

**EQUIPO:** PE11

# Protoss-PE11

## RS485 to Ethernet

### User Manual

V 1.1



### Overview of Characteristic

- ✧ Cortex-M3 MCU with 2MB Flash and 128KB SRAM
- ✧ Use FreeRTOS Operation System
- ✧ Support TCP/UDP/MQTT/HTTP/WebSocket Protocol
- ✧ Support Modbus TCP to RTU, Modbus Master Function
- ✧ Support RS485 To 10/100M Ethernet Conversion, Serial Speed Up to 460800 bps
- ✧ Support 10/100M Ethernet Auto-Negotiation

- ✧ **Support Webpage Easy Configuration or PC IOTService Tool**
- ✧ **Support Security Protocol Such As AES/DES3**
- ✧ **Support Heartbeat and Resister Packet Function**
- ✧ **Support Web page OTA Wireless Upgrade**
- ✧ **Support Industrial Temperature: -40 to +85° C**
- ✧ **Multiple Type of Different Power Input:**
  - **Protoss-PE11-H: 100~240VAC@50~60Hz**
  - **Protoss-PE11-M: 9~48VDC@1A**
- ✧ **Size: 97.60 x 64.95 x 27.50 mm (L x W x H) , C45 rail installation**

## TABLE OF CONTENTS TABLE OF CONTENTS

TABLE OF CONTENTS TABLE OF CONTENTS .....	3
LIST OF FIGURES.....	4
LIST OF TABLES .....	5
HISTORY.....	5
1. PRODUCT OVERVIEW.....	6
1.1. General Description.....	6
1.2. Device Parameters.....	6
1.3. Key Application.....	7
2. HARDWARE INTRODUCTION .....	8
2.1. Protoss-PE11 Pins Definition .....	9
2.2. RS485 Interface .....	10
2.3. RJ45 Interface .....	10
2.4. Mechanical Size .....	11
2.5. Product Installation .....	13
2.6. Order Information .....	13
3. FUNCTION DESCRIPTION .....	14
APPENDIX A: CONTACT INFORMATION .....	15

**LIST OF FIGURES**

Figure 1. Protoss-PE11 Appearance .....8

Figure 2. Protoss-PE11 Interface.....9

Figure 3. RJ45 Pin Defination .....10

Figure 4. Protoss-PE11 Mechanical Dimension.....12

Figure 5. Product Installation .....13

Figure 6. Protoss-PE11 Product Order Information .....13

## LIST OF TABLES

Table1. Protoss-PE11 Technical Specifications .....	6
Table2. Protoss-PE11-H Interface Definition.....	9
Table3. Protoss-PE11-M Interface Definition .....	10
Table4. RJ45 Interface .....	11

## HISTORY

**Ed. V1.0** 02-10-2020 First Version

**Ed. V1.1** 03-18-2020 Update RS485 interface

# 1. PRODUCT OVERVIEW

## 1.1. General Description

The Protoss-PE11 provides a RS485 interface to TCP/IP data transfer product. The Protoss-PE11 integrate TCP/IP controller, memory, 10/100M Ethernet transceiver, RS485 and integrates a fully developed TCP/IP network stack and FreeRTOS OS. Protoss-PE11 also includes an embedded web server used to configure device.

The Protoss-PE11 using highly integrated hardware and software platform, it has been optimized for all kinds of applications in the industrial control, smart grid, personal medical application and remote control that have lower data rates, and transmit or receive data on an infrequent basis.

## 1.2. Device Parameters

Table1. Protoss-PE11 Technical Specifications

Item	Parameters
<b>System Information</b>	
Processor/Frequency	Cortex-M3/96MHz
Flash/SDRAM	2MB/128KB
Operating System	FreeRTOS
<b>Ethernet Port</b>	
Port Number	1
Interface Standard	10/100 Base-T Auto-Negotiation
Transformer	Integrated
Network Protocol	IP, TCP, UDP, DHCP, DNS, HTTP Server/Client, ARP, AutoIP, ICMP, Telnet, NTP, Modbus TCP
Security Protocol	AES 128Bit DES3
<b>Serial Port</b>	
Port Number	1 RS485
Data Bits	5,6,7,8

Stop Bit	1,2
Check Bit	None, Even, Odd
Baud Rate	TTL: 600 bps~460800 bps
Flow Control	No Flow Control Software Xon/ Xoff flow control
<b>Software</b>	
Web Pages	Http Web Configuration Customization of HTTP Web Pages
Configuration	Web CLI XML import Telnet IOTService PC Software UART Fast Config
Firmware Upgrade	Webpage, IOTService Tools
<b>Basic Parameter</b>	
Size	97.60mm x 64.95mm x 27.50mm
Operating Temp.	-40 ~ 85°C
Storage Temp.	-45 ~ 105°C, 5 ~ 95% RH(no condensation)
Input Voltage	Protoss-PE11-H: 100~240VAC@50~60Hz Protoss-PE11-M: 9~48VDC@1A
Working Current	~100mA
Power	<400mW

### 1.3. Key Application

The Protoss-PE11 device connects serial device to Ethernet networks using the TCP/IP protocol:

- Remote equipment monitoring
- Asset tracking and telemetry
- Security Application
- Industrial sensors and controls
- Medical devices
- ATM machines
- Data collection devices
- Universal Power Supply (UPS) management units

- Telecommunications equipment
- Data display devices
- Handheld instruments
- Modems
- Time/attendance clocks and terminals

## 2. HARDWARE INTRODUCTION

The Protoss-PE11 unit is a complete solution for serial port device connecting to network. This powerful device supports a 10/100BASE-T Ethernet connection, a reliable and proven operating system stored in flash memory, an embedded web server, a full TCP/IP protocol stack, and standards based (AES) encryption.

Through Ethernet cable connect router with Protoss-PE11 serial server for data transfer, which makes the data transformation very simple.



Figure 1. Protoss-PE11 Appearance



## 2.1. Protoss-PE11 Pins Definition



Figure 2. Protoss-PE11 Interface

Table2. Protoss-PE11-H Interface Definition

Pin	Description	Net name	Signal Type	Comment
1	AC Power Input	L	Power	100~240VAC Input
2	AC Power Input	N	Power	
5		RS485_B-	IO	RS485 B
6	Signal GND	GND	Power	Used for RS485 GND, usually leave it unconnected
7		RS485_A+	IO	RS485 A+
RJ45	Ethernet	RJ45	I/O	

Reload	Restore to factory setting button	Reload	I	Press down for more than 3 seconds and loose to restore factory setting.
Reset	Reset button	Reset	I	Hardware reset button
Net	Network status LED	Net	O	On: Ethernet connection is OK Off: No Ethernet connection
Active	UART Data Transfer	Active	O	Off: No data transfer 0.3s Off -> 0.9s On: UART TX Output 0.3s Off -> 0.3s On: UART RX Receive On: UART bidirection.
Power	Power LED	Power	O	On: Power input OK Off: Power input NG.
Link	Server connection LED	Link	O	On: netp Socket connection OK. Off: no netp Socket connection.

Table3. Protoss-PE11-M Interface Definition

Pin	Description		Signal	Comment
1	DC Power Input	VCC+	Power	9~48VDC@1A Input
2	DC Power Input	GND-	Power	
5		RS485_B -	IO	RS485 B
6	Signal GND	GND	Power	Used for RS485 GND, usually leave it unconnected
7		RS485_A +	IO	RS485 A+
RJ45	Ethernet	RJ45	I/O	
Reload	Restore to factory setting button	Reload	I	Press down for more than 3 seconds and loose to restore factory setting.
Reset	Reset button	Reset	I	Hardware reset button
Net	Network status LED	Net	O	On: Ethernet connection is OK Off: No Ethernet connection

Active	UART Data Transfer	Active	O	Off: No data transfer 0.3s Off -> 0.9s On: UART TX Output 0.3s Off -> 0.3s On: UART RX Receive On: UART bidirection.
Power	Power LED	Power	O	On: Power input OK Off: Power input NG.
Link	Server connection LED	Link	O	On: netp Socket connection OK. Off: no netp Socket connection.

#### <Notes>

I — Input; O — Output; I/O: Digital I/O; Power—Power Supply

## 2.2. RS485 Interface

RS485 use two wire links, A(DATA+), B(DATA-). Connect A(+) to A(+), B(-) to B(-) for communication. Suggest to connect GND together when interference is very severe.

The RS485 interface support maximum 32 RS485 device. The cable maximum length is 1200 meters. Need to add 120Ohm terminal resistor for over 300 meters.

## 2.3. RJ45 Interface

Ethernet port is 10M/100M adaptive, support AUTO MDI/MDIX which means it support direct connecting to PC with Ethernet cable.

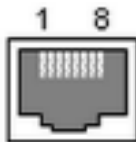


Figure 3. RJ45 Pin Definition

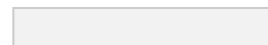


Table4. RJ45 Interface

Pin Number	Name	Description
1	TX+	Transfer Data+
2	TX-	Transfer Data
3	RX+	Receive Data+
4	PHY-VCC	Transformer Tap Voltage
5	PHY-VCC	Transformer Tap Voltage
6	RX-	Receive Data
7	N.C.	None Connect
8	N.C.	None Connect

## 2.4. Mechanical Size

The dimensions of Protoss-PE11 are defined as following picture (mm):



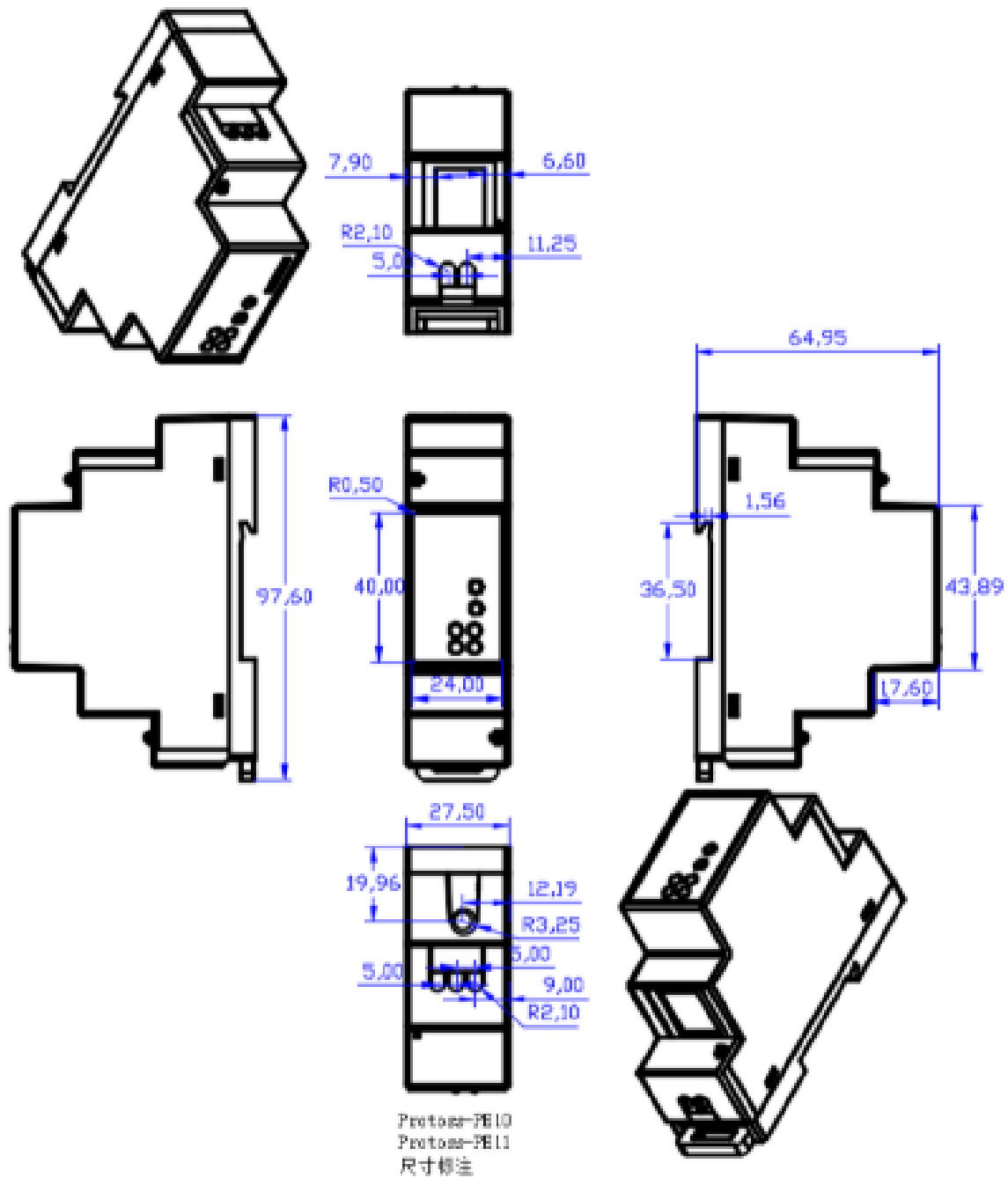


Figure 4. Protoss-PE11 Mechanical Dimension

## 2.5. Product Installation



Figure 5. Product Installation

## 2.6. Order Information

Base on customer detailed requirement, Protoss-PE11 provide different configuration version, Details as below:

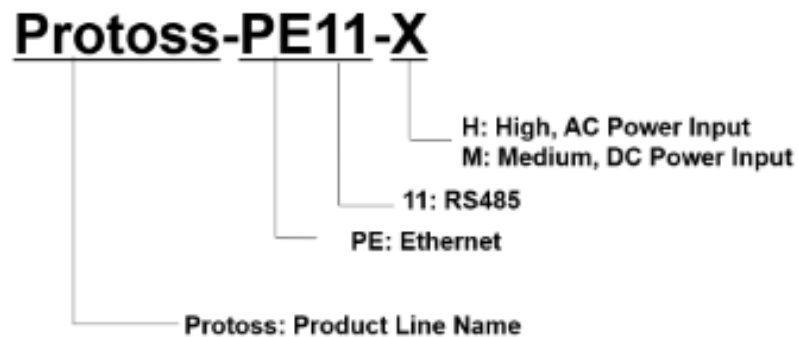


Figure 6. Protoss-PE11 Product Order Information

### 3. FUNCTION DESCRIPTION

Refer to “IOT\_Device\_Series\_Software\_Funtion” document for more detailed function.



## APPENDIX A: CONTACT INFORMATION

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Business: [business@iotworkshop.com](mailto:business@iotworkshop.com)

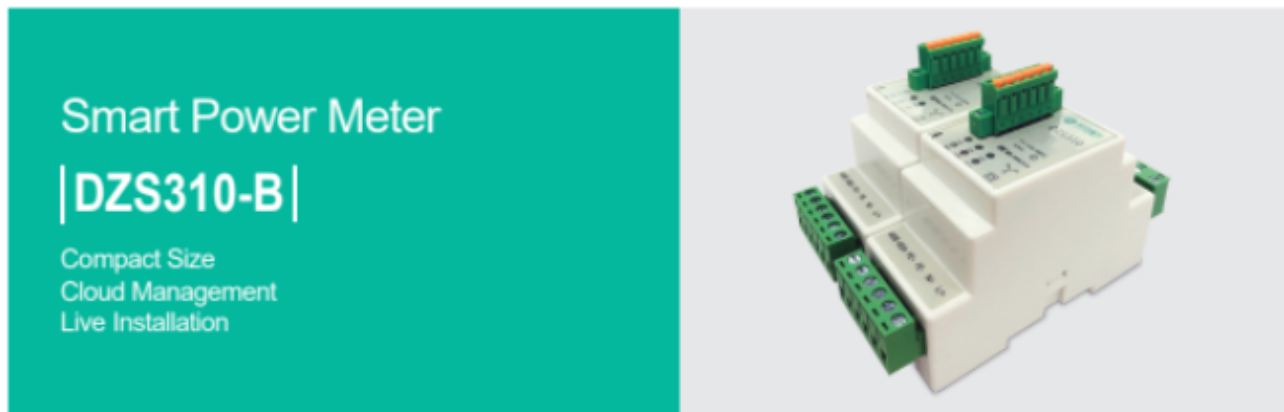
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For more information about IOTworkshop modules, applications, and solutions, please visit our web site [www.iotworkshop.com](http://www.iotworkshop.com)

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## EQUIPO: DZS310B

### Smart Power & Energy Meters Smart Power Meter DZS310-B



DZS310-B is a multifunction combined metering module with standard Din rail installation.

It is measuring active energy with accuracy class 1. Set up for multi communication protocols as Modbus RTU, DL645.

It can be used for reliable and trustworthy metering of energy usage and widely applied in smart buildings, factories, schools, hospitals etc.,

## Features & Functions

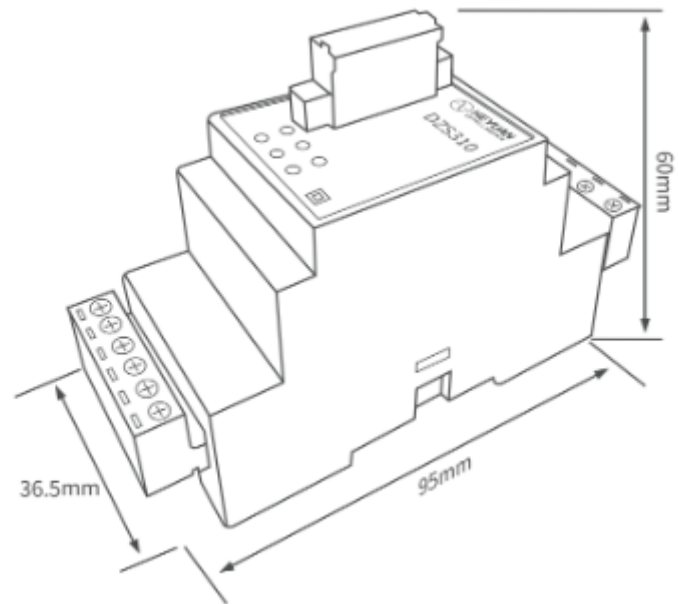
### Smart Power & Energy Meters Smart Power Meter DZS310-B

- Measuring all parameters: three phase voltage, current, line voltage, active power, reactive power, apparent power, power factor, frequency, active energy, reactive energy
- CT, PT or voltage direct connected, suitable for various wiring modes under high or low pressure environment
- 1 interface\* RS485
- Modbus RTU communication protocol
- 1\* programmable energy pulse output

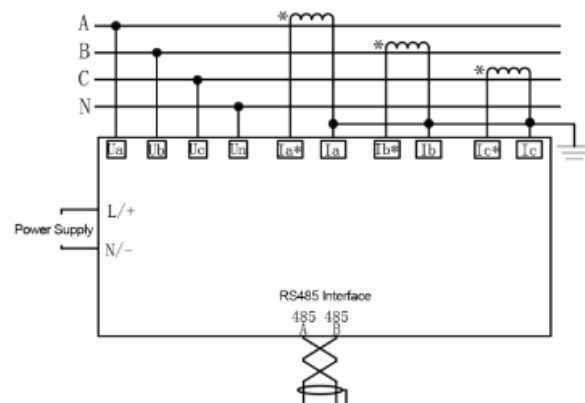
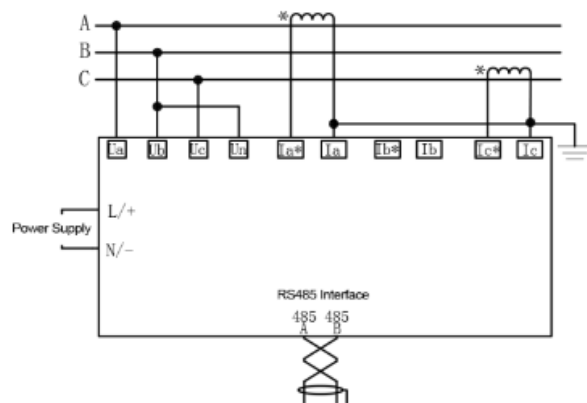
## Performance Parameter

Accuracy Class		Voltage: 0.5; Current: 0.5; Frequency: 0.05Hz; Power Factor: 1
		Active Power: 1; Reactive Power: 1; Apparent Power: 1
		Active Energy: 1; Reactive Energy: 2
Input	Rated Value	Voltage: 3*220V/380V; Current: 100mA
	Overload	Voltage: Sustained Overload: 1.2 times of the rated value Momentary Overload: 2 times of the rated value Current: Sustained Overload: 1.2 times of the rated value Momentary Overload: 10 times of the rated value
	Frequency	45-65Hz
Functional Module	Pulse Output	1
	Interface	LoRa, 1*RS485; Modbus RTU / adaptive Protocol; baud rate: 1200~9600bps
Power Supply	Working Range	AC: 85~265V DC: 85~300V
	Consumption	<3W
Working Condition	Temperature	Operating: -20℃ ~+65℃ Storage: -40℃ ~+85℃
	Humidity	Related Humidity: ≤93% (place without corrosive gas)
	Altitude	≤4000m
Dimensions		90×35×60mm
Installation		Din-Rail Mounted

## Dimension



## Wiring Diagram



# **Smart Compact Din Rail Meter**

## **DZ81-DZS310**

### **User Manual**

#### **(V1.0)**



**Heyuan Intelligence Technology Co., Ltd**

## IMPORTANT DECLARATIONS

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Please read this manual carefully before the product is operated. And once you start operating the meter, you'll be considered to have read this manual and accept all our terms. Heyuan shall not be responsible or liable for any damages or injuries caused by improper meter installation and/or operation.

**Attention:** the following symbols in this manual refer to meanings as follows



**Electric Shock Symbol:** Carries information about procedures which must be followed to reduce the risk of electric shock and danger to personal health



**Safety Alert Symbol:** Carries information about circumstances which if not considered may result in injury or death

The meter must be installed and operated by one who has experience with high-voltage devices or has qualifications. Please connect the meter to correct voltage before operating the meter. Please install and use the meter according to the user manual. Heyuan shall not be responsible or liable for any damages or injuries caused without following the instructions in the user manual.

# Contents

Chapter 1 Meter Overview .....	1
Chapter 2 Specifications .....	1
2.1 Specification.....	1
2.2 Main Technical Parameters.....	1
2.1 Input Voltage .....	1
2.2 Input Current .....	1
2.3 Energy .....	1
2.4 Frequency Measurement .....	1
2.5 Measuring Accuracy .....	1
2.6 Communication .....	1
2.7 Power Supply .....	1
2.8 Pulse Output Interface .....	1
2.9 Working Condition .....	1
Chapter 3 Dimensions & Installation .....	2
3.1 Overall Dimension and Cut-out Size (unit: mm) .....	2
3.2 Installation Method .....	2
Chapter 4 Terminals .....	2
Chapter 5 Typical Wiring .....	2
5.1 Three-phase Four-wire Wiring Mode under Low Voltage .....	2
5.2 Three-phase Three-wire Wiring Mode under Low Voltage .....	3
5.3 RS485 Interface .....	3
5.4 Interface of Energy Pulse Output .....	3
Chapter 6 Modbus Register Table .....	4
6.1 Basic Parameters Measured Zone (Secondary Value) (Function Code 03 Read).....	4
6.2 Basic Parameters Measured Zone (Primary Value) (Function Code 03 Read).....	5
6.3 Basic Setting Parameters Zone .....	7
6.4 Real-time Energy Zone (Primary Value)(Function Code 03/04 Read) .....	7
Chapter 7 After-sales Service .....	8
Chapter 8 Contact Us .....	8

## Chapter 1 Meter Overview

DZS310 is an advanced, smart compact meter with standard Din rail installation. It is widely used in energy distribution sites, energy management systems and intelligent on-line monitoring systems of different industries. It supports installation without powering off and can monitor 1 three-phase channel or 3 single-phase channels. And it measures electric parameters i.e. three-phase voltage, three-line voltage, three-phase current, active power, reactive power, apparent power, power factor, frequency, active energy, reactive energy etc. with high accuracy.

## Chapter 2 Specifications

### 2.1 Input Voltage

Reference Voltage: 3×220V/380V Voltage Range: 0.6Un~1.2Un

### 2.2 Input Current

Secondary Current: 100mA Measuring Range: 1%In~4In

### 2.3 Energy

Accuracy Class: Class 1 Resolution: 0.01kWh

### 2.4 Frequency Measurement

Frequency Measuring Range: 45~65Hz

### 2.5 Measuring Accuracy

Voltage/Current: 0.5% Power Factor: 1%

Frequency: ±0.01Hz

### 2.6 Communication

RS485/Modbus-RTU Communication Protocol Baud Rate: 1200~9600 bps (settable)

*Remark: DZ81-DZS310 adopts RS485 interfaces and Modbus RTU communication protocol to communicate. The terminals are 485A and 485B. The RS485 transmission medium is shielded twisted pair.*

### 2.7 Power Supply

Power Supply: AC85~265V Power Consumption: <3VA

### 2.8 Pulse Output Interface

Terminals PE+ and PE- are pulse output interface.

The import active energy output is settable.

### 2.9 Working Condition

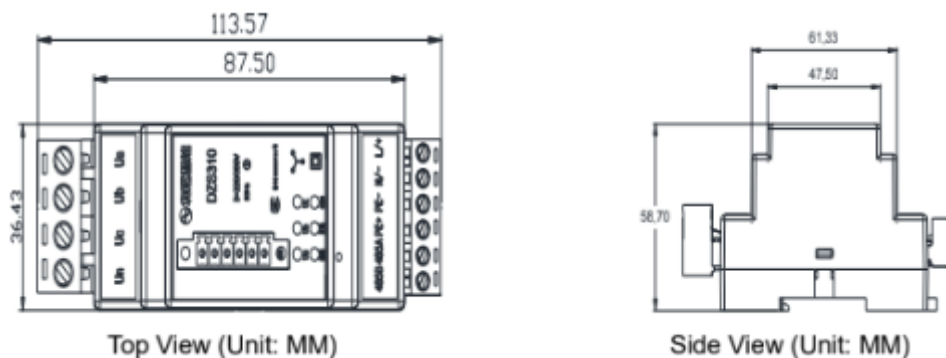
Operating Temperature: -20°C~+70°C Storage Temperature: -40°C~+80°C

Relative Humidity: 20%~90%(non-condensing)



## Chapter 3 Dimension & Installation

### 3.1 Overall Dimension (unit: mm)



Model No.	Dimension(mm)		
	L.	W.	H.
DZ81-DZS310	113.5	36.43	58.7

### 3.2 Installation Method

Installation Environment: DZS310 should be installed in a dry and dust free environment. Avoid

exposing meter to excessive heat, radiation and high electrical noise sources.

Install Method: DIN rail Mounting.

## Chapter 4 Terminals

Ua	Ub	Uc	Un
----	----	----	----

**Upper Row of Terminals**

485B	485A	PE+	PE-	N/-	L/+
------	------	-----	-----	-----	-----

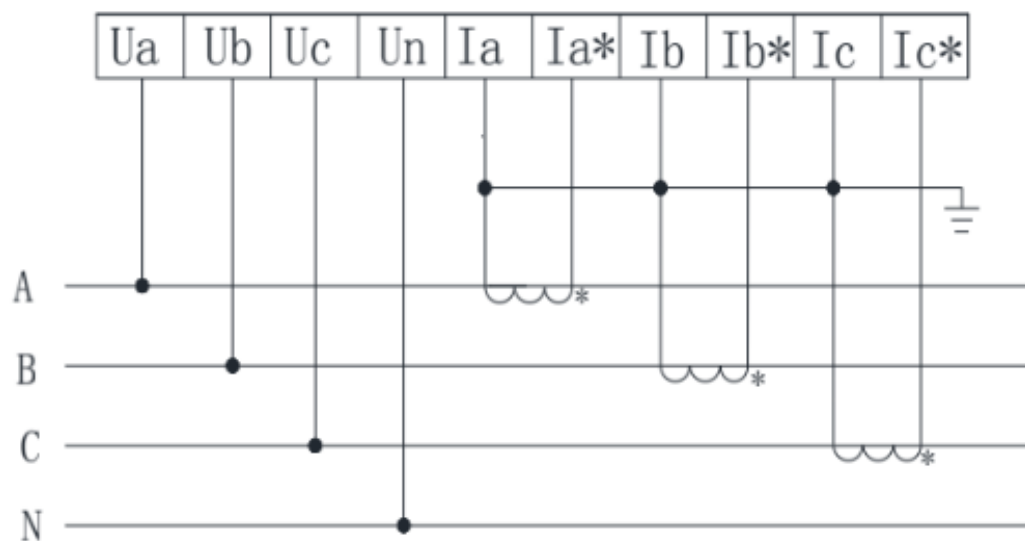
**Lower Row of Terminals**

Ic*	Ic	Ib*	Ib	Ia*	Ia
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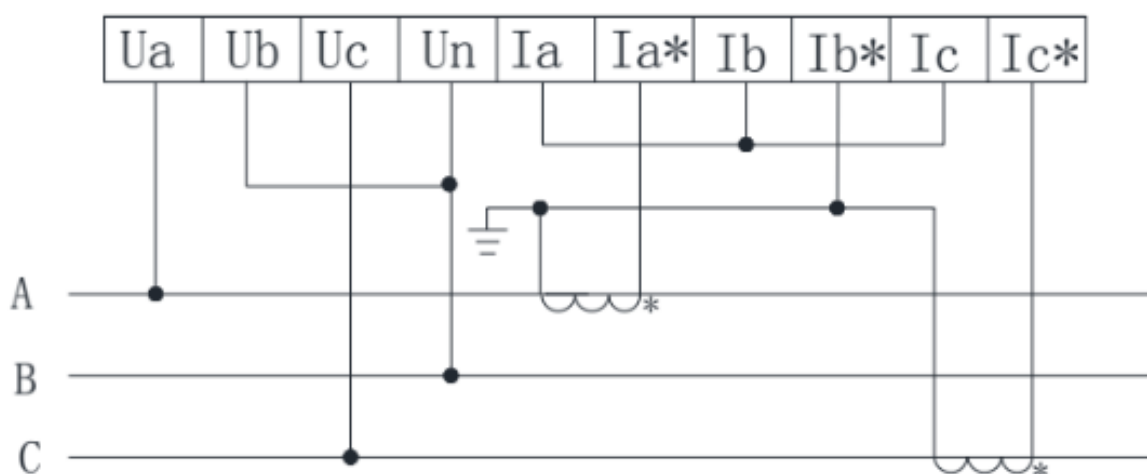
**Current Terminals**

## Chapter 5 Typical Wiring

### 5.1 Three-phase Four-wire Wiring Mode under Low Voltage



### 5.2 Three-phase Three-wire Wiring Mode under Low Voltage



### 5.3 RS485 Interface



### 5.4 Interface of Energy Pulse Output



## Chapter 6 Modbus Register Table

### 6.1 Basic Parameters Measured Zone (Secondary Value) (Function Code 03 Read)

Address DEC	Address HEX	Parameter Name	Default Value	Value Range
4096	1000	A phase voltage	Magnifying 100 times	0~65535
4097	1001	B phase voltage	Magnifying 100 times	0~65535
4098	1002	C phase voltage	Magnifying 100 times	0~65535
4099	1003	phase voltage mean value	Magnifying 100 times	0~65535
4100	1004	zero phase voltage	Magnifying 100 times	0~65535
4101	1005	line voltage(A-B)	Magnifying 100 times	0~65535
4102	1006	line voltage(B-C)	Magnifying 100 times	0~65535
4103	1007	line voltage(C-A)	Magnifying 100 times	0~65535
4104	1008	line voltage mean value	Magnifying 100 times	0~65535
4105	1009	A phase current	Magnifying 1000 times	0~65535
4106	100A	B phase current	Magnifying 1000 times	0~65535
4107	100B	C phase current	Magnifying 1000 times	0~65535
4108	100C	current mean value	Magnifying 1000 times	0~65535
4109	100D	zero phase current	Magnifying 1000 times	0~65535
4110	100E	A phase active power	Magnifying 1000 times	-32768~32767
4111	100F	B phase active power	Magnifying 1000 times	-32768~32767
4112	1010	C phase active power	Magnifying 1000 times	-32768~32767
4113	1011	total active power	Magnifying 1000 times	-32768~32767
4114	1012	A phase reactive power	Magnifying 1000 times	-32768~32767
4115	1013	B phase reactive power	Magnifying 1000 times	-32768~32767
4116	1014	C phase reactive power	Magnifying 1000 times	-32768~32767
4117	1015	total reactive power	Magnifying 1000 times	-32768~32767
4118	1016	A phase apparent power	Magnifying 1000 times	-32768~32767
4119	1017	B phase apparent power	Magnifying 1000 times	-32768~32767
4120	1018	C phase apparent power	Magnifying 1000 times	-32768~32767
4121	1019	total apparent power	Magnifying 1000 times	-32768~32767
4122	101A	A phase power factor	Magnifying 1000 times	-100~100
4123	101B	B phase power factor	Magnifying 1000 times	-100~100
4124	101C	C phase power factor	Magnifying 1000 times	-100~100
4125	101D	total power factor	Magnifying 1000 times	-100~100
4126	101E	frequency	Magnifying 100 times	0~65535

4127	101F	voltage unbalance	Magnifying 100 times	0~65535
4128	1020	current unbalance	Magnifying 100 times	0~65535

## 6.2 Basic Parameters Measured Zone (Primary Value) (Function Code 03 Read)

Address DEC	Address HEX	Parameter Name	Default Value	Value Range
5376	1500	A phase voltage	Magnifying 100 times	0~4294967295
5377	1501			
5378	1502	B phase voltage	Magnifying 100 times	0~4294967295
5379	1503			
5380	1504	C phase voltage	Magnifying 100 times	0~4294967295
5381	1505			
5382	1506	phase voltage mean value	Magnifying 100 times	0~4294967295
5383	1507			
5384	1508	zero phase voltage	Magnifying 100 times	0~4294967295
5385	1509			
5386	150A	line voltage(A-B)	Magnifying 100 times	0~4294967295
5387	150B			
5388	150C	line voltage(B-C)	Magnifying 100 times	0~4294967295
5389	150D			
5390	150E	line voltage(C-A)	Magnifying 100 times	0~4294967295
5391	150F			
5392	1510	line voltage mean value	Magnifying 100 times	0~4294967295
5393	1511			
5394	1512	A phase current	Magnifying 1000 times	0~4294967295
5395	1513			
5396	1514	B phase current	Magnifying 1000 times	0~4294967295
5397	1515			
5398	1516	C phase current	Magnifying 1000 times	0~4294967295
5399	1517			
5400	1518	current mean value	Magnifying 1000 times	0~4294967295
5401	1519			
5402	151A	zero phase current	Magnifying 1000 times	0~4294967295
5403	151B			

5404	151C	A phase active power	Magnifying 1000 times	- 2147483647~2147483647
5405	151D			
5406	151E	B phase active power	Magnifying 1000 times	- 2147483647~2147483647
5407	151F			
5408	1520	C phase active power	Magnifying 1000 times	- 2147483647~2147483647
5409	1521			
5410	1522	total active power	Magnifying 1000 times	- 2147483647~2147483647
5411	1523			
5412	1524	A phase reactive power	Magnifying 1000 times	- 2147483647~2147483647
5413	1525			
5414	1526	B phase reactive power	Magnifying 1000 times	- 2147483647~2147483647
5415	1527			
5416	1528	C phase reactive power	Magnifying 1000 times	- 2147483647~2147483647
5417	1529			
5418	152A	total reactive power	Magnifying 1000 times	- 2147483647~2147483647
5419	152B			
5420	152C	A phase apparent power	Magnifying 1000 times	0~4294967295
5421	152D			
5422	152E	B phase apparent power	Magnifying 1000 times	0~4294967295
5423	152F			
5424	1530	C phase apparent power	Magnifying 1000 times	0~4294967295
5425	1531			
5426	1532	total apparent power	Magnifying 1000 times	0~4294967295
5427	1533			
5428	1534	A phase power factor	Magnifying 1000 times	-1000~1000
5429	1535	B phase power factor	Magnifying 1000 times	-1000~1000
5430	1536	C phase power factor	Magnifying 1000 times	-1000~1000
5431	1537	total power factor	Magnifying 1000 times	-1000~1000
5432	1538	frequency	Magnifying 100 times	0~65535

**Remark:**

1. Primary Voltage Value = Secondary Voltage Value \* Voltage Ratio
2. Primary Current Value = Secondary Current Value \* Current Ratio
3. Primary Power Value = Secondary Power Value \* Voltage Ratio \* Current Ratio

### 6.3 Basic Setting Parameters Zone

(Function Code 06/0x10 Write; Function Code 03/04 Read)

Address DEC	Address HEX	Parameter Name	Default	Value Range
8192	2000	Password protection (basic parameter protection)	0001	0~9999
8193	2001	Communication Address	1	1~247
8194	2002	RS485 Communication	0	High: 0:(N,8,1), 1:(o,8,1), 2:(e,8,1)
8195	2003	Baud Rate	3	0:1200, 1:2400, 2:4800, 3:9600,
8196	2004	Wiring Mode	0	0: 3LN, 1: 2LL
8197	2005	PT	1	1~9999 (Remark 1)
8198	2006	CT	1	1~9999 (Remark 1)
8199	2007	Energy Type Selection of Pulse Output	0	0: full-wave active energy pulse 1: full-wave reactive energy pulse 2: full-wave apparent energy pulse 3: fundamental wave active energy pulse 4: fundamental wave reactive energy pulse 5: fundamental wave apparent energy pulse

**Remark 1:** The product of voltage and current should be less than 300,000.

**Remark 2:** The unit of time is 100ms

### 6.4 Real-time Energy Zone (Primary Value)(Function Code 03/04 Read)

Address DEC	Address HEX	Category	Parameter Name	Default
17664	4500	Total Real-time Energy	Total Active Energy	0
17665	4501			
17666	4502			
17667	4503		Import Active Energy	0
17668	4504			
17669	4505			

17670	4506		Export Active Energy	0
17671	4507			
17672	4508			
17673	4509		Total Reactive Energy	0
17674	450A			
17675	450B			
17676	450C		Import Reactive Energy	0
17677	450D			
17678	450E			
17679	450F		Export Reactive Energy	0
17680	4510			
17681	4511			
Primary Power Value = Secondary Power Value * Voltage Ratio * Current Ratio				

## Chapter 7 After-sales Service

### Product Warranty

1. The product warranty period is one year.
2. The company is responsible for free maintenance or exchange within one-year warranty period.
3. The cost of the components and freight shall be charged for improper meter installation and/or operation.
4. Over the warranty period, part of the maintenance cost according to actual situation will be charged.

### Service Guarantee

1. Product technical consulting and quality complaints will be replied within 12 hours.
2. Solutions for quality complaints will be provided within 24 hours.
3. Except statutory holidays and force majeure.

## Chapter 8 Contact Us

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