

System comparison of the Löbbe autarkic series - dflex, dflexHP & hybrid

Introduction:

Our system series dflex, dflexHP & hybrid are heating systems specially designed for self-sufficient (mains-voltage-independent) use. This system series, with its two different operating modes, offers particularly great flexibility. In addition to electrical heating via 380-440 V CEE plugs, an economical diesel heating system enables self-sufficient operation. dflex, dflexHP & hybrid are compatible with almost all tank containers on the market - even for retrofitting. Modular in design, each system is an individual and maintenance-friendly design with many expansion options.

Function:

The systems of the autarkic series temper the tank contents indirectly via the outer wall of the container. For this purpose, the circulation pump conveys a heat transfer fluid in a closed circuit through the half-pipes, which are normally used for steam heating. The heat transfer fluid is a food-hygienically safe glycol-water mixture. The electric heater and diesel heater installed in our system are part of the closed circuit, depending on which mode the system is in, the heat transfer fluid is heated either by the electric heater or the diesel heater.

In electric mode, the electric heater integrated in the system heats the heating medium; this mode is used, for example, for stationary loading & unloading. The heating of the heat transfer fluid is carried out according to the principle of a continuous flow heater, in this process the fluid is strictly separated from the customer's product. The power supply for the system is provided by an industry standard 380-440 V CEE plug, this also charges the battery for autarkic needs.

In diesel mode, the diesel heater integrated in the system heats the heating medium; this mode is used for intermodal transport when no external power supply is available. The heating of the heat transfer fluid is carried out according to the principle of a continuous flow heater, in this process the fluid is strictly separated from the customer's product. A battery supplies the electronics of control and temperature regulation independently of the mains supply. It is always being charged during mains operation.

With dflex/dflexHP, the battery can be connected to the vehicle's electrical system for trickle charging during truck transport, under the condition that the truck can deliver sufficient power, so the system's runtime is limited only by the diesel tank.

With the hybrid system, a diesel generator - fully integrated exclusively for this purpose - automatically charges the battery as soon as its capacity falls below 15%. This means that the system's running time is only limited by the diesel tank.

For both modes, 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. This means that even very temperature-sensitive products are protected from quality losses due to too high contact temperatures.

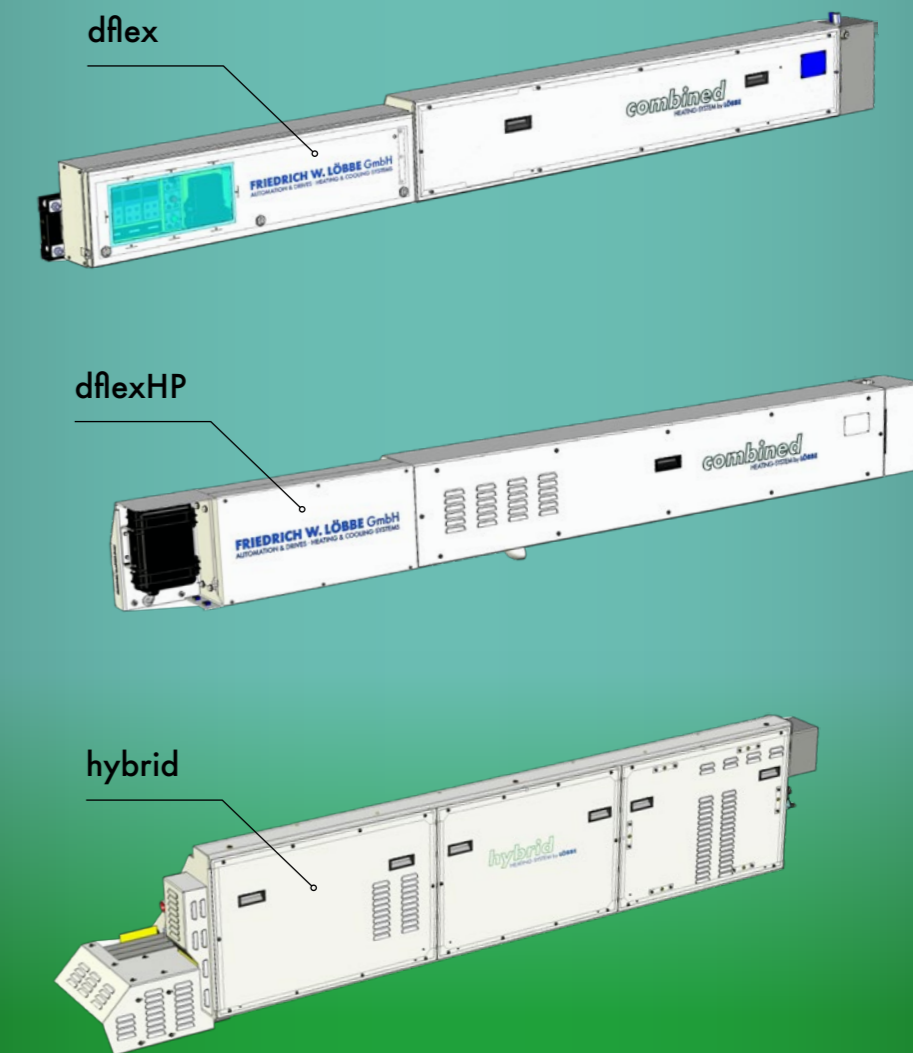
Additional info:

dflex is the standard version of the system series and is therefore the simplest self-sufficient system. It has all the standard functions of the system range and forms the basic equipment for all the three systems. Through some options, extended equipment functions can be retrofitted. Due to the reduced burner power and the lower supply temperature (in diesel burner mode) - this system is often used, for example, for the shorter transport of raw chocolate products.

dflexHP is one of the two high-power systems in the system range. In addition to the standard features, the system has a more powerful burner and can temporarily activate the boost mode, a dual operation of electric & diesel heating. Thanks to the higher power, the flow temperature is reached very quickly. dflexHP comes with better basic equipment than dflex. So basically, it has a bigger and more modern battery system, the new microflexPLC control system, advanced telematics, control and safety functions and much more. By adding battery capacity and an optional range extender, which is a small generator that can be integrated into the container, dflexHP can perform the same function as the hybrid system. This extension is only worth it if the customer has already purchased several dflexHP and then needs the longer self-sufficient runtime. dflexHP is a system that has a longer self-sufficient battery runtime because it can use up to 690 Ah battery capacity. dflexHP is often used in MDI and MMDI transport, for example. Just like hybrid, it offers several additional features beyond the basic equipment.

hybrid is the high-power system with additional fully integrated power generator and therefore has the widest range of functions. In addition to the standard functions, the system has a more powerful burner and can temporarily activate the boost mode, a dual operation of electric & diesel heating. Thanks to the higher power, the flow temperature is reached very quickly. The difference between dflexHP and hybrid is the fully integrated power generator, but the generator does not provide the voltage for the electric heating energy, but only charges the battery. This makes it up to ten times smaller than a conventional external clip-on generator and has the advantage that the runtime is only limited by the diesel tank. hybrid, like dflexHP, comes with better basic equipment than dflex. It basically has a modern battery system, the new microflexPLC or PLC control, extended telematics, control and safety functions and much more. hybrid is the system that has the longest self-sufficient runtime. Just like dflexHP, it offers several additional features beyond the basic equipment.

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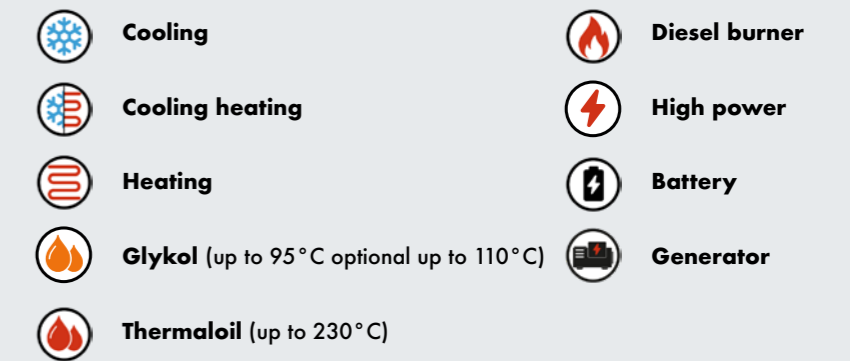
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Product group:	Autarkic, diesel and electric glycol/water heating systems for integration in tank containers - diesel heating systems which are operated by their own battery system - independent of mains voltage!		
Product details:	Lowest cost system, compact design	High power system, compact design	+ High power system with integrated power generator
Housing formfactor:	+ The systems are adapted to the contours of the tank container in their narrow design		The container must be slightly adapted to the design of the system ¹
Installation of operator panel:	The control panel forms a unit with the heating system.	+ Installation possible at different locations on the tank container.	Control panel installation at different locations under certain conditions.
Heating power:	Up to 9.1 kW diesel heating power and 12 kW electric heating power	+ Up to 15 kW diesel heating power and 12 kW electric heating power	
Scalable heating power:	Diesel and electric heating system are each separately usable.	+ Double Boost Mode (DBM) - diesel and electric heater can heat together for a certain period = 27 kW heating power	
System safety:	Stage II	+ Stage III	Stage II with PCM (as of version 2.0: Stage III)
Battery charging options:	Batteries can be charged using mains voltage or truck on-board voltage		+ Can be charged via mains voltage or integrated power generator
Runtime examples:	Up to 42 h with 35 l fuel tank and 120 Ah battery	Up to 58 h with 35 l fuel tank and 230 Ah battery/ 173 h with 120 l and 690 Ah bat.	+ Up to 168 h under optimal conditions (230 l/100 Ah)
Battery capacities:	120 Ah (Blei/Gel battery)	+ 230 Ah up to 460 Ah (LiFePo Battery)	100 Ah (as of version 2.0: LiFePo Battery 230 Ah)
Fuel storage:	35 l fuel tank	35 or 120 l fuel tank (as of 460 Ah always 120 l)	+ 120 l or 230 l fuel tank
Mains connection:	32 A CEE connection - 380 to 440 VAC (50/60 Hz)		
Ambient temperatures:	-20 °C bis +40 °C ²		
Max. preflow temperatures:	Up to 65 °C in diesel operation, boost to 80 °C ³ /95 °C electric operation	+ Up to 90 °C in diesel operation/95 °C in electric operation	
Control unit:	2-point-regulator, optionally with data interface	+ microflexPLC controlled	+ PLC controlled (As of version 2.0: microflexPLC controlled)
Control schematic:	The system is operated by a control panel and the regulators	+ The system has an intuitive visualization, almost all functions are operated using a touch display.	
Range of functions:	Simple control functions, threshold monitoring	+ Advanced control/and safety functions (TRM, SFM, PCM, DBM, ECO) ⁴	
Telematics interface:	With optional data interface (RS485/Modbus)	+ With data interface for all common protocols (e.g., RS485/Modbus, CAN-Bus, Ethernet)	
Telematics scalable:	Optional: simple telematics functions - temperature curves, errors	+ Extended telematics functions, in addition to the simple telematics functions also detailed, historized fault messages incl. remote maintenance ⁵	
Installation orientation:	Upright installation position		
Clip-in generator expandable ⁶ :	No	+ Integration of an economical clip-in generator possible	+ Not necessary - integrated power generator
Maintenance:	+ Heating rod, diesel burner and other wearing parts are easy to reach and replace, partly by Tri-Clamp connections		
Housing:	+ All housings are made of stainless steel and are additionally powder-coated for corrosion protection		

¹It must be specified during the production of the container that a Löbbe hybrid or cflex system will be installed. Large container manufacturers such as CIMC, NT-Tank, Singamas, van Hool, or Welfit Oddy already work with us. ²The minimum ambient operating temperature depends on the diesel fuel used. To ensure safe operation at a minimum temperature of -20 °C, it may be necessary to use winter diesel to operate the burner and the generator. ³It is possible to increase the temperature to 80 °C for a period of two hours (boost mode). After this time, this function is blocked until the system is restarted. ⁴See list of abbreviations/special functions. ⁵Remote maintenance access to the heating system is only possible with our self-developed telematics (working title teleflex). ⁶The 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.