

Instruction manual - calculation tool for required cooling- and heating power

By selecting the menu item "Calculation module for determining the heating and cooling capacity!" From the "Technology" section of our website, the main form of the calculation tool opens in a new tab in your web browser.

The main form

Please enter the required values for the calculation in the appropriate fields:

- a) **Section 1: Enter the external dimensions of your control cabinet in millimetres in the appropriate fields.**
- b) **Section 2: Select the type of installation of your control cabinet.** To do this, drag the mouse over the images. The currently targeted graphic is outlined in red for better visibility. The corresponding type of installation is selected by clicking with the left mouse button, which is indicated by a green border around the graphic. You can correct the entry by simply clicking on any of the seven graphics. The calculation is based on the corresponding type of installation of the graphic framed in green.
- c) **Section 3: Enter the material of your control cabinet.** To do this, click with the left mouse button in the corresponding square input field. Only one of the six possible input fields can be selected. The selection can be corrected by clicking on any of the six fields.

If you selected the option "Other", it is necessary to enter the heat transfer coefficient in $W / (m^2 * K)$ of your switch cabinet material in the adjacent field.

You can select the option "Thermal insulation available" in addition to the control cabinet material. Please enter the thickness of the insulation of your control cabinet in mm in the adjacent field. The program will do the calculation with a thermal conductivity of the insulating material of $0.04 W / (m * K)$.

- d) **Section 4: Please enter the internal power loss of your control cabinet as well as the existing respectively the desired temperatures.** The internal power loss, specified in watts, will be entered in the adjacent field. If you do not know the power loss, it can be calculated from measured values. In this case, please read the section "Calculating the power loss from measured values".

The option "Insolation available" can also be selected by clicking on the adjacent square field. For this option, please enter the additional solar radiation in watts in the adjacent field. This value depends on the geographical location and the conditions there.

Finally, please enter the maximum and minimum ambient temperatures at the installation site of the control cabinet as well as the maximum and minimum desired internal temperature of your control cabinet in degrees Celsius.

Calculating the power loss from measured values

This option can be selected if you do not know the internal power loss of your control cabinet. To carry out such a measurement, operate your control cabinet under maximum load. In the meantime, measure the occurring maximum internal temperature of the cabinet as well as the ambient temperature.

For the calculation, please fill out the sections 1 to 3 of the main form as described above and then click with the left mouse button on "Calculate from measurement data". Another input form with the following information opens:

- **Measured ambient temperature:** Please enter the ambient temperature in degrees Celsius, measured in the test.
- **Measured internal temperature:** Please enter the maximum temperature in degrees Celsius, measured during the test inside the control cabinet.
- **Additional solar radiation:** Analogous to the main form, you can enter here an additional value for the solar radiation in watts.

Now click on "**compute**" with the left mouse button. The program calculates the power loss in your control cabinet based on the measurement data as well as the control cabinet dimensions and setup you specified. The result is displayed in the line "**Calculated power loss**".

After click on the "**Apply**" button, this value and your specification on the solar radiation are transferred to the main form.

ATTENTION! *If you change data after the calculation, for example a temperature specification, the calculated value will not be assumed by the program and you will receive an error message. In this case, click again on the "**compute**" button and then on "**accept**".*

By click on the "**back**" button, all entries in the form are discarded and the program returns to the main form.

ATTENTION! *If, after transferring the calculated value to the main form, you change the values in sections 1 to 3, for example a control cabinet dimension, the power loss must be calculated again. To do this, click again on the "**Calculate from measurement data**" button and proceed as described above.*

Calculation

When you click with the left mouse button on "**compute**", the program starts calculating the required cooling- and heating power to maintain the temperatures you specified within the control cabinet.

After the calculation is done, a summary of your details will appear in the upper part of the window. The **calculation results** are displayed below.

The further options

By clicking on the "**back**" button you will get to the main form with your entered data. You can correct these if necessary and carry out the calculation again.

By clicking on the "**new**" button you will get to the main form without any data entered. You can now start a new calculation.

When you click the "**print**" button, the system dialog box for printing the calculation results on your standard printer appears.

When you click on the "close" button, the calculation program will be closed.

By clicking on the "send" button, you get to the input form for sending your calculation results to us via email. Please enter your contact details and let us know a little more about your project in the "Message" field, e.g., special environmental and operating conditions, quantities, etc.

All information in this form is optional. To send the data, please confirm that you agree to our data protection declaration and please verify yourself under the item "I am not a robot".

We will contact you as soon as possible.

Thank you very much!

Your Lm-therm Team