Single stage water injection system+DDS3

HFS-1

Instruction manual v1

GETTING TO KNOW THE AQUAMIST HFS-1

The HFS-1 is designed with one aim in mind - deliver fluid to your engine with reliability and safety.

Utilising the most powerful motor Shurflo offered on their 8000 series diaphragm pump range. The 150W motor will deliver beyond two litres of fluid per minute at 125psi with ease. Bypass switch is replaced by three 125psi internal by-pass valves, allowing the pump to operate at a smooth system pressure without pressure spikes. Most similar systems offered has pressure spikes as much as 20psi!

Since the system is designed for high flow, high power applications, continuity of flow is vital to the health of your engine. We have integrated the well proven DDS3(v8) dash display system to monitor the flow full time. In the event of a flow discrepancy, the system will lower your boost or switches map (if available).

Single point injection system has been proven to give a more consistent result than the progressive pump speed system due to it well defined rate and is not plagued by response speed and operational range. The HFS-1 can be upgraded to a PWM-valve system very easily in the future.

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Checking the contents of the box carefully

This is a "must do" immediately after unpacking ....

Water pump

Unpack the corrugated sheet carefully. The pump should be labelled with the Aquamist HFS label.

The white box

- 6M of 6mm OD nylon hose (806-261)
- 2M of 4mm OD nylon hose (806-266)
- 15A Fused water pump harness with 40A relay
- Inline valve (806-234) with 6/4 mm hose connector and mounting bracket)
- 0.8 mm water jet (806-323) in plastic bag
- 0.9 mm water jet (806-324) in plastic bag
- 1.0 mm water jet (806-325) in plastic bag
- 1x 4mm Y-piece (806-362) in plastic bag
- 2x M8 x 1/8 BSP jet adaptor with plug (806-357)
- 1x water tank adapter 1/8 BSP (806-270) + 6mm qck-fit elbow (806-376)
- 100 micron inline water filter (806-257)
- 4x M5x 40mm, nuts, washers and fasteners for pump
- 1x M6 grounding stud with washed and nuts and 6mm eyelet for pump ground
- 2x 3/8 BSP-M to 1/8BSP-F adaptor 2x 6mm 1/8BSP-M elbow.

DDS3v8 fluid monitoring system box

- Assortment of 22 AWG coloured hook-up wires
- 1x 2.5M/24 AWG 2-core wire for solenoid valve
- 1x DDS3 Dash Gauge with 1.5 M x 8-way cable
- 1x Version 8 Junction box
- 1x water level switch with connector (806-280c)
- 1x Digital flow sensor (806-428)
- HFS-1 instruction booklet

Note: Please contact your supplier immediately should you discover any missing parts.

Getting started on installation

Before installations guidelines

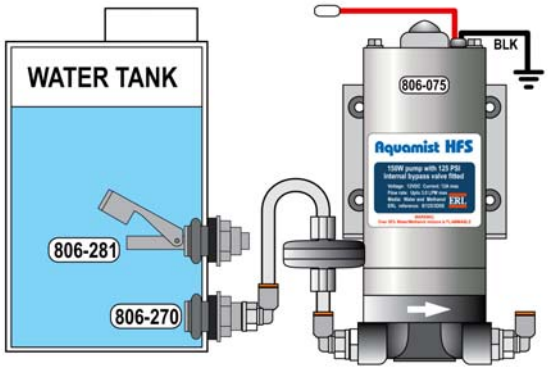
- The pump and water tank is designed to be fitted in the trunk. Install the water pump and inline filter below the water tank.
- Ensure all fittings are tighten and leak proof before filling up with water/methanol, test it with water first. If high concentration of methanol is used, please vent the tank's breather hole externally. Methanol is poisonous at high concentrations.

Assembling the pump in steps

- Gently assemble the two 3/8 BSP adapters into the pump without crossing the threads. The female one going into the inlet of the pump. Flow direction is moulded onto the plastic pump head. Ensure o-ring is properly seated inside the pump.
- Assemble the accumulator supporting bracket with the metal band supplied.
- Assemble the rest of the 1/8 BSP elbow fittings and blanking plugs. Ensure all o-ring type fittings are not overly tightened.
- Mark (dyes smeared on the bottom of the pump's rubber feet) and drill four holes for the pump.

Water tank components

- Ensure the outlet is facing the rear or the side of the tank. Drill/bore a burr-free 7/8"hole. Clear up all the burred edges and wash the tank thoroughly. No debris or plastic shaving should remained in the delivery system. 1-2 inch from the bottom of the tank is ideal.
- Same size hole for the water level sensor. Do not place the level sensor near the washer pump, it will not operate properly. The float should swing upwards. Tank venting hole must be re-directly externally if high alcohol concentration is used.
- A tall and slim water tank is ideal for this type of application. Minimise delivery surge problems at low water level.



System component installation

Reference to wiring diagram
(page 9,10)

Trunk area component :
Water pump
Water tank (not supplied),
Inline filter (806-257)
Water level sensor (806-281)
40A relay (806-276)

Main harness assembly consists of a pre-terminated red power cable (#12AWG) and a black 4-core cable (to DDS3 junction box). Put the relay somewhere between the tank and water pump. Plug in the main harness to the relay. Run the harness inside the passenger compartment leaving the 4-core wire in the dash area. The #12 gauge cable continues its journey to the battery in the engine bay through a suitable opening.

-6mm nylon hose: It may a good idea if the 6mm fluid delivery hose be routed at the same time as the main harness.
It should go directly to the engine bay without any splicing.
The reminder of the 6mm hose will be used to link the tank and pump.

Dash area components
DDS3 gauge
Junction box

DDS3 gauge to be installed somewhere in view with the driver. Route the 8-core cable towards the location of the junction box.

The junction box is the heart of the system and should be located in a position easily accessible and plenty of cable length left so the box and be pull out for future inspection. You should have the following cables run to/from various locations:

- DDS3 gauge: 8-core cable (from dash gauge)
- Main harness's 4-core cable (from trunk) please label it.
- Flow sensor: 4-core cable (from Engine bay) please label it.
- Solenoid valve: 2-core cable (to Engine bay)
- Fuel injector+: Single 18AWG red cable (to ECU/E.bay area)*
- Fuel injector-: Single 20AWG green cable (to ECU/E.bay area)*
- System ground: Single 18AWG cable to chassis ground
- Pin 17: Single 22AWG cable (to ECU/E.bay area)*
- Pin 11 - 22AWG grey cable (to ECU/E.bay area)*
- Pin 12 - 22AWG black cable (to ECU/E.bay area)*
- Pin 9/10 - un-connected for the time being until its function is Determined.

* Note: "to ECU/E.bay area" will depending on where the ECU is located. If possible, Connecting the cable closer to the ECU

Engine bay-components

Inline solenoid valve
(806-234)

This valve controls the flow of water and should be installed away from high heat, vibration and direct water splash areas. If possible locate the valve in close proximity of the flow sensor and water jet.
Inlet port: 6mm. Outlet port: 4mm, Do not connect the 6mm hose to the valve just yet until water line is primed.

Water flow sensor
(806-428)

This component should also be placed away from heat, vibration and strong magnetic field areas such as the ignition coil, wiper motor etc.

Water jet adaptor
(806-357)

Great care must be exercised when installing the Jet adaptor. The wall between the external and internal thread is very thin so after drilled (8.8mm) and tapper the 1/8BSP thread onto the inlet tract

Drill and tap two 1/8BSP (8.8mm drill) holes about 6" apart and loctite the adaptor in position. ONLY figure tightening the adaptors in position or it will snap through over -tightening.

Once the above is completed, the installation is pretty much done and just strip and terminating the wires into the junction box and splicing a few wires to the appropriate components.

Water jet location

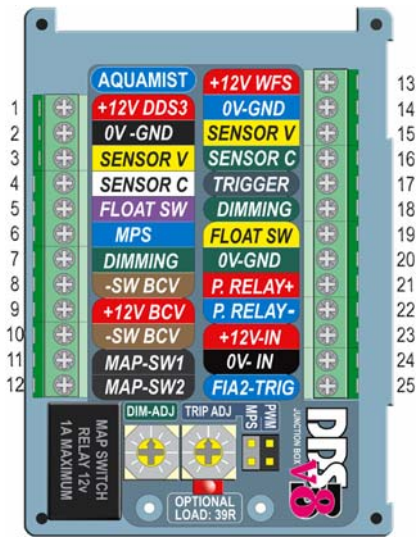
The HFS-1 comes with three jets, Y-piece and two 1/8BSP to M8 nickel plated brass adaptors. Select a suitable location preferably not too far from the exit of the intercooler.
This is to allow more time for mixing and evaporation, thus promoting better inlet-tract cooling even in-cylinder distribution.

Water jet size selection
(W50/M50)

For mild application with no tuning, water to fuel ratio should be limited to 10-15%. This will normally allow an increase of 3-4psi boost from stock, power increase yields between 5-10%. Higher % methanol wil allow higher boost, should be expecting 10-15% power increase from stock. This require some mild tune on ignition and fuel.

Running between 15-25%+ will require a more aggressive tune but will allow great power increase.

DDS3 Junction box functions



Pin1-8
Legends are colour matched and connects directly to DDS3 Gauge via a 8-core cable.

Pin 9-10
It will activate a wastegate solenoid valve directly when correct water flow is detected (system on). Pin 9 is a fused +12Vand Pin10 Switches to ground.

Pin 11-12
This relay output can be used to disconnect the OE boost control valve and switch to a "Dummy load resistor" to prevent "engine check lamp" activation. "Dummy Load Resistor" is supplied can be soldered in. It can also be used to switch pre-defined MAP on a third party EMS, if available. Open circuits under fault or "DDS3-OFF".

Pin 13-16
Flow Sensor connections, colour matched.

Pin 17
Failsafe triggering input. PWM or MPS (mode) - section by jumper link at the bottom of the board.

Pin 18
To car's +ve side lamp circuit for dimming display.

Pin 19-22
To water level switch and priming pump relay (up to 0.2A). Pin 22 switches to ground on activation when pin 17 is triggered.

Pin 23
Main +12V power supply to the DDS3 (Switched).

Pin24
To 0V, Battery negative or chassis ground with good electrical contact.

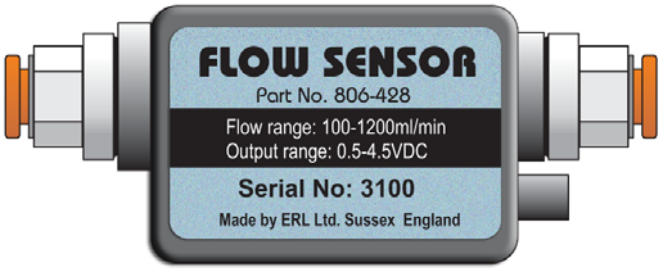
Pin25
FIA2 Fuel injector amplifier trigger in the absence of manifold pressure switch or FIDC (fuel injection duty cycle) trigger is preferred. (for Aquamist use only)

TRIP ADJ potentiometer
Setting failsafe tripping range between 25 to 75% full scale of the signal seen at pin 17.

DIM ADJ potentiometer
Adjust display/backlit intensity on the gauge for night driving conditions.

MPS/PWM jumper link.
Selecting mode of operation: the WI system can be triggered by either Manifold pressure sensor (MPS) or fuel injector's Duty cycle (PWM). Adjustable between 25% to 75% via "TRIP ADJ"

Flow Sensor



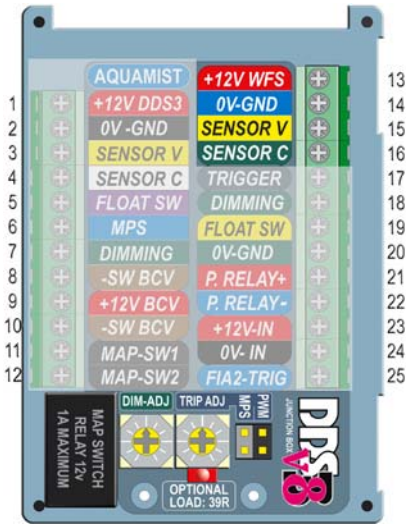
During the beginning of 2007, the flow sensor has been extensively improved to match the flow and response time with the current range of High flow systems.

The sensor is bi-directional but do not change flow direction after long period of usage unless the two internal disc filters are properly cleaned. The sensor is suitable for use with water or methanol at any concentration. Sensor is fitted with 1/8BSP 4mm qck-fit hose connectors from factory.
The DDS3 junction board supplied all the necessary electrical power and signals to and from the sensor via a 4-core cable. Length can be extended up to 20 feet without any loss of accuracy.

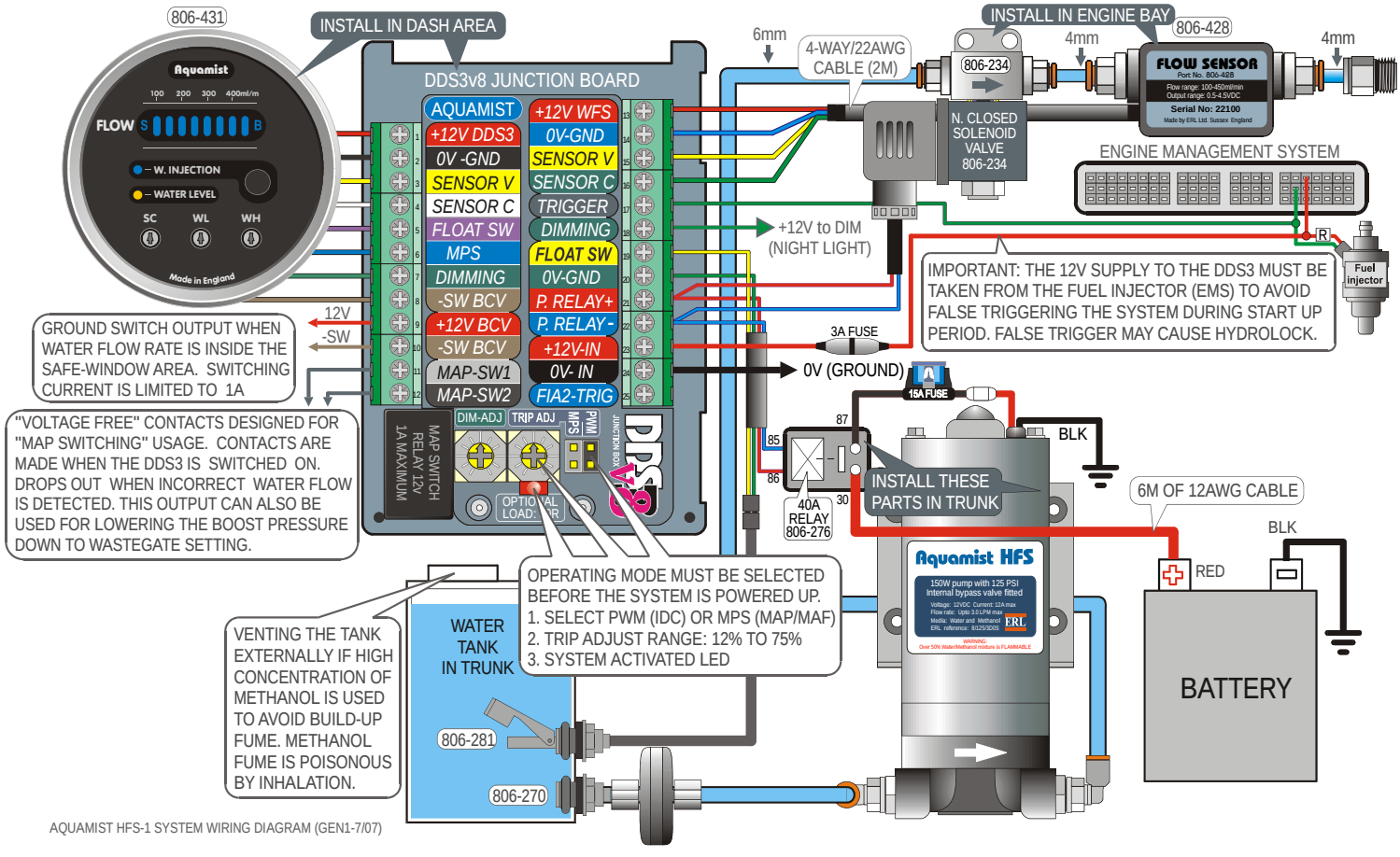
Diagram below show the pin-out and functions of the DDS3 terminals. Sensor V refers to the actual flow signal from the sensor. Sensor C is for internal reference use only. If you need to data-log the flow rate, take the signal form the Sensor V terminal.

Do not install the sensor near any magnetic radiated devices such as ignition coil, motors or solenoids because it interferes with the hall effect sensor that reads the turbine speed. Avoid areas with high heat and vibrations. A cool and dry location is ideal.

Never reverse the polarity of the power feed to the sensor or permanent damage may occur.



HFS-1 generic wiring diagrams



AQUAMIST HFS-1 SYSTEM WIRING DIAGRAM (GEN1-7/07)

Generic Wiring Diagram

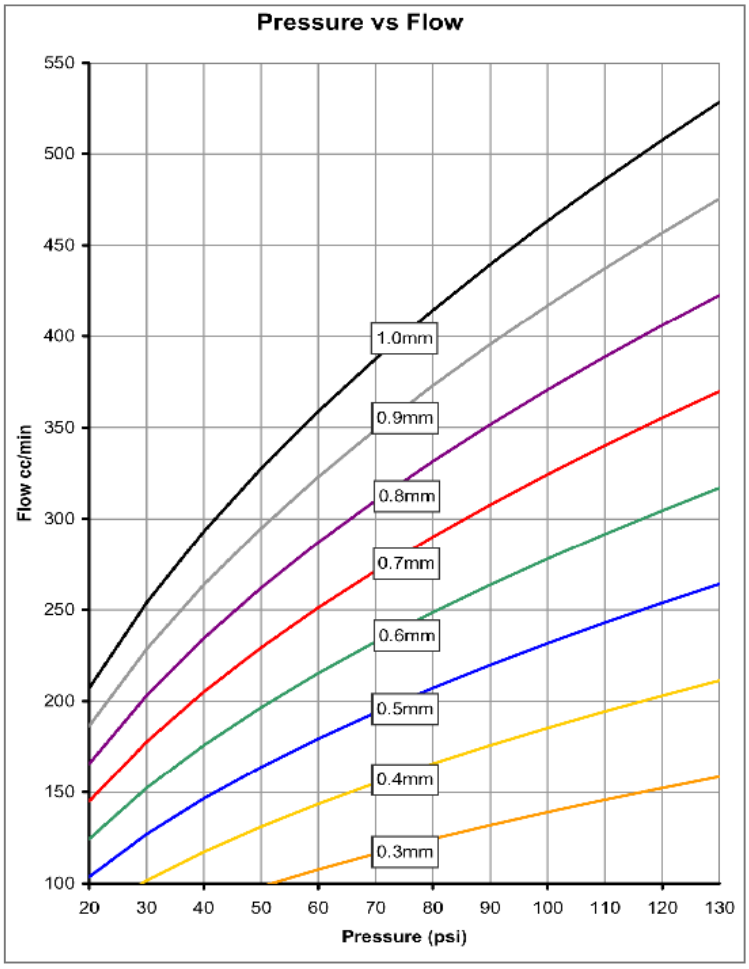
The wiring diagram in the left can be used for most installation. It does not include the "failsafe" connection. This is because it will be specific to a "third part" boost controller or third party ECU which has "MAP switch " capabilities. It is important that the +12V power supply to the DDS3 (pin23) is taken from the fuel injector's 12V supply. This prevents the water injection from activating until the car is ready to be cranked.

All strands of the stripped wires must be twisted before inserting into the terminal block. Ensure no loose stands are present to cause short circuits between the terminals.

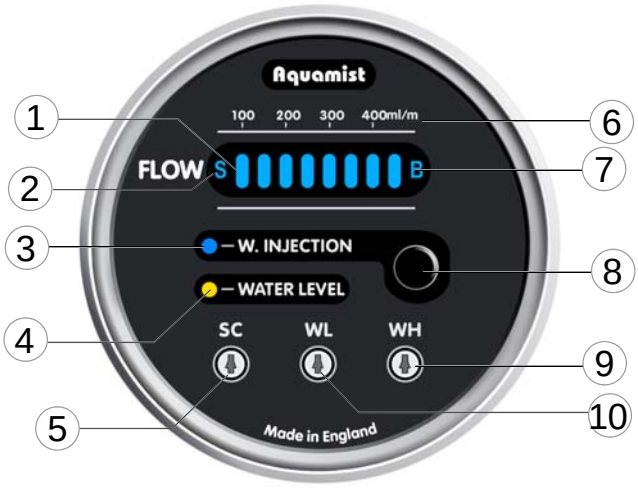
Flow chart of water jets:

Please note the flow rate of the chart on the right is rated at 1 atmospheric. In order to get more accurate flow, please subtract the maximum boost pressure from the 125psi line. For example, 1mm jet flow 520cc/min at 125psi but only flows 470cc/min. At 105psi.

The standard kit comes with 0.8, 0.9 and 1.0mm jet. A Y-piece is provided with twin jet applications.



HFS-1/DDS3 Dash Gauge Functions



1. 8-element Bargraph Display (100-450ml/min)
Each segment is equivalent to 50ml/min. of flow if the sensor is calibrated for absolute mode.
Depends on user preference, the display can be scaled to suit the liquid flow up to 1.2 litre per minute. (see 5)

2. "S" indicates the presence of sensor.
The letter "S" (sensor) must be lit after power up and stay on to show the sensor is functioning correctly.

3. Water injection ON led
This led comes on the when the dash button is depressed, showing the water injection system is enabled.
.

It will switch to full brightness when the DDS3 is triggered. (Pin 17)

4. Water Level Sensor led (yellow)
When the water level in the tank is below the sensor, this led will light up and disables the water injection as well as any other related functions such as high boost, priming pump and main pump.

5. SC (Sensor Calibration)
20-stepped potentiometer allow user to scale the flow sensor to give an ideal visual indication of a given flow rate. Ideally set the full scale of the sensor about two/three segments below maximum so a problem is easier to identify. It can also be used to trim the sensor to show a absolute or relative values for a particular set up.

6. Backlit flow legend
Fixed scale to indicate absolute flow rate. Sensor must be calibrated for each application for accuracy.

7. "B" Boost Enabled led
This led lights up to show the "extended boost" over wastegate is triggered. Provided the following conditions are met: "Water Injection On" button is depressed, flow-rate is inside the set window and water tank is above the set level.

8. Water injection enable button
Due to extra power level achieved under WI, user want may want to reduce the power to the wheels in less than ideal driving conditions. Disabling the WI will reduce boost to wastegate bleed valve setting (if fitted) as well as switching to a less aggressive MAP on custom engine management.

9. Over-range setting potentiometer
It is just as important to monitor over-range conditions as well as under-range flow conditions. If a leak develops close to the water jet and starves the engine of the water, the user must know this condition. A 20-stepped potentiometer allows accurate and repeatable adjustment range.

10. Under-range setting potentiometer
This setting can indicate partial blockage and trapped air inside a delivery hose. Again a 20-stepped potentiometer is employed.

NOTE: The two range potentiometers "9"and"10" form the basis of a SOA (Safe Operating Area) that allow users to tune their car more safely.

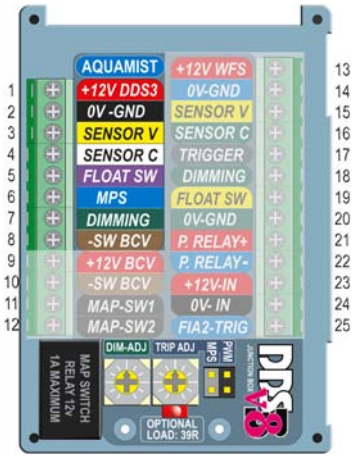
Please note that methanol has only 80% mass of water and 50% latent heat of water. If water and alcohol mix is injected, allow a bigger jet to compensate this. This is a common mistake often made. Every 25% of methanol added should allow a 0.1mm Increase of jet size diameter.

Installation

The gauge will fit into any 52mm gauge pod and a two-prong bracket is provided. Do not over-tighten the thumb-wheel since it has an embedded o-ring to create high friction between the surfaces thus preventing loosening due to vibrations.

An open ended 8-core cable is provided for connecting the gauge to the junction box where all the other sensors and peripheral devices are terminated. We avoid using plug/socket termination because it is difficult to thread them through the firewall between the engine bay and passenger compartment

All the core colours are coded and matched to the legends in front of the terminal block, this helps to avoid any accidental termination errors. The wires should be stripped and twisted before inserting into the terminal blocks. The eight top left terminals are reserved for the DDS3 gauge.



Wiring Check and powering the system up for the first time

The HFS-1 can be triggered by either fuel injector duty cycle (PWM mode) or a MAP sensor (MPS mode). Other load sensors with 0-5V output can also be used (eg.MAF, TPS). You must first select which operating mode before correcting a signal to pin 17 of the DDS3 junction box.

Step 1: Power supply to the DDS3 (important)
The DDS3 must only be powered up whilst the fuel injector is switched on. This is to avoid false triggering of water injection and fill the engine up with water. The +12V supply to the fuel injectors is an ideal source.

Step 2: Powering up test and System check
Remove the water jet and direct it into a container, Ensure the pump and the DDS3 remains off at key position #1. At key position #2 without the engine running, switch the DDS3 on via the dash gauge button. Two leds should illuminate - "S" (sensor OK) and "water injection". The water pump should remain off and no injection should occur. Start the engine.

Step 3a: Test the DDS3 in PWM mode
Jumper link on PWM mode and pin 17 is spliced into the fuel injector;s pulsed terminal. For ease of testing purposes, the "TRIP ADJ" potentiometer is set to the minimum (fully counter-clockwise (~12%). This will allow some triggering to take place by blipping the throttle. The red led below the trip potentiometer confirms this and the DDS3 gauge should show some reading.
If there are no sign of flow at the jet but pump is running, we need to prime the system. Instead of repeating this procedure to prime the water through, it would be easier to manually trigger the spray by grounding the pin 17. (make sure the wire that goes to the injector is disconnected or you will fill one of the cylinders with fuel.

Step 3b: Testing the system in MPS mode.
Engine off. Put the jumper link on MPS link before powering the system up and pin 17 is spliced into the MAP sensor (or similar load sensor). Advance the "TRIP ADJ." potentiometer fully clockwise so that the system does not spray water until the trip point is reached.
Start the engine. Slowly rotating the potentiometer counter-clockwise until the system triggers for a short moment, Visually confirming with your eyes fixed at the nozzle or the DDS3 gauge. Proceed to set the trip point to the desire load point. Depending on the sensor used, the final setting has to be set experimentally.

Final checkup and setting up the failsafe.

Step 4: Final check-up before going for a drive

Clip the water jet on the windshield and take it for a drive. Observe the jet pattern is cone shaped during spray and no splatter due to trapped air. Reconnect the hose to the manifold jet . You have now successfully installed the system.

Step 5: setting the DDS3 to perform failsafe:

This can be regarded as the most important part of the entire system especially your car is tuned to work with high percentage of water/methanol.

Setting up the DDS3 in five easy steps:

It should be relative straight forward if you following the procedures as set out below:

1. Manually trigger the system with the jet/jets you iintend to use. It will be better if you can do this jet spraying externally.

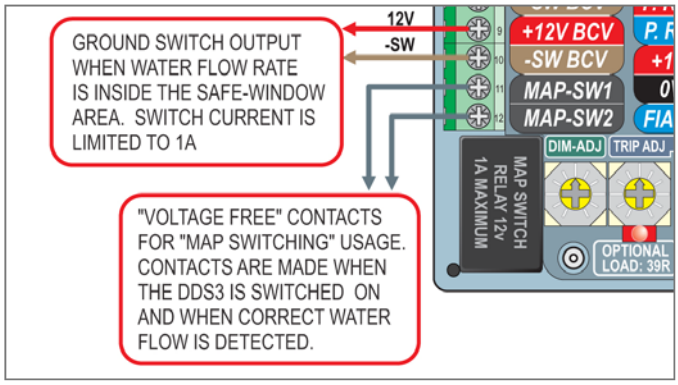
2. Adjust SC (sensor calibrate potentiometer) whilst spraying to register around 6 bars on the gauge.

3. Temporarily set the "WL" (window low potentiometer) fully counter-clockwise and the "WH"(window high potentiometer) fully clockwise.

4. Trigger the system and turn the WL clockwise until the "B" led distinguishes. Wind back 2-3 clicks after the "B" led comes back on and leave.

5. Wind the "WH" counter-clockwise until the "B" led distinguishes. Wind back 2-3 clicks further after the "B" comes back on and leave.

You have now set the fail-safe window properly. The system is now ready to perform full-time flow monitoring tasks. You may need to fine tune the window after the jet/jets are spraying against manifold pressure as flow will be slightly lower. Perhaps a click or two clockwise (more gain) on the "SC" potentiometer will do the trick.



Fail Safe wiring for MBC

Upon detection of water flow fault, the HFS-1 can reduce the boost pressure of a MBC to wastegate setting with a 3-way Low Current Solenoid valve (not supplied) - A typical supplier is MAC valve (36A-AAA-JDBA-1BA - www.macvalves.com) or Clippard valve (ECO-3-12-L-M5 - www.Cippard.com).

Fig.1 Show the valve in an energised state allowing the MBC to lift the boost pressure above the wastergate pressure. Following the red line.

Fig.2 shows the air to the MBC is being by-passed and boost pressure is fed to the wastegate directly, force the manifold pressure to drop to the default wastegate setting. Following the red line.

If high boost pressure is required without water injection being turned on, you can insert a manual toggle switch between pin 11,12. Ensure a led is lit to remind user the system is no longer protected with water injection.

Fig.1

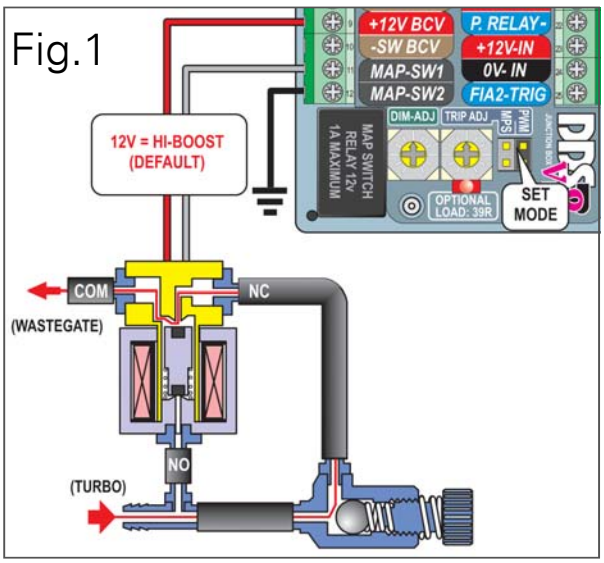
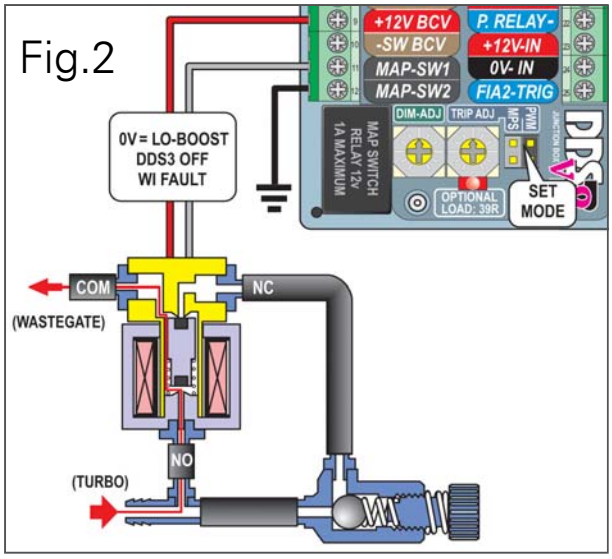


Fig.2



Failsafe wiring for OE boost control valve

Since almost all turbo car's boost pressure is controlled by the engine management. Under normal driving ideal conditions, extra boost is dialled in by the ECU by means of a solenoid valve (BCV).

This process is quite simple, by altering the duty cycle of the pulses sent to the valve, boost pressure can be increased beyond the standard wastegate setting. When the operating condition is less than ideal the ECU and lower the boost to protect the engine.

When a car is being modified beyond the factory's designed power output, this section is also being changed quite drastically, both in terms of software, hardware and mechanical parameters. The ECU's ability to control boost pressure is often limited.

The commonest way to increase power is by increase the boost pressure accompanied with fuel octane and flow increase or water/methanol injection. If anyone of the two mentioned component is being interrupted, the ECU is often unable to modified the ignition timing or fuelling to react to the onset of knock, if this condition is allow to persist, engine failure can result,
The HFS-1 will revert the boost pressure to watergate pressure should water/methanol injection is interrupted.
For extra safety, the ECU should be mapped to run without any risk at a suitable wastegate pressure. This regardless of how highly the engine is modified.

Dummy resistor prevents the onset of CEL if one would prefer not to see it whilst the HFS-1 is switched off.

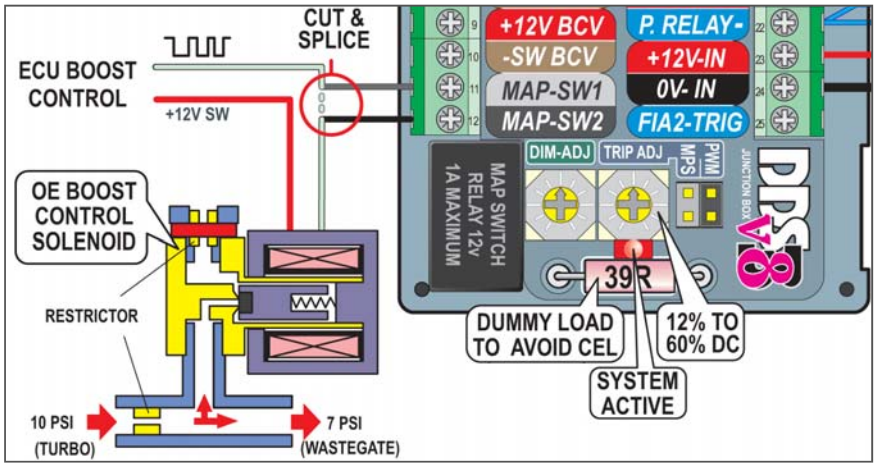


Figure above shows the the correct wiring for the failsafe

Electrical / Mechanical Specifications

DDS3-gauge

Input voltage: ..... 11.5 - 14.5VDC
Input current:
- Standby ..... 25mA DC
- Full Brightness ..... 250mA DC

Flow Sensor input voltage:
- Presence ..... 0.5V DC
- Flow ..... 0.55 - 4.5V DC

Manifold Pressure switch: ..... Ground "off" activation
Float Sensor Threshold: ..... Ground active
Sensor Calibrating Voltage: ..... 5-0V DC
Detection Window range:
- Low ..... 0.5v to 2.5V DC
- High ..... 2.5V to 5V DC

Boost valve drive ..... 1A max
Water on led:
- Standby ..... 5mA DC
- WI active ..... 15mA DC

Water level led: ..... 15mA DC
Boost enable led: ..... 8mA max
Bargraph led: ..... 8mA per segment max
Bargraph type:
- Red ..... Super Bright Red
- Blue ..... High efficiency

Dimensions ..... 52mm x 45mm (H)
Operating temperature range: 0-50C

Flow sensor

Input voltage: ..... 10-15V DC
Input current: ..... 25mA DC
Output Voltage: ..... 0-5V DC
Output current: ..... 5mA max
Dimensions: ..... 40x 75 x 20mm(H)

Water level switch

Input voltage: ..... 50VDC max
Switch current: ..... 100mA max
Panel hole dimension: 22mm

Junction box

Input voltage: ..... 11.5-15V DC
Input current:
- Standby: ..... 30mA DC

Output currents:
- Priming .Pump: ..... 1A DC max
- Boost valve: ..... 1A DC max
- Boost cut relay ..... 2A DC max
- Flow sensor ..... 50mA max

In circuit Fuse links:
- DDS3 gauge: 0.5A
- Priming pump: 0.5A
- Boost valve: 1A
- Flow sensor: 0.2A

Dimensions: ..... 75 x 57 x 17mm(H)

Water pump

Input voltage: ..... 11.5-15V DC
Input current: ..... 12A max DC
Flow: ..... 2 litre per min
Dimensions: ..... 240 x102 x 104mm(H)
Weight: 3.6Kg

Inline valve

Input voltage: ..... 11.5-14V DC
Input current: ..... 0.8 A max DC
Flow: ..... 2 litre per min

Appendix

In Car Dash Gauge (8-core cable)

Pin	Colour	Size	Description	Electrical parameter
1	Red	24awg	+12V power supply to gauge	50mA @12v
2	Black	24awg	0V power supply to gauge	50mA @12v
3	Yellow	24awg	Flow Sensor input voltage	0-5 VDC @10mA
4	White	24awg	Flow Sensor calibration output voltage	5-0 VDC @1mA
5	Purple	24awg	Float Sensor from water tank	Ground active
6	Blue	24awg	Manifold Pressure Switch (806-157)	Normally closed
7	Green	24awg	Night driving dimming connection	+12V active
8	Brown	24awg	Watergate bleed valve option (SW-)	1A @12V max.

Flow Sensor (4-core cable)

Pin	Colour	Size	Description	Electrical parameter
1	Red	24awg	+12V power supply of Flow Sensor	30mA @ 12v
2	Blue	24awg	0V power supply of Flow Sensor	0V Ground
3	Yellow	24awg	Flow Sensor output voltage	0-5VDC@10mA
4	Green	24awg	Flow Sensor calibration input voltage	5-0VDC@1mA

DDS3 Junction Box (25-ways - Pin 1= top left corner. Pin 25 bottom right corner)

Pin	Colour	Size	Description	Electrical parameter
1-8	------	8-core	Same as Dash Gauge Above	------
9	Red	22awg	+12V power supply to bleed valve	+12V, 1A fused
10	Brown	22awg	Switching to ground for Bleed valve	1A maximum
11	D.Grey	22awg	Map Switch/Boost cut (EMS side)	1A maximum
12	D,Grey	22awg	Map Switch/Boost cut (BCV side)	1A maximum
13-16	------	4-core	Same as Flow Sensor as above	------
17	D.Blue	22awg	FIDC detect or MAP senson	0 to 5V input
18	Green	22awg	Night driving dimming connection	+12V active
19	Yellow	22awg	To ground when tank is empty	0.25A maximum
20	Green	22awg	Common ground	0.25A maximum
21	Red	22awg	Priming P. relay +12V supply (0.5A FUSED)	0.5A maximum
22	Blue	22awg	Priming pump relay ground switch (active)	1A maximum
23	Red	18awg	+12V switched power supply for all	3A maximum
24	Black	18awg	0V ground supply for all	3A maximum
25	Blue	22awg	Optional System1s and FIA2 trigger	0.1A Maximum

GUARANTEE

ERL guarantees, at our option, to replace faulty goods supplied or repair the same, subject to the claim made in writing to us within 12 months after the sale by us, or for such other period as may be indicated by us for specific products in lieu of any warranty or condition implied by law as to the quality or fitness for any particular purpose of the goods.

Any claim against us must be made to us in writing within the period of 12 months after the sale by us , or our agents, or our distributors of goods in question (or such other period as may be indicated by us) and any goods to which the claim relates must be returned to us within that period suitably packaged and cleaned and, with any particular instructions which we may have notified to you at the time of supply. Original invoice, the nature of any claimed defect must accompany the goods in question prior to despatch to us.

If these requirements are not complied with our Guarantee shall not apply and we shall be discharged from all liability arising from the supply of defective goods.

LIABILITY

We shall not be under any liability whether in contract, or tort or otherwise and whether or not resulting from our negligence or that of our employees, in respect of defects in goods supplied or for any damage or loss resulting from such defects.

We shall not be under any liability for damage, loss of expense resulting from failures to give advice or information or giving the incorrect advice or information whether or not due to our negligence or that of our employees.

In no event shall any breach of contract on our part or tort (including negligence) or failure of any time on our part that of our employee give rise to liability for loss of revenue or consequential loss or damages arising from any cause whatsoever.

Note: ERL reserves the right to make changes to our products without notice in order to improve design performance and reliability.

THE END