

BlueStar

**IEC 60687
IEC 1107**

A1000 Multifunction Meter

*Product Description
Operating Instructions
Features and Technical Data
Maintenance Instructions
Diagrams and Figures*

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1. Features and Applications

Blue Star's A1000 multifunction meter meets the IEC 60687 (class 0.5S) standard for multifunction energy meters. The main features of A1000 include none physical adjustment components, digital signal processing, digital filters, digital error correction, digital calibration, immunity to temperature fluctuation, and excellent stability. Due to its 12 times overload multiplier, A1000 can record energy usage of extreme low load. Its accurate measurements of voltage, current, power factors, and power can replace a series of indicating instruments and transmitters.

The basic functions of A1000 include data processing units of active bidirectional (import and export) energy and reactive four-quadrant energy, maximum demand indications and other related functions.

Data can be retrieved through energy registering system, which consists of load-control terminal or other data terminal devices via RS232 or RS485 interface. The communication protocol complies with IEC 1107.

Infrared communication protocol complies with IEC1107 too.

A1000 Meter data processing functions include:

1.1 Energy Metering

1. Energy measurement using digital measuring chips, therefore metering precision can be digitally verified.
2. High overload-multiplier energy metering (12 times multiplier metering for class 0.5S) by applying variable gain measurement and multi-section digital compensation.
3. Active import and export energy, reactive 4-quadrant energy, and apparent energy metering through data provided by energy measuring integrated chips.
4. 4-Tariffs and total energy metering of active import and export energy, reactive 4-quadrant energy, and apparent energy.
5. Energy metering ranges from 0 - 99999.99 kwh/kvarh or 0 – 999999.9 kwh/kvarh.

4 Channels of pulse outputs are available to other devices. The pulse width is 80 ms. The first channel of pulse output is active import energy, second channel of pulse output is active export energy, third channel of pulse output is reactive energy Q1 and Q2 (first quadrant and second quadrant), fourth channel of pulse output is reactive energy Q3 and Q4 (third quadrant and fourth quadrant).

6. Pulse indication of energy metering using two bright LED's, which indicate active energy on the left and reactive energy on the right. The duty cycle of LED output is 50%.

1.2 Demand Indicating

1. Calculating functions of active import and export energy, reactive four-quadrant 4-tariff demands include total 30 demand data with the occurrence time of each demand data. The format of time stamp is “month, date, hour, minute”. The indication range of energy demand (including power) is 0 - 99.9999 kW/kvar.
2. Calculating mode can be Block or Rolling. Rolling Mode: Rolling interval can be set to 1, 2, 3, or 5 minutes and demand cycle can be set to 5, 10, 15, 30, or 60 minutes. If demand cycle is set to 60 minutes, rolling interval can only be set to 2, 3, or 5 minutes. Demand cycle must be integer multiple of rolling interval.
Block Mode: demand cycle can be set to 5, 10, 15, 30, or 60 minutes.
3. Each average power of demand cycle is calculated and recorded, which can be displayed or read through load profile.
4. Total demand is not affected when time block is changed, but a rolling interval before the change will be skipped when calculating tariff demand. The recording will start from zero by eliminating the previous rolling interval. In general, total demand equals a certain tariff demand. But sometimes total demand may exceed all the demand combined. In other words, the maximum demand is recorded when time block is being changed.

1.3 Indication of voltage, current, power factors and power

1. Voltage, current and power factors can be displayed on LCD.
2. Active instantaneous power (ABC total), reactive instantaneous power (ABC total) per second can be read through RS485 or infrared port.
3. Average power of intervals 1, 2, 3, or 5 minutes set by users can be displayed on LCD. Because these data are obtained using demand calculation, there is no need to set up demand interval in rolling mode. However, in block mode, time of power calculation should be set independently as 1, 2, 3, or 5 minutes. If demand interval is set to 60 minutes, then time of power calculation can only be set to 2, 3, or 5 minutes. But demand interval must be integer multiple of power calculation time.
4. Average power factors of rolling window interval and demand interval can display on LCD.
5. Indication of Voltage Loss: when one phase is losing voltage, the voltage of the current phase will be displayed continuously at the lower part of LCD and the corresponding phase letter will flash.
6. Indication of Overload: when meter is overloaded, the current of three phases will be displayed continuously at lower part of LCD, and string “ABC” will flash.

1.4 Time of Use (TOU) Revenue

1. TOU can be controlled by configuring the parameters that are based on the meter’s internal hardware real-time clock.

2. There are 3 levels of TOU controls, in preferential sequence, they are: “Public Holiday”, “Weekend” and “Season”.
3. There are 4 sets of “daily-profile” tables and 4 controlling schemes for fixed tariffs. In each “daily-profile” table, one day can be divided into 10 time sections and each time section can be assigned one of 4 tariffs. Time section of weekend and season can be controlled by selecting one of 4 “daily-profile” tables. In order to save time section table resources, when it is possible to set a fixed tariff for a certain day (i.e. there is no time block switch in that day), user can directly select tariffs when setting tariff for weekends and seasons without using a whole time block table.
4. TOU can set 10 years of holiday tables for public holidays, and each year may set 24 days for public holidays.
5. Weekend TOU can have up to 2 days as weekends for each week.
6. A year can be divided into up to 10 time sections. The shortest section is one day and the longest section one year.
7. “Daily-profile” can divide a day into 10 time sections. Each section can select one of 4 tariffs. The shortest time is one minute, and the longest one day.
8. When setting daily-profile table and season in handheld terminal, user should not input other data after inputting the initial number and tariff (time-section table) of the last time section. User must end input with a “confirmation” command. Program will automatically connect the “end” of the last time section with the “head” of the first time section to ensure that uncertain time section will not occur in one day (or one year).
9. There are 4 sets of daily-profile and 4 fixed tariffs. “Public holiday”, “Weekend” and “Season” can be controlled by selecting one of 4 daily-profiles.

1.5 Automatic Meter Reading

1. A1000 meter can be configured to record dynamic data at a pre-selected time to achieve the tasks of energy storing and demand reset automatically. The time is specified by ‘day/date’ and ‘hour’.
2. The automatic meter reading cycle is month. The date of automatic meter reading can be set as non-zero value, namely date XX hour XX. Meter-reading date can be chosen from 1 to 28.
3. Automatic meter reading can be configured to execute energy recording and demand reset, 16 energy and demand data can be recorded.

1.6 Load profile recording

1. A1000 meter provides scrolling recording function for selected data according to time intervals set by user. Data sampling interval is 15 minutes. There are six data samplings: active import energy, active export energy, reactive Q1 energy, reactive Q2 energy, reactive Q3 energy, and reactive Q4 energy.

2. There are total 128K bytes of storage space for “load profile recording”. Data recording uses ring mode.

1.7 Data displaying

1. The above energy and demand data can be displayed on graphic matrix LCD. Data are displayed with matrix English letters up to 12.4 mm high.
2. One row of monitoring display of voltage and current is added at the bottom of LCD, which can display voltage, current, power factors of ABC phases and total power factors in real time so that user can monitor running status of meter or power network.

1.8 Inputs and outputs

1. Passive pulse output interface with optical-coupling insulation.
2. Data output interface (RS485 port) with optical-coupling insulation.
3. Infrared remote control programming and meter reading interface, which is in accordance with IEC1107.

2. Operation Instructions

2.1 Running and display

2.1.1 Operation

There are 2 modes after data processing unit powers up:

1. Running Mode: In this mode, A1000 meter can perform TOU metering, demand calculating and load monitoring, and automatically display data at given time as programmed.
2. Programming mode: A1000 will switch to this mode after holding reset button for 8 seconds. In this mode, LCD will display message “PRG”. It will only process energy counting, demand calculating and time-section switch only without handling other functions such as timing display or load monitoring. A1000 will exit from this mode when reset button is pushed again, or exit automatically if no button was pushed for 4 minutes.

When data processing unit is running, LED will flash once an effective energy pulse is registered, no matter which mode it is in.

2.1.2 Data display

1. There are 3 types of data display modes:
 - 1) Timing display: user can choose from 4 types of time intervals. The display is automatic and can be used for routine monitoring.
 - 2) Sequential display: A1000 can display certain data sequentially once display button is pushed. This is used in manual meter reading.
 - 3) Inquiry display: User may continuously push button until the needed data is displayed. This can be used to check records in the meter.

Detailed descriptions of three types of data display modes are as following:

- 1) Timing display: This mode is effective once programmed. If the display interval is set to 15 minutes, A1000 will display data at minute of 0, 5, 15, 30 or 45 hourly. It stops automatically after all specified data have been displayed. Display time for each piece of data can be set independently from 1 to 99 seconds. If it needs more time to display all the data within one interval, meter will skip one display and will display the data at the next display time.

Continuous display is a special form of timing display. In this mode, display will not stop after it finishes one sequence of display. Instead, it will start from the beginning again. If display is interrupted due to reset or other operations, it resumes after 5 minutes maximum.
- 2) Sequential display: A1000 will switch to this mode when it is not doing timing display or user pushes display button during the timing display. Display data can be set independently and will be displayed from the very beginning. Display stops after specified data have been displayed.
- 3) Inquiry display: A1000 will switch to this mode once display button is

pushed again in Sequential Display Mode. In this mode, display time of each data item extends 60 times longer. For example, if original display time is set as 8 seconds for each data, display time for the same data extends to 8 minutes. Next data will be displayed once display button is pushed again. If display button is not pushed throughout the period when a data is being displayed, meter will automatically switch to Sequential Display Mode after data display finishes and will continue display of next data.

2. Configuring display data

Due to the large amount of data available, some data can be configured to skip if not interested in order to set the display intuitively and precisely. The configuration can be set through RS485 interface, or infrared port using handheld terminals (PR200 or PR300).

All available data are listed in PC's program, from which user can select which data to display. Once user selects a data, he can select in which of the 3 modes to display this data and set the display time.

If selected data is historical type such as historical energy data, user can choose from which one to which one to display. User can use this function to display all 16 historical data. Date and time of demand reset can be displayed in historical mode. Date and time of last 16 demand reset can also be displayed in this way.

After setting up display data, user should select continuous display or timing display, and the interval of the timing display.

Display order matches with the sequence in which user selects the data. In other words, user can set data display order arbitrarily.

3. Display Explanation

- 1) Symbol "☒" indicates that internal backup battery should be replaced.
- 2) English letter "A", "B", "and C" represent phase A, phase B, and phase C, respectively, when voltage, current and power factor are being displayed. Symbol $A+\Phi$, $B+\Phi$, and $C+\Phi$ represent power factors of phase A, phase B and phase C respectively. Sole symbol Φ represents total power factor.
- 3) When string "RX" flashes, it means that data are being received. When string "TX" flashes, it means that data are being sent.
- 4) The arrow on the right side of text "Watt" indicates the direction of present active energy. The arrow on the right side of text "var" indicates the direction of present reactive energy.
- 5) Symbol "🔒" indicates meter is in level 2 programming protection mode.
- 6) Message "err 1" indicates warning information; "err 2" means error information.
- 7) Explanations of display codes:

Display Type	Meter Display	Display Content Explain
01 Meter NO. User NO.	011 L	Meter NO. Low 6 digit
	011 H	Meter NO. High 6 digit
	012 L	User NO. Low 6 digit
	012 H	User NO. High 6 digit
	013 L	Device NO. Low 6 digit
	013 H	Device NO. High 6 digit
	014 L	Bureau NO. Low 6 digit
	014 H	Bureau NO. High 6 digit
02 Week	020	Week
Date and Time	Date	Year Month Day or Month Day Year
	Time	Hour Minute Second
Meter Constant	imp/kWh	Active Energy Constant
	imp/kvarh	Reactive Energy Constant
03 Reset and Program	030 Date 0 Num Storage	Date of Latest Reset (Year Month Day)
	030 Time 1 Num Storage	Time of Latest One Reset (Hour Minute Second)
	031	Cumulative Number of Reset
	032 Date 0 Num Storage	Date Latest Programmed (Year Month Day)
	032 Time 1 Num Storage	Time Latest – 1 Programmed (Hour Minute Second)
	033	Cumulative Number of Program
	034	Programmer NO
	035	Over Current Event Count
	036	Reverse Run Event Count
	037	Power Down Count
038	Cumulative Power Down Duration	
04 Instantaneous Active Power	04A	Phase A Instantaneous Active Power (kW)
	04B	Phase B Instantaneous Active Power (kW)
	04C	Phase C Instantaneous Active Power (kW)
	040	Instantaneous Total Active Power (kW)
04 Instantaneous Reactive Power	04A	Phase A Instantaneous Reactive Power (kvar)
	04B	Phase B Instantaneous Reactive Power (kvar)
	04C	Phase C Instantaneous Reactive Power (kvar)
	040	Instantaneous Total Reactive Power (kvar)
04 Instantaneous Apparent Power	04A	Phase A Instantaneous Apparent Power (kVA)
	04B	Phase B Instantaneous Apparent Power (kVA)
	04C	Phase C Instantaneous Apparent Power (kVA)
	040	Instantaneous Total Apparent Power (kVA)
05 Average Power	051	Average active power of rolling window

		interval (kW)
	052	Average active power of demand interval (kW)
	051	Average reactive power of slide window interval (kvar)
	052	Average reactive power of demand interval (kvar)
06 Frequency of phase A	060	Frequency of phase A
07 Power factor	071	Average power factor of rolling window interval
	072	Average power factor of demand interval
Current Active Energy	→1 Energy	Current Rate 1 Import Energy (kWh)
	→2 Energy	Current Rate 2 Import Energy (kWh)
	→3 Energy	Current Rate 3 Import Energy (kWh)
	→4 Energy	Current Rate 4 Import Energy (kWh)
	→0 Energy	Current Total Import Energy (kWh)
	←1 Energy	Current Rate 1 Export Energy (kWh)
	←2 Energy	Current Rate 2 Export Energy (kWh)
	←3 Energy	Current Rate 3 Export Energy (kWh)
	←4 Energy	Current Rate 4 Export Energy (kWh)
	←0 Energy	Current Total Export Energy (kWh)
Current Active Demand (Total, Rate1-4)	→0 Demand	Current Total Import Demand (kW)
	→0 Demand Time	Current Total Import Demand Time (Month Day Hour Minute)
	←0 Demand	Current Total Export Demand (kW)
	←0 Demand Time	Current Total Export Demand Time (Month Day Hour Minute)
Historical Active Energy (Total, Rate1-4)	→0 Energy 0 Num Storage	Historical 1 Total Import Energy (kWh)
	←0 Energy 1 Num Storage	Historical 2 Total Export Energy (kWh)
Historical Active Demand (Total, Rate1-4)	→0 Demand 0 Num Storage	Historical 1 Total Import Demand (kW)
	→0 Demand Time 0 Num Storage	Historical 1 Total Import Demand Time (Month Day Hour Minute)
	←0 Demand 1 Num Storage	Historical 2 Total Export Demand (kW)
	←0 Demand Time 1 Num Storage	Historical 2 Total Export Demand Time (Month Day Hour Minute)
Active Cumulative Demand	→1Σ Demand	Rate 1 Import Cumulative Demand (kW)
	→2Σ Demand	Rate 2 Import Cumulative Demand (kW)
	→3Σ Demand	Rate 3 Import Cumulative Demand (kW)
	→4Σ Demand	Rate 4 Import Cumulative Demand (kW)
	→0Σ Demand	Total Import Cumulative Demand (kW)
Active Cumulative Demand	←1Σ Demand	Rate 1 Export Cumulative Demand (kW)
	←2Σ Demand	Rate 2 Export Cumulative Demand (kW)
	←3Σ Demand	Rate 3 Export Cumulative Demand (kW)

	←4Σ Demand	Rate 4 Export Cumulative Demand (kW)
	←0Σ Demand	Total Export Cumulative Demand (kW)
Current Reactive Energy (Total, Rate1-4)	→0 Energy	Current Total Import Energy (kvarh)
	←0 Energy	Current Total Export Energy (kvarh)
	I 0 Energy	Current Total Quadrant 1 Energy (kvarh)
	II 0 Energy	Current Total Quadrant 2 Energy (kvarh)
	III 0 Energy	Current Total Quadrant 3 Energy (kvarh)
	IV 0 Energy	Current Total Quadrant 4 Energy (kvarh)
Current Reactive Demand (Total, Rate1-4)	→0 Demand	Current Total Import Demand (kvar)
	→0 Demand Time	Current Total Import Demand Time (Month Day Hour Minute)
	←0 Demand	Current Total Export Demand (kvarh)
	←0 Demand Time	Current Total Export Demand Time (Month Day Hour Minute)
	I 0 Demand	Current Total Quadrant 1 Demand (kvarh)
	I 0 Demand Time	Current Total Quadrant 1 Demand Time (Month Day Hour Minute)
	II 0 Demand	Current Total Quadrant 2 Demand (kvarh)
	II 0 Demand Time	Current Total Quadrant 2 Demand Time (Month Day Hour Minute)
	III 0 Demand	Current Total Quadrant 3 Demand (kvarh)
	III 0 Demand Time	Current Total Quadrant 3 Demand Time (Month Day Hour Minute)
	IV 0 Demand	Current Total Quadrant 4 Demand (kvarh)
	IV 0 Demand Time	Current Total Quadrant 4 Demand Time (Month Day Hour Minute)
Historical Reactive Energy (Total, Rate1-4)	→0 Energy 0 Num Storage	Historical 1 Total Import Energy (kvarh)
	←0 Energy 0 Num Storage	Historical 1 Total Export Energy (kvarh)
	I 0 Energy 0 Num Storage	Historical 1 Total Quadrant 1 Energy (kvarh)
	II 0 Energy 1 Num Storage	Historical 2 Total Quadrant 2 Energy (kvarh)
	III 0 Energy 2 Num Storage	Historical 3 Total Quadrant 3 Energy (kvarh)
	IV 0 Energy 3 Num Storage	Historical 4 Total Quadrant 4 Energy (kvarh)
Historical Reactive Demand (Total, Rate1-4)	→0 Demand 0 Num Storage	Historical 1 Total Import Demand (kvar)
	→0 Demand Time 0 Num Storage	Historical 1 Total Import Demand Time (Month Day Hour Minute)
	←0 Demand 1 Num Storage	Historical 2 Total Export Demand (kvarh)
	←0 Demand Time 1 Num Storage	Historical 2 Total Export Demand Time (Month Day Hour Minute)
	I 0 Demand 0 Num Storage	Historical 1 Total Quadrant 1 Demand (kvarh)
	I 0 Demand Time 0 Num Storage	Historical 1 Total Quadrant 1 Demand Time (Month Day Hour Minute)
	II 0 Demand 1 Num	Historical 2 Total Quadrant 2 Demand

	Storage	(kvarh)
	II 0 Demand Time 1 Num Storage	Historical 2 Total Quadrant 2 Demand Time (Month Day Hour Minute)
	III 0 Demand 2 Num Storage	Historical 3 Total Quadrant 3 Demand (kvarh)
	III 0 Demand Time 2 Num Storage	Historical 3 Total Quadrant 3 Demand Time (Month Day Hour Minute)
	IV 0 Demand 3 Num Storage	Historical 4 Total Quadrant 4 Demand (kvarh)
	IV 0 Demand Time 3 Num Storage	Historical 4 Total Quadrant 4 Demand Time (Month Day Hour Minute)
Current Apparent Energy	→1 Energy	Current Rate 1 Apparent Energy (kVAh)
	→2 Energy	Current Rate 2 Apparent Energy (kVAh)
	→3 Energy	Current Rate 3 Apparent Energy (kVAh)
	→4 Energy	Current Rate 4 Apparent Energy (kVAh)
	→0 Energy	Current Total Apparent Energy (kVAh)
Historical Apparent Energy	→1 Energy 0 Num Storage	Historical 1 Rate 1 Apparent Energy (kVAh)
	→2 Energy 1 Num Storage	Historical 2 Rate 2 Apparent Energy (kVAh)
	→3 Energy 2 Num Storage	Historical 3 Rate 3 Apparent Energy (kVAh)
	→4 Energy 3 Num Storage	Historical 4 Rate 4 Apparent Energy (kVAh)
	→0 Energy 0 Num Storage	Historical 1 Total Apparent Energy (kVAh)
Current Apparent Demand(Total, Rate1-4)	→0 Demand	Current Total Import Demand(kVA)
	→0 Demand Time	Current Total Import Demand Time(Month Day Hour Minute)
Historical Apparent Demand(Total, Rate1-4)	→0 Demand 0 Num Storage	Historical 1 Total Demand(kVA)
	→0 Demand Time 0 Num Storage	Historical 1 Total Demand Time(Month Day Hour Minute)
10 Cumulative Number and Time of Phase Voltage Loss	10A	Cumulative Number of Phase A Voltage Loss Cumulative Time of Phase A Voltage Loss
	10B	Cumulative Number of Phase B Voltage Loss Cumulative Time of Phase B Voltage Loss
	10C	Cumulative Number of Phase C Voltage Loss Cumulative Time of Phase C Voltage Loss
11 Cumulative Import Energy of Phase Voltage Loss	11A	Cumulative Import Energy of Phase A Voltage Loss
	11B	Cumulative Import Energy of Phase B Voltage Loss
	11C	Cumulative Import Energy of Phase C Voltage Loss
12 Cumulative Export Energy of Phase Voltage Loss	12A	Cumulative Export Energy of Phase A Voltage Loss
	12B	Cumulative Export Energy of Phase B

		Voltage Loss
	12C	Cumulative Export Energy of Phase C Voltage Loss
13 Start Time & Date of Phase Voltage Loss	13A	Start Time & Date of Phase A Voltage Loss
	13B	Start Time & Date of Phase B Voltage Loss
	13C	Start Time & Date of Phase C Voltage Loss
14 Stop Time & Date of Phase Voltage Loss	14A	Stop Time & Date of Phase A Voltage Loss
	14B	Stop Time & Date of Phase B Voltage Loss
	14C	Stop Time & Date of Phase C Voltage Loss
19 All Phase Voltage Loss	190	Cumulative Number of All Phase Voltage Loss Cumulative Time of All Phase Voltage Loss
20 Cumulative Number and Time of Phase Failure	20A	Cumulative Number of Phase A Failure Cumulative Time of Phase A Failure
	20B	Cumulative Number of Phase B Failure Cumulative Time of Phase B Failure
	20C	Cumulative Number of Phase C Failure Cumulative Time of Phase C Failure
	201	Cumulative Number of One Phase Failure Cumulative Time of One Phase Failure
	202	Cumulative Number of Two Phase Failure Cumulative Time of Two Phase Failure
21 Cumulative Import Energy of Phase Failure	21A	Cumulative Import Energy of Phase A Failure
	21B	Cumulative Import Energy of Phase B Failure
	21C	Cumulative Import Energy of Phase C Failure
22 Cumulative Export Energy of Phase Failure	22A	Cumulative Import Energy of Phase A Failure
	22B	Cumulative Import Energy of Phase B Failure
	22C	Cumulative Import Energy of Phase C Failure
23 Start Time & Date of Phase Failure	23A	Start Time & Date of Phase A Failure
	23B	Start Time & Date of Phase B Failure
	23C	Start Time & Date of Phase C Failure
24 Stop Time & Date of Phase Failure	24A	Stop Time & Date of Phase A Failure
	24B	Stop Time & Date of Phase B Failure
	24C	Stop Time & Date of Phase C Failure
30 Start Time & Date of Over Current	30A	Start Time & Date of Phase A Over Current
	30B	Start Time & Date of Phase B Over Current
	30C	Start Time & Date of Phase C Over Current
31 Stop Time & Date of Over Current	31A	Stop Time & Date of Phase A Over Current

	31B	Stop Time & Date of Phase B Over Current
	31C	Stop Time & Date of Phase C Over Current
32 Start Time & Date of Reverse Run	320	Start Time & Date of Reverse Run
33 Stop Time & Date of Reverse Run	330	Stop Time & Date of Reverse Run
34 Start Time & Date of Power Down	340	Start Time & Date of Power Down
35 Stop Time & Date of Power Down	350	Stop Time & Date of Power Down
90 Daily Profiles and Season	900 1	Daily Profiles 1 (Hour Minute), F1 is Rate 1
	900 2	Daily Profiles 2 (Hour Minute), F2 is Rate 2
	900 3	Daily Profiles 3 (Hour Minute), F3 is Rate 3
	900 4	Daily Profiles 4 (Hour Minute), F4 is Rate 4
	901	Season (Month Day), b1 is Daily Profiles 1
Reading Date	030 Energy Demand	Reading Date (Day Hour), Energy Save Demand Reset
Demand Interval	Demand Time	Demand Interval (Minute)

2.2 Programming

A1000 meter's parameters can be configured from PC or from handheld programmer. For detailed operation instructions, please see PC programming software manual or programming meter reader handbook.

2.2.1 Programming protection

In order to ensure data security and prevent non-authorized operation, user must enter "programming status" by pressing reset button after opening the seal. User should open the seal on right side of LCD first to unlock the seal lid, then press reset button (for approximately 8 seconds) until LCD screen displays "PRG". Then data processing unit is ready for programming.

3. Specifications and technical data

3.1 Specifications

3.2 Technical data

3.2.1 Power supply

Type of meter	Pattern of power supply	Current of voltage loop (mA)	Power wear-off of voltage loop (VA)	Power of voltage loop (W)
3-phase 4-wire 58V (transformer)	Single phase /charge	<23/28	<1.4/1.7	<1.2/1.6
	3 phases /charge	<8.5/13	<0.6/0.9	<0.5/0.8
3 phase 3 wire 100V (transformer)	Single phase /charge	<14/22	<1.4/2.2	<1.3/1.9
	3 phases /charge	<9/14	<0.9/1.4	<0.8/1.2
3 phases 4 wire 220V (transformer)	Single phase /charge	<6.5/8.5	<1.4/1.9	<1.2/1.8
	3 phases /charge	<3/4.5	0.7<1.0	<0.6/0.9

3.2.2 Maximum demand indication

Calculation method: rolling or block

Calculation cycle: 5, 10, 15, 30, or 60 minutes

Rolling interval: 1, 2, 3, or 5 minutes

Recording range: 99.9999 kW

Additional error: $\pm (0.5+0.05 P_m/P_n) \%$

P_m - power value at I_{max} ($\cos\phi=1.0$)

P_n - equivalent real power value on demand indicator

Reset mode: manual, automatic, infrared, and RS485

3.2.3 Clock

Electric clock: displaying year, month, day, week, hour, minute, second; in 24-hour format.

Error at $23^\circ\text{C}\pm 2^\circ\text{C}$: ± 0.5 seconds/day

Error limits under working condition: ± 2 seconds/day

3.2.4 Delay of time block switch

Less than 0.1 second

3.2.5 Backup battery

One long-lifetime super lithium battery is provided as power-down protection for clock, data and time block settings. One extra button lithium battery is also provided as backup for the super lithium battery.

- Lifetime of the button lithium battery: ≥ 10 years. Lifetime of the super lithium battery: ≥ 30 years.
- Sustaining time during continuous power-off period with either battery working alone: > 6 years.
- Two batteries are parallel connected to guarantee excellent reliability.

3.2.6 External size and weight

External Size: 11.3 x 6.6 x 3.3 (286 x 168 x 85 mm)

Weight: 1.8 kg (4 lbs)

4. Usage, transportation and storage conditions

- Same requirements as indoor meters.
- The number of piling layers should not exceed five in original package.
- Moisture absorbent must be provided inside sealed package.
- It is strictly forbidden to store the meter in the environment of high temperature or dense moisture for long period of time. Humidity and temperature requirement should strictly comply with article 8.2.3 of DL/T 614-1997 standard (0 - 40 °C, <85% RH, and no erosive substance).

5. Warranty

The product will be repaired or replaced free of charge within 18 months if technical data do not comply with the standards when the product has been used properly according to the manufacturer's manual and the seal remains intact.

6. Ordering

Meter types and specifications must be specified in the orders. Either pulse output or data output should be specified. If data output is selected, whether two-line or four-line connection pattern should be specified.

Appendix A: Register Code for IEC1107

Register Name	OBIS ID
Total active import energy	1-1:1.8.0
Total active export energy	1-1:2.8.0
Total reactive energy Q1	1-1:5.8.0
Total reactive energy Q2	1-1:6.8.0
Total reactive energy Q3	1-1:7.8.0
Total reactive energy Q4	1-1:8.8.0
Total active energy import at the end of the previous month	1-1:1.8.0*101
Total active energy export at the end of the previous month	1-1:2.8.0*101
Total reactive energy Q1 at the end of the previous month	1-1:5.8.0*101
Total reactive energy Q2 at the end of the previous month	1-1:6.8.0*101
Total reactive energy Q3 at the end of the previous month	1-1:7.8.0*101
Total reactive energy Q4 at the end of the previous month	1-1:8.8.0*101
Active energy import of the current month in F1	1-1:1.8.1
Active energy import of the current month in F2	1-1:1.8.2
Active energy import of the current month in F3	1-1:1.8.3
Active energy import of the current month in F4	1-1:1.8.4
Active energy export of the current month in F1	1-1:2.8.1
Active energy export of the current month in F2	1-1:2.8.2
Active energy export of the current month in F3	1-1:2.8.3
Active energy export of the current month in F4	1-1:2.8.4
Reactive energy Q1 of the current month in F1	1-1:5.8.1
Reactive energy Q1 of the current month in F2	1-1:5.8.2
Reactive energy Q1 of the current month in F3	1-1:5.8.3
Reactive energy Q1 of the current month in F4	1-1:5.8.4
Reactive energy Q2 of the current month in F1	1-1:6.8.1
Reactive energy Q2 of the current month in F2	1-1:6.8.2
Reactive energy Q2 of the current month in F3	1-1:6.8.3
Reactive energy Q2 of the current month in F4	1-1:6.8.4
Reactive energy Q3 of the current month in F1	1-1:7.8.1
Reactive energy Q3 of the current month in F2	1-1:7.8.2
Reactive energy Q3 of the current month in F3	1-1:7.8.3
Reactive energy Q3 of the current month in F4	1-1:7.8.4
Reactive energy Q4 of the current month in F1	1-1:8.8.1
Reactive energy Q4 of the current month in F2	1-1:8.8.2
Reactive energy Q4 of the current month in F3	1-1:8.8.3
Reactive energy Q4 of the current month in F4	1-1:8.8.4
Active energy import of the previous month in F1	1-1:1.8.1*101
Active energy import of the previous month in F2	1-1:1.8.2*101
Active energy import of the previous month in F3	1-1:1.8.3*101
Active energy import of the previous month in F4	1-1:1.8.4*101
Active energy export of the previous month in F1	1-1:2.8.1*101
Active energy export of the previous month in F2	1-1:2.8.2*101
Active energy export of the previous month in F3	1-1:2.8.3*101
Active energy export of the previous month in F4	1-1:2.8.4*101
Reactive energy Q1 of the previous month in F1	1-1:5.8.1*101
Reactive energy Q1 of the previous month in F2	1-1:5.8.2*101
Reactive energy Q1 of the previous month in F3	1-1:5.8.3*101
Reactive energy Q1 of the previous month in F4	1-1:5.8.4*101
Reactive energy Q2 of the previous month in F1	1-1:6.8.1*101
Reactive energy Q2 of the previous month in F2	1-1:6.8.2*101
Reactive energy Q2 of the previous month in F3	1-1:6.8.3*101
Reactive energy Q2 of the previous month in F4	1-1:6.8.4*101

Reactive energy Q3 of the previous month in F1	1-1:7.8.1*101
Reactive energy Q3 of the previous month in F2	1-1:7.8.2*101
Reactive energy Q3 of the previous month in F3	1-1:7.8.3*101
Reactive energy Q3 of the previous month in F4	1-1:7.8.4*101
Reactive energy Q4 of the previous month in F1	1-1:8.8.1*101
Reactive energy Q4 of the previous month in F2	1-1:8.8.2*101
Reactive energy Q4 of the previous month in F3	1-1:8.8.3*101
Reactive energy Q4 of the previous month in F4	1-1:8.8.4*101
Total sum of the maximum demand (import) of all the previous month	1-1:1.2.0
Total sum of the maximum demand (export) of all the previous month	1-1:2.2.0
Total sum of the maximum demand (import) of all the previous month in F1	1-1:1.2.1
Total sum of the maximum demand (import) of all the previous month in F2	1-1:1.2.2
Total sum of the maximum demand (import) of all the previous month in F3	1-1:1.2.3
Total sum of the maximum demand (import) of all the previous month in F4	1-1:1.2.4
Total sum of the maximum demand (export) of all the previous month in F1	1-1:2.2.1
Total sum of the maximum demand (export) of all the previous month in F2	1-1:2.2.2
Total sum of the maximum demand (export) of all the previous month in F3	1-1:2.2.3
Total sum of the maximum demand (export) of all the previous month in F4	1-1:2.2.4
Active power (import) of the current quarter	1-1:1.4.0
Active power (export) of the current quarter	1-1:2.4.0
Active power (import) of the current quarter F1	1-1:1.4.1
Active power (import) of the current quarter F2	1-1:1.4.2
Active power (import) of the current quarter F3	1-1:1.4.3
Active power (import) of the current quarter F4	1-1:1.4.4
Active power (export) of the current quarter F1	1-1:2.4.1
Active power (export) of the current quarter F2	1-1:2.4.2
Active power (export) of the current quarter F3	1-1:2.4.3
Active power (export) of the current quarter F4	1-1:2.4.4
Active power (export) of the current quarter F1	1-1:2.4.1
Active Maximum demand (import)	1-1:1.6.0
Active Maximum demand (export)	1-1:2.6.0
Active Maximum demand (import) in F1	1-1:1.6.1
Active Maximum demand (import) in F2	1-1:1.6.2
Active Maximum demand (import) in F3	1-1:1.6.3
Active Maximum demand (import) in F4	1-1:1.6.4
Active Maximum demand (export) in F1	1-1:2.6.1
Active Maximum demand (export) in F2	1-1:2.6.2
Active Maximum demand (export) in F3	1-1:2.6.3
Active Maximum demand (export) in F4	1-1:2.6.4

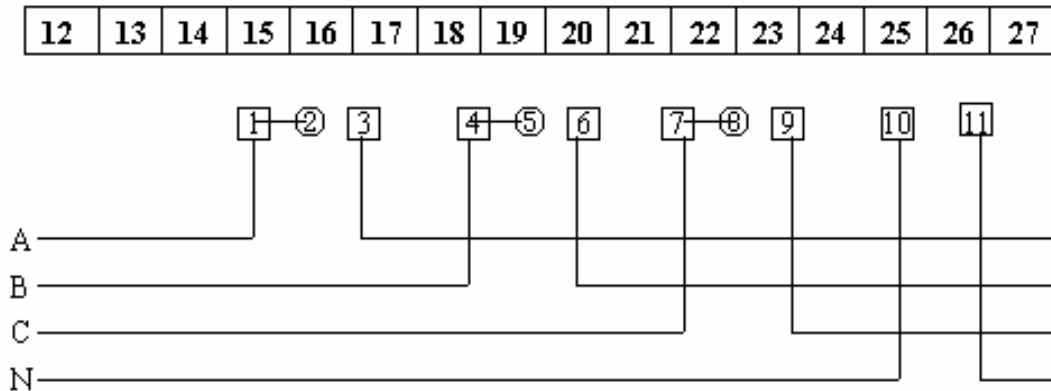
Appendix B: Warning and Error Information

ERR 2	Error Info	
	0000 0001	Clock 's Oscillator Error
	0000 0010	Read/Write Clock Error
	0000 0100	Read/Write EEPROM Error
	0000 1000	Read /Write Cs5460A Error
	0001 0000	CPU Program Error
	0010 0000	reserved
	0100 0000	Low Battery Voltage
	1000 0000	SPI Read or Write Error
ERR 1	Warning Info	
	0000 0001	Over Voltage
	0000 0010	Under Voltage
	0000 0100	Phase Voltage Loss
	0000 1000	Phase failure
	0001 0000	Current Reversal
	0010 0000	Energy Reversal
	0100 0000	Missing Current
	1000 0000	Phase Sequence Reversal

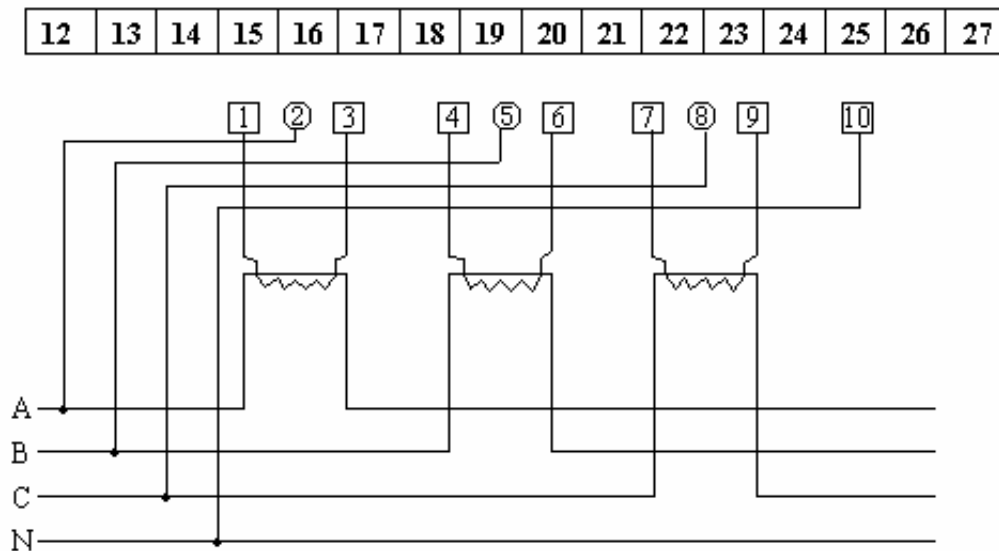
Attention: Every Event of Warning or Error Use One Number, if Missing Voltage and Over Voltage, Display "0000 0101".

Appendix C: Connect Figure

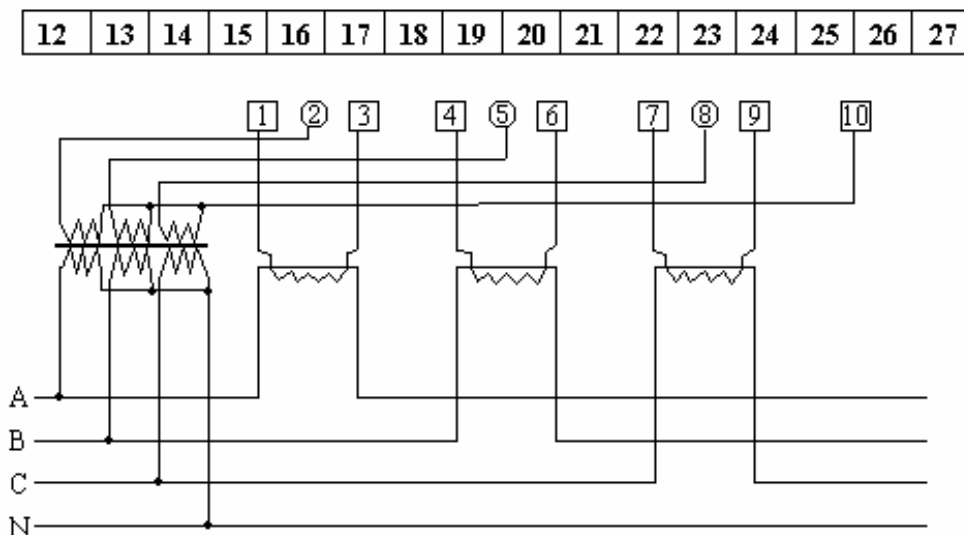
3 Phase 4 Wire Direct connection



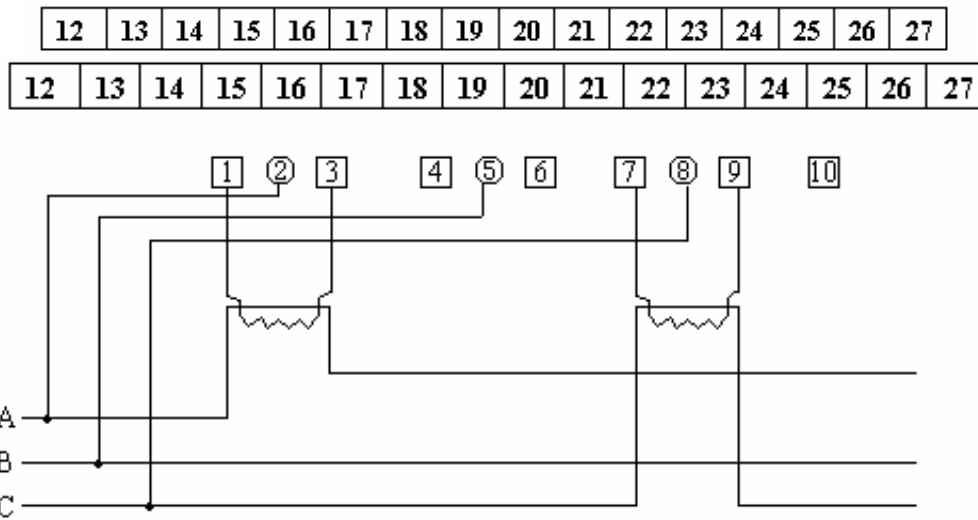
Connection through current transformer



Connection through current transformer and voltage transformer



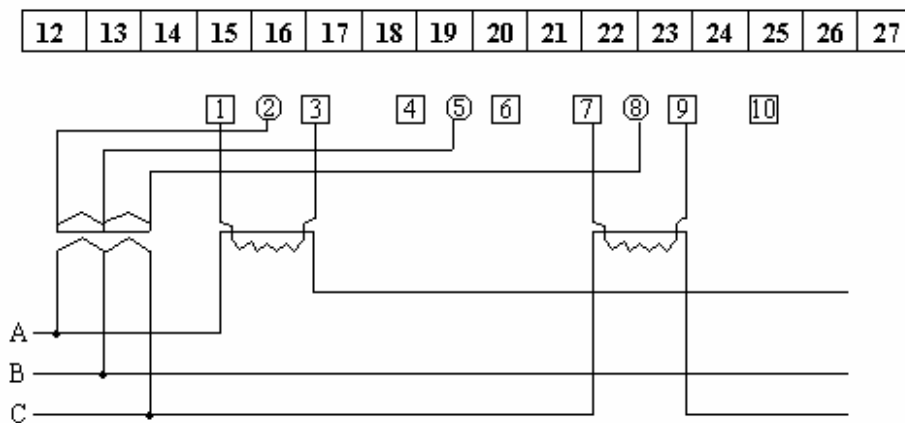
3 Phase 3 Wire Direct connection

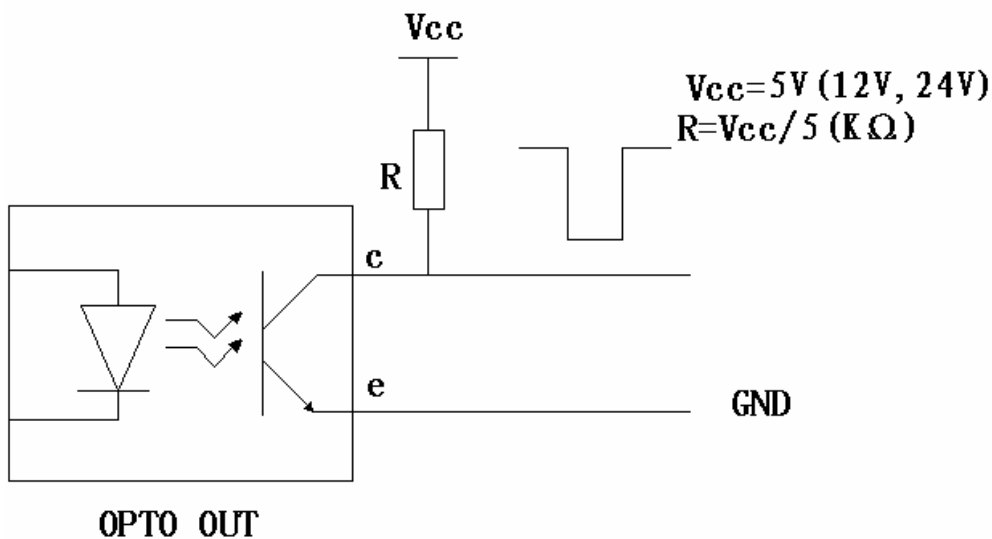
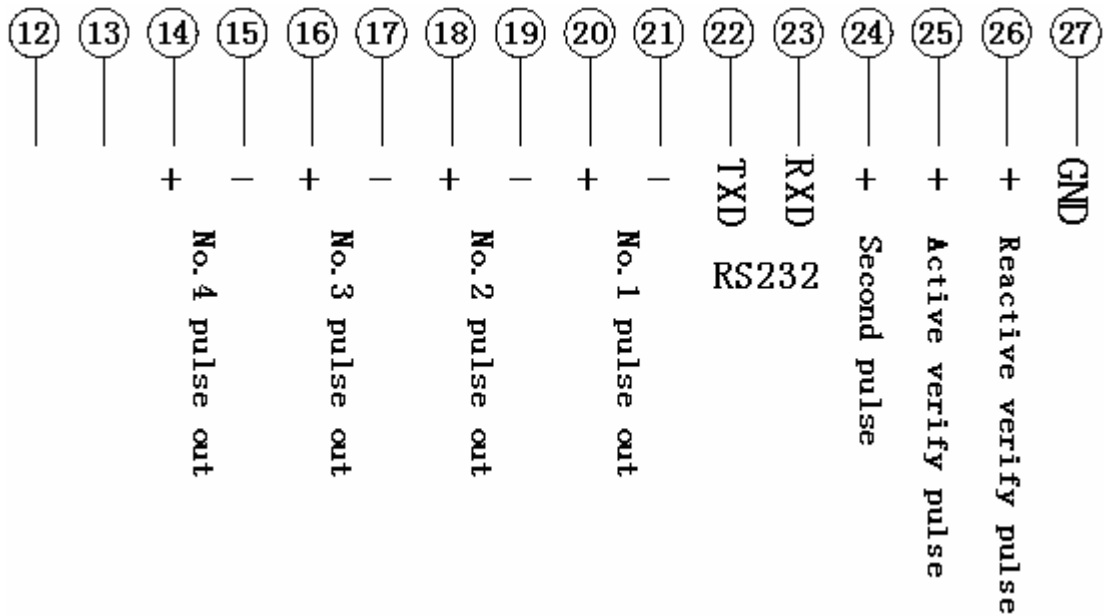


Connection through current transformer

Connection through current transformer and voltage transformer

Output Define





- NO.1 Pulse Output : Active import energy
- NO.2 Pulse Output : Active export energy
- NO.3 Pulse Output : Reactive import energy
- NO.4 Pulse Output : Reactive export energy

RXD : PC send data to meter
 TXD : Meter send data to PC