

Electronic Temperature Control Type ETC1H



Introduction

The new generation of Danfoss' ETC1 called the ETC1H is adding additional features to a product very well accepted in the market place.

The ETC1H is introducing a more flexible platform due to on-board micro-controller and software dedicated product configuration. There will exist a basic version with similar functionality as the existing ETC1, and several high performance versions with added features and functionalities.

The ETC1H is developed for applications such as:

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

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 (black-out 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

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, CAN/CSI, Semko Approvals

Technical data

		NAM/LAM	EU/IEC	Mobile version
Power supply		115 V a.c. +/- 10% 60 Hz	220 V a.c. -240 V d.c +/- 10% 50 Hz	12 V d.c.-24 V d.c. +/- 10%
Energy consumption		Max 0.5 Watt	Max 0.5 Watt	Max 0.5 Watt
Environment	Ambient temp.	32°F to +122°F	0°C to 50°C	0°C to 50°C
	Humidity	Max 90% RH, Non-condensing	Max 90% RH, Non-condensing	Max 90% RH, Non-condensing
Operation	Standard sensor	-40°F to 185°F	-40°C to 85°C	-40°C to 85°C
	Low temp sensor	-76°F to 185°F	-60°C to 85°C	-60°C to 85°C
	ETC1H	32°F to +122°F	0°C to 50°C	0°C to 50°C
Compressor load	Locked rotor	96 Amp for max 4 seconds	96 Amp for max 4 seconds	96 Amp for max 4 seconds
	Rating	LRA96, FLA16	16(16) A	16(16) A
Fan load	Rating	FLA5	5 A	5 A
Heater load	Rating	FLA5	5 A	5 A
Accuracy	Standard sensor	+/- 1K	+/- 1K	+/- 1K
	ETC1H	+/- 0,5K	+/- 0,5K	+/- 0,5K
Temperature sensors		NTC	NTC	NTC
Life time	Compressor	+350,000 cycles	+350,000 cycles	+350,000 cycles
	Output2	+30,000 cycles	+30,000 cycles	+30,000 cycles
	Output3	+30,000 cycles	+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	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	3-pole RAST 2,5 edge connector 2-Pole RAST 2,5 edge connector
Temperature indication		Optimal remote display	Optimal remote display	Optimal remote display
Approvals		UL-C	Semko, CE	Semko, CE
Tested according to		EN 55104, EN 55014, EN 6055-2, EN 61000-3-2, EN 61000-3-3	EN 55104, EN 55014, EN 6055-2, EN 61000-3-2, EN 61000-3-3	EN 55104, EN 55014, EN 6055-2, EN 61000-3-2, EN 61000-3-3
IP class		IP 00	IP 00	IP 00
Programming		In-circuit programmable	In-circuit programmable	In-circuit programmable
Remote control		Optional remote display with control. 1-wire protocol	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)	2 (optional 3)
Start-up-time		< 2 seconds	< 2 seconds	< 2 seconds

Functionality
All functions are optional

Temperature	Settings	Differential: 0-10K • Range: 0-30K • Defrost: 0°C-10°C
	Adjustment	Knob with stop 210° +/-5°. Stop 45° +/-5° • Knob angle without stop 255° +/-5°
	Visual indication	On-board LED (Red)
	Function	Self check of sensors and potentiometer
Diagnostics	Sensor fault	Air sensor
Compressor protection	Brown-out Black-out	Under-voltage and over-voltage protection Based on temperature on air-sensor
Defrost	Mode 1 Mode 2 Mode 3	Time controlled (1 sensor) Time controlled (2 sensors) 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	Function	Monitor the condenser temperature and stop the compressor until <i>On customer request only</i> 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

Data Sheet

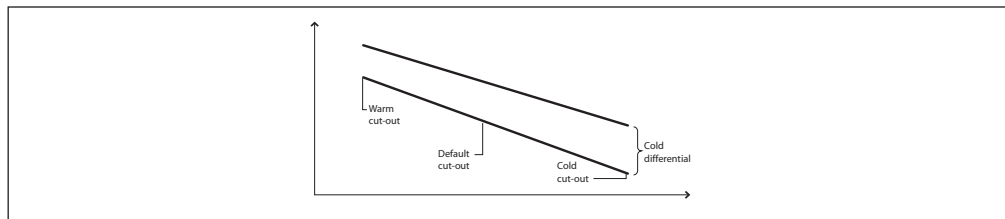
Electronic temperature control, type ETC1H

Customisation

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.

Parameter		Min	Max	Default	Unit
Thermostat	Cold cut-out	-65.00	+50.00	0.00	oC
	Warm cut-out	-65.00	+50.00	10.00	oC
	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	0	1	0	
	D9: Max stop time	0	1	0	
Alarm	Cold overtemp alarm	-65.00	+50.00	15.00	oC
	Warm overtemp alarm	-65.00	+50.00	15.00	oC
	Cold undertemp alarm	-65.00	+50.00	2.00	oC
	Warm undertemp alarm	-65.00	+50.00	2.00	oC
	Alarm delay	0	120	60	Min
	Function flag: D0: Alarm undertemperature	0	1	0	
Defrost	D1: Alarm overtemperature	0	1	0	
	Defrost method:	0	3	0	Num
	0: No defrost				
	1: Time start, Control T stop				
	2: Time start, Evap T stop				
	3: Evap T start, Evap T stop				
	Defrost terminate temperature	0	+50.00	5.00	oC
	Defrost start temperature	-25.00	0.00	-10.00	oC
	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
Fan	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 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	+50.00	+85.00	70.00	oC
	Condenser stop temperature	+50.00	+85.00	80.00	oC
	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: Shibaura			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	
Remote parameter	Function flag: D10: Zero switch	0	1	0	
	D5: Stop function	0	1	0	
	Remote Function Flag:				Boolean
	D0: Fahrenheit in display	0	1	0	
	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	



Variants

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

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 an ETC1H similar to the super-seeded ETC1 or with a shifting relay to add more functionality at an attractive price.

- 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 optimised and dedicate customer software. 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.

Product overview

There exist a dedicated product overview where all the standard models can be seen.

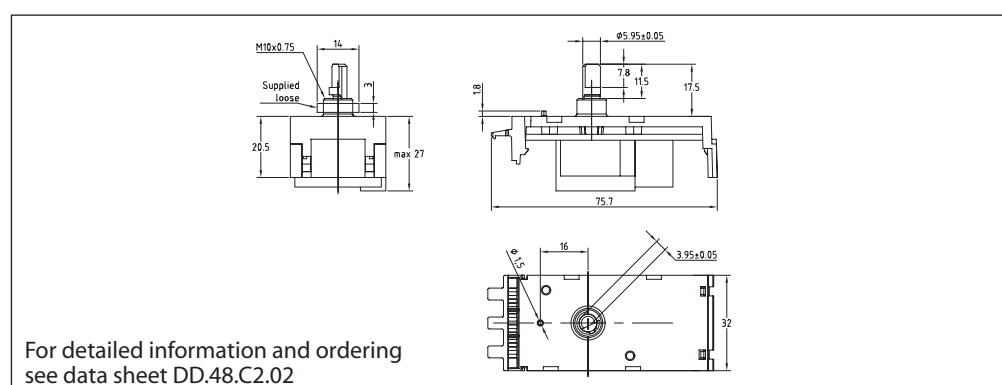
Please contact your Danfoss representative for further information.

Electrical connections

Connections and combinations possible for this specific ETC 1H:								
RAST2.5	Appl. 1	Appl. 2A	Appl. 2B	Appl. 4	Appl. 5	Appl. 6	Appl. 7	Appl. 8
1.1	nc	Defrost	nc	nc	Defrost	Display	Display	Display
1.2								
1.3								
2.1	nc	nc	Defrost	Alarm LED	Alarm LED	nc	Defrost	Alarm LED
2.2								
3.1	Cabinet	Cabinet	Cabinet	Cabinet	Cabinet	Cabinet	Cabinet	Cabinet
3.2								
3.3								

Connections for ETC1H basic only (1 relay)

Dimensions



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.