



**Distributed Multi-loop
Power Monitoring Unit
User Manual SAM3000 Series**

Safety instructions

	“Danger” sign is used to warn personnel there may be danger. If this sign is neglected, it may cause injury or death to personnel, damage to equipment, and loss to property.
	“Warn” sign is used to warn personnel to take care measures, otherwise, it may cause death or serious injury to personnel.

CAUTION:

- ◆ Make sure only the qualified technicians perform the installation and maintenance;
- ◆ Before performing wiring operation to the meter, make sure the input signal and the power supply are switched off;
- ◆ The proper voltage detecting device should be used to guarantee no voltage in any part of the meter;
- ◆ The electrical parameters supplied should be within the rated range;

The following situations may result in damages to the meter or cause mistakes in the operation of the meter.

- ◆ The voltage of the auxiliary power supply goes beyond the rated range.
- ◆ The frequency of the power distribution system goes beyond the rated range.
- ◆ The input polarity of the voltage or the current is incorrect.
- ◆ Remove or connect the communication plugs without powering off.
- ◆ Connect the terminal wires against the related instructions.



Please don't touch the terminals when the meter is in operation!

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EU Regulation 2023/1542 concerning batteries and waste batteries requires that, from 18 February 2027, all products placed on the market incorporating portable batteries shall ensure that those batteries are readily removable and replaceable by the end-user at any time during the lifetime of the product. This requirement does not apply to this equipment (Display SAM3000-03) as it falls within the exceptions set out in Article 11(3) of Regulation (EU) 2023/1542, as clarified in Commission Notice C/2025/214, since it is a product whose main function is to collect and supply data and the purpose of the battery is to maintain the integrity of that data.

1. Overview

SAM3000 distributed multi-loop power monitoring unit is a new generation of electrical parameter monitoring product which is researched and developed by SACI. It can realize real-time electrical parameter measurement, energy metering, power quality analysis, status monitoring and off-limit alarm functions. SAM3000 can measure 32 three-phase circuits or 96 single-phase circuits at most. It is equipped with color LCD and touch type buttons which are used for convenient operation. It also has compact size and easy installation. All these functions and advantages make SAM3000 to be a good solution for multi-loop electrical parameter monitoring in industrial fields.

Feature

Multi-loop measurement: one monitoring module can measure electrical parameters of 32 three-phase circuits.

Compact structure: ultra narrow installation width is convenient for installing it near load monitoring point and reducing wires; display module adopts screw mounting installation method which is similar as signal lamp in order to occupy less cabinet space.

Color LCD display: information from different loops are shown on one display module with friendly interface.

Simple installation: DIN-rail installation, pluggable terminals

Automatic addressing: communication addresses of measurement modules are automatically assigned through display module.

2. Function

The following list shows the parameters which are directly measured or acquired after calculation on the basis of basic parameters by SAM3000.

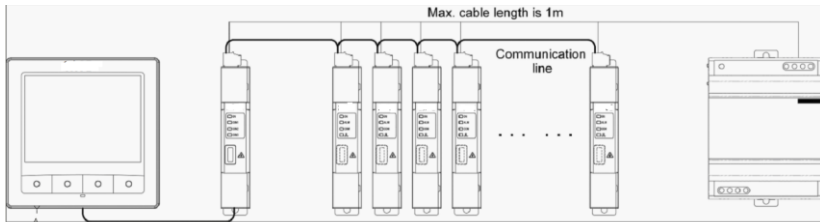
Measurement function	Accuracy	Real-time	Extreme value	Demand	Remark
Phase/line voltage	0.2	●	●	—	
Current	0.2	●	●	●	
Frequency	±0.01Hz	●	●	—	
Phase active power	0.5	●	—	—	
Total active power	0.5	●	●	●	
Phase reactive power	0.5	●	—	—	
Total reactive power	0.5	●	●	●	
Phase apparent power	0.5	●	—	—	
Total apparent power	0.5	●	●	●	
Phase power factor	0.5	●	—	—	
Total power factor	0.5	●	●	—	
Import/export active energy	0.5S	●	—	—	If split-core or flexible coil current transformer is adopted, the accuracy is Class 1.
Import/export reactive energy	2	●	—	—	
Four-quadrant reactive energy	2	●	—	—	
Apparent energy	0.5	●	—	—	
Voltage/current THD	Class A	●	—	—	63rd
Voltage/current harmonic content	Class A	●	—	—	63rd
Voltage/current unbalance	Class B	●	—	—	
Voltage/current sequence component	0.5	●	—	—	
Voltage/current phase	±0.1°	●	—	—	
Voltage crest factor	—	●	—	—	
Current K factor	—	●	—	—	

Note: “●” Yes, “—” No.

3. Model selection

3.1 Composition

SAM3000 is composed of one display module SAM3000-03, one communication module SAM3000-02, one power module SAM3000-04, 32 measurement modules SAM3000-01 at most, current transformer, switching module and special connection wires.



Component		Quantity
Name	Module	
Measurement module	SAM3000-01	1-32
Communication module	SAM3000-02	1
Display module	SAM3000-03	1
Power module	SAM3000-04	1

3.2 Instruction for component

The following list shows the functions of SAM3000 series modules.

Name	Model	Function
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Measurement module	SAM3000-01	Measure voltage, current, power, frequency, energy, demand, extreme value and harmonics of three-phase grid. One RS485 communication interface, two digital inputs, one relay output, external current transformer. Three models available according to different functions which are SAM3000-011/012/013.
Communication module	SAM3000-02	Three digital communication interfaces available, adopting Modbus-RTU protocol. No.1 interface is connected to measurement module SAM3000-01; No.2 interface is connected to host computer; No.3 interface is connected to display module SAM3000-03.
Display module	SAM3000-03	TO show measured data from measurement module, and be used to set parameter of measurement module
Power module	SAM3000-04	Provide DC24V power supply to the whole monitoring unit.

Accessory

Name	Model	Description
Current transformer	TU__M3K	External closed type current transformer for measurement module
Current transformer	TA__M3K	External open type current transformer for measurement module
Current transformer	RC___F3K	External flexible coil transformer for measurement module
Connection line	RJ12-1	Connecting display module and communication module with length 1m
Connection line	RJ12-2	Connecting measurement module to SAM3000-05 or SAM3000-06 with length 0.5m
Connection line	RJ12-3	Connecting measurement module and closed type TU__M3K with length 0.5m.
Switching module	SAM3000-05	Applied as connector when open type TA__M3K is used.
Switching module	SAM3000-06	Applied as connector when flexible coil RC___F3K is

		used
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Function instruction

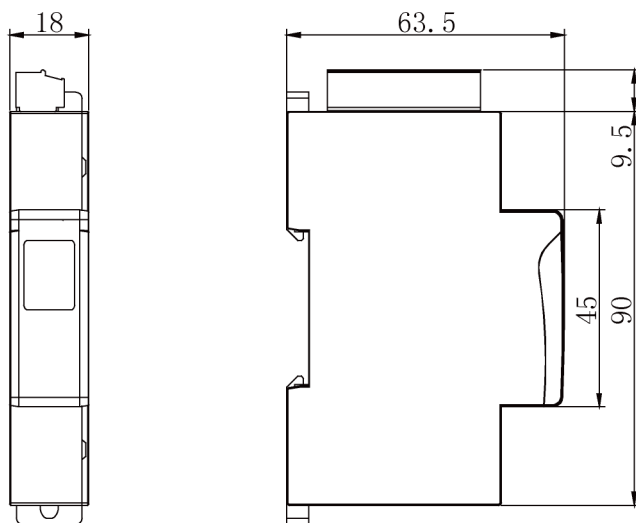
Function		SAM3000-		
		011	012	013
Parameter measurement	Three-phase voltage, current and frequency	•	•	•
	Phase and total power and power factor	•	•	•
	Demand, max. value, min. value, average value	•	•	•
	Fundamental voltage, current, power and power factor	—	—	•
Energy metering	Bi-direction energy, apparent energy	•	•	•
	Four-quadrant reactive energy	•	•	•
	Tariff energy	—	•	•
	Fundamental active energy and reactive energy	—	—	•
Power quality	THD	•	•	•
	Sub-harmonic	—	63rd	63rd
	Unbalance	—	•	•
	Crest factor, K factor	—	•	•
	Voltage swell, voltage sag	—	—	•
	Voltage fluctuation and flicker	—	—	•
	Voltage deviation, frequency deviation	—	•	•
Data record	Demand record	—	•	•
	Max value, min value and average value record	—	•	•
	Off-limit alarm records	—	•	•
	SOE event record	—	•	•
	Voltage swell, sag and interruption record	—	—	•
Digital input		2	2	2

Relay output	1	1	1
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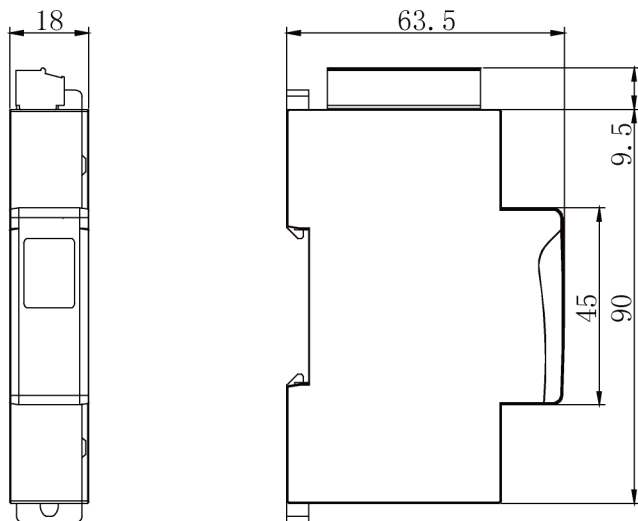
4. Installation

4.1 Dimension

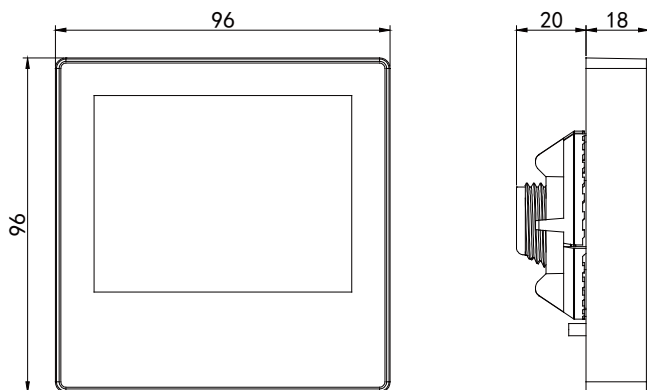
4.1.1 SAM3000-01



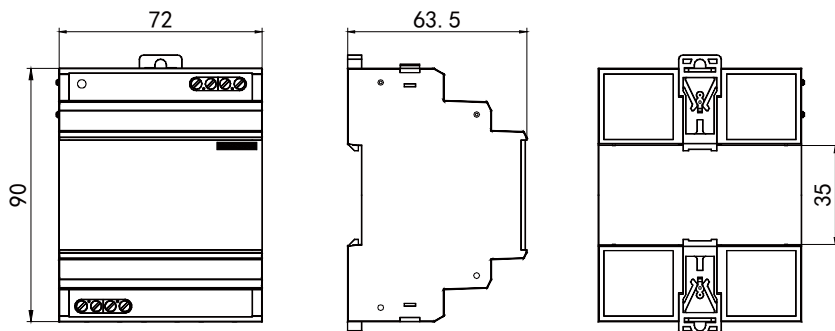
4.1.2 SAM3000-02



4.1.3 SAM3000-03

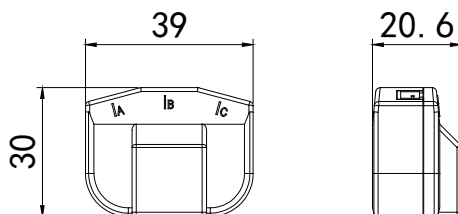


4.1.4 SAM3000-04

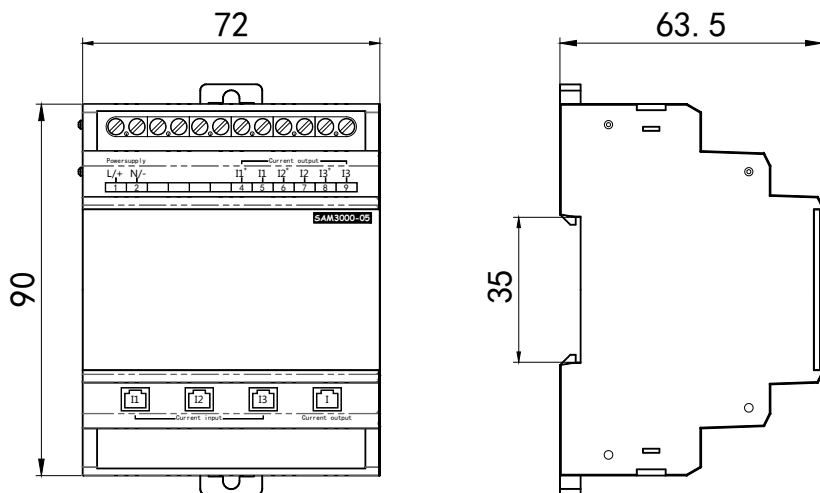


4.1.5 Switching module

Module SAM3000-05 (equipped with open type current transformer TA__M3K)

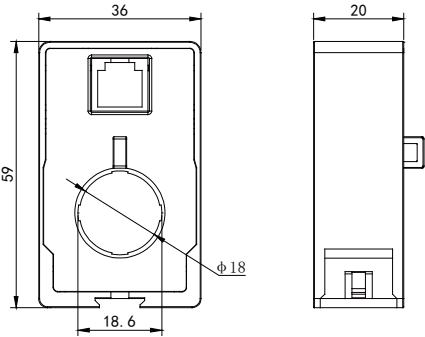
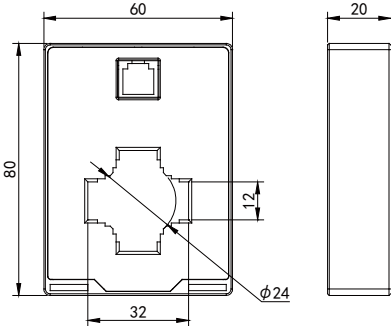
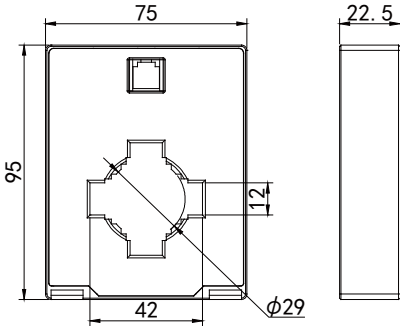


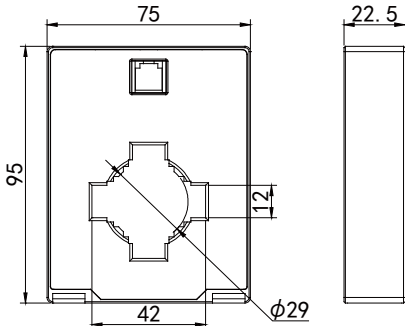
Module SAM3000-06 (equipped with flexible coil current transformer RC__F3K)



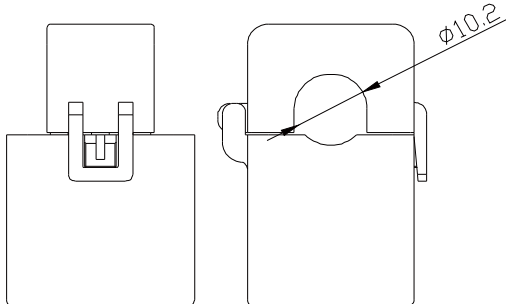
4.1.6 Closed type current transformer

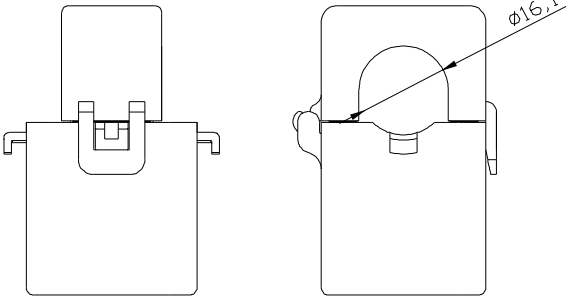
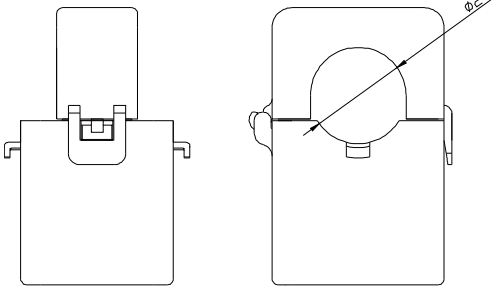
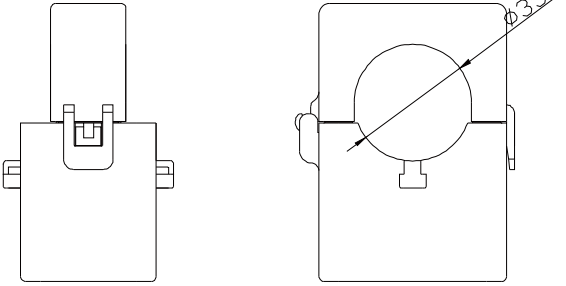
Model	Dimension (mm)
TU05M3K	

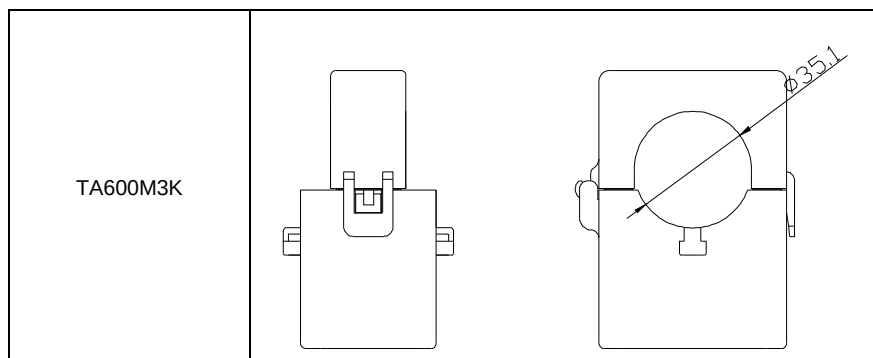
TU100M3K	 Technical drawing of the TU100M3K component. The front view shows a rectangular component with a width of 36 and a height of 59. It features a circular hole with a diameter of $\phi 18$ and a small rectangular feature at the bottom with a width of 18.6. The side view shows a height of 20.
TU200M3K	 Technical drawing of the TU200M3K component. The front view shows a rectangular component with a width of 60 and a height of 80. It features a circular hole with a diameter of $\phi 24$ and a small rectangular feature at the bottom with a width of 32. The side view shows a height of 20.
TU400M3K	 Technical drawing of the TU400M3K component. The front view shows a rectangular component with a width of 75 and a height of 95. It features a circular hole with a diameter of $\phi 29$ and a small rectangular feature at the bottom with a width of 42. The side view shows a height of 22.5.

TU600M3K	 Technical drawing of the TU600M3K current transformer. The front view shows a rectangular unit with a central circular window. Dimensions are: overall width 75 mm, overall height 95 mm, bottom width 42 mm, and a central vertical slot width of 12 mm. A circular hole with a diameter of $\phi 29$ is located on the right side. The side view shows a rectangular profile with a height of 22.5 mm.
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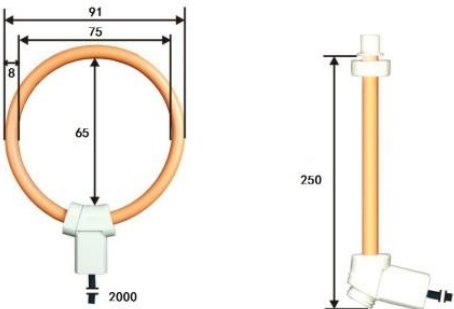
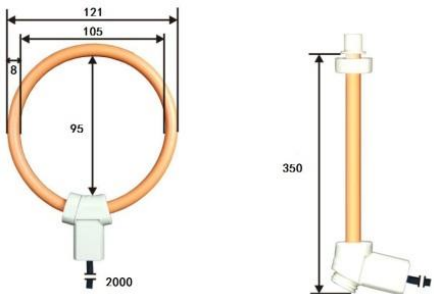
4.1.7 Open type current transformer

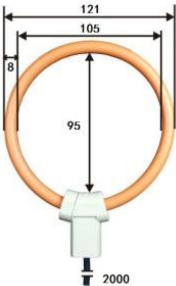
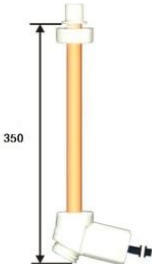
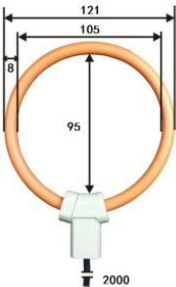
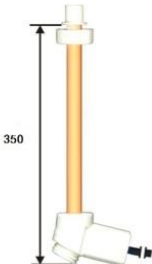
Model	Dimension (mm)
TA05M3K	 Technical drawing of the TA05M3K open type current transformer. The front view shows a rectangular unit with a central circular window. The side view shows a rectangular profile with a circular hole. A dimension line indicates the hole diameter is $\phi 10.2$.

TA100M3K	
TA200M3K	
TA400M3K	

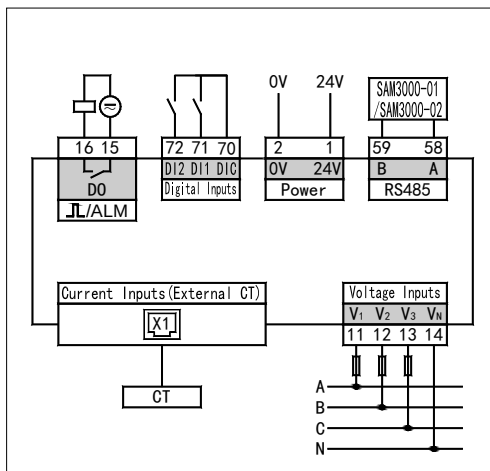


4.1.8 Flexible coil current transformer

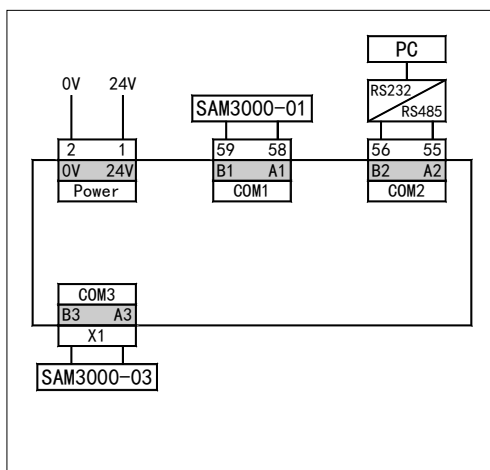
Model	Dimension (mm)
RC600F3K	
RC1000F3K	

RC2000F3K	 
RC3000F3K	 

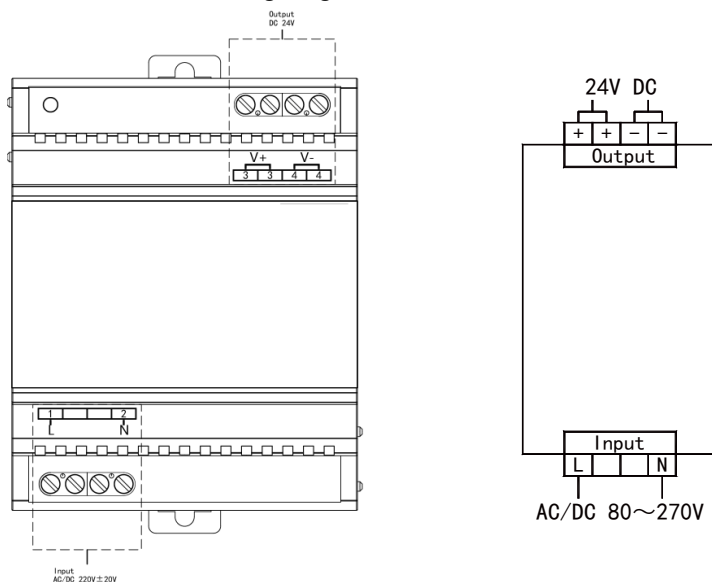
4.2.1 SAM3000-01 wiring diagram



Power supply	COM1 connected to SAS9000 (-1)	COM2 connected to communication cable(s)
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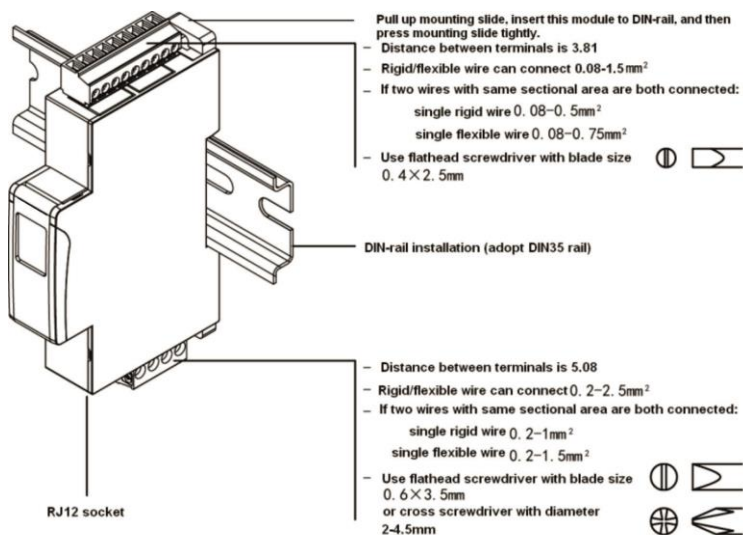


4.2.3 SAM3000-04 wiring diagram



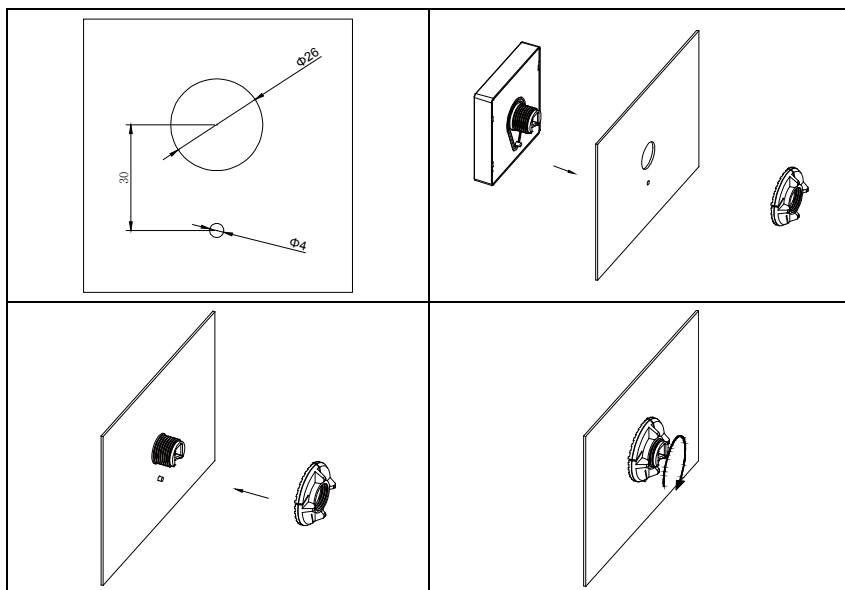
4.3 Installation

4.3.1 SAM3000 installation method

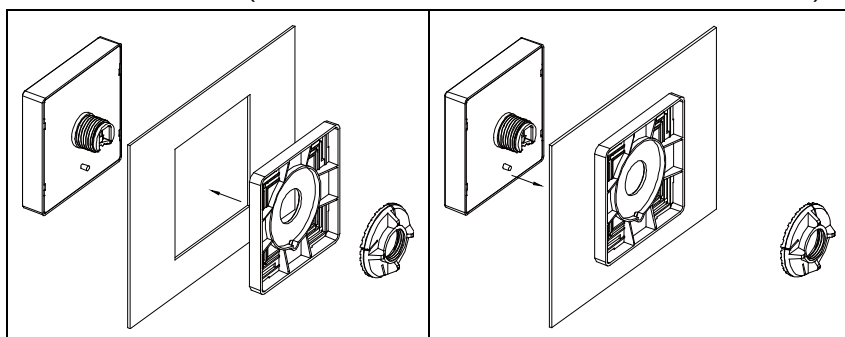


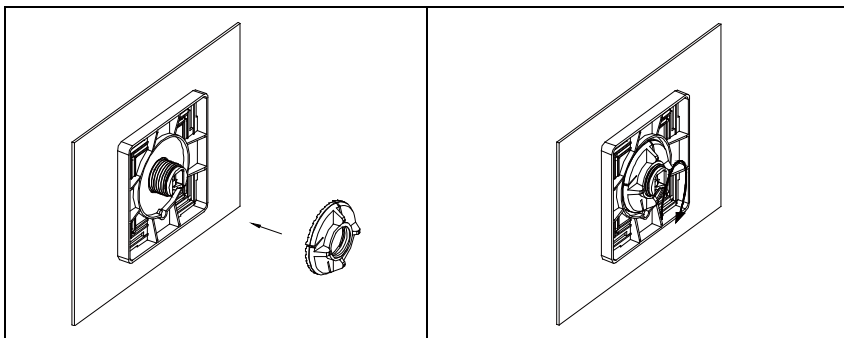
4.3.2 SAM3000-03 installation

Installation method 1



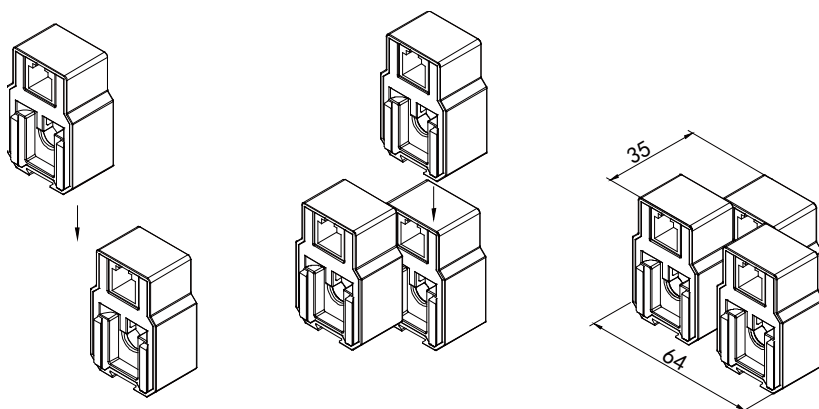
Installation method 2 (used for cut-out size 91×91mm, 76×76mm, 67×67mm)



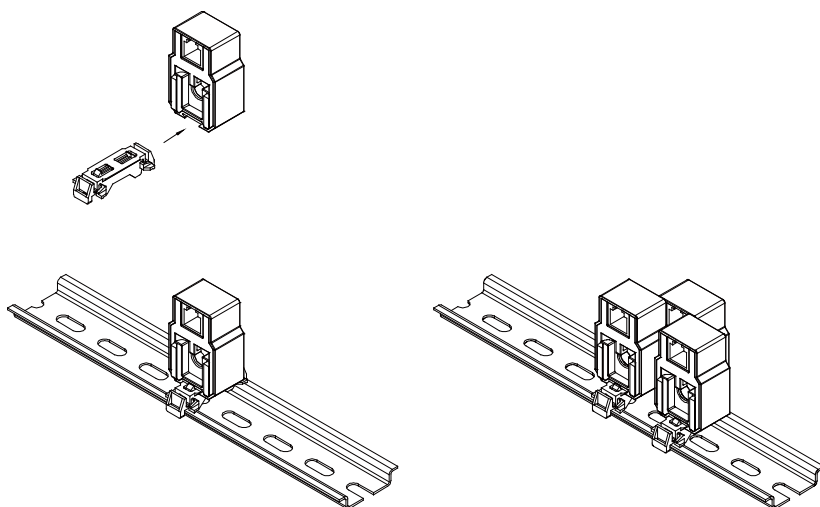


4.3.3 Closed type current transformer installation

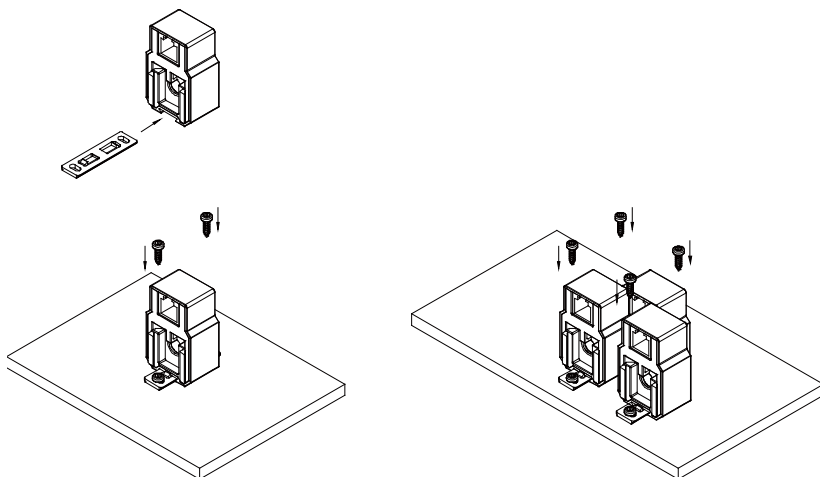
1) TU05M3K closed type current transformer assembly



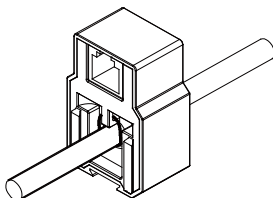
2) TU05M3K DIN-rail installation



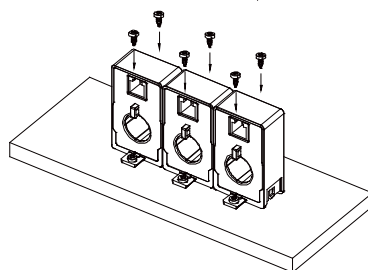
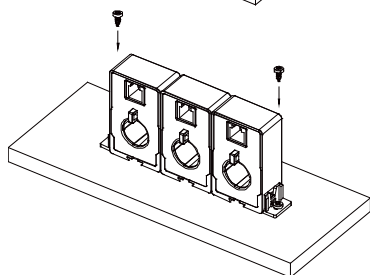
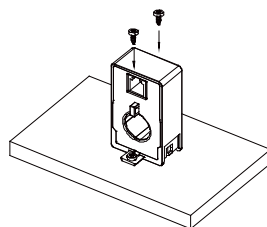
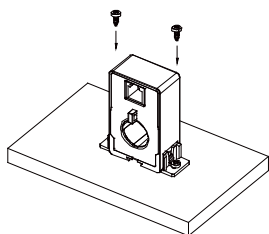
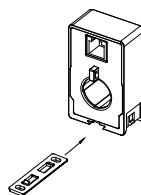
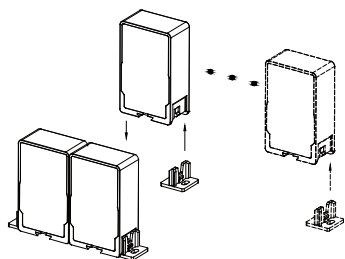
3) TU05M3K panel mounting



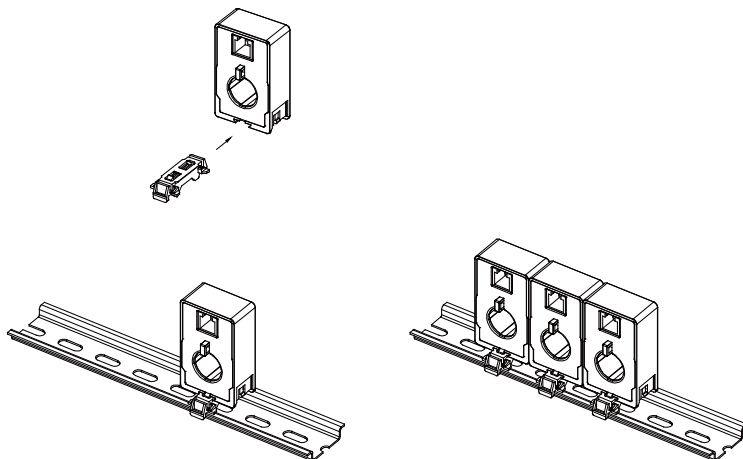
4) TU05M3K cable fixing with tie



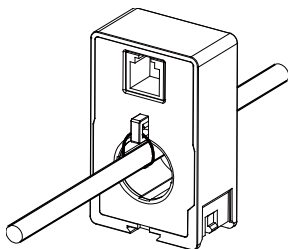
5) TU100M3K closed type transformer panel mounting



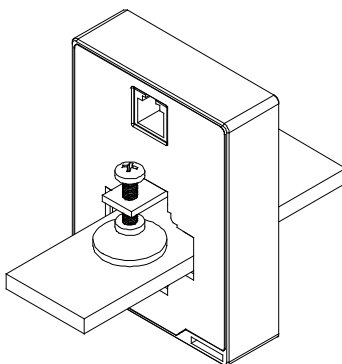
6) TU100M3K closed type transformer DIN-rail installation



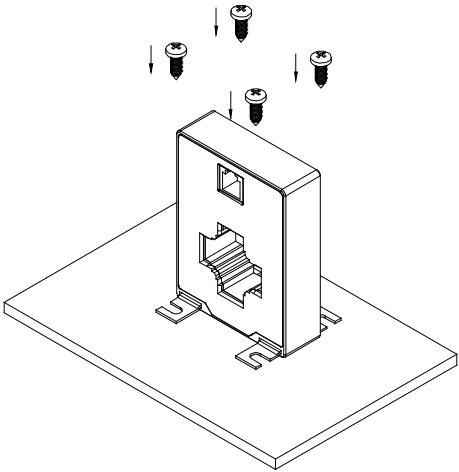
7) TU100M3K cable fixing with tie



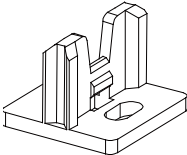
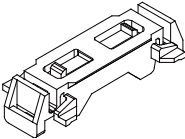
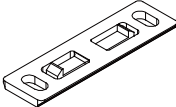
8) TU200M3K/400/600 cable fixing



9) TU200M3K/400/600 closed type transformer panel mounting



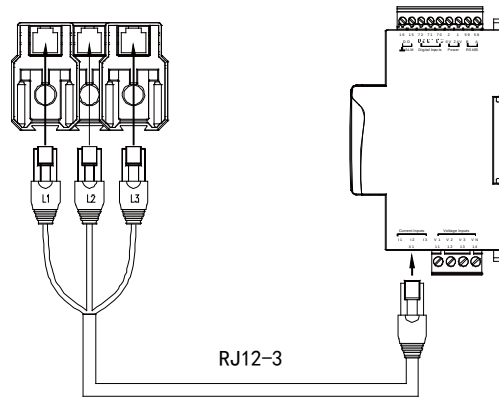
10) Installation accessory for closed type transformer

		
Expanding or fixing accessory for TU100M3K	DIN-rail installation accessory for TU100M3K/TU05M3K	Fixing accessory for TU100M3K/ TU05M3K

11) If measurement current is larger than 600A, please connect TU05M3K to the secondary side of primary current transformer.



12)Diagram for connection between measurement module and transformer



4.3.4 Open type current transformer installation

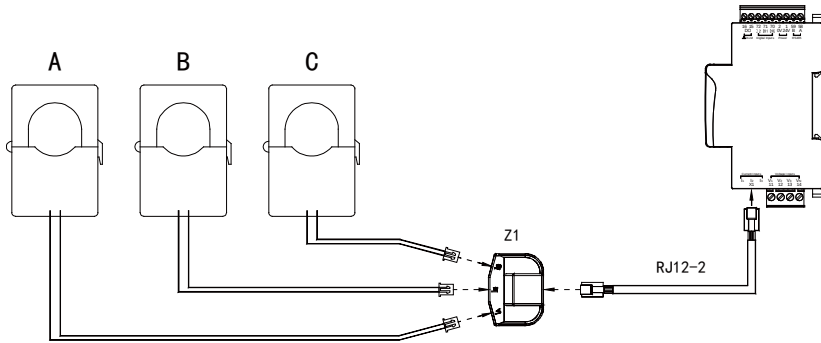
1) Connect with cable



2) TA05M3K can be connected to the secondary side of primary current transformer if it is equipped with primary current transformer.

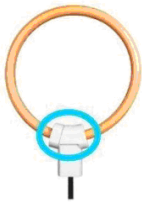


3)Diagram for connection between measurement module and transformer

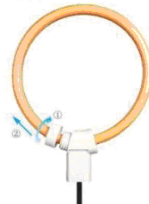


4.3.5 Flexible coil current transformer installation

1) Connect to cable



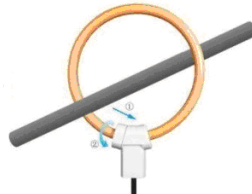
①.catch connection part;



②..loosen plastic nut;

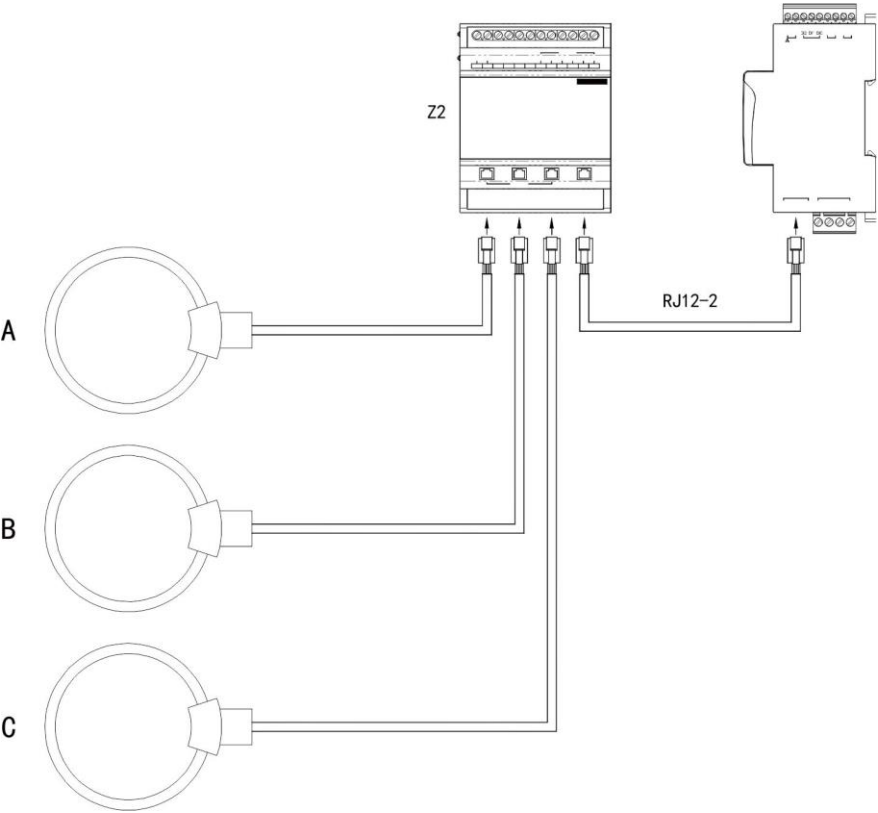


③.open connector and make it through cable;



④.insert connector and screw the nut;

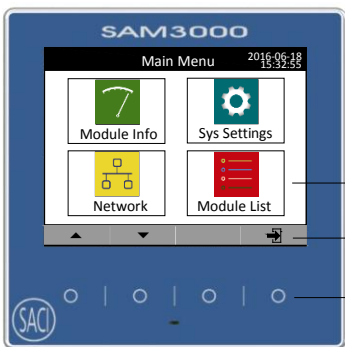
2) Diagram for connection between current transformer and measurement module



5. Operation and display

5.1 Panel description

Module	Instruction
--------	-------------

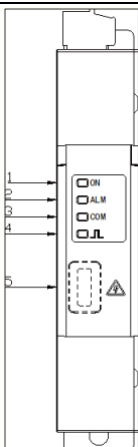


Left picture shows SAM3000-03 main display interface

A: display window

B: Indication for function of buttons

C: Touch buttons



Left picture shows SAM3000-01 indication diagram.

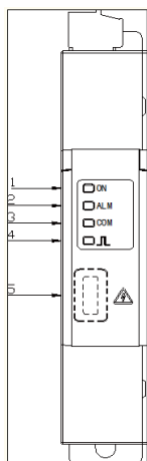
1. Power supply indication light

2. Alarm indication light

3. Communication indication light: flashing in communicating status.

4. Pulse output indication light

5. USB port: used when updating software

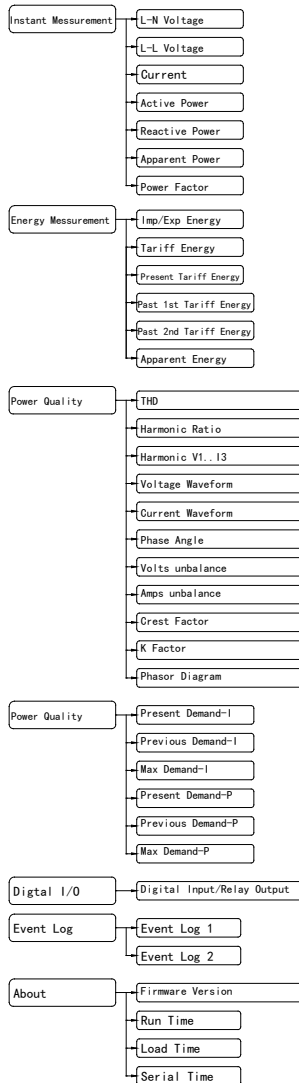


Left picture shows SAM3000-02 indication diagram

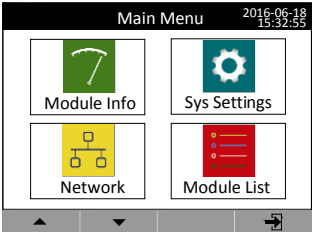
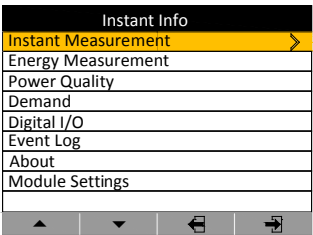
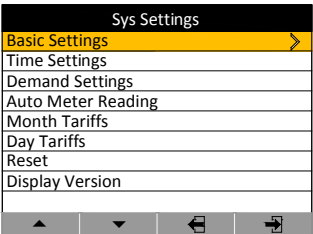
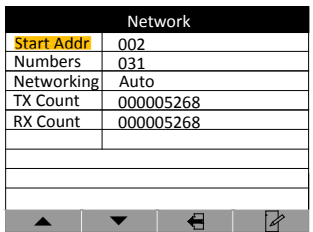
1. Power supply indication light
2. Communication 1 indication light
3. Communication 2 indication light
4. Communication 3 indication light
5. USB port

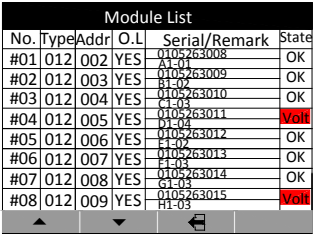
5.2 SAM3000-03 display interfaces

Measured data can be checked through SAM3000-03. The following diagram shows overview of measurement display menu.

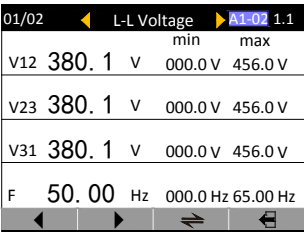


Display interfaces	Instruction
--------------------	-------------

	Left picture shows main display interface Instant Info: show measurement information; Sys Settings: set system parameters; Net settings: network configuration; Module list: I/O module information
	Left picture shows “Instant Info” display interface.
	Left picture shows “System settings” display interface. Parameters of all modules are set through radio in this interface.
	Left picture shows “Net settings” display interface.



Left picture shows on-line module information display interface.



A

B

C

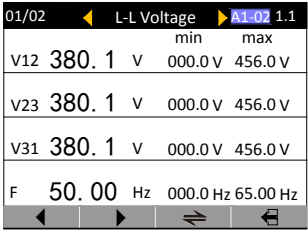
A: “01/08” indicates that there are eight modules, and the information is about first module at present; “L-L Voltage” indicates measured parameter; “A1-01” indicates the No. of module; “1.1” indicates that this interface is the first page of measurement information.

B: This part shows measured information or graphic information.

C: This part shows the functions of four buttons at present.

5.3.1 Real-time measurement

Real-time measurement interfaces show phase voltage, line voltage, phase current, phase and total active power, reactive power, apparent power, power factor and extreme values.

Display interfaces	Instruction
	Left picture shows real-time values of three line voltages and frequency. First press “” or “” to select module, second press “” to enter the display interface of the selected module. If user needs to check other modules, please press “” at first, and then press “” or “” to switch to another module. Press “” to exit

	real-time measured information display interface and return to instant measurement display interface.
--	---

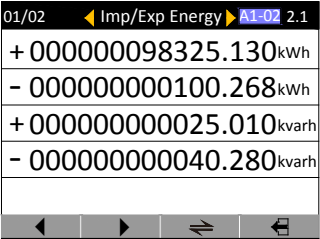
5.3.2 Energy metering

Detailed energy metering functions is as follows:

- Import/export active and reactive energy
- Tariff energy (two sets of rates in twelve time zones, four kinds of rates)
- Apparent energy

The meter shows primary value. The primary value is equal to the secondary value multiplied by voltage or current transformer ratio. Secondary value is the reference to all of the energy. The smallest energy accumulation resolution ratio of secondary value is 1Wh or 1varh. The smallest energy display resolution is 0.001kWh or 0.001kvarh.

The storage range of energy is secondary energy 4294967295 Wh, and the display range of energy is primary energy 9999999999 kWh without data overrun during normal life of meter. User can clear energy data by manual according to requirements after entering correct password

Display interfaces	Instruction
	Left picture shows bi-direction active/reactive energy. EP+= 98325.13kWh, EP- = 100.268, EQ+ = 25.01varh, EQ- = 40.28。

01/02	◀	Tariff Energy	▶	A1-02 2.2
Σ	000000014525.012kWh			
T1	000000000100.208kWh			
T2	000000003021.110kWh			
T3	000000000123.022kWh			
T4	000000000300.012kWh			
◀ ▶ ⇐ ⇨				

Left picture shows active energy in different time zones

Total active energy (Σ): 14525.012kWh

Active energy of T1: 100.208kWh

Active energy of T2: 3021.11kWh

Active energy of T3: 123.022kWh

Active energy of T4: 300.012kWh

5.3.3 Power quality

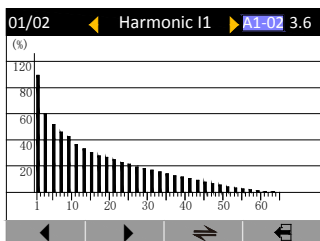
Detailed functions of power quality are as follows:

- 2nd to 63rd sub-harmonics measurement
- Voltage and current harmonics bar graph
- Voltage and current waveform
- Voltage and current phase angle
- Voltage and current sequence component
- Voltage crest factor
- Current K factor
- Voltage and current vector graph

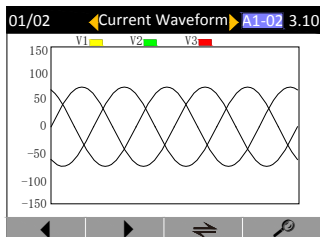
Display interfaces	Instruction																		
01/02 ◀ THD ▶ A1-02 3.1 <table><tr><td></td><td>THDU(%)</td><td>THDI(%)</td></tr><tr><td>L1</td><td>026.3</td><td>012.0</td></tr><tr><td>L2</td><td>030.1</td><td>012.3</td></tr><tr><td>L3</td><td>032.0</td><td>011.6</td></tr><tr><td colspan="3"></td></tr><tr><td colspan="3">◀ ▶ ⇄ ↶</td></tr></table>		THDU(%)	THDI(%)	L1	026.3	012.0	L2	030.1	012.3	L3	032.0	011.6				◀ ▶ ⇄ ↶			Left picture shows three-phase voltage and current THD.
	THDU(%)	THDI(%)																	
L1	026.3	012.0																	
L2	030.1	012.3																	
L3	032.0	011.6																	
◀ ▶ ⇄ ↶																			

01/02	Harmonic Ratio					A1-02 3.2
	V1	V2	V3	I1	I2	I3
01	100.0	100.0	100.0	100.0	100.0	100.0
02	000.0	000.0	000.0	000.0	000.0	000.0
03	020.0	020.0	020.0	000.0	000.0	000.0
04	000.0	000.0	000.0	000.0	000.0	000.0
05	010.0	010.0	010.0	010.0	000.0	000.0
06	000.0	000.0	000.0	000.0	000.0	000.0
07	000.0	000.0	000.0	000.0	000.0	000.0
08	000.0	000.0	000.0	000.0	000.0	000.0

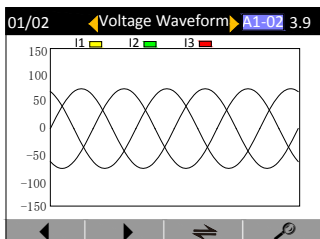
Left picture shows sub-harmonics content of three-phase voltage and current. Press “” to check other sub-harmonics content.



Left picture shows bar graph information for sub-harmonics of I1.

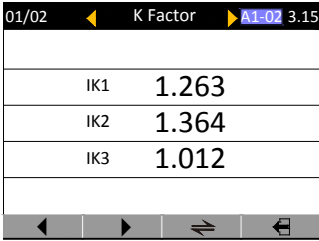
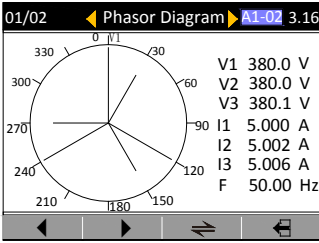


Left picture shows real-time waveform of three-phase current.



Left picture shows real-time waveform of three-phase voltage.

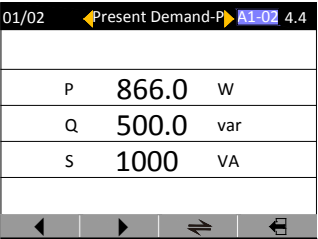
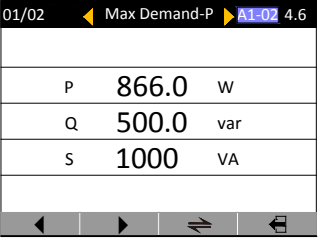
01/02 ◀ Phase Angle ▶ A1-02 3.11 <table><thead><tr><th></th><th>V</th><th>I</th></tr></thead><tbody><tr><td>L1</td><td>000.0 °</td><td>030.0 °</td></tr><tr><td>L2</td><td>120.0 °</td><td>150.0 °</td></tr><tr><td>L3</td><td>240.0 °</td><td>270.0 °</td></tr><tr><td colspan="3"></td></tr></tbody></table> ◀ ▶ ⇌ ⏮		V	I	L1	000.0 °	030.0 °	L2	120.0 °	150.0 °	L3	240.0 °	270.0 °				Left picture shows phase angle of three-phase voltage and current. Phase angle of V1 is defaulted as 0°. Phase angle of other parameters are the relative phase difference to V1.
	V	I														
L1	000.0 °	030.0 °														
L2	120.0 °	150.0 °														
L3	240.0 °	270.0 °														
01/02 ◀ Volts unbalance ▶ A1-02 3.12 <table><tbody><tr><td>Posi.Seq.component</td><td>256.3</td><td>V</td></tr><tr><td>Neg.Seq.component</td><td>173.4</td><td>V</td></tr><tr><td>Zero.Seq.component</td><td>020.3</td><td>V</td></tr><tr><td>Unbalance Factor</td><td>025.3</td><td>%</td></tr><tr><td colspan="3"></td></tr></tbody></table> ◀ ▶ ⇌ ⏮	Posi.Seq.component	256.3	V	Neg.Seq.component	173.4	V	Zero.Seq.component	020.3	V	Unbalance Factor	025.3	%				Left picture shows three-phase voltage sequence component and unbalance.
Posi.Seq.component	256.3	V														
Neg.Seq.component	173.4	V														
Zero.Seq.component	020.3	V														
Unbalance Factor	025.3	%														
01/02 ◀ Amps unbalance ▶ A1-02 3.13 <table><tbody><tr><td>Posi.Seq.component</td><td>10.25</td><td>A</td></tr><tr><td>Neg.Seq.component</td><td>6.255</td><td>A</td></tr><tr><td>Zero.Seq.component</td><td>1.287</td><td>A</td></tr><tr><td>Unbalance Factor</td><td>022.3</td><td>%</td></tr><tr><td colspan="3"></td></tr></tbody></table> ◀ ▶ ⇌ ⏮	Posi.Seq.component	10.25	A	Neg.Seq.component	6.255	A	Zero.Seq.component	1.287	A	Unbalance Factor	022.3	%				Left picture shows three-phase current sequence component and unbalance.
Posi.Seq.component	10.25	A														
Neg.Seq.component	6.255	A														
Zero.Seq.component	1.287	A														
Unbalance Factor	022.3	%														
01/02 ◀ Crest Factor ▶ A1-02 3.14 <table><tbody><tr><td colspan="2"></td></tr><tr><td>UKPR1</td><td>0.955</td></tr><tr><td>UKPR2</td><td>0.325</td></tr><tr><td>UKPR3</td><td>0.012</td></tr><tr><td colspan="2"></td></tr></tbody></table> ◀ ▶ ⇌ ⏮			UKPR1	0.955	UKPR2	0.325	UKPR3	0.012			Left picture shows crest factor of voltage.					
UKPR1	0.955															
UKPR2	0.325															
UKPR3	0.012															

 01/02 ◀ K Factor ▶ A1-02 3.15 <table border="1"> <tr><td>IK1</td><td>1.263</td></tr> <tr><td>IK2</td><td>1.364</td></tr> <tr><td>IK3</td><td>1.012</td></tr> </table> ◀ ▶ ⇌ ⏮	IK1	1.263	IK2	1.364	IK3	1.012	Left picture shows K factor of current.
IK1	1.263						
IK2	1.364						
IK3	1.012						
 01/02 ◀ Phasor Diagram ▶ A1-02 3.16 330 300 270 240 210 180 150 120 90 60 30 0 V1 380.0 V V2 380.0 V V3 380.1 V I1 5.000 A I2 5.002 A I3 5.006 A F 50.00 Hz ◀ ▶ ⇌ ⏮	Left picture shows phase angle diagram of three-phase voltage and current.						

5.3.4 Demand record

There are six separate demand record channels for measuring max. demand, present demand and demand in last period of three-phase current, total active power, total reactive power and apparent power.

Display interfaces	Instruction									
01/02 ◀ Present Demand-▶ A1-02 4.1 <table><tr><td>I1</td><td>5.000</td><td>A</td></tr><tr><td>I2</td><td>5.000</td><td>A</td></tr><tr><td>I3</td><td>5.000</td><td>A</td></tr></table> ◀ ▶ ↺ ↻	I1	5.000	A	I2	5.000	A	I3	5.000	A	Left picture shows three-phase current demand at present.
I1	5.000	A								
I2	5.000	A								
I3	5.000	A								

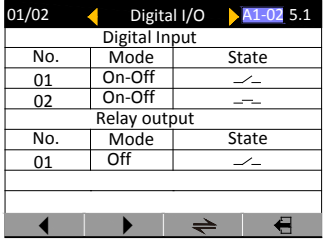
	Left picture shows last demand value of three-phase total active/reactive/apparent power.
	Left picture show max. demand value of three-phase total active/reactive/apparent power.

5.3.5 Digital input and relay output

Digital input adopts dry contact mode which is powered by power supply inside meter and is not in need for external power supply.

Digital inputs monitor the status of external switches. Meter receives status changes of contacts and shows it on screen immediately.

Meter has one relay output. There are three working modes for relay output which are energy pulse output, remote control and alarm linkage.

Display interfaces	Instruction
	Left picture shows two digital input status of No. 2 module. Second digital input is closed; work mode of relay output is off.

5.3.6 Event record

Event records include power on record, parameter modification record,

over current record and etc. with total number of times and latest occurrence time.

Display interfaces	Instruction																											
01/02 ◀ Event Log 1 ▶ A1-02 6.1 <table><tr><th>Type</th><th>Number</th><th>Last Record Time</th></tr><tr><td>Power On</td><td>0005</td><td>2016-06-04-14-33-10</td></tr><tr><td>Power Off</td><td>0005</td><td>2016-06-03-18-25-20</td></tr><tr><td>Setting</td><td>0007</td><td>2016-06-04-11-02-26</td></tr><tr><td>Clr Demand</td><td>0001</td><td>2016-06-04-14-52-35</td></tr><tr><td>Clr Energy</td><td>0001</td><td>2016-05-23-11-03-25</td></tr><tr><td>Ovr Volts</td><td>0002</td><td></td></tr><tr><td>Low Volts</td><td>0000</td><td></td></tr><tr><td>Ovr Amps</td><td>0000</td><td></td></tr></table> ◀ ▶ ⇄ ⏪	Type	Number	Last Record Time	Power On	0005	2016-06-04-14-33-10	Power Off	0005	2016-06-03-18-25-20	Setting	0007	2016-06-04-11-02-26	Clr Demand	0001	2016-06-04-14-52-35	Clr Energy	0001	2016-05-23-11-03-25	Ovr Volts	0002		Low Volts	0000		Ovr Amps	0000		Left picture shows event record information.
Type	Number	Last Record Time																										
Power On	0005	2016-06-04-14-33-10																										
Power Off	0005	2016-06-03-18-25-20																										
Setting	0007	2016-06-04-11-02-26																										
Clr Demand	0001	2016-06-04-14-52-35																										
Clr Energy	0001	2016-05-23-11-03-25																										
Ovr Volts	0002																											
Low Volts	0000																											
Ovr Amps	0000																											

6. Networking setup

6.1 Networking

Networking means to set communication connection between communication module SAM3000-02 and measurement module SAM3000-01, so as to read measured data and set parameter through communication. There are two methods of networking which are automatic networking and manual networking. These two methods can be realized through display module SAM3000-03 or “SAM3000 Commissioning Software”.

6.1.1 Automatic networking

Automatic networking means to set communication connection between SAM3000-02 and SAM3000-01 automatically.

1) Automatic networking through display module SAM3000-03.

Enter networking interface of SAM3000-03.

Select networking sign in main display interface and enter “Network”.

Input password. The initial password is 0001.

Input slave address of communication module SAM3000-02 in “Start Addr”. This address must be the same with that of communication module. The sum of slave address and module quantity in “Numbers” should not be larger than 247. Module quantity should not be larger than 32.

After setting “Start Addr”, select and confirm “Auto” to start networking. Re networking should be done after adding or reducing measurement module SAM3000-01.

When automatic networking is finished, on-line module information can be checked in “Module List” interface. In “State” column, “OK” indicates measured information is normal; if it shows letters with red backlight, it means corresponding measured information is

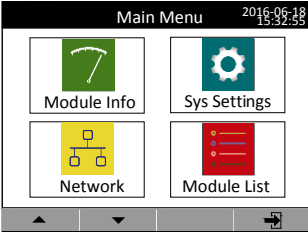
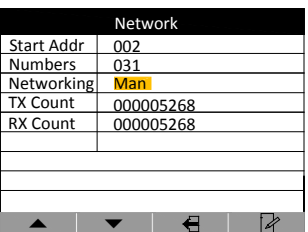
	abnormal. The letters are as follows: “Volt” indicates abnormal voltage; “Phas” indicates abnormal phase angle; “Freq” indicates abnormal frequency. Please check measured information according to these indication letters.
--	--

6.1.2 Manual networking

Manual networking means to set communication connection between SAM3000-02 and SAM3000-01 by manual.

1) Manual networking through display module SAM3000-03.

Connect SAM3000-01 and SAM3000-02 with communication line. Enter networking interface of SAM3000-03.

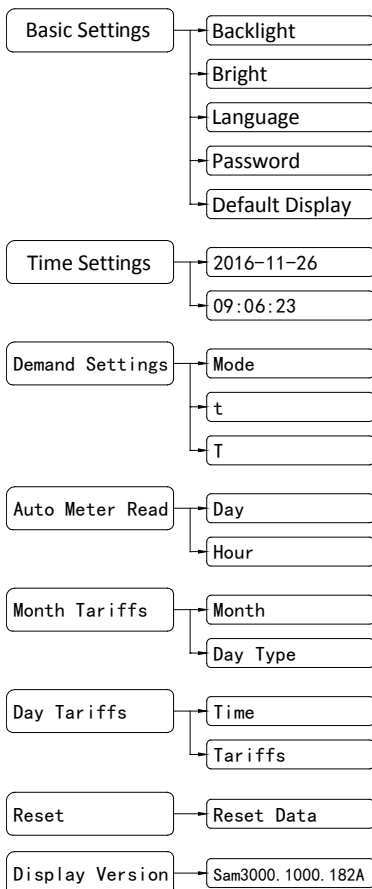
	Select networking sign in main display interface and enter “Network”.
	The same process as before but select “Man” in Networking.

6.2 Menu

Parameter setting includes system setting and parameter setting: System setting adopts radio setting mode. Modified parameters are effective for all monitoring modules SAM3000-01. Parameter setting adopts separate setting mode. Modified parameters are only effective for selected monitoring module.

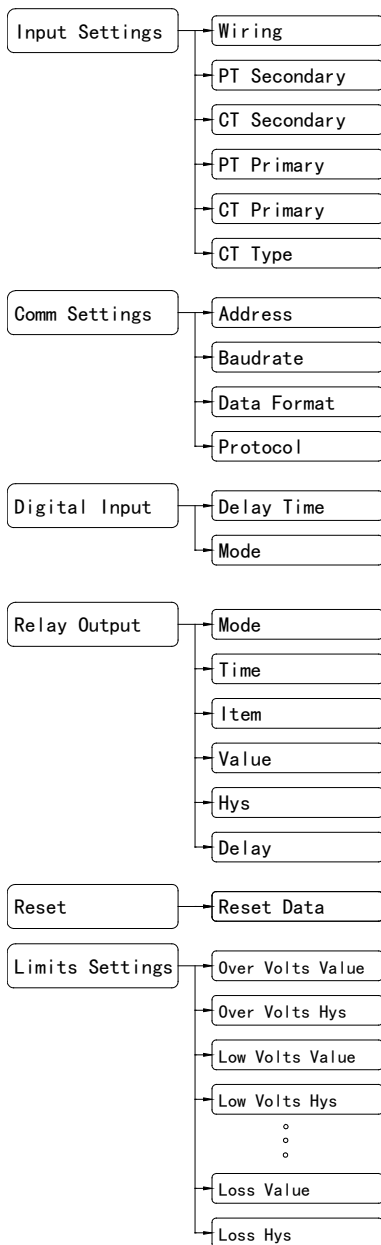
Programming menu adopts hierarchical structure. Main structure is shown as follows,

1)In main interface, press “▲” or “▼” to select “Sys settings”, press “Enter” to enter system setting mode, and then input programming password to set system parameters. (Defaulted password is 0001. User can change it.).



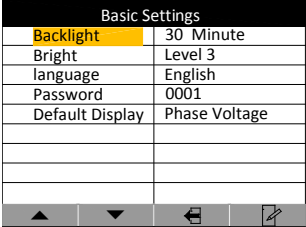
2)In main interface, press “▲” or “▼” to select “Instant Info—Instant Measurement”, press “→” to enter parameter setting mode, and then input programming password to set programming parameters.

(Defaulted password is 0001. User can change it.).

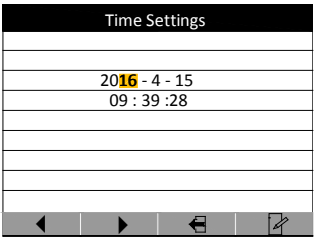


6.3 Setting item

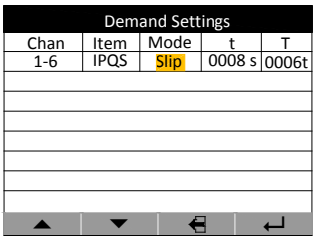
6.3.1 Basic setting

	Backlight control	00-99 minutes 00- normal on
	Backlight brightness degree	Level 1 ~level 5
	Language	Español/English
	Password	0001-9999
	First display interface after power on	First display interface after power on can be set as U, I, P, En, THD.

6.3.2 Time setting

	To set date and time
--	----------------------

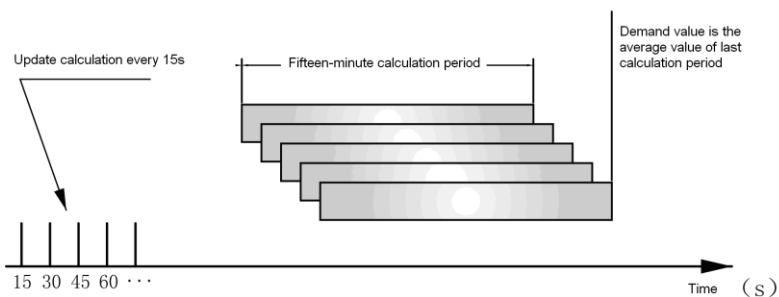
6.3.3 Demand setting

	Channel	1-6
	Item	I1,I2,I3,P,Q,S
	Mode	slip/fixed
	Calculation updating time	t
	Time zone	T=n*t, n:

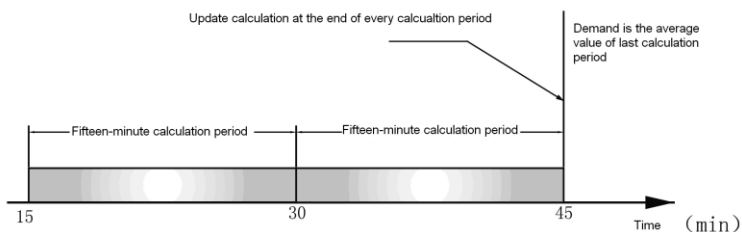
There are two demand measurement modes which are slip and fixed. The relative time parameters are set as t (updating time) and T (time zone). T is integral multiple of t .

Slip: meter calculates average demand during latest T minutes every t seconds, tests and records the value, automatically reads the demand every month;

Fixed: meter calculates average demand during latest T minutes after T minutes, tests and records the value, automatically reads the demand every month.



Slip mode



Fixed mode

Note: calculation method in upper pictures takes 15min as example.

6.3.4 Automatic meter reading setup

Auto Meter Reading	
Monthly	00 Day 00 Hour
◀	▶ ◀ ▶ ↻

Specify meter reading time. This time should be a sharp time in one day.

6.3.5 Monthly tariffs setup

Month Tariffs			
Month	Day Type	Month	Day Type
01	#1	07	#1
02	#2	08	#2
03	#1	09	#1
04	#2	10	#2
05	#1	11	#1
06	#2	12	#2
▲	▼	◀	▶ ↻

There are two sets of daily tariffs. Energy metering in a month can be specified to follow one set of daily tariffs. Daily tariffs can be set on daily tariff interface.

6.3.6 Daily tariff setup

#1 Day Tariffs					
NO	Time	Tariffs	NO	Time	Tariffs
01	00:00	T1	07	00:00	T1
02	00:00	T1	08	00:00	T1
03	00:00	T1	09	00:00	T1
04	00:00	T1	10	00:00	T1
05	00:00	T1	11	00:00	T1
06	00:00	T1	12	00:00	T1
◀	▶	◀	▶	↻	↻

There are two sets of daily tariffs. 24 hours in a day are divided into twelve time zones. Four kinds of rates can be set for each time zone.

6.3.7 Synchronous clearing setup

6.3.8 Input signal setup

<table><tr><th colspan="2">Input Settings</th></tr><tr><td>Wiring</td><td>3P4W</td></tr><tr><td>PT Secondary</td><td>0380 V</td></tr><tr><td>PT Primary</td><td>0000380V</td></tr><tr><td>CT Primary</td><td>0000005V</td></tr><tr><td>CT Type</td><td>Closed</td></tr><tr><td colspan="2"></td></tr><tr><td colspan="2"> ◀ ▶ ↶ ↷ </td></tr></table>		Input Settings		Wiring	3P4W	PT Secondary	0380 V	PT Primary	0000380V	CT Primary	0000005V	CT Type	Closed			◀ ▶ ↶ ↷		<table><tr><td>Wiring mode</td><td>3P3W,3P4W</td></tr><tr><td>PT Secondary</td><td>0-690V</td></tr><tr><td>CT Secondary</td><td>0-6A</td></tr><tr><td>PT Primary</td><td>0-999999V</td></tr><tr><td>CT Primary</td><td>0-999999A</td></tr><tr><td>Current transformer type (CT Type)</td><td>Closed type, open type, flexible coil type</td></tr></table>	Wiring mode	3P3W,3P4W	PT Secondary	0-690V	CT Secondary	0-6A	PT Primary	0-999999V	CT Primary	0-999999A	Current transformer type (CT Type)	Closed type, open type, flexible coil type
Input Settings																														
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Current transformer type (CT Type)	Closed type, open type, flexible coil type																													

6.3.9 Communication setup

Comm Settings Address 002 Baudrate 19200 bps Data Format N.8.1 Protocol Modbus-RTU				Slave address (Slave Addr)	1-247
				Baud rate (Baudrate)	19200bps
				Data format (Data format)	E81,O81,N81,N82
				protocol (Comm protocol)	Modbus-RTU

6.3.10 Relay output setup

Relay Output Settings <table border="1"> <thead> <tr> <th>Channel</th><th>Mode</th></tr> </thead> <tbody> <tr> <td>01</td><td>Alarm</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> ▲ ▼ ◀ ▶	Channel	Mode	01	Alarm															Relay output has three kinds of working modes: ◆ active energy pulse output; ◆ remote control, control open and closed actions of relay through communication; ◆ alarm linkage, relay acts when the measured value is beyond a certain threshold value
Channel	Mode																		
01	Alarm																		
Relay Output Settings <table border="1"> <tbody> <tr> <td>Time</td><td>00.00 s</td></tr> <tr> <td>Item</td><td>UIn ></td></tr> <tr> <td>Value</td><td>00456.0 V</td></tr> <tr> <td>Hys</td><td>00000.5 V</td></tr> <tr> <td>Delay</td><td>01.00 s</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> ▲ ▼ ◀ ▶	Time	00.00 s	Item	UIn >	Value	00456.0 V	Hys	00000.5 V	Delay	01.00 s									Alarm linkage If pulse width is “00.00”, it works in electrical level mode; otherwise, it works in pulse output mode. Please refer to alarm item list table for more information.
Time	00.00 s																		
Item	UIn >																		
Value	00456.0 V																		
Hys	00000.5 V																		
Delay	01.00 s																		
Relay Output Settings <table border="1"> <tbody> <tr> <td>Time</td><td>00.00 s</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> ▲ ▼ ◀ ▶	Time	00.00 s															Remote control through communication If pulse width is “00.00”, it works in electrical level mode; otherwise, it works in pulse output mode.		
Time	00.00 s																		

Alarm item list table

Item	Format	Instruction	Item	Format	Instruction
DI2-0	0	Linkage when No. 2 digital input is 0	Q <	xxxx var	Low total reactive power alarm
DI2-1	1	Linkage when No. 2 digital input is 1	Q >		High total reactive power alarm
DI1-0	0	Linkage when No. 1 digital input is 0	P <	xxxx W	Low total active power alarm
DI1-1	1	Linkage when No. 1 digital input is 1	P >		High total active power alarm
THDi <	xx.xx%	Low current THD alarm	F <	xx.xx Hz	Low grid frequency alarm
THDi >		High current THD alarm	F >		High grid frequency alarm
THDu <	xx.xx%	Low voltage THD alarm	I <	x.xxx A	Low phase current alarm (any phase current)
THDu >		High voltage THD alarm	I >		High phase current alarm (any phase current)
PF <	x.xxx	Low total power factor alarm	Ull <	xxx.x V	Low line voltage alarm (any line voltage)
PF >		High total power factor alarm	Ull >		High line voltage alarm (any line voltage)
S <	xxxx	Low total apparent power alarm	Uln <	xxx.x V	Low phase voltage alarm (any phase voltage)
S >	VA	High total apparent power alarm	Uln >		High phase voltage alarm (any phase voltage)

Note: Off-limit alarm value of voltage, current or power is based on primary value.

6.3.11 Clear record

Reset		
Reset Energy		☐
Reset Demand		☐
Reset Max/Min		☐
Reset SystemEvent		☐
Reset SoE		☐
Reset Alarm		☐

Select an item, and then press Enter to clear corresponding record.

6.3.12 Limit value setup

Limits #1	
Over Volts Value	000000.0 V
Over Volts Hys	000000.0 V
Low Volts Value	000000.0 V
Low Volts Hys	000000.0 V
Over Amps Value	000000.000 A
Over Amps Hys	000000.000 A
Low Amps Value	000000.000 A
Low Amps Hys	000000.000 A
▲▼↶↷	

Set limit value of voltage and current

Limits #2	
Over Power Value	000000.000 kW
Over Power Hys	000000.000 kW
Low Power Value	000000.000 kW
Low Power Hys	000000.000 kW
▲▼↶↷	

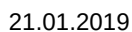
Set limit value of power.

Limits #3	
Swell Value	000000.0 V
Swell Hys	000000.0 V
Sag Value	000000.0 V
Sag Hys	000000.0 V
Loss Value	000000.0 V
Loss Hys	000000.0 V
▲▼↶↷	

Set limit value of voltage swell, voltage sag and voltage interruption.

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7. Technical specification

7.1 SAM3000-01 measurement module

Working environment	
Working temperature	-20°C-70°C
Storage temperature	-40°C-85°C
Relative humidity	≤95%RH, no condensation
Working altitude	≤2500m
Protection	IP20
Insulation	Signal, power supply and output terminal to case resistance>100MΩ
Withstand voltage	≥2kV
EMC	
Immunity to electrostatic discharge	IEC 61000-4-2-Level III
Immunity to radio-frequency field	IEC 61000-4-3- Level III
Immunity to electrical fast transients/bursts	IEC 61000-4-4- Level IV
Immunity to impulse waves	IEC 61000-4-5- Level IV
Immunity to conducted disturbances	IEC 61000-4-6- Level III
Immunity to power frequency magnetic fields	IEC 61000-4-8- Level III
Immunity to voltage dips and short interruptions	IEC 61000-4-11- Level III
Working power supply	
Rated range	DC:24V±20%
Power consumption	≤0.5W
Voltage input	

Range	3×220V/380V
Resolution	0.1 V
Impedance	≥1.7 MΩ/phase
Power consumption	≤0.1 VA /phase
Over voltage	Continuous 1.2Un, instantaneous: 2Un/10s
Frequency	45-65 Hz
Current input	
Range	External current transformer, please refer to 7.5 current transformer
Relay output	
Type	Solid state relay
Capacity	AC: 0.12A/280V; DC:0.12A/400V
Isolation voltage	5000 V AC
Action time	2ms max
Release time	1ms max
Pulse output width	80ms±20%
Energy pulse frequency	≤10Hz
Digital input	
Sensitivity	DC12V power supply, closed ≤10kΩ, open ≥15kΩ
Isolation voltage	4000 V AC
Scanning time	1 ms
Filtering time	30 ms
Communication interface	
Physical interface	RS485
Communication speed	19200bps at most
Communication protocol	Modbus-RTU
Isolation voltage	4000 V AC

7.2 SAM3000-02 communication module

Working environment	
Storage temperature	-40°C-85°C
Relative humidity	≤95%RH, no condensation
Working altitude	≤2500m
Protection	IP20
Insulation	Signal, power supply and output terminal to case resistance>100MΩ
Working power supply	
Rated range	DC 24V
Power consumption	≤0.5W
Communication interface	
Communication interface 1	Detachable screw terminal, connect to SAM3000-01
Communication interface 2	RJ12, connect to host computer
Communication interface 3	Detachable screw terminal, connect to SAM3000-03
Physical interface	RS485
Communication speed	9600bps at most
Communication protocol	Modbus-RTU
Isolation voltage	2500 V AC
Real-time clock	
Error	≤0.5s/day

7.3 SAM3000-03 Display module

Parameter	Specification
Connection	RJ12 cable, connect to communication module SAM3000-02
Display	3.5" TFT LCD, resolution 320×240, 16700 colors
Button	4 capacitive touch buttons, backlight

Breathing light	Working frequency 1Hz when backlight is off, working frequency 2Hz when alarm.
Protection	Front case IP67
Working temperature	-20-70°C
Storage temperature	-30-80°C
Relative humidity	≤95%RH (no condensation)
Working range	(24±20%)VDC
Power consumption	≤2W

7.4 SAM3000-04 power supply module

Parameter	Specification
Input voltage	AC/DC: 80V-270V
Output voltage	DC: 24V
Output power	≤20W
Accuracy	±1%
Efficiency	≥75%
Withstand voltage	2000V AC

7.5 Current transformer

Closed type current transformer

Model	Parameter	Specification
TU05M3K	Rated value	5A
	Max. value	10A
	Accuracy	0.1%
	Isolation voltage	4000V AC
	Working temperature	-40-70° C
	Storage temperature	-40-85° C
	Accessory	RJ12-3
TU100M3K	Rated value	100A

	Max. value	120A
	Accuracy	0.1%
	Isolation voltage	4000V AC
	Working temperature	-40-70° C
	Storage temperature	-40-85° C
	Accessory	RJ12-3
TU200M3K	Rated value	200A
	Max. value	240A
	Accuracy	0.1%
	Isolation voltage	4000V AC
	Working temperature	-40-70° C
	Storage temperature	-40-70° C
TU400M3K	Accessory	RJ12-3
	Rated value	400A
	Max. value	480A
	Accuracy	0.1%
	Isolation voltage	4000V AC
	Working temperature	-40-70° C
TU600M3K	Storage temperature	-40-85° C
	Accessory	RJ12-3
	Rated value	600A
	Max. value	720A
	Accuracy	0.1%
	Isolation voltage	4000V AC
	Working temperature	-40-70° C
	Storage temperature	-40-85° C
	Accessory	RJ12-3

Open type current transformer

Model	Parameter	Specification
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TA05M3K	Rated value	5A
	Max. value	6A
	Accuracy	1%
	Isolation voltage	4000V AC
	Working temperature	-10°C-50°C
	Storage temperature	-20°C-70°C
	Accessory	SAM3000-05+RJ12-2
TA100M3K	Rated value	100A
	Max. value	120A
	Accuracy	0.5%
	Isolation voltage	4000V AC
	Working temperature	-10°C-50°C
	Storage temperature	-20°C-70°C
	Accessory	SAM3000-05+RJ12-2
TA200M3K	Rated value	200A
	Max. value	240A
	Accuracy	0.5%
	Isolation voltage	4000V AC
	Working temperature	-10°C-50°C
	Storage temperature	-20°C-70°C
	Accessory	SAM3000-05+RJ12-2
TA400M3K	Rated value	400A
	Max. value	480A
	Accuracy	0.5%
	Isolation voltage	4000V AC
	Working temperature	-10°C-50°C
	Storage temperature	-20°C-70°C
	Accessory	SAM3000-05+RJ12-2
TA600M3K	Rated value	600A

	Max. value	660A
	Accuracy	0.5%
	Isolation voltage	4000V AC
	Working temperature	-10°C-50°C
	Storage temperature	-20°C-70°C
	Accessory	SAM3000-05+RJ12-2

Flexible coil current transformer

Model	Parameter	Specification
RC600F3K	Rated value	600A
	Range	60-720A
	Accuracy	1%
	Lead length	2m
	Working temperature	-20°C-70°C
	Storage temperature	-30°C-90°C
	Accessory	SAM3000-06+RJ12-2
RC1000F3K	Rated value	1000A
	Range	100-1200A
	Accuracy	1%
	Lead length	2m
	Working temperature	-20°C-70°C
	Storage temperature	-30°C-90°C
	Accessory	SAM3000-06+RJ12-2
RC2000F3K	Rated value	2000A
	Range	200-2400A
	Accuracy	1%
	Lead length	2m

	Working temperature	-20°C-70°C
	Storage temperature	-30°C-90°C
	Accessory	SAM3000-06+RJ12-2
RC3000F3K	Rated value	3000A
	Range	300-3600A
	Accuracy	1%
	Lead length	2m
	Working temperature	-20°C-70°C
	Storage temperature	-30°C-90°C
	Accessory	SAM3000-06+RJ12-2

The information in this document is subject to change without further notice.