60 YEARS
1963 2023
DEBUGGER
Heat technology
Powered by FrigorTec – Made in Germany

FRIGOR TEC
Heating to the point
FrigorTec GmbH • Germany

DEBUGGER –
ecological pest control

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Heating to the point

DEBUGGER	DB 09	DB 18	SC 6000
	400 V-50 Hz	400 V-50 Hz | 460 V-60 Hz	400 V-50 Hz | 460 V-60 Hz
Air flow rate [m^3 / h]	1,200	5,400	6,000
Connected load [kW]	9.0	18.0 | 18.0	1.1 | 1.1
Power rating [kW]	0% / 50 % / 100 %	0% / 50 % / 100 %	-
Max. current consumption [A]	14.5	30.0 | 25.0	3.0 | 2.5
Electrical connection [1] [A]	16.0	32.0 | 32.0	16.0 | 16.0
Dimensions [L x W x H in mm]	490 x 430 x 620 [3]	710 x 570 x 1,250	620 x 600 x 1,350 - 2,150
Weight [2] [kg]	26.0	85.0	45.0

DEBUGGER technical features:

- Connection cable with CEE plug
- Room thermostat
- Temperature controller and safety temperature limit
- Fan guard
- Air deflector (DB 18)
- Cable holder (DB 18)
- Wheels

DEBUGGER options:

- Chassis with swivelling mechanism (DB 09)
- Push rod (DB 09)
- High-temperature extension cable, 25 m length
- Hose adapter including hose, 5 m length (DB 18)
- Base tray air inlet (DB 18)
- Air outlet baffle (DB 18)
- Crane eyelets (DB 18)
- Special transport pallet (DB 18)
- Infrared thermometer

All figures are valid for 400 V-3 Ph-50 Hz | 460 V-3 Ph-60 Hz

[1] In accordance with CEE

[2] Including cable and plug

[3] Without telescopic rod and hose

Subject to technical changes.

FrigorTec GmbH is certified to DIN EN ISO 9001 : 2015.

The company is a member of:

- Verein zur Förderung der deutschen Müllerschule Braunschweig e.V., Munich/Germany
- RKL, Rendsburg/Germany
- Bundeslehranstalt Burg Warberg e.V., Warberg/Germany
- ALB, Stuttgart/Germany
- AGF, Detmold/Germany
- BVA, Berlin/Germany

Insect heat treatment using the DEBUGGER method

Food processing and marketing companies, such as mills and bakeries, must work strictly in accordance with the HACCP system (Hazard Analysis Critical Control Points). This system defines specific details that are considered critical for food safety: from preparation, processing, packaging and storage to the transport, distribution and sale of food.
In order to comply with these standards, regular, systematic pest monitoring and, if necessary, pest control is required. For this purpose, a natural pest control method has proven its worth in many companies: insect heat treatment.

The principle behind insect heat treatment
Insect heat treatment exploits the fact that pests cannot transpire. In other words, they cannot cool themselves down and their body temperature rises in line with the ambient temperature. Most pests display high levels of activity at an ambient temperature of 15°C to 35°C, with the exception of various mite strains that can remain active at lower temperatures near the frost line.
If an insect's body temperature rises above 45°C, enzymes decompose and the body's own proteins denature, i.e. they coagulate. The molecules lose their biological function, causing the metabolism and biosynthesis to slow to zero, resulting in the insect's death.
During insect heat treatment, a room or machine is heated in a targeted manner and the temperature is kept constant until the proteins denature. Experience has shown that insect heat treatment is effective against all types of pests commonly found in buildings: ants, beetles, mites, cockroaches, moths, wood-damaging beetle larvae, as well as larvae that damage materials and items in storage (e.g. mealworms).

Pest control management
The treatment intervals are not the only critical factor. It can also be advantageous to carry out pest control in stages (room by room, floor by floor, etc.). It is important to ensure good air distribution, as all areas of the room to be treated must reach the required temperature to achieve a positive result. It may make sense to treat critical areas separately.

Cost-effectiveness
The operating costs of insect heat treatment are a significant economic factor; effective disinfestation requires approx. 2 – 4 kWh of electricity per cubic metre of room volume.
Heating the room using the recirculation method ensures that only the room air is heated and saves energy. Special fans can also be used to return the warm, rising air back to floor level. This means that fewer insect heat treatment ovens are required, which reduces costs.
Energy-efficient insect heat treatment is dependent on the room characteristics, e.g. how well the space is insulated.

Possible applications:
Insect heat treatment is carried out at a wide variety of businesses, e.g. mills, bakeries, grain stores, pasta production plants, spice processing factories, coffee processing facilities, the tobacco industry, connected control rooms and cereal stores.

Insect heat treatment process

Preparation
If thermal pest control is carried out correctly, the temperature does not rise to an extent that could result in damage to the building fabric or furnishings.
Nevertheless, critical objects and potential fire loads should be removed from the room before starting the insect heat treatment. For example, these include:

- Sensitive electronic devices such as printers or medical devices
- Check whether any permanently installed components can withstand ambient temperatures of 60°C
- Food and medicines
- Cosmetics and wax products
- Aerosol cans, containers with carbonated contents
- Fire extinguishers
- Pictures, antiques, plants, etc.
- Flammable objects such as paper and wood

Any electrical appliances remaining in the room during the insect heat treatment must be de-energised. In particular, refrigerators and freezers must be switched off. Otherwise, their compressors will react to the rising ambient temperature with an increased power draw, potentially causing damage.
Sprinkler systems must be protected with cover flaps and smoke/fire detectors must be taken out of operation. In addition, all dust should also be removed from the room before starting thermal pest control. Depending on the specific location, it may also be necessary to check whether the insect heat treatment device requires ATEX approval.

Implementation and duration
The duration of thermal pest control depends on the space to be treated and the intensity of the pest infestation. As a rule, it is sufficient to maintain a room temperature of between 50°C and 60°C for 48 hours. During the disinfestation process, the temperature should be continuously monitored to ensure that the target temperature range is not only reached, but is maintained for a sufficient period.

Conclusion
Insect heat treatment is an effective and environmentally friendly method of pest control in the food industry. The targeted application of heat kills pests biologically without leaving any residue. This makes insect heat treatment an attractive option for companies that strive to meet the highest standards in terms of food safety and eco-friendliness.

Advantages of the DEBUGGER method

- No chemicals required
- Economical thanks to customised pest control management
- Easy to implement
- Guaranteed to kill insects at all stages of development
- Highly flexible thanks to modular design; customisable to suit the structural conditions
- Simple assembly and disassembly

We only hand over products that we have produced with our own hands – Made in Germany.

All FrigorTec GmbH products are developed, designed and produced at our main plant in Amtzell, Germany. Each device passes a quality control and test run prior to delivery. We market FrigorTec solutions in more than 90 countries through our global distribution network.

SERVICE (24 / 7)

Our after-sales service team maintains the respective devices and ensures that replacement parts are readily available – globally.
service@frigortec.com

GRANIFRIGOR™
grain cooling units

CRANEFRIGOR™ crane air-conditioning units

STANDARDFRIGOR
standard cooling units

FrigorTec
SERVICES

DEBUGGER
insect heat treatment

AGRIFRIGOR™
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