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EXPERIMENTAL RESEARCH AT A SOLAR INSTALLATION LOCATED AT A HOTEL UNIT IN THE BRAN-MOIECIU AREA

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Abstract: *The article presents the experimental research on a solar installation used for the production of domestic hot water at a hotel in the Bran Moieciu area. During the paper were analyzed operating parameters of the solar installation (temperature and time), measurements were made with the KIMO tip VT300 thermo-hygro-anemometer device, after processing the data were made graphs that highlight the influence of temperature on the solar thermal agent.*
Keywords: *Solar collectors, temperature, hotel unit.*

1. INTRODUCTION

The paper presents the experimental research on the influence of the experimental temperature on the thermal agent in the solar installation for the preparation of domestic hot water at a hotel unit in the Bran Moieciu area. In the first stage, mathematical calculations were performed to determine the temperatures at the entrance and exit of the solar collector, in the second phase experimental research was performed with KIMO type VT300, which recorded the temperature values during a day, and in Following this, graphs were made that highlighted the influence of solar radiation on the efficiency of the solar installation.

2. TECHNICAL REQUIREMENTS

Experimental research on the influence of experimental temperature on the thermal agent in the solar installation.
The measurements were performed using the KIMO VT300 thermo-hygro-anemometer type
The VT 300 thermo-hygro-anemometer is a multifunctional instrument, compatible with all SMART PRO type probes and all K type thermo-couples. SMART PRO probes come with a calibration certificate, so when they are connected to the device, it displays the date of the last calibration.

Figure 1. Termo-higro-anemometrul VT 300 *(www.kimo.fr)*

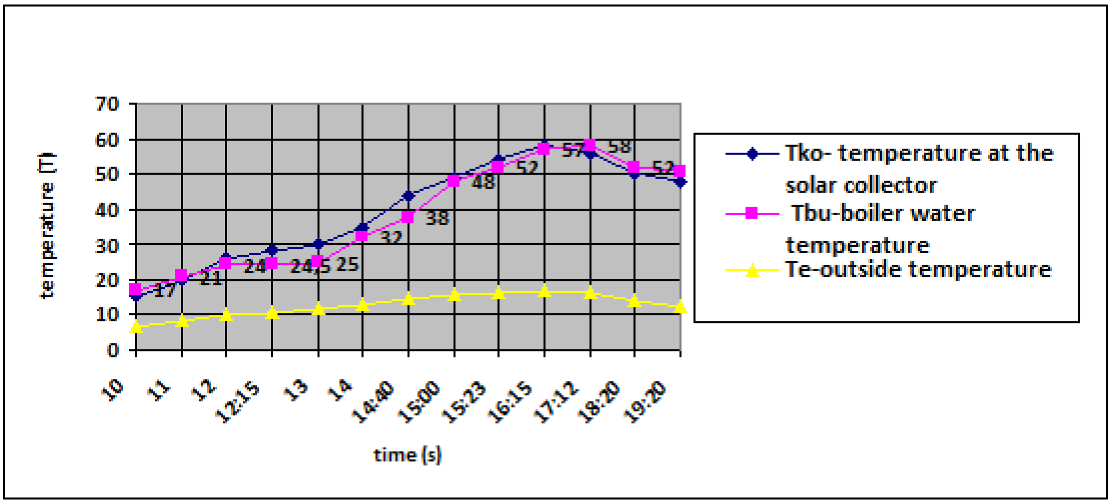
All probes are automatically recognized when they are connected and interchangeable. The notations in figure 1. represent: 1 - the thermo-hygro-anemometer VT 300; 2 - thermo-anemometer with hot wire; 3 - thermocouple with penetration probe; 4 - telescopic thermo-anemometer with hot wire; 5 - thermocouple type K; 6 - PV type anemometer.
Table 1 presents the technical characteristics of all probes attached to the VT 300 thermo-anemometer.

Table 1. Technical characteristics of the VT 300 thermo-hygro-anemometer attachable probes *(www.kimo.fr)*

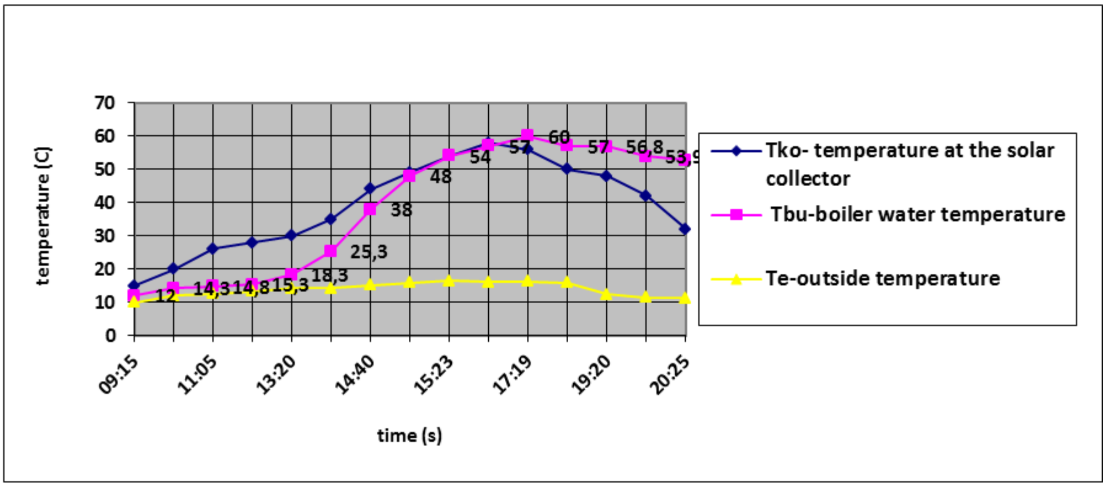
Probe		Unit of measurement	Measuring range	Precision	Resolution
Helical thermo-anemometer	Propeller diameter 100mm	*m/s, fpm*	0,20...3 *m/s* 3,1...35 *m/s*	±2% from reading ±0,06 *m/s* ±2% from reading ±0,2 *m/s*	0,01 *m/s* 0,1 *m/s*
	Propeller diameter 70mm	*m/s, fpm*	0,3...35 *m/s*	±2% from reading ±0,1 *m/s*	0,1 *m/s*
	Propeller diameter of 16mm	*m/s, fpm*	0,6...40 *m/s*	±2% from reading ±0,1 *m/s*	0,1 *m/s*
	Ambient temperature (except for the 16mm diameter propeller)	^0C, ^0F, *K*	-20...+80^0C	±2% from reading ±0,1 ^0C	0,1 ^0C
	Air flow	m^3/h, *cfm*, *l/s*,m^3/s	0...65000 m^3/h	±2% from reading ±10 m^3/h	1 m^3/h
Hot wire thermo-anemometer	Hot wire for speed measurement	*m/s, fpm*	0...3 *m/s* 3,1...30 *m/s*	±3% from reading ±0,03 *m/s* ±3% from reading ±0,1 *m/s*	0,01 m/s 0,1 m/s
	Telescopic hot wire for speed measurement	*m/s, fpm*	0,3 *m/s* 3,1...30 *m/s*	±3% from reading ±0,03 *m/s* ±3% from reading ±0,1 *m/s*	0,01 m/s 0,1 m/s
	Ambient temperature	^0C, ^0F, *K*	-20...+80^0C	±2% from reading ±0,1 ^0C	0,1 ^0C
	Air flow	m^3/h, *cfm*, *l/s*,m^3/s	0...65000 m^3/h	±3% from reading ±10 m^3/h	1 m^3/h
Thermo-hygrometer	Humidity	*% RH, g/kg*	3...98 *%*	±1% from reading ±1,5*% RH*	0,1*% RH*
	Dew point	^0C, ^0F, *K*	-20...+80^0C	±2% from reading ±0,1 ^0C	0,1 ^0C
	Ambient temperature	^0C, ^0F, *K*	-20...+80^0C	±2% from reading ±0,1 ^0C	0,1 ^0C
Thermometers	PT 100 transducer (2 channels)	^0C, ^0F, *K*	-100...+400^0C	±2% from reading ±0,1 ^0C	0,1 ^0C
	Thermocouple type K (with 2 channels)	^0C, ^0F, *K*	-200...-40^0C -39...+999^0C +1000...+1300^0C	±1% from reading ±1,2 ^0C ±0,5% from reading ±0,8 ^0C ±1% from reading ±1,2 ^0C	0,1 ^0C 0,1 ^0C 1 ^0C
Speedometer	Optical	*Tr/min, rpm, m/min, ft/min, ln/min*	60...50000 *tr/min*	±0,5% from reading ±1 *m/min*	1 *tr/min*
	Contact		4...2500 *m/min* 30...20000 *tr/min*	±2% from reading ±1 *m/min*	0,1 *m/min* 1 *tr/min*

This device has a 66x33 mm magnification with automatic screen illumination, a weight of 450 g and a shock resistant housing made of ABS / PC, with Elastomer edges and keyboard. It has 4 keys and a rotary control knob. Communication with the PC is carried out through an RS 232 port.

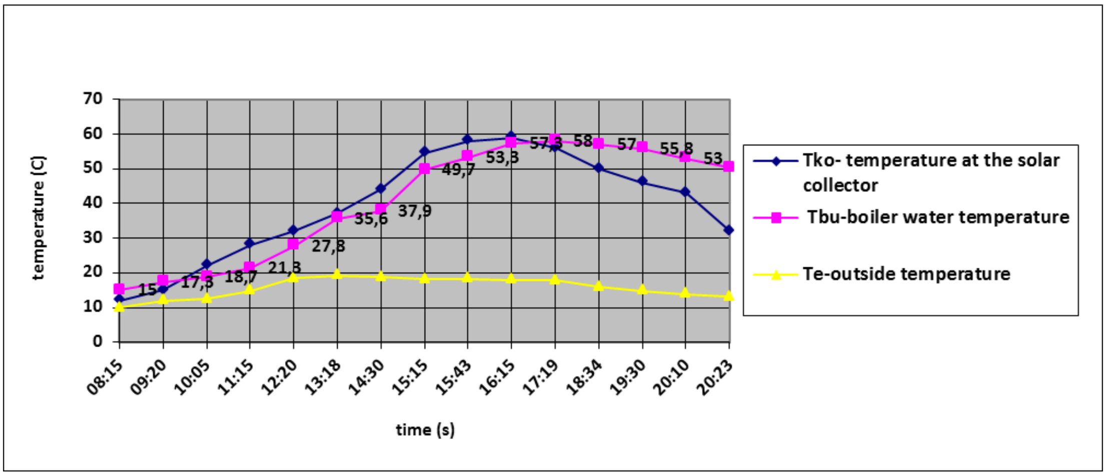
During June-July 2020, measurements were made on the solar installation installed at a hotel unit in the Bran Moieciu mountain area, and following the monitoring of the installation, the following graphs were made according to the external and internal parameters of the installation.



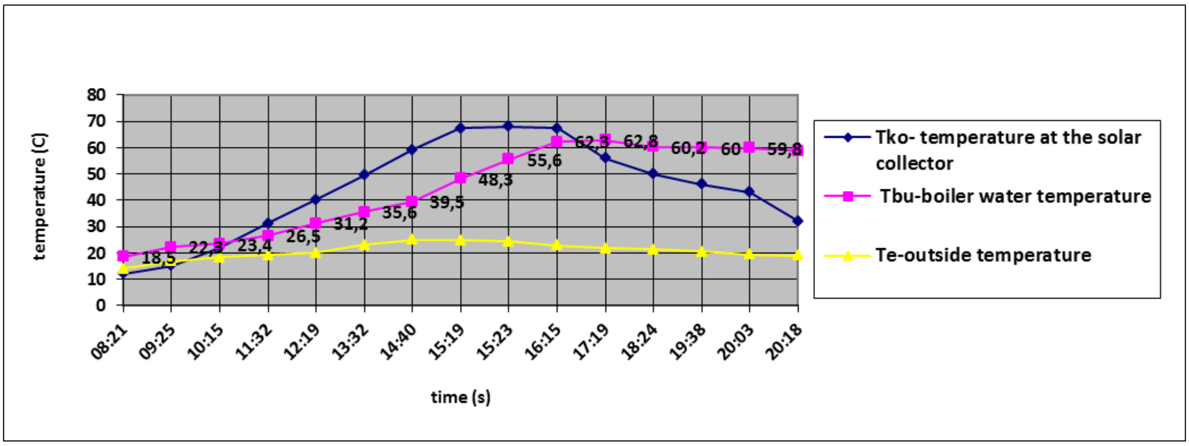
Graph 1: The influence of the temperature from 26.06.2020 on the thermal agent in the boiler of the solar installation



Graph 2 The influence of the temperature from 29.06.2020 on the thermal agent in the boiler of the solar installation



Graph 3 The influence of the temperature from 02.07.2020 on the thermal agent in the boiler of the solar installation



Graph 4 The influence of the temperature from 05.07.2020 on the thermal agent in the boiler of the solar installation

3. CONCLUSION

Following the experimental researches performed on the solar installation, the influence of the external temperature on the thermal agent in the installation can be observed, with the help of the temperature measuring device, during a day between 11:00 -17:00 the installation operates at maximum capacity and the temperature of the thermal agent is very high. which leads to the heating of the water in the tank of the installation.

The efficiency of the solar installation is high during a sunny day so the temperature of the thermal agent depends on the intensity of the solar radiation. On days when the intensity of solar radiation is low and the temperature of the thermal agent in the installation decreases.

REFERENCES

[1] *(www.kimo.fr)*