



**ST2010**

# ST2010 INVERTER 1 MOTOR

## “DRIVE FAST AND SAFE”

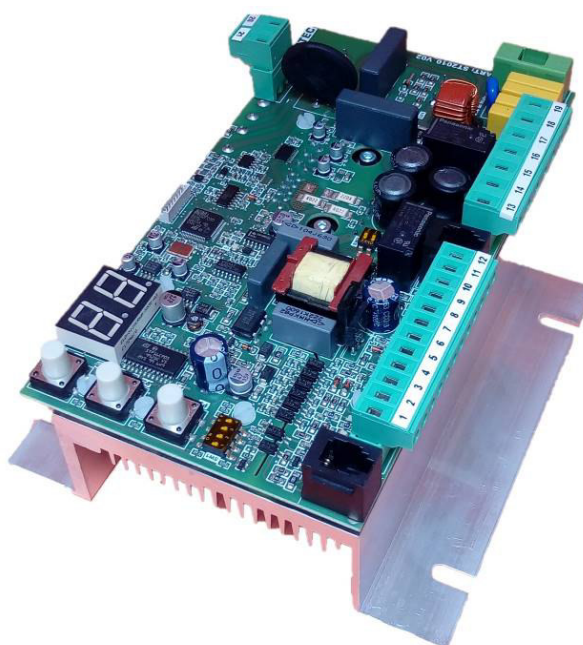
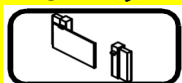
and

**Opening without mains with battery (UPS)**  
**single-phase power supply 230Vac**  
**three-phase or single-phase motor output 230Vac**

**FRIDGE  
DOORS**

**FOLDING  
DOORS**

**SLIDING  
GATES**



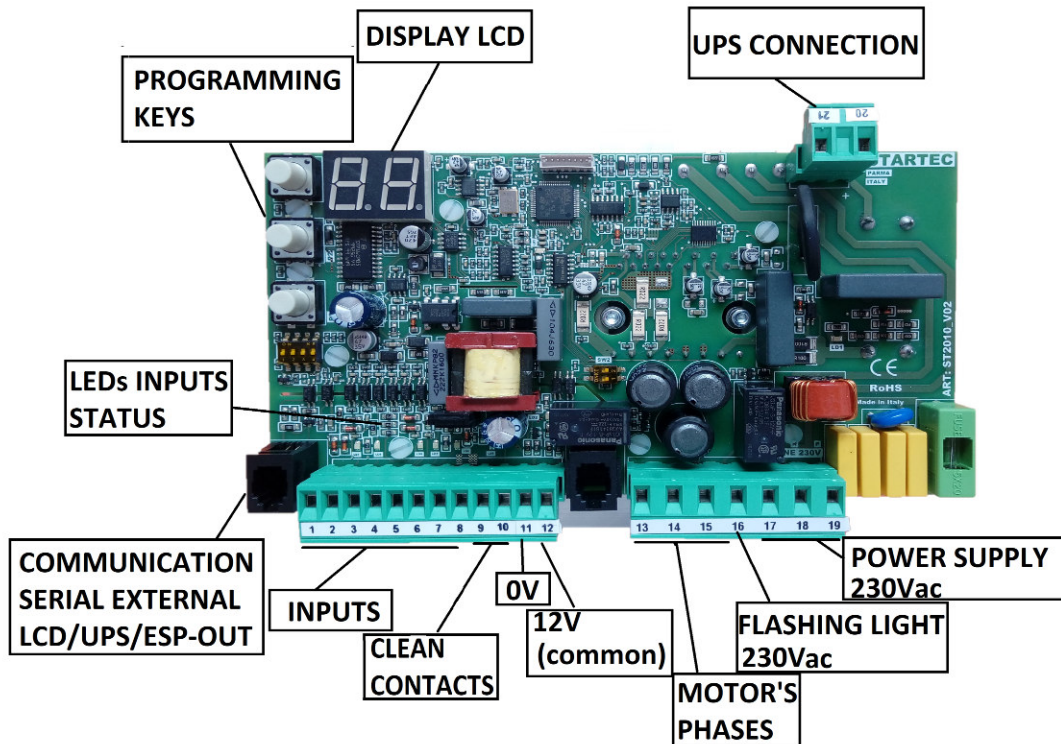
### Features:

- Working frequency open and close separately adjustable
- Acceleration / deceleration ramp and slowdown speed adjustable
- Obstacle detection adjustable in opening and closing
- Amperometric system for detection obstacle self settable with frequency variation
- Input: Start, Pedestrian Start, photocell, Stop, safety edge and opening-closing limit switch
- Operating programs: automatic, semi-automatic or present man selectable
- Display inputs status and function assignment using an LED display
- **Function “DRIVE FAST AND SAFE” that enables, by long press of command Start, to pass from the standard speed at twice speed (waiting time end maneuver halved).**
- Switching power supply universal 110Vac÷230Vac
- Preset for connecting a **UPS** (optional): in case of lack power you can perform operation of opening a battery.

## Summary

1. GENERAL DESCRIPTION.....	3
1.1 Accessories on demand:.....	3
1.2 Features:.....	3
1.3 Technical features:.....	4
1.4 Protections.....	4
2. CONNECTIONS.....	4
2.1 MOTORS - FLASHING LIGHT – COMMANDS.....	4
2.2 Connection security devices.....	5
2.3 Terminal numbering/LED meaning.....	6
3. PATENT FUNCTION “FAST AND SAFE”.....	7
3.1 Select the functionality “FAST AND SAFE”.....	8
4. SETTINGS.....	9
4.1 Meaning Dip Switch.....	9
4.2 SELECT TYPE OF MOTOR.....	9
4.3 MENU.....	9
Function 01 – Select type of motor: mono-phase or three-phases.....	10
Function 02 – select the automation’s weight.....	10
Function 03 – Modify pause time.....	10
Function 04 - Maximum torque regulation.....	10
Function 05 – Opening work frequency regulation.....	10
Function 06 - Closing work frequency regulation.....	10
Function 07 – Slowdown opening work frequency regulation.....	10
Function 08 - Slowdown closing work frequency regulation.....	10
Function 09 – Amperometric sensibility regulation at the opening.....	10
Function 10 - Amperometric sensibility regulation at the closing.....	11
Function 11 – Amperometric sensibility regulation in slowdown at the opening.....	11
Function 12 - Amperometric sensibility regulation in slowdown at the closing.....	11
Function 13 – Adjustment of the inversion time from photocell in closing.....	11
Function 14 – Final hit at the closing after limit.....	11
Function 15 – Test function enable.....	11
Function 16 – Maneuvers counter.....	11
Function 17 – Maximum frequency in maneuver “FAST AND SAFE”.....	11
Function 18 – Open/close function.....	11
Function 19 – NOT USED.....	12
Function 20 – Fixed flashing function selection.....	12
Function 21 – Re-closing function from photocell selection.....	12
Function 22 – Dead-man opening and closing function selection.....	12
PROGRAMMING ST2010.....	13
4.4 Verify direction of rotation of the motor.....	13
4.5 Learning of work time at the opening and closing.....	13
4.6 Learning of partial work time (pedestrian).....	13
5. LCD.....	15
5.1 Possible notifications on display DS1.....	15
5.2 Possible error notified on LCD DS1.....	15
6. DECLARATION OF COMPLIANCE.....	16

## 1. GENERAL DESCRIPTION



### 1.1 Accessories on demand:

- Expansion board inputs and outputs **ESP-OUT**.
- **ST-DISPLAY**: permit SW update of the board, the visualization of the current state of the automation and the modification of some additional parameters.

### 1.2 Features:

- Programming and auto teach by keys (increase, decrease, selection) and a display with 2 figures.
- Safety management: Photocell, safety edge, stop and amperometric.
- Clean contacts for the reporting open door/close door.
- Universal supply 110Vac+230Vac
- In case of use of single-phase motors is not necessary any more the start capacitor
- Advanced amperometric system for the detection of obstacles that permits a stable and accurate calibration maximising intervention speed.
- Serial with plug for external handheld connection ST-DISPLAY and UPS:

through the serial plug connection, the control panel can communicate with the external display ST-DISPLAY for programming / displaying automation status and / or software update (via micro SD).

- With the same serial connection, the UPS board is connected in case it is foreseen.
- Removable power and signal terminals.
- in compliance with the relevant European guidelines:
  - mains integrated filter
  - Low power 2006/95/CE
  - Electromagnetic Compatibility (EMC) 2014/30/UE



**ST-DISPLAY**

1.3 Technical features:

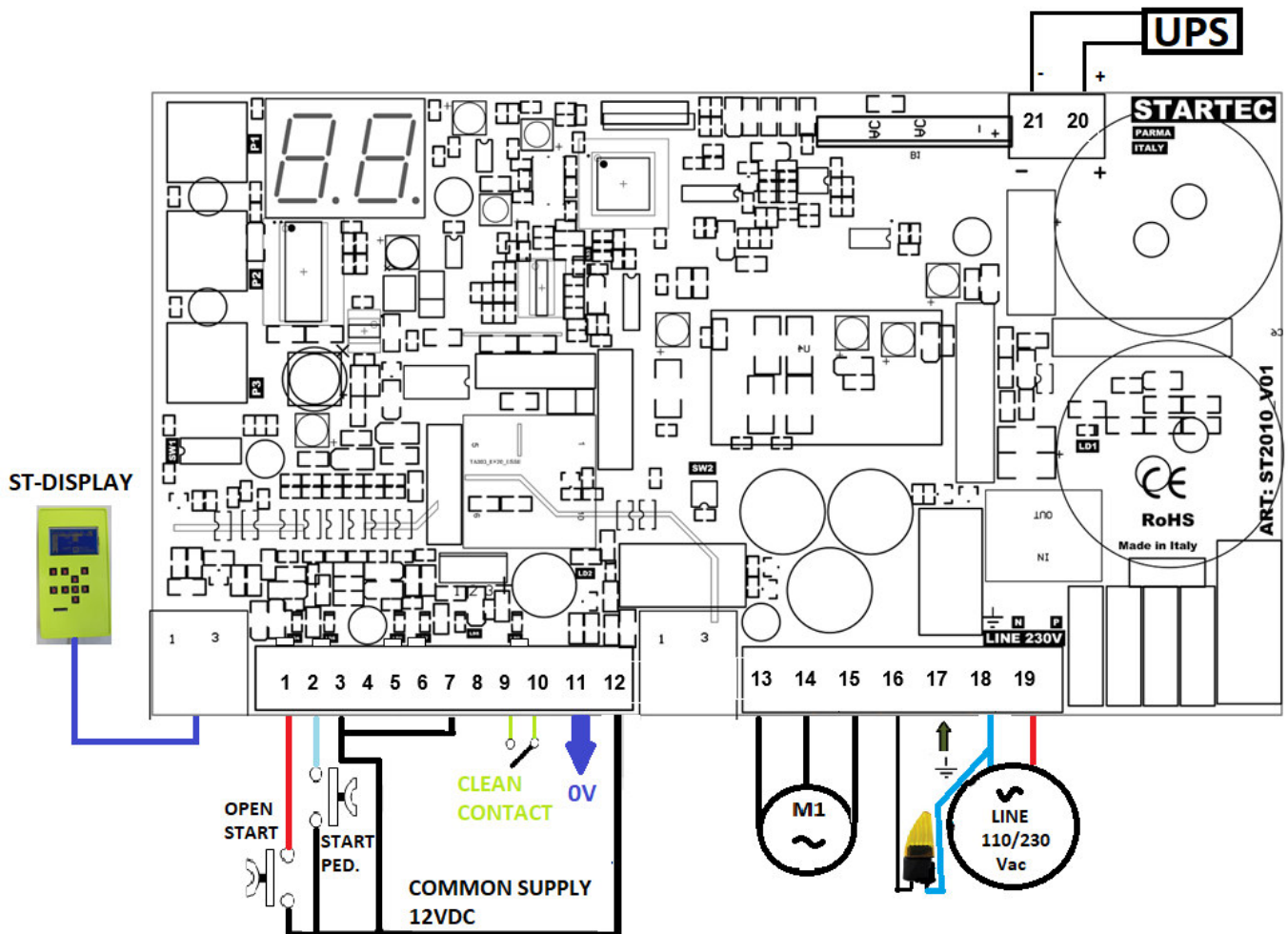
Power supply	230Vac,50+60Hz
Motor output	Three-phases or mono-phases 230Vac
Three phases motor wiring	Triangle
Single-phases motor wiring	No capacitor
Max motors power	1100W
Operating temperature	-20°C / + 55 °C
Accessories power supply	12VDC – 500mA (6W) For higher power install external transformer

1.4 Protections

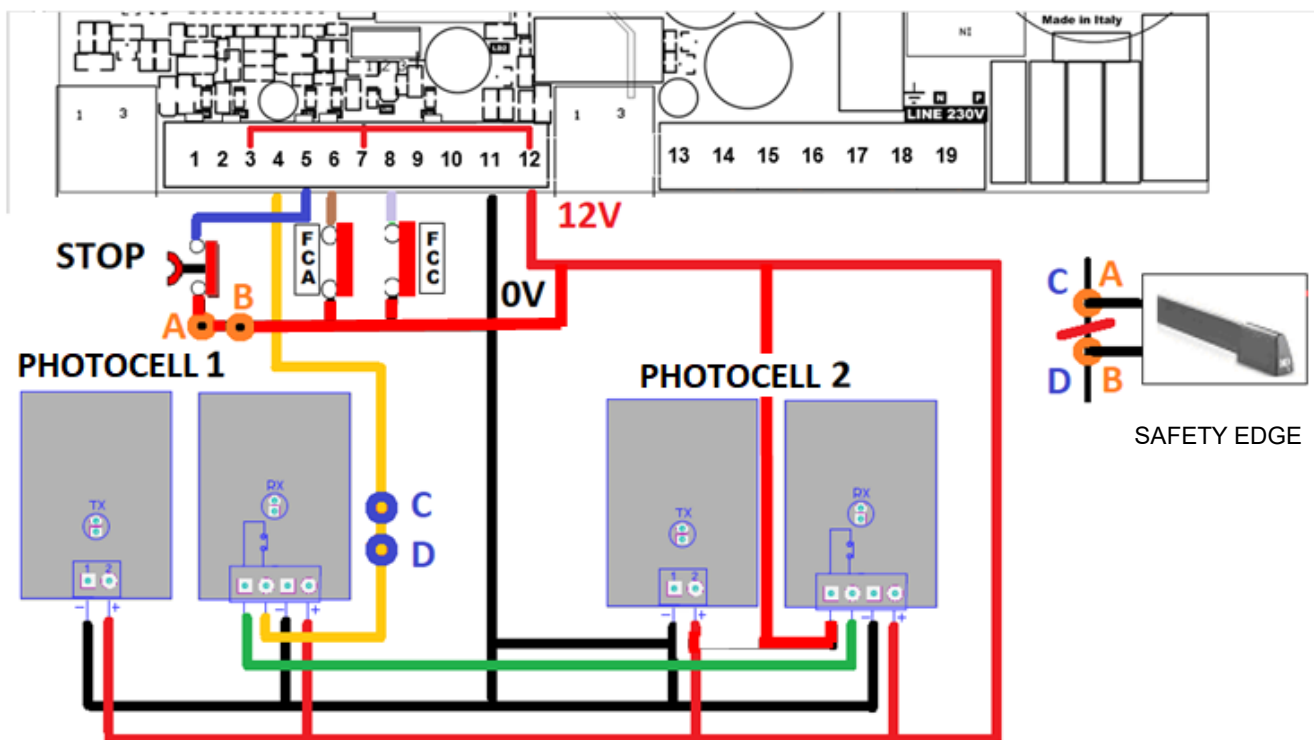
- Motors protected by fuse and by electronic control
- Power circuits electronically protected by varistor
- Switching supply auto-protected
- Mains filter L-C

2. CONNECTIONS

2.1 MOTORS - FLASHING LIGHT – COMMANDS



## 2.2 Connection security devices



It's possible to add the device Safety Edge at the opening and/or closing.

If you want use it at the closing, it has to be connected in series at the photocells (already in series with each other) like in the scheme interrupting the connection between the points **C** and **D**. In this way, every time that at the closing will be activated the safety edge, the automation will stop and after that it will restart in opening like when the photocell's beam has be interrupted.

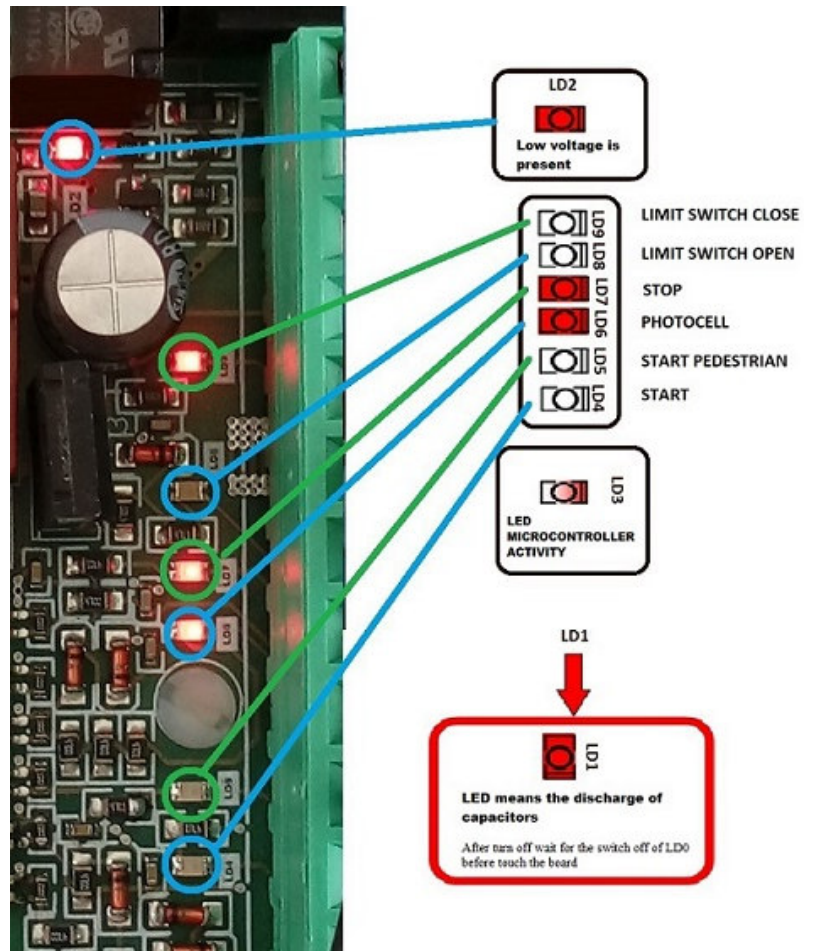
If you want to use it at the opening, it has to be connected in series at the stop button like in the scheme interrupting the connection between the points **A** and **B**. In this way, every time that at the opening or at the closing will be activated the safety edge, the automation will stop and to restart it need the pressure of the start button. After the start command it will restart in the same direction it was going.

The safety edge is a normally close device.

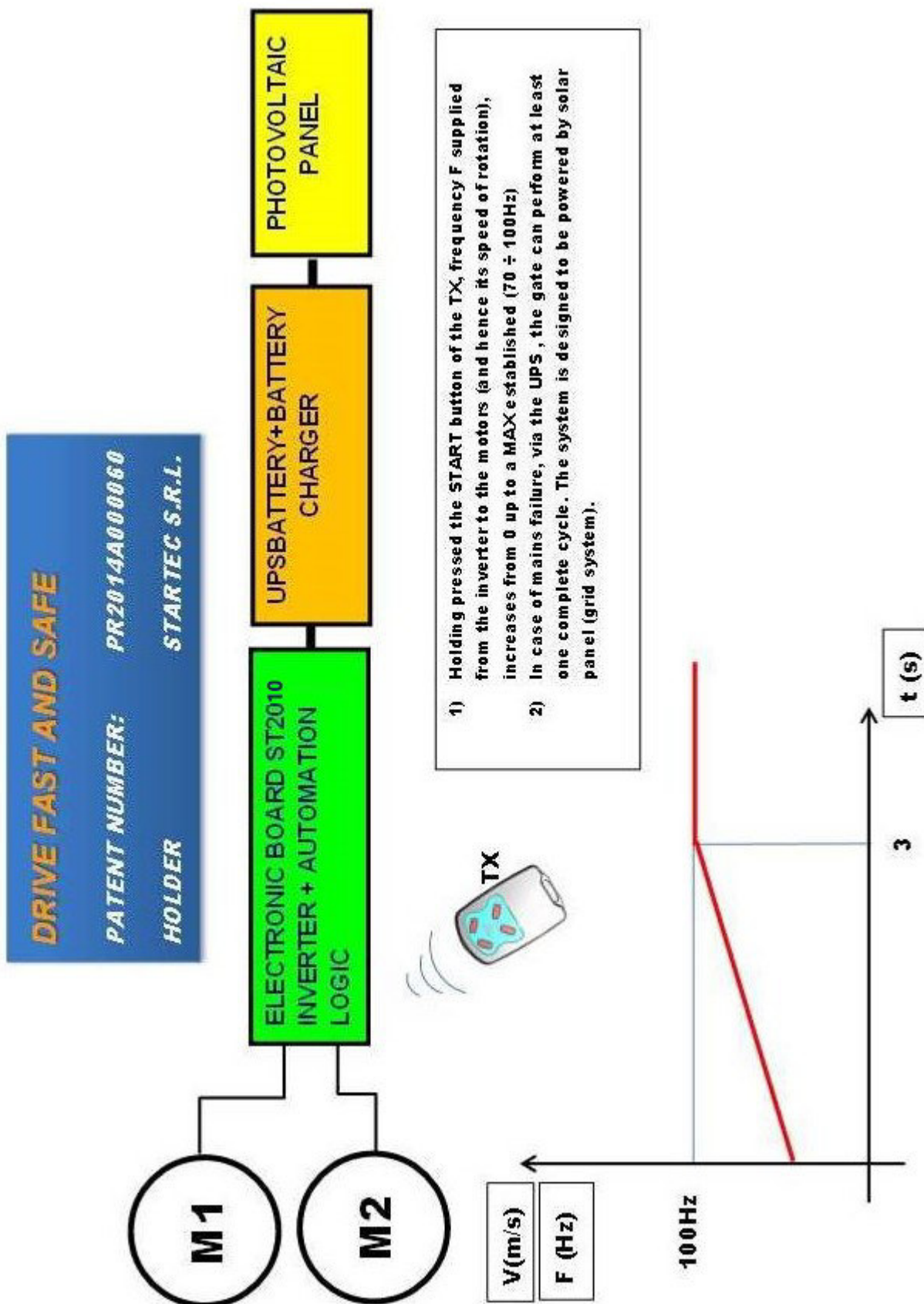
### 2.3 Terminal numbering/LED meaning

#### Terminal:

1. Input start
2. Input start pedestrian
3. Output 12V (COMMON)
4. Input photocell/Safety edge (security N.C.)
5. Input Stop/Safety edge (security N.C.)
6. Input limit switch open (N.C.)
7. OUTPUT 12V (COMMON)
8. Input limit switch close (N.C.)
9. Dry contact (N.O.)
10. Dry contact (N.O.)
11. Output 0V
12. Output +12V (COMMON)
  
13. Output phase R motor 1
14. Output phase S motor 1
15. Output phase T motor 1
16. Output flashing light 230Vac (to connect with the terminal 18 NEUTRAL)
17. Ground 230Vac
18. Neutral 230Vac supply
19. Phase 230Vac supply
  
20. Connection UPS (+BUS)
21. Connection UPS (-BUS)



3. PATENT FUNCTION "FAST AND SAFE"



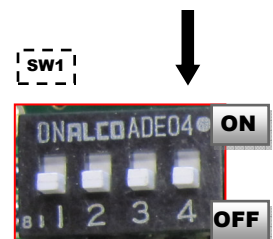


## ATTENTION

- 1) The function **“DRIVE FAST AND SAFE”** can be **enabled only THROUGH EXTERNAL LCD ST-DISPLAY** entering a **password**.
- 2) The function **“DRIVE FAST AND SAFE” while being inserted** (FUNCTION 17) is activated only in case of prolonged pressure on the START command (by transmitter or key selector). This function is intended as an emergency/ use occasionally **NOT AS USUAL HANDLING SYSTEM**.  
To the activation of the function “DRIVE FAST AND SAFE” the sensitivity of the amperometric system, managed by microcontroller on the board, is automatically taken to the maximum value. In the same manner is increased to the maximum value of the response speed and reverse maneuvering in case of intervention of the amperometric system (obstacle detection)
- 3) If you enable the function **“DRIVE FAST AND SAFE”** is **not** possible to interface with an external timer for maneuvers planned.
- 4) During the maneuver **“DRIVE FAST AND SAFE”** the flashing light flashes at a frequency twice the standard.
- 5) The maximum frequency supplied by the control unit ST2009 to the motor, during the maneuver **“DRIVE FAST AND SAFE”**, is a parameter that can be set by the display on board or connected LCD external ST-DISPLAY:  
FUNCTION 17 (see explanations on page 11)  
The value can be set between 51 to 99 and is the frequency in Hz to which the motor will be Driven.  
ATTENTION: The value selected is not arbitrary but depends on the structural characteristics of the motor.  
A large value of the maximum selected frequency, can damage the motor and still could not bring increased speed actuator but only excessive overheating.  
Therefore, only **QUALIFIED PERSONNEL** will have access to the parameter setting of the function **“DRIVE FAST AND SAFE”** and only after consultation with the motor manufacturer

### 3.1 Select the functionality **“FAST AND SAFE”**

The function **“FAST AND SAFE”** permit, trough prolonged pressure of the command START, to switch from the standard speed to a double speed (time to wait the end of the maneuver is halved).



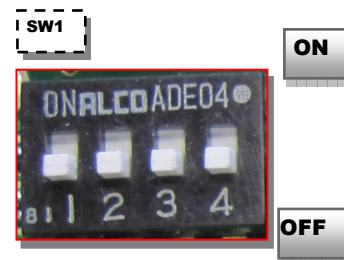
- **DIP4 in OFF:** function **“FAST AND SAFE”** **only at the opening**.  
During the closing phase, the automation is in the standard behaviour: performs acceleration and deceleration ramps in the range of 0÷50Hz.  
During the opening is possible to use the function.
- **DIP4 in ON:** the function **“FAST AND SAFE”** is available **both in opening and in closing**.  
With prolonged pressure of the command START on the remote control or on the key selector the automation’s speed increase until the double of the standard speed, halved the maneuver’s time.



## 4. SETTINGS

### 4.1 Meaning Dip Switch

Dip 1 ON	automatic reclosing enabled
Dip 1 OFF	automatic reclosing disabled
Dip 2 ON	inversion on start during closing enabled
Dip 2 OFF	inversion on start during closing disabled
Dip 3 ON	does not accept start when opening and open
Dip 3 OFF	accepts start when in opening and closing
Dip 4 ON	“FAST AND SAFE” both in OPENING that in CLOSING
Dip 4 OFF	“FAST AND SAFE” ONLY in OPENING



### 4.2 SELECT TYPE OF MOTOR

The first thing to do is the choice of the type of motor that you want to utilize. The motor could be a mono-phase motor or a three-phases motor.

To recognize is enough to verify with a multimeter, without supply the motor, the resistance of the three couple of cable in pairs that come out from the motor itself.

If the resistance is equal in every pairs the motor is three-phases, so it has to be connected in triangle configuration;

otherwise, the motor will be mono-phase, so the neutron wire (common) has to be connected in the central terminal (14) and any capacitor connected to the motor must be removed because, with the inverter supply, they are not necessary.

### 4.3 MENU

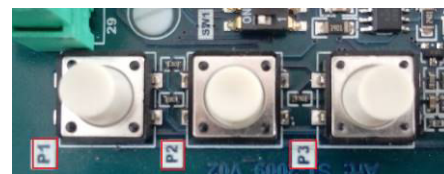


#### HOW TO USE THE MENU:

**Menu:** contains the different function of the board (ex. Function 01 – Select type of motor: mono-phase or three-phases)

**Submenu:** contains the parameters of the functions (ex. In the function 01 we can see **1.P.** = selection of mono-phase motor, or **3.P.** = selection of three-phases motor.)

**Highlighted word = display visualization**



- Verify that the display shows the word **CH** (close situation and out from every menu).
- To enter the menu press and hold P3 button until that the display shows the word **01**. It means that you are in the menu and you are seeing the function 01.
- To change the function showed on the display you can press P2 (go on) or P1 (come back).
- Select the function indicated on the display with P3.
- If in the word there is punctuation, means that you are in the submenu.

**ATT. the punctuation does not indicate decimal numbers.**

- To move in the submenu with P1 e P2 like in menu and select the desired parameter with P3. In this way you return in the menu (up 1 level).
- **Press P1 and P2 in the same time to exit from the current menu going up one level: from submenu to menu and from menu to out of the menu – CH.**

## Function 01 – Select type of motor: mono-phase or three-phases

**1.P.** = mono phase motor

**3.P.** = three-phases motor

## Function 02 – select the automation's weight

**a.** = light gate

**b.** = medium gate

**c.** = heavy gate

## Function 03 – Modify pause time

If the factory setting remains display will show **0.0**; otherwise will show the layoff previously set or the time learned during the automatic learning [chapter 4.5] expressed in second. It can be increased or decreased.

N.B. the punctuation does not mean (ex. 0.5. means 5 seconds).

## Function 04 - Maximum torque regulation

If the factory setting remains display will show **9.0**; pre-set percentage of the maximum torque. It can be increased or decreased.

## Function 05 – Opening work frequency regulation

If the factory setting remains display will show **5.0**; pre-set frequency. It can be increased or decreased.

## Function 06 - Closing work frequency regulation

If the factory setting remains display will show **5.0**; pre-set frequency. It can be increased or decreased.

## Function 07 – Slowdown opening work frequency regulation

If the factory setting remains display will show **2.5**; pre-set frequency. It can be increased or decreased.

## Function 08 - Slowdown closing work frequency regulation

If the factory setting remains display will show **2.5**; pre-set frequency. It can be increased or decreased.

Nota:

Factory settings	Min/Max	Factory
Opening work frequency	01 ÷ 99	50Hz
Closing work frequency	01 ÷ 99	50Hz
Slowdown opening work frequency	01 ÷ 99	25Hz
Slowdown closing work frequency	01 ÷ 99	25Hz
Opening frequency FAS	51 ÷ 99	90Hz
Closing frequency FAS	51 ÷ 99	90Hz

## Function 09 – Amperometric sensibility regulation at the opening

If the factory setting remains display will show **2.5**; pre-set sensibility threshold.

It can be increased or decreased. **0.1** is the maximum sensitivity; **9.9** is the lower sensitivity (hard).

To disable the current control set to **0.0**.

### Function 10 - Amperometric sensibility regulation at the closing

If the factory setting remains display will show **2.5**: pre-set sensibility threshold.

It can be increased or decreased. **0.1** is the maximum sensitivity; **9.9** is the lower sensitivity (hard)?

To disable the current control set to **0.0**.

### Function 11 – Amperometric sensibility regulation in slowdown at the opening

If the factory setting remains display will show **2.5**: pre-set sensibility threshold.

It can be increased or decreased. **0.1** is the maximum sensitivity; **9.9** is the lower sensitivity (hard)?

To disable the current control set to **0.0**.

### Function 12 - Amperometric sensibility regulation in slowdown at the closing

If the factory setting remains display will show **2.5**: pre-set sensibility threshold

It can be increased or decreased. **0.1** is the maximum sensitivity; **9.9** is the lower sensitivity (hard)

To disable the current control set to **0.0**.

### Function 13 - Adjustment of the inversion time from photocell in closing

If the default setting remains, 0.5 will be displayed: it indicates the time that elapses between stopping the motor and opening the motor.

N.B. It is expressed in tenths of a second regardless of punctuation ( 1.0. = 10 tenths of a second).

It can be increased and / or decreased in the range of values from 0.3 to 20 tenths of a second

### Function 14 – Final hit at the closing after limit

If the factory setting remains display will show **0.0**: means that the function is disabled.

ATT: it is expressed in tenths of second (ex. **0.0** = 10 tenth of second)

Useful for locking the lock. Values from 1 to 20.

### Function 15 – Test function enable

If the factory setting remains display will show **0.0**: means that the function is disabled.

If the function is enabled, the gate will open and close cyclically. The value that display shows is the number of seconds between the closing of a cycle and the opening of the next one until the function will be disabled resetting the value showed at **0.0**.

### Function 16 – Maneuvers counter

Indicate the number of maneuvers that the automation did. Entering in the function 16 will be displayed the figures corresponding at the hundreds of thousands and tenth of thousands; pressing the button P2 will be displayed the thousands and hundreds; pressing again P2 will be displayed tenth and unity.

### Function 17 – Maximum frequency in maneuver “FAST AND SAFE”

If the factory setting remains display will show **9.0**: the pre-set frequency. It can be increased or decreased in the range from 51 to 99Hz.

### Function 18 – Open/close function

If you enable this function, the button START become OPEN and the PEDESTRIAN START become CLOSE.

**si** = enable

**no** = disable (default)

ATT: with **si**, the “DRIVE FAST AND SAFE” function is automatically disabled.

**Function 19 – – NOT USED****Function 20 – Fixed flashing function selection**

By enabling the function, the flashing light will output a steady light, without flashing.

**si** = enable

**no** = disable (di default)

**ATT:** with **si**, use an external flashing circuit

**Function 21 – Re-closing function from photocell selection**

If the default setting remains, it will be displayed **0.0**: indicates the disabling of the function.

If different from **0.0**, the gate in the open position, automatic re-closing enabled, will close again after the value set on the display in seconds if the photocell is engaged and disengaged, thus anticipating the standard automatic re-closing from the pause time.

**Function 22 – Dead-man opening and closing function selection**

By enabling the function, the START input becomes OPEN dead-man and PEDESTRIAN START becomes CLOSE dead-man.

**si** = enable

**no** = disable ( default)



**IF AFTER THE LEARNING 1 OR MORE PARAMETERS HAVE BEEN CHANGE,  
THE LEARNING HAS TO BE REPEAT.**

## PROGRAMMING ST2010

### 4.4 Verify direction of rotation of the motor

Once the connections have been completed, power on the electrical cabinet. Use the buttons on the board that have the following function:

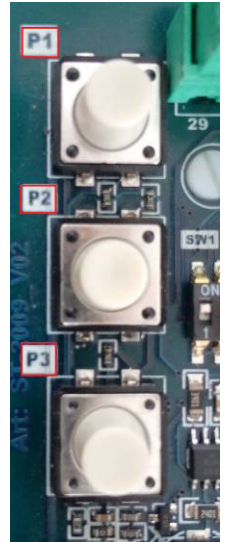
- P1 CLOSE
- P2 OPEN
- P3 SELECT

Verify that pressing P1, both the motors (the motor in case the automation has only 1 wing) will close and make sure that the gate is closed, after that verify that the LEDs will be turned on like in the chapter 2.3.

Otherwise, in case motor 1 does not move correctly, reverses the cable of the terminal 13 with that of 15. If the motor 2 does not move correctly reverses the cable of the terminal 16 with that of 18.

We remember that in case of mono-phase motor the common cable (neutral) must always be connected in the terminal 14.

Verify that display DS1 shows the word **CH** = gate close



### 4.5 Learning of work time at the opening and closing

**ATT:** During this phase the current absorption curve is detected for management of obstacle control (ampere-stop). In this phase is determined the behaviour that we want the automation has when it will be in the standard operation.



#### Start with the automation in close position

- 1) Press and hold P3 (near to 6 seconds) until the display shows the word **t E**
- 2) Press START: the motor start in opening (if FAS function enable, the motor will do a short stretch at the FAS frequency and after that will come back at the selected work frequency)
- 3) If slowdown is enabled, press START when you want that slowdown starts. If disabled go to the next point.
- 4) Once on the opening limit switch, the motor will stop.
- 5) Wait the wanted stop time, so press START
- 6) Motor starts in closing (if FAS function is enable, the motor will do a short stretch at the FAS frequency and after that will come back at the selected work frequency)
- 7) If slowdown is enabled, press START when you want that slowdown starts. If disabled go to the next point.
- 8) Once on the closing limit switch, the motor will stop.

### 4.6 Learning of partial work time (pedestrian).



#### Start with the automation in close position

- Press and hold P3 until the display shows the word **t E**
- Press PEDESTRIAN START: the automation starts in opening.
- Press again PEDESTRIAN START when you want to stop the opening.
- Wait the break time wanted, so press again PEDESTRIAN START
- The automation will start at the closing.
- Once on the closing stop, press START.

**ATT:** In default:

For the automation 2 wings the PEDESTRIAN START will do a complete opening of only first wing.

For the automation 1 wing the PEDESTRIAN START will do an opening which is equivalent to half opening of the START learning [chapter 4.5].

For the double sliding doors is not the PEDESTRIAN START input.

## 5. LCD

### 5.1 Possible notifications on display DS1

**CH** gate close.

**CL** gate closing

**OP** gate opening

**AP** gate open



### 5.2 Possible error notified on LCD DS1

#### **E0** Microcontroller operation problem

The working times of the microcontroller do not reflect the default ones, if the problem persists replace the board.

#### **E1** Both limit switch pressed at the same time

Single non-blocking error. Verified when both limit switches are pressed simultaneously: impossible situation to occur during correct operation of the automation. Check the operation of the limit switches (N.C.)

#### **E2** Short circuit

Check that the phases of motor 1 are not in short circuit and that the motor has not power higher than 1KW

#### **E3** Wrong writing to memory

Parameter write memory problem, turn off the card and try again, if the problem persists replace the card, the memory is damaged.

#### **E4** Failure capacitor charge

Check that the voltage supply is not too low

#### **E5** Motor driving overtemperature

Maximum temperature work reached, increase the pause time in reclosing.

#### **E6** Snapshot overcurrent motor 1

Check the climb ramps: they could be too fast. Control that the motor utilized is not more than 1KW

#### **E7** Delayed overcurrent motor 1

Check the climb ramps: they could be too fast. Control that the motor utilized is not more than 1KW

#### **E8** Bus overvoltage

Check that the motor does not regenerate during the stop maneuvers, if this happens to decrease regeneration, lengthen the deceleration / stop ramps.

#### **E9** Lack encoder pulses of motor 1

In the version with encoder management it indicates the lack of encoder pulses, check connections and functionality of the installed encoder

ATT: every alarm is blocker and, though the problem is solved, is necessary a restart of the board to reset the error. If the error is still there after restart, it means that it's not solved.



## 6. DECLARATION OF COMPLIANCE

### DECLARATION OF COMPLIANCE

The product indicated in the title of this book and in it described, must be combined with single-phase mains filter FL-01 and installed following signs:

- ▶ The power cables of the control unit and power supply cables for motors shielded type (or armored) with individual conductors of greater than or equal to 2.5 mm<sup>2</sup>
- ▶ These cables should be the minimum length needed. The shield of the conductors must be connected to earth on both sides. On the Motor use the carcass metal for the connection to earth of the shield
- ▶ To avoid ground loops which can create noise radiation (antenna effect), the motor operated by the control unit to inverter must be grounded individually, always with a low-impedance connection using the machine casing.
- ▶ The paths of the power cables and control unit – motor must be spaced as much as possible, do not create loops, do not let them run parallel and distances below 50 cm, in case they need to intersect directions must be at 90 degrees to produce the minimum coupling.

**Failure to comply with these conditions could frustrate completely or partially the effect of the noise filter**

**It complies with the provisions of the following European Directives and the national implementing provisions and the following technical standards:**

- ▶ Machinery Directive 2006/42/CE
- ▶ Low tension 2006/95/CE
- ▶ 2014/30/EU (EMC)
- ▶ IEC 60335-1, EN55014-1, EN55014-2, IEC 61000-3-2: 2018, IEC 61000-3-3: 2013 + AMD1 2017, IEC 61000-3-4, EN292-1, EN292-2, EN50178

The Legal Representative

---





