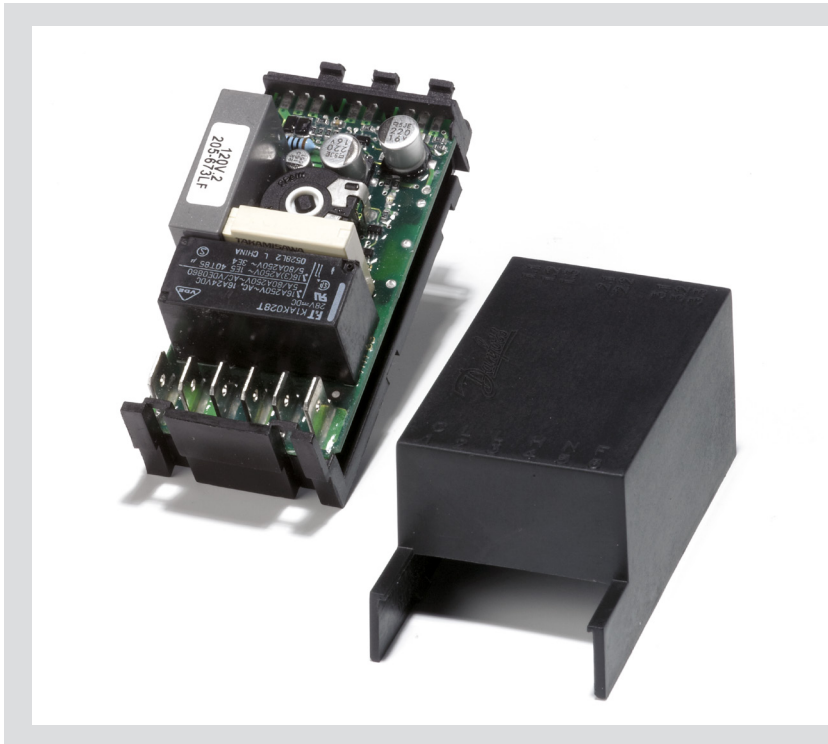


Data Sheet

ETC 1H refrigeration controller



Introduction

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

The ETC1H is developed for applications such as:

- Refrigerators
- 2 door refrigerators
- Bottle coolers
- Ice banks
- Freezers
- Street coolers
- No-frost freezers with heating element
- Medicine coolers (WHO approved)
- Wine, cake and chocolate coolers, optional with fan

Features

- ETC1H can control the cabinet temperature directly
- ETC1H 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
 - contact Danfoss for further info.

Approvals

 EMC tested to EN 55014, EN 55104, EN 6055-2,
 EN 61000-3-2 and EN 61000-3-3

 Ex approval IEC 9915 zone 2
 UL-C (UL + Canada), Semko Approvals

Technical data

		NAM/LAM	EU/IEC
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
Environment	Ambient temp.	32°F to +122°F	0°C to 50°C
	Humidity	Max 90% RH, Non-condensing	Max 90% RH, Non-condensin
Operation	Standard sensor	-40°F to 185°F	-40°C to 85°C
	Low temp sensor	-76°F to 185°F	-60°C to 85°C
	ETC1H	32°F to +122°F	0°C to 50°C
Compressor load	Locked rotor	96 Amp for max 4 seconds	96 Amp for max 4 seconds
	Rating	LRA96, FLA16	16(16) A
Fan load	Rating	LRA 6,1	5 A
Heater load	Rating	FLA5	5 A
Accuracy	Standard sensor	+/- 1 K	+/- 1 K
	ETC1H	+/- 0.5 K	+/- 0.5 K
Temperature sensors		NTC	NTC
Life time	Compressor	+350,000 cycles	+350.000 cycles
	Output2	+30,000 cycles	+30.000 cycles
	Output3	+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 2-Pole RAST 2,5 edge connector	3-pole RAST 2,5 edge connector 2-Pole RAST 2,5 edge connector
Temperature indication		Optinal remote display	Optinal remote display
Approvals		UL-C	Semko, CE
Tested according to		EN 55104, EN 55014, EN 6055-2, EN 61000-2, EN 61000-3-3	EN 55104, EN 55014, EN 6055-2, EN 61000-2, EN 61000-3-3
IP class		IP 00	IP 00
Programming		In-circuit programmable	In-circuit programmable
Remote control		Optional remote display 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° • 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	Time controlled (1 sensor)
	Mode 2	Time controlled (2 sensors)
	Mode 3	Temperature controlled (2 sensors)
Alarm	Types	Over or/and under temperature in cold or warm
	Indication	Flashing LED on the ETC1H 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 ETC1H or by an external connected remote module or optionally to one of the relays to control a buzzer

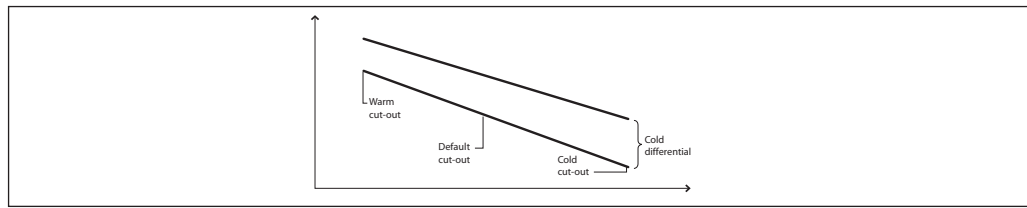
Parameters

 For customized ETC1H versions it is possible to
 adjust the following parameters in software.

 Please contact Danfoss if you have questions or
 want to discuss a sample.

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 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 D9: Max stop time	0 0	1 1	0 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	
	Function flag: D0: Alarm undertemperature D1: Alarm overtemperature	0 0	1 1	0 0		
Defrost	Defrost method: 0: No defrost 1: Time start, Control T stop 2: Time start, Evap T stop 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 D3: Hot-gas defrost D11: Timer reset on cutout	0 0 0	1 1 1	0 0 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: Shibuara			Epcos	Num	
	Zero-cross switching	-100	100	0	% of 1/4 period	
	Thermostat ID low D0-32	0	2 ³²	0	Num	
	Typenumber	0	10000	0	Num	
	D14-15 group number					
	D0-13 number					
	SW version	0	999	100		
	Function flag: D10: Zero switch D5: Stop function	0 0	1 1	0 0		
	Remote parameter	Remote Function Flag: D0: Fahrenheit in display D1: Decimalpoint D2: Show setpoint D3: Display lock at defrost	0 0 0 0	1 1 1 1	0 1 0 0	Boolean
		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	



Variants

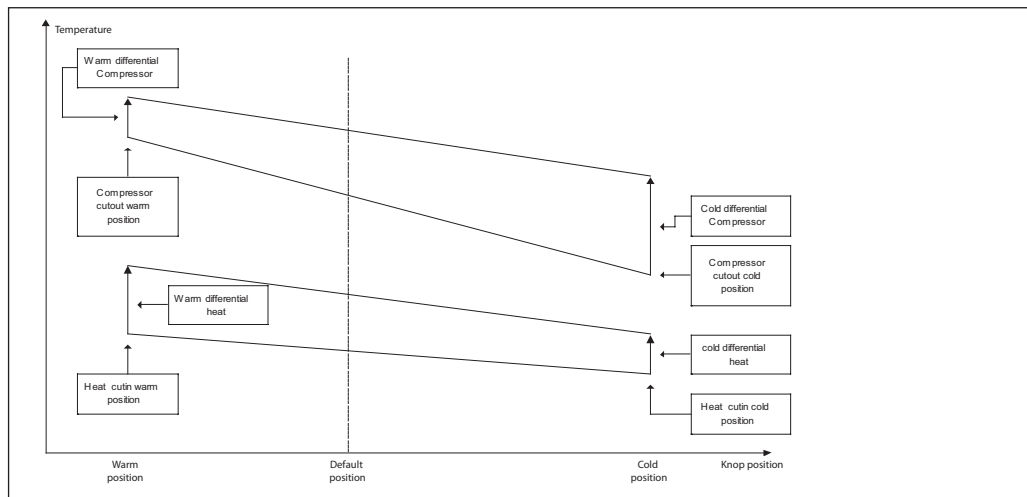
There are many and almost unlimited ways of using the ETC1H.

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

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.

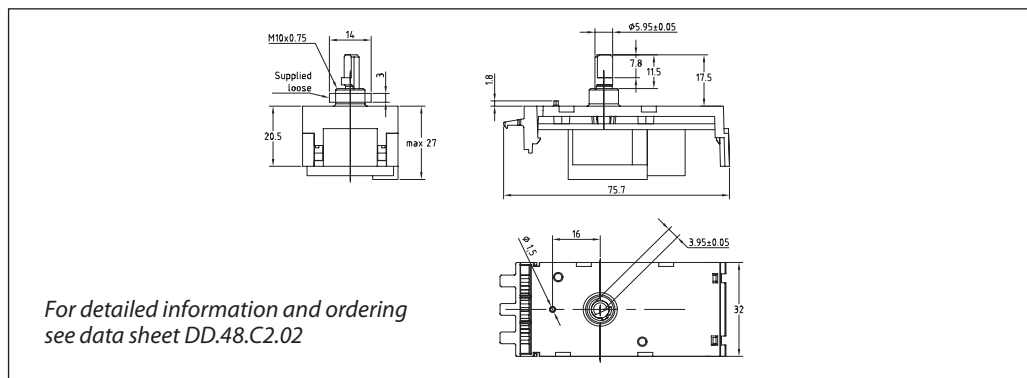
Danfoss does not accept any responsibility for ETCs placed in environments outside our design specifications. Use of the ETCs in such cases must be verified via relevant field-tests, and always remains the responsibility of the buyer.

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



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.

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.

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