| 1 Phase | 3 Phase | 3 Phase CT |

82.5 mm — 217.4 mm — 130 mm

92 mm — 300.5 mm — 175 mm

92 mm — 300.5 mm — 175 mm

## Features:

1. Digital display
2. Two-way communication
3. Remote data reading (through web-based monitoring)
4. Interval data logging
5. Relay controlling
6. Time of use (TOU) multi-tariffs

Callibration results:



**CALIBRATION BY DIRECTORATE OF METROLOGY**

# SMART ELECTRICITY METER

A smart electricity meter, also known as a smart meter, is an advanced digital device used to measure and record electricity consumption in homes, businesses, and other facilities. Unlike traditional analog meters, smart meters provide real-time data on electricity usage and can communicate this information to utilities and consumers electronically.

**Sensor implementations:**
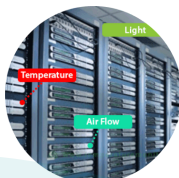


BUILDING

RESIDENTIAL

INDUSTRIAL ESTATE

MANUFACTURER

# SMART ELECTRICITY



IKI's Smart Electricity meter provide an excellent and stable accuracy and performance. This meter is equipped with LoRaWAN communicarion module for AMI integrtaion, so all the operation can be done remotely from the central server, including meter billing/configuration/alarm event etc.
The meter supports exchangeable payment between pre-paid and post-paid.

This meter is an advanced bi-directional, 4-quadrant, multi-functional, static single-phase revenue meter. It contains the following main feature:

- Active/reactive energy and demand measurement
- Remote control for open/close relay
- Automatic log data for 15 minutes, 30 minutes, 1 hour, etc
- Alerting system
- Real-time clock and Calendar
- Tamper detection
- LoRaWAN Comliant: Class C
- Support ultra high voltage measurement
- Good safety performance
- High reliability
- LBT (Listen Before Talk)

## Electrical Parameters

| Parameters | Single Phase | Three Phase | Three Phase CT |
|---|---|---|---|
| Connection wiring | 1P2W LNNL (BS / LLNN (DIN)<br>1P3W L1L2 L2L1 / L1L1 L2L2 | 3P4W L1L1-L2L2-L3L3-NN | 3P4W L1L1-L2L2-L3L3-NN |
| Nominal voltage | 120 V ~ 240 V | 3*230V/400V | 3*230V/400V (AC) |
| Operating voltage range | 70% ~ 130% Un | 70% ~ 130% Un | 80% ~ 120% Un |
| Basic current | 5A | 5A | 1A or 5A |
| Maximum current | 40A, 60A, 80A, 100A | 0.25 - 5(100)A | 0.01 - 1(10)A or 0.05 - 5(6)A |
| Starting current | 0.4‰ Ib / 20 mA | 0.4‰Ib / 20mA | 1‰Ib / 1mA |
| Frequency | 50 Hz and 60 Hz ± 5% | 50 Hz ± 5% | 50 Hz ± 5% |
| Accuracy kWh/kVarh | Class 1 / Class 2 (IEC), Class B (MID) | Class 1 / Class 2(IEC), Class B(MID) | Class 0.5S / Class 2(IEC), Class C(MID) |

| Parameters | Single Phase | Three Phase | Three Phase CT |
|---|---|---|---|
| Pulse constant | 1000 imp/kWh, 1000 imp/kVarh | 1000 imp/kWh, 1000 imp/kVarh | 10000 imp/kWh, 10000 imp/kVarh |
| Power consumption voltage circuit | ≤0.75 Watt; ≤1.75 VA | ≤0.75W; ≤1.2VA (for each phase) | ≤0.45W; ≤1.2VA(for each phase) |
| Power consumption current circuit | 0.3 VA | ≤0.1VA(for each phase) | ≤0.12VA(for each phase) |
| Max power consumption in voltage circuit with PLC module | 3.2 W | 5W | 5W |

| EMC/EMI | |
|---|---|
| Electrostatic discharge IEC61000-4-2 | Contact discharge, 8kV, 10 cycles; / CLOU internal test 10kV |
| IEC1000-4-2 | Air discharge, 15kV, 10 cycles; / CLOU internal test 18kV |
| Immunity to RF fields IEC61000-4-3 | 150kHz~ 80MHz 10V/m |
| | 80MHz ~ 2GHz 30V/m |
| Fast instantaneous pulse group IEC62052-11 | 4kV @100kHz; / CLOU internal test 4.3kV @100kHz |
| Surge | 4kV / CLOU internal test 4.3kV |

| ISOLATION IEC62052-11 | |
|---|---|
| Isulation protection | Class II |
| Immunity to impulse voltage IEC 62052-11 | 6 kV / CLOU internal test 6.5kV |
| AC voltage on main circuit | 4 kV @2mA;/ CLOU internal test 4.1 kV @2mA |
| AC voltage on Auxiliary Contact | 2 kV @2mA;/ CLOU internal test2.5 kV @2mA |

## Physical Parameters

| Parameters | Single Phase | Three Phase | Three Phase CT |
|---|---|---|---|
| Resistance to heat and fire class | Vo (all the casing made out of heat-resistant and fire-retardant material) | | |
| Environment class | M1 / E2 | | |
| Specified operating temperature range | –25 ºC ~ + 55 ºC | | |
| Limit operating temperature range | –40ºC ~ + 70ºC (3K7) | | |
| Limit temperature range for storage and transport | –40 ºC ~ + 70 ºC | | |
| Relative humidity | ≥ 95%, non-condensing | | |
| Ingress protection | IP54 (Indoor) | | |
| Clock accuracy | ≤ 0.5s /day | | |
| Meter lifetime | ≥ 15 years | | |
| Dibension (W x H x D)mm | 217.4 * 130.0 * 82.5 | 300.5 * 175.0 * 92 | |
| Relay controlling | Yes | Yes | No |

## LoRa Parameters

| | |
|---|---|
| Communication Mode | LoRaWAN AS923-2 (920-923 mHz) |
| Memory | 256 KB Flash; 64 KB RAM |
| Bandwith | 125KHz |
| Channels | 8 Settable Channels |
| Lora data rate | 980bps~3.125Kbps |
| | Adaptive data rate,supportspreading factor of SF8~SF10 |
| TX Power | Up to 22dBm |
| RX Sensitivities | Down to -134dBm |
| Spreading Factor | SF7~SF10 (adaptive) |
| Listen Before Talk (LBT) | Yes |
| Protocol | Standard LoRaWAN Class A, Class C |

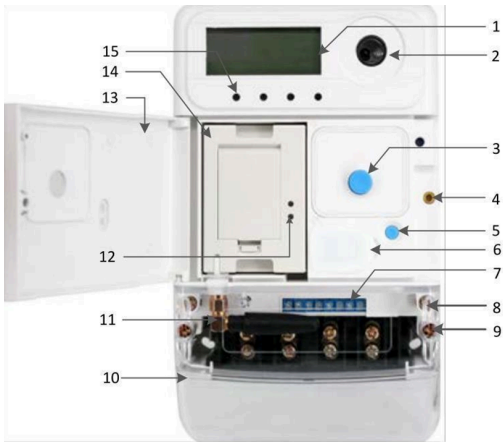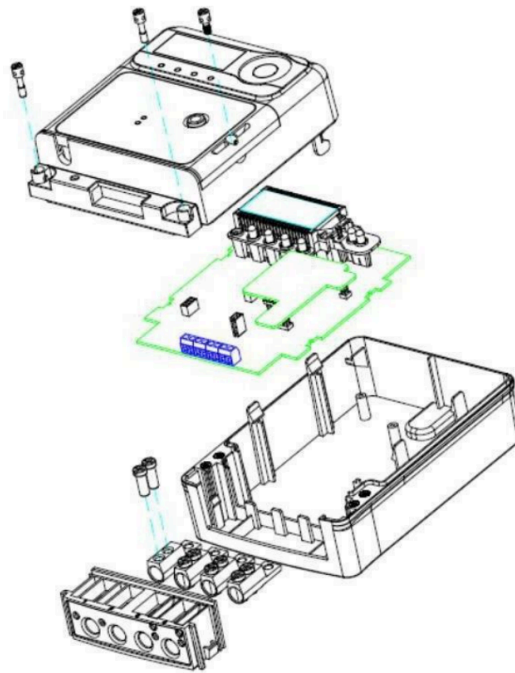## APPEARANCE



1. LCD
2. Optical port
3. Display button
4. Module cover screw
5. Demand reset button
6. Replaceable battery box
7. Auxiliary contacts
8. Meter main cover screw
9. Terminal cover screw
10. Terminal cover
11. Antennas for NIC/module
12. LED indicators of NIC/module
13. Module cover
14. Communication module box
15. LED indicators

## INTERNAL STRUCTURE DIAGRAM

# FUNCTIONAL DESCRIPTION

The meter current sensors provide a wide dynamic range and guarantee high stability over the operating temperature range of the meter. The current and voltage input signals are sampled by an analog-to-digital converter (ADC) on the measurement chip, the measurement chip then derives various energy values and transfers to the MCU. The MCU records these values in a suite of registers that are independent of any meter configuration and are always available. These registers accumulate their respective energy values. The contents of these registers can be displayed at any time as instantaneous values on the meter LCD.

**Parameter Data Output:**

1. Bi-directional metering for import/export active energy and 4 quadrants reactive energy,
2. Metering instantaneous voltage and current, active/reactive/apparent power, power factor, and frequency for total and per-phase values,
3. The monimum cycle of the unit for electric energy direction judgment is 1 second
4. The minimum unit od energy metering of output (communication/display) is 1 Wh, 1 varh, and 1 Vah
5. Data refreshes every second
6. Average value of the following items can be calculated: import and export active/reactive power with default calculation cycle of 15 minutes

## LED

There are 4 LEDs on the mian cover for mete status and 2 LEDs on module cover for cummunication module status.

### LEDs for Meter

- **Pulse LEDs** : for active and reactive energy
  Both LEDs are in red, flash according to the energy pulse output based on, the pulse with is 35 ms by default.
- **Alarm LEDs** : for alarm status indication

| Alarm Event | Alarm LED Status | Description |
|---|---|---|
| No alarm | Off | - |
| Meter disconnected (High priority) | Light ON | - |
| Significant alarm (Medium priority) | Flash @2Hz | High level alarm events contain:<br>○ Main cover open<br>○ Terminal cover open<br>○ Module cover open<br>○ Magnet disturb<br>○ Internal battery low voltage<br>○ External battery low voltage<br>○ Measure un-calibrate<br>○ High temperature |
| General alarm (Low priority) | Flash @0.5Hz | Low level alarm events contain:<br>○ Neutral disturb<br>○ Phase sequence error<br>○ Current unballance<br>○ CT bypass<br>○ CT open<br>○ Current reverse<br>○ Power factor low<br>○ Over current<br>○ Voltage unballance<br>○ Over power |

## LEDs for LoRa Communications

- **LoRa System (Blue LED)** : indicate the active status of LoRa Communication system (the LED is flash when the LoRa communication system is alive)
- **LoRa Communication (Green LED)** : indicate the LoRa Communication (the LED is flash when there is data transmission between the LoRa module and LoRaWAN server)