



Manual enAble® X1

Power Wheelchair Control System

»Software Version 3.0«



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Read Instructions Carefully!

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WARNINGS AND SAFETY INSTRUCTIONS

The symbols below are used throughout the manual to identify important information regarding operation and configuration of the system.



WARNING! Indicates a potentially hazardous condition, situation, or configuration. Failure to follow designated procedures can cause component damage, malfunction, or personal injury.



MANDATORY! Indicates actions that need to be performed as specified. Failure to perform mandatory actions can cause component damage, malfunction, or personal injury.



PROHIBITED! Indicates actions that are not allowed under any circumstances. Performing a prohibited action can cause component damage, malfunction, or personal injury.

NOTE: These instructions are compiled from the latest specifications and product information available at the time of publication. Curtis Instruments, Inc. reserves the right to make changes as they become necessary.

The enEnable X1 system



- adheres to WEEE and REACH initiatives
- is RoHS compliant
- is IPx4 rated (IEC 60529)
- conforms to FCC/IC rules
 - FCC ID: T7V1316
 - IC: 216Q-1316
- has passed EMC testing according to ANSI/RESNA WC-2:2009 Section 21, ISO 7176-21:2009, and IEC 60601-1-2:2007
- should be maintained and stored in a clean and dry environment
 - avoid exposure to rain, snow, ice, salt, or standing water whenever possible



Contact the OEM for instructions for proper disposal and recycling

1 — SYSTEM OVERVIEW

1.1 ABOUT enABLE X1

The enEnable X1 vehicle control system is designed for operation of a power wheelchair. It features outstanding versatility, smooth and responsive operation, and a color display with intuitive feedback. Various input devices can be used interchangeably to meet diverse needs. The system is highly programmable, and can be configured for different languages.



Image 1

Wheelchair with enEnable X1 system

1.2 MODULE LIST

Below is a list of modules compatible within the eX1 system. Each module is explained in the [Modules section](#). At least two modules are necessary for the system to be operational - a Hand Control or Enhanced Display, and a Powerbase.

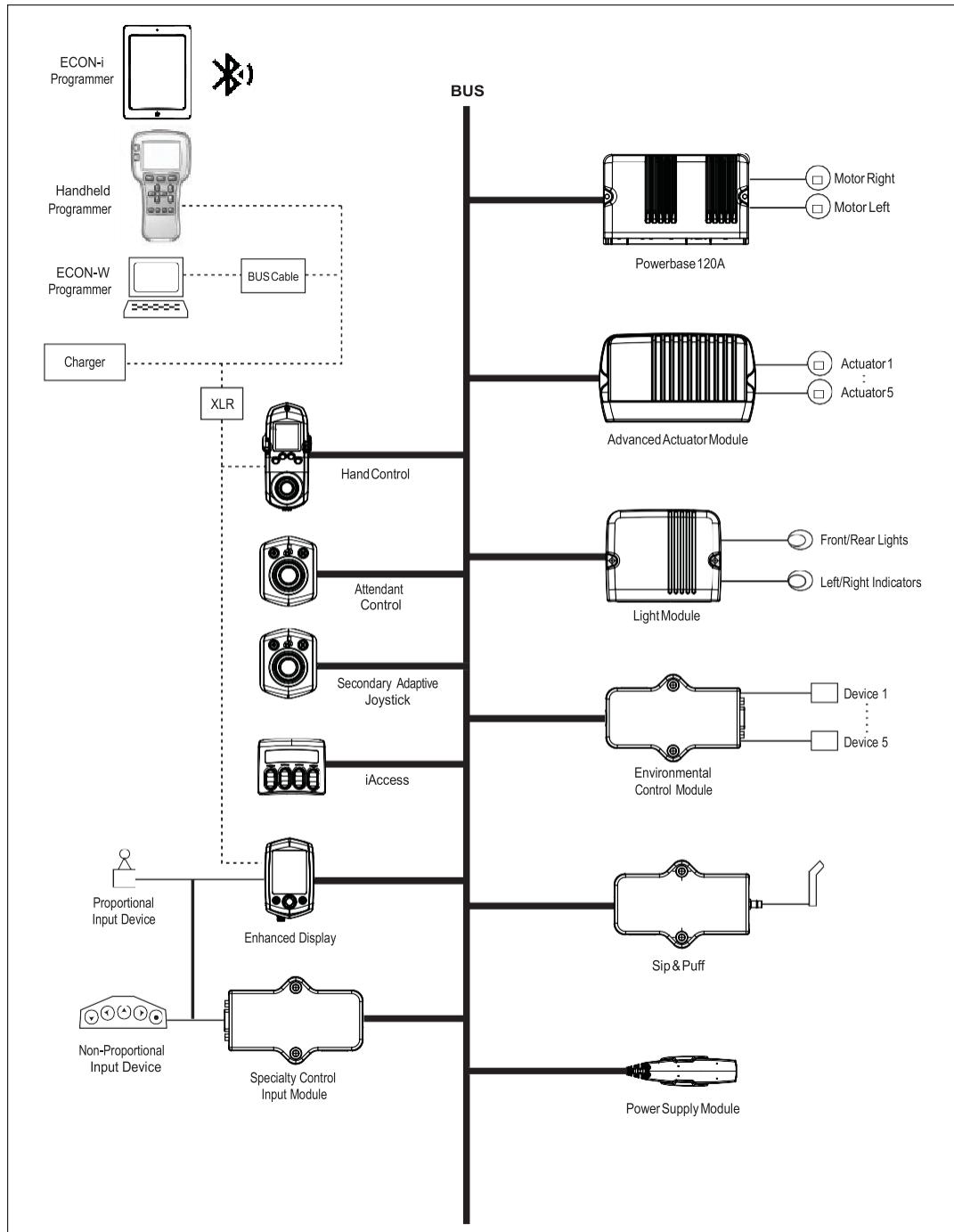
Table 1 enAble X1 module list

Module Name	Module Abbreviation	Part Number
Hand Control	HC-Qx1	17949700-02-0009
Hand Control Light	HC-L-Qx1	17949700-02-0109
Enhanced Display	AD-Qx1	17955700-02-3409
Secondary Adaptive Joystick	SAJ-Qx1	17953700-1109
Attendant Control	AC-Qx1	17962700-2109
Specialty Control Input Module	SCIM-x1	17950700-1009
Sip N Puff	SPM-x1	17961700-0009
Powerbase 120A	PB120-x1	17930700-3509
Advanced Actuator Module	AAM5-x1	17952700-5009
Actuator Module 1	AAM1-x1	17963700-1009
Actuator Module 2	AAM2-x1	17963700-2009
Light Module	LM-x1	17963700-0109
Light and Actuator Module	AAM2L-x1	17963700-2109
Caster Angle Sensor Left	CAS-L	17951900-PRD-00L
Caster Angle Sensor Right	CAS-R	17951900-PRD-00R
iAccess Flat Switch	ESM8-F-x1	17966700-4009
iAccess Toggle Switch	ESM8-T-x1	17966700-4109
Environmental Control Module	ECM5-x1	17956700-0209
Power Supply Module	PSM-x1	17951700-02-1109

1.3 CONFIGURATION OPTIONS

The eX1 modules work together over a CANopen based bus system running a proprietary CAN protocol.

Figure 1 *enAble*
X1 block
diagram



The XLR port on the Hand Control and Enhanced Display are used for charging and programming. The 14-pin Molex connection on the Powerbase offers on-board charging, motor encoder feedback, and switches that are programmable.

There are two options for programming: The Model 1313 handheld and ECON programmer. ECON is available on Windows and iOS. See the [Programmers appendix](#) for more information on programmers.

2— MODULES

All eX1 modules are connected by a 6-pin bus cable. A compatible module can be added or removed to the system while it is powered off, and be recognized at the next power on.

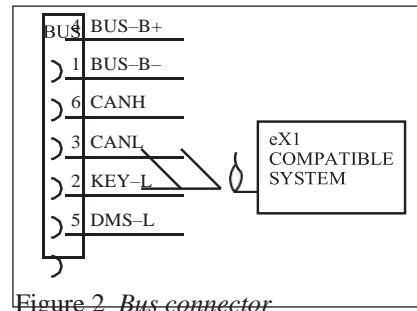


Figure 2 Bus connector

There are other common connections that pertain to some, but not all modules.
XLR port (Hand Control, Enhanced Display)

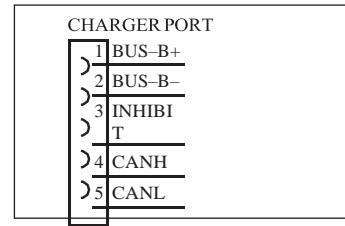


Figure 3 XLR port

9-pin D-sub for specialty input devices (Enhanced Display, Specialty Control Input Module)

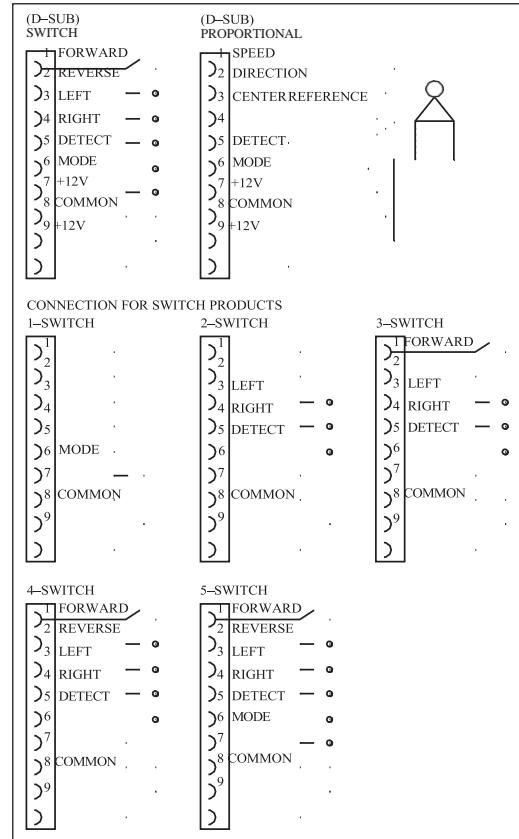
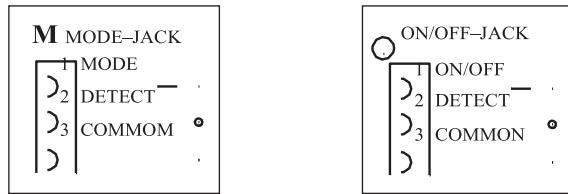


Figure 4 9-pin D-sub connections

Stereo Jacks (Hand Control, Enhanced Display, Secondary Adaptive Joystick, Attendant Control)

Figure 5 *Jack connections*

NOTE: All dimensions shown in this section are for reference only.

2.1 INPUT DEVICES

The eX1 system has multiple input devices. The standard input device is the Hand Control, but it is also possible to use the Enhanced Display or Specialty Control Input Module (SCIM) to utilize a third party input device. There are two more joysticks; the Attendant Control that is intended for walk-behind use when the system is mounted to a wheelchair, and Secondary Adaptive Joystick as a basic input device used in combination with Enhanced Display.

Image 2
Hand Control



2.1.1 Hand Control (HC)

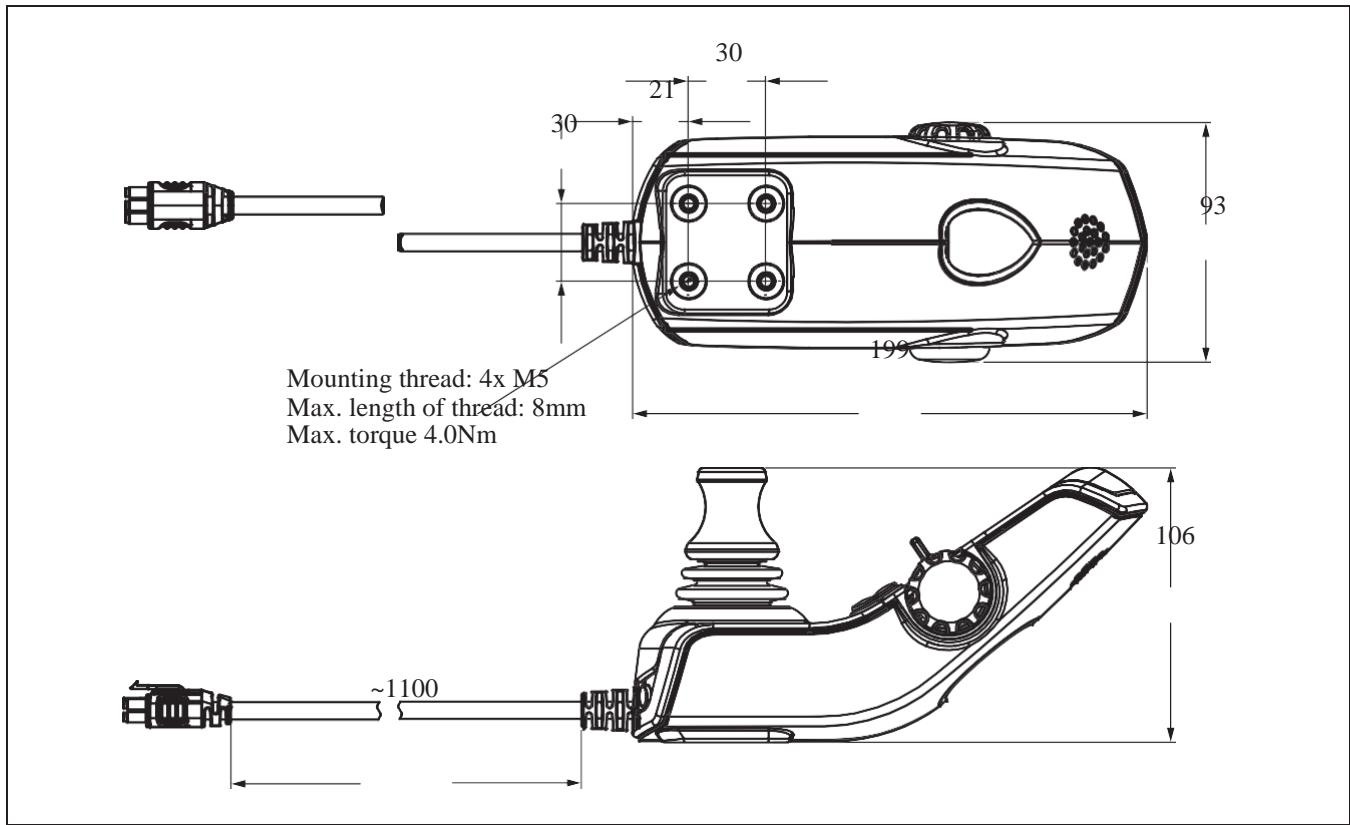
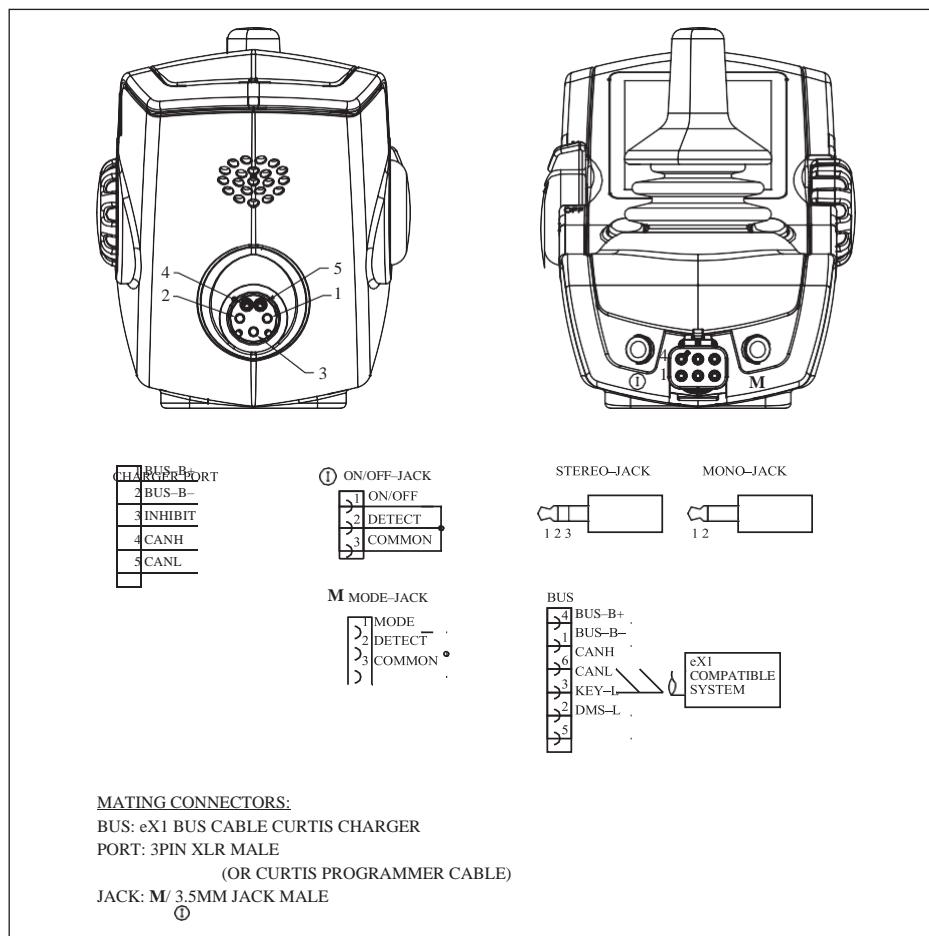


Figure 6
Outline & Mounting (Hand Control)

Figure 7
Wiring (Hand Control)



The Hand Control (HC) is the most common input device. It has a 2.8" color LCD with intuitive and easy-to-use controls. The displayed information includes a speedometer, odometer, battery state-of-charge, and a real-time clock.

On-Off/Mode Lever

To power the system on via Hand Control, the on-off/mode lever must be pressed forward. When the system is powered on, pressing forward again results in a mode command. To power the system off via Hand Control, the on-off/mode lever must be pressed backward.



WARNING! See the [Powering On/Off section](#) for important information regarding limitations if an Attendant Control is part of the system.

Joystick

Used to navigate system menus, operate seating, and drive. The default joystick configuration is a proportional input, but can also be configured to switched input and 3-direction proportional or switched.

See the [Input Configuration section](#) for more information on these different configurations.

Speed Knob

Adjusts speed based on drive profile settings. A visual indication is displayed in the drive profiles. The lowest point corresponds to the minimum drive profile settings, and the highest point corresponds to the maximum drive profile settings. It has an upper and lower mechanical limit by default. The knob can be removed and a plastic clip can be snapped off inside to enable continuous movement in both forward and reverse direction.

Push Buttons

On the standard Hand Control there are Key I/II, Home, and Horn push buttons. Key I/II are separately programmable for various operations. The Home key transitions between the home screen (profile select), and the last profile used. The horn button creates an audible alert from the built-in speaker, as long as it is pressed. The volume of the horn is adjustable.

On the Hand Control Light there are Lights, Indicators/Hazards, and Horn push buttons. The Lights and Indicators/Hazards are not programmable, and only operate the corresponding lighting. The horn button operates the same as the standard Hand Control. To activate the Hazards, both indicator push buttons must be pressed simultaneously. If the hazards are active, both indicators must also be pressed simultaneously to turn off. By holding either indicator individually for the configured long command time, a Home operation is executed.

XLR Port

The 5-socket port built-in allows for charger and programmer connectivity.

MicroSD Card

For storing eX1 firmware, photos, and Infrared configuration, a microSD card is required. While the microSD card is not necessary for operation, the system will not be able to save updated firmware for self-updates, photos for viewing, or IR templates. A warning will be present at every power on that the system cannot read the microSD card.

Two Stereo Jacks

Each stereo jack supports up to two switches. The jacks are configurable by programming. The jack command options are Mode, Mode Shortcut, Toggle, Power Off, Sleep, Home, Inactive, and System Lock. The mapped I/O options are expansive, and can be seen better using the ECON programmer. See the [Jack Command section](#) for information on available options.

Ambient Light Sensor

The built in light sensor determines the display brightness between two possible settings, day or night. Both brightness levels can be configured in the system settings menu.

Bluetooth

The Hand Control has Bluetooth built-in that allows connection to a computer, smartphone, or tablet. Basic applications are:

- Wireless programming via ECON
- Using Hand Control as a mouse for a computer
- Assistive Switch Control on Apple iOS

See the [Bluetooth Capabilities section](#) for more information.

Infrared

An IR receiver is built-in to the Hand Control for learning IR codes. In order to transmit an IR signal from the Hand Control, an external IR transmitter must be connected to a stereo jack.

See the [Infrared Setup section](#) for operation.

NOTE: If a Hand Control is not part of the system, then an Enhanced Display must be present for operation. If both modules are present, then the Hand Control will display a splash screen and the Enhanced Display will be the primary display. In this case, the microSD card in the Hand Control is disregarded.

2.1.2 Enhanced Display (ED)

Figure 8
Outline & Mounting
(Enhanced Display)

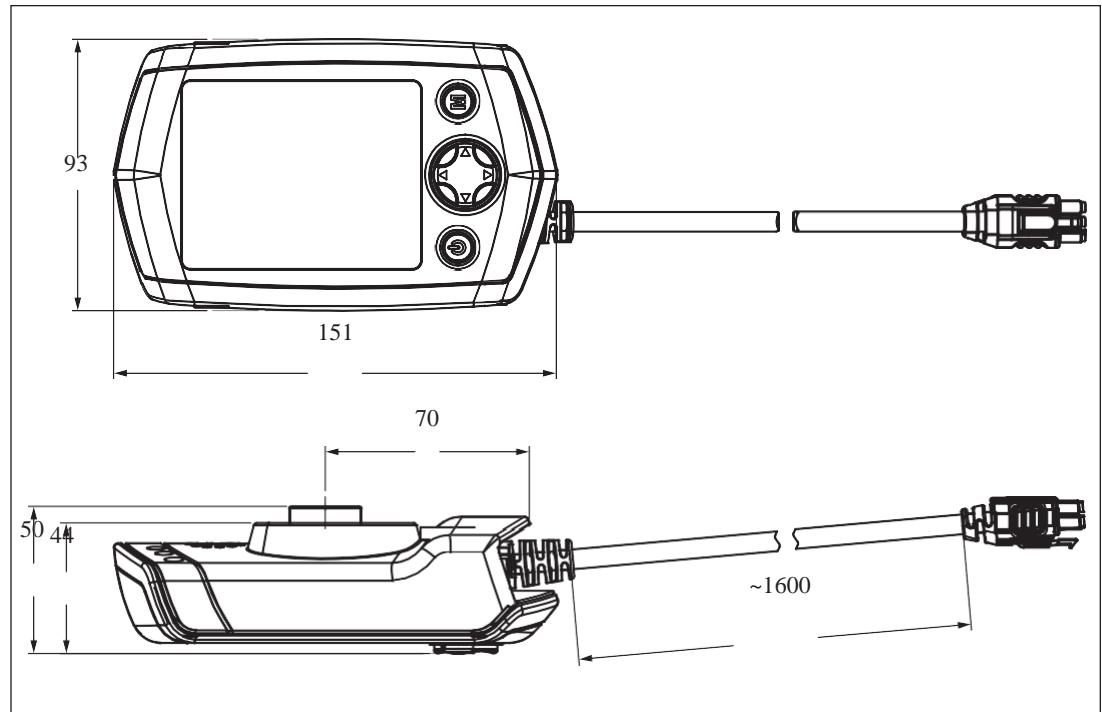
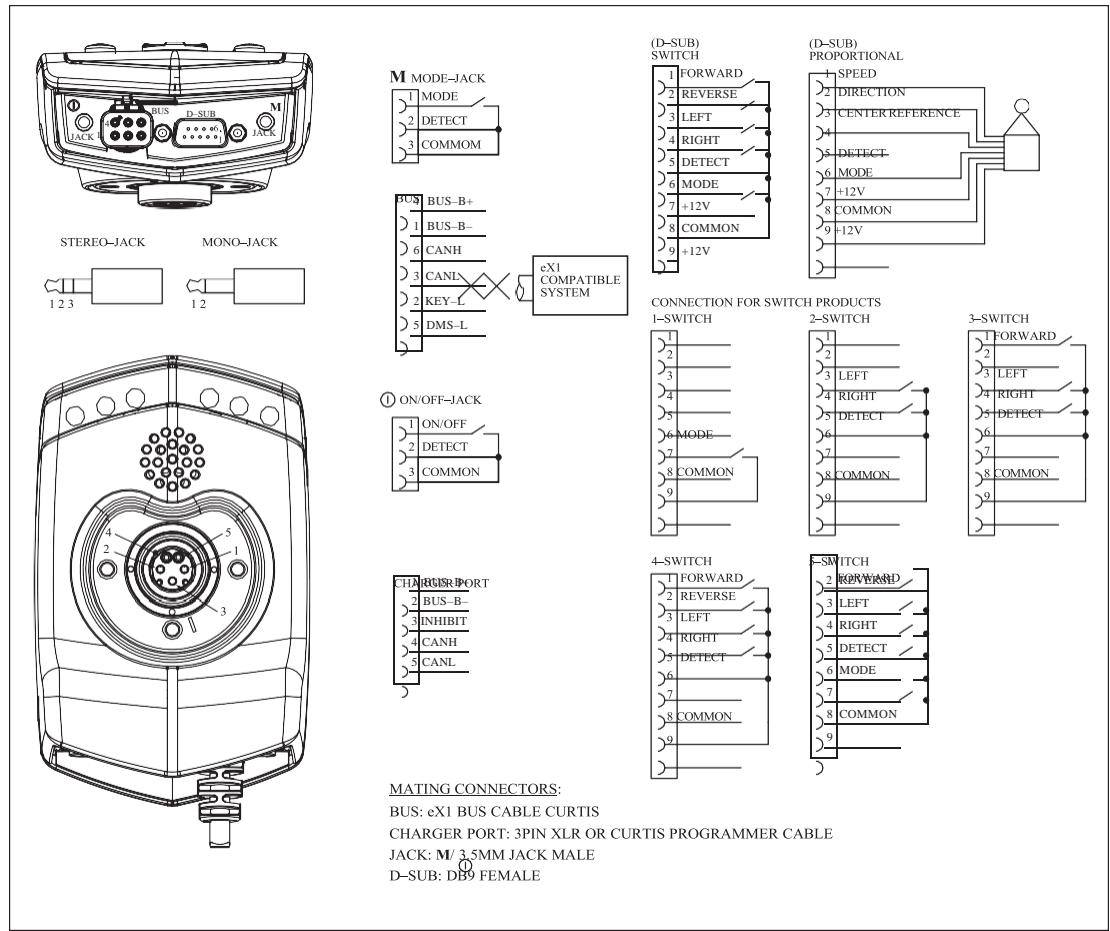


Figure 9
Wiring (Enhanced
Display)



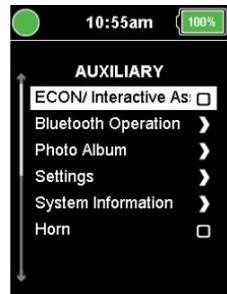
The Enhanced Display (ED) can be used for a variety of specialty input devices via the 9-pin D-sub connection. It has a larger LCD than the Hand Control, and infrared capabilities. The display information is not different than what is shown on the Hand Control. If it is not used with a Hand Control, the horn is accessible through the auxiliary menu or via Mapped I/O.



On/Off Button

This button powers the system on and off.

WARNING! See the [Powering On/Off section](#) for important information regarding possible limitations if an Attendant Control is part of the system.



Mode Button

The mode button executes a mode command.

4-Directional Keypad

The keypad allows for navigation of menus and seating operation. It cannot be used for driving, or selected as an active input device. It can be used to control seat functions, Mouse, and Assistive Switch Control operation.

9-pin D-sub

To operate the system using a specialty control, connect a compatible device to the 9-pin connector. Wiring diagrams can be found at the beginning of this section for proportional and switched configurations.

XLR Port

See the [Hand Control \(HC\) section](#)

MicroSD card

See the [Hand Control \(HC\) section](#)

Two Stereo Jacks

See the [Hand Control \(HC\) section](#)

Ambient Light Sensor

See the [Hand Control \(HC\) section](#)

Bluetooth

See the [Hand Control \(HC\) section](#)

Infrared

The Enhanced Display has both an IR receiver and transmitter built-in. No external module is required.

See the [Infrared Setup section](#) for setup and operation.

NOTE: If an Enhanced Display is not part of the system, then a Hand Control must be present for operation. If both modules are present, then the Hand Control will display a splash screen and the Enhanced Display will be the primary display. In this case, the microSD card in the Hand Control is disregarded.

2.1.3 Secondary Adaptive Joystick (SAJ)

Figure 10
*Outline & Mounting
(Secondary Adaptive
Joystick)*

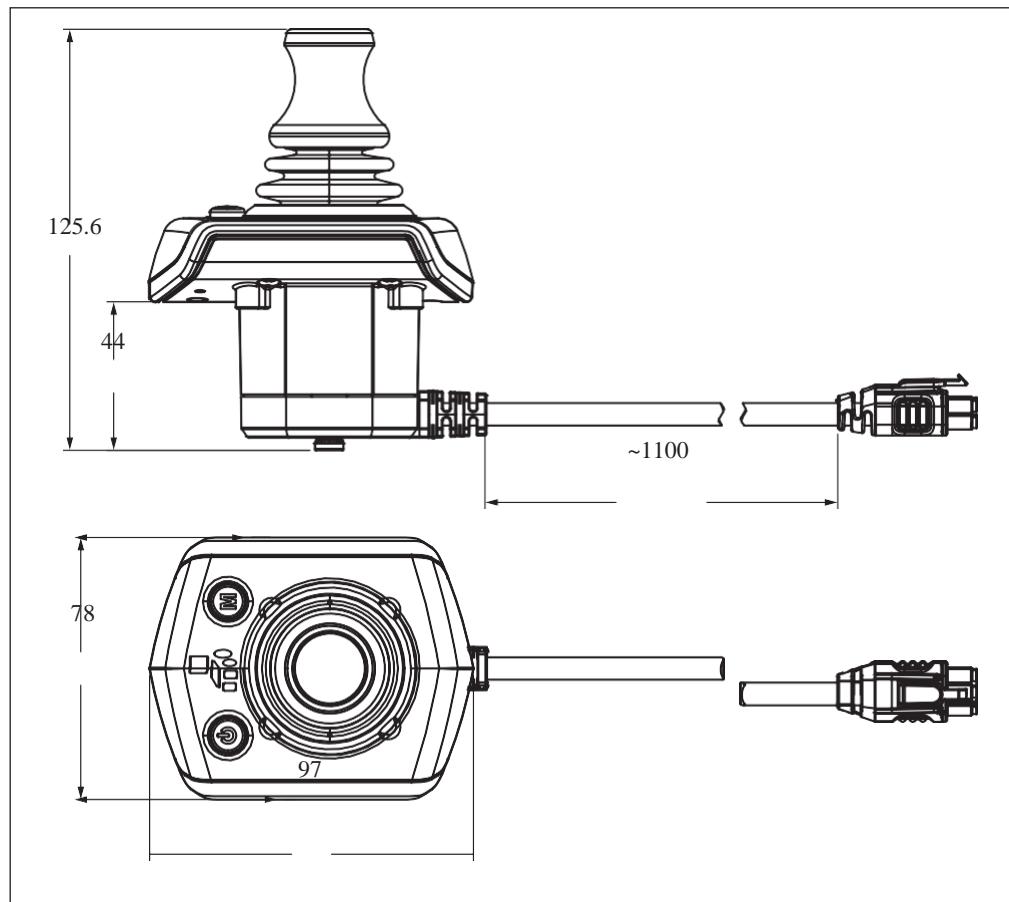
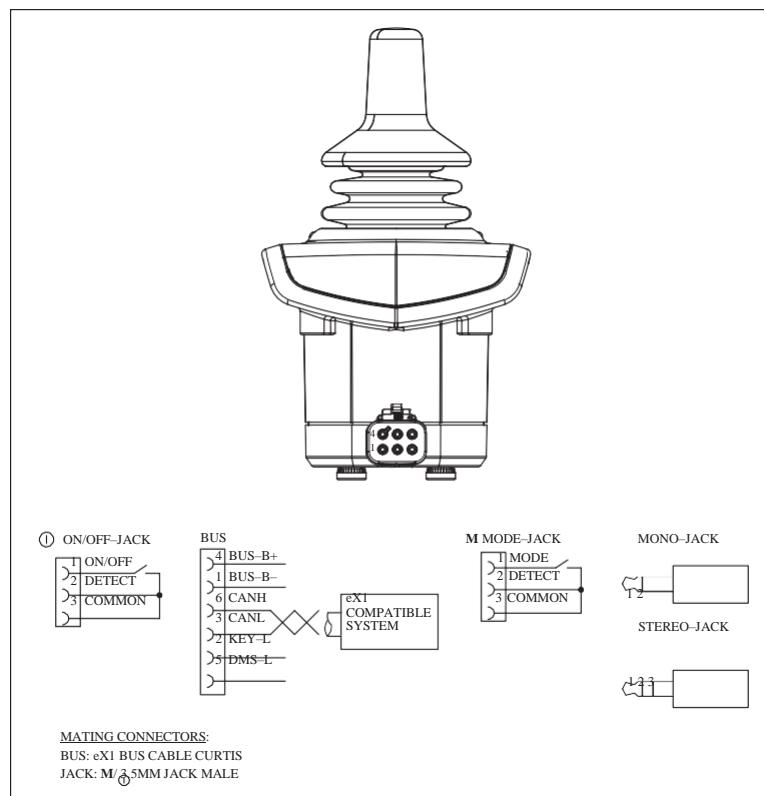


Figure 11
*Wiring (Secondary
Adaptive Joystick)*



The Secondary Adaptive Joystick (SAJ) is a basic input device intended for use in combination with the Enhanced Display. It has an LED display to indicate drive or seating profile, and approximate battery charge. The joystick is the same as on the Hand Control. Because a Hand Control or Enhanced Display must be part of the system, the same display screens are available for navigation.

LED Display

The Battery LED is tri-color, and represents approximate battery charge. The actual charge can be seen on the Hand Control or Enhanced Display LCD.

Table 2 SAJ Battery Indication

Battery LED Color	Battery Charge
Green (solid)	50-100%
Amber (solid)	31-49%
Red (solid)	21-30%
Red (blinking)	0-20%

The Mode LED indicates if the first drive profile is selected (green), or any other drive profile (amber). It is unlit when in the seat profile.

The Actuator LEDs indicate which actuator (alone or in combination) is selected for movement.

If any fault is present on the system, the battery and mode LED will blink at the same frequency eight times. The fault code and description can be found on the Hand Control or Enhanced Display. For more detail about the fault condition, a programmer must be connected.

On/Off Button

See the [Enhanced Display \(ED\) section](#)



WARNING! See the [Powering On/Off section](#) for important information regarding possible limitations if an Attendant Control is part of the system.

Joystick

See the [Hand Control \(HC\) section](#)

Mode Button

See the [Enhanced Display \(ED\) section](#)

Two Stereo Jacks

See the [Hand Control \(HC\) section](#)

2.1.4 Attendant Control (AC)

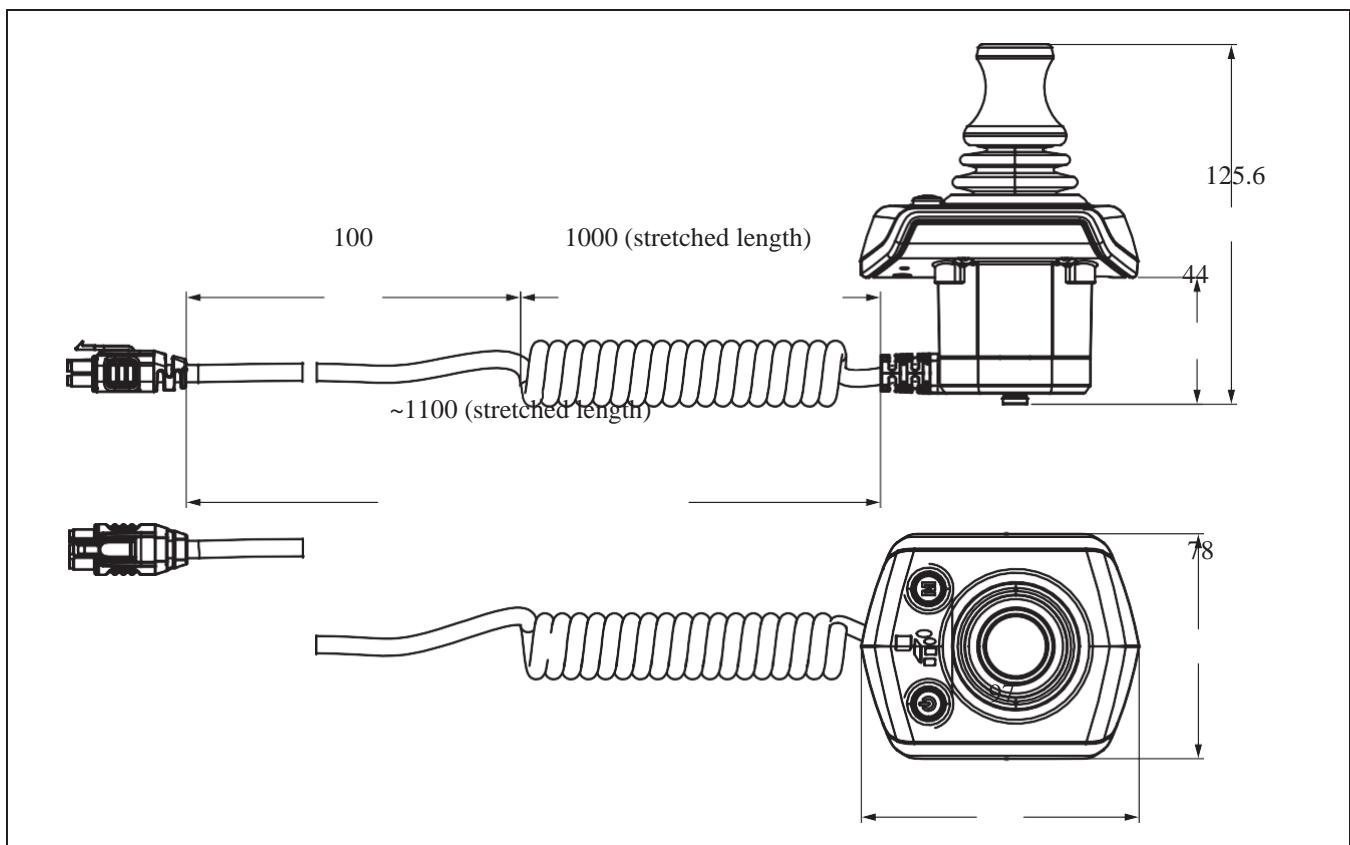


Figure 12
Outline & Mounting (Attendant Control)

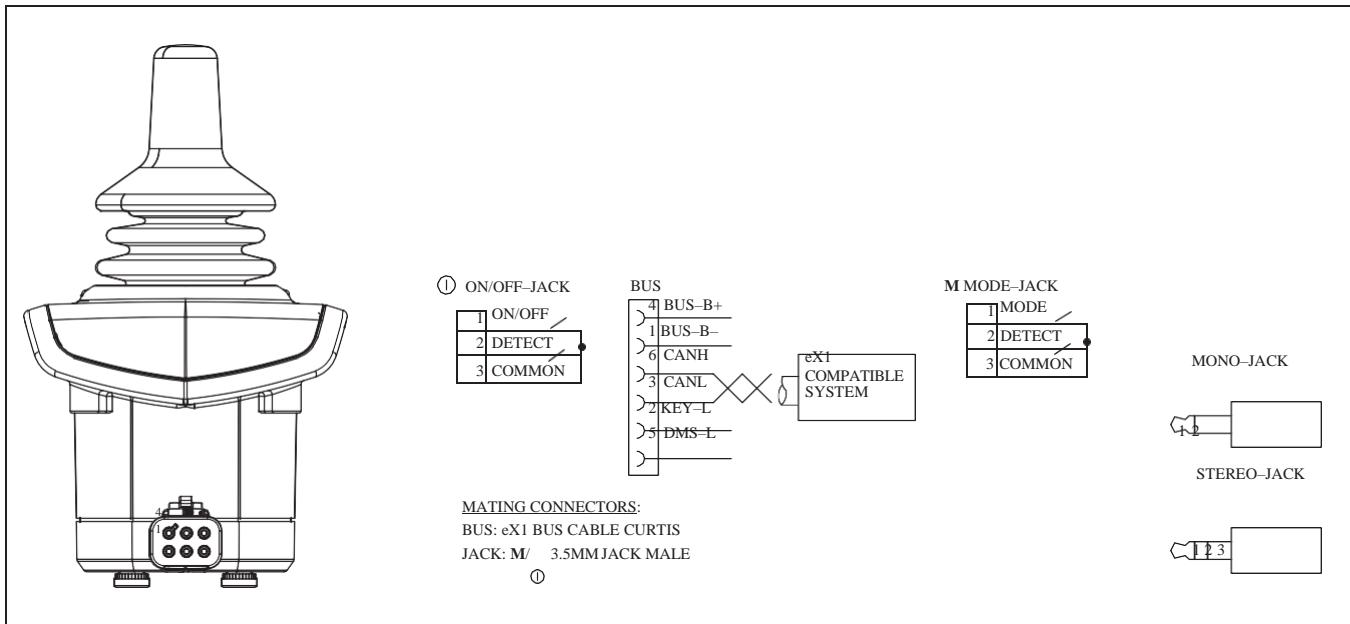


Figure 13
Wiring (Attendant Control)

The Attendant Control (AC) is an input device intended for walk-behind control of a power wheelchair, and has the same appearance as the SAJ. When in use, the Hand Control or Enhanced Display LCD shows a separate screen for the available drive profiles. See the [Drive section](#) for more information.

LED Display

See the [Secondary Adaptive Joystick \(SAJ\) section](#).

On/Off Button

If the system is powered off and the power button on the Attendant Control is pressed, the system will boot up with the Attendant Control as the active input device.

If the system is powered on and the Attendant Control is active, the power button will turn the system off.

If the system is powered on and the Attendant Control is not active, the power button will make the Attendant Control the active input device. If the chair is driving in this condition from another input device, the chair will perform a Quick Stop before transferring control. If the seat is operating in this condition, the seat function stops before transferring control.

When the Attendant Control takes over, the profile is always defaulted to Drive Profile 1.



WARNING! See the [Powering On/Off section](#) for important information regarding possible limitations if an Attendant Control is part of the system.

Joystick

Used to navigate system menus, operate seating, and drive. The joystick is a proportional input, and not configurable.

Mode Button

See the [Enhanced Display \(ED\) section](#).

Two Stereo Jacks

Both stereo jacks on the Attendant Control are not configurable. They're used for Mode and Power On/Off commands only, and are labeled on the module accordingly.

2.1.5 Specialty Control Input Module (SCIM)

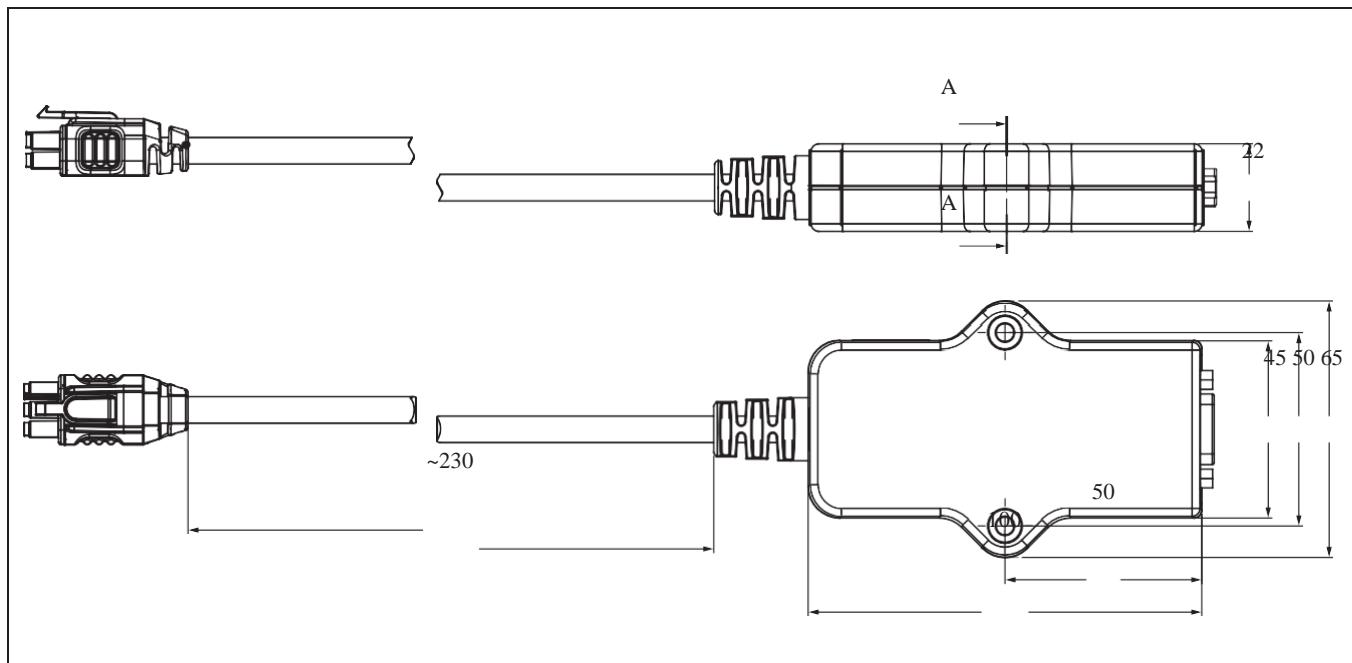


Figure 14
Outline & Mounting (Specialty Control Input Module)

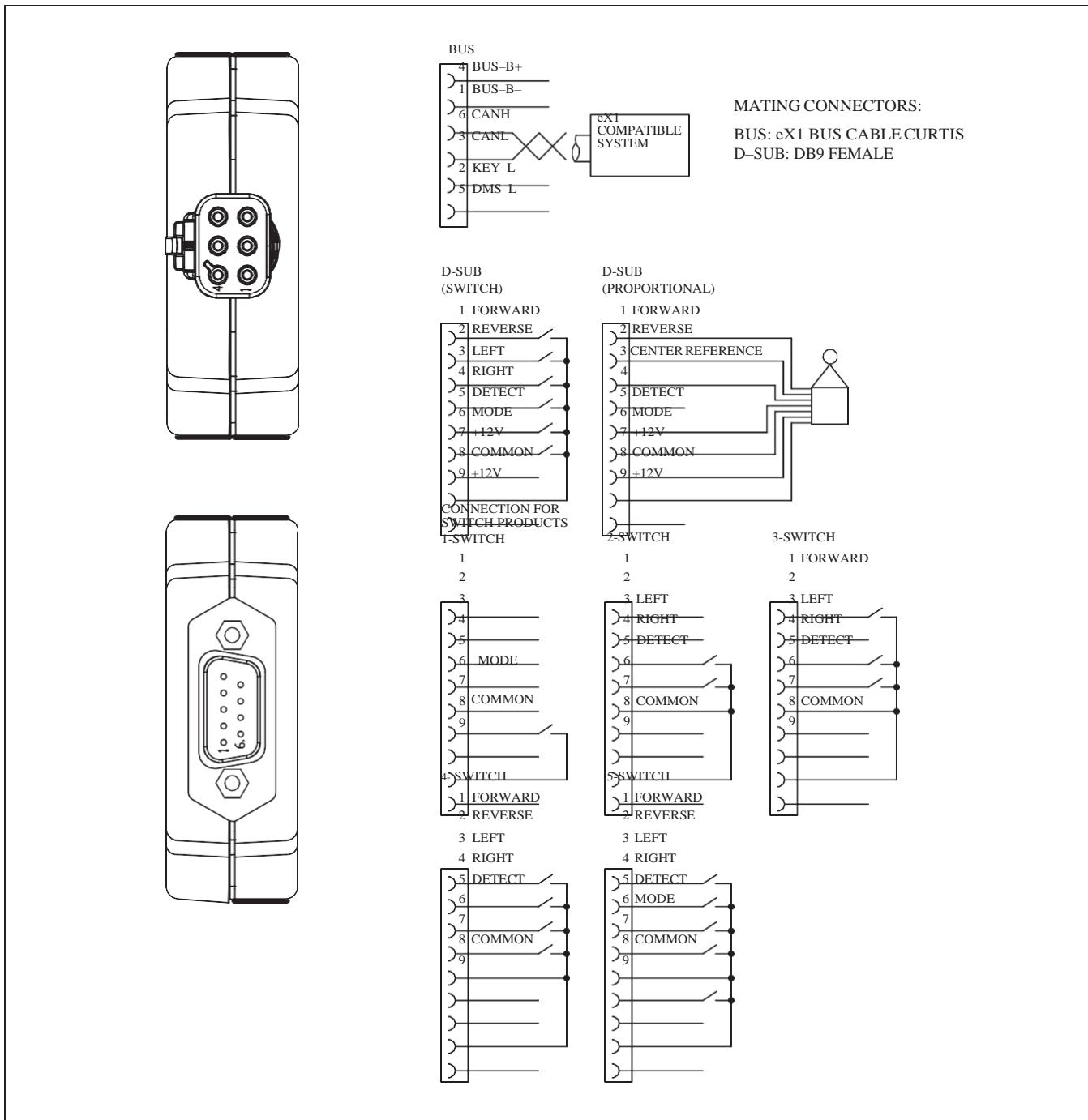


Figure 15
Wiring (Specialty Control Input Module)

The Specialty Control Input Module (SCIM) is used for connecting a compatible third party input device. It is possible to power the system on, execute a mode command, and navigate the system through the SCIM.

9-pin D-sub

See the [Enhanced Display \(ED\) section](#).

2.1.6 Sip N Puff Module (SPM)

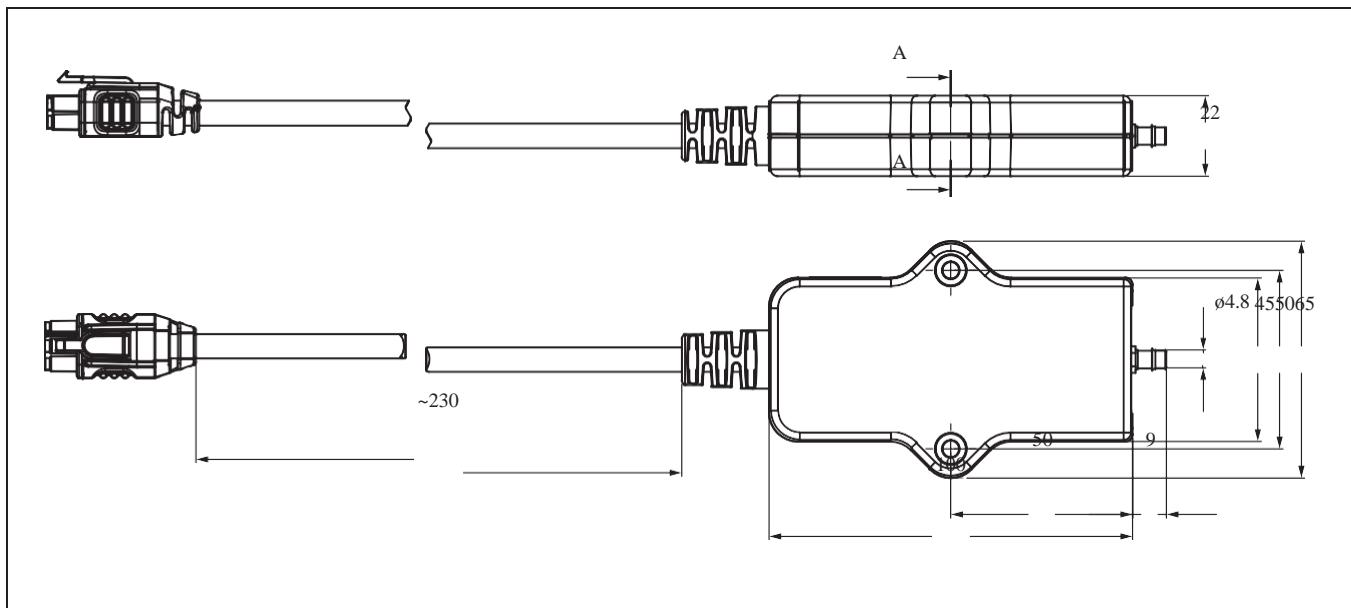


Figure 16
Outline & Mounting (Sip N Puff Module)

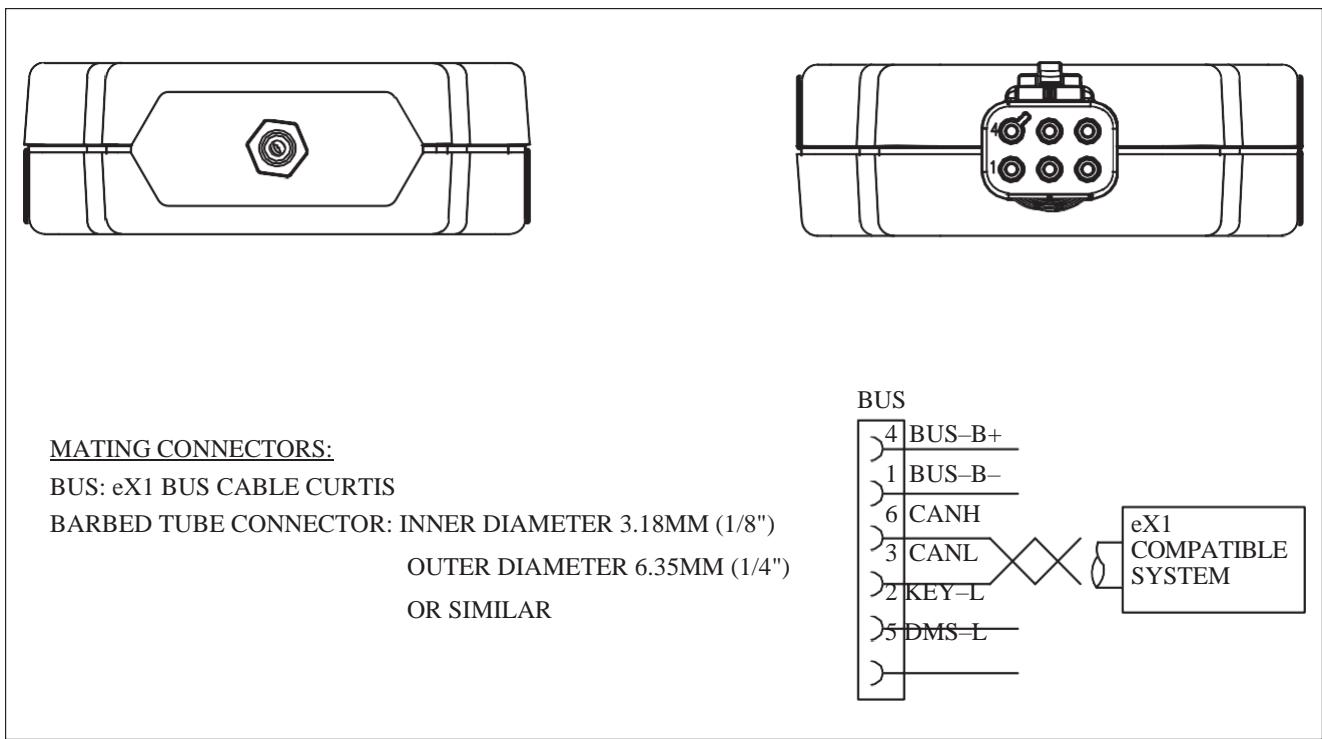


Figure 17
Wiring (Sip N Puff Module)

The Sip N Puff Module (SPM) is a breath-controlled input device that can be configured for 2 or 4 pressure inputs.

See the [2 Pressure/4 Pressure section](#) for operation using the SPM.

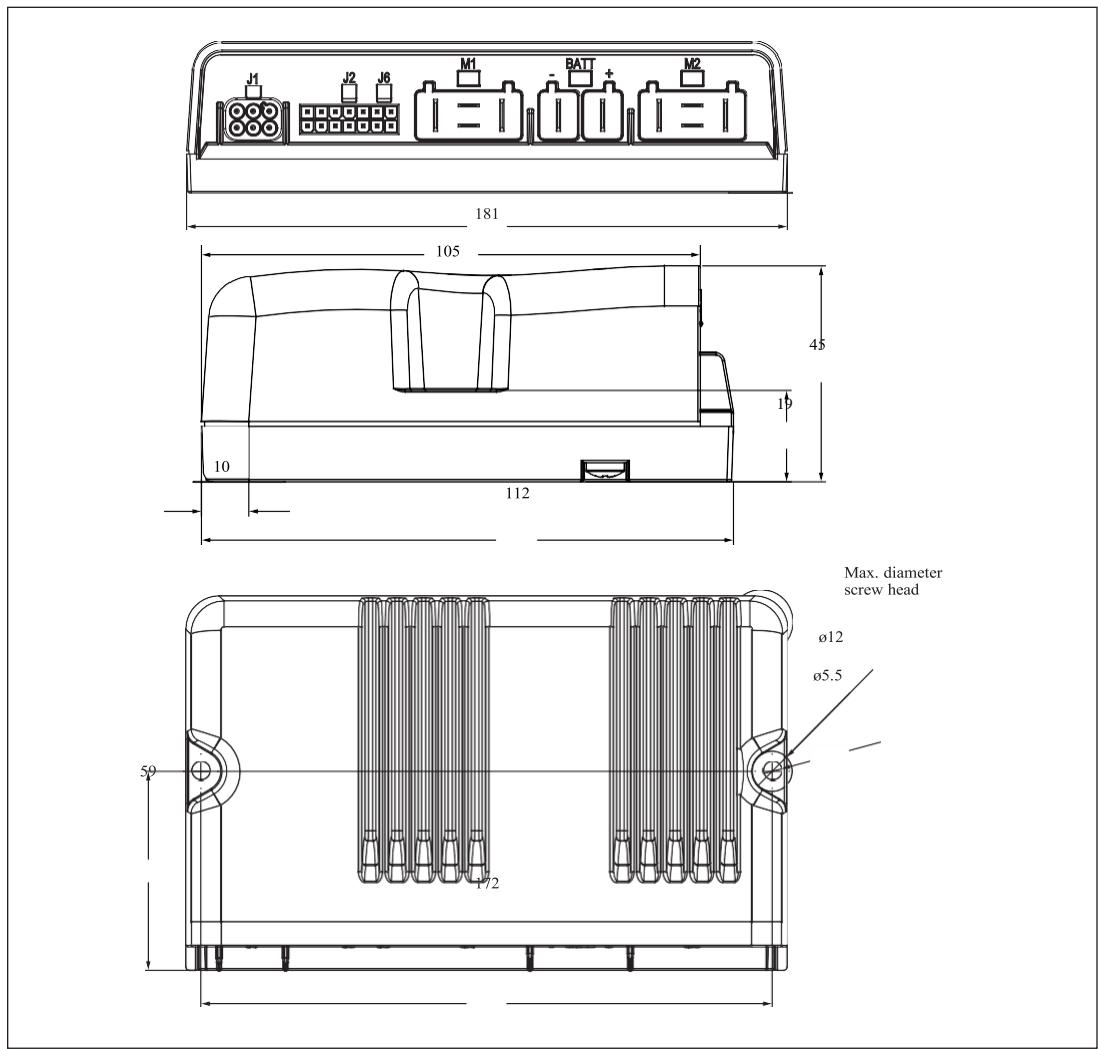
2.2 POWERBASE

Image 3
*Powerbase
120A*



2.2.1 Powerbase 120A (PB120)

Figure 18
*Outline & Mounting
(Powerbase 120A)*



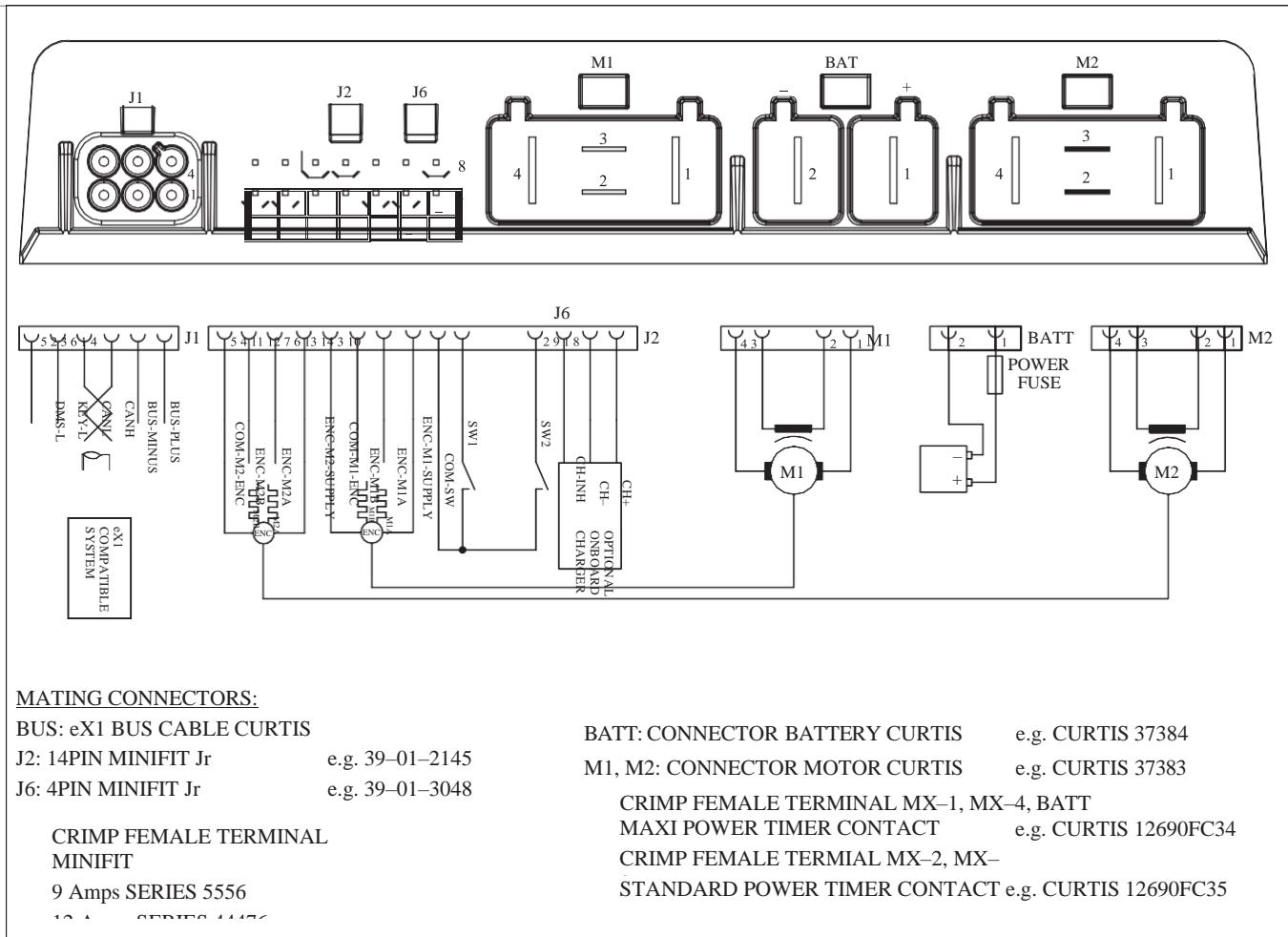


Figure 19
Wiring (Powerbase 120A)

The Powerbase (PB120) is a speed controller with dual motor and brake output, and is the main connection to the battery. Only permanent-magnet DC (PMDC) motors are supported. It also features quadrature encoder feedback for each motor, on board charging, gyro, and programmable switches (all optional to configure).

Motor Connection (M1/M2)



MANDATORY! For all motors, contact Curtis Instruments Inc. to obtain proper motor settings for safe operation.

Each motor output operates up to 24V and 120A. See table below for current ratings.

Table 3 PB120 Motor Output Current Rating

Current	Time
120 A	For 5 seconds
60 A	For 1 minute
35 A	Continuous

The motor connections are protected against short circuit between the two motor connectors. A short from the battery (B+/B-) to the motor connector may damage the controller. If the controller is damaged, it stops all motor output and signals a fault to the main display (HC or ED).

The Powerbase also features MOTOR CURRENT FOLDBACK and MOTOR STALL DETECTION.

MOTOR CURRENT FOLDBACK is a current reduction when THE MOTOR CURRENT FOLDBACK THRESHOLD (A) has been exceeded on either channel for the MOTOR CURRENT LIMIT TIME (s). The current reduces to MOTOR CURRENT FOLDBACK (A) for MOTOR CURRENT FOLDBACK TIME (s).

MOTOR STALL DETECTION ensures there is no motor output and the brakes engage when the MOTOR STALL CURRENT THRESHOLD (A) has been exceeded for the MOTOR STALL TIME THRESHOLD (s), within the MOTOR STALL SPEED THRESHOLD (rpm).

Each brake output is PWM controlled, up to 24 VDC. Two voltages are available for configuration, APPLY VOLTAGE and CONTINUOUS VOLTAGE. APPLY VOLTAGE ensures the brakes release, while the CONTINUOUS VOLTAGE ensures they do not get re-engaged. The brake output voltage is consistent, regardless of battery voltage. The maximum continuous current rating for each brake output is 1.5 A.

If either motor or brake connection is disconnected or shorted, the system will not be operable and the corresponding faults will be raised. To clear the faults, the system must be powered down and the connections should be checked.

The [System section](#) has information for all motor and brake settings.

Battery Connection (B+/B-)

The battery connection is nominal 24 VDC. An internal relay is used to protect against polarity swap. See the [Battery section](#) in the System Specifications appendix for further specifications.

Encoder Feedback

There are independent +5 VDC encoder supplies for each motor. The Powerbase supports 60-256 pulses per revolution at a motor speed of 5500 RPM.

If equipped, MOTOR ENCODERS ENABLED must be set to Yes in programming, and MOTOR ENCODERS PULSES PER REV and MOTOR ENCODER INVERTED set correctly. See the [System section](#) for relevant parameters.

If the encoder function is enabled and the Powerbase detects that an encoder is not connected or shorted, a warning will be shown intermittently. The system will still be operable, but without encoder feedback.

Gyro

A gyro is built into the Powerbase for stability control, but is not yet used. It will be used in future firmware update.



Push Mode

It is possible to manually release the motor brake so a power wheelchair can be pushed.

If the brake lever is released while the system is on, no fault will be raised unless a drive command is given. If a fault is raised, manually engage the brake and power cycle the system.

If the brake lever is released while the system is off, manually engage the brake before powering on. Otherwise, the system will boot up with a corresponding brake fault.

Onboard Charging

The Powerbase supports connection of an onboard charger through the J2 or J6 Molex connector. If the charger is actively charging, it will drive the Inhibit Line (Pin 9) high or low to prevent driving. Depending on the charger, the CHARGER INHIBIT parameter must be set accordingly (High active or Low active) to properly detect charging. See the [System section](#) for information on Charger parameters.

Switch Inputs

There are two switch inputs on the J2 Molex connection that are programmable for a variety of functions. See the [Mapped I/O section](#) for all options.

2.3 SEATING

The eX1 system offers multiple seating modules that support actuator output and feedback, programmable switches, and lights. They also include an inclination sensor. It is only possible to have one actuator module in a system. See the [Module Compatibility section](#).



MANDATORY! The OEM is responsible for adding appropriate temperature protection in the actuator motor. The probability of overheating can be lowered by choosing an adequate motor.

Image 4
*Advanced
Actuator Module*



2.3.1 Advanced Actuator Module (AAM5)

Figure 20
*Outline & Mounting
(Advanced Actuator
Module 5)*

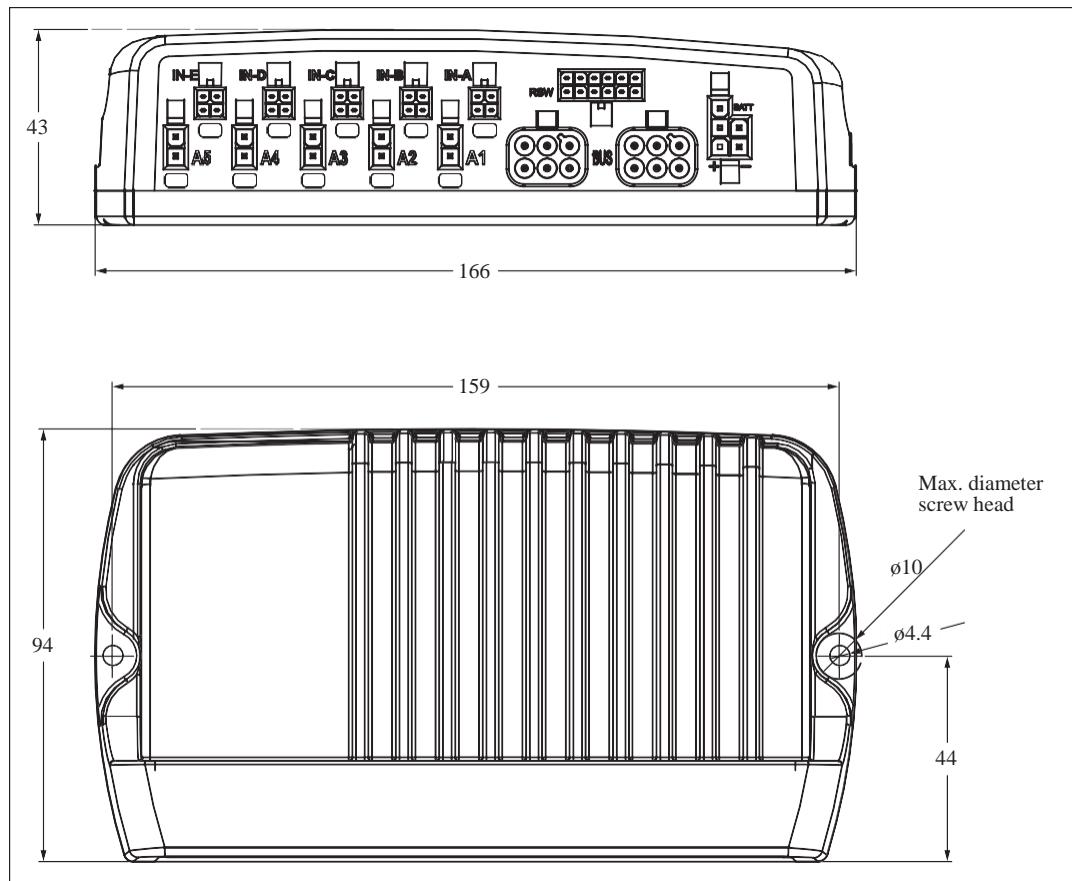
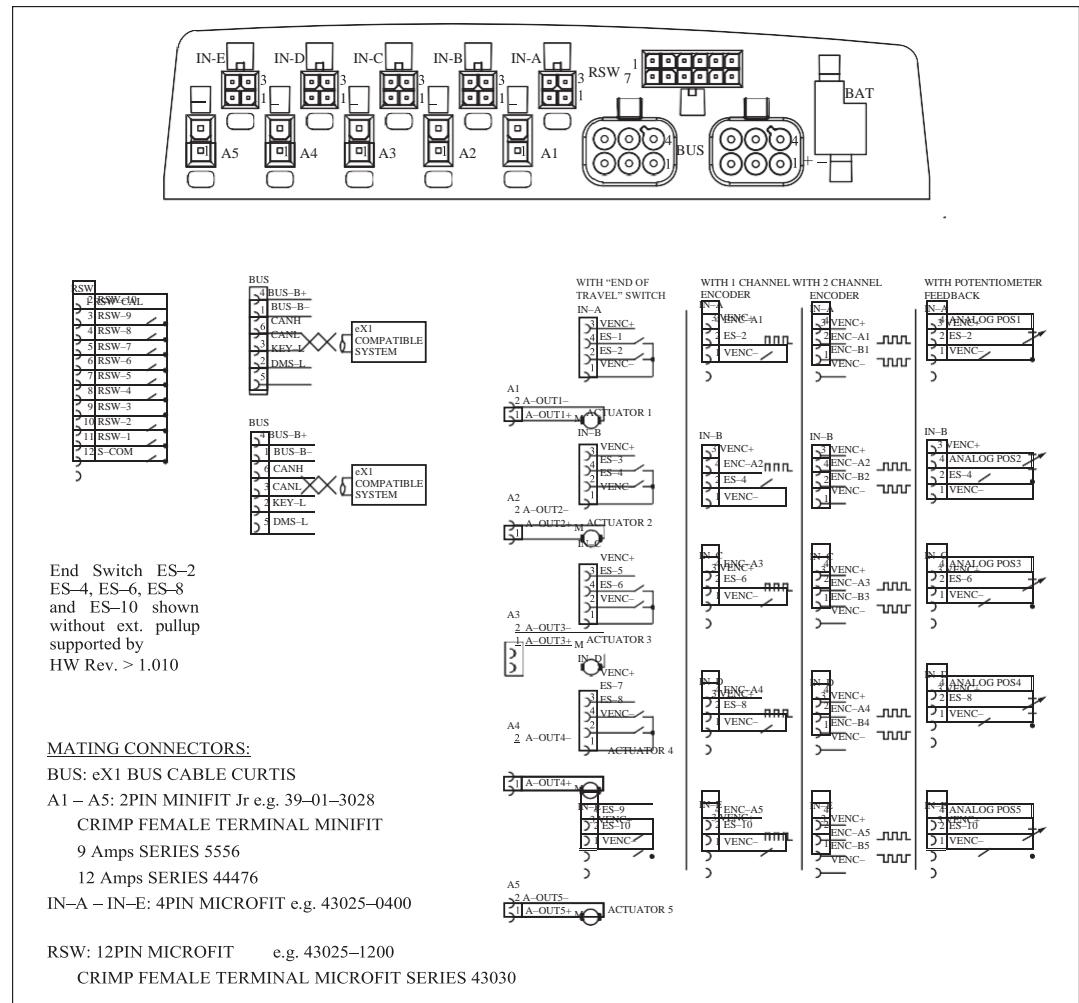


Figure 21
Wiring (Advanced
Actuator Module 5)



The Advanced Actuator Module (AAM5) has five actuator outputs, each with optional feedback. The AAM5 also supports ten remote switches, programmable to different functions.

Actuator Outputs

Each actuator port is rated for 24V, 15A for 10 seconds and 10A continuous.

Actuator Feedback

The five feedback ports (IN-A to IN-E) can be used for end switch and/or potentiometer feedback. Creating a drive or seat restriction with potentiometer feedback is not yet supported, and planned for a future firmware update.

End Switch – Depending on the switch state, a drive, actuator, and/or seat restriction is possible. They can be configured for normally open or closed. The AAM5 has ten end switch inputs total, two end switches for each port.

Inclination Sensing

The built-in sensor is used to create drive, actuator, and/or seat restrictions. For proper sensing, the system configuration must have the proper parameter setup which matches the actuator module mounting. See the [General section](#) for a more detailed explanation.

Remote Switch Inputs

There are ten switch inputs on the RSW Molex connection that are programmable for a variety of functions. See the [Mapped I/O section](#) for all options.

2.3.2 Actuator Module (AAMx)

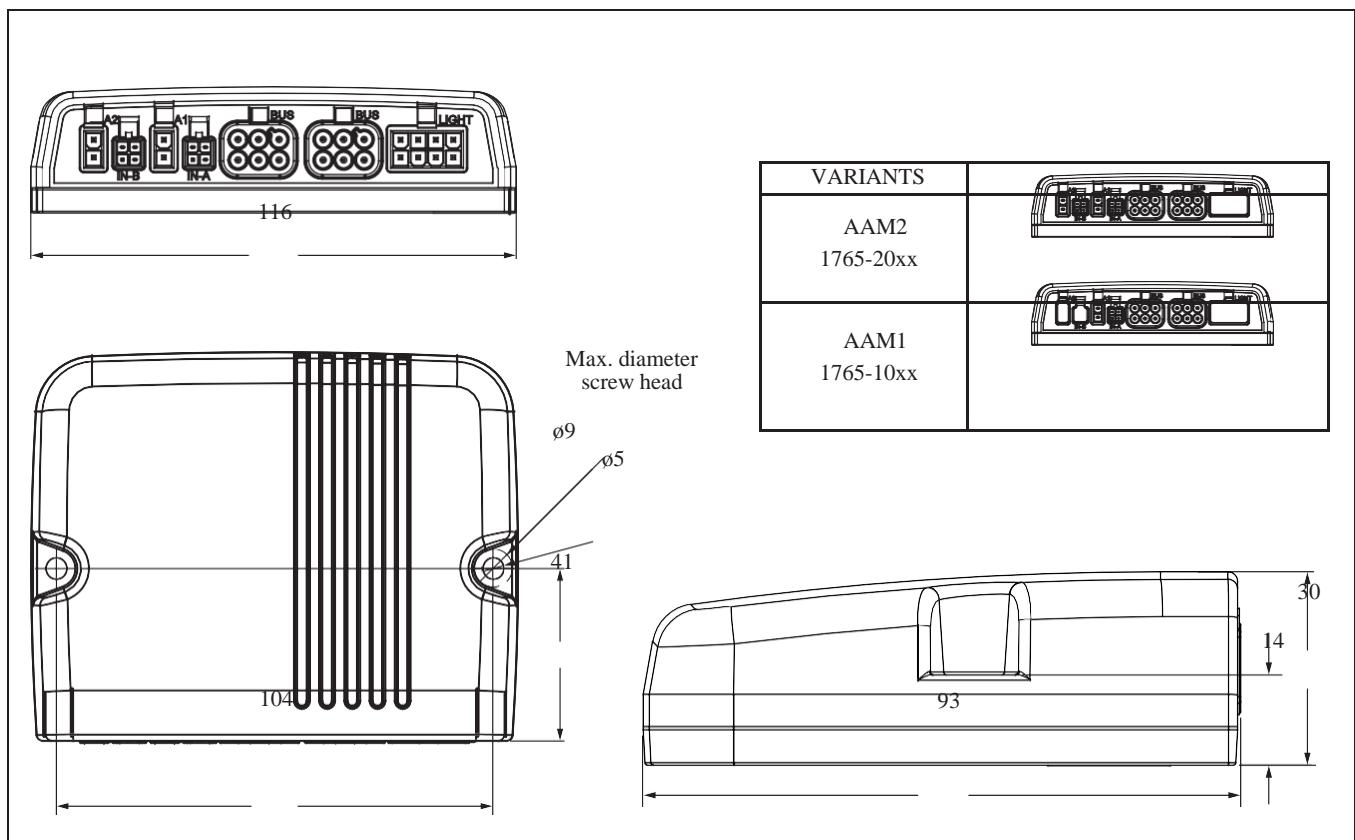


Figure 22
Outline & Mounting (Advanced Actuator Module 1 and 2)

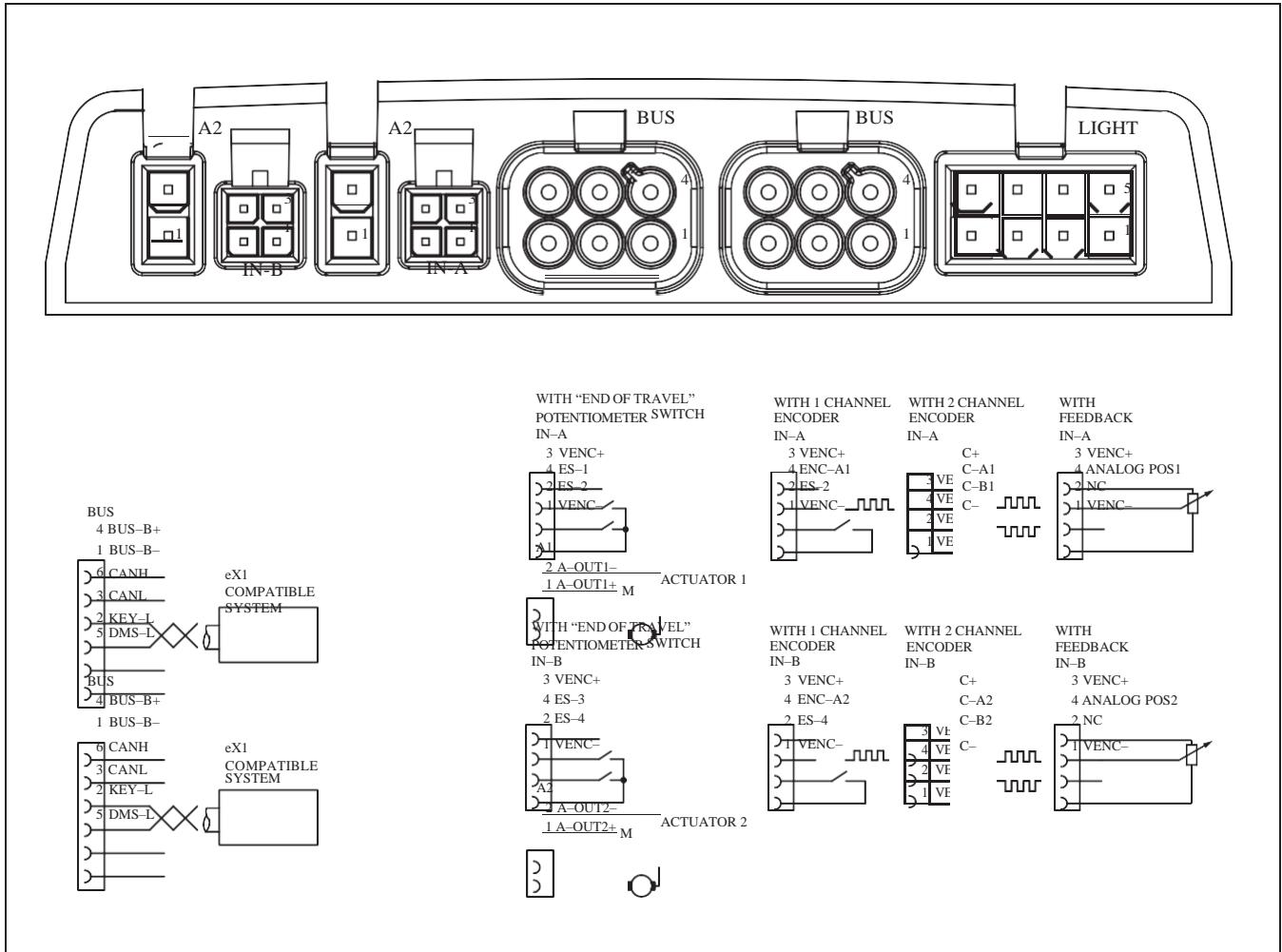


Figure 23
Wiring (Advanced Actuator Module 1 and 2)

The Actuator Module is offered in two versions, with one (AAM1) or two (AAM2) actuator outputs. They do not include remote switches.

Actuator Outputs

See the [Advanced Actuator Module \(AAM5\)](#) section.

Actuator Feedback

See the [Advanced Actuator Module \(AAM5\)](#) section.

The AAM1 has two end switches, and the AAM2 has four end switches.

Inclination Sensing

See the [Advanced Actuator Module \(AAM5\)](#) section.

2.3.3 Light and Actuator Module (AAM2L)

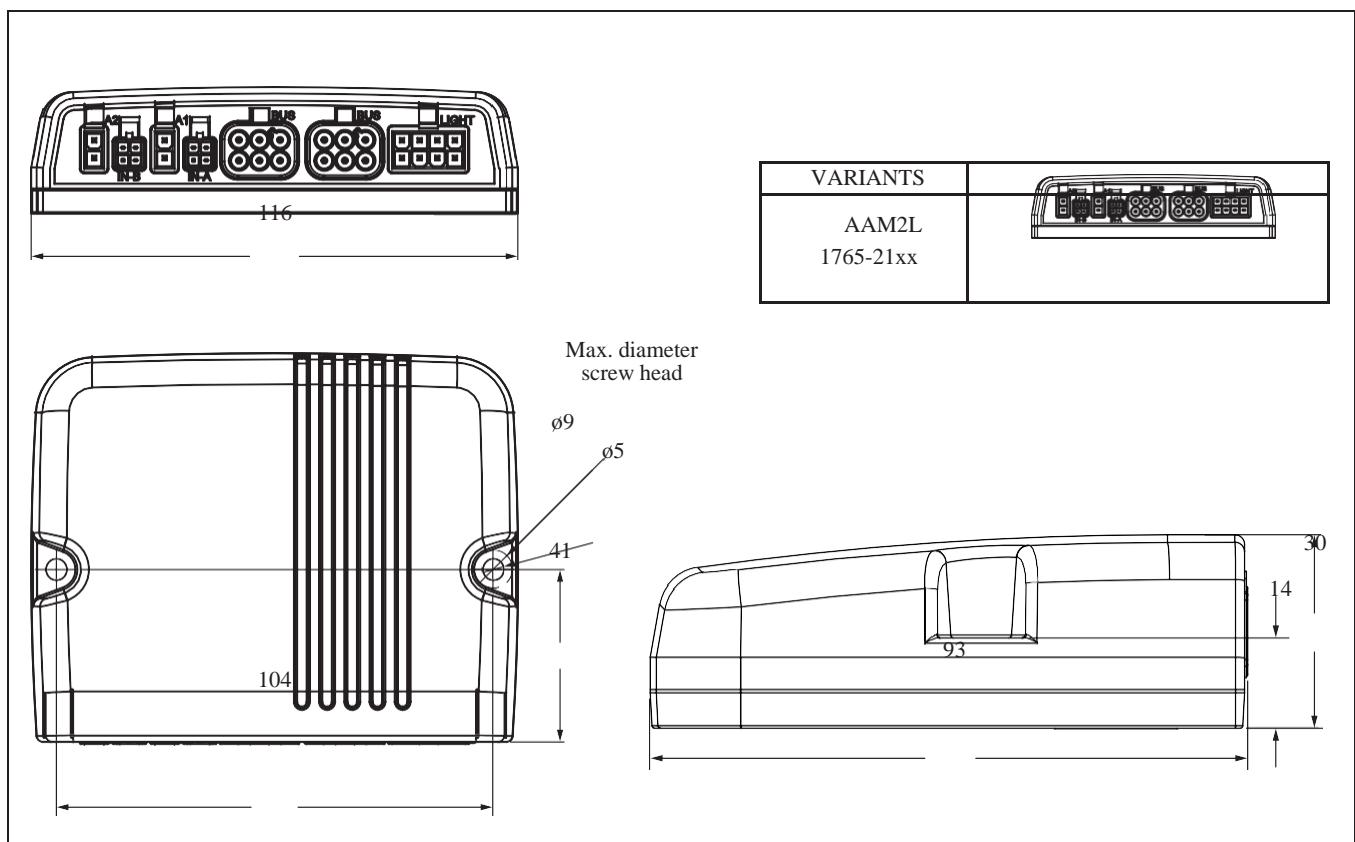


Figure 24
Outline & Mounting (Light & Actuator Module)

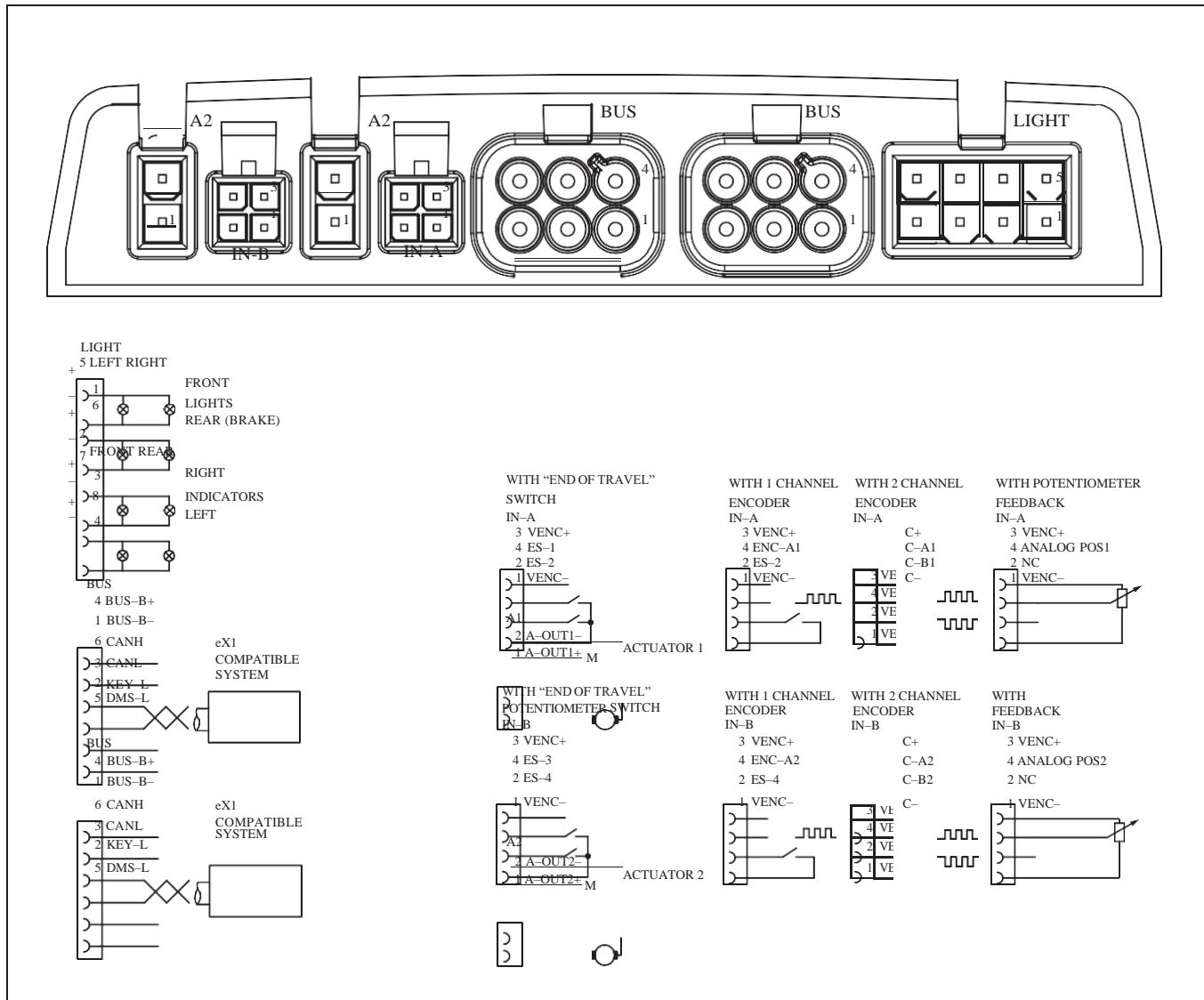


Figure 25
Wiring (Light & Actuator Module)

The Light and Actuator Module (AAM2L) provides two outputs for front and rear lights and two outputs for left and right indicators. It also has two actuator outputs.

Actuator Outputs

See the [Advanced Actuator Module \(AAM5\) section](#).

Actuator Feedback

See the [Advanced Actuator Module \(AAM5\) section](#).

Inclination Sensing

See the [Advanced Actuator Module \(AAM5\) section](#).

Lights and Indicators

See the [Light Module \(LM\) section](#).

2.4 MISCELLANEOUS

Image 5
Light Module



2.4.1 Light Module (LM)

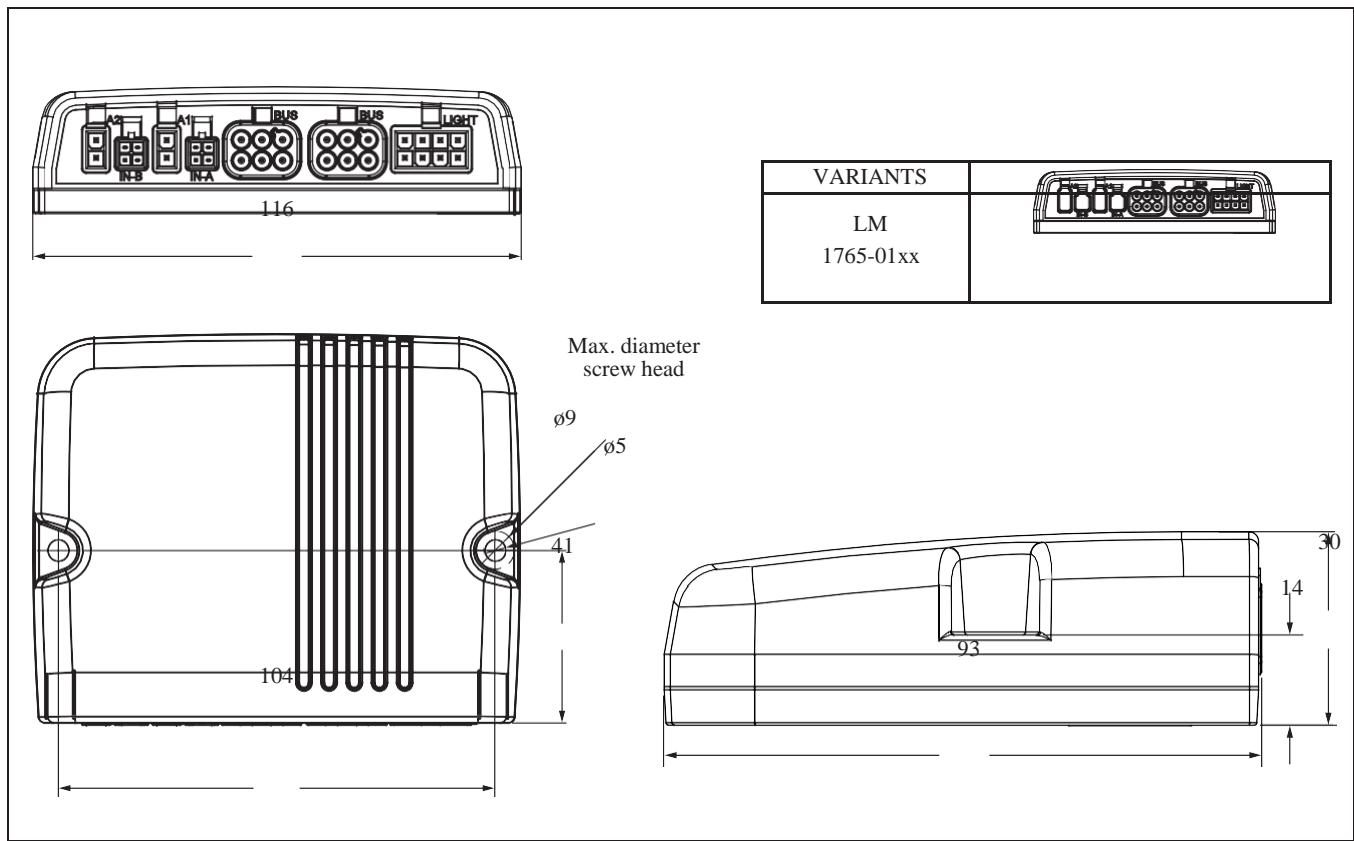


Figure 26
Outline & Mounting (Light Module)

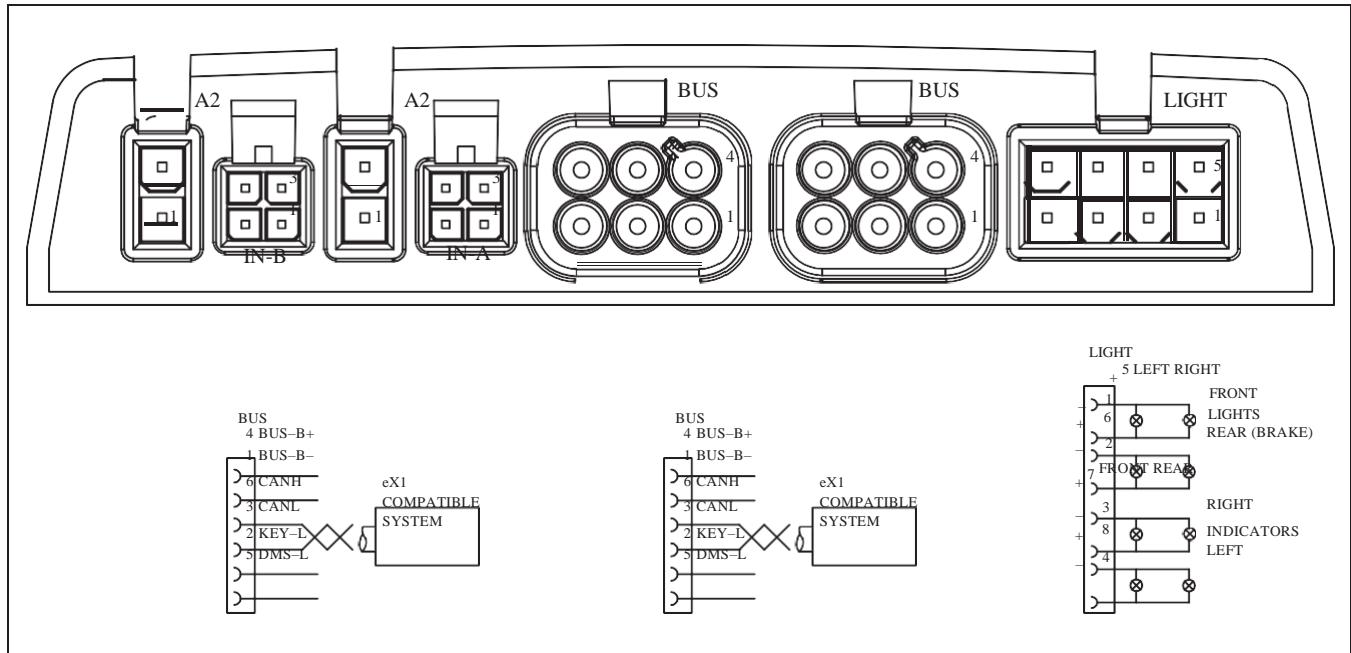


Figure 27
Wiring (Light Module)

The Light Module (LM) provides two outputs for front and rear lights, and two outputs for left and right indicators. Unlike the AAM2L, it has no actuator outputs.

Lights and Indicators

Table 4 Light Output Current Rating

Current	Time
2 A	Peak
1 A	Continuous
3 A	Continuous for all 4 outputs together

The LIGHT VOLTAGE outputs are programmable from 6-24V. See below table for current ratings. The lights can be controlled by:

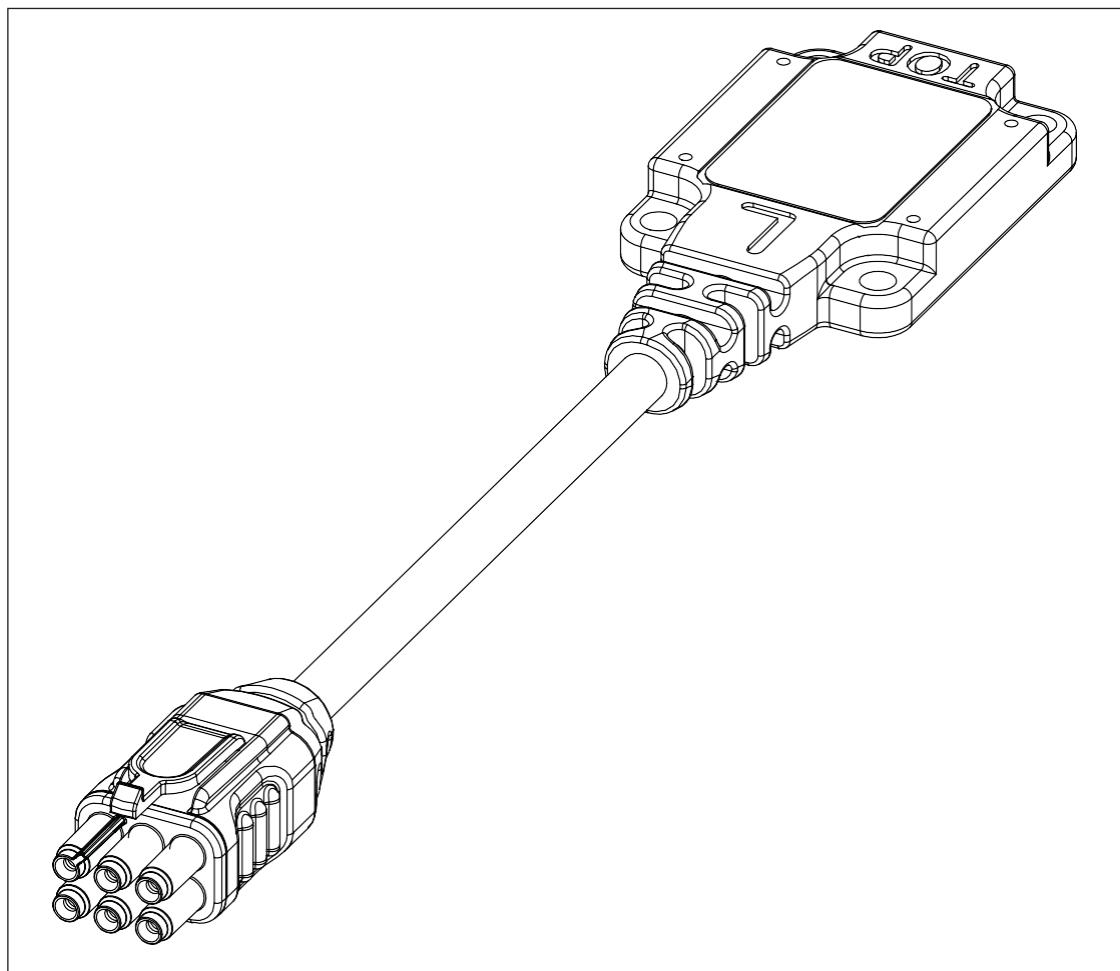
- Dedicated push buttons on Hand Control Light
- Programmable keys I/II on Hand Control
- Mode jacks on Hand Control, Enhanced Display, and Secondary Adaptive Joystick
- Remote switches on Advanced Actuator Module and Powerbase

The system needs to be powered on for the lights to operate. If the system is powered off while the hazards are active, the hazards will remain on.

See the [Light section](#) for all light parameters.

2.4.2 Caster Angle Sensor (CAS)

Figure 28
Outline (Caster Angle Sensor)



The Caster Angle Sensor (CAS) is designed and supported by Quantum Rehab Corporation, for specific models of their power wheelchair.

They are used as feedback for stability control, which helps prevent the chair from veering, spinning-out, and improving overall control. The CAS can be calibrated using a programmer, and the system must be properly configured to integrate the feedback (STABILITY CONTROL ENABLED, STABILITY CONTROL TECHNOLOGY).

See the [System section](#) for Stability Control parameters and calibration functions.

2.4.3 iAccess (ESM)

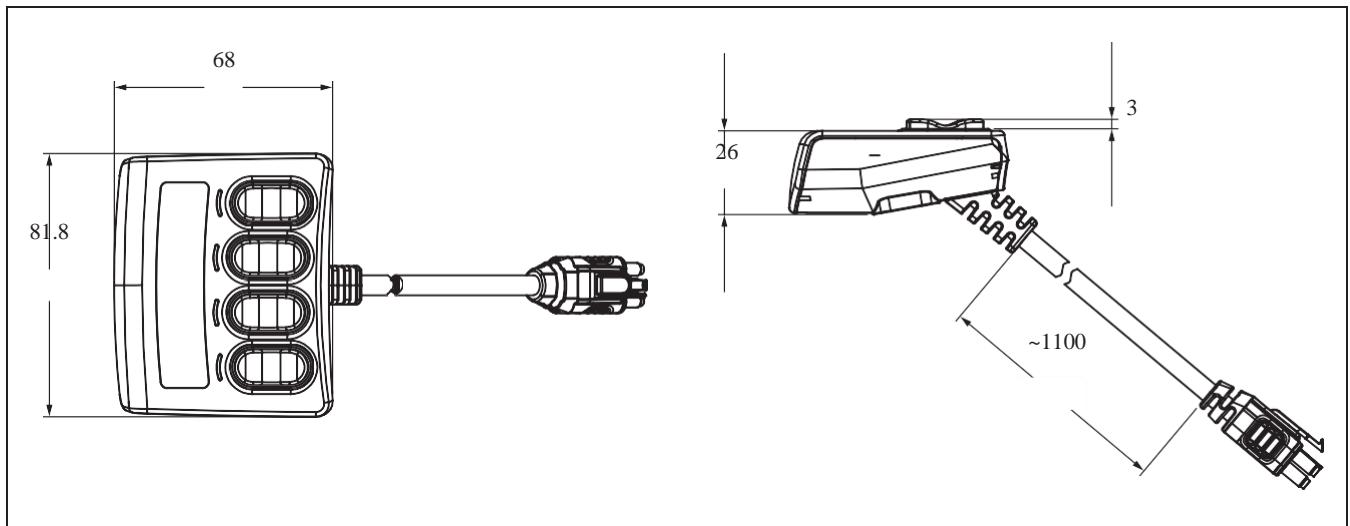


Figure 29
Outline & Mounting (iAccess)

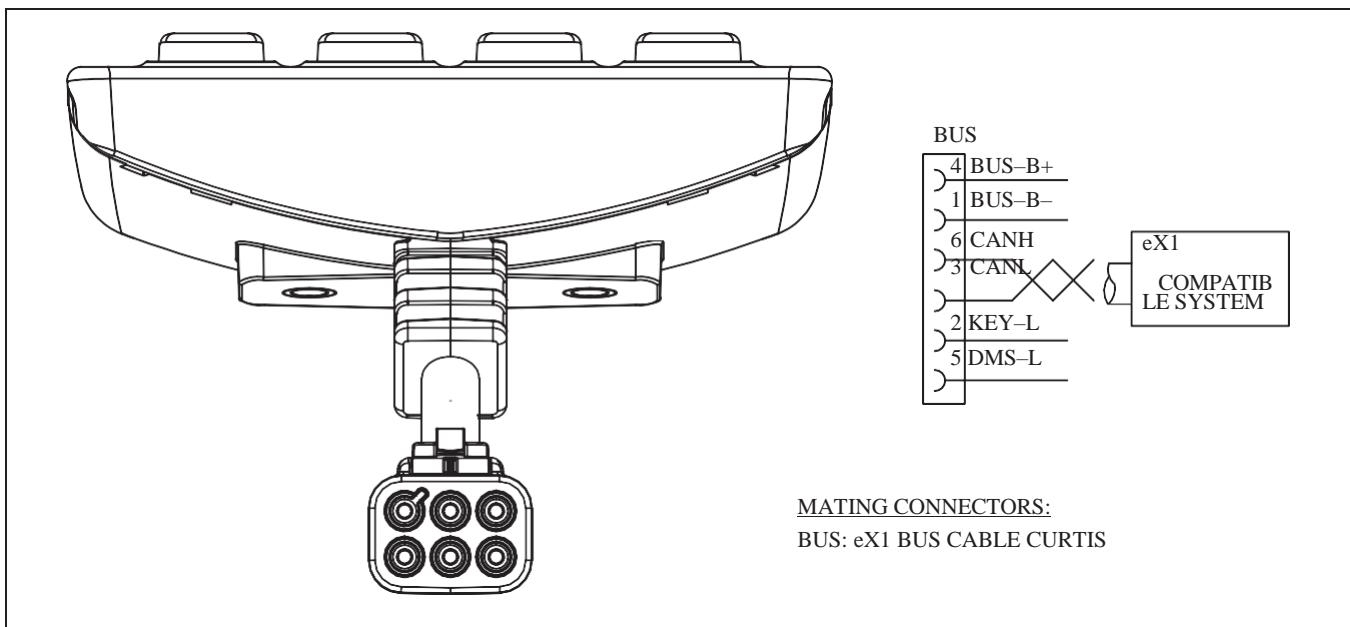


Figure 30
Wiring (iAccess)

The iAccess is a switch module that is customizable to operate seat, Bluetooth, light, Environmental Control Module, and other system functions. It is available in two models, flat or toggle push buttons (flat shown above). The functionality in both models is the same. For a full list of functions, see the [iAccess section](#).

OLED Display

The display shows dedicated icons depending on how each switch is configured. For example, if a switch is setup to operate a seating function, the display will show the appropriate seat icon. The display is not used to show errors or warnings on the system.

Two brightness levels can be configured through programming, Day and Night. The display brightness changes based on the ambient light sensor feedback from the Hand Control or Enhanced Display. See the [Display section](#) for information on these parameters.

LED Feedback

The LED feedback above each switch is used to indicate drive status based on seat position. This will match the drive status reported on the Hand Control or Enhanced Display. See below table for LED status based on seat position.

Table 5 iAccess Drive Status Indication

Condition	Elevate	Tilt	Recline	Other Seat	Non Seat
No restriction-No iLevel	Green (solid)	Green (solid)	Green (solid)	Green (solid)	No LED
Speed Restriction–Elevate	Amber (solid)	Green (solid)	Green (solid)	Green (solid)	No LED
Speed Restriction–Tilt/Recline	Green (solid)	Amber (solid)	Amber (solid)	Green (solid)	No LED
Drive Lockout–Tilt/Recline	Green (solid)	Red (solid)	Red (solid)	Green (solid)	No LED
Speed Profile–iLevel	Green (blink)	Green (blink)	Green (blink)	Green (blink)	No LED
Speed Restriction–Tilt/Recline in iLevel	Green (blink)	Amber (solid)	Amber (solid)	Green (blink)	No LED
Drive Lockout–Tilt/Recline in iLevel	Green (blink)	Red (solid)	Red (solid)	Green (blink)	No LED

NOTE: If the Attendant Control is in control of the system, only seat and light functions will be operable from the iAccess.

2.4.4 Environmental Control Module (ECM)

Figure 31
Outline & Mounting
(Environmental
Control Module)

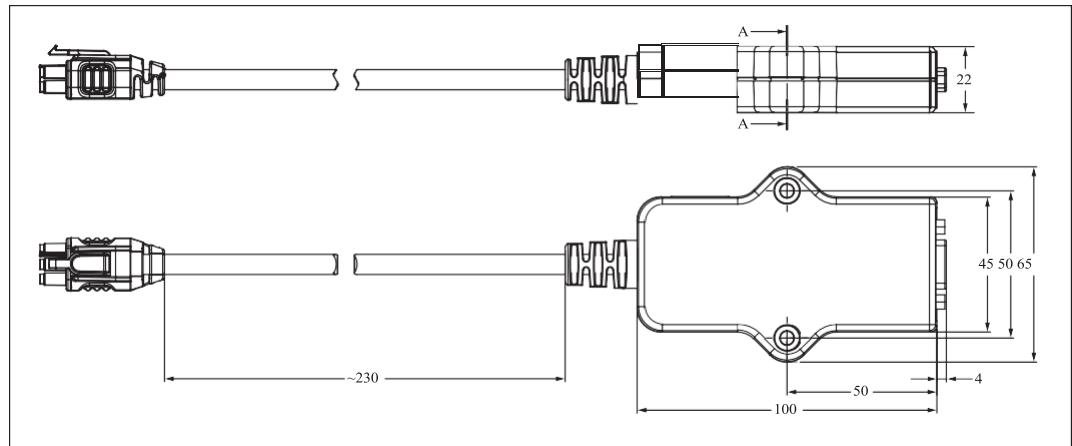
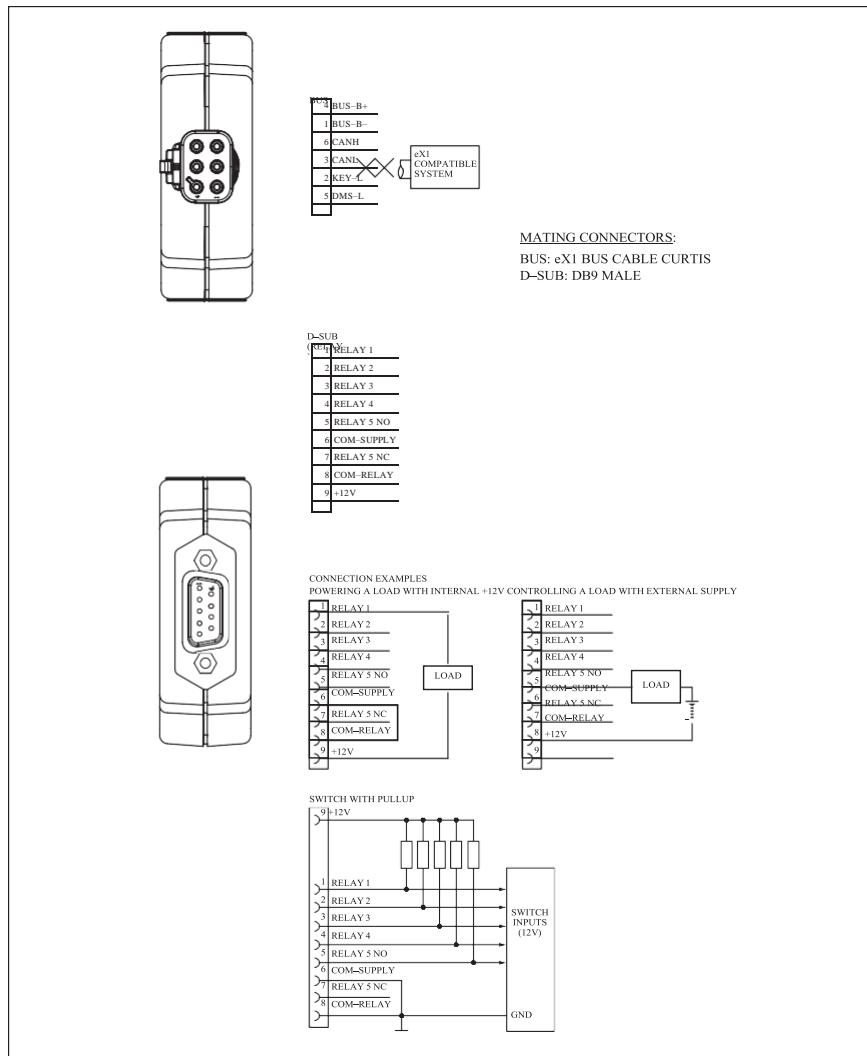


Figure 32
Wiring (Environmental
Control Module)



The Environmental Control Module (ECM) consists of five relays, which allow for control of an external device. Up to ten functions can be setup in programming to activate or deactivate any combination of the five relays. Each function can be controlled through the Settings menu, Mapped I/O, or the iAccess.

2.4.5 Power Supply Module (PSM)

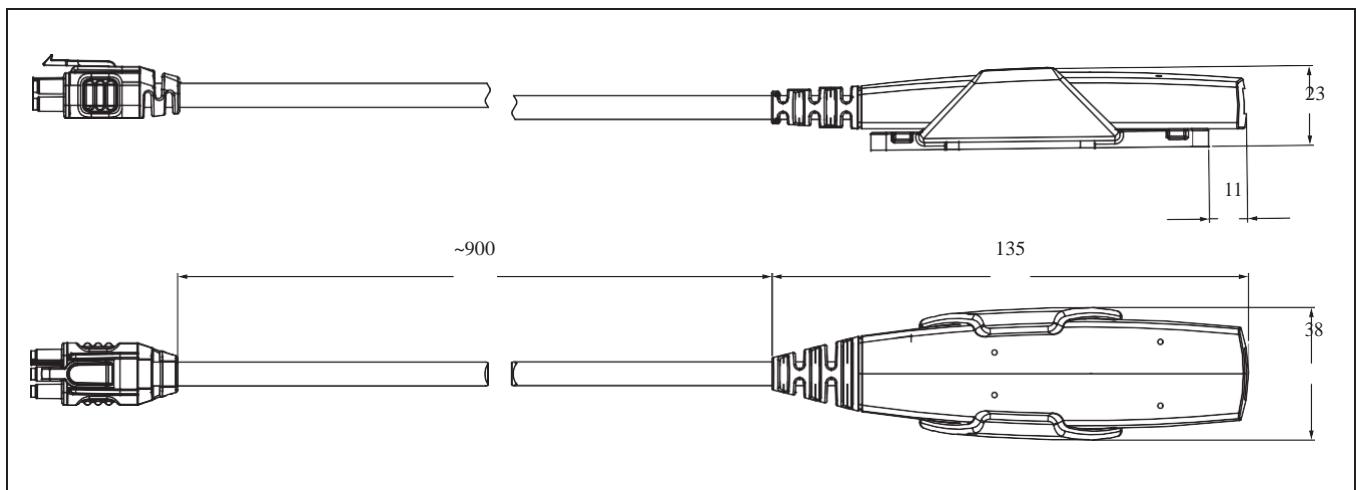
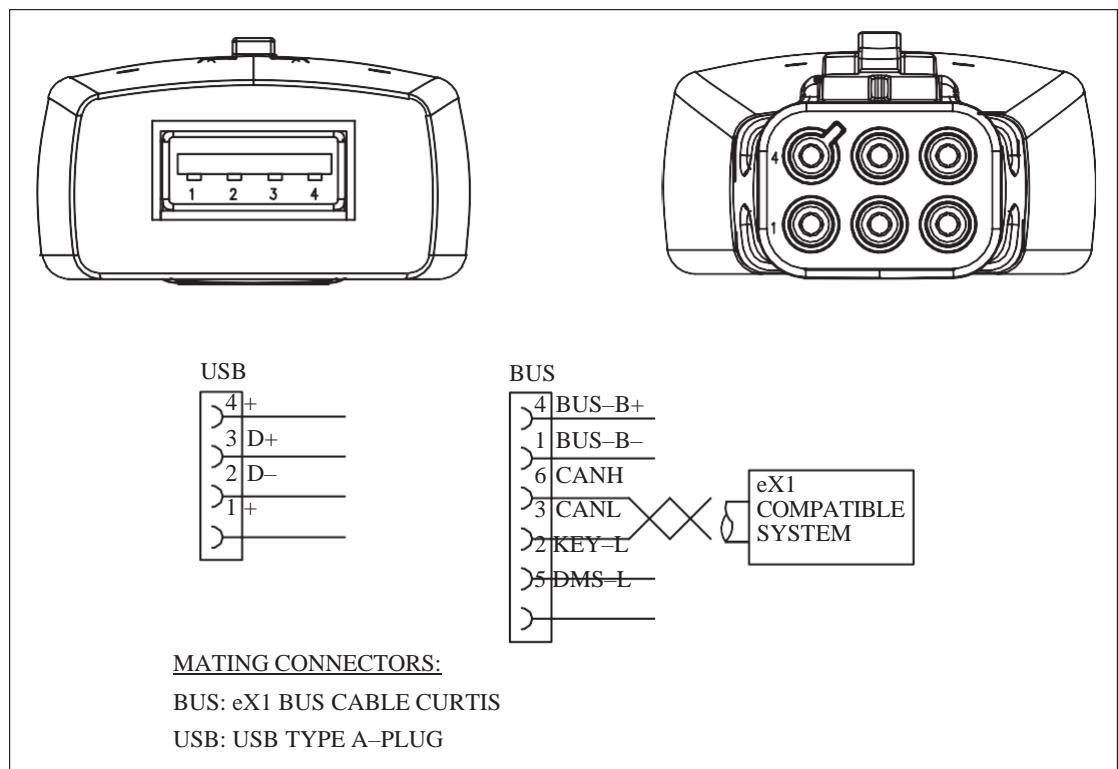


Figure 33
Outline & Mounting (Power Supply Module)

Figure 34
Wiring (Power Supply Module)



The Power Supply Module (PSM) is a USB Type-A charger. It is only active while the system is powered on. If the PSM reaches 50°C, the output voltage is reduced.

Table 6 PSM Output Current Rating

Output Voltage	Output Current
5 V	1.5 A

3 — OPERATION

3.1 MODULE COMPATIBILITY

The enAble X1 system can be configured in different combinations. The minimum system requirement is:

1. Powerbase
2. Hand Control or Enhanced Display

The maximum system is:

1. Powerbase
2. Hand Control
3. Enhanced Display
4. Secondary Adaptive Joystick
5. Attendant Control
6. Specialty Control Input Module
7. Sip N Puff
8. Actuator Module
9. Light Module
10. iAccess
11. Environmental Control Module
12. Caster Angle Sensor (Left)
13. Caster Angle Sensor (Right)
14. Power Supply Module (not limited)

3.2 POWERING ON/OFF

Power buttons

Using the on/off pushbutton (ED, SAJ, AC) or side lever (HC) is the standard method for powering the system on and off. Jack switches can also be configured for on/off functionality.

Auto Shutoff

An auto shutoff feature can be used, up to 240 minutes after the system has been idle. Without powering down the system manually, this will shut down the system at the defined parameter setting. To disable AUTO SHUTOFF, set the parameter to 0 min. See the [Parameters Setting section](#).

System Lock

The last feature that can shut down the system is SYSTEM LOCK. It can be initiated by:

- Selecting menu entry “System Lock” in Auxiliary – System Functions menu
- A long mode command with any mode button or lever, for 5 seconds
- Short, long, or double jack command dependent on configuration
 - This works independent of the SYSTEM LOCK setting



If the system is shut down via System Lock, there are two ways to unlock the system at the next power on:

- Forward command from active input device for 5 seconds followed by a Reverse command for 5 seconds
- Left-right-left command from any head input device

With Attendant Control Installed

If an Attendant Control is installed on the system, it can be configured to allow powering off the system from only itself if it is the active input device. See the [Attendant Control section](#) for the parameter TURN OFF.

3.3 STOPPING

There are multiple ways to stop the system from driving.

3.3.1 Decel Stop

Reducing the drive command to neutral on the active input device is the standard method of stopping. The system reduces speed to zero with the programmed deceleration rates configured for the active drive profile. The drive parameters can be found in the [User Drive Profiles section](#).

The On/Off Jack, Mode Jack, Enhanced Display and SCIM 9-pin D-sub (D-SUB MODE E-STOP) can be configured to perform a Decel Stop if the switch is pressed while driving. The jack switches will still work as configured when the system is not moving.

3.3.2 Quick Stop

A quick stop is initiated by moving the joystick in the opposite direction for more than 50% of the active range. The quick stop is a multiplied factor to the deceleration rate used, and can be configured for forward and reverse direction.

Example: (FWD MAX DECEL 20%) * (DRIVE QUICK STOP FWD FACTOR 2.0) = Quick Stop Fwd Decel 40%

The On/Off Jack, Mode Jack, Enhanced Display and SCIM 9-pin D-sub (D-SUB MODE E-STOP) can be configured to perform a Quick Stop if the switch is pressed while driving. The jack switches will still work as configured when the system is not moving.

See the [System section](#) for Quick Stop parameters.

3.3.3 Emergency Stop

The emergency stop will occur if the system is powered off while driving, or in case of specific system hardware or software errors. The DRIVE EMERGENCY STOP parameter can be set from 50-100%, which represents a range of 2.0 – 4.0 m/s²

An emergency stop will take place as a result of:

- Timeout of joystick data
- DMS supervision
- Battery overvoltage
- Charger connected
- Brake disconnected
- Brake shorted
- Motor shorted
- Bus overload
- Heatsink over temperature

3.3.4 Park Brake Stop

The park brake stop is the most drastic; the motor outputs turn off immediately and the brakes are engaged. There are no parameters associated with this type of stop. It is seen only in case of serious hardware or software errors.

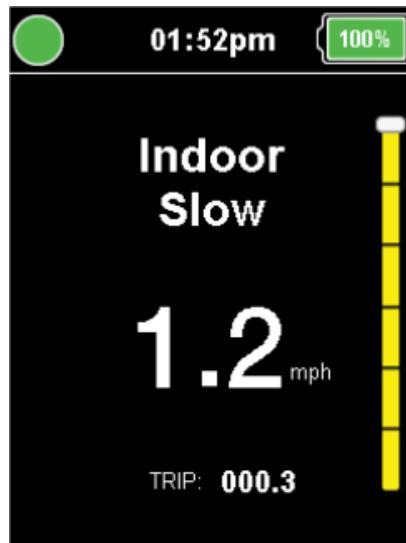
3.4 CONFIGURABLE PROFILES

Each input device has its own dedicated profile setup for up to six programmable profiles, except the Attendant Control which only allows four. The profile options are four programmable drive profiles, a seat profile, and an auxiliary profile. Since the AC allows four profiles total, only two drive profiles are possible. The profiles can be programmed in any order for all input devices, or disabled.

No matter which profile is active, the top of the display always shows drive status and battery percentage.

3.4.1 Drive

The drive screen shows information including speed, odometer, and speed knob indication (if not disabled). If the SPEED KNOB TYPE is disabled then there is no visual indication of speed adjustment, and the max configured drive profile parameters are used (FWD MAX SPEED, FWD MAX ACCEL, etc.). It is still possible to adjust speed if USER SPEED ADJUST is enabled. It can be adjusted from the Auxiliary Menu.



If an Attendant Control is operating the system, the drive screen shows a different graphic with only profile indication, but not speed.



Drive Profile Configuration

Each drive profile can be independently configured per input device. For example, HC Drive Profile 1 can be configured separately from SAJ Drive Profile 1. Drive configuration includes speed, accel, decel, power, and latch settings.

For more detailed information on drive related parameters, see the [User Drive Profiles section](#).

A. Drive Restrictions

The enAble X1 system can reduce or lockout driving due to iLevel mode, seat position, rescue drive, or while the system is charging. The drive status is indicated in the top left of the display.



DRIVE READY

The system has no drive restriction.



DRIVE REDUCTION

Drive speed is reduced due to seat position (reduction based on active drive profile), or certain system faults (Rescue Drive settings used).



iLEVEL MODE

Drive speed is reduced since the seat is in iLevel mode (iLevel Drive settings used).



DRIVE LOCKOUT

The system will not drive due to seat position, if the system is charging, or Mapped I/O configured to Drive Lockout.



MANDATORY! Using the latest available correct seat preset automatically configures drive restrictions to ensure safe system operation.

B. iLevel Drive

iLevel Drive is a configurable drive profile which is enabled based on Seat Configuration restrictions. It is separate from the standard drive profiles by input device. All iLevel seat presets in the Seat Configuration enable iLevel depending on an elevate and suspension lock switch.

When iLevel is active, the system compares the active drive profile with the iLevel Drive profile. If the active drive profile setting is lower than the iLevel Drive profile setting, then the active drive profile setting is used.

If the suspension lock does not engage or the signal is faulted, a standard elevate drive reduction is used.

See the [System section](#) for parameters related to iLevel Drive, and the [Restrictions section](#) for configuring conditions to activate iLevel Drive.

C. Rescue Drive

Rescue Drive is a configurable drive profile, which is automatically enabled based on certain system faults. This includes MODE JACK SUPERVISION and ON / OFF JACK SUPERVISION, depending on how they are configured.

When Rescue Drive is active, the system compares the active drive profile with the Rescue Drive profile. If the active drive profile setting is lower than the Rescue Drive profile setting, then the active drive profile setting is used.

See the [System section](#) for parameters related to Rescue Drive.

3.4.2 Seat

Standard

The standard seat screen shows a seat graphic with directional arrows. The actuator(s) of the seat to be controlled are highlighted. When an actuator is moving, the corresponding arrow will have a highlighted animation indicating the direction of movement. To operate the seat, a forward or reverse command is needed from the active input device. To navigate the different configured seat functions, a left or right command is required from the active input device. By default, SEAT NAVIGATION is standard.

NOTE: Standard seat operation is different for a head array input device, as only the left and right

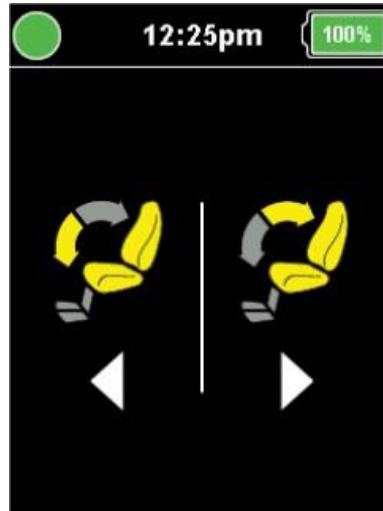


inputs are used. See the [Switch section](#) for more information.

Advanced

The advanced seat screen shows the same seat graphic side by side, with left and right arrows indicating direction of movement. To operate the seat, a left or right command is needed from the active input device. To navigate the different configured seat functions, a mode command is required. SEAT NAVIGATION must be programmed to advanced.

NOTE: It is not required to be in a seat screen to operate a seat function. It is possible to operate a



seat function through the iAccess, Mapped I/O, or the Auxiliary menu per configuration. If the iAccess or Mapped I/O is used, the system can be configured to operate the seat while driving (SEAT ENABLE WHILE DRIVING).

See the [Seat section](#) and [Seat Configuration section](#) for all parameters related to seating.

A. Seat Restrictions

The enAble X1 system can restrict seat functions based on switch condition and inclinometer feedback. Seat restrictions can be setup to stop movement in either or both directions.



MANDATORY! Using the latest available correct seat preset automatically configures seat and actuator restrictions to ensure safe system operation.

3.4.3 Auxiliary

The auxiliary screen provides list menu navigation for many different system features. Not all are enabled by default, and must be configured. A complete listing of Auxiliary menu items are described below.



Change Input Device

This list item is shown if more than one input device is configured and SHOW CHANGE INPUTDEVICE is enabled.

It allows the user to change the active input device without power cycling the system.

ECON / Interactive Assist

This list item is always shown.

It enables and disables Bluetooth for programming and Interactive Assist access.

NOTE: This does not need to be enabled to use other Bluetooth features like Mouse, or Assistive Switch Control.

Bluetooth Operation

This list item is shown if one or more Bluetooth profiles are configured.

It allows the user to use the active input device as a computer mouse, or with Assistive Switch Control on Apple Devices.

See the [Bluetooth Capabilities section](#) for more information.

IR

This list item is shown if IR is enabled, and one IR code is learned or IR Learn Mode is enabled.

It allows the user to learn and use IR codes.

See the [Infrared Setup section](#) for information on learning and using the systems IR feature.

Sleep Power Mode

This list item is shown if SLEEP POWER MODE is enabled.

It allows the user to put the system to sleep, without waiting for the configured SLEEP TIMEOUT to expire.

User Functions

This list item is shown if SHOW IN AUX is selected for one or more actuators in the Seat Configurator.

It allows the user to control seat and actuator functions.

ECM

This list item is shown if ECM ENABLED is enabled and at least one ECM Function is configured.

It allows the user to enable/disable, or toggle any of the configured functions.

Light

This list item is shown if a Light Module or Light and Actuator Module is part of the system.

It allows the user to turn on/off any equipped lights.

Reminder

This list item is shown if:

- USER REMINDER ACCESS is enabled, Reminders Enable in system settings is enabled, and User Reminder X TYPE is not disabled

OR

- USER REMINDER ACCESS is disabled and User Reminder X TYPE is not disabled

It allows the user to configure reminders through the system, without needing programming access.

Photo Album

This list item is shown if PHOTO ALBUM is enabled and at least one picture is downloaded to the system from a programming device.

It allows the user to navigate and view photos on the HC or ED.

Settings

This list item is shown if SETTINGS is enabled.

It allows the user to adjust Sound, Display, access Bluetooth Operation, Speed Adjust, and toggle IR Learn Mode and Charging Detection.

System Functions

This list item is shown if one or more System Functions are available.

It allows the user to toggle Latch Driving (LATCH DRIVING VISIBILITY), System Lock (SYSTEM LOCK), and Power Off commands (1-SWITCH SCANNER ENABLE, 1-SWITCH POWER OFF).

System Information

This list item is always shown independent of configuration.

It shows important information pertaining to the Provider, module software versions, and FCC information.

Horn

This list item is shown if the active input device does not have a horn button, or HORN BUTTON is disabled.

It can be toggled on and off.

3.5 HOME SCREEN AND MENU NAVIGATION

Home Screen

The eX1 home screen allows quick access to drive, seat, settings, and environmental screens. They can be accessed by providing a forward, reverse, left, or right command respectively from the active input device. The requirements for the icons to appear on the home screen are:

- Drive – At least one profile in Profile Setup must be configured for Drive 1, 2, 3, or 4
- Seat – A seat configuration is downloaded to the system, and a seat module is part of the system
- Settings – SETTINGS is enabled
- Environmental – Bluetooth MOUSE or ASSISTIVE SWITCH CONTROL is enabled, or an IR configuration is downloaded and configured on the system



Shortcuts to access the Home screen are available from anywhere on the system:

- HC home button
- HC-L left or right indicator (long press)
- On/Off or Mode Jack Command configured as Home
- D-Sub (9-pin) Mode on ED or SCIM configured as Home

If Home is commanded while on the Home screen, the system will go to the last active screen.



WARNING! When accessing drive from the Home screen, the first configured drive profile in Profile Setup is always selected. All drive profiles can be configured at any speed, so the first drive profile may not be the slowest.

Startup Mode

By default, the home screen is shown when the system is powered on (USER ENTRY POINT).

Other possibilities for startup are:

- Last Used
- 1st Drive Profile
- 2nd Drive Profile
- 3rd Drive Profile
- 4th Drive Profile
- Input Device Selection
- Auxiliary
- Seat

NOTE: If USER ENTRY POINT is set to 3rd Drive Profile or 4th Drive Profile and the AC powers on the system, the home screen will be shown.

It can also be configured for the system to boot up to the Input Device Selection Screen (INPUT DEVICE SELECTION), where all configured input devices will appear. Once an input device is selected by performing INPUT DEVICE SELECTION DIRECTION with the preferred input device, then the configured USER ENTRY POINT screen is shown.

List Menu Navigation

Navigation in list menus (Settings, Auxiliary, ECM, etc.) is configurable to three different options with MENU NAVIGATION MODE for all input devices, except the Attendant Control. It can be configured individually per input device.

1. Manual: Menu commands are generated manually, and not repeated.
2. Auto Repeat: The first menu command is generated manually. Thereafter, moving from one menu item to the next is repeated as long as the input command is still active. The timing can be configured using MENU NAVIGATION TIMING.

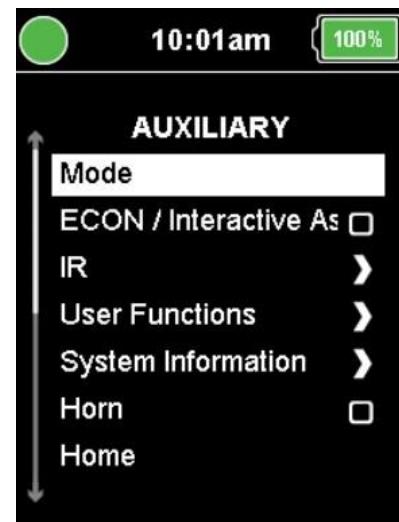
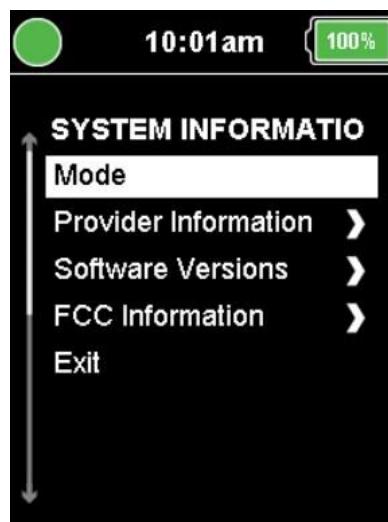
NOTE: Auto Repeat does not work with the ED's 4-directional keypad.

3. Auto Change: Menu commands are generated automatically without any input command. The timing can be configured using MENU NAVIGATION TIMING.

NOTE: If 3-Direction Proportional or 3-Direction Switched is the active input device, there will be no forward or reverse toggle arrows in list menus.

In seat screens: If SEAT NAVIGATION is set to standard, the seat functions will automatically cycle. If SEAT NAVIGATION is set to advanced, a mode command is required to cycle the available seat functions.

NOTE: If 1-Sw i t c h Scanner is the active input device, there will be no scanner in list menus and seat screens. In Auxiliary, Mode and Home will both be available within the list menu. In seat screens, the pre-defined scan order is Mode, Seat Function 1, Seat Function 2 ... Seat Function n, Home.



The List Navigation can also be configured to assign a specific navigation command for a valid input. See the [Parameters Setting section](#) for information on LIST NAVIGATION FORWARD INPUT, LIST NAVIGATION LEFT INPUT, LIST NAVIGATION REVERSE INPUT, and LIST NAVIGATION

RIGHT INPUT. These settings can be configured individually per input device.

NOTE: If MENU NAVIGATION MODE is set to Auto Change, only Select and Backup commands are active.

3.5.1 Mode Command

The mode command cycles through programmed profiles as defined in Profile Setup. There are multiple ways to generate a mode command:

- HC Side Lever (TOGGLE MODE)
- ED, SAJ, AC Mode button
- ED, SCIM D-sub Mode
- Jack Commands
- Input Device (DEVICE DOUBLE COMMAND)
- Mapped I/O

From the Home screen, a mode command navigates to the first configured drive profile.

Table 7 Profile Setup, Mode Example 1

	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6
Mode	Drive 1	Drive 2	Drive 3	Drive 4	Auxiliary	Seat

Example 1: A mode command from the Home screen navigates to Drive 1. Successive mode commands then navigate to Drive 2, Drive 3, Drive 4, Auxiliary, Seat, etc.

Table 8 Profile Setup, Mode Example 2

	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6
Mode	Auxiliary	Drive 2	Drive 3	Drive 4	Disabled	Seat

Example 2: A mode command from the Home screen navigates to Drive 2. Successive mode commands then navigate to Drive 3, Drive 4, Seat, Auxiliary, etc.



WARNING! When accessing drive from the Home screen, the first configured drive profile in Profile Setup is always selected. All drive profiles can be configured at any speed, so the first drive profile may not be the slowest.

Mode Types

There are other types of mode commands that can be configured through ED / SCIM D-Sub Mode, Jack Commands, and Mapped I/O Support.

- Mode Shortcut: Navigate to the next active profile type.

Table 9 Profile Setup, Mode Shortcut Example

	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6
Mode	Drive 1	Drive 2	Drive 3	Drive 4	Auxiliary	Seat

Example: A mode shortcut command from the Home screen navigates to Drive 1. Successive mode shortcut commands then navigate to Auxiliary, Seat, Drive 1, etc.

- Mode Next: Navigate to the next active profile. This is the same effect as a standard mode command.
- Mode Previous: Navigate to the previous active profile. Once the first configured drive profile is reached, it is not possible to go any further.

Profile Change Stop

A mode command can be possible while driving. If PROFILE CHANGE STOP DRIVE is enabled, a mode command always stops driving before the mode command is executed. If PROFILE CHANGE STOP DRIVE is disabled and the next profile is a drive profile, a mode command changes to the next drive profile without stopping unless the system is being switched to or from a latched drive profile. If the next profile is not a drive profile, a mode command will stop driving and the next profile will be selected.

3.5.2 Jack Command

Jack Configuration

Jack commands are highly customizable for both the Mode Jack and On/Off Jack. Each jack can be configured for 1 switch or 2 switch using MODE JACK SWITCH TYPE and ON / OFF JACK SWITCH TYPE.

The Mode Jack can be configured with MODE JACK CONFIGURATION TYPE to use Jack Configuration or Mapped I/O. The On/Off Jack can only be used with Jack Configuration.

Jack Switch Options / Timing allow for short, long, and double commands for each jack switch when using Jack Configuration (not available for Mapped I/O). The timings for long, and double commands are all configurable and can be taught by using a programming device. The short command is executed once the double command time has elapsed. This allows for up to three different commands per switch.

Jack Supervision

A warning can be displayed if a jack is disconnected by configuring MODE JACK SUPERVISION or ON / OFF JACK SUPERVISION.

By default, both supervisions are disabled.

- Stop: If a switch is disconnected while driving, the system comes to a stop and a warning is shown. No driving is allowed until the switch is reconnected.
- Rescue Mode: If a switch is disconnected while driving, the system enters rescue drive and a warning is shown. The system will remain in rescue drive until the switch is reconnected.
- Warning: If a switch is disconnected while driving, the system continues to drive normally and a warning is shown.





WARNING! For the Jack Supervision to work properly, the MODE JACK SWITCH TYPE and ON / OFF JACK SWITCH TYPE must be configured properly.

Jack E-Stop

The system can come to a stop while driving if MODE JACK E-STOP or ON / OFF E-STOP. By default, both E-Stops are off.

- Decel Stop: Activating the jack switch while driving will cause the system to come to a Decel Stop. See the [Decel Stop section](#) for more information on this type of stop.
- Quick Stop: Activating the jack switch while driving will cause the system to come to a Quick Stop. See the [Quick Stop section](#) for more information on this type of stop.

While the system is not driving, the jack switches will still perform their other configured function(s).

Jack Command Options

- Mode: Navigate to the next active profile.
- Mode Shortcut: Navigate to the next active profile type.
- Toggle: Change directional arrow (FWD / REV) in 3-direction driving context.
- Power Off: System powers off (for On / Off Jack Command only).
- Sleep: System enters Sleep Power Mode.
- Home: Navigate to the home screen.
- Inactive: No functionality.
- Enter Lock: Enter System Lock.
- Mapped I/O Options

See the [Mapped I/O section](#) for a full list of all Mapped I/O programming options.

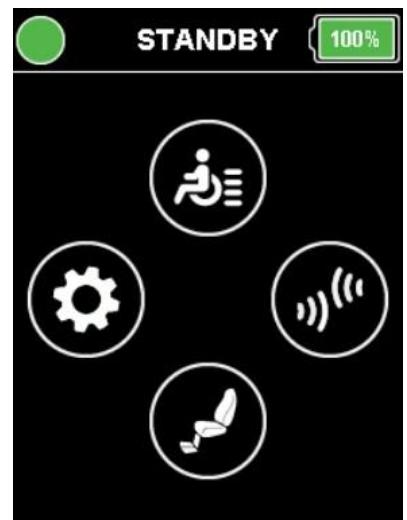
Infrared with Mode Jack

An IR transmitter can be used with the Hand Control configured by IR OVER MODE JACK 1. An IR receiver is already built-in to the Hand Control for learning.

NOTE: Curtis Instruments, Inc. do not design, develop, or manufacture an IR transmitter as mentioned above.

3.5.3 Standby Select

Standby Select allows for profile navigation without a mode command. The Standby Select screen is identical to the home screen. If STANDBY SELECT is enabled and no input command is given for STANDBY SELECT TIMEOUT while on the home screen or in a drive profile, the system will enter the Standby Select screen.



If the drive icon is selected from the Standby Select screen, a drive profile selection screen is shown. If one of the available drive profiles is not selected within STANDBY SELECT TIMEOUT, the system will return to the Standby Select screen.



To enter Standby Select from a Seat or Auxiliary profile, STANDBY SEAT TIMEOUT and STANDBY AUX TIMEOUT must be enabled. Otherwise, an alternative method to leave those profiles must be available.

Standby Select can be configured independently for each input device configured on the system.

3.6 INPUT CONFIGURATION

There are various configuration options for input types. The input signals for drive and seat profiles can be proportional, switch, or pressure controlled. In addition, 3-direction and latch settings are available for proportional and switch inputs. Latch settings are available for pressure control inputs.

There are corresponding drive profiles for different input device types. The User Drive Profiles used by the system depend on the active input device being used. See the [User Drive Profiles section](#) for a full listing.

Hand Control Profiles

HC INPUT CONFIGURATION set to Proportional, or 3-Direction Prop.

Switched Head Profiles

ED INPUT CONFIGURATION, SCIM INPUT CONFIGURATION set to 3-Switch Head, 4-Switch Head, 5-Switch Head, or 3-Dir. Prop. Head Switch Op.

Switched Profiles

HC INPUT CONFIGURATION set to Switch Operation, or 3-Direction Switch Op.

ED INPUT CONFIGURATION / SCIM INPUT CONFIGURATION set to Proportional Switch Op., 3-Direction Prop. Switch Op., 2-Switch, 3-Switch, 4-Switch, or 5-Switch

SAJ INPUT CONFIGURATION set to Switch Operation, or 3-Direction Switch Op. 1-SWITCH SCANNER ENABLE set to Enabled

Mini Proportional Input Profiles

ED INPUT CONFIGURATION / SCIM INPUT CONFIGURATION set to Mini Proportional, or 3-Direction Mini Proportional

Proportional Input

ED INPUT CONFIGURATION / SCIM INPUT CONFIGURATION set to Proportional, or 3-Direction Proportional

Proportional Head Profiles

ED INPUT CONFIGURATION / SCIM INPUT CONFIGURATION set to 3-Direction Prop. Head

Sip N Puff Profiles

SNP INPUT CONFIGURATION set to 2 Pressure, or 4 Pressure

Attendant Control Profiles

Attendant Control input is not adjustable, proportional operation only

Secondary Adaptive Joystick Profiles

SAJ INPUT CONFIGURATION set to Proportional, or 3-Direction Prop.

3.6.1 Proportional

A proportional input is an analog signal, and gives full control of the system when operating in drive and seat profiles since the input is measured in a range of 0 – 100%. The drive and seat speed can be varied with amount of deflection of a joystick, or amount of pressure on a proportional head device.

Proportional Joystick

A joystick is a common proportional input. Joystick Setup parameters can be adjusted like CENTER DEADBAND, TREMOR SUPPRESSION, THROW, and ASSIGNED DIRECTION in order to achieve the desired control. For a third party proportional device, a calibration of the device may be necessary. If AUTO CENTER ADJUST is Enabled, then the system will automatically detect center and allow safe usage without a proper calibration.

By default:

- A forward command occurs by deflecting the joystick forward (up), past CENTER DEADBAND.
- A reverse command occurs by deflecting the joystick backward (down), past CENTER DEADBAND.
- A right command occurs by deflecting the joystick right, past CENTER DEADBAND.
- A left command occurs by deflecting the joystick left past, CENTER DEADBAND.

See the [Hand Control section](#) and [Enhanced Display section](#) for more detailed information related to these parameters.

3.6.2 Switch

A switch input is a digital signal, which is either on or off. In a drive or seat profile, the system will begin to achieve the max speed with an active input using that drive profile / actuator acceleration rate.

Additional driving parameters can be adjusted while operating in switched, for combined switched commands (e.g. turning left while driving forward). These parameters are SWITCHED TURN DRIVE 1, 2, 3, 4, and SWITCHED TURN TIME. See the [System section](#) for more information on these parameters.

Proportional Joystick Switch Operation

The Hand Control or a third-party proportional input joystick can be programmed for Switch Operation. When the joystick is deflected past 50% input, a command will be generated. The input command remains active until the joystick is moved below 30%. Because the Joystick Setup CENTER DEADBAND and THROW parameters are still relevant, 50% joystick deflection may not be 50% input command.

For example, consider CENTER DEADBAND 10% and FORWARD THROW 30%. Only 20% forward joystick deflection would be needed to achieve a 50% input command.

Table 10 Joystick Deflection vs. Input Command vs. System Output

Joystick Deflection	Input Command	System Output
0	0	0
5	0	0
10	0	0
15	25	0
20	50	100
25	75	100
30	100	100

By default:

- A forward command occurs by deflecting the joystick forward (up), past 50% input.
- A reverse command occurs by deflecting the joystick backward (down), past 50% input.
- A right command occurs by deflecting the joystick right, past 50% input.
- A left command occurs by deflecting the joystick left, past 50% input.

See the [Hand Control section](#) and [Enhanced Display section](#) for more detailed information related to these parameters.

Switch Devices

Third party switch devices can be used via the D-Sub connector, with different switch input configurations.

Head Switch Seat Operation and Total Back Angle Head Control

Operating the seat with a head device is different for standard seat operation.

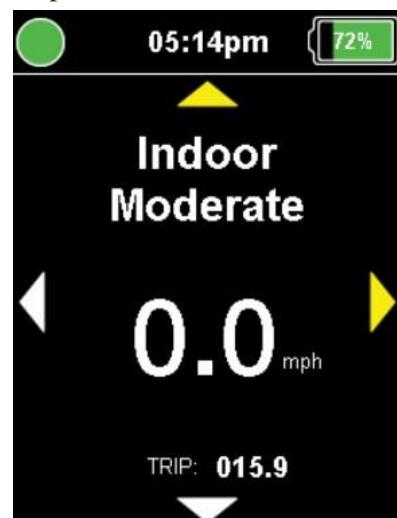
To change the seat function, provide a short left command.

To toggle the seat direction arrow, provide a short right command.

To actuate the seat function in the highlighted direction, provide a long right command.

NOTE: If SEAT HEAD LEFT / RIGHT SWAP is set to Yes, the left and right commands above are swapped.

The main difference with a head device is that the back switch needs to be deactivated if the chair gets tilted too far back. When the TOTAL BACK ANGLE HEAD CONTROL is met and a head device is active (3-Switch Head, 4-Switch Head, 5-Switch Head), the back switch becomes disabled, so driving



and menu navigation operation changes. A left and right direction arrow then becomes available, in addition to the forward and reverse direction arrow.

When TOTAL BACK ANGLE HEAD CONTROL is met:

To toggle the forward and reverse direction arrow, provide a short right command.

To toggle the left and right direction arrow, provide a short left command.

A forward command occurs from a long right switch activation, while the forward direction arrow is highlighted.

A reverse command occurs from a long right switch activation, while the reverse direction arrow is highlighted.

A right command occurs from a long left switch activation, while the right direction arrow is highlighted.

A left command occurs from a long left switch activation, while the left direction arrow is highlighted.

In a confirm screen where only two options are available, a left switch toggles options and right switch selects the highlighted option.

Normal 3-Switch Head, 4-Switch Head, or 5-Switch Head operation resumes when the measured angle is less than the TOTAL BACK ANGLE HEAD CONTROL.

A. 1-Switch Scanner

All system capabilities are available with a single switch (Mode). The switch must be connected to the Mode Jack, On/Off Jack, or D-Sub Mode (pin 6) to use 1-Switch Scanner. While 1-Switch Scanner is the active input device, the following is true:

- D-Sub Mode (pin 6) is defaulted to operate the 1-Switch Scanner, and the configuration of D-Sub Mode (pin 6) is disregarded
- The Mode Jack is defaulted to operate the 1-Switch Scanner. MODE JACK SWITCH TYPE is treated as 1 Switch. If MODE JACK CONFIGURATION TYPE is set to Mapped I/O, the Mapped I/O configuration is still active.
- The On/Off Jack is defaulted to switch the system on and operate the 1-Switch Scanner. ON / OFF JACK SWITCH TYPE is treated as 1 Switch, and Jack configurations are disregarded
- HC Key I, Key II, and Home shortcuts are inactive
- ED Mode Button and 4-Directional Keypad are active

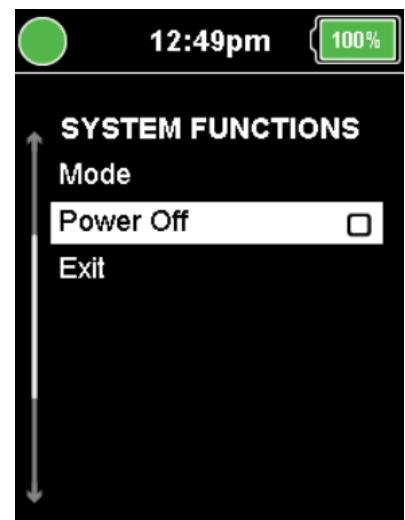
1-SWITCH POWER ON / OFF

The system can be powered on with 1-Switch Scanner if it is connected to the On / Off Jack.

NOTE: If INPUT DEVICE SELECTION is set to Input Device Selection Screen, 1-Switch Scanner cannot be activated directly from power on.

To power off with 1-Switch Scanner, 1-SWITCH POWER OFF must be Enabled. Then select Power Off by navigating to the Auxiliary – System Functions menu on the system.

See the [Powering On/Off section](#) for alternative methods of powering the system.



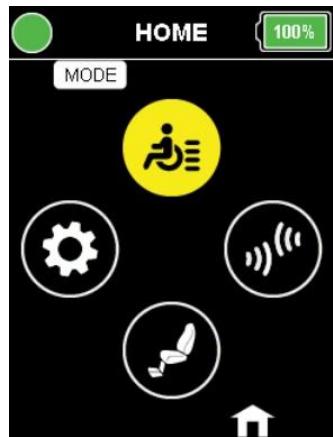
1-SWITCH OPERATION

When 1-Switch Scanner is active, available menu choices are cycled continuously on the display. SCAN RATE determines how fast the scanner will cycle the different options.

Home:

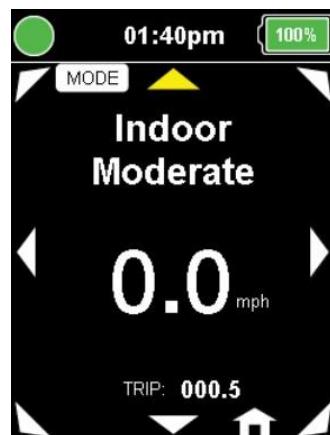
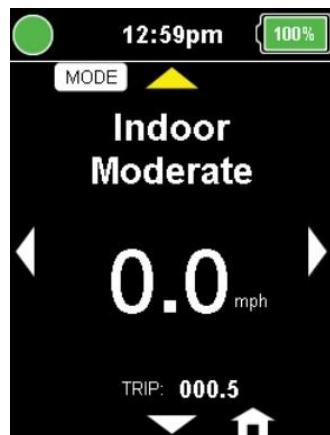
On the Home screen, the scanner highlights the available profiles, Mode, and Home options.

NOTE: If MODE SCAN OPTION is Off, the Mode option is no longer available in any screen. An alternative Mode method must be available for standard operation.



Drive:

In a Drive profile, arrows are highlighted to select direction of drive. Mode and Home options are still available. 4 Direction and 8 Direction options are programmable per drive profile.



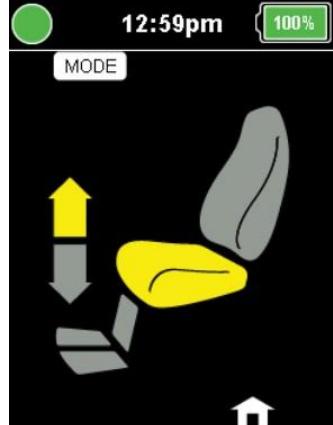
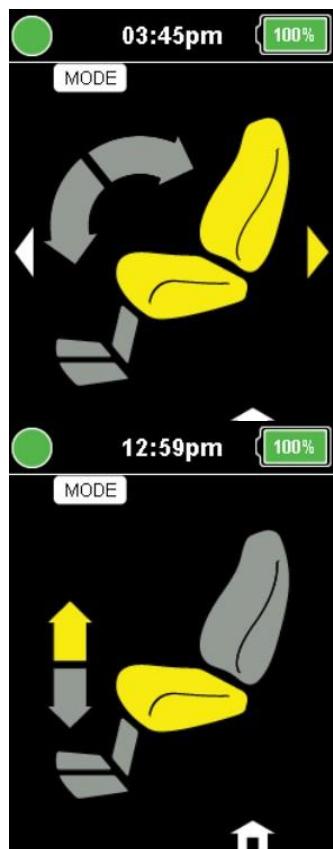
Seat:

If MENU NAVIGATION MODE is Manual or Auto Repeat, left and right arrows will highlight to navigate different available seat functions. The seat arrows will highlight to operate the function in the highlighted direction.

If MENU NAVIGATION MODE is Auto Change, the available seat functions will cycle automatically and a seat arrow is highlighted. To toggle direction, press the 1-Switch on the desired actuator and the opposite seat arrow will highlight. Another 1-Switch command will operate the seat in the new highlighted direction.

If a seat is running latched in the seat profile, scanning stops. Another 1-Switch command stops actuator movement, and scanning resumes.

NOTE: While 1-Switch Scanner is active and SEAT NAVIGATION is advanced, the system operates as if it is set to standard. If the active input device is changed from 1-Switch Scanner, advanced seat will then be active.



Auxiliary / Settings Menu:

In the Auxiliary and Settings menu, arrows are highlighted to select different menu entries. Mode and Home options are available.

NOTE: If MENU NAVIGATION MODE is Auto Change for 1-Switch Scanner, then the arrows do not appear. Mode and Home options become available within the Auxiliary list menu.

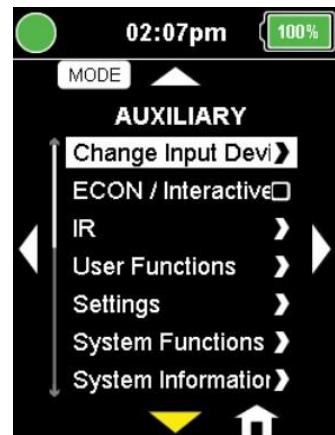
Scan Order

Each drive profile can have a preset or custom scan order. Up to two steps can be configured within one profile, so that two scan orders are possible by selecting the Step 2 option.

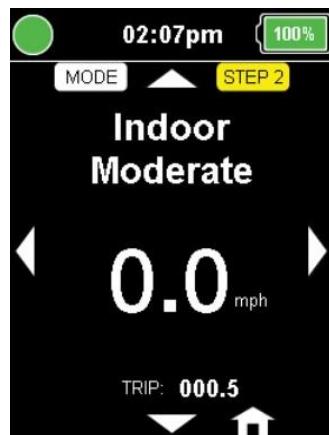
For example, consider the 2 Step 4 Direction Clockwise preset:

Table 11 1-Switch Scan Order Example

	Profile 2 Step 1	Profile 2 Step 2
Item 1	Forward	Reverse
Item 2	Right	Mode
Item 3	Left	Home
Item 4	Step 2	None
Item 5	None	None
Item 6	None	None
Item 7	None	None
Item 8	None	None
Item 9	None	None
Item 10	None	None



When drive profile 2 is selected, the Profile 2 Step 1 scan order will initiate. If Step 2 is selected, the Profile 2 Step 2 scan sequence will begin.



The preset scan order can be selected by configuring PROFILE 1 ASSIGN SCAN ORDER, PROFILE 2 ASSIGN SCAN ORDER, PROFILE 3 ASSIGN SCAN ORDER, and PROFILE 4 ASSIGN SCAN

ORDER. See the [1-Switch Scanner section](#) for a complete listing.

The Scan Order cannot be changed for all other profiles and operates in the clockwise direction (e.g. Home), or from left to right (e.g. Set Time function).

Configuration

There are other important parameters related to 1-Switch Scanner, like E-STOP FOR LATCH and 1-SWITCH TIMEOUT. See the [1-Switch Scanner section](#) for all relevant parameters in configuring 1-Switch operation.

B. 2-Switch

With 2-Switch control (Left, Right), a Mode button is optional. DEVICE DOUBLE COMMAND can be programmed Enable Left or Enable Right to perform a Mode operation.

A forward command occurs from a short right, then long right switch activation.

A reverse command occurs from a short left, then long left switch activation.

A right command occurs from a long right switch activation.

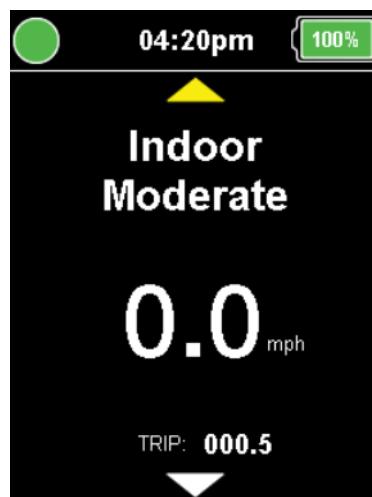
A left command occurs from a long left switch activation.

Any simultaneous switch combination while driving 2-Switch will lead to a drive inhibit, until both switches are released.

C. 3-Switch / 3-Switch Head

With 3-Switch control (Forward, Left, Right), a Mode button is optional. DEVICE DOUBLE COMMAND can be programmed Enable Left or Enable Right to perform a Mode operation.

Forward and reverse arrows are available on Home, Drive, and Auxiliary screens. To toggle the direction arrow, provide a short forward command.



A forward command occurs from a long forward switch activation, while the forward direction arrow is highlighted.

A reverse command occurs from a long forward switch activation, while the reverse direction arrow is highlighted.

A right command occurs from a right switch activation.

A left command occurs from a left switch activation.

A forward and right switch, or forward and left switch combination are possible while driving (e.g. to drive forward and turn right simultaneously). A left and right switch combination while driving will lead to a drive inhibit, until both switches are released.

3-Switch Head

A 3-Switch Head device has a slightly different configuration (Back, Left, Right), with a back switch replacing the forward switch on 3-Switch device.

See the beginning of the [Switch section](#), for operation with a head device when the TOTAL BACK ANGLE HEAD CONTROL is met.

D. 4-Switch / 4-Switch Head

With 4-Switch control (Forward, Reverse, Left, Right), a Mode button is optional. DEVICE DOUBLE COMMAND can be programmed Enable Left or Enable Right to perform a Mode operation.

A forward command occurs from a forward switch activation.

A reverse command occurs from a reverse switch activation.

A right command occurs from a right switch activation.

A left command occurs from a left switch activation.

A forward or reverse and right switch, or forward or reverse and left switch combination are possible while driving (e.g. to drive forward and turn right simultaneously). A left and right or forward and reverse switch combination while driving will lead to a drive inhibit, until all switches are released.

4-Switch Head

A 4-Switch Head device has the same operation as a 4-Switch device.

See the beginning of the [Switch section](#), for operation with a head device when the TOTAL BACK ANGLE HEAD CONTROL is met.

E. 5-Switch / 5-Switch Head

With 5-Switch control (Forward, Reverse, Left, Right, Mode), a Mode button is included. DEVICE DOUBLE COMMAND can still be programmed Enable Left or Enable Right to perform a Mode operation.

A forward command occurs from a forward switch activation.

A reverse command occurs from a reverse switch activation.

A right command occurs from a right switch activation.

A left command occurs from a left switch activation.

A mode command occurs from a mode switch activation.

A forward or reverse and right switch, or forward or reverse and left switch combination are possible while driving (e.g. to drive forward and turn right simultaneously). A left and right or forward and reverse switch combination while driving will lead to a drive inhibit, until all switches are released.

5-Switch Head

A 5-Switch Head device has the same operation as a 5-Switch device.

See the beginning of the [Switch section](#), for operation with a head device when the TOTAL BACK ANGLE HEAD CONTROL is met.

3.6.3 3-Direction

3-Direction operation can be proportional or switched, and is similar to 3-Switch operation. Reverse, Right, and Left inputs are used.

To toggle the direction arrow, provide a short reverse command.

A forward command occurs by deflecting the joystick backward (down), while the forward direction arrow is highlighted.

A reverse command occurs by deflecting the joystick backward (down), while the reverse direction arrow is highlighted.

A right command occurs by deflecting the joystick right.

A left command occurs by deflecting the joystick left.

A. Toggle Settings

3-Direction Arrow Toggle Settings are available to define the input to create a toggle or select command. It can also be customized in which profiles are the toggle arrows available. If toggling is disabled in any profile, another method of toggling is necessary (e.g. through Jack Commands).

The [Hand Control](#), [Secondary Adaptive Joystick](#), [Enhanced Display](#) and [SCIM sections](#) have all parameter descriptions regarding 3-Direction Arrow Toggle Settings.

3.6.4 2 Pressure / 4 Pressure

The Sip N Puff module allows inputs to the system through a straw, by sipping and puffing. When the Sip N Puff is being used, a pressure gauge is shown on the left of the display.

The two input configurations are detailed below.

2 Pressure

Inputs are made with a continuous sip or puff, and a short then continuous sip or puff. The forward, reverse, right, and left direction assignment can be customized. By default:

A forward command occurs from a short, then continuous puff.

A reverse command occurs from a short, then continuous sip.

A right command occurs from a continuous puff.

A left command occurs from a continuous sip.



4 Pressure

Inputs are made with a soft sip, soft puff, hard sip, or hard puff. The forward, reverse, right, and left direction assignment can be customized. By default:

A forward command occurs from a hard puff.

A reverse command occurs from a hard sip.

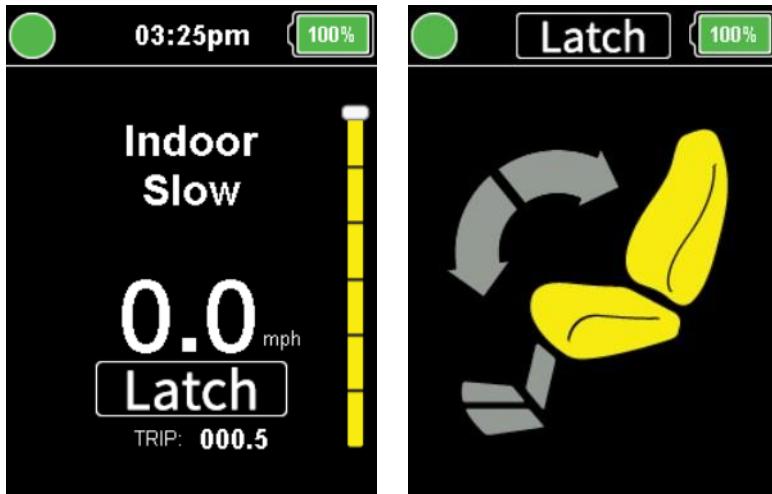
A right command occurs from a soft puff.

A left command occurs from a soft sip.

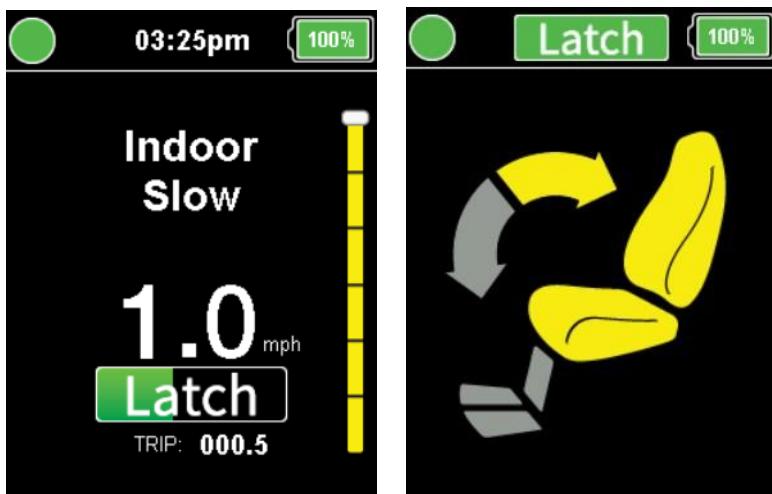
A Quick Setup function is available with a programming device to quickly configure sip and puff pressure levels. See the [Sip N Puff section](#) for all related parameters to Pressure Fine Adjustment and Pressure Direction Assignment.

3.6.5 Latched

Latching is a feature that allows drive and seat operation for LATCH TIMEOUT period, without keeping the original input active. A latch indication is shown on the display when it is programmed for a drive profile or seat function. When latch is inactive, the indication bar is empty.



When latch is active, the indication bar is green and slowly depletes until the latch time is expired.



While a drive or seat function is latched, there are two simple ways to stop the latch before the LATCH TIMEOUT expires:

- A mode command will stop the latch and the system will navigate to the next profile.
- A command in the opposite direction of travel will stop the latch, and stay on the current profile (e.g. driving forward latch, provide a reverse command to stop).

While drive is latched, a direction command (right or left) will refresh the latch to LATCH TIMEOUT.

NOTE: If LATCH TIMEOUT DISABLE is set to Yes, the drive or seat operation will not stop while latched unless a stop command is given.

MANDATORY! LATCH TIMEOUT DISABLE should not be set to Yes for normal operation.

WARNING! Do not enable any latch mode if the mode switch is not easily accessible for the user to stop the chair in any situation. An emergency stop method is highly recommended for any latch setting.



There are three different types of latch for drive operation, detailed in the sections below.

See the [User Drive Profiles section](#) for drive latch settings, and the [Seat section](#) for seat latch settings.

A. Cruise

Cruise can be configured for drive LATCH FORWARD. Speed continuously ramps up while the forward command is active, and will maintain the speed achieved when the forward command is released.

B. 3-Step

3-Step can be configured for drive LATCH FORWARD. Speed increases by one step (33.3% of the configured drive profile) with each forward command over 50%, to a total of three steps.

C. 1-Step

1-Step can be configured for drive LATCH FORWARD and LATCH REVERSE. Speed increases to max drive profile setting with one forward or reverse command over 50%.

D. Speed / Step Reduce

When stopping or slowing a latch drive, there are three options for LATCH DECEL / BRAKING: Decel Stop, Quick Stop, or Speed / Step Reduce. Below states the behavior if Speed / Step Reduce is selected, for the various latch driving methods.

Cruise

Speed continuously ramps down while the reverse command is active, and will maintain the speed achieved when the reverse command is released.

3-Step

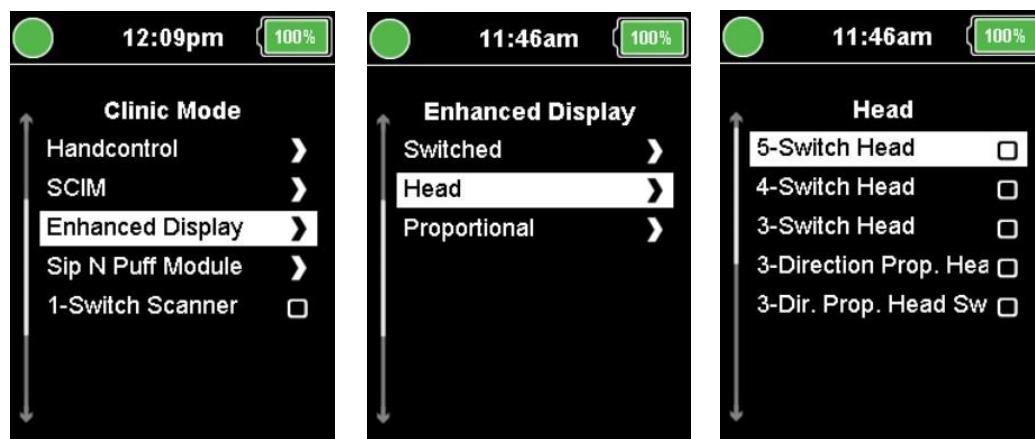
Speed decreases by one step (33.3% of the configured drive profile) with each reverse command over 50%.

1-Step

Speed decreases to zero with one forward or reverse command over 50%.

3.6.6 Clinic Mode

Clinic Mode offers all input configurations as a selection at startup. It is intended to quickly configure and test different devices without several programming changes. To access this menu, CLINIC MODE must be enabled and a long power on command must be made. To navigate clinic mode menu, the ED 4-directional keypad, HC or SAJ joystick can be used. The AC cannot access or navigate clinic mode. The example below shows 5-Switch Head being configured for the ED.



When an input is selected, the Input Configuration for that module is changed in the system configuration. All other input device programming like Device Options / Timing, and Switch Options / Timing remain the same.

3.7 CONFIGURATION MANAGEMENT

The Logical Master stores the system configuration internally and is the primary display. It is used in case a module in the system needs to be replaced, the configuration will automatically transfer to the newly installed module. If an Enhanced Display is part of a system (with or without a Hand Control), that is the Logical Master. If there is no Enhanced Display then the Hand Control would be the Logical Master. A microSD card is recommended for firmware updates, Bluetooth, and IR – but is not necessary for configuration management. The microSD card must be installed in the Logical Master.

3.7.1 Backup and Restore Process

Backup

A Parameter Backup occurs when the system is powering off, if the configuration has been changed. While the configuration is stored in the Logical Master, the backup saves a copy to the Powerbase.

Restore

A Parameter Restore occurs when the system is powering on, if a different Powerbase or Logical Master module is installed. If the Powerbase has a backup configuration, the Parameter Restore will use that. The next power off initiates a Parameter Backup, to ensure the configuration is the same in both the Powerbase and Logical Master.

If the Powerbase has no backup, a Parameter Restore will not occur. Instead, on the next power off the Logical Master will backup its configuration to the Powerbase.



3.7.2 Erasing Powerbase Backup

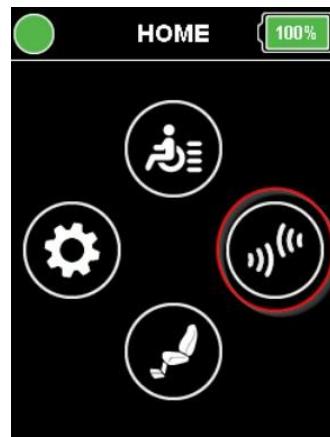
The Powerbase backup can be erased with the ERASE POWERBASE BACKUP function, using any programming device. If this function is used, the first power off of the system will not execute a parameter backup. A Powerbase without a backup can be installed on any system, without overwriting the new system's configuration.

3.8 BLUETOOTH CAPABILITIES

The enAble X1 system has advanced Bluetooth functionality to act as a mouse, gaming joystick, or Assistive Switch Control with Apple iOS devices. For the below sections, it is assumed that MOUSE, JOYSTICK, and ASSISTIVE SWITCH CONTROL is enabled in programming. Otherwise, these Bluetooth connections are not possible.

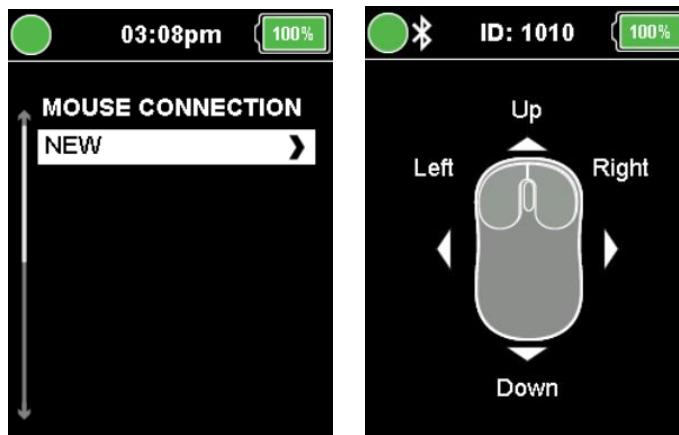
3.8.1 Pairing

To initiate pairing for mouse, joystick, or assistive switch control, navigate to the Bluetooth Operation menu from the Auxiliary menu or access the shortcut from the home screen.



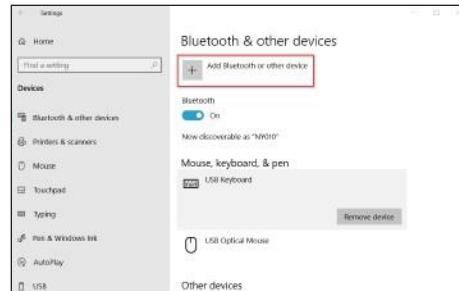
Select the desired connection type, then new.

Mouse and Joystick pairing

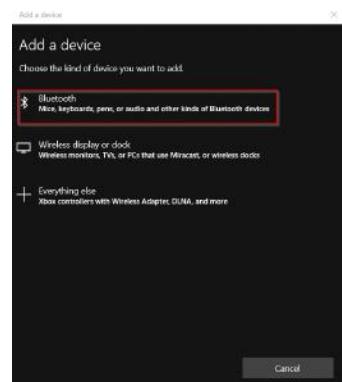


Notice the Bluetooth ID on the system display, the example above for mouse shows ID: 1010.

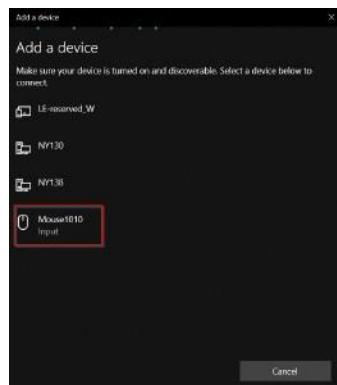
The pairing shown below uses Windows 10 Version 1809 as an example. From the Windows 10 device, navigate to Settings -> Devices -> Bluetooth & other devices. Click “Add Bluetooth or other device.”



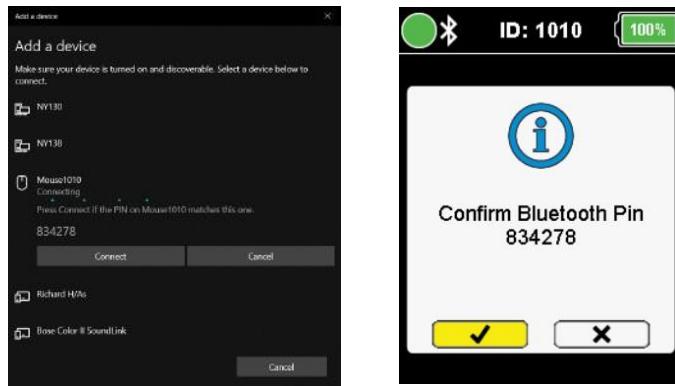
Click “Bluetooth.”



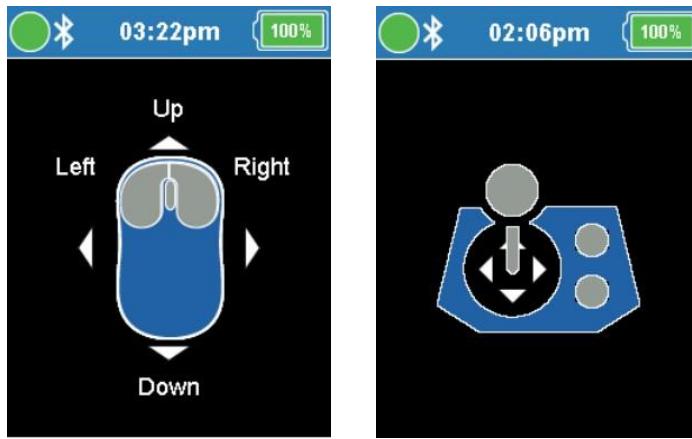
Click "Mouse#####" or "Joystick####."



A pairing screen will be shown on both enEnable X1 display and the Windows 10 device. Make sure the Bluetooth Pin matches on both, before accepting.



Once the connection has been established, the system is now capable of controlling the connected Windows 10 device or playing a game. The connection status is indicated by the top bar on the display, blue is active.



See the [Mouse and Joystick section](#) for more info.

Assistive Switch Control Pairing

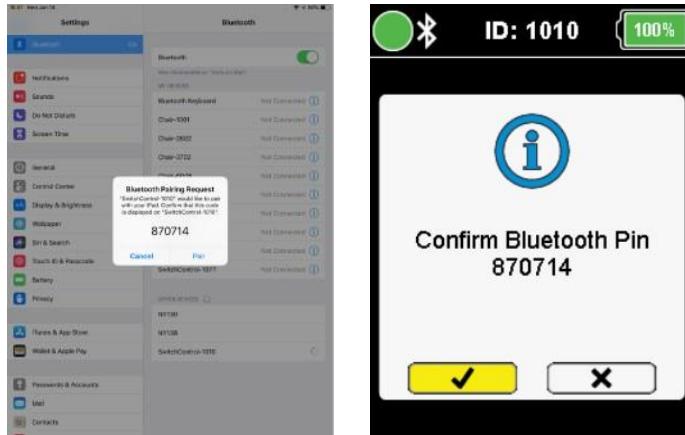


Notice the Bluetooth ID on the system display, the example above shows ID: 1010.

The assistive switch control pairing shown below uses iOS 12 as an example. From the iOS device, navigate to Settings -> Bluetooth and click on “SwitchControl-####.”



A pairing screen will be shown on both enEnable X1 display and the compatible iOS device. Make sure the Bluetooth Pin matches on both, before accepting.



Once the connection has been established, the system is now capable of controlling the connected iOS device. The connection status is indicated by the top bar on the display, blue is active.



See the [Assistive Switch Control section](#) for more info.

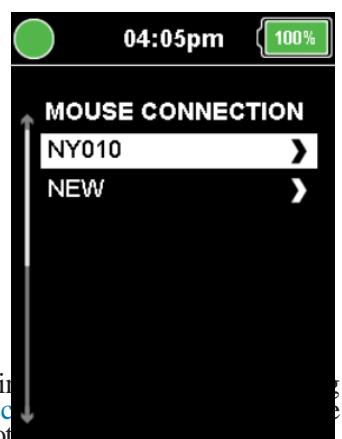
Store and Clear Bluetooth Connections

Once a Bluetooth connection has been established, the pairing is automatically stored for ease of re-connecting to the previous device. Up to eight connections can be stored for Mouse and Assistive Switch Control.

The saved connections can be deleted by using the CLEAR BLUETOOTH CONNECTIONS function from a programming device, or through the system menu itself (Settings – Bluetooth Operation – Delete Connections).

3.8.2 Mouse

There are two screens associated with the mouse. There are many different possibilities for navigating between the two screens and operating MOUSE CLICKS. All options are covered in detail, see the [Bluetooth section](#). Settings can be accessed on the system by navigating to Auxiliary - Bluetooth.



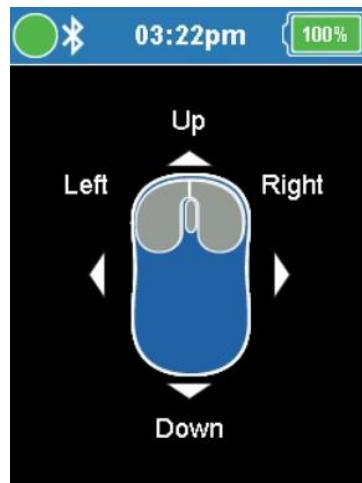
The Mouse can be used with any input device. For 3-direction control, the toggle arrows are shown. And 1-switch scanner, the scanner arrows are shown.

Compatible operating systems for the mouse are:

- Windows XP
- Windows Vista
- Windows 7
- Windows 8
- Windows 10
- Mac OS

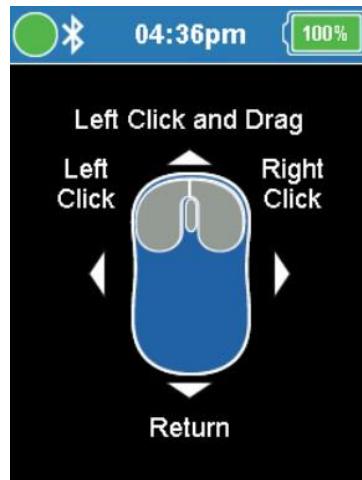
Mover

The active input or ED 4-Directional Keypad can be used to move the mouse on the connected device in any direction. A double right command on the ED 4-Directional Keypad switches to Mouse Clicks screen.



Clicks

The active input or ED 4-Directional Keypad can be used to click, or click and drag on the connected device. A double right command on the ED 4-Directional Keypad switches to Mouse Mover screen.



The iAccess or Mapped I/O can be programmed for mouse click shortcuts, so the input device would only need to move the mouse.

3.8.3 Assistive Switch Control

Once the connection is established between the eX1 system and a compatible iOS device, all programming is setup through iOS Settings. Navigate to General -> Accessibility -> Switch Control.



Up to eight switches can be configured (four short, and four long commands). The long command timing is configured in iOS settings.

For further information regarding Switch Control on iOS: <https://support.apple.com/en-us/HT201370>

3.8.4 Joystick

The Joystick profile allows the input device to become a game controller for PC applications. This feature can be utilized with 3rd party PC software to configure the joystick and two buttons as different inputs, depending on the game that is played.

The two buttons can be operated by Mapped I/O, iAccess, or push buttons on the Hand Control. See the [Bluetooth section](#) for programming options using the Joystick profile. Additionally, the Joystick Settings can be accessed on the system by navigating to Auxiliary - Bluetooth Operation - Joystick Settings.

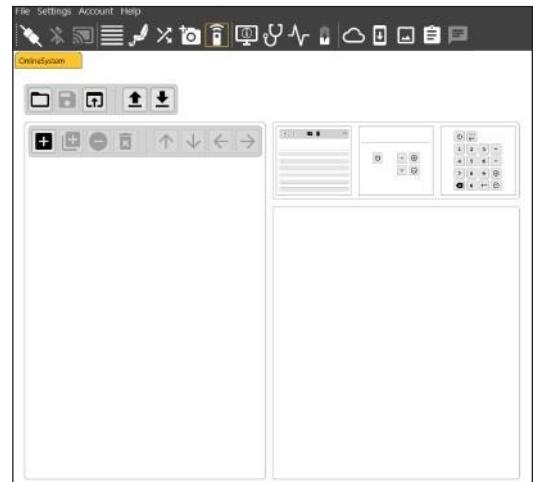
3.9 INFRARED SETUP

The enAble X1 system allows for IR capabilities fully integrated with the Enhanced Display. The Hand Control requires an external IR transmitting module connected to a stereo jack, for full operation. A microSD card must be installed in the Logical Master (Enhanced Display, or Hand Control if no ED is available) to save an IR configuration to the system.

Creating an IR Project

Before using IR, a template must be built using an ECON programming device. ECON-W will be shown below. See the [Connection Options section](#) in the Programmers appendix on how to establish a connection between the system and an ECON programming device.

Once connected, navigate to the Infrared Remote Control icon on the top toolbar.



By hovering over the available icons on the IR page, each icon action is explained. To create a new template, choose Add new menu entry. The menu entry can be named, and one of the three available templates can be chosen. Sub-menus can also be added with Add new submenu entry.

6-Buttons Template: Custom text can be added to the template, and additional pages can be added.

Function Remote Template: A simplified remote with power, channel, and volume icons.

Remote Template: An advanced remote with additional icons compared to Function Remote. Number, send directly, delete, and enter keys are available.

The Remote template is shown below.



When customization is finished, Save IR Project to device downloads the project to the current connected system. The system must be power cycled to load the new menus.

Save IR Project saves the project in a format recognized by enEnable X1 (.xrp) or enEnable 50 (.irm) so it can easily be transferred to other systems using Open IR Project or Import IR Project.

NOTE: An IR project from enEnable 50 can be opened or imported to an enEnable X1 system.

IR Screen Navigation

Menu navigation can be customized in programming specific to the IR menu. See the [Infrared section](#) for relevant parameters. By default:

Forward Input: Select

Reverse Input Scroll

Down Left Input: Scroll

Left Right Input: Scroll

Right Send

Simultaneously

The Send Simultaneously icon is only available on the Remote Template, and gives the option to send

up to four IR commands at once.



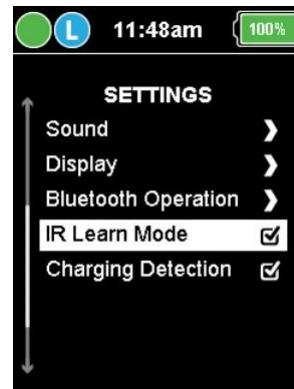
Highlight and select the Send Simultaneously icon (blue when selected), then select up to 4 IR commands.



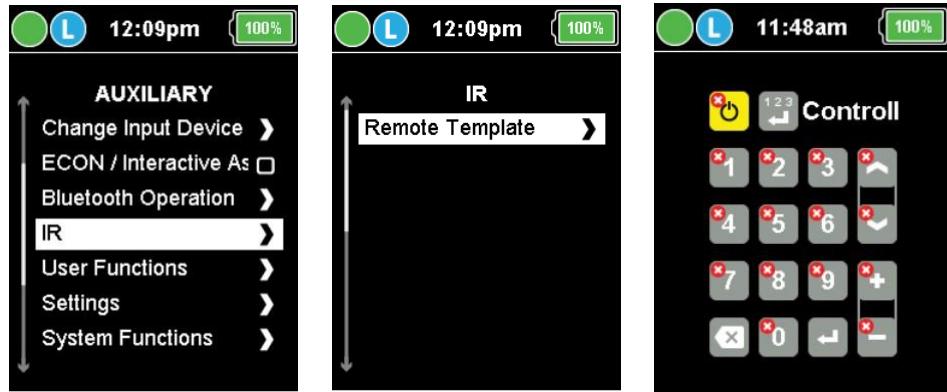
The above example shows Send Simultaneously is selected. On the top bar, IR commands 1, 2, and 3 are selected from the remote. To send the commands at once, use the enter icon. To delete a command, select the backspace icon.

3.9.1 Learning IR Codes

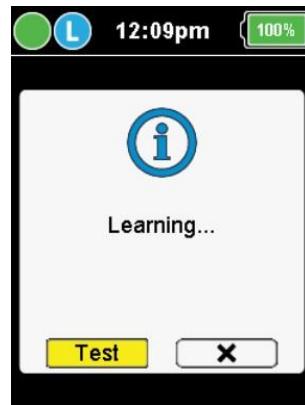
With an IR project saved to the system, it is ready to learn IR codes. Navigate to the enAble X1 Settings menu and enable IR Learn Mode. An icon in the top left indicates IR Learn Mode is active.



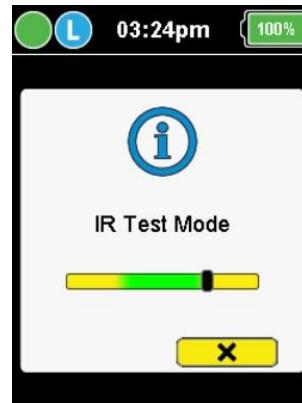
The IR menu structure is now available from the Auxiliary menu, and the configured project can now be accessed.



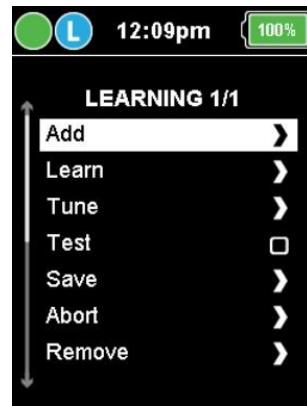
Make a select command on the desired icon to teach a code. Icons with a “red x” indicate that no IR code is learned. The IR receiver is on the top of the Enhanced Display and Hand Control. Point the IR remote towards the built-in receiver from a distance of 4-8 inches, and press the desired command.



By selecting the Test option in the screenshot above, press the desired command from the remote device to determine if the aim and distance is sufficient for learning codes. The cursor should appear somewhere in the green section. An IR code cannot be learned while in test mode.



Once the command is learned, a new list menu appears.



Add: Learn an additional IR command for the selected icon. The indication will show how many codes are learned.

Learn: Learn a command. This replaces the currently selected IR code if multiple codes are learned.

Tune: Frequency, Repetition, and Pause can be tuned. A right command changes the tuning step size, forward/reverse commands increment/decrement by step size value, and left command exits the menu.

The frequency is the IR Carrier Frequency learned, and can be adjusted.

Repetition sets how many times the learned IR command is repeated. A fixed number repeats the learned code the set amount of times with a short or long command. ‘N’ repeats as long as the input command is given.

Pause is the length of time between IR repetitions.

Test: Test the learned IR command.

Continue multi: If multiple codes are learned, this menu allows to tune, test, and save the learned commands.

Repeat All: Found in “Continue multi” menu. If enabled, all learned codes are repeated as long as the input command is given. The repetition of each individual code is still taken into account.

Next: Cycles to the next learned IR code when multiple codes are learned.

Save: Save the learned IR command.

Abort: Abort the current learn process. Any previously learned IR signal will still be stored.

Remove: Removes the current learned IR code. If multiple codes are learned, it deletes the currently selected code. Any previous learned IR signal will be cleared.

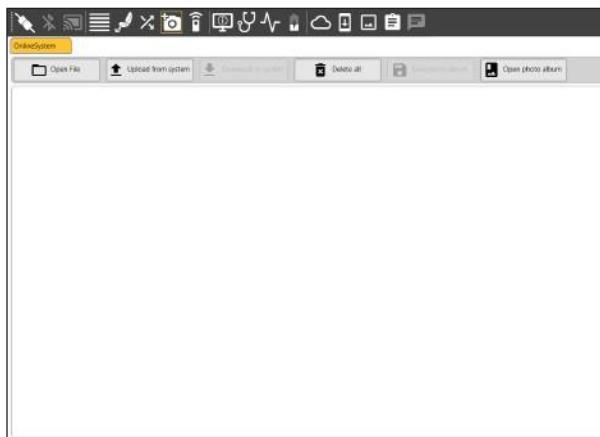
Always test, and then save the command to ensure it is properly learned. Once all learning is complete, disable IR Learn Mode in the Settings menu to start using the programmed codes. IR Enable must be selected in system Settings – Display to ensure the IR in the Auxiliary menu is available.

3.10 PHOTO ALBUM

Photos can be downloaded from a programming device to the enAble X1 system, for viewing on the display. A microSD card must be installed in the Logical Master (Enhanced Display, or Hand Control if no ED is available) to save a photo album to the system.

ECON-W will be shown below. See the [Connection Options section](#) in the Programmers appendix on how to establish a connection between the system and an ECON programming device.

Once connected, navigate to the Photo Album Manager icon on the top toolbar.



If there are already images loaded to the system, click Upload from system. Then, choose Open File to locate one or more images for the photo album. Finally, use Download to system to save the selected photos to the systems microSD card. A power cycle is required.

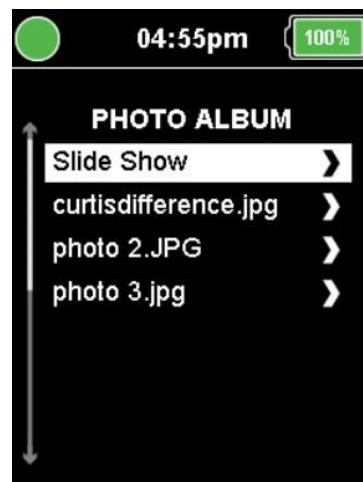
NOTE: Only .jpg format pictures are compatible with the photo album.

Save photo album saves the album in a format recognized by enAble X1 (.xph) so it can easily be transferred to other systems using Open photo album.

PHOTO ALBUM must be enabled in programming or Photo Album Enable can be selected from the system Settings – Display to ensure Photo Album in the Auxiliary menu is available.



The photos can be viewed by a Slide Show, or individually.

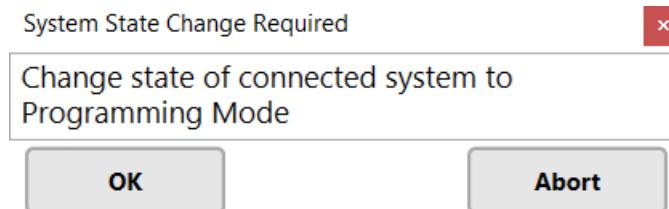


While the Slide Show is active, all images cycle every 5 seconds. A left input command exits the slide show, a reverse or right command advances to the next picture, and a forward command reverts to the previous picture.

4 — PROGRAMMING

4.1 SYSTEM CONFIGURATION STATE

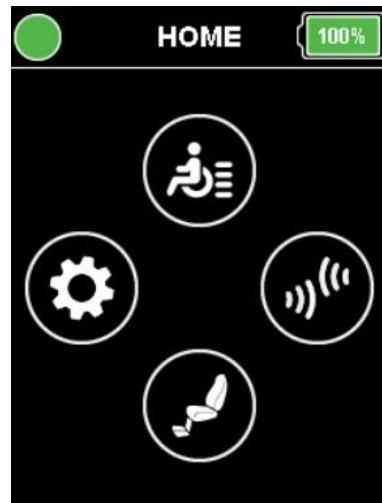
When programming the enAble X1 system, some parameter adjustments result in a system state change. The system state will be shown on the main display via traffic light indication, or splash screen indicating the system state. Before a system state change occurs, a programming device will display a warning to accept the state change to adjust the parameter or abort. A warning will not be displayed when loading a configuration, and the system automatically enters Power Cycle Required.



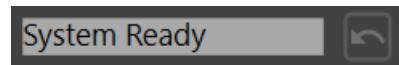
WARNING! Only program the system in a safe environment, since some configuration states limit system operation.

4.1.1 System Ready

In the System Ready state, normal operation of the system can be expected. Notice the status indication in the top left of the main display.



The ECON programming device also shows the configuration state.



4.1.2 Programming Mode

In Programming Mode, the system is no longer operable until it is back in System Ready. The main display shows a splash screen.



The ECON programming device also shows the configuration state.



To exit Programming Mode, use the connected programming device to revert back to System Ready.

4.1.3 Power Cycle Required

When the system is in Power Cycle Required, the programming device can remain connected and other parameter adjustments can be made.



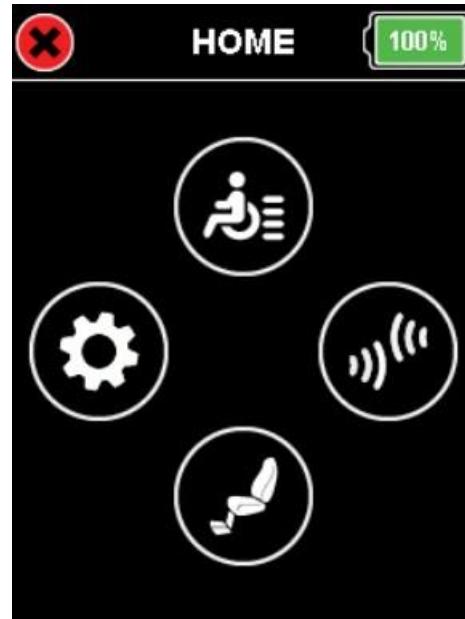
The ECON programming device also shows the configuration state.



When all desired changes are made, the system will need to be power cycled to revert back to System Ready.

4.1.4 Output Inhibited

The Output Inhibit state occurs when running certain functions, like ASSIGN DIRECTIONS or TEACH DOUBLE COMMAND. It disables operation of the system with the input device until the function is finished running. Notice the status indication in the top left of the main display.



The ECON programming device also shows the configuration state.



Once the function is finished running or aborted, the system will automatically revert back to System Ready.

4.2 PARAMETERS SETTING

The enEnable X1 system has a number of parameters that can be programmed using a Curtis Model 1313 handheld or ECON programmer. The programmable parameters allow the systems performance and features to be customized to fit the needs of specific applications. See the [Programmers appendix](#) for more information on programmers.

4.2.1 User Drive Profiles

The user drive profiles can be customized for each input device type, so it is easy to switch between different device types to have a comfortable and safe drive.



MANDATORY! Make sure that a system user can safely operate after adjusting drive profile parameters



WARNING! The minimum settings are intended to cover all conditions that a system user may encounter



WARNING! It is recommended to use low speed drive settings when using a specialty input device, e.g. 1-Switch Scanner

USER DRIVE PROFILES

PARAMETER	RANGE	DESCRIPTION
Profile Label Type		Defines how the drive profile is shown on the system display, as number, text, icon or symbol. One of these options must be selected. The number displays as D1 to D4. ‘Text, Icon and Symbol’ can be assigned with the parameters ‘Text & Icon’ and ‘Symbol’.
Text & Icon		Defines what profile indication is shown on the system display if either ‘Text’ or ‘Icon’ is configured under the parameter ‘Profile Label Type’. The following list is available: ‘Indoor Slow, Indoor Moderate, Outdoor Moderate, Outdoor Fast, School, Work, Ramp, Sport’.
Symbol		Defines what profile indication is shown on the system display if parameter ‘Profile Label Type’ is set to ‘Symbol’. The following symbols are available: ‘Green Circle, Purple Pentagon, White Square, Red Triangle, Blue Cross, Yellow Star’.
Fwd Max Speed	5 – 100 %	Defines the speed limit of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its maximum position and when full forward input is applied. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, the achievable speed is linearly adjusted between this parameter and the parameter ‘Fwd Min Speed’.
Fwd Min Speed	5 – 100 %	Defines the speed limit of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its minimum position and a full forward input is applied. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, the achievable speed is linearly adjusted between this parameter and the parameter ‘Fwd Max Speed’.
Fwd Max Accel	5 – 100 %	Defines the forward acceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its maximum position. A higher value represents a shorter acceleration time and a faster start. High acceleration values provide abrupt acceleration and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, acceleration is linearly adjusted between this parameter and ‘Fwd Min Accel’.

USER DRIVE PROFILES, cont'd

PARAMETER	RANGE	DESCRIPTION
Fwd Min Accel	5 – 100 %	Defines the forward acceleration of the wheelchair when the ‘Speed Knob’ / ‘User Speed Adjust’ is at its minimum position. A higher value represents a shorter acceleration time and a faster start. High acceleration values provide abrupt acceleration and should only be used under special circumstances. When the ‘Speed Knob’ / ‘User Speed Adjust’ is between its min. and max. position, acceleration is linearly adjusted between this parameter and ‘Fwd Max Accel’.
Fwd Max Decel	5 – 100 %	Defines the forward deceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its maximum position. A higher value represents a shorter deceleration time and a faster stop. High deceleration values provide abrupt deceleration and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, deceleration is linearly scaled between this parameter and ‘Fwd Min Decel’.
Fwd Min Decel	5 – 100 %	Defines the forward deceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its minimum position. A higher value represents a shorter deceleration time and a faster stop. High deceleration values provide abrupt decelerations and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, then the deceleration is linearly adjusted between this parameter and ‘Fwd Max Decel’.
Rev Max Speed	5 – 100 %	Defines the speed limit of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its maximum position and full reverse input is applied. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, the achievable speed is linearly adjusted between this parameter and ‘Rev Min Speed’.
Rev Min Speed	5 – 100 %	Defines the speed limit of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its minimum position and when full reverse input is applied. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, then the achievable speed is linearly adjusted between this parameter and the ‘Rev Max Speed’ parameter.
Rev Max Accel	5 – 100 %	Defines the reverse acceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its maximum position. A higher value represents a shorter acceleration time and a faster start. High acceleration values provide abrupt acceleration and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, acceleration is linearly adjusted between this parameter and ‘Rev Min Accel’.
Rev Min Accel	5 – 100 %	Defines the reverse acceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its minimum position. A higher value represents a shorter acceleration time and a faster start. High acceleration values provide abrupt acceleration and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, then the acceleration is linearly adjusted between this parameter and ‘Rev Max Accel’.
Rev Max Decel	5 – 100 %	Defines the reverse deceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its maximum position. A higher value represents a shorter deceleration time and a faster stop. High deceleration values provide abrupt deceleration and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, deceleration is linearly adjusted between this parameter and ‘Rev Min Decel’.

USER DRIVE PROFILES, cont'd

PARAMETER	RANGE	DESCRIPTION
Rev Min Decel	5 - 100 %	Defines the reverse deceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its minimum position. A higher value represents a shorter deceleration time and a faster stop. High deceleration values provide abrupt decelerations and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, deceleration is linearly adjusted between this parameter and ‘Rev Max Decel.’
Turn Max Speed	5 – 100 %	Defines the turning speed limit of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its maximum position and a full left or right input is applied. The turn speed is normally set to a value lower than the forward speed. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, the achievable speed is linearly adjusted between this parameter and ‘Turn Min Speed’.
Turn Min Speed	5 – 100 %	Defines the turning speed limit of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its minimum position and a full left or right input is applied. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, the achievable speed is linearly adjusted between this parameter and the ‘Turn Max Speed’ parameter.
Turn Max Accel	5 – 100 %	Defines the turning acceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its maximum position. A higher value represents a shorter turning acceleration time and a faster direction response. High turn acceleration values provide abrupt direction changes and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, acceleration is linearly adjusted between this parameter and ‘Turn Min Accel’.
Turn Min Accel	5 – 100 %	Defines the turning acceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its minimum position. A higher value represents a shorter turning acceleration time and a faster direction response. High turn acceleration values provide abrupt direction changes and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, acceleration is linearly adjusted between this parameter and ‘Turn Max Accel’.
Turn Max Decel	5 – 100 %	Defines the turning deceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its maximum position. A higher value represents a shorter turning deceleration time and a faster direction response. High turn deceleration values provide abrupt direction changes and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, deceleration is linearly adjusted between this parameter and ‘Turn Min Decel.’
Turn Min Decel	5 – 100 %	Defines the turning deceleration of the wheelchair when the “Speed Knob” / “User Speed Adjust” is at its minimum position. A higher value represents a shorter turning deceleration time and a faster direction response. High turn deceleration values provide abrupt direction changes and should only be used under special circumstances. When the “Speed Knob” / “User Speed Adjust” is between its min. and max. position, deceleration is linearly adjusted between this parameter and ‘Turn Max Decel.’
Soft Start Fwd / Rev	0 – 5000 ms	Delay in time to smooth fwd / rev acceleration ramp
Soft Start Turn	0 – 1000 ms	Delay in time to smooth turn acceleration ramp

USER DRIVE PROFILES, cont'd

PARAMETER	RANGE	DESCRIPTION
Power	20 – 100 %	<p>Limits the system drive torque output. The power limit is usually reduced for wheelchair users who may have cognitive disabilities which may result in unintentionally driving into surrounding obstacles.</p> <p>Reducing the power limit also reduces the ability of the wheelchair to cross over obstacles and to maneuver in certain situations under higher load.</p> <p>Lower power limits are normally used for indoor operation.</p> <p>After setting this parameter, please ensure that the wheelchair performs as required in the given user environment (slopes, obstacles, curbs).</p>
Latch Forward		<p> WARNING! Do not enable any latch mode if the mode switch is not easily accessible for the user to stop the chair in any situation.</p> <p>An emergency stop method is highly recommended for any latch setting! ‘Cruise’ latch:</p> <p>Speed continuously ramps up until the desired speed is reached and will hold the speed reached when releasing the forward command. While driving latched, any deviation below the actual speed will have no influence.</p> <p>Deceleration and stop behavior is governed by parameter setting ‘Latch Decel / Braking’.</p> <p>‘3-Step’ latch:</p> <p>Latch command is active on forward command over 50% of the input device. If the chair is not driving latched, a command below 50% will drive without latch. Speed commands are limited to 33% of max. forward speed to avoid a potential deceleration to the first step from 49% speed down to 33% speed.</p> <p>If the chair is driving latched, a command below 50% will not have any impact. Latch will increase one step with each successive forward command. Deceleration and stop behavior is governed by parameter setting ‘Latch Decel / Braking’.</p> <p>‘1-Step’ latch:</p> <p>Latch command is active on forward command over 50% of the input device. If the chair is not driving latched, a command below 50% will drive without latch. If the chair is driving latched, a command below 50% will not have any impact.</p> <p>Stop behavior is governed by parameter setting ‘Latch Decel / Braking’. ‘Latch with ‘1-Switch’:</p> <p>If ‘Latch Forward’ is configured, and a forward-right or forward-Left command is given, then no forward command is executed but a 50% direction command of the actual drive profile settings.</p> <p>If ‘Latch Forward’ is configured, any reverse command (reverse, reverse-right, reverse-left) brings the unit to a stop according to parameter setting ‘Latch Decel / Braking’.</p> <p>If ‘Cruise’ latch is set, the unit will not accelerate further once cruise speed is set.</p> <p>NOTE: If the input device is held after the unit has stopped, no command will be generated. To move in reverse direction, a new command must be given.</p>

USER DRIVE PROFILES, cont'd

PARAMETER	RANGE	DESCRIPTION
Latch Decel / Braking		<p>‘Decel Stop’: When a reverse command over 50% is given, the chair will come to a soft stop. Latch will be canceled and the chair stops with the drive profile ‘Decel’ setting.</p> <p>‘Quick Stop’: When a reverse command over 50% is given, the chair will perform a quick stop.</p> <p>‘Speed / Step Reduce’, different behaviors for:</p> <p>‘Cruise’ latch: If a deceleration is required, a reverse command over 50% must be given. Chair will keep the speed once the reverse command is released. A stop can be executed by giving a permanent reverse command over 50%. The chair will then come to a soft stop with the drive profile ‘Decel’ setting.</p> <p>‘3-Step’ latch: If a reverse command over 50% is given (reverse, reverse-right, reverse-left), the chair has to decelerate to the next lower step. If the command is released while the speed has already passed, the next lower step chair decelerates to the next step below. Each reverse command over 50% has to step down one step, regardless of the actual speed. A stop can be executed by giving a permanent reverse command over 50%.</p> <p>‘1-Step’ latch: Same as ‘Decel Stop’. Regardless how ‘Latch Decel / Braking’ is set, a reverse command below 50% will have no impact on the speed but direction corrections remain possible.</p> <p>NOTE: ‘3-Step’ latch indication is refreshed when the input command is released.</p>
Latch Reverse		 <p>WARNING! Do not enable any latch mode if the mode switch is not easily accessible for the user to stop the chair in any situation.</p> <p>An emergency stop method is highly recommended for any latch setting! ‘1-Step’ latch: Latch command is active on reverse command over 50% of the input device. If the chair is not driving latched, a reverse command below 50% will drive without latch. If the chair is driving latched, a reverse command below 50% will not have any impact on the speed but direction corrections are possible.</p> <p>When a forward command over 50% is given, the unit will come to a soft stop. Latch will be canceled and chair stops with the drive profile ‘Decel’ setting.</p> <p>A forward command below 50% will not have any impact on the speed but direction corrections are possible.</p> <p>Latch with ‘1-Switch’: If ‘Latch Reverse’ is active, and a reverse-right or reverse-left command is given, no reverse command is executed, but a 50% direction command of the actual drive profile settings.</p> <p>If ‘Latch Reverse’ is active, any forward command (forward, forward-right, forward-left) brings the unit to a soft stop.</p> <p>NOTE: If the input device is held after the unit has stopped, no command will be generated. To move in forward direction, a new command must be given.</p>
Latch Timeout	5 – 120 s	<p>Defines the time the chair will continue to drive latched without input command. After ‘Latch Timeout’ setting, the chair will come to a stop if no input command was given during the ‘Latch Timeout’ period.</p> <p>Dependency: ‘Latch Timeout’ is a common setting for ‘Latch Forward’ and ‘Latch Reverse’ commands in the drive profile.</p> <p>NOTE: The parameter ‘Latch Timeout Disable’ should not be set to ‘Yes’.</p>

4.2.2 Startup Configuration

Startup configuration defines how the system behaves when it is turned on, what input device to use and the first screen shown.

STARTUP CONFIGURATION

PARAMETER	RANGE	DESCRIPTION
Input Device Selection		<p>'Default Input Device': At startup, the system activates the input device configured under 'Default Input Device'. If this device is missing (faulty or not connected to the system), the 'Input Device Selection Screen' will appear.</p> <p>'Last Device Used': At startup, the system activates the last used input device. If this device is missing or if the Attendant Control was last used, the 'Input Device Selection Screen' will appear.</p> <p>'Input Device Selection Screen': At startup all configured and connected input devices will appear.</p> <p>'Power On Device': At startup, the input device used at power on will be active.</p>
Input Device Selection Direction		Defines how an input device is selected if the system was powered up in the 'Input Device Selection Screen' (parameter 'Input Device Selection' set to 'Input Device Selection Screen'). The input device giving a 'Left, Right, Left- Right-Left, Right-Left-Right' command governing the setting is selected as the active input device.
Default Input Device		At startup, the system activates the input device configured: 'Enhanced Display, Handcontrol, SCIM, Secondary Adaptive Joystick, 1-Switch Scanner' (parameter 'Input Device Selection' set to 'Default Input Device'). If this device is missing (faulty or not connected to the system), the 'Input Device Selection Screen' will appear.
User Entry Point		<p>Defines the screen, menu, or function the system will enter after power up. 'Home' will enter the Home screen. 'Last Used' will enter the screen, menu, or function that was last used before the system was powered off. Any other available settings will behave accordingly.</p> <p>If a configured entry point is not available due to the system configuration (e.g. '4th Drive Profile'), the Home screen will be entered.</p>
Clinic	Disabled / Enabled	<p>If 'Enabled', the 'Clinic Mode' is activated. By giving a long power on command the Clinic Mode screen is displayed.</p> <p>The Clinic Mode screen offers all possible (Specialty) Input Devices / operation modes the user can select for all connected system modules (e.g. HC, ED, SCIM).</p> <p>If 'Disabled', the Clinic Mode is inactive for the system.</p>

4.2.3 Hand Control

The Handcontrol menu has the same parameters as the Handcontrol Light menu, and additionally Key I, Key II and Home Button that are not available on the Handcontrol Light.

HANDCONTROL: Profile Setup

PARAMETER	RANGE	DESCRIPTION
Mode		Determines the operation for that particular profile in the given order, 1 to 6. If a same mode is configured twice, the system shows the first placed mode only. Disabled profiles do not show on the system. A reverse mode command is disregarded at the first drive profile for safety reasons. Mode shortcut commands change between the profile main types that are Drive, AUX, Seat according to the configured order.

HANDCONTROL: Input Configuration

PARAMETER	RANGE	DESCRIPTION
HC Input Configuration		Defines ‘Handcontrol’ operation modes: ‘Proportional Joystick’, ‘Switched Joystick’, ‘3-Way Proportional Joystick’, ‘3-Way Switched Joystick’.

HANDCONTROL: Joystick Setup

PARAMETER	RANGE	DESCRIPTION
Center Deadband	10 – 50 %	Defines how far the input device must be operated from center for a command to be recognized by the system. The value corresponds to the diameter of a circle around the center position. No drive or menu command will be generated unless the input device is operated out of this circle. NOTE: Increasing the ‘Center Deadband’ value could be useful for an operator with a severe hand tremor.
Joystick Supervision At Startup	Disabled / Enabled	Defines whether the Handcontrol DMS supervision is ‘Enabled’ or ‘Disabled’ at system startup.
Tremor Suppression	0 – 100 %	Setting suppresses a tremor on the proportional input device. 0% equals no, 100% equals maximum tremor suppression. NOTE: When a short command is used to operate the system (e.g. when 3-way operation is configured for a device) the ‘Tremor Suppression’ value should not be set over 90%, otherwise short commands will be ignored.
Assigned Direction		The Direction Assignment function is used to select which command is used for forward and steering movements of the wheelchair. Dependency: To determine the proper assignment of the direction the function “Assign Directions” is used.
Forward Throw	30 – 100 %	Sets the percentage of movement of a proportional input device (joystick) in the forward direction to achieve maximum forward driving speed within the drive profile.
Reverse Throw	30 – 100 %	Same as Forward Throw, but for reverse direction.
Left Throw	30 – 100 %	Same as Forward Throw, but for left direction.
Right Throw	30 – 100 %	Same as Forward Throw, but for right direction.

HANDCONTROL: 3 — Direction Arrow Toggle Settings

PARAMETER	RANGE	DESCRIPTION
Toggle Command Time	200 – 4000 ms	Defines the time in which a command is detected as a toggle command. Toggle while driving: The forward / reverse direction must be operated longer than 'Toggle De-bounce Time', but shorter than 'Toggle De-bounce Time' + 'Toggle Command Time'. To issue a drive command the forward / reverse direction must be operated longer than 'Toggle De-bounce Time' + 'Toggle Command Time'. Toggle while stopped: The forward / reverse direction must be operated shorter than 'Toggle Command Time', To issue a drive command the forward / reverse direction must be operated longer than 'Toggle Command Time'.
Toggle De-bounce Time	0 – 4000 ms	Defines the time the input command must be operated while driving before it is recognized as a command (de-bounced). This timing exists only while driving and applies for all 3-Way Input Devices.
Toggle In Seat Command	200 – 4000 ms	Defines the time within which a toggle command is possible in Seat mode. NOTE: This parameter is only used for '4-Switch Head' and '5-Switch Head' in Seat mode.
Latch Toggle Auto Flip	Off / On	If set to 'Off' and first acceleration command has been pressed for 500 ms, the arrow remains in the current driving direction. If first acceleration command is released in 500 ms, the arrow will auto flip to the opposite direction assuming that the movement was unintended and the individual wants to stop quickly. If set to 'On', the arrow will auto flip to opposite direction as soon as command is released and latch is activated.
		 WARNING! Emergency Stop Switch highly recommended.
Toggle In Drive	Disabled / Enabled	Is relevant for '3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head'. If set to 'Disabled', toggling in a drive profile is not possible. NOTE: If set to 'Disabled', and toggling must be possible, an alternative toggling method is necessary.
Toggle While Driving	Disabled / Enabled	Is relevant for '3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head'. If set to 'Disabled' when the chair is in motion, the direction cannot be toggled. NOTE: If set to 'Disabled', an alternative toggling method or stopping the chair is necessary.
Toggle In Seat	Disabled / Enabled	Is relevant for '3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head'. If set to 'Disabled', toggling in 'Seat' is not possible. NOTE: If set to 'Disabled', and toggling must be possible, an alternative toggling method is necessary.
Toggle In Aux	Disabled / Enabled	Is relevant for '3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head'. If set to 'Disabled', toggling in the auxiliary menu is not possible. NOTE: If set to 'Disabled', and toggling must be possible, an alternative toggling method is necessary.
Toggle In Bluetooth	Disabled / Enabled	Is relevant for '3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head'. If set to 'Disabled', toggling in the Bluetooth menu is not possible. NOTE: If set to 'Disabled', and toggling must be possible, an alternative toggling method is necessary.
Toggle In IR	Disabled / Enabled	Is relevant for '3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head'. If set to 'Disabled', toggling in the IR menu is not possible. NOTE: If set to 'Disabled', and toggling must be possible, an alternative toggling method is necessary.
Toggle In ECM	Disabled / Enabled	Is relevant for '3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head'. If set to 'Disabled', toggling in the ECM menu is not possible. NOTE: If set to 'Disabled', and toggling must be possible, an alternative toggling method is necessary.

HANDCONTROL: Button Operation

PARAMETER	RANGE	DESCRIPTION
Toggle Mode	Disabled / Enabled	Defines whether 'Toggle Mode' is 'Enabled' or 'Disabled' on the Handcontrol side lever.
Horn Button	Disabled / Enabled	Defines whether the Horn button is 'Enabled' or 'Disabled' on the Handcontrol.
Key I		Assigns shortcuts to the hand control 'Key I' to get into 'Drive Profile 1, Auxiliary Menu or Seat Menu'. The key can be set to 'Disabled' or 'Custom (MIO)' to be available for mapped I/O purpose (output possibilities according to the 'Mapped I/O Configurator'). NOTE: Not available for Handcontrol Light
Key II		Same as Key I, but for Key II
Home Button	Disabled / Enabled	Defines whether the Home button is 'Enabled' or 'Disabled' on the Handcontrol.

HANDCONTROL: Speed Knob Setup

PARAMETER	RANGE	DESCRIPTION
Speed Knob Type		Five configurations are available: 'Continuous': Change speed knob value up and down without stroke limits. 'Limited Stroke': If knob mechanically limited by lower and upper strokes. 'Continuous Forward': Change knob value only with forward movement -cycling to lowest value after reaching maximum value. 'Continuous Reverse': Change knob value only with reverse movement -cycling to lowest value after reaching maximum value. 'Disabled': Speed knob not functional.
Speed Knob Scaling	5 – 100 %	This parameter is used to scale the speed knob potentiometer. At 100%, the potentiometer must be turned approx. 720 degrees to cover the full range. At 5%, the potentiometer must be turned approx. 36 degrees to cover the full range. This only applies when the 'Speed Knob Type' is set to 'Continuous, Continuous Forward or Continuous Reverse'.
Speed Knob Inactive Range	0 – 720°	Defines the range where the potentiometer is inactive at its maximum / minimum value. The 'Inactive Range' parameter is only relevant when the parameter 'Speed Knob Type' is set to 'Continuous Forward' or 'Continuous Reverse'. It is also dependent on the 'Speed Knob Scaling' parameter.

HANDCONTROL: Device Options / Timing

PARAMETER	RANGE	DESCRIPTION
Device Double Command		A double command is only processed when the chair has stopped / is at stand-still. The parameter defines whether 'Device Double Command' is 'Disabled', or assigned to 'Enabled Left' or 'Enabled Right'. If 'Enabled Left' or 'Enabled Right', a double command with a specialty input device will perform a 'Mode' command. If 'Disabled', the left or right command will perform the associated drive command. NOTE: When 'Enabled', the 'Long Command Time' will dictate how much time the system must wait after the direction is pressed before it activates the function.
Double Command Time	200 – 4000 ms	Defines the time required after command release to give a second command to execute a double command.
Long Command Time	200 – 4000 ms	Defines how long an input command must be operated to execute a long command without waiting for the double command.

HANDCONTROL: Switch Options / Timing

PARAMETER	RANGE	DESCRIPTION
IR Over Mode Jack 1	Disabled / Enabled	If set to ‘Enabled’, IR can be used on the handcontrol through an external IR transmitter connected to the ‘Mode Jack 1’ of the handcontrol. Contact your OEM for technical details.
Mode Jack Supervision		‘Disabled’: If switch becomes disconnected, no action is taken. ‘Stop’: If switch becomes disconnected, the chair comes to a smooth stop and a warning, ‘(Device) Mode Jack disconnected’ is displayed. No driving is allowed until the Mode Jack switch is reconnected. ‘Rescue Mode’: If switch becomes disconnected, the chair enters rescue drive mode and displays a warning, ‘(Device) Mode Jack disconnected’. Once the Mode Jack switch is reconnected, the chair will drive at normal speed. ‘Warning’: If switch becomes disconnected, the chair continues to drive normally and a warning, ‘(Device) Mode Jack disconnected’ will be displayed.
On / Off Jack Supervision		Same as Mode Jack Supervision, but for On / Off Jack
Mode Jack Configuration Type		The ‘Configuration’ setting assigns the Mode Jack to execute short, double or long commands (see settings under ‘Jack Commands’). Device Mode Jack can be set to ‘Mapped I/O’ to be available for mapped I/O purpose (output possibilities according to the ‘Mapped I/O Configurator’).
Jack 1 Double Command Time	200 – 4000 ms	It sets Jack 1 (jack tip) double command time, defining within what time the second command has to follow to execute a double command. Otherwise the command will be interpreted as a short command. For assignable commands, see menu ‘Jack Commands’.
Jack 1 Long Command Time	200 – 4000 ms	It sets Jack 1 (jack tip) long command time, defining how long the switch must be pressed to execute a long command. For assignable commands, see menu ‘Jack Commands’.
Jack 2 Double Command Time	200 – 4000 ms	Same as Jack 1 Double Command Time, but for Jack 2.
Jack 2 Long Command Time	200 – 4000 ms	Same as Jack 1 Long Command Time, but for Jack 2.
Mode Jack Switch Type	1 Switch / 2 Switch	This parameter defines if the mode stereo jack processes one or two switches. If ‘1 Switch’ is chosen, only Jack 1 commands (see menu ‘Jack Commands’) are supported; the switch must be wired to the jack tip. Set to ‘2 Switch’, Jack 1 and Jack 2 commands are processed, where the second switch is wired to the jack ring. Important: If a single switch is plugged into the ‘Mode Jack’ or ‘On / Off Jack’, do not set ‘Mode Jack Switch Type’ or ‘On / Off Jack Switch Type’ to ‘Switch 2’ nor configure any ‘Jack 2’ function.
On / Off Jack Switch Type	1 Switch / 2 Switch	Same as Mode Jack Switch Type, but for On / Off Jack.
Mode Jack E-Stop		Defines how the chair stops if ‘Mode Jack E-Stop’ is set to ‘Decel Stop’ or ‘Quick Stop’ and Mode Jack is operated. – ‘Decel Stop’: Any activation of the Mode Jack switch while driving will cause the unit to come to a soft stop. – ‘Quick Stop’: Any activation of the Mode Jack switch while driving will cause the unit to perform a quick stop. While the chair is at rest the Mode Jack will perform the configured functions.
On / Off E-Stop		Same as Mode Jack E-Stop, but for On / Off Jack.

HANDCONTROL: Jack Commands

PARAMETER	RANGE	DESCRIPTION
Mode Jack Short Command		Assigns one of the following functions / shortcuts to the mode jack short command: ‘Mode, Mode Shortcut, Toggle, Sleep, Home, Enter Lock’. If set to ‘Inactive’, no mode jack short command is recognized by the system. Important: If a single switch is plugged into the ‘Mode Jack’ or ‘On / Off Jack’, do not set ‘Mode Jack Switch Type’ or ‘On / Off Jack Switch Type’ to ‘Switch 2’ nor configure any ‘Jack 2’ function.
Mode Jack Long Command		Same as Mode Jack Short Command, but for Mode Jack Long Command.
Mode Jack Double Command		Same as Mode Jack Short Command, but for Mode Jack Double Command.
On / Off Jack Short Command		Same as Mode Jack Short Command, but for On / Off Jack Short Command.
On / Off Jack Long Command		Same as Mode Jack Short Command, but for On / Off Jack Long Command.
On / Off Jack Double Command		Same as Mode Jack Short Command, but for On / Off Jack Double Command.

HANDCONTROL: Menu Settings

PARAMETER	RANGE	DESCRIPTION
Menu Navigation Mode		‘Manual’: Menu commands are generated manually and are not repeated. ‘Auto Repeat’: Moving from one menu item to the next will be repeated automatically as long as the command is active. ‘Auto Change’: The menu changes from one item to the next in a pre-determined time ‘Menu Navigation Timing’ with no input command.
Menu Navigation Timing	200 – 2000 ms	For ‘Auto Change’ Mode setting in ‘Menu Navigation Mode’ this parameter sets the time to move from one menu item to the next.
List Navigation Forward Input		Assigns a specific navigation command to the forward direction. Assignment is valid for all list menus. – ‘Scroll Up’ moves upwards through the list – ‘Scroll Down’ moves downwards through the list – ‘Select’ selects the highlighted menu entry – ‘Back Up’ returns to the previous menu – ‘Inactive’ disables directional command NOTE: If ‘Auto Change’ is chosen only ‘Select’ and ‘Back Up’ are active.
List Navigation Left Input		Same as List Navigation Forward Input, but for left input
List Navigation Reverse Input		Same as List Navigation Forward Input, but for reverse input
List Navigation Right Input		Same as List Navigation Forward Input, but for right input

HANDCONTROL: Menu Entries

PARAMETER	RANGE	DESCRIPTION
Settings	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Settings’. If enabled, system settings are available to the user in the auxiliary menu.
Show Change Inputdevice	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Change Input Device’. If enabled, the ‘Change Input Device’ option is available to the user in the auxiliary menu.

HANDCONTROL: Standby Select

PARAMETER	RANGE	DESCRIPTION
ON		
Standby Select	Disabled / Enabled	Standby Select' allows a user to operate the system without using a mode switch. The system changes to 'Standby Select' screen if no input command was given for the programmed 'Standby Select Timeout'.
Standby Select Timeout	1 – 120 s	Defines the time after which the system changes to 'Standby Select' screen if no valid command was given.
Standby Aux Timeout	Disabled / Enabled	Enables / disables the 'Standby Select' function for the auxiliary menu. If 'Disabled', an alternative mode method has to be available.
Standby Seat Timeout	Disabled / Enabled	Enables / disables the 'Standby Select' function for the seat screen. If 'Disabled', an alternative Mode method has to be available.

HANDCONTROL: Sleep

PARAMETER	RANGE	DESCRIPTION
ON		
Sleep Timeout	0 – 240 min	Defines the time to elapse after the last command given before the system enters the 'Sleep Power Mode'.
Sleep Power Mode	Disabled / Enabled	If 'Enabled', the display will go dark when 'Sleep Timeout' has elapsed or 'Sleep Power Mode' has been executed. To wake up the system with a Head Input Device, a left-right-left command must be given. Any command will wake up the system with any other input device. If 'Disabled': This function is not available.
Wake Up		Defines how the system can be woken up from 'Sleep Power Mode'. Available setting options: 'Mode, Left, Right, Left-Right-Left (default), Right-Left-Right'. 'Mode' enables the wake up by Mode command on HC, SAJ and ED. Alternative ways to wake the system up: – Jacks (Mode or On / Off) if configured to enter sleep – Reminder message (popup message) – Error message (popup message) – On / Off keys on HC, SAJ and ED. No wake up will cause the following: – Auto Change – Standby Select – MIOs – ED 4-way cursor button – AC Jacks. 1-Switch Scanner: Any switch command will wake the system up.

HANDCONTROL: Latch Driving

PARAMETER	RANGE	DESCRIPTION
ON		
Latch Driving Visibility	Disabled / Enabled	Enables / disables the auxiliary menu entry 'Latch Driving'. If 'Enabled', the option to enable / disable latch for configured latch drive profiles is available to the user in the auxiliary menu.

HANDCONTROL: User Speed Adjust

PARAMETER	RANGE	DESCRIPTION
User Speed Adjust	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Speed Adjust’. If ‘enabled’, the ‘Speed Adjust’ option is available to the user in the auxiliary menu.
Drive 1	0 – 10	If ‘User Speed Adjust’ is ‘Enabled’ the user has the ability to adjust the speed of each drive profile in steps of 10% (0 – 10) in the auxiliary menu. If ‘User Speed Adjust’ is ‘Disabled’ the settings of ‘Speed Adjust’ are disregarded and the settings of the corresponding drive profile are taken.
Drive 2	0 – 10	Same as Drive 1
Drive 3	0 – 10	Same as Drive 1
Drive 4	0 – 10	Same as Drive 1

HANDCONTROL: Profile Change Stop

PARAMETER	RANGE	DESCRIPTION
Profile Change Stop Drive	Disabled / Enabled	If ‘Enabled’, a mode command always stops the driving. After the chair has stopped the mode command is executed. If ‘Disabled’, a mode command changes to the next drive profile while driving without stop, if the next profile is a drive profile. If the next profile is Auxiliary or Seat, driving will stop upon one mode command and the profile will subsequently change.

HANDCONTROL: Auto Shutoff

PARAMETER	RANGE	DESCRIPTION
Auto Shutoff	0 – 240 min	Defines the time to elapse before the system powers down after the last input command. A power on command by the user will restart the system. Use this parameter to save battery capacity. NOTE: A setting of 0 min disables Auto Shutoff

4.2.4 Enhanced Display

ENHANCED DISPLAY: Profile Setup

PARAMETER	RANGE	DESCRIPTION
Mode		Determines the operation for that particular profile in the given order, 1 to 6. If a same mode is configured twice, the system shows the first placed mode only. Disabled profiles do not show on the system. A reverse mode command is disregarded at the first drive profile for safety reasons. Mode shortcut commands change between the profile main types that are Drive, AUX, Seat according to the configured order.

ENHANCED DISPLAY: Input Configuration

PARAMETER	RANGE	DESCRIPTION
ED Input Configuration		Determines the input device to be connected to the ED. The settings list shows all supported input devices. If set to ‘No Device Connected’, the system will not supervise the D-Sub connector, and no device appears in the ‘Input Device Selection Screen’.

ENHANCED DISPLAY: Mini Proportional Input

PARAMETER	RANGE	DESCRIPTION
Center Deadband	10 – 50 %	Defines how far the input device must be operated from center for a command to be recognized by the system. The value corresponds to the diameter of a circle around the center position. No drive or menu command will be generated unless the input device is operated out of this circle. NOTE: Increasing the ‘Center Deadband’ value could be useful for an operator with a severe hand tremor.
Tremor Suppression	0 – 100 %	Setting suppresses a tremor on the proportional input device. 0% equals no, 100% equals maximum tremor suppression. NOTE: When a short command is used to operate the system (e.g. when 3-way operation is configured for a device) the ‘Tremor Suppression’ value should not be set over 90%, otherwise short commands will be ignored.
Forward Throw	30 – 100 %	Sets the percentage of movement of a proportional input device (joystick) in the forward direction to achieve maximum forward driving speed within the drive profile.
Reverse Throw	30 – 100 %	Same as Forward Throw, but for reverse direction.
Left Throw	30 – 100 %	Same as Forward Throw, but for left direction.
Right Throw	30 – 100 %	Same as Forward Throw, but for right direction.
Assigned Direction		The Direction Assignment function is used to select which command is used for forward and steering movements of the wheelchair. Dependency: To determine the proper assignment of the direction the function “Assign Directions” is used.
Auto Center Adjust	Disabled / Enabled	If set to ‘Enabled’, the center values for the X- and Y-axis of the proportional Specialty Input Device are temporarily adjusted during X-/Y-axis and the center reference signal, an out of center error shows during startup. In this case the ‘Auto Center Adjust’ must be set to ‘Disabled’ and the proportional calibration has to be done. If set to ‘Disabled’, it is strongly recommended to execute the proportional calibration in order to set the correct center values for Y- and X-axis and to have the full range of the connected proportional Specialty Input Device. NOTE: It is strongly recommended to perform the proportional calibration after a new proportional Specialty Input Device was connected to the system independent of the ‘Auto Center Adjust’ setting in order have the full range calibrated.
X Min	0.5 – 4 V	Defines the minimum value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device Calibration Function, but it can be manually adjusted if required.
Y Min	0.5 – 4 V	Same as X Min, but for Y axis
X Center	2 – 10 V	Defines the center value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device calibration function, but it can be manually adjusted if required.
Y Center	2 – 10 V	Same as X Center, but for Y axis
X Max	0.5 – 4 V	Defines the maximum value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device calibration function, but it can be manually adjusted if required.
Y Max	0.5 – 4 V	Same as X Max, but for Y Axis

ENHANCED DISPLAY: Proportional Input

PARAMETER	RANGE	DESCRIPTION
Center Deadband	10 – 50 %	Defines how far the input device must be operated from center for a command to be recognized by the system. The value corresponds to the diameter of a circle around the center position. No drive or menu command will be generated unless the input device is operated out of this circle. NOTE: Increasing the ‘Center Deadband’ value could be useful for an operator with a severe hand tremor.
Tremor Suppression	0 – 100 %	Setting suppresses a tremor on the proportional input device. 0% equals no, 100% equals maximum tremor suppression. NOTE: When a short command is used to operate the system (e.g. when 3-way operation is configured for a device) the ‘Tremor Suppression’ value should not be set over 90%, otherwise short commands will be ignored.
Forward Throw	30 – 100 %	Sets the percentage of movement of a proportional input device (joystick) in the forward direction to achieve maximum forward driving speed within the drive profile.
Reverse Throw	30 – 100 %	Same as Forward Throw, but for reverse direction.
Left Throw	30 – 100 %	Same as Forward Throw, but for left direction.
Right Throw	30 – 100 %	Same as Forward Throw, but for right direction.
Assigned Direction		The Direction Assignment function is used to select which command is used for forward and steering movements of the wheelchair. Dependency: To determine the proper assignment of the direction the function “Assign Directions” is used.
Auto Center Adjust	Disabled / Enabled	If set to ‘Enabled’, the center values for the X- and Y-axis of the proportional Specialty Input Device are temporarily adjusted during startup. In case of a missing center signal or large deviation between X- / Y-axis and the center reference signal, an out of center error shows during startup. In this case the ‘Auto Center Adjust’ must be set to ‘Disabled’ and the proportional calibration has to be done. If set to ‘Disabled’, it is strongly recommended to execute the proportional calibration in order to set the correct center values for Y- and X-axis and to have the full range of the connected proportional Specialty Input Device. NOTE: It is strongly recommended to perform the proportional calibration after a new proportional Specialty Input Device was connected to the system independent of the ‘Auto Center Adjust’ setting in order have the full range calibrated.
X Min	0.5 – 4 V	Defines the minimum value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device Calibration Function, but it can be manually adjusted if required.
Y Min	0.5 – 4 V	Same as X Min, but for Y axis
X Center	2 – 10 V	Defines the center value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device calibration function, but it can be manually adjusted if required.
Y Center	2 – 10 V	Same as X Center, but for Y axis
X Max	0.5 – 4 V	Defines the maximum value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device calibration function, but it can be manually adjusted if required.
Y Max	0.5 – 4 V	Same as X Max, but for Y Axis

ENHANCED DISPLAY: 3 — Direction Arrow Toggle Settings

PARAMETER	RANGE	DESCRIPTION
Toggle Command Time	200 – 4000 ms	Defines the time in which a command is detected as a toggle command. Toggle while driving: The forward / reverse direction must be operated longer than ‘Toggle De-bounce Time’, but shorter than ‘Toggle De-bounce Time’ + ‘Toggle Command Time’. To issue a drive command the forward / reverse direction must be operated longer than ‘Toggle De-bounce Time’ + ‘Toggle Command Time’. Toggle while stopped: The forward / reverse direction must be operated shorter than ‘Toggle Command Time’. To issue a drive command the forward / reverse direction must be operated longer than ‘Toggle Command Time’.
Toggle De-bounce Time	0 – 4000 ms	Defines the time the input command must be operated while driving before it is recognized as a command (de-bounced). This timing exists only while driving and applies for all 3-Way Input Devices.
Toggle In Seat Command	200 – 4000 ms	Defines the time within which a toggle command is possible in Seat mode. NOTE: This parameter is only used for ‘4-Switch Head’ and ‘5-Switch Head’ in Seat mode.
Latch Toggle Auto Flip	Off / On	If set to ‘Off’ and first acceleration command has been pressed for 500 ms, the arrow remains in the current driving direction. If first acceleration command is released in 500 ms, the arrow will auto flip to the opposite direction assuming that the movement was unintended and the individual wants to stop quickly. If set to ‘On’, the arrow will auto flip to opposite direction as soon as command is released and latch is activated.  WARNING! Emergency Stop Switch highly recommended.
Toggle In Drive	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in a drive profile is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle While Driving	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’ when the chair is in motion, the direction cannot be toggled. NOTE: If set to ‘Disabled’, an alternative toggling method or stopping the chair is necessary.
Toggle In Seat	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in ‘Seat’ is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In Aux	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the auxiliary menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In Bluetooth	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the Bluetooth menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In IR	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the IR menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In ECM	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the ECM menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.

[ENHANCED DISPLAY: Device Options / Timing](#)

PARAMETER	RANGE	DESCRIPTION
Device Double Command		<p>A double command is only processed when the chair has stopped / is at stand-still.</p> <p>The parameter defines whether ‘Device Double Command’ is ‘Disabled’, or assigned to ‘Enabled Left’ or ‘Enabled Right’.</p> <p>If ‘Enabled Left’ or ‘Enabled Right’, a double command with a specialty input device will perform a ‘Mode’ command.</p> <p>If ‘Disabled’, the left or right command will perform the associated drive command.</p> <p>NOTE: When ‘Enabled’, the ‘Long Command Time’ will dictate how much time the system must wait after the direction is pressed before it activates the function.</p>
Double Command Time	200 – 4000 ms	Defines the time required after command release to give a second command to execute a double command.
Long Command Time	200 – 4000 ms	Defines how long an input command must be operated to execute a long command without waiting for the double command.

[ENHANCED DISPLAY: D-Sub \(9-Pin\)](#)

PARAMETER	RANGE	DESCRIPTION
D-Sub Supervision	Disabled / Enabled	Defines whether the D-Sub supervision of the device is ‘Disabled’ or ‘Enabled’. If ‘Enabled’ and the D-Sub-9 of the active input device is disconnected, a warning is issued. The chair will stop driving if in drive profile. Auxiliary, Settings and Seat Profiles remain available.
Mode Short Command Type		Assigns one of the following functions / shortcuts to the D-Sub mode short command: ‘Mode, Mode Shortcut, Toggle, Sleep, Home, Enter Lock’. ‘Inactive’ disables D-Sub mode short commands.
Mode Long Command Type		Same as Mode Short Command Type, but for Long Command
Mode Double Command Type		Same as Mode Short Command Type, but for Double Command
Mode Long Command Time	200 – 4000 ms	Defines how long an input command on D-Sub mode must be operated to execute a long command without waiting for the double command. For assignable commands, see menu ‘D-Sub Mode Commands’.
Mode Double Command Time	200 – 4000 ms	Defines the time required to give a second command on D-Sub mode to execute a double command. Otherwise the command will be interpreted as a short command. For assignable commands see menu ‘D-Sub Mode Commands’.
D-Sub Mode E-Stop		<p>Defines how the chair stops if ‘D-Sub Mode E-Stop’ is set to ‘Decel Stop’ or ‘Quick Stop’ and D-Sub Mode is operated.</p> <ul style="list-style-type: none"> – ‘Decel Stop’: Any activation of the D-Sub Mode switch while driving will cause the unit to come to a soft stop. – ‘Quick Stop’: Any activation of the D-Sub Mode switch while driving will cause the unit to perform a quick stop. <p>While the chair is at rest the D-Sub Mode will perform the configured functions.</p>

ENHANCED DISPLAY: Switch Options / Timing

PARAMETER	RANGE	DESCRIPTION
Mode Jack Supervision		<p>'Disabled': If switch becomes disconnected, no action is taken.</p> <p>'Stop': If switch becomes disconnected, the chair comes to a smooth stop and a warning, '(Device) Mode Jack disconnected' is displayed. No driving is allowed until the Mode Jack switch is reconnected.</p> <p>'Rescue Mode': If switch becomes disconnected, the chair enters rescue drive mode and displays a warning, '(Device) Mode Jack disconnected'. Once the Mode Jack switch is reconnected, the chair will drive at normal speed.</p> <p>'Warning': If switch becomes disconnected, the chair continues to drive normally and a warning, '(Device) Mode Jack disconnected' will be displayed.</p>
On / Off Jack Supervision		Same as Mode Jack Supervision, but for On / Off Jack
Mode Jack Configuration Type		The 'Configuration' setting assigns the Mode Jack to execute short, double or long commands (see settings under 'Jack Commands'). Device Mode Jack can be set to 'Mapped I/O' to be available for mapped I/O purpose (output possibilities according to the 'Mapped I/O Configurator').
Jack 1 Double Command Time	200 – 4000 ms	It sets Jack 1 (jack tip) double command time, defining within what time the second command has to follow to execute a double command. Otherwise the command will be interpreted as a short command. For assignable commands, see menu 'Jack Commands'.
Jack 1 Long Command Time	200 – 4000 ms	It sets Jack 1 (jack tip) long command time, defining how long the switch must be pressed to execute a long command. For assignable commands, see menu 'Jack Commands'.
Jack 2 Double Command Time	200 – 4000 ms	Same as Jack 1 Double Command Time, but for Jack 2.
Jack 2 Long Command Time	200 – 4000 ms	Same as Jack 1 Long Command Time, but for Jack 2.
Mode Jack Switch Type	1 Switch / 2 Switch	<p>This parameter defines if the mode stereo jack processes one or two switches. If '1 Switch' is chosen, only Jack 1 commands (see menu 'Jack Commands') are supported; the switch must be wired to the jack tip.</p> <p>Set to '2 Switch', Jack 1 and Jack 2 commands are processed, where the second switch is wired to the jack ring.</p> <p>Important: If a single switch is plugged into the 'Mode Jack' or 'On / Off Jack', do not set 'Mode Jack Switch Type' or 'On / Off Jack Switch Type' to 'Switch 2' nor configure any 'Jack 2' function.</p>
On / Off Jack Switch Type	1 Switch / 2 Switch	Same as Mode Jack Switch Type, but for On / Off Jack.
Mode Jack E-Stop		<p>Defines how the chair stops if 'Mode Jack E-Stop' is set to 'Decel Stop' or 'Quick Stop' and Mode Jack is operated.</p> <ul style="list-style-type: none"> – 'Decel Stop': Any activation of the Mode Jack switch while driving will cause the unit to come to a soft stop. – 'Quick Stop': Any activation of the Mode Jack switch while driving will cause the unit to perform a quick stop. <p>While the chair is at rest the Mode Jack will perform the configured functions.</p>
On / Off E-Stop		Same as Mode Jack E-Stop, but for On / Off Jack.

[ENHANCED DISPLAY: Jack Commands](#)

PARAMETER	RANGE	DESCRIPTION
Mode Jack Short Command		Assigns one of the following functions / shortcuts to the mode jack short command: 'Mode, Mode Shortcut, Toggle, Sleep, Home, Enter Lock'. If set to 'Inactive', no mode jack short command is recognized by the system. Important: If a single switch is plugged into the 'Mode Jack' or 'On / Off Jack', do not set 'Mode Jack Switch Type' or 'On / Off Jack Switch Type' to 'Switch 2' nor configure any 'Jack 2' function.
Mode Jack Long Command		Same as Mode Jack Short Command, but for Mode Jack Long Command.
Mode Jack Double Command		Same as Mode Jack Short Command, but for Mode Jack Double Command.
On / Off Jack Short Command		Same as Mode Jack Short Command, but for On / Off Jack Short Command.
On / Off Jack Long Command		Same as Mode Jack Short Command, but for On / Off Jack Long Command.
On / Off Jack Double Command		Same as Mode Jack Short Command, but for On / Off Jack Double Command.

[ENHANCED DISPLAY: Menu Settings](#)

PARAMETER	RANGE	DESCRIPTION
Menu Navigation Mode		'Manual': Menu commands are generated manually and are not repeated. 'Auto Repeat': Moving from one menu item to the next will be repeated automatically as long as the command is active. 'Auto Change': The menu changes from one item to the next in a pre-determined time 'Menu Navigation Timing' with no input command.
Menu Navigation Timing	200 – 2000 ms	For 'Auto Change' Mode setting in 'Menu Navigation Mode' this parameter sets the time to move from one menu item to the next.
List Navigation Forward Input		Assigns a specific navigation command to the forward direction. Assignment is valid for all list menus. – 'Scroll Up' moves upwards through the list – 'Scroll Down' moves downwards through the list – 'Select' selects the highlighted menu entry – 'Back Up' returns to the previous menu – 'Inactive' disables directional command NOTE: If 'Auto Change' is chosen only 'Select' and 'Back Up' are active.
List Navigation Left Input		Same as List Navigation Forward Input, but for left input
List Navigation Reverse Input		Same as List Navigation Forward Input, but for reverse input
List Navigation Right Input		Same as List Navigation Forward Input, but for right input

[ENHANCED DISPLAY:](#) Menu Entries

PARAMETER	RANGE	DESCRIPTION
Settings	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Settings’. If enabled, system settings are available to the user in the auxiliary menu.
Show Change Inputdevice	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Change Input Device’. If enabled, the ‘Change Input Device’ option is available to the user in the auxiliary menu.

[ENHANCED DISPLAY:](#) Standby Select

PARAMETER	RANGE	DESCRIPTION
Standby Select	Disabled / Enabled	‘Standby Select’ allows a user to operate the system without using a mode switch. The system changes to ‘Standby Select’ screen if no input command was given for the programmed ‘Standby Select Timeout’.
Standby Select Timeout	1 – 120 s	Defines the time after which the system changes to ‘Standby Select’ screen if no valid command was given.
Standby Aux Timeout	Disabled / Enabled	Enables / disables the ‘Standby Select’ function for the auxiliary menu. If ‘Disabled’, an alternative mode method has to be available.
Standby Seat Timeout	Disabled / Enabled	Enables / disables the ‘Standby Select’ function for the seat screen. If ‘Disabled’, an alternative Mode method has to be available.

[ENHANCED DISPLAY:](#) Sleep

PARAMETER	RANGE	DESCRIPTION
Sleep Timeout	0 – 240 min	Defines the time to elapse after the last command given before the system enters the ‘Sleep Power Mode’.
Sleep Power Mode	Disabled / Enabled	If ‘Enabled’, the display will go dark when ‘Sleep Timeout’ has elapsed or ‘Sleep Power Mode’ has been executed. To wake up the system with a Head Input Device, a left-right-left command must be given. Any command will wake up the system with any other input device. ‘Disabled’: This function is not available.
Wake Up		<p>Defines how the system can be woken up from ‘Sleep Power Mode’. Available setting options: ‘Mode, Left, Right, Left-Right-Left (default), Right-Left-Right’. ‘Mode’ enables the wake up by Mode command on HC, SAJ and ED.</p> <p>Alternative ways to wake the system up:</p> <ul style="list-style-type: none"> – Jacks (Mode or On / Off) if configured to enter sleep – Reminder message (popup message) – Error message (popup message) – On / Off keys on HC, SAJ and ED. <p>No wake up will cause the following:</p> <ul style="list-style-type: none"> – Auto Change – Standby Select – MIOs – ED 4-way cursor button – AC Jacks. <p>1-Switch Scanner: Any switch command will wake the system up.</p>

[ENHANCED DISPLAY: Latch Driving](#)

PARAMETER	RANGE	DESCRIPTION
Latch Driving Visibility	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Latch Driving’. If ‘Enabled’, the option to enable / disable latch for configured latch drive profiles is available to the user in the auxiliary menu.

[ENHANCED DISPLAY: User Speed Adjust](#)

PARAMETER	RANGE	DESCRIPTION
User Speed Adjust	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Speed Adjust’. If ‘enabled’, the ‘Speed Adjust’ option is available to the user in the auxiliary menu.
Drive 1	0 – 10	If ‘User Speed Adjust’ is ‘Enabled’ the user has the ability to adjust the speed of each drive profile in steps of 10% (0 – 10) in the auxiliary menu. If ‘User Speed Adjust’ is ‘Disabled’ the settings of ‘Speed Adjust’ are disregarded and the settings of the corresponding drive profile are taken.
Drive 2	0 – 10	Same as Drive 1
Drive 3	0 – 10	Same as Drive 1
Drive 4	0 – 10	Same as Drive 1

[ENHANCED DISPLAY: Profile Change Stop](#)

PARAMETER	RANGE	DESCRIPTION
Profile Change Stop Drive	Disabled / Enabled	If ‘Enabled’, a mode command always stops the driving. After the chair has stopped the mode command is executed. If ‘Disabled’, a mode command changes to the next drive profile while driving without stop, if the next profile is a drive profile. If the next profile is Auxiliary or Seat, driving will stop upon one mode command and the profile will subsequently change.

[ENHANCED DISPLAY: Auto Shutoff](#)

PARAMETER	RANGE	DESCRIPTION
Auto Shutoff	0 – 240 min	Defines the time to elapse before the system powers down after the last input command. A power on command by the user will restart the system. Use this parameter to save battery capacity. NOTE: A setting of 0 min disables Auto Shutoff

4.2.5 Secondary Adaptive Joystick

SECONDARY ADAPTIVE JOYSTICK: Profile Setup

PARAMETER	RANGE	DESCRIPTION
Mode		Determines the operation for that particular profile in the given order, 1 to 6. If a same mode is configured twice, the system shows the first placed mode only. Disabled profiles do not show on the system. A reverse mode command is disregarded at the first drive profile for safety reasons. Mode shortcut commands change between the profile main types that are Drive, AUX, Seat according to the configured order.

SECONDARY ADAPTIVE JOYSTICK: Input Configuration

PARAMETER	RANGE	DESCRIPTION
SAJ Input Configuration		Defines the operation mode of the ‘Secondary Adaptive Joystick’: ‘Proportional Joystick, Switched Joystick, 3-Way Proportional Joystick, 3-Way Switched Joystick’.

SECONDARY ADAPTIVE JOYSTICK: Joystick Setup

PARAMETER	RANGE	DESCRIPTION
Center Deadband	10 – 50 %	Defines how far the input device must be operated from center for a command to be recognized by the system. The value corresponds to the diameter of a circle around the center position. No drive or menu command will be generated unless the input device is operated out of this circle. NOTE: Increasing the ‘Center Deadband’ value could be useful for an operator with a severe hand tremor.
Tremor Suppression	0 – 100 %	Setting suppresses a tremor on the proportional input device. 0% equals no, 100% equals maximum tremor suppression. NOTE: When a short command is used to operate the system (e.g. when 3-way operation is configured for a device) the ‘Tremor Suppression’ value should not be set over 90%, otherwise short commands will be ignored.
Assigned Direction		The Direction Assignment function is used to select which command is used for forward and steering movements of the wheelchair. Dependency: To determine the proper assignment of the direction the function “Assign Directions” is used.
Forward Throw	30 – 100 %	Sets the percentage of movement of a proportional input device (joystick) in the forward direction to achieve maximum forward driving speed within the drive profile.
Reverse Throw	30 – 100 %	Same as Forward Throw, but for reverse direction.
Left Throw	30 – 100 %	Same as Forward Throw, but for left direction.
Right Throw	30 – 100 %	Same as Forward Throw, but for right direction.

SECONDARY ADAPTIVE JOYSTICK: Device Options / Timing

PARAMETER	RANGE	DESCRIPTION
Device Double Command		<p>A double command is only processed when the chair has stopped / is at stand-still.</p> <p>The parameter defines whether ‘Device Double Command’ is ‘Disabled’, or assigned to ‘Enabled Left’ or ‘Enabled Right’.</p> <p>If ‘Enabled Left’ or ‘Enabled Right’, a double command with a specialty input device will perform a ‘Mode’ command.</p> <p>If ‘Disabled’, the left or right command will perform the associated drive command.</p> <p>NOTE: When ‘Enabled’, the ‘Long Command Time’ will dictate how much time the system must wait after the direction is pressed before it activates the function.</p>
Double Command Time	200 – 4000 ms	Defines the time required after command release to give a second command to execute a double command.
Long Command Time	200 – 4000 ms	Defines how long an input command must be operated to execute a long command without waiting for the double command.

SECONDARY ADAPTIVE JOYSTICK: Switch Options / Timing

PARAMETER	RANGE	DESCRIPTION
Mode Jack Supervision		Disabled': If switch becomes disconnected, no action is taken. 'Stop': If switch becomes disconnected, the chair comes to a smooth stop and a warning, '(Device) Mode Jack disconnected' is displayed. No driving is allowed until the Mode Jack switch is reconnected. 'Rescue Mode': If switch becomes disconnected, the chair enters rescue drive mode and displays a warning, '(Device) Mode Jack disconnected'. Once the Mode Jack switch is reconnected, the chair will drive at normal speed. 'Warning': If switch becomes disconnected, the chair continues to drive normally and a warning, '(Device) Mode Jack disconnected' will be displayed.
On / Off Jack Supervision		Same as Mode Jack Supervision, but for On / Off Jack
Mode Jack Configuration Type		The 'Configuration' setting assigns the Mode Jack to execute short, double or long commands (see settings under 'Jack Commands'). Device Mode Jack can be set to 'Mapped I/O' to be available for mapped I/O purpose (output possibilities according to the 'Mapped I/O Configurator').
Jack 1 Double Command Time	200 – 4000 ms	It sets Jack 1 (jack tip) double command time, defining within what time the second command has to follow to execute a double command. Otherwise the command will be interpreted as a short command. For assignable commands, see menu 'Jack Commands'.
Jack 1 Long Command Time	200 – 4000 ms	It sets Jack 1 (jack tip) long command time, defining how long the switch must be pressed to execute a long command. For assignable commands, see menu 'Jack Commands'.
Jack 2 Double Command Time	200 – 4000 ms	Same as Jack 1 Double Command Time, but for Jack 2.
Jack 2 Long Command Time	200 - 4000 ms	Same as Jack 1 Long Command Time, but for Jack 2.
Mode Jack Switch Type	1 Switch / 2 Switch	This parameter defines if the mode stereo jack processes one or two switches. If '1 Switch' is chosen, only Jack 1 commands (see menu 'Jack Commands') are supported; the switch must be wired to the jack tip. Set to '2 Switch', Jack 1 and Jack 2 commands are processed, where the second switch is wired to the jack ring. Important: If a single switch is plugged into the 'Mode Jack' or 'On / Off Jack', do not set 'Mode Jack Switch Type' or 'On / Off Jack Switch Type' to 'Switch 2' nor configure any 'Jack 2' function.
On / Off Jack Switch Type	1 Switch / 2 Switch	Same as Mode Jack Switch Type, but for On / Off Jack.
Mode Jack E-Stop		Defines how the chair stops if 'Mode Jack E-Stop' is set to 'Decel Stop' or 'Quick Stop' and Mode Jack is operated. – 'Decel Stop': Any activation of the Mode Jack switch while driving will cause the unit to come to a soft stop. – 'Quick Stop': Any activation of the Mode Jack switch while driving will cause the unit to perform a quick stop. While the chair is at rest the Mode Jack will perform the configured functions.
On / Off E-Stop		Same as Mode Jack E-Stop, but for On / Off Jack.

SECONDARY ADAPTIVE JOYSTICK: 3 — Direction Arrow Toggle Settings

PARAMETER	RANGE	DESCRIPTION
Toggle Command Time	200 – 4000 ms	Defines the time in which a command is detected as a toggle command. Toggle while driving: The forward / reverse direction must be operated longer than ‘Toggle De-bounce Time’, but shorter than ‘Toggle De-bounce Time’ + ‘Toggle Command Time’. To issue a drive command the forward / reverse direction must be operated longer than ‘Toggle De-bounce Time’ + ‘Toggle Command Time’. Toggle while stopped: The forward / reverse direction must be operated shorter than ‘Toggle Command Time’. To issue a drive command the forward / reverse direction must be operated longer than ‘Toggle Command Time’.
Toggle De-bounce Time	0 – 4000 ms	Defines the time the input command must be operated while driving before it is recognized as a command (de-bounced). This timing exists only while driving and applies for all 3-Way Input Devices.
Toggle In Seat Command	200 – 4000 ms	Defines the time within which a toggle command is possible in Seat mode. NOTE: This parameter is only used for ‘4-Switch Head’ and ‘5-Switch Head’ in Seat mode.
Latch Toggle Auto Flip	Off / On	If set to ‘Off’ and first acceleration command has been pressed for 500 ms, the arrow remains in the current driving direction. If first acceleration command is released in 500 ms, the arrow will auto flip to the opposite direction assuming that the movement was unintended and the individual wants to stop quickly. If set to ‘On’, the arrow will auto flip to opposite direction as soon as command is released and latch is activated.  WARNING! Emergency Stop Switch highly recommended.
Toggle In Drive	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in a drive profile is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle While Driving	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’ when the chair is in motion, the direction cannot be toggled. NOTE: If set to ‘Disabled’, an alternative toggling method or stopping the chair is necessary.
Toggle In Seat	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in ‘Seat’ is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In Aux	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the auxiliary menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In Bluetooth	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the Bluetooth menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In IR	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the IR menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In ECM	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the ECM menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.

SECONDARY ADAPTIVE JOYSTICK: Jack Commands

PARAMETER	RANGE	DESCRIPTION
Mode Jack Short Command		Assigns one of the following functions / shortcuts to the mode jack short command: ‘Mode, Mode Shortcut, Toggle, Sleep, Home, Enter Lock’. If set to ‘Inactive’, no mode jack short command is recognized by the system. Important: If a single switch is plugged into the ‘Mode Jack’ or ‘On / Off Jack’, do not set ‘Mode Jack Switch Type’ or ‘On / Off Jack Switch Type’ to ‘Switch 2’ nor configure any ‘Jack 2’ function.
Mode Jack Long Command		Same as Mode Jack Short Command, but for Mode Jack Long Command.
Mode Jack Double Command		Same as Mode Jack Short Command, but for Mode Jack Double Command.
On / Off Jack Short Command		Same as Mode Jack Short Command, but for On / Off Jack Short Command.
On / Off Jack Long Command		Same as Mode Jack Short Command, but for On / Off Jack Long Command.
On / Off Jack Double Command		Same as Mode Jack Short Command, but for On / Off Jack Double Command.

SECONDARY ADAPTIVE JOYSTICK: Menu Settings

PARAMETER	RANGE	DESCRIPTION
Menu Navigation Mode		‘Manual’: Menu commands are generated manually and are not repeated. ‘Auto Repeat’: Moving from one menu item to the next will be repeated automatically as long as the command is active. ‘Auto Change’: The menu changes from one item to the next in a pre-determined time ‘Menu Navigation Timing’ with no input command.
Menu Navigation Timing	200 - 2000 ms	For ‘Auto Change’ Mode setting in ‘Menu Navigation Mode’ this parameter sets the time to move from one menu item to the next.
List Navigation Forward Input		Assigns a specific navigation command to the forward direction. Assignment is valid for all list menus. – ‘Scroll Up’ moves upwards through the list – ‘Scroll Down’ moves downwards through the list – ‘Select’ selects the highlighted menu entry – ‘Back Up’ returns to the previous menu – ‘Inactive’ disables directional command NOTE: If ‘Auto Change’ is chosen only ‘Select’ and ‘Back Up’ are active.
List Navigation Left Input		Same as List Navigation Forward Input, but for left input
List Navigation Reverse Input		Same as List Navigation Forward Input, but for reverse input
List Navigation Right Input		Same as List Navigation Forward Input, but for right input

SECONDARY ADAPTIVE JOYSTICK: Menu Entries

PARAMETER	RANGE	DESCRIPTION
Settings	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Settings’. If enabled, system settings are available to the user in the auxiliary menu.
Show Change Inputdevice	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Change Input Device’. If enabled, the ‘Change Input Device’ option is available to the user in the auxiliary menu.

SECONDARY ADAPTIVE JOYSTICK: Standby Select

PARAMETER	RANGE	DESCRIPTION
Standby Select	Disabled / Enabled	Standby Select' allows a user to operate the system without using a mode switch. The system changes to 'Standby Select' screen if no input command was given for the programmed 'Standby Select Timeout'.
Standby Select Timeout	1 – 120 s	Defines the time after which the system changes to 'Standby Select' screen if no valid command was given.
Standby Aux Timeout	Disabled / Enabled	Enables / disables the 'Standby Select' function for the auxiliary menu. If 'Disabled', an alternative mode method has to be available.
Standby Seat Timeout	Disabled / Enabled	Enables / disables the 'Standby Select' function for the seat screen. If 'Disabled', an alternative Mode method has to be available.

SECONDARY ADAPTIVE JOYSTICK: Sleep

PARAMETER	RANGE	DESCRIPTION
Sleep Timeout	0 – 240 min	Defines the time to elapse after the last command given before the system enters the 'Sleep Power Mode'.
Sleep Power Mode	Disabled / Enabled	If 'Enabled', the display will go dark when 'Sleep Timeout' has elapsed or 'Sleep Power Mode' has been executed. To wake up the system with a Head Input Device, a left-right-left command must be given. Any command will wake up the system with any other input device. 'Disabled': This function is not available.
Wake Up		<p>Defines how the system can be woken up from 'Sleep Power Mode'. Available setting options: 'Mode, Left, Right, Left-Right-Left (default), Right-Left-Right'. 'Mode' enables the wake up by Mode command on HC, SAJ and ED.</p> <p>Alternative ways to wake the system up:</p> <ul style="list-style-type: none"> – 'Jacks (Mode or On / Off) if configured to enter sleep – 'Reminder message (popup message) – 'Error message (popup message) – 'On / Off keys on HC, SAJ and ED. <p>No wake up will cause the following:</p> <ul style="list-style-type: none"> – 'Auto Change – 'Standby Select – 'MIOs – 'ED 4-way cursor button – 'AC Jacks. <p>1-Switch Scanner:</p> <p>Any switch command will wake the system up.</p>

SECONDARY ADAPTIVE JOYSTICK: Latch Driving

PARAMETER	RANGE	DESCRIPTION
Latch Driving Visibility	Disabled / Enabled	Enables / disables the auxiliary menu entry 'Latch Driving'. If 'Enabled', the option to enable / disable latch for configured latch drive profiles is available to the user in the auxiliary menu.

SECONDARY ADAPTIVE JOYSTICK: User Speed Adjust

PARAMETER	RANGE	DESCRIPTION
User Speed Adjust	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Speed Adjust’. If ‘enabled’, the ‘Speed Adjust’ option is available to the user in the auxiliary menu.
Drive 1	0 – 10	If ‘User Speed Adjust’ is ‘Enabled’ the user has the ability to adjust the speed of each drive profile in steps of 10% (0 – 10) in the auxiliary menu. If ‘User Speed Adjust’ is ‘Disabled’ the settings of ‘Speed Adjust’ are disregarded and the settings of the corresponding drive profile are taken.
Drive 2	0 – 10	Same as Drive 1
Drive 3	0 – 10	Same as Drive 1
Drive 4	0 – 10	Same as Drive 1

SECONDARY ADAPTIVE JOYSTICK: Profile Change Stop

PARAMETER	RANGE	DESCRIPTION
Profile Change Stop Drive	Disabled / Enabled	If ‘Enabled’, a mode command always stops the driving. After the chair has stopped the mode command is executed. If ‘Disabled’, a mode command changes to the next drive profile while driving without stop, if the next profile is a drive profile. If the next profile is Auxiliary or Seat, driving will stop upon one mode command and the profile will subsequently change.

SECONDARY ADAPTIVE JOYSTICK: Auto Shutoff

PARAMETER	RANGE	DESCRIPTION
Auto Shutoff	0 – 240 min	Defines the time to elapse before the system powers down after the last input command. A power on command by the user will restart the system. Use this parameter to save battery capacity. NOTE: A setting of 0 min disables Auto Shutoff

4.2.6 Attendant Control

ATTENDANT CONTROL: Profile Setup

PARAMETER	RANGE	DESCRIPTION
Mode		Determines the operation for that particular profile in the given order, 1 to 4. If a same mode is configured twice, the system shows the first placed mode only. Disabled profiles do not show on the system. A reverse mode command is disregarded at the first drive profile for safety reasons. Mode shortcut commands change between the profile main types that are Drive, AUX, Seat according to the configured order.

ATTENDANT CONTROL: Joystick Setup

PARAMETER	RANGE	DESCRIPTION
Center Deadband	10 – 50 %	Defines how far the input device must be operated from center for a command to be recognized by the system. The value corresponds to the diameter of a circle around the center position. No drive or menu command will be generated unless the input device is operated out of this circle. NOTE: Increasing the ‘Center Deadband’ value could be useful for an operator with a severe hand tremor.
Tremor Suppression	0 – 100 %	Setting suppresses a tremor on the proportional input device. 0% equals no, 100% equals maximum tremor suppression. NOTE: When a short command is used to operate the system (e.g. when 3-way operation is configured for a device) the ‘Tremor Suppression’ value should not be set over 90%, otherwise short commands will be ignored.
Assigned Direction		The Direction Assignment function is used to select which command is used for forward and steering movements of the wheelchair. Dependency: To determine the proper assignment of the direction the function “Assign Directions” is used.
Forward Throw	30 – 100 %	Sets the percentage of movement of a proportional input device (joystick) in the forward direction to achieve maximum forward driving speed within the drive profile.
Reverse Throw	30 – 100 %	Same as Forward Throw, but for reverse direction.
Left Throw	30 – 100 %	Same as Forward Throw, but for left direction.
Right Throw	30 – 100 %	Same as Forward Throw, but for right direction.
Turn Off	Disabled / Enabled	Defines whether the user can power off the system while the Attendant Control has active system control. If set to ‘Disabled’, only an off command from the Attendant Control will power off the system.

ATTENDANT CONTROL: Device Options / Timing

PARAMETER	RANGE	DESCRIPTION
Double Command Time	200 – 4000 ms	Defines the time required after command release to give a second command to execute a double command.
Long Command Time	200 – 4000 ms	Defines how long an input command must be operated to execute a long command without waiting for the double command.

ATTENDANT CONTROL: Switch Options

PARAMETER	RANGE	DESCRIPTION ON
Mode Jack Supervision		Disabled': If switch becomes disconnected, no action is taken. 'Stop': If switch becomes disconnected, the chair comes to a smooth stop and a warning, '(Device) Mode Jack disconnected' is displayed. No driving is allowed until the Mode Jack switch is reconnected. 'Rescue Mode': If switch becomes disconnected, the chair enters rescue drive mode and displays a warning, '(Device) Mode Jack disconnected'. Once the Mode Jack switch is reconnected, the chair will drive at normal speed. 'Warning': If switch becomes disconnected, the chair continues to drive normally and a warning, '(Device) Mode Jack disconnected' will be displayed.
On / Off Jack Supervision		Same as Mode Jack Supervision, but for On / Off Jack

ATTENDANT CONTROL: User Speed Adjust

PARAMETER	RANGE	DESCRIPTION ON
User Speed Adjust	Disabled / Enabled	Enables / disables the auxiliary menu entry 'Speed Adjust'. If 'enabled', the 'Speed Adjust' option is available to the user in the auxiliary menu.
Drive 1	0 – 10	If 'User Speed Adjust' is 'Enabled' the user has the ability to adjust the speed of each drive profile in steps of 10% (0 – 10) in the auxiliary menu. If 'User Speed Adjust' is 'Disabled' the settings of 'Speed Adjust' are disregarded and the settings of the corresponding drive profile are taken.
Drive 2	0 – 10	Same as Drive 1

4.2.7 SCIM

SCIM: Profile Setup

PARAMETER	RANGE	DESCRIPTION
Mode		Determines the operation for that particular profile in the given order, 1 to 6. If a same mode is configured twice, the system shows the first placed mode only. Disabled profiles do not show on the system. A reverse mode command is disregarded at the first drive profile for safety reasons. Mode shortcut commands change between the profile main types that are Drive, AUX, Seat according to the configured order.

SCIM: Input Configuration

PARAMETER	RANGE	DESCRIPTION
SCIM Input Configuration		Determines the input device to be connected to the SCIM. The Settings list shows all supported input devices. If set to ‘No Device Connected’, the system will not supervise the D-Sub connector, and no device will appear in the ‘Input Device Selection Screen’.

SCIM: Mini Proportional Input

PARAMETER	RANGE	DESCRIPTION
Center Deadband	10 – 50 %	Defines how far the input device must be operated from center for a command to be recognized by the system. The value corresponds to the diameter of a circle around the center position. No drive or menu command will be generated unless the input device is operated out of this circle. NOTE: Increasing the ‘Center Deadband’ value could be useful for an operator with a severe hand tremor.
Tremor Suppression	0 – 100 %	Setting suppresses a tremor on the proportional input device. 0% equals no, 100% equals maximum tremor suppression. NOTE: When a short command is used to operate the system (e.g. when 3-way operation is configured for a device) the ‘Tremor Suppression’ value should not be set over 90%, otherwise short commands will be ignored.
Forward Throw	30 – 100 %	Sets the percentage of movement of a proportional input device (joystick) in the forward direction to achieve maximum forward driving speed within the drive profile.
Reverse Throw	30 – 100 %	Same as Forward Throw, but for reverse direction.
Left Throw	30 – 100 %	Same as Forward Throw, but for left direction.
Right Throw	30 – 100 %	Same as Forward Throw, but for right direction.
Assigned Direction		The Direction Assignment function is used to select which command is used for forward and steering movements of the wheelchair. Dependency: To determine the proper assignment of the direction the function “Assign Directions” is used.
Auto Center Adjust	Disabled / Enabled	If set to ‘Enabled’, the center values for the X- and Y-axis of the proportional Specialty Input Device are temporarily adjusted during startup. In case of a missing center signal or large deviation between X- / Y-axis and the center reference signal, an out of center error shows during startup. In this case the ‘Auto Center Adjust’ must be set to ‘Disabled’ and the proportional calibration has to be done. If set to ‘Disabled’, it is strongly recommended to execute the proportional calibration in order to set the correct center values for Y- and X-axis and to have the full range of the connected proportional Specialty Input Device. NOTE: It is strongly recommended to perform the proportional calibration after a new proportional Specialty Input Device was connected to the system independent of the ‘Auto Center Adjust’ setting in order have the full range calibrated.

SCIM: Mini Proportional Input, cont'd

PARAMETER	RANGE	DESCRIPTION
X Min	0.5 – 4 V	Defines the minimum value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device Calibration Function, but it can be manually adjusted if required.
Y Min	0.5 – 4 V	Same as X Min, but for Y axis
X Center	2 – 10 V	Defines the center value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device calibration function, but it can be manually adjusted if required.
Y Center	2 – 10 V	Same as X Center, but for Y axis
X Max	0.5 – 4 V	Defines the maximum value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device calibration function, but it can be manually adjusted if required.
Y Max	0.5 – 4 V	Same as X Max, but for Y Axis

SCIM: Proportional Input Input

PARAMETER	RANGE	DESCRIPTION
Center Deadband	10 – 50 %	Defines how far the input device must be operated from center for a command to be recognized by the system. The value corresponds to the diameter of a circle around the center position. No drive or menu command will be generated unless the input device is operated out of this circle. NOTE: Increasing the ‘Center Deadband’ value could be useful for an operator with a severe hand tremor.
Tremor Suppression	0 – 100 %	Setting suppresses a tremor on the proportional input device. 0% equals no, 100% equals maximum tremor suppression. NOTE: When a short command is used to operate the system (e.g. when 3-way operation is configured for a device) the ‘Tremor Suppression’ value should not be set over 90%, otherwise short commands will be ignored.
Forward Throw	30 – 100 %	Sets the percentage of movement of a proportional input device (joystick) in the forward direction to achieve maximum forward driving speed within the drive profile.
Reverse Throw	30 – 100 %	Same as Forward Throw, but for reverse direction.
Left Throw	30 – 100 %	Same as Forward Throw, but for left direction.
Right Throw	30 – 100 %	Same as Forward Throw, but for right direction.
Assigned Direction		The Direction Assignment function is used to select which command is used for forward and steering movements of the wheelchair. Dependency: To determine the proper assignment of the direction the function “Assign Directions” is used.
Auto Center Adjust	Disabled / Enabled	If set to ‘Enabled’, the center values for the X- and Y-axis of the proportional Specialty Input Device are temporarily adjusted during startup. In case of a missing center signal or large deviation between X- / Y-axis and the center reference signal, an out of center error shows during startup. In this case the ‘Auto Center Adjust’ must be set to ‘Disabled’ and the proportional calibration has to be done. If set to ‘Disabled’, it is strongly recommended to execute the proportional calibration in order to set the correct center values for Y- and X-axis and to have the full range of the connected proportional Specialty Input Device. NOTE: It is strongly recommended to perform the proportional calibration after a new proportional Specialty Input Device was connected to the system independent of the ‘Auto Center Adjust’ setting in order have the full range calibrated.
X Min	0.5 – 4 V	Defines the minimum value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device Calibration Function, but it can be manually adjusted if required.

[SCIM](#): Proportional Input Input, cont'd

PARAMETER	RANGE	DESCRIPTION
Y Min	0.5 – 4 V	Same as X Min, but for Y axis
X Center	2 – 10 V	Defines the center value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device calibration function, but it can be manually adjusted if required.
Y Center	2 – 10 V	Same as X Center, but for Y axis
X Max	0.5 – 4 V	Defines the maximum value for the X-axis of the proportional Specialty Input Device. Usually this parameter is automatically set by the proportional device calibration function, but it can be manually adjusted if required.
Y Max	0.5 – 4 V	Same as X Max, but for Y Axis

[SCIM](#): 3 — Direction Arrow Toggle Settings

PARAMETER	RANGE	DESCRIPTION
Toggle Command Time	200 – 4000 ms	Defines the time in which a command is detected as a toggle command. Toggle while driving: The forward / reverse direction must be operated longer than 'Toggle De-bounce Time', but shorter than 'Toggle De-bounce Time' + 'Toggle Command Time'. To issue a drive command the forward / reverse direction must be operated longer than 'Toggle De-bounce Time' + 'Toggle Command Time'. Toggle while stopped: The forward / reverse direction must be operated shorter than 'Toggle Command Time'. To issue a drive command the forward / reverse direction must be operated longer than 'Toggle Command Time'.
Toggle De-bounce Time	0 – 4000 ms	Defines the time the input command must be operated while driving before it is recognized as a command (de-bounced). This timing exists only while driving and applies for all 3-Way Input Devices.
Toggle In Seat Command	200 – 4000 ms	Defines the time within which a toggle command is possible in Seat mode. NOTE: This parameter is only used for '4-Switch Head' and '5-Switch Head' in Seat mode.
Latch Toggle Auto Flip	Off / On	If set to 'Off' and first acceleration command has been pressed for 500 ms, the arrow remains in the current driving direction. If first acceleration command is released in 500 ms, the arrow will auto flip to the opposite direction assuming that the movement was unintended and the individual wants to stop quickly. If set to 'On', the arrow will auto flip to opposite direction as soon as command is released and latch is activated.  WARNING! Emergency Stop Switch highly recommended.
Toggle In Drive	Disabled / Enabled	Is relevant for '3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head'. If set to 'Disabled', toggling in a drive profile is not possible. NOTE: If set to 'Disabled', and toggling must be possible, an alternative toggling method is necessary.
Toggle While Driving	Disabled / Enabled	Is relevant for '3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head'. If set to 'Disabled' when the chair is in motion, the direction cannot be toggled. NOTE: If set to 'Disabled', an alternative toggling method or stopping the chair is necessary.
Toggle In Seat	Disabled / Enabled	Is relevant for '3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head'. If set to 'Disabled', toggling in 'Seat' is not possible. NOTE: If set to 'Disabled', and toggling must be possible, an alternative toggling method is necessary.

SCIM: 3 — Direction Arrow Toggle Settings, cont'd

PARAMETER	RANGE	DESCRIPTION
Toggle In Aux	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the auxiliary menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In Bluetooth	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the Bluetooth menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In IR	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the IR menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.
Toggle In ECM	Disabled / Enabled	Is relevant for ‘3-Switch, 3-Switch Head, 3-Way Proportional Devices and 3-Way Proportional Head’. If set to ‘Disabled’, toggling in the ECM menu is not possible. NOTE: If set to ‘Disabled’, and toggling must be possible, an alternative toggling method is necessary.

SCIM: Device Options / Timing

PARAMETER	RANGE	DESCRIPTION
Device Double Command		A double command is only processed when the chair has stopped / is at stand-still. The parameter defines whether ‘Device Double Command’ is ‘Disabled’, or assigned to ‘Enabled Left’ or ‘Enabled Right’. If ‘Enabled Left’ or ‘Enabled Right’, a double command with a specialty input device will perform a ‘Mode’ command. If ‘Disabled’, the left or right command will perform the associated drive command. NOTE: When ‘Enabled’, the ‘Long Command Time’ will dictate how much time the system must wait after the direction is pressed before it activates the function.
Double Command Time	200 – 4000 ms	Defines the time required after command release to give a second command to execute a double command.
Long Command Time	200 – 4000 ms	Defines how long an input command must be operated to execute a long command without waiting for the double command.

SCIM: D-Sub (9-Pin)

PARAMETER	RANGE	DESCRIPTION
D-Sub Supervision	Disabled / Enabled	Defines whether the D-Sub supervision of the device is ‘Disabled’ or ‘Enabled’. If ‘Enabled’ and the D-Sub-9 of the active input device is disconnected, a warning is issued. The chair will stop driving if in drive profile. Auxiliary, Settings and Seat Profiles remain available.
Mode Short Command Type		Assigns one of the following functions / shortcuts to the D-Sub mode short command: ‘Mode, Mode Shortcut, Toggle, Sleep, Home, Enter Lock’. ‘Inactive’ disables D-Sub mode short commands.
Mode Long Command Type		Same as Mode Short Command Type, but for Long Command
Mode Double Command Type		Same as Mode Short Command Type, but for Double Command
Mode Long Command Time	200 – 4000 ms	Defines how long an input command on D-Sub mode must be operated to execute a long command without waiting for the double command. For assignable commands, see menu ‘D-Sub Mode Commands’.
Mode Double Command Time	200 – 4000 ms	Defines the time required to give a second command on D-Sub mode to execute a double command. Otherwise the command will be interpreted as a short command. For assignable commands see menu ‘D-Sub Mode Commands’.
D-Sub Mode E-Stop		Defines how the chair stops if ‘D-Sub Mode E-Stop’ is set to ‘Decel Stop’ or ‘Quick Stop’ and D-Sub Mode is operated. – ‘Decel Stop’: Any activation of the D-Sub Mode switch while driving will cause the unit to come to a soft stop. – ‘Quick Stop’: Any activation of the D-Sub Mode switch while driving will cause the unit to perform a quick stop. While the chair is at rest the D-Sub Mode will perform the configured functions.

SCIM: Menu Settings

PARAMETER	RANGE	DESCRIPTION
Menu Navigation Mode		‘Manual’: Menu commands are generated manually and are not repeated. ‘Auto Repeat’: Moving from one menu item to the next will be repeated automatically as long as the command is active. ‘Auto Change’: The menu changes from one item to the next in a pre-determined time ‘Menu Navigation Timing’ with no input command.
Menu Navigation Timing	200 – 2000 ms	For ‘Auto Change’ Mode setting in ‘Menu Navigation Mode’ this parameter sets the time to move from one menu item to the next.
List Navigation Forward Input		Assigns a specific navigation command to the forward direction. Assignment is valid for all list menus. – ‘Scroll Up’ moves upwards through the list – ‘Scroll Down’ moves downwards through the list – ‘Select’ selects the highlighted menu entry – ‘Back Up’ returns to the previous menu – ‘Inactive’ disables directional command NOTE: If ‘Auto Change’ is chosen only ‘Select’ and ‘Back Up’ are active.
List Navigation Left Input		Same as List Navigation Forward Input, but for left input
List Navigation Reverse Input		Same as List Navigation Forward Input, but for reverse input
List Navigation Right Input		Same as List Navigation Forward Input, but for right input

SCIM: Menu Entries

PARAMETER	RANGE	DESCRIPTION
Settings	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Settings’. If enabled, system settings are available to the user in the auxiliary menu.
Show Change Inputdevice	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Change Input Device’. If enabled, the ‘Change Input Device’ option is available to the user in the auxiliary menu.

SCIM: Standby Select

PARAMETER	RANGE	DESCRIPTION
Standby Select	Disabled / Enabled	‘Standby Select’ allows a user to operate the system without using a mode switch. The system changes to ‘Standby Select’ screen if no input command was given for the programmed ‘Standby Select Timeout’.
Standby Select Timeout	1 – 120 s	Defines the time after which the system changes to ‘Standby Select’ screen if no valid command was given.
Standby Aux Timeout	Disabled / Enabled	Enables / disables the ‘Standby Select’ function for the auxiliary menu. If ‘Disabled’, an alternative mode method has to be available.
Standby Seat Timeout	Disabled / Enabled	Enables / disables the ‘Standby Select’ function for the seat screen. If ‘Disabled’, an alternative Mode method has to be available.

SCIM: Sleep

PARAMETER	RANGE	DESCRIPTION
Sleep Timeout	0 – 240 min	Defines the time to elapse after the last command given before the system enters the ‘Sleep Power Mode’.
Sleep Power Mode	Disabled / Enabled	If ‘Enabled’, the display will go dark when ‘Sleep Timeout’ has elapsed or ‘Sleep Power Mode’ has been executed. To wake up the system with a Head Input Device, a left-right-left command must be given. Any command will wake up the system with any other input device. ‘Disabled’: This function is not available.
Wake Up		<p>Defines how the system can be woken up from ‘Sleep Power Mode’. Available setting options: ‘Mode, Left, Right, Left-Right-Left (default), Right-Left-Right’. ‘Mode’ enables the wake up by Mode command on HC, SAJ and ED.</p> <p>Alternative ways to wake the system up:</p> <ul style="list-style-type: none"> – Jacks (Mode or On / Off) if configured to enter sleep – Reminder message (popup message) – Error message (popup message) – On / Off keys on HC, SAJ and ED. <p>No wake up will cause the following:</p> <ul style="list-style-type: none"> – Auto Change – Standby Select – MIOs – ED 4-way cursor button – AC Jacks. <p>1-Switch Scanner:</p> <p>Any switch command will wake the system up.</p>

SCIM: Latch Driving

PARAMETER	RANGE	DESCRIPTION
Latch Driving Visibility	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Latch Driving’. If ‘Enabled’, the option to enable / disable latch for configured latch drive profiles is available to the user in the auxiliary menu.

SCIM: User Speed Adjust

PARAMETER	RANGE	DESCRIPTION
User Speed Adjust	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Speed Adjust’. If ‘enabled’, the ‘Speed Adjust’ option is available to the user in the auxiliary menu.
Drive 1	0 – 10	If ‘User Speed Adjust’ is ‘Enabled’ the user has the ability to adjust the speed of each drive profile in steps of 10% (0 – 10) in the auxiliary menu. If ‘User Speed Adjust’ is ‘Disabled’ the settings of ‘Speed Adjust’ are disregarded and the settings of the corresponding drive profile are taken.
Drive 2	0 – 10	Same as Drive 1
Drive 3	0 – 10	Same as Drive 1
Drive 4	0 – 10	Same as Drive 1

SCIM: Profile Change Stop

PARAMETER	RANGE	DESCRIPTION
Profile Change Stop Drive	Disabled / Enabled	If ‘Enabled’, a mode command always stops the driving. After the chair has stopped the mode command is executed. If ‘Disabled’, a mode command changes to the next drive profile while driving without stop, if the next profile is a drive profile. If the next profile is Auxiliary or Seat, driving will stop upon one mode command and the profile will subsequently change.

SCIM: Auto Shutoff

PARAMETER	RANGE	DESCRIPTION
Auto Shutoff	0 - 240 min	Defines the time to elapse before the system powers down after the last input command. A power on command by the user will restart the system. Use this parameter to save battery capacity. NOTE: A setting of 0 min disables Auto Shutoff

4.2.8 Sip N Puff

SIP N PUFF: Profile Setup

PARAMETER	RANGE	DESCRIPTION
Mode		Determines the operation for that particular profile in the given order, 1 to 6. If a same mode is configured twice, the system shows the first placed mode only. Disabled profiles do not show on the system. A reverse mode command is disregarded at the first drive profile for safety reasons. Mode shortcut commands change between the profile main types that are Drive, AUX, Seat according to the configured order.

SIP N PUFF: Input Configuration

PARAMETER	RANGE	DESCRIPTION
SNP Input Configuration		Defines the operation mode of the ‘Sip N Puff’: ‘4 Pressure, 2 Pressure’.

SIP N PUFF: Pressure Fine Adjustment

PARAMETER	RANGE	DESCRIPTION
4 Pressure Hard Puff	15 – 100 %	Defines the pressure level that must be applied to give a ‘Hard Puff’ command.
4 Pressure Hard Sip	15 – 100 %	Defines the pressure level that must be applied to give a ‘Hard Sip’ command.
4 Pressure Soft Puff	8 – 100 %	Defines the pressure level that must be applied to give a ‘Soft Puff’ command.
4 Pressure Soft Sip	8 – 100 %	Defines the pressure level that must be applied to give a ‘Soft Sip’ command.
Sampling Delay Puff	20 – 1000 ms	Defines the time that a ‘Puff’ command must be applied for, before it is recognized by the system. It is recommended to set this parameter as low as possible for ‘2 Pressure’ operation.
Sampling Delay Sip	20 – 1000 ms	Defines the time that a ‘Sip’ command must be applied for, before it is recognized by the system. It is recommended to set this parameter as low as possible for ‘2 Pressure’ operation.
Hard Hyst	2 – 10 %	Defines the amount of pressure that a hard command must drop below to be released. The gap between command activation and command release is called hysteresis.
New Command Level	1 – 10 %	Defines the pressure that a command has to fall below before the next command is accepted.
Soft Hyst	2 – 10 %	Defines the amount of pressure that a soft command must drop below to be released. The gap between command activation and command release is called hysteresis.
2 Pressure Puff	8 – 100 %	Defines the pressure level that must be applied to give a ‘Puff’ command.
2 Pressure Sip	8 – 100 %	Defines the pressure level that must be applied to give a ‘Sip’ command.

SIP N PUFF: Pressure Direction Adjustment

PARAMETER	RANGE	DESCRIPTION
Four Pressure Forward Assignment		Defines the forward pressure assignment: ‘Hard Sip, Hard Puff, Soft Sip, Soft Puff’.
Four Pressure Left Assignment		Same as Four Pressure Forward Assignment, but for Left Assignment.
Four Pressure Reverse Assignment		Same as Four Pressure Forward Assignment, but for Reverse Assignment.
Four Pressure Right Assignment		Same as Four Pressure Forward Assignment, but for Right Assignment.
Two Pressure Forward Assignment		Defines the forward pressure assignment: ‘Sip Continuous, Puff Continuous, Sip Short-Continuous, Puff Short-Continuous’.
Two Pressure Left Assignment		Same as Two Pressure Forward Assignment, but for Left Assignment.
Two Pressure Reverse Assignment		Same as Two Pressure Forward Assignment, but for Reverse Assignment.
Two Pressure Right Assignment		Same as Two Pressure Forward Assignment, but for Right Assignment.

SIP N PUFF: Device Options / Timing

PARAMETER	RANGE	DESCRIPTION
Mode Command		Defines how a mode command is executed: ‘Double Sip, Double Puff’. If ‘Disabled’, an alternative mode option has to be available.
Double Command Time	200 – 4000 ms	Defines the time required after command release to give a second command to execute a double command.
Long Command Time	200 – 4000 ms	Defines how long an input command must be operated to execute a long command without waiting for the double command.

SIP N PUFF: Menu Settings

PARAMETER	RANGE	DESCRIPTION
Menu Navigation Mode		‘Manual’: Menu commands are generated manually and are not repeated. ‘Auto Repeat’: Moving from one menu item to the next will be repeated automatically as long as the command is active. ‘Auto Change’: The menu changes from one item to the next in a pre-determined time ‘Menu Navigation Timing’ with no input command.
Menu Navigation Timing	200 – 2000 ms	For ‘Auto Change’ Mode setting in ‘Menu Navigation Mode’ this parameter sets the time to move from one menu item to the next.
List Navigation Forward Input		Assigns a specific navigation command to the forward direction. Assignment is valid for all list menus. – ‘Scroll Up’ moves upwards through the list – ‘Scroll Down’ moves downwards through the list – ‘Select’ selects the highlighted menu entry – ‘Back Up’ returns to the previous menu – ‘Inactive’ disables directional command NOTE: If ‘Auto Change’ is chosen only ‘Select’ and ‘Back Up’ are active.
List Navigation Left Input		Same as List Navigation Forward Input, but for left input
List Navigation Reverse Input		Same as List Navigation Forward Input, but for reverse input
List Navigation Right Input		Same as List Navigation Forward Input, but for right input

SIP N PUFF: Menu Entries

PARAMETER	RANGE	DESCRIPTION
Settings	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Settings’. If enabled, system settings are available to the user in the auxiliary menu.
Show Change Inputdevice	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Change Input Device’. If enabled, the ‘Change Input Device’ option is available to the user in the auxiliary menu.

SIP N PUFF: Standby Select

PARAMETER	RANGE	DESCRIPTION
Standby Select	Disabled / Enabled	‘Standby Select’ allows a user to operate the system without using a mode switch. The system changes to ‘Standby Select’ screen if no input command was given for the programmed ‘Standby Select Timeout’.
Standby Select Timeout	1 – 120 s	Defines the time after which the system changes to ‘Standby Select’ screen if no valid command was given.
Standby Aux Timeout	Disabled / Enabled	Enables / disables the ‘Standby Select’ function for the auxiliary menu. If ‘Disabled’, an alternative mode method has to be available.
Standby Seat Timeout	Disabled / Enabled	Enables / disables the ‘Standby Select’ function for the seat screen. If ‘Disabled’, an alternative Mode method has to be available.

SIP N PUFF: Sleep

PARAMETER	RANGE	DESCRIPTION
Sleep Timeout	0 - 240 min	Defines the time to elapse after the last command given before the system enters the ‘Sleep Power Mode’.
Sleep Power Mode	Disabled / Enabled	If ‘Enabled’, the display will go dark when ‘Sleep Timeout’ has elapsed or ‘Sleep Power Mode’ has been executed. To wake up the system with a Head Input Device, a left-right-left command must be given. Any command will wake up the system with any other input device. ‘Disabled’: This function is not available.
Wake Up		<p>Defines how the system can be woken up from ‘Sleep Power Mode’. Available setting options: ‘Long Puff (default), Long Sip’. For ‘4 Pressure’ configuration, this applies for both, soft or hard pressure commands.</p> <p>Alternative ways to wake the system up:</p> <ul style="list-style-type: none"> – Jacks (Mode Or On / Off) if configured to enter sleep – Reminder message (popup message) – Error message (popup message) – On / Off keys on HC, SAJ and ED. <p>No wake up will cause the following:</p> <ul style="list-style-type: none"> – Auto Change – Standby Select – MIOs – ED 4-way cursor button – AC Jacks.

SIP N PUFF: Latch Driving

PARAMETER	RANGE	DESCRIPTION
Latch Driving Visibility	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Latch Driving’. If ‘Enabled’, the option to enable / disable latch for configured latch drive profiles is available to the user in the auxiliary menu.

SIP N PUFF: User Speed Adjust

PARAMETER	RANGE	DESCRIPTION
User Speed Adjust	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Speed Adjust’. If ‘enabled’, the ‘Speed Adjust’ option is available to the user in the auxiliary menu.
Drive 1	0 – 10	If ‘User Speed Adjust’ is ‘Enabled’ the user has the ability to adjust the speed of each drive profile in steps of 10% (0 – 10) in the auxiliary menu. If ‘User Speed Adjust’ is ‘Disabled’ the settings of ‘Speed Adjust’ are disregarded and the settings of the corresponding drive profile are taken.
Drive 2	0 – 10	Same as Drive 1
Drive 3	0 – 10	Same as Drive 1
Drive 4	0 – 10	Same as Drive 1

SIP N PUFF: Profile Change Stop

PARAMETER	RANGE	DESCRIPTION
Profile Change Stop Drive	Disabled / Enabled	If ‘Enabled’, a mode command always stops the driving. After the chair has stopped the mode command is executed. If ‘Disabled’, a mode command changes to the next drive profile while driving without stop, if the next profile is a drive profile. If the next profile is Auxiliary or Seat, driving will stop upon one mode command and the profile will subsequently change.

SIP N PUFF: Auto Shutoff

PARAMETER	RANGE	DESCRIPTION
Auto Shutoff	0 – 240 min	Defines the time to elapse before the system powers down after the last input command. A power on command by the user will restart the system. Use this parameter to save battery capacity. NOTE: A setting of 0 min disables Auto Shutoff

SIP N PUFF: Calibration

PARAMETER	RANGE	DESCRIPTION
Pressure Sensor Calibration Sip	-12 – 5 kPa	Configures the available operation pressure window between a defined minimum of -0.5kPa (related to ambient pressure) and the maximum Sip (negative) pressure. The selected max value in kPa is considered as 100% reference for all other Sip parameters. The max. Sip (negative) pressure is adjustable between -5kPa and -12kPa. A suggested setting according to standards is -6.8kPa.

Pressure Sensor Calibration Puff	5 – 12 kPa	Configures the available operation pressure window between a defined minimum of 0.5kPa (related to ambient pressure) and the maximum Puff (positive) pressure. The selected max value in kPa is considered as 100% reference for all other Puff parameters. The max. Puff (positive) pressure is adjustable between 5kPa and 12kPa. A suggested setting according to standards is 6.8kPa.
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4.2.9 1-Switch Scanner

1-SWITCH SCANNER: Profile Setup

PARAMETER	RANGE	DESCRIPTION
Mode		Determines the operation for that particular profile in the given order, 1 to 6. If a same mode is configured twice, the system shows the first placed mode only. Disabled profiles do not show on the system. A reverse mode command is disregarded at the first drive profile for safety reasons. Mode shortcut commands change between the profile main types that are Drive, AUX, Seat according to the configured order.

1-SWITCH SCANNER: 1-Switch Scan Settings

PARAMETER	RANGE	DESCRIPTION
1-Switch Scanner Enable	Disabled / Enabled	<p>If ‘Enabled’, the ‘1-Switch Scanner’ is available as an input device.</p> <ul style="list-style-type: none"> – The ‘D-Sub (9-Pin)’ mode pin 6 defaults to operate the ‘1-Switch Scanner’ implying that the configuration of ‘D-Sub (9-Pin)’ mode pin 6 is disregarded. – The ‘On / Off Jack’ and ‘Mode Jack’ default to operate the ‘1-Switch Scanner’. They are set to ‘1 Switch’ operation and the individual configuration is disregarded. <p>Important: If ‘Input Device Selection’ is set to ‘Power On Device’ the ‘1-Switch Scanner’ cannot be activated directly. To activate ‘1-Switch Scanner’ directly, the ‘Input Device Selection’ must be set to ‘Default Input Device’ and ‘Default Input Device’ must be set to ‘1-Switch Scanner’.</p>
Scan Rate	0.5 – 5 s	Defines the scan speed: the higher the value, the slower the scanner will rotate. The scan function is only available when ‘1-Switch Scanner Enable’ is set to ‘Enabled’.
E-Stop for Latch	Disabled / Enabled	<p>If ‘Enabled’, the chair comes to a smooth stop when the ‘1-Switch Scanner’ input is pressed for ‘E-Stop Switch Hold Time’.</p> <p>Important: Shall only be set to ‘Disabled’ if an emergency stop switch is available.</p> <p>NOTE: This parameter is only used in combination with ‘1-Switch Scanner’ and ‘Latch’ driving.</p>
E-Stop Switch Hold Time	500 – 1500 ms	Defines the time after which latch driving is stopped if switch is kept pressed. NOTE: If the chair is driving forward in Latch mode and user presses switch while arrow points to the right, the chair will drive to the right until ‘E-Stop Switch Hold Time’ elapses, and the chair comes to a smooth stop. This parameter is only used in combination with ‘1-Switch Scanner’ and ‘Latch’ driving.
1-Switch Timeout	0 – 60 s	Defines how long the switch can be pressed before driving is stopped. When set to ‘0’, the ‘1-Switch Timeout’ is disabled. NOTE: This parameter is only used in conjunction with ‘1-Switch Scanner’. ‘1-Switch Timeout’ runs independently of ‘Latch Timeout’ and ‘E-Stop For Latch’.
Mode Scan Option	Off / On	Defines if the ‘1-Switch Scanner’ scans through the ‘Mode’ option or not. If set to ‘Off’, the ‘1-Switch Scanner’ skips the ‘Mode’ option. NOTE: If ‘Mode Scan Option’ is set to ‘Off’ and Mode is required for system operation, an alternative Mode method has to be available.
Mouse Move Directions		Defines how the mouse move screen is operated. Available options are ‘4-Direction’ or ‘8-Direction’ scanner. NOTE: This parameter is only used in conjunction with ‘1-Switch Scanner’.

1-SWITCH SCANNER: Scan Order

PARAMETER	RANGE	DESCRIPTION
Item 1		Defines 1st scanner position.
Item 2		Defines 2nd scanner position.
Item 3		Defines 3rd scanner position.
Item 4		Defines 4th scanner position.
Item 5		Defines 5th scanner position.
Item 6		Defines 6th scanner position.
Item 7		Defines 7th scanner position.
Item 8		Defines 8th scanner position.
Item 9		Defines 9th scanner position.
Item 10		Defines 10th scanner position.

1-SWITCH SCANNER: Menu Settings

PARAMETER	RANGE	DESCRIPTION
Menu Navigation Mode		‘Manual’: Menu commands are generated manually and are not repeated. ‘Auto Repeat’: Moving from one menu item to the next will be repeated automatically as long as the command is active. ‘Auto Change’: The menu changes from one item to the next in a pre-determined time ‘Menu Navigation Timing’ with no input command.
Menu Navigation Timing	200 – 2000 ms	For ‘Auto Change’ Mode setting in ‘Menu Navigation Mode’ this parameter sets the time to move from one menu item to the next.

1-SWITCH SCANNER: Menu Entries

PARAMETER	RANGE	DESCRIPTION
Settings	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Settings’. If enabled, system settings are available to the user in the auxiliary menu.
Show Change Inputdevice	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Change Input Device’. If enabled, the ‘Change Input Device’ option is available to the user in the auxiliary menu.
1-Switch Power Off	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘1-Switch Power Off’. If ‘Enabled’, the ‘1-Switch Power Off’ option is available to the user in the auxiliary menu.

1-SWITCH SCANNER: Standby Select

PARAMETER	RANGE	DESCRIPTION
Standby Select	Disabled / Enabled	‘Standby Select’ allows a user to operate the system without using a mode switch. The system changes to ‘Standby Select’ screen if no input command was given for the programmed ‘Standby Select Timeout’.
Standby Select Timeout	1 – 120 s	Defines the time after which the system changes to ‘Standby Select’ screen if no valid command was given.
Standby Aux Timeout	Disabled / Enabled	Enables / disables the ‘Standby Select’ function for the auxiliary menu. If ‘Disabled’, an alternative mode method has to be available.
Standby Seat Timeout	Disabled / Enabled	Enables / disables the ‘Standby Select’ function for the seat screen. If ‘Disabled’, an alternative Mode method has to be available.

1-SWITCH SCANNER: Sleep

PARAMETER	RANGE	DESCRIPTION
ON		
Sleep Timeout	0 – 240 min	Defines the time to elapse after the last command given before the system enters the ‘Sleep Power Mode’.
Sleep Power Mode	Disabled / Enabled	If ‘Enabled’, the display will go dark when ‘Sleep Timeout’ has elapsed or ‘Sleep Power Mode’ has been executed. To wake up the system with a Head Input Device, a left-right-left command must be given. Any command will wake up the system with any other input device. ‘Disabled’: This function is not available.

1-SWITCH SCANNER: Latch Driving

PARAMETER	RANGE	DESCRIPTION
ON		
Latch Driving Visibility	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Latch Driving’. If ‘Enabled’, the option to enable / disable latch for configured latch drive profiles is available to the user in the auxiliary menu.

1-SWITCH SCANNER: User Speed Adjust

PARAMETER	RANGE	DESCRIPTION
ON		
User Speed Adjust	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Speed Adjust’. If ‘enabled’, the ‘Speed Adjust’ option is available to the user in the auxiliary menu.
Drive 1	0 – 10	If ‘User Speed Adjust’ is ‘Enabled’ the user has the ability to adjust the speed of each drive profile in steps of 10% (0 – 10) in the auxiliary menu. If ‘User Speed Adjust’ is ‘Disabled’ the settings of ‘Speed Adjust’ are disregarded and the settings of the corresponding drive profile are taken.
Drive 2	0 – 10	Same as Drive 1
Drive 3	0 – 10	Same as Drive 1
Drive 4	0 – 10	Same as Drive 1

1-SWITCH SCANNER: Auto Shutoff

PARAMETER	RANGE	DESCRIPTION
ON		
Auto Shutoff	0 – 240 min	Defines the time to elapse before the system powers down after the last input command. A power on command by the user will restart the system. Use this parameter to save battery capacity. NOTE: A setting of 0 min disables Auto Shutoff

4.2.10 Bluetooth

Bluetooth allows setup for environmental functions like Mouse or Assistive Switch Control. See the [Bluetooth Capabilities section](#) for operation of these features.

BLUETOOTH: Mouse

PARAMETER	RANGE	DESCRIPTION
Mouse	Disabled / Enabled	Enables / disables Bluetooth ‘Mouse’ connectivity. If ‘Enabled’, ‘Mouse’ is available to the user in the auxiliary menu.
Mouse Clicks		<ul style="list-style-type: none"> – ‘Switches’: Use external switches from base to activate left and right mouse buttons. – ‘Base Toggle’: Use external left mouse switch from base to toggle between mouse movement and mouse clicks. – ‘Base Auto’: Same as ‘Base Toggle’ but automatically returns back to mouse move after click. – ‘Base Hold’: Same as ‘Base Toggle’ but mouse clicks are only active as long as button is being held. – ‘Mode Toggle’: Use mode switch to toggle between mouse movement and mouse clicks. * – ‘Mode Auto’: Same as ‘Mode Toggle’ but automatically returns back to mouse move after click. * – ‘Mode Hold’: Same as ‘Mode Toggle’ but mouse clicks are only active as long as button is being held. * – ‘Double Left Toggle’: Use double left command to toggle between mouse movement and mouse clicks. ** – ‘Double Right Toggle’: Use double right command to toggle between mouse movement and mouse clicks. ** – ‘Double Left Auto’: Same as ‘Double Left’, but returning automatically back to mouse movement. ** – ‘Double Right Auto’: Same as ‘Double Right’, but returning automatically back to mouse movement. ** – ‘Key Toggle’: Use the button ‘Key I’ or ‘Key II’ to toggle between mouse movement and mouse clicks. *** – ‘Key Auto’: Same as ‘Key Toggle’ but automatically returns back to mouse move after click. *** – ‘Key Hold’: Same as ‘Key Toggle’ but mouse clicks are only active as long as button is being held. *** – ‘Keys’: Use the buttons ‘Key I + II’ to activate left and right mouse buttons. *** – ‘Dwell’: After a dwell time the screen toggles automatically between mouse movement and mouse clicks. The ‘Dwell’ time is defined with the ‘Device Long Command Time’. <p>*) If Mode command is used to change between mouse movement and mouse click, an alternative Mode option has to be available.</p> <p>**) If Double command is used to change between mouse movement and mouse click an alternative Mode option has to be available.</p> <p>***) If a Hand Control with light keys is used, the turn indicator buttons are used instead.</p>

BLUETOOTH: Mouse, cont'd

PARAMETER	RANGE	DESCRIPTION
Dwell Time	200 – 10000 ms	If the ‘Mouse Clicks’ option ‘Dwell’ is selected, the mouse screen changes automatically from the mouse move screen to the mouse click screen if the mouse cursor was not moved for the ‘Dwell Time’. The ‘Dwell Time’ starts after the mouse movement command is released. After a click option was selected, the screen changes automatically back to the move screen. A double left click is executed when the left click is operated twice within the ‘Double Command Time’ of the active input device. To return to the mouse move screen without executing a click option, operate the ‘Return’ option in the mouse click screen. If ‘Return’ is operated twice within the ‘Double Command Time’ of the active input device, the Bluetooth screen is left as if a ‘Mode’ command was given. NOTE: For ‘2-Switch’ and ‘Sip N Puff’ set to ‘2 Pressure’ the ‘Right Click’ has to be operated twice within the ‘Double Command Time’ of the active input device to exit the Bluetooth screen.
Mouse Command Scaling	10 – 100 %	Defines the mouse pointer speed.

BLUETOOTH: Assistive Switch Control

PARAMETER	RANGE	DESCRIPTION
Assistive Switch Control	Disabled / Enabled	Enables / disables the Bluetooth ‘Assistive Switch Control’ connectivity. If ‘enabled’, ‘Assistive Switch Control’ is available to the user in the auxiliary menu.

BLUETOOTH: Joystick

PARAMETER	RANGE	DESCRIPTION
Joystick	Disabled / Enabled	Enables / disables Bluetooth ‘Joystick’ connectivity. If ‘Enabled’, ‘Joystick’ is available to the user in the auxiliary menu. NOTE: ‘Joystick’ is not available for 1-Switch and 2-Switch input devices. If a 1-Switch or 2-Switch input device is configured, ‘Joystick’ will not become available to the user in the auxiliary menu.
Joystick Clicks	Switches / Keys	Left and right mouse clicks are used to operate button 1 and 2 in the joystick profile. Alternatively to ‘Switches’ and ‘Keys’ left and right mouse clicks configured in the ‘iAccess’ or as ‘Mapped I/O’ can be used. - ‘Switches’: Use external switches from base to activate button 1 and 2. - ‘Keys’: Use the buttons ‘Key I + II’ to activate button 1 and 2. * * If a Hand Control with light keys is used, the turn indicator buttons are used instead.

4.2.11 Infrared

The Infrared parameters allow for custom navigation within the IR list menus and enabling IR Learn Mode. IR Learn Mode can also be enabled from the system menu. See the [Infrared Setup section](#) for setup, learning, and operation of Infrared using the IR Configurator through ECON.

INFRARED: IR Screen Navigation

PARAMETER	RANGE	DESCRIPTION
Forward		Assigns a specific navigation command to the forward direction. Assignment is valid for all IR screens. – ‘Scroll Up’ moves upwards through the screen – ‘Select’ selects the highlighted element – ‘Back Up’ returns to the previous menu NOTE: - If ‘Auto Change’ is selected only ‘Select’ and ‘Back Up’ are active. – The system does not check, if some or all the directions are set to the same command.
Left		Same as Forward, but for Left
Reverse		Same as Forward, but for Reverse
Right		Same as Forward, but for Right
Mode	Select / Back Up	Assigns a specific navigation command to the mode command. Assignment is valid for all IR screens. – ‘Select’ selects the highlighted element – ‘Back Up’ returns to the previous menu NOTE: - If ‘Auto Change’ is selected only ‘Select’ and ‘Back Up’ are active. – The system does not check, if some or all the directions are set to the same command.

INFRARED: Learn

PARAMETER	RANGE	DESCRIPTION
IR Learn Mode	Off / On	Enables / disables the ‘IR Learn Mode’. If ‘Enabled’, the system is ready to learn IR codes.

4.2.12 Seat

The Seat parameters are for general seat navigation and enabling specific seat functions like iLevel. See the [Seat Configuration section](#) for the full seat customization.

SEAT: Total Back Angle Head Control

PARAMETER	RANGE	DESCRIPTION
Total Back Angle Head Control	10 – 180°	<p>Defines the angle beyond which a Head Input Device will be changed from 3-, 4- or 5-Way operation to 2-Way operation (left and right command).</p> <p>This is necessary because the user might not be able to operate the center command in a tilted position.</p>

SEAT: Seat Navigation

PARAMETER	RANGE	DESCRIPTION
Seat Navigation	standard / advanced	<p>Defines navigation in Seat mode. If set to ‘Standard’:</p> <p>Forward command: Moves selected seat function up / backward. Reverse command: Moves selected seat function down / forward. Right command: Next seat function.</p> <p>Left command: Previous seat function. If set to ‘Advanced’:</p> <p>Forward and reverse commands are ignored.</p> <p>Right command: Moves selected seat function up / backward. Left command: Moves selected seat function down / forward. Mode command: Next seat function.</p> <p>NOTE: Advanced seat navigation is not allowed with ‘1-Switch Scanner’.</p>

SEAT: Seat Head Left / Right Swap

PARAMETER	RANGE	DESCRIPTION
Seat Head Left / Right Swap	No / Yes	Swaps left and right head switches in seat if set to ‘Yes’. For instance, it may be more convenient for the user to operate the ‘Device Double Command’ on the opposite pad to change through seat functions.

SEAT: iLevel

PARAMETER	RANGE	DESCRIPTION
iLevel	Disabled / Enabled	<p>The ‘iLevel’ drive mode is automatically active when the ‘iLevel’ parameter is set to ‘Enabled’ and the seat is in an elevated position. If ‘Disabled’ and seat is in elevated position, the restricted drive profile applies.</p> <p>Before enabling iLevel, ensure that the user can safely operate the wheelchair in ‘iLevel’ drive mode.</p>

SEAT: Latch Cancel

PARAMETER	RANGE	DESCRIPTION
Latch Cancel	Disabled / Enabled	Defines how a latched seat function can be stopped. ‘Enabled’: Any switch or input command will stop the seat function. ‘Disabled’: Only the switch or input command which started the seat function is able to stop the seat function.

SEAT: Cutout Inhibit Time

PARAMETER	RANGE	DESCRIPTION
Cutout Inhibit Time	100 – 2000 ms	Defines for how long the seat actuator current cutout is inhibited. This can be adjusted to prevent unintentional actuator stop due to increased actuator current during start and acceleration phase.

SEAT: Seat Enabled While Driving

PARAMETER	RANGE	DESCRIPTION
Seat Enable While Driving	No / Yes	Defines if seat actuator operation via iAccess module or mapped input / outputs is enabled or disabled while driving (parameter settings ‘Yes, No’).

4.2.13 Environmental Control Module

ENVIRONMENTAL CONTROL MODULE: ECM Settings

PARAMETER	RANGE	DESCRIPTION
ECM Enable	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘ECM’. If ‘Enabled’ and if at least one ECM function is configured and enabled for visibility, the ‘ECM’ entry is available to the user in the auxiliary menu.
Com. Device Output Time	200 – 2000 ms	Defines the minimum output time of an ECM function operated over the ‘Com. Device’ screen.

ENVIRONMENTAL CONTROL MODULE: Function Configuration

PARAMETER	RANGE	DESCRIPTION
Function Visibility	Disabled / Enabled	Enables / disables the ECM function visibility in the auxiliary menu. If ‘Enabled’ and if the ECM function is configured, the ECM function is available to the user in the auxiliary menu.
Function Name		Defines the user specific text for the ECM function.
Function Type		Defines the ECM function type. ‘Hold’: The ECM function is active as long as the input device is operated. ‘Toggle (On / Off)’: The ECM function is toggled with each input command between active and non-active depending on the current state of the ECM function. ‘Com. Device’: Enables the “Communication Device” screen in the auxiliary menu. The ‘Com. Device’ is operated as a ‘Hold’ function. ‘4-Way Screen’: Enables the ‘4-Way Screen’ in the auxiliary menu. The ‘4-Way Screen’ has a fixed relay output assignment (FWD=R1 / RIGHT=R2 / REV=R3 / LEFT=R4) and is operated as a ‘Hold’ function. ‘8-Way Screen’: Enables the ‘8-Way Screen’ in the auxiliary menu. The ‘8-Way Screen’ has a fixed relay output assignment (FWD=R1 / FWD-RIGHT=R1+R2 / RIGHT=R2 / REV-RIGHT=R2+R3 / REV=R3 / REV-LEFT=R3+R4 / LEFT=R4 / FWD-LEFT=R1+R4) and is operated as a ‘Hold’ function.
Relay Outputs		Defines which relay outputs will be set active with the ECM function.

4.2.14 Reminder

Reminders can be configured to show an informational pop-up on the main display. Five custom user reminders are available for configuration, which can have any text up to 32 characters.

REMINDER: General Settings

PARAMETER	RANGE	DESCRIPTION
Display Time	1 – 30 s	Defines how long each pop-up reminder displays.
Repetition Rate	0 – 60 min	Defines how often the reminder pop-up is shown until it is accepted by the user. If set to '0', each reminder will pop up just once. This setting should be used if the 'Reminder Remind Me Later Active' is set to 'Disabled'.

REMINDER: Driven Distance Reminder

PARAMETER	RANGE	DESCRIPTION
Driven Distance Reminder	Disabled / Enabled	Defines if the maintenance reminder will display according to the 'Driven Distance Trigger' condition.
Distance Reminder Text		Defines the text that displays on the maintenance reminder pop-up when the 'Driven Distance Trigger' condition has been reached.
Driven Distance Trigger	0 – 3000 km	Defines the driven distance that triggers the maintenance reminder.

REMINDER: System Days Reminder

PARAMETER	RANGE	DESCRIPTION
System Days Reminder	Disabled / Enabled	Defines if the maintenance reminder displays according to the 'System Days Trigger' condition.
System Days Reminder Text		Defines the text that displays on the maintenance reminder pop-up when the 'System Days Trigger' condition has been reached.
System Days Trigger	1 – 1500 d	Defines after how many days the maintenance reminder is triggered.

REMINDER: User Reminder Settings

PARAMETER	RANGE	DESCRIPTION
User Reminder Access	Disabled / Enabled	Allows the dealer to give user access to the parameter 'User Reminders Active' in the system Settings menu.
Remind Me Later	Disabled / Enabled	Defined by 'Enabled, Disabled' if the 'Accept' and the 'Remind Me Later' buttons are displayed when a reminder pops up.

[REMINDER:](#) User Reminder

PARAMETER	RANGE	DESCRIPTION
Type		Defines the type of ‘User Reminder’ (1 to 5 individually configurable). ‘Disabled’: User reminder is disabled. ‘Interval’: User reminder recurs at an interval. ‘Time’: User reminder displays daily during a specific period of time.
User Reminder Text		Defines the user specific text for ‘User Reminder’ (1 to 5 individually configurable).
Interval	0 – 1440 min	Defines how frequently the user reminder pop-up displays between the Start and Stop time.
Start Time Hours	0 – 23 h	Defines at what time of day the first user reminder pop-up displays. Applies to ‘Interval’ and ‘Time’ reminders.
Start Time Minutes	0 – 59 m	Defines at what time of day the first user reminder pop-up displays. Applies to ‘Interval’ and ‘Time’ reminders.
Stop Time Hours	0 – 23 h	Defines at what time of day the user reminder pop-ups end. Applies to ‘Interval’ reminders.
Stop Time Minutes	0 – 59 m	Defines at what time of day the user reminder pop-ups end. Applies to ‘Interval’ reminders.

4.2.15 System



MANDATORY! The motor settings must be configured to match motor manufacturer specifications for proper speed calculation and a motor resistance for safe system compensation.

SYSTEM: Motor

PARAMETER	RANGE	DESCRIPTION
Motor Current Limit	120 A	Defines the maximum current in Amperes the controller will supply during both drive and regenerating operation. This parameter can be limited to protect the motor from excessive (potentially damaging) currents or to reduce the maximum torque applied to the drive system by the motor.
Motor Current Foldback Threshold	45 – 120 A	After the Power Base has supplied current over the ‘Motor Current Foldback Threshold’ for the configured ‘Motor Current Limit Time’, then the current is reduced to the ‘Motor Current Foldback’ setting for the ‘Motor Current Foldback Time’. NOTE: The Power Base may limit the current to protect itself before the ‘Motor Current Limit Time’ is reached.
Motor Current Limit Time	0 – 100 s	After the Power Base has supplied current over the ‘Motor Current Foldback Threshold’ for the configured ‘Motor Current Limit Time’, the current is reduced to the ‘Motor Current Foldback’ setting for the ‘Motor Current Foldback Time’. NOTE: The Power Base may limit the current to protect itself before the ‘Motor Current Limit Time’ is reached.
Motor Current Foldback	20 – 120 A	After the Power Base has supplied current over the ‘Motor Current Foldback Threshold’ for the configured ‘Motor Current Limit Time’, then the current is reduced to the ‘Motor Current Foldback’ setting for the ‘Motor Current Foldback Time’. NOTE: The Power Base may limit the current to protect itself before the ‘Motor Current Limit Time’ is reached.
Motor Current Foldback Time	10 – 500 s	After the Power Base has supplied current over the ‘Motor Current Foldback Threshold’ for the configured ‘Motor Current Limit Time’, then the current is reduced to the ‘Motor Current Foldback’ setting for the ‘Motor Current Foldback Time’. NOTE: The Power Base may limit the current to protect itself before the ‘Motor Current Limit Time’ is reached.
Motor Limit Hold Current	0 – 100 A	Defines the maximum start current the controller supplies to the motors after releasing the brakes when the chair has stopped under high load with high hold currents. Limiting this current reduces the risk of the chair making a jerky movement if the obstacle / load is removed before giving a new input command. Limiting this current could on the other hand cause a worse roll-back behavior in hill hold conditions since the control loop needs to build up additional hold current off that ‘Motor Limit Hold Current’ level. A reasonable setting is at 40% to 60% of the ‘Motor Current Limit’.
Motor Stall Detection	Disabled / Enabled	Defines whether motor blocking (e.g. at a curb) is supervised by setting the parameter to ‘Enabled’, or not if set to ‘Disabled’. The parameters ‘Stall Current Threshold’ and ‘Stall Time Threshold’ define when the motor is detected as stalled.
Motor Stall Current Threshold	20 – 120 A	Defines the current threshold, where the motor stall condition is detected. After the Power Base has supplied current over the ‘Motor Stall Current Threshold’ for the ‘Motor Stall Time Threshold’ and the motor speed was lower than ‘Motor Stall Speed Threshold’, then the chair comes to a safe stop and the brakes engage.
Motor Stall Time Threshold	0 – 20 s	Defines the time threshold, where the motor stall condition is detected. After the Power Base has supplied current over the ‘Motor Stall Current Threshold’ for the ‘Motor Stall Time Threshold’ and the motor speed was lower than ‘Motor Stall Speed Threshold’, then the chair comes to a safe stop and the brakes engage.

SYSTEM: Motor, cont'd

PARAMETER	RANGE	DESCRIPTION
Motor Stall Speed Threshold	20 – 500 rpm	Defines the speed threshold in RPM at the motor rotor, where the motor stall condition is detected. After the Power Base has supplied current over the ‘Motor Stall Current Threshold’ for the ‘Motor Stall Time Threshold’ and the motor speed was lower than the programmed ‘Motor Stall Speed Threshold’, then the chair comes to a safe stop and the brakes engage.
Motor Max Resistance	5 – 1000 mΩ	Defines the upper motor terminal resistance in mOhms for situations where the chair is blocked under high load (e.g. at curbs where the motors cause a short to the PB outputs and ‘Motor Current Limit’ could be reached). The purpose of this parameter is to apply a speed estimation feedback correction if driving without encoders. This parameter is not used for stall detection or other purpose. For proper determination of the setting, the ‘PB Resistance M1/ M2’ shall be monitored for that specific high load situations, ideally while the chair is at normal operation temperature (whether cold nor hot). - To be effective, the setting is normally 30-80% higher than the characteristic ‘Motor Resistance’. - To switch the speed estimation feedback correction off, the parameter shall be set to a value equal or lower than the ‘Motor Resistance’. - Setting this parameter too high may cause jerky, uncomfortable chair operation under load at low speeds.
Motor Resistance	5 – 1000 mΩ	Defines the motor terminal resistance in mOhms. The setting is used for speed estimation and control feedback. It should be set to the nominal motor reactance. Setting this parameter to a lower value reduces aggressive control and precision. Setting this parameter higher than the actual resistance may cause jerky, uncomfortable or even unsafe chair operation.
Motor Resistance Calibrated	20 – 300 mΩ	Indicates the motor terminal resistance measured and saved by the ‘Motor Resistance Calibration’ function. The parameter is individual per motor and further manually configurable by OEM. The ‘Motor Resistance Calibrated’ is required for motion estimator based driving without encoders and to supervise the encoder speed feedback if driving with encoders.  MANDATORY! The calibration function must be conducted to assure the correct values for the chair, initially or upon motor replacement.
Motor Ke	1 – 1000	The Motor Ke parameter defines the ‘back emf constant’ or ‘voltage constant’ of the drive motor. This parameter is used for the speed estimation and the feedback control.
Motor Max. Idle RPM	100 – 6000 rpm	Defines the maximum rotor-speed of the drive motor, with gear, under no load, when nominal voltage of 24V is applied. This parameter is relevant for speed calculation by the control algorithm.
Motor Gear Ratio	1.0 – 50.0	Defines the ratio between wheel and motor rotor RPM. The motor spins by this ratio faster than the wheel.
Motor Polarity Inverted	No / Yes	Defines the polarity for motor M1 and M2 (reference is PB output). If this parameter is set to ‘No’ the standard output is used, positive motor voltage = forward driving. If it is set to ‘Yes’ the polarity is swapped to positive voltage = reverse driving.  MANDATORY! After changing this parameter the driving direction of the wheelchair must be verified while the chair is jacked / driving wheels are off ground.
Motor Swap	No / Yes	Offers the possibility to mechanically swap the motors. Motor M1 becomes motor M2 (reference is PB output) and vice versa.  MANDATORY! After changing this parameter the driving direction of the wheelchair must be verified while the chair is jacked / driving wheels are off ground.



WARNING! The encoder settings must be configured properly, to match the encoder manufacturer specification. If not, the encoder supervision will detect this and ignore encoder feedback. A warning will be shown on the main display.

SYSTEM: Encoders

PARAMETER	RANGE	DESCRIPTION
Motor Encoders Enabled	No / Yes	If the drive motors are equipped with quadrature encoders, enable this feature by setting to ‘Yes’. Be aware that the ‘Motor Encoder Pulses Per Rev.’ have to be set correctly according to the encoder product specification.
Motor Encoders Pulses per Rev.	10 – 256	Defines the revolution rate of the drive motor encoders. This value must be verified with the encoder product specification. The higher the revolution, the more accurately the chair will behave at low speed. 60 or more pulses per revolution are required. The system supports up to 256 pulses per revolution at a motor rotor speed of 5500 RPM.
Motor Encoder Inverted	No / Yes	Makes it possible to invert the encoder polarity. This may be required if the encoder wiring was changed. Forward encoder information becomes reverse information and vice versa.  MANDATORY! After changing this parameter the driving direction of the wheelchair must be verified with the chair being jacked / driving wheels off ground.



MANDATORY! Stability Control must be tuned to ensure safe driving in turns, when STABILITY CONTROL ENABLED is set Yes and STABILITY CONTROL TECHNOLOGY is set to Gyro or Caster Sensors.

SYSTEM: Stability Control Technology

PARAMETER	RANGE	DESCRIPTION
Stability Control Technology		Disables (None) or enables either ‘Caster Sensors’ or ‘Gyro’ as drive stabilizing technology, which is required for front wheel drive chairs. If enabled, the respective Caster position setting or Gyro calibration function needs to be conducted in order to assure correct operation of the system. If not done, a speed reduction (Stability Control Supervision) warning will be issued, putting the chair in ‘Rescue Drive’ mode.

SYSTEM: Stability Control

PARAMETER	RANGE	DESCRIPTION
Stability Control Enabled	No / Yes	Enables (Yes) or disables (No) the stability control feature set by the OEM. If the OEM has no stability control foreseen, this parameter will not have an effect.
Speed Reduction In Turns	0.00 – 1.00	Limits the speed in a turn for front wheel drive chairs, if the stability control is enabled. Increasing the setting amplifies this effect, reducing it makes the wheel chair more agile / performant.
Accel Reduction Out Of Turns	0.00 – 1.00	Limits the acceleration coming out of a turn for front wheel drive chairs, if the stability control is enabled. Increasing the setting amplifies this effect, reducing it makes the wheel chair more agile / performant.
Decel Increase Into Turns	0.00 – 1.00	Increases the deceleration going into a turn for front wheel drive chairs, if the stability control is enabled. Increasing the setting amplifies this effect. When reducing it the wheel chair adjusts slower to the ‘Speed Reduction In Turns’.
Left Caster Straight Position	-3.15 – 3.15	Adjusts the angle value of the left caster sensor referring to the absolute straight forward position of the left caster wheel. The correct value must be determined by conducting the respective function. The value depends on the caster sensor pickup and is likely to be different for any sensor (left / right).
Right Caster Straight Position	-3.15 – 3.15	Adjusts the angle value of the right caster sensor referring to the absolute straight forward position of the right caster wheel. The correct value must be determined by conducting the respective function. The value depends on the caster sensor pickup and is likely to be different for any sensor (left / right).
Gyro Positive Scaling	0.10 – 3.00	Adjusts the Gyro signal scaling. The correct value must be determined by conducting the respective function. The default value 1.0 enables safe chair operation, but which might not be optimal. The Gyro scaling must not be conducted on moving environment (train, ferry, etc.).
Gyro Neutral Calibration	-1.00 – 1.00	Adjusts the Gyro neutral signal (chair is not moving). The correct value must be determined by conducting the respective function. The Gyro calibration must not be conducted on moving environment (train, ferry, etc.).
Gyro Negative Scaling	0.10 – 3.00	Adjusts the Gyro signal scaling. The correct value must be determined by conducting the respective function. The default value 1.0 enables safe chair operation, but which might not be optimal. The Gyro calibration must not be conducted on moving environment (train, ferry, etc.).



MANDATORY! Limit Settings determine the maximum achievable drive and turn speed, as well as the User Drive Profile limits. They must be tuned to match the max speeds desired and to ensure safe profile tuning adjustments for dealers.

SYSTEM: Limit Settings

PARAMETER	RANGE	DESCRIPTION
Drive Max Speed	5 – 100 %	Defines the maximum possible chair speed based on motor RPM and gear ratio. The value of this parameter rescales the individual forward and reverse speed settings for all drive profiles. Example: ‘Drive Max Speed’ = 60%, ‘Fwd Max Speed’ in Drive Profile 4 = 80%, Resulting max. forward speed = $0.6 \times 0.8 = 48\%$ of the max. possible forward speed.
Drive Max Turn	5 – 100 %	Defines the maximum possible chair turn speed based on motor RPM and gear ratio. The value of this parameter rescales the individual turn speed settings for all drive profiles. Example: ‘Drive Max Turn’ = 75%, ‘Turn Max Speed’ in Drive Profile 4 = 90%, Resulting max. turn speed = $0.75 \times 0.9 = 67.5\%$ of the max. possible turn speed.
Profile Fwd Accel Limit	25 – 100 %	
Profile Fwd Decel Limit	25 – 100 %	
Profile Fwd Speed Limit	25 – 100 %	
Profile Rev Accel Limit	25 – 100 %	
Profile Rev Decel Limit	25 – 100 %	
Profile Rev Speed Limit	25 – 100 %	
Profile Turn Accel Limit	25 – 100 %	
Profile Turn Decel Limit	25 – 100 %	
Profile Turn Speed Limit	25 – 100 %	Sets the limit a lower access level can configure the related drive profile setting to. It applies to all drive profiles. If lowered, previously higher profile settings are limited accordingly.



MANDATORY! Shaping Settings must be tuned to ensure safe driving in turns at maximum possible forward and turn speeds, so traction is always maintained.

SYSTEM: Shaping Settings

PARAMETER	RANGE	DESCRIPTION
Velocity Turn KShape	0.00 – 1.00	This parameter defines the amplitude/Strength of the shaping function which reduces the vehicle speed in turns. Set to 1 (max value) equals factor 0.5 on the possible vehicle speed in the direction where the ‘Velocity Turn Shape Phase’ angle is set. Away from the phase angle, but within the ‘Velocity Turn Shape Sector’ angle the speed reduction fades out towards zero. This setting depends on the chair type and user weight.
Velocity Turn Shape Sector	0 – 90°	This parameter defines the sector within which the velocity / turn shaping function reduces vehicle speed in turns. The sector angle has to entirely fit into the forward / right quadrant. The sector middle (half of the sector angle) is where the ‘Velocity Turn Shape Phase’ is set. The sector defined is applied to all four quadrants of the input commands. The phase angle plus / minus half of the sector angle shall not exceed the forward / right quadrant. This setting depends on the chair type and user weight.
Velocity Turn Shape Phase	0 – 90°	This parameter defines the phase angle, measured from 12 o'clock to 3 o'clock (forward / right quadrant) over which the sector angle is centrally placed. The phase angle plus / minus half of the sector angle shall not exceed the forward / right quadrant. This setting depends on the chair type and user weight.
Velocity Turn Reactivity	0.00 – 1.00	This parameter increases the vehicle reactivity to turn commands at higher speeds. Maximum effect is when the setting is 1, no effect at 0. This setting depends on the chair type and user weight.
Switched Turn Drive 1	20 – 50°	Defines the input trajectory angle for all drive 1 profiles of switched input devices or proportional input devices configured to operate switched. Example for setting of 35°: Forward + left for switched operation equals 35° degrees of a proportional input, resulting in the respective turning arc. All diagonal directions forward / reverse, left / right use the same angle symmetrically, measured against the forward / reverse axis.
Switched Turn Drive 2	20 – 50°	Same as ‘Switched Turn Drive 1,’ but for Drive 2
Switched Turn Drive 3	20 – 50°	Same as ‘Switched Turn Drive 1,’ but for Drive 3
Switched Turn Drive 4	20 – 50°	Same as ‘Switched Turn Drive 1,’ but for Drive 4
Switched Turn Time	0.00 – 2.00 s	Defines the transition time for changing drive directions giving switched input commands. Examples for a setting at 1 second: – Forward to forward + left takes 1s – Forward + left to left takes 1s – Left to forward + left takes 1s etc. – Left directly to forward takes 1s after passing forward + left sector (time being reset at transition through forward + left to not double up) The transition time setting does not apply if there is a direction change forward / reverse or when the input command has been released between two switch commands. In this case, the drive profile accels / decels apply.

SYSTEM: Chair Drive Profile

PARAMETER	RANGE	DESCRIPTION
Drive Quick Stop Fwd Factor	1.0 – 3.0	This parameter value is multiplied by the individual forward deceleration setting of each individual drive profile. The result is a stronger deceleration when stopping in quick stop mode. A quick stop is performed when the joystick is deflected more than 50% in reverse direction while driving forward. Example: 'Drive Quick Stop Forward Factor' = 2.0, 'Fwd Max Accel' in Drive 1 = 50%. Quick stop deceleration forward = $2.0 \times 50\% = 100\%$.
Drive Quick Stop Rev Factor	1.0 – 3.0	This parameter value is multiplied by the individual reverse deceleration setting of each individual drive profile. The result is a stronger deceleration value when stopping in quick stop mode. A quick stop is performed when the joystick is deflected more than 50% in forward direction while driving reverse. Example: 'Quick Stop Factor Reverse' = 1.5, 'Rev Max Accel' in Drive 1 = 40%. Quick stop deceleration reverse = $1.5 \times 40\% = 60\%$.
Drive Emergency Stop	50 – 100 %	Defines deceleration in an emergency stop. The 'Emergency Stop' has a higher deceleration rate than the 'Quick Stop', but will not exceed 4m / s2. An 'Emergency Stop' is performed as a result of system hardware or software errors being detected, or if the system gets switched off while driving. 100% corresponds to a deceleration of 4m / s2. 'Emergency Stop' is concluded by engaging the park brake and switching the system off.
Drive Forward Tracking	-100 – 100	Adjusts the straight forward driving. It is used to compensate small differences in the motors, tires, wheels, weight etc. Before changing 'Drive Forward Tracking', check the following factors that influence straight driving: Tire pressure, caster tension, weight distribution of the operator and ground surface. Decrease the tracking value (-), if the chair veers to the right. Increase the tracking value (+), if the chair veers to the left. Adjustment increments of 2 should be used, then retest the tracking. Notes: A loose caster wheel tension will cause the casters to flutter at high speeds. If it is too tight, the wheelchair is hard to turn. If the operator's weight is not centered, the wheelchair will veer. The chair will not drive fully straight on uneven ground.
Drive Reverse Tracking	-100 – 100	Same as 'Drive Forward Tracking,' but for Reverse
Rescue Drive Fwd Speed	5 – 40 %	
Rescue Drive Fwd Accel	5 – 40 %	
Rescue Drive Fwd Decel	5 – 60 %	Defines the speed, accel, and decel limits when the wheelchair is in 'Rescue Drive'. 'Rescue Drive' can be activated by certain warnings or errors.
Rescue Drive Turn Speed	5 – 40 %	If these parameters are higher than the active drive profile setting, the lower value is used.
Rescue Drive Turn Accel	5 – 40 %	
Rescue Drive Turn Decel	5 – 60 %	 WARNING! Make sure that the user can safely operate the wheelchair at this setting.
Rescue Drive Rev Speed	5 – 40 %	
Rescue Drive Rev Accel	5 – 40 %	
Rescue Drive Rev Decel	5 – 60 %	
Rescue Drive Power	20 – 100 %	Limits the system drive torque output for the 'Rescue Drive' profile. If this setting is higher than the current drive profile 'Power' parameter setting, then the lower value is taken. Ensure that the user can safely operate the wheelchair at this setting.

SYSTEM: Chair Drive Profile, cont'd

PARAMETER	RANGE	DESCRIPTION
iLevel Drive Fwd Speed	5 – 40 %	
iLevel Drive Fwd Accel	5 – 40 %	
iLevel Drive Fwd Decel	5 – 60 %	
iLevel Drive Turn Speed	5 – 40 %	Defines the maximum value when the wheelchair is fully elevated in 'iLevel Drive' mode. The 'iLevel Drive' mode is automatically active when 'iLevel' parameter is 'Enabled' and the seat is in an elevated position.
iLevel Drive Turn Accel	5 – 40 %	If these parameters are higher than the active drive profile setting, the lower value is used.
iLevel Drive Turn Decel	5 – 60 %	
iLevel Drive Rev Speed	5 – 40 %	 WARNING! Make sure that the user can safely operate the wheelchair at this setting.
iLevel Drive Rev Accel	5 – 40 %	
iLevel Drive Rev Decel	5 – 60 %	
iLevel Drive Power	20 – 100 %	Limits the system drive torque output for the 'iLevel Drive' mode. If this setting is higher than the current drive profile 'Power' parameter setting, then the lower value is taken. Ensure that the user can safely operate the wheelchair at this setting.

SYSTEM: Wheel Settings

PARAMETER	RANGE	DESCRIPTION
Wheel Diameter	0.100 – 1.000 m	Defines the diameter of the drive wheels of the chair. This value must be set accurately.
Wheelbase	0.100 – 1.000 m	Defines the distance between the driving wheels and caster wheels for front- and rear wheel drive chairs. This value is required for the turn rate calculation based on caster sensor angle data and must be set correctly.
Speed Calibration	0.000 – 2.000	Allows speed indicator adjustment on eX1 system drive screens. Increasing the 'Speed Calibration' value increases the indicated speed. The default factor of '1' may be slightly increased for example, where a 6mph chair indicates 5.9mph only at 100% 'Fwd Max Speed' in the drive profile, and 100% 'Drive Max Speed' in the 'Limit settings'.
Track Width	0.100 – 1.000 m	Defines the distance between the driving wheels (mid tire). This value is required for the turn rate calculation based on caster angle sensor feedback and must be set correctly.



MANDATORY! Brake Settings must be configured to ensure the brake always engages with the apply voltage, and holds with the continuous voltage.

SYSTEM: Brake Settings

PARAMETER	RANGE	DESCRIPTION
Delay	10 – 500 ms	If the motors run below a certain RPM and no drive command is detected, the brakes will engage after the ‘Delay’ (in ms) expires. NOTE: ‘Delay’ should have a lower value than ‘Safety Delay’.
Safety Delay	10 – 1500 ms	Defines the delay to engage the brakes as a second criteria (subsequent to ‘Delay’) if no more drive command is detected. For safety reasons, ‘Safety Delay’ is without regard of the motor RPM. NOTE: The ‘Safety Delay’ should have a higher value than ‘Delay’.
Apply Time	100 – 2000 ms	Defines the duration (in ms) of the release pulse applied to the brakes. This pulse has to release the brakes, even if they are at maximum operating temperature. After the release pulse, the ‘Continuous Voltage’ is applied to the brakes.
Apply Voltage	6 – 24 V	Defines the voltage of the release pulse applied to the brakes. This pulse has to release the brakes, even if they are at maximum operating temperature. After the release pulse, the ‘Continuous Voltage’ is applied to the brakes.
Continuous Voltage	6 – 24 V	Defines the voltage applied to the brakes after the release pulse. This parameter should be set higher than the minimum required voltage to keep the brakes released, even if the brakes are at maximum operating temperature. ‘Continuous Voltage’ set to the minimum required level reduces the power consumption and the brake temperatures.

SYSTEM: Miscellaneous

PARAMETER	RANGE	DESCRIPTION
System Lock	Disabled / Enabled	Enables or disables the system to start up in a locked condition. The user is asked to unlock the system at start up before using it. When activating the ‘System Lock’ the system shall power down.
Latch Timeout Disable	No / Yes	If set to ‘Yes’ the ‘Latch Timeout’ is disabled. The chair will NOT come to a stop unless a stop command is given.  WARNING! This parameter should not be set to ‘Yes’ for normal operation!
Chair Serial Number		Editable field that contains the chair serial number from production. Example: JB626813322020.
Seat Serial Number		Editable field that contains the seat serial number. This information is not configured in production and will be added by the provider. Example: Y031751507106
Provider Info Line 1		The system provides 6 editable fields for entering the provider information. Each field refers to a line on the provider information screen (HC or ED display).
Provider Info Line 2		
Provider Info Line 3		
Provider Info Line 4		Provider information example and format: Line 1: Curtis Instruments, Inc.
Provider Info Line 5		Line 2: - spare -
Provider Info Line 6		Line 3: 200 Kisco Ave Line 4: Mt Kisco, NY 10549 Line 5: 1-914-666-2971 Line 6: https://www.curtsinstruments.com/

SYSTEM: Motor Load Compensation

PARAMETER	RANGE	DESCRIPTION
Motor Calibration Range Max	20 – 300 mΩ	Defines the upper limit where the measured values by the ‘Motor Resistance Calibration’ function are considered valid. If a measured value exceeds that limit, it is saved to the ‘Motor Resistance Calibrated’ settings cut back to this limit. The values configurable by OEM may exceed this limit according to the ‘Motor Resistance Calibrated’ parameter range.
Motor Calibration Range Min	20 – 300 mΩ	Defines the lower limit where the measured values by the ‘Motor Resistance Calibration’ function are considered valid. If both motor resistance values are at or above that limit, they are saved to the ‘Motor Resistance Calibrated’ settings. The calibration function results unsuccessful below that limit. The values configurable by OEM may exceed this limit according to the ‘Motor Resistance Calibrated’ parameter range.
Motor Load Compensation Rate	60 – 100 %	 WARNING! Important: The setting greatly effects how the chain drives, adjust with caution, in small increments. Before adjusting this parameter be sure to adjust the ‘User Drive Profiles’ to achieve the desired drive experience. The parameter chooses the percentage of the motor load compensation that is applied to the control loop. Decreasing the default value will soften the drive reaction and result in reduced curb climb and hill hold performance. Increasing the default value will make the drive experience more direct which can make the unit feel aggressive.

SYSTEM: Charger

PARAMETER	RANGE	DESCRIPTION
Charger Inhibit	Low active / High active	Defines whether the system ‘Charger Inhibit’ signal set by the charger connector is ‘Low Active’ (charger pulls the inhibit signal low) or ‘High Active’ (charger pulls the inhibit high). With the correct setting, the system shows the drive inhibit state in the display top bar while the charger is connected.
Charging Detection	Disabled / Enabled	If ‘Enabled’ the system measures if the connected charger does charge the chair. If no charge is detected after 30 seconds, the system will issue an error message if the battery voltage is below 25V. It is possible with certain chargers that the system issues an error message even if the charger is charging. In this case, it is recommended to ‘Disable’ the ‘Charging Detection’.

4.2.16 Display

DISPLAY: Language

PARAMETER	RANGE	DESCRIPTION
Language		Sets the preferred system dialogue language.

DISPLAY: Background

PARAMETER	RANGE	DESCRIPTION
Background		Defines background wallpaper of the system display of Handcontrol or Enhanced Display. The setting ‘No Background’ displays a black background. The background wallpapers display in Drive and Seat screens, but not in Auxiliary and Settings screens. A list of different backgrounds is also available to the user in the system Settings menu.

DISPLAY: Units

PARAMETER	RANGE	DESCRIPTION
Measurement System	Miles / Km	Defines Metric or US / Imperial units for the system. Setting ‘EU’ is for metric values, ‘US’ for US / Imperial values displayed on the system.
Time Format	12h / 24h	Defines the time format for the system. Setting ‘12h’ displays ‘11:25 am’ and ‘11:25 pm’. Setting ‘24h’ displays ‘11:25’ and ‘23:25’.

DISPLAY: Photo Album

PARAMETER	RANGE	DESCRIPTION
Photo Album	Disabled / Enabled	Enables / disables the auxiliary menu entry ‘Photo Album’. If ‘Enabled’ and if at least one picture is available, the ‘Photo Album’ entry is available to the user in the auxiliary menu.

DISPLAY: Icon Visibility

PARAMETER	RANGE	DESCRIPTION
Time Indicator	Disabled / Enabled	The visibility of the Time Indicator (clock time) on the display top bar is ‘Disabled’ or ‘Enabled’ by this parameter.
Distance Indicator	Disabled / Enabled	The visibility of the Mileage Indicator on the Drive screens is ‘Enabled’ or ‘Disabled’ by this parameter.
Trip / Odo Meter		If ‘Mileage Indicator’ is ‘Enabled’ the user has the ability to choose between ‘Trip Meter’ or ‘Odometer’ in the ‘Settings’ menu.
Battery Percentage	Disabled / Enabled	The visibility of the Battery Percentage on the display top bar is ‘Disabled’ or ‘Enabled’ by this parameter.
Speed Indicator	Disabled / Enabled	The visibility of the Speed Indicator on the Drive screens is ‘Disabled’ or ‘Enabled’ by this parameter.
Speed Pot	Disabled / Enabled	The visibility of the Speed Pot Indicator on the Drive screens is ‘Disabled’ or ‘Enabled’ by this parameter. If ‘Disabled’, the indicator is not displayed for ‘3-Step’ latch (where it is used to indicate the three latch speed levels).
Footrest and Lift Operation Indication	Disabled / Enabled	The visibility of the animated Footrest and Lift Operation Indication arrows on the Seat screen is ‘Disabled’ or ‘Enabled’ by this parameter.
Back Operation Indication	Disabled / Enabled	The visibility of the animated Back Operation Indication arrows on the Seat screen is ‘Disabled’ or ‘Enabled’ by this parameter.
Tilt and Recline Operation Indication	Disabled / Enabled	The visibility of the animated Tilt and Recline Operation Indication arrows on the Seat screen is ‘Disabled’ or ‘Enabled’ by this parameter.

DISPLAY: Battery Life Indication

PARAMETER	RANGE	DESCRIPTION
Battery Life Indication	Disabled / Enabled	If ‘Enabled’ the system will show a popup with the remaining battery charge when the battery charge is at 50%, 30% and 15%.

DISPLAY: Brightness

PARAMETER	RANGE	DESCRIPTION
Brightness Day	5 – 100 %	Defines display brightness when ambient light conditions are above the threshold set with parameter ‘Day / Night Threshold’.
Brightness Night	5 – 100 %	Defines display brightness when ambient light conditions are below the threshold set with parameter ‘Day / Night Threshold’.
Day / Night	Off / On	Defines with ‘On, Off’ setting if the display brightness is automatically adjusted to the ‘Brightness Day’ and ‘Brightness Night’ levels according to the ambient light conditions.
Day / Night Threshold	0 – 100 %	Defines the ambient light threshold value to switch the display brightness between the ‘Brightness Day’ and ‘Brightness Night’ settings.
Dimming Delay	0 – 240 s	If there is no user input command for longer than ‘Dimming Delay’ setting, the display brightness is reduced.

DISPLAY: iAccess

PARAMETER	RANGE	DESCRIPTION
Display and LED brightness day	5 – 100 %	Defines the iAccess device display and LED brightness when ambient light conditions are above the threshold set with parameter ‘Day / Night Threshold’.

Display and LED brightness night	5 – 100 %	Defines the iAccess device display and LED brightness when ambient light conditions are below the threshold set with parameter ‘Day / Night Threshold’.
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4.2.17 Audio

AUDIO: Horn

PARAMETER	RANGE	DESCRIPTION
Horn Volume	10 – 100 %	Defines the horn volume. The horn volume applies as well for the audible warning signal while the chair is driving in reverse.
Horn Frequency	500 – 3000 Hz	Defines the Horn signal frequency. Can be adjusted to meet local traffic laws and / or user preference.

AUDIO: Beep

PARAMETER	RANGE	DESCRIPTION
Beep Low Frequency	600 – 4500 Hz	Defines the frequency of the low beep. Low beeps are used to indicate command beeps, navigation beeps, reminder beeps, warning and error beeps, other system beeps.
Beep Medium Frequency	600 – 4500 Hz	Defines the frequency of the medium beep. Medium beeps are used to indicate navigation beeps.
Beep High Frequency	600 – 4500 Hz	Defines the frequency of the high beep. High beeps are used to indicate navigation beeps.
Beep Volume	10 – 100 %	Defines the standard beep volume used for all beep types ('Horn Volume' is a separate parameter).
Mouse Command Beep	Off / On	If set to 'On', mouse commands give an audible feedback.
De-bounce Feedback	Off / On	If 'Enabled', an acoustical signal will be given after 'Toggle De-bounce Time' has passed.
Reminder Beep	Off / On	If set to 'On', reminder pop-ups give an audible feedback.
Seat Latch Timeout Beep	Off / On	If set to 'On', latched seat functions give an audible feedback when stopped.
Sip N Puff Beep		If set to 'On', every pressure level gives an individual audible feedback as long as a valid pressure is applied to the input device.
Reverse Alarm D1	Off / On	
Reverse Alarm D2	Off / On	If set to 'On', the drive profile 1, 2, 3, and/or 4 gives an intermittent audible warning while the chair is driving backwards. Sound frequency and volume settings are shared with 'Horn' parameter settings.
Reverse Alarm D3	Off / On	
Reverse Alarm D4	Off / On	
1-Switch Beep D1	Off / On	
1-Switch Beep D2	Off / On	If set to 'On', in 1-Switch drive profile 1, 2, 3, and/or 4 each cursor position on the screen items gives individual beep frequencies while scanning through.
1-Switch Beep D3	Off / On	
1-Switch Beep D4	Off / On	

AUDIO: Navigation

PARAMETER	RANGE	DESCRIPTION
Navigation Beep Type		This parameter offers the following settings: – 'Disabled': No command or navigation beep audible. – 'Basic': Transitions between profile screens, drive profiles and seat functions are audible. – 'Advanced': In addition to 'Basic', menu and list navigation is audible. – 'Command': Audible feedback if a valid input command (keys, mode switch, menu navigation with any input device, etc.) is entered.
Home / Standby Beep	Off / On	
Drive Beep	Off / On	If set to 'On', the selected 'Navigation Beep Type' is audible in these screens. If set to 'Off', all beeps are deactivated for these screens.
Aux / Settings Beep	Off / On	
Seat Beep	Off / On	

4.2.18 Battery



MANDATORY! The battery settings must be set according to the battery manufacturer specifications, to ensure an accurate battery indication level is displayed.

BATTERY: Voltage

PARAMETER	RANGE	DESCRIPTION
Reset Voltage	2.15 – 2.25 V	If the battery voltage meets or exceeds this voltage level at system power up, then the system assumes that the battery has been fully charged and resets the battery capacity and indicator to 100% (fully charged).
Full Voltage (Charge)	2.20 – 2.40 V	Defines the Battery voltage per cell at 100% battery charge (fully charged) WHILE CHARGING. This parameter is not only dependent on the battery but also on the charger (charge rate, profile, etc.).
Empty Voltage (Charge)	1.80 – 2.20 V	Defines the Battery voltage per cell at 0% battery charge (empty battery) WHILE CHARGING. This parameter is not only dependent on the battery but also on the charger (charge rate, profile, etc.).
Full Voltage (Discharge)	2.00 – 2.10 V	Defines the voltage per cell of the battery at 100% (fully charged) of the useable battery capacity during a discharge process (system stand by, driving). These parameters are mainly dependent on the battery type (Lead Acid, Ni-Cd, etc.), technology (wet, gel, etc.) and manufacturer.
Empty Voltage (Discharge)	1.50 – 2.00 V	Defines the voltage per cell of the battery at 0% (empty battery) of the useable battery capacity during a discharge process (system stand by, driving). These parameters are mainly dependent on the battery type (Lead Acid, Ni-Cd, etc.), technology (wet, gel, etc.) and manufacturer.  WARNING! A too low voltage value (below battery specification) may lead to deep discharge causing damage to the battery.

BATTERY: Charge / Discharge

PARAMETER	RANGE	DESCRIPTION
Charge Rate	1 – 10	This parameter is used to adjust the system Battery Indicator accuracy while charging. It depends on the battery capacity, battery age, and charging rate. An average value setting is '5'. It should be set higher than '5' for high capacity batteries or low current charging (long charging time). It should be set lower than '5' for low capacity batteries or high current charging (short charging time). A change of 1 unit increases / decreases the rate by 20%.
Discharge Rate	1 – 10	This parameter is used to adjust the system Battery Indicator accuracy while discharging. It depends on the battery capacity, battery age, and discharge pattern. An average value setting is '5'. It should be set higher than '5' for high capacity batteries or low current discharging (long discharging time). It should be set lower than '5' for low capacity batteries or high current discharging (short discharging time). A change of 1 unit increases / decreases the rate by 20%.

4.2.19 Light

LIGHT: Light Settings

PARAMETER	RANGE	DESCRIPTION
Light Voltage	6 – 24 V	Defines the standard nominal operation voltage for the front, back and indicator lights. Please make sure this setting meets the light product specification.
Indicator Fault Current	0.0 – 2.0 A	If the current of an indicator (left or right) is below this limit, then the indicator frequency of the affected indicator will be doubled. If indicator detection is missing, the indicator frequency will be doubled and a warning message will be issued.
Indicator Timeout	5 – 300 s	Defines the time in seconds, after which the indicators automatically turn off. Important: This timeout does not end the hazard indication mode.
Blink Frequency	0.5 – 2.0 Hz	Defines the blink frequency for indicators and hazard lights.

LIGHT: Light Key Settings

PARAMETER	RANGE	DESCRIPTION
Enable Light	No / Yes	Enables the light functions. The lights must be ‘Disabled’ when no lights are connected to the light module. Otherwise the light icon will appear on the system display. There will be no warning if the lights of both sides are disconnected.
Enable Indicators	No / Yes	Enables the indicator functions. The indicators must be ‘Disabled’ when no indicators are connected to the light module. Otherwise the indicator icons will appear on the system display and an indicator warning will be issued due to no indicator current consumption.

4.3 SEAT CONFIGURATION

The seat configuration can be customized from any programming device, but for full programming capabilities, ECON must be used.

Seat programming customization not included using a 1313 Handheld:

- Functions Order
- End Switches
- Restrictions

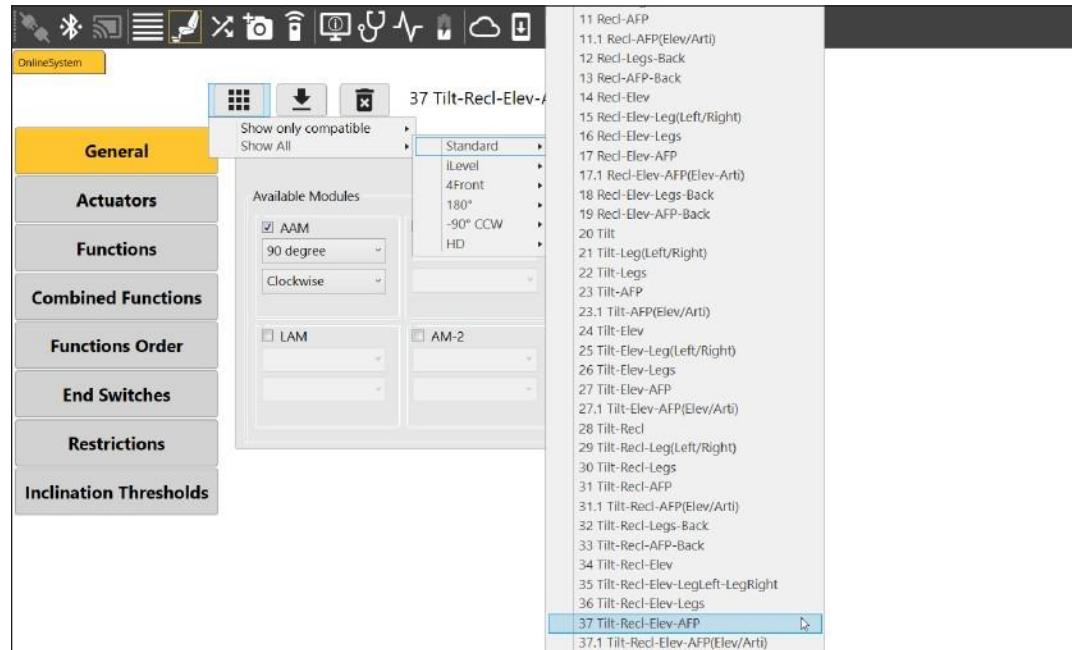
NOTE: If a Seat Preset is loaded from the 1313 Handheld, the Functions Order, End Switches, and Restrictions are still imported to the online system.

Seat Presets

A Seat Preset Library contains pre-defined seat configurations for all of the customization options included in this section. Once a Seat Preset is selected, the configuration can be added to, modified, or deleted by the OEM.

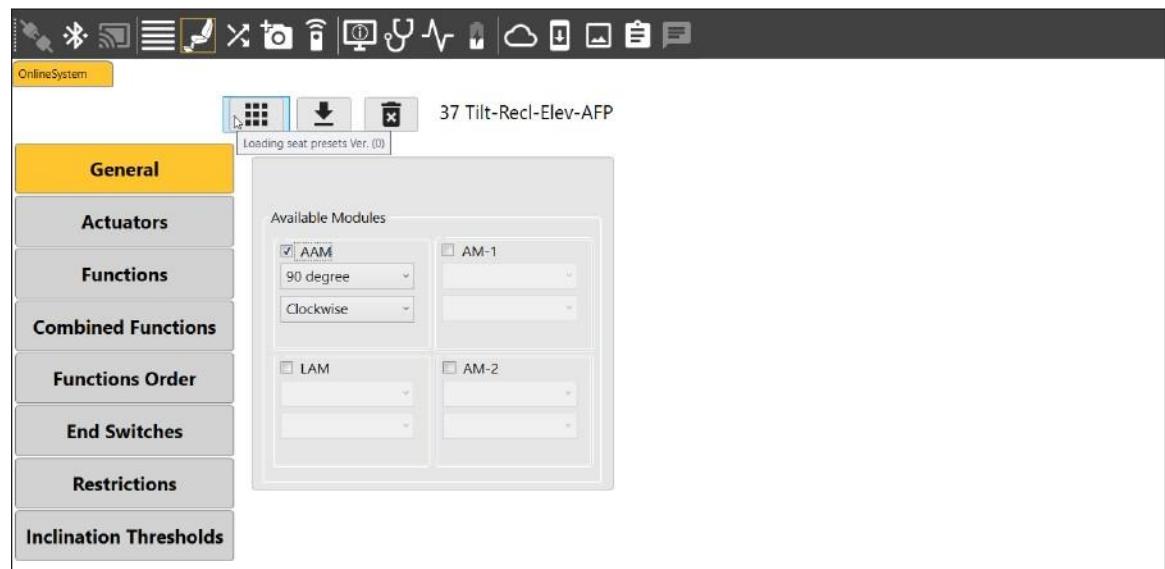
Seat Configuration with ECON-W will be shown throughout this section. While connected to the enEnable X1 system, select Seat Configuration on the top toolbar. There are three options when connected to an online system:

- Load Seat Preset – opens menu with available pre-defined configurations
- Save Seat Configuration – saves current seat configuration to online system
- Delete Seat Configuration – deletes current seat configuration from online system



The image above shows Seat Preset “37 Tilt-Recl-Elev-AFP” selected.

4.3.1 General



General configures the actuator module in use, and the mounting orientation of the module on the chair.

NOTE: The actuator module must be mounted so the front plate (with connections) is facing laterally. It cannot face up and down, based on the programming orientation options.



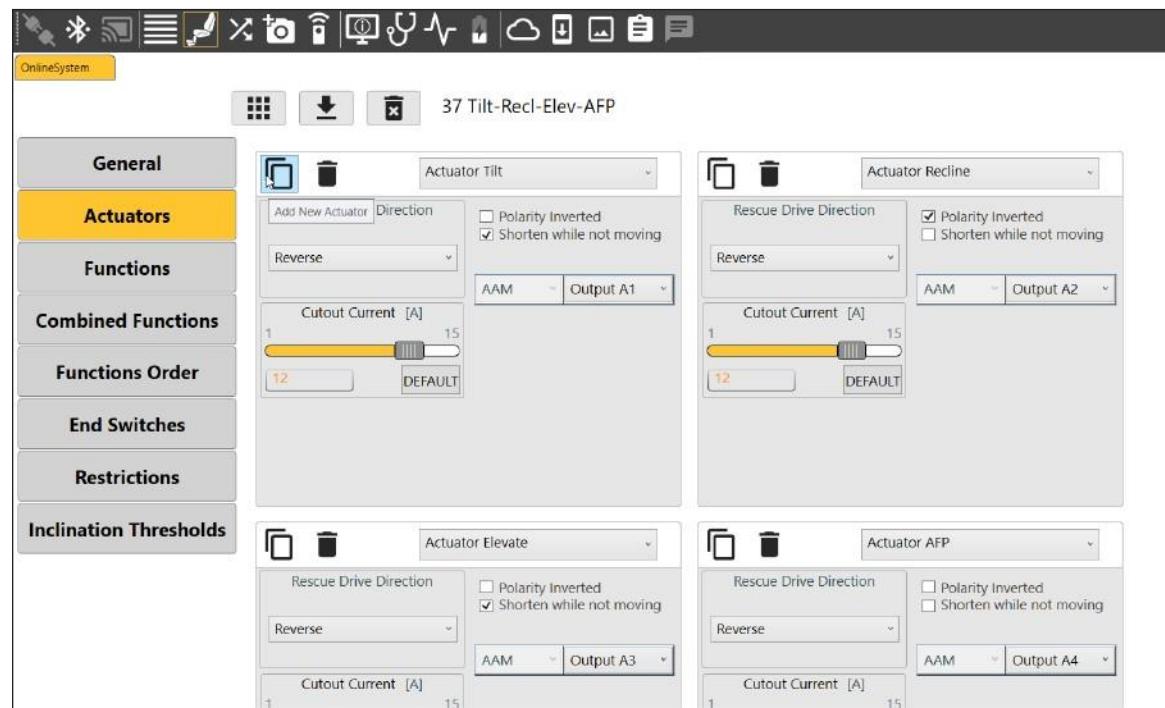
MANDATORY! This setting is critical to ensure that the Inclination Sensor Tilt Angle is positive when the seat is tilted or reclined backward, and negative when the seat is tilted or reclined forward (past 0 degrees). The inclination angle is used for seat, actuator, drive restrictions, and the TOTAL BACK ANGLE HEAD CONTROL

4.3.2 Actuators

Actuators allow customization of an actuator, including adding new or deleting existing. Each actuator can be assigned to any port on the connected actuator module.

SEAT CONFIGURATION: Actuators

PARAMETER	RANGE	DESCRIPTION
Polarity Inverted		Changes the polarity of the actuator port output
Shorten while not moving		Disables the output port internally, to help prevent actuator back drive
Cutout Current	1 – 15 A	Assigned actuator output turns off if this current is met

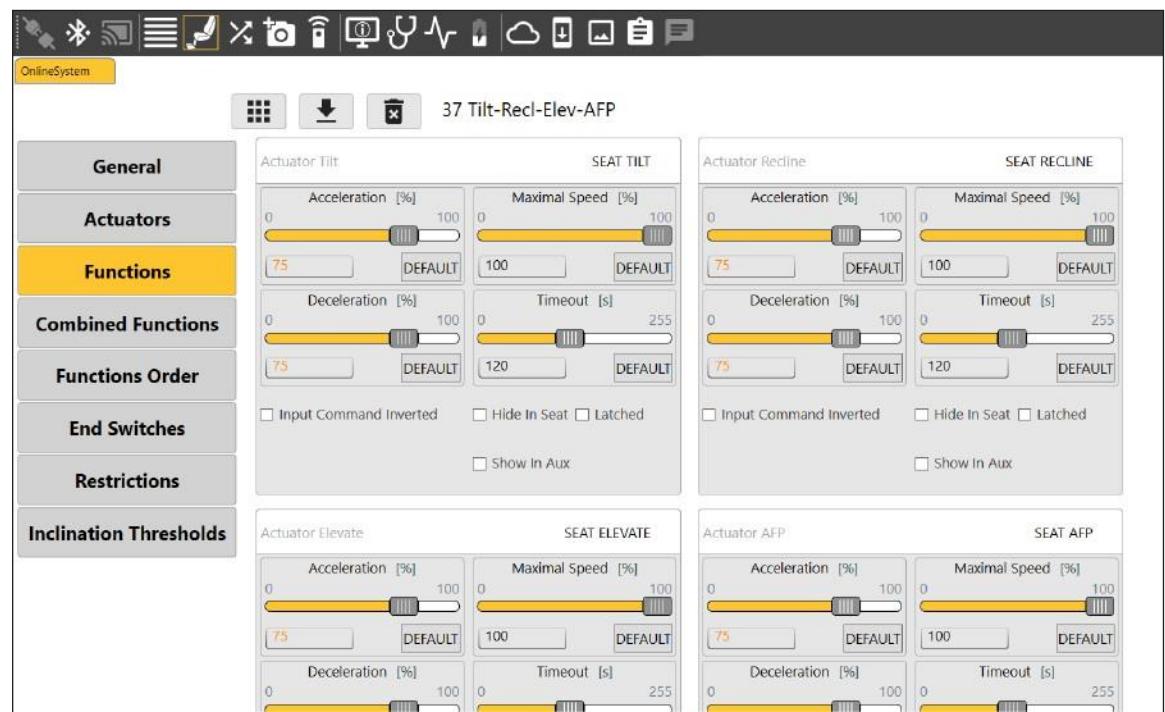


4.3.3 Functions

Functions define the speed, acceleration, deceleration, and timeout of the configured actuators.

SEAT CONFIGURATION: Functions

PARAMETER	RANGE	DESCRIPTION
Acceleration	0 – 100 %	Defines the acceleration of the actuator. A higher value represents a shorter acceleration time to maximum speed.
Deceleration	0 – 100 %	Defines the deceleration of the actuator. A higher value represents a shorter deceleration time from maximum speed.
Maximal Speed	0 – 100 %	Defines the maximum speed of the actuator
Timeout	0 – 255 s	Amount of time the function will run continuously before stopping
Input Command Inverted		Swaps the seat function direction for forward / reverse input
Hide In Seat		Hides the function in the Seat Profile
Show In Aux		Shows the function in the Aux Menu
Latched		Latches the seat function when an input command is given

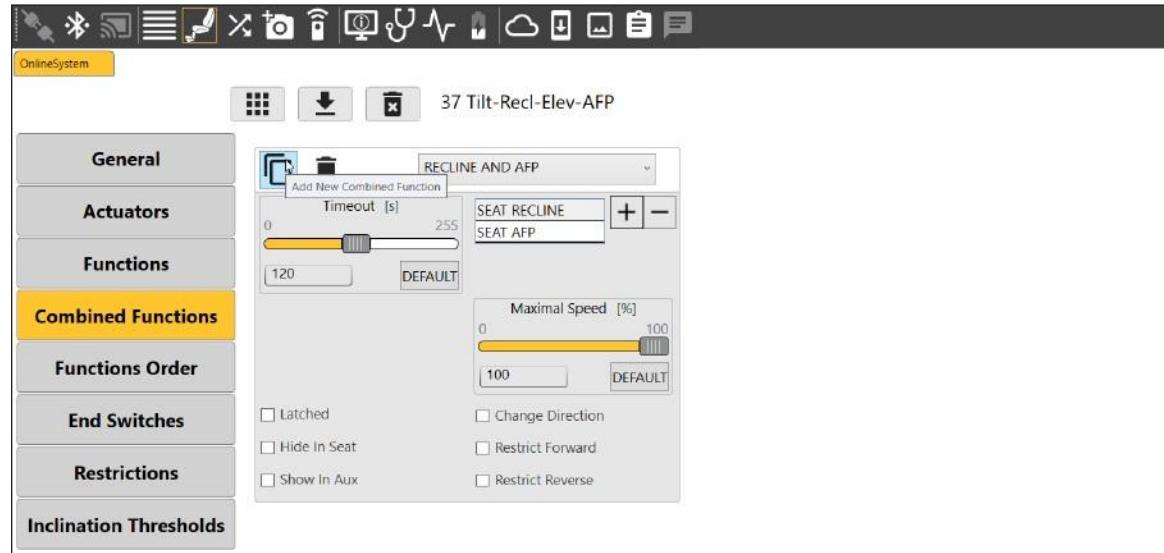


4.3.4 Combined Functions

Combined Functions configures two or more Functions to work simultaneously. The drop down menu defines the text of the Combined Function. The “+” and “-” adds and deletes a function. Multiple combined functions can be added.

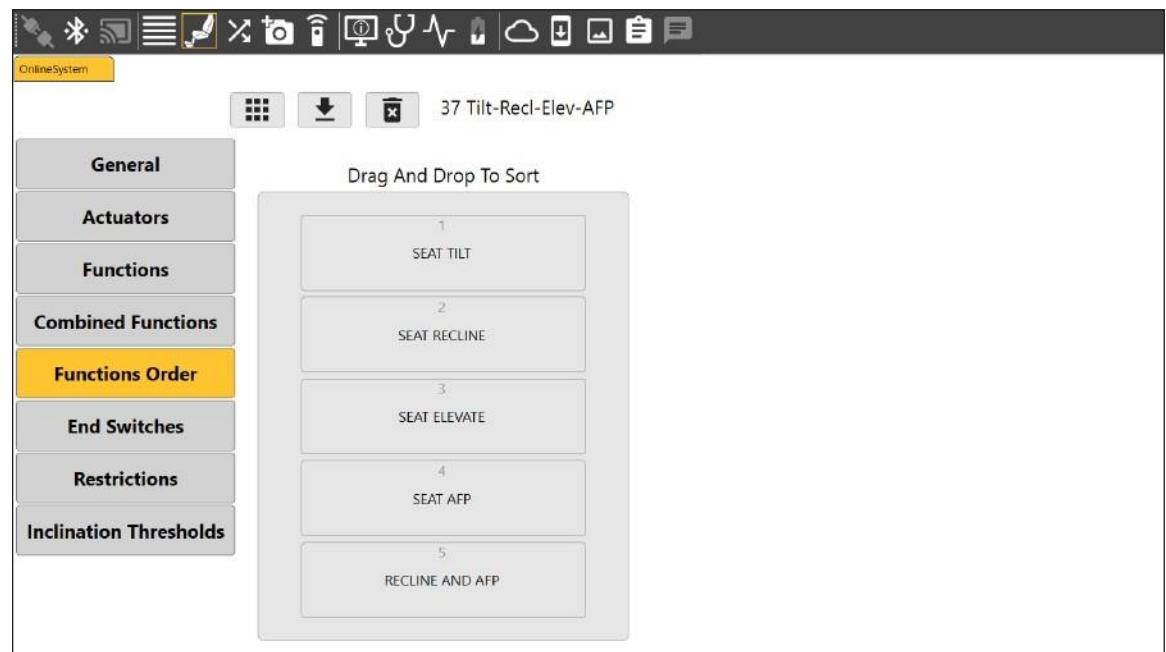
SEAT CONFIGURATION: Combined Functions

PARAMETER	RANGE	DESCRIPTION
Timeout	0 – 255 s	Amount of time the combined function will run continuously before stopping
Maximal Speed	0 – 100 %	Defines the maximum speed for a function, within the combined function
Latched		Latches the combined function when an input command is given
Hide In Seat		Hides the combined function in the Seat Profile
Show In Aux		Shows the combined function in the Aux Menu
Change Direction		Changes the direction of a function, within the combined function



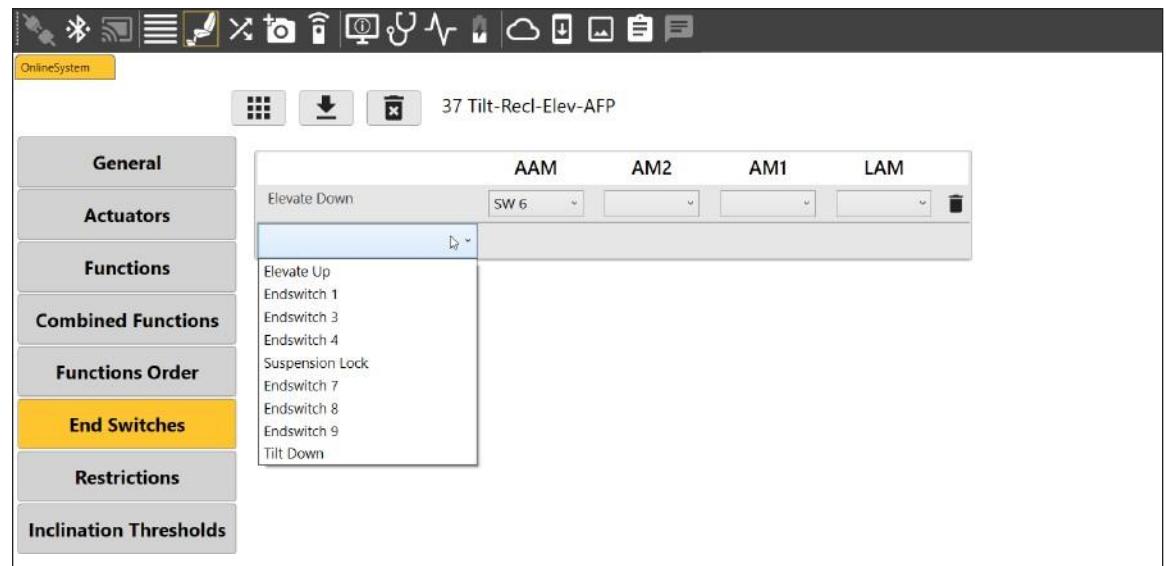
4.3.5 Functions Order

Functions Order defines the order that all configured functions and combined functions when cycling through the seat profile. To change the order, drag and drop the functions.



4.3.6 End Switches

End Switches are configured to use for Restrictions. Any actuator module switch input can be used. The left-most drop down box is used to select the name for the end switch. The drop down box under each module selects which input the end switch will be wired to.



4.3.7 Restrictions

Types of Restrictions

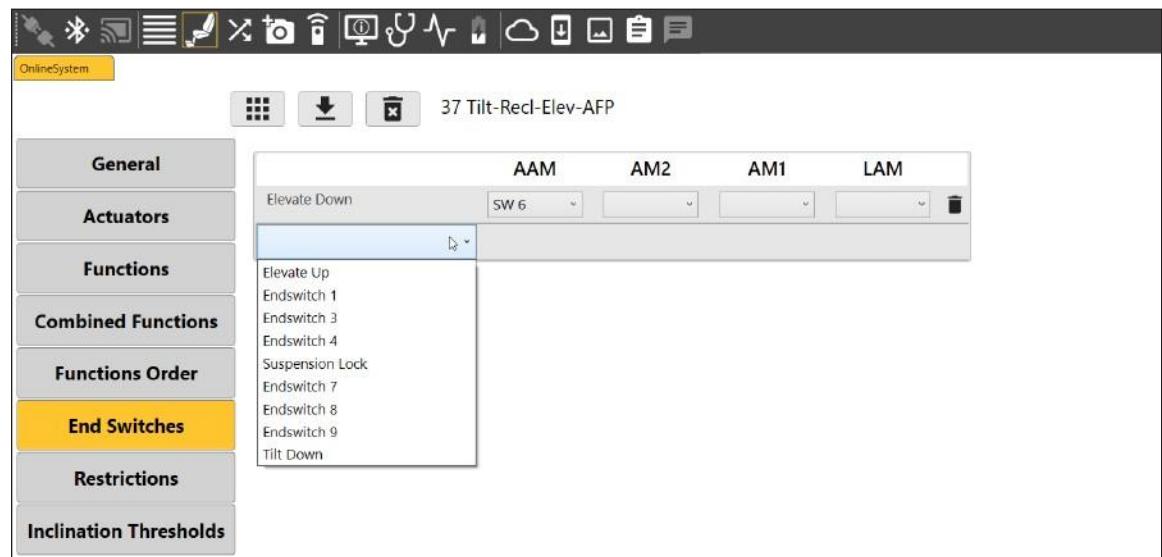
Actuator Restriction – Prevents the actuator from moving as defined by the RESTRICTION when the programmed feedback conditions are met.

Seat Restriction – Prevents the seat function from moving as defined by the RESTRICTION when the programmed feedback conditions are met. This includes combined functions.

Drive Restriction – Reduces or prevents drive when the programmed feedback conditions are met.

SEAT CONFIGURATION: Restrictions

PARAMETER	RANGE	DESCRIPTION
Restriction		<p><i>Available for Actuator and Seat Restriction</i></p> <p>Forward Restriction - Prevents forward actuator/seat movement if the configured condition(s) is/are met.</p> <p>Reverse Restriction - Prevents reverse actuator/seat movement if the configured condition(s) is/are met.</p> <p>Stop Restriction - Prevents all actuator/seat movement if the configured condition(s) is/are met.</p> <p><i>Available for Drive Restriction</i></p> <p>Drive Limit % - Limits the drive % if the configured condition(s) is/are met. This limit is ignored if "Start iLevel" is selected, since the iLevel Drive profile is used.</p>
Actuator Type		This parameter is available for an Actuator or Seat Restriction - it restricts the chosen function as defined by the condition
Start iLevel		This parameter is available for a Drive Restriction. When the configured condition(s) is/are met, the iLevel Drive profile is used.
Ignore in iLevel Profile		This parameter is available for a Drive Restriction. If the configured condition(s) is/are met but the iLevel Drive profile is active (due to another Restriction), the restriction is ignored.
iAccess Indication		This parameter is available for a Drive Restriction. It changes the LED indication color on the iAccess corresponding actuator function if the Drive Restriction is met.
Switch Condition		<p><i>Switch Type</i></p> <p>Switch Normally Open – The condition is met when the configured switch is closed</p> <p>Switch Normally Closed – The condition is met when the configured switch is open</p>
Inclination Condition		Angle - Defines the angle of inclination where the condition is met (can be defined for "Threshold Less Than" or "Threshold Equal or Greater Than."



4.3.8 Inclination Thresholds

Inclination Thresholds is a simplified view of all Restrictions configured with Inclination Condition. The Restrictions cannot be modified from this view, but the Angle can be adjusted within the full range of 0 to 90°.

The screenshot shows the 'Inclination Thresholds' configuration screen. The left sidebar lists categories: General, Actuators, Functions, Combined Functions, Functions Order, End Switches, Restrictions (which is selected and highlighted in yellow), and Inclination Thresholds. The main area displays a table of restrictions, each with an 'Angle [°]' slider and a value field. The restrictions listed are:

RestrictionType	Limitation	Function	Condition	Inclination
Actuator	Reverse Restricted	Actuator Tilt	Threshold Equal or Greater Than	Angle [°] 74
Actuator	Reverse Restricted	Actuator Recline	Threshold Equal or Greater Than	Angle [°] 74
Actuator	Reverse Restricted	Actuator Tilt	Threshold Equal or Greater Than	Angle [°] 25
Actuator	Reverse Restricted	Actuator Recline	Threshold Equal or Greater Than	Angle [°] 25
Seat Function	Reverse Restricted	SEAT ELEVATE	Threshold Equal or Greater Than	Angle [°] 25
Drive	0%		Threshold Equal or Greater Than	Angle [°] 25

4.4 MAPPED I/O SUPPORT

Inputs and outputs can be configured for the system via:

- iAccess
- Key I / II (HC)
- Mode Jack (HC, ED)
- Switch inputs (PB120, AAM5)

4.4.1 iAccess

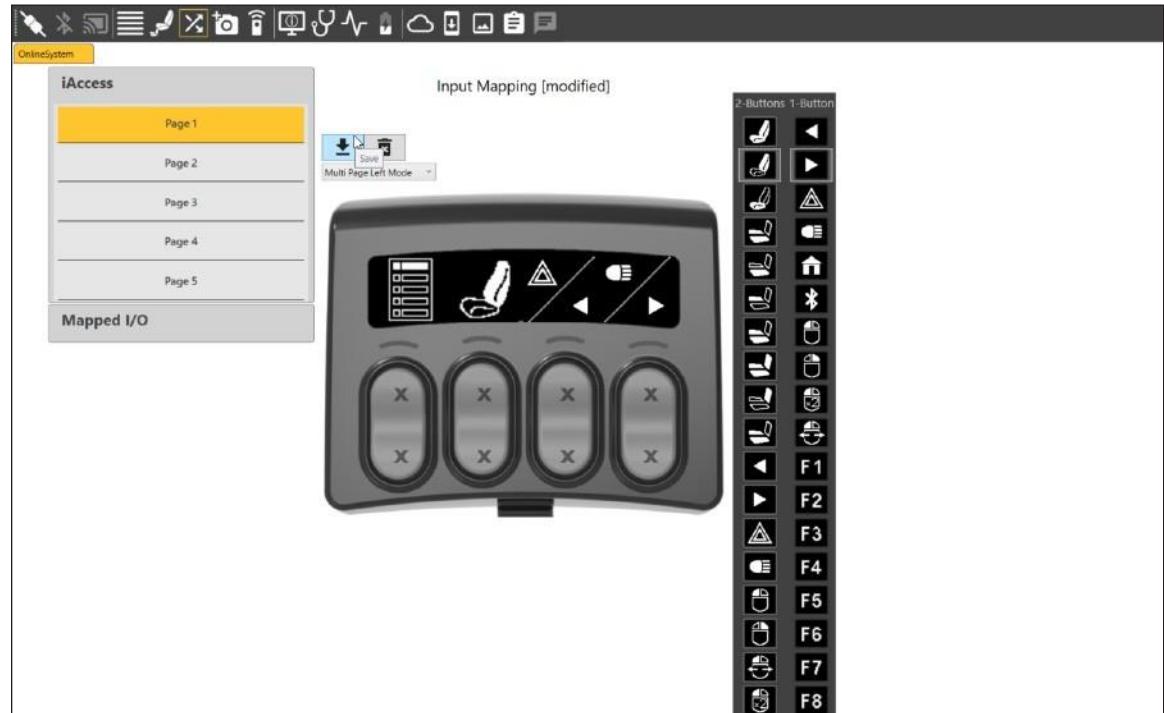
The iAccess configurator uses drag & drop functionality to place the chosen icons for system functions onto the desired switch. The icons use one or two switches.

There are three different modes for the iAccess:

Single Page – Only one page of the iAccess is used

Multi Page Left – Up to five pages can be configured, and the left most switch scrolls through the pages

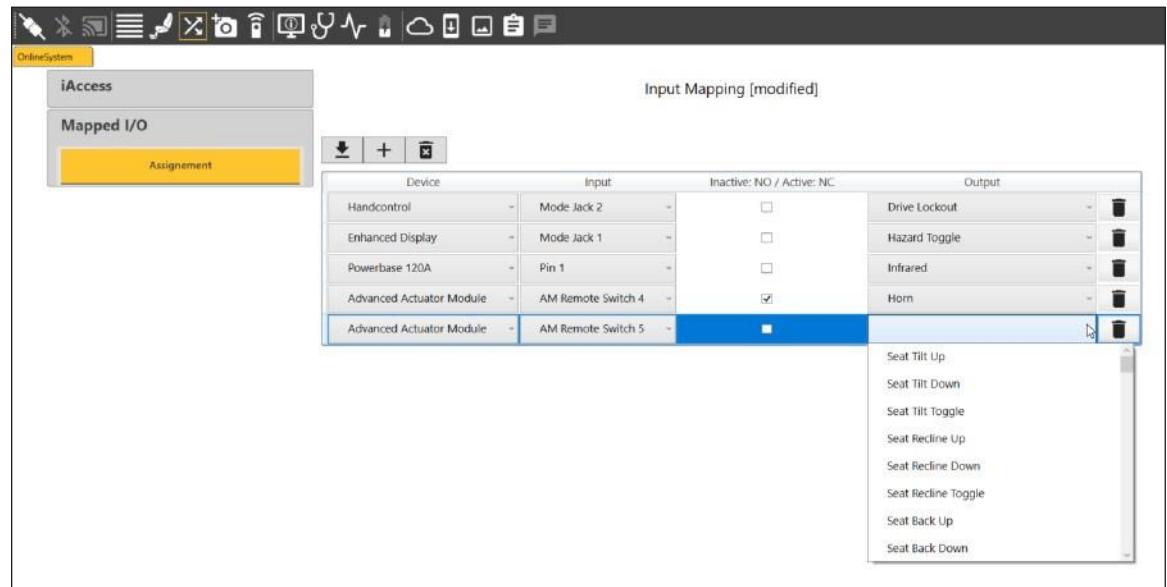
Multi Page Right – Up to five pages can be configured, and the right most switch scrolls through the pages



When the iAccess is configured, click the “Save” icon to download the changes to an online system. To save the changes to an offline configuration, use *File -> Save* or *File -> Save As*.

4.4.2 Mapped I/O

The Mapped I/O assignment uses drop down menus to select the device, input, and output. Each assignment can be normally open (NO) or normally closed (NC). There are over 80 different output options.

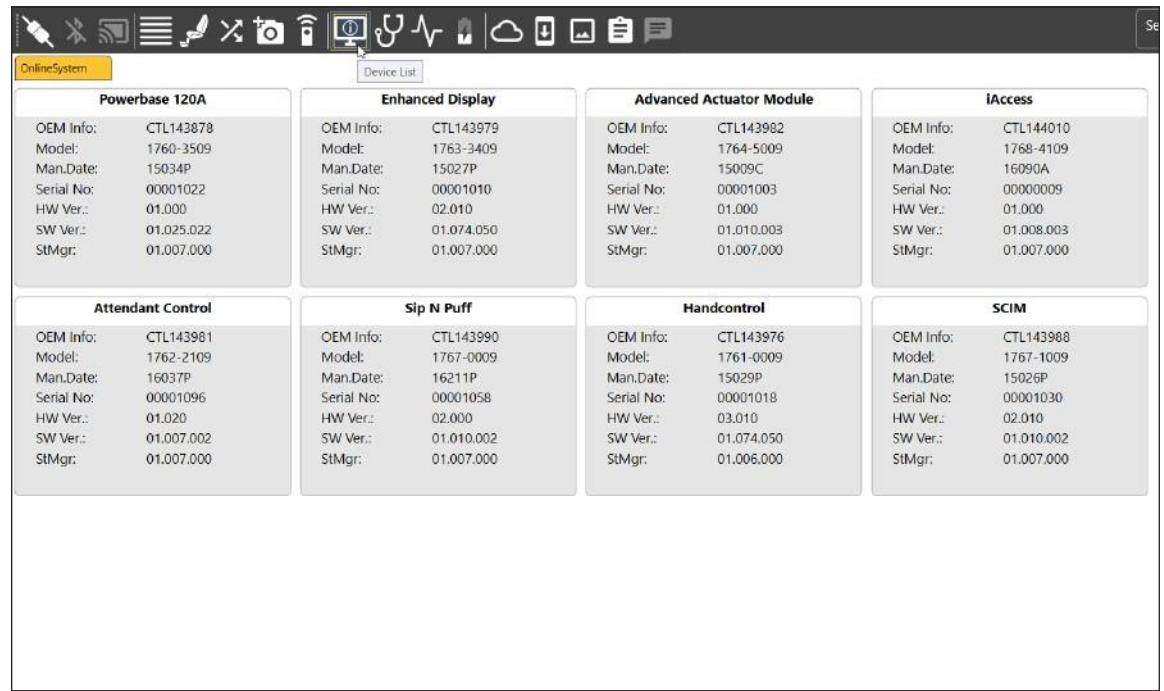


When all Mapped I/O is configured, click the “Save” icon to download the changes to an online system. To save the changes to an offline configuration, use *File -> Save or File -> Save As*.

5 — DIAGNOSTICS AND TROUBLESHOOTING

The ECON and 1313 programming devices provide access to real-time data when connected to an online enAble X1 system. The diagnostic tools in this section can help troubleshoot issues to find a quick resolution. ECON-W is shown throughout this section.

5.1 DEVICE LIST

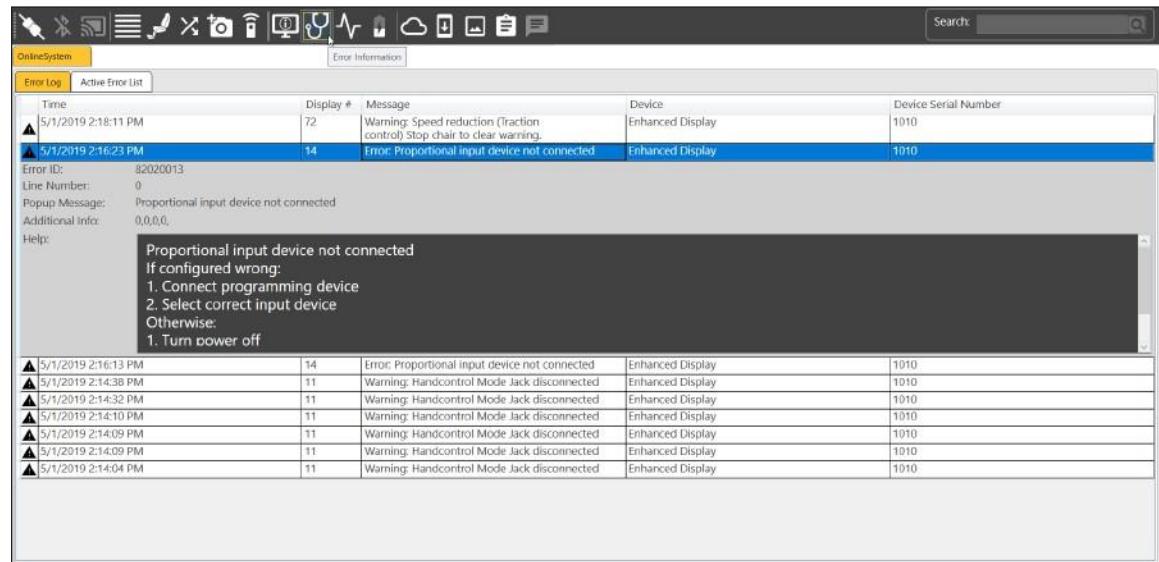


The device list shows all enAble X1 modules on the connected system. Each module includes the following information

- OEM Info: Part number defined by the OEM
- Model: Curtis Instruments, Inc. model number
- Man.Date: Date and location of manufacture
- Serial No: Module serial number
- HW Ver.: Module hardware version
- SW Ver.: Module software version
- StMgr: Module start manager version

The device list is saved and viewable in an offline configuration.

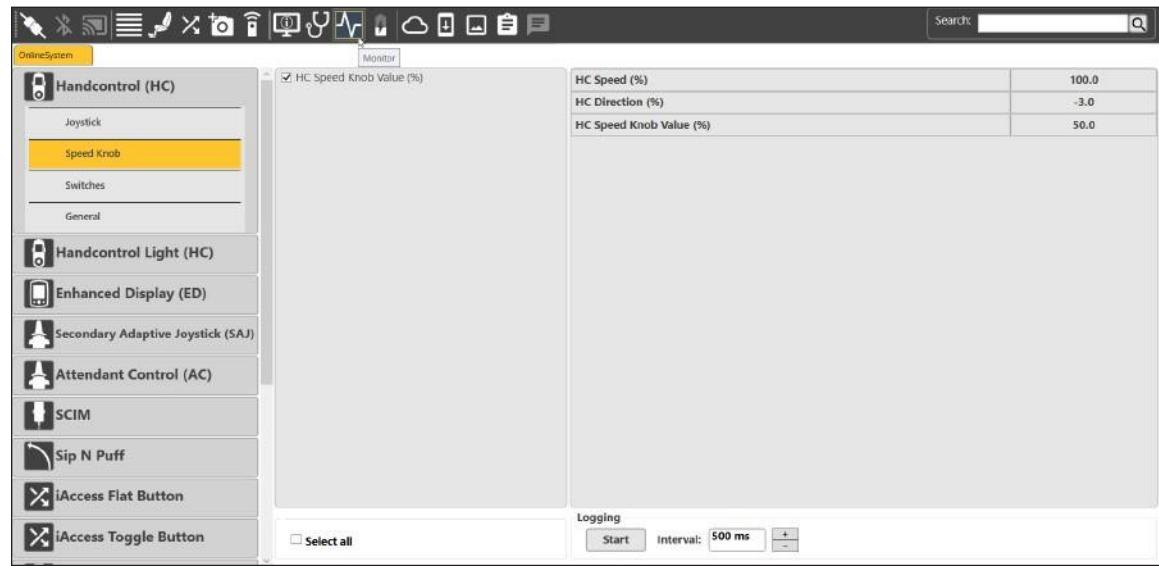
5.2 ERROR INFORMATION



The error information shows a history of the error log, and the active error list. Each error is timestamped, and shows which module the error originated from. Each error entry can be expanded to show additional information, including help text to further diagnose an issue. The error information can be deleted by using the **DELETE ERROR HISTORY** function when connected to an online system.

The error log is saved and viewable in an offline configuration.

5.3 MONITOR



The monitor menu shows the status of module inputs and outputs, and various system statistics (driven distance reminders, hour meters, battery voltage, etc.). The menu structure is easy to navigate, the I/O and system statistics are organized under the module it belongs to. Once the desired signals are selected, the live values are displayed. A logging feature is available to record and save a trace of the currently selected monitor values.

Monitor values are saved and viewable in an offline configuration, as a snapshot from when the configuration was saved.

5.4 BATTERY STATISTICS



The battery statistics page shows historical information logged by the system, which indicates charging habits, lowest and highest recorded battery voltage, and undervoltage and charging statistics.

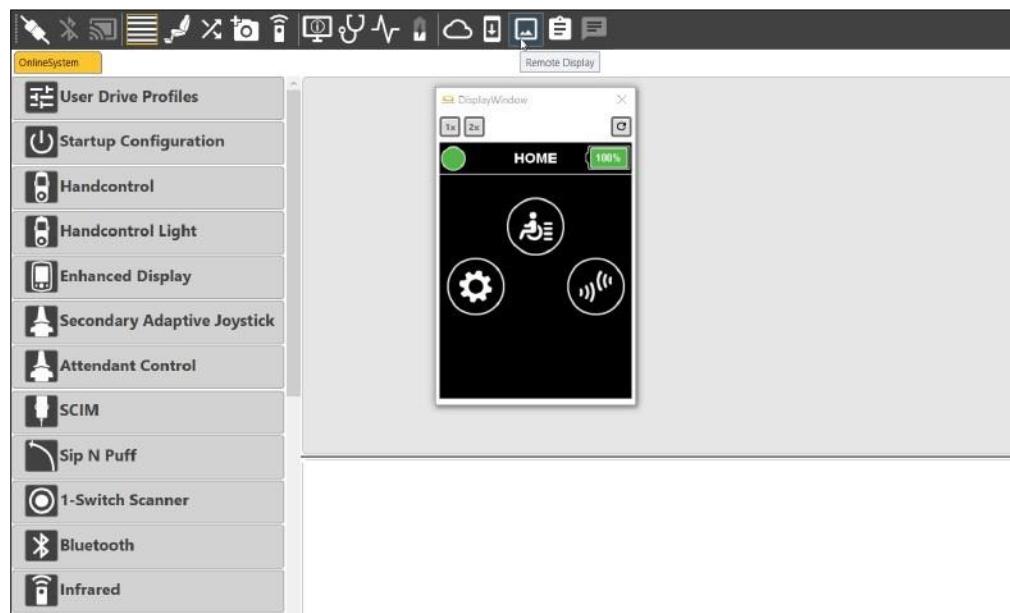
The chart logs start and end battery charging, and a cell is incremented each time a charger is connected and the battery charge has incremented at least 1%.

When the batteries are replaced, the Battery statistic reset function can be used to clear all of the existing historical battery information.

NOTE: Undervoltage warnings and errors do not get deleted from the Error Information log if the Battery statistic reset function is used.

Battery statistics are saved and viewable in an offline configuration.

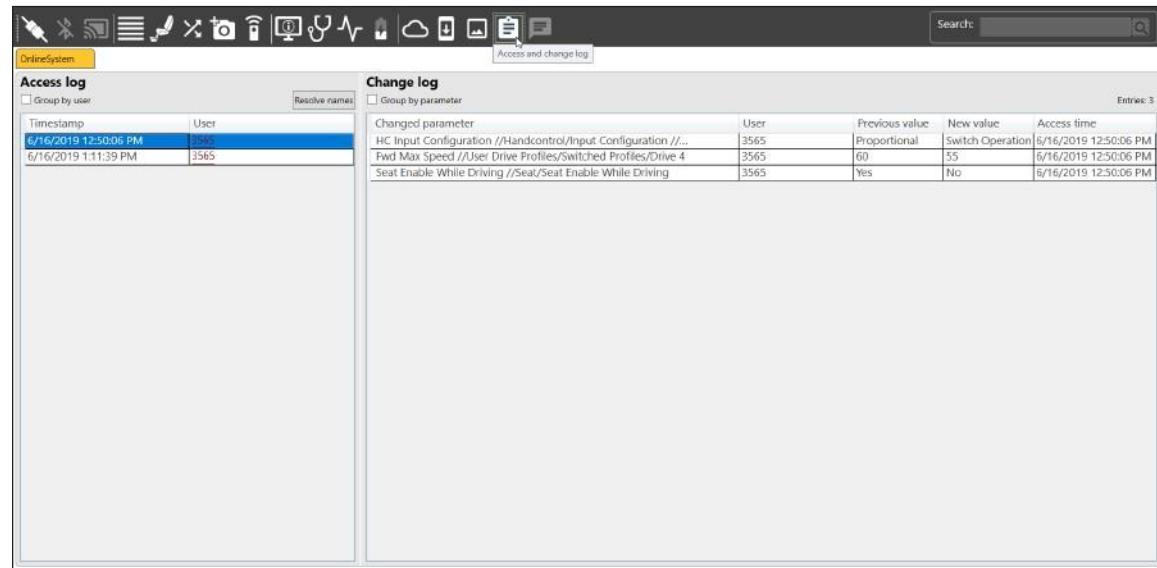
5.5 REMOTE DISPLAY



The remote display window can be used when connected to an enEnable X1 system. It shows a live screen mirror of what is shown on the active display. This feature can be used with any connection type, but is implemented for a remote Interactive Assist connection. It can also be used for training purposes.

See the [Connection Options section](#) in the Programmers appendix for more information on remotely connecting to an enEnable X1 system.

5.6 ACCESS AND CHANGE LOG



The Access and Change Log records all parameter changes made to the system, and by which user. It also logs the previous and new values, and when the system was accessed to make these changes. The access and change log information can be deleted by using the DELETE ACCESS AND CHANGE LOG function when connected to an online system.

The Access and Change Log is only viewable when connected to an online system, and is not saved in an offline configuration.

5.7 FAULT CODE LIST

The enAble X1 system detects a wide variety of faults and error conditions, and can be seen by a pop-up on the system's main display (HC or ED). When a fault or informational pop-up occurs, an audible alert will be made based on BEEP VOLUME and BEEP LOW FREQUENCY settings. The displayed fault information is logged, and accessible by a programming device.

Some fault are not recoverable, and require replacing a system component. However, sometimes the fault circuits catch a temporary or extreme event that is not a true fault in the system. Turning the power off and back on again will help determine if the fault is permanent or repeatable.

Other faults can be remedied by correcting an operational condition. For example, in response to an Undervoltage warning, recharge the battery.

If the problem doesn't go away when power is cycled, or if the precise nature of the fault isn't clear, connect a programmer and look in the Error Information to find out more about the precise fault that is occurring. The problem may be as simple as a loose connection or faulty wiring that can be easily fixed.

Table 12 Fault Codes

#	TYP E	MESSAGE	HELP TEXT
1	Warning	Motor 1 not connected	Motor 1 error detected 1. Turn power off 2. Inspect motor connections 3. Turn power on
1	Error	Motor 1 not connected	Motor 1 error detected 1. Turn power off 2. Inspect motor connections 3. Turn power on
2	Warning	Motor 2 not connected	Motor 2 error detected 1. Turn power off 2. Inspect motor connections 3. Turn power on
2	Error	Motor 2 not connected	Motor 2 error detected 1. Turn power off 2. Inspect motor connections 3. Turn power on
3	Error	Brake 1 not connected	Brake 1 error detected 1. Turn power off 2. Disengage then re-engage brake lever 3. Inspect motor connections 4. Turn power on
4	Error	Brake 2 not connected	Brake 2 error detected 1. Turn power off 2. Disengage then re-engage brake lever 3. Inspect motor connections 4. Turn power on
5	Warning	Attendant Control On / Off Jack disconnected	Attendant Control On/Off jack switch disconnected 1. Turn power off 2. Disconnect then re-connect the On/Off Jack switch 3. Turn power on

Table 12 Fault Codes,

#	TYP E	MESSAGE	HELP TEXT
6	Warning	Enhanced Display On / Off Jack disconnected	Enhanced Display On/Off jack switch disconnected 1. Turn power off 2. Disconnect then re-connect the On/Off Jack switch 3. Turn power on
7	Warning	Handcontrol On / Off Jack disconnected	Handcontrol On/Off Jack switch disconnected 1. Turn power off 2. Disconnect then re-connect the On/Off Jack switch 3. Turn power on
8	Warning	Secondary Adaptive Joystick On / Off Jack disconnected	Secondary Adaptive Joystick On/Off jack switch disconnected 1. Turn power off 2. Disconnect then re-connect the On/Off Jack switch 3. Turn power on
9	Warning	Attendant Control Mode Jack disconnected	Attendant Control Mode jack switch disconnected 1. Turn power off 2. Disconnect then re-connect the Mode Jack switches 3. Turn power on
10	Warning	Enhanced Display Mode Jack disconnected	Enhanced Display Mode jack switch disconnected 1. Turn power off 2. Disconnect then re-connect the Mode Jack switches 3. Turn power on
11	Warning	Handcontrol Mode Jack disconnected	Handcontrol Mode jack switch disconnected 1. Turn power off 2. Disconnect then re-connect the Mode Jack switches 3. Turn power on
12	Warning	Secondary Adaptive Joystick Mode Jack disconnected	Stand Alone Mode jack switch disconnected 1. Turn power off 2. Disconnect then re-connect the Mode Jack switches 3. Turn power on
13	Warning	D-Sub (9-Pin) disconnected	D-Sub (9-Pin) disconnected 1. Turn power off 2. Disconnect then re-connect the D-Sub (9-Pin) 3. Turn power on
14	Warning	Proportional input device not connected	Proportional input device not connected If configured wrong: 1. Connect programming device 2. Select correct input device Otherwise: 1. Turn power off 2. Disconnect then re-connect the D-Sub (9-Pin) 3. Turn power on
14	Error	Proportional input device not connected	Proportional input device not connected If configured wrong: 1. Connect programming device 2. Select correct input device Otherwise: 1. Turn power off 2. Disconnect then re-connect the D-Sub (9-Pin) 3. Turn power on

Table 12 Fault Codes,

#	TYP E	MESSAGE	HELP TEXT
15	Warning	Drive Motor Encoder not connected	Encoder error detected 1. Turn power off 2. Disconnect both encoder cables 3. Inspect encoder connections 4. Reconnect both encoder cables 5. Turn power on
16	Error	Brake 1 shorted or programmed incorrectly	Brake 1 error detected 1. Connect programming device 2. Check Brake Voltage Setting 3. Turn power off 4. Disengage then re-engage brake lever 5. Inspect motor connections 6. Turn power on
17	Error	Brake 2 shorted or programmed incorrectly	Brake 2 error detected 1. Connect programming device 2. Check Brake Voltage Setting 3. Turn power off 4. Disengage then re-engage brake lever 5. Inspect motor connections 6. Turn power on
18	Warning	Actuator shorted	Seat error detected 1. Turn power off 2. Disconnect and reconnect seat module cables one at a time 3. Turn power on
19	Warning	Drive Motor Encoder shorted	Encoder error detected 1. Turn power off 2. Disconnect both encoder cables 3. Inspect encoder connections 4. Reconnect both encoder cables 5. Turn power on
20	Warning	Undervoltage	Charge Battery
20	Error	Undervoltage	Charge Battery
21	Error	Overvoltage	Check the battery voltage, batteries may be overcharged. Avoid driving downhill fast with fully charged batteries.
22	Warning	Speed reduction (Overvoltage)	Check the battery voltage, batteries may be overcharged. Avoid driving downhill fast with fully charged batteries.
23	Error	Motor 1 output defect	Motor 1 error detected 1. Turn power off 2. Inspect motor connections 3. Turn power on
24	Error	Motor 2 output defect	Motor 2 error detected 1. Turn power off 2. Inspect motor connections 3. Turn power on
25	Error	Brake 1 error	Brake 1 error detected 1. Turn power off 2. Disengage then re-engage brake lever 3. Inspect motor connections 4. Turn power on

Table 12 Fault Codes,

#	TYP E	MESSAGE	HELP TEXT
26	Error	Brake 2 fault	Brake 2 error detected 1. Turn power off 2. Disengage then re-engage brake lever 3. Inspect motor connections 4. Turn power on
27	Error	Motor output defect	Powerbase error detected 1. Turn power off 2. Check Motor wiring and wait 5 seconds 3. Turn power on
28	Warning	Main contactor error	Powerbase error detected 1. Turn power off 2. Wait 5 seconds 3. Turn power on
29	Warning	Main contactor error	Powerbase error detected 1. Turn power off 2. Wait 5 seconds 3. Turn power on
30	Error	Main contactor error	Powerbase error detected 1. Turn power off 2. Wait 5 seconds 3. Turn power on
31	Warning	Motor stall detected	Motor stall detected 1. Back up and try to overcome obstacle again with more speed 2. If chair stalls again, drive around the obstacle or find a location where the obstacle height is lower
32	Error	Overtemperature	Chair stopped to protect system electronics 1. Turn power off to let system cool down. Note: This is the normal system behavior.
33	Warning	Speed reduction (Overtemperature)	Chair speed is reduced to protect system electronics 1. Turn power off to let system cool down. Note: This is the normal system behavior.
34	Error	Bus voltage dropped	Primary system module (HC/ED) error detected 1. Turn power off 2. Inspect Handcontrol and/or Enhanced Display cable 3. Disconnect and reconnect Handcontrol and/or Enhanced Display cable 4. Turn power on
35	Error	Joystick not centered	Joystick deflected at power up 1. Turn power off 2. Release joystick to neutral position 3. Turn power on
36	Warning	Joystick out of center	Joystick deflected at power up 1. Turn power off 2. Release joystick to neutral position 3. Turn power on
37	Warning	Switched input pressed	Switched input pressed at power up 1. Turn power off 2. Release switched input 3. Turn power on

Table 12 Fault Codes,

#	TYP E	MESSAGE	HELP TEXT
38	Error	Switched input not released	Switched input pressed at power up 1. Turn power off 2. Release switched input 3. Turn power on
39	Warning	Incompatible Device connected	Incompatible device 1. Turn power off 2. Remove incompatible device 3. Turn power on
39	Error	Incompatible Device connected	Incompatible device 1. Turn power off 2. Remove incompatible device 3. Turn power on
40	Warning	Encoder connected but not configured	Encoder error detected 1. Connect programming device 2. Enable encoders 3. Cycle the power 4. If encoders are available but not used, disable encoders with a programming device and unplug both encoder cables.
41	Error	Input device is not configured	Configuration load error, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
42	Error	Incompatible secondary module version	An incompatible secondary module is connected to the system 1. Turn power off 2. Remove incompatible device from the system 3. Turn power on
43	Warning	Motor 1 current measurement out of range	Motor 1 current measurement error detected 1. Turn power off 2. Inspect motor connections 3. Turn power on
44	Warning	Motor 2 current measurement out of range	Motor 2 current measurement error detected 1. Turn power off 2. Inspect motor connections 3. Turn power on
45	Warning	Input device is not present	Input device selected is not present 1. Connect programming device 2. In the 'Startup Configuration' menu select an input device that is connected to the system 3. Cycle the power
46	Warning	Bluetooth not working	Bluetooth error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
47	Warning	Suspension lock not engaged - Seek level ground	Suspension lock not engaged 1. Seek level ground 2. Check suspension lock mechanism

Table 12 Fault Codes,

#	TYP E	MESSAGE	HELP TEXT
48	Error	Invalid 1-Switch Scanner sequence	Invalid 1-Switch Scanner sequence 1. Connect programming device 2. Check if scanner sequence makes sense (e.g. empty or step 2 defined but no step 2 entry)
49	Error	DMS fault	DMS line interruption 1. Turn power off 2. Wait 5 seconds 3. Turn power on
50	Warning	Device exchanged	An existing device has been exchanged/replaced, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
51	Warning	Device added	A new device has been added to the system, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
52	Warning	Device removed	A device was removed from the system, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
53	Error	Sip N Puff not in neutral position	Sip N Puff input operated at power up 1. Turn power off 2. Release Sip N Puff input 3. Turn power on
54	Warning	Sip N Puff out of neutral position	Sip N Puff input operated at power up 1. Turn power off 2. Release Sip N Puff input 3. Turn power on
55	Warning	Test version	The installed software was built for test purposes only.
56	Warning	Actuator Overcurrent	Seat error detected 1. Turn power off 2. Disconnect and reconnect seat module cables one at a time 3. Turn power on
57	Error	Severe Overtemperature	Seat error detected 1. Turn power off to let system cool down 2. Turn power on 3. If error persists, change actuator module
58	Error	H-Bridge defect	Seat error detected 1. Turn power off 2. Disconnect and reconnect seat module cables one at a time 3. Turn power on 4. If error persists, change actuator module
59	Error	ADC Overrun	H: ADC Overrun
60	Error	Pressure Sensor not connected	H: Pressure Sensor not connected
61	Warning	Non active input activated	H: Non active input activated
62	Warning	Actuator relay	H: Actuator relay

Table 12 Fault Codes,

#	TYP E	MESSAGE	HELP TEXT
63	Error	Sip Parameter wrong	H: Sip Parameter wrong
64	Error	Puff Parameter wrong	H: Puff Parameter wrong
65	Warning	Switched input not released	H: Switched input not released
66	Warning	Actuator Undervoltage	H: Actuator Undervoltage
68	Warning	Speed reduction(Current limit)	H: Speed reduction (Current limit)
69	Warning	Actuator timeout	H: Actuator timeout
70	Warning	IR for handcontrol is not enabled.	H: IR for handcontrol is not enabled.
71	Warning	Corrupt IR data.	H: Corrupt IR data.
72	Warning	Speed Reduction (Traction control) Stop chair to clear warning	H: Speed Reduction (Traction control) Stop chair to clear warning.
73	Warning	Speed Feedback Timeout	H: Speed Feedback Timeout
74		Intervention ramp	H: Intervention ramp
80	Warning	System is now in Configuration Mode. Do not power off until completed.	H: System is now in Configuration Mode. Do not power off until completed.
81	Error	Motor overcurrent M1	H: Motor overcurrent M1
82	Error	Motor overcurrent M2	H: Motor overcurrent M2
202	Error	Emergency device power down	H: Emergency device power down
203	Error	Pre drive test error	Pre drive test error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
204	Warning	Communication error	Communication error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
204	Error	Communication error	Communication error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
205	Warning	Memory error	Memory error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
206	Warning	Data error	Data error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
206	Error	Data error	Data error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
207	Warning	SD-Card access failed	SD-Card error detected 1. Turn power off 2. Remove and inspect SD-Card 3. Plug the SD-Card back in 4. Make sure the SD-Card is inserted correctly 5. Turn power on 6. If issue persists, format the SD-Card

Table 12 Fault Codes,

#	TYP E	MESSAGE	HELP TEXT
208	Warning	Supervision error	Supervision error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
208	Error	Supervision error	Supervision error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
209	Warning	Supervision software download error	Supervision software download error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
210	Error	Software error	Software error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
211	Error	Software error	Software error detected, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
212	Warning	Reset to default values	Reset to default, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
213	Warning	Parameter database restored	Parameter restored, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
214	Warning	Database load error	Database load error, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on
215	Warning	Parameter database not saved	Database load error, please reboot system 1. Turn power off 2. Wait 5 seconds 3. Turn power on

APPENDIX A: PROGRAMMERS

The following programming and connection options are available for the enAble X1 system:

- ECON-W (Windows PC application): Wired XLR, Bluetooth, or Interactive Assist
- ECON-i (iOS application): Bluetooth only
- 1313 Handheld Programmer: Wired XLR only

A.1 Q3DC CLOUD ACCOUNT

For all programming devices, cloud account registration is required. Use the link provided below to create a new account. Contact your distributor or OEM if assistance is needed. <https://q3dc.quantumrehab.com>

The cloud account determines the programming access level, see the [Access Level section](#) in this appendix for descriptions.

Once the account is created and authorized, a programming device can be linked to the account when you login to ECON from a PC or iPad. For the 1313 HHP, a 1-time registration is required that links the programmer to your cloud account. See the [Registering Programming Devices section](#) in this appendix for more information.

A maximum of five ECON devices and ten 1313 HHP devices can be registered with each cloud account.

A.1.1 Access Level

There are four access levels, which define what programming parameters and functionality are available. The access level is connected to the cloud account registration, mentioned in the [Q3DC Cloud Account section](#) in this appendix.

User – Intended for the power wheelchair user. The lowest level programming access allows for environmental control setup, reminders, photo album, and display and audio adjustments. No cloud account registration is required for User access level, just an ECON programming device.

Dealer – Intended for the provider of the power wheelchair. This level programming access allows for basic drive profile tuning, adding to seat configuration (seat preset, actuators, restrictions), and access to diagnostic tools.

Subsidiary – Intended for the power wheelchair manufacturer's subsidiaries. This level programming access allows for battery parameter adjustment, and full customization in the Seat Configuration.

OEM – Intended for the power wheelchair manufacturer. This is the highest programming access, and allows for full drive and seat customization.

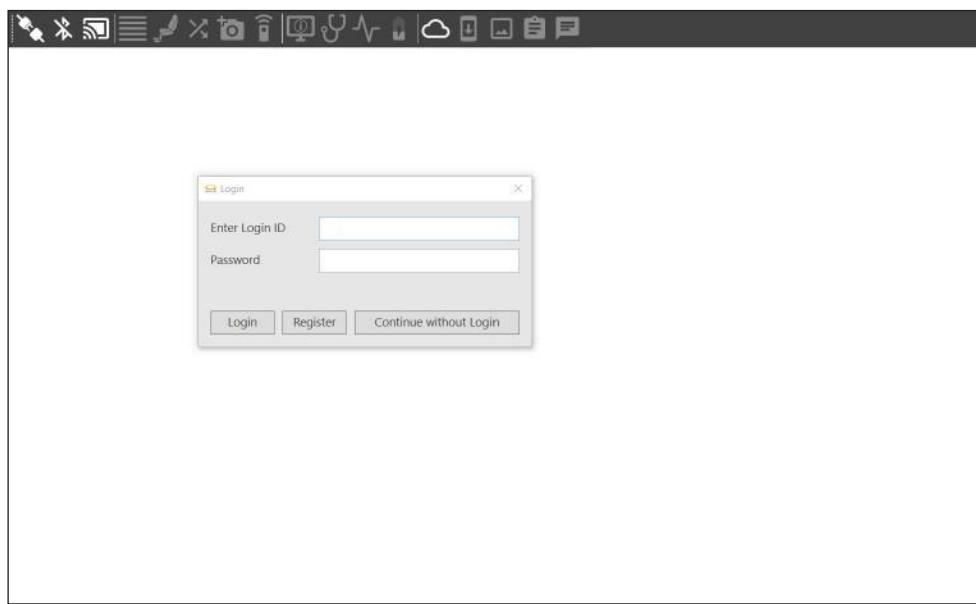
NOTE: Each access level includes all of the programming parameters and functionality of the access levels below.

A.1.2 Registering Programming Devices

With an active Q3DC Cloud Account, a programming device can be registered.

ECON

When opening an ECON programming device, a login will be requested.

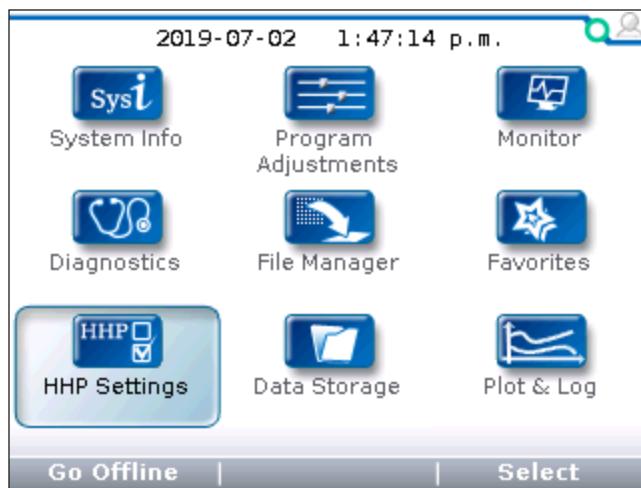


By logging in with a Q3DC cloud account, the programming device is successfully registered to the account.

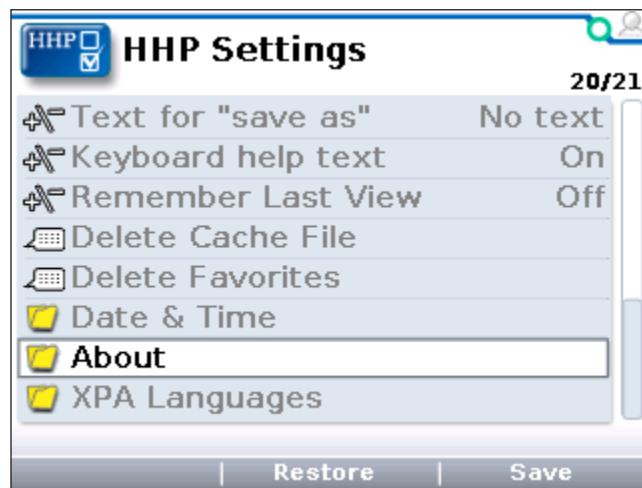
1313

A 1-time registration is required that links the 1313 HHP to your cloud account. Internet connection is required. Power the 1313 by connecting to an enEnable X1 system, or with two AA batteries.

1. On the home screen, navigate to “HHP Settings” and hit the “Select” soft key.



2. Scroll down to the “About” folder, and hit the Right Arrow key.



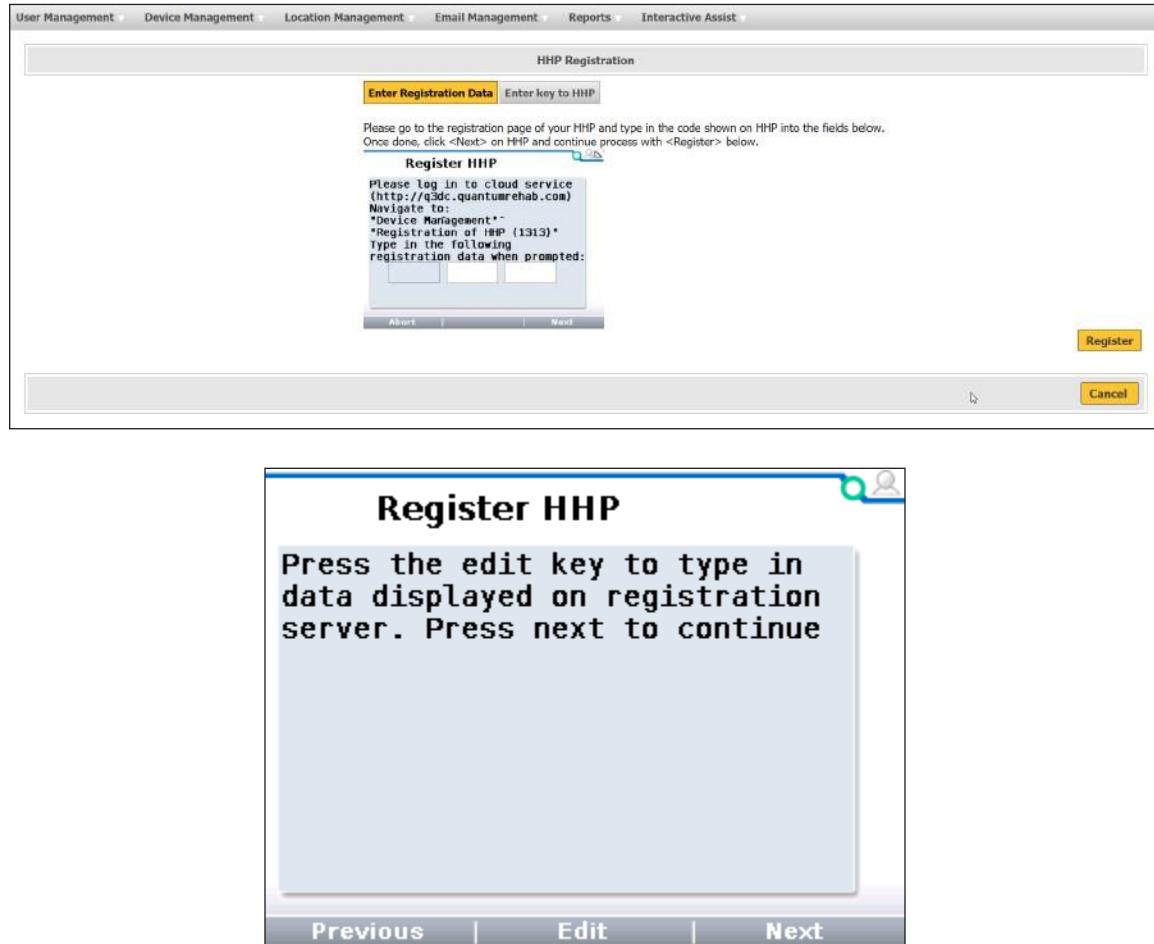
3. Scroll down to “Register HHP,” hit the (+) key and follow the instruction on the device.

The left screenshot shows the 'About' section of the HHP Settings menu. It includes options like HW Version (3.03), Serial Number (000051), Manufacturing Date (16034A), Format Internal Drive, Register HHP (highlighted with a yellow square icon), Unregister HHP, Reg. User ID (Not registered), and Reg. User Level (User). The right screenshot shows the 'Register HHP' instructions. It says "Please log in to cloud service: (http://q3dc.quantumrehab.com)" and provides steps: "Navigate to: Device Management", "Registration of HHP (1313)", and "Type in the following registration data when prompted: 1112-I2IP-YZ8Q".

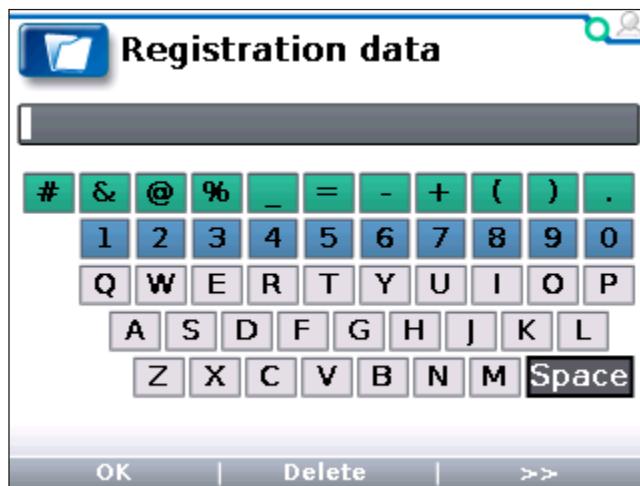
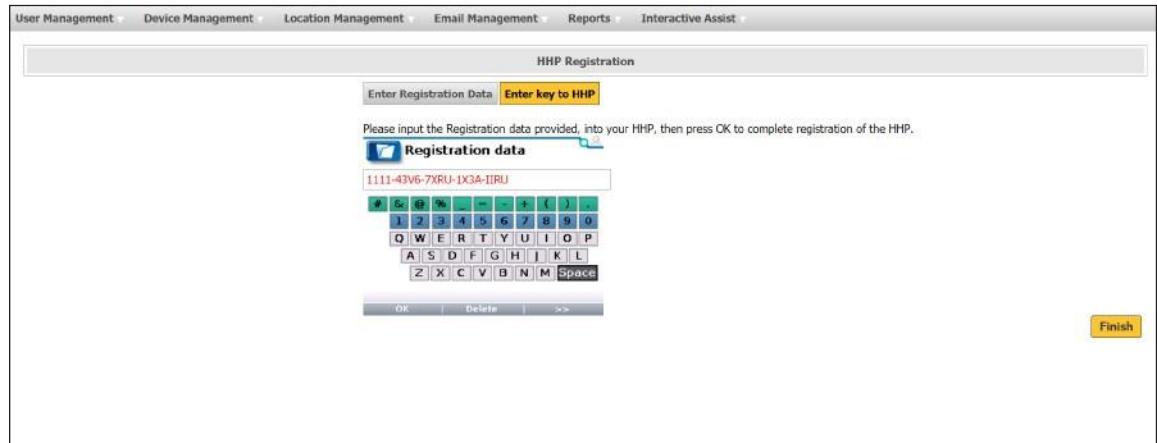
4. Login to Q3DC, and navigate to Device Management -> Registration of HHP(1313). Click “Add.”

The screenshot shows the 'Device Management' tab selected in the top navigation bar. Under 'Registration of HHP(1313)', the 'Manage ECON Device' button is highlighted with a yellow square icon. The form below includes fields for Device Status (Active), First Name, Registration Date, User Id, Device Serial Number, Last Name, User Email, and Location. At the bottom are 'Search', 'Reset', and 'Add' buttons.

5. Enter the registration data as shown on the 1313 HHP from step 3, and click “Register.” On the 1313 HHP, hit the “Next” soft key.



6. A key is provided from Q3DC, and requires input on the 1313 HHP. Input the key using the on-screen keyboard. Use the 4 directional arrows to navigate the keyboard, and the (+) key to select a character (include the “-“ dashes). On the last character input, hit the “Ok” soft key.



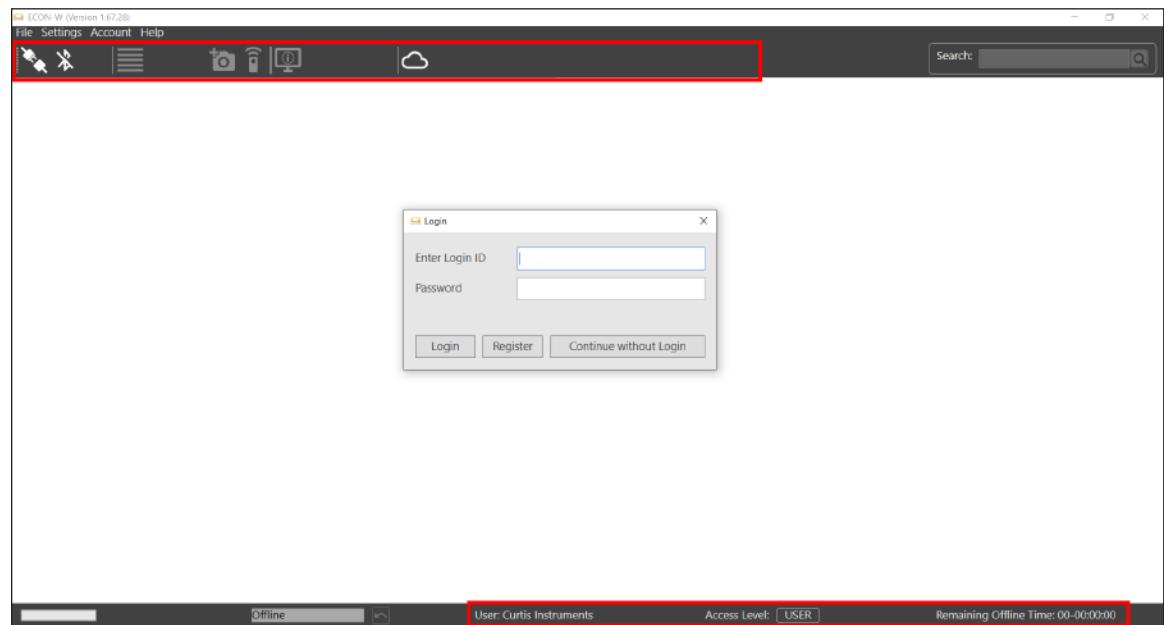
7. Registration is now complete, and the programmer can be used at the defined access level.



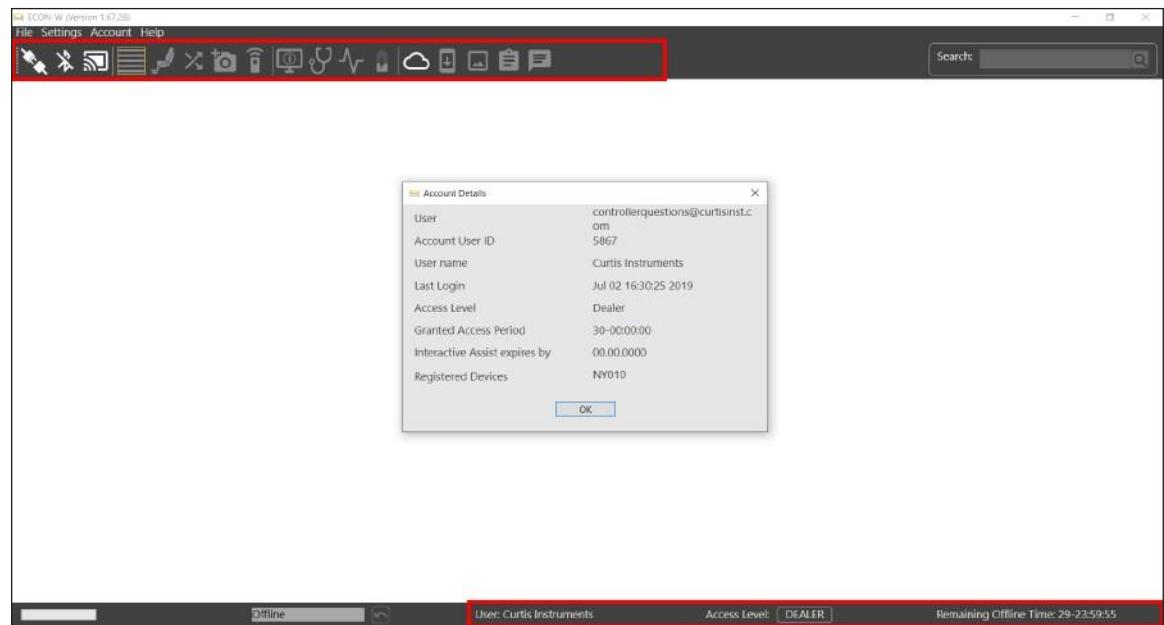
A.2 ECON

A.2.1 Overview

ECON is a powerful programming tool that enables programming and diagnostic capabilities of the enAble X1 system. It is required to login each time, to obtain the appropriate access level. The login popup opens immediately with ECON. If not logged in, the programmer is restricted to User access level. Notice the missing icons on the top tool bar.



Once logged in, the Account Details pop-up appears. The toolbar becomes populated, and the bottom status bar is updated.



User – Name of the user as defined during Q3DC cloud registration

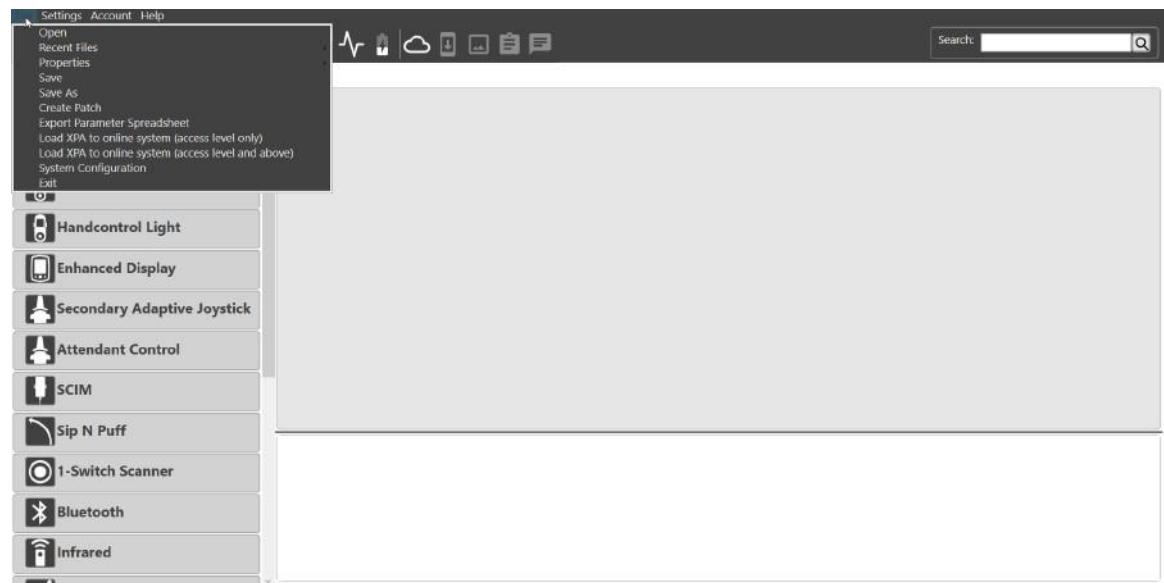
Access Level – The cloud account defined access level

Remaining Offline Time – The amount of time remaining before another login is required with an internet connection. Once this time expires, the access level is defaulted to User. After successful login with internet connection, the Remaining Offline Time is set to 30 days.

Viewing, Saving and Loading a Configuration

An enAbLe X1 system configuration can be viewed offline (disconnected from system) or online (connected to system).

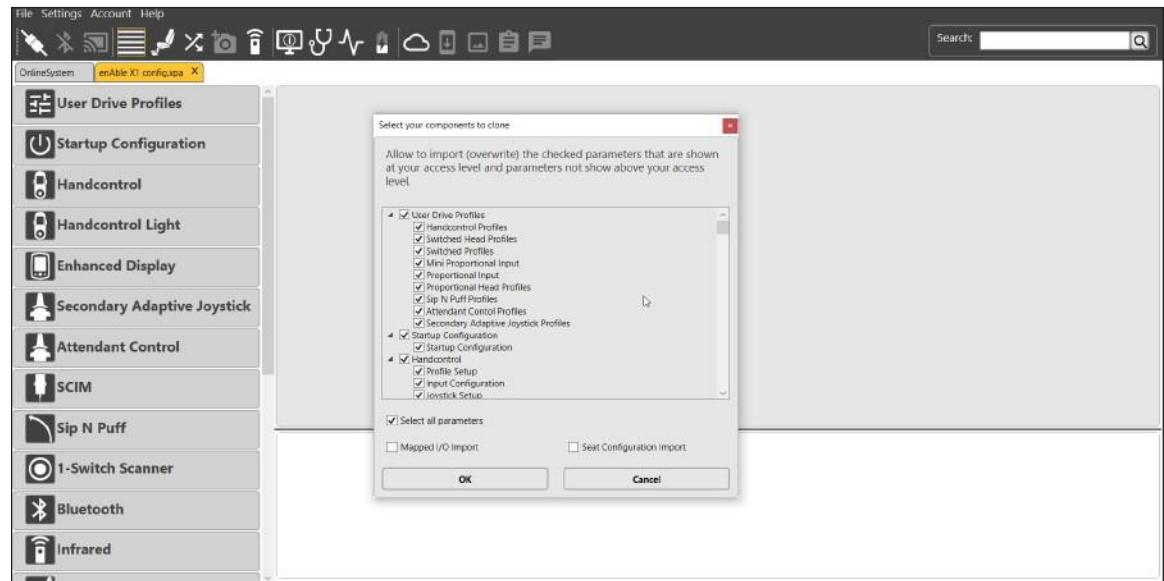
The File drop down menu allows to save a configuration that can be opened for later viewing, or loading the same configuration to another system.



When loading a configuration, there are two options:

1. Access level only - loads the selected XPA to the current connected system at the current access level. For example, if Dealer access level loads a configuration using this option, only Dealer access level and lower parameters will be loaded.
2. Access level and above - loads the selected XPA to the current connected system at all access levels. For example, if Dealer access level loads a configuration using this option, all access level parameters will be loaded. This includes higher access levels, which Dealer access are not able to see.

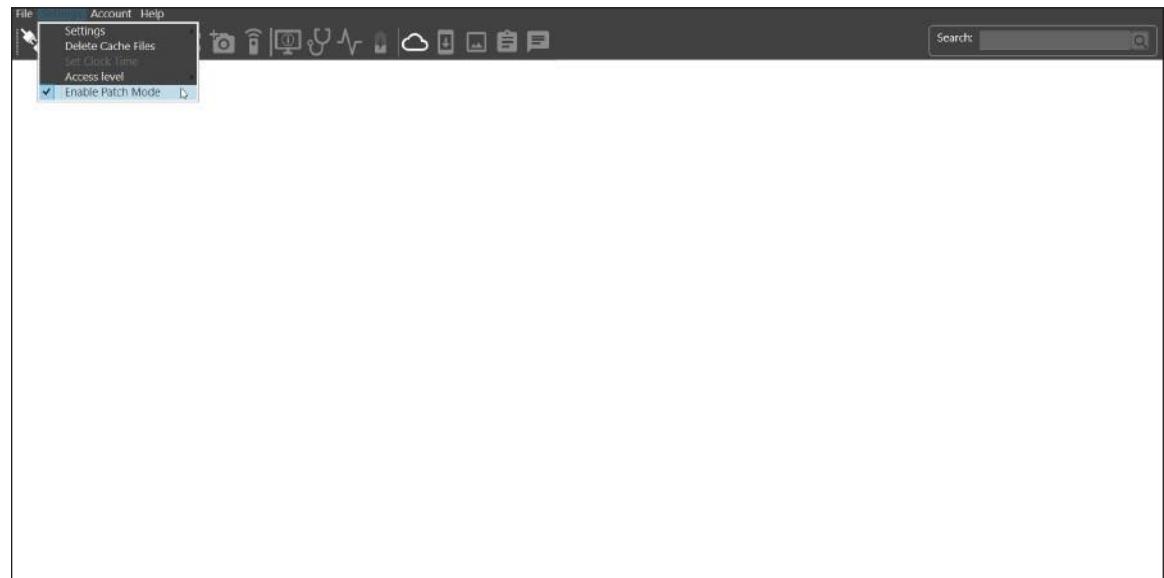
Once either load option is selected, another popup appears that allows to select if only certain parameter groups or the full configuration is loaded. Additionally, Mapped I/O and Seat Configuration can be loaded.



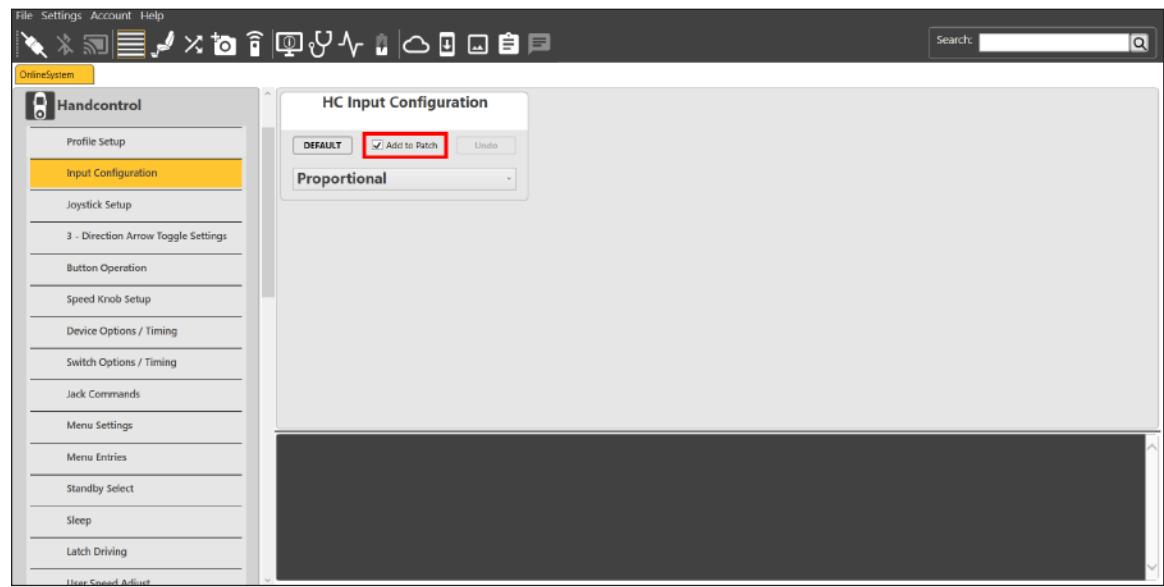
NOTE: A limited set of parameters are non-clonable. These parameters will not be written to an online system, regardless of which load option is selected. For a list of non-clonable parameters, please contact Curtis Instruments, Inc.

Patch Mode and Creating a Patch

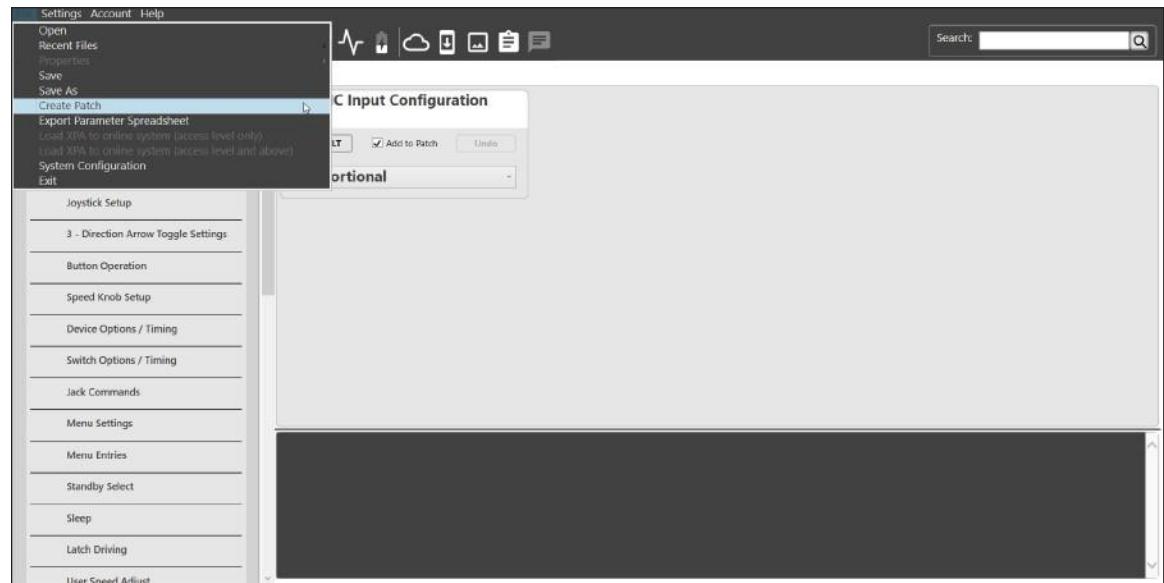
Patch mode allows OEM access level to create a configuration, which only loads specific parameters to an online system. A patch can be created from an online or offline configuration. First, Enable Patch Mode must be selected in Settings.



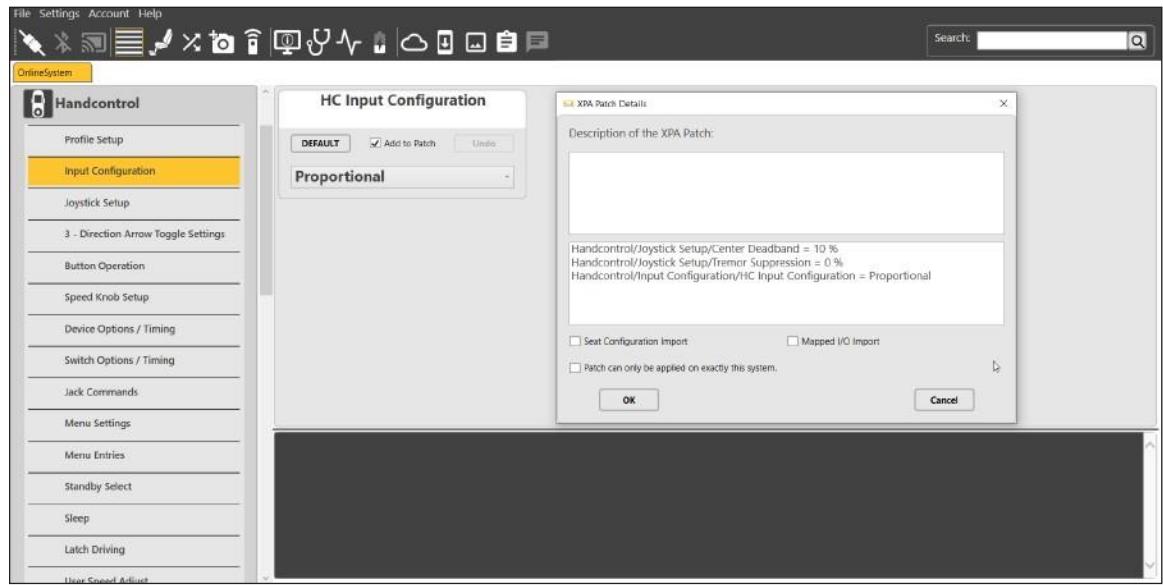
Each parameter now has a selectable option to “Add to Patch.” If checked, this parameter value will be saved as part of the patch. There is no limit to how many parameters can be added.



Once all desired parameters are selected, the patch can be created by selecting Create Patch in the File drop down menu.



The patch details will be shown, before it is saved. It lists the parameters and values selected to be part of the patch. A custom note can also be added to describe the patch.



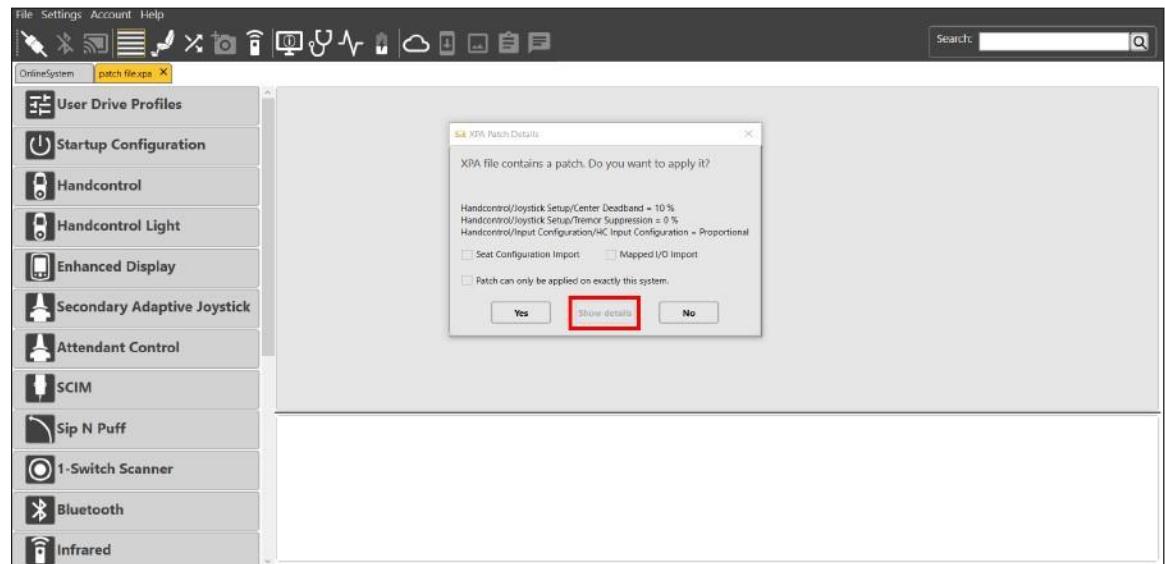
The Seat Configuration and Mapped I/O can be added to the patch from the patch details window.

Additionally, by selecting “Patch can only be applied on exactly this system” then the Patch can only be loaded to the exact system (modules and serial numbers must match) and will not load on any other system.



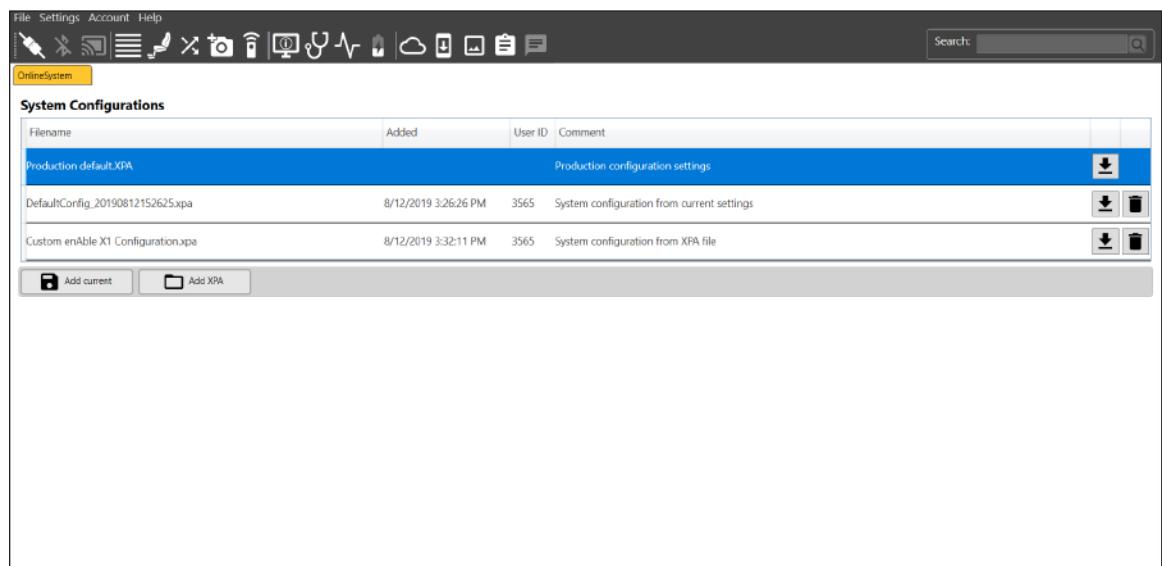
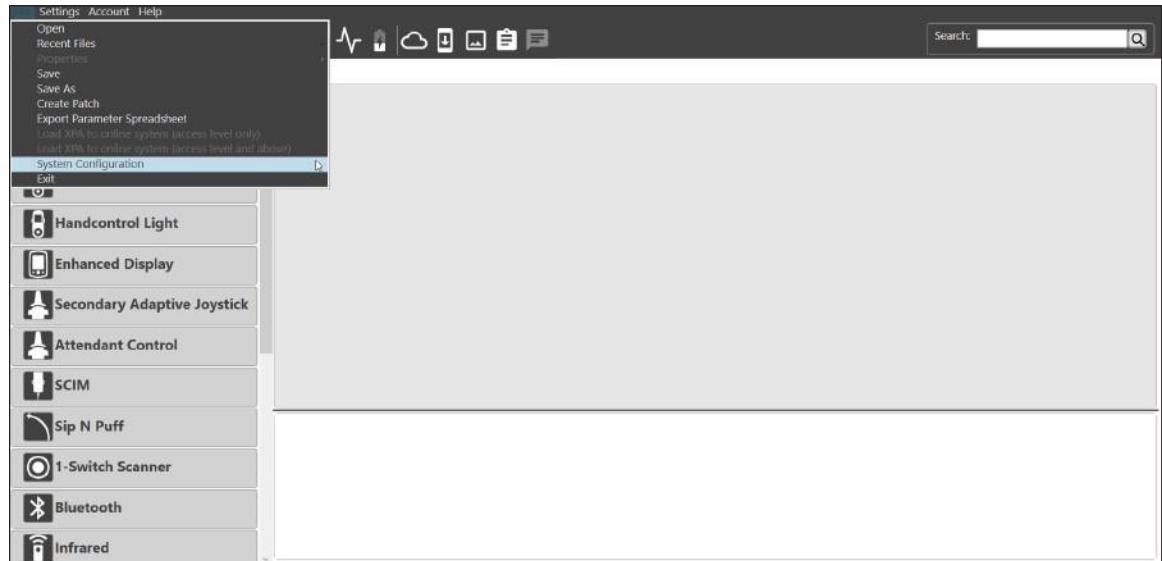
WARNING! If using “Patch can only be applied on exactly this system,” non-clonable parameters can be patched to an online system. For a list of non-clonable parameters, please contact Curtis Instruments, Inc.

To load a patch, simply open the patch file using File -> Open. A message pops-up indicating the file contains a patch, and asks if it should be loaded to the current connected online system. The summary of the patch can be seen by clicking “Show Details.”



System Configuration

The system configuration tool allows Dealer access level and higher to retrieve and store configuration files on an online system. System Configuration can be found in the File drop down menu.



The *Production default.XPA* configuration can be loaded only through a special production process, and not through a programming device. It is stored in the Powerbase, and cannot be deleted.

Other configurations can be added to the system, if a microSD card is available. To add the current configuration of the system to storage, “Add current” can be used. It is also possible to save another local configuration to storage, by using “Add XPA.”

To retrieve a configuration for viewing, use the download arrow to the right of the configuration. Any configuration stored through the System Configuration tool can be deleted.

Using the System Configuration tool does not change any parameter settings of the online system, it only manages stored configurations.

NOTE: The microSD Card must be installed in the Logical Master (Enhanced Display, or Hand Control), see the [Configuration Management section](#).

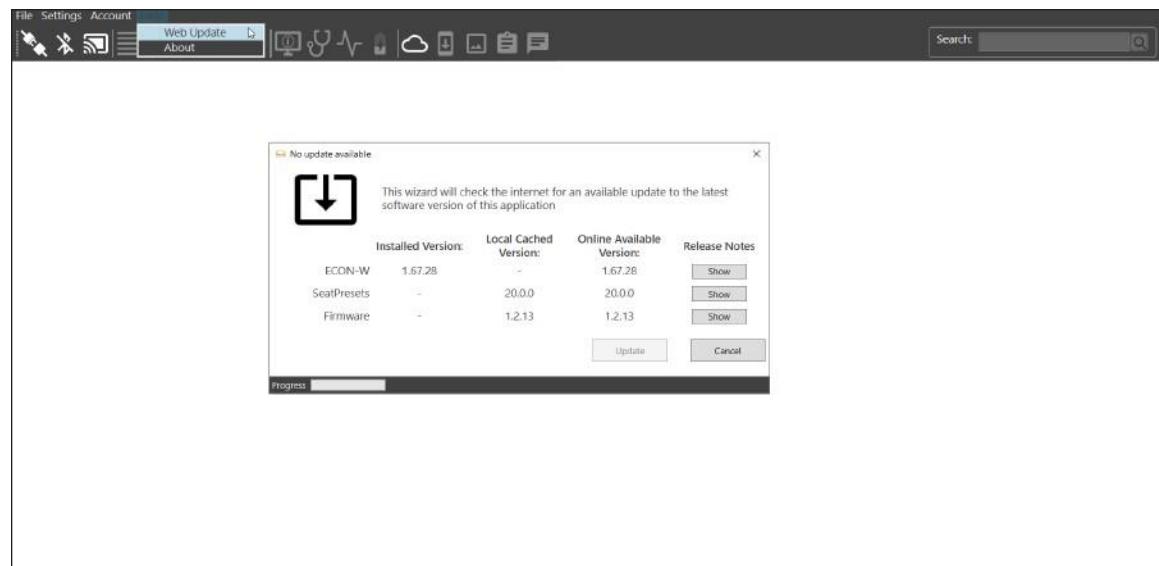
Deleting Cache Files

Delete cache files cleans up local files related to ECON-W including firmware and seat presets.

NOTE: If connection problems occur or ECON-W is not working properly, always delete cache files as a first step to resolve the issue.

A.2.2 ECON Programmer Update

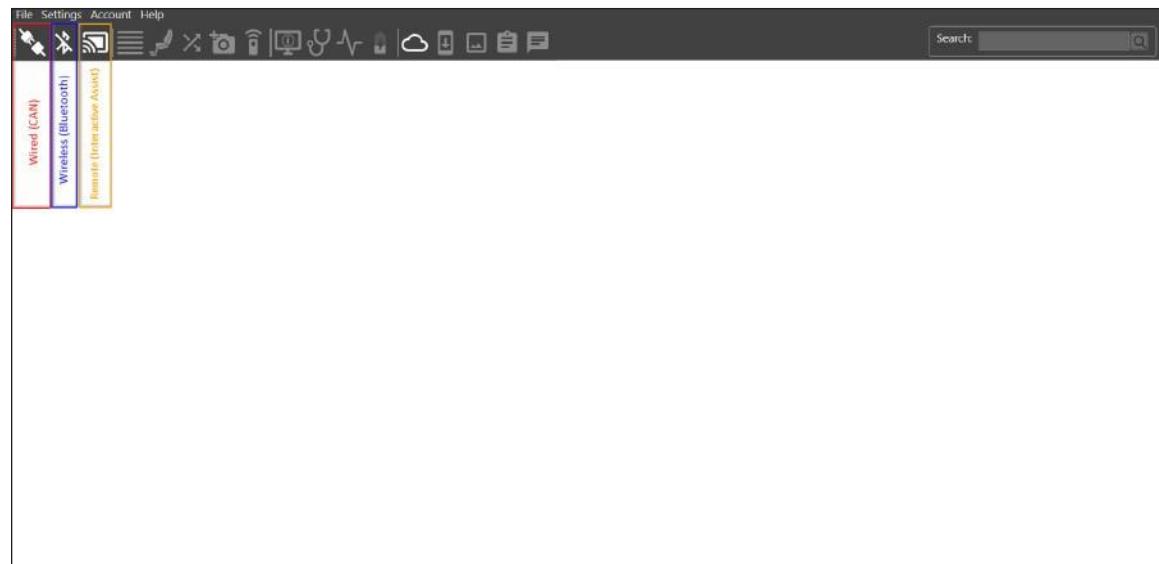
If a new ECON-W programming device is available, it can be downloaded and updated via web update. Use the Help drop-down menu, and select Web Update.



The Web Update will also allow you to download new Seat Presets, and enAble X1 system firmware if available.

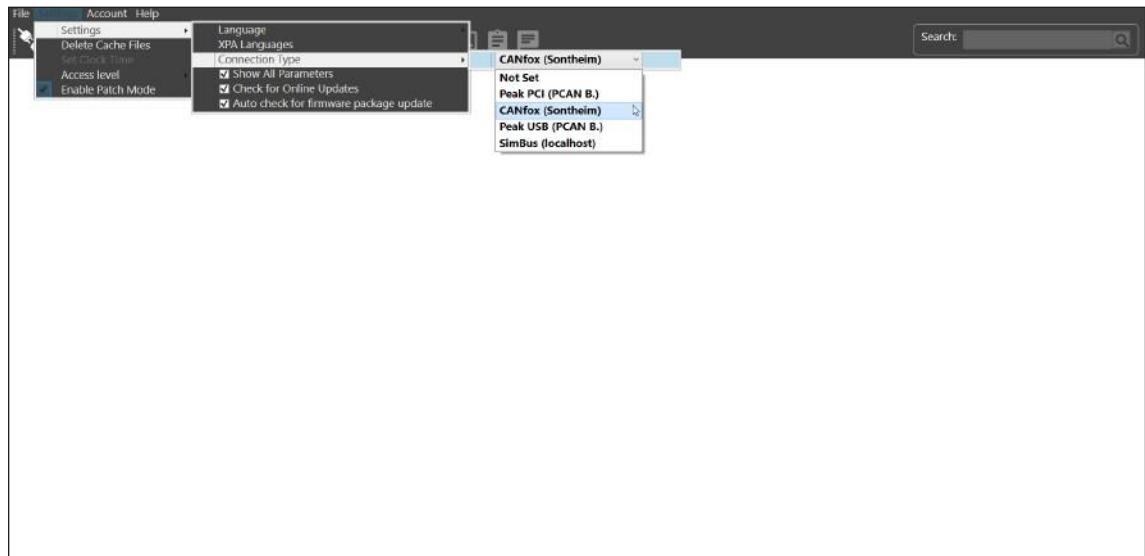
A.2.3 Connection Options

There are multiple ways to connect to an enAble X1 system. ECON-W (Windows) allows for CAN Bus (wired), Bluetooth (wireless), and Interactive Assist (Remote). ECON-i (iOS) allows for Bluetooth only.



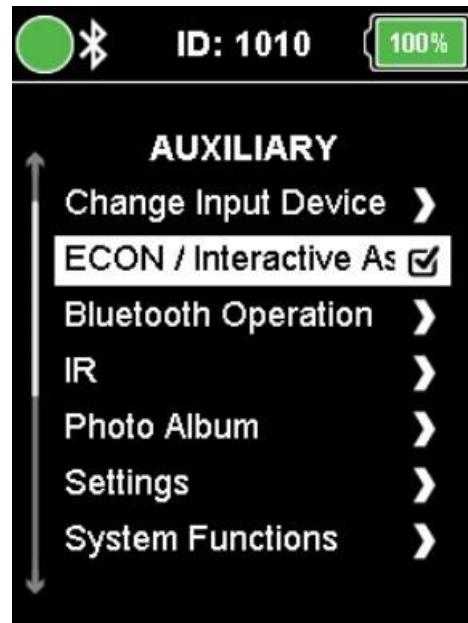
A. CAN Bus

The default CAN dongle used for wired connection is the CANfox – Sontheim cable. This is the same cable used for enAble 40 and enAble 50 products. The connection type must be specified in the Settings drop-down menu.



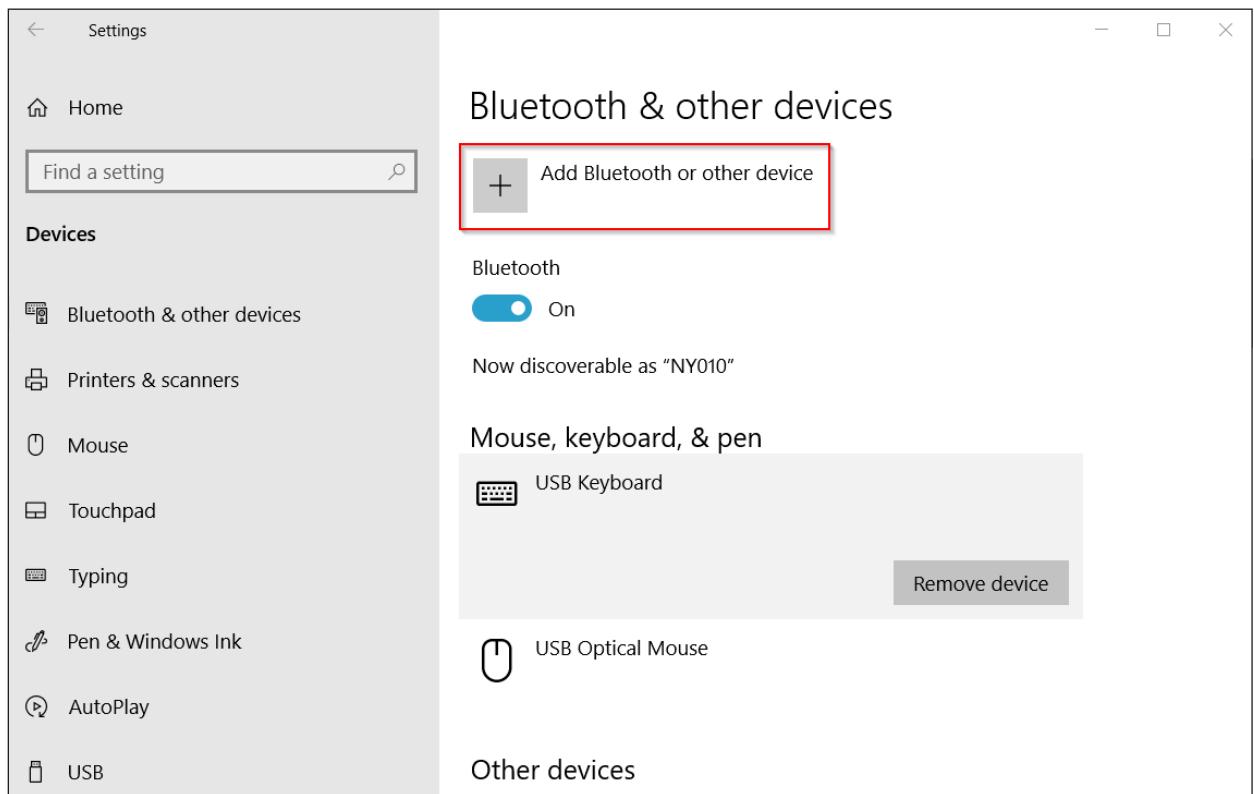
B. Bluetooth

To connect wirelessly, the Bluetooth must be first turned on from the systems Auxiliary menu by enabling “ECON / Interactive Assist.”

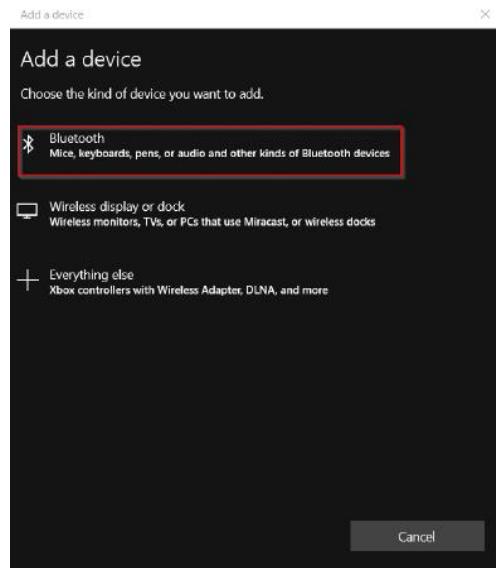


Notice the Bluetooth ID on the system display, the example above shows ID: 1010.

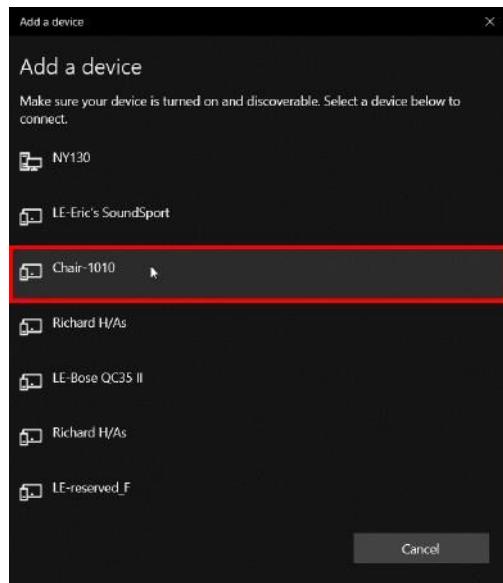
The pairing process shown below uses Windows 10 Version 1809 as an example. From the Windows 10 device, navigate to *Settings -> Devices -> Bluetooth & other devices*. Click “Add Bluetooth or other device.”



Click “Bluetooth.”

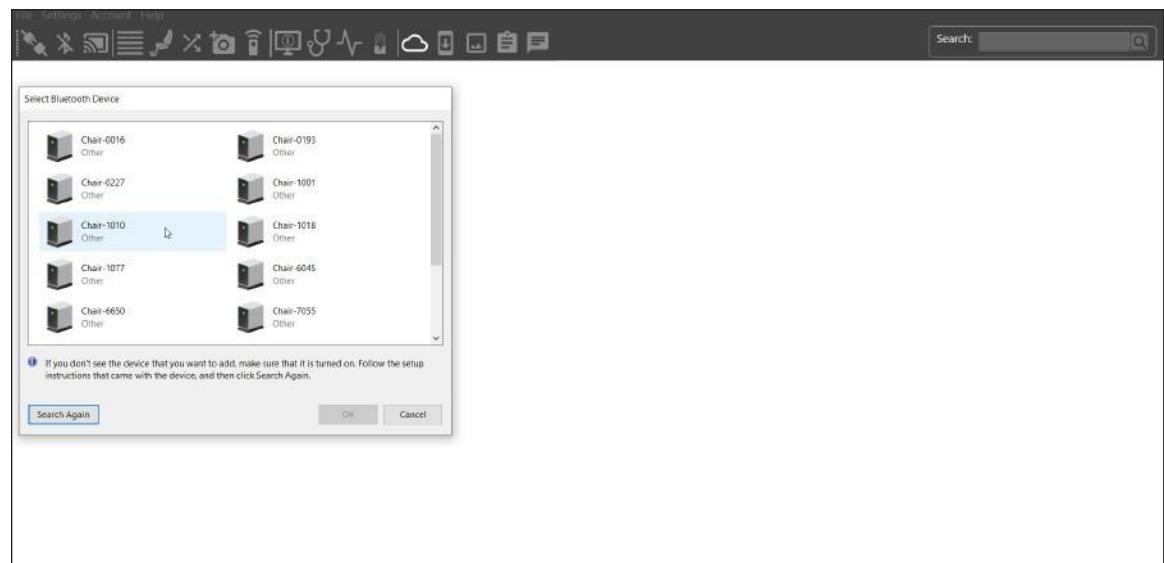


Click “Chair-####.”



A pairing screen will be shown on both enAble X1 display and the Windows 10 device. Make sure the Bluetooth Pin matches on both, before accepting.

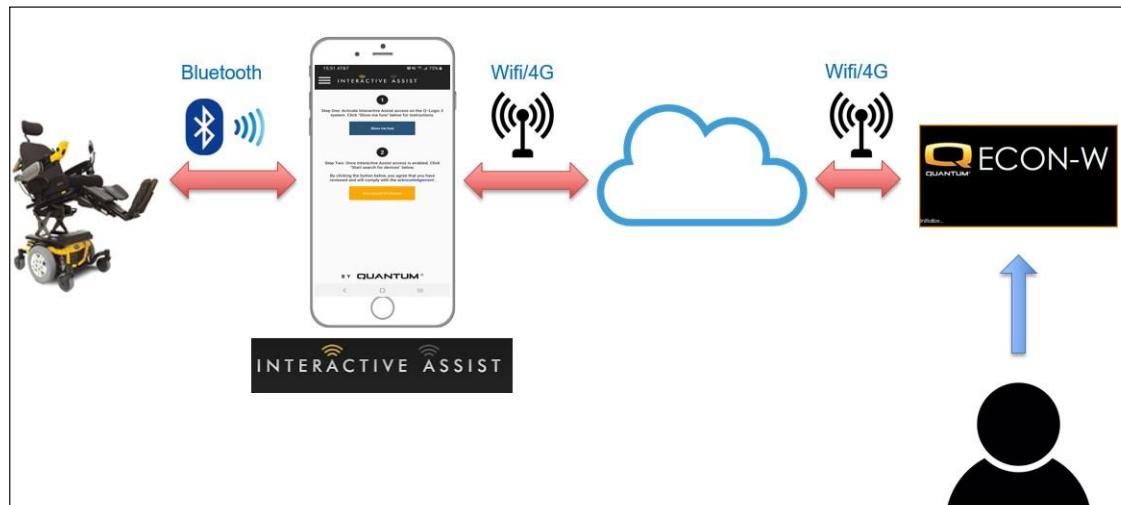
Once the pairing process is complete, the Bluetooth icon from ECON can be used to search for the desired enAble X1 system for connection.



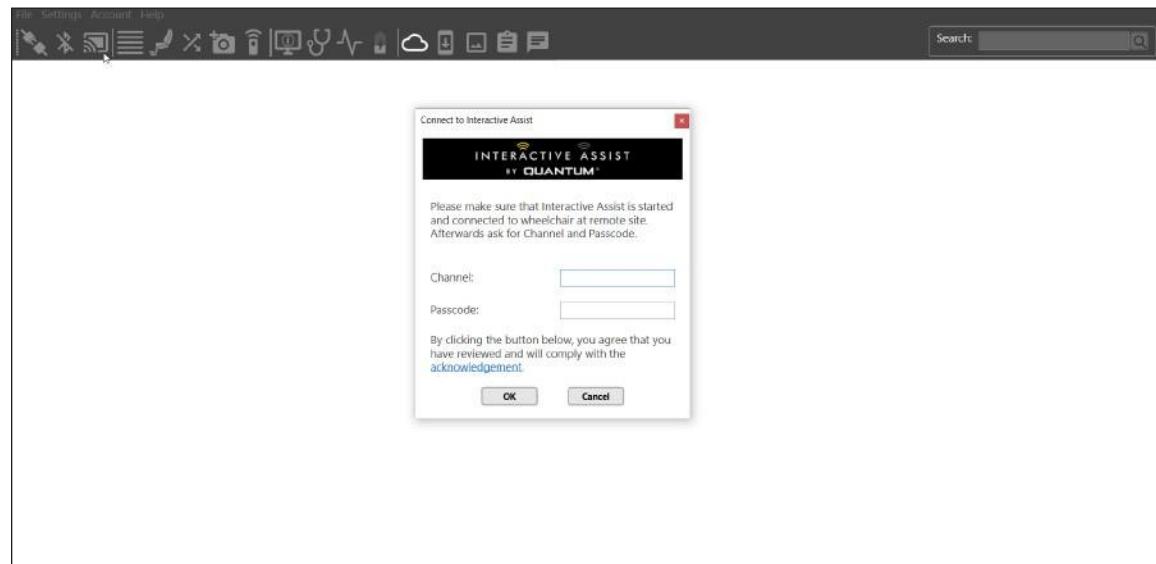
C. Interactive Assist

Interactive Assist is a smartphone application available on Apple iOS and Android smartphones. It allows for a remote connection from ECON-W to an enAble X1 system, using Interactive Assist as a gateway. Below is an overview of the connection.

Image 6 Interactive Assist Connection Overview



Once Interactive Assist is downloaded, a built in tutorial is available to establish the Bluetooth connection via the smart phone device and eX1 system. With the pairing and connection process complete, a Channel and Passcode is shown in the app. This is then shared with the ECON-W remote user that can input the information by choosing the Interactive Assist icon.



NOTE: Not all programming functionality is available while using Interactive Assist. For more information, please contact the OEM.

A.3 1313 HANDHELD

Image 7
1313 Handheld
Programmer



A.3.1 Overview

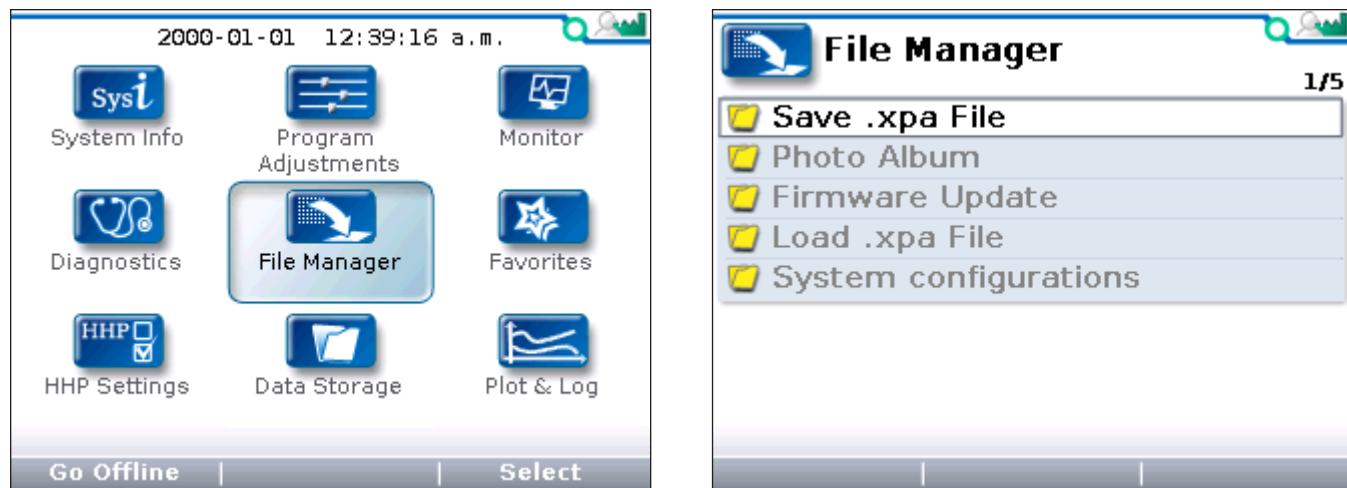
The 1313 Handheld is a portable programming tool that enables programming and diagnostic capabilities of the enEnable X1 system. There is some reduced functionality compared to ECON, noted below:

- Patch Mode
- Seat restriction customization and new actuator setup
 - Seat Presets still available
- Web updates

The 1313 has internal storage of 64 MB, but additional storage can be added using a Standard SD Card (not required for operation, but is required for logging and taking screenshots). It can be accessed using a USB Type-A to USB Mini-B cable connected to a PC or laptop device. Storage is generally used for saving system configurations, firmware, photo album, and 1313 HHP settings.

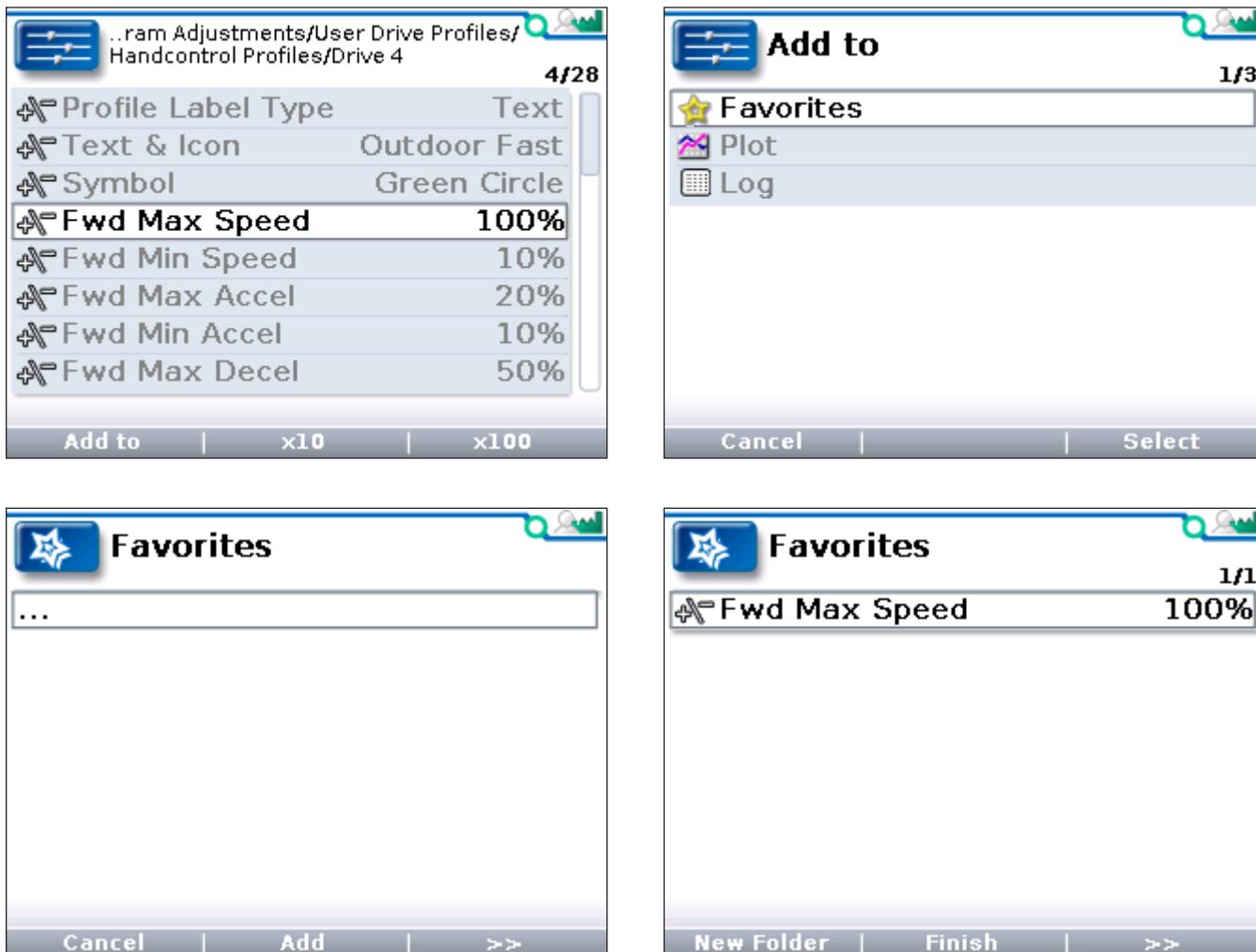
File Manager

The file manager allows saving and loading configurations, photo albums, updating system firmware, and accessing System Configurations. This is the same functionality as with ECON.



Favorites

A favorites menu is available, where individual parameters and monitor values, or folders can be added to the same screen for quick access. To add an individual item or folder to the Favorites menu, use the “Add to” soft key over the desired item. Then use the “Select” soft key, “Add” soft key to add the item to Favorites, then “Finish” soft key.

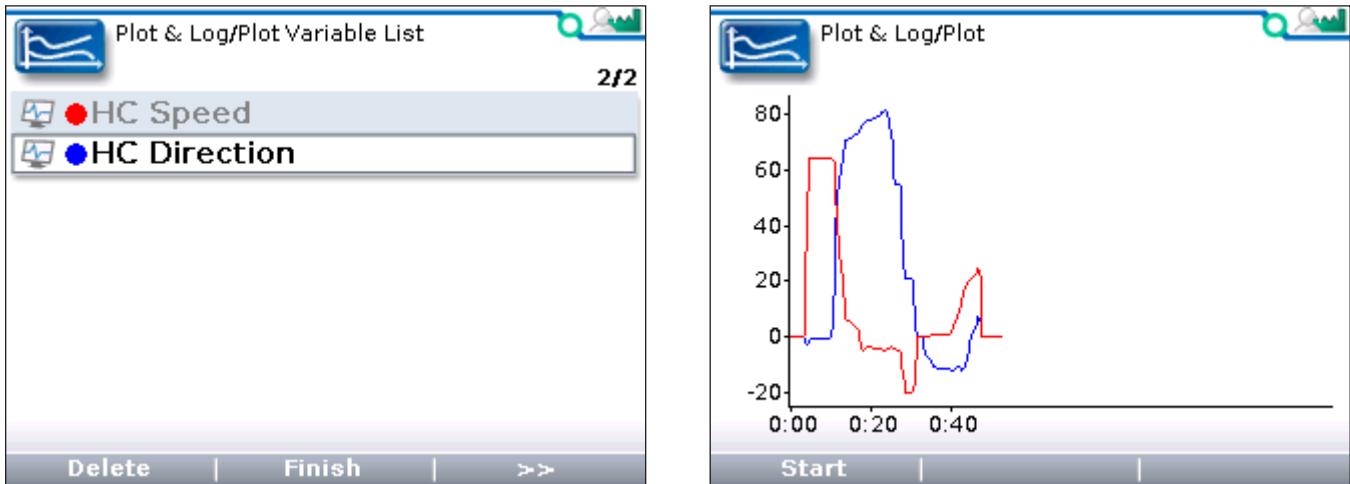


To remove a favorite, access the Favorites menu and use the “>>” Soft key until a “Delete” option is available. No popup confirmation will be shown when “Delete” is used, and the selection will be instantly removed.

Plot & Log

The Plot & Log feature allows to save real-time graphs and logs of selected monitor values. To select which values to plot or log, the same process is used as adding to Favorites (“Add to”), except the Plot or Log option is chosen.

To start plotting, access the Plot & Log menu, select Plot, and use the “Start” soft key. Use the “Stop” soft key when finished. The plot can be saved through taking a screenshot with the 1313, by pressing the Power key and then the Favorites key (while Power key is still held).



To start logging, access the Plot & Log menu, select Log, and use the “Ok” soft key. Select Log again when finished. The logging feature saves an Excel spreadsheet in .XLS format, but is not viewable on the 1313 itself.

A.3.2 1313 Programmer Update

The 1313 HHP firmware can be updated automatically or manually. To update automatically, connect the device to an enAble X1 system with the latest system firmware installed. The 1313 will update automatically. This is because the eX1 firmware pack also stores the firmware for 1313 HHP devices.

To update manually, the necessary firmware files can be loaded to the root directory of a 1313 using a USB Type-A to USB Mini-B cable connected to a PC or laptop device. The update occurs on the next power cycle. The firmware update files can only be obtained directly from an OEM or Curtis Instruments, Inc.

APPENDIX B: SYSTEM SPECIFICATIONS

B.1 BATTERY

Nominal Voltage	24 Vdc
Operating Voltage Range	17 – 33 Vdc
Maximum Voltage	35 Vdc

NOTE: When battery voltage falls below 21V, current output is reduced to preserve battery life.



WARNING! Applying voltage higher than the maximum rating may cause permanent damage to all system components.

WARNING! The internal battery fuse in the Powerbase may not trip at low battery voltage.

B.1.1 Charging

The maximum BUS current while charging through the enAble X1 system is 13A continuous.

The charger used should match the selected battery type, voltage, and capacity. The charger manufacturer's instructions should be followed for proper operation, maintenance, and cleaning.



WARNING! Using a higher rated charger may cause permanent damage to all system components.

B.2 ENVIRONMENTAL

Ambient temperature range (storage)	–40 to 70°C
Ambient temperature range (operation)	–25 to 50°C
Ambient humidity range (operation)	0 to 95% RH

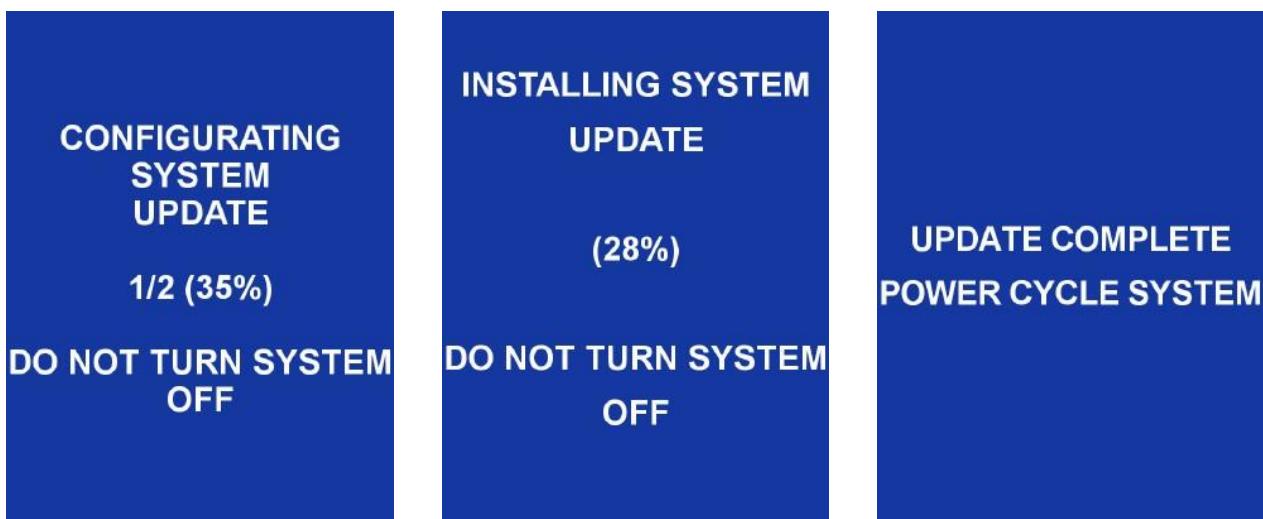
APPENDIX C: EX1 FIRMWARE COMPATIBILITY AND UPDATES

C.1 FIRMWARE UPDATES

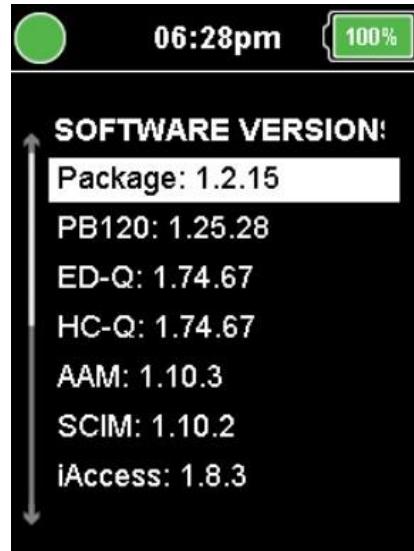
Updating the enAble X1 system firmware can be done using any programming device. The firmware is loaded to the microSD card (see the [Configuration Management section](#) to ensure proper installation), and becomes available to install on the next power cycle.



The installation begins once the update is initiated, and the firmware is distributed to each connected module via an automatic self-update.



Then, the firmware pack and module versions can be seen in the *Auxiliary -> System Information -> Software Versions* screen.



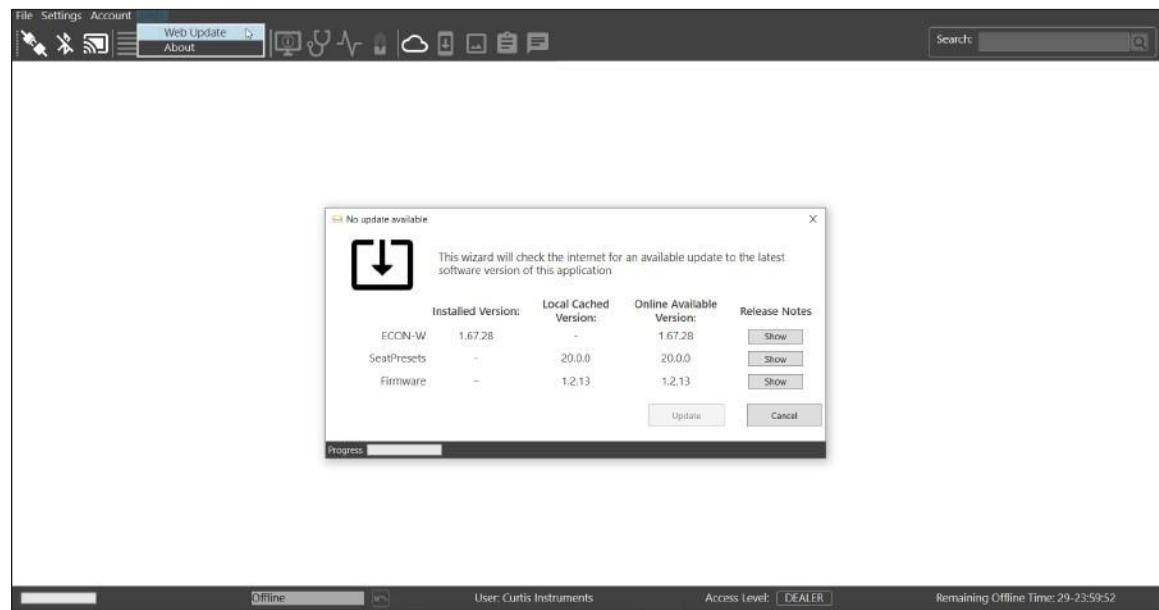
It is recommended to use the latest firmware to ensure the newest features of the system are available.

NOTE: If the Charger Inhibit or a Drive Restriction due to seat position (including iLevel) is active, a firmware update will not be shown if available.

NOTE: It is not possible to downgrade firmware.

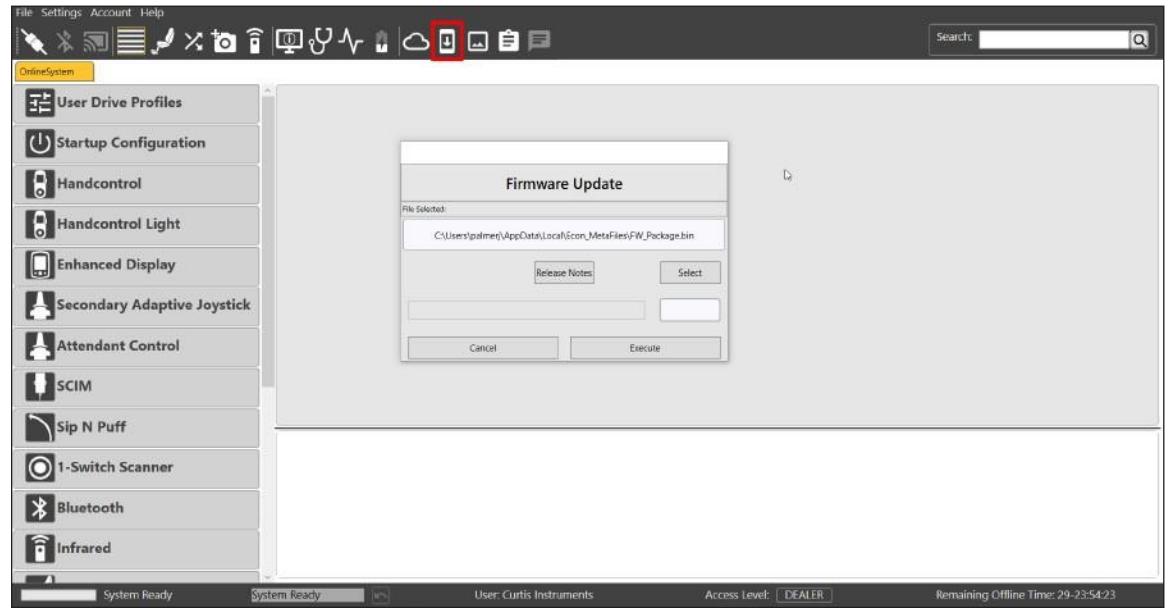
C.1.1 Using ECON

To download the latest firmware using ECON-W, the pack must first be obtained from the web server. Using ECON-W, select Web Update from the Help drop-down menu. Choose Update if the latest firmware is not yet downloaded.



NOTE: Web Update will be prompted automatically if Check for Online Updates is enabled from the Settings drop-down menu.

Next, connect to an enAble X1 system and choose the Firmware Update icon from the top toolbar. A pop-up will be shown to start downloading the firmware to the systems microSD card.

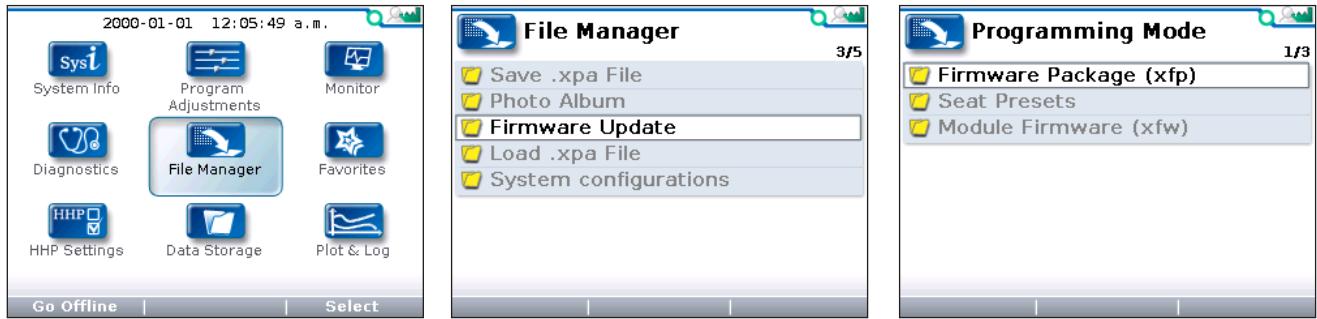


NOTE: Firmware Update will be prompted automatically if Auto check for firmware package update is enabled from the Settings drop-down menu.

C.1.2 Using 1313 HHP

To download the latest firmware using the 1313 HHP, the pack must first be obtained from the OEM. Then, the pack can be loaded into the 1313's internal memory (or installed Standard SD card) to any directory using a USB Type-A to USB Mini-B cable.

Next, connect to an enAble X1 system and choose *File Manager -> Firmware Update -> Firmware Package (xfp)*.



Locate the directory where the firmware package is stored, and use the “Update” soft key to start the update.

C.2 EXCHANGING MODULES OF DIFFERENT FIRMWARE

All enAble X1 modules connected to a system must utilize firmware versions from the same firmware pack. The firmware on the Logical Master's microSD card should always be up to date.

If a replacement module is added to an existing system and that module has older firmware, it will receive an update from the firmware pack on the installed microSD card.

If a replacement module is added to an existing system and that module has newer firmware, a firmware update of the system is required.

NOTE: In some cases, if system modules are not utilizing firmware from the same firmware pack, an error will be shown and the system will be inoperable until the firmware is updated.

APPENDIX D: FILE EXTENSIONS

Table 13 File Extensions

FILE EXTENSION	DESCRIPTION	eX1	ECO N	1313
.HAP	Application software necessary for connecting to the enAble X1 system			x
.HFM	Firmware manager that manages installation of application software			x
.HPS	Saved programming device settings			x
.HRC	Resource files that contain the programmer text display in multiple languages			x
.XFP	System firmware pack (all modules)	x	x	x
.XFW	System firmware (single module only)	x	x	x
.XPA	System configuration	x	x	x
.XPH	Contains sets of photos, formatted for display on the enAble X1 system	x	x	x
.XRP	IR project configuration	x	x	

APPENDIX E: SPARE PARTS AND ACCESSORIES LIST

Table 14 Handheld Programming Accessories List

Handheld Programming	
DESCRIPTION	PART NUMBER
Bag HHP 1313, Q-logic logo	17917314
Lanyard, Q-logic logo	17917316
Quick start guide 1313, Q-logic logo	53115
1313-Programmer Cable XLR	17926304-02
Manual for 1313 handheld Programmer	50384
1313 HHP Dealer	17965700-3309
1313 HHP OEM	17965700-4409
1313 HHP Kit, Dealer	17965701-3309
USB Cable Type-A to Mini-B	17927700

Table 15 Accessories List

Accessories	
DESCRIPTION	PART NUMBER
Multiplier cable, m/m/m/f	17881359-02-01
Multiplier cable, m/m/f/f	17881360-02-01
Bus cable, 0.3m, f/f	17881361-01-02
Bus cable, 1m, f/f	17881361-01-01
Bus cable, 0.41m, m/f	17881362-01-01
Bus cable, 1m, m/f	17881362-01-02
Charger/programmer harness, 1m	17880701
Motor connector housing	37383
Battery connector housing	37384
Boot, Motor connector	38316
Boot, Battery connector	38314
Charger/programmer Socket	17880310
4-Switch Box	17682700

Table 16 Spare Parts List

Spare Parts	
DESCRIPTION	PART NUMBER
Joystick SK 175-002 SPI	18139MXYD-0002
Soft spring SK 175-141 incl. Circlip	17518033
Knob Joystick	17519114-01
Gaiter SK 175-138	17518031
Gaiter JC-2500	17518032-01
Connector kit assembly (motor & battery)	381570001
Spare Kit Handcontrol HC-Q	17949366-02
Holster for PSM	17951300-01
Shell painted HC-Q	17949365-02
Speed dial	17949367-01
Shell HC-Q	17949301-01
Shell painted AD-Q	17955353-02
Shell AD-Q	17955300-01
Spare Kit Advanced Display	17955362-02
Spare Kit Stand Alone Joystick	17953352-01
Spare Kit Enhanced Switch Module	17966355-01
Sontheim USB-CAN Programmer cable	17876300-02
Programmer cable, 6m (XLR / Lumberg)	17926306-04