



STAGE 2 V2 PROGRESSIVE DELIVERY

WATER METHANOL INJECTION

# CONTROLLER MANUAL

## **INITIAL SETUP PROCEDURE BASED ON INSTALLED SYSTEMS CONFIGURATION**

Controllers that carry the 'V2' branding on the face of the controller include substantial improvements found in this controller operation document over the V1 firmware. Should you have a Version 1 controller please refer to the manual relating to it as this one does not have the same operational philosophy and features.

### **Indications**

The controllers LED indications display the status of the system and are as per the below table:

<b>Indication</b>	<b>Red LED</b>	<b>Green LED</b>	<b>Blue LED</b>
System Active/ Powered	●		
Pre-Pressurization Active	●	●	
Injection Active in Progressive Output Delivery		●	
Injection Active at Maximum Output Delivery			●
Reservoir Low Level Warning			○
Low Pressure Warning	○	○	
Blocked Nozzle Warning	○	○	
System Failure to Ground Detection	○		

### **Legend**

- Steady Indication
- Flashing Indication

### **1 The Setup**

After installing your system in your vehicle, the first step is to power on the controller and configure it up to suit your systems layout and injection requirements.

Vehicles equipped with a Non Return Valve MUST NOT have the Pre-Pressurization feature enabled, as when this mode is enabled the system will run the pump and build pressure up against the solenoid before the activation setpoint and also after the system has run in order to keep the system responsive before and in-between gear shifts.

Based on your setup, configure the system based on table as per below

<b><u>Component Installed</u></b>	<b><u>Pre-Pressurization</u></b>
Non Return Valve / Check Valve	Disabled
Solenoid Valve	Enabled

Should Pre-Pressurization be enabled, it is completely normal that the system ready itself when you turn on the ignition. The system does this in order get rid of air that might have found its way in the system while the vehicle was off.

It is recommended that the vehicle be driven initially with the new setup with a 50/50 ratio of Water Methanol (approximately 4L Water to 6L Methanol) with the activation setpoint set at (half the settling boost at redline/ 50% throttle) and the Peak setpoint adjusted to the (settling boost at redline/90% throttle).

From there you can alter the injection setpoints earlier whilst assessing the motors tolerance during injection and attempt to activate and reach peak delivery as early as possible or where required.

## 2 **Entering the Menu**

With the Ignition off, press and hold the “Test/ Save” button for 1 second whilst turning the ignition on.

If you have successfully entered the Menu, this will be indicated by all three LED’s (Red, Green and Blue) being on. From here onwards, a short button press will cycle the menu feature and a long button press will enable the feature. Menu 1 (Pre-Pressurization) will be indicated by a continuously flashing Red LED and Menu 2 (Auxiliary Output) likewise by a continuously flashing Green LED. The Blue LED will indicate whether the feature is enabled (on) or disabled (off). As mentioned a long press (more than 2 seconds) will toggle the feature on or off, and a short button press (less than 1 second) will toggle through the Menu structure.

Once set, you can simply turn the ignition off and then switch the controller on as per normal to save the settings.

### 2.1 **Pre-Pressurization (Menu 1 Feature)**

The controller will automatically ready itself (pre-pressurization) if the vehicle experiences more than half of the pressure between zero (atmospheric) and the activation setpoint.

*For example: Activation is at 1bar boost, the system will begin pre-pressurization at 0.5bar*

This feature prevents injection latency which typically is found on aged systems and on those that are installed on vehicles that are driven periodically.

This feature also does not only ready the system before hand but also keeps the system on idle for 10 seconds after system activation in order to prevent latency on gear shifts

Please note that it is completely normal to hear an audible click in the cabin when driving above the midpoint activation for this feature and this activity can be confirmed by the indication: *Red LED + Green LED Active*

### 2.2 **Auxiliary Output (Menu 2 Feature)**

The controller is able to use its output for two functions, put the vehicle into an interlock when an injection fault has been detected or be utilized as a dashboard status led mimic to the controller face LED indications.

#### 2.2.1 **Boost Safe Output (Menu 2 Feature Activated)**

The controllers auxiliary output can be wired in a series of ways to provide types of vehicle interlock in order to protect the vehicle from running without active water methanol injection safety.

Please take note that the activation of this safety varies in response time whether the Menu 1 Feature is active or not due to the latency improvement that it awards to the system injection.

Response Times are as per below:

Pre-Pressurization active	1000ms / 1 seconds Failure Time
Pre-Pressurization deactivated	4000ms / 4 seconds Failure Time

#### 2.2.2 **Status LED Output (Menu 2 Feature De-Activated)**

The auxiliary output can be wired to an external LED that is placed in the drivers view that will indicate via a series of flashes of the systems condition.

This allows for the controller to be placed out of sight in a glove box/ cubby hole.

The indications of the LED are as per the table below:

Steady On	Injection Active
2 Flashes with a Pause	Reservoir Fluid Level is Low
Fast Flashing	Critical Failure - Check controller LEDS for more information

### **3 The Priming Function**

The system will require to be primed before first time use as the lines are not yet filled (primed) with fluid. This would also be periodically necessary for vehicles that are not often driven that could have drained lines. To perform this action, make sure the controller is powered on, press the "Test/Save" button in for longer than 2 seconds but less than 5 seconds to activate the prime feature. If the Prime function is successfully activated this will be indicated by all three LED's flashing simultaneously every second for three seconds and this is to notify the driver that the prime test is about to happen after the 3 second timer expires. There are two modes the Prime will run as dependant on setup as per below:

#### **3.1 Standard Fixed 3 Second Timed Prime(systems not equipped with an SPMU)**

System will activate at 100% max injection for 3 Seconds and exit automatically

#### **3.2 Intelligent Priming (only for systems equipped with an SPMU)**

System will activate at 100% max injection and run for a maximum of 10 Seconds or until the SPMU detects pressure and exit automatically.

The Prime function run time can be overridden manually for a user desired run time for as long as the "Test/ Save" button is held in AFTER the prime function has activated.

### **4 Saving the Progressive Delivery Setpoints**

Once the controller has been configured in its menu and primed the controller can now be adjusted to suit your vehicles injection requirements. Once set, the controller will never lose its memory even if the setpoints are moved. The first Potentiometer "Activate" refers to the activation point of the system and this will be when the controller delivers its lowest pressure. The second Potentiometer "Peak" refers to the point where the controller will deliver its maximum injection pressure. Between these two adjusted setpoints the controller will interpolate a progressive ramp and vary the pumps output in order to achieve a smooth pressure rise on the output. To save your injection settings, the "Test/ Save" button must be held down until the LED's scroll up and down in the following order:

From initially Red to Blue → Green → Red → Green → Blue and returns back to steady Red.

If a new injection point is desired the Potentiometer may be moved and once again the "Test/ Save" button be pressed and held until the acceptance flashes are seen.

The values are stored in Non-Volatile memory so even if the controller is unplugged the setpoints will never be lost unless the user chooses to set them in new positions.

### **5 Internal MAP Sensor Altitude Calibration**

If you have found that the controller is slightly inaccurate on its activation pressure based on the set and saved potentiometers position to a boost gauge, you should calibrate the controllers set altitude.

To calibrate the controller all that is required is for the "Test/Save" button be held down before switching on the vehicles ignition and to keep it pressed in (for around 5 seconds) until the three status LED's on the controller face flash simultaneously three times .

## **6 Warning and Fault Indications**

### **6.1 Low Level Indication - (Slow Flashing Blue LED)**

Should the controller receive an open signal on the from the level monitor the system will wait 10 seconds before indicating a low level alarm by **continuously flashing the blue LED** on the controller face.

A normal condition will override this warning when the controller receives a closed signal from the Fluid Level Sensor.

The time delay is done prevent nuisance reporting of low levels on tanks which experience fluid wash.

### **6.2 System Pressure Low - (Simultaneous Fast Flashing of Red and Green LEDs)**

When your system experiences a low pressure scenario caused by injection latency or a physical fault on the system, the System Pressure Monitoring will detect this and indicate this condition initially by flashing the Red LED during the system injection indication which would be either Green (Progressive) or Blue (Peak).

Should the system sustain this low pressure condition for longer than 4 seconds the controller will interlock and shut off the injection to prevent the possibility of a fire from forming should a pipe have ruptured.

This condition is indicated via continuous and simultaneous flashing of the **Red and the Green LED's**.

This interlocked state can be reset by momentarily pressing the "Test/Save" button for less than 2 seconds, and it is advisable that you inspect your system thoroughly as to why it has experienced a prolonged low pressure.

### **6.3 Blocked Nozzle Detected Warning - (Simultaneous Fast Flashing of Red and Blue LEDs)**

If debris blocks the nozzle/s over time, the system will retain pressure after activation and take long to depressurize.

This condition will be detected by the controller and will be indicated via continuous and simultaneous flashing of the **Red and Blue LED's** on the face of the controller.

This condition does not interlock injection and the system will operate as per normal.

### **6.4 System Hardware Failure – (Fast Flashing Red LED)**

Should a critical failure occur internally within the controller or from a wiring issue (such as wearing through a wires insulation and a short to ground), the controller has the ability to detect and prevent this uncontrolled injection which generally leads to a catastrophic event called engine hydro-locking.

The controller is designed to prevent runaway system injection with its 3 stage electrical isolation by interlocking itself.

This feature of the controller is known as the "electrical fail safe" and the controller will indicate this critical failure with a continuous **flashing Red LED**.

This state cannot be reset or exited for as long as the controller detects the issue.