ETX-1

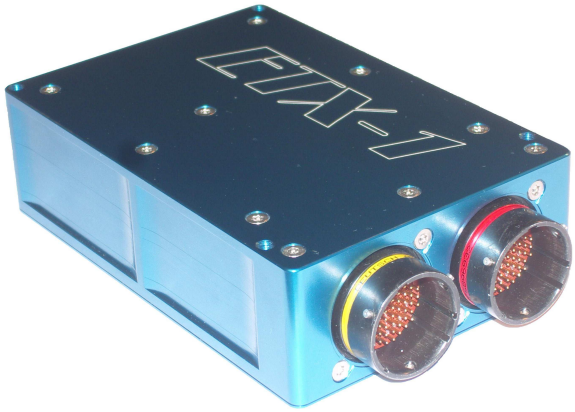
Engine Control Unit for up to 6 cylinders with embedded coil drivers, 4 UEGO lambda controller and data logger capability

di Sancassani Riccardo

Description

ETX-1 is an engine control unit especially suited for racing where weight and space are a real concern and the need of integrating is a must.
ETX-1 has four lambda controllers and a data logger embedded in the engine control unit, which includes all the coil drivers, to optimize the space taken and the complexity of the wiring loom.
The system can be expanded by external components via the CAN bus (two High Speed and one Low Speed), allowing the ECU to use their data for logging or computing purposes.
ETX-1 can manage engines up to 6 cylinders (with up to 2 injectors per cylinder) or up to 12 cylinders (with lost spark ignition), 2 Drive-by-Wire systems, 4 UEGO linear lambda controllers with heater control, 2 differential knock sensors, 1 differential input with programmable gain.
All the single ended analog inputs are hardware filtered (160Hz) and sampled with a 12 bit ADC at a sampling rate of 1000 Hz, then digitally filtered with a programmable IIR single pole filter with a different programmable cut frequency for each single input.

The temperature and digital inputs have an integrated 1000 Ohm pull-up to simplify the wiring loom, while the single ended inputs have a 1 MOhm pull-up resistor for diagnosis purposes.



Caratteristiche

- 17 single ended analog inputs
- 4 NTC/PT1000 temperature sensor inputs
- 2 Hall or VRS pick-up inputs
- 8 digital/speed inputs
- 1 digital input
- 6 inductive ignition drivers
- 12 on/off injector or PWM drivers
- 2 H bridges for dc motors (DBW) control
- 4 UEGO lambda controllers
- 2 differential knock inputs
- 512MB memory space for data logging
- sampling rate up to 1000 Hz.
- 3 CAN communication lines (1 LS + 2 HS)
- 1 Ethernet line 10/100 Mbps
- 1 programmable differential input (gain 1-128)
- lap trigger based on digital input or CAN (GPS)
- code load via CAN or Ethernet line

Particolarità

- external data logger not required
- no need for external lambda controllers
- very light and compact design
- Aluminium alloy machined box
- IP67 environmental protection
- high precision timing thanks to the high speed floating point processing unit
- dual processor system
- logged data export capability for most popular data analysis software
- high speed data download using the Ethernet line
- possibility to use NTC and PT1000 temperature sensors on the same vehicle (1kOhm pull-up)
- temperature range for ECU -40..125°C
- temperature range for logger -20..85°C
- flexible and highly customizable firmware
- password access control to several mapping levels
- user definable dashboard channel table via CAN bus (max 40 packets @ 200Hz)

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Electric characteristics

• Hall/VRS pick-up inputs		2
• Analog inputs		17
• Digital inputs		1
• Digital/frequency inputs		8
• NTC/PT1000 temperature sensor inputs		4
• Internal temperature sensors		2
• Knock sensor inputs		2
• Differential input (gain1-128)		1
• UEGO lambda controllers		4
• Inductive ignition drivers (max 20A)		6
• Injector/PWM outputs (max 4A)		12
• H bridges (max 6A)		2
• PWM max frequency	[kHz]	20
• Lambda heaters outputs (max 4A)		4
• 5Vdc reference voltage outputs		4
• High Speed CAN lines		2
• Low Speed CAN line		1
• Ethernet line (10/100Mbps)		1
• Minimum power supply	[V]	6
• Maximum power supply	[V]	18

Mechanic characteristics

• Height	[mm]	40
• Length (without connectors)	[mm]	137
• Depth	[mm]	93
• Weight	[g]	550
• Minimum temperature	[°C]	-20
• ECU maximum temperature	[°C]	125
• Logger maximum temperature	[°C]	85
• Environmental protection		IP67

Data logger characteristics

• FLASH memory	[MB]	512
• Maximum logged channels		1023
• Maximum logging rate	[kB/s]	100
• Maximum sampling rate	[Hz]	1000
• Maximum CAN transmission rate	[kB/s]	64
• Maximum number of CAN packet		40
• Maximum CAN transmission rate	[Hz]	200

IIR filter coefficient (Fs=1 kHz)

Fo [Hz]	K
No filtering	1.0000
200	0.7154
150	0.6103
100	0.4665
80	0.3951
60	0.3141
50	0.2696
40	0.2222
30	0.1718
20	0.1181
15	0.0899
10	0.0609
8	0.0490
6	0.0370
5	0.0309
4	0.0248
3	0.0187
2	0.0125
1	0.0063
0.8	0.0050
0.6	0.0038
0.5	0.0031
0.4	0.0025
0.3	0.0019
0.2	0.0013
0.1	0.0006

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Pinout

Deutsch AS 6 18-35 SN

1	GND_PWR	34	OUT_IGN4
2	V_BATT	35	OUT_IGN4
3	H_BRIDGE_1N	36	GND_PWR
4	H_BRIDGE_1P	37	IN_DIG_1
5	GND_PWR	38	OUT_INJ11
6	V_BATT	39	IN_SPD_7
7	CAN_1_H	40	OUT_INJ06
8	H_BRIDGE_2P	41	OUT_INJ03
9	H_BRIDGE_2N	42	GND_PWR
10	GND_PWR	43	OUT_IGN4
11	GND_DIG	44	OUT_IGN3
12	CAN_1_L	45	GND_PWR
13	OUT_INJ07	46	GND_PWR
14	OUT_INJ05	47	OUT_INJ01
15	OUT_INJ02	48	OUT_INJ08
16	GND_PWR	49	HEAT_LMBD1
17	OUT_IGN2	50	V_BATT
18	GND_PWR	51	OUT_IGN3
19	OUT_INJ04	52	OUT_IGN3
20	IN_SPD_1	53	OUT_IGN1
21	HEAT_LMBD2	54	OUT_INJ12
22	IN_SPD_8	55	HEAT_LMBD4
23	GND_PWR	56	HEAT_LMBD3
24	GND_PWR	57	GND_PWR
25	OUT_IGN2	58	OUT_IGN1
26	OUT_IGN2	59	OUT_IGN1
27	GND_PWR	60	OUT_IGN5
28	IN_SPD_2	61	OUT_IGN6
29	IN_SPD_6	62	OUT_IGN6
30	IN_SPD_3	63	SHIELD
31	OUT_INJ09	64	OUT_IGN5
32	OUT_INJ10	65	OUT_IGN5
33	GND_PWR	66	OUT_IGN6

Deutsch AS 6 18-35 SA

1	INP_KNOCK_1P	34	TX_ETH_N
2	INP_KNOCK_1N	35	IN_AN10
3	IN_LMBD1_VS+	36	IN_AN08
4	INP_KNOCK_2P	37	IN_AN02
5	INP_KNOCK_2N	38	IN_LMBD4_IP+
6	IN_PKUP2P	39	IN_AN17
7	IN_LMBD1_VS-	40	IN_AN07
8	IN_LMBD2_IP+	41	IN_AN03
9	A_GND	42	A_GND
10	VREF2	43	TX_ETH_P
11	IN_LMBD4_VS-	44	IN_AN09
12	IN_PKUP2N	45	IN_AN14
13	IN_LMBD1_IP+	46	IN_AN06
14	IN_LMBD2_VS+	47	IN_AN04
15	IN_TEMP1	48	IN_AN12
16	IN_LMBD4_VS+	49	IN_AN01
17	A_GND	50	VREF1
18	IN_SPD_4	51	RX_ETH_P
19	IN_SPD_5	52	IN_AN13
20	SHIELD	53	IN_AN16
21	IN_LMBD2_VS-	54	IN_AN05
22	IN_TEMP2	55	VREF4
23	IN_TEMP3	56	A_GND
24	A_GND	57	VREF3
25	IN_LMBD3_IP+	58	RX_ETH_N
26	IN_LMBD3_VS-	59	CAN2_L
27	IN_TC1N	60	IN_AN15
28	IN_TC1P	61	CAN_2_T
29	IN_LMBD3_VS+	62	CAN_3_T
30	IN_PKUP1N	63	A_GND
31	IN_PKUP1P	64	CAN2_H
32	IN_TEMP4	65	CAN3_L
33	IN_AN11	66	CAN3_H

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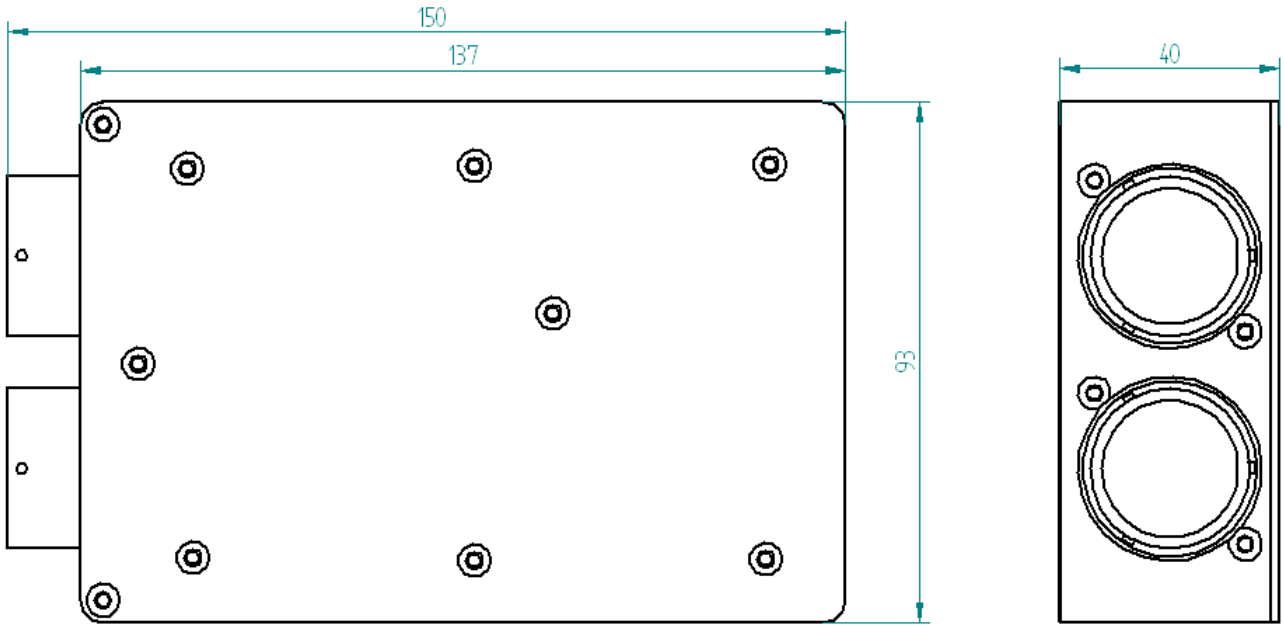
Dimensions (mm)



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