

SMART-SENSE CONTROLLER

DESIGNED FOR STAGE-V
COMPLIANT ENGINES

V1: AUG 2021



CONTENTS

A roadmap which helps navigate and get the most out of the Smart Sense controller unit. Our electrical and support departments are always on hand should you need to ask any further questions regarding the Smart Sense system.

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INTRODUCTION

Why GreenMech's "Smart Sense" Controller is the way forward

With the introduction of Stage V engines came the need to control and manage the electronics of the chipper. Smart Sense is GreenMech's new controller, designed to provide the user with a visual representation of performance, servicing and the ability to tailor the chipper to suit user requirements.

Our reliable, integrated system, cased in a waterproof housing, is built to withstand a chipper's tough working environment and allows the user to monitor and maintain the engine with ease.

1.1 Generic Features and Benefits

- Digital Interactive Screen = **ease of use**
- 3.5 inch display = **visibility of information**
- Optically bonded colour screen = **excellent clarity**
- High level IP67 protection from dust and water = **reliability**

1.2 Specific Features and Benefits

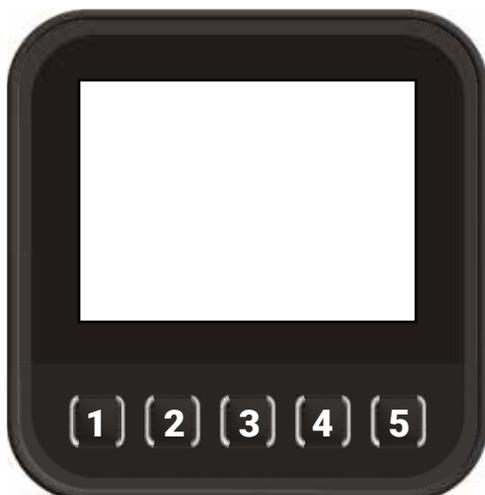
- **"Smart Stress"** No Stress Load Detection
- Keeps engine torque at optimal level to permit continuous feed of
- all material = **savings in operating time and fuel**
- Optional **"Economy Mode"** When selected, it automatically increases or reduces engine revs if rollers are fed/not fed = **savings in fuel, noise, engine and DPF life.**

NAVIGATION

Getting used to the controls and accessing the functions you require.

2.1 Control Unit

Screen set in panel with buttons Note it is not a "touchscreen".



| | |
|-----------------|----------------|
| Button 1 | Decrease Value |
| Button 2 | Menu |
| Button 3 | Page Down |
| Button 4 | Page Up |
| Button 5 | Increase Value |

Press and hold buttons 1 or 5 to increase or decrease engine speed.

2.1 Screen Navigation

You can navigate through the 5 Status screens using the page down / page up button.



Home Screen:

Shows the most common information and remains visible unless buttons on the control panel or in-feed panel are pressed.



Status:

The following screen shows when the buttons on the red bar are pressed. Rollers direction, service hours, bonnet switch, high and low load are all shown in the display:



Engine Oil & DPF Filter Information:

Shows oil information and once running will show ash and soot values of the DPF filter.



Fuel & DPF Regeneration Information:

Shows the condition of the DPF.

Once running fuel consumption and pressure will be shown. To the bottom left of the screen you will see the Inhibit Regeneration Button and at the bottom right the Force Regeneration Button.



Chipping Information:

This screen is to show you the seconds and the hours of chipping time. The values shown at PLC can be used for engine torque reading.



2.2 Menu Navigation

You can navigate through the 5 Status screens using the menu button.



Menu Section:
Main menu button.



DM (Diagnostic Message) / DTC's (Diagnostic Trouble Codes)
This page will show fault error codes should an issue within the engine arise. Contact your Service dealer for engine fault finding.



Smart Stress / ECO Mode Information:
Shows Smart Stress and optional ECO mode settings.



Brightness:

To suit user preference.

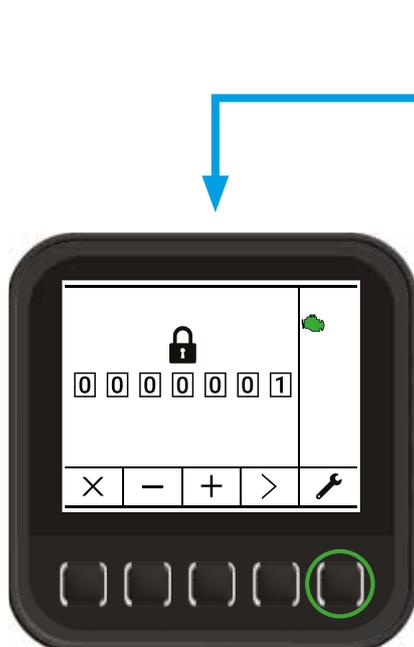
You can also access system settings using the Spanner icon (see below for more details).



System Settings:

Press the "Spanner" icon to access the system settings. Adjust the setting to suit user preference.

Note: This section is password protected, factory default is **0000001**



Default system settings will be shown in the "What can you tailor" section.

STATUS SCREEN INFORMATION



What your Smart Sense Controller is showing

3.1 Home Screen

Once running, the control unit will show the main Home Screen, where you will find the status of:



| ICON | MEANING |
|------|----------------------------|
| | Engine RPM & Engine Torque |
| | Oil pressure (kPa) |
| | Engine Temp (°C) |
| | Battery voltage (V dc) |
| | Engine / Machine Hours (h) |

Engine revs can be increased or decreased by using Button 1 (Tortoise) or Button 5 (Hare).

3.2 Roller Status Page

The following screen shows you the buttons are pressed. Rollers direction, service hours, bonnet switch, high and low load are all shown in the display:



| ICON | MEANING |
|------|--------------------------------------|
| | Stop circuit is closed ready to work |

When you see this, it means that the Stop circuit is closed and ready to work.



| ICON | MEANING |
|---|--------------------------------------|
| S  | Stop circuit is closed ready to work |
| TH  | Throttle up/down |

When you see this, it means that the yellow button is being operated to change the throttle/rpm's.



| ICON | MEANING |
|--|--------------------------------------|
| S  | Stop circuit is closed ready to work |
| F  | Forward Button |
|  | Forward Rollers |

When you see this, it means that the green button is being operated and moving the rollers forward.



| ICON | MEANING |
|--|--------------------------------------|
| S  | Stop circuit is closed ready to work |
| R  | Reverse Button |
|  | Reverse Rollers |

When you see this, it means that the blue button is being operated and moving the rollers backwards.

3.3 Engine Oil & DPF Filter Information

Once Running the Oil information (temp/prssure) and condition of the DPF filter are shown in levels of soot and ash %.



| ICON | MEANING |
|------|---|
| | Oil pressure (kPa) |
| | Oil temp (°C) |
| | DPF condition (%) soot amount accumulated in DPF filter |
| | PF condition (%) ash amount accumulated in DPF filter |

3.4 Fuel & DPF Regeneration Information

Once Running the control unit will show fuel consumption and pressure as well as the option to perform a regeneration on the DPF filter. You can force and inhibit a regeneration if required.



| ICON | MEANING |
|------|--|
| | Fuel Consumption (l/h) litres per hour |
| | Fuel Pressure (°C) |
| | Inhibit (delay) Regeneration button |
| | Force Regeneration button |

At the bottom left of the screen you will see the **Inhibit Regeneration Button** and at the bottom right the **Force Regeneration Button**. You will find more information in Section 6.

3.5 Chipping Information

This screen is to show you the seconds and the hours of chipping time. The values shown at PLC can be used for engine torque reading.



| ICON | MEANING |
|-------|------------------------------------|
| PLC | For service dept only |
| hrci | Hours of chipping (re-settable) |
| sci | Seconds of chipping (re-settable) |
| hrcni | Hours of chipping (not resettable) |

ADJUSTING SETTINGS FOR INDIVIDUAL USE

This is where you can adjust the settings to suit your own operational needs



4.1 DM(Diagnostic Message) /DTC's (Diagnostic Trouble Codes)

This page is for Authorised Service Dealer information. It will show fault error codes should an issue within the engine arise.



See Section 7 Trouble Shooting and, if necessary, contact your Service dealer for engine fault finding.

4.2 Smart Sense

Smart Stress

0 = Smart Sense Off 1 = Smart Sense On

This is where the unit is controlling the machine's Min and Max Stress settings. Should you wish to over-ride these, change the value from 1 to 0. Turning this mode off will always run the machine at Max Stress setting.



Economy Mode (Optional)

With Economy Mode selected, the unit controls the machine's feed settings and senses input load. If the unit doesn't detect any material, the engine will decrease power and run at the selected ECO rpm setting.

When fresh material is loaded into the infeed chute, the machine will detect it and automatically increase engine revs to chip the material. The value can be changed to show how many seconds the machine will run without sensing load, before powering down to the pre-set ECO rpm.

10 = 10 seconds before power down
20 = 20 seconds before power down
 The maximum delay setting is 6000 seconds!



Remember!

If settings are changed and the Save Icon  appears, the associated button must be pressed in order for settings to be stored.

4.3 Adjusting Screen Brightness

You can adjust the brightness of the screen to suit indoor or outdoor conditions



Using the + and - buttons you can increase or decrease the brightness to suit user preference.

4.4 Service Reminder & System Settings

Shows the hours in operation since last service and the hours remaining until the next service is due. Pressing the “Spanner” icon will take you into the System Setting screens where you can customise the machine set up to suit user or job criteria.



4.5 PIN Code

The machine's PIN code is pre-set at 000001. This has the benefit of locking-out any user from making changes within the System Settings as well as immobilising the machine and preventing theft. Use the directional arrows and + or - to enter numerical values.

If a customer wishes to amend the code, this can be changed and recorded through GreenMech's Electrical Department.

4.6 Service hours page and settings page

You can navigate and change settings by arrow down increase values where applicable using the + - buttons.



Service hours and engine DM2 (Diagnostic Message) history.

You can change the service timer and then save it with button 5.

You can see the fault code history at DM2; some faults maybe insignificant and not need any action, whereas others may need Service Dealer assistance. See Section 7.



Smart Sense System Settings.

This settings page drills down deeper in to the machine settings and is hidden from front end users.

Refer to section 3 for notes on **Smart Sense** and **Economy mode**.

MAX Stress

The figure shows the RPM value that during high load (thicker material), the machine will kick the material back.

MIN Stress

The figure shows the RPM value that during low load (smaller material), the machine will kick the material back.

Feed Rollers

Shows the RPM value you want the rollers to start feeding material in to chip. You can adjust how the feed rollers react in order to suit working conditions.

NOTE: This figure must always be equal or higher than the MAX Stress value

Kick Back

This is where you can adjust the length of material you want the machine to kick back.

Higher Number = **longer**

Lower Number = **shorter**

ECO RPM

The RPM value you set to trigger idle running speed under Economy Mode.



Remember!

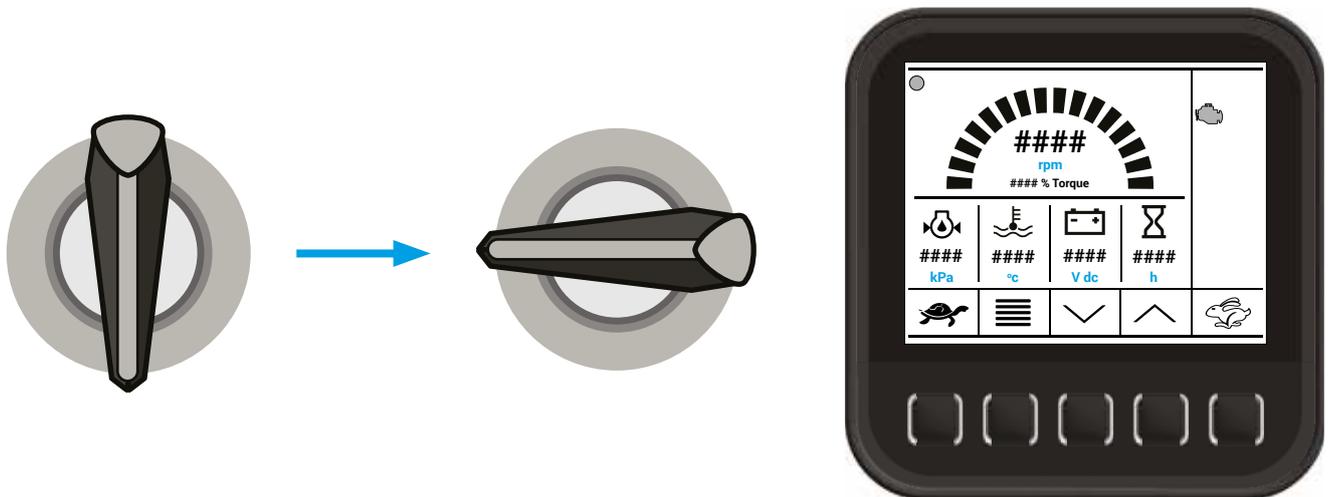
If settings are changed and the Save Icon  appears, the associated button must be pressed in order for settings to be stored.

STARTING THE MACHINE

Starting the machine for use

5.1 Switch On

Turn the key a quarter turn to the 3 o'clock position. Once turned, the control unit will automatically turn on and enter pre-heat mode.

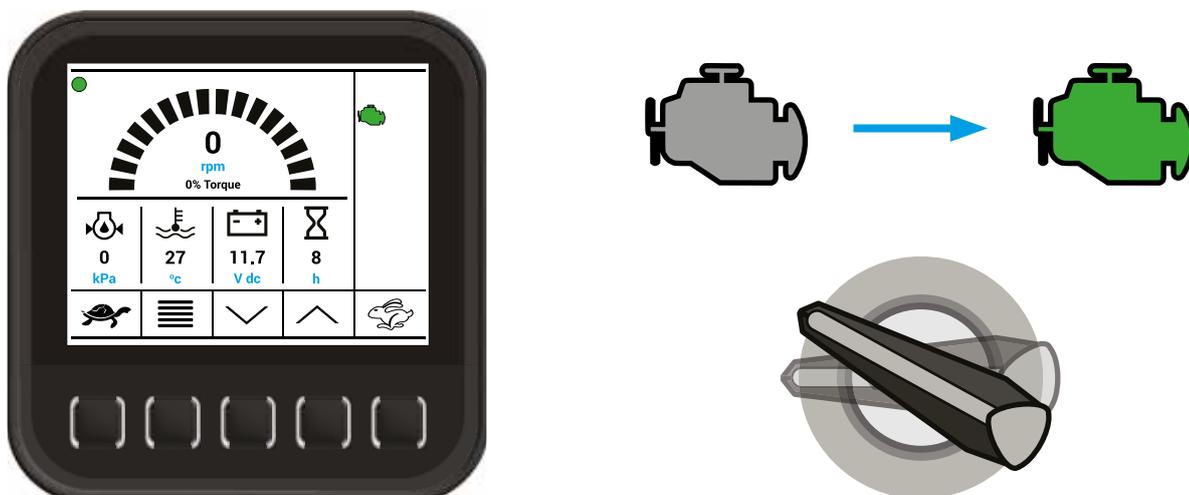


NOTE: The machine will not turn over until the pre-heat process is completed.

5.2 Pre-Heat

Pre-heat will last up to 6 seconds and heats the glow plugs in order to maintain optimum engine performance.

The engine management icon will turn green once pre-heat is completed. You can then turn the key to the 4 o'clock position which will start the engine.



NOTE: In colder climates, the pre-heat process may take longer

5.3 Running

Once running, the control unit will show the main Home Screen, where you will find the status of:



| ICON | MEANING |
|------|----------------------------|
| | Engine RPM & Engine Torque |
| | Oil pressure (kPa) |
| | Engine Temp (°C) |
| | Battery voltage (V dc) |
| | Engine / Machine Hours (h) |

Engine revs can be increased or decreased by using Button 1 (Tortoise) or Button 5 (Hare).

DPF REGENERATION

A diesel particulate filter (DPF) is a device designed to remove diesel particulate matter or soot from the exhaust gas of the engine.

The engine management system will automatically cleanse (regenerate) the DPF when all the right criteria are met. The following steps will guide you through forcing or inhibiting (delaying) the DPF regeneration function.

6.1 Forcing a regeneration

If your machine's regeneration has been inhibited for a long period, then you can choose to force a regeneration.

If soot level is 100%, engine is at optimum temperature, machine is set at MAX revs and the inhibit button off, then you can press the "force regeneration" button at the bottom right of the DPF screen which will start the process



6.2 Inhibiting (delaying) a regeneration

You can inhibit (or delay) a regeneration should you be in a hazardous area such as a fuel station or heavily wooded area. The steps to delay or stop are:

Simply press the "Inhibit Regeneration" button located at the bottom left of the DPF screen. This will delay the regen process until the machine is turned off.

Should the regen already be underway, pressing the inhibit button will stop the process.

6.3 Soot Level

The soot level will never reach 0% so please don't be worried if you have forced a regeneration and still notice a soot level present. After a successful regeneration the soot level should sit at around the 20% mark.

6.4 Regeneration when in “ECO” mode.

The Machine will still enter a regeneration cycle if you are using ECO mode.

Note: It might take slightly longer than when the machine is running at higher RPM's.



Remember!

DON'T Inhibit (delay) a regeneration for long periods of time when the soot level has reached 100% unless absolutely necessarily. This can lead to DPF blockage and the need of a Kubota engineer to clean or replace it.



Remember!

During a regeneration its normal for the chipper to experience noticable changes:

Changes in engine tone (sound) / Areas of extreme heat / Smoke from air vents and discharge chute.

TROUBLE SHOOTING

7.1 Button Error on the screen.

If this screen flashes up temporarily and then disappears, it means that it is simply checking the system and it's OK to proceed.

If the red alert is permanently on the screen then there is a problem with the machine.

If you go to the Status screen you can see if one of the buttons is stuck. If the fault insists then check for water at the bulging plug at the rear harness. If this does not fix the problem, then contact your Service Dealer.



7.2 No rollers turning.

If you have no rollers working, please check the Status screen if the stop circuit is ready (red button ON). If you don't see the red button on the screen, please check the "mushroom" buttons have clicked out properly. If you can see the red button and the green arrow then please check the flow valve. If the flow valve is closed then the rollers don't turn.

7.3 Engine doesn't start.

If the engine light on the Home screen is not turning green, please check the Status screen to see if the bonnet switch is activated. If you can see the bonnet icon, check that the bonnet is closed and the switch is well adjusted. If you don't see the bonnet icon, then check in the PIN settings if you have deactivated the engine for theft protection.

7.4 Engine icon not turning green.

If the engine light on the Home screen is not turning green, please check the Status screen to see if the bonnet switch is activated. If you can see the bonnet icon, check that the bonnet is closed and the switch is well adjusted. If you don't see the bonnet icon, then check in the PIN settings if you have deactivated the engine for theft protection.

| ICON | MEANING |
|--|---|
|  | Bonnet icon states the bonnet enclosure is open. Ensure the bonnet is secured using latches located on the sides and top of the bonnet. |

7.5 Restore to Factory Settings

If you need to restore your chipper to factory settings you can use the below chart. Simply copy the settings below and press the save icon once complete.

| FUNCTION | VALUE |
|--------------|-------|
| Smart Sense | 1 |
| Economy Mode | 90 |
| Max Stress | 2650 |
| Low Stress | 2300 |
| Feed Rollers | 2700 |
| KickBack | 120 |
| ECO RPM | 2000 |
| | 0 |



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