

Spitronics ECU - General Purpose Outputs - Guide

Index

[Output Selected](#)
[Driver Output](#)
[Driver Output Colour](#)
[Driver Allocation by Firmware](#)
[Output Settings](#)
[Not Used](#)
[Min and Max](#)
[Output Active Between Min and Max](#)
[Output Active Outside Min and Max](#)
[Switching Dead Band](#)
[RPM Output Function](#)
[Vacuum Output Function](#)
[TPS Output Function](#)
[Water Temperature Output Function](#)
[Air Temperature Output Function](#)
[POT Value Output Function](#)
[Battery Voltage Output Function](#)
[Altitude Output Function](#)
[Fuel Pressure Output Function](#)
[Lambda Output Function](#)
[Timing Output Function](#)
[Injector Output Function](#)
[Output 2 - V-Tech TPS](#)
[V-Tech TPS Operation](#)
[V-Tech Application](#)
[Tacho Output](#)
[Pulses/RPM](#)
[Tacho Driver Output](#)
[Tacho Output Setup](#)
[General Purpose Adjustments](#)
[Hardware Connections](#)
[Relays and Solenoids](#)
[Realtime Testing](#)
[Common Problems](#)
[Setup Procedure](#)
[Setup Check](#)

General Purpose Outputs allow available ECU output drivers to be assigned to additional functions.

A General Purpose Output can switch an external device according to an ECU operating value such as:

- RPM.

- Vacuum.
- TPS.
- Coolant Temperature.
- Air Temperature.
- POT Value.
- Battery Voltage.
- Altitude.
- Fuel Pressure.
- Lambda.
- Timing.
- Injector time.

The output operates according to the configured **Min** and **Max** values.

Typical applications include:

- Cooling fans.
- Shift lights.
- Warning lamps.
- VVT or V-Tech solenoids.
- Auxiliary relays.
- Application-specific control functions.

Software Page

Open:

Features → Outputs

General Purpose Outputs

Output Selected Output 1

Driver Output **HV Negative Output 11**

Output Settings

RPM

Min 7300 (RPM) Max 9500 (RPM)

Tacho Output

Pulses/RPM  2

Driver Output **LV Negative Output 2**

General Purpose Adjustments

Auxiliary 1 255

Auxiliary 2 255

The page contains:

- Output Selected.
- Driver Output.
- Output Settings.
- Min.
- Max.
- Tacho Output.
- General Purpose Adjustments.

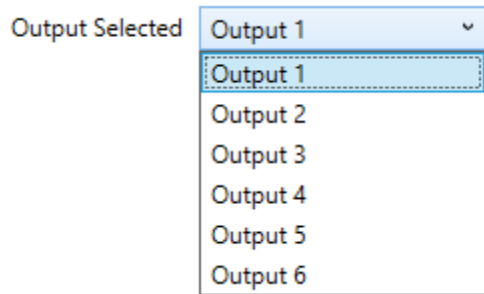
Some settings appear only when a particular Output or function is selected.

Output Selected

Output Selected determines which General Purpose Output is currently being configured. The number of available outputs may vary from 1 to 10 depending on the Product and firmware.

This software version provides:

- Output 1.
- Output 2.
- Output 3.
- Output 4.
- Output 5.
- Output 6.



Each Output can be configured separately.

Selecting another Output displays the settings and physical driver allocated to that Output.

[Back to Top](#)

Driver Output

Driver Output identifies the physical ECU driver currently allocated to the selected General Purpose Output.

Example:

HV Negative Output 11

or:

LV Negative Output 2

This information is important because General Purpose Outputs may move between physical drivers depending on:

- Firmware.
- Product.
- Enabled features.
- Driver priority.
- ECU configuration.

Do not assume that Output 1 always uses the same physical ECU pin on every firmware.

[Back to Top](#)

Driver Output Colour

The **Driver Output** displayed in Cosmos identifies the physical ECU driver allocated to the selected function.

The text colour provides an additional visual indication of the **driver type**.

Driver colour convention:

Colour	Driver Type	Typical Purpose
Black	Negative Output	General low-side switching output 40-100 V 6- 8A
Red	Positive Output	Positive/high-side switching output 28 – 60 V 5 – 12 A
Green	General Purpose Output	Driver allocated from the General Purpose output group 40V 3.5A
Blue	Coil Negative Output	High-current negative ignition-coil driver 300-500 V 9 - 42 8A
Purple	Combo Output	Multi-purpose driver capable of different functions depending on configuration – Pos or Neg driver any sort

[Back to Top](#)

Driver Allocation by Firmware

The firmware may allocate any suitable combination of available ECU drivers for General Purpose Outputs.

For this reason, always check the **Driver Output** shown in Cosmos and confirm that the allocated driver is suitable for the intended load.

Before connecting a device, verify:

- Driver type.
- Driver current rating.
- Product-specific wiring.
- Whether the load can be driven directly or requires a relay or external driver.

Inductive Loads

Inductive loads such as:

- Relays.
- Solenoids.
- Valves.
- Motors.

can generate a voltage spike when switched off.

A suitable **freewheel diode** must therefore be fitted across the inductive load where required by the installation.

High-Current Loads

High-current devices such as cooling fans must normally **not** be driven directly from the ECU.

Use a suitable relay or external power driver.

Typical arrangement:

ECU GP Output → Relay Coil → Relay Contacts → Fan

The relay coil is itself an inductive load and should also have a suitable freewheel diode fitted across the coil.

Important

Always refer to the applicable Product wiring drawings for:

- Correct connection.
- Driver polarity.
- Relay wiring.
- Freewheel diode orientation.
- Maximum driver current.

Do not select a GP Output based only on the function name. The firmware determines which physical driver is allocated, and the electrical capability of that driver must match the load.

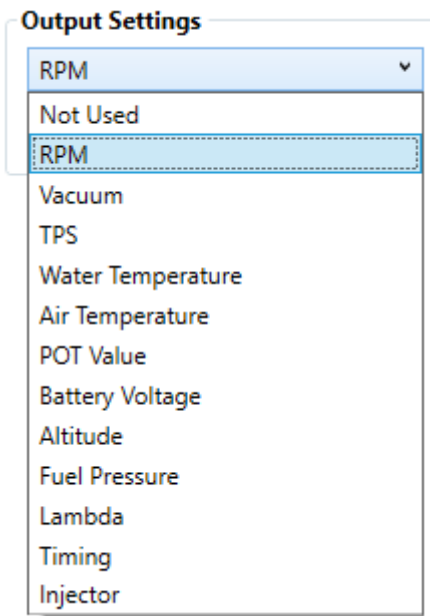
[Back to Top](#)

Output Settings

The **Output Settings** dropdown determines which ECU operating value controls the selected output.

This software version includes:

- Not Used.
- RPM.
- Vacuum.
- TPS.
- Water Temperature.
- Air Temperature.
- POT Value.
- Battery Voltage.
- Altitude.
- Fuel Pressure.
- Lambda.
- Timing.
- Injector.



Where the software label uses Water Temperature, current documentation refers to the engine value as Coolant Temperature / Water Temperature to avoid confusion.

[Back to Top](#)

Not Used

Select:

Not Used

when the General Purpose Output is not required.

This prevents an unused output from performing an unintended function.

[Back to Top](#)

Min and Max

Most General Purpose Output functions use two limits:

- Min.
- Max.

The output logic depends on the relationship between these two values.

The ECU compares the selected operating value with the configured limits and switches the output accordingly.

[Back to Top](#)

Output Active Between Min and Max

When:

Min < Max

the output is normally active **between the two values**.

Example:

- Min = 5000 RPM.
- Max = 7000 RPM.

The output switches ON as RPM rises through the lower limit and switches OFF after the upper limit is passed.

This is useful for functions such as a shift-light operating window.

[Back to Top](#)

Output Active Outside Min and Max

If the Min and Max values are reversed:

Min > Max

the output logic is reversed.

The output is then OFF between the limits and active outside the configured window.

This provides a flexible way of creating either:

- An operating window.
- An exclusion window.

[Back to Top](#)

Switching Dead Band

The output switching includes a small amount of hysteresis or dead band.

This prevents the output from repeatedly switching ON and OFF when the measured value is sitting very close to the configured limit.

For example, an RPM-controlled output should not chatter rapidly if engine speed moves slightly around the switching point.

This is particularly important when controlling:

- Relays.

- Solenoids.
- Warning lamps.
- Cooling fans.

[Back to Top](#)

RPM Output Function

Select:

Output Settings → RPM

when the General Purpose Output must respond to engine speed.

Example:

- Min = 7300 RPM.
- Max = 9500 RPM.

Output Settings

RPM ▼

Min (RPM) Max (RPM)

Possible applications include:

- Shift light.
- RPM warning.
- Auxiliary control.
- RPM-dependent solenoid.

[Back to Top](#)

Vacuum Output Function

Select:

Vacuum

when the output must respond to manifold pressure or engine load.

Possible applications include:

- Load warning.
- Vacuum-operated auxiliary control.
- Turbo-related external devices.
- Application-specific relay control.

The correct operating values depend on how the software represents the MAP/Vacuum signal.

[Back to Top](#)

TPS Output Function

Select:

TPS

when the output must respond to throttle position.

Possible applications include:

- Full-throttle indication.
- Auxiliary enrichment hardware.
- Load-dependent switching.
- VVT-related control where appropriate.

The Min and Max values are expressed as throttle percentage.

[Back to Top](#)

Water Temperature Output Function

Select:

Water Temperature

when the output must respond to engine Coolant Temperature.

A common application is an electric cooling fan.

A practical cooling-fan example is:

- Fan ON above 98°C.
- Fan OFF below 92°C.

as an example of a 6°C switching band.

The actual temperatures must be selected for the engine and cooling system.

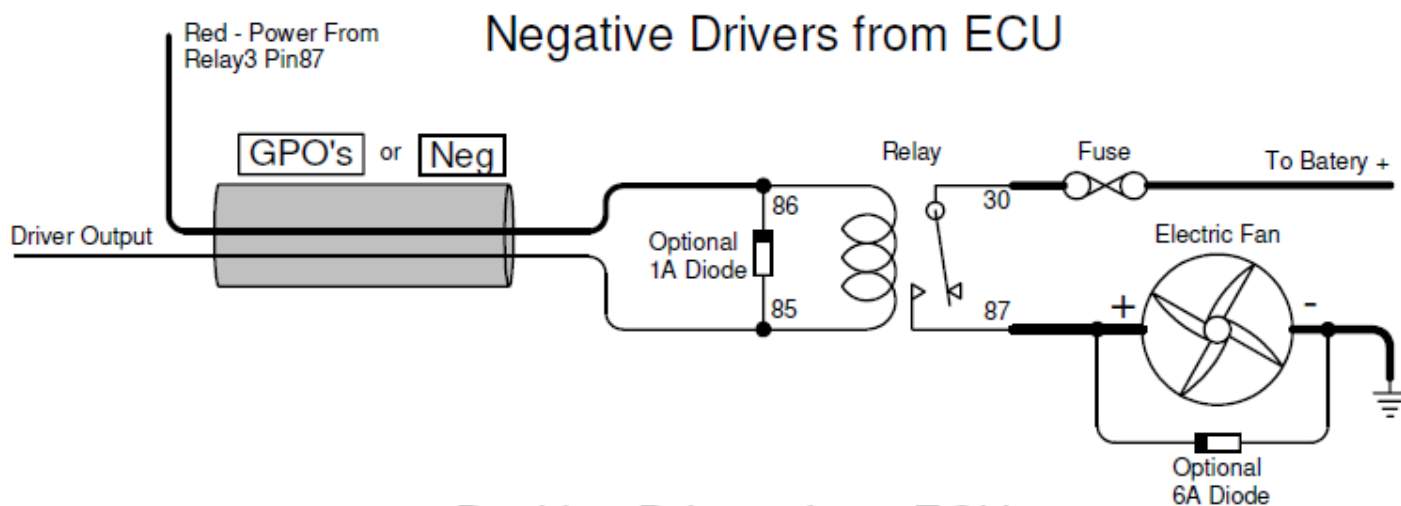
Cooling Fan Example

Typical principle:

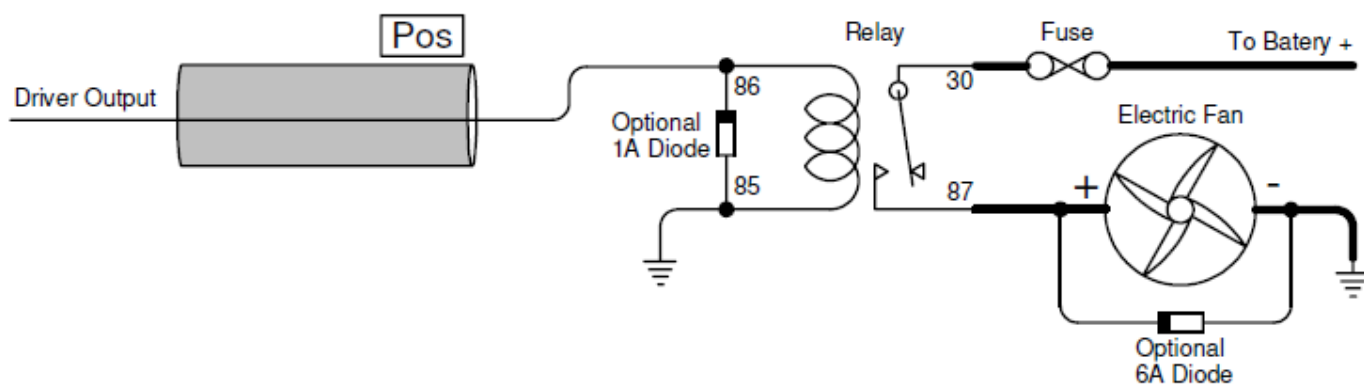
Max = Fan ON temperature

Min = Fan OFF temperature

This creates a temperature difference between switching ON and OFF and prevents relay chatter.



Positive Drivers from ECU



[Back to Top](#)

Air Temperature Output Function

Select:

Air Temperature

when the output must respond to Intake Air Temperature.

Possible applications include:

- Warning lamp.
- Cooling device.
- Intercooler spray system.
- Application-specific protection.

[Back to Top](#)

POT Value Output Function

Select:

POT Value

when the output must respond to the Adjustment POT position.

This can be useful for application-specific driver controls where a physical POT is used to select or vary another function.

[Back to Top](#)

Battery Voltage Output Function

Select:

Battery Voltage

when an auxiliary output must respond to electrical-system voltage.

Possible uses include:

- Low-voltage warning.
- High-voltage warning.
- Auxiliary load control.

Do not use this as a substitute for correcting a charging-system fault.

[Back to Top](#)

Altitude Output Function

Select:

Altitude

when the output must respond to Barometric Pressure.

This allows an auxiliary device to operate differently according to ambient pressure or altitude.

[Back to Top](#)

Fuel Pressure Output Function

Select:

Fuel Pressure

when the output must respond to the Fuel Pressure input.

Possible applications include:

- Fuel-pressure warning.
- Auxiliary pump control.
- External safety relay.

The Fuel Pressure input must first be correctly configured and calibrated.

[Back to Top](#)

Lambda Output Function

Select:

Lambda

when the output must respond to the Lambda input value.

Possible applications include:

- Rich or lean warning.
- Logging indication.
- Auxiliary protection strategy.

The Lambda input must be correctly configured before using it to control an output.

[Back to Top](#)

Timing Output Function

Select:

Timing

when the output must respond to the current ignition timing value.

This is generally an application-specific function.

[Back to Top](#)

Injector Output Function

Select:

Injector

when the output must respond to calculated injector time.

Possible applications include:

- Injector-load warning.
- Auxiliary fuel-system control.
- Application-specific switching.

Use the displayed software values when configuring the Injector output function.

[Back to Top](#)

Output 2 - V-Tech TPS

Output 2 is a special case.

When:

Output Selected = Output 2

and the applicable RPM function is selected, an additional setting becomes visible:

V-Tech TPS

Output Selected

Driver Output **HV Negative Output 12**

Output Settings

RPM

Min

800

(RPM)

Max

4000

(RPM)

V-tech TPS

20

(%)

This setting is not displayed for the other General Purpose Outputs.

[Back to Top](#)

V-Tech TPS Operation

The V-Tech output uses both:

- RPM operating window.
- Minimum TPS requirement.

Example:

- Min RPM = 800 RPM.
- Max RPM = 4000 RPM.
- V-Tech TPS = 20%.

The output will operate according to the RPM window only when TPS is above the configured V-Tech TPS value.

Conceptually:

RPM condition valid

AND

TPS above V-Tech TPS

→ Output active.

This allows a solenoid to be controlled only when both engine speed and driver demand satisfy the required conditions.

[Back to Top](#)

V-Tech Application

The additional TPS condition can be useful for:

- V-Tech solenoid operation.
- Variable intake switching.
- Application-specific cam control.
- Other functions requiring RPM plus throttle-load qualification.

Do not assume Output 2 must always be used for V-Tech.

It remains a General Purpose Output; the additional V-Tech TPS setting is simply an extra capability available on this output.

[Back to Top](#)

Tacho Output

The Outputs page also contains a separate:

Tacho Output

section.

This is not one of the six normal General Purpose Output functions.

The Tacho Output generates an engine-speed signal for equipment such as:

- Rev counter.
- Instrument cluster.
- External RPM device.

[Back to Top](#)

Tacho Output
Pulses/RPM  
Driver Output **LV Negative Output 2**

Pulses/RPM

Pulses/RPM determines the number of output pulses generated for the tachometer signal.

This allows the ECU output to be matched to different instrument clusters and rev counters.

The correct value is the one that makes the external tachometer display the same RPM as the ECU Realtime RPM.

[Back to Top](#)

Tacho Driver Output

The software displays the physical driver allocated to the Tacho Output.

Example:

LV Negative Output 2

As with General Purpose Outputs, always confirm:

- Driver type.
- Driver number.
- Product wiring.
- Current capability.

The warning symbol next to **Pulses/RPM** indicates that this setting affects important hardware/output behaviour.

[Back to Top](#)

Tacho Output Setup

The **Tacho Output** provides an RPM-related signal for devices such as:

- Rev counters.
- Instrument clusters.
- OEM ECUs.
- Other RPM-dependent equipment.

Pulses/RPM

Pulses/RPM sets the number of output pulses per engine revolution and is used to calibrate external tachometers.

Version 1.2 firmware supports values from 1 to 60 pulses per revolution.

Crank Signal Mimic

On supported firmware, the RPM Output can also reproduce the ECU's crank-angle signal. This is useful when the OEM ECU must remain operational.

Instead of tapping directly into the Crank Sensor wiring:

Crank Sensor → Spitronics ECU → Recreated Crank Signal → OEM ECU

This avoids loading or disturbing the original Crank Sensor circuit.

Version 1.2 firmware uses the special value 61 to enable this function.

Important

The recreated signal must still be electrically compatible with the receiving ECU.

Check:

- Driver type.
- Signal polarity.
- Pull-up requirements.
- Required voltage level.
- Product wiring.

On supported firmware, setting Pulses/RPM = 0 can disable the Tacho Output and free the driver for another function.

[Back to Top](#)

General Purpose Adjustments

The page also provides:

- Auxiliary 1.
- Auxiliary 2.

under:

General Purpose Adjustments

General Purpose Adjustments

Auxiliary 1	255	 
Auxiliary 2	255	 

These are application-specific auxiliary values and are normally hidden unless the firmware requires them.

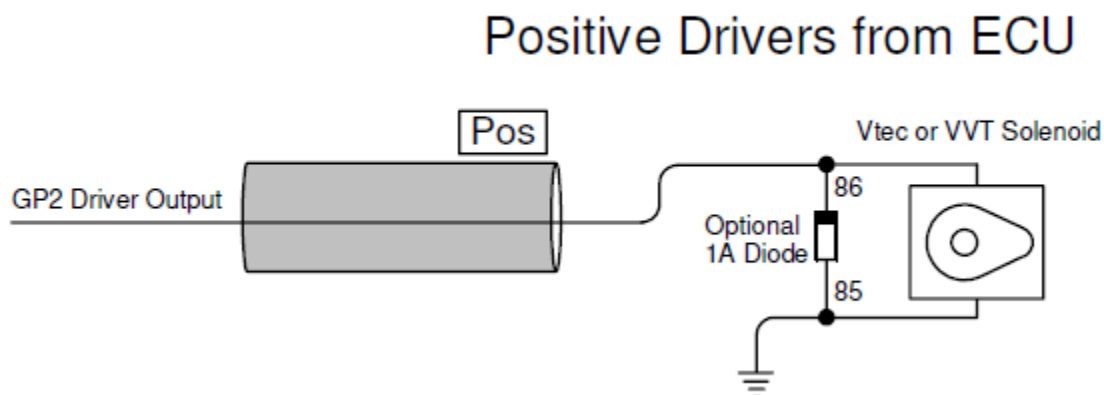
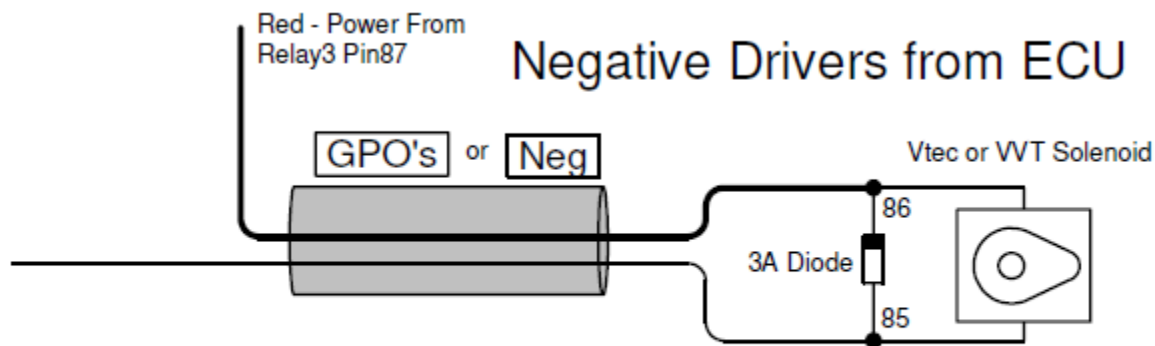
[Back to Top](#)

Hardware Connections

The electrical connection depends on the physical driver allocated to the output.

Typical loads may include:

- Relay.
- Lamp.
- Solenoid.
- Electronic input.



For this reason:

Use the Driver Output shown in the software together with the applicable Product Pin Layout.

Do not rely on a fixed pin number from another firmware or application.

[Back to Top](#)

Relays and Solenoids

General Purpose Outputs are commonly used to control relays and solenoids.

When controlling an inductive load, ensure the wiring includes the required suppression arrangement.

Do not assume that every ECU output can directly drive every solenoid.

Check:

- Driver type.
- Driver current capability.
- Load resistance/current.
- Product-specific wiring requirements.

Realtime Testing

After configuring a General Purpose Output:

1. Connect the ECU to Cosmos.
2. Observe the controlling Realtime value.
3. Move the operating value through the configured Min and Max limits.
4. Verify the physical output switches at the expected points.
5. Verify the load operates correctly.

Where practical, test the output under controlled conditions before relying on it during normal vehicle operation.

Common Problems

Symptom	Possible Cause	Check
Output does nothing	Output set to Not Used	Check Output Settings
Output operates wrong device	Wrong Driver Output wiring	Check displayed driver index
Relay always ON	Min/Max logic reversed	Check limit order
Relay operates outside desired range	Min and Max swapped	Verify operating window
Output chatters near limit	Too little operating margin	Increase dead band
Output 2 behaves differently	V-Tech TPS active	Check TPS requirement
V-Tech output does not operate	TPS below V-Tech setting	Check Realtime TPS
Fan does not switch off	Min set too high	Check fan hysteresis
Tacho reads double/half RPM	Incorrect Pulses/RPM	Recalibrate
Driver shown in software changes	Firmware/feature allocation changed	Use current Driver Output indication
Positive-driver load wired as negative	Wrong driver assumption	Check driver colour/type
Auxiliary value has unexpected effect	Firmware uses Auxiliary 1/2	Check application documentation

Setup Procedure

For a new General Purpose Output:

1. Open **Features** → **Outputs**.
2. Select the required Output.
3. Note the displayed Driver Output.

4. Confirm whether the driver is Positive or Negative.
5. Select the required Output Setting.
6. Enter Min and Max values.
7. If using Output 2 V-Tech operation, set V-Tech TPS.
8. Wire the load according to the displayed driver.
9. Verify the driver current capability.
10. Test the switching logic.
11. Confirm operation at both limits.
12. Save the Tune.

[Back to Top](#)

Setup Check

Before considering a General Purpose Output complete, verify:

- ☐ Correct Output number selected.
- ☐ Driver Output noted.
- ☐ Positive or Negative driver type confirmed.
- ☐ Product pinout matches the displayed driver.
- ☐ Output Settings function is correct.
- ☐ Min value is correct.
- ☐ Max value is correct.
- ☐ ON-inside or ON-outside logic is understood.
- ☐ Suitable dead band is present.
- ☐ Output 2 V-Tech TPS is configured where required.
- ☐ Load current is within driver capability.
- ☐ Relay or suppression components are fitted where required.
- ☐ Physical output has been tested.
- ☐ Tacho Pulses/RPM is correct where used.
- ☐ Auxiliary values have not been changed without application instructions.

[Back to Top](#)