Technical Description

ENGELS ELECTRIC AIR HEATERS

Design, Materials
Engels electric air heaters are heat exchangers for electrical energy that have been specially developed for use in heating, air conditioning and ventilating systems.

Because of the many new constructive and functional features, these units provide optimal solutions for the heating of flowing air.

The standard bolted duct is made of aluminium ALMG 3, DIN material no. 3.3535, with a continuous, non-drilled flange of 25 - 35 mm (standard unit) or as requested for optional units. The material thickness is 1.5 to 3 mm depending on unit size. The ELP 1-36 Engelcanal® and ELR 0,25-9 Engelvari-o® feature galvanised sheet metal canals.

Genuine Engels heating grids® are used exclusively as heating elements. Millions of these special heating elements have proven successful in the widest variety of electric heating equipment for air heating.
Engels heating grids® are woven in a meander pattern on special heavy-duty weaving machines developed by ourselves. Thanks to this special manufacturing process, the non-glowing heating conductor made of the corrosion-resistant special alloy CuNi 44 (detailed information on page 39) can stand freely in the air flow. This unique advantage ensures inertia-free regulation, a low surface temperature and the avoidance of dangerous after-heating. For the electrical and thermal insulation of the heating conductor, and for the construction of our tested, self-contained heating grid, we use fibre glass as the carrier material. The E-glass fibres are non-flammable and treated with a non-combustible, solvent-free high-temperature insulation compound to ensure the required stability. For further information, see page 38.
Engels heating grids® are flat, shock- and vibration-resistant, with a large surface-area, and operate noiselessly. The large heat-producing surface ensures good heat emission to the air flowing by. Installation is made layer by layer with ceramic insulation stones and aluminium tubes (AL 99.5) as spacers, on galvanized threaded rods. For internal wiring, silicon copper strands are used (permanent temperature resistance up to 453 K/+180 °C), with all connections per terminal and the switching of the individual heating grids optimally staggered according to the relevant switch stage, to ensure uniform heat distribution. The externally located aluminium terminal box (not with type E-HR 6) complies with regulation VDE 0110 part 2 regarding permissible air flow and electrical creepage distances, and allows quick and safe electrical connection to be established at the interior terminal strip.
All parts are corrosion-protected:

Installation
When installing, please note the pertinent regulations as well as our detailed installation instructions on page 15, Catalogue EL 2020.
Experience has shown no difficulties when operated under the conditions of usual humidity.
Before starting operation, check the adjustment of the temperature limiter and air flow monitor.

Regulation
We offer a complete solution:
Engeltherm® electronic temperature control equipment
Engelthyrotemp® temperature control cabinets.

Electrical connection/control
The electrical connection may only be made by an electrician. Here VDE 0100/DIN 57100 must be especially observed. The control system, always to be structurally integrated, must integrate the above-mentioned safety regulations according to our information bulletin no. S 20. Also note information important for the electrical connection on pages 15 + 16.
Terminal strips acc. to VDE allow simple, fast and safe connection. The switch stages/groups are according to list or specification. The lowest stage is always the output of the heating grid specified in the list. Higher stages can always contribute many times this output.
When changing the prescribed switch group number, check whether the circuit can be in Ph-N or only in Δ/Y. The number of the integrated heating grids, with Ph-N circuit, counts as the highest switch stage number, it being also possible to distribute the total output uniformly over three phases.
In principle, the regulation of the electrical heat exchangers should depend not on the electrical output, but exclusively on the level of the desired temperature increase (Δt), as well as the desired control precision. Temperature fluctuations greater than $\Delta t = 4K$ should be avoided for reasons of comfort. The most economical regulation (least expensive heat exchanger version) can be established by means of linear stage switches and meets the highest demands for comfort, thanks to electronic control design= Engeltherm®.
Single-stage heat exchanger versions for continuous thyristor control generally also involve no extra charge = Engelthyrotemp®.

Should digital or binary controls be planned, considerable extra cost as well as in part essentially greater installation depth for manufacture of the heat exchanger arise from the different stages (and precisely prescribed magnitudes) of the individual stages. The prescribed breaking capacity of max. 10 A fuses allows only a max. output of up to 2 kW to be directly switched on.
With all greater output levels, the control system must be structurally integrated with power protection.

Note
It is possible to increase output by combining several units. Other voltages (up to max. 690 V) are available on request. Other dimensions, output levels, constructive designs, etc. acc. to optional line. Most of the units are also available silicon-free on request.
Engels electric air heaters are tested in compliance with Low-Voltage Giudelines (93/68/EEC), EN 60335-1 and EN 60335-2-30.

Technical Data - Standard Units

Operating voltage:	230 V (alternating current) 230 V or 400 V (rotary current)
Heater output;	listed units up to 100 kW correspond to 360,000 kJ (86,000 kcal)
Air outlet temperature:	max. 373 K (+100 °C), higher temperatures on request.
Air speeds:	approx. 1.5 - 10 m/s (acc. to spec. min. 2 - 3 m/s)
Dimensions:	see list