

Defrost Sensor MK-2

Defrost system including temperature sensor (PT1000)



Category: HBDF-MK2



Functional description:

HBDF-MK2 is a simple solution for automatic defrosting of evaporators. Optimal defrost periods result in energy savings and gain more freezing capacity. Experiences from existing installations show have shown that it can save up to 40% of energy and thereby quickly is recouping its costs. The sensor measures the thickness of ice built up between the fins and it sends a 4-20mA or digital ON/OFF signal to the control systems.

The defrost sensors are based on the capacitive measuring principle, in which an isolated steel wire acts as one conductor. The evaporator fins and tubes act as the second conductor, jointly forming a viable electrical capacitor. Changes in the measured signal occur when ice is built up between the fins, as the sensor is measuring the dielectric difference between the air and ice.

The sensor can be installed in less than one hour, both on new and old evaporators. It can be installed when the system is in operation. Therefore a system shutdown is not necessary. The electronic part is mounted on the evaporator's frame by using 2 screws. The mechanical part consists of a thin PA12 or PTFE- coated wire, which is mounted between the fins of the evaporator in the air inlet side with special HB Snap-On clips or standard nylon strips. The HBDF-MK2 sensor is available in 3 versions, with a 10m, 20m and 30m wire.

The sensor with a built-in control relay will start the defrosting based on the ice thickness and stop the defrost when the ice is melted and the temperature outside the evaporator tubes rises above 0°C (32°F). Recommended setpoint for stop of defrost cycle is 5-10°C (41-50°F).

After the installation, the sensor should be calibrated/configured to the evaporator by using the HB-TOOL (PC-based software tool), which can be downloaded from our web-site.



Graphical view of a typical sequence on an air cooler





Technical data

| Power supply | | Mechanical specifications | |
|-----------------------|-----------------|-----------------------------|---------------------|
| Voltage | 24 V AC/DC | | |
| Power consumption | 600 mA | Material – mechanical parts | AISI 316L |
| Electrical connection | Screw terminals | Material – electronic parts | Nylon 6 (PA) |
| Sensor design | 3-wire | | |
| Analog output | 4-20 mA | | |
| Max. load | 500 ohm | Installation conditions | |
| Relay output | 2x5A, NO/NC | Ambient temperature | -30+50°C |
| Relay output 24V | 2x3A, NO/NC | Protection degree | IP65 |
| Cable entry: | PG9 / M12 | Vibrations | IEC 68-2-6 (4g) |
| Approvals | | Accessories | |
| EMC Emission | EN61000-3-2 | Supply cable, 5 meters | HBxC-M12/5 Straight |
| EMC Immunity | EN61000-4-2 | USB Programming cable | HBxC-USB |
| Configuration | | | |
| Type of configuration | PC tool | | |
| Tool to be used | HB software | | |

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Application example







2 x relay 1 x mA Ice thickness

Safety:

Defrosting with hot gas must be performed in a safe way in order to ensure that there is no risk for liquid hammering and leakage of refrigerant.

Ordering codes

| Sensor type | Wire length | Temperature Sensor Length | Ordering code |
|---|-------------|---------------------------|----------------|
| Defrost sensor MK2 | 10 m | 2 m | HBDF-MK2-10 |
| Defrost sensor MK2 | 20 m | 2 m | HBDF-MK2-20 |
| Defrost sensor MK2 | 30 m | 2 m | HBDF-MK2-30 |
| Low temperature defrost sensor MK2 | 10 m | 2 m | HBDF-MK2-10-LT |
| Low temperature defrost sensor MK2 | 20 m | 2 m | HBDF-MK2-20-LT |
| Low temperature defrost sensor MK2 | 30 m | 2 m | HBDF-MK2-30-LT |
| Defrost sensor for heat pump applications | 10 m | 2 m | HBDF-MK2-10-RS |
| Defrost sensor for heat pump applications | 20 m | 2 m | HBDF-MK2-20-RS |
| Defrost sensor for heat pump applications | 30 m | 2 m | HBDF-MK2-30-RS |





HBDF-SnapON Clips for mounting of HBDF wire probe. To be ordered seperately. HBDF-SnapON Clips are sold in bags of 25 or 50 pieces

Accessories

| Tube dimension | Quantity | Ordering code |
|-----------------------|----------|----------------------|
| 8 - 10 mm | 25 | HBDF-SnapONClip8-25 |
| 8 – 10 mm | 50 | HBDF-SnapONClip8-50 |
| 10 - 12 mm | 25 | HBDF-SnapONClip10-25 |
| 10 – 12 mm | 50 | HBDF-SnapONClip10-50 |
| 12 - 14 mm | 25 | HBDF-SnapONClip12-25 |
| 12 - 14 mm | 50 | HBDF-SnapONClip12-50 |
| 14 - 16 mm | 25 | HBDF-SnapONClip14-25 |
| 14 – 16 mm | 50 | HBDF-SnapONClip14-50 |
| 16 - 18 mm | 25 | HBDF-SnapONClip16-25 |
| 16 - 18 mm | 50 | HBDF-SnapONClip16-50 |
| 19 - 22 mm | 25 | HBDF-SnapONClip19-25 |
| 19 – 22 mm | 50 | HBDF-SnapONClip19-50 |
| 22 - 25 mm | 25 | HBDF-SnapONClip22-25 |
| 22 – 25 mm | 50 | HBDF-SnapONClip22-50 |
| | | |
| USB Programming cable | | HBxC-USB |







Spare parts

| Position | Designation | Specification | Ordering code |
|----------|--------------------|---|----------------------|
| 1 | Mechanical part | 10 m wire | HBDF-MK2-Wire-10 |
| | Mechanical part | 20 m wire | HBDF-MK2-Wire-20 |
| | Mechanical part | 30 m wire | HBDF-MK2-Wire-30 |
| 2 | Electronic part | РСВ | HBDF-MK2-EL |
| | Electronic part | PCB - Electronic part for the first version | HBDF-EL |
| 3 | Temp. Cable sensor | Pt1000-Cable type | HBTS-PT1000/Cable-2M |





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Ordering codes

| Refrigerant | Туре | Dimensions | Cooling capacity | Ordering code |
|-------------|------------|----------------------|------------------|------------------|
| CO2/HFC | E2V05CS000 | Ø10 | 0,014 [m³/h] | Carel E2V 05 |
| CO2/HFC | E2V09CS000 | Ø10 | 0,024 [m³/h] | Carel E2V 09 |
| CO2/HFC | E2V11CS000 | Ø10 | 0,042 [m³/h] | Carel E2V 11 |
| CO2/HFC | E2V14CS000 | Ø10 | 0,066 [m³/h] | Carel E2V 14 |
| CO2/HFC | E2V18CS000 | Ø10 | 0,09 [m³/h] | Carel E2V 18 |
| CO2/HFC | E2V24CS000 | Ø10 | 0,18 [m³/h] | Carel E2V 24 |
| NH3 | E2V05BS100 | E2V05-B Ø13-13mm ODF | 8,9 kW | Carel E2V 05 NH3 |
| NH3 | E2V09BS100 | E2V09-B Ø13-13mm ODF | 14,8 kW | Carel E2V 09 NH3 |
| NH3 | E2V11BS100 | E2V11-B Ø13-13mm ODF | 25,9 kW | Carel E2V 11 NH3 |
| NH3 | E2V14BS100 | E2V14-B Ø13-13mm ODF | 40,7 kW | Carel E2V 14 NH3 |
| NH3 | E2V18BS100 | E2V18-B Ø13-13mm ODF | 55,6 kW | Carel E2V 18 NH3 |
| NH3 | E2V24BS100 | E2V24-B Ø13-13mm ODF | 111 kW | Carel E2V 24NH3 |

(*) Cooling capacity calculated in the following conditions: tevap: -12 °C (6.4 0F); tcond: 378 °C (I 00 °F); SC: I k (I .8 °R)