How to set up a test laboratory for Solar Water Heater

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Opening remark

Goal should be to establish not just a test laboratory but a solar thermal competence centre providing

- **Testing**
- **Experience exchange**
- **Research and development**
- **Standardisation and certification**

Speeds up innovation and development of attractive and cost effective products

Standards for testing of Solar Water Heaters

Reference	Title
ISO 9806:2013	Solar energy- Solar thermal collectors-Test methods
ISO 9459-2:1995	Solar heating -- Domestic water heating systems -- Part 2: Outdoor test methods for system performance characterization and yearly performance prediction of solar-only systems
ISO 9459-4:2013	Solar heating -- Domestic water heating systems -- Part 4: System performance characterization by means of component tests and computer simulation
ISO 9459-5:2007	Solar heating -- Domestic water heating systems -- Part 5: System performance characterization by means of whole-system tests and computer simulation

Setup thermal performance test facility

data acquisition unit

chiller (cooling machine)

cold-water storage tank

temperature unit

solar collector mounting system

Solar collector mounting system

data acquisition unit

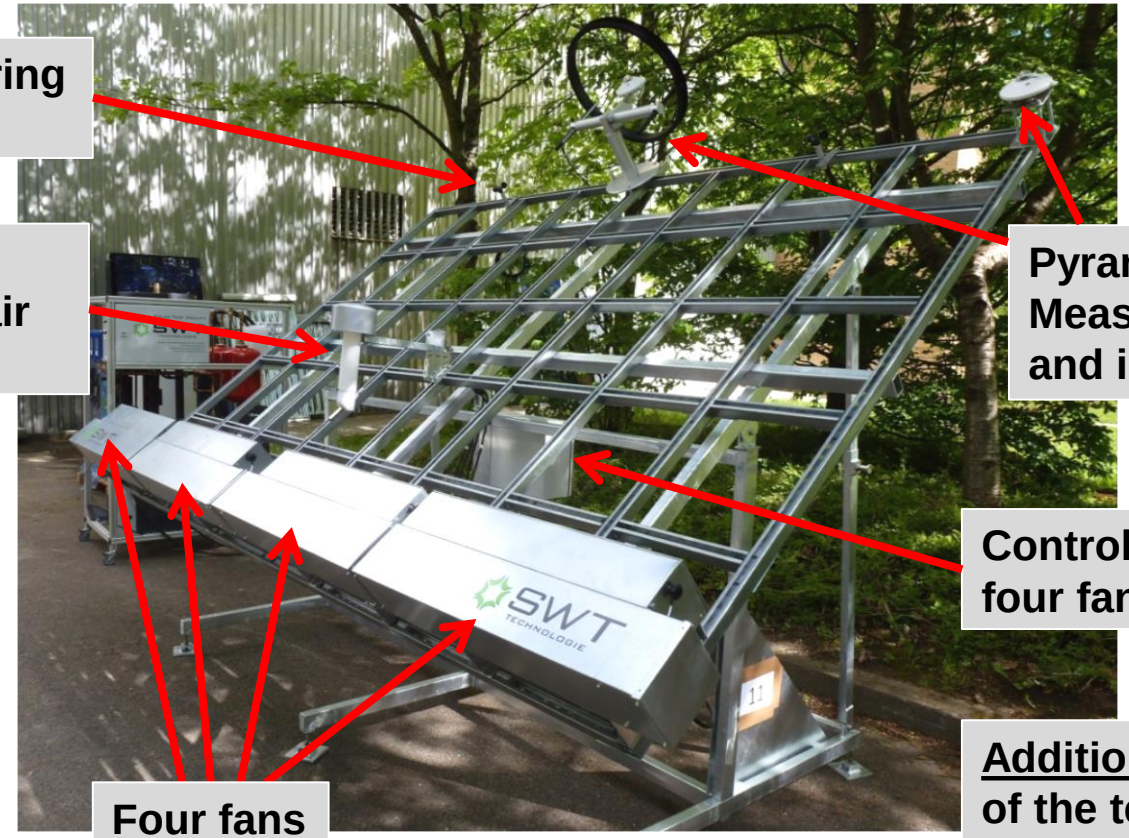
chiller (cooling machine)

cold-water storage tank

temperature unit

solar collector mounting system

Solar collector mounting system



Anemometer: Measuring of the wind speed

Temperature sensor: Measurement of the air temperature

Pyranometers: Measuring of the direct and indirect radiation

Control panel for the four fans

Four fans

<u>Additionally:</u> Measurement of the temperatures of collector inlets and outlets

Temperature unit

data acquisition unit

chiller (cooling machine)

cold-water storage tank

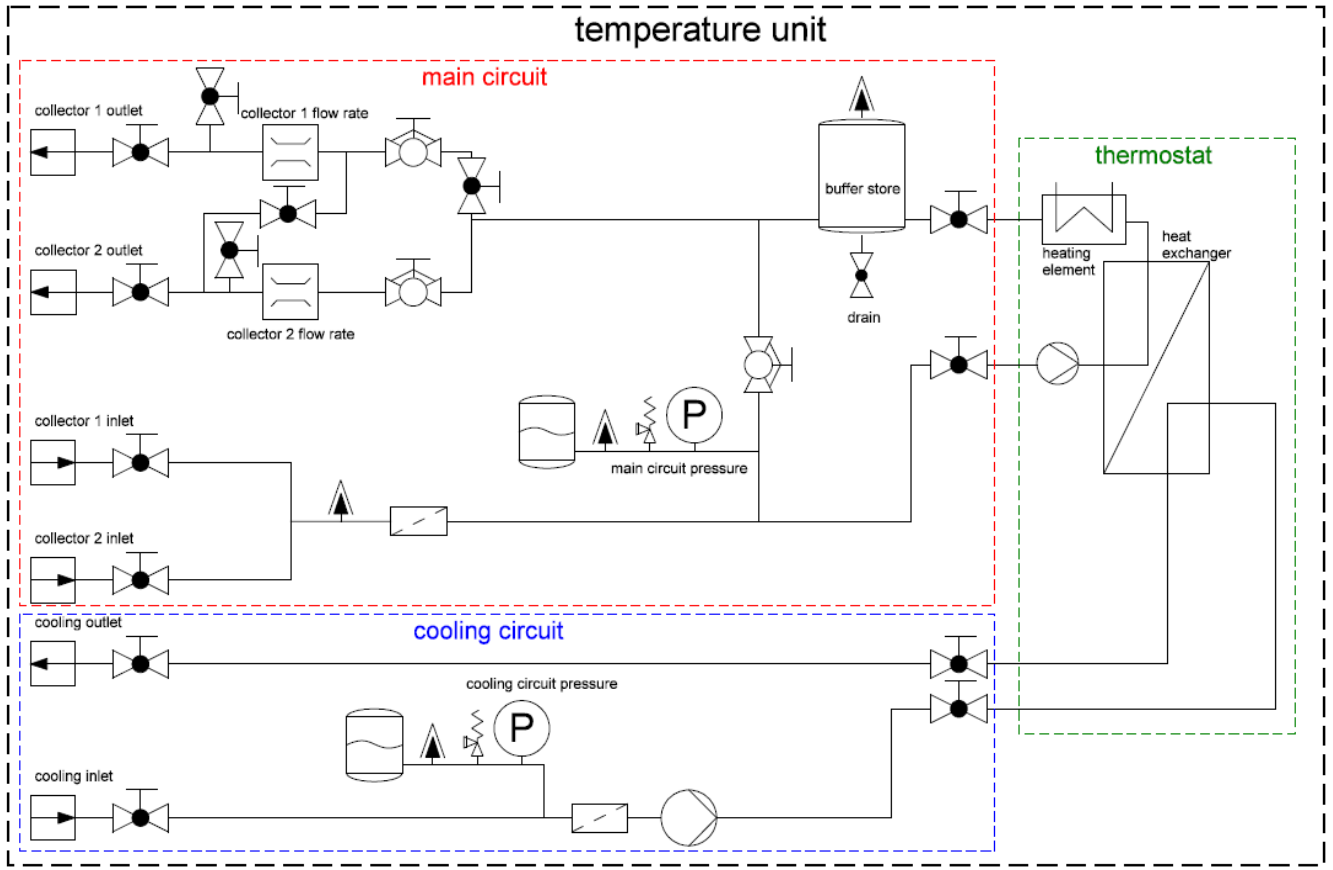
temperature unit

solar collector mounting system

Temperature unit

Hydraulic circuit to the collectors (main circuit)

Hydraulic circuit to the cold-water storage tank (cooling circuit)



- Two hydraulic circuits
- Thermostat: provides cold water with a steady temperature to the collector

Cold-water storage tank

data acquisition unit

chiller (cooling machine)

cold-water storage tank

temperature unit

solar collector mounting system

Cold-water storage tank

- **Volume: 300 l**
- **Two hydraulic circuits:**
  1. **to the temperature unit (e.g. hydraulic connections ① + ②)**
  2. **to the chiller (e.g. hydraulic connections ③ + ④)**

Chiller (cooling machine)

data acquisition unit

chiller (cooling machine)

cold-water storage tank

temperature unit

solar collector mounting system

Chiller (cooling machine)

Adjusting temperature

- continuously cools the water contained in the cold-water storage tank

→ temperature unit is able to provide the collectors cold water

Data acquisition unit

data acquisition unit

chiller (cooling machine)

cold-water storage tank

temperature unit

solar collector mounting system

Data acquisition unit

Multimeter and switch for data measurement

PC for data acquisition

Possibilities to reduce investment costs

1. Self made
2. Locally sourced material and components
3. Reduced functionality (e.g. collector mounting with fixed slope)
4. Reduced capacity (e. g. testing of just one solar water heater possible)
5. Reduced capacity (e. g. not all tests can be berformed)
6. Reduced accuracy of the sensors and the data acquisition system

“self made” versus “turn key solution”

	self made	turn key
Investment costs		
Rescources (time and personal)		
Experiance		
Support		
Quality		

Thank you very much for your attention