



# **TECHNICAL SPECIFICATION**

# Smart DCDU



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Version	Date	Prepared	Reviewed	Approved

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# Catalogue

1. Products	3
1.1 Product Overview	3
1.2 System Features	3
1.3 Product model	3
1.4 Working Principle	3
1.5 System Configuration	3
1.6 Product dimensions	4
2. Components Introduction	5
2.1 Monitoring Module	5
2.1.1. The monitoring module panel is shown in Figure 2-1	5
2.1.2 Intelligent DC metering and control host interface description	5
2.1.3 Intelligent DC metering and control host interface indicator description	5
2.2 Intelligent circuit breaker	6
2.2.1 Specifications and dimensions	6
2.2.2 Interface definition	7
2.2.3 Interface Usage Description	7
3. Product functions	9
3.1 Anti-downtime mechanism	9
3.2 Communication function	9
3.3 Time calibration mechanism	9
3.4 Power monitoring and metering	9
3.5 Local/remote control function	10
3.6 Remote intelligent on-off function	10
3.7 Alarm protection function	10
3.8 Cycle shutdown (timed shutdown)	10
3.9 Backup power status monitoring	10
3.10 Alarm record and query	10
3.11 Online upgrade	11
4. Product use	11
4.1 Check before use	11
4.2 Power on the device	11



# 1. Products

#### 1.1 Product Overview

Rack-mounted intelligent DC metering unit is based on the operators and towers of intelligent power management and shutdown equipment to assist the peripheral collection unit, which can realize the utility/oil/battery backup power start/stop detection function, can be achieved through the measurement of communication base station loads according to the backup duration, backup voltage, backup power to achieve the differentiation of the management of the circuit breaker distribution equipment to achieve smarter detection and management of power consumption.



Figure 1-1 Product Appearance Schematic

#### 1.2 System Features

Collecting power supply and transmitting the collected information to the host device through wireless transmission, supporting the independent detection function of oil machine, battery backup and utility power, rail mounting, supporting 4G or CAT1 networking, while reserving RS485 transmission interface, supporting upward communication and device expansion.

- Device supports standard network communication protocol: it supports FSU protocol and 485 cascade;
- Supports data reporting mode: answering type reporting;
- Provides supporting configuration tools and reporting methods: field operability;
- Equipment with online upgrade function;
- Product appearance: power supply detection rail mounting; the overall height is 1U, meets the 19-inch rack installation design
- Software to meet the function.

#### 1.3 Product model

1	ZNJL48/300	Intelligent DC metering and control equipment host
2	/	Intelligent Circuit Breaker

① One "ZNJL48/300" intelligent DC metering and control equipment mainframe can connect up to 12 intelligent circuit breakers;

#### **1.4 Working Principle**

The monitoring unit monitors the operation status of each component of the power supply system in real time and carries out intelligent control accordingly. If there is any abnormality, the alarm signal is reported in time. The device supports authorized on-off control, manual on-off control, remote on-off control, and timed on-off control. Each module can independently set the control functions other than manual on-off control and remote on-off control to enable/disable.

#### **1.5 System Configuration**

The appearance of the intelligent DC metering equipment system is shown in Figure 2-2.



Figure 1-2 ESPS48150\_D201 Switching Power Supply System Diagram

The smart DC metering equipment system configuration is shown in Table 1-1.

#### Table 1-1 Switching power supply system configuration table

No.	Name	Specification
1	DC terminal block	Meets 300A DC input, including 2 pairs of DC access
		points
		1U/1P circuit breaker, can be configured with up to 12 63A
0	D0 intelligent size it beschen	intelligent circuit breakers
Z	DC Intelligent circuit breaker	or 9 63A intelligent circuit breakers plus 2 125A intelligent
		circuit breakers
3	Monitoring unit	1 set

## 1.6 Product dimensions





# 2. Components Introduction

#### 2.1 Monitoring Module

#### 2.1.1. The monitoring module panel is shown in Figure 2-1.



Figure 2-1 Monitoring module panel diagram

#### 2.1.2 Intelligent DC metering and control host interface description

Table 2-1 Intelligent DC metering and control host interface description

Туре	Symbol	Functional description
	A1	Southbound 485 interface, connected to
	B1	metering and control equipment
Signal	A2	Southbound 485 interface, connected to
Interface	B2	wireless module
	A3	Northbound 485 interface, connected to
	B3	dynamic ring

#### 2.1.3 Intelligent DC metering and control host interface indicator description

Intelligent DC metering and control equipment set up multi-LED indicator, easy for users to observe and judge the working status of the equipment, and quickly complete the diagnosis and analysis of the equipment.

#### Table 2-2 Indicator Description

Symbol	Function	Indicator status	Indicator color		
Symbol	Definition		Description		
	Power indicator	Lights on	Normal power supply		
PWR	· · · · · · · · · · · · · · · · · · ·	Light out	No power		
		Flashing	System operating		
	System	ridoning	normally		
RUN	Operation	Always on	Abnormal hardware		
	Indicator	Always off	operation		
		Lamp out	System not running		
ALM	Alarm indicator	Blinking	Pending alarms		

|--|

		Lights out	No pending alarms
СОМ	Communication Indicator	1	1

#### 2.2 Intelligent circuit breaker

Intelligent circuit breaker integrates power electronic semiconductor technology, low-voltage electrical technology and digital intelligent communication technology, and realizes low-power operation, remote switching and closing, double protection and metering functions in a small volume. The product supports hot-swapping, has mechanical breakpoints, meets the requirements of electrical insulation and isolation, and is mainly used for communication system power distribution and low-voltage DC energy management.

The actuator meets IEC/EN 60947-2 certification and adopts the RTU (Remote Terminal Unit) mode of RS485/Modbus protocol, with each byte in 2 hexadecimal digits, and the valid data ranges from 0 to 9, A to F. The actuator has an electrical life of 10,000 cycles, and the interval between switching operations should not be less than 20s to avoid the heat of the actuator coil.

The electrical life of the actuator is 10,000 times, and the interval between opening and closing operations should not be less than 20s to avoid overheating of the actuator coil in case of continuous and frequent operation.



Figure 2-2 Intelligent Circuit Breaker Outline Diagram (63A for example)

Each gold finger has 4 copper cladding strips at the top and bottom, each strip has a width of 1mm, the distance between the copper cladding strips is 1mm, and the two sides are left 0.6mm each, which together form a gold finger of 8.2mm width. The gold fingers are designed to be compatible with 10mm, 20mm, and 30mm. facing the front panel of the switch, the corresponding slot of the switch and the gold finger are located at the leftmost 10mm position of the switch, as shown below:



#### 2.2.1 Specifications and dimensions

#### Table 2-3 Models and dimensions of smart circuit breakers

Туре	63A	100A	125A

DCDU			- <b>©ZTT</b>
Length (mm)	19.8	29.8	29.8
Width (mm)	180	180	180
Height (mm)	39	39	39

#### 2.2.2 Interface definition



Figure 2-3 Product Interfaces and Definitions (Picture shows 63DC version as an example)

## 2.2.3 Interface Usage Description

Address Signal Recognition Usage Description



#### Address Recognition Signal Usage Explanation



The customer connects a capacitor and resistor across the backplane between pin 4 and pin 2, and between pin 3 and pin 2. Please refer to Table 1 for the resistance value of the resistor, and select 0603 package thick film chip resistor with recommended accuracy of 1%. For capacitors, choose 0603 package ceramic chip capacitors, made of X7R, with capacitance value of 100nF~1uF. The default address definition is reported in hexadecimal, with the high and low bits storing the readings of the two pins, and the numbers used for each bit are from 1 to C, while the numbers used for 0, D, E, and F are not used; for example, the physical position 1 is 0x11, the physical position 12 is 0x1C, the physical location 13 is 0x21, and so on.

Address												
Corresponding	1	2	3	4	5	6	7	8	9	10	11	12
Readings												
Backplane positioning												
resistance Rx or Ry	NC	100	47	27	18	12	8.2	5.6	3.9	2.2	1	0
(kΩ)												

#### Table 2-4 Address Configuration Locator Resistor Description

Table 2-5 Address definitions and format description

Assuming that the high digit of the KY-Silicon location address is x and the low digit is y, the actual physical address A=(x-1)*12+y; in turn, when calculating x and y through A, it is necessary to divide A-1 by 12 to get the remainder, y=remainder+1, and x=[AV12] is						
Physical address	KY-Silicon locator					
	addross (class 12					
A (decimar) address (class 12						
decimal number)						
1	11					
2	12					
9	19					
10	1A					
11	1B					
12	1C					
13	21					
14	22					
15	23					

#### In-position Signal Usage Description

KSiS1 pin 5 and pin 6 are occupied detection signals, pin 5 and pin 6 are internally shorted, when KSiS1 is in position, the corresponding pin 5 and pin 6 on the backplane are shorted, and the user can realize the in-position signal detection by using this feature. pins 5 and 6 are similar to the dry contact mode, there is no  $\pm$  requirement for the use of these pins, and they are not electrically connected with other signal pins.



#### System Lightning Protection Module Reference Design



Figure 6 System lightning protection module reference design

#### 3. **Product functions**

#### 3.1 Anti-downtime mechanism

The device has a watchdog to ensure long-term stable operation of the device.

#### 3.2 Communication function

The device connects to the FSU (monitoring unit & modem) through the 485 interface and connects to the cloud platform through 4G or CA1. The device is expanded through the second 485 interface. The device and the solid-state circuit breaker interact with each other through the 485 interface according to the question-and-answer method.

#### 3.3 Time calibration mechanism

Periodic shutdown, remote shutdown, electricity metering and other execution and collection require accurate time. The terminal will take the following measures to ensure accurate time:

1. Hardware time calibration will be performed when the device leaves the factory;

2. The terminal has an RTC clock battery to ensure that the time is not lost after power failure and power on again;

3. When the terminal is connected to the network, if the time difference with the server is greater than 60s, the server will calibrate the terminal time.

#### 3.4 Power monitoring and metering

1. The terminal monitors line voltage, power, power, power and other information in real time, and the output accuracy is as follows:



Voltage accuracy 0.1V; current accuracy 0.01A;

2. It has daily, monthly and annual power freezing functions. After the device is disconnected from the network, the platform can query the power consumption within the disconnection event and analyze the power saving of the device.

#### 3.5 Local/remote control function

The terminal side automatically judges the manual and automatic mode switching of the hardware platform to realize intelligent control of the device and intelligent switching of application scenarios, ensuring the safe use of electricity by users.

The platform switches to manual mode and cannot remotely open or close a gate or perform timed shutdown;

The platform is switched to automatic mode to restore intelligent shutdown;

Supports local/remote control of each intelligent circuit breaker on and off.

#### 3.6 Remote intelligent on-off function

1. In the automatic mode of the device and the network is normal, the server initiates the opening and closing command and transmits back the current execution status;

2. In order to ensure the time accuracy and timeliness of remote on-off, the time difference between the terminal and the server must be less than 60s,otherwise the on-off operation will not be performed.

#### 3.7 Alarm protection function

In order to protect the equipment from damage caused by overload, overcurrent, undervoltage, overvoltage, overtemperature and other faults, the terminal side is equipped with intelligent protection function, and the protection parameters can be adjusted according to the on-site environment.

#### 3.8 Cycle shutdown (timed shutdown)

The device supports 5 groups of cycle timers, which can be set by the customer through the platform to meet different scenarios and automatically perform shutdown on time.

#### 3.9 Backup power status monitoring

The device has a backup power detection function, which can correctly detect the start and stop conditions of various power consumption, and query the backup power status through the established RS485 communication according to the protocol by the gateway.

#### 3.10 Alarm record and query

The device can send alarm signals to the gateway and cloud platform through the communication interface. The alarm signals sent can distinguish the backup power switching alarm categories. The device has alarm recording and query functions, and has an alarm timestamp and a storage capacity of 1,000. The alarm record can be refreshed and uploaded at any time; the alarm information can continue to be saved when the system is completely out of power.

It is possible to monitor the status of smart circuit breakers and send an alarm in the event of a fault (short circuit, overcurrent) or loss of monitoring.



#### 3.11 Online upgrade

Users can operate on the platform and realize the online upgrade function of the device software through gateway transparent transmission.

#### 4. Product use

#### 4.1 Check before use

- 1) Check whether the power supply terminal is connected correctly.
- 2) Check whether the circuit breaker is inserted into the correct slot and inserted in place.

#### 4.2 Power on the device

1) Before powering on the device, confirm whether the power supply, circuit breaker and sensor wiring are correct.

2) Power on the device. A -48V DC power supply is recommended with a voltage range of 40-60V.