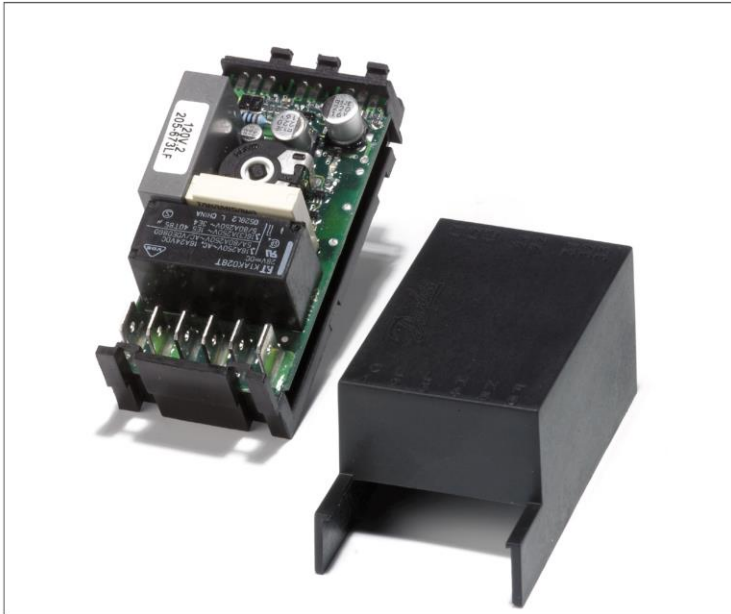


Data Sheet

# Refrigeration Controller

## ETC 1H



### Introduction

The ETC 1H is introducing a flexible platform due to onboard micro-controller and software dedicated product configuration, perfect for light commercial refrigeration applications. Standard versions with similar functionality as the traditional electro-mechanical thermostats as well as several customized high performance software versions for various applications are available.

The ETC 1H is developed for applications such as:

- Refrigerators
- Bottle coolers
- Ice banks
- Freezers
- Street coolers
- No-frost freezers with heating element
- Medicine coolers
- Wine, cake and chocolate coolers

### Features

- ETC 1H can control the cabinet temperature directly
- ETC 1H has low energy consumption
- 1 or 2 sensors (Air, evaporator) and optional remote display can be connected
- Using NTC temperature sensors
- Temperature control independent of barometric pressure
- High accuracy combined with close differentials and narrow tolerances ensures improved control
- Built in timers enhances functionality
- Optional alarm for over or under temperature in both cold and warm
- Auxiliary relays: 5 Amp for heater, fan, light etc. Eventually with delayed start or/and stop
- Under voltage and over voltage compressor protection (brown-out protection)
- Pressure equalisation protection on starting the device or when voltage drops out (blackout protection)
- Diagnostics and self check of sensors and potentiometer
- Several defrosting methods can be handled:
  - Time controlled defrosting
  - Time controlled defrosting with evaporator sensor
  - Temperature controlled defrosting
- Dual band control of outdoor bottle coolers



Data sheet | Electronic temperature control, type ETC 1H

Approvals



|                       |                        | 120V, 60Hz  | 230V, 50/60Hz  |  |
|-----------------------|------------------------|---|--|--|
| <b>Technical data</b> | Power supply           | 115 V a.c. +/- 10% 60 Hz                              | 220 V a.c. -240 V d.c +/- 10% 50 Hz                              |  |
|                       | Energy consumption     | Max 0.5 Watt  | Max 0.5 Watt   |  |
|                       | Operating conditions   | Ambient temp.   | 32°F to +122°F   | 0°C to 50°C  |
|                       |                        | Humidity  | Max 90% RH, Non-condensing                                       | Max 90% RH, Non-condensing                                       |
|                       | Measuring range        | NTC sensor  | -40°F to 185°F   | -40°C to 85°C  |
|                       | Relay output 1         | Compressor  | UL 60730: LRA96, FLA16   | IEC/EN 60730: 16(16) A<br>UL 60730: LRA 60/ FLA 10               |
|                       | Relay output 2         | Heater  | 5 A  | 5 A  |
|                       | Relay output 3         | Fan   | UL 60730: LRA 6/ FLA1  | IEC/EN 60730: 5 A<br>UL 60730: LRA 6/ FLA 1                      |
|                       | Accuracy               | NTC sensor  | +/- 1 K  | +/- 1 K  |
|                       |                        | ETC1H   | +/- 0.5 K  | +/- 0.5 K  |
|                       | Temperature sensors    |   | NTC- 5K  | NTC- 5K  |
|                       | Life time              | Relay 1   | +350,000 cycles  | +350,000 cycles  |
|                       |                        | Relay 2   | +30,000 cycles   | +30,000 cycles   |
|                       |                        | Relay 3   | +30,000 cycles   | +30,000 cycles   |
|                       | Connections            | Power   | 6.3 mm x 0.8 mm tabs, RAST 5                                     | 6.3 mm x 0.8 mm tabs, RAST 5                                     |
|                       |                        | Signal/remote   | 3-pole RAST 2,5 edge connector<br>2-Pole RAST 2,5 edge connector | 3-pole RAST 2,5 edge connector<br>2-Pole RAST 2,5 edge connector |
|                       | Temperature indication |   | Through optional remote display                                  | Through optional remote display                                  |
|                       | Approvals              |   | UL-C, NSF  | Semko, CE, CQC, EAC  |
| EMC Category          |                        | -----   | Category-1   |  |
| IP class              |                        | IP 00   | IP 00  |  |
| Remote control        |                        | Optional remote display with Control. 1-wire protocol | Optional remote display with Control. 1-wire protocol            |  |
| Number of sensors     |                        | 2 (optional 3)  | 2 (optional 3)   |  |
| Start-up-time         |                        | < 2 seconds   | < 2 seconds  |  |

**Functionality**  
(All functions are optional)

|  |                   |  |
|--|-------------------|--|
| Temperature  | Settings          | Differential: -1-10 K , Range: 0-30 K, Defrost: 0°C-10°C   |
|  | Adjustment        | Knob with stop 210° +/-5°. Stop 45° +/-5° o Knob angle without stop 255° +/-5°   |
| Diagnostics  | Visual indication | On-board LED (Red)   |
|  | Function          | Self check of sensors and potentiometer  |
|  | Sensor fault      | Air sensor   |
| Compressor protection                                | Brown-out         | Under-voltage and over-voltage protection  |
|  | Black-out         | Based on temperature at cabinet sensor   |
| Defrost  | Mode 1            | Start by Time- Stop by Cabinet Temperature (1 sensor)  |
|  | Mode 2            | Start by Time- Stop by Defrost Sensor (2 sensors) Start and Stop by Defrost Sensor (2 sensors)                               |
|  | Mode 3            | Start by Time- Stop by Defrost Sensor (2 sensors)  |
| Alarm  | Types             | Over or/and under temperature in cold or warm  |
|  | Indication        | Flashing LED on the ETC 1H or by an external connected remote module or optionally to one of the relays to control a buzzer  |
| Blocked condenser<br><i>On customer request only</i> | Function          | Monitor the condenser temperature and stop the compressor until the temperature goes below the condenser warning temperature |
|  | Indication        | Flashing LED on the ETC 1H or by an external connected remote module or optionally to one of the relays to control a buzzer  |

**Parameters**

For customized ETC 1H versions to suit individual application needs, it is possible to adjust the following parameters in software.



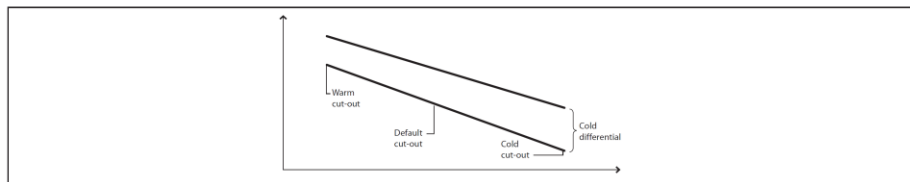
Data sheet | Electronic temperature control, type ETC 1H

**Introduction**

| Parameter                       |   | Min    | Max    | Default    | Unit                   |
|---------------------------------|---|--------|--------|------------|------------------------|
| Thermostat                      | Cold cut-out  | -65.00 | +50.00 | 0.00       | °C                     |
|                                 | Warm cut-out  | -65.00 | +50.00 | 10.00      | °C                     |
|                                 | Default temp set also used as remote setpoint   | 0      | 1023   | 512        | 0: cold<br>1023: warm  |
|                                 | Cold differential   | -1.00  | +20.00 | 1.00       | K                      |
|                                 | Warm differential   | -1.00  | +20.00 | 1.00       | K                      |
| Compressor                      | Min runtime   | 0      | 1800   | 300        | Sec                    |
|                                 | Min stoptime  | 0      | 1800   | 300        | Sec                    |
|                                 | Max runtime   | 0      | 10800  | 3600       | Sec                    |
|                                 | Max stoptime  | 0      | 10800  | 5400       | Sec                    |
|                                 | Error runtime   | 0      | 1800   | 600        | Sec                    |
|                                 | Error Stoptime  | 0      | 1800   | 900        | Sec                    |
|                                 | Functions flag: D8: Max run time  | 0      | 1      | 0          |                        |
|                                 | D9: Max stop time   | 0      | 1      | 0          |                        |
| Alarm on relay                  | Cold overtemp alarm   | -65.00 | +50.00 | 15.00      | °C                     |
|                                 | Warm overtemp alarm   | -65.00 | +50.00 | 15.00      | °C                     |
|                                 | Cold undertemp alarm  | -65.00 | +50.00 | 2.00       | °C                     |
|                                 | Warm undertemp alarm  | -65.00 | +50.00 | 2.00       | °C                     |
|                                 | Alarm delay   | 0      | 120    | 60         | Min                    |
| Defrost                         | Function flag: D0: Alarm undertemperature   | 0      | 1      | 0          |                        |
|                                 | D1: Alarm overtemperature   | 0      | 1      | 0          |                        |
|                                 | Defrost method:<br>0: No defrost<br>1: Time start, Control T stop<br>2: Time start, Evap T stop<br>3: Evap T start, Evap T stop | 0      | 3      | 0          | Num                    |
|                                 | Defrost terminate temperature   | 0      | +50.00 | 5.00       | °C                     |
|                                 | Defrost start temperature   | -25.00 | 0.00   | -10.00     | °C                     |
|                                 | Drip-off time   | 0      | 1800   | 0          | Sec                    |
|                                 | Minimum defrost time  | 0      | 3600   | 900        | Sec                    |
|                                 | Maximum defrost time  | 0      | 7200   | 1800       | Sec                    |
|                                 | Minimum defrost interval  | 0      | 720    | 360        | Min                    |
|                                 | Maximum defrost interval  | 0      | 2160   | 720        | Min                    |
|                                 | Function flag: D2: Fan on during defrost  | 0      | 1      | 0          |                        |
| D3: Hot-gas defrost             | 0   | 1      | 0      |            |                        |
| D11: Timer reset on cutout      | 0   | 1      | 0      |            |                        |
| Fan                             | Fan start delay   | 0      | 1800   | 0          | Sec                    |
|                                 | Fan stop delay  | 0      | 1800   | 0          | Sec                    |
|                                 | Function flag: D4: Fan stop on cutout   | 0      | 1      | 0          |                        |
| Blocked condenser               | Condenser warning temperature   | +50.00 | +85.00 | 70.00      | °C                     |
|                                 | Condenser stop temperature  | +50.00 | +85.00 | 80.00      | °C                     |
|                                 | Function flag: D7: Condenser watch  | 0      | 1      | 0          |                        |
| Voltage protection              | Minimum cut-in voltage  | 80     | 210    | 185        | Vrms                   |
|                                 | Voltage threshold   | 0      | 20     | 15         | Vrms                   |
|                                 | Maximum cut-in voltage  | 130    | 264    | 260        | Vrms                   |
|                                 | Function flag: D6: Voltage protect  | 0      | 1      | 0          |                        |
| Miscellaneous                   | Function flags (see def in each section)  |        |        |            | Num                    |
|                                 | Factory test  | 0      | 65535  | 0          | Boolean                |
|                                 | D0: Comp relay  |        |        |            |                        |
|                                 | D1: Fan relay   |        |        |            |                        |
|                                 | D2: Heater relay  |        |        |            |                        |
|                                 | D6: LED 1/10 blinking   |        |        |            |                        |
|                                 | D7: LED _ blinking  |        |        |            |                        |
|                                 | D15: Factory test   |        |        |            |                        |
|                                 | Sensor Type 0: Epcos 1: Shibuaara Zero-cross switching  | -100   | 100    | Epcos<br>0 | Num<br>% of 1/4 period |
|                                 | Thermostat ID low D0-32   | 0      | 232    | 0          | Num                    |
|                                 | Typenumber  | 0      | 10000  | 0          | Num                    |
|                                 | D14-15 group number   |        |        |            |                        |
|                                 | D0-13 number  |        |        |            |                        |
| SW version                      | 0   | 999    | 100    |            |                        |
| Function flag: D10: Zero switch | 0   | 1      | 0      |            |                        |
| D5: Stop function               | 0   | 1      | 0      |            |                        |
| Remote parameter                | Remote Function Flag:<br>D0: Fahrenheit in display  | 0      | 1      | 0          | Boolean                |
|                                 | D1: Decimalpoint  | 0      | 1      | 1          |                        |
|                                 | D2: Show setpoint   | 0      | 1      | 0          |                        |
|                                 | D3: Display lock at defrost   | 0      | 1      | 0          |                        |
|                                 | Remote sensor offset  | -10.00 | 10.00  | 0.00       |                        |
|                                 | Remote sensor deviation   | -10.00 | 10.00  |            |                        |
|                                 | Remote sample time  | 0      | 100    | 10         |                        |
| Remote display lock             | 0   | 1440   | 0      | Min        |                        |



Data sheet | Electronic temperature control, type ETC 1H



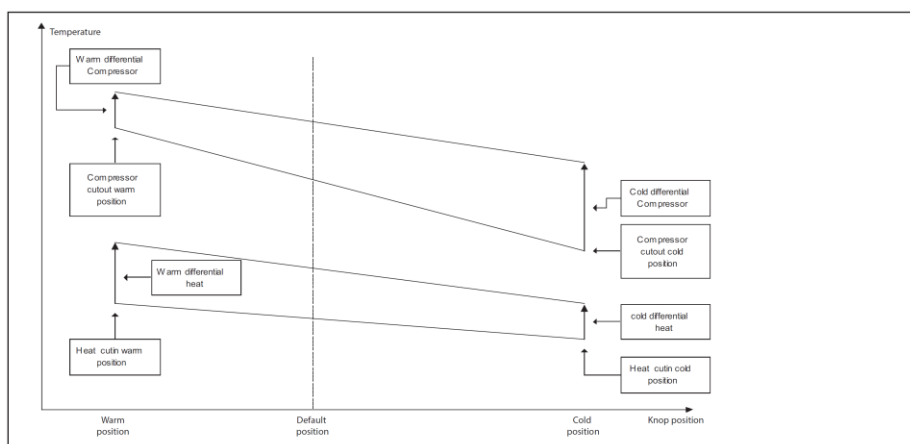
Variants

In order to optimize the efficiency and ensure the reliability of the Danfoss products in your specific applications and systems, always contact Danfoss prior to initiating the use of any Danfoss products.

- You can have the ETC1H with optional 2 or 3 relays, for controlling heaters, fans etc.

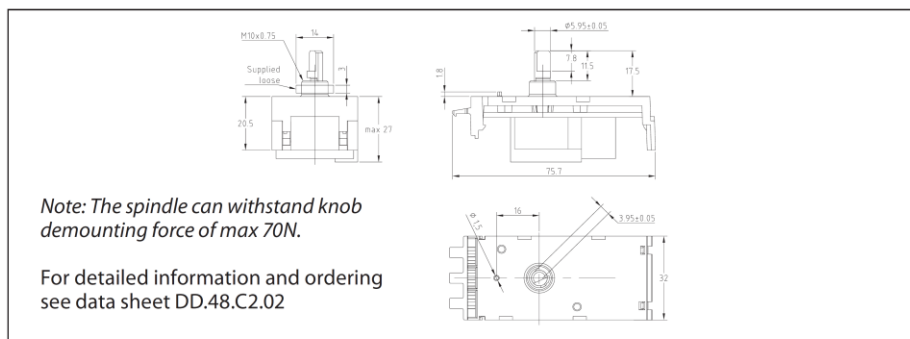
- You can have the ETC1H with standard soft-ware or optionally with special customized software for optimized functionality. Please contact Danfoss regarding this..

Danfoss does not accept any responsibility for ETCs placed in environments outside our design specifications. Use of the ETCs in such cases must be verified via relevant field-tests, and always remains the responsibility of the buyer.



Dual band control of compressor and cabinet heater for outdoor bottle coolers placed in cold environment.

Dimensions and mounting



The controls can be mounted using the nut shown or it can be mounted using 2 screws type EJOT DURO-PT dia. 3 × 7 mm.

**Warning:** By using screw types different than the above mentioned, there is a risk of short circuiting the line potential.

**Please note:** All Danfoss knobs have been designed to sit flush against the housing, relieving the load on the spindle arm. Maximum mounting force of knob: 80 Newton. Whenever using non-Danfoss knobs, please ensure that they are mounted as described above and that the maximum mounting force of knob: 80 Newton is not exceeded.

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