Monaco Membrane Display Operation

T350

Controls Group

Revision Number A

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T350 Scrubber Display Guide

UI Rev 0.18 or later

GENERAL INFORMATION

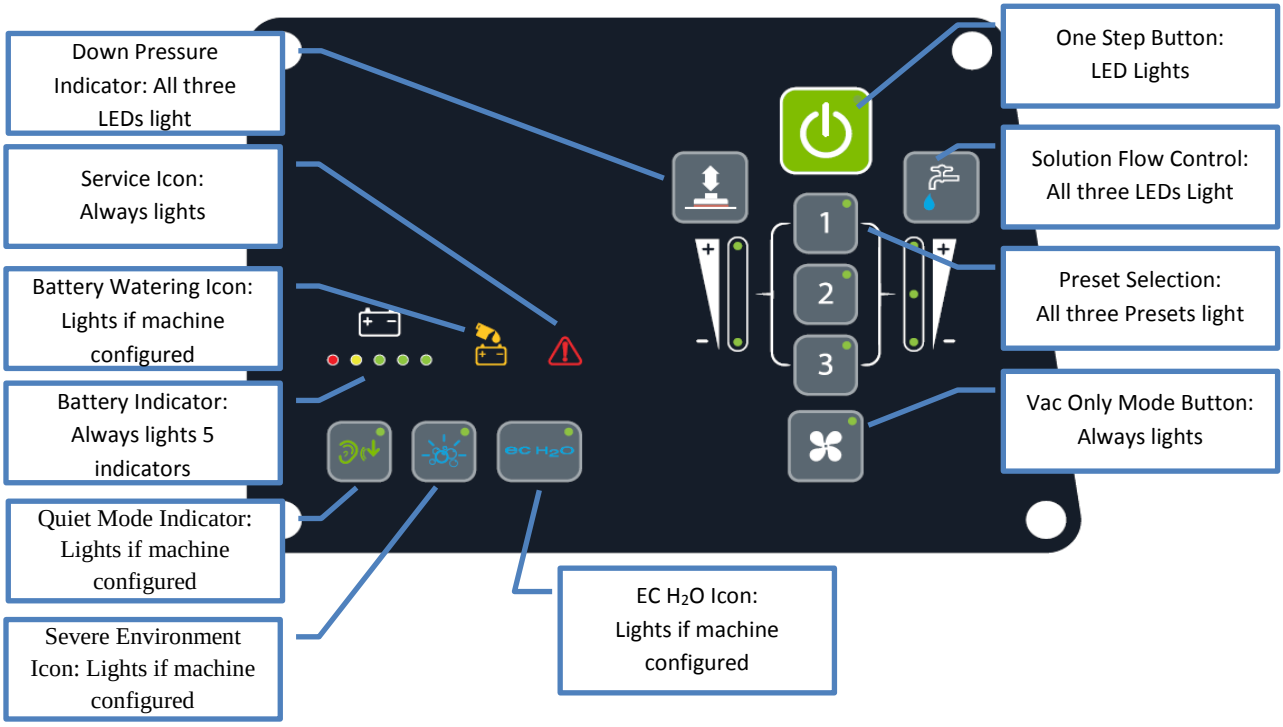
This document describes and documents the design operation of the display on the Monaco project. It details the button and indicator functions that could be displayed when the machine is keyed on. Terminology is written from a controls perspective and may not exactly match customer or public terms.

Two user interface options are available for Monaco machines: Membrane and LCD. This document only covers the membrane display.

MACHINE STARTUP

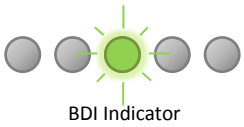
NORMAL MODE POWER-UP

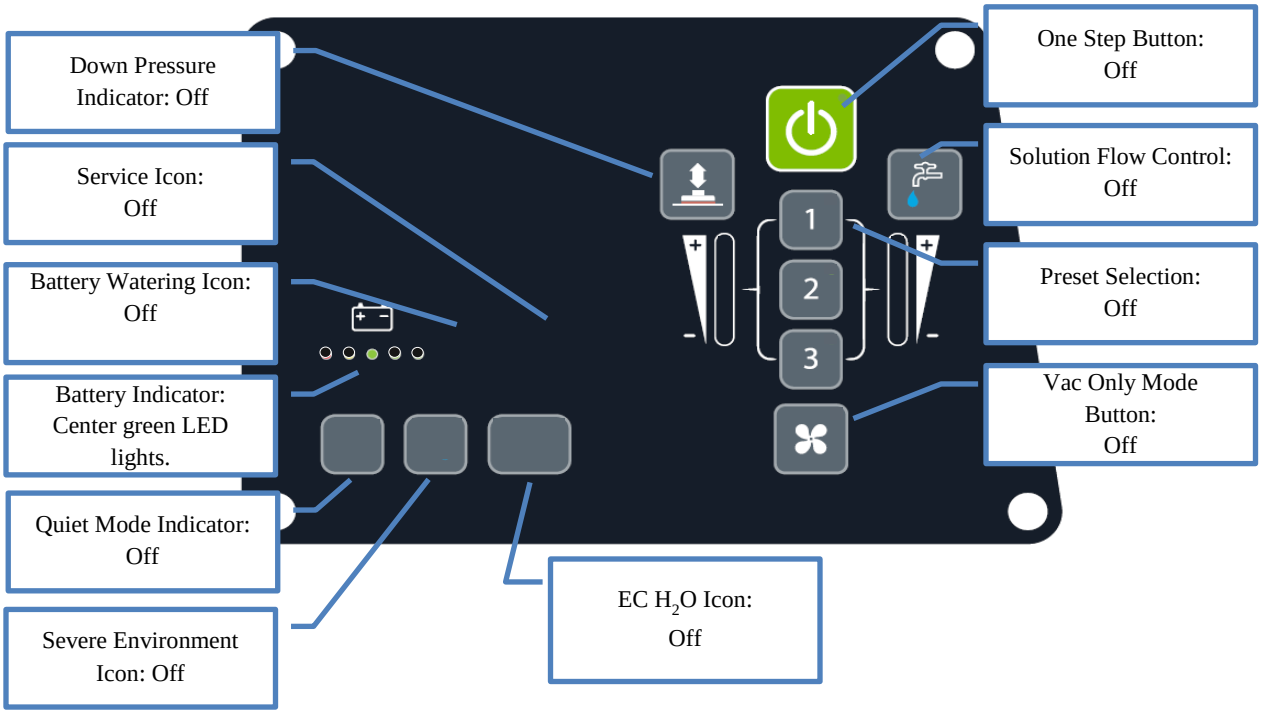
When the machine powers up, the LED's on the display panel turn on briefly. Some specific indicators light up depending on which features are enabled on the machine as shown in the figure below. The rest of the indicators light for functional verification.



CHARGE MODE POWER-UP (ON-BOARD)

When the machine powers up in charge mode, the LED's are all off except for the single center green LED on the battery indicator. The light blinks *slowly* until communication has been established with the charger. If it is unable, then the CAN error message is displayed.

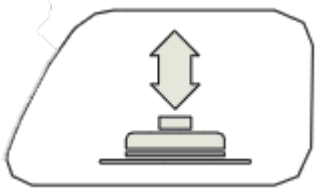




SUPERVISOR MODE POWER-UP

Standard machines support an advanced configuration mode for supervisors. This mode allows certain machine functions to be locked out. This section describes how to get into the mode. There are more details of this feature in the Supervisor Mode Section.

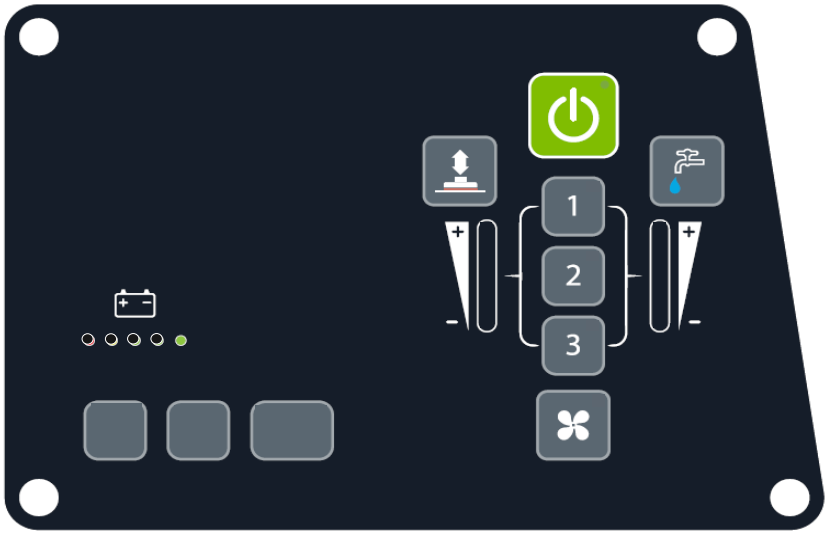
1. With the machine powered off, press and hold the left Down Pressure button on the control panel.



2. No lights on the panel will display.

3. Power on the machine while holding the button until the right-most green LED on the battery indicator lights.

BDI Indicator



4. Release the button. The Service indicator will remain lit and the battery indicator will go dark. See the Down Pressure Assist section for machine use in this mode.

To leave supervisor mode, key machine off and on again for normal startup.

MANUAL MODE POWER-UP

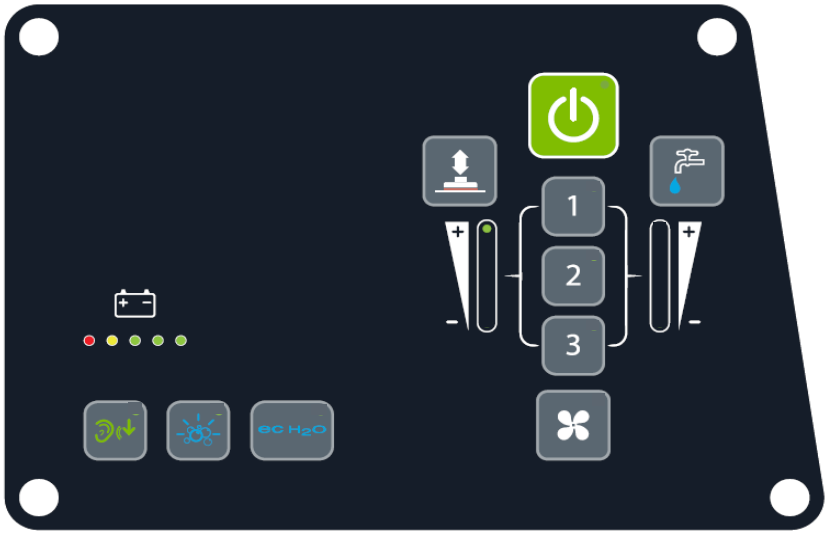
Standard machines support an advanced diagnostics mode for service technicians. This mode allows certain machine sub-systems to be turned on and off independently of each other. This section describes how to get into the mode. There are more details of this feature in the Manual Mode Section.

1. With the machine powered off, press and hold the center One Step button on the control panel.

2. No lights on the panel will display.

3. Power on the machine while holding the button until the BDI indicator lights.

BDI Indicator



4. Release the button. See the Manual Mode section for machine use in this mode.

To leave manual mode, key machine off and on again for normal startup.

NORMAL MODE DISPLAY BEHAVIOR

EC-H2O

Depending on variant configuration, the machine may be equipped with a chemical free cleaning system called EC-H_2O Nanoclean. A mechanical switch on the accessory panel will be present if EC-H_2O is available. The EC-H_2O indicator lights when the system is active. Pressing the ecH2O button will enable or disable it. The following table describes the different indicator states the machine may report.

	Solid Blue	EC-H_2O System is enabled. The system will run when scrub mode is active.
	Blinking Blue/Red	Water conditioning module cartridge has expired and needs replaced.
	Solid Red	A fault exists within the EC-H_2O System in which it cannot run. This fault is likely due to some electrical issue.
	Blinking Red	A fault exists within the EC-H_2O System in which it cannot run. This fault is likely due to a water or plumbing issue.

EC H_2O MODULE OPERATION

The module contains its own membrane that allows additional features to be controlled locally. See the functional guide for the module for more details.

EC H_2O FAULT TABLE

There are a number of specific faults within the module. See the Fault Reporting section for more information on all the faults available on the machine including specifically EC-H_2O faults.

BATTERY WATERING

The battery watering icon indicates if the battery watering tank is empty. If flashing, the tank is empty. If flashing rapidly, the machine scrub functionality will be disabled until the user fills the tank and lets the ABW system run.

ONE STEP

The one step button turns the machine scrub functionality on or off. The LED indicates if scrub functionality is active or not.

When scrub functionality is active, the scrub head is lowered to the floor. If the bail is pulled in, it will turn on when it reaches the floor. When scrub functionality is not active, the scrub head will be raised to its transport position.

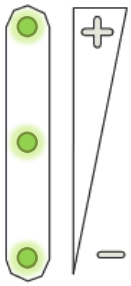
VAC ONLY

The vac only button enables or disables vac only mode. The LED indicates if vac only mode is active or not.

SOLUTION FLOW SELECTION

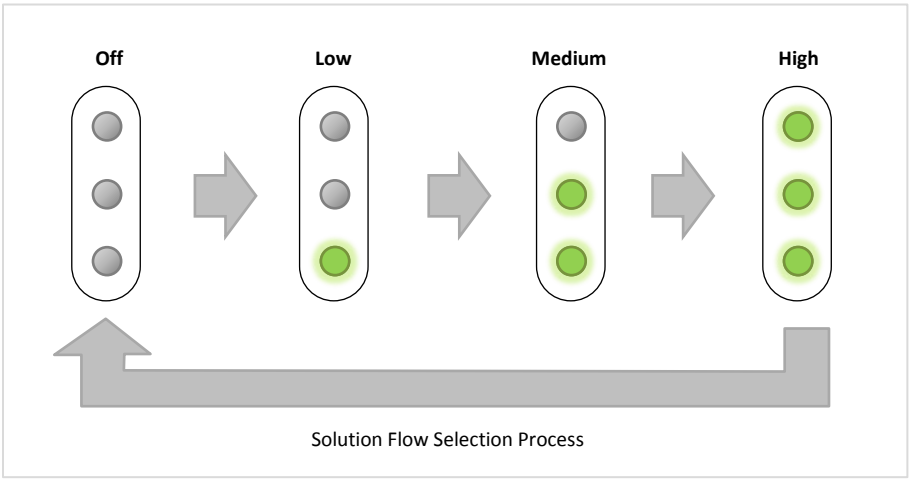
The solution flow indicator uses three LED's to indicate the volume of water the machine shall put to the floor.

Flow Button



Flow Indicator

The spigot button above the flow indicator changes the flow rate according to the process diagram below. The solution off setting is available for stripping applications.



Solution Flow Selection Process

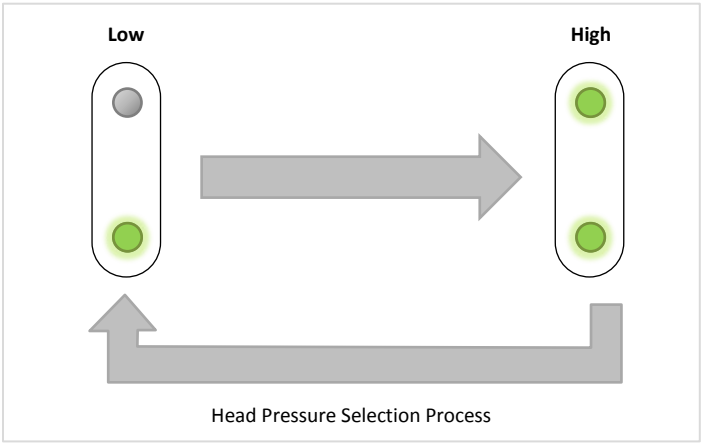
HEAD PRESSURE SELECTION

The down pressure indicator uses three LED's to indicate the level of head down pressure the machine shall put to the floor while scrubbing.

Pressure Button

Pressure Indicator

The pressure button above the down pressure indicator changes the head down pressure according to the process diagram shown below.



Head Pressure Selection Process

QUIET MODE

The quiet mode button enables or disables the quiet mode feature for the vacuum fan.

Quiet Mode Button

This mode will reduce the vacuum fan speed to make the machine quieter when needed. This feature will reduce the water pick-up volume and therefore may require the solution flow setting to be lowered. The mode is active when the corner green LED is lit up.

Mode OFF

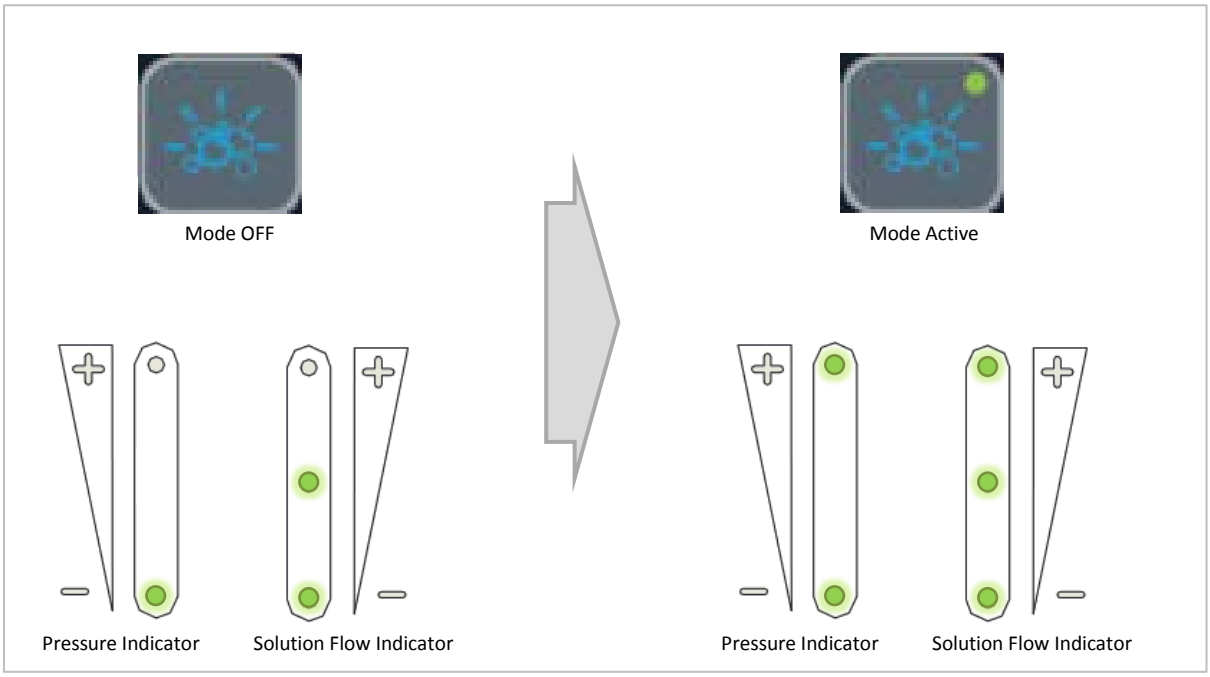
Mode ON

SEVERE ENVIRONMENT

Some machine configurations may feature a Severe Environment (SE) mode. If this option is available, the bubble icon will be lit.

Severe Environment Mode Button

This option allows for dosing the water with a specific concentration of cleaning solution. If EC-H_2O is on, it is turned off while SE is running. When the mode is active, the down pressure and solution flow will change to high settings to help ensure successful cleaning. Once SE mode is turned off, the previous down pressure and solution flow settings are applied.



The down pressure and/or solution flow may be manually overridden after SE is enabled. In this scenario, the machine will not return these settings once the mode is disabled; the current settings are kept.

There are two modes of operation available: timed and locked.

TIMED MODE

Blinking Indicator

This is the default mode of operation when enabled. To activate, press the Severe Environment button one time. The LED in the corner of the button will turn on blink slowly and turn off EC-H_2O if it was enabled. The mode will be enabled for 30 seconds. During the last 5 seconds, the green LED will blink rapidly as a warning the timer is about to expire. Press the button again to turn off prematurely.

LOCKED MODE

Steady Indicator

In this mode, the Severe Environment cleaning option will remain active until turned off. To activate this mode, press and hold the button for 2 seconds. The green LED will light and remain on. As indicated previously, the solution flow and down pressure settings will adjust to high. To turn off, press the button again.

DETERGENT TANK EMPTY WARNING

In order to run severe environment mode, the detergent tank must not be empty. A sensor in the tank allows indication that the tank is empty. If the tank is empty and the button is pushed, the bubbles icon will blink for 15 seconds and then stop. If the tank runs out while the machine is operating, it will return to the last user settings.

PRESETS

The machine can save up to three commonly used cleaning settings called presets. The presets are used by pushing the selected button number to apply.

Preset Buttons

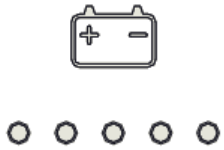
The following options can be tied to preset options. Not all features may be available on the machine as they are configuration dependent.

- Down Pressure Setting
- Solution Flow Setting
- Quiet Mode Active
- Severe Environment Active (locked mode only)
- EC-H_2O Active

To save a preset, select the settings listed above for desired machine configuration. Press and hold the specific preset button to re-assign for 3 seconds. The LED on the preset will blink 3 times indicating the save is complete. If the save function does not work, the machine is configured to one of the supervisor lockout modes. See the Supervisor Mode Operation section for more details.

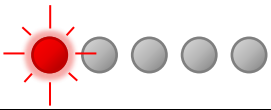
BATTERY INDICATOR

The remaining charge on the battery is displayed on this icon. This indicator is used to display fault codes when the Service Icon is also lit.



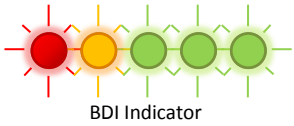
DISCHARGE BEHAVIOR

During machine use, the battery indicator displays the voltages according to the following table. The battery voltages in the table are average voltages and can vary by a couple tenths on the machine. **Note**: There may be situations in which the voltages differ from those listed here due to a future option to change the low battery percent threshold.

BDI Indicator	Operation	Battery Level
	Full	> 60%
	Full	> 50%
	Full	> 40%
	Full	> 30%
	Full	> 20%
	Propel Only	< 20%

FAULT REPORTING

Machine fault codes are displayed on the Battery Discharge Indicator (BDI) when the service icon is flashing and the battery BDI indicator is flashing at the same rate.



BDI Indicator

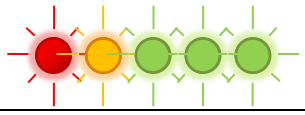
The entire list of reportable fault codes is documented in the T500 Scrubber Fault Codes document. Not all faults are available on every machine. It will vary depending on the machine variant configuration.

CHARGE MODE DISPLAY BEHAVIOR

In charge mode, only the BDI and Service icons are used.

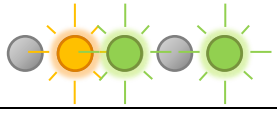
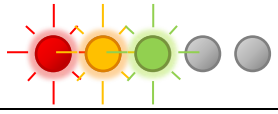
CHARGE BEHAVIOR

The following table defines the battery indicator display during the battery charging process with an on-board charger.

BDI Indicator	Service Indicator	LED Action	State
	Off	None	Machine Off Charger Unplugged
	Off	All On and a single LED Off Ripple	Charging
	Off	All On Double Wink	Charge Complete

CHARGER FAULT CODES

The following table is a list of faults or warnings that may appear during the charge process. For other codes not listed here, see the entire fault code list. More details are listed in the fault code list as well.

BDI Indicator	Service Indicator	LED Action	State
		Blinking Service and 3 blinking BDI.	Charger Communication Error
		Blinking Service and 2 BDI	Charger No Load Warning
		Blinking Service and 3 BDI	Charger Timer Phase I
		Blinking Service and 3 BDI	Charger Error

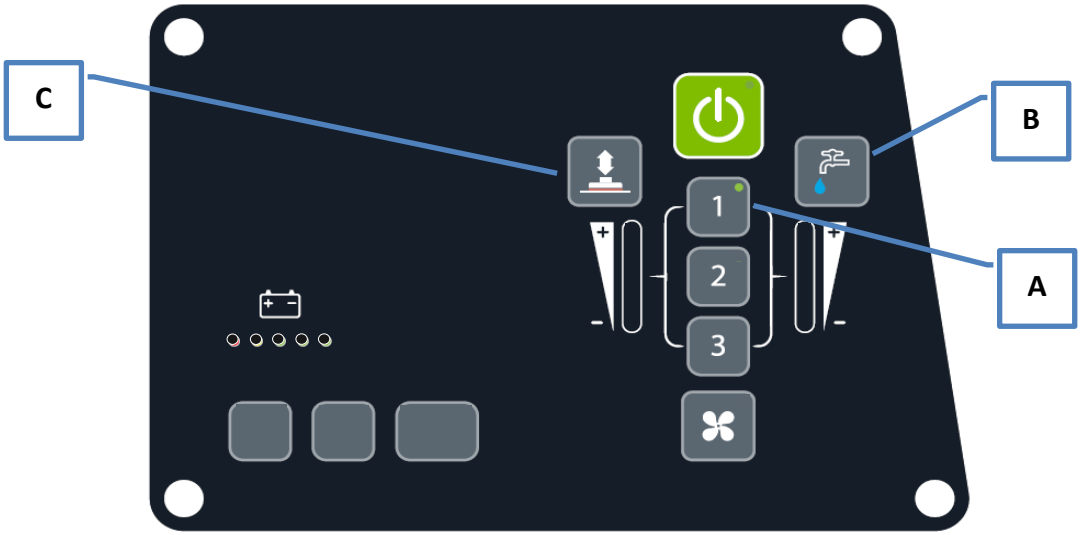
SUPERVISOR MODE OPERATION

The following section describes the supervisor mode display and button operation. There are levels of display referred to as screens or pages. Once supervisor mode is entered, the first page is automatically displayed. There are three available lockout modes. The higher the lockout mode, the less control is given to the user in normal mode. The following table describes the available control in normal mode when a particular lockout mode is enabled.

	Lockout Mode		
Control Items	**1**	**2**	**3**
Use Presets	X	X	X
Save Presets	X		
Down Pressure	X	X	
Solution Flow	X	X	
Quiet Mode	X	X	
Severe Environment (if available)	X	X	
EC-H_2O	X	X	
Limit Max Scrub Speed	Full Speed	X	X

PAGE 1

This page or screen is used to select the lockout mode for normal operation. When the machine first enters this mode, it displays the current lockout mode setting.



DESCRIPTION

The three button areas on this page are defined below.

A	Buttons used for selecting and displaying lockout modes. Button Light Key: • Solid: Indicates the currently active lockout mode. • Blinking: Indicates a new mode is selected but ***not*** active.
B	Move to the next page.
C	Display the current lockout mode setting.

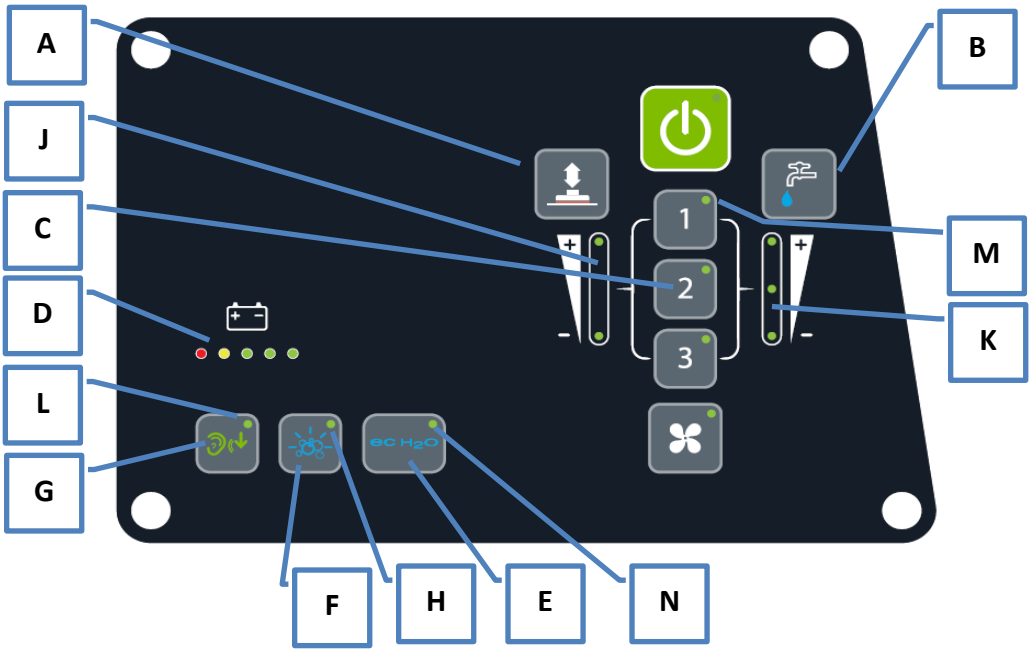
PROCEDURE

Follow the steps below to configure the machine lockout mode.

Step #	Task
1	Select lockout mode 1, 2, or 3 (A). The button LED will light. Lockout mode 3 is selectable by pressing buttons 1 and 2 simultaneously.
2	If button LED is blinking, press and hold the selection (A) for three seconds to apply. The LED will remain on.
3	Press the solution flow button (B) to configure settings for the selected mode.

PAGE 2

This page is used for configuring the specific preset operation when lockout modes 2 or 3 are active.



DESCRIPTION

The following table describes the button and indicator functions for this page of supervisor mode.

	Main Function	Alternate Function
A	Cycle between the three down pressure setting options. (1, 2, 3)	**Hold (3 secs.):** Return to the previous page to change lockout mode.
B	Cycle between the four solution flow setting options (Off, 1, 2, 3)	
C	Recall the saved settings for the selected preset.	**Hold (3 secs)**: Save the current settings to the selected preset. Preset 3 is selectable by pressing 1 and 2 simultaneously.
D	Indicate the speed setting options from button F. See Machine Scrub Speed for setting definitions.	
E	Indicate the status of EC-H_2O active option.	
F	Cycle through the speed options displayed on the battery gauge if not in Lockout mode 1.	**Hold (3 secs):** Turn on or off the Severe environment feature (if equipped). Displayed on H.
G	Push to turn on or off the quiet mode option	

	Main Function	Alternate Function
H	LED indicates whether severe environment mode is active.	
J	LED's display the down pressure setting.	
K	LED's display the flow rate setting.	
L	LED Indicates quiet mode active setting.	
M	LED's indicate the preset's settings are being displayed.	
N	Push to turn on or off the ecH2O option	

PROCEDURE

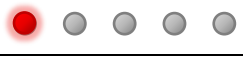
Follow the steps below to configure the preset settings.

Step #	Task
1	Configure all the options for a single preset: down pressure, flow rate, max machine speed, quiet mode, EC-H_2O, and severe environment*.
2	Press and hold the preset for three seconds to save the settings to that preset.
3	Repeat for remaining presets.
4	Press a preset button to see the options configured for that preset.

*Severe environment and EC-H_2O cannot be active simultaneously. One option will disable the other option.

MACHINE SCRUB SPEED

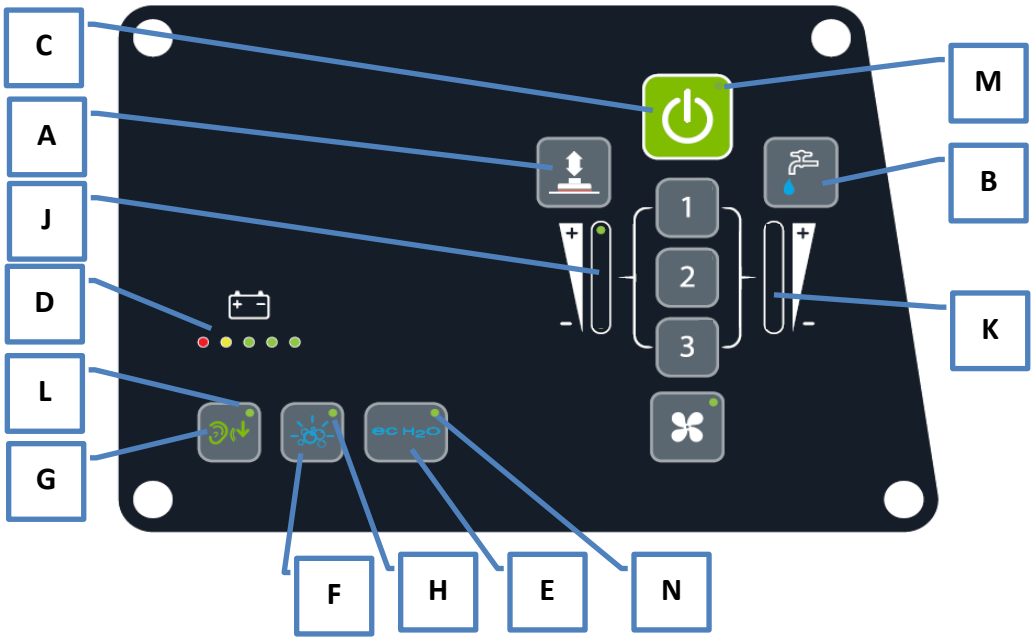
The following table lists the maximum machine speed allowed when scrubbing is active. These speeds do not impact transport speeds. Since this is the maximum allowed, the speed control knob can adjust the speed down from this point only. Again, this feature is only available in Lockout mode 2 or 3.

LED Display	Speed Setting*
	20%
	40%
	60%
	80%
	100%

*Speeds are approximate.

MANUAL MODE OPERATION

The following section describes the manual mode display and button operation. Propel functionality is disabled in this mode. Pressing the go pedal will cause the actuator to move. Releasing the go pedal will cause it to stop. The ecH2O button can be used to turn ecH2O functionality on or off. Quiet mode and squeegee vac can be run using the quiet mode and vac buttons.



DESCRIPTION

The following table describes the button and indicator functions for manual mode.

	Main Function	Alternate Function
A	Toggle the actuator direction.	
B	Cycle between the four solution flow setting options (Off, 1, 2, 3). When ecH2O is enabled, ecH2O will run instead of conventional solution.	
C	Toggles the scrub motor(s) on or off.	
D	Indicate the battery discharge level. See Discharge Level for setting definitions.	
E	Indicate the status of EC-H_2O active option.	
F	Turn the Severe Environment sub-system on or off. This will turn off ecH2O if ecH2O is enabled.	
G	Push to turn the quiet mode feature on or off.	

	Main Function	Alternate Function
H	LED indicates whether the severe environment sub-system is active.	
J	LED's display the actuator direction.	
K	LED's display the flow rate setting.	
L	LED Indicates quiet mode active setting.	
M	LED's indicate if the scrub motors are turned on.	
N	Push to turn on or off the ecH2O option	

FIRMWARE MODE DISPLAY BEHAVIOR

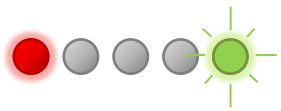
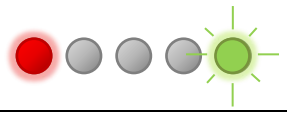
FIRMWARE UPDATE

This section explains only how the machine LED indicators on the display behave during a firmware update. The process for the update is controlled and detailed via a software application (not described here). All T500 machines support firmware updates over the USB connector. There are up to five boards in the machine, each containing a microprocessor. A firmware image exists for each board and is loaded into the machine separately of each other. Connect the USB cable and start the firmware update computer application. When the firmware update mode is active, the service indicator will light solid.

The red LED will light on the BDI once the firmware process has started. The three right-most LED's are used to indicate which board is currently being updated as described below.

USER INTERFACE

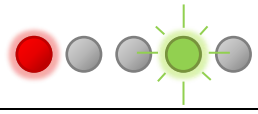
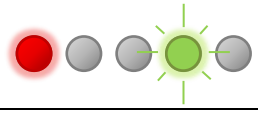
The right LED on the BDI blinks while data is transferred to the User Interface module.

BDI Indicator	Service Indicator	LED Action	State
	On	Slow Blink Second Green LED	Transferring Update File
	On	Fast Blink Second Green LED	Processing Update
	On	Solid Second Green LED	Update Complete

For the User Interface board, all the LED indicators will go out while the update process is finishing. The User Interface automatically restarts after the update is finished.

SCRUB CONTROLLER

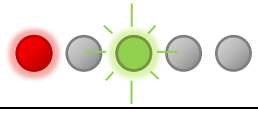
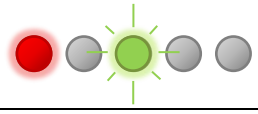
The second LED from the right blinks slowly while the data is transferred to the Scrub Controller module.

BDI Indicator	Service Indicator	LED Action	State
	On	Slow Blink Second Green LED	Transferring Update File
	On	Fast Blink Second Green LED	Processing Update
	On	Solid Second Green LED	Update Complete

Once the data transfer is complete, the light will flash quickly while processing the data. For the Scrub Controller, this process occurs for approximately 10 seconds. Once the light remains solid, the process has completed.

EC-H2O MODULE

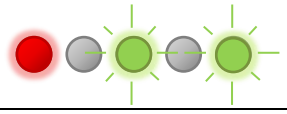
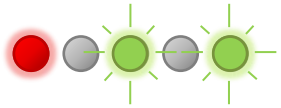
The third LED from the right blinks slowly while the data is transferred for the EC-H2O module.

BDI Indicator	Service Indicator	LED Action	State
	On	Slow Blink Third Green LED	Transferring Update File
	On	Fast Blink Third Green LED	Processing Update
	On	Solid Third Green LED	Update Complete

Once the data transfer is complete, the light will flash quickly while processing the data. For the EC-H2O module, this process occurs for approximately 10 seconds. Once the light remains solid, the process has completed.

TELEMETRY MODULE

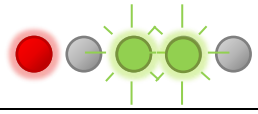
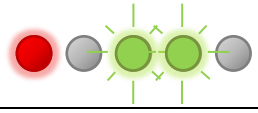
The first and third LEDs from the right blink slowly while the data is transferred for the Telemetry module.

BDI Indicator	Service Indicator	LED Action	State
	On	Slow Blink First and Third Green LEDs	Transferring Update File
	On	Fast Blink First and Third Green LEDs	Processing Update
	On	Solid First and Third Green LEDs	Update Complete

Once the data transfer is complete, the light will flash quickly while processing the data. For the Telemetry module, this process occurs for approximately 10 seconds. Once the light remains solid, the process has completed.

BATTERY WATERING MODULE

The second and third LEDs from the right blink slowly while the data is transferred for the Battery Watering module.

BDI Indicator	Service Indicator	LED Action	State
	On	Slow Blink Second and Third Green LEDs	Transferring Update File
	On	Fast Blink Second and Third Green LEDs	Processing Update
	On	Solid Second and Third Green LEDs	Update Complete

Once the data transfer is complete, the light will flash quickly while processing the data. For the Battery Watering module, this process occurs for approximately 10 seconds. Once the light remains solid, the process has completed.