Lithium iron phosphate battery
（Backup power supply series）

Product Specification

Model: ECELL-51.2-100-SA

Approved by	Audited by	Made by

Customer Approvals

宜嘉國際有限公司

ECELL BATTERIES INTERNATIONAL LIMITED

History of Version
版本变更履历表

版本号 Ver.	变更日期 Date	更改内容 Description	编制 Prepared By
A1	2024.3.30	新制定 First issue	林明杰

Content

1.Scope

This product specification defines the requirements of the rechargeable lithium-ion battery supplied to the customer by FuJian HuaZhen New Energy Technology Co.Ltd. Should there be any deviations in the test items or instructions, the customers are advised to contact HuaZhen to find a solution.

2.Description and Model

2.1 Description：Rechargeable Lithium-ion Battery

2.2 Model： HZF-51.2-100-SA

3. Specification

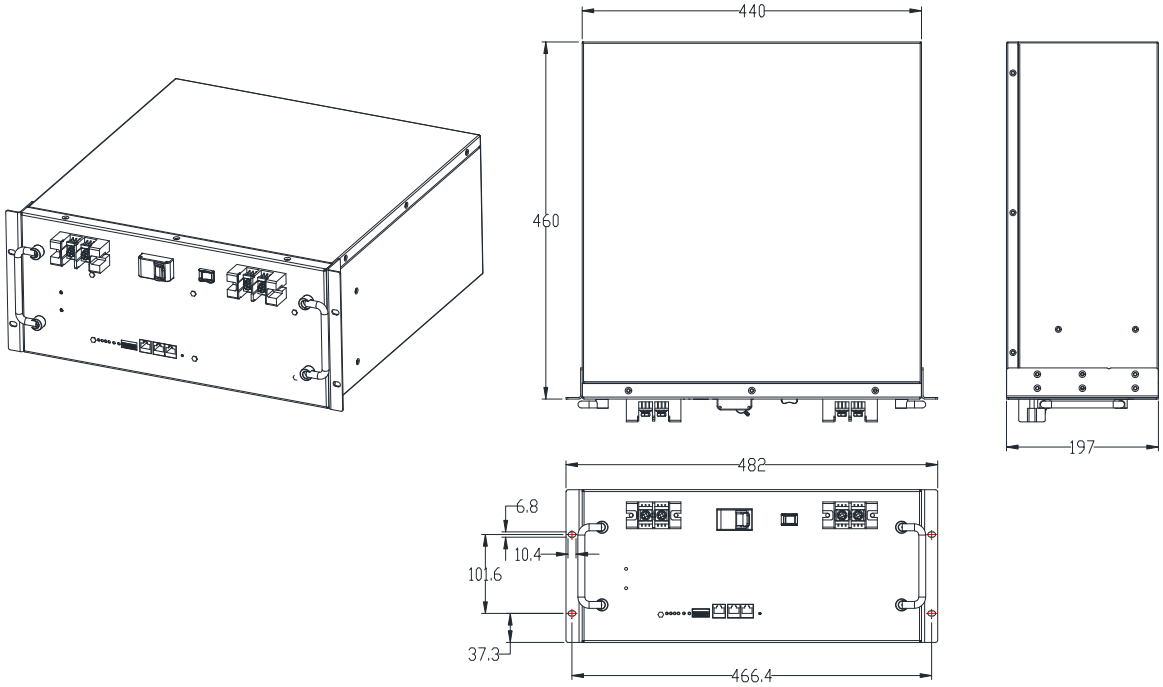
No.	Item	Specification	Remarks
1	Typical capacity	100.0Ah	Rated discharge(1) capacity after rated charge(2)
2	Minimum capacity	98.0Ah	
3	Nominal voltage	51.2V	Configuration: 16 cells in series. Voltage of single cell is 3.2V.
4	Voltage at end of discharge	42.0V	
5	Charge voltage	58.4V	At 25±3℃
7	Maximum Continuous charge current	50A	At 25 ± 3℃
8	Maximum Continuous discharge Current	100A	At 25 ± 3℃
9	Operation Allowable Temperature Range	Charge 0～50°C	0.2C Charge
		Discharge -20 ～ 60°C	0.2C Discharge
10	Humidity	10% ～85% RH	Operation
		5% ～ 85% RH	Storage
11	Storage temperature range	0～50°C	Max. 6 month
12	Net Weight	About 45kg	
13	Cycle life	≥3000	@0.2C 80%DOD

(1) Rated discharge : Constant current discharge(0.2CA) till the discharge end Voltage (42.0V) at 25±3℃.

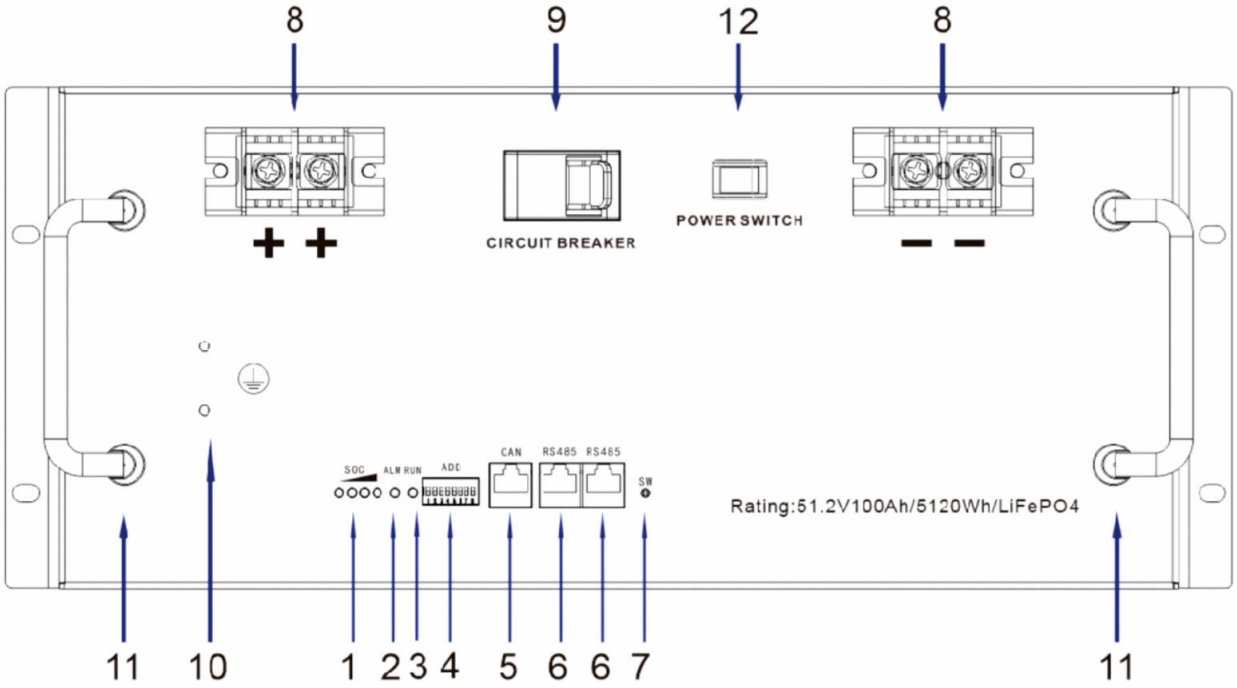
(2) Rated charge : 58.4V±0.05V constant voltage and(0.02CA) current limited charge, for 6.0 hours at 25±3℃

4 Dimensions

4.1 Maximum Dimension: Width = 440mm; Depth = 460mm; Height =197mm



4.2 Connections



No.	Name	Description	Remark
1	SOC	Indicate battery capacity status	
2	ALM	Indicate the fault state, indicated by a red light, when there is a fault, it will be on.	
3	RUN	Indicates the operating status of the equipment	
4	ADD	Set the battery address	
5	CAN	CAN communication interface	
6	RS-485	RS-485 communication interface	
7	Restart switch	Sleep and wake-up function	
8	Battery Output	51.2V power connector + and -	
9	Protection switch	Circuit Breaker	
10	Grounding point		
11	Handle		
12	Power switch		

4.3 Electrical attributes

project	Whether it can be set	Details	Set value	Qualified range
Charging current limiting	Non settable	Charging current limit	10A	10±1A
Charging current limiting mode	Settable		4	-
Consumption current	Non settable	Internal consumption of circuit during operation	≤30mA	≤30mA
		standby power	≤30mA	≤30mA
	Non settable	Internal consumption during sleep	≤100uA	≤250uA
Full charge setting 1	Configurable	Constant pressure value	56.4V	56.4±0.5V
	Configurable	Constant current value	0.5A	0.5A±0.2A
Charging balance	Configurable	Balanced opening voltage	3.5V	3.5V
	Configurable	Balanced opening pressure difference	15mV	15mV
	-	Balanced current	60-200mA	60-200mA
Standby time note 2	Configurable	Forced recovery of charging on voltage after overcharge	48H	48H
Capacity settings	Configurable	Full capacity setting	100Ah	100Ah
	Configurable	Residual capacity settings	50AH	50Ah

4.4 Basic parameter setting

Basic parameter setting(Note: The following parameters shall be tested at 25℃ cyclic temperature unless otherwise specified.)

project	default state	whether Configurable	Details	Set point	Remarks (scope of conformity)
Monomer overcharge protection	open	Configurable	Detection voltage of over charge of monomer	3.85V	3.85±0.05V
	open	Configurable	Delay time of single overcharge detection	1000MS	1000~2500 ms
	open	Configurable	Recovery voltage of over charge of monomer	3.40V，或放电恢复	3.40±0.05V,或放电恢复
Monomer over discharge protection	open	Configurable	Detection voltage of single over discharge	2.50V	2.50±0.05V
	open	Configurable	Delay time of single over discharge detection	1000MS	1000~2500 ms
	open	Configurable	Recovery of over discharge of monomer	2.90V,或充电恢复	2.90±0.05V,或充电恢复
Overall overcharge protection	open	Configurable	Total overcharge detection voltage	57.0V	57.0±0.5V
	open	Configurable	Total over charge detection delay time	1000MS	1000~2500 ms
	open	Configurable	Overall overcharge recovery voltage	50.5V	50.5±0.5V,或放电恢复
Overall over discharge protection	open	Configurable	Total over discharge detection voltage	40.0V	40.0±0.5V
	open	Configurable	Total over discharge detection delay time	1000MS	500~3000 ms

	open	Configu rable	Overall over discharge recovery	45.0V,或充电恢复	45.0V±0.5V,或充电恢复
Over current protection	open	Configu rable	Charging over current protection current 1	110A	110±3A
	open	Configu rable	Charge over current detection delay time 1	10000MS	8000~12000 ms
	open	Configu rable	Over current protection current 1	110A	110±3A
	open	Configu rable	Delay time of over current detection of discharge 1	10000MS	8000~12000 ms
	open	Configu rable	Discharge over current protection current 2	250A	250±10A
	open	Configu rable	Delay time of over current detection of discharge 2	30MS	400MS-600MS
	open	Not availabl e	Short circuit detection current	300A	300±10A
	open	-	Protection conditions	负载短路	负载短路
Short circuit protection	open	Configu rable	Short circuit protection delay time	≤500us	400-700us
	open	-	Protection recovery conditions	断开负载后复位或充电恢复	断开负载后复位或充电恢复
	open	Configu rable	High temperature protection of charging	65℃	65±2℃
	open	Configu rable	Delay time of charging high temperature protection	4000MS	3500MS-4500MS
Temperature protection	open	Configu rable	Recovery of charging high temperature	50℃	50±2℃
	open	Configu rable	High temperature protection of discharge	70℃	70±2℃
	open	Configu rable	Delay time of high temperature protection of discharge	4000MS	3500MS-4500MS
	open	Configu rable	Recovery of high temperature discharge	50℃	50±2℃
	open	Configu rable	Low temperature protection of charging	-10℃	-10±2℃
	open	Configu rable	Delay time of low temperature protection of charging	4000MS	3500MS-4500MS
	open	Configu rable	Low charge recovery	0℃	0±2℃
	open	Configu rable	Low temperature protection of discharge	-15℃	-15±2℃
	open	Configu rable	Delay time of low temperature protection of discharge	4000MS	3500MS-4500MS
	open	Configu rable	Discharge low temperature recovery	0℃	0±2℃
	open	Configu rable	MOS high temperature protection	100℃	100±2℃
	open	Configu rable	MOS high temperature protection delay time	4000MS	3500MS-4500MS
	open	Configu rable	MOS high temperature recovery	85℃	85±2℃
	open	Configu rable	Environmental high temperature protection	65℃	65±2℃
	open	Configu rable	Delay time of high temperature protection	4000MS	3500MS-4500MS

	open	Configu rable	High temperature recovery	55℃	55±2℃
	open	Configu rable	Environmental low temperature protection	-10℃	-10±2℃
	open	Configu rable	Delay time of low temperature protection of environment	4000MS	3500MS-4500MS
	open	Configu rable	Low temperature recovery of environment	0℃	0±2℃
	open	Configu rable	Isostatic high temperature prohibition	50℃	50±2℃
	open	Configu rable	Equalization low temperature prohibition	0℃	0±2℃
Other projects	open	Configu rable	Pre charge delay	4000MS	2500MS-4000MS
	open	Configu rable	Capacity protection	0%	

4.5 Appearances

There shall be no defects (deep scratch, crack, rust, discoloration, leakage, and so on), which may adversely affect the commercial value of the module.

5 Characteristics

5.1 Standard Test Conditions

The sample should be fresh battery that has been manufactured for no more than 1 month, and cycled less than 5 times. Unless otherwise specified, all tests stated in this specification are conducted at the following conditions:

Temperature: 25 ± 2℃; Relative Humidity: 45%～85%

If it has been proven that above condition has no influence on the test result, the tests may as well be conducted at the condition with temperature of 15～30°C and humidity of 25%～85%.

5.2 Test Equipment accuracy

(1) Precision of dimension meter should no less than 0.01mm

(2) Multi-meter precision in measuring voltage and current should no less than 0.5 grade with internal resistance should no less than 10kΩ

(3) The cell internal resistance is determined by the alternation current (a.c.) method (1Kh$_z$LCR)

(4) Requirement for the cell test system: current precision≥±0.1%, constant voltage precision ±0.5%, time precision ≥±0.1%.

(5) Thermometer precision: no less than ±0.5℃.

5.3 Standard Charge

58.4V ±0.05V constant voltage and(0.2CA) current limited charge till the charge end at 25 ± 2°C.

5.4 Electrical Performance Test

Item	Test Instructions	Requirements
1）0.2C Discharge Performance	After full charge, rest no more than 1 hour, then discharge at a constant of $0.2C_5A$ [Note 1] to end voltage [Note 2], record discharge time.	Discharge time≥294min
2）0.5C Discharge Performance	After full charge, rest 0 to 1 hour, discharge at a constant of $0.5C_5A$ [Note 1] to end voltage in 1h, record discharge time.	Discharge time≥110min
3）1C Discharge Performance	After full charge, rest no more than 1 hour, discharge at a constant of $1C_5A$ [Note 1] to end voltage, record discharge time.(Not applicable for this type)	Discharge time≥54min
4）High temperature performance	After standard charge, stay in 60±2℃ high-temperature cabinet for 6h, then discharge at $0.5C_5A$ to end voltage at the same temperature. Leave at 25±5℃ for 2h. then record discharge time.	Discharge time≥105min
5）Low temperature (-10°C)performance	After full charge, stay in -10±2℃ low-temperature cabinet for 6h, then discharge at $0.2C_5A$ [Note 1] to end voltage at the same temperature. then record discharge time.	Discharge time ≥180min
6）Charge Retention Capability	After full charge, leave the cell open circuit at 25±5℃ for 28 days. Then discharge at $0.2C_5A$ [Note 1] to end voltage. then record discharge time.	Discharge time ≥275min
7）Cycle Life	After full charge, leave the cell open circuit for 60 min. Discharge at a constant current of $0.2C_5A$ for 255min. leaved for 60min. Repeat the step until the both discharge time of twice successive step less than 180min. Record discharge time.	Charge-discharge cycle≥2000

Note: 1. $0.2C_5A$ ＝20A
2. end voltage is 42V

Remark: Test current should not be bigger than the battery can endure.

5.5 Environmental Adaptation Test

Item	Test Equipments and Instructions	Test Requirements
1）Constant Temperature and Moisture Test	After full charge, stay 12h in constant temperature humidity chamber at 40℃±2℃ with relative humidity of 90%~95%. Then expose at 20℃±5℃ environment temperature for 2h. Discharge at $0.5C_5A$ to end voltage.	There should not be evident deformation, pocking, smoke or explosion. Discharge time should be not less than 110min.
2）Vibration Test	Fix the battery at vibro-bench. In three mutually perpendicular directions, swing sets 0.38mm(vibration frequency 10 ~ 30Hz) and 0.19mm(vibration frequency 30 ~ 55Hz) in a loop scanning vibration. Vibration time is 30mins.Sweep speed is 1oct/min.	No explosion, no fire, no smoke and no leakage.
3）Drop Test	The cell drop from 60cm to thickness of 20mm wood.	No explosion, no fire, no smoke and no leakage.

Remark: Test current should not be bigger than the battery can endure.

5.6 Safety Tests

5.6.1 Safety tests on battery pack

Item	Test Equipments and Instructions	Test Requirements
1）Short-circuit	Leave the battery which linked to thermoelectric pair in fuming cupboard at 20°C±5°C. Make the battery Short-circuited (Total impedance shall not over 50mΩ). Monitor the temperature change in test. Finish the test when temperature drops about 10°C below the peak.	No fire, no explosion.
2) Overcharge Resistance Performance	In environmental temperature of 20±5℃. Connect cell with thermocouple and then place in ventilated cabinet, charge cell with a constant current of $3C_5$A to 4.0(×N)V and then tampering current to 0A. Stop test when cell temperature is 10℃ lower than the peak value or RS485 output overcharge signals.	No fire, no explosion.
3) Over-discharge Resistance Performance	Discharge at a constant current of $1C_5$A to 0V at 20±5℃. Stop test when RS485 output over-discharge signals.	No fire, no explosion.

Remark: Test current should not bigger than the battery can endure.

6 Transportation and Storage

6.1 Transportation

Avoid violent vibration, impact, crash, direct solar irradiation or drench. Can be transported by truck, railway, ship or airplane with the appropriate packaging.

6.2 Storage

The sample should be fresh cell have been manufactured for no more than 3 months. Cell should be charged to 40%~70% of its nominal capacity, and then stored in a temperature-controlled environment at 0～50°C(45%～85%RH) for 6 months. After test, cell should be discharged with a current of $0.2C_5$A. The discharge time should no less than 4h.

If the battery is not used for long time, please charge it every 6 months.

7 Guidebook for lithium-ion batteries

Note the following advice to ensure right use of HuaZhen lithium-ion cell. HuaZhen should not be responsible for any problem resulted from abuse.

DANGER！

To prevent the possibility of cell leakage, catch fire, or explosion, pay attention to the following item.

1.Do not immerse the cell in water or wet it

2.Do not use or storage cell near a hot source as fire or heater

3.When recharging, use the cell charger specifically for that purpose

4.Do not reverse the position (+) and negative (-) terminals
5.Do not connect the cell directly to an electrical outlet
6.Do not discard the cell in fire or heat it
7.Do not short-circuit the cell by directly connecting the positive (+) and negative (-) terminal with metal objects such as wire
8.Do not transport or store the cell together with metal objects such as necklaces, hairpins etc
9.Do not subject the cell to mechanical shock, do not strike or throw cell
10.Do not directly solder the cell and pierce the cell with a nail or other sharp object.
11.Do not disassemble cell in any way
12.Do not charge cell near fire source or under heat condition

WARNINGS!

Please read the following warnings. Or it may cause battery leakage, explosive and fire.
— Do not put the battery in microwave oven or pressure vessels;
— Do not use the battery in combination with primary batteries(such as dry-cell batteries) or batteries of different capacity, type or brand;
— If the cell gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or cell charger and stop using it;
— If the battery leaks or gives off an odor, remove immediately from the place which is close to fire. The electrolyte leakage may cause fire or explosion;
— If the cell leaks, and the electrolyte get into the eyes. Do not rub eyes, instead, rinse the eyes with clean running water, and immediately seek medical attention. Otherwise, it may injure eyes.
— Do not use or leave the cell at very high temperature (for example, at strong direct sunlight or in a vehicle in extremely hot weather). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.
— If the device is long-time unused, take the battery out and put in a cool, dry place. Otherwise, it may rust or be of poor performance.
— In case the cell terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.

8 Warranty Period

Warranty period of this product is 48 months from manufacturing code or otherwise negotiated by the commercial entities. HuaZhen is responsible for changing the product due to its own quality and manufacturing needs. If the troubles are caused by mishandling of the cell, which is clearly against the instructions in this specification, exchange is unavailable.

9 State of the fresh battery

Unless otherwise stated, generally, the battery is charged about 60% capacity of its nominal value, and the nominal voltage is 51.2V.

10 Specification Revision

HuaZhen has the right to revise the specification. Custom will be not informed when any revision is applied to the specification except for the adjunct of contract.

Appendix 1 Technical Parameters

technical parameter

Environmental conditions

1. Working temperature: -20℃～＋60℃
2. Storage temperature: -5℃～＋40℃
3. Relative humidity: 5% to 95%, no condensation.
4. Altitude: 0～2000m. Derating applications above 2000m. The maximum working environment temperature is reduced by 1℃ for every increase of 200m, and the maximum working altitude is 4000m.

Electrical parameters

1. Charging input voltage: 58.4V
2. Charging current: ≤50A
3. Output voltage range: 42V～58.4V
4. Standard configuration maximum output current: 100.0A

Mechanical parameters

Volume (H×W×D): 197mm×440mm×460mm

Weight: about 45Kg

Appendix 2 Technical Parameters

LED Instructions

state	charge				discharge			
Capacity indicator	L1●	L2●	L3●	L4●	L1●	L2●	L3●	L4●
0~25%	twinkle	Extinguish	Extinguish	Extinguish	bright	Extinguish	Extinguish	Extinguish
25~50%	bright	twinkle	Extinguish	Extinguish	bright	bright	Extinguish	Extinguish
50~75%	bright	bright	twinkle	Extinguish	bright	bright	bright	Extinguish
75~100%	bright	bright	bright	twinkle	bright	bright	bright	bright
Operation indicator●	Changliang				Blink 3			

RJ45 connector pin number definition (top view)

There are three RJ45 connectors on the protection board as RS485 and can communication interfaces, which are RJ45-1, RJ45-2 and RJ45-3 respectively.(see Section 7: management system connections / front schematic of the main board).

RJ45-1 hardware is the can communication interface by default.

RS485 communication interface is the default on RJ45-2 and RJ45-3 hardware.All pins of RJ45-2 and RJ45-3 connectors are parallel, so the interface definition is identical.

RJ45 connector interface description

Interface	explain	Compatible (two out of one spare)
RJ45-1	PIN4：CANH	
	PIN5：CANL	
	PIN1、3、8：NC	485-2B
	PIN2、6、7：NC	485-2A
RJ45-2	PIN2、7： 485-1A	
	PIN1、3、8： 485-1B	
	PIN6： 485-2A	CANH
	PIN5： 485-2B	CANL
RJ45-3	PIN2、7： 485-1A	
	PIN1、3、8： 485-1B	
	PIN6： 485-2A	CANH
	PIN5： 485-2B	CANL

Note: Considering wiring compatibility, to meet more connection scenarios of users.The 5-pin and 6-pin of rj45-2 and rj45-3 are used as optional pins. It can be used as can communication or as the second 485 communication by means of resistance jumper on hardware.Two out of one.

RJ45-1 1 / 3 / 8 pin and 2 / 6 / 7 pin are also optional pins. These pins can be used as the second 485 communication by means of resistance jumper on hardware.

1. Communication description

■ CAN communication

Can communicate with inverter through can
For RJ45 socket 8p8c wiring, refer to 7.1 network port definition.
Baud rate: 500K

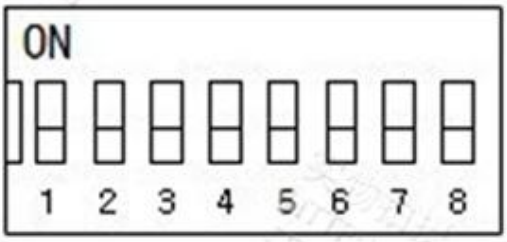
■ RS485 communication

It can communicate with the upper computer through RS485 with baud rate of 19200. The communication method is as follows:

8.2.1 RS485 communication wiring

For RJ45 socket 8p8c wiring, refer to 7.1 network port definition.

8.2.2 Dial switch



Definition of dial switches Bit1 to bit8: Bit1 to bit4 are used to set the address, and bit5 to bit8 are used to set the number of slaves.

Set the address from Bit1 to bit4 according to the sequence of Bit1 to bit15.Bit5 to bit8 are fixed to 0.

See slave setting table

Host setting: Bit1 to bit4 are 0, the host address is fixed to 0, and bit5 to bit8 are set according to the number of slaves in parallel.

See host setting table

Slave setting table

address	Dial switch position				explain
	#1	#2	#3	#4	
1	ON	OFF	OFF	OFF	Address 1
2	OFF	ON	OFF	OFF	Address 2
3	ON	ON	OFF	OFF	Address 3
4	OFF	OFF	ON	OFF	Address 4
5	ON	OFF	ON	OFF	Address 5
6	OFF	ON	ON	OFF	Address 6
7	ON	ON	ON	OFF	Address 7
8	OFF	OFF	OFF	ON	Address 8
9	ON	OFF	OFF	ON	Address 9
10	OFF	ON	OFF	ON	Address 10
11	ON	ON	OFF	ON	Address 11
12	OFF	OFF	ON	ON	Address 12
13	ON	OFF	ON	ON	Address 13
14	OFF	ON	ON	ON	Address 14
15	ON	ON	ON	ON	Address 15

Host setting table

Number of parallel machines	Dial switch position				explain
	#5	#6	#7	#8	
2	ON	OFF	OFF	OFF	2 parallel machines
3	OFF	ON	OFF	OFF	3 parallel machines
4	ON	ON	OFF	OFF	4 parallel machines
5	OFF	OFF	ON	OFF	5 parallel machines
6	ON	OFF	ON	OFF	6 parallel machines
7	OFF	ON	ON	OFF	7 parallel machines
8	ON	ON	ON	OFF	8 parallel machines
9	OFF	OFF	OFF	ON	9 parallel machines
10	ON	OFF	OFF	ON	10 parallel machines
11	OFF	ON	OFF	ON	11 parallel machines
12	ON	ON	OFF	ON	12 parallel machines
13	OFF	OFF	ON	ON	13 parallel machines
14	ON	OFF	ON	ON	14 parallel machines
15	OFF	ON	ON	ON	15 parallel machines