EVOLUTION

MT-444E Faston Ver.05

DIGITAL REFRIGERATION CONTROLLER

Connector for quick coupling | Fast Freezing | Power-saving mode | On/off light | Buzzer | Functions lock | Control functions shutdown | Serial Programming | Protection level: IP 65 FRONT

E251415

MT444EFASTONV05-05T-18796 - 2606

1. DESCRIPTION

The **MT-444E Faston** has 3 recipe options, each with its control temperature and their differentials (hysteresis), as well as specific keys for triggering / disabling and turn the lamp on / off, in addition to fast freezing functionality. It also has a digital filter, which has the purpose of simulating an increase in mass in the ambient sensor (S1), delaying its response time (thermal inertia) and avoiding unnecessary compressor trips. It also includes an intelligent blocking of functions and a shutdown mode of the control functions.

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 Equipamenet (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

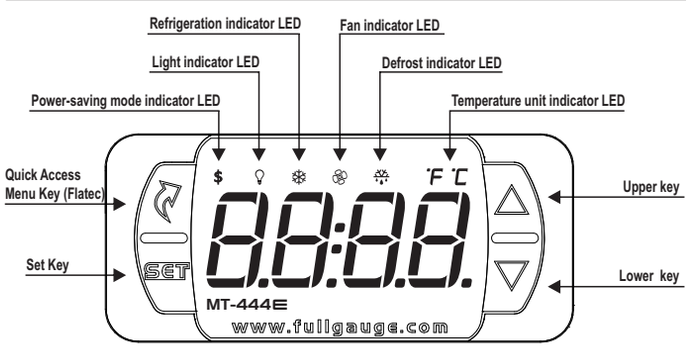
Power supply	**MT-444E Faston:** 115 or 230Vac ±10%(*) (50/60 Hz) **MT-444EL Faston:** 12 or 24Vac/dc +10%(*)
Approximate consumption	3.4 VA
Setpoint Temperature	- 50 to 75°C (-58 to 167°F)
Operating humidity	10 to 90% RH (without condensation)
Digital input	Dry contact type configurable
Maximum dimensions (**) (mm)	76 x 34 x 84 (WxHxD)
Cutouts dimensions (mm)	X = 71±0,5 Y = 29±0,5 (see Image V)

(*) Admissible variation in relation to the voltage rating.
(**) Maximum dimensions without connectors.

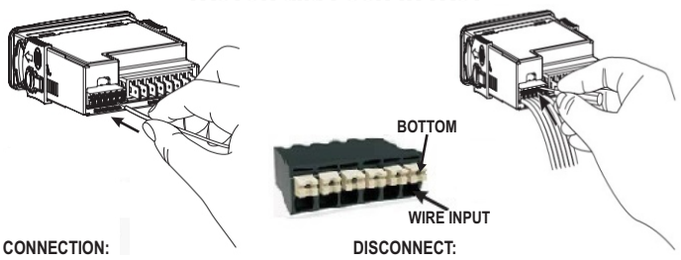
UL / CSA Standards	873	60730-1
Operating Temperature	-10 a 50°C / 14 a 122°F	-10 a 60°C / 14 a 140°F
Maximum current per output COMP	12(8)A / 240V 1HP	12(8)A / 240V 1HP
Maximum current per output DEFR / FAN / LIGHT	3A / 240Vac 720W 5(3)A / 240Vac 5W LED / 240Vac	5A / 250Vac 1200W 1/8HP / 250Vac 1A E-Ballast / 250Vac

Note: Only Coating controllers from version 04 onwards meet Standard 60730-1.

5. INDICATORS AND KEYS



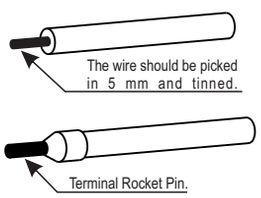
NEW CONNECTION SYSTEM (QUICK COUPLING): FASTON and PUSH-IN FAST



CONNECTION:
- Hold the wire near its end and insert it into the desired slot.
- If necessary, press the bottom to assist the connection.

NOTE:
- In the connectors 1 to 6 the maximum wire diameter that can be used is 1,5mm².
- The wires must be tinned or use Rocket Pin terminals with a maximum diameter of 0,75mm².

DISCONNECT:
- To disconnect the cord, press the bottom and remove it.



6.1. Temperature sensors connection

- Connect the **sensor S1** wires to terminals "1 and 2", wires of **sensor S2** to terminals "3 and 4" and wires of **sensor S3** to terminals "5 and 6": 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

a) Install overload protectors in the controller supply.
b) 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.
c) 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. FIXING PROCEDURE

a) Cutout the panel plate (Image V - item 13) where the controller will be fixed, with dimensions X = 71±0,5 mm and Y = 29±0,5 mm;
b) Remove the side locks (Image VI - item 13): To do this, squeeze the elliptical central part (with the Logo Full Gauge Controls) and move the latches back;
c) Pass the wires through the cutout of the plate (image VII - Item 13) and make the electrical installation as described in item 6;
d) Insert the controller into the panel cutout, from the outside in;
e) Replace the latches and push then until they are pressed against the panel, securing the controller to the housing (see arrow in Figure VI - item 13);
f) Adjust the parameters as described in item 9.

⚠ **WARNING: for installations requiring liquid-tight sealing, the cut-off for the installation of the controller should be at must 70.5x29mm. The side latches must be secured so that they press the rubber sealing to prevent infiltration between the cutout and the controller.**

Vinyl protector - Image IX (item 13)
Protects the controller should when installed in a place with splashing water, such as in refrigerated counters. This adhesive vinyl accompanies the instrument, on the packaging.

⚠ **IMPORTANT: Apply only after completing electrical connections.**
a) Retract the lateral locks (Image VI - item 13);
b) Remove the protective film from the adhesive side of the vinyl;
c) Apply the vinyl over the whole top, folding the flaps, as indicated by the arrows - Image IX (item 13);
d) Reinstall the latches.
NOTE: The vinyl is transparent, allowing to visualize the electric scheme of the instrument.

6. WIRING DIAGRAM

Image I - Connection 115 Vac

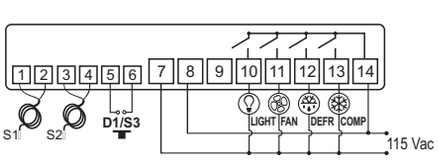


Image II - Connection 230 Vac

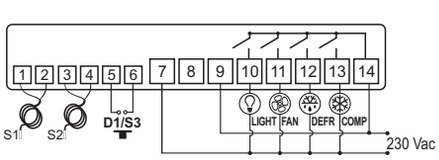


Image III - Connection 12 Vac/dc

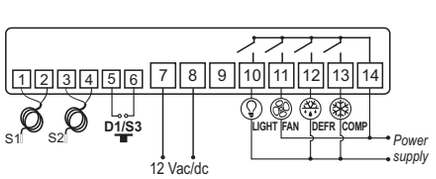
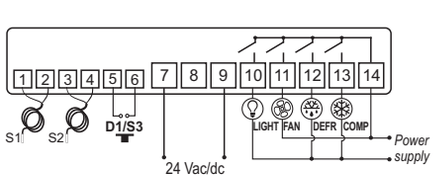


Image IV - Connection 24 Vac/dc



Controller power supply

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

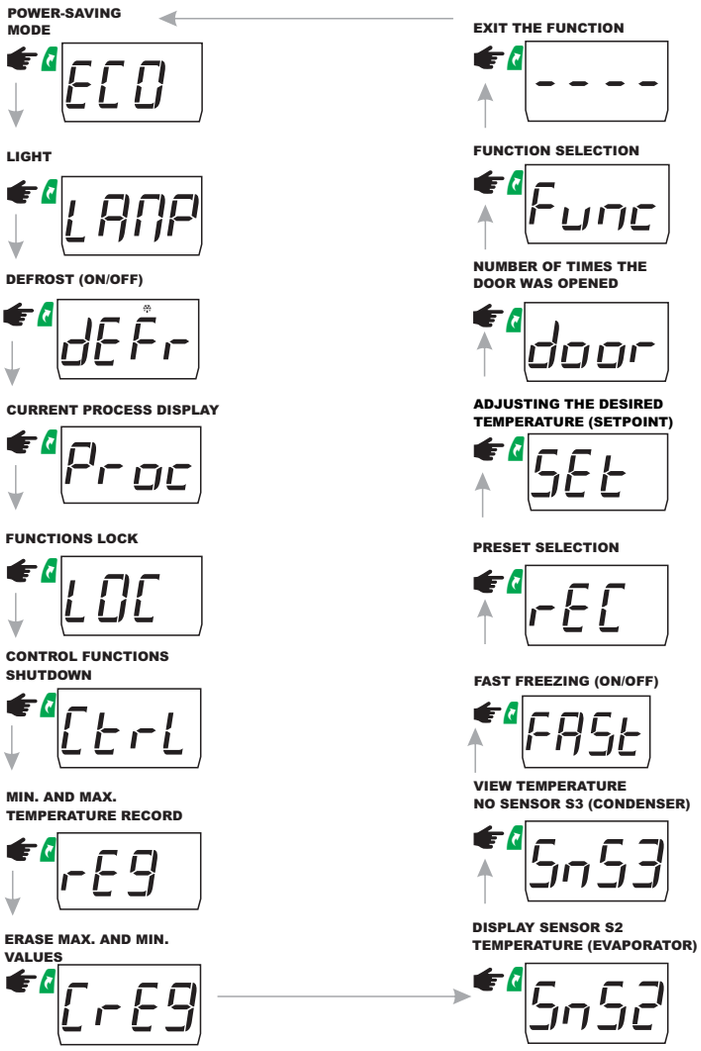
Pins	MT-444E Faston	MT-444EL Faston
9 and 10	115 Vac	12 Vac/dc
9 and 11	230 Vac	24 Vac/dc

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

8. QUICK ACCESS MENU AND BASIC OPERATIONS

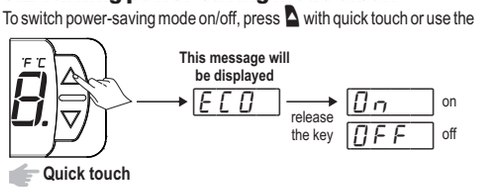
8.1. Quick Access Menu Map

You can navigate through the function menus by pressing the key (Flatec). See items below for further details. The map of functions is shown below:



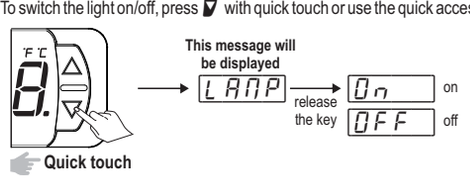
8.2 Turning power-saving mode on/off

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



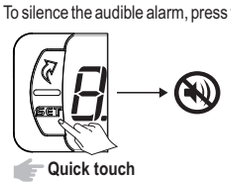
8.3 Switch the light on/off

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



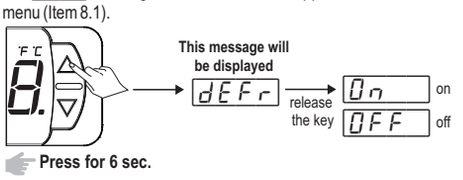
8.4 Silencing the alarm

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



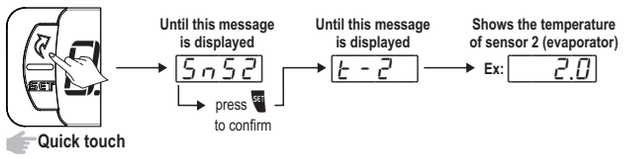
8.5 Manual Defrost

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



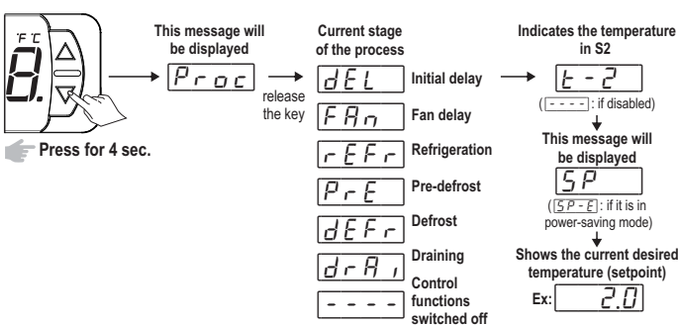
8.6 Display Temperature of S2 (evaporator)

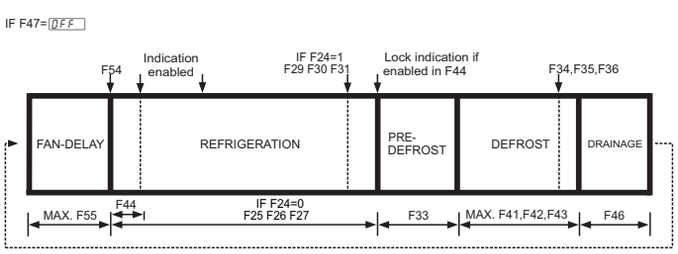
The temperature of sensor 2 (S2) can be viewed by pushing button until the message SnS2 is displayed. In case the sensor 2 is disable, message ---- will be displayed.

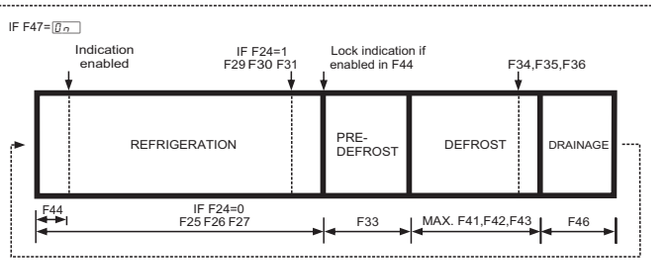


8.7 Display process stage and current setpoint

To see which process stage is underway, press and hold the key for 4s, until the Proc 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).

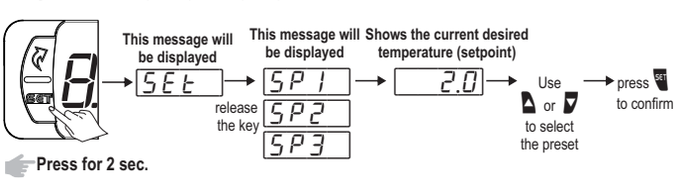






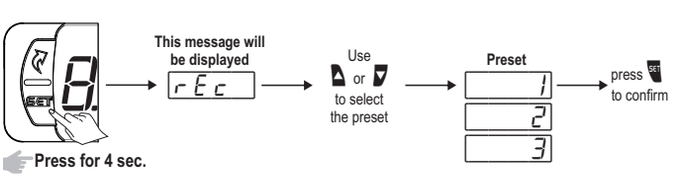
8.8 Adjusting the desired temperature (setpoint)

To select the desired preset, press and hold the key for 2s, until the SEt message appears, and then release it. The message SP1 or SP2 or SP3 will be displayed depending on the currently active preset and then the value for adjusting the normal setpoint of this preset. Use the or to change the value and press (1, 2 or 3) and press to confirm.



8.9 Change Preset

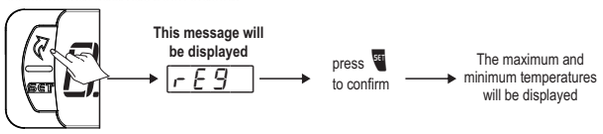
To select the desired preset, press and hold the key for 4s,until the rEc . Message appears, and then release it. Use the or keys to select the desired preset (1,2 or 3) and press to confirm.



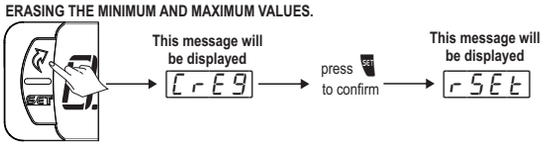
8.10 Maximum and Minimum Temperature Recording

The Maximum and Minimum Temperature Record can be viewed by pressing the key until the message [rE9] is displayed (see item 8.1 on the map) :

To delete the current minimum and maximum values, press the key (quick touch) until the message [CrE9] is displayed. Press to confirm. Another way to erase the records is by pressing the key for 2s while the records of maximums and minimums are being displayed. The message [rSEt] confirms that data has been erased.



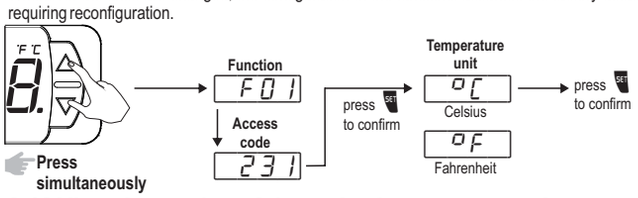
ERASING THE MINIMUM AND MAXIMUM VALUES.



8.11 Selecting the unit temperature

The temperature of the controller can be viewed either in degress Celsius (°C) or in degress 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 . Then select the desired units (°C or °F)using the or key. Press to confirm.

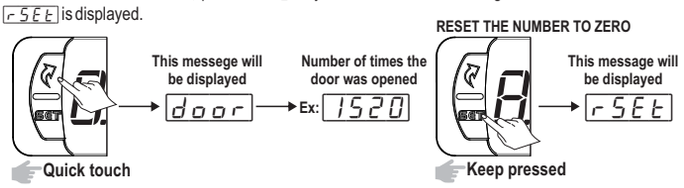
Whenever the units are changed, the configuration of the functions assumes the factory default, thus requiring reconfiguration.



8.12 View the number of times the door was opened

The numberof 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 [rSEt] is displayed.



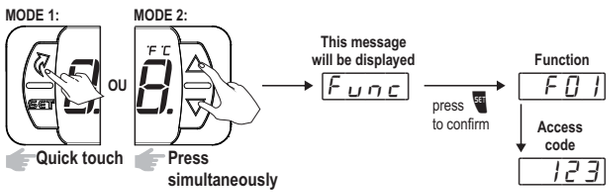
8.13 Fast Freezing

In fast freezing mode the refrigeration output is continuously switched on to speed up the cooling or freezing process. This operating mode may be activated or deactivated on the quick access menu through the option [FASt] or using an external switch connected to the digital input [F57]. It can also be automatically deactivated by temperature [F10] or time [F11]. During the fast freezing period, the indication of the operating compressor flashes rapidly and the defrost continues. When the fast freezing mode is activated, if the controller identifies a defrost schedules to start by this time period, the defrost will start in advance and then the fast freezing mode will be activated.

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 [F01] 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 deactived. How the operation of turning the control functions off is made shall depend on the parameter "[F87]-Control functions shutdown" setting:

[0] Does not allow the control functions shutdown.

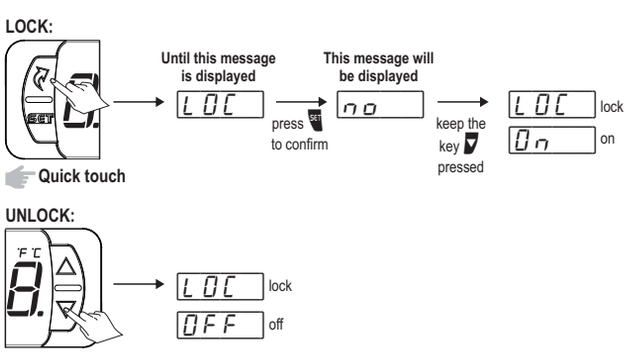
[1] Allows the control functions to be turned on and off only if the functions are unlocked.

[2] 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.

9.3 Functions lock

The use of the functions lock brings greater security to the operation oh the instrument. When it is active the presets and other parameters can be visible to the user, but are protected against undue changes([F85]=2) or you can lock only the changes in the control functions and leave the selection of presets unlocked ([F85]=1). To lock the functions, access the option [LOC] in the quick access menu using the key (Flatec) and press to confirm.The message [no] will be displayed if the lock is inactive. At this time, press and hold the key for the time configured in function [F86]. The activation will be indicated by the message [LOC] [On] and will take place only if function [F85] is configured with 1 or 2.

To deactive the lock, switch the controller off and on again with the key pressed. Keep the key pressed until the message [LOC] [OFF] is indicated.



9.4 Parameters table

			CELSIUS (FAHRENHEIT)			
FUN	FUNCTION	DESCRIPTION	MIN	MAX	UNIT.	DEFAULT
[F01]	**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: [123] - Allows the access to change the parameters of the table. [231] - Allows configuring the units of measurement [°F] or [°C]. [231] - To select the units the instrument will use to operate, enter function [F01] using the access code [231], 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.	-	-	-	-
[F02]	**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)
[F03]	**Desired temperature (setpoint) (r2)**		-50 (-58)	75.0 (167)	°C (°F)	-1.0 (30)
[F04]	**Desired temperature (setpoint) (r3)**		-50 (-58)	75.0 (167)	°C (°F)	2.0 (36)
[F05]	**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)
[F06]	**Desired temperature (power-saving setpoint) (r2)**		-50 (-58)	75.0 (167)	°C (°F)	4.0 (39)
[F07]	**Desired temperature (power-saving setpoint) (r3)**		-50 (-58)	75.0 (167)	°C (°F)	7.0 (45)
[F08]	**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)
[F09]	**Maximum desired temperature (setpoint) allowed to the user**		-50 (-58)	75.0 (167)	°C (°F)	75.0 (167)
[F10]	**Control differential of operating setpoint (r1)**	This is the difference between turning refrigeration OFF and BACK ON in normal operating mode. *Example: If adjusted [F02]=[4.0] and [F10]=[1.0], the compressor will be turned off when the sensor S1 temperature (room) is less than [4.0] and it will be turned on when it is higher than [5.0] ([4.0]+[1.0]).*	0.1 (1)	20.0 (36)	°C (°F)	3.0 (5)
[F11]	**Control differential of operating setpoint (r2)**					
[F12]	**Control differential of operating setpoint (r3)**					

			CELSIUS (FAHRENHEIT)			
FUN	**FUNCTION**	**DESCRIPTION**	**MIN**	**MAX**	**UNIT.**	**DEFAULT**
F13 F14 F15	**Control differential of power-saving setpoint (r1)** **Control differential of power-saving setpoint (r2)** **Control differential of power-saving setpoint (r3)**	This is the difference between turning refrigeration OFF and BACK ON in power-saving mode.	0.1 (1)	20.0 (36)	ºC (°F)	3.0 (5)
F16	**Antifreeze safety differential temperature**	This is the value that will be added to the current preset setpoint after the time set in F64. *Example: If* F02 = 3.0 *(setpoint),* F10 = 2.0 *(differential) and* F16 = 1.0 *(antifreeze), refrigeration will be turned off at* 4.0 *(* 3.0 + 1.0 *) and turned back on at* 6.0 *(* 3.0 + 2.0 + 1.0 *).*	0.1 (1)	20.0 (36)	ºC (°F)	2.0 (4)
F17	**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
F18	**Digital filter operating mode**	0 = The filter operates both when the temperature rises and when it falls; 1 = The filter operates only when the temperature rise. When the temperature fall, the response is immediate; 2 = The filter operates on temperature rise and decrease without impact in the control (only acts on display); 3 = The filter operates only when the temperature rise without impact in the control (only acts on display). When the temperature fall, the response is immediate.	0	1	-	0
F19	**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 frezzers, 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.	no	999	sec.	no
F20 F21 F22	**Offset of room sensor (S1)** **Offset of evaporator sensor (S2)** **Offset of condensing/door sensor (S3)**	This compensates for any deviations in the sensor reading due to replacement or a change in cable lenght	-20.0 (-36)	20.0 (36)	ºC (°F)	0.0 (0)
F23	**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
F24	**Condition to start the defrost**	0 = Defrost started by time; 1 = Defrost started by temperature.	0	1	-	0
F25 F26 F27	**Interval between defrosts if** F24 = 0 **(r1)** **Interval between defrosts if** F24 = 0 **(r2)** **Interval between defrosts if** F24 = 0 **(r3)**	Determines how often defrost will be performed, which is the time counted from the end of the previous defrost.	1	999	H	12
F28	**Additional time at the end of the first refrigeration cycle**	It serves to increase the refrigeration time only in the first cooling cycle. In installations with several equipment it is possible to avoid demand spikes, causing the defrosts to be realized at different times, when assigning different values in this function.	no	999	min.	no
F29 F30 F31	**Evap. temp. to start defrost if** F24 = 1 **(r1)** **Evap. temp. to start defrost if** F24 = 1 **(r2)** **Evap. temp. to start defrost if** F24 = 1 **(r3)**	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)	ºC (°F)	-5.0 (23)
F32	**Confirmation time of low temperature (sensor S2) to start the pre-defrost if** F24 = 1	When the evaporator temperature (sensor S2) drops and reaches the value set in F29, F30, F31, 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.	no	999	min.	10
F33	**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.	no	999	min.	no
F34 F35 F36	**Evap. temp. (sensor S2) to finalize the defrost (r1)** **Evap. temp. (sensor S2) to finalize the defrost (r2)** **Evap. temp. (sensor S2) to finalize the defrost (r3)**	If the temperature on the evaporator (sensor S2) reaches the set valuem the defrosting process will end as usual, i.e. by temperature. This, it optimizes the defrosting process.	-50 (-58)	75.0 (167)	ºC (°F)	40.0 (104)
F37 F38 F39	**Room temperature to end the defrost (r1)** **Room temperature to end the defrost (r2)** **Room temperature to end the defrost (r3)**	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)	ºC (°F)	20.0 (68)
F40	**Maximum time without defrosts if** F24 = 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 F29, F30, F31. This function determines the maximum time that the controller will wait for without carrying out the defrost.	1	999	H	12
F41 F42 F43	**Maximum defrost time (for safety) (r1)** **Maximum defrost time (for safety) (r2)** **Maximum defrost time (for safety) (r3)**	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 F84), 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
F44	**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 0, the temperature display will only be frozen at the defrost stage. This function can be disabled if set to no.	no	999	min.	15
F45	**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)	OFF	On	-	On
F46	**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 no.	no	999	min.	1

			CELSIUS (FAHRENHEIT)			
FUN	FUNCTION	DESCRIPTION	MIN	MAX	UNIT.	DEFAULT
F47	**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, defrost and drainage. **Note: With F47 = ON, the functions related to fan control are disregarded.**	OFF	On	-	OFF
F48 F49	**Fan operation mode : Normal Mode** **Fan operation mode : Power-Saving Mode**	The fan operation settings in normal and power-saving mode are: Auto 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 F50 and F51. Cont Continuous : The fan will be constantly activated in cooling process. dEPt Dependent : The fan will be activated together with the compressor.	Auto	dEPt	-	dEPt
F50	**Fan ON Time if F48 and F49 are in automatic mode (Auto)**	This is the amount of time the fan will remain ON if F48 and F49 are configured as automatic, while the compressor is off.	1	999	min.	1
F51	**Fan OFF Time if F48 and F49 are in automatic mode (Auto)**	This is the amount of time the fan will remain OFF if F48 and F49 are configured as automatic, while the compressor is off.	1	999	min.	999
F52	**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.	OFF	On	-	OFF
F53	**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 faz 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)	ºC (°F)	75.0 (167)
F54	**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)	ºC (°F)	2.0 (36)
F55	**Maximum fan reactivation time after draining (fan-delay)**	For safety, in case the evaporator temperature does not reach the value in F54 or the sensor S2 is disconnected, fan reactivation will occur after the function's set time.	no	999	min.	1
F56	**Maximum time in ventilation mode if F57 = 3 or 4**	Maximum time the instrument will remain in ventilation mode. After this time, the instrument goes to the refrigeration stage.To activate this mode, press the digital input button for 3 seconds.In this mode the temperature displayed on the display is alternated with the FAnS message, all alarms are ignored and the control outputs are switched off, except for the fans output remaining on for the time set in this function. **Note: This mode has priority over other control functions of the instrument, except for the control functions shutdown.**	no	999	min.	360
F57	**Operating mode of the digital input**	no - Digital input disabled; 1 - Door Sensor - Normally open contact (NO); 2 - Door sensor - Normally closed contact (NC); 3 - Activate Ventilation Mode - Normally Open (N.O push-button); 4 - Activate Ventilation Mode - Normally Closed (N.C push-button); 5 - Activate Economic Setpoint - Normally Open (N.O push-button); 6 - Activate Economic Setpoint - Normally Closed (N.C push-button); 7 - Perform Fast Freezing - Normally Open (N.O push-button); 8 - Perform Fast Freezing - Normally Closed (N.C push-button); 9 - External alarm sensor - Normally open contact (NO), indication only; 10 - External alarm sensor - Normally closed contact (NC), indication only; 11 - Door temperature sensor, anti - condensation (sensor S3);	no	11	-	1
F58	**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 F34, F35, F36 and the room temperature (sensor S1) is lower than F37, F38, F39.	no	999	min.	30
F59	**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.	no	999	min.	5
F60	**Time unit of functions F61, F62 and F64**	Min Time in minutes Hour Time in hours	Min	Hour	-	Min
F61	**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.	no	999	min./H	2
F62	**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.	no	999	min./H	no
F63	**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.	no	999	H	no
F64	**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.	no	999	min./H	no
F65	**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.	no	999	min.	no
F66	**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.	no	999	min.	no

			CELSIUS (FAHRENHEIT)			
FUN	**FUNCTION**	**DESCRIPTION**	**MIN**	**MAX**	**UNIT.**	**DEFAULT**
F67	**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
F68	**Compressor OFF time in case of error on sensor S1 (room)**		0	999	min.	10
F69	**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.	no	999	min.	2
F70	**Temperature limit for Fast Freezing**	It is the minimum temperature that the instrument can achieve during the fast freezing	-50 (-58)	75.0 (167)	°C (°F)	-25 (-13)
F71	**Fast Freezing time**	It is the duration of the fast freezing process.	no	999	min.	no
F72	**Desired temperature for anti-condensation (sensor heating setpoint 3) if F57 = 11 and F77 = 3**	It is the control temperature to prevent moisture condensation of the air in the door. When the temperature of sensor S3 (door) is greater than the value set in this function, the resistance of the door will be turned off.	-50 (-58)	75.0 (167)	°C (°F)	30.0 (86)
F73	**Differential control for anti-condensation (S3) if F57 = 11 and F77 = 3**	It is the temperature difference between OFF and RELIGURE the resistance of the door to avoid condensation.	0.1 (1)	20.0 (36)	°C (°F)	3.0 (5)
F74	**Maximum temperature at condenser (S3) to shut down control outputs if F57 = 11**	Above this temperature, in addition to the visual alarm AL2 and buzzer indications, the loads driven by the outputs will be turned off. If the S3 sensor input is configured F57 for another function this alarm is disable. This alarm is ignored time and the time set in F83 is exceeded.	no	75.0 (167)	°C (°F)	75.0 (167)
F75	**Control differential for maximum condenser temperature (hysteresis) if F57 = 11**	For the loads to be switched on again, the temperature of sensor S3 (condenser) should drop to the value set in F74 minus the value set in this parameter. In this condition, the process proceeds to the refrigeration step.	0.1 (1)	20.0 (36)	°C (°F)	3.0 (5)
F76	**High temperature alarm on condenser (S3) if F57 = 11**	It is the temperature of the condenser above which the instrument will indicate high visual alarm AL1 and audible (buzzer). If the sensor input S is set F57 to another function this alarm is deactivated. This alarm is ignored until time and the time set in F83 is exceeded.	no	75.0 (167)	°C (°F)	75.0 (167)
F77	**Operating Mode Lamp Output / Alarm / Door Resistance / Auxiliary compressor**	0 - Lamp: Controls the illumination. 1 - Alarm: Activates the output during the occurrence of alarms of the functions F78, F79, F80 and F81. 2 - Door resistance (without S3 sensor): Door resistance remains on regardless of door temperature. The resistance is switched off only during the occurrence of the alarms of the F78, F79, F80 and F81 functions. The buzzer does not fire during alarms. 3 - Door resistance with sensor S3, if F57 = 11 : The resistance of the door to prevent condensation is controlled by the temperature of sensor S3 and the values set in functions F72 and F73. The output is turned off at the occurrence of alarms on the F78, F79, F80 functions. The buzzer does not fire during alarms. 4 - Auxiliary compressor: The output will be used for the activation of a second compressor. The output will be activated 15 seconds (fixed time) after the COMP output is activated and always switched off next to the COMP output. **Note.: In the 1, 2, 3 and 4 options, the LED indicator for the light output is constantly off.**	0	4	-	0
F78	**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.	no	999	H	no
F79	**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. *Example: Setpoint = 3.0, F79 = 2.0. In this case, the alarm will only be activated if the room temperature is lower than 1.0 (3.0 - 2.0).*	no	50.0 (90)	ºC (ºF)	10.0 (18)
F80	**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. *Example: Setpoint = 3.0, F80 = 10.0. In this case, the alarm will only be activated if the room temperature higher than 13.0 (3.0 + 10.0).*	no	50.0 (90)	ºC (ºF)	50.0 (90)
F81	**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.	no	999	min.	1
F82	**Temperature alarm delay**	This function is used to stop the alarm for a certain period, due to a possible increase in temperature.	no	999	min.	no
F83	**Alarm delay when powering the controller**	During the time set in this function, the alarm remains off, waiting for the system to start working.	no	999	min.	no
F84	**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	On	-	On
F85	**Functions Lock**	It allows and configures the functions lock; this function may operate in the following ways: no Does not allow functions lock; 1 Allows a partial lock, where the control functions will be locked but the change of presets is allowed; 2 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**	no	2	-	2
F86	**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 LOC message will be displayed. **Note: To activate or deactivate the functions lock, please refer to item 9.3**	15	60	seg.	15

			CELSIUS (FAHRENHEIT)			
FUN	FUNCTION	DESCRIPTION	MIN	MAX	UNIT.	DEFAULT
F87	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: no Does not allow the control functions shutdown; 1 Allows turning on and off of control functions only if the functions are unlocked; 2 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**	no	2	-	no

10. DISPLAY SIGNALINGS

Err1	Room sensor error: Sensor disconnected or damaged.
Err2	Evaporator sensor error: Sensor disconnected or damaged.
Err3	Sensor error: Sensor disconnected or damaged.
AtH1	High room temperature alarm (sensor 1).
AtLo	Low room temperature alarm (sensor 1).
AC1	High temperature in condenser alarm (level 1).
AC2	High temperature in condenser alarm (level 2).
Ad in	External alarm (digital input).
ALrC	Maximum compressor on time exceeded without reaching the control temperature (setpoint).
OPEn	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 F84).
Flashing LED	If F47 = OFF Indicates drainage in progress. If F47 = On Indicates drainage and pre-defrost in progress.
Flashing LED	Indicates refrigeration in Fast Freezing.
OFF	Control routines turned off.
AOPn	Open door alarm.
ECAL	Contact Full Gauge Controls.
PPPP	Reconfigure the function values.

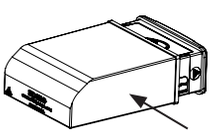
11. GLOSSARY OF ACRONYMS

- ***°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

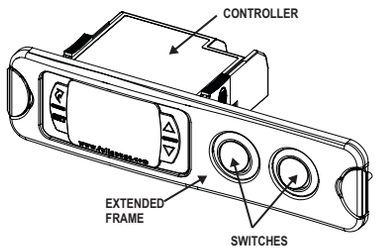
Ecase protective cover

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.
NOTE: Ecase is compatible with the use of small type Faston terminals, usually with silicone protection.



Extended frame

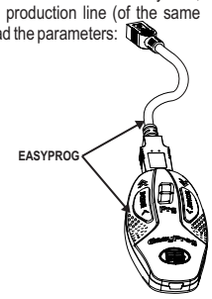
It allows the installation of Evolution line controllers with sizes 76 x 34 x 77 mm in various situations, since it does not require precision in the notch of the instrument fitting panel.
The frame integrates two switches of 10 Amperes that may be used to actuate interior light, air curtain, fan, and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



EasyProg - version 2 or higher

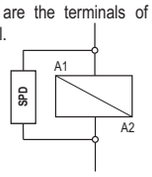
It is an accessory that has as its main function to store the parameters of the controllers. At any time, you can load new parameters of a controller and unload them on a production line (of the same controller), for example. It has three types of connections to load or unload the parameters:

- 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.

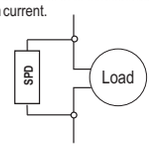


Surge Protective

Wiring diagram for instalation of SPD in magnectic contactor
A1 and A2 are the terminals of the contactor coil.



Wiring diagram for instalation of SPD in line with loads
For direct drive take in to consideration the specified maximum current.



13. ANNEXES - Reference Images

Image V

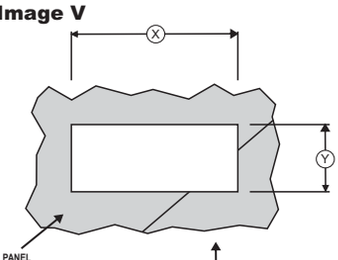
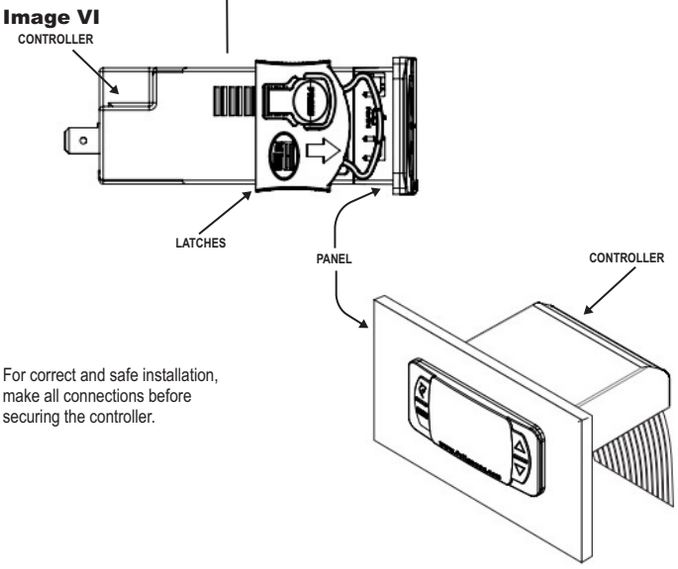
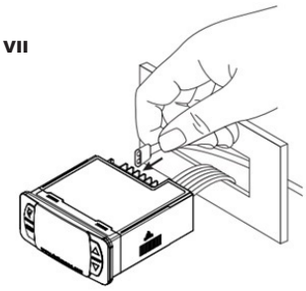


Image VI



For correct and safe installation, make all connections before securing the controller.

Image VII



IMPORTANT:
Faston connectors should be protected with covers, preferably silicone.

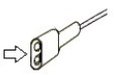


Image VIII

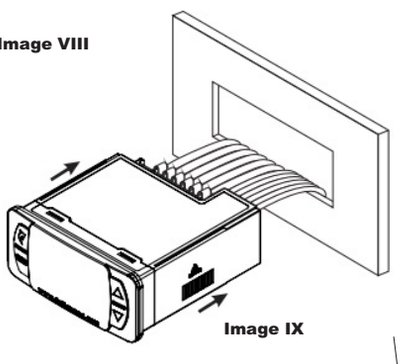
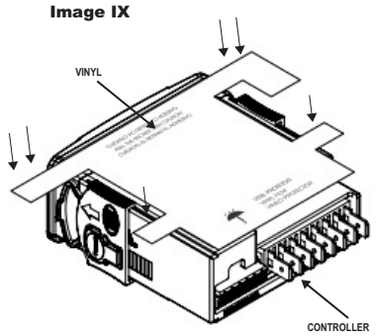


Image IX



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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