VFL-EX, VTL-EX and VRA-EX
Rectangular electric duct heaters for hazardous areas

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VEAB's rectangular ATEX-approved duct heaters are available in ratings up to 200 kW and are used for heating air in duct systems, central ventilation units and for various industrial processes in environments in which there occasionally occur danger of explosion (Zone 1 and Zone 2). Our flexible production enables us to adapt the duct heater to different sectors of application such as offshore, chemical industry, oil industry and ships.

- Power ratings from 1 kW to 400 kW
- Temperature class T3 (max 200°C)
- For use in areas in which the dangers of explosion are due to gases or fumes (equipment category 2G)
- Degree of protection IP64
- Max. outlet temperature 40°C
- Minimum air velocity 2.5 m/s
- Can be installed horizontally or vertically
- Built-in overheating protection and temperature limiter
- VFL-EX has heating elements mounted in a removable casette

Design

The casing is made of stainless steel EN 1.4301 or acid-resistent stainless steel EN 1.4404. The casing is available in three different versions. See page 7 for additional information. The duct heaters are produced to degree of protection IP64 in accordance with EN 60529.

The tubular heating elements, without surface enlarging plates, are made of stainless steel, EN 1.4301 or from acid-resistent stainless steel, EN 1.4404 on special request. The surface load is max 1 W/cm^2. VFL-EX has heating elements mounted in a removable cassette. The magazine can be pulled out without dismantling the duct section.

The heaters are made with a junction box in Increased Safety Ex e in compliance with EN 60079-7 and with overheating protectors and temperature limiter in Flame Proof Ex d performance in compliance with 60079-1.
There are EX e approved terminal blocks in the electric junction box for both heating elements, the overheating protection and the temperature limiter.

The duct heater has to be equipped with cable glands with IP64 protection, approved for EX e or EX d. These are not included in the delivery.

Approvals

The VEAB ATEX-approved duct heaters fulfill the requirements within EC/EFTA.
Tests and certifications have been performed by Intertec (notified body 0359) as per report: ITS10ATEX36956X
Applied testing standards
Degree of protection IP64, IEC/EN 60529
General ATEX requirements IEC/EN 60079-0
EX d (explosion-proof sealing) IEC/EN 60079-1
EX e (improved safety) IEC/EN 60079-7

The duct heaters are also tested and approved by SEMKO according to:
LVD directive: IEC/EN 60335-1, IEC/EN 60335-2-30 and SEMKO 111 FA1982
EMC directive: IEC/EN 61000-6-2, IEC/EN 61000-6-3 and IEC/EN 61000-3-11

Overheating protection/Temperature limiter

All duct heaters have a manual overheating protector for each phase and powerstep which limits the surface temperature of the heating elements to 200°C (temperature class T3). In addition to this, there is also an automatic temperature limiter which limits the outgoing temperature. Resetting the manual overheating protectors is done inside the junction box.
The overheating protectors and the temperature limiter are constructed to break the security circuits if there is a leakage in the capillary tubes.

Heater in the junction box

In order to further adapt the heater to your application there is a possibility to add a heater in the junction box. This is always recommended for damp environments and for outdoor installations in order to reduce the risk of condensation in the box at low temperatures. Please note that the heater is an option and not a standard delivery.

Control

ATEX-approved duct heaters have to be controlled by appropriate control equipment that are approved for the specific environment in which the control equipment is placed. The control equipment must also have a separate sensor which automatically limits the temperature of the outgoing air from the heater to 40°C.
Observe local regulations governing control equipment for ATEX-certified duct heaters.

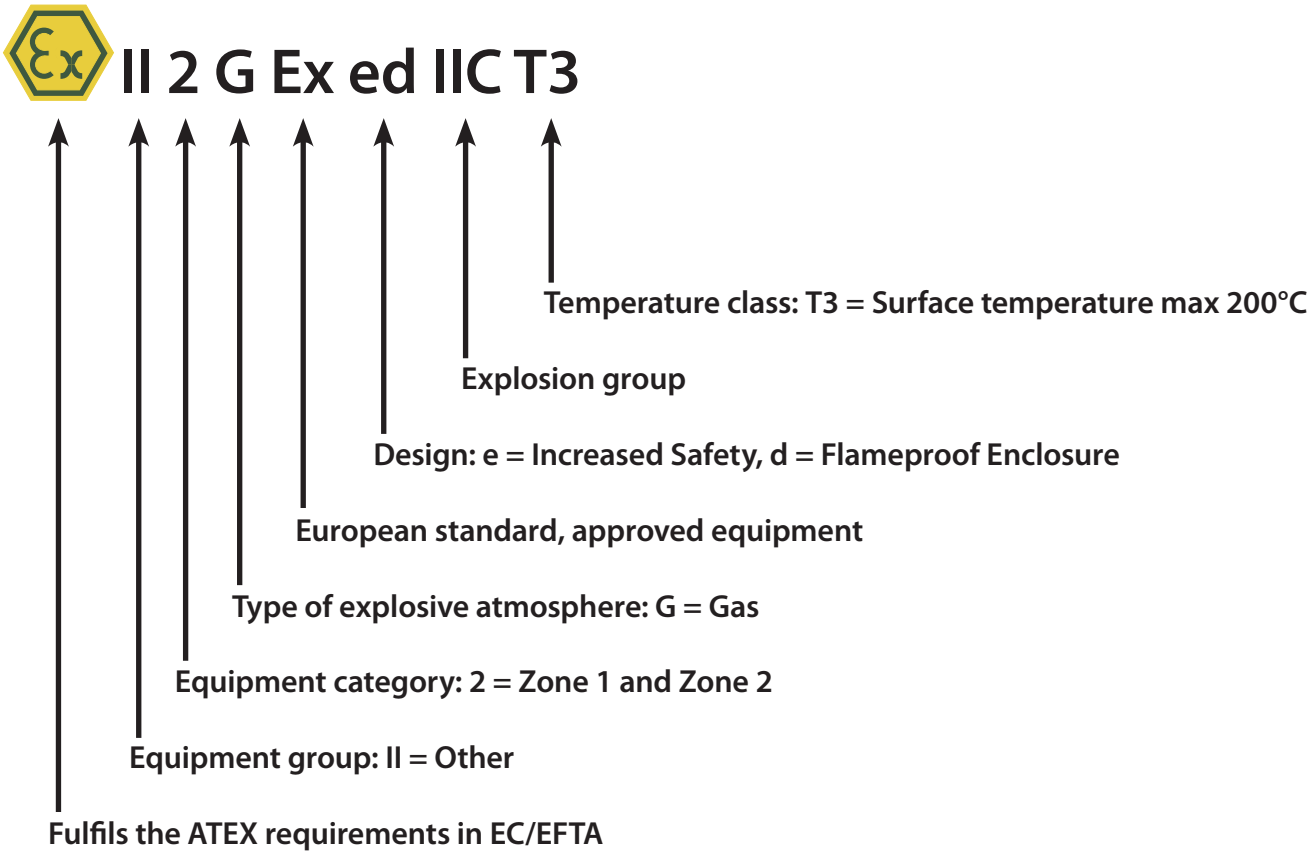
Power supply

The voltage can be adjusted up to 3 × 690V depending on customer requirements.

Powersteps

The total output of the heater can be diveded into a number of steps with maximum 63 A per step.

Markings

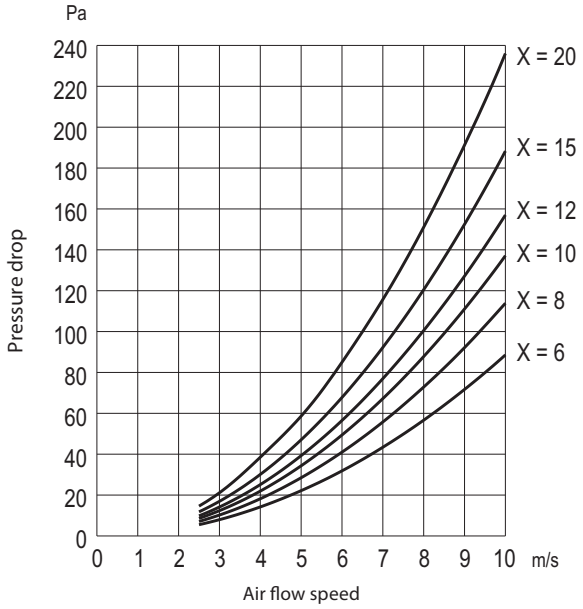


Air pressure drop across the duct heater

The pressure drop of the air flowing through the duct heater is dependent on the air velocity and the number of heating element rows in the heater.
The approximate number of heating element rows can be calculated from the following formula:

$$X = \frac{P}{A \times 5}$$

X = number of element rows
A = flow area of the duct heater, BxH, m^2
P = total power, kW



Minimum air velocity and outlet air temperature

The duct heaters are designed as standard for a minimum air velocity of 2.5 m/s and a maximum operating air temperature of 40°C.
Ambient temperature for the duct heater is -20…+40°C.
The following formula can be used for calculating the air velocity:

$$V = \frac{Q}{3600 \times A}$$

V = air velocity, m/s
Q = air flow, m^3/h
A = cross-section of the duct heater (B×H), m^2

Power demand

The air flowing through the duct heater is heated in accordance with the following formula:

$$P = Q \times 0.36 \times \Delta t$$

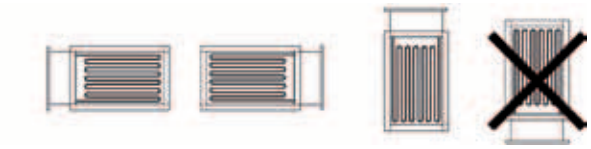
P = power, W
Q = air flow, m^3/h
Δt = temperature rise, °C

Dimensions

ATEX-approved duct heaters are manufactured according to customer requirements. Width and height are chosen in accordance with the duct or the unit into which the heater is to be installed. The dimensioning has to reflect that the minimum air velocity through the heater is 2.5 m/s.
Width and height have to be at least 200 mm and 3000 mm at the maximum, the depth has to measure at least 270 mm and it will be specified by VEAB at the time of quote or order.

Installation

The duct heaters can be installed in horizontal of vertical ducts. The air flow through the duct heater must be in the direction of the arrow on the duct heater cover. In a horizontal duct system, the junction box can be located either on the right, left or upwards, although not downwards. The duct heater must be mounted so that the air flow will be uniform throughout the cross-sectional area. We recommend that the distance to or from a duct bend, fan, damper, etc. should be at least the same as the diagonal dimension of the duct heater, i.e. from corner to corner at the connection face of the heater. In other cases, division plates must be fitted.

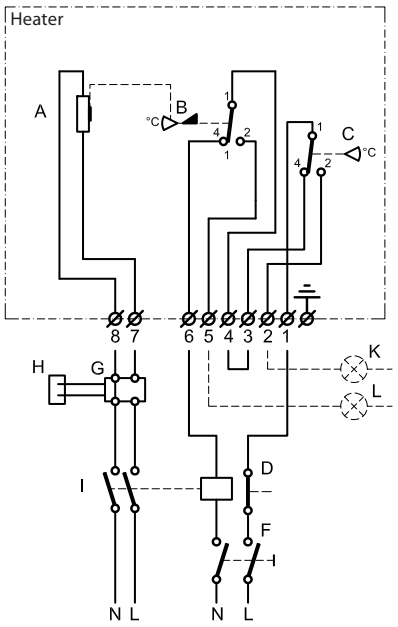


Interlock with fan/air flow rate

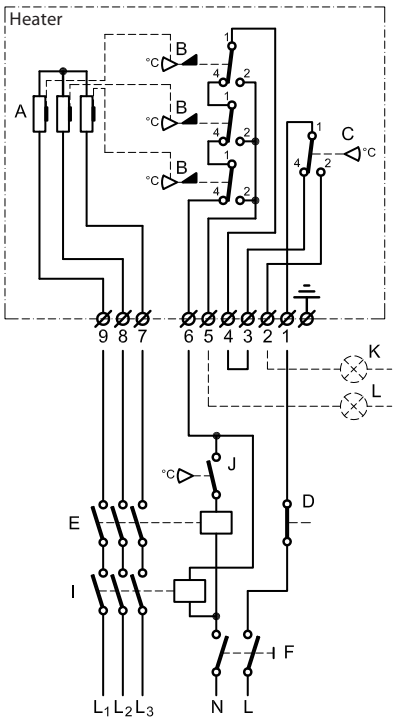
Electric duct heaters must always be installed so that they are interlocked either with the fan that delivers air into the duct or with the air flow rate through the heater.
The power supply to the duct heater must be interrupted when the fan is tripped or if the air flow should cease. For heaters rated above 30 kW, it is recommended that the fan should be left running for at least 3 minutes after the power supply has been switched off.

Wiring diagram

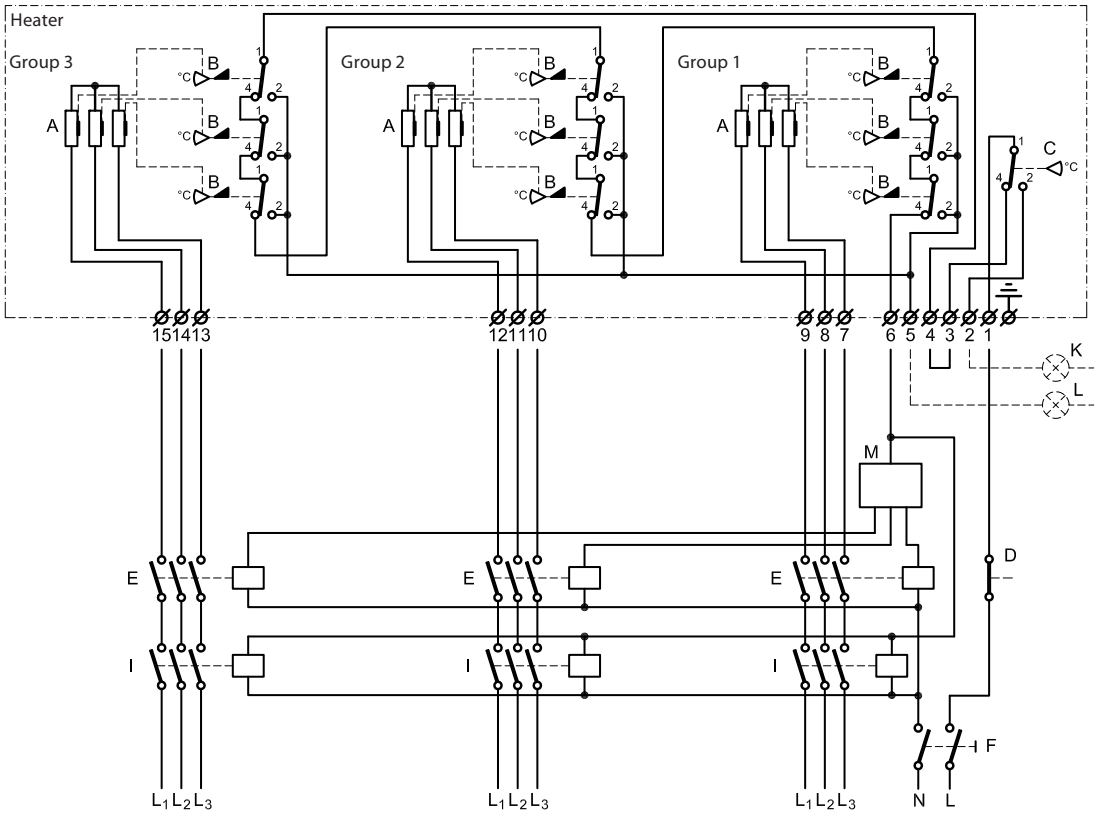
Sample connection 1
230V~



Sample connection 2
Max 43 kW, 400V3~ (63A)



Sample connection 3
Max 129 kW, 400V3~, 3 groups (⅓+⅓+⅓) (3×63A)



A	Load, heating element	G	Outgoing control
B	Overheating protection with manual resets (1 per phase and group) limits the surface temperature of the heater elements.	H	Sensor
		I	Safety contactor, back-up contactor
		J	Thermostat
C	Thermostat for limitation of output temperature	K	Signal, high temperature output
D	Interlock	L	Signal, triggered overheating protection
E	Contactor	M	Regulator / step controller
F	Circuit switch		

Project design/orders

Versions	VFL – with flanges VTL – for insertion mounting in the duct VRA – for air handling unit
Width, dimension B Height, dimension H	Min 200 mm. Max 3000 mm Min 200 mm. Max 3000 mm
Total output, kW	Can be selected between 1 kW and 400 kW
Power supply voltage / max load / output stage	1× 230 V = 1 phase 230 V / 14.5 kW 2x 400 V / 25 kW 3x 230 V / 25 kW 3x 400 V / 43 kW 3x 440 V / 48 kW 3x 460 V / 50 kW 3x 500 V / 54 kW 3x 690 V / 75 kW
Model	M = Heater with built-in overheating protection and for external control equipment.
Casing material	S = Stainless steel, EN 1.4301 SA = Acid-proof stainless steel, EN 1.4404
Degree of protection	IP64
Electric insulation	NI = Normal electric insulation
Temperature class	T3 = Max 200°C on the surface of the heating elements
Output temperature	40C = 40°C max outlet temperature

Type designation VFL-EX and VTL-EX

A type designation of a duct heater may be, for example, VFL-EX-1200-500-80kW-3x400V-M-S-IP64-NI-T3-40C, which describes the design of the product. The type designation is made up in accordance with the following model:

Versions	**Dimension Width, B**	**Dimension Height, H**	Total output kW	Power supply voltage, V	Model	Casing material	Degree of protection	Electric insulation	Temperature class	Output air temperature
VFL-EX	1200	500	80 kW	3×400 V	M	S	IP64	NI	T3	40C

40+40

No. of kW / step

Type designation VRA-EX

Versions	**Dimension Width, B1**	**Dimension Hight, H1**	Total output kW	Power supply voltage, V	Model	Casing material	Degree of protection	Electric insulation	Temperature class	Output air temperature
VRA-EX	1485	570	80 kW	3×400 V	M	S	IP64	NI	T3	40C

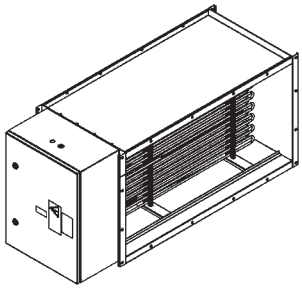
Descriptive text - VFL-EX

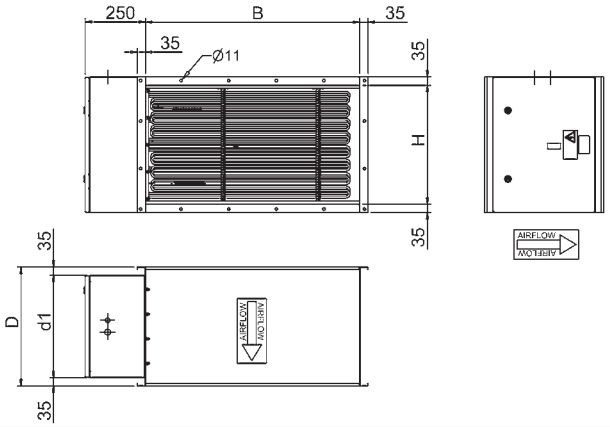
ATEX-approved duct heater of VEAB type VFL-EX-1200x500-80kW-3×400V-M-S-IP64-T3-40C, with casing in stainless steel EN 1.4301 and heater element in stainless steel EN 1.4301. Complete with built-in heater in the junction box. Airflow: 7000 m^3/h

Width: 1200 mm
Height: 500 mm
Depth: VEAB will specify the depth in the quote and in the order confirmation
Output: 80 kW
Output stages: 40 kW + 40 kW
Voltage: 3×400 V
Model: M
Casing material: Stainless steel, EN 1.4301
Degree of protection: IP64
Temperature class: T3 (max 200°C)
Max output air temperature: 40°C
Element material: EN 1.4301
Heater in junction box: Yes

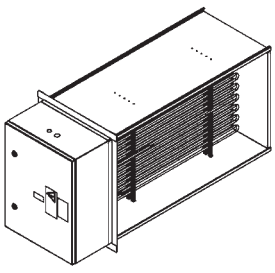
Dimensions

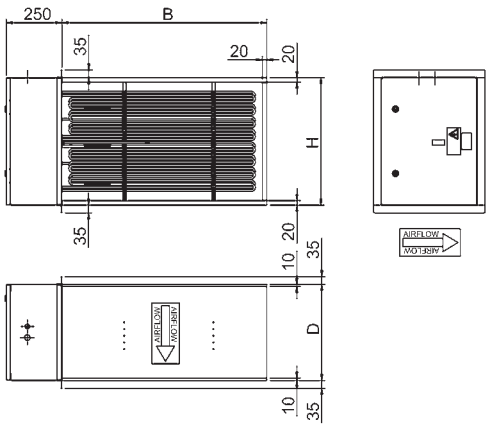
VFL – with flanges



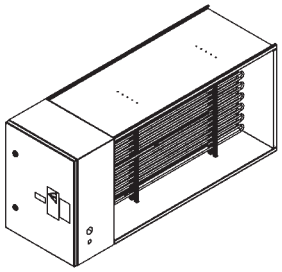


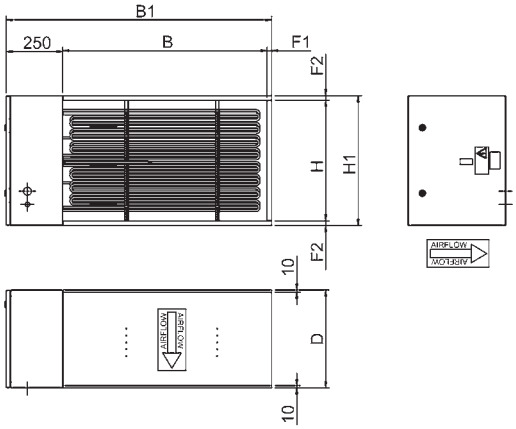
VTL - for insertion mounting in duct system





VRA – for air handling units





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