Compact controllers

E-Series
E102

Contents

User manuals

Versions：Av6

User manual
Contents

Historical records

Version	Date	Release	Editor	Description
Av2	2021/11/8	N	ChenMo	Initial Version
Av3	2021/11/9	N	ChenMo	Modify port description
Av4	2021/12/27	N	ChenMo	Modify current rating
Av5	2022/3/7	N	ChenMo	Modify pair of plug-in information
Av6	2022/4/1	N	ChenMo	Update order number

1. Security instructions

1.1. Copyright

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1.2. Preface

This manual has been verified and reviewed for accuracy. The instructions and descriptions contained in this manual are accurate for the E102 controller at the time of publication. However, future issues of the E102 controller and its manual are subject to change without notice. Xuzhou Mook Electro-Hydraulic Co., Ltd. assumes no liability for damages arising directly or indirectly from errors, omissions or discrepancies between the product and the manual.

1.3. Marking of notices

Icon	Meaning	Detailed instructions
	DANGEROUS	It can be predicted to cause unavoidable serious injury, death or property damage
	WARNING	May result in unavoidable serious injury, death or property damage
	NOTE	This may result in minor injuries and losses
	INSTRUCTION	Non-safety-related usage guidance and information
	ANNOTATION	Additional instructions or usage recommendations

2. Product introduction

2.1. Product Description

2.2. Port Description

Input ports	Number of ports	Parameters
DIH/DIL	4	Default to high active switch inputs; Multiplexable as low active switch input
DIH	4	High effective switching inputs
PI/DIH	4	Default to frequency input; Can be multiplexed as a high effective switching input
RI/DIL	4	0 to 15 KΩ resistive type analogue input by default; May be multiplexed as a low valid switch input;
AI/DIH	8	0~5V voltage type analog input by default; Multiplexable as 4~20mA current type analog input; Multiplexable as a high effective switching input;
Output ports	**Number of ports**	**Parameters**
PWM(CC)/DOH	8	PWM output by default with current feedback; May be multiplexed to a 2A high-side output;
PWM/DOH	4	Default to 2A high-side output; Can be multiplexed to PWM output
DOH	10	Default to 2A high-side output;
AO	2	0-5V output
+5VOUT	1	5V power output

2.3. Technical parameters

Technical parameters	
Operating Voltage	8~36V DC
Operating temperature	-40℃~+75℃
Storage Temperature	-40℃~+85℃
Relative Humidity	45%~90%
Current consumption	No load, in 12V vehicle electrical systems: 200mA No load, in 24 V vehicle electrical systems: 100mA
Maximum load current	15A
Processor unit	32Bit 180MHz
Parameter space	32KB FRAM
Protection class	IP66/67
External dimensions	158.6mm × 111mm × 40.4mm
Communication interface	CAN2.0B
Programming method	Codesys,simulink

Testing standards	
Low temperature test	Execution standard: GB/T2423.01/IEC60068-2-1 -40℃Low temperature start test, 10 times, normal start -40℃Low temperature working test for 16h -40℃Low temperature storage test for 72h
High temperature testing	Execution standard: GB/T2423.02/IEC60068-2-2 +75℃ high temperature full load working test 16h +85℃ high temperature storage test 72h
Temperature shock testing	Execution standard: GB/T2423.22/IEC60068-2-14 Low temperature -40℃, high temperature 85℃, high and low temperature changeover time 3min, cycle times 10 times
Temperature and humidity cycle testing	Execution standard: GB/T2423.34/IEC60068-2-38 High temperature 65±2℃, 93±3%; room temperature 25±2℃, 93±3%; low temperature -10℃, 24h for one cycle, carry out ten cycles
Vibration testing	Execution standard: GB/T2423.10/IEC60068-2-6 Sine vibration Vibration (sine) 30Hz, 4g, vertical 4h, horizontal left, right, front and rear 2h each, total 8h Execution standard: GB/T2423.56/IEC60068-2-64 Random vibration 10Hz~20Hz Amplitude 3mm 20Hz~2000Hz, peak acceleration 50m/s2 Sweeping frequency 1oct/min, 2 times according to the number of up and down direction, front and back direction, left and right direction in turn, for 24h
Impact testing	Execution standard: GB/T2423.5/IEC60068-2-27 30g/11ms, half sine wave, 100 times in each of the three axes
Drop test	Execution standard: GB/T2423.8/IEC60068-2-32 Transport condition (with bubble bag packaging), drop height 1000mm, 2 times
Salt spray resistance	Execution standard: GB/T2423.17/IEC60068-2-11 Under 35℃, 5% sodium chloride salt spray environment, 96h test without electricity, no corrosion of shell, connectors and other parts after the test, normal operation after access to test voltage
EMC	EN 61000-6-2:2005; EN 61000-6-4: 2011; ISO 7637 Immunity; ISO 11452 Immunity; ISO 16750 Immunity

2.4. Order Number

Serial No.	Material No.	Material Description
1	234491	Controller，E102
2	236257	Controller，E103
3	236260	Controller，E104
4	236259	Controller，E105
5	234677	Controller，E106

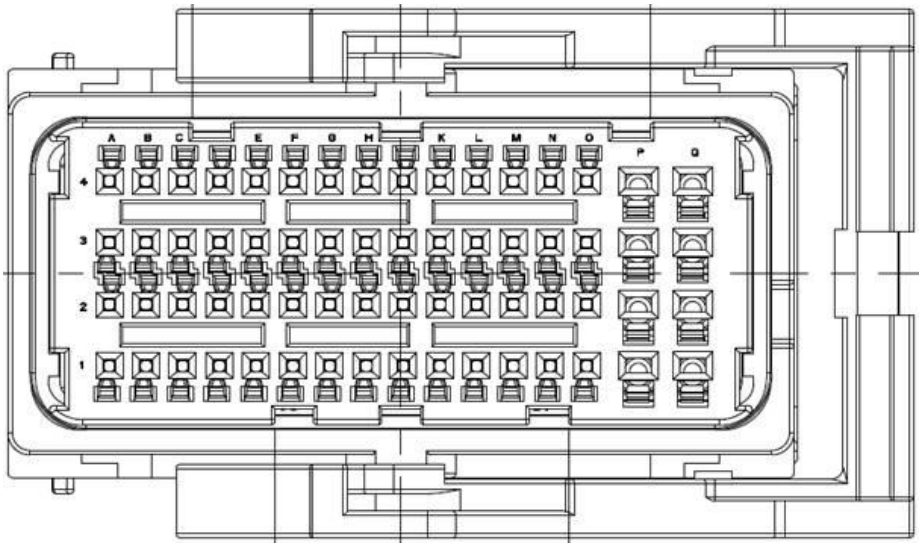
2.5. Product code description

3. Port Description

3.1. Connector

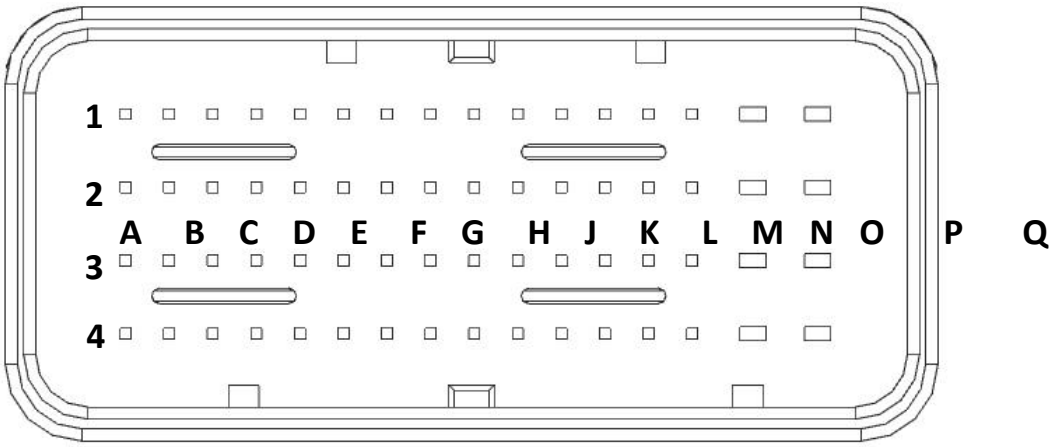
The connector for the E-Series controller is the AMP2209129 sixty-four pin socket.

3.2. List of plug-ins



Serial No.	Related accessories	Type	Order No.	Producers
1	Sixty four pole hole type plugs	2050036-1	508982	TE
2	Large Terminals	638652-1	508983	TE
3	Small terminals	968221-1	508984	TE
4	Large blind plug	1670108-1	508985	TE
5	Small blind plug	1394871-1	508981	TE

3.3. Pin definition



Pin	Port Definition	Main Function	Alternative Function 1	Alternative Function 2
A1	DOUT9	HS DO 2A		
B1	PWM1	HS DO 2A	PWM（50~1000HZ）2A	
C1	PWM2	HS DO 2A	PWM（50~1000HZ）2A	
D1	DOUT10	HS DO 2A		
E1	PWM3	HS DO 2A	PWM（50~1000HZ）2A	
F1	PWM4	HS DO 2A	PWM（50~1000HZ）2A	
G1	PWM5	HS DO 2A	PWM（50~1000HZ）2A	DOCC 2A
H1	PWM6	HS DO 2A	PWM（50~1000HZ）2A	DOCC 2A
J1	PWM7	HS DO 2A	PWM（50~1000HZ）2A	DOCC 2A
K1	PWM8	HS DO 2A	PWM（50~1000HZ）2A	DOCC 2A
L1	PWM9	HS DO 2A	PWM（50~1000HZ）2A	DOCC 2A
M1	PWM10	HS DO 2A	PWM（50~1000HZ）2A	DOCC 2A
N1	PWM11	HS DO 2A	PWM（50~1000HZ）2A	DOCC 2A
O1	PWM12	HS DO 2A	PWM（50~1000HZ）2A	DOCC 2A
P1	UBP	Power Supplies		
Q1	UBP	Power Supplies		
A2	DOUT1	HSDO 2A		
B2	DOUT2	HSDO 2A		
C2	DOUT3	HSDO 2A		
D2	DOUT4	HSDO 2A		
E2	DI1	DIH		
F2	DI2	DIH		
G2	DI3	DIH		
H2	DI4	DIH		
J2	DI5	DIH	DIL	
K2	DI6	DIH	DIL	
L2	+5VOUT	5V reference supply ,100mA		
M2	AGND	Analog Ground		
N2	DOUT5	HSDO 2A		
O2	DOUT6	HSDO 2A		
P2	UBP	Power Supplies		

(Continued from the table on the previous page)

Pin	Port Definition	Main Function	Alternative Function 1	Alternative Function 2
Q2	BSL	Bootloader select Line		
A3	DOUT7	HSDO 2A		
B3	DOUT8	HSDO 2A		
C3	AO1	AI 0~5V	AI 30mA	
D3	AO2	AI 0~5V	AI 30mA	
E3	AI1	AI 0~5V	AI 4~20mA	DIH
F3	AI2	AI 0~5V	AI 4~20mA	DIH
G3	AI3	AI 0~5V	AI 4~20mA	DIH
H3	AI4	AI 0~5V	AI 4~20mA	DIH
J3	CAN1_H	CAN1_H		
K3	CAN1_L	CAN1_L		
L3	CAN2_H	CAN2_H		
M3	CAN2_L	CAN2_L		
N3	DI7	DIH	DIL	
O3	DI8	DIH	DIL	
P3	AI11	RI 0~15KΩ	DIL	
Q3	AI12	RI 0~15KΩ	DIL	
A4	TXDOUT	RS232 serial port transmission		
B4	RXDIN	RS232 serial port reception		
C4	AI5	AI 0~5V	AI 4~20mA	DIH
D4	AI6	AI 0~5V	AI 4~20mA	DIH
E4	AI7	AI 0~5V	AI 4~20mA	DIH
F4	AI8	AI 0~5V	AI 4~20mA	DIH
G4	AI9	RI 0~15KΩ	DIL	
H4	AI10	RI 0~15KΩ	DIL	
J4	PI1	PI, 10HZ~15KHZ	DIH	
K4	PI2	PI, 10HZ~15KHZ	DIH	
L4	PI3	PI, 10HZ~15KHZ	DIH	
M4	PI4	PI, 10HZ~15KHZ	DIH	
N4	PGND	Power ground		
O4	PGND	Power ground		
P4	PGND	Power ground		
Q4	UBS	System supply		

3.4. Schematic Diagram

- Cautions：

(1) Short circuit or low resistance connection between case screw and vehicle ground.

(2) System power supply UBS supplies the internal electronics and power supply UBP supplies the PWM outputs and switching outputs.

(3) CAN bus requires 120Ω termination resistor.

(4) The fuse size of the power output power supply matches the maximum current consumption of the PWM output and the switching outputs and does not exceed 15A.

(5) The PWM output comes with current feedback, the duty cycle of each channel can be adjusted separately and the frequency can be adjusted uniformly.

3.5. Specification of Inputs and Outputs

3.5.1. Power supply

(1) Functional description: System power supply UBS, which supplies power to the internal electronics; power supply UBP, which supplies power to the PWM outputs and switching outputs.

(2) Pin number: UBS pin is Q4; UBP pins include P1, Q1 and P2.

The above power supply pins all use 1.5mm2 wire diameter and support a maximum of 10A current on a single pin.

3.5.2. Ground

(1) Functional description: M2 is the analogue ground, the rest of the ground signals are the power ground GND.

(2) Pin number: M2, N4, O4, P4

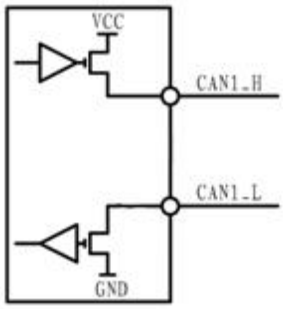
Among the above ground pins, N4, O4 and P4 use 1.5mm2 wire diameter, single pin supports a maximum of 10A current; M2 uses 0.75mm2 wire diameter, single pin supports a maximum of 5A current.

3.6. Communication port

3.6.1. CAN1

(1) Pin number: J3, K3

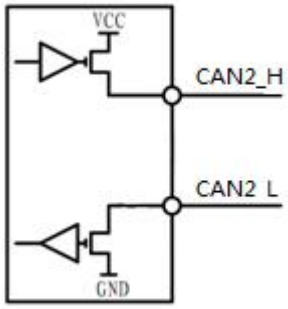
(2) Port parameters:

CAN1	
CAN Diagram	
Communication type	CAN2.0B
Port protection	protection functions1:CAN Line short-circuit to UB protection functions2: CAN Line short-circuit to GND.
Terminal resistance	No built-in terminal resistance

3.6.2. CAN2

（1） Pin number:L3,M3

（2）Port parameters:

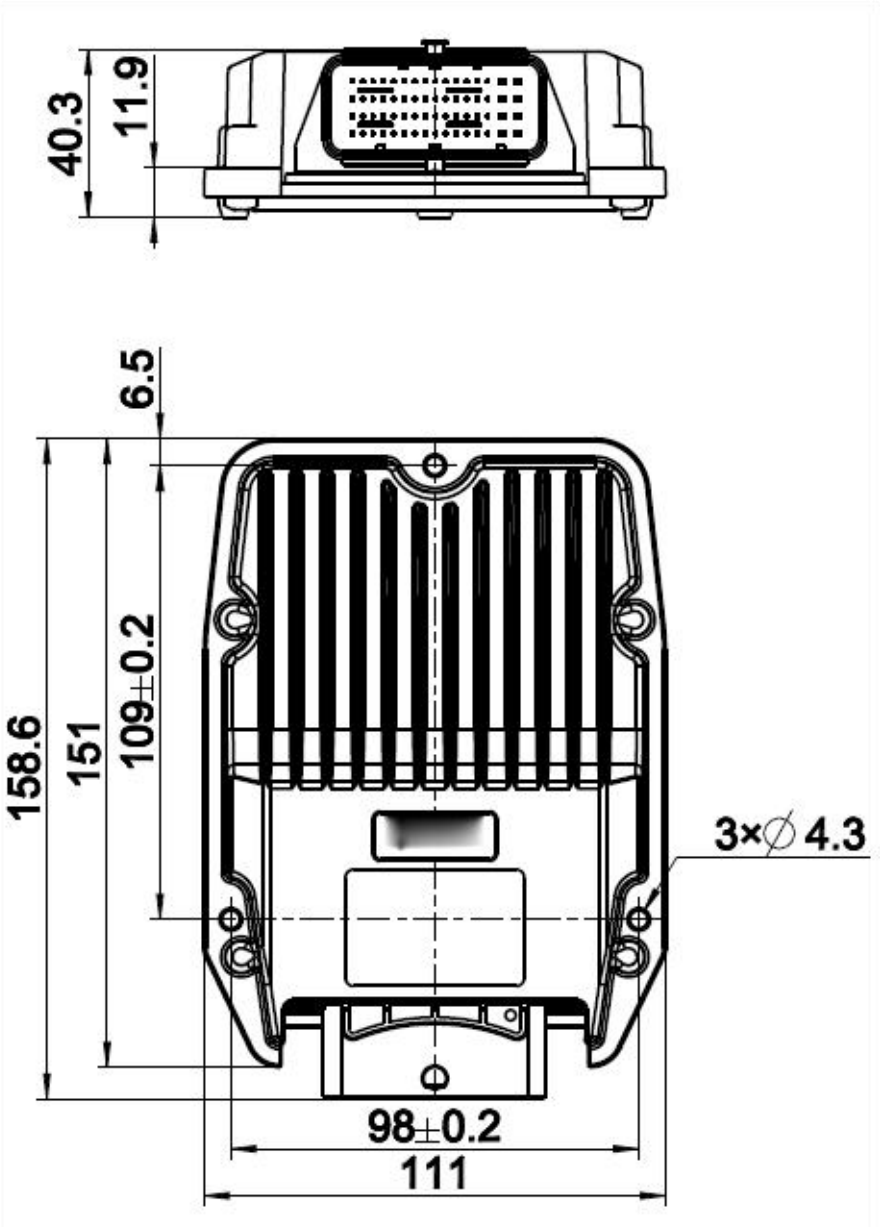
CAN2	
CAN Diagram	
Communication type	CAN2.0B
Port protection	protection functions1:CAN Line short-circuit to UB protection functions2: CAN Line short-circuit to GND.
Terminal resistance	No built-in terminal resistance

4. Installation instructions

4.1. Pre-Installation Check

	INSTRUCTION
	Before installation, please check whether the power supply and wiring are completely corresponding, and whether the product status is intact and without bumps.

4.2. Physical Dimensions



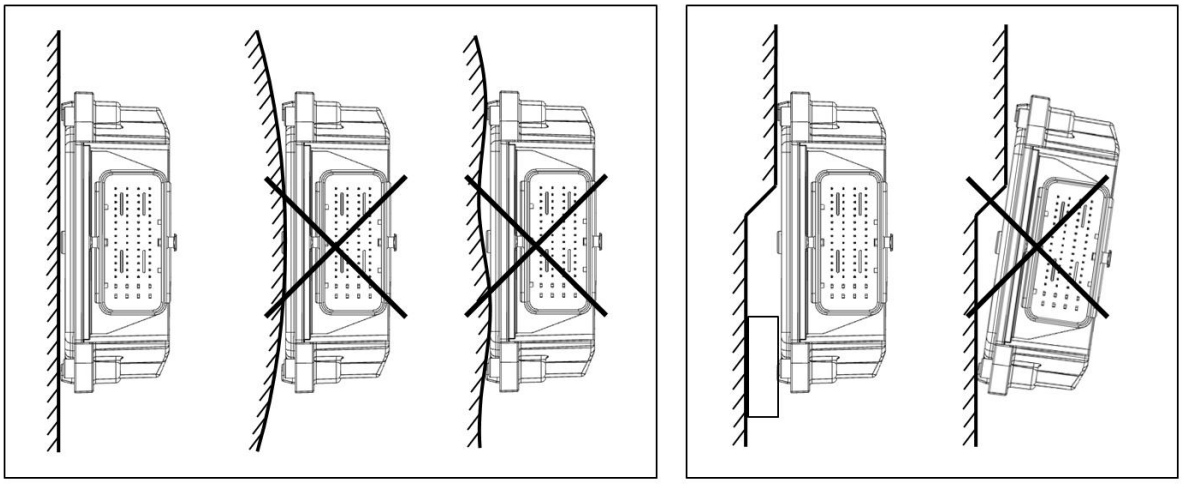
4.3. Mounting Option

Please ensure that the installation surface is flat and free of foreign objects. The mounting position should leave at least 100mm of mounting space in the direction of the connector to facilitate the unplugging of the connector.

	Caution
⚠	Please use suitable screws for installation to prevent damage to the product during placement and fastening.

4.4. Mounting planes

If the installation surface cannot be made level on site, please use a mat to assist in the installation.



5. Troubleshooting

5.1. hardware failures and solutions

number	questions	solution
1	The port has no output when powered on	First check whether the power supply is normal, if the power supply is normal, please contact our service staff to communicate and solve.
2	The port does not collect a signal after power-on	First check whether the signal voltage is normal, if it is normal, please contact our service staff to communicate and solve.
3	CAN communication failure after power-on	First of all, check whether the external CAN cable is connected correctly, if the connection is normal, please contact our service staff to solve the problem.