

BOX L DC1D

UNIVERSAL MOTOR CONTROLLER

For one motor doors at 24 VDC

INSTRUCTIONS MANUAL

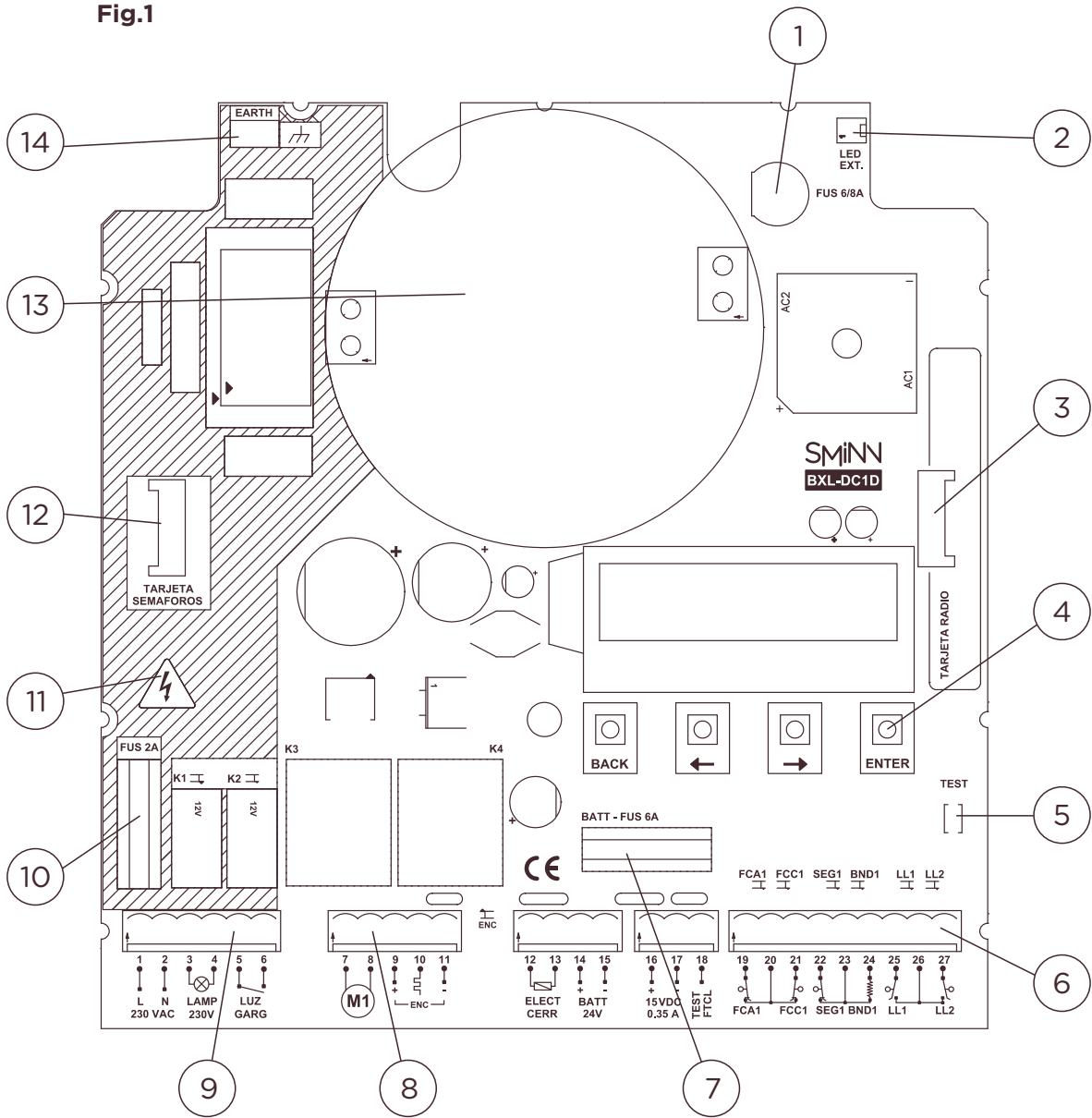


SMiNN

innovative in electronics

COMPONENTS SITUATION

Fig.1












- | | |
|---------------------------|--------------------------------|
| 1. VDC power fuse | 8. DC motor terminal strip |
| 2. Box cover LED terminal | 9. Power input terminal strip |
| 3. TRSH radio card slot | 10. Power fuse |
| 4. Configuration keyboard | 11. High voltage zone |
| 5. TEST start button | 12. Semaphore card slot |
| 6. Terminal strip | 13. Earth fast-on terminal |
| 7. Battery fuse | 14. Toroidal power transformer |

INDEX

Description	2
Limitations on the use of motor controllers	2
Warnings	2
Installation	3
Important safety instructions for installation	3
Important safety instructions for usage	3
Wiring	4
Setup	6
Door types	7
Operating modes	7
Normal functionality of securities ..	7
Electrical wiring diagram	8
Photocell power wiring.....	8
Accesories and peripherals	9
Learning maneuver	10
Options	11
Timings	12
Maintenance	13
Force diagram	13
Warranty	14
Waste of electrical and electronic devices	14
Features	15
CE declaration of conformity	15
Notes	16
Error messages	16
Parts explosion	17

Simbols

DC Motor
Encoder pulses
Flash lamp
Electrolock
Safety edge
Normally close contact
Normally open contact
Earth
High voltage zone

FEATURES

The BXL-DC1D universal motor controller is designed to be part of a gate automation system for swing, rising, sliding, or overhead gates of one electromechanical 24VDC engine.

Among other features the motor controller provides:

- Control 1 motor of 24VDC - 120W max.
- Automatic activation of the motor relays and lights without spark.
- Independent connection terminals for motor and encoder.
- Independent regulation of the power applied to the motor both in startup, maneuver and stop.
- Quick maneuver learning to ease installation.
- Limit switches control.
- Independent terminals for light barrier and safety edge with safety test option conforming to regulations.
- Connection to electric lock, garage light (impulsive or latched) and beacon light.
- Two independent key inputs for complete and pedestrian maneuvers.
- Connection sockets for radio card and SMINN semaphore card.
- Status LEDs for all the inputs and outputs.
- Peripheral power output with resettable fuse.
- Optocoupled inputs with high electrical insulation.
- Intuitive menu using a keyboard and LCD that eases the configuration and maintenance of the panel.
- Ability to protect the configuration with a password.
- Storage of the number of maneuvers and security failures to ease the maintenance.

MOTOR CONTROLLER USAGE RESTRICTIONS

Operation is not guaranteed when installed in different equipment than the specified.

The manufacturer reserves the right to change the specifications of these systems as well as this manual without prior warning. The equipment must be manipulated only by specialized and/or skilled personnel.

WARNING

This product must be used in installations which has been conceived for, considering any other as improper use. The packaging must not be dumped in the environment. Keep products, packaging, wrapping, documentation, etc., out of the reach of children. Follow the current local, national or European regulations. The information contained in this document may have some mistakes that will be corrected in future editions. The manufacturer reserves the right to modify the contents of this document or the product without any prior warning.

THE USAGE INSTRUCTIONS OF THIS DEVICE SHALL BE HANDED TO THE USER, WHO WILL HAVE THEM IN THEIR POSSESSION. IF THEY ARE MISLAID, THE USER CAN ASK FOR A COPY OR DOWNLOAD IT DIRECTLY FROM THE WEBSITE WWW.SMINN.COM

INSTALLATION

The motor controller is fixed to the wall with just 3 screws, all of them external. See fig.3

Make three holes in the wall following the printed cutout template at the bottom of the cardboard box.

Cut the cable glands located at the bottom of the case and pass through them the wiring tube inside the case.

See the IMPORTANT SAFETY INSTRUCTIONS FOR INSTALLATION.

Connect the power supply, motor and device cables to the terminals of the terminal strip as indicated in the printed circuit board. See fig 1.

After activating the power supply, the ON led will switch on . See fig.1

Set up the timings and configuration of the board.

IMPORTANT SAFETY INSTRUCTIONS FOR INSTALLATIONS

Before installing the panel you should:

- Check that the door/shutter is in good mechanical condition and well balanced.
- Remove from the surroundings anything that is not needed and turn off AC power (VAC).
- Install the motor controller at a minimum height of 1,5m, preferably next to the door.
- Use power and motor cables of enough gauge.
- Power the board through a circuit breaker or security switch that can be easily reached by the end user.

The European regulations for doors EN 12453 and EN 12445 specify the minimum protection and safety levels for doors installed in houses and community and public facilities.

Collision with any object must be prevented or the contact force must be limited (safety edge), and in the case of automatic cycle, a presence detector must be used too (i.e. light barrier).

With the LED associated to each one of these inputs.

Check that the limit switches, and if installed, the light barrier and the safety edge, are all working. See fig. 1

Make sure the safety edge is not activated when the door/shutter is fully closed.

Press the TEST button (fig.1) to start an opening maneuver. If the motor doesn't move its connection could be reversed. Correct it and repeat this step.

SMINN MOTOR CONTROLLERS ARE EQUIPPED WITH A LED TO LET KNOW IF THE DEVICE IS POWERED.

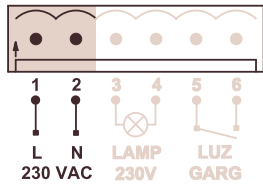
IMPORTANT SAFETY INSTRUCTIONS FOR USAGE

Once the controller is installed, as a prevention measure, the user must:

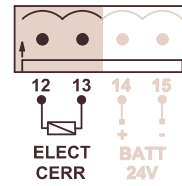
- Keep the controller out of reach of children.
- Observe that there are no objects or people in the way when the gate is moving.
- You must take precautions when handling the gate manually (unblocked) because it can move without control, due to its own weight, the state of fixing points, springs and counterweights.

If you detect a malfunction of the system, call IMMEDIATELY the technical service. You must not use the mechanism as it can cause damage.

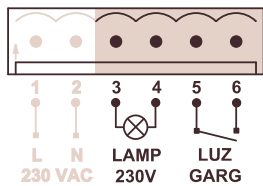
CONNECTIONS



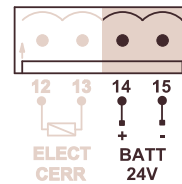
The motor controller is powered with 230VAC 50Hz through terminals 1 and 2 and the ground connection is made in the FAST-ON connector located at the top left of the motor controller, marked EARTH.



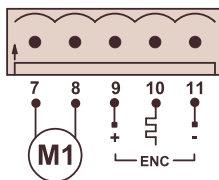
Use the terminals 12-13 to connect a 12V/24VDC - 1A electric lock. The controller can be set to activate the lock when opening and has options like "Reversing stroke" and "Final stroke".



If desired, connect a 230VAC - 40W lamp in the terminals 3-4 to act as a maneuver beacon. It is also possible to activate the garage light or turn on a temporization device using the terminals 5-6.

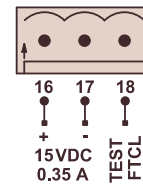


Terminals 14 and 15 are used to connect an optional 24V battery (or 2 12V batteries in series) for emergency maneuver. This connection will charge the battery with up to 150mA.

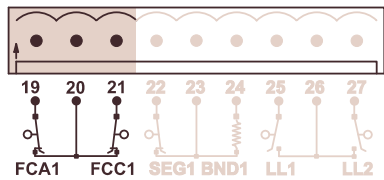


The motor controller can handle an 24DC electromechanical with encoder. The 7 and 8 terminals are used for motor connection.
 Term. 9: Encoder 5V power
 Term. 10: Encoder pulses
 Term. 11: Encoder power ground

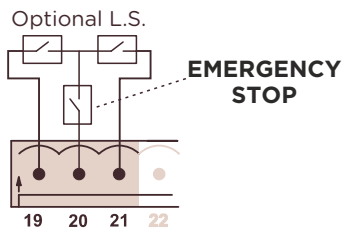
Note: If the motor has no encoder the terminals 9, 10 and 11 will be left disconnected.



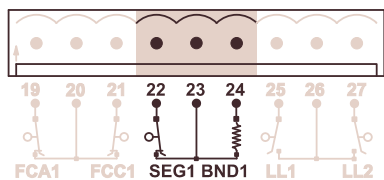
The board has a peripheral power output of 15VDC - 3,5VA in the terminals 16 and 17 protected with a resettable fuse designed to power devices like light barriers. Also, terminal 18 is used as an specific negative for light barrier test. According to regulations.



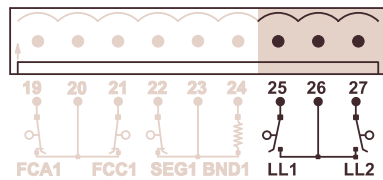
The board has specific inputs for opening and closing limit switches. The contacts are normally closed and have a shared common to ease installation.



It is possible to install an emergency stop button breaking both limit switches at the same time. See options menu.



The controller can manage light barriers and a safety edge. The safety edge input can be set to manage a second light barrier or any kind of safety edge (resistive or contact). Light barriers must always be normally closed. See options.



Use the terminals 25-26 to connect a switch that starts a complete maneuver and the terminals 26-27 to connect another switch for pedestrian maneuver or closing.



The radio socket can be used to connect an SMINN radio card, allowing the controller to be used with radio transmitters.



The semaphore card socket allows the board to manage, via an SMINN semaphore card, a two light semaphore and optionally use the red light as a maneuver beacon.

CONFIGURATION

The controller has an advanced menu system using an integrated keyboard and backlit LCD display to make configuration and maintenance easy, fast and intuitive.

Press the BACK and ENTER keys simultaneously to access the configuration menu. The LCD backlight will power on.

There are 4 keys to move through the menu:

- BACK (exit)
- ENTER (accept)
- <- (back)
- > (forward)

The <- / -> keys, are used to move through the selected menu options or settings.

The ENTER key is used to accept and validate the selection.

The controller has a configuration wizard that allows the installer to set up the most important configuration parameters and get the board working faster.

To use the wizard, go into the main menu pressing BACK + ENTER, press → until “MANEUVER PROG” is shown in the screen and accept pressing ENTER.

After this, the controller will ask one by one the most important configuration parameters to the installer. Please choose the appropriate settings using ← and → and press ENTER to continue or BACK to go back.

Once the needed configuration is done, the controller will prompt the installer to press ENTER to start the learning maneuver.

From here on the ENTER key, the LL1 input or a radio transmitter can be used for the learning process.

CONFIGURATION MENUS

OPTIONS

- Automatic closing
- Fast beam closing
- Optional Automatic
- Invert on Key
- Partial times
- Limit switches
- Light Barrier / Light Barrier Test
- Light Barrier Mode
- Band type
- Band mode
- Pressure Mode
- Hardware short-circuit
- Electrolock Type
- Soft stop enabled
- Close on boot
- Flashing semaphore
- Auxiliary dead-man
- Encoder / Time Encoder
- Limit switch Stop
- Switch 1 / Switch 2 lock

ADJUSTMENTS

- Opening time / Pedestrian
- Closing time / Pedestrian
- Extra time
- Automatic closing / pedestrian
- Close on beam
- Dirac. change time / inversion
- Electrolock / reverse stroke
- Power
- Soft stop
- Final stroke time
- Preflashing / Garage light
- Pressure sensibility
- Pressure limit
- Overcurrent limit

MAINTENANCE

- Version
- Partial / Total counter
- Input status
- Open / Close
- Default values
- Enable / Change password

PROGRAMMING WIZARD

DOOR TYPES

The controller can be set up for four different kind of gates.

- **SWING**
- **RISING (Vertical)**
- **OVERHEAD**
- **SLIDING**

OPERATING MODES

In all the modes securities worked as shown in the attached chart except when indicated otherwise.

The STOP input stops instantaneously the maneuver.

STANDARD

In this mode LL1 and radio starts a full maneuver and LL2 starts a pedestrian maneuver. It is not possible to interrupt the opening in this mode.

OPEN/CLOSE

In this mode LL1 opens and LL2 closes. Any of these signals interrupt the current maneuver immediately.

ALTERNATING STOP

In this mode LL1 and radio starts a full maneuver and LL2 starts a pedestrian maneuver. It is possible to interrupt the maneuver using any of these inputs; when the gate is moving any input will make it stop, when it is stopped any input will make it go the other way.

DEAD MAN

This mode only allows the gate to move while the LL1 input or radio are active (open) or the LL2 input is active (close). The maneuver interrupts immediately when there is no active input.

In this mode securities only pause the maneuver.

SEMI-AUTOMATIC DEAD MAN

The gate opens fully when the LL1 input or radio are active but only allows closing while the LL2 input is kept active. Securities function normally while opening and only pause while closing.

NORMAL FUNCTIONALITY OF SECURITIES

CLOSING LIGHT BARRIER



Closing: Inverts the maneuver
Opening: Nothing

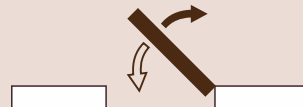
CLOSING SAFETY EDGE



Closing: Inverts 3 seconds and stops
Opening: Stops immediately



OPENING LIGHT BARRIER



Closing: Inverts the maneuver
Opening: Pauses the maneuver



OPENING SAFETY EDGE



Closing: Stops the maneuver.
Opening: Inverts 3 seconds and stops

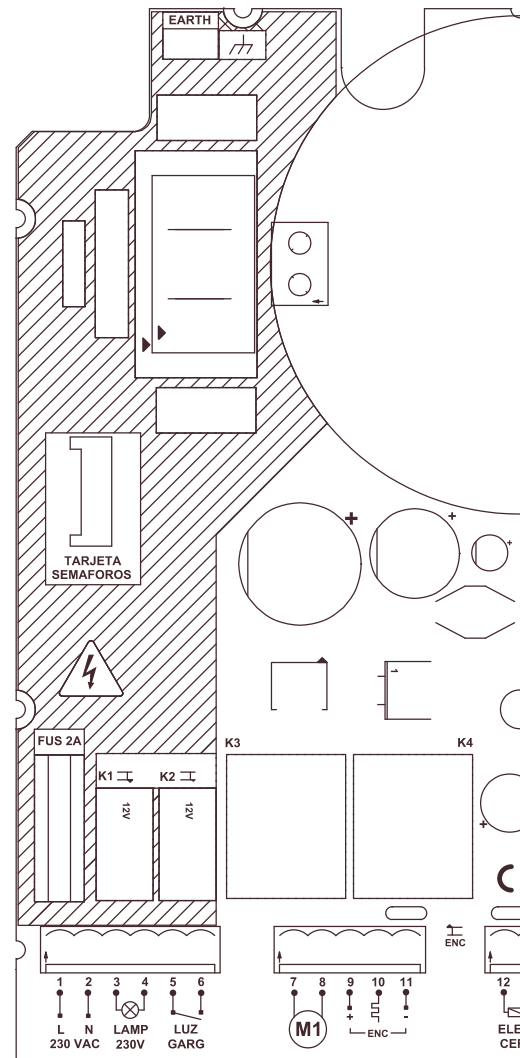


After STOP or a safety edge collision the next maneuver inverts direction.

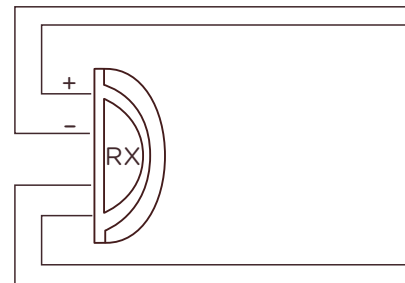
ELECTRICAL CONNECTIONS

1	230VAC phase
2	230VAC Neutral
3	Beacon light 230V 40W
4	
5	POTENTIAL FREE relay contacts for garage light or auxiliary lamp.
6	
7	Motor Connection 24VDC
8	
9	+ Encoder power
10	Encoder signal
11	- Encoder power
12	Electrolock 12/24 VDC
13	
14	+ Battery
15	- Battery
16	Positive VDC power for light barriers and other peripherals
17	Negative VDC power for light barriers and other peripherals
18	Negative power output for light barrier with autotest
19	NC opening limit switch
20	Limit switch common
21	NC closing limit switch
22	NC light barrier contact
23	Securities common
24	R8K2/NC contact for safety edge
25	Start complete maneuver input
26	Start/Stop common
27	Pedestrian start / dead-man input

Fig.2

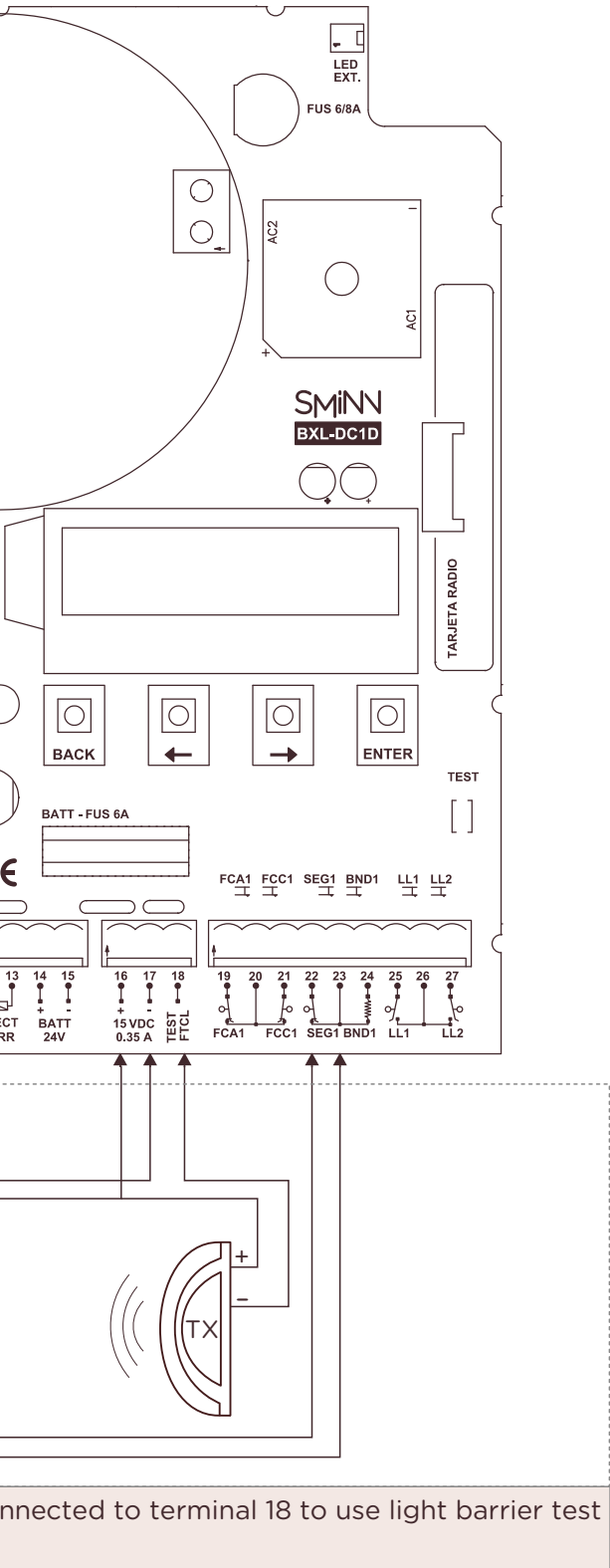


LIGHT BARRIER POWER CONNECTIONS

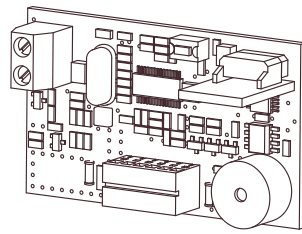


Light barrier transmitter negative must be connected to common ground.

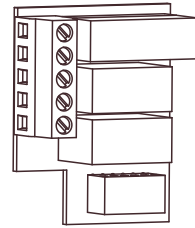
ACCESORIES AND PERIPHERALS



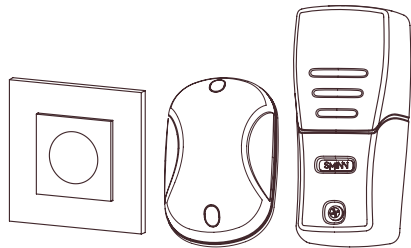
connected to terminal 18 to use light barrier test



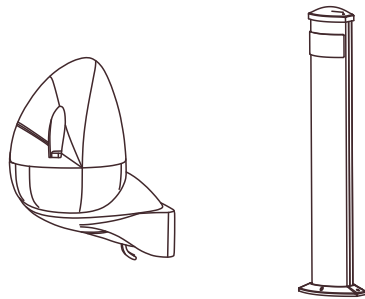
Radio card



Semaphore card



Transmitter-receiver light barrier set



Beacon light and light barrier stand

ESPAÑOL

ENGLISH

FRANÇAIS

ITALIANO

PORTUGUÊS

DEUTSCH

NEDERLANDS

LEARNING MANEUVER

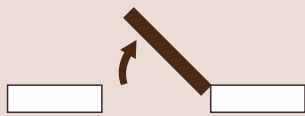
The learning maneuver is useful to set the temporization parameters of the controller. It is different depending on whether slow stop has been activated or not.

LEARNING WITHOUT SOFT STOP

Close door



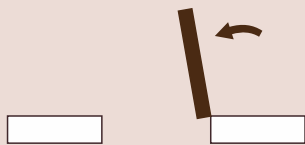
Press ENTER to learn opening



Press ENTER to stop the gate or wait for opening limit switch (FCA)



Press ENTER to learn closing



Press ENTER to stop the gate or wait for closing limit switch (FCC)



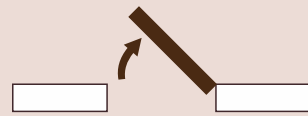
Gate closed

LEARNING WITH SOFT STOP

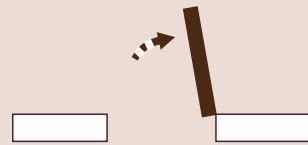
Close gate.



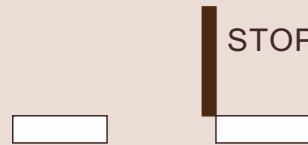
Press ENTER to learn opening



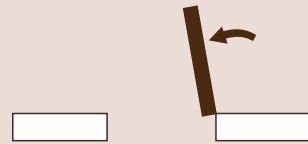
Press ENTER for soft stop



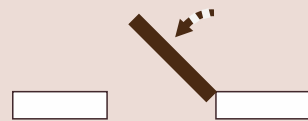
Press ENTER to stop the gate or wait for opening limit switch (FCA)



Press ENTER to learn closing



Press ENTER for soft close



Press ENTER to stop the gate or wait for closing limit switch (FCC)



Gate closed

OPTIONS

	LCD TEXT	DEFAULT VALUE
AUTOMATIC CLOSING Enables automatic closing after pause time	AUTO CLOSE	YES
FAST BEAM CLOSING If the maneuver inverts because of a light barrier the pause time is reduced to the one set in Close on Beam	FAST BEAM CLOSE	NO
OPTIONAL AUTOMATIC Allows to end the pause time prematurely	OPTIONAL AUTO	YES
AUTO DELAY ON KEY Reinicia el tiempo de pausa con cada orden de maniobra Only visible with Opt. Auto Closing off	AUTO DEL KEY	NO
INVERT ON KEY Allows to invert the maneuver in STANDARD mode	INVER ON KEY	YES
PARTIAL TIMES Invert as much times as the gate has closed plus extra time	PARTIAL TIMES	NO
LIMIT SWITCH Enables the inputs for limit switch	FCA1 FCC1	YES YES
LIGHT BARRIER Enables management of light barrier	BEAM	NO NO
LIGHT BARRIER TEST 1 - LIGHT BARRIER TEST 2 Enables autotest for light barrier before maneuver	TEST BEAM 1 TEST BEAM 2	NO NO
LIGHT BARRIER MODE 1 - LIGHT BARRIER MODE 2 Configures behavior of each light barrier when opening / closing Opts.: NOTHING / PAUSE / INVERT / STOP / SHORT INVERT	BEAM 1 OPEN BEAM 1 CLOSE BEAM 2 OPEN BEAM 2 CLOSE	NOTHING INVERT PAUSE INVERT
EDGE Enables the input for a closing safety edge. Its supports 8K2, NA or NC safety edge or NC light barrier. Options: NO / R8K2 / NA / NC / BEAM	EDGE	NO NO
SAFETY EDGE MODE / IMPACT MODE Configures behaviour of security when Opening / Closing Options: NOTHING / STOP / SHORT INVERT / INVERT	EDGE OPEN EDGE CLOSE PUSH OPEN PUSH CLOSE	STOP SHORT INV. SHORT INV. SHORT INV.
SHORTCIRCUIT HARDWARE SENSOR Enables the fast detection of short circuit	HW SC TRIP	YES
ELECTROLOCK TYPE Voltage to apply on the electrolock. 12V or 24V	ELOCK TYPE	12V
SOFT STOP Soft Stop enabled	SOFT STOP	YES
CLOSE ON BOOT When the controller is powered on it initiates a closing maneuver if the closing limit switch is not active.	CLOSE ON BOOT	NO
FLASHING SEMAPHORE Use the red light as maneuver beacon	FLASHING SEM.	NO
AUXILIARY DEAD MAN If the light barrier test fails the controller sets itself in dead-man mode temporarily so the gate can be opened securely.	AUX DEAD MAN	YES
ENCODER Maneuver control via encoder	ENCODER	NO
TIME ENCODER Simulates an encoder counting pulses considering time and power. Maneuver invert timings are more precise but it requires similar speed when opening and closing	TIME ENCODER	NO
STOP IN LIMIT SWITCHES Enables the emergency stop breaking the limit switches	STOP LIM SW	YES
SWITCH 1 LOCK - SWITCH 2 LOCK Locks the switch 1 / 2 Only visible when password is enabled	LL1 LOCK LL2 LOCK	NO NO

ESPAÑOL

ENGLISH

FRANÇAIS

ITALIANO

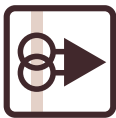
PORTUGUÊS

DEUTSCH

NEDERLANDS

ADJUSTMENTS

	LCD TEXT	DEFAULT VALUE	ADJUSTMENTS
Leaf open time	LEAF 1 OPEN	15 sec.	1-240 sec.
Pedestrian leaf open time	PEDESTR. OPEN	5 sec.	0-120 sec.
Leaf close time	LEAF 1 CLOSE	15 sec.	1-240 sec.
Pedestrian close	PEDESTR. CLOSE	5 sec.	0-120 sec.
Extra time	EXTRA TIME	0 sec.	No/1-50 sec.
Automatic close time	AUTO CLOSE	60 sec.	1-360 sec.
Pedestrian automatic close time	PED. AUTO CL.	20 sec.	1-240 sec.
Lightbarrier close time	CLOSE ON BEAM	0 sec.	2-240 sec.
Short inversion time	SHORT INV. T.	2 sec.	1-240 sec.
Electrolock time	ELECTROLOCK	0 sec	2-10 sec
Reversing stroke time	REVERS. STROKE	0 sec.	0-5 sec.
Power	POWER	75%	30-90%
Soft stop power	SOFT POWER	40%	30-90%
Final stroke	FINAL STROKE	0 sec.	0-3 sec.
Preflashing time	PREFLASHING	2 sec.	0-10 sec.
Garage light time	GARAGE LIGHT	120 sec.	0-240 sec.
Push current sensitivity	M1 SENSIB.	3	0-9
Push current limit	M1 PUSH. LIM.	3A	0-20A
Overcurrent limit	M1 OC. LIM.	5A	0-25A



Note: The motor controller has a precision current sensor that monitors the motor current displaying in real time the instant current and the overcurrent limit.

3 different securities may be set for the maneuver:

- **Pressure sensitivity:** The controller analyses the difference in motor current between normal movement and an obstacle, acting like a configurable security that can be set in the adjustments menu.

- **Impact current limit:** A motor current limit can be set helping to guarantee motor life against steep impacts or gate mechanical problems.

- **Overcurrent limit:** This security cuts current to the motor when a shortcircuit or overcurrent happens, helping to protect the power supply and the controller electronics.

MAINTENANCE

This menu can be used to check the maneuver counters, input status, password configuration and doing factory reset.

PARTIAL COUNTER

It shows the total number of maneuvers since the last reset. Pressing ENTER on this option you can reset the partial meter, starting at 0.

TOTAL COUNTER

Displays the number of maneuvers performed since installation. This counter can not be set to 0.

INPUT STATUS

Displays the status of all configured inputs. The safety edge will not appear unless it is enabled

DEFAULT VALUES

Reset to the default setting (Factory Reset)

ENABLE PASSWORD

Enables a 4 digit password to access the menu. The default password is: 1234

CHANGE PASSWORD

Changes the controller 4 digit password.

OPEN

Forces opening while Enter is held. Use to test the motor direction.

CLOSE

Forces closing while Enter is held. Use to test the motor direction.

SMINN offers the installer a professional grade technical support service that will solve any problem and extend if needed the device warranty.

Temporally and depending on use the installation must be thoroughly tested by qualified personnel to detect any sign of wear.

If the board needs repair please contact the manufacturer or the nearest official service.

Once the controller is set up the installer must ensure the power and slow stop adjustments meet the EN12453:2000 regulations by performing the meterings described in the EN12445:2000 regulations. See force graph.

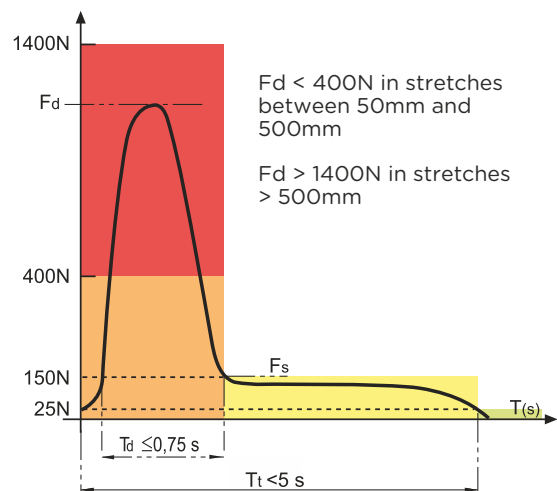
If these requirements are not met additional securities must be installed.

The dynamic force (F_d) must not surpass the following measures:

- < 400N in spaces between 5-50cm
- < 1400N in spaces greater than 50cm

Force graph

F_d : Dynamic force
 F_s : Static force



WARRANTY

This product has undergone a complete TEST during its manufacturing process that guarantees its reliability and proper operation. The manufacturer provides 24 months of warranty to the product from the date printed in the product and against any anomaly that it may present in its appearance or operation.

Any damage caused by third parties, natural causes (flooding, fire, lightning, etc), arising from improper handling or installation, vandalism or any other cause non attributable to the manufacturer will void the warranty.

The warranty only covers repairs or replacement of the damaged device.

Any expenses derived from assembling, travelling, transport, natural wear of parts, etc., and, in general, any expenses that are not part of the repairs or replacement of the damaged element of the system are excluded.

The installer/provider will ask the manufacturer for a RMA number or authorization for transport of the system in warranty. Without this previous requisite, the manufacturer will not be able neither to process nor provide warranty service.

WASTE OF ELECTRICAL AND ELECTRONIC DEVICES (WEEE)

In accordance with the European Directive 2002/96/EC about waste electrical and electronic equipment (WEEE), the presence of this symbol (see symbol at the bottom of this text) in the product or in the packaging, means that this article shall not be disposed in local non-classified waste streams.

It is the user's responsibility to dispose this product taking it to a collection point designed for waste recycling of electrical and electronic devices. The separate collection of this product helps optimize the waste sorting and recycling of any recyclable material and also decreases the impact on health and the environment. For more information about the correct wasting of this product, please contact the local authority or the distributor where you acquired this product.



TECHNICAL CHARACTERISTICS

Power supply	230VAC
Maximun charge	24V / 120W
AC main fues	2A
DC main fuse	6/8A delayed
Battery fuse	6A delayed
Power output	15VDC / 3.5VA (300mA)
Power output protection	Rearmable fuse
Electrolock output	12/24VDC / 1A selectable
Battery	24V (2x12V in series)
Maneuver control inputs	6 high insulation optoacoupled inputs 1 analog inputs
Plug-in cards	Radio and semaphore
LCD display	2x16 characters Chip-on-glass technology - Backlight
Operation temp.	-20°C / 70°C
Casing	ABS
Dimensions	L280 x W196 x H90 mm
Weight	2200g
Watertight	IP54 (IP65 with cable glands)

CE DECLARATION OF CONFORMITY

The company ELSON ELECTRÓNICA, S. A.
Pol. Torrelarragoiti, P6 - A3
48170 Zamudio - Vizcaya (SPAIN)

Declares:
The product BOX L DC1D motor controller
Manufactures
Under the trademark **SMINN**
For use in Residential, Commercial or
light industry enviroments.

This device meets the provisions as long as its usage
is compilant to what was envisaged, having applied the
following directives:

Directive 2014/30/EU - Electromagnetic compatibility

Directive 2014/35/EU - Low tension

Directive 2006/42/EC - Machines

Directive 2011/65/EU - RoHs

Directive 2012/19/EU - WEEE

Zamudio 14.02.2017



José Miguel Blanco Pérez
Chief Technical Officer

SMINN

innovative in electronics

www.sminn.com
info@sminn.com

ESPAÑOL

ENGLISH

FRANÇAIS

ITALIANO

PORTUGÊS

DEUTSCH

NEDERLANDS

NOTES



ERROR MESSAGE

When an error happens during maneuver, the controller stores the error along with other previous errors so that next time the configuration menu is accessed they can be displayed. When there are errors to be displayed an “E” appears in the four corners of the screen. When the configuration menu is accessed the controller displays one by one the stored errors.

The possible errors are:

SEG 1 / 2 TEST FAIL

The test procedure of the indicated security has failed. For SEG 1/2 it is the standard test procedure for light barriers.

BND 1 TEST FAIL

The test procedure of the indicated security has failed.
The safety edge may be blocked or have an electrical problem.

SECURITY FAIL SEG BLOCKED

At least one security was blocked before starting the maneuver.

MOTOR OC

The motor stopped because of overconsumption. This security activates when surpassing the current limit set in the menu.

MOTOR SC

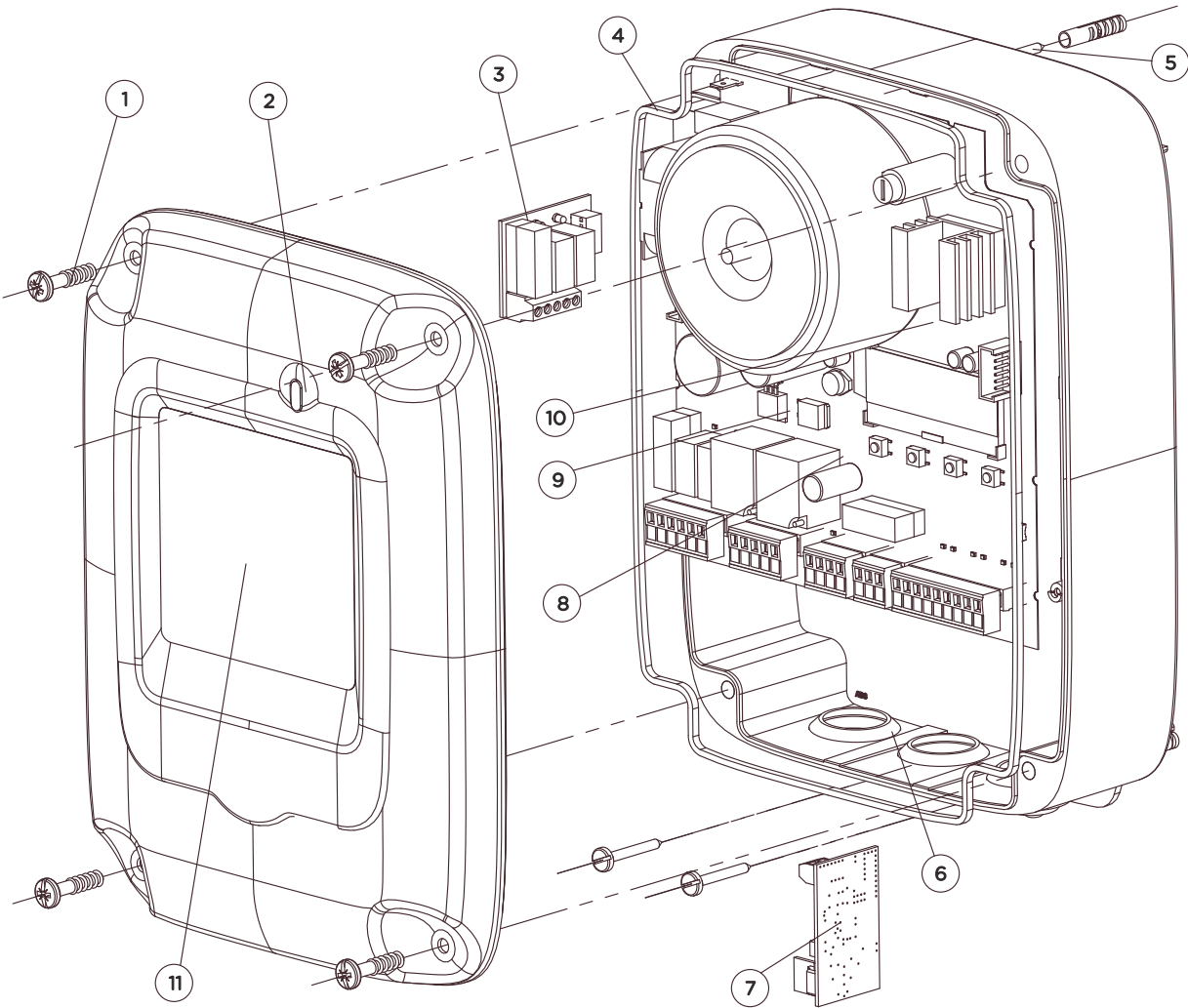
The motor stopped because of a shortcircuit.

MOTOR PUSH

The obstacle detection security was activated while operating the motor.

DC1D EXPLOSION

Fig3



- 1. Captive screws
- 2. Power status LED
- 3. Semaphore card
- 4. Vacuum rubber gasket
- 5. External fixing with just three screws
- 6. Access ports for 16/24mm tubes
- 11. Frontal space for installer/revision sticker

- 7. Radio card
- 8. Plug-in terminal blocks
- 9. Power relays
- 10. Display

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