
Water flow	analoque water meter	0.1 liters per minute
Pressure	analoque manometer 0 to 4 Bar	0.05 Bar readable
Electic power	electricity meter for 3 phase, 380VAC	1 Ah for 180 turns

Testplan

1. To get the efficiency of the heat generator, the water flow through the heat generator and the amount of the produced heat was measured as exact as possible. For this, the two temperature of the in-flow and the out-flow to the heat generator was measured with the WAVETEK dual temperature meter. The two sensors are mounted on the tubes on thermal non-isolating pads, and thermal isolations to the surrounding air.
2. To hold the water pressure out of the results, the pressure was stabilized manually by the air pressure in the expansion containers valve.
3. The electric power was measured by measurement of 10 turns of the electricity meter motor, by stopping the time for ten turns.
4. To measure the temperature in the boiled water in the vessel, a third temperature sensor was mounted on a copper rail, positioned vertical in the middle of the water vessel, as long as the hight of the vessel.

5. The exact output power are physical calculated with the values of the energy capacity of the water, the thermal volume expansion and the assumed efficiency of the Russian electric motor.
6. The measurements starts with fresh cold water of about 20°C. The heat generator runs after start without interruption until the boiled water reached near 100°C in the outlet of the generator.



inlet and outlet installations

Results

time	minutes	T Vessel[°C]	T Forfl[°C]	T Backfl[°C]	Eff[%] (VHG)
18:50	0	**23.4**	23.7	23.5	**96.88**
18:55	5	24.0	43.3	26.7	**104.95**
19:00	10	28.5	46.6	30.6	**101.49**
19:05	15	33.0	50.6	34.7	**101.47**
19:10	20	37.5	54.8	38.6	**104.11**
19:15	25	42.2	58.8	42.6	**103.16**
19:20	30	46.7	62.9	46.8	**102.77**
19:25	35	49.7	66.8	50.9	**102.36**
19:30	40	54.2	70.8	54.7	**103.15**
19:35	45	58.4	74.9	58.8	**102.20**
19:40	50	62.3	78.7	62.8	**101.07**
19:45	55	66.7	82.9	66.6	**103.85**
19:50	60	70.5	86.7	70.4	**102.47**
19:55	65	74.5	90.6	74.3	**101.19**
20:00	70	78.1	94.4	78.2	**99.72**
20:05	75	**83.3**	97.5	81.8	**97.68**

calculations:

water energy capacity c: 4190 J/kg

water volume extension vol_coe: non-linear see table PTP

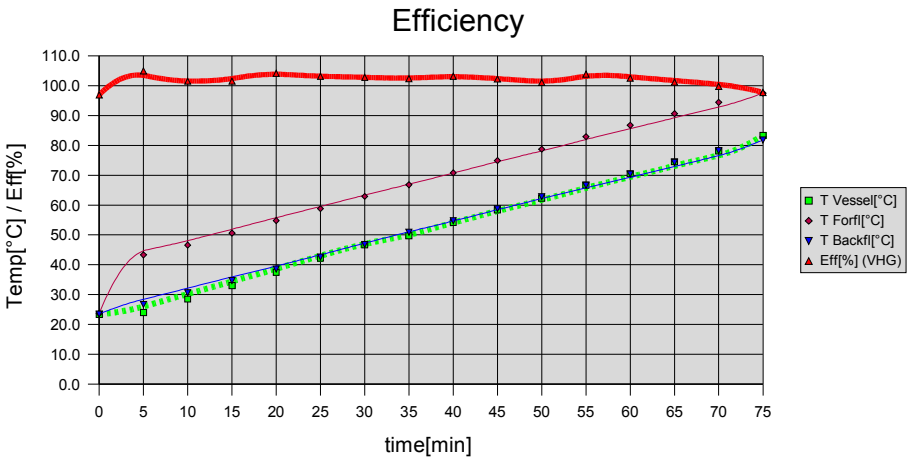
efficiency electric motor: assumed 0.84

$$P\ VHG\ out = \frac{Flow * (T\ ForFlow - T\ BackFlow) * 4190 * vol\_coeff}{60 * 1000}$$

$$Eff\ VHG = \frac{P\ VHG\ out * eff\_el\_motor}{P\ in}$$

measurement of the efficiency
measured values:

T Vessel: temperature inside the vessel(120l), measured in the water
T Forfl: temperature in the tube from heat generator to vessel
T Backfl: temperature from vessel to heat generator
Eff: The total efficiency of the heat generator (without el motor)
el. meter: electricity meter counter
S/10 turn: time[sec] electricity meter uses for 10 turns (180 turn = 1kWh)
KW is: measured and calulated input power of the electric motor in kW



minutes	P in[KW]	P out VHG [kW]	delta(T out-in)[°C]	Flow[l/m]
0	9.22	7.50	0.2	6.90
5	9.05	7.98	16.6	6.95
10	9.01	7.68	16.0	6.95
15	9.01	7.68	15.9	7.00
20	8.93	7.81	16.2	7.00
25	8.93	7.74	16.2	6.95
30	8.89	7.67	16.1	6.95
35	8.85	7.61	15.9	7.00
40	8.81	7.63	16.1	6.95
45	8.81	7.56	16.1	6.90
50	8.77	7.45	15.9	6.90
55	8.73	7.62	16.3	6.90
60	8.70	7.48	16.3	6.80
65	8.66	7.36	16.3	6.70
70	8.58	7.19	16.2	6.60
75	8.58	7.04	15.7	6.65

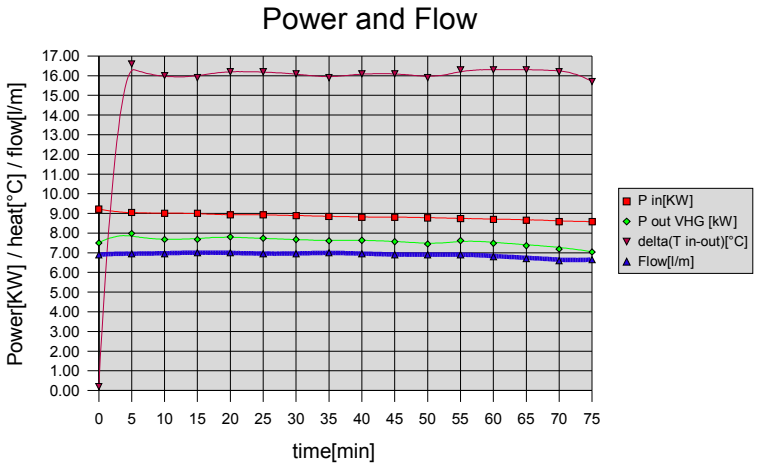
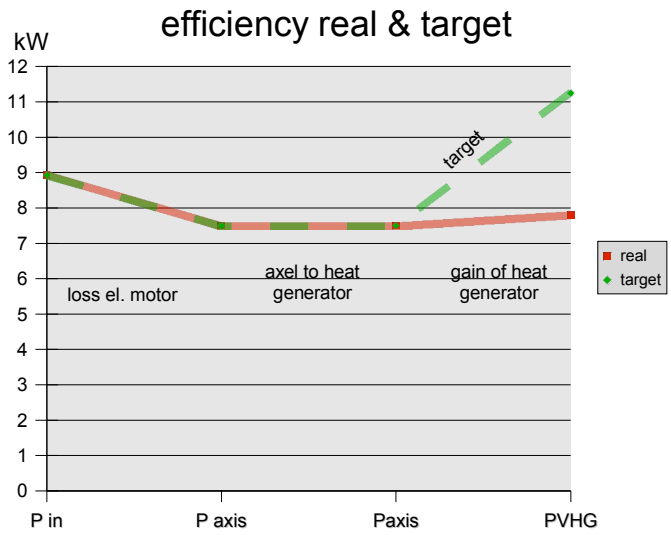


Figure "Power an Flow"
This figure shows the behavior of the difference between the two temperatures (T Forfl and T Backfl), the input power (electric power), the output power of heat generator (thermal) and the water flow through heat generator.

Figure "Efficiency real & target
This figure show the loss (electric energy) of the electric motor and the real thermal gain of the heat generator. The green line shows the target for future, promised by the producer of the heat generator. This target is still the target of the author (costumer), because only this target will enable economical use for future of the heat generator technology.



Nevertheless, this result is an miracle for physics in western Europe. But the customer still hopes to reach the target values soon - with support of the producer.