

Controller

F102



User's Manual

Version: Av2

Document Number:0000244331

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1. Version

Version	Date	Release	Author	Changes
Av1	2023/10/16	N	CM	First Edition

Av2	2023/11/1	Y	CM	Add wiring schematic
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2. Security instructions

2.1. Copyright

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2.2. Company Statement

This manual has been verified and reviewed for accuracy. The instructions and descriptions contained in this manual are accurate for the F102 controller at the time of publication. However, future F102 controllers and their manuals are subject to change without notice. Xuzhou Mook Electro-Hydraulic Control Co.,Ltd. shall not be liable for damages arising directly or indirectly from errors, omissions or discrepancies between the product and the manual.

2.3. Signs and meanings used in the manual

Marking	Meaning	Details
	Danger	Predictable leading to unavoidable serious injury, death or property damage
	WARNING	Likely to result in unavoidable serious injury, death or property damage
	Caution	May result in minor injuries and damages
	Hints	Non-safety related use instructions and information
	Note	Additional instructions or recommendations for use

3. Products

3.1. Products

F102 controller is a powerful controller product suitable for complex working conditions and specially designed and developed for the construction machinery industry. The product integrates a high-speed computing chip with port diagnostic function, which can make quick and accurate judgment on various fault types, facilitate the checking of port faults, improve the maintenance efficiency and reduce the maintenance cost.

F102 controller product features in line with EN ISO 13849-1:2015, PLd safety level requirements, safe and reliable, applicable to the complex environment of the construction machinery industry.

3.2. Technical Parameters

Technical Parameters	
Operating Voltage	8~36V DC, Rated 24V
Operating Temperature	-40℃~+85℃
Storage Temperature	-40℃~+85℃
Current consumption	<290mA@24V System
Maximum Load	30A
Processor Unit	32Bit 300MHz , 3 Core Processor
RAM Capacity	4MB
Parameter space	32KB FRAM, 1 billion times erasure
Flash space	6MB
Status Indicator	SYS Indicator, USER Indicator
Protection class	IP66/67 (with matching plug)
Environmental testing	
Low temperature test	Execution standard: GB/T2423.01/IEC60068-2-1 -40℃ low temperature start test, 10 times, start normal -40℃ low temperature working test 16h -40℃ low temperature storage test 72h
High temperature test	Execution standard: GB/T2423.02/IEC60068-2-2 +85℃ high temperature full load working test 16h +85℃ high temperature storage test 72h
Temperature shock test	Execution standard: GB/T2423.22/IEC60068-2-14 Low temperature -40℃, high temperature 85℃, high and low temperature conversion time 3min, cycle times 10 times
Temperature and humidity cycle test	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 a cycle, for ten cycles
Vibration test	Execution standard: GB/T2423.10/IEC60068-2-6 sinusoidal vibration Vibration (sinusoidal) 30Hz, 4g, 4h vertically, 2h horizontally left and right, front and back, total 8h Executive standard: GB/T2423.56/IEC60068-2-64 Random vibration 10Hz~20Hz Amplitude 3mm 20Hz~2000Hz, peak acceleration 50m/s ² . Sweep frequency 1oct/min, according to the up and down direction, front and back direction, left and right direction of the number of times in order to sweep the frequency 2 times, for 24h
Shock test	Execution standard: GB/T2423.5/IEC60068-2-27

	30g/11ms, half-sine wave, 6 times in each of the three axial directions
Drop Test	Execution standard: GB/T2423.8/IEC60068-2-32 Transportation status (with bubble bag packaging), drop height 1000mm, 2 times
Salt spray resistance test	Execution standard: GB/T2423.17/IEC60068-2-11 Under 35°C, 5% sodium chloride salt spray environment, 96h test in uncharged state, no rust and corrosion of shell, connector and other parts after the test, and work normally after connecting to the test voltage.
EMC	EN 61000-6-2:2005; EN 61000-6-4: 2011; ISO 7637 immunity; ISO 11452 immunity; ISO 16750 immunity

3.3. Port Overview

Input port	Number of ports	Parameter
DIL/DIH	6	Low validity switching inputs, software configurable to high validity
DIL_SR	1	Safe switching inputs
VI(0~32V)	3	0~32V analog input
VI/CI	20	0~5V analog input, can be multiplexed to 4~20mA inputs
RI (0~2K Ω)	2	0~2K Ω resistive analog input, software configurable to range from 0~337.7 Ω .
RI (0~50K Ω)	1	0~50K Ω resistive analog inputs
PI	9	PWM duty cycle input, can be multiplexed as frequency input.
Output port	Number of ports	Parameter
AO (0~5V)	2	0~5V analog output signal
DOH/PWM 2A	8	Switching output, 2A, multiplexable to PWM, without current feedback
PWM 1.5A	30	PWM output with chattering, 1.5A, with current feedback
DOL_SR	1	Safe low side output, 2A
DOH_SR	1	Safe high side output, 2A

3.4. Order No.

No.	Order No.	Product Name	Remarks
1	236337	Controller, F102	No built-in termination resistor, CAN2 can be equipped with built-in termination resistor.
2	241939	Controller, F102	CAN1 and CAN0 have built-in terminating resistors, CAN2 can be equipped with built-in terminating resistors.

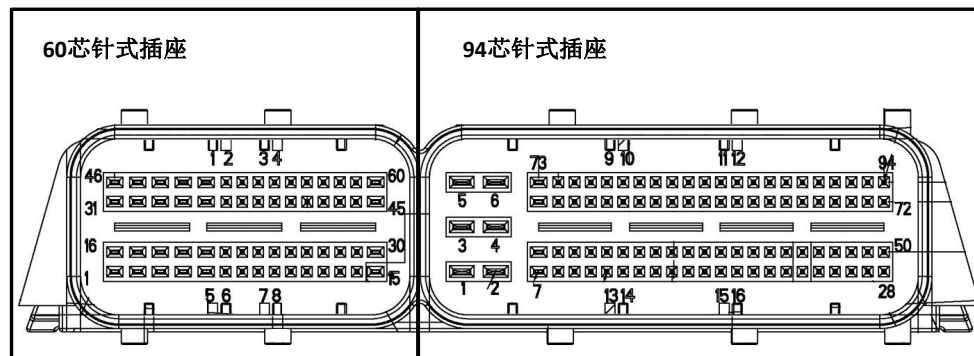
4. Port Description

4.1. Electrical interface

- The F102 controller utilizes a TE 154 pole waterproof connector.

4.2. Pin Definition

- The 154-pole connector used in the F102 controller can be categorized into 60-pole pin sockets and 94-pole pin sockets:



4.2.1. 60 pole pin socket

No.	Pin	Port Definition	Function Description
101	1	PSOL8	PWM Output with Dither, 1.5A
102	2	PSOL10	PWM Output with Dither, 1.5A
103	3	PSOL12	PWM Output with Dither, 1.5A
104	4	PSOL14	PWM Output with Dither, 1.5A
105	5	SOL_GND	Loop ground for high side output
106	6	SOL_GND	Loop ground of high-side output
107	7	A_IN1_1	0-5V analog input, multiplexable to 4-20mA inputs
108	8	A_IN1_3	0-5V analog input, multiplexable to 4-20mA inputs
109	9	A_IN1_5	0-5V analog input, multiplexable to 4-20mA inputs
110	10	A_IN1_7	0-5V analog input, multiplexable to 4-20mA inputs
111	11	A_IN2_0	0-32V analog input
112	12	A_IN2_2	0-32V analog input
113	13	A_IN3_1	0-2K Ω resistive analog input, software configurable range 0-337.7 Ω
114	14	N.C.	blank pin
115	15	FS_OUT	Safe Switching High Side Output, 2A
116	16	PSOL9	PWM Output with Dither, 1.5A
117	17	PSOL11	PWM Output with Dither, 1.5A
118	18	PSOL13	PWM Output with Dither, 1.5A
119	19	PSOL15	PWM Output with Dither Function, 1.5A
120	20	SOL_GND	Loop ground for high-side output
121	21	A_IN1_0	0-5V analog input, multiplexable to 4-20mA inputs
122	22	A_IN1_2	0-5V analog input, multiplexable to 4-20mA inputs
123	23	A_IN1_4	0-5V analog input, multiplexable to 4-20mA inputs
124	24	A_IN1_6	0-5V analog inputs, multiplexable to 4-20mA inputs

(Continued from previous page)

No.	Pin	Port Definition	Function Description
125	25	A_IN1_8	0-5V analog input, multiplexable to 4-20mA inputs
126	26	A_IN2_1	0-32V analog input
127	27	A_IN3_0	0-2K Ω resistive analog input, software configurable to 0-337.7 Ω range
128	28	A_IN4_0	0-50K Ω resistive analog inputs
129	29	RESET_COM	Software burn-in control line, grounded and powered up into burn-in mode
130	30	FS_OUTGND	Safe Switching Low Side Output, 2A
131	31	PSOL0	PWM Output with Dither, 1.5A
132	32	PSOL2	PWM Output with Dither, 1.5A
133	33	PSOL4	PWM Output with Dither, 1.5A
134	34	PSOL6	PWM Output with Dither, 1.5A
135	35	SOL_GND	Loop ground for high-side output
136	36	SOL_GND	Loop ground for high-side output
137	37	A_IN1_10	0-5V analog input, multiplexable to 4-20mA input
138	38	A_IN1_12	0-5V analog input, multiplexable to 4-20mA input
139	39	A_IN1_14	0-5V analog input, multiplexable to 4-20mA inputs
140	40	A_IN1_16	0-5V analog input, multiplexable to 4-20mA inputs
141	41	A_IN1_18	0-5V analog input, multiplexable to 4-20mA inputs
142	42	S_PWR1	Sensor power supply 1, 5V (3 pins total current 500mA)
143	43	S_PWR1	Sensor power supply 1, 5V (3 pins total current 500mA)
144	44	S_GND1	Reference ground for sensor power supply 1
145	45	N.C.	Empty pin
146	46	PSOL1	PWM Output with Dither, 1.5A
147	47	PSOL3	PWM Output with Dither, 1.5A
148	48	PSOL5	PWM Output with Dither, 1.5A
149	49	PSOL7	PWM output with dither function, 1.5A
150	50	SOL_GND	Loop ground for high-side output
151	51	A_IN1_9	0-5V analog input, multiplexable to 4-20mA inputs
152	52	A_IN1_11	0-5V analog input, multiplexable to 4-20mA inputs
153	53	A_IN1_13	0-5V analog input, multiplexable to 4-20mA inputs
154	54	A_IN1_15	0-5V analog input, multiplexable to 4-20mA inputs
155	55	A_IN1_17	0-5V analog input, multiplexable to 4-20mA inputs
156	56	A_IN1_19	0-5V analog input, multiplexable to 4-20mA inputs
157	57	S_PWR1	Sensor power supply 1, 5V (total current 500mA on 3 pins)
158	58	S_GND1	Reference ground for sensor power supply 1
159	59	S_GND1	Reference ground for sensor power supply 1
160	60	N.C.	Empty pin

4.2.2. 94 pole pin socket

No.	Pin	Port Definition	Function Description
201	1	UBP	Power Supply, 6A
202	2	UBP	Power Supply, 6A
203	3	UBP	Power Supply, 6A

204	4	GND	Power Supply Ground
205	5	GND	Power supply ground
206	6	GND	Power supply ground

(Continued from previous page)

No.	Pin	Port Definition	Function Description
207	7	UBP	Power Supply, 6A
208	8	UBS	System Power Supply, 2A
209	9	S_GND2	Reference Ground for Sensor Power Supply 2
210	10	S_PWR2	Sensor power supply 2, 5V (3 pins total 500mA)
211	11	S_PWR2	Sensor power supply 2, 5V (3 pins total current 500mA)
212	12	PI1	PWM duty cycle input, multiplexable as frequency quantity input
213	13	PI3	PWM duty cycle input, multiplexable as frequency input
214	14	PI5	PWM duty cycle input, multiplexable as frequency input
215	15	PI7	PWM duty cycle inputs, multiplexable to frequency inputs
216	16	CANMH	CAN bus, CANMH
217	17	SHIELD	Shielded Ground
218	18	CANOH	CAN Bus, CANOH
219	19	CAN1H	CAN Bus, CAN1H
220	20	SHEILD	Shielded Ground
221	21	SWIN1	Low valid switching inputs, software configurable to high validity
222	22	SOL_GND	Loop ground for high-side output
223	23	SOL_GND	Loop ground for high-side output
224	24	PSOL24	PWM output with dither function, 1.5A
225	25	PSOL26	PWM Output with Dither, 1.5A
226	26	PSOL28	PWM output with dither function, 1.5A
227	27	AO1	0-5V analog output
228	28	FS_PWR_VCC	Safety Switching Input Power Supply, 5V
229	29	UBP	Power Supply, 6A
230	30	S_GND2	Reference ground for sensor power supply 2
231	31	S_GND2	Sensor power supply 2 reference ground
232	32	S_PWR2	Sensor power supply 2, 5V (total current 500mA on 3 pins)
233	33	PI0	PWM duty cycle input, multiplexable to frequency inputs
234	34	PI2	PWM duty cycle input, multiplexable to frequency input
235	35	PI4	PWM duty cycle input, multiplexable to frequency input
236	36	PI6	PWM duty cycle input, multiplexable to frequency inputs
237	37	PI8	PWM duty cycle inputs, multiplexable to frequency inputs
238	38	CANML	CAN bus, CANML
239	39	SHEILD	Shielded Ground
240	40	CANOL	CAN Bus, CANOL
241	41	CAN1L	CAN bus, CAN1L
242	42	SWIN0	Low valid switching inputs, software configurable to high validity
243	43	SWIN2	Low valid switching inputs, software configurable to high validity
244	44	SOL_GND	Loop ground for high-side output
245	45	SOL_GND	Loop ground for high-side output
246	46	PSOL25	PWM output with dither function, 1.5A
247	47	PSOL27	PWM Output with Dither, 1.5A
248	48	PSOL29	PWM output with dither function, 1.5A
249	49	AO2	0-5V analog output

250	50	N.C.	Empty Pins
251	51	GND	Power Supply Ground
252	52	DSOL0	Switching output, 2A, multiplexable to PWM, without current feedback

(Continued from previous page)

No.	Pin	Port Definition	Function Description
253	53	DSOL2	Switching Output, 2A, Multiplexable to PWM without Current Feedback
254	54	DSOL4	Switching Output, 2A, Multiplexable to PWM without Current Feedback
255	55	DSOL6	Switching Output, 2A, Multiplexable to PWM without Current Feedback
256	56	SOL_GND	Loop ground for high-side output
257	57	CAN2H	CAN Bus, CAN2H
258	58	CAN2TH	CAN Bus Wiring Configuration with Built-in Terminating Resistor, CAN2TH
259	59	SHEILD	Shielded Ground
260	60	CAN3H	CAN bus, CAN3H
261	61	BSL	Serial BSL cable, grounded and powered on in BSL mode
262	62	TXD	RS232 serial port send
263	63	SWIN3	Low valid switch input, can be configured to high valid by software
264	64	SWIN5	Low valid switching input, software configurable to high validity
265	65	SOL_GND	Loop ground of high-side output
266	66	SOL_GND	Loop ground of high-side output
267	67	PSOL16	PWM Output with Dither, 1.5A
268	68	PSOL18	PWM Output with Dither, 1.5A
269	69	PSOL20	PWM Output with Dither, 1.5A
270	70	PSOL22	PWM Output with Dither, 1.5A
271	71	N.C.	Empty Pins
272	72	FS_SWIN	Safe switching input
273	73	GND	Power Supply Ground
274	74	DSOL1	Switching Output, 2A, Multiplexable to PWM without Current Feedback
275	75	DSOL3	Switching Output, 2A, Multiplexable to PWM without Current Feedback
276	76	DSOL5	Switching Output, 2A, Multiplexable to PWM without Current Feedback
277	77	DSOL7	Switching Output, 2A, Multiplexable to PWM without Current Feedback
278	78	SOL_GND	Loop Ground for High Side Output
279	79	CAN2L	CAN Bus, CAN2L
280	80	CAN2TL	CAN bus wiring configuration with built-in termination resistor, CAN2TL
281	81	SHEILD	Shielded Ground
282	82	CAN3L	CAN Bus, CAN3L
283	83	GND	RS232 signal ground
284	84	RXD	RS232 serial port reception
285	85	SWIN4	Low valid switching input, software configurable to high validity
286	86	SOL_GND	Loop ground for high side output
287	87	SOL_GND	Loop ground for high side output
288	88	SOL_GND	Loop ground for high side output
289	89	PSOL17	PWM Output with Dither, 1.5A
290	90	PSOL19	PWM Output with Dither, 1.5A

291	91	PSOL21	PWM Output with Dither, 1.5A
292	92	PSOL23	PWM Output with Dither, 1.5A
293	93	N.C.	Empty Pins
294	94	N.C.	Empty Pins

4.3. List of connectors

➤ 60-pole pin plug:

No.	Management No.	Description	Quantity
1	510436	Sixty pole eyelet plug, 2209544-9	1
2	510430	Sixty pole outlet cover, 2137753-1	1
3	510431	Sixty-pole secondary lock, 6-1355118-1	1
4	510437	Wrench, 2137752-1	1
5	509285	Hole Terminals, 1241608-1	24
6	509284	Hole Terminals, 968221-1	36

➤ 94 芯插头:

No.	Management No.	Description	Quantity
1	510435	Ninety-four pole outlet plug, 2209545-9	1
2	510434	94 pole outlet cover, 2137755-1	1
3	510433	94 pole secondary lock, 6-1355134-1	1
4	510432	94 pole secondary lock, 6-1355135-1	1
5	510437	Wrench, 2137752-1	1
6	509284	Hole Terminals, 1241394-1	6
7	509285	Hole Terminals, 1241608-1	4
8	508984	Hole Terminals, 968221-1	84
9	509289	Watertight Plugs, 828905-1	6
10	509288	Blind Plugs, 828922-1	2 for 1 with waterproof plugs, max. 6

4.4. Port Detailed Parameters

4.4.1. DI

➤ DIL/DIH:

Switching Input Port number: 94 pole pin socket: 21, 42, 43, 63, 64, 85	Low valid switch input, can be configured as high valid switch input by software Threshold voltage: >4V is judged as high level, <1V is judged as low level. Input impedance of high valid switching input: 6.8K Ω . Pull-up resistance of low valid switching input: 16.8K Ω , pull-up to UBS.
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➤ DIL_SR:

Safe switching input Port no: 94 pole pin socket: 72	Safe switching input, low active Threshold voltage: >4 V judged as high, <1 V judged as low Pull-up resistor: 20 K Ω , pull-up to UBS
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4.4.2. PI

PWM duty cycle input/frequency input Port number: 94 pole pin socket: 12~15, 33~37	PWM duty cycle input/frequency input Input range: 1~15K Hz Threshold Voltage: Configurable Input impedance: pull-down resistor 20K Ω ; pull-up resistor 67K Ω
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AI

➤ **VI (0~32V):**

Analog Input Port number: 60 pole pin socket: 11, 12, 26	Voltage type analog input Input range: 0~32V Input impedance: 53.8 KΩ Resolution: 12 bits Accuracy: 2%FS Port Diagnostics: Disconnect/short circuit to ground, short circuit to power supply
---	---

➤ **VI/CI:**

Analog Input Port number: 60 pole pin socket: 7~10, 21~25, 37~41, 51~56	Voltage type analog input Input range: 0~5V Input impedance: 100.2 KΩ Resolution: 12 bits Accuracy: 2%FS Port Diagnostics: Disconnect/short circuit to ground, short circuit to power supply
	Current type analog input Input range: 4~20mA Input impedance: 200 Ω Resolution: 12 bits Accuracy: 2%FS Port Diagnostics: Disconnect/short circuit to ground, short circuit to power supply

➤ **RI (0~2K Ω):**

Analog Input Port number: 60 pole pin socket: 13, 27	Resistive analog input Input range: 10 Ω ~2K Ω Resolution: 12 bits Accuracy: 1%FS Pull-up resistance: 1K Ω , pull-up to 5V
---	---

➤ **RI (0~50k Ω):**

Analog Input Port number: 60 pole pin socket: 28	Resistive analog input Input range: 10 Ω ~50K Ω Resolution: 12 bits Accuracy: 10~2K Ω : 5%FS; 2K~3K Ω : 3%FS; 3K~15K Ω : 2%FS; 15K~50K Ω : 10%FS Pull-up resistor: 15K Ω , pull-up to 5V
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4.4.3. DO

➤ DOH/PWM:

Switching Output/PWM Output Port number: 94 pole pin socket: 52~55, 74~77	High-side switching output Built-in continuous current diode Driving current: 2A Port diagnostics: short to power; short to ground; load overrun (2A, 30s); disconnection.
	PWM high side output Built-in Continuous Current Diode Output frequency: 100~1000Hz Driving current: 2A Duty cycle: 0....100% adjustable Port diagnostics: short circuit to power; short circuit to ground; load overrun (2A, 30s); disconnection.

➤ DOH_SR:

Safe switching output Port number: 60 pole pin socket: 15	Safe high side switching output Built-in Continuous Current Diode Driving current: 2A Port diagnostics: short to power; short to ground; load overrun (2A, 30s); disconnection.
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➤ DOL_SR:

Safe switching output Port number: 60 pole pin socket: 30	Safe low-side switching output Built-in Continuity Diode Driving current: 2A Port diagnostics: short to power; short to ground; load overrun (2A, 30s); disconnection.
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4.4.4. AO

Analog Input Port number: 94 pole pin socket: 27, 49	Analog Input Output range: 0~5V Port diagnosis: short circuit to power supply, short circuit to ground, output voltage deviation of more than 5%
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4.4.5. PWM

PWM Output/Switching Output Port number: 60 pole pin socket: 1~4, 16~19, 31~34, 46~49 94 pole pin socket: 24~26, 46~48, 67~70, 89~92	PWM high side output Built-in continuous current diode with current feedback, with chattering function Output frequency: 100~1000Hz Driving current: 1.5A Duty cycle: 0....100% adjustable Current feedback range: 50~2000mA Current sampling accuracy: $\pm 1\%$ FS Float voltage: <10V, 10K Ω load can be pulled down to <0.5V Port diagnostics: short circuit to power; short circuit to ground; load overrun (1.5A, 30s); disconnection.
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4.5. Communications port

4.5.1. CAN1

CAN1	parameters
Baud Rate Range	50K, 100K, 125K, 250K, 500K, 1Mbit/s, software programmable
Default Baud Rate	250Kbit/s
Port Protection	CAN1_H and CAN1_L have short-circuit protection for UB and GND respectively.
Termination Resistance	236337 has no built-in termination resistor, 241939 has built-in termination resistor.

4.5.2. CAN2

CAN2	parameters
Baud Rate Range	50K, 100K, 125K, 250K, 500K, 1Mbit/s, software programmable
Default Baud Rate	250Kbit/s
Port Protection	CAN2_H and CAN2_L have short circuit protection for UB and GND respectively.
Termination Resistance	Connect CAN2TH to CAN2H and CAN2TL to CAN2L to realize the built-in terminating resistor function.

4.5.3. CAN3

CAN3	parameters
Baud Rate Range	50K, 100K, 125K, 250K, 500K, 1Mbit/s, software settable
Default Baud Rate	250Kbit/s
Port Protection	CAN3_H and CAN3_L have short-circuit protection for UB and GND respectively.
Termination Resistance	No built-in termination resistor

4.5.4. CANO

CANO	parameters
Baud Rate Range	50K, 100K, 125K, 250K, 500K, 1Mbit/s, software settable
Default Baud Rate	250Kbit/s
Port Protection	CAN4_H and CAN4_L have short circuit protection for UB and GND respectively.
Termination Resistance	236337 has no built-in termination resistor, 241939 has built-in termination resistor.

4.5.5. CANM

CANM	parameters
Baud Rate Range	50K, 100K, 125K, 250K, 500K, 1Mbit/s, software settable
Default Baud Rate	250Kbit/s
Port Protection	CAN4_H and CAN4_L have short-circuit protection for UB and GND respectively.
Termination Resistance	No built-in termination resistor

5. Installation Instructions

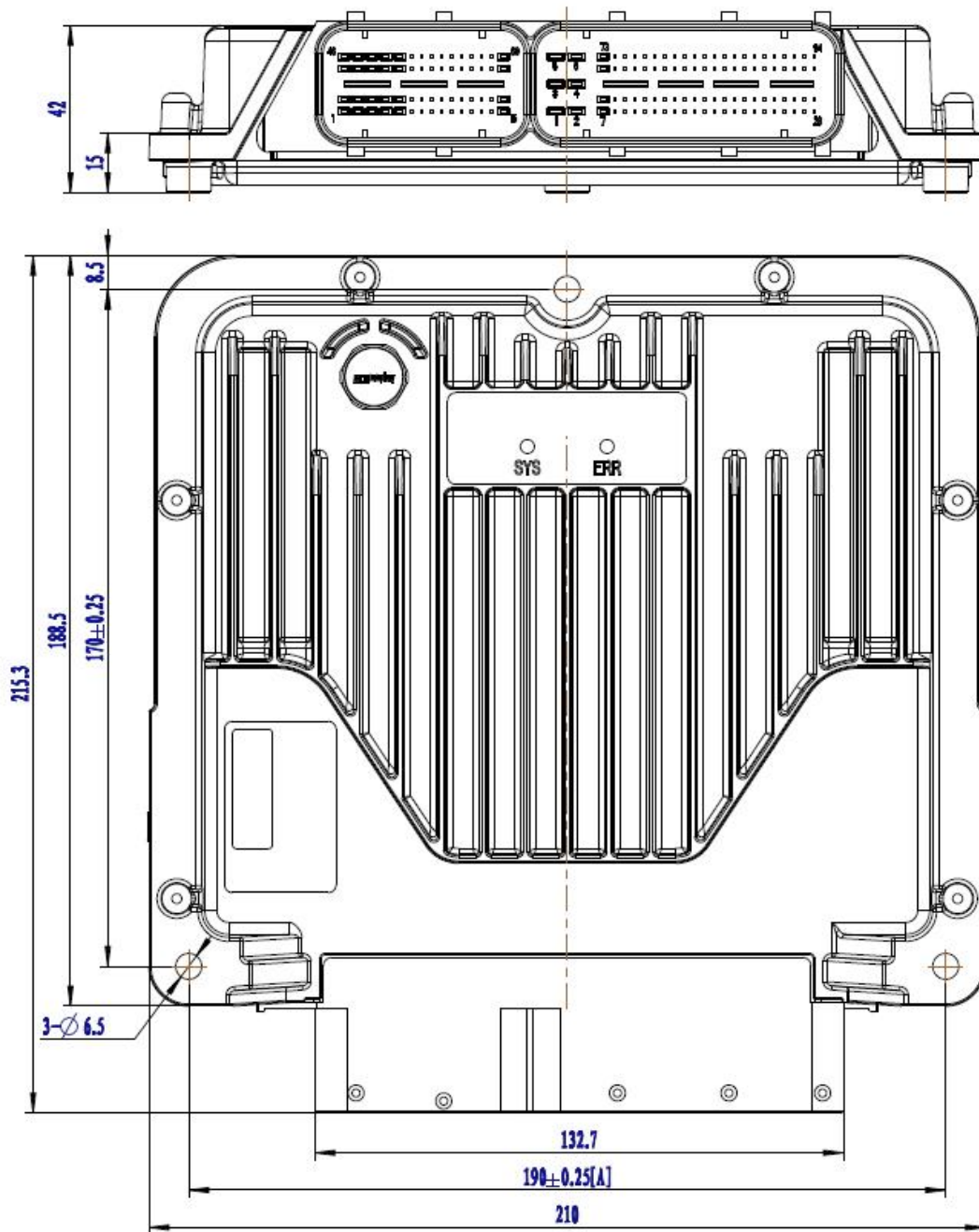
5.1. Pre-installation inspection



Tip:

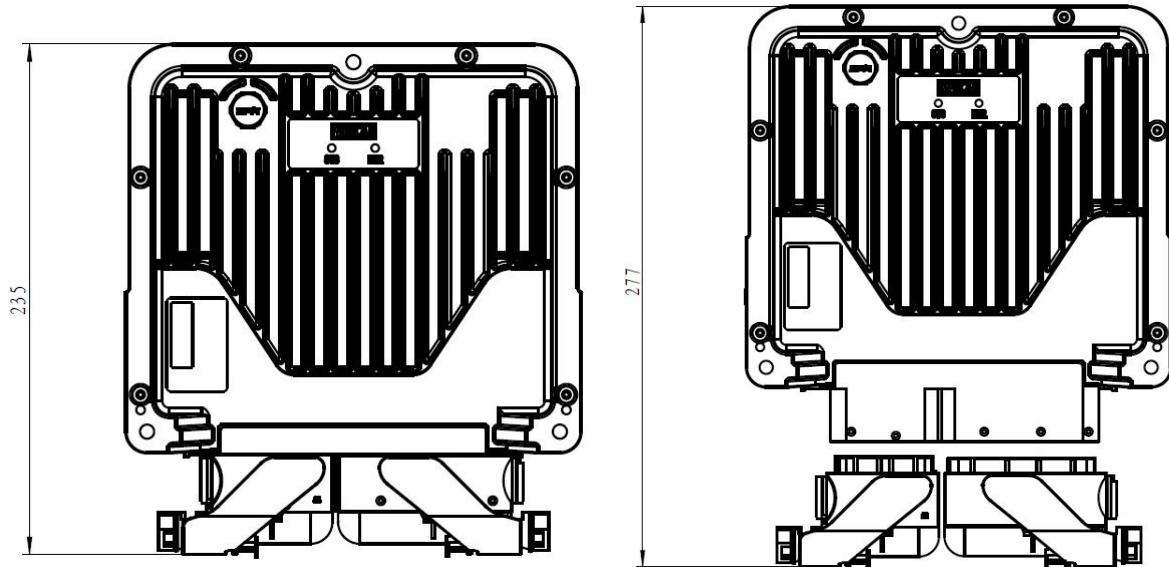
Before installation, please check whether the power supply and wiring are complete and correspond to each other, and whether the product is in good condition and free of bumps.

5.2. Outline and Installation Dimension Drawing

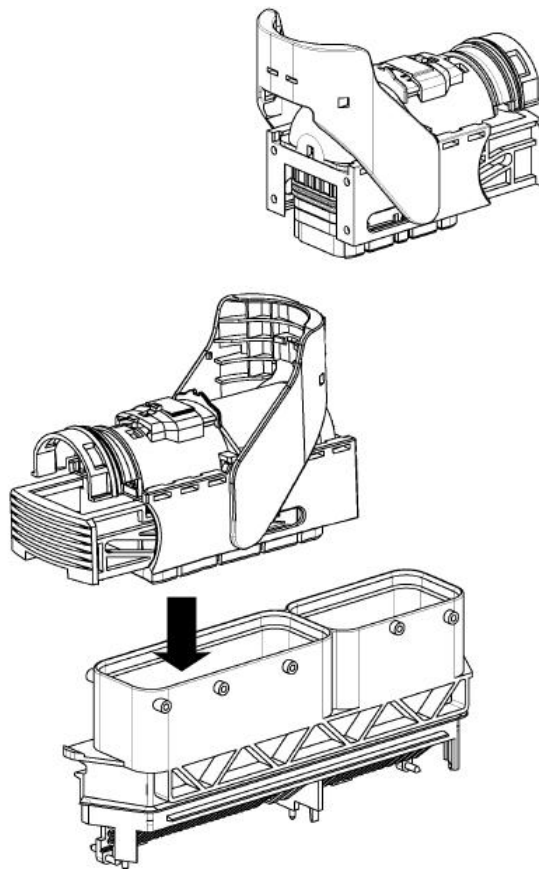


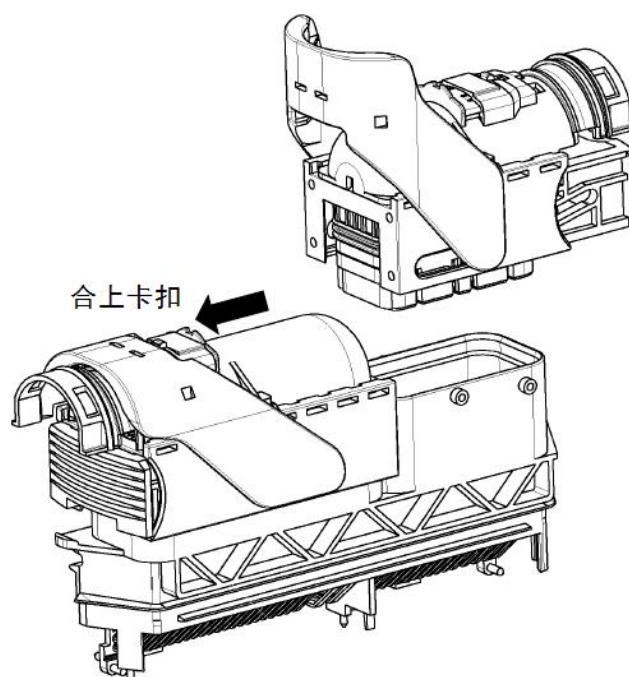
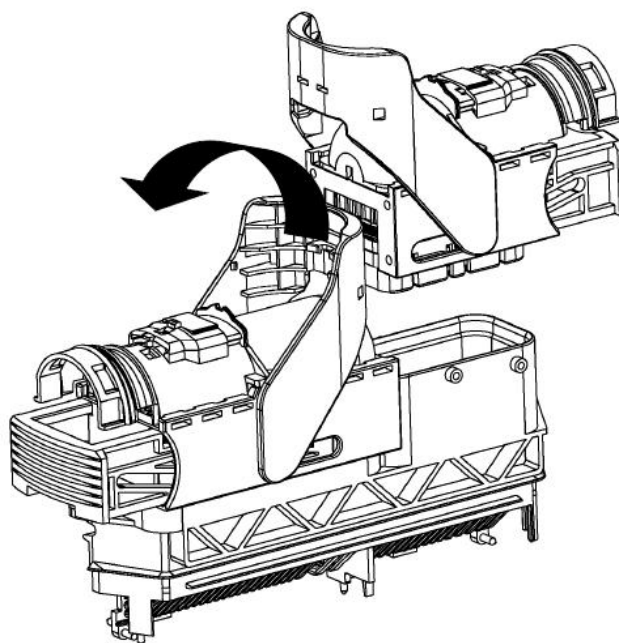
5.3. Mounting accessories

The F102 controller is mounted with 3 x M6 bolts/screws. The overall length of the F102 controller is 235mm when connected to the mating connector. Therefore, it is recommended to leave at least 60mm of mounting space at the controller connector for ease of insertion and removal:



➤ Counterbore fitting installation method:





6. Common Troubleshooting

6.1. Common Hardware Failures and Solutions

No.	FAQs	Solutions
1	No output from port after power on	First check whether the power supply is normal, if it is normal, please contact our service personnel to solve the problem.
2	No signal acquisition from port after power on	First check whether the signal voltage is normal, if normal, please contact with our service personnel to solve the problem.
3	CAN communication failure after power on	First check whether the external CAN cable is connected correctly, if the connection is normal, please contact with our service personnel to solve the problem.

6.2. Common Software Troubleshooting

No.	FAQs	Solutions
1	CodeSys online failure	(1) Please make sure whether the CAN device or serial port driver has been installed; (2) Please make sure whether the CAN device or serial port is occupied, if it is occupied, please close the application software and restart Gateway; (3) Please replace the Gateway.cfg file in the correct path.
2	Controller stops running after loading App program	Please make sure that there is no div 0 or overflow in the application program, if there is, the PLC program will stop and check the error message "May be div 0 or Overflow" in the Device Log.

6.3. Status Indicator Description

➤ The SYS lamp indicates the controller operating status:

System Status	LED Indication Type	Remarks
Unpowered	Out	
No underlay	White constant light	
BSL program upgrade in progress	White 2HZ blinking	
System startup in progress	Yellow Always On	
Low Voltage Alarm	Blue Always On	
CODESYS Online Wink Operation	Purple 5HZ blinking for 2 seconds	
Running but with errors	Red 2HZ blinking	When there is an underlying but no CODESYS application
Fatal error	Red Always On	For example in the case of FRAM checksum errors
CODESYS component operation error	Blue 2HZ blinking	
CAN bus error	Red 5HZ blinks 2 times for 2 seconds	
CAN receive buffer full error	Red 5HZ blinks 3 times at 2 second intervals	
Sensor power supply out of	Red 5HZ blinks 5 times at 2	

range exception	second intervals	
DO output current out of range	Red 5HZ blinks 5 times at 2 second intervals	
CODESYS application running normally	Green 2HZ blinking	
CODESYS application stopped	Green constant light	
CODESYS online download in progress	Green 5HZ blinking	

- The ERR indicator can be controlled by the customer according to their own product software.