

ACCU-100M Microgrid Coordination Controller

Technical specifications

Acrel Co., Ltd.

目录

1. Product Introduction	2
2. Product Features.....	2
3. Product Parameter	3
4. System Architecture	6
5. Technical Specifications.....	7
6. Performance Indicators	8
7. Energy Dispatch.....	8
8. Device Wiring.....	9
9. Exterior Dimensions	10
10. General Requirements.....	11
10.1.General Requirements.....	11
10.2.Packaging and Transport.....	11
11. Technical Services.....	12

1. Product Introduction

ACCU-100M Microgrid Coordination Controller is a modular intelligent coordination controller applied to microgrid, distributed power generation, energy storage and other fields. ACCU-100M microgrid coordination controller is a modular intelligent coordination controller applied in the field of microgrid, distributed power generation and energy storage. The device meets the system requirements for the access of photovoltaic system, wind power generation, energy storage system and charging piles, etc. It monitors the operation status and health condition of photovoltaic, wind power generation, energy storage system and charging piles through round-the-clock data collection and analysis of the microgrid system, and on the basis of which, with the target of safe and economic optimisation of operation, it obtains the optimal control strategy and then implements the regulation and control on the microgrid, realising real-time dynamic regulation function of the distributed energy. It can achieve real-time dynamic regulation of microgrid distributed energy, energy storage system and load, promote localised consumption of new energy, improve the stability of grid operation and compensate for load fluctuations; effectively implement demand management of microgrid, improve the operating efficiency of microgrid, reduce the cost of power supply, and guarantee the safe, reliable and economic operation of microgrid.

2. Product Features

ACCU-100M Microgrid Coordination Controller has the following functional features:

Data acquisition: support serial, Ethernet and other multi-channel real-time operation, to meet the various types of wind power and photovoltaic inverters, energy storage and other equipment access;

Communication management: Support Modbus RTU, Modbus TCP, IEC 60870-5-101, IEC 60870-5-103, IEC 60870-5-104, MQTT and other communication protocols, which can realise cloud-side collaboration (combined with the Ankru Intelligent Energy Management Cloud Platform for remote operation and maintenance), OTA upgrades, on-site/remote switching, local Human-computer interaction (optional);

Edge computing: flexible alarm threshold setting, active alarm uploading, data merge calculation, logic control, breakpoint transmission, data encryption, 4G routing;

Strategy management: anti-reverse current, planning curve, peak and valley shaving, demand control, active/reactive power control, optical storage coordination, etc., and supports strategy customisation.;

System security: user rights designed based on the untrustworthy model, preventing the intrusion of illegal users; based on data encryption and data security verification technology, the use of data calibration and anti-tampering mechanisms, to achieve solid evidence and traceability of data.;

Operational safety: collecting and analysing all station signals and measurement data, including battery, temperature control and fire protection, to achieve operational safety early warning and prediction.

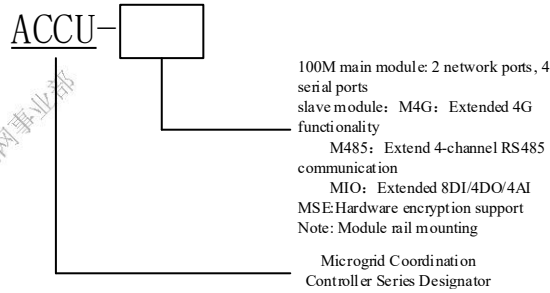
3. Product Parameter

ACCU-100M microgrid controller is mainly responsible for data acquisition, local control strategy and cloud data interaction in industrial and commercial photovoltaic storage and charging new energy power plants.



Figure 3-1 ACCU-100M Product Diagram

Model Description:



The typical hardware configuration and accessory parameters of the ACCU-100M microgrid controller are shown in Table 3-1 below.

Table 3-1 Typical Configuration Parameters

Project	Specifications
CPU	ARM Cortex-A7 528MHz
Memory	256MB DDR3 + 256MB NAND Flash
Frequency and Power Consumption	50 Hz (45 Hz~65 Hz), Power consumption ≤10 W
Supply Voltage	DC 9-36V
RS-485 Serial Port	4-channel optocoupler isolation + 1-channel RS232 (debug port)
RJ45 Ethernet Port	2-Channel 10/100M Adaptive
USB HOST	1-Channel USB 2.0 High-Speed Interface, supporting connection of USB drives for breakpoint resume (resumable transmission) or wireless Wi-Fi network adapter (optional)
TF Card Interface	Supports hot-plug-and-play and plug-and-play data storage.
DI Acquisition	8 passive dry contact switch inputs
RST Button	Short press for 2-5 seconds to restart the device, long press for more than 5 seconds to restore the factory default settings.
Protocol Support	Device side: Modbus Rtu/TCP, DL/T 645-1997, DL/T 645 and others; Master side: Modbus TCP, 104, SNMP, MQTT protocol, etc;
Environment	Operating Temperature: -20℃~+55℃
	Storage and Transportation Temperature: -25℃~+70℃

Electrical Performance	Relative Humidity: $\leq 95\%$ ($+25^{\circ}\text{C}$)
	Altitude: $\leq 2500\text{m}$
	GB/T 17626.2-2018 Electrostatic Discharge (ESD) Immunity Test, Level 4
	GB/T 17626.3-2016 Radiated, Radio-frequency, Electromagnetic Field Immunity Test, Level 3
	GB/T 17626.4-2018 Electrical Fast Transient/Burst (EFT/B) Immunity Test, Level 4
	GB/T 17626.5-2019 Surge (Impact) Immunity Test, Level 4

Table 3-2 Slave Module Technology Table

ACCU-M485 Module	Power Supply	RJ45 Interface, powered by the Main Module.
	Communication	Uplink: RJ45 Interface, communicating with the Main Module. Downlink: 4-Channel Optocoupler-Isolated RS485
ACCU-M4G Module	Power Supply	RJ45 Interface, powered by the Main Module.
	Communication	Uplink: 2G/4G Full-Netcom Downlink: RJ45 Interface, communicating with the Main Module.
ACCU-MIO Module	Power Supply	RJ45 Interface, powered by the Main Module.
	Communication	Uplink: RJ45 Interface, communicating with the Main Module Downlink: 8 Digital Inputs (Passive) / 4 Digital Outputs (Passive) / 4 Analog Inputs (4-20mA)
ACCU-MSE Module	Power Supply	RJ45 Interface, powered by the Main Module.
	Communication	Uplink: RJ45 Interface, communicating with the Main Module Hardware Encryption Module: Supports encryption algorithms including SM1, SM4, DES, 3DES128, AES128, AES192, AES256, RSA1024, RSA1280, RSA2048, and others.

4. System Architecture



Figure 4-1 System Architecture Diagram

ACCU-100M Coordination Controller: Controls the output and power demand of energy storage equipment, distributed energy resources, and adjustable load equipment, and is able to carry out optical storage replacement to reduce light abandonment under the premise of satisfying scheduling according to the economic efficiency model. It also interacts with the cloud platform and responds to the cloud policy configuration.

Intelligent energy management cloud platform EMS3.0: It meets the access of massive data across sites and regions, achieves the calculation and control of indicators such as resource, power, loss, indicator, maintenance and contribution of each site through data analysis, and analyses the trend of power generation and consumption through diversified forecasts, combining with the tariff data, production plan, and load demand, to provide the optimal control scheme. It also provides remote monitoring and operation and maintenance functions.

5. Technical Specifications

The products are mainly based on the following standards:

- GB/T 13729-2002 Remote terminal equipment
- GB/T 17626.4 Electromagnetic compatibility Test and measurement techniques Electrical fast transient impulse group immunity test
- GB/T 15153.1 Remote control equipment and systems Part 2: Working conditions Part 1: Power supply and EMC compatibility
- GB/T 15153.2 Remote control equipment and systems Part 2: Working conditions Part 2: Environmental conditions (climatic, mechanical and other non-electrical influences)
- GB/T 4208-2008 Enclosure protection level (IP code)
- Q/GDW 639-2011 Testing Procedures for Distribution Automation Terminal Equipment
- NB/T 32015 Technical Provisions on Distributed Power Supply Access to Distribution Grids
- DL/T 584 3~110kV Grid Relay Protection Device Operation and Setting Regulations
- DL/T 721-2013 Distribution Network Automation Remote Terminal
- DL/T 630-1997 Technical Conditions of AC Sampling Remote Terminal
- DB/T 864-2012 Technical Specification for Microgrid Access to Distribution Networks of 10kV and Below
- GB/T 33589-2017 Technical provisions for microgrid access to power systems
- GB/T 36274-2018 Technical specification for microgrid energy management system
- GB/T 36270-2018 Technical specification for microgrid monitoring system
- DL/T 1864-2018 Technical specification for stand-alone microgrid monitoring system
- T/CEC 153-2018 Technical guidelines for load management in grid-connected microgrids
- T/CEC 152-2018 Demand response technical requirements for grid-connected microgrids
- T/CEC 153-2018 Technical guidelines for load management in grid-connected microgrids

6. Performance Indicators

Table 6-1 ACCU-100M Coordination Controller Performance Indicators

Technical Specifications Items	Indicator
Telemetry Response Time	≤10s
Telemetry Combined Error Rate	≥99.9%
Teleindication Change Response Time	≤2s
Teleindication Accuracy Rate	≥99.9%
Telecontrol Command Response Time	≤5s
Telecontrol Accuracy Rate	≥99.9%
System Availability	≥99.9%
Time Synchronization Accuracy	≤1S
Data Recording Time Stamp Accuracy	≤1ms
Number of Supported Status Variables	≤30000
Number of Supported Analog Variables	≤30000
Number of Supported Control Variables	≤30000
Protocol Support	IEC 104/Modbus/MQTT/HTTP

7. Energy Dispatch

Table 7-1 Typical Energy Dispatch Functionality Table

Operating Mode	Control Logic
Manual Strategy	It supports manual switching of microgrid to and from the grid, distributed power generation, energy storage, and adjustable equipment command issuance, etc., and performs remote control and other actions.
Planned Curve	Users configure their own tariff templates based on local time-sharing tariffs, set the charging and discharging power of energy storage during different time periods, and form a peak-shaving and valley-filling strategy template; it provides the function of configuring strategy templates on a daily and weekly basis. Adapt to multi-region, multi-price environment strategy operation mode.

Demand Control	By accessing the master meter on the low voltage side of the transformer in the main inlet line to collect the demand value in real time, and triggering the demand control when the demand value reaches the limiting value (which can be set), the system carries out the actions such as reducing charging, discharging, lowering the charging power of the charging pile, or lowering the power of the adjustable loads, etc., according to the configured parameters of the energy storage.
Dynamic Expansion	Real-time collection of transformer load factor by accessing the total meter on the low-voltage side of the transformer in the main feeder, triggering the protection when the transformer load factor reaches the limiting value (can be set), and the system carries out the actions of reducing charging, discharging, lowering charging power of the charging pile, or lowering the power of the adjustable loads according to the configured parameters for the energy storage.
New Energy Consumption	Real-time collection of reverse power data through the low voltage side of the transformer in the main feeder to access the total meter, when the reverse power and reach the limit value (can be set), when the system detects the reverse current, priority scheduling of the storage system to absorb the excess PV energy; when the storage system is full, and then regulate the output power of the photovoltaic inverter (such as the requirements of the anti-reverse current).
Anti-backflow Protection	By accessing the total meter on the low voltage side of the transformer in the main feeder to collect the real-time reverse power data, when the reverse power appears and reaches the limiting value (can be set), the system carries out the action of static, reduced discharge, charging or photovoltaic power reduction on the energy storage according to the configured parameters. The system's anti-reverse current strategy is software protection, if you need to achieve a faster response, more reliable protection, it is necessary to add the corresponding reverse power protection device, detection of reverse current immediately trip protection.
Standby Power Capability	During system operation, the EMS coordinates and controls the execution of SOC protection for the energy storage system, so that the energy storage system operates within the set SOC range, and reserves a certain power interval for power reserve capacity, which can be customised to provide emergency power to the loads in the event of a grid power failure.
Others	Different strategies can be customised according to customer needs

8. Device Wiring

ACCU-100M Coordination Controller with standard DIN-rail mounting. After the device is plugged into the Internet cable LINK green light will light up and blink when there is data, SPEED yellow light is always on at 100Mb/s and off at 10Mb/s; the device has data transmission receive data RX red light blinks, send data TX green light blinks.

Rails can be mounted on both rear and base plates。

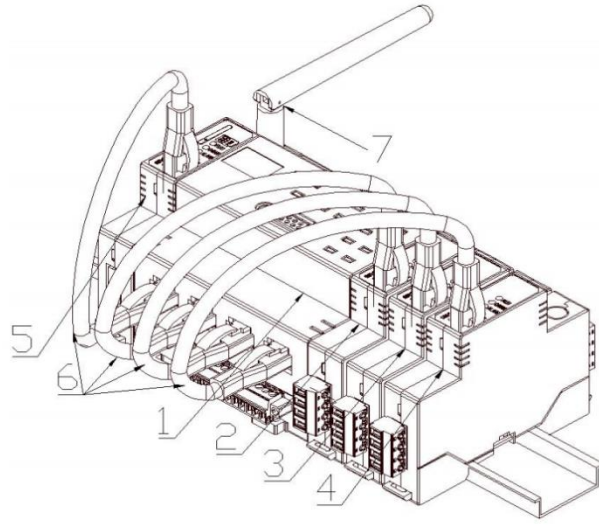
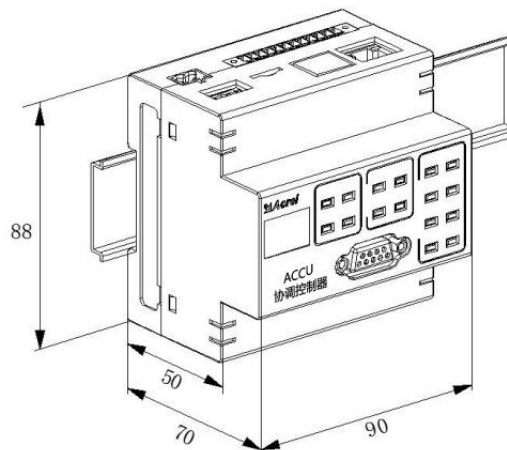


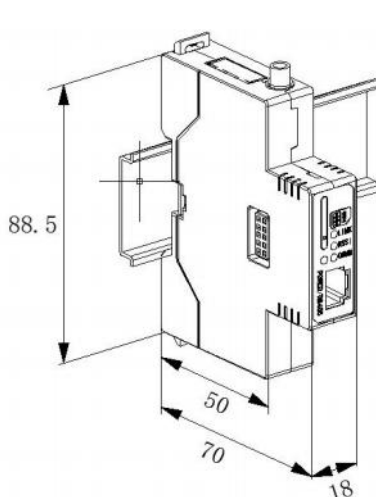
Figure 8-1 Device Wiring Diagram

1. 1: ACCU-100M Master Module
2. 2, 3, 4: ACCU-M485 Expansion Module
3. 5: ACCU-M4G Communication
4. 6: Network Cable
5. 7: 4G Antenna

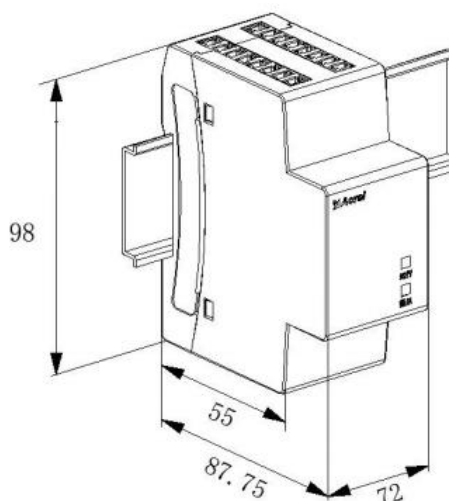
9. Exterior Dimensions



(a) ACCU-100M Master Module



(b) ACCU-M4G/M485/MSE Slave Module



(c) ACCU-MIO Slave Module

Figure 9-1 Unit Exterior Dimensions

10. General Requirements

10.1. General Requirements

Take measures such as shielding and corresponding anti-interference to prevent damage to equipment caused by electromagnetic interference and lightning interference, and ensure that the device can operate safely and effectively under the specified environmental conditions.

10.2. Packaging and Transport

1) The packaging of the equipment should be in accordance with the relevant provisions, and take measures against rain, moisture, rust, shock and so on, so as to avoid damage caused by vibration and collision in the course of transport.

2) Consider the support and fixation of the equipment in the packing box, all loose parts are packed separately into the box.

3) Each packaged part should have a packing list that corresponds to the packaged part, placed in a conspicuous position in the package, and packaged in a moisture-proof sealed bag. The parts contained in the bag should be clearly marked or labelled with at least the part number, number, name, quantity, etc., and the relevant information should be consistent with the packing list.

4) Equipment and accessories should be protected against moisture, rust and corrosion to ensure that rust and damage do not occur within 12 months. If it exceeds 12 months, it should be inspected and re-treated against rust and corrosion.

5) The packaged parts shall comply with the regulations for transport operations to avoid sliding, impact and friction of the parts inside the packaged parts during transport, loading and unloading, which may cause damage to the parts.

11. Technical Services

1) Provide the buyer with all technical information specified in the contract in a timely manner.。

2) Timely guidance to the buyer in accordance with the supplier's technical information and drawings for installation, division and complete set of trial operation and trial production.。

3) Arranging business training for the buyer on equipment installation, commissioning, use and maintenance techniques as stipulated in the contract.。

4) Strictly enforcing the minutes of meetings held or agreements signed between buyers and sellers on major issues of concern.

5) Do a good job of pre-sale, sale and after-sale service.

6) Meet the buyer's requirements for spare parts at any time.