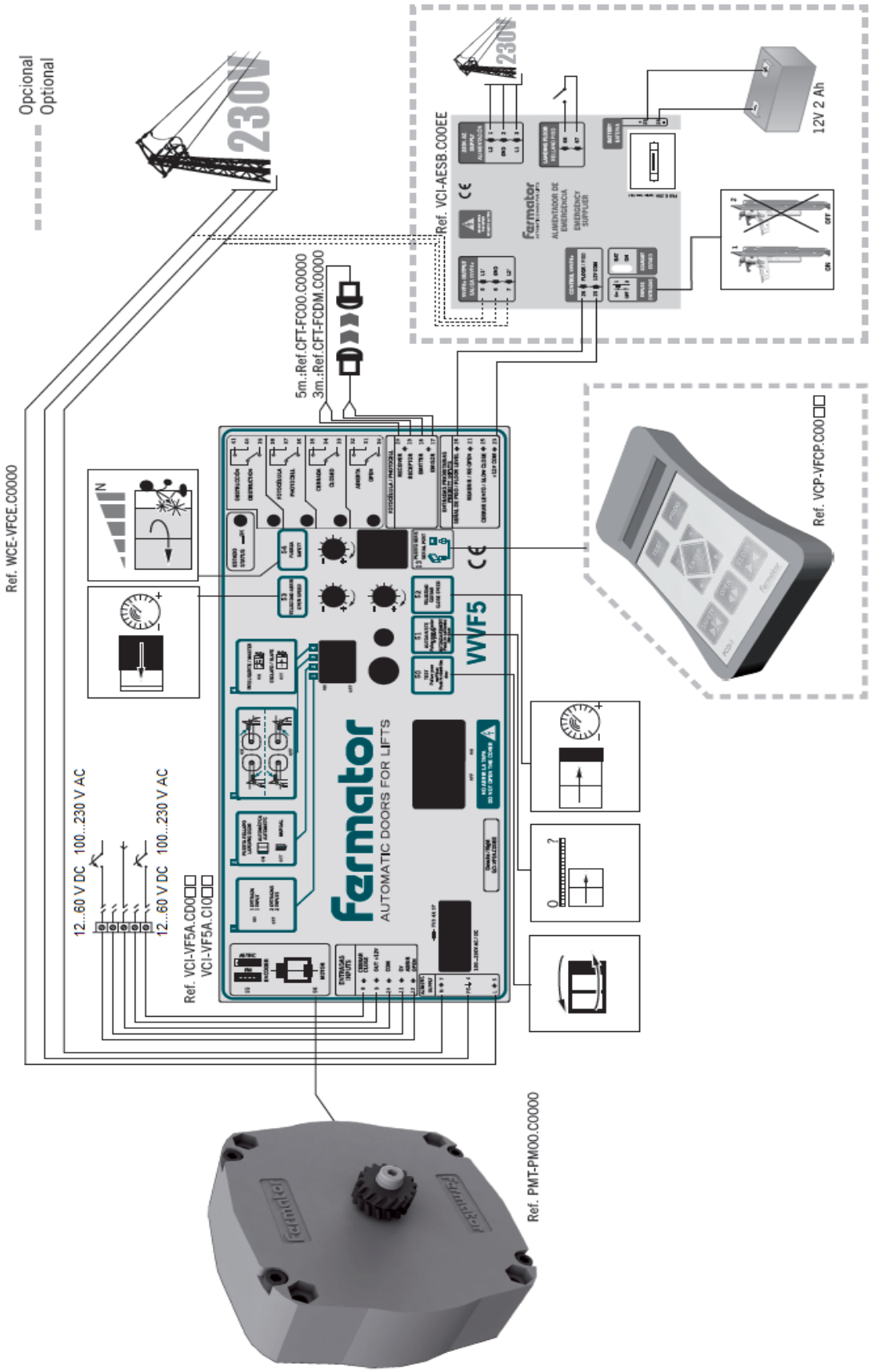
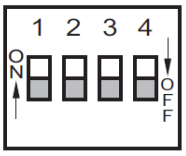
VF5 Electronic Module

INDEX


Opcional
Optional
230V
Ref. VCI-AESB.C00EE
12V 2 Ah
5m.:Ref.CFT-FC00.C0000
3m.:Ref.CFT-FCDM.C0000
Ref. VCP-VFCP.C00□□
Ref. WCE-VFCE.C0000
VVVF5
Fermator
AUTOMATIC DOORS FOR LIFTS
12...60 V DC 100...230 V AC
12...60 V DC 100...230 V AC
Ref. VCI-VF5A.CD0□□
VCI-VF5A.CI0□□
Ref. PMT-PM00.C0000

PROGRAMMING

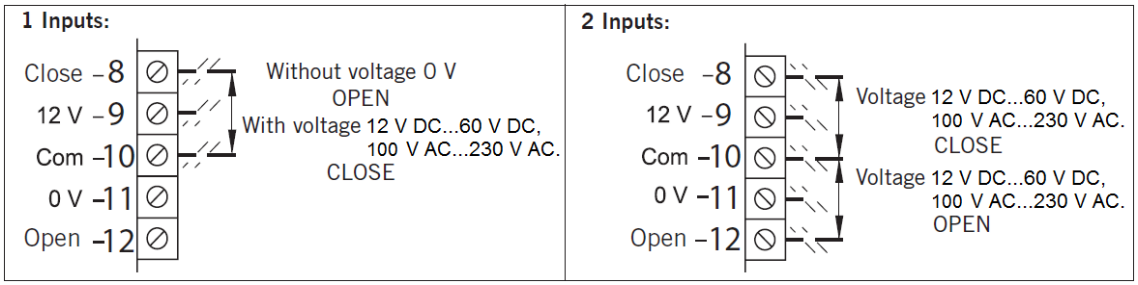


The VF may be programmed using the DIP switches on the front of the unit. If any change is made to any of the above switch selections, the main supply of the VF5 unit MUST be switched OFF and ON again to read the new programming. The switches functions are:

1.- 1 & 2 Inputs.

ON: 1 Input.
The door control unit will be controlled by a single input. Any voltage between 12 V DC to 60 V DC or 100 V AC to 230 V AC applied between terminals 8 & 10 will open the doors. Without input active the door remains opened. When it activates the door close. Open input is not used.

OFF: 2 Inputs.
The door control module will be controlled by two independent inputs. Any voltage between 12 V DC to 60 V DC or 100 V AC to 230 V AC applied between terminals 8 & 10 will cause the doors to close. And between terminals 10 & 12 will cause the doors to open. In the absence of a signal, the doors will remain static. If both inputs are applied then the open signal has priority.

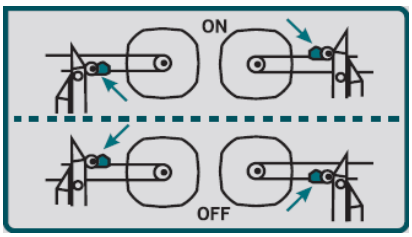


2.- Automatic / Semiautomatic.

ON: Automatic.
Operators with skate (automatic landing). In this case a special movement is made for locking and unlocking the skate.

OFF: Semiautomatic.
Operators without skate (Semiautomatic landing door).

3.- Rotation sense.



ON: Look at the picture:
- Skate fixed on the top side of the belt and the motor on the right side.
- Skate fixed on the bottom side of the belt and the motor on the left side.

OFF: Look at the picture:
- Skate fixed on the bottom side of the belt and the motor on the right side.
- Skate fixed on the top side of the belt and the motor on the left side.

4.- Master and Slave.

ON: Master.
The door control unit will execute instructions directly. Example: photocell activation will cause the doors to re-open immediately without control of the door control unit.

OFF: Slave.
There is no automatic reopen movements. The doors will only react to instruction given by the main lift controller. Example: with the photocell activated the unit will send a signal to the main lift controller via the PHOTOCELL output (36, 37, 38). Then, the main lift controller must remove the close signal and put the open signal.

INPUTS

POWER INPUTS 230 VOLTS SINGLE PHASE AC (5, 6, 7)
The circuit has been designed to operate on a mains supply of 230 V AC (+10%,-15%, 50 or 60 Hz). The unit will consume on average approximately 1 ampere from the supply.

It is important that the Door Operator Module has a GOOD EARTH CONNECTION.

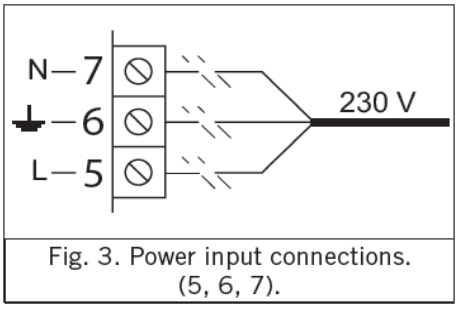
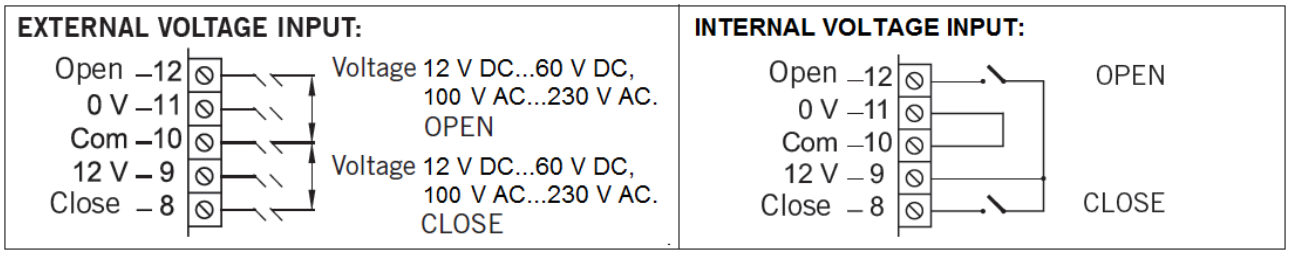


Fig. 3. Power input connections. (5, 6, 7).

CONTROL INPUTS (8, 9, 10, 11, 12)
The circuit can work with external voltage inputs or internal voltage input (voltage free contact).



12.- <u>Opening Signal.</u>
Is a signal that orders the door to open. The tension to apply could be from 12 V DC to 60 V DC or 100 V AC to 230 V AC, with an external supply between this input and common (10).

11.- <u>0 Volts.</u>
Is the opposite pole to 12 V, in the case of using internal voltage it should be connected to common input.

10.- <u>Common.</u>
Is the reference used for the opening and closing signal.

9.- <u>12 Volt.</u>
Isolated 12 Volts output available to control the door via a voltage free contact.
Features are:
a) This supply must only be used for this purpose.
b) This contact must be isolated from any other power supply.

8.- <u>Close signal.</u>
This signal is used for ordering to close the door.

SERIAL PORT (13)
The serial port is used to connect with external devices like the diagnostic console, interfaces and future expansion devices. Operating speed 1.200 Baud per second, current loop. It is used a RJ11 connector (phone jack connector).

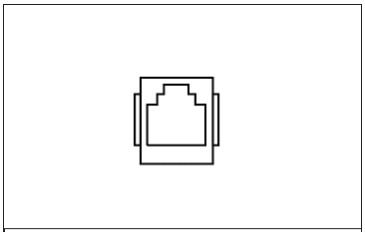


Fig. 5. Serial Port connection. (13).

PHOTOCELL (17, 18, 19, 20)
One of the most relevant characteristics of this control is the optional incorporation of the Fermator photocell. It is composed by a emitter and receptor infrared.

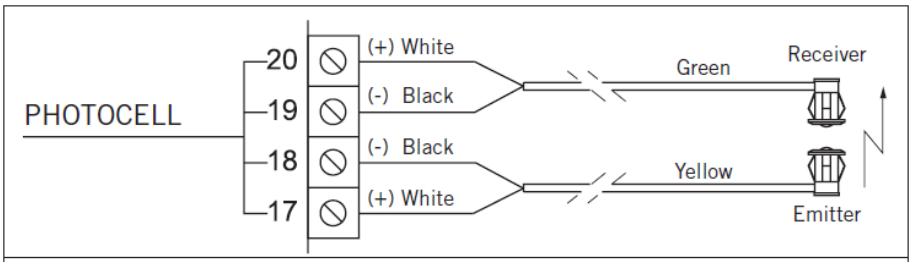


Fig. 6. Connection of the photoelectric detector. (17, 18, 19, 20).

OTHER INPUTS (26, 21, 25, 23)

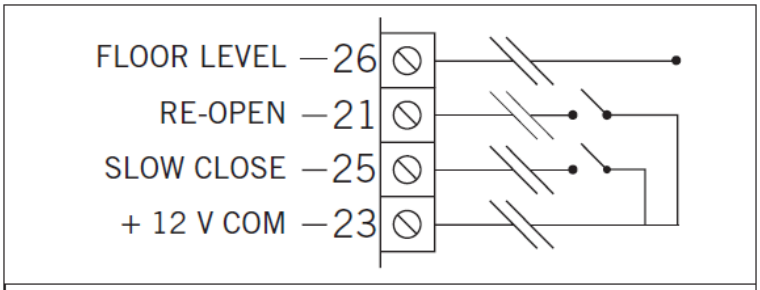


Fig. 8. Connection of the «other inputs». (26, 21, 25, 23).

26.- <u>Floor Level</u>
This input is for connecting the external emergency supplier that allows the opening manouvre in the case of power failure by a battery of 12 V, able to give power during 15 seconds for a passengers rescue.

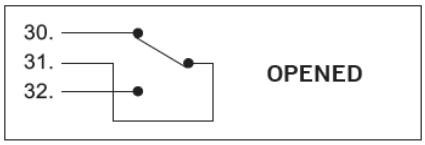
21.- <u>Reopen</u>
This signal is used for installing the cabin door switch or an external barrier. In order to active this signal, connect the re-open input (21) with the +12 V (23). Use voltage free contacts. The reopening signal has priority over the closing signal.

25.- <u>Slow Closing</u>
This signal is used for ordering to close the door slowly. The slow signal has priority over the control signals and the photocell. It's created for working with detection of fire centres.
Note: In USA model when this signal is active the VF program a closing speed customizable by the user and waits for the activation of the close input signal to perform the closure.

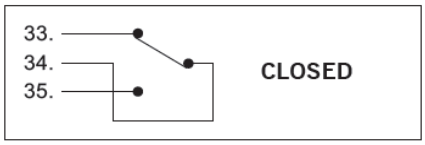
23.- <u>+ 12 V. COM</u>
This terminal is used for giving with an isolated contact a reopening order or a slow closing. Always use voltage free contacts and usually open.

OUTPUT RELAYS AND LED INDICATORS (from 30 to 41)
Output relays have been provided to give continuous information to the main lift controller concerning the status of the doors. The output contacts of the relays may be used by the main lift controller to pilot such information as «doors fully opened», «doors fully closed», «Photoelectric detection», «obstruction in the doorway» and «door control O.K.».

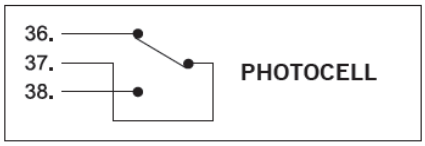
- **Opened.**
  Led indicator and relay activated when the doors are fully open.



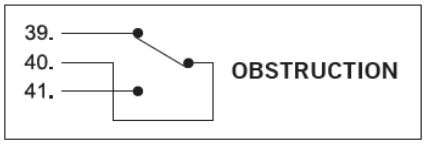
- **Closed.**
  Led indicator and relay activated when the doors are fully closed and locked.



- **Photocell.**
  Led indicator and relay activated when the photocell or the reopening input is operated.
  Note: In USA model the photocell led is also the obstruction led.



- **Obstruction.**
  Led indicator and relay activated when an obstacle is detected that stops the doors from closing. The signal will reset when the doors reach the opened or closed position.
  Note: In USA model the obstruction relay functionality is redefined, the relay will be activated when the operator has passed a third part of the clear opening.



- **Status.**
  Blinking led indicating proper working conditions

TEST PUSHBUTTON (50)
Operation of the TEST pushbutton will cause a door open or close cycle.
Note: In USA model is necessary to hold down the TEST pushbutton to complete a door open or close cycle. If the open signal or the close signal is active, pressing the TEST pushbutton the door will not complete a cycle because the TEST has not priority.

AUTOADJUSTMENT PUSHBUTTON (51)
The Autoadjustment pushbutton is used to set up the doors. The doors will do 5 complete movements to detect the motor and the clear opening. From the information gained the microprocessor will calculate the acceleration and deceleration ramps and the bracking torque required to give the optimum control of the doors. Once the autoadjustment has been completed the parameters are stored in non-volatile EEPROM and will be used to calculate the optimum performance. The doors will open slowly for the first operation after power has been removed from the door control unit. Autoadjustment only needs to be used when setting the initial parameters or when changes such as connecting or removing the Fermator photocell are made.

Autoadjustment process:

- Disconnect the inputs (Pins 8, 9, 10, 11 & 12) and the priority inputs (Pins 26, 21, 25 & 23).
- Switch OFF the VF5 and place the doors in closed position.
- Switch ON the VF5 and Push auto-adjustment button (51)

Next 2 movements are to detect which kind of motor it is installed.

- 1st Movement: The door will open 200mm (If the door instead of opening makes small rebounds, means that it's trying to close and that the direction is the opposite. The pin 3 of the DIP switch has to be changed.).
- 2nd Movement: The door will close 150mm.

Next 3 movements are to detect the clear opening of the door, the 3rd movement is starting 2 or 3 seconds after finishing the second one.

- 3rd Movement: The door will close completely in slow velocity until the end to detect the 0 position.
- 4th Movement: The door will open slowly counting the pulses from the encoder built into drive motor until it reach the open mechanical stop. Will detect the final position.
- 5th Movement: The door will close after a short delay. From the information gained the microprocessor will calculate the acceleration and deceleration ramps and the bracking torque required to give the optimum control of the doors.

CLOSE SPEED (52)
The door closing speed can be independently adjusted from 150 mm/s upto 400 mm/s.

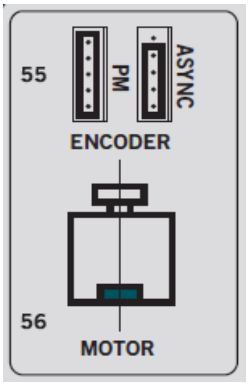
OPEN SPEED (53)
The door opening speed can be independently adjusted from 200 mm/s upto 700 mm/s.

SAFETY (54)
This potentiometer is used to set the closing pressure onto an obstacle in the clear opening. The closing pressure can be set between 60 and 150 Nm.
Note: In USA model the maximum pressure in case of obstruction is 130 Nm.

ENCODER (55)
An integral quadrature pulse encoder is connected to this input. The purpose of the encoder, which is situated inside the motor, is to inform the control of the exact position and speed of doors.

Compatibility with Fermator asynchronous motor.

- The VF5+ encoder connector is prepared to connect the high resolution encoder for the synchronous PM motor (5 wires) and the standard encoder from the asynchronous motor (4 wires).
- The encoder from the asynchronous motor (4 wires) has to be connected to the 4 pins of the encoder marked like ASYNC.

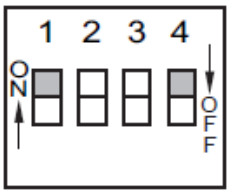


MOTOR (56)
Output to the 3 phase motor varying the voltage and frequency to control speed and torque.

ON / OFF SWITCH (57)
Disconnects the unit from the 230 V AC mains supply.

PROGRAMMING EXAMPLES

MASTER: 1 INPUT



- **Configuration**

1. ON: 1 Input.
2. Depends on type of door.
3. Depends on type of door.
4. ON: Master.

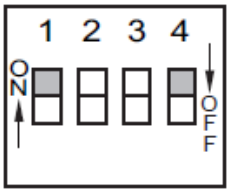
- **Inputs**

1. (8) Close. Closes the doors with voltage between terminals 8 & 10. Open the doors when the voltage between terminals 8 & 10 is removed.
2. (17...20) Photocell. Doors will reopen if the photocell beam is broken.
3. (21-23) Reopening. Doors will not close if this signal is active.
4. Obstacle. Door will re-open if an obstacle is detected by the motor ceasing to rotate.
5. (25-23) Slow Closing. Closes regardless of the state of the photocell.

- **Priorities**

1.(21-23) Reopening.
2. Obstacle.
3.(25-23) Slow Closing.
4.(17...20) Photocell.
5.(8) Close.

SLAVE: 2 INPUTS



- **Configuration**

1. ON: 2 InputS.
2. Depends on type of door.
3. Depends on type of door.
4. ON: Slave.

- **Inputs**

1. (8) Close. Closes the doors with voltage between terminals 8 & 10.
2. (12) Open. Open the doors with voltage between terminals 12 & 10.
3. (17...20) Photocell. Does not re-open the doors when activated but provides signal to main controller via the Photocell relay.
4. (21-23) Reopening. Doors will not close if this signal is active.
5. Obstacle. Door will not re-open if an obstacle is detected by the motor ceasing to rotate.
6. (25-23) Slow Closing. Closes regardless of the state of the photocell.

- **Priorities**

1.(12) Open.
2.(21-23) Reopening.
3.(25-23) Slow Closing.
4.(8) Close.

LEARNING PHASE OF THE DOOR OPERATOR

1.- Switch on the VF door controller.
- Button O/I in the side of the box.

2.- Cables.
- Connect the 230V AC mains supply to the controller (#5, #6, #7).
- If they are connected, disconnect the following connections:
  - Input signals (#8 to #12),
  - Priority inputs (#21, #23, #25, #26),
  - Outputs (#30 to 41).

3.- Program in "2 INPUTS" (switch 1=OFF) **and "MASTER"** (switch 4=ON).

4.- Program the door type.
- Switch 2 : landing door type (semiautomatic=OFF or automatic=ON).
- Switch 3 : rotation sense.

5.- Adjust the 3 potentiometers in maximum (maximum to the right #52, #53 and #54)
With these regulations, the door overcomes little mechanic frictions, but if they are very important is not possible to fix it.
If the door does not move with this configuration, then there is a mechanical problem or electric (motor or controller not supplied).

6.- Place the door in a middle position in order to see the starting movement.

7.- Switch on the VF unit (O/I button on the controller).
The door must remain stopped. If the door moves, verify the position of switch 1.

8.- Press once the «AUTOADJUSTMENT» button to start a learning cycle.
The correct steps that the door has to make are:
- The door will open 200mm. (If the door instead of opening makes small rebounds, means that it's trying to close and that the direction is the opposite. The pin 3 of the DIP switch has to be changed.).
- The door will close 150mm.
- The door should close completely (the «CLOSED» LED lights on).
- Then the door opens completely (during this phase, the OK Status led will blink synchronized with the encoder pulses to check it visually) and after a open pause of 3s the door closes again (OK LED blinks normally).
- The door keeps closed with CLOSED LED and relay on. The skate is completely closed and the «OK» LED blinks normally.

9.- Door Test.
- Press once the «TEST» button and the door will open, and it will close pressing again the button.

TROUBLESHOOTING DURING THE AUTOADJUSTMENT

• The control does not answer to the *TEST* or *AUTOADJUSTMENT button*.
- Switch off the controller and test again.
Change the controller If nothing happens.

• The door does not move.
- Verify the motor cable and its connection with the motor connector.
- Verify that a variable voltage is applied to the motor when a movement order is applied. This voltage is different when the door stops closed or open, because in open position a torque to keep the position is needed. The motor voltage has to be checked with the Fermator programming tool.
You should change the motor if no movement is made when the voltage is present.

• The door stops before the end of the learning cycle.
Verify the encoder :
- The door keeps open with no movement → sense of opening reversed, so interchange the 2 middle cables in the connector (#55).
- The door closes and opens only 20cm then stopping → encoder disconnected, encoder not supplied or damaged, pulley screw wrong tight.
Change the encoder if nothing solves it.

• The door opens instead of close.
- Verify the DIP switch 3 position.
- Reverse 2 phases of the motor connection (#56).

• The door makes the learning phase correctly but the skate stays open with the closed relay active.
- Verify the switch 2 according to the correct open sense of the door. The door should be close in the motor zone with the skate closed too.

• The door stops in the skate zone.
- Verify by hand the correct and soft movement of the skate (see the assembling manual).

• The door does not close completely.
- Disconnect the whole system and verify that no obstruction happens.

TEST always in this way in order to obtain the correct movement and verify in a well known schedule.

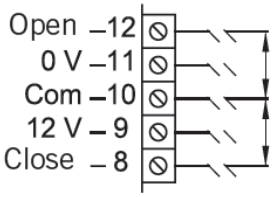
NORMAL REGULATION WITH THE LIFT CONTROLLER

If the autoadjustment was correctly passed, then the connections with the lift controller can be assembled. The 3 potentiometers can be regulated too.

1.- Connect the cables coming from the lift controller.
- Connect the inputs cables (Pins 8, 9, 10, 11 & 12) and priority inputs cables (Pins 26, 21, 25 & 23).
- Connect the relays outputs cables that inform the lift controller (Pins 30 to 41).

Switch off the VF control before connecting the open and close command cables. Do not mix the voltages from the lift controller with the internal ones in the VF control (#9: 12 V and #11: 0 V).

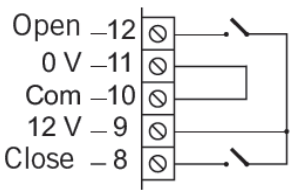
EXTERNAL VOLTAGE INPUT:



Voltage 12 V DC...60 V DC, 100 V AC...230 V AC. OPEN

Voltage 12 V DC...60 V DC, 100 V AC...230 V AC. CLOSE

INTERNAL VOLTAGE INPUT:



2.- Put the potentiometers to the minimum.
- Close Speed (#52).
- Open Speed (#53).
- Safety (#54).

3.- Test the door.
- Check from the landing door side.
- Press the «TEST» button and establish the potentiometers (open speed, close speed and the safety force) in order to get the required adjustment.

Information: The VF parameters could be adjusted with the Fermator programming tool.

TEST OF THE PHOTOCELL

Remove the photocell wiring from any place where there are "electric noises" such as motors, supplies wiring, etc.

1.- Verify that there is an emitter and a receiver (E mark and R mark on the capsules) connected to the correct cable (emitter to the yellow cable and receiver to the green one).

2.- Connect the photocell (on the operator).

Even if you will not install the photocell, make the learning of the photocell to avoid that the photocell relay is active by no reason. Once the photocell is verified, it is possible to disconnect it and the VF control will detect that is not connected anymore.

3.- Put the capsules face to face at a minimum distance of 50cm, make the autoadjusment process without hitting the capsules, once done, make a open and a close movement, and then block the photocell with the hand during the close movement to check that the Photocell relay is active every time the hand is in the middle of the infrared beam.

PROBLEMS WITH THE PHOTOCELL.

- **The photocell is active intermitently**
  - Check the "grounding" connection (#6).
  - Check the correct plugs connection. (#17 to #20).
  - Disconnect the photocell, make a complete open and close movement, connect again the photocell and try again.
  - Verify that there is an emitter and a receiver (E mark and R mark on the capsules) connected to the correct cable (emitter to the yellow cable and receiver to the green one).
  - Remove the photocell wiring from any place where there are "electric noises" such as motors, supplies wiring,...being sure that the cables are not short-circuited.
  - If you can use a console, please check the stability of the signal.
  - Do not extend the wires.
  - Take in mind that in master mode the system recognizes automatically the photocell detector after making a complete learning cycle with the beam free controlled *by the input signals*.

TROUBLESHOOTING

• The door doesn't answer to the test or auto-adjustment buttons.
- Switch OFF (57) and try again.
- If does not works change the VF control.

• The door only closes 35 cm.
- This is the clear entrance of any controller that has never been adjusted. Therefore an autoadjustment is required (check the autoadjustment process).

• The door opens but doesn't close.
- Check if the photocell LED is activated. If so, verify that the photocell is not blocked or the «OPEN» input is active (#8) comtinuously.
- Check if the close signal (#12) arrives to the system using a multimeter or the console. Change the VF control if the voltage arrives, but the door does not close.
- Check if the re-opening signal (#21) is activated.
- Check that there is no stray voltage in the open signal.

• The door re-opens by itself.
- Check the sensibility of the re-opening (#54) Safety regulation potentiometer.
- Check that the photocell is not activated.
- Check that there is no mechanical obstruction on the door.
- In case of having the same problem, disconnect the photocell and try again with the TEST button, and if the door doesn't open or close totally there must be a mechanical obstruction on the door.

• The door doesn't reach the fully open position
- Verify the mechanical adjustments of the door. The motor has enough torque to open the doors in normal circumstances until a Clear Opening of 1400mm.

• The door reopens when the skate is closing.
- Check the regulation of the skate, because probably the locking system of the skate is not well adjusted and the door has a mechanical friction. Verify if the the obstruction LED lights.

• The door hits when it opens.
- Check that the skate un-locking is well fixed before the door starts to open.
In case the skate is not fully fixed you should check the skate adjustment because it is probably too hard.

• The door hits when it arrives at the fully open position, the "open" LED is not activated and the system gets out of order.
- Check the tension of the toothed belt, because probably is not correctly adjusted and it slips on the pulley of the motor and consequently the encoder is sending a wrong information.
Adjust the belt tension and make the autoadjustment again.

• The system gets power but doesn't work and the led ON is off.
- Check if the external fuse is burned and change it for another Fermator fuse (250 V, 4 A ceramic fast speed).

• The motor is moving intermittently.
- Check the wiring connections or if a phase of the motor is failing.
- Verify that the pulley of the encoder is well assembled.

• The "ON" LED is activated and the door doesn't obey to the signals.
- There has been an obstruction at opening and then the door enters into an "out of order stage" during 15 seconds.
- In slave mode, there is a continuous obstruction and the lift controller has not changed the close signal by the open signal in slave mode.
- There has been a short circuit in the output of the motor, and the system will be deactivated during 3 seconds.

CHARACTERISTICS PAGE

POWER SUPPLY:

AC voltage range:	230 V AC +10%, -15%.
Frequency supply:	50...60 Hz.
Stand by power:	50 mA 4 W.
Nominal power (PM motor):	0,21 A 20 W.
Maximum peak power:	1,31 A 170 W.

INVERTER:

Carrier frequency:	16 KHz.
Frequency range:	0,5...100 Hz.
Voltage range:	40...200 V AC III.
Maximum output current:	4 A.
Positional control:	Quadrature encoder.

MOTOR VF:

Asynchronous triphasic:	6 pole.
Voltage supply:	230 V.
Power:	250 W.
Nominal torque:	1,5 N·m.
Nominal speed:	900 RPM.
Thermic class:	F-155°C.

MOTOR PM:

Synchronous permanent magnet:	10 pole.
Voltage supply:	88 V.
Power:	63 W.
Nominal torque:	1 N·m.
Nominal speed:	600 RPM.
Thermic class:	F-155°C.

INPUTS:

Impedance:	20 KΩ.
Voltage:	12 V DC to 60 V DC, 100 V AC to 230 V AC .

OUTPUTS:

Contacts:	Switched.
R. contact:	50 mW.
Swich time:	5 ms.
Output current:	Máximum: 150 mA.
Voltage:	230 V AC.

PERFORMANCE:

- Open Speed: 200...700 mm/s.
- Close speed: 150...400 mm/s.
- Maximum acceleration: 800...1500 mm/s^2.
- Safety force: 60...150 N adjustable.
- Maintenance torque (Opened Door): 80 N/ cm.

DECLARATION OF CONFORMITY

Tecnolama, S.A.
Ctra. Constantí Km. 3
43206 REUS (España)

Herewith declares that the products mentioned below conform with the following E.U. council directives:

CE

European Directive 2014/30/EU on Electromagnetic Compatibility (EMC) in accordance with the Product family standard for lifts, escalators and moving walks EN12015: 2005 and EN12016: 2008:
VF5 Electronic Module
(10/31700972_M1)

Tecnolama S.A., 2014

Josep Vilà Gomis
Administrator