MT-444 eXpress
MT-444 V-eXpress

VER. 02

DIGITAL COOLING CONTROLLER WITH TOUCH SCREEN KEYS

Power-saving mode | Touch screen | Manual Defrost | Function blocking | Turn control functions off | Audible Alarm | Serial Programming

444EXPRESSV02-03T-15355

WARNING

BEFORE INSTALLING THE CONTROLLER, WE RECOMMEND READING THROUGH THE ENTIRE INSTRUCTION MANUAL IN ORDER TO AVOID POSSIBLE DAMAGE TO THE PRODUCT.

PRECAUTIONS WHEN INSTALLING THE PRODUCT:
Before performing any procedure on this instrument, disconnect it from the mains;
Ensure that the instrument has adequate ventilation and avoid installation in panels containing devices that may cause it to operate outside the specified temperature limits;
Install the product away from sources that may generate electromagnetic disturbances such as: motors, contactors, relays, solenoid valves, etc;

AUTHORIZED SERVICE:
The installation or maintenance of the product must be performed by qualified professionals only;

ACCESSORIES:
Only use original Full Gauge Controls accessories.
If you have any questions, please contact technical support.

DUE TO YOUR CONSTANT EVOLUTION, THE FULL GAUGE CONTROLS RESERVES THE RIGHT TO CHANGE THE INFORMATION CONTAINED IN THIS MANUAL AT ANY TIME WITHOUT NOTICE.

1. DESCRIPTION

The ***MT-444 eXpress*** is a digital controller designed specifically for cooling. The touch screen keys can select the desired Preset (3 options); enable/disable the energy saving mode, among other functions. It has a normal operating setpoint and a power-saving setpoint for each one of the three Presets, with their respective hysteresis.
While the ***MT-444 eXpress*** offers a default solution for most applications, the ***MT-444 V-eXpress*** offers a distinct characteristic, the power grid voltage meter. Using the True-RMS strain gauge, it is capable of protecting the compressor against activations with improper voltage, whether it is high or low. Similarly, when the power grid voltage is higher or lower than the maximum or minimum voltage setup, the compressor output will be automatically switched off for protection.

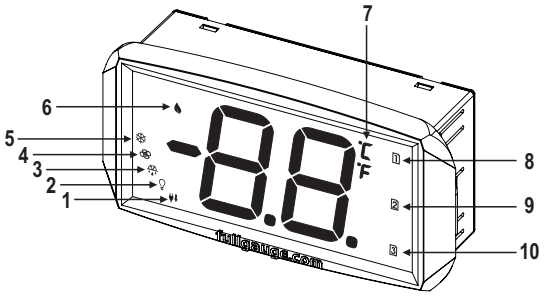
2. APPLICATION

- Beverage displays;
- Refrigeration cabinets.

3. TECHNICAL SPECIFICATIONS

- **Power Supply:** 230Vac ±10% (50/60 Hz) or on the version 115Vac ±10% (50/60 Hz)
- **Setpoint Temperature:** -50 to 60ºC or -58 to 99ºF
- **Operation Temperature:** 0 to 45ºC (32 to 113ºF)
- **Resolution:** 0.1ºC between -9.9 and 9.9ºC and 1ºC on the remainder of the range
  1ºF on all the range
- **Maximum current of the relays:** 10(8) A/ 250Vac 1HP–compressor output
  7A/ 250Vac – defrost output
  3(2) A/ 250Vac – 1/10HP– fan output
  2(2) A/ 250Vac – light output
- **Digital input:** input for open-door detection (dry contact type)
- **Operating humidity:** 10 to 90% RH (with no condensation)
- **Frontal dimension (with frame):** 105x55x90 mm (WxHxD)
- **Frontal cutouts dimension:** 91x45 mm
- **Base module dimension:** 113x87.5x32 mm (WxHxD)

4. INDICATORS AND KEYS



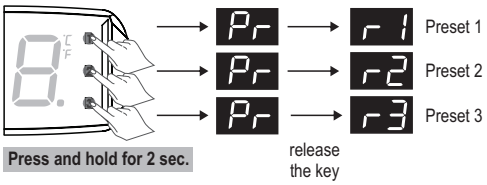
1	Power-Saving Mode LED indicator
2	Light LED indicators
3	LED indicator for pre-defrost and defrost (on) or draining (blinking)
4	Fan LED indicators
5	Compressor LED indicators
6	Power-Saving Mode Key
7	Temperature unit LED indicator
8	Plus Key / Preset 1
9	Set Key / Preset 2
10	Minus Key / Preset 3

5. BASIC OPERATIONS

NOTE: If L3 is at 0, the first touch will be to enable the keyboard.

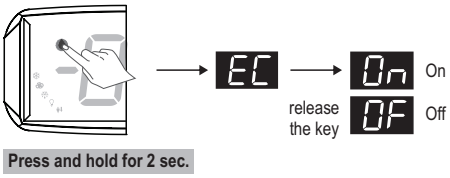
5.1 Change Preset

To select the desired preset, press and hold the corresponding key for 2s, until the Pr screen appears, and then release it.



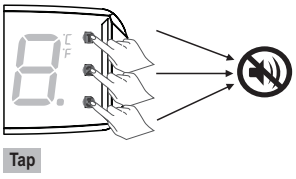
5.2 Turning power-saving mode on/off

To turn the energy saving mode on/off press and hold the key for 2s, until the EC message appears, and then release it.



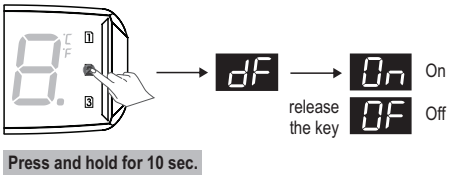
5.3 Silencing the alarm

To silence the audible alarm, tap any of the keys 1, 2 or 3.



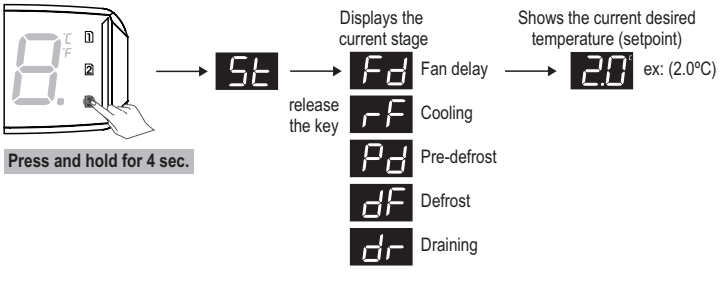
5.4 Manual Defrost

To start/stop a manual defrost, regardless of the schedule, press and hold the 2 key for 10s, until the dF message appears, and then release it. The On message will appear when it has started and the OF message when it has been stopped.



5.5 Display process stage and the current desired temperatures (setpoint)

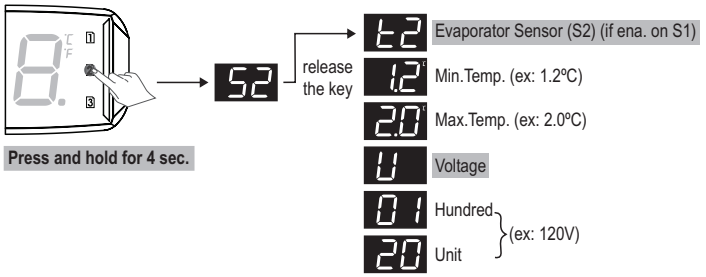
To see which process stage is underway, press and hold the 3 key for 4s, until the St message appears, and then release it. The stage of the process in progress will be displayed, showing the desired temperature (setpoint) in use, in relation to the current operating mode (normal/power-saving).



5.6 Display the current temperature on sensor 2 (evaporator) and power grid voltage

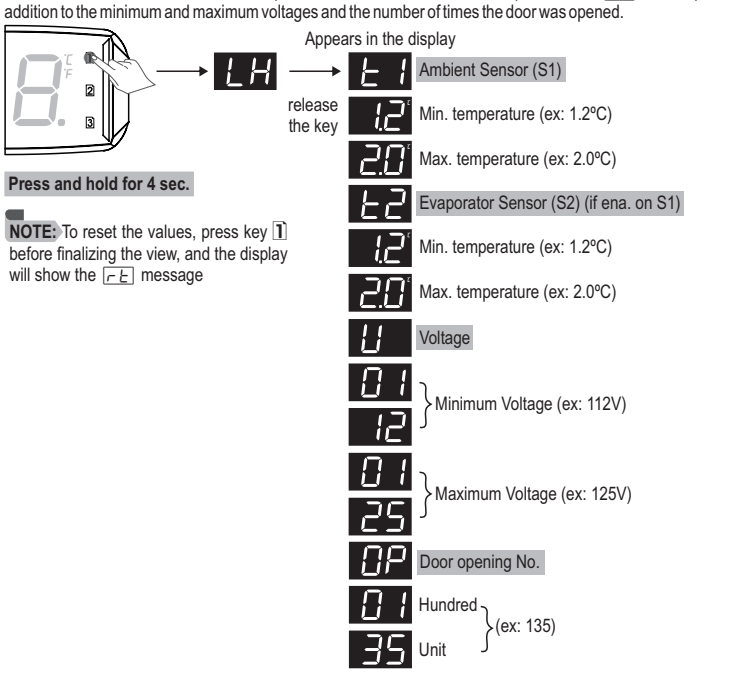
Press and hold the 2 key for 4s, until the S2 message appears, and then release it. The following information will be shown:

NOTE: Audible alarm must be turned off.



5.7 Display minimum and maximum temperatures, voltage and door opening number

Press and hold the 1 key for 4s, until the LH message appears, and then release it. The controller will indicate the minimum and maximum temperatures of the S1 and S2 sensors (if enabled in S1 function), in addition to the minimum and maximum voltages and the number of times the door was opened.

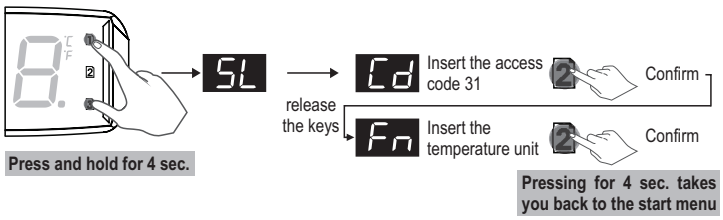


NOTE: To reset the values, press key 1 before finalizing the view, and the display will show the rE message

5.8 Selecting the unit temperature

The controller temperature can be displayed either in Celsius (ºC) or Fahrenheit (ºF). To set the unit, press and hold the 1 and 3 keys simultaneously for 4 seconds, until SL is displayed.

Insert the access code 31. When accessing the Fn menu, it is possible to switch between the two units. Every time the unit changes, the setup should be reconfigured, as all settings return to the "default" values.



6.5 Parameters table

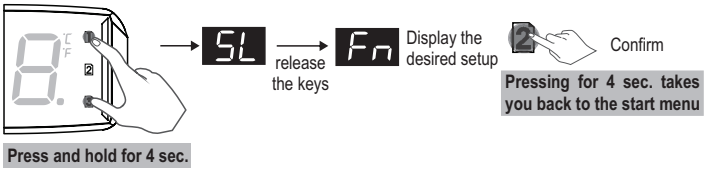
FUN	FUNCTION	DESCRIPTION	CELSIUS (FAHRENHEIT) MIN	MAX	UNIT	DEFAULT
t1	**Desired temperature (setpoint) (r1)**	This is the control temperature of the normal operating mode. When the S1 sensor temperature (ambient) is lower than the configured value for this function, the compressor will be turned off.	-50 (-58)	60 (99)	ºC (°F)	-6.0 (21)
t2	**Desired temperature (setpoint) (r2)**		-50 (-58)	60 (99)	ºC (°F)	-1.0 (30)
t3	**Desired temperature (setpoint) (r3)**		-50 (-58)	60 (99)	ºC (°F)	2.0 (36)
t4	**Desired temperature (power-saving setpoint) (r1)**	This is the control temperature when the power-saving mode is active. If the S1 sensor temperature (ambient) is lower than the configured value for this function, the compressor will be turned off.	-50 (-58)	60 (99)	ºC (°F)	-6.0 (21)
t5	**Desired temperature (power-saving setpoint) (r2)**		-50 (-58)	60 (99)	ºC (°F)	-1.0 (30)
t6	**Desired temperature (power-saving setpoint) (r3)**		-50 (-58)	60 (99)	ºC (°F)	2.0 (36)
t7	**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)	60 (99)	ºC (°F)	-50 (-58)
t8	**Maximum desired temperature (setpoint) allowed to the user**		-50 (-58)	60 (99)	ºC (°F)	60 (99)
h1	**Control differential of operating setpoint (r1)**	This is the difference between turning cooling OFF and BACK ON in normal operating mode. *Example: If adjusted t1 = 4.0 and h1 = 1.0, the compressor will be turned off when the S1 sensor temperature (ambient) is less than 4.0 and it will be turned on when it is higher than 5.0 (4.0 + 1.0).*	0.1 (01)	8.0 (14)	ºC (°F)	3.0 (05)
h2	**Control differential of operating setpoint (r2)**					
h3	**Control differential of operating setpoint (r3)**					
h4	**Control differential of power-saving setpoint (r1)**	This is the difference between turning cooling OFF and BACK ON in power-saving mode.	0.1 (01)	8.0 (14)	ºC (°F)	3.0 (05)
h5	**Control differential of power-saving setpoint (r2)**					
h6	**Control differential of power-saving setpoint (r3)**					

6. ADVANCED OPERATIONS

NOTE: If L3 is at 0, the first touch will be to enable the keyboard.

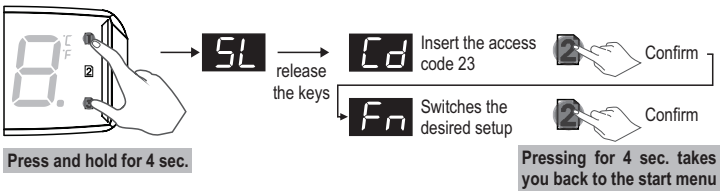
6.1 Display the setup

It is possible to display controller settings without editing them. To do so, press the 1 and 3 keys simultaneously for 4s, until the SL message appears, and then release it. Select the Fn menu (tap 1) and confirm the selection by tapping the 2 key. You can then view all controller settings. Navigate the menus using keys 1 (plus) and 3 (minus). Confirm the selection with the 2 key.



6.2 Changing the configured setup

To change the setup, press and hold the 1 and 3 keys simultaneously for 4s, until the SL message appears, and then release it. Select the Cd menu (tap 2) insert the code 23 and confirm. It is possible to change all controller configurations. Navigate the menus using the 1 (plus) and 3 (minus) keys. Confirm selection with the 2 key.



6.3 Time for function blocking

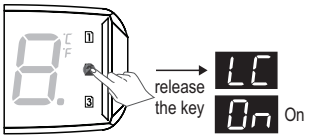
With this function enabled, setups are protected against unauthorized changes, and thus are available for viewing only. In this condition, when trying to change these values, the LC message will be displayed.

To block functions, select any value different from no (15 to 60) on L1 setup. This is the pressing time required to validate function blocking. To block the keyboard, press and hold the 2 key for the time set in L1.

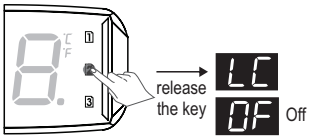
To unblock, turn off the controller and then turn it on again. As soon as the SF message appears, press the 2 key for 10s, until the LC + OF message appears, and then release it.

NOTE: If L3 is at 0, the first touch will be to enable the keyboard.

Block:



Unblock:



6.4 Shut down control functions

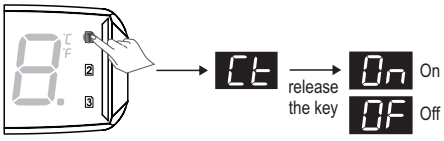
As control functions are shut down (L2), the controller starts to operate as a temperature indicator only, with all outputs deactivated. This function can operate in the following ways:

0 Does not allow control functions to shutdown.
1 Allows the turning on and off of control functions only if the functions are unlocked.
2 Allows the turning on and off of control functions even if the functions are blocked.

To turn the control functions on/off, press and hold the 1 key for 10s, until the Ct message appears, and then release it.

NOTE: When restarting the control functions, the controller will continue with these functions.

c1 (compressor minimum shutdown time) and d5 (Defrost when powering the controller).



			CELSIUS (FAHRENHEIT)			
FUN	FUNCTION	DESCRIPTION	MIN	MAX	UNIT	DEFAULT
h7	**Antifreeze safety differential temperature**	This is the value that will be added to the current preset setpoint after the time set in P7. *Example: If t1=3.0 (setpoint), h1=2.0 (differential) and h7=1.0 (antifreeze), cooling 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 (01)	8.0 (14)	ºC (ºF)	2.0 (04)
S1	**Enables the evaporator temperature sensor (sensor S2)**	The S2 sensor can be disabled. In this case, the defrost will be initiated in time.	OF	On	-	OF
S2	**Intensity of the digital filter applied to the ambient sensor (sensor S1)**	The value set in this function represents the time (in seconds) to 0,1ºC temperature change. 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.	no	20	sec.	0
S3	**Local calibration of the ambient sensor (sensor S1)**	This compensates for any deviations in the sensor reading due to replacement or a change in cable length.	-5.0 (-09)	5.0 (09)	ºC (ºF)	0.0 (00)
S4	**Local calibration of the evaporator sensor (sensor S2)**					
S5	**Operating mode of the digital filter**	0 = The filter acts both on the rise ramp as on the decrease ramp temperature; 1 = The filter acts only in the temperature rise ramp. When the temperature falls, your response will be immediate.	0	1	-	0
d1	**Defrost type**	0 = Electrical defrost (by resistances), 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
d2	**Condition to start the defrost**	0 = Defrost started by time 1 = Defrost started by temperature.	0	1	-	0
d3 d4 d5	**Interval between defrosts if d2=0 (r1)** **Interval between defrosts if d2=0 (r2)** **Interval between defrosts if d2=0 (r3)**	Determines how often defrost will be performed, which is the time counted from the end of the previous defrost.	1	99	H	12
d6 d7 d8	**Evap. temp. to start defrost if d2=1 (r1)** **Evap. temp. to start defrost if d2=1 (r2)** **Evap. temp. to start defrost if d2=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)	60 (99)	ºC (ºF)	-5.0 (23)
d9	**Confirmation time of low temperature (sensor S2) to start the pre-defrost if d2=1**	When the evaporator temperature (sensor S2) drops and reaches the value set in d6, d7, d8, 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 cooling stage.	no	99	min.	10
b1	**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	99	min.	no
b2 b3 b4	**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 value, the defrosting process will end as it should, i.e. by temperature. Thus, it optimizes the defrosting process.	-50 (-58)	60 (99)	ºC (ºF)	40 (99)
b5 b6 b7	**Ambient temperature to finalize the defrost (r1)** **Ambient temperature to finalize the defrost (r2)** **Ambient temperature to finalize the defrost (r3)**	If the ambient temperature (sensor S1) reaches the set value, the defrosting process will end by temperature.	-50 (-58)	60 (99)	ºC (ºF)	20 (68)
b8	**Maximum time without defrosts if d2 = 1**	If the controller is configured to perform defrosting by temperature, this time works as a safeguard in situations where the evaporator temperature (sensor S2) does not reach the programmed values in d6, d7, d8. This function determines the maximum time the controller will wait without performing the defrost.	1	99	H	12
o1 o2 o3	**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 defrosting process. If, within such period, defrosting is not concluded by temperature, a dot will start blinking on the bottom-right corner of the display (it needs to be enabled in A7), indicating that the defrosting process has been concluded 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 S2 sensor is disconnected or not connected to the evaporator.	1	99	min.	30
o4	**Locked temperature indication during defrost**	This function is intended to prevent a rise in ambient temperature, due to the defrosting process, being displayed. During the defrosting process, the last measured temperature in the cooling cycle will be frozen on the display. The indication will be unfrozen when this temperature is re-reached or when the time set using this function is exceeded, after the start of the next cooling 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	99	min.	15
o5	**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).	OF	On	-	OF
o6	**Draining time**	Time required for dripping, i.e. to drain the last drops of the evaporator. During this period, all outputs remain turned off. If you do not want this stage, adjust this time to no.	no	99	min.	1
F1 F2	**Fan operation mode: Normal Mode** **Fan operation mode: Power-Saving Mode**	The fan operation settings in normal and power-saving mode are: A 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 adjusted time to F3 and F4. C Continuous: The fan will be constantly activated. d Dependent: The fan will be activated together with the compressor.	A	d	-	d
F3	**Fan ON Time if F1 and F2 are in automatic mode (A)**	This is the amount of time the fan will remain ON if F1 and F2 are configured as automatic, while the compressor is off.	1	99	min.	1

FUN	FUNCTION	DESCRIPTION	CELSIUS (FAHRENHEIT) MIN	MAX	UNIT	DEFAULT
F4	**Fan OFF Time if F1 and F2 are in automatic mode (A)**	This is the amount of time the fan will remain OFF if F1 and F2 are configured as automatic, while the compressor is off.	1	99	min.	99
F5	**Fan operation when opening the door**	The fan can be set to remain activated or deactivated in the period when the door is kept open.	OF	On	-	OF
F6	**Fan deactivation by high temperature in evaporator**	The purpose of this function is to cycle evaporator ventilation until the ambient temperature approaches that listed in the installation manual, thus preventing a high temperature and suction pressure which can damage the compressor. If the evaporator temperature surpasses that of the set value, the fan is turned off, turning back on with a set hysteresis of 2ºC/4ºF. It is a valuable resource when, for example, cooling equipment has been inactive for a few days or refrigeration cabinets are restocked.	-50 (-58)	60 (99)	ºC (°F)	60 (99)
F7	**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 drops to the set programmed value. This process is required to remove heat (caused by the defrosting process) still present in the evaporator, preventing ambient release.	-50 (-58)	60 (99)	ºC (°F)	2.0 (36)
F8	**Maximum fan reactivation time after draining (fan-delay)**	For safety, in case the evaporator temperature does not reach the value in F7 or the S2 sensor is disconnected, fan reactivation will occur in the function's set time.	no	30	min.	1
P1	**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 b2, b3, b4 and the ambient temperature (sensor S1) is lower than b5, b6, b7.	no	99	min.	30
P2	**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	99	min.	5
P3	**Time unit of functions P4, P5 and P7**	n Time in minutes H Time in hours	n	H	-	n
P4	**Door closed time until light is turned off**	This setup defines when the light will be turned off with the door closed. It contributes towards power saving.	no	99	min./H	2
P5	**Door closed time until 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	99	min./H	2
P6	**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 operation mode. This time is calculated in hours.	no	99	H	no
P7	**Closed door time until activation of antifreeze safety differential temperature**	In order to prevent the product from freezing, this function is activated after the set time with the door closed elapses.	no	99	min./H	no
c1	**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	15	min.	no
c2	**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	15	min.	no
c3	**Compressor ON time in case of error on S1 sensor (ambient)**	If the ambient 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	99	min.	20
c4	**Compressor OFF time in case of error on S1 sensor (ambient)**		0	99	min.	10
c5	**Compressor delay time when powering the controller**	When the controller is turned on, its control may remain disabled for a while, delaying the start of the process. During this time, it works only as a temperature indicator. It is used to prevent electricity demand peaks in case of power shortage or return thereof, when there are multiple devices connected to the same line. For this, simply adjust the times for each piece of equipment. This delay may be related to the compressor or the defrosting process (when there is defrost upon turning the controller on).	no	99	min.	2
U1	**Minimum limit of work voltage**	If the voltage exceeds the limits set with these functions, the compressor will shut down immediately after the time adjusted in the U4. To disable voltage monitoring, set U1 to a value greater than U2.	9(*) 18(**)	15(*) 26(**)	x10V x10V	10(*) 20(**)
U2	**Maximum limit of work voltage**		9(*) 18(**)	15(*) 26(**)	x10V x10V	14(*) 24(**)
U3	**Offset of voltage measurement**	This compensates for possible deviations in the reading of voltage.	-10	10	V	0
U4	**Voltage validation time**	The time set in this function prevents small voltage variations by quickly turning the compressor off.	2	30	sec.	4
A1	**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	48	H	no
A2	**Differential of desired temperature (setpoint) for minimum ambient temperature alarm**	This is the temperature difference in the current setpoint to activate the alarm (buzzer) for LOW temperature. *Example: Setpoint= 3.0, A2 = 2.0. In this case, the alarm will only be activated if the ambient temperature is lower than 1.0 (3.0 – 2.0).*	0.1 (01)	20 (36)	ºC (ºF)	10 (18)
A3	**Differential of desired temperature (setpoint) for maximum ambient temperature alarm**	This is the temperature difference in the current setpoint to activate the alarm (buzzer) for HIGH temperature. *Example: Setpoint= 3.0, A3 = 1.0. In this case, the alarm will only be activated if the ambient temperature is higher than 1.3 (3.0 + 1.0).*	0.1 (01)	50 (90)	ºC (ºF)	50 (90)
A4	**Door open time until the alarm is activated**	When the door is opened, the OP 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	99	min.	1

FUN	FUNCTION	DESCRIPTION	CELSIUS (FAHRENHEIT) MIN	MAX	UNIT	DEFAULT
A5	**Alarm silencing time by temperature**	This function is used to stop the alarm for a certain period, due to a possible increase in temperature from defrost. During defrost, draining and fan-delay, the alarm does not work.	no	99	min.	no
A6	**Alarm silencing time when powering the controller**	During the time set in this function, the alarm remains off, waiting for the system to start working.	no	99	min.	no
A7	**Indication to defrost concluded by time alarm**	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 ( ).	OF	On	-	OF
L1	**Time for functions block**	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, an LC message will be displayed. **NOTE: To activate or deactivate the functions block, please refer to item 6.3**	14-no	60	sec.	14-no
L2	**Shutdown of the control functions**	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: 0 Does not allow the shutdown of control functions. 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 blocked. **NOTE: To activate or deactivate the control, please refer to item 6.4**	no	2	-	no
L3	**Operation of the touch keyboard**	The keys work in two ways, one is hidden and the other is always visible: 0 The keys remain hidden. Touching any key will only enable the use of the keyboard. If no key is pressed within 10 seconds, the keyboard will be hidden again. This prevents unwanted activations from being performed. 1 The keys always remain on. In this mode, the first touch is enough to perform functions.	0	1	-	0

(*)The minimum default value is 90V for a 115VAC power supply and 200V for a 230Vac power supply.
(**)The maximum default value is 140V for a 115Vac power supply and 260V for a 230Vac power supply.

7. SIGNS

Lt
Reason: Low temperature alarm.
Actions:- Check connection and operation of the sensor S1 (ambient);
- Check the cooling system;
- Check function A2.

Ht
Reason: High temperature alarm.
Actions:- Check connection and operation of the sensor S1 (ambient);
- Check cooling system and/or door sealing;
- Check function A3.

Lu
Reason: Low voltage alarm.
Actions:- Check that the voltage is not below that configured in U1.

Hu
Reason: High voltage alarm.
Actions:- Check that the voltage is not above that configured in U2.

Eu
Reason: Invalid voltage reading.
Actions: Check the power supply voltage of the instrument.

A1
Reason: Maximum compressor ON time exceeded without reaching the control temperature (setpoint).
Actions:- Check the compressor and the cooling system;
- Check the door sealing;
- Check function A1.

E1
Reason: Ambient temperature sensor disconnected or short-circuited.
Actions: Check the connection on the controller. If necessary, replace the sensor.

E2
Reason: Evaporator temperature sensor disconnected or short-circuited.
Actions: Check the connection on the controller. If necessary, replace the sensor.

OP
Reason: Open door alert.
Actions:- Ensure that the door is properly closed.
- Check the micro limit switches or magnetic sensor (reed switch) of closed door detection (if applicable), and the connection to the controller.

Ct
OF
Reason: Shutdown of the control functions.
Actions: Please refer to item 6.4.

.
Reason: 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 A7).
Actions:- Check that there are no burned resistances;
- Check that hot gas is circulating;
- Check that the fan is working and not shorted;
- Check that the maximum defrost time is not too short (o1, o2, o3).

Pu
Actions: Contact Full Gauge Controls.

PP
Actions: Reconfigure the function values.

8. FREQUENTLY ASKED QUESTIONS

1)I have more than one instrument. Is it possible to use the frontal module of one with the base module of the other? *Yes, the frontal module works with any base module of the same version.*

2)In the *MT-444 V-eXpress* version, is it possible to deactivate the voltage monitor? *Yes, just set the function U1 to a value greater than U2.*

3)Is it possible to deactivate sensor 2 (evaporator)? *Yes, see function S1 on the setup table (item 6.5).*

4)What percentage of power supply voltage variation can the controller tolerate? *10% either way.*

5)Is it possible to extend the length of the RJ45 cable connecting the base and frontal modules? *Contact Full Gauge Controls for more information.*

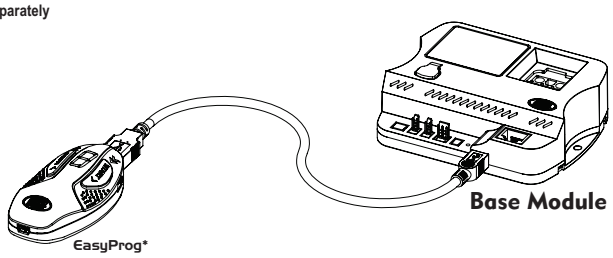
6)Is it possible to use the RJ45 cable that connect the base and frontal modules of the MT-444 in the MT-444 eXpress? *No. It should be always used the cable supplied with the instrument.*

7)Is it possible to extend the length of the ambient and evaporator sensor cables? *Yes. Contact Full Gauge Controls for more information.*

9. KEY OF PROGRAMMING - EasyProg ver.02 or higher

This accessory's main function is to store the controllers' the setup data. It can load a new controller's setup at any time and unload onto a production line (of the same controller).
The ***MT-444 eXpress*** and ***MT-444 V-eXpress*** controller includes an USB connection to load or unload setups:
- USB: can be connected to the computer via the USB port. Using the Sitrad Preset Editor, setups can be copied, edited and saved in **EasyProg ver. 02**. The USB port can also electrically supply the **EasyProg ver. 02** and the controller (when the USB and Serial TTL are used in conjunction).

***Sold separately**

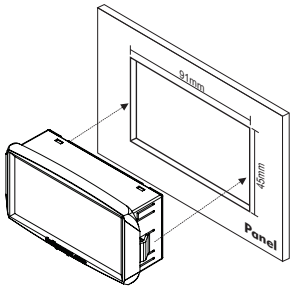


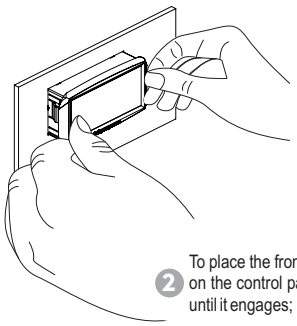
10. INSTALLATION

10.1 Fastening of frontal and base modules

- Frontal Module

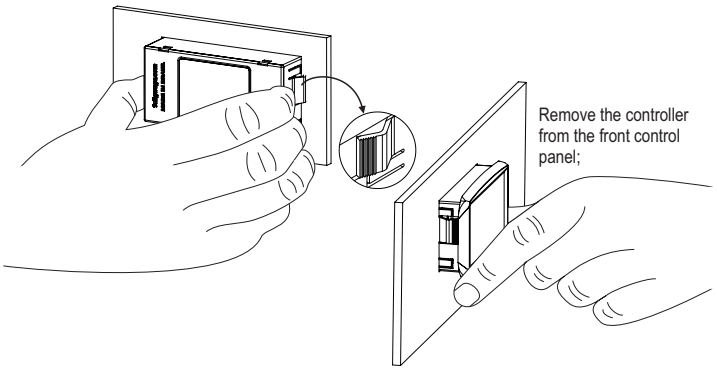
1 Make the cut in the control panel by taking the given measures. Please refer to item 3;





2 To place the frontal module on the control panel, press until it engages;

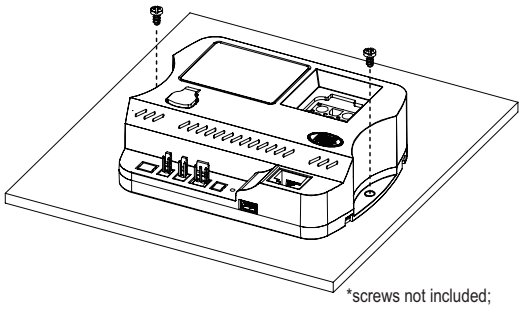
3 To release it, just press the side locks;



Remove the controller from the front control panel;

- Base Module

Fastening the base module with screws*;

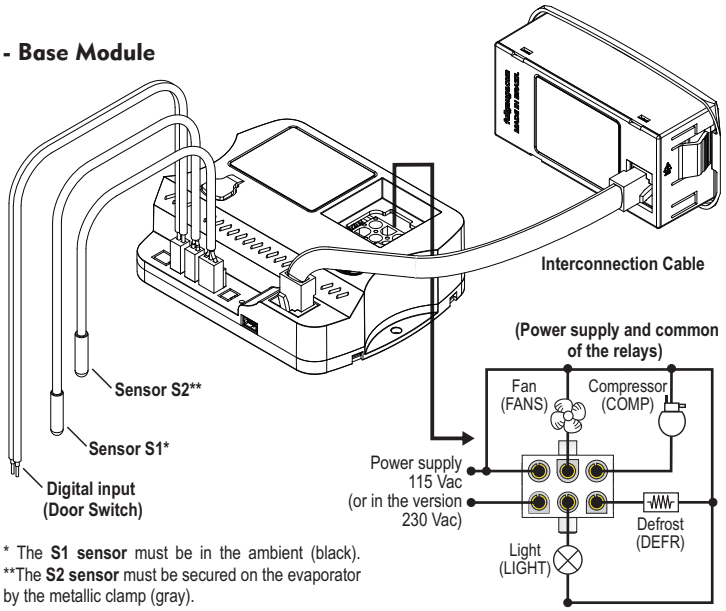


*screws not included;

10.2 Connection Scheme

- Frontal Module

- Base Module



* The **S1 sensor** must be in the ambient (black).
The **S2 sensor must be secured on the evaporator by the metallic clamp (gray).

11. IMPORTANT

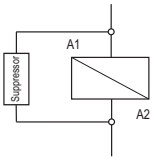
According to the chapters of the NBR 5410 regulations:

1: Install overvoltage protectors at the power supply

2: Sensors and serial communication cables can go together, but not in the same conduit through which power supply and charge activation pass.

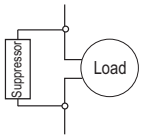
3: Install transient suppressors (RC filter) parallel to the charges in order to increase the life of the relays.

Suppressors wiring diagram on contactors



A1 and A2 are the terminals of the contactor coil.

Suppressors wiring diagram on direct activation charges



For direct activation, consider the maximum current specified.

Full Gauge Controls offers suppressors for sale

ENVIRONMENTAL INFORMATION

Packaging:
The materials used in Full Gauge products' packaging are 100% recyclable. Dispose of your waste preferably using specialized recycling agents.

Product:
The components used in Full Gauge controllers can be recycled and reused if disassembled by a specialized company.

Disposal:
Do not burn or throw controllers in domestic garbage. Obey the laws in effect for your area regarding the 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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