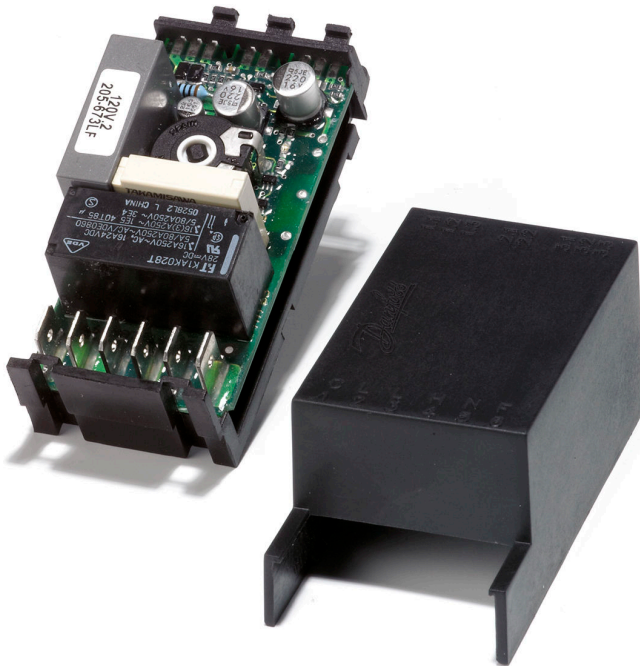


## Data Sheet

# Electronic thermostat control Type **ETC 1H**

For simple commercial refrigeration applications



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
- Freezers
- No-frost freezers with heating element
- Medicine 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
- Quick Parameter Programming using PC software tool and Gateway
- Hydrocarbon refrigerant compatible relay outputs

## Product specification

### Technical data

Table 1: Technical data

Product specification		120 V, 60 Hz	230 V, 50/60 Hz
Power supply		115 V AC +/- 10% 60 Hz	220 V AC – 240 V DC +/- 10% 50 Hz
Energy consumption		Max 0.5 Watt	Max 0.5 Watt
Operating conditions	Ambient temp.	32 – 122 °F	0 – 50 °C
	Humidity	Max 90% RH, Non-condensing	Max 90% RH, Non-condensing
Measuring range	NTC sensor	-40 – +185 °F	-40 – +85 °C
Relay output 1	Compressor	UL 60730: LRA96, FLA16	IEC/EN 60730: 16(16) A 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 UL 60730: LRA 6/ FLA 1
Accuracy	NTC sensor	+/- 1 K	+/- 1 K
	ETC 1H	+/- 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 x 0.8 mm tabs, RAST 5	6.3 x 0.8 mm tabs, RAST 5
	Signal/remote	3-pole RAST 2,5 edge connector 2-Pole RAST 2,5 edge connector	3-pole RAST 2,5 edge connector 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

Table 2: Functionality

Product specification		Description
Temperature	Settings	Differential: -1 – 10 K, Range: 0 – 30 K, Defrost: 0 – 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)
	Mode 3	Start and 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 <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

It is possible to adjust the following parameters in the controller using Danfoss PC software tool 'KoolProg' and Gateway.

For more information please visit: [KoolProg](#)

Table 3: Parameters

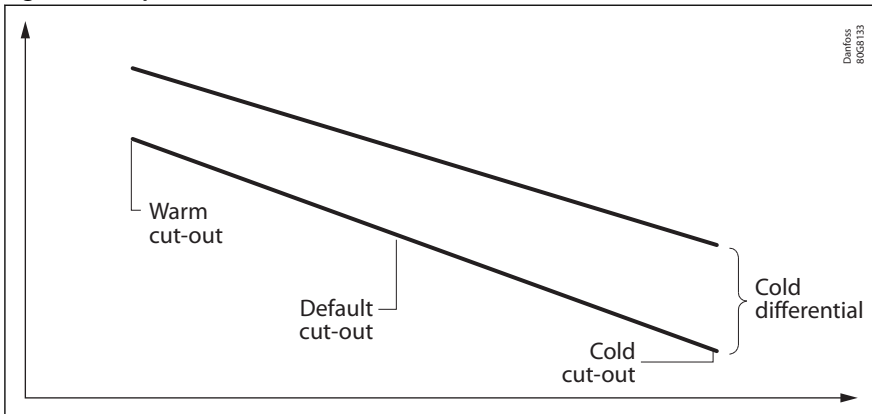
Parameter		Min	Max	Default	Unit
Thermostat	Cold cut-out	-65	50	0	°C
	Warm cut-out	-65	50	10	°C
	Default temp set also used as remote setpoint	0	1023	512	0: cold 1023: warm
	Cold differential	-1	20	1	K
	Warm differential	-1	20	1	K
Compressor	Min runtime	0	1800	300	Sec
	Min stoptime	0	1800	300	Sec
	Max runtime	0	10800	3600	Sec
	Max stoptime	0	10800	5400	Sec
	Error runtime	0	1800	600	Sec
	Error Stoptime	0	1800	900	Sec
Alarm on relay	Cold overtemp alarm	-65	50	15	°C
	Warm overtemp alarm	-65	50	15	°C
	Cold undertemp alarm	-65	50	2	°C
	Warm undertemp alarm	-65	50	2	°C
	Alarm delay	0	120	60	Min

## Electronic thermostat control, type ETC 1H

Parameter		Min	Max	Default	Unit	
Defrost	Defrost method	0: No defrost		0	Num	
		1: Time start, Control T stop				
		2: Time start, Evap T stop				
		3: Evap T start , Evap T stop				
	Defrost terminate temperature	0	50	5	°C	
	Defrost start temperature	-25	0	-10	°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	
	Fan on during defrost	Disable	Enable	Disable		
Hot-gas defrost	Disable	Enable	Disable			
Timer reset on cutout	Disable	Enable	Disable			
Fan	Fan start delay	0	1800	0	Sec	
	Fan stop delay	0	1800	0	Sec	
	Fan stop on cutout	Disable	Enable	Disable		
Blocked condenser (optional)	Condenser warning temperature	50	85	70	°C	
	Condenser stop temperature	50	85	80	°C	
	Condenser watch	Disable	Enable	Disable		
Voltage protection	Minimum cut-in voltage	80	210	185	Vrms	
	Voltage threshold	0	20	15	Vrms	
	Maximum cut-in voltage	130	264	260	Vrms	
	Voltage protection	Disable	Enable	Disable		
Miscellaneous	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		-100	100	Epcos
		1: Shibuara Zero-cross switching				0
	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		
	Zero switch	Disable	Enable	Disable		
	Stop function	Disable	Enable	Disable		
	Remote display	Fahrenheit in display	Disable	Enable	Disable	Boolean
Decimal point		Disable	Enable	Enable		
Show setpoint		Disable	Enable	Disable		
Display lock at defrost		Disable	Enable	Disable		
Remote sensor offset		-10	10	0		
Remote sensor deviation		-10	10			
Remote display lock		0	1440	0	Min	

**Variants**

Figure 1: Temperature cut-out

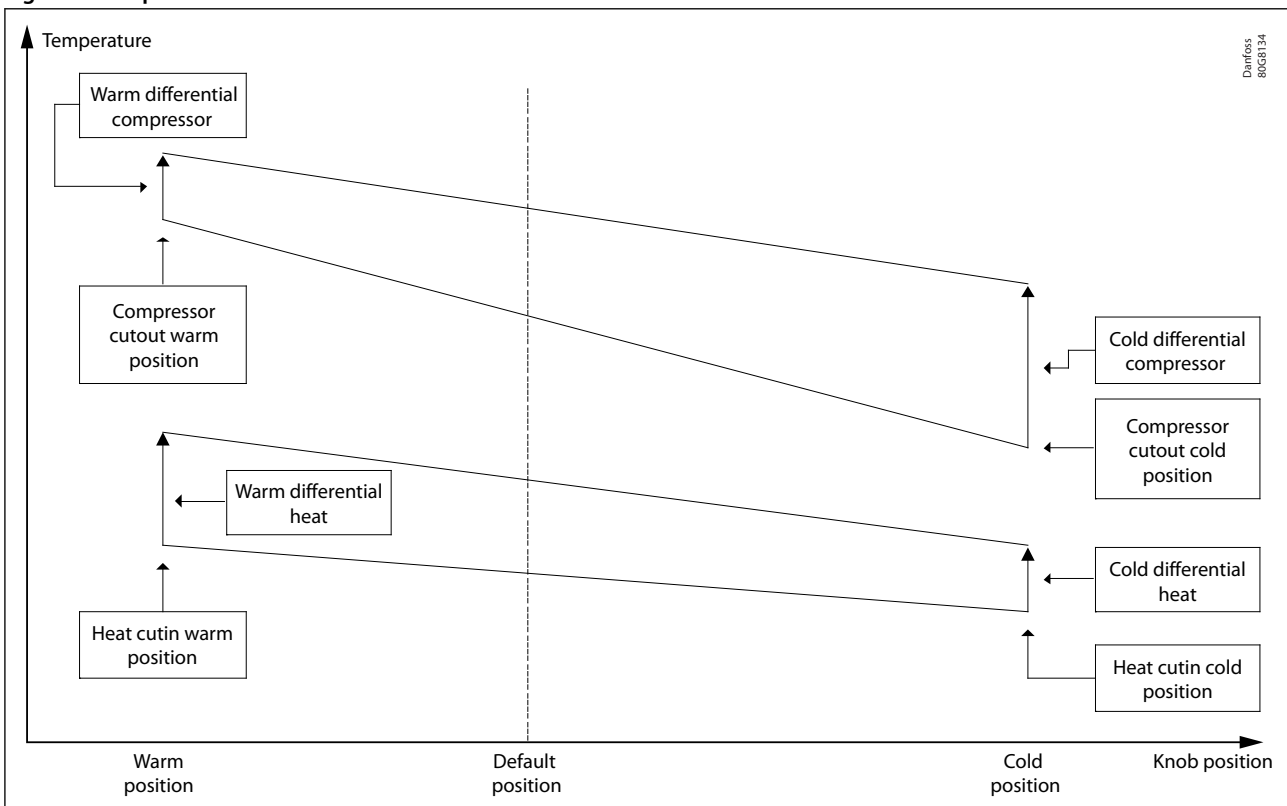


In order to optimize the efficiency and ensure the reliability of the Danfoss products in your specific applications and systems, always contact Danfoss prior to initiating the use of any Danfoss products.

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

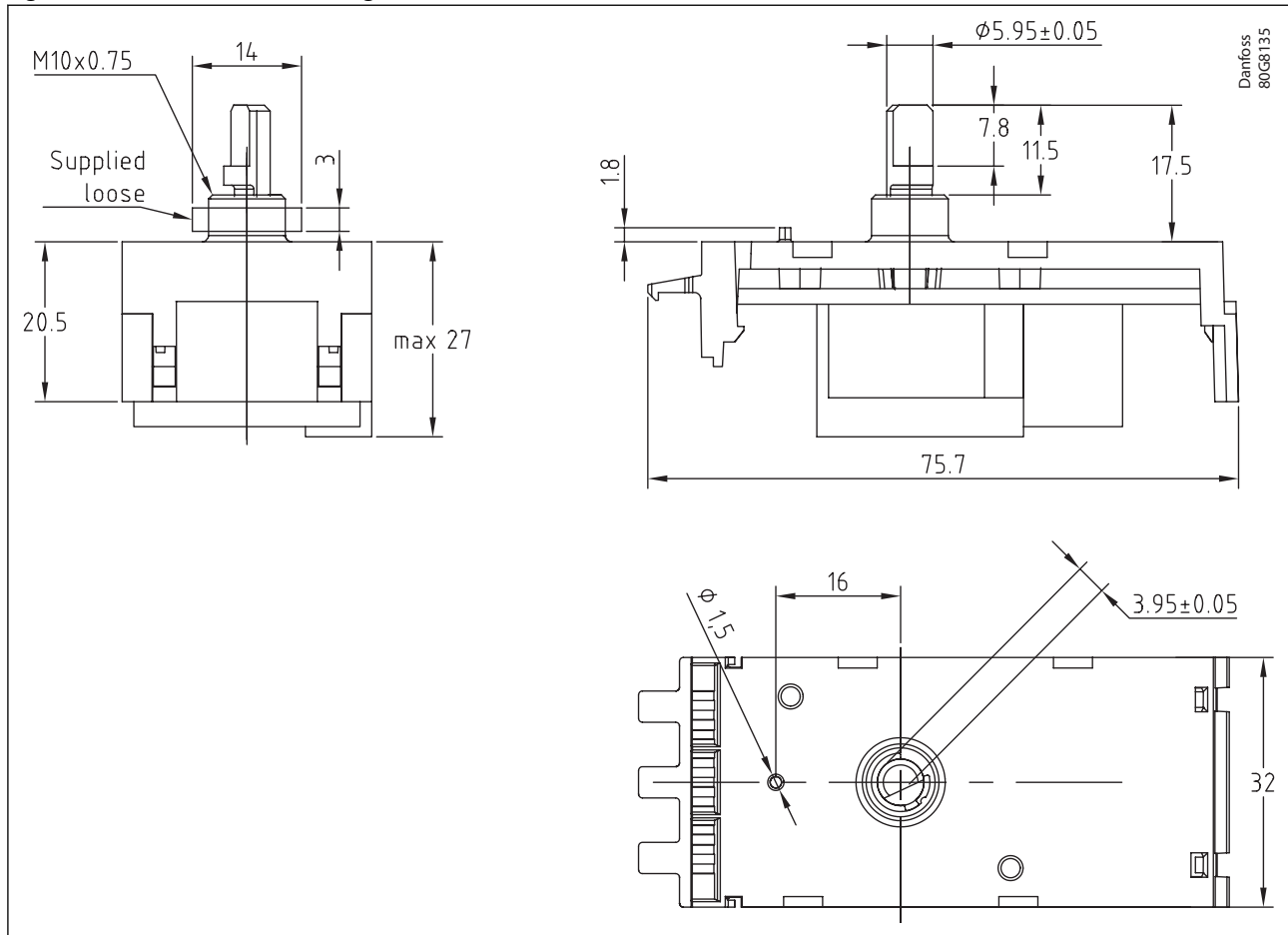
Figure 2: Temperature differential chart



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

## Dimensions and Mounting

Figure 3: 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.

**📌 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: 60 N. Whenever using non-Danfoss knobs, please ensure that they are mounted as described above and that the maximum mounting force of knob: 60 N is not exceeded.

## Ordering

**Table 4: Ordering for ETC-1H**

Description	Code number	Comment
ETC 1H1 (120 V/ 240 V)	077F1396/99	Project specific
ETC 1H2 (120 V/ 240 V)	077F1395/98	
ETC 1H3 (120 V/ 240 V)	077F1394/97	
Black knob	077F8562	Mechanical options
Washer, Black, White print 0-9, I-Pack	077F8577	

**Table 5: Ordering for sensors**

Description	Cable length	Port	Code
Cabinet sensor <sup>(1)</sup>	470	S1	077F8751
Cabinet sensor <sup>(1)</sup>	1.0	S1	077F8757
Cabinet sensor <sup>(1)</sup>	1.5	S1	077F8761
Cabinet sensor <sup>(1)</sup>	2.0	S1	077F8765
Cabinet sensor <sup>(1)</sup>	2.5	S1	077F8767
Cabinet sensor <sup>(1)</sup>	3.0	S1	077F8769
Cabinet sensor <sup>(1)</sup>	3.5	S1	077F8723
Cabinet sensor <sup>(1)</sup>	6.0	S1	080G2019
Evaporator sensor <sup>(2)</sup>	1.0	S2	077F8786
Evaporator sensor <sup>(2)</sup>	1.5	S2	077F8790
Evaporator sensor <sup>(2)</sup>	2.0	S2	077F8794
Evaporator sensor <sup>(2)</sup>	3.0	S2	077F8798
Evaporator sensor <sup>(2)</sup>	6.0	S2	080G2029
Condenser sensor <sup>(3)</sup>	1.0	S3	077F8756
Condenser sensor <sup>(3)</sup>	1.5	S3	077F8760
Condenser sensor <sup>(3)</sup>	3.0	S3	077F8768

<sup>(1)</sup> NTC temp sensor w/o color marking Typical cabinet temperature sensor (depending on assignment).

<sup>(2)</sup> NTC temperature sensor with 2" color marking Typical evaporator temperature sensor (depending on assignment).

<sup>(3)</sup> NTC temperature sensor with 1" color marking Typical condenser temperature sensor (depending on assignment).

**Certificates, declarations, and approvals**

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at danfoss.com or contact your local Danfoss representative if you have any questions.



**Table 6: Certificates, declarations, and approvals**

Regulatory and Compliance	Directive	Standards	Country
Electrical Safety (Class I & Class II equipment)	Low Voltage Directive: 2014/35/EU	EN 60730-1:2000 +A12+A13+A1+A14+A16+A2	Europe
Electrical Safety (Class I & Class II equipment)	Low Voltage Directive: 2014/35/EU	EN 60730 2-9 : 2010	Europe
Electrical Safety (Class I & Class II equipment)	-	GB 14536.1:2008, GB 14536.10:2008	China
Electrical Safety (Class I & Class II equipment)	-	UL 60730-1, UL 60730 2-9	US
Electrical Safety (Class I & Class II equipment)	-	CAN/CSA-E60730-1, CAN/CSA-E60730 2-9	Canada
Electrical Safety (Class I & Class II equipment)	-	CU TR 004/2011	Eurasia
Electromagnetic Compatibility	EMC Directive: 2014/30/EU	EN 61000 6-2:2005, EN61000 6-3:2007 +A1:2011	Europe
RoHS	RoHS Directive: 2011/65/EU & 2015/863/EU	EN 50581:2012, EN IEC 63000 : 2018	Europe
Food Safety	-	NSF/ANSI-2	US
Approved for use in Flammable Refrigerants	-	EN 60335 2-89: 2010 Annex BB, EN 60335 2-24: 2010 Annex CC	Europe
Approved for use in Flammable Refrigerants	-	UL 471, UL 60335 2-24, UL 60079-15 ed.4	US
Enclosure material flammable class	-	UL 94	US
Certification and Manufacturer Declarations on Conformity	CE, C-UL-US, CQC, UA , EAC, ENEC, NSF, S Mark, RoHS		



## Online support

Danfoss offers a wide range of support along with our products, including digital product information, software, mobile apps, and expert guidance. See the possibilities below.

### The Danfoss Product Store



The Danfoss Product Store is your one-stop shop for everything product related—no matter where you are in the world or what area of the cooling industry you work in. Get quick access to essential information like product specs, code numbers, technical documentation, certifications, accessories, and more.

Start browsing at [store.danfoss.com](https://store.danfoss.com).

### Find technical documentation



Find the technical documentation you need to get your project up and running. Get direct access to our official collection of data sheets, certificates and declarations, manuals and guides, 3D models and drawings, case stories, brochures, and much more.

Start searching now at [www.danfoss.com/en/service-and-support/documentation](https://www.danfoss.com/en/service-and-support/documentation).

### Danfoss Learning



Danfoss Learning is a free online learning platform. It features courses and materials specifically designed to help engineers, installers, service technicians, and wholesalers better understand the products, applications, industry topics, and trends that will help you do your job better.

Create your Danfoss Learning account for free at [www.danfoss.com/en/service-and-support/learning](https://www.danfoss.com/en/service-and-support/learning).

### Get local information and support



Local Danfoss websites are the main sources for help and information about our company and products. Find product availability, get the latest regional news, or connect with a nearby expert—all in your own language.

Find your local Danfoss website here: [www.danfoss.com/en/choose-region](https://www.danfoss.com/en/choose-region).