

HOW TO SELECT THE CORRECT HEATER??

Exemplary calculations:

The calculated heat demand of a room is 682 W.

The design parameters for water supply, returning water and room temperature are (respectively):

$t_s/t_r/\theta_i = 55/45/20^\circ\text{C}$ (water parameters typical for low-temperature heat sources such as condensing gas boiler or heat pump).

EQUATION 1

Takes only the power of the device into account

Read the corrective coefficient for set temperatures and respective products from the appropriate table. In this case, according to table on page no. 10 it equals to 0.600.

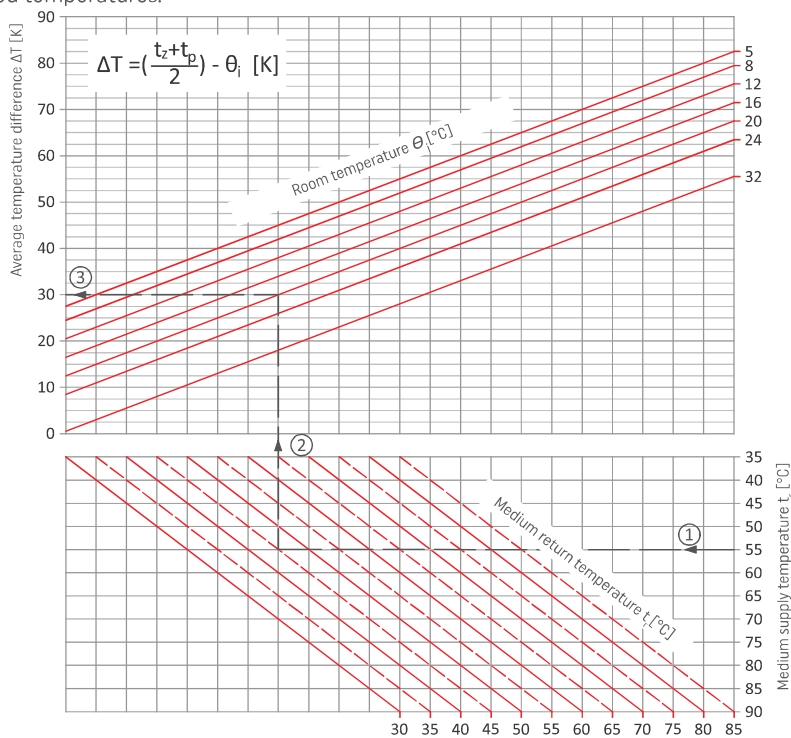
Next divide the calculated heating power demand (682 W) by the corrective coefficient read (0.600). The result is the heating power (1136) for which we select the 75/65/20°C parameters adjusted heater.

The last step is to select a heater with room-appropriate size, e.g. the **VKN1-6,5/17/165** model, which in the Med mode for 75/65/20°C will reach the power of 1174 W, and 704 W for 55/45/20°C.

EQUATION 2

Takes the power of device and noise levels in account

Using the graph below read/calculate the average temperature difference for selected temperatures.



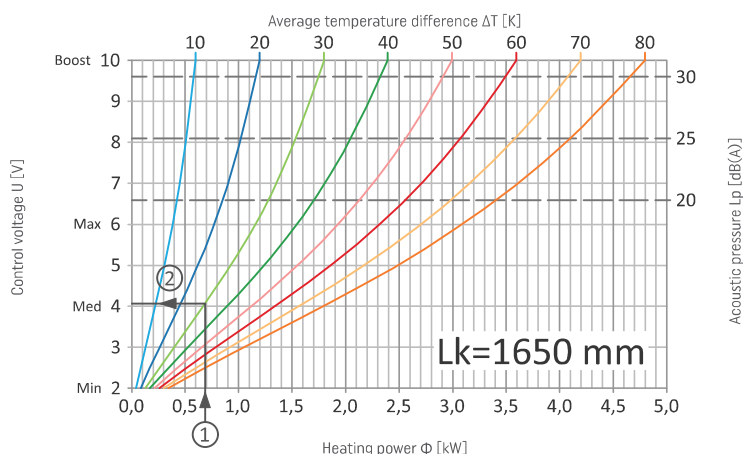
The graph allows for easy readout of average temperature difference ΔT for selected heating media parameters t_s & t_r , depending on room temperature θ_i .

1. Draw a horizontal line from the supply temperature of $t_s=55^\circ\text{C}$ to the crossing point with the transverse line of returning water temperature $t_r=45^\circ\text{C}$
2. Draw a vertical line to the crossing point with the transverse room temperature line $\theta_i=20^\circ\text{C}$
3. Draw a horizontal line and read the average temperature difference $\Delta T=30\text{ K}$.

Next, using the graphs from page no. 9 select a heater with appropriate parameters for that room. Always take the mode of fan operations and the connected acoustic pressure level into account.

1. Draw a vertical line from the calculated heating power demand (682) to the crossing point with the 30 K temperature difference curve.
2. Read the control voltage and corresponding level of acoustic pressure L_p .

The selected **VKN1-6,5/17/165** heater reaches the assumed design parameters with a control voltage of $U=4\text{ V}$ (Med. mode) and thus the acoustic pressure level is below 20 dB(A).



CONTROLLING THE VKN5 HEATER

Selecting power supply:

1. Using the table included in the catalogue read the maximum power of electric fan of selected heater. Selection of power lower than the maximal will result in switching off fans in higher fan speed and may result in damage to power supply unit or fan motor.
2. Using the technical sheet of the selected actuator read its maximum electric power – e.g. 4.8 W / 0.2 A for the VERSST24 actuator.
3. Using the technical sheet of the selected controller read its maximum electric power – e.g. 1.3 W / 0.06A for VER-24 and VER-24S controllers.
4. Add up all maximum powers and loads for all devices used (including multiple use of devices).
5. After calculations select the smallest power supply unit that provides the required electric power.

Maximum energy demand and current are to be read from the table for the Boost mode.

Example:

3 heaters were selected for a room according to its heating power demand:

- 1 x VKN1-6,5/17/125,
- 2 x VKN1-6,5/17/165.

Additionally there are 3 VERSST24 thermal actuators and 1 VER-24 controller in the system.

Using the electric data for VKN1 heaters included on page 9 and the technical sheets of control devices we read:

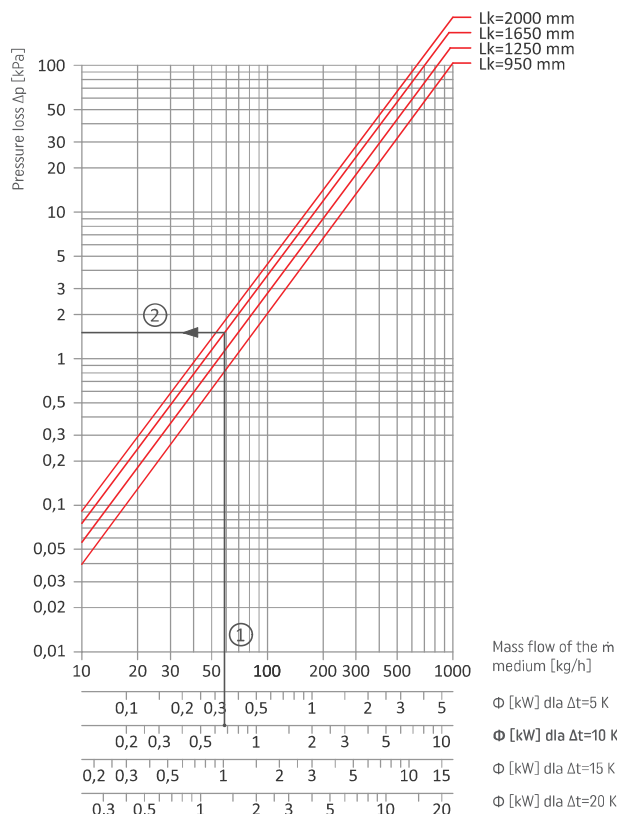
Devices type	Maximum electric power	Maximum current
1 x VKN1-6,5/17/125 fan heater	1 x 9,2 W	1 x 0,38 A
2 x VKN1-6,5/17/165 fan heater	2 x 12 W	2 x 0,5 A
VERSST24 thermal actuator	3 x 4,8 W	3 x 0,2 A
VER-24 controller	1 x 1,3 W	1 x 0,06 A
Total:	48,9 W	2,04 A

Power supply unit selected: **Z060W 24VDC (60 W / 2,5 A)**

PRESSURE LOSSES

Based on heater selection mode, as presented on page 40 we selected the **VKN1-6,5/17/165** heater with a power of 682 W at fan voltage of 3.9V. The temperature the cooling medium is cooled by is $\Delta t=10^{\circ}\text{C}$

1. Using the axis for 10°C cooled medium we draw a vertical line to the heating power of 0.68 kW till it crosses the transverse line representing heater length of $L_k=1650$ mm.
2. Draw a horizontal line and read the pressure loss value of $\Delta p=1.55$ kPa.



VKN HEATER WIRING DIAGRAM

The fan-assisted trench heaters are controlled automatically with use of room regulator and thermal actuator. The controller, with use of its built-in sensor measures the room temperature and keeps it at a preset level. The high precision of that adjustment is the result of the simultaneous, fully automated control of both the 2-position actuator and the fan motor.

The following are required for correct operation of trench heater with fan: room controller, thermal actuator installed on thermostatic valve and 24V DC power supply unit selected according to the electrical characteristics of installed heaters.

The room regulator, according to diagram below, is connected with heater fan and the actuator installed on thermostatic valve. The recommended cable type for control system is LIY or LIYCY. Due to the built-in temperature sensor the room controller should not be built over or covered with furniture or other interior design elements.

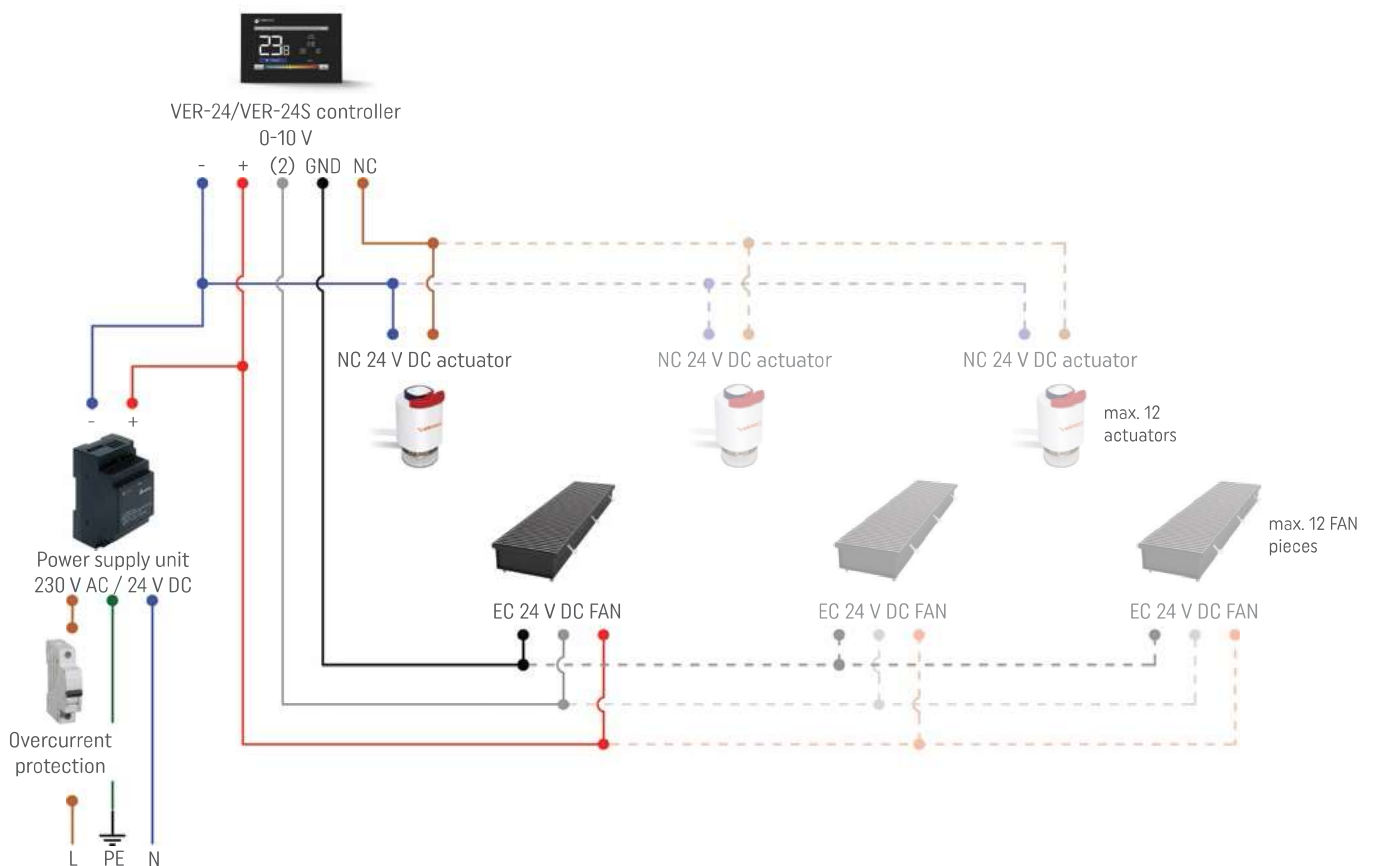
It is also possible to connect several fan-assisted heaters to a single regulator. In order to do that the heating zones should be correctly designated, so that the number of fan motors does not exceed 12 pieces, that is the upper limit for VER-24 and VER-24 controllers in each of those zones. The detailed electric data are presented in the respective sections of the product catalogue.

Verano also offers 230 V AC/ 24 V DC DIN-rail or switchboard mounted power supply units. The example procedure for selection of power supply unit is presented on page 41. The power supply unit should be protected with appropriate overcurrent protection that will also allow to switch the power off during service and maintenance.

WARNING!

Only properly skilled and trained personnel, holding SEP licenses and observing applicable PN standards can install electric connections. Power can only be switched back on when the correctness of the whole wiring was checked and approved.

Due to use of safe low-voltage fans the heaters can only be powered by 24 V DC voltage. It is prohibited to connect the heaters directly to 230 V AC power grid.



An exemplary wiring diagram for one or several fan-assisted trench heaters with use of a single room temperature controller and the NC type ON/OFF actuators

INSTALLING AND USING VKN FAN HEATERS

Prior to start of assembly always make sure to prepare a trench in the floor with dimensions exceeding the dimensions of the heater by some 40-50mm in every direction. Plan the depth of the trench in such a way, that the surface of grille matches the expected floor finish level.

Levelling the trays of fan assisted trench heaters is achieved with use of levelling legs. The legs shall rest on the construction layer of the floor. The next step is to assemble the anchoring screws and anchors that fix the heater to the concrete.

Due to the strength requirements we recommend insulation materials with compression strength of no less than 70 kPa, e.g. the EPS70, for insulation of heater tray. Free spaces between insulation and heater tray should be filled with low compression foam. Tray of trench heater should only be installed after the heating set was first removed from it.

Fan assisted trench heater is installed in such a way that the heat exchanger faces the division and the fan faces the heated room. The fan assisted heaters are not universal – always remember to quote the correct connection side when ordering.

For the duration of finishing works it is recommended to cover the tray with assembly cover that protects the elements of the heater from mechanical damage and dust.

Prior to pouring concrete that the edge of the tray will rest on make sure that all heater water and control connections were installed.

Electric and installation ducts may be connected to the tray from its longer or shorter side. After hydraulic and electric connection of the heater test the correctness of control system and remove all dirt from tray. The poured concrete that the edge of the tray will rest on should be at least 50 mm thick.

During assembly of trench heater always remember about the assembly spreaders that are included with the heater and prevent the tray and heater edge from deformation. Addition of dilatation mat on the side of heater tray allows to lower the contact surface of concrete and heater tray, thus serving as additional acoustic insulation of the heater.

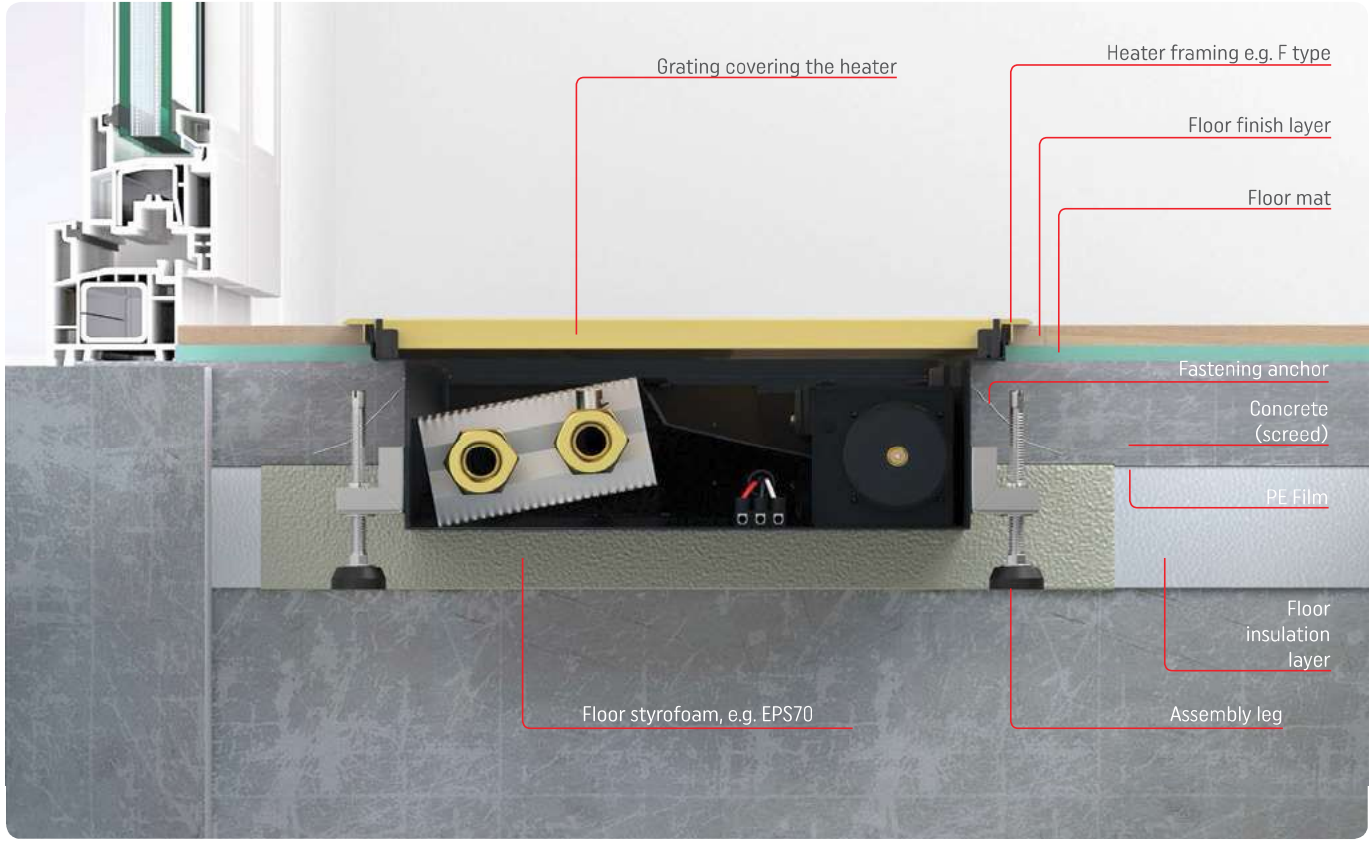
The border L and F type frames are accessories that allow the finishing of the tray borders during finishing works.

All assembly operations should be performed by properly skilled and trained construction industry, electrical and installation workers.

Fan assisted trench heaters could be optionally equipped with adjustable edge. This allows to level the difference between the expected and final height of floor finish without the need to chisel the floor to do that.

The trench heaters used in heating season should not be covered by carpets, furniture or curtains. The grilles can resist pressure and abrasion connected with low intensity pedestrian traffic. Avoid exercising excessive pressure on the grille bars, e.g. by placing room furnishings on them.

Due to the possible influence of dirt on the efficiency of heater we recommend the periodic cleaning of heater tray.



Example of installation of fan assisted trench heater (side view)