

EWFC 1005

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"quick-chill and hold" cold control, open version

WHAT IT IS

The EWFC 1005 is an electronic device to control all functions in a "quick-chill and hold" freezer system.

HOW IT IS MADE

- Dimensions: front 56x202 mm ("vertical" version); 202x56 mm ("horizontal" version)
- Mounting: open version
- Connections: Faston connectors 6.3 mm (1/4" male spade)
- Display: 12.5 mm LED (0.50")
- Push buttons: located on front panel
- Relay output: one (1) SPST relay 15(7)A 250V AC for compressor, one (1) SPDT relay 8(3)A 250V AC for defrost, two (2) SPST relays 8(3)A 250V AC for evaporator fan control and light
- Remote alarm output: one (1) output 12 Vdc/50 mA to remote alarm buzzer or relay
- Analog inputs: two (2) PTC probes for temperature control and defrost termination, one (1) insert probe for product control
- Digital inputs: three (3) digital inputs for door switch, compressor alarm and fan alarm
- Resolution: 1 °C (°F)
- Accuracy: better than 0.5% of full scale
- Power supply (dep. on model): 12 Vdc or 220, 110, 24 Vac, 50/60 Hz

PLUS PRODUCT

- Easy function selection by means of keyboard guided steps
- Automatic detection of insert probe presence
- Product surface anti-freeze function
- Available in "horizontal" or "vertical" version

GENERAL DESCRIPTION

The EWFC 1005 is an electronic device to control all functions in a "quick-chill and hold" freezer system.

It can also be used for units designed for a quick pull down of product temperature to approximately 0 °C, or for blast freezing as dictated by prevailing legislature and regulations. After the initial quick-chill process, a product-hold temperature cycle can be programmed for any length of time, during which the system operates as a normal refrigerator.

Various relay outputs are available to control the components of the system, i.e. compressor, fan, defrost cycle and cabinet light.

The change-over from "quick-chill" mode to "hold" mode can be achieved either on temperature, by using a product insert probe, or strictly on time, if an insert probe is not used. On the contrary, temperature control is achieved strictly on room probe. Even if an insert probe is used, the quick-chill will terminate on time, in the event that the probe is not properly inserted into the product.

A comprehensive parameter programming menu is available through which all data can be entered, such as the various operating temperatures, time delays and operating modes.

The end of a "quick-chill" cycle and start of a "hold" cycle are signalled by an on-board buzzer.

A number of status lights indicate the status of the programming and of the functioning of the equipment.

EWFC 1005 is available in two versions: vertical format 56x202 mm and horizontal format 202x56 mm, both for open version.

OPERATION

Operating cycle selection

When the instrument is turned on with the "On/Off" button, the display will flash "SEL", prompting the selection of the required operating cycle.

The following Leds will be blinking: "Quick-chill at positive temperature", "Quick-chill at negative temperature" and "Hold, above or below freezing".

Any of the following modes may be selected by using the respective buttons (see "front keypad" section):

- 1) quick-chill at positive temperature (above freezing);
- 2) quick-chill at negative temperature (below freezing);
- 3) hold, above freezing;

4) hold, below freezing;

5) quick-chill and hold above freezing;

6) quick-chill and hold below freezing;

The selection of the above combinations is done simply by pushing the corresponding buttons in sequence.

Cycle change mode selection (cycles 5 and 6)

The change-over from the quick-chill mode to the hold mode can be done either on temperature or on time. If the "Time" button has not been activated, then the change-over point will be dictated by the product core temperature as sensed by the insert probe in relation to the setpoint as selected during the programming (see "parameter programming" section). If however it is decided not to use the insert probe, then push the "Time" button; the change-over will now take place upon lapse of the time period as programmed with the corresponding parameter.

In the event that the probe was accidentally not inserted in the product, then the system will detect such condition and cause the cycle change-over to take place strictly on time.

The same will occur in the event that the probe has been placed in its holder which will activate the "probe holder" switch.

Cycle start

A cycle is started with the "Start/Stop" button.

During the quick chill cycle a particular control algorithm will eliminate "surface crystallisation" of the product, a phenomenon harmful to hygienic principles.

Defrost management

Before a quick-chill cycle is initiated, the system will go through a defrost, in order to start with a clean coil and thus make use of the full cooling capacity of the unit. No further defrosts will take place during this quick-chill cycle.

During the subsequent hold cycle however the system will defrost at time intervals as selected during the set-up programming.

Fans control

The fans remain running during the entire "quick-chill" phase, be it at positive or negative temperature (above or below freezing). In the "hold" phase however the fans will operate in parallel with the compressor, regardless of whether it operates at positive or negative temperature.

Via the parameter programming it is possible to select a "fan-off" temperature, along with a corresponding switching differential.

Status display

Each button has a corresponding Led sta-

tus light. These will flash once to indicate that this function or mode can be selected; a steady Led indicates that the corresponding cycle is in progress, while a flashing Led means that the cycle is waiting to be activated.

In addition, there is a Led for each output. The 3-digit Led display normally shows the cabinet temperature; the product core temperature can be read by pushing the appropriate button.

If a "cycle change-over on time" was selected, or the insert probe is not activated, then the display will show the time remaining to the end of the quick-chill cycle.

FRONT KEYPAD



Start/Stop

Starts the selected cycle if the machine is off or stops the cycle when it is running.



Positive quick-chill (65...10)

Pre-sets the system for a quick-chill cycle above or close to freezing temperature. The required temperature setting is selected with a programming parameter.



Negative quick-chill (65...-22)

Pre-sets the system for a quick-chill cycle below freezing. The required temperature setting is selected with a programming parameter.



Hold

Pre-sets the system for a hold cycle. The system will function as a normal refrigeration unit, if neither the "65...10" nor the "65...-22" has been activated. The hold temperature can be selected within one of two ranges, i.e. 65...10 or 65...-22 by pushing the appropriate button (the corresponding Led will light up).

On the other hand, if a quick-chill cycle is already selected, then activating this button will only light up the Led associated with the temperature relative to the pre-selected quick-chill cycle.



Cabinet probe/Insert probe

With this button the temperature display can be alternated between cabinet temperature and insert probe temperature; the corresponding Led indicates which is the case.



Time

Pushing this button de-activates the insert probe; the change-over between the two cycles will now be determined by time, as selected with the appropriate parameter. The display will switch to show the time remaining to the end of the quick-chill cycle. During this mode the temperature can still be shown, simply by pushing the "Cabinet probe/Insert probe" button; the display will show the temperature for a few seconds, then switch back to the time read out.



Light

This pushbutton activates the relay connected to the cabinet light. Push again to turn the light off.



On/Off

Turns the instrument on or off. Power to the EWFC 1005 is still live, even when the instrument has been turned off.



Compressor Led

Indicates whether the compressor is running; a flashing Led means that the compressor is in a delay-before-start mode.



Fan Led

Shows that the fan is running; a flashing Led means that the fan is in a delay-before-start mode.



Insert probe Led

If this status light is on it means that the insert probe is activated. A flashing light can either mean that the probe is located in its "probe holder", or - if the flashing started some time after the quick-chill cycle began - that the probe is not inserted into the product, thus causing the cycle to terminate on time.



Defrost Led

This pushbutton is on, when a defrost cycle is in progress.



Programming Led

Flashes during the entire parameter programming procedure.



Alarm Led

Status light for the 12 Vdc/50 mA remote alarm signal.

This Led stays steady during an alarm caused by a probe or high or low temperature.

PARAMETER PROGRAMMING

Programming mode can be entered by holding an hidden key pressed for some seconds. Such key is located in the lower right (under the "Prg" Led) in the vertical model and in the upper right (beside the "Prg" led) in the horizontal model.

The display shows the label of the first parameter, and the "Prg" Led starts blinking. To skip to the other parameters press "Light" (which operates as "Up" key) and On/Off (which operates as DOWN); to see the value of the selected parameter press the key "room probe/core temperature probe" placed above (vertical version) or on the right (horizontal version) of the "Light" key.

To change such value press "Light" and "On/Off" until the required value is displayed. By pressing "room probe/core temperature probe" again the label of the parameter will be displayed - the new value has been stored.

The instrument exit from parameters' pro-

gramming mode and stores data in case no operation is performed for a few seconds.

DESCRIPTION OF PARAMETERS

Note: the letter "A" refers to parameters which apply to the operating cycles for positive temperature (cycles 1, 3 and 5), while the letter "C" applies to negative temperatures (cycles 2, 4 and 6).

diF: diFferential.

Switching differential between on and off the compressor relay.

LAA: Low Alarm "A".

Temperature deviation below box setpoint, beyond which the low temperature alarm is activated (cycles 1, 3, 5; see the initial note).

LAC: Low Alarm "C".

Temperature deviation below box setpoint, beyond which the low temperature alarm is activated (cycles 2, 4, 6; see the initial note).

hAA: high Alarm "A".

Temperature deviation above box setpoint, beyond which the high temperature alarm is activated (cycles 1, 3, 5; see the initial note).

hAC: high Alarm "C".

Temperature deviation above box setpoint, beyond which the high temperature alarm is activated (cycles 2, 4, 6; see the initial note).

AFd: Alarm (and) Fan differential.

Switching differential of the fans, in addition to the high and low box temperature alarms.

AtA: Alarm time delAy.

Time delay for temperature alarm initiation, in minutes.

EPr: Evaporator Probe read-out.

This parameter provides a read-out of the actual temperature of the evaporator (sensed by the defrost termination probe) even during normal operation.

dty: defrost type selection.

To select the defrost type.

EL = ELectric defrost;

in = hot gas (reverse cycle) defrost.

dPo: defrost (at) Power-on.

Selects whether the system should go through a defrost cycle at start-up (or after a power failure).

If set at "y" (yes), defrost will take place, even if no evaporator probe is used.

n = no; y = yes.

tcA: time cycle "A".

This is the defrost time limit after which the defrost is terminated; applies to cycles 1, 3 and 5 and is expressed in minutes.

tcC: time cycle "C".

This is the defrost time limit after which the defrost is terminated; applies to cycles 2, 4 and 6 and is expressed in minutes.

diA: defrost interval "A".

Defrost frequency, i.e. time interval between two consecutive defrost starts; applies to cycles 1, 3, 5 and is expressed in hours.

diC: defrost interval "C".

DEFAULT SETTINGS - STANDARD MODELS

Parameter	Description	Range	Default	Unit
dIF	dIFferential	1...15	2	°C / °F
LAA	Low Alarm "A"	0...60	40	°C / °F
LAC	Low Alarm "C"	0...60	40	°C / °F
hAA	high Alarm "A"	0...60	40	°C / °F
hAC	high Alarm "C"	0...60	40	°C / °F
AFd	Alarm (and) Fan differential	0...60	2	°C / °F
AtA	Alarm time delAy	1...60	60	minutes
EPr	Evaporator Probe read-out	/	/	°C / °F
dtY	defrost type selection	EL / in	EL	flag
dPo	defrost (at) Power-on	n / y	n	flag
tcA	time cycle "A"	0...99	5	minutes
tcC	time cycle "C"	0...99	5	minutes
diA	defrost interval "A"	0...24	2	hours
diC	defrost interval "C"	0...24	2	hours
dEA	dEfrost termination "A"	-60...60	2	°C / °F
dEC	dEfrost termination "C"	-60...60	2	°C / °F
ddt	defrost drainage time	0...240	60	seconds
dct	defrost count type	rt / dF	rt	flag
ddl	defrost display lock	n / y / Lb	Lb	flag
FSA	Fan Stop "A"	-20...99	10	°C / °F
FSC	Fan Stop "C"	-20...99	10	°C / °F
Ftd	Fan time delay	0...240	30	seconds
SCA	Set Cabinet probe "A"	-60...50	5	°C / °F
SSA	Set inSert probe "A"	-50...50	10	°C / °F
i1A	interval 1 "A"	24 / 240	120	minutes
SE1	SEt 1	-60...60	2	°C / °F
SCC	Set Cabinet probe "C"	-60...50	-25	°C / °F
SSC	Set inSert probe "C"	-50...50	-22	°C / °F
i1C	interval 1 "C"	24 / 240	120	minutes
SE2	SEt 2	-60...60	-22	°C / °F
dod	disable with opened door	n / y	y	flag
oAo	output (door) Alarm override	1...60	30	seconds
dSd	diSable (light) with open. door	n / y	y	flag
tLC	time light Cabinet	0...60	30	seconds
cdP	compressor delay Protection	1...99	1	minutes
CAL	CALibration	-20...20	0	°C / °F
tAb	tAble of parameters	/	/	/

Defrost frequency, i.e. time interval between two consecutive defrost starts; applies to cycles 2, 4, 6 and is expressed in hours.

dEA: dEfrost termination "A".

Defrost termination temperature for cycles 1, 3 and 5.

dEC: dEfrost termination "C".

Defrost termination temperature for cycles 2, 4 and 6.

ddt: defrost drainage time.

Upon defrost completion, evaporator fan and compressor remain "OFF" for this amount of time to allow coil drainage; expressed in seconds.

dct: defrost count type.

This determines the way the defrost interval time ("diA" and "diC") is calculated.

The choice is:

dF = digiFrost®; time calculation is based on accumulative running time of the compressor;

rt = real time; time calculation is based on running time of the system and controller; SC = Stop Compressor; a defrost cycle is activated each time the compressor stops.

ddl: defrost display lock.

Temperature display can be "locked" in during a defrost.

n = no; the actual box temperature is displayed during defrost;

y = yes; the temperature shown at the moment a defrost starts is locked in and remains steady during the defrost;

Lb = Label; the display will show the "dEf" label during the entire defrost cycle.

Note: in case of "y" or "Lb" the display will switch back to the actual temperature only after setpoint has been reached again after a defrost.

FSA: Fan Stop "A".

Temperature setting above which the fan stops in cycles 1, 3 and 5.

FSC: Fan Stop "C".

Temperature setting above which the fan stops in cycles 2, 4 and 6.

Ftd: Fan time delay.

Fan start time delay in seconds after completion of a defrost, or after a defrost drainage time, if used.

SCA: Set Cabinet probe "A".

Required setting of the cabinet (box) temperature during cycle 1 and quick-chill phase of cycle 5.

SSA: Set inSert probe "A".

Required setting of the termination temperature of cycle 1 and of quick-chill phase of cycle 5 (if a product insert probe is used).

i1A: interval 1 "A".

Time setting, in minutes, which determines the maximum duration of cycle 1 and of quick-chill phase of cycle 5, if operated on time only (without insert probe).

SE1: SEt 1.

Setting of the cabinet (box) temperature required during cycle 3 and of hold phase of cycle 5.

SCC: Set Cabinet probe "C".

Required setting of the cabinet (box) temperature during cycle 2 and quick-chill phase of cycle 6.

SSC: Set inSert probe "C".

Required setting of the termination temperature of cycle 2 and of quick-chill phase of cycle 6 (if a product insert probe is used).

i1C: interval 1 "C".

Time setting, in minutes, which determines the maximum duration of cycle 2 and of quick-chill phase of cycle 6, if operated on time only (without insert probe).

Note: the effective value will be 120 minutes higher than selected.

SE2: SEt 2.

Setting of the cabinet (box) temperature required during cycle 4 and of hold phase of cycle 6.

dod: disable with opened door (compressor and fan).

A choice is given whether or not to stop the compressor and fan when door is opened.

n = no; y = yes.

oAo: door Alarm override.

Alarm time delay in seconds after the door is opened.

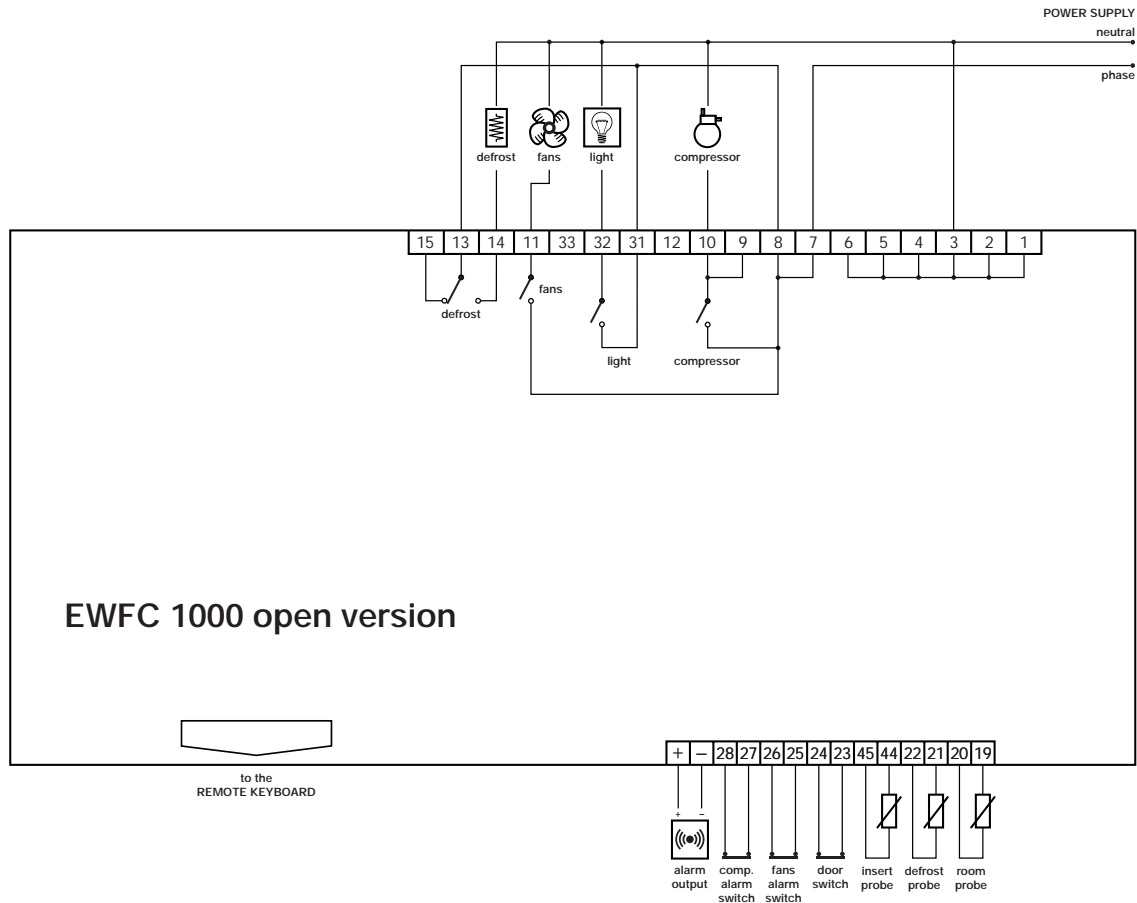
dSd: diSable light with open door.

Light comes on automatically when door is opened.

n = no; y = yes.

tLC: time light Cabinet.

Time in seconds after which the light is turned off; if set at "0" the light is controlled directly by door closure or by the light button.



cdP: compressor delay Protection.

Compressor start time delay in minutes to avoid short-cycling.

CAL: CALibration.

This is an offset calibration which may be required due to the location of the sensor.

tAb: table of parameters.

This is factory set and can not be modified; it is determined by the parameter configuration.

DIGITAL INPUTS

The EWFC 1005 can accommodate up to three input signals, dry contact and voltage free.

The door switch input controls the cabinet light: light on when input open, off when contact is closed.

If the light has already been switched on with the (manual) button, then this input has no further effect (see "FRONT KEY-PAD" section).

Opening of the door switch input causes the Led warning light located above the "LIGHT" button to come on, and causes an audible alarm (internal buzzer) to go off after the delay time selected through parameter "oAo". The acoustic alarm can be turned off simply by pushing any front panel button; the visual alarm remains on until the door is closed (input contact closure).

The compressor alarm input, if interrupted, cuts off the compressor output; this input should be shorted if not used.

The fans alarm input, if interrupted, cuts off

the compressor output; this input should be shorted if not used.

INSTALLATION

The EWFC 1005 is designed for open version mounting. The ambient temperature around the instrument should be kept between -5 and 65 °C ($23...149$ °F).

Select a location which will not be subject to high humidity or condensation.

ELECTRICAL WIRING

The EWFC 1005 is equipped with Faston spade connectors 6.3 mm.

Make sure that the available voltage corresponds to the nameplate rating of the instrument.

Power remains connected even if the instrument is turned off; a main switch should therefore be installed between the instrument and the mains.

The three PTC-type sensors do not require polarity and can be extended in the field by using common 2-lead wire. It is strongly recommended that the probe wiring is kept away from power leads.

Also, it is good practice to install the sensor tip facing up, in order to avoid moist from entering the sensor housing.

The digital inputs should be dry contacts, voltage free.

The compressor output relay is voltage free and can handle up to 1.5 HP; use a suitable external contactor for larger compressors.

ERROR ANNUNCIATION

The EWFC 1005 will display a number of temperature or probe error alarm conditions.

In the event of an open or shorted box probe the alarm Led status light will come on, while the display will alternate between code "CP" (Cabinet Probe) and the actual box temperature. Likewise, a code "EP" (Evaporator Probe) will appear to signal an evaporator probe alarm, "IP" (Insert Probe) to signal an insert probe problem.

If the box probe is open or shorted the cycle in progress is immediately interrupted, while a defrost cycle will continue and terminate normally. At this point the START function of the unit is blocked until such a time that - upon correction of the error - the system is turned OFF first (manual reset).

In the event that the evaporator probe becomes defective (open or short circuit), the cycle in progress will continue and terminate normally, while a defrost cycle is stopped at once.

The "START" function is again blocked, however the reset is automatic. Finally, in the event of an insert probe defect, the cycle in progress will terminate on time only, a defrost terminates normally and the reset is automatic.

If the temperature goes below the low alarm temperature setting, or above the high alarm temperature setting; then the error codes "LI" (Low limit), respectively

"HI" (High limit) will be displayed; this alarm not have any effect on the operation of the machine.

TECHNICAL DATA

Dimensions: front 56x202 mm ("vertical" version); 202x56 mm ("horizontal" version).

Mounting: open version.

Connections: Faston connectors 6.3 mm (1/4" male spade).

Display: 12.5 mm LED (0.50").

Push buttons: located on front panel.

Data storage: non-volatile EEPROM memory.

Operating temperature: -5...65 °C (23...149 °F).

Storage temperature: -30...75 °C (-22...167 °F).

Relay outputs: one (1) SPST relay 15(7)A 250V A C for compressor, one (1) SPDT relay 8(3)A 250V A C for defrost, two (2) SPST relays 8(3)A 250V A C for evaporator fan control and light.

Remote alarm output: one (1) output 12 Vdc/50 mA to remote alarm buzzer or relay.

Analog inputs: two (2) PTC probes for temperature control and defrost termination, one (1) insert probe for product control.

Digital inputs: three (3) digital inputs for door switch, compressor alarm and fan alarm.

Resolution: 1 °C (°F).

Accuracy: better than 0.5% of full scale.

Power supply (depending on model): 12 Vcc \pm 15%; 12, 24, 110, 220 Vca \pm 10%, 50/60 Hz.

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