

# CTR31 – GENERAL TECHNICAL MANUAL

## A) – Scope of the device

Electronic board controlling 1 230Vac single-phase asynchronous motor for the automation of a sliding gate or an overhead door with or without limit switch.

## B) – Limits to use

**Caution :**      **Before operating the electronic unit make sure the following operations have been carried out**

**Note 1** – Read carefully the whole technical documentation supplied.

**Note 2** – The electronic unit must be installed by qualified personnel only. The installation engineer must have the necessary technical and professional qualification.

**Note 3** – The mains power supply connected to the unit must be 230Vac +/- 10%.

**Note 4** – The neutral (N) pole of the mains power supply must be unipotential to the ground.

**Note 5** – All security norms for the installation of electric and electronic devices must be respected.

**Note 6** – The mains power must be supplied with an efficient differential switch tested and calibrated in conformity with the applicable rules.

**Note 7** – Before installing the electronic unit check the motor to which it will be connected. When the motor is connected to the mains power the torque it apply to the gate must respect the applicable rules and, in any case, it must be such that in case of collision no damage will be caused to persons, animals or objects.

**Note 8** – The unit must be applied for the intended use only (see point A). All other use is to be considered improper and dangerous.

**Note 9** – Before acceding to the electronic unit's box for any intervention check that the mains power has been cut off.

**Note 10** – Do not access the unit with wet/damp hand or feet.

**Note 11** – Do not expose the unit to weather (rain, snow, etc.)

**Note 12** – Do not allow any children or unqualified persons to touch the unit.

**Note 13** – The electronic unit must be placed in the box supplied.

**Note 14** – The plastic material used for the box is not self-extinguishing. Therefore it must be installed in an well aired place far from any objects or elements that can cause fire.

**Note 15** – The ordinary maintenance of electronic unit must be executed by qualified personnel every 6 months.

**Caution:**      **Failure to respect the above listed norms can cause damage to persons, animals or objects. The manufacturer can in no way be held responsible for such damage.**

## C) – Installation

- 1) Unscrew the cover screws and lift the cover. Check that the electronic unit is in good order. In case of doubt do not install the unit and ask for the intervention of qualified personnel. The container's accessories (screws, round seal, cable glands) must not be left within the reach of children since they are a potential danger.
- 2) Check that the electronic unit is properly fixed to its box. If not, tighten all screws or provide the missing screws.
- 3) Place the unit near the gate so that the system connection wires' length is reduced to the minimum.

**Caution:** For the unit's correct operation the wires connected to it must not be longer than 10 metres.

- 4) For increased weather protection we recommend to place the unit under a roof or, even better, in an enclosure having two side walls. Wherever possible, it is advisable to install the unit at a minimum 1,5 mt level above the ground to keep it out of the reach of children.
- 5) Before proceeding to assembly place the container so that the side fitted with the cable glands is directed towards the ground.

**Caution:** Do not assemble the container on wood surfaces.

- 6) Insert the supplied round seal in its seat. Make sure the two ends meet at the centre of the side to which the cable glands are fitted.
- 7) Lift the mobile portion of the connector and proceed to connect the unit wires as described in the following chapters.

## D) - Operation

### 1) Definitions of Controls

#### **Start**

Input connected to a push-button placed outside the unit. It is employed to request the gate's opening or closure. This input is usually connected to a key push-button.

#### **Pedestrian Start**

Input connected to a push-button placed outside the unit. It is employed to request the opening or closure partial of the gate to allow the passage of persons or animals.

#### **Opening Start**

Input connected to a push-button placed outside the unit. It is employed to request the opening of the gate.

#### **Closing Start**

Input connected to a push-button placed outside the unit. It is employed to request the closure of the gate.

### 2) Definitions of Safety devices

#### **Stop**

Input connected to a push-button or switch placed outside the unit. It is employed to cause the gate's immediate stop. This control must be used in an emergency situation.

#### **Photo-cell**

Input connected to an optical barrier. It detects and signal the passage of persons or vehicles in the area crossed by the gate or in the nearby area.

#### **Photostop**

Input connected to an optical barrier. It detects and signal the passage of persons or vehicles in the area crossed by the gate or in the nearby area.

#### **Opening Limit Switch**

Input connected to a switch placed outside the unit. The switch operates when the gate has completed its opening phase. When it is operated it causes the gate's immediate stop.

#### **Closing Limit Switch**

Input connected to a switch placed outside the unit. The switch operates when the gate has completed its closing phase. When it is operated it causes the gate's immediate stop.

### 3) Definitions of Outputs

#### **Blinker**

Lamp's on/off control. The lamp functions as a warning and optical signaller of potential danger for the gate's motion.

#### **Motor 1**

Outputs for the opening/closure control of the motor which drives the gate.

#### **Courtesy light**

Continuous control for the lamp which lights the area around the gate. The lamp is lit for approx. 2 minutes after the cycle has ended. During the pause before the gate closes back the lamp is lit.

#### **Electric lock**

Impulse control for the electric lock release.

#### 4) Definitions of Power Supply Inputs/Outputs

##### **230Vac mains power**

Input for the electronic board power supply.

##### **24Vac low voltage**

Power supply output for the photo-cells and/or any other accessory devices.

##### **+12Vdc terminal**

Output not available for the installer.

#### 5) Definitions of Accessory Inputs/Outputs

##### **Aerial**

Input for the connection of a radio receiving aerial. This input can only be used if a radio receiver card is connected to the unit.

#### 6) Definitions of Optical Signals

##### **LD6 – Photo-cell led (yellow)**

It signals the optical barrier's state. The led goes off when the photo-cell is covered by persons or vehicles

##### **LD5 – Photostop led (yellow)**

It signals the optical barrier's state. The led goes off when the photo-cell is covered by persons or vehicles

##### **LD2 – Stop led (red)**

It signals the gate's block state. The led goes off when the stop control is operated (emergency).

##### **LD7 – Opening Start led (green)**

It is lit when the opening start control is operated.

##### **LD8 – Closing Start led (green)**

It is lit when the closing start control is operated.

##### **LD3 – Opening limit switch led (yellow)**

It signals the opening limit switch state. The led goes off when the gate has completely opened.

##### **LD4 – Closing limit switch led (yellow)**

It signals the closing limit switch state. The led goes off when the gate has completely closed.

##### **LD1 – Programming led (red)**

It is lit (together with the blinker) in the programming phase and during the gate's motion.

#### 7) Definitions of Trimmers

##### **RV1 – Slow-down speed and power regulator**

It defines the gate's speed during the slow-down phase and it regulates the power supplied to the motor during the normal speed phase.

#### 8) Definitions of Dip Switches (Selection of Programs)

##### **Dip switch 1**

It chooses whether the unit will operate in the mode determined by dip-switch 2 or in condominium mode.

ON=Codominium                      OFF=No effect

##### **Dip switch 2**

It chooses whether the unit will operate in step-by-step mode or in automatic mode.

ON =Automatic                      OFF=Step by step

##### **Dip switch 3**

It Excludes the slowing-down during the opening phase.

ON=opening slow-down excluded      OFF=opening slow-down enabled

##### **Dip switch 4**

It determines whether the unit will operate in opening/closing or cyclical mode.

ON=Cyclical mode enabled      OFF=Opening/closing logic

#### 9) Definitions of Programming Keys

##### **P1**

Allows to insert/cancel the radio-command codes in the memory

##### **P2**

Allows to set the motor's work time

##### **P3**

Allows to set the pause time

#### 10) Definitions of Protection Fuses

##### **F1 – Mains power fuse (5A)**

It disconnects the electronic unit from the power supply mains in case of short-circuit or electric current consumption anomalies.

##### **F2 – Low voltage fuse (2A)**

It protects the electronic unit in case of short circuits or over-currents on photo-cells or any other accessory devices connected to the 24Vac power supply.

## 11) Technical features

### Power regulator

Regulating the RV1 trimmer it is possible to reduce the power supplied to the motor during the normal speed phase.

**Caution:** In case of failure or anomaly of the electronic card the motor may operate at its maximum power value. This is why note n° 7 in the previous chapter "limits to use" must absolutely be put into practice.

### Starting of maximum start up power

When the motor starts the unit supplies the maximum power value for approx. 1 sec. Subsequently the power regulator operates. This particular feature allows to overcome the high negative torque at the motor's start.

### Radioreceiver

The electronic unit contains a two-channel radio receiver allowing remote control of the gate by means of the radio transmitter. When dip-switch 4=ON the radio receiver channel 1 acts as **Start** control and channel 2 acts as **Pedestrian start**. When dip switch 4=OFF the radio receiver channel 1 acts as **Opening start**, whereas channel 2 acts as **Closing start**. The radio receiver operates with a self-learning logic and can store up to 120 different codes from the radio-commands. Each code may be addressed on the desired channel. The memory contents is preserved in absence of power supply. The memory contents may be erased (total cancellation).

In alternative the electronic unit is pre-set for the optional connection of an accessory radio receiver card. The channel 1 of the radio receiver card ends with a non-polarized electric contact (relay) directly connected to the **start/opening start** input. The channel 2 of the radio receiver card ends with a non-polarized electric contact (relay) directly connected to the **pedestrian start/closing start** input.

### Blinker

The electronic card supplies an on/off control (flashing light) to the lamp. The logic of the blinking allows displaying the gate's operating.

Quick flashing light : it signals the opening phase

Slow flashing light : it signals the closing phase

Fixed light : it signals that the gate is blocked in wait that the obstacle that covers the photocell or photostop to be removed.

The device supplies an on/off control (flashing light) to the lamp for approx. 1 sec. before the motor start (**pre-alarm**).

### Work time

The motor's work time is controlled by one digital timer.

If any command interrupts the gate's travel before its end, the Timer stops and the elapsed time is stored in memory.

Therefore the unit can determine, with a fair approximation, the partial working time necessary to the gate to end its travel.

Thanks to this feature it is possible to avoid that the motor works for a long time after the end of the gate's travel, thus reducing overheating to the minimum.

**Warning :** In case of absence of power supply the stored position will be lost.

## 12) Operation modes

### Introduction

The electronic unit contains a micro-processor to control the gate's operation modes. These are the four main operation phases :

- Phase preceding the gate's motion
- Gate's fast motion phase
- Gate's slow motion phase
- Gate's pause phase (open gate)

The unit can function in three modes :

**Step by step** – This mode is enabled by setting the dip switches 1=OFF 2=OFF

**Automatic** – This mode is enabled by setting the dip switches 1=OFF 2=ON

**Condominium**– This mode is enabled by setting the dip switches 1=ON 2= No effect

The **Condominium** mode is the priority operation mode. If more than one modes are selected the priority mode will be enabled.

**Notice:** The operation logic setting (dip switch), the work time programming and the pause time programming must be carried out only if the cycle is concluded or before it starts (with closed gate).

The operating cycle is enabled by a **Opening Start** or **Closing Start** control.

#### **“Step-by-step” mode**

When the gate is closed, the opening start command determines an opening cycle. At the end of the work time, the gate stops. The operating cycle is completed (blinker off) and the system waits for a closing start command to determine the closing cycle. If a opening start or closing start command is supplied when the end of travel has not been reached yet the gate stops.

#### **“Automatic” mode**

When the gate is closed, the opening start command determines an opening cycle. At the end of the work time, the gate stops. The pause period starts (blinker off). At the end of the pause period the gate closes automatically. The operating cycle is complete only when the closing motion has ended. If a opening start or closing start command is supplied before the end of travel is reached the gate stops. If a opening start or closing start command is supplied during the pause period the operating cycle is interrupted and the gate does not close automatically.

#### **“Condominium” mode**

When the gate is closed, the opening start command determines an opening cycle. At the end of the work time, the gate stops. The pause period starts (blinker off). At the end of the pause period the gate closes automatically. The operating cycle is complete only when the closing motion has ended. If a opening start or closing start command is supplied while the gate opens, the command will have no effect. During the closing phase the opening start command operates whereas the closing start command not operates. If a opening start command is supplied while the gate closes, the gate will stop and reverse its motion after approx. 2 sec. If a opening start or closing start command is supplied during the pause period, the period will be reset and the automatic closure will start later.

**Important :** If the gate opening is controlled by a clock the “condominium” mode must be enabled.

**Note :** The opening start and closing start commands can be supplied by the two push-buttons of radio-command.

#### **“Cyclical” mode (dip switch 4 = ON)**

In cyclical mode the opening start and closing start commands become, respectively, start and pedestrian start. The pedestrian start command is enabled only when the gate is closed. In any operation mode, the pedestrian start command causes the gate opening for 7 seconds.

**Note :** At the beginning of each opening cycle the electric lock operates a split of second ( 0,8 sec ) before the first gate starts , and stops operating a split of second ( 0,4 sec ) after the gate's start.

In any operation mode, the safety devices causes the following effects :

**Stop :** If the stop command is enabled, no cycles can start and all the start commands will have no effect. If a stop command is supplied during motion, the gate will immediately stop e interrupt its operating cycle. This condition will continue until the stop command is on. A stop command supplied during the pause period interrupts the operating cycle. A closing start command subsequently supplied will start a closure cycle.

**Photo-cell :** This device has effect only during the closure phase or in the pause period. If an obstacle covers the photo-cell during the closure phase , the gate stops and reverses its motion after approx. 2 sec. If an obstacle covers the photo-cell during the pause period this last one is reset and the automatic closure is therefore delayed.

**Photostop :** If an obstacle covers the photo-cell during the gate's motion (opening or closure), or during the period preceding the operating cycle's start, then the gate is temporarily stopped, until the obstacle is not removed. The blinker will light with a fixed light to signal the irregular condition. When the obstacle is removed and the photocell is freed, an opening cycle will start. This does not apply when a start command determines the closing phase in step-by-step mode at the end of an opening cycle. If an obstacle covers the photostop during the pause period this last one is reset and the automatic closure is therefore delayed.

### 13) Electrical and mechanical specifications

**Dimensions and weight** : 177 x 247 x 92 mm - 1 Kg  
**Mains power supply** : 230 Vac +/- 10%  
**Stand-by power consumption** : approx. 1 W  
**Operating temperature range** : 0 to + 60 °C  
**Single-phase motor power supply** : 230Vac 1 HP max  
**Blinker power supply** : 230Vac 40 W max  
**Courtesy light power supply** : 230Vac 40 W max  
**Electric lock power supply** : 12 Vac 15 W max  
**Accessories power supply** : 24 Vac 2 W max  
**Motor's work time** : programmable, 0 to 250 sec.  
**Pause time** : programmable, 2 to 250 sec.  
**Operating frequency** : 433,92 MHz

**Caution :** The unit must be not switched on if the connected loads or the power supply exceed the a.m. limits. Failure to observe this precaution can result in damage to persons, animals or objects for which the manufacturer cannot be held responsible.

### 14) Electric connections

5 electric connectors are fitted to the card :

- 1) **J3** 6-pole Terminal board for the connection of the devices operating with 230Vac mains power supply (motor, blinker and courtesy light).
- 2) **J4** 13-pole Terminal board for the connection of the devices operating at low voltage (commands, safety devices, electric lock and 24Vac power supply output)
- 3) **J2** 2-pole Terminal board for the connection of the aerial cable
- 4) **J1** 3-pole Terminal board for the connection of the mains power supply and the ground cable
- 5) **J7** 10-pole connector for the optional connection of a radio receiver card

#### Terminal board J3

**Terminal1** - 230 Vac blinker power supply phase  
**Terminal2** - 230 Vac blinker and courtesy light power supply neutral (common)  
**Terminal3** - 230 Vac courtesy light power supply phase  
**Terminal4** - 230 Vac motor M1 power supply phase (opening)  
**Terminal5** - 230 Vac motor M1 power supply phase (closure)  
**Terminal6** - 230 Vac motor M1 power supply neutral (common)  
**Note:** connect the capacitor of the motor M1 between terminals 4 and 5

#### Terminal board J1

**Terminal1** – Ground cable connection  
**Terminal2** - 230 Vac mains power supply phase  
**Terminal3** - 230 Vac mains power supply neutral

**Warning:** The power supply voltage polarities must be carefully observed.

#### Terminal board J4

**Terminal1** – Output not available for the installer  
**Terminal2** – Electric lock 12 Vac power supply  
**Terminal3** – Electric lock 12 Vac and 24 Vac power supply (common)  
**Terminal4** – 24Vac power supply for photo-cells or other devices  
**Terminal5** – Opening limit switch's normally closed electric contact  
**Terminal6** – Closing limit switch's normally closed electric contact  
**Terminal7** – Photoelectric cell's normally closed electric contact (photostop)  
**Terminal8** – Common terminal for all electric contacts of limit switches and photostop  
**Terminal9** – Photo-cell's normally closed electric contact  
**Terminal10** – Emergency push-button's normally closed electric contact (stop)  
**Terminal11** – Opening Start push-button's normally open electric contact  
**Terminal12** – Common terminal for all electric contacts of commands and photo-cell  
**Terminal13** – Closing Start push-button's normally open electric contact

**Important :** The normally closed inputs not in use must be fitted with jumpers

## **Terminal board J2**

**Terminal1** – Aerial cable connection (signal) for radio receiver card

**Terminal2** – Aerial cable connection (shield) for radio receiver card

## **Connector J7**

**Terminal1** – Normally open electric contact connected to the opening start

**Terminal2** – Common of the normally open electric contact connected to the opening start

**Terminal3** – Normally open electric contact connected to the closing start

**Terminal4** – Common of the normally open electric contact connected to the closing start

**Terminal5** - 12Vdc power supply negative (common)

**Terminal6** - 12Vdc power supply positive

**Terminal7** - 12Vdc power supply positive

**Terminal8** - 12Vdc power supply negative (common)

**Terminal9** – Aerial input (shield)

**Terminal10** – Aerial input (signal)

## **Connection of the devices**

**230Vac mains power supply cable and ground** – Terminals 1,2 and 3 on J1

**Warning:** The cable's ground pole must be connected to a good ground reference in the gate's nearby area.

**Motor 1** – Terminals 4, 5 and 6 on J3

**Blinker** – Terminals 1 and 2 on J3

**Courtesy light**– Terminals 2 and 3 on J3

**Electric lock** – Terminals 2 and 3 on J4

**Photo-cells power supply** – Terminals 3 and 4 on J4

**NC photo-cell contact** – Terminals 9 and 12 on J4

**NC stop push-button** – Terminals 10 and 12 on J4

**NC photostop contact** – Terminals 7 and 8 on J4

**NO opening start push-button** – Terminals 11 and 12 on J4

**NO closing start push-button** – Terminals 12 and 13 on J4

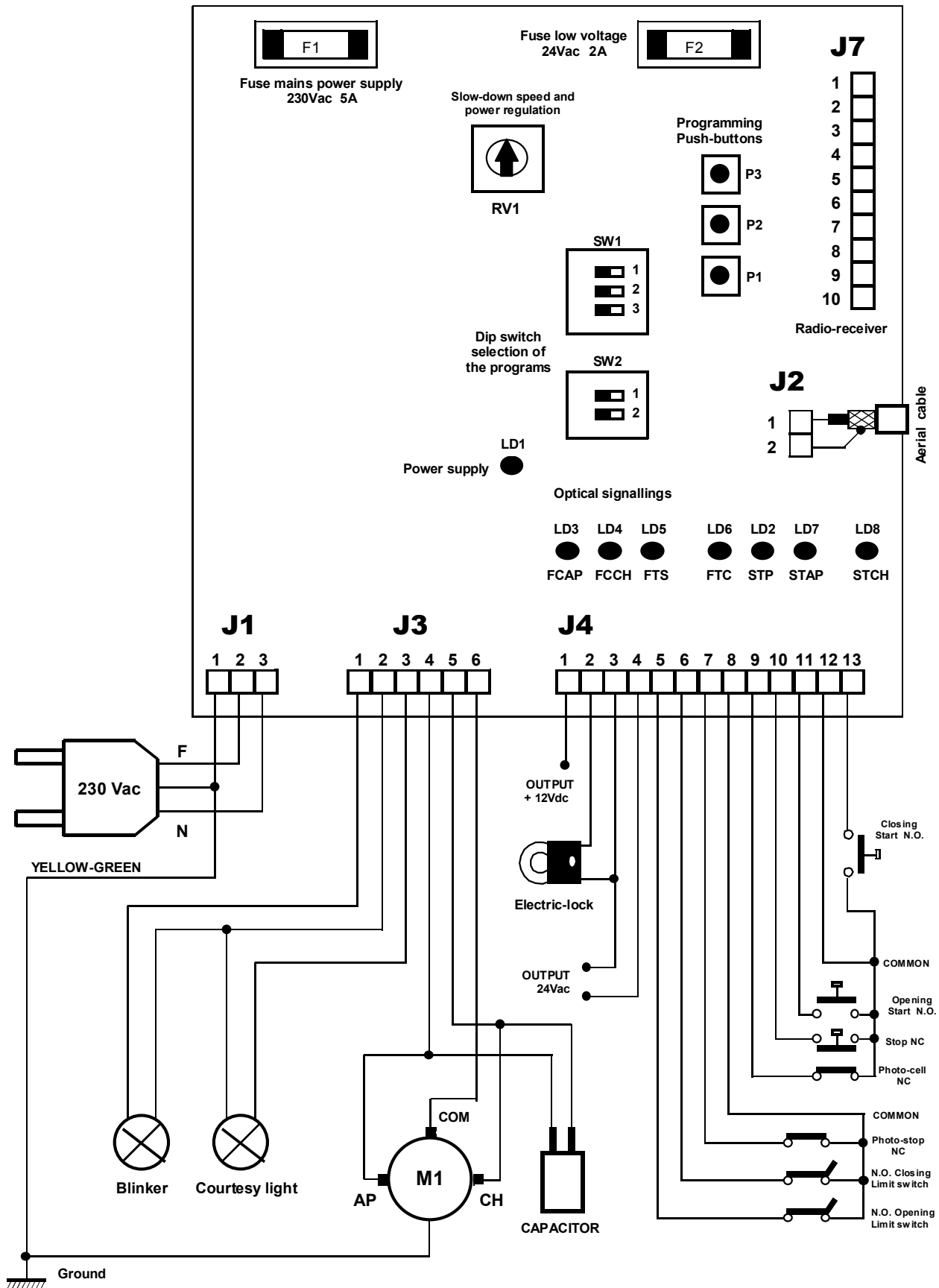
**NC opening limit switch** – Terminals 5 and 8 on J4

**NC closing limit switch** – Terminals 6 and 8 on J4

**Aerial** – Terminals 1 and 2 on J2

**Important:** Before starting the gate check all connections to the electronic card. Check also the electric contacts' switching, which is signalled by the leds' operation.

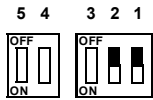
# General diagram





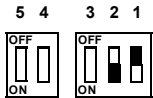
# Programming the card

## Step-by-step logic



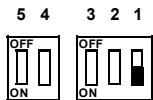
Set the dip switches 1 and 2 to OFF  
The state of the other dip switches has no effect

## Automatic logic



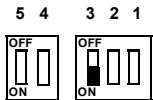
Set the dip switch 1 to OFF  
Set the dip switch 2 to ON  
The state of the other dip switches has no effect

## Condominium logic



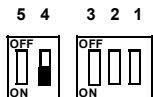
Set the dip switch 1 to ON  
The state of the other dip switches has no effect

## Opening slow-down exclusion logic



Set the dip switch 3 to ON  
The state of the other dip switches has no effect

## Cyclical mode



Set the dip switch 4 to ON  
The state of the other dip switches has no effect

## Radio-command codes self-learning

Press the **P1** push-button once to insert a “Opening Start” code; press the **P1** push-button twice to insert a “Closing Start” code; press the **P1** push-button three times to insert a “Pedestrian Start” code”. Each time the push-button is pressed, the led DL1 flashes in acknowledgement. Subsequent pressures of the **P1** push-button must be spaced by 1 sec. minimum periods. When the led is lit with a fixed light transmit the code to be learn by means of the radio-command.

**Warning:** In **Ciclical mode (dip switch 4 = ON)** the opening start and closing start commands become, respectively, start and pedestrian start.

## Erasing all stored codes

Press push-button **P1** until the led DL1 goes off (about 10 seconds).

## Setting the work time

Make sure the gate is completely closed. If not, position it manually. Press push-button **P2** for about 3 seconds (the led DL1 will light with a fixed light) until the gate starts opening at a reduced speed. During this phase adjust the speed by means of the trimmer RV1 to obtain the desired slow-down. When the gate is completely open press push-button P2 again and wait for the led DL1 and the blinker to go on with a fixed light. Press push-button P2 repeatedly (3 times) to program the following operations :

- 1) motor M1start in closure
- 2) motor M1slow-down start
- 3) motor M1stop (end of travel and end of programming)

**Note :** if the unit is connected to the closing limit switch it is not necessary to press P2 in order to stop the motor.

## Setting the pause time

Press push-button **P3** until the led DL1 lights. Let the desired pause time pass, then press push-button **P3** again.