PZ19 Series Digital Display DC Voltmeter
PA19 Series Digital Display DC Ammeter
User's Manual

The manual is applied to the following models：

PZ195U-2X1/3X1/5X1/AX1/9X1

PA195I-2X1/3X1/5X1/AX1/9X1

PZ195U-2K1/3K1/5K1/AK1/9K1/DK1

PA195I-2K1/3K1/5K1/AK1/9K1

PZ195U-2S1/9S1J

PA195I-2S1/9S1J

PZ195U-5XY1/AXY1/9XY1

PA195I-5XY1/AXY1/9XY1

PZ195U-5KY1/AKY1/9KY1

PA195I-5KY1/AKY1/9KY1

PZ195U-5SY1/ASY1/9SY1

PA195I-5SY1/ASY1/9SY1

Menu

1. Safety Instruction

Thank you for choosing the meter researched and developed by Jiangsu Sfere Electric Co., Ltd. In order to ensure you to be convenient to purchase and use the meter safely, correctly and efficiently, please read this instruction carefully before using it, and make sure of paying attention to several points as follows:

◆ Make sure only the qualified technicians perform the installation and maintenance

◆ Before performing external or internal operation of the meter, make sure the input signal and power supply are switched off.

◆ The proper voltage detect device shall always be used to check there is no voltage in every part of meter.

◆ The electrical parameter supplied to the meter should be within the rated range.

The following conditions may result in damage or abnormal operation to the device

◆ The voltage of auxiliary power supply goes beyond the range;

◆ The frequency of power grid goes beyond rated range

◆ Connecting terminal wires without following the requirements.

2. Product instruction

2.1 Overview

There are two series of DC digital meters which are PA19 series digital display DC ammeter and PZ19 series digital display DC voltmeter. They are used to monitor and control DC system. They also support limit alarm, analog output, digital input, relay output and communication functions. All the measured data and status can be read through RS485 communication interface with Modbus-RTU protocol.

PA195I-□X□：Measurement

PA195I-□K□：Measurement + Communication + Analog outupt

PA195I-□S□：Measurement + Communication + Digital input + Relay output+ Analog output (optional)

PZ195U-□X□：Measurement

PZ195U-□K□：Measurement + Communication + Analog output

PZ195U-□S□：Measurement + Communication + Digital input + Relay output+ Analog output (optional)

2.2 Model selection

Model	Phase		Display	Communication	Analog output	Digital input	Relay output	□ outline code				
								2	3	5	9	A
PZ195U-□X1	Single	phase	LED	-	-	-	-	■	■	■	■	■
PA195I-□X1								■	■	■	■	■
PZ195U-□K1	single	phase	LED	1	1	-	-	■	■	■	■	■
PA195I-□K1								■	■	■	■	■
PZ195U-2S1	single	phase	LED	1	-	4	2	■	-	-	-	-
PA195I-2S1								■	-	-	-	-
PZ195U-9S1	single	phase	LED	1	-	-	2	-	-	-	■	-
PA195I-9S1								-	-	-	■	-
PZ195U-□XY1	single	phase	LCD	-	-	-	-	-	-	■	■	■
PA195I-□XY1				-	-	-	-	-	-	■	■	■
PZ195U-□KY1	single	phase	LCD	1	1	-	-	-	-	■	■	■
PA195I-□KY1				1	1	-	-	-	-	■	■	■
PZ195U-□SY1	single	phase	LCD	1	Optional	4	2	-	-	■	■	■
PA195I-□SY1				1	Optional	4	2	-	-	■	■	■

Note:

1. AS1 and ASY1 only have 2 digital inputs and 2 relay outputs;

2. Numbers in the blank indicate channels of corresponding functions;

3. ■ means the corresponding outline is available.

3. Installation and wiring

3.1 Outline dimension

Outline code	Pointer meter model	Panel （mm²）	Cut-out （mm²）	Installation depth （mm）
2	42 square type	120×120	111×111	55.5/76
3	6 square type	83×83	76×76	75
9	9 square type	96×96	91×91	75/98
A	61 square type	74×74	67×67	75/90
5	5 slot type	96×48	91×44	68.5/82

3.2 Installation method

1) On the fixed distribution electric cabinet, choose a suitable place for cutout by size of cut-out;

2) Take off the fixed clip of meter.

3) Insert the meter into the cutout.

4) Push the fixed clip to fix the meter.

3.3 Wiring diagram
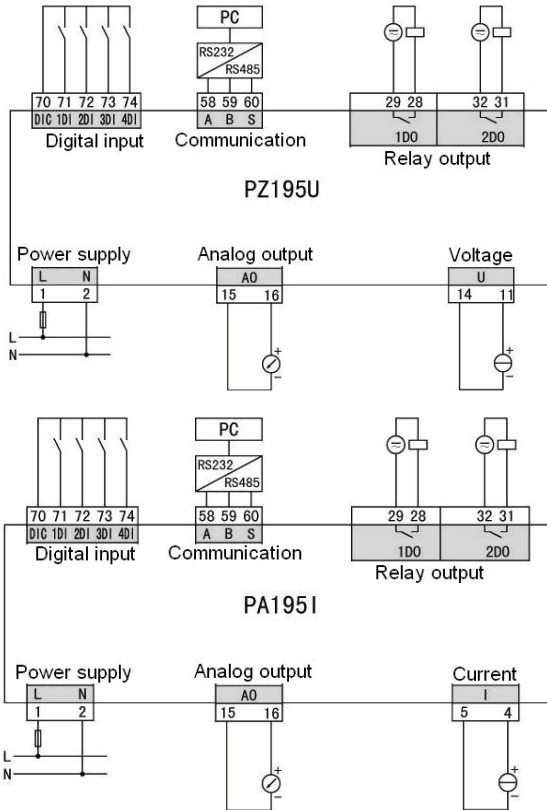
Note: upper diagram is for the meters with all functions. If a meter only has some of the functions shown in upper diagram, please refer to the wiring diagram on the case of that meter.

Wiring instruction:

1. Current input: directly connected to 0～10A, if the current is larger than 10A, please use diverter or holzer component;

2. Voltage input: directly connected to 0～1000V;

3. Make sure the positive and negative terminal of voltage or current are corresponding to the wiring diagram;

4. Power supply: AC/DC (80～270)V. User can choose fuse with max. rated current 0.25A.

5. Diagrams of different models are not the same with each other, please refer to the specific diagram on the meter.

4. Operation

4.1 Panel instruction

A: Unit and signs

B: Button

C: Measured value display
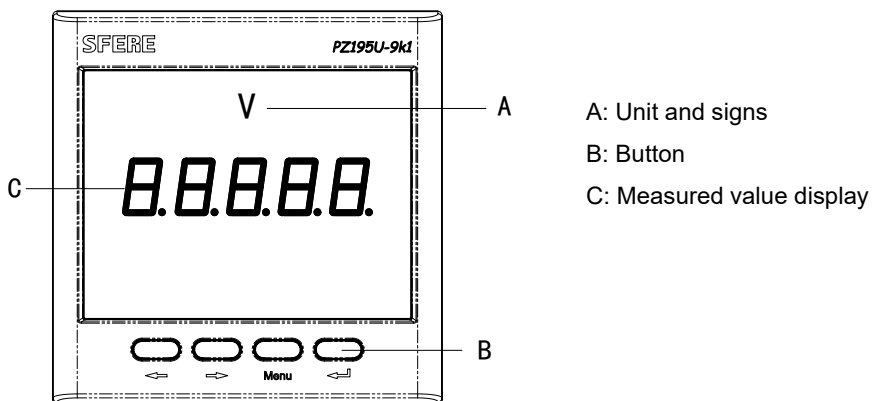
PZ195U-9K1 panel

4.2 Display

Measurement display interfaces show measured data of voltage, current, digital input and relay output. User can press ⬅ or ➡ button to switch between different interfaces in a cyclic order.

Main measurement display interfaces are as follows：

Measurement display interfaces	Instruction
	U＝380.0V I=300.0A
	Press ⬅ or ➡ button to switch to digital input interface.

		Press ← or → button to switch to relay output interface.
$d\,o$	$l\,2$	
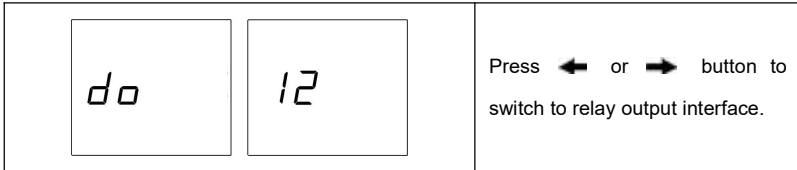
Notice:

If some information does not exist or relative information does not work, it means that meter does not have relative function.

5. Setting

There are reading and programming modes in the meter.

5.1 Reading mode

In measurement display interface, keep pressing Menu button for more than three seconds until $r\,E\,H\,d$ appears, then press ← button to enter system parameter checking interface. In this interface, the parameters only can be read.

|				
`0000`	`InPt`	`in 1`	`5000.`	Primay value
		`Unt.1`	`oFF`	Unit of primay value
Menu >3s		`in 2`	`5000.`	Secondary value
`rEAd`		`Unt.2`	`oFF`	Unit of secondary value
	`Conn`	`Addr`	`0001`	Communication address
		`bAUd`	`9600`	Baud rate
		`dAtA`	`n8.1`	Data format
	`do-1`	`nodE`	`rEn`	Remote control mode
			`ALr`	Alarm mode
			`oFF`	Alarm off
		`tInE`	`0010`	Pulse time
		`ItEn`	`UI-H`	Alarm item
		`dELY`	`0010`	Delay time
		`uALE`	`6000`	Action threshold value
		`HYS`	`0005`	Hysteresis value
	`do-2`	• • •	• • •	Same to do-1
	`Ao-1`	`nodE`	`4-20`	Analog output mode
		`dS`	`0000`	Lower limit value of analog output range
		`FS`	`3800`	Upper limit value of analog output range
	`SEt`	`CodE`		Programming password
		`LIGH`	`L5`	Brightness degree
		`ALr`	`1200.`	Off limit alarm
	`uEr`	`114A`		Software version

5.2 Programming mode

In measurement display interface, keep pressing Menu button for more than three seconds until ⌐EAd appears, then press ⬅ or ➡ button to switch to ProG. Now press ⬅┘ button to enter program password interface. Press ⬅ or ➡ button to input password (defaulted 0001), and then press ⬅┘ button to enter setting menu. (Note: if the password is not right, Err will appear. Then it returns to program password interface after seven seconds.)

The method of entering setting menu is as follows：

| 0000 | Menu >3S | ⌐EAd | ⬅/➡ | ProG | ⬅┘ | CodE | ⬅ | 0000 | ⬅/➡ | 0001 | ⬅➡ |
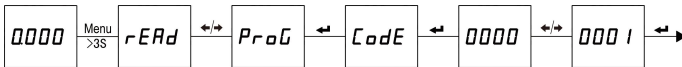
If the parameters of third level data are modified, please press ⬅┘ button to save the modified data and return to secondary level. If user press Menu button, the modified data will not be saved.

If user wants to exit program setting interface, please return to first level of program setting interface, then press Menu button to see SAuE-no, now there are two choices available:

（1）Press ⬅┘ button to exit program setting interface without saving modified data;

（2）Press ⬅ or ➡ button to switch to SAuE-YES, then press ⬅┘ button to exit program setting interface and save modified data.

The method of saving modified data and exiting setting interface is as follows：

| Menu | SAuE | ⬅┘ | no | ⬅/➡ | YES | ⬅┘ | 0000 |

Setting menu instruction：

First level		Second level		Third level	
Letter	Instruction	Letter	Instruction	Letter/number	Instruction
⎍⊓P⏄	Input	⁀⊓ ⎷	Display value	0.0.0.0~ 9.9.9.9	0~9999
		⎍⊓⏄.⎷	Unit of display value	o⎓⎓ or o⊓	Unit o⎓⎓ means A, V o⊓ means kA, kV
		⁀⊓ ⊇	Input signal value	0.0.0.0~9.9.9.9	0~9999 （User can not set this）
		⎍⊓⏄.⊇	Unit of input signal value	o⎓⎓ or o⊓	Unit （User can not set this） o⎓⎓ A, V o⊓ mA, mV
[o⊓⎷	Communication	�⏄ Addr	Meter address	000⎷~0⊇4⏄	1~247
		bAⵑd	Baud rate	⊇400~9600	2400~9600bps
		dA⏄E	Data format	⊓8.⎷	No check one stop bit
				⊓8.⊇	No check, two stop bits
				o8.⎷	Odd check, one stop bit
				E8.⎷	Even check, one stop bit
do-⎷ do-⊇	Alarm setting	⊼odE	Relay mode	AL⊓	Alarm
				⊓E⊼	Remote control
				o⎓⎓	Off
		⏄⎷ ⊼E	Relay pulse time	0000~9999	Unit 0.1s

		$l\ tE\bar{n}$	Alarm item	$Ul\ -H$ or $ll\ -H$, $dl\ lH \sim dl\ 4H$, $Ul\ -L$ or $ll\ -L$, $dl\ lL \sim dl\ 4L$	See alarm item setting
		$dELY$	Relay delay	$0000\sim9999$	Unit 0.1s
		uAL	Alarm limit value	$0000\sim9999$	Set off limit alarm value
		HYS	Hysteresis value	$0000\sim9999$	Set hysteresis value
$Ro-1$	Analog output setting	$\bar{n}odE$	Analog output mode （User can not set this）	$0-20$	$0\sim20$mA
				$4-20$	$4\sim20$mA
				12.20	$4\sim12\sim20$mA
				$0-5$	$0\sim5$mA
				$0-5u$	$0\sim5$V
				$1-5u$	$1\sim5$V
				$0.10u$	$0\sim10$V
		dS	Lower limit value of analog output	$0000\sim9999$	$0\leq DS\leq0.5*a$ a: rated value (FS-DS)≥500
		FS	Upper limit value of analog output	$0000\sim9999$	$0.5*a\leq FS\leq1.2*a$ a: rated value (FS-DS)≥500
SEt	System parameter	CYC	Cyclic display period	$0000\sim9999$	Unit s
		$CodE$	Password	$0000\sim9999$	Setting password
		$Ll\ GH$	Brightness	$Ll\sim L5$	L1 ～ L5, lower to higher brightness degree
		ALr	Flashing alarm	$0.00.0\sim120.0$	Flashing alarm range is between 30.0 and 120.0% of rated value. 0.0% means this function is off.

5.3 System setting

E.g. set password to be 2, choose brightness degree to be L4, and select flashing alarm value to be more than 120% of rated value.

Enter setting interface, press ⬅ or ➡ button to select `SEt`, then press ↵ button to enter system setting menu. Now press ⬅ or ➡ button again to select specific items and press ↵ button again.
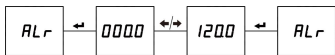
※Set password

CodE	⬅	000 1	⬅/➡	0002	⬅	CodE

※Choose brightness degree

LI GH	⬅	L5	⬅/➡	L4	➡	LI GH

※Select flashing alarm value

ALr	⬅	0000	⬅/➡	1200	⬅	ALr
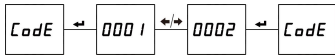
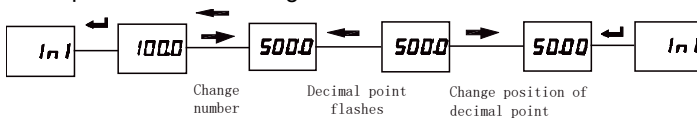### 5.4 Input setting

User can change input signal according to actual situation in field. Unit of primary value is A/V. E.g. set input signal as 50.0A/75mV (user can not change secondary value 50.0A/75mV). First enter setting menu, second press ⬅ or ➡ button to select `InPt`, third press ↵ button to enter input signal setting menu. Now press ⬅ or ➡ button again to select specific items and press ↵ button again.

In 1	100.0	500.0	500.0	50.00	In 1

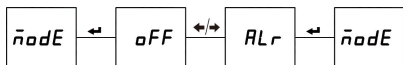Change number   Decimal point flashes   Change position of decimal point
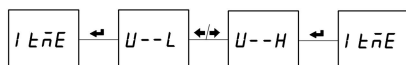
5.5 Relay output setting

User can change first relay from off to alarm mode, alarm activates after 5 seconds when DC current is higher than 6.000A with hysteresis value of 0.005A. First enter setting interface, second press ⬅ or ➡ button to select `do- 1`, third press ↵ button to enter relay output setting menu. Now

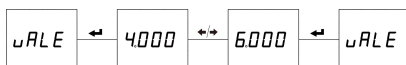press ← or → button again to select specific items and press ↵ button again.

※Set alarm mode

| n̄odE | ↵ | oFF | ←/→ | ALr | ↵ | n̄odE |

※Set alarm item

| I tn̄E | ↵ | U--L | ←/→ | U--H | ↵ | I tn̄E |

※Set alarm current value

| uALE | ↵ | 4.000 | ←/→ | 6.000 | ↵ | uALE |

※Set relay delay time

| dELY | ↵ | 00 10 | ←/→ | 0050 | ↵ | dELY |

※Set hysteresis value

| HYS | ↵ | 0.000 | ←/→ | 0.005 | ↵ | HYS |
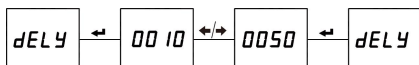
5.6 Analog output setting

E.g. set analog output as DC current 0～5A corresponds to 4～20mA output. First enter setting menu, second press ← or → button to select Ao-1, third press ↵ button to enter analog output setting menu. Now press ← or → button again to select specific item and press ↵ button again.

※Set lower limit value of analog output

| dS | ↵ | 0.0 10 | ←/→ | 0.000 | ↵ | dS |

※Set upper limit value of analog output

| FS | ↵ | 0.000 | ←/→ | 5.000 | ↵ | FS |
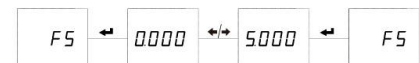
Note：1）User can not set analog output mode such as 4～20mA；

2）Analog output item of DC ammeter is defaulted to be current. User can not change it.

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5.7 Communication setting

E.g. set communication address to be 3, select baud rate as 9600bps, choose data format as no check mode. First enter setting menu, second press ← or → button to select $\overline{Conn}$, third press ← button to enter communication menu. Now press ← or → button to select specific items and press ← button again.

※Set communication address

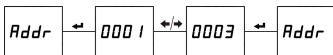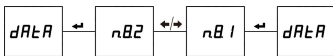| Addr | ← | 000 1 | ←/→ | 0003 | ← | Addr |

※Set data format

| dAtA | ← | nB2 | ←/→ | nB 1 | ← | dAtA |

※Set baud rate

| bAUd | ← | 4800 | ←/→ | 9600 | ← | bAUd |
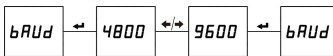
6. Common problems and troubleshooting

6.1 About communication

The meter does not send data back

First make sure the communication setting information of the meter such as subordinate machine address, baud rate and check mode corresponds to the requirements of host computer. If several meters on spot do not send data back, please check whether the communication bus on spot is connected correctly and whether RS485 converter working normally.

If there is only one meter or a few meters communicate abnormally, related communication bus is also needed to be checked. You may check whether there is an error in the host computer by exchanging the subordinate machine addresses of normal meter and abnormal meter. Besides you may check whether there is a fault in the meter by exchanging the installation positions of normal and abnormal meters.

The data sent back by the meter is incorrect

Communication data which is opened to users includes primary grid float type data and secondary grid int/long type data. Please read the instruction for data storage address and format in communication address table carefully, and make sure to transmit data according to relative format.

It is suggested to download testing software MODSCAN32 for checking MODBUS-RTU communication protocol from our homepage. This software adopts standard MODBUS-RTU protocol which can display data in the formats such as integer, float and hexidecimal, so that you can compare the data with measured data displayed on the meter directly.

Communication indication sign

There is a communication indication sign in the display interface of meters. If a meter receives communication data during communication test process, this communication sign will flash.

6.2 Measured data is not correct

First make sure that the meter has been input right voltage. The multimeter is used for measuring voltage. Electric quantity displayed on the meter is the value of primary grid; it may lead to wrong electric quantity display if the ratio of voltage transformer does not conform to that of transformer in-service. The defaulted voltage range is not allowed to be modified after delivery. Connection network is available to be modified according to actual connection on spot, but the connection mode set in programming shall correspond with the actual connection method, otherwise it may lead to wrong display.

6.3 Meter does not work

Ensure proper auxiliary supply （AC/DC80-270V）is linked to the auxiliary supply terminal. As the meter may be damaged by auxiliary supply voltage which is beyond rated range and can not recovery. Use multi-meter to measure the voltage of auxiliary supply, if the meter does not display when the voltage is proper, please electrify again.

6.4 Other phenomena

Please contact our technical service department to give a detailed description of the field condition. Our technicians will analyze possible causes according to your description. The company will appoint technicians to deal with problems on spot as soon as possible if the problem can not be settled after oral communication.

7. Technical specification

Electrical feature		
Accuracy		0.2%, 0.5%(defaulted)
Data refresh rate		1s
Input	Rated voltage value	DC 75mV, 1～5V, 110V, 220V, 1000V etc.
	Rated current value	DC 4～20mA, 1A, 5A, 10A, 75mV
	Overload	continuous 1.2 of rated value
Power supply	Working range	AC 80～270V （50/60Hz）, DC 80～270V, DC 24V
	Consumption	≤5VA
Digital input		Dry contact mode
Relay output		Contact capacity (resistive)：AC 5A/250V, DC 5A/30V
Analog output	Current output	DC 4～20mA, 0～20mA etc.，load≤350Ω
	Voltage output	DC 0～5V, 1～5V etc.，load ≥20kΩ
Communication		RS485 interface，Modbus-RTU protocol，baud rate 2400～9600bps
Environment		

Protection degree	Panel IP64，Case IP20
Working temperature	-40～70℃（LED）, -25～70℃（LCD）
Storage temperature	-40～85℃
Relative humidity	≤93%RH
Insulating ability	Between power and input or output≥AC2kV; Between input and output≥AC1kV
Altitude	2500m
EMC	
Electrostatic discharge surge immunity	IEC 61000-4-2-III
Radiated, radio-frequency, electromagnetic field immunity	IEC 61000-4-3-III
Electrical fast transient/burst immunity	IEC 61000-4-4-Ⅳ
Surge immunity	IEC 61000-4-5-Ⅳ
Immunity to conducted disturbances, induced by radio-frequency fields	IEC 61000-4-6-III
Power frequency magnetic field immunity	IEC 61000-4-8-III
Voltage dips, short interruptions and voltage variations immunity	IEC 61000-4-11-III

Appendix 1 Alarm items and units of relative alarm threshold

No.	Alarm item	Unit of alarm value
0	U--H（High voltage alarm） or I--H（High current alarm）	0.1V or 0.001A
1	U--L（Low voltage alarm） or I--L（Low current alarm）	
2	dI1.H（Relay activates when first digital input conducts.）	Alarm value is not needed to be set in relay linkage mode.
3	dI1.L（Relay activates when first digital input opens.）	
4	dI2.H（Relay activates when second digital input conducts.）	
5	dI2.L（Relay activates when second digital input opens.）	
6	dI3.H（Relay activates when third digital input conducts.）	
7	dI3.L（Relay activates when third digital input opens.）	
8	dI4.H（Relay activates when fourth digital input conducts.）	
9	dI4.L（Relay activates when fourth digital input opens.）	

Appendix 2 Modbus-RTU Communication address information list

◆ **Read DC information through function code 0x03/0x04**

Address	Format	Data instruction	Unit	R/W
Primary data				
0x06	float	DC voltage	V	R
0x08～0x11	Reserved			
0x12	float	DC current	A	R
0x14～0xFF	Reserved			
0x100～0x101	Bit[32]	Relay output status Bit[0]-Bit[2]	0: Open 1: Closed	R
0x102～0x103	Bit[32]	Digital input status Bit[0]-Bit[3]	0: Open 1: Closed	R

◆ **Read status information of relay through function code 0x01, and control relay through function code 0x05, 0x0F.**

Address	Format	Data content	Data instruction	R/W
0000 （fixed address）	Bit	First relay	0：off 1：closed	R/W
	Bit	Second relay	0：off 1：closed	R/W

◆ **Remotely control relay through function code 0x05, 0x0F**

Address	Format	Data content	Data instruction	R/W
0000	Bit	First relay	0：off 1：closed	R/W
0001	Bit	Second relay	0：off 1：closed	R/W

◆ **Read status of digital input through function code 0x02**

Address	Format	Data content	Data instruction	R/W
0000 （fixed address）	Bit	First digital input	0：off 1：closed	R
	Bit	Second digital input	0：off 1：closed	R
	Bit	Third digital input	0：off 1：closed	R
	Bit	Fourth digital input	0：off1：closed	R

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Modbus-RTU message format instruction

Read the status of relay output（Function code 0x01）

	Frame structure	Address code	Function code	data code		CRC check code
				initial relay address	Number of relay	
Host request	Byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes
	Data range	1～247	0x01	0x0000 （fixed）	0x0001 ～0x0004	CRC16
	Message example	0x01	0x01	0x00 0x00	0x00 0x02	0xBD 0xCB
	frame structure	address code	function code	data code		CRC check code
				byte of register	register value	
slave response	Byte	1 byte	1 byte	1 byte	1 byte	2 bytes
	Message example	0x01	0x01	0x01	0x03	0x11 0x89

Remark: the register value in the slave response indicates the state of the relay. Beginning from the lowest bit of the byte, each number corresponds to the state of a loop of relay output. "1" indicates the relay is closed, while "0" indicates the relay is cut off. In the upper list, the register value "0x03" corresponds to "0000 0011" in binary system which means the first and second loop of relays are closed.

Read the state of digital input（Function code 0x02）

	Frame structure	address code	function code	data code		CRC check code
				initial switch address	number of switches	
Host request	Byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes
	Data range	1～247	0x02	0x0000	0x0001～ 0x000C	CRC16

	Message example	0x01	0x02	0x00 0x00	0x00 0x04	0x79 0xC9
Slave response	Data structure	address data	function code	data code		CRC check code
				byte of register	register value	
	Byte	1 byte	1 byte	1 byte	1 byte	2 bytes
	Message example	0x01	0x02	0x01	0x02	0x20 0x49

Remark: the register value in the slave response indicates the state of digital input. Beginning from the lowest bit of the byte, each number corresponds to the state of a loop of digital inut. "1" indicates the switch is closed, while "0" indicates the switch is cut off. In the upper list the register value "0x02" is "0000 0010" in binary system which means second loop of digital input is closed.

Read data register value（function code 0x03/0x04）

	Frame structure	addres s code	function code	data code		CRC check code
				initial register address	number of register	
Host request	Byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes
	data range	1～247	0x03/ 0x04		max 48	CRC16
	message example	0x01	0x03	0x00 0x06	0x00 0x06	0Xe4 0x36
slave response	frame structure	addres s code	function code	data code		CRC check code
				byte of register	register value	
	byte	1 byte	1 byte	1 byte	12 bytes	2 bytes
	message example	0x01	0x03	0x0C	（12-byte data）	（CRC16）

Remark: the initial register address in host inquiry is the initial address of the data collected from primary grid or secondary grid. The number of register indicates the length of the data. In the upper list the register address "0x00 0x06" indicates the initial address of phase voltage float data of three phases,

and the number of register "0x00 0x06" indicates the length of the data includes three Word data and three float data. Please refer to appendix 1 MODBUS-RTU communication address information table.

Remotely-control single relay output（function code 0x05）

<table>
<tr><td rowspan="5">host request</td><td rowspan="2">frame structure</td><td rowspan="2">address code</td><td rowspan="2">function code</td><td colspan="2">data code</td><td rowspan="2">CRC check code</td></tr>
<tr><td>initial relay address</td><td>relay action value</td></tr>
<tr><td>byte</td><td>1 byte</td><td>1byte</td><td>2 bytes</td><td>2 bytes</td><td>2 bytes</td></tr>
<tr><td>data range</td><td>1～247</td><td>0x05</td><td>0x0000 ～0x0003</td><td>0xFF00/0x00 00</td><td>CRC 16</td></tr>
<tr><td>message example</td><td><u>0x01</u></td><td><u>0x05</u></td><td><u>0x00 0x00</u></td><td><u>0xFF 0x00</u></td><td><u>0x8 C 0x3A</u></td></tr>
<tr><td rowspan="4">slave response</td><td rowspan="2">frame structure</td><td rowspan="2">address code</td><td rowspan="2">functi on code</td><td colspan="2">data code</td><td rowspan="2">CRC check code</td></tr>
<tr><td>initial relay address</td><td>relay action value</td></tr>
<tr><td>byte</td><td>1 byte</td><td>1 byte</td><td>2 bytes</td><td>2 bytes</td><td>2 bytes</td></tr>
<tr><td>message example</td><td><u>0x01</u></td><td><u>0x05</u></td><td><u>0x00 0x00</u></td><td><u>0xFF 0x00</u></td><td><u>0x8C 0x3A</u></td></tr>
</table>

Remark: in host request, the relay action value "0xFF00" indicates the relay is closed, while "0x0000" indicates the relay is cut off. If you want to perform remotely control, please make sure the relay is working in "remotely control" mode.

Remotely-control multi-relay output（function code 0x0F）

<table>
<tr><td rowspan="4">host request</td><td rowspan="2">frame structure</td><td rowspan="2">address code</td><td rowspan="2">function code</td><td colspan="4">data code</td><td rowspan="2">CRC check code</td></tr>
<tr><td>initial relay address</td><td>number of relay</td><td>number of data byte</td><td>relay action value</td></tr>
<tr><td>byte</td><td>1 byte</td><td>1 byte</td><td>2 bytes</td><td>2 bytes</td><td>1 byte</td><td>1 byte</td><td>2 bytes</td></tr>
</table>

				data code				CRC
data range	1~247	0x0F	0x0000	0x0001 ~ 0x0002	0x01		CRC16	
message example	0x01	0x0F	0x00 0x00	0x00 0x02	0x01	0x03	0x5F 0x56	

slave response	frame structure	address code	function code	data code		CRC check code
				initial relay address	number of relay	
	byte	1 byte	1byte	2bytes	2bytes	2 bytes
	message example	0x01	0x0F	0x00 0x00	0x00 0x02	0XD4 0x0A

Remark: in the host inquiry, beginning from the lowest bit of relay action value, each bit corresponds to a loop of relay output. "1" indicates the relay is closed, while "0" indicates the relay is cut off. In the upper list, relay action value "0x07"is "0000 0111"in binary system, which means the first, second and third loops of relay are closed.