



MOTOCRANE

COMMAND

CONSOLE

PRO / LITE

⚠️ WARNING

To minimize risk of serious injury, death or damage, before using the MotoCrane COMMAND Console, all drivers and operators must read this Operation Manual and all on-product labels.

All practices and procedures stated herein are required for the proper and safe operation of the COMMAND Console.

If there are any questions, please contact MotoCrane Support at support@motocrane.com.

Keep this Operation Manual near your COMMAND Console for future reference.

Safety Signal Words

This manual and the safety labels attached to this equipment utilize signal words that signify safety hazards with different levels of severity. The words are preceded by a triangle signifying that these are safety related. Below are the words used and the definitions for these words:

- **⚠️ WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury or damage
- **⚠️ CAUTION** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury or damage
- **NOTICE** is used to address practices not related to physical injury

The terms IMPORTANT and NOTE are also used to describe ideas for better and more efficient use of COMMAND Console.

Table of Contents

Safety Signal Words	2
Table of Contents	3
Before the First Drive	4
IMPORTANT PRODUCT & SAFETY INSTRUCTIONS	5
Safety	5
IMPORTANT: Restricted Use Statement	5
Disclaimer and Limitations of Liability	5
Limited Warranty	6
Intellectual Property	6
System Overview	7
COMMAND Console PRO	7
COMMAND Console LITE	8
COMMAND Console Setup	9
Setup “at a glance”	9
MotoCrane COMMAND Console	10
COMMAND Console Touchscreen Interface	11
Interface Layout	11
Header	12
Dashboard	13
Joystick Settings	14
Expanded Dashboard	15
Control Panel	16
Dock	17
Information	18
Battery Bank (HYPER-ONLY)	19
UPC (RADICAL-ONLY)	20
INS 2 Advanced Stabilization	21
Limits	22
Control Mode	23
Setup	24
Diagnostics	25
Status	26
System Log	27
Code Lookup	28
Known Hazards	29
Terminology	29
Transporting COMMAND Console	29

Troubleshooting	29
Troubleshooting	29
Firmware Update	30
Maintenance	40
Weather & Water	40
Mounting/Dimensions of COMMAND Console	40
Specifications	41
Mechanical	41
Electrical	41
Weather	41
Revision History	42

Before the First Drive

Do the following before using the COMMAND Console for the first time.

1. Read this Operation Manual
2. Read the Warranty in the Terms of Sale
3. Watch the Video Tutorials at www.motocrane.com/knowledge-base
4. Recommended: Attend MotoCrane Training for in-person demonstration

IMPORTANT PRODUCT & SAFETY INSTRUCTIONS

Safety

The MotoCrane COMMAND Console is not a toy and can cause serious injury, death or damage if not used properly. You must exercise caution during use of the COMMAND Console to ensure a safe filming environment for everyone. This Operation Manual describes safe operation and should be read in conjunction with the online training videos or additional in-person training.

IMPORTANT: Restricted Use Statement

The COMMAND Console must only be used by trained operators 18 years of age or older.

Do not modify or adjust the COMMAND Console. The COMMAND Console has been calibrated before it is shipped to you. No modification or adjustment to the COMMAND Console is allowed without the express written approval of MotoCrane, LLC.

Disclaimer and Limitations of Liability

You agree that you are responsible for your own conduct and any content created while using the COMMAND Console, and for any consequence thereof. You agree to use this product only for purposes that are proper and in accordance with local laws, regulations or other legal requirements.


You also agree:

1. Any part of this disclaimer is subject to change without prior notice. Refer to www.motocrane.com/knowledge-base for the latest version.
2. MotoCrane, LLC reserves the right of final interpretation of this disclaimer.
3. MotoCrane, LLC has no control over the use, setup, assembly, modification or misuse of the COMMAND Console, and therefore no liability shall be assumed or accepted by MotoCrane, LLC for any resulting damage, death, or injury incurred directly or indirectly from the use of the COMMAND Console. By the act of use, setup or assembly, the user accepts all resulting liability.

Limited Warranty

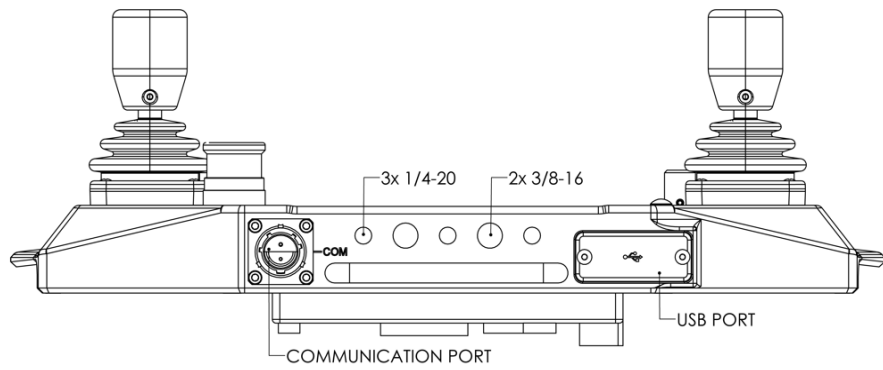
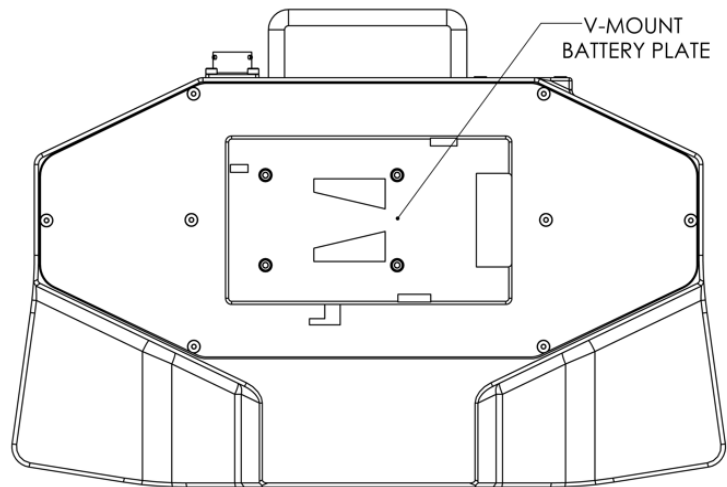
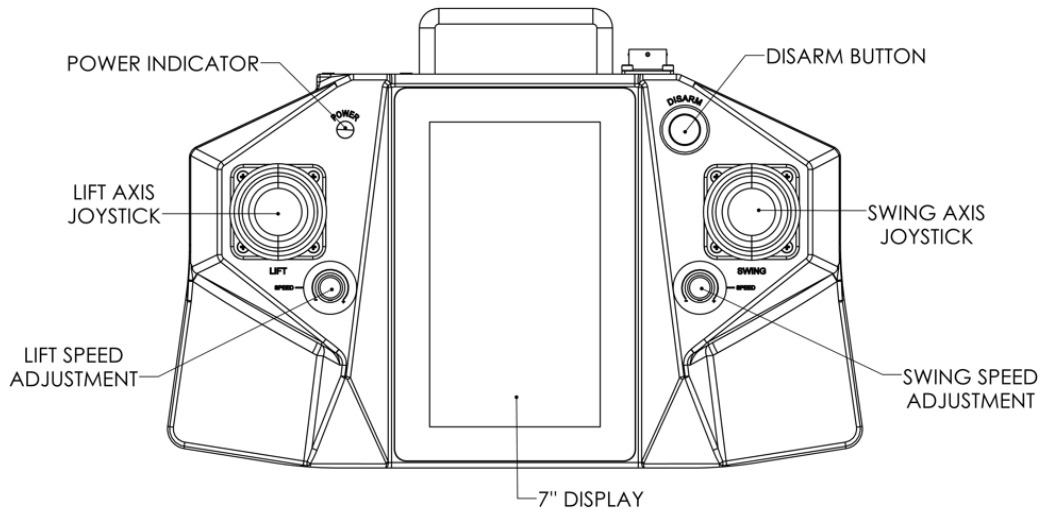
The COMMAND Console has a limited manufacturer's warranty on parts and assembly. See the Terms and Conditions of Sale for your COMMAND Console for a complete description of this limited warranty. This Limited Warranty is incorporated by reference into this Operation Manual.

Intellectual Property

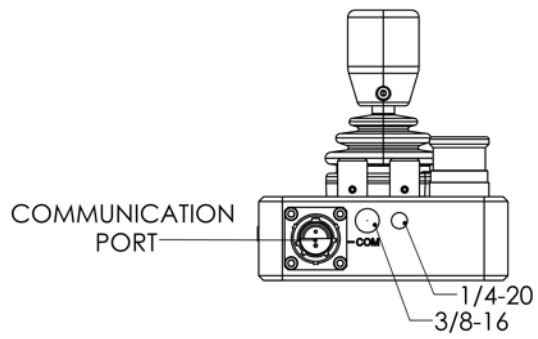
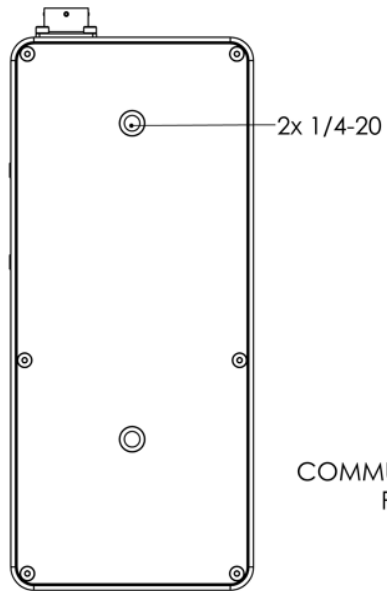
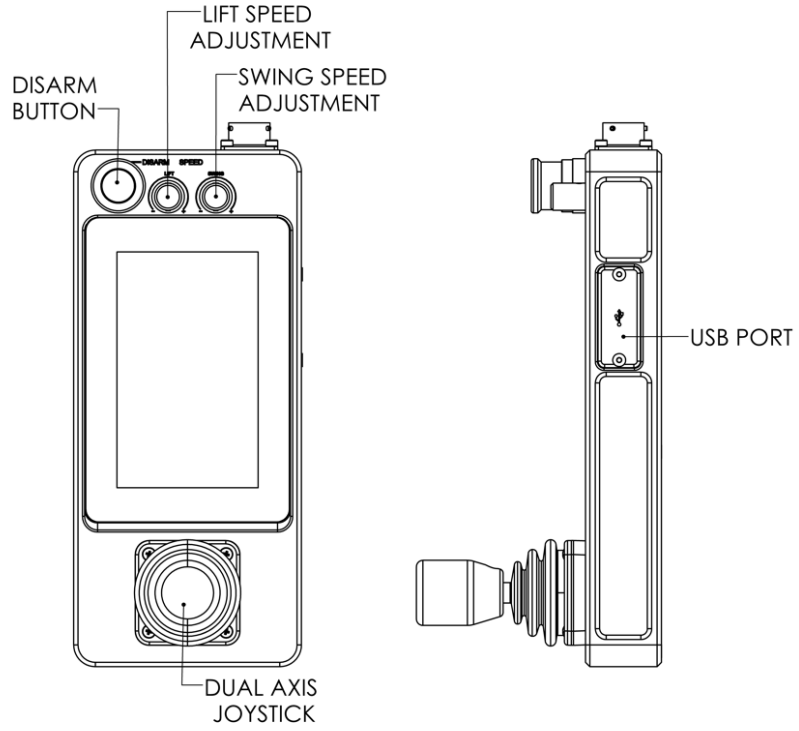
MotoCrane™, and  **MOTOCRANE** are trademarks of MotoCrane, LLC. You may not use the trademarks of MotoCrane, LLC without express written permission. All rights reserved.

System Overview

COMMAND Console PRO



COMMAND Console LITE



COMMAND Console Setup

Setup “at a glance”

In order to be operational, the COMMAND Console must be connected to the PSU.

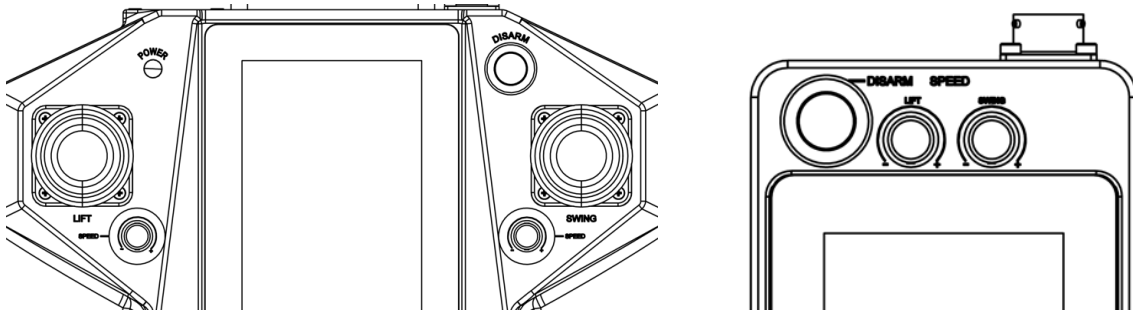
1. Setup your MotoCrane remote arm system as described in its corresponding Operation Manual.
2. Once ready, connect the COMMAND Console to the PSU using the Controller COM Cable.
3. Make sure the COMMAND Console ‘DISARM’ button is depressed, and turn on the PSU.
4. Tune to desired speeds on the COMMAND Console before driving.
5. Release the ‘DISARM’ button to enable arm control via the joysticks.
6. Operate in a safe manner as described in the manual and obey all laws.

⚠WARNING : Failure to follow these instructions and those below can result in serious injury, death or damage.

These instructions are demonstrated in our training videos and found online at www.motocrane.com/knowledge-base. All terminology is referred to in the above diagrams.

MotoCrane COMMAND Console

The MotoCrane COMMAND Console PRO houses two single-axis joysticks for Swing and Lift axis control, whereas the LITE version houses one dual-axis joystick. Both are equipped with speed adjustment knobs for easy user adjustment, and a touch screen color display for configuration, monitoring, and advanced settings. Joysticks send a command proportional to the degree that they are moved along their axis.



There are also 3 parameters adjusted via the Touchscreen interface - SMOOTH, INVERT, and DEADBAND which should be configured and tested before operation. Take time to get comfortable with the controls. Consider changes in focal length, and how these might affect your changing field of view.

SPEED - The maximum speed (RPM) achievable by the axis.

SMOOTH - The rate at which RPMs are gained and lost.

INVERT - Inverts the direction of the controls

DEADBAND- The distance moved by the joystick before moving the axis.

Examples:

High Speed, Low Smooth: The axis will feel very reactive and touchy. The axis will eventually achieve fastest rotation quickly, and when released will take very little time to come to a stop.

Low Speed, High Smooth: The axis will feel sluggish and dampened. If held, the axis will achieve slow rotation over some time, and when released will stop very smoothly.

⚠ WARNING When the DISARM/ EMERGENCY STOP button is engaged (pressed down), all power is cut from the motors, and the Lift-axis brake is engaged. The remote arm will not be controllable, which could prevent the operator from moving it into a safe position. It will stop immediately, regardless of the speed or acceleration settings. After releasing this button, it will take a few seconds to regain the ability to move.

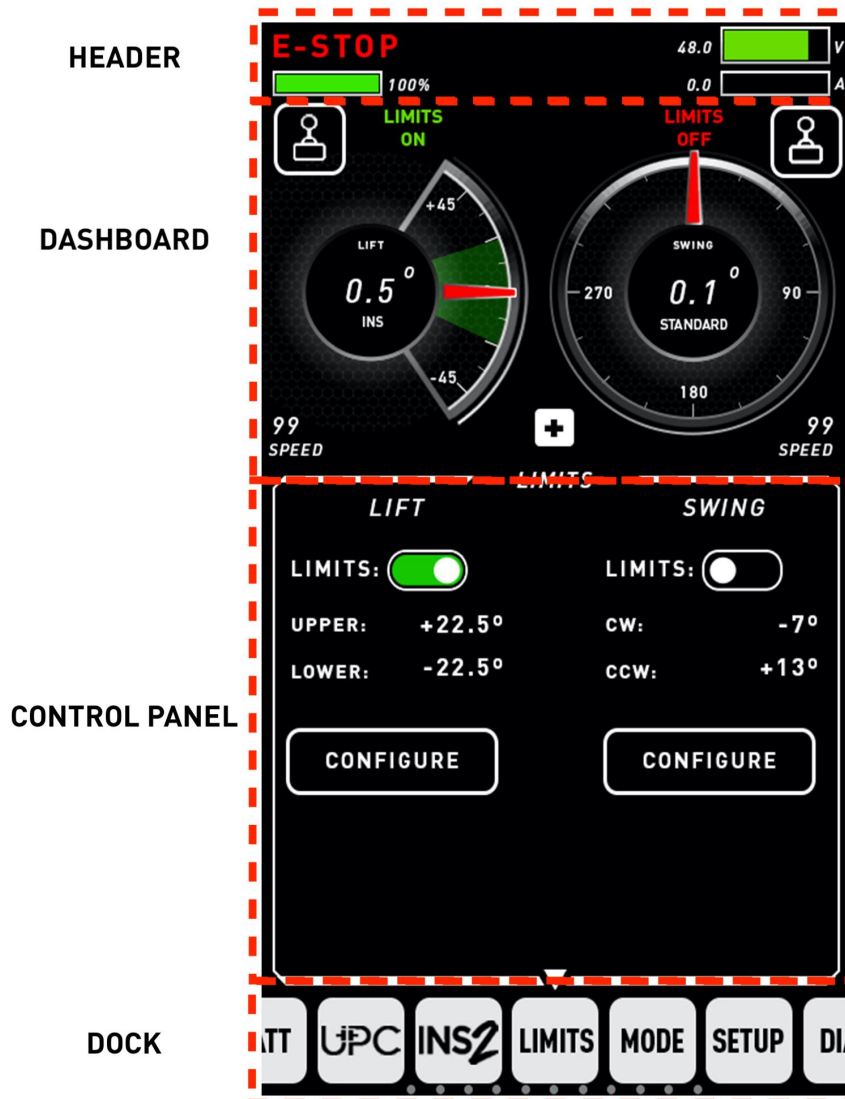
⚠ WARNING Do not force the joysticks past their range of motion. This can send erroneous commands causing undesired and potentially hazardous movement.

COMMAND Console Touchscreen Interface

Interface Layout

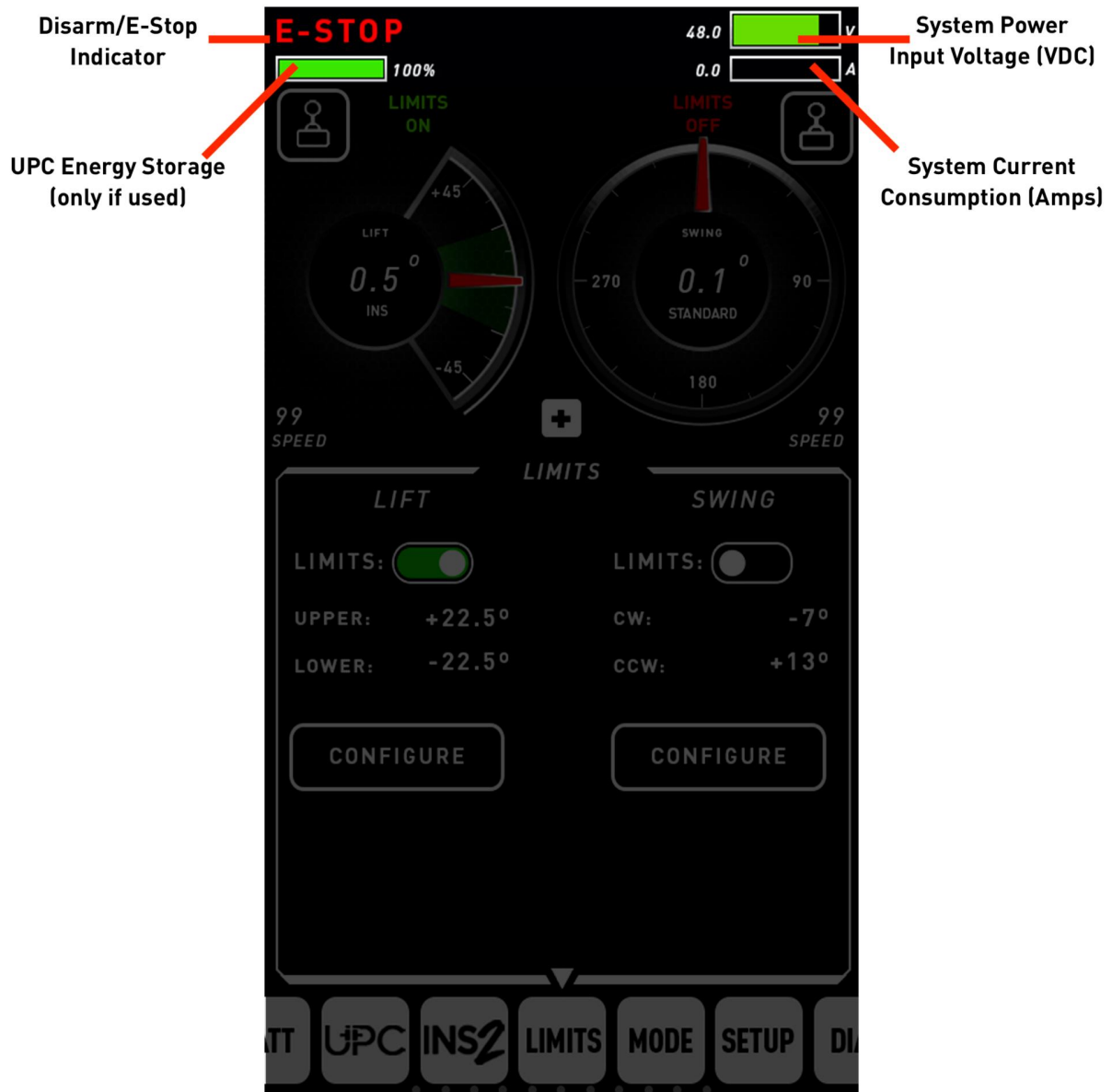
The COMMAND Console features a touchscreen interface for monitoring real-time system data, configuring settings like range of motion limits, and also performing tuning or calibrations required for your application.

The layout is organized into 4 sections (**Header, Dashboard, Control Panel, and Dock**) to allow critical system information like battery voltage and arm position to always be displayed, even when adjusting settings or monitoring system performance.



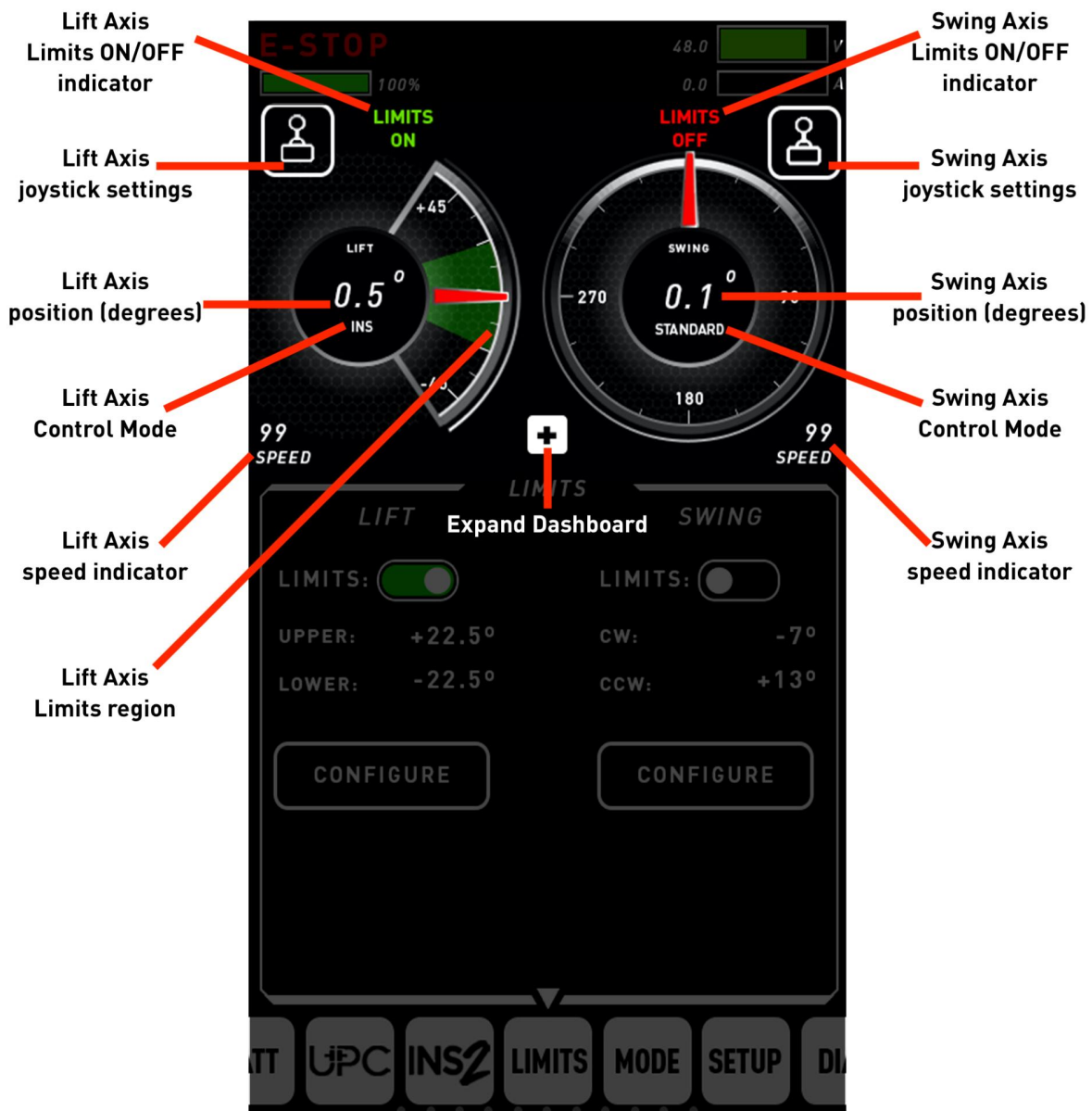
Header

The Header contains basic critical system information like System Input Voltage, Total System Current Draw (in Amps) and an indicator for when the system is Disarmed (E-Stop pressed down). If the UPC (Ultracapacitor Power Core) is connected, you're also able to monitor how much energy is stored within the UPC (charge level).



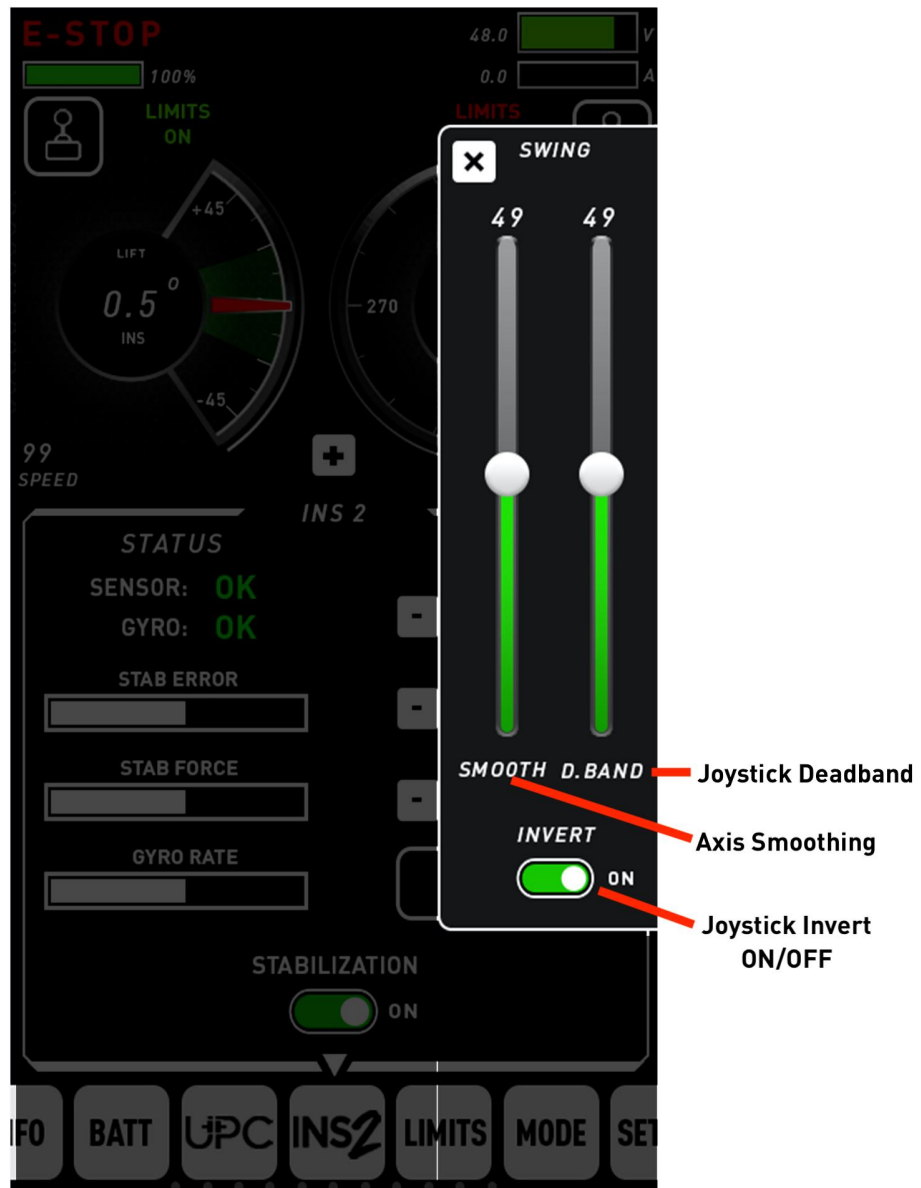
Dashboard

The dashboard contains axis position and control information like Lift and Swing axis position gauges and their corresponding joystick settings. The Dashboard indicates whether range of motion Limits are ON or OFF and displays a green region for the configured Limits region when Limits are turned ON. For a more focused view of the Dashboard, it can be expanded by pushing the "+" button. Joystick settings like the Smooth, Deadband, and Invert are accessed by pushing the corresponding joystick setting button.



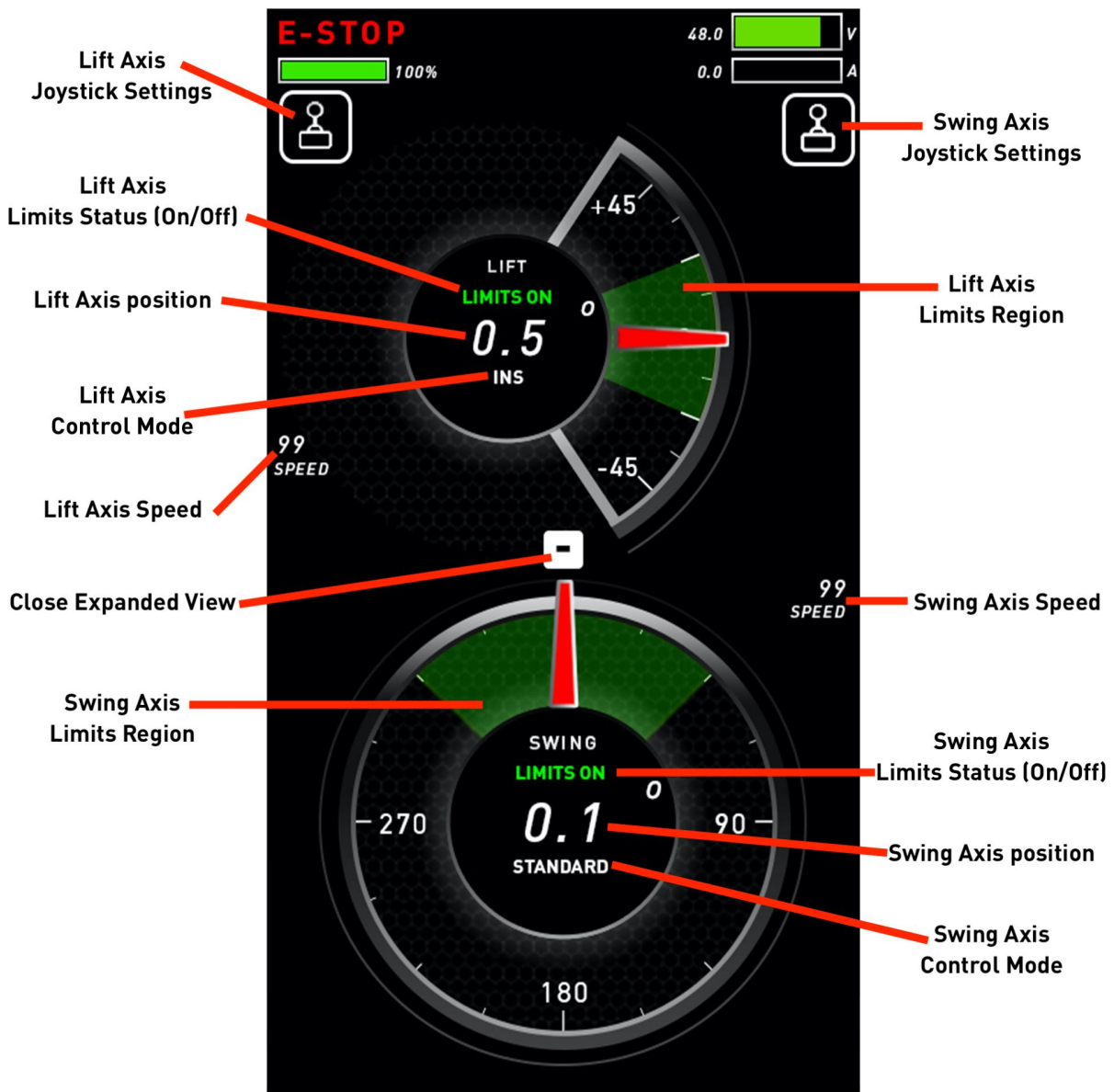
Joystick Settings

Joystick settings for either axis can be accessed and adjusted by touching the Joystick Icon located on the dashboard. Smoothing and Deadband are adjusted by touching and dragging the vertical sliders up and down to the desired levels. Axis inversion can be toggled ON or OFF by tapping the INVERT toggle switch.



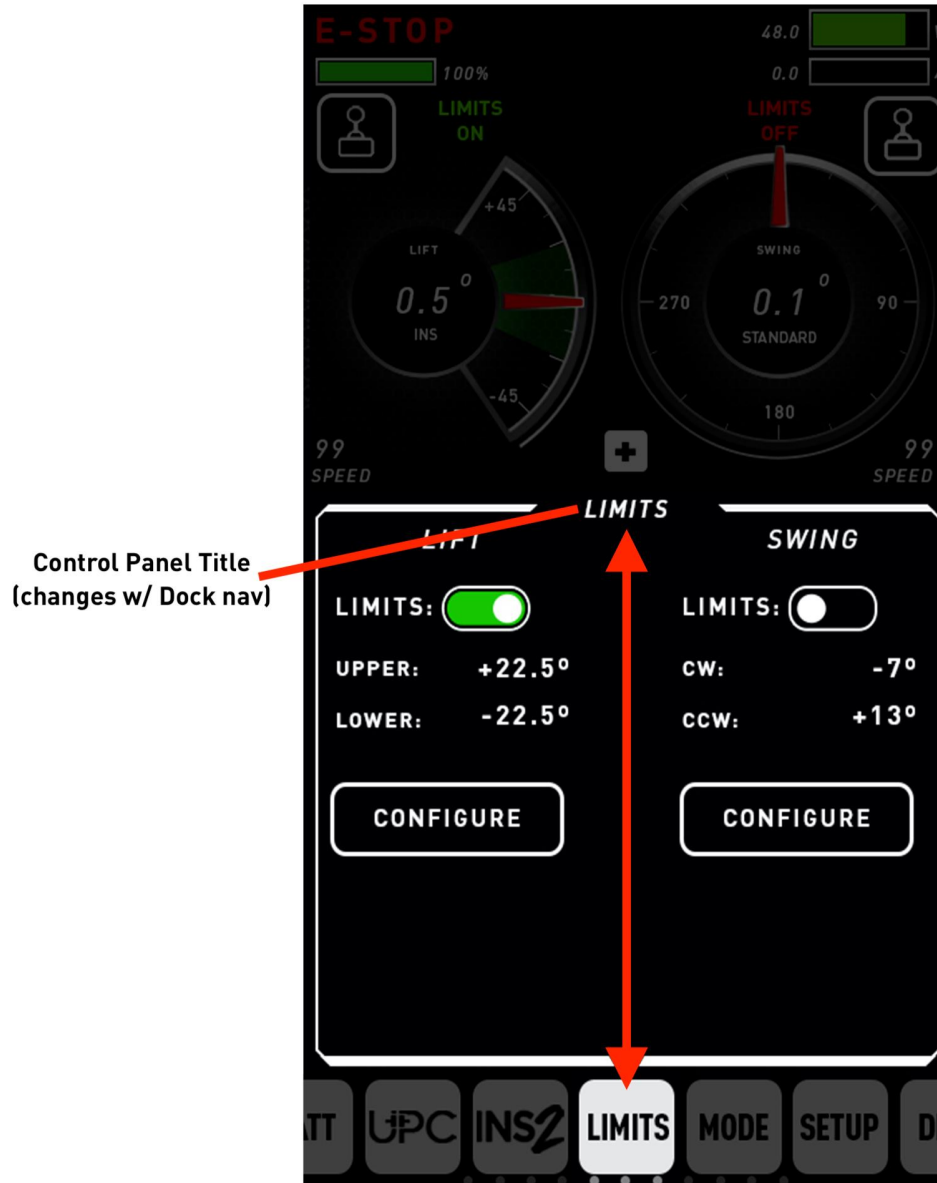
Expanded Dashboard

The Dashboard can be Expanded to offer a more focused view of Lift and Swing position by pressing the "+" icon on the Dashboard. This can be helpful after all settings/configurations have been completed and only arm position is of primary interest. The Header is retained within the Expanded Dashboard for monitoring system power and E-STOP/DISARM Status.



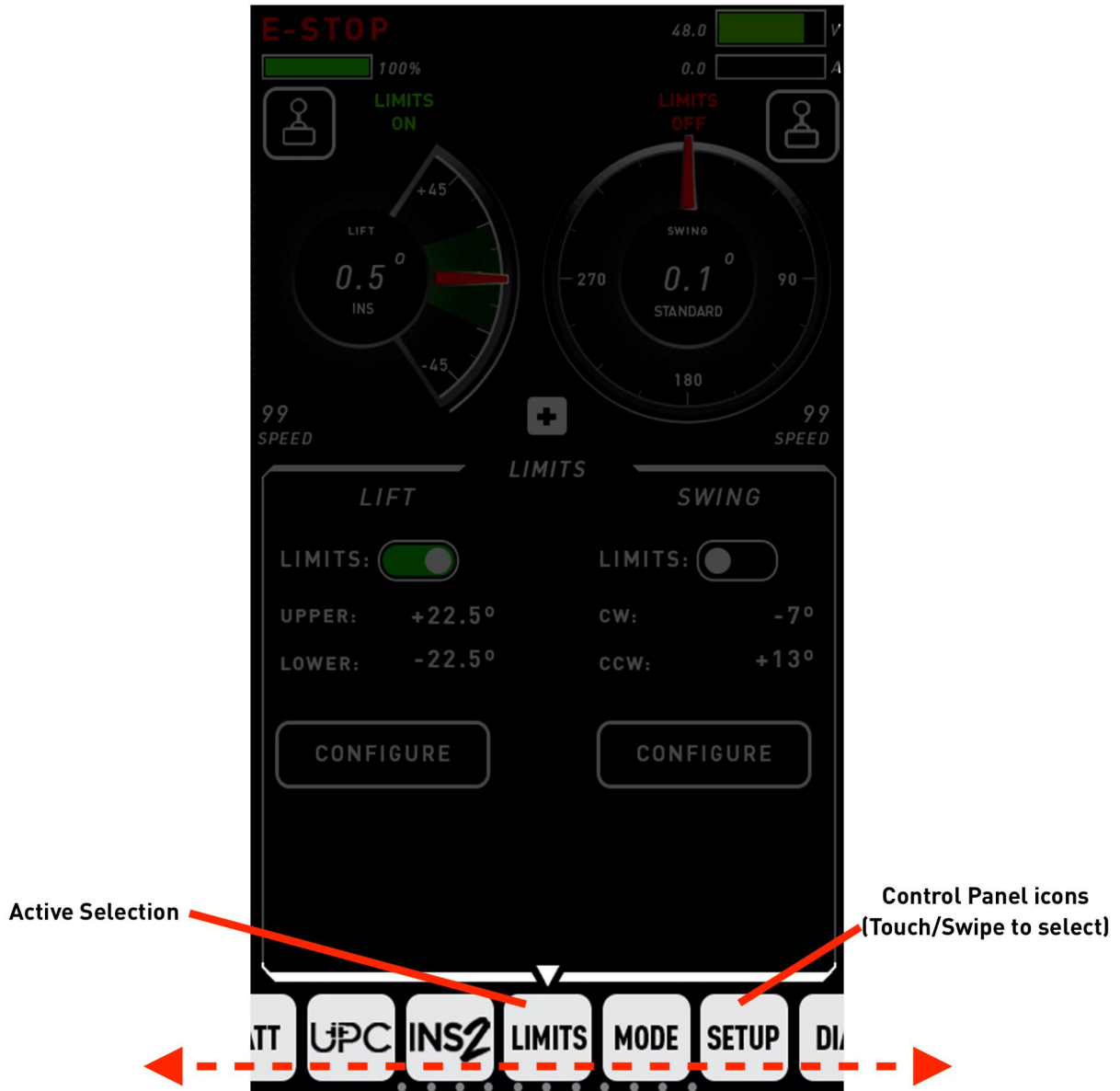
Control Panel

The Control Panel is a dedicated region for settings, configuration/calibrations, and diagnostics. Below is an example of the "Limits" Control Panel:



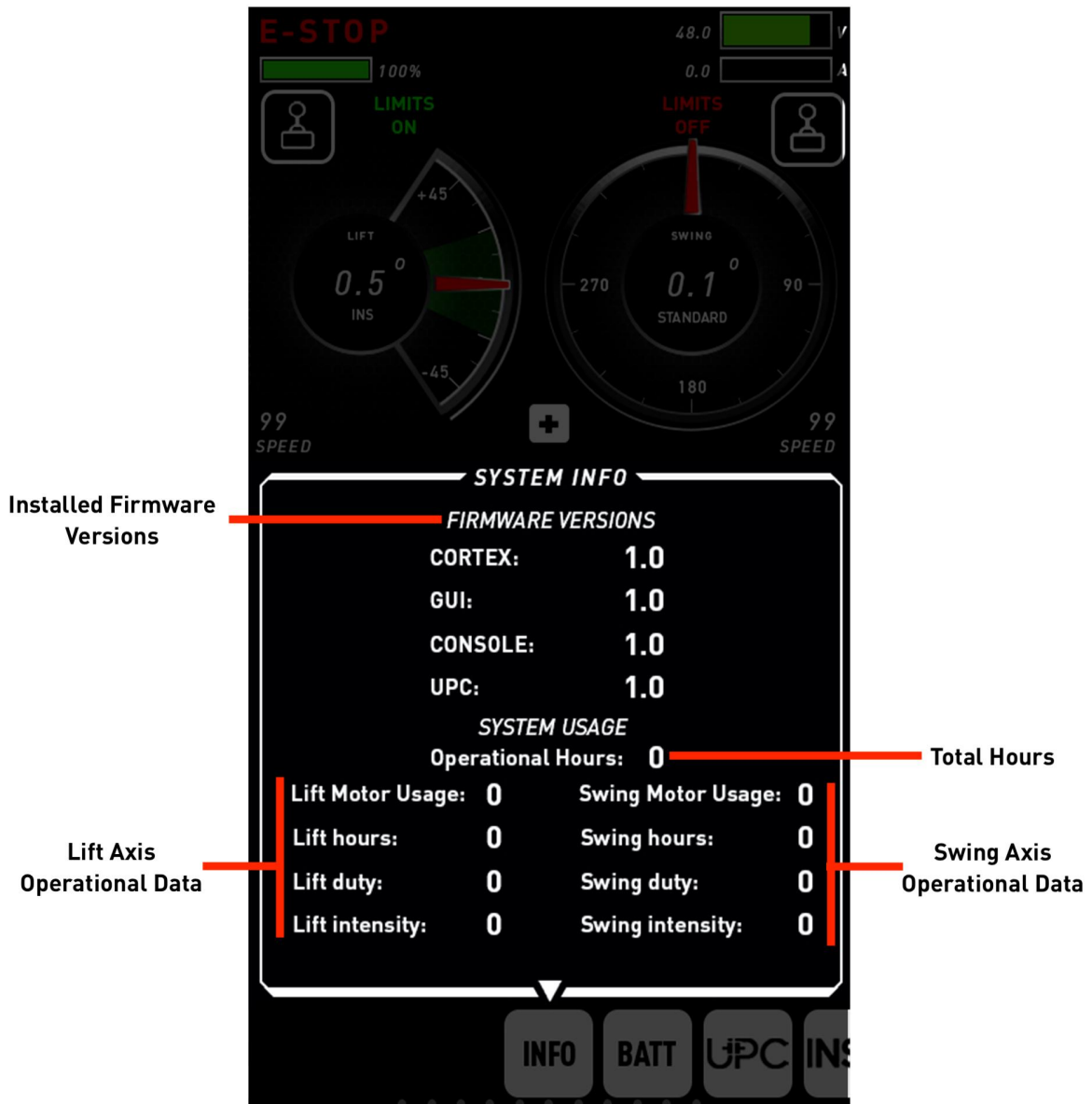
Dock

The Dock is used for navigating the various Control Panels that are available. To navigate, simply touch the icon of the desired Control Panel, or swipe right/left to see more options.



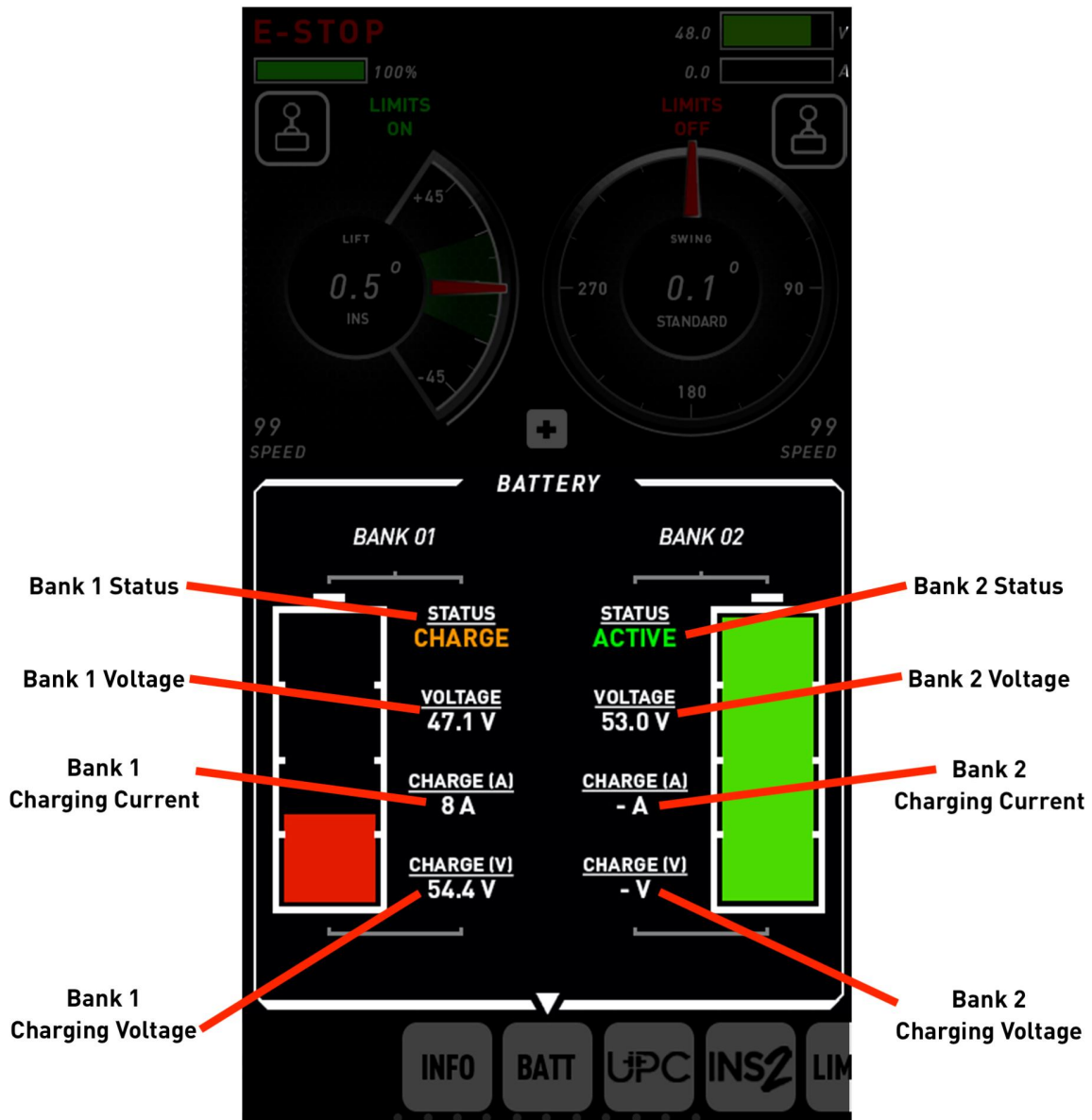
Information

Displays system firmware and usage information. This information is sometimes used by MotoCrane Technical Support for diagnosing or prescribing service procedures and/or maintenance.



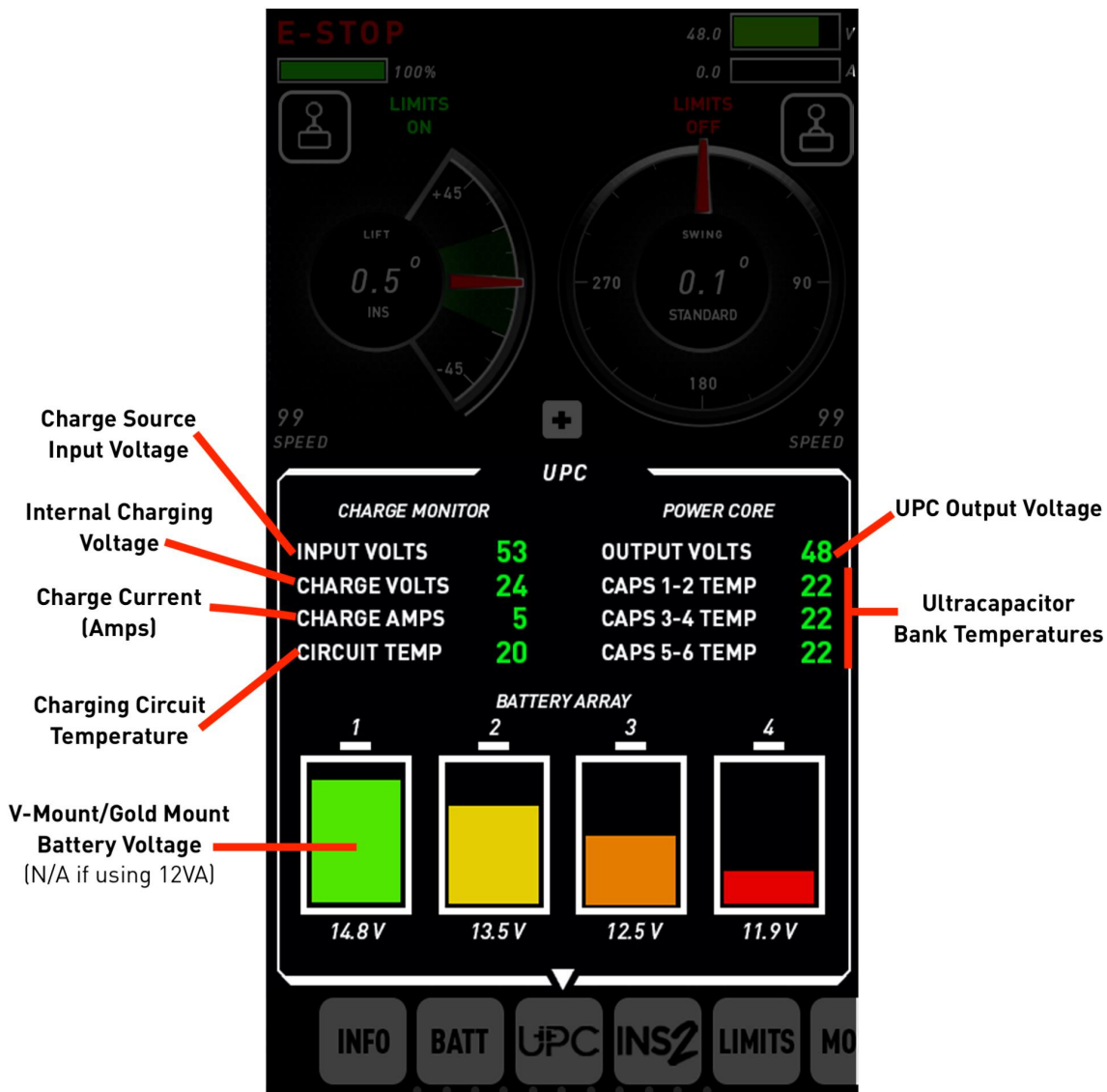
Battery Bank (HYPER-ONLY)

MotoCrane HYPER has dual on-board 48v battery banks, which are charged via the MotoCrane Powerlink when connected to a 120VAC source. The Battery Bank Control Panel is used for monitoring status of both banks.



UPC (RADICAL-ONLY)

The MotoCrane Ultracapacitor Power Core (UPC) is a power accessory that provides 48V power from common V-Mount/Gold Mount Batteries and/or the vehicles own 12V battery when using the MotoCrane 12VA. This Control Panel is used for monitoring UPC-specific diagnostics such as input/output voltage, V-Mount Battery levels, and thermal status of the power core.



Input Volts- The input voltage being supplied to the UPC by either the Battery Array or 12VA

Capacitor Charging Volts- The voltage applied to charge the Ultracapacitor modules of the UPC.

Capacitor Charging Amps- The amperage applied to charge to the Ultracapacitor modules of the UPC.

Charge Circuit Temperature- The temperature, in degrees Celsius, of the charging circuit.

Output Voltage- The output voltage of the UPC being supplied to the PSU.

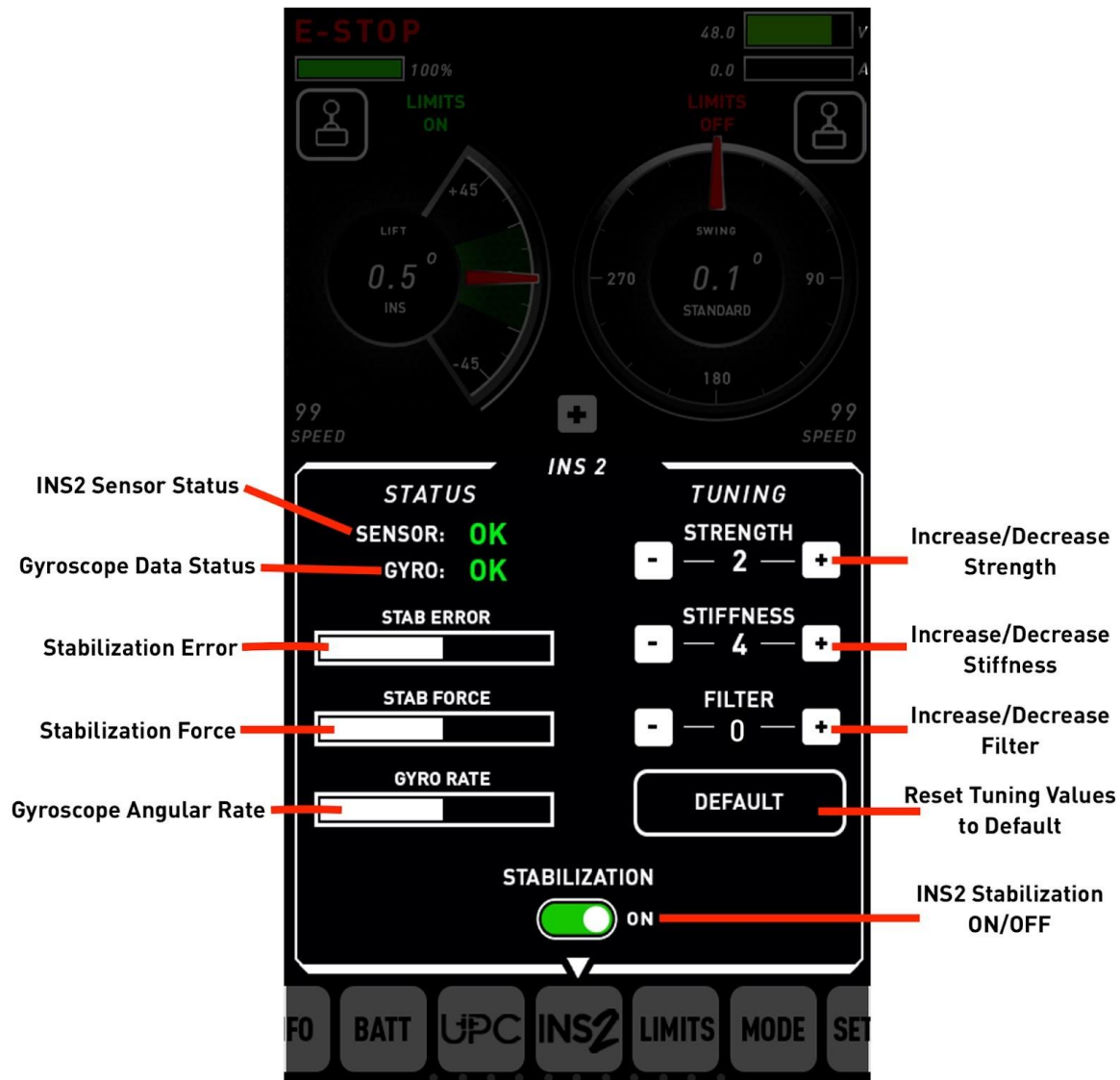
Battery Array- The *voltage of the batteries connected to the "Battery Array" of the UPC.

**Approximate averaged value- will fluctuate based on load/charging duty.*

Capacitor Temperature- The temperature, in degrees Celsius, of the corresponding Ultracapacitor module pair (1 & 2, 3 & 4, 5 & 6)

INS 2 Advanced Stabilization

Displays data from the MotoCrane INS Advanced Stabilization sensor (if connected) and allows configuration of INS 2 tuning parameters. Refer to the INS 2 Advanced Stabilization Operation manual. The latest version can be found at www.motocrane.com/knowledge-base.



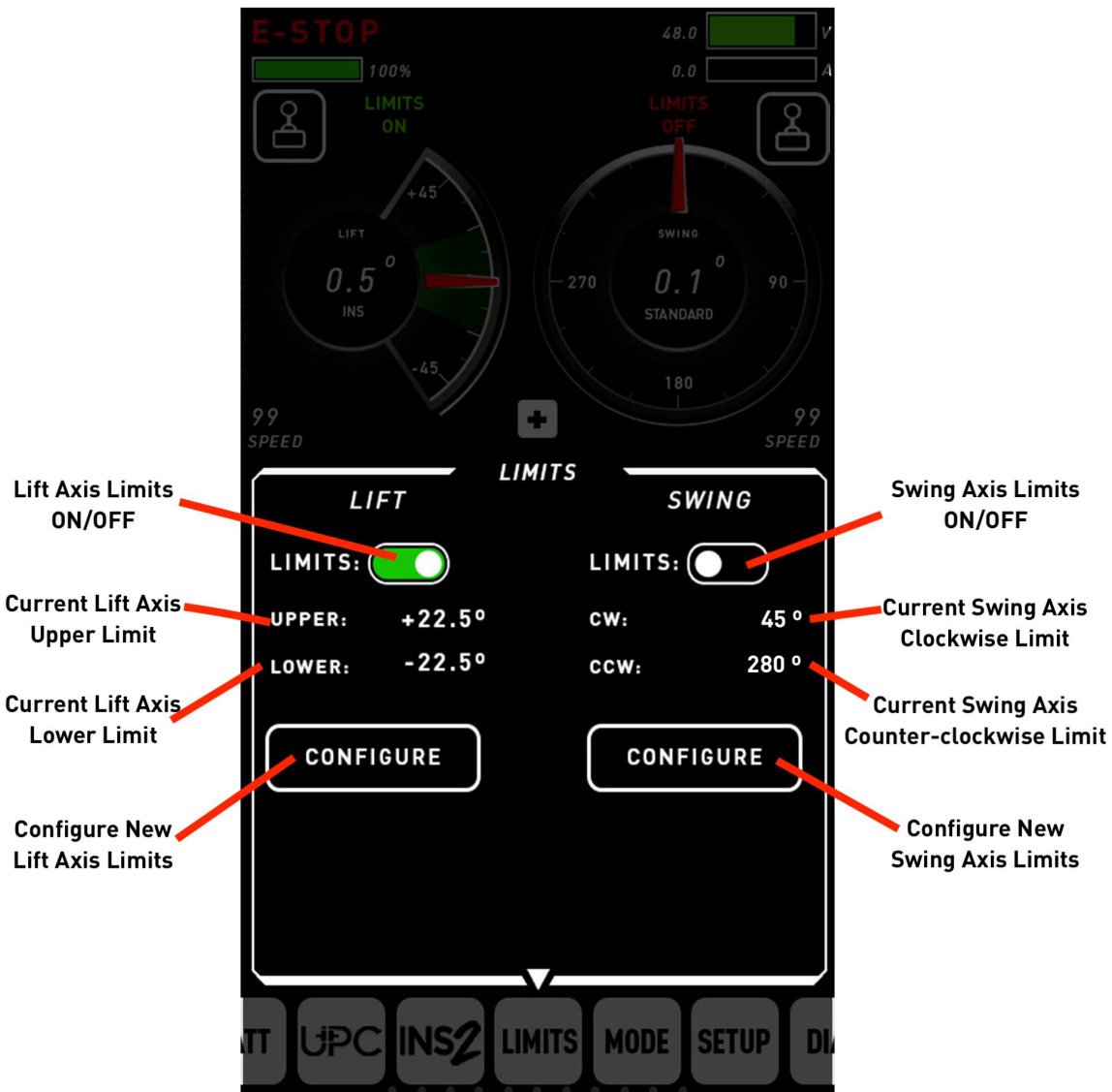
STRENGTH- Controls the magnitude of the correction applied to the Lift axis based on position error - maintains target angle of the Boom.

STIFFNESS- Controls the speed of the correction applied in order to minimize angular rate changes of the Boom - improves the rate of response.

FILTER- Default set to "1". A setting of 1 removes resonant frequencies and small amounts of noise from INS Sensor data. Increasing the setting removes more noise, but slows system response.

Limits

Both Swing and Lift axes of MotoCrane RADICAL and HYPER are equipped with high-accuracy encoders that allow the range of motion to be limited within a configured region. Limits cannot be used when the axis is in the "SETUP" Control Mode, which is an open-loop/non-encoded control mode. See *Control Mode on the next page*.



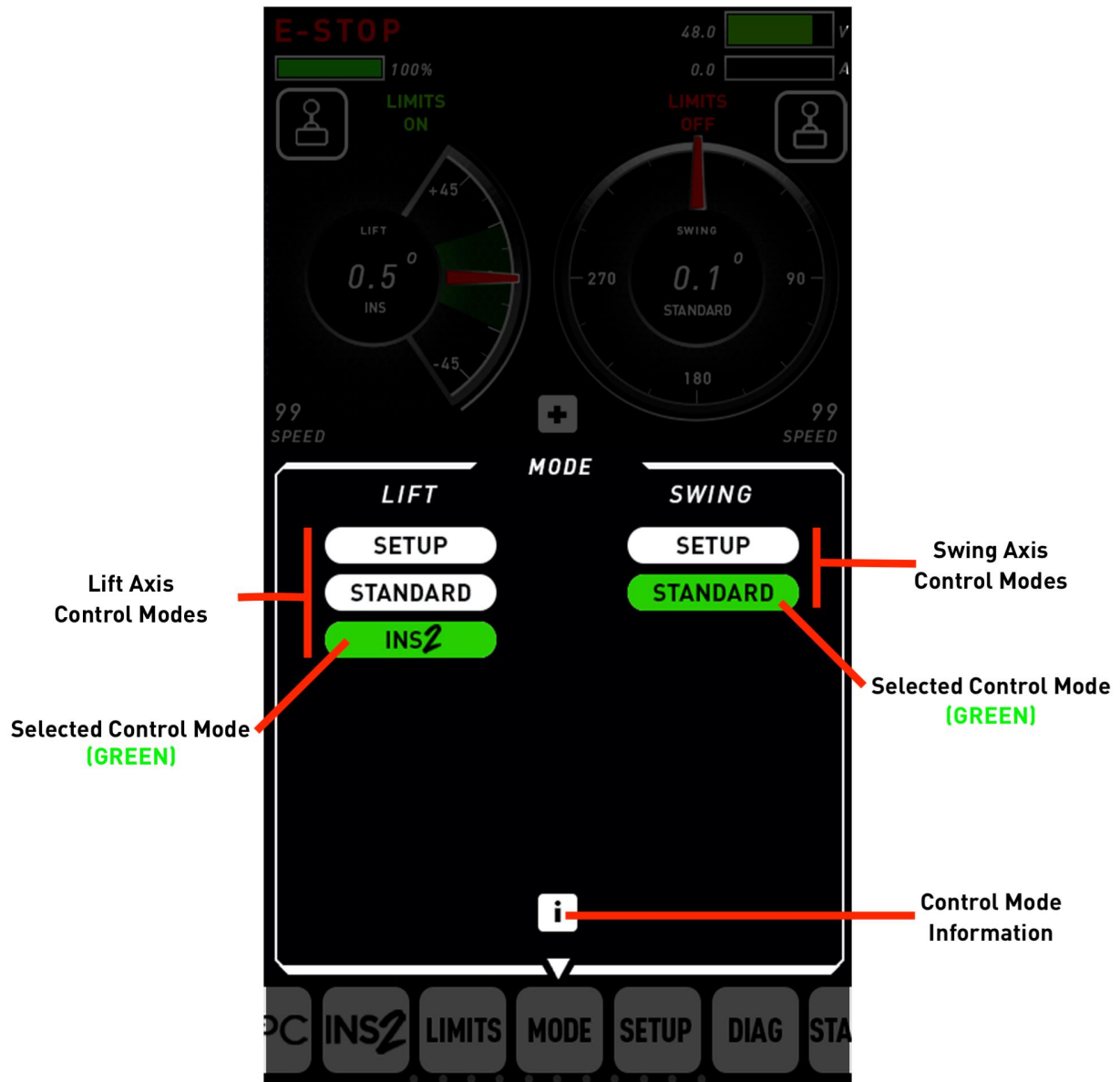
Limits ON/OFF- Toggles range of motion for that axis on or off. When Limits are turned off, previous Limit values are stored. If Limits are turned ON when the arm is not within the specified range, the arm will move freely until it is within range, then no longer move beyond the limits.

Upper/Lower/CW/CCW Limit- The previously configured values for the Lower/Upper Limits (Lift) and the Clockwise, Counter-Clockwise Limits (Swing).

CONFIGURE- Configures new range of motion limits.

Control Mode

Both Axes of RADICAL and HYPER can operate in various “Control Modes” which use different types of input for arm positioning.



SETUP Mode- This mode is used for during physical setup or bench-testing, when no payloads are attached. Because this is an open-loop Control Mode, Limits are not available in this Control Mode.

STANDARD Mode- Uses encoder data for closed-loop position of the axis. Recommended for normal operation if INS is not available.

INS 2- Uses angular rate data from the INS 2 sensor gyroscope to actively stabilize the Lift axis of the arm. Suggested anytime terrain is uneven See *RADICAL* and *INS 2* Operation Manuals for more information.

Setup

Used for less-frequently adjusted configurations.



Balance Test- Helps to detect any Lift Axis imbalance between payload and counterweight by eliminating the electromotive torque present in a gear-reduced powertrain.

Joystick Calibration- Calibrates minimum, maximum, and neutral positions for the Joystick along both the Lift and Swing axes.

Encoder Calibration- Allows Swing Angle to be re-oriented to the 12 o'clock position. Used more frequently, as the Base has no dedicated Front/Back side and can be mounted in any position.

Diagnostics

Motor Command- Joystick value commanding movement to the motor driver circuit. It's maximum and minimum value is based on the SPEED value, and will increase/decrease based on SMOOTH value.

Motor RPM- Speed of the brushless motor in Revolutions Per Minute.

Motor Current- The current consumption of the brushless motor in Amperes

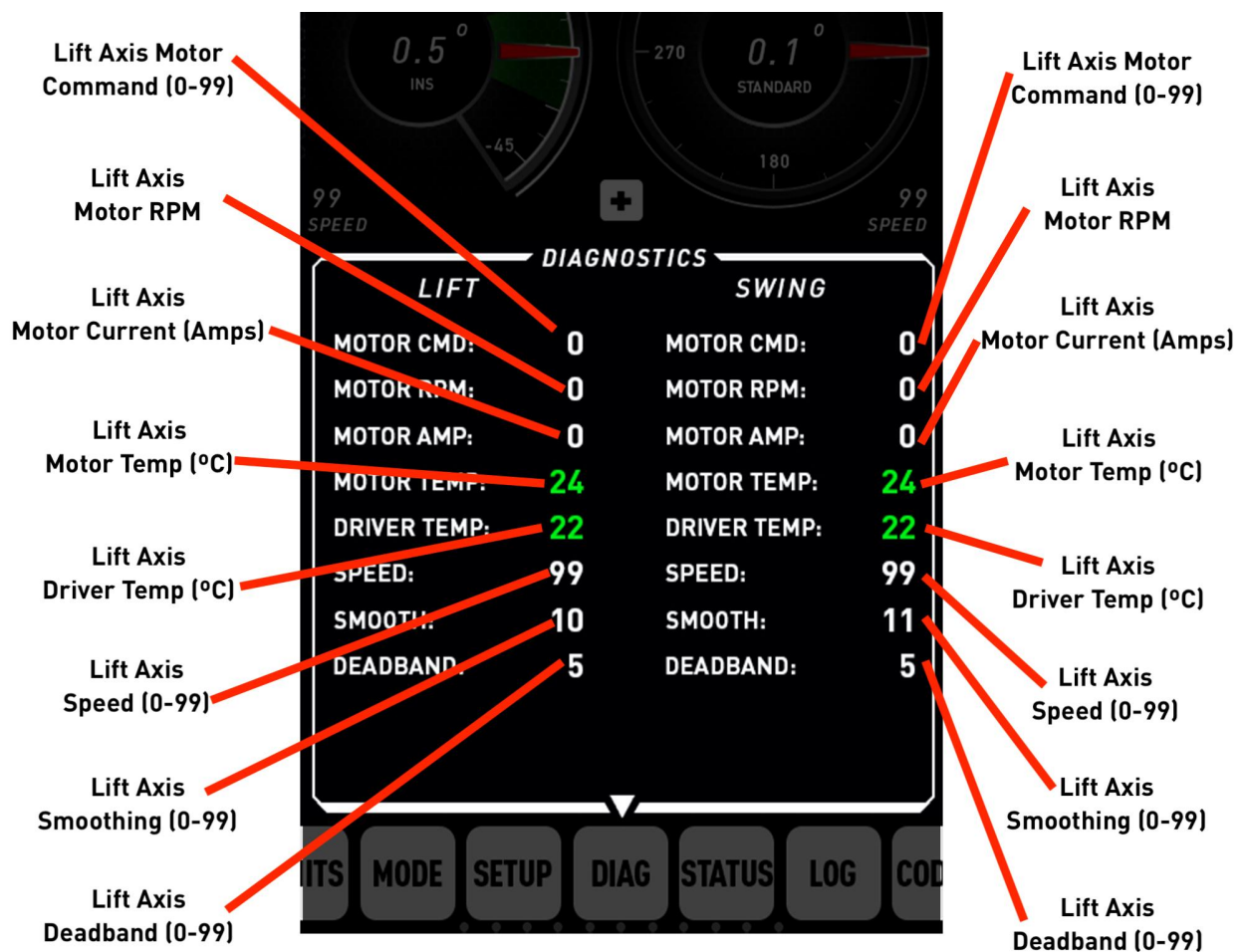
Motor Temperature- The temperature of the brushless motor housing in degrees Celsius

Driver Temperature- The temperature the motor driver circuit in degrees Celsius

Speed- The maximum speed of the axis, as a percentage from 0-99

Smooth- The maximum rate of acceleration and deceleration of the axis, as a percentage from 0-99

Deadband- The amount of travel the joystick must move before sending a Motor Command.



When necessary, diagnostic data is color coded.

If the data is **GREEN**, then the data range is as expected.

If the data is **YELLOW**, the data is slightly out of range (a Warning might be triggered).

If the data is **RED**, then the value is well out of the expected range and an Error will be triggered.

If the data displayed is white, then it is not color coded (i.e. joysticks commands, speed/smooth values).

Status

Shows system errors/warnings that are currently active in the system. To view any active Errors/Warnings, press the “!” button on the COMMAND Console when it is illuminated. The description indicates what the error/warning consists of, while the code number indicates the specific error/warning event. The “#” icon on the bottom right redirects to the CODE LOOKUP page, described in a later section.

Active Error/Warning Indicator

Active Errors/Warning Description

Code Lookup Number

Code Lookup Dock Shortcut

DESCRIPTION	CODE#
Lift Motor Temp Warning	002
Lift Motor Temp Error	003
Lift Motor Temp Sensor Failure	004
Lift Motor Driver Temp Warning	007

System Log

The SYSTEM LOG page shows recent system errors reported to the COMMAND Console. When an error or warning condition clears, the STATUS page will not display the error anymore, but the SYSTEM LOG page will, along with the time elapsed since the error was triggered. The CODE LOOKUP shortcut is at the bottom right and the CLEAR icon on the bottom left allows the user to clear the system log. Note that the system log data is stored upon power-cycle, but the time elapsed will not be updated for those errors carried over.

TIME LAPSED	DESCRIPTION	CODE#
00:01	Lift Motor Temp Warning	001
00:09	Lift Motor Temp Warning	002
01:06	Lift Motor Temp Warning	002
02:33	Lift Motor Temp Warning	002
02:59	Lift Motor Temp Warning	002
03:13	Lift Motor Temp Warning	002

Annotations:

- Time Lapsed since Error/Warning event
- Error/Warning Description
- Code Lookup Number
- Clear System Log Memory
- Code Lookup Dock Shortcut

Bottom navigation buttons: UP, DIAG, STATUS, LOG, CODE#

Code Lookup

Displays all system warnings and errors that can be triggered along with a summarized service procedure. Refer to this page to lookup an error code displayed in the STATUS/SYSTEM LOG control panels. For more information on error codes and troubleshooting your remote arm system, refer to the corresponding Troubleshooting Guide found at www.motocrane.com/knowledge-base.

E-STOP

100% LIMITS ON

48.0 V
0.0 A

LIMITS OFF

LIFT: 0.5° INS

SWING: 0.1° STANDARD

99 SPEED

CODE#	DESCRIPTION	SERVICE
002	Lift Motor Temp Warning	Use caution and watch motor temperature
003	Lift Motor Temp Error	Use caution and observe current and temps.
004	Lift Motor Temp Sensor Failure	Use caution and watch motor temperature
007	Lift Motor Driver Temp Warning	Use caution and watch motor temperature
008	Lift Motor Driver Temp Error	Use caution and watch motor temperature
009	Lift Motor Driver Temp Sensor Failure	Use caution and watch motor temperature

AG STATUS LOG CODE#

Code Number

Error/Warning Description

Status Dock Shortcut

Service Procedure

System Log Dock Shortcut

Known Hazards

⚠️ WARNING The following list represents a list of known hazards that exist when operating the COMMAND Console. This is not exhaustive, but represents some common hazards to watch out for.

Terminology

Clear communication among drivers, operators, and other personnel is essential for safe and high quality production.

⚠️ WARNING Drivers and operators must obey and observe all traffic rules and regulations and operate COMMAND Console in a safe manner and ensure that all personnel within the vicinity of COMMAND Console understand and abide by all safety precautions.

Transporting COMMAND Console

As the COMMAND Console is not IP-rated, transportation of the COMMAND Console should be within a weather-resistant enclosure sufficient for protecting the COMMAND Console from damaging temperatures, moisture and/or humidity.

Troubleshooting

For remote arm system errors, refer to the corresponding Troubleshooting Guide.

For UPC errors, refer to the UPC Operation Manual.

For INS errors, refer to the INS 2 Advanced Stabilization Operation Manual.

The latest versions of these operation manuals can be found at

www.motocrane.com/knowledge-base

Maintenance

None required - contact Technical Support if you believe the unit requires service or maintenance.

Weather & Water

The COMMAND Console is NOT WATER RESISTANT and should be kept out of direct sunlight to avoid unnecessary heat buildup within the unit.

Mounting/Dimensions of COMMAND Console

The COMMAND Console PRO is equipped with 3x ¼-20 and 2x ⅜-16 threaded mounting points on the top of the controller, and also features a passive V-Mount Battery sled on the back. **The V-Mount Battery sled is not for providing power to COMMAND Console, and is only used as a mounting plate for the battery so that it can provide power for other accessories mounted to the COMMAND Console.**

The COMMAND Console LITE is equipped with 2x ¼-20 threaded mounting points on the back of the controller, and an additional 1x ¼-20 and 1x ⅜-16 at the front of the Controller.

These are sufficient for mounting the COMMAND Console to support systems, and also for mounting reference monitors to the COMMAND Console itself.

Specifications

Mechanical

PRO Weight: 3.5 lbs/ 1.5 kg

LITE Weight: 1.5 lbs/ 0.7 kg

Construction: 6061-T6 Aluminum

Electrical

PRO LCD: 7.0" TFT, 800x480 pixels

LITE LCD: 5.0" TFT, 800x480 pixels

INPUT: 24V (must come from PSUI) + CAN-BUS

Weather

Operating Temp: MIN: 14°F, MAX: 120°F

IP Rating (Ingress Protection): NOT rated

Revision History

Revision	Date	Description
1.0	NOV 2021	Initial Release
1.1	APR 2022	JS Added Programming Instructions
1.2	SEP 2022	ZN Removed Programming Instructions ZN Add firmware 1.5 features

MotoCrane Support
support@motocrane.com

This content is subject to change.

Download the latest version from
www.motocrane.com/knowledge-base

If you have any questions about this document, please contact MotoCrane, LLC by sending a message to contact@motocrane.com.

©2022 MotoCrane, LLC. All rights reserved.