

The solar thermal collector ES

Solar thermal collector for use in solar heat experiments

Technical and instruction manual

with 3 absorber sheets, black, white, selective absorber

Especially suited for student-centered experimental classes in class levels 3-9

The **solar thermal collector ES** is used for the measurement and demonstration of the **heliothermal effect**, the **solar radiation is converted into available heat here**. Inside a casing insulated with cork there is a metal plate as an absorber, above there is a transparent cover plate, that is hold in place by a blue frame fastened by wing nuts. If the collector is placed in the sunlight or the light of a halogen flood light, the sheet is heated up in the "greenhouse" of the collector. The collector can be opened, this way 3 different sheets can be placed inside for experiments, a high-quality selective absorber sheet (professional material from the industry), a black coated sheet and a white coated sheet. An inserting thermometer can be inserted through a small hole in the upper edge to measure the temperature of the absorber, as shown in the photo to the right.

In the photo the inserting thermometer shows a current temperature of 79°C in an outdoor experiment.

The value can be saved with the HOLD key on the thermometer to transfer it to a measurement report in the classroom.

In the **sunlight of the summer** the temperature can reach values **over 100°C**. By placing a test tube in the collector water can also be heated and brought to boil.

For the collector ES there is an extensive experimentation manual for solar heat experiments in Primary School and lower Secondary School available.

Scope of delivery:

Solar thermal collector with wing nuts for opening the front side, with 2 absorber sheets for experiments.

Sheet 1: Front side white, back side black

Sheet 2: Front side selective (violet), back side copper

With insertion sleeve for inserting thermometer

Safety instructions:

Caution! Absorber sheet becomes hot in operation!

Do not open the collector while the absorber sheet is hot!

Before opening the collector the absorber sheet must be cooled down!

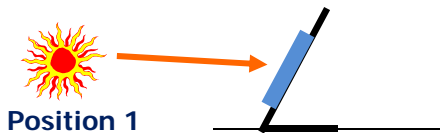


Caution! Do not touch the surface of the absorber sheets with bare hands!
Caution! Collector becomes hot in operation, follow safety instructions!

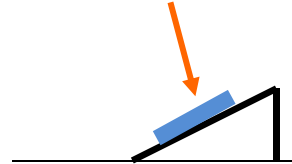
The instruction manual

The condition as supplied to customer is with inserted selective absorber sheet (color blue-violet). The solar collector can be positioned in two versions according to the solar altitude:

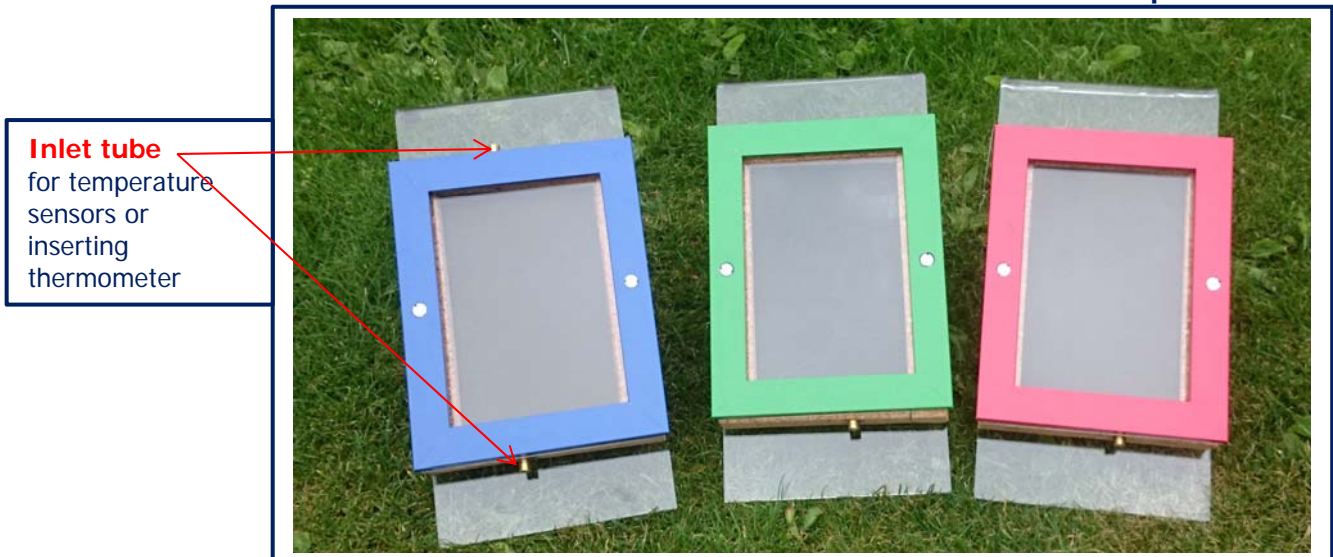
Winter
Low solar altitude



Sommer  **High solar altitude**



3 Solar collectors ES of the suncatcher box ES in summer position



The **solar collectors ES** can be used for **solar heat experiments in Primary School** and in **lower Secondary School**.

Extensive experimentation manuals are available for both fields of application. Experiments can be conducted outdoors in the natural sunlight or indoors with halogen flood lights 120 W. Please keep the procedure and safety instructions in the experimentation manuals in mind.

The colored front cover can be taken off to the front by unscrewing 2 wing nuts (on the back side) to change the absorber sheet. In delivery status the absorber sheet with the selective absorber is placed in the device. The selective absorber is a special coating of a copper sheet to reach a high absorption of the solar radiation and get high temperatures. These sheets are used in professional solar collectors. The selective absorber layer is colored deep blue or purple, it should not be touched with bare hands, because the fat of the skin damages the layer. The back side is copper, a separately delivered absorber sheet has a black and a white side, so that 4 different surfaces can be used in the experiment.

Into the inlet tube tethered temperature sensors of multimeters or inserting thermometers can be inserted, they have to be positioned centered under the absorber sheet.