



MT-444E Fit^{Ver.02}

DIGITAL REFRIGERATION CONTROLLER



Connector for quick coupling



Power-saving mode



On/off light



Buzzer



Functions lock



Control functions shutdown



Serial Programming



IP 65 FRONT Protection level



CALUS
E251415

EVOLUTION



MT444EFTV02-02T-17190

1. DESCRIPTION

Designed to maximize energy efficiency in commercial refrigeration equipment, the **MT-444E Fit** features pluggable terminal block for quick coupling, increasing productivity in manufacturing lines. It is equipped with 4 output relays (compressor, fan, defrost and light), 2 temperature sensors and one digital input. It can be configured with 3 independent sets of parameters for quick change of (setpoint, eco-setpoint, differential and defrost) settings to accommodate change of product in the room. Digital input can be programmed to activate/deactivate economic set point, initiate defrost, door ajar alarms, door open counter or light control. Light and economy set point can also be controlled through quick access menu key, eliminating the need of external switches. Other salient features include temperature initiated defrost, internal buzzer, IP65 frontal, drip protection case on rear, min-max temperature record, serial programming key, multi LED color options and functions lockdown to prevent unauthorized parameter changes.

Product conforming to UL Inc. (United States and Canada).

2. SAFETY RECOMMENDATIONS

- Check the controller for correct fastening;
- Make sure that the power supply is off and that it is not turned on during the controller installation;
- Read the present manual before installing and using the controller;
- Use adequate Personal Protective Equipment (PPE);
- For application at sites subject to water spills, such as refrigerated counters, install the protecting vinyl supplied with the controller;
- For protection under more critical conditions, we recommend the Ecase cover, which we make available as an optional item (sold separately);
- The installation procedures should be performed by a qualified technician.

3. APPLICATIONS

- Beverage displays; • Reach-in coolers;
- Refrigeration counters;
- Up right freezers.

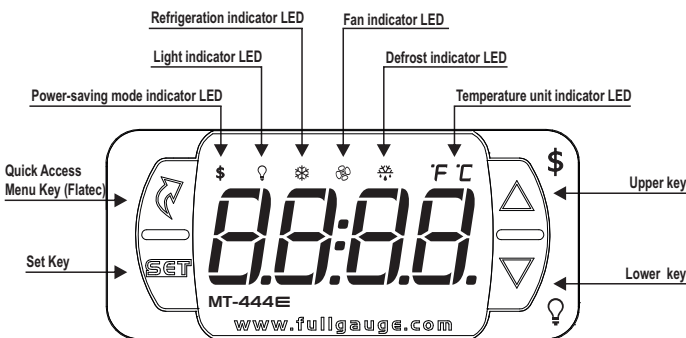
4. TECHNICAL SPECIFICATIONS

Power supply	MT-444E Fit: 115 or 230Vac $\pm 10\%$ (*) (50/60 Hz) MT-444EL Fit: 12 or 24Vac/dc $\pm 10\%$ (*)
Approximate consumption	3.4 VA
Setpoint Temperature	- 50 to 75°C (-58 to 167°F)
Operating Temperature	-10 to 50°C / 14 to 122°F
Operating humidity	10 to 90% RH (without condensation)
Maximum current per output	COMP: 12(8)A / 240Vac 1HP DEFR: 3A / 240Vac 720W FAN: 5(3)A / 240Vac LIGHT: 5(3)A / 240Vac
Digital input	input for open-door detection (dry contact type)
Maximum dimensions (**) (mm)	76 x 34 x 77 (WxHxD)
Cutouts dimensions (mm)	X = 71 $\pm 0,5$ Y = 29 $\pm 0,5$ (see Image V)

(*) Admissible variation in relation to the voltage rating.

(**) Maximum dimensions without connectors.

5. INDICATORS AND KEYS



6. WIRING DIAGRAM

Image I - Connection 115 Vac

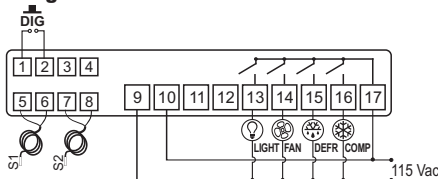


Image III - Connection 12 Vac/dc

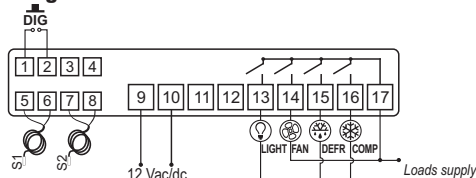


Image II - Connection 230 Vac

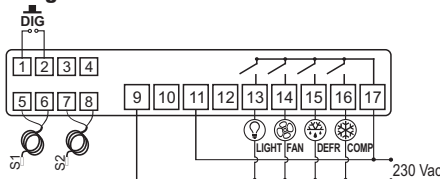
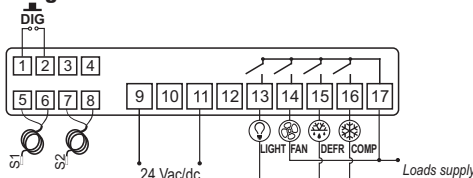


Image IV - Connection 24 Vac/dc



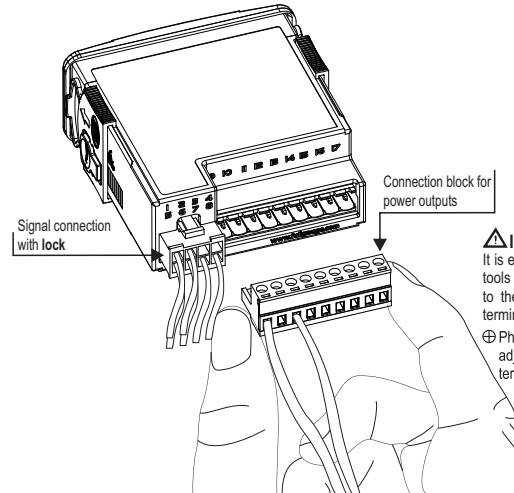
Controller power supply

Use the pins according to table below, considering the set version:

Pins	MT-444E Fit	MT-444EL Fit
9 and 10	115 Vac	12 Vac/dc
9 and 11	230 Vac	24 Vac/dc

The **sensor S1** must be in the ambient.
The **sensor S2** must be placed in the evaporator through metallic clamp.

NEW FIT CONNECTION SYSTEM (QUICK COUPLING)



IMPORTANT
It is essential to use the correct tools in order to avoid damages to the instrument's connection terminals:
⊕ Phillips screwdriver #1 for adjustments at the power terminals.

6.1. Temperature sensor connection

- Connect the **sensor S1** wires to terminals "1 and 2" and wires **sensor S2** to terminals "3 and 4": the polarity is not relevant.
- Length of the sensor cables can be increased by user himself to up to 200 meters, using a PP 2x24 AWG cable.

6.2. Recommendations of IEC60364 standard

- Install overload protectors in the controller supply.
- Install transient suppressors – suppressor filter RC – in the circuit to increase the service life of the controller relay. See connection instructions of the filter on the previous page.
- The sensor cables may be together, but not in the same conduit where the power supply of the controller and/or of the loads passes through.

7. FASTENING PROCEDURE

- Cut out the panel plate (Image V - item 13) where the controller shall be fastened, with sizes $X = 71 \pm 0,5$ mm and $Y = 29 \pm 0,5$ mm;
- Remove side locks (Image VI - item 13); to do that, compress the central elliptical part (with the Full Gauge Controls logo) and displace the locks backwards;
- Introduce the controller in the notch made on the panel, inwards;
- Place the locks again and then displace them until they compress into the panel, fastening the controller to the housing (see arrow indication in Image VI - item 13);
- Perform the electric installation as described in item 6;
- Adjust the parameters as described in item 9.

ATTENTION: for installations requiring liquid tight sealing, the notch sizes for the controller installation should be no more than 70.5x29mm. The side locks should be fastened so that they press the sealing rubber avoiding infiltration between the notch and the controller.

Protector vinyl - Image VII (item 13)

It protects the controller when installed at a site subject to water spills, such as refrigerated counters. This adhesive vinyl is supplied with the instrument in the package.

IMPORTANT: Make the application only after completing the electrical connections.

- Retreat the side locks (Image VI - item 13);
- Remove the protective film from the adhesive vinyl face;
- Apply the vinyl over the entire upper part, bending the flaps, as indicated by the arrows - Image VII (item 13);
- Reinstall the locks.

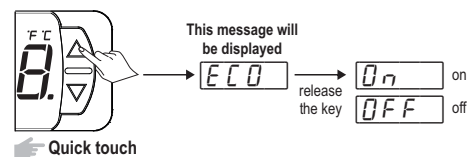
NOTE: The vinyl is transparent, allowing visualization of the wiring system of the instrument.

8.1. Quick Access Menu Map

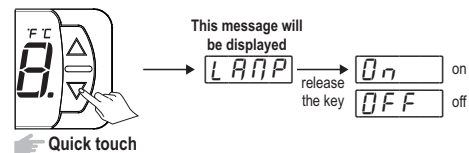
POWER-SAVING MODE
↓
LIGHT
↓
DEFROST (ON/OFF)
↓
CURRENT PROCESS DISPLAY
↓
FUNCTIONS LOCK
↓
CONTROL FUNCTIONS SHUTDOWN
→
MIN. AND MAX. TEMPERATURE RECORD
→
ERASE MAX. AND MIN. VALUES

The LCD displays the following text in sequence:
Eco
LAMP
deFr
Proc
LOC
LOC
Ctrl
rEG
CrEG

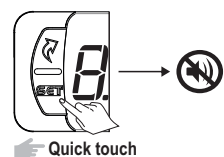
To switch power-saving mode on/off, press with quick touch or use the quick access menu (Item 8.1).



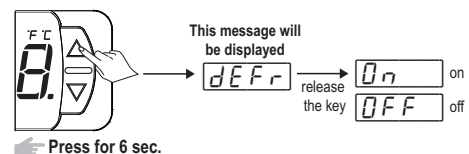
To switch the light on/off, press with quick touch or use the quick access menu (Item 8.1).



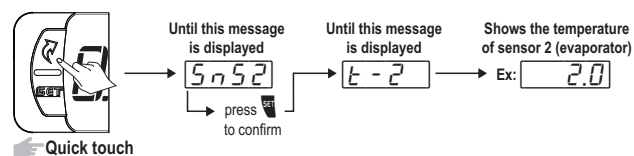
To silence the audible alarm, press the key (quick touch).



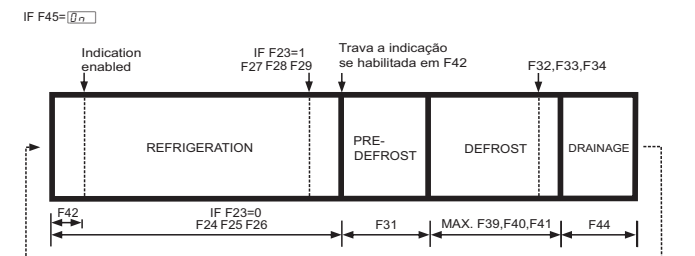
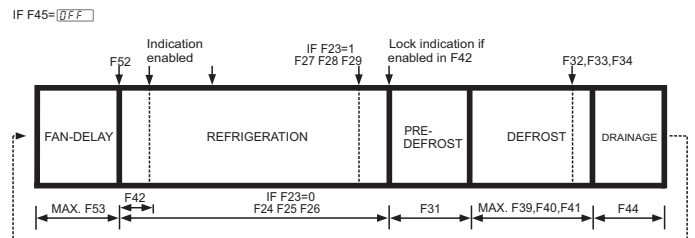
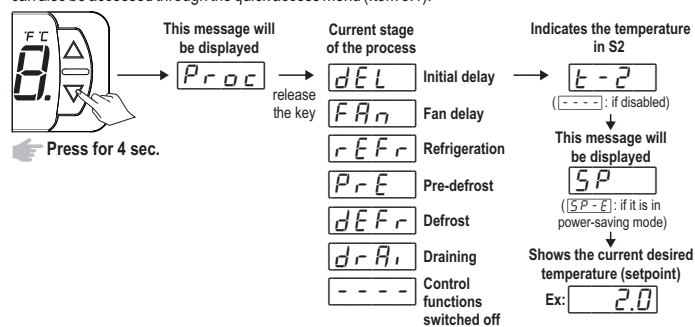
To start/stop a manual defrost, regardless of the schedule, press and hold the key for 6s, until the message appears. Then release it. The message will appear when it has started and the message when it has been stopped. It can also be accessed through the quick access menu (Item 8.1).



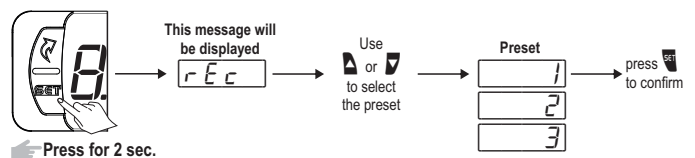
The temperature in sensor S2 (evaporator) can be viewed by pressing the key (quick touch) until the message is displayed. If the sensor is disabled the indication will be displayed.



To see which process stage is underway, press and hold the **P** key for 4s, until the **[P_r_o_c]** message appears. Then release it. The stage of the process which is in progress will be displayed, showing the desired temperature (setpoint) in use, in relation to the current operating mode (normal/power-saving). It can also be accessed through the quick access menu (Item 8.1).

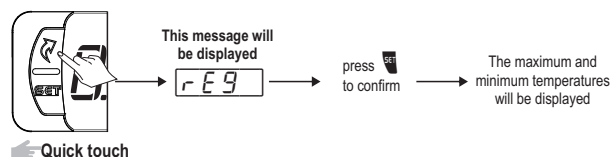


To select the desired preset, press and hold the key for 2s, until the . Message appears, and then release it. Use the or keys to select the desired preset (1, 2 or 3) and press to confirm.



The Maximum and Minimum Temperature Record can be viewed by pressing the key until the message is displayed (see item 8.1 on the map):

To delete the current minimum and maximum values, press the **DEL** key (quick touch) until the message **CONFIRM** is displayed. Press **ENT** to confirm. Another way to erase the records is by pressing the **DEL** key for 2s while the records of maximums and minimums are being displayed. The message **CONFIRM** confirms that data has been erased.



Quick touch

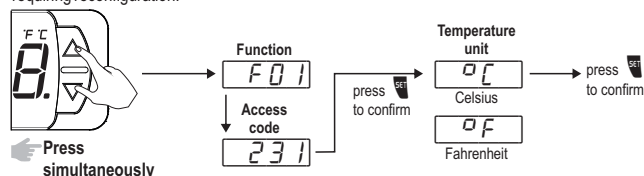
This message will be displayed

press to confirm

This message will be displayed

The temperature of the controller can be viewed either in degrees Celsius (°C) or in degrees Fahrenheit (°F). To set the units of measurement that the instrument will use to operate, enter function **[F01]** using the access code **[231]**, and then press **[SET]**. Then select the desired units (**[C]** or **[F]**) using the **[▲]** or **[▼]** key. Press **[SET]** to confirm.

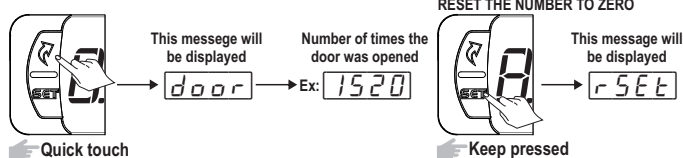
Whenever the units are changed, the configuration of the functions assumes the factory default, thus requiring reconfiguration.



8.11 View the number of times the door was opened

The number of times the door was opened can be viewed by pressing the **▲** key (quick touch) until the message **door** is displayed, and then the number is shown.

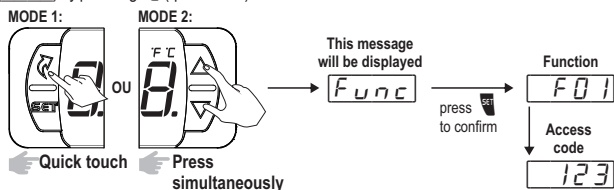
To reset this number to zero, press the **▼** key while the number is being shown until the indication **reset** is displayed.



9. ADVANCED OPERATIONS

9.1 Changing the configured setup

The functions menu can be accessed through the quick access menu, option **Func** or by pressing **▲** and **▼** simultaneously during the temperature display. To allow a change of parameters, enter **FOI** by pressing **▲** (quick touch) and enter code **123**.



9.2 Control functions shutdown

When control functions are shutdown, the controller starts to operate purely as a temperature indicator, with all outputs deactivated. How the operation of turning the control functions off is made shall depend on the parameter "FO77-Control functions shutdown" setting:

- FO77** Does not allow the control functions shutdown.
- FO77** Allows the control functions to be turned on and off only if the functions are unlocked.
- FO77** Allows the control functions to be turned on and off even if the functions are locked. With the **▲** key (quick touch), select **Ctrl**, and then press **▼** (quick touch) to confirm. Also is possible turn on/ turn off the control functions by pressing the key **▲** for 5 seconds.

9.4 Parameters table

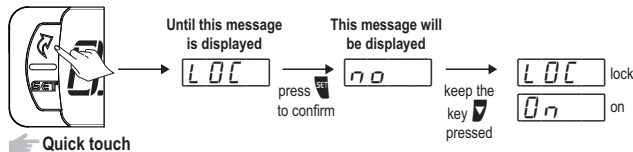
		CELSIUS (FAHRENHEIT)			
FUN	FUNCTION	DESCRIPTION	MÍN	MÁX	UNIT. DEFAULT
FOI Access code: 123 (one hundred and twenty-three)		It is required for changing parameters. This code is not required for viewing the parameters. It allows entering the access codes provided: FOI - Allows the access to change the parameters of the table. FOI - Allows configuring the units of measurement °F or °C . FOI - To select the units the instrument will use to operate, enter function FOI using the access code FOI , and then press ▼ . Then select the desired unit °F or °C using the ▲ or ▼ key, and press ▼ to confirm. NOTE: Whenever the unit is changed the parameters must be reconfigured because they will assume the "default" values of the table of parameters.	-	-	-
FO2	Desired temperature (setpoint) (r1)	This is the control temperature of the normal operating mode. When the sensor S1 temperature (room) is lower than the configured value for this function, the compressor will be turned off.	-50 (-58)	75.0 (167)	°C (°F) -6.0 (21)
FO3	Desired temperature (setpoint) (r2)		-50 (-58)	75.0 (167)	°C (°F) -1.0 (30)
FO4	Desired temperature (setpoint) (r3)		-50 (-58)	75.0 (167)	°C (°F) 2.0 (36)
FO5	Desired temperature (power-saving setpoint) (r1)	This is the control temperature when the power-saving mode is active. If the sensor S1 temperature (room) is lower than the configured value for this function, the compressor will be turned off.	-50 (-58)	75.0 (167)	°C (°F) 1.0 (34)
FO6	Desired temperature (power-saving setpoint) (r2)		-50 (-58)	75.0 (167)	°C (°F) 4.0 (39)
FO7	Desired temperature (power-saving setpoint) (r3)		-50 (-58)	75.0 (167)	°C (°F) 7.0 (45)
FO8	Minimum desired temperature (setpoint) allowed to the user	Limits preventing the accidental setup of an excessively high or low temperature setpoint, which could result in high energy consumption by keeping the system turned on.	-50 (-58)	75.0 (167)	°C (°F) -50 (-58)
FO9	Maximum desired temperature (setpoint) allowed to the user		-50 (-58)	75.0 (167)	°C (°F) 75.0 (167)
FO10	Control differential of operating setpoint (r1)	This is the difference between turning refrigeration OFF and BACK ON in normal operating mode. Example: If adjusted FO2 = FO4 and FO10 = FO1 , the compressor will be turned off when the sensor S1 temperature (room) is less than FO4 and it will be turned on when it is higher than FO4 + FO10 .	0.1 (1)	20.0 (36)	°C (°F) 3.0 (5)
FO11	Control differential of operating setpoint (r2)				
FO12	Control differential of operating setpoint (r3)				
FO13	Control differential of power-saving setpoint (r1)	This is the difference between turning refrigeration OFF and BACK ON in power-saving mode.	0.1 (1)	20.0 (36)	°C (°F) 3.0 (5)
FO14	Control differential of power-saving setpoint (r2)				
FO15	Control differential of power-saving setpoint (r3)				
FO16	Antifreeze safety differential temperature	This is the value that will be added to the current preset setpoint after the time set in FO61 . Example: If FO2 = FO3 (setpoint), FO10 = FO2 (differential) and FO16 = FO1 (antifreeze), refrigeration will be turned off at FO3 + FO1 and turned back on at FO3 + FO2 + FO1 .	0.1 (1)	20.0 (36)	°C (°F) 2.0 (4)
FO17	Enables the evaporator temperature sensor (sensor S2)	The sensor S2 can be disabled. If this is the case, defrost will be initiated by time.	OFF	On	- OFF
FO18	Digital filter operating mode	FO18 = The filter operates both when the temperature rises and when it falls; FO18 = The filter operates only when the temperature rise. When the temperature fall, the response is immediate.	0	1	- 0
FO19	Intensity of the digital filter applied to the room sensor (sensor S1)	The value adjusted in this function represents the time (in seconds) for the temperature to change by 0.1°C. A typical application for this type of filter is for ice cream and frozen food freezers, as, when the door is opened, a mass of hot air reaches the sensor directly, causing a rapid increase in the measured temperature indication and often unnecessarily activating the compressor.	On	20	sec. On
FO20	Local calibration of the room sensor (sensor S1)	This compensates for any deviations in the sensor reading due to replacement or a change in cable length	-20.0 (-36)	20.0 (36)	°C (°F) 0.0 (0)
FO21	Local calibration of the evaporator sensor (sensor S2)				

9.3 Functions lock

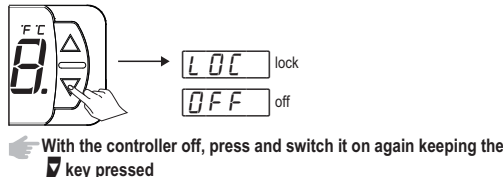
The use of the functions lock brings greater security to the operation of the instrument. When it is active the presets and other parameters can be visible to the user, but are protected against undue changes (**FO75**=2) or you can lock only the changes in the control functions and leave the selection of presets unlocked (**FO75**=1). To lock the functions, access the option **LOC** in the quick access menu using the **▲** key (Fleat) and press **▼** to confirm. The message **On** will be displayed if the lock is inactive. At this time, press and hold the **▼** key for the time configured in function **FO76**. The activation will be indicated by the message **LOC On** and will take place only if function **FO75** is configured with 1 or 2.

To deactivate the lock, switch the controller off and on again with the **▼** key pressed. Keep the key pressed until the message **LOC OFF** is indicated.

LOCK:



UNLOCK:



			CELSIUS (FAHRENHEIT)			
FUN	FUNCTION	DESCRIPTION	MÍN	MÁX	UNIT.	DEFAULT
F22	Defrost type	☐ 0 = Electrical defrost (by resistance), where only the defrost output is activated.. ☐ 1 = Hot gas defrost, whereby the compressor and defrost output are activated.. ☐ 2 = Natural defrost, where only the fan output is activated.	0	2	-	0
F23	Condition to start the defrost	☐ 0 = Defrost started by time; ☐ 1 = Defrost started by temperature.	0	1	-	0
F24	Interval between defrosts if ☐ F23 = ☐ 0 (r1)	Determines how often defrost will be performed, which is the time counted from the end of the previous defrost.	1	999	H	12
F25	Interval between defrosts if ☐ F23 = ☐ 1 (r2)					
F26	Interval between defrosts if ☐ F23 = ☐ 2 (r3)					
F27	Evap. temp. to start defrost if ☐ F23 = ☐ 1 (r1)	When the evaporator temperature (sensor S2) reaches the value configured by this function, the controller will initiate the countdown to defrost.	-50 (-58)	75.0 (167)	°C (°F)	-5.0 (23)
F28	Evap. temp. to start defrost if ☐ F23 = ☐ 1 (r2)					
F29	Evap. temp. to start defrost if ☐ F23 = ☐ 1 (r3)					
F30	Confirmation time of low temperature (sensor S2) to start the pre-defrost if ☐ F23 = ☐ 1	When the evaporator temperature (sensor S2) drops and reaches the value set in ☐ F27, ☐ F28, ☐ F29, the countdown to start the pre-defrost begins. During this stage, if the temperature remains low, the pre-defrost starts. Otherwise, if this temperature rises above the set value, the system returns to the refrigeration stage.	00	999	min.	10
F31	Pre-defrost Time (gas collecting)	When starting the defrosting process, the controller will only activate the fan to take advantage of the gas residual energy.	00	999	min.	00
F32	Evap. temp. (sensor S2) to finalize the defrost (r1)	If the temperature on the evaporator (sensor S2) reaches the set value the defrosting process will end as usual, i.e. by temperature. This, it optimizes the defrosting process.	-50 (-58)	75.0 (167)	°C (°F)	40.0 (104)
F33	Evap. temp. (sensor S2) to finalize the defrost (r2)					
F34	Evap. temp. (sensor S2) to finalize the defrost (r3)					
F35	Room temperature to end the defrost (r1)	If the room temperature (sensor S1) reaches the set value, the defrosting process will end, avoiding an eventual unwanted rising of product temperature.	-50 (-58)	75.0 (167)	°C (°F)	20.0 (68)
F36	Room temperature to end the defrost (r2)					
F37	Room temperature to end the defrost (r3)					
F38	Maximum time without defrosts if ☐ F23 = ☐ 1	If the controller is configured to carry out the defrost based on temperature, this time works as a safeguard in situations where the evaporator temperature (sensor S2) does not reach the programmed values in ☐ F27, ☐ F28, ☐ F29. This function determines the maximum time that the controller will wait for without carrying out the defrost.	1	999	H	12
F39	Maximum defrost time (for safety) (r1)	This function is used to set the maximum time for a defrost. If, within such period, defrosting is not terminated by temperature, a dot will start blinking on the bottom-right corner of the display (it needs to be enabled in ☐ F74), indicating that the defrosting process has been terminated by the time limit rather than by temperature. This may happen if the temperature set is too high, the time limit is too short, or the sensor S2 is disconnected or not connected to the evaporator.	1	999	min.	30
F40	Maximum defrost time (for safety) (r2)					
F41	Maximum defrost time (for safety) (r3)					
F42	Locked temperature indication during defrost	This function is intended to prevent an increase in room temperature, due to the defrosting process being displayed. During the defrosting process, the last measured temperature in the refrigeration cycle will be frozen on the display. The indication will be unfrozen when the temperature before defrost is reached or when the time set using this function is exceeded, after the start of the next refrigeration cycle (whichever comes first). If set to the value 00 , the temperature display will only be frozen at the defrost stage. This function can be disabled if set to 00 .	00	999	min.	15
F43	Defrost when powering the controller	Allows a defrost to start when the controller is powered. For example, when the power supply returns (in the case of a power shortage)	0FF	00	-	00
F44	Draning time	Time required for dripping, i.e. to drain the last drops of the evaporator. During this period, all outputs remain switched off. If you do not want this stage, adjust this time to 00 .	00	999	min.	1
F45	Enable second defrost output	With this function activated, you can make the output FAN operate as a second defrost output. This output is activated during the execution of the pre-defrost and drainage. <i>Note: With ☐ F45 = ON, the functions related to fan control are disregarded.</i>	0FF	00	-	0FF
F46	Fan operation mode : Normal Mode	The fan operation settings in normal and power-saving mode are: ☐ Automatic : The fan will be permanently switched on while the compressor is activated. When the compressor is off, the fan will cycle according to the time set in ☐ F48 and ☐ F49. ☐ Continuous : The fan will be constantly activated. ☐ Dependent : The fan will be activated together with the compressor.	Automatic	dependent	-	dependent
F47	Fan operation mode : Power-Saving Mode					
F48	Fan ON Time if ☐ F46 and ☐ F47 are in automatic mode (☐ Automatic)	This is the amount of time the fan will remain ON if ☐ F46 and ☐ F47 are configured as automatic, while the compressor is off.	1	999	min.	1
F49	Fan OFF Time if ☐ F46 and ☐ F47 are in automatic mode (☐ Automatic)	This is the amount of time the fan will remain OFF if ☐ F46 and ☐ F47 are configured as automatic, while the compressor is off.	1	999	min.	999
F50	Fan operation when opening the door	The fan can be set to remain activated or deactivated during the period when the door is kept open.	0FF	00	-	0FF
F51	Fan deactivation by high temperature in evaporator	The purpose of this function is to stop the evaporator fan until the room temperature approaches that listed in the project, thus preventing a high temperature and suction pressure which can damage the compressor. If the evaporator temperature surpasses that of the value, the fan is turned off, turning back on with a set hysteresis of 2°C/4°F. It is a valuable resource when, for example, cooling equipment has been inactive for a few days or when freezer rooms or refrigerated counters are refilled with stock.	-50 (-58)	75.0 (167)	°C (°F)	75.0 (167)
F52	Evaporator temperature for fan reactivation after draining	After drainage, the fan's delay cycle is enabled. The compressor is immediately turned on because the evaporator temperature is high, but the fan is only enabled after the evaporator temperature decrease to the set programmed value. This process is required to remove residual heat (caused by the defrosting process) in the evaporator, preventing room temperature to rise.	-50 (-58)	75.0 (167)	°C (°F)	2.0 (36)
F53	Maximum fan reactivation time after draining (fan-delay)	For safety, in case the evaporator temperature does not reach the value in ☐ F52 or the sensor S2 is disconnected, fan reactivation will occur after the function's set time.	00	999	min.	1

			CELSIUS (FAHRENHEIT)			
FUN	FUNCTION	DESCRIPTION	MÍN	MÁX	UNIT.	DEFAULT
F54	Digital Input operating mode (Door Sensor)	00 01 02 - Digital input disabled; - Normally open contact (NO); - Normally closed contact (NC);	00	2	-	1
F55	Door open time until instant defrost begins	If the door is kept open for a longer period than set with this function, an instant defrost will take place, provided that the evaporator temperature (sensor S2) is lower than F32 , F33 , F34 and the room temperature (sensor S1) is lower than F35 , F36 , F37 .	00	999	min.	30
F56	Door open time until compressor and fan are turned OFF	For safety, if the time that the door is kept open is greater than that set with this function, both the compressor and the fan will be turned off.	00	999	min.	5
F57	Time unit of functions F58 , F59 and F61	0, n Time in minutes Hour Time in hours	0, n	Hour	-	0, n
F58	Time of door closed for turning the lights off	This setup defines when the light will be turned off with the door closed. It contributes towards power saving.	00	999	min./H	2
F59	Time of door closed for activation of power-saving mode	This setup defines when power-saving mode will be activated with the door closed. The light output will be deactivated if it is ON and the operation setpoint will control the system according to the power-saving setpoint.	00	999	min./H	00
F60	Maximum time on power-saving mode with the door closed	This allows you to set a maximum operating time for power-saving mode while the door is closed. After this time, the setpoint returns to the normal operating mode. This time is calculated in hours.	00	999	H	00
F61	Time of closed door for activation of antifreeze safety differential temperature	This function aims at preventing products from freeze after a period of closed door.	00	999	min./H	00
F62	Minimum time with compressor OFF	This is the minimum time the compressor will remain turned off, i.e. time between its last deactivation and the next activation. It helps to relieve the discharge pressure and increase the lifespan of the compressor.	00	999	min.	00
F63	Minimum time with compressor ON	This is the minimum time the compressor will remain on, i.e. time between the last activation and the next deactivation. It helps to prevent high voltages within the power grid.	00	999	min.	00
F64	Compressor ON time in case of error on sensor S1 (room)	If the room sensor (sensor S1) is disconnected or out of its measuring range, the compressor will turn on and off according to the setup configured in these functions.	0	999	min.	20
F65	Compressor OFF time in case of error on sensor S1 (room)		0	999	min.	10
F66	Compressor delay time when powering the controller	When the instrument is switched on, the compressor will be kept off for some time, thus delaying the beginning of the process. The purpose of this is to avoid peaks in electric power demand when power returns after a power fault and many devices are connected to the same mains. To do this, just set different times for each device.	00	999	min.	2
F67	Lamp/ alarm output operating mode	00 - Lamp : Controls the lighting 01 - Alarm : Activates the output during the occurrence of the alarms of functions F68 , F69 , F70 and F71 . 02 -Door resistance : Deactivates the output only during the occurrence of the alarms of functions F68 , F69 , F70 and F71 . The buzzer is not activated during the occurrence of alarms.	0	2	-	0
F68	Maximum time of compressor operation without reaching the desired temperature (setpoint)	This is the alarm that indicates when the compressor is active for longer than the configured time set by this function, without reaching the setpoint.	00	999	H	00
F69	Minimum room temperature alarm relative to the setpoint	This is the temperature difference in the current setpoint to activate the alarm (buzzer) for LOW temperature. <i>Example: Setpoint = 3.0 , F68 = 2.0 . In this case, the alarm will only be activated if the room temperature is lower than 1.0 (3.0 - 2.0).</i>	0.1 (1)	50.0 (90)	°C (°F)	10.0 (18)
F70	Maximum room temperature alarm relative to the setpoint	This is the temperature difference in the current setpoint to activate the alarm (buzzer) for HIGH temperature. <i>Example: Setpoint = 3.0 , F69 = 10.0 . In this case, the alarm will only be activated if the room temperature higher than 13.0 (3.0 + 10.0).</i>	0.1 (1)	50.0 (90)	°C (°F)	50.0 (90)
F71	Door opening time until the alarm is activated	When the door is opened, the OPEN message will appear on the display and the open door timer starts. If this time is longer than the set time with this function, the audible alarm (buzzer) will be activated.	00	999	min.	1
F72	Temperature alarm delay	This function is used to stop the alarm for a certain period, due to a possible increase in temperature.	00	999	min.	00
F73	Alarm delay when powering the controller	During the time set in this function, the alarm remains off, waiting for the system to start working.	00	999	min.	00
F74	Indication to defrost terminated by time	When defrost is concluded by time and not by temperature, the user is alerted by a blinking dot on the lower right corner of the display (_____).	OFF	0n	-	0n
F75	Functions Lock	It allows and configures the functions lock; this function may operate in the following ways: 00 Does not allow functions lock; 01 Allows a partial lock, where the control functions will be locked but the change of presets is allowed; 02 Allows a full lock leaving only the access to the functions of the quick access menu available. Note: To activate or deactivate the functions lock, please refer to item 9.3	00	2	-	2
F76	Time for functions lock	With this function enabled, setups are protected against unauthorized changes, and are available for viewing only. In this state, when trying to change these values, a LOCK message will be displayed. Note: To activate or deactivate the functions lock, please refer to item 9.3	15	60	sec.	15
F77	Control functions shutdown	When control functions are shutdown, the controller starts to operate purely as a temperature indicator, with all outputs deactivated. This function can operate in the following ways: 00 Does not allow the control functions shutdown; 01 Allows turning on and off of control functions only if the functions are unlocked; 02 Allows turning on and off of control functions even if the functions are locked. Note: To activate or deactivate the control, please refer to item 9.2	00	2	-	00

10. DISPLAY SIGNALINGS

	Room sensor error: Sensor disconnected or damaged.
	Evaporator sensor error: Sensor disconnected or damaged.
	High room temperature alarm (sensor 1).
	Low room temperature alarm (sensor 1).
	Maximum compressor on time exceeded without reaching the control temperature (setpoint).
	Door open indication.
	Alert of defrost concluded by time and not by temperature. The dot in the lower right corner of the display will blink until the next defrost (if enabled by the function).
	Control routines turned off.
	Open door alarm.
	Contact Full Gauge Controls.
	Reconfigure the function values.

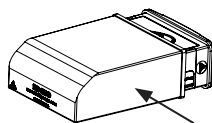
11. GLOSSARY OF ACRONYMS

- °C: Temperature in Celsius degrees.
- °F: Temperature in Fahrenheit degrees.
- Defr: Defrost.
- LOC: Blocked.
- No: No.
- OFF: Turned off/disabled.
- ON: Turned on, enabled.
- Refr: Refrigeration.
- SET (as in "Setting") (setting or configuration).

12. OPTIONAL ITEMS - Sold Separately

Ecase protective cover

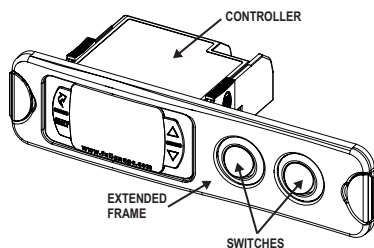
It is recommended for the Evolution line, keeps water from entering the back part of the instrument. It also protects the product when the installation site is washed.



CAPA PROTETORA ECASE

Extended frame

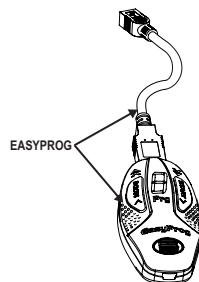
It allows the installation of Evolution line controllers with sizes 76 x 34 x 77 mm in various situations, since it does not require precision in the notch of the instrument fitting panel. The frame integrates two switches of 10 Amperes that may be used to actuate interior light, air curtain, fan, and others.



EasyProg - version 2 or higher

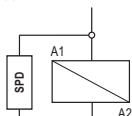
It is an accessory that has as its main function to store the parameters of the controllers. At any time, you can load new parameters of a controller and unload them on a production line (of the same controller), for example. It has three types of connections to load or unload the parameters:

- **Serial RS-485:** It connects via RS-485 network to the controller (only for controllers that have RS-485).
- **USB:** it can be connected to the computer via the USB port, using Sitrad's Recipe Editor.
- **Serial TTL:** The controller can be connected directly to **EasyProg** by the TTL Serial connection.



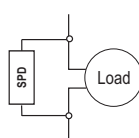
Surge Protective

Wiring diagram for installation of SPD in magnetic contactor
A1 and A2 are the terminals of the contactor coil.



Wiring diagram for installation of SPD in line with loads

For direct drive take in to consideration the specified maximum current.



13. ANNEXES - Reference Images

Image V

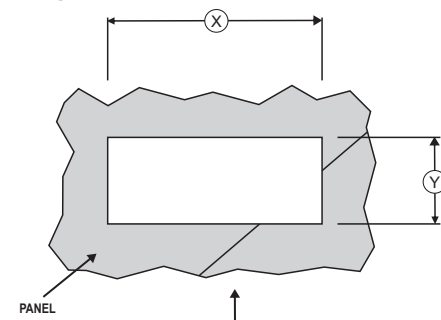


Image VI

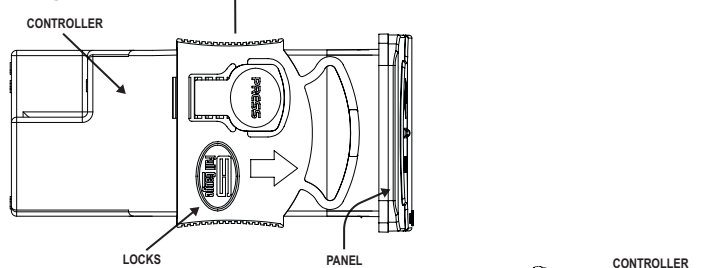
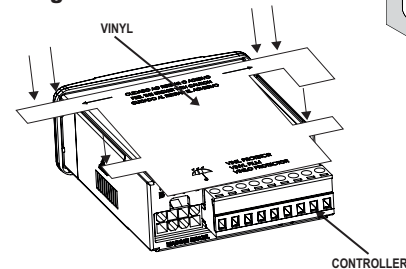


Image VII



ENVIRONMENTAL INFORMATION

Packaging:

The materials used in the packaging of Full Gauge products are 100% recyclable. Try to perform disposal through specialized recyclers.

Product:

The components used in Full Gauge controllers can be recycled and reused if disassembled by specialized companies.

Disposal:

Do not incinerate or dispose the controllers that have reached the end of their service as household garbage. Observe the laws in your area regarding disposal of electronic waste. If in doubt, please contact Full Gauge Controls.

WARRANTY - FULL GAUGE CONTROLS

Products manufactured by Full Gauge Controls, as of May 2005, have a two (02) year warranty, as of the date of the consigned sale, as stated on the invoice. They are guaranteed against manufacturing defects that make them unsuitable or inadequate for their intended use.

EXCEPTIONS TO WARRANTY

The Warranty does not cover expenses incurred for freight and/or insurance when sending products with signs of defect or faulty functioning to an authorized provider of technical support services. The following events are not covered either: natural wear and tear of parts; external damage caused by falls or inadequate packaging of products.

LOSS OF WARRANTY

Products will automatically lose its warranty in the following cases:

- The instructions for assembly and use found in the technical description and installation procedures in Standard IEC60364 are not obeyed;
- The product is submitted to conditions beyond the limits specified in its technical description;
- The product is violated or repaired by any person not a member of the technical team of Full Gauge Controls;
- Damage has been caused by a fall, blow and/or impact, infiltration of water, overload and/or atmospheric discharge.

USE OF WARRANTY

To make use of the warranty, customers must send the properly packaged product to Full Gauge Controls together with the invoice or receipt for the corresponding purchase. As much information as possible in relation to the issue detected must be sent to facilitate analysis, testing and execution of the service.

These procedures and any maintenance of the product may only be provided by Full Gauge Controls Technical Support services in the company's headquarters at Rua Júlio de Castilhos, 250 - CEP 92120-030 - Canoas - Rio Grande do Sul - Brasil

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