

## System comparison tflex & tflexHP

### Introduction:

Our tflex & tflexHP systems are electric heating systems specially designed for very high temperature ranges. Their operating principle is similar to that of the gflex system series, with the difference that various components are designed to meet special regulations and higher temperatures. A thermal oil is used as the heat transfer medium. tflex & tflexHP are compatible with almost all tank containers on the market - even for retrofitting. Modular in design, the result of each system is an individual and maintenance-friendly design with many expansion options.

### Function:

The systems of the high-temperature series temper the tank contents indirectly via the outer wall of the container. For this purpose, the circulation pump conveys a heat transfer medium in a closed circuit through the half-pipes, which are normally used for steam heating. The heat transfer medium is a thermal oil based on alkylbenzene. The electric heater installed in our system is part of the closed circuit.

In heating mode, the electric heater integrated in the system heats the heating medium. The heating of the heat transfer fluid is carried out according to the principle of a continuous flow heater, whereby it is strictly separated in terms of material from the customer's product. The power supply for the system is provided by an industry standard 380-440 V CEE plug. Heating is fully automatic. The flow temperature at which the heat transfer medium flows into the container's pipe circuit can be set with high precision. In this way, even very temperature-sensitive products are protected from quality losses due to too high contact temperatures.

### Additional info:

tflex is the standard version of the system series. It is therefore equipped with the features of a high-temperature system as described above. The system series generally has better basic equipment than the gflex series. A microflexPLC control system with its extended control functions is part of the basic equipment of the system series as standard. The system can be further equipped with some additional options.

tflexHP is the high-power system of the system series. In addition to the features of a high-temperature system, tflexHP reaches the flow temperature particularly quickly thanks to its higher output of 27.5 kW. The system series generally has better basic equipment than the gflex series. A microflexPLC control with its extended control functions is part of the basic equipment of the system series as standard. The system can be further equipped with some additional options.

## System comparison tflex & tflexHP

tflex



tflexHP



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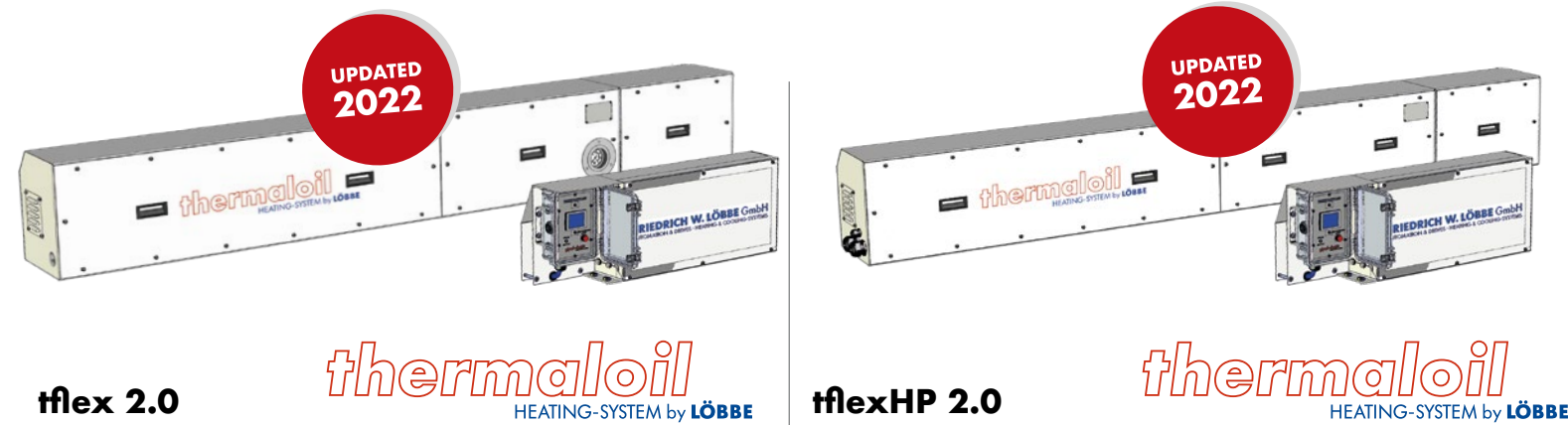
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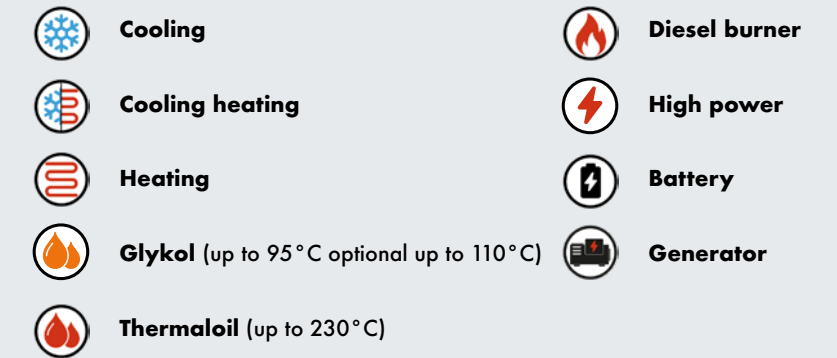
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Product group:	Electrically operated high temperature thermal oil heating systems for integration on tank containers	
Product details:	Slightly lowest priced system, more compact design	+ High power system, compact model, to quickly reach the target temperature
Housing formfactor:	+ The systems are largely adapted to the contours of the tank container	
Installation of operator panel:	+ Control panel installation possible at different locations on the tank container	
Heating power:	+ Up to 21 kW (at 440 V)	Up to 27,5 kW (at 440 V)
Circulating pump:	Powerful three-phase stainless steel circulation pump 380 V to 440 V 3 AC with ceramic shaft, magnetic coupling, SAE flanges and rotation direction monitoring 50/60 Hz 2.8 kW	
System safety:	+ Stage III	
Mains connection:	32 A CEE - 380 to 440 VAC (50/60 Hz)	2x 32 A CEE - 380 to 440 VAC (50/60 Hz) optional 1x 63 A CEE
Ambient temperatures:	-20 °C - +40 °C	
Max. preflow temperatures:	Up to 230 °C	
Control unit:	microflexPLC controlled	
aflex extention <sup>3</sup> :	No	
Control schematic:	+ The system has an intuitive visualization, almost all functions are operated using a touch display	
Scope of functions:	+ Advanced control and safety functions (TRM, SFM, PCM, ECO) <sup>1</sup>	
Telematics interface:	+ With data interface (all common protocols)	
Telematics scalable:	+ Extended telematics functions, in addition to the simple telematics functions also detailed, historized fault messages incl. remote maintenance <sup>2</sup>	
Installation positions:	Upright installation position only	
Clip-In Generator expandable <sup>4</sup> :	No - however, the system can be operated via a clip-on power generator	
Maintenance:	+ The heating rod and other wearing parts can be reached and replaced from the front	
Housing:	+ All housings are made of stainless steel and are additionally powder-coated for corrosion protection	

<sup>1</sup>see list of abbreviations/special functions <sup>2</sup>Remote maintenance access to the heating system is only possible with our self-developed telematics (working title teleflex). <sup>3</sup>aflex is an agitator extension for many of our heating systems and for our cooling /heating system cflex. The heating system is extended in the control accordingly and can control one or more agitator drives. The drives can additionally be equipped with frequency converters to control the rotation of the agitators. <sup>4</sup>The clip-in generator is a small power generator system which can operate electrically low-power heating systems, such as dflex and at the same time represent a runtime extension. Since a diesel-powered heating system can run longer on its diesel filling, than on its battery charge, the clip-in generator can be used to provide an equalization.

### Pictograms & abbreviations list:



#### TRM: Temperature Rise Monitoring

The controller monitors the rate of temperature rise. If this rises too quickly, the heat is not transported away correctly and there is a high probability of a flow fault; the system then switches off the heating process and outputs an error message.

#### SFM: Software Flow Monitoring

The temperature of the heating medium is monitored at two points in the system. If the differential temperature remains stable within a set range, the flow of the heating medium is in order. If the differential temperature drops, there is a flow fault, and a warning message is issued.

#### PCM: Power Contactor Monitoring

The mechanical main and circuit contactors in the system are switched at fixed intervals (once a day), the auxiliary contacts are monitored, and it is determined whether the contactor is still working reliably. In this way, any „sticking“ of the contactor can be determined. If one of the two contactors no longer switches correctly, the system is disabled for heating processes and an error message is displayed.

#### DBM: Double Boost Mode

This mode is currently only available for the hybrid and dflexHP systems. When connected to the mains voltage, the system can also switch on the diesel burner in addition to the electric heating element. This is only possible for a certain period and is then blocked until the system is restarted.

#### SCM: Single Channel Monitoring (ibcflex only)

The single channel monitoring measures the temperature at each back flow connection of the ibcflex, thus the most accurate temperature control of the product is possible. This monitoring can also be carried out directly in the product, either cable-bound or by radio sensors.

#### ECO: Eco Mode

The eco mode is an automatic operating mode to make the heating process as energy-efficient as possible. In a system with a minimum of two heating elements, both are controlled in such a way that the heating phase is as short as possible, and the holding phase is as economical as possible.

#### STB: Safety Temperature Limiter

The safety temperature limiter is a standard component installed in every heating system, from Stage I to Stage III. It is the most important and, in case of a temperature rise monitoring (TRM) in the system, also the last instance for emergency shutdown of the heating process. The sensor of the STB is located directly on the heating rod and switches off the heating rod at a fixed defined overtemperature (e.g., 105 °C).

#### Stage I-III: Safety Level (I - lowest / III - highest level)

The individual safety levels are shown in a table, currently only levels II and III are used. Level I is only used in old or transitional systems.