Fermator

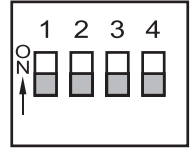# TECHNICAL MANUAL AND ELECTRONICAL MODULE REGULATION VVVF-4$^+$
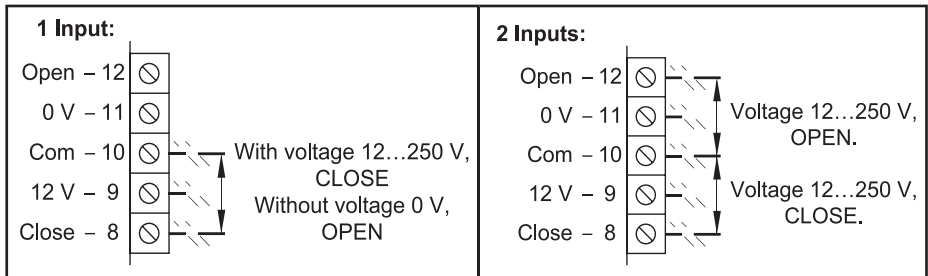
DESCRIPTION OF SWITCHES

The unit may be programmed using the DIL switches on the front of the unit. If any change is made to any of the above switch selections, the Mains Supply to the VVVF-4+ 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 to 250 volts AC or DC 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 to 250 volts AC or DC applied between terminals 8 & 10 will cause the doors to close. And between terminals 12 & 10 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.

1 Input:		**2 Inputs:**	
Open – 12		Open – 12	
0 V – 11		0 V – 11	Voltage 12…250 V, **OPEN.**
Com – 10	With voltage 12…250 V, CLOSE	Com – 10	
12 V – 9	Without voltage 0 V, OPEN	12 V – 9	Voltage 12…250 V, **CLOSE.**
Close – 8		Close – 8	

- **2.- Type of landing door.**

    ON: Automatic landing door. Fully automatic landing door control.

    OFF: Semiautomatic landing door.   Semiautomatic landing door control, (car door with manual landing door).

- **3.- Rotation sense.**

    ON: The control unit is expecting to control left hand or centre opening doors.

    OFF: The control unit is expecting to control right hand opening doors. The sense is defined from the outside of the car, refering to the direction taken when the door is opening.

- **4.- Master and Slave.**

    ON: Master.   The door control unit will execute instructions directly. Example: operation of the Photoelectric Detector will cause the doors to re-open immediately under 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 by the inputs. Example: operation of the Safety Edge Detector will cause the door operator module to give a signal to the main lift controller via the PHOTOCELL (36, 37, 38) output. The main lift controller then must remove the close signal and put the open signal.

POWER INPUTS 220-250 VOLTS SINGLE PHASE AC (5, 6, 7)

The circuit has been designed to operate on a mains supply of 230 Volts AC (+10%,-15%, 50 or 60 Hz). The unit will consume approx 1 Amp from the supply.
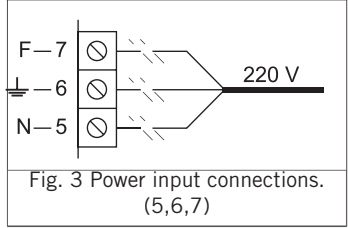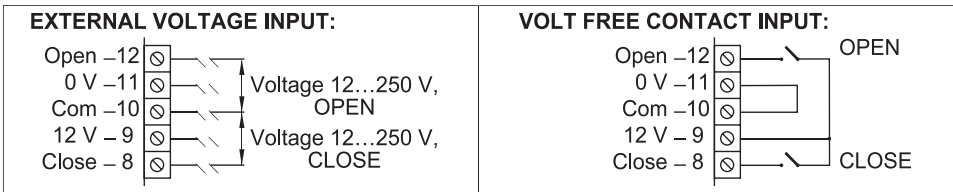It is important that the Door Operator Module has a GOOD EARTH CONNECTION.

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

CONTROL INPUTS (8, 9, 10, 11, 12)

The circuit can work with external voltage inputs or by means a volt free contact input.

EXTERNAL VOLTAGE INPUT:

Open – 12
0 V – 11
Com – 10
12 V – 9
Close – 8

Voltage 12…250 V, OPEN
Voltage 12…250 V, CLOSE

VOLT FREE CONTACT INPUT:

Open – 12
0 V – 11
Com – 10
12 V – 9
Close – 8

OPEN

CLOSE

- **12.- Señal de abrir.**

  Isolated 20 KOhm impedance input activated with a voltage from 12 to 250 Volts AC or DC in order to open the door.
  It has the same characteristics as the close signal.

- **11.- 0 Volt.**

  This is the reference (return) used for the two input signals applied to terminals 12 & 8.

- **9.- 12 Volt output power supply.**

  Isolated 12 Volts output available to control the door via a volt 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.- Close signal.**

  It has the same characteristics as the open signal.

Fig. 5. Serial Port connection. (13, 14, 15, 16).

V- – 16
Rx – 15
Tx – 14
V+ – 13

SERIAL PORT (13, 14, 15, 16)

The serial port is used to connect with external devices like the diagnostic console, interfaces and future expansion devices. Operating speed 1.200 Baud, current loop.
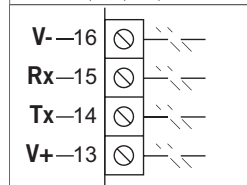
PHOTOCELL (17, 18, 19, 20)

The Fermator VVVF Door Control Unit is supplied with a Photocell comprising of a transmitter and receiver. When autosetup is operated the control module will search to detect if the Photocell is installed.
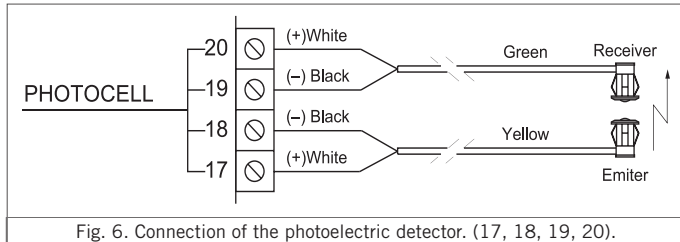

Fig. 6. Connection of the photoelectric detector. (17, 18, 19, 20).
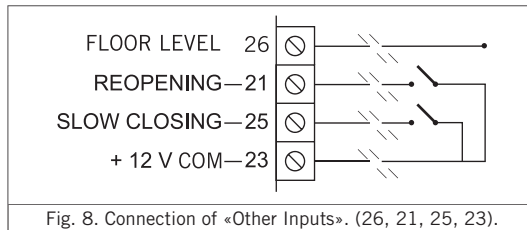
OTHER INPUTS (26, 21, 25, 23)

Fig. 8. Connection of «Other Inputs». (26, 21, 25, 23).

- **26. Floor level.**

  This input signal serves to connect with an optional Emergency Passenger Release powered from a 12 Volt battery source that will provide power to allow 15 seconds of door control, sufficient to release trapped passengers.

- **21. Re-opening.**

  This input has been provided to accomodate a volt free contact from a Door Open Pushbutton or an external Safety Edge Detector. This signal will have priority over the door close signal.

- **25. Slow closing.**

  Connection between terminals 25 & 23 via a volt free contact will cause the doors to close at a slow speed overriding the Photoelectric safety Detector. Useful in installations with fire alarm systems.

- **23. + 12 COM.**

  This terminal is used in association with terminals 21 & 25 via a volt free contact (normally opened) to activate them.

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.

One 2 Amp 150 Volts volt free change over contact is provided on each relay that 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.
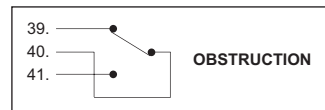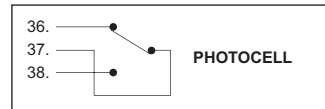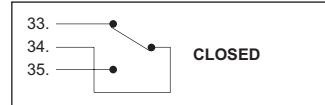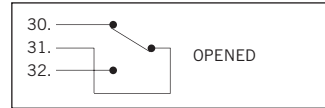
- **Photocell.**
  Led indicator and relay activated when the photocell or the reopening input is operated.

- **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.

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

```
30. ---•
31. ---      •---   OPENED
32. ---•
```

```
33. ---•
34. ---      •---   CLOSED
35. ---•
```

```
36. ---•
37. ---      •---   PHOTOCELL
38. ---•
```

```
39. ---•
40. ---      •---   OBSTRUCTION
41. ---•
```

TEST PUSHBUTTON (50)

Operation of the Test pushbutton will cause a door open or close cycle.

AUTOADJUSTMENT PUSHBUTTON (51)

The Autoadjustment pushbutton is used to set up the doors. The doors will do 3 complete movements at first the doors will close completly, then the doors will open slowly counting the pulses from the encoder built into the drive motor until they reach the open mechanical stop, and after a short delay the doors will close. 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 parameter 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 Safety Detector are made.

CLOSE SPEED (52)

The door closing speed can be independently adjusted from 150 mm/s upto 600 mm/s.

OPEN SPEED (53)

The door opening speed can be independently adjusted from 200 mm/s upto 1.000 mm/s.

SAFETY (54)

This potentiometer is used to set the closing pressure onto an obstacle in the doorway. The closing pressure can be set between 40 and 150 Nw.

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.

MOTOR (56)

Output to the 3 phase motor varying the voltage and frequency to control speed and torque.
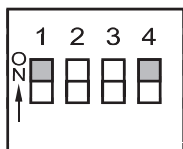
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ON / OFF SWITCH (57)

Disconnects the unit from the 230 Volts AC mains supply.

Caution: **When the supply is switched off, capacitors in the control system will remain charged for a short time. Allow 60 seconds before handling the Control Card or Motor.**

PROGRAMMING EXAMPLES

MASTER: 1 INPUT

- **Configuration**
    1. **ON: 1 Input.**
    2. **Depends on type of door.**
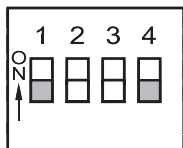   3. **Depends on type of door.**
    4. **ON: Master.**
- **Inputs**
    1. (8) Close. Closes the doors with voltage between terminals 8 & 10. Open the doors when the voltage between terminals 8 & 10 is removed.
    2. (17...20) Photocell. Doors will reopen if the photocell beam is broken.
    3. (21-23) Reopening. Doors will not close if this signal is active.
    4. Obstacle. Doors will 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. 4. (17...20) Photocell.
    2. Obstacle. 5. (8) Close.
    3. (25-23) Slow closing.

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. Priority to close.
    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. Doors 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. 3. (25-23) Slow closing.
    2. (21-23) Reopening. 4. (8) Close

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CHARACTERISTICS PAGE

POWER SUPPLY:

- AC voltage range: 230v +10%, -15%. AC /DC
- Frequency supply: 50...60 Hz.
- Minimum supply: 70 mA, 13W.
- Open door power: 0,6 A 80W.
- Nominal power: 0,93 A 140W.
- Maximum power: 1,38 A 190W.

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:

- Asynchronous three phase: 6 poles.
- Voltage supply: 250 V.
- Power: 250 W.
- Thermic class: B-130°C.
- Nominal speed: 900 RPM.

DOOR:

- Opening speed: Maximum: 1.000 mm/s.
- Closing speed: Maximum: 600 mm/s.
- Safety force: 40...150 Nw adjustable.
- Maintenance torque (opened door): 80 Nw.

INPUTS:

- Impedance: 20 KΩ
- Voltage: 12...230 V AC / DC.

OUTPUTS:

- Contacts: Switched.
- R contact: 50 mW
- Switch time: 5 ms.
- Output current: Maximum: 1,5 A.
- Voltage: 230 V

DINAMICS:

- Open speed: 200...1000 mm/s.
- Close speed: 150...600 mm/s.
- Maximum acceleration: 800...1500 mm/s^2