

## ENGELS - ELECTRIC-AIR HEATER

Information No. S 20  
Safety measures 01/2024

Engels-Electric-Air Heaters, Engelnorm, Engelcanal®, Engelvari-o®, Engelcompact® and Engelspecial are high-quality components for modern heating, air conditioning and ventilation systems. They are manufactured according to the latest functional and quality requirements and offer you optimum problem solutions.

However, in order to ensure trouble-free and safe use, it is essential that the prescribed safety measures are taken, as electric heat exchangers can generally reach such a high excess temperature that a fire hazard cannot be ruled out, even in the low-temperature version during undisturbed, intended operation, in the event of improper use or disturbed operating conditions (e.g. failure of the air flow).

The necessary safety measures are prescribed by VDE regulations (temperature monitoring/limitation), VOB regulations (air flow monitoring), as well as by statutory building and fire regulations and official regulations, e.g. TÜV, DIN, trade inspectorate, employers' liability insurance association and special regulations, such as the building inspectorate directive on fire protection requirements for ventilation systems, and must therefore be strictly observed.

### 1. System interlock

Electric air heaters must always be electrically interlocked against the fan so that the air heater can only be switched on when the fan is running (e.g. according to the circuit diagram on the back). This dependency also ensures that the air heater is also switched off if the fan fails. As this electrical safety circuit may remain ineffective in the event of a mechanical fault, e.g. rubbing of the V-belts, further precautions - as described under points 2 and 3 - must be observed.



**ENGELAIR®**  
Air flow monitoring

**CE** ELW 170  
ELW 180

ENGELAIR®

### 2. Air volume monitoring

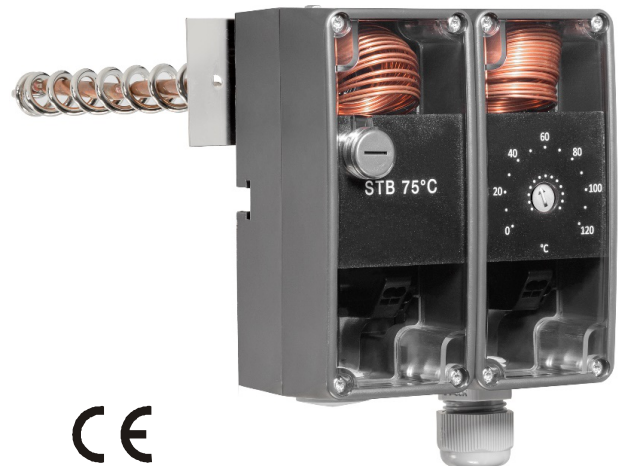
Regulation according to VOB 3.2.3.3./DIN 18379  
DIN VDE 0100 - 420 (Oct. 2019 / Section 424.1)  
IEC 60364 - 4 - 42 : 2010 + A1: 2014  
Building authority guideline version Jan. 84  
VDI 88803 44.5. (2015)

In addition to the malfunction described above, failure to achieve the specified air volume flow can also be the result of dirty filters or closed fresh air or fire dampers.

Monitoring is also particularly important with infinitely variable fans to ensure that the air velocity does not fall below the minimum required for the air heater (approx. 1.5 - 2 m/s).

Mechanical wind vanes, differential pressure switches and even most commercially available electronic air flow monitors do not comply with the latest regulations. We therefore recommend that you only use our ELW 170 and ELW 180 devices.

Both electronic devices of the latest design have an adjustable switch-on delay, as well as a potential-free changeover switch (relay), which must be connected as a control contact in the auxiliary circuit upstream of the heating power contactor. At the same time, a fault indicator can be provided. The electrical connection options are shown on the back as a connection diagram.

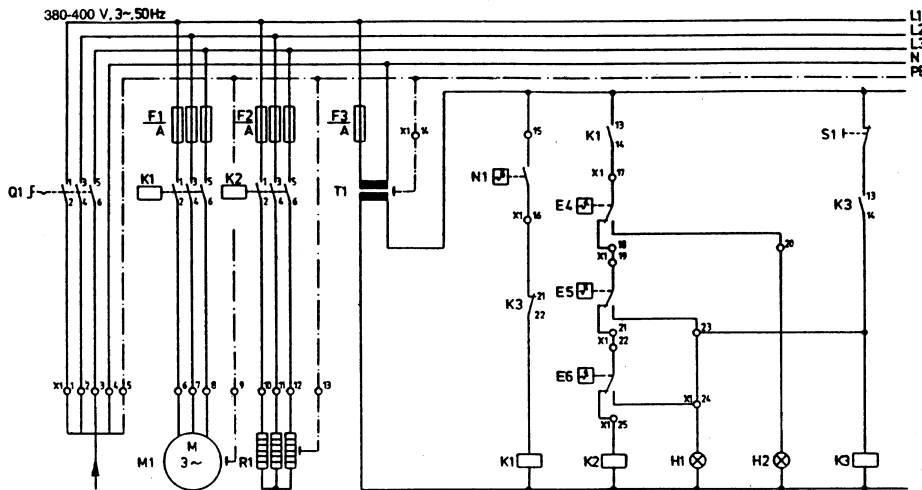


**ENGELCONTROL®**  
Safety temperature limiter  
Type STBW 225 / RTKSA-011-210

The current DIN VDE 0100-420 (Oct. 2019) stipulates the use of two independent temperature-limiting devices (e.g. TR and STB) for fan-assisted heating systems in addition to air flow monitoring. **In addition, the heating system may only go into operation once the intended air flow rate has been reached.** However, according to the 'Building Inspectorate Directive', which has priority, at least one overheating protection must be provided as a safety temperature limiter (max. 373K) (e.g. our type ZB 123).

It cannot be ruled out that an additional STB will be required for system acceptance in accordance with the model ventilation system directive M-LÜAR (as of 2005) point 6.1.

### Connection diagram with integrated safety devices



N1 = Temperature controller  
 E4 = Current monitor  
 E5 = Temperature monitor

E6 = Temperature monitor / safety temperature limiter  
 S1 = Fault clearance button  
 H1 = Heating fault indicator  
 H2 = Fan fault indicator

### 3. Engelcontrol temperature limiter / monitor

(Regulation according to DIN VDE - 0100 - 420, VDI 3803- 4.4.5, VOB 3.2.3.3).

In addition to the measures described above, a temperature limiter/monitor must always be provided as further protection against possible overheating of the air heater. Since electric air heaters have a small cell constant, only fast-responding devices should be used for monitoring.

For this purpose, temperature monitors - TW, e.g. our type ZB 111 (for a detailed description, see catalogue EL 2021 p. 12) - are usually installed directly at the top of the duct above the heating grilles (for

(when retrofitting, please ensure that the capillary sensor is at least 20 mm away from the upper heating grid). With this device, the desired switch-off temperature can be set (this usually depends on the surrounding components, as the air heater itself does not suffer any damage even if excess temperatures of e.g. 400 K occur for a short time) and the switch-off would then take place above the set value if the air flow fails. Once the temperature falls below the set value, this device switches on again automatically, so an electrical interlock must be provided on site. In accordance with VDI 3803, however, a safety temperature limiter must always be used as a second device. (e.g. type ZB 123, or as a double device type STBW 225), possibly even in the direction of flow behind the air heater (max. 1 m). The setting value should preferably be selected in the range of 348 - 373 K. At low air velocities or higher discharge temperatures, the maximum setting of 373 max. may also be necessary.

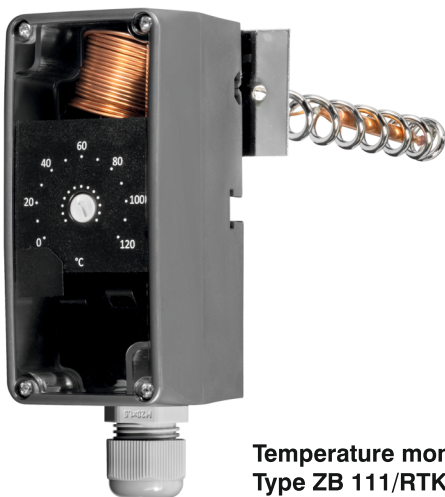
As the safety temperature limiters type ZB 123 and Type STBW 225 safety temperature limiters have a restart lock, they must be unlocked after switching off by pressing the button (the reset button) and removing the cover cap. The cause of the failure should be determined by a specialist beforehand and unlocking should only be carried out by a qualified electrician.

When using temperature monitors and safety temperature limiters, please note that subsequent accessibility must also be guaranteed.

Furthermore, when making the setting (temperature limit value), it must be taken into account that the temperature monitor is set approx. 10 K lower than the safety temperature limiter. In all Engelcompact air heaters of the E-HR 6 series, we always install a type ZB 01 temperature monitor (T75 or T90 version) as standard (for a detailed description, see catalogue 2021 p. 34). This is a bi-metal monitor that is permanently set to a switch-off temperature of 348 or 363 K. An electrical interlock must be provided by the customer.

For installation in your appliance, at a distance of approx. 10-20 cm in the direction of flow behind the electric air heater, the safety temperature limiter type ZB 123 can be installed additionally, but we can usually also install it directly in the air heater.

Since the aforementioned safety measures remain ineffective if the heating contactor is »stuck«, an additional temperature monitor would have to switch on the fan and signal the fault at the same time.



Temperature monitor  
 Type ZB 111/RTKSA001.301



Safety-Temperature limiter  
 Type ZB 123/RTKSA003.312