USER MANUAL

ENGLISH - REV. 02

TEMPERATURE CONTROLLER

STORM *ST101* 2HP

INNOVATION AND MANUFACTURING
AT YOUR SERVICE

INDEX

1. PRODUCT DESCRIPTION

The Temperature Controller **ST101 2HP** is a micro controlled digital electronic, developed for applications **Heating** or **Cooling** with timer for defrosting by compressor stop. Main features are:

- Programable by NFC approximation with an Android APP;
- Power Supply (alternating current) | 85 to 2 40 Vac | 50/60Hz - Automatic Bivolt;
- Power Supply (direct current) | 9 to 36 Vdc – With Polarity;
- Shortcut keys for direct access to the functions;
- Defrost by compressor stopping (natural defrost);
- Can be applied for Heating or Cooling;
- Neutral design that harmonizes with different types and colors of equipment;
- Front panel with IP65 protection;
- 2HP relay that allows direct connection of the load to the controller;
- Parameters for using different types of sensors;
- Diverse configurations, like defrost, functions blocking, thermal inertia and delay when controller starts.

Note: *Requires Android phone with version greater than 6.0, availability of NFC communication and active internet plan for sharing settings (if applicable).*

1.1. APPLICATIONS

The **ST101 2HP** Temperature Controller it's compatible with applications that requires ON – 0FF control and temperature measurement through one sensor.

- Refrigerators
- Freezers
- Cold Storages
- Heating Systems and Greenhouses
- Industrial Heating
- Reach-In Coolers

1.2. ITEMS IN THE PRODUCT BOX

- ST101 2HP Controller
- User Manual
- IP65 sensor with 1,5m cable length

1.3. TECHNICAL SPECIFICATIONS

Power Supply	ST101**AC** - 85 to 240 Vac | 50/60Hz - Automatic Bivolt
	ST101**DC** - 9 to 36 Vdc - With Polarity
Temperature Measuring Range	-50°C a 105°C
Operating temperature	(0 a 40) °C e (10 a 90) %UR [without condensation]
Maximum load current	16A resistive loads /12A inductive loads
Maximum load power	2HP
IP Protection level	IP65 (frontal)
Dimensions	76 x 34 x 77 [mm] (Width x Height x Depth)
Cutout dimensions	X = 71±0,5 Y = 29±0,5 [mm]
NFC Communication	Android version greater than 6.0 - ISO/IEC 15693

TABLE 1

1.4. INDICATIONS AND KEYS

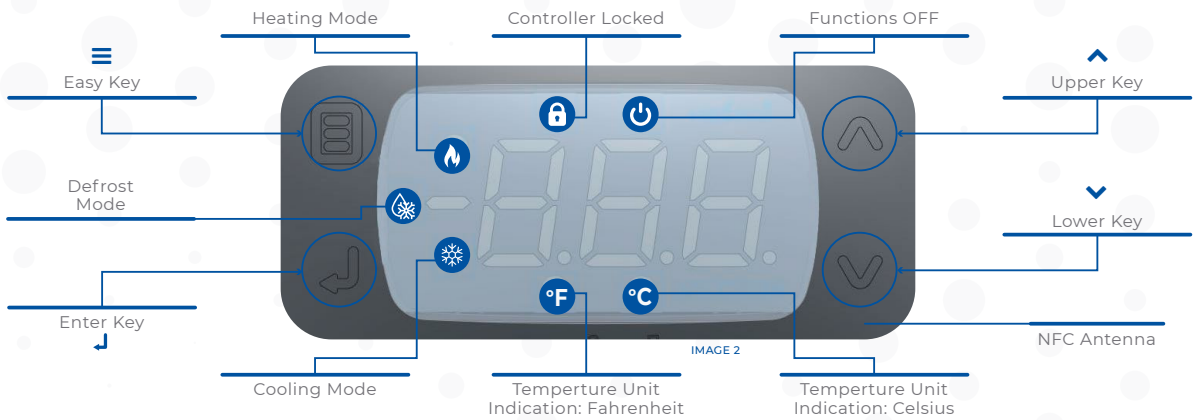


IMAGE 2

1.5. WIRING DIAGRAM

▸ Connect the temperature sensor wires to terminals "1 and 2". There is no polarity. [2]

▸ Use terminals 9 and 11 to connect the controller to the power supply voltage 85 to 250Vac or 9 a 36 V dc, according to controller model.[3]

▸ Use terminals 15 and 16 to directly control a resistive load for 2HP (NA relay - normally open)

[2] - In parameter P22 it is possible to choose the types of temperature sensors.

[3] - The terminal 10 has no function, so it sh ould not be used.

AC CONTROLLER

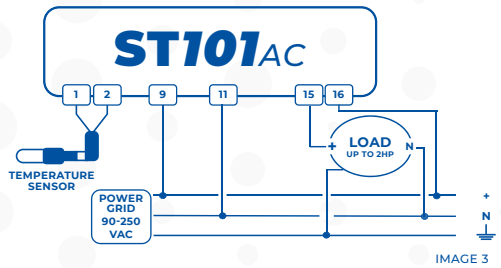


IMAGE 3

DC CONTROLLER

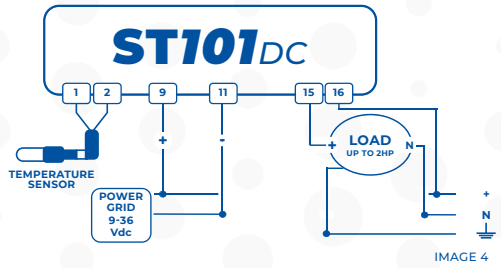


IMAGE 4

Note: *The DC controller has polarity in the power signals. With the inversion of the power signals, the controller will not work. If the DC model is powered with AC voltage, it will burn the internal circuit of the same, not being covered by the warranty.*

1.6. PRODUCT ASSEMBLY

The Controller must be installed in a space as indicated in the table of item 1.3. Avoid installing in places exposed to high humidity and dirt that can cause condensation and the introduction of substances or particles.

Make sure that the controller is installed in a location that does not exceed the temperature limits indicated in the table of item 1.3. The installation must be as far away as possible from equipment that can generate electromagnetic interference such as motors, contactors, relays and solenoids.

INNOVATION AND MANUFACTURING AT YOUR SERVICE

2. ADJUSTMENT OF THE PARAMETERS

The **ST101 2HP** Controller can be configured by two different ways. Through the Emicol Easy APP or directly through the front keys of the controller.

The number of different adjustments with **Emicol Easy APP** is unlimited. Depending only on the memory capacity of the cell phone. The ST101 controller can store only one configuration.

2.1. CONFIGURATION WITH EMICOL APP

Access the Google Play to install the APP Emicol Easy (see technical specifications in the table of item 1.3).

With the APP it's possible:

▸ Create countless configurations;

▸ Send a configuration from the Cellphone to the Controller via approximation;

▸ Receive a configuration from the Controller to the Mobile via approximation.

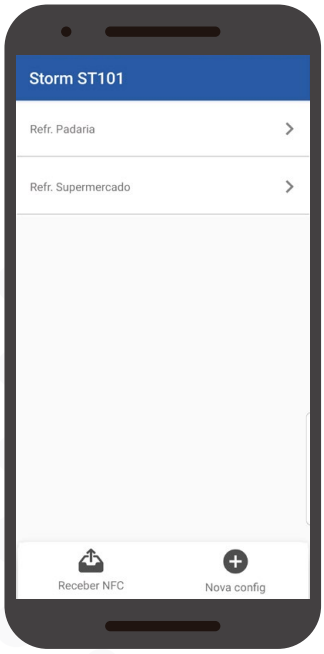
▸ Share a configuration. For example, by WhatsApp;

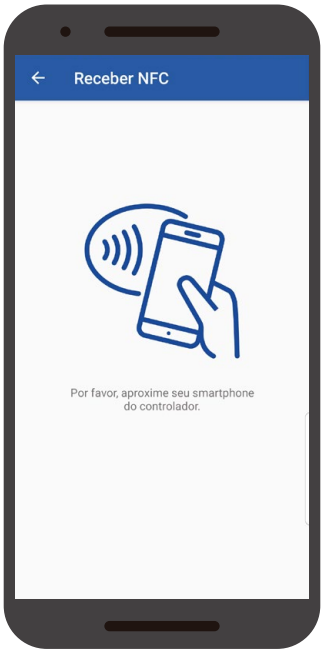
▸ Compare configurations and know their differences.

The ST101 2HP Controller can receive or send a configuration even when disconnected from the power supply.

IMAGE 5

2.2. EXAMPLES OF EMICOL EASY APP SCREENS





Receive NFC
Receives configuration from the Controller even when disconnected from the power.

New configuration
Create configuration and edit parameters from P02 to P24.

Move the phone closer to the controller to receive the configuration. Even when disconnected from the power.

Parameters from P02 to P24
Edit the parameters.

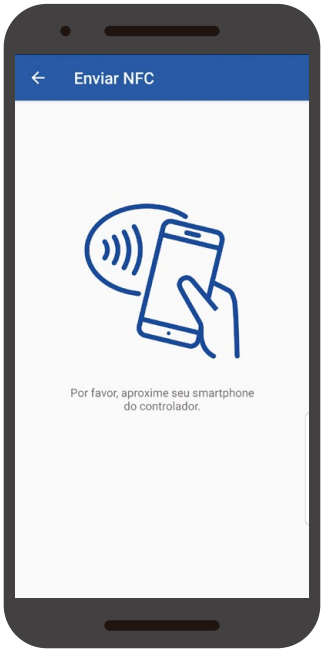
Compare
Compare two settings and list their differences.

Send NFC
Send the parameters from P02 to P24 to the controller, even if disconnected from the power.

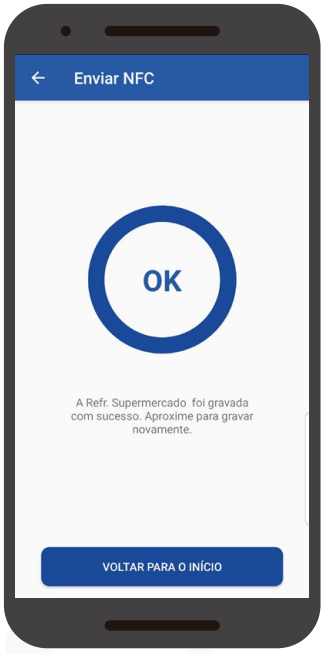
Share
Share the parameters from P02 to P24. For example, by WhatsApp.

Delete
Delete the programs from the phone's memory (cannot be undone).

Compare
Compare adjustments. For example: Shows that parameters P02, P06 and P07 are different.



Get the phone closer to the controller to send the configuration. Even when disconnected from the power.



Configuration successfully saved.
It's possible to repeat the process and record diverse controllers.

2.3. CONFIGURATION WITH FRONTAL KEYS

2.3.1. ADJUSTMENT OF THE SETPOINT TEMPERATURE

▸ Press ↵ until the [SET] appears.

▸ The currently set temperature is shown.

▸ Use ⌃⌄ to change the value that should be between **P04** and P05.

▸ Press ↵ to save.

2.3.2. ADVANCED OPERATIONS (ACCESS THE FULL MENU)

▸ Press ☰ and then ↵ to access the [ACC] parameter.

▸ When [ACC] is shown, press ↵. [0] will be displayed.

▸ With ⌃⌄ select the code [123] and press ↵.

▸ Press ↵ to access and edit the parameters from **P02** to **P23**.

▹ To change the parameter **P07**, for Example:

▹ With ⌃⌄ browse P07. Press ↵ and adjust the parameter with ⌃⌄. Then, confirm with ↵.

▸ To return to the main screen, hold ↵ until [---] is shown.

▸ Notes

▹ After 15 seconds of inactivity it will be necessary to enter the code in [ACC] again.

▹ This function also can be accessed by pressing ⌃⌄ simultaneously.

▹ Three options of ACC are available:

- [99] Reset factory parameters
- [123] Complete parameter menu
- [231] Change from Celsius to Fahrenheit or vice versa.

The parameters will not change. Only the unit of measurement will change.

3. EASY MENU FEATURES

By pressing ☰ and then ⌄ the following sequence will be shown

▸ ☰ [PAR] ⌄ [Cr9] ⌄ [rE9] ⌄ [Prc] ⌄ [Loc] ⌄ [CtL] ⌄ [dFr] ⌄ [SEt]

▸ To access the function, press ↵

Description of functions:

FUNCTION	DESCRIPTION
PAR	Function Selection
Cr9	Clear Min|Max
rE9	Min|Max recorded
Prc	Show current Process
Loc	Functions Blocking
CtL	Control Functions Shutdown
dFr	Manually Defrost
SEt	Setpoint Adjustment

TABLE 2

3.1. MANUAL DEFROST CYCLE (FORCED DEFROST)

▸ PPress ☰ and then ⌃⌄ until [dFr] is shown. Press ↵ and [On] and 💧 will be shown.

▸ The defrost could be activated or disactivated by pressing ⌃ until [On] be shown and 💧 is off.

3.2. FUNCTIONS LOCKDWON

With the functions blocked, it will only be possible to view the parameters. In an attempt to change the parameters, [Loc] will be displayed. 🔒 indicates that this function is activated.

This function requires that parameter **P20** have a value greater than 15. If **P20** have the value [no], the blocking function will not be activated.

▸ Press ☰ and then ⌃⌄ until [Loc] be shown. Press ↵ and [OFF] will be shown.

▸ Press ⌄ during the time that was setted in P20. [On] will be shown.

3.3. CONTROL FUNCTIONS SHUTDOWN

This function disables the control functions. ST101 2HP starts to operate as a temperature display. This function depends on the parameters configured in **P21**.

▸ Press ☰ and then ⌃⌄ until [Ctl] be shown. Press ↵ and [OFF] and ⏻ will be shown.

***Note:** This function could be activated or disactivated by pressing ☰. [On] and ⏻ will be shown.*

4. QUICK ACCESS KEY MAP

When the controller is displaying the temperature, the key combinations below are shortcuts to the functions:

☰	**Hold down 4s:** Turn on/turn off the control functions when P21 is activated
⌄ + ☰	**Pressed together:** Turn on Function blocking if P20 is activated
☰ + ⌃	**Pressed simultaneously:** Clears temperature logs (Cr9)
↵	**Hold down 3s:** Adjust the Setpoint
⌄	**Quick touch:** Current process display
⌄	**Continuously pressed when turning on the control:** Disables locked mode (if enabled)
⌃	**Quick touch:** Maximum and minimum temperatures display (record)
⌃ ⌄	**Pressed simultaneously:** Access to complete parameters menu
⌃	**Press for 5s:** Turn on defrost mode

TABLE 3

5. DISPLAY SIGNALINGS

Message	Description
Er1	Sensor Error: Disconnected or damaged.
OFF	Control functions turned off.
dFr On	Manual activation of the defrost process.
dFr OFF	Manual activation of the cooling process.
LOC	Blocked functions.
LOC On	Activate function blocking.
nFC LOC	NFC Blocked, parameters transmitted by the APP have not been saved.

Message	Description
nFC REJ	Parameters transmitted by the APP are corrupted, not saved.
nFC Er4	NFC not initialized. Out of operation.
dEL	Delay when starting the controller.
rEF	Cooling mode turned on.
Hot	Heating mode turned on.
nFC Sto	Parameters successfully saved.

TABLE 4

6. DESCRIPTION OF PARAMETERS AND FACTORY VALUES

P02 – Desired temperature (Setpoint): It is the value set for temperature control, where the load supply output is turned off.

Standard value	Minimum	Maximum	Unid	Operating mode
4	-50	200	°C	Heating | Cooling

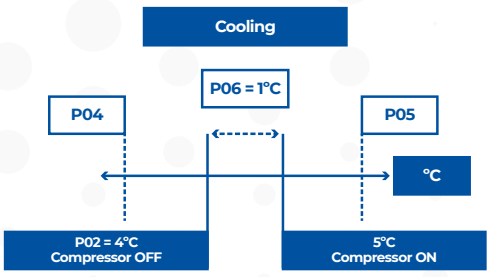
P03 – Indication shifting (Offset): It is the value of the compensation for temperature differences presented by the controller.

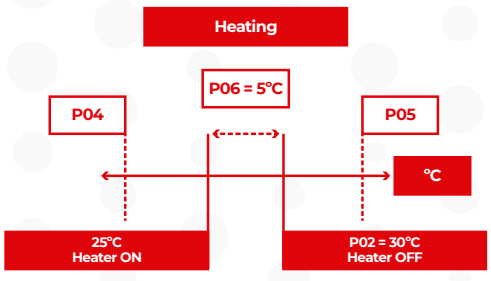
Standard value	Minimum	Maximum	Unid	Operating mode
0	-5	5	°C	Heating | Cooling

P04 and P05 – Minimum/Maximum setpoint allowed to the user (P02): It is the temperature range defined for the user.

Standard value	Minimum	Maximum	Unid	Operating mode
-50	-50	200	°C	Heating | Cooling
75	-50	200	°C	Heating | Cooling

P06 – Control differential (hysteresis): It is the temperature difference (hysteresis) where the controller will operate. Examples:





Standard value	Minimum	Maximum	Unid	Operating mode
1	0,1	20	°C	Heating | Cooling

P07 – Operation mode: It is the operating mode of the controller:

[0] Cooling **[1] Heating**

Standard value	Operating mode
0-refri	Heating | Cooling

P08 – Minimum output-on time: It is the minimum time the load remains on, the interval between the last start and the next stop.

Standard value	Minimum	Maximum	Unid	Operating mode
20	no	999	Seconds	Heating | Cooling

P09 – Minimum output-off time: It is the minimum time the load remains off, the interval between the last stop and the next start. If the controller is configured for refrigeration, the starting pressure will decrease, increasing the compressor life and saving electricity.

Standard value	Minimum	Maximum	Unid	Operating mode
20	no	999	Seconds	Heating | Cooling

P10 – Refrigeration time (defrost interval): It is the compressor running time. After this period, the controller starts the defrosting process according to parameter P11.

Standard value	Minimum	Maximum	Unid	Operating mode
240	1	999	Minutes	Cooling

P11 – Defrost Time: It is the time that the compressor will remain off to defrost the cooling system.

Standard value	Minimum	Maximum	Unid	Operating mode
30	no	999	Minutes	Cooling

P12 – Initial state when powering the instrument on: This parameter allows to define an additional defrost when starting the controller:

▸ Option [0] (Cooling): The controller starts in cooling mode.

▸ Option [1] (Defrost): The system will perform the defrost when the controller is energized.

Note: *The defrost time will be in accordance with parameter P11.*

Standard value	Minimum	Maximum	Operating mode
0-refri	0-refri	1-Degg	Cooling

P13 – Lock temperature indication during defrost: This parameter allows freezing the temperature on the controller display during defrost.

▸ Option [No]: It does not lock the temperature indication during the defrost.

▸ Option [Yes]: It locks the temperature indication during the defrost.

Note: *The temperature will return only in the next refrigeration cycle.*

Standard value	Minimum	Maximum	Operating mode
no	no	yes	Cooling

P14 – Instrument powering-on delay: It delays the process start to avoid several devices turn on at the same time. The ideal is to configure different times when there are a lot of products installed on the same power network.

Standard value	Minimum	Maximum	Unid	Operating mode
no	no	240	Minutes	Heating | Cooling

P15 - Extra time for the first cycle: Sets an extra run time for the first refrigeration cycle.

Standard value	Minimum	Maximum	Unid	Operating mode
no	no	240	Minutes	Cooling

P16 – Compressor situation with damaged sensor: If the temperature sensor is short-circuited or disconnected, the load output assumes the configured state:

▸ Option [0]: Turn off the compressor

▸ Option [1]: Keeps the compressor on

▸ Option [2]: Cycles according to the times of P17 and P18

Note: *In heating mode if an error occurs, the output is turned off.*

Standard value	Minimum	Maximum	Operating mode
0	0	2	Cooling

P17 - Compressor ON time (defective sensor P16): This will be the minimum time the compressor will be on, in case of defective sensor and P16 = [2].

Standard value	Minimum	Maximum	Unid	Operating mode
15	1	999	Minutes	Cooling

P18 – Compressor OFF time (defective sensor P16): This will be the minimum time the compressor will be off, in case of defective sensor and P16 = [2].

Standard value	Minimum	Maximum	Unid	Operating mode
15	1	999	Minutes	Cooling

P19 – Sensor thermal inertia: This parameter simulates an increase in thermal mass in the sensor, delaying the response time (thermal inertia). As higher the value set in this parameter, greater the response delay of the sensor.

Standard value	Minimum	Maximum	Operating mode
no	no	9	Heating | Cooling

P20 – Function blocking time: This function activates the permission to block or not the functions through the Easy Key.

Check item 3.3 on how to activate / deactivate the block.

▸ Option [No]: It does not allow the [Loc] function in the Emicol Easy Menu to block the control functions.

▸ Option >15: Allows the [Loc] function in the "Easy Menu" to block the control functions. Pressing the “down” key with the time> 15 programmed in this function.

Standard value	Minimum	Maximum	Unid	Operating mode
no	no	60	Seconds	Heating | Cooling

PP21 – Turn of the control functions: It allows to turn off the control functions according to the following possibilities:

▸ Option [No]: It does not allow the control functions to be turned off.

▸ Option [1]: It allows to activate/deactivate the control functions only if the functions are unlocked.

▸ Option [2]: It allows to activate/deactivate the control functions even if the functions are blocked.

▸ Option [3]: It allows to activate/deactivate the control functions only if the functions are unlocked. *

▸ Option [4]: It allows to activate/deactivate the control functions even if the functions are blocked. *

Note: ** keeps the display off and returns for 5s when any key is pressed. Then turn the display off again and* ⏻ *is shown.*

Standard value	Minimum	Maximum	Operating mode
no	no	4	Heating | Cooling

P22 – Temperature sensor selection: The ST101 2HP controller can work with different models of temperature sensors.

▸ [SF9] Standard ▸ [SCL] Optional ▸ [SEP] Optional

Standard value	Operating mode	Sensor Specifications
SFG (padrão)	Heating | Cooling	NTC/10K/B (25/85) 3950K 1%
SCL	Heating | Cooling	NTC/10K/B (25/100) 3988K 1%
SEP	Heating | Cooling	NTC/10K/B(25/85) 3435K 1%

P23 – NFC blocking: This function blocks the NFC communication from the controller.

▸ [No]: NFC Communication between cell phone and Controller enabled

▸ [Yes]: NFC communication blocked. The cell phone will not communicate with the controller.

Note: *This lock works only when the instrument is energized.*

Standard value	Minimum	Maximum	Operating mode
no	yes	no	Heating | Cooling

P24 – Temperature Unit, Operation Mode and Function Lock:

This parameter is exclusive to the App Emicol Easy. Parameter P24 will not be show on the controller display.

This parameter can change the settings of the Temperature Unit (Degrees Celsius and Fahrenheit), Key Lock and turn off the functions.

7. HOW TO BUY

The **ST101 2HP** has a smart code, where the controller characteristics can be defined according to the needs of the application.

Controller Model
ST101

Product Version
Product Version

Power Supply	
AC	85-240Vac 50/60Hz
DC	9-36Vdc

Display Color	
B	Blue
R	Red
W	White
G	Green
A	Amber

Panel Color	
BL	Blue
BK	Black
GY	Grey
RD	Red

ST101 [ ] [ ] [ ] [ ]

TABLE 5

8. WARRANTY

This product is guaranteed by **Emicol** against manufacturing defects in the period of ***12 months from the date of sale***. The guarantee does not apply to defects resulting from bad use or damage caused by technical inability, improper installation/maintenance, carried out by unqualified person.

This product cannot be applied in situations that may generate dangerous or harmful situations for people.

Emicol guarantees the product and is exempt from any extra expenses such as supplies, services or transportation.

9. CUSTOMER SERVICE

Still have any questions? Contact us:

- e-mail: **marketing@emicol.com.br**