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MAKING CONTROL SMARTER

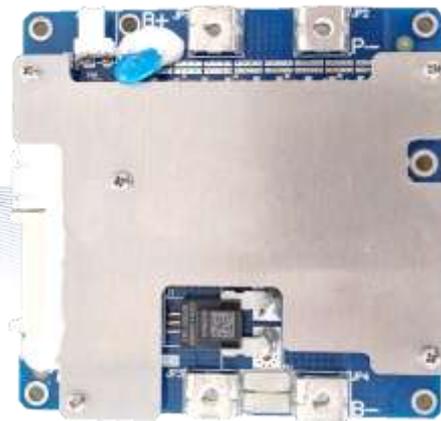
HPA100-16 SERIES LITHIUM BATTERY PROTECTION BOARD USER MANUAL



Physical Image of HPA100-16 Control Board



Physical Image of HPA100-16-050 Power Board



Physical Image of HPA100-16-080 Power Board

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Table 1 Software Version

Date	Version	Note
2024-01-03	1.0	Original release.
2025-06-17	1.1	1. Add parameter setting contents; 2. Add terminal definition of current limiting board, heating board, overall dimensions, application diagram, etc.

Table 2 Notation Clarification

Sign	Instruction
 NOTE	Highlights an essential element of a procedure to ensure correctness.
 CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
 WARNING!	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

Glossary and List of Abbreviations

BMS: Battery Management System

AFE: Analog Front End



1 OVERVIEW

HPA100-16 series split-type lithium battery protection board is a significant part of low-voltage lithium battery module, mainly used as backup power supply for 7~16 strings lithium battery base station communication, AGV power lithium battery pack, household energy storage and other systems. It can monitor the working status (voltage, current, temperature, charging and discharging status, etc.) of battery pack to alarm and protect the over/under voltage, over current, over temperature, etc. It can also provide the passive balanced protection function to extend the service life for battery cell, and realize the data monitoring, parameter configuration and firmware upgrade via RS485, CANBUS and other interfaces.

2 NAMING CONVENTIONS

2.1 NAMING CONVENTIONS

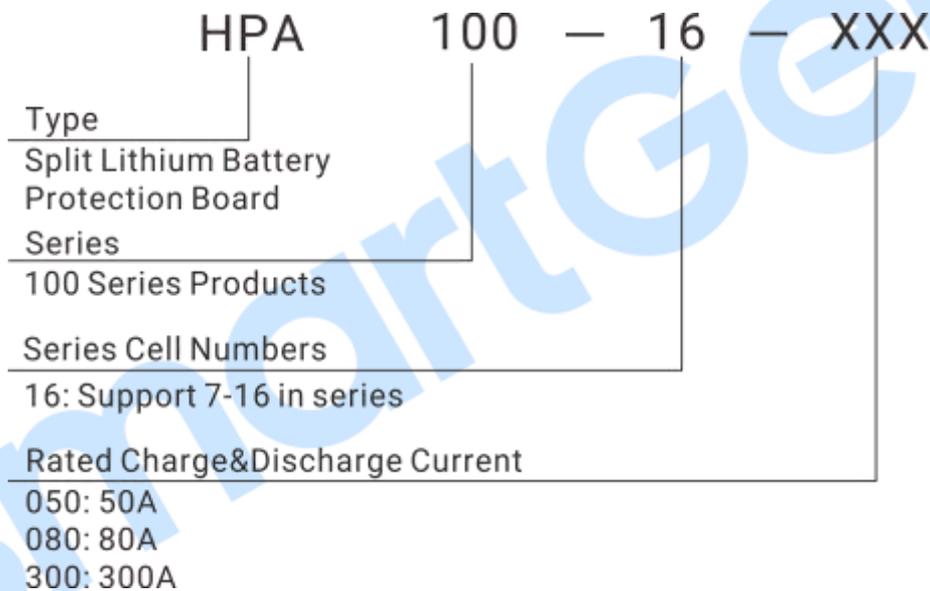


Fig.1 Naming Conventions

2.2 MODEL COMPARISON

Table 3 Model Comparison

Model	HPA100-16-050	HPA100-16-080	HPA100-16-300
Rated Charge/Discharge Current	50A	80A	300A
Charge/Discharge Switch Device	Built-in MOS	Built-in MOS	External Relay
External Shunt	/	/	●
Cell Capacity	≤50Ah	≤100Ah	Match with relay
Heating Function	●	●	/
Current Limiting	●	●	/
Short Circuit Protection	●	●	/

3 PERFORMANCE AND CHARACTERISTICS

- The stable and reliable AFE chip is adopted to realize the voltage detection of the cells, which supports the voltage detection of 7~16 strings of cells;
- 4 channels of cell temperature detection are supported, and the temperature sensor type is NTC 10K-3950;
- 1 MOS field-effect transistor temperature sampling function, 1 ambient temperature sampling function;
- Alarm and protection functions of over/under voltage, over current, over temperature, etc.;
- With reverse connection protection function;
- Battery loop charge and discharge control;
- With 1# isolated CANBUS interface, 1# isolated RS485 interface, 1# non-isolated and parallel connected RS485 interface, max.15 modules cascade communication is supported;
- 2 Aux. input ports;
- 4 high-side switches (HPA100-16-300);
- It has sleep and wakeup functions for low power consumption;
- Passive balance function, and the max. balanced current is 77mA;
- RTC display and event log functions, which can circularly record 1000 groups of warning, protection, fault and other alarms when they occur and eliminate the records (it can be viewed via PC);
- The black box function can record 3 groups of protection and fault events. Each group records 60 pieces of data 50s before and 10s after an event occurs (it can be viewed via PC);
- The power is supplied by battery module;
- With buzzer alarm function;
- With heating function, which is used for battery module heating;
- The maximum capacity load of the pre-charging circuit is 30000uF, and specific value is subject to the actual measurement of the system;
- The firmware is upgraded via RS485 interface.

Table 4 Technical Index

Item	Contents
Working Voltage	Battery supply: 17VDC~64VDC
Overall Power Consumption	Normal working: $\leq 1.2W$; the max.: $\leq 2.6W$ Sleep: $\leq 17mW$
Cell Voltage Collection	Range: (0~5000)mV Resolution: 1mV Accuracy: $\pm 5mV$
Temperature Collection	Range: (-40 ~+125) $^{\circ}C$ Resolution: 1 $^{\circ}C$ Accuracy: $\pm 1^{\circ}C$ Temp. Sensor Type: NTC 10K-3950
Current Collection	HPA100-16-050, Range: -50A~+50A, Resolution: 0.1A, Accuracy: 1.5%FS (Full Range)
	HPA100-16-080, Range: -80A~+80A, Resolution: 0.01A, Accuracy: 1.5%FS (Full Range)
	HPA100-16-300, Range: -300A~+300A, Resolution: 0.01A, Accuracy: 1.5%FS (Full Range)
SOC Accuracy	$\pm 5\%$
CAN Interface	1#, 250kbps, isolation
RS485 Interface	2#, 9600bps, RS485-1 isolation, RS485-2 non-isolation
Heating Power of Power Board	Max.2A, voltage supplied by P+, P-
High-side Switch 1-4 (HPA100-16-300)	3A DC24V power supply active output
Heating Board Power (Optional)	Max.20A, voltage supplied by P+, P-
Limiting Current of Current-limiting Board	Optional 5A and 10A
EMC Standard	GB/T 34131-2023
Case Dimensions	Control Board: 94.0mmx80.0mmx12.6mm
	HPA100-16-050: 89.3mmx74.2mmx16.7mm
	HPA100-16-080: 93.0mmx90.0mmx18.7mm
	HPA100-16-300: 100.0mmx70.0mmx24.2mm
	Heating Board: 62.0mmx47.0mmx9.1mm
	Current-limiting Board: 110.0mmx78.0mmx14.8mm
Panel Cutout	Control Board: 74.0mmx88.0mm
	HPA100-16-050: 80.0mmx65.5mm
	HPA100-16-080: 85.0mmx82.0mm
	HPA100-16-300: 92.9mmx62.7mm
	Heating Board: 56.0mmx41.0mm
	Current-limiting Board: 103.4mmx71.5mm
Working Temperature	(-40~+70) $^{\circ}C$

Item	Contents
Working Humidity	(20~93)%RH
Storage Temperature	(-40~+80)°C
Weight	Control Board: 0.05kg
	HPA100-16-050: 0.10kg
	HPA100-16-080: 0.20kg
	HPA100-16-300: 0.05kg
	Heating Board: 0.02kg
	Current-limiting Board: 0.10kg

5 BUZZER ACTION

Table 5 Description of Buzzer Action

Enable Status	Action Description
Disable	The buzzer does not sound.
Enable	The buzzer will sound for 1s when you power on the device for the first time or wake up from sleep mode.
	The buzzer will sound for 0.3s when in sleep.
	When in warning, sounds for 2s and rest for 0.5s; in protection, sounds for twice per second; in fault protection, sounds for 5 times per second; after the short circuit protection is locked for 3 times, the buzzer does not sound.
NOTE: The buzzer functions can be set to enable or disable through PC, and the factory default is disabled.	

6 SLEEP/WAKEUP KEYS DESCRIPTION

When BMS is in sleep mode, long press the sleep/wakeup key for more than 1s, then release the key after the buzzer changing from sounding to not sounding, then BMS enters the running mode.

When BMS is in running mode, long press sleep/wakeup key for (3~6)s, then release the key after the buzzer sounding for once, BMS enters the sleep mode.

7 SLEEP/WAKEUP DESCRIPTION

System will enter the sleep mode if any of the following conditions are met:

- (1) The single cell or the total voltage over discharge protection is not removed after a delay of 30s;
- (2) Long press and hold the keys for (3~6)s;
- (3) System without any operation for more than 24 hours and no communication & charger connection;
- (4) Sleep by PC software;
- (5) System without any operation, and the min. single cell voltage is lower than the sleep voltage, and the duration reaches the sleep delay time without communication and charger connection.

System will enter the running mode if any of the following conditions are met:

- (1) Connect to charger, the output voltage of charger will be greater than 36V;
- (2) Long press and hold the key for more than 1s.

NOTE: The position of sleep/wakeup key is shown in fig.2.

Table 6 Contents and Ranges of Parameter Setting

No.	Item	Range	Default	Description
Module Setting				
1	Password	(0-65534)	1234	
2	RS485_1Comm Baud Rate	(0-2)	0	0: 9600bit/s 1: 19200bit/s 2: 115200bit/s
3	RS485_1 Comm Stop Bit	(0-1)	0	0: 1bit 1: 2 bits
4	RS485_1Parity Check Bit	(0-2)	0	0: No parity 1: Odd 2: Even
5	RS485_2 Comm Baud Rate	(0-2)	0	0: 9600bit/s 1: 19200bit/s 2: 115200bit/s
6	RS485_2 Comm Stop Bit	(0-1)	0	0: 1bit 1: 2 bits
7	RS485_2 Parity Check Bit	(0-2)	0	0: No parity 1: Odd 2: Even
8	CAN Comm Baud Rate	Not Selectable	250kbps	
9	Power Switch Enable	(0-1)	0	0: Disable 1: Enable
10	Pre-charge Enable	(0-1)	1	0: Disable 1: Enable
11	Buzzer Mute	(0-1)	1	0: Disable 1: Enable
12	Module Address Source	(0-1)	1	0: Configuration 1: DIP Switch
13	Module Address	(1-15)	1	

No.	Item	Range	Default	Description
14	Inverter Type	(0-49)	0	0: Not Used 1: JYHY-01 2: JYHY-02 3: JYHY-03 4: JYHY-04 5: JYHY-05 6: JYHY-06 7: JYHY-07 8: JYHY-08 9: JYHY-09 10: JYHY-10 11: JYHY-11 12: JYHY-12 13: JYHY-13 14: JYHY-14 15: JYHY-15 16: JYHY-16 17: JYHY-17 18: JYHY-18 19: JYHY-19 20: JYHY-20 21~49: Reserved

No.	Item		Range	Default	Description	
15	Heating Mode		(0~9)	2	0: Mode1-Charging and Heating (open and close the heating according to charging low-temperature protection status and cell temperature) 1: Mode2-Charging&Discharging Heating (for charging heating, open and close the heating according to charging low-temperature protection status; for discharging heating, open and close the heating according to cell temperature and cell voltage) 2: Mode3 3: Reserved 4: Reserved 5: Reserved 6: Reserved 7: Reserved 8: Reserved 9: Reserved	
16	Input Port	Input1	Set	(0-10)	0	0-10: Reserved
17			Active Type	(0-1)	0	0: Close for Active 1: Open for Active
18		Input2	Set	(0-10)	0	0-10: Reserved
19			Active Type	(0-1)	0	0: Close for Active 1: Open for Active
20	Output Port (only for HPA100-1 6-300, and it can't be set via PC currently. The PC will be upgraded when there	Output 1	Set	(0-20)	1	0: Not Used 1: Remote Control 2: SOC Low Output 3: Fault Alarm Output 4-20: Reserved
21			Active Type	(0-1)	0	0: N/O Output 1: N/C Output
22		Output 2	Set	(0-20)	2	0: Not Used 1: Remote Control 2: SOC Low Output 3: Fault Alarm Output 4-20: Reserved

No.	Item			Range	Default	Description
23	is a need in the future)		Active Type	(0-1)	0	0: N/O Output 1: N/C Output
24		Output 3	Set	(0-20)	0	0: Not Used 1: Remote Control 2: SOC Low Output 3: Fault Alarm Output 4-20: Reserved
25			Active Type	(0-1)	0	0: N/O Output 1: N/C Output
26		Output 4	Set	(0-20)	0	0: Not Used 1: Remote Control 2: SOC Low Output 3: Fault Alarm Output 4-20: Reserved
27	Active Type		(0-1)	0	0: N/O Output 1: N/C Output	
Battery Module						
1	System Nominal Capacity			(1-600.0)AH	100.0	
2	System Total Capacity			(1-600.0)AH	100.0	
3	Rated Charging Current			(1.0-500.0)A	100.0	
4	Rated Discharging Current			(1.0-500.0)A	100.0	
5	Balance Start Voltage			(2000-5000)mV	3450	
6	Balance Start Voltage Difference			(0-1000)mV	50	
7	Sleep Voltage for Single Cell			(2000-5000)mV	2500	
8	Sleep Delay for Single Cell			(0-120)min	5	
9	Full Charging Voltage			(20.0-70.0)V	57.6	
10	Full Cut-off Current			(50-10000)mA	2000	
11	Intermittent Charging SOC			(50-100)%	95	
12	Charging Active Current Limiting Value			(0-200.0)%	100.0	
13	Cells Number			(7~16) Strings	16	(7~16) strings are selectable.
14	Current Limiting			(0-1)	1	0: 10A 1: 5A
15	Self-discharging SOC			(0.0-50.0)%	1.0	
16	Full-charge Inhibit Time			(0-6000)min	60	Unit: minute
17	Current Limiting Control			(0-2)	0	0: Not Start 1: Forced Start 2: Active/Passive Current Limiting
Protection Parameter Setting						
1	Single Cell Over Volt.	Protection	Warning Enable	(0-1)	1	0: Disable 1: Enable

No.	Item			Range	Default	Description
2	Protection	Set	Warning Threshold	(2000-5000)mV	3550	Return voltage difference is 10mV.
3			Protection Threshold	(2000-5000)mV	3650	
4			Protection Delay	(0-60.0)s	3.0	
5		Return Condition	Return Volt.	(2000-5000)mV	3450	When the cell voltage is less than or equal to the setting threshold, the protection returns; or when SOC is less than or equal to the setting threshold, the protection returns; or when the discharging current is greater than or equal to the threshold, the protection returns.
6			Return SOC	(0-100)%	90	
7			Return Current	(0-50.0)A	1.0	
8	Total Cell Over Volt. Protection	Protection Set	Warning Enable	(0-1)	1	0: Disable 1: Enable
9			Warn	(20.0-70.0)V	56.0	
10			Protection	(20.0-70.0)V	57.6	
11		Return Condition	Delay	(0-60.0)s	3.0	When total voltage is less than or equal to the setting threshold, the protection returns; or when SOC is less than or equal to the setting threshold, the protection returns; or when discharging current is greater than or equal to the setting threshold, the protection returns.
12			Return	(20.0-70.0)V	54.4	
13			Return SOC	(0-100)%	90	
14			Return Current	(0-50.0)A	1.0	
15	Single Cell Under Volt. Protection	Protection Set	Warning Enable	(0-1)	1	0: Disable 1: Enable
16			Warn	(2000-5000)mV	2700	
17			Protection	(2000-5000)mV	2600	When under voltage protection lasts for 30s and still cannot be recovered, the unit enters the low-power mode and returns when charging voltage signal is detected.

No.	Item		Range	Default	Description	
18		Protection Delay	(0-60.0)s	1.0		
19	Return Condition	Return	(2000-5000)mV	2950	The protection returns when the lowest voltage is greater than or equal to the setting threshold.	
20	Total Cell Under Volt. Protection	Protection Set	Warning Enable	(0-1)	1	0: Disable 1: Enable
21			Warn	(20.0-70.0)V	44.0	
22			Protection	(20.0-70.0)V	42.4	When under voltage protection lasts for 30s and still cannot be recovered, the unit enters the low-power mode and returns when charging voltage signal is detected.
23		Delay	(0-60.0)s	2.0		
24		Return Condition	Return	(20.0-70.0)V	48.0	The protection returns when total voltage is greater than or equal to the setting threshold.
25	Charging Over Current Protection	Protection Set	Warning Enable	(0-1)	1	0: Disable 1: Enable
26			Warn	(0.1-150.0)%	102.5	
27			Protection	(0.1-150.0)%	105	The status will be locked after 3 consecutive occurrences, it will not be automatically unlocked. It will be automatically unlocked after 1 minute.
28		Delay	(0-60.0)s	2.0		
29		Return Condition	Return Current	(0-50.0)A	1.0	The protection returns when discharging current is greater than the setting threshold.
30	Discharging Over	Protection Set	Warning Enable	(0-1)	1	0: Disable 1: Enable
31			Warn	(0.1-300.0)%	102.5	

No.	Item		Range	Default	Description	
32	Current Protection		Protection 1	(0.1-300.0)%	105	The status will be locked after 3 consecutive occurrences, it will not be automatically unlocked. It will be automatically unlocked after 1 minute. It will be unlocked when charging current is greater than the setting threshold.
33			Delay	(0-60.0)s	0.1	
34			Protection 2	(0.1-300.0)%	112.5	The status will be locked after 3 consecutive occurrences, it will not be automatically unlocked. It will be automatically unlocked after 1 minute. It will be unlocked when charging current is greater than the setting threshold.
35			Delay	(0-60.0)s	0.1	
36		Return Condition	Return Current	(0-50.0)A	1.0	The protection returns when charging current is greater than the setting threshold.
37	Short-Circuit Protection		Delay	(100-1000)us	300	The status will be locked after 3 consecutive occurrences, it will not be automatically unlocked. It will be unlocked when charging voltage signal is detected or load is removed.
38	MOS High Temp. Protection	Protection Set	Warning Enable	(0-1)	1	NOTE: HPA100-16-300 has no this setting.
39			Warn	(-40-120) °C	95	
40			Protection	(-40-120) °C	115	
41		Return Condition	Return	(-40-120) °C	85	The protection returns when MOS temperature is less than or equal to the setting threshold.
42	Low Ambient Temp.	Protection Set	Warning Enable	(0-1)	1	
43			Warn	(-40-120) °C	-10	
44			Protection	(-40-120) °C	-20	

No.	Item			Range	Default	Description
45	Protection	Return Condition	Return	(-40-120) °C	0	The protection returns when the ambient temperature is greater than or equal to the setting threshold.
46	High Ambient Temp. Protection	Protection Set	Warning Enable	(0-1)	1	
47			Warn	(-40-120) °C	60	
48			Protection	(-40-120) °C	70	
49	Return Condition	Return	(-40-120) °C	50	The protection returns when the ambient temperature is less than or equal to the setting threshold.	
50	High Charging Temp. Protection	Protection Set	Warning Enable	(0-1)	1	
51			Warn	(-40-120) °C	50	
52			Protection	(-40-120) °C	65	
53		Return Condition	Return	(-40-120) °C	55	The protection returns when the charging temperature is less than or equal to the setting threshold.
54	Low Charging Temp. Protection	Protection Set	Warning Enable	(0-1)	1	
55			Warn	(-40-120) °C	0	
56			Protection	(-40-120) °C	-10	
57		Return Condition	Return	(-40-120) °C	-1	The protection returns when the charging temperature is greater than or equal to the setting threshold.
58	High Discharging Temp. Protection	Protection Set	Warning Enable	(0-1)	1	
59			Warn	(-40-120) °C	50	
60			Protection	(-40-120) °C	65	
61	Return Condition	Return	(-40-120) °C	60	The protection returns when the discharging temperature is less than or equal to the setting threshold.	
62	Low Discharging Temp.	Protection Set	Warning Enable	(0-1)	1	
63			Warn	(-40-120) °C	0	

No.	Item		Range	Default	Description	
64	Protection		Protection	(-40-120) °C	-20	
65		Return Condition	Return	(-40-120) °C	-10	The protection returns when the discharging temperature is greater than or equal to the setting threshold.
66	Low Power Warning		Warning Threshold	(0-100)%	5	No warning when charging.

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9 TERMINAL DEFINITION AND CASE DIMENSIONS

9.1 TERMINAL DEFINITION

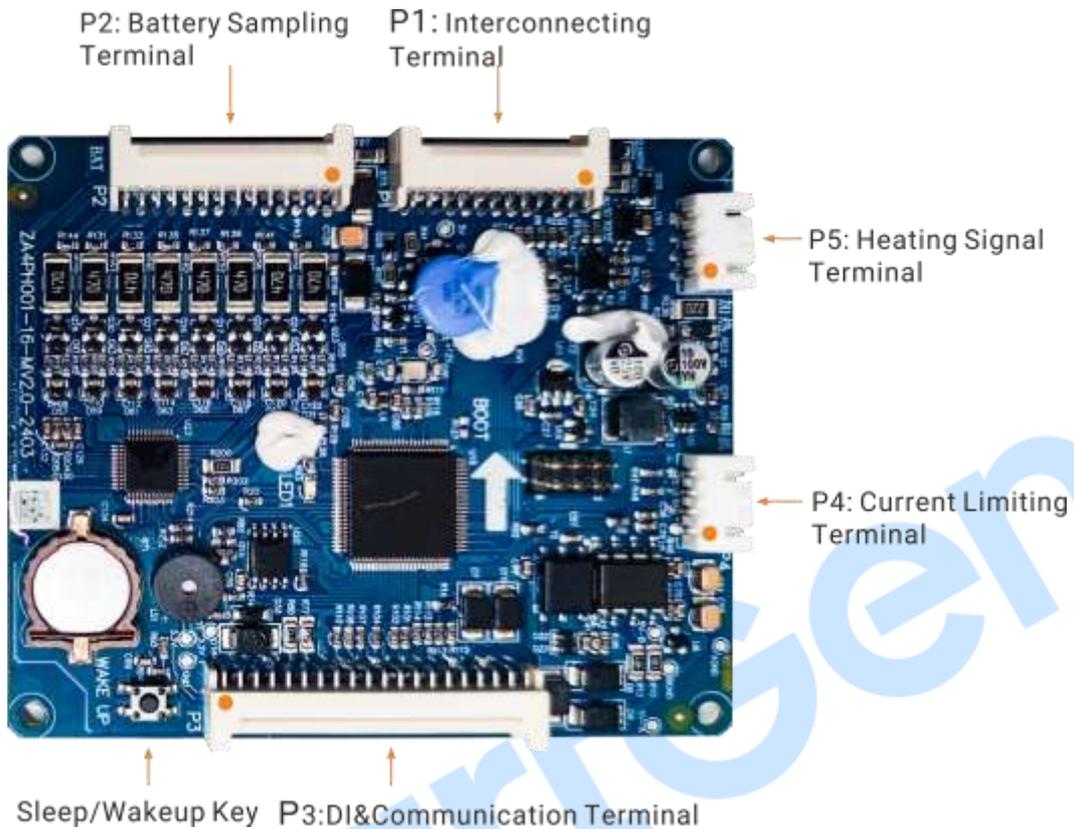


Fig.2 HPA100-16 Physical Image

NOTE: The orange point is the No.1 pin of each terminal.

1	3	5	7	9	11	13	15	17	19	21	23												
P+	B+	NC	GND	RELOUT4	RELOUT2	POW_OFF	SC	GND	CUR1	MOS_BT	PCHG_MOS	2	4	6	8	10	12	14	16	18	20	22	24
	B+	P_ID2	P_ID1	RELOUT3	RELOUT1	GND	NC	+5V	GND	DSG_MOS	CHG_MOS												

Fig.3 Internal Connection Terminal (P1) of HPA100-16 Control Board

1	3	5	7	9	11	13	15	17	19	21	23	25	27
TGND	TGND	TGND	TGND	NC	NC	BV15	BV13	BV11	BV9	BV7	BV5	BV3	BV1
2	4	6	8	10	12	14	16	18	20	22	24	26	28
NTC4	NTC3	NTC2	NTC1	NC	BV16	BV14	BV12	BV10	BV8	BV6	BV4	BV2	BV0

Fig.4 Battery Sampling Terminal (P2) of HPA100-16 Control Board

Table 7 Function Description of Battery Sampling Terminals

No.	Definition	Function Description
1	TGND	COM of cell temperature sensor 4
2	NTC4	Cell temperature sensor 4
3	TGND	COM of cell temperature sensor 3
4	NTC3	Cell temperature sensor 3
5	TGND	COM of cell temperature sensor 2
6	NTC2	Cell temperature sensor 2
7	TGND	COM of cell temperature sensor 1
8	NTC1	Cell temperature sensor 1
9-11	NC	Hang up
12	BV16	16 th battery positive
13	BV15	15 th battery positive
14	BV14	14 th battery positive
15	BV13	13 th battery positive
16	BV12	12 th battery positive
17	BV11	11 th battery positive
18	BV10	10 th battery positive
19	BV9	9 th battery positive
20	BV8	8 th battery positive
21	BV7	7 th battery positive
22	BV6	6 th battery positive
23	BV5	5 th battery positive
24	BV4	4 th battery positive
25	BV3	3 rd battery positive
26	BV2	2 nd battery positive
27	BV1	1 st battery positive
28	BV0	1 st battery negative

1	2	3	4
HEAT_FAULT	FAULT_MOS	HEAT_MOS	GND

Fig.5 Heating Signal Terminal (P5) of HPA100-16 Control Board

1	2	3	4
GND	LIM_CUR	CUR_ON	LIM_ON

Fig.6 Current Limiting Terminal (P4) of HPA100-16 Control Board

1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
NC	NC	IN2	POW_SW	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	+12V	RS485_2B	NC	RS485_1B	NC	CAN_L
2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
NC	NC	GND	GND	IN1_2	IN1_1	NC	GND	RS485_2A	NC	RS485_1A	NC	CAN_H							

Fig.7 DI & Communication Terminal (P3) of HPA100-16 Control Board

Table 8 Function Description of DI & Communication Terminal

No.	Definition	Function Description
1-4	NC	Hang up
5	IN2	Aux. input2 (B- connected is active)
6	GND	Aux. input2 COM (internal B- connected)
7	POW_SW	According to the user requirements, power switch is enabled by PC configuration, using rocker switch to connect to Terminal 7 and Terminal 8 (No.6)
8	GND	
9	NC	Hang up
10	IN1_2	Aux. input1 COM (external connect B- or charger-)
11	NC	Hang up
12	IN1_1	Aux. input1 (connect B+ or charger+)
13-28	NC	Hang up
29	+12V	12V power positive
30	GND	12V power COM
31	RS485_2B	Non-isolated 485 for communication with PC
32	RS485_2A	
33-34	NC	Hang up
35	RS485_1B	Isolated 485 for communication with PCS, charging pile, etc.

No.	Definition	Function Description
36	RS485_1A	
37-38	NC	Hang up
39	CAN_L	Isolated CAN for communication with external device
40	CAN_H	

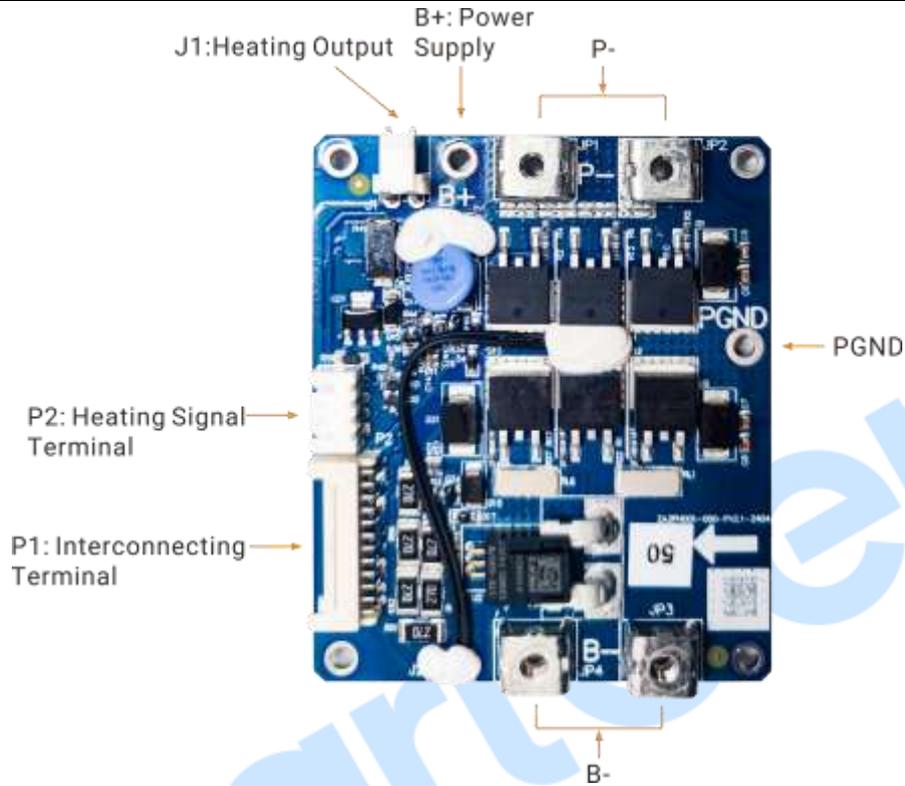


Fig.8 Physical Image of HPA100-16-050

NOTE: The P1 terminal definition of HPA100-16-050 power board is same as fig.3, P2 is same as fig.5.

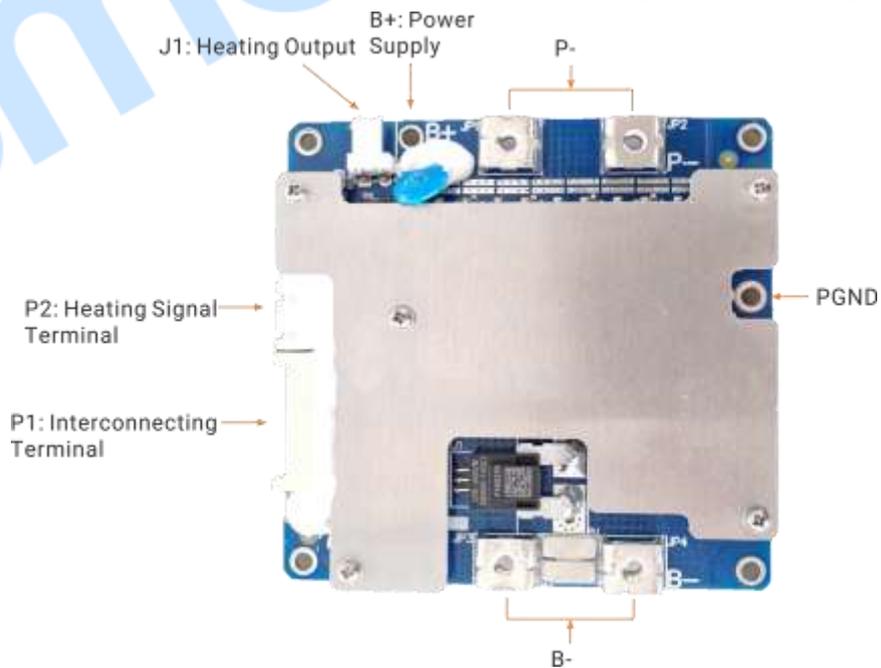


Fig.9 Physical Image of HPA100-16-080

NOTE: The P1 terminal definition of HPA100-16-080 power board is same as fig.3, P2 is same as fig.5.

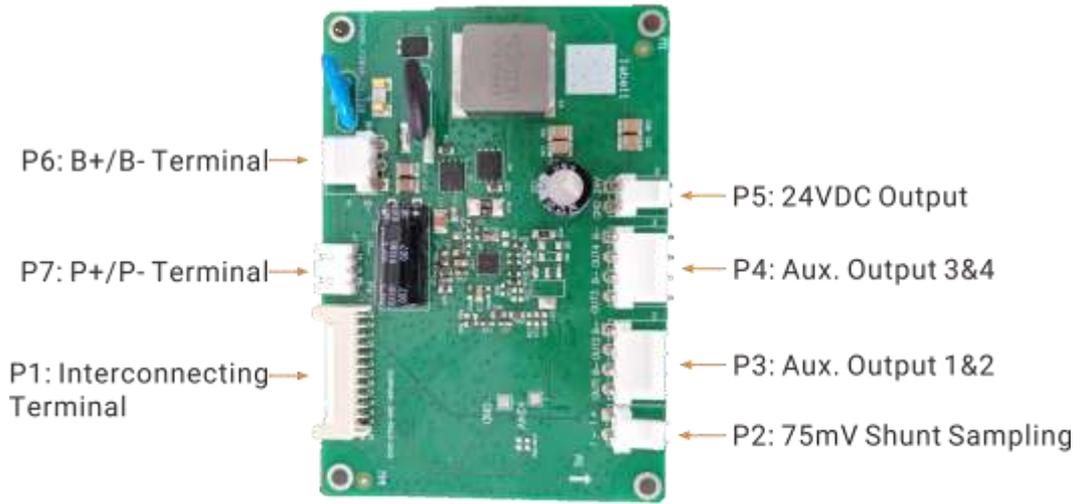


Fig.10 Physical Image of HPA100-16-300

NOTE: The P1 terminal definition of HPA100-16-300 power board is same as fig.3.

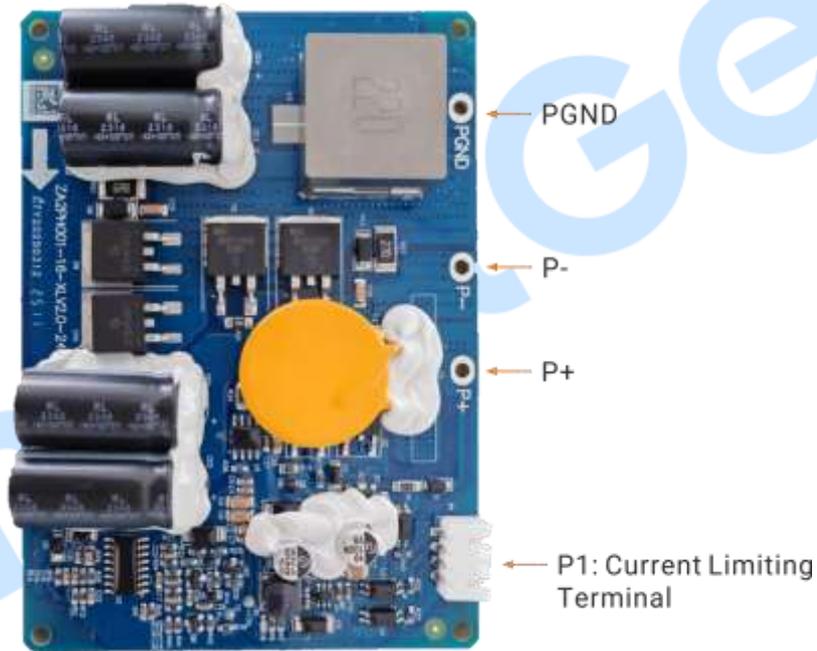


Fig.11 Physical Image of Current Limiting Board

NOTE: The P1 terminal definition of current limiting board is same as fig.6.

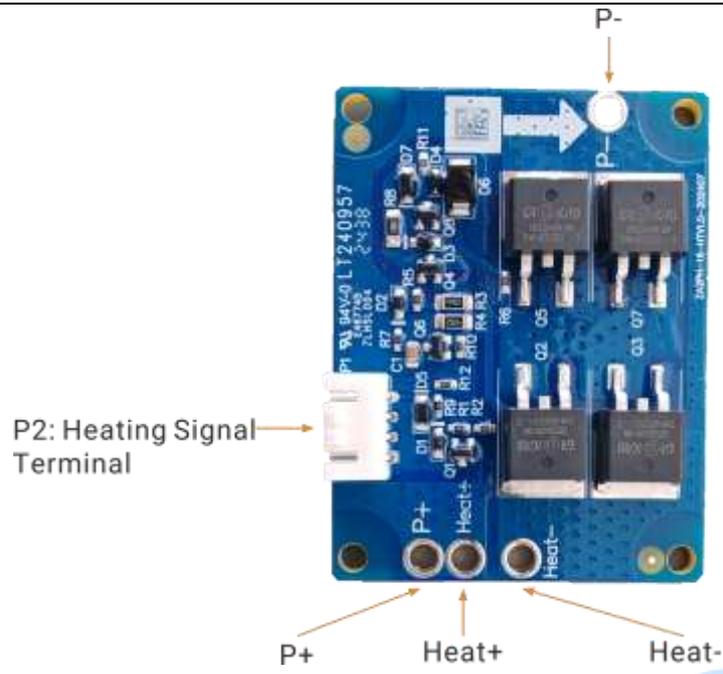


Fig.12 Physical Image of Heating Board

NOTE: The P2 terminal definition of heating board is same as fig.5.

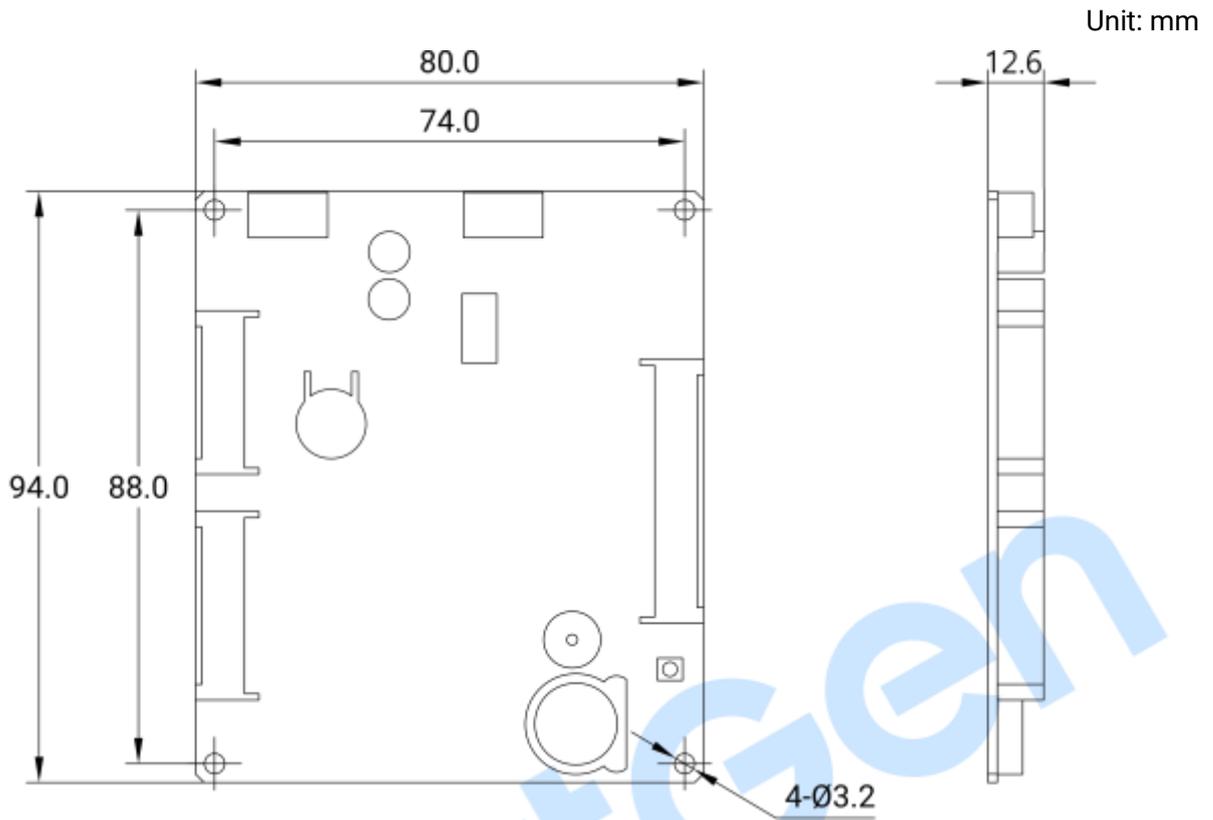


Fig.13 Case Dimensions of HPA100-16 Control Board

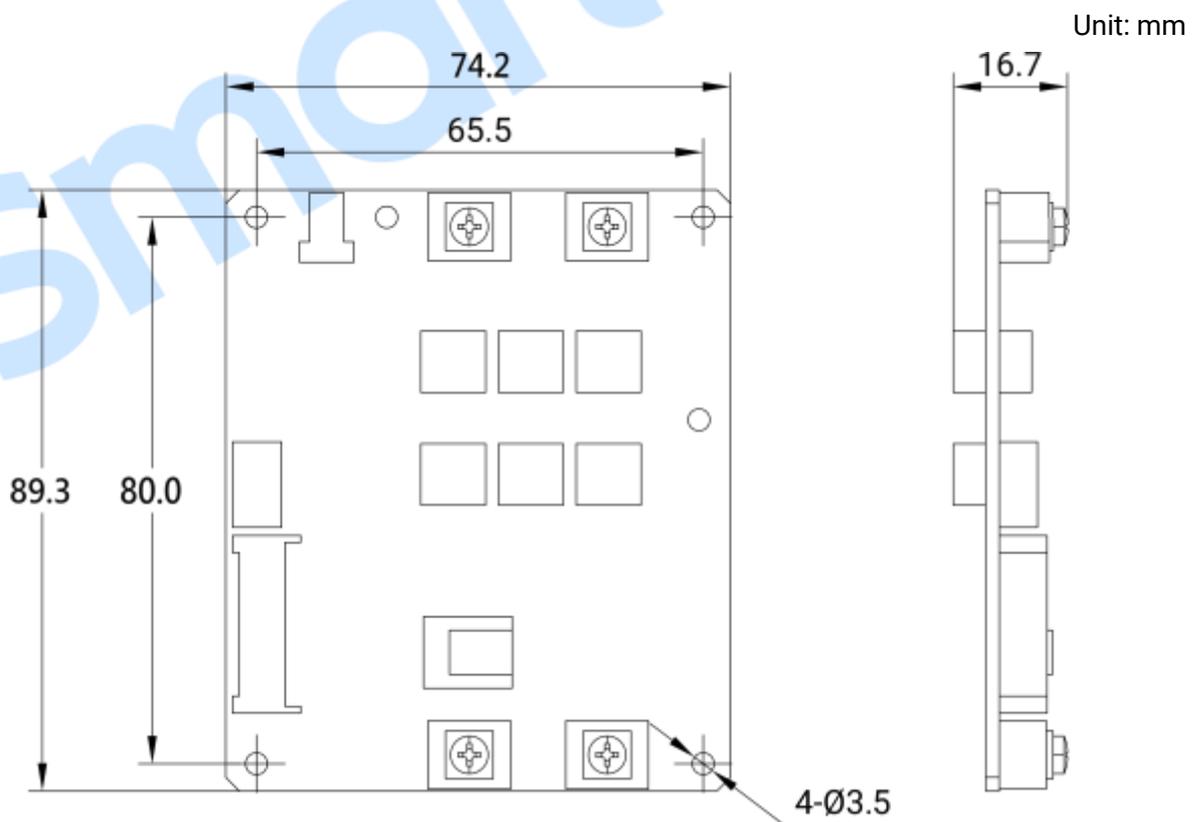


Fig.14 Case Dimensions of HPA100-16-050

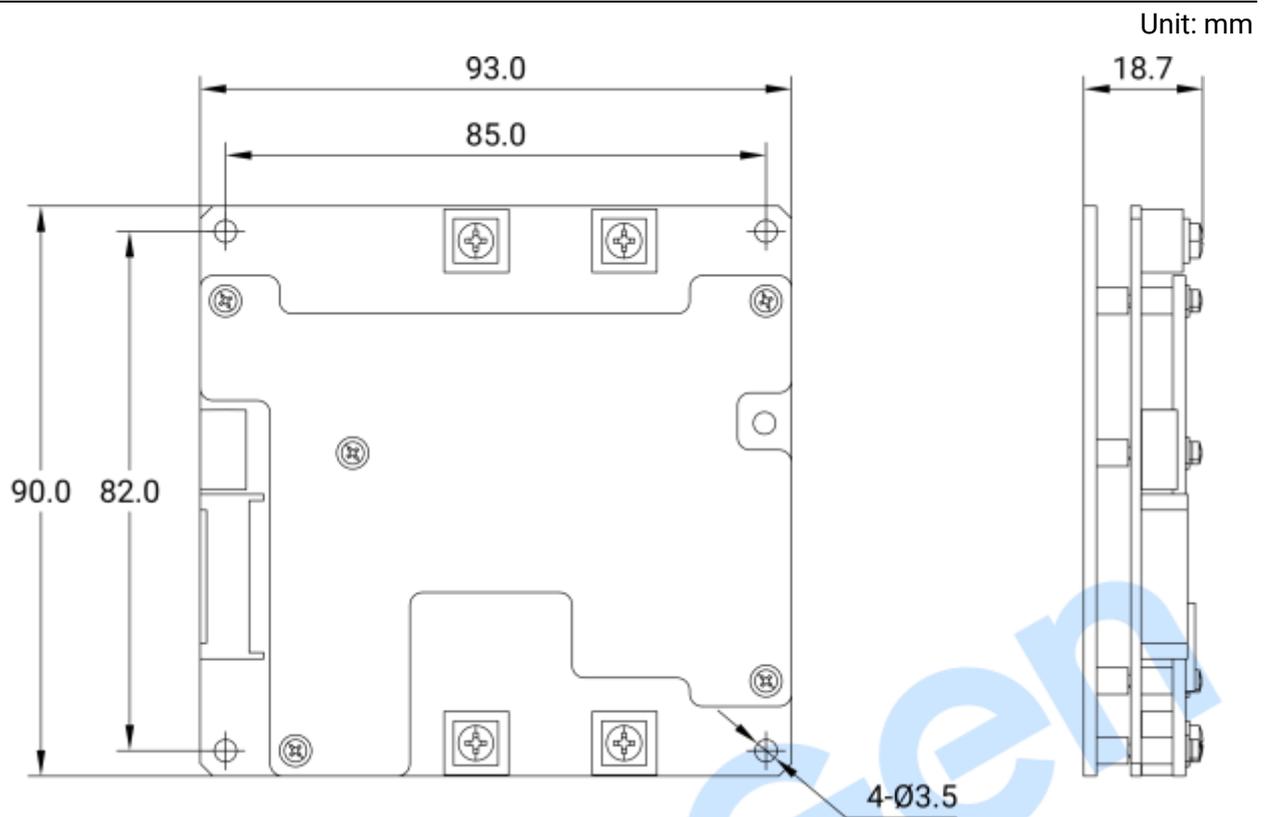


Fig.15 Case Dimensions of HPA100-16-080

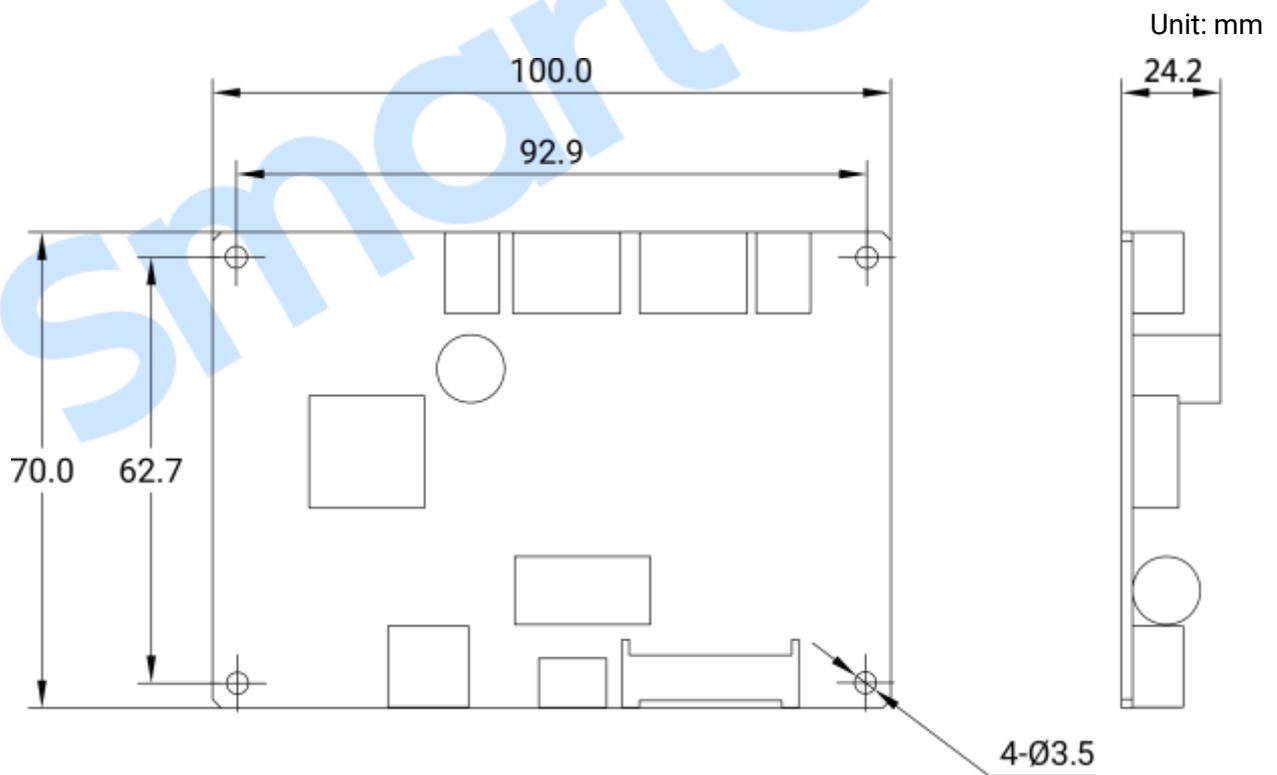


Fig.16 Case Dimensions of HPA100-16-300

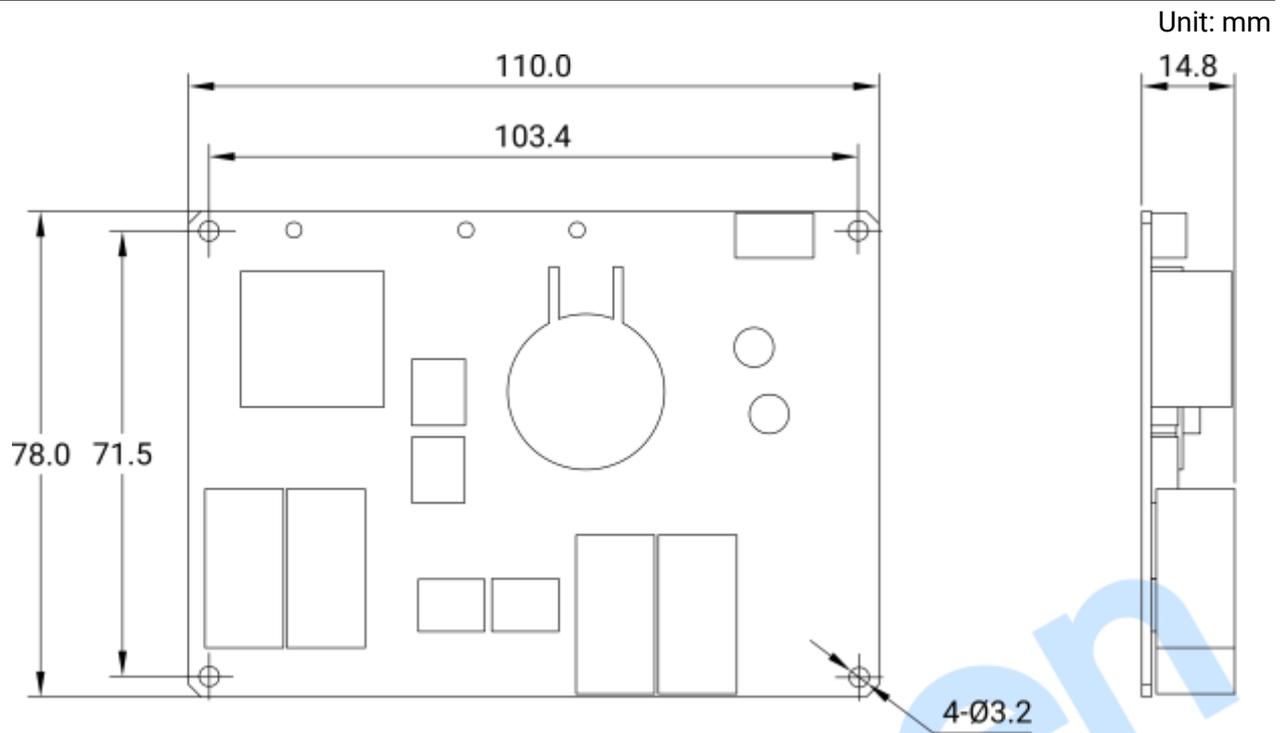


Fig.17 Case Dimensions of Current Limiting Board

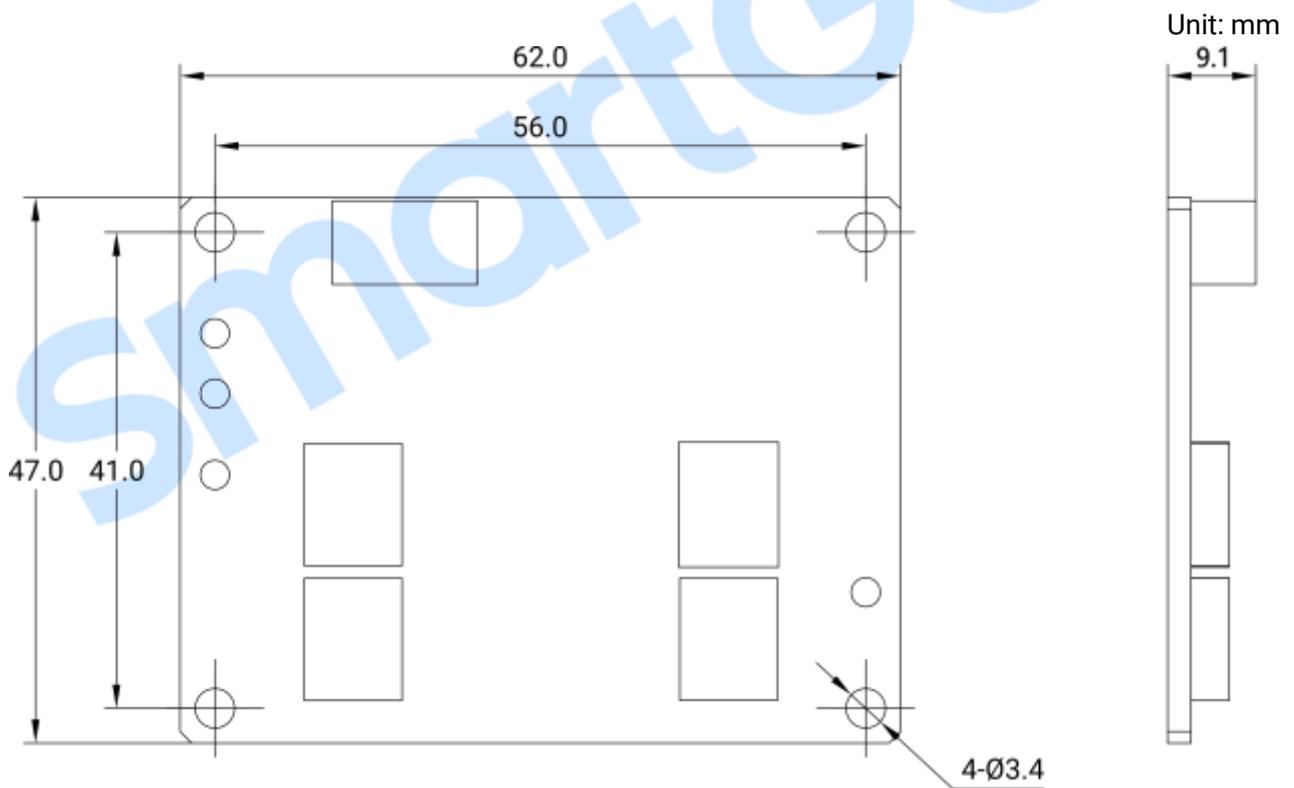


Fig.18 Case Dimensions of Heating Board

10 APPLICATION DIAGRAM

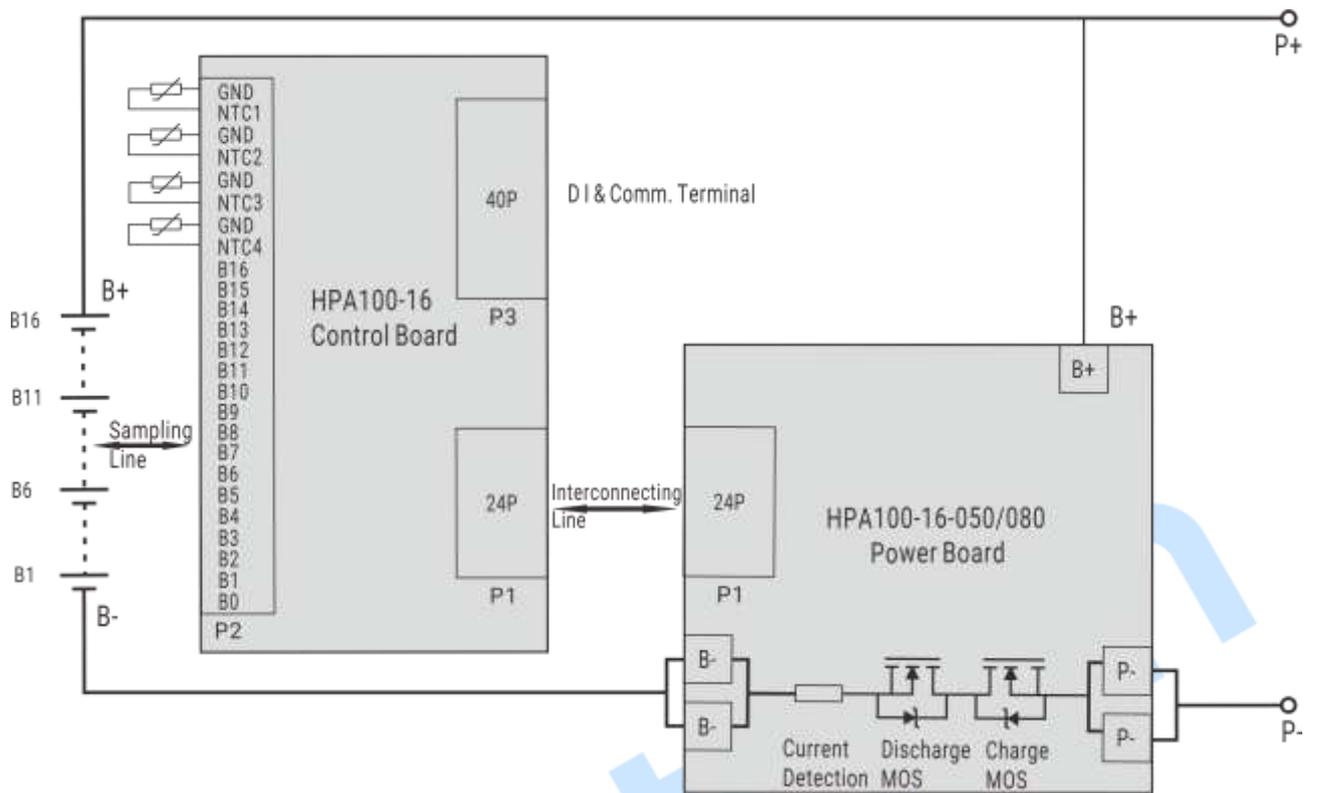


Fig.19 Application Diagram of HPA100-16-050/080

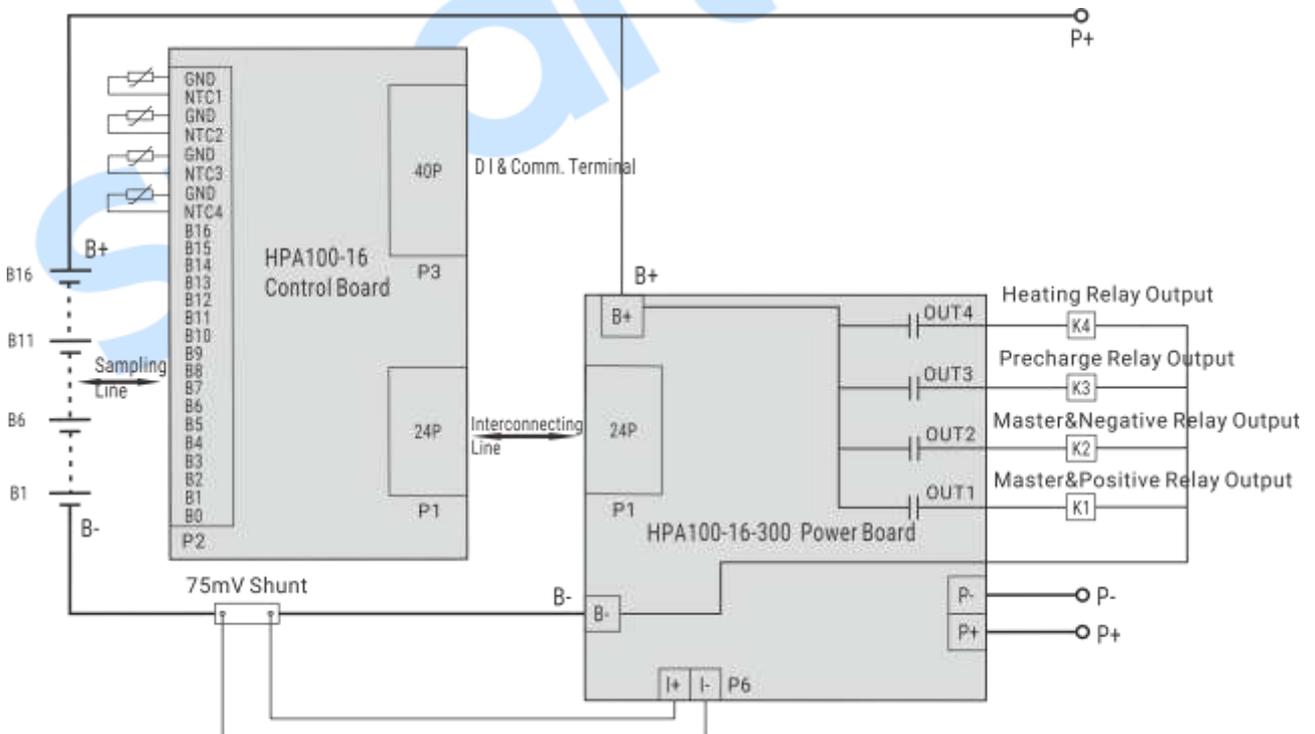


Fig.20 Application Diagram of HPA100-16-300

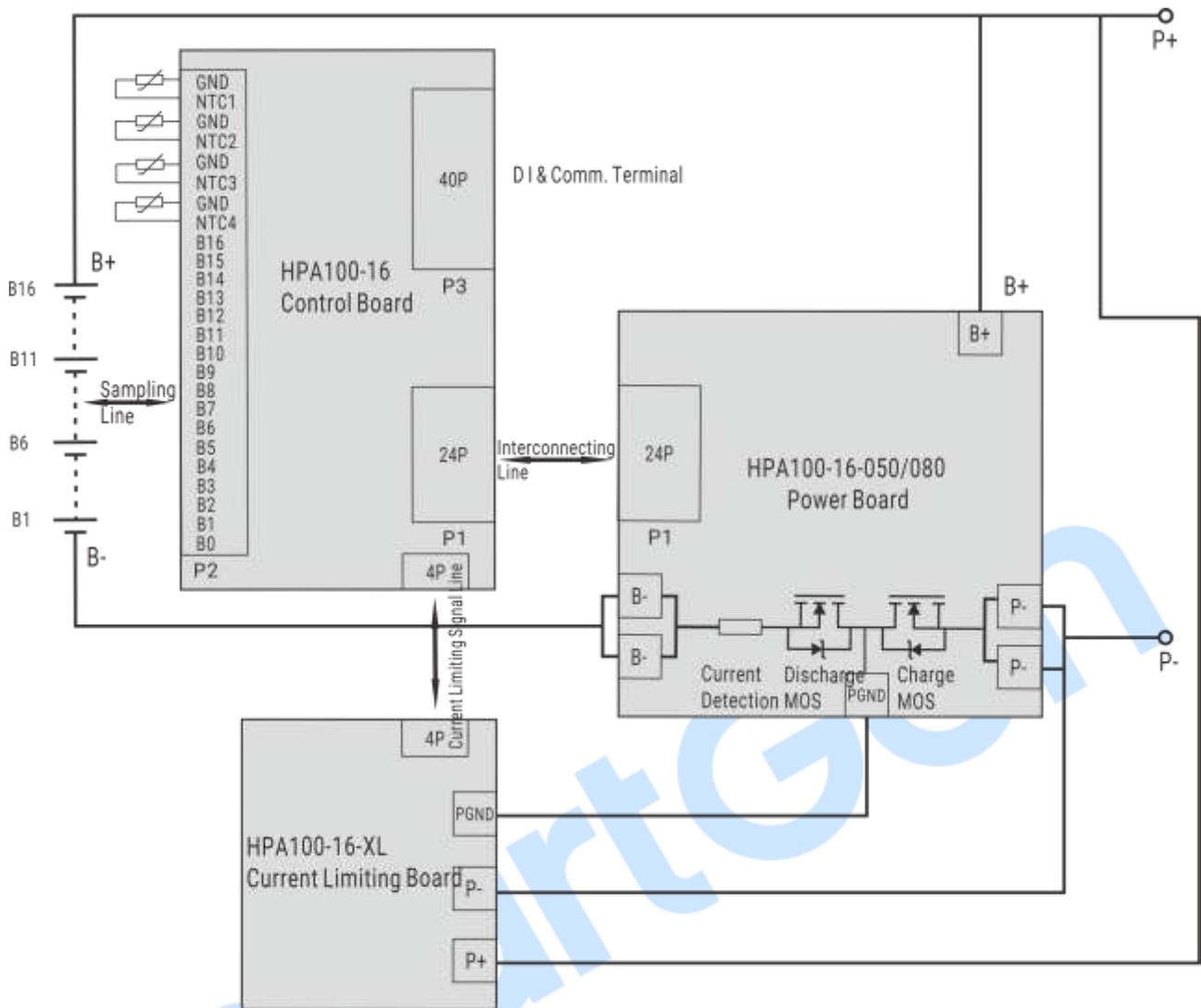


Fig.21 Application Diagram of Current Limiting Board

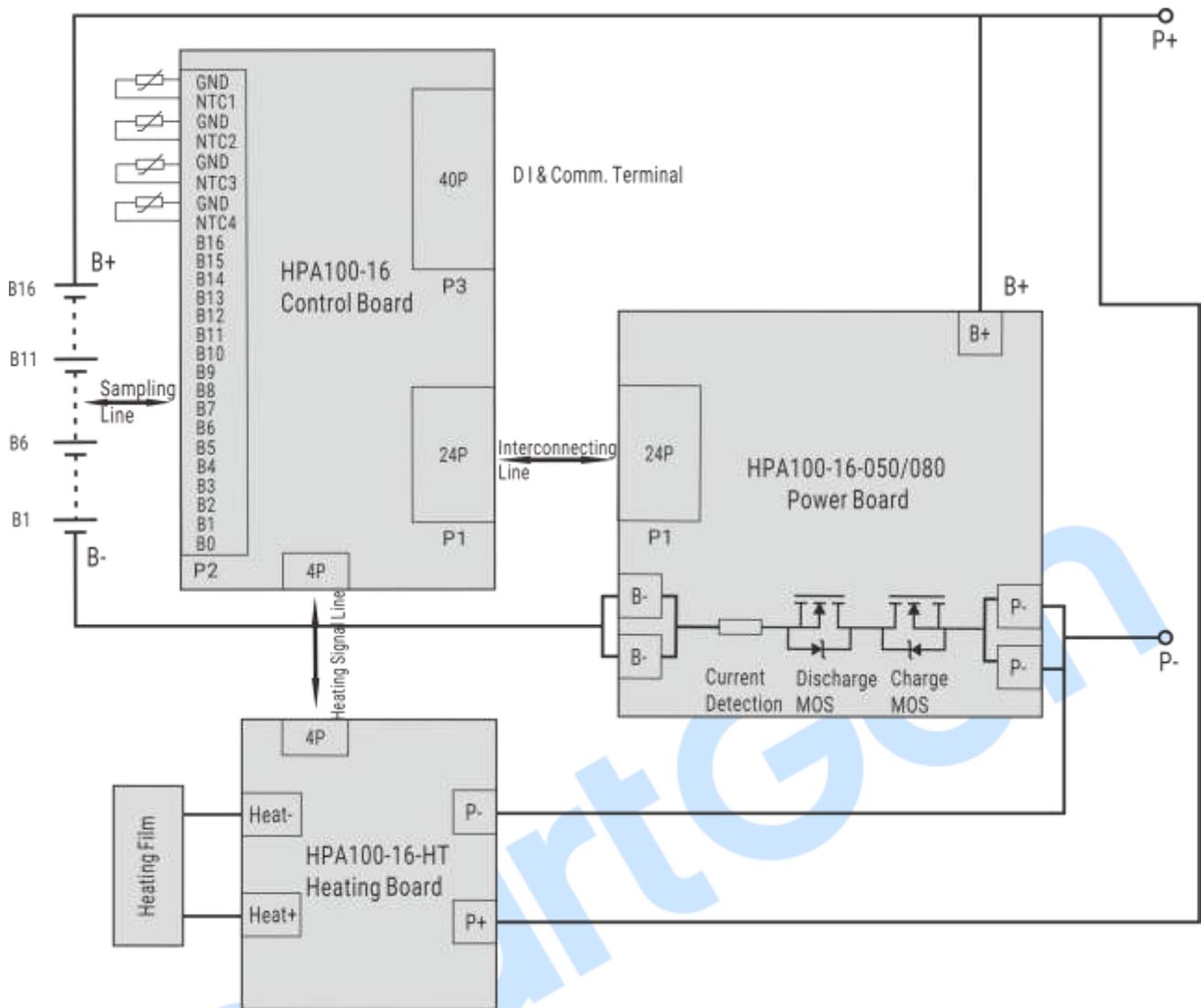


Fig.22 Application Diagram of Heating Board

Table 9 Trouble Shooting

Fault Symptom		Possible Measurement
Protection board no response when power on		Check the wirings of protection board.
Communication Failure	CAN Communication Fault	Check the wirings; Check if the wirings between CAN_H and CAN_L are reversely connected; A 120Ω resistor is recommended to connect between CAN_H and CAN_L.
	485 Communication Fault	Check the wirings; Check module address ID setting; Check if the wirings between RS485_A and RS485_B are reversely connected; Check if PC communication baud rate and parity bit are correct; A 120Ω resistor is recommended to connect between A&B of RS485.
Abnormal battery voltage and temperature data		Check the wirings; Check whether the connector is tightly inserted.