



1. Overview

The ND/NS series controller is an advanced high-power permanent magnet synchronous motor controller, which has the advantages of high quality, high efficiency, and intelligence. The controller is designed for PMSM/BLDC motor with three hall sensors or encoder. It is suitable for various hall motor vehicle applications. It is suitable for middle and high speed motorcycles with BLDC hub motors, mid-mounted motors, and high-performance electric tricycles. Using high-quality imported MOS cores, full metal shielding and aluminum heat dissipation structure, the hardware architecture and software implementation have been perfectly matched and finely optimized. We can offer PMSM Motor with Encoder for customers also.

Item	Description
Control Mode	Dual current loop and FOC vector control
Speedometer signal	Isolated type pulse signal or CAN communication protocol
Regeneration	Can support regeneration brake function.
Protection Level	Fully sealed potting
Insulation level	DC1000V Leaking current 0.05
Working temp	-30℃~+55℃
Storage temp	-45℃~+85℃
Efficiency	99%
Cooling Type	Natural cooling
Vibration standard	GB/T2423
Cooling requirements	Good ventilation or increase air cooling by fans

Precise matching control function:

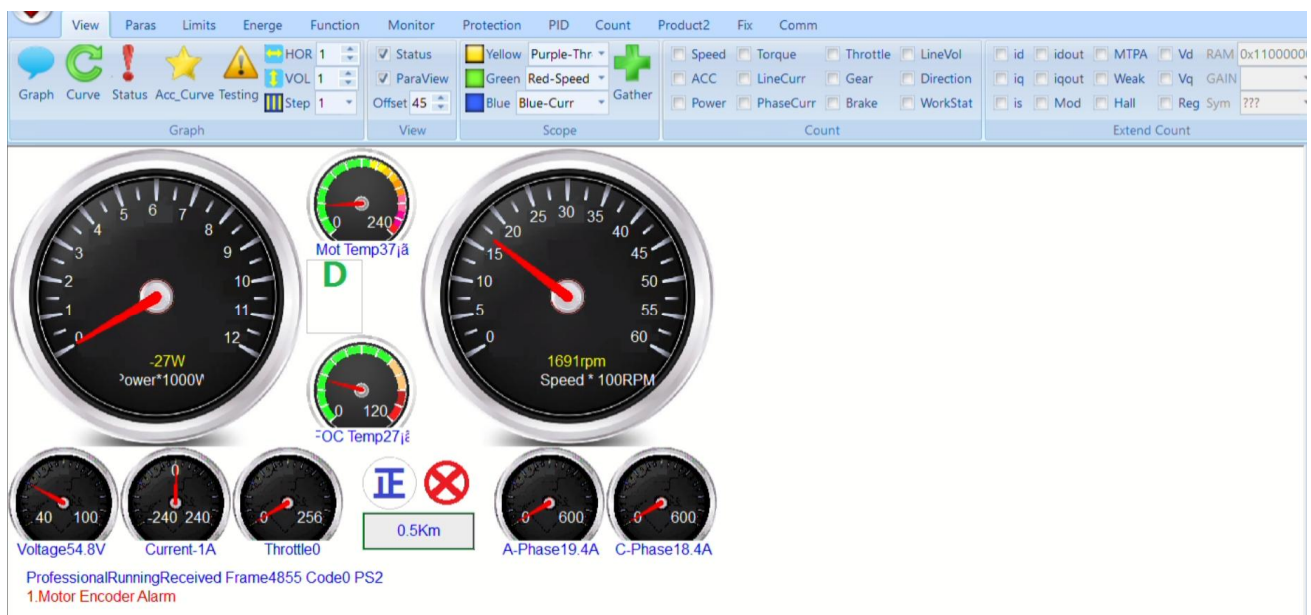
Using 32-bit intelligent microprocessor, matching high-precision motor angle encoder, and innovative vector control algorithm and intelligent control technology, the motor efficiency is maximized. The wide dynamic range of high efficiency enables the driving vehicle to still obtain strict cruising range requirements under comprehensive road conditions. Expand and highlight the advantages of comfort performance and field weakening expansion.



Anti-slipping function, maximum speed limit, electronic brake, regeneration brake function, current limit, host computer communication and other functions are all available.

Various software parameters configuration:

- Monitor and configure the controller through the visual computer interface, Android/iOS APP, and update and upgrade online.



- Current amount can be adjusted under different speeds in the user program.
- Can set up the speed value in forwarder and reversing direction. The speed value in Economy mode can be adjusted also.
- The battery bus current and motor phase current can be configured in the user program.
- The threshold values of acceleration throttle pedal can be adjusted to meet the different response sensitivity of pedal.

Feature:

This controller can support anti-theft, three speed function, low/high level brake switch input, Cruise/boost,

Anti-slip, Park function, regen, many many functions. We can configure different speed and current values under three speed mode. Under three speed modes, you can configure the speed limiting and current limitings for each speed mode.

It has CAN optional function. It can support different CAN baud rate configuration.

The auto-learn function can be used directly without using APP or PC user program. We will enable auto-learn function for each controller before shipment. The operation is easy. You just need to press the throttle to top position and the motor will run on two directions accordingly. After that, the auto-learn operation is finished successfully. We also can use brake on and off status to create mose code to finish auto learn. we also can use mose code to change the motor direction. Of course, it can support PC user program, Android APP and iPhone OS when you want to configure the parameters. The programming can be based on PC user program, Android APP or Iphone OS.

This controller can support field weakening function also. And it has more smooth operation for field weakening. The controllers can support 60 degrees hall sensor, 120 degrees sensor type and Encoder sensor type. can support many types of motor temp sensors such as PTC, NTC, KTY84-130, 83-122, 84-121.. Right now it can support releasing throttle regen mode and brake switch regen mode. It has low level brake switch and high level brake switch. It can support idle speed for electric vehicle.

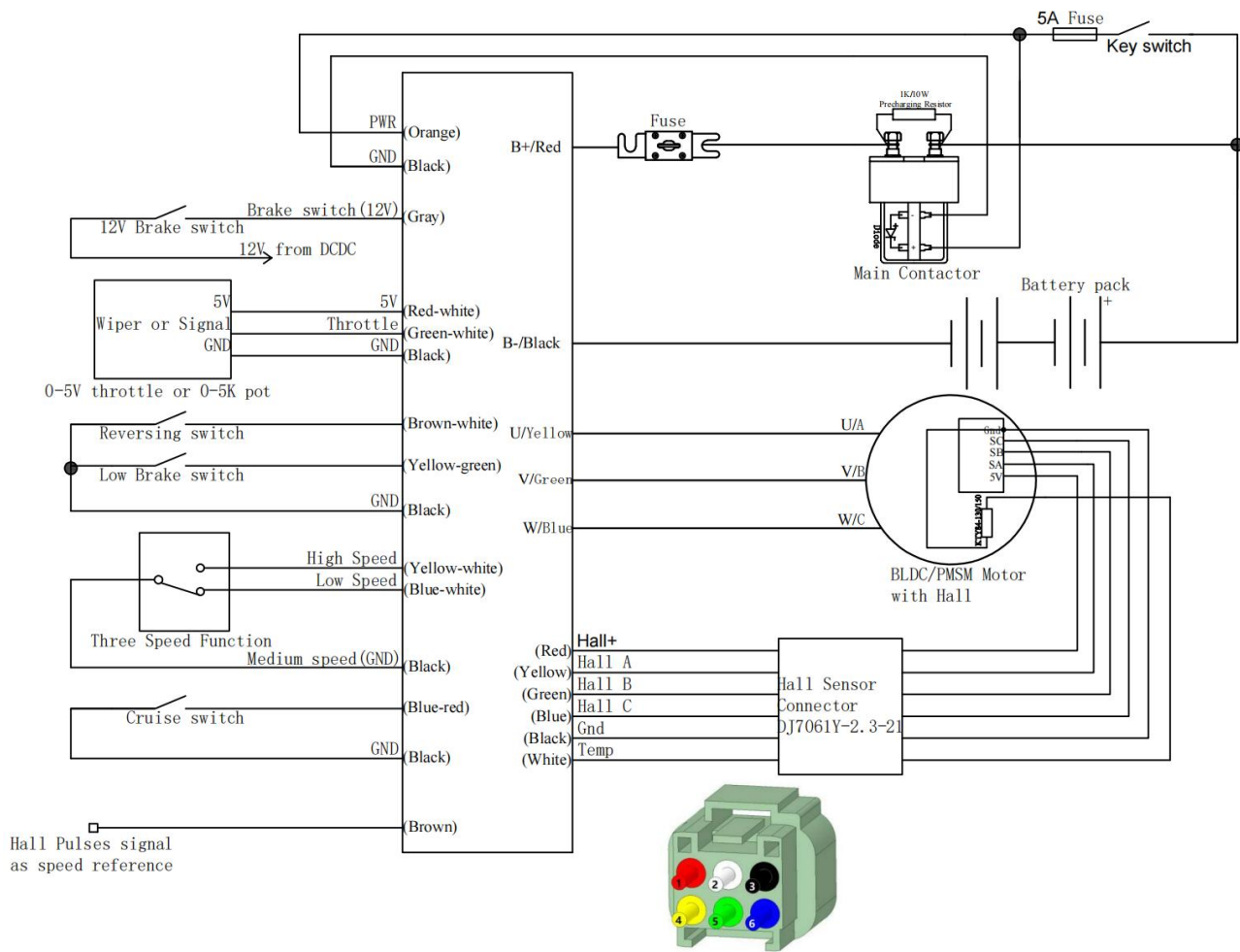
Perfect protection function:

Monitor working voltage, current, temperature, motor, gear, accelerator pedal, brake, etc. Ensure the safety of vehicle driving control:

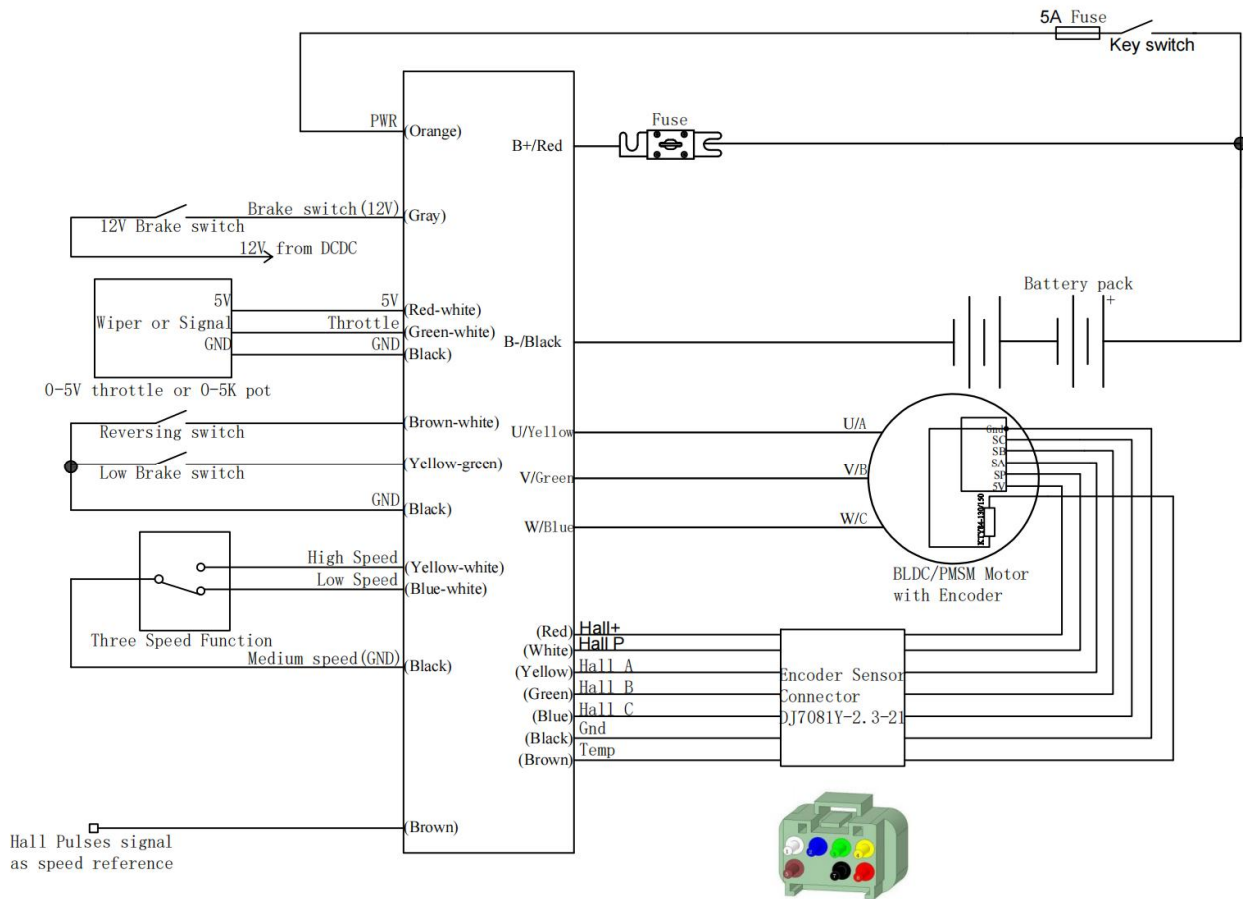
Encoder/Hall sensor failure protection	Accelerator pedal failure protection	Controller temp protection	Motor temp protection
Motor leaking current protection	High pedal disable protection	Over voltage protection	Under voltage protection
Over current protection	Phase wires short circuit protection		

Part Number	Max Bus Current	Max Phase Current	Rated battery Volt	Max Voltage	Size(mm)	Weight	Quantity of Mosfets	Adapted Motor Power
72200	55A	200A	48V~72V	90V	174*103*52	1.0kg	S12	0.2-1.0KW
72240	70A	240A	48V~72V	90V	174*103*52	1.0kg	S12	1.0-1.2KW
72300	100A	300A	48V~72V	90V	174*103*52	1.2kg	S12	1.2-1.5KW
72340	110A	340A	48V~72V	90V	180*118*60	1.75kg	S18	1.5-2.0KW
72450	190A	450A	48V~72V	90V	180*118*60	2.0kg	S24	2.5-3KW
72680	350A	680A	48V~72V	90V	180*118*65	2.3kg	S30	5-6KW
72780	390A	780A	48V~72V	90V	189*136*66	2.5kg	S36	6-7KW
72850	450A	850A	48V~72V	90V	222*142*71	3.2kg	S36	7-8KW
72890	450A	890A	48V~72V	90V	189*136*66	3.2kg	S42	7-8KW
721000	500A	1000A	48V~72V	90V	189*136*66	3.2kg	S48	8-10KW
84450	180A	450A	60V~84V	100V	180*118*60	2.0kg	S24	3-3.5KW
84680	340A	680A	60V~84V	100V	180*118*65	2.3kg	S30	5-6KW
84850	450A	850A	60V~84V	100V	222*142*71	3.2kg	S36	6-8KW
84780	360A	780A	60V~84V	100V	189*136*66	2.5kg	S36	6-7KW
84890	410A	890A	60V~84V	100V	189*136*66	3.2kg	S42	7-8KW
841000	450A	1000A	60V~84V	100V	189*136*66	3.2kg	S48	8-10KW
96450	170A	450A	72V~96V	117V	180*118*60	2.0kg	S24	2-3KW
96680	330A	680A	72V~96V	117V	180*118*65	2.3kg	S30	3.5-5KW
96850	450A	850A	72V~96V	117V	222*142*71	3.2kg	S36	6-8KW
96780	360A	780A	72V~96V	117V	189*136*66	2.5kg	S36	6-7KW
96890	410A	890A	72V~96V	117V	189*136*66	3.2kg	S42	7-8KW
961000	450A	1000A	72V~96V	117V	189*136*66	3.2kg	S48	8-10KW
108270	120A	270A	96V~108V	128V	189*121*70.5	1.75kg	S24	2-4KW
108530	310A	530A	96V~108V	128V	222*142*71	3.2kg	S36	4-5KW
721200	600A	1200A	48V~72V	90V	238*155*88	4.0kg	S60	8-12KW
721800	800A	1800A	48V~72V	90V	238*155*88	4.0kg	S60	10-15KW
841200	600A	1200A	72V~84V	100V	238*155*88	4.0kg	S60	10-12KW
841800	800A	1800A	72V~84V	100V	238*155*88	4.0kg	S60	12-16KW
961200	600A	1200A	72V~96V	117V	238*155*88	4.0kg	S60	8-12KW
961800	800A	1800A	72V~96V	117V	238*155*88	4.0kg	S60	12-16KW
1081000	500A	1000A	96V~108V	128V	238*155*88	4.0kg	S60	10-12KW
Track Version								
841800X	1300A	1800A	72V~84V	100V	238*155*88	4.0kg	S60	15-20KW
961800X	1300A	1800A	72V~96V	117V	238*155*88	4.0kg	S60	15-20KW
842600	1500A	2600A	72V~84V	100V	268*155*72	6.0kg	S120	20-30KW
962600	1500A	2600A	72V~96V	117V	268*155*72	6.0kg	S120	20-30KW
1081800X	1000A	1800A	96V~108V	128V	268*155*72	6.0kg	S120	15-20KW

2. Wiring Diagram

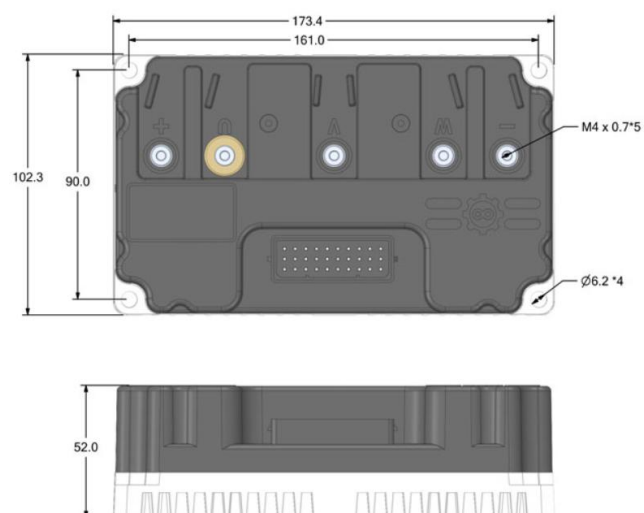
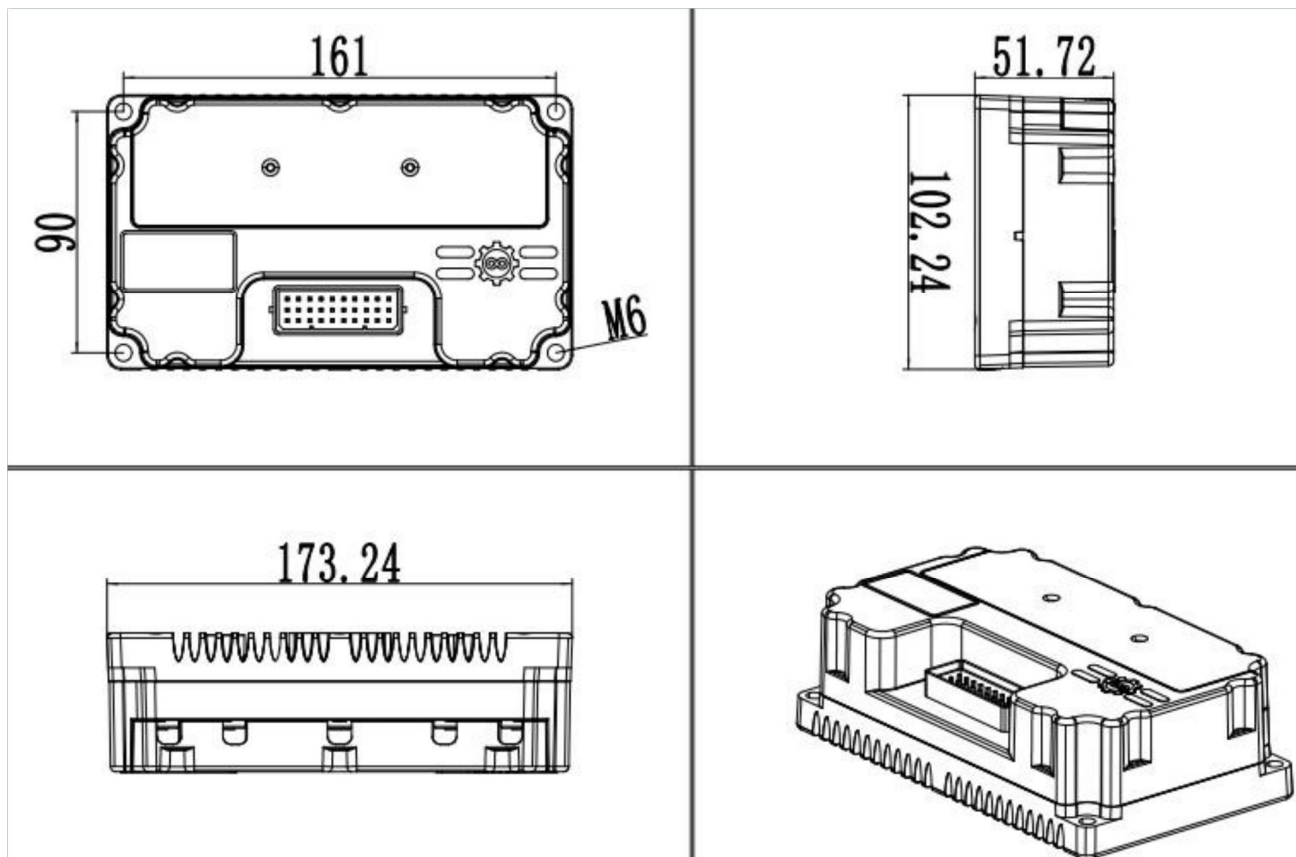


Wiring Diagram with Main Contactor(Hall Sensor Version)

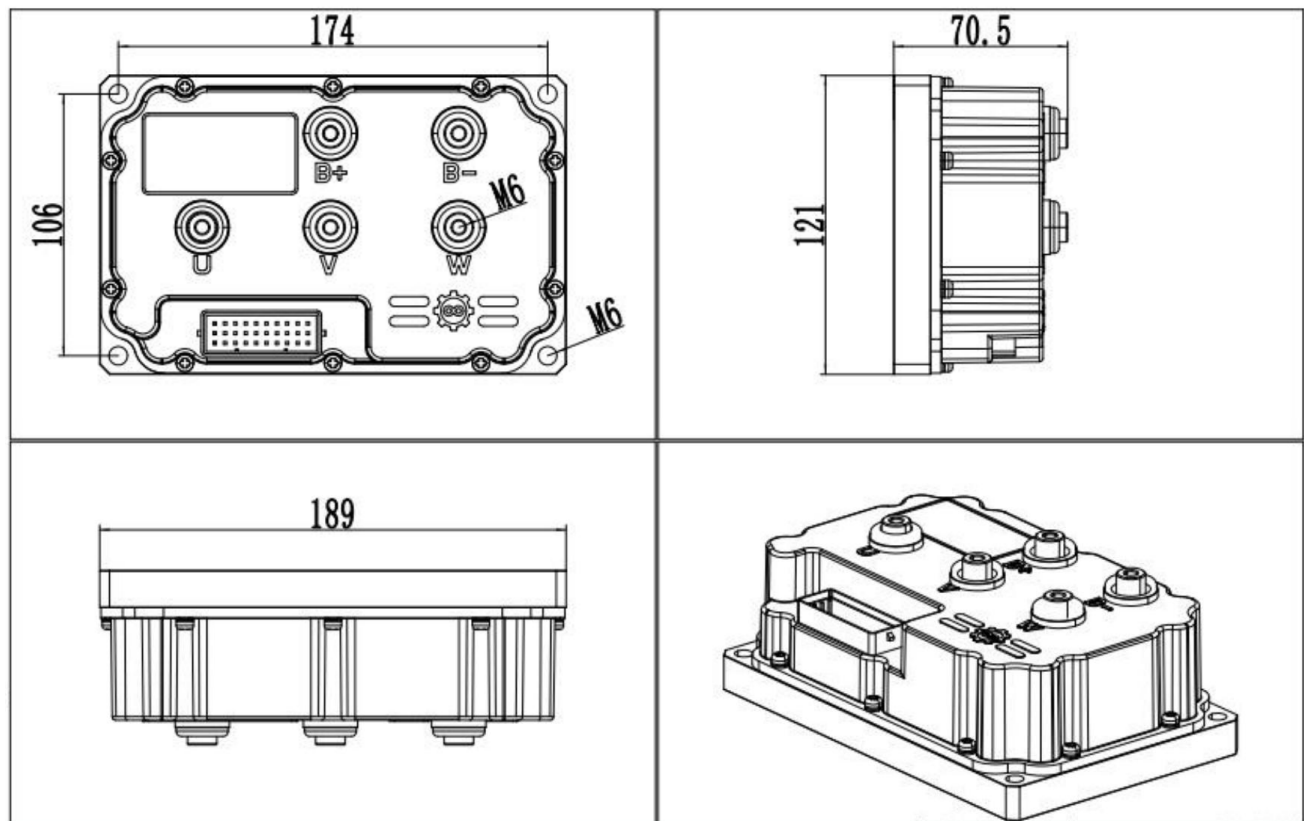


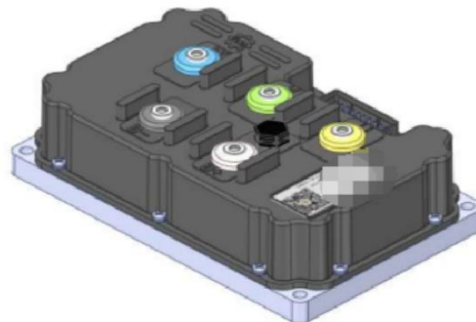
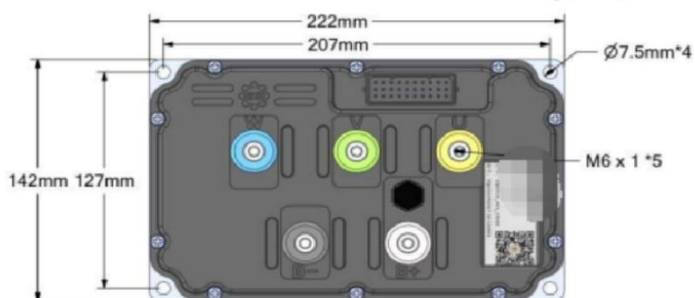
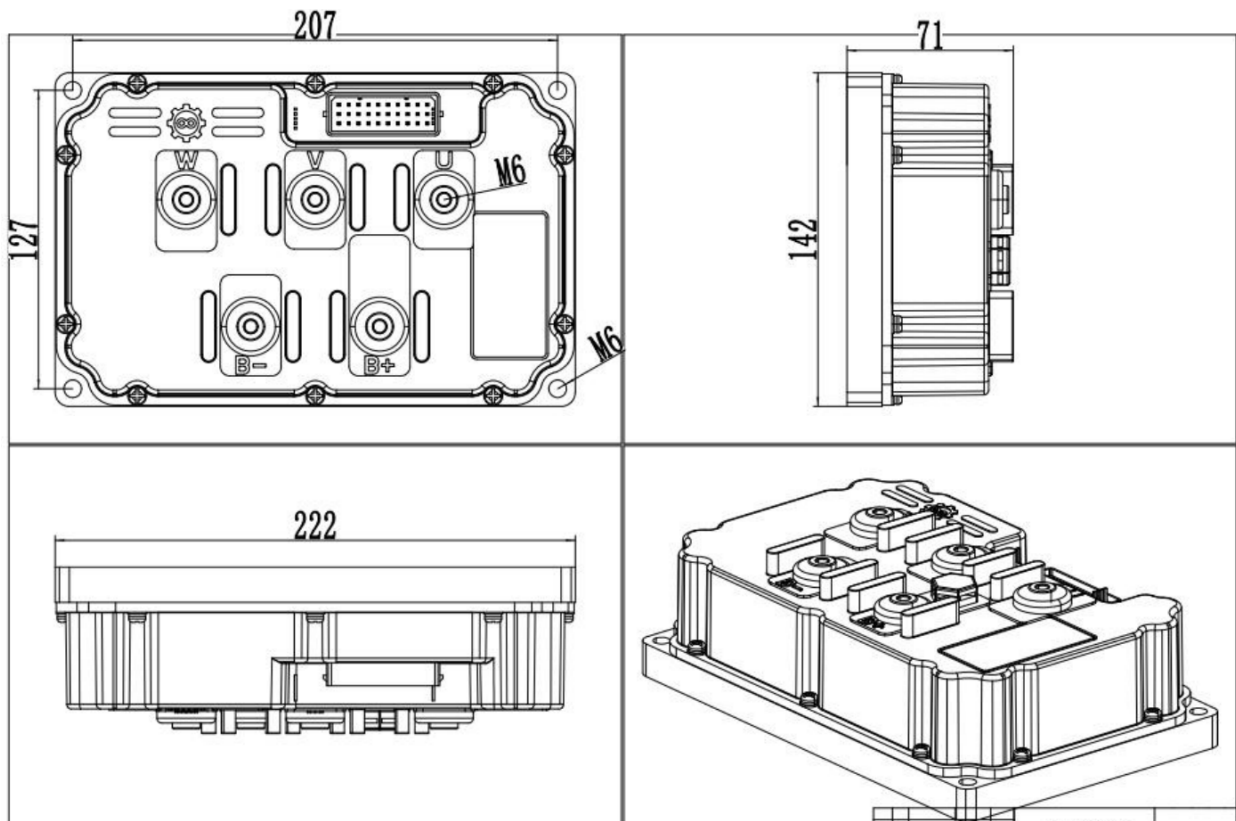
Wiring Diagram for motor with encoder version

3. Dimension



72200,72240,72300

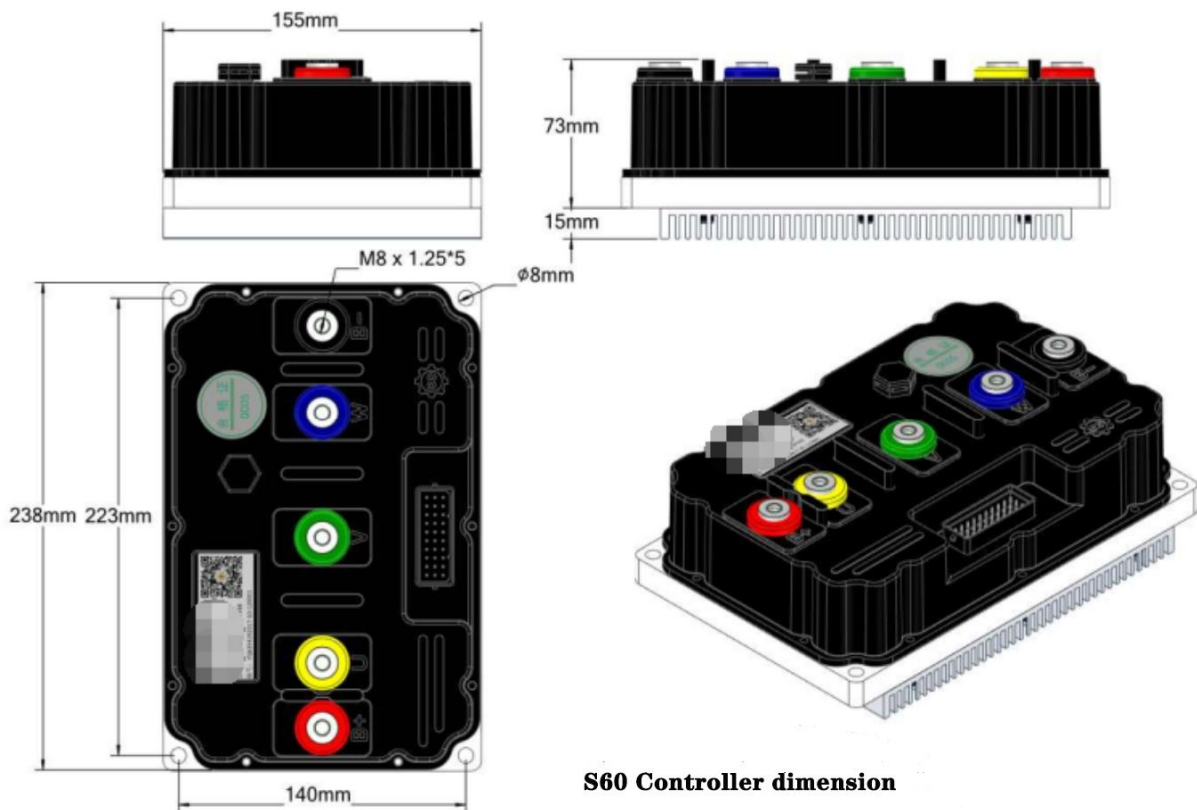
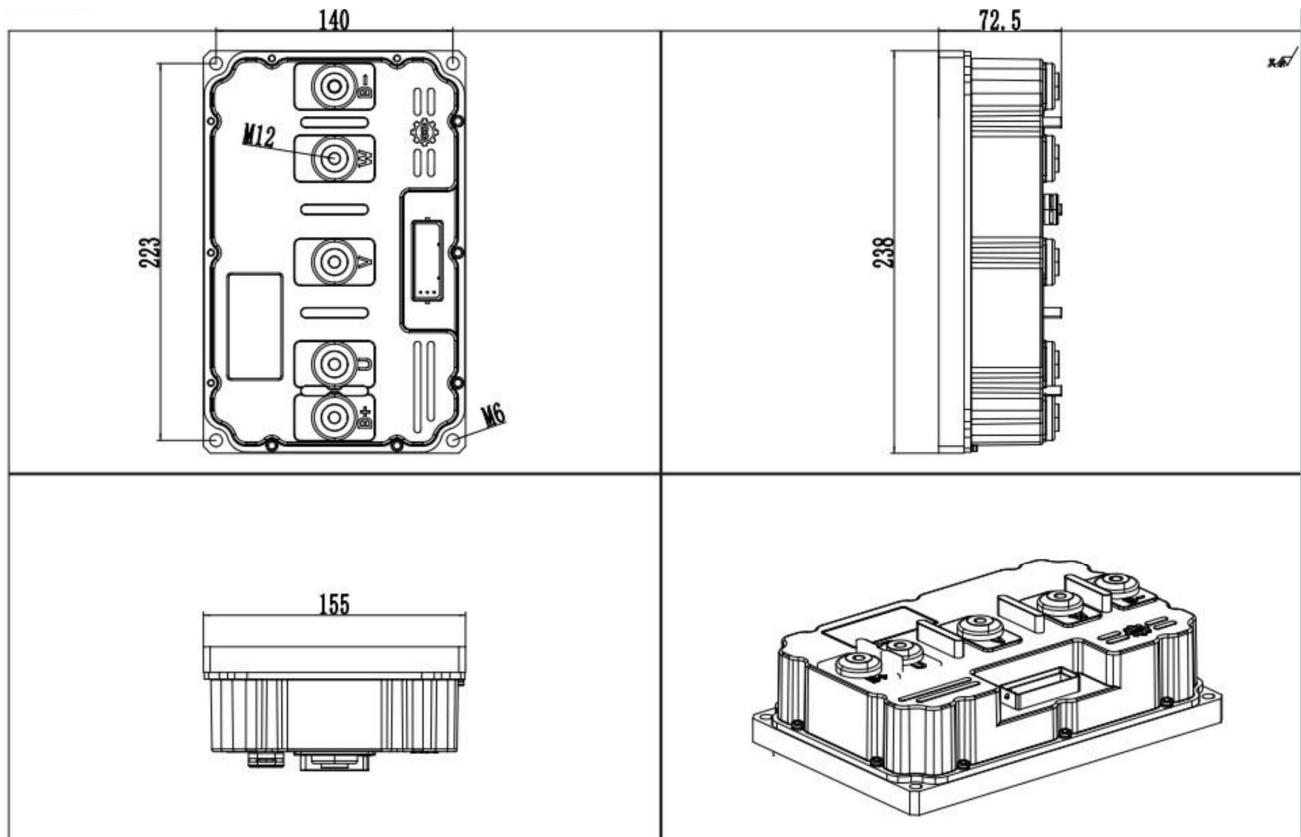




S36 Controller dimension

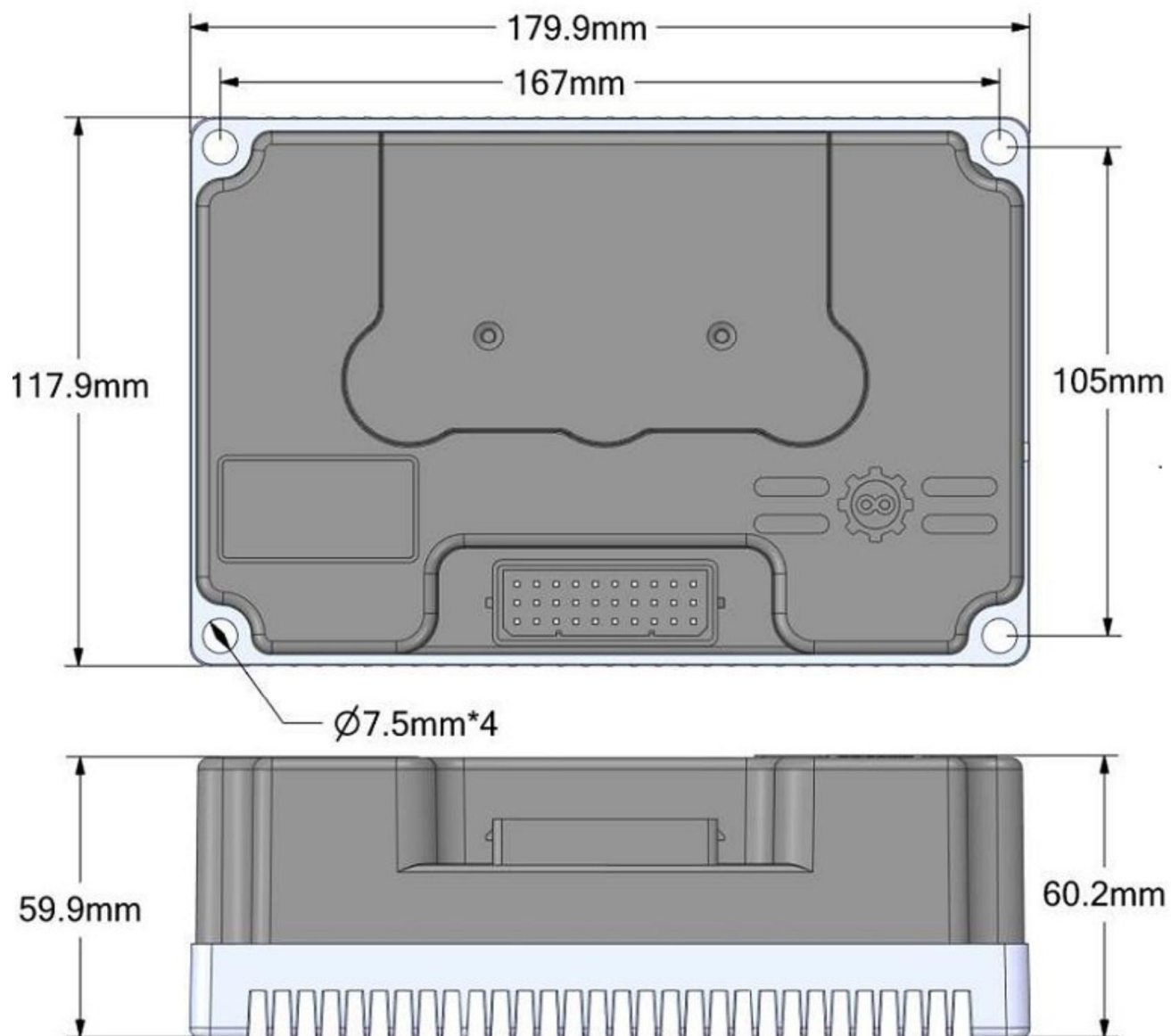


72850,84850,96850,108530

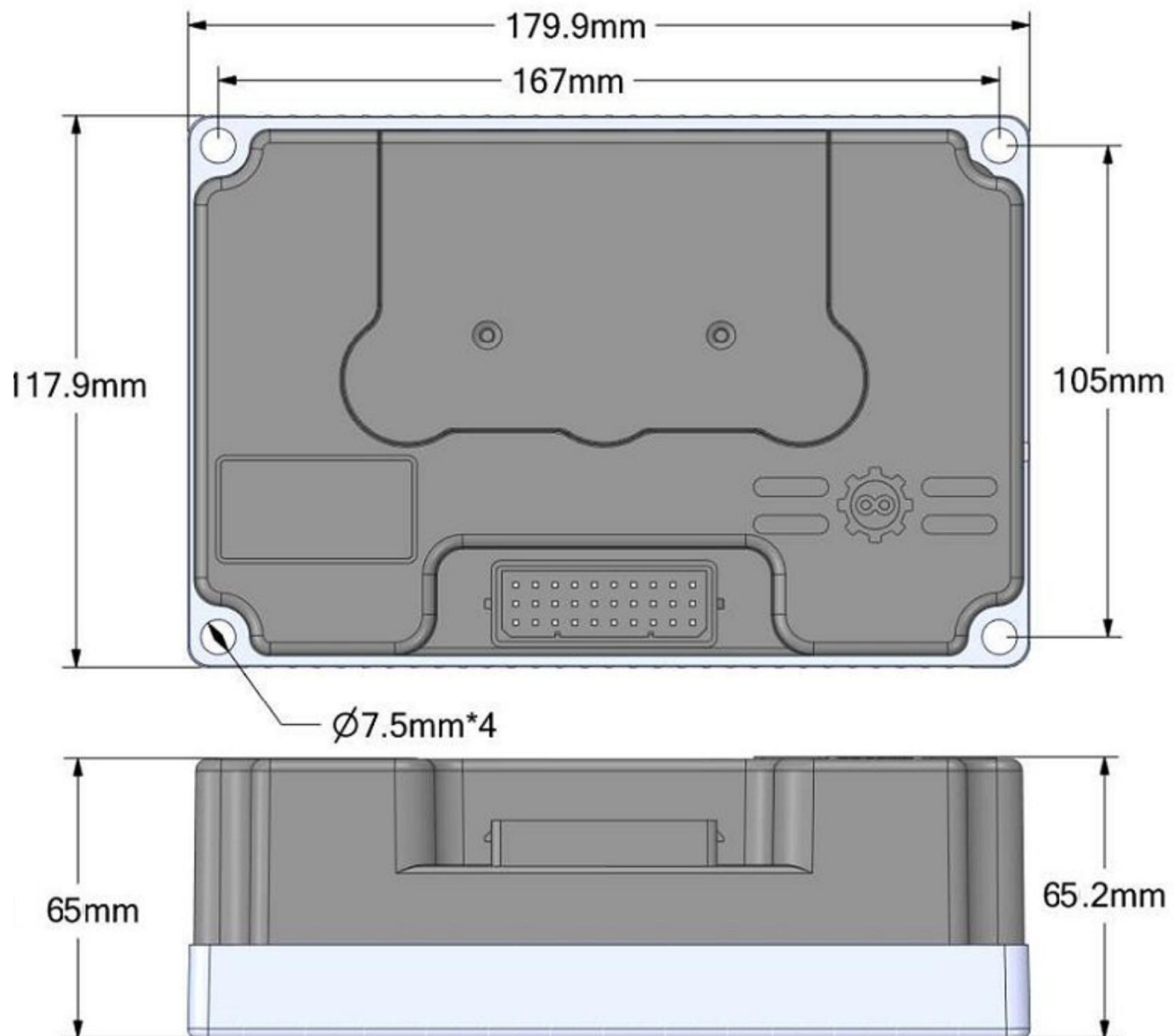


S60 Controller dimension

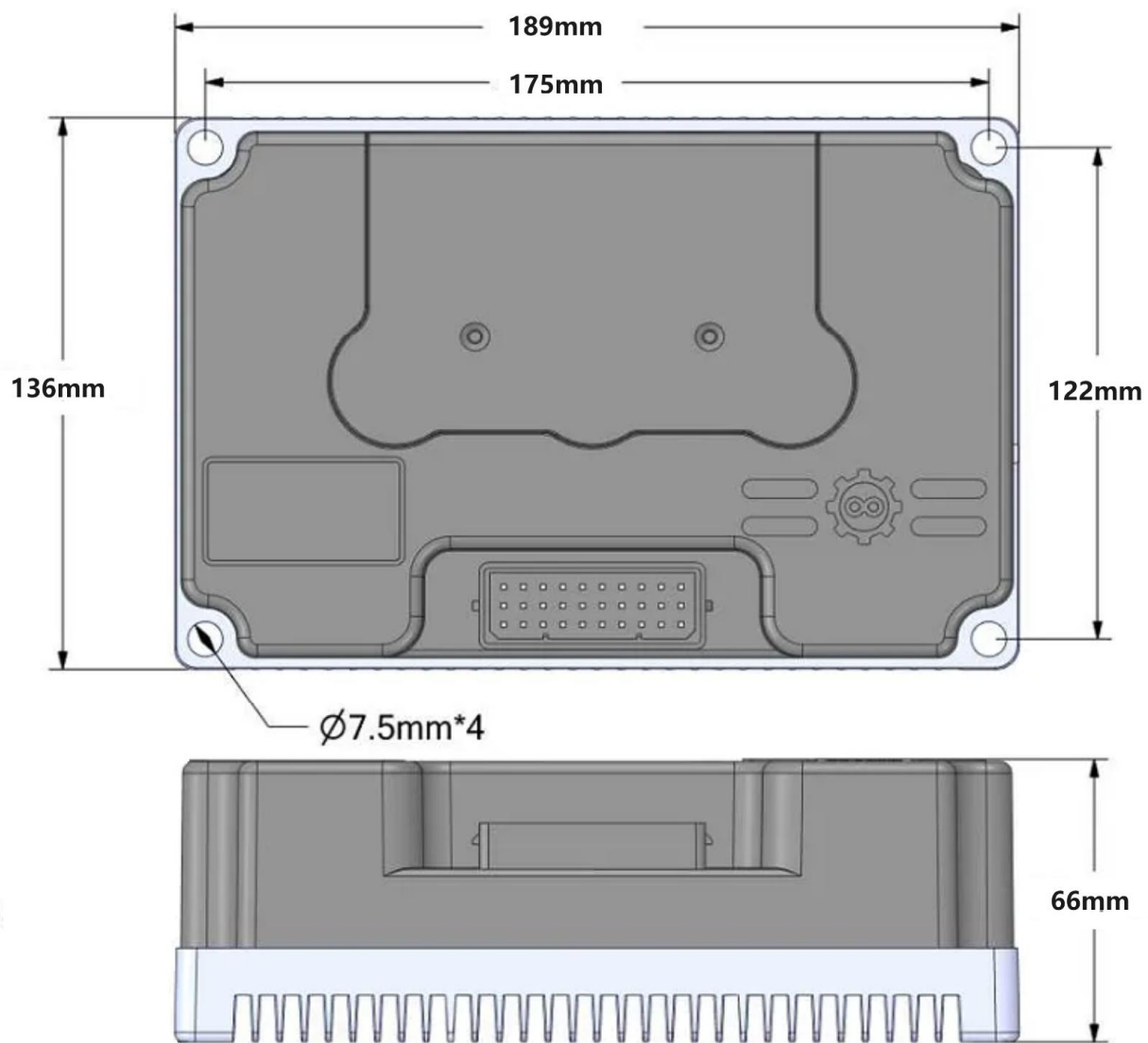
721200,721800,841200,841200,841800,961200,961800,1081000,841800X,961800X



72340,72450,84450,96450



72680,84680,96680



72780,72890,721000,84780,84890,841000,96780,96890,961000

5.Electric Features:

Item	Content		
1	Hall power supply	14V (No load) 8V/30mA with loading	
2	Throttle power supply 5V	5.1V	Optional

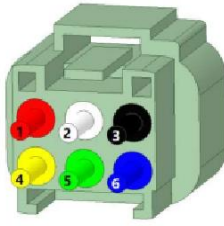
3	Throttle signal	0.5V~4.3V 1.1V~3.9V	Configuration
4	BW5V	Power supply source for bluetooth	
5	High speed/Low speed input port	Inactivate when idle Activate when connecting to GND	
6	Reverse switch input port	Inactivate when idle Activate when connecting to GND	
7	Anti-theft input signal	Inactivate when idle Activate when connecting to GND	
8	Low level brake switch	It is activated by connecting to GND	
9	High level brake switch	It is activated by 12V. High level : Battery volt or non isolated 12V+	
10	Key switch input	PWR:Power supply input port	
11	RX	TTL Level;RX:Receive signal for RS232 port	
12	TX	TTL Level;TX:Send signal for RS232 port	
13	GND	Signal ground	

6.Pin definition and color code

6.1 NS plastic shell type controller

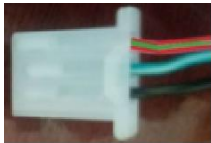
It is suitable for Hall sensors version motor. These pin definitions are only valid for BLDC/PMSM motor with three hall sensors. And there is no CAN bus function on the controller by default. If customers need CAN bus function, we will provide another version for the manual.

Hall Sensor Version:

Function	Connector	Description	Color	Definition	Pin NO.
Hall sensor wires; Length:290mm DJ7061Y-2.3-21		Hall Positive	Red	HALL+	4
		Motor temp	White	Motor Temp	24
		Hall ground	Black	GND	6
		Hall C	Blue	Hall C	22
		Hall B	Green	Hall B	12
		Hall A	Yellow	Hall A	1

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PMSM/BLDC motor controller

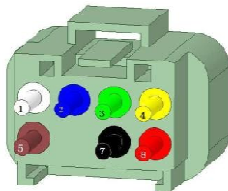
PWR; Length:290mm DJ7011Y-6.3-21		Key switch input for PWR	Orange	Key	10
CAN_H	Optional	CAN_H Wire	Red-yellow	CAN H	15
CAN_L	Optional	CAN_L Wire	Brown-yellow	CAN L	5
Cruise/Boost Length:290mm DJ7021A-2.8-11		Cruise	Blue-Red	Cruise	17
		Hall Pulses signal	Brown	Hall Pulses signal	18
Low level brake switch input Length:290mm DJ7021A-2.8-11		Ground wire	Black	GND	26
		Low brake switch	Yellow-Green	Low brake	21
Analog speedometer signal Length:290mm		Analog speed signal	Purple	Speedometer signal	9
High level brake switch input Length:290mm DJ7011Y-6.3-21		High level brake switch input	Gray	High Brake	11
Throttle signal Length:290mm DJ7031A-2.8-21		Ground wire	Black	GND	26
		Throttle	Green-White	TPS	27
		Throttle power	Red-White	ACC+	28
Anti-Theft alarm connector.Length:290mm DJ7041A-2.8-21(Red)		Anti-Theft signal	Black-White	FW	14
		Lock Phase	Brown-Red	Lock Phase wire	19
		PWR	Orange	Key	20
Power supply connector of Anti-Theft device connector.Length:290mm DJ7021A-2.8-21(Red)		Battery positive	Pink	B+	30
		Battery negative	Black	B-	7
Three speed function connector.Length:290mm DJ7031A-2.8-21(Blue)		High speed	Yellow-white	High speed	3
		GND	Black	Medium speed	7
		Low speed	Blue-white	Low speed	2
Reversing switch		Reversing switch	Brown-White	REV	8

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PMSM/BLDC motor controller

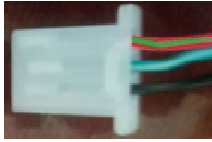
connector.Length:290mm DJ7021A-2.8-21		Ground wire	Black	GND	16
Speed pulses signal.Length:290mm		One-Line	Light-Blue	SPD	13
RS232 port for programming connector.Length:190mm DJ7041A-2.8-11		Power supply	Brown-Green	V+	29
		RXD	Red-Black	RxD	13
		TXD	Brown-Blue	TxD	23
		GND	Black	GND	16

Encoder sensor version:

Function	Connector	Description	Color	Definition	Pin NO.
Hall sensor wires; Length:290mm DJ7081Y-2.3-21		Hall Positive	Red	HALL+	4
		Motor temp	White	Motor Temp	24
		Hall ground	Black	GND	6
		Hall C	Blue	Hall C	22
		Hall B	Green	Hall B	12
		Hall A	Yellow	Hall A	1
		Hall P	White	Hall P	17
PWR; Length:290mm DJ7011Y-6.3-21		Key switch input for PWR	Orange	Key	10
CAN_H	Optional	CAN_H Wire	Red-yellow	CAN H	15
CAN_L	Optional	CAN_L Wire	Brown-yellow	CAN L	5
Cruise/Boost Length:290mm DJ7021A-2.8-11					
		Hall Pulses signal	Brown	Hall Pulses signal	18
Low level brake switch input Length:290mm DJ7021A-2.8-11		Ground wire	Black	GND	26
		Low brake switch	Yellow-Green	Low brake	21
Analog speedometer signal Length:290mm		Analog speed signal	Purple	Speedometer signal	9

SunPole

PMSM/BLDC motor controller

High level brake switch input Length:290mm DJ7011Y-6.3-21		High level brake switch input	Gray	High Brake	11
Throttle signal Length:290mm DJ7031A-2.8-21		Ground wire	Black	GND	26
		Throttle	Green-White	TPS	27
		Throttle power	Red-White	ACC+	28
Anti-Theft alarm connector.Length:290mm DJ7041A-2.8-21(Red)		Anti-Theft signal	Black-White	FW	14
		Lock Phase	Brown-Red	Lock Phase wire	19
		PWR	Orange	Key	20
Power supply connector of Anti-Theft device connector.Length:290mm DJ7021A-2.8-21(Red)		Battery positive	Pink	B+	30
		Battery negative	Black	B-	7
Three speed function connector.Length:290mm DJ7031A-2.8-21(Blue)		High speed	Yellow-white	High speed	3
		GND	Black	Medium speed	7
		Low speed	Blue-white	Low speed	2
Reversing switch connector.Length:290mm DJ7021A-2.8-21		Reversing switch	Brown-White	REV	8
		Ground wire	Black	GND	16
Speed pulses signal.Length:290mm		One-Line	Light-Blue	SPD	13
RS232 port for programming connector.Length:190mm DJ7041A-2.8-11		Power supply	Brown-Green	V+	29
		RXD	Red-Black	RxD	13
		TXD	Brown-Blue	TxD	23
		GND	Black	GND	16

7.Error codes from Beeper.

The controller is equipped with a buzzer inside. When an alarm occurs, the beeper will send out corresponding error codes.

7.1 Description of the codes of buzzer alarm sounds:

7.1.1 When turn on normally,the beeper will make only one sound and then stop sounding.

7.1.2 If there is a constant beep, please check whether the brake and accelerator pedals are effective at the same time.

Using this function, you can check whether the brake and accelerator pedals are normal: Press them at the same time, and let go either of them will not sound,then you will know which one has the problem.

7.1.3 If there are 2 short beeps and 1 long beep, repeating the code cyclically, it means that the controller is in the self-learning status, and the self-learning should be completed according to the self-learning operation instructions.

7.1.4 If there are 2 short beeps, pause for a while, and then a short beep, repeating again and again, it means that the controller program verification has failed. In this case, the controller firmware needs to be upgraded again.

7.1.5 If there are 4 short beeps, 1 long beep, and 5 short beeps, the cycle repeats, indicating that the upgraded program does not match the controller model. Please check whether the firmware version is consistent with the model on the controller label. If not, find the matching firmware and try to do upgrading again.

7.1.6 If there are 1 to 15 beeps, judge the fault according to the number of sounds.
Please check the error codes according to the table as below.

	Description for faults	Numbers of sounds	
1	Hall sensors malfunction	1	1,The hall sensors connector has the bad connection issue. 2,The hall sensors of motor are defective.Need to replace the hall sensors for the motor 3,The power supply for hall sensors is damaged.Please check the volt between pin26 and pin16.

2	Throttle malfunction	2	1) During Auto-learning, after learning in one direction, the motor will automatically stop. And report this failure, prompting you to release the throttle. (Release the throttle at original position will clear the code) 2) It is detected that the throttle/brake pedal has not returned to the original position when power supply is turned on. (accelerator reset) 3) The initial throttle voltage is higher than the low threshold voltage setting when idle. (Need to raise the TPS Dead low setting value).TPS dead low is the throttle effective starting position value. 4) The twist throttle or foot pedal pedal is broken. (Replace the throttle or pedal) 5) When the throttle is turned to the max position,the throttle voltage is higher than the high threshold voltage setting.In simple,the max volt of throttle is higher than TPS Dead high value. (Need to increase the high threshold parameter.) 6) When the controller is started on, the fault will be displayed by default. When the self-check is passed, the fault will disappear. (No need to deal with)
3	Current protection restart	3	Abnormal protection alarm
4	Overcurrent on phase side	4	Abnormal protection alarm. (Reduce the current limiting parameters at each RPM speed range to control the phase current which does not exceed

			the maximum phase current value)
5	Internal voltage issue	5	The volt is too high or too low. The volt is beyond the input voltage range of controller. Check the battery pack voltage whether the pack voltage is overvoltage or undervoltage.
6	Anti-theft warning signal	6	When the anti-theft function is turned on, the alarm will be prompted when the anti-theft is triggered. (Eliminate anti-theft state)
7	Overtemp of the motor	7	Motor temp is too high or low.
8	Overtemp of the controller	8	Controller temp is too high or low
9	Phase current overflow	9	Abnormal protection alarm (reduce the maximum phase current parameter value)
10	Phase current zero point fault	10	Controller internal alarm (Replace the controller)
11	Phase wires short circuit fault	11	Phase wires are short circuited. Motor is defective or damaged. Replace the motor.
12	Bus current zero point fault	12	Controller internal alarm (Replace the controller)
13	Mosfet upper bridge failure	13	High side of Mosfet is damaged. Check whether the controller phase wire is short-circuited with the positive pole, except the short-circuit factor, If the controller itself is short-circuited, replace the controller
14	Mosfet lower bridge failure	14	Low side of Mosfet is damaged. Check whether the controller phase wire is short-circuited with the negative pole, except the short-circuit factor, If the controller itself is short-circuited, replace the controller. Pay attention to the motor phase wires and A short-circuit of the shell or

			case of motor can also cause this fault, so first determine whether the motor phase wire is Short-circuited to the shell or case, if not, then consider other factors.
15	Overcurrent protection from bus side	15	Hardware overcurrent protection warning. You can see the MOE count in the statistics count of user program, which appears once and accumulates one time. (Reduce the phase current to prevent this error code, for the controller of 84V or above, The MOE protection can be turned off when the parameters are adjusted well. Pay attention to when The current limit parameter function can not limit the maximum speed, this function can not be Closed, once the motor is overspeed and field weakening is too deep, it will burn control without protection)

Contact Info:

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