

Spitronics - Installation Safety and Wiring Precautions - Guide

This guide contains the general safety, wiring and installation requirements that apply when installing Spitronics electronic products.

These precautions apply to products such as ECUs, transmission controllers, electronic throttle controllers, standalone controllers, driver modules and other Spitronics electronic devices.

Always use the applicable product Pin Layout, connection drawings and product documentation together with this guide.

Incorrect installation or wiring may damage the Spitronics device, vehicle wiring, engine, transmission or connected components.

Installation Safety

Use automotive-grade wiring, terminals, connectors and installation methods suitable for the current and environment involved.

Use the correct wire size for each circuit. Undersized wiring can cause voltage drop, overheating and possible fire.

Protect circuits with correctly rated fuses. Where practical, protect individual high-current circuits separately rather than using one oversized fuse for several circuits.

Keep wiring away from exhaust components, sharp edges, moving components and other sources of heat or mechanical damage.

Allow sufficient movement between the engine, transmission and vehicle body so that movement cannot pull on the harness.

Make sure the harness is supported and cannot rub against sharp edges or moving components.

Power Supply

Supply high-current power circuits directly from battery positive through correctly rated fuses and relays where required.

Do not supply high-current circuits through the ignition switch. The ignition switch should normally control the appropriate relay rather than carry the full operating current of the connected equipment.

Ensure that battery terminals, alternator connections and power connections are clean and secure.

Connect the alternator charging cable directly to the battery positive connection as required by the vehicle electrical system. Avoid routing alternator charging current through Spitronics harness supply wiring.

Never disconnect the battery while the engine is running. Alternator voltage spikes may damage Spitronics devices and other electronic equipment.

Earth Connections

Correct earth wiring is essential for reliable operation of electronic control systems.

Ensure good heavy-current earth connections between:

- Battery negative and engine.
- Battery negative and chassis.

Do not rely on the engine-to-body connection as the only heavy-current return path.

Spitronics device earth connections must be made according to the applicable connection drawing.

Earth connections must be clean and secure. Remove paint, corrosion or anodising from the connection surface where required.

Sensor Earth connections must be connected according to the applicable Spitronics wiring documentation. Do not assume that any convenient chassis earth can be substituted for Sensor Earth.

Where more than one electronic controller shares signals, ensure that the controllers have a suitable common earth reference as specified in the applicable documentation.

Never switch power on if the required earth connections are not properly connected.

Fuses

Use the smallest fuse rating that will reliably carry the normal operating current of the circuit.

An oversized fuse may allow excessive current to flow long enough to damage wiring, electronic drivers or connected components before the fuse opens.

Where practical, protect separate high-current loads individually or in appropriate groups.

The fuse is primarily there to protect the wiring and connected equipment. Never increase a fuse rating simply because the existing fuse repeatedly fails. Find the cause of the excessive current first.

Relays

Verify the terminal numbering and internal connection of every relay against the applicable wiring drawing. Relays with similar housings may have different internal contact arrangements.

Make sure the relay contact current rating is suitable for the connected load.

Where required, fit flyback or free-wheel diodes to external relay coils to suppress switching voltage spikes.

When fitting a diode across a relay coil, connect the stripe side of the diode towards the positive side of the relay coil.

Inputs and Sensors

Connect sensors, switches and other inputs according to the applicable Spitronics connection drawings.

Do not assume that sensors or switches with similar connectors have the same pin arrangement.

Sensor supply and Sensor Earth connections must not be substituted with unrelated vehicle power or earth connections unless specifically documented.

Never apply a voltage to an input that exceeds the permitted input voltage for that device.

When sharing a sensor signal with an OEM ECU or another controller, follow the applicable Spitronics Tap-In instructions.

Do not connect an input directly to ignition-coil negative or another high-voltage switching signal unless the input is specifically designed and documented for that purpose. Coil-negative switching can produce voltage spikes capable of damaging a normal electronic input.

Where a two-wire temperature sensor is specified, use an isolated two-wire sensor with its earth returning to the appropriate ECU or controller earth system.

Do not tap into a single-wire vehicle gauge-type temperature sender.

Outputs and Connected Loads

Before connecting an output, identify the type of load and confirm that the output is designed to control it.

Check the applicable product documentation for:

- Output type.
- Maximum current.
- Required external driver or relay.
- Required flyback protection.
- Whether the output switches positive or negative.

Do not assume that two outputs with similar software functions have the same electrical capability.

Never connect a load that exceeds the specified rating of the output.

Where an external driver, relay or protection component is specified, it forms part of the required installation and must not be omitted.

Specific information for ignition coils, injectors, solenoids, motors and other controlled devices is covered in the relevant product or function manual.

Electrical Interference

Keep sensitive input wiring away from ignition coils, high-tension leads, alternator wiring, starter wiring, motors, solenoids and other sources of electrical interference.

Crank, cam, speed and other frequency or timing signals are particularly sensitive to electrical interference.

Where sensitive wiring must cross ignition or other high-current wiring, cross the wires as close to a right angle as practical rather than running them parallel.

Connect screened wiring only as shown in the applicable Spitronics connection drawing.

Do not connect input cable screens to the engine unless specifically instructed. Starter current may find a return path through incorrectly connected screen wiring, and an engine-side screen connection may introduce electrical interference into the controller.

Keep the unscreened section of sensitive signal wiring as short as practical.

Terminals and Connections

Use the correct automotive crimping tool for the terminal and wire size wherever possible.

A correctly made crimp provides a strong and reliable connection while allowing the wire to remain flexible.

After crimping, perform a firm pull test to confirm that the terminal is securely attached.

Avoid inserting oversized multimeter probes into connector terminals. This can spread or damage the terminal and cause intermittent connections. Probe from an appropriate test point or gently contact the terminal without deforming it.

If the correct crimping tools or terminals are not available, the connection may be soldered.

Make sure a soldered joint is mechanically secure, properly insulated with heat-shrink tubing and supported so that vibration cannot repeatedly flex the wire where the solder ends.

Avoid allowing solder to travel too far along the wire. This creates a rigid section where vibration can eventually cause the wire to break.

Wire Splicing

For joining wires in a harness, a correctly sized automotive crimp splice is the preferred method when the proper crimping equipment is available.

Where suitable crimping equipment is not available, wires may be soldered together and insulated with heat-shrink tubing.

Stagger multiple joints in the harness where practical so that they do not all lie next to each other. This reduces harness thickness and reduces the possibility of adjacent joints shorting together.

Do not use Vampire Taps or unsuitable quick-splice connectors on Spitronics wiring or critical vehicle circuits. These connectors can create poor connections or damage the conductor when used on an unsuitable wire size.

Harness Routing and Strain

Do not pull wires tight at controller, sensor or actuator connectors.

Provide sufficient slack for engine, transmission and vehicle movement without allowing the harness to contact hot, sharp or moving components.

Secure the harness so that the weight of the wiring is not carried by connector terminals.

Pay particular attention to wiring between the engine or transmission and vehicle body. Continuous movement can cause metal fatigue and eventual wire failure.

Do not cable-tie wiring tightly to ignition leads, starter cables or other high-current wiring.

Welding and Electrical Work

Before welding on the vehicle, disconnect the battery and electronic controllers as recommended for the vehicle and equipment being used.

Position the welding earth clamp as close as practical to the area being welded. Do not allow welding current to use the engine, transmission, ECU wiring or electronic controller earth wiring as its return path.

Take similar precautions when using battery chargers, boosters or other high-current electrical equipment.

For jump-starting procedures, refer to the applicable **Spitronics - Safe Jump Start - Quick Guide**.

Before First Power-Up

Once the installation is complete, inspect the complete installation before applying power.

Check:

- ☐ Power supply wiring is correct.
- ☐ Battery, engine and chassis earth connections are secure.
- ☐ Device earth connections are correct.
- ☐ Fuse ratings are correct.
- ☐ Relay wiring and terminal numbers are correct.
- ☐ Jumper settings are correct where applicable.
- ☐ Sensors and input signals are connected to the correct inputs.
- ☐ Outputs are connected only to suitable loads.
- ☐ External drivers or relays are fitted where required.
- ☐ Sensitive signal wiring is routed away from electrical interference.
- ☐ Harnesses are secured away from heat, sharp edges and moving components.
- ☐ Connectors and terminals are properly seated and locked.
- ☐ Installation agrees with the applicable Spitronics Pin Layout and connection drawings.

Only after these checks have been completed should power be applied to the device.

Follow the applicable product startup or setup procedure before operating the engine, transmission or controlled system.
