



MT-512E Log Ver.10

DIGITAL INDICATOR AND CONTROLLER FOR
HEATING OR REFRIGERATION WITH NATURAL DEFROST
THROUGH COMPRESSOR SHUTDOWN AND
INTERNAL DATALOGGER



MT512ELOGV10-03T-19341-2501

Have this manual in the palm of your hand by FG Finder application.



Manual defrost



Function lock



Control functions shutdown



Serial programming



Datalogger



Supervisory system



IP 65 FRONT



Modbus Protocol

1. DESCRIPTION

Designed for cooling or heating application. **MT-512E Log** is equipped with 1 powerful 2HP relay, 1 temperature sensor, 1 digital input, data logger, cyclic time for natural defrost, IP65 frontal, min-max temperature record, sensor response time control, fast freezing mode, tamper-proof function, control functions shutdown and RS485 serial communication port for Sitrad real-time monitoring and management. The **MT-512E Log** allows you to configure the RS-485 communication port for the MODBUS-RTU protocol. For more information about the implemented commands and the registration table, contact Full Gauge Controls.

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

2. SAFETY RECOMMENDATIONS

- Check the controller for correct assembling;
- 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 cabinets, install the protecting vinyl supplied with the controller;
- For protection under more critical conditions, we recommend the Ecace cover, which we make available as an optional item (sold separately);
- The installation procedures should be performed by a qualified technician.

3. APPLICATIONS

- Refrigerated displays
- Walk-in coolers
- Hot cabinets
- Greenhouses

4. TECHNICAL SPECIFICATIONS

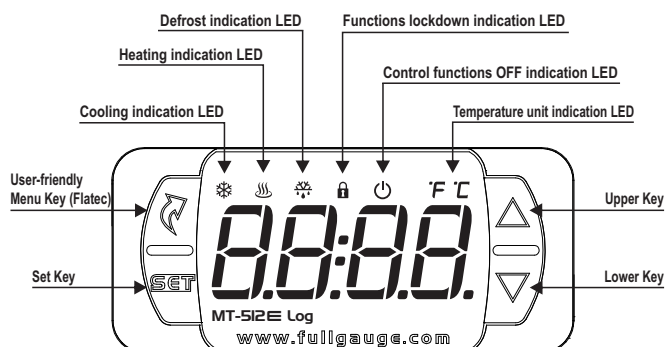
Power supply	MT-512E Log 115 or 230 Vac $\pm 10\%$ (*) (50/60 Hz) MT-512EL Log 12 or 24 Vac/dc $\pm 10\%$ (**)
Control temperature	-50 to 105°C (-58 to 221°F) (**)
Operating temperature	0 to 50 °C / 32 to 122 °F
Maximum output current	NO -16A / 2HP NC - 500W / 1/10HP
Maximum consumption of device	1.5 VA
Temperature resolution	0,1°C / 0,1°F
Digital input	Configurable dry contact type
Operating humidity	10 to 90% RH (without condensation)
Dimensions (mm)	76 x 34 x 77 mm / 2,99" x 1,33" x 3,82 (WxHxD)
Cutout dimensions (mm)	71 $\pm$ 0,5 (2,79" $\pm$ 0,02") x 29 $\pm$ 0,5 mm (1,14 $\pm$ 0,02")

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

(**) This device can measure and control temperatures of up to 200° C when used in conjunction with a model SB59 silicon sensor cable (sold separately).

Note: Sensor cable length can be increased to up to 200 meters by the user by using a PP 2 x 24 AWG cable.

5. INDICATIONS AND KEYS



6. WIRING DIAGRAM

6.1. Identifications (see Images I to IV)

- Image I: MT-512E Log, supplied at 115 Vac.
- Image II: MT-512E Log, supplied at 230 Vac.
- Image III: MT-512EL Log, supplied at 12 Vac/dc.
- Image IV: MT-512EL Log, supplied at 24 Vac/dc.

IMPORTANT

THE USE OF APPROPRIATE TOOLS IS ESSENTIAL TO AVOID DAMAGE IN THE CONNECTION AT INSTRUMENT TERMINALS:

- ⊖ SCREWDRIVER SLOT 3/32" (2.4mm) FOR ADJUSTMENTS IN THE SIGNAL TERMINALS;
- ⊕ SCREWDRIVER PHILLIPS #1 FOR ADJUSTMENTS IN THE POWER TERMINALS;

Image I: MT-512E Log - 115Vac

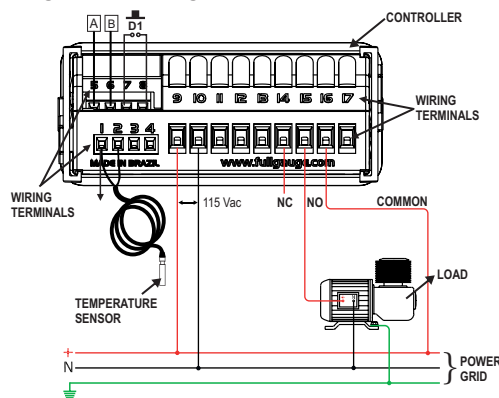


Image II: MT-512E Log - 230 Vac

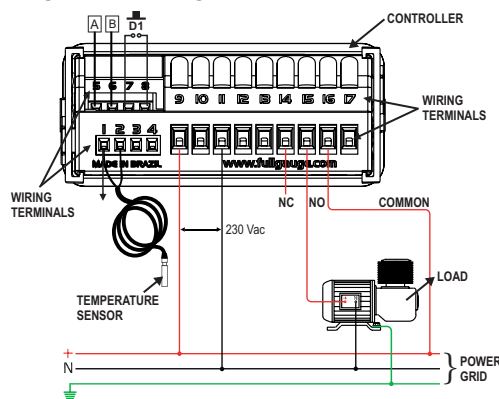
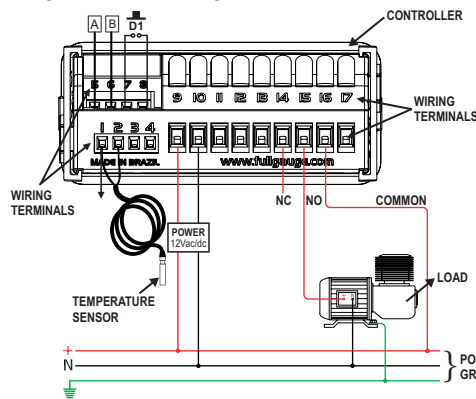


Image III: MT-512EL Log - 12Vac/dc



Surge Protective Device (SPD) (sold separately)

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

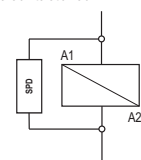
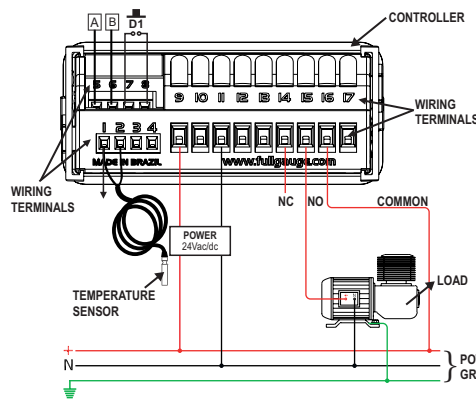
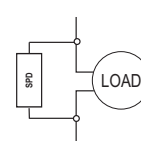


Image IV: MT-512EL Log - 24Vac/dc



Wiring diagram for installation of SPD in line with loads

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



6.2. Temperature sensor connection

- Connect the sensor wires to terminals '1 and 2': 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.
- For immersion in water, use a thermowell (Image VI - item 13), available in the Full Gauge Controls product line (sold separately).

6.3. Controller power supply

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

Pins	MT-512E Log	MT-512EL Log
9 and 10	115 Vac	12 Vac/dc
9 and 11	230 Vac	24 Vac/dc

6.4. 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. ASSEMBLING PROCEDURE

- Cut out the panel plate (Image V - item 13) where the controller shall be fastened, with sizes $X=71\pm0.5$ mm and $Y=29\pm0.5$ mm;
- Remove side locks (Image VII - 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 VII - item 13);
- Perform the electric installation as described in item 6;
- Adjust the parameters as described in item 8.

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 VIII (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.

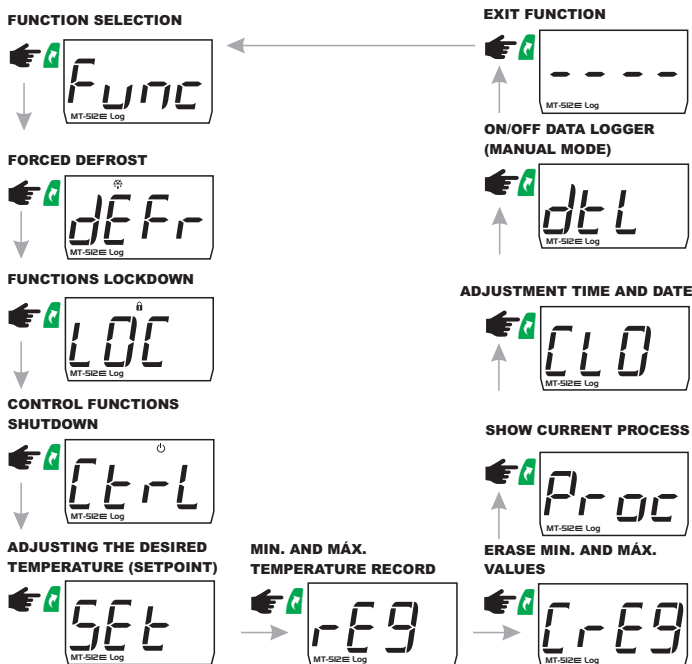
- Retreat the side locks (Image VII - item 13);
- Remove the protective film from the adhesive vinyl face;
- Apply the vinyl over the entire upper part, bending the flaps, as indicated by the arrows - Image VIII (item 13);
- Reinstall the locks.

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

8. SETTING THE SETPOINT AND PARAMETERS

8.1. Quick Access Menu Map

By pressing **F** (Flatec), it is possible to navigate through the function menus. For more details, see chapter 8.3. See the functions map below:



8.2. Quick access keys map

When the controller is in temperature display mode, the following keys can be used as a shortcut to the following functions:

	Hold down for 2 seconds: Setpoint adjustment.
	Quick touch: The current day, month, year, hour and minute will be shown in sequence on the display.
	Quick touch: Displays the status of the process.
	Quick touch: Maximum and minimum temperature display.
	Hold down for 2 seconds: Clear history when records are being displayed.
	Hold down for 4 seconds: Carries out manual defrost.
	Enter the quick access menu.
	Hold down for 10 seconds: Manually switches the datalogger on/off.
	Enter the quick access menu.

8.3. Basic operations

8.3.1. Adjusting setpoint (desired temperature)

Hold the key **SET** down for 2 seconds until the message **SEt** is displayed. The adjusted control temperature will be displayed when the key is released.

Use the keys **▲** or **▼** to change the value and then press **SET** to save.

The desired temperature can also be changed in the quick access menu, (see map on item 8.1) or by function **SEt** item 8.5.

8.3.2. Manual defrost

The manual defrost is performed through the quick access menu (**F**) or by holding the key **DEFr** for 4 down for 4 seconds. Press the key **DEFr** (quick touch) until the message **DEFr** (led flashing) is displayed, and then press the key **SET** (quick touch) to select. The message **DEFr** (led on) will then be displayed.

To manually stop the defrosting, press the key **DEFr** (quick touch) until the message **DEFr** (led flashing) is displayed. Press the key **SET** (quick touch) to select. The message **DEFr** (led off) will then be displayed.



8.3.3. Function lock

The use of the functions lock brings greater security to the operation of the instrument, with it active the setpoint and the other parameters can be visible to the user, but protected against undue changes (**F20**=2) or you can just lock the changes in the control functions leaving the setpoint adjustment released (**F20**=1). To lock the functions, access the **LOC** option in the easy menu using the **F** (Flatec) key and confirm by pressing the **SET** key.



The message **LOC** will be displayed if the lock is disabled. At this time, press and hold the **SET** key for the time configured in the **F20** function. Activation will be indicated by the message **LOC** (led flashing) and will only occur if the function **F20** is set to 1 or 2. To deactivate the lock, turn off the controller and turn it on again with the **SET** key pressed. Keep the key pressed until the message **LOC** (led off) indicates unlocking (10 seconds).

Note: The date and time setting will always be enabled, regardless of the values of **F20** and **F21**.

8.3.4. Control functions shutdown

When the control functions are turned off, the controller starts to operate as a temperature indicator only and the output relay turns off.

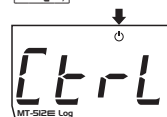
The way to turn off the control functions depends on the configuration of the parameter " **F20** - Turn off of the control functions":

F20 - Does not allow the turning off the control functions.

F20 - Allows shutdown the control functions only if the functions are not locked.

F20 - Allows shutdown the control functions even if the functions are locked. Using the key **Ctrl** (quick touch), select **Ctrl**, and then press **SET** (quick touch) to confirm.

Note: The date and time setting will always be enabled, regardless of the values of **F20** and **F21**.



Then, the message **Ctrl** (led flashing) will be displayed. At this moment the temperature display will alternate with the message **FFF**.

To turn the control functions back on, follow the same procedure used to turn them off, selecting with the key **Ctrl** (quick touch). The message **Ctrl** (led on) will be displayed as soon as the user presses the key **SET**.

Note: When the control functions are turned on again, the **MT-512E Log** will keep following the functions " **F00** - Minimum output switched off time" and " **F11** - Initial state when turning the device on".

8.3.5. Visualization of Processes

Press **Proc** (quick touch) to view the status and the time already elapsed. This way the controller will display the stage of the current process, and the following messages may be shown on the display:

- - control off
- DEL** - initial delay
- DEFr** - refrigeration
- Hot** - heating
- DEFr** - defrost

8.3.6. Minimum and Maximum Temperature Record

Holding the **SET** key down or also via the quick access menu (see item 8) will cause the message **rEg** to be displayed and the minimum and maximum temperatures to be recorded.

For erasing the current minimum and maximum values, press the **CrEg** key (quick touch) until the message **CrEg** is displayed. Press **SET** to confirm.

Note: These records are not stored in the internal datalogger and in the case of a power cut, the data will be lost.

8.3.7. View current date and time

Quickly pressing the key **SET** makes it possible to view the current date and time set in the controller.

The current day (**--d**), month (**--M**), year (**--Y**), hour, and minute (**HH:MM**) will be shown in sequence on the display. It is also possible to view the date and time through the quick access menu in the option **CLD**.

8.3.8. Manual datalogger activation

The manual activation requires function [F23] to be configured with the value 2. By holding down the keys [Δ] and [▽] for 10 seconds, it is possible to activate or deactivate the operation of the internal record of temperature values and control outputs (datalogger). The message [dEL] will be shown followed by the message [On] when the datalogger is activated or [OFF] when it is deactivated. It is also possible to activate the datalogger manually through the quick access menu in option [dEL].

8.3.9. Selection of temperature measurement units

To select the temperature measurement units the system will use to operate, press [Δ] and [▽] simultaneously while the temperature is being displayed, enter the option [odE] using the access code [237] and then press [↵]. Then select the desired unit [°C] or [°F] using the keys [Δ] or [▽], and press [↵] to confirm.

Note: Whenever the units are changed, the configuration of the functions assume the factory default, so they need to be configured again.

8.4. Advanced operations

8.4.1. Access to the main menu

The main menu can be accessed through the quick access menu ([Δ]), option [Func] or pressing [Δ] and [▽] simultaneously when the temperature is being displayed.

The following options will be displayed:

- [odE] - Entry to the access code
- [Func] - Change the advanced parameters
- [ELD] - Adjust or visualization of the date and time

8.4.2. Access code

To allow changing the parameters or adjusting the clock, select the option [odE] by pressing [↵] (quick touch) and enter the access code 123 (one hundred and twenty-three) using the keys [Δ] or [▽], and confirm with [↵].

8.4.3. Changing the controller parameters

In the main menu (after entering the code 123) select the option [Func] and then the desired function using the keys [Δ] and [▽]. Press [↵] (quick touch) after selecting the function to view its value.

8.5 Parameters table

Fun	Description	CELSIUS				FAHRENHEIT			
		Min	Max	Unit	Standard	Min	Max	Unit	Standard
[F01]	Desired temperature (Setpoint)*	-50.0	200.0	°C	4.0	-58.0	392.0	°F	39.0
[F02]	Indication offset (Offset)	-20.0	20.0	°C	0	-36.0	36.0	°F	0.0
[F03]	Minimum setpoint allowed to the end user	-50.0	200.0	°C	-50.0	-58.0	392.0	°F	-58.0
[F04]	Maximum setpoint allowed to the end user	-50.0	200.0	°C	75.0	-58.0	392.0	°F	167.0
[F05]	Control differential (hysteresis)	0.1	20.0	°C	1.0	0.1	36.0	°F	1.8
[F06]	Operation mode	0-cool.	1-heat.	-	0-cool.	0-cool.	1-heat.	-	0-cool.
[F07]	Minimum output on time	0(Off)	9999	sec	20	0(Off)	9999	sec	20
[F08]	Minimum off time	0(Off)	9999	sec	20	0(Off)	9999	sec	20
[F09]	Cooling time (interval between defrosts)	1	9999	min	240	1	9999	min	240
[F10]	Defrost time	0(Off)	999	min	30	0(Off)	999	min	30
[F11]	Initial state when powering up the instrument	0-cool.	1-defrost	-	0-cool.	0-cool.	1-defrost	-	0-cool.
[F12]	Temperature display locked during defrost	0	2	-	1	0	2	-	1
[F13]	Maximum time of temperature indication locked in the defrost process	0(Off)	999	min	15	0(Off)	999	min	15
[F14]	Delay in instrument power on (delay)	0(Off)	240	min	0(Off)	0(Off)	240	min	0(Off)
[F15]	Additional time at the end of the first cycle	0(Off)	240	min	0(Off)	0(Off)	240	min	0(Off)
[F16]	Compressor status with sensor inoperative	0	2	-	0	0	2	-	0
[F17]	Compressor time on in case of error	1	999	min	15	1	999	min	15
[F18]	Compressor off time in case of error	1	999	min	15	1	999	min	15
[F19]	Digital filter strength	0(Off)	9	-	0(Off)	0(Off)	9	-	0(Off)
[F20]	Function lock mode	0	2	-	0	0	2	-	0
[F21]	Function lock time	15	60	sec	15	15	60	sec	15
[F22]	Turning off control functions	0(Off)	2	-	0(Off)	0(Off)	2	-	0(Off)
[F23]	Datalogger operating mode	0(Off)	2	-	2	0(Off)	2	-	2
[F24]	Time between each sample in memory	1	999	sec	30	1	999	sec	30
[F25]	Temperature variation to force data writing	0(Off)	10.0	°C	0(Off)	0(Off)	18.0	°F	0(Off)
[F26]	Input and output variation to force writing data	0(Off)	1(On)	-	0(Off)	0(Off)	1(On)	-	0(Off)
[F27]	Overwrite old records when memory is full?	0(Off)	1(On)	-	1(On)	0(Off)	1(On)	-	1(On)
[F28]	Digital input	0(Off)	6	-	0(Off)	0(Off)	6	-	0(Off)
[F29]	Door open time for alarm	0(Off)	999	min	5	0(Off)	999	min	5
[F30]	Instrument address on the RS-485 network	1	247	-	1	1	247	-	1

8.5.1. Parameters description

[F01] - Desired temperature (Setpoint):

The reference value for temperature control, that is, the temperature to be maintained in a controlled environment.

[F02] - Sensor indication displacement (Offset):

Compensates for any deviations in temperature reading caused by sensor exchange or alterations in the cable length.

[F03] - Minimum setpoint allowed to the end user:

A threshold aimed at preventing an exceedingly low temperature setpoint from being inadvertently adjusted.

[F04] - Maximum setpoint allowed to the end user:

A threshold aimed at preventing an exceedingly high temperature setpoint from being inadvertently adjusted.

[F05] - Differential control (hysteresis):

The difference in temperature (hysteresis) between TURNING ON and OFF the refrigeration (or heating).

Example: One wants to control the temperature at 4.0 °C with a differential of 1.0 °C. Therefore, the refrigeration is switched off at 4.0 °C and switched back on at 5.0 °C (4.0 + 1.0), in the heating mode the output is switched off at 4° C is switched on again at 3° (4.0 - 1.0), as per the charts below:

Use [Δ] or [▽] to change the value and press [↵] when ready to save the configured value and return to the function menu. To leave the menu and return to the normal operating mode (temperature indication), hold down [↵] (long touch) until [--- appears.

Note: If the function lock is active, the controller will show the message [ELC], in the display upon pressing [Δ] or [▽] and will not allow the adjustment of the parameters.

8.4.4 Date and time adjustment

When the [ELD] menu is selected, if the access code [123] has been entered, the controller will enter the date and time adjustment mode. Use [Δ] or [▽] to change the value and press [↵] when ready to save the configured value. If the date entered is invalid, the message [ELD] will be shown on the display. It is also possible to adjust the date and time through the easy menu. In this case, it is not necessary to enter the access code.

Example 1 (correct access code entered):

[00d] - day [00m] - month [00y] - year [00:00]
time flashing minute

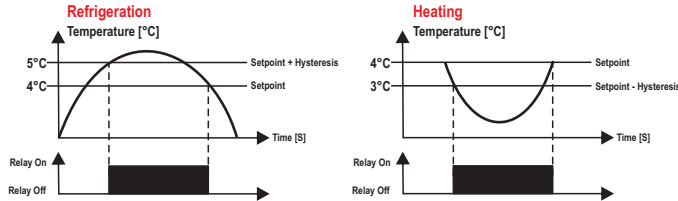
⚠ IMPORTANT:

The controller has an auxiliary internal power supply to keep the clock running for at least 72 hours in case of a power failure. If the controller remains off for a long period of time, the message [ELD] may be displayed to indicate that the clock is not programmed. In this case, the date and time must be adjusted and the controller must be kept on for 10 hours to fully recharge the auxiliary power supply.

8.4.5. Internal datalogger (internal memory)

When the datalogger is enabled [F23], it is possible to store records in the controller's internal memory. It can be configured to store records by time interval [F24], by temperature variation [F25], and/or by the variation of the state of the digital output or inputs [F26].

Note: The equipment records date, time, temperature, and events (sensor error, refrigeration/heating output state, defrost output state, and open door sensor).



[F06] - Operating mode:

Allows selecting the controller operation mode.

- [0] - Refrigeration
- [1] - Heating

Note: In the heating mode functions [F09], [F10], [F11] and [F12] are disregarded.

[F07] - Minimum output-on time:

The minimum time the output will remain on, i.e. the length of the time between the last start up and the next stop. It is aimed at avoiding high voltage surges in the power lines.

F08 - Minimum output-off time:

The minimum time the output will remain off, i.e. the length of time between the last start up and the next stop. It relieves the discharge pressure and increases the service life of the compressor.

F09 - Refrigeration time (interval between defrosts):

Corresponds to the time in which the refrigeration function will operate via the controller. When this time is up the controller enters the defrost process.

F10 - Defrost time:

This is the defrost duration time. Within this period, the relay will remain off, and upon finishing, the controller will go back to the refrigeration state.

F11 - Initial status when turning on the device:

It allows defrosting when controller is turned on.

F12 - Temperature indication locked during defrost:

Sensor temperature indication:

Locked indication - last temperature before defrost:

Indication "DEF":

This function is intended to prevent the ambient temperature rise due to defrost from being displayed.

F13 - Maximum time of temperature indication locked in the defrost process:

During the defrosting process, the last temperature measured in the refrigeration cycle or the message DEF will be frozen on the display. The indication will be defrosted when this temperature is reached again or exceeds the time set in this function, after the start of the next refrigeration cycle (whichever comes first). If configured with the value DEF, the temperature indication will be frozen only in the defrost stage.

F14 - Delay in turning on device:

When the device is switched on its control output will remain disabled, delaying the beginning of the process. During this time the controller only works as a temperature indicator. The purpose is to avoid peaks of electric power demand after a power cut when many devices are connected to the mains. To do this, simply set different times for each device. This delay may be either for the compressor or the defrost (when the defrost is configured during the startup).

Note: At its end, the count of minimum time of output off is started, if there is any.

F15 - Additional time to the end of the first cycle:

Aimed at increasing the refrigeration time only in the first refrigeration cycle, increasing the efficiency.

F16 - Compressor state with a disconnected or faulty sensor:

If the room sensor is shorted, disconnected or out of range, the compressor will assume the state configured in this function.

- Compressor off

- Compressor on

- Cycling according to times defined in F17 and F18

Note: If the system is in both heating and error mode, the output will be switched off.

F17 - Compressor time on in case of error:**F18 - Compressor time off in case of error:**

Sets the minimum time the compressor will remain on/off respectively when the sensor is disconnected or out of range.

F19 - Digital filter intensity:

This filter has the purpose of simulating thermal mass increase in the sensor, thus increasing its response time (thermal inertia). The greater the value set in this function, the greater the sensor response delay will be.

F20 - Function lock mode:

Allows and configures the blocking of functions (see item 8.3.3).

: Does not allow blocking of functions;

: Enables partial blocking, where the control functions will be blocked but the setpoint adjustment remains released;

: Enables total blocking, leaving only access to easy menu functions available.

F21 - Function lock time:

With this functionality active, the parameters are protected against undue changes, making them available only for viewing. In this condition, when trying to change these values, the message LOC will be shown on the display.

F22 - Control functions shutdown:

Allows the output to be switched off for maintenance purposes, see item 8.3.4 - Basic Operations, item Turning off the control functions.

F23 - Datalogger operating mode:

Indicates how to activate the device that records data in the internal memory:

- Always off

- Always on

- Manual operation

F24 - Time between each sample in the memory:

The time in seconds that the controller takes to record samples of the temperature information and refrigeration output state.

F25 - Minimum temperature change to force the writing of data:

The temperature difference in relation to the last piece of data written in the datalogger for the data to be recorded in the memory regardless of the sampling time set in F24. To deactivate this function, just decrement the value until the message na is displayed.

F26 - Output change to force the writing of data:

Indicates whether the change in the control output will force the recording of data in the memory regardless of the sampling time set in F24.

F27 - Overwrite old records when memory is full:

This function indicates whether the controller should start writing new data at the beginning of the datalogger memory when the memory is full. This function prevents the last data calculated by the equipment from being lost.

F28 - Digital input operating mode:

Digital input disabled: DEF

NC contact - Door sensor:

Contact NO - Door sensor:

NC pulser - Defrost:

NO pulser - Defrost:

NC contact - Control shutdown:

Contact NO - Control shutdown:

Note: In options 5 and 6, the Sitrad supervisory system has priority over the digital input. Thus, if Sitrad sends a command to turn the control functions on/off, the digital input is temporarily disabled and a transition in its state will be necessary to enable it again.

F29 - Door open time for alarm:

If the door is open for a time greater than or equal to the one configured in this parameter, the controller will activate a signaling of open door ADPn. In order for the door open alarm to operate, one of the digital inputs must be configured as a door sensor. The alarm is suspended when the door is closed. The alarm is disabled by setting this time to the minimum value DEF.

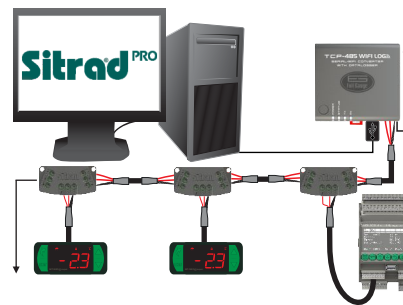
F30 - Address of the instrument in the RS-485 network:

Equipment's network address for communicating with Sitrad software.

Note: Every single controller within the network must have different address.

9. SIGNALS

Err1	Error in sensor: Sensor disconnected or damaged.
DEF	Control functions turned off.
DEFr On	Manual activation of defrost process.
DEFr OFF	Manual activation of the refrigeration process.
LOC On	Function lock.
LOC OFF	Function unlock.
Open	Open door indication.
ADPn	Open door alarm indication.
AdFL	Datalogger memory full.
ENEN	Contact Full Gauge Controls.
CLD	Adjustment or visualization of the date and time.
ECLD	Invalid date and/or time (adjust the clock).
PPPP	Reconfigure the values of the functions.
ECLL	Contact Full Gauge Controls.

10. INTEGRATING CONTROLLERS, RS-485 SERIAL INTERFACE AND COMPUTER***INTERFACE SERIAL RS-485**

Device used to establish the connection of Full Gauge Controls instruments with Sitrad®.

* Full Gauge offers different interface options, including technologies such as USB, Ethernet, Wifi, among others. For more information, consult Full Gauge Controls. Sold separately.

MODBUS PROTOCOL

The controller allows you to configure the RS-485 communication port for the MODBUS-RTU protocol. For more information about the implemented commands and the registration table, contact Full Gauge Controls.

**CONNECTION BLOCK**

It is used to connect more than one controller to the Interface. The wire connections must be made as follows: Terminal A of the controller connect to terminal A of the connection block, which in turn, must be connected to terminal A of the Interface. Repeat the procedure for terminals B and $\frac{1}{2}$, being $\frac{1}{2}$ the cable screen.

The MT-Si2e Log allows you to configure the RS-485 communication port for the MODBUS-RTU protocol. For more information about the implemented commands and the registration table, contact Full Gauge Controls.

11. GLOSSARY OF ACRONYMS

- °C: Temperature in Celsius degrees.

- °F: Temperature in Fahrenheit degrees.

- Refr: Refrigeration.

- Defr: Defrost.

- Heat.: Heating.

- LOC: Blocked.

- No: No.

- OFF: Turned off/disabled.

- ON: Turned on, enabled.

- SET (as in "Setting") (setting or configuration).

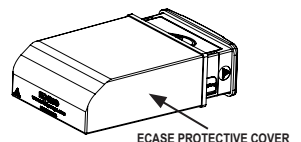
- Vac: Electrical voltage (volts) of alternating current.

- Vdc: Electrical voltage (volts) of direct current.

- Yes: Yes.

12. OPTIONAL ITEMS**Ecase protective cover**

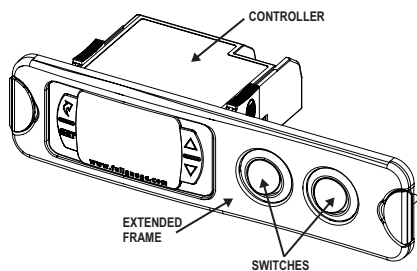
It is recommended for the Evolution line, keeps water from entering the back part of the instrument. It also protects the product when the installation site is washed.



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.

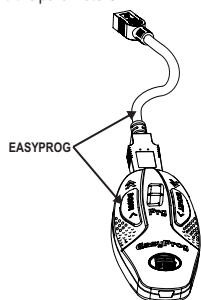
The frame integrates two switches of 10 Amperes that may be used to actuate interior light, air curtain, fan, and others.



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 download 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.



IMPORTANT

TO PERFORM THE COMMUNICATION WITH EASYPROG THIS EQUIPMENT MUST NOT BE COMMUNICATING WITH SITRAD SOFTWARE.

13. ANNEXES - Reference Images

Image V

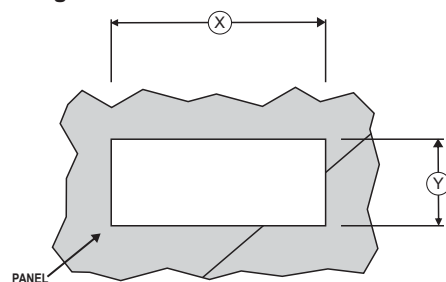


Image VI

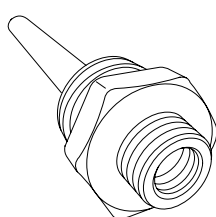


Image VII

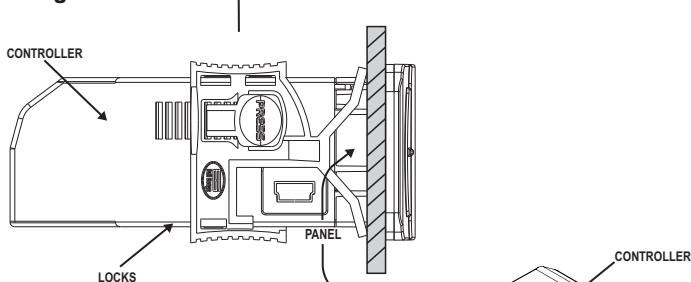
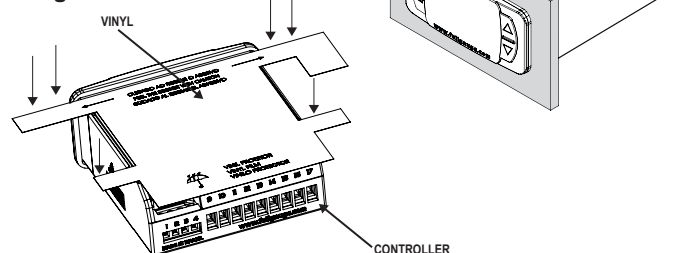


Image VIII



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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