

— REFERENCE

Wiring & Pinouts

Every pin, wire colour and lead label on the three harnesses, the vehicle's OBD-II socket, and wiring diagrams for the loads and sensors people fit most often.



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Wiring & pinouts

Every pin, wire colour and lead label on the three FusionDrive harnesses, how the plugs are numbered, and typical wiring diagrams for the loads and sensors people fit most often.

FD Design LS · Rev A-LS harness reference For installation steps see the [installation guide](#)

**WARNING**

Work with the battery disconnected. Fuse every load. Never apply 12 V to a sensor input, never connect always-on power to the IGN lead, and validate the actual load, cable, fuse and thermal capability. Nominal lead markings are not continuous-current qualification. Values not listed here are in the [specifications](#).

1 The connector face



Left to right: service port · OBD port (Harness A) · sensor port (Harness C) · power & outputs port (Harness B) · boost barb.

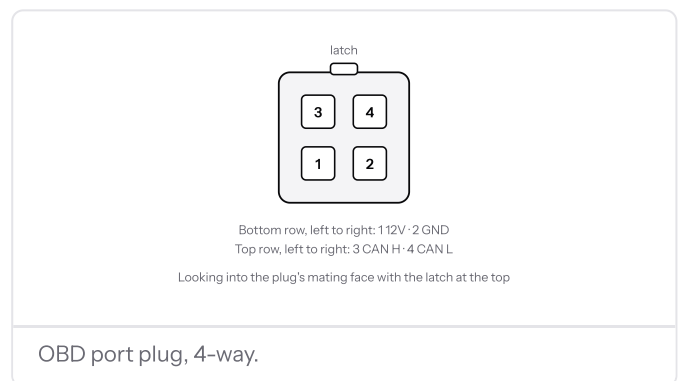
Port	Ways	Harness	Carries
Service port	—	none	Workshop and support use only. Not needed for installation or updates.
OBD port	4	Harness A (1.5 m)	Vehicle 12 V, ground, vehicle CAN bus (CAN 1)
Sensor port	8	Harness C (0.5 m)	Six 0–5 V inputs, 5 V sensor supply, sensor ground
Power & outputs port	12	Harness B (0.5 m)	Battery feed, two grounds, ignition sense, CAN 2, OUT 1–4, AUX 1–2

Port	Ways	Harness	Carries
Boost barb	—	2 mm hose	Manifold pressure to the built-in boost/vacuum sensor (to 60 psi). Barb is about 2 mm across; use 2 mm bore silicone hose.

2 Conventions used on this page

- Pin numbers** are the positions in the harness plug as shown in each connector diagram, looking into the plug's mating face with the latch at the top: the bottom row is numbered left to right first, then the top row.
- Lead labels** are printed on a heat-shrink sleeve 20 mm from the end of every flying lead. Check the label against the connector position and the LS pin map before connecting it. Stop and resolve any colour or label mismatch; do not use a current marking as proof of continuous load capability.
- Wire gauges** are given in AWG with the cross-section in mm². When extending a lead, use the same gauge or heavier.
- All harness wire is thin-wall automotive grade rated to 125 °C.

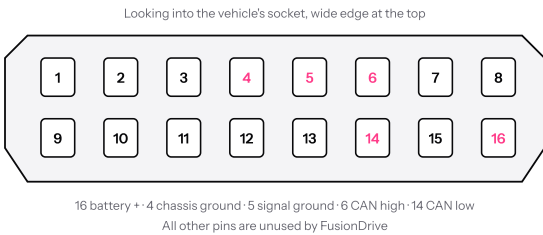
3 Harness A — OBD-II 1.5 M



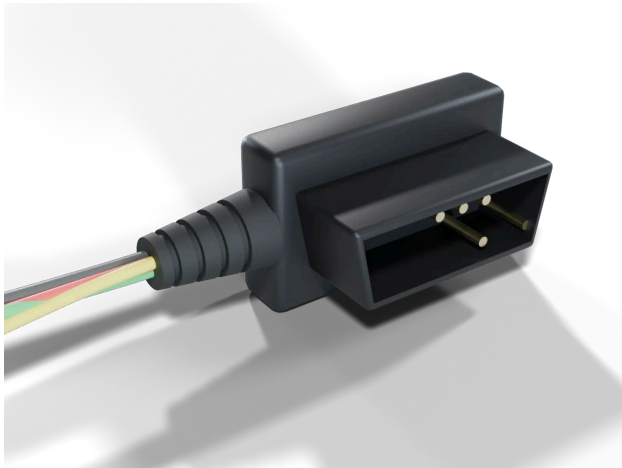
Pin	Function	Colour	Gauge	Vehicle OBD-II socket pin	Notes
1	Vehicle 12 V	red	18 AWG (0.8 mm ²)	16	Battery power from the OBD socket. Protected by a 2 A self-resetting device in the controller.
2	Ground	black	18 AWG (0.8 mm ²)	4 (and 5)	Chassis and signal ground are linked inside the plug.
3	CAN high	yellow	20 AWG (0.5 mm ²)	6	Twisted pair with pin 4.
4	CAN low	green	20 AWG (0.5 mm ²)	14	Twisted pair with pin 3.

Harness A is fully terminated at both ends; there is nothing to wire. If your vehicle's OBD socket is not powered with the key off, the controller will only be awake with the ignition on unless you also fit the dedicated feed. Vehicles whose diagnostic socket does not use CAN on pins 6 and 14 will power the controller but will not provide vehicle data; use the **IGN** lead for a verified ignition state. Ignition on does not prove that the engine is running.

The vehicle's OBD-II socket



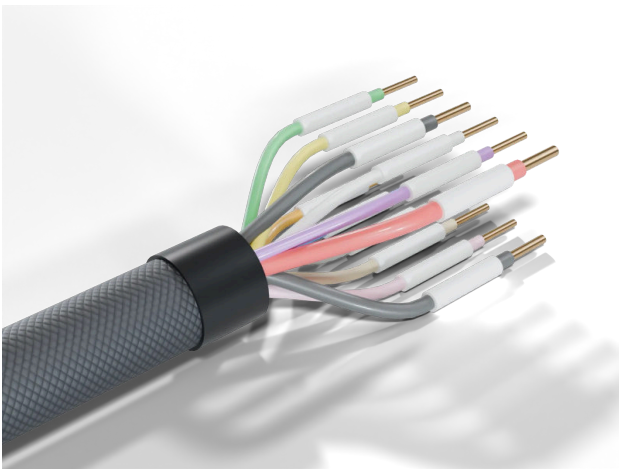
The vehicle's OBD-II socket. FusionDrive uses the five pins highlighted; the plug on Harness A has no contacts in the other positions.



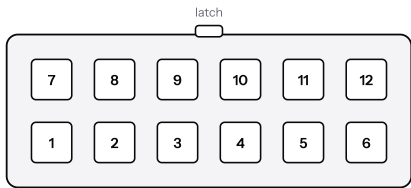
The OBD-II plug on Harness A. Only the five positions FusionDrive needs carry a contact.

Socket pin	Vehicle signal	Harness A wire	What FusionDrive does with it
16	Battery positive, usually always on	 red	Powers the controller (2 A self-resetting protection). Most vehicles fuse this pin at 7.5–15 A together with the cigarette lighter or radio.
4	Chassis ground	 black	Controller ground. Pins 4 and 5 are linked inside the plug, so either one grounds the controller.
5	Signal ground		
6	CAN high	 yellow	Supported vehicle data and fault-code services, with wake-on-traffic where configured. Available parameters depend on the vehicle ECU.
14	CAN low	 green	

4 Harness B — Power & outputs 0.5 M



Twelve labelled leads. Check LS output type and pin number as well as the nominal lead marking.



Bottom row, left to right: 1 BATT+ - 2 AUX1 - 3 IGN - 4 GND - 5 CAN2 H - 6 CAN2 L
Top row, left to right: 7 GND - 8 AUX2 - 9 OUT4 - 10 OUT3 - 11 OUT2 - 12 OUT1
Looking into the plug's mating face with the latch at the top

Power & outputs port plug, 12-way.

Pin	Lead label	Function	Colour	Gauge	Rating / range	Notes
1	BATT+ 30A	Dedicated battery feed	 red	12 AWG (3.3 mm ²)	12 V feed; 30 A fused path	Dedicated battery positive through a correctly sized battery-end fuse, no larger than the 30 A path limit. Required for OUT1–4. LS Rev A can falsely indicate feed presence when unplugged; verify the actual supply.
2	AUX1 LS 1A	Low-side auxiliary output 1	 violet	16 AWG (1.3 mm ²)	Ground-switching sink, nominal 1 A-class, PWM	Connect a compatible load between its fused +12 V supply and AUX1. Requires common ground, correct suppression and validated power sequencing. Does not supply 12 V.
3	IGN	Ignition sense	 white	16 AWG (1.3 mm ²)	12 V in, sense only	Ignition-switched 12 V sense/wake input. Configure and verify ignition-dependent logic. Not a physical OUT1–4 supply interlock; never wire permanent battery positive here.
4	GND	Ground	 black	14 AWG (2.1 mm ²)	Power ground / return	Chassis ground. Connect both GND leads (pins 4 and 7).
5	CAN2 H	CAN 2 high	 yellow	16 AWG (1.3 mm ²)	CAN bus	Separate CAN2 interface for compatible accessories; not internally bridged to CAN1 and not a claim of galvanic isolation. Start listen-only; verify bitrate, termination and signal definitions. Twisted pair with pin 6.
6	CAN2 L	CAN 2 low	 green	16 AWG (1.3 mm ²)	CAN bus	Twisted pair with pin 5.
7	GND	Ground	 black	14 AWG (2.1 mm ²)	Power ground / return	Chassis ground. Second return path; must be connected.
8	AUX2 LS 1A	Low-side auxiliary output 2	 pink	16 AWG (1.3 mm ²)	Ground-switching sink, nominal 1 A-class, PWM	As AUX1.
9	OUT4 10A	Output 4	 tan	16 AWG (1.3 mm ²)	High-side 12 V PWM; designed for 10 A	Positive-side output from the dedicated feed. Shares the 30 A fused path; actual load and thermal capability require validation.
10	OUT3 10A	Output 3	 grey	16 AWG (1.3 mm ²)	High-side 12 V PWM; designed for 10 A	Positive-side output from the dedicated feed. Shares the 30 A fused path; actual load and thermal capability require validation.
11	OUT2 10A	Output 2	 blue	16 AWG (1.3 mm ²)	High-side 12 V PWM; designed for 10 A	Positive-side output from the dedicated feed. Shares the 30 A fused path; actual load and thermal capability require validation.

Pin	Lead label	Function	Colour	Gauge	Rating / range	Notes
12	OUT1 10A	Output 1	orange	16 AWG (1.3 mm ²)	High-side 12 V PWM; designed for 10 A	Positive-side output from the dedicated feed. Shares the 30 A fused path; actual load and thermal capability require validation.



OUTPUT CURRENT

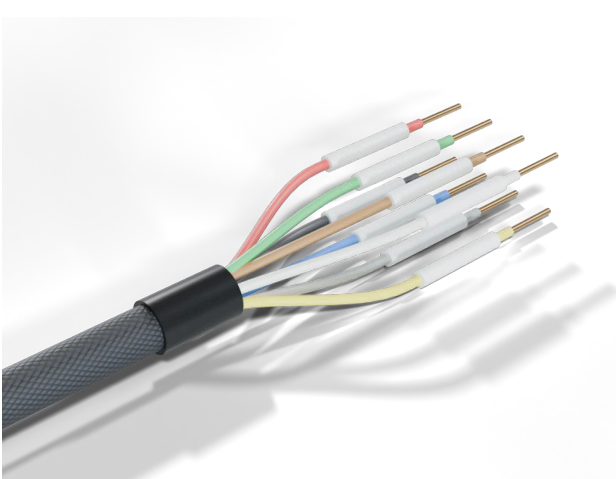
OUT1–4 have built-in high-side PWM power drivers designed for 10 A each, sharing a 30 A fused power path. Compatible loads connect directly; no extra driver is needed within their electrical requirements. Check running and start/stall current, wiring, connectors, fuse protection, cooling and enclosure temperature for the actual installation; reduce the load or use a suitable external driver where needed. Do not plan four 10 A loads at once. AUX1–2 are nominal 1 A-class low-side sinks. The load connects from fused +12 V to AUX, with a common power ground. OUT1–4 instead connect to load positive; load negative returns to ground. Neither output type is an isolated contact.

On the LS Rev A assembly, an unplugged dedicated feed can backfeed the load rail and produce a false feed indication or an unstable heavy-output supply. Fit the dedicated fused feed before using OUT1–4. Verify it at J6 pin 1 with a meter; the app or LED alone is not proof. Software cannot correct this power-path issue.

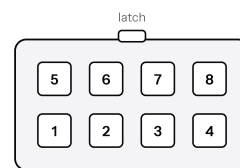
IGN is a sense/wake input, not a physical load–power interlock. Configure and test key-off output behaviour. Choose compatible inductive suppression using the separate high-side and low-side examples below.

The supplied wire gauges do not establish the current capability of the board, connector or installed assembly. Validate the complete path, including start/stall current and heat. Controllers, EBC triggers and automations share six channels: there are four heavy outputs and two small AUX sinks, not six interchangeable power drivers.

5 Harness C — Sensor inputs

0.5 M

Eight labelled leads, all 20 AWG.



Bottom row, left to right: 1 IN1·2 IN2·3 IN3·4 +5V OUT
Top row, left to right: 5 IN4·6 IN5·7 IN6·8 GND
Looking into the plug's mating face with the latch at the top

Sensor port plug, 8-way.

Pin	Lead label	Function	Colour	Gauge	Range	Notes
1	IN1	Input 1	 white	20 AWG (0.5 mm ²)	0–5 V	Analog or level/switch. App name: IN1.
2	IN2	Input 2	 brown	20 AWG (0.5 mm ²)	0–5 V	App name: IN2.
3	IN3	Input 3	 green	20 AWG (0.5 mm ²)	0–5 V	App name: IN3.
4	+5V OUT	Sensor supply	 red	20 AWG (0.5 mm ²)	5 V out; keep combined sensor draw below $\approx$ 500 mA	For compatible 5 V sensors; shares the board rail. Allow margin. Not for pumps, lamps, relays or wideband heaters.
5	IN4	Input 4	 yellow	20 AWG (0.5 mm ²)	0–5 V	App name: IN4.
6	IN5	Input 5	 grey	20 AWG (0.5 mm ²)	0–5 V	App name: IN5.
7	IN6	Input 6	 blue	20 AWG (0.5 mm ²)	0–5 V	App name: IN6.
8	GND	Sensor ground	 black	20 AWG (0.5 mm ²)	—	Reference for all sensors. Do not use as a load return.

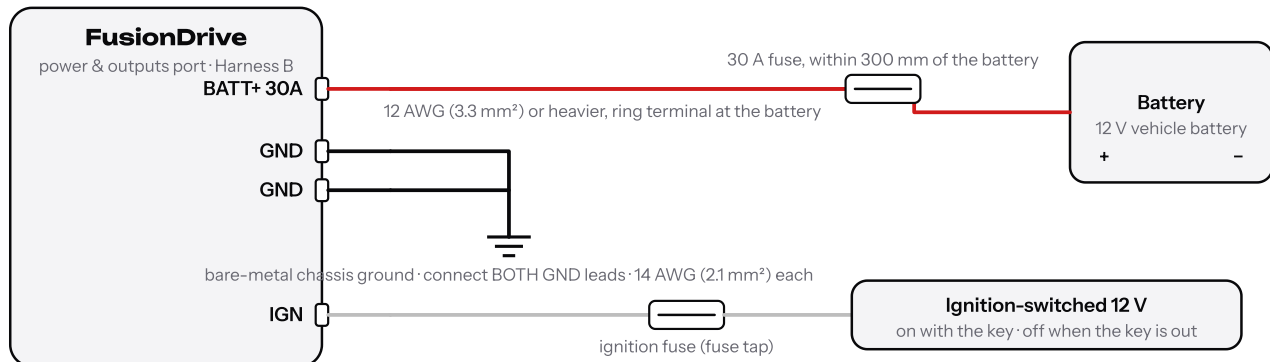
Input behaviour

- **Voltage compatibility:** inputs accept conditioned 0–5 V signals. Never connect 12 V, a coil/ignition signal or a negative-going signal directly. Input clamps are not permission to miswire; an overvoltage or transient can damage the controller or the connected sensor.
- **Zero is a reading, not a diagnosis:** an open input tends toward 0 V, but 0 V may also be a valid sensor value. A zero reading, freshness flag or app label does not prove a wire is intact. Check the sensor's documented failure voltages and test the chosen fault response.
- **Calibration:** analog inputs use the voltage/value calibration you set. Presets are starting points; enter the correct units, range and calibration from the actual sensor or conditioner.
- **Level/switch mode:** the default threshold is 2.5 V. Threshold, hysteresis and reverse logic are configurable. Verify both states and the disconnected-wire state before using a switch as an arm or safety input.
- **Sensor supply:** J8 pin 4 supplies 5 V for compatible sensors and shares the board's 5 V rail. Keep the combined external sensor draw below the hardware guide's approximately 500 mA allowance, with margin. It is not a pump, lamp, relay or wideband-heater supply.
- **Sensor reference:** use J8 pin 8 sensor GND as the signal reference. Do not use it as a load return. Before sharing an existing sensor signal, verify its output type, voltage, grounding and permitted additional loading with the device maker.
- **Pulse and specialised sensors:** these multiplexed analog inputs are not dedicated frequency counters. Frequency-output flex-fuel or flow sensors, crank/cam signals and raw thermocouples need a compatible conditioner or a supported, defined CAN signal. Selecting a preset does not add the missing interface.
- **Freshness:** input conversion, CAN/OBD acquisition and phone display rates differ. Use the actual source age and configured stale limits; a faster display or recording setting does not make the sensor update faster.

6 Typical wiring diagrams

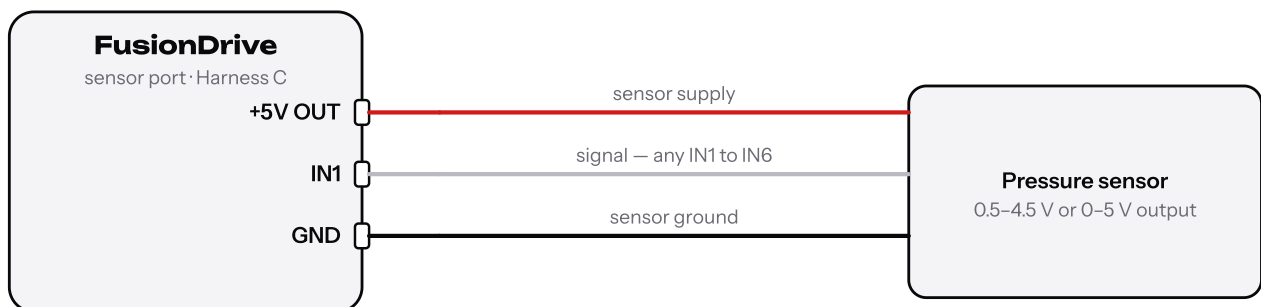
These LS wiring examples show connection polarity; they do not qualify every pump, valve, controller or relay. Fuse values are illustrative or shared-path limits, not continuous-current ratings. Verify the actual load, start/stall current, wiring, driver, suppression and heat before connecting it. OUT1–4 require the dedicated feed; all connected supplies need the correct common reference.

Dedicated power feed and ignition sense



Battery positive through an appropriately sized fuse (30 A maximum path limit) to J6 pin 1 **BATT+ 30A**; both **GND** leads, pins 4 and 7, to power ground; **IGN**, pin 3, to a verified ignition-switched circuit. The pictured fuse does not establish continuous load capacity. Verify the real feed, not only its indicator.

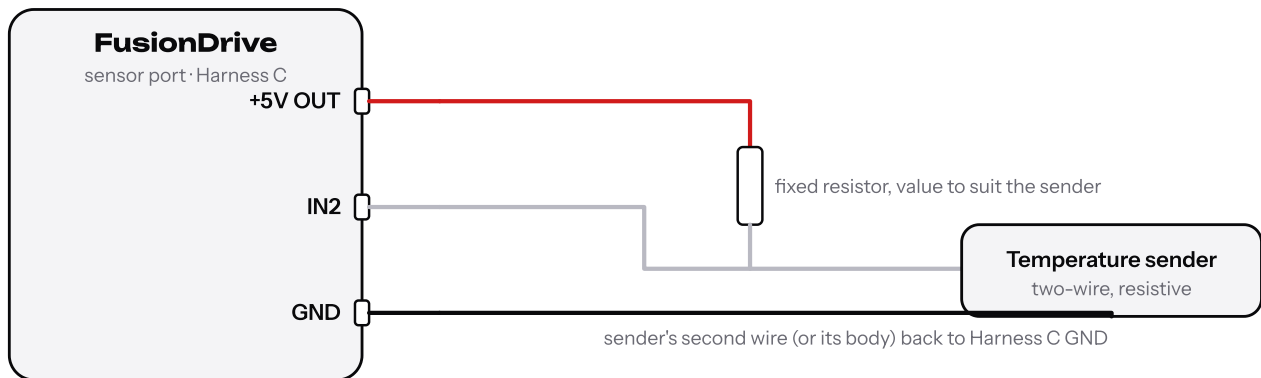
Three-wire 0–5 V pressure sensor



Configure the actual sensor's input, units and voltage/value calibration. Presets do not establish electrical compatibility.

Example for a sensor rated for a 5 V supply with a documented 0–5 V analog output. Other supply voltages need the correct external supply and compatible reference. Frequency-output ethanol/flow sensors and raw thermocouples do not connect this way without conditioning.

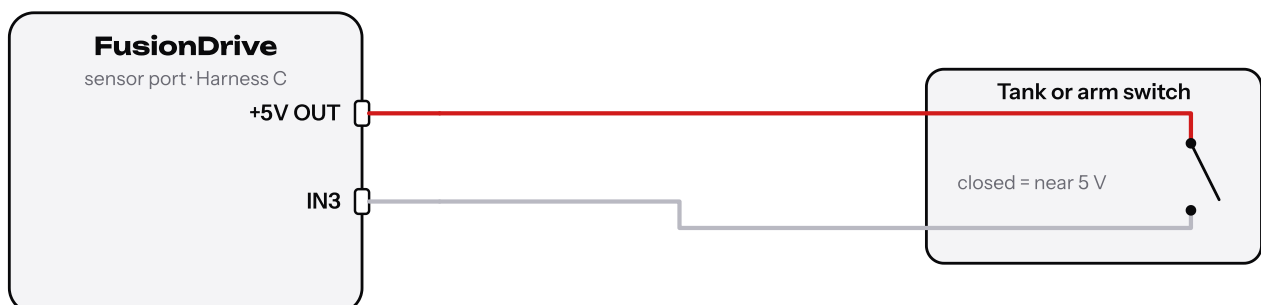
Two-wire temperature sender



A linear calibration is only an approximation for a nonlinear sender. Check the useful range at known temperatures. Use a compatible conditioner when accurate temperature limits are needed; never connect a raw thermocouple directly.

A compatible resistive sender and correctly selected pull-up produce a voltage. The sender is generally nonlinear: a two-point linear calibration is an approximation that must be checked over the useful range. Use a conditioner where accuracy is needed; this is not a raw thermocouple input.

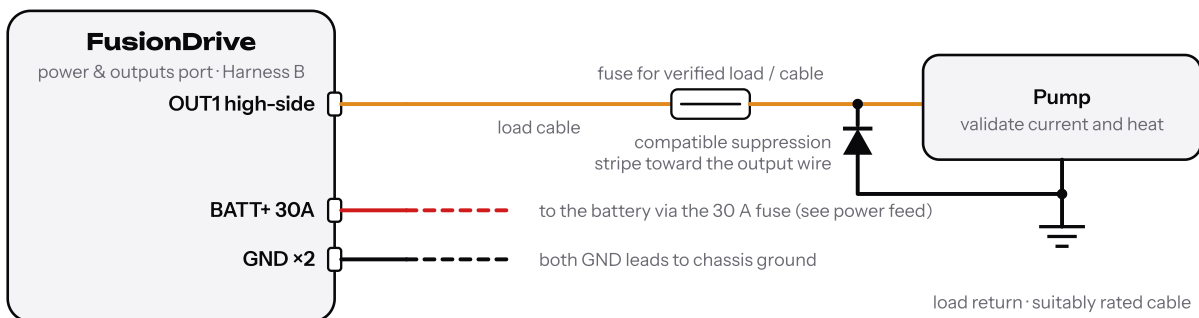
Level switch, float switch or arm switch



Level / Switch: set threshold (default 2.5 V), hysteresis and polarity; verify both states and the disconnected-wire state. Never wire a switch between an input and 12 V. Any of IN1 to IN6 can be a switch input.

Compatible dry switch between **+5V OUT** and an input. Closed is near 5 V; the displayed meaning depends on configured polarity and threshold. An open switch and broken wire can look the same. Configure and test any arm or protection logic separately.

High-current pump on an output



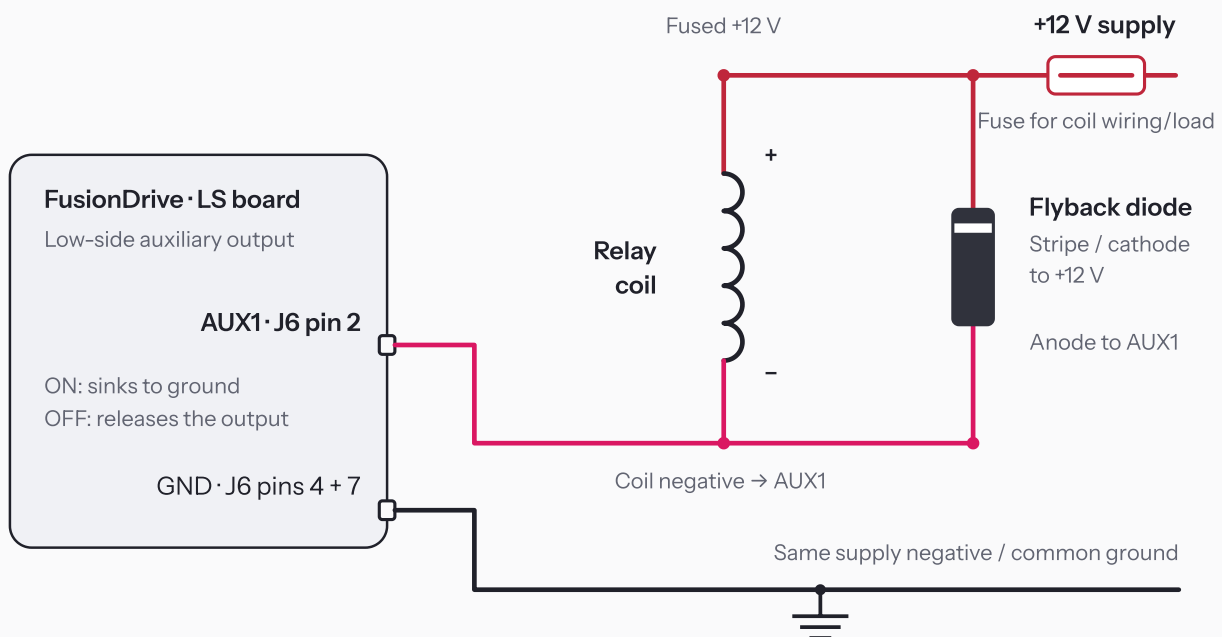
OUT1-4 are high-side outputs. Use the dedicated fused feed; verify the load, wiring and shared path capacity.

High-side example: OUT1 supplies load positive and load negative returns to power ground. Protect the cable/load with a suitable fuse and follow the pump maker's suppression and PWM requirements. For a compatible diode-suppressed load, stripe/cathode connects to OUT and anode to ground. Verify running/start current and heat; use an external driver if needed.

Relay on an auxiliary output

Relay coil on LS AUX1

AUX switches the coil to ground. The relay contacts switch a separate load.

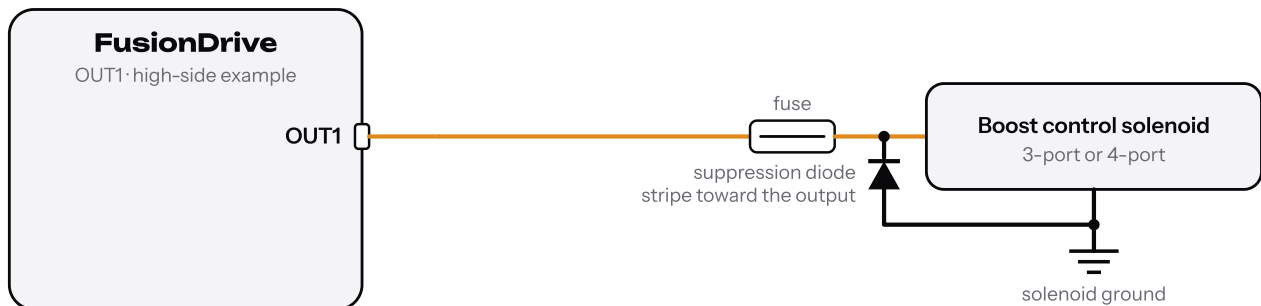


AUX: nominal 1 A-class sink — verify coil current and suppression.

Follow relay polarity if suppression is built in. Contacts/load wiring and FD power feeds are not shown.

LS AUX relay coil: fused +12 V to coil positive; coil negative to AUX1 (J6 pin 2). The flyback stripe/cathode faces +12 V; its anode faces AUX1. Use common power ground. Relay contacts and their separately fused load are not shown; select their ratings for the actual load. A mechanical relay is on/off only.

Boost control solenoid

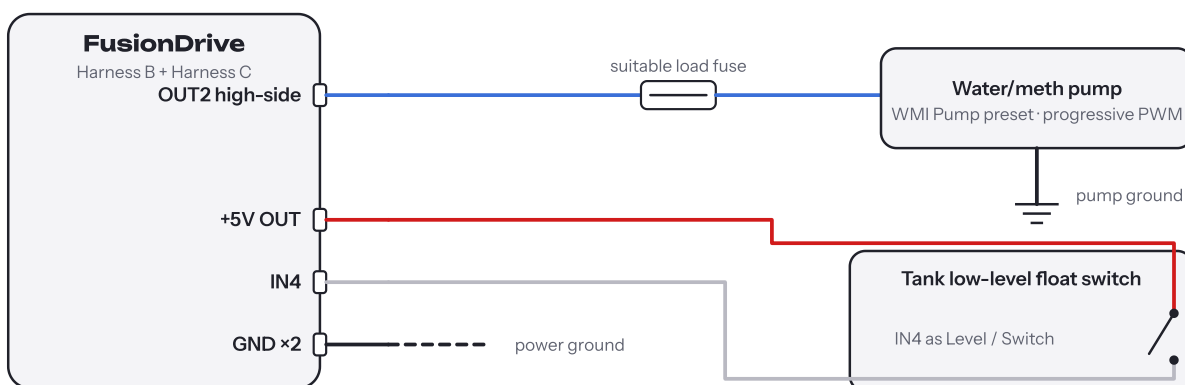


High-side example: OUT1 to coil positive, coil negative to ground; stripe/cathode to OUT1, anode to ground. Use the dedicated fused feed. Follow the valve maker's plumbing, PWM and suppression requirements.

High-side OUT1 example for a compatible solenoid; the dedicated feed is required. Match polarity, current, frequency, suppression and pneumatic plumbing to the actual valve. A preset name is not a compatibility guarantee.

Low-side alternative: a compatible small solenoid may instead connect from fused +12 V to AUX1 or AUX2, with its negative terminal on AUX. Use the LS diode orientation shown in the relay example: stripe/cathode to +12 V, anode to AUX. Stay within the nominal 1 A-class interface and validate the actual load and power sequencing.

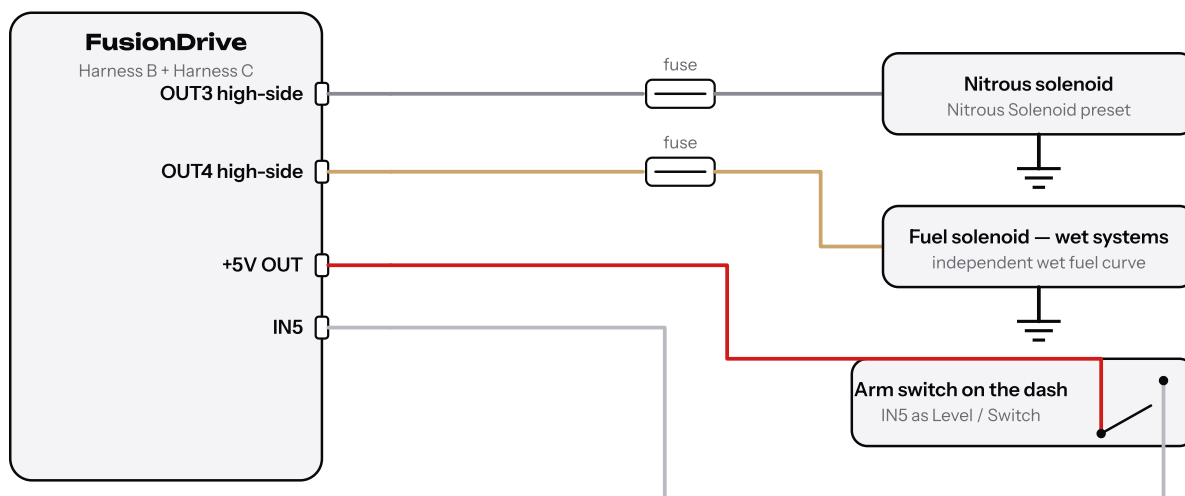
Water/methanol pump with a tank level switch



Select and test the level source and fault response; a switch connection alone does not configure protection. IN4 open tends low through internal pull-down bias; an open switch and a broken wire can look the same.

Compatible pump on high-side OUT2, with a separately configured level/switch input. Select and test the WMI or automation gate and any linked boost cut; the wire alone does not establish protection. Pump duty is not measured flow. Required feed wiring and manufacturer-compatible suppression are omitted for clarity. An existing WMI controller can remain in control when using compatible monitoring or binary permit wiring instead.

Nitrous solenoid with an arm switch



Configure and test the arm input, stage limits and required source gates; confirm physical operation safely.

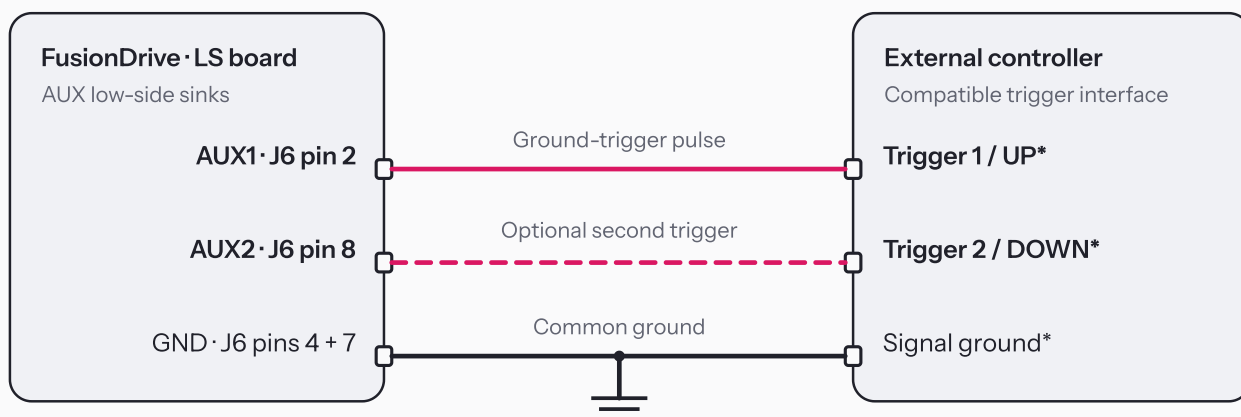
One compatible wet stage: nitrous on OUT3, fuel on OUT4 with its independently configured curve, and a selected/tested arm switch on IN5. Add the dedicated feed, individual fuses and required suppression. Dry stages use no fuel output. Up to three configured stages share the same six-channel budget; three wet stages leave no spare channels and still include only four heavy outputs. Nitrous boots disabled; review any explicitly configured local re-enable path. A retard output is only a compatible binary request, not direct ignition timing control.

Keeping an external boost controller

FusionDrive can use AUX1 (J6 pin 2), and AUX2 (J6 pin 8) where required, to operate **documented ground-trigger selection inputs** on a compatible external EBC. The EBC retains its own sensor, control algorithm and solenoid wiring. Choose the matching pulse/group behaviour only after checking the exact controller manual.

Keep a compatible external boost controller

Connect only to inputs documented for a momentary pull to ground.



No +12 V is injected into these trigger inputs.

*Use the controller manual: names, polarity, pulse timing and electrical limits vary.

AUX is nominal 1 A-class, not an isolated contact. Controller power and solenoid wiring are not shown.

AUX sinks a documented trigger input to the shared ground. The optional second wire is only for a controller that requires it. Do not inject +12 V into the input or treat AUX as an isolated pushbutton contact.

Check trigger voltage, sink current, polarity, pull-ups, pulse width, group count and power-on behaviour. Analog, resistor-ladder, isolated-contact or proprietary interfaces need a suitable interface; a brand/preset listing is not universal electrical compatibility. If group restoration is enabled, FusionDrive assumes the external EBC starts at Group 1. Verify that reset synchronisation on the actual device before relying on restored selections. These two AUX channels cannot simultaneously serve other output assignments.

7 Extending the leads

Lead	Harness gauge	Minimum extension gauge	Notes
BATT+ 30A	12 AWG (3.3 mm ²)	12 AWG (3.3 mm ²)	Heavier for runs over 2 m. Fuse at the battery.
GND (Harness B)	14 AWG (2.1 mm ²)	14 AWG (2.1 mm ²)	Keep short; ground close to the controller.
OUT1-OUT4	16 AWG (1.3 mm ²)	16 AWG (1.3 mm ²)	Select for actual load current, voltage drop, temperature and installation length.
AUX1, AUX2, IGN	16 AWG (1.3 mm ²)	16 AWG (1.3 mm ²)	Match or exceed the supplied gauge; AUX load current returns through its lead.
CAN2 H / L	16 AWG (1.3 mm ²)	18–20 AWG twisted pair	Keep the pair twisted to within 25 mm of each end.
IN1-IN6, +5V OUT, GND (Harness C)	20 AWG (0.5 mm ²)	20 AWG (0.5 mm ²)	Twisted or shielded for long or noisy runs; shield to Harness C GND at the controller end only.

- Use crimped butt splices or heat-shrink splice sleeves, then adhesive-lined heat shrink over the joint.
- Use automotive thin-wall wire rated to at least 105 °C; 125 °C in the engine bay.
- Keep sensor wiring away from output wiring and ignition components.

8 Optional ignition sense with OBD

J6 pin 3 remains the dedicated IGN sense input. It is optional for software vehicle-activity detection when fresh running-engine OBD data is available; either or both sources may be used. IGN is not a load-power feed. Preserve all documented output, ground and CAN pin assignments.



Questions?

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FusionDrive switches real current to real loads and can control boost, water/methanol injection and nitrous. Fuse every feed and every load, respect the ratings in the specifications, and set failsafes before you drive. Configure and tune with the vehicle stationary. The installer is responsible for compliance with local vehicle regulations. This is a beta-build document; figures marked as design targets will be confirmed for production units.