Powered Stair-climbing Wheelchair

XSTO X12 Series

User Manual

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Please read the manual carefully before use and keep it properly

* Headrest, trunk supports and calf lateral support are optional accessories, not standard equipment.

CATALOG

Preface

The XSTO X12 series includes two models listed below (hereinafter referred to as XSTO X12 and XSTO X12 Pro). The key differences between the models are: XSTO X12 Pro features an electric leg support, while XSTO X12 comes with a manual leg support.

Product Model	Product Code
XSTO X12(CPLY136JEA)	CPLY136JEA-01
XSTO X12 Pro(CPLY136JEB)	CPLY136JEB-01

The XSTO X12 series Powered Stair-climbing Wheelchairs are innovative mobility devices with exceptional maneuverability, delivering user a smarter and more convenient travel experience.

Compared to traditional electric wheelchairs, the XSTO X12 series integrates seat height adjustment and multi-angle adjustment functions, equipped with a tracked climbing mechanism, complemented by multiple practical designs that significantly enhance device adaptability and comfort. Thanks to the tracked climbing mechanism, the XSTO X12 series can effortlessly navigate obstacles such as stairs, steps, and wide-span grooves—barriers that are difficult for conventional wheelchairs to overcome—thereby markedly improving mobility capabilities.

The Powered Stair-climbing Wheelchair is equipped with a tracked climbing mechanism. Before use, please ensure you fully understand the device's functions. This equipment must only be operated after completing the required operation training and passing the assessment.

Structural composition

Primarily consists of the frame, motor, control handle, battery, and seat.

Intended use

The XSTO X12 Series intelligent powered stair-climbing wheelchair is designed specifically for individuals with lower extremity mobility impairments and non-ambulatory users. It assists users with outdoor mobility within applicable environments to meet daily travel needs.

Contraindications

- Users who have not completed equipment operation training.
- Users whose weight exceeds the product's specified maximum load capacity.
- Users with impaired cognitive ability (dementia, unconsciousness, slow response, etc.) who cannot identify climbing risks or properly switch climbing modes.
- Users with severe osteoporosis or other conditions causing increased bone fragility, who cannot withstand the impact of emergency braking.
- Users with severe cardiovascular and cerebrovascular diseases, orthostatic hypotension, epilepsy, or other conditions prone to sudden medical emergencies.
- Users with severe motor control disorders (severe limb spasms, involuntary convulsions, etc.) who cannot stably operate the joystick.
- Users with severe mental or behavioral abnormalities who cannot cooperate during use, are prone to leaving the device without permission, or colliding with others.
- Users unable to maintain a sitting posture independently or without postural stability.

1 Icons and Usage Instructions

1.1 Symbols Description

The following symbols are used in this manual to indicate hazard warnings and safety precautions.

Symbol	Explanation
 WARNING	Involving personal safety.
 NOTICE	May indicate minor injury or machine damage.
	Indicating prohibited behavior.
	Indicates necessary behavior.
*	Explanatory note .

1.2 Precautions

 WARNING	
	• Powered Stair-climbing Wheelchair should not be placed in close proximity to or stacked with other equipment. If necessary, observe and verify that they can operate normally under the current configuration before use. • This device is equipped with multiple functions, requiring user to maintain clear consciousness and normal cognitive abilities. • user should read this manual before use. Elderly individuals should clearly understand the operation methods of Powered Stair-climbing Wheelchairs under the guidance of family members.

WARNING	
	• No maintenance or repair activities should be performed while the Powered Stair-climbing Wheelchair is in use. • The laser-detected rear wheel extension/retraction is an auxiliary function. During climbing, the user or accompanying personnel should closely monitor the climbing status. If the rear wheel extends or retracts at an inappropriate time, immediately stop the current operation and manually control the rear wheel extension/retraction. • The climbing function of this device is intended for auxiliary use only. During operation, there is a risk of tipping or backward overturning. At least one professionally trained attendant must be present, and both the user and attendant must remain highly alert to ensure personal safety. Use without supervision is strictly prohibited.
	• Powered Stair-climbing Wheelchairs are not suitable for people with intellectual disabilities. • Do not use attachments, detachable components, or materials other than those specified in this user manual. • Do not connect the device to any other devices not specified in the user manual. • Do not modify this device without authorization. • The patient is the intended operator. When operating the device independently, do not reach into any moving mechanical parts. All equipment maintenance must be performed exclusively by authorized after-sales professionals.. • The use of this equipment by untrained personnel is strictly prohibited: All user must complete operational training under the guidance of professionals before use. • Overloading is strictly prohibited: The total weight of users and personal belongings must not exceed the rated load capacity of the product, as exceeding this limit may result in equipment damage or the risk of machinery overturning. • Children Must Not Use Alone: When a child is using the Powered Stair-climbing Wheelchair, a guardian must supervise at all times. Use without supervision is strictly prohibited.

WARNING	
	• The use of this equipment in the following environments is strictly prohibited, as it may lead to overturning, loss of control, personnel injury, or equipment damage: ✧ Road surfaces prone to slipping or with insufficient load-bearing capacity, such as loose gravel, thick snow accumulation, or icing; ✧ Severely uneven road surfaces with potholes, cracks, or damage; ✧ Rotating staircases and escalators with a twist angle>4°; ✧ Stairs with all-black, light-absorbing surfaces, highly transparent or highly reflective materials, or densely packed small objects (may cause the LiDAR sensor to fail to detect properly). • During equipment climbing, users must maintain stable sitting posture and are strictly prohibited from leaning forward, getting up without authorization, making violent movements, or exiting the vehicle to prevent equipment tipping over or personnel injuries due to falls.

1.3 Security Statement

1. All laser radar-assisted functions in this equipment—including high-speed collision warning, elevated fall detection, and climbing assistance—are categorized as "auxiliary features." These functions are designed to provide supplementary guidance for experienced operators and cannot replace the operator's direct observation, judgment, or control. The user remains the primary responsible party for safe operation. Our company shall not be held liable for any accidents resulting from complete reliance on this auxiliary function.

2. The climbing function of this device involves high-risk operations. users and accompanying personnel must be fully aware of and voluntarily assume all associated risks. Our company shall not be liable for any damages resulting from the following circumstances:

- Failure to use the climbing function without qualified accompanying personnel supervision as required by this manual;
- The accompanying personnel were not adequately trained or made operational errors;
- Forced use of the climbing function in unsuitable environments;
- Functional failure due to improper maintenance of equipment;
- Perform repairs, disassembly, or other operations on the device without authorization.

1.4 Recycling and Disposal

To protect the environment, any damaged or scrapped components of this product must be returned to the manufacturer or disposed of by the authorities designated by the state. Do not discard them arbitrarily. For plastic parts, frames, and tubular components, they may be handed over to professional recycling units after reaching their service life.

This user manual is for the XSTO X12 series.

1.5 Label Description

Symbol	Explanation
	Pay attention to prevent hand clamping
	Pay attention to electromagnetic interference
	Prohibition of Storage

Symbol	Explanation
	Unlock and lock the electromagnetic brake （see section details **7.4.6Electromagnetic Brake** ）
	Warning label
	BF-type applied part
IPX4	The entire vehicle's liquid ingress protection level is IPX4.
	The package contains fragile items; handle with care during transportation.
	Keep the package vertically upward in accordance with the arrow direction during transportation or storage.
	The package is not rainproof; protect it from rain exposure during transportation or storage.
	Do not stack more than 3 layers of identical packages.
	Place the package stably during transportation and avoid rolling to prevent damage to the items.
	Follow the user manual.

2 About the Equipment

2.1 Packing List

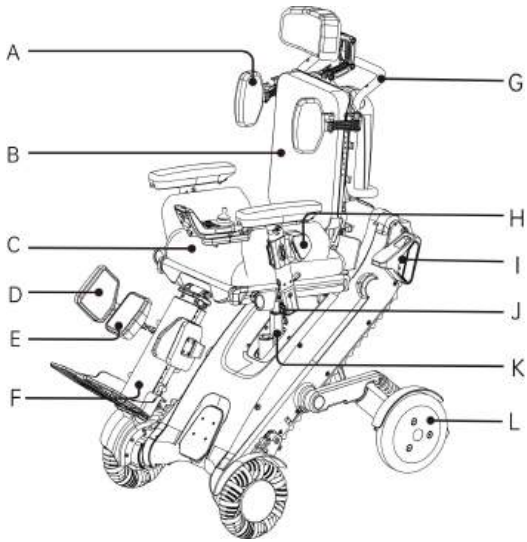
Powered Stair-climbing Wheelchair*1	Lithium battery*2
User Manual*1	Hex wrench *1
Charger*1	

2.2 Optional Accessories

For information on optional accessories compatible with this device, please contact the distributor or manufacturer.

2.3 Product Structure

Key differences between the two models: The XSTO X12 Pro features an electric leg support, while the XSTO X12 comes with a manual leg support. Please refer to the actual product for appearance details; the following image only demonstrates the XSTO X12 Pro.



A: Trunk support (optional)

B: Backrest cushion

C: Seat cushion

D: Calf lateral support (optional)

E: Calf support (optional)

F: Legrest

G: Push handle

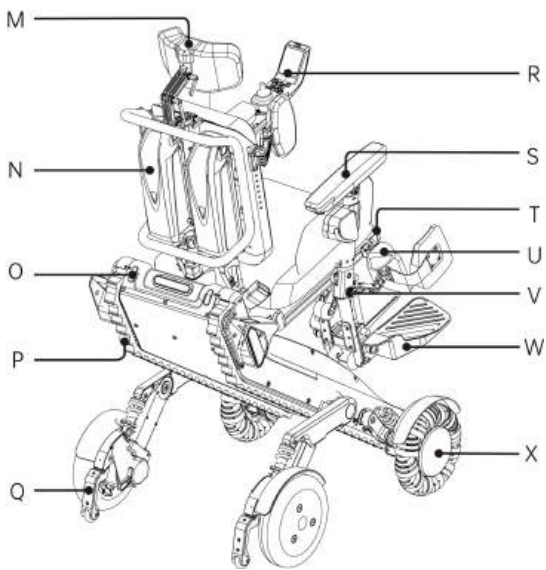
H: Armrest LiDAR

I: Rear LiDAR

J: Armrest charging port

K: Seat push rod

L: Rear wheel



M: Headrest (optional)

N: Lithium battery

O: Rear turn signal light

P: Track

Q: Anti-tip wheel

R: Control handle

S: Armrest

T: Front turn signal light

U: Headlights

V: Emergency stop switch

W: Footrest

X: Front wheel

2.4 Product Parameter

Parameter	Specification Description
Dimensions (length×width× height)	Expanded size: 1210×685×1550mm Folded size: 1185×685×617 mm
Gross mass	125kg
Base weight (excluding battery)	XSTO X12 : 115kg XSTO X12 Pro: 116kg
Pedal assembly dimensions (length × width)	230mm x 150mm * 2
Pedal assembly weight	0.73kg * 2
Handle size	213mm x 70mm x 113mm
Handle weight	300g
Size of rear anti-roll wheel	50mm x 20mm
Solid Tire	Front wheels: 10 inches (all-wheel drive) Rear wheels: 10 inches (rubber wheels)
Joystick diameter	12mm
Frame	Rigid Frame
Folding mechanism	Z mould
Main material	Carbon steel
Service life	5 years
Serial Number Label	Check the fuselage nameplate
Effective seat depth	380mm-435mm
Effective seat width	390mm-440mm
Backrest height adjustment range	128mm

Parameter	Specification Description
Backrest angle	Min:90°, Max:121°
Distance between pedals and seats	Min:375 mm, Max: 680 mm
Angle between leg support and seat surface	Min:98°, Max:175°
Distance between armrest and seat	Min: 255 mm; Max: 312 mm
Seat height	Min: 490 mm; Max: 762 mm
Wheelbase height	119 mm
Obstacle clearance depth	50mm
Crossing ditch width	Wheel-type <180mm / Track <300mm
Maximum weight capacity	136kg
Independent load-bearing capacity of seats	136kg
Maximum speed	12km/h
Flat ground Range	35 km
Minimum turning diameter	1650 mm
Maximum forward obstacle clearance height	100mm
Maximum backward obstacle clearance height	200mm (Climbing Mode)
Stagnation performance	15°
Climbing capacity	15° (wheel-mounted)/40° (crawling)
Safety slope/Maximum slope	15°
Maximum climbing angle	15° (wheel-mounted)/35° (crawling)

Parameter	Specification Description
Static slope stability	15°
Dynamic stability	15°
Noise level	<70 dB
Motor	Brushless motor; 300 W × 24 VDC * 4
Driving system	Four wheel drive
Battery specifications	Lithium battery: 25.2 VDC, 25.6Ah*2
Battery weight	7.2kg (3.6kg* 2)
Battery module size	367*111*90 mm
Battery charging duration	6.5h * 2
Charger specifications	Input: 100-240VAC, 50/60 Hz, 2.5 A MAX; Output: 29.4 VDC /4 A
Brake	Electromagnetic brake
Safety belt	1
Anti-slip wheel	2
Temperature range for device storage and operation	0°C to +35°C / +5°C to +40°C
Temperature range for battery storage/operating	0°C to +45°C/0°C to +45°C
Minimum platform size	L-shaped corner: 1400x1400mm U-shaped corner: 1400x2000mm
Classification of waterproof	IPX4

* The test dummy used in performance testing had a weight of 136 kg.

Note: Machines may exhibit machining and assembly tolerances, with actual dimensions generally within ±5mm of the specified values in the table and weight within ±2kg.

NOTICE
• This product is a versatile outdoor Powered Stair-climbing Wheelchair. • The total weight of user and personal belongings must not exceed the rated load capacity of the product; otherwise, there may be risks of equipment damage or machine overturning.

Device speed and braking distance :

Mode	Gear	Device speed		Braking Performance on Level Ground
		Forward: km / h	Reverse: km / h	Braking Distance
N mode	1	1.0	0.33	290mm
	2	1.5	0.5	400mm
	3	2.0	0.66	550mm
	4	3.0	1	760mm
	5	4.0	1.26	1160mm
S mode	Gear	Forward: km / h	Reverse: km / h	Braking Distance
	1	1.0	0.33	360mm
	2	2.0	0.6	590mm
	3	3.5	1.05	1000mm
	4	6.0	1.86	1570mm
	5	8.0	2.0	2000mm
H mode	Gear	Forward: km / h	Reverse: km / h	Braking Distance
	1	2.0	0.6	650mm
	2	6.0	1.86	1600mm
	3	8.0	2.0	2200mm
	4	10.0	2.0	2760mm
	5	12.0	2.0	2900mm

* The braking distance indicators shown in this table were measured under standard test conditions for dry asphalt pavements. Actual performance may be affected by factors

such as pavement conditions, load, tires, and environmental factors.

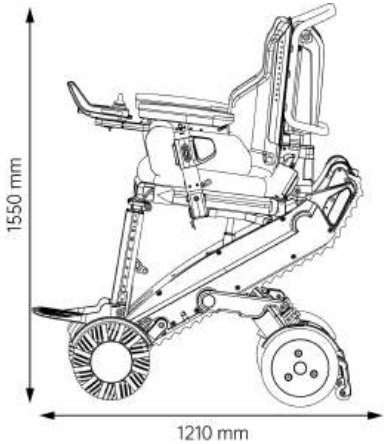
Working environment conditions for Powered Stair-climbing Wheelchairs:

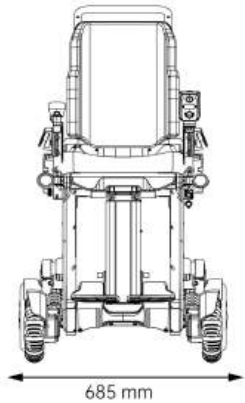
1. Environmental temperature: 5°C to 40°C
2. Relative humidity: <95%
3. Atmospheric pressure range: 800 hPa to 1060 hPa
4. At an ambient temperature of 20°C, the Powered Stair-climbing Wheelchair requires 2 hours to reach normal operation from the lowest storage temperature, and another 2 hours from the highest storage temperature.

The storage and transportation environmental conditions for Powered Stair-climbing Wheelchairs between two uses shall comply with the following requirements:

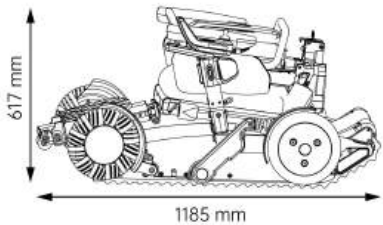
1. Environmental temperature: 0°C to 35°C
2. Relative humidity: ⩽95%
3. Atmospheric pressure range: 800 hPa to 1060 hPa

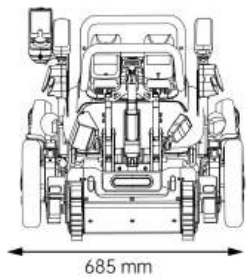
2.5 Product Overall Size



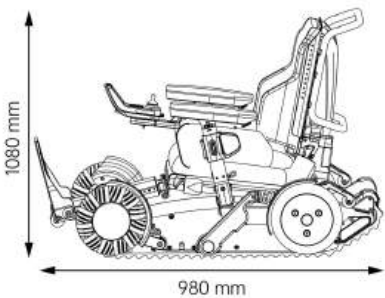


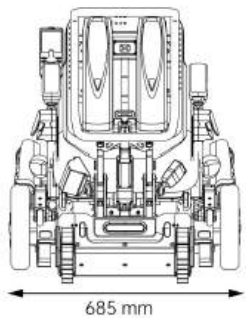
Maximum state





Folded state



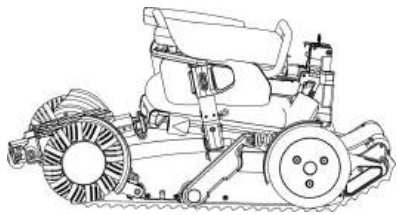
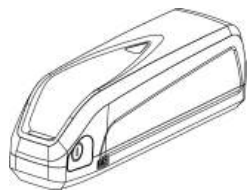


Track travel state

3 Assembly and Adjustment

3.1 Components Introduction

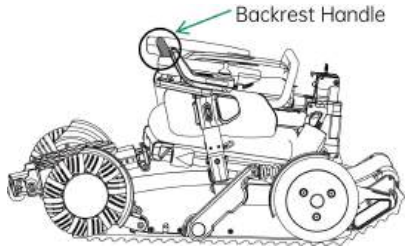
The equipment is packaged and shipped in the following main components, as shown in the diagram below:

Part Name	Illustration
Main unit*1	
Lithium battery*2	
Handle assembly*1	

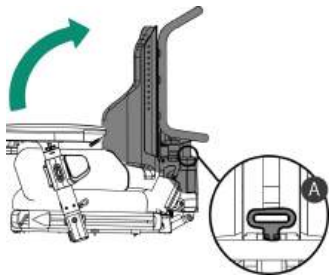
3.2 Assembly Method

The assembly and startup operation procedure for Powered Stair-climbing Wheelchairs is as follows:

1. Grab the backrest handle and press the backrest unlock handle Ⓐ ;



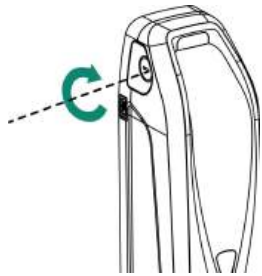
2. Pull the backrest backward until it reaches the limit, then release the unlock handle and gently shake it to confirm the backrest is locked. Finally, extend the pedal.



3. Hold both sides of the battery pack, align it with the battery mounting rail on the seat backrest, and insert it smoothly. Push it horizontally downward to secure it. The two batteries have different addresses; use batteries with addresses 01 and 02 respectively.

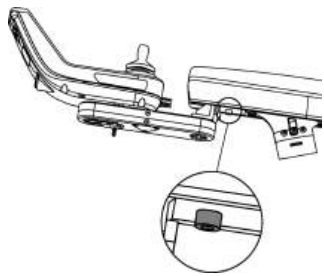
NOTICE	
	Strictly avoid grasping the lower half of the battery to prevent the risk of pinching injury.

4. Use the key provided with the battery to turn clockwise and lock the battery in place. If the battery cannot be locked, it indicates that the battery is not properly seated. Remove the battery and reinsert it correctly.



5. Handle installation.

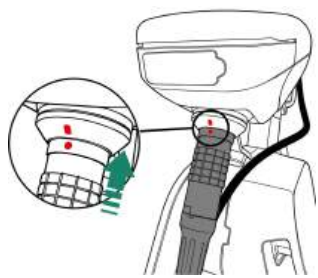
1) Remove the handle assembly, align it with the armrest base, and secure it using an M5x10 hexagon socket cylinder head screw.



2) Connect the handle cable.

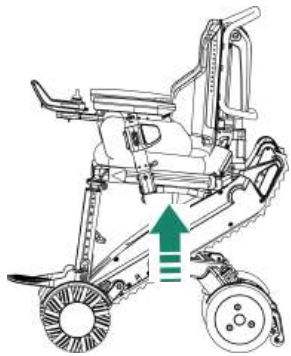
Locate the aviation plug end of the handle cable, align it with the corresponding interface on the armrest, insert it, and verify a secure connection.

To remove the handle cable, grip the aviation plug end and pull it downward.



6. Press the power ⏻ button on the controller to turn on the device.

7. Press and hold the Up and Down buttons simultaneously. After approximately 3 seconds, the one-touch deployment function activates, and the Powered Stair-climbing Wheelchair enters driving mode.



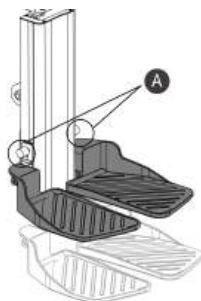
3.3 Manual Adjustment

User can adjust the device to a comfortable setting based on their actual needs.

3.3.1 Footrest

Footrest height adjustment:

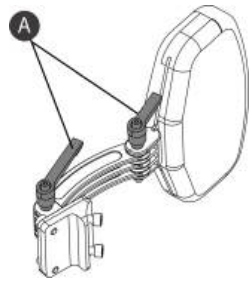
1. Pull the rotating plunger Ⓐ outward to allow the footrest to move vertically.
2. Adjust the footrest to the desired height and release the rotating plunger.



3.3.2 Trunk Support Assembly (optional)

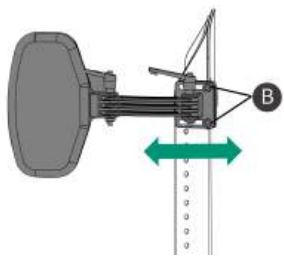
- Angle adjustment of trunk support assembly

1. Loosen the 7-shaped bolt A ;
2. Adjust the trunk support assembly to the desired angle;
3. Tighten the 7-shaped bolt.



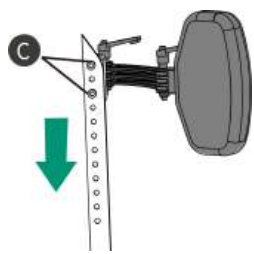
- Front/rear adjustment of trunk support assembly

1. Remove the internal hex screw B ;
2. Adjust the trunk support assembly to the desired position;
3. Simply re-tighten the screws that were removed to secure the fixation.



- Height adjustment of trunk support assembly

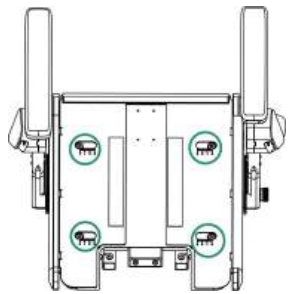
1. Remove the internal hexagonal cylindrical head screw C ;
2. Adjust the trunk support assembly downward to the desired height;
3. Simply re-tighten the screws that were removed to secure the fixation.



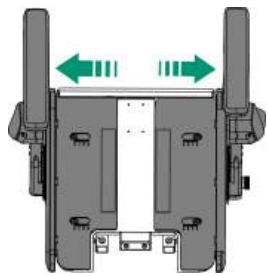
3.3.3 Seat

3.3.3.1 Seat Width

The seat base features internal hexagonal cylindrical screws. Loosening the four screws shown in the diagram will unlock the seat width adjustment function.

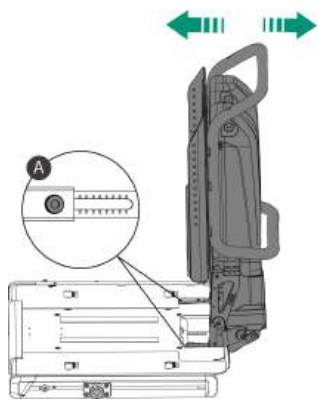


1. Loosen the hexagonal cylindrical screws at the bottom of the seat;
2. Seize both armrests and adjust the armrest spacing to the desired width.
3. Tighten the screws at the bottom to adjust the seat width.



3.3.3.2 Seat Depth

1. Remove the seat cushion and locate the screws Ⓐ that secure the backrest assembly to the seat base.
2. Loosen the screws and adjust the reclining assembly by moving it forward and backward to the desired position.
3. Tighten the screws and install the seat cushion.



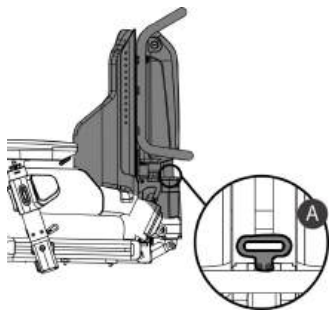
3.3.4 Headrest (optional)

Adjustment of headrest angle

1. Loosen the 7-shaped bolt Ⓐ ;
2. Adjust the headrest to the desired position according to personal preference;
3. Simply tighten the 7-shaped bolt.

3.3.5 Backrest Folding

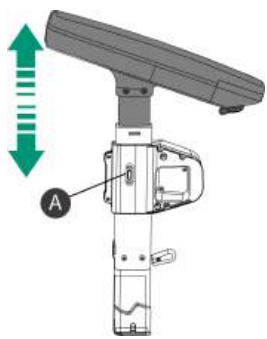
1. Hold the backrest unlock handle Ⓐ and press slightly upward;
2. Press the backrest assembly forward and downward to fold it.



3.3.6 Armrest

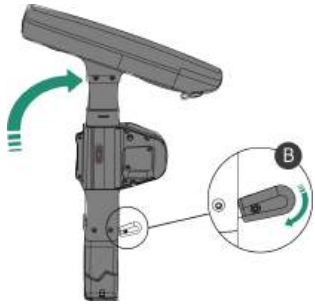
■ Armrest height adjustment

1. Long press the armrest height adjustment button Ⓐ ;
2. Adjust the armrest to the desired height;
3. Release the armrest height adjustment button to complete the adjustment.



■ Flip-Back Armrest

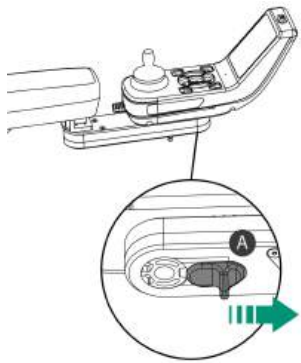
1. Press down the unlock handle Ⓑ and hold the press;
2. Flip the armrest assembly backward;
3. Release the unlock handle.



3.3.7 Control Handle

■ Control handle angle adjustment

1. Push the control handle backward to release the angle lock Ⓐ , allowing the control handle to enter the unlocked state.



2. Rotate the control handle to the desired position;
3. Rotate the handle forward to release the angle lock and unlock the current position.

■ Control handle height adjustment

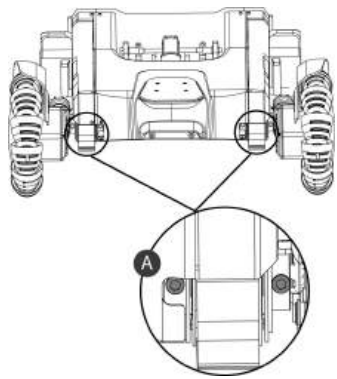
The control handle mounting base is equipped with two holes for height adjustment, which can be selected as needed.

1. Loosen the internal hexagonal cylindrical head screw Ⓐ ;
2. Adjust the control handle assembly to the desired height;
3. Re-tighten the fixation with the original screws to complete the height adjustment.

3.3.8 Track Tensioning

1. Adjust the seat height to the lowest permissible position in driving mode.

2. Insert the hex key and turn the screw clockwise to tighten the track.



4 Control Handle

The control handle consists of a power button, display screen, joystick, and multiple buttons. Its components are illustrated in the figure below:

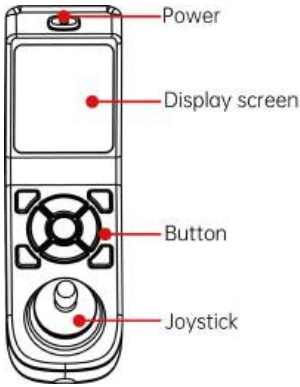


Figure 4-1 Control Handle

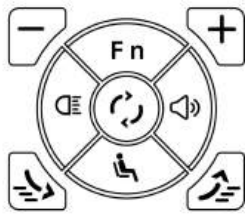


Figure 4-2 Key Icons

4.1 Interface Operation Instructions

Short press the power button ⏻ on the control handle to turn on the device. The system will enter the initialization interface, and then automatically enter Interface 1 (Main Interface) by default.

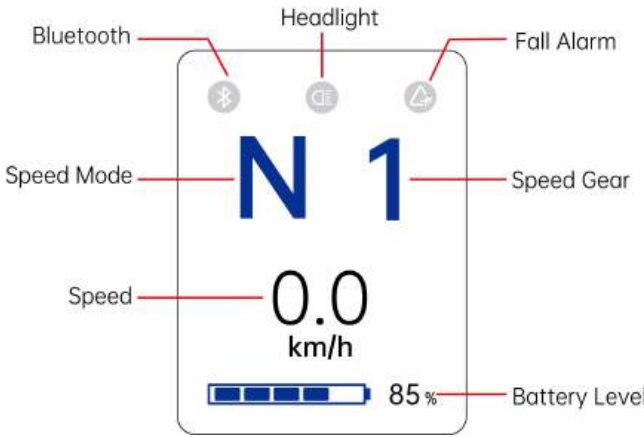
Figure 4-3 Initialization Interface

Figure 4-4 Interface 1

The display screen is configured with the following three control interfaces. Short press the Page button to switch between the three interfaces in sequence. The content displayed and the operations available on each interface are different.

- Interface 1 (Main Interface)
- Interface 2 (Adjustment Interface)
- Interface 3 (Rocking Chair Interface)

4.1.1 Interface 1 (Main Interface)



Current Interface	Button Icon	Functional Description
	−	Short press: Speed reduction in driving mode and track mode Long press: Climbing mode retracts rear wheels
	+	Short press: Accelerate in driving mode and track mode Long press: Release rear wheels in climbing mode
	Fn	Short press to switch driving modes: N, S, H Long press: Turn on/off the hazard warning assist feature

		Short press: Turn light on/off
		Press the horn to sound, release to stop
		Long press: • In driving mode, enter or exit the Easy boarding setting mode • Calibrate the sensor in track mode
		Short press: Switch pages in Driving Mode
		Long press to enter upstairs mode
		Long press to enter downstairs mode
		Long press: Wireless key Programming
		Long press: Wireless key Erasing
		Long press and hold the key combination • Climbing mode forces exit to driving mode • Switch driving mode to track mode • Switch from track mode to driving mode
		Long press: Open or close the parameter configuration page
	Joystick	• In driving mode: control the wheel • In climbing mode: control the tracks • In track mode: control the tracks

For details on driving mode, track mode, and climbing mode, refer to section **7 Overall Operation**. Information on adjustment, easy boarding, and flat-bed positioning modes is provided in section **4.2 Posture Adjustment**.

4.1.2 Interface 2 (Adjustment Interface)

Press the button once in Interface 1 mode to display this interface.

Current Interface	Button icon	Functional Description
	−	Short press: Switch the push rod control target (the corresponding part will be highlighted in color)
	+	Short press: Switch the push rod control target (the corresponding part will be highlighted in color)
	Fn	Long press: Turn on/off the hazard warning assist feature
		Short press: Turn light on/off
		Press the horn to sound, release to stop
		Long press: Enter/Exit one-click flat mode
		Short press: Switch pages
		Not available
		Not available
	and	Long press: Open or close the parameter configuration interface
	Joystick	• Adjust the seat angle forward and backward when the seat displays color; adjust the seat height left and right. • When the leg support displays color, adjust the leg support angle forward and backward, and adjust the leg support extension left and right. • When the backrest displays color, adjusting the backrest angle forward or backward has no effect on left or right movement.

4.1.3 Interface 3 (Rocking Chair Interface)

Short press the button twice in Interface 1 mode to display this interface.

Current Interface	Button Icon	Functional Description
	−	Long press: Lift or lower the left front wheel
	+	Long press: Lift or lower the right front wheel
	Fn	Not available
		Short press: Turn light on/off
		Press the horn to sound, release to stop
		Not available
		Short press: Switch pages
		Long press: Turn auto left/right rock on/off
		Long press: Turn auto front/rear rock on/off
	and	Long press: Open or close the parameter configuration interface
	Joystick	Vehicle Attitude with Joystick Movement

4.2 Posture Adjustment

The Powered Stair-climbing Wheelchair can switch among three modes: adjustment, easy boarding, and reclining Mode, allowing for different posture adjustments.

4.2.1 Adjustment Mode

In Interface 1, short press the button once to switch to Interface 2; the system will enter the seat adjustment mode by default.

4.2.2 Easy Boarding Mode

- Enter and exit easy boarding mode

In Interface 1, short press the button once to enter the Easy Riding Mode. The seat height will lower for convenient boarding, and the easy boarding icon will appear on the screen.

To exit, short press the button once. After exiting Easy Boarding Mode, the seat will return to the preset height.

- Seat position adjustment

In Interface 1, long press the button once to enter the Boarding Posture Setting. The posture setting icon will be displayed on the screen. At this time, you can adjust the device posture via the joystick.

After adjustment, short press the button once to exit.

4.2.3 Reclining Mode

In Interface 2, long press the button once to enter Reclining Mode . The Reclining Mode icon will be displayed on the screen, and you can adjust the device posture via the joystick.

To exit, long press the button once.

4.2.4 Adjust Attitude Using the Joystick

In adjustment mode, easy boarding mode, and lying flat mode, the device supports adjustment of the seat, backrest, and leg rest.

This chapter takes the adjustment mode as an example for explanation.

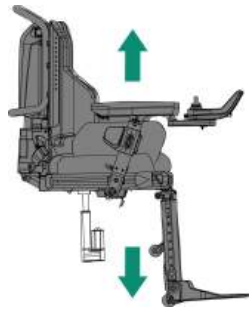
4.2.4.1 Seat adjustment

1. In Interface 1, short press the button once to switch to Interface 2, and the system will enter the Seat Adjustment Mode by default.

2. When the seat icon on the display is colored:

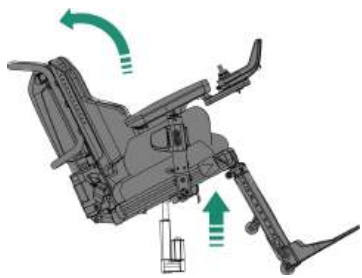
- Push the joystick left/right to control the seat height to rise/lower.

NOTICE
When driving on uphill or downhill slopes, the seat should be at the standard height of 550 mm and must not be raised to the maximum position. Otherwise, there is a risk of the machine tipping over.



- Push the joystick forward/backward to control the seat forward tilt/backward tilt.

NOTICE
Before adjusting the backrest, first check for any items such as backpacks behind it and remove them to prevent squeezing during adjustment, which may cause damage to the bottom cover.



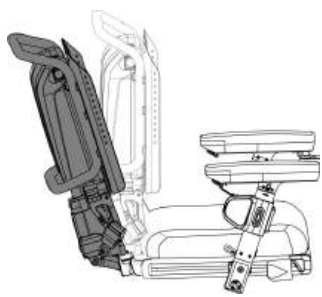
4.2.4.2 Backrest Adjustment

1. In Interface 1, short press the button once to switch the screen to Interface 2.

2. Short press the − or + button to switch the interface to Backrest Adjustment Mode.

3. When the backrest icon on the display is colored, push the joystick forward/backward to control the forward/backward tilt of the backrest.

NOTICE	
	Before adjusting the backrest, first check for any items such as backpacks behind it and remove them to prevent squeezing during adjustment, which may cause damage to the bottom cover.



4.2.4.3 Legrest Adjustment

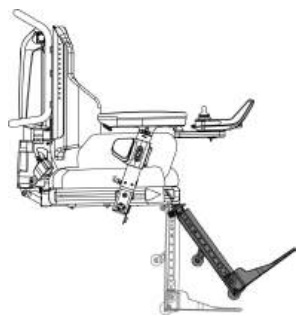
Electric legrest adjustment is only available for the XSTO X12 Pro device.

1. In Interface 1, short press the button once to switch to Interface 2.

2. Short press the − or + button to switch the interface to the Leg Rest Adjustment Mode.

3. When the leg rest icon on the display is colored:

- Push the joystick forward/backward to adjust the angle of the leg rest.

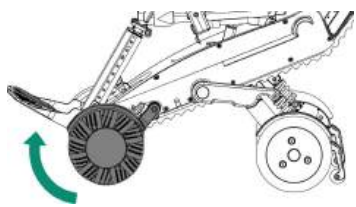


- Push the joystick left/right to control the extension/retraction of the leg rest.

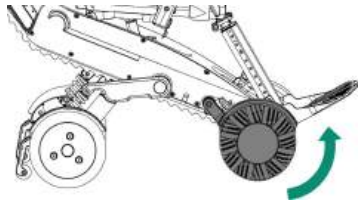
4.3 Rocking Chair Function

In Interface 1, short press the button twice to switch the screen to Interface 3.

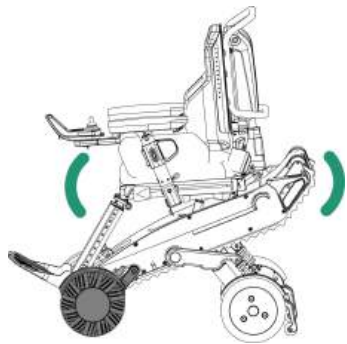
- Long press the button — to lift or lower the left front wheel.



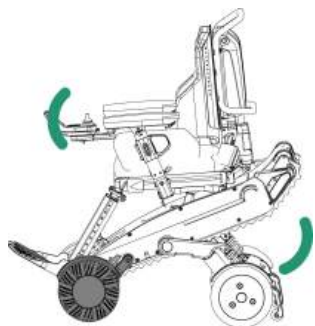
- Long press the button + to lift or lower the right front wheel.



- Long press the button to enable automatic left-right shaking. Long press again to disable it.



- Long press the button to enable automatic front and rear shaking. Long press again to turn it off.



4.4 Parameter Configuration

Press and hold the and buttons simultaneously in any interface to enable/disable the parameter configuration interface.

Current Interface	Functional Description
	Joystick Operation Instructions for Parameter Configuration Interface • Push forward: Move option up • Push backward: Move option down • Push left: Decrease parameter / Disable function / Cancel & Exit • Push right: Increase parameter / Enable function / Confirm

Parameter Name	Explanation
Restore Default	Restore all configurable parameters to default values
Language	Optional: English, Chinese (with memory function)
Volume Settings	0 (Mute), 1, 2, 3, 4 (with memory function)
Fall and Collision Warning Function	Enabled by default upon startup. Switching modes after disabling it will reactivate the feature (without memory retention).
Self-Balancing Function	Seat Automatic Adjustment Switch (with Memory Function)
Reverse Alert	A reminder sound is issued during reversing (with memory function)

Parameter Name	Explanation
Seat Adjustment Enabled	Forward and rearward seat adjustment (with memory function)
Alarm Function	Slope climbing, hazard warning alert sound (with memory function)
Seat Height Speed Limit	Seat height less than 200mm or greater than 580mm, set to N/S mode level 3 (with memory function)
Automatic Gear Downshift on Slope/Obstacles	When climbing slopes or crossing obstacles, the system will automatically switch to N/S mode Level 3 with memory function.
Left / Right Tilt angle Speed limit Threshold	Lateral tilt angle exceeds ±8°, reduced to N/S mode level 3 (with memory function)
Bluetooth Disabled	Bluetooth connection function switch (with memory function)
High-speed Mode	Enable or disable H mode. H mode supports 5 gears with a maximum speed of 12 km/h (with memory function).
Turn Signal Enabled	Enable or disable turn signal function (with memory function)
PRO Function Enabled	Electric Leg Rest Adjustment Switch (with Memory Function)

4.5 Alarm Alert

Alarm information generated during device operation will be displayed in the upper area of the screen. When multiple alarms are triggered simultaneously, the system will display them in sequential rotation.

For detailed alarm descriptions, please refer to section **11Alarm Investigation** Troubleshooting.

4.6 Danger Alert Assistive Feature

The device is equipped with a hazard warning auxiliary function, which includes auxiliary high-speed collision warning and auxiliary high-altitude fall warning (see section **6 LiDAR sensor**).

Long press the button **Fn** to turn the function on/off. When the corresponding icon lights up on the controller display, the function is enabled (default on startup).

When the feature is turned off, it will automatically turn on after switching modes or 15 minutes.

Auxiliary High-Altitude Fall Hazard Warning:

After enabling the hazard warning assist function, the Powered Stair-climbing Wheelchair will activate braking automatically when approaching staircases or steps with significant vertical drops (active braking can be triggered both forward and backward). A fall warning icon will then appear on the screen. This function is effective in both driving mode and track mode.

Auxiliary High-Speed Collision Warning:

When the hazard warning assist function is enabled, the vehicle will decelerate upon detecting a collision obstacle and emit a beeping alarm sound as it approaches the obstacle, with the alarm becoming more urgent as it gets closer. This function is activated in driving mode.

During equipment operation, the laser window must not be obstructed, as this may affect normal functionality.

4.7 Wireless Remote Programming or Erasing

■ Wireless Remote programming

Press and hold the — and button for 5 seconds to enter wireless remote programming mode, displaying the wireless remote programming icon.

After successfully programming a wireless remote control, press and hold the unlock button to activate it. The system will emit an unlock sound and display the unlock icon upon completion.

If wireless remote programming fails, follow these steps:

1. Erase learned remote keys
2. Return to wireless remote programming mode;
3. Bring the remote key close to the control handle and press the unlock button repeatedly for programming.

■ Remote Wireless Erasing

Press and hold the + and button for 5 seconds to enter the wireless remote control erasing state. The wireless remote control erasing icon will appear and remain visible for 18 seconds. After erasing, the wireless remote control will no longer function.

4.8 Device Calibration

This icon is a calibration icon (see section 7.1 Device Calibration).

4.9 Backrest Limit

When the backrest reaches the rear adjustment limit, the screen displays a limit icon . In adjustment mode, the backrest cannot be adjusted backward, while in climbing mode, it retracts forward.

5 Remote Key Fob

5.1 Appearance of the Key Fob

The appearance of the Key Fob is as shown in below figure. There are three buttons on the Key Fob: unlock button, power-on button and lock button.

Remote Key Fob appearance

5.2 Operation of the Remote Key Fob

- Starting up

Press the power button on the remote key fob, and the control handle will power on accordingly.

Locking

When the Powered Stair-climbing Wheelchair is in handle control or bluetooth control, pressing the lock button on the key fob will put the robot into a locked state.

In this state, the robot cannot be controlled via the control handle or bluetooth, and the display screen will show the "Locked" status.

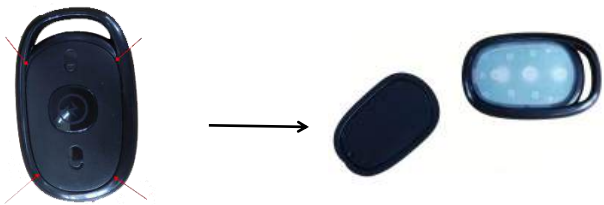
Unlocking

After the Powered Stair-climbing Wheelchair is locked, it can be unlocked by pressing the unlock button on the key fob, and an unlock icon will appear on the display.

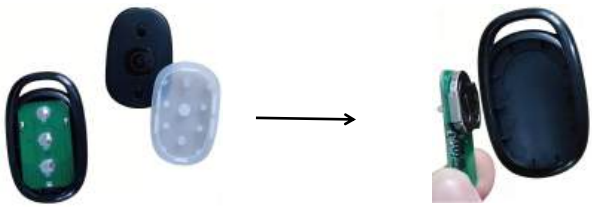
If the device was in bluetooth control before locking, it will automatically switch to handle control after unlocking, and the speed gear will remain the same as before locking.

5.3 Battery Replacement of the Remote Key Fob

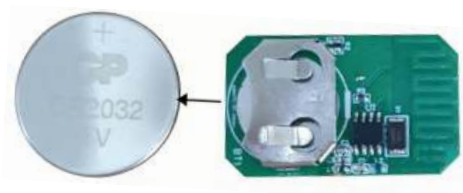
(1) Use a slightly pointed tool to pry the lid open.



(2) Remove the white rubber shell, and please note that the rubber shell is embedded in the groove inside. Then remove the circuit board.



(3) Take out the button battery and replace new ones.(the battery model: CR2032).



(4) Follow the replacement procedure to reassemble the cover in the order of (3) - (2) - (1).

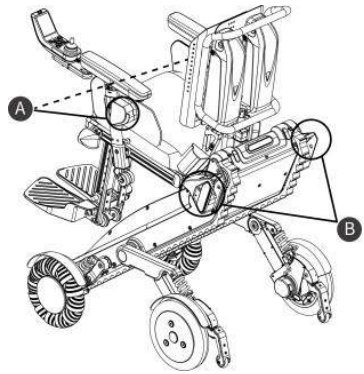
6 LiDAR Sensor

6.1 Installation Site

The Powered Stair-climbing Wheelchair is equipped with four LiDAR sensors.

The laser sensors Ⓐ on both sides of the left and right armrests are installed at a specific lateral inclination angle.

The laser sensors Ⓑ on both sides of the machine tail are installed perpendicular to the machine.

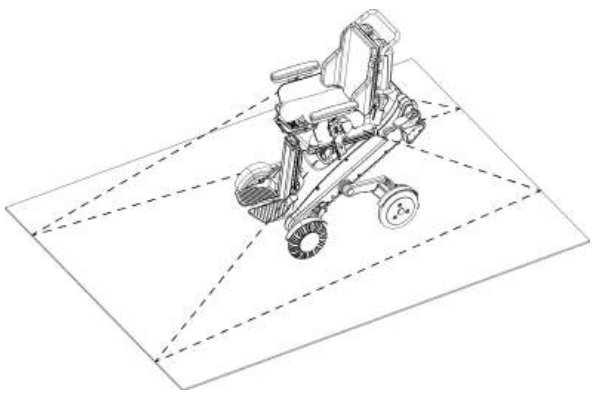


6.2 Detection Zone

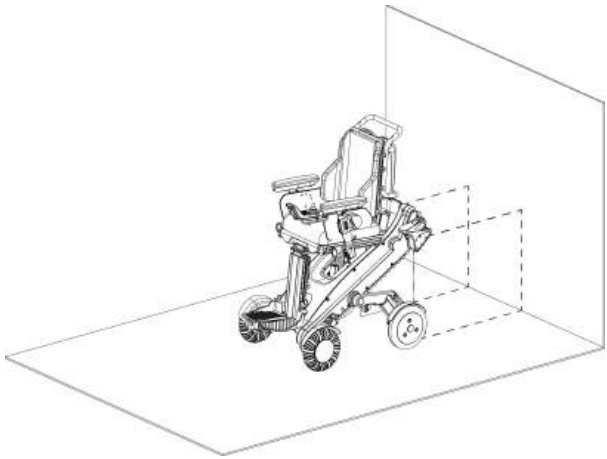
The detection zone is a surface formed by circles centered on the radar and perpendicular to the laser window.

The effective scanning range of LiDAR is influenced by installation height, tilt angle, ground material, slope, and surface smoothness, while also being constrained by external factors such as atmospheric conditions, lighting conditions, and target reflection characteristics. The actual detection range and coverage area vary depending on operational conditions, as illustrated schematically in the figure below.

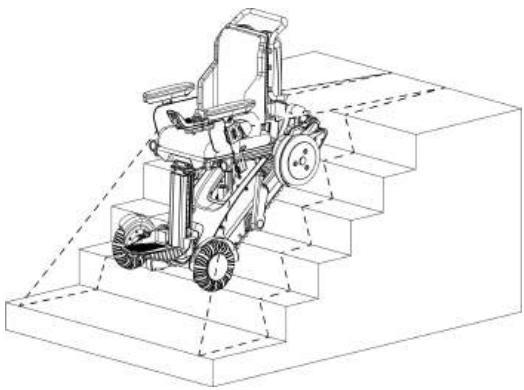
- Laser detection zone on both left and right armrests at the highest attitude during driving mode



- Laser detection zone on both sides of the highest attitude rear section for driving mode.



- Laser detection zone on both sides of the left and right armrests in climbing mode.



6.3 Daily Cleaning

Dust, fingerprints, or stains on the radar optical window (enclosure) can directly increase ranging noise, leading to functional abnormalities and system failure.

Wipe gently with clean, fine, soft microfiber cloth (e.g., lens cloth). Avoid using corrosive chemical solvents or rough paper towels/cloths.

6.4 Usage Precautions

6.4.1 Operating Environment

- Avoid use in high-temperature, high-humidity, or strongly dusty environments.
- Light avoidance: Although the radar inherently supports ambient light resistance exceeding 80,000 Lux, it should still be avoided under intense direct light sources to prevent range measurement errors that may cause functional abnormalities or system failure.
- Interference from multiple devices operating in the same area: If multiple units of the same product operate face-to-face in the same space, the lasers being at the same horizontal plane may interfere with each other, causing random noise points and potentially leading to malfunctions or system failure.
- Material Limitations: Avoid use in areas with high concentrations of high-absorptivity materials (e.g., black velvet carpet), high-transmittance materials (e.g., glass), high-reflectivity materials (e.g., polished mirror tiles, polished metal surfaces), or fine materials (e.g., kite strings, electric wires).

  In such scenarios, laser light may be absorbed, transmitted, or diffusely reflected, resulting in abnormal operation or functional failure.

6.4.2 Precautions Before use

- Ensure the LiDAR appearance is free of damage. The optical window must be kept clean, without scratches, stains (e.g., fingerprints), or obstructions. If any abnormalities are present, do not power on or use the device.
- Verify that the LiDAR installation positions (radars on both left and right armrests, and radars on both sides of the rear) are free from looseness or misalignment. If any abnormalities are detected, do not turn on the device for use.
- Check the radar module for deformation caused by external compression. If any abnormalities are detected, do not turn on or use the device.

- If a malfunction occurs, perform calibration according to the calibration procedure. Ensure the LiDAR scanning plane is level to eliminate malfunctions or failures caused by overall device tilting.

6.4.3 Precautions During Use

- During operation, it is strictly prohibited to obstruct or touch the radar optical window, and scraping the window surface with hard objects is forbidden to avoid affecting range measurement, which may lead to functional abnormalities or failure.
- During equipment operation, monitor the screen for radar-related error alerts. If an alarm is detected, immediately shut down the system to troubleshoot the fault. Operating with a malfunction is strictly prohibited.
- During normal operation, the radar emits a steady sound. If noticeable metal friction or jamming sounds are heard, it indicates potential bearing damage inside the radar, and the machine should be immediately shut down for inspection.

6.5 Features Overview

In driving mode and track mode, the LiDAR functions as a driver-assistance system, specifically providing Auxiliary High-Speed Collision Warning and Auxiliary High-Altitude Fall Hazard Warning.

During climbing mode, the LiDAR system assists in both ascending and descending stairs by detecting staircases and steps. It uses feature data to guide control strategies, enabling the device to complete the climbing process.

Do not block the sensor during device use. If blocked, the device will stop and a warning will appear on the screen.

6.5.1 Auxiliary High-Speed Collision Warning

- **Collision Obstacle Confirmation**: Taking the plane on which the device is located as the reference surface, collision obstacles shall be at least 200 mm higher than the reference surface.
- **Environment Confirmation**: Before use, ensure that the current environment meets the applicable scenarios specified in the precautions (see section **6.4.1 Service Environment**).
- **Switch confirmation**: Before use, ensure the hazard warning assist function is enabled.
- **Mode confirmation:** This feature is only available in Driving mode.

- Scope limitation: The LiDAR can only detect obstacles within its laser scanning plane.Obstacles located in blind spots cannot be detected or warned against — for example, obstacles appearing directly in the middle of the device.
- Deceleration safety:
  - When an obstacle is detected, the device will only slow down without stopping. Please be cautious.
  - When the device is operating at high speed and suddenly detects a nearby obstacle, it will decelerate with a significant acceleration. Within a short period, the device will generate substantial forward inertial force, which may cause unsecured loads on the device to slip or tip over, or result in collision injuries to surrounding personnel.
  - Before use, all mounted loads must be secured. When operating in narrow or densely populated areas, it is recommended to drive at low speeds.

6.5.2 Auxiliary High-Altitude Fall Hazard Warning

- Drop Obstacle Confirmation: Taking the plane on which the device stands as the reference surface, a drop obstacle shall be at least 200 mm lower than the reference surface.
- Environment Confirmation: Before use, ensure that the current environment complies with the applicable scenarios specified in the precautions (see section 6.4.1 Service Environment).
- Switch confirmation: Before use, ensure the hazard warning assist function is enabled.
- Mode confirmation: This feature works in driving mode and track mode.
- Scope limitation :
  - The LiDAR can only detect drops within its laser detection range. Drops located in blind spots cannot be detected or warned against, such as a drop appearing in the middle of the device.
  - As the front laser detection range is angled, functions may fail or operate abnormally when traveling on narrow, elevated surfaces (e.g., approaching stairs or when the device is on a slope). Ensure the width of the flat surface or stairs in the travel direction is at least 2000 mm during use.
  - Since the rear laser installation position is on the inner side of the rear

wheel, the device will fail and malfunction when the angle between the equipment and the falling surface is too small. Please pay attention to safety.

- When driving on grid-like road surfaces, such as sewer manhole covers or gaps parallel to the vehicle's front and rear, be cautious of potential failures or abnormalities. Stay safe.

- Deceleration safety:
  - This feature will stop when it detects a fall. Ensure the ground is not slippery and avoid stopping for too long.
  - When the device is operating at high speed and a sudden near-fall detection occurs, it will decelerate with a significant acceleration. Within a short period, the device will generate substantial forward inertial force, which may cause unsecured loads on the device to slip or tip over, or result in collision injuries to surrounding personnel.
  - Before use, all mounted loads must be secured. When operating in narrow or densely populated areas, it is recommended to drive at low speeds.

6.5.3 Auxiliary Climbing Up and Auxiliary Descending Functions

- Feature recognition is not 100% reliable and should be used for auxiliary purposes only.
- Position of accompanying personnel during the climbing process:
  - Maintain a distance of at least 0.5 meters behind to avoid obstructing the rear radar.
  - Maintain a distance of at least 0.8 meters ahead to avoid blocking the radar on both side armrests.
  - The left and right sides must maintain a distance of at least 0.5 meters from the front wheels to prevent obstruction of the left and right armrest radar sensors.
- Obstacles below 1000 mm in height on staircases cannot be detected.

7 Overall Operation

When using Powered Stair-climbing Wheelchairs for the first time, it is recommended to conduct multiple test drives in familiar environments to become acquainted with the accessories and functionalities of these robots in various scenarios.

Powered Stair-climbing Wheelchairs must dynamically switch to appropriate operational modes based on real-world conditions.

Pattern	Function
Driving Mode	Driving on ordinary pavement
Climbing Mode	Stair activity
Track Mode	Crossing ditches

7.1 Device Calibration

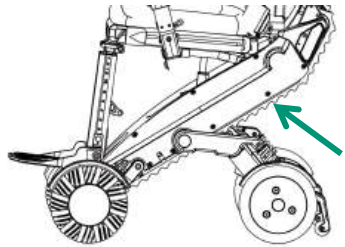
This device has been calibrated before leaving the factory. If functional abnormalities occur during subsequent use or the screen prompts for calibration, you can perform the calibration operation. When the system indicates calibration needs, the calibration icon will flash at a frequency of 1s per occurrence.

Calibration steps:

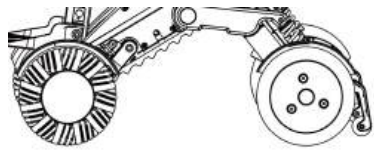
1. Place the device on a flat, hard surface and ensure there are no obstructions around it.
2. Switch the device to crawler mode (refer to section 7.5Track Mode), then press and hold the flat button to begin calibration.
3. The calibration icon remains on during the crawler mode calibration process.
4. When the calibration icon disappears, switch to driving mode to continue calibration.
5. If the calibration icon disappears in driving mode, calibration is complete.
6. If calibration fails, the calibration icon will flash at a frequency of 0.3 seconds per occurrence for approximately 1 minute.
7. If calibration fails, ensure the ground is level and free of debris, then try calibration again.

7.2 Pre-use Inspection

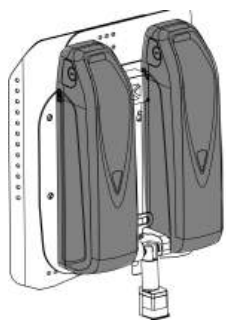
1. Check the track tensioning condition. If the gap between the track and the track frame exceeds 8mm, use tools to tighten the track (refer to section **3.3.8Track Tensioning)**.



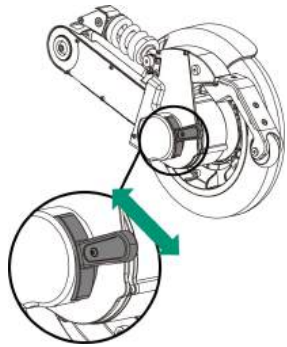
2. Inspect the wear conditions of front and rear wheels. If abnormal vibrations or severe localized damage occur during operation, immediately cease use and contact the manufacturer or distributor.



3. Inspect the battery for damage, moisture exposure, and correct installation. If the battery is damaged or exposed to moisture, stop using it immediately. For improperly installed batteries, ensure correct installation before use (refer to section **9 Battery Usage Instructions**).



4. Check whether the electromagnetic brake is in the locked state. If not, adjust it to the locked state before using the Powered Stair-climbing Wheelchair (see section **7.4.6Electromagnetic Brake**).



5. Check the LiDAR (see section **6 LiDAR Sensor**).

7.3 Seat Occupancy and Departure

7.3.1 Front Seating

1. Long press the button to activate easy borading mode.

2. After the Powered Stair-climbing Wheelchair has completed posture adjustment and reached a stable state, the user may be seated smoothly.
3. Sit down and hold the button to exit easy boarding mode.
4. Adjust the seat to a comfortable position (refer to section **4.2.4.1 Seat adjustment**)

5. Fasten your safety belt before driving.

7.3.2 Side seating

1. Long press the button to activate easy borading mode.

2. Press the unlock handle on the armrest, then flip the armrest backward.

3. Sit down and hold the button to exit easy boarding mode.
4. Lower the armrests and adjust the seat to a comfortable position (refer to section **4.2.4.1 Seat adjustment**).

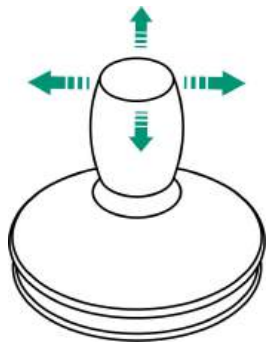
5. Fasten your safety belt before driving.

7.4 Driving Mode

In Interface 1 of the control handle interface (main interface), simultaneously press and hold the upstairs and downstairs buttons on the control handle for approximately 3 seconds to switch the Powered Stair-climbing Wheelchair to driving mode.

7.4.1 Forward & Back & Turn

The joystick on the control handle features self-resetting capability and stepless speed control function: the joystick automatically returns to its neutral position upon release, causing the mobile robot to stop immediately; the greater the joystick deflection angle, the faster the travel speed.



The joystick enables Powered Stair-climbing Wheelchairs to perform steering and forward/backward movement. During operation, simply control the joystick toward the desired movement direction.

Furthermore, steering operations can be combined with forward and backward movements: During the forward or backward movement of an Powered Stair-climbing Wheelchair, tilting the joystick to either side enables the wheelchair to perform left or right turns while in motion.

7.4.2 Speed Adjustment

User can adjust the speed of Powered Stair-climbing Wheelchairs through the display interface.

- Speed gear adjustment:

The driving mode features five speed gears, with progressively increasing speeds from 1 to 5 (see section 2.4Product Parameter). Shift gears by pressing the down button — and up button + on the control lever.

Speed adjustment affects the forward, backward, and steering speeds to varying degrees, but it has no effect on adaptive speed during uphill/downhill driving or seat elevation speed.

- Speed mode adjustment

Press and hold the button **Fn** to switch between speed modes, which include three options: N (Normal Mode), S (Sport Mode), and H (High-Speed Mode). Acceleration and maximum speed vary across these modes (see section 2.4Product Parameter). When the instantaneous change in seat angle exceeds the safety threshold, the device automatically reduces the speed setting.

7.4.3 Uphill & Downhill

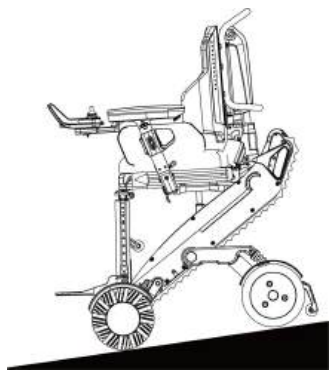
The Powered Stair-climbing Wheelchair has slope adaptive function.

- Uphill

When climbing uphill, the Powered Stair-climbing Wheelchair automatically adjusts the rear push rod to maintain a constant angle of the seat relative to the horizontal plane. The adjustment process may be accompanied by deceleration, which is a normal phenomenon.

After automatic adjustment, if the slope exceeds 15 degrees, the machine will issue a speed limit warning.

- Downhill



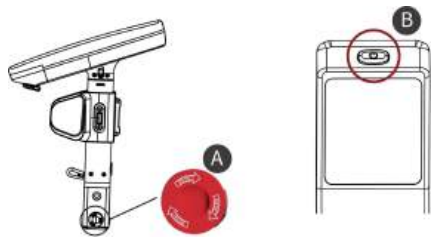
During downhill movement, the Powered Stair-climbing Wheelchair automatically adjusts the rear push rod to maintain a constant angle of the seat relative to the horizontal plane. This adjustment process may be accompanied by deceleration, which is a normal phenomenon.

After automatic adjustment, if the slope exceeds 15 degrees, the machine will issue a speed limit warning.

7.4.4 Emergency Stop

In emergency situations, the emergency stop switch Ⓐ located at the base of the right armrest support rod of the Powered Stair-climbing Wheelchair or the power button Ⓑ on the control handle can be pressed to shut down the device. The equipment will initiate power-off shutdown, and the left and right motors as well as the track motor brake will automatically lock.

The emergency stop switch on the armrest provides a faster response time than the power button on the joystick. In an emergency, using the emergency stop switch is highly recommended as the top priority.



7.4.5 Obstacle Crossing

When you need to cross obstacles, please pay attention to the following:

1. Check if the obstacle height is less than 100mm. Select the driving mode only when the height is below 100mm.
2. Identify the position with the lowest obstacle height as the passageway point.
3. Drive steadily and slowly forward toward the obstacle.
4. Gently push the joystick to allow the front wheel to slowly clear the obstacle;
5. After the Powered Stair-climbing Wheelchair has completely passed the obstacle, it will resume normal speed.

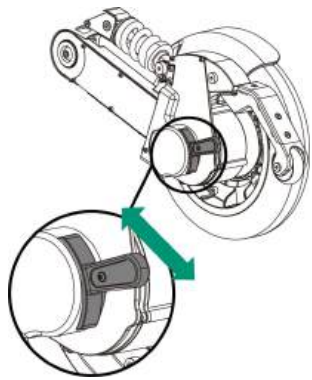
NOTICE	
	• Do not use only one wheel to roll over obstacles, as this may cause the Powered Stair-climbing Wheelchair to tip sideways! • If the obstacle height is between 100 and 200 mm, switch to climbing mode to cross it.

7.4.6 Electromagnetic Brake

The Powered Stair-climbing Wheelchair operates on a hands-off stop-and-go principle. When power is depleted or the device is powered off, its rear wheels remain locked.

To propel an Powered Stair-climbing Wheelchair, release the electromagnetic brake on the rear wheels, allowing it to move even when the battery is depleted.

Unlock the rear wheel by pushing the lever next to the front wheel. After pushing, pull the lever back to lock the rear wheel again to prevent rolling.



Before starting the engine, pull the shift lever backward to lock the rear wheels. If the brake lever is not in the locked position, the system will display a brake code message upon startup. The code message will disappear once the brake lever is locked.

If the brake is locked and the machine is re-supplied with power, the machine must confirm that the handle screen displays normally without warnings, and the horn button responds normally when pressed. Otherwise, the Powered Stair-climbing Wheelchair cannot be operated.

7.5 Track Mode

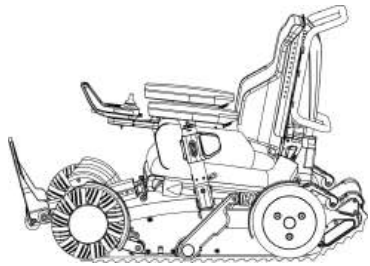
The Powered Stair-climbing Wheelchair can be folded and unfolded with one button press.

In Interface 1 of the control handle interface (main interface), simultaneously press and hold the upstairs and downstairs buttons on the control handle for approximately 3 seconds. If the Powered Stair-climbing Wheelchair is in driving mode, it will switch to track mode.

The track mode is suitable for navigating complex terrains such as staircases. Prolonged use on flat surfaces is not recommended, as it may accelerate track wear and reduce component lifespan.

Track Mode

NOTICE	
	When using the one-press fold and unfold functions, user must leave their seats and are not allowed to place heavy objects on them.



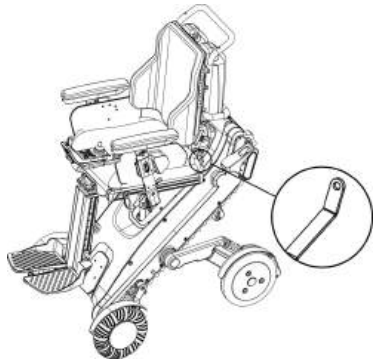
7.6 Climbing Mode

7.6.1 Precautions

NOTICE	
	• If the pitch angle on stairs is too steep, backward movement will be restricted to prevent tipping. • If the roll angle on stairs is too steep, forward and backward movement will be restricted. The device must be leveled before continuing to prevent tipping. • During the climbing process, when performing wheel release or retraction operations, there is a risk of the anti-tip wheel getting stuck in steps or other foreign objects. In case of jamming, immediately cut off the power supply and handle the situation properly. • Laser recognition of rear wheel retraction/extension is an auxiliary function. users or accompanying personnel should continuously monitor the climbing status during ascent. If the timing for rear wheel retraction/extension is incorrect, immediately cease the current operation and manually control the rear wheel retraction/extension (long press the − button to retract the rear wheel, long press the + button to extend the rear wheel).

NOTICE

- During the climbing process, if equipment failure or loss of control occurs (e.g., battery depletion), the system may be powered off, and the track brake should be manually released (as shown in the right figure). Accompanying personnel must assist in operating the equipment to slide down the stairs.



WARNING

- The climbing function of this device is for auxiliary purposes only. There are risks of tipping over or backward movement during use. At least one professionally trained accompanying personnel must be present. Both user and accompanying personnel must remain highly vigilant at all times to ensure personal safety. Unattended operation is strictly prohibited.
- During equipment climbing, user must maintain stable sitting posture and are strictly prohibited from leaning forward, getting up without authorization, making violent movements, or exiting the vehicle to prevent equipment tipping over or personnel injuries due to falls.
- Before climbing, make sure the stairs are suitable for an Powered Stair-climbing Wheelchair. Using unsuitable stairs may cause serious injuries or even fatal consequences!
- Ensure that the staircase can withstand the total weight of the Powered Stair-climbing Wheelchair and its user.
- When climbing up or down stairs, one must always maintain a 90° vertical orientation relative to the staircase surface, and it is strictly prohibited to climb up or down in an inclined posture.

7.6.2 Applicable Staircase

The climbing capability of Powered Stair-climbing Wheelchairs is applicable to most linear staircases and must meet the following requirements:

- The stair inclination angle shall be ⩽35°, and the distance between the edges of two steps shall be ⩽375 mm; for single-step stairs, the step height must be ⩽200 mm.

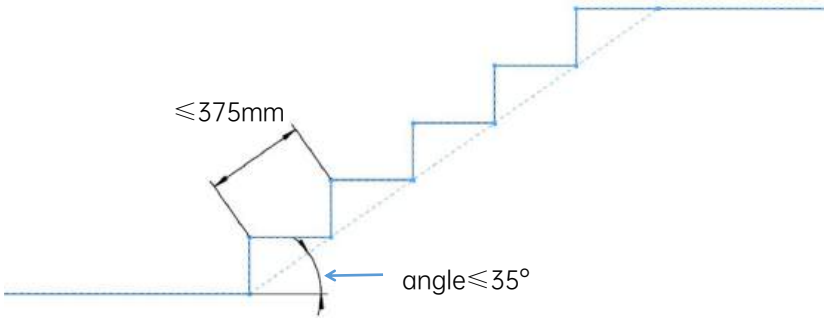
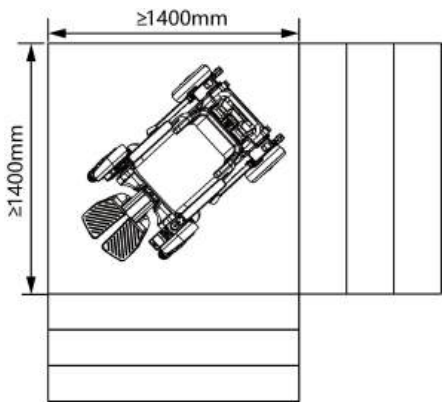


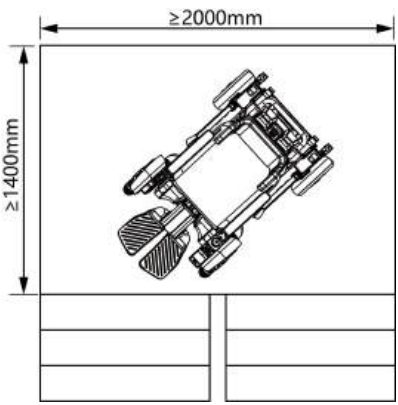
Figure 7-1 Staircases with a passable incline angle ⩽35°

- The stair steps have uniform height, are hard, slip-resistant, and smooth, with no looseness, damage, or obstructions/water accumulation/icing/oil stains.
- Minimum platform size at the bottom of the stairs:

L-shaped corner: 1400x1400mm



U-shaped corner: 1400x2000mm



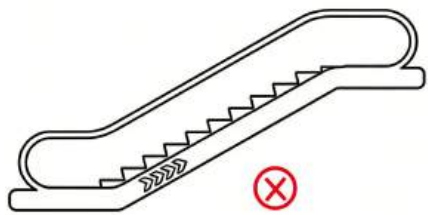
* The minimum size of the terminal platform indicated in this manual is based on test data under laboratory standard conditions and rated operating conditions. Actual clearance dimensions may vary due to factors such as practical application scenarios and on-site environments, with final measurements subject to on-site verification.

7.6.3 Inapplicable Staircase

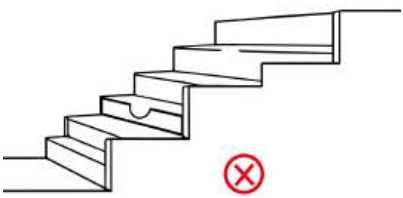
The XSTO X12 series powered stair-climbing wheelchairs are not compatible with the following staircases:

- Rotating staircase with a twist angle>4°

- Escalator



- Stairs with uneven steps, damage, depressions, or loose components



- Wet, slippery, damp, snow-covered, or ice-covered stairs

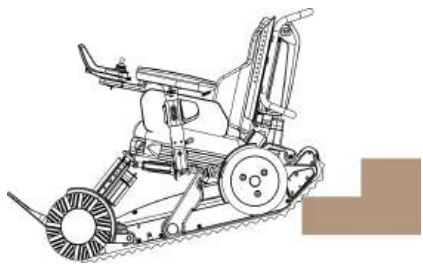
- Staircases with all-black absorption, high light transmittance, high reflectivity, and dense small objects
- Staircase with a hollow-out height of ⩾200mm

7.6.4 Upstairs Operation

1. Switch the handle to Interface 1 and operate the joystick to move the machine backward, allowing the rear wheels to press against the first step. The anti-roll wheels will naturally compress against the step. (When used on low stairs, ensure they fully retract.)

2. After confirming that the rear wheels are tightly against the steps, press and hold the upward button for approximately 3 seconds. The machine will announce the start of ascent and switch its posture: rear wheels retract, tracks touch the ground, seat balance adjusts to 13°-15°, and front wheels retract to align with the tracks. The joystick is inactive during posture transitions.

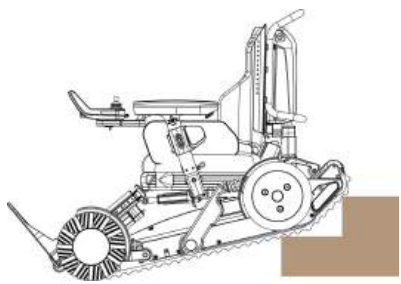
   If the radar fails to detect the rear staircase, the machine will display a prompt. To continue climbing, you can hold down the upstairs button again.



3. After the machine completes the attitude transformation, pulling the rocker backward allows entry into the staircase.

   For safety reasons, pushing the joystick forward is ineffective immediately after changing posture, and pushing the joystick left or right is ineffective upon entering the staircase.

   During the climbing process, the machine can automatically detect vehicle body deflection and perform self-correction only when pushing the joystick forward or backward to maintain perpendicular

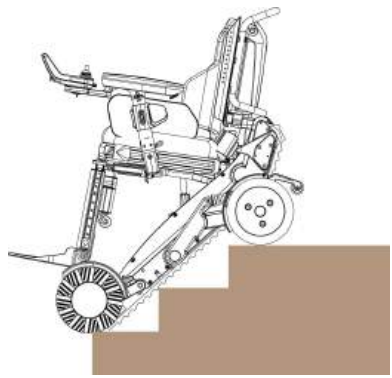


alignment between the vehicle body and the steps. users may also manually adjust direction by pushing the joystick left or right; excessive deflection in any direction will render such operations ineffective.

If you need to descend during the climbing process, simply push the joystick forward and release to stop.

4. When the machine detects that the rear wheel has cleared the final step, it will slow down and automatically lower the rear wheel.

   When the stairs are wide, the machine may misinterpret them as flat ground and lower the rear wheels. In this case, you can continue climbing by pressing the button to manually retract the rear wheels (long press the button ⎯ in Interface 1). Alternatively, the rear wheels will automatically retract after pressing them against the steps and compressing the anti-roll wheels.



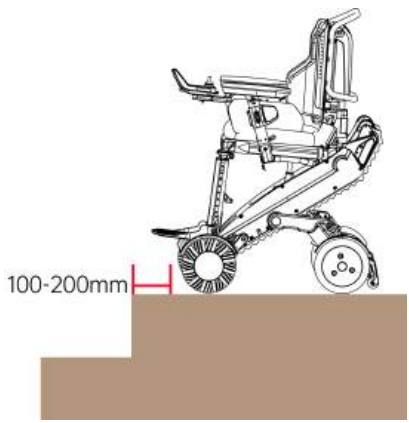
NOTICE	
	The automatic rear wheel retraction function is an auxiliary feature and may not be fully compatible with all staircases and steps. user must remain vigilant about climbing conditions throughout the ascent. If the timing for rear wheel retraction is incorrect, immediately halt the operation and manually lower the rear wheels.

5. After the machine lowers its rear wheels to support the ground, the user can continue pulling the joystick backward until the entire machine ascends to level ground. Upon reaching the flat surface and moving approximately 100mm to 200mm away from the steps, the machine will automatically switch back to driving mode.

7.6.5 Downstairs Operation

1. Switch the handle to Interface 1. Use the joystick to control the machine's movement, slowly approaching the stairs with the front wheels maintaining a distance of 100mm to 200mm from the stairs while aligning with them.

WARNING	
	• Before descending the stairs, the auxiliary high-altitude fall warning function must be activated (refer to section **4.6Danger Alert Assistive Feature**). Otherwise, the equipment may tip over, potentially causing severe personal injuries and equipment damage. • When descending the stairs, ensure the equipment is aligned with the stair edge to prevent tipping over during the initial descent.

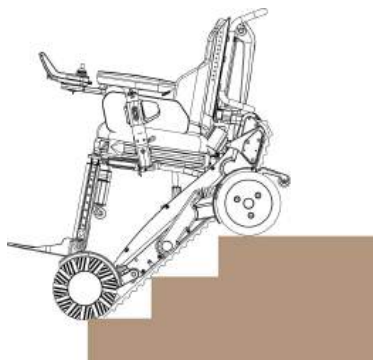


2. Long press the downstairs button (about 3 seconds). The machine will announce the start of descent and switch its posture—adjusting the seat balance to 13°-15° and retracting the front wheels to be roughly level with the tracks. The joystick will be invalid during the posture switch.

   The machine armrest is equipped with a laser sensor that detects the presence of stairs ahead. If the laser sensor fails to detect stairs or if the detected stairs do not meet requirements, the machine will display a message indicating "No stairs detected" when the user long-presses the downward button, prompting whether to continue descending. If the user wishes to proceed, they may long-press the downward button again.

3. After the machine completes the attitude transformation, keep pushing the lever forward to fully enter the staircase, and the rear wheels will retract. If the rear wheels are already close to the edge of the step but have not retracted, press and hold the — button to retract the rear wheels.

   To ensure safety, the track will not activate when the tracked vehicle's attitude is adjusted and it first enters the stairway, as the joystick is pushed laterally.

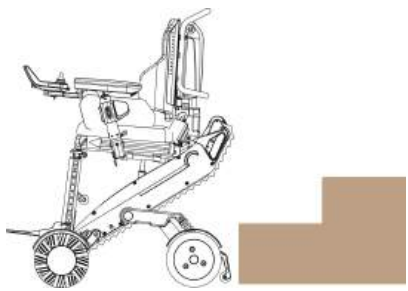


The machine automatically detects vehicle body deflection in staircases. When the driver simply pushes the joystick forward or backward, the system actively corrects body alignment to maintain vertical alignment with steps. Drivers can also manually adjust the joystick left or right to control descent trajectory. If excessive deflection occurs, pushing the joystick in that direction will no longer trigger the track response.

If you change your mind and want to climb back up while descending, simply pull the joystick backward and release the joystick to stop.

4. When the machine detects that the rear wheel has cleared the final step, it switches to driving mode.

NOTICE	
	The automatic rear wheel retraction function is an auxiliary feature and may not be fully compatible with all staircases and steps. User must remain vigilant about climbing conditions throughout the ascent. If the timing for rear wheel retraction is incorrect, immediately halt the current operation and manually control the rear wheel retraction process.



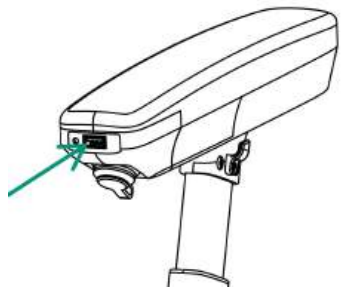
7.6.6 Warning Interface that May Appear in Climbing Mode

Cause	Warning interface
Switching to driving mode is not allowed in the stairs	
Stair-climbing conditions not met; stair-climbing mode cannot be activated.	
Stair-descending conditions not met; stair-descending mode cannot be activated.	

7.7 USB Charging Port

The armrest features a USB charging port with a maximum output power of 18 W, supporting the following charging protocols (the USB port is exclusively for charging and does not support data transfer). After use, promptly cover the port with a silicone plug to prevent liquid splashing.

- Supports BC1.2 and Apple
- Supports Qualcomm QC2.0 and QC3.0
- Supports Huawei fast charging protocols FCP and SCP
- Supports Samsung's fast charging protocol AFC (MAX12V)



8 Storage

For Powered Stair-climbing Wheelchairs requiring long-term storage, the batteries should be removed.

The storage environment should meet the following conditions:

1. Environmental temperature: 0 to 35°C
2. Relative humidity: ≤95%
3. Atmospheric pressure range: 800 to 1060 hPa

The following environments should be avoided:

- Exposure to sunlight and humid environment
- High-temperature and low-temperature environments
- Environment with high dust concentration

9 Battery Usage Instructions

9.1 Battery Precautions

Instructions regarding battery pack storage, maintenance, and precautions.

9.1.1 Storage

For long-term storage, please charge the battery pack to approximately 50%, remove it from the device, and place it in a dry, well-ventilated area away from strong magnetic fields. Recharge the battery with the charger every 3 months..

The battery pack and charger should be stored in a clean, dry, and well-ventilated area. Avoid contact with corrosive substances such as grease, detergents, and thinners, and keep them far away from fire and heat sources.

The recommended charging temperature range is 0-40°C. Operating outside this range may lead to reduced battery performance and shortened lifespan.

9.1.2 Transport

The battery pack and charger should be packaged before transportation. During transit, they must be protected from severe vibrations, impacts, or compression, as well as exposure to sunlight and rain.

9.1.3 Maintenance

- If the battery pack is not used for a long period, it is recommended to perform a full charge and discharge cycle approximately every 3 months, then recharge it to around 50% using only the specified charger.
- During maintenance, do not manually reassemble or disassemble the batteries in the battery pack, as this may degrade battery performance.
- Do not disassemble or replace any battery in the battery pack without authorization, and disassembly of batteries is strictly prohibited.
- Troubleshooting:

Fault Symptoms	Failure Cause	Fault Resolution
No Output from Battery Pack	• The battery pack output line is not connected. • The battery pack is dead. • Machine malfunction caused the fuse to blow.	• Connect the battery pack output cables correctly according to the specification requirements. • Charge the battery pack. • Disassemble the rear fuse holder and check if the fuse has blown. Contact the supplier for assistance.
Charger power indicator does not turn on	• The charger's mains power input plug is not properly inserted. • Charger malfunction.	• Connect the charger input plug to the mains power socket as specified in the user manual. • The mains power supply is functioning normally, and the charger input plug is properly connected to the socket, yet the indicator light remains off.
The battery pack cannot be charged	• The input and output plugs of the charger are loose. • Charger malfunction.	• If the charger indicator light does not illuminate, troubleshoot using the method described above. • If the charger indicator light displays green, check that the mains power socket is properly powered and the charger input plug is securely connected to the socket; verify whether the charger output plug is firmly connected to the battery pack.

- Battery shelf life

The shelf life is 14 months from the date of delivery. Cycle life: 500 charge-discharge cycles with capacity remaining ⩾80%.

- Battery disposal

If the battery capacity falls below 50% of its original rated capacity, battery disposal must comply with the laws and regulations of the country where it is located.

9.1.4 Precautions for Battery Use

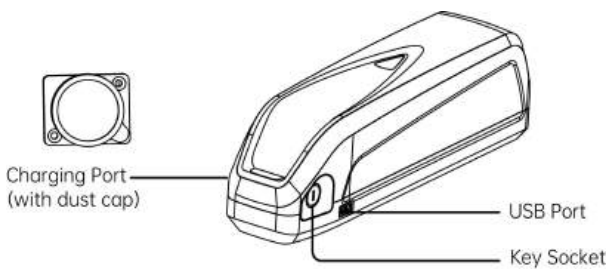
NOTICE	
	• Do not immerse the battery pack in water, fruit juice, or other liquids. Avoid wetting the battery pack! • Charging battery packs is prohibited near ignition sources or under extreme heat conditions! Do not use or store battery packs near heat sources (such as open flames or heaters) or flammable/explosive materials! If battery leakage or unusual odors occur, immediately remove it from areas near open flames. For first-time battery use, ensure the battery is fully charged before operation! • Do not reverse the polarity of the positive and negative electrodes! • Do not place battery packs in fire or heat them! • Do not use wires or other metal objects to short-circuit the positive and negative terminals of the battery pack! • Do not pierce the battery pack casing with nails or other sharp objects, and do not hammer or step on the battery pack! • Do not disassemble battery packs or batteries in any way! • Do not place battery packs in microwave ovens or pressure vessels! • Do not use the battery for other devices! • Do not connect batteries in series or parallel! • Do not charge the battery outdoors under high temperatures, in direct sunlight, in rain, or in humid environments! • Do not charge the battery in hallways, evacuation routes, emergency exits, or residential indoor areas! • Do not use a charger that is not compatible with your device.
	• Battery should be charged, used, and stored in locations away from static electricity.

NOTICE	
	• The battery should be charged during the day under supervision. When leaving, please ensure the charger is unplugged. Overnight charging is strictly prohibited. • Charging should be stopped if the device remains fully charged for an excessively long duration (exceeding 12 hours). • The battery pack must not be used if it emits an odor, generates heat, deforms, changes color, or exhibits any other abnormal phenomena. If the battery pack is in use or charging, it should be immediately removed from the electrical appliance or charger and discontinued immediately! • Battery packs should not be used in extremely hot environments, such as direct sunlight exposure or inside vehicles during hot weather. Otherwise, the battery pack may overheat, which can impair performance and shorten its service life. • If battery electrolyte leaks into the eyes, do not rub. Rinse immediately with water and seek medical attention at once. Failure to do so may result in eye injury! • If any of the above problems occur, please contact the manufacturer immediately. Unauthorized disassembly is strictly prohibited.

9.2 Charge

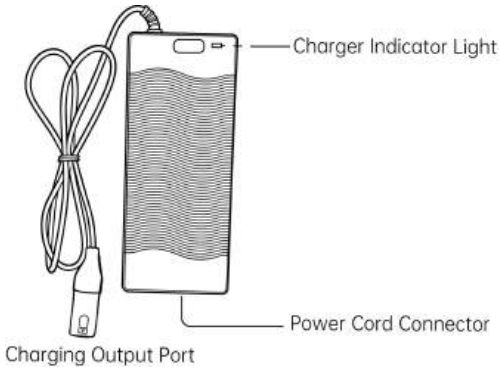
9.2.1 Battery and Charger

■ Battery



■ Charger

The charger operates at an input voltage of 100-240VAC (50/60Hz) and delivers an output voltage of 29.4V with a current of 4A.

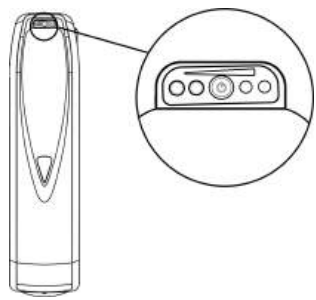


The charging output port connects pin 1 and pin 3 to the positive terminal, and pin 2 to the negative terminal.

9.2.2 Battery Level

Each battery pack is equipped with a battery level indicator at the top. Simply press the power button lightly to check the current battery level through the status of the indicator lights.

Additionally, battery level can be monitored via the display screen, which shows the average power state of all batteries currently connected to the unit.



9.2.3 Charge Operation

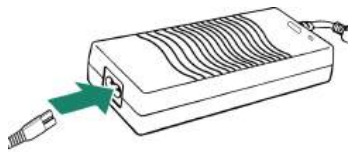
There are three battery charging methods: charging with the battery installed on the device, charging by removing the battery from the device, and charging using the interface at the handle.

Please fully charge the battery before first use.

NOTICE	
	• Please keep the charging ports of both the charger and the battery dry! • Charge according to the user manual! • Leaving the battery in a fully depleted state will cause battery performance to degrade and shorten its lifespan! • Please remember to recharge the battery after each use!

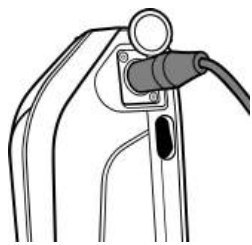
9.2.3.1 Charge the battery while it is installed in the device

During battery charging, the control handle can be powered on normally, but the device cannot operate.



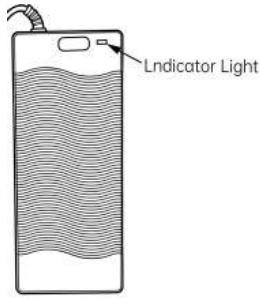
1. Connect the charger to the power supply cable.

2. Open the dust cover of the battery charging port, and insert the charger's output plug into the battery charging interface.



3. Plug the charger into the power outlet to power the battery. The charger indicator will show an orange light during charging.

4. Charging is complete when the charger indicator turns green.

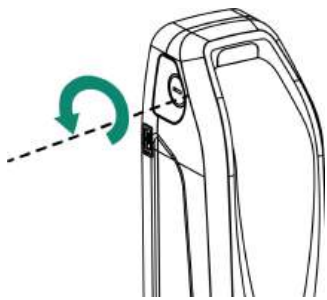


5. Unplug the battery charger, then disconnect the power plug.

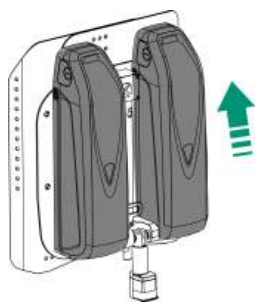
6. Close the dust cover from the battery charging port.

9.2.3.2 Remove the battery from the device for charging

1. Use the key provided with the battery to turn counterclockwise and unlock the battery.



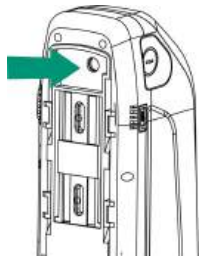
2. Hold the battery with both hands and pull it upward to disengage it from the backrest guide rail, then tilt the battery backward to remove it.



3. Move the battery to the charging area. Refer to section **9.2.3.1 The Battery is Installed on the Device for Charging** for charging procedures.

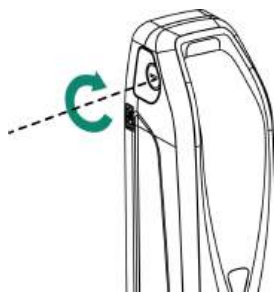
4. Install the battery after charging.

   Before installing the battery, ensure the battery lock core is in the retracted position (adjust clockwise with the included key).



5. Hold both sides of the battery pack, align it with the battery mounting rail on the seat backrest, and insert it smoothly. Push it horizontally downward to secure it in place.

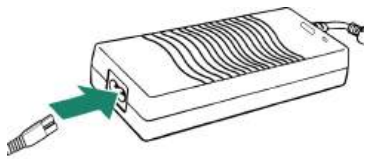
6. Use the key provided with the battery to turn clockwise and lock the battery in place. If the battery cannot be locked, it indicates that the battery is not properly seated. Remove the battery and reinsert it correctly.



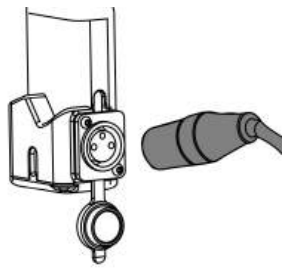
9.2.3.3 Charging via the Armrest Port

During battery charging, the controller can be powered on normally, but the device cannot operate.

1. Connect the charger to the power supply cable.

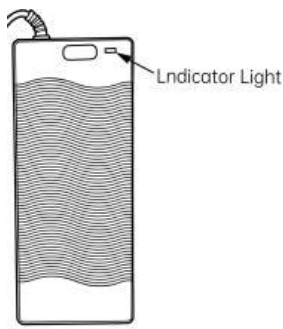


2. Open the dust cover of the charging port on the armrest and insert the charger's output plug.



3. Insert the charger plug into the power socket to power the battery. The charger will display an orange light during charging.

4. Charging is complete when the charger indicator turns green.



5. Unplug the charger and close the dust cover from the charging port.

9.3 Battery Storage

NOTICE	
	• The battery should be removed during transportation and storage. • Keep the battery away from damp environments. Remember to charge it after each use! Follow the user manual for charging instructions. Keep the socket dry. • Protect charging and charging cables from oil stains, grease, detergents, solvents, or any potentially destructive substances!

10 Maintenance

10.1 User Maintenance and Inspection

Perform the following steps to keep your device clean.

- Use a dry, soft cloth to wipe the exterior of the device, seat, armrests, and joystick to remove dust, stains, or debris (such as crumbs in seat cushion seams).
- Check the wheels for entangled materials (such as hair or ropes) and remove them promptly.
- If the dirt is difficult to remove, use a neutral detergent. Avoid petroleum solvents.
- Sensors on the machine exhibit cumulative errors and require periodic calibration. Monthly calibration is recommended. Calibration method: long press the and both buttons simultaneously on a flat surface to fold the device. After folding, long press the button and wait 20 seconds for calibration completion. If the screen displays icon, calibration should be performed promptly.
- Do not use high-pressure washers.

NOTICE	
	• Do not use paint thinner, benzene, or other organic solvents for cleaning, and do not use a high-pressure washer. Doing so may cause discoloration, deformation, deterioration, or damage. • Do not insert sharp objects into the speaker hole. This may damage the control handle. • Do not apply commercially available lubricants, oil-based anti-rust agents, or waxes to the moving parts or connectors of the device. The stickiness of these substances may cause sand or other foreign objects to enter the device, resulting in equipment malfunction. • Do not operate the device with wet hands!
	• Keep the device away from damp environments! • Charge when battery level is low! • Please keep the device away from oils, grease, detergents, thinners, or any potentially damaging substances! • In addition to seat cushions and backrests, if any components are worn out or require replacement, please Contact the distributor. Otherwise, there is a risk of equipment damage that may render it inoperable.

WARNING	
	Use water only to flush the equipment wheels. Do not flush the equipment or other components, as this may lead to electric shock, short circuits, or corrosion-induced malfunctions.

The following items are recommended for inspection every 6 months (the specific inspection cycle should be determined based on the actual usage of the equipment).

 	Inspect the front and rear wheels for cracks or dents. Check whether the wheels have become elliptical due to wear. If cracks, dents, or severe wear occur, contact your distributor for replacement.
	Inspect the anti-tipping wheel for cracks. If cracks are detected, contact your distributor for replacement.
	Check whether the screws are loose. If loosened, tighten them.

10.2 Warranty

During the warranty period, under normal usage conditions: the frame is covered for 5 years, and the entire unit for 14 months; the tracks, seat cushion, backrest cushion, and headrest are covered for 1 year. Damage caused by non-quality issues such as the outer shell or wheels is not covered by the warranty.

Equipment damage or injury caused by the following reasons is not covered by warranty:

- Damage caused by an overload of work;
- Damage caused by incorrect operation;

- Violent destruction;
- Natural wear and tear of casters, seat belts, etc.;
- Improper or inadequate maintenance;
- Unauthorized changes in structure, and improper use of equipment and accessories;
- The battery is not charged properly.

During the warranty period, material costs and service fees may be charged at discretion under any of the following circumstances.

- Damage caused by improper use, maintenance, or storage by the consumer.;
- Damage caused by disassembly by unauthorized parties.
- Lack of warranty certificate and valid invoice.
- Warranty certificate model does not match the model of the product being repaired or has been altered.
- Damage caused by force majeure is not covered under warranty.

10.3 Liability Exemption

Unless in violation of mandatory legal requirements, our company shall not provide free repairs or assume product liability for equipment damage or performance failures caused by the following user-related reasons:

- Damage caused by improper use, maintenance, or storage by the consumer.;
- Damage caused by disassembly by unauthorized parties.
- Lack of warranty certificate and valid invoice.
- Warranty certificate model does not match the model of the product being repaired or has been altered.
- Damage caused by force majeure is not covered under warranty.

This user manual content may be updated to enhance product quality or upgrade technical specifications without prior notice. For the latest product information, please contact our company.

10.4 Recycling

XSTO products are designed for long service life. However, if your XSTO product is approaching its service limit, you may return the machine components to our company or authorized distributors for recycling.

11 Alarm Troubleshooting

11.1 Brushless Motor

Applicable modules: Left front wheel, Right front wheel, Left rear wheel, Right rear wheel, Left track, Right track.

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
over_current	Over current protection	The phase current exceeds 42A or the bus current exceeds 28A for more than 15 seconds.	Check for foreign objects obstructing the wheels
line_short	Short-circuit protection	The phase current exceeds 78A or the bus current exceeds 52A for more than 30ms.	Check the wiring for any visible damage or disconnection
lost_speed	Stall protection	The actual speed differs from the target speed by more than one-quarter of the maximum speed or in the opposite direction for more than 1 second.	Contact the distributor
lack_phase	Phase loss protection	The sum of three-phase currents does not equal zero, and the duration exceeds 5 seconds.	Check the wiring for any visible damage or disconnection
hall	Switching Hall anomaly	The Hall state is 0 or 7, or the sequence of changes is incorrect, or the duration exceeds 1.5 seconds.	Check the wiring for any visible damage or disconnection
linear_hall	Linear Hall anomaly	The Hall signal approaches zero or approaches full scale,	Check the wiring for any visible damage or disconnection

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
		with a duration exceeding 5 seconds.	
vbus_over_high	Over voltage	The busbar voltage exceeds 40V for more than 10ms.	Check whether the battery is loose
board_temp_over	Board-mounted high-temperature protection	The onboard temperature exceeds 70°C for more than 1 second.	Check for foreign objects obstructing the wheels
stuck	Stall protection	The phase line current exceeds 37A, the speed approaches 0, and the duration lasts over 20 seconds.	Check for foreign objects obstructing the wheels
current_offset	Current zero offset anomaly	Current zero offset exceeds 3A	Contact the distributor
gate_driver	Gate drive failure	The gate drive fault register is not equal to zero	Contact the distributor
vbus_over_low	Voltage below level	Busbar voltage below 17V for over 10ms	Check whether the battery is loose
motor_temp_over	High temperature protection for motors	The motor temperature exceeds 90°C for more than 1 second.	Check for foreign objects obstructing the wheels

11.2 Brushed, Push-Pole Motor

Applicable modules: Left front push rod, Right front push rod, Left rear push rod, Right rear push rod, Seat push rod, Leg support push rod, Foot support push rod, Backrest push rod.

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
over_current	Over current protection	The coil current exceeds 6A or the bus current exceeds 6A for more than 10 seconds.	Check for foreign objects obstructing the wheels
board_temp_over	Boardborne high temperature	The onboard temperature exceeds 70°C for more than 1 second.	Check for foreign objects obstructing the wheels
vbus_over_high	Over voltage	Busbar voltage exceeds 40V (60V for left rear and right rear boost push rods), lasting more than 10ms	Check whether the battery is loose
encoder	Encoder malfunction	The motor rotates but the encoder shows no signal for more than 3 seconds.	Check the wiring for any visible damage or disconnection
current_offset	Abnormal current bias	Current zero offset exceeds 3A	Contact the distributor
stuck	Stall protection	The coil current exceeds 3A, the speed approaches 0, and the duration exceeds 15 seconds.	Check for foreign objects obstructing the wheels
inverse	Reverse protection	The motor rotates in the opposite direction to the encoder, lasting more	Check the wiring for any visible damage or disconnection

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
		than 3 seconds.	
line_short	Short-circuit protection	The coil current exceeds 18A or the bus current exceeds 12A for more than 50ms.	Check the wiring for any visible damage or disconnection
gate_driver	Gate drive failure	The gate drive fault register is not equal to zero	Contact the distributor
vbus_over_low	Voltage below level	Busbar voltage below 17V for over 10ms	Check whether the battery is loose
motor_temp_over	High temperature protection for motors	The motor temperature exceeds 70°C for more than 1 second.	Check for foreign objects obstructing the wheels

11.3 LiDAR

Applicable modules: left rear LiDAR, right rear LiDAR, left armrest LiDAR, right armrest LiDAR.

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
offline	Off-line	Cannot establish connection with LiDAR	Check the wiring for any visible damage or disconnection
low_vot	voltage below level	Low internal voltage in LiDAR	Contact the distributor
high_vot	Over voltage	Excessive internal voltage in LiDAR	Contact the distributor
temp	High temperature	The internal temperature of LiDAR is relatively high.	Observe whether any object is covering the LiDAR.

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
signal_weak	Weak signal	The LiDAR return signal is weak.	Observe whether any object is covering the LiDAR.
communicate	Communication error	Cannot establish connection with LiDAR	Check the wiring for any visible damage or disconnection
resolution	Resolution error	LiDAR data anomaly	Contact the distributor
crc	CRC error	LiDAR data anomaly	Contact the distributor

11.4 Angular Transducer

Applicable modules: Brush angle, Seat angle.

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
offline	Off-line	Failed to connect to the angle sensor	Contact the distributor
temp	High temperature	The angle sensor is overheated.	Contact the distributor
data_err	Data error	Abnormal angle sensor data	Contact the distributor

11.5 Battery Supply

Applicable module: Power board

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
temp_over	High temperature	Power supply temperature is too high	Check for foreign objects obstructing the wheels
vbus_over	Over voltage	The power supply voltage is too high.	Check whether the battery is loose
over_current	Over current	Power supply current is too high	Check for foreign objects obstructing the wheels
offline	Battery communication is offline	Cannot connect to the battery	Contact the distributor

11.6 Communication Offline

Applicable module: Communication offline

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
handler	Handle plate	Cannot connect to the controller	Check the wiring for any visible damage or disconnection
track	Tread shoe	Failed to connect to the crawler controller	Check the wiring for any visible damage or disconnection

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
wheel_back	Rear wheel plate	Failed to connect with the rear wheel controller	Check the wiring for any visible damage or disconnection
bat_board	Power panel	Failed to connect to the power controller	Check the wiring for any visible damage or disconnection
brush_board	Brushed board	Failed to connect to the brush controller	Check the wiring for any visible damage or disconnection
wheel_front	Front wheel plate	Cannot connect to the front wheel controller	Check the wiring for any visible damage or disconnection

11.7 Follow Module

Applicable modules: front follower module, rear follower module

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
offline	Off-line	Failed to connect to the following module	Check the wiring for any visible damage or disconnection
signal_weak	Weak signal	The tracking module signal is weak	Check for foreign body obstruction of the tracking module
data_err	Data error	Abnormal module data tracking	Contact the distributor

11.8 Joystick

Applicable module: Joystick

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
not_origin	Joystick not returned to position	The joystick was not reset to zero position during startup	Reset the joystick to neutral position
data_err	Joystick data error	Joystick data exceeds limit	Contact the distributor

11.9 Rear Wheel Control

Applicable module: Front wheel control

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
right_brake	Right brake	Manually release the brake lever	Re-lock the actuator lever
left_brake	Left brake lever	Manually release the brake lever	Re-lock the actuator lever

11.10 Track Control

Applicable module: Track control

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
right_brake	Right brake	Manually release the brake lever	Re-lock the actuator lever
left_brake	Left brake lever	Manually release the brake lever	Re-lock the actuator lever

11.11 Climbing Push Rod Control

Applicable module: Climb push rod control

Display warning	Warning description	Trigger condition	Troubleshooting Suggestions
track_gyro_cal	Angle chip initialization is unstable	Excessive vibration during machine startup	Maintain stillness for more than 5 seconds
track_angle	Abnormal angle	The ground angle exceeds-8° to 40°	Do not drive on excessively sloped roads.
track_roll	Abnormal roll angle	The ground angle exceeds ± 8°	Do not drive on excessively sloped roads.
volt_release	Abnormal pressure relief in the boost module	Pressure relief timeout	Contact the distributor
back_diff	Excessive difference in rear wheel position	The ground is too steep to maintain balance.	Do not drive on excessively sloped roads.
seat_tilt	Excessive seat angle	Seat angle exceeds-8° to 40°	Do not drive on excessively sloped roads.

11.12 Common Fault Troubleshooting Guide

Question	Detection and Solutions
The device cannot start	Check if the battery level display is normal. If it shows low battery, charge it. When the battery is powered, check if the indicator light inside the control handle illuminates. If not, inspect the communication cable between the handle and the controller. If the issue is caused by an unknown fault, contact the supplier for assistance.
The battery cannot be charged	Check if the battery and charger interfaces are loose. If the issue is due to an unknown fault, contact the supplier for assistance.
Operation button function is abnormal	If the button functions on the control panel are missing or do not match the description, contact the supplier.
The motor produces abnormal noise	If the motor produces abnormal noises during operation, first check for noise under no-load conditions. If the noise persists, contact the supplier.
The joystick screen displays abnormal images with overlapping icons or missing visuals.	Shut down the machine, disconnect the battery for 3 seconds, then power it on again. If the issue persists, inspect the internal cables of the control handle for damage or loose connectors. For other unknown malfunctions, contact the supplier for assistance.

12 Electromagnetic Compatibility Information

NOTICE

Portable RF communications equipment should no closer than 30 cm (12 inches) to any part of the device, including cables specified by the manufacturer.

The XSTO X12 series complies with IEC60601-1-2:2014+A1:2020, EN60601-1-2:2015+A1:2021,ISO7176-21:2025 standard electromagnetic compatibility requirements.

user should install and use the product in accordance with the EMC information provided in the accompanying documentation.

The XSTO X12 series generates, uses, and radiates radio frequency energy. The equipment may cause radio frequency interference to other medical or non-medical devices and to radio communications.

If this equipment is found to cause interference, which can be determined by turning on and off the equipment, the operator or qualified service personnel should take following actions:

- Reorient or relocate the affected device;
- Increase the distance between the equipment and the affected equipment;
- Power the equipment by another power source;
- Consult the service engineer for further suggestions.

NOTICE

- The XSTO X12 series should not be used close to or stacked with other equipment. If it must be used close to or stacked, it should be observed and verified that it can operate normally under the configuration it is used in.
- It is customer's responsibility to assure that this equipment and nearby equipment comply with the contents of IEC 60601-1-2 4th Edition.
- Do not use any device that might send out RF signals, including cell phone, radio transceiver and radio control products, which might cause operation parameters beyond the standards. Please shutdown these devices when the user is near the equipment. Operator has the responsibility to warn user

or any others to comply with this rule.

- Manufacturer will not be responsible for any unauthorized actions that cause interference.
- The XSTO X12 series cannot be used together with HF surgical equipment.

Table 1

Guidance and Manufacture's Declaration – Electromagnetic Emission		
The XSTO X12 series is intended for use in the electromagnetic environment specified below. User should assure that it is used in such an environment.		
Emissions Test	**Compliance**	**Electromagnetic Environment - Guidance**
RF emissions CISPR 11	Group 1	The XSTO X12 series uses RF energy only for its internal function. Its RF emissions are very low and are not likely to cause any interference in nearby electronic.
RF emissions CISPR 11	Class B	The XSTO X12 series is suitable for direct connection to public low-voltage power supply networks.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	/	

Table 2

Guidance and Manufacture's Declaration – Electromagnetic Immunity			
The XSTO X12 series is intended for use in the electromagnetic environment specified below. User should assure that it is used in such an environment.			
Immunity Test	**IEC60601 Test Level**	**Compliance Level**	**Electromagnetic Environment - Guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±8kV contact(elec.) ±2kV, ±4kV, ±8kV, ±15kV air	±8kV contact(elec.) ±2kV, ±4kV, ±8kV, ±15kV air	Floors should be wood, concrete or ceramic tile. Humidity should be at least 30% if it is synthetic materials.
Electrical fast transients/bursts (EFT) IEC 61000-4-4	±2kV 100kHz repetition frequency	±2kV 100kHz repetition frequency	Main power quality should be that of a typical commercial or hospital environment.
Surges IEC 61000-4-5	±0.5kV, ±1kV line-to-line ±0.5kV, ±1kV, ±2kV line-to-ground	±0.5kV, ±1kV line-to-line ±0.5kV, ±1kV, ±2kV line-to-ground	
Voltage dips IEC 61000-4-11	0 % UT; 0.5 cycle At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°	0 % UT; 0.5 cycle At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°	Mains power quality should be typical commercial or hospital

	0 % UT; 1 cycle and 70 % UT; 25/30 cycles Single phase: at 0°	0 % UT; 1 cycle and 70 % UT; 25/30 cycles Single phase: at 0°	environment. UPS power is recommended if this device needs to be used continuously.
Voltage interruptions IEC 61000-4-11	0% UT; 250/300 cycle	0% UT; 250/300 cycle	
RATED power frequency magnetic fields IEC 61000-4-8	30A/m 50Hz or 60Hz	30A/m 50Hz or 60Hz	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

IMMUNITY to proximity magnetic fields IEC 61000-4-39	65A/m, Modulation: Pulse modulation, 2.1KHz Test frequency:134.2KHz ; 7.5A/m, Modulation: Pulse modulation, 50KHz Test frequency:13.56MHz; See Table 6	65A/m, Modulation: Pulse modulation, 2.1KHz Test frequency:134.2 KHz; 7.5A/m, Modulation: Pulse modulation, 50KHz Test frequency:13.56 MHz; See Table 6	--
Note: UT is the A.C. mains voltage prior to application of the test level.			

Table 3: Guidance & Declaration - electromagnetic immunity concerning Conducted RF & Radiated RF

Guidance & Declaration - Electromagnetic immunity			
The XSTO X12 series are intended for use in the electromagnetic environment specified below. The customer or the user should assure that they are used in such environments.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms 150	Portable RF communications equipment

	6 Vrms in ISM bands	kHz to 80 MHz 6 Vrms in ISM & amateur radio bands	(including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the XSTO X12 series, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.
Radiated RF IEC 61000-4-3	10 V/m 80 MHz to 2.7 GHz 385MHz- 5785MHz Test specifications for ENCLOSURE PORT IMMUNITY to RF wireless communication equipment (Refer to table 9 of IEC 60601-1-2:2014+A1:2020)	20V/m 26MHz to 25GHz 10 V/m 80 MHz to 2.7 GHz 385MHz- 5785MHz Test specifications for ENCLOSURE PORT IMMUNITY to RF wireless communication equipment (Refer to table 9 of IEC 60601-1-2:2014+A1:2020)	

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