

MG300-A Microgrid controller Product Specification



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1. Overview

The MG300 series microgrid controller is a high-performance universal communication and control device specially designed for microgrid systems. It can function as a microgrid controller, EMS controller, virtual power plant cabinet-level control node, communication manager, protocol converter, and energy storage controller. Together with EMS cloud platforms, APP terminals, and other microgrid controllers, it forms a cloud-edge-terminal integrated IEMS (Intelligent Energy Management System) command and energy management system.

The MG300 series features high integration and can be installed in high-voltage cabinets. It supports the access of devices such as BMS, PCS, EMS controllers, photovoltaic systems, energy storage systems, charging piles, various sensors, meters, HVAC, and lighting systems. It is compatible with communication protocols including IEC61850, IEC104, Modbus, TCP/IP, DL/T645, MQTT, and HTTP, and can also support customization of private protocols/specifications. The system integrates functions such as peak shaving and valley filling, demand control, dynamic capacity expansion, anti-reverse power flow control, orderly charging, fluctuation suppression, power factor adjustment control, photovoltaic consumption (self-consumption with surplus power not fed into the grid), backup power mode, energy storage-diesel generator coordination, and remote upgrade. It realizes the optimal economy and carbon emission reduction of the microgrid system.



Figure 1 MG300-A Appearance Diagram

2. Typical Applications

- Industrial and commercial energy storage
- Charging Station
- Photovoltaic (PV) Power Station

3. Basic Features

Table 1 Product Basic Characteristics Table

MG300-A		
Hardware Interface/Peripheral	Resource	Remarks
System Resources		
CPU	4-core Cortex®-A55	
NPU	1TOPS	
Main Frequency	2GHz	Maximum Frequency
Memory	2GB/4GB LPDDR4	Memory optional: 2GB or 4GB
Storage	32GB	SSD solid-state drive optional
System	Linux	
Peripheral Resources		
Power Supply	1 channel	DC 9~36V
Gigabit Ethernet	2 channels 10/100/1000Mbps	
RS485	8 channels	Isolated type
RS232	2 channels	Isolated type
CAN	2 channels	Isolated type
DI	4 channels	
DO	4 channels	For signal use only
USB3.0	1 channel	
SD Card	1 channel	
SIM Card	1 channel	
4G/5G	4G Cat1/4;5G RedCap	Communication module optional
WIFI	2.4G WiFi	
Bluetooth	BT5.2	
Human-Machine Interaction		
HDMI2.0	1 channel	
Indicator Lights	5 pieces	
Environmental Parameters		
Operating	-25~55°C	

Temperature		
Operating Humidity	5%~95% (non-condensing, non-freezing)	
Operating Altitude	Below 3000 meters	
	Mechanical Characteristics	
Mechanical Dimensions	200x235x52 mm	
Protection Class	IP20	

4. Software Functions

Table 2 Software Function Strategy List

Software Function List			
Serial Number	Strategy Name	Strategy Description	Remarks
1	Data External Transmission	Supports external protocols (Modbus-RTU/Modbus-TCP); supports data reading;	Data External Transmission
2	Data Acquisition	Supports protocols such as Modbus RTU, Modbus TCP, DLT645, IEC61850, IEC104, CAN2.0;	Data Acquisition
3	Multi-Unit Parallel Operation	Supports parallel operation of multiple cabinet controllers, with the station controller uniformly issuing charging/discharging power, grid-connected/off-grid switching and other functions;	Multi-Unit Parallel Operation
4	Multiple Protection	Adds an additional layer of protection mechanism based on the inherent protection thresholds of PCS and BMS. When PCS and BMS reach the protection thresholds but do not trigger protection, the cabinet controller directly disconnects the AC/DC side switches for protection;	Multiple Protection
5	Fault Shutdown	After detecting an abnormal	Fault Shutdown

		alarm of the device, issues a shutdown command to stop the device;	
6	Data Upload to Cloud	Uploads all device data to the cloud platform via MQTT protocol; supports customized connection to third-party platforms;	Data Upload to Cloud
7	Local Data Monitoring	Can be equipped with a screen to view the real-time status of in-cabinet devices locally; supports log query; supports local data storage; supports customized language display;	Local Data Monitoring
8	Remote Upgrade	Supports remote upgrade of cabinet control EMS, in-cabinet PCS, and BMS devices;	Remote Upgrade

5. Operating Conditions

Table 3 Operating Environment Parameter Table

Environmental Condition		
Operating Temperature	-25~55℃	
Operating Humidity	5%~95% (non-condensing, non-freezing)	
Operating Altitude	Below 3000 meters	

Table 4 Operating Power Supply Parameter Table

Power Supply and Power Consumption		
Power Supply and Power Consumption	Power Supply and Power Consumption	Power Supply and Power Consumption
Operating Voltage	DC 9~36V ±10%	

6. Interface Parameters

6.1.Front Panel Introduction

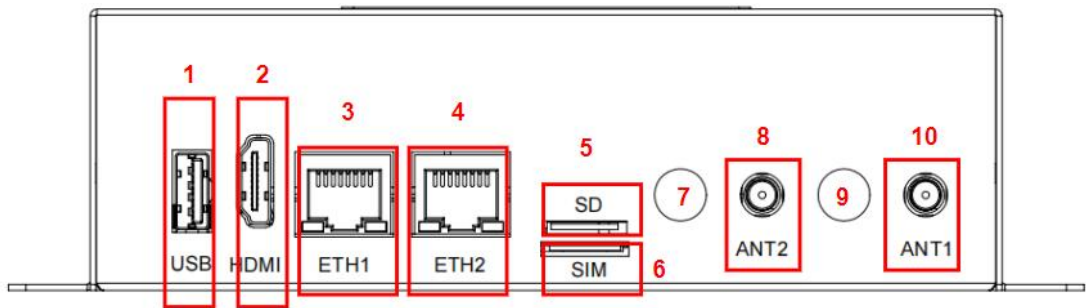


Figure 2 Front Panel Schematic Diagram

Table 5 Front Panel Function List

Serial Number	Interface	Description	Remarks
1	USB3.0 OTG Interface		
2	HDMI2.0 Interface		
3	10/100/1000Mbps Ethernet Electrical Port		
4	10/100/1000Mbps Ethernet Electrical Port		
5	SD Card Interface		microSIM Card
6	SIM Card Interface		
7	Reserved Antenna Port		
8	WIFI/BLE Antenna Interface		2.4GHz
9	Reserved Antenna Port		
10	4G Antenna Port		

6.2. Rear Panel Introduction

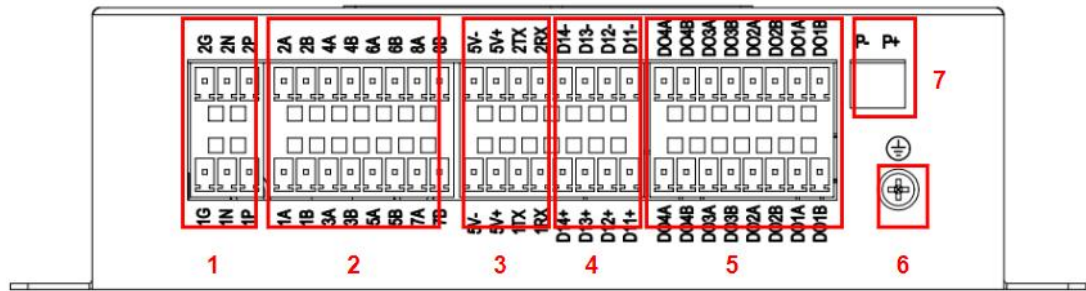


Figure 3 Rear Panel Schematic Diagram

Table 6 Rear Panel Function List

Serial Number	Interface	Description	Remarks
1	CAN Interface	2-channel CAN Interface	Built-in 120 Ω resistor
2	RS485 Interface	8-channel RS485	No built-in 120 Ω resistor
3	RS232 Interface	2-channel RS232	
4	DI Interface	4-channel Optocoupler Input	
5	DO Interface	4-channel DO Output	Relay normally open contact
6	Chassis Ground Screw	Chassis Ground	
7	Power Input	DC 9~36V	Maximum power 30W

6.3. Top Panel Introduction

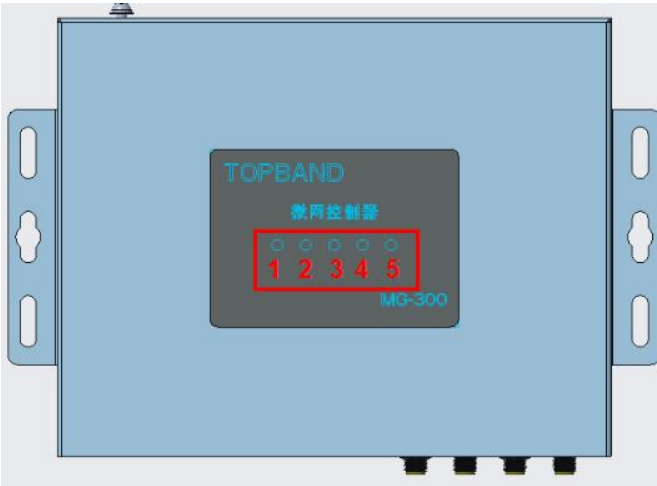
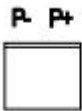


Table 7 Top Panel Indicator Light Description

Serial Number	Interface	Description	Remarks
1	Power Indicator Light	Lights up when powered on	
2	System Indicator Light 1	Indicates system status	
3	System Indicator Light 2	Indicates system status	
4	System Indicator Light 3	Indicates system status	
5	System Indicator Light 4	Indicates system status	

6.4.Power Input



The rated input voltage of MG300 is DC 9~36V $\pm 10\%$, and the rated maximum power is 30W (full load of CPU and all peripherals).

Table 8 Power Input Terminal Definition Description

Silkscreen	Interface	Description	Remarks
P+	Power 1 Positive Pole		DC 9~36V
P-	Power 1 Negative Pole		

6.5.RS485 Interface

The device is equipped with 8 isolated RS485 interfaces, supporting a communication baud rate of 2400~115200 bps.

Table 9 RS485 Interface Terminal Definition Description

Silk Screen	Interface	Description	Remarks
1A	RS485 Channel 1	RS485 signal A	
1B		RS485 signal B	
1G		RS485 signal ground	
2A	RS485 Channel 2	RS485 signal A	
2B		RS485 signal B	
2G		RS485 signal ground	
3A	RS485 Channel 3	RS485 signal A	
3B		RS485 signal B	
3G		RS485 signal ground	
4A	RS485 Channel 4	RS485 signal A	
4B		RS485 signal B	
4G		RS485 signal ground	
5A	RS485 Channel 5	RS485 signal A	
5B		RS485 signal B	
5G		RS485 signal ground	
6A	RS485 Channel 6	RS485 signal A	
6B		RS485 signal B	
6G		RS485 signal ground	
7A	RS485 Channel 7	RS485 signal A	
7B		RS485 signal B	
7G		RS485 signal ground	
8A	RS485 Channel 8	RS485 signal A	
8B		RS485 signal B	
8G		RS485 signal ground	

6.6. Wireless Communication

The MG300 has a built-in 4G/5G communication module, supporting optional 4G CAT1, 4G CAT4, and 5G communication modules, with a built-in SIM card and optional data plans.

The MG300 supports 802.11b/g/n and Bluetooth 5.2 communication.

Table 10 Wireless Communication Antenna Terminal Definition Description

Silk Screen	Interface	Description	Remarks
4G	4G communication antenna interface	SMA male thread with inner hole	
WIFI/BLT	WIFI,Bluetooth communication antenna interface	SMA male thread with inner hole	

6.7. Ethernet Interface

MG300 is equipped with 2 10/100/1000Mbps adaptive Ethernet ports.

Table 11 Definition and Description of Ethernet Interface

Silk Screen	Interface	Description	Remarks
ETH1	10/100/1000Mbps Ethernet Interface		
ETH2	10/100/1000Mbps Ethernet Interface		

6.8. DO Interface

The MG300 has 4 relay output channels. O+ and O- are the two ends of the normally open relay contacts; the maximum capacity of the relay contacts is 5A 250VAC or 5A 30VDC;

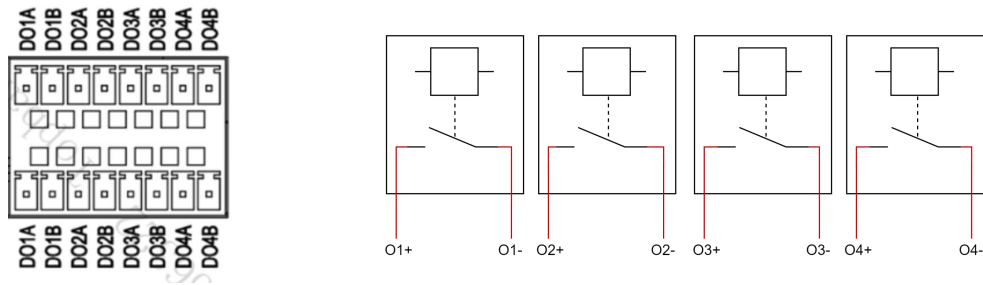


Figure 4 DO Interface Terminal Diagram and Internal Schematic Diagram

- Note:*
- 1. The upper and lower rows of DO1A are internally connected.*
 - 2. The descriptions of the relay contacts such as +, -, A, and B are only for contact description, and the contacts themselves have no polarity.*

Table 12 DO Interface Terminal Definition Description

Silk Screen	Interface	Description	Remark
DO1A	DO1	DO1 normally open relay contact A	
DO1B		DO1 normally open relay contact B	
DO2A	DO2	DO2 normally open relay contact A	
DO2B		DO2 normally open relay contact B	
DO3A	DO3	DO3 normally open relay contact A	
DO3B		DO3 normally open relay contact B	
DO4A	DO4	DO4 normally open relay contact A	
DO4B		DO4 normally open relay contact B	

6.9. DI Interface

The MG300 has 2 RS232 interfaces; TX is the data transmitting end of the device, RX is the data receiving end of the device, 5V+ is the isolated power output, and 5V- is the RS232 communication ground;

Table 13 RS232 Terminal Definition Description

Silk Screen	Interface	Description	Remarks
1RX	RS232 Interface 1	RS232 Interface 1 receiving	
1TX		RS232 Interface 1 transmitting	
5V+		RS232 interface 5V	

		power +	
5V-		RS232 interface 5V power -	RS232 reference ground
2RX	RS232 Interface 2	RS232 Interface 2 receiving	
2TX		RS232 Interface 2 transmitting	
5V+		RS232 interface 5V power +	
5V-		RS232 interface 5V power -	RS232 reference ground

Note:

1. The 5V power supply is only for the RS232's own communication, with a maximum external current <100mA; otherwise, it may cause abnormal RS232 communication.

2. RS232 is non-differential communication, and the communicating devices need a common ground.

6.10. RS232 Interface

The MG300 has 2 RS232 interfaces; TX is the data transmitting end of the device, RX is the data receiving end of the device, 5V+ is the isolated power output, and 5V- is the RS232 communication ground;

Table 14 RS232 Terminal Definition Description

Silk Screen	Interface	Description	Remarks
1RX	RS232 Interface 1	RS232 Interface 1 receiving	
1TX		RS232 Interface 1 transmitting	
5V+		RS232 interface 5V power +	
5V-		RS232 interface 5V power -	RS232 reference ground
2RX	RS232 Interface 2	RS232 Interface 2 receiving	

2TX		RS232 Interface 2 transmitting	
5V+		RS232 interface 5V power +	
5V-		RS232 interface 5V power -	RS232 reference ground

Note:

1. The 5V power supply is only for the RS232's own communication, with a maximum external current <100mA; otherwise, it may cause abnormal RS232 communication.

2. RS232 is non-differential communication, and the communicating devices need a common ground.

6.11. CAN Interface

The MG300 supports 2 independent isolated CAN communications, with a maximum communication baud rate of 1Mbps.

Table 15 CAN Interface Terminal Definition Description

Silk Screen	Interface	Description	Remarks
1P	CAN1	CAN1 signal P	
1N		CAN1 signal N	
1G		CAN1 signal reference ground	
2P	CAN2	CAN2 signal P	
2N		CAN2 signal N	
2G		CAN2 signal reference ground	

Note: 1G and 2G are internally connected. Note: 1G and 2G are internally connected.。

6.12. USB3.0 Interface

The MG300 has 1 USB3.0 interfaces.

6.13. HDMI Interface

The HDMI of MG300 is compatible with HDMI1.4 and HDMI2.0.

It supports a maximum of 10bits color depth;

It supports a maximum display output of 1080p@120Hz and 4096x2304@60Hz;

It supports RGB/YUV (10bit) format;

It supports HDCP1.4/2.2;

6.14. SIM Card Interface

MG300-A is designed with an external SIM card and has no built-in SIM card.

The external SIM card supports the microSIM card standard.



6.15. SD Card Interface

MG300-A is equipped with an external SD card interface, supporting the specification of Micro SD Card (also known as Trans-flash Card).

7. Electromagnetic Compatibility

Test Item	Test Standard	Test Interface	Test Level	Remarks
Electrical Fast Transient/Burst Immunity	IEC 61000-4-4	Power interface RS485 interface RS232 interface CAN interface DI, DO interfaces Ethernet interface	Level 4	
Electrostatic Discharge Immunity Test	IEC 61000-4-2	Power interface RS485 interface RS232 interface CAN interface DI, DO interfaces Ethernet interface HDMI interface USB interface Indicator lights Antenna interface	Level 4	
Surge (Impact) Immunity Test	IEC 61000-4-5	Power interface	Level 4	
Radio Frequency Electromagnetic Field Radiation Immunity	IEC 61000-4-3	Power interface RS485 interface RS232 interface CAN interface Ethernet interface	Level 3 (10V/m)	
Conducted Disturbance Immunity Induced by Radio Frequency Field	IEC 61000-4-6	Power interface RS485 interface RS232 interface CAN interface	Level 3 (10V/m)	

9. Declaration

Shenzhen Topband Co., Ltd. (hereinafter referred to as "Topband") strives to provide accurate and reliable product information. However, due to the timeliness of the content in this manual, Topband cannot fully guarantee the timeliness and applicability of this document at any time. Topband reserves the right to update the content of this manual without prior notice. For the latest version of the information, please contact Topband staff. Thank you for your understanding and support!

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