Multifunctional power instruments

User Manual

Notes:

1. Please read this manual carefully before using the instrument;

2. Dangerous voltage, be careful of the risk of electric shock;

3. Non professional personnel of our company are prohibited from repairing instruments;

4. Product updates and iterations will not be notified separately. If they do not match the actual product, please refer to the latest manual.

Multi functional power instrument is an intelligent network instrument with programmable electricity measurement, electricity metering, data display, network communication, electricity pulse, transmission output, and alarm output. It is widely used in substations, distribution automation, intelligent buildings, enterprise production and other scenarios. It has the characteristics of digital/LCD high-definition display, easy installation, simple wiring, convenient maintenance, small engineering quantity, and on-site configuration parameters, We can accept customized production from customers and support multiple communication protocols.

Measurement: voltage, current, active power, reactive power, apparent power, power factor, grid frequency
Measurement: positive and negative active energy, positive and negative reactive energy
Display: Integrated LED digital tube display/blue background self text LED liquid crystal display
Classification: three-phase multifunctional, single-phase multifunctional, three-phase combination, three-phase current, three-phase voltage, single-phase current, single-phase voltage

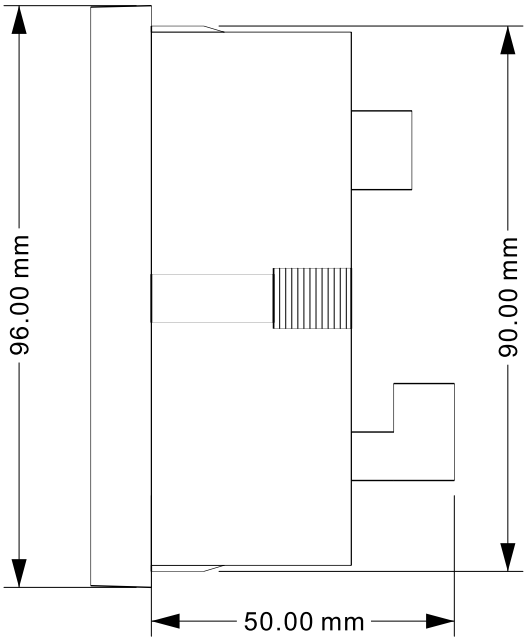
Technical indicators		parameter
Signal input	Wiring method	Three-phase four wire 3P4L, three-phase three wire 3P3L, single-phase two wire LN
	voltage	Rated value: AC110V/220V/400V, etc
		Overload capacity: continuous 480V; 1000V for 10 seconds
		Power consumption:<1VA
	Current	Rated value: 5A
		Overload capacity: Continuous 6A; 10 seconds 10A
		Power consumption:<1VA
	Frequency	Frequency: 40-70Hz
	Accuracy	Voltage and current: 0.2%, others: 0.5%; Reactive energy: 1%
	Temperature drift	<200ppm
Auxiliary power supply		AC220V (default), AC/DC80-275V, DC12-48V
Wired communication		RS485 communication interface, physical layer isolation Protocol: Modbus RTU/DLT645-2007 Communication speed: 1200-56000bps Verification methods: N81, E81, O81, N82
Transformer ratio		PT/CT: 1-5000
Switching output		0-4 switch quantities 10A250VAC/30VDC
Analog output		0-4 channels 4-20mA
Electric energy pulse		Passive optocoupler collector output, fixed pulse width 80mS ± 20%
Isolation and withstand voltage		Input, output, and power supply>AC2KV >50M Ω between input, output, and housing
external environment		Working temperature: -20-60 ° C Storage temperature: -20-70 ° C Relative humidity: 5% -95% (no condensation, no corrosive gas) Altitude<3000m

Table 1 Technical Parameters

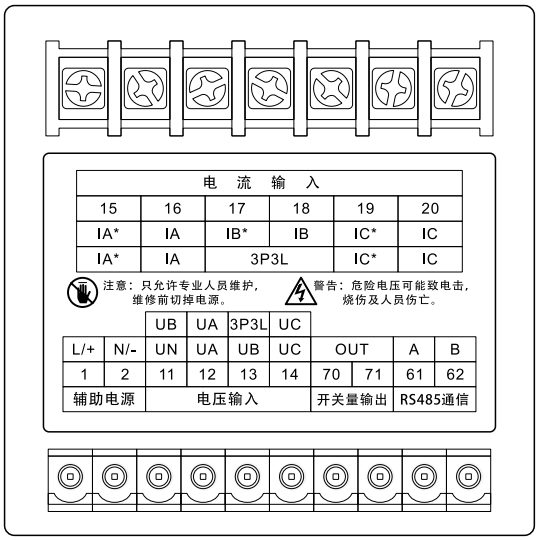
Panel size

Outer frame (mm)	Opening (mm)	Depth (mm)
120*120	111*111	50
96*96	90*90	50
80*80	76*76	50
72*72	68*68	50

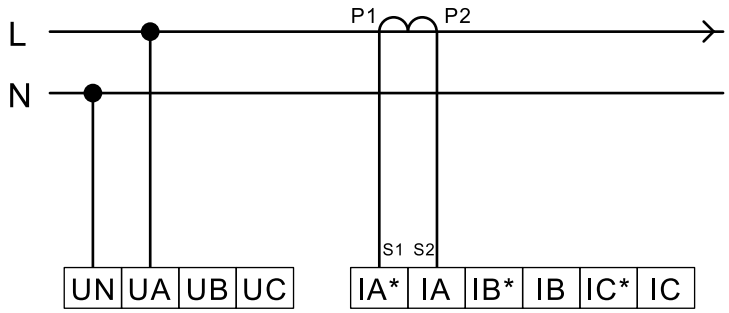
Table 2



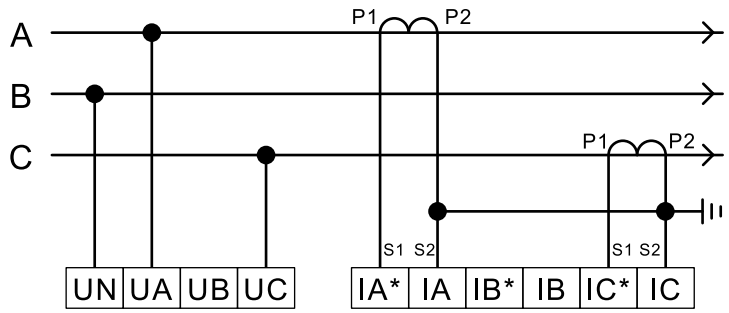
Side view



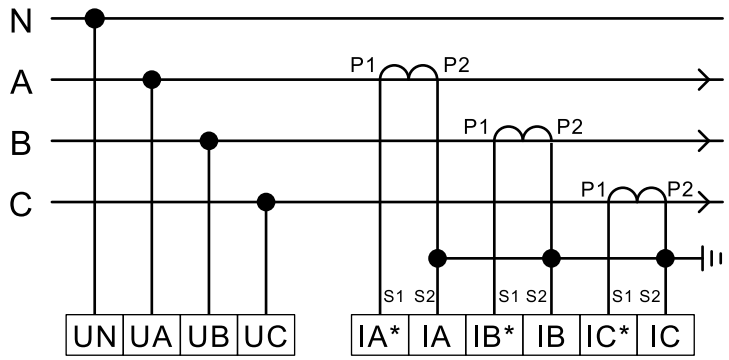
Rear view



Single phase wiring



Three phase three wire



Three phase four wire

Notes:

1. The input voltage should not be higher than the rated input voltage of the product, otherwise PT should be considered for easy maintenance. It is recommended to use a wiring block;

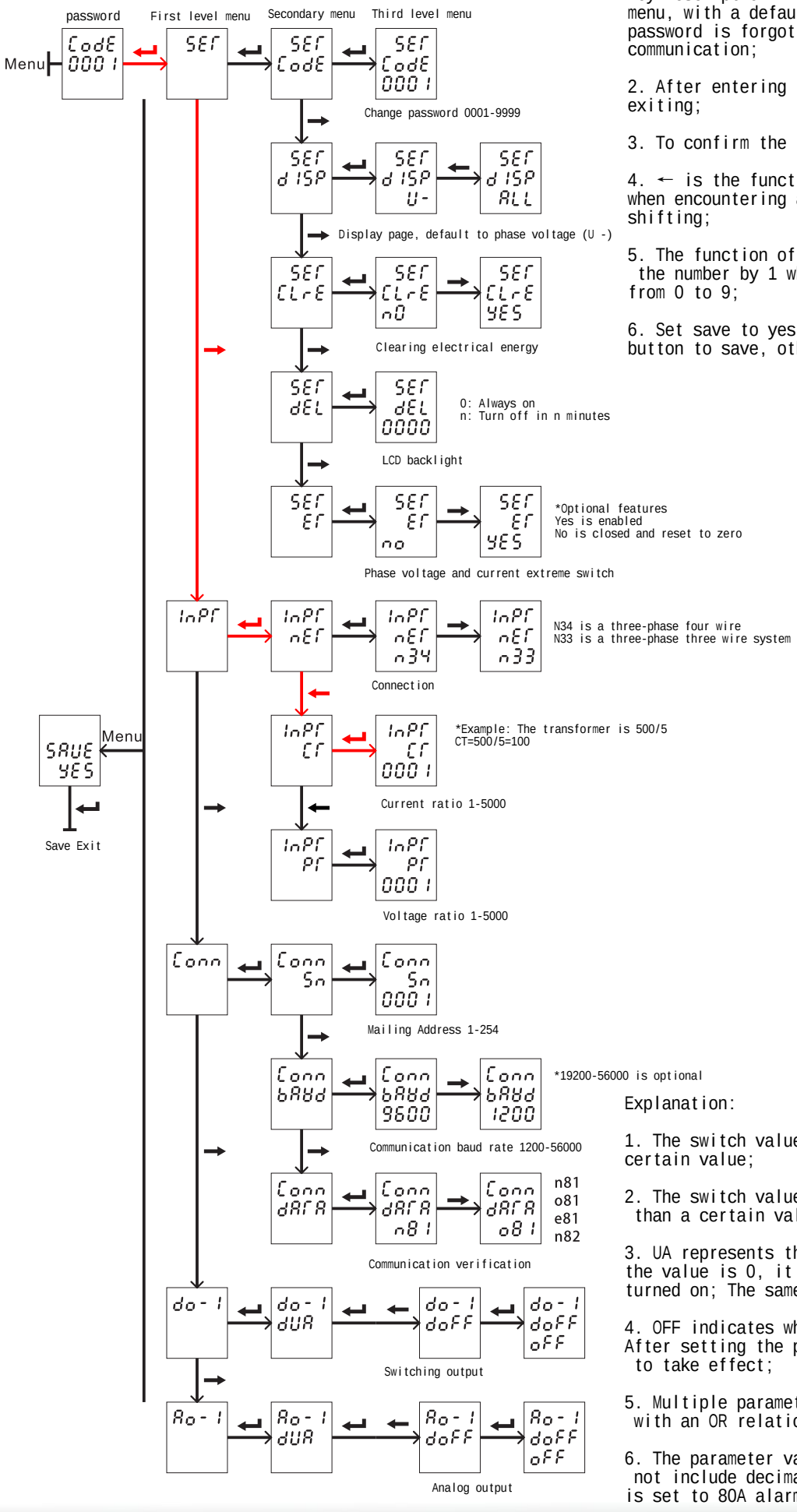
2. The standard rated input current is 5A, and if it is greater than 5A, an external CT should be used. If other instruments are connected to the CT used, the wiring should be in series. Before removing the current input connection of the product, it is necessary to first disconnect the CT primary circuit or short-circuit the secondary circuit;

3. To ensure that the input voltage and current correspond, the phase sequence is consistent, and the direction is consistent , otherwise numerical and symbol errors (power and energy) may occur:

4. The instrument can operate in either three-phase four wire or three-phase three wire mode, and users should choose the corresponding wiring method based on on-site usage. Generally, three-phase three wire method is used without a centerline. Only two CTs (A and C phases) can be installed for three-phase three wire, while three CTs need to be installed for three-phase four wire. There are two wiring methods that can be set inside the instrument. The actual wiring method and the setting method inside the instrument must be consistent, otherwise the measurement data of the instrument is incorrect;

5. For wiring safety and lightning protection, it is recommended to connect a 1A fuse at the voltage input terminal and the L terminal of the auxiliary power supply.

Function settings



Key Description: 1. Menu is used to enter the settings menu, with a default password of 1. If the modified password is forgotten, it can be viewed through communication;

2. After entering the menu, it has the function of exiting;

3. To confirm the function of the key, enter;

4. ← is the function of switching to the right, and when encountering a number, it is the function of shifting;

5. The function of switching to the left is to increase the number by 1 when encountering a number, looping from 0 to 9;

6. Set save to yes when exiting, press the confirm button to save, otherwise it will not be saved.

Explanation:

1. The switch value d represents down, meaning below a certain value;

2. The switch value u represents up, which means higher than a certain value;

3. UA represents the voltage of phase A line, and when the value is 0, it indicates that this value is not turned on; The same applies to other parameters;

4. OFF indicates whether the d/u switch is turned on. After setting the parameters, OFF needs to be set to on to take effect;

5. Multiple parameter values can be set simultaneously, with an OR relationship between each condition;

6. The parameter values are all secondary values and do not include decimal points. If the 100/5 transformer is set to 80A alarm, then 80/100 * 5000=4000

DEC	HEX	TYPE	R/D	describe	illustrate
40001	0x00	UInt16	R	UA A-phase voltage	Primary value=register value/10 * PT (V)
40002	0x01	UInt16	R	UB phase B voltage	
40003	0x02	UInt16	R	UC C phase voltage	
40004	0x03	UInt16	R	IA A-phase current	Primary value=register value/1000 * CT (A)
40005	0x04	UInt16	R	IB phase B current	
40006	0x05	UInt16	R	IC C phase current	
40008	0x07	Int16	R	Total active power of P	Primary value=Register value * CT * PT (W) Negative value, indicating that the positive and negative poles of the current input are reversed
40009	0x08	Int16	R	PA A phase active power	
40010	0x09	Int16	R	PB B phase active power	
40011	0x0A	Int16	R	PC C phase active power	
40012	0x0B	Int16	R	Q total reactive power	One time value=register value * CT * PT (Var) Negative value represents tolerance; Positive value, representing sensibility
40013	0x0C	Int16	R	QA A phase reactive power	
40014	0x0D	Int16	R	QB B-phase reactive power	
40015	0x0E	Int16	R	QC C phase reactive power	
40016	0x0F	UInt16	R	S total apparent power	Primary value=Register value * CT * PT (VA)
40017	0x10	UInt16	R	SA A apparent power	
40018	0x11	UInt16	R	SB B phase apparent power	
40019	0x12	UInt16	R	SC C apparent power	
40020	0x13	UInt16	R	PF total power factor	Actual value=Register value/1000
40021	0x14	UInt16	R	PFA A phase power factor	
40022	0x15	UInt16	R	PFB phase B power factor	
40023	0x16	UInt16	R	PFC C phase power factor	
40024	0x17	UInt16	R	UAB Phase A Line Voltage	Primary value=register value/10 * PT (V)
40025	0x18	UInt16	R	UBC Phase B Line Voltage	
40026	0x19	UInt16	R	UCA C phase line voltage	
40027	0x1A	UInt16	R	FA A-phase frequency	Actual value=Register value/100 (Hz) Measurement range 40-70Hz
40028	0x1B	UInt16	R	FB B-phase frequency	
40029	0x1C	UInt16	R	FC C phase frequency	

Table 3 Protocol Address 1

DEC	HEX	TYPE	R/D	Describe	illustrate
40030	0x1D	UInt32	R	EP+positive active energy	Actual value=(0x1D * 65536+0x1E)/100 (KWH)
40031	0x1E		R		
40032	0x1F	UInt32	R	EP - Reverse active energy	Actual value=(0x1F * 65536+0x20)/100 (KWH)
40033	0x20		R		
40034	0x21	UInt32	R	EQ+positive reactive energy	Actual value=(0x21 * 65536+0x22)/100 (KVarH)
40035	0x22		R		
40036	0x23	UInt32	R	EQ - Reverse reactive energy	Actual value=(0x23 * 65536+0x24)/100 (KVarH)
40037	0x24		R		
40038	0x25	UInt32	R	EP total active energy	Actual value=(0x25 * 65536+0x26)/100 (KWH)
40039	0x26		R		
40040	0x27	UInt32	R	Total reactive energy of EQ	Actual value=(0x27 * 65536+0x28)/100 (KVarH)
40041	0x28		R		
40081	0x50	UInt16	R/W	CODE password (default value 1)	1-9999
40082	0x51	UInt16	R/W	Communication address (default value 1)	1-254
40083	0x52	UInt16	R/W	Baud rate (default value 3)	0:1200 1:2400 2:4800 3:9600
40084	0x53	UInt16	R/W	Check bit (default value 0)	0:N81 1:O81 2:E81 3:N82
40085	0x54	UInt16	R/W	Zeroing electrical energy	Write 0x55AA
40086	0x55	UInt16	R/W	Wiring method (default value 1)	0:3P3L 1:3P4L
40090	0x59	UInt16	R/W	PT voltage ratio (default value 1)	1-5000
40091	0x5A	UInt16	R/W	CT current ratio (default value 1)	1-5000
40108	0x6B	UInt16	R	Software version number	
40311	0x136	UInt16	R	Voltage imbalance	Actual value=Register value/10 * 100%
40312	0x137	UInt16	R	Current imbalance	Actual value=Register value/10 * 100%

Table 4 Protocol Address 2

Explanation:

1. DEC represents decimal, HEX represents hexadecimal, TYPE represents data type, UInt16 represents unsigned 16 bit integer, Int16 represents signed 16 bit integer, R/D represents read-write, R represents read-only, W represents writable, and R/W represents read-write;

2. The decimal point is achieved by dividing by 10. For example, if the voltage is to 1 decimal place, the read value is divided by 10. If the current is to 3 decimal places, the read value is divided by 1000:

3. Writing data to read-only registers will be directly ignored

The structure of communication data frames: address code, function code, data code, verification code

Address code: defaults to 1, can be set to 1-253;

Function code: 03 Read data, 10 Write data;

Data code: composed of a starting address of 2 bytes and a data length of 2 bytes

Verification code: CRC16 with 2 bytes.

Note: The frame data is represented in hexadecimal, and the register address starts from 0.

Reading data:

01 03 00 00 00 03 05 CB reads the three-phase voltage value of abc

01 is the address code

03 is for reading function codes

00 00 is the starting address

00 03 is the data length

05 CB is the verification code

Write individual data:

01 10 00 5A 00 01 02 02 58 AA 30 Write CT as 600, which is a 3000/5 current transformer

01 is the address code

10 is for writing function codes

005A is the register CT address code

0001 is the number of registers

02 is the number of bytes written

0258 is the written value, converted to decimal to 600

AA30 is the verification code

Write multiple data:

01 10 00 55 00 06 0C 00 00 00 00 01 00 01 00 01 00 01 00 01 00 0A 04 EF modified the wire system to three-phase three wire, CT to 10

01 is the address code

10 is for writing function codes

00 55 is the starting register address, corresponding to a wire register

00 06 is the number of connected write registers, where 6 registers are written and 5A is written. Correspondingly, CT register 0C is the number of write bytes, with 2 bytes per register and 12 bytes per 6 registers. That is, 0C 00 00 00 01 00 01 00 01 00 01 00 01 00 01 00 01 00 0A is the 12 write data. 04 EF is the checksum

Note: Write multiple registers that can only be continuous, ensuring that each corresponding register value is correct.

Clearing electrical energy:

01 10 00 54 00 01 02 55 AA 14 AB

01 is the address code

10 is for writing function codes

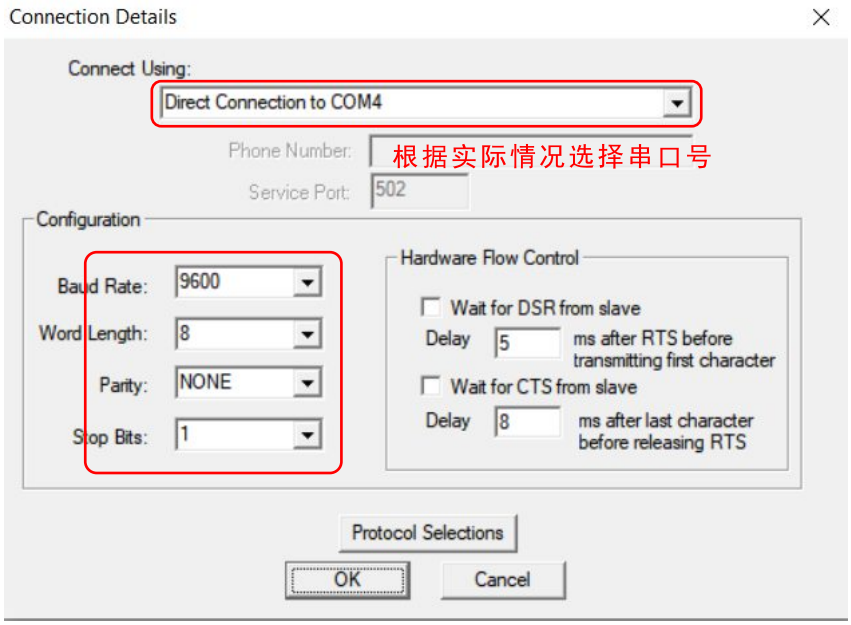
00 54 is the register address code

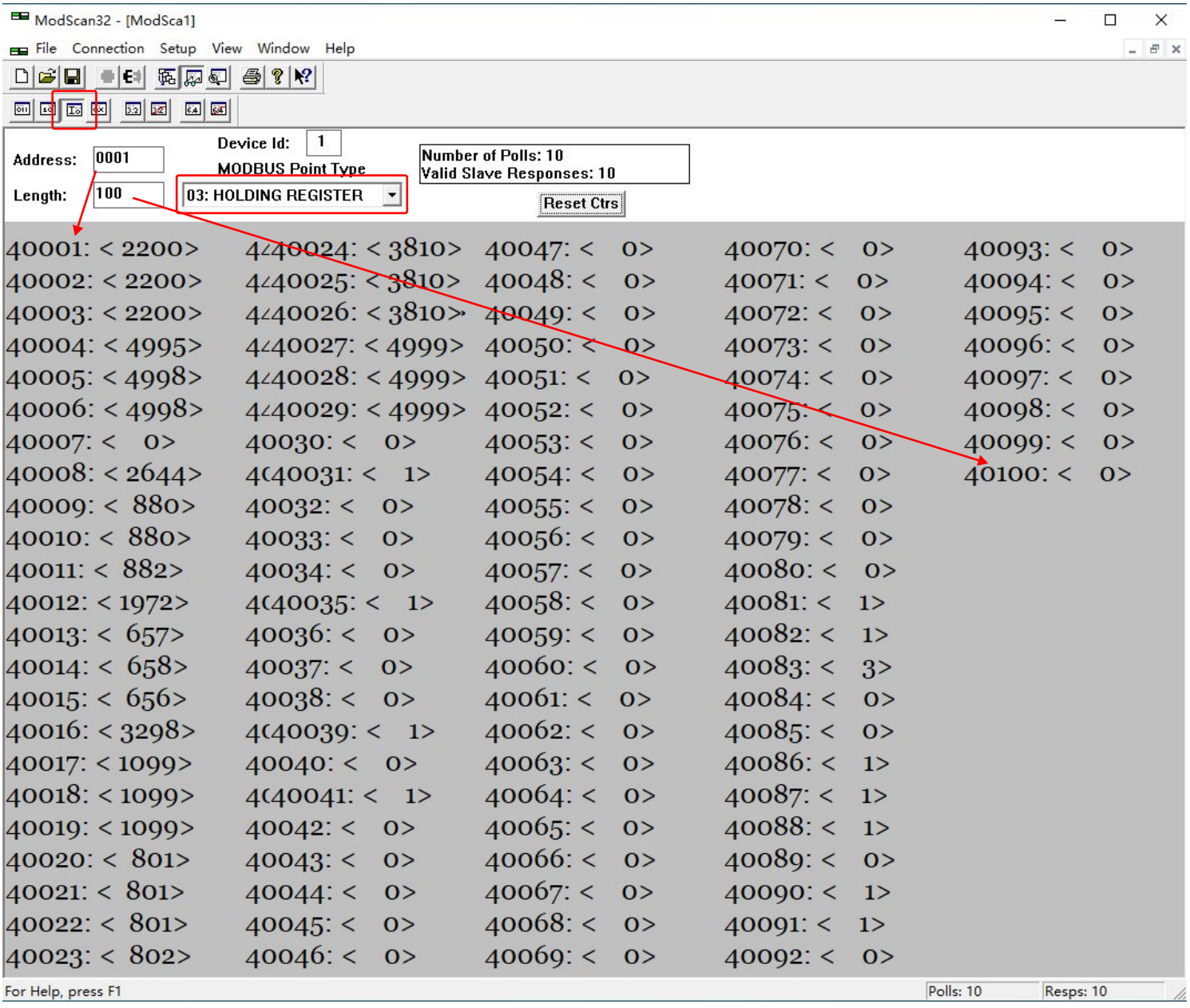
00 01 is the number of registers

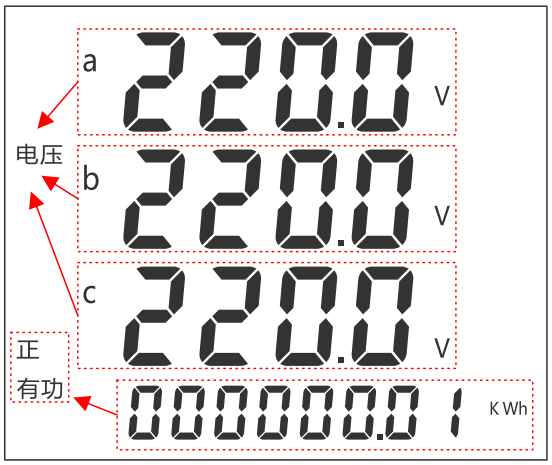
02 is the number of bytes written

55 AA is the write value

Modscan is a universal software for Modbus testing, which requires the use of 485 to serial port tools.



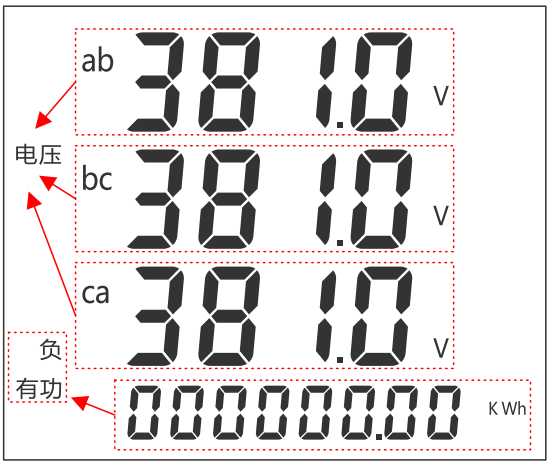




"Voltage abc" represents the phase voltage unit in V

Attention: This page is not available for three-phase and three wire systems

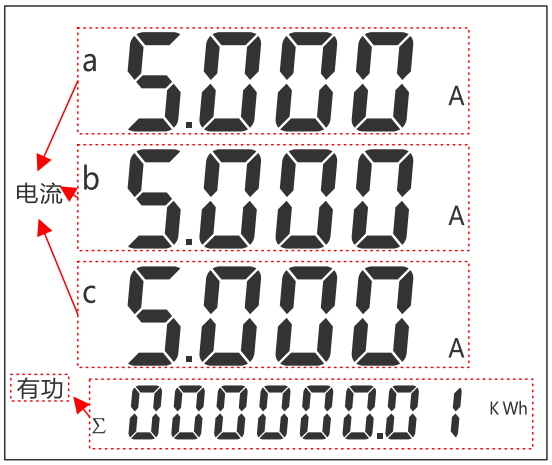
"Positive active" represents positive active electrical energy, in KWh



"Voltage ab bc ca" represents the line voltage, in volts

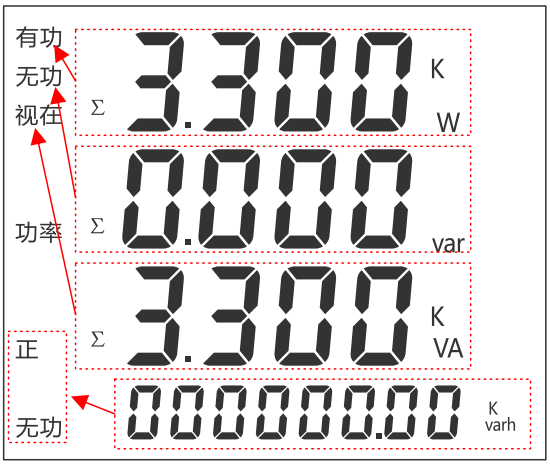
"Negative power" represents negative active electrical energy, measured in KWh

When the current is negative, negative electrical energy will accumulate



"Current abc" represents three-phase current, in units of A

Active Σ represents the total active electrical energy, in KWh



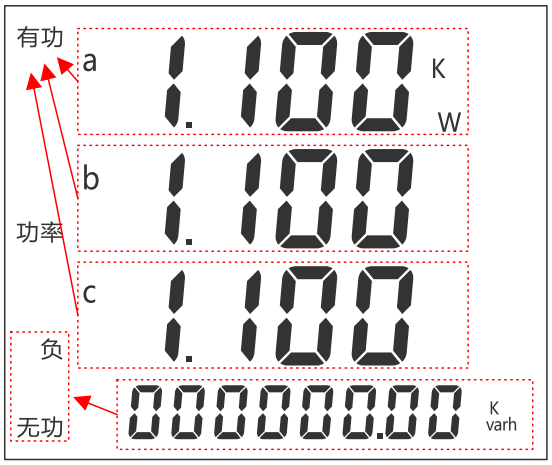
"Active and reactive apparent power" represents three behaviors:

Total three-phase active power, in KW

Total three-phase reactive power, in var

Total three-phase apparent power, in KVA

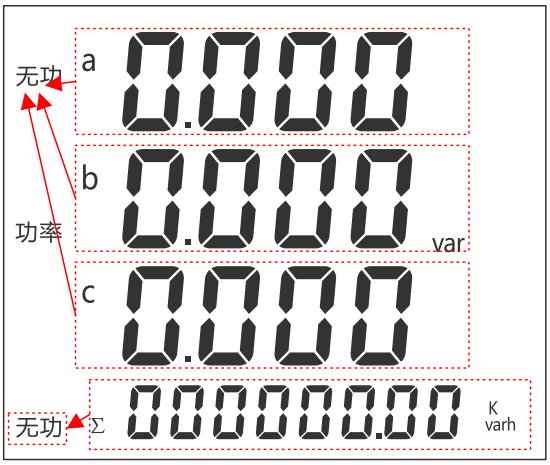
"Positive reactive power" refers to the positive reactive energy, measured in Kvarh



"Active power abc" corresponds to three phases respectively, with units in KW

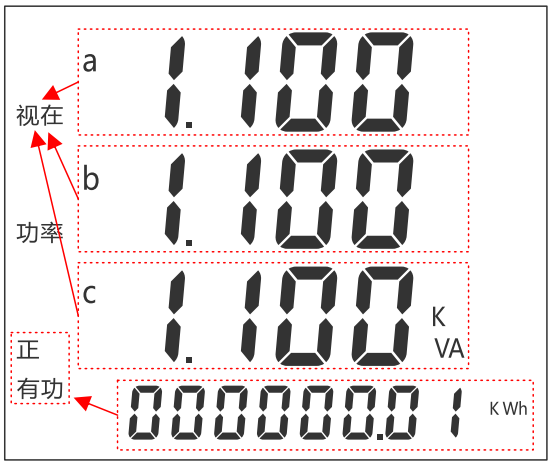
Note: If a negative sign appears, it indicates that the current wire is connected in the wrong direction

"Negative reactive power" refers to the negative reactive energy, measured in Kvarh

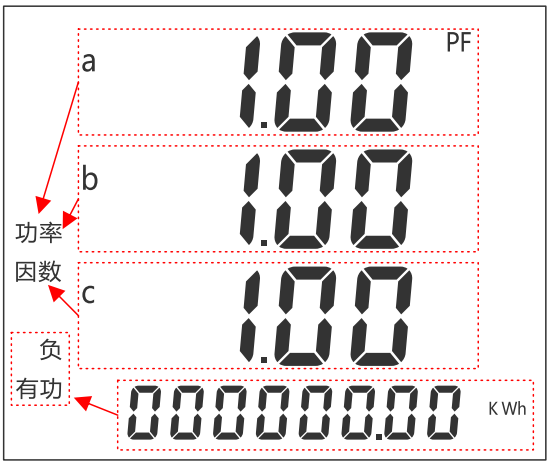


"Reactive power abc" corresponds to three phases, with units in var

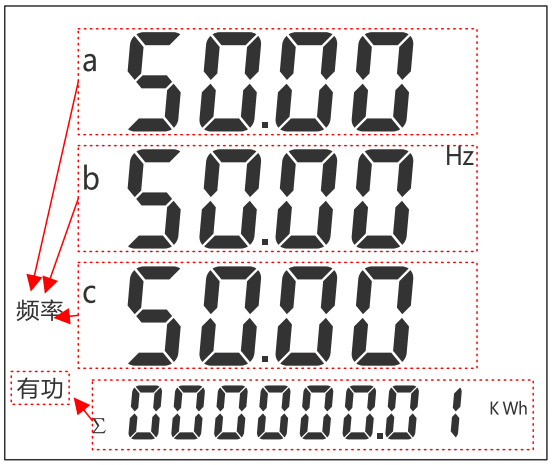
"Reactive Σ" represents the total reactive energy, in Kvarh



"Apparent power abc" corresponds to three phases, with units of KWh



"Power factor abc" corresponds to three phases, represented by PF. Note that a power factor of 1 is an ideal situation



"Frequency abc" corresponds to three phases, with units in Hz

Explanation:

1. Active power P=U * | * cos φ， Unit: W, KW, MW; Among them, cos φ Is the power factor;

2. The total power of the three phases is P=P (a)+P (b)+P (c). When the three phases are balanced, one phase can be calculated and multiplied by 3. When they are unbalanced, they can be calculated separately;

3. The relationship between line voltage and phase voltage is U (ab)=√ 3 * U (a), P (a)=U (a) * | (a) * cos φ (a) =U (ab) * | (a) * cos φ (a) /V3

4. Reactive power Q=U * * sin φ， Units are var, Kvar, Mvar;

5. Apparent power S=U *, in units of VA, KVA, MVA;

6. Active electrical energy W=P * t, in KWh;