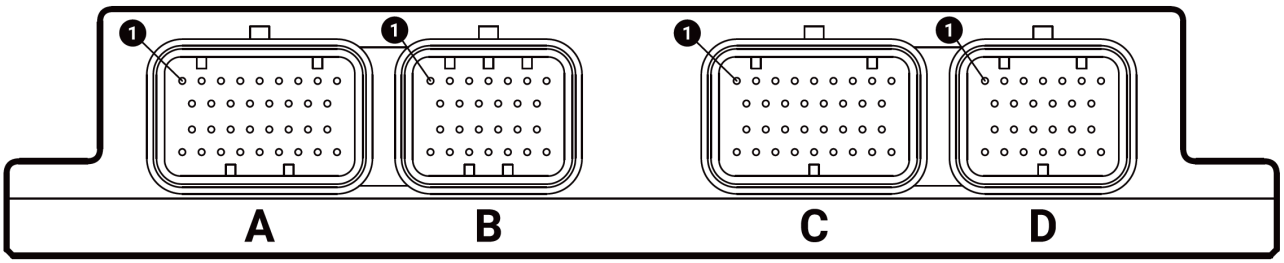
EMU PRO 16 Pinout

Document information:

This document is dedicated to EMU PRO 16 with board Rev.F or newer. These devices have serial numbers “101-2242-xxxxx” and higher. Additionally, the board revision can be checked in the Help/About menu after connecting to the ECU.

Connector symbols:



Connector part numbers:

Connector series	AMP SUPERSEAL 1.0		
Connector A	4-1437290-1	34 Positions	Keys: 2 top, 2 bottom
Connector B	1473416-1	26 Positions	Keys: 3 top, 2 bottom
Connector C	4-1437290-0	34 Positions	Keys: 2 top, 1 bottom
Connector D	3-1437290-7	26 Positions	Keys: 2 top, 1 bottom
Terminal	1-1437284-0	14-16 AWG	
Terminal	3-1447221-3	16-18 AWG	
Terminal	3-1447221-4	20 AWG	
Terminal	3-1447221-5	22 AWG	

Power pins	
Pin name	**Description**
+12V supply	Power supply for the ECU and H-bridges. Can be connected as constant or switched battery voltage. Delayed turn off will only function with constant supply.
+12V switched	+12V input to switch the ECU on or off. Should be connected to +12V after the ignition switch.
Power GND	Power ground. All power ground pins must be connected to the main ground point (chassis, engine, battery). ECU supply and current from every output switched to ground flows through those pins.
+5V source A/B	+5V sensor supply. There are two separate sources, A & B. Each source can provide up to 2 A of current.
Digital GND	Digital ground. Digital signals (frequency, duty cycle, switches) must be connected between digital input and digital ground. Do not connect those pins to the external ground point or other ground pins.
Analog GND	Analog ground. Analog signals (voltage) must be connected between analog input and analog ground. Do not connect those pins to the external ground point or other ground pins.

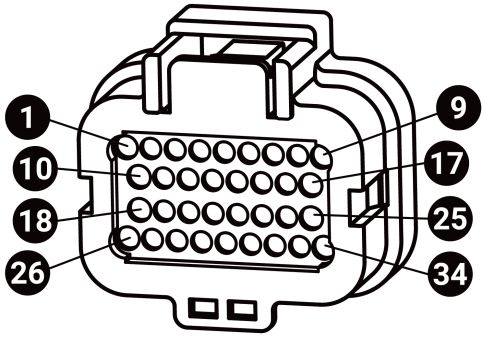
Communication pins	
Pin name	**Description**
CAN 1 high/low	CAN bus, fixed 1Mbps, used for communication with PC and peripheral devices. Communication with PC software can only be done through this CAN bus. Fully configurable communication. No internal termination resistor. External termination required.
CAN 2 high/low	CAN bus, configurable speed, used for communication with peripheral devices. Configurable speed (125, 250, 500, 1000 kbps). Fully configurable communication. Software controlled termination resistor.
LIN	LIN network. Communication with peripheral LIN devices.
USB D-, D+	USB data pins. Pins used to connect a flash drive for data logging. A group of pins from B9 to B12 should be used when connecting a USB socket.

Input pins	
Pin name	**Description**
Digital	Digital signal input. Input for digital signals (frequency, duty cycle, switches). Digital signals must be connected between these inputs and digital ground. Inductive (VR), HALL, or magnetoresistive (MR) sensors can be used. Digital 1 is dedicated to the crankshaft position sensor. Turboshaft speed sensors can only be connected to Digital 5 & 6. Digital 7 shares a voltage threshold with Digital 9. Digital 8 shares a voltage threshold with Digital 10. Digital 9 is sharing a pin with Analog 19. Digital 10 is sharing a pin with Analog 20. Configurable voltage threshold. Configurable pull up/down 1k ohm resistor. Configurable input filter strength. Maximum voltage for Digital 1: 120 V. Maximum voltage for other inputs: 50 V.
Analog	Analog signal input. Input for analog signals (voltage). Analog signals must be connected between these inputs and analog ground. Analog 1 is dedicated to the manifold pressure sensor. Analog 19 is sharing a pin with Digital 9. Analog 20 is sharing a pin with Digital 10. Configurable pull up/down resistor. Analog 9-12 have a 2.2k ohm pull resistor. Recommended for thermistors. Analog 13-14 have a 1k ohm pull resistor. Recommended for thermistors. Analog 15 has a 330 ohm pull resistor. Recommended for low resistance thermistors. Analog 16 has a 100 ohm pull resistor. Recommended for fuel level sensors. Analog 19-20 have a 1k ohm pull resistor. Other inputs have a 10k ohm pull resistor. Measurement resolution: 12 bit. Measurement voltage range: 0-5 V. Maximum input voltage: 20 V.

Input pins	
Pin name	**Description**
Precision analog	High precision analog input. Input for analog signals (voltage) that require higher resolution. Possibility to directly connect type K thermocouples. Analog signals must be connected between these inputs and analog ground or between 2 adjacent inputs. Recommended for EGT sensors (exhaust gas temperature). Possibility to use differential mode with two pins for a single input. Configurable 10k ohm pull up/down resistor. Configurable measurement range. Cold junction compensation for type K thermocouples. Measurement resolution: 16 bit. Minimum measurement voltage range: 0-512 mV. Maximum measurement voltage range: 0-5 V. Maximum input voltage: 5 V.
Knock sensor	Knock sensor input. Input for knock sensor signals (voltage). Knock sensor signals must be connected between these inputs and analog ground. Configurable gain. Configurable frequency of the input filter. Maximum input voltage: 14 V.
WBO	Wideband oxygen sensor inputs. Inputs for the wideband oxygen sensor LSU 4.9. There are two separate oxygen sensor controllers. Sensor heaters can be connected to auxiliary outputs 1-4.

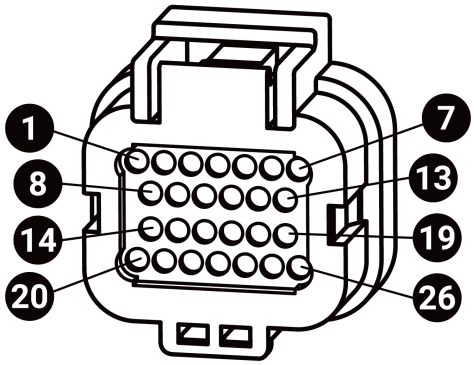
Output pins	
Pin name	**Description**
Injector	Output for high or low impedance injectors. Output for injectors as well as auxiliary devices. Can control low impedance injectors directly with peak & hold strategy. Can be used as an auxiliary output with on/off, PWM, or current control mode. Short circuit/overcurrent protection. Open load detection. Integrated flyback diode. Turn off voltage clamp: 36 V. Maximum peak current: 8 A. Maximum constant current: 5 A.
Ignition	Output for active or passive ignition coils. Output for controlling active or passive ignition coils. Coil type configurable in software. Active coils high voltage level: 8 V. Maximum current for active coils: 80 mA. Maximum peak current: 15 A.
Auxiliary	Output for auxiliary devices. Output for auxiliary devices with on/off, PWM, or current control mode. Short circuit/overcurrent protection. Open load detection. Integrated flyback diode. Integrated 10k ohm pull up resistor to +12V. Maximum constant current: 5 A.
H-bridge	H-bridge output. Output from the h-bridge driver. Can be used as a single output or a full h-bridge with two outputs. In single output mode, only outputs B can be used in PWM mode. Short circuit/overcurrent protection. Overtemperature protection. Configurable current limit. Maximum constant current: 7 A.

Connector A:



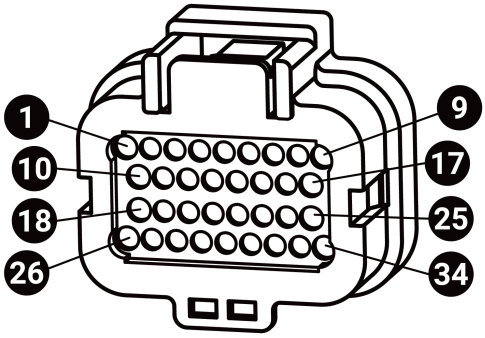
Pin	Name	Description
A1	Ignition 8	Output for active or passive ignition coils.
A2	Injector 1	Output for high or low impedance injectors.
A3	Injector 2	Output for high or low impedance injectors.
A4	Injector 3	Output for high or low impedance injectors.
A5	Injector 4	Output for high or low impedance injectors.
A6	Injector 5	Output for high or low impedance injectors.
A7	Injector 6	Output for high or low impedance injectors.
A8	Injector 7	Output for high or low impedance injectors.
A9	Injector 8	Output for high or low impedance injectors.
A10	Ignition 7	Output for active or passive ignition coils.
A11	Power GND	Power ground.
A12	+5V source A	+5V sensor supply, source A.
A13	Digital 2	Digital signal input.
A14	Digital 4	Digital signal input.
A15	Digital 8	Digital signal input.
A16	Digital 6 (turbo)	Digital signal input, can be used for turboshaft speed sensor.
A17	Power GND	Power ground.
A18	Ignition 6	Output for active or passive ignition coils.
A19	Power GND	Power ground.
A20	Digital GND	Digital ground.
A21	Digital 1 (crank)	Digital signal input, dedicated crankshaft sensor input.
A22	Digital 3	Digital signal input.
A23	Digital 7	Digital signal input.
A24	Digital 5 (turbo)	Digital signal input, can be used for turboshaft speed sensor.
A25	Auxiliary 9	Output for auxiliary devices.
A26	Ignition 5	Output for active or passive ignition coils.
A27	Ignition 4	Output for active or passive ignition coils.
A28	Ignition 3	Output for active or passive ignition coils.
A29	Ignition 2	Output for active or passive ignition coils.
A30	Ignition 1	Output for active or passive ignition coils.
A31	CAN 1 high (PC comm)	CAN bus, fixed 1Mbps, used for communication with PC and peripheral devices.
A32	CAN 1 low (PC comm)	CAN bus, fixed 1Mbps, used for communication with PC and peripheral devices.
A33	CAN 2 high	CAN bus, configurable speed, used for communication with peripheral devices.
A34	CAN 2 low	CAN bus, configurable speed, used for communication with peripheral devices.

Connector B:



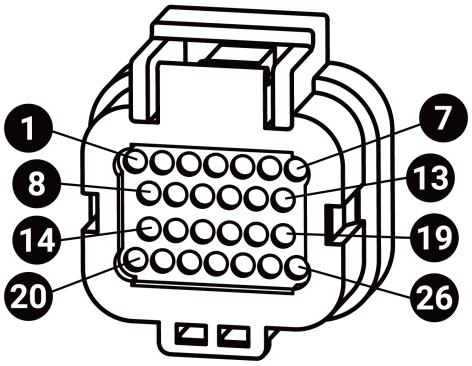
Pin	Name	Description
B1	Auxiliary 1 (WBO heater)	Output for auxiliary devices, can be used as a WBO heater.
B2	Auxiliary 2 (WBO heater)	Output for auxiliary devices, can be used as a WBO heater.
B3	Auxiliary 3 (WBO heater)	Output for auxiliary devices, can be used as a WBO heater.
B4	Auxiliary 4 (WBO heater)	Output for auxiliary devices, can be used as a WBO heater.
B5	Auxiliary 5	Output for auxiliary devices.
B6	Auxiliary 6	Output for auxiliary devices.
B7	Auxiliary 7	Output for auxiliary devices.
B8	+12V supply	Power supply for the ECU and H-bridges.
B9	Digital GND (flash drive)	Digital ground, recommended for flash drive connection.
B10	USB D- (flash drive)	USB data pin for a flash drive, data logging.
B11	USB D+ (flash drive)	USB data pin for a flash drive, data logging.
B12	+5V source A (flash drive)	+5V sensor supply, source A, recommended for flash drive connection.
B13	Auxiliary 8	Output for auxiliary devices.
B14	+12V supply	Power supply for the ECU and H-bridges.
B15	+12V switched	+12V input to switch the ECU on or off.
B16	Knock sensor 1	Knock sensor input.
B17	Knock sensor 2	Knock sensor input.
B18	WBO 2 VGND (LSU 4.9)	Wideband oxygen sensor input, LSU 4.9 Pin 2 (IPN / VM).
B19	Power GND	Power ground.
B20	WBO 1 IP (LSU 4.9)	Wideband oxygen sensor input, LSU 4.9 Pin 1 (APE / IP).
B21	WBO 1 VS (LSU 4.9)	Wideband oxygen sensor input, LSU 4.9 Pin 6 (UN / RE).
B22	WBO 1 RCAL (LSU 4.9)	Wideband oxygen sensor input, LSU 4.9 Pin 5 (RT / IA).
B23	WBO 1 VGND (LSU 4.9)	Wideband oxygen sensor input, LSU 4.9 Pin 2 (IPN / VM).
B24	WBO 2 IP (LSU 4.9)	Wideband oxygen sensor input, LSU 4.9 Pin 1 (APE / IP).
B25	WBO 2 VS (LSU 4.9)	Wideband oxygen sensor input, LSU 4.9 Pin 6 (UN / RE).
B26	WBO 2 RCAL (LSU 4.9)	Wideband oxygen sensor input, LSU 4.9 Pin 5 (RT / IA).

Connector C:



Pin	Name	Description
C1	Auxiliary 10	Output for auxiliary devices.
C2	Auxiliary 11	Output for auxiliary devices.
C3	Auxiliary 12	Output for auxiliary devices.
C4	Analog 7	Analog signal input.
C5	Analog 10 (2k2 pull)	Analog signal input.
C6	H-bridge 1A	H-bridge output.
C7	H-bridge 2B	H-bridge output.
C8	H-bridge 3A	H-bridge output.
C9	H-bridge 2A	H-bridge output.
C10	Analog 1 (MAP)	Analog signal input, dedicated MAP sensor input.
C11	Analog 3	Analog signal input.
C12	Analog 5	Analog signal input.
C13	Analog 8	Analog signal input.
C14	Analog 11 (2k2 pull)	Analog signal input.
C15	Analog 13 (1k pull)	Analog signal input.
C16	Analog 15 (330R pull)	Analog signal input.
C17	H-bridge 3B	H-bridge output.
C18	Analog 2	Analog signal input.
C19	Analog 4	Analog signal input.
C20	Analog 6	Analog signal input.
C21	Analog 9 (2k2 pull)	Analog signal input.
C22	Analog 12 (2k2 pull)	Analog signal input.
C23	Analog 14 (1k pull)	Analog signal input.
C24	Analog 16 (100R pull)	Analog signal input.
C25	H-bridge 1B	H-bridge output.
C26	LIN	LIN network.
C27	+5V source B	+5V sensor supply, source B.
C28	+5V source B	+5V sensor supply, source B.
C29	Analog GND	Analog ground.
C30	Power GND	Power ground.
C31	Precision analog 1	High precision analog input.
C32	Precision analog 2	High precision analog input.
C33	Precision analog 3	High precision analog input.
C34	Precision analog 4	High precision analog input.

Connector D:



Pin	Name	Description
D1	Injector 10	Output for high or low impedance injectors.
D2	Injector 11	Output for high or low impedance injectors.
D3	Injector 12	Output for high or low impedance injectors.
D4	Injector 13	Output for high or low impedance injectors.
D5	Injector 14	Output for high or low impedance injectors.
D6	Injector 15	Output for high or low impedance injectors.
D7	Injector 16	Output for high or low impedance injectors.
D8	Injector 9	Output for high or low impedance injectors.
D9	Analog 17	Analog signal input.
D10	Analog 18	Analog signal input.
D11	Digital 9 / Analog 19	Digital signal input or Analog signal input.
D12	Digital 10 / Analog 20	Digital signal input or Analog signal input.
D13	Auxiliary 13	Output for auxiliary devices.
D14	H-bridge 4A	H-bridge output.
D15	Precision analog 6	High precision analog input.
D16	Precision analog 8	High precision analog input.
D17	Analog GND	Analog ground.
D18	Power GND	Power ground.
D19	Auxiliary 14	Output for auxiliary devices.
D20	H-bridge 4B	H-bridge output.
D21	Precision analog 5	High precision analog input.
D22	Precision analog 7	High precision analog input.
D23	Ignition 9	Output for active or passive ignition coils.
D24	Ignition 10	Output for active or passive ignition coils.
D25	Auxiliary 16	Output for auxiliary devices.
D26	Auxiliary 15	Output for auxiliary devices.

Document revision history:

Revision	Date	Changes
1.0	2022-12-19	- first public version