PA250 Powertech Articulated Arm Gate Opener Instruction Manual

Contents

PA250 Powertech Articulated Arm Gate Opener

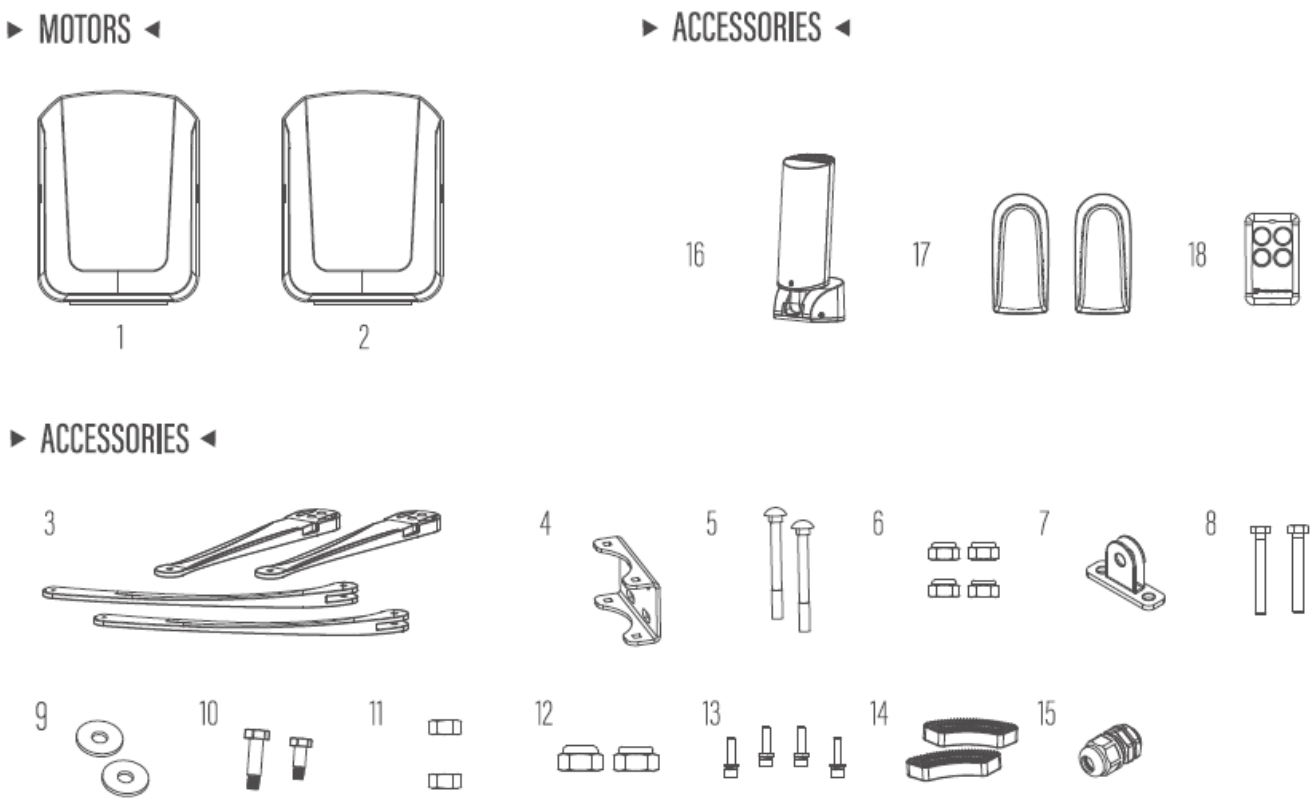
GENERAL SAFETY WARNINGS AND PRECAUTIONS

WARNING!

- Please read this instruction manual carefully before the installation of the gate-automated system,
- This manual is exclusively for qualified installation personnel, Powertech Automation Inc, is not responsible for improper installation and failure to comply with local electrical and building regulations,
- Keep all the components of the kit content and this manual for further consultation,
- In this manual, please pay extra attention to the contents marked by the symbol: A
- Be aware of the hazards that may exist in the procedures of installation and operation of the gate-automated system,
- Besides, the installation must be carried out in conformity with local standards and regulations,
- If the system is correctly installed and used following all the standards and regulations, it will ensure a high degree of safety,
- Make sure that the gates work properly before installing the gate-automated system and confirm the gates are appropriate for the application, Do not let children operate or play with the gate-automated system,
- Do not cross the path of the gate-automated system when operating,
- Please keep all the control devices and any other pulse generator away from children to avoid the gate-automated system being activated accidentally,
- Do not make any modifications to any components except that it is mentioned in this manual,
- Do not try to manually open or close the gates before you release the gear motor,
- If there is a failure that cannot be solved and is not mentioned in this manual, please contact qualified installation personnel,
- Do not use the gate-automated system before all the procedures and instructions have been carried out and thoroughly read,
- Test the gate-automated system weekly and have qualified installation personnel to check and maintain the system at least every 6 months, Install warning signs (if necessary) on both sides of the gate to warn the people in the area of potential hazards.

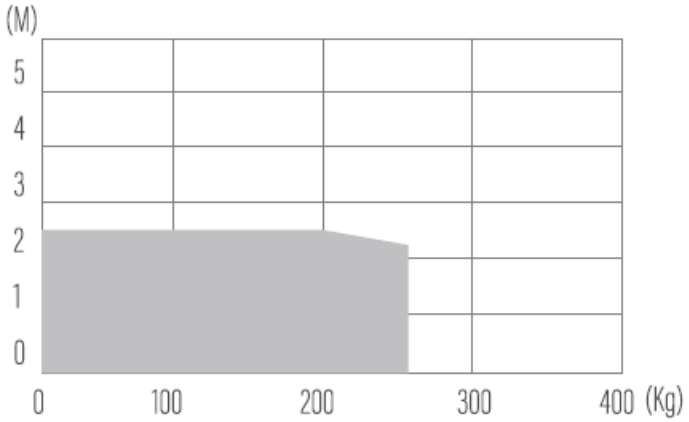
PRODUCT DESCRIPTION AND INTENDED USE

KIT CONTENT



1. Motor 1 (Master) including PC190U control box and WBI WiFi module 1
2. Motor 2 (Slave) 1
3. Straight and curved arms 2
4. Li-Shape fixing plate 2
5. Screws for Li-Shape fixing plate 4
6. Nut for screws number 5 and 8 x8
7. Front end bracket 2
8. Screws for front-end bracket 4
9. Gaskets 4
10. Screws for straight and curved arms 2
11. Nut for screws number 10 2.
12. Nut for screws number 10 2.
13. Screws for mechanical stoppers 4
14. Mechanical stoppers 8
15. Cable gland 4
16. Flashing light 2
17. Photocells 1
18. Remote 1

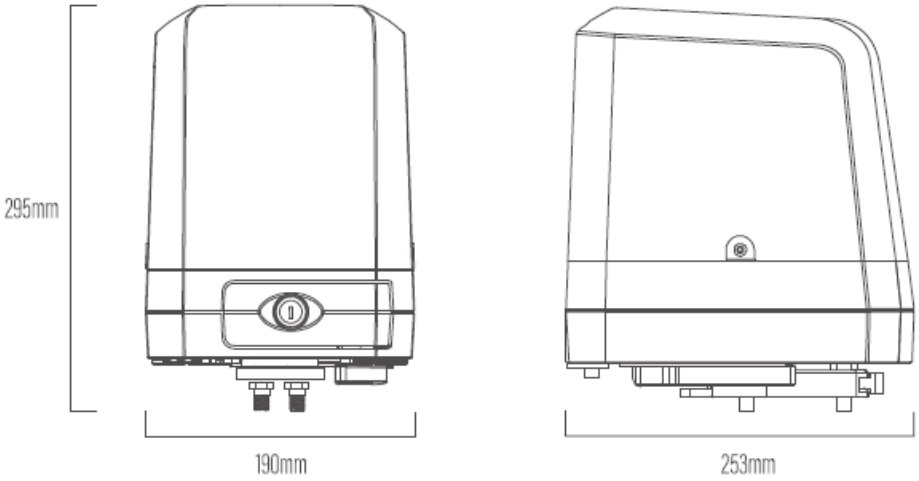
PRODUCT USAGE LIMITS

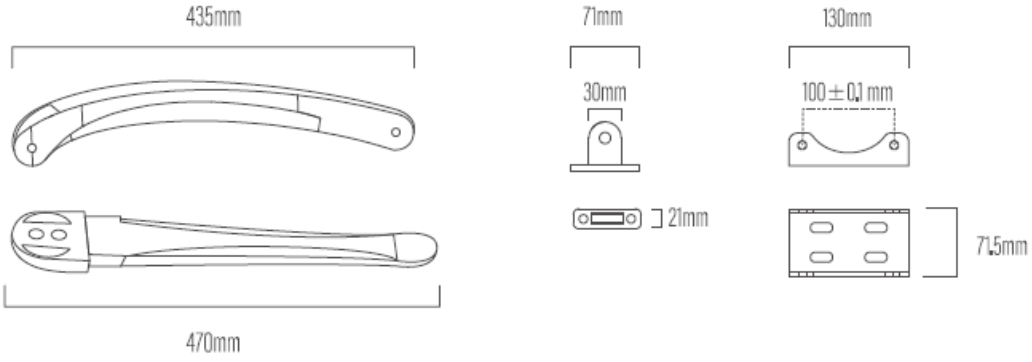


USAGE LIMITS

- **Max gate weight:** 250kg
- **Max gate length:** 2.5Meters

DIMENSIONS





INSTALLATION

PRE-INSTALLATION CHECKS

Installation must be carried out by expert qualified personnel and in full compliance with current regulations.

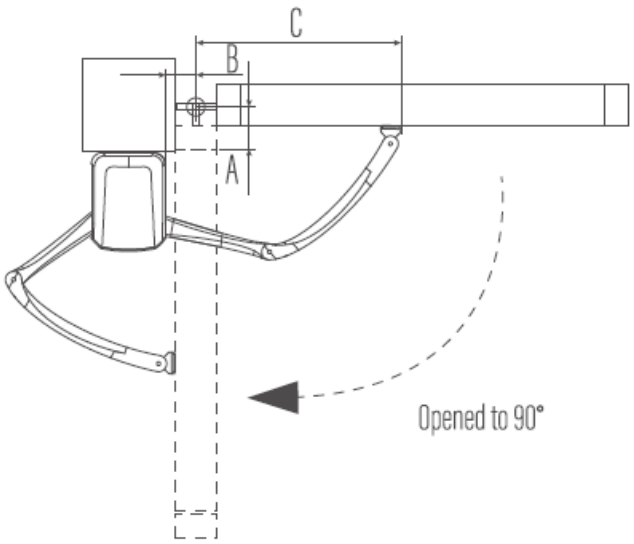
Before commencing the installation of the motor, make sure to:

1. Check that all the materials are in good working order and suited to the intended applications.
2. Gate status verification:
    - Make sure the structure of the gate is sturdy, the hinges work,
    - Ensure that the gate has been properly installed and that it swings freely in both directions,
    - Make sure that there are no frictions between moving and non-moving parts,
3. Make sure that the weight and dimensions of the gate leaf fall within the operating limits
    1. **Max leaf weight:** 250kg
    2. **Max leaf length:** 2.5 meters

INSTALLATION OF THE MOTORS

DIMENSION CHART
Refer to the dimension chart to choose the correct dimensions of the motors and installation position,

- **A:** Distance between the hinge and the pillar bracket
- **B:** Distance between the hinge and the side of the motor,
- **C:** Distance between the hinge and the front fixing bracket



Unit : MM

	C	B		
A		50	100	150
	50	625	575	545
	100	615	565	540
	150	600	550	
	200	585	535	
	250	565	515	
	300	540		

INSTALLATION OF THE GEAR MOTOR

1. Refer to the dimension chart to determine the correct dimensions and position to be installed, (figure 1)
2. Check if the mounting surface is smooth, vertical and rigid. Mark it and drill the 4 holes. (figure 2)
3. Fix the U-shape fixing plate with the corresponding screw and nuts. (figure 3)

figure 1

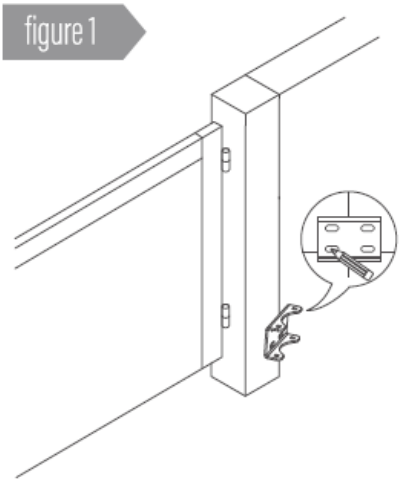


figure 2

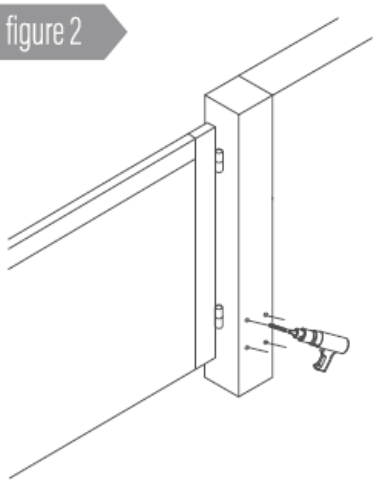
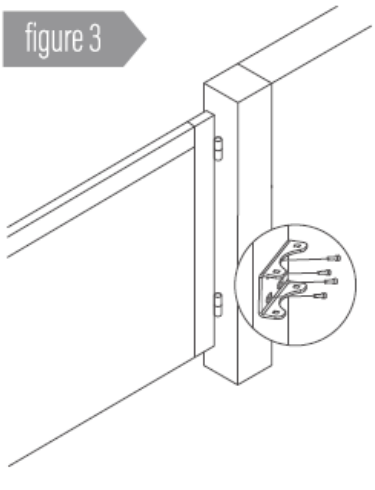


figure 3



4. Install the motor on the U-shaped fixing plate with corresponding screws and nuts. (figure 4)
5. After positioning the curved arm on the bottom of the motor, release the motor and position the minor arm on the end of the curved arm and mounting bracket with corresponding screws and nuts. (figure 5)

figure 4

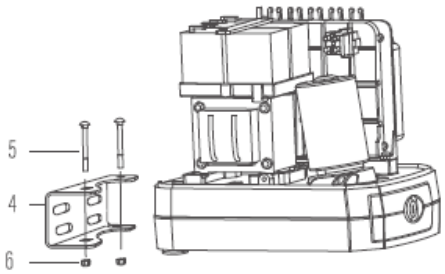
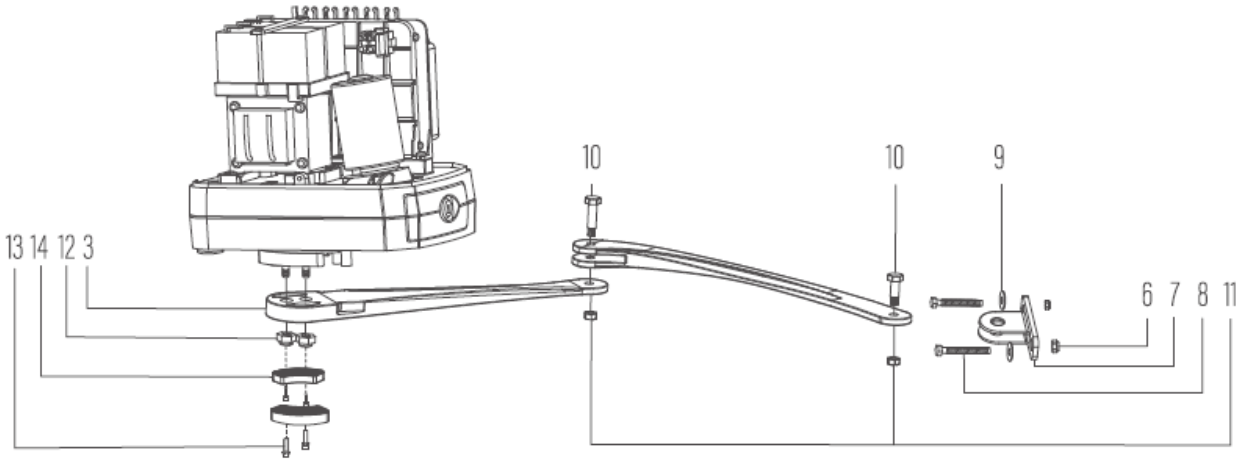


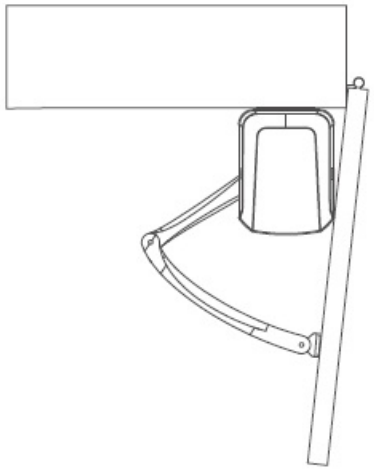
figure 5

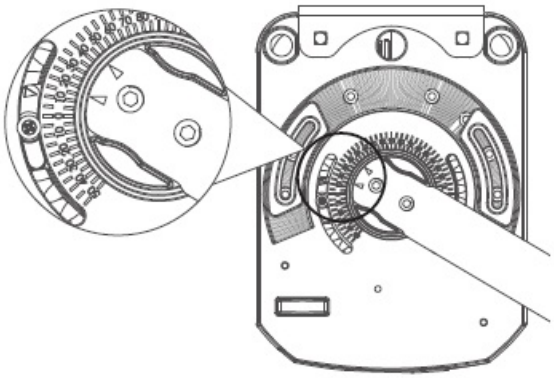


MECHANICAL STOPPERS ADJUSTMENT

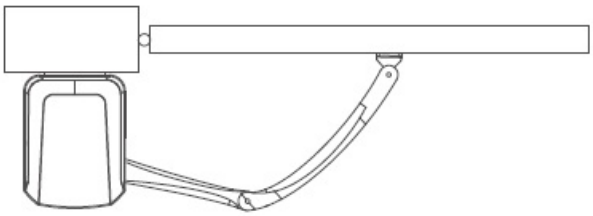
Open limit adjustment

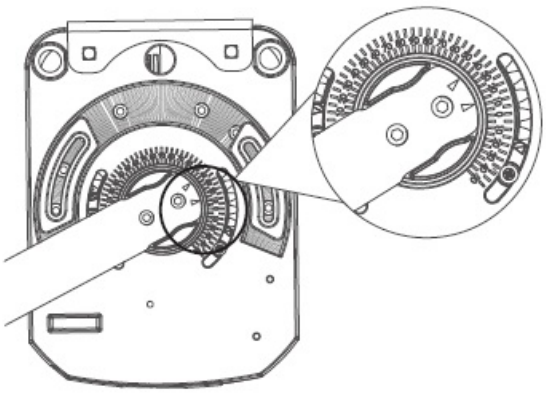
Unlock the gear motor, and manually move the gate to the fully open position. Place and fix the corresponding mechanical stopper.





Close limit adjustment
Unlock the gear motor, and manually move the gate to the fully closed position. Place and fix the corresponding mechanical stopper.





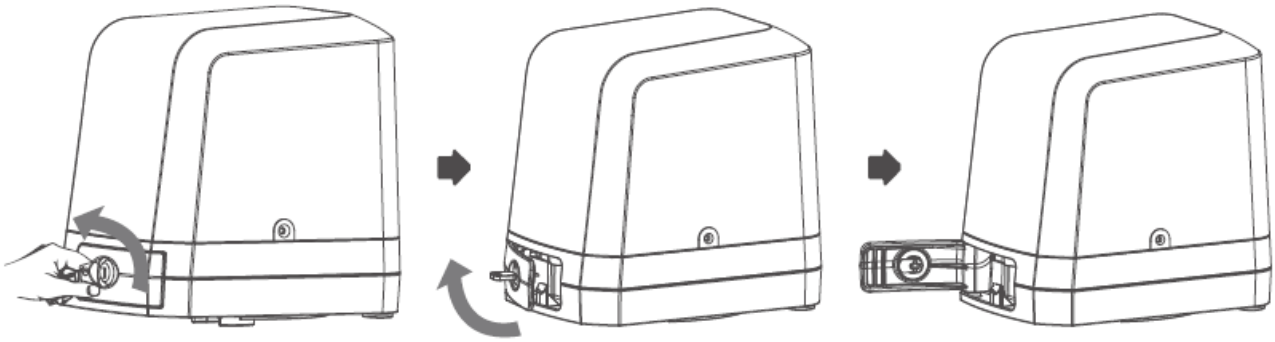
MANUAL RELEASE OF THE MOTOR

To unlock the device

1. Insert the key
2. 2. Turn it anti-clockwise by 180°
3. Turn it anti-clockwise by 180°
4. The gate leaf can now be moved manually to the desired position.

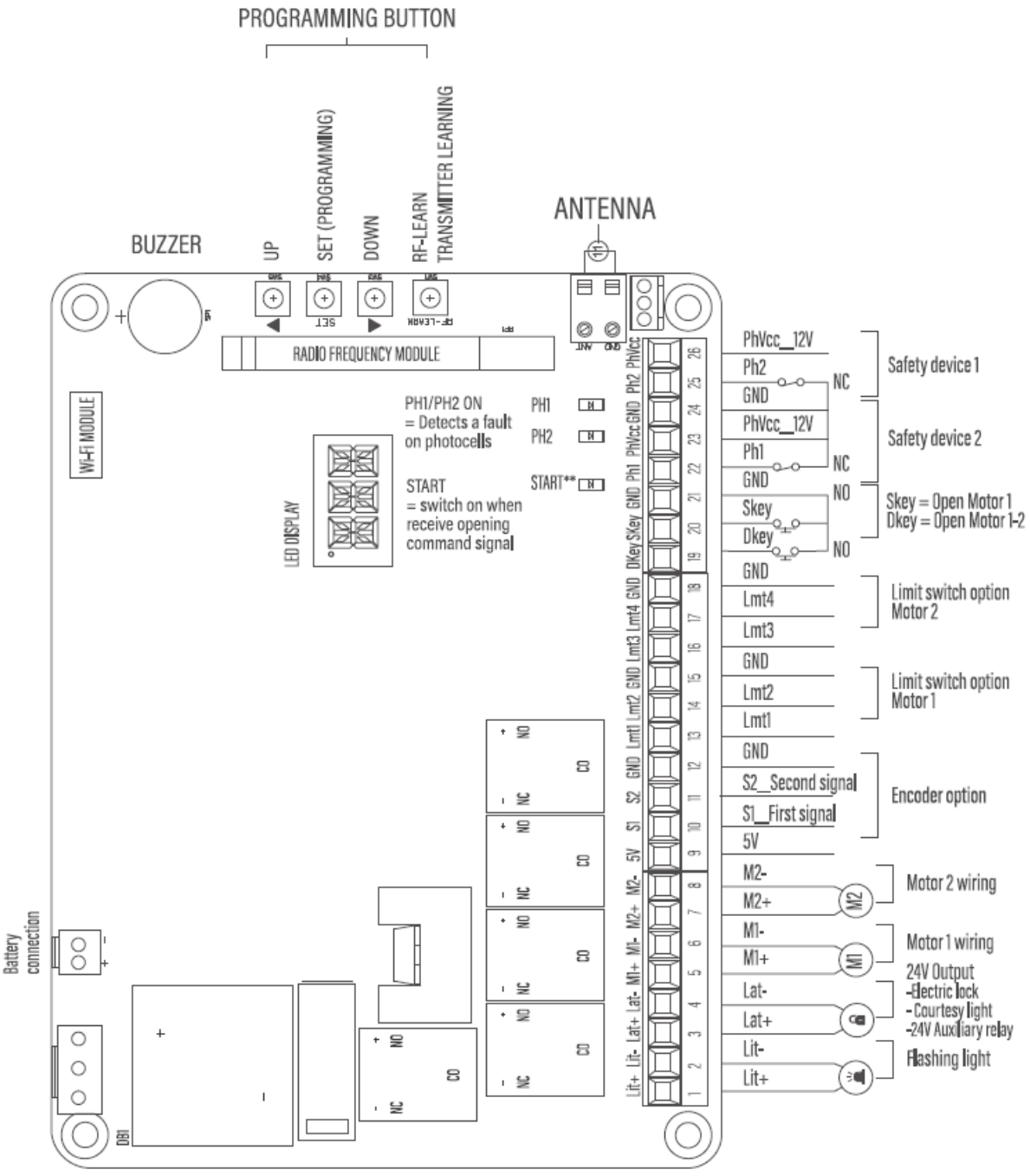
To lock the device

1. Insert the key
2. Turn it clockwise by 180°
3. Remove the key



COMMISSIONING

PC19OU CONTROL BOARD



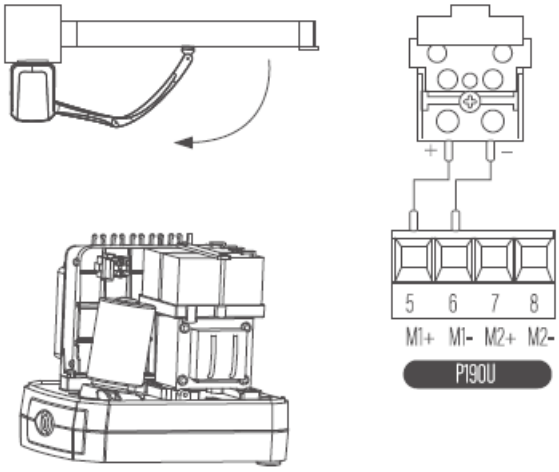
MOTOR is the MASTER Motor that will open first and close last

WARNING!
BY DEFAULT, THE SAFETY DEVICES PH1-PH2 ARE DISABLED. (PARAMETER FD AND FE) When powering on for the first time, the LED display will show N-L = System learning not completed DURING STANDARD OPERATION, the photocells are wired and aligned, and the 3 LED indicators are OFF. Control: By passing your hand in front of the photocell beam, LED I will switch ON.

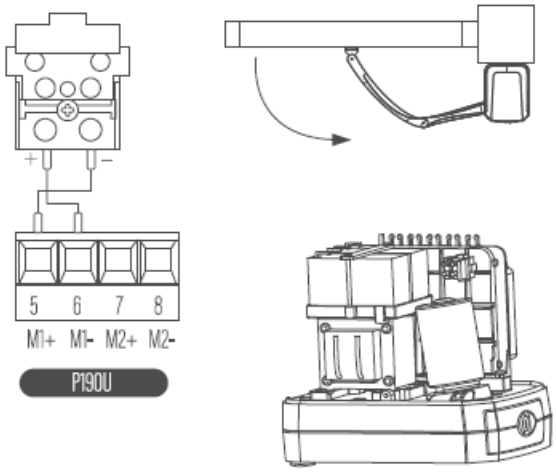
MOTOR WIRING

MOTOR WITHOUT LIMIT SWITCH
MANDATORY: Make sure stoppers are placed on the ground or the motors

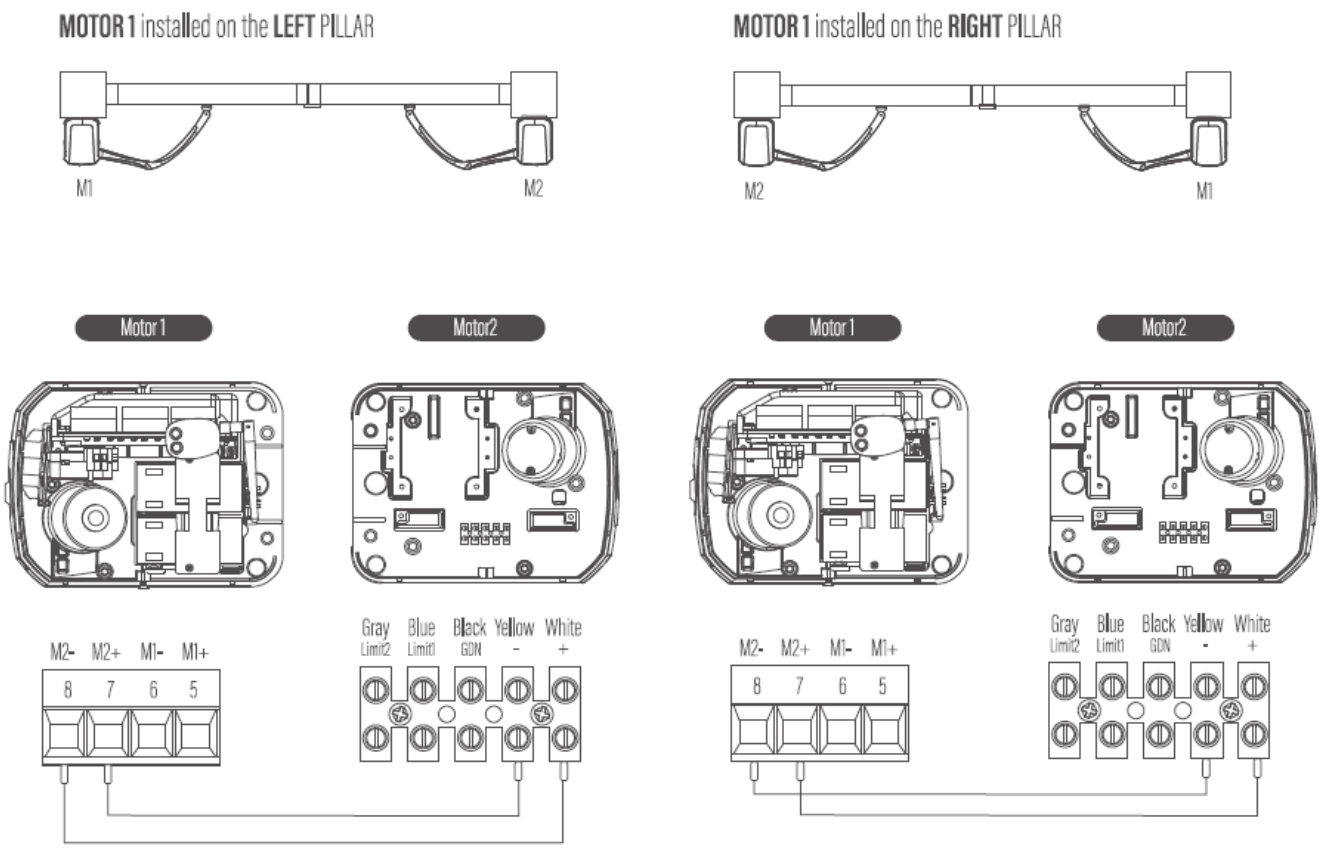
- (Refer to parameter table – PARAMETER  (DEFAULT SETTING)
- MOTOR 1 INSTALLED ON THE LEFT PILLAR



- MOTOR 1 INSTALLEO ON THE RIGHT PILLAR



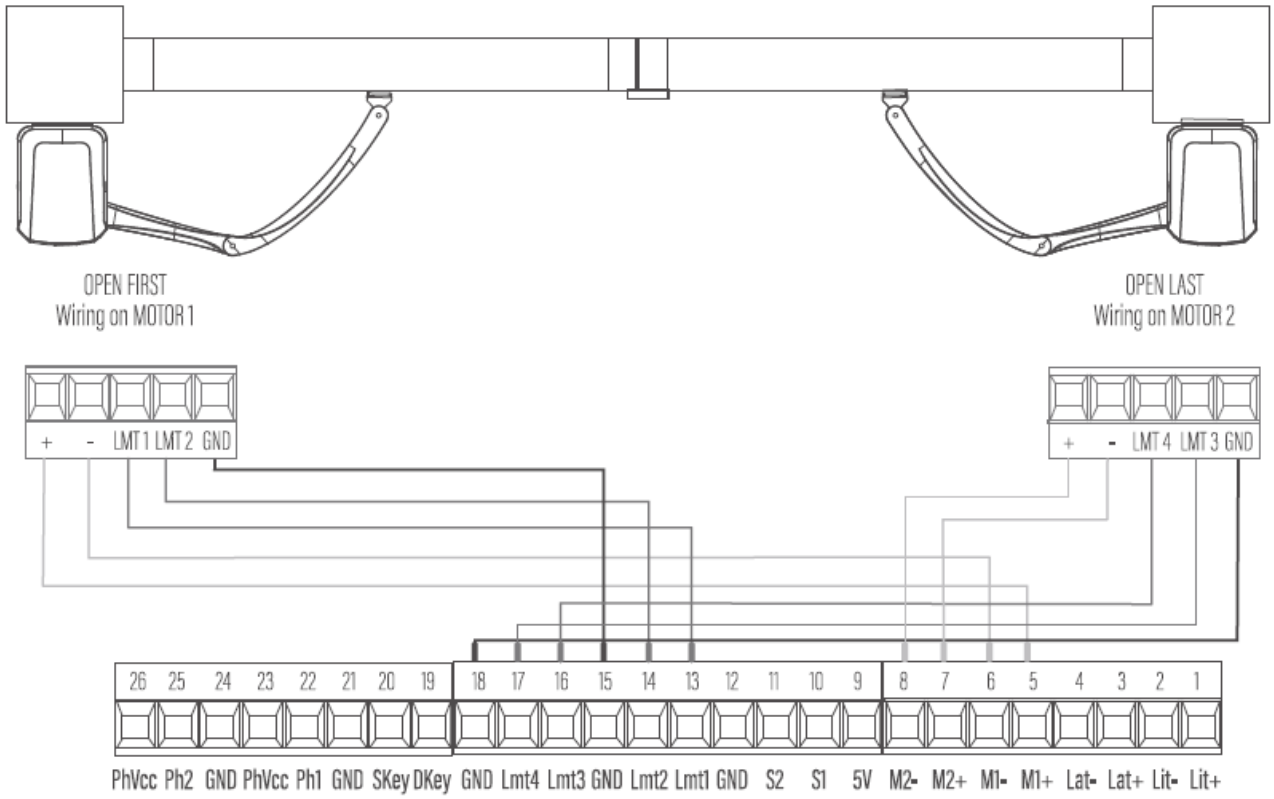
- **WIRING OF MOTOR 1 TO MOTOR 2**



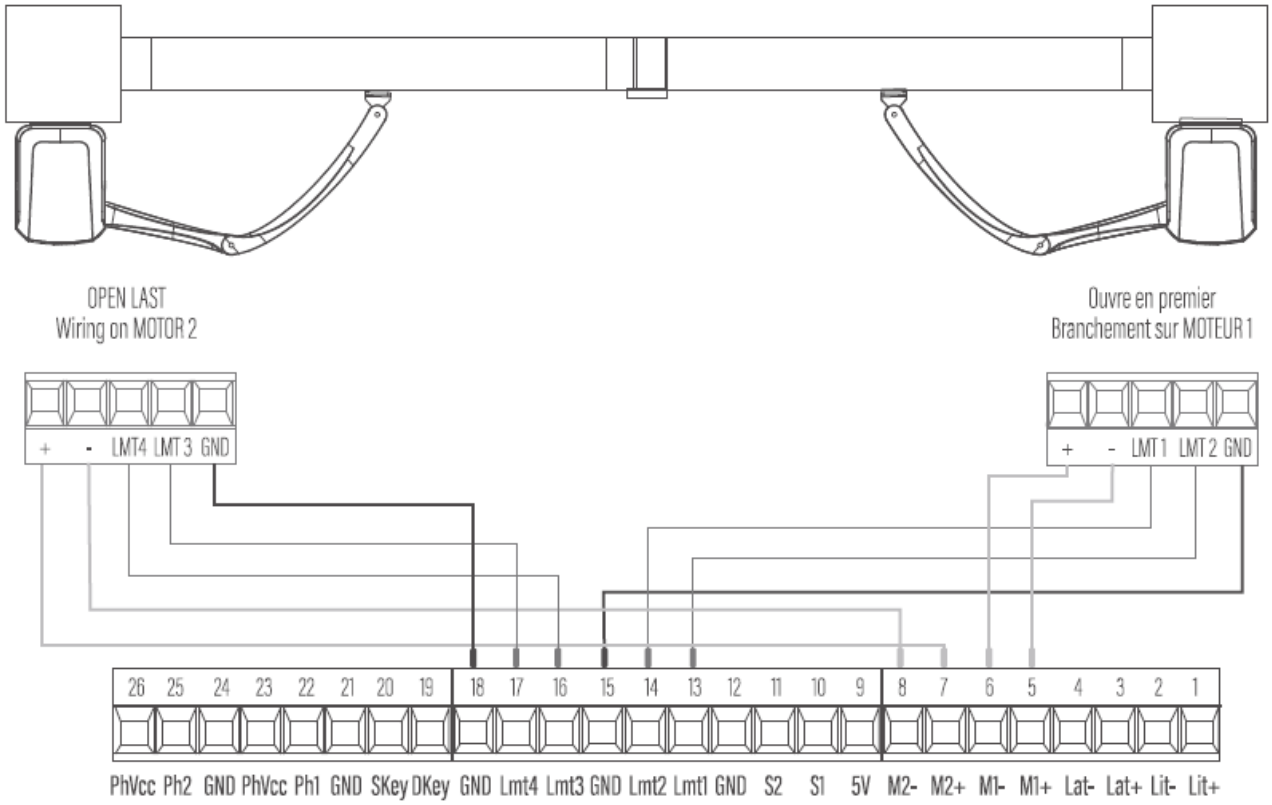
- **MOTOR WITH LIMIT SWITCH**

  (Refertoparametertable-PARAMETER )

- MOTOR 1 INSTALLED ON THE LEFT PILLAR

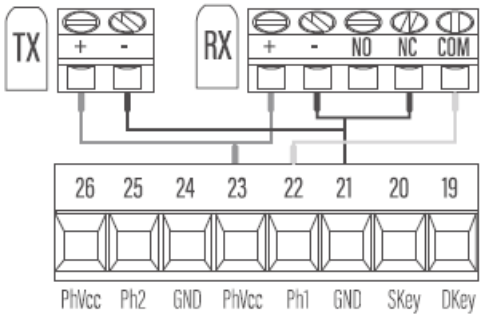


- MOTOR 1 INSTALLED ON THE RIGHT PILLAR

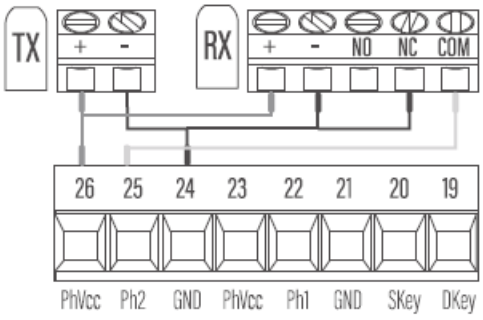


WIRING OF ACCESSORIES

SAFETY DEVICE 1 WIRING



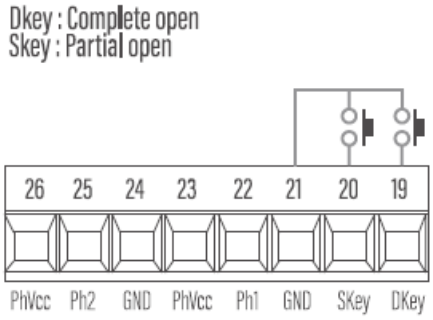
SAFETY DEVICE 2 WIRING



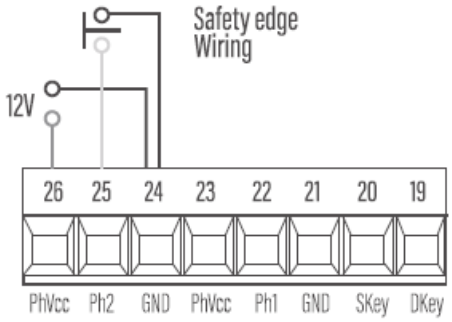
AUXILIARY DEVICE WIRING

- **Okey:** Complete open

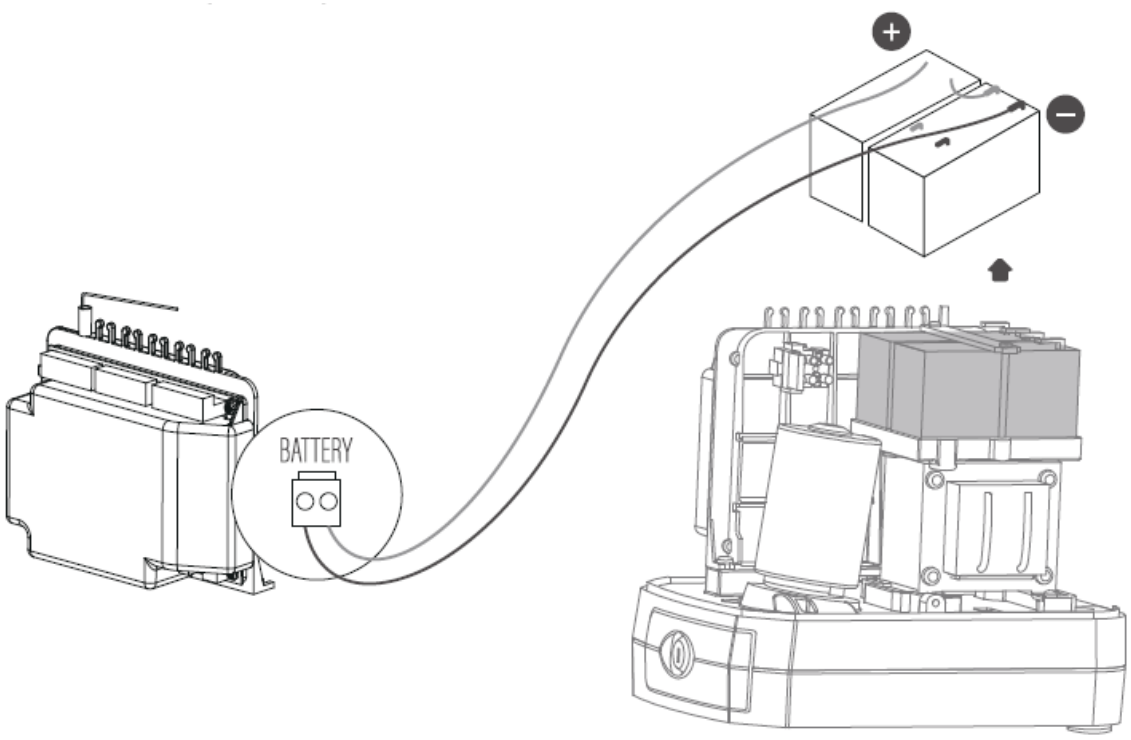
- **Skey:** Partial open



12V AVAILABLE TO POWER ACCESSORIES



BATTERY WIRING (OPTIONAL)



REMOTE LEARNING

MANDATORY:
Before processing system learning, you must first memorize the remotes.

● RESET (DELETE) ALL THE REMOTES

Press and hold RF button. After 10 seconds, the LED display will first show [DKY] then [DAL] that confirms that all the transmitters have been deleted.

● OPEN/CLOSE/STOP ON DUAL GATE

Press RF Learn button. The LED display show [OSC].
Press and hold a button on the remote for at least 1 second then release. [OSC] blinks 3 times, completing the memorization process.
You have 5 seconds to memorize another remote.

● OPEN/STOP/CLOSE ON SINGLE GATE (PEDESTRIAN OPENING)

Press RF Learn button. The LED display show [OSC]. Press RF button a 2nd time, the LED display show [PED].
Press and hold a button on the remote for at least 1 second then release. [PED] blinks 3 times, completing the memorization process.
You have 5 seconds to memorize another remote.

● COMMAND FOR AUXILIARY DEVICE (FM FUNCTION)

Press RF Learn button. The LED display show [OSC]. Press RF button a 2nd time, the LED display show [PED].
Press RF button a 3rd time, the LED display show [LIT].

Press and hold a button on the remote for at least 1 second then release.
[LIT] blinks 3 times, completing the memorization process. You have 5 seconds to memorize another remote.

SAFETY DEVICE LOGIC
MOTOR REACTION FOLLOWING A FAULT ON CONTACT PHI / PH2 – PARAMETER SETTINGS SELECTION – FA

IMPORTANT: PHI and PH2 are disabled by default.

FA-1 - Anticrush safety between the gate and the wall		
Safety device category	Photocells default on PH1	Safety edge default on PH2
Gate fully closed	No effect	No effect
Opening phase	No effect	Stop and close
Stop during cycle	Reload pause time = > Automatic closing	No effect
Gate fully open	Reload pause time =>Automatic closing at slow speed	No effect
Closing phase	Stop = > Open at slow speed	No effect

FA-2 -Security during closing stage		
Safety device category	Photocells default on PH1	Safety edge default on PH2
Gate fully closed	Blocks the open command	No effect
Opening phase	No effect	Stop => Reverse 2 seconds = > Pause time => Automatic closing
Stop during cycle	Reload pause time =>Automatic closing at slow speed	No effect
Gate fully open	Reload pause time = > Automatic closing	Reload pause time = > Automatic closing
Closing phase	Stop = > Open at slow speed	Stop => Reverse 2 seconds = > Pause time => Automatic closing

FA-3 - Loop detector		
Safety device category	Photocells default on PH1	Loop detector default on PH2
Gate fully closed	No effect	Open
Opening phase	No effect	No effect
Stop during cycle	Reload pause time = > Automatic closing	Open
Gate fully open	Reload pause time = > Automatic closing	Reload pause time = > Automatic closing
Closing phase	Stop = > Open at slow speed	Stop = > Open at slow speed

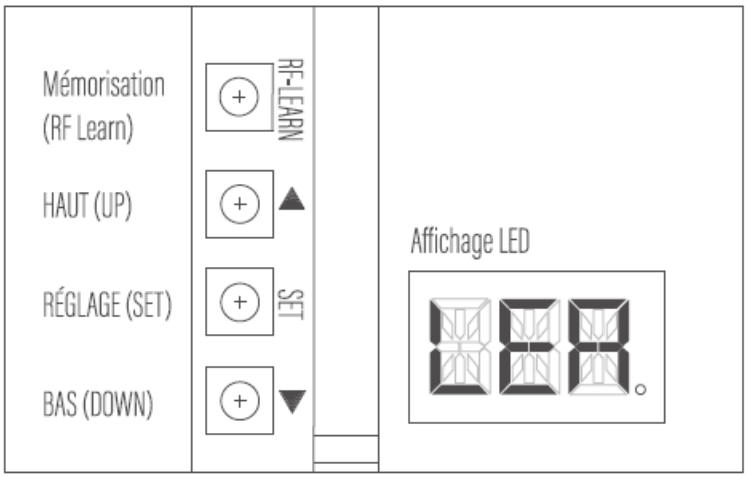
FA-4 - Photocells on pillars and photocells on column		
Safety device category	Photocells default on PH1	Photocells default on PH2
Gate fully closed	No effect	No effect
Opening phase	No effect	Pause time before automatic closing reduced to 5 seconds
Stop during cycle	Reload pause time = > Automatic closing	Pause time before automatic closing reduced to 5 seconds
Gate fully open	Stop => Reload pause time = > Automatic closing	Pause time before automatic closing reduced to 5 seconds
Closing phase	Open	Open = > Reduce pause time to 5 seconds
Fonction FA-5 - Le passage devant les photocellules réduit le temps de pose à 5 secondes		
Safety device category	Photocells default on PH1	Photocells default on PH2
Gate fully closed	No effect	Aucun effet
Opening phase	Pause time before automatic closing reduced to 5 seconds	Pause time before automatic closing reduced to 5 seconds
Stop during cycle	Pause time before automatic closing reduced to 5 seconds	Pause time before automatic closing reduced to 5 seconds
Gate fully open	Pause time before automatic closing reduced to 5 seconds	Pause time before automatic closing reduced to 5 seconds
Closing phase	Open = > Reduce pause time to 5 seconds	Open = > Reduce pause time to 5 seconds
FA-6 - Standard residential mode ***DEFAULT SETTING*		
Safety device category	Photocells default on PH1	Photocells default on PH2
Gate fully closed	No effect	No effect
Opening phase	No effect	No effect
Stop during cycle	Reload pause time = > Automatic closing	Reload pause time = > Automatic closing
Gate fully open	Reload pause time = > Automatic closing	Reload pause time = > Automatic closing
Closing phase	Open	Open
Fonction FA-7 - Mode copropriété. Les télécommandes ne commande que l'ouverture du portail/ Fermeture auto obligatoire		
Safety device category	Photocells default on PH1	Photocellules PH2
Gate fully closed	No effect	No effect
Opening phase	No effect	No effect
Stop during cycle	Impossible	Impossible
Gate fully open	No effect	No effect
Closing phase	Open	Open

PROGRAMMING

INDICATIONS ON THE LEO DISPLAY

During the programming and operation, the LED display is ON and provides indications.

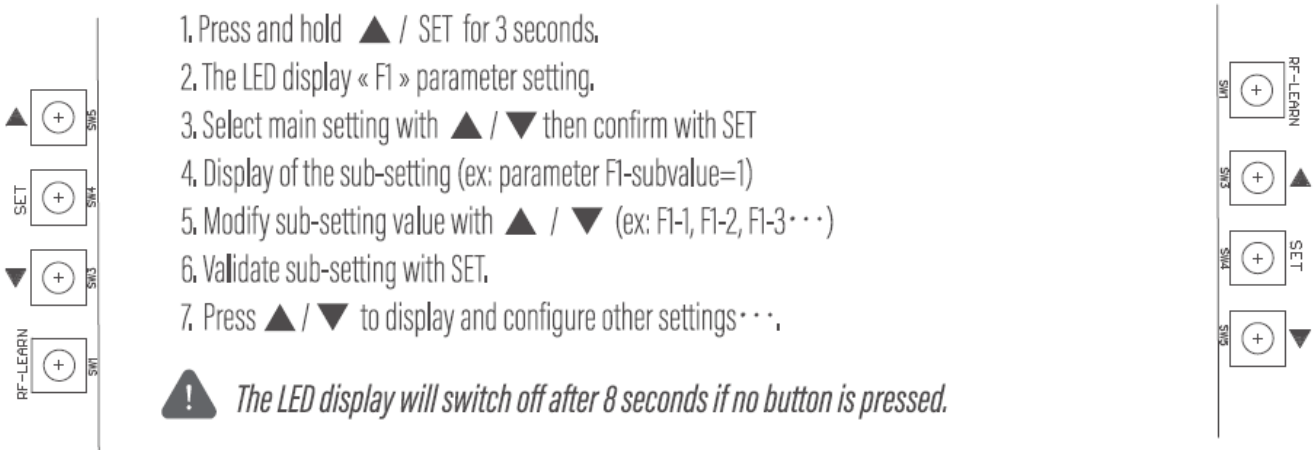
- N-L = System learning not completed
- LEA= In the process of system learning
- S-G = Completed system learning for single-gate
- D-G = Completed system learning for dual gate
- OPN = Motors in the opening phase
- CLS = Motors in the closing phase
- STP = Fault (display for second)
- CLN = Return to the default setting
- FI= Motor wiring fault



Indication example on the LED display

PARAMETER SETTINGS

WARNING!
Depending on the placement of the control unit the programming buttons may be located on the right or left side, the RF button at the top or bottom.



PARAMETER

PARAMETER TABLE (PARTIE 1)

SETTING	DESCRIPTION				DEFAULT SETTING
F1	MOTOR WITHOUT LIMIT SWITCH / WITH LIMIT SWITCH / WITH ENCODERS				F1-1
	F1-1 : Motor without limit switch. MANDATORY : Stoppers must be placed on the ground or on the motor F1-2 : Limit switch F1-3 : Encoders - Wiring on 5V/S1 and 5V/S2				
F2	MOTOR FORCE DURING OPENING PHASE				F2-2
	F2-1 = 1 amp F2-2 = 2 amp F2-3 = 3 amp F2-4 = 4 amp	F2-5 = 5 amp F2-6 = 6 amp F2-7 = 7 amp	Recommended value: PW200 = 2A / 4A PW320/330 = 2A / 5A PW530 = 2A / 6A	⚠ **WARNING!** Do not exceed recommended value or you may damage the motors.	
F3	MOTOR FORCE DURING CLOSING PHASE				F3-2
	F2-1 = 1 amp F2-2 = 2 amp F2-3 = 3 amp F2-4 = 4 amp	F2-5 = 5 amp F2-6 = 6 amp F2-7 = 7 amp	Recommended value: PW200 = 2A / 4A PW320/330 = 2A / 5A PW530 = 2A / 6A	⚠ **WARNING!** Do not exceed recommended value or you may damage the motors	
F4	MOTOR SPEED DURING OPENING PHASE				F4-3
	F4-1 = 40% of full speed F4-2 = 50% of full speed	F4-3 = 75% of full speed F4-4 = 100% of full speed			
F5	MOTOR SPEED DURING CLOSING PHASE				F5-3
	F5-1 = 40% of full speed F5-2 = 50% of full speed	F5-3 = 75% of full speed F5-4 = 100% of full speed			
F6	MOTOR DECELERATION DURING OPENING AND CLOSING PHASE				F6-2
	F6-1 = 40% F6-2 = 50%	F6-3 = 75% F6-4 = 100%			
F7	MOTOR DEPHASING DURING OPENING PHASE				F7-1
	F7-0 = 0 second F7-1 = 2 seconds F7-2 = 5 seconds	F7-3 = 10 seconds F7-4 = 15 seconds F7-5 = 20 seconds	F7-6 = 25 seconds F7-7 = 35 seconds F7-8 = 45 seconds	F7-9 = 55 seconds	
F8	MOTOR DEPHASING DURING CLOSING PHASE				F8-1
	F8-0 = 0 second F8-1 = 2 seconds F8-2 = 5 seconds	F8-3 = 10 seconds F8-4 = 15 seconds F8-5 = 20 seconds	F8-6 = 25 seconds F8-7 = 35 seconds F8-8 = 45 seconds	F8-9 = 55 seconds	
F9	PAUSE TIME BEFORE AUTOMATIC CLOSING				F9-0
	F9-0=No automatic closing F9-1 = 3 seconds F9-2 = 10 seconds	F9-3 = 20 seconds F9-4 = 40 seconds F9-5 = 60 seconds	F9-6 = 120 seconds F9-7 = 180 seconds F9-8 = 300 seconds		

Temporary suspension of automatic closing function (Party mode)
It is possible to deactivate/reactivate the automatic closing function by pressing simultaneously buttons A + B of the remote.

- Automatic closing activated=> Automatic closing deactivated= 4 Buzzer sounds
- Automatic closing deactivated=> Automatic closing activated= 2 Buzzer sounds

PARAMETER TABLE (PARTIE 2)

PARAMETERS	DESCRIPTION	DEFAULT SETTING
FA	SAFETY DEVICE LOGIC FA-1 Anti-crush FA-2 Safety edge FA-3 Loop detector FA-4 Quick close 1 FA-5 Quick close 2 FA-6 Standard residential mode FA-7 Condominium mode	FA-6
FB	PEDESTRIAN OPENING (PARTIAL OPENING) ON MOTOR 1 FB-0 = Open motor 1 to the maximum range FB-1 = Open at 1/2 of the motor 1 maximum range	FB-1
FC	PRE-FLASHING (24V Flashing Light wiring on LIT+ / LIT- terminals) FC-0 = Deactivated FC-1 = Activated = preflashes 3 seconds before the gate manoeuvre	FC-0
FD	SAFETY DEVICE 1 FD-0 = Deactivated FD-1 = Activated	FD-0
FE	SAFETY DEVICE 2 FE-0 = Deactivated FE-1 = Activated	FE-0
FF	BUZZER FUNCTION (Buzzer beeps during every gate manoeuvre) FF-0 = Activated FE-1 = Deactivated (Can be useful during the comissioning and parameter settings)	FF-0
FG	ELECTRIC LOCK (wiring between LAT+ / LAT-) FG-0 = Release OFF FG-1 = Release ON (During opening phase, motor reserves for 0,25s to release tension and unlock the electric lock)	FG-1
FH	LED DISPLAY DIRECTION (LED display direction is reversed on the articulated arm) FH-0 = Value facing up FH-1 = Value facing down	FH-1

FI	SINGLE OR DUAL GATE FI-1 = 1 motor (Wiring on M1+ / M1-) FI-2 = 2 motors	FI-2
FJ	MOTOR DISCHARGE AFTER CLOSING AND OPENING FJ-0 = No discharge FJ-2 = Reversal 0,2s FJ-5 = Reversal 0,5s FJ-1 = Reversal 0,1s FJ-4 = Reversal 0.4s FJ-6 = Reversal 0,6s	FJ-2
FK	LAT+ / LAT- OUTPUT: ELECTRIC LOCK / ZONE LIGHTING / 24V OUTPUT ACTIVATED BY BUTTON C ON THE REMOTE) FK-1 = Power an electric lock in 24V (activated at start of the cycle) FK-2 = Zone lighting (activated during the movement of the gates) FK-3 = 24V output (courtesy light) controlled by the C button of the remote (adjustment of the duration with FL setting)	FK-1
FL	TRIGGER DURATION ON LAT+/LAT- / 24V OUTPUT (ACTIVATED BY BUTTON C ON THE REMOTE) FL-0 = ON / OFF FL-3 = 60 seconds FL-1 = 1 second FL-4 = 90 seconds FL-2 = 30 seconds FL-5 = 180 seconds	FL-1
FM	MOTOR SENSITIVITY (overcurrent sensitivity when detecting an obstacle) FM-1 = Stop after 0,2 second FM-2 = Stop after 0,5 second FM-3 = Stop after 0,75 second FM-4 = Stop after 1 second FM-5 = Stop after 1.5 second **⚠ WARNING!** For values exceeding 1 and 1,5 seconds, an additional safety device (safety edge) MUST be installed.	FM-1

SYSTEM LEARNING

PRE-CHECK UP BEFORE LEARNING PROCEDURE

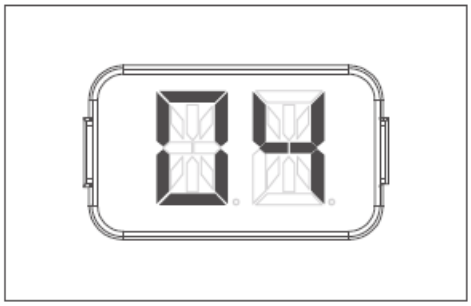
- The motors, photocells and other safety devices are installed and wired,
- The stoppers or limit switchs are installed and adjusted,
- The remotes are memorized,
- Unlock the motors, Manually move the gate to 75% of the travel and lock the motors,

SYSTEM LEARNING PROCEDURE ⚠ MANDATORY

1. Press and hold SET for 3 seconds,
2. The LED display LEA, Releases the button to launch the system learning procedure.
   The first movement of the motors must be in the closing direction. If this is not the case, power off and invert the wiring of the 2 motors M+/M-
3. The motor(s) perform(s) closing/opening movements then stop,
4. The display of DG (2 motors) or **SG** (1 motor) confirms that the learning procedure has been completed successfully.

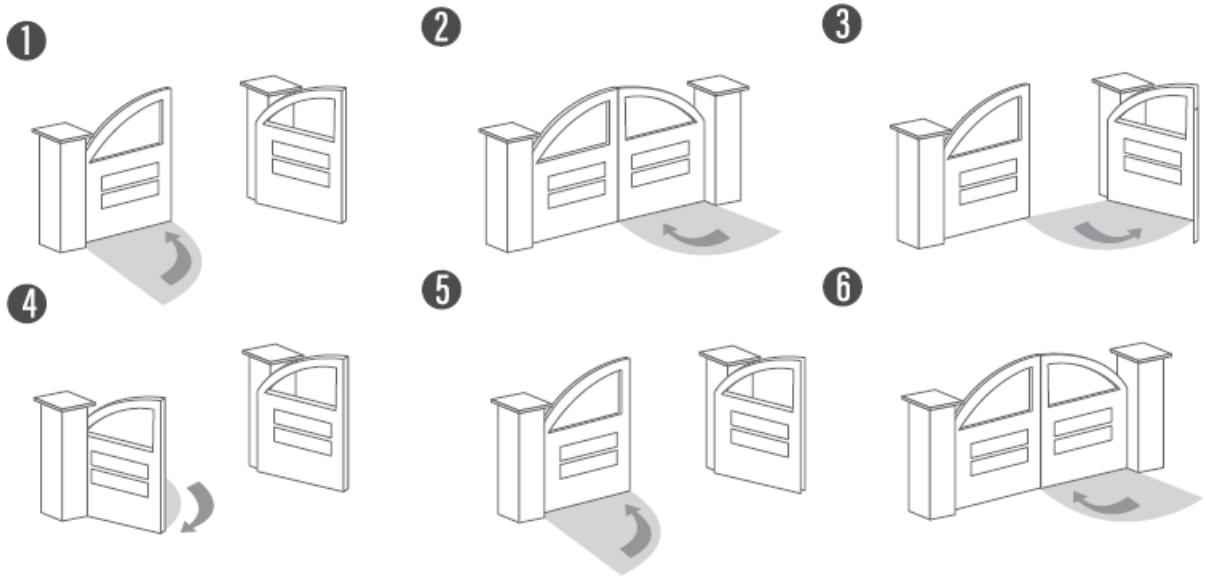
During the learning phase, the LED display the motor power consumption (in Ampere). If this value fluctuates a lot

during the gagateovement make sure to verify if there are any hard spots.



DUAL GATE MOVEMENT DURING SYSTEM LEARNING PROCEDURE:

1. Motor 2 close
2. Motor 1 close
3. Motor 1 open
4. Motor 2 open
5. Motor 2 close
6. Motor 1 close



RESET TO DEFAULT SETTINGS

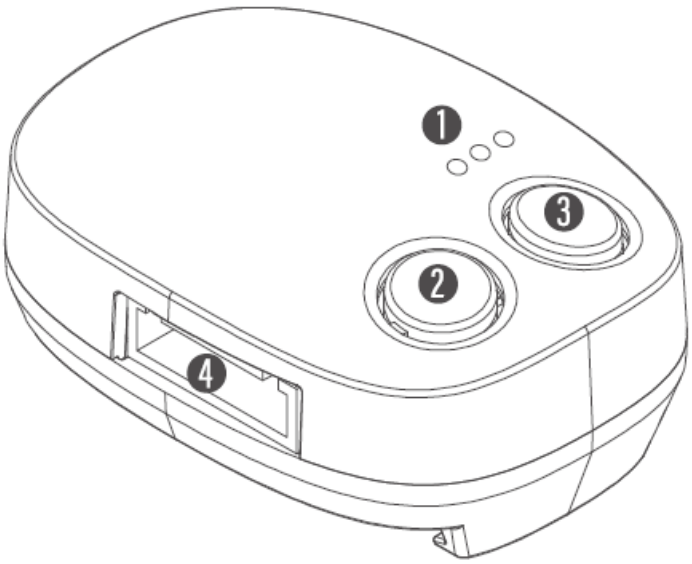
1. Press and hold ▲/SET/ ▼
2. Laffichagede CLN signifies reunited operation, confirming that the system has successfully returned to default settings, Release the buttons=> The LED display N-L (System learning not completed)

SMARTPHONE CONTROL WITH EYE OPEN MOBILE APPLICATION

WB1 Wi-Fi MODULE

1. LED INDICATORS

2. R BUTTON (RESET)
3. P BUTTON (PAIR)
4. TERMINALS



LED INDICATORS DESCRIPTION

- **BLUE:** The blue LED blinks before pairing and stays ON when successfully connected to the WiFi,
- **GREEN:** The green LED blinks once when the WBl module receives a signal from the application, If the WiFi is disconnected or the WiFi signal is weak, the green LED blinks constantly,
- **RED:** Indicates that the system is disconnected or the WiFi password is incorrect

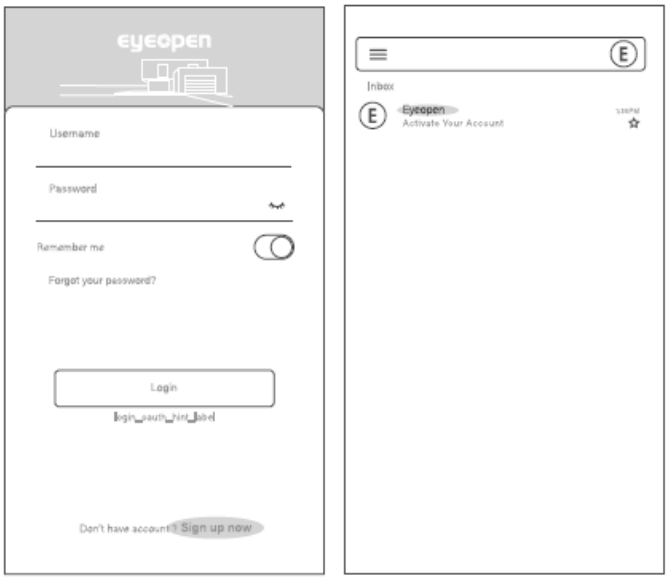
The range between the WBl module and the router is 30 meters (in open space),

QUICK SET-UP GUIDE

- Select which smartphone will be the« owner» smartphone
- The owner can give authorization to the other shared smartphones,
- Activate and connect the smartphone to the WiFi that will be connected to the WBl WiFi module,
- EYED PEN is only compatible with a 2.4Ghz WiFi network

1. Download the EYED PEN application on your smartphone.

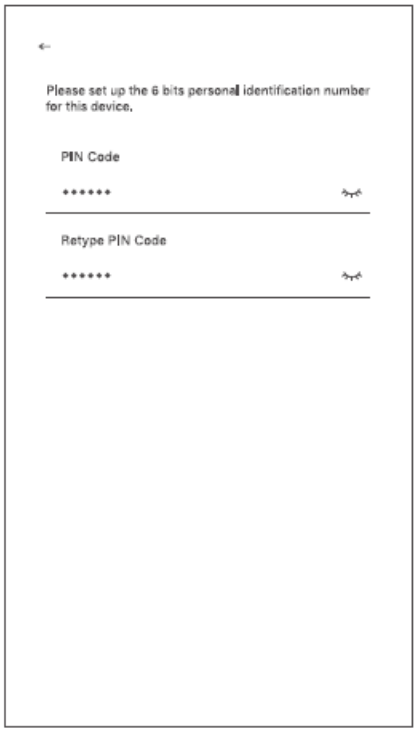
2. Sign up and create a login and password, Confirm and exit the EYEOPEN application, Open your mailbox and activate the link received in the email.



3. Open and login into the application.

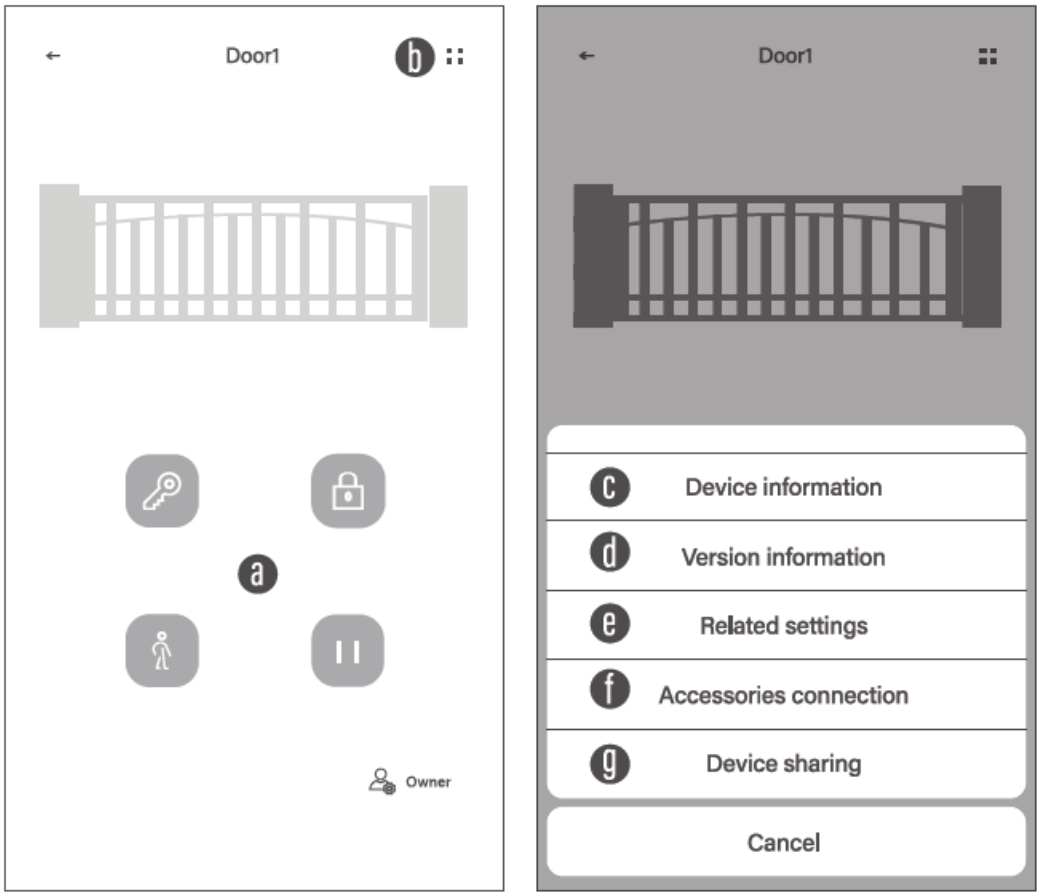
4. Tap the(+) icon to add the device and follow the instructions, Key in confirm the WiFi password and select the device.

5. Set up the 6-digit PIN Code twice and confirm.



- By default, choose 123456 (Twice), You can later modify This PIN code once you are more comfortable with the application.

6. You have now access to the operation interface of the device, You can control, modify settings, add accessories or share the access.
    - **a.** Operation button
    - **b.** Setting page
    - **c.** Device information
    - **d.** Version information
    - **e.** Related settings
    - **f.** Accessories connection
    - **g.** Device sharing



TECHNICAL SPECIFICATIONS

Model Name	PA250
Category	Articulated arm opener
Max gate length	2.5 meters
Max gate weight	250 kilos
Power supply	110-240Vac (50-60Hz)
Motor power supply	24Vdc
Gear type	Worm gear
Duty cycle	20%
IP Rating	IP44
Working/Operating temperature	-20°~50°C
Current (A)	6A
Power (W)	144W
Release	Key
Dimensions	256mm x 187mm x 267mm

MAINTENANCE AND TROUBLESHOOTING

MAINTENANCE

Conduct the following operations at least every 6 months. For intensive use scenarios, shorten this delay.

Disconnect the power supply

1. Clean and lubricate the screws, hinges with grease.
2. Make sure the fastening is properly tightened.
3. Make sure the wire connection is in good functioning condition.

Connect the power supply

1. Double-check the parameter settings.
2. Check the manual release.
3. Check the photocells and other safety devices.

TROUBLESHOOTING

Problem	Solution
The gate is not moving when pressing the buttons on the remote	1. Check if LED2 blinks when pressing buttons on the remote 2. Check if the voltage on the batteries is above 22V 3. Check if LED3-4 are "ON". 4. Make sure all the wires are connected to the PCB terminals 5. Make sure the fuse is fully functional on the panel and power socket.
Transmission range on the remote/keypad is too short	1. Make sure the antenna is well attached and screwed on the control board 2. Make sure there is no obstruction of the antenna (power or motor cables)
Flashing light does not function	1. Make sure the wiring is correct
The gate stops during movement.	Manually move the gate and check if there are any hard spots.
The gate does not move or only move towards a single direction.	1. Verify the motors wiring. 2. Check the fuse status 3. Make sure there are no obstacles obstructing the photocells beam.
One gate fully closes but the other gate stops.	Manually move the gate and check if there are any hard spots. 1. Verify the motors wiring. 2. Check the fuse status 3. Make sure there are no obstacles obstructing the photocells beam. 4. Increase the F2-F3 settings (Force)

Documents / Resources

POWERTECH PA250 Powertech Articulated Arm Gate Opener [pdf] Instruction Manual
PA250 Powertech Articulated Arm Gate Opener, PA250, Powertech Articulated Arm Gate Opener, Articulated Arm Gate Opener, Arm Gate Opener, Gate Opener

References

- **User Manual**