

Nebula Cam Controller



1. Introduction

The Nebula Cam Controller is a standalone control unit designed to add features not supported by the main ECU or where additional output drivers are required. This unit is based on the Nebula hardware and uses the same tuning software as the Spitronics Cosmos ECU.

👉 Some terminology in the software may differ slightly, but all functions are explained in this manual.

2. Features

- Open-loop VVT cam control for up to four cams (PWM control)
 - Cam control adjustable using RPM and TPS modulation
 - PWM output adjustable from 0% to 100% duty cycle
 - One output configurable as either:
 - RPM tacho output
 - General Purpose (GP) output
 - RPM tacho output scalable from 1 to 60 pulses per revolution
 - General Purpose (GP) output configurable via TPS or RPM signals
-

3. Wiring

Refer to the wiring diagrams at the end of this manual.

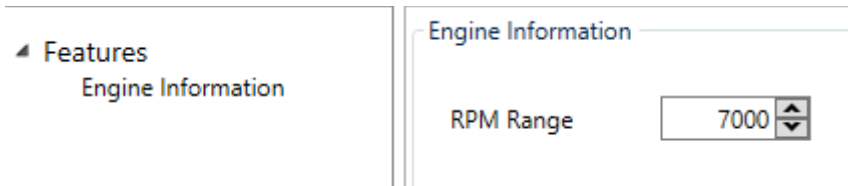
⚠ Important

Diodes must be installed with correct polarity.
Incorrect installation may damage the output drivers.

4. Basic Setup

RPM Configuration

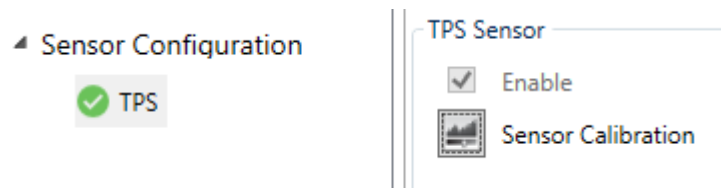
Set the RPM range according to the engine's operating range.



TPS Configuration



- MAP input scale **set to 1 bar.**

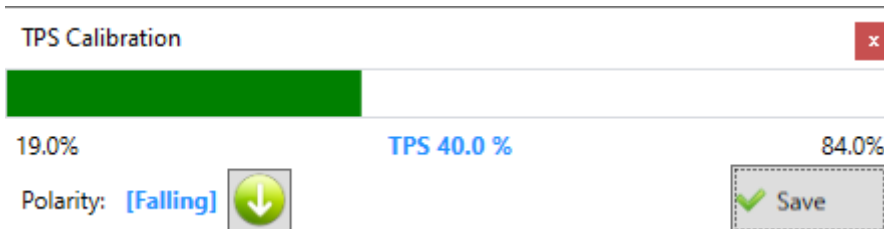


- 👉 No additional TPS scaling configuration is required
- 👉 The MAP signal is used as the TPS reference signal

5. TPS Calibration

The TPS is used as an input for cam control under certain operating conditions.

- Ensure the TPS is calibrated correctly
- TPS signal must increase with throttle position

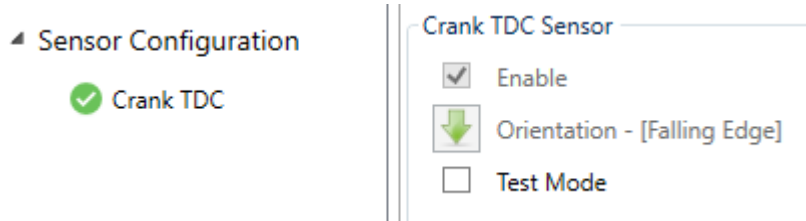


i For full setup and calibration:

Documentation → Software → ECU → Sensors → Throttle Position Sensor

6. RPM Signal

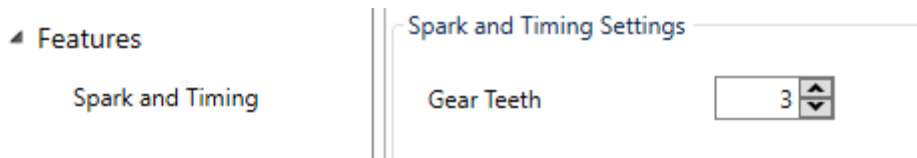
A valid RPM signal is required for correct operation.



The Nebula controller can accept:

- Magnetic trigger
- Hall trigger
- ECU-derived RPM signal

Setup



Set the **Gear Teeth** count to match the number of trigger pulses per engine revolution.

Example:

- 60-2 trigger wheel → set to **58 teeth**

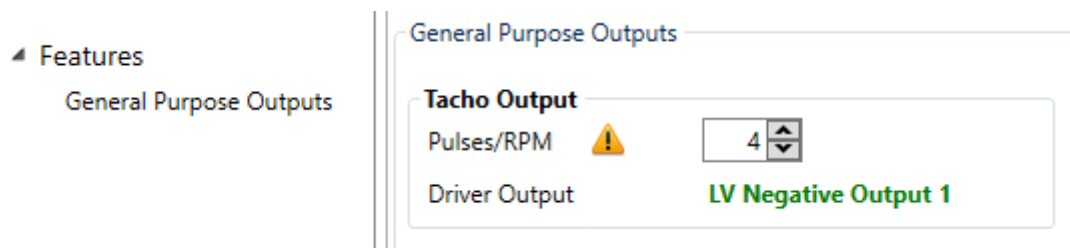
👉 The RPM signal must be stable and not erratic

📌 For full setup and fault finding:

Documentation → Software → ECU → Sensors → Crank and Cam Sensors

7. Rev Counter / GP Output

The controller provides a configurable RPM output for rev counters.



If not used, this output can function as a General Purpose (GP) output.

Notes

- GP outputs can be triggered by TPS or RPM
- Useful for indicators or ECU feedback signals

📌 For more information:

Documentation → Software → ECU → Inputs and Outputs → Tacho Meters / General Purpose Outputs

8. Cam Control

Supports up to four VVT cams.

Mode Selection

You can configure cam control in two ways:

- **4 Independent Cams (4 Graphs)**

Each cam is controlled individually with its own graph and output.

- **2 Paired Cams (2 Graphs, 2 Outputs Each)**

Two outputs share the same duty cycle and graph.

This is useful for V-engines, as it eliminates the need to tune duplicate graphs.

Features

Spark and Timing

Spark and Timing Settings

Ignition Coil Combination

Wasted Spark Coil Per Cylinder

Wasted Spark Coil Per Cylinder

Full Sequential



Ignition Mode Interaction

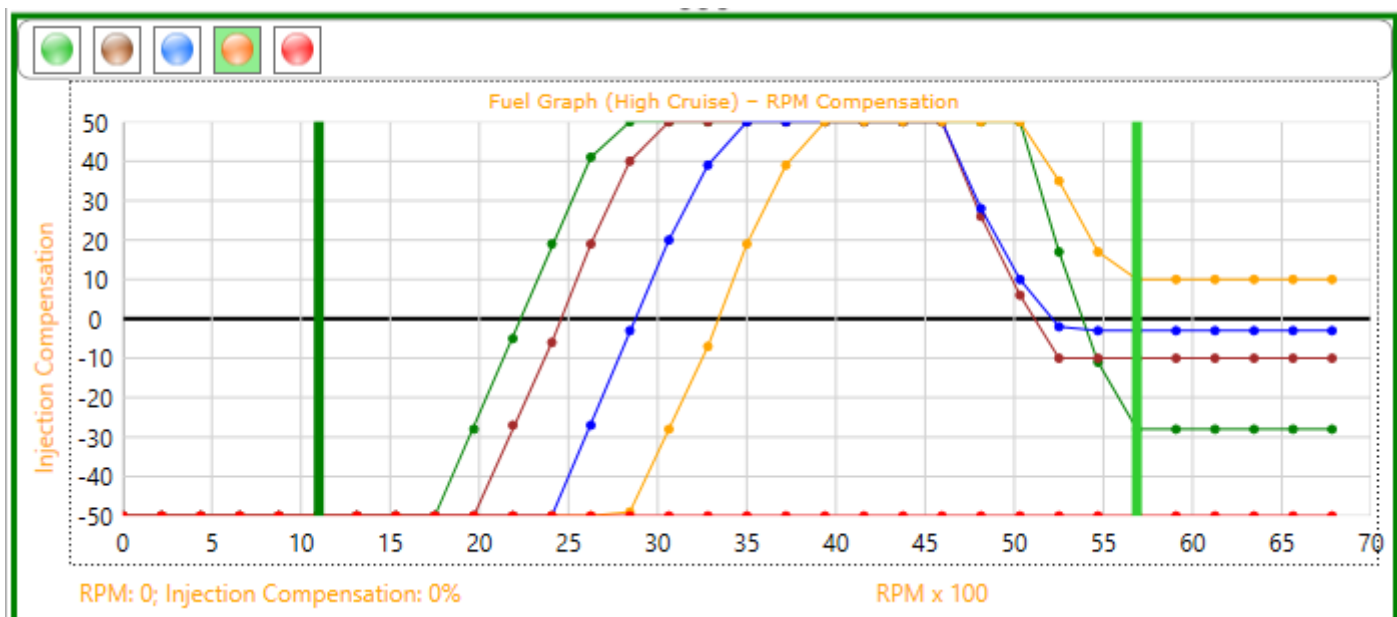
- **Wasted Spark**

Selects **2 graphs controlling 4 outputs** (paired operation)

- **Full Sequential**

Selects **4 graphs controlling 4 outputs** (independent control)

RPM Range

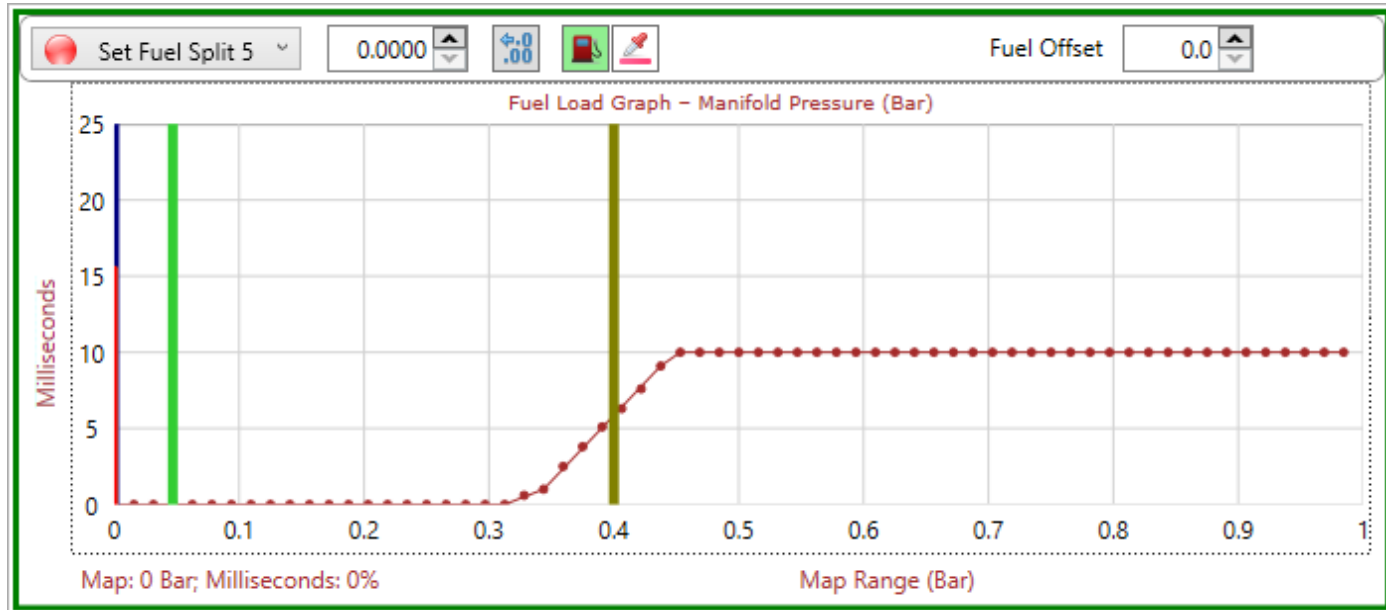


- Individual control of each cam
- Uses four separate graphs
- Adjustments -50 to +50 in 100 increments
- -50 = 0% and +50 = 100% duty cycle

Note

- Graphs are set like this for explanation purposes

TPS Range



- Acts as a global limiter for cam operation
- Limits maximum cam duty cycle
- Adjustments 0 to 10 in 100 increments
- 10 = 100% duty cycle (values above 10 remain at 100%)

👉 Functions as a “maximum cap” on RPM-based cam control

Note

- Graphs are set like this for explanation purposes

9. Cam Duty Cycle Calculation

Final cam duty cycle is calculated as:

- Final duty cycle = (RPM graph × 4), limited by TPS graph

👉 Output is limited between **0% and 100% PWM**

10. Safety Notice

⚠ Warning

Incorrect cam control setup can cause piston-to-valve contact.

- Only qualified technicians should perform cam timing setup.

Always:

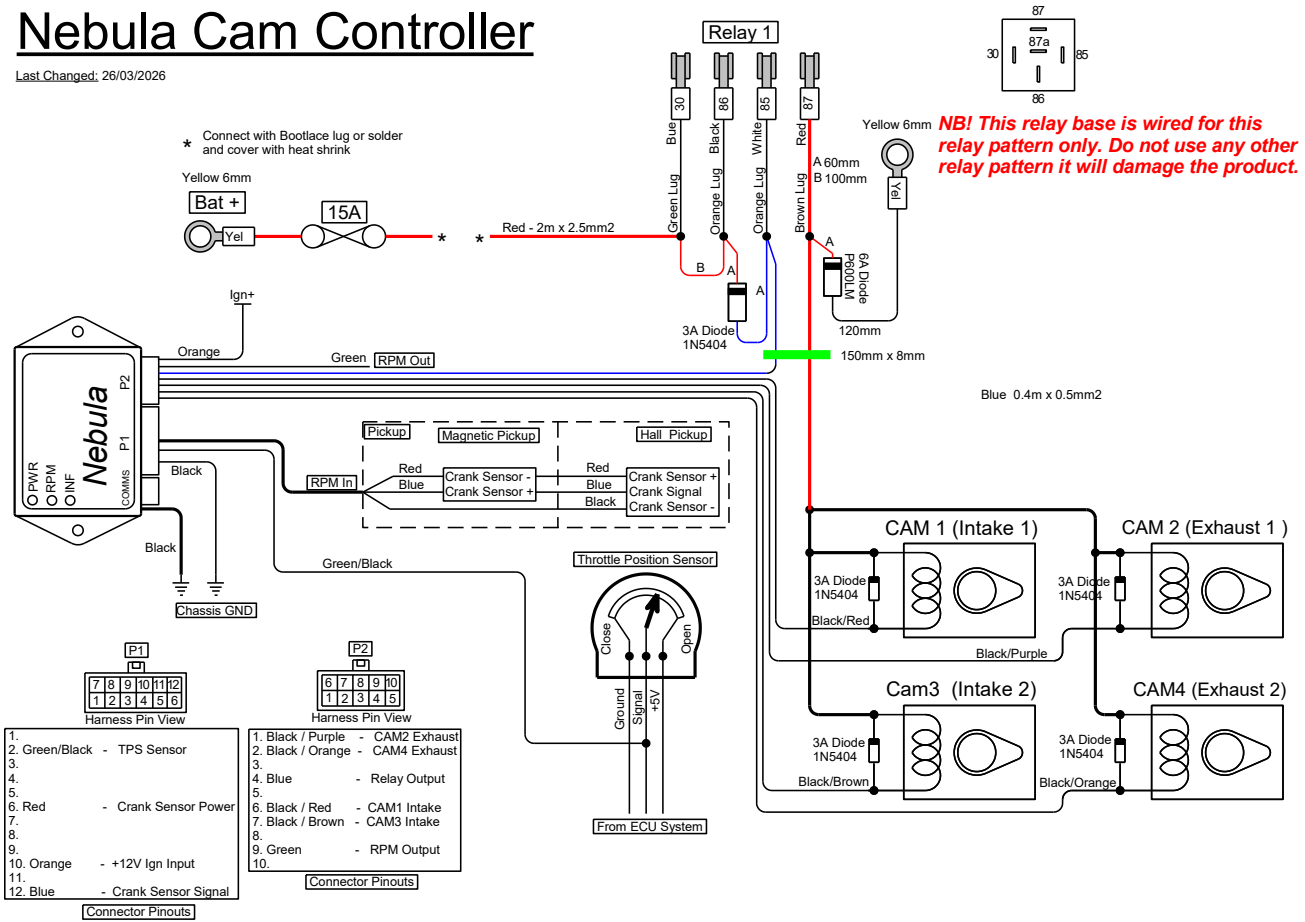
- Verify mechanical clearances
- Use clean oil and filters
- Test solenoid operation

Spitronics accepts no liability for damage resulting from incorrect setup.

11. Drawings

Nebula Cam Controller

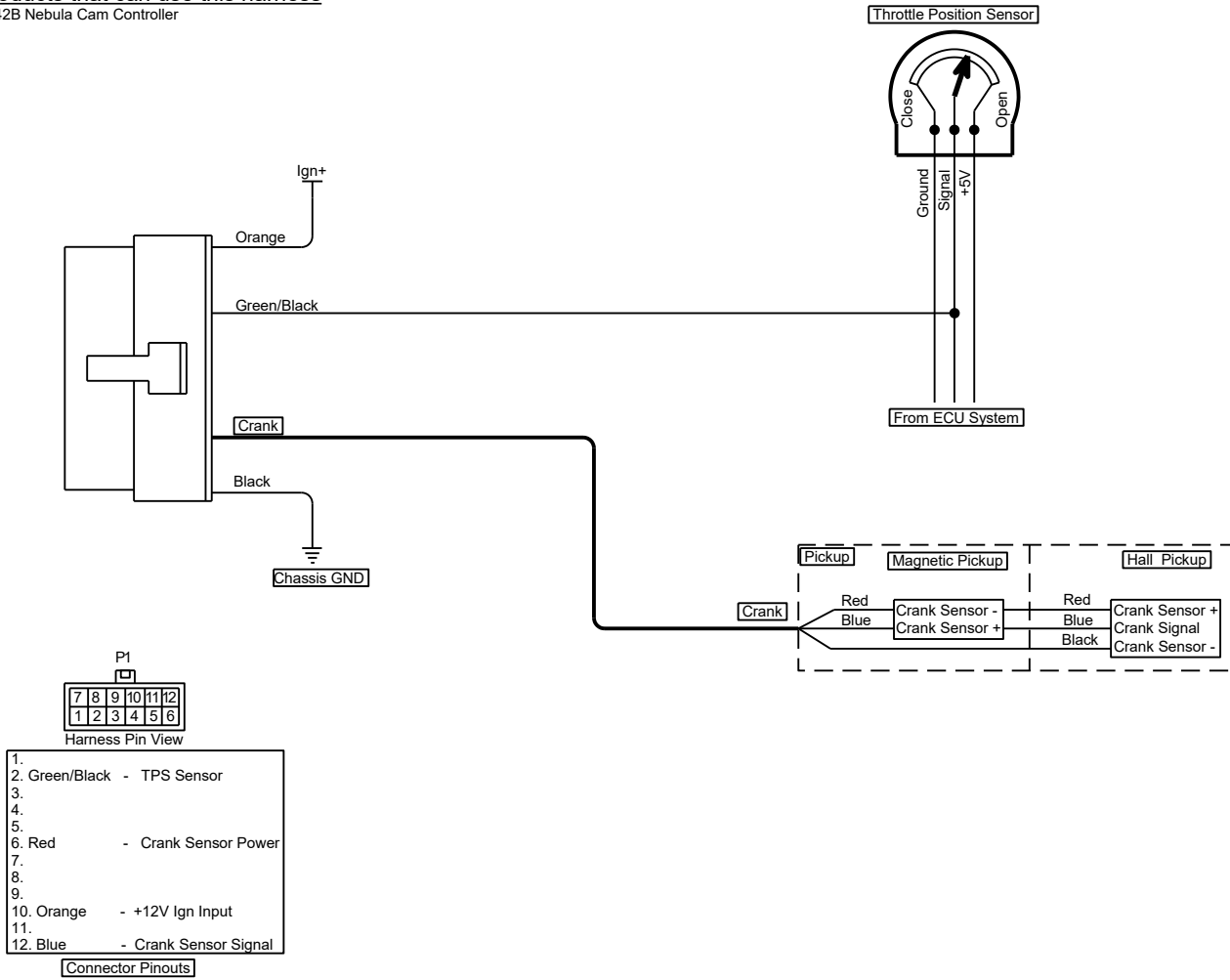
Last Changed: 26/03/2026



N14_P1 Cam Control Input Harness Wiring

Last Changed: 27/03/2026

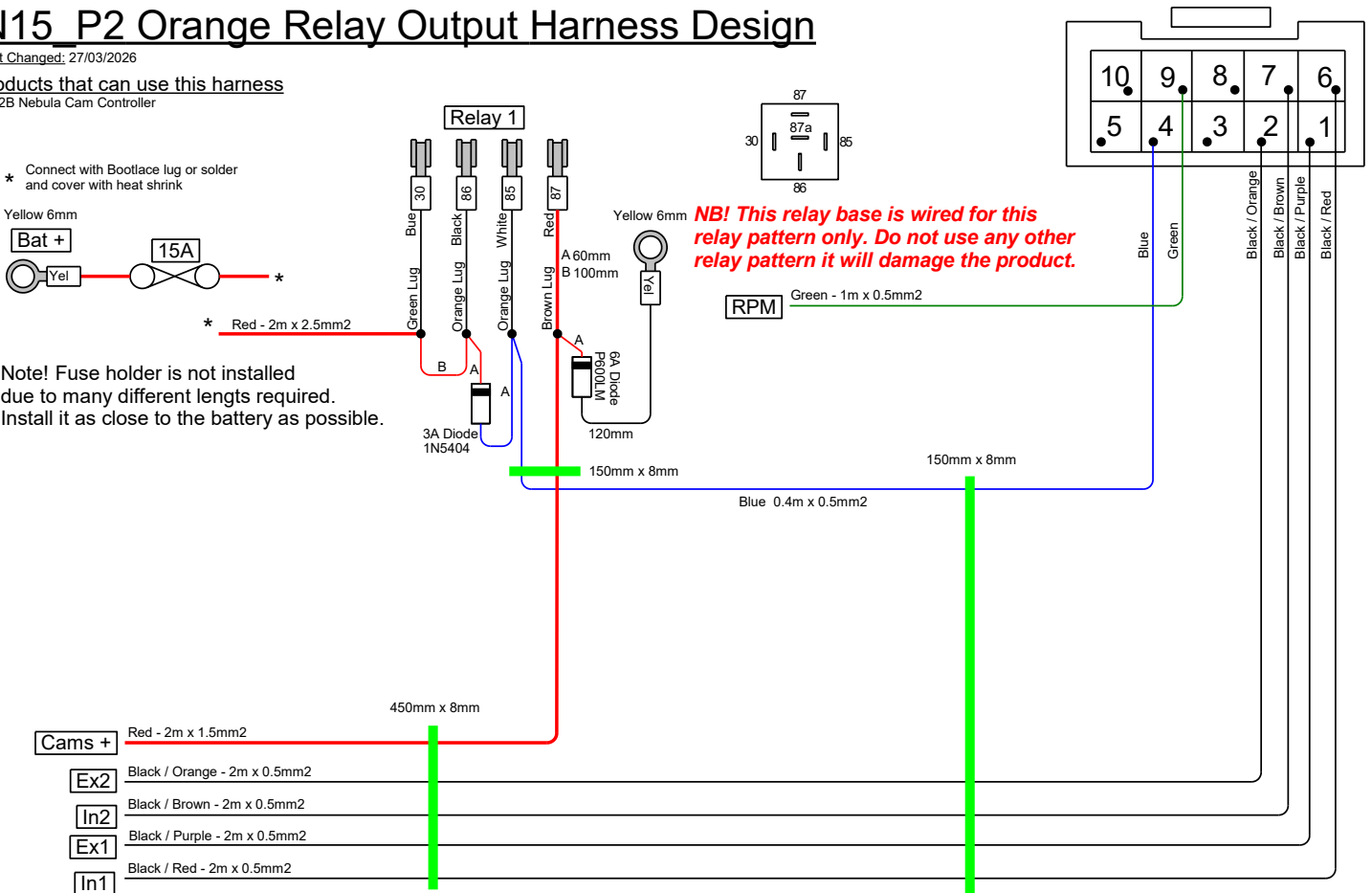
Products that can use this harness
EZ42B Nebula Cam Controller



N15_P2 Orange Relay Output Harness Design

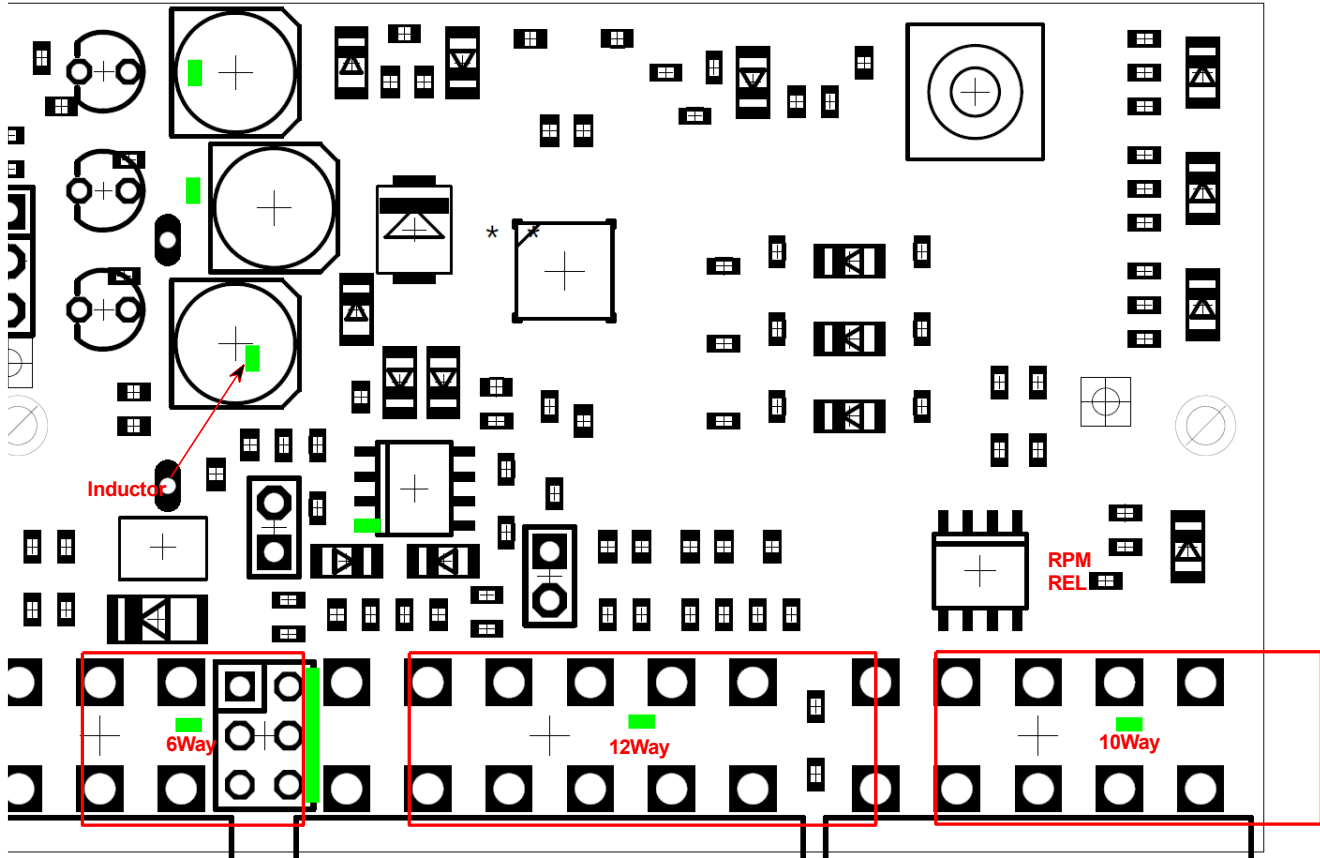
Last Changed: 27/03/2026

Products that can use this harness
EZ42B Nebula Cam Controller



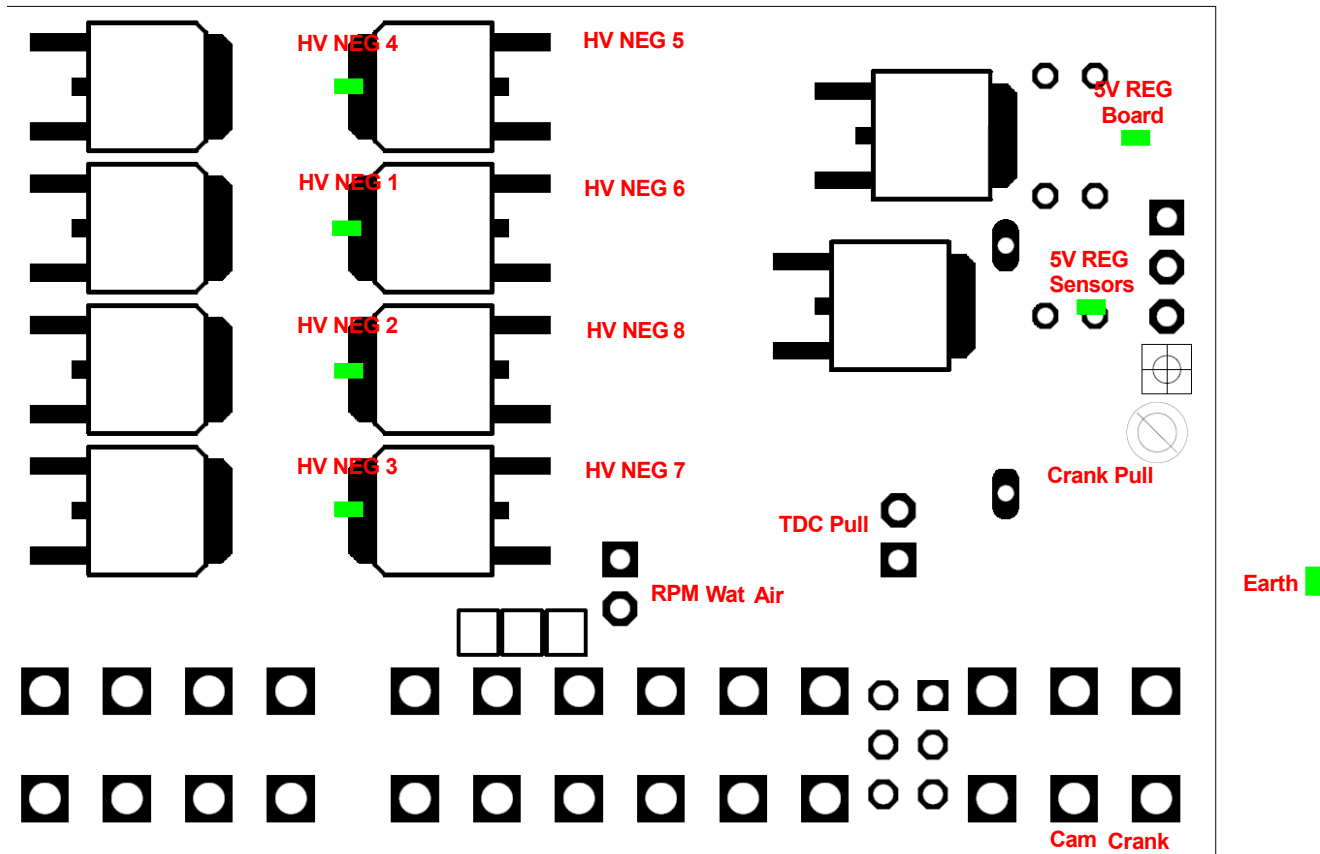
EZ42B Nebula Cam Control Component Layout

Last Changed: 27/03/2026



EZ42B Nebula Cam Control Component Layout

Last Changed: 27/03/2026



Cam Control										
EZ42A CAM Layout										
Wire Colors	Sim	Priority1	Pin Name		Pin Name	Priority1	Sim	Wire Colors		
N14_P1	leds		P1 - 12 Way Input					leds	N14_P1	
			Water Temp	7	1	Air Temp				
			Lambda	8	2	TPS	TPS	Green/Black		
			.+5 Volt Out	9	3	MAP				
Orange		Ignition In	.+12 Volt Ign	10	4	GND	Sensors GND	Black		
			TDC Sensor	11	5	TDC Power				
Blue		RPM In	Crank Sensor	12	6	Crank Power	Crank Sens +	Red		
			P2 - 10 Way Output						N15_P2	
Black/Red	N6	CAM 1 (Intake)	HV Negative 1	6	1	HV Negative 2	CAM 2 (Exhaust)	N5	Black/Purple	
Black/Brown	N4	CAM 3 (Intake)	HV Negative 3	7	2	HV Negative 4	CAM 4 (Exhaust)	N3	Black/Orange	
				8	3					
Green	RPM	RPM Out / GP	LV Negative 1	9	4	Relay LV Neg	Relay Out	Relay	Blue	
				10	5					
			6 Way USB						USB	
N/C				4	1				N/C	
Yellow			Receive	5	2	Transmit			Green	
Red			.+5 Volt Out	6	3	GND			Blue	
Notes										
RPM Output = LV Negative driver 100 Volt 8 Amp Drivers with 1K pullup to 12V SO8										
Relay Output = LV Negative driver 100 Volt 8 Amp Drivers SO8										
HV Negative Drivers 450 Volt 42 Amp Drivers D-Pack										
N/C = Not Connected										