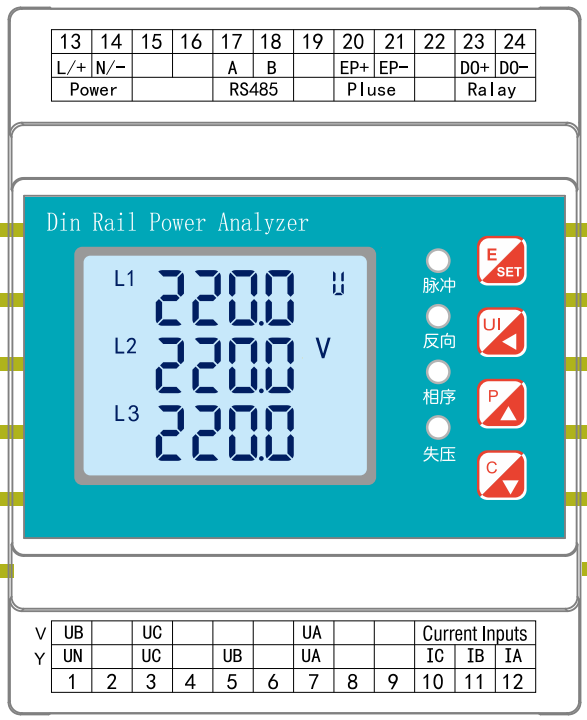
ADS400

Technical Manual



⚠ Successful operation of this equipment depends on safe and proper installation and operation, please read this manual carefully before installation and use; ignoring basic safety requirements may result in electric shock, fire, equipment damage, and abnormal operation of the meter.

V2411

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1. General

ADS400 mini DIN rail power analyzer is designed special for energy management system (EMS). By its DIN rail installation, it is very suitable to be used with breakers, contactors. Besides electrical energies, it can measure all the parameters on the electrical networks, such as currents, voltages, active powers, reactive powers, apparent powers, frequency, power factors and 4 quadrant energies.

We may connect it with current transformer(CT) or voltage transformer(PT). It has a 8 digits LCD display. By its front keys, you may easily check different display data or program its parameters. It has a RS485 interface to transfer the measuring data to other master devices, such as PLC, data center computers.

ADS400 has good cost performance, as an intelligent unit and a digital electrical data collection unit, it has been widely used in many intelligent systems.

2. Functions

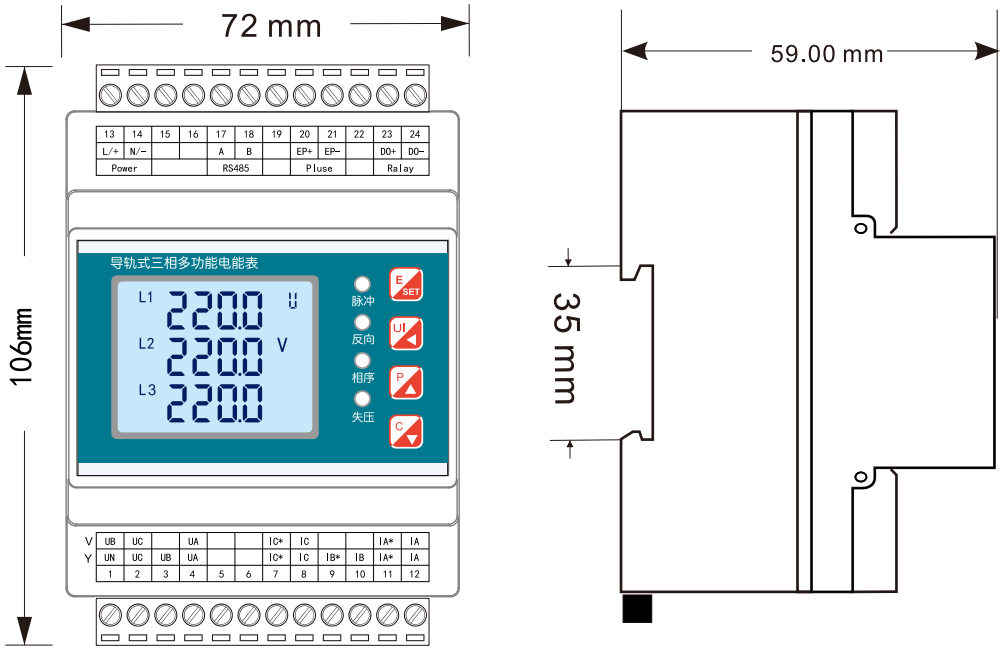
- Measuring:30 parameters on AC electrical network:
  AL1, AL2, AL3(current senses), VL1, VL2, VL3, VL1-2, VL2-3, VL3-1, Fr,
  PL1, PL2, PL3, PL,QL1, QL2, QL2, QL, SL1, SL2, SL3, SL, PF1, PF2, PF3, PF,
  imp & exp kWh, L & C kvarh
- Display: With 8 digits LCD, display range 000000.00~99999999 kWh;
  keep kWh value without power;
  dot will move according to energy value to 8 integer digits;
- Dimension:4 modules (72 × 89 × 74mm);
- Current Input:
  3x1A/5A (Connect external CT);
- Line & Voltage Input:
  3P4L (3x57.7/100V, 3x127/220V, 3x230V/400V,3x240/415V);
  3P3L (3x100V, 3x220V, 3x380V)
- Power Supply: Default axiliary power supply AC/DC85~265V;
  Optional DC9V/12V/24V/48V
- Communication:With 2 cables isolated RS485 interface up to 57600bps (Def. Modbus-RTU protocol);
- Pulse: kWh impulse output (comply DIN43864);
- Relay ouput:Optional 1 relay output as remote switch or as alarm;
- Autodiagnosis:for wiring error alarm, check error reason by alarm code;
- Mounting:35mm standard DIN rail installation;
- Software: With free testing software, to easily read its data and set its parameters by computer;

3. Features

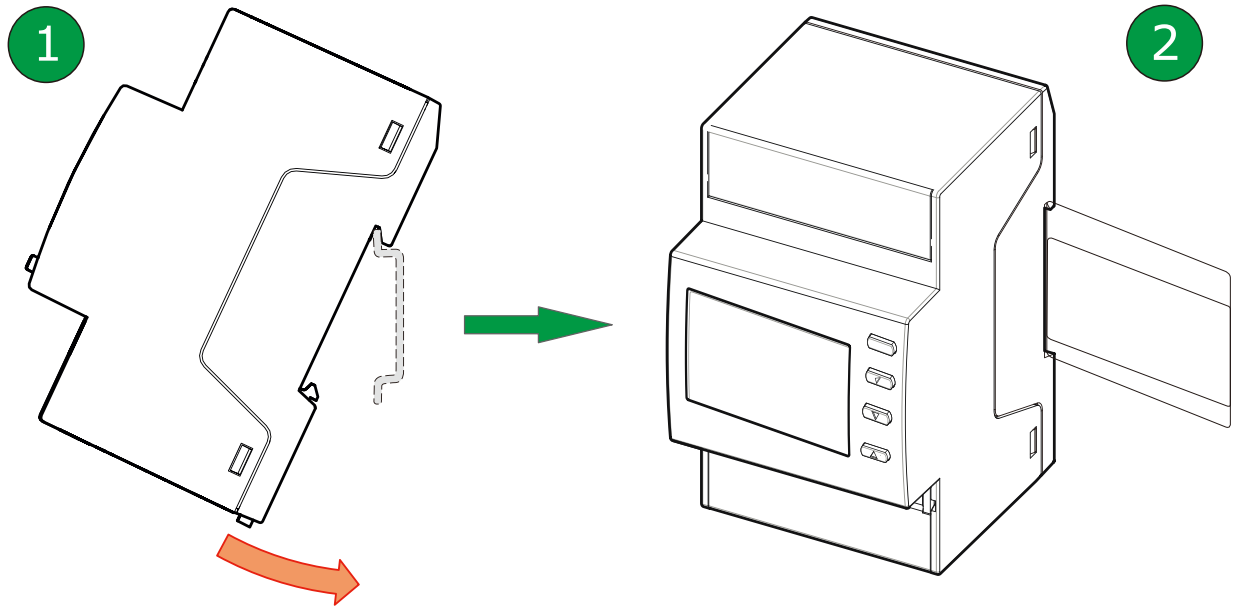
Technical Feature		Parameters
Input	Wiring	1P2L, 3P3L, 3P4L
	Voltage	2x110V/220V, 3x57.7/100V, 3x127/220V, 3x230V/400V,3x240/415V 3x100V, 3x220V, 3x380V
		Rated 0.9 ~ 1.1Un; Max 0.7 ~ 1.2Un
		Comsumption ≤5VA / line
	Current	ADS400M: 5A (to measure normal 5A CT), 20A, 40A, 60A, 100A, 200A, 400A, 600A, 800A (Split core CT) 200A, 600A, 1kA, 2kA, 4kA, 6kA(Rogowski Coil)
		Comsumption ≤4VA / line
	Frequency	50 / 60Hz
	Accuracy	U,I,P 0.5%, kWh 1.0%
	Thermal drift	<200ppm
RS485 interface	Wiring	2 cables isolated RS485 (Modbus-RTU protocol)
	Baud rate	1200,2400,4800,9600,19200,38400,57600bps
	Parity	n.8.1,n.8.2,e.8.1,o.8.1
	Bus Capacity	32
Relay Ouput (Option K)	Mode	Dry Contact
	Capacity	Capcity: AC250/3A,DC24/5A
Energy Impulse		kWh impulse (open-collector)
		VCC<48V, Iz<50mA
		Constant: 10imp/kWh
Auxiliary power supply		AC/DC85-265V; Consumption < 5VA
Isolation		2kVAC/min (input / output / power supply)
		input / housing and output / housing >50MΩ
Installation		Standard 35mm DIN rail
Standard		IEC 61557-12 Class 0.5 IEC 62053-21 Class 1.0
Environment		Work Temperature: -20C ~ +55C
		Storage Temperature: -40C ~ +70C
		Relative humidity: 5% ~ 95% (no condensation)
		Altitude: < 2500m
Others		Dimension: 72×89×74 (mm)
		Weight: 150g

4. Dimension

4.1 Dismension

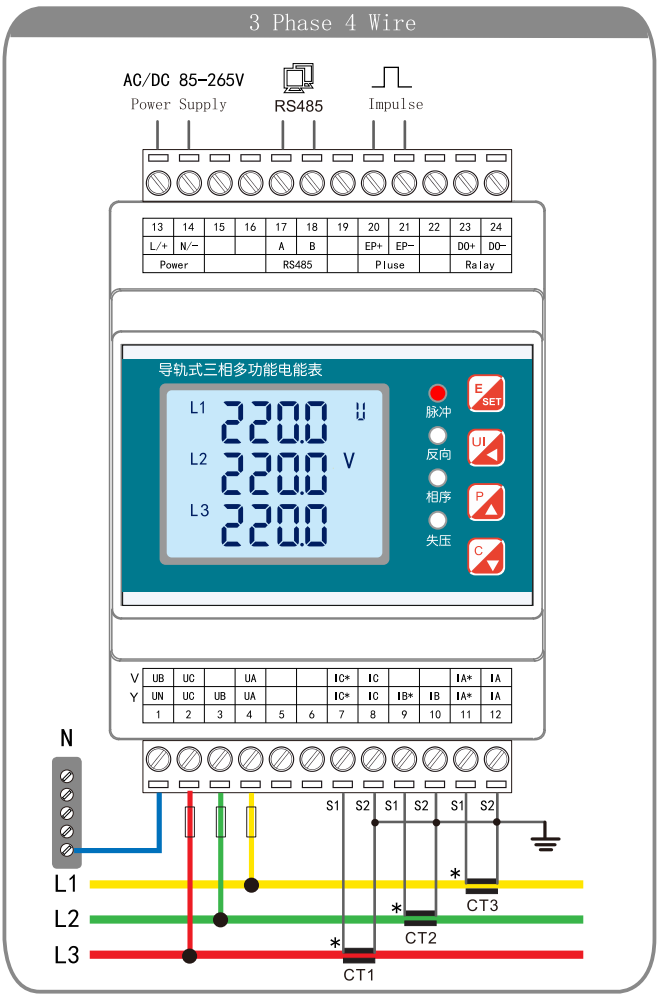


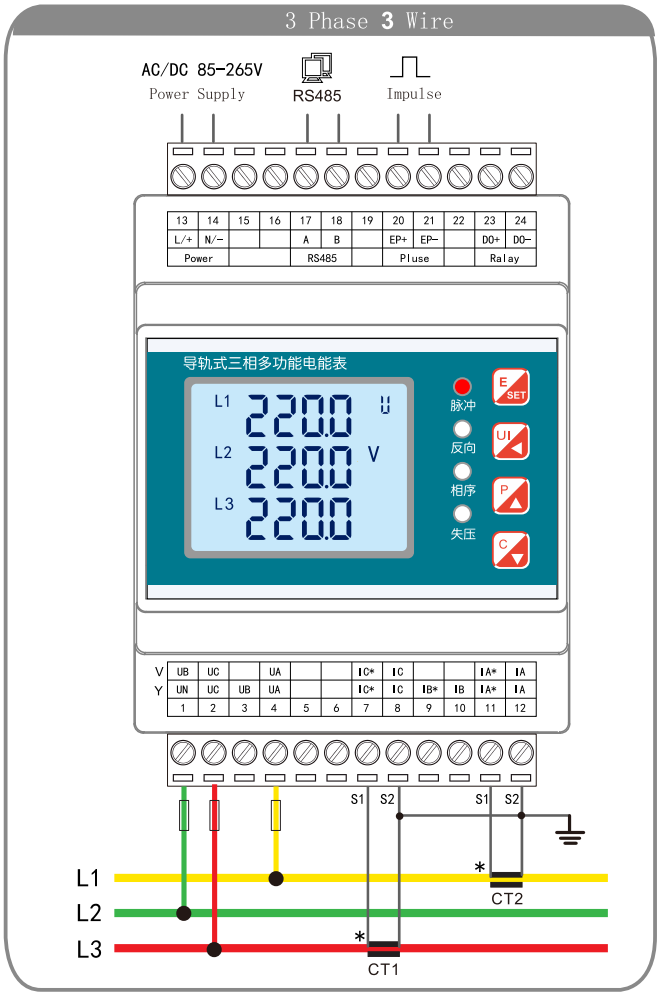
4.2 Installation



5. Wiring

5.1 ADS400M (for normal 5A(1A) CT.)





1. Voltage Input：

(1) When line-line voltage is more than rating 500V, it's best to use PT;

(2) For safe wiring and lightning protection, best to wire the 1A fuse on voltage inputs and power supply L line;

2. Current Input：

(1) When current is more than rating 6A, it's best to use CT;

(2) If there is other kWh meter or ammeter on the AC line, please mount ADS400 in series connection with their current transformers.

(3) Before disconnect current input, make sure disconnect CT primary circuit or short CT secondary circuit;

(4) Make attention of current transformer direction, including installation direction P1,P2 and wiring direction S1,S2; The reverse current will cause negative active power and negative energy value;

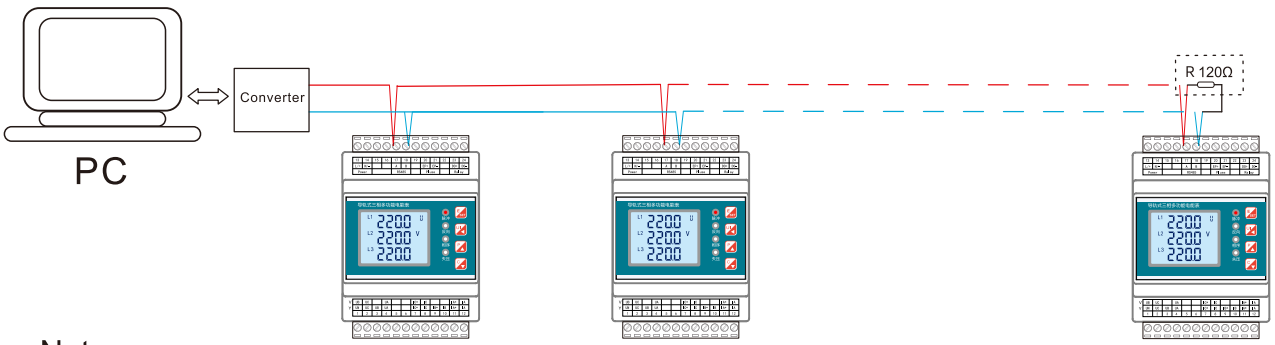
3. Make sure that each phase current matchs its voltage, including their phase number and their direction; otherwise it will cause error measuring or error sign;

4. The normal ADS400M need auxiliary power supply, its work voltage is AC/DC85-265V

(sometimes we get the its auxiliary power from one phase voltage input);

5.2 RS485 Wiring

RS485 Wiring



Note:

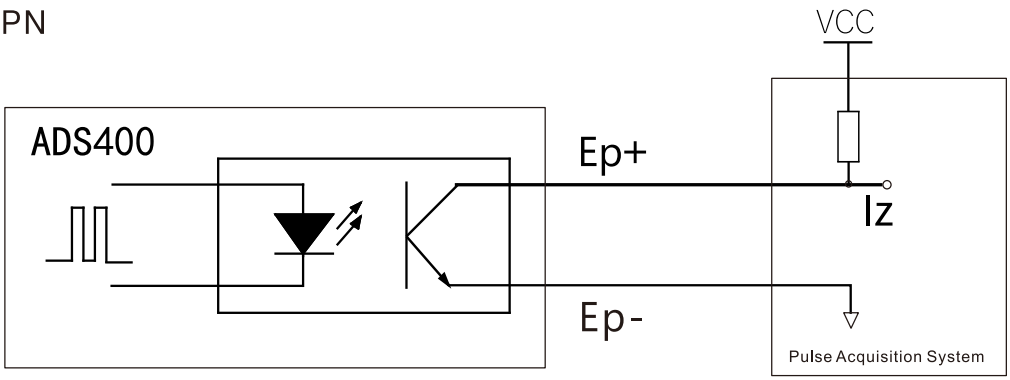
1. On the same RS485 line, there aren't more than 32 devices;
2. At the end of RS485 line, please connect a 120Ω resistor to the last device;
3. Every ADS400 must have own different slave address

(You may set ADS400 slave address by its front button or its testing software).

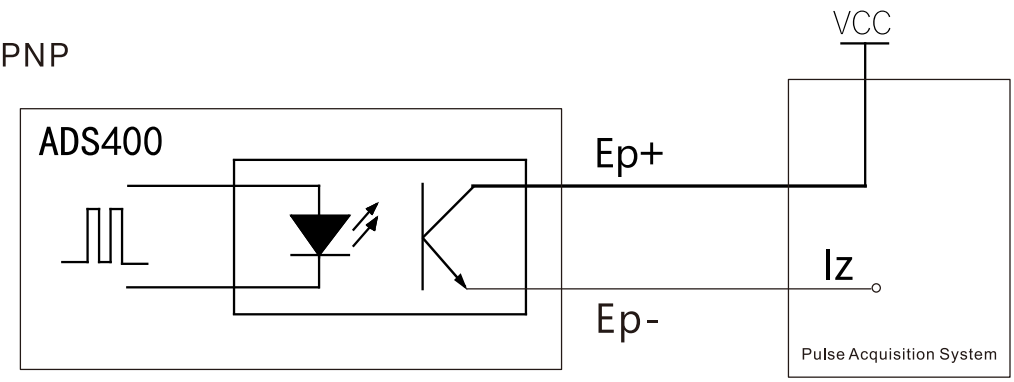
5.3 Pluse Wiring

Pluse Wiring

1,NPN



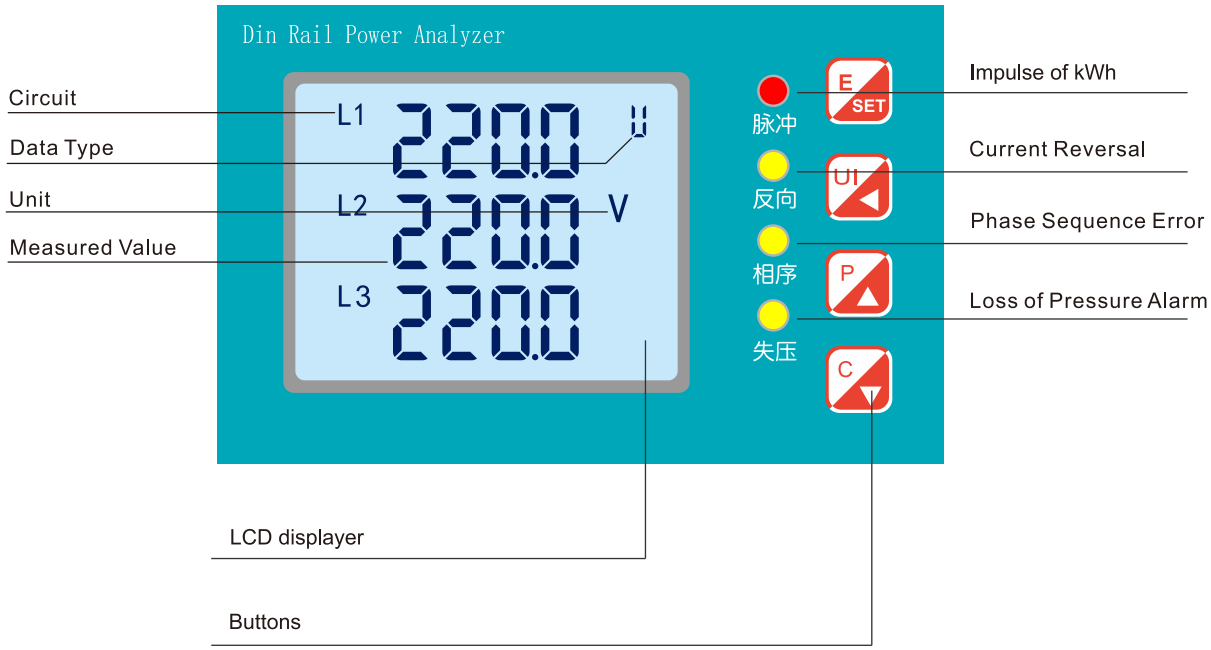
2,PNP



(+Vcc ⩽35V, Iz⩽50mA)

6. Display

6.1 Display introduction

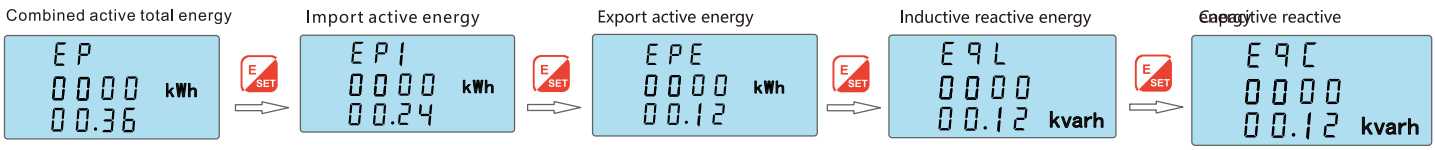


Attention:

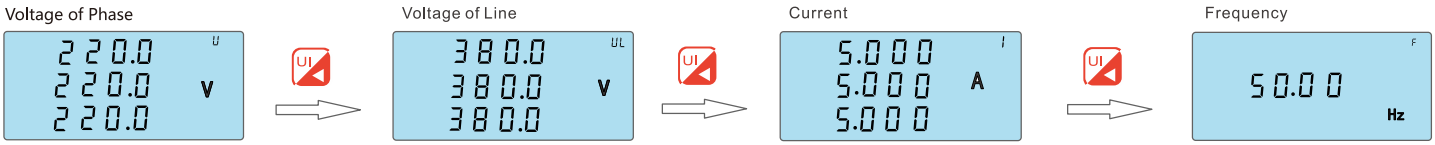
1. If under well communication of RS485, the marking will flicker;
2. If there is load current, LED of Impluse will flicker;
3. If Yellow LED lights, it means there is wiring error(s); please check error code to look for the error reason;
4. By front 4 keys, you may change display and setting parameters.

6.2 Display Pages

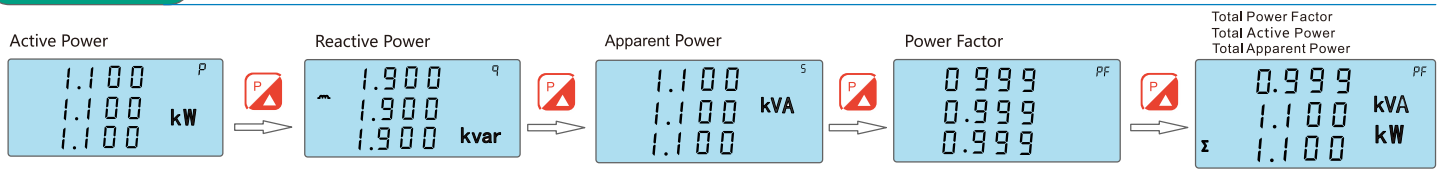
Energies



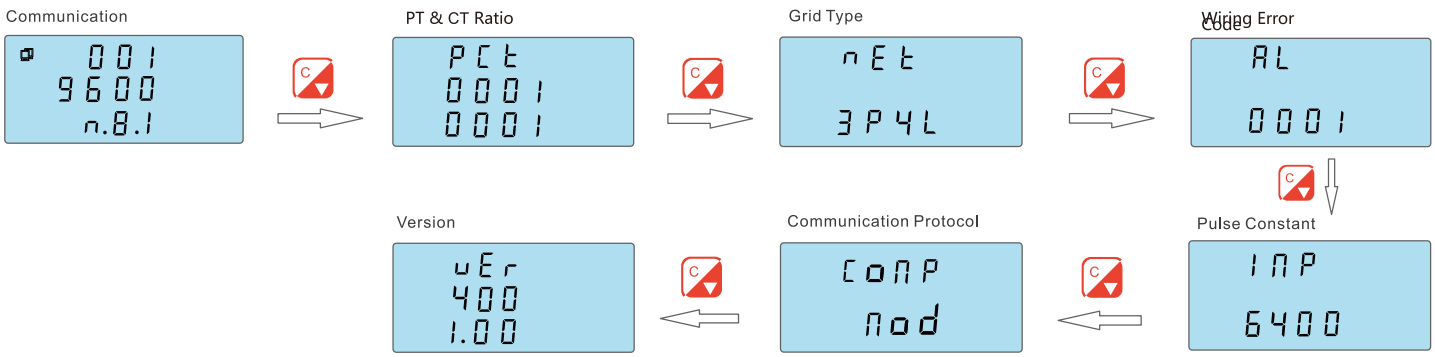
Voltage & Current



Power



Parameters



Note:

- ADS400 can display all parameters, the user may change display page by button;
- After set PT or CT ratio, ADS400 displays real values; you don't need multiply the PT or CT ratio again
- You may check ADS400 parameters without into setting menu;

- [AL] wring error code: with 4 digits.

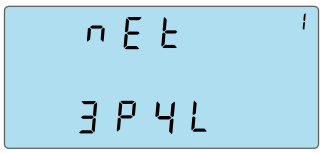
	X X	X	X
Normal	0 - Normal	0 - Normal	0 - Normal
Error	1 - phase sequence error	1 - lose phase voltage	1 - reversed current
Reason	There is unmatch of phase current and phase voltage	There is missing of phase voltage	There is CT mounted reversedly

7. Progamming

7.1 Button Setting Locally

Programming Menu

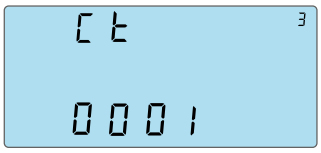
Enter programming password
1.Under reading pages, press and keep SET 4 seconds to go into Programming mode;
2. Default enter programming password is 1111
3. Press ◀ ▲ to choose digit, Press SET to confirm password.



Choose Network:
- 3P4L
- 3P3L

Press ▼ ▲ to change value;

Set PT Ratio:
1.Option value: 0001- 9999
2.Press ◀ ▲ to change value;
(4000/400V, set PT = 10)



Set CT Ratio:
1.Option value: 0001- 9999
2.Press ◀ ▲ to change value;
(200/5A, set CT= 40)

Set Modbus Slave Address:
1.Option value: 1- 247
2.Press ◀ ▲ to change value;

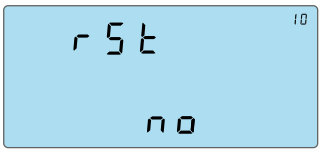
Set RS485 Baud rate:
1.Option value: -1.200(1200bps)
-2.400(2400bps) -4.800(4800bps)
-9.600(9600bps) -19.20(19200bps)
-38.40(38400bps) -57.60(57600bps)
2.Press ◀ ▲ to change value;

Set RS485 frame mode:
1.Option value:
- n,8,1 (1 stop bit, no parity)
- o,8,1 (1 stop bit,odd parity)
- e,8,1 (1 stop bit,even parity)
-n,8,2 (2 stop bit,no parity)
2.Press ◀ ▲ to change value;

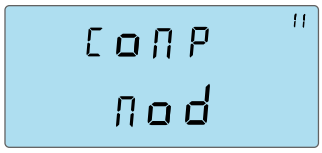
Set Display Mode:
00: fixed display
Others are cyclic displays,
and values are cyclic display time

Set LCD backlight duration:
1.Option value: 0-255 (seconds)
2.Press ◀ ▲ to change value;
(value 0: backlight is always ON;
default value is 60 seconds)

Reset all energies' value:
1.Option value: - no -yes
2.Press ▼ ▲ to change value;
(Attention: After reset energy values, they can be recovered)



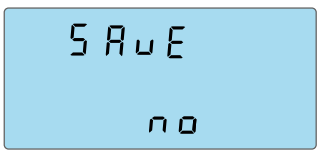
Reset setting parameters' value:
1.Option value: - no -yes
2.Press ▼ ▲ to change value;
(Attention: Restore to factory settings)



Choose Protocol:
- mod (Modbus-RTU)
- 645 (DL/T645)

Press ◀ ▲ to change value;

Set programming password:
1.Option value:0-9999(Default 1111)
2.Press ◀ ▲ to change value;



Save programming values:
1.press & keep SET 3 sec to enter Save Page;
2.Option value: - no - yes
3.Press ◀ ▲ to choose;
Press SET to confirm saving.

Attention:

1. ADS400 is cabled on 3P4W or 3P3W,then set network on it;
2. *After setting, have to save the setting;*
3. *To check the good setting on the parameter menu, after setting*

8. Modbus Address

8.1 Registor Map

Registor Address PLC	Registor Address PC	Items	Format	Length	Read Write	units	Explanation
40001	0	password	uint16	1	R/W		0~9999
40002	1	Display Mode	uint8	1	R/W		0:fixed display Others are cyclic time display: 1~99 s
		Grid Type	uint8				low 0:3P4L; 1:3P3L (Default: 0)
40003	2	PT Ratio	uint16	1	R/W		1~9999 (External CT 200/5A, ratio = 40)
40004	3	CT Ratio	uint16	1	R/W		1~9999 (External PT 10kV/100V, ratio = 100)
40005	4	Slave Address	uint8	1	R/W		:1~247(1)
		Baud rate	uint8				low 1 1200 2 2400 3 4800 4 9600(Default) 5 19200 6 38400 7 57600 8 115200
40006	5	Data Frame format	uint8	1	R/W		high 0:N.8.1(Default) 1:O.8.1 2:E.8.1 3:N.8.2
		Communication Protocol	uint8				low (0 MODBUS_RTU 1 645_07)
40007	6	LCD backlight duration	uint16	1	R/W	1s	0~9999
40008	7	Reset all energies' value	uint16	1	R/W		Write 55AAH Clear all energies
40009	8	Restore the factory settings	uint16	1	R/W		Write 55AAH Reset Meter
40024	23	Pulse width	uint16	1	R/W		100 50-3000ms
40025	24	Set pulse constant	uint16	1	R/W		1\10\100 imp/kWh
40040	39~41	ID number	uint8	3	R/W		
40051	50	Voltage L1-N	uint16	1	R	0.1V	Registor * PT/10
40052	51	Voltage L_2-N	uint16	1	R		
40053	52	Voltage L_3-N	uint16	1	R		
40054	53	Voltage between L1 & L2	uint16	1	R		
40055	54	Voltage between L_2 & L_3	uint16	1	R		
40056	55	Voltage between L_3 & L_1	uint16	1	R		
40057	56	Current on phase L1	uint16	1	R	0.001A 0.01A	1(6)A Registor * CT/1000 10(100)A Registor/100
40058	57	Current on phase L_2	uint16	1	R		
40059	58	Current on phase L_3	uint16	1	R		
40060	59	Active power on phase L1	uint16	1	R	0.001kW 0.01kW	
40061	60	Active power on phase L_2	uint16	1	R		
40062	61	Active power on phase L_3	uint16	1	R		
40063	62	Total Active power	uint16	1	R		
40064	63	Reactive power phase L1	uint16	1	R	0.001kvar 0.01kvar	
40065	64	Reactive power phase L_2	uint16	1	R		
40066	65	Reactive power phase L_3	uint16	1	R		
40067	66	Total Reactive power	uint16	1	R		
40068	67	Apparent power phase L1	uint16	1	R	0.001kVA 0.01kVA	
40069	68	Apparent power phase L_2	uint16	1	R		
40070	69	Apparent power phase L_3	uint16	1	R		
40071	70	Total Apparent power	uint16	1	R		
40072	71	Power factor on phase L1	uint16	1	R	0.001	Registor/1000
40073	72	Power factor on phase L_2	uint16	1	R		
40074	73	Power factor on phase L_3	uint16	1	R		
40075	74	Total Power factor	uint16	1	R		
40076	75	Grid frequency	uint16	1	R	0.01Hz	Registor/100
40077	76,77	Total active energy	uint32	2	R/W	0.01kWh	RealValue = (65536*Registor_H+Registor_L)*CT*PT/100 (Unite:: kWh)
40079	78 79	Import active energy	uint32	2	R/W		
40081	80 81	Export active energy	uint32	2	R/W		
40083	82 83	Inductive reactive energy	uint32	2	R/W	0.01kvarh	
40085	84 85	Capacitive reactive energy	uint32	2	R/W		
40087	86 87	Active energy on L1	uint32	2	R/W	0.01kWh	
40089	88 89	Active energy on L_2	uint32	2	R/W		
40091	90 91	Active energy on L_3	uint32	2	R/W		
40093	92	Error Alarm Message	uint8	1	R		High bit0~bit2 voltage loss(0 no 1 yes) bit3 phase sequence(0:normal 1 error)
		Power direction	uint8		R		LOW bit0~bit3 IL1 IL2 IL3(0 postive; 1 negative)

ADS400 Din Rail Power Analyzer