



electric trench heater
**with an electric heating unit,
heating**

TERMO - electric trench heaters



Features

- optimum heat outputs
- all electric
- no heating system connection required
- continuous output regulation
- safety features
- electronic regulator
- 24 V DC EC tangential fans
- 4 grille designs



Electric trench heaters are normally installed directly in front of large glass surfaces. The advantage of electric-only heaters lies in their independence of forced-circulation heating systems. The heat output produced by trench heaters is sufficient to be used either as the primary or secondary heat source. They make a perfect fit in the existing building space, in contemporary low-energy and passive homes, in electric-only houses, in buildings under construction and wherever connection to the heating system is not possible or desirable.

The family of electric trench heaters includes the **FEK** model with natural convection and a fan-operated **FET** model. The trench heater includes a built-in electric heating unit controlled by an electronic regulator. Forced convection models feature a tangential ventilator with cylindrical rotors, designed to force air into the ribbed heating unit. This allows for more than doubling the heat output without any increase in size. The heaters utilize efficient EC motors supplied with safe 24 V DC voltage. The motors have very low power consumption. The fan speed is continuously regulated by a control voltage in the range from 0 to 10 V DC.

Function

The trench heater is controlled via a room thermostat or 0-10 V DC higher-level regulation. The room thermostat ensures correct functioning, adjusts the difference between the preset and actual room temperature, activates the heating unit and regulates the fan speed based on the temperature difference and the set operation mode.

Operation of the heater is regulated by an electronic power controller located in each unit. The output of the heater (both the heating unit and the fan) is smoothly regulated ensuring that any changes in room temperature are continuously monitored and adjusted. This in turn significantly increases the room's thermal comfort. The same applies when using an appropriate control device such as the RTD201 digital thermostat.

Safety

The power electronics are placed in an IP44 aluminium box connected to the heating unit with the same degree of protection. The fan is powered by safe 24 V DC voltage.

The electronics feature a multi-stage function control, including sensors installed above the heat exchanger. The regulating mechanism responds promptly to any changes in conditions if it detects a deviation from normal operation. Especially if the heater is accidentally covered by a rug or if the free air flow through the grille is otherwise impeded, it immediately switches the unit into a stand-by mode or shuts the heater down. The designer grille is securely fixed to the unit and cannot be removed without the appropriate tool.

Heat and safety sensors monitor the output temperature from the trench heater. The grille temperature will not exceed 45 K above the ambient temperature. (in accordance with EN 603335-1 and 603335-2-30).

The range of electric trench heaters

Electric trench heater with fan

FET

- heating
- tangential fan
- lamellar electric heating unit
- dry environment
- page 24

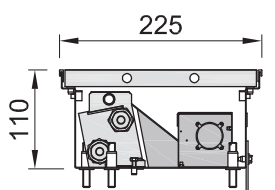
Electric trench heater with natural convection

FEK

- heating
- lamellar electric heating unit
- dry environment
- page 25

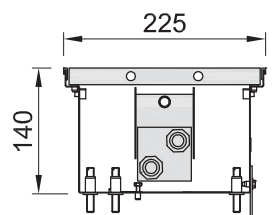
Overview of FET, FEK electric trench heaters

FET



FET 0110 0225
page 24

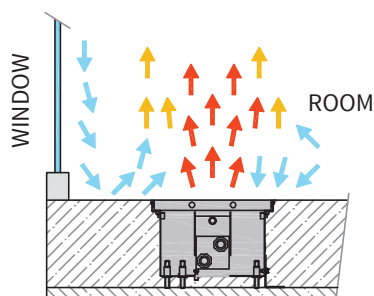
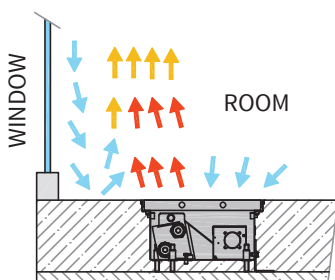
FEK



FEK 0140 0225
page 25

Placement in the floor

The trench heaters are laid in the floor so that the heat exchanger is closer to the window side, while fans are placed deeper into the room. The vertical and horizontal distribution of temperatures in the heated room is uniform and conditions are created to provide thermal comfort.



Heating function

- Air becomes heated by flowing through the heat exchanger
- Warm air is mixed with cool air running down the window surfaces
- Air circulation:
 - Heating air in the room
 - Screening out window surfaces
 - Secondary demisting window surfaces

Operating conditions

- Rated voltage of the heater: 230 V AC, 50/60 Hz
- Rated voltage of the heating unit: 230 V AC, 50/60 Hz
- Rated voltage of the fan: 24 V DC (EC motor with continuous speed regulation)
- Protection rating of the heater: IP20, use in dry environments
- Ambient conditions: Ambient temperature +2 - 40°C; Relative humidity 20 - 70%

FET 0110 0225

FAN-ASSISTED ELECTRIC TRENCH HEATER



- glass-walled rooms
- high performance of the heating unit in combination with the fan
- operation independent of the central heating system
- continuous speed regulation, silent operation
- safe 24 V DC fan voltage
- 230 V AC / 50 Hz heating unit
- cable connection to IP44 control regulation
- safety sensors along the entire length of the heating unit



* at an indoor temperature of 20 °C

Technical data

Trench heater

Height [H]	110 mm
Width [W]	225 mm
Length [L]	800-2 000 mm in step 400 mm

Heating unit

Type	Al-Cu type with a heating element
Length	L-410 mm

Operating conditions

Protection	IP 20
Control unit and connection cabling protection	IP 44
Ambient conditions	Temp. T = +2 to +40 °C Humidity RH = 20 to 70%

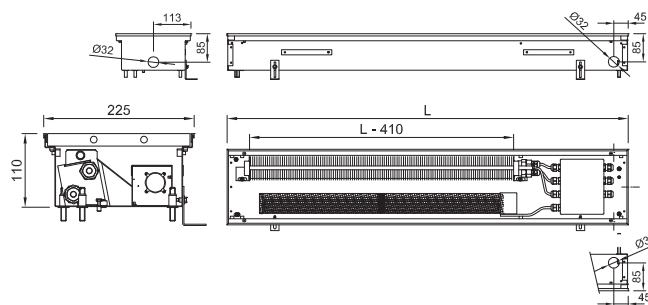
Trench heater standard equipment

Trough	Galvanized steel trough with surface finish and black spray layer inside, black cover plates of connection
Heating unit	Heating unit with aluminium ribs and tubing, including temperature and safety sensors, black coating
Grille	Design walkable grille according the customer's choice (stainless grilles surcharge)
Ledge	Made of anodized aluminium, type and colour according the customer's choice
Fan	Modern tangential fan with 24 V DC EC motor with high efficiency, rotors protection
Assembly elements	Leveling screws for setting up the trough, mounting brackets
Manual	Manual for the progress of work during installation and user manual
Wiring	Electrical wiring diagram of the trench heaters
Mounting board	Cover and the spacer particle board for easy installation
Package	Transport package for protection against damage during transportation and handling

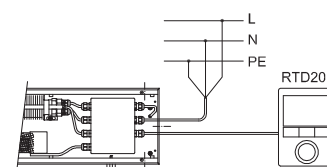
Safety

- Rigid non-roll grille is secured to the trench heater casing - child-tamper resistant
- The surface temperature of the grille does not normally exceed 65°C - in accordance with EN 60335-1 and EN 6035-2-30
- Safety features designed to reduce the output temperature if the grille gets accidentally covered - multiple electronic protection to ensure safety of operation

Technical drawing



Wiring preview



Controls

Room thermostat



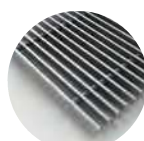
Digital room thermostat



Room thermostat

Variants

Grilles



Rigid

Peripheral ledge



- ⓘ Grilles → 6
 Ⓜ Ledges → 8
 Ⓜ Acoustic power → 13
 ⊕ Accessories → 14
 Ⓜ Wiring → 27

Code example: FET 0110 0225 1600 C 37 J3 R - 6

Trench heater **FET** H = 110 mm, W = 225 mm, L = 1 600 mm, „**C**“ Galvanized steel trough with black inside, heat exchanger and inner parts painted black, „**37**“ black anodized aluminium grille, transverse, rigid „**J3**“ peripheral ledge „**J**“, black anodized aluminium, „**R**“ right-side power connection (with the heating unit installed closer to the window and fans on the room side) „**6**“ 24 V DC fans + installed control unit

FEK 0140 0225

NATURAL CONVECTION ELECTRIC TRENCH HEATER



- glass-walled rooms
- high performance of the heating unit
- operation independent of the central heating system
- silent operation
- safe 24 V DC fan voltage
- 230 V AC / 50 Hz heating unit
- cable connection to IP44 control regulation
- safety sensors along the entire length of the heating unit



* at an indoor temperature of 20 °C

Technical data

Trench heater

Height [H]	140 mm
Width [W]	225 mm
Length [L]	800-2 000 mm in step 400 mm

Heating unit

Typ	Al-Cu type with a heating element
Length	L-410 mm

Operating conditions

Protection	IP 20
Control unit and connection cabling protection	IP 44
Ambient conditions	Temp. T = +2 to +40 °C Humidity RH = 20 to 70%

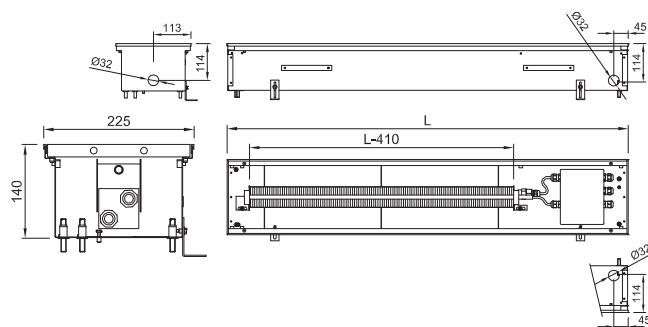
Trench heater standard equipment

Trough	Galvanized steel trough with surface finish and black spray layer inside, black cover plates of connection
Heating unit	Heating unit with aluminium ribs and tubing, including temperature and safety sensors, black coating
Grille	Design walkable grille according to the customer's choice (stainless grilles surcharge)
Ledge	Made of anodized aluminium, type and colour according to the customer's choice
Assembly elements	Leveling screws for setting up the trough, mounting brackets
Manual	Manual for the progress of work during installation and user manual
Wiring	Electrical wiring diagram of the trench heaters
Mounting board	Cover and the spacer particle board for easy installation
Package	Transport package for protection against damage during transportation and handling

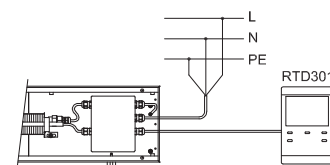
Safety

- Rigid non-roll grille is secured to the trench heater casing - child-tamper resistant
- The surface temperature of the grille does not normally exceed 65°C - in accordance with EN 60335-1 and EN 6035-2-30
- Safety features designed to reduce the output temperature if the grille gets accidentally covered - multiple electronic protection to ensure safety of operation

Technical drawing



Wiring preview



Controls

Room thermostat



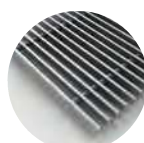
Digital room thermostat



Room thermostat

Variants

Grilles



Rigid

Peripheral ledge



- 🔊 Grilles → 6
🔊 Ledges → 8
🔊 Accessories → 14
🔊 Wiring → 27

Code example: FEK 0140 0225 1200 C 17 J1 R - 1

Trench heater FEK H = 140 mm, W = 225 mm, L = 1 200 mm, „C“ Galvanized steel trough with black inside, heat exchanger and inner parts painted black, „17“ natural anodized aluminium grille, transverse, rigid „J1“ peripheral ledge „J“, natur anodized aluminium, „R“ right-side power connection, „1“ installed control unit

FET, FEK – outputs and acoustic parameters

Technical data

Heating output FET 0110 0225

Length L [mm]	Speed [-] / Heating output [W]		
	minimum	medium	maximum
800	90 W	340 W	550 W
1200	165 W	620 W	1 000 W
1600	260 W	990 W	1 600 W
2000	360 W	1 360 W	2 200 W

Heating output can be continuously controlled with 0 ... 10 V DC

Heating output FEK 0140 0225

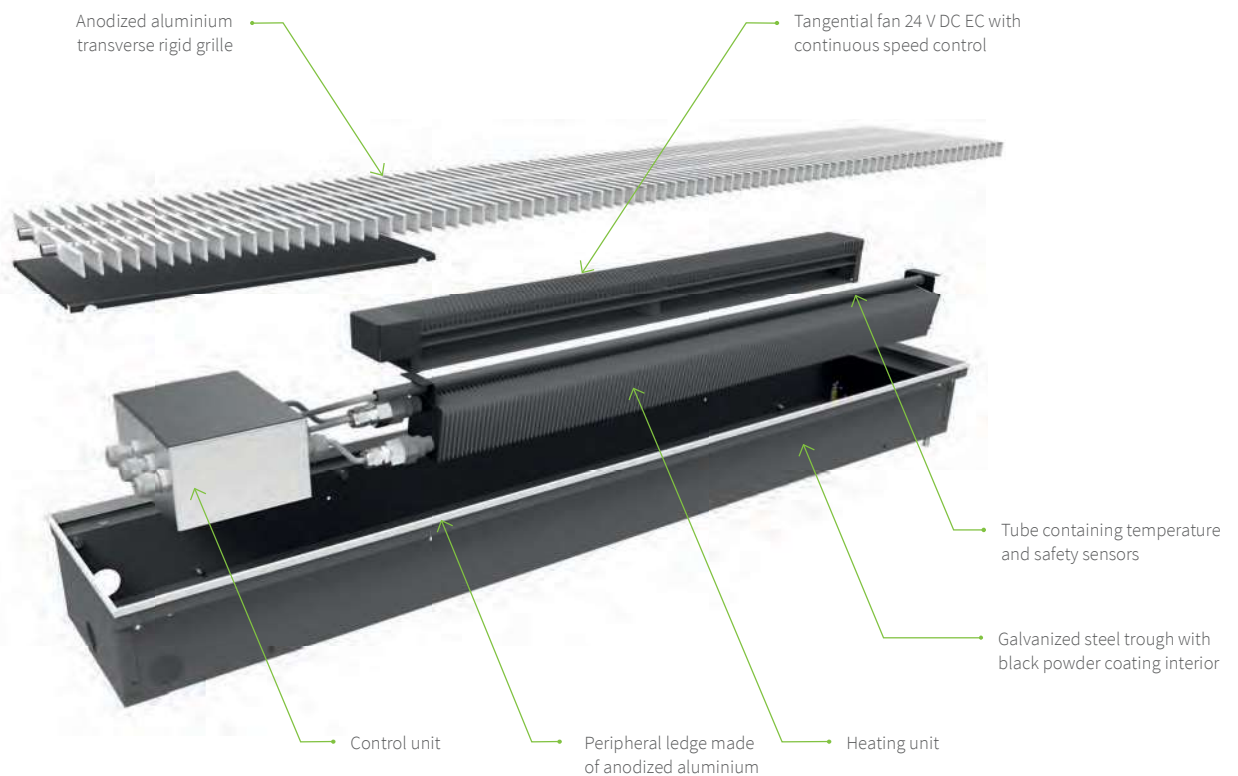
Length L [mm]	Heating output [W]
	maximum
800	250 W
1200	500 W
1600	750 W
2000	1 000 W

Heating output can be continuously controlled with 0 ... 10 V DC

Acoustic power [dB(A)]

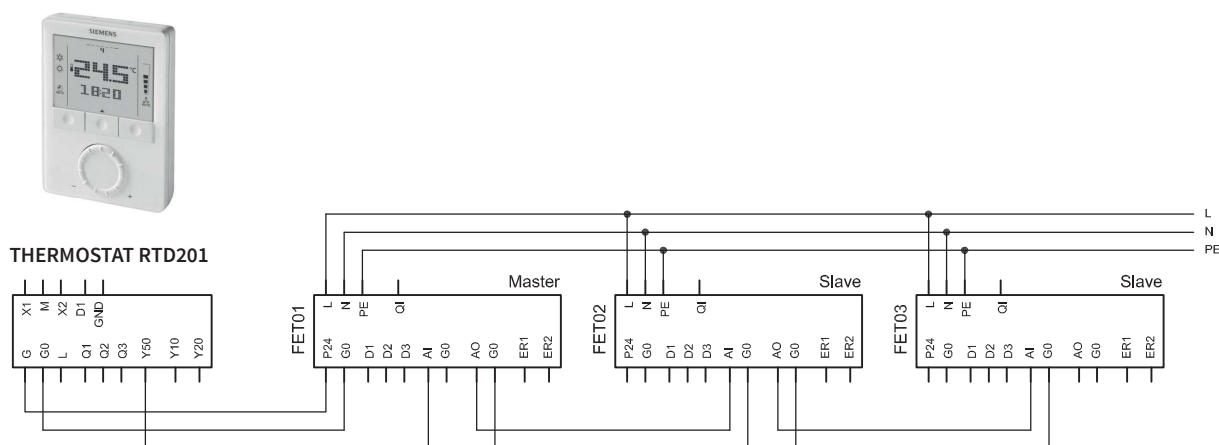
Length L [mm]	Speed [-] / Acoustic power [dB(A)]		
	minimum	medium	maximum
800	< 25 dB(A)	26 dB(A)	29 dB(A)
1200	< 25 dB(A)	27 dB(A)	30 dB(A)
1600	< 25 dB(A)	29 dB(A)	33 dB(A)
2000	< 25 dB(A)	30 dB(A)	34 dB(A)

Trench heater design

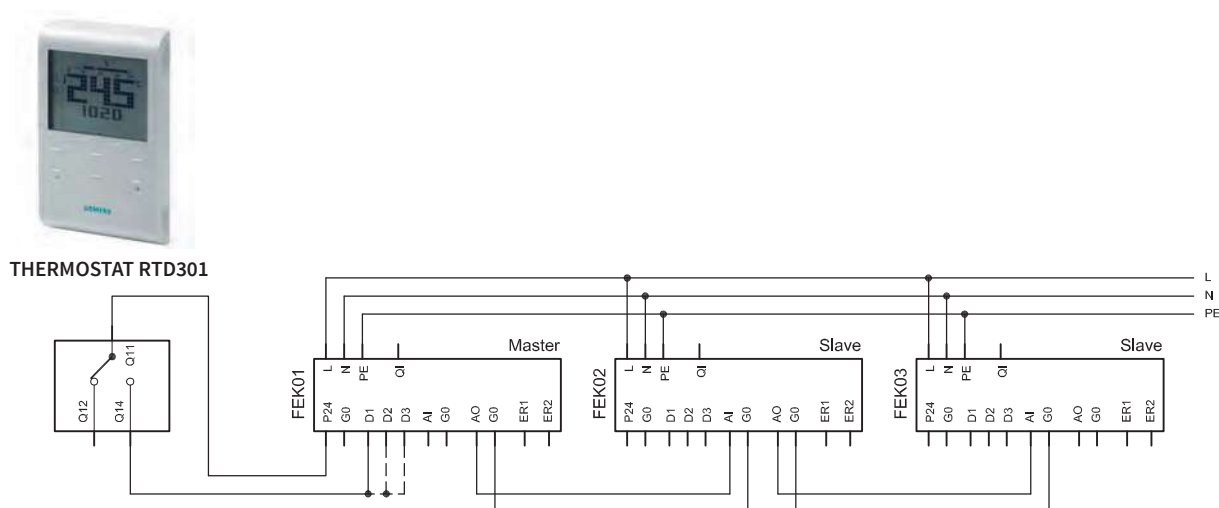


Trench heating wiring diagram

Basic wiring diagram for FET models with the RTD201 thermostat



Basic wiring diagram for FEK models with the RTD301 thermostat



0...10 V DC continuous control

Both FET and FEK electric trench heaters allow for continuous control using a 0...10 V DC signal. The regulator uses this signal to adjust the heating unit output and, in FET models, to continuously regulate the fan speed.

This means that the heater continuously corrects any deviations from the desired room temperature. The RTD201 thermostat functions in the same way.

The 0...10 V DC control facilitates easy integration of the trench heater into modern BMS-controlled buildings and smart homes.

All of these systems are capable of device control using the 0...10 V DC range. As the central control processes information obtained from room sensors, it proceeds to regulate the heating system, including trench heaters, based on the supplier-specified algorithm.

The KNX protocol allows the use of the RTD201KN thermostat, capable of communicating with this higher-level control system (see the accessories).

Combination

It is possible to combine fan-forced and natural-convection trench heaters within one branch. The electricity network must be properly designed with consideration for the power input of individual units.

TERMO for the heating system

WITH FAN



Trench heaters TERMO with forced convection via a fan provide a very good thermal output. This is achieved via installed fans with longitudinal tangential rotors, which force air into a heat exchanger. The fans are fitted with effective electrically commuted (EC) motors functioning on the basis of safe voltage of 24 V DC.

The motors have very small consumption of electric power. The speeds of fans are controlled continuously with a controlling voltage of 0...10 V DC. The room thermostat secures the correct function of all installed TERMO trench heaters, compares the set and actual temperature in the room, opens the flowing of heating medium in the heat exchanger and controls the fan's revs according to the difference in the temperatures and the set mode of operation.

The use of new technologies secures the optimal heating of the interior, which results in energy savings, the economical operation of the trench heater, the high efficiency and flexibility of heating. The trench heater is powered with safe voltage only, all components are powered with direct current of 24 V.

The substantial range of the heights and widths of trench heaters gives the designer a lot of options for selecting a model with the required output for the composition of the floor in question. The necessary data are presented in data sheets of individual products, including the acoustic parameters of the trench heaters.

The range of models with a fan 24 V DC

Heating	Heating / cooling	Heating, humid environment	Heating, installed power supply	Heating and cooling, installed power supply
FRT <ul style="list-style-type: none"> heating with fan lamellar exchanger dry environment page 32 	FRC <ul style="list-style-type: none"> heating and cooling 2 pipe, single circuit with fan lamellar exchanger dry environment page 84 	FRB <ul style="list-style-type: none"> heating with fan lamellar exchanger humid environment page 94 	FRZ <ul style="list-style-type: none"> heating with fan lamellar exchanger installed power supply dry environment page 98 	FZC <ul style="list-style-type: none"> heating and cooling 2 pipe, single circuit with fan lamellar exchanger dry environment installed power supply page 100
	FRD <ul style="list-style-type: none"> heating and cooling 4 pipe, double circuit with fan lamellar exchanger dry environment page 90 			FZD <ul style="list-style-type: none"> heating and cooling 4 pipe, double circuit with fan lamellar exchanger dry environment installed power supply page 100

Trench heater „made to measure“

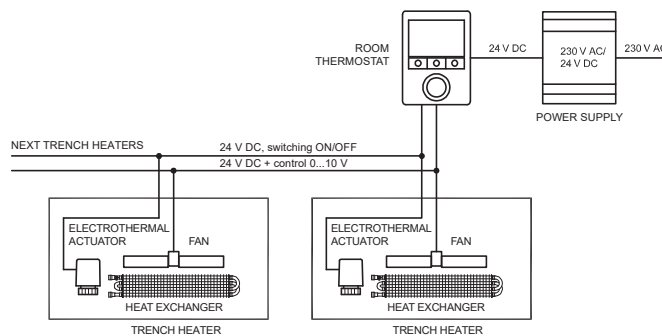
Based on the requirements of larger projects it is possible to supply a „made to measure“ trench heater with adjusted height and width. Having approved the structure we will submit a protocol from a test room presenting output parameters. We also offer modifications of the trench heater for the use in humid environment, the connection of air handling piping and others. The technical documentation is first consulted with the customer and only then the production of the trench heater starts.

Operating conditions

- Installation in a hot water heating system with forced circulation
- Maximal operating temperature of heating medium 110 °C
- Maximal operating overpressure 1 MPa
- Electric parts with IP20 cover protection, use in dry environment (FRB: use in wet environment)
- Operating voltage 24 V DC
- Ambient temperature +2 to +40 °C
- Relative humidity of environment 20 to 70% (FRB: 20 - 100%)

Connecting to the mains

The connection into the electric circuit is done according to the scheme. The entire circuit is powered with a switched power supply (placed in the switchboard), which provides the voltage of 24 V DC. All trench heaters and the room thermostat are connected to this voltage. The cabling shall be sized to ensure that the voltage in distribution lines never drops below 22 V DC in any individual device. More details concerning the sizing of the electric circuit are presented on page 129.



Connecting in the heating system

Lamellar **Al-Cu** heat exchangers have aluminium lamellas pressed onto a copper pipe through which the heating medium flows.

The pipe's outlet and inlet are equipped with a connecting end with internal thread G1/2". Normally the water connection of the exchanger is on the left side (when the exchanger is placed nearer the window).

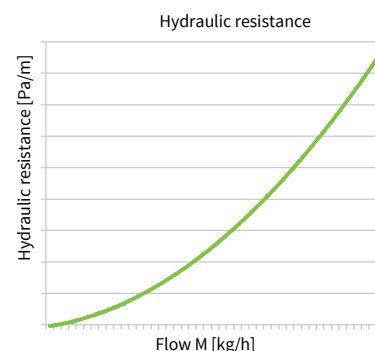
We install a thermostatic valve fitted with an electrothermal actuator on the inlet of the lamellar heat exchanger. The actuator works in the opened/closed mode and controls the flow of the heating medium. It is not necessary to use a thermostatic valve if the temperature of the heating medium is controlled by the heating system (e.g. equithermal system). The way of regulation is to be determined by the designer of the heating and this shall be specified in the project documentation.

A return regulating screw connection shall be used for the outlet. This enables the incorporation of the trench heater into the heating system from the viewpoint of the hydraulic balancing. Based on the parameters of the screw connection used the designer determines the setting (corresponding to pressure loss at the fitting) and this value shall be specified in the project documentation.

Each exchanger is fitted with an air vent valve. When the heating system is connected and filled air bubbles remain caught in the upper part of the exchanger. These shall be let out through the air vent valve.

Hydraulics

- Tables with hydraulic resistance are presented on page 126.
- Some trench heaters have a too high output at thermal gradient of 75/65/20°C, during the calculation of the required flow and hydraulic resistance we will exceed the recommended limitations.
- We design such trench heaters for low-temperature systems or systems with a high difference between inlet and outlet, in which the output and thus also the flow of the heating medium are at acceptable level. Let us consider the flow rate of the heating medium to be up to 300 kg/hour. The designer may increase the flow in the trench heater's exchanger being aware of the fact that this will increase hydraulic resistance and flow rate in the piping (correct sizing of overpressure and the pump), the table with hydraulic parameters is presented on page 126.
- If the output is too high, it is possible to use a trench heater with a reduced number of fans;
- it is best to consult our technical department ISAN Radiatory s.r.o. if this variant is to be selected.



How to size the trench heater

What room the trench heater is to be placed in

We always consider output and acoustic parameters of the trench heater taking into account the room's nature – residential rooms, bedrooms, corridors, offices, theatres, hospital rooms, halls, presentation rooms and others. The trench heater shall comply with the requirement for thermal output at a selected temperature gradient, however at the same time the operation shall not disturb the user with excessive noise. The noise issue is regulated by the applicable standard, which defined permitted limits for individual types of rooms. (more info on page 13).

The output of the trench heater

The tables contain output data for thermal gradient 75/65/20°C, standardized output according to standard ČSN EN 16 430-2. This standard also defines the procedure for conversion to other thermal gradients. The second table presents a converted thermal gradient of 55/45/20°C and a fast approximate conversion for gradients of 90/70/20°C and 70/55/20°C.

Cooling capacity is indicated for dry cooling 17/19/28 °C.

- Convert the output to the required thermal gradient, check acoustic parameters.
- It is not a problem if the calculated output is higher than the required one – the automatic regulation functions from the lowest revs per the output that is equal to the current thermal loss in the room, the trench heater will not overheat, on the contrary it will function with less noise (it will achieve the required output at lower revs), the comfort temperature in the room will be achieved faster