



DRIVE FOX

(for MICRO operator)

MANUAL



General Information:

The drive is a DC motor actuator reverse controlled by an encoder. It is powered from the mains using a transformer. The drive is controlled by input from a *control board*. Door movement is performed following a programmed speed profile that can be modified by means of a user interface. The user interface is used to define the speed profiles, the stationary torques, the safety-protection activation level, and all of the data relative to the application optimization.

Technical Specification:

Drive	A
Main Power	220 V
Mains protection required	2 A
Peak power absorption	300 W
Emergency power	24 V DC
Power fuse	16 A
Nominal current	13 A
Position and speed reaction	Encoder 200 Impulses/rev.
Green LED	Power On
Yellow LED	Safety reopening system
Red LED	Fault (malfunction)
J1	Motor power phase connector and auxiliary power
J2	Connector for commands from elevator control board
J3	Encoder connector
J4	User interface connector

Installation:

- **Connect the motor power cables and the encoder connector to the drive.**
- **Connect the 220 V mains power**
The drive must be protected with a 2 A fuse or with a circuit breaker with the same rating.
- **Verify that the RIGHT - LEFT or CENTER CLOSING settings of the door are correct:**

Right/center CLOSING door	Left CLOSING door
C1S/R	C1S/L
C2S/R	C2S/L
C3S/R	C3S/L
C2C	
C4C	
C6C	
SEE FIG. 2 + 3 FOR CONNECTIONS	SEE FIG. 2 + 3 FOR CONNECTIONS

NOTE: SET-UP OF THE CLOSING DIRECTION IS PERFORMED IN THE FACTORY PRIOR TO DELIVERY, FOR THIS REASON THIS PARAGRAPH IS ONLY INFORMATIONAL.

The following 3 elements must be taken into consideration:

- Motor with encoder and thermostat
- Terminal board on operator transmission group
- Connection cable between motor, drive and relative terminal boards

FIG. 2 illustrates the traction group applied on the operator and the relative terminal board. The connection between the motor and this terminal board is performed in the factory and takes into consideration the closing side of the door, as shown in detail in **FIG. 2**.

If the wiring is faulty (wrong closing direction) the drive will not be able to distinguish opening and closing direction of the door correctly.

FIG. 1



FIG. 2

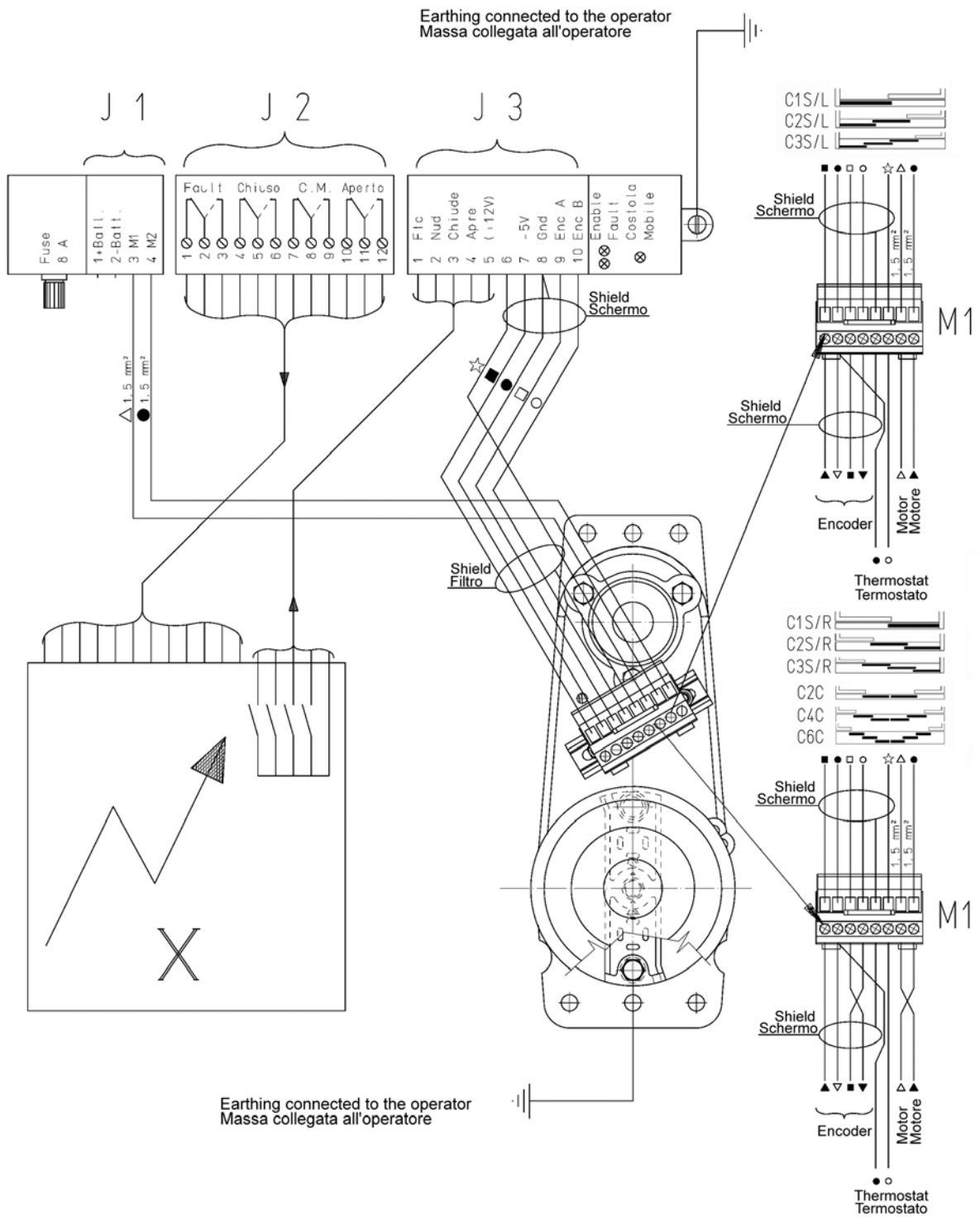


FIG. 3

WARNING!
 The colors from the motor to the M1 terminal may not correspond to those connecting M1 terminal board to the drive. There are two possible reasons:

1. The direction of opening requires inversion of the wiring.
2. The cable of the encoder may vary based on the market availability

Terminals (J3)-5 / (J3)-4 and (J3)-5 / (J3)-3 must **NOT** be powered since the power is already available on the drive. The terminal 5 is the common one for Terminals (J3)-1, (J3)-2, (J3)-3, (J3)-4 and must be a clean contact.

	X	CONTROL BOARD
J1		ENGLISH
	1	1 BATT. (-)
	2	2 BATT. (+)
	3	M1
J2	4	M2
	1	FAULT
	2	
	3	
	4	CLOSED (DOOR CLOSED)
	5	
	6	CM= SAFETY REOPENING SYSTEM
	7	
	8	
	9	OPEN (DOOR OPEN)
	10	
	11	
J3	12	
	1	PHOTOCELL
	2	NUDGE
	3	CLOSING
	4	OPENING
	5	+12 v
	6	
	7	+5 V
	8	GND
	9	ENCODER CHANNEL A
10	ENCODER CHANNEL B	

Encoder on Drive side	■	Yellow	
	●	Brown	
	□	Green	
	○	White	
Encoder on Motor side	▲	Red	
	▽	Black	
	■	Yellow	♣
	▼	Violet	
Motor	△	Blue	Sec. 1.5 mm ²
	●	Brown	Sec. 1.5 mm ²
Thermostat on Drive side	☆	Gray	
Thermostat on Motor side	○	White	
	●	Brown	(earthing)

♣ Invert according to closing direction

Detection of *Point 0*:

When the door is powered, it starts to close slowly until it reaches the mechanical stops, thus causing the current to rise. This position will be recognized as *Point 0*. The drive will only test the inputs from the *self-learning* commands and the *default loaded parameters*, ignoring any command from the control board of the elevator. Following the self-learning, the drive will supply the *End of Run Closing* signal and will automatically put itself in the stationary torque status, waiting for commands from the control board.

NOTE:

DURING THIS PHASE, MAKE CERTAIN THAT THE TRAVEL OF THE DOOR IS NOT INTERRUPTED BY ANY OBSTACLES AND THAT THE ACQUIRED *POINT 0* EFFECTIVELY CORRESPONDS TO FULLY CLOSED DOORS, INCLUDING THE EXTRA TRAVEL OF THE TOOTH BELT TO CLOSE THE COUPLING CAM FOR FULLY AUTOMATIC DOORS. OTHERWISE REPEAT THE OPERATION.

Commands from the control board of the elevator:

➤ **OPENING:**

Door opening must be controlled by the elevator control board by closing terminals **(J3)-5** and **(J3)-4**, or using the command on the programming pad (user interface).

The opening command from the elevator control board must stay on during the entire opening phase; if not, the door will stop and wait for a new command. In this state, it is possible to intervene manually on the door.

The opening command is ignored in the following instances:

- *Point 0* search phase
- Self-learning phase
- When the door closing command is active

For the door opening command to be accepted during the closing phase it is necessary to interrupt the *door close* command.

The opening command is void if the following commands are active:

- Alarm on
- Door closing with Nudge
- Door closing command from the programming pad (user interface)

➤ **CLOSING:**

Closing of the door must be controlled by the elevator control board by closing terminals **(J3)-5** and **(J3)-3**, or using the command on the programming pad (user interface).

The closing command from the elevator control board must stay on during the entire closing phase; if not, the door will stop and wait for a new command. In this state, it is possible to intervene manually on the door.

The closing command is ignored in the following instances:

- *Point 0* search phase
- Self-learning phase
- When the door opening command is active

For the door closing command to be accepted during the opening phase it is necessary to interrupt the *door open* command.

The closing command is void if the following commands are active:

- Alarm On
- Door closing with Nudge
- Door opening command from the programming pad (user interface)
- Safety reopening system is activated
- Reopening command from the photocell

➤ **Nudging:**

In this mode, the drive performs a forced closing of the door with a safety torque that must be set by the installer according to the norm EN 81.1/2 and at a constant speed of 1 m/min ignoring both the photocell and the safety reopening system until the door is completely closed. The function is controlled by closing terminals **(J3)-5** and **(J3)-2** and only remains active while the command stays on.

Nudge may be commanded during the open stationary state and while the door is in movement.

If the command is interrupted prior to complete closing of the door, the drive performs the opening or closing command coming from the elevator control board. Should this command not be present, the door will remain still, waiting for command.

➤ **Photocell:**

This function is only enabled during the closing phase.

Closing of terminals **(J3)-5** and **(J3)-1** causes the door to reopen according to the speed profile set for the estimated position and the drive will not accept any door closing commands.

➤ **SAFETY REOPENING SYSTEM**

This function is only enabled during the closing phase.

The presence of an obstacle between the closing doors will cause a rise in the current. Exceeding the level of the set torque limit causes the doors to reopen following the speed profile set for the estimated position.

User interface:

The programming pad (user interface) is made up of a keyboard with 4 buttons (**▲**, **▼**, **Enter**, **Esc**) and an alphanumerical display (with 16 characters on two lines) and communicates with the drive via a **RS232** serial connection (Connector **J4**).

FIG. 4



FIG. 5



Using the **▲** and **▼** buttons it is possible to select the commands to give to the drive and confirm them by pressing the **ENTER** button.

Once the new parameters have been set, return to the **COMMAND** function. Use the **▲** and **▼** buttons to select the **SAVE** command and press **ENTER** to save the new parameters.

It is possible to perform a single save after modifying more than one parameter, even for a number of functions (“Open”, “Close”, etc.).

If this operation is not performed, should the drive be turned off and then back on, the new parameters will be lost and the values will reset to the previously memorized ones.

When the user interface is connected to **J4** terminal, it recalls the current drive parameters in use and makes them visible to the user for checking or changes.

When turned on, “**Prisma**” will appear on the alphanumerical display on the keyboard. By pressing **▲** or **▼** the interface menu is activated.

The interface is structured with 5 main menu levels:

➤ **Language**

Using the ▲ and ▼ buttons it is possible to choose the desired language and confirm it using **ENTER**, thus immediately switching to the newly selected language. This selection can be saved using the **SAVE** command in the command menu.

➤ **Commands**

- The commands **Open** and **Close** have priority over the elevator control board commands and open and close the door immediately.
- The **Save** command causes all of the data handled by the interface to be saved in the permanent memory of the drive.
- The **Default** command replaces all the current data in use with the original factory settings, except for the security torque, which remains as set by the operator.
- The recalled default parameters will be saved in the permanent memory of the microprocessor (Eeprom) only if confirmed using the **Save** command.

Default Parameters		TELESCOPIN G CLOSURE	CENTRAL CLOSURE	
Position	A-Ap	2	2	Initiate opening acceleration ramp
Position	B-Ap	12	12	End opening acceleration ramp
Position	C-Ap	80	80	Initiate opening deceleration ramp
Position	D-Ap	95	95	End opening deceleration ramp
Position	Z-Ch	3	3	Initiate skate closing ramp
Position	A-Ch	5	5	End closing deceleration ramp
Position	B-Ch	25	30	Initiate closing deceleration ramp
Position	C-Ch	95	95	End closing acceleration ramp
Position	D-Ch	100	100	Initiate closing acceleration ramp
Speed	vA-Ap	5	3	Skate opening speed
Speed	vH-Ap	70	50	Maximum opening speed
Speed	vZ-Ap	5	5	End opening speed
Speed	vA-Ch	4	4	End closing speed
Speed	vH-Ch	45	30	Maximum closing speed
Speed	vZ-Ch	5	1	Initial opening speed
Limit Torque		60	60	NOTE: The parameter Z-Ch, in the case of an operator without mobile coupling cam, may be reduced to 1.
Open stationary torque (Wait Torq. Op.)		40*	40*	
Closed stationary torque (Wait Torq. Cl.)		40*	40*	
Maximum torque		80	80	
Security torque		70	70	

***Warning**, the values of the open stationary torque and of the closed stationary torque must be set so that the **1 A motor absorption limit is not exceeded**.

The value of the Maximum Torque must be at least 5 points higher than that of the Security Torque.

NOTE:

The parameters relative to the **torque** are expressed in **hundredths of 20 A**. The set parameters are expressed in **values of percentage of clear opening of the door** (for example with a door width of 900 mm, the parameter 60 = 540 mm from the beginning of the run).

The parameters relative to the **reference speeds** are expressed in **percentage of the maximum speed that the system can reach starting from Point 0**.

- The **Self-learning** function must be set-up by the installer on installation of the drive. This operation is required in order to have the drive register the number of encoder impulses corresponding to the door clear opening. The door closes slowly until it reaches the mechanical stops (*Point 0*) and then slowly opens and searches for the point of maximum opening. The drive ends the self-learning process by storing the door clearance data in its permanent memory, and the door remains open, waiting for a command. During this phase, make certain that the travel of the doors is not interrupted by obstacles and that the *Point 0* memorized effectively corresponds to the complete closed doors. Otherwise, repeat the operation.

NOTE: The self-learning command is automatically performed by the drive when turned on if it detects the presence of a brand-new or damaged EEPROM, or if the wiring setting the direction of movement of the door has been reversed (see Installation).

➤ Opening Profile and Closing Profile

FIG. 6 – Parameters for managing the OPEN settings

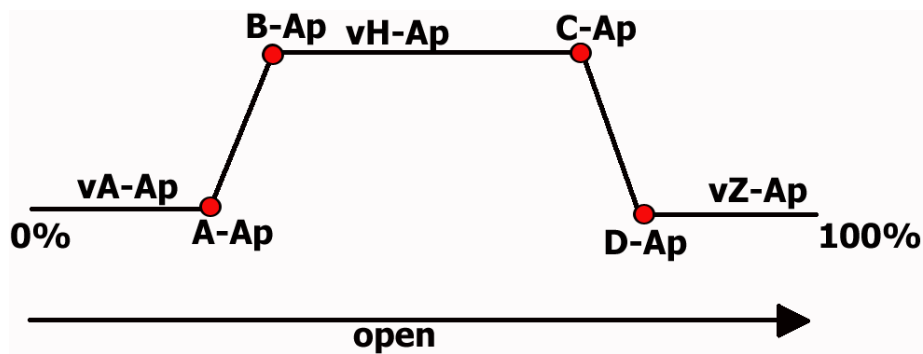
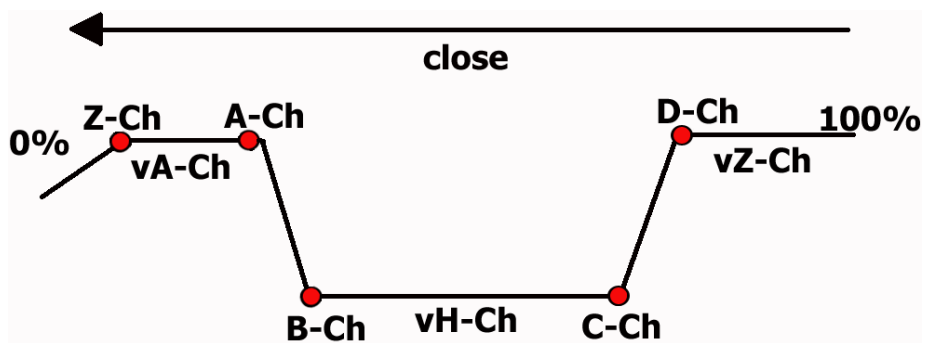


FIG. 7 - Parameters for managing the CLOSE settings



The parameters managed by these two menus allow to change the profiles of the door movement, shifting the position of the starting point of the acceleration and deceleration ramps and the relative speeds.

It is possible to select the various points in the opening and closing profiles using the ▲ and ▼ buttons. On the programming pad display first the positions and then the speeds are shown. Press the **ENTER** button to access the function indicated on the programming pad display: the parameters saved in the drive will start to blink on the display. Using the ▲ and ▼ buttons it is possible to change the parameter (decreasing it or increasing it). Use the **ENTER** button to confirm and save the newly selected value.

EXAMPLE: To modify the parameter **B-Ap** from 12 to 15, go to the function **OPEN PROFILE** using the ▲ and ▼ buttons. Press **ENTER**. The value 12 will start to blink. Using the ▲ button, increase the value to 15. **Wait for the door to either be open or closed and then press ENTER once again.**

The new parameter is already saved, but not permanently. In fact, should there be a power outage, the value will be lost and the default stored parameters will be restored.

To be certain not to lose the changed parameter (for example due to a black-out), using the ▲ and ▼ buttons select the function **COMMANDS** and press **ENTER** to enter the selection menu. Using the ▲ and ▼ buttons again, go to the **SAVE** position. Press **ENTER** and the new parameter is recorded in the permanent memory. **It is possible to perform a single save after modifying more than one parameter, even with a number of functions (“Open”, “Close”, etc.).**

NOTE:

All of the parameter modification operations may be performed with the door in movement. However, they must be saved (using the **ENTER** button) while the door is completely still (either open or closed).

If saving of the changes is made while the door is moving, **“ERRORE PROTOCOLLO”** (protocol error) will appear on the programming pad display.

In this case, wait for **“ERRORE PROTOCOLLO”** (protocol error) to disappear and repeat the operation with the door is open or closed.

➤ Auxiliaries

The auxiliary parameters are represented by five references of current expressed in hundredths of 20 A.

- **Maximum Torque**

This represents the maximum torque that the drive can dispense according to the requested speed profile.

- **Limit Torque**

This represents the level of current that must be exceeded in order to acquire the status of completely open or completely closed door, so that the drive will set itself to the relative stationary torque.

- **Stationary opening torque (Wait Torq. Op.)**

and

- **Stationary closing torque (Wait Torq. Cl.)**

They allow to set the pushing force needed to keep the door either open or closed.

- **Security Torque**

The security torque is used as a limit level for the Safety Reopening System, the Nudging and as limit during the first detection of the Point 0.

Protection and alarm signals

➤ Short circuit:

This type of protection is always present in each phase of operation and cannot be deactivated. It protects the phases of the motor from short circuits or damage to the power stage.

Whenever the protection is active the Red LED turns on; all the relays will be disconnected.

It is possible to exit from the Fault state only by removing and restoring power to the drive. If the fault status remains, disconnect the motor. If the fault status continues, it means that the drive has incurred permanent damages and must be replaced.

➤ **Thermal Protection of the IxT motor:**

This function is always active and protects the motor from overloads due to mechanical hardening or obstacles that impede the normal path of the door.

If the current absorbed by the motor is higher than the set level (5 A) for more than 7 sec., the driver will be disabled and remains paused for 15 sec. and it will then close the door in Nudging mode. If closing fails and the current is higher than 5 A again, the cycle described above will be repeated. After a third failed attempt, the driver will enter the Fault state. If the obstacle is removed, after one regular cycle the count will be zeroed.

➤ **Thermal Protection of the motor:**

A temperature sensor is located on the motor. If the temperature measured exceeds 60 °C, the driver will enter the fault state. To reactivate it, a manual reset is necessary (remove and restore power).

➤ **Emergency power:**

By connecting the terminals (J1)-1(+) and (J1)-2(-) to a 24 V (7 A/h min.) battery, the drive can perform all of the normal functions with a reduced maximum speed.

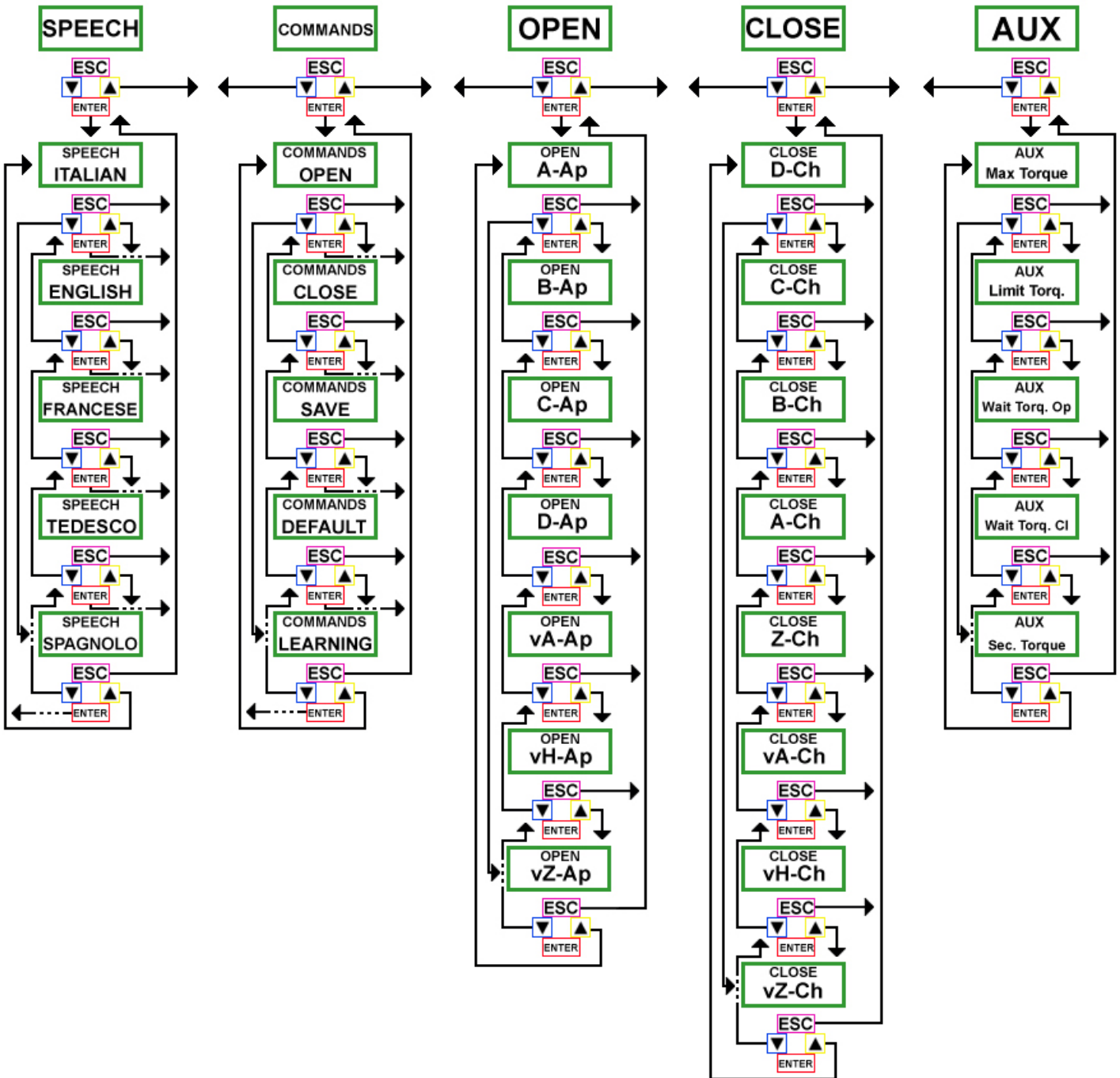
WARNING!

With the door still, completely open or completely closed, the motor continues to absorb the stationary torque from the battery. This means that, in the case of a long power outage, the battery may completely discharge, sustaining damages.

For drives with release letter "/A" it is recommended that a relay be installed that will interrupt the power of the drive 5 to 10 minutes after the start of the power outage.

For drives with a release letter other than /A (B/C/D/E...) the system of recharging and temporary exclusion of the battery is automatically included in the drive.

FIG. 8 – QUICK REVIEW OF THE FUNCTIONS OF THE PROGRAMMING PAD (USER INTERFACE)



NOTE:

All of the parameter modification operations may be performed with the door in movement. However, they must be saved (using the **ENTER** button) while the door is completely still (either open or closed).

If saving of the changes is made while the door is moving, “**ERRORE PROTOCOLLO**” (protocol error) will appear on the programming pad display.

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